



Wood Buffalo Environmental Association

SEPTEMBER 2017 MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
October 27, 2017

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



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October 27, 2017

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

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

The continuous ambient air quality monitoring network stations are:

AMS 1 - Fort McKay – Bertha Ganter
AMS 2 - Mildred Lake
AMS 3 - Lower Camp B (meteorology)
AMS 4 - Buffalo Viewpoint
AMS 5 - Mannix
AMS 6 - Patricia McInnes
AMS 7 - Athabasca Valley
AMS 8 - Fort Chipewyan
AMS 9 - Barge Landing
AMS 11 - Lower Camp (air quality)
AMS 13 - Fort McKay South
AMS 14 - Anzac
AMS 15 - Horizon
AMS 16 - Muskeg River
AMS 17 - Wapasu
AMS 18 - Stony Mountain
AMS 19 - Firebag
AMS 20 - MacKay River
AMS 21 - Conklin
AMS 22 - Janvier
AMS 23 - Fort Hills
AMS 24 - Surmont
AMS 25 - Waskōw ohci Pimâtisiwin
AMS 500 - Christina Lake
AMS 502 – Surmont (Portable)
AMS 505 - Sawbones Bay

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



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

Government and Non-Industrial Organizations

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

Aboriginal Communities

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

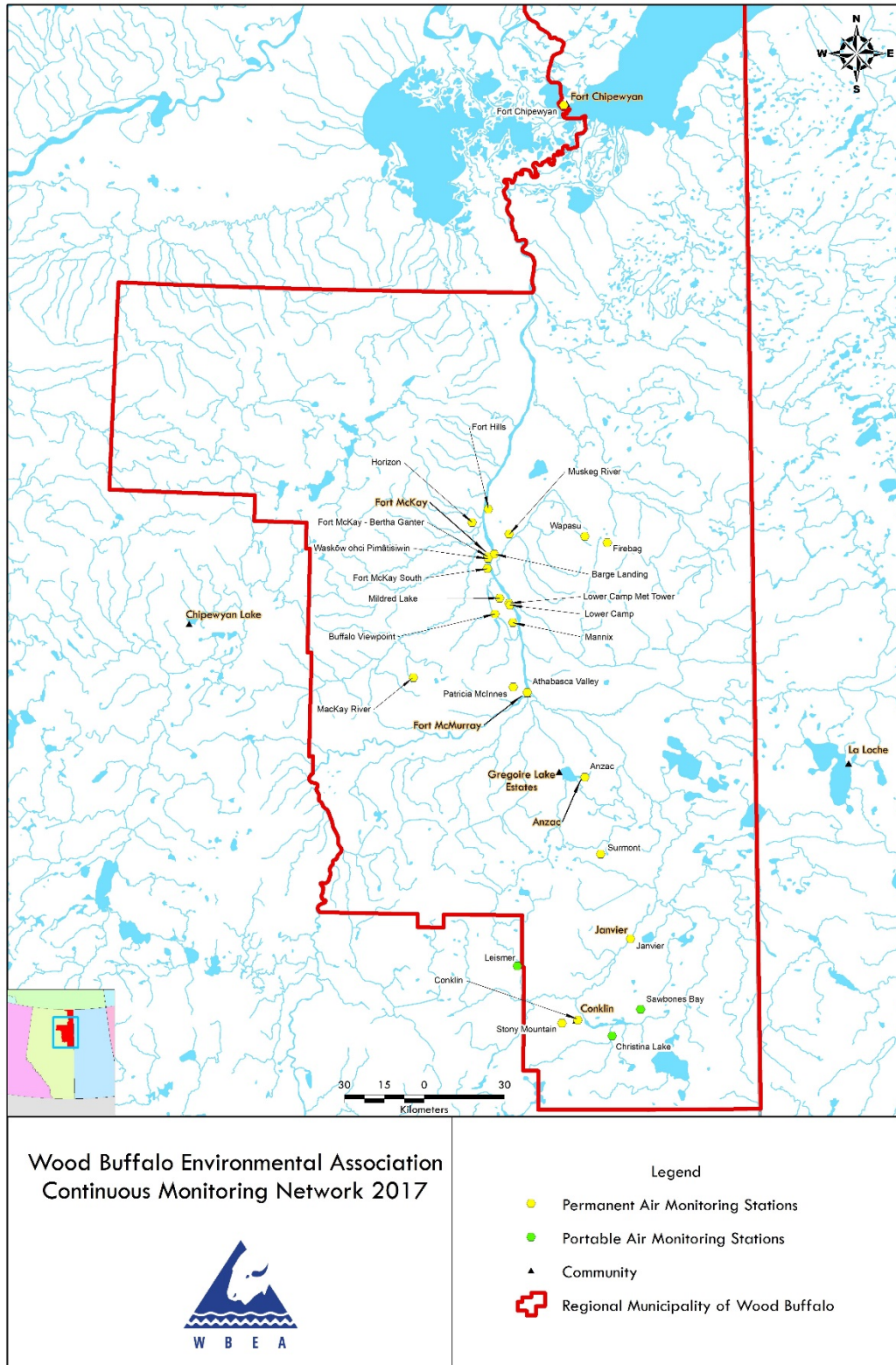


Figure 1: Map of WBEA Continuous Monitoring Network.

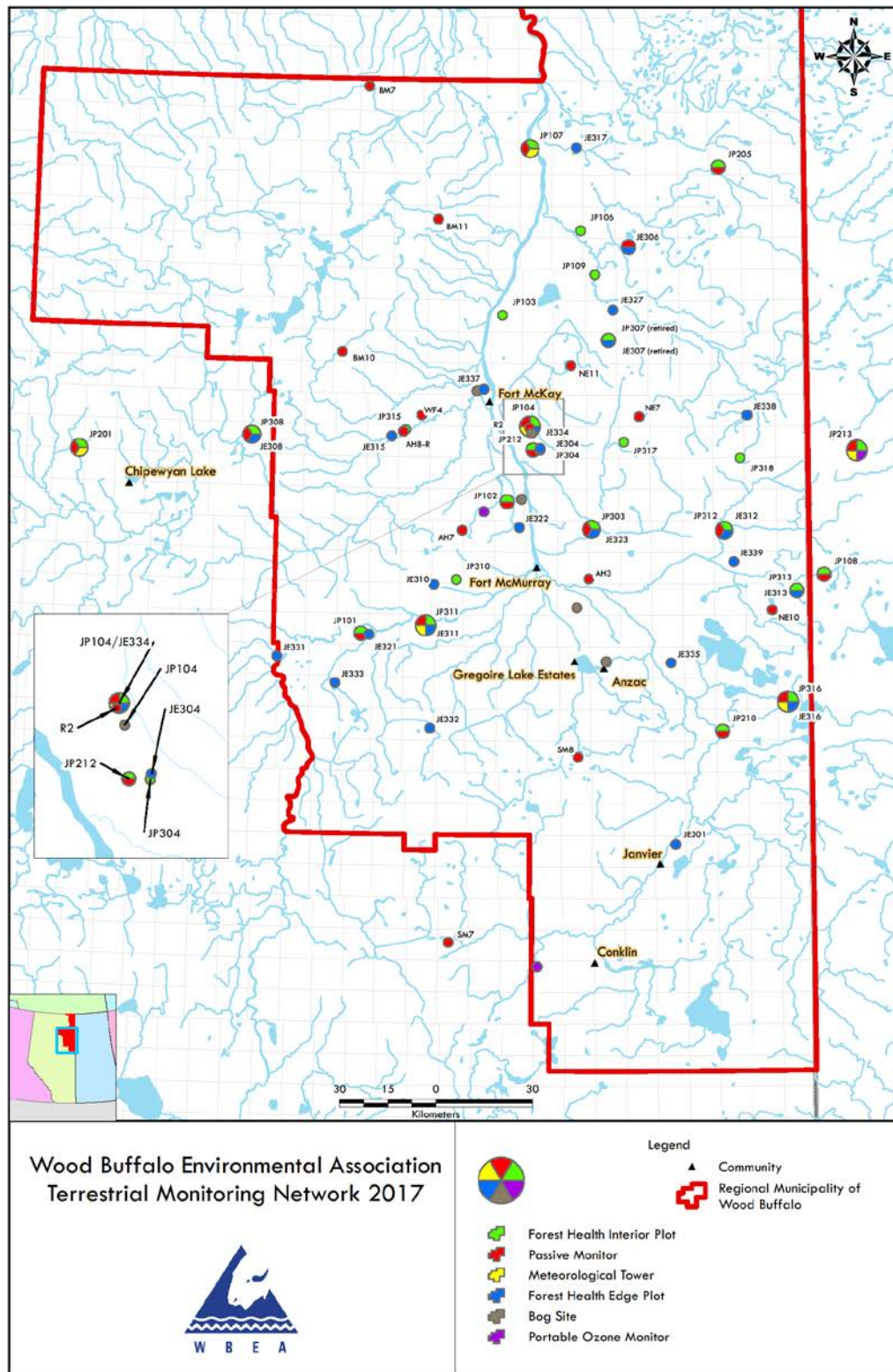


Figure 2: Map of WBEA Terrestrial Monitoring Network.

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

1.0 Concentrations in Excess of Alberta Ambient Air Quality Objectives

There were no ambient concentrations in excess of the air quality objectives as indicated in the Air Monitoring Directive Section III.A.3 (a & b) for CO, O₃, NH₃, NO₂, PM_{2.5}, and SO₂.

There were 2 ambient ground level concentrations in excess of the 1-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 2 concentrations in excess of the 1-hour H₂S 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> | <u>Concentration ppb or ug/m³</u> | | <u>Status</u> |
|--------------|------------------|--------------------|------------------|---------------|--|--------------|---------------|
| | | | | | <u>Reported</u> | <u>Final</u> | |
| AMS 5 Mannix | H ₂ S | 14Sep17, 06:00 | 329688 | 1hr | 15 | 15 | exc |
| AMS 5 Mannix | H ₂ S | 14Sep17, 07:00 | 329688 | 1hr | 13 | 13 | 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 September 2017, there were no compliance monitoring instruments operating less than 90% of the time.

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

The 45m meteorological sensors at AMS 3 – Lower Camp Met Tower did not record data for much of the month due to wiring issues. The temperature and relative humidity sensors did not record data for had 443 hours, and the sonic wind sensors did not record data for 659 hours. Wiring issues were repaired on September 28.

Intermittent Monitoring

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

3.0 Monitoring Notes

General Network Notes

WBEA commissioned a permanent Air Monitoring Station at the Conoco Phillips site, with data collection beginning on September 19, 2017. This station is equipped with ambient air quality analyzers for SO₂, H₂S, THC, NO, NO₂, and NO_x. Temperature, wind speed and direction, and relative humidity are also continuously measured. As a result, the Surmont Portable Air Monitoring Station (AMS 502) was removed from site.

Waskōw ohci Pimâtisiwin Air Monitoring Station was relocated within the Oski Otin compound, approximately 15 meters away from the original site, on September 8, 2017. Maintenance times associated with the relocation of continuous analyzers are detailed below.

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

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

Station 1, Fort McKay - Bertha Ganter

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1-2 hours following the daily spans have been reported as invalid for a total of 49 hours this month.

Due to baseline drift issues associated with the calibration system zero air generator, maintenance to replace the zero air generator on September 12 and 13 interrupted the routine operation of the THC analyzer for 24 hours.

A data collection error on September 13 interrupted the data collection of the THC analyzer for 1 hour.

Flat-lines in the output signal of the PM_{2.5} analyzer resulted in 13 hours of invalid data this reporting period.

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

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

Station 3, Lower Camp - Meteorology

Meteorological sensors at the 45m elevation did not record data for much of the month due to wiring issues. The temperature and relative humidity sensors did not record data for 442 hours, and the sonic wind sensors did not record data for 659 hours this reporting period. Repairs to the tower were completed on September 28.

Program changes to the data acquisition system interrupted the normal operation of the temperature and relative humidity sensors at the 20 meter and 100 meter elevations for 25 hours this reporting period.

Program changes to the data acquisition system interrupted the normal operation of the temperature and relative humidity sensors at the 167 elevation for 5 hours this reporting period.

Program changes to the data acquisition system interrupted the normal operation of all parameters for 2 hours this reporting period.

Maintenance to replace sensors on September 28 and 29 interrupted the normal operations of all 45 meter and 100 meter sensors for 1 to 2 hours.

Station 4, Buffalo Viewpoint

Station operator activities on September 6 affected the normal operation of the NO₂ analyzer for 1 hour.

Unstable operation due to baseline drift on September 26 affected the normal operation of the PM_{2.5} analyzer for 1 hour.

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

Station 5, Mannix

An internal WBEA audit on September 20 interrupted the normal operations of the H₂S and SO₂ analyzers for 3 and 2 hours, respectively.

Unstable operation on September 15 affected the normal operation of the sonic wind sensors at the 45 meter elevation for 1 hour.

Station 6, Patricia McInnes

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly multipoint calibration periods. Additional time for stabilization after exposure to high concentrations of the NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1-2 hours following each daily span has been reported as invalid for a total of 38 hours this month.

Station temperature fluctuations on September 7 and 8 affected the normal operation of the NH₃, NO₂, and THC analyzers for 11 to 13 hours.

Replacement of the calibration gas cylinder at the station on September 25 affected the normal operation of the NH₃, NO₂, SO₂, and THC analyzers for 2 to 4 hours.

Maintenance and cleaning of the sample manifold on September 18 interrupted the normal operation of the O₃, SO₂, THC, and TRS analyzers for 2 hours this reporting period.

Station 7, Athabasca Valley

On September 18, the TRS calibration gas was replaced with a new cylinder. Maintenance to purge the regulator and verify the daily span response on September 25 and 26 interrupted the normal operations of the TRS analyzer for 4 hours. On September 28, the original calibration cylinder was re-installed as the new cylinder was providing a less stable daily span, resulting in 1 hour of invalid data.

Station 8, Fort Chipewyan

Two instances of unstable operation due to baseline drift throughout the month affected the normal operations of the PM_{2.5} analyzer for 7 hours this reporting period.

Station 9, Barge Landing

Station operator activities on September 6 affected the normal operation of the THC analyzer for two hours.

Maintenance and cleaning of the sample manifold on September 7 interrupted the normal operation of the TRS analyzer for 1 hour.

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

Station 11, Lower Camp

Replacement of the fuel gas cylinder at the station on September 7 affected the normal operations of the THC analyzer for 1 hour.

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

Station 13, Fort McKay South

Numerous instances of unstable operation due to baseline drift throughout the month affected the normal operation of the PM_{2.5} analyzer for 11 hours this reporting period.

Station 14, Anzac

Power outages at the station on September 3, 13, and 14 affected the normal operations of all analyzers for 7 to 10 hours.

A data collection error on September 6 interrupted the data collection of the THC analyzer for 1 hour this reporting period.

A data collection error occurring September 29 and 30 interrupted the data collection of the surface leaf wetness sensor for 34 hours this reporting period.

Replacement of the carrier gas cylinder at the station on September 29 affected the normal operation of the THC analyzer for 2 hours.

Numerous instances of unstable operation due to baseline drift throughout the month affected the normal operation of the PM_{2.5} analyzer for 4 hours this reporting period.

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

Station 15, Horizon

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

A brief power outage at the station on September 26 affected the normal operations of the THC analyzer for 1 hour.

Station 16, Muskeg River

A power outage at the station on September 26 affected the normal operation of all analyzers for 2 to 3 hours.

Two instances of unstable operation due to baseline drift on affected the normal operations of the PM_{2.5} analyzer for 5 hours this reporting period.

Station 17, Wapasu

Maintenance and cleaning of the sample manifold September 27 interrupted the normal operations of the H₂S and O₃ analyzers for 1 hour.

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

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

Station 18, Stony Mountain

Maintenance and cleaning of the sample manifold on September 27 interrupted the normal operation of the NO₂, O₃, SO₂, and THC analyzers for 1 to 2 hours this reporting period.

The normal operations of the NOX analyzer was interrupted on September 27 for 2 hours to confirm analyzer responses to in-situ calibrator O₃ concentrations. These O₃ concentration responses were used in subsequent calibration of the O₃ analyzer at the station.

Station 19, Firebag

A data collection error on September 17 interrupted the data collection of all parameters for 1 hour this reporting period.

Station 20, MacKay River

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

Station 21, Conklin

Flat-lines in the output signal of the PM_{2.5} analyzer resulted in 20 hours of invalid data this reporting period.

Replacement of the calibration gas cylinder at the station on September 25 affected the normal operation of the NO₂, SO₂, and THC analyzers for 3 hours.

Replacement of the carrier gas cylinder at the station on September 29 affected the normal operation of the THC analyzer for 1 hour.

Maintenance and cleaning of the sample manifold on September 15 interrupted the normal operations of the O₃ and TRS analyzers for 1 hour.

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

Station 22, Janvier

Depletion and replacement of the fuel cylinder on September 4 and 5 interrupted the normal operation of the THC analyzer for 26 hours.

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

A power outage at the station on September 10 and 11 affected the normal operations of all analyzers for 9 to 11 hours.

Replacement of the carrier gas cylinder at the station on September 29 affected the normal operation of the THC analyzer for 1 hour.

An internal WBEA audit on September 1 interrupted the normal operations of the TRS analyzer for 4 hours.

Station 23, Fort Hills

A power outage at the station on September 7 affected the normal operations of all analyzers for 3 to 4 hours.

Maintenance and cleaning of the sample manifold on September 12 interrupted the normal operations of the THC and TRS analyzers for 1 hour.

Numerous instances of unstable operation due to baseline drift throughout the month affected the normal operation of the PM_{2.5} analyzer for 18 hours this reporting period.

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

Station 24, Surmont

Note: install calibration files are included with routine monthly calibration files, in the report section of this station. This station officially commenced operation on September 19, 2017.

Maintenance to verify the daily span response on September 22 interrupted the normal operations of the THC analyzer for 2 hours.

Station 25, Waskōw ohci Pimâtisiwin

Waskōw ohci Pimâtisiwin Air Monitoring Station was relocated within the Oski Otin compound, approximately 15 meters away from the original site, on September 8, 2017. Stabilization of the SO₂ and H₂S analyzers following the relocation resulted in 1 to 3 hours of invalid data. Maintenance associated with the station move interrupted the normal operation of all meteorological parameters for 2 hours.

An internal WBEA audit on September 14 interrupted the normal operations of all air quality analyzers for 2 to 3 hours.

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

Station 500, Christina Lake

An internal WBEA audit on September 7 interrupted the normal operations of all air quality analyzers for 2 to 4 hours.

Station 502, Surmont

Note: This station was removed from site and replaced with a permanent monitoring location on September 19, 2017.

Two instances of unstable operation due to baseline drift throughout the month affected the normal operation of the H₂S analyzer for 3 hours this month.

Station 505, Sawbones Bay.

An internal WBEA audit on September 6 interrupted the normal operations of all air quality analyzers for 2 to 5 hours.

Sample pump failure and maintenance to replace the pump on September 25 and 26 interrupted the routine operation of the NO₂ analyzer for 31 hours.

Flat-lines in the output signal of the wind sensor resulted in 4 hour² of invalid data this reporting period.

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

Yours sincerely,

Wood Buffalo Environmental Association

Mike Martineau
Data Lead

Emilie Briggs
Air Program Coordinator

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

SEPTEMBER 2017

page 1 of 3

Prepared: Oct 26 2017 15:02

| APPROVAL NUMBERS | REPORT DATE | | | | | | |
|------------------|-------------------------------|----------|--------------------|-----------------------|---------------------------|-----------------------|---------------------------|
| | MONTH | YEAR | | | | | |
| 289664-00-00 | 9 | 2017 | | | | | |
| 241311-00-00 | CONTINUOUS AMBIENT MONITORING | | | | | | |
| 254465-00-00 | | | | | | | |
| 149968-01-00 | | | | | | | |
| 48522-01-00 | | | | | | | |
| 240008-00-00 | | | ONE-HOUR AVERAGE | | 24-HOUR AVERAGE | | |
| 48263-01-00 | PARAMETER | STN. NO. | % TIME OPERATIONAL | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION |
| 151469-01-00 | SO2(ppm) | 1 | 100.00 | 0.027 | 0 | 0.005 | 0 |
| 224816-00-00 | SO2(ppm) | 2 | 100.00 | 0.069 | 0 | 0.016 | 0 |
| 189942-00-00 | SO2(ppm) | 4 | 100.00 | 0.013 | 0 | 0.003 | 0 |
| 206355-00-00 | SO2(ppm) | 5 | 99.72 | 0.042 | 0 | 0.010 | 0 |
| 46586-00-00 | SO2(ppm) | 6 | 99.44 | 0.011 | 0 | 0.002 | 0 |
| 73203-02-00 | SO2(ppm) | 7 | 100.00 | 0.011 | 0 | 0.002 | 0 |
| 216466-01-00 | SO2(ppm) | 8 | 100.00 | 0.004 | 0 | 0.002 | 0 |
| 137467-01-00 | SO2(ppm) | 11 | 100.00 | 0.084 | 0 | 0.012 | 0 |
| 236394-00-00 | SO2(ppm) | 13 | 100.00 | 0.027 | 0 | 0.004 | 0 |
| 20809-01-00 | SO2(ppm) | 14 | 98.75 | 0.010 | 0 | 0.002 | 0 |
| 094-02-00 | SO2(ppm) | 15 | 100.00 | 0.018 | 0 | 0.002 | 0 |
| 305529-00-00 | SO2(ppm) | 16 | 99.58 | 0.023 | 0 | 0.004 | 0 |
| 026-02-00 | SO2(ppm) | 17 | 100.00 | 0.014 | 0 | 0.003 | 0 |
| 228044-00-00 | SO2(ppm) | 18 | 99.86 | 0.005 | 0 | 0.001 | 0 |
| | SO2(ppm) | 19 | 99.86 | 0.016 | 0 | 0.003 | 0 |
| | SO2(ppm) | 20 | 100.00 | 0.014 | 0 | 0.002 | 0 |
| | SO2(ppm) | 21 | 99.58 | 0.005 | 0 | 0.001 | 0 |
| | SO2(ppm) | 22 | 98.61 | 0.003 | 0 | 0.001 | 0 |
| | SO2(ppm) | 23 | 99.58 | 0.018 | 0 | 0.004 | 0 |
| | SO2(ppm) | 24 | 100.00 | 0.002 | 0 | 0.001 | 0 |
| | SO2(ppm) | 25 | 99.58 | 0.023 | 0 | 0.004 | 0 |
| | SO2(ppm) | 500 | 99.72 | 0.053 | 0 | 0.009 | 0 |
| | SO2(ppm) | 502 | 100.00 | 0.013 | 0 | 0.004 | 0 |
| | SO2(ppm) | 505 | 99.72 | 0.027 | 0 | 0.011 | 0 |
| | H2S(ppm) | 2 | 100.00 | 0.008 | 0 | 0.002 | 0 |
| | H2S(ppm) | 4 | 100.00 | 0.003 | 0 | 0.001 | 0 |
| | H2S(ppm) | 5 | 99.58 | 0.015 | 2 | 0.003 | 0 |
| | H2S(ppm) | 11 | 100.00 | 0.008 | 0 | 0.001 | 0 |
| | H2S(ppm) | 17 | 99.86 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 19 | 99.86 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 20 | 99.03 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 24 | 100.00 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 25 | 99.17 | 0.002 | 0 | 0.001 | 0 |
| | H2S(ppm) | 500 | 99.72 | 0.002 | 0 | 0.000 | 0 |
| | H2S(ppm) | 502 | 99.33 | 0.003 | 0 | 0.001 | 0 |
| | H2S(ppm) | 505 | 99.72 | 0.002 | 0 | 0.000 | 0 |
| | TRS(ppm) | 1 | 100.00 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 6 | 99.72 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 7 | 99.31 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 9 | 99.86 | 0.005 | 0 | 0.001 | 0 |
| | TRS(ppm) | 13 | 100.00 | 0.001 | 0 | 0.001 | 0 |
| | TRS(ppm) | 14 | 99.03 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 15 | 100.00 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 18 | 100.00 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 21 | 99.86 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 22 | 98.19 | 0.000 | 0 | 0.000 | 0 |
| | TRS(ppm) | 23 | 99.44 | 0.003 | 0 | 0.001 | 0 |
| | THC(ppm) | 1 | 96.53 | 3.2 | - | 2.3 | - |
| | THC(ppm) | 2 | 100.00 | 7.4 | - | 3.6 | - |
| | THC(ppm) | 4 | 100.00 | 4.8 | - | 2.7 | - |
| | THC(ppm) | 5 | 100.00 | 8.9 | - | 2.9 | - |
| | THC(ppm) | 6 | 97.64 | 2.3 | - | 2.0 | - |
| | THC(ppm) | 7 | 100.00 | 3.4 | - | 2.3 | - |
| | THC(ppm) | 9 | 99.72 | 4.0 | - | 2.6 | - |
| | THC(ppm) | 11 | 99.86 | 7.0 | - | 3.1 | - |
| | THC(ppm) | 13 | 100.00 | 3.7 | - | 2.7 | - |
| | THC(ppm) | 14 | 98.19 | 2.4 | - | 2.1 | - |
| | THC(ppm) | 15 | 99.86 | 4.8 | - | 2.8 | - |
| | THC(ppm) | 16 | 99.58 | 6.5 | - | 3.1 | - |
| | THC(ppm) | 17 | 100.00 | 2.5 | - | 2.2 | - |
| | THC(ppm) | 18 | 99.72 | 2.3 | - | 2.1 | - |
| | THC(ppm) | 19 | 99.86 | 3.1 | - | 2.3 | - |
| | THC(ppm) | 20 | 100.00 | 2.6 | - | 2.3 | - |
| | THC(ppm) | 21 | 99.44 | 2.9 | - | 2.3 | - |
| | THC(ppm) | 22 | 94.86 | 2.2 | - | 2.1 | - |

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

SEPTEMBER 2017

page 2 of 3

Prepared: Oct 26 2017 15:02


| APPROVAL NUMBERS | REPORT DATE | | | | | | |
|------------------|-------------------------------|----------|--------------------|-----------------------|---------------------------|-----------------------|---------------------------|
| | MONTH | YEAR | | | | | |
| 289664-00-00 | 9 | 2017 | | | | | |
| 241311-00-00 | CONTINUOUS AMBIENT MONITORING | | | | | | |
| 254465-00-00 | | | ONE-HOUR AVERAGE | | 24-HOUR AVERAGE | | |
| 149968-01-00 | PARAMETER | STN. NO. | % TIME OPERATIONAL | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION |
| 48522-01-00 | THC(ppm) | 23 | 99.31 | 6.0 | - | 3.0 | - |
| 240008-00-00 | THC(ppm) | 24 | 99.30 | 3.0 | - | 2.0 | - |
| 48263-01-00 | THC(ppm) | 505 | 99.72 | 3.7 | - | 2.5 | - |
| 151469-01-00 | O3(ppm) | 1 | 100.00 | 0.065 | 0 | 0.035 | - |
| 224816-00-00 | O3(ppm) | 6 | 99.72 | 0.071 | 0 | 0.043 | - |
| 189942-00-00 | O3(ppm) | 7 | 100.00 | 0.075 | 0 | 0.039 | - |
| 206355-00-00 | O3(ppm) | 8 | 100.00 | 0.072 | 0 | 0.052 | - |
| 46586-00-00 | O3(ppm) | 13 | 100.00 | 0.067 | 0 | 0.033 | - |
| 73203-02-00 | O3(ppm) | 14 | 99.03 | 0.069 | 0 | 0.046 | - |
| 216466-01-00 | O3(ppm) | 17 | 99.86 | 0.067 | 0 | 0.050 | - |
| 137467-01-00 | O3(ppm) | 18 | 99.86 | 0.077 | 0 | 0.059 | - |
| 236394-00-00 | O3(ppm) | 21 | 99.86 | 0.077 | 0 | 0.043 | - |
| 20809-01-00 | O3(ppm) | 22 | 98.61 | 0.078 | 0 | 0.041 | - |
| 094-02-00 | NO2(ppm) | 1 | 100.00 | 0.030 | 0 | 0.010 | - |
| 305529-00-00 | NO2(ppm) | 6 | 97.92 | 0.018 | 0 | 0.008 | - |
| 026-02-00 | NO2(ppm) | 7 | 100.00 | 0.028 | 0 | 0.010 | - |
| 228044-00-00 | NO2(ppm) | 8 | 100.00 | 0.009 | 0 | 0.003 | - |
| | NO2(ppm) | 13 | 100.00 | 0.030 | 0 | 0.009 | - |
| | NO2(ppm) | 14 | 98.75 | 0.009 | 0 | 0.004 | - |
| | NO2(ppm) | 15 | 100.00 | 0.035 | 0 | 0.013 | - |
| | NO2(ppm) | 16 | 99.58 | 0.037 | 0 | 0.021 | - |
| | NO2(ppm) | 17 | 100.00 | 0.011 | 0 | 0.003 | - |
| | NO2(ppm) | 18 | 99.58 | 0.004 | 0 | 0.002 | - |
| | NO2(ppm) | 19 | 99.86 | 0.015 | 0 | 0.005 | - |
| | NO2(ppm) | 20 | 100.00 | 0.011 | 0 | 0.004 | - |
| | NO2(ppm) | 21 | 99.58 | 0.018 | 0 | 0.008 | - |
| | NO2(ppm) | 22 | 98.33 | 0.006 | 0 | 0.002 | - |
| | NO2(ppm) | 23 | 99.58 | 0.032 | 0 | 0.013 | - |
| | NO2(ppm) | 24 | 100.00 | 0.009 | 0 | 0.002 | - |
| | NO2(ppm) | 500 | 99.44 | 0.024 | 0 | 0.007 | - |
| | NO2(ppm) | 502 | 100.00 | 0.011 | 0 | 0.004 | - |
| | NO2(ppm) | 505 | 95.00 | 0.018 | 0 | 0.008 | - |
| | CO(ppm) | 7 | 100.00 | 0.7 | 0 | 0.2 | - |
| | NH3(ppm) | 1 | 93.19 | 0.000 | 0 | 0.000 | - |
| | NH3(ppm) | 6 | 92.50 | 0.000 | 0 | 0.000 | - |
| | PM2.5(ug/m3) | 1 | 98.19 | 47.3 | - | 18.0 | 0 |
| | PM2.5(ug/m3) | 6 | 100.00 | 90.0 | - | 17.7 | 0 |
| | PM2.5(ug/m3) | 7 | 100.00 | 52.3 | - | 20.3 | 0 |
| | PM2.5(ug/m3) | 8 | 99.03 | 75.9 | - | 10.9 | 0 |
| | PM2.5(ug/m3) | 13 | 98.47 | 38.3 | - | 15.7 | 0 |
| | PM2.5(ug/m3) | 14 | 98.47 | 49.1 | - | 19.6 | 0 |
| | PM2.5(ug/m3) | 15 | 100.00 | 61.4 | - | 19.7 | 0 |
| | PM2.5(ug/m3) | 16 | 99.03 | 47.1 | - | 17.9 | 0 |
| | PM2.5(ug/m3) | 17 | 96.67 | 69 | - | 19.9 | 0 |
| | PM2.5(ug/m3) | 18 | 100.00 | 56 | - | 21.6 | 0 |
| | PM2.5(ug/m3) | 21 | 97.22 | 67 | - | 24 | 0 |
| | PM2.5(ug/m3) | 22 | 98.75 | 70.3 | - | 21.7 | 0 |
| | PM2.5(ug/m3) | 23 | 97.08 | 68 | - | 26 | 0 |
| | PM2.5(ug/m3) | 505 | 100.00 | 58 | - | 23 | 0 |
| | WIND | 1 | 100.00 | - | - | - | - |
| | WIND | 2 | 99.86 | - | - | - | - |
| | WIND | 4 | 99.72 | - | - | - | - |
| | WIND | 5 | 100.00 | - | - | - | - |
| | WIND | 6 | 100.00 | - | - | - | - |
| | WIND | 7 | 100.00 | - | - | - | - |
| | WIND | 8 | 100.00 | - | - | - | - |
| | WIND | 9 | 99.58 | - | - | - | - |
| | WIND | 11 | 99.17 | - | - | - | - |
| | WIND | 13 | 100.00 | - | - | - | - |
| | WIND | 14 | 99.86 | - | - | - | - |
| | WIND | 15 | 99.58 | - | - | - | - |
| | WIND | 16 | 100.00 | - | - | - | - |
| | WIND | 17 | 99.31 | - | - | - | - |
| | WIND | 18 | 100.00 | - | - | - | - |
| | WIND | 19 | 99.86 | - | - | - | - |
| | WIND | 20 | 99.86 | - | - | - | - |

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

SEPTEMBER 2017

page 3 of 3

Prepared: Oct 26 2017 15:02

| APPROVAL NUMBERS | REPORT DATE | | | | | | |
|------------------|---|----------|--------------------|-----------------------|---------------------------|-----------------------|----------------------------------|
| | MONTH | YEAR | | | | | |
| 289664-00-00 | 9 | 2017 | | | | | |
| 241311-00-00 | CONTINUOUS AMBIENT MONITORING | | | | | | |
| 254465-00-00 | | | | ONE-HOUR AVERAGE | | 24-HOUR AVERAGE | |
| 149968-01-00 | PARAMETER | STN. NO. | % TIME OPERATIONAL | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION |
| 48522-01-00 | WIND | 20 | 100.00 | - | - | - | - |
| 240008-00-00 | WIND | 21 | 99.31 | - | - | - | - |
| 48263-01-00 | WIND | 22 | 100.00 | - | - | - | - |
| 151469-01-00 | WIND | 23 | 99.86 | - | - | - | - |
| 224816-00-00 | WIND | 24 | 100.00 | - | - | - | - |
| 189942-00-00 | WIND | 25 | 99.58 | - | - | - | - |
| 206355-00-00 | WIND | 500 | 100.00 | - | - | - | - |
| 46586-00-00 | WIND | 502 | 100.00 | - | - | - | - |
| 73203-02-00 | WIND | 505 | 99.44 | - | - | - | - |
| 216466-01-00 |  | | | | | | |
| 137467-01-00 | | | | | | | |
| 236394-00-00 | | | | | | | |
| 20809-01-00 | | | | | | | |
| 094-02-00 | | | | | | | |
| 305529-00-00 | SIGNATURE OF ASSOCIATION REPRESENTATIVE | | | | | | FOR ALBERTA ENVIRONMENT USE ONLY |
| 026-02-00 | | | | | | | |
| 228044-00-00 | | | | | | | |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 1
BERTHA GANTER FORT MCKAY
SEPTEMBER 2017

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

October 27, 2017

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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 687 | 33 | 33 | 100 | 27 | 0 | 5 | 0 |
| TRS(ppb) Average | 687 | 33 | 33 | 100 | 2 | 0 | 1 | 0 |
| THC(ppm) Average | 663 | 32 | 57 | 96.53 | 3.2 | - | 2.3 | - |
| NMHC(ppm) Average | 663 | 32 | 57 | 96.53 | 0.887 | - | 0.183 | - |
| CH4(ppm) Average | 663 | 32 | 57 | 96.53 | 2.9 | - | 2.2 | - |
| O3 (ppb) Average | 686 | 34 | 34 | 100 | 65 | 0 | 35 | - |
| NO2 (ppb) Average | 685 | 35 | 35 | 100 | 30 | 0 | 10 | - |
| NO (ppb) Average | 685 | 35 | 35 | 100 | 45 | - | 8 | - |
| NOX (ppb) Average | 685 | 35 | 35 | 100 | 74 | - | 18 | - |
| NH3 (ppb) Average | 628 | 43 | 92 | 93.19 | 0 | 0 | 0 | - |
| PM2.5 (ug/m3) Average | 705 | 2 | 15 | 98.19 | 47.3 | - | 18 | 0 |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 27 | - | 20 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 32.5 | - | 21.2 | - |
| Temperature 10 m (C) Average | 720 | 0 | 0 | 100 | 31.9 | - | 21.9 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 99 | - | 92 | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100 | 3.6 | - | 12.4 | - |
| Leaf Wetness (% of range) Average | 720 | 0 | 0 | 100 | 69 | - | 28 | - |
| Global Solar Radiation (W/m2) Average | 720 | 0 | 0 | 100 | 669 | - | 222 | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|---------------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 687 | 0.9 | 2 | - | 0 | 0 | 0 | 0 | 1 | 2 | 27 |
| TRS (ppb) Average | 687 | 0.4 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| THC (ppm) Average | 663 | 2.08 | 0.2 | - | 1.9 | 1.9 | 1.9 | 2 | 2.1 | 2.4 | 3.2 |
| NMHC(ppm) Average | 663 | 0.046 | 0.094 | - | 0 | 0 | 0 | 0 | 0.1 | 0.1 | 0.887 |
| CH4(ppm) Average | 663 | 2.03 | 0.2 | - | 1.9 | 1.9 | 1.9 | 2 | 2.1 | 2.2 | 2.9 |
| O3 (ppb) Average | 686 | 18.8 | 11 | - | 0 | 4 | 9 | 19 | 26 | 33 | 65 |
| NO2 (ppb) Average | 685 | 4.1 | 4 | - | 0 | 0 | 1 | 3 | 6 | 10 | 30 |
| NO (ppb) Average | 685 | 1.7 | 5 | - | 0 | 0 | 0 | 0 | 1 | 5 | 45 |
| NOX (ppb) Average | 685 | 5.8 | 8 | - | 0 | 0 | 1 | 3 | 8 | 14 | 74 |
| NH3 (ppb) Average | 628 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PM2.5 (ug/m3) Average | 705 | 6.78 | 6.5 | - | 0.3 | 1.2 | 2.3 | 4.6 | 9.8 | 13.8 | 47.3 |
| Wind Speed 10 m (km/h) Average | 720 | 7.8 | 5 | - | 0 | 2 | 4 | 6 | 11 | 16 | 27 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 11.88 | 6.6 | - | -2.3 | 3.7 | 7 | 11.3 | 16.3 | 20.9 | 32.5 |
| Temperature 10 m (C) Average | 720 | 12.3 | 6.2 | - | -1.5 | 4.7 | 7.4 | 11.7 | 16.4 | 21 | 31.9 |
| Relative Humidity (%) Average | 720 | 69.7 | 22 | - | 21 | 36 | 54 | 73 | 89 | 95 | 99 |
| Precipitation (mm) Total | 720 | - | - | 31.83 | - | - | - | - | - | - | - |
| Leaf Wetness (% of range) Average | 720 | 4.7 | 12 | - | -2 | -1 | -1 | 0 | 3 | 19 | 69 |
| Global Solar Radiation (W/m2) Average | 720 | 130.4 | 186 | - | 0 | 0 | 0 | 10 | 222 | 473 | 669 |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------|-------------------|-------------------|---------------------|---|
| NMHC, CH4, THC | 12 Sep 2017 10:00 | 13 Sep 2017 09:00 | 24 | Maintenance - replacement of zero air generator |
| NMHC, CH4, THC | 13 Sep 2017 14:00 | 13 Sep 2017 14:00 | 1 | DAS collection error - data not recorded |
| NH3 | 01 Sep 2017 08:00 | 30 Sep 2017 08:00 | 49 | Stabilization after daily span |
| PM2.5 | 11 Sep 2017 01:00 | 11 Sep 2017 11:00 | 11 | Analyzer failure - filter tape depleted |
| PM2.5 | 11 Sep 2017 12:00 | 11 Sep 2017 13:00 | 2 | Maintenance to replace filter tape |



| | | | | |
|---|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 27 ppb on Sep 24 13:00 | Maximum Daily Average: 5.0 ppb on Sep 24 | | Hours of Data: | 687 |
| Minimum Value: 0 ppb on Sep 26 14:00 | Minimum Daily Average: 0.1 ppb on Sep 26 | | Hours of Missing Data: | 33 |
| Maximum Diurnal Average: 2.6 ppb at hour 12 | Minimum Diurnal Average: 0.3 ppb at hour 2 | | Hours of Calibration: | 33 |
| 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 = 13 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 0.4 | 4 |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 1 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.4 | 4 |
| 8-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 9 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 10-Sep | Z | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 7 | 7 | 4 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1.5 | 7 |
| 12-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 14-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 8 | 6 | 2 | 3 | 1 | 3 | 3 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1.7 | 8 |
| 17-Sep | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 5 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.6 | 5 |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 7 | 5 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 7 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 20-Sep | 0 | 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-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0.4 | 2 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 | 19 | 27 | 21 | 16 | 8 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 5.0 | 27 |
| 25-Sep | 2 | 2 | 1 | Z | 1 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 2 |
| 26-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | C | C | C | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 14 | 14 | 5 | 3 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2.4 | 14 |
| 29-Sep | 2 | Z | 4 | 4 | 3 | 3 | 3 | 2 | 4 | 12 | 11 | 14 | 9 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 3.3 | 14 |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |

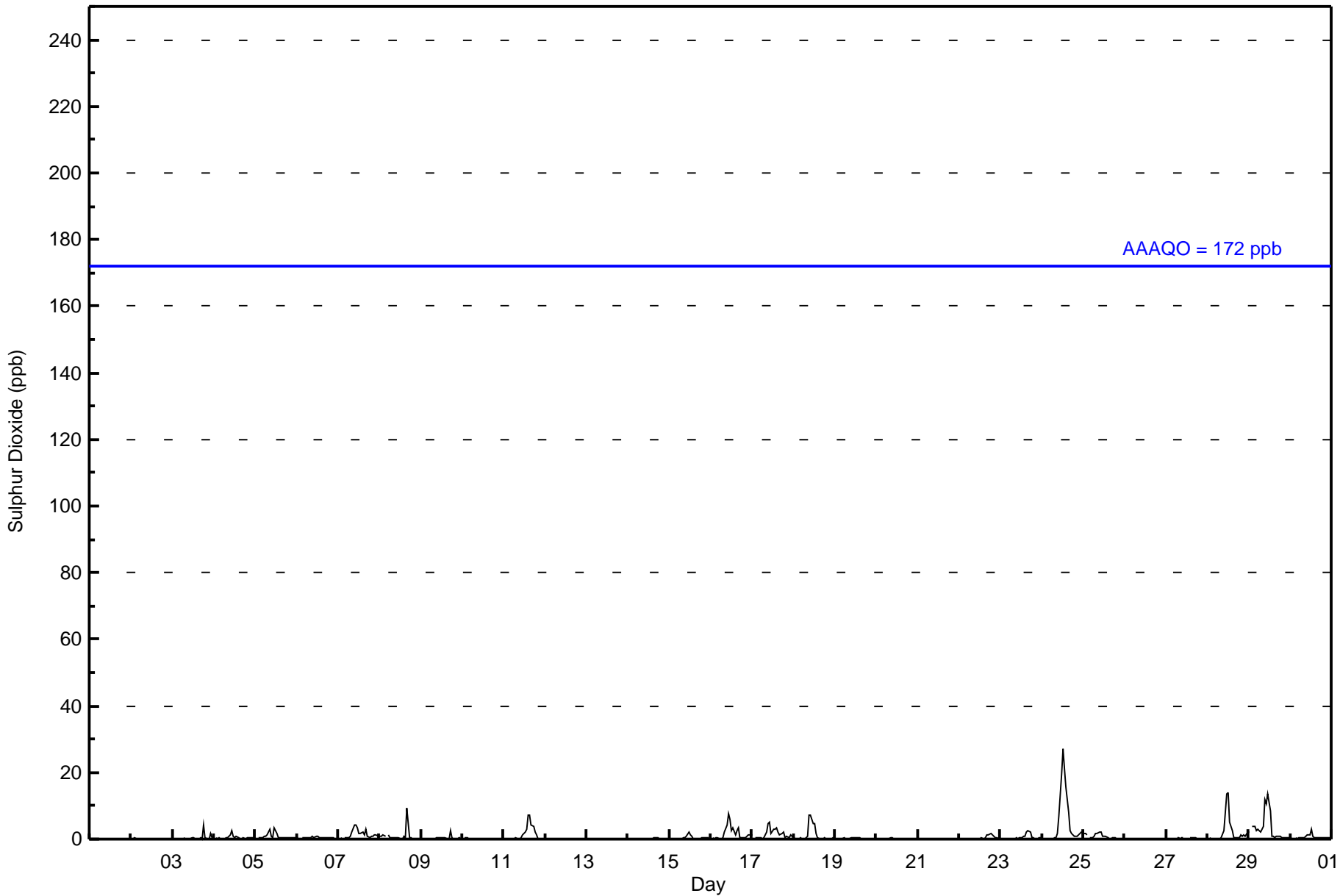
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.4 | 0.3 | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.7 | 1.5 | 2.0 | 2.6 | 2.5 | 1.6 | 1.3 | 1.0 | 1.1 | 0.6 | 0.6 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 | Diurnal Average | |
| 2 | 2 | 4 | 4 | 3 | 3 | 3 | 2 | 4 | 12 | 11 | 19 | 27 | 21 | 16 | 8 | 9 | 4 | 4 | 1 | 1 | 1 | 2 | 2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 678 | 98.69 | 98.69 |
| 11 - 20 | 7 | 1.02 | 99.71 |
| 21 - 60 | 2 | 0.29 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 77 | 22 | 13 | 7 | 4 | 8 | 11 | 106 | 97 | 49 | 40 | 39 | 56 | 71 | 45 | 33 | 678 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 77 | 22 | 13 | 7 | 4 | 8 | 11 | 115 | 97 | 49 | 40 | 39 | 56 | 71 | 45 | 33 | 687 |

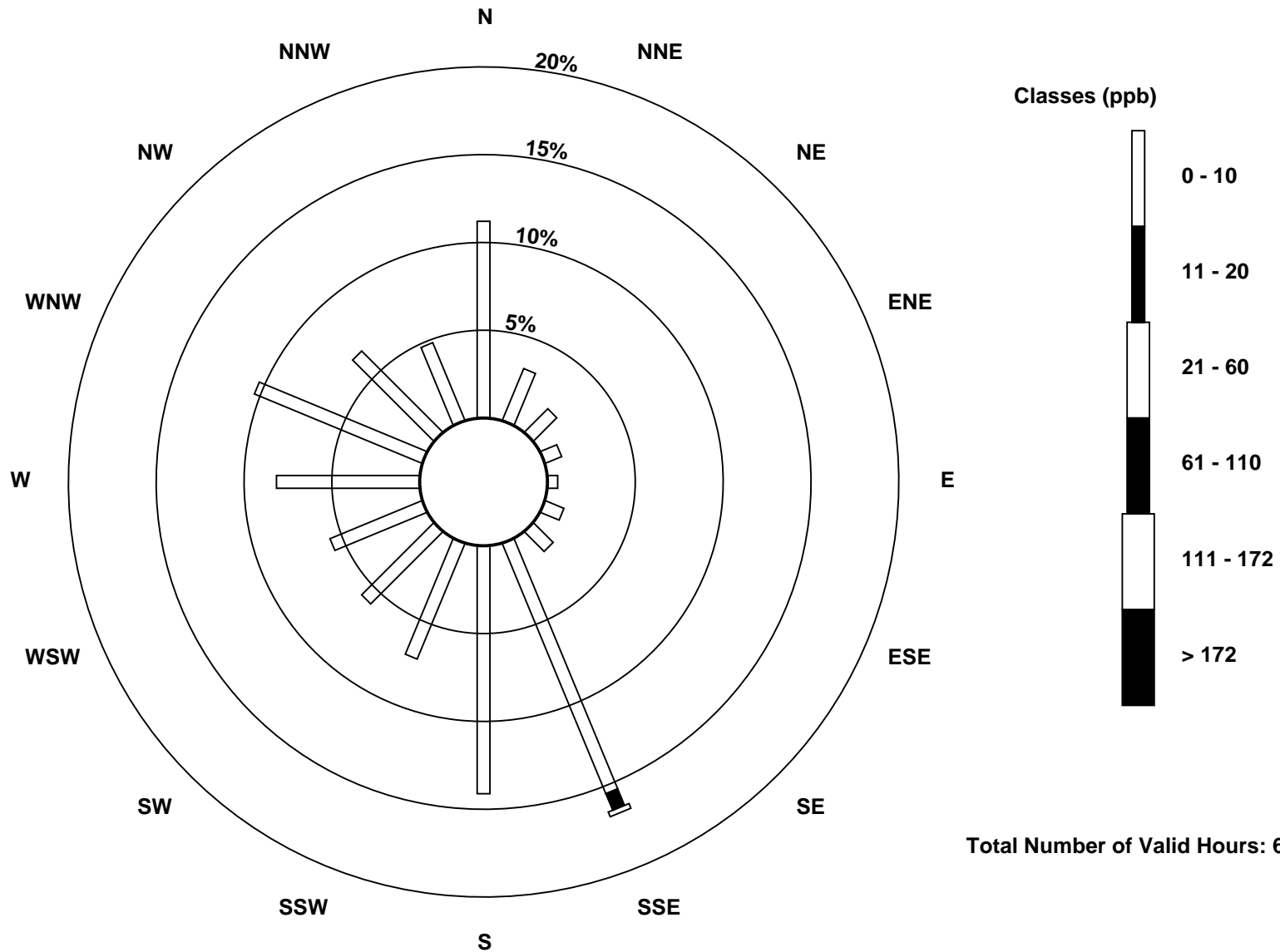
Total Number of Valid Hours: 687

Total Number of Hours: 720

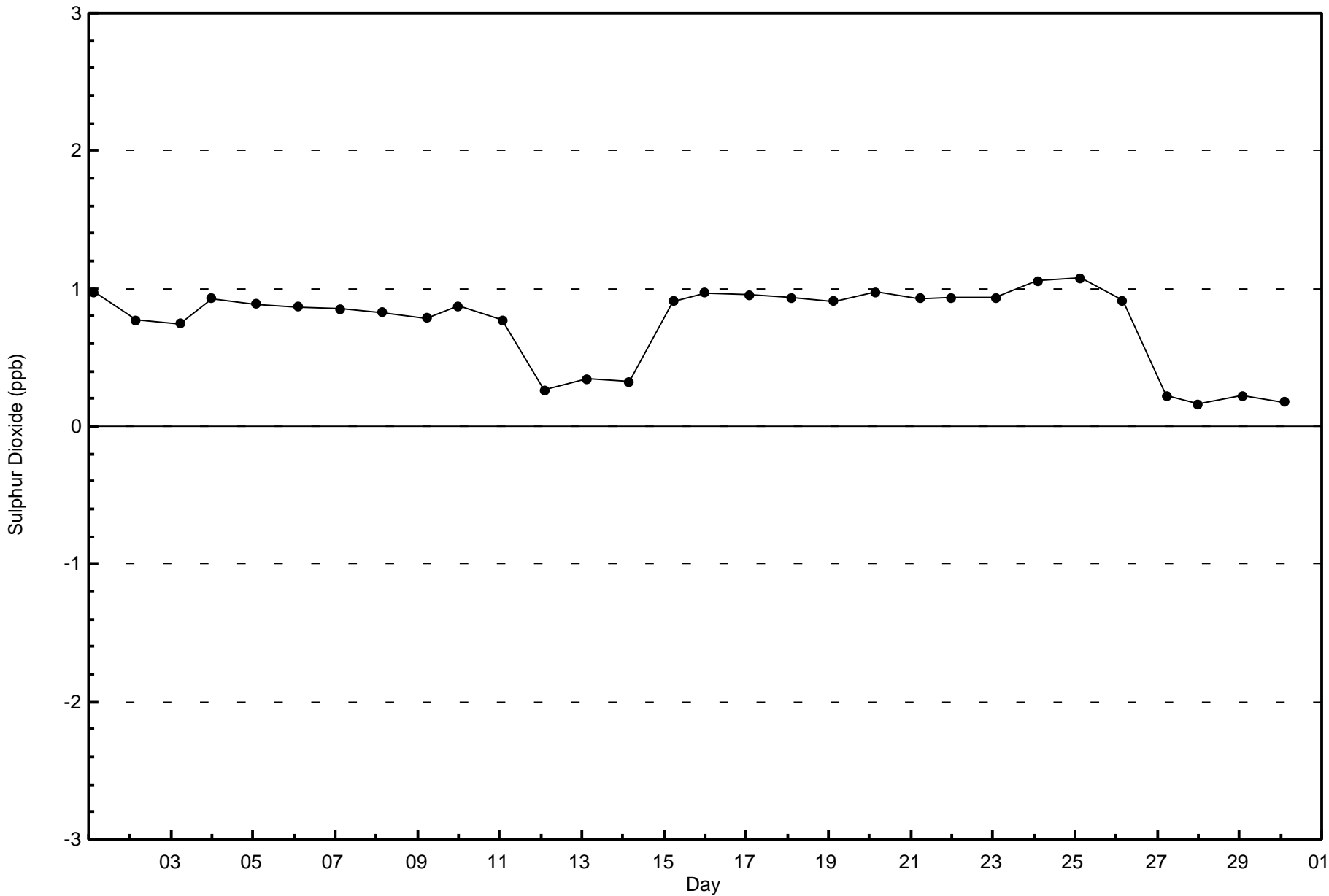


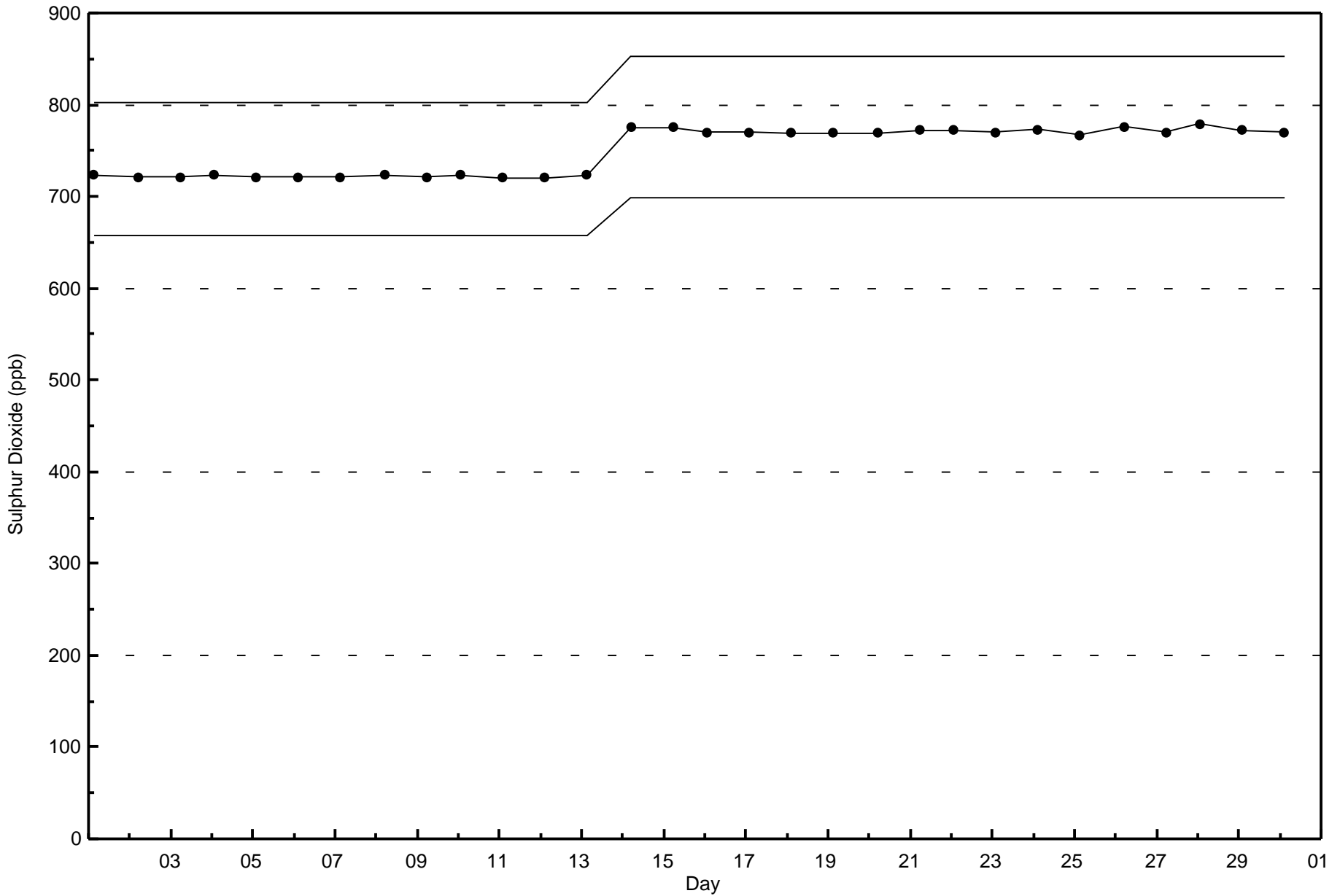
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 687

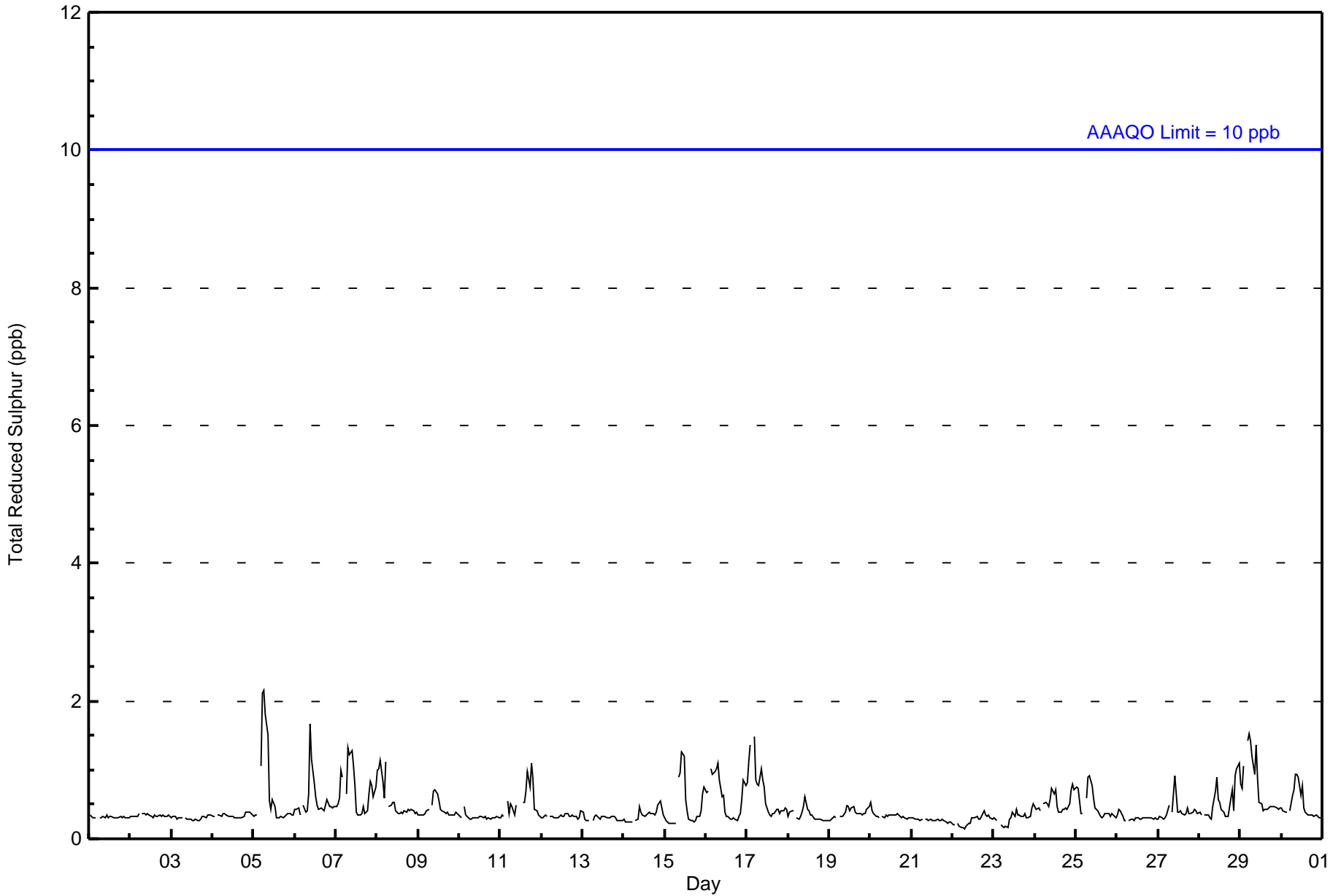






Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

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

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 78 | 23 | 12 | 7 | 3 | 7 | 13 | 113 | 95 | 51 | 40 | 39 | 54 | 73 | 44 | 35 | 687 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 78 | 23 | 12 | 7 | 3 | 7 | 13 | 113 | 95 | 51 | 40 | 39 | 54 | 73 | 44 | 35 | 687 |

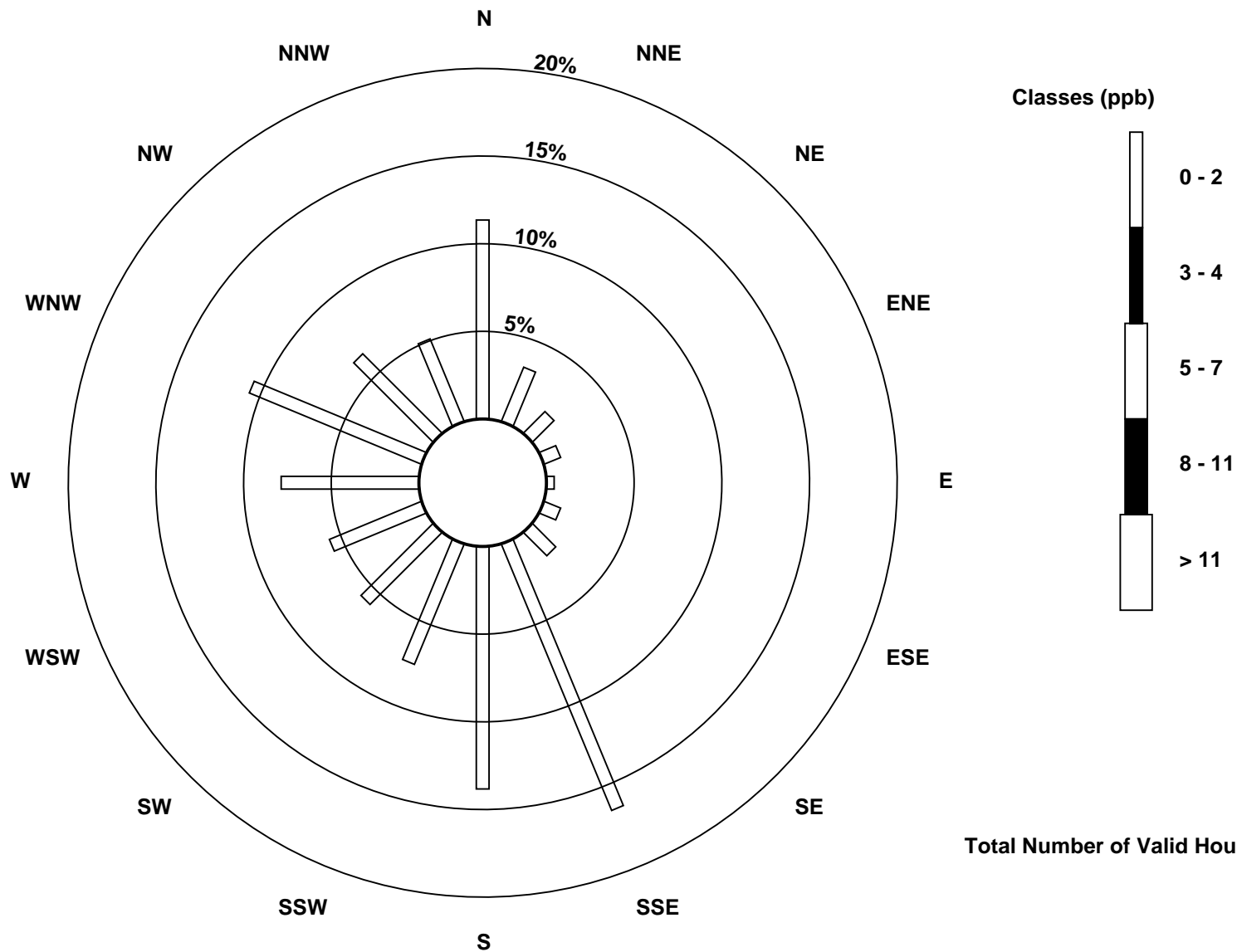
Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

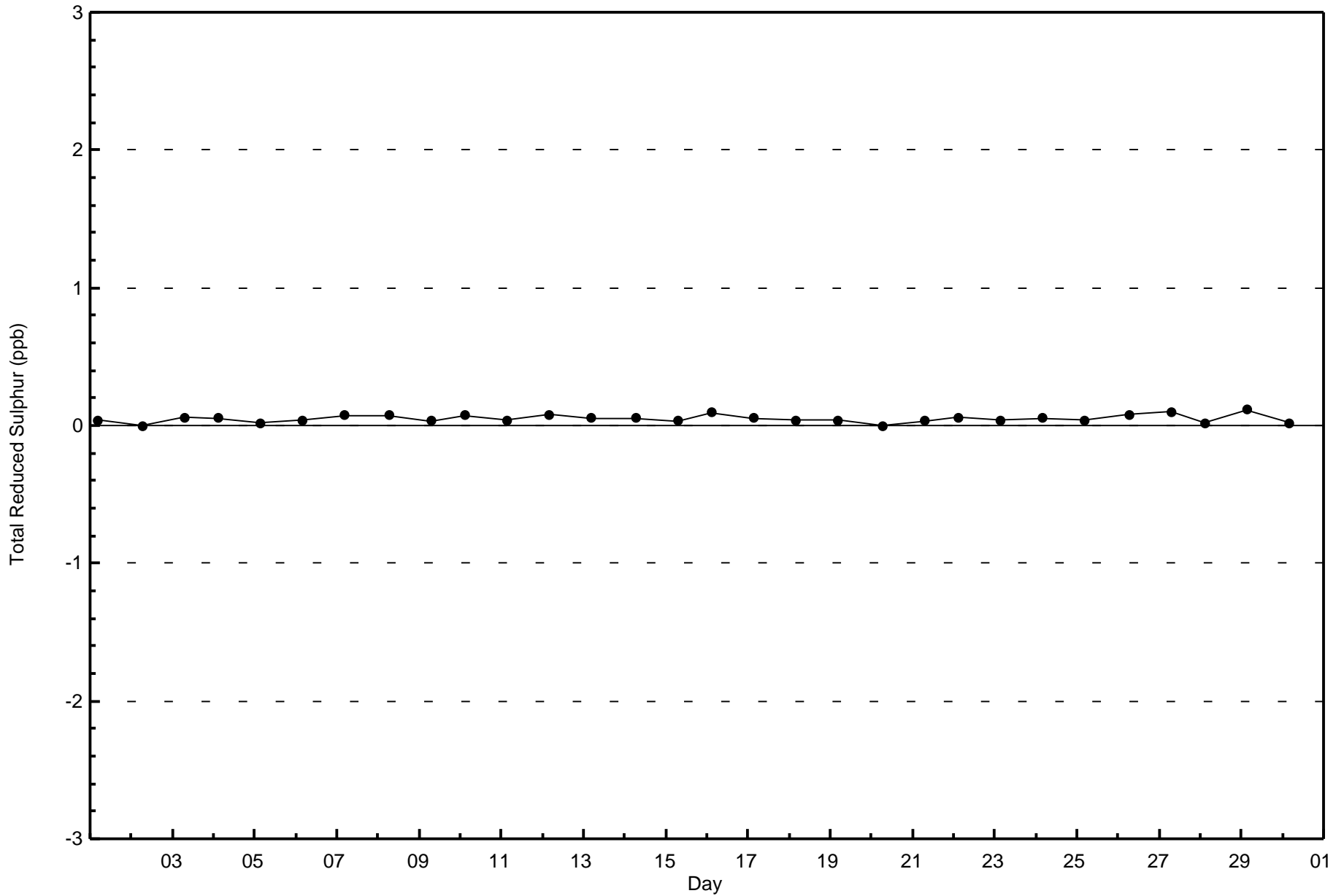


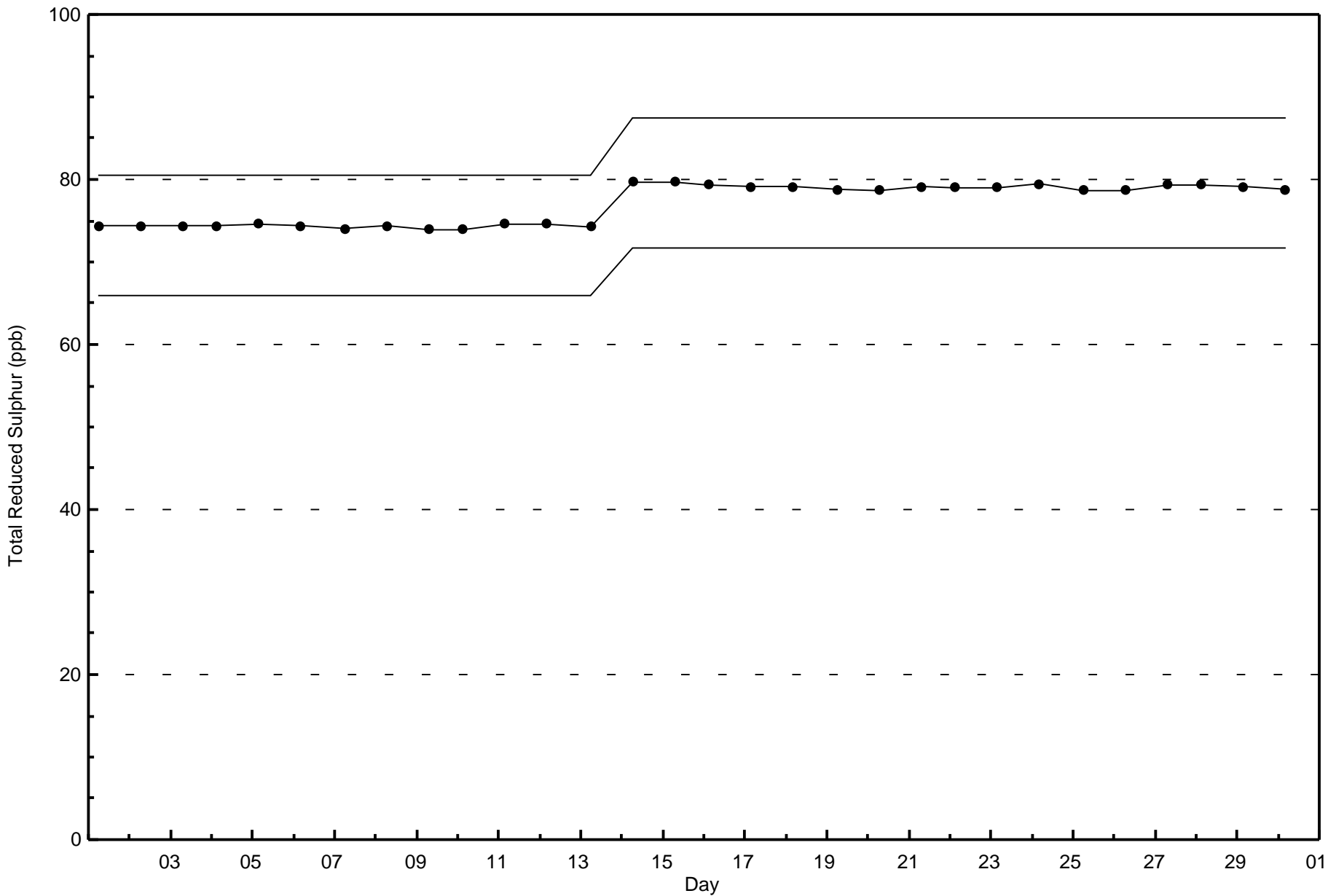
Total Number of Valid Hours: 687



Wood Buffalo Environmental Association
Zero Responses

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

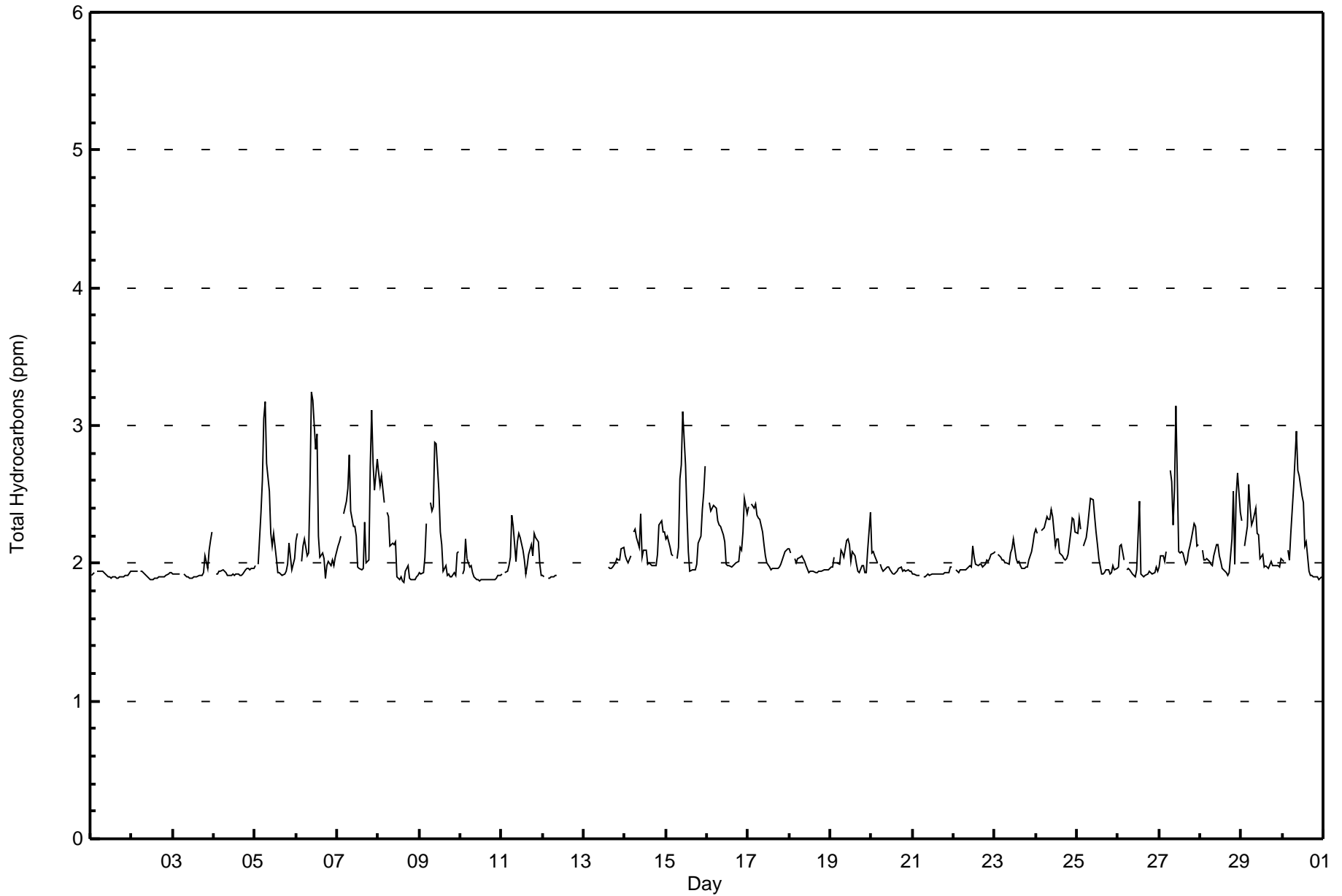






Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 416 | 62.75 | 62.75 |
| 2.1 - 3.0 | 241 | 36.35 | 99.10 |
| 3.1 - 10.0 | 6 | 0.90 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 663

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 49 | 10 | 8 | 6 | 1 | 6 | 6 | 42 | 44 | 29 | 32 | 36 | 49 | 50 | 25 | 23 | 416 |
| 2.1 - 3.0 | 24 | 10 | 4 | 1 | 1 | 2 | 5 | 71 | 52 | 20 | 7 | 3 | 6 | 17 | 12 | 6 | 241 |
| 3.1 - 10.0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 75 | 20 | 13 | 7 | 2 | 8 | 11 | 115 | 97 | 49 | 39 | 39 | 55 | 67 | 37 | 29 | 663 |

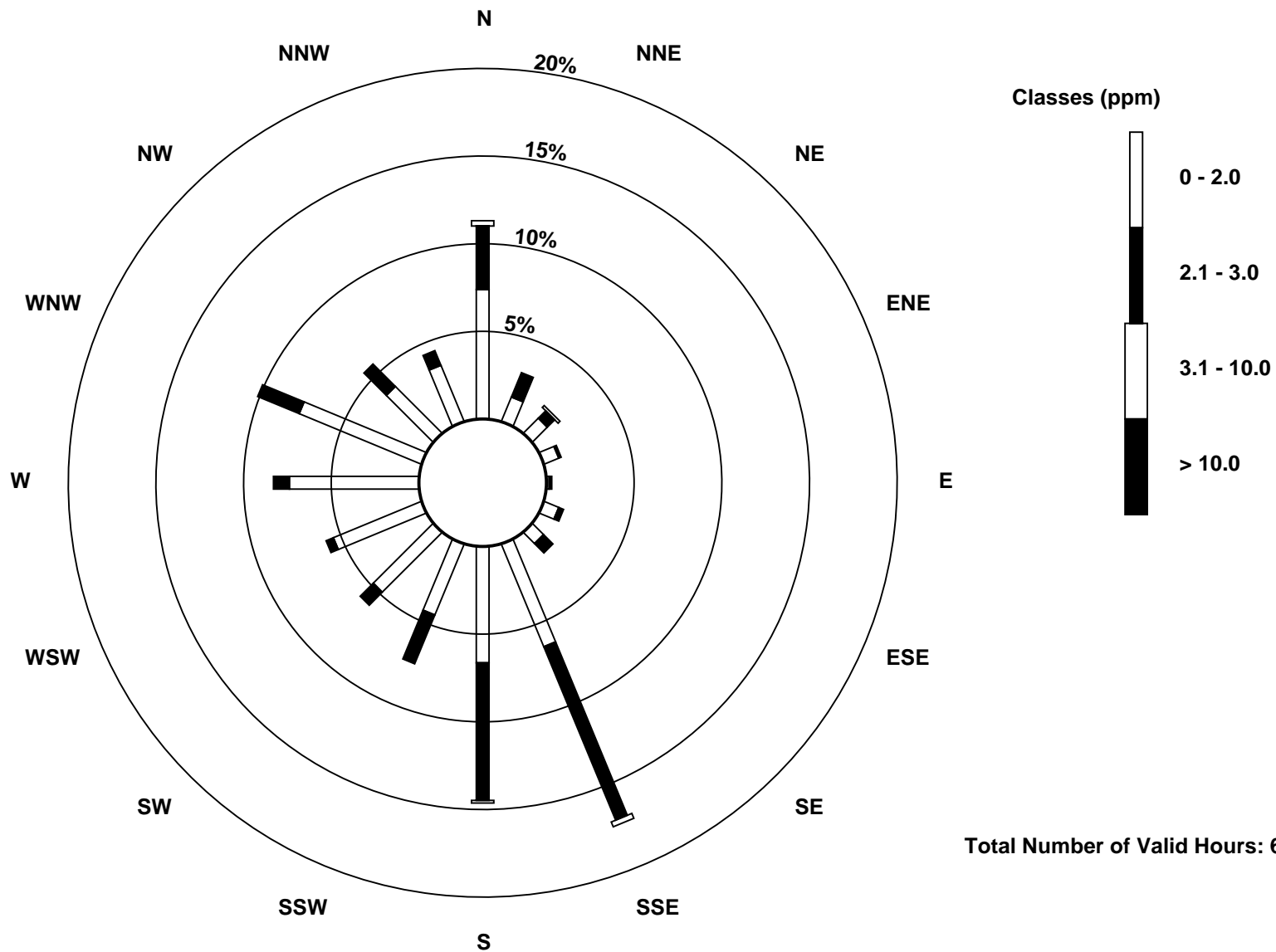
Total Number of Valid Hours: 663

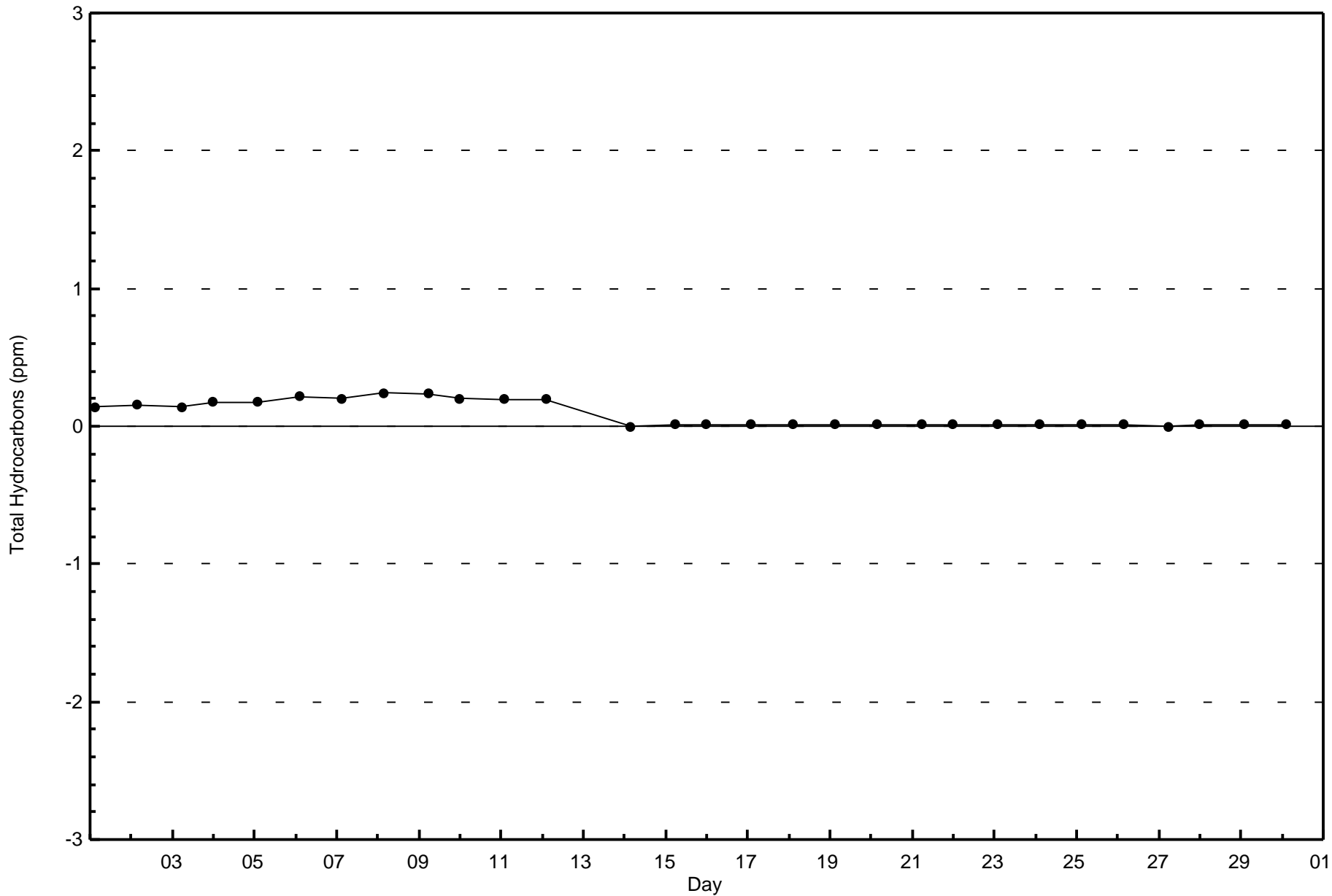
Total Number of Hours: 720

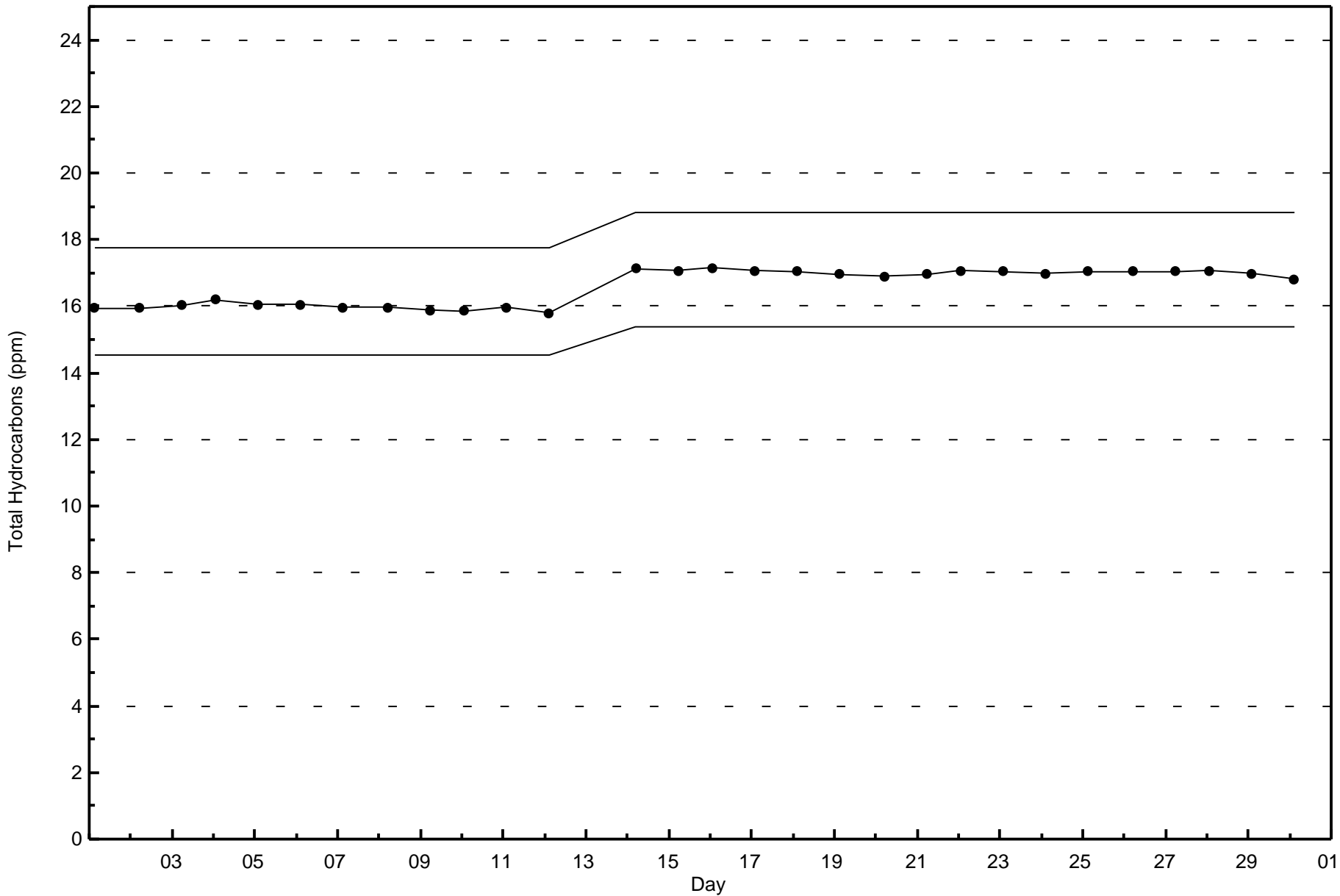


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



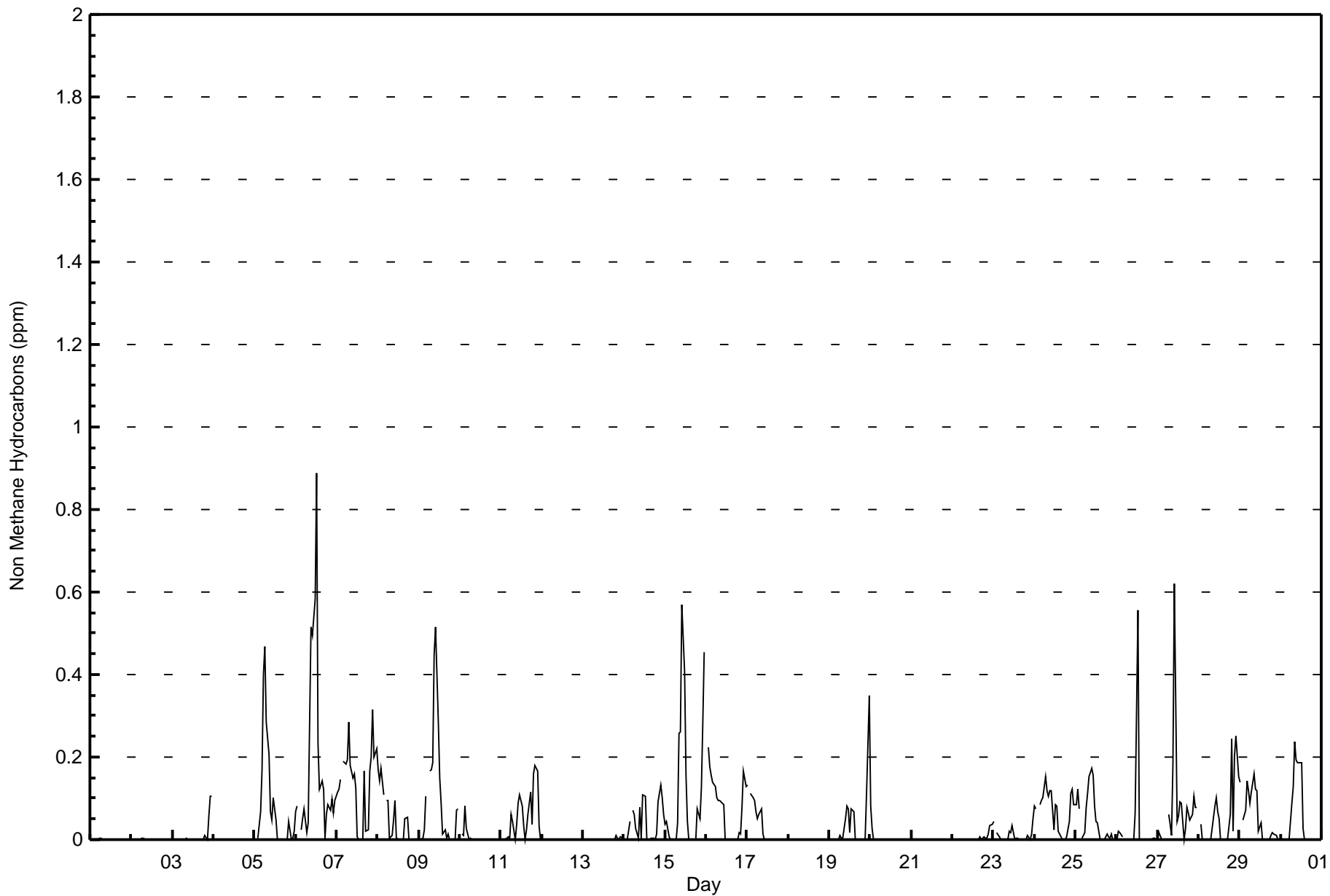






Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 390 | 58.82 | 58.82 |
| 0.006 - 0.05 | 92 | 13.88 | 72.70 |
| 0.06 - 0.1 | 118 | 17.80 | 90.50 |
| > 0.1 | 63 | 9.50 | 100.00 |

Total Number of Valid Hours: 663

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 48 | 7 | 5 | 6 | 1 | 5 | 7 | 45 | 36 | 30 | 28 | 29 | 47 | 50 | 26 | 20 | 390 |
| 0.006 - 0.05 | 9 | 1 | 1 | 0 | 0 | 2 | 1 | 15 | 19 | 6 | 6 | 7 | 4 | 11 | 2 | 8 | 92 |
| 0.06 - 0.1 | 12 | 9 | 5 | 0 | 1 | 1 | 2 | 36 | 21 | 11 | 3 | 3 | 4 | 4 | 6 | 0 | 118 |
| > 0.1 | 6 | 3 | 2 | 1 | 0 | 0 | 1 | 19 | 21 | 2 | 2 | 0 | 0 | 2 | 3 | 1 | 63 |
| Totals | 75 | 20 | 13 | 7 | 2 | 8 | 11 | 115 | 97 | 49 | 39 | 39 | 55 | 67 | 37 | 29 | 663 |

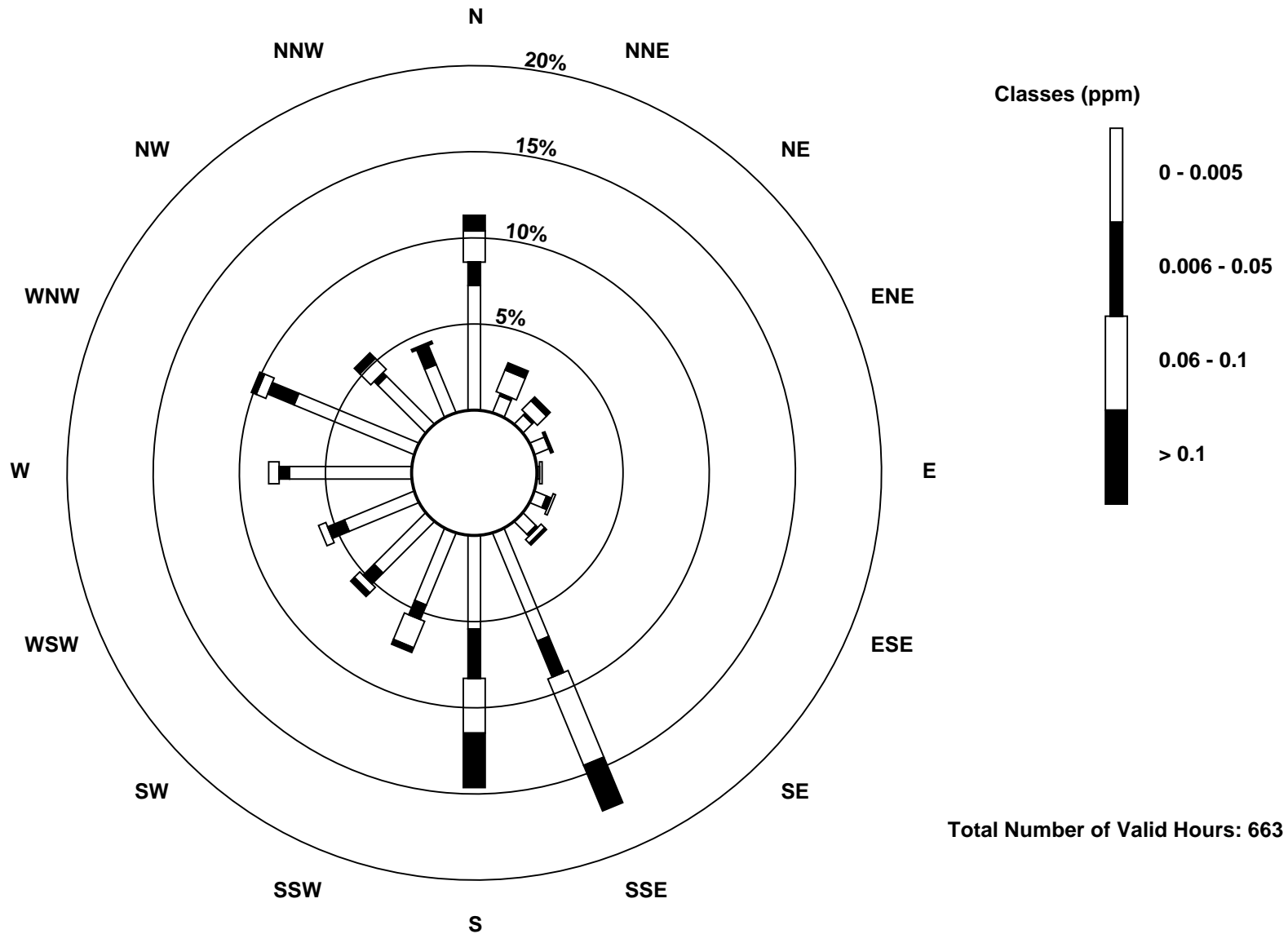
Total Number of Valid Hours: 663

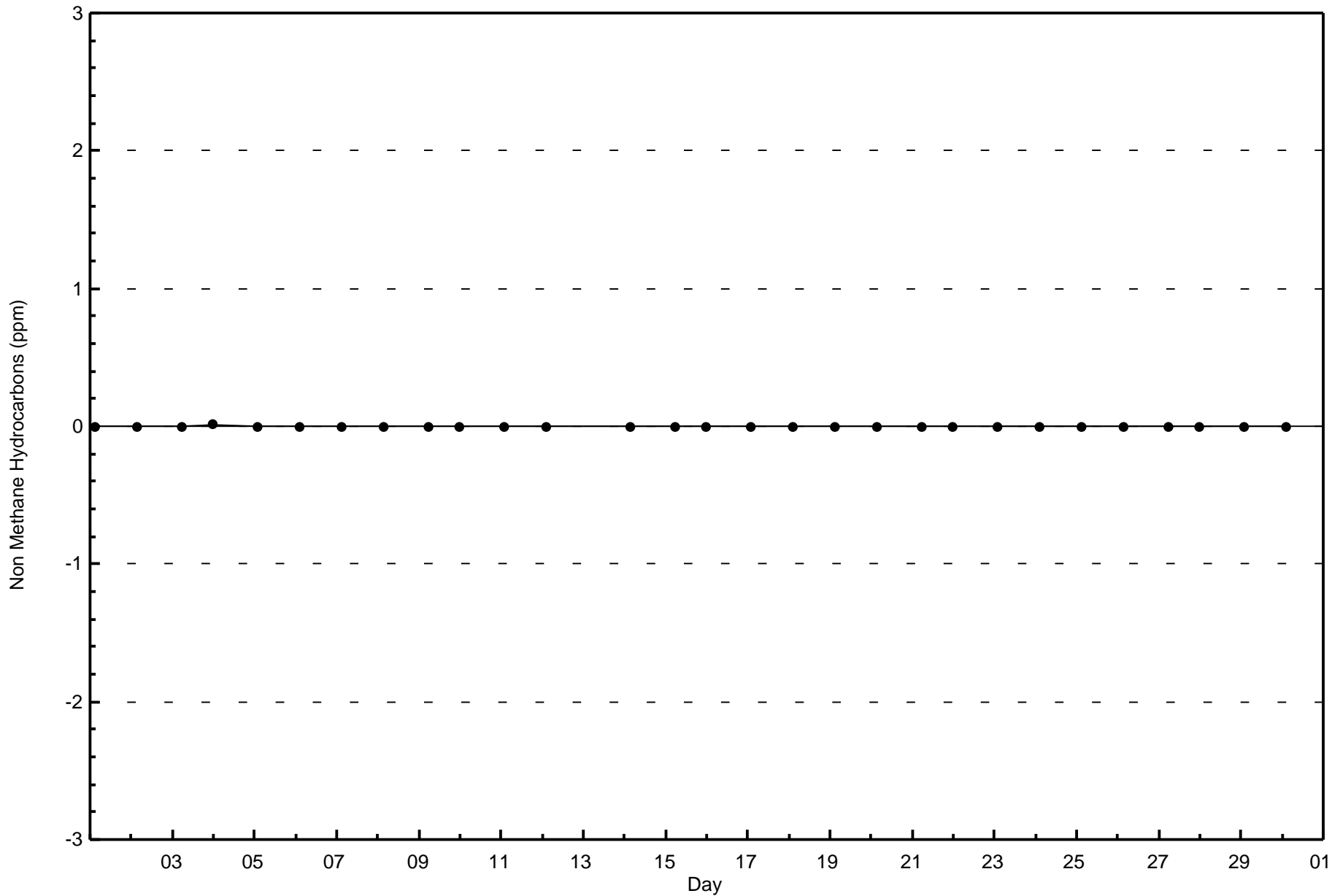
Total Number of Hours: 720

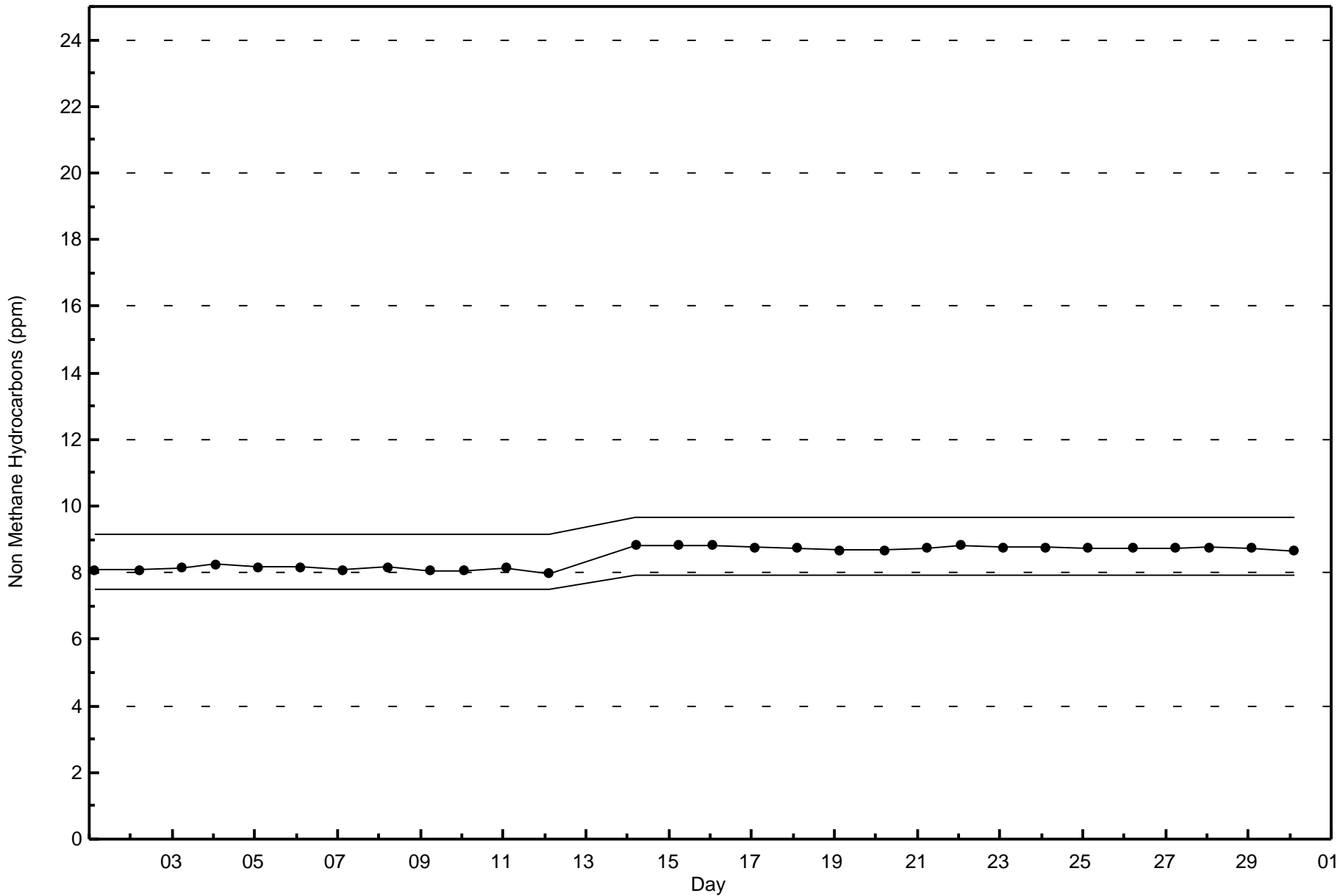


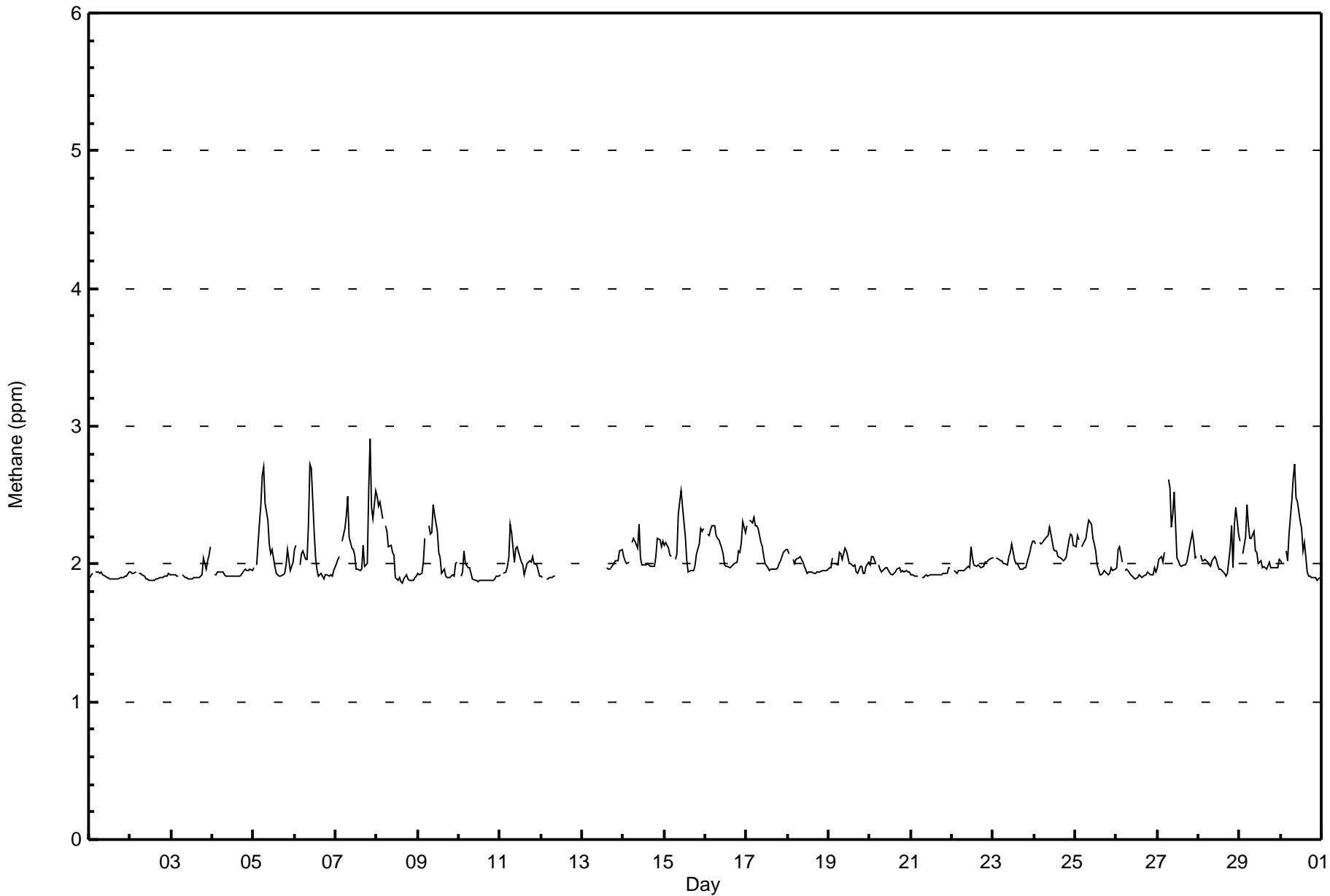
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 457 | 68.93 | 68.93 |
| 2.1 - 3.0 | 206 | 31.07 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 663

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 53 | 18 | 11 | 7 | 1 | 7 | 6 | 49 | 46 | 29 | 34 | 37 | 51 | 55 | 29 | 24 | 457 |
| 2.1 - 3.0 | 22 | 2 | 2 | 0 | 1 | 1 | 5 | 66 | 51 | 20 | 5 | 2 | 4 | 12 | 8 | 5 | 206 |
| 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 | 75 | 20 | 13 | 7 | 2 | 8 | 11 | 115 | 97 | 49 | 39 | 39 | 55 | 67 | 37 | 29 | 663 |

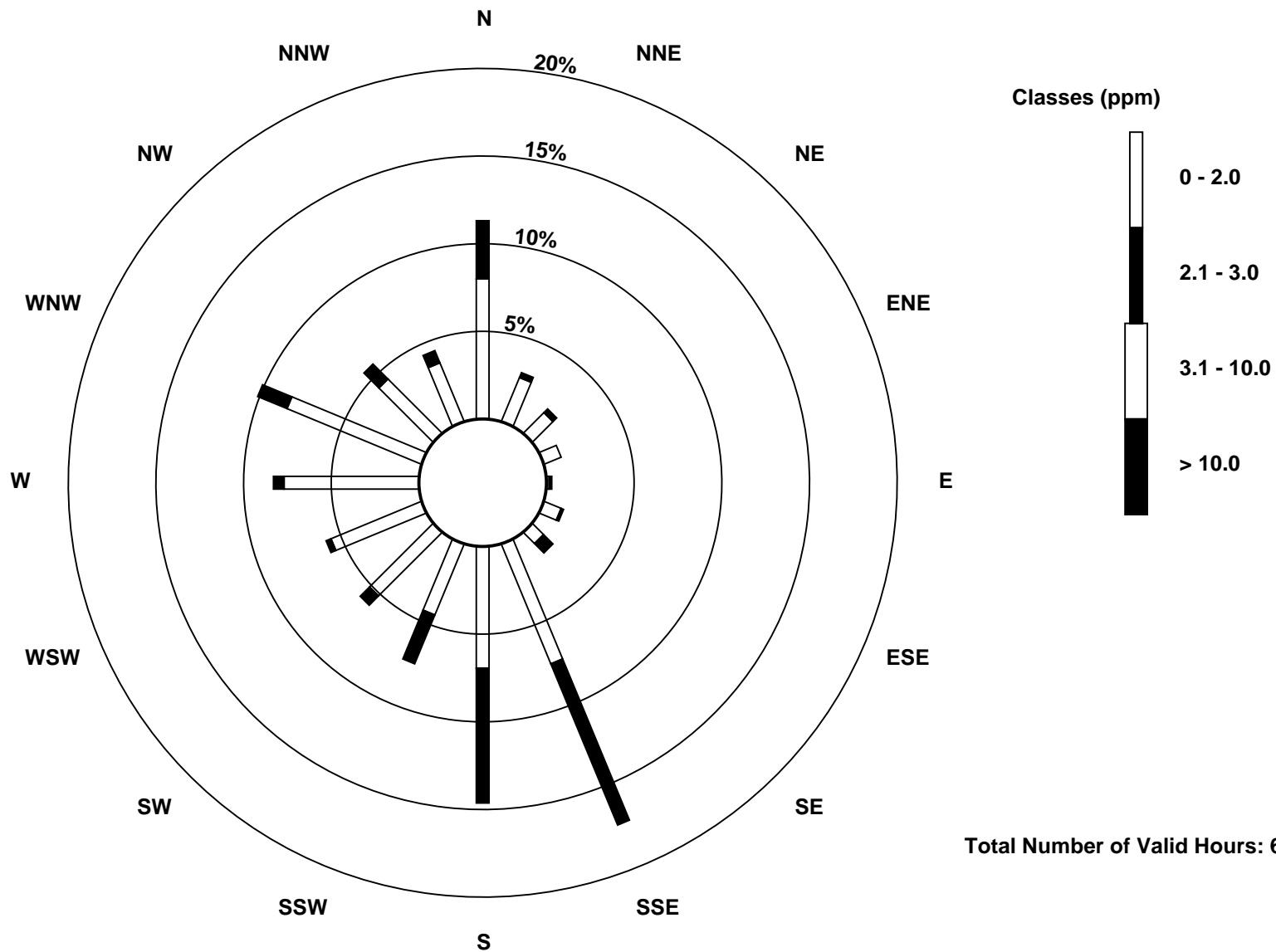
Total Number of Valid Hours: 663

Total Number of Hours: 720

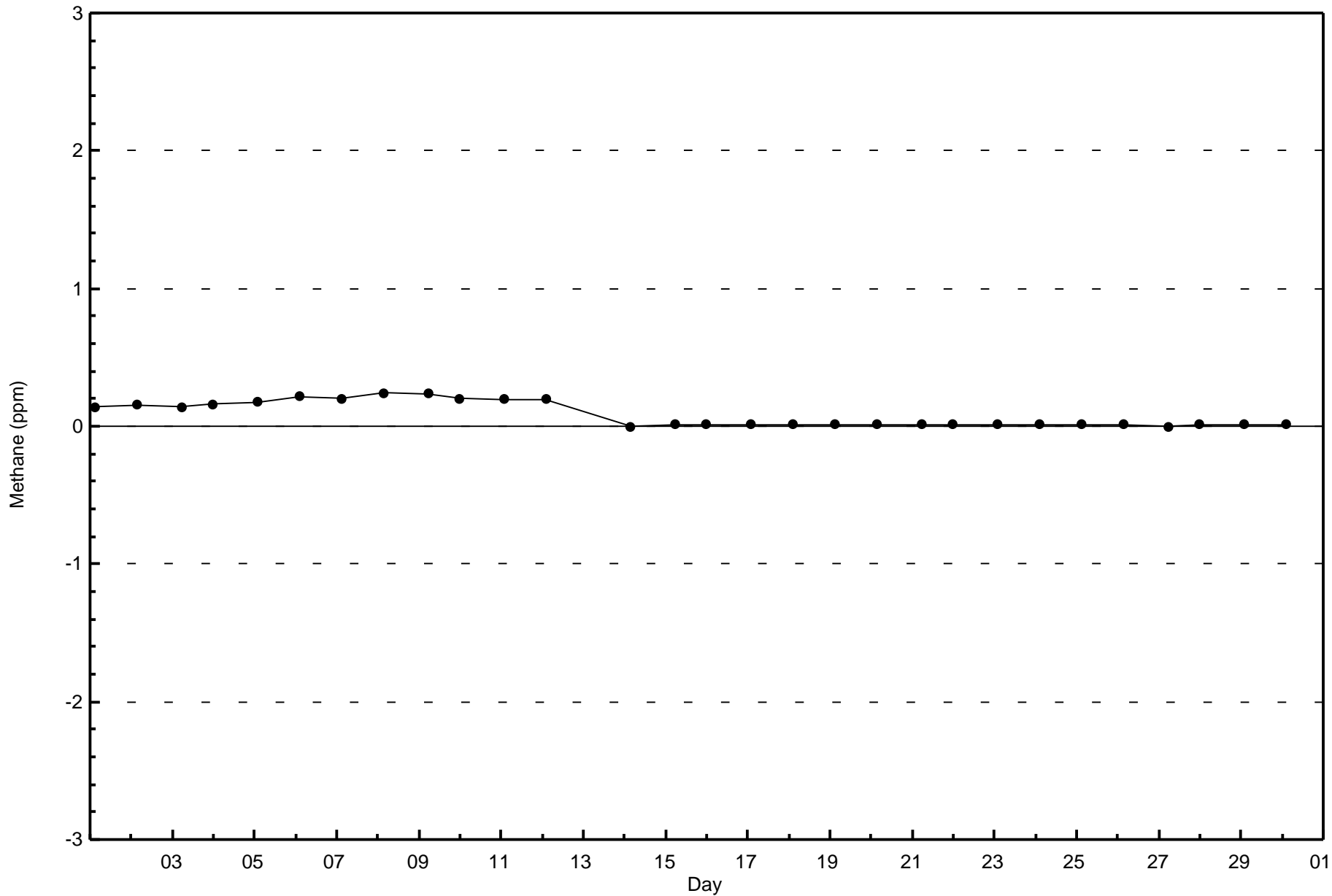


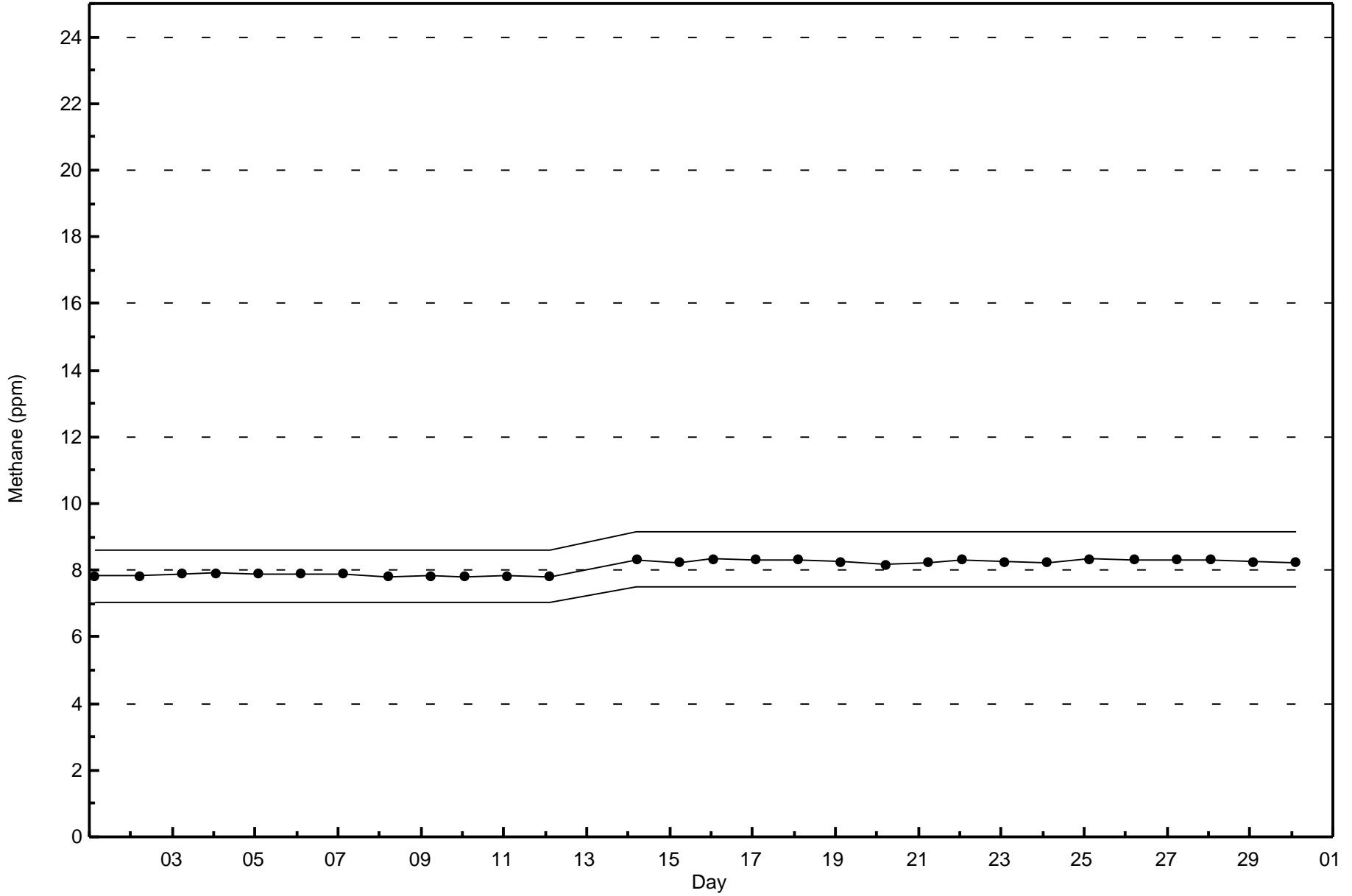
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



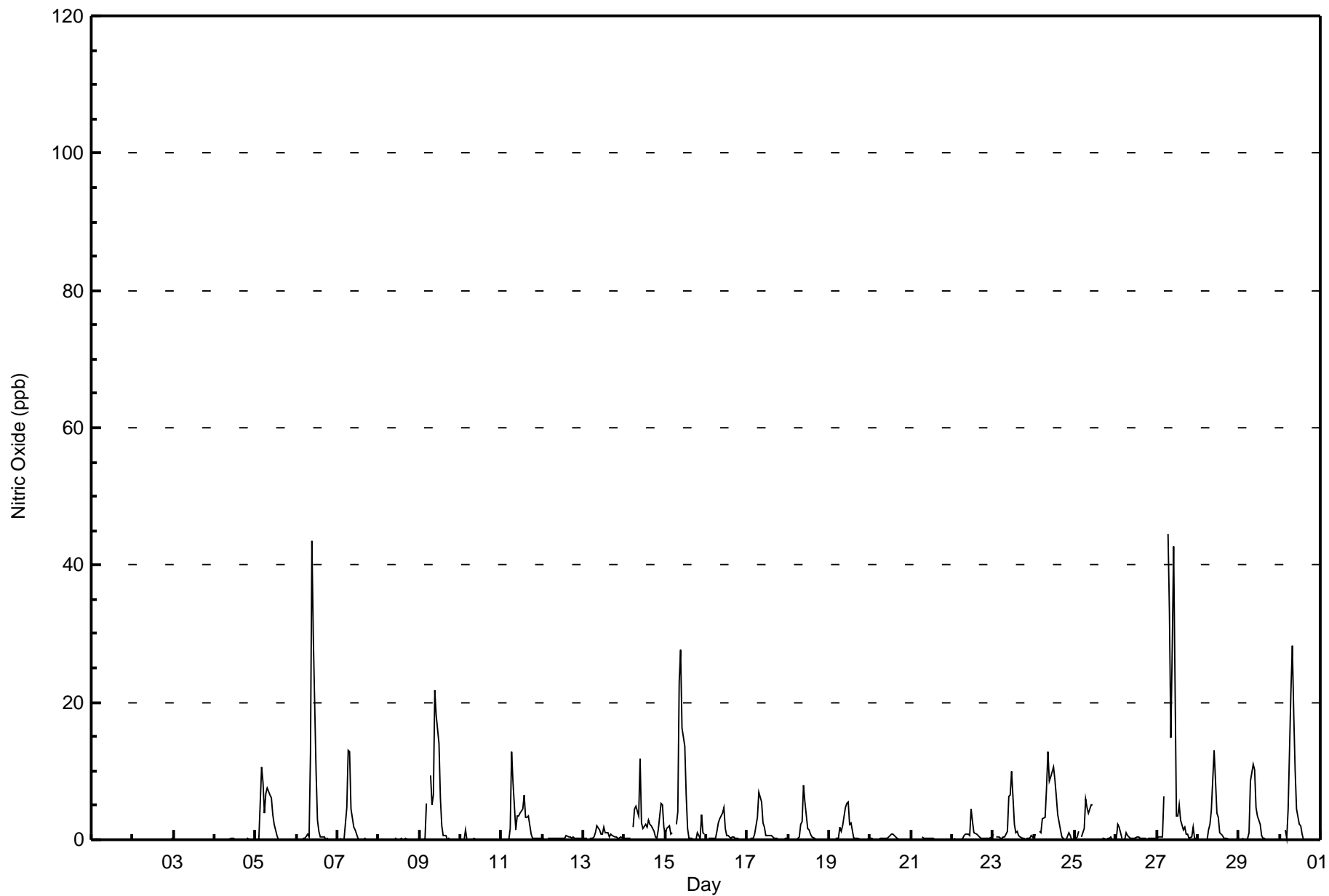
Total Number of Valid Hours: 663







| Maximum Value: 45 ppb on Sep 27 07:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 8.4 ppb on Sep 27 | | | | | | Hours in Service: 720 | | | |
|---|-------------------------------|---|---|----|---|---|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|---------------------------|---------------|---------------|--|
| Minimum Value: 0 ppb on Sep 3 12:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 1 | | | | | | Hours of Data: 685 | | | |
| Maximum Diurnal Average: 7.3 ppb at hour 10 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.1 ppb at hour 20 | | | | | | Hours of Missing Data: 35 | | | |
| Monthly Average: 1.7 ppb | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 5 P ₉₉ = 28 | | | | | | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 5-Sep | 0 | Z | 0 | 11 | 8 | 4 | 7 | 7 | 7 | 6 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 11 | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 13 | 44 | 30 | 10 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.5 | 44 | |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 5 | 13 | 13 | 5 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 | 13 | |
| 8-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 5 | Z | 9 | 5 | 7 | 22 | 18 | 14 | 6 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.9 | 22 | |
| 10-Sep | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 2 | 13 | 8 | 1 | 3 | 4 | 4 | 4 | 7 | 3 | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 13 | |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 2 | 5 | 5 | 3 | 12 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 0 | 0 | 1 | 5 | 5 | 2 | 2.5 | 12 | |
| 15-Sep | 1 | 2 | 2 | 1 | 1 | Z | 2 | 4 | 23 | 28 | 16 | 14 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 1 | 1 | 4.7 | 28 | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 4 | 5 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 | |
| 17-Sep | 0 | Z | 0 | 0 | 1 | 2 | 3 | 7 | 5 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 7 | |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 3 | 8 | 6 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 8 | |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 2 | 1 | 2 | 5 | 5 | 5 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 5 | |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 21-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 5 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 | |
| 23-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 7 | 10 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1.5 | 10 | |
| 24-Sep | 0 | 1 | Z | 1 | 1 | 3 | 3 | 8 | 13 | 8 | 9 | 11 | 9 | 6 | 4 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3.5 | 13 | |
| 25-Sep | 0 | 0 | 1 | Z | 0 | 2 | 6 | 5 | 4 | 5 | 5 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 6 | |
| 26-Sep | 0 | 2 | 2 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 27-Sep | 0 | 0 | 0 | 0 | 6 | Z | 45 | 33 | 15 | 28 | 43 | 4 | 4 | 5 | 3 | 1 | 2 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 8.4 | 45 | |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 13 | 9 | 4 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 | 13 | |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 9 | 11 | 10 | 5 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 11 | |
| 30-Sep | 0 | 0 | Z | 1 | 0 | 4 | 22 | 28 | 18 | 10 | 4 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.1 | 28 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 674 | 98.39 | 98.39 |
| 21 - 40 | 8 | 1.17 | 99.56 |
| 41 - 80 | 3 | 0.44 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 76 | 22 | 12 | 7 | 4 | 8 | 11 | 111 | 95 | 48 | 38 | 37 | 56 | 71 | 45 | 33 | 674 |
| 21 - 40 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 8 |
| 11 - 80 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 79 | 23 | 13 | 7 | 4 | 8 | 11 | 113 | 97 | 48 | 40 | 37 | 56 | 71 | 45 | 33 | 685 |

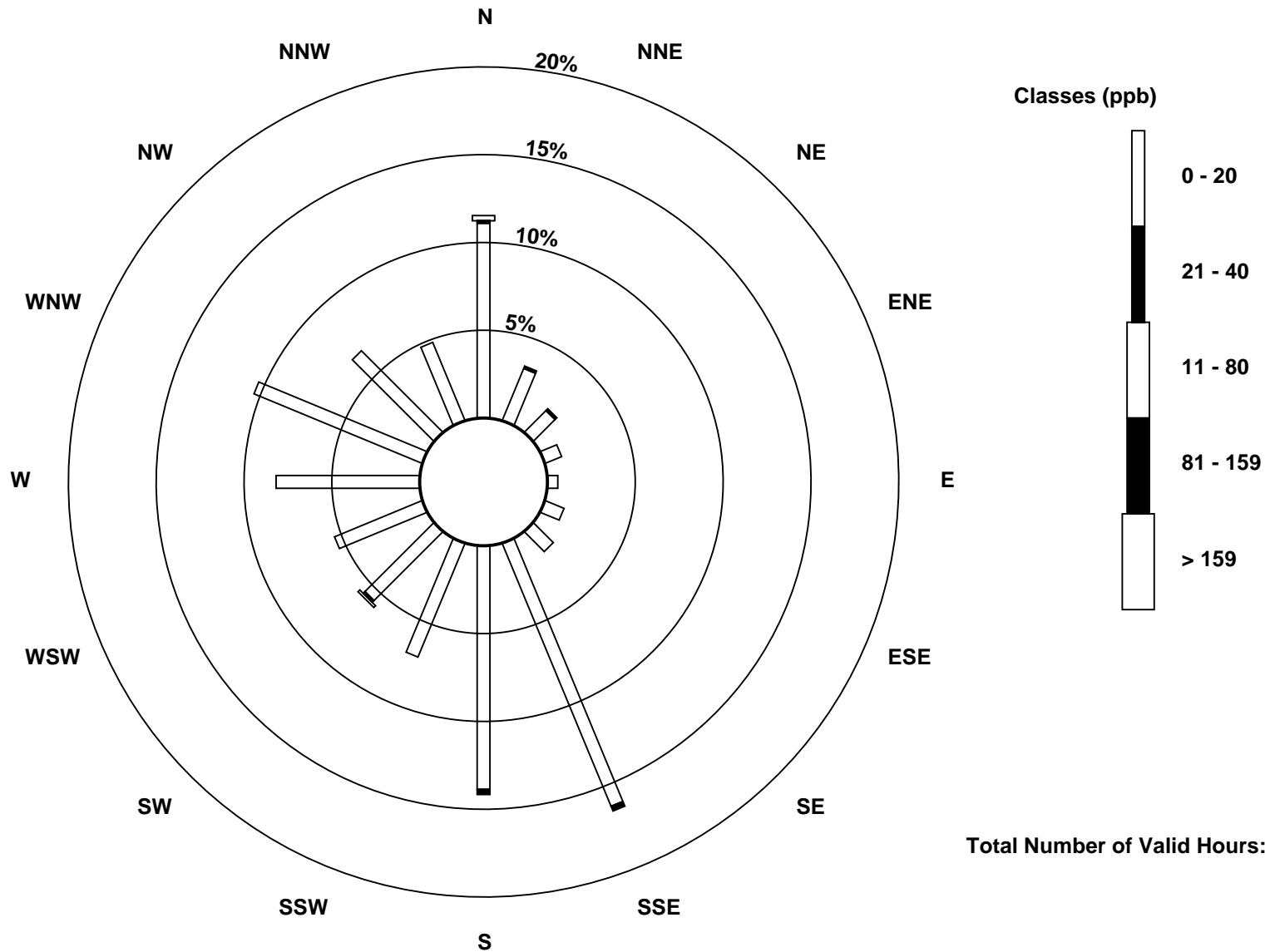
Total Number of Valid Hours: 685

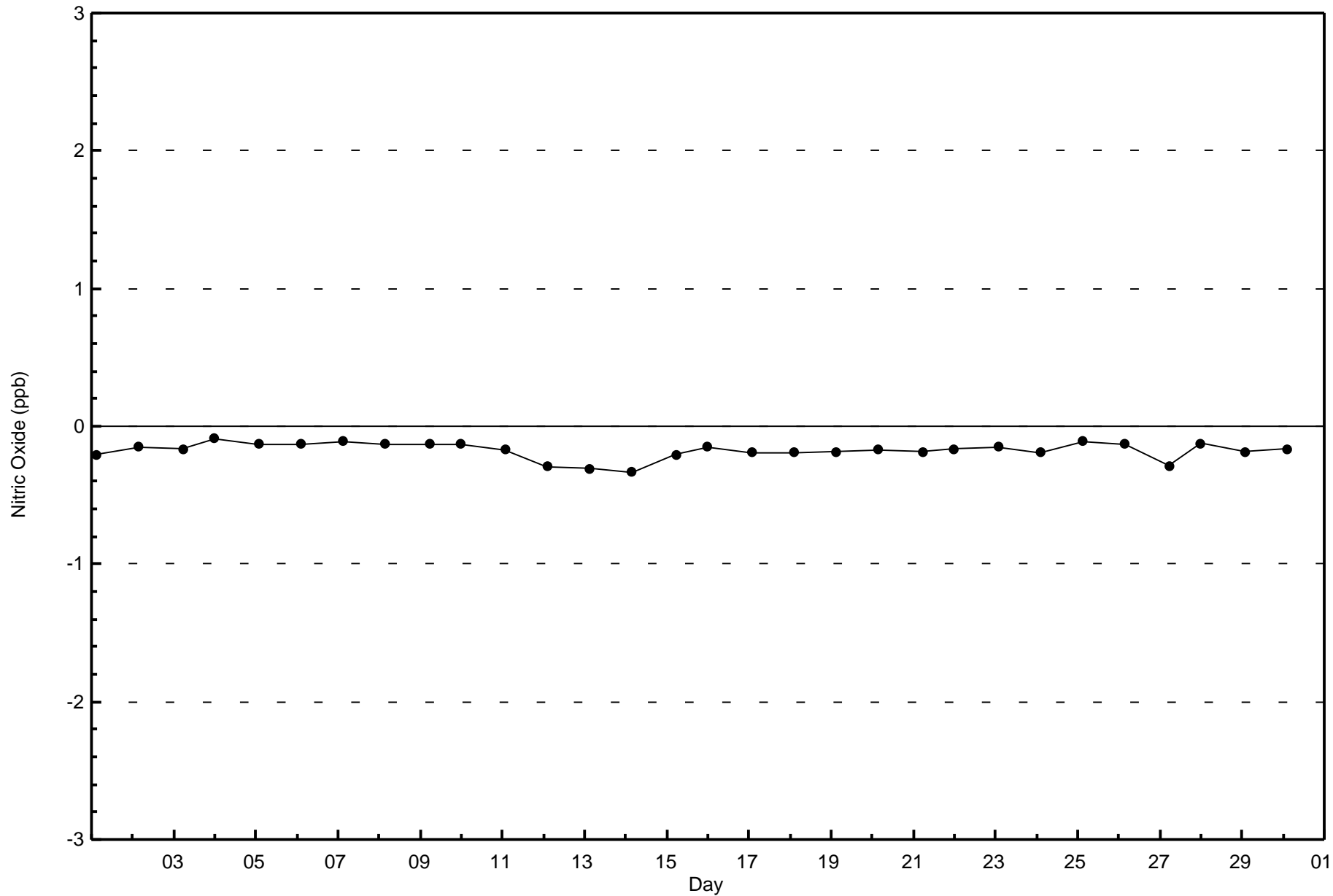
Total Number of Hours: 720

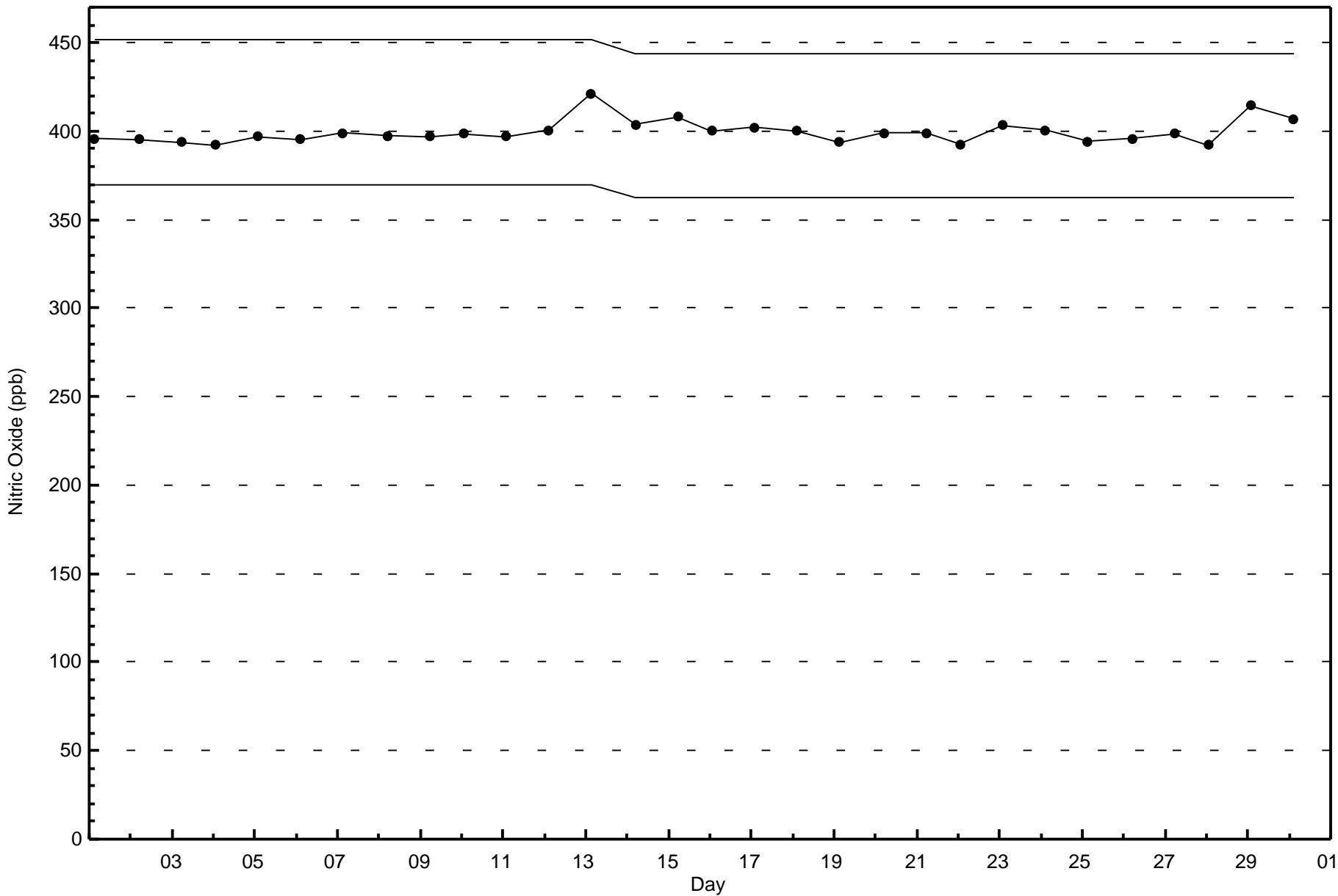


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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 - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 30 ppb on Sep 6 10:00 | Maximum Daily Average: 9.6 ppb on Sep 27 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 2 11:00 | Minimum Daily Average: 0.1 ppb on Sep 2 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 6.2 ppb at hour 10 | Minimum Diurnal Average: 1.7 ppb at hour 16 | | Hours of Calibration: | 35 |
| Monthly Average: 4.1 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 O ₃ = 6 P ₉₀ = 10 P ₉₉ = 18 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.2 | 1 | |
| 2-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 6 | 10 | 1.3 | 10 | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 6 | 7 | 5 | 3 | 1.2 | 7 |
| 5-Sep | 2 | Z | 2 | 11 | 12 | 12 | 10 | 8 | 8 | 8 | 6 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 6 | 1 | 3 | 2 | 4.6 | 12 |
| 6-Sep | 4 | 5 | Z | 2 | 3 | 3 | 3 | 2 | 13 | 30 | 29 | 19 | 10 | 5 | 3 | 3 | 4 | 3 | 7 | 7 | 8 | 6 | 3 | 4 | 7.6 | 30 | |
| 7-Sep | 4 | 5 | 8 | Z | 6 | 13 | 12 | 10 | 9 | 6 | 6 | 5 | 2 | 2 | 2 | 1 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 9 | 5.6 | 13 | |
| 8-Sep | 19 | 17 | 11 | 7 | Z | 6 | 5 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 1 | 0 | 3 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 3.8 | 19 | |
| 9-Sep | 0 | 0 | 1 | 3 | 7 | Z | 5 | 6 | 6 | 10 | 16 | 18 | 14 | 8 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 4 | 2 | 4.7 | 18 | |
| 10-Sep | Z | 0 | 1 | 9 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 9 | |
| 11-Sep | 0 | Z | 0 | 0 | 1 | 5 | 13 | 10 | 4 | 9 | 9 | 7 | 8 | 10 | 6 | 9 | 8 | 4 | 4 | 6 | 5 | 3 | 1 | 1 | 5.3 | 13 | |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 6 | 5 | 3 | 2 | 2 | 5 | 1.5 | 6 | |
| 13-Sep | 7 | 5 | 3 | Z | 2 | 2 | 3 | 6 | 6 | 4 | 2 | 2 | 4 | 5 | 3 | 2 | 2 | 3 | 5 | 6 | 3 | 3 | 5 | 7 | 3.9 | 7 | |
| 14-Sep | 7 | 3 | 2 | 2 | Z | 7 | 7 | 5 | 4 | 10 | 4 | 3 | 4 | 3 | 5 | 5 | 5 | 6 | 5 | 7 | 15 | 16 | 12 | 11 | 6.3 | 16 | |
| 15-Sep | 8 | 8 | 5 | 4 | 3 | Z | 2 | 3 | 8 | 10 | 9 | 11 | 8 | 3 | 0 | 0 | 0 | 1 | 4 | 20 | 13 | 18 | 11 | 13 | 7.0 | 20 | |
| 16-Sep | Z | 9 | 9 | 9 | 7 | 6 | 6 | 5 | 6 | 6 | 7 | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 5 | 2 | 3 | 2 | 3 | 4 | 4.2 | 9 | |
| 17-Sep | 4 | Z | 7 | 9 | 11 | 17 | 14 | 11 | 8 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 4 | 8 | 12 | 10 | 12 | 13 | 6.9 | 17 | |
| 18-Sep | 9 | 6 | Z | 3 | 2 | 1 | 2 | 3 | 4 | 10 | 8 | 3 | 3 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 2.8 | 10 | |
| 19-Sep | 0 | 1 | 3 | Z | 7 | 5 | 11 | 10 | 9 | 9 | 9 | 8 | 5 | 7 | 4 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 5 | 8 | 5.0 | 11 | |
| 20-Sep | 9 | 8 | 5 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 2.0 | 9 | |
| 21-Sep | 1 | 1 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0.4 | 3 |
| 22-Sep | Z | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 9 | 6 | 5 | 5 | 4 | 4 | 4 | 6 | 5 | 6 | 5 | 4 | 4 | 3.2 | 9 | |
| 23-Sep | 8 | Z | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 5 | 6 | 8 | 5 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 6 | 13 | 13 | 8 | 4.3 | 13 | |
| 24-Sep | 5 | 6 | Z | 6 | 5 | 6 | 6 | 5 | 6 | 6 | 6 | 7 | 8 | 8 | 7 | 4 | 3 | 3 | 2 | 6 | 18 | 16 | 7 | 9 | 6.7 | 18 | |
| 25-Sep | 11 | 15 | 16 | Z | 10 | 12 | 14 | 11 | 8 | 6 | 5 | C | C | C | C | C | 1 | 2 | 3 | 5 | 2 | 4 | 1 | 2 | 6.9 | 16 | |
| 26-Sep | 4 | 10 | 9 | 2 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 2 | 4 | 2 | 1 | 3 | 2 | 2.0 | 10 | |
| 27-Sep | 2 | 6 | 7 | 6 | 11 | Z | 14 | 12 | 9 | 13 | 22 | 5 | 6 | 8 | 7 | 4 | 6 | 6 | 12 | 9 | 13 | 18 | 11 | 13 | 9.6 | 22 | |
| 28-Sep | Z | 8 | 4 | 2 | 4 | 4 | 4 | 3 | 4 | 10 | 10 | 7 | 7 | 3 | 2 | 1 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | 12 | 4.6 | 12 | |
| 29-Sep | 15 | Z | 14 | 6 | 5 | 8 | 13 | 17 | 16 | 15 | 9 | 7 | 6 | 3 | 2 | 1 | 1 | 1 | 2 | 5 | 5 | 6 | 4 | 7 | 7.3 | 17 | |
| 30-Sep | 6 | 2 | Z | 5 | 2 | 6 | 9 | 8 | 10 | 10 | 8 | 6 | 7 | 3 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 3.8 | 10 | |

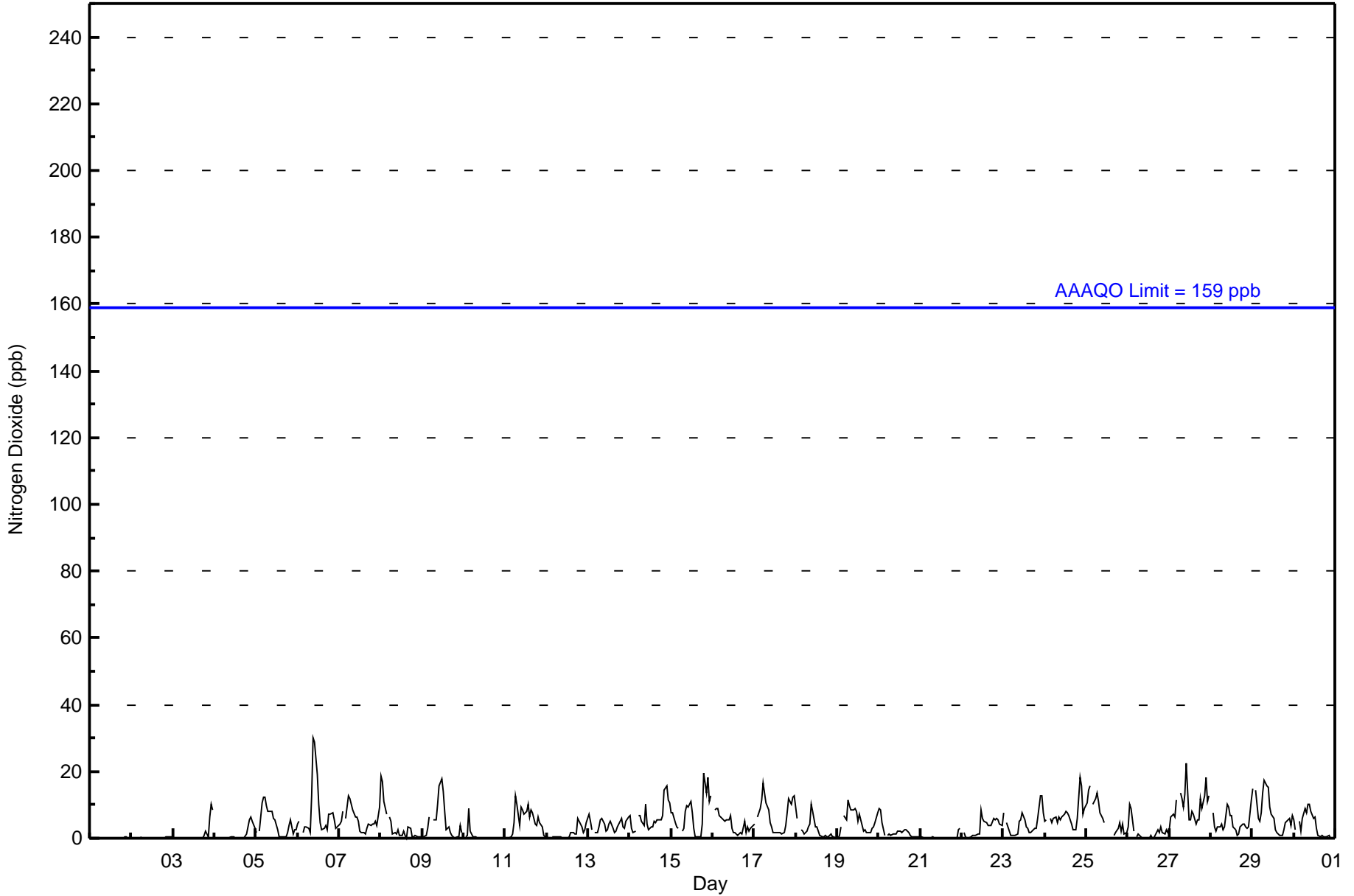
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 5.0 | 4.7 | 4.4 | 3.6 | 4.1 | 4.7 | 5.3 | 4.7 | 4.7 | 6.2 | 6.0 | 4.8 | 3.8 | 3.0 | 2.1 | 1.7 | 1.9 | 1.9 | 2.9 | 4.0 | 4.7 | 5.0 | 4.3 | 4.9 | Diurnal Average | |
| 19 | 17 | 16 | 11 | 12 | 17 | 14 | 17 | 16 | 30 | 29 | 19 | 14 | 10 | 7 | 9 | 8 | 6 | 12 | 20 | 18 | 18 | 13 | 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
Fort McKay - Bertha Ganter - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 682 | 99.56 | 99.56 |
| 21 - 40 | 3 | 0.44 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 77 | 23 | 12 | 7 | 4 | 8 | 11 | 113 | 97 | 48 | 40 | 37 | 56 | 71 | 45 | 33 | 682 |
| 21 - 40 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 79 | 23 | 13 | 7 | 4 | 8 | 11 | 113 | 97 | 48 | 40 | 37 | 56 | 71 | 45 | 33 | 685 |

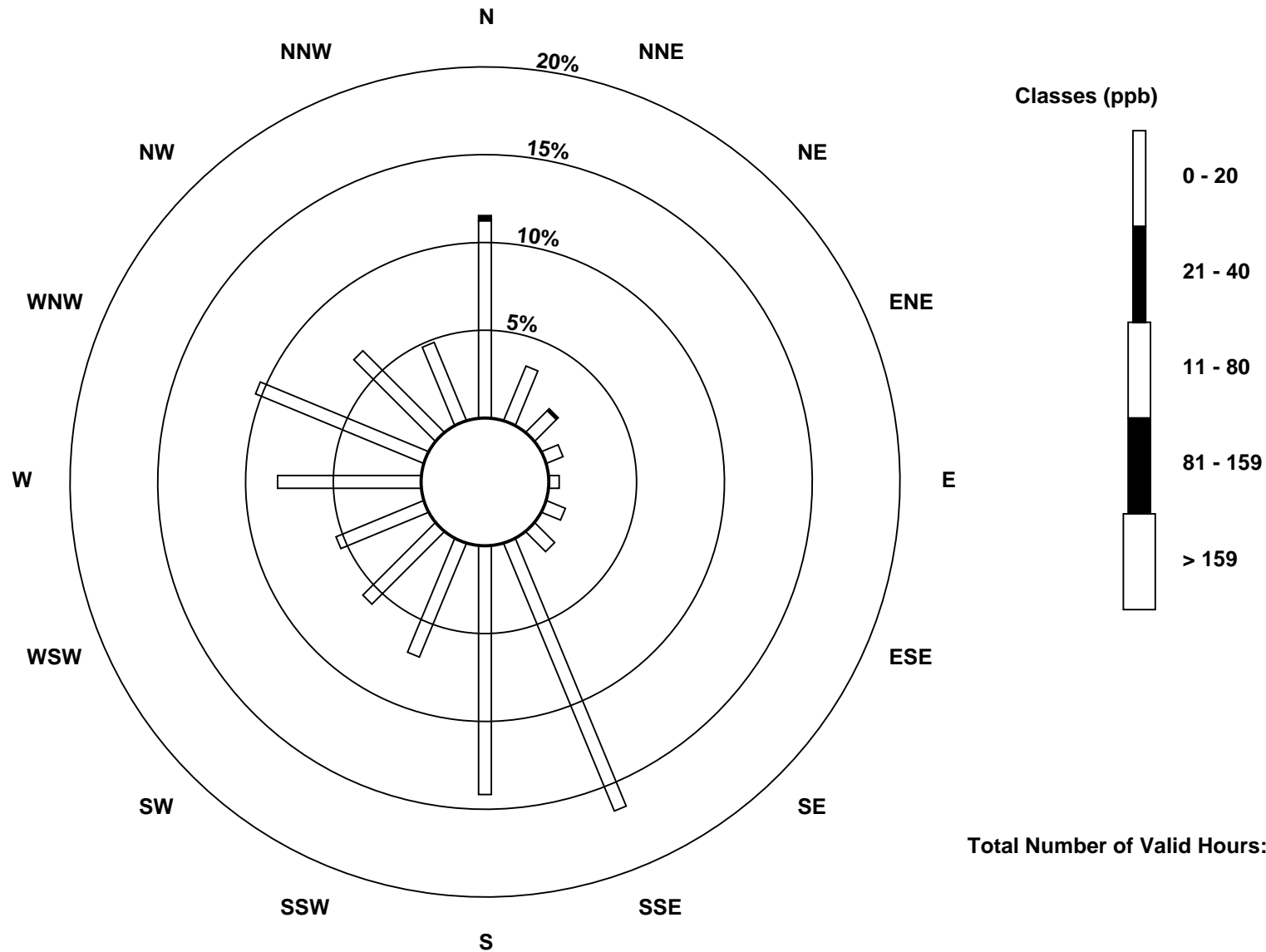
Total Number of Valid Hours: 685

Total Number of Hours: 720

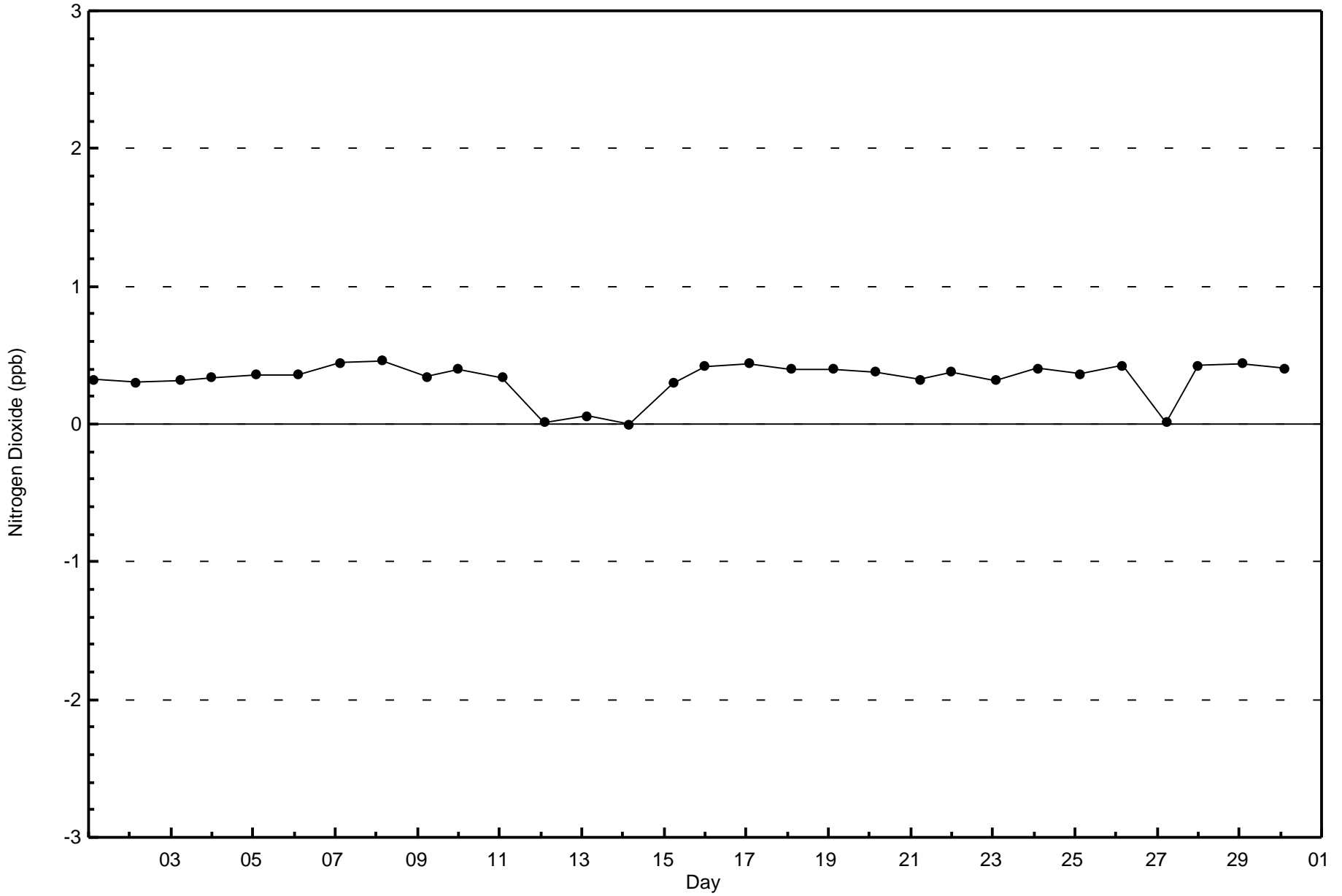


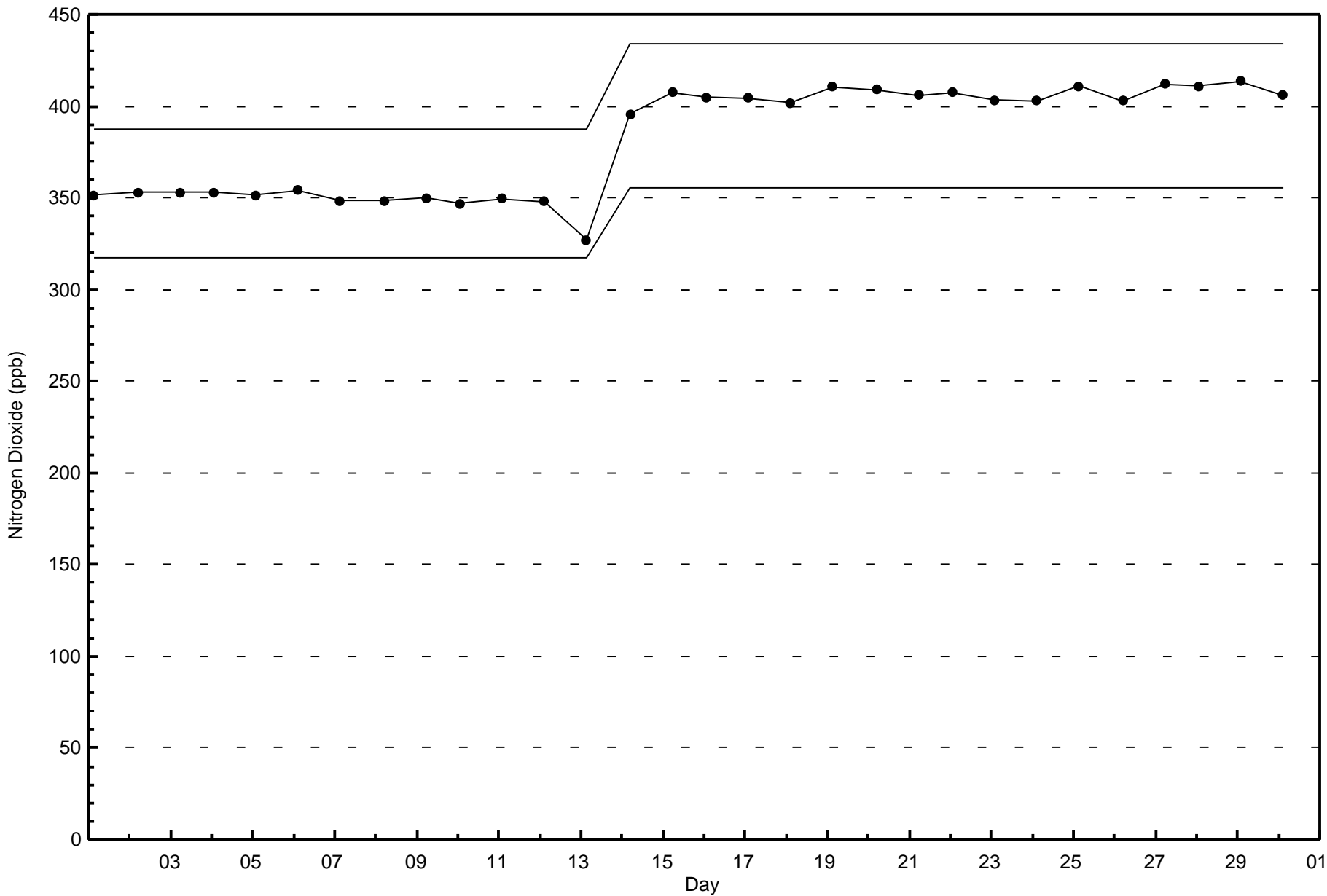
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 685





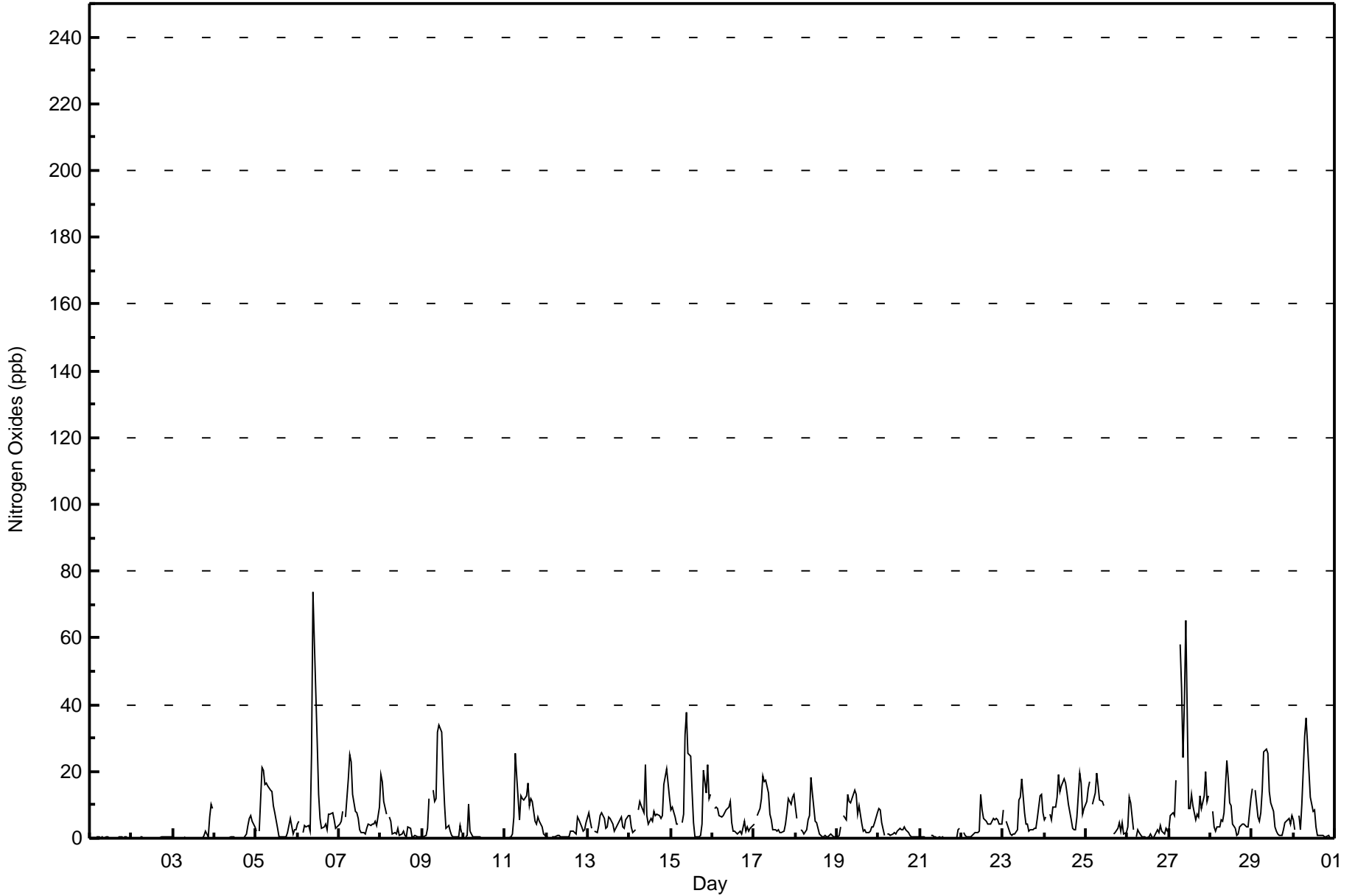


| Maximum Value: 74 ppb on Sep 6 10:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 18.0 ppb on Sep 27 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|----|----|----|----|----|----|----|---------------|---------------|---|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: 0 ppb on Sep 3 12:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.2 ppb on Sep 1 | | | | | | | | | | | | | | | | | Hours of Data: 685 | |
| Maximum Diurnal Average: 13.5 ppb at hour 10 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.1 ppb at hour 18 | | | | | | | | | | | | | | | | | Hours of Missing Data: 35 | |
| Monthly Average: 5.8 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 O ₃ = 8 P ₉₀ = 14 P ₉₉ = 36 | | | | | | | | | | | | | | | | | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.2 | 1 | | | | | | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 6 | 10 | 9 | 1.3 | 10 | | | | | | | | | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 6 | 7 | 5 | 3 | 1.2 | 7 | | | | | | | | | |
| 5-Sep | 2 | Z | 2 | 21 | 20 | 16 | 16 | 15 | 15 | 14 | 10 | 8 | 3 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 6 | 1 | 3 | 2 | 7.0 | 21 | | | | | | | | | |
| 6-Sep | 4 | 5 | Z | 2 | 4 | 4 | 4 | 2 | 25 | 74 | 59 | 29 | 13 | 6 | 3 | 3 | 4 | 3 | 7 | 7 | 8 | 5 | 3 | 4 | 12.0 | 74 | | | | | | | | | |
| 7-Sep | 4 | 5 | 8 | Z | 6 | 18 | 25 | 23 | 13 | 8 | 8 | 6 | 2 | 2 | 2 | 1 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 9 | 7.4 | 25 | | | | | | | | | |
| 8-Sep | 19 | 17 | 11 | 7 | Z | 6 | 5 | 1 | 2 | 1 | 3 | 1 | 1 | 2 | 1 | 0 | 4 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 3.8 | 19 | | | | | | | | | |
| 9-Sep | 0 | 0 | 1 | 3 | 12 | Z | 15 | 11 | 12 | 32 | 34 | 32 | 20 | 10 | 3 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | 8.6 | 34 | | | | | | | | | |
| 10-Sep | Z | 0 | 1 | 10 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 10 | | | | | | | | | |
| 11-Sep | 0 | Z | 0 | 0 | 1 | 7 | 25 | 19 | 5 | 13 | 12 | 11 | 13 | 17 | 10 | 12 | 11 | 5 | 4 | 6 | 5 | 3 | 1 | 1 | 7.9 | 25 | | | | | | | | | |
| 12-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 6 | 5 | 4 | 2 | 3 | 5 | 1.7 | 6 | | | | | | | | | |
| 13-Sep | 8 | 5 | 3 | Z | 2 | 2 | 4 | 7 | 8 | 6 | 3 | 3 | 6 | 6 | 4 | 2 | 3 | 4 | 5 | 6 | 3 | 3 | 5 | 7 | 4.6 | 8 | | | | | | | | | |
| 14-Sep | 7 | 3 | 2 | 3 | Z | 8 | 11 | 10 | 7 | 22 | 7 | 4 | 6 | 5 | 8 | 7 | 7 | 7 | 6 | 7 | 16 | 21 | 16 | 12 | 8.8 | 22 | | | | | | | | | |
| 15-Sep | 9 | 9 | 7 | 4 | 4 | Z | 5 | 7 | 31 | 38 | 26 | 25 | 14 | 5 | 0 | 0 | 0 | 1 | 4 | 20 | 14 | 22 | 12 | 13 | 11.7 | 38 | | | | | | | | | |
| 16-Sep | Z | 9 | 9 | 9 | 7 | 6 | 7 | 8 | 9 | 9 | 11 | 5 | 2 | 2 | 1 | 2 | 2 | 1 | 5 | 2 | 3 | 2 | 3 | 4 | 5.1 | 11 | | | | | | | | | |
| 17-Sep | 4 | Z | 7 | 9 | 12 | 19 | 17 | 17 | 14 | 7 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 8 | 12 | 10 | 12 | 13 | 8.1 | 19 | | | | | | | | | |
| 18-Sep | 9 | 6 | Z | 3 | 2 | 1 | 3 | 5 | 7 | 18 | 14 | 5 | 5 | 3 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 3.8 | 18 | | | | | | | | | |
| 19-Sep | 0 | 1 | 3 | Z | 7 | 5 | 13 | 11 | 11 | 13 | 14 | 13 | 7 | 10 | 4 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 5 | 8 | 6.2 | 14 | | | | | | | | | |
| 20-Sep | 9 | 8 | 5 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 0 | 1 | 0 | 1 | 2.3 | 9 | | | | | | | | | |
| 21-Sep | 0 | 1 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.5 | 3 | | | | | | | | | |
| 22-Sep | Z | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 13 | 8 | 6 | 5 | 4 | 4 | 4 | 6 | 5 | 6 | 5 | 4 | 4 | 3.9 | 13 | | | | | | | | | |
| 23-Sep | 9 | Z | 5 | 3 | 1 | 1 | 1 | 1 | 2 | 11 | 12 | 18 | 8 | 4 | 4 | 2 | 2 | 3 | 3 | 3 | 6 | 13 | 13 | 8 | 5.8 | 18 | | | | | | | | | |
| 24-Sep | 5 | 6 | Z | 7 | 6 | 9 | 9 | 12 | 19 | 14 | 16 | 18 | 17 | 14 | 10 | 6 | 3 | 3 | 3 | 6 | 19 | 16 | 7 | 9 | 10.2 | 19 | | | | | | | | | |
| 25-Sep | 11 | 15 | 17 | Z | 10 | 13 | 19 | 16 | 12 | 11 | 10 | C | C | C | C | C | 1 | 2 | 3 | 5 | 2 | 5 | 1 | 2 | 8.6 | 19 | | | | | | | | | |
| 26-Sep | 4 | 12 | 10 | 3 | Z | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 2 | 4 | 2 | 1 | 3 | 2 | 2 | 2.4 | 12 | | | | | | | | | |
| 27-Sep | 3 | 7 | 8 | 7 | 18 | Z | 58 | 45 | 24 | 41 | 65 | 9 | 9 | 13 | 10 | 6 | 7 | 6 | 13 | 9 | 13 | 20 | 11 | 13 | 18.0 | 65 | | | | | | | | | |
| 28-Sep | Z | 8 | 3 | 2 | 4 | 4 | 6 | 5 | 8 | 23 | 18 | 11 | 10 | 4 | 3 | 1 | 1 | 3 | 4 | 4 | 4 | 3 | 3 | 12 | 6.3 | 23 | | | | | | | | | |
| 29-Sep | 15 | Z | 14 | 6 | 5 | 8 | 15 | 26 | 27 | 25 | 14 | 11 | 8 | 3 | 2 | 1 | 1 | 1 | 2 | 5 | 5 | 6 | 4 | 7 | 9.2 | 27 | | | | | | | | | |
| 30-Sep | 6 | 2 | Z | 7 | 2 | 10 | 31 | 36 | 28 | 20 | 12 | 8 | 8 | 4 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 7.9 | 36 | | | | | | | | | |
| 5.2 | | | | | | | | | | | | | | | | | 5.0 | | | | | | | | | | | | | | | | | Diurnal Average | |
| 19 | | | | | | | | | | | | | | | | | 17 | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| 4.7 | | | | | | | | | | | | | | | | | 4.3 | | | | | | | | | | | | | | | | | | |
| 5.1 | | | | | | | | | | | | | | | | | 5.7 | | | | | | | | | | | | | | | | | | |
| 9.8 | | | | | | | | | | | | | | | | | 9.5 | | | | | | | | | | | | | | | | | | |
| 9.5 | | | | | | | | | | | | | | | | | 13.5 | | | | | | | | | | | | | | | | | | |
| 11.9 | | | | | | | | | | | | | | | | | 11.9 | | | | | | | | | | | | | | | | | | |
| 8.1 | | | | | | | | | | | | | | | | | 8.1 | | | | | | | | | | | | | | | | | | |
| 5.8 | | | | | | | | | | | | | | | | | 5.8 | | | | | | | | | | | | | | | | | | |
| 4.2 | | | | | | | | | | | | | | | | | 4.2 | | | | | | | | | | | | | | | | | | |
| 2.8 | | | | | | | | | | | | | | | | | 2.8 | | | | | | | | | | | | | | | | | | |
| 2.2 | | | | | | | | | | | | | | | | | 2.2 | | | | | | | | | | | | | | | | | | |
| 2.3 | | | | | | | | | | | | | | | | | 2.3 | | | | | | | | | | | | | | | | | | |
| 2.1 | | | | | | | | | | | | | | | | | 2.1 | | | | | | | | | | | | | | | | | | |
| 3.0 | | | | | | | | | | | | | | | | | 3.0 | | | | | | | | | | | | | | | | | | |
| 4.1 | | | | | | | | | | | | | | | | | 4.1 | | | | | | | | | | | | | | | | | | |
| 4.9 | | | | | | | | | | | | | | | | | 4.9 | | | | | | | | | | | | | | | | | | |
| 5.5 | | | | | | | | | | | | | | | | | 5.5 | | | | | | | | | | | | | | | | | | |
| 4.6 | | | | | | | | | | | | | | | | | 4.6 | | | | | | | | | | | | | | | | | | |
| 5.1 | | | | | | | | | | | | | | | | | 5.1 | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 655 | 95.62 | 95.62 |
| 21 - 40 | 24 | 3.50 | 99.12 |
| 41 - 80 | 6 | 0.88 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 72 | 21 | 11 | 7 | 4 | 8 | 11 | 104 | 93 | 45 | 38 | 36 | 56 | 71 | 45 | 33 | 655 |
| 21 - 40 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 9 | 4 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 24 |
| 11 - 80 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 6 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 79 | 23 | 13 | 7 | 4 | 8 | 11 | 113 | 97 | 48 | 40 | 37 | 56 | 71 | 45 | 33 | 685 |

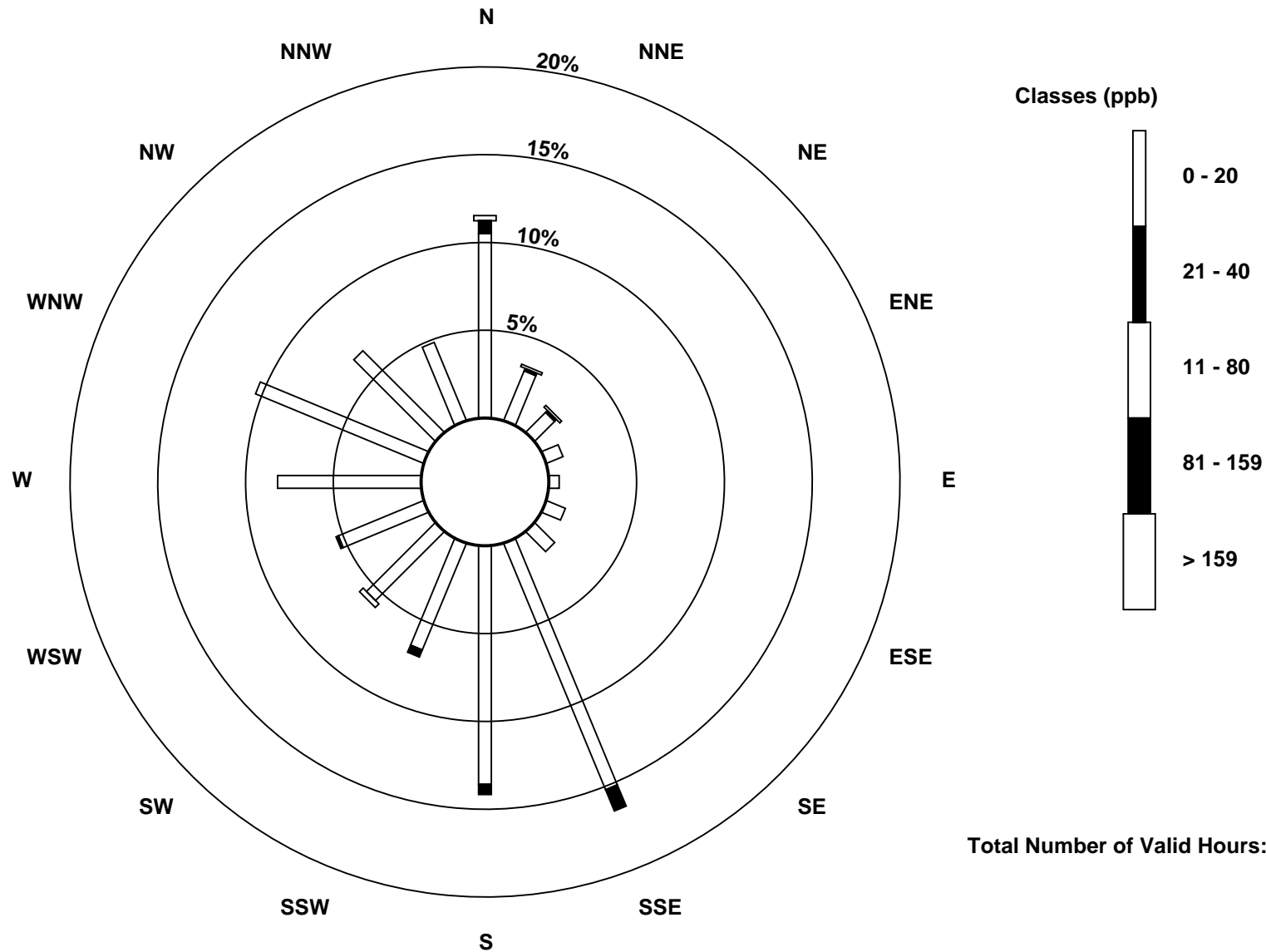
Total Number of Valid Hours: 685

Total Number of Hours: 720

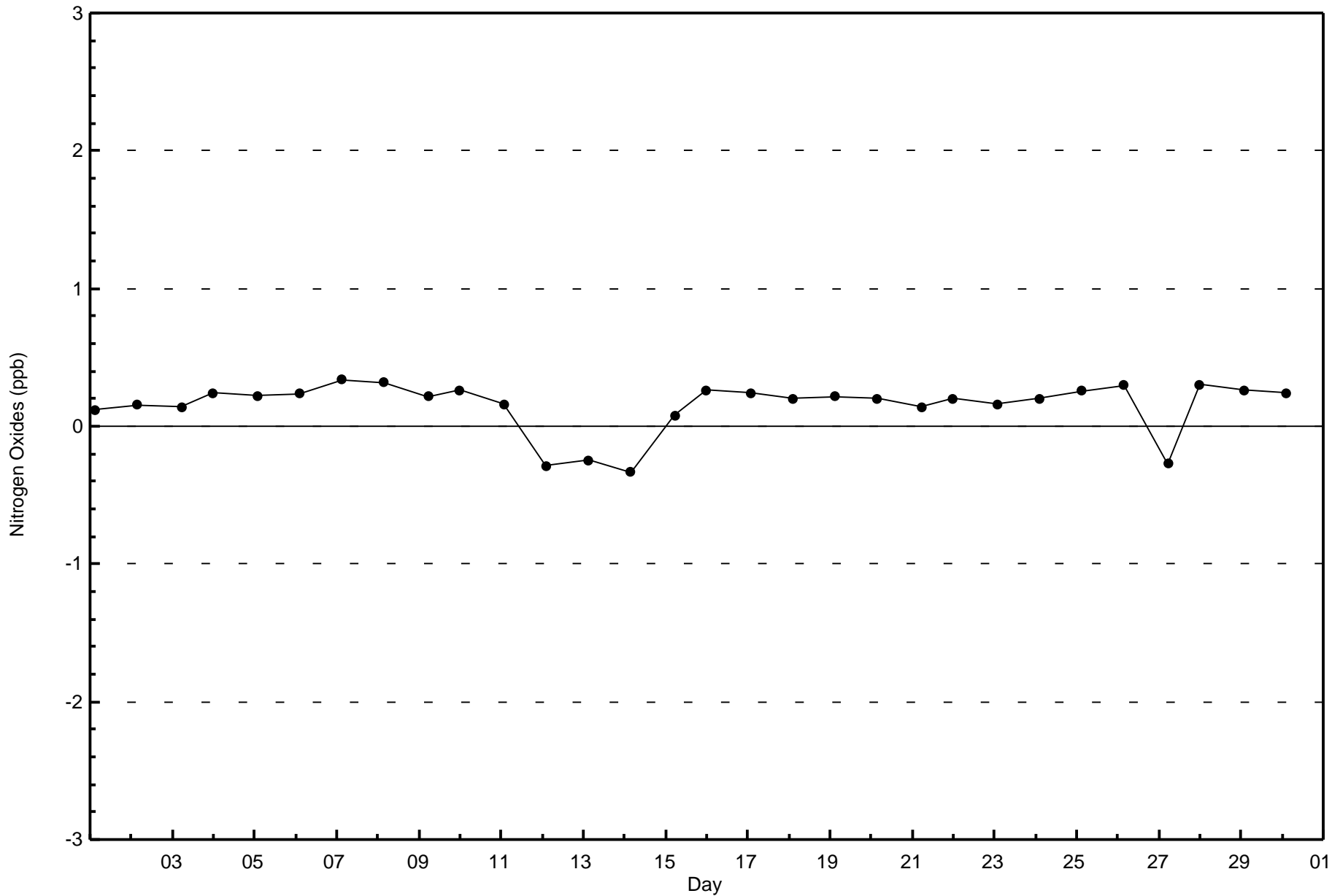


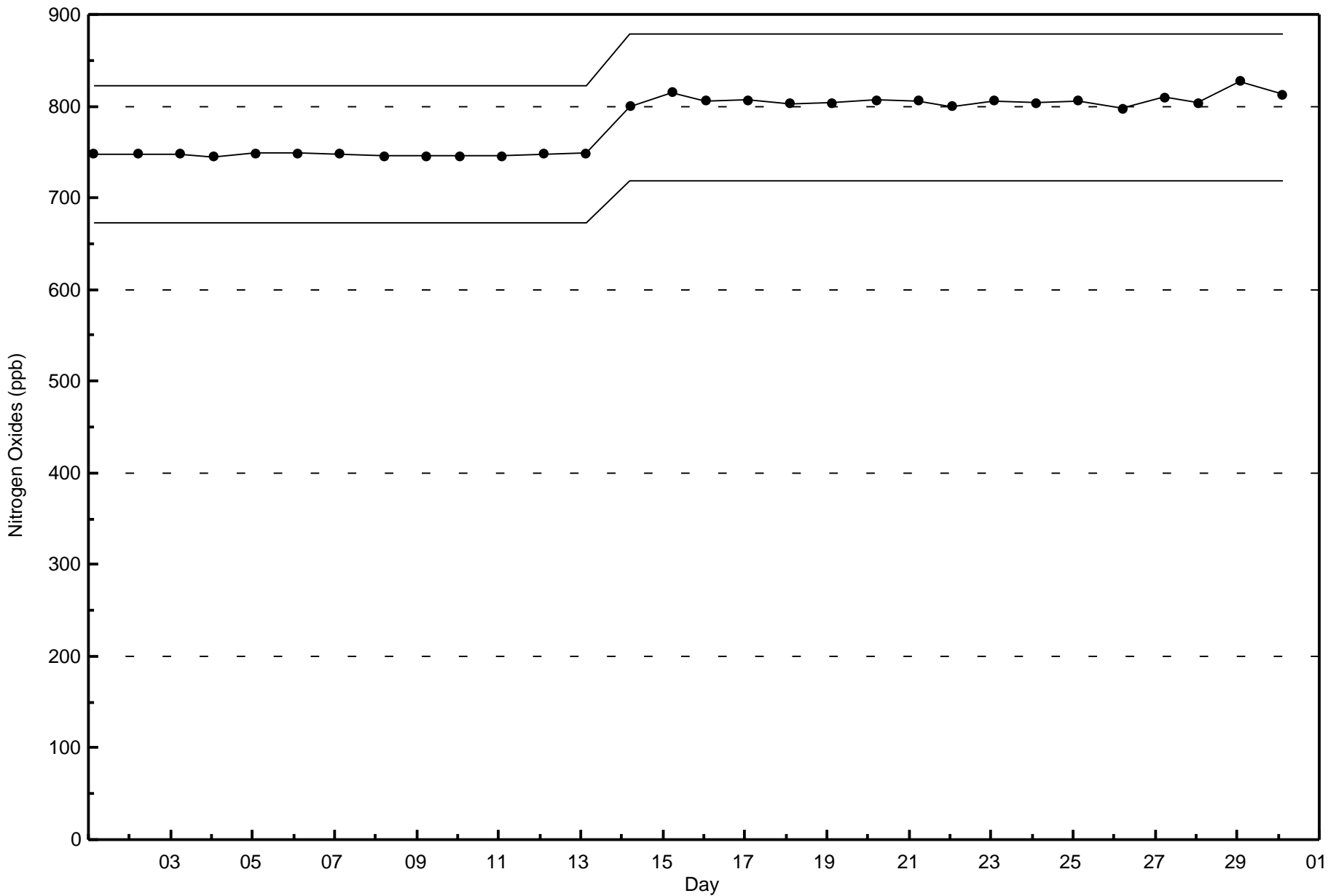
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

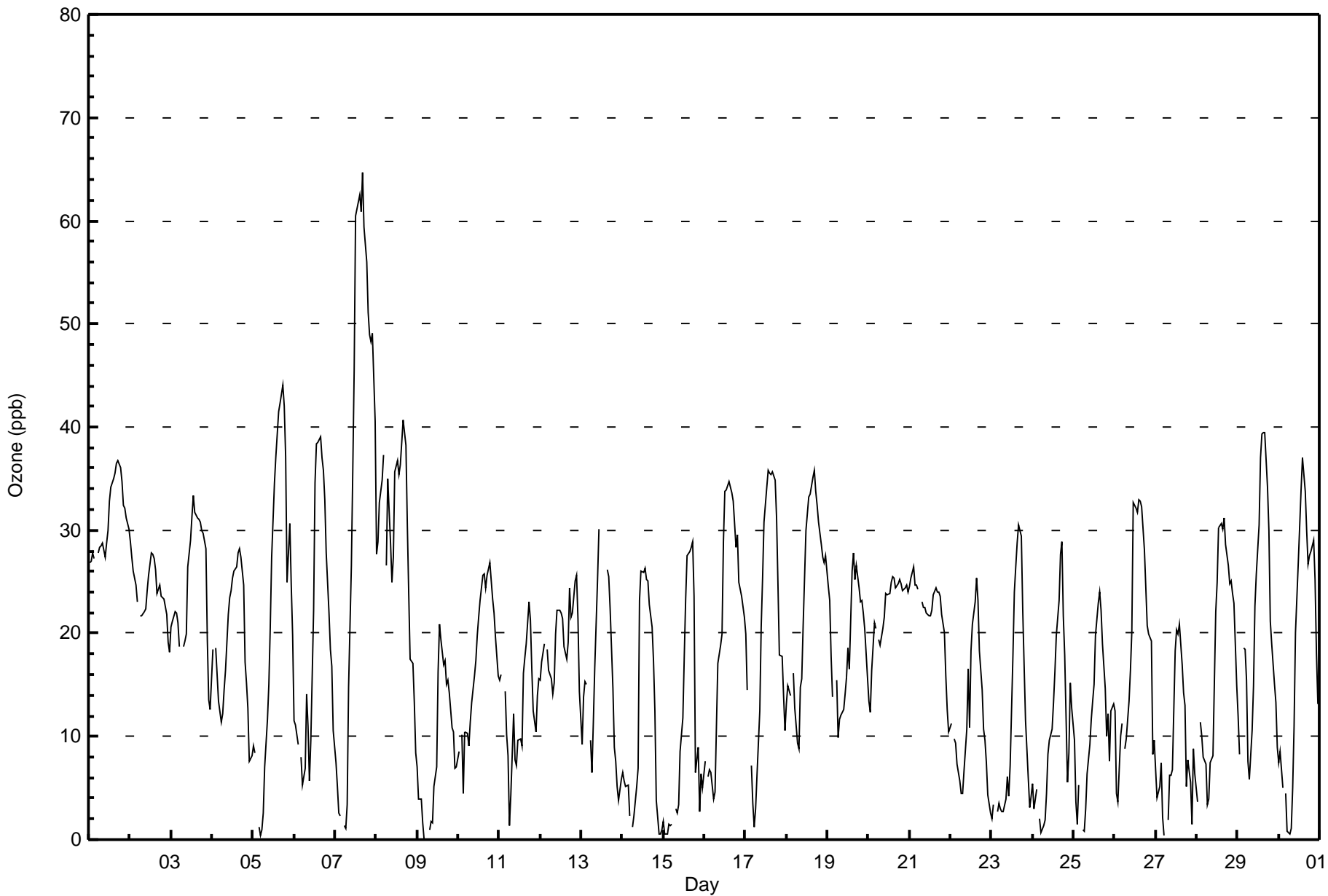
Fort McKay - Bertha Ganter - September 2017

| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 65 ppb on Sep 7 17:00 | Maximum Daily Average: 35.2 ppb on Sep 7 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 9 06:00 | Minimum Daily Average: 8.9 ppb on Sep 9 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 29.8 ppb at hour 16 | Minimum Diurnal Average: 8.1 ppb at hour 6 | | Hours of Calibration: | 34 |
| Monthly Average: 18.8 ppb | Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 9 Median = 19 Q ₃ = 26 P ₉₀ = 33 P ₉₉ = 55 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 27 | 27 | 28 | 27 | Z | 28 | 28 | 29 | 29 | 27 | 29 | 30 | 33 | 34 | 35 | 36 | 37 | 37 | 36 | 35 | 32 | 32 | 31 | 30 | 31.1 | 37 |
| 2-Sep | 29 | 27 | 26 | 25 | 23 | Z | 22 | 22 | 22 | 22 | 24 | 26 | 28 | 28 | 27 | 26 | 24 | 25 | 24 | 23 | 23 | 22 | 19 | 18 | 24.1 | 29 |
| 3-Sep | 21 | 21 | 22 | 22 | 21 | 19 | Z | 19 | 19 | 20 | 26 | 29 | 31 | 33 | 32 | 31 | 31 | 31 | 30 | 30 | 28 | 19 | 14 | 13 | 24.4 | 33 |
| 4-Sep | 19 | Z | 19 | 16 | 13 | 11 | 12 | 15 | 16 | 22 | 23 | 24 | 25 | 26 | 26 | 28 | 28 | 27 | 25 | 17 | 15 | 13 | 8 | 8 | 19.0 | 28 |
| 5-Sep | 9 | 8 | Z | 1 | 0 | 1 | 3 | 7 | 12 | 15 | 21 | 27 | 35 | 37 | 39 | 42 | 42 | 44 | 42 | 37 | 25 | 31 | 25 | 20 | 22.7 | 44 |
| 6-Sep | 12 | 11 | 9 | Z | 8 | 5 | 7 | 14 | 11 | 6 | 10 | 22 | 35 | 38 | 39 | 39 | 37 | 36 | 33 | 28 | 22 | 18 | 17 | 11 | 20.3 | 39 |
| 7-Sep | 7 | 5 | 3 | 2 | Z | 1 | 1 | 3 | 15 | 27 | 36 | 46 | 60 | 61 | 63 | 61 | 65 | 59 | 56 | 51 | 49 | 48 | 49 | 41 | 35.2 | 65 |
| 8-Sep | 28 | 29 | 33 | 35 | 37 | Z | 27 | 35 | 29 | 25 | 27 | 36 | 37 | 35 | 36 | 38 | 41 | 38 | 31 | 24 | 18 | 17 | 13 | 8 | 29.4 | 41 |
| 9-Sep | 7 | 4 | 4 | 2 | 0 | 0 | Z | 1 | 2 | 2 | 5 | 7 | 16 | 21 | 19 | 17 | 17 | 15 | 15 | 14 | 11 | 10 | 7 | 7 | 8.9 | 21 |
| 10-Sep | 9 | Z | 10 | 4 | 10 | 10 | 9 | 11 | 13 | 16 | 17 | 20 | 22 | 23 | 26 | 26 | 24 | 26 | 27 | 25 | 23 | 22 | 20 | 16 | 17.8 | 27 |
| 11-Sep | 15 | 16 | Z | 14 | 10 | 8 | 1 | 4 | 12 | 8 | 7 | 10 | 10 | 9 | 16 | 18 | 19 | 23 | 21 | 16 | 13 | 10 | 14 | 16 | 12.7 | 23 |
| 12-Sep | 15 | 17 | 19 | Z | 18 | 16 | 16 | 14 | 15 | 20 | 22 | 22 | 22 | 21 | 19 | 17 | 19 | 24 | 22 | 22 | 25 | 26 | 21 | 14 | 19.5 | 26 |
| 13-Sep | 9 | 14 | 15 | 15 | Z | 10 | 6 | 11 | 17 | 25 | 30 | C | C | C | C | 26 | 26 | 22 | 15 | 9 | 8 | 5 | 4 | 6 | 14.4 | 30 |
| 14-Sep | 7 | 6 | 5 | 5 | 2 | Z | 1 | 2 | 5 | 7 | 23 | 26 | 26 | 26 | 25 | 25 | 23 | 21 | 17 | 12 | 4 | 1 | 1 | 1 | 11.8 | 26 |
| 15-Sep | 2 | 1 | 1 | 1 | 1 | 1 | Z | 3 | 3 | 3 | 8 | 12 | 18 | 23 | 28 | 28 | 28 | 29 | 24 | 7 | 9 | 3 | 6 | 5 | 10.6 | 29 |
| 16-Sep | 8 | Z | 6 | 7 | 7 | 4 | 5 | 11 | 17 | 19 | 20 | 29 | 34 | 34 | 35 | 34 | 34 | 33 | 28 | 30 | 25 | 24 | 24 | 22 | 21.1 | 35 |
| 17-Sep | 20 | 15 | Z | 7 | 4 | 1 | 3 | 6 | 12 | 21 | 25 | 31 | 34 | 36 | 36 | 35 | 36 | 35 | 31 | 25 | 18 | 18 | 14 | 11 | 20.5 | 36 |
| 18-Sep | 13 | 15 | 14 | Z | 16 | 13 | 9 | 9 | 15 | 16 | 21 | 30 | 32 | 33 | 34 | 35 | 36 | 34 | 32 | 31 | 29 | 27 | 27 | 28 | 23.8 | 36 |
| 19-Sep | 25 | 23 | 18 | 14 | Z | 15 | 10 | 12 | 12 | 13 | 14 | 16 | 19 | 17 | 26 | 28 | 25 | 27 | 24 | 23 | 23 | 22 | 20 | 16 | 19.1 | 28 |
| 20-Sep | 13 | 12 | 16 | 21 | 20 | Z | 19 | 19 | 21 | 22 | 24 | 24 | 24 | 25 | 26 | 25 | 24 | 25 | 25 | 25 | 24 | 24 | 25 | 24 | 22.1 | 26 |
| 21-Sep | 24 | 25 | 26 | 25 | 25 | 24 | Z | 23 | 23 | 23 | 22 | 22 | 22 | 22 | 24 | 24 | 24 | 24 | 24 | 22 | 20 | 16 | 13 | 10 | 22.0 | 26 |
| 22-Sep | 11 | Z | 10 | 9 | 7 | 6 | 5 | 4 | 7 | 11 | 17 | 11 | 18 | 21 | 23 | 25 | 23 | 18 | 15 | 11 | 10 | 7 | 4 | 3 | 12.0 | 25 |
| 23-Sep | 2 | 3 | Z | 3 | 4 | 3 | 3 | 3 | 4 | 6 | 4 | 7 | 18 | 24 | 26 | 29 | 31 | 29 | 22 | 17 | 11 | 6 | 3 | 4 | 11.4 | 31 |
| 24-Sep | 5 | 3 | 5 | Z | 2 | 1 | 1 | 2 | 4 | 8 | 10 | 11 | 13 | 16 | 20 | 23 | 28 | 29 | 22 | 18 | 5 | 8 | 15 | 13 | 11.4 | 29 |
| 25-Sep | 10 | 4 | 1 | 5 | Z | 1 | 1 | 3 | 6 | 9 | 12 | 13 | 15 | 20 | 23 | 24 | 22 | 19 | 15 | 10 | 12 | 8 | 12 | 13 | 11.2 | 24 |
| 26-Sep | 12 | 4 | 4 | 10 | 11 | Z | 9 | 10 | 13 | 16 | 20 | 33 | 32 | 32 | 33 | 33 | 32 | 28 | 24 | 21 | 20 | 19 | 8 | 10 | 18.9 | 33 |
| 27-Sep | 7 | 4 | 5 | 7 | 2 | 0 | Z | 2 | 6 | 6 | 7 | 18 | 20 | 20 | 21 | 17 | 14 | 13 | 5 | 8 | 6 | 1 | 9 | 6 | 9.0 | 21 |
| 28-Sep | 4 | Z | 11 | 10 | 8 | 7 | 3 | 4 | 7 | 8 | 15 | 22 | 25 | 30 | 31 | 30 | 31 | 29 | 27 | 25 | 25 | 24 | 23 | 15 | 18.0 | 31 |
| 29-Sep | 12 | 8 | Z | 19 | 18 | 16 | 8 | 6 | 11 | 15 | 23 | 26 | 30 | 37 | 39 | 39 | 39 | 34 | 30 | 21 | 19 | 15 | 13 | 9 | 21.2 | 39 |
| 30-Sep | 7 | 9 | 5 | Z | 4 | 1 | 0 | 1 | 5 | 11 | 20 | 27 | 30 | 34 | 37 | 34 | 30 | 27 | 28 | 28 | 29 | 25 | 18 | 13 | 18.4 | 37 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 12.9 | 12.5 | 12.6 | 12.3 | 11.0 | 8.1 | 8.4 | 10.2 | 12.8 | 14.9 | 18.8 | 22.6 | 26.3 | 28.2 | 29.7 | 29.8 | 29.7 | 28.7 | 25.6 | 22.1 | 19.4 | 17.4 | 15.9 | 13.6 | Diurnal Average | |
| 29 | 29 | 33 | 35 | 37 | 28 | 28 | 35 | 29 | 27 | 36 | 46 | 60 | 61 | 63 | 61 | 65 | 59 | 56 | 51 | 49 | 48 | 49 | 41 | Diurnal Maximum | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 373 | 54.37 | 54.37 |
| 21 - 50 | 305 | 44.46 | 98.83 |
| 51 - 82 | 8 | 1.17 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 38 | 8 | 3 | 0 | 1 | 4 | 9 | 66 | 51 | 35 | 26 | 16 | 24 | 52 | 22 | 18 | 373 |
| 21 - 50 | 40 | 15 | 10 | 7 | 2 | 3 | 4 | 46 | 36 | 21 | 13 | 19 | 30 | 19 | 24 | 16 | 305 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 78 | 23 | 13 | 7 | 3 | 7 | 13 | 112 | 95 | 56 | 39 | 35 | 54 | 71 | 46 | 34 | 686 |

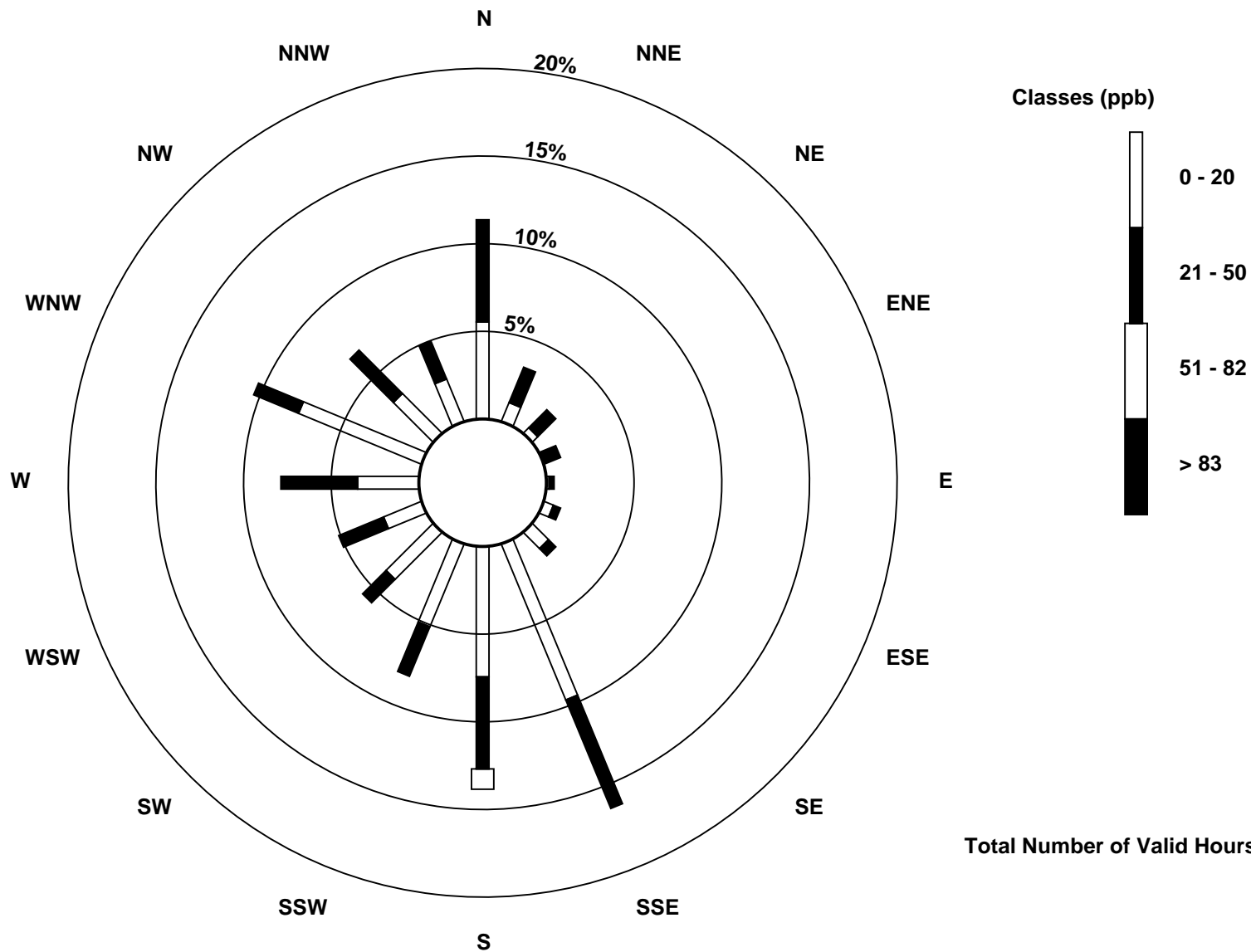
Total Number of Valid Hours: 686

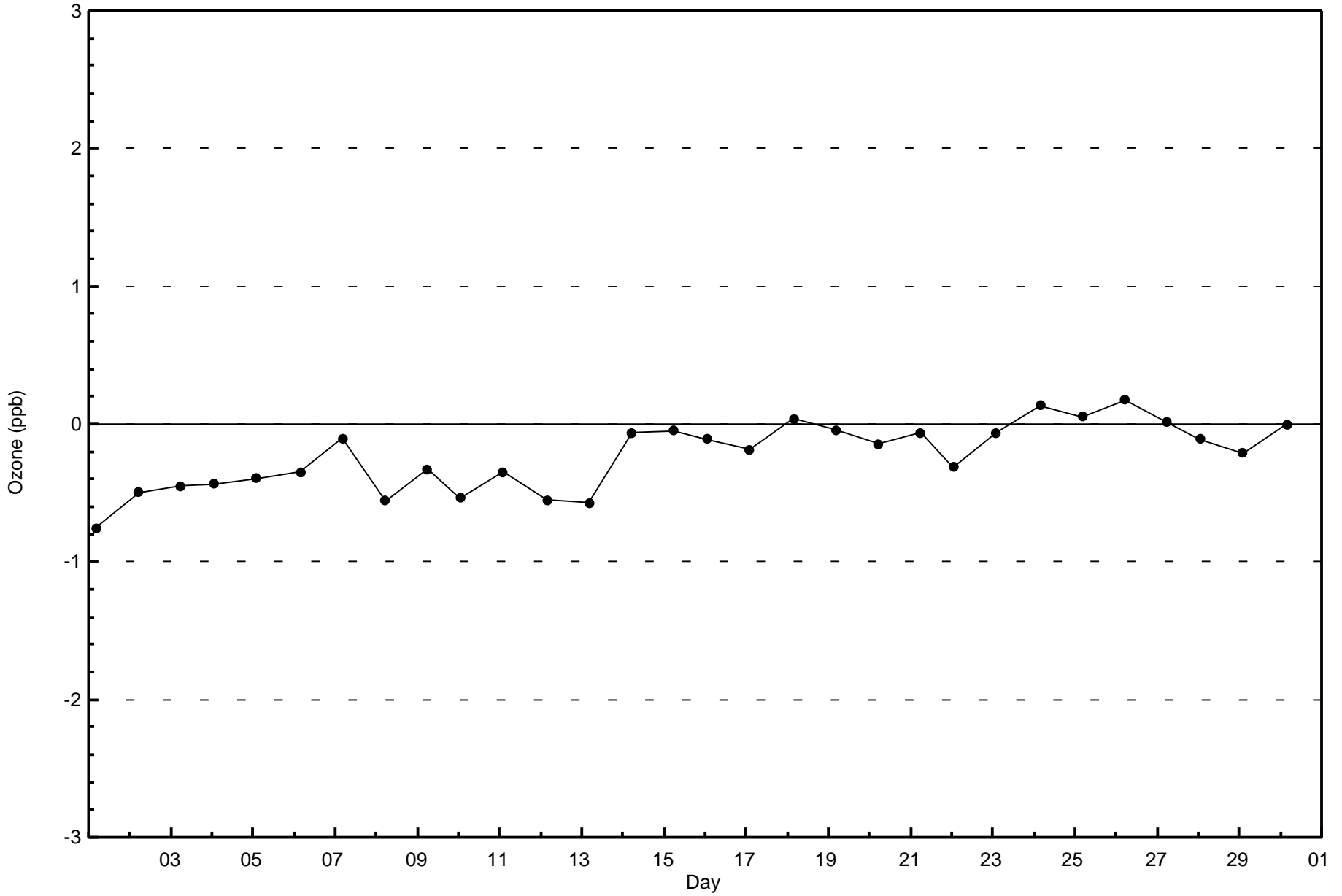
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





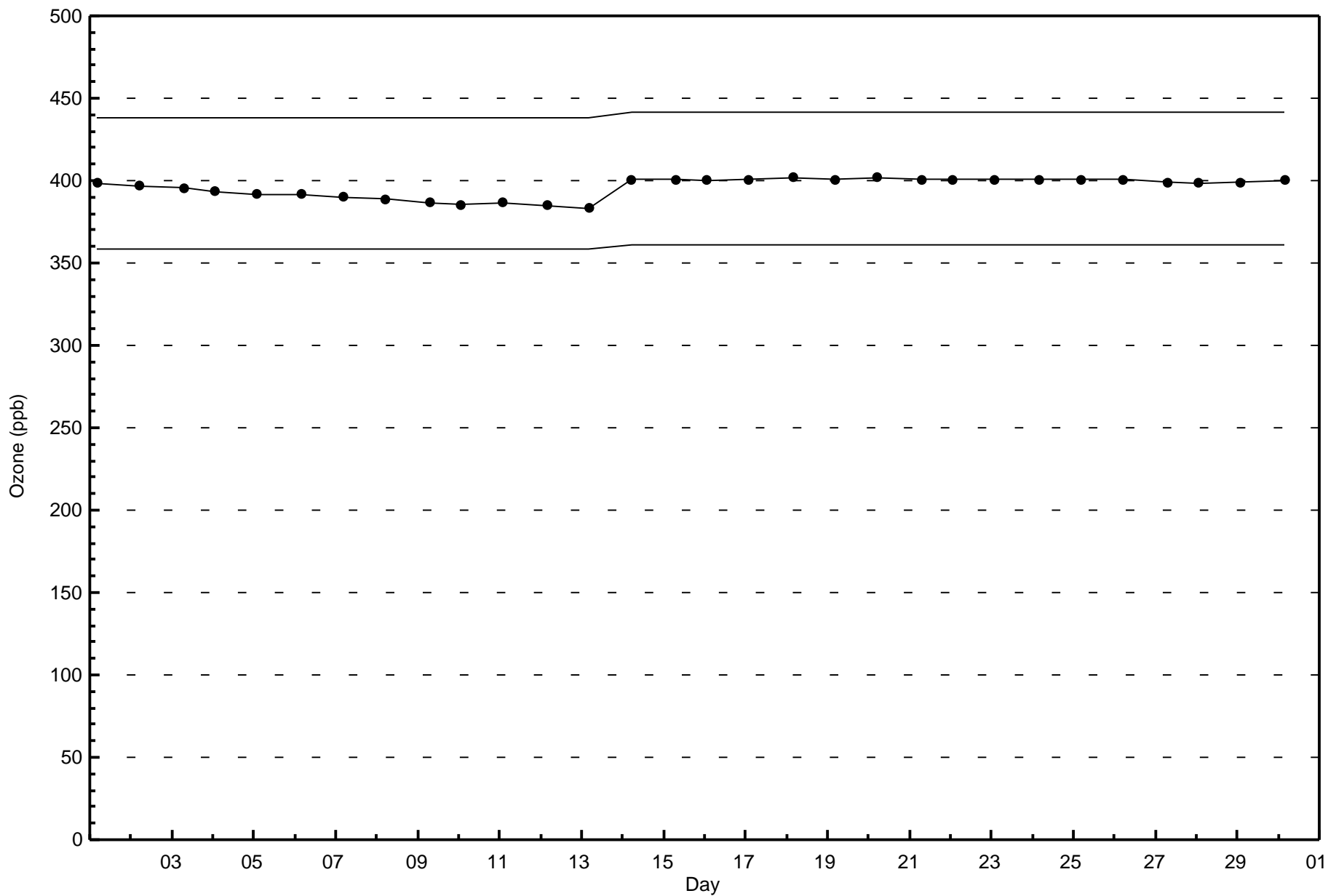


Wood Buffalo Environmental Association

Span Responses

Ozone (O₃) - ppb

Fort McKay - Bertha Ganter - September 2017





| | | | |
|--|--|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 47.3 µg/m ³ on Sep 19 11:00 | Maximum Daily Average: 18.0 µg/m ³ on Sep 7 | Hours of Data: | 705 |
| Minimum Value: 0.3 µg/m ³ on Sep 21 01:00 | Minimum Daily Average: 0.8 µg/m ³ on Sep 21 | Hours of Missing Data: | 15 |
| Maximum Diurnal Average: 10.1 µg/m ³ at hour 11 | Minimum Diurnal Average: 5.0 µg/m ³ at hour 17 | Hours of Calibration: | 2 |
| Monthly Average: 6.78 µg/m ³ | Percentiles: P ₁ = 0.5 P ₁₀ = 1.2 Q ₁ = 2.3 Median = 4.6 Q ₃ = 9.8 P ₉₀ = 13.8 P ₉₉ = 30.0 | Percent Operational Time: | 98.2 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 3.7 | 3.4 | 3.4 | 4.0 | 3.8 | 3.8 | 3.8 | 3.0 | 2.6 | 1.7 | 1.9 | 1.5 | 1.3 | 1.4 | 1.3 | 1.4 | 1.4 | 1.4 | 2.2 | 2.9 | 3.8 | 3.3 | 3.4 | 3.5 | 2.7 | 4.0 |
| 2-Sep | 3.7 | 4.0 | 4.2 | 4.8 | 4.6 | 4.5 | 4.5 | 3.2 | 2.5 | 2.3 | 2.2 | 1.9 | 1.3 | 1.7 | 2.1 | 1.4 | 1.5 | 1.4 | 1.7 | 2.5 | 2.2 | 3.2 | 3.7 | 2.7 | 2.8 | 4.8 |
| 3-Sep | 2.7 | 3.6 | 3.8 | 3.7 | 3.9 | 4.6 | 4.2 | 2.8 | 2.7 | 3.1 | 2.4 | 2.4 | 2.7 | 2.6 | 2.5 | 2.6 | 2.8 | 3.2 | 8.8 | 6.0 | 4.2 | 4.4 | 4.3 | 4.3 | 3.7 | 8.8 |
| 4-Sep | 3.8 | 3.3 | 3.3 | 3.6 | 3.8 | 3.7 | 3.5 | 2.0 | 1.7 | 1.6 | 1.7 | 1.9 | 1.7 | 1.7 | 1.8 | 1.6 | 1.7 | 1.7 | 2.2 | 4.6 | 6.4 | 7.2 | 10.3 | 8.2 | 3.5 | 10.3 |
| 5-Sep | 11.1 | 12.3 | 10.5 | 12.4 | 11.6 | 12.9 | 12.8 | 12.5 | 12.8 | 9.0 | 9.5 | 11.5 | 6.4 | 3.5 | 3.4 | 3.2 | 3.2 | 4.1 | 8.0 | 6.7 | 11.6 | 7.5 | 10.6 | 10.4 | 9.1 | 12.9 |
| 6-Sep | 11.0 | 10.7 | 10.2 | 9.4 | 10.5 | 12.1 | 18.7 | 26.2 | 18.7 | 13.2 | 12.3 | 8.7 | 8.7 | 8.4 | 8.9 | 12.4 | 10.7 | 9.5 | 14.8 | 13.0 | 11.5 | 12.8 | 10.8 | 11.1 | 12.3 | 26.2 |
| 7-Sep | 11.3 | 11.9 | 13.8 | 13.4 | 12.0 | 14.6 | 16.7 | 27.9 | 14.6 | 15.5 | 14.6 | 12.7 | 10.3 | 10.7 | 13.8 | 15.8 | 18.1 | 25.7 | 32.7 | 30.4 | 26.2 | 26.3 | 22.1 | 21.9 | 18.0 | 32.7 |
| 8-Sep | 23.6 | 23.1 | 20.6 | 17.2 | 17.6 | 22.9 | 21.3 | 15.8 | 22.8 | 39.1 | 28.8 | 15.3 | 11.9 | 14.6 | 11.2 | 8.1 | 10.4 | 8.3 | 4.5 | 2.9 | 2.1 | 2.1 | 3.2 | 4.2 | 14.7 | 39.1 |
| 9-Sep | 5.1 | 6.1 | 6.6 | 6.3 | 5.5 | 4.2 | 6.2 | 6.2 | 4.7 | 3.1 | 2.5 | 2.9 | 6.4 | 11.2 | 10.7 | 10.0 | 7.4 | 6.8 | 5.7 | 7.0 | 9.2 | 8.5 | 8.0 | 10.8 | 6.7 | 11.2 |
| 10-Sep | 11.5 | 9.2 | 11.4 | 11.9 | 9.6 | 9.5 | 10.5 | 7.2 | 4.8 | 3.2 | 3.3 | 5.1 | 7.3 | 7.1 | 8.0 | 5.2 | 3.9 | 2.1 | 1.8 | 2.2 | 2.3 | 2.3 | 2.3 | 2.6 | 6.0 | 11.9 |
| 11-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | M | M | 20.4 | 16.2 | 7.7 | 11.6 | 16.0 | 12.1 | 13.5 | 8.8 | 7.3 | 4.3 | 3.7 | -- | 20.4 |
| 12-Sep | 3.6 | 3.8 | 4.1 | 4.8 | 5.8 | 5.1 | 5.7 | 6.7 | 6.8 | 5.9 | 5.4 | 5.3 | 5.5 | 5.5 | 6.1 | 5.9 | 5.2 | 4.6 | 5.6 | 5.5 | 5.3 | 5.1 | 5.5 | 6.3 | 5.4 | 6.8 |
| 13-Sep | 5.4 | 3.3 | 3.4 | 3.1 | 3.7 | 2.8 | 3.2 | 3.2 | 3.2 | 2.8 | C | C | 2.7 | 1.6 | 1.2 | 1.1 | 1.0 | 0.8 | 0.6 | 4.0 | 1.6 | 0.8 | 1.2 | 0.9 | 2.3 | 5.4 |
| 14-Sep | 0.8 | 0.8 | 0.7 | 0.8 | 0.9 | 1.0 | 1.2 | 1.1 | 1.3 | 2.3 | 1.2 | 1.4 | 1.6 | 1.8 | 2.3 | 2.5 | 2.2 | 1.9 | 1.4 | 1.6 | 2.8 | 3.9 | 2.7 | 1.8 | 1.7 | 3.9 |
| 15-Sep | 2.0 | 2.0 | 1.7 | 1.7 | 1.7 | 1.7 | 2.2 | 2.5 | 13.2 | 21.4 | 25.6 | 16.2 | 6.8 | 3.7 | 0.6 | 0.6 | 0.7 | 1.2 | 2.6 | 6.0 | 7.7 | 10.2 | 14.3 | 10.2 | 6.5 | 25.6 |
| 16-Sep | 5.8 | 4.9 | 5.0 | 5.1 | 4.5 | 4.7 | 4.3 | 4.5 | 9.0 | 13.3 | 23.9 | 13.1 | 7.9 | 9.3 | 6.7 | 6.1 | 6.5 | 7.0 | 7.6 | 12.6 | 12.8 | 7.9 | 7.6 | 11.1 | 8.4 | 23.9 |
| 17-Sep | 8.3 | 10.8 | 8.0 | 7.9 | 7.1 | 7.1 | 7.2 | 8.3 | 9.3 | 15.1 | 17.4 | 15.3 | 15.3 | 12.6 | 11.7 | 9.9 | 8.0 | 8.3 | 10.2 | 10.9 | 11.9 | 11.2 | 11.5 | 11.5 | 10.6 | 17.4 |
| 18-Sep | 11.3 | 11.9 | 14.0 | 15.6 | 15.3 | 13.9 | 13.3 | 15.5 | 13.5 | 10.9 | 8.8 | 10.0 | 10.8 | 9.1 | 11.6 | 11.1 | 8.5 | 12.0 | 12.7 | 11.4 | 12.4 | 9.6 | 11.0 | 12.5 | 11.9 | 15.6 |
| 19-Sep | 11.9 | 11.7 | 11.5 | 10.8 | 11.6 | 11.8 | 17.2 | 23.1 | 25.9 | 37.7 | 47.3 | 46.9 | 41.8 | 40.6 | 32.7 | 20.0 | 10.3 | 2.5 | 2.2 | 1.9 | 2.5 | 2.7 | 3.2 | 3.3 | 18.0 | 47.3 |
| 20-Sep | 3.7 | 4.2 | 4.2 | 4.2 | 3.5 | 1.9 | 1.6 | 1.5 | 2.0 | 2.3 | 1.9 | 1.4 | 1.1 | 1.1 | 1.1 | 1.1 | 1.6 | 1.1 | 1.2 | 1.0 | 0.7 | 0.6 | 0.5 | 0.4 | 1.8 | 4.2 |
| 21-Sep | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.1 | 1.2 | 0.9 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 | 1.2 | 1.2 | 0.8 | 1.2 |
| 22-Sep | 1.2 | 1.9 | 1.2 | 1.2 | 1.4 | 1.8 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 2.4 | 1.9 | 2.1 | 2.8 | 4.3 | 7.4 | 8.2 | 9.3 | 9.8 | 10.2 | 12.7 | 13.8 | 9.7 | 4.6 | 13.8 |
| 23-Sep | 9.8 | 9.3 | 9.8 | 9.3 | 6.6 | 5.7 | 5.9 | 5.4 | 4.9 | 4.8 | 4.6 | 4.4 | 3.4 | 2.4 | 2.3 | 2.1 | 2.5 | 3.5 | 4.9 | 6.0 | 8.5 | 8.1 | 9.4 | 7.8 | 5.9 | 9.8 |
| 24-Sep | 8.4 | 7.2 | 5.3 | 5.3 | 5.3 | 6.2 | 7.9 | 4.7 | 4.6 | 5.1 | 9.0 | 14.6 | 9.1 | 7.1 | 2.8 | 2.8 | 1.6 | 2.3 | 3.2 | 4.5 | 5.5 | 4.9 | 4.7 | 4.3 | 5.7 | 14.6 |
| 25-Sep | 3.8 | 4.3 | 3.8 | 2.8 | 3.1 | 3.4 | 4.0 | 4.9 | 5.4 | 8.9 | 6.2 | 2.1 | 1.3 | 0.9 | 0.3 | 0.5 | 1.2 | 2.5 | 3.5 | 3.9 | 3.2 | 1.5 | 0.5 | 0.5 | 3.0 | 8.9 |
| 26-Sep | 0.4 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.6 | 0.8 | 0.8 | 1.5 | 2.6 | 1.3 | 0.8 | 1.1 | 1.0 | 0.6 | 0.8 | 1.0 | 1.3 | 3.4 | 2.2 | 1.3 | 3.3 | 2.6 | 1.3 | 3.4 |
| 27-Sep | 4.4 | 4.1 | 2.7 | 1.5 | 1.7 | 2.0 | 3.3 | 3.0 | 2.7 | 3.4 | 5.5 | 3.4 | 3.1 | 2.9 | 3.0 | 3.9 | 3.7 | 3.9 | 5.0 | 5.6 | 4.3 | 4.3 | 4.1 | 4.3 | 3.6 | 5.6 |
| 28-Sep | 4.7 | 5.0 | 4.8 | 4.6 | 4.9 | 4.8 | 5.4 | 3.7 | 3.7 | 5.2 | 9.3 | 12.4 | 12.1 | 5.7 | 3.5 | 3.1 | 2.6 | 4.1 | 11.4 | 8.2 | 3.9 | 3.4 | 4.2 | 3.9 | 5.6 | 12.4 |
| 29-Sep | 2.4 | 2.7 | 4.2 | 6.3 | 7.1 | 8.1 | 8.2 | 8.2 | 7.3 | 11.0 | 16.5 | 16.3 | 12.2 | 5.8 | 5.3 | 4.9 | 4.4 | 6.6 | 9.6 | 26.9 | 15.8 | 14.2 | 12.4 | 19.5 | 9.8 | 26.9 |
| 30-Sep | 22.5 | 11.2 | 7.2 | 7.3 | 6.2 | 6.5 | 7.9 | 10.6 | 12.5 | 13.4 | 15.6 | 11.6 | 11.7 | 7.3 | 5.3 | 5.2 | 7.0 | 6.1 | 4.9 | 4.2 | 3.3 | 3.3 | 2.1 | 0.6 | 8.1 | 22.5 |

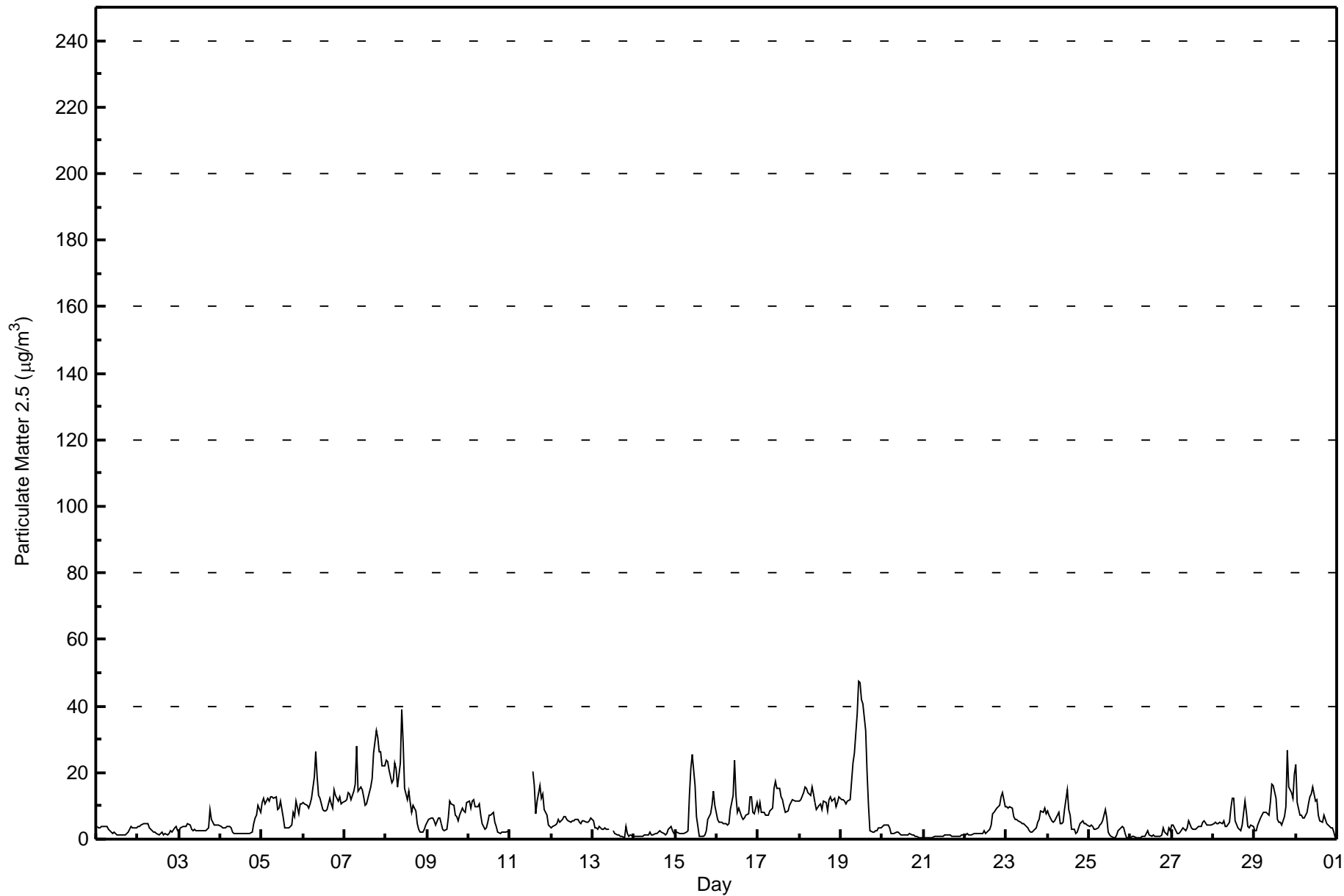
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 6.8 | 6.5 | 6.2 | 6.2 | 6.0 | 6.3 | 7.0 | 7.5 | 7.5 | 8.9 | 10.1 | 8.7 | 7.2 | 6.8 | 6.0 | 5.2 | 5.0 | 5.3 | 6.4 | 7.3 | 6.8 | 6.4 | 6.5 | 6.5 | Diurnal Average | |
| 23.6 | 23.1 | 20.6 | 17.2 | 17.6 | 22.9 | 21.3 | 27.9 | 25.9 | 39.1 | 47.3 | 46.9 | 41.8 | 40.6 | 32.7 | 20.0 | 18.1 | 25.7 | 32.7 | 30.4 | 26.2 | 26.3 | 22.1 | 21.9 | Diurnal Maximum | |

C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 345 | 48.94 | 48.94 |
| 6 - 15 | 253 | 35.89 | 84.82 |
| 16 - 25 | 34 | 4.82 | 89.65 |
| 26 - 80 | 18 | 2.55 | 92.20 |
| > 81.0 | 0 | 0.00 | 92.20 |

Total Number of Valid Hours: 705

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay - Bertha Ganter - September 2017**

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 37 | 17 | 4 | 5 | 1 | 2 | 2 | 33 | 34 | 15 | 24 | 27 | 51 | 49 | 30 | 14 | 345 |
| 6 - 15 | 17 | 4 | 5 | 2 | 0 | 4 | 11 | 69 | 47 | 26 | 11 | 8 | 5 | 21 | 9 | 14 | 253 |
| 16 - 25 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 11 | 6 | 7 | 4 | 1 | 0 | 0 | 0 | 0 | 34 |
| 26 - 80 | 6 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 18 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 63 | 22 | 12 | 7 | 1 | 6 | 13 | 115 | 92 | 48 | 40 | 36 | 56 | 70 | 39 | 30 | 650 |

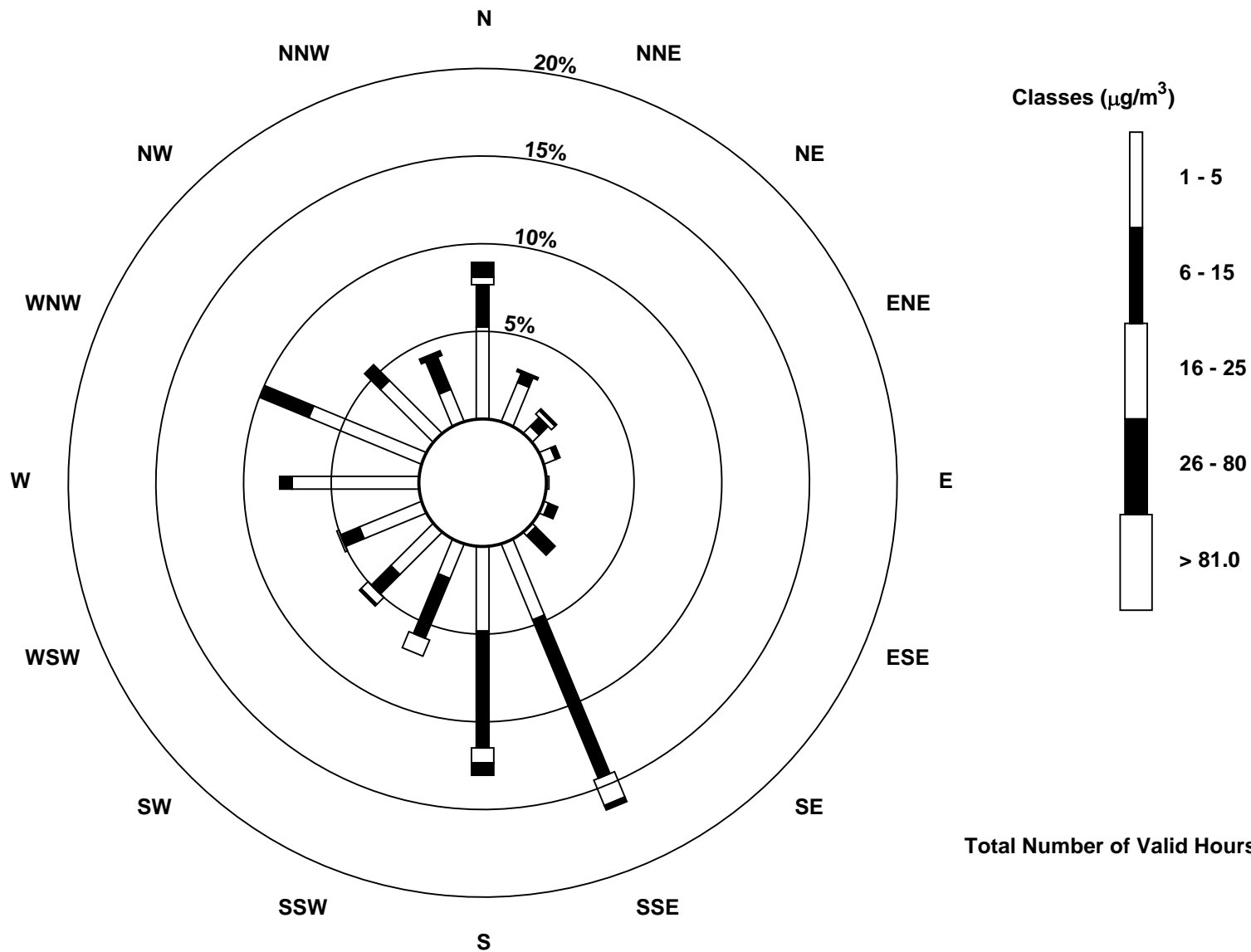
Total Number of Valid Hours: 705

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

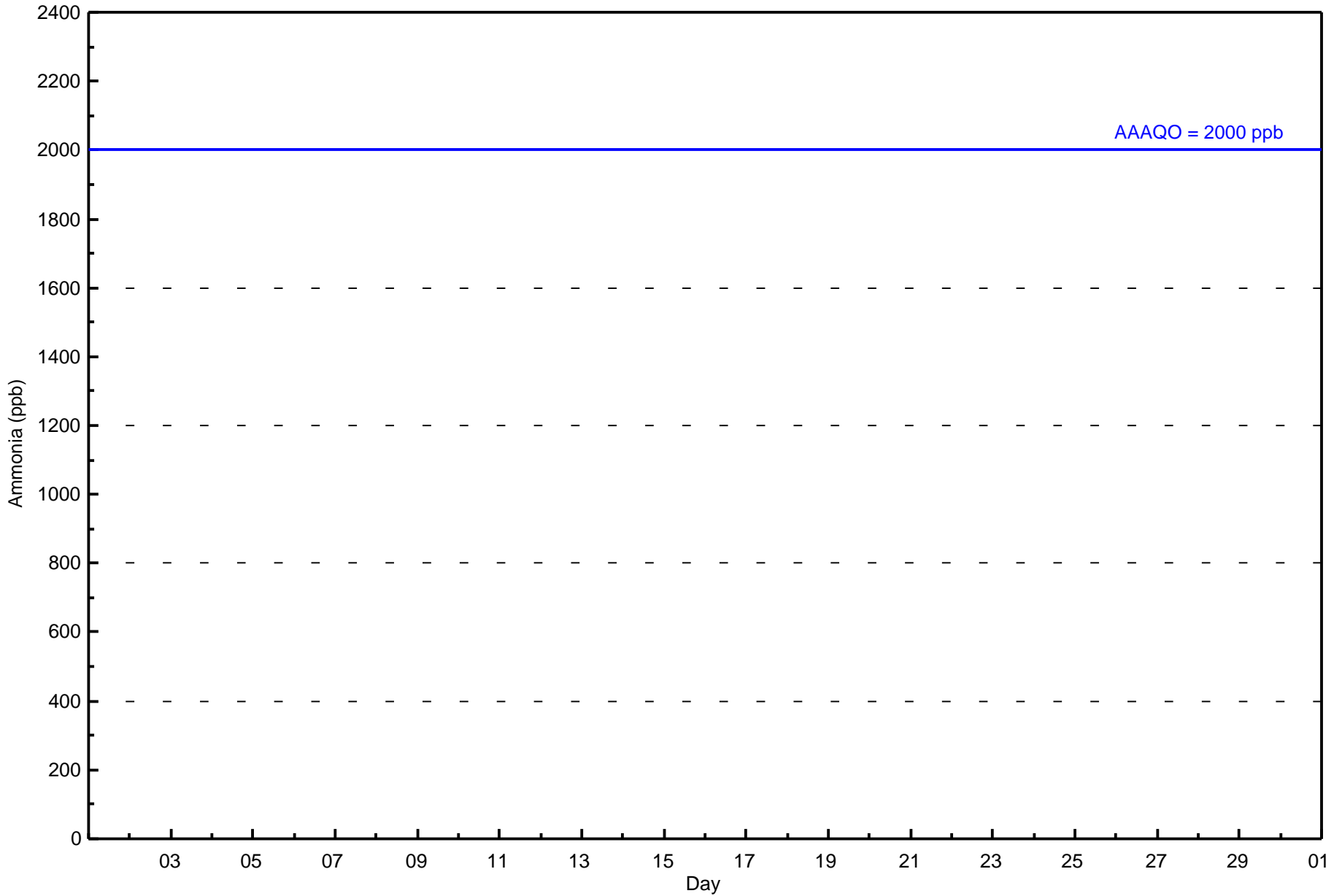


Total Number of Valid Hours: 705



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 628 | 100.00 | 100.00 |
| 6 - 10 | 0 | 0.00 | 100.00 |
| 11 - 15 | 0 | 0.00 | 100.00 |
| 16 - 20 | 0 | 0.00 | 100.00 |
| 21 - 25 | 0 | 0.00 | 100.00 |
| > 26 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 628

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 66 | 21 | 13 | 7 | 4 | 8 | 12 | 103 | 86 | 49 | 34 | 36 | 54 | 65 | 41 | 29 | 628 |
| 6 - 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 66 | 21 | 13 | 7 | 4 | 8 | 12 | 103 | 86 | 49 | 34 | 36 | 54 | 65 | 41 | 29 | 628 |

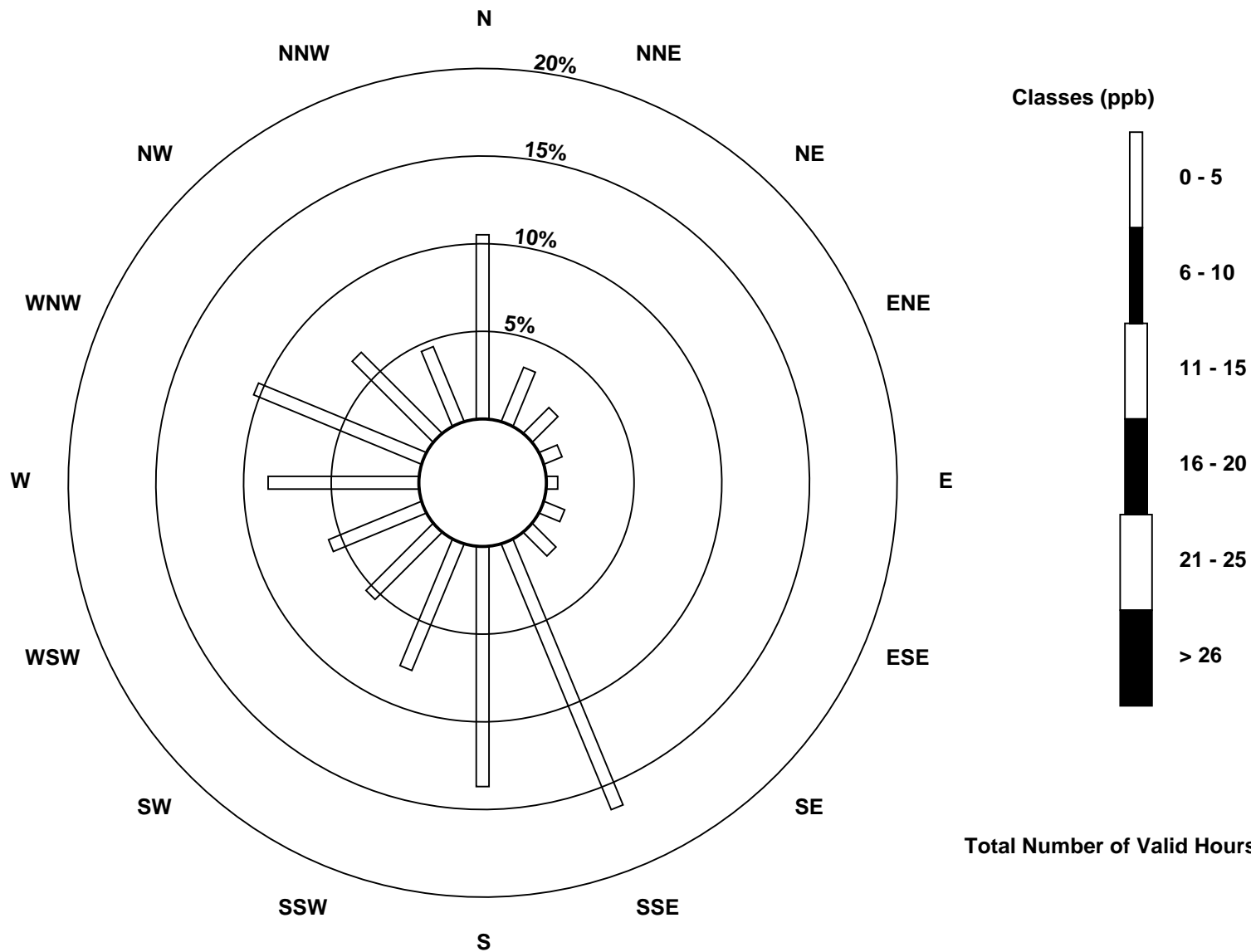
Total Number of Valid Hours: 628

Total Number of Hours: 720

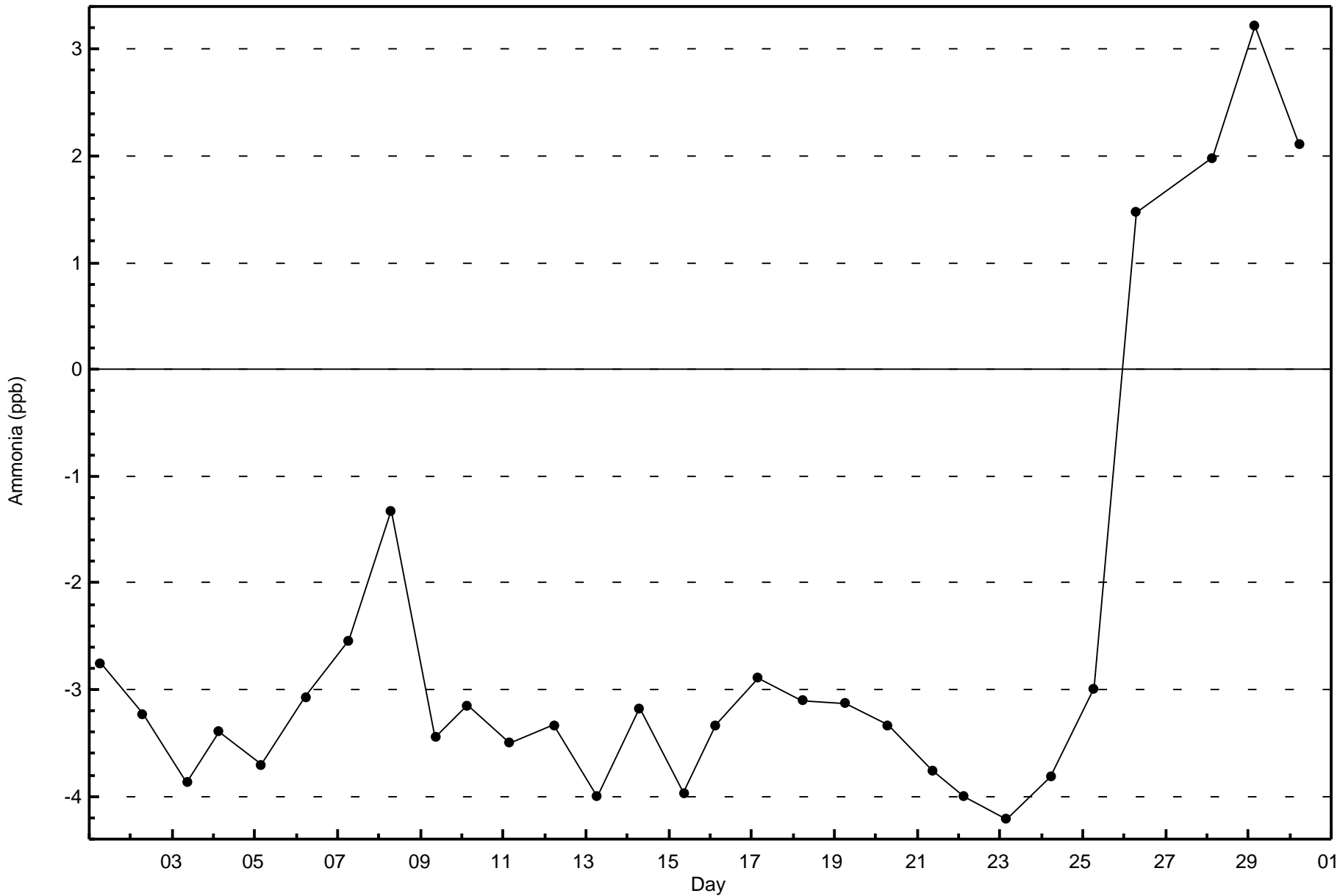


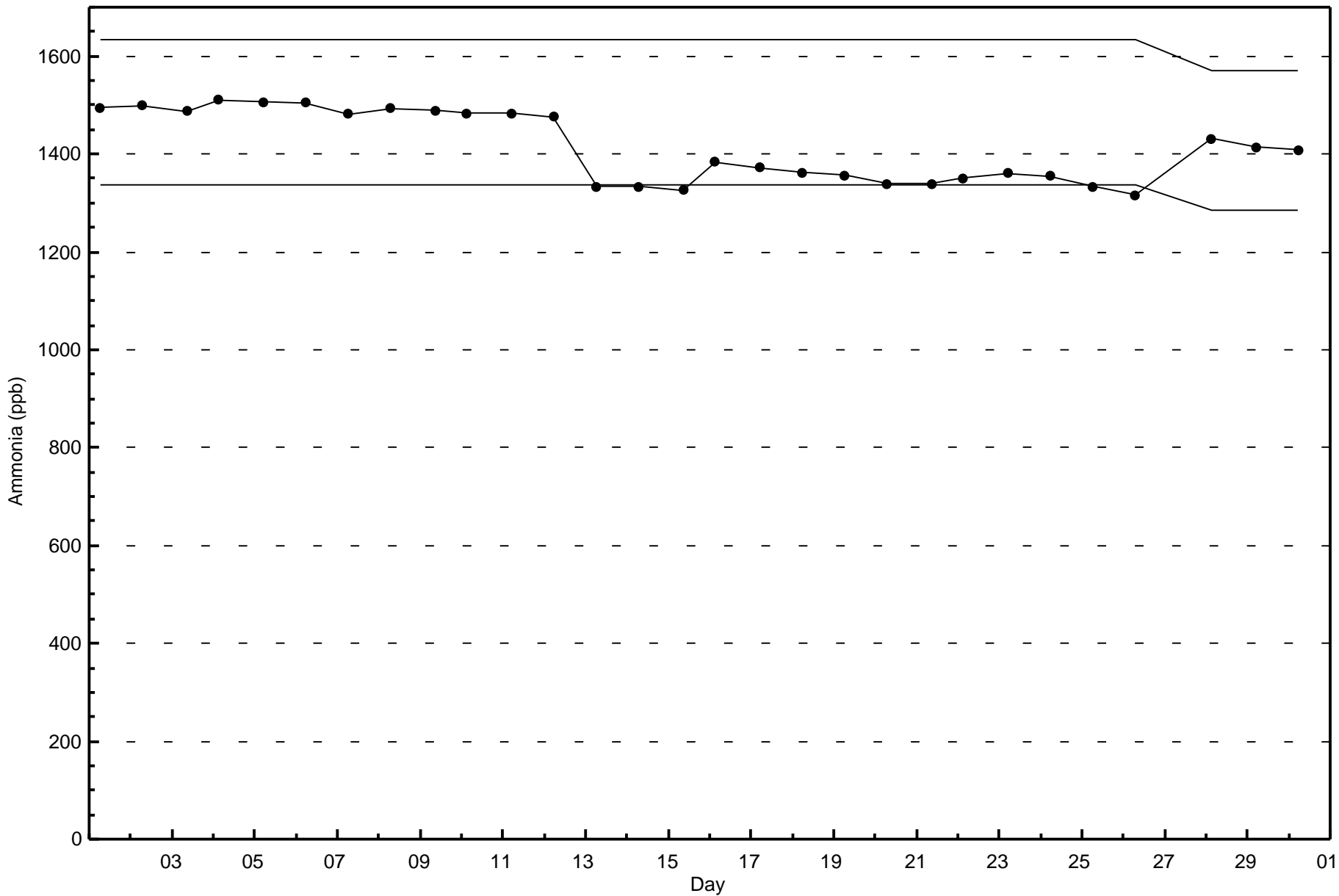
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 628







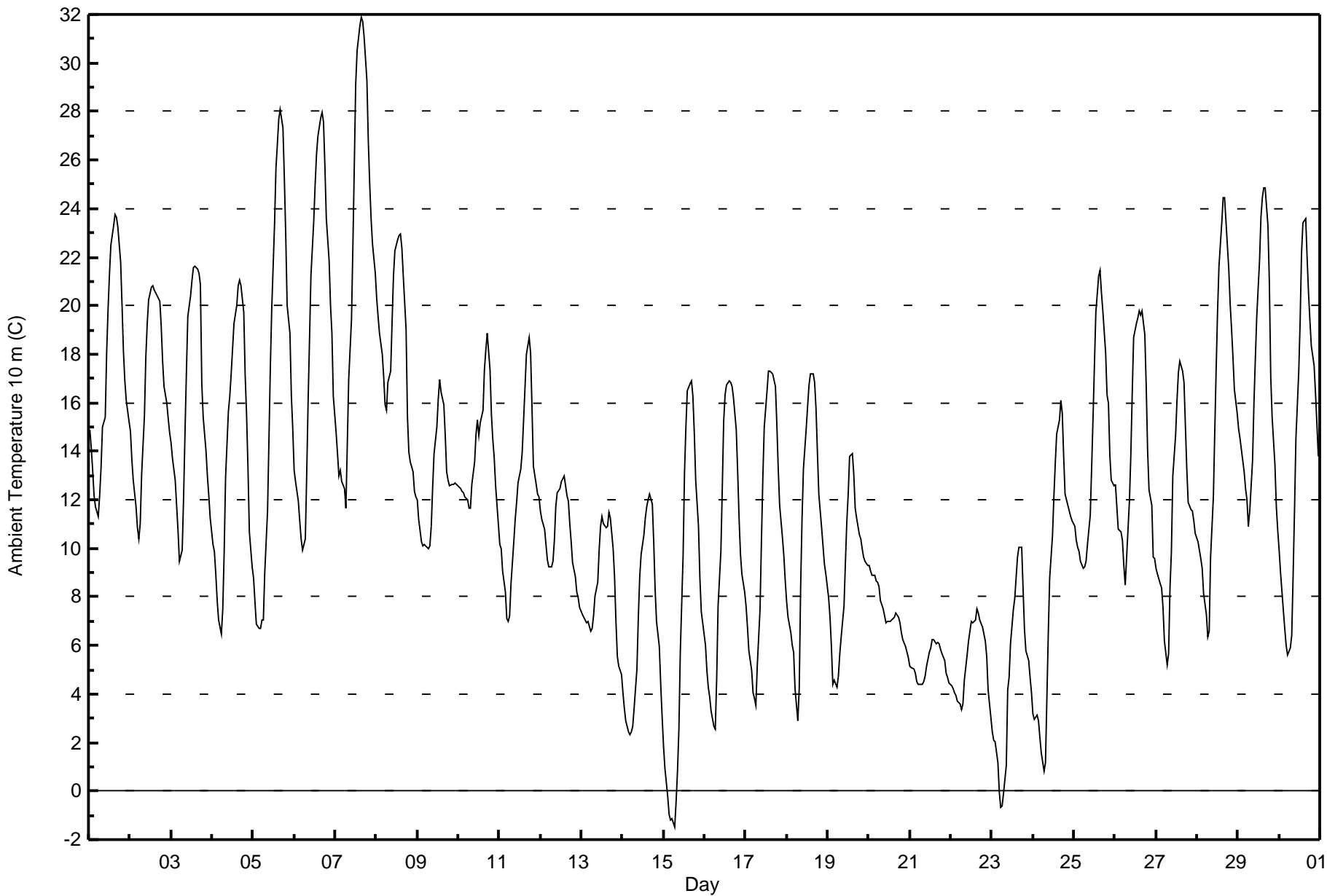
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 10 m (AT 10m) - C

Fort McKay - Bertha Ganter - September 2017

| Maximum Value: 31.9 C on Sep 7 16:00 | | Maximum Daily Average: 21.9 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.5 C on Sep 15 07:00 | | Minimum Daily Average: 4.6 C on Sep 23 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 18.0 C at hour 16 | | Minimum Diurnal Average: 6.9 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.30 C | | Percentiles: P ₁ = -0.3 P ₁₀ = 4.7 Q ₁ = 7.4 Median = 11.7 Q ₃ = 16.4 P ₉₀ = 21.0 P ₉₉ = 29.0 | | 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-Sep | 14.9 | 14.1 | 13.2 | 12.2 | 11.7 | 11.3 | 12.2 | 13.4 | 15.0 | 15.4 | 18.1 | 19.8 | 21.3 | 22.5 | 23.3 | 23.8 | 23.6 | 23.2 | 21.8 | 20.0 | 18.1 | 16.9 | 16.1 | 15.2 | 17.4 | 23.8 |
| 2-Sep | 14.8 | 13.7 | 12.8 | 11.7 | 10.8 | 10.4 | 11.0 | 13.1 | 15.4 | 17.9 | 19.3 | 20.3 | 20.8 | 20.8 | 20.7 | 20.5 | 20.4 | 20.2 | 19.2 | 17.7 | 16.6 | 16.0 | 15.3 | 14.7 | 16.4 | 20.8 |
| 3-Sep | 14.4 | 13.8 | 12.8 | 11.8 | 10.7 | 9.5 | 9.9 | 12.1 | 14.8 | 17.2 | 19.5 | 20.4 | 21.0 | 21.6 | 21.7 | 21.5 | 21.3 | 20.9 | 16.8 | 15.4 | 14.0 | 13.0 | 12.2 | 11.3 | 15.7 | 21.7 |
| 4-Sep | 10.1 | 9.9 | 8.9 | 7.9 | 7.0 | 6.5 | 7.5 | 9.9 | 12.9 | 15.7 | 16.3 | 17.2 | 18.2 | 19.3 | 20.0 | 20.8 | 21.0 | 20.8 | 19.7 | 17.1 | 15.5 | 13.3 | 10.7 | 9.2 | 14.0 | 21.0 |
| 5-Sep | 8.8 | 7.8 | 6.8 | 6.7 | 6.7 | 7.0 | 7.0 | 9.0 | 11.5 | 14.5 | 17.5 | 19.9 | 23.3 | 25.6 | 26.7 | 27.7 | 28.1 | 27.3 | 25.3 | 22.9 | 20.0 | 18.9 | 16.4 | 14.9 | 16.7 | 28.1 |
| 6-Sep | 13.2 | 12.7 | 12.0 | 11.1 | 10.4 | 9.9 | 10.4 | 13.1 | 16.1 | 18.6 | 21.2 | 23.4 | 25.0 | 26.3 | 27.0 | 27.7 | 27.9 | 27.6 | 25.7 | 23.6 | 21.9 | 20.0 | 18.8 | 16.3 | 19.2 | 27.9 |
| 7-Sep | 14.8 | 13.9 | 13.0 | 13.2 | 12.8 | 12.5 | 11.7 | 14.3 | 16.9 | 19.5 | 22.5 | 25.8 | 29.1 | 30.5 | 31.5 | 31.9 | 31.7 | 31.1 | 29.3 | 26.8 | 25.1 | 23.6 | 22.6 | 21.4 | 21.9 | 31.9 |
| 8-Sep | 20.3 | 19.5 | 18.9 | 18.0 | 17.1 | 15.9 | 15.7 | 16.9 | 17.3 | 19.3 | 21.2 | 22.3 | 22.7 | 22.9 | 22.9 | 22.4 | 21.2 | 19.0 | 15.4 | 14.0 | 13.6 | 13.2 | 12.4 | 12.1 | 18.1 | 22.9 |
| 9-Sep | 12.0 | 11.2 | 10.3 | 10.1 | 10.1 | 10.1 | 10.0 | 10.1 | 10.9 | 12.5 | 13.9 | 15.0 | 16.2 | 17.0 | 16.4 | 15.9 | 14.7 | 13.2 | 12.8 | 12.6 | 12.6 | 12.7 | 12.7 | 12.7 | 12.7 | 17.0 |
| 10-Sep | 12.5 | 12.5 | 12.4 | 12.3 | 12.1 | 12.0 | 11.7 | 11.6 | 12.6 | 13.6 | 14.7 | 15.3 | 14.7 | 15.2 | 15.7 | 17.4 | 18.2 | 18.9 | 17.4 | 15.5 | 14.5 | 13.7 | 12.6 | 10.9 | 14.1 | 18.9 |
| 11-Sep | 10.2 | 10.0 | 9.0 | 8.2 | 7.1 | 7.0 | 7.2 | 8.6 | 10.3 | 11.2 | 11.9 | 12.7 | 13.3 | 13.9 | 15.3 | 16.6 | 18.0 | 18.7 | 18.1 | 15.8 | 13.4 | 12.6 | 12.2 | 12.1 | 12.2 | 18.7 |
| 12-Sep | 11.6 | 11.2 | 10.8 | 10.2 | 9.5 | 9.3 | 9.2 | 9.5 | 10.3 | 11.7 | 12.3 | 12.4 | 12.7 | 12.9 | 13.0 | 12.1 | 11.9 | 11.0 | 10.2 | 9.4 | 8.8 | 8.2 | 8.0 | 7.6 | 10.6 | 13.0 |
| 13-Sep | 7.3 | 7.2 | 7.0 | 6.9 | 7.0 | 6.6 | 6.7 | 7.2 | 8.0 | 8.6 | 9.9 | 10.9 | 11.3 | 11.0 | 10.9 | 10.9 | 11.5 | 11.3 | 10.0 | 8.9 | 7.0 | 5.6 | 5.2 | 4.8 | 8.4 | 11.5 |
| 14-Sep | 4.1 | 3.4 | 2.9 | 2.4 | 2.3 | 2.4 | 2.6 | 3.4 | 5.0 | 7.2 | 8.9 | 9.7 | 10.5 | 11.2 | 11.7 | 12.0 | 12.2 | 11.8 | 10.3 | 8.3 | 7.0 | 5.9 | 4.4 | 3.1 | 6.8 | 12.2 |
| 15-Sep | 1.8 | 0.9 | -0.2 | -1.0 | -1.2 | -1.2 | -1.5 | -0.4 | 0.8 | 2.5 | 5.7 | 9.7 | 13.1 | 15.0 | 16.5 | 16.8 | 16.9 | 16.3 | 14.8 | 12.8 | 10.9 | 8.8 | 7.4 | 6.9 | 7.2 | 16.9 |
| 16-Sep | 6.0 | 5.0 | 4.3 | 3.9 | 3.3 | 2.6 | 2.5 | 4.6 | 7.6 | 9.9 | 12.5 | 15.2 | 16.3 | 16.7 | 16.9 | 16.9 | 16.7 | 16.2 | 14.9 | 13.2 | 11.3 | 9.7 | 8.9 | 8.2 | 10.1 | 16.9 |
| 17-Sep | 7.6 | 6.7 | 5.8 | 4.9 | 4.0 | 3.8 | 3.5 | 5.2 | 7.5 | 10.4 | 12.9 | 15.0 | 16.5 | 17.3 | 17.3 | 17.3 | 17.2 | 16.7 | 15.1 | 13.3 | 11.7 | 10.5 | 9.7 | 8.7 | 10.8 | 17.3 |
| 18-Sep | 7.8 | 7.2 | 6.5 | 6.0 | 5.7 | 4.2 | 2.9 | 4.2 | 8.4 | 11.2 | 13.3 | 15.0 | 15.9 | 16.7 | 17.2 | 17.2 | 16.8 | 15.7 | 14.0 | 12.3 | 10.8 | 10.1 | 9.3 | 8.9 | 10.7 | 17.2 |
| 19-Sep | 7.9 | 7.1 | 6.0 | 4.4 | 4.6 | 4.3 | 4.7 | 5.7 | 6.3 | 7.6 | 9.4 | 11.1 | 12.3 | 13.8 | 13.9 | 13.0 | 11.7 | 11.3 | 10.6 | 10.4 | 10.0 | 9.6 | 9.5 | 9.3 | 8.9 | 13.9 |
| 20-Sep | 9.3 | 9.1 | 8.9 | 8.9 | 8.6 | 8.6 | 8.4 | 7.8 | 7.5 | 7.2 | 6.9 | 7.0 | 7.0 | 7.1 | 7.1 | 7.1 | 7.3 | 7.2 | 6.9 | 6.5 | 6.2 | 6.0 | 5.7 | 5.5 | 7.4 | 9.3 |
| 21-Sep | 5.1 | 5.1 | 5.1 | 4.9 | 4.5 | 4.4 | 4.4 | 4.4 | 4.5 | 4.8 | 5.1 | 5.7 | 5.9 | 6.2 | 6.2 | 6.1 | 6.1 | 6.1 | 5.8 | 5.6 | 5.4 | 4.9 | 4.7 | 4.5 | 5.2 | 6.2 |
| 22-Sep | 4.3 | 4.2 | 4.1 | 3.9 | 3.7 | 3.6 | 3.4 | 3.6 | 4.5 | 5.6 | 6.2 | 6.6 | 7.0 | 6.9 | 7.0 | 7.5 | 7.3 | 7.0 | 6.8 | 6.5 | 6.2 | 5.6 | 4.2 | 3.0 | 5.4 | 7.5 |
| 23-Sep | 2.5 | 2.1 | 2.1 | 1.2 | -0.1 | -0.7 | -0.6 | -0.1 | 1.0 | 4.2 | 4.7 | 6.1 | 7.4 | 7.9 | 8.8 | 9.7 | 10.1 | 10.0 | 8.3 | 6.7 | 5.8 | 5.4 | 4.7 | 4.1 | 4.6 | 10.1 |
| 24-Sep | 3.2 | 3.0 | 3.1 | 2.9 | 2.2 | 1.6 | 0.9 | 1.2 | 3.8 | 6.5 | 8.8 | 10.5 | 12.1 | 13.5 | 14.7 | 15.3 | 16.1 | 15.6 | 13.8 | 12.2 | 11.8 | 11.5 | 11.3 | 11.1 | 8.6 | 16.1 |
| 25-Sep | 10.9 | 10.3 | 10.0 | 9.8 | 9.5 | 9.2 | 9.2 | 9.5 | 10.2 | 11.4 | 13.4 | 15.4 | 17.6 | 19.7 | 21.2 | 21.5 | 20.6 | 19.8 | 18.1 | 16.3 | 16.0 | 13.8 | 12.8 | 12.6 | 14.1 | 21.5 |
| 26-Sep | 12.6 | 11.7 | 10.8 | 10.7 | 10.3 | 9.3 | 8.5 | 9.6 | 12.0 | 13.8 | 16.4 | 18.7 | 19.3 | 19.5 | 19.8 | 19.6 | 19.8 | 18.8 | 16.7 | 14.0 | 12.4 | 11.8 | 9.6 | 9.6 | 14.0 | 19.8 |
| 27-Sep | 9.2 | 8.9 | 8.6 | 8.4 | 7.6 | 6.2 | 5.2 | 5.7 | 8.4 | 9.9 | 13.0 | 14.7 | 16.1 | 17.2 | 17.7 | 17.3 | 16.8 | 15.0 | 13.3 | 11.9 | 11.6 | 11.5 | 11.2 | 10.6 | 11.5 | 17.7 |
| 28-Sep | 10.3 | 10.0 | 9.6 | 9.2 | 8.1 | 7.3 | 6.3 | 6.6 | 9.6 | 12.1 | 14.8 | 17.4 | 19.8 | 21.6 | 23.4 | 24.5 | 24.4 | 23.5 | 21.5 | 20.0 | 19.0 | 17.9 | 16.5 | 15.6 | 15.4 | 24.5 |
| 29-Sep | 15.0 | 14.5 | 14.1 | 13.2 | 12.5 | 12.0 | 10.9 | 11.5 | 13.6 | 16.0 | 17.8 | 19.6 | 21.8 | 23.7 | 24.4 | 24.9 | 24.9 | 23.3 | 21.0 | 17.1 | 15.4 | 13.5 | 11.7 | 10.7 | 16.8 | 24.9 |
| 30-Sep | 9.9 | 9.0 | 7.5 | 6.7 | 6.0 | 5.6 | 5.9 | 6.4 | 8.9 | 11.6 | 14.5 | 17.2 | 19.3 | 22.2 | 23.4 | 23.6 | 22.0 | 20.5 | 19.4 | 18.3 | 17.5 | 16.4 | 15.1 | 13.8 | 14.2 | 23.6 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

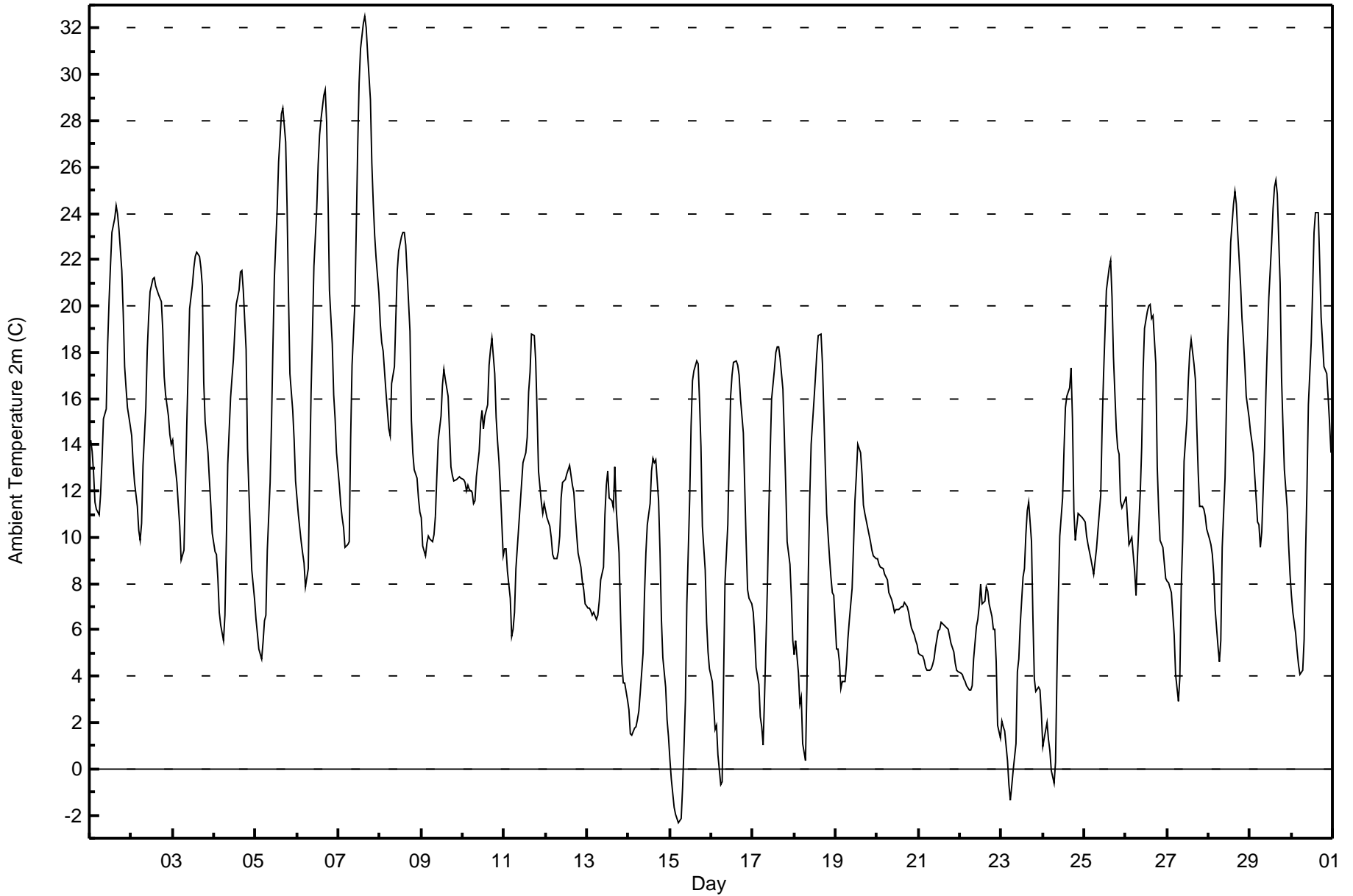
| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 10 | 1.39 | 1.39 |
| 0 - 10 | 266 | 36.94 | 38.33 |
| 10 - 20 | 353 | 49.03 | 87.36 |
| > 20 | 91 | 12.64 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 32.5 C on Sep 7 16:00 Maximum Daily Average: 21.2 C on Sep 7 | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | |
|--|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|------|---------------|---------------|
| Minimum Value: -2.3 C on Sep 15 06:00 Minimum Daily Average: 4.2 C on Sep 23 Maximum Diurnal Average: 18.5 C at hour 16 Minimum Diurnal Average: 6.0 C at hour 6 Monthly Average: 11.88 C Percentiles: P ₁ = -0.7 P ₁₀ = 3.7 Q ₁ = 7.0 Median = 11.3 Q ₃ = 16.3 P ₉₀ = 20.9 P ₉₉ = 29.1 | | | | | | | | | | | | | | | | | | | | | | 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-Sep | 14.2 | 13.7 | 12.8 | 11.5 | 11.2 | 10.9 | 11.9 | 13.3 | 15.1 | 15.5 | 18.3 | 20.3 | 21.8 | 23.2 | 23.8 | 24.3 | 24.0 | 23.3 | 21.5 | 19.7 | 17.4 | 16.5 | 15.6 | 14.8 | 17.3 | 24.3 |
| 2-Sep | 14.4 | 13.2 | 12.4 | 11.3 | 10.3 | 9.8 | 10.6 | 13.1 | 15.6 | 18.0 | 19.5 | 20.6 | 21.2 | 21.2 | 20.9 | 20.7 | 20.5 | 20.2 | 19.0 | 17.0 | 16.2 | 15.3 | 14.4 | 14.0 | 16.2 | 21.2 |
| 3-Sep | 14.2 | 13.5 | 12.4 | 11.4 | 10.5 | 9.0 | 9.5 | 12.1 | 14.9 | 17.3 | 19.9 | 20.9 | 21.7 | 22.1 | 22.3 | 22.1 | 21.7 | 20.8 | 16.7 | 15.0 | 13.6 | 12.5 | 11.4 | 10.2 | 15.7 | 22.3 |
| 4-Sep | 9.4 | 9.2 | 8.2 | 6.8 | 6.2 | 5.6 | 6.7 | 9.8 | 13.2 | 16.1 | 16.9 | 17.7 | 18.9 | 20.0 | 20.7 | 21.4 | 21.5 | 20.7 | 18.1 | 13.8 | 11.9 | 10.2 | 8.6 | 7.3 | 13.3 | 21.5 |
| 5-Sep | 6.5 | 5.8 | 5.2 | 4.7 | 5.5 | 6.4 | 6.7 | 9.4 | 12.4 | 15.0 | 18.3 | 21.2 | 24.2 | 26.2 | 27.2 | 28.3 | 28.5 | 27.1 | 24.3 | 20.5 | 17.1 | 15.5 | 14.2 | 12.4 | 15.9 | 28.5 |
| 6-Sep | 11.7 | 10.9 | 9.8 | 9.3 | 8.9 | 7.9 | 8.6 | 12.8 | 16.3 | 18.9 | 21.7 | 24.2 | 26.1 | 27.4 | 28.1 | 29.1 | 29.3 | 27.9 | 24.6 | 20.7 | 18.4 | 16.2 | 15.1 | 13.7 | 18.2 | 29.3 |
| 7-Sep | 12.3 | 11.4 | 10.8 | 10.5 | 9.6 | 9.7 | 9.8 | 14.3 | 17.4 | 20.1 | 23.4 | 26.9 | 29.6 | 31.1 | 32.2 | 32.5 | 32.0 | 30.9 | 28.9 | 26.1 | 24.5 | 23.1 | 22.1 | 20.6 | 21.2 | 32.5 |
| 8-Sep | 19.2 | 18.4 | 18.0 | 16.3 | 15.5 | 14.7 | 14.4 | 16.7 | 17.4 | 19.5 | 21.5 | 22.4 | 23.0 | 23.1 | 23.2 | 22.6 | 21.4 | 18.9 | 15.1 | 13.7 | 12.9 | 12.6 | 11.7 | 11.1 | 17.6 | 23.2 |
| 9-Sep | 10.9 | 9.6 | 9.2 | 9.8 | 10.1 | 10.0 | 9.8 | 10.1 | 10.9 | 12.6 | 14.2 | 15.3 | 16.6 | 17.3 | 16.8 | 16.1 | 14.6 | 13.1 | 12.7 | 12.5 | 12.5 | 12.6 | 12.6 | 12.6 | 12.6 | 17.3 |
| 10-Sep | 12.5 | 12.4 | 12.0 | 12.3 | 12.1 | 12.0 | 11.5 | 11.6 | 12.6 | 13.7 | 14.9 | 15.5 | 14.7 | 15.3 | 15.7 | 17.4 | 18.1 | 18.6 | 17.1 | 15.2 | 14.1 | 13.3 | 12.1 | 9.2 | 13.9 | 18.6 |
| 11-Sep | 9.5 | 9.5 | 8.5 | 7.3 | 5.7 | 6.1 | 6.8 | 8.6 | 10.5 | 11.4 | 12.3 | 13.2 | 13.7 | 14.3 | 16.3 | 17.1 | 18.8 | 18.7 | 17.6 | 15.4 | 12.9 | 11.5 | 11.0 | 11.4 | 12.0 | 18.8 |
| 12-Sep | 11.2 | 10.9 | 10.5 | 10.0 | 9.3 | 9.1 | 9.1 | 9.4 | 10.1 | 11.7 | 12.4 | 12.5 | 12.7 | 12.9 | 13.1 | 12.3 | 11.9 | 11.0 | 10.1 | 9.3 | 8.7 | 8.1 | 7.8 | 7.1 | 10.5 | 13.1 |
| 13-Sep | 7.0 | 7.0 | 6.8 | 6.6 | 6.7 | 6.5 | 6.6 | 7.3 | 8.1 | 8.7 | 10.9 | 12.3 | 12.9 | 11.7 | 11.6 | 11.3 | 13.0 | 11.3 | 9.3 | 6.8 | 4.5 | 3.7 | 3.7 | 3.0 | 8.2 | 13.0 |
| 14-Sep | 2.6 | 1.5 | 1.4 | 1.8 | 1.8 | 2.1 | 2.5 | 3.3 | 5.0 | 7.5 | 9.3 | 10.6 | 11.5 | 12.9 | 13.4 | 13.2 | 13.4 | 11.6 | 9.4 | 6.5 | 4.8 | 3.5 | 2.1 | 1.4 | 6.4 | 13.4 |
| 15-Sep | 0.4 | -0.5 | -1.6 | -1.9 | -2.1 | -2.3 | -2.1 | -0.8 | 1.0 | 3.0 | 7.1 | 11.6 | 14.8 | 16.8 | 17.2 | 17.7 | 17.5 | 15.9 | 13.9 | 10.5 | 8.6 | 6.3 | 5.1 | 4.3 | 6.7 | 17.7 |
| 16-Sep | 3.8 | 2.8 | 1.7 | 1.9 | 0.6 | -0.7 | -0.6 | 3.9 | 8.0 | 10.5 | 13.4 | 16.1 | 17.0 | 17.6 | 17.7 | 17.4 | 17.0 | 15.9 | 14.5 | 12.1 | 9.7 | 7.7 | 7.4 | 7.1 | 9.3 | 17.7 |
| 17-Sep | 6.8 | 5.8 | 4.4 | 3.6 | 2.2 | 1.8 | 1.1 | 3.1 | 7.8 | 11.0 | 13.7 | 16.0 | 17.3 | 18.0 | 18.2 | 18.2 | 17.8 | 16.4 | 14.4 | 12.3 | 9.8 | 8.8 | 7.4 | 5.5 | 10.1 | 18.2 |
| 18-Sep | 5.0 | 5.5 | 4.1 | 2.8 | 3.1 | 1.1 | 0.3 | 3.5 | 8.4 | 11.7 | 14.0 | 15.9 | 16.9 | 17.9 | 18.7 | 18.8 | 17.5 | 15.4 | 13.1 | 11.0 | 9.1 | 8.3 | 7.6 | 7.5 | 9.9 | 18.8 |
| 19-Sep | 5.2 | 5.2 | 4.6 | 3.5 | 3.8 | 3.8 | 4.5 | 5.6 | 6.4 | 7.8 | 9.7 | 11.6 | 12.7 | 14.0 | 13.7 | 12.7 | 11.4 | 11.0 | 10.4 | 10.1 | 9.8 | 9.4 | 9.2 | 9.1 | 8.6 | 14.0 |
| 20-Sep | 9.1 | 8.9 | 8.7 | 8.6 | 8.4 | 8.3 | 8.2 | 7.6 | 7.3 | 7.1 | 6.8 | 6.9 | 6.9 | 6.9 | 7.0 | 7.0 | 7.2 | 7.0 | 6.7 | 6.4 | 6.1 | 5.8 | 5.6 | 5.3 | 7.2 | 9.1 |
| 21-Sep | 5.0 | 4.9 | 4.9 | 4.7 | 4.4 | 4.2 | 4.3 | 4.3 | 4.5 | 4.8 | 5.3 | 5.9 | 6.0 | 6.4 | 6.3 | 6.1 | 6.1 | 6.0 | 5.7 | 5.4 | 5.1 | 4.6 | 4.3 | 4.2 | 5.1 | 6.4 |
| 22-Sep | 4.2 | 4.1 | 3.9 | 3.8 | 3.6 | 3.4 | 3.4 | 3.6 | 4.7 | 6.1 | 6.5 | 7.1 | 8.0 | 7.2 | 7.3 | 7.9 | 7.7 | 7.1 | 6.6 | 6.0 | 6.0 | 4.7 | 1.9 | 1.3 | 5.2 | 8.0 |
| 23-Sep | 2.1 | 1.8 | 1.6 | 0.4 | -0.7 | -1.4 | -0.7 | -0.1 | 1.1 | 4.2 | 4.7 | 6.2 | 8.3 | 8.7 | 10.1 | 11.2 | 11.5 | 9.8 | 6.5 | 3.9 | 3.3 | 3.5 | 3.4 | 2.4 | 4.2 | 11.5 |
| 24-Sep | 1.0 | 1.3 | 2.0 | 1.3 | 0.8 | -0.1 | -0.6 | 0.3 | 4.1 | 7.4 | 10.0 | 11.7 | 13.8 | 15.6 | 16.1 | 16.5 | 17.3 | 15.1 | 11.1 | 9.9 | 11.0 | 11.0 | 10.9 | 10.9 | 8.3 | 17.3 |
| 25-Sep | 10.7 | 10.0 | 9.7 | 9.4 | 9.1 | 8.4 | 8.9 | 9.5 | 10.3 | 11.8 | 14.8 | 17.0 | 18.8 | 20.7 | 21.7 | 21.9 | 20.3 | 17.8 | 14.7 | 13.8 | 13.6 | 11.6 | 11.3 | 11.6 | 13.6 | 21.9 |
| 26-Sep | 11.7 | 10.7 | 9.7 | 10.0 | 9.3 | 8.5 | 7.5 | 9.1 | 12.0 | 13.9 | 17.2 | 19.1 | 19.8 | 20.0 | 20.0 | 19.5 | 19.6 | 17.5 | 13.1 | 11.2 | 9.8 | 9.6 | 8.9 | 8.2 | 13.2 | 20.0 |
| 27-Sep | 8.1 | 8.1 | 7.6 | 6.7 | 5.8 | 4.1 | 2.9 | 4.0 | 7.9 | 9.9 | 13.3 | 15.1 | 16.8 | 18.0 | 18.6 | 17.5 | 16.8 | 14.7 | 12.8 | 11.3 | 11.4 | 11.2 | 10.9 | 10.4 | 11.0 | 18.6 |
| 28-Sep | 9.9 | 9.7 | 9.3 | 8.4 | 6.9 | 5.3 | 4.6 | 5.6 | 9.5 | 12.6 | 15.7 | 18.4 | 20.7 | 22.7 | 24.4 | 24.9 | 24.4 | 23.1 | 20.9 | 19.4 | 18.5 | 17.4 | 16.1 | 15.2 | 15.2 | 24.9 |
| 29-Sep | 14.6 | 14.1 | 13.7 | 11.7 | 10.7 | 10.5 | 9.6 | 10.2 | 13.9 | 16.4 | 18.5 | 20.4 | 22.8 | 24.2 | 25.1 | 25.4 | 24.8 | 21.0 | 16.9 | 14.8 | 12.9 | 11.3 | 9.7 | 8.4 | 15.9 | 25.4 |
| 30-Sep | 7.5 | 6.8 | 5.9 | 5.1 | 4.5 | 4.1 | 4.3 | 5.6 | 9.2 | 12.1 | 15.7 | 18.4 | 20.7 | 23.2 | 24.1 | 24.0 | 21.9 | 19.5 | 18.5 | 17.4 | 17.0 | 16.0 | 14.9 | 13.6 | 13.8 | 24.1 |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 15 | 2.08 | 2.08 |
| 0 - 10 | 291 | 40.42 | 42.50 |
| 10 - 20 | 322 | 44.72 | 87.22 |
| > 20 | 92 | 12.78 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



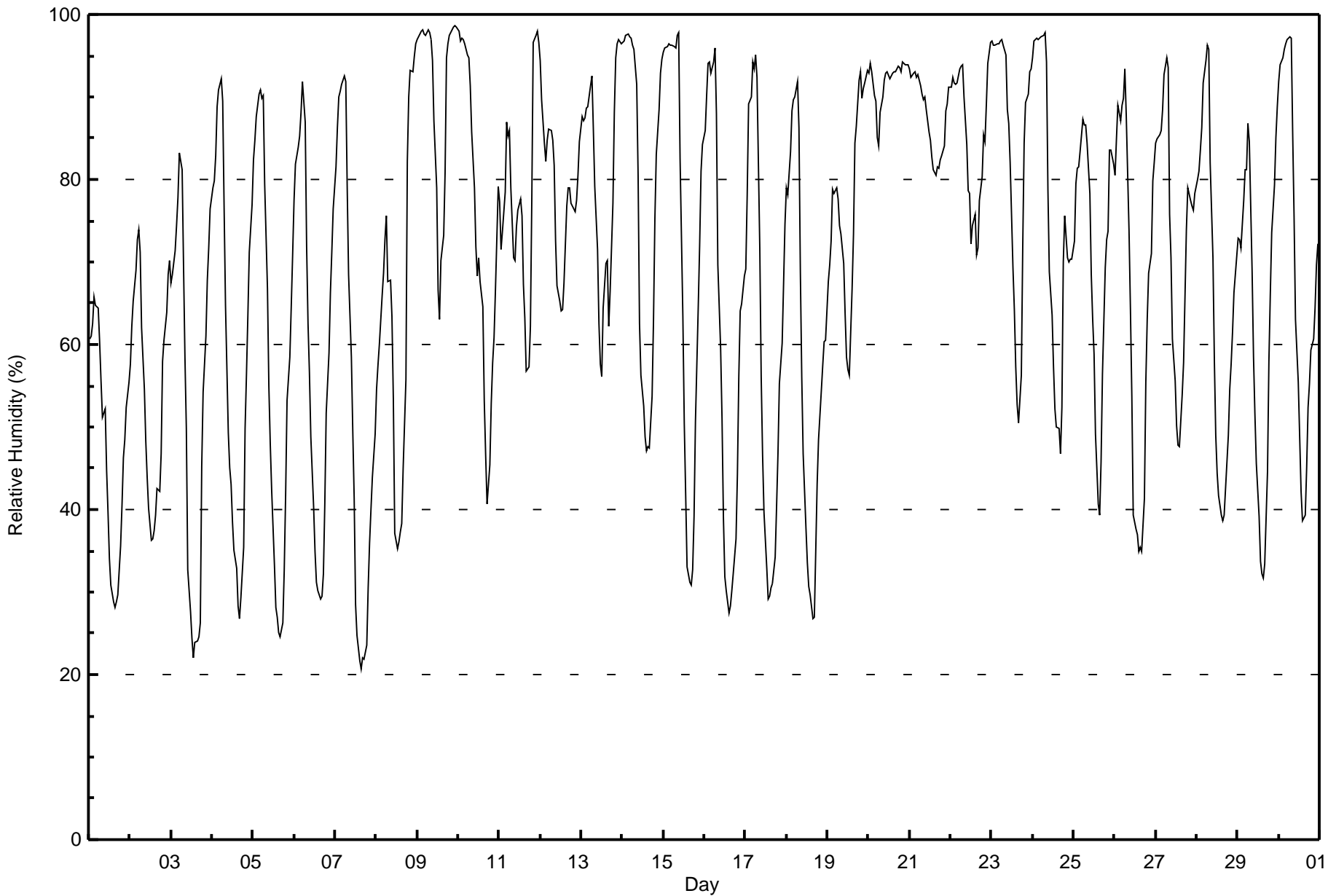
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay - Bertha Ganter - September 2017

| Maximum Value: 99 % on Sep 9 23:00 Maximum Daily Average: 91.9 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 21 % on Sep 7 16:00 Minimum Daily Average: 47.6 % on Sep 1 Maximum Diurnal Average: 89.2 % at hour 7 Minimum Diurnal Average: 46.4 % at hour 16 Monthly Average: 69.7 % Percentiles: P ₁ = 24 P ₁₀ = 36 Q ₁ = 54 Median = 73 Q ₃ = 89 P ₉₀ = 95 P ₉₉ = 98 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 61 | 61 | 62 | 66 | 65 | 64 | 60 | 56 | 51 | 52 | 45 | 40 | 34 | 31 | 29 | 28 | 29 | 30 | 36 | 40 | 46 | 48 | 52 | 55 | 47.6 | 66 |
| 2-Sep | 58 | 62 | 65 | 69 | 73 | 74 | 71 | 62 | 55 | 48 | 44 | 40 | 36 | 36 | 37 | 39 | 43 | 42 | 47 | 58 | 61 | 64 | 68 | 70 | 55.1 | 74 |
| 3-Sep | 67 | 69 | 71 | 74 | 78 | 83 | 81 | 69 | 59 | 50 | 33 | 28 | 24 | 22 | 24 | 24 | 25 | 26 | 45 | 54 | 61 | 68 | 72 | 76 | 53.5 | 83 |
| 4-Sep | 79 | 80 | 83 | 89 | 91 | 92 | 89 | 77 | 65 | 49 | 45 | 43 | 38 | 35 | 33 | 28 | 27 | 29 | 35 | 50 | 56 | 64 | 71 | 77 | 59.4 | 92 |
| 5-Sep | 82 | 85 | 88 | 90 | 91 | 90 | 90 | 80 | 67 | 55 | 48 | 42 | 33 | 28 | 27 | 25 | 25 | 26 | 33 | 42 | 53 | 58 | 65 | 71 | 58.0 | 91 |
| 6-Sep | 77 | 82 | 84 | 85 | 88 | 92 | 87 | 72 | 62 | 57 | 49 | 40 | 35 | 31 | 30 | 29 | 29 | 32 | 41 | 52 | 59 | 66 | 71 | 76 | 59.5 | 92 |
| 7-Sep | 82 | 86 | 90 | 91 | 91 | 93 | 92 | 79 | 69 | 58 | 50 | 41 | 28 | 25 | 22 | 21 | 22 | 22 | 24 | 31 | 36 | 40 | 44 | 49 | 53.5 | 93 |
| 8-Sep | 55 | 57 | 60 | 66 | 69 | 73 | 76 | 68 | 68 | 63 | 53 | 37 | 35 | 36 | 37 | 38 | 45 | 56 | 82 | 90 | 93 | 93 | 95 | 97 | 64.2 | 97 |
| 9-Sep | 97 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 94 | 87 | 79 | 67 | 63 | 70 | 73 | 81 | 95 | 96 | 98 | 98 | 98 | 99 | 98 | 90.6 | 99 |
| 10-Sep | 98 | 97 | 97 | 97 | 96 | 95 | 95 | 91 | 86 | 79 | 72 | 68 | 71 | 68 | 65 | 53 | 47 | 41 | 45 | 53 | 58 | 61 | 67 | 79 | 74.0 | 98 |
| 11-Sep | 77 | 72 | 74 | 78 | 87 | 85 | 86 | 79 | 70 | 70 | 74 | 76 | 78 | 76 | 67 | 63 | 57 | 57 | 62 | 78 | 97 | 97 | 98 | 97 | 77.3 | 98 |
| 12-Sep | 94 | 90 | 84 | 82 | 85 | 86 | 86 | 85 | 82 | 73 | 67 | 65 | 64 | 64 | 67 | 77 | 79 | 79 | 77 | 77 | 76 | 78 | 81 | 85 | 78.4 | 94 |
| 13-Sep | 88 | 87 | 87 | 89 | 89 | 91 | 93 | 86 | 79 | 72 | 63 | 58 | 56 | 64 | 70 | 70 | 62 | 67 | 77 | 88 | 95 | 96 | 97 | 97 | 80.0 | 97 |
| 14-Sep | 97 | 97 | 97 | 98 | 97 | 97 | 96 | 96 | 91 | 80 | 63 | 56 | 52 | 49 | 47 | 48 | 48 | 54 | 63 | 75 | 83 | 89 | 93 | 95 | 77.5 | 98 |
| 15-Sep | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 97 | 98 | 83 | 63 | 50 | 42 | 33 | 31 | 31 | 33 | 39 | 51 | 65 | 72 | 81 | 84 | 71.7 | 98 |
| 16-Sep | 86 | 90 | 94 | 94 | 93 | 94 | 96 | 88 | 70 | 60 | 51 | 39 | 32 | 30 | 27 | 28 | 30 | 32 | 36 | 44 | 56 | 64 | 65 | 68 | 61.2 | 96 |
| 17-Sep | 69 | 78 | 89 | 90 | 94 | 93 | 95 | 92 | 72 | 56 | 47 | 40 | 33 | 29 | 29 | 30 | 31 | 34 | 40 | 47 | 55 | 60 | 67 | 75 | 60.3 | 95 |
| 18-Sep | 79 | 78 | 83 | 88 | 90 | 90 | 92 | 86 | 69 | 56 | 47 | 38 | 34 | 31 | 30 | 27 | 27 | 35 | 43 | 49 | 54 | 57 | 60 | 60 | 58.5 | 92 |
| 19-Sep | 68 | 70 | 73 | 79 | 78 | 79 | 78 | 74 | 73 | 70 | 64 | 59 | 57 | 56 | 67 | 73 | 84 | 86 | 92 | 93 | 90 | 91 | 92 | 93 | 76.6 | 93 |
| 20-Sep | 93 | 94 | 93 | 90 | 90 | 85 | 84 | 88 | 90 | 92 | 93 | 93 | 92 | 93 | 93 | 93 | 93 | 94 | 94 | 93 | 94 | 94 | 94 | 94 | 91.9 | 94 |
| 21-Sep | 93 | 92 | 93 | 93 | 92 | 93 | 91 | 90 | 90 | 90 | 88 | 86 | 85 | 83 | 81 | 81 | 81 | 81 | 82 | 83 | 84 | 88 | 89 | 91 | 87.6 | 93 |
| 22-Sep | 91 | 92 | 92 | 92 | 92 | 93 | 94 | 94 | 90 | 84 | 79 | 78 | 72 | 74 | 76 | 71 | 72 | 77 | 80 | 85 | 85 | 89 | 94 | 97 | 85.2 | 97 |
| 23-Sep | 97 | 96 | 96 | 97 | 96 | 97 | 97 | 96 | 95 | 88 | 87 | 82 | 69 | 64 | 57 | 53 | 50 | 56 | 72 | 84 | 89 | 90 | 93 | 93 | 83.2 | 97 |
| 24-Sep | 95 | 97 | 97 | 97 | 97 | 97 | 97 | 98 | 94 | 79 | 69 | 64 | 57 | 52 | 50 | 50 | 47 | 52 | 70 | 76 | 70 | 70 | 70 | 70 | 75.6 | 98 |
| 25-Sep | 73 | 80 | 81 | 82 | 83 | 87 | 87 | 87 | 84 | 78 | 69 | 63 | 59 | 49 | 41 | 39 | 46 | 56 | 69 | 73 | 74 | 84 | 83 | 82 | 71.2 | 87 |
| 26-Sep | 80 | 85 | 89 | 87 | 89 | 90 | 93 | 88 | 74 | 64 | 54 | 39 | 38 | 37 | 35 | 35 | 35 | 41 | 55 | 63 | 69 | 71 | 80 | 82 | 65.6 | 93 |
| 27-Sep | 84 | 85 | 85 | 86 | 88 | 93 | 95 | 94 | 76 | 70 | 61 | 56 | 50 | 48 | 48 | 54 | 58 | 66 | 74 | 79 | 78 | 77 | 76 | 78 | 73.2 | 95 |
| 28-Sep | 80 | 81 | 83 | 86 | 92 | 94 | 96 | 96 | 82 | 71 | 58 | 49 | 44 | 42 | 39 | 39 | 39 | 42 | 49 | 55 | 58 | 62 | 66 | 71 | 65.6 | 96 |
| 29-Sep | 73 | 73 | 72 | 78 | 81 | 81 | 87 | 84 | 69 | 58 | 52 | 46 | 39 | 34 | 32 | 32 | 33 | 45 | 58 | 66 | 74 | 79 | 85 | 89 | 63.3 | 89 |
| 30-Sep | 92 | 94 | 95 | 96 | 96 | 97 | 97 | 97 | 86 | 76 | 63 | 55 | 49 | 42 | 39 | 39 | 45 | 52 | 55 | 59 | 61 | 64 | 70 | 72 | 70.5 | 97 |
| | 82.0 | 83.4 | 85.1 | 86.8 | 88.2 | 89.1 | 89.2 | 84.8 | 77.0 | 69.7 | 61.8 | 55.5 | 50.4 | 47.8 | 46.7 | 46.4 | 47.3 | 51.3 | 59.1 | 66.1 | 70.9 | 74.5 | 77.9 | 80.7 | Diurnal Average | |
| | 98 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 98 | 93 | 93 | 92 | 93 | 93 | 93 | 93 | 95 | 96 | 98 | 98 | 98 | 99 | 98 | Diurnal Maximum | |



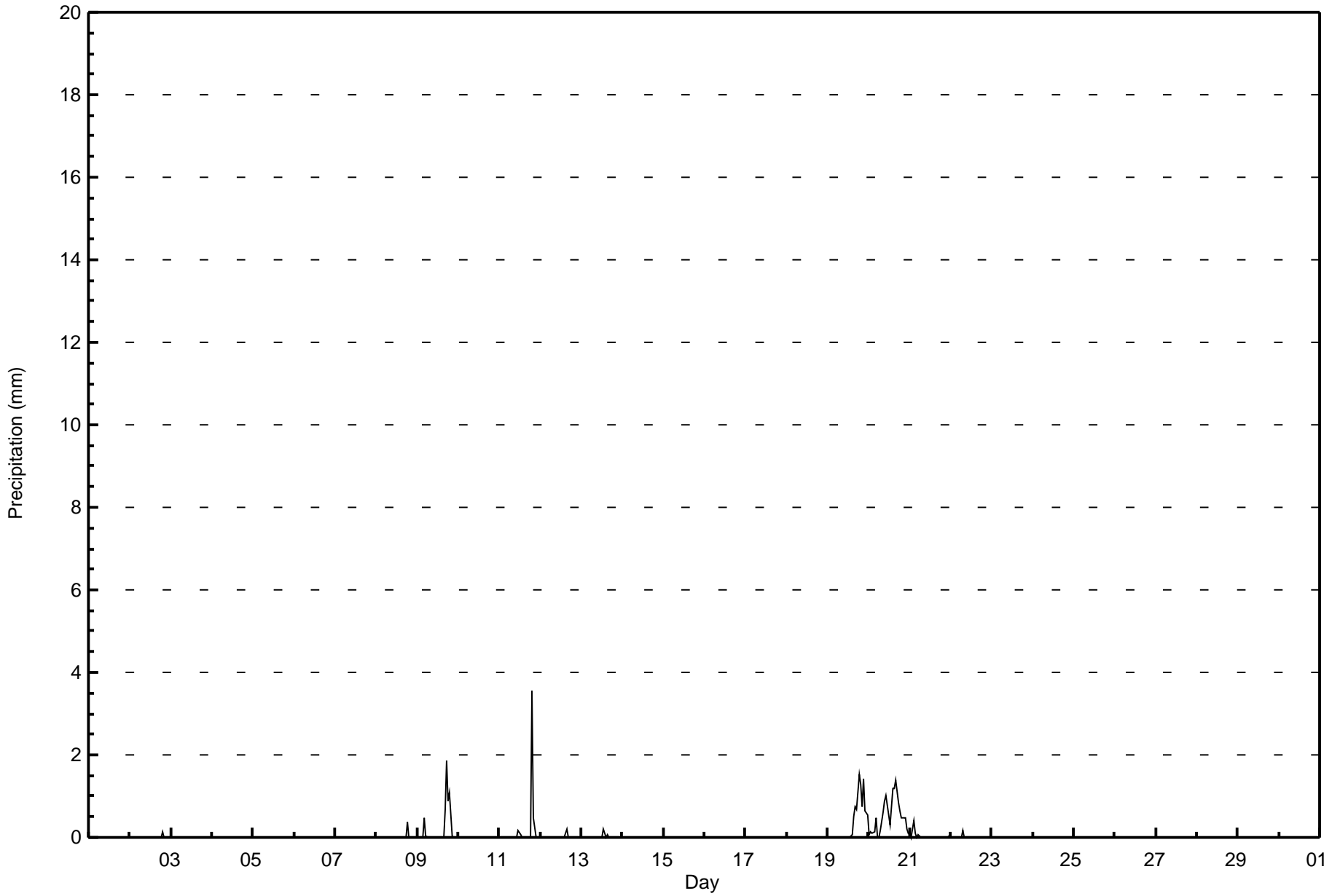


| Maximum Value: 3.6 mm on Sep 11 20:00 Maximum Daily Total: 12.4 mm on Sep 20 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|-----|-----|-----|-----|-----|-----|------|-----|-----|
| Minimum Value: 0.0 mm on Sep 1 01:00 Maximum Diurnal Total: 6.6 mm at hour 20 Monthly Total: 31.83 mm | | Minimum Daily Total: 0.0 mm on Sep 1 Minimum Diurnal Total: 0.0 mm at hour 7 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 |
| 3-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 |
| 9-Sep | 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 | 0.7 | 1.9 | 0.9 | 1.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.1 | 1.9 |
| 10-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.6 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.3 | 3.6 | |
| 12-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | |
| 13-Sep | 0.0 | 0.0 | 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 | 0.1 | 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 | 0.3 | 0.2 | |
| 14-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.8 | 0.7 | 1.5 | 1.3 | 0.7 | 1.4 | 0.7 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.2 | 1.5 | |
| 20-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 | 0.0 | 0.0 | 0.2 | 0.6 | 0.9 | 1.0 | 0.8 | 0.3 | 0.7 | 1.2 | 1.2 | 1.4 | 0.8 | 0.7 | 0.5 | 0.5 | 0.5 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.4 | 1.4 | |
| 21-Sep | 0.1 | 0.0 | 0.4 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.4 | |
| 22-Sep | 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 | 0.0 | 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 | |
| 23-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 28-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (mm) | Number of Hours | % | Cumulative % |
|----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 688 | 95.56 | 95.56 |
| 0.4 - 0.5 | 10 | 1.39 | 96.94 |
| 0.6 - 0.7 | 7 | 0.97 | 97.92 |
| 0.8 - 1.4 | 12 | 1.67 | 99.58 |
| 1.5 - 10 | 3 | 0.42 | 100.00 |
| > 10 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

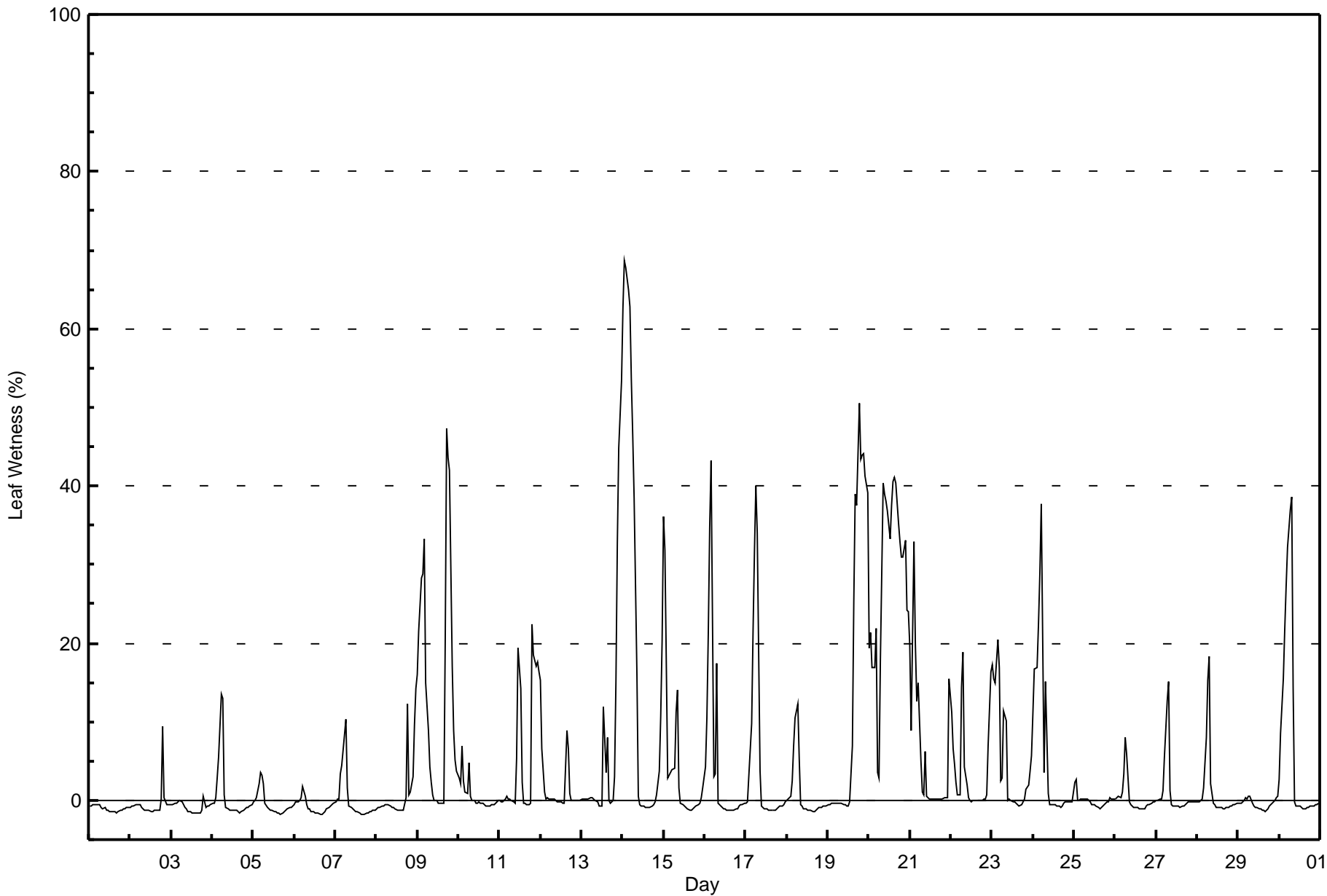


| Maximum Value: 69 % on Sep 14 02:00 | | | | | | | | | | | | | | Maximum Daily Average: 28.3 % on Sep 20 | | | | | | | | | | | | | | Hours in Service: 720 | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|------|------|---------------|---------------|--|---------------------------------|--|
| Minimum Value: -2 % on Sep 5 17:00 | | | | | | | | | | | | | | Minimum Daily Average: -1.0 % on Sep 1 | | | | | | | | | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 9.9 % at hour 5 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.8 % at hour 13 | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 4.7 % | | | | | | | | | | | | | | Percentiles: P ₁ = -2 P ₁₀ = -1 Q ₁ = -1 Median = 0 Q ₃ = 3 P ₉₀ = 19 P ₉₉ = 53 | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 1-Sep | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -2 | -2 | -2 | -1 | -1 | -1 | -1 | -1 | -1 | -1.0 | -1 | | | |
| 2-Sep | -1 | -1 | -1 | -1 | -1 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 9 | 0 | -1 | 0 | 0 | -0.4 | 9 | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -2 | -2 | -2 | -2 | -2 | -2 | -1 | 1 | -1 | -1 | -1 | -1 | -0.9 | 1 | | | | |
| 4-Sep | 0 | 0 | 0 | 3 | 6 | 14 | 13 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -2 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0.7 | 14 | | | | |
| 5-Sep | 0 | 0 | 0 | 2 | 3 | 3 | 2 | 0 | -1 | -1 | -1 | -1 | -2 | -2 | -2 | -2 | -2 | -2 | -1 | -1 | -1 | -1 | -1 | -0.4 | 3 | | | | |
| 6-Sep | -1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | -1 | -1 | -1 | -2 | -2 | -2 | -2 | -2 | -2 | -1 | -1 | -1 | -1 | -1 | 0 | -0.8 | 2 | | | | |
| 7-Sep | 0 | 0 | 0 | 3 | 4 | 8 | 10 | 2 | -1 | -1 | -1 | -1 | -2 | -2 | -2 | -2 | -2 | -2 | -2 | -1 | -1 | -1 | -1 | 0.2 | 10 | | | | |
| 8-Sep | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 12 | 1 | 1 | 3 | 10 | 14 | 1.1 | 14 | | | | |
| 9-Sep | 16 | 22 | 28 | 29 | 33 | 15 | 9 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 21 | 47 | 44 | 42 | 17 | 9 | 5 | 4 | 14.4 | 47 | | | | |
| 10-Sep | 3 | 2 | 7 | 2 | 1 | 1 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0.6 | 7 | | | | |
| 11-Sep | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 19 | 14 | 2 | 0 | 0 | -1 | -1 | 0 | 22 | 18 | 17 | 18 | 16 | 5.5 | 22 | | | |
| 12-Sep | 15 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 1.6 | 15 | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | 12 | 4 | 8 | 0 | 0 | 3 | 15 | 33 | 45 | 53 | 7.1 | 53 | | | | |
| 14-Sep | 63 | 69 | 68 | 65 | 63 | 54 | 46 | 38 | 16 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 1 | 4 | 11 | 20 | 21.3 | 69 | | | | | |
| 15-Sep | 36 | 32 | 3 | 3 | 4 | 4 | 4 | 11 | 14 | 2 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 2 | 4.4 | 36 | | | | |
| 16-Sep | 4 | 11 | 21 | 35 | 43 | 3 | 3 | 17 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 5.1 | 43 | | | | |
| 17-Sep | 0 | 0 | 3 | 10 | 22 | 32 | 40 | 34 | 4 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 5.4 | 40 | | | | |
| 18-Sep | 0 | 0 | 1 | 2 | 7 | 11 | 12 | 5 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0.9 | 12 | | | | |
| 19-Sep | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | 0 | 7 | 25 | 39 | 37 | 51 | 43 | 44 | 44 | 41 | 39 | 15.2 | 51 | | | |
| 20-Sep | 19 | 21 | 17 | 17 | 22 | 3 | 3 | 18 | 40 | 39 | 38 | 37 | 33 | 38 | 41 | 41 | 40 | 35 | 33 | 31 | 31 | 33 | 24 | 24 | 28.3 | 41 | | | |
| 21-Sep | 20 | 9 | 33 | 20 | 13 | 15 | 5 | 1 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 5.8 | 33 | | | | |
| 22-Sep | 11 | 7 | 5 | 2 | 1 | 1 | 14 | 19 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 16 | 3.7 | 19 | | | |
| 23-Sep | 17 | 16 | 15 | 20 | 17 | 2 | 3 | 11 | 10 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | 0 | 0 | 1 | 2 | 4 | 6 | 5.1 | 20 | | | |
| 24-Sep | 11 | 17 | 17 | 22 | 29 | 38 | 4 | 15 | 8 | 1 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 6.5 | 38 | | | | |
| 25-Sep | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 3 | | | |
| 26-Sep | 0 | 0 | 1 | 0 | 1 | 3 | 8 | 6 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0.3 | 8 | | | | |
| 27-Sep | 0 | 0 | 0 | 0 | 1 | 5 | 13 | 15 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 1.2 | 15 | | | | |
| 28-Sep | 0 | 0 | 0 | 0 | 2 | 8 | 15 | 18 | 2 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 1.4 | 18 | | | | |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | -0.5 | 0 | | | | |
| 30-Sep | 3 | 9 | 15 | 22 | 27 | 32 | 37 | 39 | 14 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 7.8 | 39 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| 7.2 | | | | | | | | | | | | | | 63 | | | | | | | | | | | | | | 63 | |
| 7.3 | | | | | | | | | | | | | | 69 | | | | | | | | | | | | | | 69 | |
| 7.7 | | | | | | | | | | | | | | 68 | | | | | | | | | | | | | | 68 | |
| 8.6 | | | | | | | | | | | | | | 65 | | | | | | | | | | | | | | 65 | |
| 9.9 | | | | | | | | | | | | | | 63 | | | | | | | | | | | | | | 63 | |
| 8.4 | | | | | | | | | | | | | | 54 | | | | | | | | | | | | | | 54 | |
| 8.2 | | | | | | | | | | | | | | 46 | | | | | | | | | | | | | | 46 | |
| 8.4 | | | | | | | | | | | | | | 39 | | | | | | | | | | | | | | 39 | |
| 3.6 | | | | | | | | | | | | | | 40 | | | | | | | | | | | | | | 40 | |
| 1.2 | | | | | | | | | | | | | | 39 | | | | | | | | | | | | | | 39 | |
| 0.8 | | | | | | | | | | | | | | 38 | | | | | | | | | | | | | | 38 | |
| 1.1 | | | | | | | | | | | | | | 37 | | | | | | | | | | | | | | 37 | |
| 0.8 | | | | | | | | | | | | | | 33 | | | | | | | | | | | | | | 33 | |
| 0.9 | | | | | | | | | | | | | | 38 | | | | | | | | | | | | | | 38 | |
| 0.8 | | | | | | | | | | | | | | 41 | | | | | | | | | | | | | | 41 | |
| 1.9 | | | | | | | | | | | | | | 41 | | | | | | | | | | | | | | 41 | |
| 2.6 | | | | | | | | | | | | | | 40 | | | | | | | | | | | | | | 40 | |
| 3.2 | | | | | | | | | | | | | | 47 | | | | | | | | | | | | | | 47 | |
| 4.0 | | | | | | | | | | | | | | 51 | | | | | | | | | | | | | | 51 | |
| 4.6 | | | | | | | | | | | | | | 43 | | | | | | | | | | | | | | 43 | |
| 3.9 | | | | | | | | | | | | | | 44 | | | | | | | | | | | | | | 44 | |
| 4.5 | | | | | | | | | | | | | | 44 | | | | | | | | | | | | | | 44 | |
| 5.2 | | | | | | | | | | | | | | 45 | | | | | | | | | | | | | | 45 | |
| 6.8 | | | | | | | | | | | | | | 53 | | | | | | | | | | | | | | 53 | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

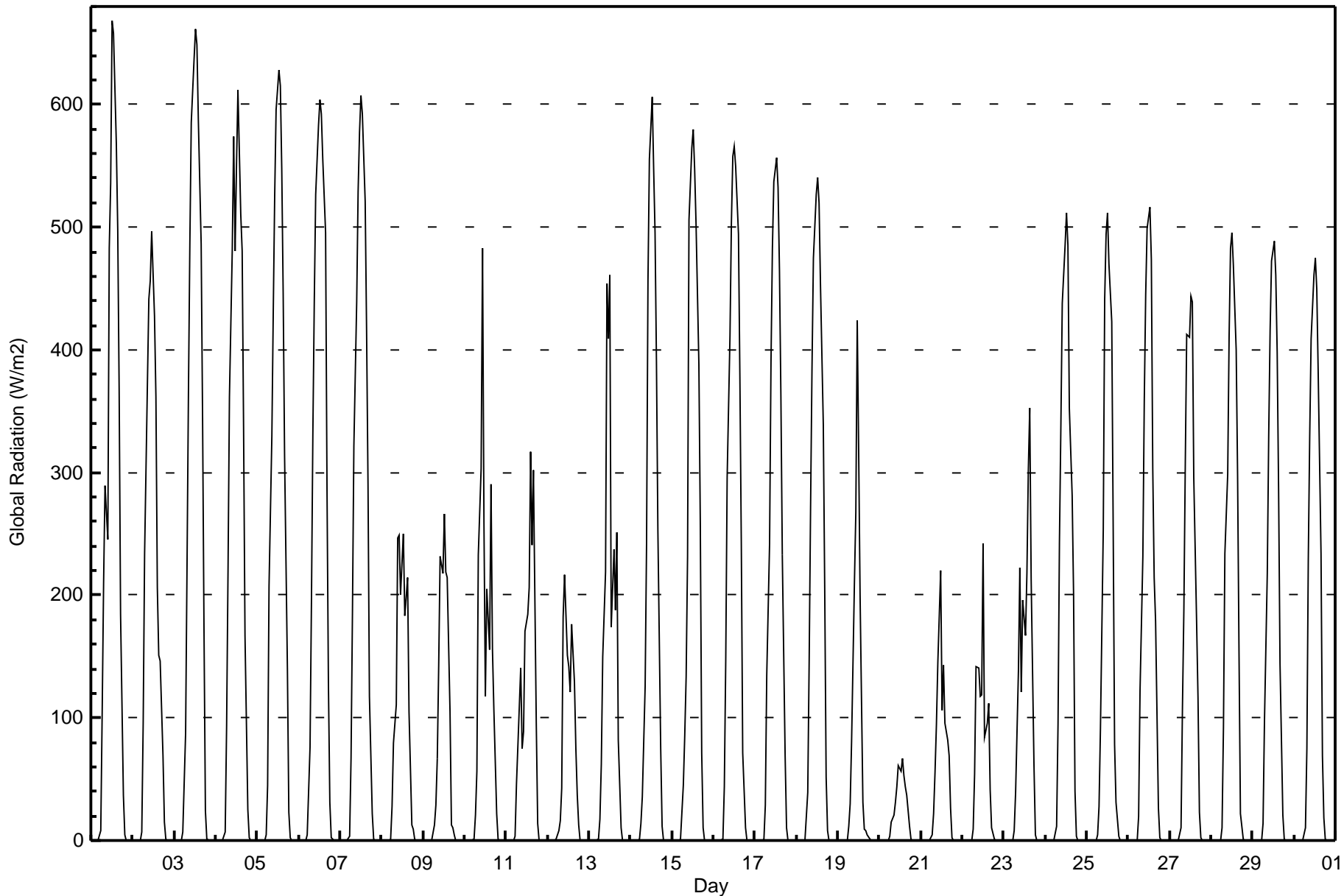
| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 67 | 21.82 | 21.82 |
| 0.4 - 0.5 | 17 | 5.54 | 27.36 |
| 0.6 - 0.7 | 11 | 3.58 | 30.94 |
| 0.8 - 1.4 | 11 | 3.58 | 34.53 |
| 1.5 - 10 | 80 | 26.06 | 60.59 |
| > 10 | 121 | 39.41 | 100.00 |

Total Number of Valid Hours: 307

Total Number of Hours: 720



| Maximum Value: 669 W/m2 on Sep 1 13:00 | | Maximum Daily Average: 221.6 W/m2 on Sep 3 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|-----|---------------------------------|-----|-----|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|-----|-----|-----|---------------|-----------------|
| Minimum Value: 0 W/m2 on Sep 1 01:00 | | Minimum Daily Average: 18.5 W/m2 on Sep 20 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 425.1 W/m2 at hour 13 | | Minimum Diurnal Average: 0.0 W/m2 at hour 2 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 130.4 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 10 Q ₃ = 222 P ₉₀ = 473 P ₉₉ = 606 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | 0 | 8 | 104 | 210 | 289 | 246 | 483 | 536 | 669 | 658 | 568 | 498 | 367 | 185 | 36 | 4 | 0 | 0 | 0 | 0 | 202.6 | 669 |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 96 | 234 | 373 | 442 | 456 | 496 | 428 | 362 | 207 | 151 | 146 | 69 | 15 | 1 | 0 | 0 | 0 | 0 | 145.1 | 496 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 87 | 224 | 364 | 486 | 586 | 637 | 661 | 649 | 588 | 486 | 345 | 173 | 24 | 1 | 0 | 0 | 0 | 0 | 221.6 | 661 |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 94 | 220 | 362 | 482 | 574 | 481 | 551 | 613 | 511 | 481 | 336 | 167 | 26 | 2 | 0 | 0 | 0 | 0 | 204.5 | 613 |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 45 | 207 | 330 | 433 | 526 | 595 | 628 | 615 | 547 | 447 | 314 | 139 | 24 | 2 | 0 | 0 | 0 | 0 | 202.3 | 628 |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 76 | 195 | 332 | 439 | 526 | 583 | 604 | 592 | 556 | 495 | 287 | 127 | 31 | 2 | 0 | 0 | 0 | 0 | 202.1 | 604 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 67 | 186 | 321 | 439 | 529 | 578 | 608 | 592 | 521 | 415 | 290 | 117 | 22 | 1 | 0 | 0 | 0 | 0 | 195.4 | 608 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 28 | 79 | 110 | 246 | 249 | 200 | 251 | 183 | 198 | 215 | 105 | 13 | 9 | 1 | 0 | 0 | 0 | 0 | 78.7 | 251 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 29 | 66 | 143 | 232 | 218 | 266 | 219 | 215 | 105 | 13 | 11 | 5 | 0 | 0 | 0 | 0 | 0 | 64.0 | 266 |
| 10-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 21 | 57 | 233 | 303 | 483 | 259 | 118 | 205 | 155 | 290 | 157 | 107 | 22 | 1 | 0 | 0 | 0 | 0 | 100.5 | 483 |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 46 | 77 | 140 | 75 | 88 | 170 | 184 | 206 | 317 | 241 | 301 | 96 | 13 | 0 | 0 | 0 | 0 | 0 | 81.7 | 317 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 17 | 42 | 182 | 217 | 150 | 142 | 121 | 176 | 129 | 75 | 36 | 13 | 0 | 0 | 0 | 0 | 0 | 54.5 | 217 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 18 | 62 | 150 | 219 | 454 | 409 | 461 | 174 | 238 | 187 | 252 | 82 | 10 | 0 | 0 | 0 | 0 | 0 | 113.2 | 461 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 14 | 36 | 125 | 242 | 456 | 555 | 606 | 548 | 495 | 389 | 254 | 75 | 12 | 0 | 0 | 0 | 0 | 0 | 158.7 | 606 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 46 | 85 | 134 | 232 | 506 | 565 | 580 | 547 | 502 | 389 | 259 | 71 | 11 | 0 | 0 | 0 | 0 | 0 | 163.7 | 580 |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 44 | 147 | 296 | 412 | 504 | 558 | 566 | 550 | 495 | 378 | 243 | 72 | 10 | 0 | 0 | 0 | 0 | 0 | 178.2 | 566 |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 28 | 134 | 242 | 390 | 483 | 537 | 556 | 532 | 464 | 363 | 233 | 69 | 10 | 0 | 0 | 0 | 0 | 0 | 168.4 | 556 |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 39 | 146 | 271 | 385 | 475 | 527 | 541 | 520 | 453 | 338 | 205 | 52 | 8 | 0 | 0 | 0 | 0 | 0 | 165.2 | 541 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 30 | 80 | 210 | 267 | 424 | 318 | 200 | 31 | 10 | 8 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 66.5 | 424 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 15 | 21 | 31 | 44 | 61 | 56 | 67 | 53 | 44 | 37 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 18.5 | 67 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 22 | 56 | 94 | 145 | 220 | 106 | 143 | 96 | 82 | 69 | 27 | 2 | 0 | 0 | 0 | 0 | 0 | 44.4 | 220 |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 54 | 142 | 141 | 117 | 119 | 242 | 84 | 96 | 112 | 42 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 48.7 | 242 |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 39 | 138 | 223 | 122 | 196 | 168 | 217 | 302 | 353 | 213 | 61 | 4 | 0 | 0 | 0 | 0 | 0 | 85.2 | 353 |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 94 | 243 | 337 | 438 | 486 | 511 | 485 | 352 | 281 | 200 | 40 | 3 | 0 | 0 | 0 | 0 | 0 | 145.1 | 511 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 27 | 91 | 253 | 441 | 494 | 512 | 470 | 422 | 257 | 78 | 32 | 3 | 0 | 0 | 0 | 0 | 0 | 128.6 | 512 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 122 | 232 | 358 | 445 | 499 | 516 | 474 | 304 | 215 | 178 | 27 | 2 | 0 | 0 | 0 | 0 | 0 | 141.3 | 516 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 108 | 188 | 307 | 413 | 410 | 444 | 439 | 296 | 179 | 116 | 23 | 2 | 0 | 0 | 0 | 0 | 0 | 122.3 | 444 |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 92 | 233 | 299 | 411 | 483 | 496 | 469 | 400 | 297 | 153 | 22 | 2 | 0 | 0 | 0 | 0 | 0 | 140.4 | 496 |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 97 | 218 | 330 | 417 | 473 | 489 | 461 | 398 | 286 | 144 | 21 | 1 | 0 | 0 | 0 | 0 | 0 | 139.5 | 489 |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 75 | 229 | 330 | 409 | 461 | 475 | 450 | 381 | 234 | 70 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 131.0 | 475 |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 33.1 | 104.1 | 201.7 | 290.3 | 383.3 | 412.7 | 425.1 | 394.9 | 344.6 | 278.2 | 183.0 | 65.3 | 10.8 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | Diurnal Average |
| | | 0 | 0 | 0 | 0 | 0 | 8 | 104 | 234 | 373 | 486 | 586 | 637 | 669 | 658 | 588 | 498 | 367 | 185 | 36 | 4 | 0 | 0 | 0 | 0 | Diurnal Maximum |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (W/m2) | Number of Hours | % | Cumulative % |
|------------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 380 | 52.78 | 52.78 |
| 21 - 100 | 80 | 11.11 | 63.89 |
| 101 - 300 | 121 | 16.81 | 80.69 |
| 301 - 600 | 128 | 17.78 | 98.47 |
| 601 - 900 | 11 | 1.53 | 100.00 |
| > 900 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

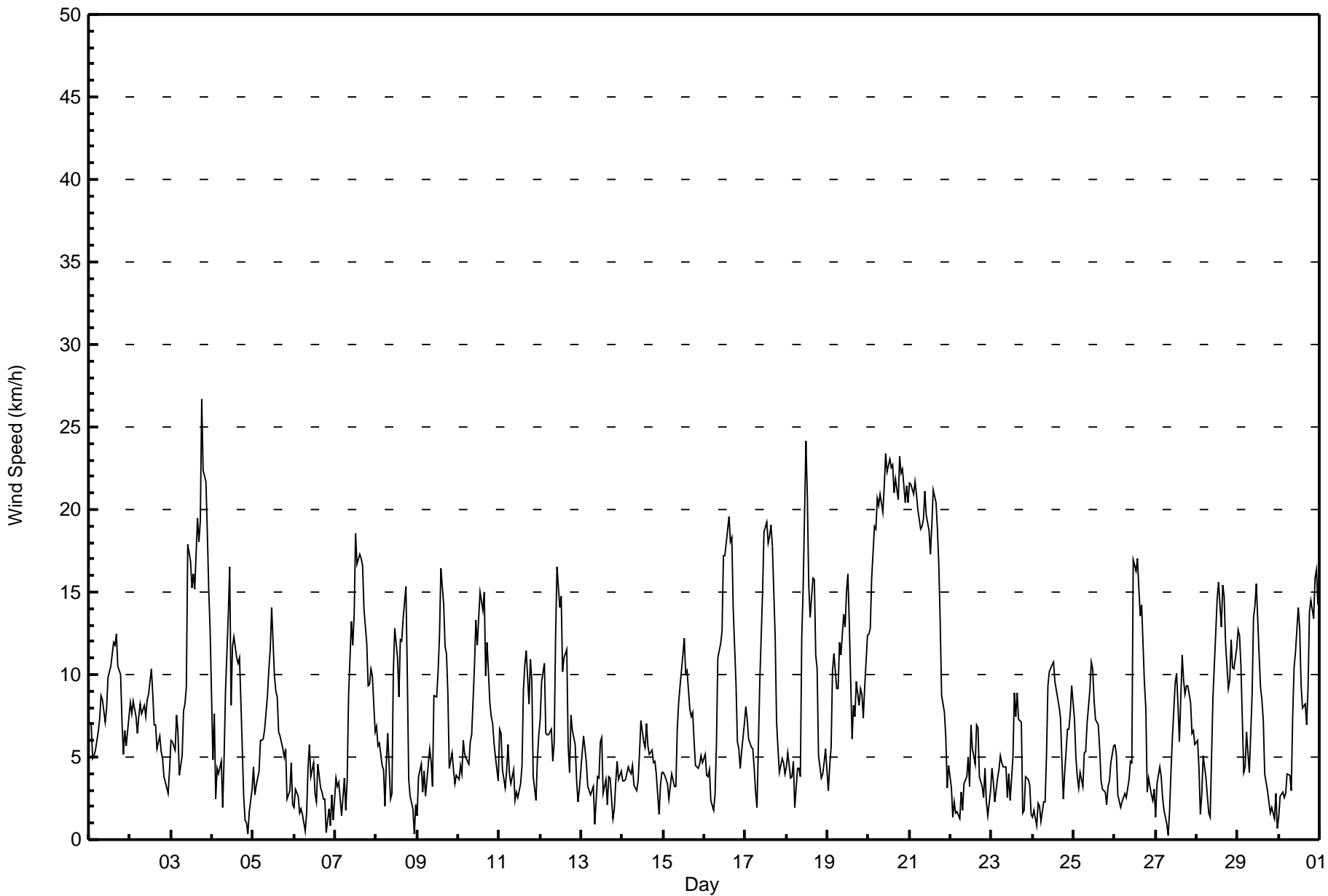
Total Number of Hours: 720



| | | |
|--|---|---------------------------------|
| Maximum Speed: 27 km/h on Sep 3 19:00 | Maximum Daily Speed Average: 20.4 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 27 08:00 | Minimum Daily Speed Average: 0.8 km/h on Sep 6 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 2.1 km/h at hour 24 | Minimum Diurnal Speed Average: 0.6 km/h at hour 11 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 1.4 km/h 268.7 deg | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 22 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--|-------------------------------|------|------|-------|-------|------|------|------|-------|---------|---------|---------|-------|-------|-------|-------|-------|-------|-------|------|------|------|-------|-----------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | W7 | W7 | SW5 | SSW5 | WSW5 | W7 | W7 | W9 | W8 | WSW7 | W8WSW10 | WSW10 | WSW11 | WSW12 | WSW12 | W12 | W11 | WSW10 | W7 | SW5 | WSW7 | W6 | W7 | WSW7.9 | W12 | |
| 2-Sep | W8 | W8 | WNW8 | W7 | WNW6 | W7 | W8 | W8 | W8 | W7 | W8 | W9WNW10 | W9 | WSW7 | SW7 | SW6 | WSW6 | W5 | SW5 | S4 | SW3 | W3 | WSW4 | W6.2 | WNW10 | |
| 3-Sep | WSW6 | W6 | W5 | W8 | WSW7 | SSW4 | W5 | W8 | WNW8 | W9WNW18 | WNW17 | WNW15 | WNW16 | WNW15 | NW19 | WNW18 | NW19 | NNW27 | NW22 | NW22 | NW19 | NW15 | NW13 | WNW12.3 | NNW27 | |
| 4-Sep | WNW5 | WNW8 | NW2 | WNW4 | WNW4 | WNW5 | WNW2 | WNW5 | WNW9 | NW14 | NW17 | NW8 | NW12 | NW12 | NW11 | WNW11 | NW11 | NNW8 | NNW3 | WNW1 | SSW1 | SW0 | WSW2 | SSW3 | NW6.1 | NW17 |
| 5-Sep | SSW4 | SSW3 | S3 | SSW4 | S6 | S6 | SSE6 | SSE7 | SSE9 | S10 | SSE12 | SSE14 | S10 | SW9 | SW9 | SW6 | WSW6 | WSW6 | SSW5 | SSW5 | WSW2 | SW3 | S5 | WSW2 | S5.4 | SSE14 |
| 6-Sep | SSE2 | S3 | SSW3 | W2 | SSE2 | SSW2 | SW0 | NNW2 | N4 | N6 | NE4 | NE5 | NNE3 | ENE2 | NNE5 | NE3 | SE3 | NE2 | NE2 | NNE0 | S2 | WSW1 | SSW3 | WNW1 | NE0.8 | N6 |
| 7-Sep | NW4 | WNW3 | SSW4 | SSW2 | WNW1 | SW4 | SSW2 | SSE4 | SSE9 | SSE13 | SSE12 | SSE14 | S19 | S17 | S17 | S17 | S17 | S14 | S12 | S9 | S9 | S10 | S10 | SSW7 | S8.8 | S19 |
| 8-Sep | S7 | S6 | S6 | SSW4 | S4 | SW2 | SSW5 | SSW6 | SSW2 | NNW3 | N10 | N13 | N11 | NNW9 | NNW12 | N12 | NNW13 | NNW15 | NNW10 | NW4 | WSW3 | WSW2 | S0 | WNW2 | NW3.3 | NNW15 |
| 9-Sep | W1 | NW4 | WNW5 | W3 | SSW4 | NNW3 | WNW5 | NW5 | NNW5 | N3 | N9 | N9 | N10 | N12 | N16 | N14 | NW12 | NNW11 | NNW9 | N4 | WNW5 | WNW4 | W3 | WSW4 | NNW5.7 | N16 |
| 10-Sep | SW4 | S5 | SSW4 | S6 | SW5 | SSW5 | SW5 | SW6 | WSW6 | W11 | W13 | W12 | WNW13 | WNW15 | W14 | WNW15 | WNW10 | W12 | WSW8 | SW7 | SW7 | WSW6 | W5 | WNW4 | W7.1 | WNW15 |
| 11-Sep | W7 | W6 | WSW4 | SSW3 | S4 | SSW6 | SSW4 | SSW3 | S4 | SSE2 | ESE3 | E3 | NE3 | NE5 | SSE9 | SSE11 | SSE11 | SSE8 | S11 | NW10 | S4 | SW2 | W5 | W6 | SSW3.0 | SSE11 |
| 12-Sep | W7 | W10 | W11 | SW6 | SSW6 | SSW6 | SW7 | WSW5 | WNW6 | WNW12 | NW17 | WNW14 | NW15 | NW10 | NNW11 | NNW11 | NNW6 | NNE4 | N8 | N7 | NNE6 | NNE4 | N2 | NW3 | NW5.5 | NW17 |
| 13-Sep | NW5 | NNW6 | NW6 | NW5 | W3 | WNW3 | WNW3 | NW3 | SW1 | NW4 | E4 | E6 | ESE6 | N3 | SSE4 | NNW2 | ESE4 | NNE4 | NW1 | SW2 | WNW3 | NW5 | WNW4 | NW4 | NNW1.7 | NNW6 |
| 14-Sep | WNW4 | WNW4 | WNW4 | WNW4 | WNW4 | WNW4 | WNW4 | WNW3 | NW3 | NNE4 | N5 | NNE7 | NNE6 | ENE6 | ENE7 | NE6 | ENE5 | NE5 | N5 | NNW5 | NW4 | WSW2 | W3 | W4 | NNW2.4 | NNE7 |
| 15-Sep | WNW4 | WNW4 | W3 | WNW2 | SW3 | SW4 | SW3 | SSW3 | S7 | SSE8 | SSE9 | SSE11 | SSE12 | SSE10 | SSW10 | SSW8 | SSW7 | S8 | SSW6 | SSW4 | S4 | S5 | S5 | S5 | S5.1 | SSE12 |
| 16-Sep | S5 | S4 | S4 | S4 | SSE2 | S2 | SSE3 | SSE6 | SSE11 | SSE12 | SSE13 | SSE17 | S17 | S18 | S20 | S18 | S18 | S14 | S9 | S6 | SSE5 | SSE4 | S5 | SSE7 | S9.3 | S20 |
| 17-Sep | S8 | SSE7 | SSE6 | SSE6 | SSE5 | SSE4 | SE3 | SE2 | SSE10 | SSE12 | SSE15 | SSE19 | S19 | S18 | SSE18 | SSE19 | SSE18 | SSE12 | SSE7 | SSE6 | SSE4 | SSE5 | SSE5 | SE4 | SSE9.6 | S19 |
| 18-Sep | SE4 | SSE5 | SE4 | SSE4 | SSE5 | N2 | NNW4 | N4 | SSE4 | SSE12 | SSE15 | SSE24 | SSE21 | SSE15 | SE13 | SE16 | SSE16 | SE11 | ESE10 | ESE5 | S4 | S4 | S5 | S6 | SSE7.7 | SSE24 |
| 19-Sep | WNW3 | NNE4 | N6 | NNW10 | NNW11 | NNW9 | N9 | N12 | N11 | N14 | N13 | N15 | N16 | NNE13 | NE6 | NE8 | ENE7 | ENE10 | NNE8 | NE9 | ENE9 | NE7 | NNE9 | NNE12 | NNE8.8 | N16 |
| 20-Sep | N12 | N13 | N16 | N19 | N19 | N21 | N20 | N21 | N20 | N21 | N23 | N22 | NNE23 | NNE23 | NNE23 | N21 | N22 | N21 | N23 | N22 | N22 | N20 | N21 | N20 | N20.4 | N23 |
| 21-Sep | N22 | N21 | N21 | N22 | N21 | N20 | N19 | N19 | N19 | N21 | N20 | N19 | N17 | N19 | N21 | N20 | NNW19 | N17 | N13 | NNW9 | NNW8 | NW6 | WNW3 | WNW4 | N16.3 | N22 |
| 22-Sep | WNW3 | W1 | WNW2 | WNW2 | WSW2 | SW1 | SSW3 | SW2 | S3 | SSE4 | S5 | SSE3 | SSE7 | SSW6 | S5 | SSE7 | SSE7 | SSE4 | ESE3 | SE3 | SSE4 | SSW2 | WNW1 | WNW3 | S2.4 | SSE7 |
| 23-Sep | WNW4 | WNW3 | W2 | W4 | WNW4 | WNW5 | WNW5 | WNW4 | NW4 | WNW3 | WNW4 | NNW2 | SE5 | SSE9 | SSE7 | SSE9 | SSE7 | SSE7 | E2 | ESE2 | SSE4 | S4 | S3 | NW2 | SSW1.4 | SSE9 |
| 24-Sep | S1 | SSW2 | SSW1 | SSW2 | W2 | SW1 | S2 | SSE2 | SSE5 | SSE9 | SSE10 | SSE11 | SSE11 | SSE10 | SSE9 | SSE8 | SSE7 | SSE5 | SSE2 | S4 | S7 | S7 | S8 | S9 | SSE5.4 | SSE11 |
| 25-Sep | SSE7 | SSE5 | SSE4 | SE3 | SSE4 | S3 | S5 | S5 | SSE7 | SSE9 | SE11 | SSE10 | SSE8 | SSW7 | W7 | WSW6 | S4 | S3 | SW3 | WSW2 | WSW3 | S4 | S5 | S6 | S4.7 | SE11 |
| 26-Sep | S6 | S5 | S3 | SW2 | W2 | WNW3 | SSW3 | SSW3 | SW4 | SW5 | SSE5 | NW17 | NW16 | NNW17 | NNW15 | NW14 | NNW14 | NW9 | NW8 | W3 | WNW4 | WNW3 | SSE2 | SW3 | NW4.3 | NNW17 |
| 27-Sep | S1 | S3 | S4 | SW4 | SSW3 | SSW2 | SW1 | SW0 | N2 | N4 | N6 | N10 | N10 | NNE8 | NE6 | N11 | NNE10 | NNE9 | N9 | N9 | N8 | N6 | N7 | N6 | N4.3 | N11 |
| 28-Sep | NNW6 | NNW4 | N2 | NNW3 | WNW5 | WNW4 | SW3 | W2 | ESE1 | S9 | SSE11 | SSE13 | SSE15 | SSE16 | SSE13 | S15 | S15 | S12 | S9 | S10 | S12 | S10 | S10 | S12 | S6.7 | SSE16 |
| 29-Sep | S13 | S12 | S11 | S4 | S4 | S7 | SSE5 | SSE4 | SSE9 | SSE13 | SSE14 | SSE15 | S11 | SSW9 | SSW8 | SSW7 | W4 | NW3 | WNW2 | SW2 | WSW2 | WSW1 | SSW3 | SW1 | S6.0 | SSE15 |
| 30-Sep | SW1 | SW3 | SSW3 | SSW3 | S3 | SSW4 | S4 | SSE3 | SSE7 | SSE10 | SSE11 | SSE14 | SSE13 | S9 | SSW8 | SSW8 | SSW7 | WNW9 | NW14 | NW15 | NW13 | NW16 | WNW16 | NW14 | WSW3.7 | WNW16 |
| W2.0 W2.0 W1.7 W1.8 W1.7 W1.8 W1.8WNW1.8WSW1.1 SW1.3 SW0.6 SSE0.8 SW1.0WSW1.9WSW1.5 W1.4WSW1.3 NW1.6 NW2.0 NW2.0 W1.3 W1.7 W1.7 W2.1 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| N22 N21 N21 N22 N21 N21 N20 N21 N20 N21 N23 SSE24 NNE23 NNE23 NNE23 N21 N22 N21 NNW27 NW22 N22 N20 N21 N20 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 325 | 45.14 | 45.14 |
| 6 - 11 | 237 | 32.92 | 78.06 |
| 12 - 19 | 123 | 17.08 | 95.14 |
| 20 - 28 | 35 | 4.86 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 11 | 9 | 8 | 2 | 3 | 6 | 9 | 36 | 46 | 40 | 33 | 19 | 21 | 53 | 18 | 11 | 325 |
| 6 - 11 | 21 | 9 | 5 | 5 | 1 | 2 | 2 | 49 | 31 | 18 | 9 | 18 | 33 | 10 | 8 | 16 | 237 |
| 12 - 19 | 23 | 2 | 0 | 0 | 0 | 0 | 2 | 29 | 21 | 0 | 0 | 2 | 5 | 13 | 18 | 8 | 123 |
| 20 - 28 | 26 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 35 |
| 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 | 81 | 23 | 13 | 7 | 4 | 8 | 13 | 116 | 99 | 58 | 42 | 39 | 59 | 76 | 46 | 36 | 720 |

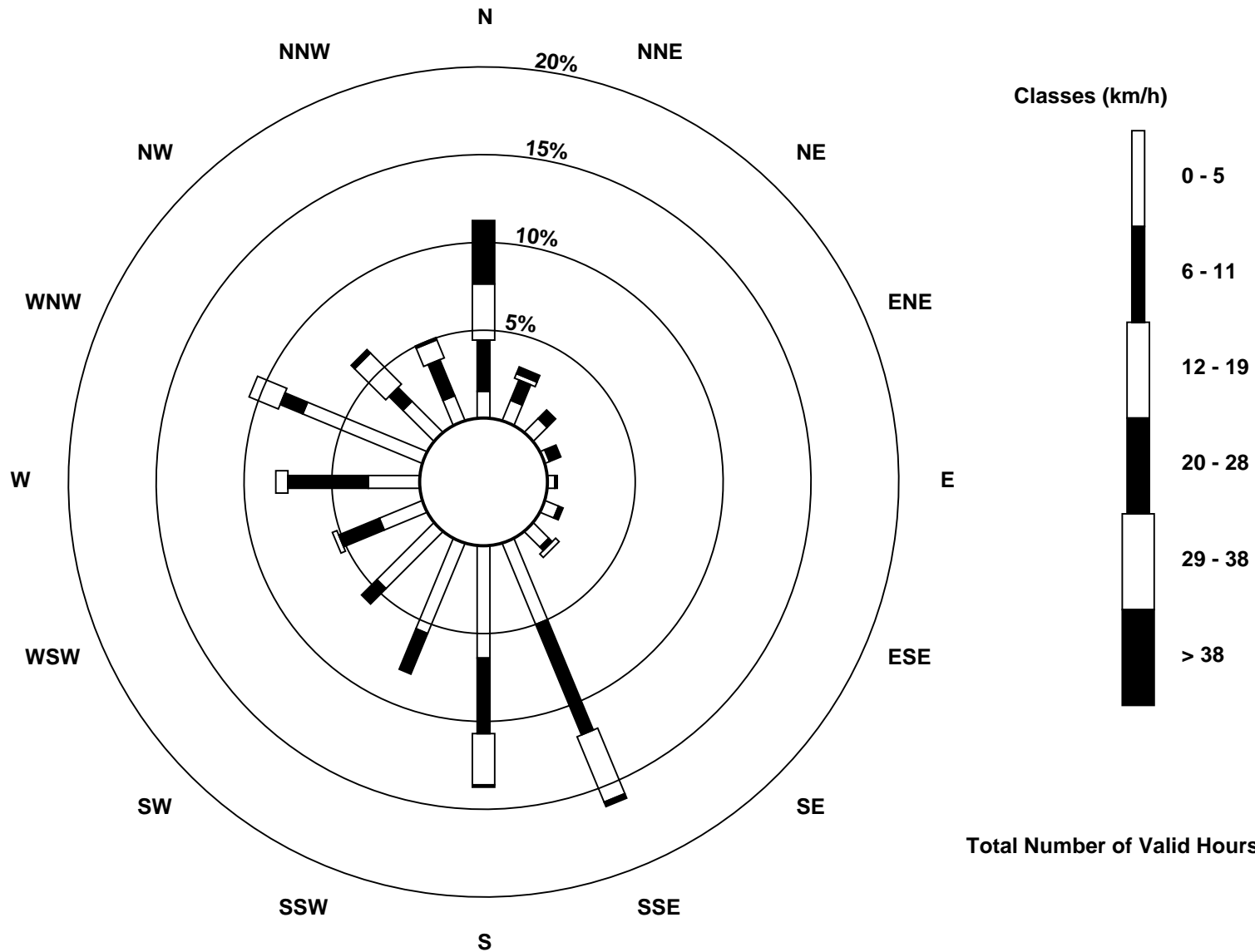
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - September 2017

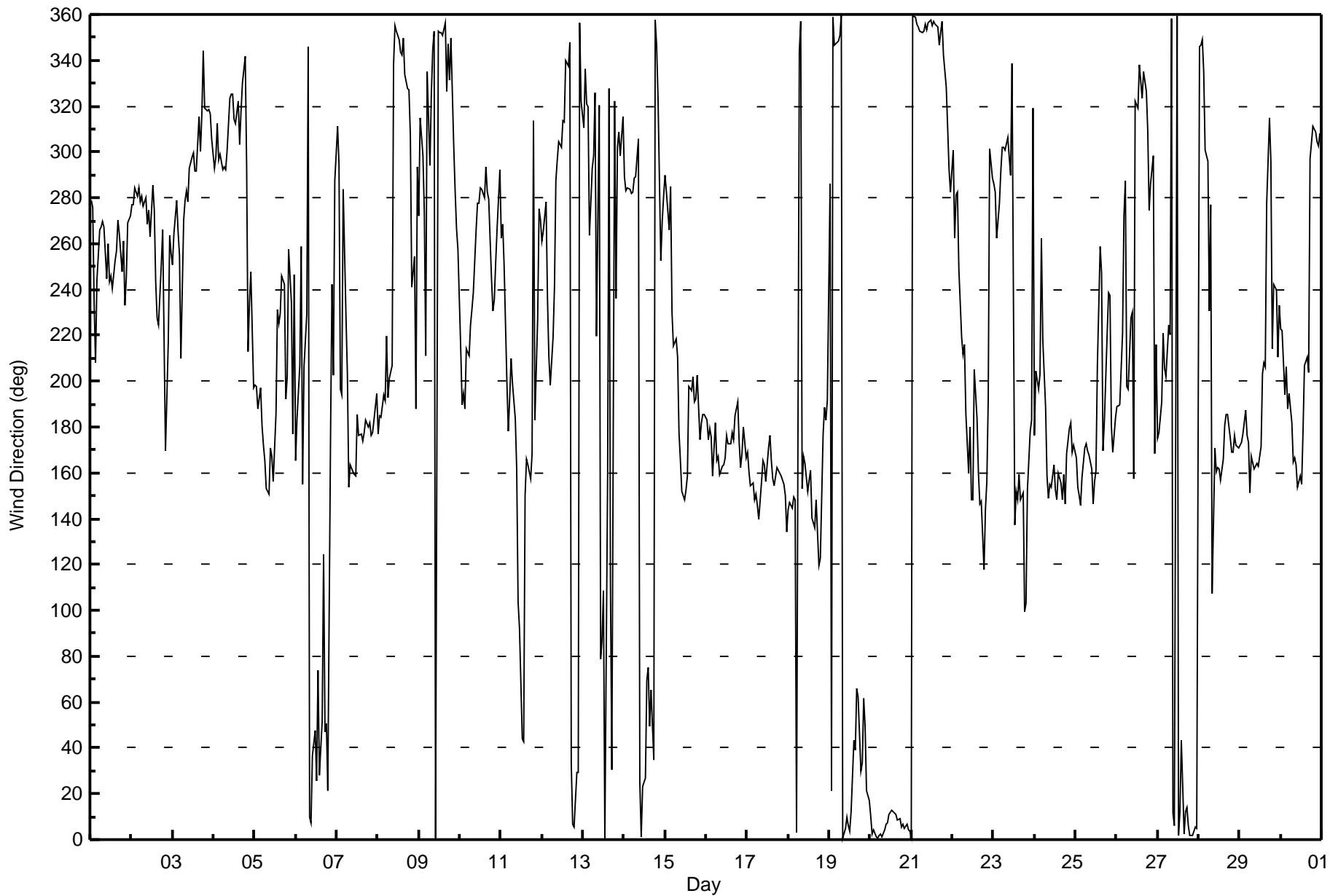
| | |
|---|---|
| Direction of Maximum Speed: 344 deg on Sep 3 19:00 Direction of Maximum Daily Speed Average: 6.4 deg on Sep 20 | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 |
| Direction of Minimum Speed: 220 deg on Sep 27 08:00 Direction of Minimum Daily Speed Average: 0.8 deg on Sep 6 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 258.2 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-Sep | 279 | 276 | 234 | 208 | 244 | 266 | 267 | 270 | 267 | 245 | 260 | 244 | 246 | 241 | 253 | 257 | 270 | 264 | 248 | 261 | 233 | 245 | 269 | 272 | 256.2 |
| 2-Sep | 277 | 277 | 284 | 281 | 285 | 278 | 281 | 277 | 280 | 268 | 275 | 263 | 285 | 275 | 244 | 227 | 224 | 251 | 266 | 218 | 170 | 217 | 264 | 256 | 265.8 |
| 3-Sep | 251 | 264 | 279 | 265 | 255 | 210 | 270 | 279 | 283 | 278 | 293 | 298 | 299 | 291 | 291 | 315 | 300 | 316 | 344 | 319 | 318 | 319 | 316 | 306 | 302.5 |
| 4-Sep | 293 | 298 | 313 | 297 | 299 | 292 | 294 | 292 | 300 | 323 | 325 | 325 | 314 | 313 | 322 | 303 | 318 | 330 | 342 | 293 | 213 | 234 | 248 | 197 | 310.8 |
| 5-Sep | 198 | 198 | 188 | 197 | 181 | 172 | 165 | 153 | 151 | 171 | 167 | 156 | 186 | 231 | 225 | 230 | 246 | 242 | 192 | 202 | 258 | 234 | 177 | 247 | 190.5 |
| 6-Sep | 165 | 184 | 207 | 259 | 155 | 206 | 230 | 346 | 10 | 8 | 37 | 48 | 26 | 74 | 28 | 52 | 125 | 47 | 51 | 21 | 179 | 242 | 203 | 287 | 49.0 |
| 7-Sep | 311 | 295 | 196 | 194 | 284 | 228 | 203 | 154 | 164 | 160 | 159 | 159 | 186 | 176 | 177 | 174 | 178 | 183 | 180 | 182 | 176 | 178 | 183 | 195 | 178.4 |
| 8-Sep | 177 | 185 | 184 | 194 | 191 | 220 | 193 | 202 | 207 | 338 | 355 | 353 | 349 | 344 | 342 | 350 | 334 | 328 | 327 | 308 | 241 | 254 | 188 | 293 | 320.4 |
| 9-Sep | 272 | 315 | 298 | 274 | 211 | 335 | 294 | 325 | 345 | 353 | 1 | 353 | 352 | 352 | 351 | 356 | 326 | 347 | 331 | 349 | 303 | 283 | 267 | 257 | 333.9 |
| 10-Sep | 214 | 190 | 195 | 188 | 214 | 211 | 224 | 231 | 238 | 266 | 278 | 277 | 285 | 283 | 280 | 293 | 282 | 279 | 245 | 231 | 236 | 252 | 266 | 292 | 260.9 |
| 11-Sep | 262 | 268 | 251 | 199 | 178 | 193 | 210 | 199 | 184 | 162 | 104 | 92 | 44 | 43 | 150 | 166 | 164 | 157 | 169 | 314 | 183 | 227 | 275 | 270 | 192.8 |
| 12-Sep | 261 | 266 | 278 | 236 | 210 | 198 | 219 | 241 | 288 | 296 | 305 | 302 | 314 | 313 | 340 | 338 | 348 | 33 | 7 | 6 | 30 | 30 | 356 | 322 | 304.5 |
| 13-Sep | 311 | 336 | 321 | 320 | 263 | 293 | 299 | 326 | 220 | 320 | 79 | 87 | 109 | 1 | 160 | 328 | 112 | 31 | 322 | 236 | 302 | 309 | 298 | 316 | 330.5 |
| 14-Sep | 289 | 283 | 284 | 284 | 282 | 283 | 289 | 289 | 306 | 25 | 1 | 23 | 27 | 70 | 75 | 49 | 65 | 34 | 358 | 347 | 324 | 253 | 270 | 281 | 346.7 |
| 15-Sep | 290 | 282 | 266 | 285 | 230 | 215 | 218 | 210 | 178 | 165 | 152 | 148 | 153 | 159 | 198 | 196 | 202 | 191 | 192 | 203 | 175 | 182 | 186 | 186 | 186.2 |
| 16-Sep | 183 | 175 | 179 | 176 | 158 | 182 | 165 | 167 | 159 | 163 | 163 | 166 | 176 | 173 | 172 | 177 | 175 | 185 | 191 | 173 | 162 | 168 | 180 | 167 | 172.6 |
| 17-Sep | 169 | 160 | 155 | 156 | 148 | 151 | 146 | 140 | 156 | 165 | 164 | 156 | 171 | 176 | 165 | 157 | 154 | 162 | 161 | 160 | 159 | 155 | 150 | 134 | 160.6 |
| 18-Sep | 144 | 147 | 145 | 150 | 148 | 3 | 344 | 357 | 153 | 167 | 164 | 152 | 157 | 161 | 140 | 136 | 148 | 134 | 120 | 123 | 177 | 189 | 183 | 191 | 150.4 |
| 19-Sep | 286 | 21 | 359 | 347 | 347 | 348 | 351 | 360 | 1 | 5 | 10 | 6 | 3 | 12 | 43 | 39 | 66 | 62 | 30 | 34 | 61 | 49 | 21 | 17 | 14.6 |
| 20-Sep | 10 | 2 | 4 | 1 | 0 | 2 | 2 | 1 | 5 | 7 | 7 | 11 | 13 | 12 | 12 | 11 | 8 | 9 | 6 | 7 | 5 | 6 | 4 | 4 | 6.4 |
| 21-Sep | 1 | 359 | 359 | 356 | 355 | 352 | 352 | 353 | 356 | 353 | 356 | 358 | 355 | 357 | 355 | 354 | 346 | 352 | 357 | 342 | 328 | 311 | 292 | 283 | 352.7 |
| 22-Sep | 301 | 263 | 282 | 283 | 249 | 219 | 212 | 216 | 186 | 160 | 180 | 148 | 148 | 205 | 183 | 160 | 147 | 148 | 118 | 144 | 156 | 192 | 301 | 289 | 179.3 |
| 23-Sep | 286 | 282 | 263 | 278 | 292 | 302 | 302 | 301 | 307 | 298 | 290 | 339 | 138 | 152 | 148 | 159 | 148 | 151 | 99 | 103 | 152 | 178 | 183 | 319 | 205.1 |
| 24-Sep | 176 | 205 | 197 | 203 | 263 | 218 | 189 | 158 | 149 | 155 | 154 | 163 | 153 | 148 | 160 | 156 | 148 | 160 | 147 | 169 | 179 | 182 | 169 | 172 | 163.4 |
| 25-Sep | 167 | 154 | 150 | 146 | 158 | 171 | 173 | 170 | 168 | 162 | 146 | 156 | 161 | 207 | 259 | 247 | 170 | 183 | 221 | 238 | 238 | 181 | 169 | 184 | 176.0 |
| 26-Sep | 189 | 189 | 190 | 221 | 272 | 288 | 198 | 197 | 228 | 230 | 157 | 322 | 319 | 338 | 331 | 323 | 335 | 326 | 309 | 275 | 286 | 298 | 168 | 216 | 305.4 |
| 27-Sep | 175 | 178 | 191 | 221 | 206 | 202 | 225 | 220 | 358 | 11 | 6 | 359 | 2 | 12 | 43 | 2 | 12 | 14 | 6 | 2 | 2 | 3 | 6 | 5 | 5.4 |
| 28-Sep | 346 | 346 | 349 | 335 | 301 | 296 | 231 | 277 | 107 | 171 | 160 | 162 | 162 | 157 | 166 | 180 | 186 | 185 | 175 | 169 | 169 | 176 | 172 | 171 | 174.6 |
| 29-Sep | 172 | 173 | 177 | 188 | 176 | 173 | 151 | 167 | 162 | 163 | 164 | 163 | 171 | 203 | 208 | 206 | 278 | 315 | 296 | 214 | 242 | 240 | 210 | 233 | 180.0 |
| 30-Sep | 223 | 222 | 194 | 206 | 188 | 195 | 182 | 165 | 167 | 163 | 154 | 159 | 155 | 179 | 207 | 210 | 204 | 297 | 304 | 311 | 309 | 305 | 303 | 308 | 237.7 |

260.6 268.7 267.4 276.4 268.6 277.4 276.4 291.5 243.0 217.1 226.1 162.9 221.8 250.9 243.7 259.7 239.3 304.6 322.4 309.1 278.4 270.3 263.4 274.7

Diurnal Average

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Sep 27 08:00 Minimum Value: 7 deg on Sep 3 23:00 Percentiles: P ₁ = 10 P ₁₀ = 13 Q ₁ = 16 Median = 24 Q ₃ = 44 P ₉₀ = 57 P ₉₉ = 86 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 27 | 43 | 52 | 36 | 53 | 47 | 47 | 48 | 57 | 59 | 57 | 50 | 52 | 52 | 53 | 54 | 46 | 49 | 55 | 48 | 44 | 49 | 46 | 43 | 59 |
| 2-Sep | 31 | 34 | 25 | 27 | 25 | 27 | 30 | 39 | 38 | 47 | 45 | 51 | 36 | 48 | 45 | 48 | 45 | 49 | 41 | 49 | 41 | 35 | 34 | 45 | 51 |
| 3-Sep | 52 | 48 | 34 | 39 | 51 | 48 | 42 | 34 | 36 | 40 | 25 | 29 | 30 | 27 | 34 | 27 | 24 | 25 | 18 | 13 | 9 | 8 | 7 | 11 | 52 |
| 4-Sep | 36 | 26 | 50 | 21 | 27 | 31 | 83 | 38 | 22 | 27 | 21 | 45 | 27 | 30 | 36 | 34 | 28 | 14 | 44 | 77 | 68 | 86 | 44 | 27 | 86 |
| 5-Sep | 18 | 41 | 55 | 15 | 18 | 12 | 15 | 19 | 15 | 19 | 22 | 15 | 45 | 53 | 47 | 57 | 52 | 44 | 14 | 11 | 54 | 37 | 17 | 69 | 69 |
| 6-Sep | 65 | 36 | 27 | 57 | 42 | 55 | 84 | 70 | 25 | 34 | 63 | 48 | 86 | 75 | 44 | 70 | 70 | 52 | 45 | 95 | 31 | 60 | 36 | 34 | 95 |
| 7-Sep | 15 | 46 | 23 | 71 | 78 | 28 | 42 | 24 | 19 | 13 | 15 | 15 | 19 | 21 | 19 | 16 | 16 | 16 | 13 | 12 | 11 | 12 | 13 | 23 | 78 |
| 8-Sep | 17 | 11 | 13 | 17 | 25 | 74 | 37 | 25 | 70 | 61 | 36 | 16 | 19 | 24 | 20 | 18 | 20 | 11 | 14 | 60 | 47 | 54 | 91 | 57 | 91 |
| 9-Sep | 61 | 33 | 24 | 35 | 40 | 67 | 21 | 33 | 20 | 31 | 16 | 16 | 16 | 14 | 15 | 14 | 26 | 13 | 15 | 29 | 20 | 26 | 40 | 49 | 67 |
| 10-Sep | 39 | 38 | 33 | 20 | 38 | 34 | 42 | 45 | 50 | 51 | 41 | 41 | 35 | 37 | 35 | 31 | 39 | 40 | 54 | 43 | 53 | 53 | 51 | 35 | 54 |
| 11-Sep | 49 | 45 | 65 | 53 | 13 | 13 | 21 | 33 | 28 | 58 | 36 | 46 | 45 | 44 | 23 | 15 | 19 | 13 | 12 | 87 | 56 | 45 | 30 | 37 | 87 |
| 12-Sep | 50 | 43 | 41 | 47 | 34 | 21 | 37 | 45 | 44 | 23 | 16 | 19 | 16 | 20 | 16 | 24 | 49 | 60 | 19 | 16 | 43 | 57 | 53 | 24 | 60 |
| 13-Sep | 17 | 14 | 12 | 20 | 35 | 29 | 26 | 63 | 87 | 52 | 62 | 41 | 45 | 84 | 35 | 83 | 43 | 41 | 81 | 46 | 17 | 16 | 15 | 14 | 87 |
| 14-Sep | 13 | 15 | 19 | 26 | 18 | 21 | 18 | 16 | 34 | 46 | 66 | 46 | 52 | 61 | 45 | 47 | 49 | 42 | 20 | 18 | 14 | 62 | 24 | 16 | 66 |
| 15-Sep | 18 | 19 | 18 | 26 | 22 | 14 | 48 | 34 | 17 | 17 | 16 | 14 | 16 | 31 | 35 | 39 | 39 | 21 | 13 | 16 | 15 | 15 | 13 | 13 | 48 |
| 16-Sep | 15 | 15 | 14 | 16 | 31 | 27 | 15 | 48 | 17 | 16 | 15 | 18 | 21 | 20 | 17 | 17 | 17 | 17 | 17 | 12 | 10 | 14 | 13 | 11 | 48 |
| 17-Sep | 10 | 11 | 9 | 11 | 10 | 14 | 17 | 43 | 16 | 18 | 16 | 15 | 20 | 20 | 16 | 17 | 15 | 18 | 15 | 13 | 19 | 11 | 11 | 13 | 43 |
| 18-Sep | 11 | 12 | 20 | 14 | 12 | 61 | 24 | 14 | 87 | 17 | 16 | 15 | 17 | 19 | 28 | 17 | 15 | 15 | 12 | 26 | 23 | 46 | 31 | 22 | 87 |
| 19-Sep | 51 | 72 | 28 | 14 | 10 | 14 | 14 | 13 | 14 | 16 | 18 | 20 | 18 | 25 | 53 | 45 | 46 | 55 | 38 | 42 | 53 | 56 | 31 | 20 | 72 |
| 20-Sep | 15 | 14 | 15 | 16 | 15 | 15 | 16 | 16 | 16 | 17 | 17 | 18 | 19 | 18 | 18 | 17 | 17 | 17 | 17 | 16 | 16 | 16 | 16 | 15 | 19 |
| 21-Sep | 15 | 16 | 15 | 16 | 15 | 14 | 15 | 14 | 15 | 15 | 15 | 16 | 16 | 15 | 15 | 15 | 13 | 15 | 14 | 13 | 12 | 18 | 28 | 28 | 28 |
| 22-Sep | 38 | 63 | 41 | 59 | 48 | 58 | 33 | 47 | 27 | 30 | 18 | 45 | 19 | 33 | 40 | 20 | 12 | 17 | 20 | 68 | 24 | 24 | 58 | 15 | 68 |
| 23-Sep | 21 | 24 | 45 | 21 | 19 | 9 | 11 | 18 | 18 | 75 | 40 | 66 | 33 | 15 | 24 | 22 | 20 | 19 | 75 | 56 | 27 | 15 | 21 | 82 | 82 |
| 24-Sep | 40 | 55 | 64 | 29 | 39 | 46 | 18 | 28 | 17 | 15 | 19 | 18 | 18 | 16 | 21 | 17 | 20 | 15 | 18 | 26 | 10 | 12 | 12 | 12 | 64 |
| 25-Sep | 12 | 11 | 16 | 24 | 16 | 29 | 13 | 14 | 14 | 16 | 15 | 27 | 32 | 56 | 51 | 55 | 24 | 22 | 29 | 45 | 38 | 30 | 18 | 13 | 56 |
| 26-Sep | 15 | 20 | 63 | 79 | 73 | 66 | 44 | 66 | 68 | 51 | 63 | 25 | 24 | 18 | 23 | 16 | 16 | 9 | 11 | 62 | 34 | 44 | 62 | 38 | 79 |
| 27-Sep | 78 | 19 | 16 | 18 | 36 | 64 | 57 | 97 | 61 | 34 | 30 | 22 | 20 | 40 | 45 | 17 | 25 | 17 | 15 | 11 | 12 | 12 | 13 | 15 | 97 |
| 28-Sep | 17 | 19 | 74 | 31 | 13 | 8 | 37 | 64 | 82 | 22 | 17 | 15 | 15 | 15 | 18 | 16 | 16 | 15 | 12 | 11 | 11 | 12 | 11 | 12 | 82 |
| 29-Sep | 12 | 13 | 14 | 20 | 14 | 14 | 16 | 16 | 16 | 13 | 14 | 14 | 26 | 34 | 41 | 41 | 50 | 53 | 38 | 46 | 43 | 46 | 30 | 73 | 73 |
| 30-Sep | 47 | 38 | 25 | 44 | 18 | 25 | 19 | 54 | 17 | 14 | 12 | 12 | 12 | 46 | 31 | 35 | 31 | 35 | 12 | 11 | 13 | 12 | 16 | 16 | 54 |
| | | | | | | | | | | | | | | | | | | | 78 72 74 79 78 74 84 97 87 75 66 66 86 84 53 83 70 60 81 95 68 86 91 82 | | | | | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association

SO₂ Calibration Summary

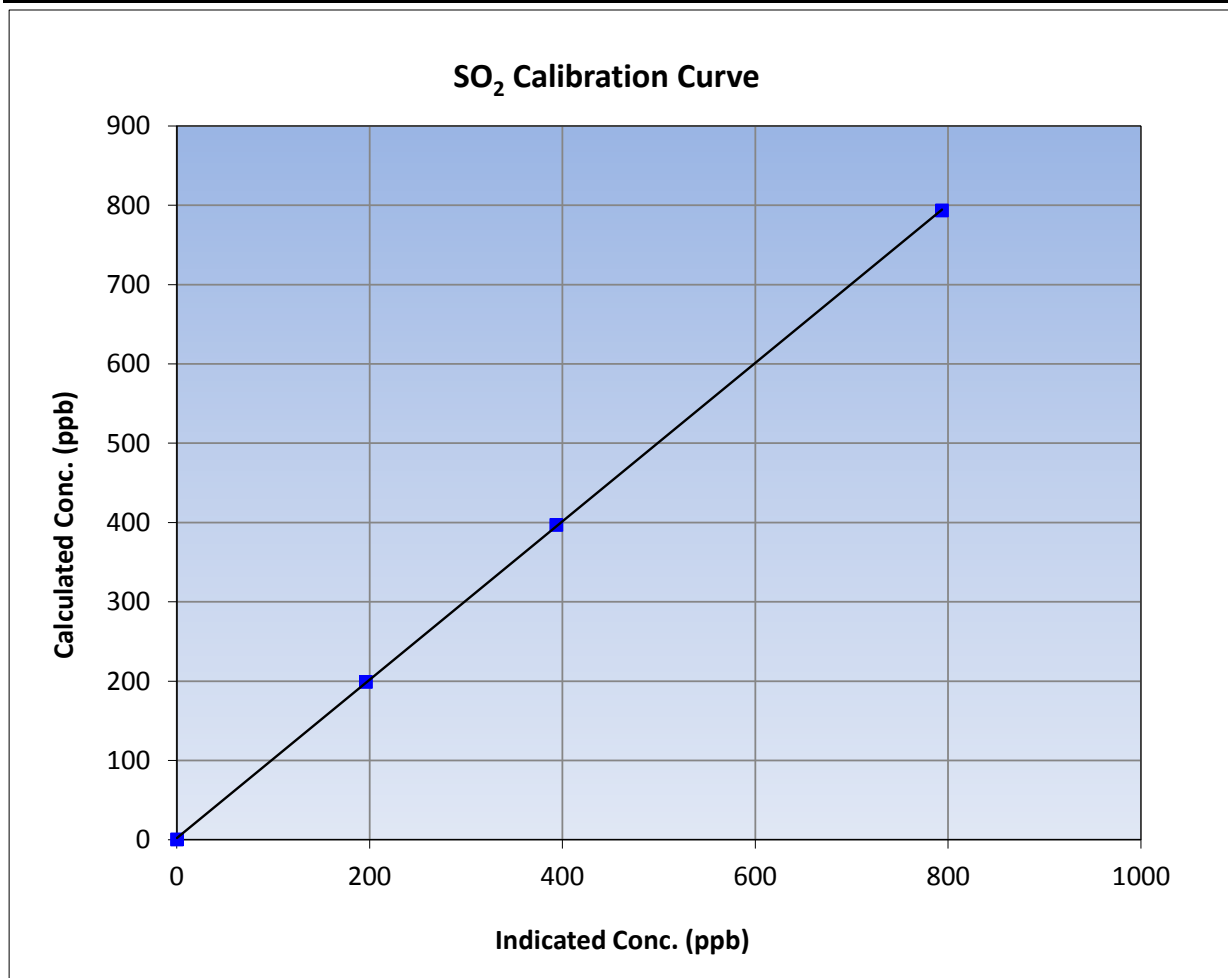
Version-03-2017

Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:24 | End Time (MST) | 14:03 |
| Analyzer make | Thermo 43i | Analyzer serial # | JC1501301448 |

Calibration Data

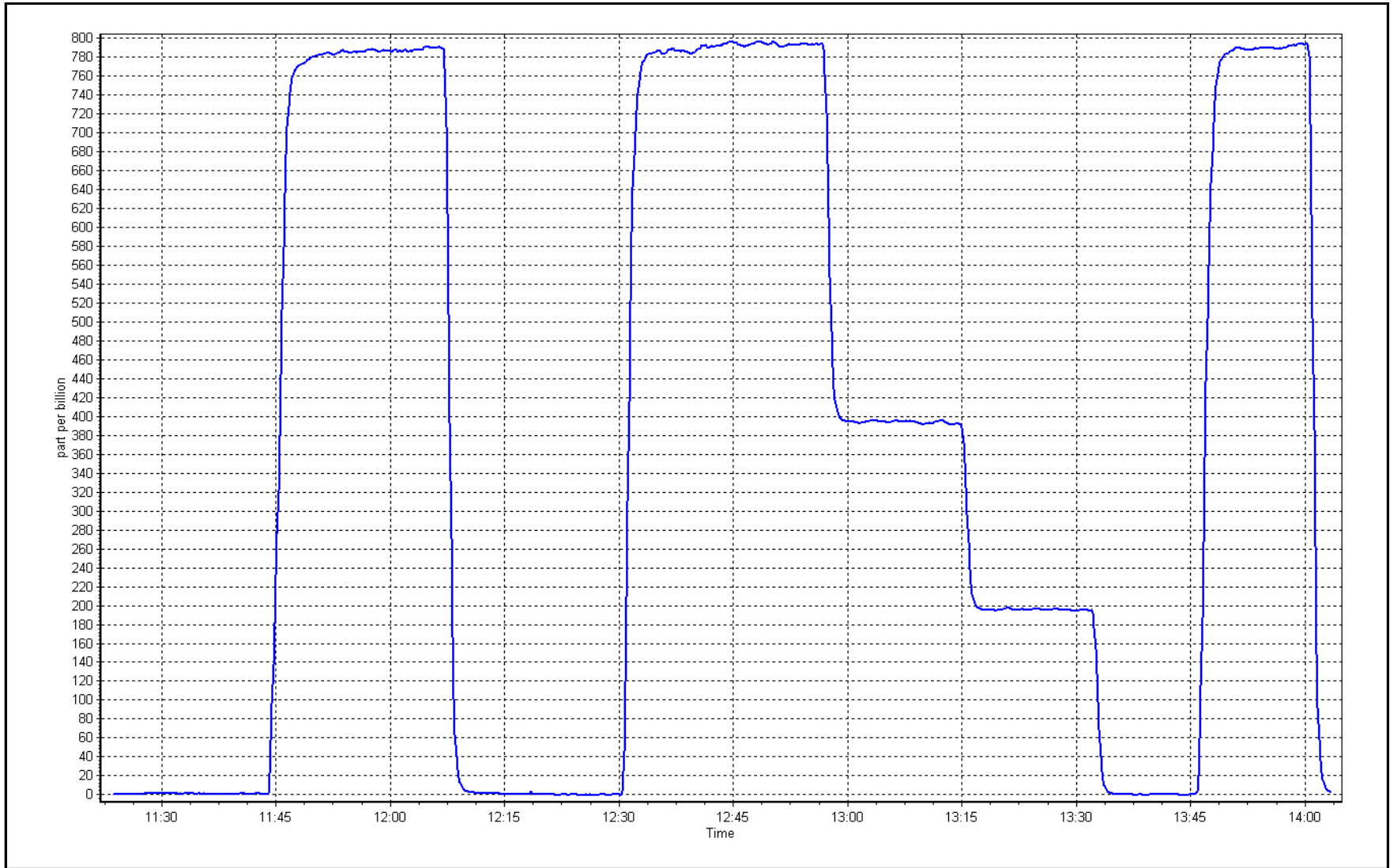
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 |
| 793.0 | 793.3 | 0.9997 | | |
| 396.5 | 393.3 | 1.0082 | Slope | 0.90 - 1.10 |
| 198.8 | 195.8 | 1.0152 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 27, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

TRS Calibration Summary

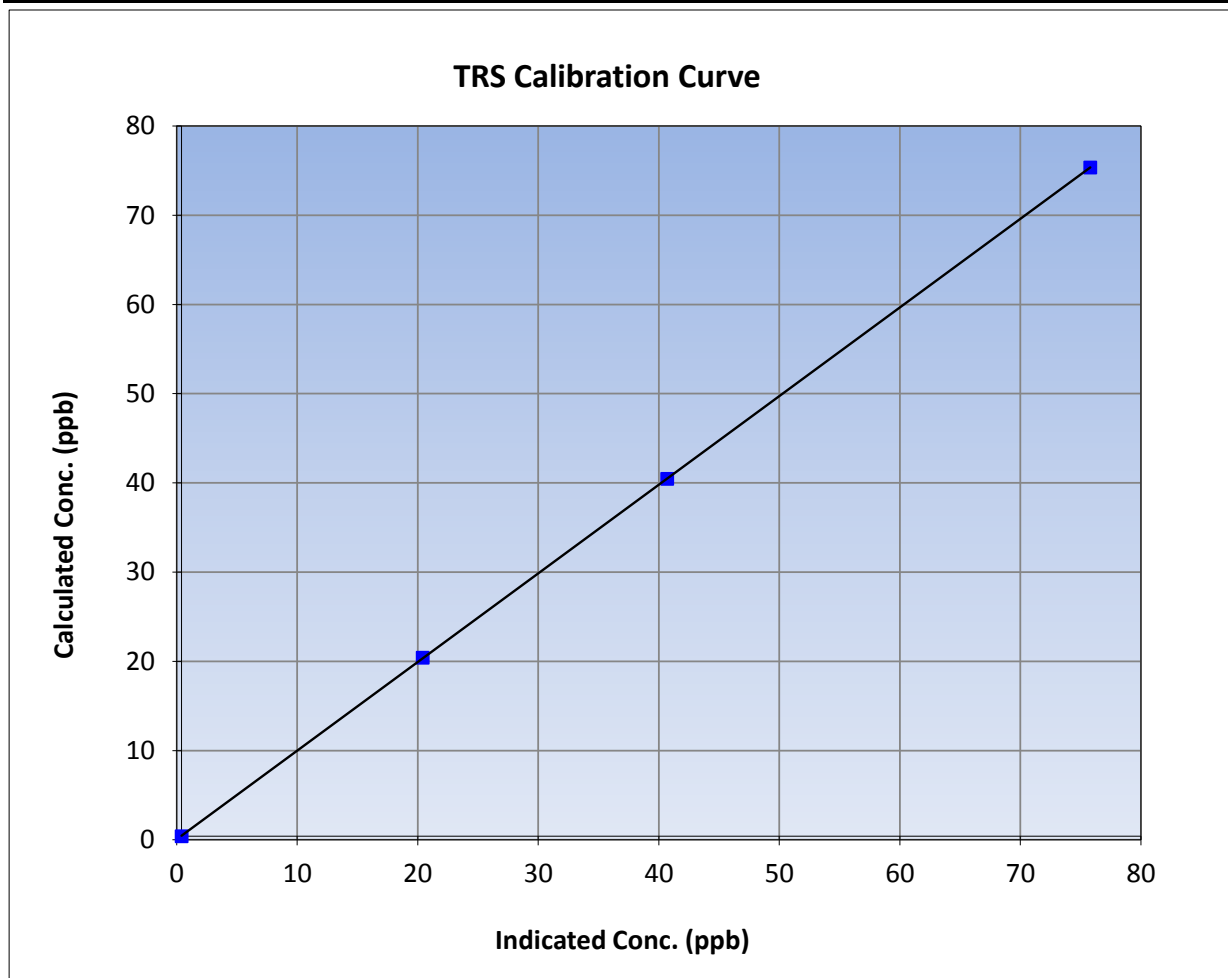
Version-03-2017

Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 10:00 | End Time (MST) | 12:45 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1218153461 |

Calibration Data

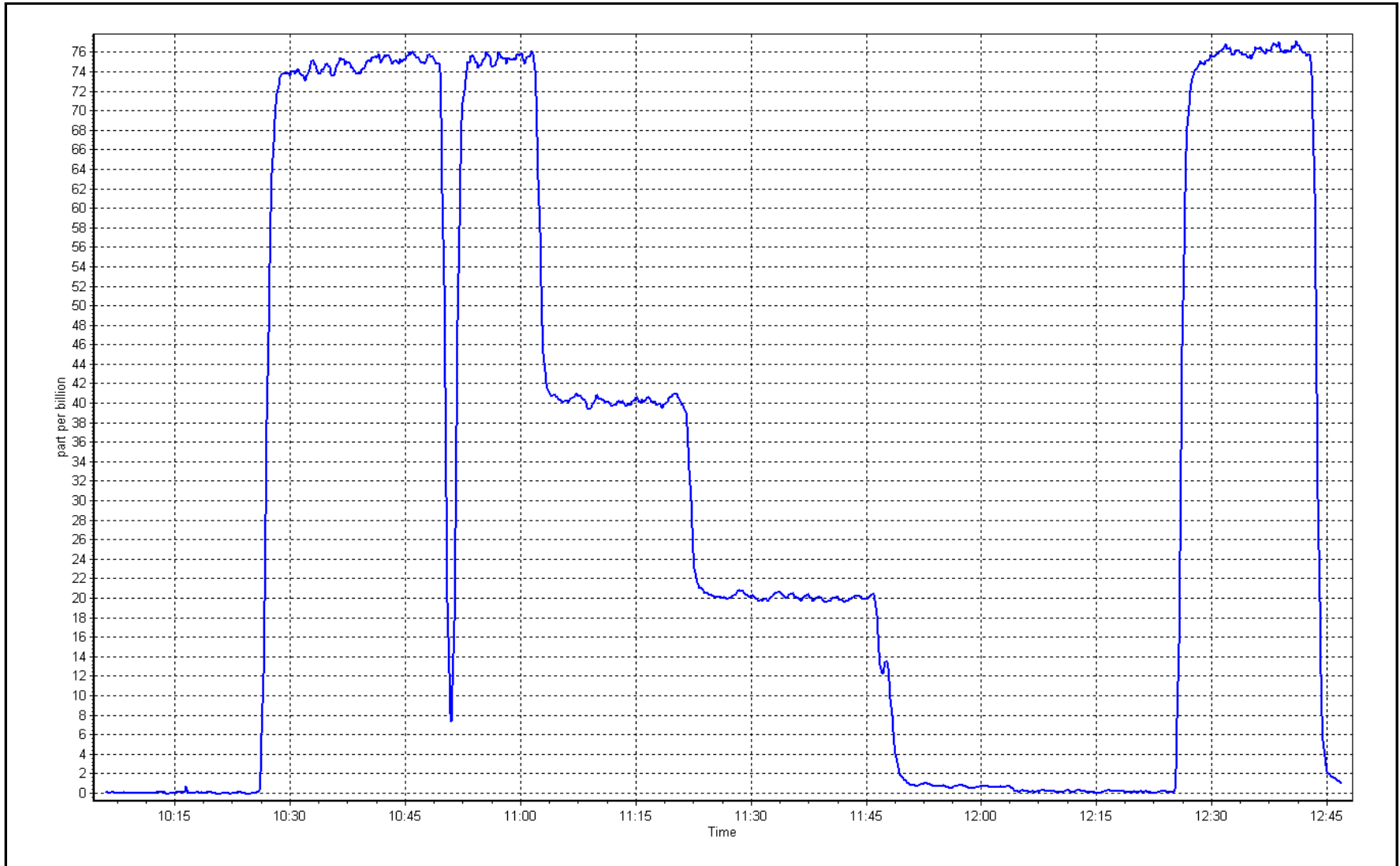
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999996 | ≥0.995 |
| 75.0 | 75.4 | 0.9941 | | | |
| 40.1 | 40.3 | 0.9938 | Slope | 0.993436 | 0.90 - 1.10 |
| 20.0 | 20.0 | 1.0010 | | | |
| | | | Intercept | 0.053714 | +/-3 |



TRS Calibration Plot

Date: September 11, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|----------------------------|-----------------|-----------------|
| Station Name: | Fort McKay - Bertha Ganter | Station number: | AMS 01 |
| Calibration Date: | September 12, 2017 | Last Cal Date: | August 11, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 11:30 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|--------------------|------------------|---------------------|----------------|
| Gas Cert Reference | EY0000683 | Cal Gas Expiry Date | November-04-19 |
| CH4 Cal Gas Conc. | <u>515.0</u> ppm | CH4 Equiv Conc. | 1062.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 21 Deg C |
| Calibrator Model | API T700 | Serial Number | 2464 |
| ZAG make/model | API 701H | Serial Number | 262 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1152430012

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 1.74E-04 | 1.70E-04 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 12.2 | 12.0 | Carrier Pressure | 36.7 | 36.7 |
| NMHC SP Ratio | 3.96E-05 | 3.91E-05 | Fuel Pressure | 47.7 | 47.7 |
| NMHC Peak Area | 208609 | 225145 | Air Pressure | 39.0 | 39.0 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.998565 | 0.997074 |
| THC Cal Offset | 0.021592 | 0.045884 |
| CH4 Cal Slope | 1.000578 | 0.995111 |
| CH4 Cal Offset | 0.021901 | 0.031296 |
| NMHC Cal Slope | 0.996076 | 0.998903 |
| NMHC Cal Offset | 0.000535 | 0.014646 |

Notes: Sample filter and pump replaced after as founds. Defective ZAG was causing elevated zero and baseline dips. ZAG replaced. Did zero chromatogram and adjusted span.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5998 | 0.0 | 0.00 | 0.20 | ---- |
| as found span | 4931 | 80.6 | 17.08 | 17.10 | 0.999 |
| calibrator zero | 5998 | 0.0 | 0.00 | 0.01 | ---- |
| high point | 4931 | 80.6 | 17.08 | 17.12 | 0.998 |
| second point | 4969 | 40.3 | 8.55 | 8.48 | 1.008 |
| third point | 4989 | 20.2 | 4.28 | 4.21 | 1.018 |
| as left zero | 5998 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4931 | 80.6 | 17.08 | 17.16 | 0.996 |
| Average Correction Factor | | | | | 1.008 |
| Corrected As found | 16.90 | Prev response | 17.09 | *% change | 1.1% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5998 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4931 | 80.6 | 8.80 | 8.71 | 1.010 |
| calibrator zero | 5998 | 0 | 0.00 | 0.00 | ---- |
| high point | 4931 | 80.6 | 8.80 | 8.81 | 0.999 |
| second point | 4969 | 40.3 | 4.40 | 4.38 | 1.006 |
| third point | 4989 | 20.2 | 2.21 | 2.19 | 1.010 |
| as left zero | 5998 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4931 | 80.6 | 8.80 | 8.82 | 0.998 |
| Average Correction Factor | | | | | 1.005 |
| Corrected As found | 8.71 | Prev response | 8.84 | *% change | 1.4% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5998 | 0.0 | 0.00 | 0.20 | ---- |
| as found span | 4931 | 80.6 | 8.28 | 8.39 | 0.988 |
| calibrator zero | 5998 | 0.0 | 0.00 | 0.01 | ---- |
| high point | 4931 | 80.6 | 8.28 | 8.32 | 0.996 |
| second point | 4969 | 40.3 | 4.14 | 4.10 | 1.011 |
| third point | 4989 | 20.2 | 2.08 | 2.02 | 1.027 |
| as left zero | 5998 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4931 | 80.6 | 8.28 | 8.34 | 0.993 |
| Average Correction Factor | | | | | 1.011 |
| Corrected As found | 8.19 | Prev response | 8.26 | *% change | 0.9% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

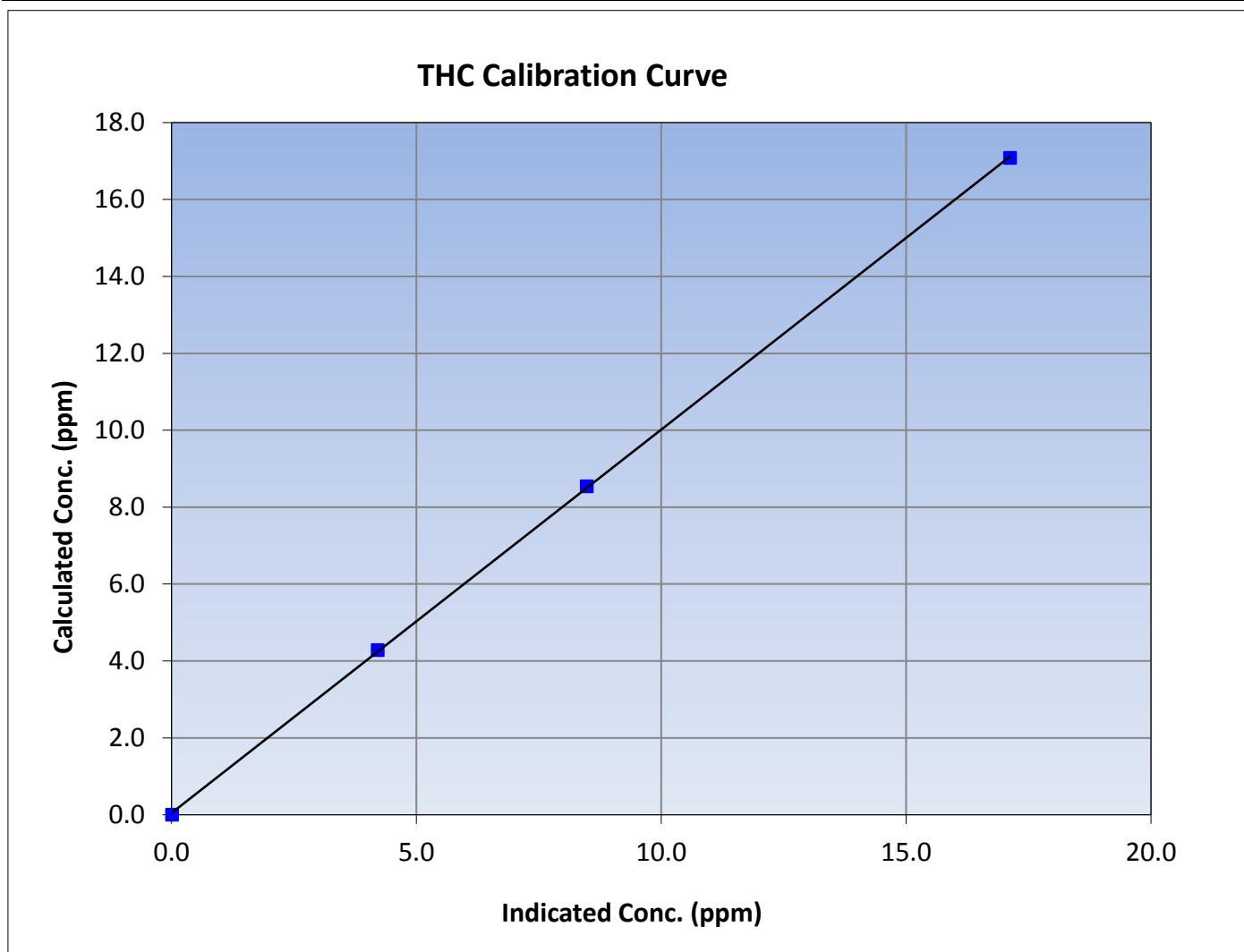
Version-02-2017

Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 9:15 | End Time (MST) | 10:30 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430012 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.01 | ---- | Correlation Coefficient | 0.999948 | ≥ 0.995 | | | |
| 17.08 | 17.12 | 0.9978 | | | | | | |
| 8.55 | 8.48 | 1.0081 | | | | Slope | 0.997074 | 0.90 - 1.10 |
| 4.28 | 4.21 | 1.0180 | | | | | | |
| | | | Intercept | 0.045884 | ± 0.5 | | | |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

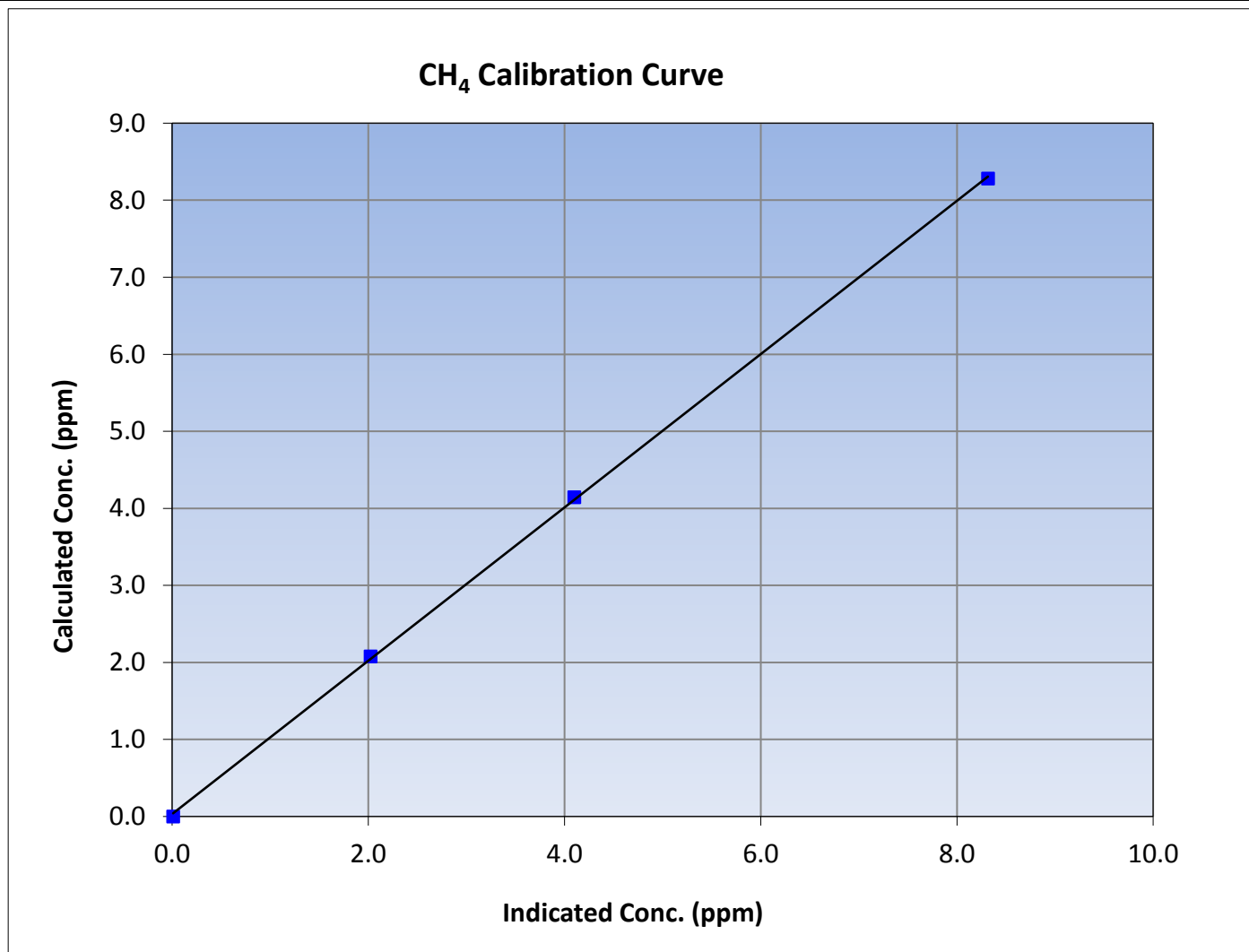
Version-02-2017

Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 9:15 | End Time (MST) | 10:30 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430012 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.01 | ---- | Correlation Coefficient | 0.999882 | ≥ 0.995 | | | |
| 8.28 | 8.32 | 0.9960 | | | | | | |
| 4.14 | 4.10 | 1.0108 | | | | Slope | 0.995111 | 0.90 - 1.10 |
| 2.08 | 2.02 | 1.0266 | | | | | | |
| | | | Intercept | 0.031296 | ± 0.5 | | | |





Wood Buffalo Environmental Association

NMHC Calibration Summary

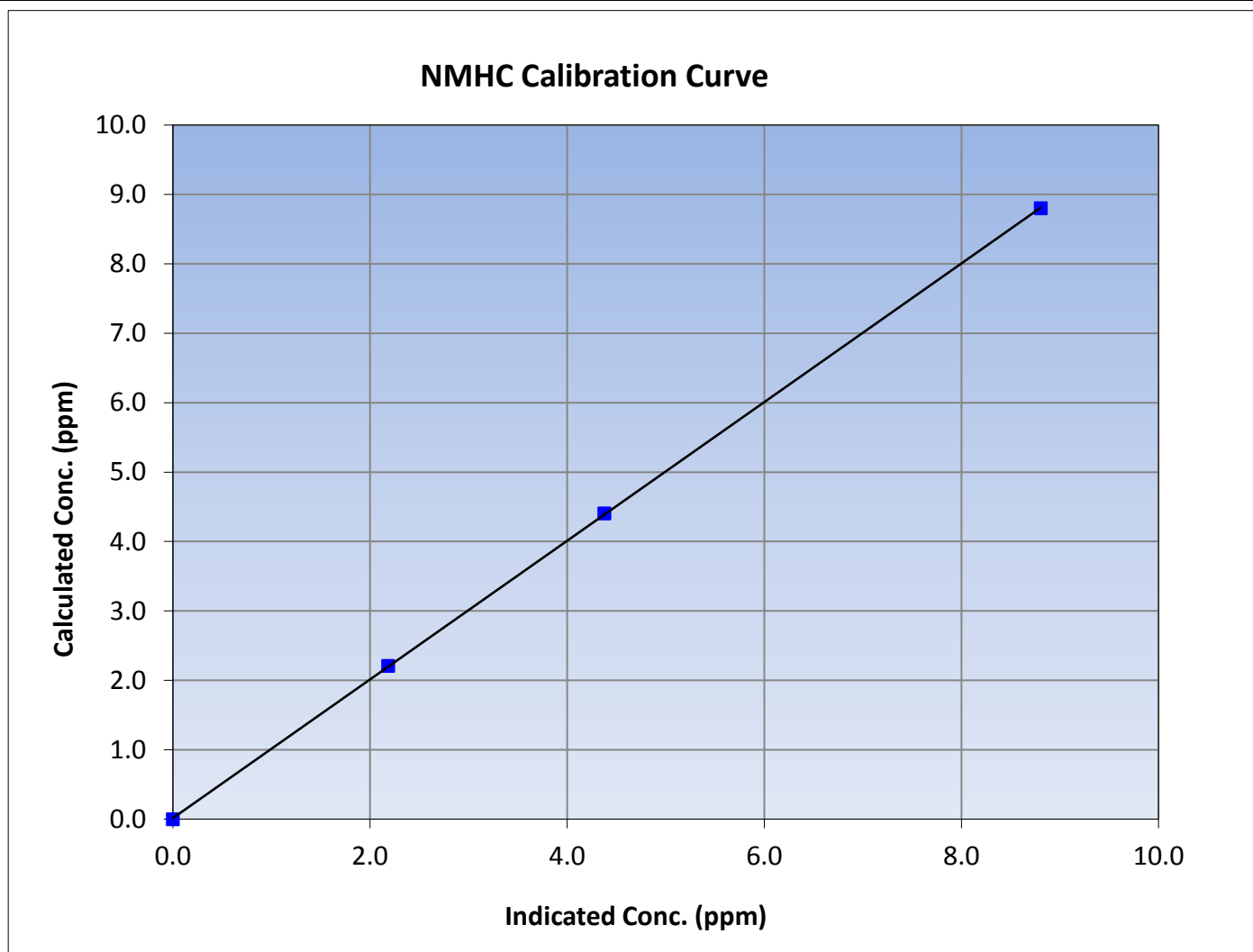
Version-02-2017

Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 9:15 | End Time (MST) | 10:30 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430012 |

Calibration Data

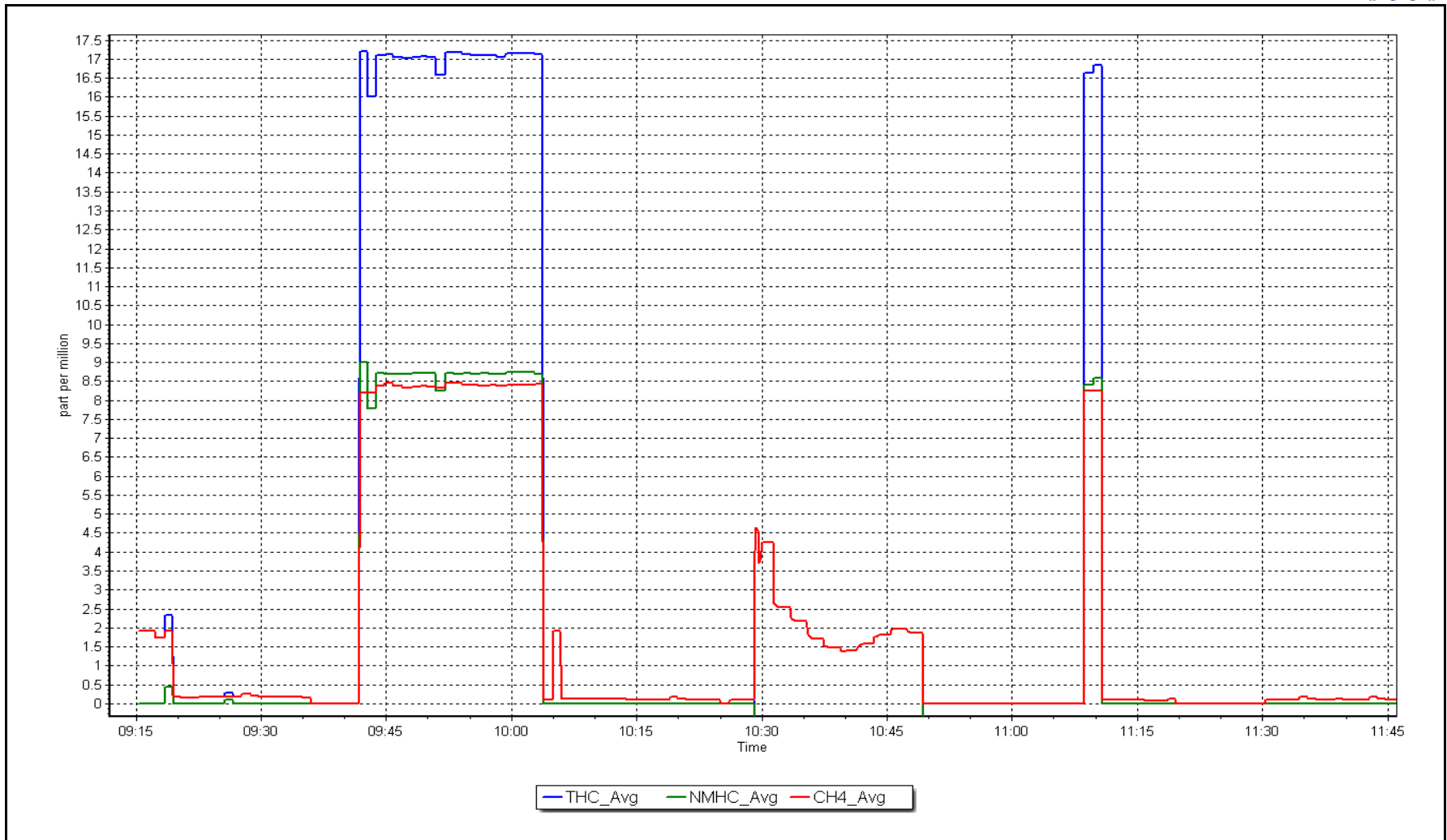
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999985 | ≥ 0.995 | | | |
| 8.80 | 8.81 | 0.9995 | | | | | | |
| 4.40 | 4.38 | 1.0056 | | | | Slope | 0.998903 | 0.90 - 1.10 |
| 2.21 | 2.19 | 1.0100 | | | | | | |
| | | | Intercept | 0.014646 | ± 0.5 | | | |

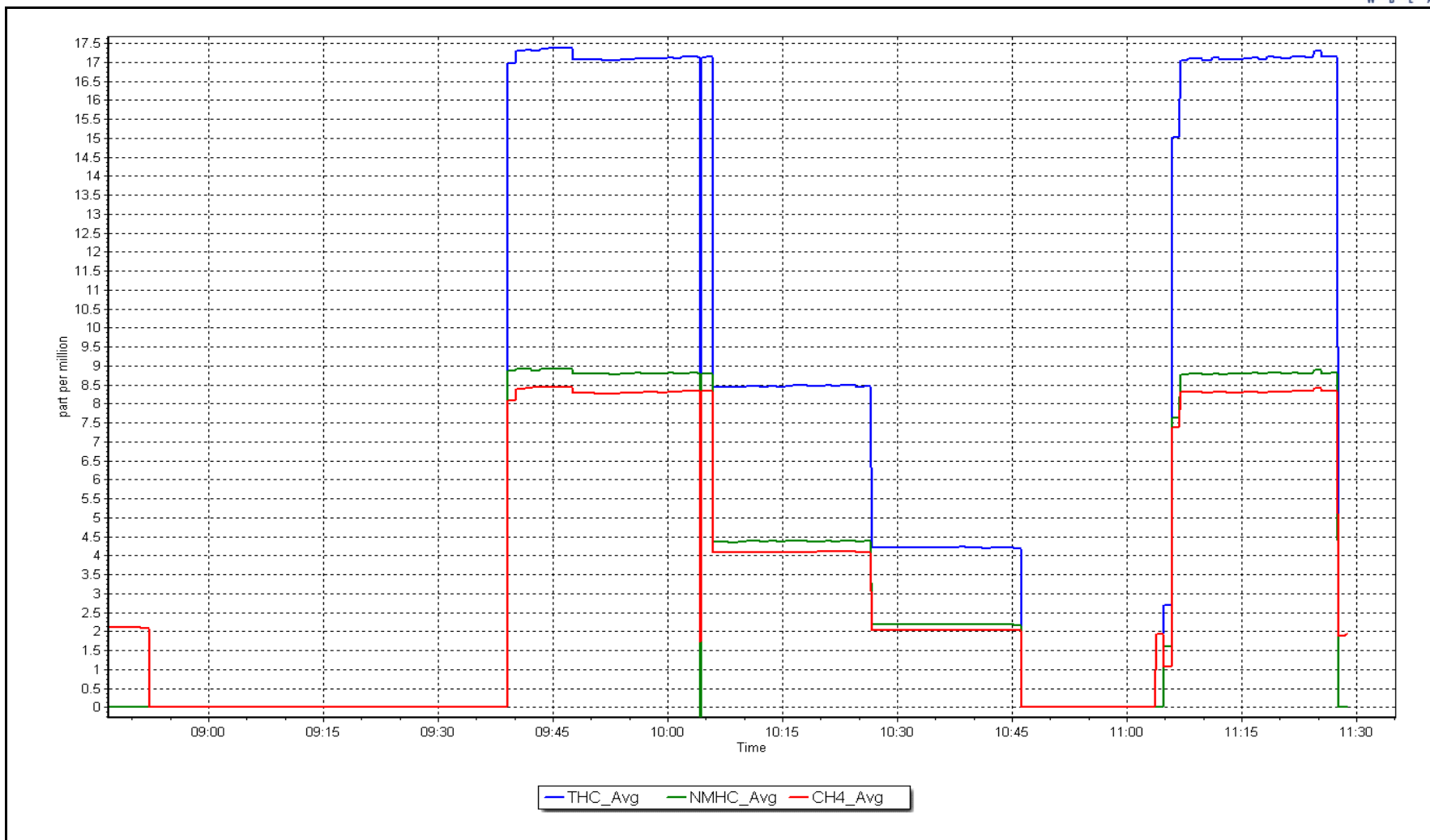


NMHC Calibration Plot
As founds

Date: September 12, 2017

Location: Fort McKay - Bertha Ganter







Wood Buffalo Environmental Association

O₃ Calibration Report

Version-03-2017

Station Information

Station Name: Fort McKay - Bertha Ganter Station number: AMS 01
 Calibration Date: September 13, 2017 Last Cal Date: August 8, 2017
 Start time (MST): 11:30 End time (MST): 14:23
 Reason: Routine

Calibration Standards

O₃ generation mode: Photometer O₃ reference Date: Photometer
 Calibrator Make/Model: API T700 Serial Number: 2464
 ZAG Make/Model: API 701H Serial Number: 262

Analyzer Information

Analyzer make: API T400

Analyzer serial #: 1107

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|----------------------------|--------------|---------------|
| Analyzer Range | 0 - 500 ppb | | Pressure | 28.1 | 26.9 |
| Calculated slope | 1.000484 | 0.998829 | Flow cell A | 341.0 | 785.0 |
| Calculated intercept | -0.459848 | -0.319451 | Flow cell B | 341.0 | 783.0 |
| Analyzer Background | 0.4 | 0.4 | O ₃ Measurement | 3860.8 | 3843.0 |
| Analyzer Coefficient | 1.007 | 1.007 | O ₃ Reference | 3861.6 | 3859.0 |

O₃ Calibration Data

| Set Point | Total air flow rate (scm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|---------------------------|-------------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5000 | 0.00 | 0.0 | -0.5 | ---- |
| as found span | 4893 | 940.00 | 400.0 | 381.3 | 1.049 |
| calibrator zero | 5996 | 0.00 | 0.0 | 0.3 | ---- |
| high point | 5000 | 940.00 | 400.0 | 400.7 | 0.998 |
| second point | 5001 | 781.30 | 200.0 | 200.8 | 0.996 |
| third point | 4999 | 672.60 | 100.0 | 100.3 | 0.997 |
| as left zero | 5996 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 5000 | 933.0 | 400.0 | 400.6 | 0.999 |
| Average Correction Factor | | | | | 0.997 |

Corrected As found 381.80 Previous response 400.27 *% change 4.8%

* = > +/-8% change initiates investigation

Notes: Inlet filter replaced after as founds. Sample pump deteriorating since last week, replaced after as founds. No adjustments made but took new average for both zero and span after replacing the pump.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

O₃ Calibration Summary

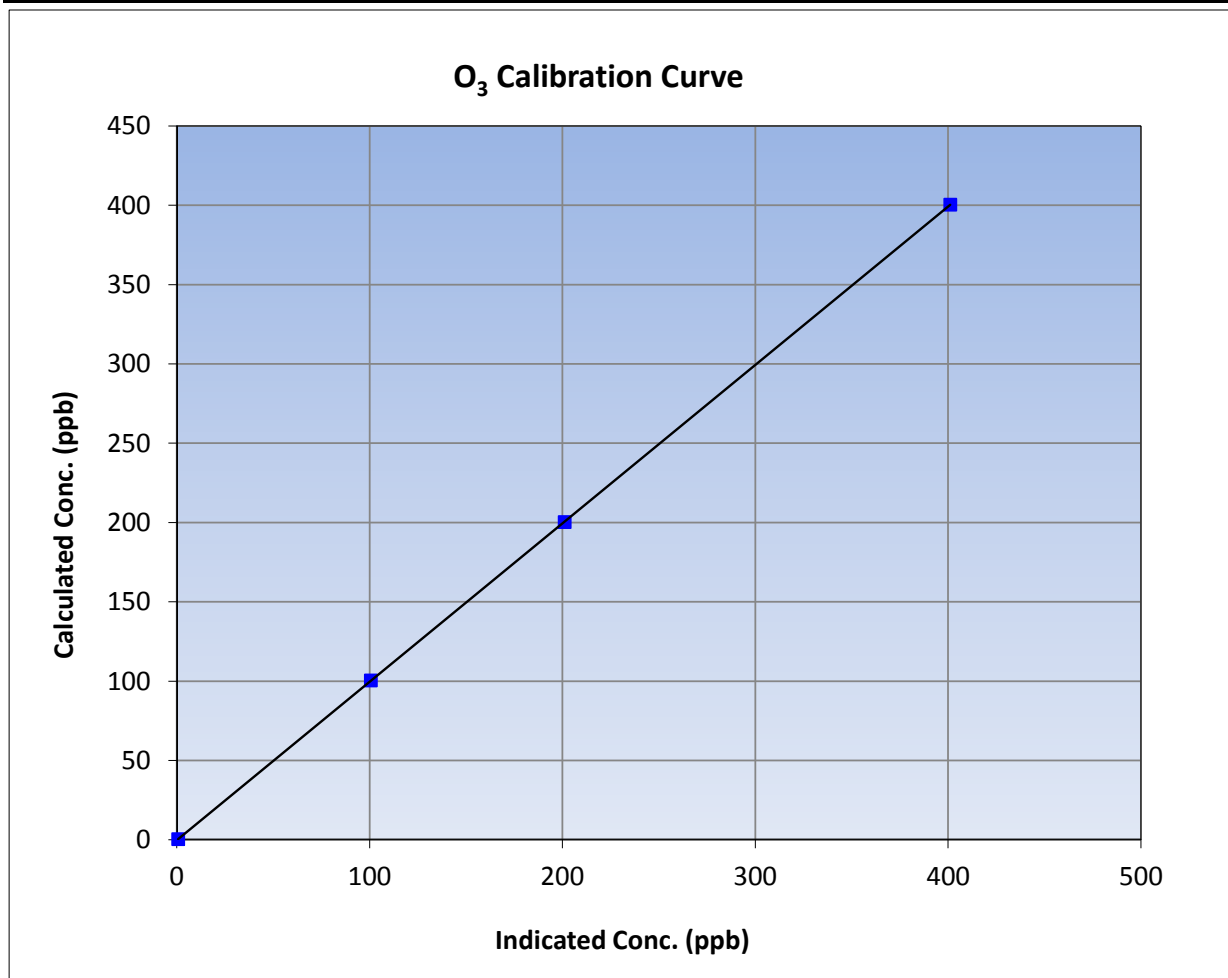
Version-03-2017

Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2017 | Previous Calibration | August 8, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:30 | End Time (MST) | 14:23 |
| Analyzer make | API T400 | Analyzer serial # | 1107 |

Calibration Data

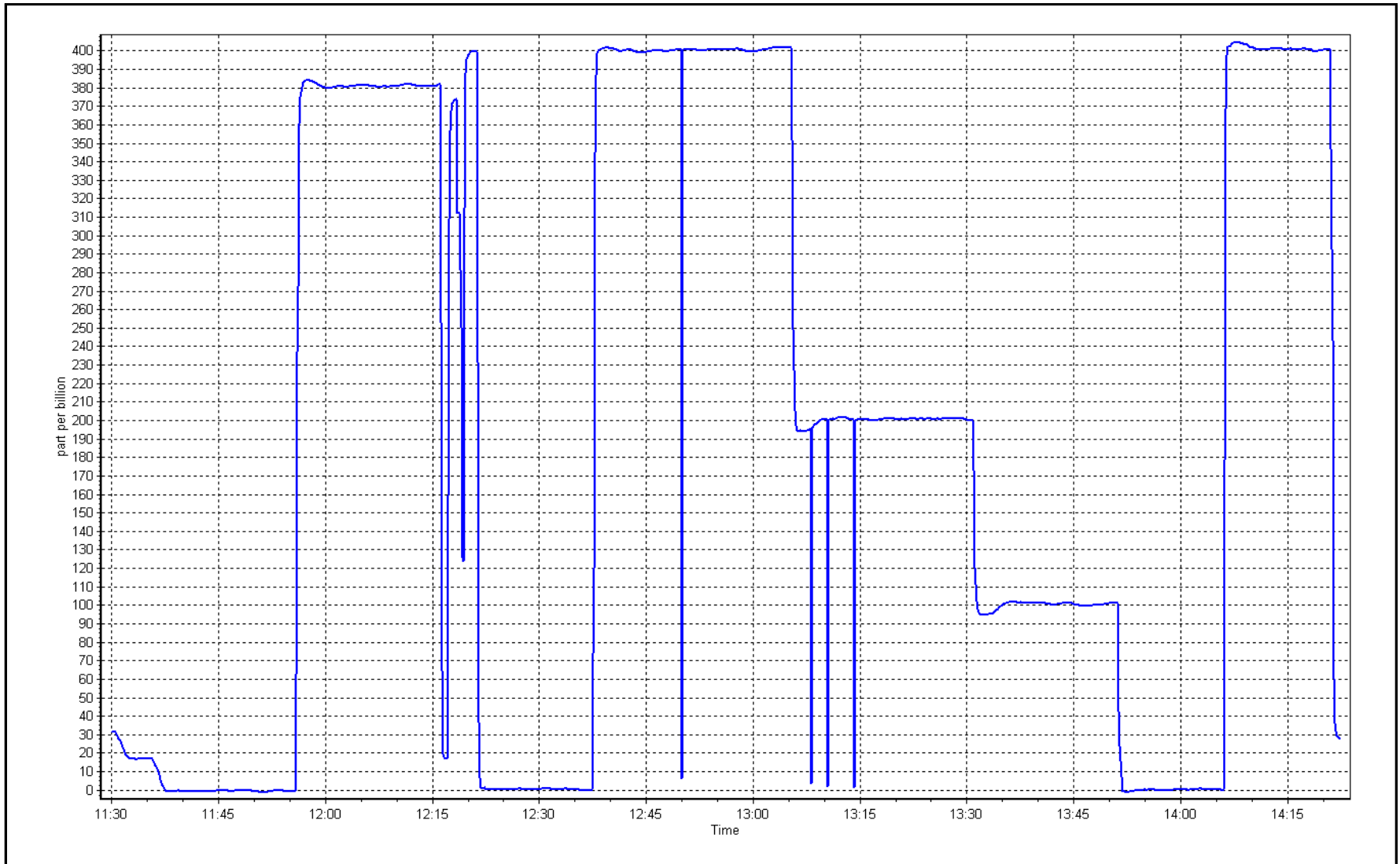
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | ≥0.995 |
| 400.0 | 400.7 | 0.9983 | | |
| 200.0 | 200.8 | 0.9960 | Slope | 0.90 - 1.10 |
| 100.0 | 100.3 | 0.9970 | | |
| | | | Intercept | +/- 10 |



O₃ Calibration Plot

Date: September 13, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|----------------------------|-----------------|-----------------|
| Station Name: | Fort McKay - Bertha Ganter | Station number: | AMS 01 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 14, 2017 |
| Start time (MST): | 11:04 | End time (MST): | 15:42 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-----------------|
| NO Gas Cylinder # | EY0000683 | Cal Gas Expiry Date | November-04-19 |
| NOX Cal Gas Conc. | <u>49.7</u> ppm | NO Cal Gas Conc. | <u>49.7</u> ppb |
| Calibrator Model | API T700 | Serial Number | 2464 |
| ZAG make/model | API 701H | Serial Number | 587 |

Analyzer Information

| | | | | | |
|---------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1218153357 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.167 | 1.174 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.999 | 0.997 | hamber Temperature | 50.2 | 50.2 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 171.7 | 172.3 |
| NO bkgrnd | 5.9 | 5.9 | Sample Flow | 0.584 | 0.585 |
| NOX bkgrnd | 6.0 | 6.0 | PMT Voltage | -792.2 | -792.2 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.999464 | 0.998276 |
| NO _x Cal Offset | 1.091241 | 1.256402 |
| NO Cal Slope | 0.999022 | 0.995657 |
| NO Cal Offset | 1.393319 | 1.772247 |
| NO ₂ Cal Slope | 1.003906 | 1.003159 |
| NO ₂ Cal Offset | 0.521479 | -0.007580 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | 0.3 | ---- | ---- |
| as found span | 4930 | 80.6 | 799.5 | 799.5 | 0.0 | 797.0 | 796.5 | 0.5 | 1.0031 | 1.0037 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | 0.3 | ---- | ---- |
| high point | 4930 | 80.6 | 799.5 | 799.5 | 0.0 | 800.3 | 802.1 | -1.7 | 0.9990 | 0.9967 |
| second point | 4970 | 40.3 | 399.8 | 399.8 | 0.0 | 398.3 | 398.4 | -0.1 | 1.0037 | 1.0034 |
| third point | 4990 | 20.1 | 199.4 | 199.4 | 0.0 | 197.4 | 197.4 | 0.0 | 1.0101 | 1.0101 |
| as left zero | 5997 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | 0.2 | ---- | ---- |
| as left span | 4930 | 80.6 | 799.5 | 389.8 | 409.7 | 797.6 | 390.1 | 407.5 | 1.0023 | 0.9992 |
| Average Correction Factor | | | | | | | | | 1.0042 | 1.0034 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 797.0 ppb | NO = 796.8 ppb | | *Percent Change | NO _x = 0.2% |
| Previous Response | NO _x = 798.8 ppb | NO = 798.9 ppb | | *Percent Change | NO = 0.3% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 799.1 | 798.7 | 0.4 | 1.0005 | 1.0010 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 389.8 | 408.9 | 797.8 | 389.8 | 407.9 | 1.0021 | ---- | 1.0025 | 99.8% |
| 2nd NO2 (200 ppb O3) | 598.9 | 199.8 | 797.4 | 598.9 | 198.6 | 1.0026 | ---- | 1.0060 | 99.4% |
| 3rd NO2 (100 ppb O3) | 699.1 | 99.6 | 798.4 | 699.1 | 99.3 | 1.0013 | ---- | 1.0030 | 99.7% |
| 2nd NO ref point | ---- | 0.0 | 797.3 | 797.7 | -0.5 | 1.0027 | 1.0022 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0022 | 1.0016 | 1.0038 | 99.6% |

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

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

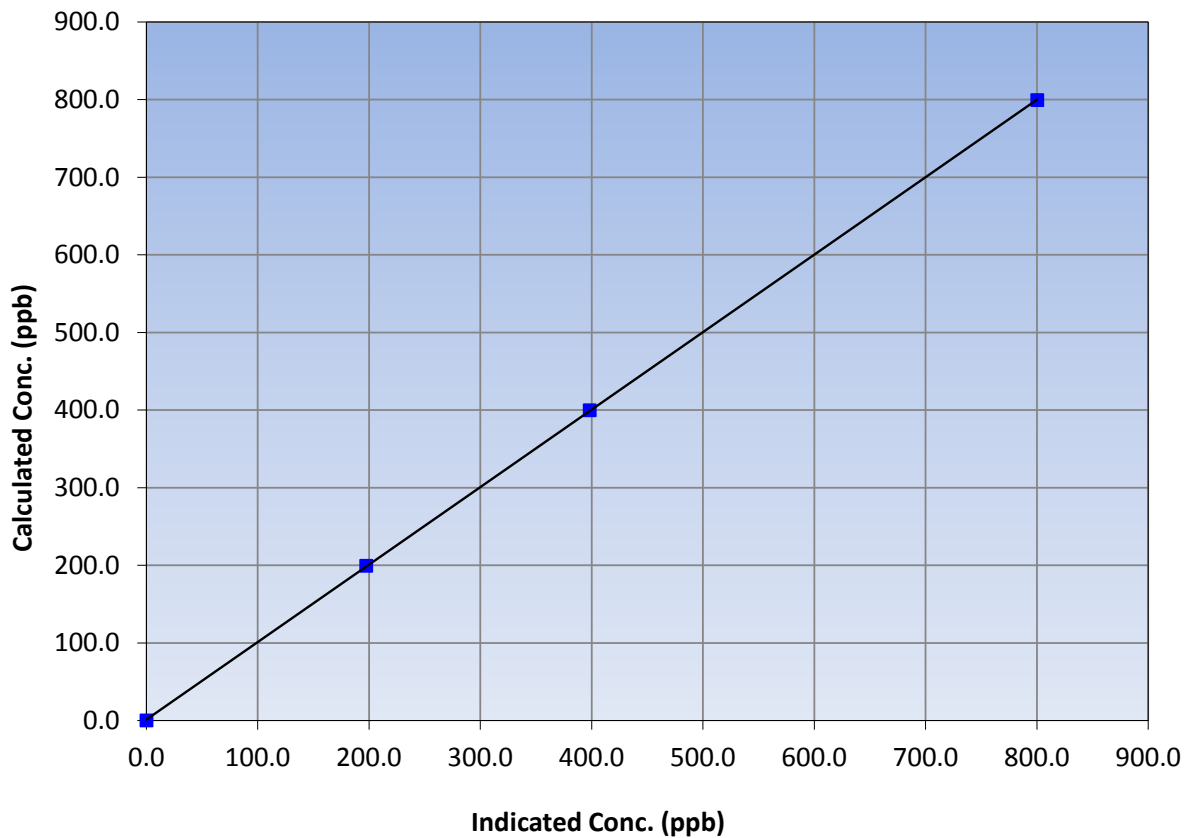
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:04 | End Time (MST) | 15:42 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153357 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.5 | 800.3 | 0.9990 | | | |
| 399.8 | 398.3 | 1.0037 | | | |
| 199.4 | 197.4 | 1.0101 | | | |
| | | | Slope | 0.998276 | 0.90 - 1.10 |
| | | | Intercept | 1.256402 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

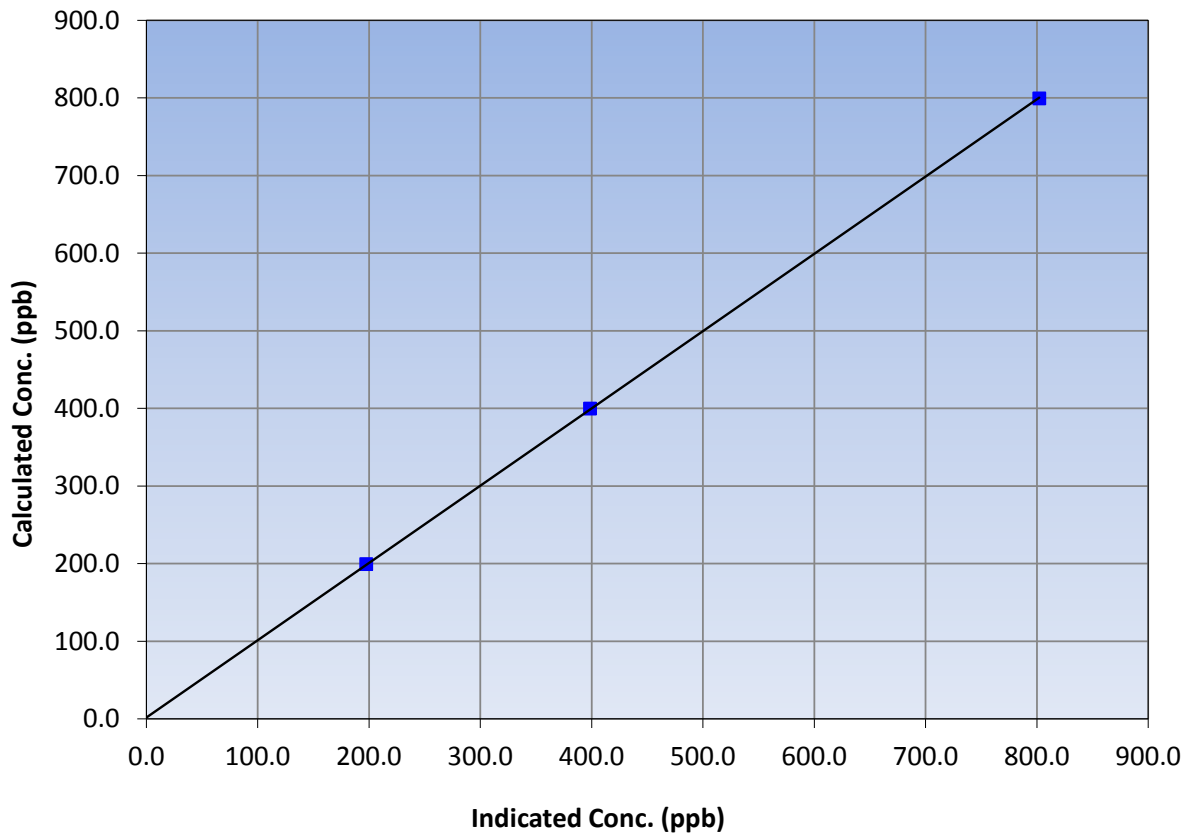
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:04 | End Time (MST) | 15:42 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153357 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.5 | 802.1 | 0.9967 | | | |
| 399.8 | 398.4 | 1.0034 | | | |
| 199.4 | 197.4 | 1.0101 | | | |
| | | | Slope | 0.995657 | 0.90 - 1.10 |
| | | | Intercept | 1.772247 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

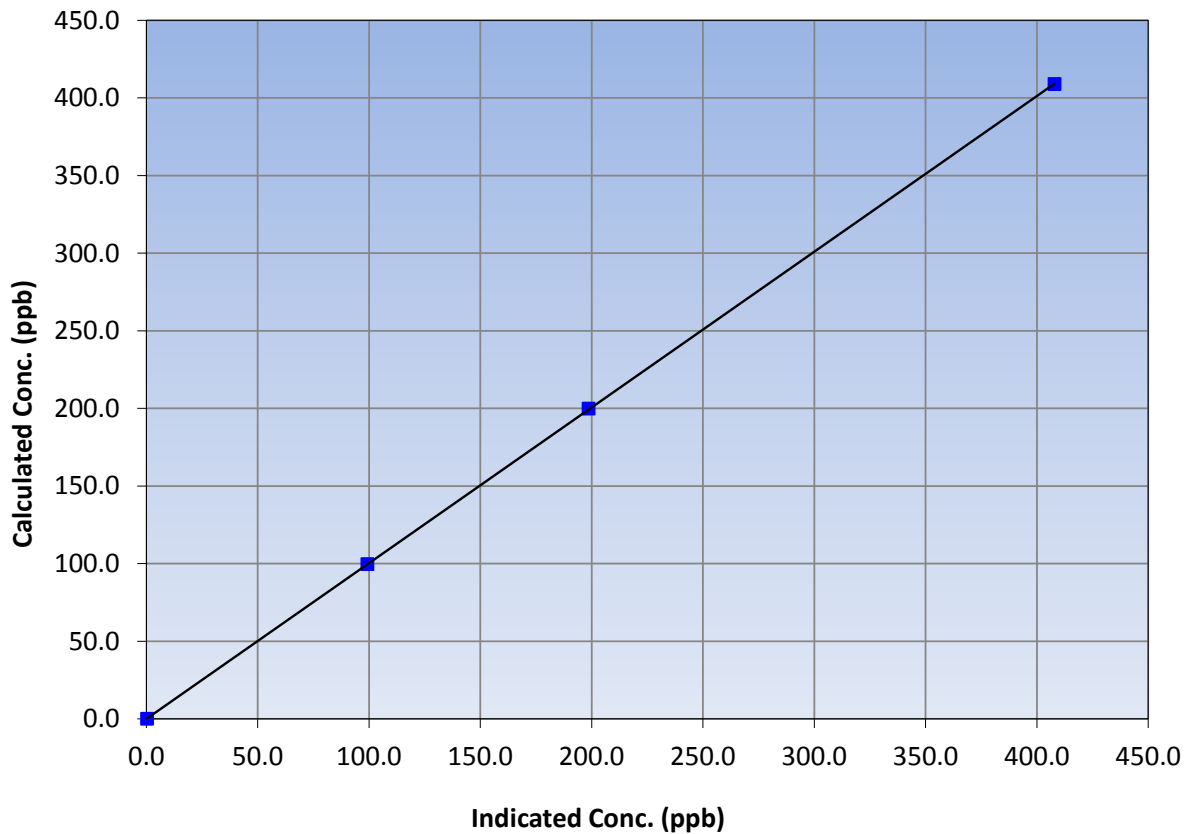
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:04 | End Time (MST) | 15:42 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153357 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | ≥0.995 | |
| 408.9 | 407.9 | 1.0025 | | | |
| 199.8 | 198.6 | 1.0060 | | | |
| 99.6 | 99.3 | 1.0030 | | | |
| | | | Slope | 1.003159 | 0.90 - 1.10 |
| | | | Intercept | -0.007580 | +/-20 |

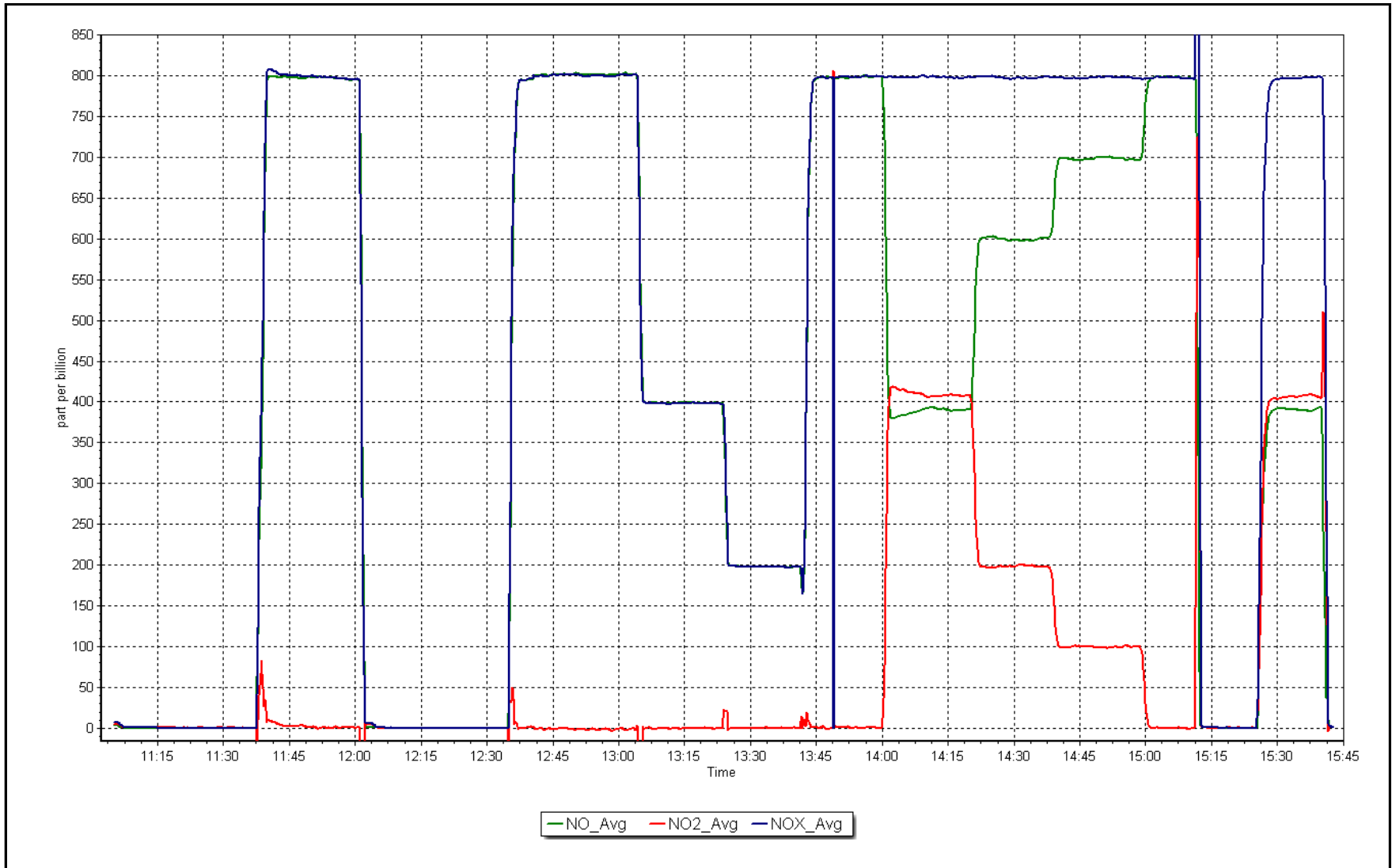
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 25, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|----------------------------|-----------------|-----------------|
| Station Name: | Fort McKay - Bertha Ganter | Station number: | AMS 01 |
| NOX Cal Date: | September 25, 2017 | Last Cal Date: | August 21, 2017 |
| Start time (MST): | 11:04 | End time (MST): | 15:25 |
| NH3 Cal Date: | September 26, 2017 | Last Cal Date: | August 22, 2017 |
| Start time (MST): | 8:25 | End time (MST): | 12:15 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-------------------|-------------|-----|--------------------|----------------|
| NOX Cal Gas Conc. | <u>49.7</u> | ppm | NO Gas Cylinder # | EY0000683 |
| NO Cal Gas Conc. | <u>49.7</u> | ppm | NO Cal Gas Expiry | November-04-19 |
| NH3 Cal Gas Conc. | <u>95.5</u> | ppm | NH3 Gas Cylinder # | LL23123 |
| | | | NH3 Cal Gas Expiry | May-24-17 |
| Calibrator Model | API T700 | | Serial Number | 2464 |
| ZAG make/model | API 701H | | Serial Number | 587 |

Analyzer Information

| | | | | |
|-----------------|--------------|--------------------|---------------------|----------------------------|
| Analyzer make: | API T201 | Analyzer serial #: | 152 | |
| | <u>Start</u> | <u>Finish</u> | | |
| NO coefficient | 1.098 | 1.101 | NH3 Range (ppb) | <u>Start</u> 0 - 1000 ppb |
| NOX coefficient | 1.237 | 1.240 | NOX Range (ppb) | <u>Finish</u> 0 - 1000 ppb |
| NO2 coefficient | 1.000 | 1.000 | PMT Temperature | 7.0 7.0 |
| NH3 coefficient | 0.957 | 0.904 | Reaction cell Press | 8.3 8.3 |
| TN coefficient | 1.257 | 1.246 | Sample Flow | 0.525 0.526 |
| NO bkgrnd | 0.1 | 0.1 | PMT Voltage | 645.0 645.0 |
| NOX bkgrnd | -0.1 | 0.1 | Moly Temperature | 316 316 |
| TN bkgrnd | 0.2 | 0.1 | NH3 Conv Temp | 825 825 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.997046 | 0.993338 |
| NO _x Cal Offset | 1.649227 | 3.029259 |
| NO Cal Slope | 0.995934 | 0.997893 |
| NO Cal Offset | 3.152819 | 2.462863 |
| NO ₂ Cal Slope | 1.001959 | 0.998136 |
| NO ₂ Cal Offset | -0.165962 | -0.044018 |
| NH3 Cal Slope | 0.998783 | 1.004900 |
| NH3 Cal Offset | 2.014696 | 2.745423 |
| TN Cal Slope | 0.979743 | 0.989574 |
| TN Cal Offset | 1.094635 | 3.082568 |



Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated TN concentration (ppb) (Cc) | Calculated NO _x concentration (ppb) (Cc) | Calculated NH ₃ concentration (ppb) (Cc) | Indicated TN concentration (ppb) (Ic) | Indicated NO _x concentration (ppb) (Ic) | Indicated NH ₃ concentration (ppb) (Ic) | TN Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NH ₃ Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|------------------------------|--------------------------------|--|---|---|---|--|--|---|--|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | -0.7 | 1.2 | ---- | ---- |
| as found NO | 4930 | 80.6 | 799.5 | 799.5 | ---- | 787.2 | 780.3 | 7.0 | 1.016 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | -0.6 | 1.0 | ---- | ---- |
| high NO point | 4930 | 80.6 | 799.5 | 799.5 | ---- | 805.9 | 802.8 | 3.1 | 0.992 | ---- |
| NO/O ₃ point | 4930 | 80.6 | 799.5 | 799.5 | ---- | 801.7 | 800.3 | 1.3 | 0.997 | ---- |
| as found NH ₃ | 4916 | 94.3 | 1797.4 | NA | 1797.4 | 1700.4 | ---- | 1673.3 | 1.057 | 1.074 |
| first NH ₃ | 4916 | 94.3 | 1797.4 | NA | 1797.4 | 1817.8 | ---- | 1790.4 | 0.989 | 1.004 |
| second NH ₃ | 4948 | 52.4 | 1000.8 | NA | 1000.8 | 999.8 | ---- | 985.1 | 1.001 | 1.016 |
| third NH ₃ | 4932 | 26.3 | 506.6 | NA | 506.6 | 509.0 | ---- | 501.2 | 0.995 | 1.011 |
| Average Correction Factor | | | | | | | | | 0.9946 | 1.0102 |

Corrected As found TN = 786.7 ppb NO_x = 781.0 ppb NH₃ = 1672.1 ppb

Previous Response TN = 814.9 ppb NO_x = 800.2 ppb NH₃ = 1797.6 ppb

NH₃ Previous Converter Efficiency = 95.7 %

NH₃ Current Converter Efficiency = 90.4 %

*Percent Change TN = 3.6%

*Percent Change NO_x = 2.5%

*Percent Change NH₃ = 7.5%

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



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NO _x concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated TN concentration (ppb) (Cc) | Indicated NO _x concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated TN concentration (ppb) (Ic) | NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|--|--|---------------------------------------|---------------------------------------|---|--|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | -0.6 | -3.5 | ---- | ---- |
| as found span | 4930 | 80.6 | 799.5 | 799.5 | 799.5 | 796.7 | 793.1 | 803.0 | 1.0035 | 1.0080 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | -0.2 | 0.5 | ---- | ---- |
| high point | 4930 | 80.6 | 799.5 | 799.5 | 799.5 | 802.8 | 800.0 | 805.9 | 0.9959 | 0.9993 |
| second point | 4970 | 40.3 | 399.8 | 399.8 | 399.8 | 398.7 | 396.4 | 402.1 | 1.0027 | 1.0085 |
| third point | 4990 | 20.1 | 199.4 | 199.4 | 199.4 | 194.9 | 195.5 | 198.1 | 1.0230 | 1.0199 |
| Average Correction Factor | | | | | | | | | 1.0072 | 1.0092 |

Corrected As found TN = 806.5 ppb NO_x = 796.2 ppb NO = 793.7 ppb
 Previous Response TN = 814.9 ppb NO_x = 800.2 ppb NO = 799.6 ppb

*Percent Change TN = 1.0%
 *Percent Change NO_x = 0.5%
 *Percent Change NO = 0.7%
 * = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO ₂ concentration (ppb) (Cc) | Indicated NO _x concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO ₂ concentration (ppb) (Ic) | NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO ₂ Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|---|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | ---- | 0.0 | 800.3 | 798.3 | 2.0 | 0.9990 | 1.0015 | ---- | ---- |
| 1st NO ₂ (400 ppb O ₃) | 388.2 | 410.1 | 799.0 | 388.2 | 410.8 | 1.0006 | ---- | 0.9983 | 100.2% |
| 2nd NO ₂ (200 ppb O ₃) | 599.5 | 198.8 | 799.5 | 599.5 | 200.0 | 1.0000 | ---- | 0.9940 | 100.6% |
| 3rd NO ₂ (100 ppb O ₃) | 698.3 | 100.0 | 797.4 | 698.3 | 99.1 | 1.0026 | ---- | 1.0091 | 99.1% |
| 2nd NO ref point | ---- | 0.0 | 797.0 | 794.8 | 2.2 | 1.0031 | 1.0059 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0016 | 1.0037 | 1.0005 | 100.0% |

Notes: Sample inlet filter replaced after as founds. Adjusted zero and span for NO/Nox/NT. NH₃ as found span was 7.4% low, see Docit note. NH₃ span adjusted.

Calibration Performed By: Asad Hidayat/Devin Russell



Wood Buffalo Environmental Association

TN Calibration Summary

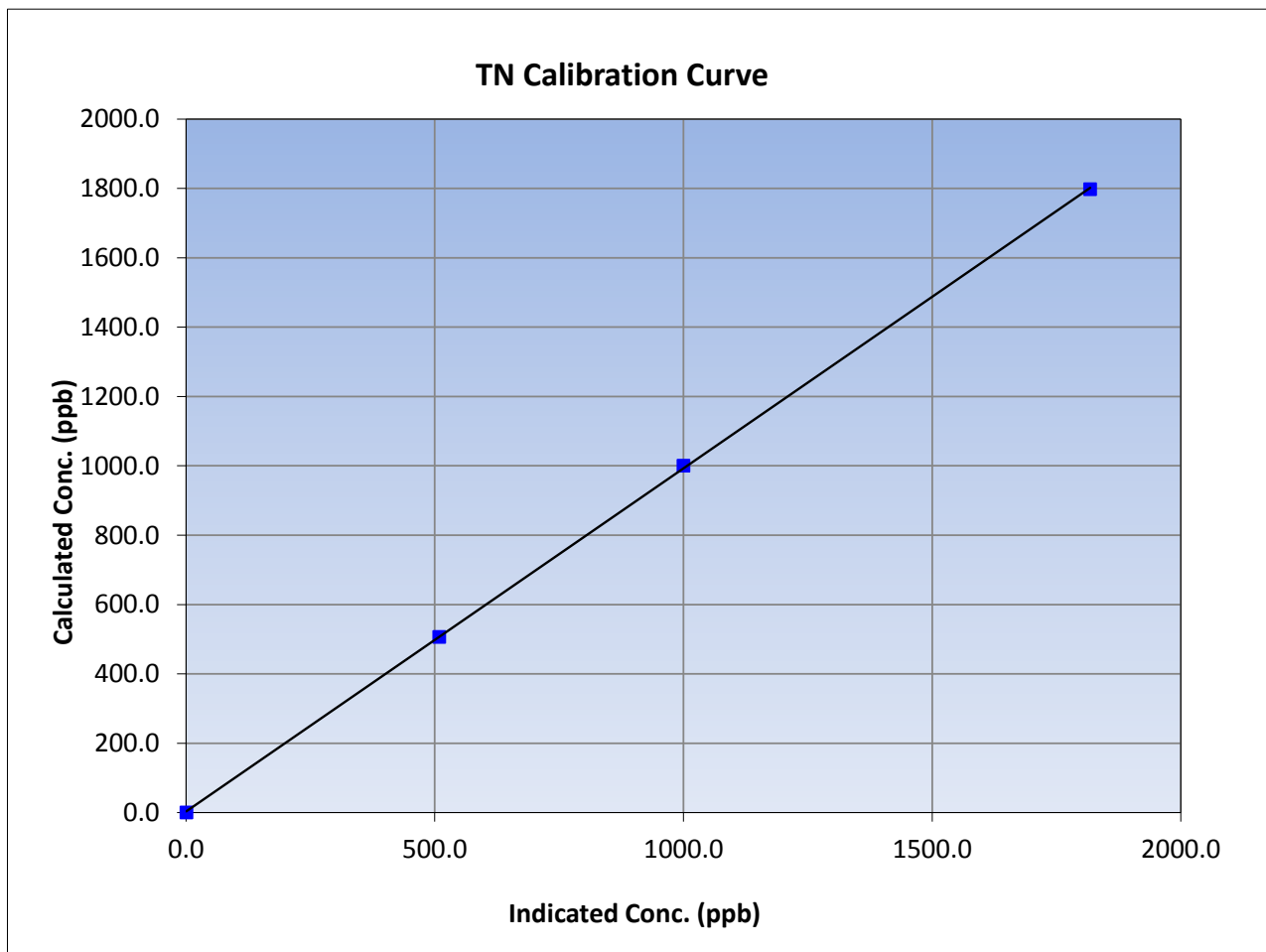
Version-03-2017

Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 8:25 | End Time (MST) | 12:15 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.5 | ---- | Correlation Coefficient | ≥0.995 | |
| 1797.4 | 1817.8 | 0.9888 | | | |
| 1000.8 | 999.8 | 1.0010 | | | |
| 506.6 | 509.0 | 0.9952 | | | |
| | | | Slope | 0.989574 | 0.90 - 1.10 |
| | | | Intercept | 3.082568 | +/-20 |





Wood Buffalo Environmental Association

NH₃ Calibration Summary

Version-03-2017

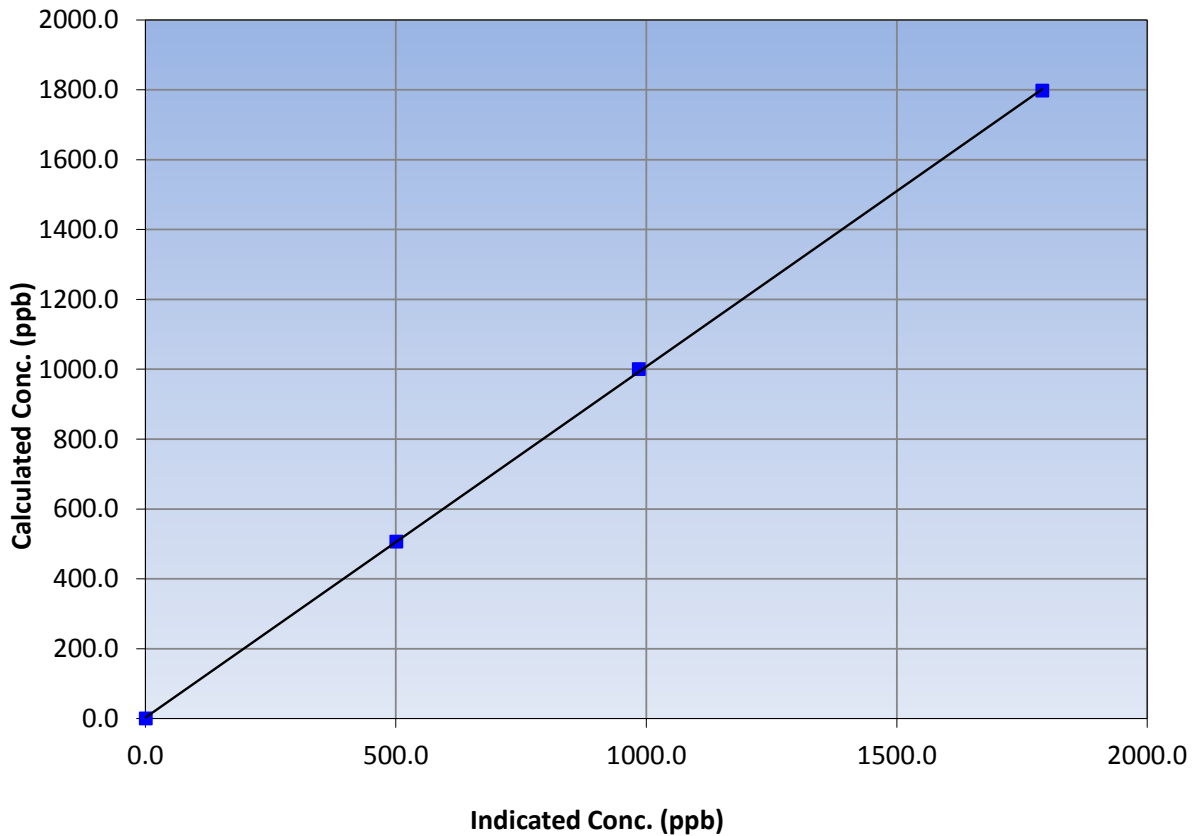
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 8:25 | End Time (MST) | 12:15 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> |
|-------------------------------------|------------------------------------|---------------------------|---|--------------------------------|
| 0.0 | 1.0 | ---- | Correlation Coefficient Slope Intercept | ≥0.995 0.90 - 1.10 +/-20 |
| 1797.4 | 1790.4 | 1.0039 | | |
| 1000.8 | 985.1 | 1.0159 | | |
| 506.6 | 501.2 | 1.0107 | | |
| | | | | |

NH₃ Calibration Curve





Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

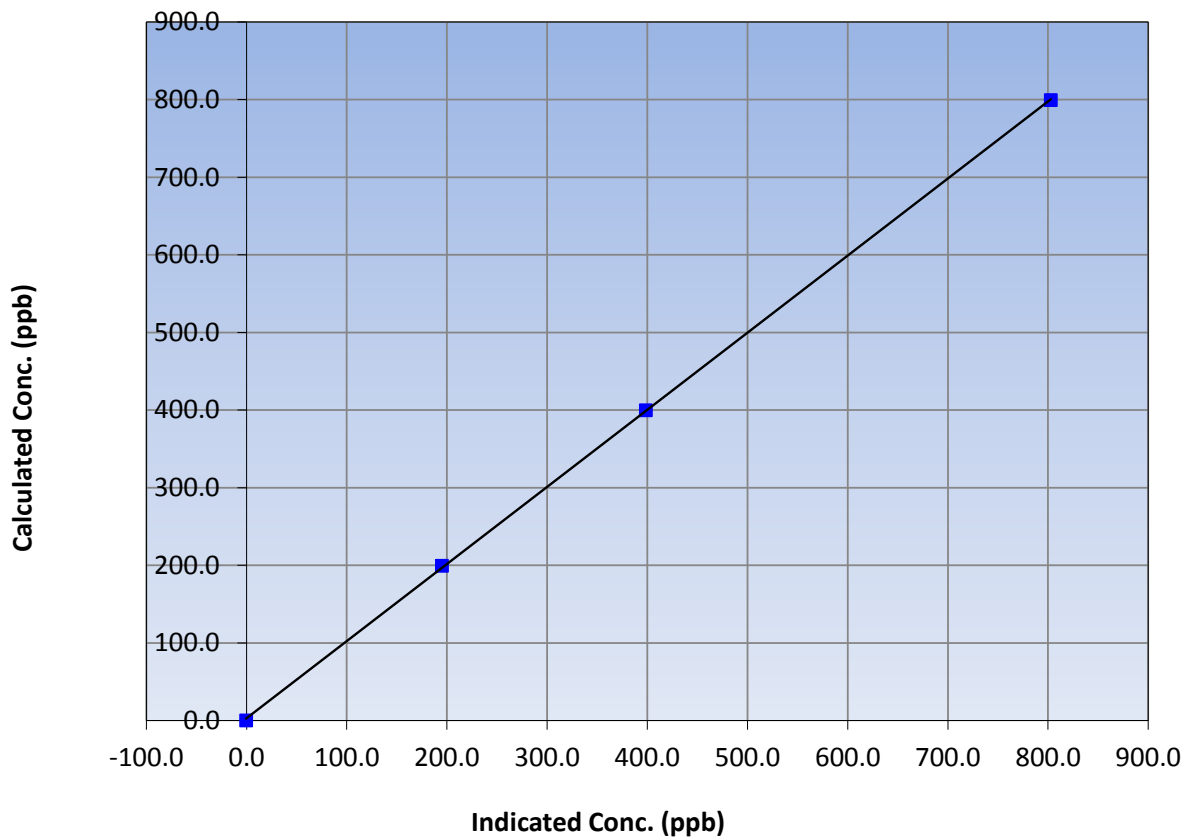
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 21, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:04 | End Time (MST) | 15:25 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.6 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.5 | 802.8 | 0.9959 | | | |
| 399.8 | 398.7 | 1.0027 | | | |
| 199.4 | 194.9 | 1.0230 | | | |
| | | | Slope | 0.993338 | 0.90 - 1.10 |
| | | | Intercept | 3.029259 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

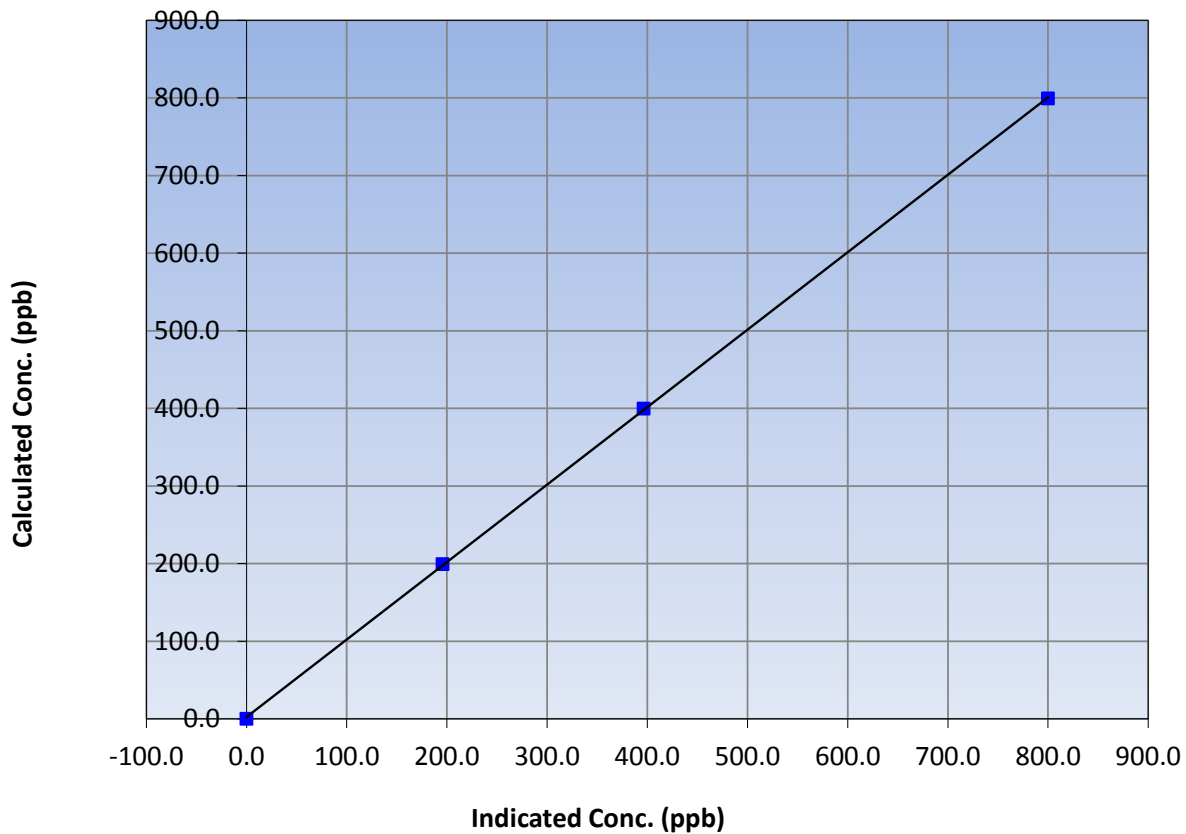
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 21, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:04 | End Time (MST) | 15:25 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.5 | 800.0 | 0.9993 | | | |
| 399.8 | 396.4 | 1.0085 | | | |
| 199.4 | 195.5 | 1.0199 | | | |
| | | | Slope | 0.997893 | 0.90 - 1.10 |
| | | | Intercept | 2.462863 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

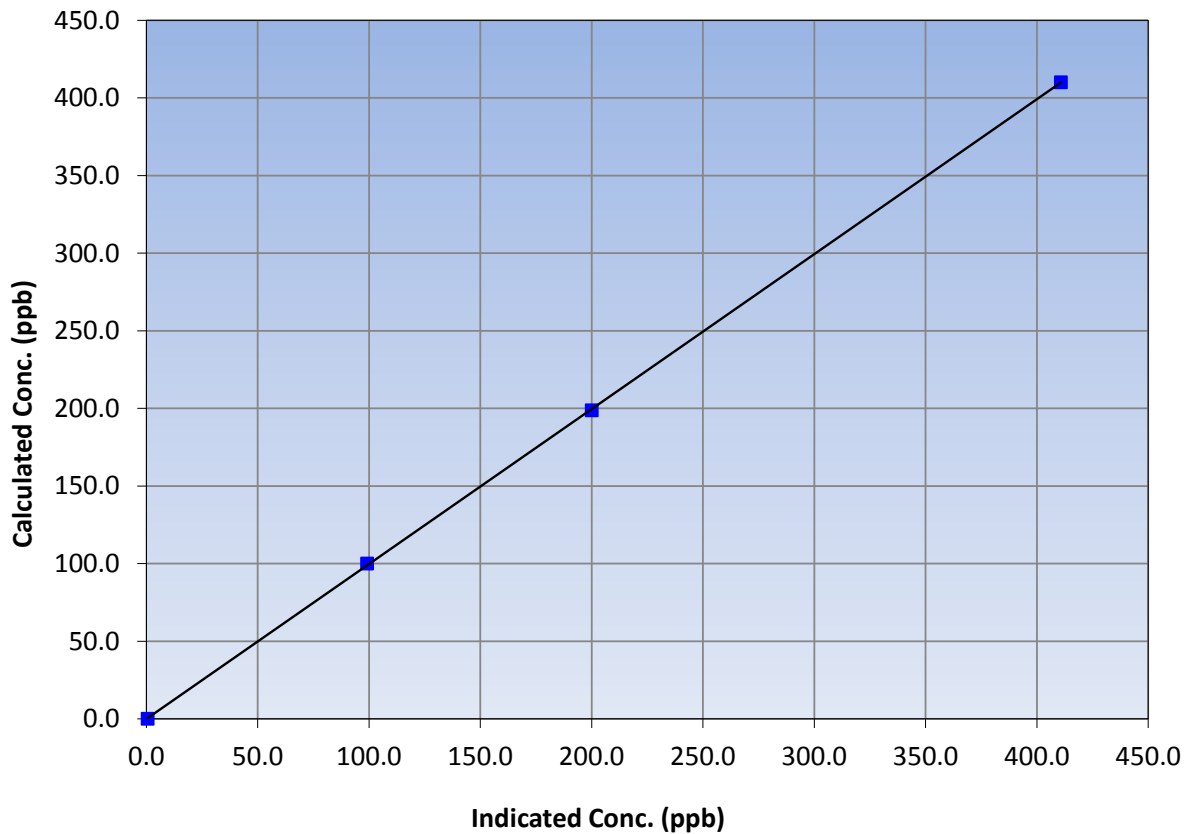
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 21, 2017 |
| Station Name | Fort McKay - Bertha Ganter | Station Number | AMS 01 |
| Start Time (MST) | 11:04 | End Time (MST) | 15:25 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.5 | ---- | Correlation Coefficient | ≥0.995 | |
| 410.1 | 410.8 | 0.9983 | | | |
| 198.8 | 200.0 | 0.9940 | | | |
| 100.0 | 99.1 | 1.0091 | | | |
| | | | Slope | 0.998136 | 0.90 - 1.10 |
| | | | Intercept | -0.044018 | +/-20 |

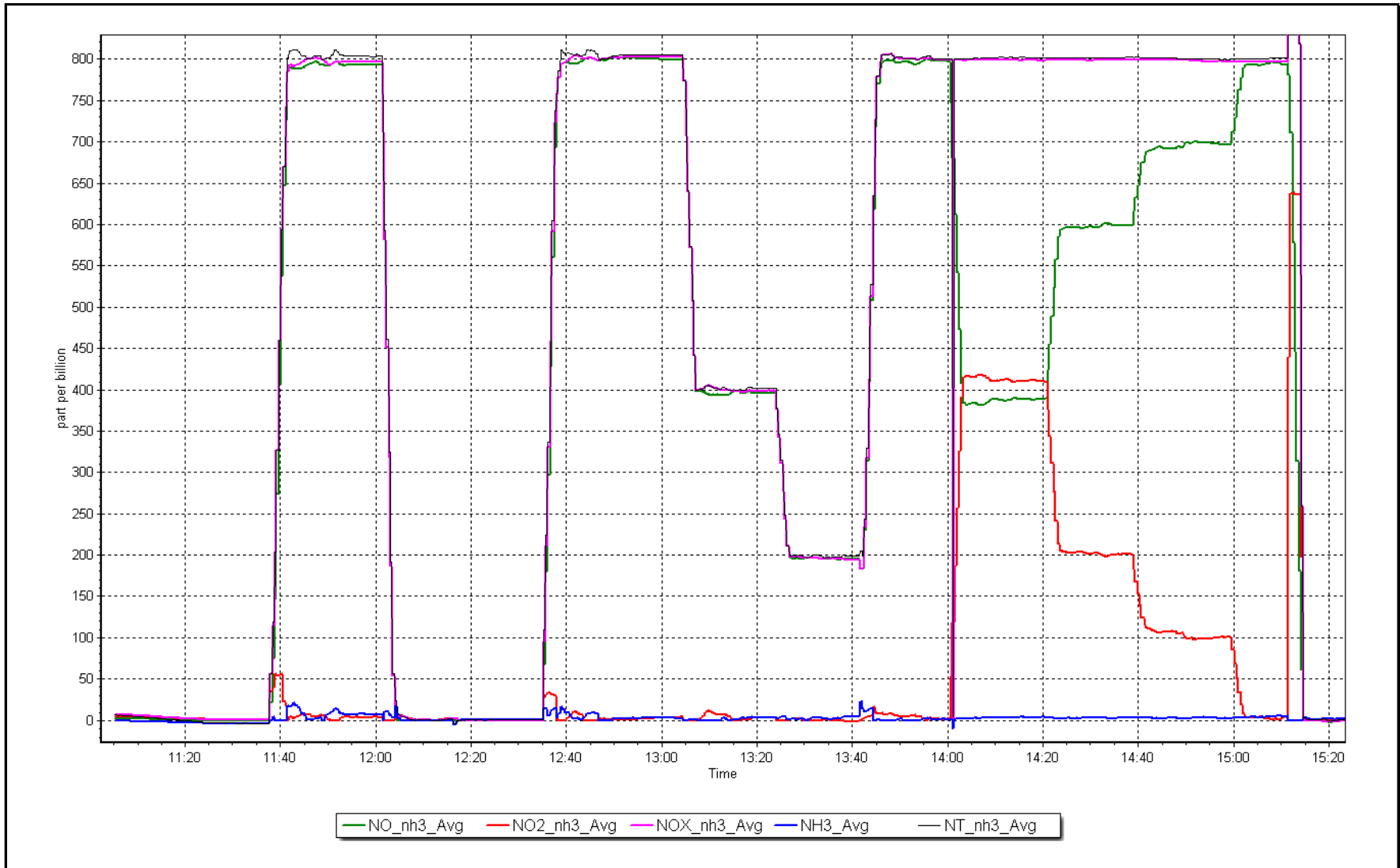
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 25, 2017

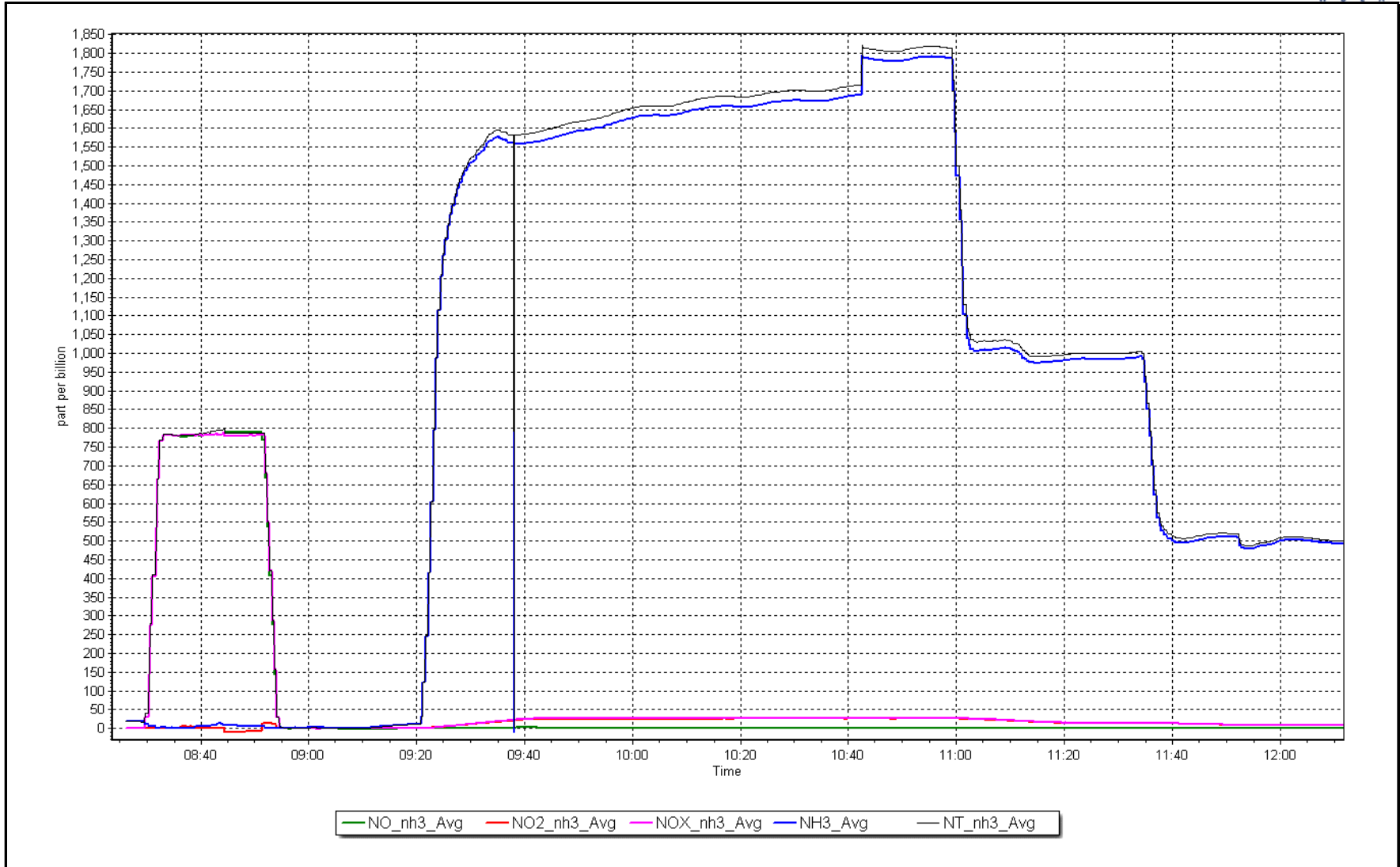
Location: Fort McKay - Bertha Ganter



NH₃ Calibration Plot

Date: September 26, 2017

Location: Fort McKay - Bertha Ganter





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|----------------------------|-----------------|-----------------|
| Station Name: | Fort McKay - Bertha Ganter | Station number: | AMS 01 |
| Calibration Date: | September 13, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 10:30 | End time (MST): | 12:00 |
| Sharp Model: | Thermo 5030 SHARP | S/N: | E-1486 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 5691 |
| Flow Meter Make/Model: | Delta-Cal | S/N: | 1019 |
| Temp/RH standard: | Delta-Cal | S/N: | 1019 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 10 | 10.1 | 10 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 983 | 985 | 983 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 992 | 938 | 960 | <input checked="" type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 1.5 | ----- | 0.1 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input checked="" type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

| | | | | |
|------------|-------------------|---------------------------|------------------|-----------------------|
| Leak Test: | Date of check: | <u>September 13, 2017</u> | Last Cal Date: | <u>April 26, 2017</u> |
| | Flow w/o adaptor: | <u>15.6</u> | Flow w/ adaptor: | <u>15.54</u> |

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-----------------------------------|---|---|-----------------|
| <input type="checkbox"/> | Foil S/N: <u>2582</u> | Foil S/N: <u>2582</u> | |
| Foil Calibration | Foil Mass: <u>1186</u> | Foil Mass: <u>1186</u> | |
| | Calibration Date: <u>September 13, 2017</u> | Calibration Date: <u>April 26, 2017</u> | |
| (Limit) +/- 5% of previous | Correction Factor: <u>7228</u> | Correction Factor: <u>7124</u> | 1.46% |

Annual Calibration Test

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

Notes: Cyclone head replaced with clean head. No adjustments made to T1, P3. Flow was adjusted. Nephelometer adjusted. Completed quarterly leak check and foil cal; no adjustments or issues.

Calibration by: Asad Hidayat



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 2 MILDRED LAKE SEPTEMBER 2017

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

October 27, 2017

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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 687 | 33 | 33 | 100 | 69 | 0 | 16 | 0 |
| H2S (ppb) Average | 684 | 36 | 36 | 100 | 8 | 0 | 2 | 0 |
| THC (ppm) Average | 687 | 33 | 33 | 100 | 7.4 | - | 3.6 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100 | 31.6 | - | 22.8 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 100 | - | 94 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 24 | - | 19 | - |
| Wind Direction 10 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 687 | 2.3 | 6 | - | 0 | 0 | 0 | 0 | 1 | 6 | 69 |
| H2S (ppb) Average | 684 | 0.5 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 8 |
| THC (ppm) Average | 687 | 2.52 | 0.6 | - | 1.9 | 2.1 | 2.2 | 2.3 | 2.6 | 3.1 | 7.4 |
| Temperature 2 m (C) Average | 720 | 12.5 | 6 | - | -1.2 | 4.8 | 8 | 12 | 16.5 | 20.3 | 31.6 |
| Relative Humidity (%) Average | 720 | 67.6 | 20 | - | 23 | 38 | 54 | 69 | 84 | 95 | 100 |
| Wind Speed 10 m (km/h) Average | 719 | 9.6 | 5 | - | 0 | 3 | 5 | 9 | 13 | 17 | 24 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|-----------------------------------|
| Wind Speed, Wind Direction | 06 Sep 2017 19:00 | 06 Sep 2017 19:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

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

| | | | | |
|--|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 69 ppb on Sep 2 01:00 | Maximum Daily Average: 15.8 ppb on Sep 1 | | Hours of Data: | 687 |
| Minimum Value: 0 ppb on Sep 4 12:00 | Minimum Daily Average: 0.0 ppb on Sep 14 | | Hours of Missing Data: | 33 |
| Maximum Diurnal Average: 6.1 ppb at hour 1 | Minimum Diurnal Average: 0.7 ppb at hour 13 | | Hours of Calibration: | 33 |
| Monthly Average: 2.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 6 P ₉₉ = 27 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 34 | 6 | 3 | 3 | Z | 11 | 16 | 23 | 27 | 20 | 8 | 4 | 1 | 12 | 19 | 13 | 14 | 12 | 18 | 29 | 27 | 11 | 4 | 48 | 15.8 | 48 |
| 2-Sep | 69 | 45 | 20 | 5 | 2 | Z | 2 | 4 | 1 | 8 | 2 | 1 | 4 | 1 | 2 | 12 | 10 | 5 | 7 | 0 | 2 | 23 | 2 | 1 | 9.9 | 69 |
| 3-Sep | Z | 9 | 2 | 0 | 0 | 0 | 1 | 3 | 4 | 5 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 1.4 | 9 |
| 4-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 17 | 1.2 | 17 |
| 5-Sep | 10 | 4 | 1 | Z | 5 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1.5 | 10 |
| 6-Sep | 0 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 8 | 13 | 6 | 2 | 1 | 1 | 1 | 2 | 2 | 2.3 | 13 |
| 7-Sep | 12 | 7 | 9 | 4 | Z | 7 | 9 | 3 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3.1 | 12 |
| 8-Sep | 5 | 25 | 18 | 17 | 3 | 2 | 7 | 3 | 2 | 2 | Z | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3.9 | 25 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 10-Sep | 1 | Z | 1 | 1 | 1 | 1 | 5 | 7 | 7 | 17 | 13 | 6 | 5 | 6 | 8 | 1 | 3 | 19 | 32 | 5 | 3 | 11 | 9 | 19 | 7.9 | 32 |
| 11-Sep | 2 | 2 | Z | 12 | 3 | 1 | 0 | 1 | 4 | 2 | C | C | C | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 12 |
| 12-Sep | 3 | 15 | 10 | Z | 14 | 8 | 2 | 11 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.1 | 15 |
| 13-Sep | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 16-Sep | 0 | Z | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 17-Sep | 0 | 0 | Z | 1 | 4 | 4 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 1 | 0 | 6 | 1.2 | 6 |
| 18-Sep | 6 | 7 | 3 | Z | 17 | 15 | 13 | 6 | 4 | 7 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 4.0 | 17 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 20-Sep | 0 | 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-Sep | Z | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 2 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0.6 | 4 |
| 24-Sep | 2 | 1 | 2 | Z | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 5 | 7 | 1 | 0 | 0 | 0 | 0 | 1.2 | 7 |
| 25-Sep | 0 | 4 | 2 | 2 | Z | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 7 |
| 26-Sep | 0 | 0 | 1 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 6 |
| 27-Sep | Z | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 4 | 1 | 1 | 1 | 3 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1.0 | 4 |
| 29-Sep | 6 | 8 | Z | 10 | 6 | 7 | 6 | 10 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 3.1 | 10 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |

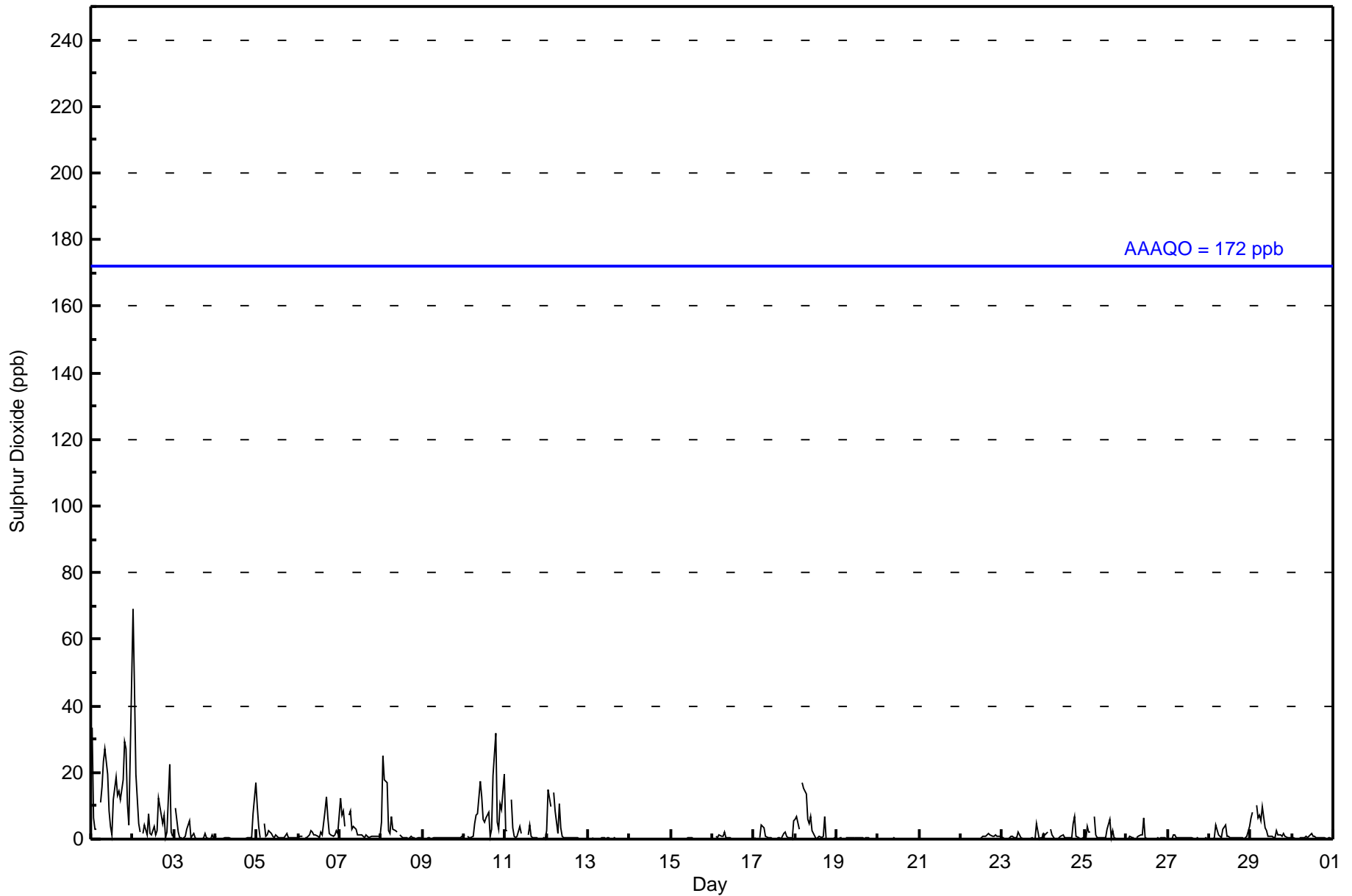
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 6.1 | 5.5 | 2.8 | 2.4 | 2.7 | 2.7 | 2.4 | 2.8 | 2.5 | 2.7 | 1.6 | 0.9 | 0.7 | 1.1 | 1.6 | 1.5 | 1.7 | 2.1 | 2.5 | 1.5 | 1.5 | 1.7 | 1.1 | 3.4 | Diurnal Average | |
| 69 | 45 | 20 | 17 | 17 | 15 | 16 | 23 | 27 | 20 | 13 | 6 | 5 | 12 | 19 | 13 | 14 | 19 | 32 | 29 | 27 | 23 | 9 | 48 | 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
Mildred Lake - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mildred Lake - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 647 | 94.18 | 94.18 |
| 11 - 20 | 29 | 4.22 | 98.40 |
| 21 - 60 | 10 | 1.46 | 99.85 |
| 61 - 110 | 1 | 0.15 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mildred Lake - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 76 | 53 | 23 | 14 | 12 | 22 | 25 | 94 | 84 | 53 | 36 | 27 | 28 | 34 | 32 | 33 | 646 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 0 | 2 | 11 | 9 | 0 | 0 | 29 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 10 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 76 | 53 | 23 | 14 | 12 | 22 | 28 | 98 | 85 | 53 | 36 | 29 | 49 | 43 | 32 | 33 | 686 |

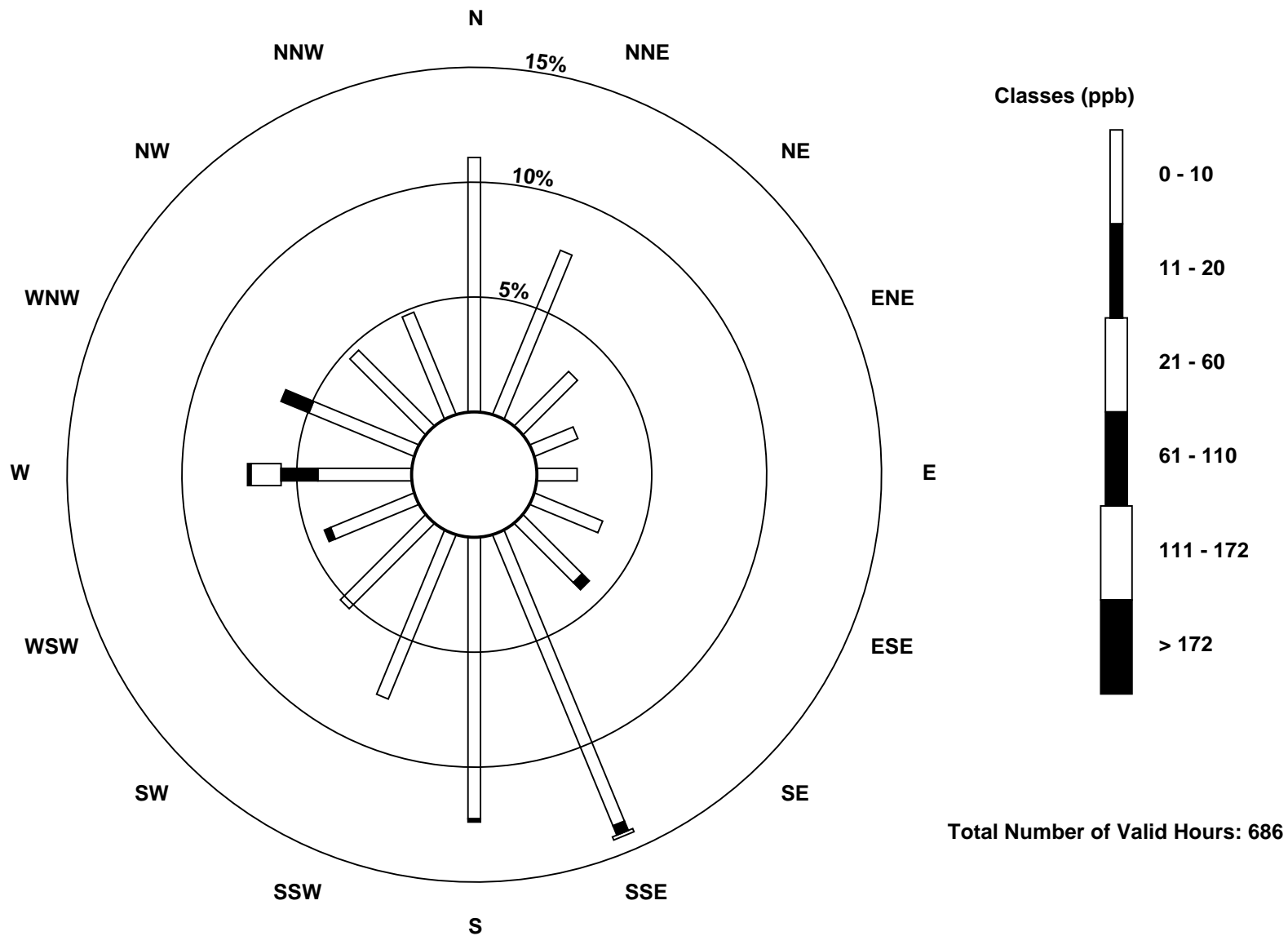
Total Number of Valid Hours: 686

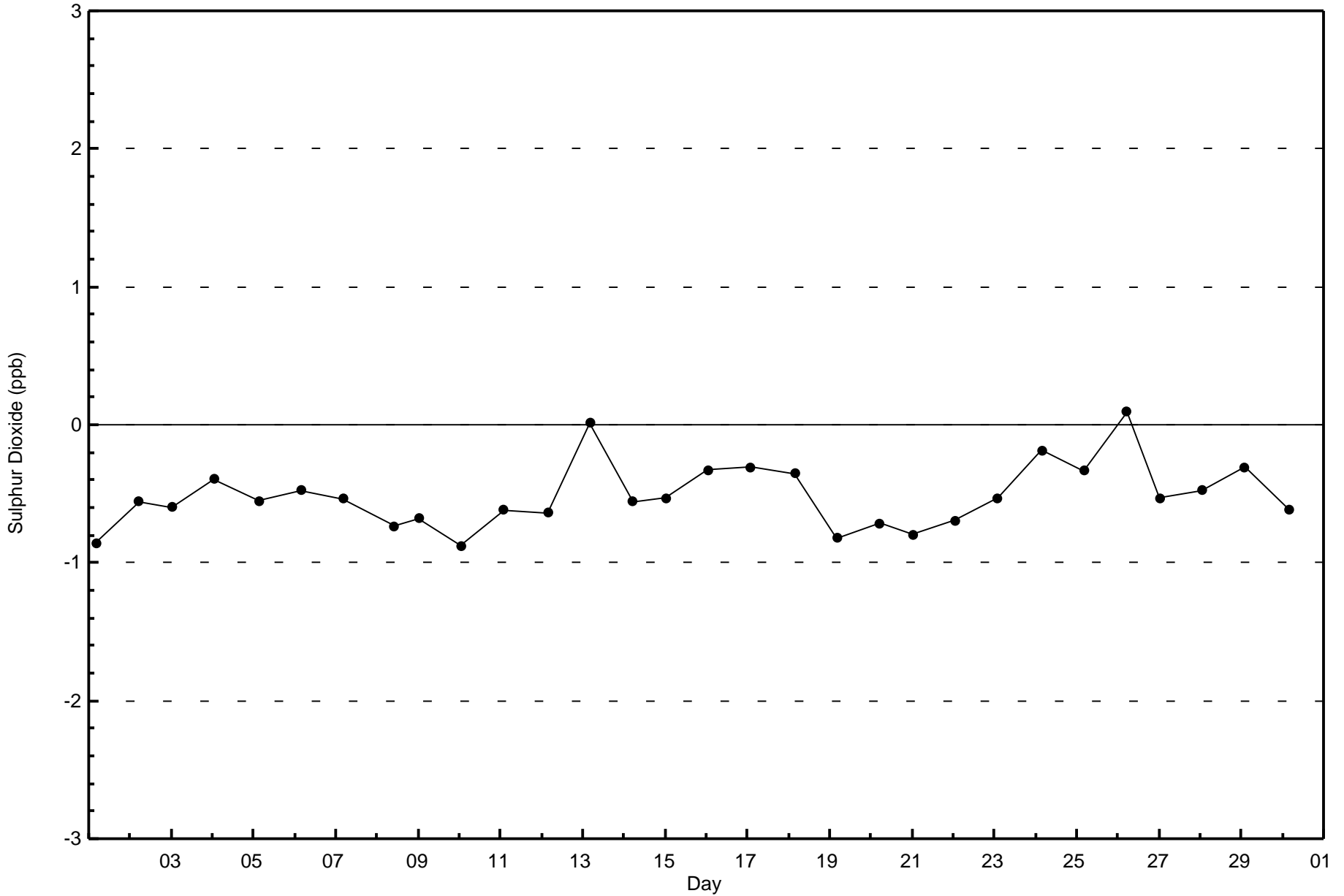
Total Number of Hours: 720

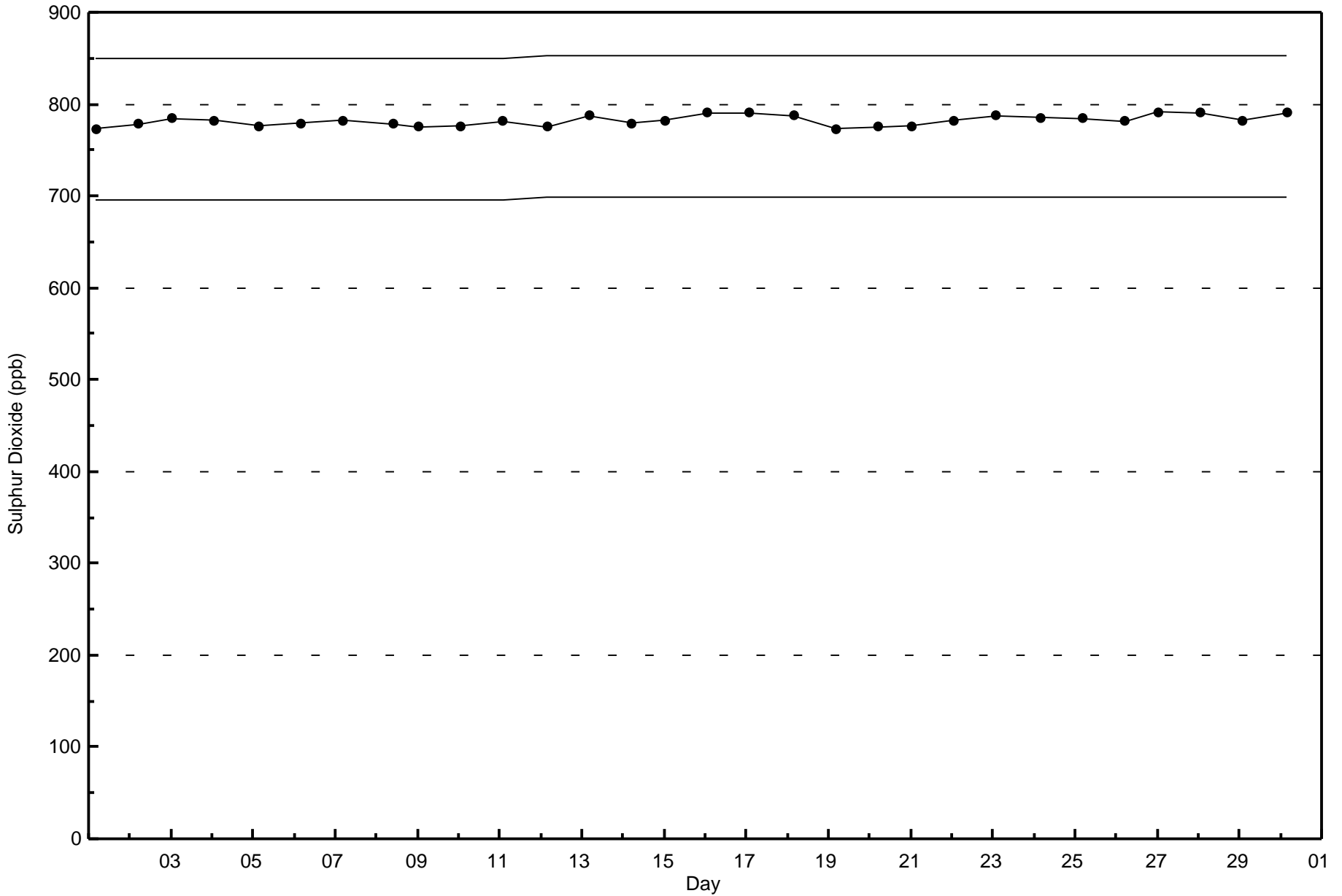


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Mildred Lake - September 2017

| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 8 ppb on Sep 8 02:00 | Maximum Daily Average: 2.0 ppb on Sep 8 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 3 14:00 | Minimum Daily Average: 0.1 ppb on Sep 20 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 1.1 ppb at hour 7 | Minimum Diurnal Average: 0.2 ppb at hour 16 | | Hours of Calibration: | 36 |
| Monthly Average: 0.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 1 P ₉₉ = 4 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 1 | 1 | 0 | 0 | 1 | Z | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 2 | |
| 2-Sep | 1 | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.5 | 1 | |
| 3-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 4-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 0.4 | 4 | |
| 5-Sep | 3 | 2 | 1 | 3 | Z | 2 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 | |
| 6-Sep | 0 | 1 | 1 | 1 | Z | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0.8 | 3 | |
| 7-Sep | 3 | 3 | 4 | 3 | 3 | Z | 4 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1.2 | 4 | |
| 8-Sep | 4 | 8 | 7 | 7 | 6 | 1 | 5 | 3 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2.0 | 8 | |
| 9-Sep | 1 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 1 | |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0.5 | 1 | |
| 11-Sep | 0 | 0 | 1 | Z | 1 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 12-Sep | 0 | 1 | 0 | 0 | Z | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 14-Sep | 0 | 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-Sep | 0 | Z | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 16-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 17-Sep | 0 | 0 | 1 | Z | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 0.6 | 2 |
| 18-Sep | 2 | 2 | 1 | 1 | Z | 2 | 2 | 1 | 1 | 1 | C | C | C | C | C | C | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 2 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 20-Sep | 0 | 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 | |
| 21-Sep | 0 | 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-Sep | 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 | |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0.4 | 2 | |
| 24-Sep | 1 | 1 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 25-Sep | 0 | 1 | 1 | 1 | 2 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | |
| 26-Sep | 0 | 0 | 0 | 1 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 27-Sep | 1 | Z | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 28-Sep | 0 | 0 | Z | 0 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 0.7 | 2 | |
| 29-Sep | 2 | 2 | 2 | Z | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 | |
| 30-Sep | 1 | 1 | 1 | 1 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |

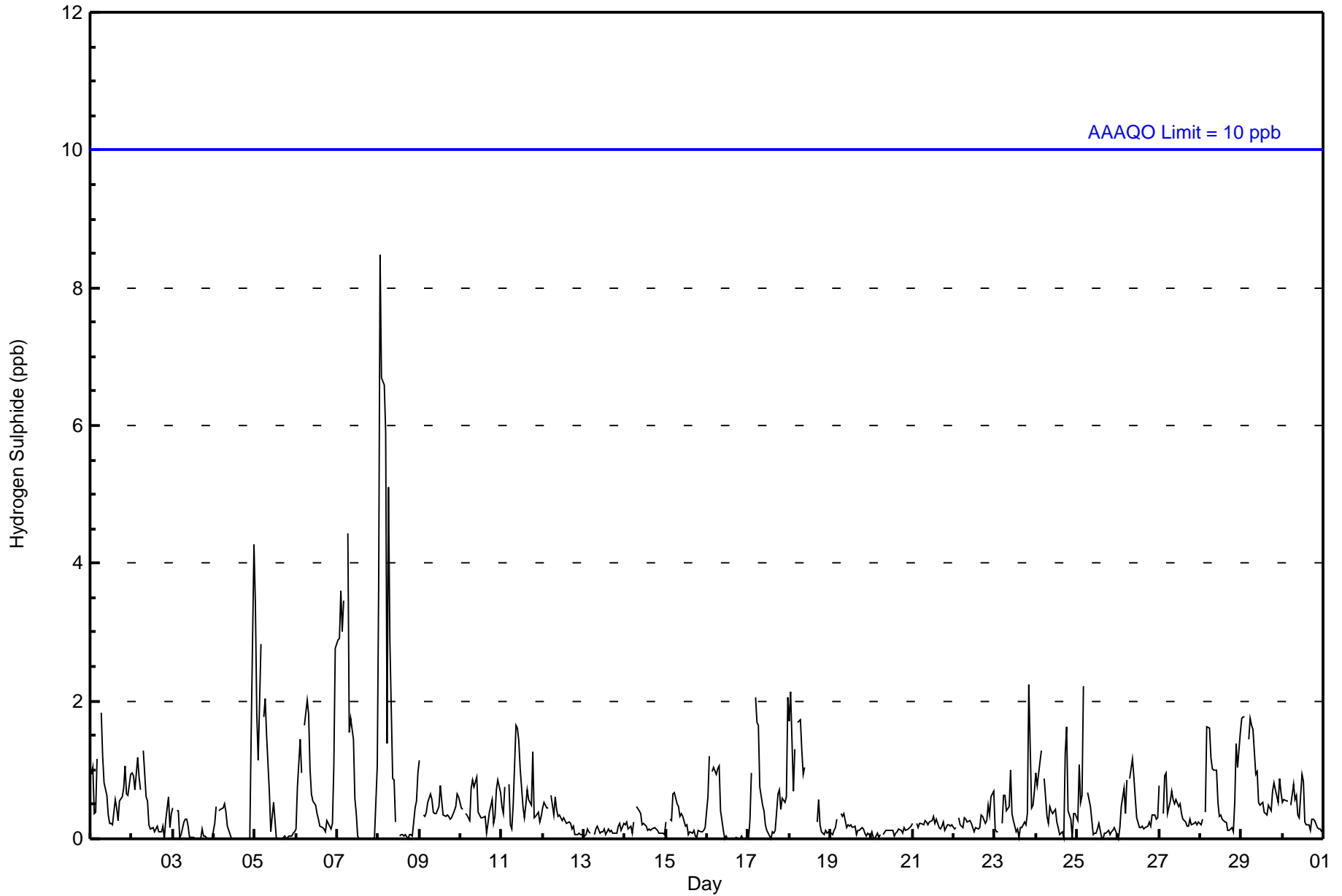
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.8 | 1.1 | 0.9 | 1.0 | 1.0 | 0.8 | 1.1 | 0.8 | 0.6 | 0.5 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.3 | 0.4 | 0.7 | Diurnal Average |
| 4 | 8 | 7 | 7 | 6 | 2 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 4 | 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
Mildred Lake - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 667 | 97.51 | 97.51 |
| 3 - 4 | 12 | 1.75 | 99.27 |
| 5 - 7 | 4 | 0.58 | 99.85 |
| 8 - 11 | 1 | 0.15 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 76 | 52 | 22 | 15 | 12 | 24 | 27 | 84 | 80 | 51 | 35 | 28 | 51 | 44 | 33 | 32 | 666 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 12 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 76 | 52 | 22 | 15 | 12 | 24 | 27 | 93 | 86 | 52 | 35 | 29 | 51 | 44 | 33 | 32 | 683 |

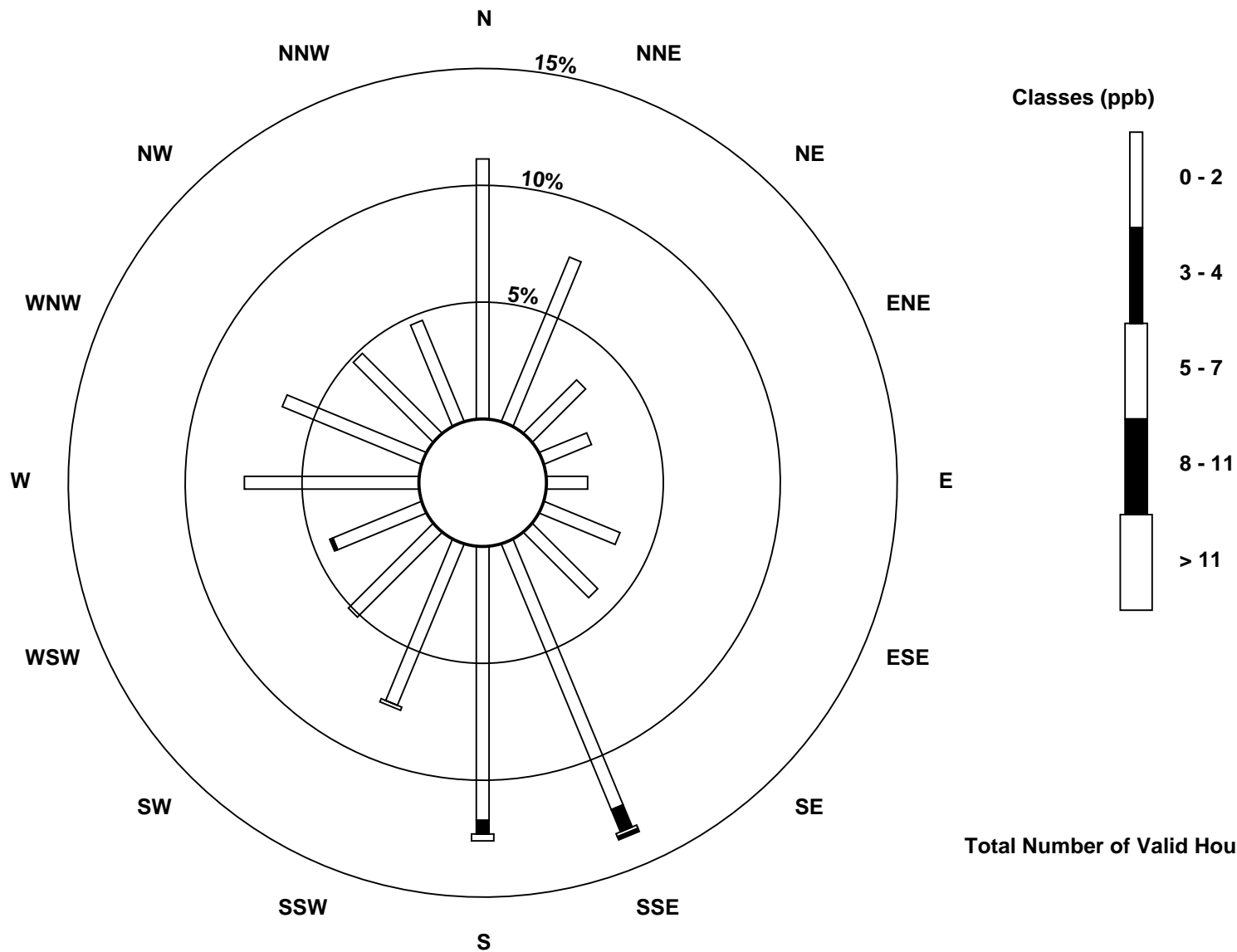
Total Number of Valid Hours: 683

Total Number of Hours: 720

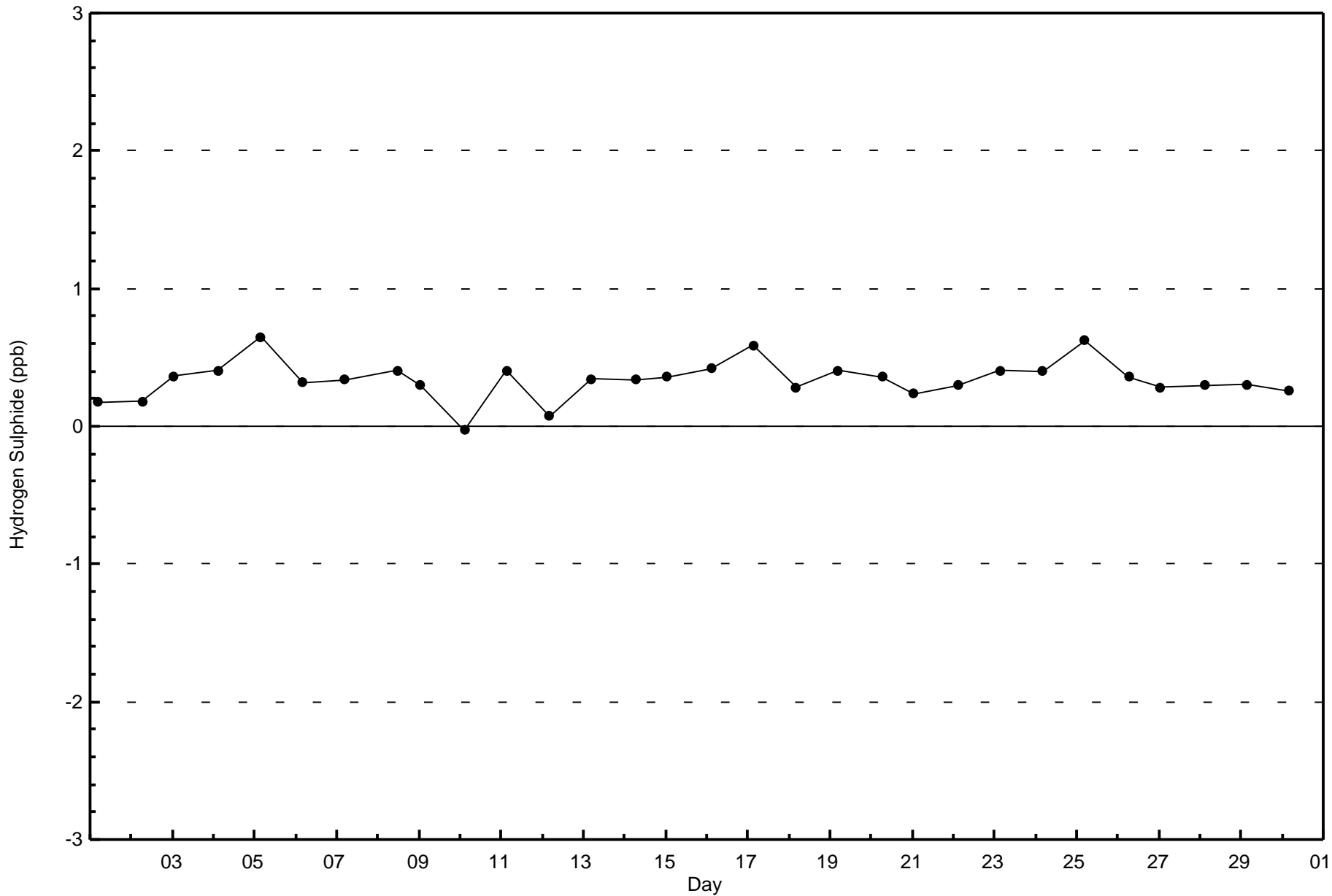


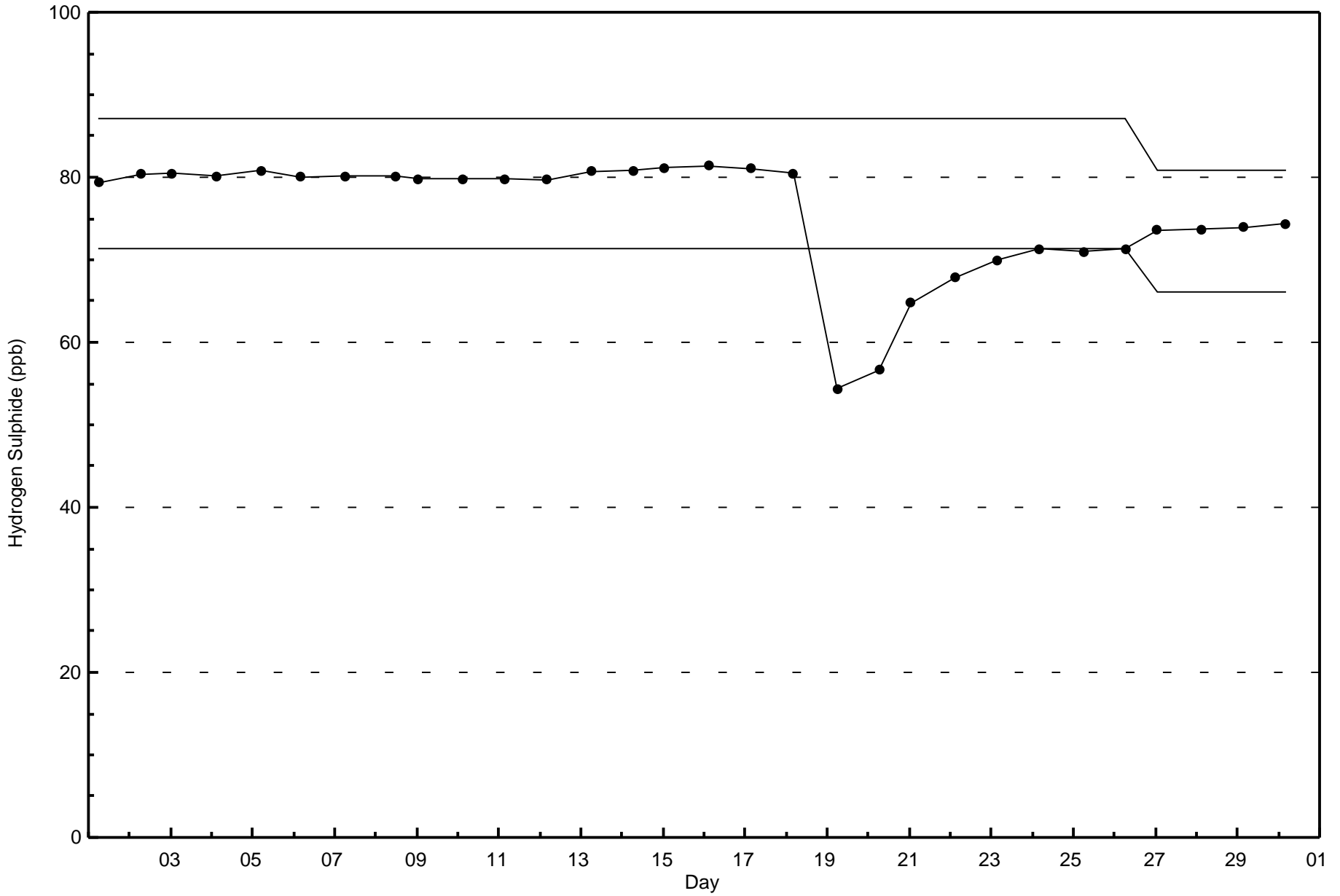
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 683



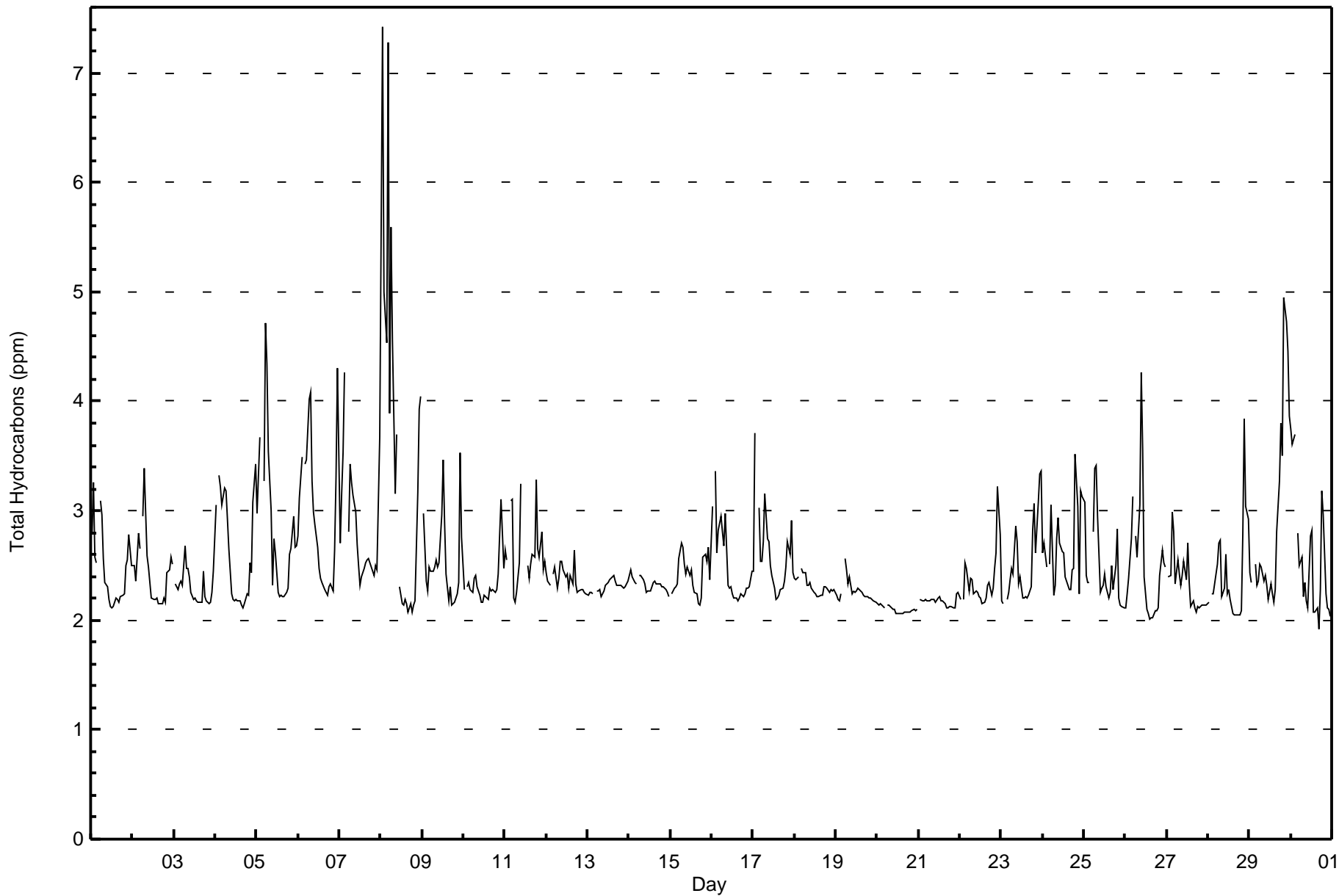




Wood Buffalo Environmental Association
Summary of Hour Averages

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

| Maximum Value: 7.4 ppm on Sep 8 02:00 Maximum Daily Average: 3.6 ppm on Sep 8 | | Hours in Service: 720 Hours of Data: 687 Hours of Missing Data: 33 Hours of Calibration: 33 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|---------------|---------------|
| Minimum Value: 1.9 ppm on Sep 30 17:00 Maximum Diurnal Average: 2.8 ppm at hour 2 Monthly Average: 2.52 ppm | | Minimum Daily Average: 2.1 ppm on Sep 20 Minimum Diurnal Average: 2.2 ppm at hour 16 Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.6 P ₉₀ = 3.1 P ₉₉ = 4.6 | | | | | | | | | | | | | | | | | | | | | | | | |
| 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-Sep | 2.8 | 3.3 | 2.6 | 2.5 | Z | 3.1 | 3.0 | 2.6 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.5 | 2.6 | 2.8 | 2.5 | 2.5 | 3.3 |
| 2-Sep | 2.5 | 2.5 | 2.4 | 2.8 | 2.7 | Z | 3.0 | 3.4 | 2.6 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 | 2.5 | 2.6 | 2.5 | 2.4 | 3.4 |
| 3-Sep | Z | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.7 | 2.5 | 2.5 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.5 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.4 | 2.3 | 2.7 |
| 4-Sep | 3.1 | Z | 3.3 | 3.2 | 3.1 | 3.2 | 3.2 | 2.9 | 2.7 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.5 | 2.4 | 3.1 | 3.4 | 2.6 | 3.4 |
| 5-Sep | 3.0 | 3.3 | 3.7 | Z | 3.3 | 4.7 | 4.3 | 3.5 | 3.0 | 2.3 | 2.7 | 2.6 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.6 | 2.6 | 3.0 | 2.7 | 2.7 | 2.9 | 4.7 |
| 6-Sep | 2.8 | 3.1 | 3.5 | Z | 3.4 | 3.5 | 4.0 | 4.1 | 3.3 | 3.0 | 2.9 | 2.7 | 2.5 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.6 | 3.3 | 4.3 | 2.9 | 4.3 | 4.3 |
| 7-Sep | 2.7 | 3.2 | 3.5 | 4.3 | Z | 2.8 | 3.4 | 3.3 | 3.1 | 3.0 | 2.7 | 2.5 | 2.3 | 2.4 | 2.5 | 2.5 | 2.5 | 2.6 | 2.5 | 2.5 | 2.4 | 2.5 | 2.5 | 3.7 | 2.8 | 4.3 |
| 8-Sep | 5.5 | 7.4 | 5.0 | 4.5 | 7.3 | 3.9 | 5.6 | 4.6 | 3.2 | 3.7 | Z | 2.3 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 3.2 | 3.9 | 4.0 | 3.6 | 7.4 |
| 9-Sep | Z | 3.0 | 2.4 | 2.3 | 2.5 | 2.4 | 2.4 | 2.5 | 2.6 | 2.5 | 2.5 | 3.0 | 3.5 | 2.9 | 2.4 | 2.2 | 2.3 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 3.5 | 2.8 | 2.5 | 3.5 |
| 10-Sep | 2.3 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.4 | 2.8 | 3.1 | 2.5 | 2.3 | 3.1 |
| 11-Sep | 2.6 | 2.6 | Z | 3.1 | 3.1 | 2.2 | 2.2 | 2.3 | 2.5 | 3.2 | C | C | C | 2.5 | 2.4 | 2.5 | 2.6 | 2.6 | 3.3 | 2.7 | 2.6 | 2.8 | 2.5 | 2.5 | 2.6 | 3.3 |
| 12-Sep | 2.4 | 2.4 | 2.3 | Z | 2.4 | 2.5 | 2.3 | 2.4 | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.3 | 2.4 | 2.3 | 2.6 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.4 | 2.6 |
| 13-Sep | 2.2 | 2.3 | 2.3 | 2.2 | Z | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.4 |
| 14-Sep | 2.4 | 2.5 | 2.4 | 2.3 | 2.3 | Z | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.5 |
| 15-Sep | Z | 2.2 | 2.3 | 2.3 | 2.3 | 2.6 | 2.7 | 2.7 | 2.5 | 2.4 | 2.5 | 2.4 | 2.5 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.2 | 2.6 | 2.6 | 2.5 | 2.7 | 2.4 | 2.4 | 2.7 |
| 16-Sep | 3.0 | Z | 3.4 | 2.6 | 2.8 | 2.9 | 2.8 | 2.7 | 3.0 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.5 | 3.4 |
| 17-Sep | 2.5 | 3.7 | Z | 3.0 | 2.5 | 2.5 | 2.7 | 3.2 | 2.7 | 2.7 | 2.5 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.5 | 2.7 | 2.6 | 2.9 | 2.4 | 2.6 | 3.7 |
| 18-Sep | 2.4 | 2.4 | 2.4 | Z | 2.5 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 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 | 2.5 |
| 19-Sep | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.6 | 2.5 | 2.3 | 2.4 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.6 |
| 20-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 21-Sep | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.2 | 2.3 |
| 22-Sep | 2.2 | Z | 2.2 | 2.5 | 2.5 | 2.3 | 2.4 | 2.4 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | 2.5 | 2.6 | 3.2 | 2.8 | 2.4 | 3.2 |
| 23-Sep | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.4 | 2.5 | 2.4 | 2.9 | 2.7 | 2.3 | 2.4 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.8 | 3.1 | 2.6 | 3.1 | 3.3 | 3.4 | 2.5 | 3.4 |
| 24-Sep | 2.6 | 2.7 | 2.5 | Z | 2.5 | 3.1 | 2.2 | 2.3 | 2.7 | 2.9 | 2.7 | 2.6 | 2.6 | 2.4 | 2.4 | 2.3 | 2.3 | 2.5 | 2.5 | 3.5 | 3.0 | 2.2 | 3.2 | 3.1 | 2.6 | 3.5 |
| 25-Sep | 3.1 | 2.4 | 2.3 | 2.3 | Z | 2.8 | 3.4 | 3.4 | 3.0 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.2 | 2.3 | 2.5 | 2.3 | 2.5 | 2.8 | 2.2 | 2.1 | 2.1 | 2.1 | 2.5 | 3.4 |
| 26-Sep | 2.1 | 2.2 | 2.4 | 2.7 | 3.1 | Z | 2.8 | 2.6 | 3.1 | 4.3 | 3.6 | 2.4 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.4 | 2.6 | 2.5 | 2.5 | 2.5 | 4.3 |
| 27-Sep | Z | 2.4 | 2.4 | 3.0 | 2.8 | 2.3 | 2.5 | 2.4 | 2.3 | 2.4 | 2.5 | 2.4 | 2.7 | 2.3 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 3.0 |
| 28-Sep | 2.2 | Z | 2.2 | 2.2 | 2.3 | 2.5 | 2.7 | 2.7 | 2.2 | 2.3 | 2.6 | 2.2 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.8 | 3.8 | 3.0 | 2.9 | 2.4 | 3.8 |
| 29-Sep | 2.4 | 2.4 | Z | 2.5 | 2.3 | 2.4 | 2.5 | 2.5 | 2.4 | 2.4 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.8 | 3.3 | 3.8 | 3.5 | 4.9 | 4.7 | 4.5 | 3.9 | 2.9 | 4.9 |
| 30-Sep | 3.8 | 3.6 | 3.7 | Z | 2.8 | 2.5 | 2.6 | 2.2 | 2.3 | 2.2 | 2.1 | 2.8 | 2.8 | 2.1 | 2.1 | 2.1 | 1.9 | 2.3 | 3.2 | 3.0 | 2.2 | 2.1 | 2.1 | 2.0 | 2.5 | 3.8 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.7 2.8 2.7 2.7 2.8 2.7 2.8 2.7 2.6 2.6 2.4 2.4 2.3 2.3 2.2 2.2 2.3 2.3 2.4 2.4 2.5 2.6 2.7 2.7 2.7 2.5 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.5 7.4 5.0 4.5 7.3 4.7 5.6 4.6 3.3 4.3 3.6 3.0 3.5 2.9 2.5 2.5 2.8 3.3 3.8 3.5 4.9 4.7 4.5 4.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 8 | 1.16 | 1.16 |
| 2.1 - 3.0 | 595 | 86.61 | 87.77 |
| 3.1 - 10.0 | 84 | 12.23 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals | |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|---|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 4 | 8 |
| 2.1 - 3.0 | 72 | 53 | 23 | 13 | 11 | 22 | 25 | 72 | 72 | 45 | 29 | 23 | 42 | 39 | 28 | 25 | 594 | |
| 3.1 - 10.0 | 4 | 0 | 0 | 1 | 1 | 0 | 3 | 26 | 13 | 5 | 7 | 5 | 7 | 4 | 4 | 4 | 84 | |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Totals | 76 | 53 | 23 | 14 | 12 | 22 | 28 | 98 | 85 | 53 | 36 | 29 | 49 | 43 | 32 | 33 | 686 | |

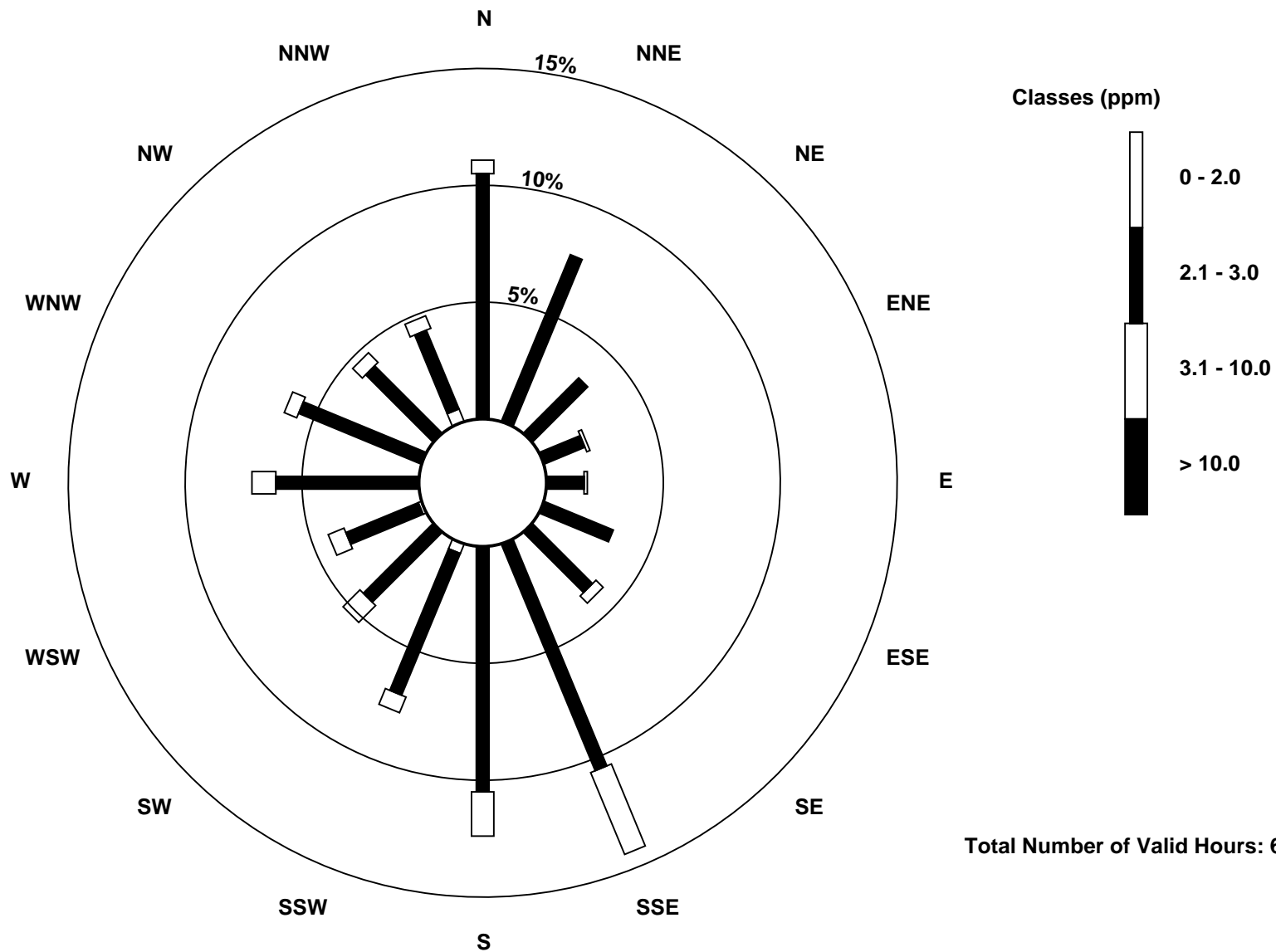
Total Number of Valid Hours: 686

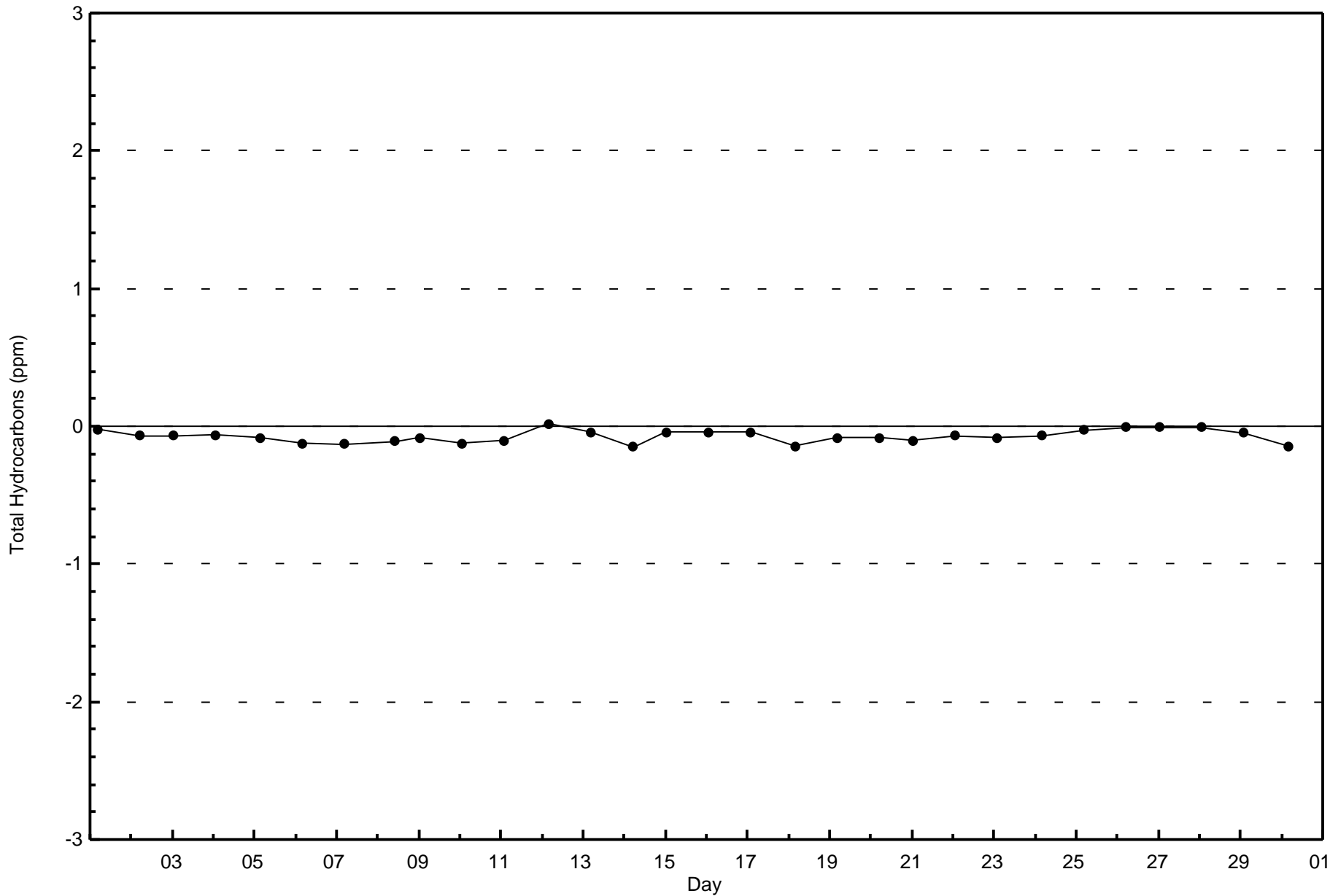
Total Number of Hours: 720

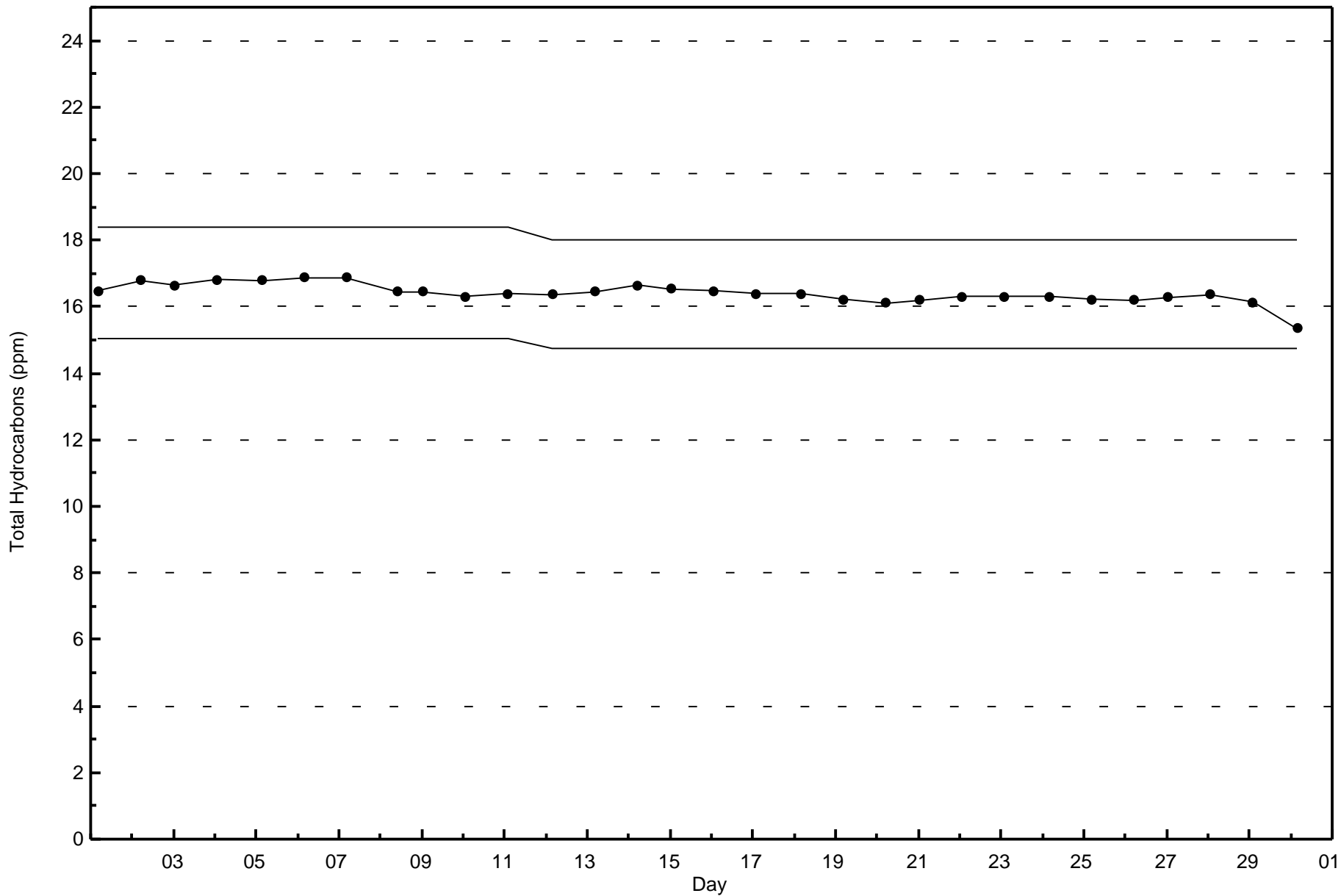


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









Wood Buffalo Environmental Association
Summary of Hour Averages

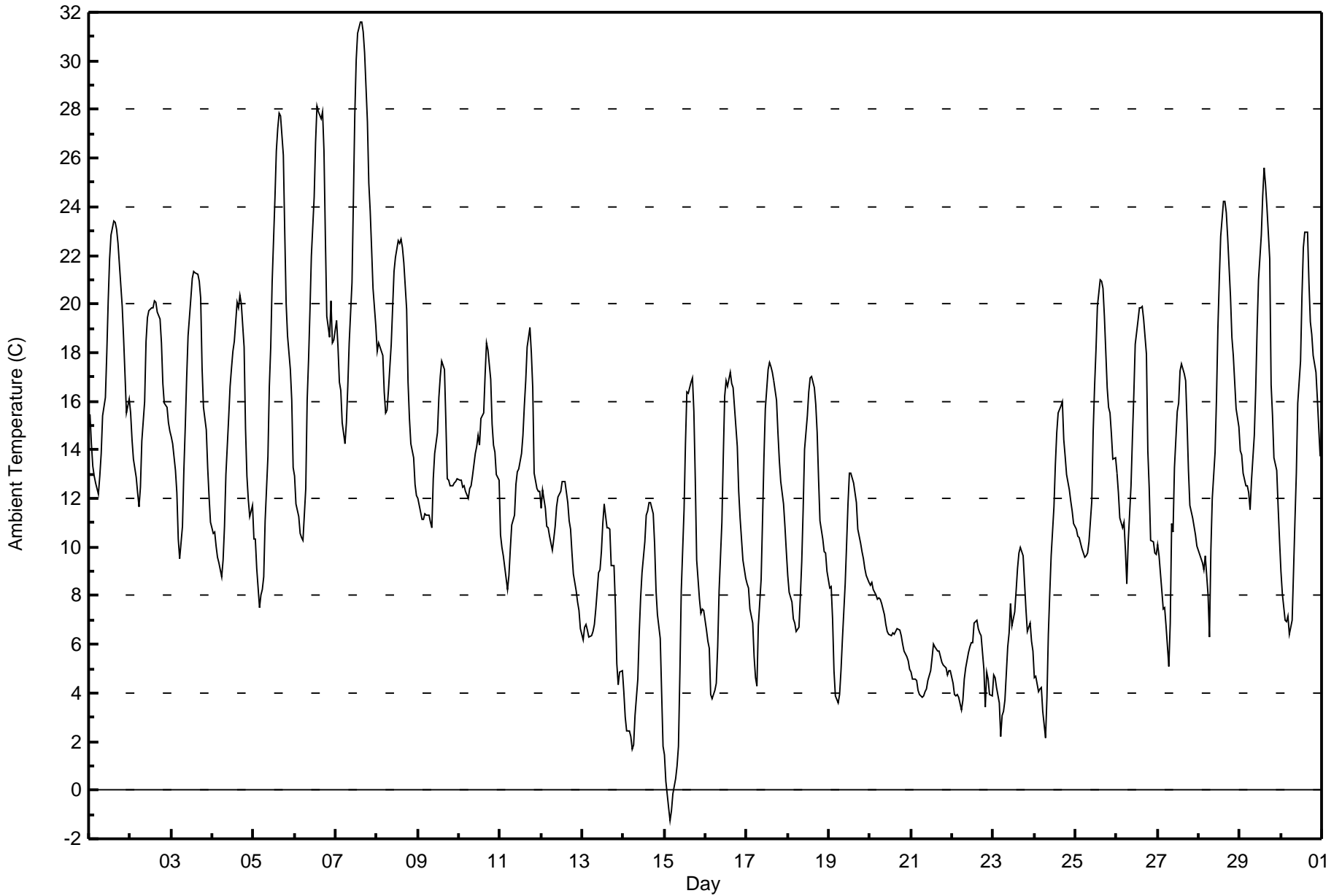
Ambient Temperature (AT) - C
Mildred Lake - September 2017

| Maximum Value: 31.6 C on Sep 7 16:00 | | Maximum Daily Average: 22.8 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -1.2 C on Sep 15 04:00 | | Minimum Daily Average: 4.8 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.8 C at hour 15 | | Minimum Diurnal Average: 7.8 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.50 C | | Percentiles: P ₁ = 1.4 P ₁₀ = 4.8 Q ₁ = 8.0 Median = 12.0 Q ₃ = 16.5 P ₉₀ = 20.3 P ₉₉ = 26.8 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 15.5 | 14.3 | 13.4 | 12.9 | 12.7 | 12.2 | 12.9 | 13.9 | 15.4 | 16.1 | 18.0 | 20.1 | 21.9 | 22.8 | 23.4 | 23.4 | 23.1 | 22.5 | 20.8 | 19.9 | 18.6 | 17.1 | 15.5 | 16.1 | 17.6 | 23.4 | |
| 2-Sep | 15.5 | 14.4 | 13.6 | 12.9 | 12.2 | 11.6 | 12.5 | 14.4 | 16.0 | 18.5 | 19.4 | 19.7 | 19.8 | 19.8 | 20.1 | 20.1 | 19.7 | 19.4 | 18.4 | 16.7 | 15.9 | 15.7 | 15.1 | 14.7 | 16.5 | 20.1 | |
| 3-Sep | 14.5 | 14.3 | 13.1 | 12.2 | 10.3 | 9.5 | 10.8 | 13.2 | 14.9 | 16.9 | 18.7 | 20.3 | 21.1 | 21.3 | 21.3 | 21.2 | 20.9 | 20.3 | 17.4 | 15.8 | 14.8 | 13.3 | 12.1 | 11.0 | 15.8 | 21.3 | |
| 4-Sep | 10.6 | 10.6 | 10.0 | 9.6 | 9.4 | 8.8 | 9.5 | 10.9 | 13.0 | 15.3 | 16.6 | 17.4 | 18.1 | 18.4 | 20.0 | 19.8 | 20.3 | 20.0 | 18.2 | 14.9 | 12.9 | 12.0 | 11.3 | 11.7 | 14.1 | 20.3 | |
| 5-Sep | 10.4 | 10.3 | 9.1 | 7.5 | 8.0 | 8.2 | 8.8 | 11.1 | 13.7 | 16.6 | 18.3 | 20.9 | 24.3 | 26.3 | 27.2 | 27.8 | 27.8 | 26.1 | 22.9 | 20.0 | 18.7 | 17.3 | 16.0 | 13.3 | 17.1 | 27.8 | |
| 6-Sep | 12.9 | 11.8 | 11.3 | 10.6 | 10.4 | 10.3 | 12.4 | 16.0 | 17.7 | 19.7 | 21.9 | 24.4 | 26.7 | 28.1 | 27.9 | 27.6 | 27.9 | 26.3 | 22.7 | 19.5 | 18.6 | 20.1 | 18.4 | 18.5 | 19.2 | 28.1 | |
| 7-Sep | 19.3 | 18.2 | 16.8 | 16.4 | 15.1 | 14.3 | 15.1 | 16.6 | 18.4 | 20.9 | 24.3 | 27.8 | 30.0 | 31.2 | 31.6 | 31.6 | 31.2 | 30.3 | 27.5 | 25.0 | 23.8 | 22.2 | 20.6 | 19.1 | 22.8 | 31.6 | |
| 8-Sep | 18.1 | 18.4 | 18.3 | 17.9 | 16.4 | 15.5 | 15.6 | 16.4 | 18.3 | 19.8 | 21.3 | 21.9 | 22.6 | 22.5 | 22.6 | 22.3 | 21.7 | 19.8 | 16.8 | 15.3 | 14.2 | 13.7 | 12.6 | 12.1 | 18.1 | 22.6 | |
| 9-Sep | 12.0 | 11.7 | 11.1 | 11.1 | 11.4 | 11.3 | 11.3 | 11.0 | 10.8 | 12.8 | 13.9 | 14.7 | 16.1 | 17.0 | 17.7 | 17.3 | 15.2 | 12.8 | 12.7 | 12.5 | 12.5 | 12.6 | 12.7 | 12.8 | 13.1 | 17.7 | |
| 10-Sep | 12.8 | 12.8 | 12.5 | 12.5 | 12.3 | 12.0 | 12.4 | 12.5 | 12.9 | 13.9 | 14.1 | 14.6 | 14.2 | 15.3 | 15.5 | 17.1 | 18.4 | 18.1 | 16.9 | 15.0 | 14.2 | 13.9 | 13.0 | 12.8 | 14.2 | 18.4 | |
| 11-Sep | 10.5 | 10.0 | 9.6 | 8.7 | 8.3 | 8.8 | 9.9 | 10.9 | 11.3 | 12.6 | 13.1 | 13.2 | 13.9 | 14.6 | 15.8 | 16.8 | 18.2 | 19.0 | 18.0 | 16.6 | 13.0 | 12.4 | 12.3 | 12.3 | 12.9 | 19.0 | |
| 12-Sep | 11.6 | 12.3 | 11.6 | 10.9 | 10.8 | 10.5 | 9.9 | 10.3 | 10.8 | 11.6 | 12.1 | 12.3 | 12.7 | 12.7 | 12.7 | 11.8 | 11.1 | 10.7 | 9.8 | 8.9 | 8.2 | 7.7 | 7.4 | 6.7 | 10.6 | 12.7 | |
| 13-Sep | 6.2 | 6.7 | 6.8 | 6.6 | 6.3 | 6.4 | 6.5 | 6.8 | 7.4 | 8.9 | 9.1 | 9.8 | 11.0 | 11.7 | 10.8 | 10.8 | 10.7 | 9.3 | 9.2 | 7.6 | 5.2 | 4.3 | 4.8 | 4.9 | 7.8 | 11.7 | |
| 14-Sep | 4.0 | 3.0 | 2.4 | 2.4 | 2.2 | 1.7 | 1.9 | 3.0 | 4.6 | 6.5 | 7.9 | 9.0 | 10.2 | 11.3 | 11.5 | 11.8 | 11.8 | 11.4 | 10.1 | 8.2 | 7.2 | 6.2 | 4.0 | 1.8 | 6.4 | 11.8 | |
| 15-Sep | 1.4 | 0.4 | -0.7 | -1.2 | -0.8 | -0.2 | 0.5 | 1.0 | 1.8 | 4.7 | 8.2 | 11.5 | 14.2 | 16.4 | 16.3 | 16.8 | 17.0 | 15.6 | 12.8 | 9.5 | 7.8 | 7.3 | 7.4 | 7.4 | 7.3 | 17.0 | |
| 16-Sep | 6.6 | 6.1 | 5.9 | 3.9 | 3.8 | 4.1 | 4.4 | 5.9 | 8.2 | 11.0 | 13.7 | 16.2 | 16.8 | 16.6 | 17.2 | 16.7 | 16.5 | 15.7 | 14.1 | 12.3 | 11.2 | 10.3 | 9.5 | 8.7 | 10.6 | 17.2 | |
| 17-Sep | 8.5 | 8.3 | 7.4 | 6.9 | 5.5 | 4.6 | 4.3 | 6.8 | 8.7 | 11.1 | 13.6 | 15.7 | 17.3 | 17.6 | 17.4 | 17.2 | 16.8 | 16.0 | 14.7 | 13.6 | 12.7 | 11.8 | 10.9 | 9.8 | 11.5 | 17.6 | |
| 18-Sep | 8.8 | 8.1 | 7.7 | 7.0 | 6.9 | 6.5 | 6.7 | 8.0 | 9.4 | 11.6 | 14.0 | 15.4 | 16.4 | 16.9 | 17.0 | 16.6 | 15.9 | 14.7 | 12.8 | 11.1 | 10.3 | 9.8 | 9.7 | 9.0 | 11.3 | 17.0 | |
| 19-Sep | 8.3 | 8.4 | 7.1 | 4.9 | 3.9 | 3.6 | 3.9 | 4.9 | 6.2 | 8.5 | 10.1 | 11.8 | 13.0 | 13.0 | 12.7 | 12.2 | 11.8 | 10.7 | 10.2 | 9.8 | 9.5 | 9.1 | 8.8 | 8.5 | 8.8 | 13.0 | |
| 20-Sep | 8.4 | 8.5 | 8.3 | 8.0 | 7.9 | 7.9 | 7.8 | 7.7 | 7.2 | 6.8 | 6.5 | 6.4 | 6.4 | 6.5 | 6.4 | 6.5 | 6.7 | 6.6 | 6.3 | 6.0 | 5.7 | 5.5 | 5.3 | 5.0 | 6.8 | 8.5 | |
| 21-Sep | 4.8 | 4.6 | 4.6 | 4.5 | 4.1 | 3.9 | 3.8 | 3.9 | 4.1 | 4.2 | 4.5 | 4.9 | 5.4 | 6.0 | 5.9 | 5.7 | 5.7 | 5.5 | 5.3 | 5.2 | 5.0 | 4.7 | 4.9 | 4.9 | 4.8 | 6.0 | |
| 22-Sep | 4.4 | 3.9 | 3.9 | 3.9 | 3.8 | 3.3 | 3.7 | 4.6 | 5.0 | 5.7 | 5.9 | 6.1 | 6.0 | 6.9 | 7.0 | 6.7 | 6.5 | 6.4 | 5.0 | 3.4 | 4.8 | 4.6 | 3.9 | 3.9 | 5.0 | 7.0 | |
| 23-Sep | 4.7 | 4.6 | 4.2 | 3.6 | 2.2 | 3.1 | 3.2 | 3.7 | 5.9 | 6.5 | 7.7 | 6.8 | 7.3 | 8.2 | 9.1 | 9.8 | 10.0 | 9.6 | 8.5 | 7.4 | 6.5 | 6.9 | 6.1 | 5.7 | 6.3 | 10.0 | |
| 24-Sep | 4.6 | 4.7 | 4.1 | 4.2 | 4.2 | 3.2 | 2.2 | 3.8 | 6.4 | 8.1 | 9.6 | 11.6 | 13.4 | 14.7 | 15.5 | 15.8 | 16.0 | 14.4 | 13.7 | 13.0 | 12.4 | 11.9 | 11.5 | 10.9 | 9.6 | 16.0 | |
| 25-Sep | 10.7 | 10.5 | 10.4 | 10.2 | 9.9 | 9.6 | 9.6 | 9.8 | 10.2 | 11.9 | 14.8 | 16.6 | 18.1 | 19.9 | 21.0 | 20.9 | 20.6 | 19.5 | 16.6 | 15.7 | 15.5 | 14.7 | 13.6 | 13.7 | 14.3 | 21.0 | |
| 26-Sep | 13.0 | 12.3 | 11.2 | 10.8 | 11.0 | 9.9 | 8.5 | 10.2 | 12.5 | 14.5 | 16.3 | 18.3 | 19.3 | 19.8 | 19.9 | 19.9 | 19.4 | 17.9 | 14.0 | 12.4 | 10.3 | 10.2 | 9.8 | 9.7 | 13.8 | 19.9 | |
| 27-Sep | 10.1 | 9.6 | 8.2 | 7.5 | 7.5 | 6.8 | 5.1 | 6.9 | 11.0 | 10.6 | 13.3 | 15.6 | 15.9 | 17.3 | 17.5 | 17.1 | 16.8 | 15.1 | 13.2 | 11.7 | 11.2 | 10.9 | 10.5 | 10.0 | 11.6 | 17.5 | |
| 28-Sep | 9.7 | 9.5 | 9.3 | 9.1 | 9.6 | 8.0 | 6.3 | 9.9 | 12.0 | 13.9 | 16.1 | 19.0 | 21.0 | 22.8 | 24.2 | 24.2 | 23.8 | 22.7 | 20.3 | 18.7 | 17.9 | 16.8 | 15.7 | 15.0 | 15.6 | 24.2 | |
| 29-Sep | 14.0 | 13.8 | 13.0 | 12.5 | 12.5 | 12.3 | 11.6 | 12.8 | 14.6 | 16.5 | 19.0 | 21.0 | 22.8 | 24.5 | 25.6 | 24.9 | 24.0 | 21.8 | 16.7 | 15.4 | 13.7 | 13.1 | 11.6 | 10.3 | 16.6 | 25.6 | |
| 30-Sep | 9.0 | 8.1 | 7.0 | 6.9 | 7.2 | 6.4 | 7.0 | 9.0 | 11.1 | 13.1 | 15.9 | 17.7 | 20.3 | 22.3 | 23.0 | 22.9 | 20.9 | 19.3 | 18.8 | 17.9 | 17.2 | 16.1 | 14.9 | 13.8 | 14.4 | 23.0 | |
| | | 10.0 | 9.7 | 9.0 | 8.5 | 8.2 | 7.8 | 7.9 | 9.2 | 10.7 | 12.3 | 13.9 | 15.4 | 16.5 | 17.4 | 17.8 | 17.8 | 17.5 | 16.6 | 14.8 | 13.3 | 12.3 | 11.7 | 11.0 | 10.5 | Diurnal Average | |
| | | 19.3 | 18.4 | 18.3 | 17.9 | 16.4 | 15.5 | 15.6 | 16.6 | 18.4 | 20.9 | 24.3 | 27.8 | 30.0 | 31.2 | 31.6 | 31.6 | 31.2 | 30.3 | 27.5 | 25.0 | 23.8 | 22.2 | 20.6 | 19.1 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 4 | 0.56 | 0.56 |
| 0 - 10 | 256 | 35.56 | 36.11 |
| 10 - 20 | 379 | 52.64 | 88.75 |
| > 20 | 81 | 11.25 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

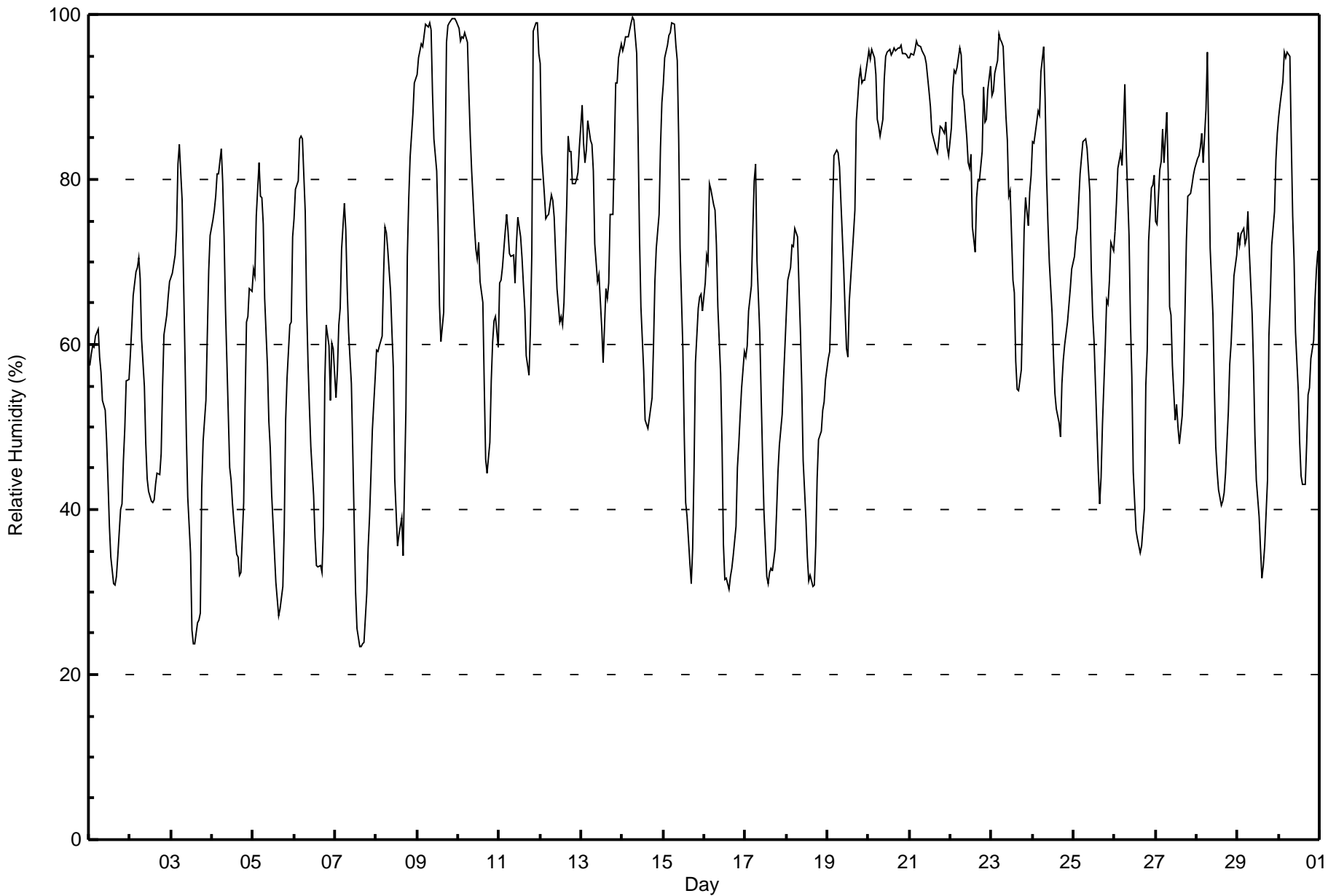


Wood Buffalo Environmental Association

Summary of Hour Averages

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

| Maximum Value: 100 % on Sep 14 07:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 93.7 % on Sep 20 | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|-----|------|---------------------------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 23 % on Sep 7 16:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 47.2 % on Sep 7 | | | | | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 84.5 % at hour 6 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 48.0 % at hour 15 | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 67.6 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 25 P ₁₀ = 38 Q ₁ = 54 Median = 69 Q ₃ = 84 P ₉₀ = 95 P ₉₉ = 99 | | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 57 | 59 | 60 | 60 | 61 | 62 | 58 | 57 | 53 | 52 | 48 | 43 | 38 | 34 | 31 | 31 | 32 | 34 | 40 | 41 | 46 | 50 | 56 | 56 | 48.3 | 62 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 59 | 62 | 66 | 69 | 69 | 70 | 68 | 61 | 55 | 48 | 44 | 42 | 41 | 41 | 41 | 43 | 44 | 44 | 47 | 55 | 61 | 64 | 66 | 68 | 55.3 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 68 | 69 | 71 | 74 | 82 | 84 | 77 | 68 | 59 | 49 | 42 | 35 | 25 | 24 | 24 | 26 | 27 | 28 | 43 | 48 | 53 | 61 | 69 | 73 | 53.3 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 75 | 76 | 78 | 81 | 81 | 84 | 80 | 73 | 64 | 52 | 45 | 44 | 41 | 39 | 35 | 34 | 32 | 32 | 41 | 53 | 63 | 63 | 67 | 66 | 58.2 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 69 | 68 | 76 | 82 | 78 | 78 | 75 | 66 | 57 | 51 | 47 | 42 | 35 | 31 | 29 | 27 | 28 | 31 | 38 | 51 | 56 | 62 | 63 | 73 | 54.7 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 75 | 79 | 80 | 85 | 85 | 85 | 76 | 65 | 58 | 52 | 48 | 42 | 37 | 33 | 33 | 33 | 32 | 38 | 55 | 62 | 60 | 53 | 60 | 59 | 57.7 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 54 | 57 | 62 | 64 | 72 | 77 | 74 | 67 | 62 | 55 | 47 | 38 | 30 | 26 | 23 | 23 | 24 | 24 | 30 | 35 | 39 | 44 | 50 | 56 | 47.2 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 59 | 59 | 60 | 61 | 68 | 74 | 74 | 72 | 67 | 62 | 57 | 44 | 36 | 37 | 38 | 39 | 34 | 52 | 71 | 78 | 83 | 88 | 92 | 92 | 62.3 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 93 | 95 | 96 | 96 | 97 | 99 | 99 | 99 | 99 | 98 | 91 | 85 | 81 | 74 | 65 | 60 | 64 | 81 | 97 | 99 | 99 | 99 | 100 | 100 | 99 | 90.2 | 100 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 98 | 97 | 97 | 97 | 98 | 97 | 91 | 85 | 81 | 74 | 72 | 70 | 72 | 68 | 65 | 55 | 46 | 44 | 48 | 56 | 60 | 63 | 63 | 60 | 73.2 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 68 | 68 | 69 | 74 | 76 | 74 | 71 | 71 | 71 | 67 | 72 | 75 | 73 | 70 | 67 | 64 | 59 | 56 | 62 | 71 | 98 | 99 | 99 | 95 | 73.7 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 94 | 83 | 78 | 75 | 76 | 76 | 78 | 77 | 75 | 71 | 67 | 63 | 63 | 62 | 65 | 77 | 85 | 83 | 83 | 79 | 80 | 80 | 81 | 84 | 76.5 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 89 | 84 | 82 | 84 | 87 | 85 | 84 | 81 | 72 | 68 | 68 | 65 | 62 | 58 | 67 | 66 | 67 | 76 | 76 | 84 | 92 | 92 | 95 | 96 | 78.3 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 96 | 96 | 97 | 97 | 98 | 99 | 100 | 99 | 95 | 85 | 73 | 65 | 57 | 51 | 50 | 50 | 51 | 53 | 60 | 68 | 72 | 76 | 84 | 89 | 77.6 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 92 | 95 | 96 | 98 | 98 | 99 | 99 | 96 | 94 | 85 | 72 | 60 | 49 | 41 | 39 | 34 | 31 | 35 | 45 | 58 | 64 | 66 | 66 | 64 | 69.8 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 68 | 71 | 70 | 80 | 79 | 77 | 76 | 72 | 65 | 56 | 48 | 36 | 31 | 32 | 30 | 32 | 33 | 34 | 38 | 45 | 48 | 52 | 55 | 59 | 53.6 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 58 | 60 | 64 | 67 | 74 | 80 | 82 | 70 | 61 | 54 | 46 | 40 | 32 | 31 | 32 | 33 | 33 | 35 | 40 | 45 | 48 | 52 | 56 | 60 | 52.1 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 64 | 68 | 69 | 72 | 72 | 74 | 73 | 67 | 62 | 55 | 46 | 39 | 34 | 31 | 32 | 31 | 31 | 36 | 44 | 49 | 49 | 52 | 53 | 56 | 52.4 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 58 | 59 | 66 | 76 | 83 | 84 | 83 | 82 | 77 | 69 | 64 | 59 | 58 | 65 | 71 | 73 | 76 | 87 | 92 | 93 | 92 | 92 | 92 | 94 | 76.9 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 96 | 95 | 96 | 95 | 93 | 87 | 86 | 85 | 87 | 92 | 95 | 95 | 96 | 95 | 95 | 96 | 96 | 96 | 96 | 96 | 95 | 95 | 95 | 95 | 93.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 95 | 95 | 95 | 96 | 97 | 96 | 96 | 96 | 95 | 95 | 94 | 91 | 89 | 86 | 85 | 84 | 83 | 85 | 86 | 86 | 86 | 87 | 84 | 83 | 90.2 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 86 | 91 | 93 | 93 | 94 | 96 | 95 | 90 | 90 | 85 | 82 | 81 | 83 | 74 | 71 | 78 | 80 | 80 | 83 | 91 | 87 | 87 | 91 | 94 | 86.5 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 90 | 91 | 93 | 94 | 98 | 97 | 97 | 96 | 88 | 85 | 78 | 79 | 68 | 66 | 58 | 55 | 54 | 57 | 65 | 74 | 78 | 74 | 78 | 81 | 78.9 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 85 | 84 | 87 | 88 | 88 | 93 | 96 | 90 | 81 | 75 | 70 | 64 | 58 | 54 | 52 | 51 | 49 | 55 | 58 | 60 | 63 | 65 | 67 | 69 | 70.9 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 71 | 73 | 74 | 77 | 81 | 85 | 85 | 85 | 84 | 78 | 69 | 64 | 60 | 55 | 45 | 41 | 44 | 50 | 60 | 65 | 65 | 68 | 72 | 71 | 67.6 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 74 | 77 | 81 | 83 | 82 | 86 | 92 | 83 | 73 | 63 | 56 | 45 | 37 | 36 | 36 | 35 | 36 | 40 | 55 | 59 | 73 | 79 | 79 | 81 | 64.2 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 75 | 75 | 81 | 82 | 86 | 82 | 88 | 81 | 64 | 64 | 57 | 51 | 53 | 50 | 48 | 51 | 55 | 64 | 72 | 78 | 78 | 79 | 81 | 81 | 69.9 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 83 | 83 | 84 | 86 | 82 | 88 | 96 | 84 | 72 | 64 | 55 | 48 | 45 | 42 | 40 | 41 | 42 | 44 | 52 | 58 | 60 | 64 | 68 | 71 | 64.6 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 74 | 72 | 73 | 74 | 72 | 73 | 76 | 71 | 64 | 58 | 49 | 44 | 39 | 35 | 32 | 33 | 36 | 43 | 61 | 66 | 72 | 76 | 82 | 86 | 60.9 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 88 | 89 | 92 | 95 | 95 | 95 | 95 | 85 | 76 | 70 | 62 | 54 | 48 | 44 | 43 | 43 | 48 | 54 | 55 | 58 | 61 | 66 | 69 | 71 | 69.0 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 76.9 | 77.6 | 79.6 | 81.8 | 83.3 | 84.5 | 83.9 | 79.1 | 73.3 | 67.5 | 61.9 | 56.6 | 52.2 | 49.2 | 48.0 | 48.1 | 49.0 | 53.0 | 59.8 | 65.4 | 69.3 | 71.6 | 74.4 | 76.1 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 98 | 97 | 97 | 98 | 98 | 99 | 100 | 99 | 98 | 95 | 95 | 95 | 96 | 95 | 95 | 96 | 96 | 97 | 99 | 99 | 99 | 100 | 100 | 99 | Diurnal Maximum | |





| | | |
|--|---|--------------------------------|
| Maximum Speed: 24 km/h on Sep 3 19:00 | Maximum Daily Speed Average: 19.0 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 6 15:00 | Minimum Daily Speed Average: 0.9 km/h on Sep 6 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 2.9 km/h at hour 15 | Minimum Diurnal Speed Average: 0.1 km/h at hour 21 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 1.1 km/h 248.2 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 9 Q ₃ = 13 P ₉₀ = 17 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-Sep | W9 | WSW8 | WSW10 | WSW12 | W13 | W13 | W13 | W16 | W15 | W14 | WSW13 | WSW12 | SW13 | WSW13 | W17 | WNW18 | W17 | W16 | W17 | W16 | W11 | W9 | W8 | W15 | W13.0 | WNW18 | |
| 2-Sep | W11 | W13 | WNW13 | W9 | WNW13 | WNW10 | WNW10 | W5 | WNW6 | WNW9 | WNW11 | WNW14 | WNW11 | WNW11 | WNW9 | W10 | W9 | WSW11 | W13 | WSW13 | WSW10 | W8 | WNW8 | WNW7 | W9.8 | WNW14 | |
| 3-Sep | WNW10 | WNW11 | NW12 | WNW11 | WSW7 | SW7 | SSW5 | WNW6 | WNW15 | WNW15 | WNW18 | WNW15 | NW18 | NW19 | NW18 | WNW17 | NW20 | NW17 | N24 | N16 | NNW19 | NNW15 | NNW13 | NNW8 | NW12.2 | N24 | |
| 4-Sep | NW8 | NW9 | NNW9 | NW8 | NNW8 | WNW8 | WNW8 | NW8 | NNW11 | NNW13 | N15 | NW13 | NW9 | NW10 | NW10 | NW11 | N7 | N5 | SW2 | SSW3 | SSW5 | SSE6 | SSE7 | SSE9 | NW5.7 | N15 | |
| 5-Sep | SSE6 | S8 | S7 | S7 | S7 | S8 | SSW5 | SSE9 | S7 | S7 | SSW7 | S9 | SSE10 | SSW11 | SW11 | SW11 | SW9 | WSW7 | W6 | WSW1 | SW2 | SW4 | SSW5 | S2 | ESE3 | SSW5.7 | SW11 |
| 6-Sep | NW1 | SSE2 | SSW3 | SSW1 | SW1 | N1 | E1 | ENE1 | N4 | NNW4 | NE3 | NNE4 | WSW4 | SW4 | NE0 | E2 | WNW1 | NE1 | AF | ESE3 | ESE7 | SE7 | SSE6 | S9 | SE0.9 | S9 | |
| 7-Sep | SSE14 | S12 | SSE7 | S8 | SSE8 | SSE7 | SSE12 | SSE13 | SSE13 | SSE13 | SSE13 | S14 | SSW16 | SSW17 | SSW18 | SSW19 | SSW19 | SSW19 | S11 | S9 | S9 | S9 | S8 | SSE6 | S11.9 | SSW19 | |
| 8-Sep | SSE7 | SSE6 | SSE6 | S8 | SSW5 | S5 | S5 | WSW2 | W4 | NW8 | N10 | N14 | NNE12 | N9 | N11 | NNE7 | NNE7 | NNW12 | N10 | N9 | N4 | WNW3 | WSW1 | N1 | N2.8 | N14 | |
| 9-Sep | ENE2 | N5 | N5 | NNE4 | SSE2 | NE4 | NNE5 | N8 | N9 | NNE3 | N8 | N10 | N12 | N12 | N15 | NNE13 | NNW13 | N11 | N9 | NNE6 | NNW4 | NW4 | NW5 | W4 | N6.4 | N15 | |
| 10-Sep | W4 | WNW4 | SSW7 | SW8 | SW7 | SW8 | W16 | W15 | W20 | W21 | WNW19 | WNW19 | WNW22 | WNW21 | WNW22 | NW16 | WNW15 | WNW20 | W20 | W11 | W11 | W10 | W11 | WNW15 | W13.4 | WNW22 | |
| 11-Sep | W8 | WSW8 | WSW8 | WSW1 | WSW3 | SW8 | SW8 | SSW3 | ESE4 | S9 | SE7 | ESE8 | ESE8 | ESE6 | SSE11 | SSE14 | S12 | S12 | SSE12 | W5 | SE2 | WSW3 | WNW6 | W8 | S4.4 | SSE14 | |
| 12-Sep | W10 | WNW20 | WNW20 | WNW18 | WNW15 | W11 | W11 | WNW14 | WNW13 | NW14 | NW17 | NW16 | NW13 | NNW10 | NW11 | NNW12 | NW10 | NNE8 | NNE8 | NE10 | NE9 | ENE7 | E3 | ENE3 | NW8.8 | WNW20 | |
| 13-Sep | NNW3 | N5 | N5 | NE2 | ESE2 | ESE3 | E3 | E4 | E5 | S3 | NW5 | SSE3 | SSW2 | ESE1 | N8 | NE2 | E2 | ESE5 | E5 | ENE2 | ESE3 | E2 | N8 | N8 | NE2.0 | N8 | |
| 14-Sep | N9 | NNE5 | N7 | NNE6 | NNE7 | NNE6 | NNE5 | NNE2 | N4 | NNE6 | NNE7 | NNW7 | N7 | N10 | NNE8 | ENE6 | NE6 | NE6 | NE5 | NNE7 | NE7 | NE7 | ENE2 | NE2 | NNE5.7 | N10 | |
| 15-Sep | N5 | N4 | N3 | ENE2 | SE2 | SSW5 | SSW7 | SSW8 | S5 | S5 | S7 | S8 | S7 | SSW7 | S8 | SSW5 | SW8 | SW7 | SSW5 | SSW3 | SSW4 | SSW6 | SSW7 | SSW10 | SSW4.4 | SSW10 | |
| 16-Sep | S9 | S7 | SSE8 | ESE4 | ESE5 | SE11 | SSE10 | SE6 | SSE10 | S11 | S15 | S17 | SSW19 | S21 | SSW17 | SSW19 | SSW16 | SSW15 | S13 | S9 | S10 | S11 | S13 | S12 | S11.3 | S21 | |
| 17-Sep | S13 | SSE16 | SSE12 | SSE10 | SE8 | SE8 | SE7 | SSE13 | SSE16 | SSE15 | SSE17 | S19 | SSW19 | S18 | S19 | SSE19 | SSE19 | SSE17 | SSE15 | SSE16 | SSE16 | SSE17 | SSE16 | SSE12 | SSE14.7 | S19 | |
| 18-Sep | SSE13 | SE12 | SE12 | SE11 | SE10 | SE11 | SE10 | SSE16 | SSE16 | SSE16 | SSE17 | SSE23 | SSE20 | SSE19 | SE15 | SE16 | SE16 | SE11 | ESE10 | ESE10 | ESE10 | ESE11 | ESE13 | ESE13 | SE13.0 | SSE23 | |
| 19-Sep | ESE12 | ESE15 | ENE5 | N10 | N12 | N14 | N13 | N13 | N13 | N15 | NNE12 | NNE14 | NNE12 | NE9 | NE12 | ENE14 | E17 | ENE12 | NE11 | NE12 | ENE11 | ENE10 | NE10 | NNE11 | NE10.1 | E17 | |
| 20-Sep | NNE12 | NNE14 | N14 | N16 | N17 | NNE17 | NNE19 | NNE21 | NNE22 | NNE21 | NNE20 | NNE22 | NNE21 | NNE23 | NNE21 | NNE20 | NNE19 | NNE20 | NNE21 | NNE21 | NNE20 | NNE20 | NNE19 | NNE20 | NNE19.0 | NNE23 | |
| 21-Sep | NNE18 | NNE19 | N20 | N18 | N18 | N17 | N17 | N17 | N16 | N17 | N16 | N18 | N17 | N18 | N18 | N20 | N17 | N15 | N13 | N11 | N9 | NNW8 | NNW8 | NNW8 | N15.4 | N20 | |
| 22-Sep | NNW3 | W1 | NE1 | NNE3 | N2 | ENE2 | SSW1 | WSW3 | SSW4 | W3 | NE2 | NE2 | SE1 | S3 | SSW2 | ESE6 | SE6 | ESE4 | ESE4 | SE5 | SSE4 | SE5 | SE3 | SSE2 | SE1.5 | ESE6 | |
| 23-Sep | SSW5 | S4 | SSE5 | SSE5 | E3 | SE3 | SE3 | ENE2 | SSE6 | SSE6 | SW2 | NE4 | S7 | S7 | S7 | S10 | S10 | SSE11 | SSE11 | SSE9 | SSE8 | SSE11 | SSE8 | SE7 | SSE5.7 | SSE11 | |
| 24-Sep | SE7 | SSE10 | SSE7 | SSE11 | SSE7 | SW5 | SW4 | SSW7 | SSW6 | S9 | SSE9 | SSE9 | SSE11 | S10 | SSE10 | SSE8 | S11 | SSE8 | SSE9 | SSE10 | S9 | S11 | SSE12 | SSE9 | SSE8.3 | SSE12 | |
| 25-Sep | SSE9 | SSE9 | SSE9 | SSE11 | SSE9 | SSE9 | SSE10 | S8 | S8 | S10 | S9 | S7 | S7 | S7 | NW9 | NW11 | W3 | SW2 | W2 | SW5 | WSW7 | WSW6 | SW5 | WSW8 | S4.9 | NW11 | |
| 26-Sep | WSW8 | SW5 | WNW3 | W7 | WNW8 | W6 | SW3 | WSW5 | W6 | W6 | W5 | WNW10 | NW14 | NW14 | NNW17 | NNW17 | NNW15 | NNW8 | N5 | N5 | SW3 | S4 | SW1 | SSW4 | WNW5.8 | NNW17 | |
| 27-Sep | SW4 | SSW3 | SSE2 | SSE4 | SSW5 | S6 | S2 | S3 | NNW1 | N7 | NNE7 | NNE9 | NNW9 | N11 | N8 | N11 | N12 | NNE11 | NNE10 | NNE11 | NNE9 | N6 | N7 | N8 | N4.4 | N12 | |
| 28-Sep | N7 | N7 | NNE5 | E3 | SSE7 | SSW3 | S3 | S11 | SSE15 | SSE15 | S12 | S12 | S15 | S15 | SSW15 | SSW17 | SSW18 | SSW16 | S11 | S10 | S11 | SSE12 | SSE11 | SSE9 | S8.7 | SSW18 | |
| 29-Sep | SE7 | SSE7 | SSE9 | SSE11 | SSE12 | SSE11 | SSE12 | SSE11 | SSE16 | SSE14 | S14 | S12 | S13 | S10 | WSW7 | NW7 | NNW7 | NNW2 | SE0 | SW3 | SW2 | SSW4 | SW3 | SW3 | S6.6 | SSE16 | |
| 30-Sep | SSW2 | SSW1 | SW1 | SW2 | SW4 | S5 | SSW5 | SW5 | SSW7 | S8 | S10 | SSE11 | S8 | WSW11 | SW12 | SW12 | WSW11 | W7 | NW11 | NW13 | NW16 | NNW17 | NW21 | NNW17 | W4.6 | NW21 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|------|-------|--------|--------|--------|-------|--------|--------|-----------------|--|
| SSW1.0 | SW1.3 | W0.8 | SW0.8 | SW1.0 | SSW1.4 | SW1.7 | SW1.6 | SW1.6 | SW1.8 | WSW1.0 | WSW1.1 | WSW2.3 | WSW2.7 | WNW2.9 | WNW1.7 | W1.7 | W1.2 | NNW1.0 | NNW0.7 | WSW0.1 | S1.2 | SSW0.7 | WSW0.7 | Diurnal Average | |
| NNE18 | WNW20 | WNW20 | N18 | N18 | NNE17 | NNE19 | NNE21 | NNE22 | NNE21 | NNE20 | SSE23 | WNW22 | NNE23 | WNW22 | N20 | NW20 | NNE20 | N24 | NNE21 | NNE20 | NNE20 | NW21 | NNE20 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

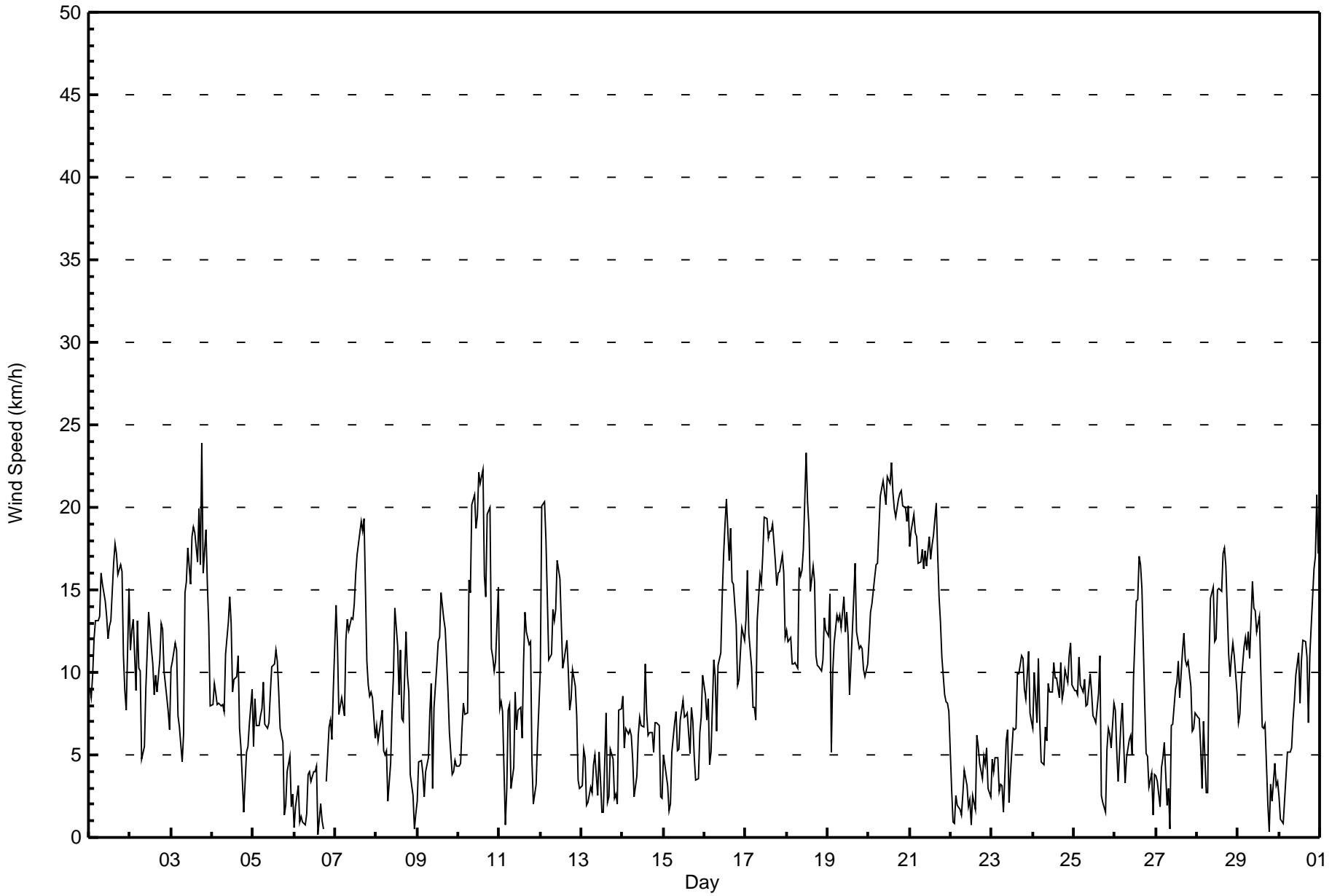
Wind Speed (WS) - km/h
Mildred Lake - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 11 km/h on Sep 11 20:00 | Hours of Data: 719 |
| Minimum Value: 1 km/h on Sep 23 05:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.9 |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|--|
| 5 | 6 | 7 | 6 | 5 | 5 | 7 | 6 | 7 | 7 | 7 | 6 | 7 | 7 | 7 | 7 | 6 | 6 | 7 | 7 | 11 | 6 | 5 | 5 | 6 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 183 | 25.45 | 25.45 |
| 6 - 11 | 305 | 42.42 | 67.87 |
| 12 - 19 | 199 | 27.68 | 95.55 |
| 20 - 28 | 32 | 4.45 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 16 | 9 | 12 | 9 | 11 | 12 | 9 | 9 | 13 | 26 | 24 | 9 | 10 | 4 | 4 | 6 | 183 |
| 6 - 11 | 30 | 19 | 9 | 4 | 0 | 9 | 16 | 56 | 53 | 12 | 11 | 15 | 24 | 19 | 14 | 14 | 305 |
| 12 - 19 | 31 | 13 | 2 | 2 | 1 | 4 | 5 | 37 | 20 | 16 | 3 | 6 | 15 | 18 | 13 | 13 | 199 |
| 20 - 28 | 3 | 15 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 6 | 2 | 0 | 32 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 80 | 56 | 23 | 15 | 12 | 25 | 30 | 104 | 87 | 54 | 38 | 30 | 52 | 47 | 33 | 33 | 719 |

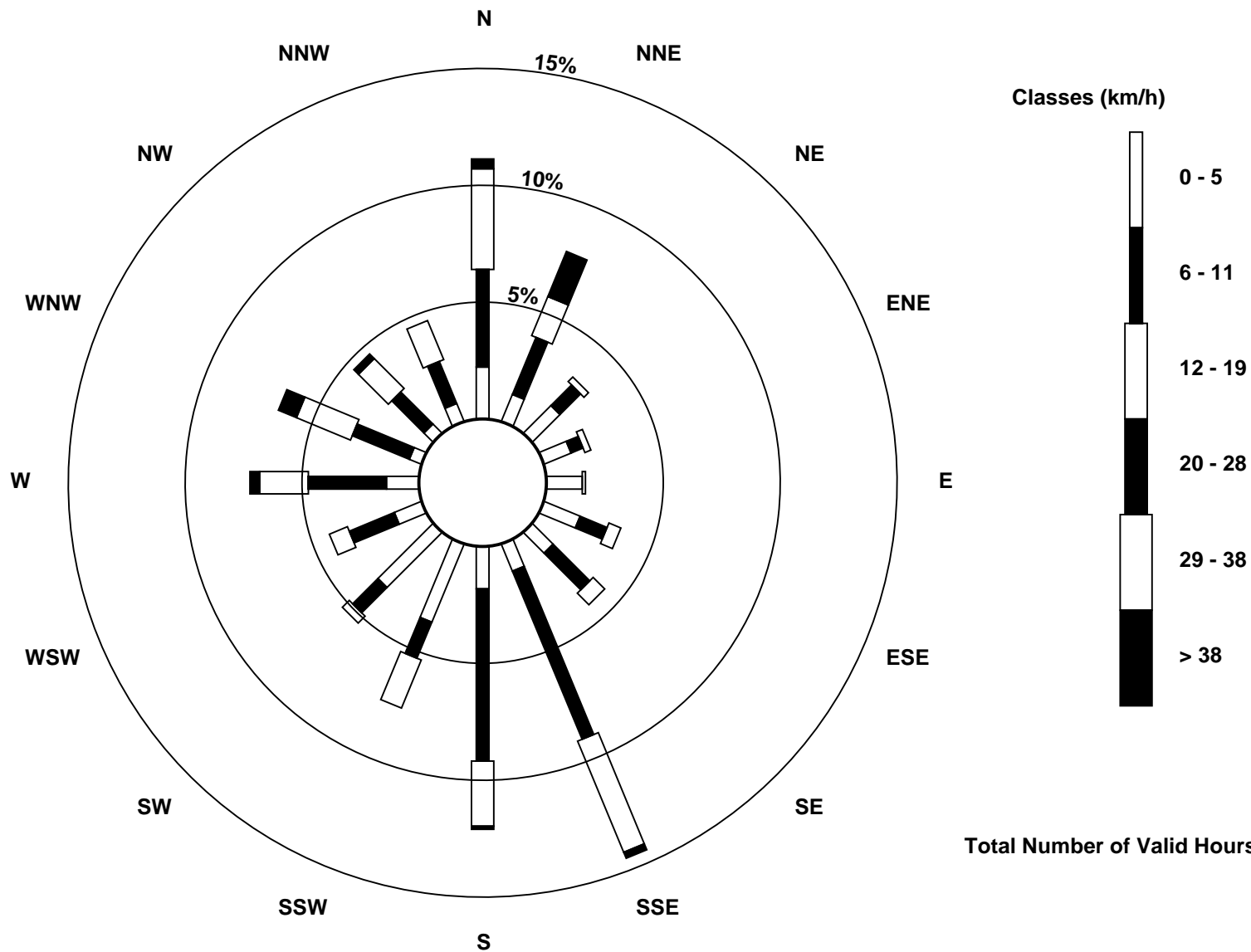
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 719



Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|--|---|
| Direction of Maximum Speed: 357 deg on Sep 3 19:00 Direction of Maximum Daily Speed Average: 20.6 deg on Sep 20 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 |
| Direction of Minimum Speed: 43 deg on Sep 6 15:00 Direction of Minimum Daily Speed Average: 0.9 deg on Sep 6 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 244.5 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-Sep | 267 | 252 | 254 | 253 | 265 | 264 | 265 | 272 | 272 | 266 | 254 | 245 | 236 | 255 | 273 | 282 | 276 | 272 | 271 | 276 | 277 | 261 | 260 | 277 | 265.9 |
| 2-Sep | 276 | 275 | 288 | 281 | 288 | 295 | 285 | 270 | 301 | 292 | 290 | 289 | 297 | 296 | 292 | 278 | 264 | 258 | 259 | 256 | 258 | 277 | 290 | 298 | 280.7 |
| 3-Sep | 295 | 287 | 310 | 294 | 248 | 218 | 196 | 294 | 291 | 289 | 295 | 289 | 310 | 309 | 313 | 302 | 325 | 309 | 357 | 351 | 342 | 343 | 336 | 328 | 311.4 |
| 4-Sep | 313 | 310 | 335 | 326 | 329 | 295 | 298 | 304 | 328 | 344 | 350 | 322 | 307 | 314 | 308 | 326 | 350 | 356 | 231 | 213 | 201 | 160 | 161 | 163 | 317.2 |
| 5-Sep | 155 | 183 | 178 | 180 | 169 | 186 | 166 | 182 | 189 | 210 | 169 | 159 | 205 | 227 | 228 | 236 | 246 | 274 | 256 | 234 | 217 | 210 | 189 | 103 | 196.8 |
| 6-Sep | 326 | 153 | 205 | 204 | 216 | 359 | 99 | 72 | 351 | 347 | 40 | 17 | 243 | 232 | 43 | 100 | 289 | 56 | AF | 111 | 109 | 135 | 161 | 181 | 143.4 |
| 7-Sep | 168 | 170 | 167 | 180 | 153 | 153 | 165 | 166 | 166 | 158 | 164 | 184 | 199 | 199 | 198 | 199 | 195 | 194 | 186 | 189 | 188 | 185 | 171 | 156 | 180.4 |
| 8-Sep | 147 | 168 | 160 | 171 | 200 | 182 | 181 | 237 | 274 | 324 | 357 | 1 | 19 | 10 | 353 | 32 | 32 | 336 | 358 | 357 | 0 | 296 | 249 | 353 | 358.1 |
| 9-Sep | 66 | 0 | 10 | 14 | 164 | 53 | 13 | 353 | 6 | 16 | 6 | 2 | 4 | 6 | 8 | 12 | 335 | 5 | 352 | 28 | 333 | 306 | 304 | 277 | 0.8 |
| 10-Sep | 264 | 284 | 196 | 218 | 235 | 231 | 273 | 275 | 277 | 279 | 290 | 293 | 292 | 291 | 291 | 304 | 295 | 285 | 281 | 260 | 260 | 267 | 265 | 282 | 278.4 |
| 11-Sep | 272 | 254 | 258 | 252 | 243 | 230 | 234 | 199 | 119 | 171 | 143 | 121 | 121 | 115 | 160 | 165 | 169 | 171 | 166 | 260 | 128 | 247 | 285 | 266 | 189.6 |
| 12-Sep | 261 | 286 | 289 | 293 | 284 | 268 | 265 | 285 | 296 | 304 | 317 | 319 | 307 | 331 | 319 | 340 | 321 | 26 | 33 | 39 | 46 | 66 | 83 | 60 | 311.1 |
| 13-Sep | 344 | 3 | 5 | 36 | 123 | 107 | 100 | 91 | 91 | 186 | 322 | 157 | 193 | 116 | 356 | 44 | 86 | 117 | 89 | 64 | 117 | 81 | 5 | 3 | 50.3 |
| 14-Sep | 10 | 22 | 8 | 22 | 16 | 14 | 21 | 24 | 10 | 25 | 14 | 342 | 11 | 349 | 31 | 61 | 46 | 52 | 36 | 31 | 42 | 54 | 64 | 51 | 23.8 |
| 15-Sep | 5 | 3 | 4 | 75 | 132 | 197 | 199 | 193 | 174 | 173 | 170 | 174 | 178 | 201 | 177 | 201 | 236 | 234 | 213 | 198 | 207 | 201 | 201 | 197 | 195.2 |
| 16-Sep | 172 | 178 | 164 | 121 | 113 | 141 | 147 | 141 | 163 | 171 | 172 | 190 | 192 | 186 | 196 | 194 | 203 | 200 | 191 | 181 | 186 | 184 | 187 | 176 | 179.8 |
| 17-Sep | 173 | 167 | 157 | 156 | 138 | 135 | 137 | 163 | 164 | 163 | 165 | 169 | 195 | 183 | 172 | 164 | 165 | 158 | 159 | 162 | 164 | 164 | 166 | 156 | 164.9 |
| 18-Sep | 151 | 146 | 145 | 137 | 135 | 132 | 138 | 154 | 150 | 156 | 154 | 160 | 166 | 164 | 137 | 124 | 128 | 137 | 103 | 104 | 107 | 115 | 108 | 105 | 139.2 |
| 19-Sep | 103 | 102 | 59 | 356 | 355 | 0 | 2 | 6 | 9 | 9 | 19 | 24 | 23 | 48 | 53 | 76 | 79 | 71 | 51 | 54 | 63 | 69 | 51 | 29 | 40.9 |
| 20-Sep | 17 | 18 | 8 | 11 | 10 | 15 | 16 | 21 | 23 | 25 | 26 | 27 | 25 | 25 | 23 | 23 | 24 | 21 | 23 | 19 | 22 | 22 | 20 | 17 | 20.6 |
| 21-Sep | 15 | 12 | 11 | 11 | 8 | 6 | 7 | 6 | 5 | 4 | 7 | 6 | 6 | 7 | 8 | 4 | 7 | 8 | 4 | 0 | 357 | 337 | 345 | 343 | 5.5 |
| 22-Sep | 340 | 274 | 37 | 17 | 1 | 66 | 207 | 240 | 213 | 261 | 54 | 45 | 142 | 182 | 197 | 116 | 124 | 111 | 121 | 141 | 162 | 126 | 127 | 161 | 133.9 |
| 23-Sep | 200 | 190 | 167 | 163 | 83 | 129 | 143 | 77 | 164 | 162 | 217 | 45 | 176 | 188 | 175 | 171 | 184 | 163 | 164 | 162 | 152 | 163 | 157 | 146 | 164.1 |
| 24-Sep | 144 | 166 | 155 | 162 | 165 | 219 | 221 | 207 | 206 | 177 | 155 | 163 | 165 | 171 | 162 | 163 | 170 | 155 | 152 | 168 | 178 | 182 | 160 | 151 | 168.4 |
| 25-Sep | 149 | 152 | 147 | 156 | 164 | 163 | 165 | 172 | 169 | 172 | 188 | 184 | 175 | 182 | 315 | 325 | 269 | 235 | 276 | 232 | 257 | 243 | 234 | 245 | 189.0 |
| 26-Sep | 246 | 236 | 289 | 278 | 299 | 278 | 234 | 245 | 262 | 263 | 274 | 303 | 319 | 316 | 328 | 332 | 332 | 339 | 359 | 349 | 225 | 189 | 216 | 205 | 300.9 |
| 27-Sep | 227 | 199 | 162 | 149 | 203 | 190 | 175 | 171 | 339 | 359 | 29 | 16 | 342 | 349 | 350 | 353 | 11 | 19 | 20 | 18 | 25 | 10 | 9 | 11 | 7.7 |
| 28-Sep | 6 | 6 | 12 | 92 | 157 | 198 | 191 | 170 | 162 | 167 | 171 | 173 | 170 | 170 | 200 | 201 | 194 | 192 | 184 | 178 | 175 | 166 | 158 | 151 | 175.1 |
| 29-Sep | 135 | 151 | 162 | 162 | 154 | 162 | 159 | 157 | 163 | 164 | 177 | 176 | 171 | 181 | 243 | 308 | 332 | 340 | 132 | 226 | 228 | 193 | 220 | 230 | 172.8 |
| 30-Sep | 196 | 196 | 235 | 222 | 220 | 183 | 211 | 217 | 192 | 190 | 187 | 163 | 173 | 238 | 222 | 229 | 237 | 276 | 313 | 320 | 326 | 328 | 323 | 330 | 261.2 |

212.9 222.7 259.5 231.6 235.3 210.4 217.5 224.3 229.7 235.4 253.3 250.6 245.9 257.7 284.5 288.4 274.4 268.4 343.6 339.8 254.3 184.2 209.5 251.8

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

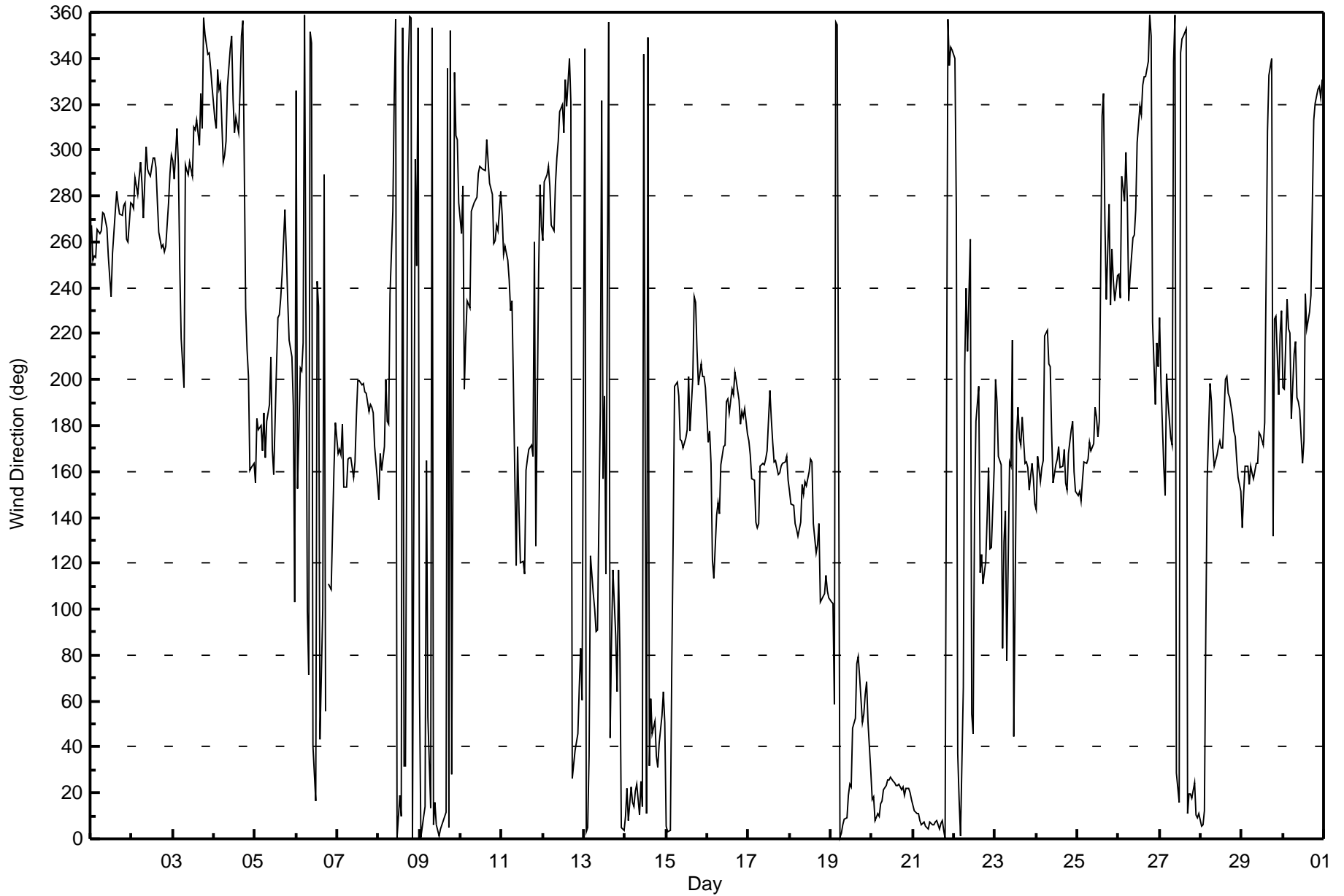
Wind Direction (WD) - deg
Mildred Lake - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 106 deg on Sep 6 15:00 | Hours of Data: 719 |
| Minimum Value: 8 deg on Sep 5 03:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 15 Median = 20 Q ₃ = 29 P ₉₀ = 49 P ₉₉ = 87 | 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-Sep | 30 | 30 | 27 | 28 | 29 | 30 | 28 | 24 | 23 | 28 | 27 | 30 | 30 | 32 | 27 | 27 | 26 | 26 | 26 | 22 | 30 | 28 | 26 | 24 | 32 |
| 2-Sep | 27 | 26 | 21 | 27 | 23 | 35 | 39 | 69 | 49 | 25 | 23 | 21 | 24 | 23 | 25 | 26 | 31 | 29 | 26 | 30 | 32 | 30 | 23 | 37 | 69 |
| 3-Sep | 20 | 24 | 21 | 23 | 26 | 27 | 56 | 71 | 21 | 20 | 21 | 23 | 22 | 20 | 21 | 22 | 18 | 19 | 23 | 15 | 12 | 10 | 11 | 71 | |
| 4-Sep | 17 | 17 | 13 | 14 | 19 | 15 | 18 | 23 | 19 | 22 | 22 | 31 | 41 | 29 | 33 | 23 | 49 | 30 | 66 | 45 | 17 | 19 | 18 | 8 | 66 |
| 5-Sep | 13 | 14 | 8 | 12 | 16 | 14 | 11 | 22 | 25 | 23 | 31 | 20 | 26 | 27 | 27 | 31 | 38 | 24 | 96 | 60 | 25 | 18 | 57 | 31 | 96 |
| 6-Sep | 77 | 66 | 23 | 85 | 64 | 85 | 65 | 34 | 23 | 35 | 64 | 55 | 62 | 45 | 106 | 86 | 89 | 46 | AF | 30 | 9 | 14 | 20 | 13 | 106 |
| 7-Sep | 9 | 11 | 17 | 50 | 15 | 15 | 12 | 13 | 13 | 15 | 15 | 21 | 16 | 19 | 18 | 16 | 15 | 14 | 14 | 15 | 15 | 13 | 10 | 14 | 50 |
| 8-Sep | 12 | 13 | 13 | 14 | 15 | 33 | 39 | 63 | 33 | 30 | 19 | 17 | 24 | 37 | 17 | 30 | 34 | 15 | 15 | 14 | 37 | 52 | 98 | 66 | 98 |
| 9-Sep | 37 | 16 | 17 | 23 | 61 | 18 | 32 | 19 | 12 | 30 | 17 | 14 | 16 | 15 | 16 | 18 | 17 | 15 | 17 | 26 | 23 | 23 | 19 | 30 | 61 |
| 10-Sep | 35 | 70 | 31 | 27 | 27 | 31 | 26 | 27 | 22 | 23 | 22 | 21 | 21 | 20 | 20 | 20 | 22 | 21 | 21 | 27 | 28 | 25 | 24 | 26 | 70 |
| 11-Sep | 33 | 29 | 41 | 98 | 78 | 28 | 28 | 68 | 46 | 17 | 24 | 19 | 20 | 31 | 22 | 13 | 16 | 18 | 14 | 69 | 72 | 48 | 29 | 33 | 98 |
| 12-Sep | 26 | 21 | 19 | 19 | 23 | 29 | 28 | 23 | 20 | 20 | 18 | 18 | 22 | 24 | 22 | 20 | 17 | 29 | 16 | 17 | 20 | 18 | 17 | 17 | 29 |
| 13-Sep | 16 | 12 | 16 | 57 | 34 | 25 | 23 | 22 | 26 | 78 | 44 | 60 | 84 | 100 | 35 | 61 | 78 | 9 | 24 | 40 | 21 | 34 | 18 | 11 | 100 |
| 14-Sep | 11 | 27 | 21 | 17 | 16 | 13 | 19 | 32 | 31 | 25 | 30 | 45 | 49 | 29 | 43 | 44 | 36 | 23 | 17 | 15 | 13 | 17 | 28 | 14 | 49 |
| 15-Sep | 10 | 13 | 13 | 52 | 35 | 15 | 14 | 16 | 33 | 27 | 25 | 20 | 36 | 33 | 47 | 50 | 28 | 28 | 20 | 18 | 20 | 15 | 13 | 11 | 52 |
| 16-Sep | 14 | 14 | 19 | 52 | 30 | 15 | 15 | 27 | 17 | 17 | 16 | 20 | 19 | 17 | 20 | 18 | 18 | 16 | 14 | 14 | 14 | 14 | 13 | 14 | 52 |
| 17-Sep | 14 | 12 | 15 | 17 | 18 | 16 | 16 | 15 | 13 | 13 | 14 | 16 | 21 | 19 | 20 | 17 | 14 | 14 | 13 | 12 | 12 | 12 | 11 | 15 | 21 |
| 18-Sep | 16 | 16 | 18 | 16 | 17 | 17 | 19 | 16 | 18 | 19 | 18 | 17 | 16 | 16 | 27 | 18 | 17 | 18 | 10 | 8 | 12 | 12 | 14 | 10 | 27 |
| 19-Sep | 11 | 11 | 50 | 9 | 10 | 13 | 12 | 13 | 15 | 14 | 19 | 22 | 19 | 28 | 19 | 21 | 19 | 20 | 18 | 19 | 22 | 21 | 24 | 18 | 50 |
| 20-Sep | 16 | 17 | 14 | 17 | 15 | 16 | 17 | 19 | 18 | 18 | 19 | 18 | 19 | 18 | 18 | 17 | 19 | 18 | 18 | 18 | 18 | 17 | 18 | 18 | 19 |
| 21-Sep | 18 | 17 | 18 | 17 | 16 | 17 | 16 | 14 | 15 | 15 | 15 | 16 | 16 | 17 | 18 | 15 | 16 | 16 | 16 | 13 | 13 | 10 | 8 | 10 | 18 |
| 22-Sep | 88 | 65 | 31 | 26 | 23 | 20 | 84 | 29 | 28 | 29 | 75 | 52 | 81 | 46 | 58 | 12 | 14 | 16 | 42 | 20 | 24 | 15 | 52 | 69 | 88 |
| 23-Sep | 14 | 17 | 16 | 12 | 20 | 42 | 34 | 51 | 24 | 23 | 76 | 60 | 24 | 26 | 34 | 20 | 25 | 15 | 11 | 12 | 14 | 14 | 15 | 19 | 76 |
| 24-Sep | 18 | 13 | 20 | 12 | 15 | 29 | 21 | 14 | 20 | 18 | 24 | 24 | 21 | 22 | 20 | 22 | 16 | 15 | 15 | 12 | 15 | 16 | 15 | 16 | 29 |
| 25-Sep | 16 | 16 | 18 | 16 | 12 | 12 | 14 | 15 | 15 | 15 | 26 | 26 | 27 | 43 | 51 | 20 | 73 | 62 | 76 | 30 | 32 | 33 | 37 | 31 | 76 |
| 26-Sep | 29 | 28 | 68 | 28 | 18 | 28 | 38 | 30 | 24 | 24 | 44 | 26 | 23 | 22 | 17 | 16 | 11 | 12 | 10 | 10 | 56 | 23 | 82 | 28 | 82 |
| 27-Sep | 33 | 39 | 57 | 32 | 23 | 14 | 47 | 26 | 91 | 23 | 30 | 30 | 17 | 18 | 25 | 14 | 16 | 16 | 17 | 15 | 16 | 13 | 12 | 13 | 91 |
| 28-Sep | 16 | 13 | 26 | 40 | 17 | 21 | 69 | 16 | 16 | 13 | 15 | 17 | 16 | 16 | 19 | 16 | 15 | 13 | 14 | 15 | 15 | 9 | 12 | 15 | 69 |
| 29-Sep | 14 | 18 | 12 | 9 | 12 | 13 | 15 | 13 | 12 | 13 | 18 | 18 | 16 | 31 | 31 | 30 | 17 | 62 | 79 | 21 | 27 | 14 | 12 | 16 | 79 |
| 30-Sep | 56 | 71 | 78 | 68 | 18 | 19 | 18 | 19 | 30 | 21 | 20 | 16 | 23 | 30 | 20 | 24 | 24 | 36 | 17 | 14 | 13 | 12 | 15 | 12 | 78 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|----|----|--|
| 88 | 71 | 78 | 98 | 78 | 85 | 84 | 71 | 91 | 78 | 76 | 60 | 84 | 100 | 106 | 86 | 89 | 62 | 96 | 69 | 72 | 52 | 98 | 69 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Mildred Lake | Station number: | AMS 02 |
| Calibration Date: | September 11, 2017 | Last Cal Date: | August 4, 2017 |
| Start time (MST): | 10:03 | End time (MST): | 12:44 |
| Reason: | Routine | | |

Calibration Standards

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

Analyzer Information

| | | | | | |
|----------------------|--------------|--------------------|--------------|---------------|--------|
| Analyzer make: | Thermo 43i | Analyzer serial #: | JC1404901075 | | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> | |
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -653.4 | -653.4 |
| Calculated slope | 0.994046 | 0.991451 | Lamp voltage | 802 | 801 |
| Calculated intercept | 1.964542 | 2.183528 | Pressure | 693.8 | 687.0 |
| Analyzer Background | 19.7 | 19.8 | Flow | 0.514 | 0.511 |
| Analyzer Coefficient | 0.951 | 0.951 | Intensity | 90 | 90 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5001 | 0.0 | 0.0 | -0.8 | ---- |
| as found span | 4931 | 76.4 | 781.2 | 787.0 | 0.993 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.8 | ---- |
| high point | 4931 | 76.4 | 781.2 | 787.0 | 0.993 |
| second point | 4969 | 38.3 | 391.6 | 390.3 | 1.003 |
| third point | 4986 | 19.2 | 196.4 | 195.7 | 1.004 |
| as left zero | 5003 | 0.0 | 0.0 | -0.4 | ---- |
| as left span | 4932 | 76.4 | 781.0 | 789.4 | 0.989 |
| Average Correction Factor | | | | | 1.000 |

| | | | | | |
|--------------------|--------|-------------------|--------|-----------|-------|
| Corrected As found | 787.80 | Previous response | 783.89 | *% change | -0.5% |
|--------------------|--------|-------------------|--------|-----------|-------|

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

SO₂ Calibration Summary

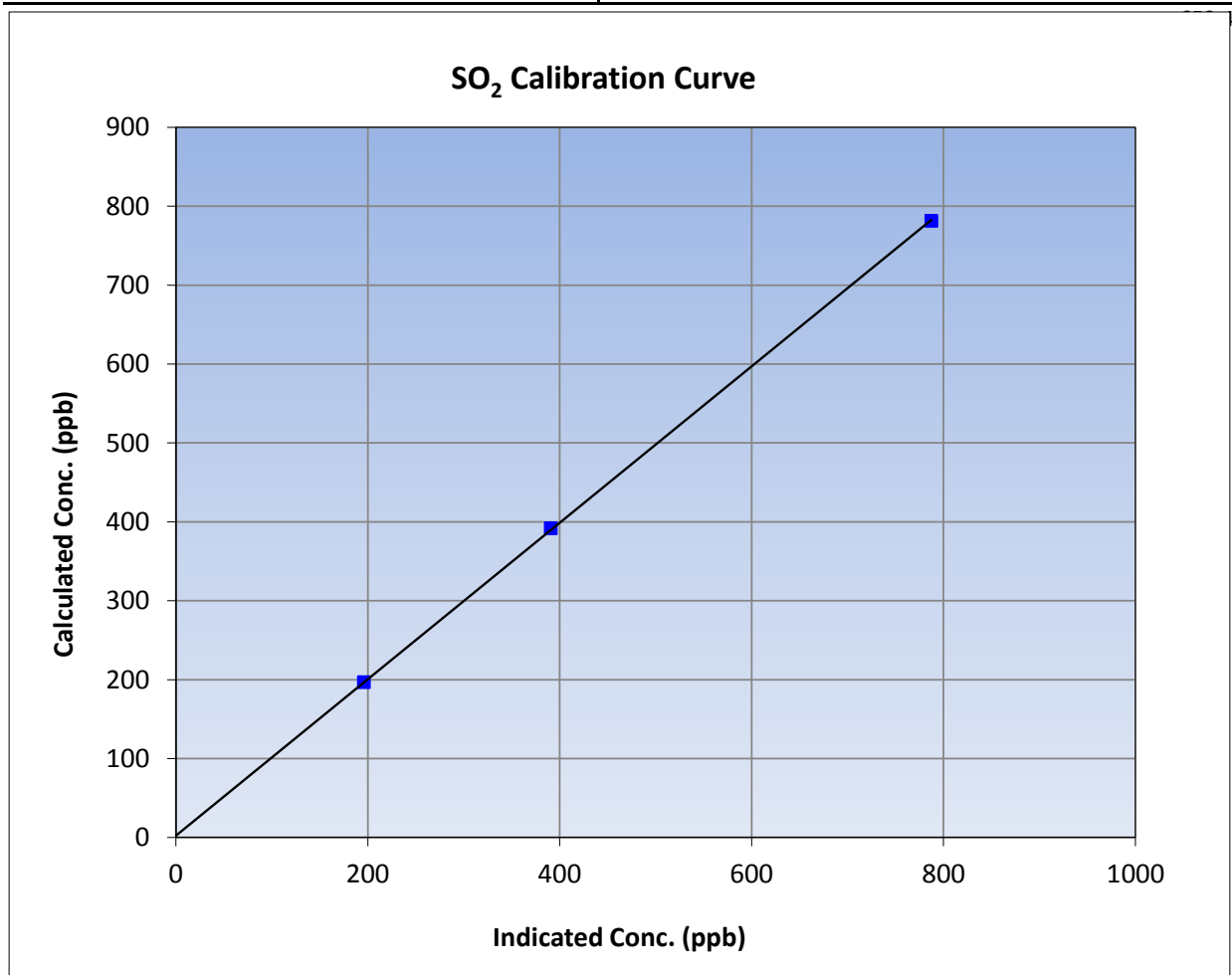
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 4, 2017 |
| Station Name | Mildred Lake | Station Number | AMS 02 |
| Start Time (MST) | 10:03 | End Time (MST) | 12:44 |
| Analyzer make | Thermo 43i | Analyzer serial # | JC1404901075 |

Calibration Data

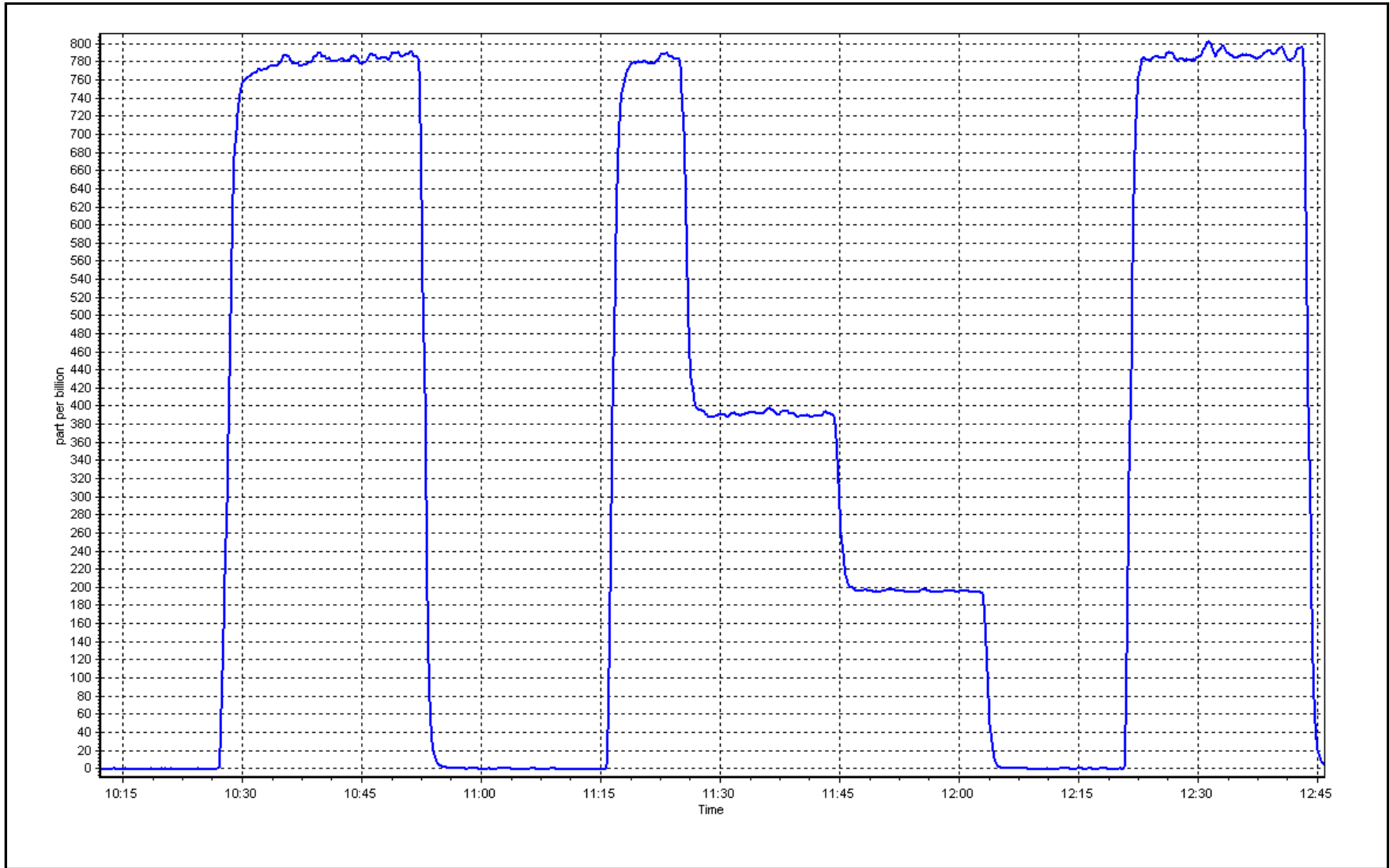
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.8 | ---- | Correlation Coefficient | 0.999971 | ≥0.995 |
| 781.2 | 787.0 | 0.9926 | | | |
| 391.6 | 390.3 | 1.0034 | Slope | 0.991451 | 0.90 - 1.10 |
| 196.4 | 195.7 | 1.0036 | | | |
| | | | Intercept | 2.183528 | +/-30 |



SO2 Calibration Plot

Date: September 11, 2017

Location: Mildred Lake





Wood Buffalo Environmental Association

H₂S Calibration Summary

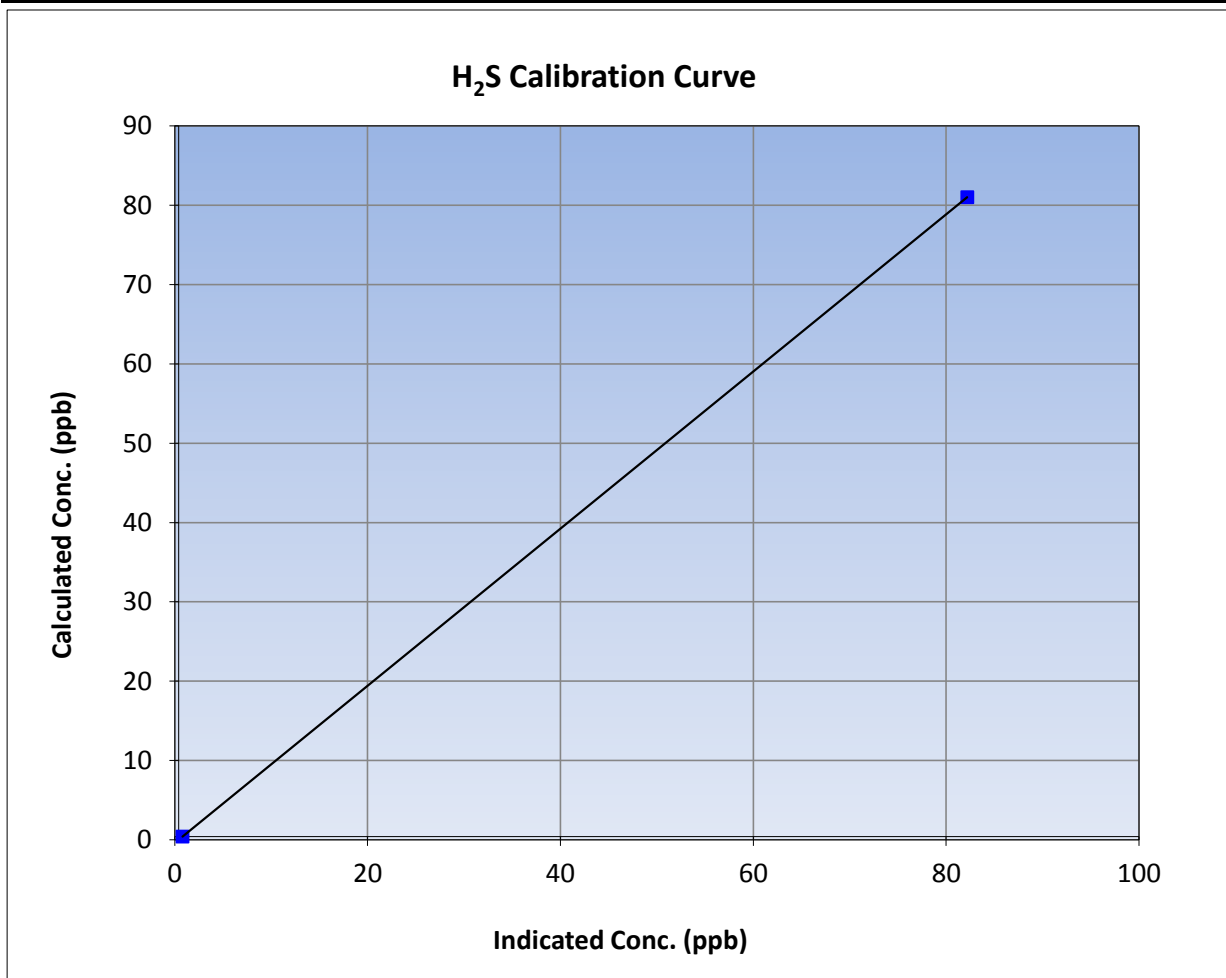
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 4, 2017 |
| Station Name | Mildred Lake | Station Number | AMS 02 |
| Start Time (MST) | 10:17 | End Time (MST) | 15:57 |
| Analyzer make | TEI 450i | Analyzer serial # | 815129107 |

Calibration Data

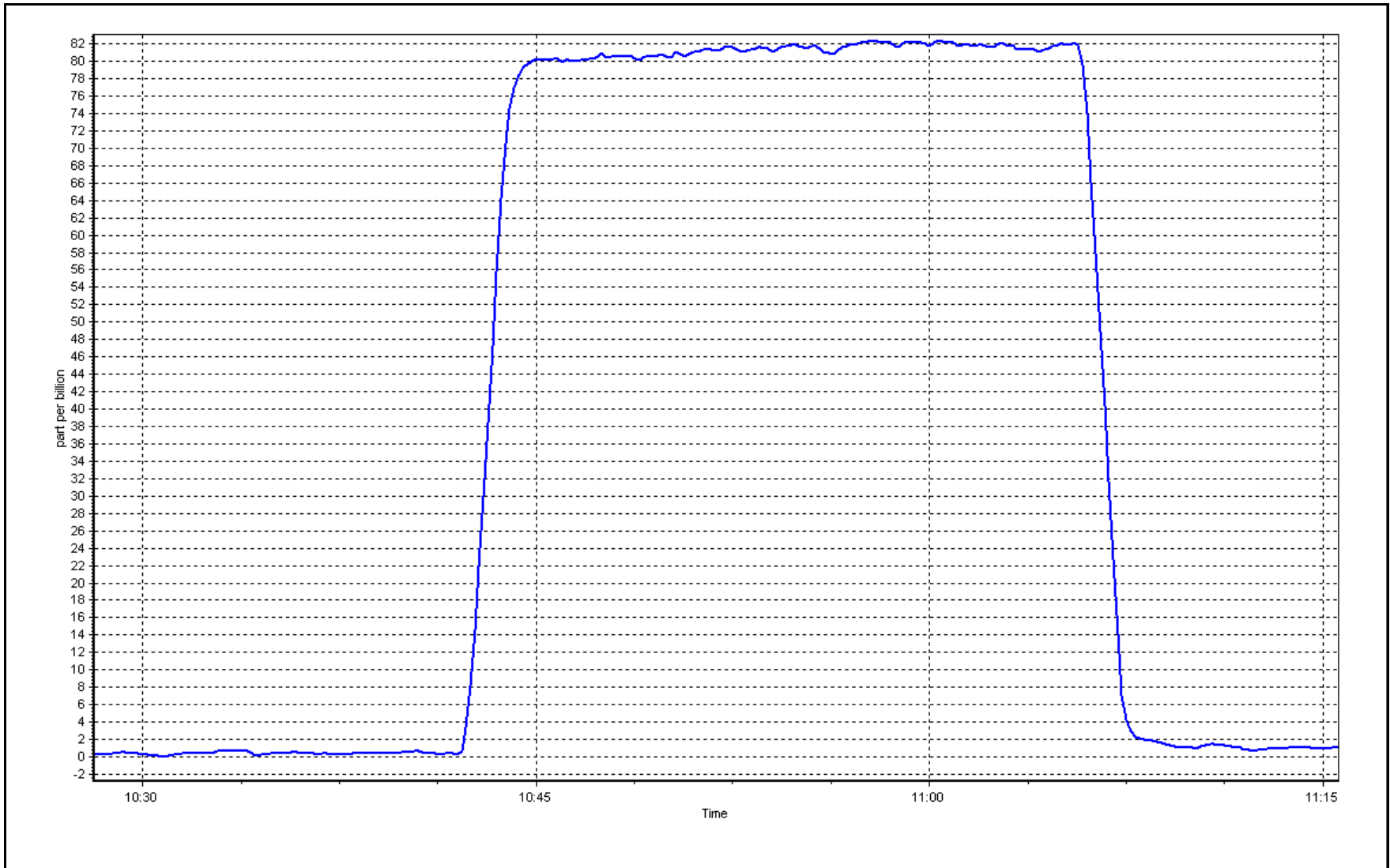
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 80.6 | 81.8 | 0.9857 | Slope | 0.990495 | 0.90 - 1.10 |
| | | | Intercept | -0.396198 | +/-3 |



H₂S Calibration Plot

Date: 18-Sep

Location: Mildred Lake





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

Station Name: Mildred Lake Station number: AMS 02
 Calibration Date: September 18, 2017 Last Cal Date: August 4, 2017
 Start time (MST): 10:17 End time (MST): 15:57
 Reason: Cylinder Change H2S

Calibration Standards

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

Analyzer Information

Analyzer make: TEI 450i Analyzer serial #: 815129107

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 100 ppb | | PMT voltage | -601 | -601 |
| Calculated slope | 0.990495 | 1.005170 | Lamp voltage | 787 | 790 |
| Calculated intercept | -0.396198 | -0.087746 | Pressure | 556.4 | 553.9 |
| Analyzer Background | 17.4 | 17.0 | Flow | 0.976 | 0.973 |
| Analyzer Coefficient | 0.966 | 0.941 | Intensity | 87 | 86 |

H₂S Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5002 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 4928 | 80.1 | 82.0 | 81.8 | 1.003 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 4927 | 78.1 | 80.0 | 79.9 | 1.002 |
| second point | 4970 | 39.1 | 40.0 | 39.7 | 1.009 |
| third point | 4988 | 19.6 | 20.1 | 19.8 | 1.014 |

SO₂ Scrubber Check

| | | | Average Correction Factor | 1.008 |
|--------------------|-------|-------------------|---------------------------|---|
| Corrected As found | 81.40 | Previous response | NA | *% change <i>* = > +/-5% change initiates investigation</i> |

Notes:

Adjusted span after cylinder change. No as lefts done in the interest of time.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

H₂S Calibration Summary

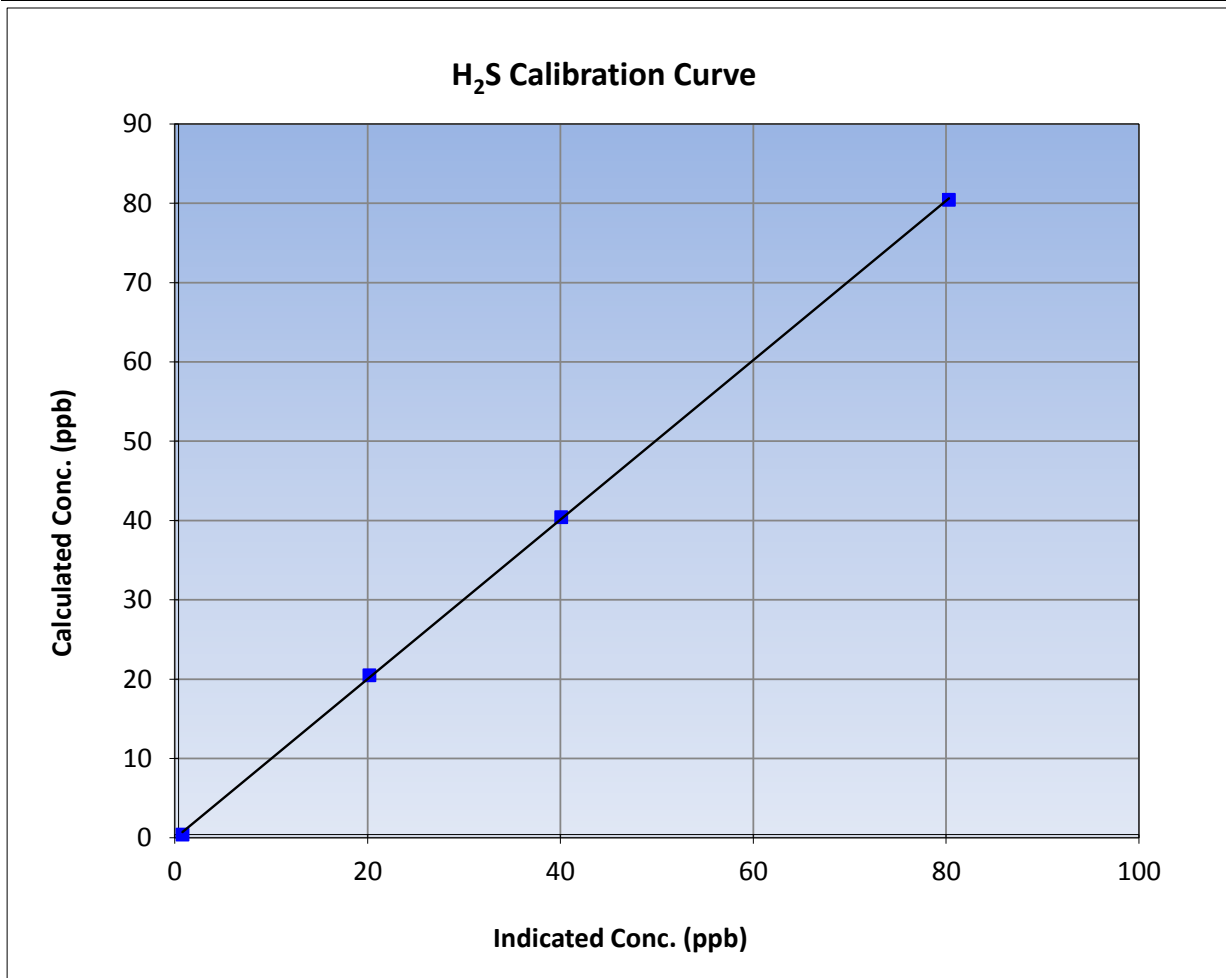
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 4, 2017 |
| Station Name | Mildred Lake | Station Number | AMS 02 |
| Start Time (MST) | 10:17 | End Time (MST) | 15:57 |
| Analyzer make | TEI 450i | Analyzer serial # | 815129107 |

Calibration Data

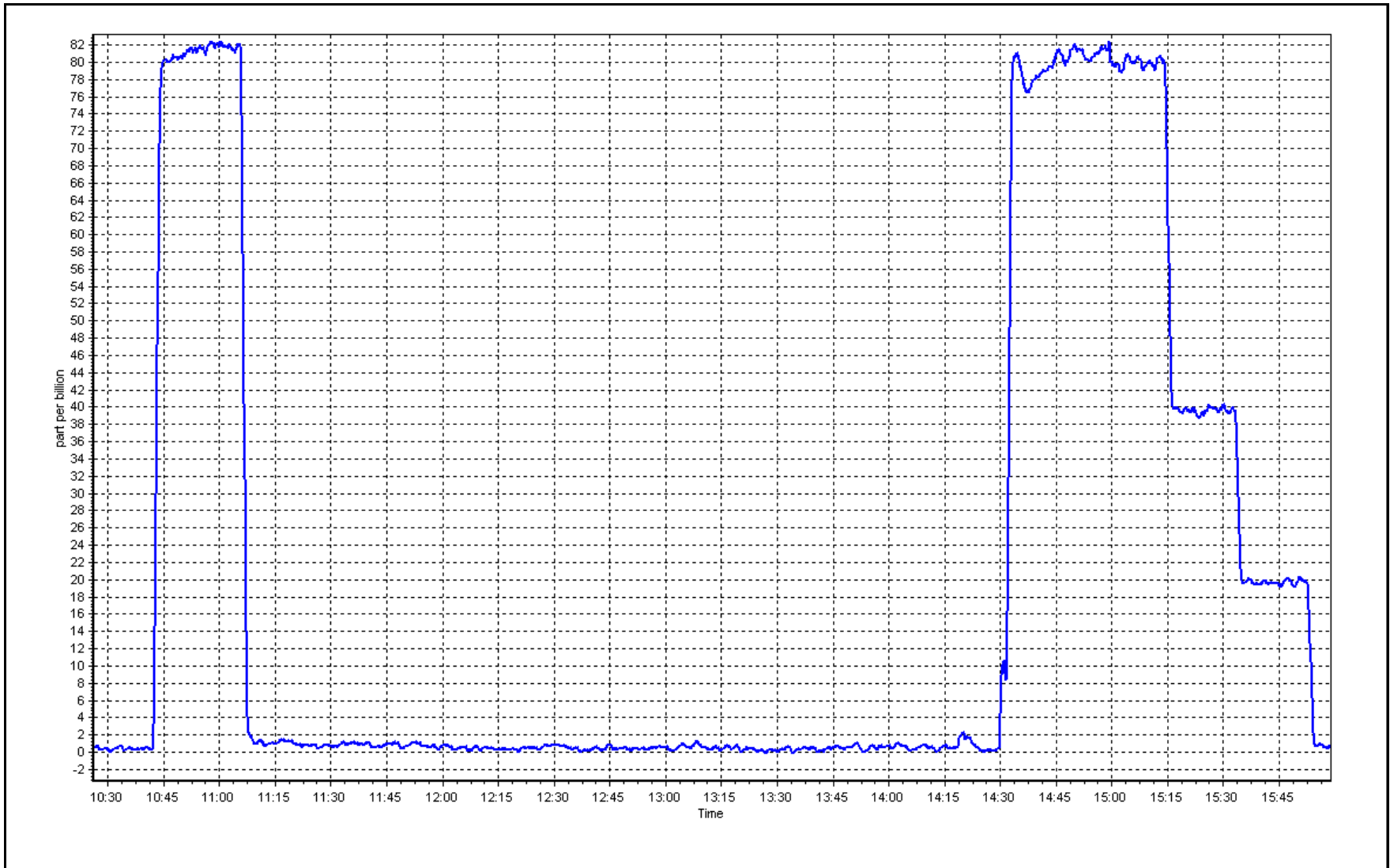
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999928 | ≥0.995 |
| 80.0 | 79.9 | 1.0019 | | | |
| 40.0 | 39.7 | 1.0087 | Slope | 1.005170 | 0.90 - 1.10 |
| 20.1 | 19.8 | 1.0141 | | | |
| | | | Intercept | -0.087746 | +/-3 |



H₂S Calibration Plot

Date: 18-Sep

Location: Mildred Lake





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Mildred Lake | Station number: | AMS 02 |
| Calibration Date: | September 11, 2017 | Last Cal Date: | August 4, 2017 |
| Start time (MST): | 10:03 | End time (MST): | 12:44 |
| Reason: | Routine | | |

Calibration Standards

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

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|--------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1300156231 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -301.9 |
| Calculated slope | 0.999238 | Sample pressure | 8.2 |
| Calculated intercept | -0.002597 | Fuel pressure | 21.8 |
| Analyzer Background | 0.50 | Air pressure | 33.1 |
| Analyzer Coefficient | 3.863 | Flame temperature | 142.6 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5001 | 0.0 | 0.00 | -0.15 | ---- |
| as found span | 4931 | 76.4 | 16.49 | 16.38 | 1.007 |
| calibrator zero | 5002 | 0.0 | 0.00 | -0.02 | ---- |
| high point | 4931 | 76.4 | 16.49 | 16.38 | 1.007 |
| second point | 4969 | 38.3 | 8.27 | 8.19 | 1.010 |
| third point | 4987 | 19.2 | 4.15 | 4.10 | 1.012 |
| as left zero | 5004 | 0.0 | 0.00 | -0.03 | ---- |
| as left span | 4932 | 76.4 | 16.49 | 16.30 | 1.012 |
| Average Correction Factor | | | | | 1.010 |
| Corrected As found | 16.53 | Previous response | 16.51 | *% change | -0.1% |

* = > +/-5% change initiates investigation

Notes:

Adjusted zero.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

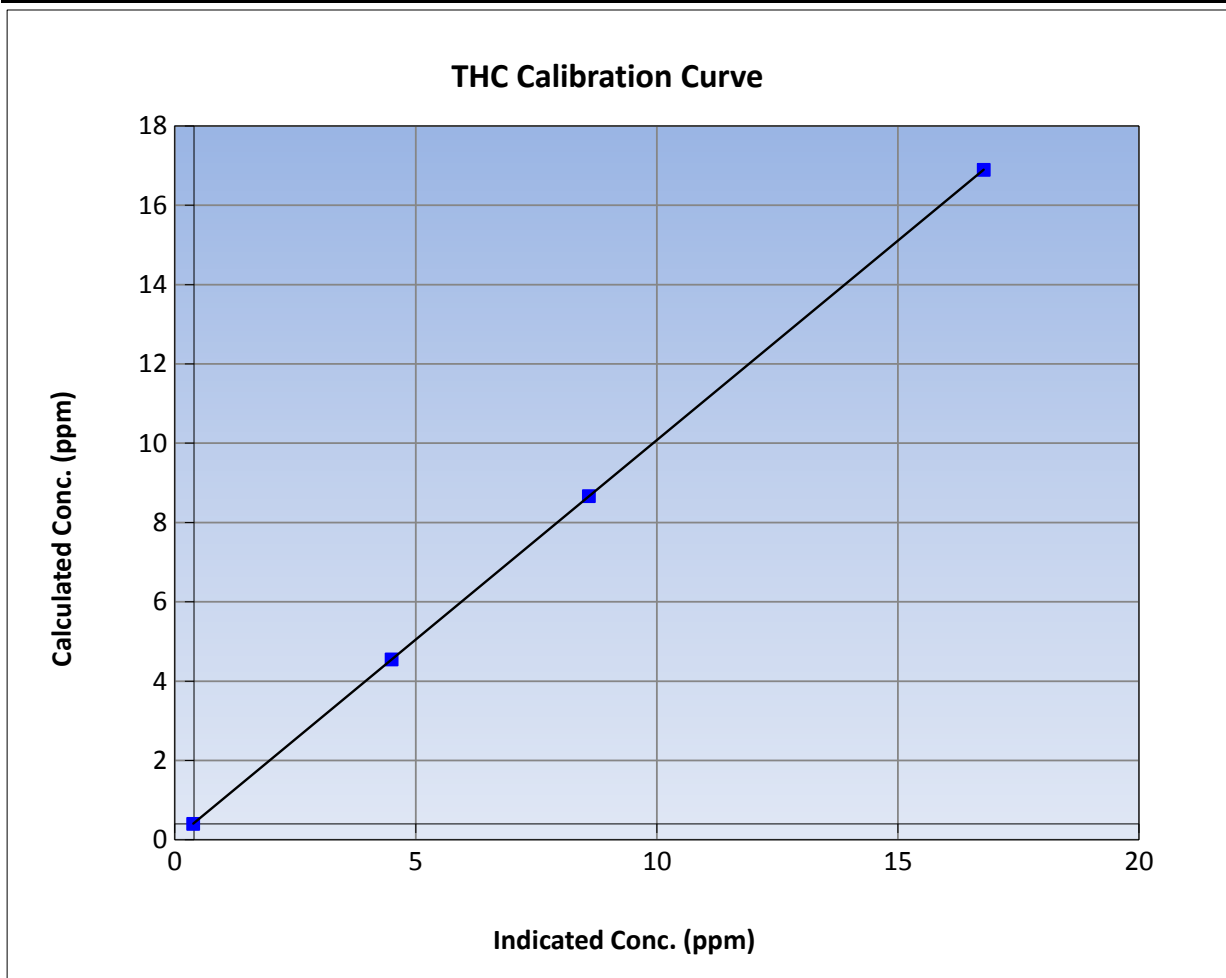
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 4, 2017 |
| Station Name | Mildred Lake | Station Number | AMS 02 |
| Start Time (MST) | 10:03 | End Time (MST) | 12:44 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1300156231 |

Calibration Data

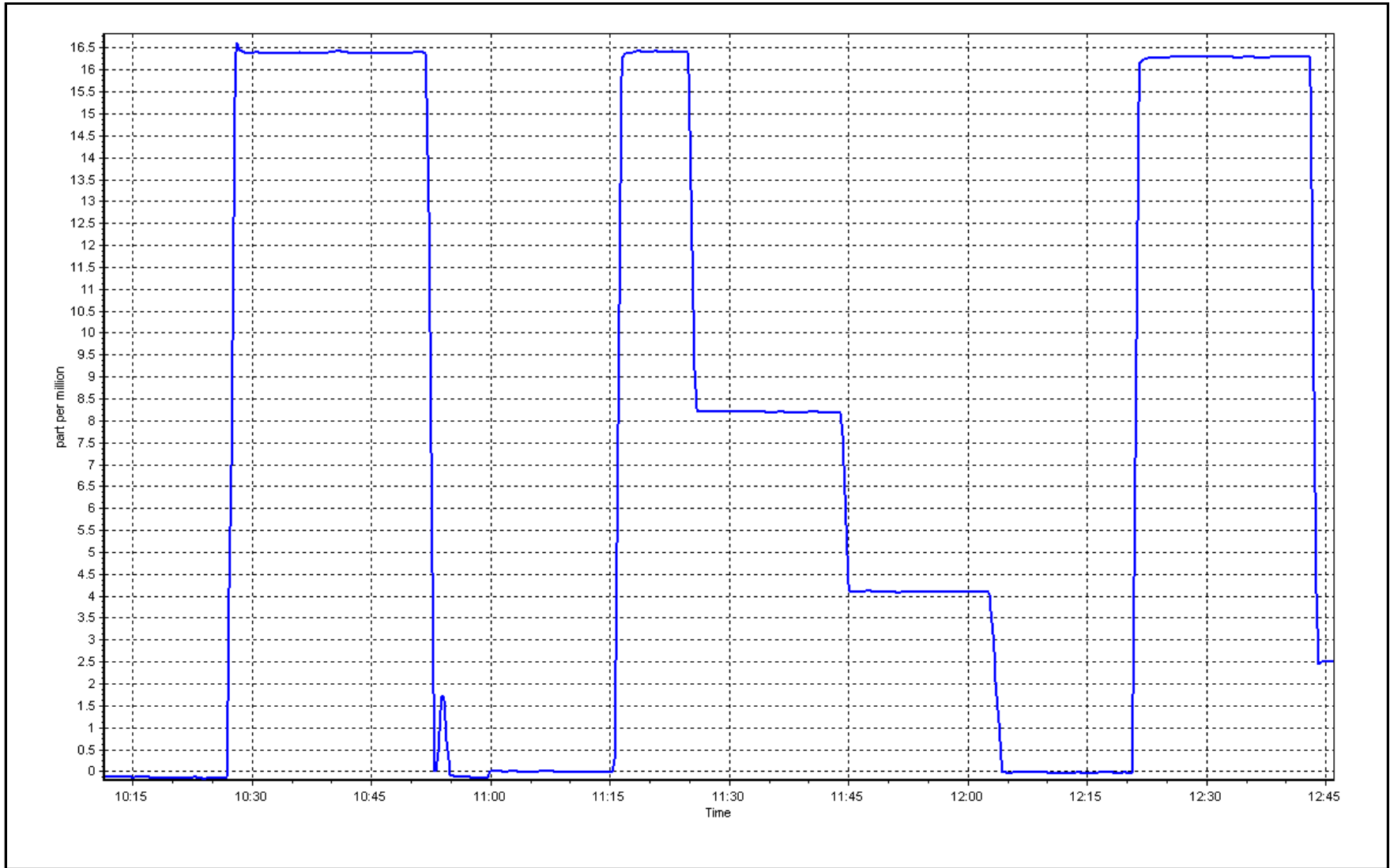
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999999 | ≥0.995 |
| 16.5 | 16.4 | 1.0069 | | | |
| 8.3 | 8.2 | 1.0096 | Slope | 1.005879 | 0.90 - 1.10 |
| 4.1 | 4.1 | 1.0122 | | | |
| | | | Intercept | 0.022029 | +/-1.5 |



THC Calibration Plot

Date: September-17

Location: Mildred Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3 LOWER CAMP METEOROLOGY SEPTEMBER 2017

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

October 27, 2017

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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|--|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| Temperature 20 m (C) Average | 693 | 0 | 27 | 96.25 | 31.6 | - | 22.6 | - |
| Temperature 45 m (C) Average | 277 | 0 | 443 | 38.47 | 25.2 | - | 17.6 | - |
| Temperature 100 m (C) Average | 693 | 0 | 27 | 96.25 | 31 | - | 23.1 | - |
| Temperature 167 m (C) Average | 713 | 0 | 7 | 99.03 | 30.4 | - | 23.3 | - |
| Relative Humidity 20 m (%) Average | 693 | 0 | 27 | 96.25 | 99 | - | 90.0 | - |
| Relative Humidity 45 m (%) Average | 277 | 0 | 443 | 38.47 | 98 | - | 89.0 | - |
| Relative Humidity 100 m (%) Average | 693 | 0 | 27 | 96.25 | 99 | - | 89.0 | - |
| Relative Humidity 167 m (%) Average | 713 | 0 | 7 | 99.03 | 99 | - | 90.0 | - |
| Wind Speed 20 m (km/h) Average | 718 | 0 | 2 | 99.72 | 22 | - | 15.0 | - |
| Wind Speed 45 m (km/h) Average | 61 | 0 | 659 | 8.47 | 20 | - | 10.0 | - |
| Wind Speed 100 m (km/h) Average | 716 | 0 | 4 | 99.44 | 43 | - | 30.0 | - |
| Wind Speed 167 m (km/h) Average | 718 | 0 | 2 | 99.72 | 49 | - | 37.0 | - |
| Wind Direction 20 m (deg) Average | 718 | 0 | 2 | 99.72 | - | - | - | - |
| Wind Direction 45 m (deg) Average | 61 | 0 | 659 | 8.47 | - | - | - | - |
| Wind Direction 100 m (deg) Average | 716 | 0 | 4 | 99.44 | - | - | - | - |
| Wind Direction 167 m (deg) Average | 718 | 0 | 2 | 99.72 | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 718 | 0 | 2 | 99.72 | 0.8 | - | 0.3 | - |
| Vertical Wind Speed 45 m (km/h) Average | 61 | 0 | 659 | 8.47 | 0.8 | - | 0.2 | - |
| Vertical Wind Speed 100 m (km/h) Average | 716 | 0 | 4 | 99.44 | 3.7 | - | 1.3 | - |
| Vertical Wind Speed 167 m (km/h) Average | 718 | 0 | 2 | 99.72 | 4.5 | - | 1.4 | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|--|--------|-------|--------|-------|------------|------|------|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| Temperature 20 m (C) Average | 693 | 12.69 | 5.9 | - | 0.7 | 5.2 | 8.4 | 12.2 | 16.5 | 20.5 | 31.6 |
| Temperature 45 m (C) Average | 277 | 11.29 | 5.5 | - | 2.4 | 4.9 | 6.7 | 10.2 | 15.1 | 19.9 | 25.2 |
| Temperature 100 m (C) Average | 693 | 12.73 | 5.8 | - | 0.7 | 5.1 | 8.6 | 12.3 | 16.1 | 20.5 | 31 |
| Temperature 167 m (C) Average | 713 | 12.79 | 5.7 | - | 0.5 | 5.1 | 8.8 | 12.4 | 16.2 | 20.4 | 30.4 |
| Relative Humidity 20 m (%) Average | 693 | 67.4 | 20 | - | 22 | 35 | 53 | 70 | 83 | 93 | 99 |
| Relative Humidity 45 m (%) Average | 277 | 71.5 | 17 | - | 31 | 46 | 58 | 75 | 86 | 91 | 98 |
| Relative Humidity 100 m (%) Average | 693 | 63.7 | 20 | - | 22 | 35 | 49 | 66 | 79 | 91 | 99 |
| Relative Humidity 167 m (%) Average | 713 | 62 | 19 | - | 23 | 35 | 47 | 63 | 78 | 88 | 99 |
| Wind Speed 20 m (km/h) Average | 718 | 7.9 | 5 | - | 0 | 1 | 3 | 7 | 12 | 16 | 22 |
| Wind Speed 45 m (km/h) Average | 61 | 11.9 | 6 | - | 1 | 2 | 6 | 14 | 17 | 19 | 20 |
| Wind Speed 100 m (km/h) Average | 716 | 16.1 | 10 | - | 0 | 4 | 8 | 15 | 23 | 29 | 43 |
| Wind Speed 167 m (km/h) Average | 718 | 19.3 | 11 | - | 0 | 5 | 10 | 18 | 28 | 35 | 49 |
| Wind Direction 20 m (deg) Average | 718 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 45 m (deg) Average | 61 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 100 m (deg) Average | 716 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 167 m (deg) Average | 718 | - | - | - | - | - | - | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 718 | -0.11 | 0.3 | - | -1 | -0.6 | -0.3 | -0.1 | 0.1 | 0.3 | 0.8 |
| Vertical Wind Speed 45 m (km/h) Average | 61 | 0.17 | 0.3 | - | -0.5 | -0.3 | 0.1 | 0.2 | 0.4 | 0.5 | 0.8 |
| Vertical Wind Speed 100 m (km/h) Average | 716 | 0.32 | 0.7 | - | -1.2 | -0.3 | -0.1 | 0.2 | 0.6 | 1.2 | 3.7 |
| Vertical Wind Speed 167 m (km/h) Average | 718 | 0.57 | 0.8 | - | -1.8 | -0.2 | 0.1 | 0.4 | 0.9 | 1.5 | 4.5 |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|--|-------------------|-------------------|------------------|--|
| Wind Speed, Wind Direction, Vertical Wind Speed 45 m | 01 Sep 2017 01:00 | 28 Sep 2017 11:00 | 659 | Sensor wiring failure |
| Temperature, Relative Humidity 45 m | 01 Sep 2017 01:00 | 19 Sep 2017 10:00 | 442 | Sensor wiring failure |
| Temperature, Relative Humidity 20 m and 100 m | 28 Sep 2017 12:00 | 29 Sep 2017 12:00 | 25 | Maintenance - sensor program change |
| Temperature, Relative Humidity 167 m | 28 Sep 2017 12:00 | 28 Sep 2017 16:00 | 5 | Maintenance - sensor program change |
| ALL 20, 100, AND 167 M SENSORS | 19 Sep 2017 09:00 | 19 Sep 2017 10:00 | 2 | Data collection error - program update |
| ALL 45 M SENSORS | 28 Sep 2017 11:00 | 28 Sep 2017 11:00 | 1 | Maintenance - sensor replacement |
| ALL 100 M SENSORS | 29 Sep 2017 10:00 | 29 Sep 2017 11:00 | 2 | Maintenance - sensor replacement |



Wood Buffalo Environmental Association
Summary of Hour Averages

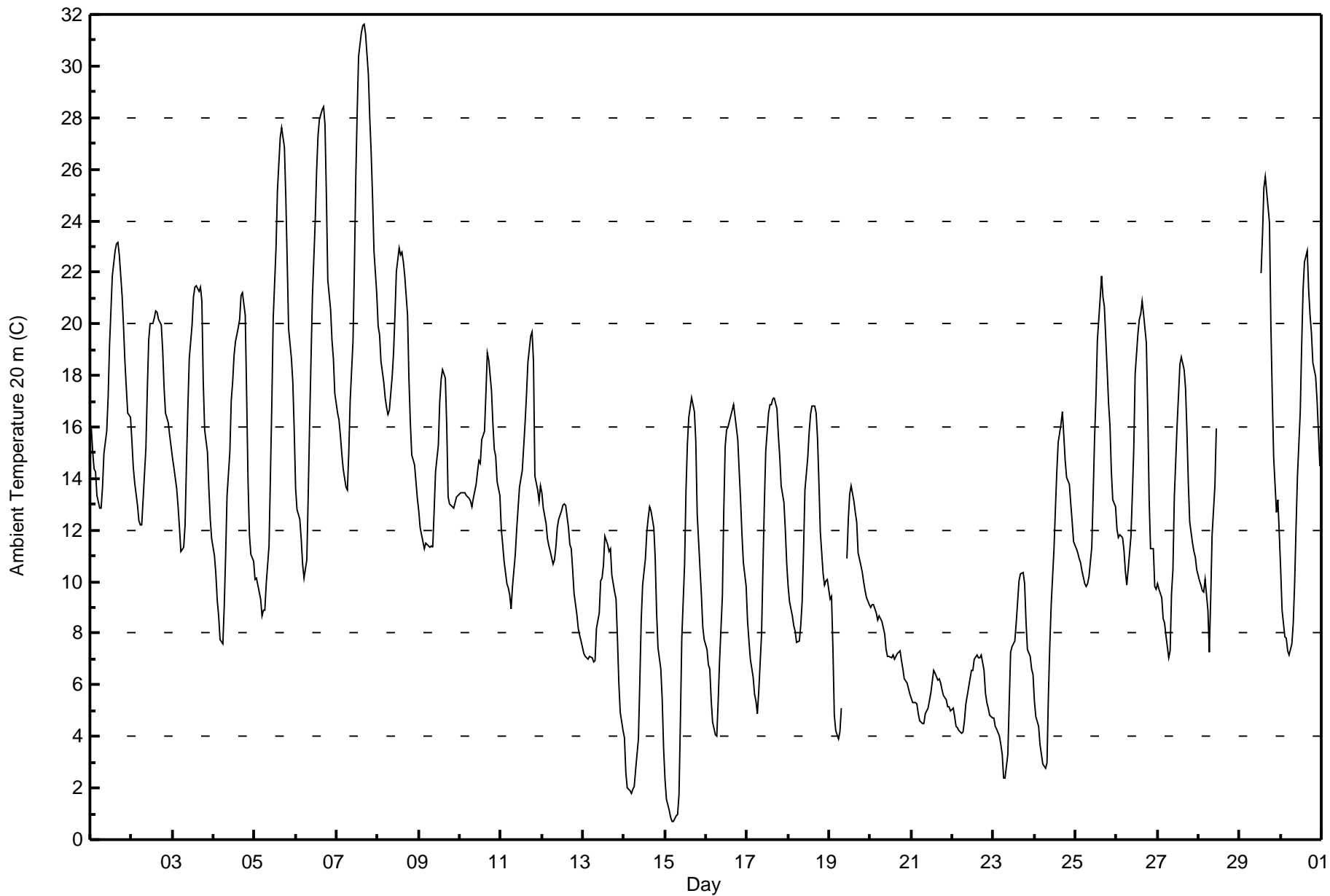
Ambient Temperature 20 m (AT20m) - C
Lower Camp Met Tower - September 2017

| | | |
|--|--|--------------------------------|
| Maximum Value: 31.6 C on Sep 7 17:00 | Maximum Daily Average: 22.6 C on Sep 7 | Hours in Service: 720 |
| Minimum Value: 0.7 C on Sep 15 06:00 | Minimum Daily Average: 5.4 C on Sep 21 | Hours of Data: 693 |
| Maximum Diurnal Average: 17.9 C at hour 16 | Minimum Diurnal Average: 8.1 C at hour 7 | Hours of Missing Data: 27 |
| Monthly Average: 12.69 C | Percentiles: P ₁ = 1.7 P ₁₀ = 5.2 Q ₁ = 8.4 Median = 12.2 Q ₃ = 16.5 P ₉₀ = 20.5 P ₉₉ = 27.9 | Hours of Calibration: 0 |
| | | Percent Operational Time: 96.3 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 15.9 | 15.0 | 14.4 | 14.3 | 13.4 | 12.8 | 12.9 | 13.7 | 15.0 | 15.8 | 17.1 | 19.2 | 20.5 | 21.8 | 22.9 | 23.1 | 23.2 | 22.7 | 21.1 | 19.9 | 18.5 | 17.5 | 16.5 | 16.4 | 17.6 | 23.2 |
| 2-Sep | 15.5 | 14.5 | 13.8 | 13.0 | 12.3 | 12.2 | 12.2 | 13.2 | 15.2 | 17.4 | 19.3 | 20.0 | 20.0 | 20.2 | 20.5 | 20.5 | 20.2 | 20.0 | 19.0 | 17.5 | 16.5 | 16.1 | 15.7 | 15.2 | 16.7 | 20.5 |
| 3-Sep | 14.8 | 14.4 | 13.6 | 12.9 | 12.1 | 11.2 | 11.3 | 12.2 | 14.6 | 16.8 | 18.7 | 20.0 | 21.1 | 21.4 | 21.5 | 21.3 | 21.4 | 20.9 | 17.8 | 15.9 | 15.0 | 13.6 | 12.4 | 11.6 | 16.1 | 21.5 |
| 4-Sep | 11.0 | 10.3 | 9.3 | 8.7 | 7.8 | 7.6 | 9.1 | 11.1 | 13.4 | 15.0 | 17.1 | 17.8 | 18.8 | 19.3 | 19.8 | 20.2 | 21.1 | 21.2 | 20.3 | 17.3 | 13.9 | 11.8 | 11.1 | 10.8 | 14.3 | 21.2 |
| 5-Sep | 10.1 | 10.1 | 9.9 | 9.3 | 8.7 | 8.9 | 8.9 | 9.9 | 11.4 | 14.1 | 16.9 | 20.2 | 22.9 | 25.1 | 26.2 | 27.2 | 27.6 | 26.9 | 24.9 | 22.4 | 19.8 | 18.7 | 17.7 | 15.9 | 17.2 | 27.6 |
| 6-Sep | 13.6 | 12.8 | 12.4 | 11.6 | 10.7 | 10.1 | 10.8 | 13.3 | 16.1 | 18.6 | 21.1 | 24.0 | 25.9 | 27.3 | 27.9 | 28.3 | 28.4 | 27.7 | 25.0 | 21.7 | 20.6 | 19.4 | 18.6 | 17.3 | 19.3 | 28.4 |
| 7-Sep | 16.5 | 16.3 | 15.7 | 15.0 | 14.4 | 13.6 | 13.5 | 15.1 | 17.0 | 19.3 | 22.1 | 25.7 | 28.2 | 30.4 | 31.3 | 31.6 | 31.6 | 31.2 | 29.7 | 28.0 | 26.7 | 24.9 | 22.8 | 21.2 | 22.6 | 31.6 |
| 8-Sep | 19.9 | 19.6 | 18.5 | 17.7 | 17.1 | 16.8 | 16.5 | 16.6 | 17.9 | 18.9 | 20.3 | 22.0 | 22.9 | 22.6 | 22.8 | 22.4 | 21.8 | 20.4 | 17.9 | 16.1 | 14.9 | 14.5 | 13.9 | 13.2 | 18.6 | 22.9 |
| 9-Sep | 12.7 | 12.1 | 11.6 | 11.3 | 11.5 | 11.4 | 11.3 | 11.4 | 11.3 | 12.7 | 14.3 | 15.3 | 17.0 | 17.8 | 18.2 | 17.9 | 16.1 | 13.3 | 13.0 | 13.0 | 12.9 | 13.1 | 13.3 | 13.4 | 13.6 | 18.2 |
| 10-Sep | 13.4 | 13.4 | 13.5 | 13.4 | 13.3 | 13.3 | 13.1 | 12.9 | 13.2 | 13.8 | 14.3 | 14.7 | 14.6 | 15.5 | 15.8 | 17.3 | 18.9 | 18.6 | 17.4 | 16.1 | 15.1 | 14.9 | 13.9 | 13.4 | 14.7 | 18.9 |
| 11-Sep | 12.0 | 11.4 | 10.8 | 9.9 | 9.8 | 9.5 | 9.0 | 9.8 | 11.1 | 12.0 | 12.9 | 13.6 | 14.3 | 15.3 | 16.1 | 17.2 | 18.5 | 19.5 | 19.7 | 18.6 | 14.1 | 13.5 | 13.1 | 13.7 | 13.6 | 19.7 |
| 12-Sep | 13.4 | 12.9 | 12.2 | 11.6 | 11.4 | 11.2 | 10.7 | 10.9 | 11.3 | 12.1 | 12.4 | 12.7 | 13.0 | 13.0 | 13.0 | 12.1 | 11.5 | 11.3 | 10.5 | 9.5 | 8.8 | 8.2 | 7.9 | 7.7 | 11.2 | 13.4 |
| 13-Sep | 7.2 | 7.1 | 7.1 | 7.0 | 7.1 | 7.0 | 6.9 | 7.0 | 8.2 | 8.8 | 10.0 | 10.1 | 10.6 | 11.8 | 11.4 | 11.2 | 11.3 | 10.2 | 9.6 | 9.3 | 7.8 | 6.1 | 4.9 | 4.2 | 8.4 | 11.8 |
| 14-Sep | 3.9 | 2.6 | 2.0 | 1.9 | 1.8 | 2.0 | 2.1 | 2.7 | 3.9 | 6.1 | 8.5 | 9.9 | 10.9 | 11.9 | 12.5 | 12.9 | 12.7 | 12.1 | 10.9 | 8.8 | 7.4 | 6.6 | 5.4 | 3.5 | 6.8 | 12.9 |
| 15-Sep | 2.4 | 1.6 | 1.1 | 0.8 | 0.7 | 0.7 | 0.9 | 1.0 | 1.7 | 4.6 | 7.8 | 10.7 | 13.6 | 15.3 | 16.4 | 17.2 | 16.9 | 16.6 | 15.5 | 12.6 | 10.5 | 9.5 | 8.3 | 7.8 | 8.1 | 17.2 |
| 16-Sep | 7.4 | 6.8 | 6.6 | 5.4 | 4.6 | 4.1 | 4.0 | 5.4 | 7.0 | 9.4 | 12.8 | 15.2 | 15.9 | 16.0 | 16.4 | 16.7 | 16.9 | 16.4 | 15.5 | 14.3 | 13.2 | 11.8 | 10.7 | 9.8 | 10.9 | 16.9 |
| 17-Sep | 8.5 | 7.7 | 7.0 | 6.3 | 5.6 | 5.4 | 4.9 | 5.7 | 8.0 | 10.6 | 13.0 | 15.1 | 16.5 | 16.9 | 16.8 | 17.1 | 17.1 | 16.7 | 15.7 | 14.9 | 13.7 | 13.1 | 12.0 | 10.7 | 11.6 | 17.1 |
| 18-Sep | 9.8 | 9.2 | 8.7 | 8.3 | 8.1 | 7.7 | 7.7 | 8.3 | 9.2 | 11.2 | 13.6 | 14.8 | 15.8 | 16.5 | 16.8 | 16.8 | 16.6 | 15.6 | 13.8 | 11.9 | 10.3 | 9.9 | 10.1 | 10.1 | 11.7 | 16.8 |
| 19-Sep | 9.3 | 9.4 | 7.4 | 4.8 | 4.2 | 3.9 | 4.2 | 5.1 | M | M | 10.9 | 12.4 | 13.4 | 13.7 | 13.1 | 12.7 | 12.3 | 11.1 | 10.6 | 10.4 | 10.0 | 9.7 | 9.4 | 9.1 | 9.4 | 13.7 |
| 20-Sep | 9.0 | 9.1 | 9.1 | 8.8 | 8.5 | 8.7 | 8.6 | 8.4 | 8.0 | 7.4 | 7.1 | 7.1 | 7.1 | 7.1 | 7.0 | 7.1 | 7.2 | 7.3 | 7.0 | 6.6 | 6.2 | 6.1 | 5.9 | 5.6 | 7.5 | 9.1 |
| 21-Sep | 5.5 | 5.3 | 5.3 | 5.2 | 4.9 | 4.6 | 4.5 | 4.5 | 4.9 | 5.0 | 5.1 | 5.7 | 6.1 | 6.6 | 6.5 | 6.2 | 6.2 | 6.1 | 5.8 | 5.6 | 5.4 | 5.2 | 5.2 | 5.0 | 5.4 | 6.6 |
| 22-Sep | 5.1 | 4.8 | 4.4 | 4.3 | 4.2 | 4.1 | 4.2 | 4.6 | 5.2 | 5.9 | 6.2 | 6.5 | 6.6 | 7.0 | 7.2 | 7.1 | 7.0 | 7.2 | 6.6 | 5.7 | 5.3 | 5.1 | 4.8 | 4.7 | 5.6 | 7.2 |
| 23-Sep | 4.7 | 4.4 | 4.3 | 4.0 | 3.7 | 3.3 | 2.4 | 2.4 | 3.3 | 5.3 | 7.3 | 7.5 | 7.7 | 8.4 | 9.2 | 10.0 | 10.3 | 10.4 | 9.9 | 8.5 | 7.4 | 7.1 | 6.6 | 6.4 | 6.4 | 10.4 |
| 24-Sep | 5.4 | 4.7 | 4.4 | 3.7 | 3.3 | 2.9 | 2.8 | 3.0 | 5.6 | 7.5 | 9.1 | 11.3 | 12.8 | 14.3 | 15.4 | 16.1 | 16.6 | 15.7 | 14.7 | 14.1 | 13.8 | 13.0 | 12.3 | 11.5 | 9.8 | 16.6 |
| 25-Sep | 11.3 | 11.1 | 10.9 | 10.7 | 10.4 | 9.9 | 9.8 | 9.9 | 10.2 | 11.4 | 13.4 | 15.6 | 17.2 | 19.4 | 21.0 | 21.8 | 21.0 | 20.7 | 18.2 | 16.9 | 16.1 | 14.3 | 13.2 | 12.9 | 14.5 | 21.8 |
| 26-Sep | 12.0 | 11.7 | 11.8 | 11.7 | 11.2 | 10.4 | 9.9 | 10.5 | 11.8 | 13.4 | 15.1 | 18.0 | 19.6 | 20.2 | 20.4 | 20.9 | 20.4 | 19.3 | 16.6 | 13.2 | 11.3 | 11.3 | 9.8 | 9.7 | 14.2 | 20.9 |
| 27-Sep | 9.9 | 9.7 | 9.4 | 8.6 | 8.4 | 7.9 | 7.0 | 7.3 | 9.6 | 10.5 | 13.3 | 16.1 | 17.2 | 18.4 | 18.7 | 18.2 | 17.5 | 15.8 | 13.8 | 12.3 | 11.5 | 11.2 | 10.9 | 10.5 | 12.2 | 18.7 |
| 28-Sep | 10.1 | 9.9 | 9.6 | 9.6 | 10.1 | 8.9 | 7.3 | 9.4 | 11.8 | 13.7 | 15.9 | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | 15.9 |
| 29-Sep | M | M | M | M | M | M | M | M | M | M | M | M | 21.9 | 23.4 | 25.3 | 25.7 | 25.1 | 23.9 | 20.0 | 17.2 | 14.8 | 12.7 | 13.2 | 11.9 | -- | 25.7 |
| 30-Sep | 10.5 | 8.9 | 7.9 | 7.8 | 7.3 | 7.1 | 7.6 | 8.4 | 10.0 | 12.2 | 14.1 | 16.6 | 19.2 | 21.3 | 22.4 | 22.8 | 21.3 | 20.3 | 19.6 | 18.5 | 18.0 | 17.1 | 15.8 | 14.5 | 14.5 | 22.8 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 10.4 | 9.9 | 9.4 | 8.9 | 8.5 | 8.2 | 8.1 | 8.7 | 10.2 | 11.8 | 13.4 | 14.9 | 16.3 | 17.2 | 17.7 | 17.9 | 17.8 | 17.2 | 15.9 | 14.4 | 13.1 | 12.3 | 11.6 | 11.0 | Diurnal Average | |
| 19.9 | 19.6 | 18.5 | 17.7 | 17.1 | 16.8 | 16.5 | 16.6 | 17.9 | 19.3 | 22.1 | 25.7 | 28.2 | 30.4 | 31.3 | 31.6 | 31.6 | 31.2 | 29.7 | 28.0 | 26.7 | 24.9 | 22.8 | 21.2 | Diurnal Maximum | |

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 243 | 35.06 | 35.06 |
| 10 - 20 | 367 | 52.96 | 88.02 |
| > 20 | 83 | 11.98 | 100.00 |

Total Number of Valid Hours: 693

Total Number of Hours: 720

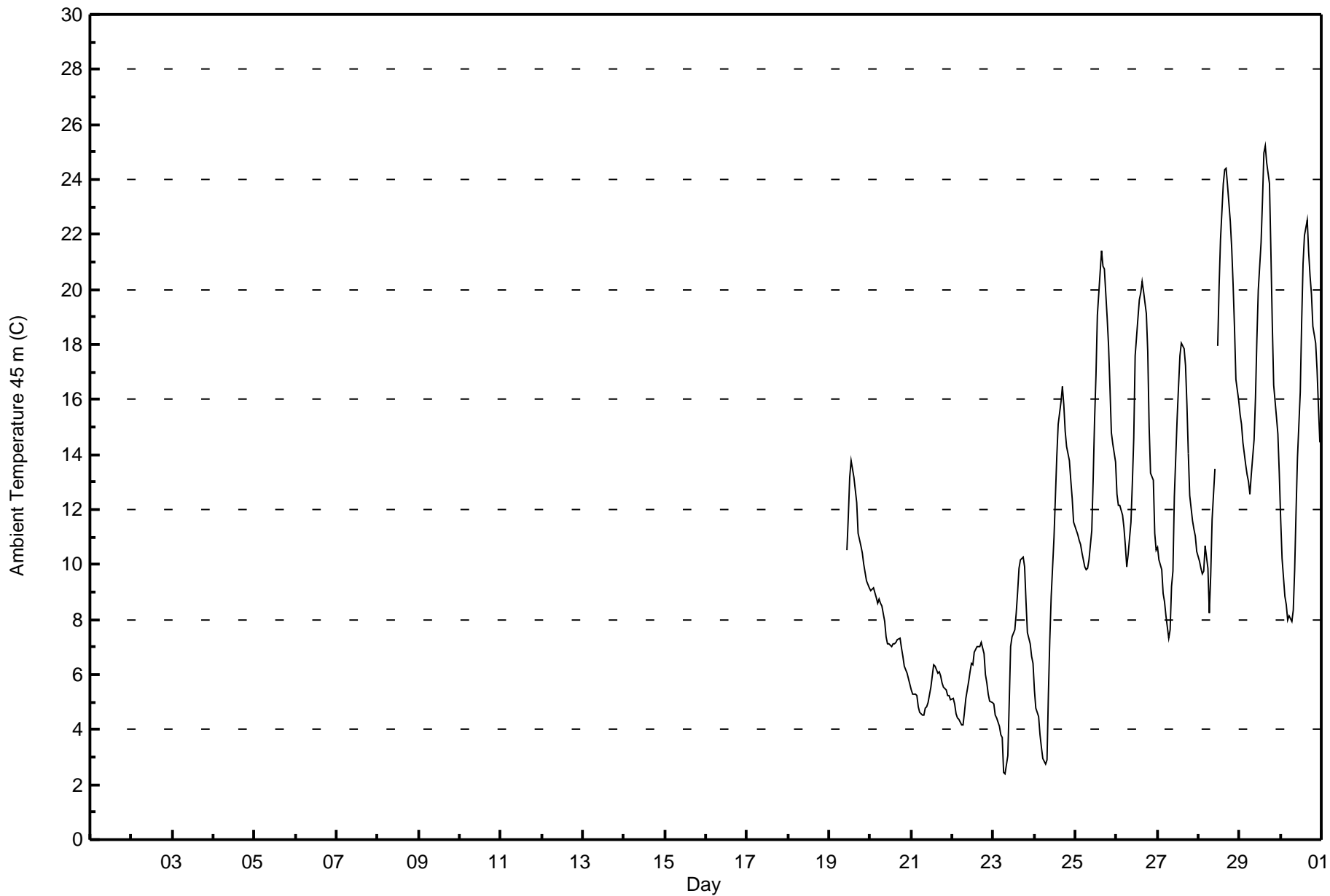


| Maximum Value: 25.2 C on Sep 29 16:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 17.6 C on Sep 29 | | | | | Hours in Service: 720 | | | | | | |
|--|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|------|------|-----------------|----------------------------|---------------|----|--|--|--|--|
| Minimum Value: 2.4 C on Sep 23 08:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 5.4 C on Sep 21 | | | | | Hours of Data: 277 | | | | | | |
| Maximum Diurnal Average: 15.9 C at hour 16 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 7.1 C at hour 7 | | | | | Hours of Missing Data: 443 | | | | | | |
| Monthly Average: 11.29 C | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 2.9 P ₁₀ = 4.9 O ₁ = 6.7 Median = 10.2 O ₃ = 15.1 P ₉₀ = 19.9 P ₉₉ = 24.5 | | | | | Hours of Calibration: 0 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 38.5 | | | | | | | | | | | |
| 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 10.5 | 11.7 | 13.2 | 13.8 | 13.2 | 12.7 | 12.2 | 11.2 | 10.7 | 10.4 | 10.0 | 9.7 | 9.4 | 9.1 | -- | 13.8 | | | | | |
| 20-Sep | 9.0 | 9.1 | 9.1 | 8.8 | 8.6 | 8.7 | 8.6 | 8.5 | 7.9 | 7.3 | 7.1 | 7.1 | 7.0 | 7.1 | 7.1 | 7.1 | 7.3 | 7.3 | 7.0 | 6.6 | 6.3 | 6.1 | 5.9 | 5.6 | 7.5 | 9.1 | | | | | |
| 21-Sep | 5.4 | 5.3 | 5.3 | 5.2 | 4.9 | 4.6 | 4.5 | 4.5 | 4.8 | 4.9 | 5.0 | 5.5 | 5.9 | 6.3 | 6.3 | 6.0 | 6.1 | 6.0 | 5.7 | 5.6 | 5.4 | 5.2 | 5.2 | 5.1 | 5.4 | 6.3 | | | | | |
| 22-Sep | 5.1 | 4.9 | 4.6 | 4.4 | 4.4 | 4.2 | 4.2 | 4.6 | 5.1 | 5.7 | 6.1 | 6.4 | 6.4 | 6.8 | 7.0 | 7.0 | 7.0 | 7.2 | 6.7 | 6.0 | 5.7 | 5.3 | 5.1 | 5.0 | 5.6 | 7.2 | | | | | |
| 23-Sep | 4.9 | 4.5 | 4.4 | 4.1 | 3.8 | 3.7 | 2.5 | 2.4 | 3.1 | 5.0 | 7.0 | 7.4 | 7.6 | 8.3 | 9.0 | 9.8 | 10.1 | 10.3 | 9.9 | 8.6 | 7.5 | 7.1 | 6.7 | 6.4 | 6.4 | 10.3 | | | | | |
| 24-Sep | 5.4 | 4.8 | 4.5 | 3.8 | 3.3 | 2.9 | 2.8 | 2.9 | 5.3 | 7.2 | 8.8 | 11.0 | 12.5 | 13.9 | 15.1 | 15.9 | 16.5 | 15.8 | 14.9 | 14.3 | 13.8 | 13.0 | 12.4 | 11.5 | 9.7 | 16.5 | | | | | |
| 25-Sep | 11.3 | 11.1 | 10.9 | 10.7 | 10.4 | 9.9 | 9.8 | 9.9 | 10.2 | 11.3 | 13.1 | 15.2 | 16.9 | 19.1 | 20.7 | 21.4 | 20.8 | 20.8 | 19.0 | 17.9 | 16.4 | 14.8 | 14.4 | 13.7 | 14.6 | 21.4 | | | | | |
| 26-Sep | 12.6 | 12.2 | 12.1 | 11.8 | 11.4 | 10.7 | 9.9 | 10.4 | 11.5 | 13.0 | 14.6 | 17.6 | 19.0 | 19.6 | 19.9 | 20.3 | 19.9 | 19.1 | 17.8 | 15.0 | 13.3 | 13.1 | 11.1 | 10.5 | 14.4 | 20.3 | | | | | |
| 27-Sep | 10.7 | 10.2 | 9.8 | 9.0 | 8.7 | 8.1 | 7.3 | 7.6 | 9.2 | 9.8 | 12.4 | 15.3 | 16.5 | 17.6 | 18.0 | 17.8 | 17.2 | 15.8 | 14.0 | 12.5 | 11.6 | 11.3 | 11.0 | 10.5 | 12.2 | 18.0 | | | | | |
| 28-Sep | 10.1 | 9.9 | 9.7 | 9.8 | 10.7 | 9.9 | 8.3 | 9.6 | 11.6 | 13.5 | M | 18.0 | 20.2 | 21.8 | 23.8 | 24.4 | 24.4 | 23.8 | 22.5 | 21.5 | 20.2 | 18.6 | 16.8 | 15.9 | 16.3 | 24.4 | | | | | |
| 29-Sep | 15.5 | 15.1 | 14.4 | 13.6 | 13.3 | 13.0 | 12.6 | 13.3 | 14.5 | 16.1 | 18.2 | 20.0 | 21.7 | 23.2 | 25.0 | 25.2 | 24.6 | 23.9 | 21.4 | 18.7 | 16.5 | 15.4 | 14.7 | 13.3 | 17.6 | 25.2 | | | | | |
| 30-Sep | 11.7 | 10.2 | 8.8 | 8.6 | 8.0 | 8.1 | 7.9 | 8.4 | 9.8 | 12.0 | 13.9 | 16.3 | 18.8 | 20.9 | 22.0 | 22.5 | 21.4 | 20.5 | 19.8 | 18.7 | 18.0 | 17.1 | 15.7 | 14.4 | 14.7 | 22.5 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | |
| M - Maintenance AF - Analyzer Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 133 | 48.01 | 48.01 |
| 10 - 20 | 118 | 42.60 | 90.61 |
| > 20 | 26 | 9.39 | 100.00 |

Total Number of Valid Hours: 277

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

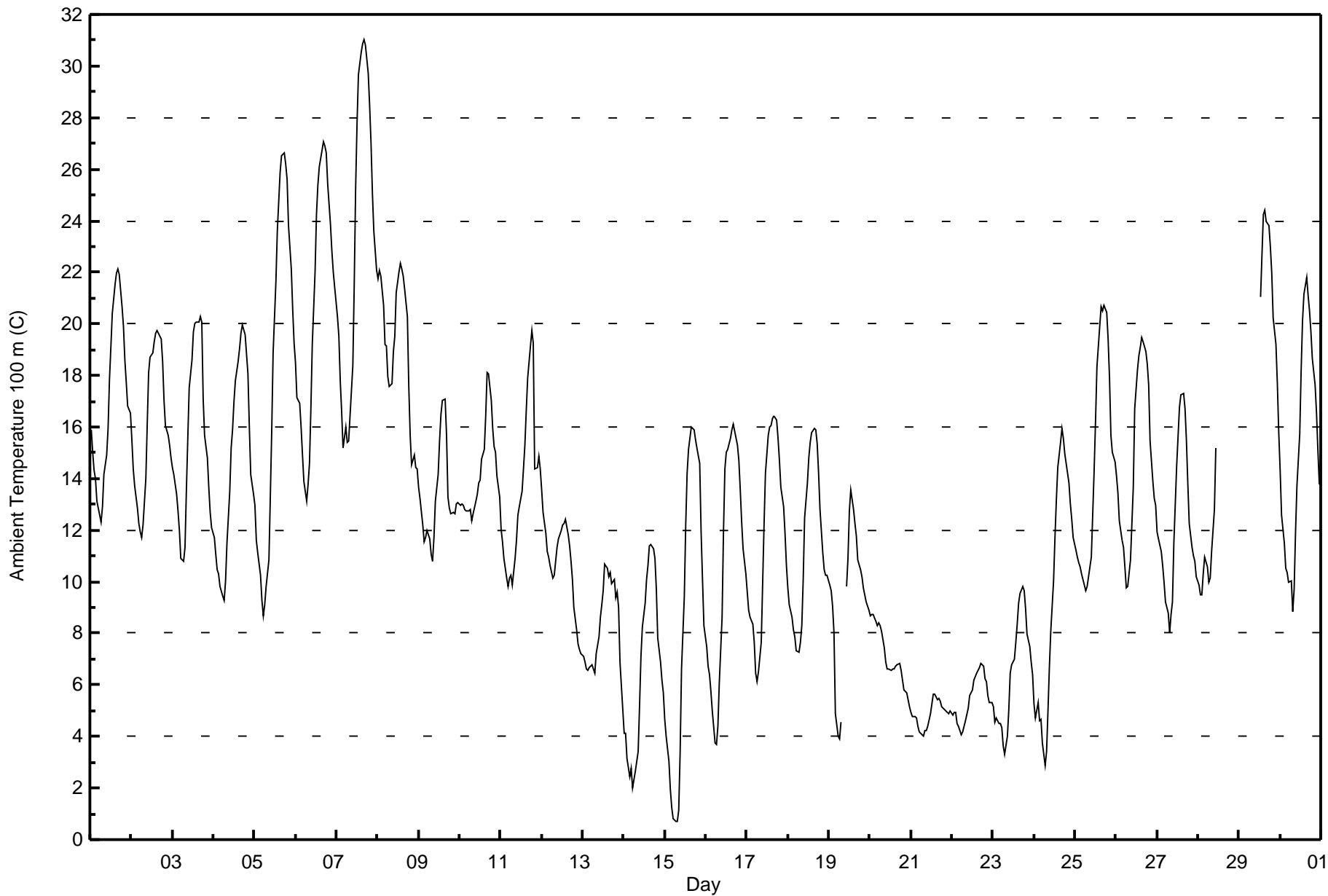
Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - September 2017

| Maximum Value: 31.0 C on Sep 7 17:00 | | Maximum Daily Average: 23.1 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 0.7 C on Sep 15 08:00 | | Minimum Daily Average: 4.8 C on Sep 21 | | Hours of Data: 693 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.1 C at hour 17 | | Minimum Diurnal Average: 8.5 C at hour 7 | | Hours of Missing Data: 27 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.73 C | | Percentiles: P ₁ = 2.3 P ₁₀ = 5.1 Q ₁ = 8.6 Median = 12.3 Q ₃ = 16.1 P ₉₀ = 20.5 P ₉₉ = 28.0 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 96.3 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 15.9 | 15.0 | 14.3 | 14.0 | 13.1 | 12.6 | 12.3 | 12.9 | 14.1 | 14.9 | 16.0 | 17.9 | 19.1 | 20.4 | 21.5 | 22.0 | 22.1 | 21.9 | 20.7 | 19.9 | 18.6 | 17.8 | 16.8 | 16.5 | 17.1 | 22.1 |
| 2-Sep | 15.5 | 14.4 | 13.7 | 12.9 | 12.3 | 11.9 | 11.7 | 12.2 | 14.0 | 16.1 | 18.1 | 18.7 | 18.9 | 19.3 | 19.6 | 19.8 | 19.6 | 19.4 | 18.5 | 17.0 | 16.1 | 15.7 | 15.3 | 14.8 | 16.1 | 19.8 |
| 3-Sep | 14.4 | 14.1 | 13.4 | 12.8 | 12.0 | 10.9 | 10.8 | 11.3 | 13.6 | 15.6 | 17.5 | 18.6 | 19.7 | 20.0 | 20.1 | 20.1 | 20.3 | 20.1 | 17.1 | 15.7 | 14.8 | 13.7 | 12.7 | 12.1 | 15.5 | 20.3 |
| 4-Sep | 11.7 | 11.1 | 10.5 | 10.3 | 9.8 | 9.4 | 9.3 | 10.1 | 11.5 | 13.5 | 15.2 | 15.9 | 17.0 | 17.8 | 18.5 | 19.0 | 19.6 | 20.0 | 19.6 | 18.8 | 18.0 | 16.0 | 14.2 | 13.4 | 14.6 | 20.0 |
| 5-Sep | 13.0 | 11.6 | 11.1 | 10.3 | 9.3 | 8.7 | 9.1 | 9.8 | 10.9 | 13.3 | 15.8 | 18.9 | 21.7 | 23.6 | 24.7 | 25.9 | 26.5 | 26.6 | 26.2 | 25.6 | 23.8 | 22.1 | 20.6 | 19.2 | 17.8 | 26.6 |
| 6-Sep | 18.5 | 17.2 | 16.9 | 16.0 | 14.9 | 13.9 | 13.2 | 13.8 | 14.6 | 16.7 | 19.2 | 22.0 | 24.2 | 25.4 | 26.1 | 26.7 | 27.0 | 26.9 | 26.6 | 25.4 | 23.9 | 22.8 | 22.0 | 21.4 | 20.6 | 27.0 |
| 7-Sep | 20.3 | 19.5 | 17.8 | 16.6 | 15.2 | 16.0 | 15.4 | 15.4 | 16.5 | 18.4 | 21.6 | 25.3 | 27.7 | 29.6 | 30.5 | 30.9 | 31.0 | 30.8 | 29.7 | 28.5 | 27.0 | 25.1 | 23.6 | 22.1 | 23.1 | 31.0 |
| 8-Sep | 21.7 | 22.1 | 21.9 | 20.7 | 19.2 | 19.2 | 18.0 | 17.5 | 17.7 | 18.9 | 19.5 | 21.2 | 22.0 | 22.3 | 22.1 | 21.9 | 21.4 | 20.3 | 17.6 | 15.7 | 14.5 | 14.9 | 14.4 | 14.4 | 19.1 | 22.3 |
| 9-Sep | 13.7 | 13.2 | 12.2 | 11.6 | 11.7 | 12.0 | 11.7 | 11.1 | 10.8 | 11.7 | 13.1 | 14.1 | 15.5 | 16.5 | 17.0 | 17.1 | 15.7 | 13.3 | 12.9 | 12.6 | 12.7 | 12.6 | 13.0 | 13.1 | 13.3 | 17.1 |
| 10-Sep | 13.0 | 13.0 | 12.9 | 12.8 | 12.7 | 12.7 | 12.8 | 12.4 | 12.6 | 13.1 | 13.4 | 13.8 | 13.9 | 14.7 | 15.1 | 16.5 | 18.1 | 18.0 | 17.0 | 15.9 | 15.2 | 15.0 | 14.1 | 13.3 | 14.3 | 18.1 |
| 11-Sep | 12.0 | 11.6 | 10.9 | 10.1 | 9.8 | 10.2 | 10.3 | 9.9 | 10.9 | 11.6 | 12.6 | 12.9 | 13.5 | 14.4 | 15.3 | 16.7 | 17.9 | 19.2 | 19.7 | 19.3 | 14.4 | 14.4 | 14.9 | 14.4 | 13.6 | 19.7 |
| 12-Sep | 13.5 | 12.7 | 11.9 | 11.2 | 11.0 | 10.6 | 10.1 | 10.3 | 10.8 | 11.4 | 11.7 | 12.0 | 12.2 | 12.3 | 12.4 | 11.8 | 11.4 | 10.8 | 10.1 | 9.0 | 8.2 | 7.6 | 7.4 | 7.2 | 10.7 | 13.5 |
| 13-Sep | 7.1 | 6.9 | 6.6 | 6.6 | 6.7 | 6.8 | 6.6 | 6.4 | 7.2 | 7.9 | 8.6 | 9.1 | 9.6 | 10.7 | 10.5 | 10.2 | 10.4 | 9.9 | 10.1 | 9.4 | 9.6 | 9.0 | 6.9 | 5.0 | 8.2 | 10.7 |
| 14-Sep | 4.1 | 4.1 | 3.2 | 2.5 | 2.7 | 2.0 | 2.3 | 2.7 | 3.4 | 5.2 | 7.1 | 8.2 | 9.2 | 10.1 | 10.6 | 11.4 | 11.4 | 11.3 | 10.9 | 9.7 | 7.8 | 6.9 | 6.2 | 5.7 | 6.6 | 11.4 |
| 15-Sep | 4.7 | 4.0 | 3.1 | 1.9 | 1.2 | 0.8 | 0.7 | 0.7 | 1.2 | 3.4 | 6.6 | 9.5 | 12.2 | 14.2 | 15.2 | 16.0 | 16.0 | 15.9 | 15.5 | 15.2 | 14.6 | 11.9 | 10.1 | 8.3 | 8.4 | 16.0 |
| 16-Sep | 7.5 | 6.7 | 6.4 | 5.7 | 5.0 | 3.8 | 3.7 | 4.4 | 6.1 | 8.6 | 12.0 | 14.4 | 15.0 | 15.2 | 15.6 | 15.9 | 16.1 | 15.8 | 15.3 | 14.7 | 13.6 | 12.3 | 11.3 | 10.3 | 10.6 | 16.1 |
| 17-Sep | 9.6 | 8.9 | 8.6 | 8.4 | 7.6 | 6.4 | 6.1 | 6.5 | 7.7 | 9.9 | 12.2 | 14.2 | 15.7 | 16.0 | 16.1 | 16.3 | 16.5 | 16.3 | 15.5 | 14.7 | 13.6 | 12.9 | 11.9 | 10.6 | 11.8 | 16.5 |
| 18-Sep | 9.7 | 9.1 | 8.6 | 8.2 | 7.8 | 7.3 | 7.3 | 7.7 | 8.3 | 10.1 | 12.5 | 13.8 | 14.8 | 15.4 | 15.8 | 15.9 | 15.9 | 15.4 | 14.2 | 12.8 | 11.1 | 10.4 | 10.2 | 10.2 | 11.4 | 15.9 |
| 19-Sep | 9.9 | 9.6 | 9.0 | 8.0 | 4.9 | 4.0 | 3.9 | 4.5 | M | M | 9.8 | 10.9 | 12.7 | 13.5 | 12.8 | 12.3 | 11.8 | 10.8 | 10.4 | 10.2 | 9.8 | 9.5 | 9.2 | 8.9 | 9.4 | 13.5 |
| 20-Sep | 8.7 | 8.7 | 8.7 | 8.5 | 8.3 | 8.4 | 8.3 | 8.1 | 7.4 | 6.9 | 6.6 | 6.6 | 6.5 | 6.6 | 6.6 | 6.7 | 6.8 | 6.9 | 6.6 | 6.2 | 5.8 | 5.7 | 5.4 | 5.1 | 7.1 | 8.7 |
| 21-Sep | 4.9 | 4.7 | 4.8 | 4.7 | 4.4 | 4.2 | 4.1 | 4.0 | 4.2 | 4.2 | 4.4 | 4.9 | 5.3 | 5.6 | 5.7 | 5.4 | 5.5 | 5.4 | 5.2 | 5.1 | 5.0 | 4.9 | 4.9 | 5.0 | 4.8 | 5.7 |
| 22-Sep | 4.8 | 5.0 | 4.9 | 4.5 | 4.4 | 4.1 | 4.2 | 4.4 | 4.6 | 5.1 | 5.6 | 5.7 | 5.8 | 6.2 | 6.4 | 6.6 | 6.7 | 6.8 | 6.7 | 6.2 | 6.1 | 5.6 | 5.3 | 5.3 | 5.5 | 6.8 |
| 23-Sep | 5.1 | 4.6 | 4.7 | 4.5 | 4.5 | 4.4 | 3.6 | 3.3 | 4.0 | 5.1 | 6.4 | 6.8 | 7.0 | 7.7 | 8.4 | 9.2 | 9.6 | 9.8 | 9.7 | 8.9 | 8.0 | 7.5 | 6.9 | 6.4 | 6.5 | 9.8 |
| 24-Sep | 5.3 | 4.7 | 5.3 | 4.6 | 4.7 | 3.7 | 2.9 | 3.4 | 5.0 | 6.7 | 8.1 | 10.0 | 11.7 | 13.2 | 14.4 | 15.4 | 16.0 | 15.6 | 15.0 | 14.6 | 13.9 | 13.0 | 12.4 | 11.7 | 9.6 | 16.0 |
| 25-Sep | 11.2 | 11.0 | 10.7 | 10.6 | 10.3 | 9.9 | 9.6 | 9.8 | 10.2 | 10.9 | 12.6 | 14.3 | 16.2 | 18.4 | 19.9 | 20.7 | 20.5 | 20.7 | 20.5 | 19.4 | 17.9 | 15.7 | 15.0 | 14.6 | 14.6 | 20.7 |
| 26-Sep | 14.1 | 13.4 | 12.4 | 11.6 | 11.4 | 10.6 | 9.8 | 9.8 | 10.8 | 12.2 | 13.7 | 16.7 | 18.2 | 18.8 | 19.1 | 19.5 | 19.3 | 18.9 | 18.4 | 17.6 | 15.5 | 13.9 | 13.3 | 13.0 | 14.7 | 19.5 |
| 27-Sep | 11.9 | 11.7 | 11.2 | 10.6 | 10.0 | 9.2 | 8.8 | 8.0 | 8.7 | 9.2 | 11.5 | 14.5 | 15.6 | 16.7 | 17.3 | 17.3 | 16.7 | 15.5 | 13.8 | 12.3 | 11.3 | 11.0 | 10.8 | 10.2 | 12.2 | 17.3 |
| 28-Sep | 9.8 | 9.5 | 9.5 | 10.3 | 11.0 | 10.6 | 10.0 | 10.1 | 11.2 | 12.8 | 15.2 | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | 15.2 |
| 29-Sep | M | M | M | M | M | M | M | M | M | M | M | M | 21.1 | 22.7 | 24.3 | 24.4 | 24.0 | 23.8 | 23.0 | 22.0 | 20.2 | 19.2 | 17.7 | 15.8 | -- | 24.4 |
| 30-Sep | 14.3 | 12.6 | 11.5 | 10.5 | 10.3 | 10.0 | 10.0 | 8.8 | 9.7 | 11.9 | 13.7 | 15.7 | 18.2 | 20.1 | 21.1 | 21.8 | 21.1 | 20.5 | 19.7 | 18.6 | 17.6 | 16.6 | 15.1 | 13.8 | 15.1 | 21.8 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 230 | 33.19 | 33.19 |
| 10 - 20 | 384 | 55.41 | 88.60 |
| > 20 | 79 | 11.40 | 100.00 |

Total Number of Valid Hours: 693

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 167 m (AT167m) - C

Lower Camp Met Tower - September 2017

| | | |
|--|--|--------------------------------|
| Maximum Value: 30.4 C on Sep 7 17:00 | Maximum Daily Average: 23.3 C on Sep 7 | Hours in Service: 720 |
| Minimum Value: 0.5 C on Sep 15 08:00 | Minimum Daily Average: 4.3 C on Sep 21 | Hours of Data: 713 |
| Maximum Diurnal Average: 16.8 C at hour 17 | Minimum Diurnal Average: 9.0 C at hour 8 | Hours of Missing Data: 7 |
| Monthly Average: 12.79 C | Percentiles: P ₁ = 3.5 P ₁₀ = 5.1 Q ₁ = 8.8 Median = 12.4 Q ₃ = 16.2 P ₉₀ = 20.4 P ₉₉ = 28.3 | Hours of Calibration: 0 |
| | | Percent Operational Time: 99.0 |

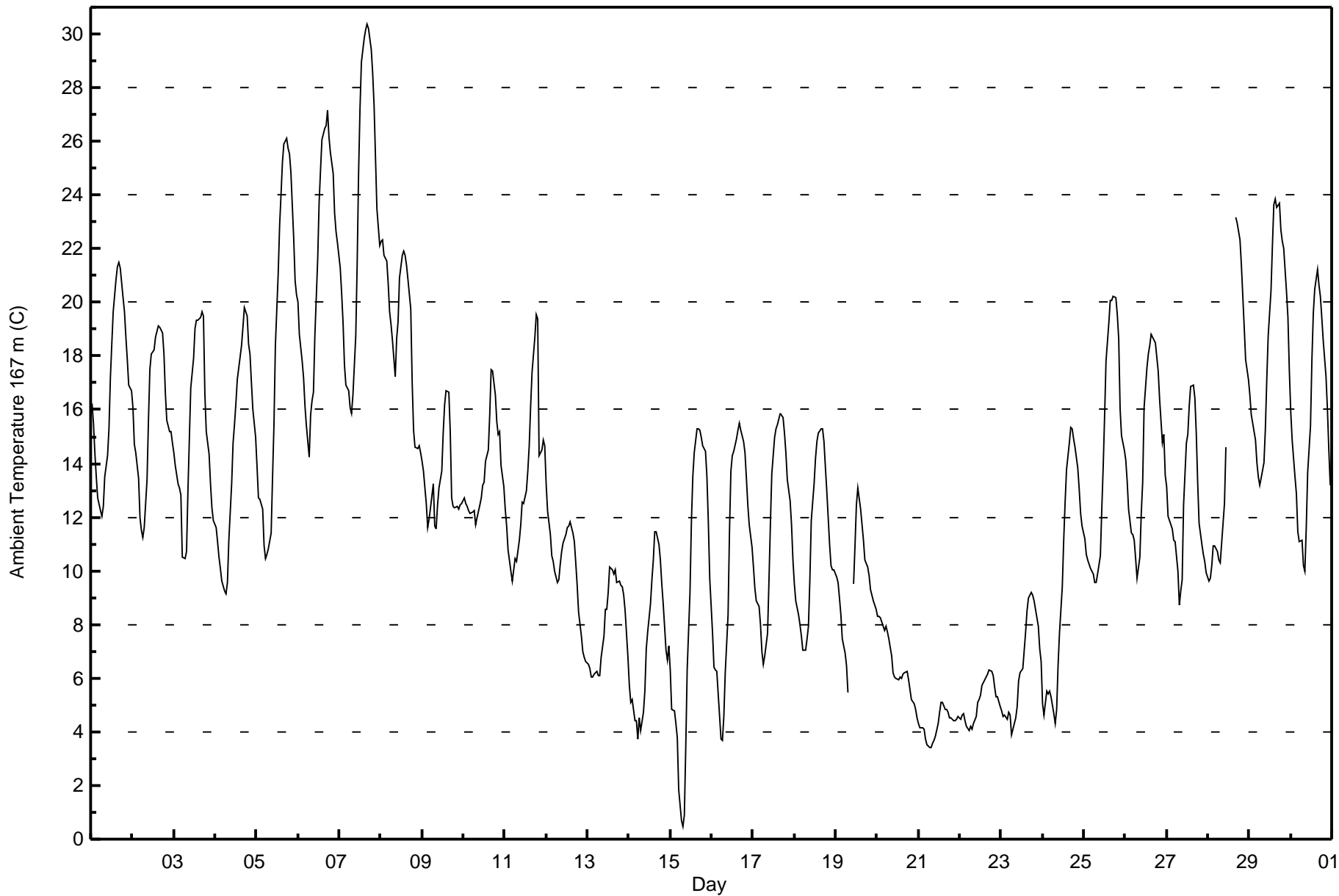
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 16.2 | 15.5 | 14.4 | 13.5 | 12.7 | 12.3 | 12.0 | 12.4 | 13.5 | 14.3 | 15.3 | 17.2 | 18.4 | 19.7 | 20.8 | 21.3 | 21.5 | 21.3 | 20.2 | 19.7 | 18.7 | 17.9 | 16.9 | 16.7 | 16.8 | 21.5 |
| 2-Sep | 16.1 | 14.7 | 14.4 | 13.4 | 12.0 | 11.5 | 11.3 | 11.6 | 13.4 | 15.6 | 17.5 | 18.0 | 18.2 | 18.7 | 18.9 | 19.1 | 19.0 | 18.9 | 18.1 | 16.6 | 15.6 | 15.2 | 15.2 | 14.8 | 15.7 | 19.1 |
| 3-Sep | 14.4 | 13.9 | 13.2 | 13.1 | 12.8 | 10.5 | 10.4 | 10.7 | 13.0 | 14.9 | 16.8 | 17.9 | 19.0 | 19.3 | 19.4 | 19.4 | 19.6 | 19.5 | 16.6 | 15.2 | 14.3 | 13.2 | 12.3 | 11.9 | 15.1 | 19.6 |
| 4-Sep | 11.6 | 11.1 | 10.5 | 10.1 | 9.6 | 9.2 | 9.2 | 9.6 | 11.1 | 13.3 | 14.8 | 15.4 | 16.3 | 17.1 | 18.0 | 18.4 | 19.1 | 19.8 | 19.5 | 18.4 | 18.1 | 17.0 | 16.0 | 15.0 | 14.5 | 19.8 |
| 5-Sep | 13.9 | 12.7 | 12.7 | 12.3 | 11.0 | 10.4 | 10.6 | 10.8 | 11.4 | 13.5 | 15.4 | 18.4 | 21.1 | 22.8 | 24.0 | 25.2 | 25.9 | 26.1 | 25.8 | 25.5 | 24.8 | 22.4 | 20.8 | 20.3 | 18.2 | 26.1 |
| 6-Sep | 20.0 | 18.8 | 17.8 | 17.2 | 16.1 | 15.4 | 14.3 | 15.8 | 16.4 | 16.7 | 18.8 | 21.6 | 23.7 | 24.9 | 26.1 | 26.5 | 26.6 | 27.1 | 26.2 | 25.6 | 24.8 | 23.3 | 22.7 | 22.2 | 21.2 | 27.1 |
| 7-Sep | 21.3 | 20.3 | 19.2 | 17.7 | 16.9 | 16.7 | 16.1 | 15.8 | 16.6 | 18.7 | 21.4 | 24.8 | 27.2 | 29.0 | 29.8 | 30.2 | 30.4 | 30.2 | 29.4 | 28.5 | 27.3 | 25.4 | 23.5 | 22.1 | 23.3 | 30.4 |
| 8-Sep | 22.3 | 22.3 | 21.7 | 21.5 | 20.7 | 19.7 | 19.2 | 18.6 | 17.2 | 18.7 | 19.3 | 20.9 | 21.7 | 21.9 | 21.7 | 21.4 | 20.9 | 19.8 | 17.0 | 15.2 | 14.6 | 14.6 | 14.7 | 14.4 | 19.2 | 22.3 |
| 9-Sep | 14.1 | 13.7 | 12.5 | 11.6 | 11.9 | 12.4 | 13.2 | 11.7 | 11.5 | 12.4 | 13.1 | 13.7 | 15.1 | 16.2 | 16.7 | 16.7 | 15.2 | 12.7 | 12.4 | 12.3 | 12.4 | 12.3 | 12.5 | 12.5 | 13.3 | 16.7 |
| 10-Sep | 12.7 | 12.5 | 12.4 | 12.2 | 12.1 | 12.2 | 12.3 | 11.7 | 12.0 | 12.5 | 12.7 | 13.2 | 13.3 | 14.1 | 14.5 | 15.8 | 17.5 | 17.5 | 16.5 | 15.6 | 15.1 | 15.2 | 13.9 | 13.2 | 13.8 | 17.5 |
| 11-Sep | 12.3 | 11.7 | 10.8 | 10.0 | 9.6 | 10.1 | 10.5 | 10.3 | 11.1 | 11.7 | 12.5 | 12.5 | 13.0 | 13.7 | 14.7 | 16.1 | 17.4 | 18.7 | 19.5 | 19.4 | 14.3 | 14.5 | 14.9 | 14.7 | 13.5 | 19.5 |
| 12-Sep | 13.3 | 12.2 | 11.3 | 10.6 | 10.4 | 10.0 | 9.6 | 9.7 | 10.2 | 10.7 | 11.0 | 11.3 | 11.6 | 11.7 | 11.8 | 11.4 | 11.1 | 10.3 | 9.5 | 8.5 | 7.6 | 7.0 | 6.8 | 6.6 | 10.2 | 13.3 |
| 13-Sep | 6.5 | 6.3 | 6.1 | 6.0 | 6.2 | 6.3 | 6.1 | 6.1 | 6.8 | 7.6 | 8.5 | 8.6 | 9.2 | 10.1 | 10.0 | 9.9 | 10.0 | 9.6 | 9.6 | 9.5 | 9.4 | 9.1 | 8.5 | 6.8 | 8.0 | 10.1 |
| 14-Sep | 5.7 | 5.1 | 5.2 | 4.4 | 4.4 | 3.7 | 4.5 | 4.0 | 4.7 | 5.5 | 7.1 | 7.7 | 8.8 | 9.6 | 10.4 | 11.5 | 11.4 | 11.0 | 10.4 | 9.5 | 8.8 | 7.1 | 6.7 | 7.2 | 7.3 | 11.5 |
| 15-Sep | 6.3 | 4.8 | 4.8 | 4.3 | 3.8 | 1.8 | 0.7 | 0.5 | 0.9 | 3.4 | 6.3 | 9.2 | 11.8 | 13.5 | 14.4 | 15.3 | 15.3 | 15.2 | 15.0 | 14.7 | 14.4 | 13.5 | 11.8 | 9.7 | 8.8 | 15.3 |
| 16-Sep | 7.7 | 6.4 | 6.3 | 6.3 | 5.4 | 3.7 | 3.7 | 4.6 | 6.2 | 8.4 | 11.4 | 13.7 | 14.3 | 14.5 | 14.9 | 15.2 | 15.5 | 15.2 | 14.8 | 14.4 | 13.5 | 12.4 | 11.7 | 10.9 | 10.5 | 15.5 |
| 17-Sep | 10.2 | 9.4 | 8.9 | 8.6 | 8.0 | 7.0 | 6.5 | 6.8 | 7.7 | 9.6 | 11.7 | 13.6 | 15.0 | 15.3 | 15.4 | 15.7 | 15.8 | 15.7 | 15.1 | 14.4 | 13.4 | 12.6 | 11.7 | 10.4 | 11.6 | 15.8 |
| 18-Sep | 9.5 | 8.9 | 8.3 | 8.0 | 7.6 | 7.0 | 7.0 | 7.4 | 7.9 | 9.6 | 11.9 | 13.3 | 14.2 | 14.8 | 15.1 | 15.3 | 15.3 | 14.8 | 13.9 | 13.0 | 11.0 | 10.2 | 10.0 | 10.0 | 11.0 | 15.3 |
| 19-Sep | 9.8 | 9.6 | 9.0 | 8.4 | 7.4 | 6.9 | 6.5 | 5.4 | M | M | 9.5 | 10.9 | 12.4 | 13.1 | 12.3 | 11.7 | 11.2 | 10.4 | 10.1 | 9.8 | 9.3 | 9.1 | 8.9 | 8.6 | 9.6 | 13.1 |
| 20-Sep | 8.3 | 8.3 | 8.2 | 8.0 | 7.8 | 7.9 | 7.7 | 7.5 | 6.8 | 6.2 | 6.0 | 6.0 | 5.9 | 6.0 | 6.0 | 6.1 | 6.2 | 6.2 | 6.0 | 5.6 | 5.2 | 5.0 | 4.8 | 4.5 | 6.5 | 8.3 |
| 21-Sep | 4.3 | 4.1 | 4.2 | 4.1 | 3.7 | 3.5 | 3.4 | 3.4 | 3.6 | 3.7 | 3.8 | 4.3 | 4.7 | 5.1 | 5.1 | 4.8 | 4.9 | 4.7 | 4.5 | 4.5 | 4.4 | 4.4 | 4.5 | 4.6 | 4.3 | 5.1 |
| 22-Sep | 4.5 | 4.6 | 4.7 | 4.4 | 4.2 | 4.0 | 4.2 | 4.1 | 4.3 | 4.6 | 5.1 | 5.2 | 5.4 | 5.7 | 5.9 | 6.1 | 6.2 | 6.3 | 6.2 | 6.1 | 5.7 | 5.3 | 5.3 | 5.0 | 5.1 | 6.3 |
| 23-Sep | 4.8 | 4.6 | 4.6 | 4.5 | 4.7 | 4.6 | 3.9 | 4.1 | 4.5 | 5.0 | 5.9 | 6.2 | 6.4 | 7.0 | 7.7 | 8.5 | 9.0 | 9.2 | 9.1 | 8.9 | 8.6 | 7.9 | 7.1 | 6.6 | 6.4 | 9.2 |
| 24-Sep | 5.0 | 4.6 | 5.5 | 5.4 | 5.5 | 5.3 | 4.7 | 4.3 | 4.8 | 6.5 | 7.7 | 9.4 | 11.1 | 12.6 | 13.8 | 14.8 | 15.3 | 15.3 | 14.9 | 14.6 | 13.8 | 13.0 | 12.1 | 11.6 | 9.7 | 15.3 |
| 25-Sep | 11.2 | 10.6 | 10.4 | 10.3 | 10.1 | 9.9 | 9.6 | 9.5 | 9.9 | 10.6 | 12.3 | 13.9 | 15.8 | 17.8 | 19.2 | 20.1 | 20.1 | 20.2 | 20.2 | 19.5 | 18.6 | 16.0 | 15.0 | 14.5 | 14.4 | 20.2 |
| 26-Sep | 14.1 | 13.4 | 12.3 | 11.4 | 11.3 | 11.1 | 10.5 | 9.7 | 10.5 | 12.1 | 13.3 | 16.1 | 17.5 | 18.1 | 18.4 | 18.8 | 18.7 | 18.5 | 18.0 | 17.5 | 16.4 | 14.8 | 15.1 | 13.5 | 14.6 | 18.8 |
| 27-Sep | 13.1 | 12.0 | 11.7 | 11.6 | 11.1 | 11.1 | 10.0 | 8.7 | 9.3 | 9.7 | 12.4 | 14.7 | 15.1 | 16.1 | 16.8 | 16.9 | 16.5 | 15.1 | 13.3 | 11.8 | 11.0 | 10.6 | 10.3 | 9.9 | 12.5 | 16.9 |
| 28-Sep | 9.6 | 9.7 | 10.2 | 10.9 | 10.9 | 10.7 | 10.4 | 10.3 | 11.0 | 12.5 | 14.6 | M | M | M | M | M | 23.2 | 23.0 | 22.3 | 21.4 | 20.2 | 19.1 | 17.8 | 17.1 | 15.0 | 23.2 |
| 29-Sep | 16.5 | 15.8 | 15.5 | 14.9 | 14.1 | 13.5 | 13.2 | 13.5 | 14.0 | 15.3 | 17.1 | 18.8 | 20.5 | 22.1 | 23.6 | 23.9 | 23.5 | 23.7 | 22.7 | 22.3 | 22.0 | 20.4 | 19.4 | 17.5 | 18.5 | 23.9 |
| 30-Sep | 15.9 | 14.9 | 13.5 | 12.9 | 11.5 | 11.1 | 11.2 | 10.2 | 10.0 | 11.6 | 13.7 | 15.4 | 17.9 | 19.6 | 20.5 | 21.2 | 20.6 | 20.2 | 19.4 | 18.6 | 17.2 | 16.0 | 14.5 | 13.2 | 15.4 | 21.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 232 | 32.54 | 32.54 |
| 10 - 20 | 400 | 56.10 | 88.64 |
| > 20 | 81 | 11.36 | 100.00 |

Total Number of Valid Hours: 713

Total Number of Hours: 720



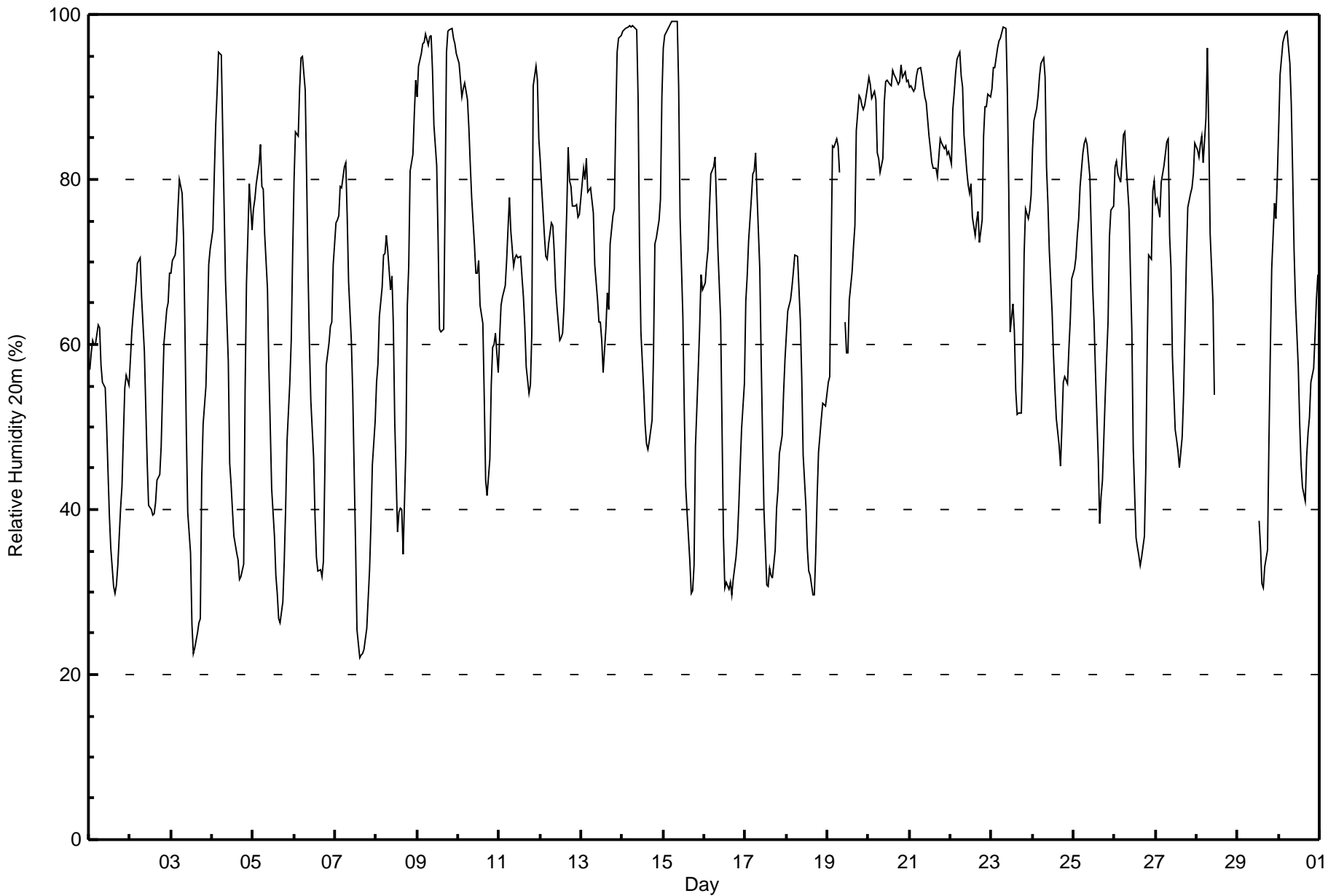
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 20m (RH20m) - %

Lower Camp Met Tower - September 2017

| Maximum Value: 99 % on Sep 15 07:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 90.2 % on Sep 20 | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|------|--------------------------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 22 % on Sep 7 15:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 49.2 % on Sep 1 | | | | | | Hours of Data: 693 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 84.9 % at hour 6 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 46.8 % at hour 16 | | | | | | Hours of Missing Data: 27 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 67.4 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 53 Median = 70 O ₃ = 83 P ₉₀ = 93 P ₉₉ = 99 | | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 96.3 | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 57 | 59 | 61 | 60 | 60 | 62 | 62 | 57 | 55 | 55 | 50 | 45 | 39 | 35 | 31 | 30 | 31 | 33 | 40 | 43 | 49 | 55 | 56 | 55 | 49.2 | 62 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 58 | 62 | 64 | 67 | 70 | 70 | 71 | 66 | 59 | 52 | 46 | 41 | 40 | 39 | 39 | 41 | 44 | 44 | 48 | 54 | 60 | 64 | 65 | 69 | 55.5 | 71 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 69 | 70 | 71 | 73 | 76 | 80 | 78 | 73 | 62 | 49 | 40 | 35 | 26 | 23 | 23 | 25 | 26 | 27 | 44 | 50 | 55 | 62 | 70 | 72 | 53.2 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 74 | 81 | 87 | 91 | 95 | 95 | 86 | 77 | 68 | 58 | 46 | 43 | 40 | 37 | 35 | 34 | 32 | 32 | 33 | 54 | 67 | 73 | 79 | 74 | 62.1 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 76 | 78 | 79 | 82 | 84 | 79 | 79 | 73 | 67 | 57 | 50 | 43 | 37 | 32 | 30 | 27 | 26 | 29 | 34 | 40 | 48 | 55 | 61 | 71 | 55.7 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 80 | 86 | 85 | 91 | 95 | 95 | 91 | 80 | 69 | 60 | 53 | 46 | 39 | 34 | 33 | 33 | 32 | 34 | 44 | 57 | 60 | 62 | 63 | 70 | 62.2 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 75 | 75 | 76 | 79 | 79 | 82 | 82 | 76 | 68 | 60 | 54 | 45 | 36 | 25 | 22 | 22 | 23 | 23 | 26 | 29 | 33 | 38 | 45 | 51 | 50.9 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 55 | 58 | 63 | 67 | 71 | 71 | 73 | 71 | 67 | 68 | 62 | 51 | 37 | 40 | 40 | 40 | 35 | 48 | 65 | 70 | 81 | 83 | 88 | 92 | 62.3 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 90 | 94 | 95 | 96 | 97 | 98 | 96 | 97 | 98 | 93 | 87 | 82 | 73 | 62 | 62 | 62 | 77 | 95 | 98 | 98 | 98 | 97 | 96 | 95 | 89.0 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 94 | 92 | 90 | 91 | 92 | 90 | 86 | 82 | 78 | 72 | 69 | 69 | 70 | 65 | 63 | 54 | 43 | 42 | 46 | 55 | 60 | 60 | 61 | 57 | 69.9 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 61 | 65 | 66 | 67 | 70 | 74 | 78 | 74 | 70 | 70 | 71 | 71 | 71 | 68 | 66 | 62 | 57 | 54 | 55 | 61 | 91 | 94 | 92 | 85 | 70.5 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 82 | 79 | 73 | 71 | 70 | 72 | 75 | 74 | 71 | 67 | 65 | 61 | 61 | 61 | 65 | 76 | 84 | 80 | 79 | 77 | 77 | 77 | 75 | 76 | 72.8 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 80 | 81 | 80 | 82 | 79 | 79 | 77 | 76 | 70 | 65 | 63 | 63 | 61 | 57 | 62 | 66 | 64 | 72 | 76 | 76 | 87 | 96 | 97 | 97 | 75.2 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 98 | 98 | 90 | 72 | 61 | 54 | 50 | 48 | 47 | 48 | 51 | 59 | 72 | 73 | 75 | 78 | 90 | 77.3 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 96 | 97 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 91 | 75 | 63 | 52 | 43 | 40 | 34 | 30 | 30 | 33 | 48 | 57 | 62 | 69 | 67 | 70.0 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 67 | 70 | 71 | 76 | 81 | 82 | 83 | 78 | 72 | 63 | 50 | 37 | 30 | 31 | 30 | 31 | 30 | 32 | 34 | 36 | 41 | 45 | 50 | 55 | 53.1 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 65 | 68 | 73 | 78 | 81 | 81 | 83 | 78 | 69 | 58 | 49 | 40 | 31 | 31 | 33 | 32 | 32 | 35 | 40 | 42 | 47 | 49 | 54 | 58 | 54.4 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 61 | 64 | 65 | 67 | 69 | 71 | 71 | 67 | 63 | 56 | 47 | 40 | 35 | 33 | 32 | 30 | 30 | 35 | 42 | 47 | 51 | 53 | 53 | 53 | 51.3 | 71 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 55 | 56 | 71 | 84 | 84 | 85 | 84 | 81 | M | M | 63 | 59 | 59 | 65 | 69 | 72 | 74 | 86 | 90 | 90 | 89 | 88 | 89 | 91 | 76.6 | 91 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 92 | 92 | 90 | 91 | 90 | 83 | 83 | 81 | 83 | 89 | 92 | 92 | 91 | 91 | 93 | 93 | 92 | 91 | 92 | 94 | 92 | 93 | 92 | 92 | 90.2 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 91 | 91 | 91 | 91 | 93 | 93 | 94 | 93 | 91 | 90 | 89 | 85 | 84 | 82 | 81 | 81 | 80 | 83 | 85 | 84 | 84 | 84 | 83 | 83 | 87.0 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 82 | 88 | 90 | 93 | 95 | 95 | 93 | 91 | 85 | 81 | 79 | 78 | 79 | 75 | 73 | 75 | 76 | 72 | 75 | 85 | 89 | 89 | 90 | 90 | 84.2 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 91 | 94 | 94 | 96 | 97 | 97 | 98 | 99 | 98 | 91 | 79 | 61 | 65 | 62 | 54 | 51 | 52 | 52 | 58 | 71 | 77 | 75 | 76 | 78 | 77.7 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 84 | 87 | 89 | 90 | 93 | 94 | 95 | 92 | 82 | 77 | 71 | 64 | 59 | 55 | 51 | 48 | 45 | 50 | 55 | 56 | 55 | 60 | 63 | 68 | 70.1 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 69 | 71 | 73 | 75 | 79 | 83 | 84 | 85 | 84 | 80 | 74 | 67 | 63 | 57 | 46 | 38 | 41 | 44 | 54 | 59 | 63 | 73 | 76 | 77 | 67.3 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 82 | 82 | 81 | 80 | 82 | 85 | 86 | 82 | 76 | 69 | 62 | 47 | 37 | 35 | 34 | 33 | 34 | 37 | 45 | 60 | 71 | 70 | 79 | 80 | 63.7 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 77 | 78 | 75 | 80 | 81 | 82 | 85 | 85 | 73 | 69 | 59 | 50 | 48 | 47 | 45 | 49 | 54 | 62 | 70 | 77 | 78 | 79 | 81 | 84 | 69.5 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 84 | 83 | 84 | 85 | 82 | 87 | 96 | 86 | 73 | 65 | 54 | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | M | M | M | M | M | M | M | M | M | M | M | M | 39 | 35 | 31 | 31 | 33 | 35 | 48 | 59 | 69 | 77 | 75 | 80 | -- | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 86 | 93 | 97 | 97 | 98 | 98 | 94 | 89 | 81 | 71 | 65 | 57 | 50 | 45 | 43 | 41 | 46 | 49 | 51 | 55 | 57 | 61 | 66 | 69 | 69.2 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 77.0 | 79.0 | 80.3 | 82.7 | 84.0 | 84.9 | 84.8 | 81.4 | 76.0 | 70.3 | 63.2 | 56.9 | 51.9 | 48.8 | 47.4 | 46.8 | 47.3 | 50.2 | 55.9 | 62.1 | 67.6 | 70.7 | 73.2 | 75.1 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 93 | 92 | 92 | 91 | 91 | 93 | 93 | 92 | 95 | 98 | 98 | 98 | 97 | 97 | 97 | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 90 | 12.99 | 12.99 |
| 40 - 60 | 146 | 21.07 | 34.05 |
| 60 - 80 | 238 | 34.34 | 68.40 |
| 80 - 100 | 219 | 31.60 | 100.00 |

Total Number of Valid Hours: 693

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

Lower Camp Met Tower - September 2017

| | | |
|---|---|--------------------------------|
| Maximum Value: 98 % on Sep 23 09:00 | Maximum Daily Average: 88.5 % on Sep 20 | Hours in Service: 720 |
| Minimum Value: 31 % on Sep 29 15:00 | Minimum Daily Average: 55.2 % on Sep 29 | Hours of Data: 277 |
| Maximum Diurnal Average: 87.4 % at hour 7 | Minimum Diurnal Average: 53.9 % at hour 16 | Hours of Missing Data: 443 |
| Monthly Average: 71.5 % | Percentiles: P ₁ = 34 P ₁₀ = 46 Q ₁ = 58 Median = 75 O ₃ = 86 P ₉₀ = 91 P ₉₉ = 97 | Hours of Calibration: 0 |
| | | Percent Operational Time: 38.5 |

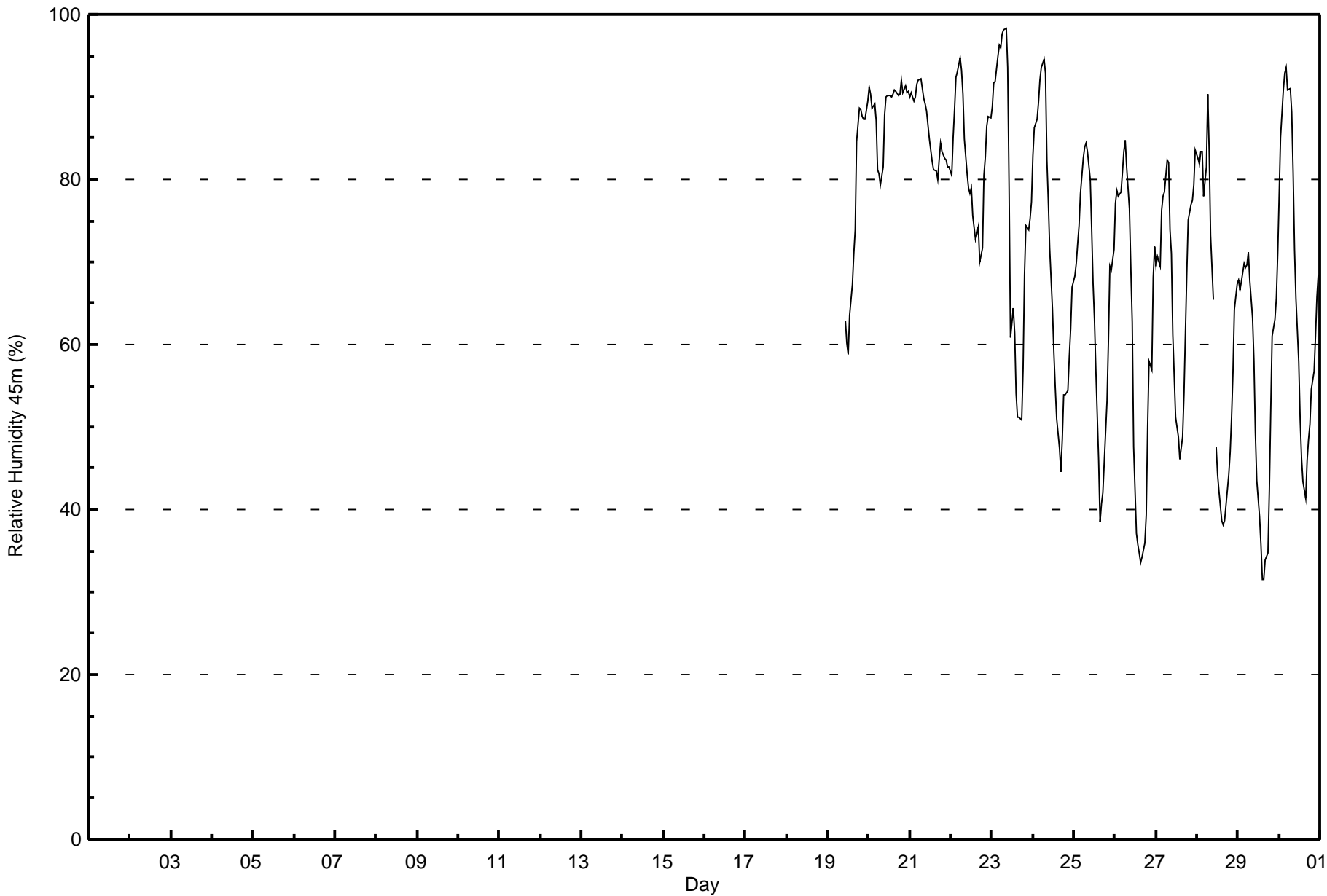
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|-----------------|
| | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 63 | 60 | 59 | 63 | 67 | 71 | 74 | 85 | 89 | 88 | 88 | 87 | 87 | 90 | -- | 90 | |
| 20-Sep | 91 | 90 | 89 | 89 | 87 | 81 | 81 | 79 | 82 | 88 | 90 | 90 | 90 | 90 | 91 | 91 | 90 | 90 | 92 | 90 | 91 | 91 | 91 | 91 | 88.5 | 92 | |
| 21-Sep | 90 | 90 | 90 | 90 | 92 | 92 | 92 | 91 | 90 | 89 | 88 | 85 | 84 | 82 | 81 | 81 | 80 | 82 | 84 | 83 | 83 | 82 | 82 | 81 | 86.0 | 92 | |
| 22-Sep | 80 | 85 | 89 | 92 | 93 | 95 | 93 | 90 | 85 | 81 | 79 | 78 | 79 | 76 | 73 | 73 | 74 | 70 | 72 | 80 | 83 | 86 | 88 | 87 | 82.6 | 95 | |
| 23-Sep | 89 | 92 | 92 | 95 | 96 | 96 | 98 | 98 | 98 | 94 | 79 | 61 | 64 | 61 | 54 | 51 | 51 | 51 | 57 | 68 | 74 | 74 | 75 | 77 | 76.9 | 98 | |
| 24-Sep | 83 | 86 | 87 | 89 | 92 | 94 | 95 | 93 | 82 | 78 | 72 | 64 | 59 | 55 | 51 | 48 | 45 | 48 | 54 | 54 | 54 | 59 | 62 | 67 | 69.6 | 95 | |
| 25-Sep | 68 | 70 | 72 | 74 | 78 | 83 | 84 | 84 | 83 | 80 | 74 | 67 | 63 | 57 | 46 | 38 | 41 | 42 | 49 | 53 | 61 | 69 | 69 | 72 | 65.8 | 84 | |
| 26-Sep | 77 | 79 | 78 | 79 | 81 | 83 | 85 | 81 | 77 | 69 | 63 | 48 | 37 | 36 | 35 | 33 | 34 | 36 | 39 | 50 | 58 | 57 | 68 | 72 | 60.6 | 85 | |
| 27-Sep | 70 | 71 | 70 | 76 | 78 | 78 | 82 | 82 | 74 | 71 | 61 | 51 | 50 | 49 | 46 | 49 | 54 | 61 | 69 | 75 | 77 | 77 | 79 | 84 | 68.1 | 84 | |
| 28-Sep | 83 | 82 | 83 | 83 | 78 | 81 | 90 | 83 | 73 | 66 | M | 48 | 44 | 42 | 39 | 38 | 39 | 40 | 44 | 47 | 51 | 57 | 64 | 67 | 61.9 | 90 | |
| 29-Sep | 68 | 67 | 68 | 70 | 69 | 70 | 71 | 68 | 63 | 58 | 49 | 44 | 39 | 36 | 31 | 31 | 34 | 35 | 42 | 52 | 61 | 63 | 66 | 71 | 55.2 | 71 | |
| 30-Sep | 78 | 85 | 91 | 93 | 94 | 91 | 91 | 88 | 81 | 71 | 66 | 58 | 51 | 46 | 43 | 41 | 46 | 48 | 50 | 55 | 57 | 61 | 66 | 68 | 67.5 | 94 | |
| | 79.7 | 81.5 | 82.5 | 84.6 | 85.2 | 85.8 | 87.4 | 85.4 | 80.7 | 76.7 | 71.2 | 62.8 | 60.0 | 57.8 | 54.8 | 53.9 | 55.2 | 57.4 | 61.7 | 66.5 | 69.7 | 72.1 | 74.7 | 77.2 | | Diurnal Average | |
| | 91 | 92 | 92 | 95 | 96 | 96 | 98 | 98 | 98 | 94 | 90 | 90 | 90 | 90 | 90 | 91 | 91 | 90 | 90 | 92 | 90 | 91 | 91 | 91 | 91 | | Diurnal Maximum |

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 17 | 6.14 | 6.14 |
| 40 - 60 | 55 | 19.86 | 25.99 |
| 60 - 80 | 91 | 32.85 | 58.84 |
| 80 - 100 | 114 | 41.16 | 100.00 |

Total Number of Valid Hours: 277

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 100m (RH100m) - %

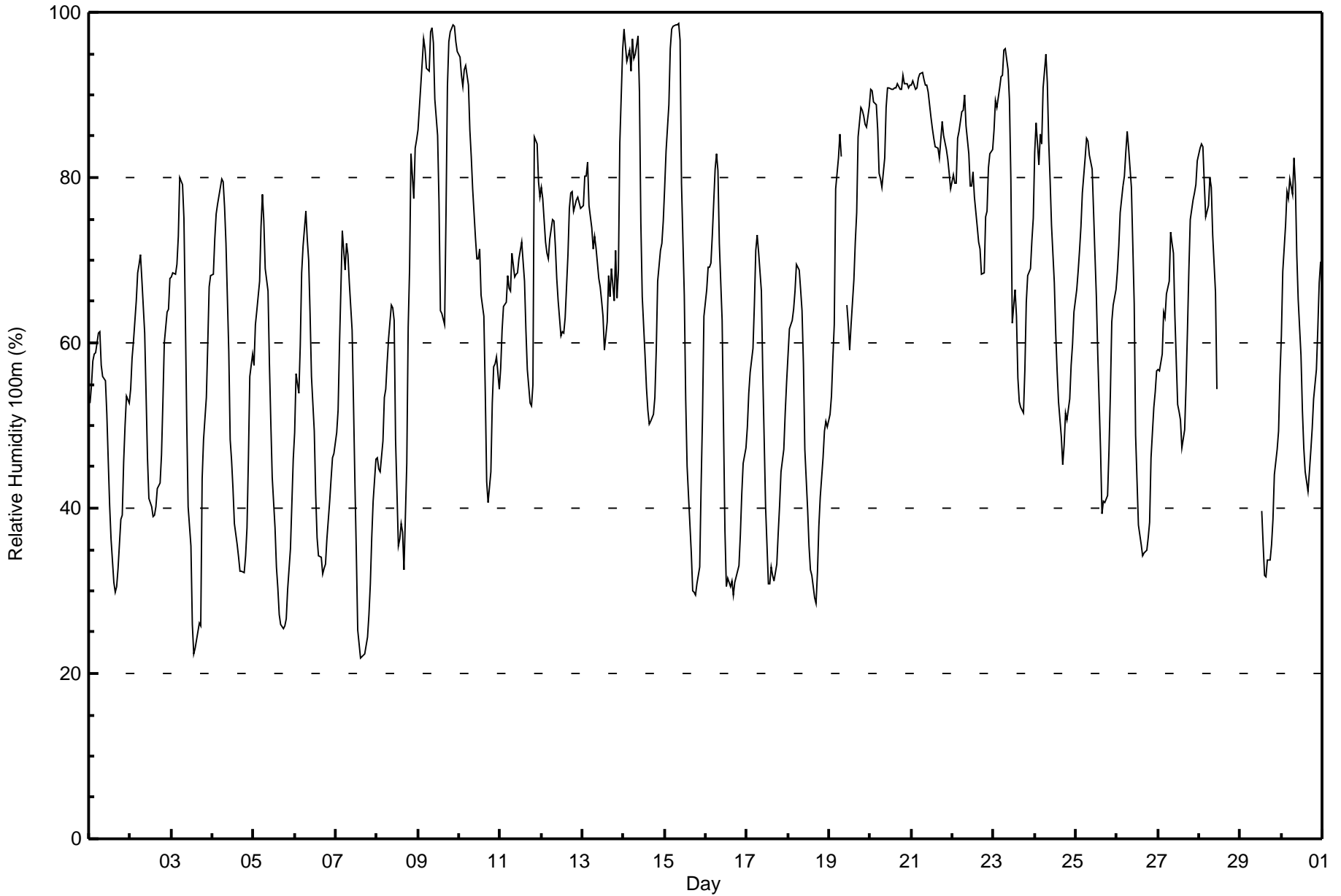
Lower Camp Met Tower - September 2017

| Maximum Value: 99 % on Sep 15 09:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 88.7 % on Sep 20 | | | | | | Hours in Service: 720 | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|-----------------|--------------------------------|---------------|----|--|
| Minimum Value: 22 % on Sep 7 15:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 45.4 % on Sep 7 | | | | | | Hours of Data: 693 | | | |
| Maximum Diurnal Average: 79.7 % at hour 7 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 46.8 % at hour 17 | | | | | | Hours of Missing Data: 27 | | | |
| Monthly Average: 63.7 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 49 Median = 66 O ₃ = 79 P ₉₀ = 91 P ₉₉ = 98 | | | | | | Hours of Calibration: 0 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 96.3 | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | |
| 1-Sep | 53 | 55 | 58 | 59 | 59 | 61 | 61 | 57 | 56 | 55 | 51 | 46 | 40 | 36 | 31 | 30 | 31 | 33 | 39 | 39 | 46 | 50 | 54 | 53 | 48.0 | 61 | | |
| 2-Sep | 54 | 58 | 60 | 65 | 68 | 69 | 71 | 68 | 61 | 54 | 46 | 41 | 40 | 39 | 39 | 40 | 42 | 43 | 46 | 53 | 60 | 64 | 64 | 68 | 54.8 | 71 | | |
| 3-Sep | 68 | 69 | 68 | 70 | 73 | 80 | 79 | 75 | 63 | 51 | 40 | 35 | 26 | 22 | 23 | 25 | 26 | 26 | 44 | 48 | 53 | 60 | 67 | 68 | 52.5 | 80 | | |
| 4-Sep | 68 | 73 | 76 | 77 | 78 | 80 | 79 | 76 | 72 | 59 | 48 | 46 | 42 | 38 | 36 | 34 | 32 | 32 | 32 | 34 | 38 | 46 | 56 | 59 | 54.6 | 80 | | |
| 5-Sep | 57 | 62 | 64 | 68 | 74 | 78 | 75 | 69 | 66 | 57 | 50 | 44 | 38 | 33 | 30 | 27 | 26 | 25 | 26 | 27 | 30 | 35 | 40 | 46 | 47.8 | 78 | | |
| 6-Sep | 49 | 56 | 54 | 60 | 68 | 72 | 76 | 73 | 70 | 64 | 56 | 49 | 42 | 36 | 34 | 34 | 32 | 33 | 33 | 36 | 41 | 44 | 46 | 47 | 50.2 | 76 | | |
| 7-Sep | 49 | 52 | 60 | 67 | 74 | 69 | 72 | 71 | 67 | 62 | 53 | 43 | 35 | 25 | 22 | 22 | 22 | 22 | 24 | 27 | 31 | 36 | 41 | 46 | 45.4 | 74 | | |
| 8-Sep | 46 | 45 | 44 | 48 | 53 | 54 | 58 | 60 | 65 | 64 | 63 | 48 | 35 | 36 | 38 | 37 | 32 | 46 | 62 | 69 | 83 | 78 | 84 | 85 | 55.6 | 85 | | |
| 9-Sep | 86 | 89 | 94 | 97 | 96 | 93 | 93 | 98 | 98 | 96 | 89 | 85 | 77 | 64 | 64 | 62 | 76 | 91 | 96 | 98 | 98 | 98 | 97 | 95 | 88.7 | 98 | | |
| 10-Sep | 95 | 92 | 91 | 93 | 94 | 91 | 86 | 83 | 79 | 73 | 70 | 70 | 71 | 66 | 63 | 54 | 43 | 41 | 44 | 53 | 57 | 57 | 58 | 54 | 69.9 | 95 | | |
| 11-Sep | 57 | 61 | 64 | 65 | 68 | 67 | 66 | 71 | 68 | 68 | 68 | 70 | 72 | 70 | 67 | 62 | 57 | 53 | 52 | 55 | 85 | 84 | 79 | 78 | 67.0 | 85 | | |
| 12-Sep | 79 | 77 | 72 | 71 | 70 | 73 | 75 | 75 | 72 | 68 | 65 | 61 | 61 | 61 | 63 | 71 | 76 | 78 | 78 | 76 | 77 | 78 | 77 | 76 | 72.1 | 79 | | |
| 13-Sep | 77 | 80 | 80 | 82 | 77 | 74 | 71 | 73 | 72 | 68 | 67 | 65 | 63 | 59 | 62 | 68 | 66 | 69 | 65 | 71 | 65 | 69 | 84 | 95 | 71.8 | 95 | | |
| 14-Sep | 98 | 96 | 94 | 95 | 93 | 97 | 94 | 95 | 97 | 90 | 75 | 66 | 58 | 55 | 52 | 50 | 51 | 53 | 59 | 68 | 71 | 72 | 75 | 75 | 75.2 | 98 | | |
| 15-Sep | 79 | 83 | 89 | 96 | 98 | 98 | 98 | 99 | 99 | 97 | 79 | 66 | 53 | 45 | 42 | 35 | 30 | 30 | 30 | 31 | 33 | 43 | 51 | 63 | 65.2 | 99 | | |
| 16-Sep | 66 | 69 | 69 | 70 | 73 | 81 | 83 | 81 | 72 | 63 | 50 | 37 | 30 | 31 | 30 | 31 | 29 | 31 | 32 | 33 | 37 | 42 | 45 | 47 | 51.4 | 83 | | |
| 17-Sep | 50 | 54 | 56 | 59 | 65 | 71 | 73 | 71 | 66 | 56 | 48 | 40 | 31 | 31 | 33 | 32 | 31 | 33 | 37 | 40 | 44 | 47 | 52 | 55 | 49.0 | 73 | | |
| 18-Sep | 58 | 62 | 63 | 64 | 66 | 70 | 69 | 66 | 64 | 57 | 47 | 40 | 35 | 33 | 32 | 29 | 28 | 32 | 38 | 41 | 46 | 49 | 51 | 50 | 49.6 | 70 | | |
| 19-Sep | 51 | 54 | 58 | 62 | 79 | 82 | 85 | 83 | M | M | 65 | 62 | 59 | 62 | 68 | 72 | 76 | 85 | 88 | 88 | 88 | 86 | 86 | 89 | 74.0 | 89 | | |
| 20-Sep | 91 | 90 | 89 | 89 | 86 | 80 | 80 | 79 | 82 | 89 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 92 | 91 | 91 | 91 | 91 | 88.7 | 92 | | |
| 21-Sep | 91 | 92 | 91 | 91 | 92 | 93 | 93 | 92 | 91 | 91 | 90 | 87 | 86 | 85 | 84 | 83 | 82 | 85 | 87 | 85 | 83 | 82 | 81 | 79 | 87.3 | 93 | | |
| 22-Sep | 80 | 79 | 79 | 85 | 86 | 88 | 88 | 90 | 86 | 83 | 79 | 79 | 81 | 78 | 74 | 72 | 71 | 68 | 69 | 75 | 76 | 81 | 83 | 83 | 79.8 | 90 | | |
| 23-Sep | 86 | 89 | 89 | 91 | 92 | 92 | 95 | 96 | 93 | 89 | 80 | 62 | 66 | 63 | 56 | 53 | 52 | 51 | 57 | 65 | 68 | 69 | 72 | 75 | 75.1 | 96 | | |
| 24-Sep | 83 | 87 | 82 | 85 | 84 | 91 | 95 | 92 | 84 | 80 | 74 | 67 | 61 | 57 | 53 | 49 | 45 | 48 | 52 | 51 | 53 | 57 | 60 | 64 | 68.8 | 95 | | |
| 25-Sep | 66 | 69 | 71 | 74 | 78 | 82 | 85 | 84 | 83 | 81 | 76 | 71 | 66 | 59 | 47 | 39 | 41 | 41 | 42 | 47 | 54 | 62 | 65 | 66 | 64.5 | 85 | | |
| 26-Sep | 69 | 72 | 76 | 79 | 80 | 83 | 86 | 84 | 79 | 72 | 65 | 49 | 38 | 37 | 36 | 34 | 35 | 35 | 36 | 38 | 46 | 52 | 54 | 57 | 57.9 | 86 | | |
| 27-Sep | 57 | 57 | 59 | 64 | 63 | 66 | 67 | 73 | 72 | 71 | 63 | 53 | 52 | 51 | 47 | 49 | 55 | 62 | 69 | 75 | 77 | 78 | 79 | 82 | 64.2 | 82 | | |
| 28-Sep | 83 | 84 | 84 | 79 | 75 | 77 | 80 | 79 | 73 | 66 | 54 | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | 84 | | |
| 29-Sep | M | M | M | M | M | M | M | M | M | M | M | M | M | 40 | 36 | 32 | 32 | 34 | 34 | 36 | 39 | 44 | 47 | 49 | 56 | -- | 56 | |
| 30-Sep | 61 | 69 | 74 | 78 | 77 | 80 | 78 | 82 | 79 | 71 | 65 | 58 | 52 | 47 | 44 | 42 | 44 | 47 | 50 | 53 | 57 | 62 | 67 | 70 | 62.8 | 82 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |
| 69.3 71.5 72.7 75.2 77.2 79.0 79.7 79.1 76.1 71.2 64.5 58.3 53.2 49.8 48.0 46.9 46.8 48.8 52.0 55.1 59.7 62.7 65.7 68.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 98 96 94 97 98 98 98 99 99 97 91 91 91 91 91 91 91 91 91 96 98 98 98 97 95 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 104 | 15.01 | 15.01 |
| 40 - 60 | 179 | 25.83 | 40.84 |
| 60 - 80 | 251 | 36.22 | 77.06 |
| 80 - 100 | 159 | 22.94 | 100.00 |

Total Number of Valid Hours: 693

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 167m (RH167m) - %

Lower Camp Met Tower - September 2017

| | | |
|---|---|--------------------------------|
| Maximum Value: 99 % on Sep 9 22:00 | Maximum Daily Average: 90.4 % on Sep 20 | Hours in Service: 720 |
| Minimum Value: 23 % on Sep 7 15:00 | Minimum Daily Average: 43.2 % on Sep 7 | Hours of Data: 713 |
| Maximum Diurnal Average: 75.4 % at hour 8 | Minimum Diurnal Average: 47.3 % at hour 17 | Hours of Missing Data: 7 |
| Monthly Average: 62.0 % | Percentiles: P ₁ = 26 P ₁₀ = 35 Q ₁ = 47 Median = 63 Q ₃ = 78 P ₉₀ = 88 P ₉₉ = 98 | Hours of Calibration: 0 |
| | | Percent Operational Time: 99.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 49 | 50 | 54 | 58 | 58 | 59 | 59 | 57 | 56 | 57 | 52 | 47 | 41 | 38 | 32 | 31 | 31 | 33 | 38 | 38 | 42 | 46 | 50 | 50 | 46.9 | 59 |
| 2-Sep | 51 | 55 | 56 | 59 | 66 | 69 | 69 | 68 | 62 | 54 | 46 | 42 | 41 | 40 | 40 | 41 | 43 | 43 | 45 | 52 | 60 | 63 | 62 | 63 | 53.8 | 69 |
| 3-Sep | 65 | 65 | 66 | 67 | 66 | 80 | 77 | 76 | 64 | 51 | 41 | 36 | 27 | 23 | 24 | 26 | 27 | 26 | 44 | 49 | 54 | 61 | 68 | 68 | 52.1 | 80 |
| 4-Sep | 67 | 71 | 74 | 77 | 77 | 79 | 79 | 77 | 71 | 58 | 49 | 46 | 43 | 39 | 37 | 35 | 33 | 32 | 32 | 35 | 37 | 40 | 46 | 51 | 53.5 | 79 |
| 5-Sep | 54 | 52 | 50 | 53 | 61 | 63 | 60 | 60 | 61 | 56 | 51 | 44 | 38 | 34 | 31 | 28 | 27 | 26 | 26 | 26 | 26 | 33 | 38 | 40 | 43.2 | 63 |
| 6-Sep | 42 | 45 | 48 | 52 | 55 | 59 | 66 | 60 | 55 | 59 | 56 | 50 | 42 | 37 | 34 | 34 | 32 | 32 | 34 | 35 | 37 | 40 | 42 | 43 | 45.4 | 66 |
| 7-Sep | 44 | 47 | 51 | 58 | 64 | 65 | 67 | 67 | 65 | 59 | 52 | 44 | 35 | 26 | 23 | 23 | 23 | 23 | 24 | 26 | 29 | 35 | 41 | 45 | 43.2 | 67 |
| 8-Sep | 43 | 42 | 44 | 45 | 48 | 52 | 54 | 56 | 66 | 64 | 62 | 47 | 36 | 37 | 38 | 37 | 33 | 47 | 63 | 71 | 74 | 73 | 77 | 81 | 53.8 | 81 |
| 9-Sep | 84 | 87 | 90 | 93 | 94 | 93 | 84 | 90 | 86 | 80 | 86 | 86 | 78 | 65 | 64 | 63 | 77 | 92 | 98 | 98 | 98 | 99 | 98 | 98 | 86.8 | 99 |
| 10-Sep | 95 | 94 | 93 | 95 | 96 | 93 | 87 | 84 | 80 | 75 | 72 | 72 | 73 | 67 | 65 | 55 | 44 | 41 | 44 | 52 | 55 | 54 | 55 | 52 | 70.6 | 96 |
| 11-Sep | 55 | 57 | 63 | 63 | 67 | 65 | 63 | 65 | 64 | 65 | 67 | 70 | 74 | 72 | 69 | 63 | 58 | 53 | 51 | 53 | 85 | 81 | 76 | 73 | 65.5 | 85 |
| 12-Sep | 77 | 77 | 73 | 72 | 71 | 74 | 76 | 76 | 73 | 69 | 67 | 62 | 63 | 63 | 65 | 71 | 75 | 78 | 79 | 76 | 78 | 78 | 78 | 78 | 72.8 | 79 |
| 13-Sep | 78 | 81 | 82 | 83 | 78 | 74 | 72 | 72 | 71 | 68 | 67 | 67 | 65 | 60 | 64 | 67 | 66 | 68 | 66 | 65 | 64 | 65 | 68 | 81 | 70.4 | 83 |
| 14-Sep | 89 | 83 | 82 | 90 | 92 | 87 | 82 | 86 | 82 | 82 | 72 | 67 | 59 | 55 | 52 | 49 | 50 | 51 | 54 | 58 | 61 | 68 | 69 | 68 | 70.4 | 92 |
| 15-Sep | 71 | 81 | 82 | 83 | 86 | 93 | 96 | 98 | 98 | 93 | 78 | 65 | 53 | 46 | 43 | 35 | 31 | 31 | 30 | 31 | 32 | 36 | 42 | 51 | 61.9 | 98 |
| 16-Sep | 61 | 67 | 64 | 61 | 66 | 77 | 79 | 76 | 69 | 62 | 50 | 38 | 32 | 33 | 32 | 32 | 30 | 32 | 33 | 33 | 37 | 41 | 43 | 44 | 49.7 | 79 |
| 17-Sep | 47 | 51 | 54 | 56 | 60 | 66 | 68 | 66 | 63 | 55 | 49 | 41 | 32 | 32 | 34 | 33 | 32 | 34 | 37 | 40 | 44 | 47 | 51 | 56 | 47.8 | 68 |
| 18-Sep | 59 | 63 | 63 | 64 | 66 | 69 | 68 | 67 | 65 | 58 | 48 | 41 | 36 | 34 | 33 | 30 | 29 | 33 | 38 | 39 | 45 | 50 | 51 | 50 | 49.9 | 69 |
| 19-Sep | 51 | 53 | 57 | 60 | 63 | 65 | 68 | 74 | M | M | 65 | 61 | 60 | 63 | 69 | 74 | 78 | 86 | 88 | 88 | 88 | 86 | 86 | 88 | 71.4 | 88 |
| 20-Sep | 91 | 91 | 90 | 89 | 87 | 81 | 81 | 81 | 84 | 92 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 94 | 94 | 94 | 93 | 93 | 90.4 | 94 |
| 21-Sep | 93 | 94 | 93 | 93 | 94 | 95 | 95 | 94 | 94 | 93 | 93 | 89 | 88 | 87 | 86 | 86 | 85 | 87 | 90 | 87 | 86 | 83 | 81 | 79 | 89.3 | 95 |
| 22-Sep | 80 | 78 | 77 | 82 | 81 | 81 | 83 | 86 | 81 | 83 | 80 | 81 | 82 | 77 | 74 | 74 | 72 | 69 | 68 | 71 | 76 | 80 | 81 | 84 | 78.4 | 86 |
| 23-Sep | 86 | 88 | 88 | 90 | 88 | 89 | 93 | 93 | 90 | 88 | 81 | 64 | 68 | 65 | 57 | 54 | 54 | 53 | 58 | 63 | 60 | 64 | 69 | 72 | 74.0 | 93 |
| 24-Sep | 83 | 86 | 78 | 79 | 80 | 83 | 86 | 88 | 87 | 80 | 76 | 69 | 63 | 58 | 55 | 50 | 47 | 47 | 50 | 49 | 53 | 56 | 60 | 62 | 67.6 | 88 |
| 25-Sep | 65 | 70 | 72 | 75 | 79 | 82 | 84 | 84 | 83 | 82 | 77 | 72 | 67 | 60 | 48 | 41 | 42 | 41 | 42 | 47 | 51 | 60 | 64 | 66 | 64.8 | 84 |
| 26-Sep | 68 | 71 | 75 | 78 | 79 | 79 | 80 | 82 | 78 | 70 | 64 | 50 | 39 | 38 | 37 | 35 | 35 | 36 | 37 | 38 | 42 | 48 | 47 | 53 | 56.5 | 82 |
| 27-Sep | 49 | 51 | 51 | 51 | 53 | 51 | 57 | 64 | 62 | 64 | 59 | 51 | 53 | 52 | 48 | 50 | 56 | 62 | 70 | 76 | 78 | 79 | 80 | 82 | 60.4 | 82 |
| 28-Sep | 83 | 82 | 79 | 74 | 73 | 75 | 76 | 77 | 74 | 66 | 55 | M | M | M | M | M | 40 | 41 | 43 | 45 | 49 | 52 | 57 | 59 | 63.2 | 83 |
| 29-Sep | 60 | 61 | 60 | 61 | 65 | 67 | 67 | 65 | 64 | 58 | 50 | 45 | 41 | 36 | 33 | 32 | 34 | 34 | 35 | 36 | 37 | 41 | 42 | 47 | 48.7 | 67 |
| 30-Sep | 53 | 58 | 62 | 65 | 69 | 71 | 70 | 74 | 76 | 72 | 65 | 59 | 52 | 48 | 45 | 43 | 45 | 47 | 49 | 52 | 58 | 63 | 69 | 72 | 59.9 | 76 |

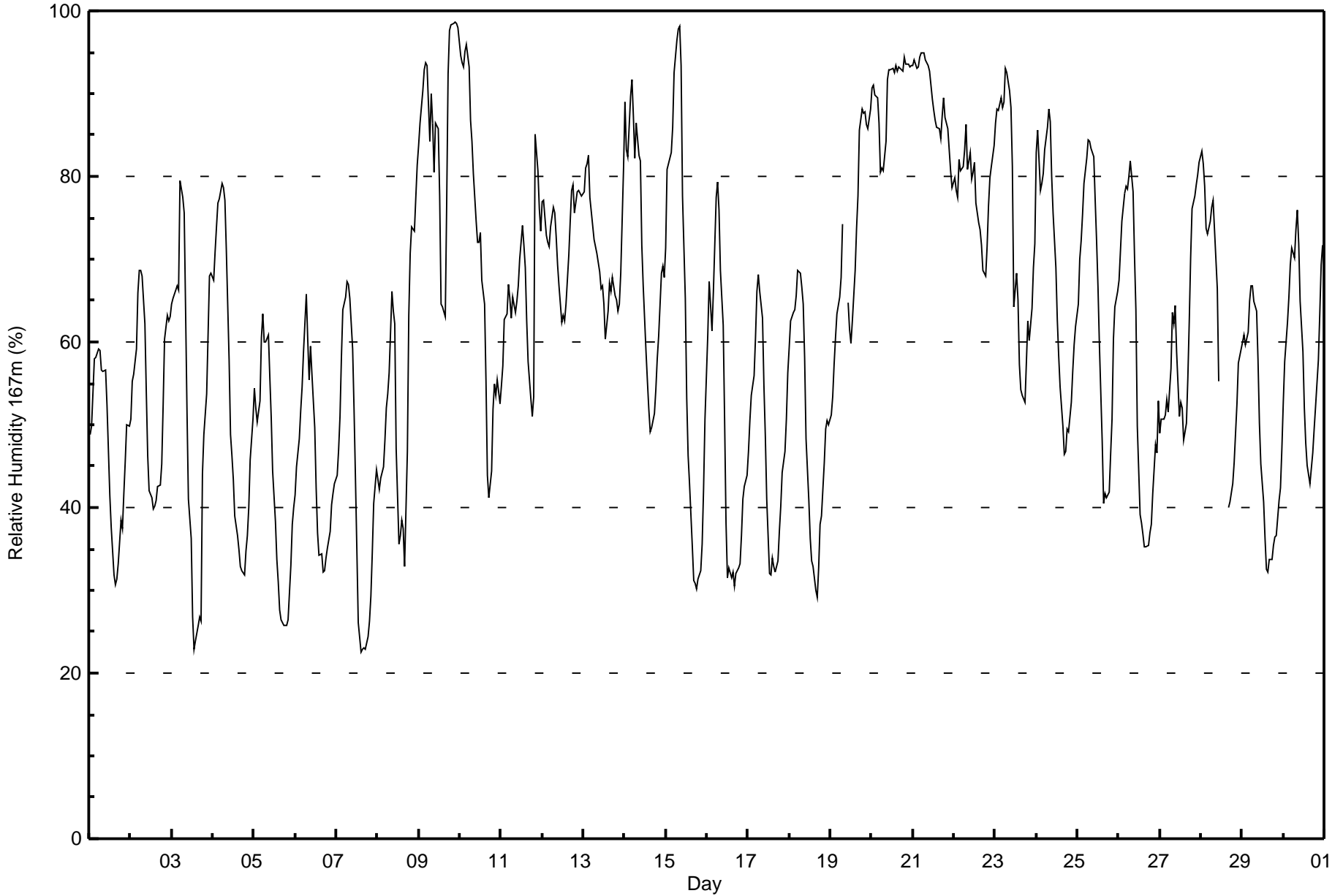
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 66.4 | 68.3 | 69.1 | 70.9 | 72.7 | 74.6 | 74.9 | 75.4 | 73.2 | 69.5 | 64.1 | 58.6 | 54.2 | 50.9 | 49.0 | 47.7 | 47.3 | 49.0 | 52.0 | 54.1 | 57.6 | 60.5 | 62.8 | 64.9 | Diurnal Average | |
| 95 | 94 | 93 | 95 | 96 | 95 | 96 | 98 | 98 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 98 | 98 | 98 | 99 | 98 | 98 | Diurnal Maximum | |

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 105 | 14.73 | 14.73 |
| 40 - 60 | 213 | 29.87 | 44.60 |
| 60 - 80 | 247 | 34.64 | 79.24 |
| 80 - 100 | 148 | 20.76 | 100.00 |

Total Number of Valid Hours: 713

Total Number of Hours: 720



| | | |
|--|---|--------------------------------|
| Maximum Speed: 22 km/h on Sep 18 12:00 | Maximum Daily Speed Average: 14.5 km/h on Sep 1 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 4 19:00 | Minimum Daily Speed Average: 0.5 km/h on Sep 22 | Hours of Data: 718 |
| Maximum Diurnal Speed Average: 3.0 km/h at hour 15 | Minimum Diurnal Speed Average: 0.7 km/h at hour 24 | Hours of Missing Data: 2 |
| Monthly Average Velocity: 1.5 km/h 227.5 deg | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 7 Q ₃ = 12 P ₉₀ = 16 P ₉₉ = 19 | Percent Operational Time: 99.7 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----------|-------|---------|-------|------|----------|-------|-------|----------|---------|----------|-------|-------|-------|----------|-------|-------|-------|----------|-------|-------|-------|-------|---------------|---------------|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | W15 | W14 | W10 | W8WNW10 | WNW14 | W16 | W19 | W14 | W14 | W18 | W15 | W15 | W16 | W17 | W21 | W19 | W19 | W18 | W13 | W10WNW10 | WNW11 | WNW15 | | | | W14.5 | W21 |
| 2-Sep | W19 | W20 | W17 | WNW9 | WNW5 | W5 | WNW6 | WNW6 | W7 | W10 | W9WNW11 | W11 | WNW8 | W9 | W10 | W11WSW11 | WSW14 | WSW18 | W14 | W11 | W8 | W9 | | | | W10.6 | W20 |
| 3-Sep | W9 | W10 | W12 | W15 | W15 | WSW6 | W5 | W8 | W10 | W13WNW18 | WNW14 | NW14 | NW16 | NW15 | WNW17 | NW14 | NW13 | N18 | N11 | NNW9 | NNW7 | NNW6 | NW7 | | WNW10.5 | N18 | |
| 4-Sep | NNW4 | N3 | NE1 | N3 | NNW1 | NNW1 | NNW2 | NW2 | N3 | N6 | N9 | N8 | NW8 | NW8 | NW7 | WNW7 | NNW5 | NNE1 | WSW0 | SSW1 | SE1 | NNE0 | SSE1 | ESE2 | NNW2.8 | N9 | |
| 5-Sep | SE3 | SE5 | SE7 | SE6 | SE6 | SSE8 | SSE9 | SSE12 | SE10 | SSE10 | SSE10 | SSE8 | S4 | W10 | W11 | W9 | WSW9 | W8 | SW2 | SSE2 | S4 | SSE5 | SSE3 | | S4.5 | SSE12 | |
| 6-Sep | N2 | SW0 | SSE1 | NNW0 | N1 | N1 | N1 | NNW1 | NNW1 | N3 | N3 | NNW3 | WNW4 | NW4 | N4 | NW4 | NNW2 | W1 | WNW1 | SSE2 | SE3 | ESE2 | SE2 | | NNW1.1 | NW4 | |
| 7-Sep | SSE3 | SSE6 | SSE8 | SE5 | SE6 | SE7 | SE7 | SSE5 | SSE7 | SE10 | SSE10 | SSE16 | S14 | S16 | SSW17 | S19 | S19 | S16 | S13 | S14 | S17 | SSE10 | S4 | ESE4 | SSE9.8 | S19 | |
| 8-Sep | SE8 | SSE11 | SSE10 | SE10 | SE7 | SE8 | SE7 | SSE4 | SSE2 | SE3 | N3 | NNW6 | N7 | NNW5 | N7 | NNE4 | NNE5 | NNW7 | N7 | N6 | NW3 | NNW3 | WNW1 | N2 | E1.2 | SSE11 | |
| 9-Sep | ENE2 | NNW3 | E1 | NE0 | ESE3 | N2 | NNE3 | NNW4 | NW4 | NW3 | NNW6 | NNW6 | N7 | NNW7 | N10 | N10 | NW9 | NNW6 | NW5 | NNW2 | WNW4 | WNW4 | NW4 | WNW5 | NNW4.0 | N10 | |
| 10-Sep | WSW4 | WSW7 | SSW4 | SW7 | WSW8 | SW8 | W14 | W14 | W17 | W19 | W19 | W19WNW18 | WNW22 | WNW22 | NW15 | WNW14 | W21 | W19 | W12 | W9WNW12 | WNW10 | WNW13 | | | W13.1 | WNW22 | |
| 11-Sep | W13 | WNW9 | NW5 | WNW5 | W5 | SSE5 | SE7 | SE8 | SSE11 | SSE10 | SE7 | SE6 | SSE5 | SE3 | SSE6 | SSE9 | SSE12 | SSE14 | SSE20 | S11 | SSE1 | SSE2 | SW3 | WSW10 | S5.0 | SSE20 | |
| 12-Sep | W11 | W16WNW18 | WNW16 | W13 | W16 | W16 | W16WNW13 | WNW15 | NW12 | NW11 | NW11 | NNW7 | NNW6 | NNW7 | NW6 | NNE6 | N5 | NNE6 | NNE5 | NE4 | NNE2 | NNE2 | | | WNW8.0 | WNW18 | |
| 13-Sep | NW3 | NNW2 | NNW2 | NW1 | ENE1 | ESE3 | E2 | ENE2 | ENE1 | NE1 | N3 | WSW4 | ESE0 | S3 | NNW4 | NNW3 | NNE2 | ESE3 | N1 | W2 | SE1 | N2 | NNW1 | NNE1 | N0.7 | WSW4 | |
| 14-Sep | N2 | N2 | N2 | N1 | NNE1 | NNW2 | NNW1 | WNW2 | WNW3 | NNW3 | N4 | NW7 | NNW5 | NNW5 | N6 | NNE4 | NE5 | NE5 | NNE3 | N4 | NNW4 | NNW2 | ENE3 | N3 | N2.8 | NW7 | |
| 15-Sep | NNW2 | NNW1 | N1 | NW2 | NNW2 | ESE4 | SSE4 | SSW5 | S3 | SE5 | SSE6 | SSE6 | SE5 | S3 | E2 | SW1 | WSW10 | SW10 | SW5 | SSW2 | SE1 | SE4 | ESE4 | E4 | S2.0 | WSW10 | |
| 16-Sep | ESE5 | E3 | SSE5 | SSE7 | SSE4 | SE1 | SSE3 | SE7 | SSE10 | S13 | S16 | S19 | S18 | S18 | SSW15 | SSW16 | S15 | S12 | S12 | S14 | S13 | S13 | SSE16 | | S10.2 | S19 | |
| 17-Sep | SSE16 | SSE16 | SSE13 | SSE14 | SSE11 | SSE9 | SSE6 | SSE6 | SSE10 | SSE12 | SSE14 | S18 | S19 | S19 | S18 | S16 | SSE16 | SSE14 | S16 | SSE14 | SSE19 | SSE15 | SSE12 | | SSE14.0 | S19 | |
| 18-Sep | SE15 | SE15 | SE14 | SE17 | SE16 | SE16 | SE15 | SE17 | SE17 | SE16 | SSE17 | SSE22 | SSE18 | SSE14 | SE14 | SE14 | SSE14 | SE12 | E6 | ENE2 | NNE3 | NW3 | SSE1 | ESE10 | SE12.1 | SSE22 | |
| 19-Sep | ESE8 | ESE10 | NNE5 | N9 | N7 | NNW6 | NNW6 | NNW5 | M | M | NNE8 | N9 | N8 | E9 | NE9 | E10 | E12 | ENE8 | NE7 | ENE8 | ENE8 | ENE8 | NE7 | NNE8 | NE6.3 | E12 | |
| 20-Sep | N9 | N10 | N11 | N11 | N10 | N12 | NNE13 | NNE15 | NNE16 | NNE15 | NNE15 | NNE16 | NNE16 | NNE15 | NNE15 | NNE14 | NNE14 | NNE15 | NNE14 | N14 | NNE14 | NNE13 | NNE13 | N13 | NNE13.4 | NNE16 | |
| 21-Sep | N13 | N15 | N15 | N14 | N15 | N12 | N11 | N13 | N11 | N10 | N11 | N13 | N12 | N12 | N14 | N12 | N14 | N11 | N9 | NNW7 | NNW5 | NW4 | N3 | NW3 | N10.7 | N15 | |
| 22-Sep | NW1 | ENE1 | N1 | NW2 | N1 | NE0 | ESE1 | SE1 | SW4 | WSW4 | ESE1 | E2 | N2 | E2 | ESE3 | ESE3 | SE2 | ESE3 | E2 | SSE1 | E1 | E1 | N2 | N2 | E0.5 | WSW4 | |
| 23-Sep | NNW3 | NNW2 | NNW2 | N2 | NNW3 | NNW4 | NNW4 | NW3 | NNW3 | N1 | NE2 | S7 | SSW5 | S7 | S8 | S7 | SSE9 | S12 | S13 | SSE9 | SSE8 | SSE8 | SSE8 | SSE7 | S3.3 | S13 | |
| 24-Sep | ESE1 | ESE2 | SSE7 | SE5 | SE4 | SE3 | SSE2 | SE4 | SE2 | SSE5 | SSE10 | SSE7 | SSE9 | SSE9 | SSE9 | SSE7 | S10 | SSE12 | SSE9 | SSE14 | S14 | SSE14 | SSE17 | SSE12 | SSE7.6 | SSE17 | |
| 25-Sep | SSE10 | SSE8 | S4 | SSE7 | SSE8 | SSE5 | SE2 | SSE6 | SSE10 | SSE12 | SSE9 | SSE6 | SE6 | SE4 | W7 | WNW6 | NE1 | SSW2 | S1 | WSW5 | W7 | NNW1 | SSE4 | S4 | S4.1 | SSE12 | |
| 26-Sep | SSE7 | SSE5 | SSW2 | W3 | WSW3 | WSW4 | W2 | SW5 | WSW6 | WSW9 | W7 | WNW5 | NNW11 | NW11 | NW11 | NNW9 | NNW8 | NNW5 | NNW2 | NW1 | SE2 | SSE2 | SW1 | SSE3 | WNW2.9 | NW11 | |
| 27-Sep | SSE5 | SSE5 | SE5 | SE2 | SE6 | SE4 | ESE2 | ENE1 | S0 | N4 | NNW3 | N5 | NW5 | NNW6 | NNW6 | NNW6 | N9 | N8 | NNW5 | N6 | NNW4 | NW3 | N4 | NNW3 | N2.2 | N9 | |
| 28-Sep | NW3 | NNW3 | NNW2 | N1 | NW2 | NNW3 | N4 | SSE2 | SSE7 | SSE7 | SSE11 | SSE14 | SSE17 | SSE15 | SSW15 | S16 | S17 | S14 | S14 | S16 | SSE17 | SSE16 | SSE13 | SSE11 | S8.3 | SSE17 | |
| 29-Sep | SSE13 | SSE16 | SSE15 | SSE10 | SSE6 | SSE5 | SSE8 | SE10 | SSE10 | SSE12 | SSE14 | SSE13 | SSE15 | SSE12 | S5 | NNW5 | N4 | WNW1 | SSE1 | WSW1 | SSE1 | SSE4 | SSE2 | SSE1 | SSE6.6 | SSE16 | |
| 30-Sep | NW1 | NNW2 | NNW1 | SW1 | WNW1 | SSE2 | SE3 | NE1 | SSE8 | SE9 | SSE10 | SSE10 | SSE9 | WSW5 | WSW11 | WSW13 | WSW13 | WSW10 | NW9 | NW9 | NW11 | NW11 | NW13 | NW12 | W2.9 | WSW13 | |

| | |
|---|-----------------|
| SW1.4 SW1.4SSW1.2 SW0.8 SW0.8SSW1.0 SW0.7 SW1.1SSW1.6SSW1.9SSW1.4SSW1.9 SW2.2WSW2.4 W3.0 W2.7WSW2.6 SW2.5 SW1.6 SW1.6SSW1.3SSW1.2SSW0.9 SW0.7 | Diurnal Average |
| W19 W20WNW18 SE17 SE16 SE16 W16 W19 W17 W19 W19 SSE22 S19WNW22WNW22 W21 W19 W21 SSE20WSW18 SSE17 SSE19 SSE17 SSE16 | 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

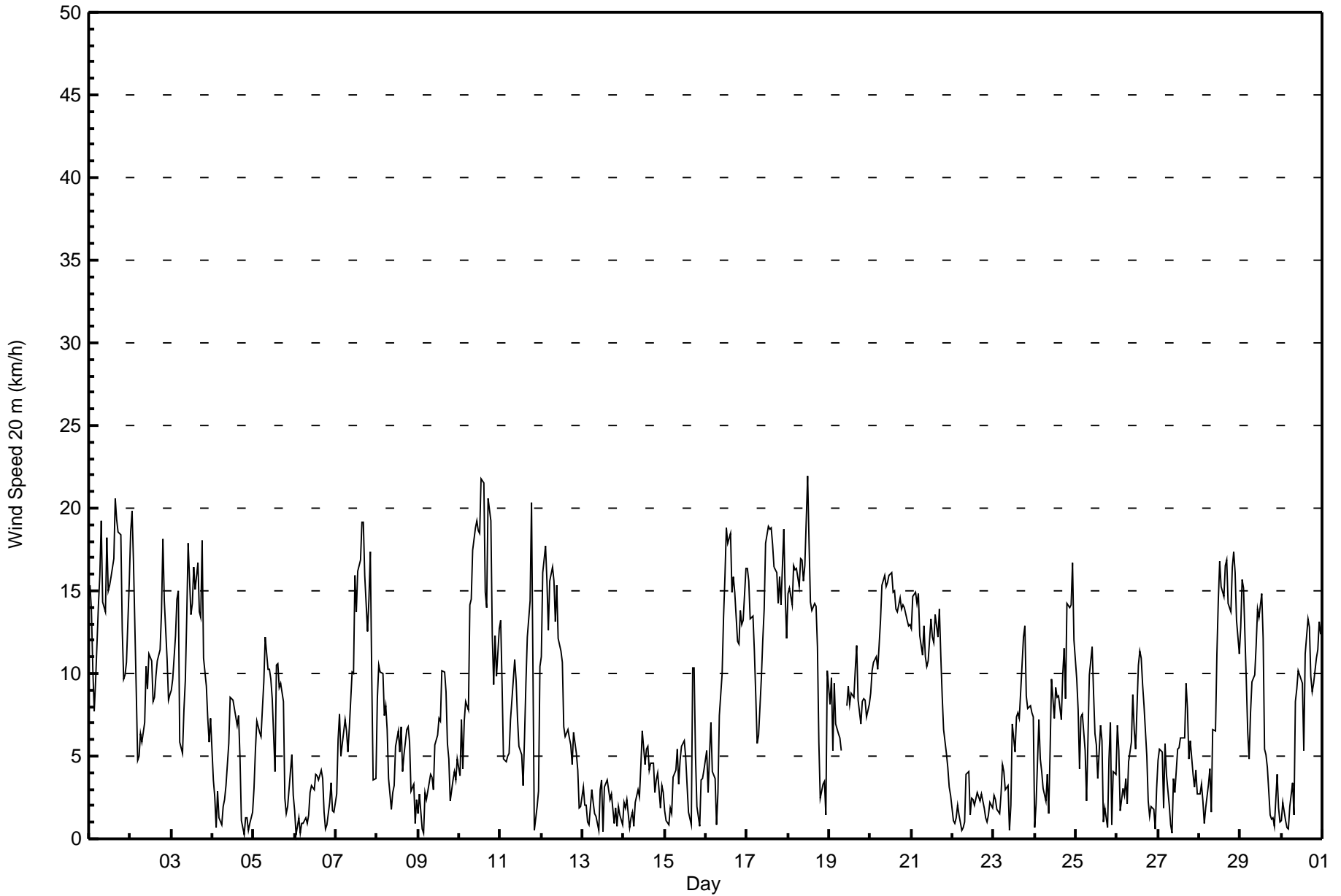
Wind Speed 20 m (WS20m) - km/h
Lower Camp Met Tower - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 10 km/h on Sep 10 14:00 | Hours of Data: 718 |
| Minimum Value: 0 km/h on Sep 23 04:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 8 | 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-Sep | 5 | 5 | 5 | 4 | 5 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 6 | 6 | 7 | 8 | 8 | 7 | 7 | 5 | 4 | 3 | 4 | 6 | 8 |
| 2-Sep | 6 | 7 | 6 | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 5 | 4 | 4 | 6 | 6 | 5 | 4 | 4 | 4 | 7 |
| 3-Sep | 4 | 4 | 4 | 6 | 6 | 3 | 3 | 4 | 4 | 6 | 8 | 6 | 7 | 7 | 6 | 6 | 6 | 5 | 8 | 5 | 4 | 3 | 2 | 2 | 8 |
| 4-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 5-Sep | 2 | 2 | 3 | 2 | 2 | 4 | 4 | 6 | 4 | 3 | 3 | 3 | 3 | 5 | 5 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 6 |
| 6-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 |
| 7-Sep | 1 | 3 | 4 | 3 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 6 | 5 | 6 | 5 | 4 | 3 | 3 | 4 | 4 | 2 | 2 | 6 |
| 8-Sep | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 4 |
| 9-Sep | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 4 |
| 10-Sep | 2 | 4 | 2 | 3 | 3 | 3 | 6 | 6 | 8 | 8 | 8 | 8 | 8 | 10 | 9 | 8 | 8 | 9 | 8 | 5 | 4 | 5 | 5 | 6 | 10 |
| 11-Sep | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 5 | 4 | 4 | 7 | 3 | 1 | 3 | 3 | 7 |
| 12-Sep | 4 | 6 | 8 | 7 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 8 |
| 13-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 15-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 2 | 1 | 1 | 2 | 2 | 1 | 4 |
| 16-Sep | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 4 | 4 | 5 | 6 | 6 | 5 | 6 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 6 |
| 17-Sep | 3 | 4 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 6 |
| 18-Sep | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 7 | 8 | 6 | 6 | 6 | 5 | 6 | 5 | 3 | 2 | 1 | 1 | 3 | 3 | 8 |
| 19-Sep | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | M | M | 3 | 4 | 4 | 5 | 4 | 7 | 6 | 4 | 3 | 4 | 4 | 4 | 4 | 3 | 7 |
| 20-Sep | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 6 | 7 | 6 | 6 | 7 | 7 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 7 |
| 21-Sep | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 6 | 5 | 6 | 5 | 4 | 3 | 2 | 2 | 1 | 1 | 6 |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 23-Sep | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 |
| 24-Sep | 1 | 2 | 4 | 2 | 2 | 1 | 2 | 2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 3 | 3 | 4 | 3 | 5 |
| 25-Sep | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 4 | 4 | 1 | 1 | 1 | 5 | 3 | 1 | 2 | 2 | 5 |
| 26-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 4 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 5 |
| 27-Sep | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 2 | 1 | 2 | 1 | 4 |
| 28-Sep | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 5 |
| 29-Sep | 3 | 4 | 4 | 3 | 3 | 2 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 30-Sep | 1 | 2 | 1 | 1 | 0 | 1 | 2 | 1 | 5 | 3 | 3 | 3 | 3 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 5 | 5 | 6 | 6 |

Diurnal Maximum

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 300 | 41.78 | 41.78 |
| 6 - 11 | 223 | 31.06 | 72.84 |
| 12 - 19 | 188 | 26.18 | 99.03 |
| 20 - 28 | 7 | 0.97 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

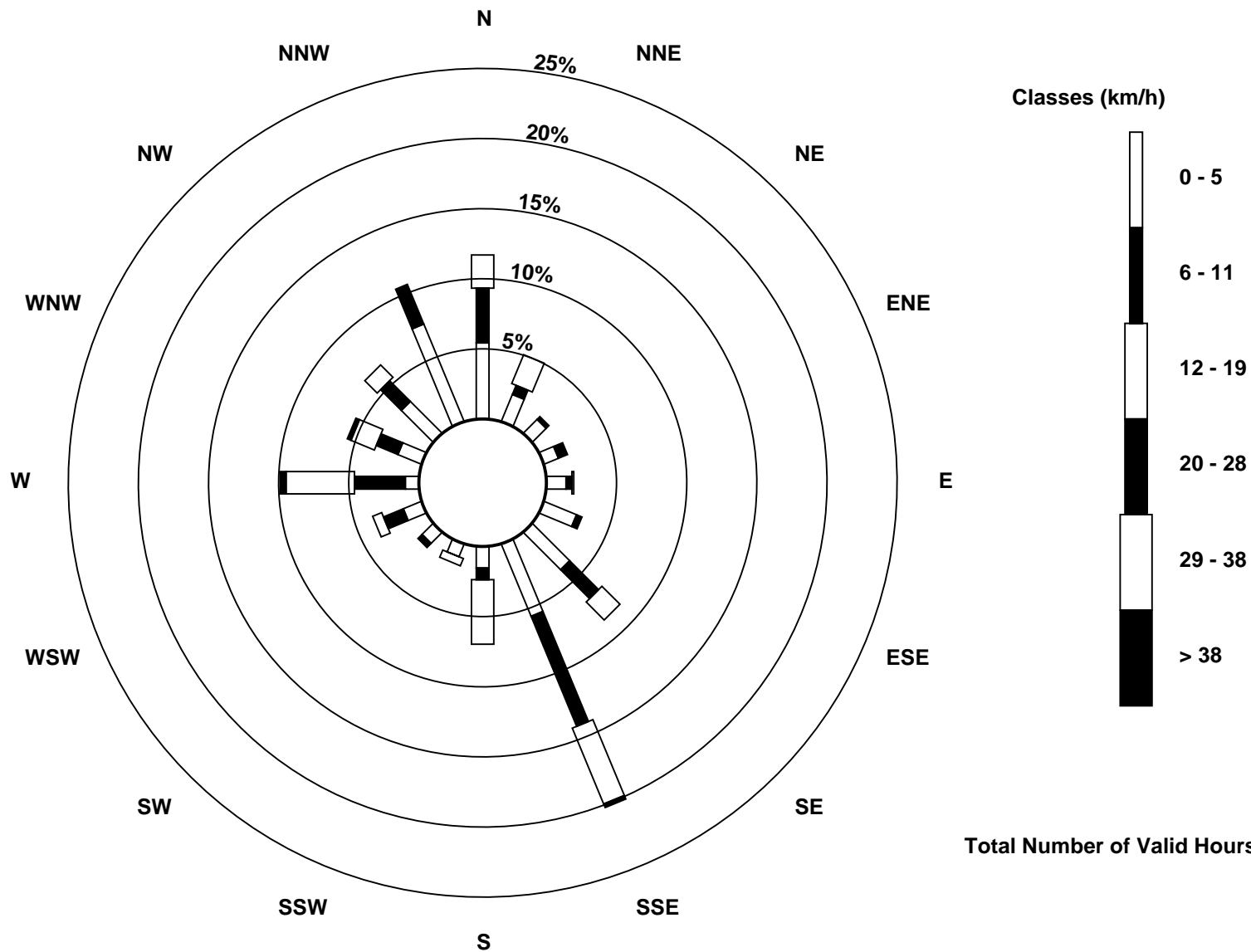
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





| | | |
|---|--|-------------------------------|
| Maximum Speed: 20 km/h on Sep 28 21:00 | Maximum Daily Speed Average: 8.7 km/h on Sep 29 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 30 05:00 | Minimum Daily Speed Average: 4.1 km/h on Sep 30 | Hours of Data: 61 |
| Maximum Diurnal Speed Average: 15.7 km/h at hour 13 | Minimum Diurnal Speed Average: 0.2 km/h at hour 24 | Hours of Missing Data: 659 |
| Monthly Average Velocity: 6.6 km/h 172.6 deg | Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 6 Median = 14 Q ₃ = 17 P ₉₀ = 19 P ₉₉ = 20 | Percent Operational Time: 8.5 |

| 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | SSE16 | SSE19 | SSE19 | SE13 | SE10 | SE8 | SE11 | SE15 | SE14 | SE15 | SSE16 | SSE16 | SSE17 | SSE14 | S6 | NNW7 | N6 | N3 | SW2 | WSW3 | S1 | SSE9 | SSE6 | S3 | SSE8.7 | SSE19 |
| 30-Sep | SSE2 | NNW1 | N2 | WNW1 | SE1 | SSE4 | SSE6 | E2 | SSE10 | SSE10 | SSE12 | SSE12 | SSE11 | W7 | W15 | WSW19 | W19 | WSW15 | NW13 | NW14 | NW15 | NNW16 | NW18 | NNW17 | W4.1 | WSW19 |

| | |
|--|-----------------|
| SSE8.7 SSE8.9 SE8.5 SSE6.4 SE5.2 SE5.9 SE8.9 SE8.2 SE12.2 SSE12.6 SSE14.0 SSE15.0 SSE15.7 S10.6 SW10.5 SW9.4 SW8.3 SW7.4 SW4.3 SW3.8 SSW3.1 S4.1 S2.1 SSW0.2 | Diurnal Average |
| SSE16 SSE19 SSE19 SE13 SE10 SE8 SE11 SE15 SE14 SSE15 SSE16 SSE17 SSE19 SSE18 S18 WSW19 S19 S16 S16 SSE19 SSE20 SSE19 NW18 NNW17 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|--|-------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 6 km/h on Oct 1 00:00 | Hours of Data: 61 |
| Minimum Value: 1 km/h on Sep 30 05:00 | Hours of Missing Data: 659 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6 | Hours of Calibration: 0 |
| | Percent Operational Time: 8.5 |

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

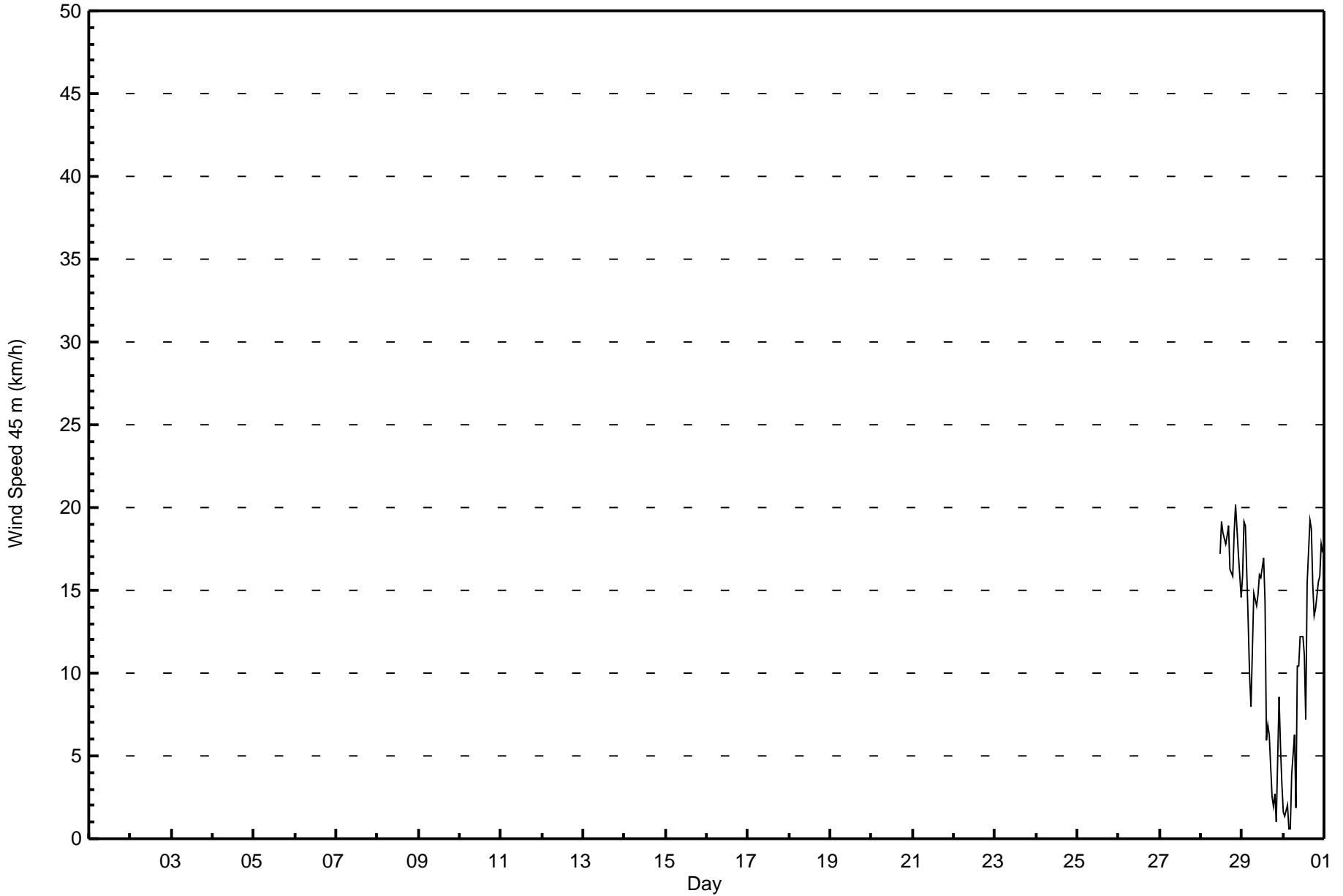
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 12 | 19.67 | 19.67 |
| 6 - 11 | 13 | 21.31 | 40.98 |
| 12 - 19 | 35 | 57.38 | 98.36 |
| 20 - 28 | 1 | 1.64 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

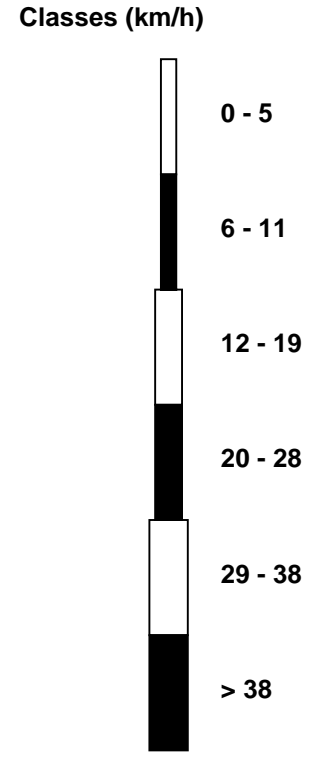
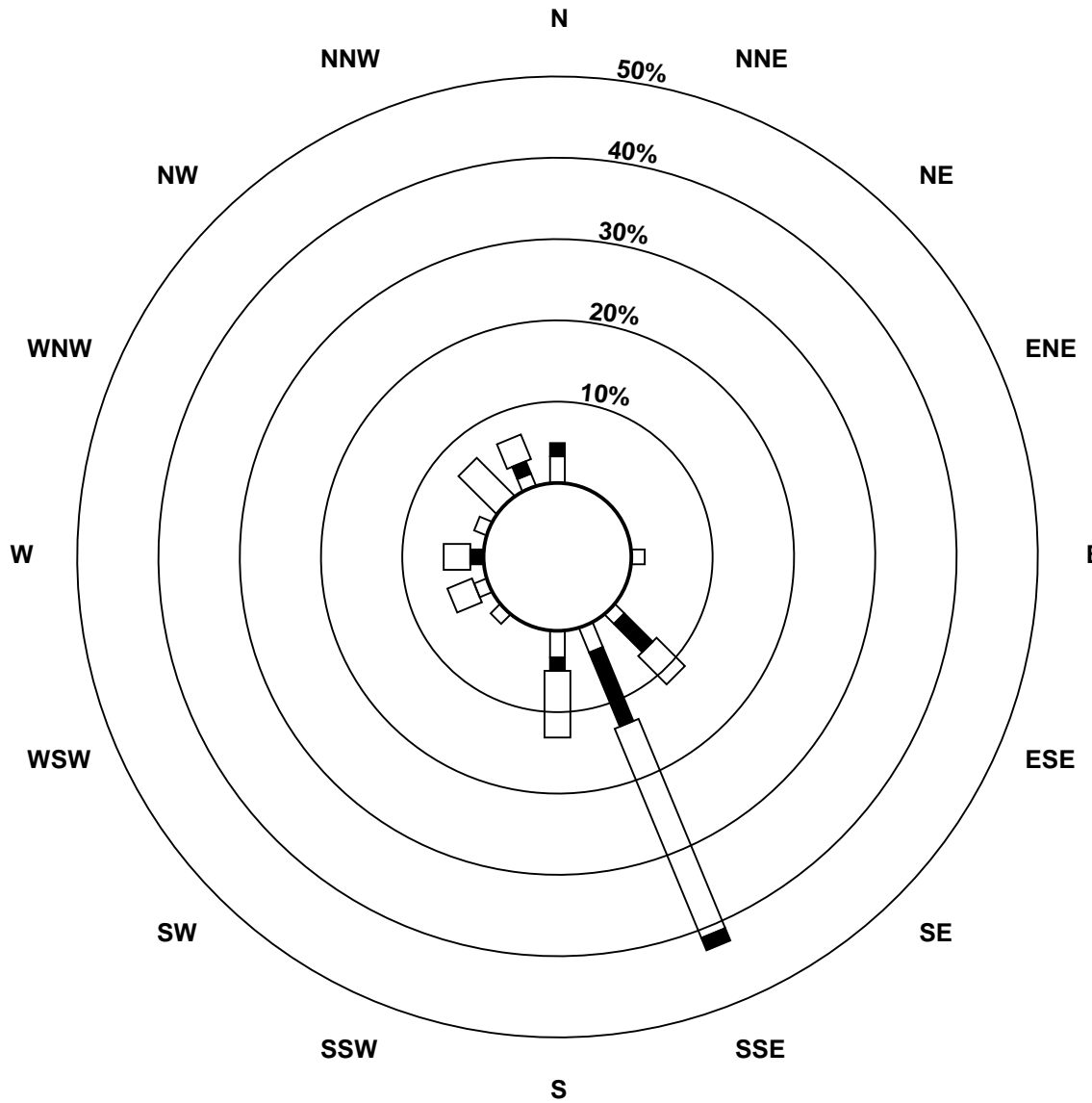
Total Number of Valid Hours: 61

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 61



Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | | |
|---|--|--------------------------------|
| Maximum Speed: 43 km/h on Sep 10 15:00 | Maximum Daily Speed Average: 30.4 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 13 05:00 | Minimum Daily Speed Average: 1.5 km/h on Sep 22 | Hours of Data: 716 |
| Maximum Diurnal Speed Average: 4.7 km/h at hour 1 | Minimum Diurnal Speed Average: 1.8 km/h at hour 12 | Hours of Missing Data: 4 |
| Monthly Average Velocity: 3.0 km/h 215.6 deg | Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 8 Median = 15 Q ₃ = 23 P ₉₀ = 29 P ₉₉ = 39 | Percent Operational Time: 99.4 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|---------------|---------------|--------|--------|--------|--------|------|------|------|------|------|--------|--------|--------|--------|------|------|--------|--|--|--|--|-----------------|-----------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | WSW34 | WSW32 | WSW25 | WSW19 | W25 | W35 | W37 | W39 | W29 | WSW26 | WSW30 | WSW23 | WSW23 | WSW25 | W31 | W38 | W37 | WSW36 | WSW37 | W31 | W24 | WSW23 | W24 | W36 | WSW29.8 | W39 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | W39 | W39 | W36 | W25 | W17 | W13 | W18 | W16 | W13 | W18 | W16 | W21 | W20 | W15 | WSW16 | WSW19 | WSW20 | WSW21 | WSW25 | WSW34 | WSW28 | WSW22 | W19 | WSW19 | W21.8 | W39 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | W21 | W22 | W26 | W30 | WSW30 | WSW15 | WSW15 | W18 | W20 | W26 | WNW31 | WNW24 | WNW25 | WNW30 | WNW27 | WNW29 | NW26 | WNW28 | NNW37 | NNW28 | NNW24 | NNW23 | NNW18 | NW18 | NNW21.2 | NNW37 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | NW14 | NW12 | NW9 | WNW10 | WNW9 | W10 | WNW12 | WNW9 | NW6 | NNW11 | NNW16 | NNW15 | NNW14 | NNW11 | NNW14 | NNW9 | NNW2 | NE2 | W1 | S4 | SE11 | SSE15 | SSE16 | NNW5.9 | SSE16 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | SSE16 | SSE14 | SSE16 | SSE13 | SSE15 | SSE19 | SSE20 | SSE17 | SSE13 | SE13 | SE15 | SE13 | S6 | WSW19 | WSW18 | WSW16 | WSW16 | WSW16 | WSW16 | WSW10 | SSW12 | SSW7 | S5 | SSW4 | SW5 | S9.5 | SSE20 | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | SW4 | SW5 | SW5 | SW2 | S2 | S2 | S3 | SSE3 | NW2 | WNW4 | NW5 | NW4 | NW5 | NW6 | NNW5 | NW6 | NW5 | N3 | E5 | ESE4 | ESE13 | SE19 | SE19 | SE23 | SSE2.1 | SE23 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | SE25 | SSE21 | SSE20 | SSE17 | SE16 | SSE20 | SSE18 | SSE16 | SE15 | SE20 | SSE20 | SSE20 | S18 | S20 | S22 | S23 | S25 | S22 | S23 | S29 | S29 | S19 | SSE14 | SSE11 | SSE19.2 | S29 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | SSE10 | SSE14 | SSE15 | SSE12 | SSE9 | SSE12 | SSE12 | SSW4 | WSW7 | WNW3 | NNW7 | NNW14 | N15 | N13 | NNW16 | NNE12 | NNE13 | NNW17 | N18 | NNW15 | NNW6 | WNW7 | WNW3 | WNW3 | N2.4 | N18 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | NNE3 | NNW7 | NNW7 | NNW6 | S2 | ENE5 | NE4 | NNW9 | N9 | N4 | NNW9 | NNW10 | NNW13 | NNW14 | N19 | N20 | NW20 | N16 | NNW12 | N7 | NNW6 | WNW6 | WNW8 | W11 | NNW8.3 | N20 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | WSW10 | WSW13 | SSW7 | SW12 | WSW14 | SW13 | W29 | W28 | W34 | W38 | W35 | W36 | W35 | W42 | W43 | WNW28 | W28 | W40 | W39 | WSW28 | WSW24 | W27 | WSW23 | W29 | W26.6 | W43 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | W28 | WSW23 | W15 | W15 | WSW15 | SW8 | S6 | SE11 | SE12 | SSE13 | SE10 | SE11 | SE8 | ESE5 | SE12 | SE20 | SSE20 | SSE20 | SSE32 | SSW17 | NNE4 | SW9 | WSW16 | WSW22 | SSW8.7 | SSE32 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | WSW25 | W33 | W36 | W30 | W27 | WSW28 | WSW30 | W30 | WNW28 | WNW28 | NW25 | NW25 | WNW20 | NNW14 | NW14 | NW18 | NW17 | NNE13 | NNE10 | NNE15 | NE12 | ENE10 | NE4 | NNE4 | WNW15.4 | W36 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | NNW5 | N6 | N5 | N3 | NW0 | E2 | E4 | E6 | ENE3 | NNE2 | N6 | WSW5 | NNE1 | SE2 | N7 | NNW4 | NNE5 | E9 | ENE11 | ENE5 | ESE4 | NE2 | N8 | NNW8 | NNE3.0 | ENE11 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | NNW11 | N8 | N8 | N7 | N6 | N5 | NNE5 | N3 | NNW3 | N4 | N7 | NW10 | NNW7 | NNW9 | NNW9 | NNE7 | NNE10 | NE10 | NE10 | NE14 | NE12 | ENE7 | ESE5 | SE4 | NNE6.3 | NE14 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | NNW1 | NNW3 | ESE2 | ESE5 | SE4 | SSE5 | SSE7 | SSE8 | SSE4 | SE6 | SSE7 | SE7 | SE6 | S2 | ESE3 | SSW1 | WSW14 | SW15 | SW15 | SSW13 | SSW14 | S11 | S12 | SSE8 | S5.6 | SW15 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | SE13 | SE11 | SE16 | SE18 | SE18 | SE17 | SE14 | SE13 | SSE18 | SSE17 | SSE16 | S19 | S21 | S21 | S18 | S19 | S19 | S20 | S22 | SSE21 | S21 | S25 | S23 | SSE17.6 | S25 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | S22 | SSE24 | SSE27 | SSE26 | SSE28 | SE24 | SSE21 | SSE21 | SSE19 | SSE20 | SSE20 | SSE24 | S22 | S22 | SSE24 | SSE23 | SSE23 | SSE28 | SSE29 | SSE26 | SSE26 | SSE31 | SSE26 | SE30 | SSE24.2 | SSE31 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | SE33 | SE34 | SE31 | SE34 | SE34 | SE33 | SE33 | SE34 | SE33 | SE29 | SE34 | SE41 | SSE27 | SE25 | SE25 | SE27 | SE30 | SE28 | ESE21 | ESE18 | SE4 | SE4 | SE10 | SE22 | SE26.7 | SE41 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | ESE21 | ESE25 | ESE16 | NE9 | N17 | N17 | N15 | N14 | M | M | NNE15 | N17 | NNE16 | E21 | NE21 | ENE25 | ENE26 | ENE22 | ENE20 | ENE23 | ENE22 | E22 | ENE20 | NE20 | ENE15.6 | ENE26 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | NNE21 | NNE23 | NNE25 | NNE26 | N25 | NNE28 | NNE31 | NNE36 | NNE35 | NNE35 | NNE34 | NNE35 | NNE35 | NNE33 | NNE34 | NNE31 | NNE31 | NNE32 | NNE31 | N32 | NNE33 | NNE30 | NNE28 | N29 | NNE30.4 | NNE36 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | N27 | N31 | N31 | N29 | N31 | N27 | N25 | N27 | N24 | N22 | N23 | N27 | N25 | N24 | N27 | N27 | N28 | N25 | N18 | NNW17 | NNW15 | NNW13 | NNW11 | NNW11 | N23.3 | N31 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | NNW5 | WNW3 | NNW2 | NNW4 | NNW5 | NNW3 | SW1 | SW4 | SW5 | WSW5 | SE1 | E4 | N4 | ENE3 | ESE4 | SE5 | SE6 | SSE5 | ESE5 | SE8 | SE5 | SE7 | SE6 | SE5 | SE1.5 | SE8 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | SSE4 | WSW5 | SW6 | S3 | SSE6 | SSE8 | SE1 | S1 | SE1 | SE6 | E4 | S8 | S6 | S9 | SSE10 | S9 | SSE12 | SSE15 | SSE19 | SSE18 | SSE18 | SSE17 | SSE18 | SSE19 | SSE8.9 | SSE19 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | SE13 | SE11 | SE19 | SE17 | SSE15 | SSE9 | SSE6 | SSE3 | SE3 | SE9 | SE12 | SE12 | SSE12 | SSE12 | SSE12 | SSE9 | SSE13 | SSE16 | SSE18 | SSE22 | S23 | S24 | SSE28 | SSE23 | SSE14.1 | SSE28 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | SSE22 | SE23 | SE19 | SE20 | SE19 | SE18 | SE14 | SSE14 | SSE16 | SSE15 | SE11 | SE9 | SE6 | SSE4 | W13 | WNW11 | NE3 | SSW4 | SW13 | SW21 | WSW21 | SW6 | SSW6 | S5 | SSE9.1 | SE23 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | S5 | SSW5 | WSW9 | W10 | W10 | W13 | WSW12 | WSW12 | WSW11 | WSW12 | W11 | WNW11 | NW19 | WNW20 | NW19 | NW19 | NW17 | NNW15 | NNW12 | NNW10 | W6 | SW4 | SW3 | S6 | WNW8.7 | WNW20 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | SW6 | SW5 | SSE5 | SE11 | S6 | S5 | SSE7 | SSE5 | SE1 | NNW5 | NNW5 | NNW8 | NW8 | NW10 | NNW11 | NNW14 | N20 | N17 | N13 | N16 | N12 | N9 | N10 | N10 | N4.9 | N20 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | N6 | N8 | N5 | SE6 | SE11 | SSE10 | SSE11 | SE19 | SE21 | SE19 | SSE15 | SSE19 | SSE22 | SSE21 | S19 | S19 | S22 | S23 | S28 | SSE24 | SSE29 | SSE28 | SSE22 | SSE22 | SSE15.8 | SSE29 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | SSE26 | SSE29 | SSE27 | SSE24 | SE24 | SE19 | SE24 | SE28 | SE25 | M | M | SSE18 | SSE19 | SSE16 | S7 | NW8 | NNW8 | N5 | ESE2 | S3 | WSW6 | SSE8 | SSE14 | SSE8 | SSE13.5 | SSE29 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | SE12 | SSE10 | SSE7 | SSE6 | S4 | SSE12 | SSE11 | SSE9 | SSE11 | S7 | SSE13 | SE15 | SE12 | WSW12 | WSW18 | WSW21 | WSW25 | WSW22 | WNW24 | NW26 | NW26 | NW25 | NW26 | NW26 | WSW6.4 | NW26 | | | | | | | | | | | | | | | | | | | | | | |
| SSW4.7SSW4.5SSW4.1SSW4.0SSW4.1 | | | | | | | | | | | | | | | | | | | | | | | | S4.4 | S4.4 | SSW3.7 | SSW3.3 | SSW3.2 | SSW1.8 | SSW1.8 | W2.6 | W3.6 | W4.6 | W4.1 | W3.7 | WSW2.9 | SSW1.9 | SSW2.8 | SSW3.0 | S3.8 | S3.9 | SSW3.6 | | | | | Diurnal Average | |
| W39 W39 W36 SE34 SE34 W35 W37 W39 NNE35 W38 W35 SE41 W35 W42 W43 W38 W37 W40 W39 WSW34 NNE33 SSE31 SSE28 W36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 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

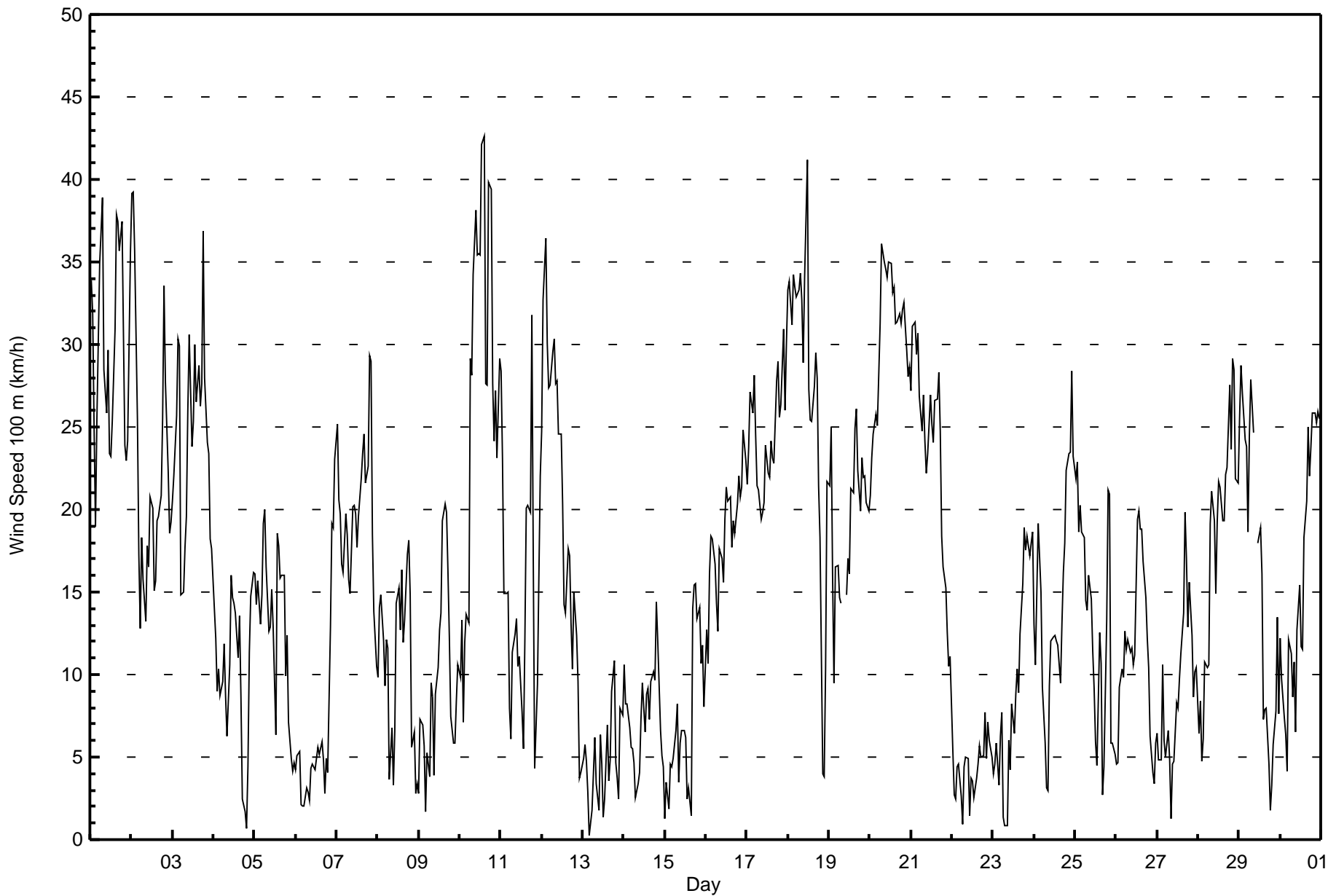
Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 11 km/h on Sep 10 18:00 | Hours of Data: 716 |
| Minimum Value: 1 km/h on Sep 13 21:00 | Hours of Missing Data: 4 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 8 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.4 |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|----|----|----|---|---|---|---|--|
| 5 | 7 | 7 | 8 | 6 | 6 | 6 | 6 | 6 | 8 | 8 | 7 | 7 | 7 | 9 | 8 | 10 | 9 | 11 | 10 | 10 | 7 | 7 | 7 | 7 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 122 | 17.04 | 17.04 |
| 6 - 11 | 144 | 20.11 | 37.15 |
| 12 - 19 | 192 | 26.82 | 63.97 |
| 20 - 28 | 176 | 24.58 | 88.55 |
| 29 - 38 | 74 | 10.34 | 98.88 |
| > 38 | 8 | 1.12 | 100.00 |

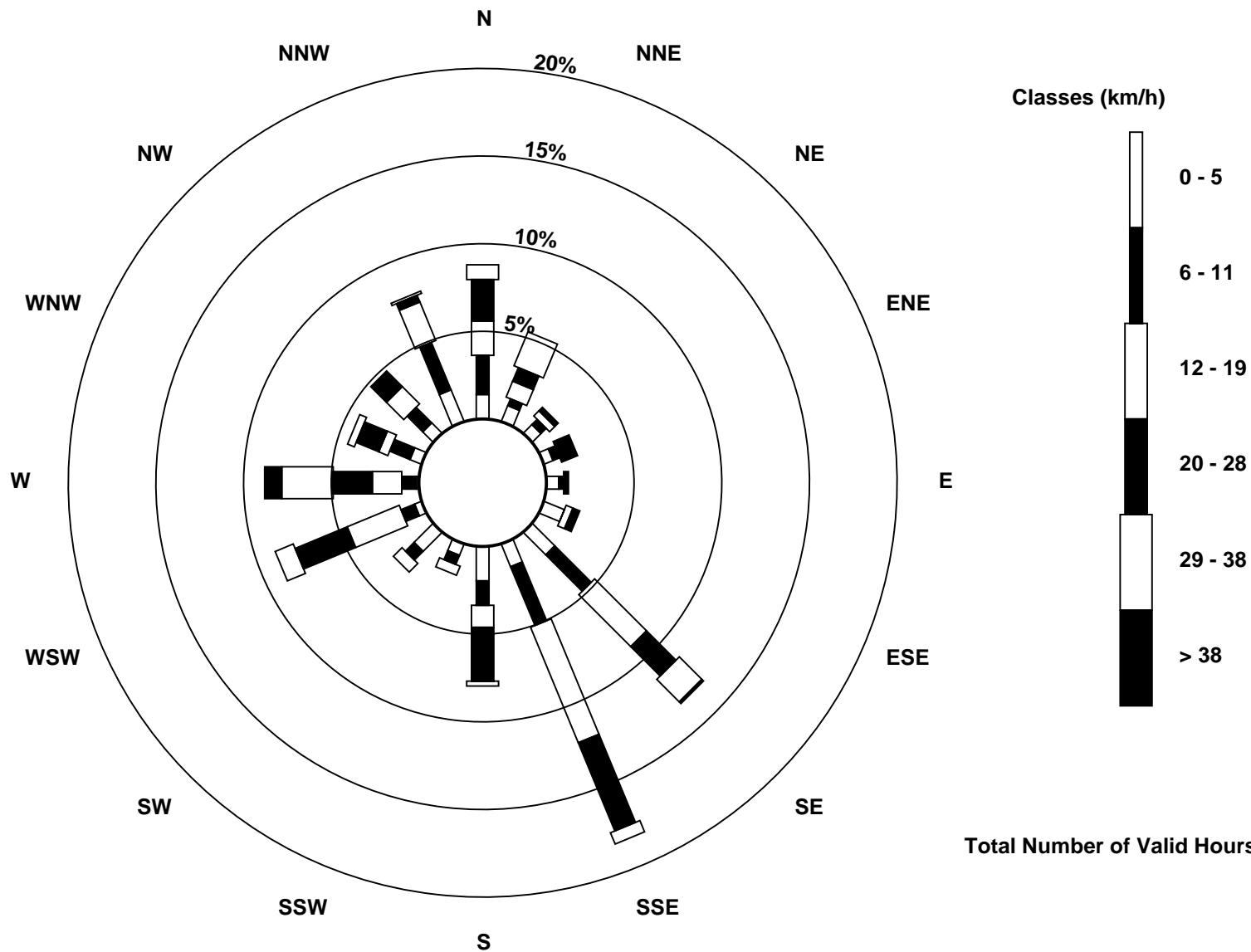
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





| | | |
|---|---|--------------------------------|
| Maximum Speed: 49 km/h on Sep 10 15:00 | Maximum Daily Speed Average: 36.9 km/h on Sep 1 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 6 08:00 | Minimum Daily Speed Average: 1.1 km/h on Sep 22 | Hours of Data: 718 |
| Maximum Diurnal Speed Average: 6.6 km/h at hour 2 | Minimum Diurnal Speed Average: 2.5 km/h at hour 12 | Hours of Missing Data: 2 |
| Monthly Average Velocity: 4.4 km/h 228.3 deg | Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 10 Median = 18 Q ₃ = 28 P ₉₀ = 35 P ₉₉ = 46 | 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-Sep | W42 | W42WSW37 | WSW28 | W35 | W44 | W46 | W46 | W32WSW30 | WSW35 | WSW26 | WSW26 | WSW29 | W34 | W41 | W41 | W40 | W44 | W39 | W35WSW35 | WSW34 | W47 | W36.9 | W47 | | | | |
| 2-Sep | W47 | W47 | W43 | W35 | W25 | W17 | W23 | W20 | W15 | W19 | W19 | W22 | W22 | W17 | W18 | W22WSW24 | WSW27 | WSW32 | WSW43 | WSW37 | W29 | W22 | W22 | W26.6 | W47 | | |
| 3-Sep | W24 | W28 | W28 | W27 | W30WSW20 | W22 | W21 | W24 | W29WNW33 | WNW26 | WNW27 | WNW32 | NW28WNW31 | NW29WNW33 | NNW40 | NNW33 | NNW30 | NNW29 | NNW23 | NNW22 | NNW24.8 | NNW40 | | | | | |
| 4-Sep | NW20 | NW21 | NW17WNW16 | WNW15 | WNW16 | WNW18 | WNW13 | WNW11 | NNW13 | NNW18 | NNW16 | NNW16 | NW16 | NW12WNW15 | WN9 | NNW3 | NNE1 | W1 | SSW7 | S9 | SSE13 | SSE14 | NNW9.5 | NW21 | | | |
| 5-Sep | SSE13 | S14 | S9 | S10 | SSE16 | SSE16 | S14 | SSW13 | SSW9 | S9 | SSE14 | SSE12 | SSW8 | WSW22 | WSW21 | WSW19 | WSW20 | WSW19 | WSW11 | SW13 | SW14 | SW12 | WSW13 | W16 | SSW11.2 | WSW22 | |
| 6-Sep | WNW6 | W10 | WSW7 | WNW5 | WNW4 | NW5 | NW4 | NE0 | NNW3 | NW4 | NW6 | NW5 | NW5 | NW6 | NNW5 | NW6 | NW4 | NNE3 | E5 | E9 | ESE23 | SE26 | SSE28 | SSE29 | SSE1.6 | SSE29 | |
| 7-Sep | SE30 | SSE24 | SSE22 | SSE22 | SSE21 | SSE20 | SSE22 | S21 | SSE17 | SSE18 | S18 | S19 | S19 | S22 | S26 | S27 | S28 | S26 | S28 | S33 | S34 | SSW26 | S19 | S16 | S22.5 | S34 | |
| 8-Sep | SSW14 | SSW14 | SSW11 | SSW10 | SSW10 | SSW9 | S9 | SW8 | WSW12 | WNW10 | NNW11 | N18 | NNE18 | N14 | N18 | NE14 | NNE15 | NNW19 | N21 | N17 | NNE8 | WNW5 | W5 | WNW7 | NW4.7 | N21 | |
| 9-Sep | WNW5 | NW10 | NNW10 | NNW7 | S5 | E6 | E6 | N5 | NNE9 | NE6 | N9 | N12 | N13 | N14 | N20 | N20 | NNW22 | N20 | N14 | NNE11 | NNE7 | NW5 | WNW8 | W12 | N8.4 | NNW22 | |
| 10-Sep | WSW13 | W18 | SW8 | SW15 | WSW17 | WSW17 | W36 | W34 | W40 | W43 | W39 | W39 | W41 | W48 | W49 | WNW31 | W33 | W46 | W46 | WSW36 | WSW35 | W39 | WSW33 | W39 | W32.4 | W49 | |
| 11-Sep | W33 | W34 | W25 | W25 | WSW23 | WSW17 | SW12 | S6 | S6 | S9 | S8 | SE12 | ESE8 | ESE6 | SE14 | SSE19 | SSE22 | S23 | S32 | SW20 | NW9 | WSW14 | W21 | W30 | SW11.2 | W34 | |
| 12-Sep | W35 | W43 | W45 | W37 | W32 | WSW34 | WSW36 | W35 | WNW33 | WNW31 | NW27 | NW26 | WNW22 | NW16 | NW16 | NW20 | NW20 | NNE15 | NNE14 | NNE21 | NE18 | ENE14 | NE6 | NNE5 | WNW18.3 | W45 | |
| 13-Sep | N7 | N8 | NNE5 | NNE3 | NW1 | NE3 | E4 | E7 | ENE4 | NNE2 | N6 | WSW5 | NNE1 | E1 | N7 | N4 | NE6 | ENE7 | ENE9 | ENE6 | E5 | ENE4 | NNE8 | NNE8 | NE3.8 | ENE9 | |
| 14-Sep | NNE9 | NE11 | E8 | ESE4 | ENE5 | NE4 | NE8 | NE9 | NE11 | NNE7 | N9 | NNW10 | NNW8 | NNW10 | N10 | NNE8 | NE10 | NE10 | NE10 | NE18 | NE23 | ENE14 | E12 | ESE12 | NE8.2 | NE23 | |
| 15-Sep | SE8 | S3 | S5 | S8 | S8 | S10 | SSE9 | SSE11 | S4 | S4 | S5 | S5 | SSE5 | SW2 | SE3 | SW2 | WSW16 | SW16 | SW17 | SSW17 | SSW16 | SSW21 | SSW25 | SSW18 | SSW8.9 | SSW25 | |
| 16-Sep | SSE14 | SSE14 | SSE19 | SSE23 | SSE22 | SSE20 | SSE19 | SSE19 | S18 | S14 | S17 | S21 | S25 | S24 | S24 | S20 | S22 | S22 | S23 | S28 | S28 | S28 | S29 | S31 | S21.3 | S31 | |
| 17-Sep | S31 | S30 | S30 | SSE29 | SSE28 | SSE24 | SSE24 | SSE24 | SSE23 | SSE22 | SSE22 | SSE26 | S26 | S23 | SSE25 | SSE25 | SSE25 | SSE30 | SSE32 | SSE29 | SSE29 | SSE36 | SSE32 | SSE31 | SSE27.0 | SSE36 | |
| 18-Sep | SSE36 | SSE36 | SE35 | SE39 | SE39 | SE39 | SE39 | SE38 | SE34 | SE31 | SE36 | SSE41 | SSE29 | SE26 | SE27 | SE29 | SE31 | SE31 | SE28 | SE30 | ESE16 | ESE15 | SE18 | ESE30 | SE30.9 | SSE41 | |
| 19-Sep | ESE31 | ESE35 | ESE24 | E15 | NNE11 | NNE16 | NNE17 | NNE19 | M | M | NNE15 | NNE16 | NE17 | E25 | ENE26 | E30 | E32 | ENE30 | ENE28 | ENE31 | E30 | E31 | ENE28 | NE26 | ENE21.7 | ESE35 | |
| 20-Sep | NE27 | NNE29 | NNE30 | NNE31 | NNE31 | NNE36 | NNE38 | NNE42 | NNE41 | NNE40 | NNE40 | NNE41 | NNE41 | NNE41 | NNE39 | NNE39 | NNE38 | NNE37 | NNE38 | NNE38 | NNE38 | NNE39 | NNE36 | NNE33 | NNE33 | NNE36.4 | NNE42 |
| 21-Sep | NNE32 | N35 | N36 | N34 | N35 | N31 | N29 | N31 | N28 | N26 | N27 | N29 | N27 | N26 | N29 | N30 | N31 | N27 | N21 | N20 | N17 | NNW15 | NNW14 | NNW15 | N26.7 | N36 | |
| 22-Sep | NNW10 | NNW5 | NNW4 | NW6 | NW7 | NW6 | WSW2 | SW6 | SW4 | WSW5 | SSW2 | E3 | N4 | N1 | SE1 | SSE4 | SSE6 | S6 | SE4 | SE8 | SSE6 | SSE7 | SSE7 | SSE7 | SSW1.1 | NNW10 | |
| 23-Sep | SSE7 | SSW6 | S7 | S8 | SSE12 | SSE14 | SSE7 | SSE8 | SSE7 | SSE8 | ESE5 | S9 | SSW7 | S9 | SSE11 | S10 | SSE12 | SSE16 | SSE21 | SSE22 | S27 | S27 | SSE23 | SSE26 | SSE12.6 | S27 | |
| 24-Sep | SSE15 | SE14 | SSE19 | SSE22 | SSE19 | SSE18 | SSE13 | SSE10 | SSE11 | SSE11 | SSE10 | SE12 | SSE12 | SSE13 | S11 | S16 | SSE19 | SSE19 | S28 | S28 | S28 | SSE30 | SSE27 | SSE16.9 | SSE30 | | |
| 25-Sep | SSE24 | SSE23 | SE23 | SE23 | SSE21 | SSE21 | SSE17 | SSE15 | SSE17 | S13 | S9 | SSE8 | SSE5 | S4 | W15 | WNW11 | NNW2 | SW9 | WSW17 | WSW29 | WSW35 | WSW16 | SW13 | SW9 | SSW10.5 | WSW35 | |
| 26-Sep | WSW9 | WSW14 | WSW18 | W17 | W14 | W18 | W17 | WSW16 | W14 | WNW11 | W11 | WNW14 | NW21 | NW21 | NW21 | NW22 | NW19 | NNW17 | NNW15 | NNW14 | NW9 | WSW5 | NNW2 | SSW5 | WNW12.3 | NW22 | |
| 27-Sep | WSW12 | WSW12 | SW6 | S4 | SSW7 | SW8 | SW9 | SW6 | WNW2 | NNW6 | N7 | N9 | NNW8 | NNW11 | NNW12 | N15 | N21 | NNE19 | NNE16 | NNE19 | NNE18 | NNE11 | NNE10 | NE11 | N5.9 | N21 | |
| 28-Sep | NE8 | NE4 | ESE4 | SE20 | SE22 | SE20 | SSE21 | SSE24 | SSE22 | SSE20 | SSE16 | SSE21 | SSE23 | SSE22 | S23 | S20 | S23 | S25 | S32 | S34 | S37 | S36 | SSE28 | SSE29 | SSE20.8 | S37 | |
| 29-Sep | SSE27 | SSE28 | SSE31 | SSE28 | SSE23 | SSE19 | SE28 | SE31 | SSE23 | SSE23 | SSE19 | SSE18 | SSE18 | SSE16 | S8 | WNW8 | NW9 | NNW3 | N1 | SW3 | WSW10 | SSW8 | S14 | SSE13 | SSE14.7 | SE31 | |
| 30-Sep | SSE15 | SSE16 | SSE13 | SSE15 | S14 | SSE14 | SSE20 | S16 | S9 | SSW9 | S10 | SSE13 | SSE10 | WSW14 | WSW21 | WSW24 | WSW30 | W27 | NW32 | NW35 | NW32 | NW30 | NW30 | NW30 | WSW9.7 | NW35 | |

| | |
|---|-----------------|
| SW5.9 SW6.6 SW6.0SSW6.0SSW6.0SSW5.8SSW5.9SSW5.2 SW4.2 SW4.3 W3.1WSW2.5 W3.4 W4.4 W5.3 W4.7 W4.5WSW3.8WSW2.7 SW3.6 SW4.2SSW6.0SSW5.7SSW5.8 | Diurnal Average |
| W47 W47 W45 SE39 SE39 W44 W46 W46 NNE41 W43 NNE40 NNE41 NNE41 W48 W49 W41 W41 W46 W46WSW43 NNE39 W39WSW34 W47 | Diurnal Maximum |

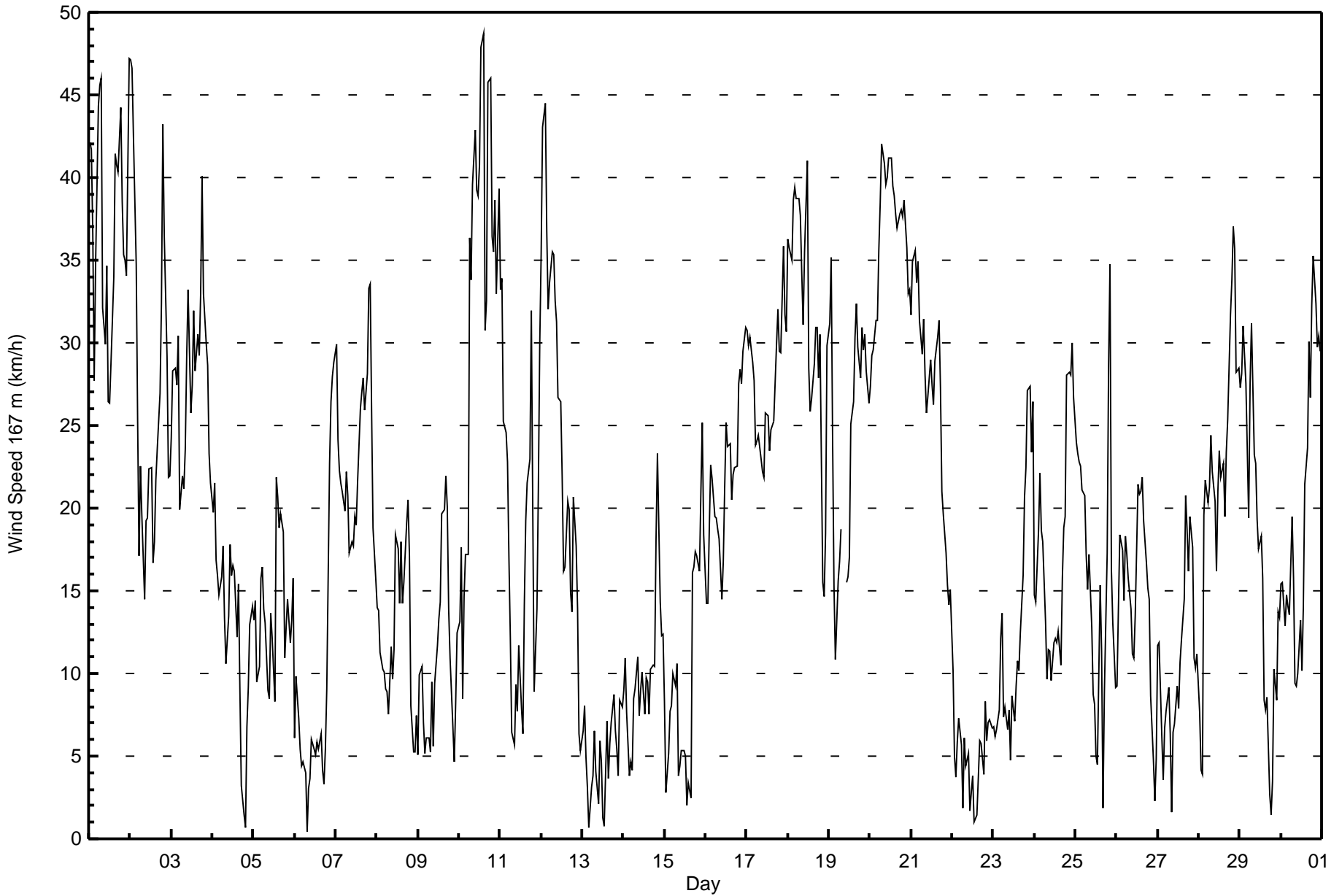
M - Maintenance
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Sep 11 20:00 Minimum Value: 0 km/h on Sep 6 05:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 718 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7 | | | | | | | |
|---|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|--|----|----|----|----|----|----|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 1 | 1 | 5 | 5 | 5 | 5 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 6 | 6 | 5 | 4 | 5 | 3 | 2 | 3 | 4 | 4 | 6 |
| 2-Sep | 1 | 1 | 3 | 2 | 3 | 3 | 2 | 4 | 4 | 3 | 5 | 5 | 4 | 5 | 3 | 6 | 2 | 2 | 6 | 4 | 3 | 4 | 4 | 2 | 6 |
| 3-Sep | 2 | 2 | 2 | 2 | 5 | 3 | 3 | 2 | 4 | 4 | 6 | 6 | 7 | 6 | 6 | 5 | 6 | 5 | 9 | 4 | 3 | 3 | 2 | 2 | 9 |
| 4-Sep | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | 4 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 5 |
| 5-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 2 | 3 | 2 | 2 | 4 | 3 | 3 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 6 | 6 |
| 6-Sep | 2 | 3 | 2 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 4 | 4 | 2 | 3 | 2 | 4 |
| 7-Sep | 2 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 3 | 2 | 2 | 3 | 3 | 2 | 5 |
| 8-Sep | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 5 | 3 | 6 | 4 | 3 | 4 | 3 | 4 | 3 | 2 | 2 | 1 | 1 | 2 | 6 |
| 9-Sep | 2 | 2 | 1 | 4 | 2 | 1 | 1 | 4 | 2 | 1 | 2 | 2 | 2 | 1 | 3 | 2 | 4 | 4 | 2 | 2 | 2 | 2 | 1 | 3 | 4 |
| 10-Sep | 2 | 6 | 3 | 4 | 3 | 3 | 5 | 4 | 6 | 6 | 5 | 5 | 7 | 8 | 8 | 11 | 10 | 10 | 4 | 5 | 4 | 6 | 7 | 6 | 11 |
| 11-Sep | 3 | 4 | 4 | 3 | 5 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 2 | 3 | 7 | 4 | 4 | 3 | 4 | 11 | 9 | 3 | 3 | 4 | 11 |
| 12-Sep | 4 | 5 | 6 | 7 | 5 | 4 | 3 | 3 | 5 | 5 | 7 | 6 | 4 | 3 | 3 | 4 | 5 | 3 | 4 | 3 | 3 | 3 | 2 | 1 | 7 |
| 13-Sep | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 2 | 4 | 3 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 5 |
| 14-Sep | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 3 | 4 | 3 | 4 | 3 | 2 | 1 | 4 | 1 | 5 | 2 | 2 | 5 |
| 15-Sep | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | 3 | 4 | 4 | 3 | 1 | 2 | 1 | 3 | 4 | 5 | 5 |
| 16-Sep | 3 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 7 | 6 | 5 | 5 | 5 | 5 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 7 |
| 17-Sep | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 4 | 5 | 5 | 5 | 8 | 6 | 5 | 6 | 4 | 8 |
| 18-Sep | 3 | 4 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 6 | 6 | 7 | 5 | 4 | 3 | 4 | 3 | 4 | 3 | 5 | 5 | 8 | 5 | 8 |
| 19-Sep | 5 | 4 | 6 | 5 | 2 | 1 | 2 | 2 | M | M | 2 | 3 | 3 | 5 | 4 | 8 | 6 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 8 |
| 20-Sep | 3 | 3 | 4 | 5 | 4 | 5 | 5 | 6 | 7 | 6 | 6 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 5 | 5 | 7 |
| 21-Sep | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 2 | 2 | 2 | 1 | 1 | 5 |
| 22-Sep | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 |
| 23-Sep | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 4 |
| 24-Sep | 3 | 2 | 3 | 2 | 2 | 2 | 4 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 2 | 2 | 3 | 3 | 4 |
| 25-Sep | 3 | 2 | 2 | 3 | 3 | 4 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 6 | 6 | 2 | 5 | 1 | 6 | 2 | 3 | 3 | 4 | 6 |
| 26-Sep | 3 | 4 | 4 | 3 | 5 | 3 | 3 | 3 | 2 | 2 | 2 | 5 | 4 | 5 | 5 | 5 | 3 | 1 | 2 | 1 | 3 | 2 | 1 | 3 | 5 |
| 27-Sep | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 |
| 28-Sep | 2 | 2 | 3 | 6 | 4 | 3 | 3 | 3 | 2 | 5 | 4 | 4 | 4 | 4 | 5 | 6 | 5 | 3 | 3 | 2 | 2 | 3 | 4 | 3 | 6 |
| 29-Sep | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 4 |
| 30-Sep | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 1 | 3 | 2 | 2 | 2 | 7 | 2 | 2 | 2 | 3 | 3 | 3 | 6 | 5 | 6 | 7 | 7 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 75 | 10.45 | 10.45 |
| 6 - 11 | 143 | 19.92 | 30.36 |
| 12 - 19 | 171 | 23.82 | 54.18 |
| 20 - 28 | 162 | 22.56 | 76.74 |
| 29 - 38 | 124 | 17.27 | 94.01 |
| > 38 | 43 | 5.99 | 100.00 |

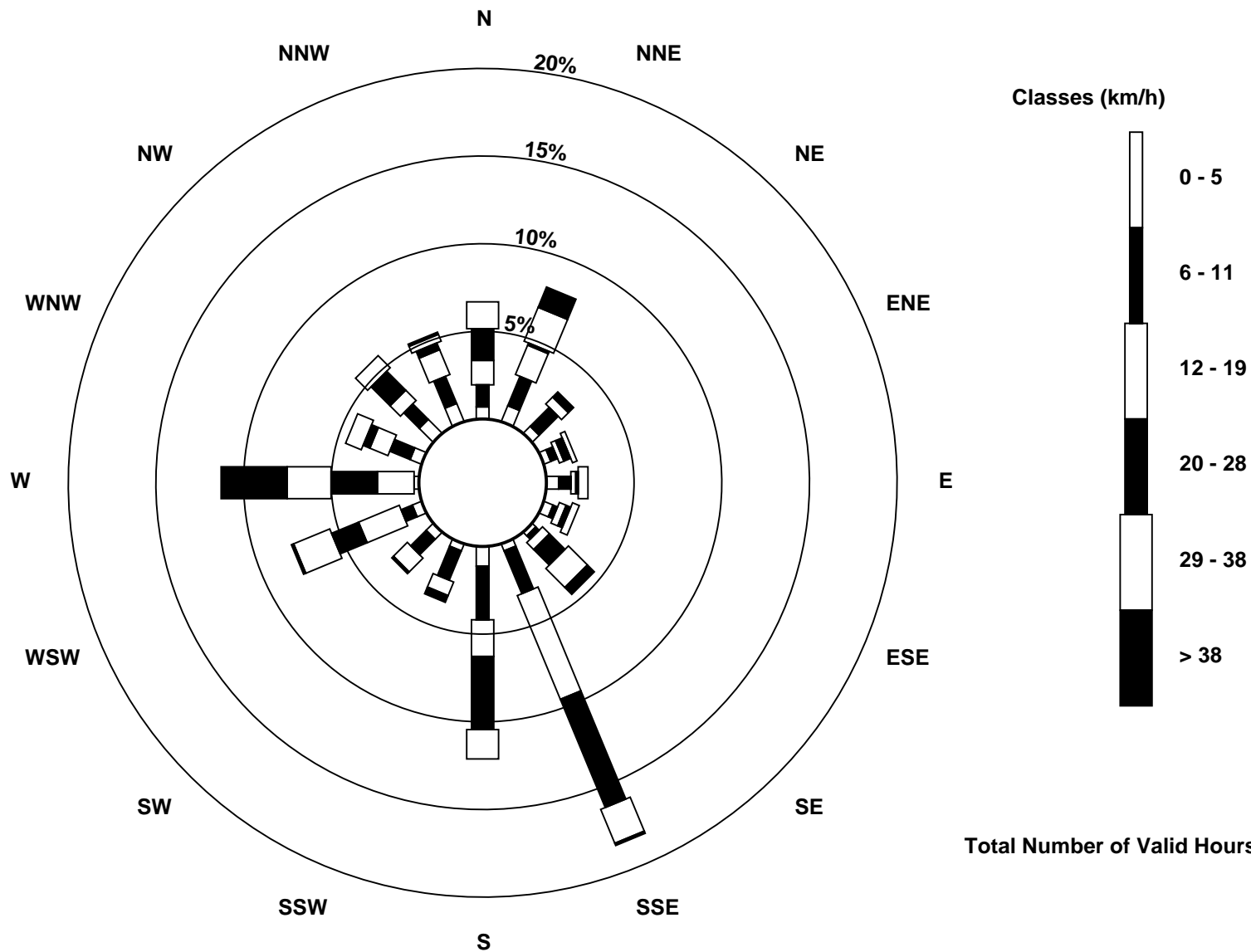
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 718



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg

Lower Camp Met Tower - September 2017

| | | | |
|--|--|---------------------------|------|
| Direction of Maximum Speed: 155 deg on Sep 18 12:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 273.1 deg on Sep 1 | | Hours of Data: | 718 |
| Direction of Minimum Speed: 257 deg on Sep 4 19:00 | | Hours of Missing Data: | 2 |
| Direction of Minimum Daily Speed Average: 0.5 deg on Sep 22 | | Percent Operational Time: | 99.7 |
| Monthly Average Direction: 293.0 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-Sep | 272 | 274 | 272 | 260 | 285 | 282 | 277 | 275 | 276 | 269 | 263 | 264 | 260 | 260 | 280 | 275 | 274 | 270 | 269 | 275 | 278 | 282 | 290 | 282 | 273.1 |
| 2-Sep | 273 | 271 | 272 | 285 | 302 | 281 | 286 | 286 | 281 | 269 | 278 | 291 | 274 | 282 | 270 | 269 | 264 | 258 | 258 | 258 | 259 | 275 | 277 | 274 | 272.2 |
| 3-Sep | 278 | 274 | 270 | 271 | 269 | 241 | 271 | 275 | 279 | 279 | 299 | 297 | 308 | 309 | 312 | 302 | 319 | 312 | 352 | 349 | 339 | 337 | 330 | 319 | 301.0 |
| 4-Sep | 335 | 359 | 43 | 9 | 344 | 336 | 336 | 325 | 360 | 4 | 353 | 349 | 310 | 310 | 308 | 297 | 333 | 25 | 257 | 208 | 132 | 16 | 166 | 114 | 333.8 |
| 5-Sep | 127 | 141 | 139 | 140 | 142 | 166 | 164 | 155 | 144 | 153 | 152 | 149 | 175 | 267 | 265 | 262 | 254 | 264 | 232 | 154 | 149 | 174 | 166 | 151 | 178.1 |
| 6-Sep | 360 | 216 | 157 | 328 | 8 | 2 | 359 | 330 | 335 | 4 | 359 | 342 | 294 | 321 | 353 | 315 | 312 | 338 | 262 | 297 | 151 | 134 | 106 | 137 | 338.8 |
| 7-Sep | 150 | 152 | 161 | 144 | 136 | 135 | 130 | 149 | 156 | 135 | 150 | 160 | 172 | 190 | 197 | 186 | 185 | 185 | 176 | 173 | 169 | 168 | 170 | 106 | 168.3 |
| 8-Sep | 146 | 156 | 149 | 146 | 144 | 145 | 141 | 147 | 164 | 125 | 9 | 346 | 360 | 344 | 351 | 23 | 19 | 338 | 352 | 349 | 320 | 333 | 295 | 359 | 82.1 |
| 9-Sep | 61 | 344 | 80 | 40 | 112 | 349 | 12 | 336 | 319 | 322 | 347 | 333 | 350 | 347 | 356 | 356 | 324 | 343 | 315 | 348 | 303 | 303 | 322 | 286 | 339.0 |
| 10-Sep | 248 | 253 | 200 | 234 | 246 | 230 | 277 | 280 | 280 | 281 | 280 | 278 | 286 | 287 | 288 | 307 | 290 | 278 | 277 | 269 | 274 | 287 | 283 | 287 | 278.1 |
| 11-Sep | 272 | 285 | 307 | 300 | 270 | 158 | 132 | 132 | 154 | 153 | 141 | 146 | 158 | 127 | 165 | 166 | 167 | 167 | 165 | 178 | 155 | 158 | 236 | 253 | 178.2 |
| 12-Sep | 266 | 277 | 284 | 289 | 278 | 266 | 259 | 273 | 298 | 301 | 313 | 323 | 309 | 336 | 330 | 338 | 321 | 25 | 10 | 16 | 29 | 51 | 29 | 32 | 299.9 |
| 13-Sep | 317 | 335 | 342 | 318 | 65 | 108 | 97 | 78 | 63 | 43 | 353 | 257 | 103 | 172 | 343 | 337 | 15 | 113 | 359 | 263 | 134 | 352 | 340 | 15 | 1.8 |
| 14-Sep | 4 | 8 | 3 | 8 | 32 | 334 | 342 | 303 | 303 | 327 | 352 | 323 | 348 | 347 | 360 | 13 | 37 | 42 | 33 | 7 | 332 | 340 | 64 | 353 | 357.1 |
| 15-Sep | 337 | 341 | 352 | 307 | 329 | 116 | 158 | 195 | 178 | 136 | 147 | 153 | 131 | 180 | 95 | 232 | 252 | 229 | 217 | 196 | 153 | 138 | 107 | 88 | 176.4 |
| 16-Sep | 102 | 98 | 166 | 147 | 152 | 147 | 134 | 151 | 146 | 156 | 169 | 181 | 188 | 188 | 187 | 193 | 194 | 185 | 188 | 180 | 171 | 175 | 174 | 164 | 175.2 |
| 17-Sep | 157 | 154 | 153 | 154 | 153 | 155 | 150 | 156 | 160 | 163 | 166 | 174 | 189 | 180 | 174 | 171 | 175 | 166 | 168 | 170 | 164 | 168 | 165 | 151 | 165.9 |
| 18-Sep | 143 | 142 | 134 | 140 | 143 | 143 | 145 | 141 | 140 | 139 | 149 | 155 | 166 | 154 | 142 | 141 | 147 | 144 | 100 | 78 | 28 | 323 | 150 | 121 | 142.7 |
| 19-Sep | 109 | 108 | 29 | 359 | 350 | 348 | 341 | 345 | M | M | 21 | 5 | 7 | 94 | 47 | 81 | 81 | 66 | 54 | 61 | 74 | 78 | 56 | 26 | 47.6 |
| 20-Sep | 10 | 11 | 7 | 7 | 5 | 10 | 13 | 14 | 18 | 19 | 19 | 20 | 20 | 19 | 18 | 16 | 16 | 16 | 19 | 11 | 15 | 12 | 14 | 10 | 14.6 |
| 21-Sep | 7 | 2 | 1 | 5 | 359 | 358 | 357 | 1 | 1 | 352 | 353 | 360 | 358 | 358 | 356 | 353 | 353 | 353 | 351 | 343 | 338 | 322 | 351 | 326 | 356.4 |
| 22-Sep | 316 | 57 | 358 | 318 | 357 | 46 | 116 | 130 | 215 | 248 | 108 | 80 | 356 | 93 | 121 | 119 | 133 | 123 | 97 | 156 | 91 | 99 | 350 | 349 | 93.9 |
| 23-Sep | 329 | 337 | 335 | 1 | 334 | 332 | 329 | 311 | 345 | 351 | 54 | 178 | 200 | 179 | 171 | 184 | 166 | 173 | 178 | 153 | 147 | 147 | 154 | 156 | 170.8 |
| 24-Sep | 113 | 104 | 156 | 127 | 134 | 142 | 151 | 139 | 145 | 156 | 159 | 159 | 160 | 163 | 168 | 165 | 179 | 162 | 149 | 163 | 170 | 168 | 162 | 157 | 159.4 |
| 25-Sep | 157 | 167 | 170 | 168 | 160 | 161 | 133 | 163 | 163 | 159 | 155 | 153 | 136 | 141 | 266 | 303 | 37 | 192 | 171 | 239 | 261 | 338 | 161 | 171 | 171.5 |
| 26-Sep | 156 | 156 | 198 | 275 | 257 | 253 | 260 | 226 | 252 | 254 | 262 | 287 | 333 | 310 | 317 | 330 | 332 | 332 | 346 | 325 | 138 | 155 | 225 | 157 | 286.9 |
| 27-Sep | 147 | 150 | 137 | 143 | 137 | 139 | 120 | 60 | 172 | 3 | 330 | 350 | 325 | 337 | 341 | 345 | 352 | 358 | 348 | 353 | 343 | 322 | 352 | 341 | 0.3 |
| 28-Sep | 326 | 348 | 341 | 6 | 317 | 342 | 354 | 156 | 161 | 162 | 168 | 162 | 168 | 160 | 192 | 189 | 186 | 182 | 177 | 170 | 166 | 161 | 156 | 156 | 171.5 |
| 29-Sep | 162 | 162 | 160 | 158 | 152 | 156 | 154 | 134 | 151 | 157 | 164 | 161 | 158 | 152 | 182 | 331 | 350 | 303 | 166 | 248 | 158 | 147 | 156 | 152 | 158.0 |
| 30-Sep | 316 | 334 | 344 | 231 | 283 | 149 | 141 | 53 | 148 | 144 | 147 | 150 | 151 | 251 | 257 | 251 | 257 | 256 | 308 | 316 | 318 | 322 | 319 | 326 | 266.7 |
| 215.9 214.6 206.8 219.7 220.6 195.6 233.9 231.3 204.3 203.4 210.5 210.5 231.7 242.2 266.7 264.4 252.0 230.4 235.5 224.7 206.4 197.1 191.4 219.3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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

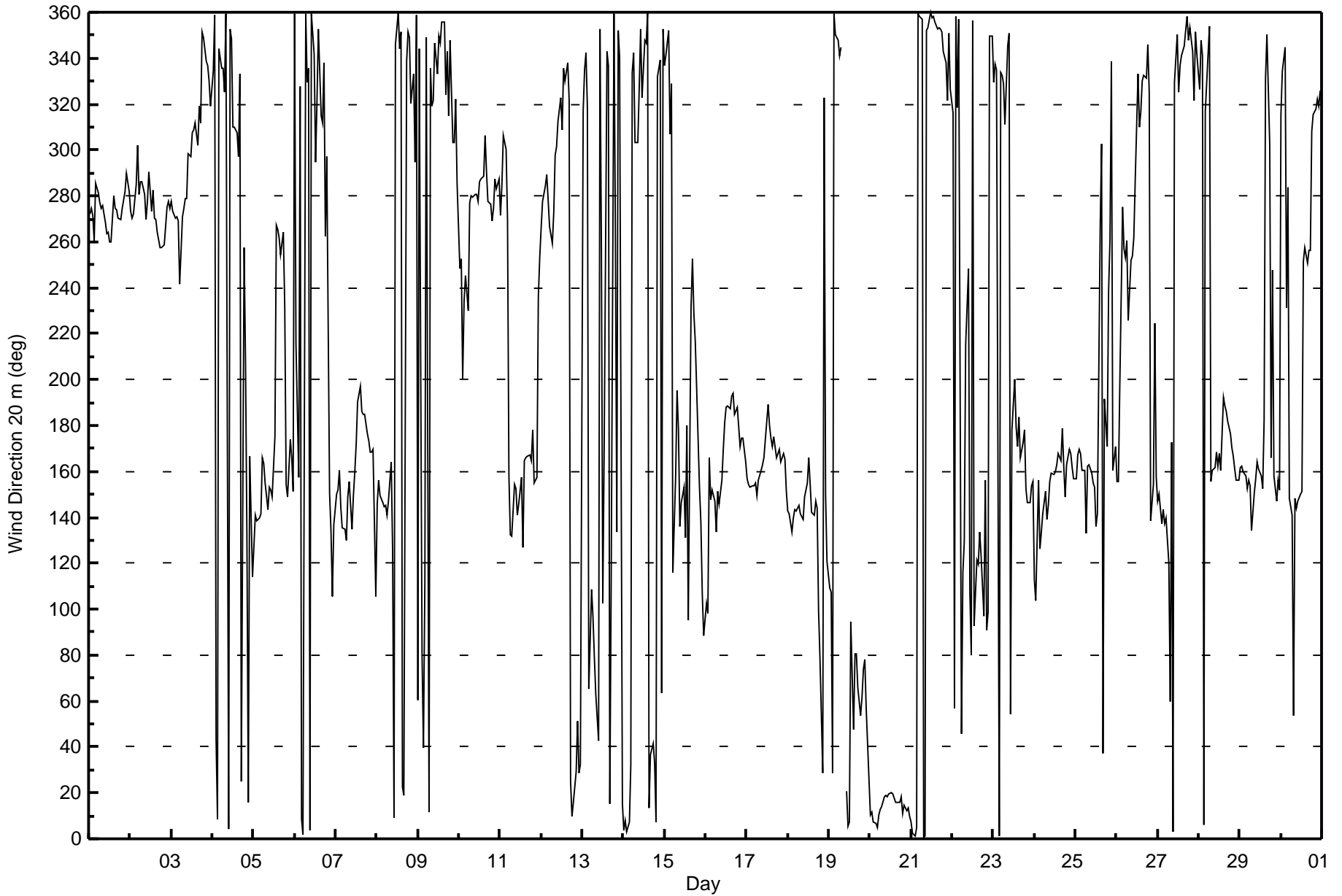
Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 114 deg on Sep 16 07:00 | Hours of Data: 718 |
| Minimum Value: 7 deg on Sep 17 01:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 9 P ₁₀ = 14 Q ₁ = 19 Median = 24 Q ₃ = 39 P ₉₀ = 68 P ₉₉ = 95 | 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-Sep | 17 | 20 | 26 | 30 | 36 | 27 | 25 | 20 | 22 | 24 | 20 | 21 | 21 | 23 | 24 | 21 | 21 | 21 | 19 | 18 | 17 | 18 | 17 | 19 | 36 |
| 2-Sep | 16 | 16 | 22 | 35 | 49 | 40 | 38 | 46 | 34 | 26 | 28 | 26 | 25 | 26 | 25 | 22 | 19 | 17 | 16 | 16 | 18 | 21 | 23 | 22 | 49 |
| 3-Sep | 24 | 18 | 18 | 19 | 21 | 30 | 42 | 32 | 26 | 25 | 21 | 26 | 26 | 25 | 23 | 23 | 24 | 20 | 24 | 22 | 21 | 20 | 18 | 11 | 42 |
| 4-Sep | 23 | 50 | 73 | 19 | 62 | 99 | 35 | 38 | 35 | 31 | 31 | 34 | 42 | 31 | 45 | 35 | 41 | 81 | 99 | 71 | 52 | 93 | 74 | 39 | 99 |
| 5-Sep | 32 | 20 | 18 | 14 | 21 | 25 | 25 | 19 | 17 | 16 | 20 | 24 | 62 | 27 | 24 | 25 | 19 | 15 | 45 | 54 | 85 | 18 | 18 | 63 | 85 |
| 6-Sep | 77 | 88 | 80 | 87 | 73 | 50 | 39 | 38 | 60 | 29 | 31 | 50 | 52 | 53 | 45 | 40 | 23 | 32 | 50 | 67 | 68 | 29 | 54 | 58 | 88 |
| 7-Sep | 36 | 23 | 19 | 28 | 18 | 14 | 17 | 35 | 25 | 24 | 23 | 14 | 24 | 14 | 15 | 12 | 13 | 11 | 10 | 8 | 13 | 34 | 30 | 36 | 36 |
| 8-Sep | 10 | 17 | 18 | 15 | 19 | 18 | 21 | 55 | 73 | 27 | 52 | 33 | 34 | 36 | 21 | 43 | 35 | 23 | 24 | 20 | 31 | 25 | 88 | 31 | 88 |
| 9-Sep | 57 | 24 | 87 | 92 | 50 | 43 | 27 | 31 | 31 | 43 | 26 | 26 | 28 | 24 | 21 | 20 | 21 | 27 | 19 | 56 | 18 | 20 | 18 | 24 | 92 |
| 10-Sep | 33 | 39 | 18 | 29 | 18 | 15 | 22 | 21 | 22 | 23 | 22 | 22 | 22 | 22 | 24 | 25 | 25 | 22 | 21 | 19 | 23 | 20 | 19 | 24 | 39 |
| 11-Sep | 19 | 24 | 42 | 24 | 60 | 35 | 13 | 18 | 16 | 17 | 21 | 25 | 24 | 69 | 27 | 19 | 14 | 12 | 7 | 72 | 90 | 56 | 77 | 14 | 90 |
| 12-Sep | 17 | 20 | 24 | 21 | 23 | 19 | 18 | 19 | 22 | 20 | 25 | 24 | 24 | 25 | 28 | 23 | 23 | 36 | 34 | 24 | 33 | 34 | 38 | 44 | 44 |
| 13-Sep | 29 | 36 | 37 | 84 | 62 | 17 | 54 | 58 | 86 | 103 | 82 | 52 | 99 | 68 | 62 | 36 | 50 | 40 | 94 | 72 | 90 | 31 | 45 | 74 | 103 |
| 14-Sep | 28 | 44 | 48 | 96 | 59 | 40 | 94 | 39 | 28 | 36 | 31 | 42 | 52 | 53 | 44 | 54 | 50 | 41 | 27 | 18 | 22 | 72 | 26 | 25 | 96 |
| 15-Sep | 34 | 77 | 69 | 60 | 61 | 24 | 28 | 17 | 43 | 28 | 25 | 23 | 43 | 63 | 92 | 94 | 21 | 16 | 10 | 26 | 68 | 29 | 36 | 21 | 94 |
| 16-Sep | 22 | 60 | 44 | 21 | 76 | 64 | 114 | 85 | 30 | 19 | 19 | 19 | 14 | 18 | 16 | 16 | 16 | 13 | 10 | 11 | 8 | 9 | 9 | 8 | 114 |
| 17-Sep | 7 | 10 | 11 | 11 | 13 | 15 | 21 | 24 | 14 | 13 | 16 | 16 | 14 | 19 | 16 | 14 | 16 | 16 | 13 | 11 | 14 | 13 | 12 | 18 | 24 |
| 18-Sep | 16 | 17 | 16 | 15 | 16 | 16 | 17 | 17 | 18 | 19 | 20 | 18 | 21 | 22 | 26 | 21 | 20 | 21 | 25 | 55 | 33 | 32 | 90 | 16 | 90 |
| 19-Sep | 18 | 20 | 53 | 16 | 24 | 22 | 25 | 28 | M | M | 29 | 25 | 35 | 33 | 28 | 34 | 36 | 33 | 31 | 33 | 35 | 33 | 33 | 24 | 53 |
| 20-Sep | 21 | 22 | 21 | 22 | 21 | 23 | 23 | 24 | 25 | 27 | 25 | 26 | 26 | 26 | 25 | 24 | 27 | 24 | 26 | 25 | 25 | 25 | 23 | 25 | 27 |
| 21-Sep | 23 | 21 | 20 | 21 | 20 | 21 | 22 | 23 | 24 | 22 | 22 | 23 | 24 | 22 | 21 | 24 | 21 | 22 | 22 | 21 | 21 | 17 | 23 | 27 | 27 |
| 22-Sep | 72 | 70 | 50 | 15 | 62 | 75 | 69 | 71 | 26 | 24 | 81 | 45 | 34 | 63 | 26 | 25 | 47 | 23 | 45 | 80 | 75 | 78 | 44 | 61 | 81 |
| 23-Sep | 43 | 28 | 62 | 29 | 17 | 18 | 17 | 23 | 27 | 95 | 67 | 20 | 20 | 20 | 23 | 27 | 18 | 9 | 10 | 13 | 12 | 14 | 16 | 19 | 95 |
| 24-Sep | 101 | 66 | 26 | 20 | 20 | 33 | 55 | 19 | 51 | 27 | 15 | 25 | 22 | 23 | 21 | 23 | 17 | 13 | 15 | 11 | 9 | 10 | 10 | 13 | 101 |
| 25-Sep | 16 | 18 | 45 | 17 | 20 | 27 | 83 | 21 | 13 | 12 | 20 | 26 | 23 | 42 | 36 | 44 | 82 | 48 | 70 | 58 | 27 | 91 | 17 | 39 | 91 |
| 26-Sep | 12 | 24 | 81 | 67 | 29 | 38 | 77 | 41 | 30 | 23 | 32 | 59 | 32 | 29 | 28 | 26 | 24 | 15 | 32 | 31 | 92 | 43 | 86 | 21 | 92 |
| 27-Sep | 19 | 12 | 16 | 87 | 17 | 33 | 52 | 67 | 95 | 23 | 41 | 32 | 31 | 28 | 28 | 22 | 19 | 18 | 21 | 22 | 22 | 20 | 23 | 26 | 95 |
| 28-Sep | 33 | 28 | 50 | 85 | 77 | 58 | 26 | 94 | 26 | 28 | 15 | 15 | 13 | 14 | 18 | 14 | 12 | 11 | 10 | 8 | 9 | 9 | 8 | 11 | 94 |
| 29-Sep | 12 | 12 | 12 | 18 | 27 | 29 | 18 | 20 | 21 | 16 | 13 | 12 | 11 | 14 | 51 | 41 | 30 | 53 | 49 | 70 | 95 | 12 | 22 | 51 | 95 |
| 30-Sep | 77 | 54 | 67 | 68 | 77 | 29 | 36 | 53 | 18 | 13 | 14 | 17 | 13 | 63 | 21 | 16 | 16 | 17 | 20 | 16 | 18 | 18 | 20 | 18 | 77 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|-----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 101 | 88 | 87 | 96 | 77 | 99 | 114 | 94 | 95 | 103 | 82 | 59 | 99 | 69 | 92 | 94 | 82 | 81 | 99 | 80 | 95 | 93 | 90 | 74 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - September 2017

| | |
|---|-------------------------------|
| Direction of Maximum Speed: 165 deg on Sep 28 21:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 151.6 deg on Sep 29 | Hours of Data: 61 |
| Direction of Minimum Speed: 134 deg on Sep 30 05:00 | Hours of Missing Data: 659 |
| Direction of Minimum Daily Speed Average: 4.1 deg on Sep 30 | Percent Operational Time: 8.5 |
| Monthly Average Direction: 200.0 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 158 | 164 | 155 | 187 | 183 | 181 | 177 | 174 | 168 | 165 | 161 | 149 | 147 | -- |
| 29-Sep | 149 | 150 | 149 | 145 | 138 | 139 | 143 | 132 | 140 | 146 | 159 | 163 | 165 | 158 | 188 | 336 | 358 | 357 | 220 | 249 | 185 | 156 | 165 | 174 | 151.6 |
| 30-Sep | 168 | 327 | 356 | 282 | 134 | 150 | 150 | 95 | 152 | 150 | 149 | 152 | 153 | 260 | 262 | 255 | 259 | 257 | 311 | 320 | 322 | 328 | 322 | 331 | 271.3 |
| 150.6 | 150.0 | 145.6 | 147.4 | 137.9 | 142.4 | 145.2 | 128.0 | 145.4 | 147.9 | 155.1 | 158.4 | 161.8 | 169.0 | 215.3 | 233.0 | 229.8 | 220.3 | 229.6 | 222.1 | 207.3 | 174.7 | 186.0 | 210.4 | | |
| Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | | | |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|---|-------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 92 deg on Sep 30 05:00 | Hours of Data: 61 |
| Minimum Value: 5 deg on Sep 29 22:00 | Hours of Missing Data: 659 |
| Percentiles: P ₁ = 5 P ₁₀ = 8 Q ₁ = 10 Median = 12 Q ₃ = 18 P ₉₀ = 61 P ₉₉ = 92 | Hours of Calibration: 0 |
| | Percent Operational Time: 8.5 |

| 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 11 | 10 | 10 | 13 | 18 | 18 | 12 | 12 | 15 | 12 | 11 | 10 | 10 | 12 | 51 | 34 | 19 | 45 | 34 | 32 | 83 | 5 | 9 | 21 | 83 | |
| 30-Sep | 65 | 71 | 57 | 90 | 92 | 12 | 16 | 45 | 13 | 10 | 11 | 13 | 10 | 63 | 12 | 8 | 9 | 12 | 15 | 12 | 14 | 14 | 15 | 14 | 92 | |
| | 65 | 71 | 57 | 90 | 92 | 18 | 16 | 45 | 15 | 12 | 11 | 13 | 10 | 63 | 51 | 34 | 19 | 45 | 34 | 32 | 83 | 14 | 15 | 21 | | |

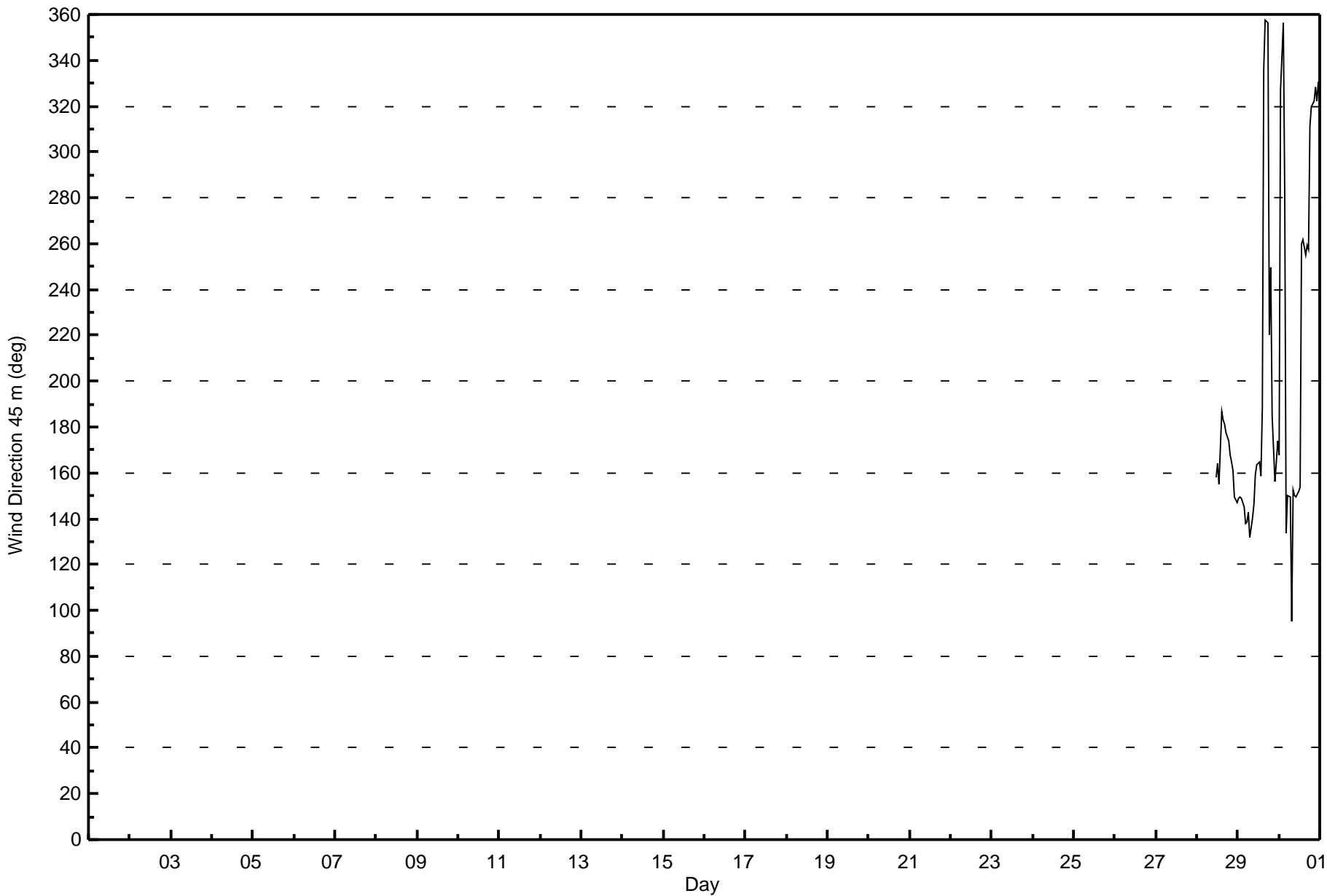
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|--|--------------------------------|
| Direction of Maximum Speed: 275 deg on Sep 10 15:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 15.9 deg on Sep 20 | Hours of Data: 716 |
| Direction of Minimum Speed: 319 deg on Sep 13 05:00 | Hours of Missing Data: 4 |
| Direction of Minimum Daily Speed Average: 1.5 deg on Sep 22 | Percent Operational Time: 99.4 |
| Monthly Average Direction: 259.6 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-Sep | 258 | 258 | 254 | 251 | 261 | 259 | 259 | 261 | 259 | 255 | 250 | 250 | 247 | 247 | 266 | 262 | 260 | 257 | 256 | 260 | 259 | 254 | 260 | 261 | 257.5 |
| 2-Sep | 261 | 260 | 262 | 259 | 259 | 260 | 259 | 264 | 274 | 261 | 267 | 281 | 262 | 276 | 257 | 258 | 253 | 248 | 248 | 247 | 248 | 258 | 263 | 257 | 259.1 |
| 3-Sep | 263 | 259 | 263 | 263 | 257 | 247 | 254 | 259 | 268 | 266 | 288 | 285 | 301 | 300 | 303 | 294 | 310 | 301 | 347 | 342 | 331 | 331 | 332 | 323 | 293.0 |
| 4-Sep | 315 | 307 | 309 | 290 | 293 | 275 | 282 | 285 | 307 | 344 | 342 | 341 | 300 | 303 | 302 | 292 | 323 | 340 | 52 | 269 | 174 | 137 | 149 | 152 | 302.0 |
| 5-Sep | 155 | 157 | 156 | 158 | 153 | 150 | 150 | 150 | 147 | 144 | 143 | 141 | 182 | 255 | 253 | 250 | 244 | 249 | 241 | 212 | 198 | 187 | 200 | 219 | 183.0 |
| 6-Sep | 216 | 228 | 231 | 223 | 186 | 187 | 172 | 152 | 321 | 303 | 307 | 308 | 308 | 320 | 344 | 316 | 313 | 359 | 96 | 113 | 123 | 136 | 142 | 142 | 157.1 |
| 7-Sep | 138 | 148 | 147 | 151 | 146 | 148 | 152 | 153 | 145 | 135 | 150 | 160 | 169 | 184 | 189 | 181 | 178 | 181 | 175 | 177 | 176 | 175 | 164 | 159 | 163.1 |
| 8-Sep | 167 | 161 | 158 | 164 | 167 | 155 | 158 | 200 | 238 | 285 | 340 | 344 | 6 | 355 | 348 | 31 | 25 | 334 | 355 | 348 | 348 | 285 | 287 | 296 | 355.0 |
| 9-Sep | 32 | 346 | 346 | 348 | 187 | 73 | 47 | 341 | 353 | 350 | 345 | 337 | 347 | 346 | 356 | 359 | 321 | 353 | 341 | 8 | 345 | 301 | 293 | 263 | 343.5 |
| 10-Sep | 240 | 250 | 204 | 230 | 240 | 236 | 260 | 264 | 263 | 265 | 267 | 266 | 274 | 274 | 275 | 293 | 278 | 265 | 262 | 253 | 256 | 262 | 257 | 266 | 263.8 |
| 11-Sep | 261 | 258 | 266 | 264 | 257 | 218 | 188 | 142 | 145 | 148 | 141 | 133 | 128 | 112 | 134 | 142 | 153 | 163 | 158 | 194 | 20 | 219 | 247 | 255 | 193.9 |
| 12-Sep | 255 | 263 | 271 | 273 | 263 | 254 | 250 | 260 | 284 | 292 | 304 | 314 | 300 | 327 | 318 | 322 | 309 | 28 | 20 | 24 | 35 | 58 | 47 | 30 | 290.0 |
| 13-Sep | 341 | 356 | 353 | 0 | 319 | 86 | 89 | 95 | 64 | 17 | 360 | 247 | 32 | 130 | 354 | 347 | 31 | 89 | 64 | 75 | 107 | 42 | 355 | 348 | 31.6 |
| 14-Sep | 348 | 351 | 356 | 351 | 10 | 357 | 20 | 359 | 347 | 352 | 360 | 325 | 342 | 336 | 348 | 16 | 30 | 39 | 41 | 37 | 42 | 60 | 113 | 125 | 12.6 |
| 15-Sep | 339 | 346 | 110 | 133 | 134 | 163 | 157 | 154 | 160 | 136 | 149 | 141 | 138 | 184 | 116 | 197 | 242 | 219 | 217 | 207 | 209 | 175 | 172 | 153 | 181.8 |
| 16-Sep | 140 | 139 | 141 | 146 | 143 | 138 | 138 | 142 | 148 | 153 | 168 | 171 | 177 | 181 | 179 | 184 | 186 | 175 | 180 | 174 | 168 | 171 | 175 | 173 | 164.5 |
| 17-Sep | 170 | 162 | 157 | 155 | 147 | 145 | 149 | 149 | 151 | 154 | 155 | 161 | 179 | 171 | 163 | 161 | 159 | 150 | 147 | 158 | 153 | 157 | 155 | 142 | 155.7 |
| 18-Sep | 142 | 141 | 136 | 137 | 139 | 139 | 140 | 138 | 137 | 135 | 140 | 143 | 150 | 142 | 131 | 133 | 136 | 136 | 118 | 119 | 136 | 124 | 132 | 124 | 136.8 |
| 19-Sep | 119 | 116 | 102 | 38 | 353 | 359 | 358 | 357 | M | M | 23 | 11 | 23 | 89 | 51 | 78 | 77 | 72 | 65 | 68 | 77 | 85 | 69 | 41 | 60.6 |
| 20-Sep | 22 | 19 | 14 | 12 | 10 | 14 | 13 | 15 | 16 | 17 | 19 | 20 | 20 | 19 | 17 | 18 | 16 | 16 | 18 | 11 | 15 | 13 | 13 | 11 | 15.9 |
| 21-Sep | 9 | 3 | 4 | 6 | 360 | 360 | 0 | 1 | 1 | 353 | 352 | 360 | 357 | 355 | 353 | 349 | 352 | 353 | 352 | 344 | 344 | 331 | 333 | 328 | 355.9 |
| 22-Sep | 330 | 282 | 346 | 343 | 329 | 346 | 222 | 221 | 219 | 243 | 129 | 81 | 8 | 68 | 110 | 128 | 134 | 150 | 105 | 127 | 138 | 135 | 127 | 146 | 129.4 |
| 23-Sep | 167 | 237 | 217 | 179 | 154 | 149 | 138 | 190 | 132 | 139 | 99 | 172 | 191 | 171 | 162 | 176 | 155 | 163 | 164 | 159 | 158 | 157 | 150 | 152 | 161.5 |
| 24-Sep | 139 | 141 | 143 | 146 | 152 | 153 | 147 | 157 | 133 | 156 | 146 | 138 | 152 | 154 | 158 | 161 | 168 | 160 | 147 | 161 | 176 | 173 | 158 | 154 | 155.1 |
| 25-Sep | 150 | 141 | 139 | 140 | 143 | 143 | 143 | 149 | 155 | 156 | 147 | 142 | 135 | 157 | 265 | 296 | 37 | 213 | 234 | 236 | 245 | 218 | 198 | 177 | 168.4 |
| 26-Sep | 186 | 207 | 248 | 262 | 276 | 260 | 253 | 241 | 248 | 253 | 261 | 285 | 319 | 302 | 309 | 319 | 322 | 337 | 335 | 331 | 266 | 216 | 228 | 177 | 285.4 |
| 27-Sep | 221 | 216 | 149 | 143 | 174 | 169 | 163 | 154 | 161 | 329 | 328 | 347 | 319 | 325 | 336 | 343 | 352 | 6 | 2 | 4 | 10 | 354 | 353 | 1 | 351.4 |
| 28-Sep | 6 | 355 | 7 | 130 | 144 | 149 | 149 | 144 | 140 | 140 | 160 | 158 | 160 | 153 | 185 | 182 | 180 | 178 | 177 | 168 | 162 | 161 | 156 | 153 | 159.8 |
| 29-Sep | 150 | 151 | 152 | 148 | 143 | 140 | 139 | 138 | 138 | M | M | 156 | 156 | 154 | 182 | 309 | 333 | 2 | 105 | 180 | 238 | 154 | 148 | 156 | 149.0 |
| 30-Sep | 146 | 150 | 149 | 150 | 177 | 149 | 155 | 152 | 152 | 172 | 149 | 145 | 143 | 248 | 247 | 241 | 245 | 252 | 300 | 306 | 311 | 314 | 309 | 316 | 249.2 |

198.8 206.2 195.1 191.5 194.6 178.3 190.9 194.1 195.7 219.1 246.6 225.6 260.3 263.6 280.2 280.0 268.5 242.5 229.4 224.2 210.0 188.6 186.2 195.2

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 100 m (WD100m) - deg
Lower Camp Met Tower - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 99 deg on Sep 15 01:00 | Hours of Data: 716 |
| Minimum Value: 3 deg on Sep 17 06:00 | Hours of Missing Data: 4 |
| Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 7 Median = 10 Q ₃ = 17 P ₉₀ = 32 P ₉₉ = 78 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.4 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 4 | 3 | 6 | 10 | 11 | 6 | 5 | 5 | 6 | 7 | 6 | 7 | 10 | 10 | 12 | 10 | 8 | 9 | 6 | 4 | 5 | 5 | 6 | 6 | 12 |
| 2-Sep | 4 | 3 | 4 | 5 | 11 | 14 | 10 | 15 | 18 | 11 | 17 | 17 | 9 | 20 | 10 | 9 | 8 | 7 | 6 | 5 | 6 | 8 | 9 | 6 | 20 |
| 3-Sep | 7 | 6 | 3 | 4 | 6 | 8 | 10 | 8 | 10 | 9 | 11 | 17 | 16 | 14 | 13 | 12 | 14 | 9 | 19 | 9 | 8 | 6 | 6 | 3 | 19 |
| 4-Sep | 10 | 10 | 8 | 6 | 10 | 10 | 9 | 18 | 24 | 18 | 16 | 18 | 23 | 21 | 29 | 21 | 22 | 47 | 29 | 89 | 43 | 6 | 6 | 6 | 89 |
| 5-Sep | 7 | 6 | 4 | 5 | 7 | 7 | 6 | 13 | 10 | 12 | 7 | 11 | 58 | 9 | 8 | 9 | 6 | 5 | 8 | 8 | 16 | 18 | 30 | 19 | 58 |
| 6-Sep | 22 | 15 | 10 | 36 | 31 | 23 | 28 | 17 | 35 | 17 | 17 | 34 | 38 | 28 | 27 | 24 | 14 | 32 | 11 | 16 | 13 | 5 | 3 | 3 | 38 |
| 7-Sep | 3 | 6 | 5 | 7 | 7 | 6 | 7 | 9 | 10 | 5 | 8 | 11 | 19 | 15 | 13 | 12 | 9 | 9 | 5 | 3 | 4 | 7 | 9 | 11 | 19 |
| 8-Sep | 10 | 7 | 6 | 7 | 11 | 11 | 9 | 45 | 18 | 51 | 29 | 13 | 15 | 25 | 9 | 20 | 14 | 13 | 10 | 7 | 26 | 8 | 44 | 32 | 51 |
| 9-Sep | 39 | 11 | 12 | 11 | 61 | 16 | 50 | 8 | 18 | 26 | 12 | 14 | 13 | 8 | 9 | 7 | 14 | 9 | 13 | 30 | 19 | 15 | 7 | 11 | 61 |
| 10-Sep | 8 | 12 | 16 | 25 | 10 | 9 | 8 | 9 | 8 | 9 | 8 | 9 | 10 | 10 | 13 | 14 | 12 | 11 | 6 | 6 | 9 | 9 | 8 | 12 | 25 |
| 11-Sep | 9 | 8 | 14 | 10 | 19 | 26 | 22 | 14 | 9 | 8 | 18 | 8 | 11 | 53 | 24 | 7 | 11 | 10 | 4 | 64 | 68 | 17 | 12 | 5 | 68 |
| 12-Sep | 6 | 9 | 11 | 10 | 8 | 7 | 6 | 7 | 12 | 9 | 14 | 13 | 13 | 13 | 13 | 10 | 8 | 31 | 18 | 9 | 14 | 15 | 28 | 23 | 31 |
| 13-Sep | 11 | 19 | 23 | 48 | 96 | 58 | 13 | 19 | 69 | 81 | 41 | 38 | 74 | 79 | 57 | 45 | 49 | 12 | 7 | 47 | 8 | 37 | 15 | 7 | 96 |
| 14-Sep | 10 | 11 | 10 | 13 | 20 | 10 | 30 | 30 | 21 | 21 | 17 | 34 | 39 | 37 | 26 | 32 | 19 | 17 | 8 | 5 | 11 | 29 | 24 | 28 | 39 |
| 15-Sep | 99 | 16 | 38 | 12 | 14 | 14 | 15 | 12 | 39 | 15 | 12 | 13 | 22 | 77 | 71 | 85 | 13 | 10 | 4 | 6 | 4 | 18 | 14 | 20 | 99 |
| 16-Sep | 8 | 9 | 7 | 6 | 6 | 8 | 12 | 11 | 9 | 13 | 13 | 17 | 14 | 15 | 15 | 16 | 16 | 10 | 6 | 5 | 6 | 6 | 7 | 6 | 17 |
| 17-Sep | 7 | 5 | 4 | 4 | 4 | 3 | 5 | 5 | 8 | 9 | 11 | 11 | 13 | 16 | 14 | 12 | 14 | 10 | 7 | 7 | 8 | 8 | 9 | 4 | 16 |
| 18-Sep | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 14 | 9 | 12 | 8 | 6 | 9 | 6 | 9 | 41 | 70 | 38 | 9 | 70 |
| 19-Sep | 7 | 7 | 24 | 34 | 10 | 4 | 6 | 6 | M | M | 9 | 11 | 28 | 18 | 11 | 15 | 11 | 10 | 10 | 9 | 12 | 11 | 16 | 9 | 34 |
| 20-Sep | 8 | 7 | 9 | 8 | 8 | 8 | 7 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 9 | 8 | 8 | 10 | 9 | 9 | 8 | 10 |
| 21-Sep | 8 | 7 | 7 | 8 | 7 | 7 | 8 | 7 | 9 | 10 | 10 | 9 | 9 | 9 | 7 | 9 | 8 | 8 | 9 | 7 | 7 | 6 | 6 | 6 | 10 |
| 22-Sep | 16 | 38 | 22 | 14 | 15 | 16 | 87 | 14 | 18 | 12 | 73 | 28 | 27 | 49 | 16 | 14 | 26 | 23 | 25 | 17 | 15 | 13 | 10 | 14 | 87 |
| 23-Sep | 28 | 21 | 8 | 28 | 9 | 17 | 41 | 61 | 93 | 14 | 64 | 17 | 17 | 16 | 19 | 27 | 14 | 5 | 4 | 6 | 7 | 9 | 8 | 10 | 93 |
| 24-Sep | 7 | 8 | 4 | 5 | 5 | 7 | 16 | 12 | 49 | 12 | 9 | 10 | 13 | 18 | 14 | 18 | 12 | 9 | 6 | 9 | 5 | 7 | 4 | 6 | 49 |
| 25-Sep | 7 | 4 | 5 | 4 | 5 | 5 | 7 | 6 | 7 | 9 | 11 | 12 | 18 | 37 | 20 | 27 | 52 | 53 | 4 | 8 | 3 | 25 | 20 | 28 | 53 |
| 26-Sep | 27 | 35 | 28 | 14 | 16 | 14 | 14 | 14 | 12 | 12 | 13 | 24 | 19 | 19 | 18 | 14 | 14 | 7 | 3 | 5 | 38 | 35 | 45 | 36 | 45 |
| 27-Sep | 17 | 20 | 24 | 12 | 12 | 11 | 14 | 12 | 77 | 14 | 24 | 19 | 19 | 17 | 16 | 12 | 9 | 8 | 11 | 8 | 10 | 13 | 9 | 5 | 77 |
| 28-Sep | 18 | 12 | 36 | 57 | 21 | 14 | 11 | 7 | 4 | 7 | 11 | 16 | 8 | 11 | 14 | 12 | 9 | 6 | 3 | 5 | 4 | 4 | 7 | 7 | 57 |
| 29-Sep | 6 | 5 | 5 | 6 | 6 | 5 | 3 | 3 | 4 | M | M | 10 | 8 | 10 | 45 | 29 | 10 | 11 | 38 | 39 | 30 | 12 | 6 | 54 | 54 |
| 30-Sep | 11 | 14 | 8 | 12 | 15 | 5 | 9 | 9 | 16 | 25 | 13 | 6 | 7 | 50 | 7 | 5 | 5 | 14 | 10 | 6 | 8 | 8 | 10 | 9 | 50 |

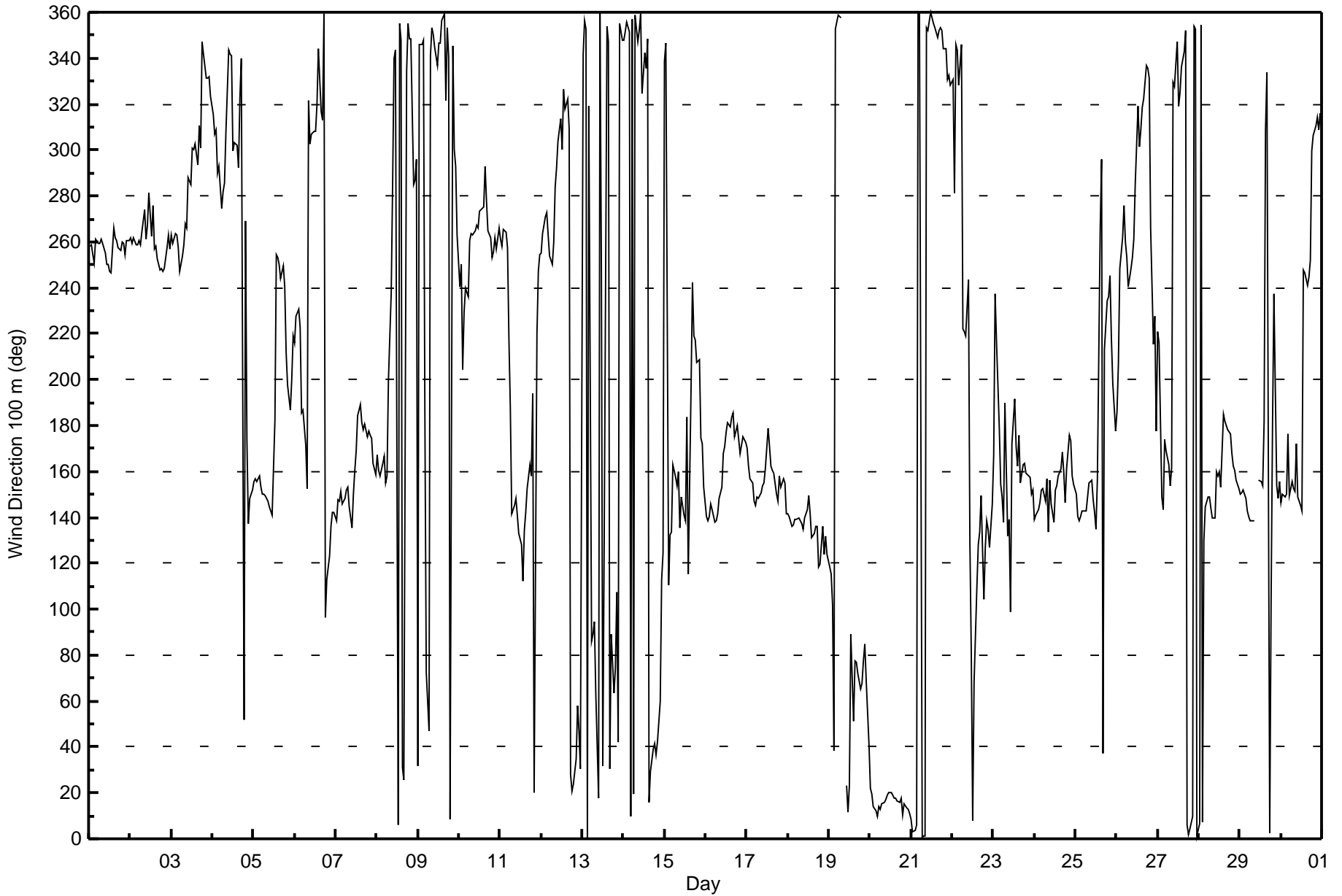
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 99 | 38 | 38 | 57 | 96 | 58 | 87 | 61 | 93 | 81 | 73 | 38 | 74 | 79 | 71 | 85 | 52 | 53 | 38 | 89 | 68 | 70 | 45 | 54 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Lower Camp Met Tower - September 2017

| Maximum Value: 0.8 km/h on Sep 16 22:00 | | Maximum Daily Average: 0.3 km/h on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.0 km/h on Sep 3 19:00 | | Minimum Daily Average: -0.6 km/h on Sep 20 | | Hours of Data: 718 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.0 km/h at hour 21 | | Minimum Diurnal Average: -0.2 km/h at hour 15 | | Hours of Missing Data: 2 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: -0.11 km/h | | Percentiles: P ₁ = -0.8 P ₁₀ = -0.6 Q ₁ = -0.3 Median = -0.1 Q ₃ = 0.1 P ₉₀ = 0.3 P ₉₉ = 0.7 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 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-Sep | -0.6 | -0.5 | -0.4 | -0.3 | -0.3 | -0.4 | -0.4 | -0.7 | -0.6 | -0.3 | -0.5 | -0.5 | -0.4 | -0.3 | -0.7 | -0.9 | -0.6 | -0.6 | -0.6 | -0.5 | -0.5 | -0.4 | -0.6 | -0.6 | -0.5 | -0.3 |
| 2-Sep | -0.7 | -0.7 | -0.5 | -0.3 | -0.2 | -0.3 | -0.4 | -0.2 | -0.2 | -0.4 | -0.1 | -0.4 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.4 | -0.3 | -0.2 | -0.3 | -0.1 |
| 3-Sep | -0.3 | -0.4 | -0.5 | -0.6 | -0.5 | 0.0 | 0.0 | -0.3 | -0.2 | -0.5 | -1.0 | -0.6 | -0.7 | -0.6 | -0.8 | -0.7 | -0.7 | -0.5 | -1.0 | -0.2 | -0.4 | -0.3 | -0.3 | -0.3 | -0.5 | 0.0 |
| 4-Sep | -0.2 | -0.1 | 0.0 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.1 | -0.4 | -0.4 | -0.3 | -0.4 | -0.5 | -0.3 | -0.3 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 |
| 5-Sep | 0.1 | 0.1 | 0.0 | 0.0 | -0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 0.2 | -0.2 | -0.4 | -0.2 | -0.2 | -0.2 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 |
| 6-Sep | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | -0.2 | -0.1 | 0.1 | 0.3 | 0.2 | -0.1 | -0.2 | -0.2 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.3 |
| 7-Sep | -0.1 | 0.3 | 0.1 | 0.0 | -0.1 | 0.0 | -0.2 | 0.2 | 0.0 | -0.3 | 0.1 | 0.1 | 0.3 | 0.6 | 0.5 | 0.7 | 0.4 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.1 | -0.1 | 0.2 | 0.7 |
| 8-Sep | 0.2 | 0.2 | 0.1 | 0.3 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | -0.1 | -0.3 | -0.3 | -0.2 | -0.1 | -0.1 | -0.3 | -0.4 | -0.3 | -0.2 | -0.1 | -0.2 | 0.0 | -0.1 | 0.0 | 0.3 |
| 9-Sep | -0.1 | -0.2 | 0.0 | 0.0 | 0.0 | -0.2 | -0.2 | -0.1 | -0.1 | 0.0 | -0.2 | -0.2 | -0.4 | -0.4 | -0.6 | -0.6 | -0.4 | -0.2 | -0.1 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | 0.0 |
| 10-Sep | 0.1 | -0.2 | 0.3 | 0.0 | -0.1 | 0.0 | -0.7 | -0.7 | -1.0 | -0.6 | -0.8 | -0.6 | -0.7 | -0.8 | -0.8 | -0.6 | -0.4 | -0.8 | -0.7 | -0.5 | -0.2 | -0.6 | -0.4 | -0.5 | -0.5 | 0.3 |
| 11-Sep | -0.6 | -0.4 | -0.4 | -0.3 | -0.3 | 0.2 | 0.1 | -0.4 | 0.1 | 0.1 | -0.1 | 0.2 | 0.2 | -0.2 | 0.3 | 0.2 | 0.4 | 0.3 | 0.6 | 0.5 | 0.0 | 0.1 | 0.0 | -0.3 | 0.0 | 0.6 |
| 12-Sep | -0.3 | -0.6 | -0.7 | -0.7 | -0.4 | -0.5 | -0.5 | -0.5 | -0.4 | -0.6 | -0.3 | -0.4 | -0.4 | -0.3 | -0.1 | -0.3 | -0.3 | -0.4 | -0.4 | -0.3 | -0.4 | -0.2 | -0.2 | -0.2 | -0.4 | -0.1 |
| 13-Sep | -0.2 | -0.1 | -0.2 | -0.1 | 0.0 | 0.0 | -0.3 | -0.1 | 0.0 | -0.1 | -0.3 | 0.0 | -0.1 | 0.3 | 0.0 | -0.3 | -0.3 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.3 |
| 14-Sep | -0.1 | -0.1 | -0.1 | 0.0 | -0.1 | 0.0 | 0.0 | -0.1 | -0.3 | 0.0 | -0.2 | -0.2 | -0.1 | -0.2 | -0.2 | -0.1 | -0.3 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | 0.0 |
| 15-Sep | 0.0 | -0.1 | 0.0 | 0.0 | -0.1 | -0.1 | 0.2 | 0.3 | 0.2 | 0.1 | 0.1 | 0.3 | 0.6 | 0.0 | 0.0 | 0.1 | -0.3 | 0.0 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | -0.2 | 0.1 | 0.6 |
| 16-Sep | -0.2 | -0.1 | 0.2 | -0.1 | 0.1 | 0.2 | 0.0 | -0.1 | 0.0 | -0.1 | 0.4 | 0.6 | 0.5 | 0.5 | 0.6 | 0.4 | 0.4 | 0.5 | 0.3 | 0.6 | 0.8 | 0.8 | 0.8 | 0.7 | 0.3 | 0.8 |
| 17-Sep | 0.2 | 0.0 | 0.2 | -0.1 | 0.1 | 0.3 | 0.2 | 0.3 | -0.1 | -0.1 | 0.2 | 0.5 | 0.4 | 0.5 | 0.4 | 0.6 | 0.5 | 0.2 | 0.2 | 0.5 | 0.4 | 0.7 | 0.5 | 0.2 | 0.3 | 0.7 |
| 18-Sep | -0.3 | -0.1 | -0.4 | -0.3 | -0.3 | -0.1 | 0.1 | -0.1 | 0.0 | -0.3 | 0.4 | 0.2 | 0.2 | 0.2 | -0.3 | -0.2 | 0.2 | 0.0 | -0.4 | -0.1 | -0.2 | -0.2 | -0.1 | -0.3 | -0.1 | 0.4 |
| 19-Sep | -0.4 | -0.4 | -0.5 | -0.6 | -0.2 | -0.3 | -0.3 | -0.1 | M | M | -0.5 | -0.3 | -0.6 | -0.6 | -0.7 | -0.6 | -1.0 | -0.6 | -0.6 | -0.6 | -0.4 | -0.6 | -0.5 | -0.3 | -0.5 | -0.1 |
| 20-Sep | -0.4 | -0.4 | -0.4 | -0.5 | -0.4 | -0.5 | -0.7 | -0.7 | -0.8 | -0.7 | -0.8 | -0.9 | -0.7 | -0.7 | -0.6 | -0.8 | -0.5 | -0.7 | -0.7 | -0.7 | -0.6 | -0.7 | -0.8 | -0.6 | -0.6 | -0.4 |
| 21-Sep | -0.7 | -0.6 | -0.8 | -0.8 | -1.0 | -0.5 | -0.5 | -0.7 | -0.5 | -0.4 | -0.4 | -0.8 | -0.7 | -0.6 | -0.7 | -0.4 | -0.7 | -0.4 | -0.4 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.5 | -0.1 |
| 22-Sep | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 | 0.1 | 0.1 | 0.0 | 0.1 | -0.2 | -0.1 | 0.0 | -0.2 | -0.3 | 0.0 | -0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | 0.1 |
| 23-Sep | -0.1 | -0.1 | -0.1 | 0.0 | -0.1 | -0.3 | -0.3 | -0.1 | 0.0 | 0.2 | -0.1 | 0.4 | 0.2 | 0.3 | 0.3 | 0.2 | 0.3 | 0.6 | 0.7 | 0.2 | 0.0 | -0.1 | 0.0 | -0.1 | 0.1 | 0.7 |
| 24-Sep | 0.0 | -0.2 | 0.0 | -0.1 | 0.1 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | 0.1 | 0.4 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.3 | 0.7 | 0.5 | 0.1 | 0.0 | 0.1 | 0.7 |
| 25-Sep | 0.1 | 0.2 | 0.3 | 0.1 | 0.1 | 0.2 | -0.1 | 0.0 | 0.0 | -0.2 | 0.0 | 0.3 | -0.1 | 0.3 | -0.2 | -0.2 | 0.0 | 0.1 | 0.1 | 0.0 | -0.1 | 0.0 | 0.2 | 0.2 | 0.1 | 0.3 |
| 26-Sep | 0.1 | 0.2 | 0.0 | -0.1 | 0.0 | 0.0 | -0.2 | -0.1 | 0.0 | -0.2 | 0.1 | 0.1 | -0.4 | -0.4 | -0.7 | -0.2 | -0.4 | -0.2 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | -0.1 | 0.2 |
| 27-Sep | 0.0 | 0.0 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.0 | -0.5 | -0.2 | -0.6 | -0.2 | -0.3 | -0.2 | -0.2 | -0.5 | -0.2 | -0.2 | -0.4 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 0.2 |
| 28-Sep | -0.1 | -0.1 | -0.1 | 0.0 | 0.0 | -0.1 | 0.0 | 0.2 | 0.4 | 0.2 | 0.1 | 0.2 | 0.3 | -0.1 | 0.2 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 0.6 | 0.5 | 0.0 | 0.0 | 0.2 | 0.7 |
| 29-Sep | -0.1 | -0.2 | -0.2 | 0.2 | -0.2 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | 0.2 | 0.3 | 0.6 | 0.4 | 0.3 | -0.2 | -0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.6 |
| 30-Sep | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.1 | 0.3 | 0.4 | 0.5 | 0.4 | 0.4 | 0.0 | -0.5 | -0.4 | -0.5 | -0.2 | -0.4 | -0.5 | -0.6 | -0.6 | -0.6 | -0.5 | -0.1 | 0.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.8 km/h on Sep 10 15:00 | Hours of Data: 718 |
| Minimum Value: 0.1 km/h on Sep 6 05:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 0.1 P ₁₀ = 0.3 Q ₁ = 0.8 Median = 1.6 Q ₃ = 2.3 P ₉₀ = 3.1 P ₉₉ = 4.3 | 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-Sep | 2.7 | 2.7 | 2.5 | 1.9 | 2.7 | 3.4 | 3.7 | 4.0 | 3.1 | 2.9 | 3.5 | 3.1 | 2.9 | 3.1 | 3.6 | 4.1 | 3.8 | 3.5 | 3.5 | 2.4 | 1.8 | 1.8 | 1.9 | 3.1 | 4.1 |
| 2-Sep | 3.3 | 3.3 | 3.2 | 2.4 | 1.6 | 1.4 | 1.9 | 2.0 | 2.0 | 2.4 | 2.3 | 2.6 | 2.3 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.5 | 3.2 | 2.7 | 2.2 | 1.7 | 1.9 | 3.3 |
| 3-Sep | 1.9 | 1.9 | 2.3 | 2.9 | 3.0 | 1.3 | 1.5 | 2.2 | 2.3 | 3.2 | 3.8 | 3.1 | 3.4 | 3.8 | 3.3 | 3.5 | 3.2 | 2.9 | 4.3 | 2.7 | 2.2 | 1.7 | 1.0 | 1.0 | 4.3 |
| 4-Sep | 0.7 | 0.5 | 0.2 | 0.3 | 0.2 | 0.3 | 0.4 | 0.8 | 1.1 | 1.8 | 2.4 | 2.4 | 2.4 | 2.1 | 1.8 | 1.8 | 1.5 | 0.6 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 | 0.4 | 2.4 |
| 5-Sep | 0.4 | 1.0 | 1.4 | 1.0 | 1.4 | 1.9 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 1.9 | 2.5 | 2.3 | 2.1 | 1.8 | 1.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.4 | 2.5 |
| 6-Sep | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.4 | 0.9 | 1.0 | 1.2 | 1.4 | 1.6 | 1.6 | 1.5 | 1.3 | 0.8 | 0.2 | 0.1 | 0.2 | 0.4 | 0.4 | 0.3 | 0.5 | 1.6 |
| 7-Sep | 0.8 | 1.2 | 1.4 | 1.3 | 1.0 | 1.0 | 1.1 | 1.5 | 1.5 | 2.7 | 2.6 | 2.5 | 2.3 | 2.1 | 2.1 | 2.3 | 2.2 | 1.9 | 1.4 | 1.6 | 1.9 | 1.3 | 0.9 | 0.6 | 2.7 |
| 8-Sep | 0.9 | 1.6 | 2.0 | 1.8 | 1.4 | 1.5 | 1.0 | 0.8 | 0.7 | 0.7 | 1.2 | 1.7 | 1.8 | 1.3 | 1.6 | 1.4 | 1.6 | 1.4 | 1.6 | 1.3 | 0.6 | 0.4 | 0.2 | 0.3 | 2.0 |
| 9-Sep | 0.3 | 0.3 | 0.2 | 0.2 | 0.5 | 0.5 | 0.5 | 1.1 | 1.0 | 1.1 | 1.5 | 1.6 | 2.0 | 1.8 | 2.3 | 2.3 | 1.9 | 1.4 | 1.0 | 0.7 | 0.6 | 0.6 | 0.6 | 0.9 | 2.3 |
| 10-Sep | 1.0 | 1.4 | 0.8 | 1.3 | 1.4 | 1.1 | 2.9 | 3.1 | 3.7 | 4.2 | 4.0 | 3.7 | 4.0 | 4.8 | 4.8 | 3.5 | 3.3 | 4.3 | 3.9 | 2.4 | 2.0 | 2.6 | 2.1 | 2.7 | 4.8 |
| 11-Sep | 2.4 | 1.9 | 1.2 | 1.0 | 1.4 | 0.9 | 1.0 | 1.6 | 1.8 | 1.9 | 1.5 | 1.4 | 1.2 | 1.2 | 1.7 | 2.1 | 2.0 | 1.8 | 2.2 | 2.9 | 1.0 | 0.5 | 0.6 | 1.4 | 2.9 |
| 12-Sep | 2.0 | 3.0 | 3.8 | 3.3 | 2.8 | 2.9 | 3.1 | 3.1 | 3.0 | 3.2 | 2.8 | 2.8 | 2.4 | 1.7 | 1.5 | 1.5 | 1.4 | 1.8 | 1.3 | 1.7 | 1.6 | 1.2 | 0.6 | 0.6 | 3.8 |
| 13-Sep | 0.3 | 0.5 | 0.6 | 0.3 | 0.2 | 0.4 | 0.6 | 0.7 | 1.2 | 1.1 | 1.8 | 1.4 | 1.2 | 1.6 | 1.3 | 1.0 | 1.2 | 0.8 | 0.6 | 0.4 | 0.2 | 0.2 | 0.2 | 0.3 | 1.8 |
| 14-Sep | 0.5 | 0.3 | 0.5 | 0.3 | 0.3 | 0.4 | 0.3 | 0.5 | 0.8 | 1.0 | 1.5 | 2.0 | 1.9 | 2.0 | 1.9 | 1.7 | 1.6 | 1.4 | 0.6 | 0.4 | 0.7 | 0.7 | 0.4 | 0.3 | 2.0 |
| 15-Sep | 0.2 | 0.2 | 0.1 | 0.3 | 0.3 | 0.9 | 0.9 | 1.1 | 1.1 | 1.6 | 1.7 | 1.8 | 1.9 | 1.6 | 1.7 | 1.5 | 1.9 | 1.4 | 0.7 | 0.4 | 0.3 | 0.5 | 1.0 | 0.7 | 1.9 |
| 16-Sep | 0.8 | 0.9 | 1.6 | 1.7 | 1.6 | 1.7 | 1.3 | 1.4 | 2.1 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 1.8 | 1.9 | 1.6 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.8 | 2.3 |
| 17-Sep | 1.8 | 2.2 | 2.1 | 2.1 | 2.0 | 1.5 | 1.3 | 1.6 | 1.8 | 2.2 | 2.4 | 2.5 | 2.3 | 2.6 | 2.4 | 2.3 | 2.3 | 2.7 | 2.4 | 2.1 | 2.2 | 2.7 | 2.2 | 2.6 | 2.7 |
| 18-Sep | 3.1 | 3.1 | 2.7 | 3.1 | 3.1 | 3.2 | 3.2 | 3.5 | 3.7 | 3.4 | 3.8 | 4.3 | 3.1 | 3.0 | 3.0 | 3.1 | 3.3 | 2.8 | 1.5 | 0.8 | 0.7 | 0.6 | 1.0 | 1.9 | 4.3 |
| 19-Sep | 1.6 | 2.2 | 1.6 | 1.6 | 1.5 | 1.4 | 1.5 | 1.4 | M | M | 2.3 | 2.5 | 1.9 | 2.5 | 2.4 | 3.2 | 3.4 | 2.6 | 1.9 | 2.4 | 2.6 | 2.4 | 2.1 | 2.0 | 3.4 |
| 20-Sep | 2.2 | 2.4 | 2.5 | 2.6 | 2.4 | 3.0 | 3.3 | 3.9 | 4.2 | 4.2 | 4.1 | 4.3 | 4.4 | 4.1 | 4.0 | 3.7 | 3.8 | 3.8 | 3.8 | 3.6 | 3.6 | 3.4 | 3.3 | 3.3 | 4.4 |
| 21-Sep | 3.1 | 3.5 | 3.4 | 3.4 | 3.2 | 2.9 | 2.6 | 3.0 | 2.8 | 2.5 | 2.7 | 3.0 | 2.8 | 3.0 | 3.1 | 3.0 | 3.3 | 2.7 | 2.1 | 1.6 | 1.2 | 0.8 | 0.7 | 0.4 | 3.5 |
| 22-Sep | 0.5 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.8 | 0.9 | 0.8 | 1.1 | 0.7 | 1.0 | 0.8 | 0.6 | 0.6 | 0.6 | 0.4 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 1.1 |
| 23-Sep | 0.4 | 0.4 | 0.3 | 0.2 | 0.2 | 0.6 | 0.5 | 0.6 | 0.9 | 0.9 | 1.0 | 1.1 | 1.0 | 1.3 | 1.5 | 1.4 | 1.5 | 1.3 | 1.5 | 1.0 | 1.2 | 1.4 | 1.5 | 1.6 | 1.6 |
| 24-Sep | 1.0 | 0.9 | 1.1 | 0.8 | 0.8 | 0.7 | 0.5 | 0.7 | 0.8 | 1.4 | 1.9 | 1.9 | 1.8 | 1.9 | 1.6 | 1.4 | 1.4 | 1.4 | 1.3 | 1.5 | 1.4 | 1.6 | 2.2 | 2.2 | 2.2 |
| 25-Sep | 1.9 | 1.9 | 1.3 | 1.5 | 1.4 | 1.4 | 1.0 | 1.2 | 1.5 | 1.9 | 2.2 | 1.8 | 1.6 | 1.5 | 1.8 | 1.7 | 0.5 | 0.4 | 0.2 | 0.9 | 1.1 | 0.4 | 0.4 | 0.6 | 2.2 |
| 26-Sep | 0.8 | 0.9 | 0.7 | 0.8 | 0.5 | 0.9 | 1.1 | 1.2 | 1.5 | 1.8 | 1.9 | 2.1 | 2.6 | 2.8 | 2.5 | 2.4 | 1.9 | 0.9 | 0.2 | 0.1 | 0.3 | 0.3 | 0.2 | 0.3 | 2.8 |
| 27-Sep | 0.6 | 0.6 | 0.4 | 0.3 | 0.7 | 0.6 | 0.4 | 0.2 | 0.7 | 1.0 | 1.4 | 1.5 | 1.6 | 1.7 | 1.6 | 1.5 | 2.1 | 1.8 | 1.0 | 1.2 | 0.8 | 0.5 | 0.6 | 0.6 | 2.1 |
| 28-Sep | 0.5 | 0.8 | 0.5 | 0.6 | 0.6 | 0.7 | 0.5 | 0.8 | 1.9 | 2.0 | 1.7 | 2.5 | 2.4 | 2.3 | 1.9 | 1.8 | 1.9 | 1.6 | 1.5 | 1.7 | 1.9 | 1.8 | 1.6 | 1.7 | 2.5 |
| 29-Sep | 2.3 | 2.7 | 2.7 | 2.0 | 1.8 | 1.2 | 1.5 | 2.3 | 2.4 | 2.4 | 2.0 | 1.7 | 1.9 | 1.9 | 1.4 | 1.5 | 1.0 | 0.4 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 2.7 |
| 30-Sep | 0.2 | 0.3 | 0.2 | 0.1 | 0.1 | 0.2 | 0.7 | 0.4 | 1.4 | 1.5 | 1.8 | 2.1 | 1.8 | 2.1 | 2.2 | 2.2 | 2.2 | 1.6 | 1.8 | 1.9 | 2.3 | 2.5 | 2.8 | 2.9 | 2.9 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 3.3 | 3.5 | 3.8 | 3.4 | 3.2 | 3.4 | 3.7 | 4.0 | 4.2 | 4.2 | 4.1 | 4.3 | 4.4 | 4.8 | 4.8 | 4.1 | 3.8 | 4.3 | 4.3 | 3.6 | 3.6 | 3.4 | 3.3 | 3.3 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



| | | |
|--|--|-------------------------------|
| Maximum Value: 0.8 km/h on Sep 28 22:00 | Maximum Daily Average: 0.2 km/h on Sep 29 | Hours in Service: 720 |
| Minimum Value: -0.5 km/h on Sep 30 23:00 | Minimum Daily Average: 0.1 km/h on Sep 30 | Hours of Data: 61 |
| Maximum Diurnal Average: 0.5 km/h at hour 10 | Minimum Diurnal Average: 0.0 km/h at hour 17 | Hours of Missing Data: 659 |
| Monthly Average: 0.17 km/h | Percentiles: $P_1 = -0.4$ $P_{10} = -0.3$ $Q_1 = 0.1$ Median = 0.2 $Q_3 = 0.4$ $P_{90} = 0.5$ $P_{99} = 0.8$ | Hours of Calibration: 0 |
| | | Percent Operational Time: 8.5 |

| 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | 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-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 0.5 | 0.5 | 0.3 | 0.1 | -0.2 | -0.2 | -0.1 | 0.1 | 0.3 | 0.6 | 0.8 | 0.5 | 0.4 | -- | 0.8 | |
| 29-Sep | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.3 | 0.4 | 0.4 | 0.2 | 0.5 | 0.4 | 0.2 | 0.5 | 0.4 | 0.4 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.4 | 0.1 | 0.1 | 0.2 | 0.5 | |
| 30-Sep | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 | 0.3 | 0.5 | 0.2 | 0.4 | 0.5 | 0.5 | 0.3 | 0.4 | -0.1 | -0.3 | 0.1 | 0.0 | 0.2 | -0.3 | -0.4 | -0.4 | -0.4 | -0.5 | -0.4 | 0.1 | 0.5 | |
| | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.3 | 0.5 | 0.3 | 0.3 | 0.5 | 0.4 | 0.3 | 0.4 | 0.2 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.3 | 0.0 | 0.0 | Diurnal Average | | |
| | 0.2 | 0.1 | 0.2 | 0.3 | 0.2 | 0.3 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.6 | 0.8 | 0.5 | 0.4 | Diurnal Maximum | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|--|-------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 3.1 km/h on Sep 30 23:00 | Hours of Data: 61 |
| Minimum Value: 0.2 km/h on Sep 30 05:00 | Hours of Missing Data: 659 |
| Percentiles: P ₁ = 0.2 P ₁₀ = 0.3 Q ₁ = 0.8 Median = 1.7 Q ₃ = 2.2 P ₉₀ = 2.5 P ₉₉ = 3.1 | Hours of Calibration: 0 |
| | Percent Operational Time: 8.5 |

| 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-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | |
| 2-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 3-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 4-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 5-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 6-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 7-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 8-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 9-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 10-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 11-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 12-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 13-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 14-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 15-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 16-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 17-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 18-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 19-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 20-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 21-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 22-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 23-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 24-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 25-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 26-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 27-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 28-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 29-Sep | 2.5 | 2.9 | 2.6 | 2.4 | 2.2 | 1.5 | 1.6 | 2.2 | 2.5 | 2.4 | 2.0 | 1.8 | 2.1 | 1.9 | 1.6 | 1.6 | 0.8 | 0.5 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 2.9 | |
| 30-Sep | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.4 | 0.9 | 0.5 | 1.5 | 1.4 | 1.7 | 2.1 | 1.6 | 2.2 | 1.9 | 1.7 | 1.9 | 1.5 | 1.8 | 2.0 | 2.5 | 2.6 | 3.1 | 3.1 | 3.1 | 3.1 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.5 2.9 2.6 2.4 2.2 1.5 1.6 2.2 2.5 2.4 2.0 2.4 2.4 2.3 2.2 2.2 2.1 1.5 1.8 2.0 2.5 2.6 3.1 3.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



| Maximum Value: 3.7 km/h on Sep 17 19:00 | | Maximum Daily Average: 1.3 km/h on Sep 17 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.2 km/h on Sep 26 08:00 | | Minimum Daily Average: -0.2 km/h on Sep 12 | | Hours of Data: 716 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.5 km/h at hour 7 | | Minimum Diurnal Average: 0.0 km/h at hour 15 | | Hours of Missing Data: 4 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.32 km/h | | Percentiles: P ₁ = -1.0 P ₁₀ = -0.3 Q ₁ = -0.1 Median = 0.2 Q ₃ = 0.6 P ₉₀ = 1.2 P ₉₉ = 2.4 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.4 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0.0 | 0.6 | 1.4 | 1.2 | 0.5 | 0.6 | 0.8 | 0.3 | 0.5 | 0.9 | 0.3 | 0.3 | 0.6 | 0.4 | -0.3 | -0.2 | -0.2 | 0.1 | 0.2 | -0.1 | -0.1 | 0.0 | -0.3 | -0.4 | 0.3 | 1.4 |
| 2-Sep | -0.3 | 0.1 | 1.0 | 2.9 | 2.1 | 0.4 | 1.4 | 1.3 | 0.3 | 0.1 | 0.8 | 0.1 | -0.3 | 0.2 | 0.4 | 0.0 | 0.4 | 0.4 | 0.7 | 0.6 | 0.9 | 0.4 | 0.6 | 0.5 | 0.6 | 2.9 |
| 3-Sep | 0.3 | -0.1 | 0.2 | 0.7 | 1.3 | 1.3 | 1.2 | 1.0 | 0.1 | 0.3 | -1.1 | 0.4 | 0.1 | -1.0 | -1.0 | -0.7 | -0.8 | -1.0 | -0.2 | -0.5 | -0.8 | -0.7 | -0.5 | -0.6 | -0.1 | 1.3 |
| 4-Sep | -0.4 | -0.4 | -0.3 | -0.5 | -0.4 | -0.3 | -0.5 | -0.3 | -0.5 | -0.4 | -0.6 | 0.0 | 0.5 | -0.3 | -0.4 | -0.5 | -0.1 | 0.1 | -0.1 | 0.2 | 0.7 | 0.9 | 1.2 | 0.9 | -0.1 | 1.2 |
| 5-Sep | 1.1 | 0.5 | 0.5 | 0.2 | 0.3 | 1.6 | 2.7 | 1.1 | 0.4 | 0.2 | 0.7 | 0.7 | 0.4 | 0.1 | 0.0 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | -0.2 | 0.0 | -0.1 | 0.0 | 0.5 | 2.7 |
| 6-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | -0.3 | -0.3 | -0.1 | 0.9 | 1.0 | -0.2 | 0.5 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 1.1 | 1.6 | 2.3 | 0.3 | 2.3 |
| 7-Sep | 2.5 | 2.0 | 2.5 | 1.7 | 0.4 | 0.4 | -0.1 | 0.3 | 0.0 | 1.0 | 1.7 | 0.9 | 0.5 | 0.2 | 0.1 | -0.1 | -0.6 | 0.0 | -0.2 | -0.4 | 0.0 | 0.5 | 1.1 | 0.4 | 0.6 | 2.5 |
| 8-Sep | 0.0 | 0.6 | 0.9 | 0.8 | 0.4 | 0.7 | 0.4 | 0.1 | -0.2 | -0.1 | -0.4 | 0.0 | 0.2 | -0.1 | -0.1 | 0.4 | -0.2 | -0.4 | 0.1 | 0.0 | 0.0 | -0.3 | 0.0 | 0.0 | 0.1 | 0.9 |
| 9-Sep | 0.1 | -0.1 | 0.1 | 0.0 | 0.1 | -0.1 | -0.1 | -0.3 | 0.1 | 0.0 | 0.2 | 0.1 | -0.1 | -0.5 | -0.2 | 0.1 | -0.5 | 0.0 | 0.0 | -0.1 | 0.0 | -0.3 | -0.3 | 0.2 | -0.1 | 0.2 |
| 10-Sep | 1.2 | 0.7 | 0.2 | 0.3 | 0.5 | 0.4 | 0.1 | -0.1 | -0.1 | -0.2 | -0.5 | -0.4 | -0.6 | -1.0 | -0.9 | -0.8 | -0.7 | -0.3 | -0.1 | 0.5 | 0.4 | -0.6 | 0.4 | -0.7 | -0.1 | 1.2 |
| 11-Sep | 0.0 | -0.1 | -0.6 | -0.1 | -0.2 | 0.3 | -0.1 | 0.0 | 0.2 | 0.6 | 0.2 | 0.4 | 0.5 | 0.5 | 1.3 | 2.4 | 1.7 | 0.8 | 0.8 | -0.5 | 0.0 | 0.6 | 0.6 | 0.2 | 0.4 | 2.4 |
| 12-Sep | 0.3 | 0.0 | -0.5 | -0.8 | -0.5 | 0.9 | 1.0 | 0.2 | -0.6 | -0.9 | -0.6 | -1.1 | -0.4 | -0.7 | -0.6 | -0.6 | -0.4 | 0.1 | 0.1 | -0.2 | 0.0 | -0.3 | -0.1 | -0.3 | -0.2 | 1.0 |
| 13-Sep | 0.0 | 0.2 | 0.0 | 0.1 | -0.1 | -0.1 | -0.2 | 0.3 | 0.6 | 0.1 | 0.9 | 0.3 | -0.4 | 1.1 | 0.3 | -0.2 | -0.1 | 0.0 | 0.5 | 0.1 | 0.2 | 0.1 | -0.1 | -0.1 | 0.2 | 1.1 |
| 14-Sep | -0.5 | -0.2 | -0.1 | -0.1 | 0.0 | -0.2 | -0.1 | -0.1 | -0.2 | 0.0 | -0.3 | 0.7 | -0.2 | 0.9 | -0.4 | 1.0 | 0.1 | -0.2 | -0.1 | 0.2 | -0.3 | 0.2 | 0.0 | 0.3 | 0.0 | 1.0 |
| 15-Sep | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.5 | 0.5 | 0.6 | 0.3 | 0.6 | 0.4 | 0.4 | 1.1 | 0.8 | 0.9 | 0.1 | 0.6 | 0.7 | -0.3 | -0.2 | 0.0 | 0.5 | 0.2 | 0.3 | 1.1 |
| 16-Sep | -0.3 | 0.4 | 1.3 | 0.6 | 1.9 | 1.5 | 1.7 | 1.6 | 1.6 | 1.3 | 0.6 | 1.1 | 0.2 | 0.0 | 0.4 | 0.3 | 0.3 | 0.0 | -0.5 | 0.1 | 0.3 | 0.6 | -0.1 | 0.5 | 0.6 | 1.9 |
| 17-Sep | 0.5 | 0.5 | 0.9 | 1.3 | 0.9 | 0.8 | 1.5 | 1.3 | 0.7 | 1.5 | 1.0 | 0.6 | -0.3 | 0.6 | 1.5 | 0.6 | 1.2 | 2.8 | 3.7 | 1.8 | 1.9 | 1.7 | 1.9 | 2.0 | 1.3 | 3.7 |
| 18-Sep | 1.9 | 1.9 | 0.8 | 0.8 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.2 | 2.2 | 2.6 | 2.4 | 1.6 | 1.0 | 0.7 | 1.7 | 1.3 | 0.8 | 0.9 | 0.1 | 0.1 | -0.3 | 0.0 | 1.2 | 2.6 |
| 19-Sep | 0.4 | 0.1 | -0.1 | -0.3 | -0.3 | -0.3 | -0.3 | 0.2 | M | M | 0.1 | 0.0 | 0.1 | 0.3 | -0.1 | -0.1 | 0.4 | -0.1 | 0.0 | -0.1 | -0.2 | 0.1 | -0.2 | -0.1 | 0.0 | 0.4 |
| 20-Sep | -0.1 | -0.3 | 0.0 | 0.1 | 0.0 | -0.1 | 0.1 | -0.1 | 0.3 | 0.2 | -0.1 | 0.1 | 0.2 | 0.1 | -0.1 | 0.1 | 0.2 | 0.0 | 0.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.1 | 0.3 |
| 21-Sep | 0.5 | 0.4 | 0.2 | 0.5 | 0.3 | 0.2 | 0.3 | 0.2 | 0.6 | 0.4 | 0.1 | 0.1 | 0.2 | -0.2 | -0.1 | 0.0 | -0.3 | 0.1 | 0.1 | -0.2 | -0.3 | -0.2 | -0.2 | -0.1 | 0.1 | 0.6 |
| 22-Sep | -0.1 | -0.1 | 0.1 | 0.0 | -0.2 | 0.1 | 0.0 | -0.1 | 0.5 | 0.0 | 0.1 | -0.1 | 0.2 | -0.1 | 0.0 | 0.0 | 0.2 | 0.4 | 0.3 | 0.3 | 0.4 | 0.2 | 0.3 | 0.1 | 0.1 | 0.5 |
| 23-Sep | 0.1 | 0.0 | 0.3 | 0.1 | 0.4 | 0.3 | 0.1 | 0.0 | 0.1 | 0.1 | 0.4 | 0.6 | 0.2 | 0.2 | 0.3 | 0.8 | 0.4 | -0.1 | -0.1 | 1.0 | 1.6 | 1.4 | 1.0 | 1.7 | 0.5 | 1.7 |
| 24-Sep | 1.2 | 0.8 | 0.6 | -0.1 | 0.4 | 0.8 | 0.1 | 0.0 | 0.1 | 0.2 | 0.8 | 1.0 | 0.5 | 0.8 | 0.6 | 0.6 | 0.5 | 1.1 | 1.2 | 0.6 | 0.0 | 0.2 | 1.0 | 1.6 | 0.6 | 1.6 |
| 25-Sep | 1.8 | 2.4 | 2.0 | 1.8 | 1.0 | 1.6 | 1.0 | 0.7 | 0.8 | 0.8 | 0.7 | 0.3 | 0.4 | 0.1 | -0.5 | 0.0 | 0.1 | 0.1 | 0.5 | 0.6 | 0.8 | 0.3 | 0.1 | 0.2 | 0.7 | 2.4 |
| 26-Sep | 0.0 | 0.3 | 0.5 | -0.1 | -0.3 | -0.4 | -0.2 | -1.2 | 0.0 | 0.0 | 0.6 | 0.3 | -1.0 | -0.1 | -0.4 | -0.1 | -0.4 | -0.3 | -0.2 | -0.1 | -0.1 | 0.0 | 0.1 | 0.3 | -0.1 | 0.6 |
| 27-Sep | 0.2 | 0.1 | 0.4 | 0.7 | 0.1 | 0.0 | 0.3 | 0.3 | 0.1 | -0.2 | -0.4 | -0.4 | 0.3 | 0.1 | -0.6 | 0.1 | -0.3 | 0.1 | 0.0 | -0.1 | -0.2 | -0.1 | -0.3 | 0.2 | 0.0 | 0.7 |
| 28-Sep | 0.1 | 0.0 | -0.1 | 0.4 | 0.4 | 0.4 | 0.3 | 1.5 | 2.4 | 1.7 | 0.8 | 1.0 | 0.9 | 1.2 | -0.2 | 0.0 | -0.3 | -0.5 | -0.1 | 0.1 | 0.2 | 0.7 | 1.3 | 1.3 | 0.6 | 2.4 |
| 29-Sep | 1.9 | 2.2 | 1.9 | 1.9 | 2.0 | 1.1 | 1.7 | 1.8 | 2.1 | M | M | 0.9 | 1.4 | 0.9 | 0.5 | 0.4 | 0.2 | 0.2 | 0.3 | 0.4 | 0.3 | 0.6 | 1.2 | 0.7 | 1.1 | 2.2 |
| 30-Sep | 1.0 | 0.6 | 0.5 | 0.4 | 0.2 | 1.0 | 0.8 | 0.9 | 0.7 | 0.5 | 0.9 | 1.2 | 0.6 | -0.1 | 0.3 | 0.5 | 0.9 | 0.8 | -0.5 | -0.5 | -0.8 | -0.8 | -0.7 | -1.1 | 0.3 | 1.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | M - Maintenance | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 1 Maximum Value: 4.9 km/h on Sep 10 15:00 Minimum Value: 0.2 km/h on Sep 13 22:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.6 Q ₁ = 1.0 Median = 1.6 Q ₃ = 2.4 P ₉₀ = 3.1 P ₉₉ = 4.2 | | | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 716 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.4 | |
|---|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 1.6 | 1.3 | 2.1 | 2.6 | 3.2 | 2.9 | 2.6 | 2.6 | 2.5 | 2.6 | 2.9 | 2.8 | 3.2 | 3.3 | 3.6 | 3.4 | 3.0 | 2.8 | 2.9 | 1.6 | 1.6 | 1.4 | 1.9 | 2.9 | 3.6 |
| 2-Sep | 1.9 | 1.4 | 1.6 | 2.0 | 2.5 | 2.0 | 2.4 | 2.5 | 2.3 | 2.1 | 2.7 | 2.7 | 2.4 | 2.1 | 2.1 | 1.8 | 1.8 | 1.9 | 1.8 | 2.2 | 2.3 | 2.2 | 1.7 | 1.6 | 2.7 |
| 3-Sep | 1.8 | 1.7 | 1.3 | 1.5 | 2.0 | 1.8 | 2.2 | 2.2 | 2.6 | 2.9 | 3.6 | 3.9 | 4.0 | 3.9 | 3.7 | 3.2 | 3.5 | 3.2 | 3.8 | 2.8 | 2.4 | 1.7 | 1.2 | 0.7 | 4.0 |
| 4-Sep | 1.0 | 1.4 | 0.8 | 0.5 | 0.7 | 1.0 | 0.8 | 1.2 | 1.4 | 2.3 | 2.8 | 3.0 | 3.4 | 3.0 | 2.5 | 1.9 | 1.8 | 1.1 | 0.5 | 0.8 | 0.7 | 0.6 | 0.9 | 0.9 | 3.4 |
| 5-Sep | 1.1 | 1.0 | 1.0 | 0.8 | 1.2 | 1.6 | 1.3 | 1.5 | 1.1 | 1.2 | 1.6 | 1.7 | 2.2 | 2.6 | 2.5 | 2.1 | 1.4 | 0.7 | 0.3 | 0.8 | 1.1 | 0.8 | 1.0 | 0.9 | 2.6 |
| 6-Sep | 0.5 | 0.6 | 0.4 | 0.3 | 0.4 | 0.2 | 0.3 | 0.3 | 0.6 | 0.8 | 1.0 | 1.8 | 2.1 | 2.2 | 1.6 | 2.0 | 1.2 | 0.5 | 0.4 | 0.8 | 1.0 | 0.7 | 0.8 | 1.0 | 2.2 |
| 7-Sep | 0.9 | 1.2 | 1.0 | 1.5 | 1.5 | 1.4 | 1.5 | 1.6 | 1.7 | 1.6 | 2.0 | 2.6 | 2.6 | 3.1 | 2.8 | 3.0 | 2.7 | 2.3 | 1.6 | 1.4 | 1.5 | 1.7 | 1.6 | 1.2 | 3.1 |
| 8-Sep | 0.8 | 1.3 | 1.0 | 1.0 | 0.9 | 1.0 | 1.1 | 0.6 | 1.4 | 1.0 | 0.9 | 2.1 | 2.1 | 1.3 | 1.4 | 1.8 | 1.6 | 1.1 | 1.2 | 0.9 | 0.4 | 0.4 | 0.3 | 0.3 | 2.1 |
| 9-Sep | 0.4 | 0.2 | 0.4 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 1.0 | 1.1 | 1.6 | 1.8 | 2.1 | 1.4 | 1.8 | 1.5 | 1.5 | 1.2 | 0.8 | 0.9 | 0.6 | 0.4 | 0.5 | 1.1 | 2.1 |
| 10-Sep | 1.1 | 1.7 | 0.8 | 1.5 | 1.9 | 1.8 | 2.9 | 3.3 | 3.8 | 3.7 | 3.8 | 3.6 | 4.2 | 4.7 | 4.9 | 3.5 | 3.7 | 3.8 | 3.1 | 2.4 | 2.4 | 2.9 | 2.4 | 2.8 | 4.9 |
| 11-Sep | 2.1 | 2.0 | 2.3 | 1.9 | 1.8 | 1.4 | 0.9 | 1.2 | 0.9 | 1.1 | 0.9 | 0.8 | 1.1 | 1.4 | 1.6 | 1.7 | 2.3 | 2.1 | 1.7 | 2.8 | 0.9 | 1.2 | 0.9 | 1.1 | 2.8 |
| 12-Sep | 2.1 | 3.7 | 4.3 | 4.0 | 2.9 | 3.2 | 2.7 | 2.7 | 3.0 | 3.0 | 3.2 | 2.8 | 2.7 | 1.7 | 1.9 | 1.4 | 1.1 | 1.8 | 1.9 | 1.7 | 2.2 | 1.5 | 1.1 | 0.9 | 4.3 |
| 13-Sep | 0.8 | 1.2 | 1.2 | 0.6 | 0.5 | 0.3 | 0.3 | 0.8 | 1.6 | 1.5 | 2.0 | 2.3 | 1.8 | 2.4 | 2.0 | 1.0 | 1.5 | 0.7 | 0.5 | 0.8 | 0.3 | 0.2 | 0.5 | 0.4 | 2.4 |
| 14-Sep | 0.7 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.7 | 0.6 | 0.7 | 1.1 | 1.6 | 2.5 | 2.8 | 3.2 | 2.8 | 2.7 | 2.4 | 1.6 | 0.4 | 0.6 | 1.4 | 1.6 | 0.8 | 0.6 | 3.2 |
| 15-Sep | 0.3 | 0.2 | 0.2 | 0.7 | 0.7 | 0.8 | 1.3 | 1.1 | 1.3 | 1.4 | 1.2 | 1.3 | 1.3 | 2.7 | 2.2 | 2.0 | 2.3 | 1.9 | 0.8 | 1.0 | 0.9 | 1.4 | 1.3 | 1.3 | 2.7 |
| 16-Sep | 1.4 | 1.5 | 1.7 | 1.7 | 1.8 | 2.2 | 1.8 | 1.6 | 2.0 | 2.1 | 2.6 | 3.7 | 3.3 | 3.1 | 3.1 | 2.8 | 2.7 | 2.1 | 1.3 | 1.2 | 1.3 | 1.2 | 1.4 | 1.5 | 3.7 |
| 17-Sep | 1.6 | 1.6 | 1.5 | 1.5 | 1.6 | 1.5 | 1.4 | 1.5 | 1.8 | 2.4 | 2.8 | 3.4 | 3.2 | 3.3 | 3.4 | 2.9 | 3.0 | 3.1 | 2.5 | 3.0 | 2.7 | 3.6 | 3.1 | 2.0 | 3.6 |
| 18-Sep | 2.0 | 2.0 | 1.5 | 1.4 | 1.5 | 1.6 | 1.9 | 2.0 | 2.5 | 2.4 | 3.0 | 3.9 | 3.5 | 3.1 | 2.9 | 2.6 | 2.5 | 1.8 | 1.6 | 1.7 | 1.6 | 1.7 | 2.2 | 2.4 | 3.9 |
| 19-Sep | 2.3 | 2.6 | 2.5 | 2.0 | 0.8 | 0.7 | 1.1 | 1.1 | M | M | 2.1 | 1.9 | 1.9 | 2.7 | 2.7 | 3.7 | 4.1 | 2.8 | 2.7 | 2.9 | 3.2 | 3.3 | 2.5 | 2.0 | 4.1 |
| 20-Sep | 1.9 | 2.3 | 2.5 | 2.8 | 2.5 | 3.0 | 3.3 | 4.2 | 4.2 | 4.3 | 4.2 | 4.5 | 4.6 | 4.2 | 4.3 | 4.0 | 4.0 | 4.0 | 4.1 | 3.5 | 4.1 | 3.5 | 3.5 | 3.4 | 4.6 |
| 21-Sep | 3.0 | 3.1 | 3.1 | 3.0 | 3.0 | 2.7 | 2.5 | 2.7 | 2.7 | 2.7 | 2.7 | 3.1 | 2.9 | 2.6 | 2.8 | 3.2 | 3.1 | 2.6 | 2.3 | 1.6 | 1.1 | 0.7 | 0.7 | 0.5 | 3.2 |
| 22-Sep | 0.5 | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.7 | 0.8 | 0.9 | 0.7 | 0.8 | 0.8 | 0.9 | 0.8 | 0.4 | 0.9 | 0.9 | 1.0 | 0.8 | 1.2 | 1.3 | 0.8 | 0.7 | 1.3 |
| 23-Sep | 0.7 | 0.8 | 0.6 | 0.5 | 0.7 | 1.2 | 0.4 | 0.3 | 0.4 | 1.0 | 1.3 | 1.4 | 1.4 | 1.7 | 2.3 | 2.2 | 1.6 | 1.2 | 1.2 | 1.4 | 1.9 | 2.0 | 1.6 | 1.9 | 2.3 |
| 24-Sep | 1.4 | 1.3 | 1.4 | 1.0 | 1.1 | 1.0 | 0.7 | 0.6 | 0.6 | 1.2 | 1.3 | 2.1 | 2.3 | 2.2 | 2.2 | 1.8 | 2.0 | 1.8 | 1.4 | 1.7 | 1.4 | 1.4 | 1.9 | 1.8 | 2.3 |
| 25-Sep | 1.6 | 1.3 | 1.4 | 1.5 | 1.6 | 1.3 | 1.4 | 1.1 | 1.4 | 1.5 | 1.5 | 1.6 | 1.2 | 1.5 | 2.2 | 2.1 | 0.7 | 1.1 | 0.6 | 0.7 | 0.8 | 1.0 | 0.9 | 1.4 | 2.2 |
| 26-Sep | 0.9 | 1.2 | 1.7 | 1.4 | 1.1 | 1.7 | 2.1 | 2.3 | 1.8 | 1.5 | 1.7 | 2.7 | 3.2 | 3.5 | 3.1 | 3.0 | 2.3 | 0.8 | 0.4 | 0.3 | 0.5 | 0.9 | 0.4 | 0.7 | 3.5 |
| 27-Sep | 0.9 | 0.8 | 0.7 | 0.7 | 0.7 | 0.6 | 0.7 | 0.5 | 0.6 | 0.6 | 1.2 | 1.6 | 2.3 | 2.6 | 1.7 | 1.5 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 | 0.6 | 0.4 | 0.6 | 2.6 |
| 28-Sep | 0.5 | 0.6 | 0.4 | 1.7 | 2.1 | 1.6 | 1.4 | 2.1 | 1.4 | 1.7 | 2.3 | 2.7 | 2.9 | 2.6 | 2.7 | 2.5 | 2.2 | 1.7 | 1.3 | 1.3 | 1.6 | 1.8 | 2.0 | 1.9 | 2.9 |
| 29-Sep | 2.1 | 2.1 | 2.3 | 2.1 | 2.2 | 1.4 | 1.0 | 1.0 | 1.8 | M | M | 2.4 | 2.4 | 2.2 | 1.9 | 1.6 | 0.8 | 0.2 | 0.2 | 0.6 | 0.6 | 0.6 | 0.6 | 0.8 | 2.4 |
| 30-Sep | 0.8 | 0.7 | 0.5 | 0.7 | 0.6 | 0.8 | 1.0 | 0.9 | 1.0 | 0.9 | 1.0 | 1.3 | 1.1 | 1.9 | 1.7 | 1.4 | 1.0 | 1.4 | 1.8 | 1.6 | 2.3 | 2.5 | 3.0 | 2.8 | 3.0 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | |



| Maximum Value: 4.5 km/h on Sep 2 04:00 | | Maximum Daily Average: 1.4 km/h on Sep 18 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.8 km/h on Sep 26 08:00 | | Minimum Daily Average: -0.1 km/h on Sep 4 | | Hours of Data: 718 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.9 km/h at hour 7 | | Minimum Diurnal Average: 0.2 km/h at hour 15 | | Hours of Missing Data: 2 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.57 km/h | | Percentiles: P ₁ = -0.9 P ₁₀ = -0.2 Q ₁ = 0.1 Median = 0.4 Q ₃ = 0.9 P ₉₀ = 1.5 P ₉₉ = 3.1 | | 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-Sep | 0.1 | 1.1 | 3.0 | 2.6 | 2.3 | 2.5 | 2.5 | 1.3 | 1.3 | 1.2 | 0.8 | 0.8 | 1.1 | 1.2 | 0.7 | 0.7 | 0.6 | 0.9 | 1.1 | 0.6 | 0.7 | 0.6 | 0.2 | 0.8 | 1.2 | 3.0 |
| 2-Sep | 0.0 | 0.3 | 1.1 | 4.5 | 4.2 | 1.2 | 3.1 | 2.8 | 1.0 | 0.5 | 1.0 | 1.0 | 0.2 | 1.2 | 0.9 | 0.1 | 0.8 | 0.8 | 1.2 | 1.5 | 1.5 | 1.1 | 0.8 | 0.9 | 1.3 | 4.5 |
| 3-Sep | 0.6 | 0.2 | 0.3 | 0.6 | 1.2 | 1.9 | 2.4 | 1.9 | 0.8 | 1.0 | -0.7 | 1.8 | 1.5 | -0.5 | -0.9 | -0.5 | -0.5 | -0.9 | 0.4 | -0.3 | -0.5 | -0.4 | -0.1 | -0.4 | 0.4 | 2.4 |
| 4-Sep | -0.2 | -0.3 | -0.4 | -0.3 | -0.4 | -0.1 | -0.3 | -0.1 | -0.4 | -0.6 | -0.1 | 0.4 | 0.5 | -0.6 | -0.3 | -0.5 | -0.2 | 0.2 | 0.0 | 0.0 | 0.6 | 0.3 | 0.5 | 0.8 | -0.1 | 0.8 |
| 5-Sep | 0.6 | 0.5 | 0.2 | 0.2 | 0.3 | 1.0 | 1.1 | 1.0 | 0.8 | 0.4 | 0.3 | 0.3 | 0.5 | 0.4 | 0.2 | 0.3 | 0.3 | 0.3 | 0.5 | 1.0 | 0.9 | 0.9 | 0.4 | 0.4 | 0.5 | 1.1 |
| 6-Sep | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | -0.3 | 0.3 | 1.1 | 1.0 | -0.4 | 0.3 | -0.1 | 0.0 | 0.2 | 0.5 | 1.4 | 1.9 | 1.8 | 2.4 | 0.4 | 2.4 |
| 7-Sep | 3.1 | 2.5 | 2.5 | 1.9 | 0.7 | 0.3 | 0.1 | 0.0 | -0.1 | 0.8 | 1.0 | 0.5 | 0.9 | 1.2 | 0.9 | 0.4 | 0.0 | 0.5 | -0.5 | 0.4 | 1.7 | 2.3 | 0.9 | 0.2 | 0.9 | 3.1 |
| 8-Sep | 1.0 | 0.9 | 0.7 | 1.0 | 0.9 | 0.6 | 0.3 | 0.4 | 0.1 | -0.1 | -0.4 | 0.2 | 0.6 | 0.2 | 0.1 | 0.6 | 0.1 | 0.0 | 0.4 | 0.2 | 0.2 | 0.0 | 0.1 | 0.0 | 0.3 | 1.0 |
| 9-Sep | 0.0 | -0.1 | 0.2 | 0.1 | 0.4 | 0.3 | 0.6 | 0.1 | 0.2 | 0.1 | 0.3 | 0.2 | 0.6 | -0.3 | 0.1 | 0.3 | -0.3 | 0.2 | 0.2 | 0.2 | 0.1 | -0.1 | -0.1 | 0.7 | 0.2 | 0.7 |
| 10-Sep | 1.4 | 0.9 | 0.8 | 0.7 | 1.0 | 0.7 | 1.0 | 0.6 | 1.0 | 0.7 | 0.2 | 0.0 | 0.0 | -0.6 | 0.0 | -0.7 | -0.2 | 0.7 | 0.5 | 1.2 | 1.4 | 0.5 | 1.5 | 0.1 | 0.6 | 1.5 |
| 11-Sep | 0.1 | 0.7 | 0.0 | 0.5 | 0.7 | 1.3 | 0.6 | 0.3 | 0.0 | 0.3 | 0.4 | 0.7 | 0.5 | 0.6 | 1.6 | 3.0 | 1.9 | 0.7 | 0.3 | 1.3 | -0.1 | 1.3 | 0.6 | 0.2 | 0.7 | 3.0 |
| 12-Sep | 0.9 | 0.5 | 0.3 | -0.2 | 0.0 | 1.3 | 1.6 | 0.7 | -0.3 | -0.7 | -0.5 | -1.0 | 0.1 | -0.5 | -0.6 | -0.6 | -0.2 | 0.7 | 0.2 | 0.1 | 0.3 | 0.0 | -0.1 | -0.2 | 0.1 | 1.6 |
| 13-Sep | 0.1 | 0.2 | 0.3 | 0.3 | -0.1 | -0.1 | 0.2 | 0.7 | 0.8 | -0.1 | 1.8 | 0.6 | -0.3 | 0.7 | 0.8 | 0.0 | -0.1 | 0.3 | 0.5 | 0.1 | 0.2 | 0.2 | 0.4 | 0.2 | 0.3 | 1.8 |
| 14-Sep | -0.1 | 0.0 | 0.4 | 0.2 | 0.2 | 0.1 | 0.0 | -0.2 | -0.1 | 0.1 | -0.2 | 1.0 | -0.5 | 1.3 | -0.4 | 1.0 | 0.3 | -0.1 | 0.2 | 0.7 | 0.4 | 1.1 | 0.4 | 1.0 | 0.3 | 1.3 |
| 15-Sep | 0.5 | 0.2 | 0.3 | 0.4 | 0.4 | 0.1 | 0.2 | 0.5 | 0.5 | 0.3 | 0.3 | 0.3 | 0.0 | 1.1 | 0.6 | 0.9 | 0.8 | 1.4 | 1.4 | 1.6 | 1.5 | 1.9 | 3.4 | 2.6 | 0.9 | 3.4 |
| 16-Sep | -0.2 | 0.5 | 1.4 | 1.1 | 1.8 | 2.0 | 2.5 | 2.1 | 1.1 | 1.0 | 0.7 | 1.2 | 0.3 | 0.3 | 0.9 | 1.0 | 1.0 | 0.2 | 0.1 | -0.6 | -0.4 | 0.0 | 1.2 | 1.0 | 0.9 | 2.5 |
| 17-Sep | 0.9 | -0.2 | 0.8 | 1.5 | 1.2 | 1.5 | 1.6 | 1.5 | 1.1 | 1.1 | 0.9 | 0.2 | 0.2 | 0.7 | 1.7 | 0.6 | 1.3 | 3.1 | 4.5 | 1.6 | 1.7 | 1.1 | 1.7 | 2.2 | 1.4 | 4.5 |
| 18-Sep | 1.9 | 2.0 | 1.2 | 1.1 | 1.2 | 1.2 | 1.4 | 1.5 | 1.6 | 1.4 | 2.1 | 2.4 | 2.3 | 1.5 | 0.6 | 0.5 | 1.8 | 1.7 | 1.6 | 2.4 | 0.7 | 0.8 | -0.3 | 0.1 | 1.4 | 2.4 |
| 19-Sep | 0.5 | 0.4 | 0.8 | 0.5 | 0.0 | -0.4 | -0.3 | 0.8 | M | M | 0.3 | 0.2 | 0.6 | 0.7 | 0.2 | 0.7 | 1.1 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 0.6 | 0.3 | 0.5 | 1.1 |
| 20-Sep | 0.2 | -0.1 | 0.2 | 0.6 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.1 | 0.2 | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.1 | 0.2 | 0.1 | 0.0 | -0.1 | 0.3 | 0.4 | 0.2 | 0.6 |
| 21-Sep | 0.6 | 0.1 | 0.5 | 0.8 | 0.4 | 0.3 | 0.6 | 0.4 | 0.7 | 0.8 | 0.4 | 0.2 | 0.3 | 0.5 | 0.4 | 0.4 | -0.1 | 0.3 | 0.3 | 0.0 | -0.1 | 0.0 | 0.0 | 0.1 | 0.3 | 0.8 |
| 22-Sep | 0.1 | 0.0 | 0.1 | 0.0 | -0.2 | -0.1 | 0.1 | 0.1 | 0.7 | 0.3 | 0.2 | 0.1 | 0.1 | -0.2 | 0.1 | 0.1 | 0.6 | 0.7 | 0.3 | 0.5 | 0.4 | 0.3 | 0.4 | 0.3 | 0.2 | 0.7 |
| 23-Sep | 0.4 | 0.3 | 0.2 | 0.5 | 0.7 | 0.6 | 0.4 | 0.4 | 0.4 | 0.3 | 0.7 | 1.0 | 0.8 | 0.3 | 0.2 | 1.0 | 0.5 | -0.1 | 0.3 | 1.1 | 1.4 | 1.5 | 1.6 | 1.8 | 0.7 | 1.8 |
| 24-Sep | 1.6 | 0.9 | 0.3 | 0.1 | 0.5 | 1.2 | 0.9 | 0.5 | 0.6 | 0.4 | 0.7 | 0.9 | 0.3 | 0.8 | 0.2 | 0.5 | 0.5 | 1.0 | 1.0 | 0.6 | 1.1 | 0.8 | 1.2 | 1.7 | 0.8 | 1.7 |
| 25-Sep | 1.7 | 3.0 | 2.9 | 2.2 | 1.4 | 1.8 | 1.2 | 0.7 | 0.8 | 0.5 | 0.6 | 0.2 | 0.2 | -0.4 | -0.2 | 0.6 | 0.3 | 0.5 | 0.7 | 1.5 | 1.4 | 1.1 | 0.9 | 0.7 | 1.0 | 3.0 |
| 26-Sep | 0.4 | 0.9 | 1.4 | 0.3 | -0.2 | -0.2 | 0.4 | -1.8 | 0.5 | 0.2 | 0.5 | 0.6 | -0.7 | 0.6 | -0.4 | 0.1 | -0.4 | -0.2 | -0.1 | 0.0 | 0.1 | 0.4 | 0.0 | 0.3 | 0.1 | 1.4 |
| 27-Sep | 0.6 | 0.5 | 0.3 | 0.3 | 0.6 | 0.5 | 0.7 | 0.5 | 0.2 | -0.1 | -0.2 | -0.3 | 0.5 | 0.4 | -0.4 | 0.4 | -0.2 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | -0.2 | 0.7 | 0.2 | 0.7 |
| 28-Sep | 0.5 | 0.2 | 0.3 | 1.5 | 1.3 | 1.3 | 0.9 | 2.1 | 2.4 | 2.1 | 0.9 | 0.7 | 0.3 | 1.0 | 0.2 | 0.2 | 0.6 | -0.2 | -1.2 | -1.1 | -0.5 | 0.0 | 0.8 | 1.0 | 0.6 | 2.4 |
| 29-Sep | 0.9 | 0.9 | 0.6 | 1.0 | 1.7 | 1.0 | 2.1 | 1.9 | 1.6 | 1.5 | 0.4 | 0.1 | 0.4 | 0.2 | 0.4 | 0.4 | 0.1 | -0.1 | 0.0 | 0.1 | 0.3 | 0.3 | 0.2 | 0.2 | 0.7 | 2.1 |
| 30-Sep | 0.5 | 0.4 | 0.4 | 0.3 | -0.1 | 0.2 | 0.4 | 0.0 | 0.2 | 0.6 | 0.3 | 0.3 | -0.1 | 0.1 | 0.2 | 0.3 | 0.6 | 0.6 | -0.6 | -0.4 | -0.7 | -0.9 | -0.8 | -1.3 | 0.0 | 0.6 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 1 | Hours in Service: 720 |
| Maximum Value: 4.7 km/h on Sep 20 13:00 | Hours of Data: 718 |
| Minimum Value: 0.2 km/h on Sep 6 08:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.5 Q ₃ = 2.3 P ₉₀ = 3.2 P ₉₉ = 4.4 | 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-Sep | 0.8 | 0.9 | 1.4 | 2.0 | 2.4 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.4 | 2.7 | 3.1 | 3.3 | 3.8 | 3.2 | 2.7 | 2.5 | 1.9 | 1.2 | 1.1 | 1.1 | 1.7 | 1.7 | 3.8 |
| 2-Sep | 0.8 | 1.1 | 1.3 | 1.5 | 1.8 | 2.3 | 1.5 | 1.9 | 2.5 | 1.9 | 2.8 | 3.0 | 2.4 | 2.3 | 2.0 | 1.4 | 1.3 | 1.5 | 1.4 | 1.8 | 1.8 | 1.7 | 1.2 | 1.0 | 3.0 |
| 3-Sep | 1.4 | 1.2 | 1.0 | 1.1 | 1.5 | 1.7 | 1.7 | 1.7 | 2.4 | 2.7 | 3.9 | 4.4 | 4.7 | 4.3 | 4.0 | 3.5 | 4.0 | 3.0 | 4.1 | 2.6 | 2.0 | 1.7 | 1.2 | 0.7 | 4.7 |
| 4-Sep | 1.0 | 1.2 | 1.0 | 0.6 | 0.8 | 0.9 | 0.7 | 1.1 | 1.6 | 2.8 | 3.1 | 3.5 | 3.8 | 3.2 | 3.0 | 2.1 | 1.9 | 1.2 | 0.6 | 1.1 | 1.0 | 0.6 | 0.8 | 0.8 | 3.8 |
| 5-Sep | 0.8 | 1.0 | 0.8 | 0.7 | 1.2 | 1.4 | 0.9 | 1.0 | 0.8 | 1.0 | 1.6 | 1.7 | 2.0 | 2.1 | 2.0 | 2.0 | 0.9 | 0.5 | 0.3 | 0.6 | 1.2 | 1.2 | 1.3 | 0.7 | 2.1 |
| 6-Sep | 0.4 | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.5 | 0.7 | 1.0 | 1.8 | 2.1 | 2.3 | 1.8 | 2.2 | 1.0 | 0.6 | 0.3 | 1.0 | 1.2 | 0.9 | 1.2 | 1.6 | 2.3 |
| 7-Sep | 1.5 | 1.6 | 1.3 | 1.5 | 1.5 | 1.3 | 1.4 | 1.3 | 1.7 | 1.7 | 1.6 | 1.9 | 2.3 | 2.5 | 2.1 | 2.2 | 1.8 | 1.6 | 1.0 | 1.3 | 1.1 | 1.0 | 1.0 | 0.9 | 2.5 |
| 8-Sep | 0.6 | 0.9 | 0.8 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 1.1 | 1.1 | 1.0 | 2.1 | 2.3 | 1.4 | 1.3 | 1.8 | 1.4 | 1.2 | 1.0 | 0.8 | 0.4 | 0.6 | 0.3 | 0.3 | 2.3 |
| 9-Sep | 0.2 | 0.2 | 0.3 | 0.3 | 0.5 | 0.4 | 0.4 | 0.5 | 0.8 | 1.1 | 1.2 | 1.4 | 2.0 | 1.3 | 2.0 | 1.8 | 1.3 | 1.1 | 1.2 | 0.9 | 0.8 | 0.6 | 0.6 | 1.0 | 2.0 |
| 10-Sep | 1.0 | 1.8 | 0.7 | 1.3 | 1.9 | 1.8 | 2.6 | 2.8 | 3.2 | 3.2 | 3.5 | 3.2 | 4.2 | 4.3 | 4.5 | 3.8 | 3.6 | 3.6 | 2.7 | 1.8 | 1.7 | 1.7 | 1.9 | 1.9 | 4.5 |
| 11-Sep | 1.2 | 1.3 | 2.1 | 1.7 | 1.6 | 1.5 | 1.5 | 0.9 | 0.9 | 0.7 | 0.7 | 0.8 | 1.2 | 1.6 | 2.0 | 2.1 | 2.4 | 1.6 | 1.5 | 3.5 | 1.1 | 0.9 | 1.1 | 1.1 | 3.5 |
| 12-Sep | 1.6 | 2.9 | 3.6 | 3.6 | 2.5 | 2.6 | 2.3 | 2.2 | 3.0 | 2.8 | 3.7 | 3.1 | 3.1 | 1.7 | 1.9 | 1.5 | 1.0 | 1.9 | 2.1 | 1.4 | 2.1 | 1.4 | 1.1 | 1.1 | 3.7 |
| 13-Sep | 1.0 | 1.4 | 1.4 | 0.9 | 0.7 | 0.4 | 0.4 | 0.6 | 1.6 | 1.3 | 1.9 | 2.6 | 1.7 | 2.6 | 2.1 | 0.6 | 1.4 | 0.7 | 0.6 | 0.7 | 0.4 | 0.3 | 0.3 | 0.4 | 2.6 |
| 14-Sep | 0.5 | 0.5 | 0.6 | 0.4 | 0.3 | 0.5 | 0.5 | 0.6 | 0.6 | 1.0 | 1.5 | 2.7 | 3.3 | 3.9 | 2.9 | 2.8 | 2.8 | 1.8 | 0.5 | 0.4 | 0.7 | 2.0 | 1.2 | 0.8 | 3.9 |
| 15-Sep | 0.4 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 1.1 | 1.0 | 1.0 | 0.6 | 0.8 | 0.7 | 1.1 | 2.7 | 2.4 | 2.3 | 2.5 | 2.0 | 0.7 | 0.6 | 0.5 | 0.9 | 1.6 | 1.8 | 2.7 |
| 16-Sep | 1.2 | 1.8 | 1.8 | 1.5 | 2.0 | 2.2 | 2.2 | 2.0 | 1.6 | 1.6 | 2.0 | 3.1 | 2.8 | 2.3 | 2.5 | 2.4 | 2.2 | 1.4 | 1.1 | 0.7 | 0.7 | 0.9 | 1.2 | 1.1 | 3.1 |
| 17-Sep | 1.0 | 0.9 | 1.1 | 1.2 | 1.9 | 1.7 | 1.5 | 1.8 | 2.1 | 2.4 | 2.5 | 3.1 | 2.7 | 2.9 | 3.6 | 2.9 | 3.1 | 3.4 | 3.0 | 3.0 | 2.9 | 2.8 | 2.7 | 2.4 | 3.6 |
| 18-Sep | 2.8 | 2.5 | 1.9 | 1.6 | 1.6 | 1.6 | 1.9 | 2.4 | 2.6 | 2.5 | 3.5 | 4.6 | 4.1 | 3.8 | 3.3 | 2.6 | 2.7 | 1.6 | 1.6 | 1.5 | 2.3 | 2.6 | 2.7 | 2.4 | 4.6 |
| 19-Sep | 2.6 | 2.3 | 3.0 | 1.8 | 1.0 | 0.6 | 0.7 | 1.0 | M | M | 2.0 | 2.2 | 2.4 | 2.9 | 2.5 | 4.0 | 4.1 | 3.1 | 2.7 | 3.1 | 3.4 | 3.6 | 2.8 | 1.8 | 4.1 |
| 20-Sep | 1.9 | 2.3 | 2.7 | 3.2 | 2.9 | 3.2 | 3.7 | 4.5 | 4.6 | 4.4 | 4.3 | 4.6 | 4.7 | 4.6 | 4.2 | 4.3 | 4.2 | 4.2 | 4.2 | 3.9 | 4.5 | 3.7 | 3.6 | 3.5 | 4.7 |
| 21-Sep | 3.4 | 3.5 | 3.4 | 3.4 | 3.2 | 2.8 | 2.8 | 2.9 | 2.9 | 2.7 | 2.6 | 3.1 | 3.2 | 2.8 | 2.7 | 3.0 | 2.8 | 2.6 | 2.3 | 1.3 | 1.2 | 0.6 | 0.5 | 0.5 | 3.5 |
| 22-Sep | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.3 | 0.5 | 0.6 | 0.7 | 0.8 | 0.7 | 1.1 | 0.8 | 0.8 | 0.6 | 1.1 | 0.9 | 0.9 | 1.1 | 1.2 | 1.8 | 1.2 | 0.9 | 1.8 |
| 23-Sep | 0.8 | 0.6 | 0.5 | 0.6 | 0.9 | 1.4 | 0.9 | 0.6 | 0.6 | 0.8 | 1.8 | 1.3 | 1.1 | 1.4 | 2.2 | 1.9 | 1.7 | 1.0 | 0.9 | 0.9 | 0.9 | 1.0 | 1.2 | 1.3 | 2.2 |
| 24-Sep | 1.8 | 1.9 | 1.7 | 1.4 | 1.2 | 1.1 | 1.0 | 0.8 | 0.7 | 1.2 | 1.4 | 2.1 | 2.0 | 2.1 | 2.0 | 1.8 | 1.8 | 1.4 | 1.3 | 1.3 | 0.9 | 1.0 | 1.3 | 1.3 | 2.1 |
| 25-Sep | 1.4 | 1.9 | 1.6 | 2.1 | 1.9 | 1.8 | 1.5 | 1.2 | 1.2 | 1.0 | 1.1 | 1.5 | 1.0 | 1.7 | 2.2 | 2.5 | 1.0 | 1.4 | 0.5 | 0.6 | 0.9 | 1.2 | 1.4 | 1.6 | 2.5 |
| 26-Sep | 1.6 | 1.5 | 1.7 | 1.3 | 1.3 | 1.5 | 1.9 | 2.1 | 1.3 | 1.1 | 1.2 | 3.3 | 3.6 | 4.1 | 3.1 | 3.4 | 2.2 | 0.8 | 0.6 | 0.4 | 0.3 | 0.9 | 0.2 | 0.4 | 4.1 |
| 27-Sep | 0.9 | 0.8 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.3 | 0.5 | 0.6 | 1.0 | 1.3 | 2.2 | 2.8 | 1.8 | 1.5 | 1.4 | 2.1 | 2.0 | 1.9 | 1.7 | 0.8 | 0.6 | 0.7 | 2.8 |
| 28-Sep | 0.7 | 0.9 | 0.7 | 2.0 | 2.4 | 1.9 | 1.4 | 1.9 | 1.9 | 2.1 | 2.2 | 2.1 | 2.4 | 2.7 | 2.2 | 1.9 | 1.7 | 1.1 | 0.6 | 0.7 | 0.9 | 0.9 | 1.4 | 1.6 | 2.7 |
| 29-Sep | 2.1 | 2.2 | 2.3 | 2.2 | 2.4 | 1.9 | 1.3 | 1.6 | 2.2 | 2.0 | 2.3 | 2.1 | 2.3 | 2.1 | 1.7 | 1.6 | 0.8 | 0.3 | 0.3 | 0.5 | 0.5 | 0.5 | 0.4 | 0.6 | 2.4 |
| 30-Sep | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.8 | 0.5 | 0.5 | 1.1 | 0.8 | 1.1 | 1.1 | 1.7 | 1.4 | 1.3 | 0.8 | 1.8 | 1.3 | 1.0 | 2.0 | 2.6 | 3.4 | 2.9 | 3.4 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 3.4 | 3.5 | 3.6 | 3.6 | 3.2 | 3.2 | 3.7 | 4.5 | 4.6 | 4.4 | 4.3 | 4.6 | 4.7 | 4.6 | 4.5 | 4.3 | 4.2 | 4.2 | 4.2 | 3.9 | 4.5 | 3.7 | 3.6 | 3.5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4 BUFFALO VIEWPOINT SEPTEMBER 2017

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

October 27, 2017

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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 685 | 35 | 35 | 100 | 13 | 0 | 3 | 0 |
| H2S (ppb) Average | 686 | 34 | 34 | 100 | 3 | 0 | 1 | 0 |
| THC (ppm) Average | 685 | 35 | 35 | 100 | 4.8 | - | 2.7 | - |
| O3(ppb) Average | 687 | 33 | 33 | 100 | 72 | 0 | 48 | - |
| NO2(ppb) Average | 684 | 35 | 36 | 99.86 | 41 | 0 | 8 | 0 |
| NO(ppb) Average | 684 | 35 | 36 | 99.86 | 39 | - | 6 | - |
| NOX(ppb) Average | 684 | 35 | 36 | 99.86 | 80 | - | 13 | - |
| PM2.5(ug/m3) Average | 717 | 2 | 3 | 99.86 | 76.2 | - | 18 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100 | 31.6 | - | 22.3 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 98 | - | 94 | - |
| Wind Speed 10 m (km/h) Average | 718 | 0 | 2 | 99.72 | 33 | - | 28 | - |
| Wind Direction 10 m (deg) Average | 718 | 0 | 2 | 99.72 | - | - | - | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 685 | 0.5 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 13 |
| H2S (ppb) Average | 686 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| THC (ppm) Average | 685 | 2.31 | 0.2 | - | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.5 | 4.8 |
| O3(ppb) Average | 687 | 24.8 | 11 | - | 3 | 12 | 18 | 24 | 31 | 36 | 72 |
| NO2(ppb) Average | 684 | 2.9 | 4 | - | 0 | 0 | 1 | 2 | 3 | 8 | 41 |
| NO(ppb) Average | 684 | 0.9 | 3 | - | 0 | 0 | 0 | 0 | 1 | 1 | 39 |
| NOX(ppb) Average | 684 | 3.8 | 6 | - | 0 | 0 | 1 | 2 | 4 | 9 | 80 |
| PM2.5(ug/m3) Average | 717 | 5.96 | 7.4 | - | 0.2 | 1.5 | 2.1 | 3.5 | 6.8 | 13 | 76.2 |
| Temperature 2 m (C) Average | 720 | 12.27 | 6.1 | - | -2.1 | 4.6 | 7.5 | 11.9 | 16.3 | 20.7 | 31.6 |
| Relative Humidity (%) Average | 720 | 67.6 | 20 | - | 23 | 37 | 53 | 70 | 83 | 95 | 98 |
| Wind Speed 10 m (km/h) Average | 684 | 10.8 | 7 | - | 0 | 4 | 6 | 9 | 14 | 20 | 33 |
| Wind Direction 10 m (deg) Average | 684 | 0 | 0 | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|---|
| NO2, NO, NOX | 06 Sep 2017 11:00 | 06 Sep 2017 11:00 | 1 | Maintenance - Station operator on site |
| PM2.5 | 26 Sep 2017 15:00 | 26 Sep 2017 15:00 | 1 | Unstable operation - excessive baseline drift |
| Wind Speed, Wind Direction | 09 Sep 2017 03:00 | 09 Sep 2017 03:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 28 Sep 2017 05:00 | 28 Sep 2017 05:00 | 1 | Flat line in sensor output signal |



| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 13 ppb on Sep 19 23:00 | Maximum Daily Average: 3.3 ppb on Sep 6 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 1 17:00 | Minimum Daily Average: 0.0 ppb on Sep 2 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 1.1 ppb at hour 16 | Minimum Diurnal Average: 0.1 ppb at hour 5 | | Hours of Calibration: | 35 |
| Monthly Average: 0.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 8 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 1 | 0 | 0.5 | 4 |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 4 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 3 | 12 | 10 | 6 | 11 | 10 | 8 | 5 | 1 | 2 | 1 | 3.3 | 12 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.6 | 2 |
| 8-Sep | 1 | 0 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 4 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.8 | 4 |
| 10-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 11-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0.2 | 2 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 4 | 5 | 3 | 1 | 5 | 1 | 1 | 0 | 1 | 2 | 5 | 2 | 6 | 5 | 3 | 1 | 1 | 0 | 2.1 | 6 |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 0 | 1.0 | 5 |
| 15-Sep | 0 | 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-Sep | Z | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 18-Sep | 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 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 8 | 2 | 1 | 0 | 0 | 1 | 12 | 13 | 1 | 0 | 2.0 | 13 |
| 20-Sep | 0 | 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-Sep | 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 |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 23-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 25-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 26-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 7 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 7 |
| 28-Sep | Z | 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 |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |

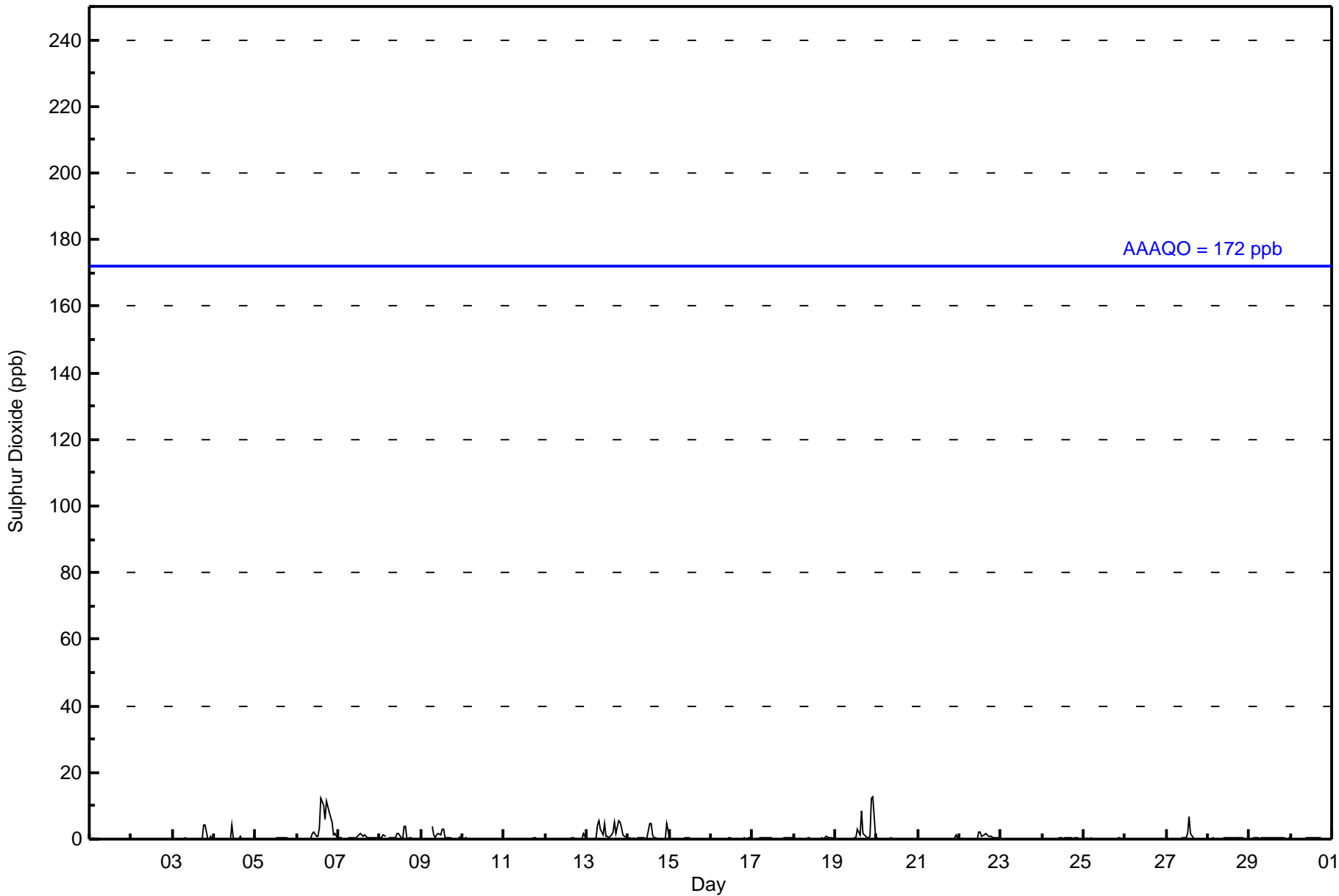
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.4 | 0.4 | 0.3 | 0.3 | 0.7 | 0.4 | 0.6 | 0.9 | 0.9 | 1.1 | 0.7 | 0.7 | 0.8 | 0.7 | 0.5 | 0.6 | 0.9 | 0.3 | Diurnal Average | |
| 1 | 1 | 1 | 1 | 0 | 0 | 4 | 5 | 3 | 2 | 5 | 2 | 5 | 7 | 12 | 10 | 6 | 11 | 10 | 8 | 5 | 12 | 13 | 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
Buffalo Viewpoint - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 681 | 99.42 | 99.42 |
| 11 - 20 | 4 | 0.58 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 50 | 52 | 17 | 18 | 6 | 4 | 25 | 161 | 82 | 33 | 20 | 44 | 77 | 38 | 36 | 16 | 679 |
| 11 - 20 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 52 | 52 | 17 | 19 | 7 | 4 | 25 | 161 | 82 | 33 | 20 | 44 | 77 | 38 | 36 | 16 | 683 |

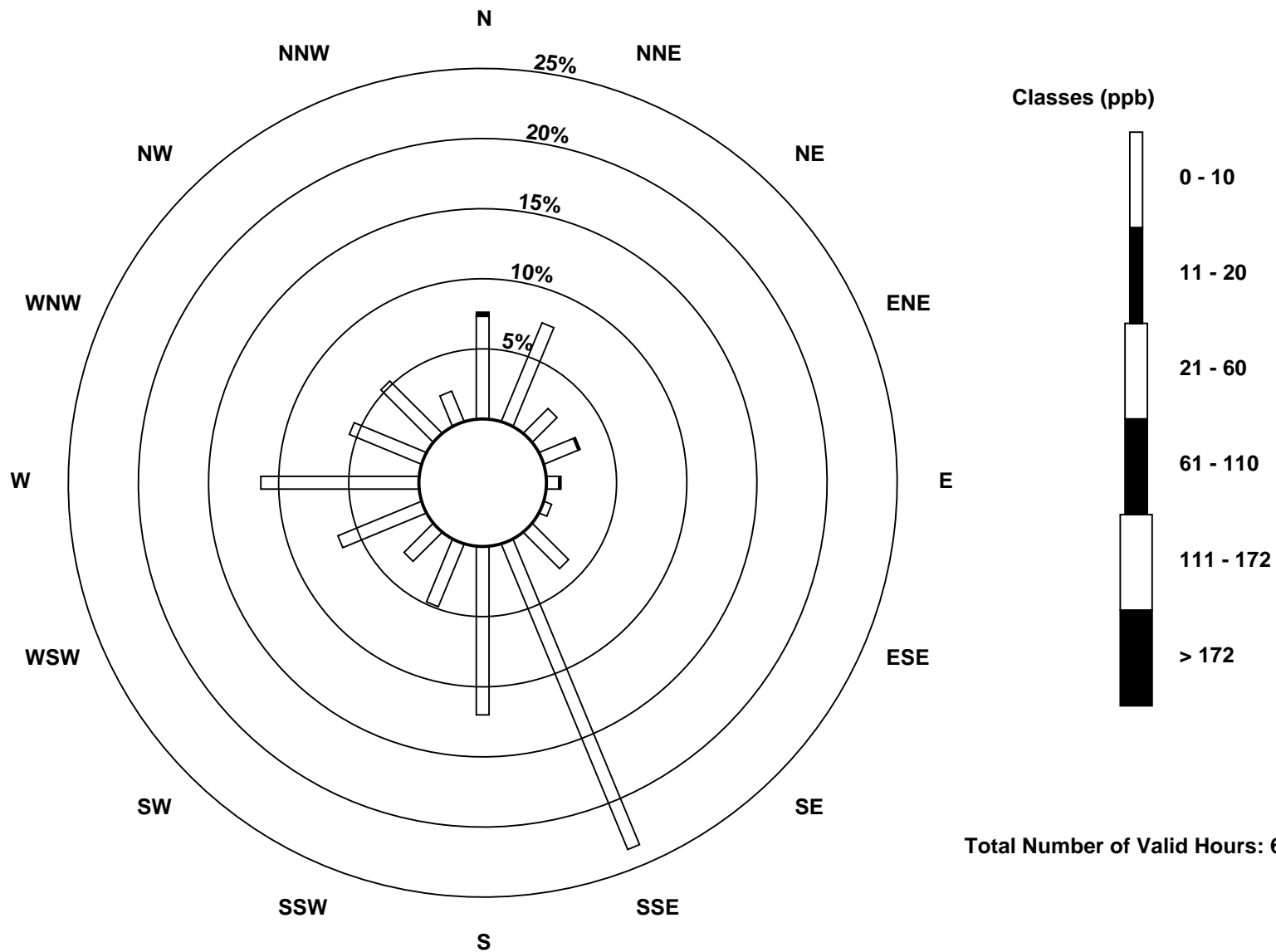
Total Number of Valid Hours: 683

Total Number of Hours: 720

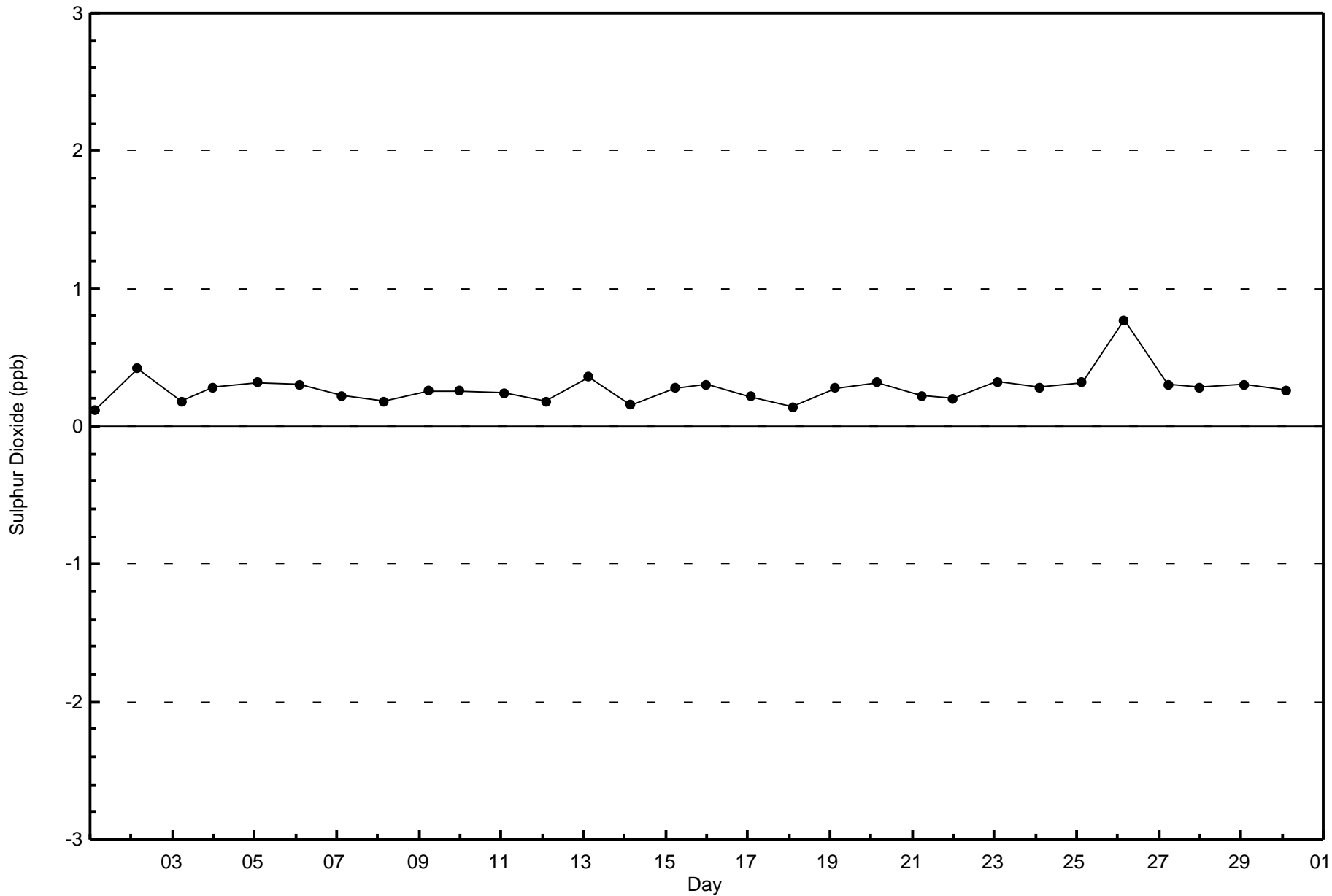


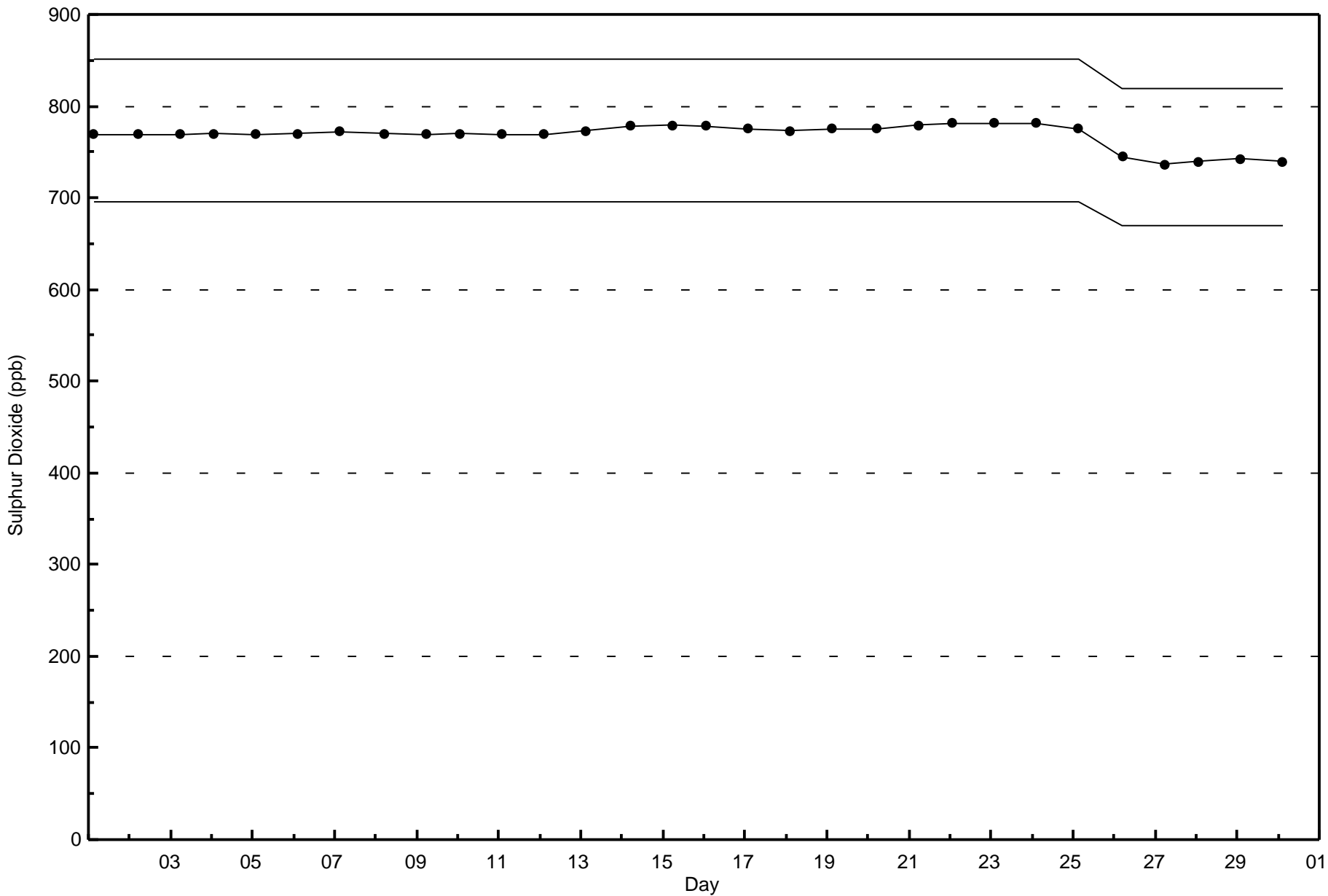
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 683







| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 3 ppb on Sep 9 06:00 | Maximum Daily Average: 0.7 ppb on Sep 9 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 1 03:00 | Minimum Daily Average: 0.0 ppb on Sep 1 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 0.3 ppb at hour 6 | Minimum Diurnal Average: 0.1 ppb at hour 17 | | Hours of Calibration: | 34 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | 0 | 0 | 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-Sep | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 6-Sep | 0 | 0 | 0 | Z | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 7-Sep | 0 | 0 | 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-Sep | 0 | 0 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 9-Sep | 0 | 1 | 1 | 1 | 0 | 3 | Z | 2 | 1 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 12-Sep | 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 | 1 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.5 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 |
| 15-Sep | 1 | 1 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 16-Sep | 0 | Z | 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-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 19-Sep | 0 | 0 | 0 | 1 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.4 | 1 |
| 20-Sep | 0 | 0 | 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-Sep | 0 | 0 | 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-Sep | 0 | Z | 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-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 25-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 28-Sep | 0 | Z | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 29-Sep | 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 | 0.3 | 1 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |

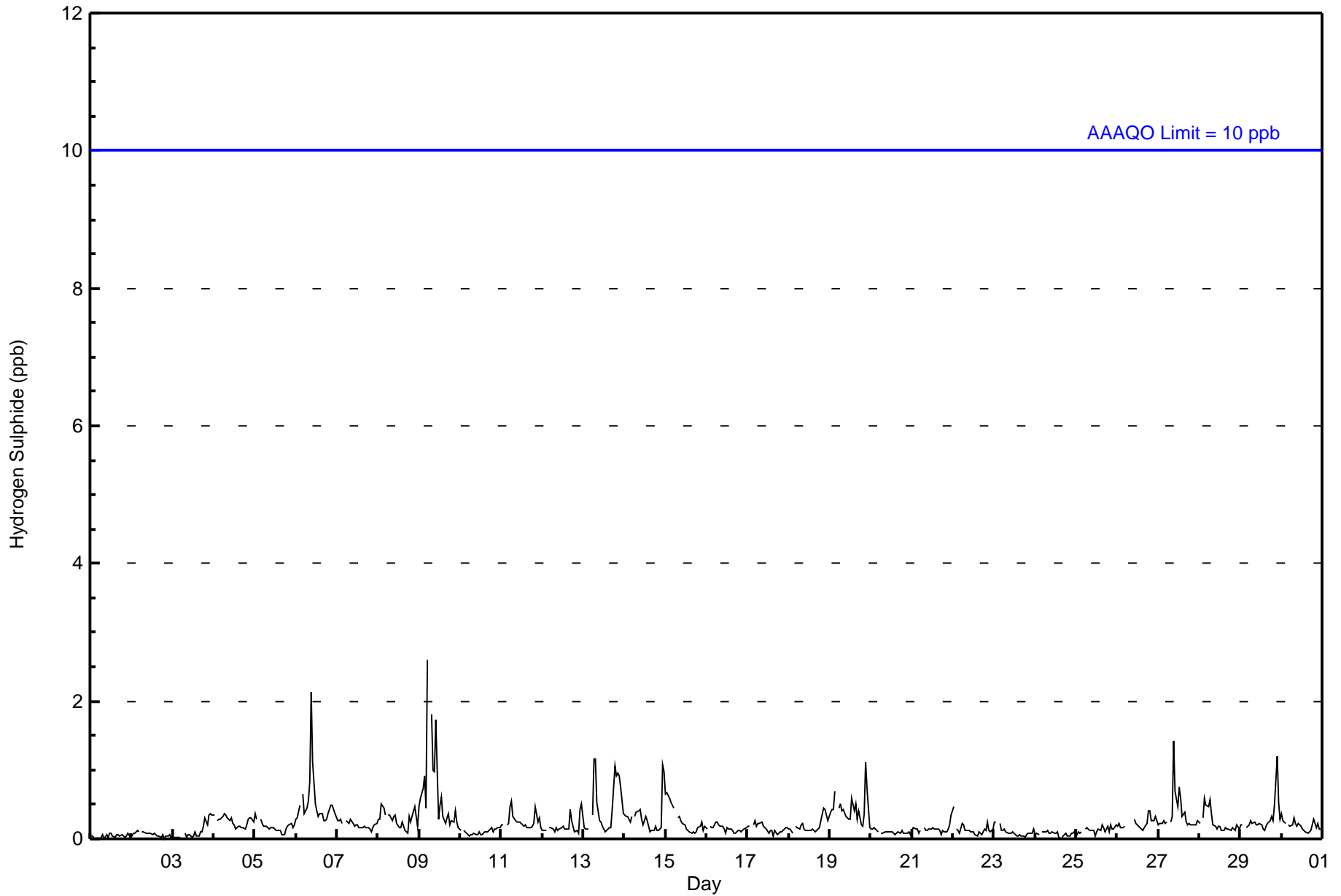
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | Diurnal Average | |
| 1 | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 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
Buffalo Viewpoint - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 685 | 99.85 | 99.85 |
| 3 - 4 | 1 | 0.15 | 100.00 |
| 5 - 7 | 0 | 0.00 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



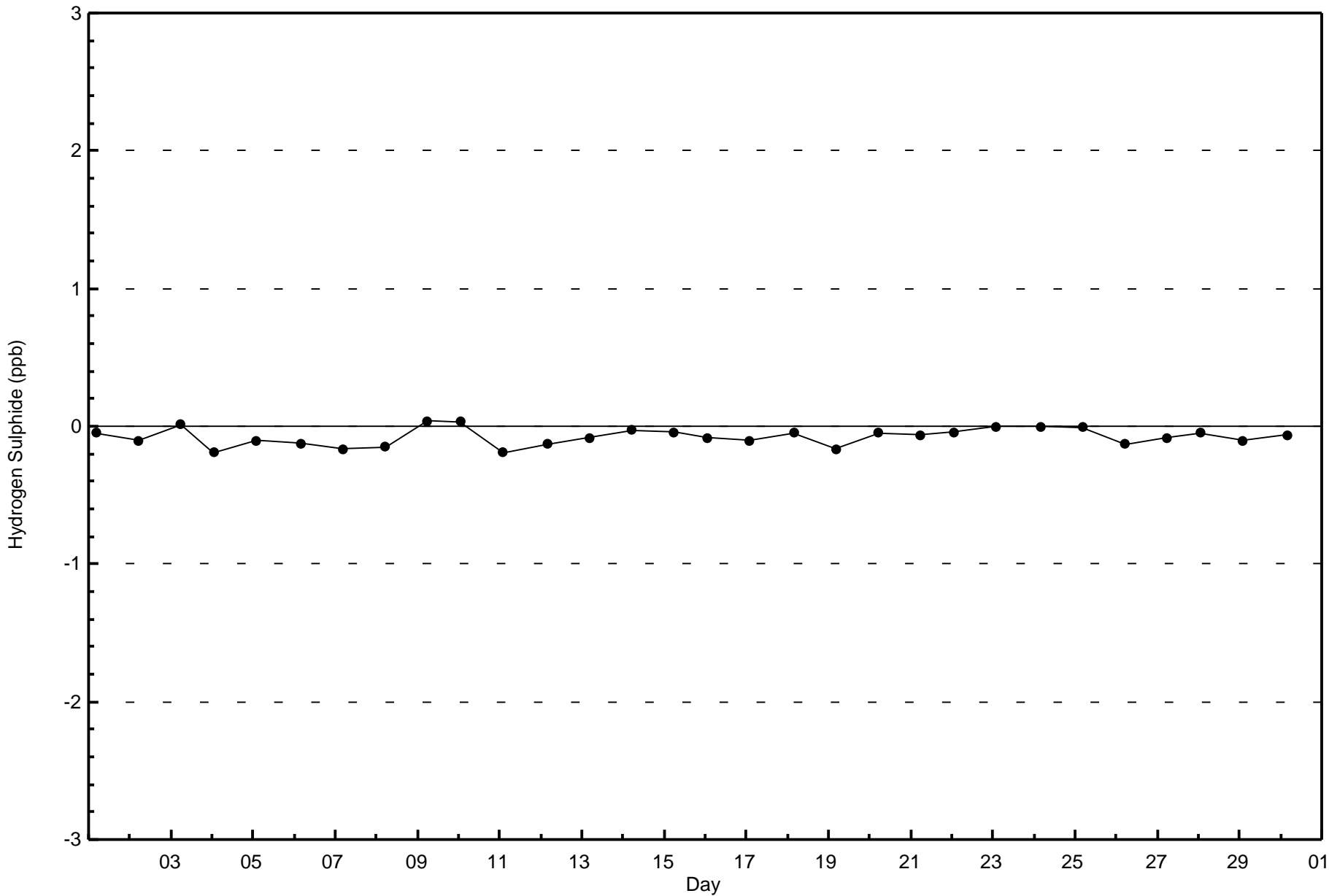
**Wood Buffalo Environmental Association
Frequency Distribution**

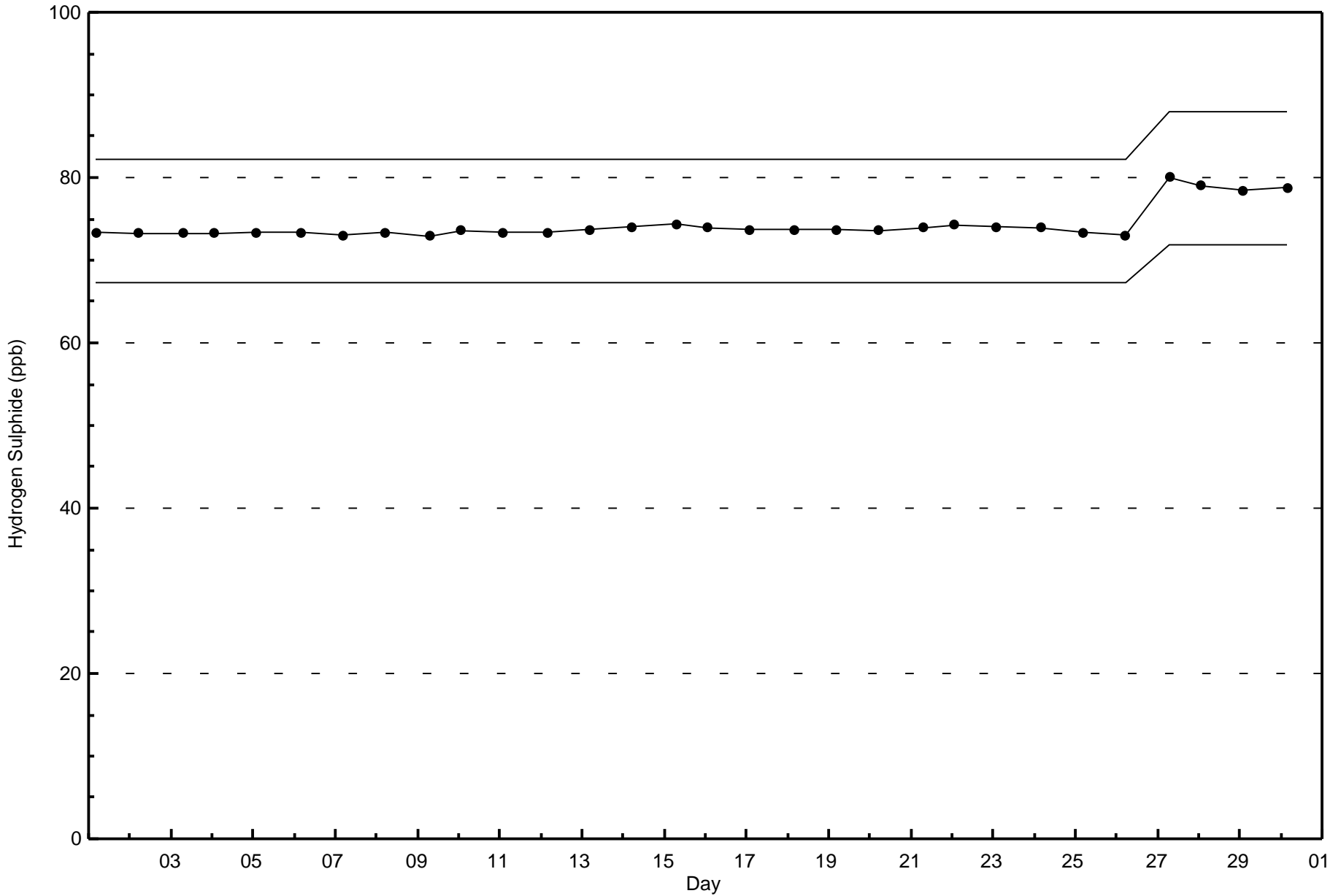
**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 54 | 51 | 16 | 21 | 7 | 4 | 27 | 164 | 83 | 30 | 19 | 42 | 73 | 38 | 38 | 16 | 683 |
| 3 - 4 | 0 | 0 | 0 | 1 | 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 | 54 | 51 | 16 | 22 | 7 | 4 | 27 | 164 | 83 | 30 | 19 | 42 | 73 | 38 | 38 | 16 | 684 |

Total Number of Valid Hours: 684

Total Number of Hours: 720

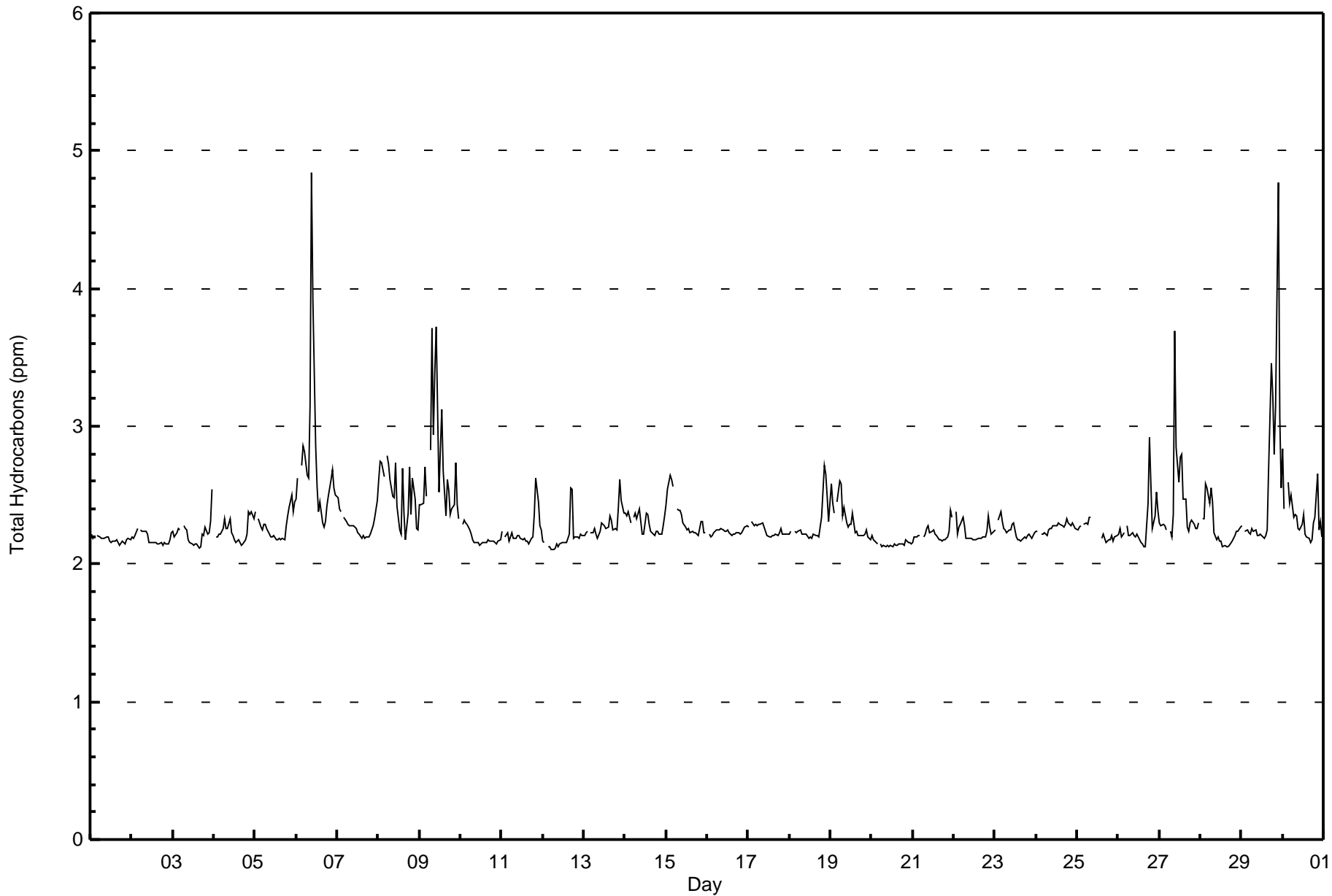






Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 0 | 0.00 | 0.00 |
| 2.1 - 3.0 | 672 | 98.10 | 98.10 |
| 3.1 - 10.0 | 13 | 1.90 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.1 - 3.0 | 48 | 52 | 17 | 19 | 7 | 4 | 25 | 158 | 82 | 32 | 20 | 44 | 77 | 36 | 36 | 13 | 670 |
| 3.1 - 10.0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 3 | 13 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 52 | 52 | 17 | 19 | 7 | 4 | 25 | 161 | 82 | 33 | 20 | 44 | 77 | 38 | 36 | 16 | 683 |

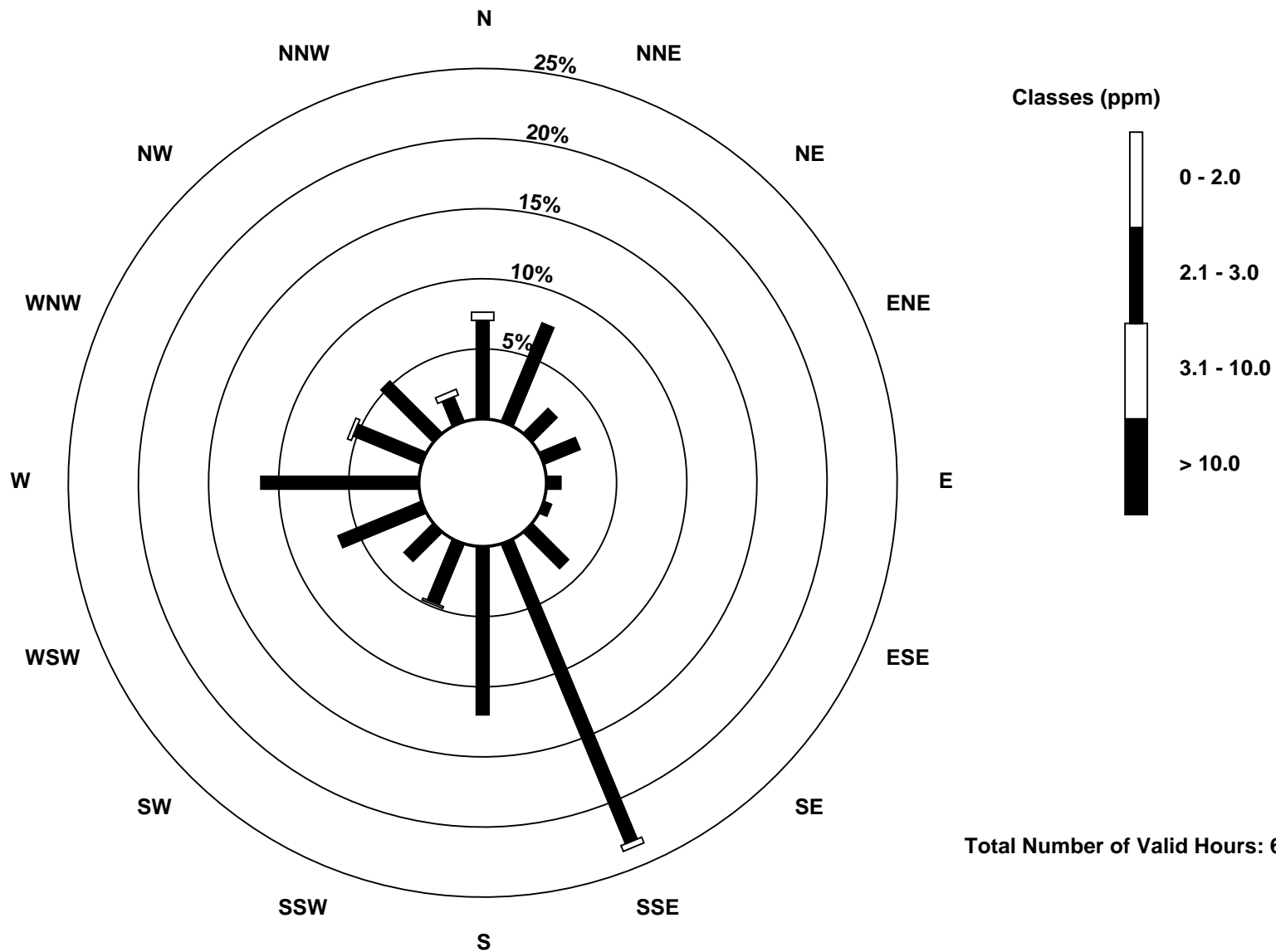
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

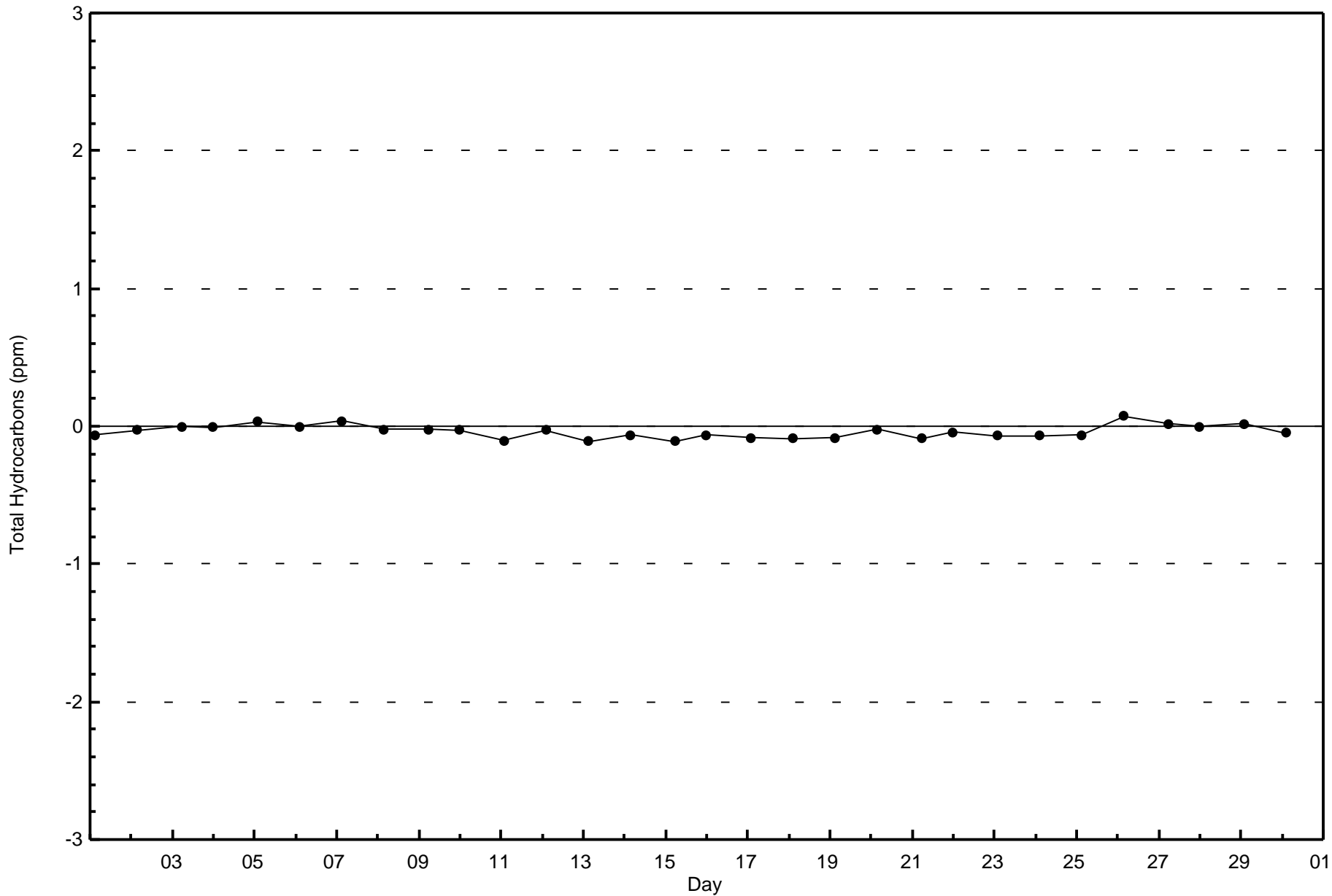


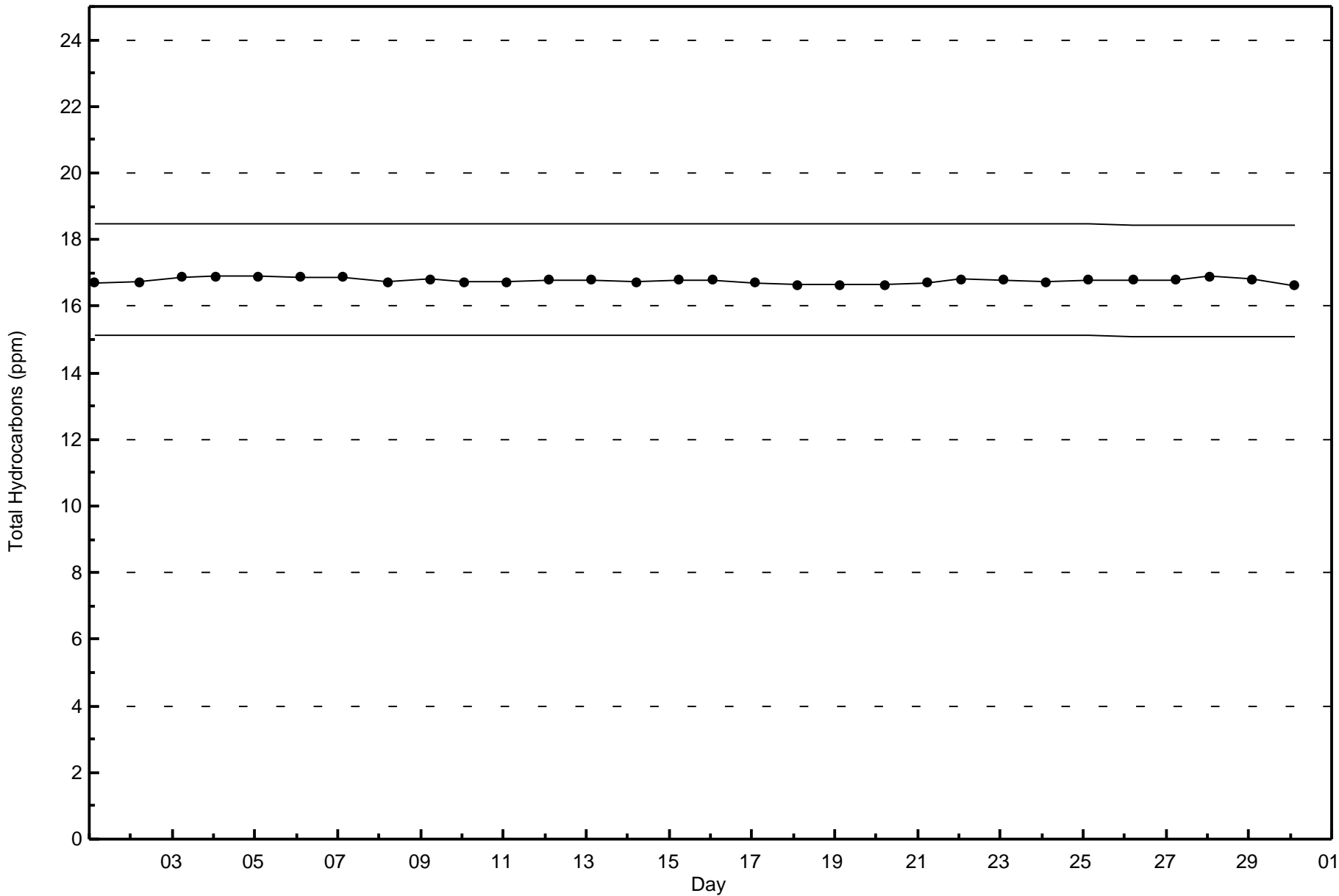
Total Number of Valid Hours: 683



Wood Buffalo Environmental Association
Zero Responses

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





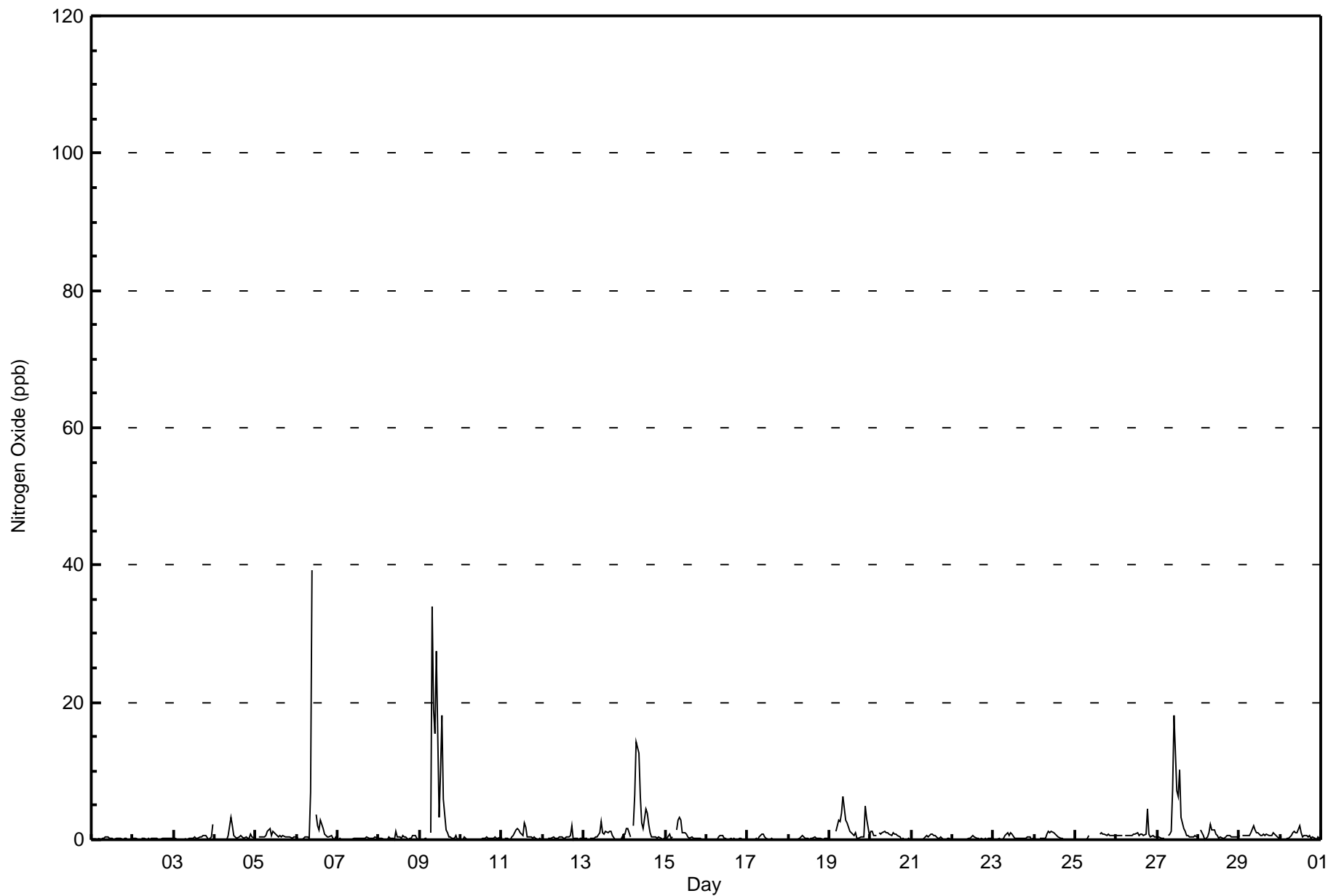


| Maximum Value: 39 ppb on Sep 6 10:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 6.0 ppb on Sep 9 | | | | | | | Hours in Service: 720 | | |
|--|-------------------------------|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|---------------------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 2 16:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 16 | | | | | | | Hours of Data: 684 | | |
| Maximum Diurnal Average: 3.2 ppb at hour 10 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.2 ppb at hour 5 | | | | | | | Hours of Missing Data: 36 | | |
| Monthly Average: 0.9 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 15 | | | | | | | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 0.3 | 2 |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.5 | 3 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 7 | 39 | M | 4 | 2 | 1 | 3 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2.9 | 39 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 8-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.3 | 1 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 34 | 19 | 15 | 28 | 3 | 10 | 18 | 6 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 6.0 | 34 |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.6 | 3 |
| 14-Sep | 1 | 2 | 2 | 0 | Z | 2 | 6 | 14 | 13 | 6 | 2 | 5 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 14 |
| 15-Sep | 0 | 0 | 1 | 0 | 0 | Z | 1 | 3 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |
| 16-Sep | 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 |
| 17-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 19-Sep | 0 | 0 | 0 | Z | 1 | 3 | 3 | 4 | 6 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 1 | 1.7 | 6 |
| 20-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 1 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 23-Sep | 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 |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 25-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | C | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.4 | 1 |
| 26-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 1 | 0 | 1 | 0 | 0 | 0.8 | 5 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 7 | 18 | 7 | 6 | 10 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 2.7 | 18 |
| 28-Sep | Z | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0.7 | 2 |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.7 | 2 |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Buffalo Viewpoint - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 681 | 99.56 | 99.56 |
| 21 - 40 | 3 | 0.44 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 51 | 52 | 17 | 19 | 7 | 4 | 25 | 161 | 82 | 33 | 20 | 44 | 77 | 37 | 36 | 14 | 679 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 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 | 51 | 52 | 17 | 19 | 7 | 4 | 25 | 161 | 82 | 33 | 20 | 44 | 77 | 38 | 36 | 16 | 682 |

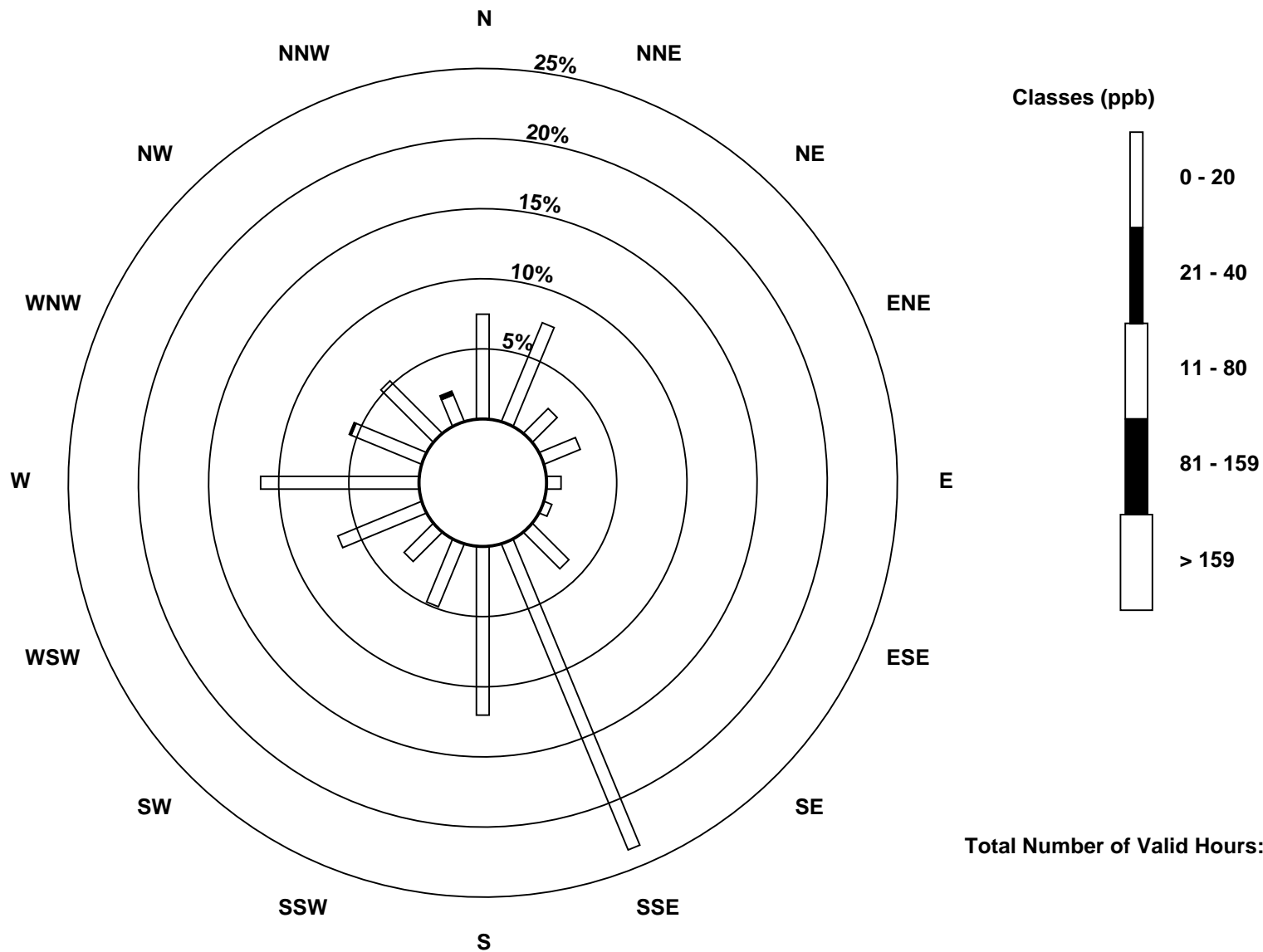
Total Number of Valid Hours: 682

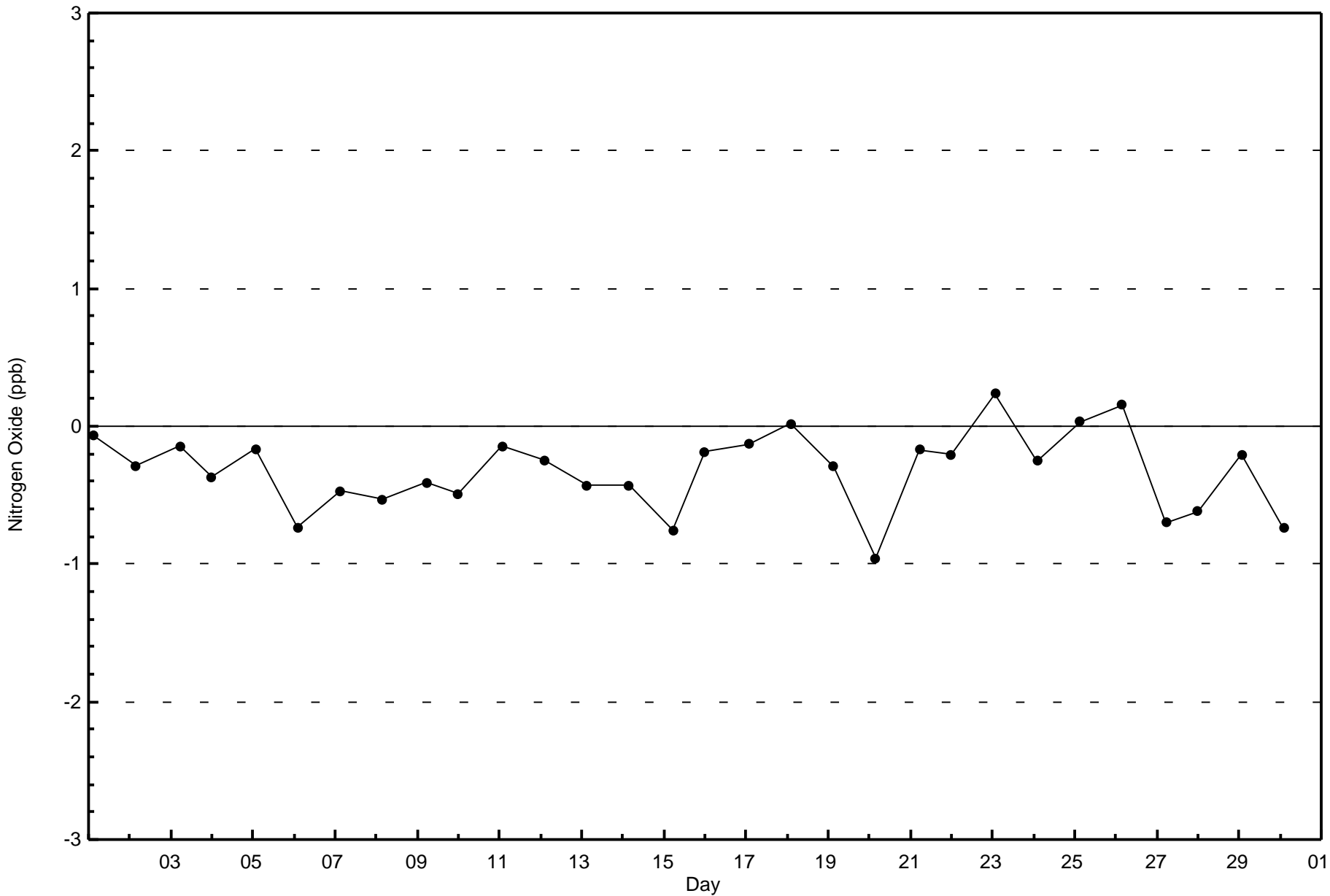
Total Number of Hours: 720

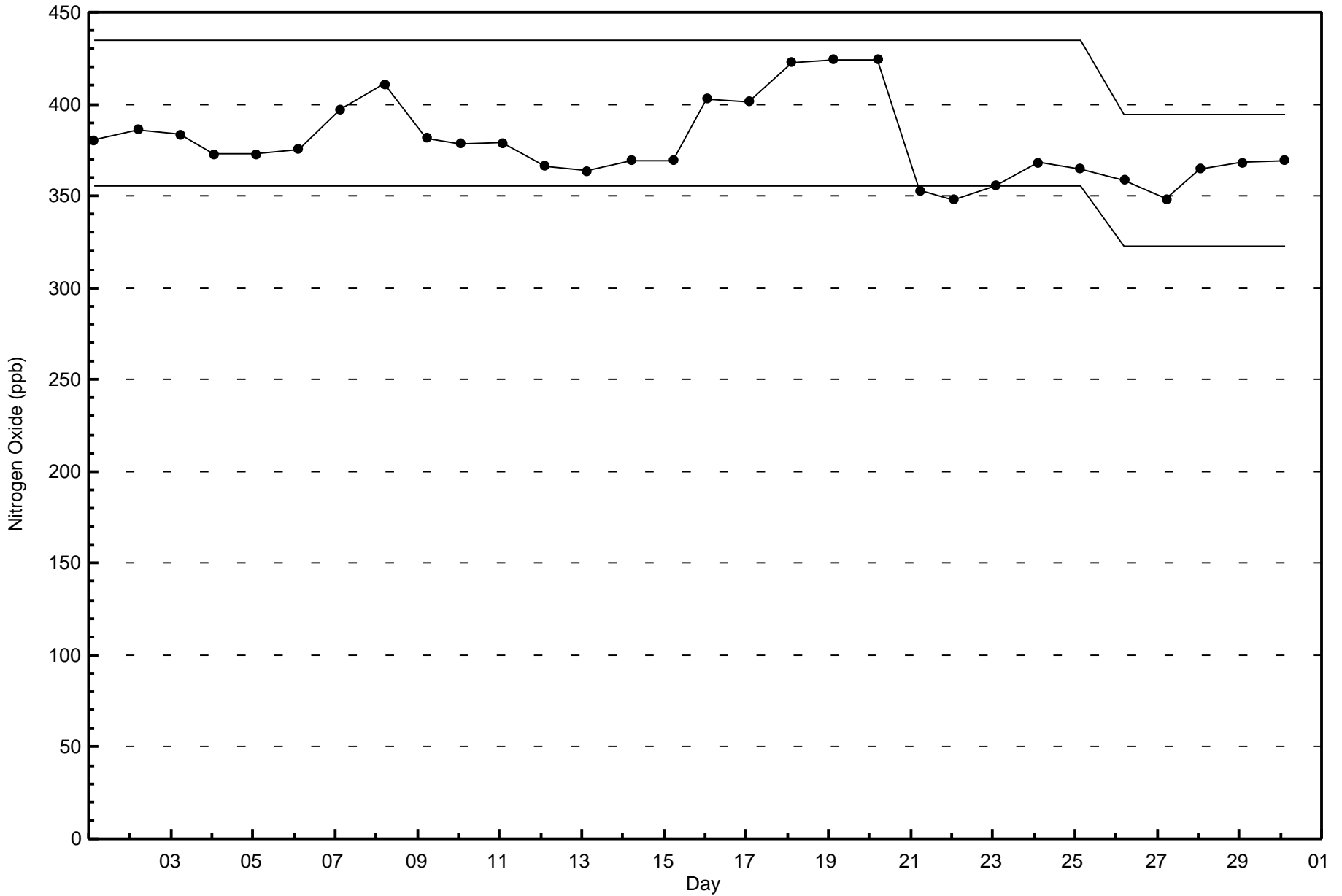


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Buffalo Viewpoint - September 2017

| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 41 ppb on Sep 6 10:00 | Maximum Daily Average: 7.6 ppb on Sep 19 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 3 08:00 | Minimum Daily Average: 0.2 ppb on Sep 10 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 4.4 ppb at hour 22 | Minimum Diurnal Average: 1.7 ppb at hour 17 | | Hours of Calibration: | 35 |
| Monthly Average: 2.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 3 P ₉₀ = 8 P ₉₉ = 18 | | Percent Operational Time: | 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 2-Sep | 0 | 1 | 1 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 6 | 8 | 6 | 9 | 22 | 2.5 | 22 |
| 4-Sep | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 3 | 2 | 1.1 | 6 |
| 5-Sep | 4 | Z | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 4 | 2 | 1 | 1.3 | 4 |
| 6-Sep | 1 | 2 | Z | 5 | 4 | 1 | 2 | 1 | 12 | 41 | M | 13 | 8 | 5 | 11 | 7 | 4 | 7 | 5 | 12 | 14 | 4 | 4 | 5 | 7.6 | 41 |
| 7-Sep | 3 | 2 | 2 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.9 | 3 |
| 8-Sep | 2 | 1 | 3 | 2 | Z | 2 | 4 | 6 | 1 | 2 | 9 | 4 | 3 | 3 | 7 | 5 | 4 | 3 | 4 | 3 | 13 | 12 | 3 | 2 | 4.2 | 13 |
| 9-Sep | 1 | 1 | 2 | 2 | 1 | Z | 9 | 10 | 9 | 11 | 17 | 7 | 15 | 22 | 15 | 6 | 10 | 4 | 3 | 5 | 4 | 10 | 4 | 2 | 7.4 | 22 |
| 10-Sep | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 4 | 3 | 2 | 1 | 6 | 4 | 1 | 0 | 1 | 2 | 4 | 6 | 3 | 1 | 0 | 2.0 | 6 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 2 | 2 | 2 | 1 | 1 | 1 | 1.0 | 9 |
| 13-Sep | 2 | 6 | 3 | Z | 3 | 3 | 4 | 3 | 2 | 4 | 7 | 4 | 4 | 4 | 6 | 9 | 8 | 5 | 7 | 7 | 5 | 4 | 5 | 10 | 4.9 | 10 |
| 14-Sep | 10 | 13 | 11 | 8 | Z | 8 | 8 | 8 | 10 | 10 | 5 | 5 | 7 | 7 | 5 | 3 | 2 | 2 | 6 | 5 | 2 | 3 | 5 | 3 | 6.3 | 13 |
| 15-Sep | 3 | 3 | 3 | 2 | 3 | Z | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 4 | 1 | 2 | 2.2 | 4 |
| 16-Sep | Z | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 1.8 | 3 |
| 17-Sep | 2 | Z | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 3 |
| 18-Sep | 2 | 2 | Z | 2 | 3 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 10 | 18 | 16 | 24 | 19 | 18 | 6.1 | 24 |
| 19-Sep | 16 | 9 | 5 | Z | 12 | 18 | 16 | 13 | 12 | 7 | 6 | 4 | 4 | 6 | 3 | 9 | 2 | 2 | 1 | 1 | 2 | 16 | 11 | 1 | 7.6 | 18 |
| 20-Sep | 3 | 4 | 3 | 1 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.7 | 4 |
| 21-Sep | 2 | 5 | 5 | 5 | 3 | Z | 2 | 3 | 4 | 3 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 5 | 14 | 7 | 3.3 | 14 |
| 22-Sep | Z | 8 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 3 | 8 | 2 | 2 | 2 | 3 | 2.2 | 8 |
| 23-Sep | 2 | Z | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 2.1 | 4 |
| 24-Sep | 3 | 2 | Z | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 3 | 2 | 2 | 2 | 2.2 | 4 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 3 | 3 | 3 | 3 | C | C | C | C | C | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 3 | 1.4 | 3 |
| 26-Sep | 2 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 23 | 12 | 1 | 3 | 8 | 2 | 2.4 | 23 |
| 27-Sep | 1 | 1 | 1 | 2 | 1 | Z | 2 | 2 | 1 | 12 | 15 | 10 | 12 | 15 | 8 | 6 | 4 | 1 | 2 | 3 | 4 | 6 | 4 | 7 | 5.1 | 15 |
| 28-Sep | Z | 12 | 12 | 10 | 8 | 7 | 6 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2.7 | 12 |
| 29-Sep | 0 | Z | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 14 | 3 | 5 | 8 | 4 | 2 | 2.4 | 14 |
| 30-Sep | 2 | 1 | Z | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 11 | 1 | 2 | 0 | 1.5 | 11 |

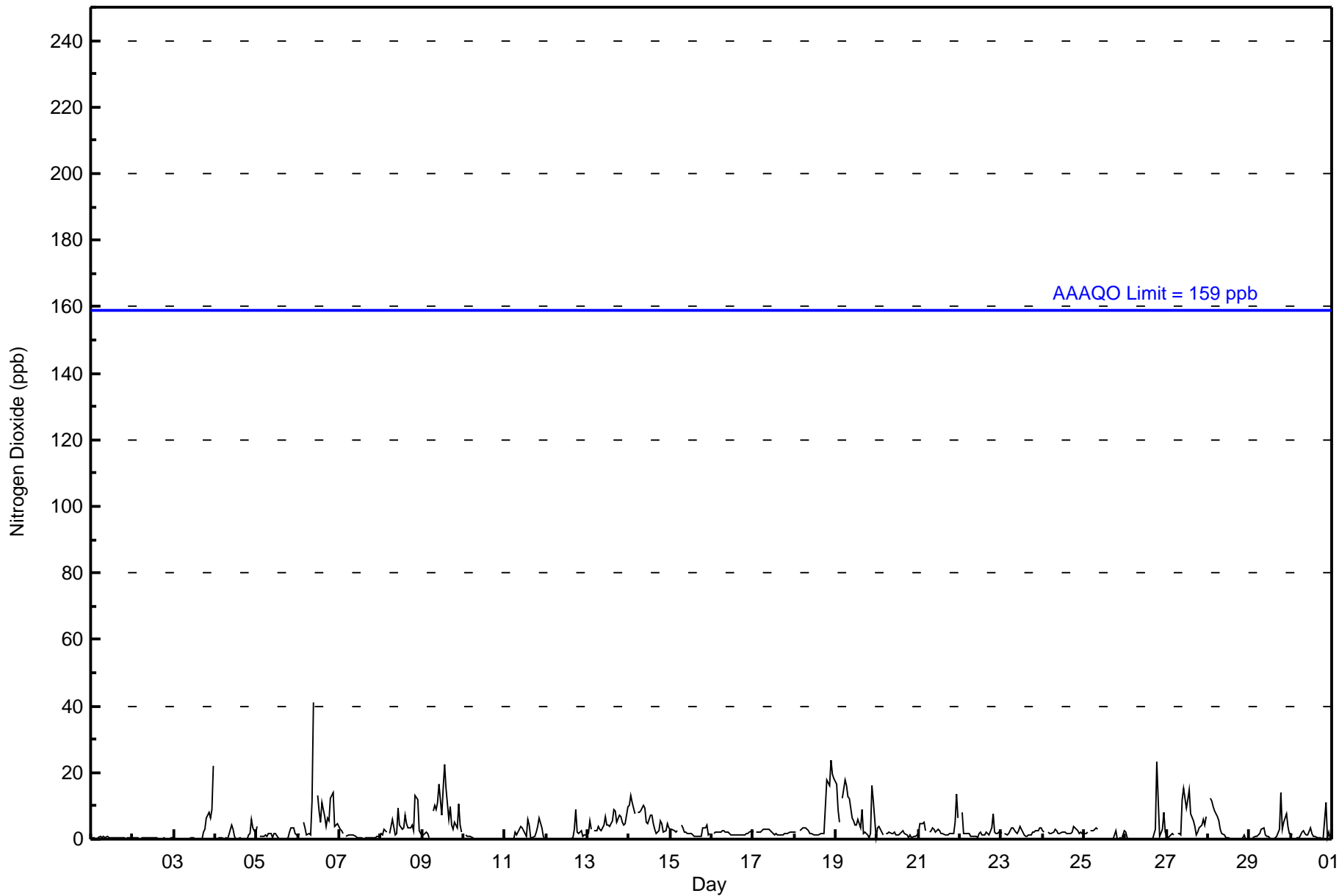
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 2.5 | 3.1 | 2.5 | 2.1 | 2.1 | 2.5 | 2.9 | 2.8 | 2.9 | 4.1 | 3.1 | 2.7 | 2.6 | 2.9 | 2.5 | 2.0 | 1.7 | 1.9 | 3.4 | 3.6 | 3.9 | 4.4 | 3.8 | 3.4 | Diurnal Average |
| 16 | 13 | 12 | 10 | 12 | 18 | 16 | 13 | 12 | 41 | 17 | 13 | 15 | 22 | 15 | 9 | 10 | 9 | 23 | 18 | 16 | 24 | 19 | 22 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 679 | 99.27 | 99.27 |
| 21 - 40 | 4 | 0.58 | 99.85 |
| 41 - 80 | 1 | 0.15 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 50 | 52 | 17 | 19 | 7 | 4 | 24 | 161 | 82 | 33 | 20 | 44 | 77 | 37 | 34 | 16 | 677 |
| 21 - 40 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 |
| 41 - 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 | 51 | 52 | 17 | 19 | 7 | 4 | 25 | 161 | 82 | 33 | 20 | 44 | 77 | 38 | 36 | 16 | 682 |

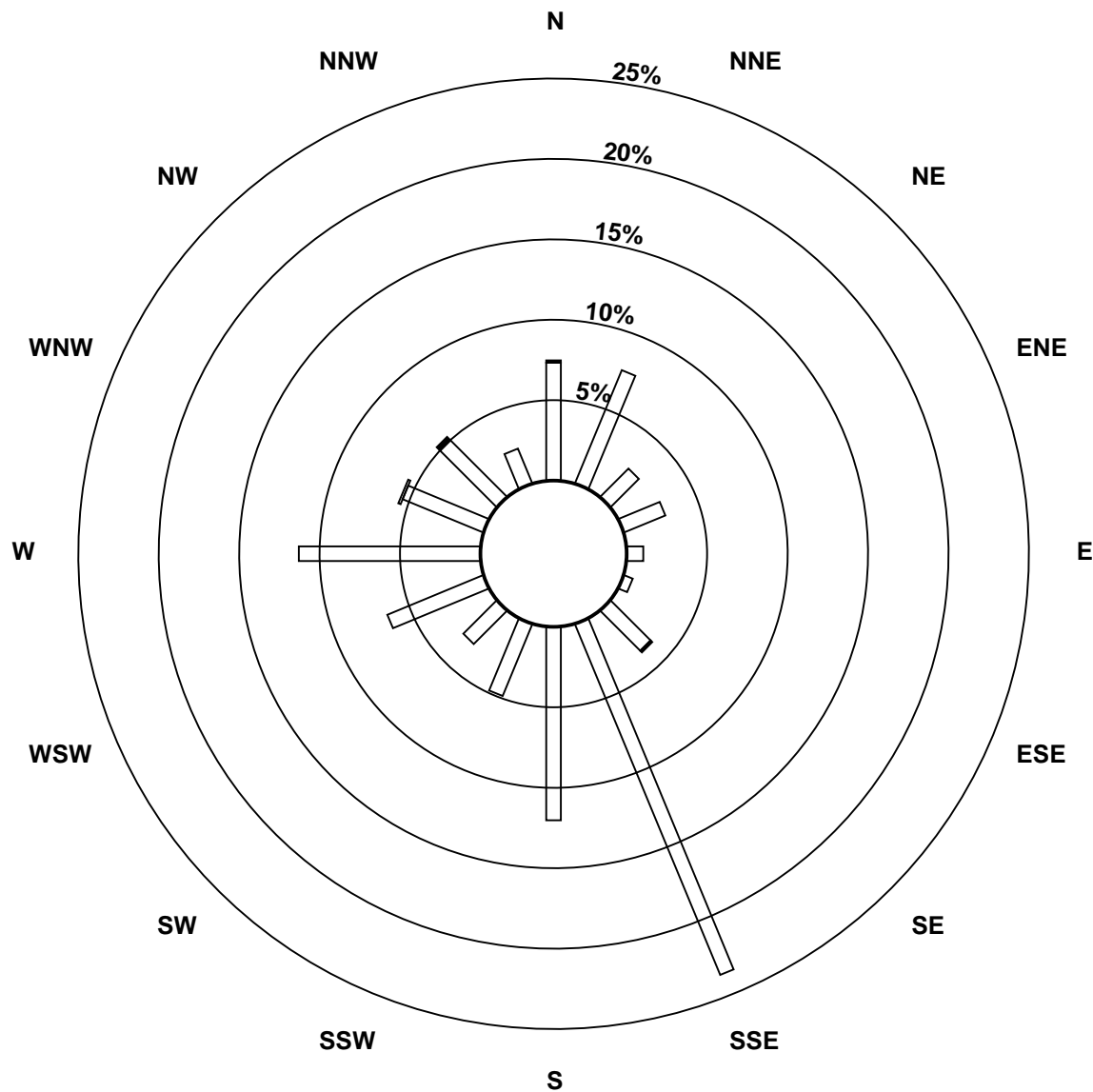
Total Number of Valid Hours: 682

Total Number of Hours: 720

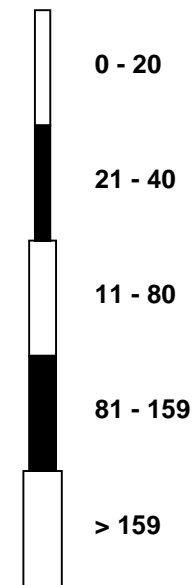


Wood Buffalo Environmental Association
Wind Rose Sep 2017

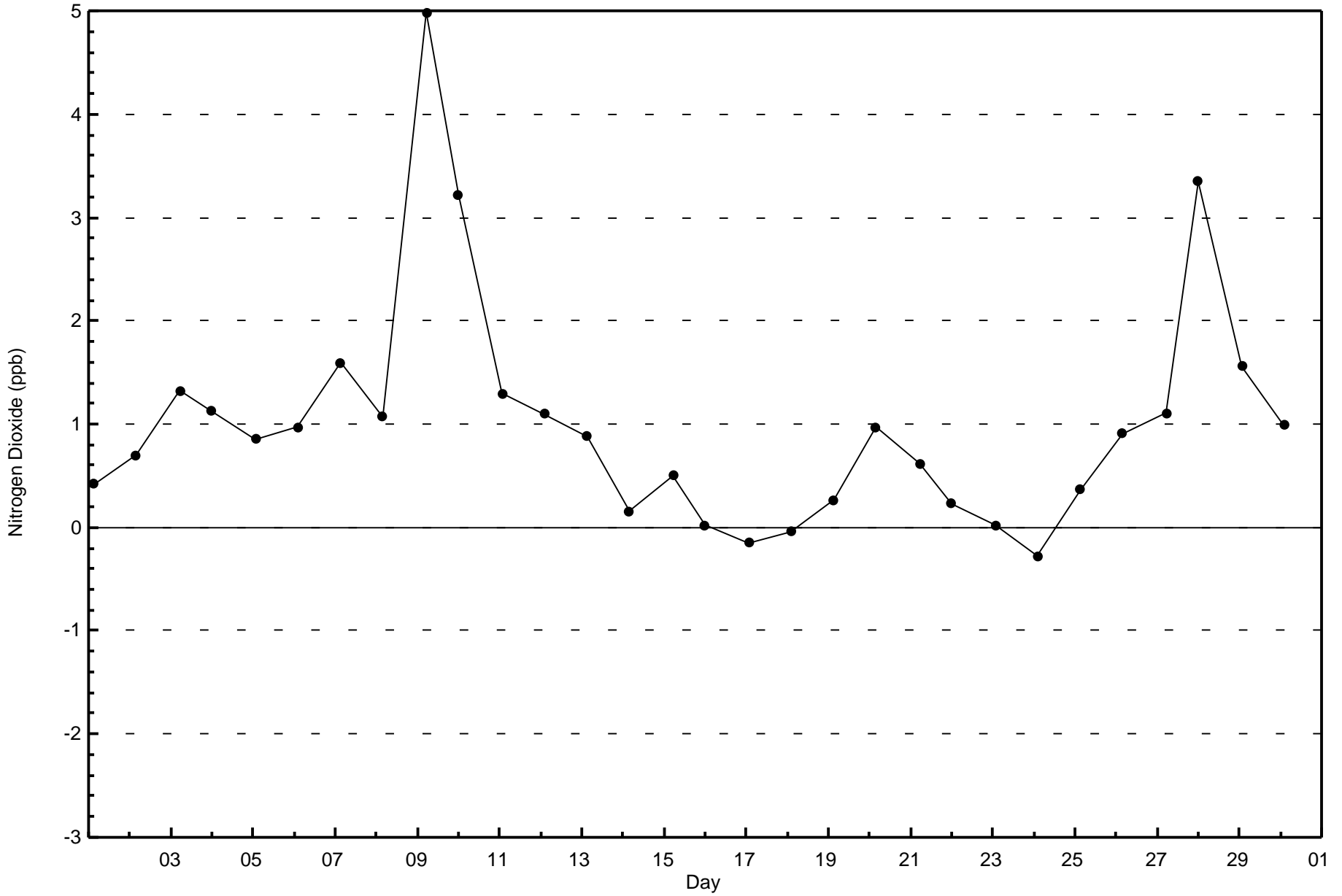
Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint (AMS 4)

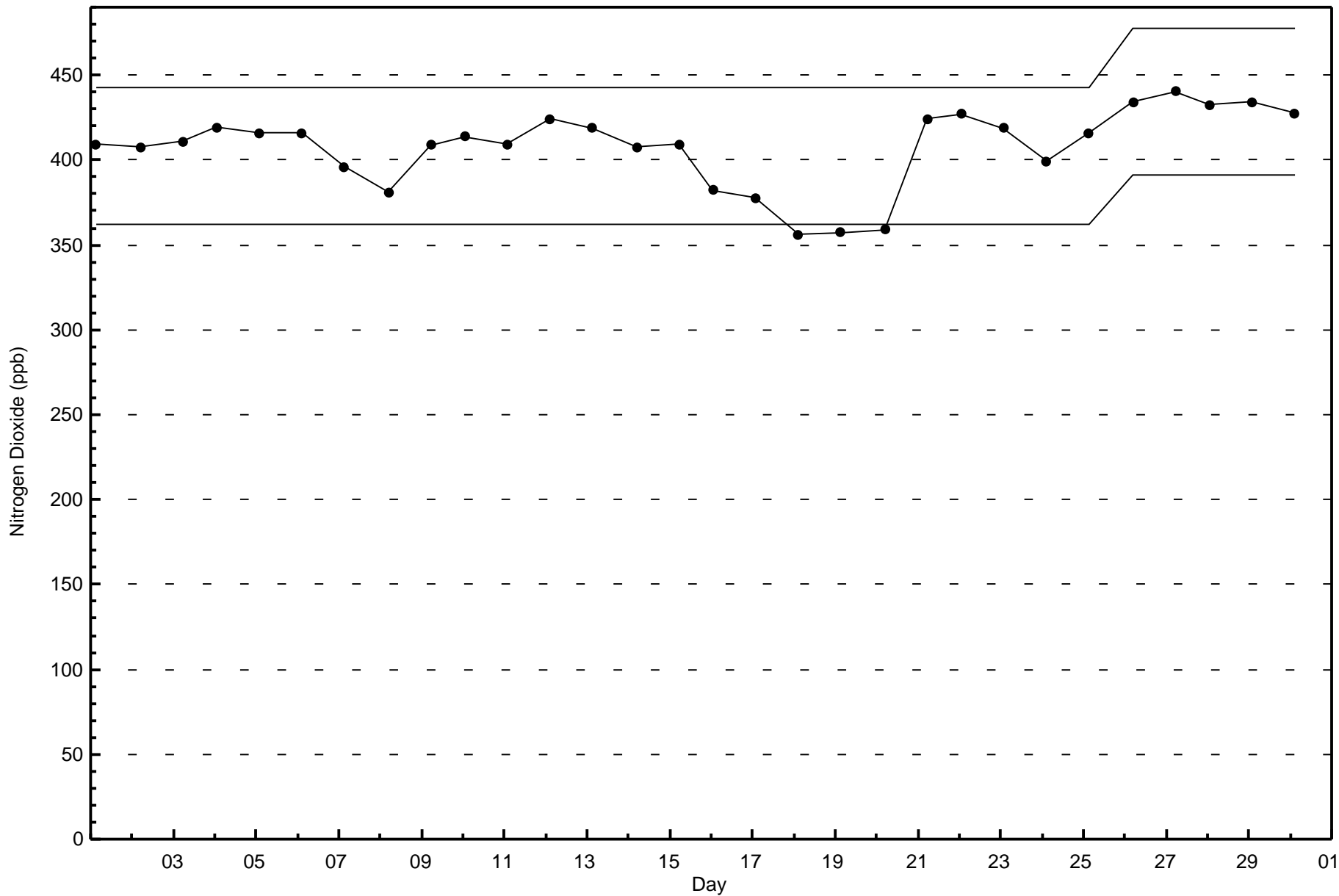


Classes (ppb)



Total Number of Valid Hours: 682







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Buffalo Viewpoint - September 2017

| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 80 ppb on Sep 6 10:00 | Maximum Daily Average: 13.4 ppb on Sep 9 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 3 08:00 | Minimum Daily Average: 0.3 ppb on Sep 10 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 7.2 ppb at hour 10 | Minimum Diurnal Average: 2.2 ppb at hour 17 | | Hours of Calibration: | 35 |
| Monthly Average: 3.8 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 4 P ₉₀ = 9 P ₉₉ = 27 | | Percent Operational Time: | 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.6 | 1 |
| 2-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0.5 | 1 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 7 | 8 | 7 | 9 | 24 | 2.9 | 24 |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 5 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 2 | 7 | 4 | 2 | 1.6 | 8 |
| 5-Sep | 4 | Z | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 4 | 2 | 2 | 1.9 | 4 |
| 6-Sep | 1 | 2 | Z | 5 | 4 | 2 | 2 | 1 | 19 | 80 | M | 17 | 10 | 7 | 14 | 8 | 4 | 7 | 6 | 13 | 14 | 4 | 4 | 5 | 10.5 | 80 |
| 7-Sep | 3 | 3 | 2 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1.0 | 3 |
| 8-Sep | 2 | 1 | 3 | 2 | Z | 2 | 4 | 6 | 1 | 2 | 10 | 5 | 3 | 3 | 8 | 5 | 4 | 3 | 5 | 3 | 14 | 12 | 3 | 2 | 4.5 | 14 |
| 9-Sep | 1 | 1 | 2 | 2 | 1 | Z | 10 | 44 | 28 | 26 | 44 | 11 | 25 | 41 | 21 | 8 | 11 | 5 | 3 | 5 | 4 | 11 | 4 | 3 | 13.4 | 44 |
| 10-Sep | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 3 | 2 | 4 | 6 | 4 | 3 | 1 | 8 | 6 | 1 | 1 | 1 | 2 | 4 | 6 | 3 | 1 | 0 | 2.6 | 8 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 11 | 2 | 2 | 3 | 1 | 2 | 1 | 1.3 | 11 |
| 13-Sep | 2 | 6 | 3 | Z | 3 | 3 | 4 | 3 | 3 | 5 | 9 | 5 | 5 | 5 | 7 | 10 | 9 | 6 | 7 | 7 | 5 | 4 | 5 | 11 | 5.5 | 11 |
| 14-Sep | 11 | 15 | 13 | 8 | Z | 10 | 14 | 23 | 23 | 16 | 7 | 6 | 12 | 11 | 7 | 4 | 2 | 3 | 6 | 5 | 2 | 3 | 5 | 3 | 9.1 | 23 |
| 15-Sep | 3 | 3 | 3 | 2 | 3 | Z | 6 | 6 | 6 | 5 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 4 | 3 | 4 | 1 | 2 | 2.9 | 6 |
| 16-Sep | Z | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 1.9 | 3 |
| 17-Sep | 2 | Z | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 4 |
| 18-Sep | 2 | 2 | Z | 2 | 3 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 10 | 18 | 16 | 24 | 20 | 18 | 6.3 | 24 |
| 19-Sep | 16 | 9 | 5 | Z | 14 | 21 | 19 | 16 | 18 | 9 | 8 | 6 | 6 | 7 | 4 | 10 | 2 | 2 | 2 | 1 | 2 | 21 | 14 | 1 | 9.3 | 21 |
| 20-Sep | 5 | 5 | 4 | 2 | Z | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2.4 | 5 |
| 21-Sep | 2 | 4 | 4 | 5 | 3 | Z | 2 | 3 | 4 | 3 | 3 | 4 | 3 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 5 | 14 | 7 | 3.5 | 14 |
| 22-Sep | Z | 8 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 8 | 2 | 2 | 2 | 3 | 2.3 | 8 |
| 23-Sep | 2 | Z | 2 | 1 | 2 | 3 | 3 | 4 | 3 | 2 | 3 | 5 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2.5 | 5 |
| 24-Sep | 3 | 2 | Z | 3 | 2 | 2 | 2 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 4 | 4 | 3 | 2 | 2 | 2 | 2.6 | 4 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 3 | 3 | 4 | 3 | C | C | C | C | C | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 3 | 1.9 | 4 |
| 26-Sep | 3 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 28 | 12 | 1 | 4 | 8 | 2 | 3.2 | 28 |
| 27-Sep | 1 | 1 | 2 | 2 | 1 | Z | 2 | 2 | 3 | 19 | 33 | 17 | 18 | 25 | 11 | 7 | 5 | 2 | 3 | 4 | 5 | 6 | 5 | 7 | 7.8 | 33 |
| 28-Sep | Z | 14 | 13 | 10 | 9 | 7 | 7 | 5 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 3.4 | 14 |
| 29-Sep | 1 | Z | 1 | 1 | 2 | 2 | 2 | 4 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 15 | 3 | 6 | 8 | 4 | 2 | 3.1 | 15 |
| 30-Sep | 2 | 1 | Z | 1 | 1 | 1 | 3 | 4 | 3 | 2 | 2 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 11 | 1 | 3 | 0 | 2.1 | 11 |

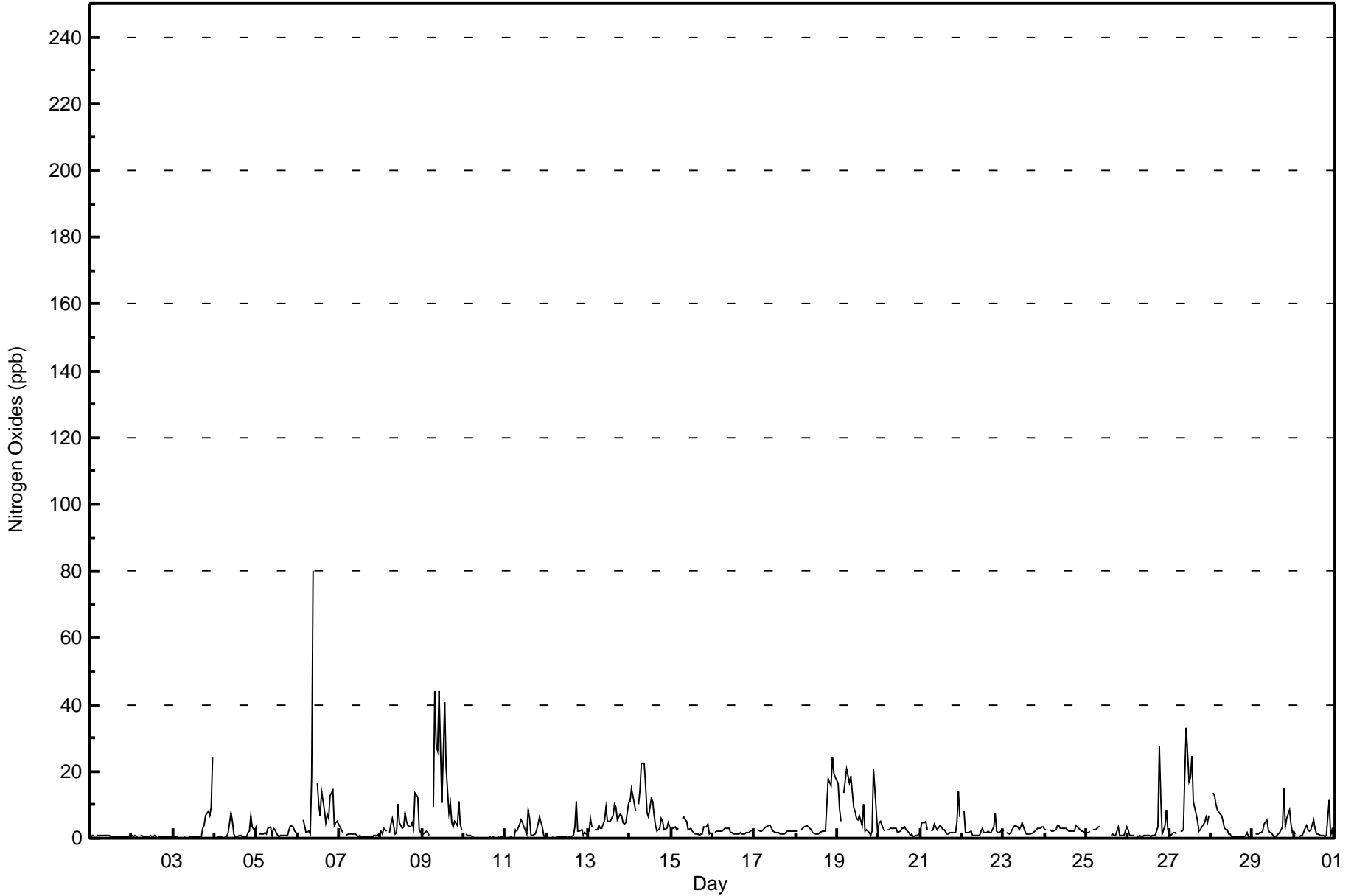
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 2.8 | 3.4 | 2.8 | 2.3 | 2.3 | 2.9 | 3.5 | 5.1 | 5.1 | 7.2 | 5.6 | 3.8 | 3.8 | 4.5 | 3.4 | 2.6 | 2.2 | 2.3 | 3.8 | 3.8 | 4.1 | 4.8 | 4.1 | 3.7 | Diurnal Average | |
| 16 | 15 | 13 | 10 | 14 | 21 | 19 | 44 | 28 | 80 | 44 | 17 | 25 | 41 | 21 | 10 | 11 | 11 | 28 | 18 | 16 | 24 | 20 | 24 | Diurnal Maximum | |

Z - zerospan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 667 | 97.51 | 97.51 |
| 21 - 40 | 13 | 1.90 | 99.42 |
| 41 - 80 | 4 | 0.58 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 46 | 50 | 16 | 19 | 6 | 4 | 24 | 161 | 82 | 33 | 20 | 44 | 77 | 36 | 34 | 13 | 665 |
| 21 - 40 | 4 | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 13 |
| 11 - 80 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 4 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 51 | 52 | 17 | 19 | 7 | 4 | 25 | 161 | 82 | 33 | 20 | 44 | 77 | 38 | 36 | 16 | 682 |

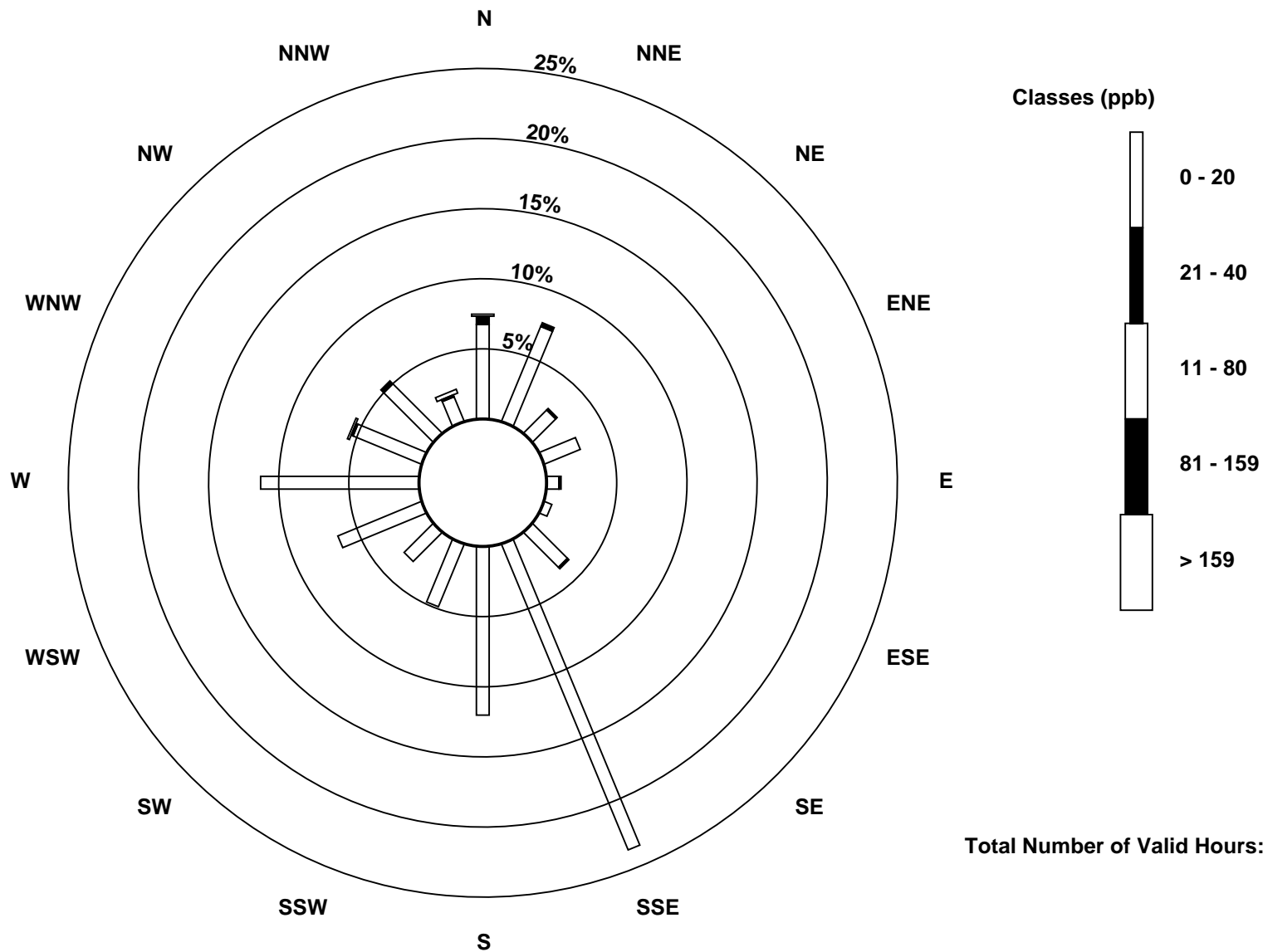
Total Number of Valid Hours: 682

Total Number of Hours: 720

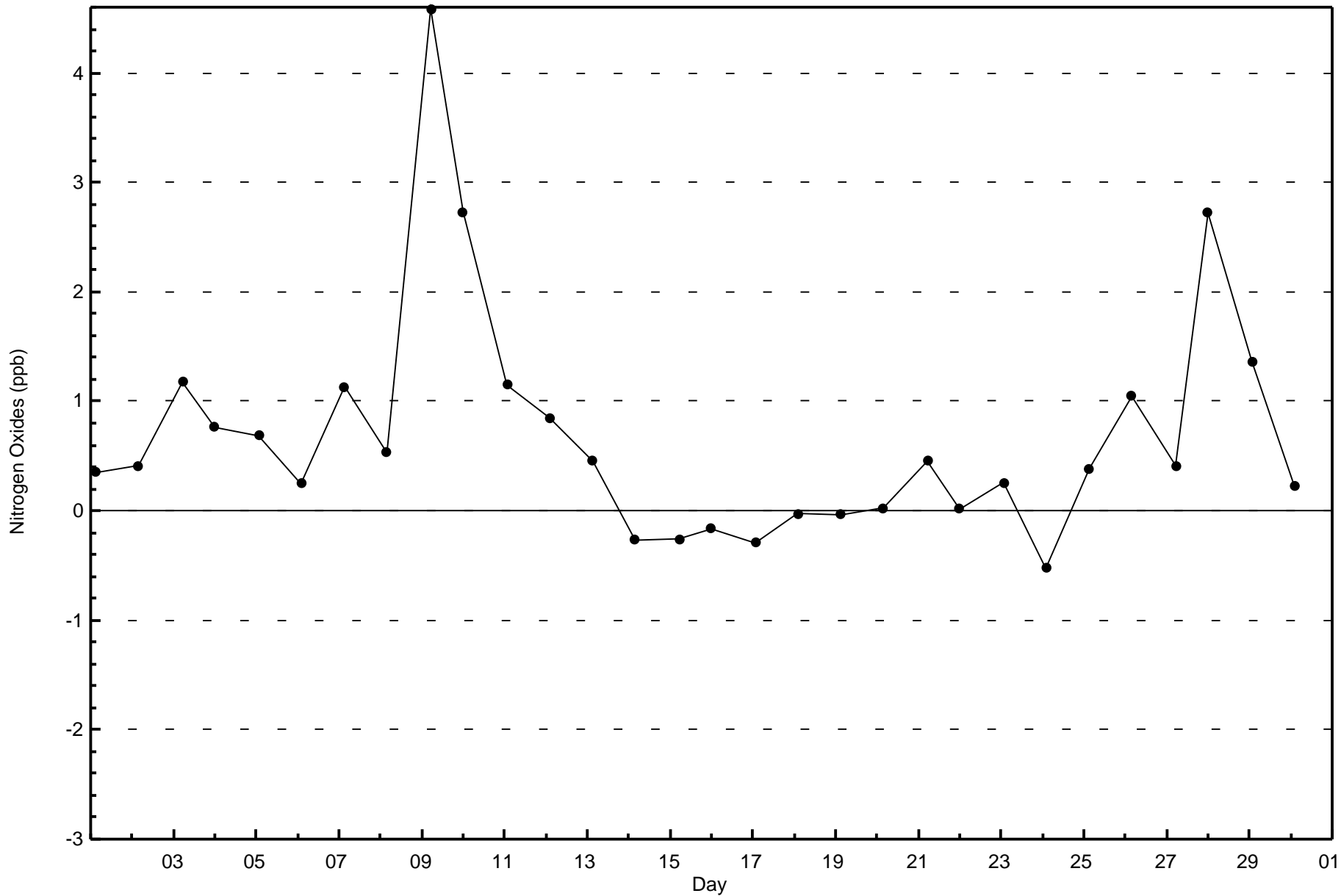


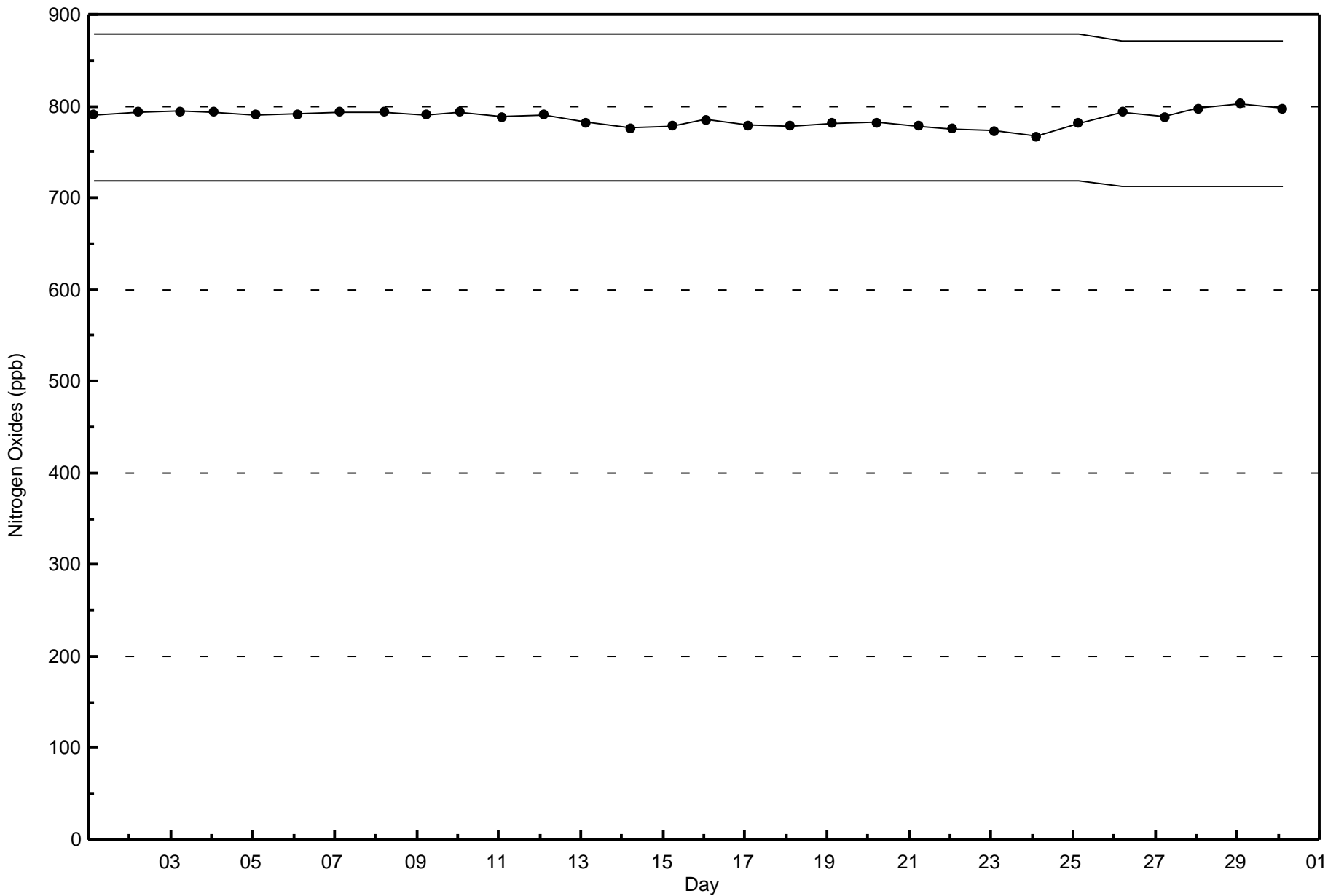
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint (AMS 4)



Total Number of Valid Hours: 682







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

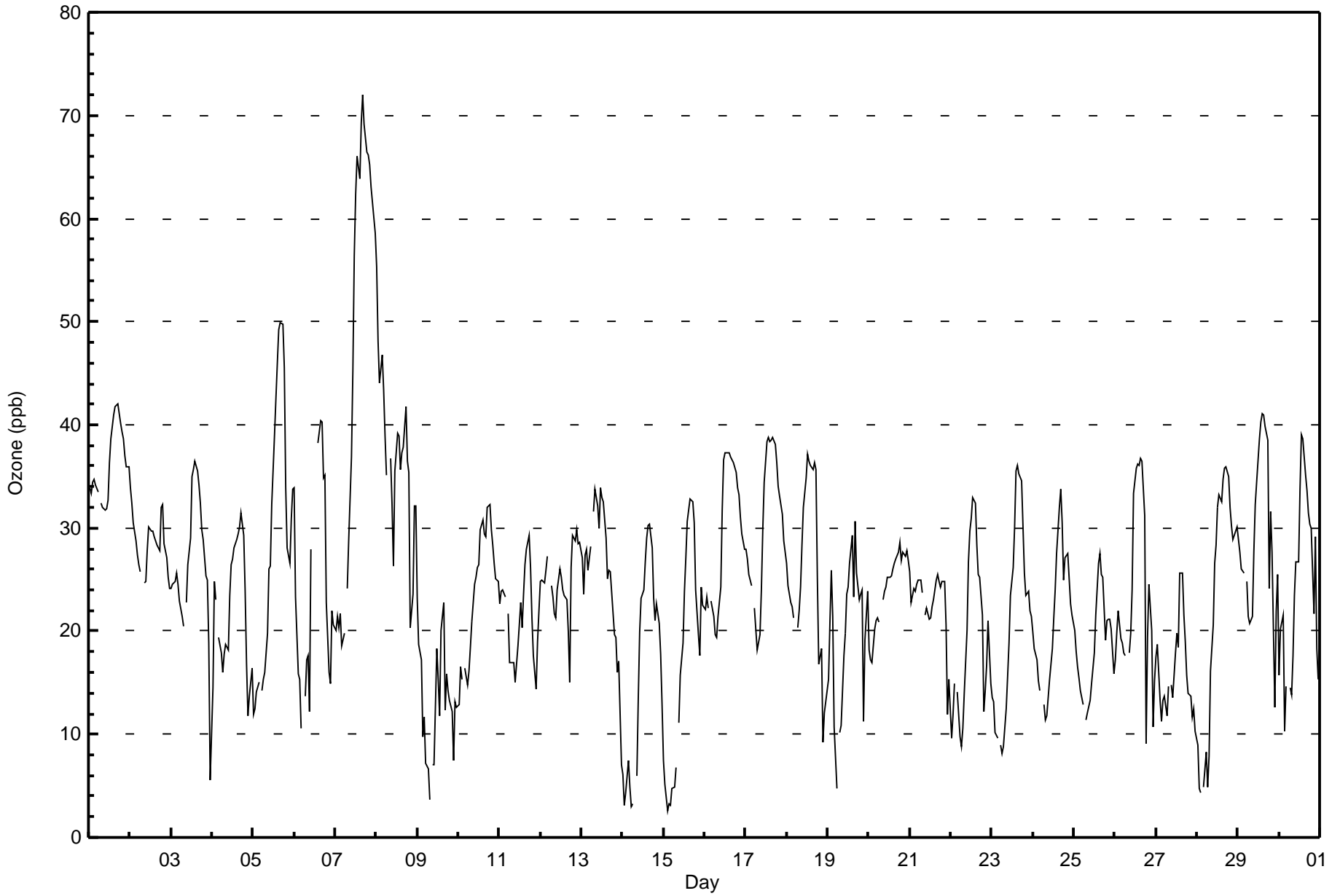
Buffalo Viewpoint - September 2017

| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 72 ppb on Sep 7 17:00 | Maximum Daily Average: 47.7 ppb on Sep 7 | | Hours of Data: | 687 |
| Minimum Value: 3 ppb on Sep 15 03:00 | Minimum Daily Average: 13.1 ppb on Sep 9 | | Hours of Missing Data: | 33 |
| Maximum Diurnal Average: 33.5 ppb at hour 16 | Minimum Diurnal Average: 16.2 ppb at hour 7 | | Hours of Calibration: | 33 |
| Monthly Average: 24.8 ppb | Percentiles: P ₁ = 4 P ₁₀ = 12 Q ₁ = 18 Median = 24 Q ₃ = 31 P ₉₀ = 36 P ₉₉ = 65 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 34 | 33 | 34 | 35 | 34 | 33 | Z | 32 | 32 | 32 | 32 | 33 | 36 | 39 | 41 | 42 | 42 | 42 | 40 | 39 | 39 | 37 | 36 | 36 | 36.2 | 42 |
| 2-Sep | 34 | 32 | 31 | 29 | 27 | 26 | 26 | Z | 25 | 25 | 28 | 30 | 30 | 30 | 29 | 29 | 28 | 28 | 32 | 32 | 29 | 27 | 25 | 24 | 28.5 | 34 |
| 3-Sep | 24 | 25 | 25 | 26 | 24 | 23 | 21 | 20 | Z | 23 | 26 | 29 | 35 | 36 | 36 | 36 | 34 | 32 | 30 | 29 | 25 | 25 | 19 | 6 | 26.5 | 36 |
| 4-Sep | 14 | 25 | 23 | Z | 19 | 18 | 16 | 18 | 19 | 18 | 23 | 26 | 27 | 28 | 29 | 29 | 30 | 32 | 29 | 24 | 17 | 12 | 14 | 16 | 22.1 | 32 |
| 5-Sep | 12 | 12 | 14 | 15 | Z | 14 | 15 | 16 | 20 | 26 | 26 | 32 | 39 | 43 | 46 | 49 | 50 | 50 | 46 | 34 | 28 | 27 | 31 | 34 | 29.5 | 50 |
| 6-Sep | 34 | 23 | 16 | 15 | 11 | Z | 14 | 17 | 18 | 12 | 28 | C | C | C | 38 | 40 | 40 | 35 | 35 | 23 | 16 | 15 | 22 | 21 | 23.6 | 40 |
| 7-Sep | 20 | 21 | 20 | 22 | 19 | 20 | Z | 24 | 29 | 37 | 45 | 56 | 62 | 66 | 64 | 69 | 72 | 69 | 66 | 66 | 65 | 63 | 62 | 59 | 47.7 | 72 |
| 8-Sep | 55 | 48 | 44 | 47 | 43 | 39 | 35 | Z | 37 | 32 | 26 | 36 | 39 | 39 | 36 | 37 | 38 | 42 | 36 | 35 | 20 | 24 | 32 | 32 | 37.1 | 55 |
| 9-Sep | 23 | 19 | 17 | 10 | 12 | 7 | 7 | 4 | Z | 7 | 7 | 18 | 15 | 12 | 20 | 23 | 12 | 16 | 14 | 13 | 12 | 7 | 13 | 13 | 13.1 | 23 |
| 10-Sep | 13 | 17 | 15 | Z | 16 | 15 | 16 | 18 | 21 | 25 | 25 | 26 | 26 | 30 | 31 | 29 | 29 | 32 | 32 | 30 | 28 | 27 | 25 | 25 | 24.0 | 32 |
| 11-Sep | 23 | 24 | 24 | 23 | Z | 22 | 17 | 17 | 17 | 15 | 17 | 19 | 23 | 20 | 24 | 26 | 28 | 29 | 26 | 21 | 18 | 14 | 19 | 22 | 21.2 | 29 |
| 12-Sep | 25 | 25 | 25 | 26 | 27 | Z | 24 | 23 | 22 | 21 | 24 | 26 | 25 | 24 | 24 | 23 | 20 | 15 | 26 | 29 | 29 | 30 | 29 | 29 | 24.8 | 30 |
| 13-Sep | 27 | 24 | 27 | 28 | 26 | 28 | Z | 32 | 34 | 32 | 30 | 34 | 33 | 33 | 29 | 25 | 26 | 26 | 22 | 20 | 19 | 16 | 17 | 7 | 25.8 | 34 |
| 14-Sep | 6 | 3 | 4 | 7 | 5 | 3 | 3 | Z | 6 | 13 | 20 | 23 | 24 | 27 | 29 | 30 | 30 | 28 | 23 | 21 | 23 | 21 | 18 | 13 | 16.6 | 30 |
| 15-Sep | 8 | 5 | 3 | 3 | 3 | 5 | 5 | 7 | Z | 11 | 16 | 19 | 24 | 27 | 31 | 33 | 33 | 33 | 30 | 24 | 20 | 18 | 24 | 23 | 17.5 | 33 |
| 16-Sep | 22 | 23 | 22 | Z | 23 | 21 | 20 | 19 | 21 | 24 | 32 | 37 | 37 | 37 | 37 | 37 | 37 | 36 | 35 | 34 | 33 | 31 | 29 | 28 | 29.5 | 37 |
| 17-Sep | 28 | 27 | 25 | 24 | Z | 22 | 20 | 18 | 20 | 24 | 30 | 34 | 38 | 39 | 38 | 38 | 39 | 38 | 36 | 34 | 33 | 31 | 29 | 28 | 30.2 | 39 |
| 18-Sep | 27 | 24 | 23 | 22 | 21 | Z | 20 | 22 | 24 | 28 | 32 | 35 | 37 | 36 | 36 | 36 | 36 | 36 | 25 | 17 | 18 | 9 | 12 | 13 | 25.7 | 37 |
| 19-Sep | 15 | 21 | 26 | 21 | 11 | 5 | Z | 10 | 11 | 18 | 20 | 24 | 24 | 27 | 29 | 23 | 31 | 26 | 23 | 24 | 24 | 11 | 19 | 24 | 20.3 | 31 |
| 20-Sep | 18 | 17 | 17 | 20 | 21 | 21 | 21 | Z | 23 | 24 | 24 | 25 | 25 | 25 | 26 | 27 | 27 | 28 | 29 | 27 | 28 | 27 | 28 | 27 | 24.1 | 29 |
| 21-Sep | 26 | 23 | 24 | 24 | 25 | 25 | 25 | 24 | Z | 22 | 22 | 21 | 21 | 22 | 23 | 25 | 26 | 25 | 24 | 25 | 25 | 21 | 12 | 15 | 22.8 | 26 |
| 22-Sep | 10 | 12 | 15 | Z | 14 | 10 | 9 | 11 | 14 | 20 | 27 | 30 | 31 | 33 | 32 | 28 | 26 | 25 | 21 | 12 | 14 | 17 | 21 | 15 | 19.4 | 33 |
| 23-Sep | 14 | 13 | 10 | 10 | Z | 9 | 8 | 9 | 13 | 16 | 19 | 24 | 26 | 30 | 36 | 36 | 35 | 35 | 30 | 26 | 23 | 24 | 22 | 21 | 21.2 | 36 |
| 24-Sep | 20 | 18 | 17 | 15 | 14 | Z | 13 | 11 | 12 | 14 | 15 | 18 | 21 | 24 | 27 | 32 | 34 | 31 | 25 | 27 | 28 | 25 | 23 | 22 | 21.1 | 34 |
| 25-Sep | 20 | 18 | 17 | 15 | 14 | 13 | Z | 11 | 12 | 13 | 15 | 16 | 18 | 21 | 27 | 27 | 26 | 25 | 19 | 21 | 21 | 20 | 16 | 16 | 18.6 | 27 |
| 26-Sep | 17 | 20 | 22 | 19 | 19 | 18 | 18 | Z | 18 | 20 | 24 | 33 | 36 | 36 | 36 | 37 | 36 | 31 | 9 | 19 | 25 | 20 | 11 | 15 | 23.4 | 37 |
| 27-Sep | 17 | 19 | 13 | 11 | 13 | 14 | 12 | 15 | Z | 15 | 14 | 18 | 20 | 18 | 26 | 26 | 22 | 19 | 16 | 14 | 14 | 12 | 13 | 10 | 16.0 | 26 |
| 28-Sep | 9 | 5 | 4 | Z | 5 | 8 | 5 | 8 | 16 | 21 | 27 | 28 | 32 | 33 | 33 | 35 | 36 | 36 | 35 | 32 | 30 | 29 | 29 | 30 | 22.8 | 36 |
| 29-Sep | 29 | 28 | 26 | 26 | Z | 25 | 21 | 21 | 21 | 28 | 32 | 34 | 39 | 40 | 41 | 41 | 40 | 38 | 24 | 32 | 28 | 13 | 22 | 26 | 29.3 | 41 |
| 30-Sep | 16 | 20 | 22 | 10 | 15 | Z | 15 | 14 | 18 | 23 | 27 | 27 | 34 | 39 | 39 | 35 | 34 | 31 | 30 | 30 | 22 | 29 | 18 | 15 | 24.4 | 39 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| 21.3 | 20.8 | 20.2 | 20.2 | 18.5 | 17.8 | 16.2 | 16.9 | 20.0 | 21.3 | 24.4 | 28.0 | 30.3 | 31.5 | 33.1 | 33.5 | 33.2 | 32.3 | 29.1 | 27.1 | 25.1 | 22.7 | 23.1 | 22.1 | Diurnal Average |
| 55 | 48 | 44 | 47 | 43 | 39 | 35 | 32 | 37 | 37 | 45 | 56 | 62 | 66 | 64 | 69 | 72 | 69 | 66 | 66 | 65 | 63 | 62 | 59 | Diurnal Maximum |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Buffalo Viewpoint - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 232 | 33.77 | 33.77 |
| 21 - 50 | 441 | 64.19 | 97.96 |
| 51 - 82 | 14 | 2.04 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Buffalo Viewpoint - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 16 | 19 | 8 | 4 | 1 | 2 | 12 | 57 | 43 | 9 | 8 | 7 | 11 | 11 | 14 | 8 | 230 |
| 21 - 50 | 37 | 29 | 10 | 18 | 6 | 1 | 15 | 102 | 34 | 18 | 12 | 34 | 65 | 28 | 24 | 8 | 441 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 6 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 53 | 48 | 18 | 22 | 7 | 3 | 27 | 163 | 83 | 31 | 20 | 41 | 76 | 39 | 38 | 16 | 685 |

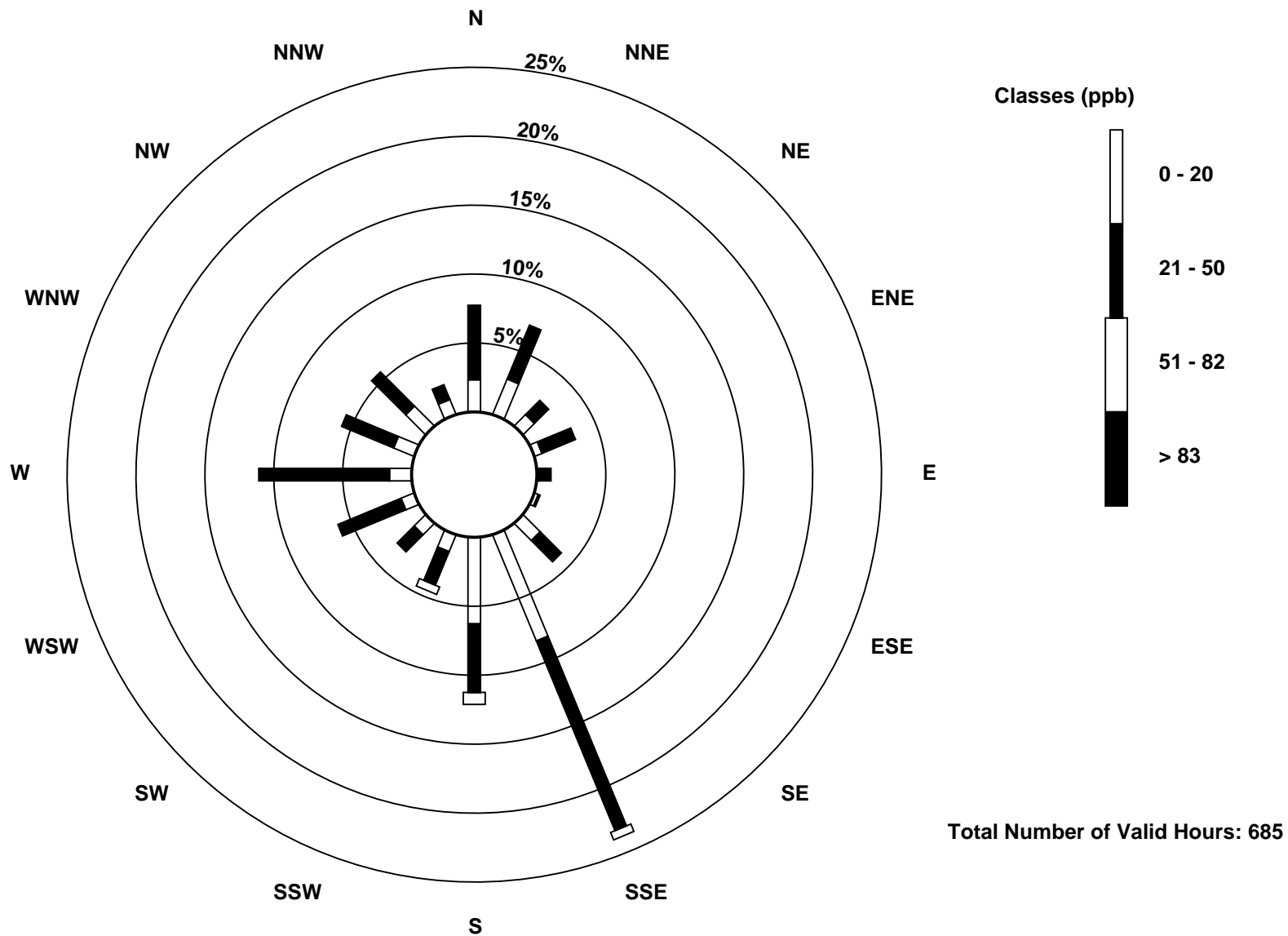
Total Number of Valid Hours: 685

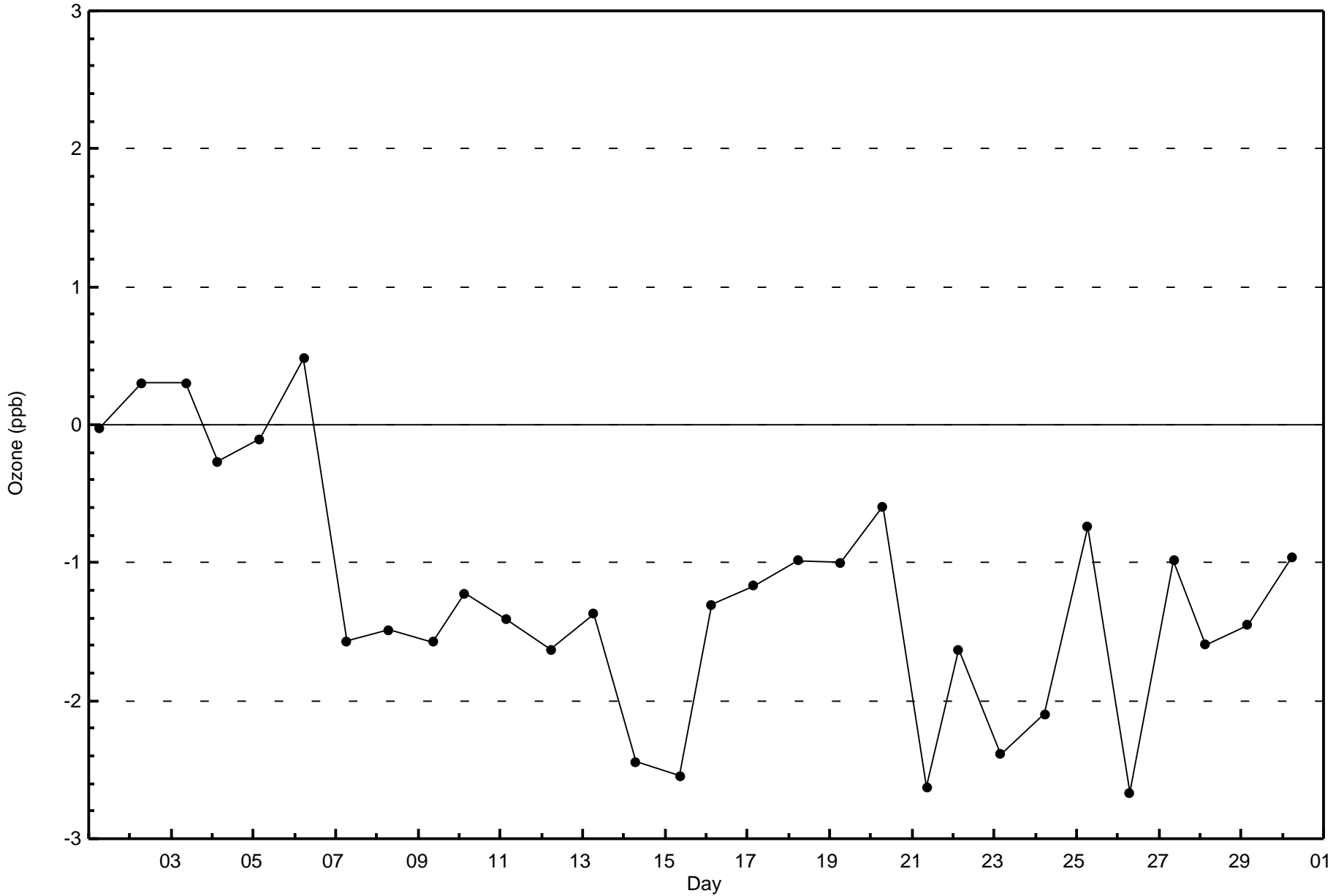
Total Number of Hours: 720

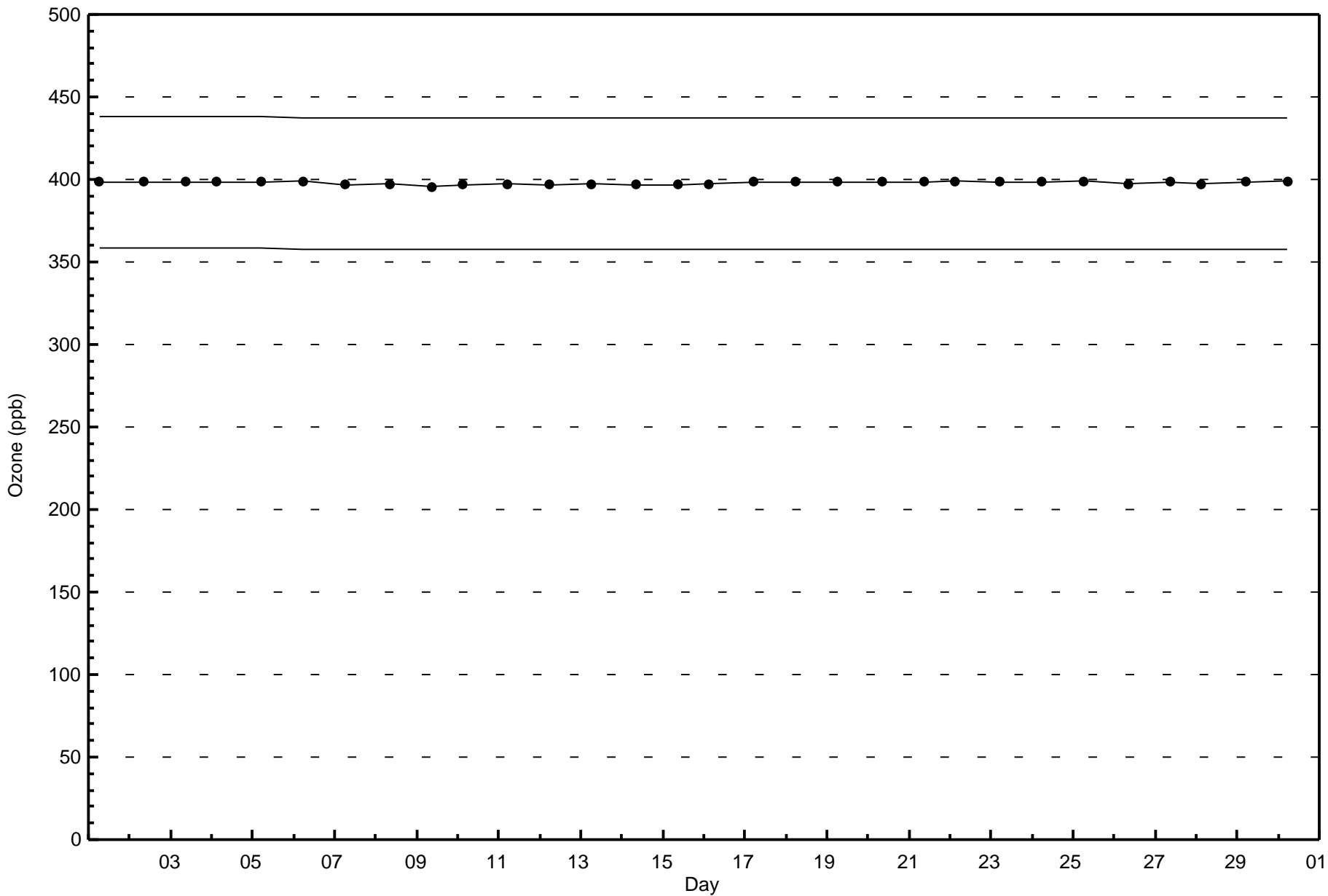


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Ozone (O₃) - ppb
Buffalo Viewpoint (AMS 4)









Wood Buffalo Environmental Association

Summary of Hour Averages

PM2.5 (PM_{2.5}) - µg/m³

Buffalo Viewpoint - September 2017

| | |
|--|--|
| Number of Exceedences (AAAQO): 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 76.2 µg/m ³ on Sep 6 10:00 | Maximum Daily Average: 18.0 µg/m ³ on Sep 6 |
| Minimum Value: 0.2 µg/m ³ on Sep 26 14:00 | Hours of Data: 717 |
| Maximum Diurnal Average: 9.0 µg/m ³ at hour 10 | Hours of Missing Data: 3 |
| Monthly Average: 5.96 µg/m ³ | Hours of Calibration: 2 |
| Minimum Daily Average: 1.7 µg/m ³ on Sep 16 | Percent Operational Time: 99.9 |
| Minimum Diurnal Average: 4.1 µg/m ³ at hour 16 | |
| Percentiles: P ₁ = 0.5 P ₁₀ = 1.5 Q ₁ = 2.1 Median = 3.5 Q ₃ = 6.8 P ₉₀ = 13.0 P ₉₉ = 38.1 | |

| 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-Sep | 2.4 | 3.2 | 3.3 | 4.0 | 6.0 | 4.4 | 4.0 | 4.9 | 4.1 | 3.4 | 3.0 | 2.1 | 1.6 | 2.7 | 7.7 | 8.5 | 12.7 | 7.4 | 7.2 | 2.9 | 2.8 | 4.0 | 3.6 | 4.1 | 4.6 | 12.7 |
| 2-Sep | 3.8 | 3.3 | 3.4 | 3.4 | 3.3 | 3.1 | 3.2 | 2.8 | 2.8 | 2.9 | 1.7 | 1.8 | 2.9 | 4.9 | 2.0 | 1.3 | 2.7 | 1.4 | 1.5 | 1.7 | 2.0 | 2.1 | 2.6 | 2.8 | 2.6 | 4.9 |
| 3-Sep | 2.2 | 1.7 | 1.8 | 1.9 | 2.4 | 2.5 | 2.0 | 2.3 | 2.4 | 2.5 | 4.1 | 3.1 | 2.9 | 4.7 | 5.1 | 3.9 | 8.1 | 8.2 | 37.3 | 8.6 | 6.2 | 6.0 | 5.0 | 4.5 | 5.4 | 37.3 |
| 4-Sep | 4.8 | 3.7 | 3.7 | 3.4 | 7.0 | 36.0 | 64.4 | 28.8 | 15.6 | 5.2 | 1.4 | 0.8 | 0.9 | 1.0 | 1.7 | 1.3 | 5.1 | 3.8 | 4.7 | 6.0 | 7.3 | 8.7 | 10.8 | 11.5 | 9.9 | 64.4 |
| 5-Sep | 9.5 | 7.6 | 5.4 | 4.1 | 3.4 | 3.2 | 3.6 | 3.4 | 2.7 | 2.1 | 2.4 | 2.3 | 2.5 | 2.5 | 2.7 | 3.0 | 6.5 | 5.5 | 6.5 | 5.3 | 7.3 | 12.4 | 11.9 | 8.8 | 5.2 | 12.4 |
| 6-Sep | 9.8 | 12.3 | 13.2 | 13.5 | 19.4 | 12.6 | 9.8 | 19.2 | 52.8 | 76.2 | 38.5 | 17.6 | 9.7 | 8.7 | 11.8 | 8.1 | 11.8 | 18.4 | 13.5 | 13.8 | 13.0 | 8.8 | 9.5 | 8.8 | 18.0 | 76.2 |
| 7-Sep | 8.1 | 8.4 | 8.3 | 8.2 | 8.5 | 11.9 | 14.2 | 12.3 | 10.0 | 8.4 | 6.4 | 5.7 | 5.5 | 5.0 | 4.3 | 4.7 | 5.6 | 7.8 | 9.3 | 12.0 | 13.7 | 13.6 | 13.1 | 12.8 | 9.1 | 14.2 |
| 8-Sep | 14.0 | 12.0 | 13.0 | 14.3 | 15.3 | 15.5 | 16.1 | 17.5 | 33.3 | 50.8 | 55.5 | 33.0 | 19.5 | 14.6 | 14.5 | 14.3 | 19.7 | 10.3 | 5.8 | 4.7 | 4.8 | 5.4 | 5.3 | 7.8 | 17.4 | 55.5 |
| 9-Sep | 7.1 | 9.6 | 21.7 | 12.0 | 12.0 | 17.3 | 13.6 | 22.1 | 21.1 | 19.8 | 13.9 | 6.3 | 7.3 | 8.1 | 9.2 | 10.1 | 9.5 | 7.1 | 6.1 | 8.0 | 8.7 | 9.7 | 15.4 | 20.5 | 12.3 | 22.1 |
| 10-Sep | 20.4 | 15.2 | 13.7 | 13.4 | 12.0 | 9.4 | 7.0 | 4.6 | 3.3 | 2.4 | 2.0 | 3.0 | 5.1 | 5.4 | 4.2 | 2.3 | 1.9 | 4.1 | 1.8 | 1.1 | 1.3 | 1.5 | 1.7 | 1.7 | 5.8 | 20.4 |
| 11-Sep | 1.9 | 2.3 | 2.6 | 2.5 | 2.8 | 2.8 | 3.1 | 2.7 | 2.4 | 2.7 | 2.3 | 1.8 | 2.0 | 2.2 | 2.0 | 1.7 | 1.7 | 1.6 | 2.1 | 4.1 | 3.6 | 1.9 | 1.5 | 1.6 | 2.3 | 4.1 |
| 12-Sep | 1.5 | 1.7 | 1.6 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 2.3 | 2.6 | 2.2 | 1.7 | 1.7 | 1.8 | 2.0 | 2.3 | 2.0 | 1.8 | 1.5 | 1.3 | 1.5 | 1.6 | 2.9 | 2.2 | 1.9 | 2.9 |
| 13-Sep | 2.3 | 3.7 | 3.6 | 3.3 | 3.5 | 3.2 | 5.4 | 4.8 | 3.1 | 2.6 | 3.5 | 2.2 | 2.1 | 1.3 | 2.0 | 3.0 | 3.9 | 2.5 | 5.2 | 4.9 | 4.8 | 4.5 | 3.7 | 3.8 | 3.4 | 5.4 |
| 14-Sep | 3.0 | 3.0 | 2.8 | 2.7 | 4.2 | 3.7 | 3.5 | 3.7 | 3.1 | 1.9 | 1.3 | 1.5 | 3.2 | 3.5 | 2.6 | 0.9 | 1.3 | 1.5 | 2.0 | 1.9 | 2.1 | 2.5 | 6.2 | 4.7 | 2.8 | 6.2 |
| 15-Sep | 3.7 | 4.0 | 3.5 | 4.0 | 4.9 | 5.1 | 6.3 | 4.5 | 4.6 | 2.6 | 1.7 | 1.5 | 1.2 | 0.8 | 0.4 | 0.2 | 0.3 | 0.3 | 0.4 | 0.6 | 1.3 | 1.8 | 1.8 | 2.3 | 2.4 | 6.3 |
| 16-Sep | 2.0 | 2.1 | 2.4 | 2.6 | 2.2 | 2.7 | 3.6 | 2.8 | 2.0 | 2.0 | 1.4 | 1.2 | 1.0 | 0.8 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 1.5 | 1.6 | 1.6 | 1.8 | 1.8 | 1.7 | 3.6 |
| 17-Sep | 1.7 | 1.9 | 2.4 | 2.4 | 2.6 | 2.9 | 3.3 | 4.1 | 3.5 | 6.2 | 9.4 | 7.2 | 5.5 | 5.5 | 5.4 | 4.7 | 4.5 | 4.5 | 4.9 | 6.7 | 7.9 | 7.3 | 6.8 | 6.7 | 4.9 | 9.4 |
| 18-Sep | 7.1 | 8.6 | 10.3 | 10.9 | 10.5 | 9.9 | 9.6 | 8.2 | 7.3 | 5.4 | 3.5 | 3.1 | 3.2 | 3.8 | 4.1 | 5.3 | 6.4 | 8.2 | 10.1 | 9.6 | 8.9 | 11.1 | 11.3 | 13.0 | 7.9 | 13.0 |
| 19-Sep | 13.6 | 13.1 | 13.3 | 14.8 | 13.3 | 12.4 | 14.4 | 18.6 | 25.2 | 32.1 | 37.6 | 39.0 | 40.4 | 37.7 | 29.8 | 16.9 | 5.6 | 3.7 | 2.9 | 2.8 | 3.2 | 4.9 | 5.0 | 3.4 | 16.8 | 40.4 |
| 20-Sep | 3.6 | 4.6 | 4.4 | 4.4 | 4.2 | 3.0 | 2.2 | 2.2 | 2.3 | 2.7 | 2.6 | 2.2 | 1.8 | 1.7 | 1.8 | 1.7 | 1.6 | 1.9 | 1.7 | 1.7 | 1.5 | 1.5 | 1.3 | 1.4 | 2.4 | 4.6 |
| 21-Sep | 1.4 | 1.3 | 1.4 | 1.6 | 1.7 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.4 | 2.2 | 2.2 | 1.9 | 1.7 | 1.6 | 1.6 | 1.7 | 2.0 | 2.0 | 3.1 | 4.4 | 2.8 | 2.0 | 4.4 |
| 22-Sep | 2.8 | 3.1 | 2.9 | 2.8 | 2.9 | 2.8 | 2.9 | 2.7 | 2.4 | 1.7 | 1.5 | 3.4 | 4.2 | 2.8 | 3.5 | 5.1 | 5.4 | 5.9 | 6.3 | 7.5 | 6.5 | 6.2 | 6.5 | 6.1 | 4.1 | 7.5 |
| 23-Sep | 5.4 | 5.5 | 5.5 | 4.8 | 4.3 | 4.3 | 4.3 | 3.6 | 2.6 | 1.8 | 1.6 | 1.6 | 1.5 | 1.3 | 1.1 | 1.2 | 1.2 | 1.7 | 2.7 | 4.4 | 5.0 | 5.1 | 5.0 | 4.5 | 3.3 | 5.5 |
| 24-Sep | 4.3 | 4.3 | 4.1 | 3.5 | 3.5 | 3.5 | 3.7 | 3.5 | 2.4 | 1.8 | 1.8 | 1.8 | 1.6 | 1.5 | 1.6 | 1.7 | 2.3 | 3.1 | 4.4 | 5.4 | 5.4 | 4.2 | 3.5 | 3.1 | 3.2 | 5.4 |
| 25-Sep | 3.0 | 3.5 | 3.4 | 3.3 | 3.1 | 3.0 | 3.2 | 2.9 | 3.0 | 2.9 | 2.1 | 1.8 | 1.8 | 1.5 | 0.9 | 1.2 | 1.1 | 1.0 | 1.6 | 2.1 | 2.1 | 1.9 | 1.9 | 2.2 | 2.3 | 3.5 |
| 26-Sep | 3.2 | 3.7 | 3.5 | 3.4 | 3.3 | 3.4 | C | C | 4.3 | 7.0 | 9.1 | 6.1 | 1.1 | 0.2 | UO | 0.6 | 0.9 | 0.7 | 10.6 | 3.3 | 1.3 | 2.6 | 3.9 | 3.5 | 3.6 | 10.6 |
| 27-Sep | 3.8 | 4.0 | 5.0 | 4.9 | 3.4 | 3.3 | 2.9 | 3.5 | 2.4 | 6.6 | 4.9 | 3.5 | 12.1 | 30.2 | 5.5 | 6.3 | 4.7 | 4.9 | 6.2 | 6.3 | 5.3 | 4.6 | 4.8 | 5.1 | 6.0 | 30.2 |
| 28-Sep | 6.2 | 6.5 | 7.4 | 8.1 | 6.9 | 7.5 | 8.0 | 6.7 | 4.0 | 2.6 | 2.0 | 1.5 | 1.0 | 0.6 | 0.3 | 0.6 | 0.5 | 0.6 | 0.8 | 1.4 | 1.6 | 2.1 | 1.9 | 2.0 | 3.4 | 8.1 |
| 29-Sep | 2.6 | 3.0 | 3.0 | 3.0 | 3.1 | 3.9 | 4.0 | 4.3 | 4.6 | 3.0 | 2.4 | 2.7 | 2.8 | 3.2 | 2.8 | 4.9 | 11.2 | 14.9 | 16.3 | 13.8 | 13.5 | 21.7 | 19.4 | 12.6 | 7.4 | 21.7 |
| 30-Sep | 12.5 | 9.7 | 8.1 | 8.3 | 8.3 | 7.9 | 8.0 | 11.9 | 9.1 | 6.9 | 5.7 | 5.8 | 5.7 | 4.9 | 5.1 | 4.6 | 5.0 | 5.4 | 6.2 | 4.7 | 5.7 | 4.2 | 3.7 | 1.8 | 6.6 | 12.5 |

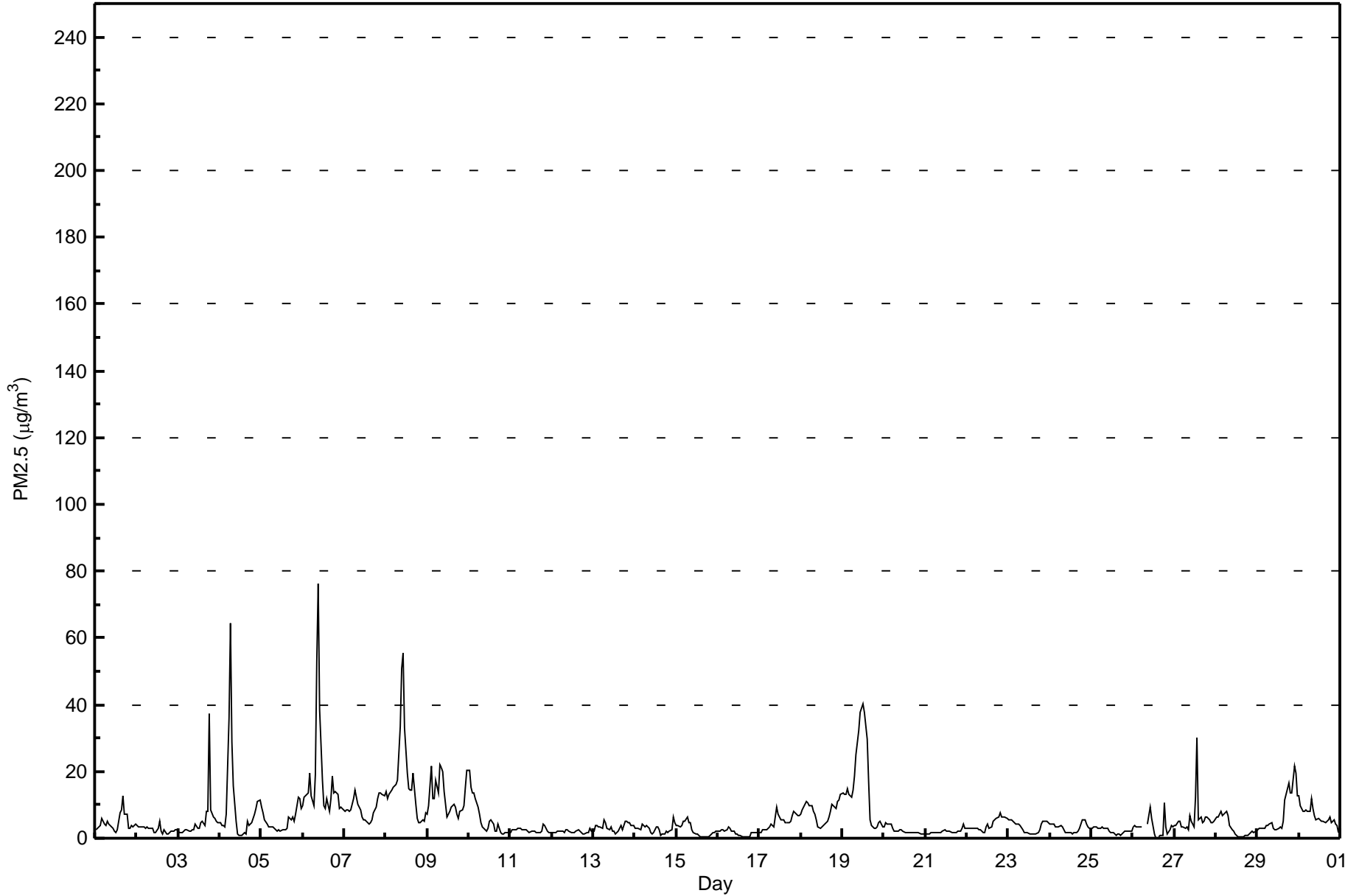
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 5.6 | 5.6 | 5.9 | 5.7 | 6.0 | 6.8 | 7.9 | 7.3 | 8.0 | 9.0 | 7.6 | 5.6 | 5.1 | 5.5 | 4.7 | 4.1 | 4.8 | 4.7 | 6.1 | 5.0 | 5.1 | 5.6 | 5.9 | 5.6 | Diurnal Average | |
| 20.4 | 15.2 | 21.7 | 14.8 | 19.4 | 36.0 | 64.4 | 28.8 | 52.8 | 76.2 | 55.5 | 39.0 | 40.4 | 37.7 | 29.8 | 16.9 | 19.7 | 18.4 | 37.3 | 13.8 | 13.7 | 21.7 | 19.4 | 20.5 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

PM2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Buffalo Viewpoint - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**PM2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Buffalo Viewpoint - September 2017**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 468 | 65.27 | 65.27 |
| 6 - 15 | 180 | 25.10 | 90.38 |
| 16 - 25 | 23 | 3.21 | 93.58 |
| 26 - 80 | 18 | 2.51 | 96.09 |
| > 81.0 | 0 | 0.00 | 96.09 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

PM2.5 (PM_{2.5}) - μg/m³
Buffalo Viewpoint - September 2017

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 36 | 34 | 15 | 16 | 4 | 2 | 14 | 109 | 50 | 18 | 14 | 35 | 68 | 27 | 23 | 3 | 468 |
| 6 - 15 | 15 | 10 | 3 | 2 | 1 | 2 | 13 | 56 | 28 | 6 | 4 | 5 | 13 | 2 | 9 | 10 | 179 |
| 16 - 25 | 1 | 5 | 1 | 1 | 1 | 0 | 0 | 6 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 2 | 22 |
| 26 - 80 | 3 | 4 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 0 | 1 | 18 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 55 | 53 | 19 | 20 | 7 | 4 | 27 | 171 | 78 | 26 | 19 | 41 | 82 | 37 | 32 | 16 | 687 |

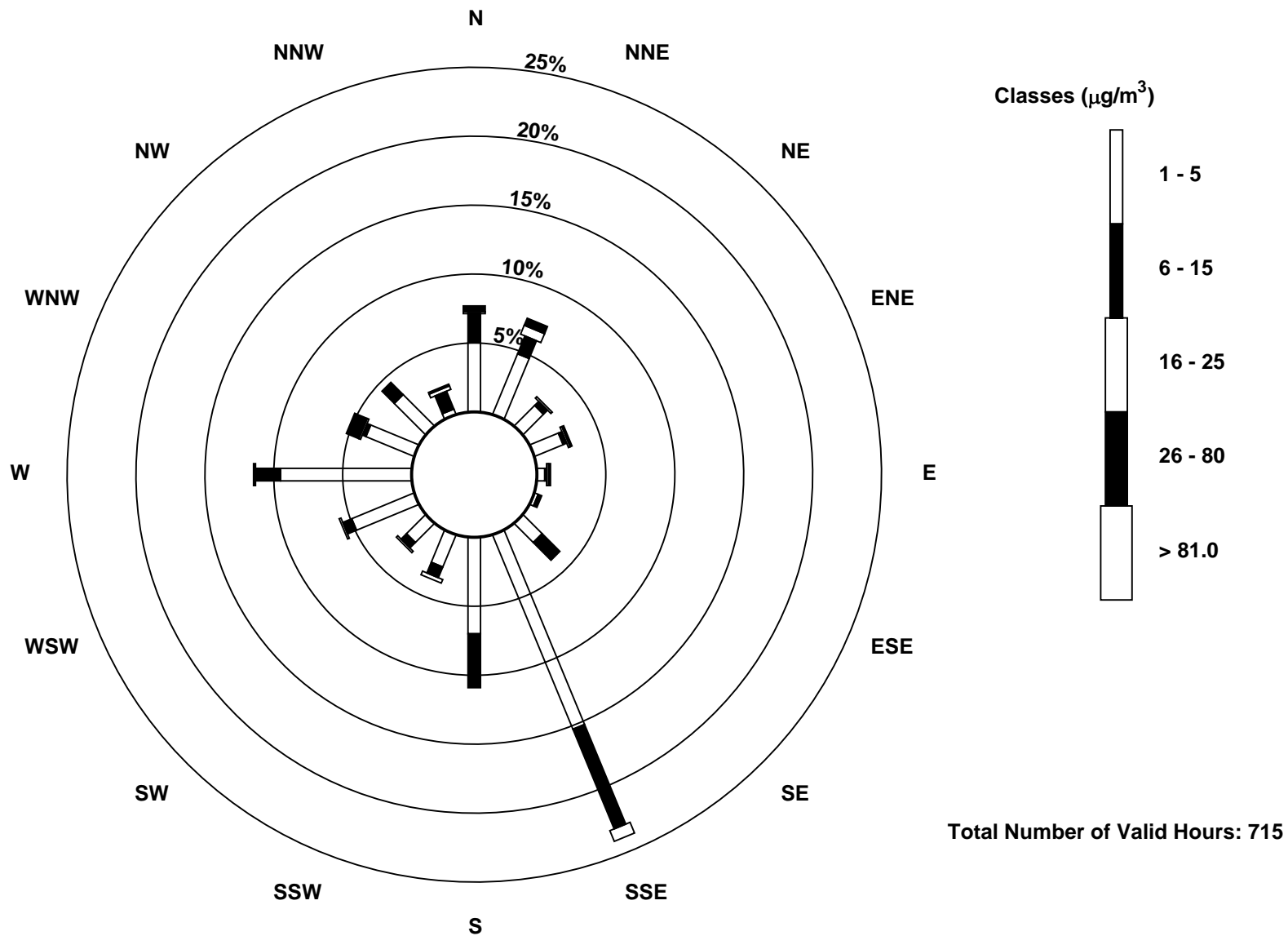
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

PM2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Buffalo Viewpoint (AMS 4)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

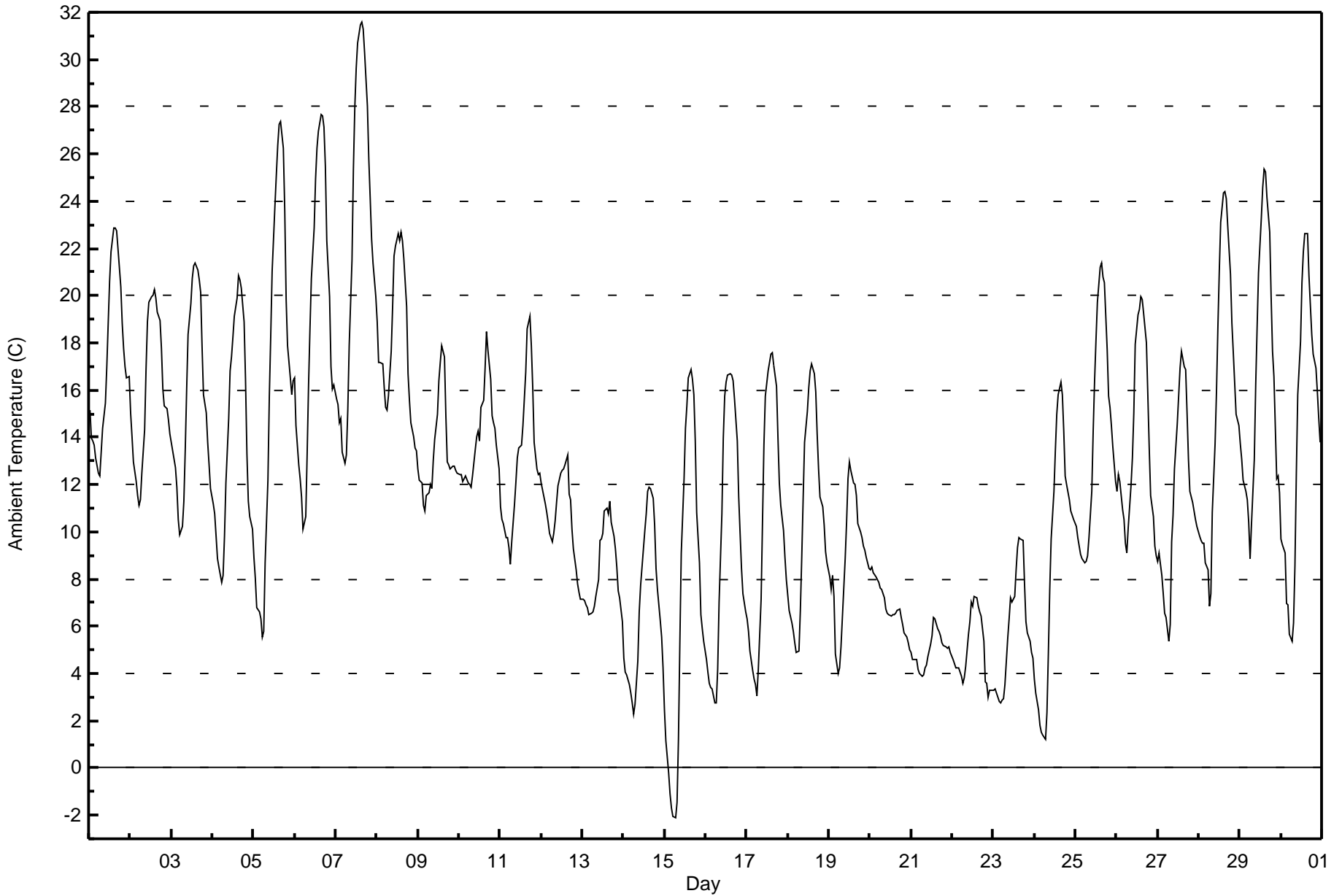
Buffalo Viewpoint - September 2017

| Maximum Value: 31.6 C on Sep 7 16:00 | | Maximum Daily Average: 22.3 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -2.1 C on Sep 15 07:00 | | Minimum Daily Average: 5.0 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.9 C at hour 16 | | Minimum Diurnal Average: 7.1 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.27 C | | Percentiles: P ₁ = 1.2 P ₁₀ = 4.6 Q ₁ = 7.5 Median = 11.9 O ₃ = 16.3 P ₉₀ = 20.7 P ₉₉ = 26.9 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 15.2 | 13.9 | 13.8 | 13.7 | 13.2 | 12.5 | 12.4 | 13.4 | 14.4 | 15.4 | 17.0 | 18.9 | 20.6 | 21.9 | 22.9 | 22.9 | 22.8 | 22.0 | 20.4 | 18.8 | 17.8 | 17.0 | 16.5 | 16.6 | 17.2 | 22.9 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 15.0 | 14.0 | 13.0 | 12.1 | 11.6 | 11.1 | 11.4 | 12.5 | 14.3 | 16.9 | 18.9 | 19.7 | 20.0 | 20.0 | 20.3 | 19.9 | 19.3 | 18.9 | 17.7 | 16.0 | 15.3 | 15.2 | 14.7 | 14.2 | 15.9 | 20.3 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 13.8 | 13.4 | 12.7 | 11.9 | 10.5 | 9.9 | 10.2 | 11.3 | 13.5 | 16.0 | 18.4 | 19.7 | 20.7 | 21.3 | 21.4 | 21.1 | 20.7 | 20.2 | 17.8 | 15.8 | 15.0 | 13.8 | 12.9 | 11.8 | 15.6 | 21.4 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 11.2 | 10.8 | 9.8 | 8.9 | 8.5 | 7.9 | 8.2 | 9.8 | 12.1 | 14.8 | 16.8 | 17.4 | 18.3 | 19.1 | 19.9 | 20.9 | 20.7 | 20.3 | 18.9 | 16.5 | 13.3 | 11.3 | 10.7 | 10.1 | 14.0 | 20.9 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 8.9 | 8.0 | 6.8 | 6.6 | 6.3 | 5.5 | 5.8 | 8.7 | 12.2 | 15.8 | 18.3 | 21.0 | 23.8 | 25.1 | 26.4 | 27.2 | 27.4 | 26.2 | 23.6 | 19.9 | 17.9 | 16.5 | 15.8 | 16.4 | 16.3 | 27.4 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 16.5 | 14.5 | 12.8 | 12.3 | 11.5 | 10.1 | 10.6 | 13.3 | 16.2 | 18.6 | 20.7 | 22.8 | 25.0 | 26.3 | 27.0 | 27.7 | 27.6 | 27.2 | 25.5 | 22.4 | 20.0 | 17.0 | 16.0 | 16.2 | 19.1 | 27.7 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 15.6 | 15.4 | 14.6 | 14.8 | 13.4 | 12.9 | 13.2 | 15.1 | 17.9 | 21.5 | 25.3 | 28.0 | 29.7 | 30.7 | 31.4 | 31.6 | 31.3 | 30.3 | 28.1 | 25.8 | 24.1 | 22.4 | 21.4 | 19.9 | 22.3 | 31.6 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 18.9 | 17.2 | 17.2 | 17.1 | 16.1 | 15.3 | 15.1 | 15.8 | 17.7 | 19.5 | 21.7 | 22.1 | 22.6 | 22.3 | 22.7 | 22.3 | 21.6 | 19.6 | 16.7 | 15.6 | 14.6 | 14.0 | 13.6 | 13.4 | 18.0 | 22.7 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 12.6 | 12.2 | 12.1 | 11.1 | 10.9 | 11.5 | 11.6 | 12.0 | 11.8 | 13.0 | 13.9 | 15.0 | 16.4 | 17.2 | 17.9 | 17.4 | 14.9 | 13.0 | 12.8 | 12.7 | 12.8 | 12.8 | 12.6 | 12.5 | 13.4 | 17.9 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 12.4 | 12.4 | 12.1 | 12.2 | 12.4 | 12.1 | 12.0 | 11.9 | 12.4 | 13.5 | 14.0 | 14.3 | 13.9 | 15.3 | 15.5 | 16.9 | 18.5 | 17.7 | 16.4 | 14.9 | 14.6 | 14.4 | 13.7 | 12.6 | 14.0 | 18.5 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 11.1 | 10.5 | 10.4 | 9.7 | 9.8 | 9.4 | 8.6 | 9.6 | 11.2 | 12.2 | 13.1 | 13.5 | 13.7 | 14.5 | 15.6 | 16.8 | 18.6 | 19.1 | 17.9 | 16.1 | 13.8 | 12.7 | 12.4 | 12.5 | 13.0 | 19.1 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 12.1 | 11.8 | 11.2 | 10.8 | 10.4 | 10.0 | 9.6 | 9.9 | 10.4 | 11.3 | 11.9 | 12.5 | 12.6 | 12.6 | 12.9 | 13.2 | 11.6 | 11.4 | 10.1 | 9.3 | 8.4 | 7.8 | 7.5 | 7.1 | 10.7 | 13.2 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 7.1 | 7.1 | 6.9 | 6.8 | 6.5 | 6.5 | 6.6 | 6.9 | 7.3 | 7.9 | 9.6 | 9.7 | 9.9 | 10.9 | 11.0 | 10.7 | 11.3 | 10.4 | 9.8 | 9.3 | 8.5 | 7.5 | 7.2 | 6.2 | 8.4 | 11.3 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 4.7 | 4.1 | 3.9 | 3.5 | 3.2 | 2.8 | 2.3 | 2.7 | 4.5 | 6.6 | 7.8 | 8.5 | 10.1 | 10.8 | 11.7 | 11.9 | 11.8 | 11.4 | 10.3 | 8.5 | 7.6 | 6.3 | 5.5 | 4.3 | 6.9 | 11.9 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 2.5 | 1.1 | -0.2 | -1.1 | -1.7 | -2.0 | -2.1 | -1.4 | 1.2 | 5.3 | 9.1 | 12.2 | 14.4 | 15.3 | 16.5 | 16.9 | 16.5 | 15.8 | 13.8 | 10.8 | 8.7 | 6.5 | 5.9 | 5.4 | 7.1 | 16.9 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 4.6 | 4.1 | 3.6 | 3.4 | 3.3 | 2.7 | 2.7 | 4.2 | 7.0 | 10.8 | 14.0 | 15.8 | 16.4 | 16.6 | 16.7 | 16.6 | 16.4 | 15.7 | 13.8 | 11.5 | 9.9 | 8.5 | 7.4 | 6.6 | 9.7 | 16.7 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 6.3 | 5.8 | 5.0 | 4.1 | 3.8 | 3.5 | 3.0 | 4.2 | 7.1 | 10.4 | 13.7 | 15.8 | 16.8 | 17.1 | 17.5 | 17.6 | 17.1 | 16.1 | 14.0 | 12.1 | 11.1 | 10.1 | 8.9 | 8.0 | 10.4 | 17.6 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 7.3 | 6.6 | 6.2 | 5.8 | 5.3 | 4.9 | 5.0 | 6.7 | 9.0 | 11.4 | 13.8 | 15.1 | 16.1 | 16.8 | 17.1 | 16.7 | 15.9 | 14.2 | 12.7 | 11.5 | 11.1 | 10.3 | 9.1 | 8.7 | 10.7 | 17.1 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 8.1 | 7.6 | 8.2 | 7.3 | 4.8 | 4.0 | 4.2 | 5.1 | 6.4 | 8.9 | 10.4 | 12.2 | 12.9 | 12.6 | 12.1 | 12.0 | 11.6 | 10.4 | 10.0 | 9.7 | 9.4 | 9.2 | 8.9 | 8.5 | 8.9 | 12.9 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 8.4 | 8.5 | 8.3 | 8.1 | 8.0 | 7.9 | 7.6 | 7.5 | 7.2 | 6.7 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.6 | 6.7 | 6.7 | 6.4 | 6.1 | 5.7 | 5.6 | 5.3 | 5.0 | 6.9 | 8.5 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 4.9 | 4.6 | 4.6 | 4.6 | 4.2 | 4.0 | 3.9 | 3.9 | 4.2 | 4.3 | 4.7 | 5.2 | 5.6 | 6.4 | 6.3 | 5.9 | 5.8 | 5.6 | 5.3 | 5.2 | 5.1 | 5.1 | 5.2 | 4.9 | 5.0 | 6.4 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 4.6 | 4.4 | 4.3 | 4.2 | 4.2 | 3.9 | 3.6 | 3.8 | 4.3 | 5.6 | 6.2 | 7.0 | 6.8 | 7.3 | 7.2 | 6.9 | 6.6 | 6.4 | 5.4 | 3.7 | 3.6 | 3.0 | 3.3 | 3.3 | 5.0 | 7.3 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 3.3 | 3.4 | 3.2 | 2.8 | 2.7 | 2.9 | 2.9 | 3.5 | 5.5 | 6.3 | 7.2 | 7.0 | 7.3 | 8.4 | 9.4 | 9.7 | 9.7 | 9.7 | 7.8 | 6.2 | 5.7 | 5.3 | 4.9 | 4.6 | 5.8 | 9.7 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 3.8 | 3.2 | 2.5 | 1.8 | 1.5 | 1.4 | 1.2 | 2.4 | 4.8 | 7.6 | 9.7 | 11.7 | 13.4 | 15.0 | 15.8 | 16.3 | 15.8 | 14.3 | 12.4 | 12.0 | 11.4 | 10.9 | 10.7 | 10.5 | 8.7 | 16.3 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 10.2 | 9.8 | 9.4 | 9.1 | 8.9 | 8.7 | 8.7 | 9.0 | 9.7 | 11.7 | 14.2 | 16.4 | 18.1 | 19.7 | 21.2 | 21.4 | 20.8 | 20.6 | 17.7 | 15.7 | 15.3 | 14.5 | 13.6 | 12.1 | 14.0 | 21.4 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 11.7 | 12.4 | 12.1 | 11.0 | 10.5 | 9.5 | 9.1 | 10.1 | 11.9 | 13.1 | 15.0 | 18.0 | 19.2 | 19.4 | 19.9 | 19.9 | 19.2 | 18.0 | 15.8 | 13.6 | 11.6 | 10.6 | 9.4 | 9.0 | 13.8 | 19.9 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 8.8 | 9.1 | 8.1 | 7.4 | 6.6 | 6.4 | 5.4 | 6.1 | 9.6 | 10.7 | 12.6 | 14.6 | 15.8 | 17.0 | 17.6 | 17.0 | 16.9 | 15.0 | 13.1 | 11.7 | 11.2 | 10.9 | 10.5 | 10.2 | 11.3 | 17.6 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 9.8 | 9.6 | 9.5 | 9.5 | 8.7 | 8.4 | 6.9 | 7.4 | 10.8 | 13.7 | 15.9 | 18.7 | 21.0 | 23.1 | 24.4 | 24.4 | 24.1 | 23.0 | 20.9 | 18.8 | 17.6 | 16.3 | 15.0 | 14.5 | 15.5 | 24.4 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 13.7 | 13.1 | 12.2 | 11.7 | 11.3 | 10.4 | 8.9 | 10.4 | 13.1 | 16.2 | 18.7 | 21.0 | 23.3 | 24.6 | 25.4 | 25.2 | 24.2 | 22.7 | 20.0 | 17.6 | 16.6 | 12.3 | 12.3 | 11.7 | 16.5 | 25.4 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 9.7 | 9.5 | 9.1 | 7.0 | 6.9 | 5.7 | 5.3 | 6.2 | 8.6 | 12.5 | 15.8 | 18.1 | 20.6 | 21.9 | 22.6 | 22.6 | 20.8 | 19.6 | 18.4 | 17.5 | 17.0 | 16.0 | 14.8 | 13.8 | 14.2 | 22.6 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.8 | 9.3 | 8.8 | 8.3 | 7.8 | 7.3 | 7.1 | 8.1 | 9.9 | 11.9 | 13.8 | 15.3 | 16.4 | 17.2 | 17.8 | 17.9 | 17.5 | 16.7 | 15.1 | 13.5 | 12.5 | 11.5 | 10.9 | 10.4 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 18.9 | 17.2 | 17.2 | 17.1 | 16.1 | 15.3 | 15.1 | 15.8 | 17.9 | 21.5 | 25.3 | 28.0 | 29.7 | 30.7 | 31.4 | 31.6 | 31.3 | 30.3 | 28.1 | 25.8 | 24.1 | 22.4 | 21.4 | 19.9 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 6 | 0.83 | 0.83 |
| 0 - 10 | 269 | 37.36 | 38.19 |
| 10 - 20 | 365 | 50.69 | 88.89 |
| > 20 | 80 | 11.11 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



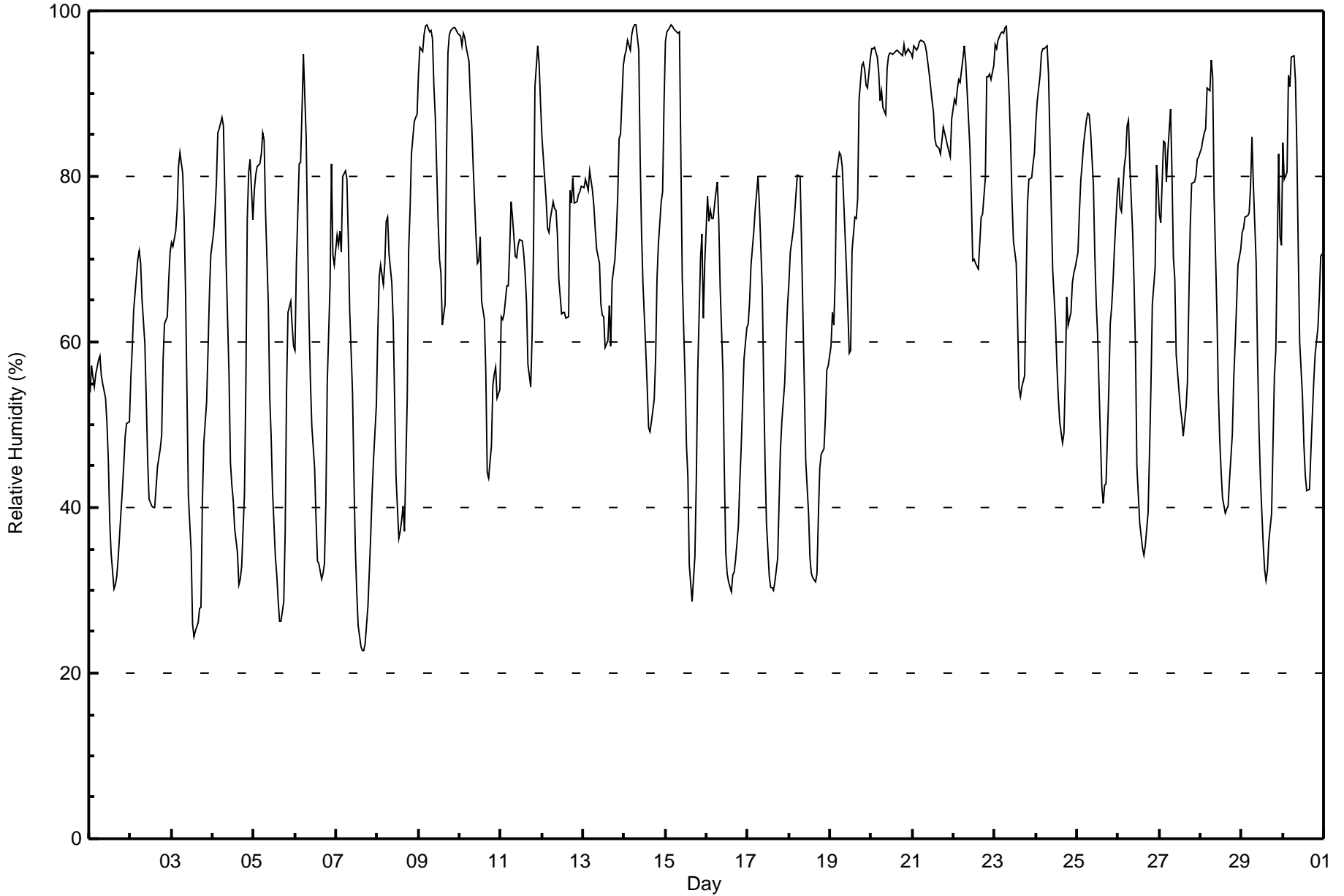
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - September 2017

| Maximum Value: 98 % on Sep 15 04:00 Maximum Daily Average: 93.8 % on Sep 20 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 23 % on Sep 7 17:00 Minimum Daily Average: 47.0 % on Sep 1 Maximum Diurnal Average: 85.5 % at hour 7 Minimum Diurnal Average: 46.7 % at hour 16 Monthly Average: 67.6 % Percentiles: P ₁ = 26 P ₁₀ = 37 Q ₁ = 53 Median = 70 O ₃ = 83 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-Sep | 54 | 57 | 56 | 55 | 56 | 58 | 58 | 56 | 55 | 53 | 50 | 46 | 38 | 34 | 30 | 31 | 32 | 34 | 39 | 42 | 45 | 49 | 50 | 50 | 47.0 | 58 |
| 2-Sep | 56 | 59 | 64 | 68 | 70 | 71 | 69 | 65 | 60 | 53 | 46 | 41 | 40 | 40 | 40 | 42 | 45 | 47 | 49 | 58 | 62 | 63 | 67 | 71 | 56.1 | 71 |
| 3-Sep | 72 | 72 | 73 | 76 | 81 | 83 | 80 | 75 | 66 | 54 | 41 | 35 | 26 | 24 | 25 | 26 | 28 | 28 | 41 | 48 | 53 | 59 | 66 | 70 | 54.3 | 83 |
| 4-Sep | 73 | 76 | 79 | 85 | 86 | 87 | 86 | 78 | 69 | 56 | 45 | 43 | 41 | 37 | 35 | 31 | 31 | 33 | 42 | 55 | 75 | 81 | 82 | 75 | 61.7 | 87 |
| 5-Sep | 78 | 80 | 81 | 82 | 83 | 85 | 84 | 76 | 65 | 53 | 49 | 42 | 34 | 32 | 29 | 26 | 26 | 29 | 37 | 54 | 64 | 65 | 62 | 60 | 57.3 | 85 |
| 6-Sep | 59 | 70 | 81 | 82 | 88 | 95 | 85 | 72 | 63 | 55 | 50 | 45 | 39 | 34 | 33 | 31 | 32 | 33 | 40 | 55 | 67 | 81 | 70 | 69 | 59.6 | 95 |
| 7-Sep | 73 | 72 | 73 | 71 | 80 | 81 | 80 | 73 | 64 | 54 | 44 | 35 | 30 | 26 | 23 | 23 | 23 | 24 | 28 | 32 | 37 | 42 | 46 | 52 | 49.3 | 81 |
| 8-Sep | 61 | 68 | 69 | 67 | 70 | 75 | 75 | 71 | 67 | 63 | 53 | 44 | 36 | 37 | 38 | 40 | 37 | 53 | 71 | 76 | 83 | 87 | 87 | 88 | 63.1 | 88 |
| 9-Sep | 92 | 96 | 95 | 97 | 98 | 98 | 98 | 98 | 97 | 91 | 87 | 75 | 70 | 68 | 62 | 64 | 83 | 95 | 97 | 98 | 98 | 98 | 98 | 97 | 89.5 | 98 |
| 10-Sep | 97 | 96 | 97 | 97 | 96 | 94 | 89 | 86 | 81 | 73 | 69 | 70 | 73 | 65 | 63 | 56 | 44 | 44 | 47 | 55 | 56 | 57 | 53 | 54 | 71.3 | 97 |
| 11-Sep | 63 | 63 | 63 | 67 | 67 | 71 | 77 | 75 | 70 | 70 | 72 | 72 | 72 | 71 | 68 | 65 | 57 | 55 | 61 | 71 | 91 | 96 | 94 | 89 | 71.6 | 96 |
| 12-Sep | 85 | 82 | 77 | 74 | 73 | 75 | 77 | 76 | 76 | 73 | 68 | 63 | 64 | 64 | 63 | 63 | 78 | 77 | 80 | 77 | 77 | 78 | 78 | 79 | 74.0 | 85 |
| 13-Sep | 79 | 80 | 79 | 78 | 81 | 78 | 76 | 74 | 71 | 70 | 65 | 63 | 63 | 59 | 60 | 64 | 59 | 67 | 70 | 73 | 78 | 85 | 85 | 93 | 72.9 | 93 |
| 14-Sep | 95 | 95 | 96 | 95 | 97 | 98 | 98 | 98 | 95 | 82 | 73 | 67 | 59 | 55 | 50 | 49 | 50 | 53 | 58 | 68 | 72 | 77 | 78 | 89 | 77.0 | 98 |
| 15-Sep | 96 | 98 | 98 | 98 | 98 | 98 | 97 | 97 | 98 | 82 | 68 | 56 | 47 | 44 | 33 | 29 | 31 | 34 | 43 | 56 | 70 | 73 | 63 | 70 | 69.9 | 98 |
| 16-Sep | 78 | 75 | 76 | 75 | 75 | 78 | 79 | 75 | 67 | 56 | 44 | 35 | 32 | 31 | 30 | 32 | 32 | 34 | 38 | 43 | 47 | 53 | 58 | 62 | 54.3 | 79 |
| 17-Sep | 62 | 65 | 69 | 73 | 76 | 78 | 80 | 76 | 66 | 55 | 45 | 38 | 32 | 30 | 30 | 30 | 31 | 34 | 41 | 47 | 51 | 55 | 60 | 64 | 53.8 | 80 |
| 18-Sep | 67 | 71 | 73 | 75 | 78 | 80 | 80 | 72 | 63 | 54 | 46 | 39 | 34 | 32 | 31 | 31 | 32 | 39 | 45 | 47 | 47 | 51 | 57 | 57 | 54.2 | 80 |
| 19-Sep | 59 | 64 | 62 | 68 | 80 | 83 | 83 | 81 | 77 | 69 | 64 | 59 | 59 | 71 | 75 | 75 | 77 | 89 | 93 | 94 | 93 | 91 | 91 | 94 | 77.1 | 94 |
| 20-Sep | 95 | 95 | 96 | 94 | 93 | 89 | 90 | 88 | 87 | 93 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 96 | 95 | 95 | 95 | 95 | 93.8 | 96 |
| 21-Sep | 94 | 96 | 95 | 96 | 96 | 96 | 96 | 96 | 95 | 94 | 92 | 89 | 88 | 85 | 84 | 83 | 83 | 84 | 86 | 85 | 84 | 83 | 82 | 87 | 89.6 | 96 |
| 22-Sep | 89 | 89 | 91 | 92 | 91 | 94 | 96 | 94 | 90 | 83 | 77 | 70 | 70 | 69 | 69 | 72 | 75 | 75 | 80 | 92 | 92 | 92 | 92 | 93 | 84.5 | 96 |
| 23-Sep | 96 | 95 | 96 | 97 | 98 | 97 | 98 | 98 | 89 | 84 | 77 | 72 | 69 | 62 | 54 | 53 | 55 | 56 | 66 | 77 | 80 | 80 | 81 | 83 | 79.8 | 98 |
| 24-Sep | 87 | 89 | 92 | 95 | 95 | 95 | 96 | 92 | 85 | 76 | 69 | 62 | 57 | 53 | 50 | 48 | 49 | 56 | 65 | 62 | 63 | 67 | 68 | 69 | 72.6 | 96 |
| 25-Sep | 71 | 76 | 79 | 82 | 84 | 87 | 88 | 87 | 85 | 79 | 71 | 65 | 61 | 55 | 42 | 41 | 43 | 43 | 54 | 62 | 64 | 67 | 71 | 78 | 68.1 | 88 |
| 26-Sep | 80 | 76 | 76 | 81 | 83 | 86 | 87 | 81 | 73 | 67 | 59 | 45 | 38 | 37 | 35 | 34 | 35 | 39 | 47 | 55 | 65 | 69 | 81 | 79 | 62.8 | 87 |
| 27-Sep | 75 | 74 | 84 | 84 | 79 | 83 | 88 | 80 | 70 | 68 | 58 | 54 | 52 | 51 | 49 | 52 | 55 | 65 | 74 | 79 | 79 | 80 | 82 | 82 | 70.8 | 88 |
| 28-Sep | 83 | 84 | 85 | 86 | 91 | 90 | 94 | 92 | 78 | 64 | 54 | 48 | 44 | 41 | 39 | 40 | 40 | 43 | 49 | 56 | 60 | 64 | 69 | 71 | 65.3 | 94 |
| 29-Sep | 73 | 74 | 75 | 75 | 76 | 79 | 85 | 79 | 69 | 58 | 49 | 44 | 36 | 32 | 31 | 32 | 36 | 39 | 48 | 56 | 59 | 83 | 73 | 72 | 59.7 | 85 |
| 30-Sep | 84 | 80 | 81 | 92 | 91 | 94 | 95 | 92 | 83 | 71 | 60 | 53 | 48 | 44 | 42 | 42 | 47 | 51 | 55 | 58 | 62 | 65 | 70 | 71 | 68.0 | 95 |
| | 77.6 | 78.8 | 80.5 | 81.9 | 83.6 | 85.3 | 85.5 | 81.8 | 75.9 | 68.5 | 61.3 | 55.5 | 51.5 | 49.3 | 47.0 | 46.7 | 48.1 | 51.6 | 58.0 | 64.2 | 68.9 | 72.9 | 73.7 | 75.5 | Diurnal Average | |
| | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 94 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 97 | 98 | 98 | 98 | 98 | 97 | Diurnal Maximum | |





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Buffalo Viewpoint - September 2017

| | | |
|--|---|--------------------------------|
| Maximum Speed: 33 km/h on Sep 20 13:00 | Maximum Daily Speed Average: 27.8 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 28 06:00 | Minimum Daily Speed Average: 0.5 km/h on Sep 6 | Hours of Data: 718 |
| Maximum Diurnal Speed Average: 4.2 km/h at hour 15 | Minimum Diurnal Speed Average: 0.3 km/h at hour 21 | Hours of Missing Data: 2 |
| Monthly Average Velocity: 1.9 km/h 262.4 deg | Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 31 | 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-Sep | W18WNW10 | W12 | W18 | W22 | W26 | W25 | W28 | W18WSW16WSW16WSW14WSW17 | W20 | W23 | W23 | W22 | W23 | W21WSW15WSW14WSW13WSW15 | W22 | | | | | | | | | | W18.7 | W28 | |
| 2-Sep | W22 | W21 | W15 | W17 | W14 | W15 | W16 | W19 | W18 | W14 | W12WNW14WNW12WNW11WNW10 | W12 | WSW9 | WSW9WSW12WSW16WSW15WSW14 | W11 | W12 | | | | | | | | | W13.7 | W22 | |
| 3-Sep | W14 | W15 | W20 | W14 | WSW8 | W12 | W16 | W20 | W16 | W19WNW20WNW20WNW22WNW20 | NW19WNW19 | NW21 | NW20 | N26 NNW22 NNW22 NNW20 NNW18 | NW13 | | | | | | | | | | WNW15.9 | N26 | |
| 4-Sep | NW11WNW11 | W8 | W9 | W11WNW11WNW10WNW10 | WNW9 | NW11 | NW13 | NW12WNW11 | WNW8 | NW7 | NW11WNW10 | W5 | SSW5 | S5 | S6 | SSE9 | SSE7 | SSE5 | | | | | | | WNW6.4 | NW13 | |
| 5-Sep | S6 | S7 | SSW6 | S6 | S7 | S8 | S7 | S5 | SSE5 | SSW6 | SE7 | SE6WSW10WSW13WSW12WSW12 | W11 | W8 | SW6 | S7 | SSE8 | SSE8 | SSE6 | WSW2 | | | | SSW5.7 | WSW13 | | |
| 6-Sep | WNW4 | SSW6 | SE7 | SSE4 | SSW1 | SSW3 | S3 | SSE2 | WNW2 | WNW6 | N5 | NNE5 | N6 | NNE6 | N6 | N6 | N5 | N2 | S2 | SE5 | SE6 | S6 | SSE7 | SSE8 | SE0.5 | SSE8 | |
| 7-Sep | SSE8 | SSE8 | SSE8 | SSE10 | SSE9 | SSE7 | SSE9 | SSE10 | SSE10 | SSE12 | S11 | S15 | SSW14 | SSW15 | SSW17 | SSW16 | S16 | S14 | S11 | S10 | SSE11 | S8 | S8 | SSE4 | S10.5 | SSW17 | |
| 8-Sep | SE7 | S6 | SE8 | SSE6 | S5 | SSE6 | SSE5 | SSW4 | W9WNW10 | NNW14 | N16 | NNE16 | NNE10 | N12 | NNE9 | NE8 | NW12 | NNW10 | N9 | NW2 | WNW6 | W5 | WSW3 | NNW3.3 | N16 | | |
| 9-Sep | S2 | NW4 | AF | SSE2 | SSE3 | ENE5 | NE2 | NNW6 | NNE7 | NNW4 | NNW6 | N8 | N10 | N11 | N14 | N14 | NNW13 | N12 | N10 | NNE7 | NNW5 | WNW5 | W7 | WSW7 | N5.5 | N14 | |
| 10-Sep | SW7 | SW5 | S5 | SW4 | WSW9WSW10 | W20 | W20 | W25 | W30 | W29 | W28 | W26 | W30WNW27WNW15WNW19 | W31 | W23 | WSW15WSW16WSW14WSW17 | W18 | | | | | | | W17.8 | W31 | | |
| 11-Sep | W9 | W11 | W16 | W17 | WSW9 | SSE4 | SE6 | SSE5 | SE7 | SSE6 | SE5 | SE7 | SE7 | SE6 | SE8 | SSE10 | SSE11 | SSE11 | S10 | W4 | NW4 | SSW6 | SW4 | WSW7 | SSW4.3 | W17 | |
| 12-Sep | WSW14 | W23 | W24 | W22 | W18WSW17WSW14 | W19 | W18WNW18WNW18WNW17WNW15WNW14WNW14 | NW14 | NNW15 | NNW10 | NE10 | NNE13 | NE14 | ENE9 | E4 | E4 | | | | | | | | | WNW10.6 | W24 | |
| 13-Sep | NNE4 | NNE8 | NE8 | ENE6 | SW2 | SSE2 | ESE3 | ENE4 | NE5 | SSW2 | NW2 | NE5 | E3 | ENE2 | NW5 | NNE5 | NE3 | ENE6 | ENE5 | ENE6 | ESE5 | SW4 | NW4 | NNE7 | NE2.7 | NE8 | |
| 14-Sep | NNE8 | N3 | N5 | NNE6 | NE6 | NE4 | NE5 | NE3 | N2 | N5 | NE7 | N8 | NW7 | N5 | NNE9 | ENE7 | ENE7 | ENE8 | ENE6 | NE9 | ENE9 | ENE8 | ENE4 | SSE1 | NE5.2 | ENE9 | |
| 15-Sep | SW2 | SW1 | S5 | SSE6 | SSE6 | SSE7 | S7 | S7 | S3 | S4 | SSW6 | SSE5 | SSE1 | ENE3 | SSW5WSW15 | SW10 | SW8 | SSW6 | S5 | S6 | SSE8 | SSE9 | SSE8 | | S5.0 | WSW11 | |
| 16-Sep | SSE8 | SSE6 | SSE8 | SSE10 | SSE10 | SSE9 | SSE9 | SSE11 | SSE11 | SSE9 | S14 | SSW16 | S17 | S17 | SSW16 | SSW17 | SSW15 | SSW13 | S9 | SSE8 | SSE8 | SSE8 | SSE9 | SSE10 | S10.7 | S17 | |
| 17-Sep | SSE10 | SSE10 | SSE9 | SSE8 | SSE9 | SSE10 | SSE10 | SSE9 | SSE11 | SSE11 | S13 | SSE15 | S18 | SSW18 | S15 | S13 | S14 | SSE10 | SSE10 | SSE10 | SSE10 | SSE8 | SSE8 | SSE8 | | S10.9 | S18 |
| 18-Sep | SSE9 | SSE10 | SSE9 | SSE10 | SSE10 | SSE10 | SSE11 | SSE13 | SSE13 | SSE15 | SSE17 | SSE20 | SSE18 | SSE14 | SE14 | SE16 | SE15 | SE11 | SE9 | SE9 | ESE9 | SE10 | SSE6 | SSE5 | SE11.5 | SSE20 | |
| 19-Sep | SE6 | SSE5 | ESE5 | ENE7 | NNE11 | NNE13 | NNE13 | NNE13 | NNE13 | NNE14 | NNE14 | NNE14 | NNE15 | E13 | ENE15 | E17 | E19 | ENE15 | NE15 | ENE16 | ENE14 | E15 | ENE15 | NE15 | NE11.4 | E19 | |
| 20-Sep | NNE17 | NNE19 | N20 | NNE22 | N24 | NNE23 | NNE25 | NNE29 | NNE31 | NNE31 | NNE32 | NNE32 | NNE33 | NNE32 | NNE32 | NNE30 | NNE30 | NNE30 | NNE30 | NNE32 | NNE31 | NNE28 | NNE28 | NNE28 | | NNE27.8 | NNE33 |
| 21-Sep | NNE27 | N26 | N27 | N27 | N27 | N26 | N25 | N24 | N23 | N24 | N24 | N23 | N23 | N23 | N25 | N27 | N26 | N22 | N20 | N19 | N17 | N12 | NW8 | NW7 | | N21.8 | N27 |
| 22-Sep | NW6 | W4 | W4 | W3 | WNW2 | S1 | S4 | SSW4 | SSW4 | SW4 | S3 | SW6 | W6 | W8 | SSW4 | S5 | SSE4 | SSE4 | SE5 | SSE5 | S4 | SSE5 | SSE5 | SE5 | | SSW2.9 | W8 |
| 23-Sep | WSW1 | SSE2 | SSW3 | S3 | SSE3 | S4 | S4 | SSE4 | SSE5 | SSE5 | W2 | SSE2 | SSE5 | SSE8 | S8 | SSE8 | SSE8 | SSE8 | SSE7 | SSE7 | SSE8 | SSE9 | SSE9 | SSE10 | | SSE5.4 | SSE10 |
| 24-Sep | SSE8 | SSE8 | S6 | S7 | S8 | S7 | S6 | S6 | S5 | SSE7 | SSE8 | SSE8 | SSE9 | SSE8 | S8 | SSE9 | SSE8 | SE7 | SE7 | SSE8 | SSE9 | SSE8 | SSE10 | SSE9 | | SSE7.6 | SSE10 |
| 25-Sep | SSE9 | SSE8 | SSE8 | SSE8 | S7 | SSE8 | S8 | S7 | SSE9 | SSE9 | S7 | SE5 | NE4 | N4WNW11 | NW8 | WSW5 | SW6 | S6 | SW10 | SW10 | SW7 | SSW7 | SSE5 | | S4.7 | WNW11 | |
| 26-Sep | SSE4 | WSW6 | W11WNW10WNW11 | W8 | WSW8 | WSW5 | W10 | W10 | W12 | NW10 | NW15 | NW17 | NW14 | NW16 | NW14 | NW10 | NW7 | SW2 | SW5 | S5 | SSE5 | S6 | | | WNW7.2 | NW17 | |
| 27-Sep | S4 | S4 | SSE6 | S7 | SSE8 | SSE8 | S8 | S5 | W2 | N5 | N5 | N5 | NW6 | WNW9 | N7 | NNW9 | N13 | NNE14 | NNE13 | NNE13 | NNE10 | N7 | N7 | NNE9 | | NNE3.1 | NNE14 |
| 28-Sep | NNE8 | NE7 | NE5 | SSE3 | AF | WSW0 | S2 | SSE6 | SSE10 | SSE10 | SSE10 | SSE13 | S14 | S14 | SSW14 | S15 | S15 | S13 | S11 | SSE11 | SSE12 | SSE11 | S9 | S11 | | S8.0 | S15 |
| 29-Sep | SSE13 | SSE13 | SSE13 | SSE12 | SSE9 | S6 | SSE4 | SSW4 | S7 | SSE11 | S12 | SSE11 | SSW14 | SSW12 | SW10 | WNW7 | NNW6 | N3 | SSE3 | SW5 | SSW4 | SSE8 | SSE8 | SSE8 | | S6.8 | SSW14 |
| 30-Sep | SSE7 | S7 | S7 | S8 | S7 | SSE7 | S7 | S7 | SSE6 | S6 | SSE7 | SE9 | NNW2 | W13WSW12WSW12WSW12 | W11 | NW12 | NW14 | NW14 | NW18 | NW19 | NW18 | | | | WSW4.8 | NW19 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|-------|-------------|-------|-------------|--------|------|------------|--------|------------|--------|--------|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|-----------------|
| SW1.9WSW2.5 | SW2.5 | SW2.5WSW2.7 | SW2.3 | SW2.7WSW3.1 | WSW2.4 | W2.8 | W2.5WNW1.4 | NNW3.3 | W3.7NNW4.2 | NNW3.5 | NNW2.9 | NNW2.4 | NNW1.2 | N0.9 | SSE0.3 | S1.4 | SW1.5 | SW1.5 | | | | | | | | | Diurnal Average |
| NNE27 | N26 | N27 | N27 | N27 | W26 | W25 | NNE29 | NNE31 | NNE31 | NNE32 | NNE32 | NNE33 | NNE32 | NNE32 | NNE30 | NNE30 | W31 | NNE30 | NNE32 | NNE31 | NNE28 | NNE28 | NNE28 | | | | 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

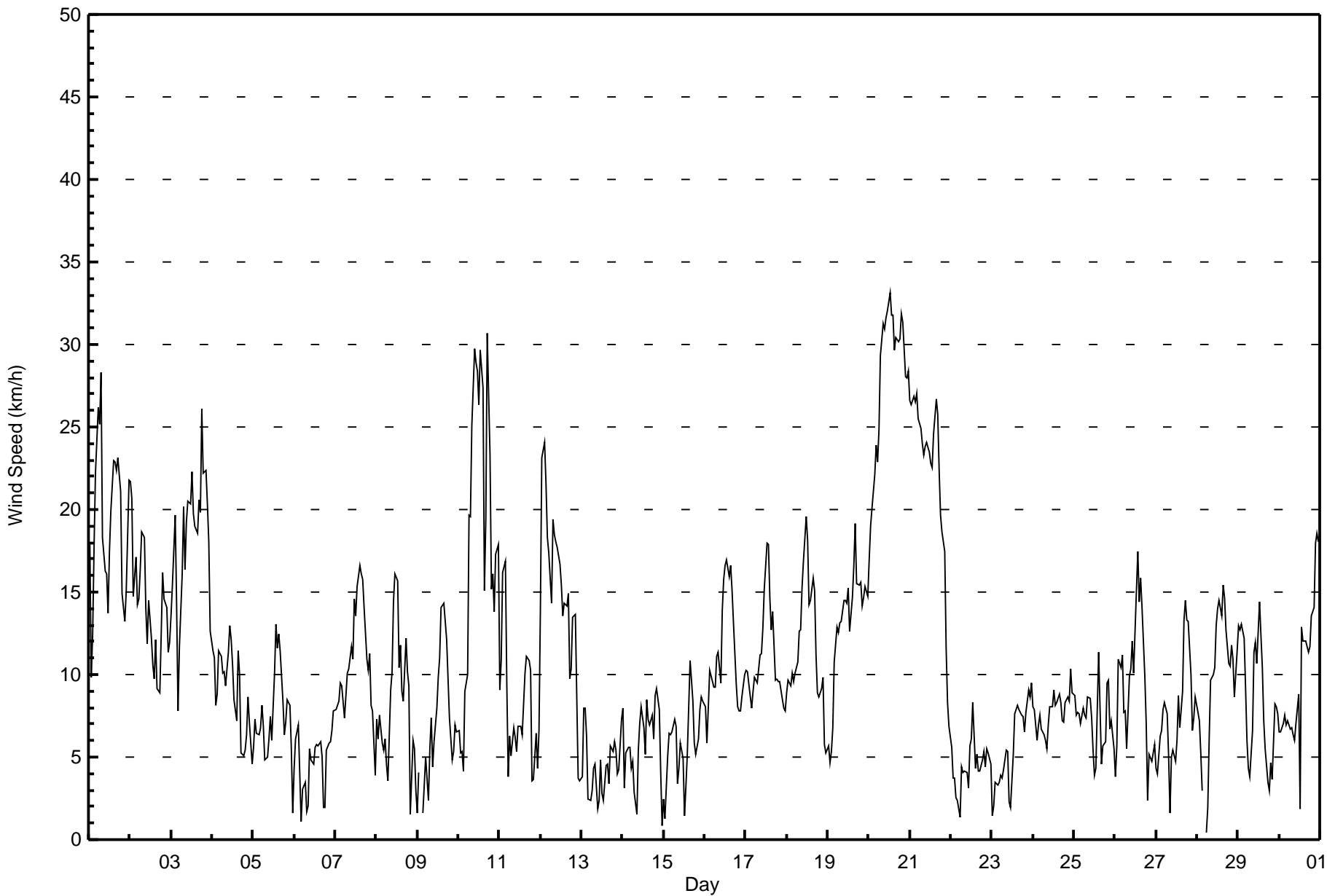
Wind Speed (WS) - km/h
Buffalo Viewpoint - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 11 km/h on Sep 11 20:00 | Hours of Data: 718 |
| Minimum Value: 1 km/h on Sep 4 20:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.7 |

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

Diurnal Maximum

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 151 | 21.03 | 21.03 |
| 6 - 11 | 316 | 44.01 | 65.04 |
| 12 - 19 | 170 | 23.68 | 88.72 |
| 20 - 28 | 63 | 8.77 | 97.49 |
| 29 - 38 | 18 | 2.51 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 718

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 13 | 3 | 9 | 6 | 3 | 3 | 5 | 34 | 25 | 12 | 11 | 6 | 8 | 4 | 6 | 3 | 151 |
| 6 - 11 | 12 | 14 | 7 | 11 | 0 | 1 | 19 | 121 | 46 | 8 | 10 | 12 | 17 | 19 | 13 | 6 | 316 |
| 12 - 19 | 9 | 15 | 3 | 5 | 4 | 0 | 3 | 15 | 16 | 13 | 0 | 26 | 29 | 11 | 17 | 4 | 170 |
| 20 - 28 | 21 | 7 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 24 | 5 | 2 | 3 | 63 |
| 29 - 38 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 18 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 55 | 53 | 19 | 22 | 7 | 4 | 27 | 171 | 87 | 33 | 21 | 44 | 82 | 39 | 38 | 16 | 718 |

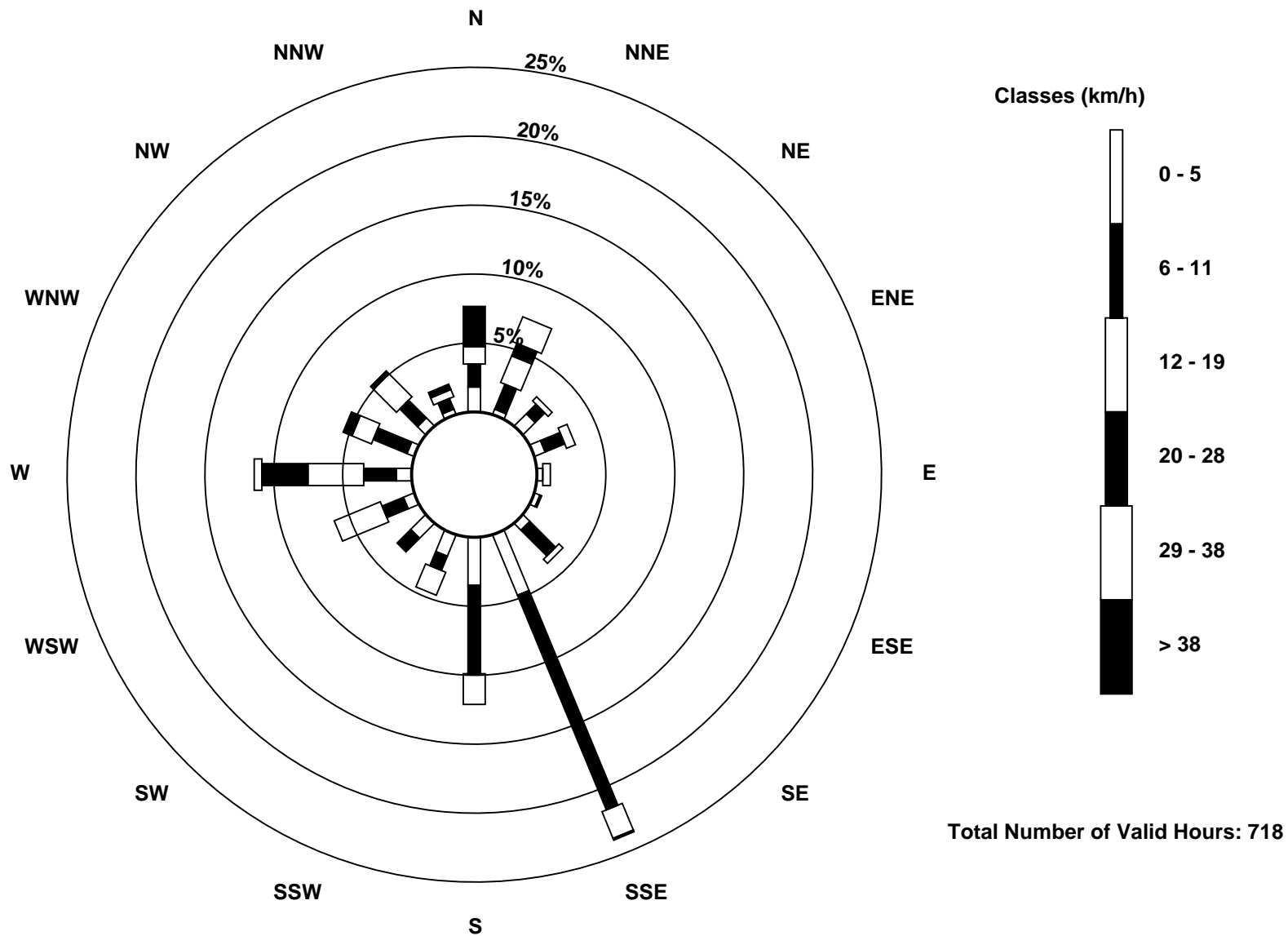
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|--|--|
| Direction of Maximum Speed: 23 deg on Sep 20 13:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 18.4 deg on Sep 20 | Hours of Data: 718 |
| Direction of Minimum Speed: 251 deg on Sep 28 06:00 | Direction of Minimum Daily Speed Average: 0.5 deg on Sep 6 |
| Direction of Minimum Speed: 251 deg on Sep 28 06:00 | Hours of Missing Data: 2 |
| Monthly Average Direction: 233.0 deg | Percent Operational Time: 99.7 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 264 | 289 | 265 | 261 | 266 | 262 | 263 | 264 | 262 | 252 | 248 | 247 | 254 | 264 | 273 | 277 | 269 | 263 | 262 | 257 | 253 | 244 | 252 | 259 | 261.7 |
| 2-Sep | 262 | 259 | 275 | 273 | 274 | 271 | 270 | 271 | 270 | 274 | 275 | 299 | 297 | 303 | 288 | 265 | 251 | 244 | 252 | 250 | 250 | 257 | 274 | 264 | 268.9 |
| 3-Sep | 266 | 261 | 266 | 265 | 254 | 262 | 268 | 269 | 269 | 272 | 289 | 286 | 293 | 303 | 309 | 300 | 310 | 320 | 350 | 339 | 333 | 334 | 333 | 325 | 298.5 |
| 4-Sep | 314 | 297 | 264 | 269 | 273 | 285 | 283 | 282 | 288 | 313 | 324 | 308 | 300 | 292 | 322 | 309 | 294 | 259 | 206 | 183 | 172 | 151 | 152 | 167 | 284.4 |
| 5-Sep | 181 | 180 | 192 | 177 | 174 | 176 | 174 | 175 | 152 | 203 | 145 | 140 | 240 | 239 | 254 | 256 | 266 | 262 | 223 | 173 | 163 | 162 | 168 | 244 | 202.4 |
| 6-Sep | 302 | 208 | 146 | 159 | 209 | 204 | 170 | 166 | 299 | 303 | 6 | 20 | 6 | 14 | 8 | 357 | 3 | 353 | 184 | 138 | 144 | 180 | 164 | 156 | 138.1 |
| 7-Sep | 156 | 158 | 158 | 163 | 151 | 160 | 163 | 165 | 164 | 159 | 174 | 189 | 199 | 195 | 197 | 195 | 187 | 187 | 178 | 174 | 168 | 169 | 171 | 165 | 176.2 |
| 8-Sep | 146 | 169 | 141 | 148 | 184 | 154 | 154 | 200 | 279 | 298 | 330 | 8 | 12 | 17 | 349 | 18 | 37 | 323 | 348 | 351 | 315 | 289 | 271 | 251 | 344.8 |
| 9-Sep | 176 | 321 | AF | 167 | 152 | 64 | 35 | 333 | 15 | 330 | 339 | 8 | 5 | 10 | 10 | 4 | 334 | 359 | 355 | 23 | 336 | 300 | 276 | 253 | 352.7 |
| 10-Sep | 227 | 234 | 185 | 231 | 249 | 249 | 264 | 268 | 267 | 271 | 273 | 275 | 280 | 278 | 285 | 295 | 285 | 267 | 263 | 250 | 249 | 247 | 253 | 259 | 266.8 |
| 11-Sep | 281 | 263 | 265 | 274 | 254 | 165 | 140 | 147 | 136 | 148 | 132 | 130 | 130 | 134 | 144 | 160 | 167 | 167 | 169 | 260 | 313 | 197 | 226 | 247 | 196.2 |
| 12-Sep | 252 | 266 | 277 | 279 | 264 | 256 | 251 | 264 | 274 | 283 | 301 | 302 | 297 | 296 | 291 | 308 | 338 | 344 | 35 | 32 | 40 | 60 | 81 | 94 | 292.0 |
| 13-Sep | 13 | 19 | 46 | 58 | 221 | 161 | 113 | 76 | 52 | 203 | 305 | 56 | 96 | 63 | 324 | 16 | 37 | 72 | 74 | 65 | 122 | 217 | 315 | 24 | 49.6 |
| 14-Sep | 28 | 5 | 349 | 29 | 42 | 47 | 35 | 34 | 0 | 10 | 42 | 8 | 315 | 3 | 25 | 59 | 61 | 57 | 67 | 39 | 59 | 60 | 67 | 164 | 35.2 |
| 15-Sep | 226 | 219 | 188 | 162 | 165 | 166 | 171 | 181 | 173 | 184 | 206 | 164 | 151 | 63 | 194 | 248 | 232 | 228 | 208 | 175 | 180 | 163 | 166 | 163 | 187.3 |
| 16-Sep | 158 | 168 | 165 | 162 | 159 | 158 | 158 | 158 | 159 | 165 | 187 | 193 | 185 | 190 | 199 | 204 | 205 | 194 | 177 | 167 | 168 | 168 | 165 | 159 | 177.6 |
| 17-Sep | 160 | 156 | 157 | 168 | 162 | 164 | 165 | 168 | 163 | 164 | 170 | 166 | 183 | 196 | 188 | 180 | 176 | 160 | 153 | 156 | 160 | 166 | 166 | 162 | 169.1 |
| 18-Sep | 158 | 153 | 153 | 150 | 155 | 154 | 155 | 151 | 150 | 150 | 153 | 148 | 155 | 147 | 130 | 127 | 127 | 131 | 125 | 125 | 120 | 124 | 157 | 153 | 143.7 |
| 19-Sep | 135 | 160 | 112 | 57 | 18 | 26 | 27 | 24 | 27 | 27 | 19 | 32 | 31 | 84 | 57 | 84 | 79 | 74 | 55 | 59 | 72 | 88 | 71 | 35 | 54.1 |
| 20-Sep | 21 | 17 | 8 | 12 | 8 | 13 | 12 | 15 | 20 | 22 | 22 | 23 | 23 | 23 | 21 | 21 | 20 | 19 | 21 | 16 | 21 | 18 | 18 | 16 | 18.4 |
| 21-Sep | 14 | 9 | 9 | 11 | 7 | 6 | 5 | 4 | 5 | 4 | 5 | 9 | 4 | 6 | 6 | 4 | 6 | 4 | 5 | 8 | 5 | 353 | 324 | 309 | 5.0 |
| 22-Sep | 305 | 260 | 268 | 265 | 283 | 186 | 175 | 204 | 198 | 220 | 171 | 229 | 271 | 262 | 204 | 171 | 157 | 160 | 137 | 152 | 182 | 148 | 149 | 143 | 200.7 |
| 23-Sep | 254 | 157 | 193 | 174 | 166 | 179 | 175 | 166 | 164 | 165 | 264 | 167 | 162 | 168 | 181 | 165 | 163 | 155 | 158 | 153 | 164 | 166 | 164 | 160 | 167.1 |
| 24-Sep | 161 | 163 | 171 | 174 | 176 | 178 | 180 | 177 | 169 | 164 | 161 | 168 | 164 | 159 | 171 | 162 | 155 | 136 | 141 | 165 | 164 | 158 | 160 | 164 | 163.7 |
| 25-Sep | 165 | 157 | 159 | 163 | 172 | 168 | 171 | 170 | 167 | 165 | 175 | 140 | 48 | 357 | 303 | 316 | 255 | 227 | 189 | 217 | 220 | 223 | 210 | 152 | 188.1 |
| 26-Sep | 156 | 249 | 276 | 290 | 291 | 266 | 250 | 246 | 274 | 272 | 274 | 310 | 316 | 320 | 311 | 312 | 310 | 321 | 309 | 228 | 221 | 186 | 152 | 171 | 287.3 |
| 27-Sep | 186 | 173 | 155 | 176 | 168 | 147 | 177 | 173 | 280 | 351 | 9 | 10 | 309 | 298 | 350 | 340 | 2 | 21 | 26 | 27 | 25 | 2 | 10 | 32 | 16.1 |
| 28-Sep | 27 | 42 | 54 | 149 | AF | 251 | 182 | 166 | 159 | 159 | 168 | 165 | 169 | 180 | 203 | 190 | 191 | 180 | 172 | 165 | 163 | 164 | 171 | 169 | 169.4 |
| 29-Sep | 163 | 161 | 163 | 162 | 167 | 188 | 164 | 196 | 174 | 163 | 169 | 161 | 208 | 209 | 219 | 298 | 327 | 6 | 161 | 224 | 207 | 161 | 165 | 166 | 179.7 |
| 30-Sep | 165 | 189 | 178 | 191 | 180 | 163 | 174 | 187 | 162 | 178 | 160 | 134 | 327 | 260 | 246 | 244 | 252 | 260 | 306 | 313 | 322 | 315 | 319 | 312 | 255.2 |

233.2 240.3 233.6 235.0 238.8 225.8 231.0 246.3 253.9 260.6 278.6 297.4 289.0 280.8 291.2 294.1 297.3 295.0 338.2 7.1 152.4 188.6 217.6 226.9

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

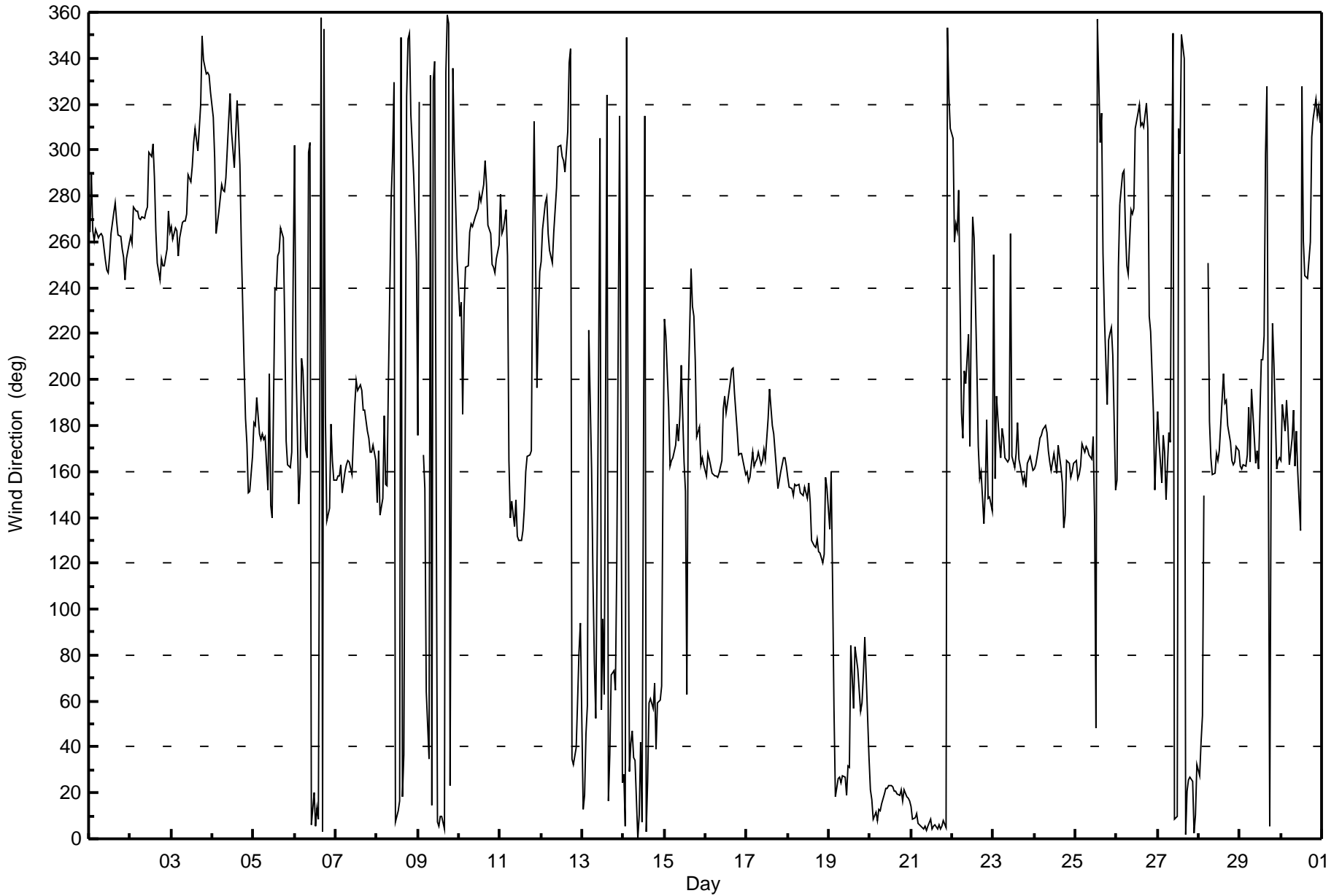
Wind Direction (WD) - deg
Buffalo Viewpoint - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 104 deg on Sep 15 13:00 | Hours of Data: 718 |
| Minimum Value: 6 deg on Sep 29 23:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 7 P ₁₀ = 13 Q ₁ = 17 Median = 20 Q ₃ = 26 P ₉₀ = 38 P ₉₉ = 82 | 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-Sep | 14 | 25 | 27 | 14 | 13 | 12 | 12 | 12 | 16 | 18 | 18 | 20 | 20 | 20 | 18 | 17 | 16 | 15 | 13 | 14 | 15 | 17 | 16 | 14 | 27 | |
| 2-Sep | 12 | 15 | 27 | 10 | 13 | 12 | 10 | 11 | 11 | 19 | 24 | 21 | 21 | 21 | 22 | 17 | 16 | 17 | 16 | 16 | 17 | 17 | 18 | 13 | 27 | |
| 3-Sep | 12 | 13 | 10 | 12 | 20 | 19 | 11 | 10 | 13 | 15 | 21 | 20 | 21 | 23 | 22 | 21 | 21 | 17 | 27 | 21 | 18 | 16 | 16 | 14 | 27 | |
| 4-Sep | 16 | 16 | 19 | 10 | 12 | 13 | 12 | 17 | 21 | 22 | 28 | 32 | 27 | 46 | 45 | 32 | 24 | 22 | 10 | 7 | 6 | 8 | 7 | 14 | 46 | |
| 5-Sep | 16 | 13 | 17 | 14 | 14 | 14 | 15 | 31 | 34 | 30 | 29 | 43 | 31 | 25 | 23 | 21 | 17 | 13 | 34 | 13 | 7 | 11 | 12 | 56 | 56 | |
| 6-Sep | 34 | 38 | 10 | 16 | 63 | 46 | 20 | 65 | 57 | 29 | 40 | 40 | 31 | 37 | 36 | 31 | 24 | 38 | 33 | 9 | 33 | 12 | 16 | 20 | 65 | |
| 7-Sep | 20 | 23 | 22 | 21 | 17 | 19 | 21 | 24 | 24 | 23 | 27 | 24 | 25 | 24 | 23 | 23 | 25 | 23 | 21 | 22 | 20 | 22 | 23 | 85 | 85 | |
| 8-Sep | 12 | 16 | 14 | 14 | 14 | 34 | 48 | 52 | 18 | 23 | 19 | 22 | 20 | 33 | 23 | 28 | 31 | 21 | 21 | 21 | 82 | 14 | 21 | 37 | 82 | |
| 9-Sep | 70 | 13 | AF | 88 | 51 | 19 | 41 | 15 | 17 | 29 | 27 | 23 | 21 | 18 | 18 | 21 | 17 | 19 | 22 | 22 | 21 | 23 | 13 | 18 | 88 | |
| 10-Sep | 14 | 37 | 24 | 24 | 20 | 19 | 13 | 12 | 13 | 13 | 14 | 15 | 17 | 16 | 19 | 21 | 20 | 11 | 13 | 17 | 17 | 18 | 17 | 16 | 37 | |
| 11-Sep | 18 | 13 | 11 | 11 | 40 | 55 | 18 | 41 | 18 | 24 | 21 | 25 | 29 | 26 | 26 | 24 | 25 | 24 | 22 | 75 | 63 | 13 | 56 | 25 | 75 | |
| 12-Sep | 16 | 11 | 16 | 15 | 14 | 17 | 17 | 13 | 14 | 18 | 21 | 21 | 20 | 21 | 20 | 29 | 20 | 38 | 16 | 17 | 19 | 18 | 18 | 26 | 38 | |
| 13-Sep | 24 | 19 | 17 | 40 | 66 | 50 | 34 | 23 | 28 | 75 | 80 | 37 | 58 | 83 | 41 | 34 | 52 | 22 | 12 | 10 | 16 | 48 | 33 | 15 | 83 | |
| 14-Sep | 13 | 18 | 19 | 20 | 16 | 27 | 21 | 36 | 32 | 25 | 32 | 25 | 48 | 55 | 28 | 30 | 28 | 21 | 12 | 11 | 11 | 27 | 32 | 79 | 79 | |
| 15-Sep | 42 | 65 | 16 | 10 | 6 | 12 | 15 | 18 | 32 | 45 | 40 | 53 | 104 | 75 | 65 | 30 | 24 | 26 | 15 | 9 | 16 | 6 | 13 | 12 | 11 | 104 |
| 16-Sep | 18 | 16 | 23 | 21 | 21 | 23 | 22 | 22 | 22 | 26 | 25 | 27 | 28 | 28 | 26 | 21 | 20 | 22 | 21 | 19 | 20 | 22 | 21 | 20 | 28 | |
| 17-Sep | 21 | 20 | 20 | 22 | 21 | 21 | 21 | 21 | 23 | 24 | 29 | 28 | 26 | 23 | 29 | 27 | 26 | 26 | 21 | 19 | 20 | 22 | 21 | 19 | 29 | |
| 18-Sep | 20 | 19 | 19 | 20 | 20 | 20 | 22 | 21 | 23 | 23 | 25 | 26 | 26 | 31 | 22 | 19 | 18 | 18 | 16 | 14 | 16 | 16 | 31 | 23 | 31 | |
| 19-Sep | 21 | 30 | 26 | 30 | 14 | 12 | 13 | 14 | 14 | 17 | 18 | 20 | 18 | 23 | 17 | 20 | 16 | 16 | 16 | 16 | 17 | 16 | 21 | 16 | 30 | |
| 20-Sep | 15 | 16 | 16 | 18 | 17 | 18 | 19 | 18 | 16 | 17 | 16 | 16 | 16 | 15 | 15 | 16 | 17 | 17 | 16 | 17 | 16 | 17 | 17 | 17 | 19 | |
| 21-Sep | 17 | 18 | 19 | 17 | 18 | 17 | 19 | 20 | 19 | 19 | 18 | 18 | 19 | 18 | 18 | 18 | 18 | 17 | 18 | 17 | 16 | 23 | 17 | 17 | 23 | |
| 22-Sep | 19 | 31 | 36 | 46 | 49 | 85 | 21 | 17 | 17 | 21 | 38 | 46 | 47 | 29 | 39 | 24 | 27 | 30 | 28 | 28 | 22 | 18 | 21 | 17 | 85 | |
| 23-Sep | 50 | 33 | 20 | 20 | 17 | 20 | 19 | 21 | 30 | 31 | 70 | 89 | 30 | 33 | 42 | 30 | 25 | 24 | 19 | 17 | 21 | 21 | 20 | 20 | 89 | |
| 24-Sep | 20 | 20 | 17 | 18 | 20 | 20 | 19 | 22 | 29 | 31 | 29 | 35 | 32 | 34 | 34 | 26 | 24 | 17 | 15 | 20 | 19 | 19 | 21 | 20 | 35 | |
| 25-Sep | 19 | 20 | 19 | 19 | 21 | 20 | 19 | 17 | 20 | 24 | 34 | 51 | 67 | 64 | 23 | 23 | 25 | 11 | 18 | 9 | 17 | 27 | 20 | 25 | 67 | |
| 26-Sep | 54 | 44 | 20 | 14 | 17 | 24 | 25 | 32 | 20 | 21 | 21 | 22 | 20 | 19 | 21 | 18 | 17 | 13 | 8 | 50 | 22 | 33 | 31 | 29 | 54 | |
| 27-Sep | 29 | 41 | 12 | 14 | 18 | 8 | 14 | 24 | 68 | 27 | 35 | 36 | 30 | 21 | 34 | 22 | 25 | 17 | 14 | 14 | 15 | 17 | 15 | 12 | 68 | |
| 28-Sep | 13 | 15 | 18 | 62 | AF | 77 | 61 | 19 | 23 | 26 | 26 | 25 | 25 | 26 | 23 | 22 | 22 | 21 | 19 | 19 | 19 | 19 | 19 | 20 | 77 | |
| 29-Sep | 19 | 20 | 20 | 22 | 24 | 21 | 50 | 20 | 23 | 22 | 25 | 27 | 23 | 22 | 19 | 31 | 33 | 27 | 62 | 40 | 43 | 6 | 6 | 14 | 62 | |
| 30-Sep | 21 | 10 | 11 | 9 | 17 | 14 | 12 | 15 | 23 | 26 | 33 | 21 | 93 | 21 | 20 | 19 | 17 | 16 | 18 | 16 | 16 | 18 | 19 | 17 | 93 | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|--|
| 70 | 65 | 36 | 88 | 66 | 85 | 61 | 65 | 68 | 75 | 80 | 89 | 104 | 83 | 65 | 34 | 52 | 38 | 62 | 75 | 82 | 48 | 56 | 85 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 10:05 |
| Reason: | As Found | | |

Calibration Standards

| | | | | |
|-----------------------|-----------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>49.7</u> | ppm | Cal Gas Exp Date | September 8, 2019 |
| Cal Gas Cylinder # | <u>LL107929</u> | | | |
| Calibrator Make/Model | API T700 | | Serial Number | 3060 |
| ZAG Make/Model | API 701 | | Serial Number | 4297 |

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: JC1327300932

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -576.1 | -576.1 |
| Calculated slope | 0.995006 | 0.994474 | Lamp voltage | 832 | 827 |
| Calculated intercept | 1.594502 | -0.198895 | Pressure | 691.6 | 687.7 |
| Analyzer Background | 11.3 | 11.3 | Flow | 0.503 | 0.500 |
| Analyzer Coefficient | 0.973 | 0.973 | Intensity | 85 | 85 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5008 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 4936 | 78.8 | 781.0 | 785.5 | 0.994 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 4936 | 78.8 | 781.0 | 785.5 | 0.994 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |

| | | | | | |
|---------------------------|--------|-------------------|--------|----------|-------|
| Average Correction Factor | | | | 0.994 | |
| Corrected As found | 785.30 | Previous response | 783.29 | % change | -0.3% |

* = > +/-5% change initiates investigation

Notes:

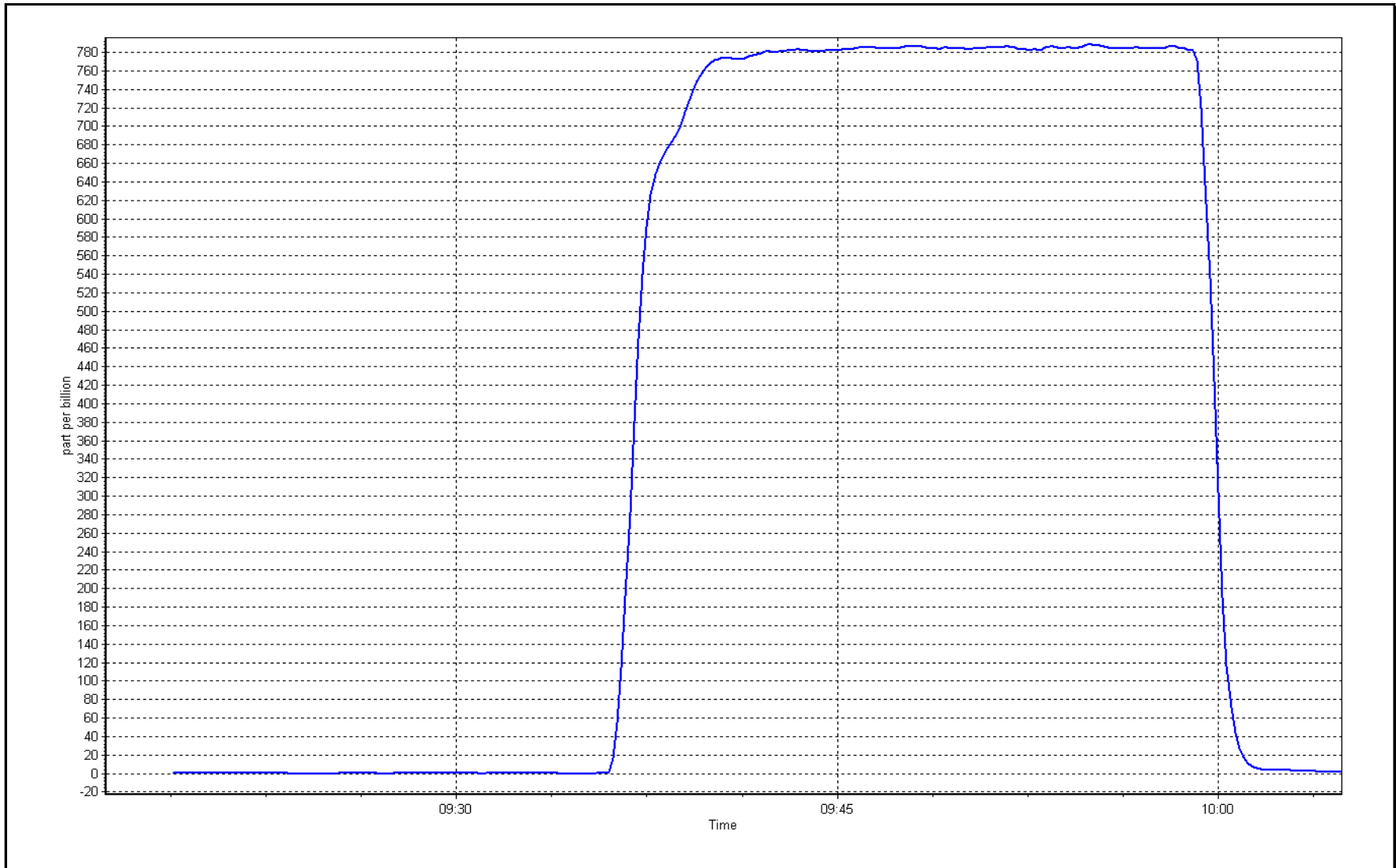
Calibration Gas change out

Calibration Performed By: Melissa Lemay

SO2 Calibration Plot

Date: September 25, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

SO₂ Calibration Summary

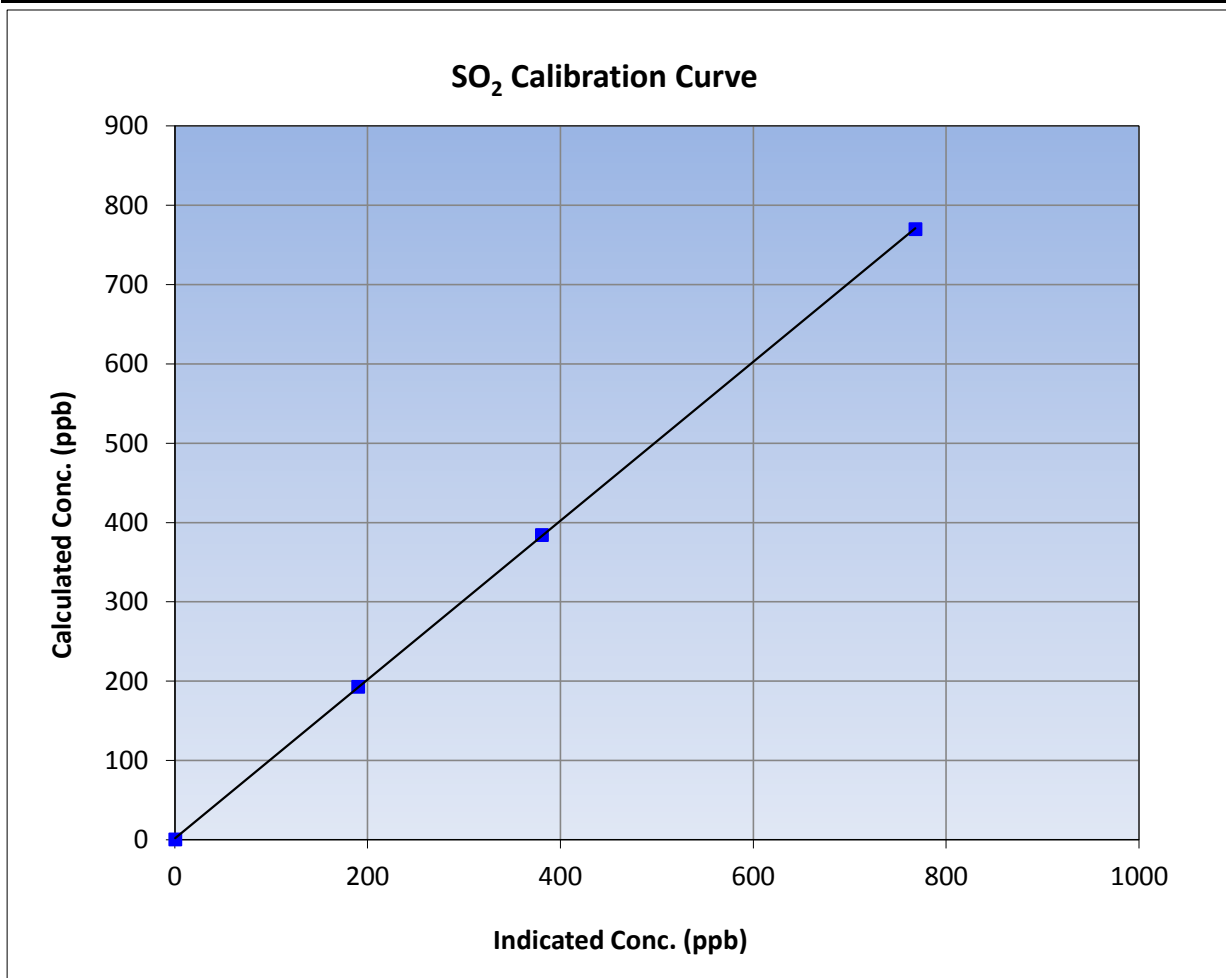
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 04 |
| Start Time (MST) | 9:15 | End Time (MST) | 14:11 |
| Analyzer make | Thermo 43i | Analyzer serial # | JC1327300932 |

Calibration Data

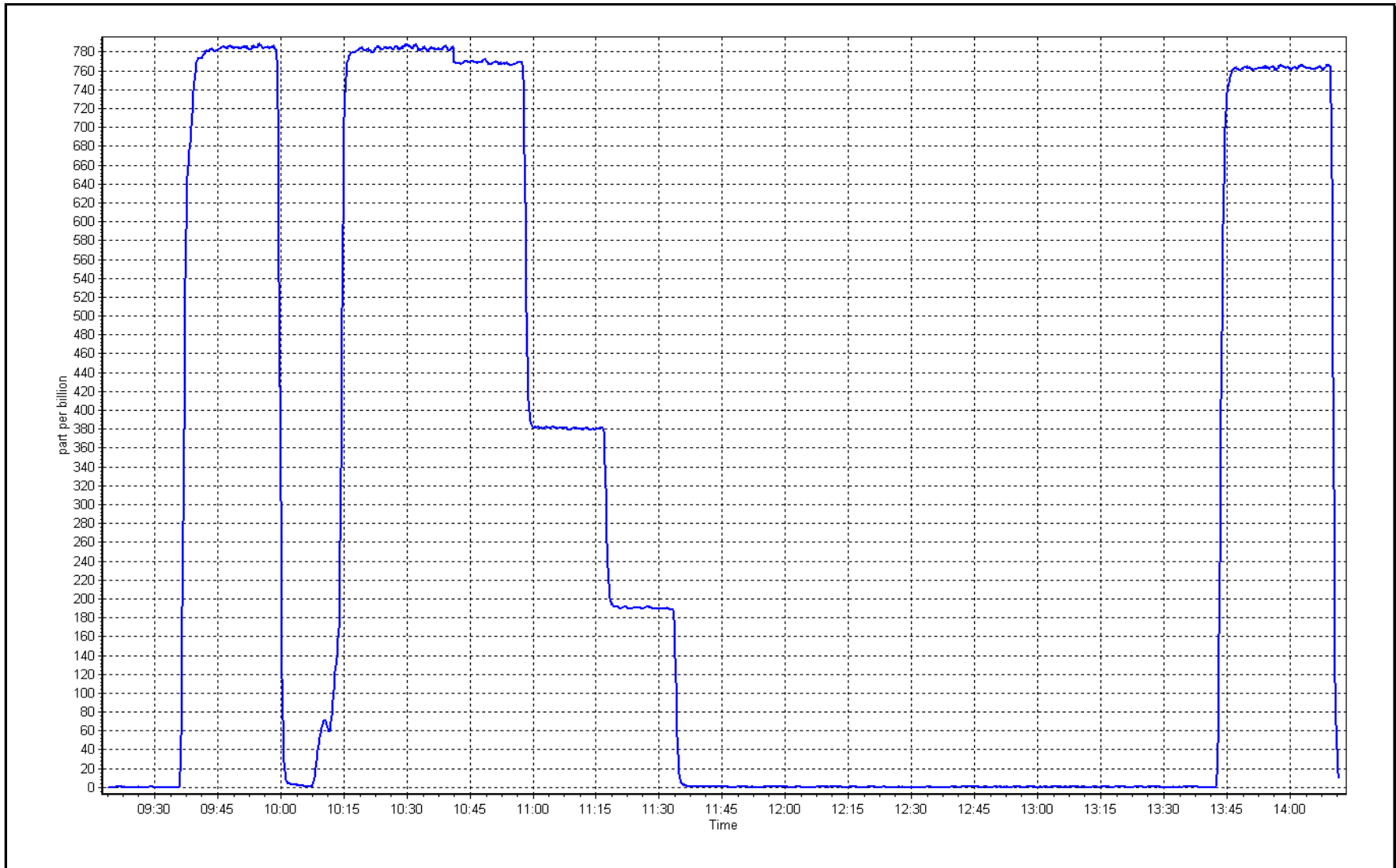
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999980 | ≥0.995 |
| 769.6 | 767.8 | 1.0024 | | | |
| 384.0 | 380.4 | 1.0096 | Slope | 1.002076 | 0.90 - 1.10 |
| 192.4 | 190.0 | 1.0127 | | | |
| | | | Intercept | 1.223337 | +/-30 |



SO2 Calibration Plot

Date: September 25, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 26, 2017 | Last Cal Date: | August 21, 2017 |
| Start time (MST): | 6:00 | End time (MST): | 10:03 |
| Reason: | Routine | | |

Calibration Standards

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

Analyzer Information

| | | | | | |
|----------------------|--------------|--------------------|--------------|---------------|-------|
| Analyzer make: | Thermo 450i | Analyzer serial #: | 1336160094 | | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> | |
| Analyzer Range | 0 - 100 ppb | PMT voltage | -599.8 | -599.8 | |
| Calculated slope | 0.991070 | 0.983294 | Lamp voltage | 875 | 875 |
| Calculated intercept | 0.053564 | 0.067561 | Pressure | 543.6 | 543.6 |
| Analyzer Background | 14.1 | 14.1 | Flow | 1.047 | 1.047 |
| Analyzer Coefficient | 0.975 | 0.975 | Intensity | 94 | 94 |

H₂S Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4938 | 78.6 | 80.1 | 80.1 | 1.000 |
| calibrator zero | 6000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4938 | 78.6 | 80.1 | 81.3 | 0.985 |
| second point | 4974 | 39.2 | 40.0 | 40.7 | 0.982 |
| third point | 4995 | 19.7 | 20.1 | 20.3 | 0.989 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 4936 | 78.6 | 80.1 | 81.5 | 0.983 |
| SO2 Scrubber Check | 4979 | 20.4 | 200.0 | 1.7 | ---- |
| Average Correction Factor | | | | | 0.985 |
| Corrected As found | 80.21 | Previous response | 80.73 | *% change | 0.6% |

* = > +/-5% change initiates investigation

Notes:

No maintenance or adjustments done,

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

H₂S Calibration Summary

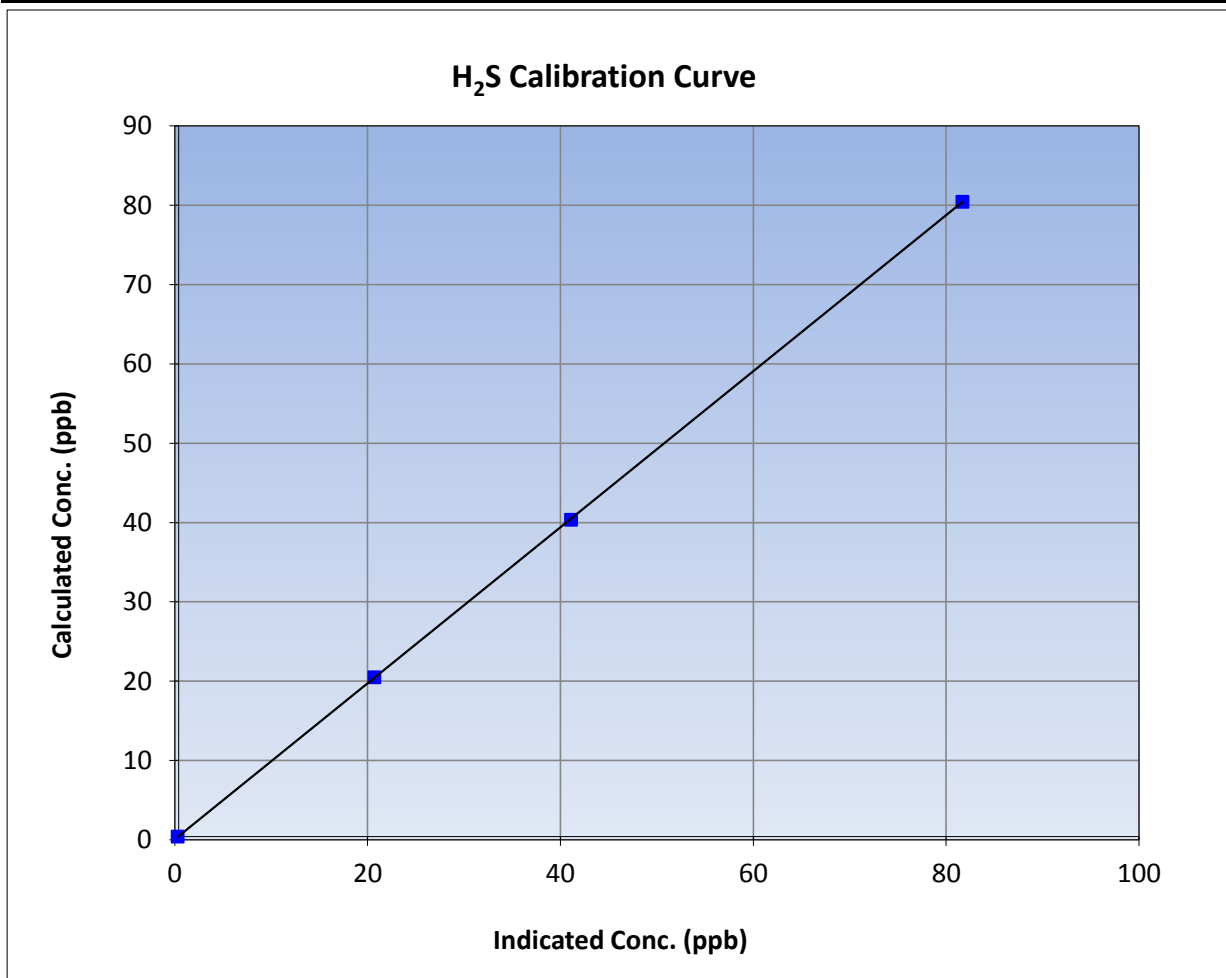
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 21, 2017 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 04 |
| Start Time (MST) | 6:00 | End Time (MST) | 10:03 |
| Analyzer make | Thermo 450i | Analyzer serial # | 1336160094 |

Calibration Data

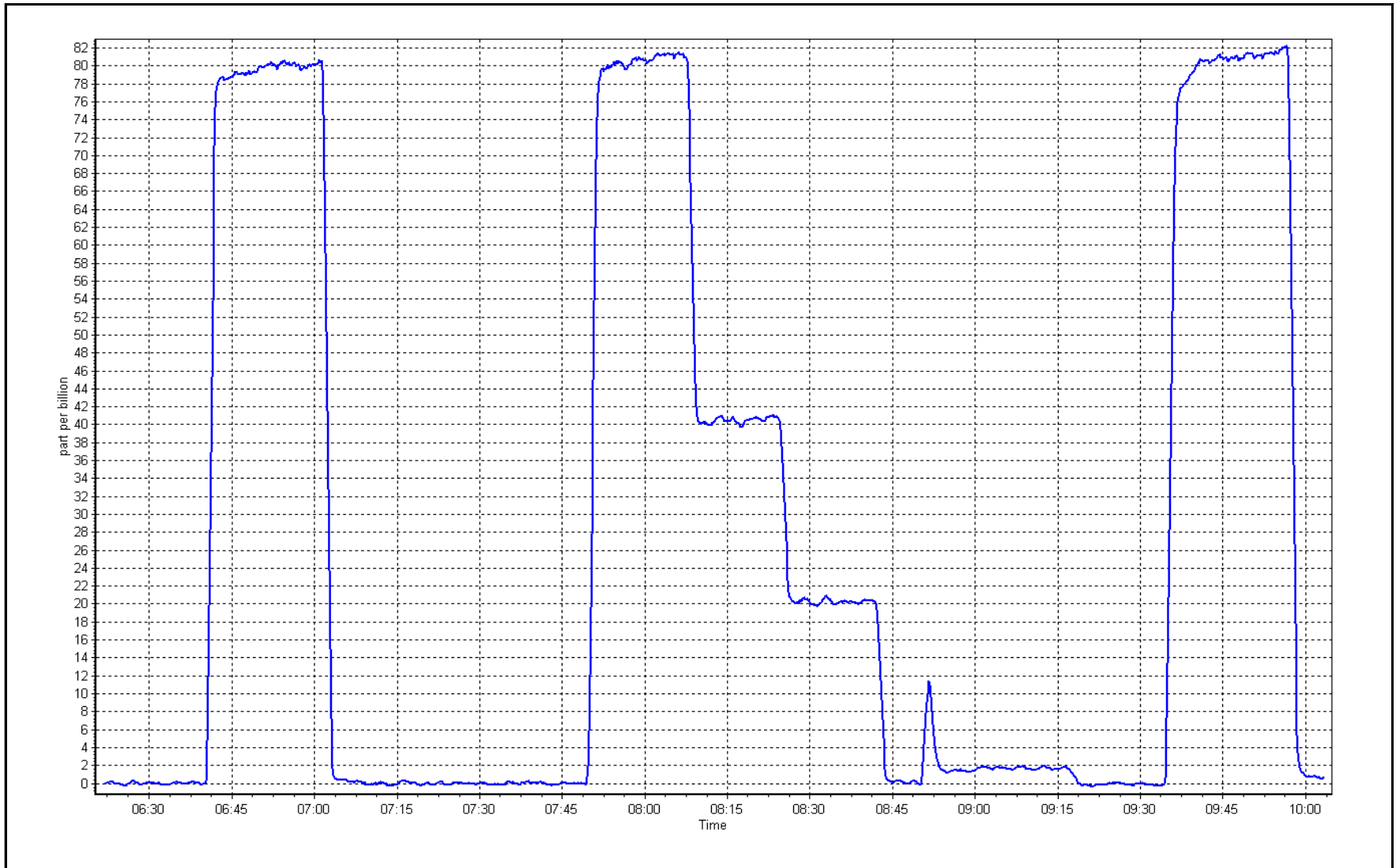
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999993 | ≥0.995 |
| 80.1 | 81.3 | 0.9848 | | | |
| 40.0 | 40.7 | 0.9817 | Slope | 0.983294 | 0.90 - 1.10 |
| 20.1 | 20.3 | 0.9889 | | | |
| | | | Intercept | 0.067561 | +/-3 |



H₂S Calibration Plot

Date: September 26, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 10:05 |
| Reason: | As Found | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|-----------------|
| Gas Cert Reference | LL107929 | Cal Gas Expiry Date | September-08-18 |
| CH4 Cal Gas Conc. | <u>514.0</u> ppm | CH4 Equiv Conc. | 1061.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 3060 |
| ZAG Make/Model | API 701 | Serial Number | 4297 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|---------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1170050149 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -287.2 |
| Calculated slope | 0.999618 | Sample pressure | 8.7 |
| Calculated intercept | 0.025629 | Fuel pressure | 19.3 |
| Analyzer Background | 3.410 | Air pressure | 34.6 |
| Analyzer Coefficient | 3.856 | Flame temperature | 147.1 |
| | | | <u>Finish</u> |
| | | | -287.7 |
| | | | 8.7 |
| | | | 19.3 |
| | | | 34.6 |
| | | | 147.2 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|--|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5008 | 0.0 | 0.00 | -0.08 | ---- |
| as found span | 4936 | 78.8 | 16.68 | 16.57 | 1.006 |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.08 | ---- |
| high point | 4936 | 78.8 | 16.68 | 16.57 | 1.006 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.006 |
| Corrected As found | 16.65 | Previous response | 16.66 | *% change | 0.0% |
| * = > +/-5% change initiates investigation | | | | | |

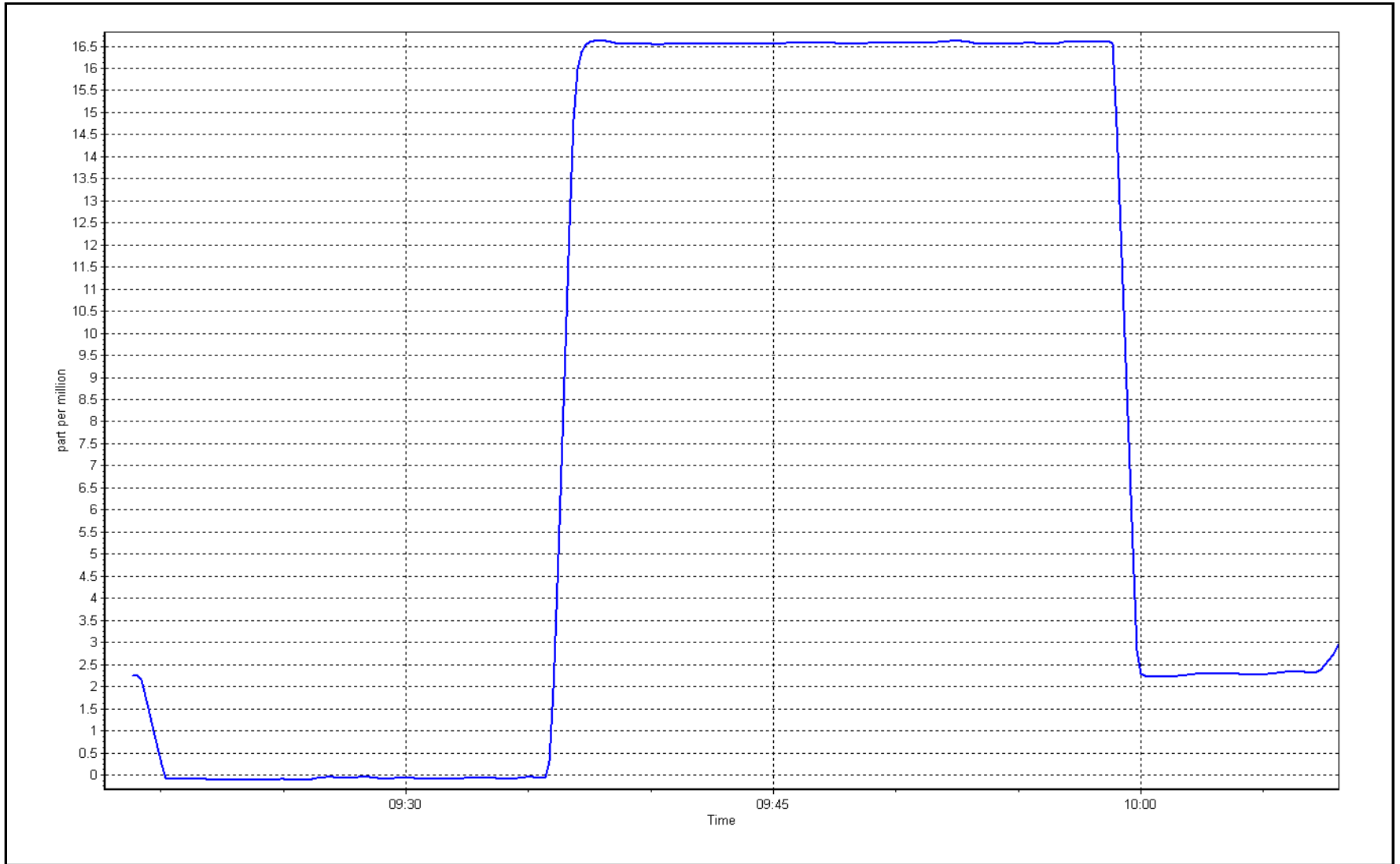
Notes: Calibration Gas cylinder change out

Calibration Performed By: Melissa Lemay

THC Calibration Plot

Date: September 25, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 14:10 |
| Reason: | Cylinder Change | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|--------------------------|
| Gas Cert Reference | LL28372 | Cal Gas Expiry Date | Tuesday, August 18, 2020 |
| CH4 Cal Gas Conc. | <u>501.0</u> ppm | CH4 Equiv Conc. | 1053.8 ppm |
| C3H8 Cal Gas Conc. | <u>201.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 3060 |
| ZAG Make/Model | API 701 | Serial Number | 4297 |

Analyzer Information

| | | | | |
|----------------------|---------------|---------------------|--------------|---------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1170050149 | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -287.2 | -287.2 |
| Calculated slope | 1.001558 | Sample pressure | 8.7 | 8.7 |
| Calculated intercept | 0.080125 | Fuel pressure | 19.3 | 19.3 |
| Analyzer Background | 3.410 | Air pressure | 34.6 | 34.6 |
| Analyzer Coefficient | 3.856 | Flame temperature | 147.1 | 147.1 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5008 | 0.0 | 0.00 | -0.08 | ---- |
| as found span | 4932 | 78.7 | 16.55 | 16.56 | 0.999 |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.08 | ---- |
| high point | 4932 | 78.7 | 16.55 | 16.56 | 0.999 |
| second point | 4975 | 39.3 | 8.26 | 8.26 | 1.000 |
| third point | 4997 | 19.7 | 4.14 | 4.14 | 1.000 |
| as left zero | 5008 | 0.0 | 0.00 | 0.08 | ---- |
| as left span | 4932 | 78.7 | 16.55 | 16.80 | 0.985 |
| Average Correction Factor | | | | | 1.000 |
| Corrected As found | 16.64 | Previous response | 16.44 | *% change | -1.2% |

* = > +/-5% change initiates investigation

Notes: Calibration Gas cylinder change out; no adjustments done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

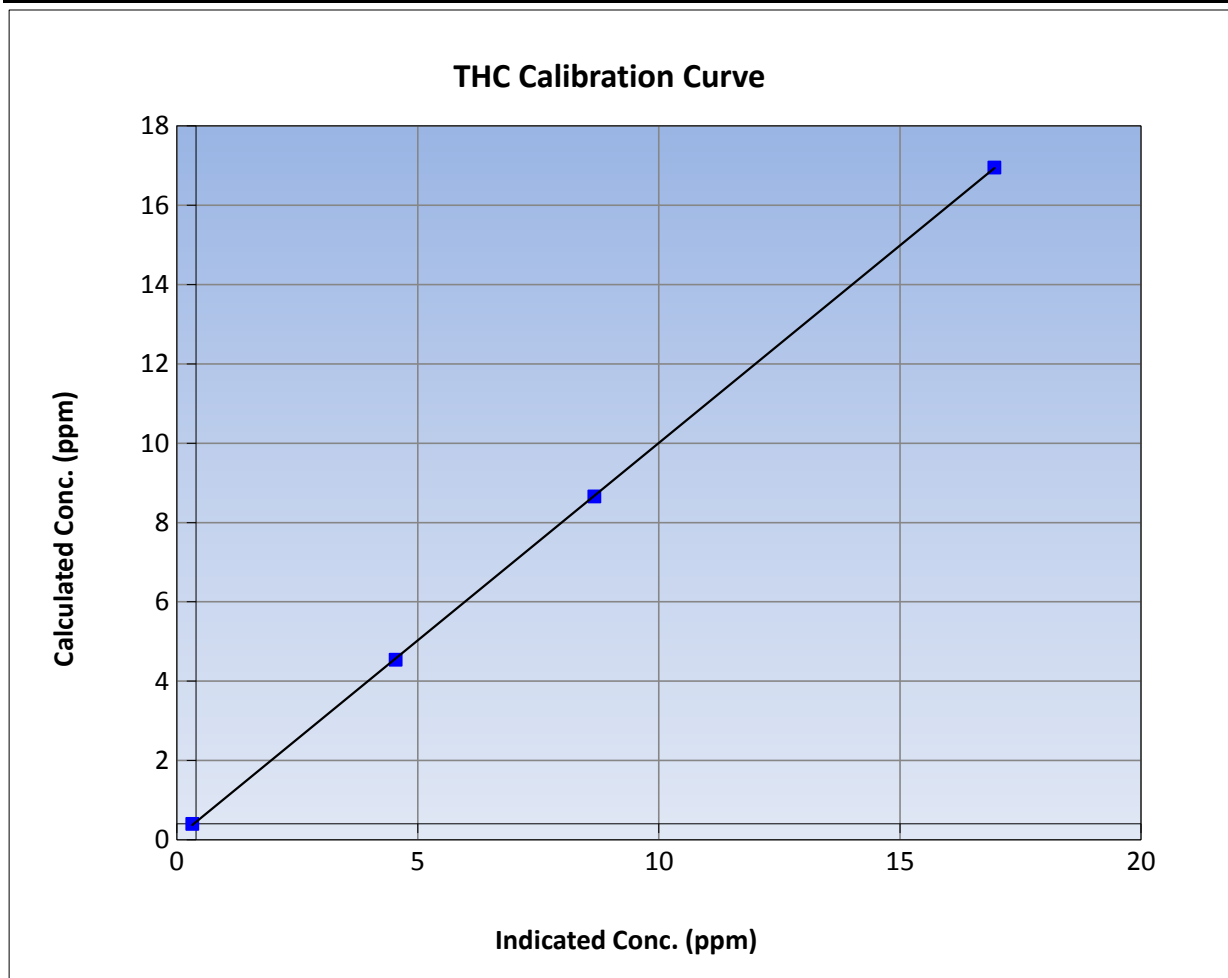
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 04 |
| Start Time (MST) | 8:00 | End Time (MST) | 14:10 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1170050149 |

Calibration Data

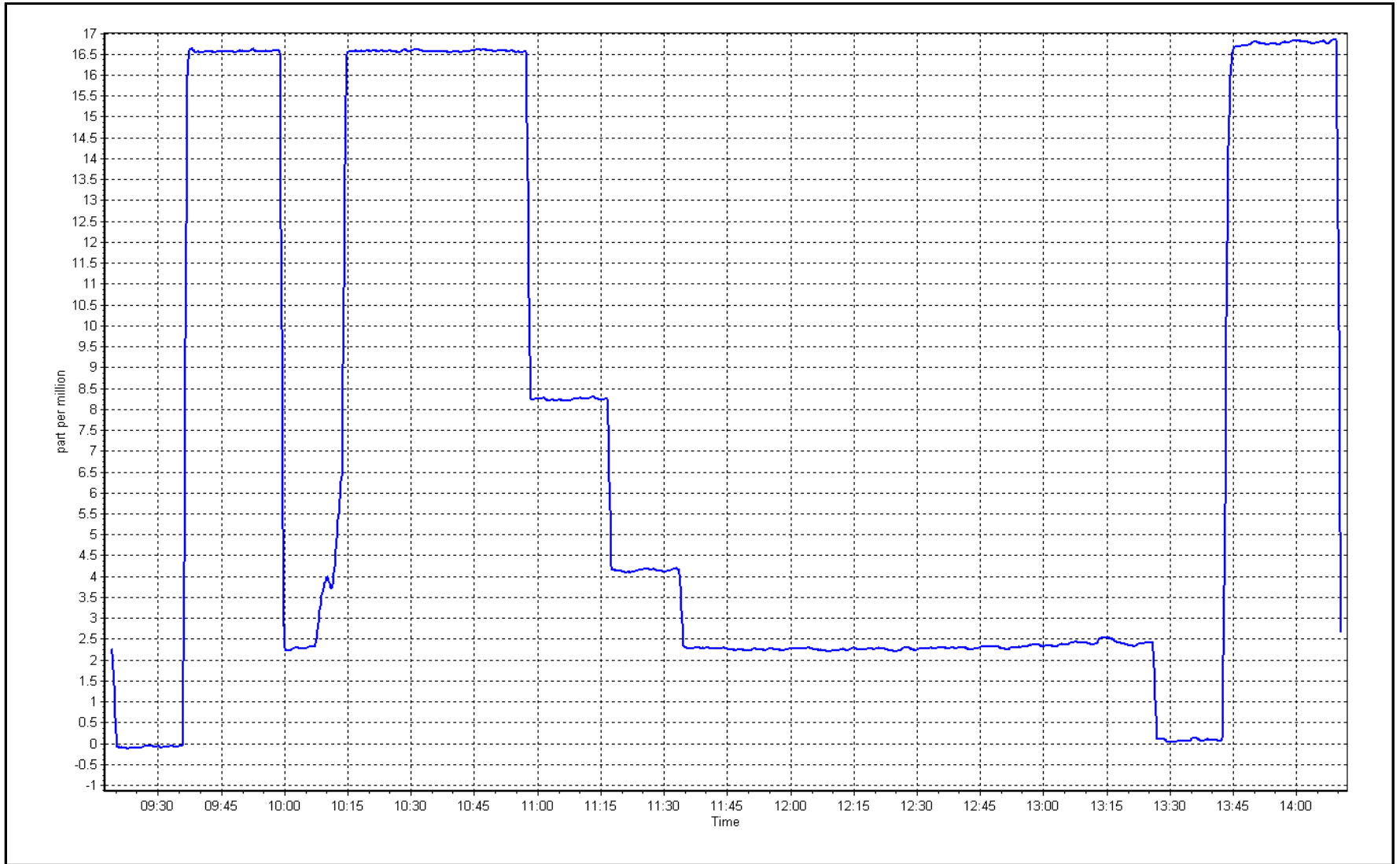
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999984 | ≥0.995 |
| 16.6 | 16.6 | 0.9994 | | | |
| 8.3 | 8.3 | 0.9999 | Slope | 0.995588 | 0.90 - 1.10 |
| 4.1 | 4.1 | 0.9995 | | | |
| | | | Intercept | 0.048708 | +/-1.5 |



THC Calibration Plot

Date: September 25, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

O₃ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|-----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 6, 2017 | Last Cal Date: | August 16, 2017 |
| Start time (MST): | 11:05 | End time (MST): | 13:40 |
| Reason: | Routine | | |

Calibration Standards

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

Analyzer Information

Analyzer make: API T400

Analyzer serial #: 2961

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|------------------------|--------------|---------------|
| Analyzer Range | 0 - 500 ppb | | Pressure | 26.5 | 26.5 |
| Calculated slope | 1.002175 | 0.998541 | Flow | 821 | 821 |
| Calculated intercept | -0.480353 | 1.827667 | O ₃ Measure | 4243.1 | 4243.1 |
| Analyzer Background | -3.1 | -1.3 | | | |
| Analyzer Coefficient | 1.036 | 1.041 | | | |

O₃ Calibration Data

| Set Point | Total air flow rate (scm) | Calibrator Lamp Voltage Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|---------------------------|-------------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5002 | 0.0 | 0.0 | 1.1 | ---- |
| as found span | 5023 | 1014.4 | 399.0 | 396.3 | 1.007 |
| calibrator zero | 5002 | 0.0 | 0.0 | -0.3 | ---- |
| high point | 5023 | 1007.1 | 399.0 | 398.5 | 1.001 |
| second point | 5024 | 848.3 | 200.0 | 197.7 | 1.012 |
| third point | 5025 | 741.1 | 100.0 | 96.8 | 1.033 |
| as left zero | 5002 | 0.0 | 0.0 | -0.6 | ---- |
| as left span | 5023 | 1019.4 | 399.0 | 401.1 | 0.995 |
| Average Correction Factor | | | | | 1.015 |

| | | | | | |
|--------------------|--------|-------------------|--------|-----------|------|
| Corrected As found | 395.20 | Previous response | 398.61 | *% change | 0.9% |
|--------------------|--------|-------------------|--------|-----------|------|

* = > +/-8% change initiates investigation

Notes:

No maintenance done, zero adjusted

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

O₃ Calibration Summary

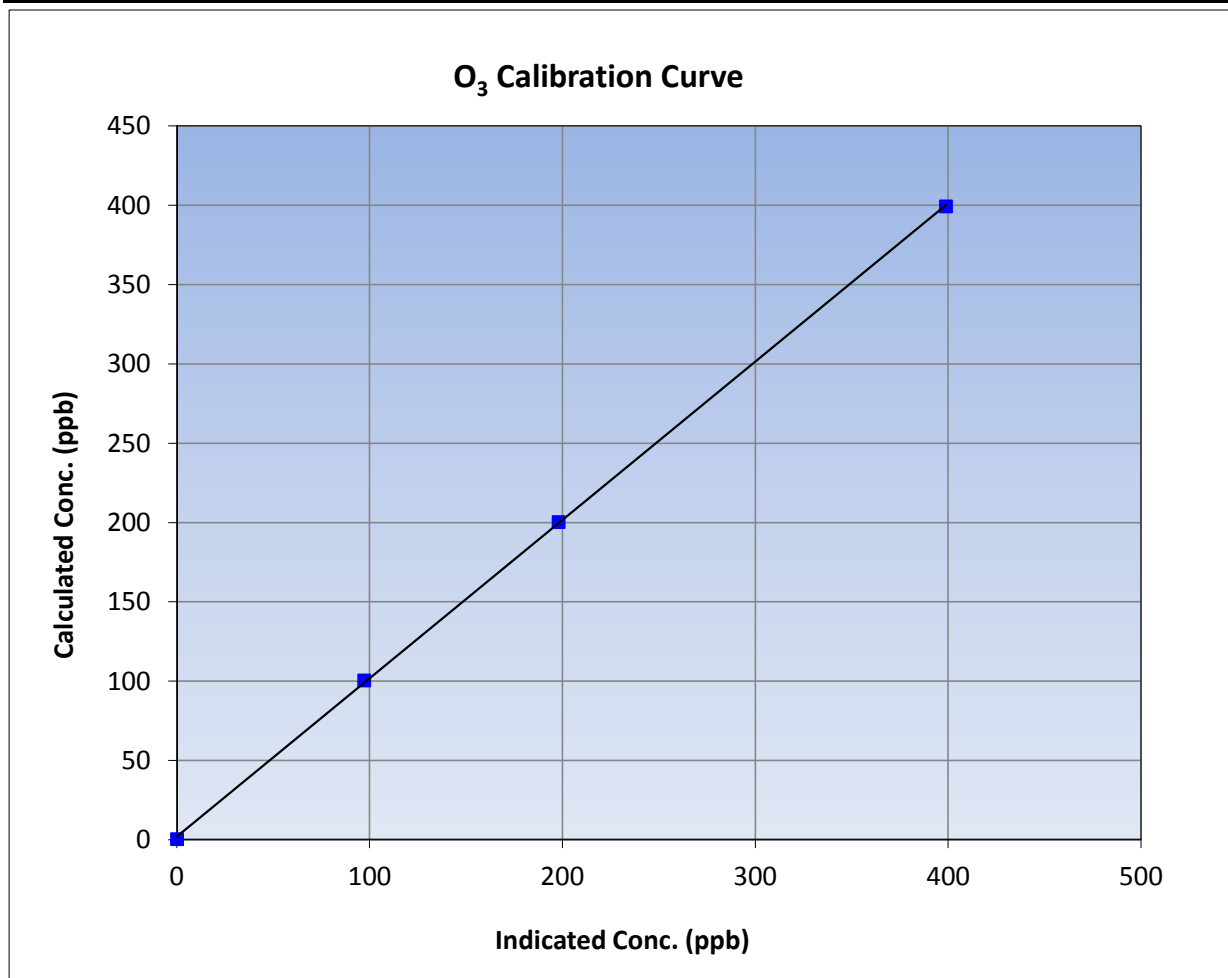
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 04 |
| Start Time (MST) | 11:05 | End Time (MST) | 13:40 |
| Analyzer make | API T400 | Analyzer serial # | 2961 |

Calibration Data

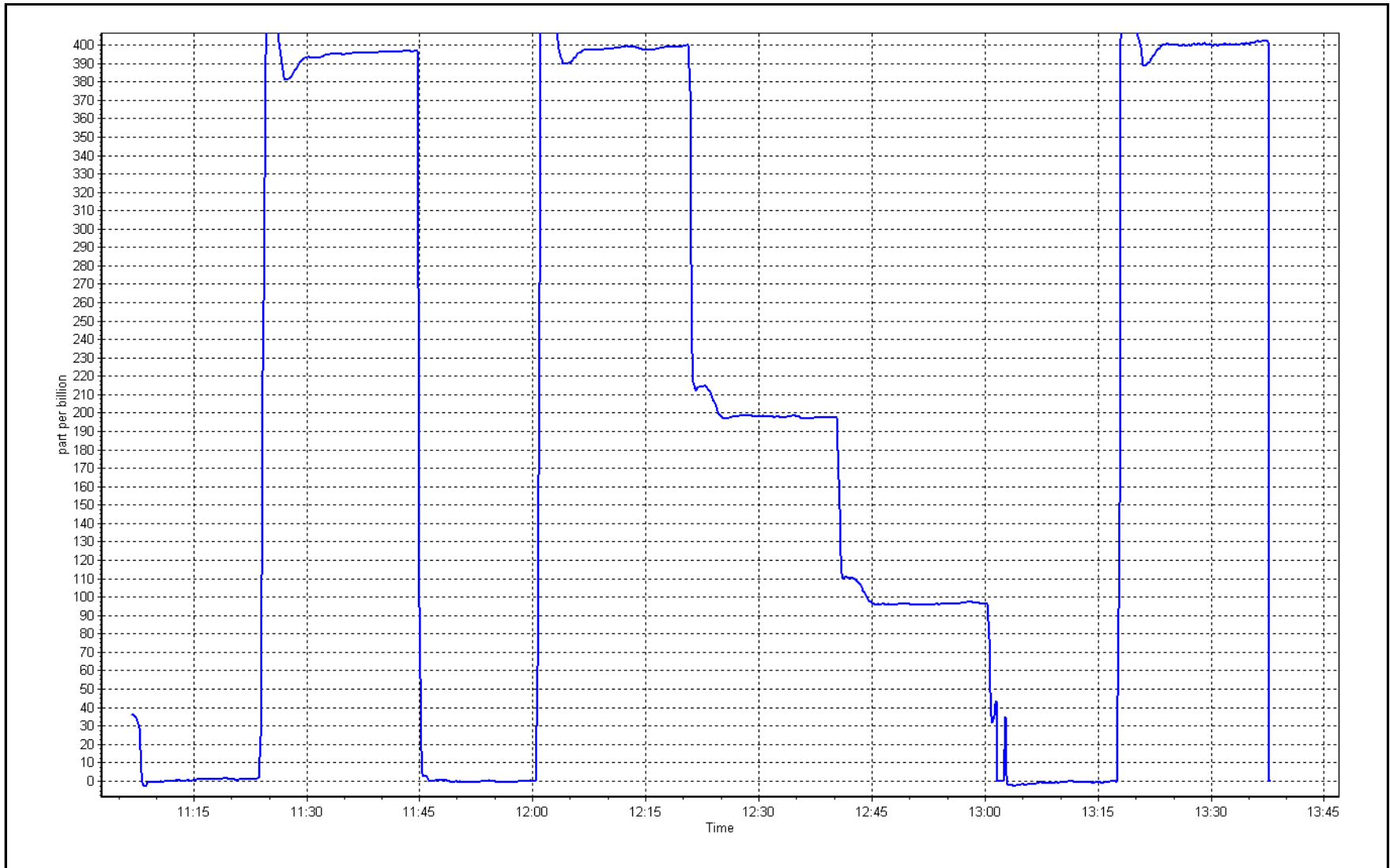
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | 0.999934 | ≥0.995 |
| 399.0 | 398.5 | 1.0013 | | | |
| 200.0 | 197.7 | 1.0116 | Slope | 0.998541 | 0.90 - 1.10 |
| 100.0 | 96.8 | 1.0331 | | | |
| | | | Intercept | 1.827667 | +/- 10 |



O₃ Calibration Plot

Date: September 6, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 10:05 |
| Reason: | As Found | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-----------------|
| NO Gas Cylinder # | LL107929 | Cal Gas Expiry Date | August-09-18 |
| NOX Cal Gas Conc. | <u>50.8</u> ppb | NO Cal Gas Conc. | <u>50.8</u> ppb |
| Calibrator Model | API T700 | Serial Number | 3060 |
| ZAG make/model | API T701 | Serial Number | 60 |

Analyzer Information

| | | | |
|-------------------------|--------------|-------------------------|-----------------|
| Analyzer make: API T200 | | Analyzer serial #: 1035 | |
| | <u>Start</u> | <u>Finish</u> | |
| NO coefficient | 1.161 | 1.161 | NOX Range (ppb) |
| NOX coefficient | 1.164 | 1.164 | 0 - 1000 ppb |
| NO2 coefficient | 1.000 | 1.000 | PMT Temperature |
| NO bkgrnd | -0.1 | -0.1 | 7.4 |
| NOX bkgrnd | 1.4 | 1.4 | 4.4 |
| | | | Sample Flow |
| | | | 488 |
| | | | PMT Voltage |
| | | | 750 |
| | | | 750 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.001731 | 1.027078 |
| NO _x Cal Offset | 1.527388 | 0.308123 |
| NO Cal Slope | 1.001723 | 1.036682 |
| NO Cal Offset | 2.356721 | 0.207336 |
| NO ₂ Cal Slope | 0.993190 | |
| NO ₂ Cal Offset | 0.576259 | |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5008 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.2 | -0.1 | ---- | ---- |
| as found span | 4936 | 78.8 | 798.2 | 798.2 | 0.0 | 776.9 | 769.8 | 7.1 | 1.0275 | 1.0370 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.2 | -0.1 | ---- | ---- |
| high point | 4936 | 78.8 | 798.2 | 798.2 | 0.0 | 776.9 | 769.8 | 7.1 | 1.0275 | 1.0370 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 1.0275 | 1.0370 |

| | | | | | |
|--------------------|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 777.2 ppb | NO = 770.0 ppb | | *Percent Change | NO _x = 2.3% |
| Previous Response | NO _x = 795.3 ppb | NO = 794.5 ppb | | *Percent Change | NO = 3.2% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | | | | | | | | |
| 1st NO2 (400 ppb O3) | | | | | | | | | |
| 2nd NO2 (200 ppb O3) | | | | | | | | | |
| 3rd NO2 (100 ppb O3) | | | | | | | | | |
| 2nd NO ref point | | | | | | | | | |
| Average Correction Factor | | | | | | | | | |

Notes:

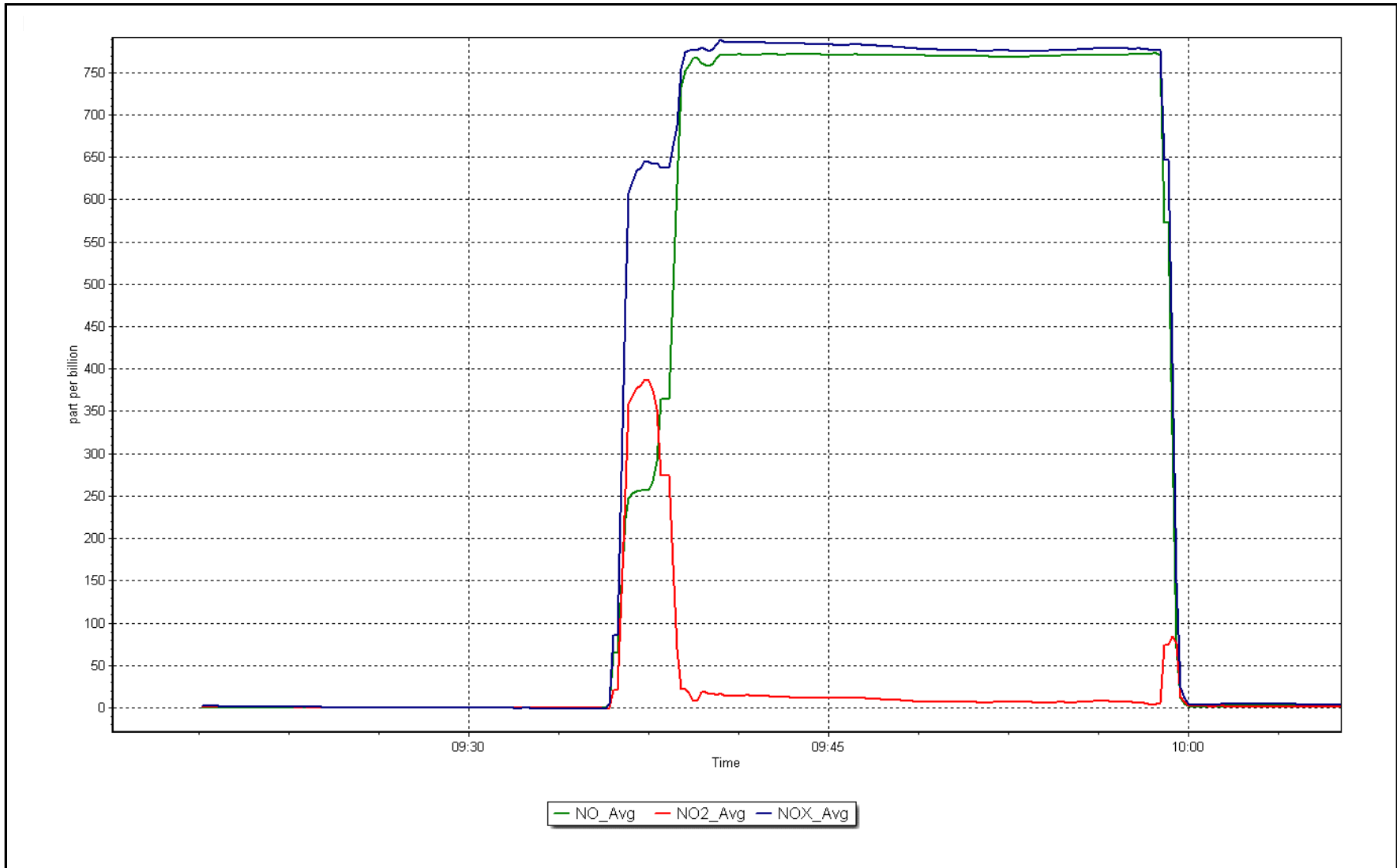
Calibration Gas change out

Calibration Performed By: Melissa Lemay

NO_x Calibration Plot

Date: September 25, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 14:10 |
| Reason: | Cylinder Change | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|--------------------------|
| NO Gas Cylinder # | LL28372 | Cal Gas Expiry Date | Tuesday, August 18, 2020 |
| NOX Cal Gas Conc. | <u>50.9</u> ppb | NO Cal Gas Conc. | <u>50.9</u> ppb |
| Calibrator Model | API T700 | Serial Number | 3060 |
| ZAG make/model | API T701 | Serial Number | 60 |

Analyzer Information

| | | | |
|-----------------------------|--------------|-------------------------|------------------------------|
| Analyzer make: API T200 | | Analyzer serial #: 1035 | |
| | <u>Start</u> | <u>Finish</u> | |
| NO coefficient | 1.161 | 1.202 | NOX Range (ppb) 0 - 1000 ppb |
| NOX coefficient | 1.164 | 1.198 | PMT Temperature 7.4 7.4 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press 4.4 4.4 |
| NO bkgrnd | -0.1 | -0.1 | Sample Flow 488 485 |
| NOX bkgrnd | 1.4 | 1.4 | PMT Voltage 750 750 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.027078 | 1.003584 |
| NO _x Cal Offset | 0.308123 | 0.871532 |
| NO Cal Slope | 1.036682 | 0.997091 |
| NO Cal Offset | 0.207336 | 1.930923 |
| NO ₂ Cal Slope | | 0.996230 |
| NO ₂ Cal Offset | | 0.725294 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5008 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.2 | -0.1 | ---- | ---- |
| as found span | 4932 | 78.7 | 799.5 | 799.5 | 0.0 | 775.2 | 772.1 | 3.0 | 1.0313 | 1.0354 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.2 | -0.1 | ---- | ---- |
| high point | 4932 | 78.7 | 799.5 | 799.5 | 0.0 | 795.9 | 801.0 | -5.1 | 1.0045 | 0.9981 |
| second point | 4975 | 39.3 | 398.9 | 398.9 | 0.0 | 396.7 | 396.4 | 0.3 | 1.0056 | 1.0064 |
| third point | 4997 | 19.7 | 199.9 | 199.9 | 0.0 | 197.5 | 197.4 | 0.1 | 1.0120 | 1.0126 |
| as left zero | 5008 | 0.0 | 0.0 | 0.0 | 0.0 | -0.8 | -0.1 | -0.7 | ---- | ---- |
| as left span | 4932 | 78.7 | 799.5 | 411.3 | 388.2 | 799.6 | 393.4 | 407.2 | 0.9998 | 1.0455 |
| Average Correction Factor | | | | | | | | | 1.0074 | 1.0057 |

| | | | | | |
|--------------------|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 775.5 ppb | NO = 772.3 ppb | | *Percent Change | NO _x = 0.3% |
| Previous Response | NO _x = 778.1 ppb | NO = 771.0 ppb | | *Percent Change | NO = -0.2% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 797.5 | 800.4 | -2.9 | 1.0025 | 0.9988 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 411.3 | 389.1 | 801.5 | 411.3 | 390.2 | 0.9974 | ---- | 0.9972 | 100.3% |
| 2nd NO2 (200 ppb O3) | 634.5 | 165.9 | 799.4 | 634.5 | 165.1 | 1.0001 | ---- | 1.0048 | 99.5% |
| 3rd NO2 (100 ppb O3) | 717.9 | 82.5 | 799.8 | 717.9 | 81.8 | 0.9996 | ---- | 1.0086 | 99.2% |
| 2nd NO ref point | ---- | 0.0 | 800.7 | 803.4 | -2.9 | 0.9984 | 0.9951 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9989 | 0.9970 | 1.0035 | 99.7% |

Notes: Calibration Gas change out; span adjusted; Due to instability of the GPT 2nd NO ref point used

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

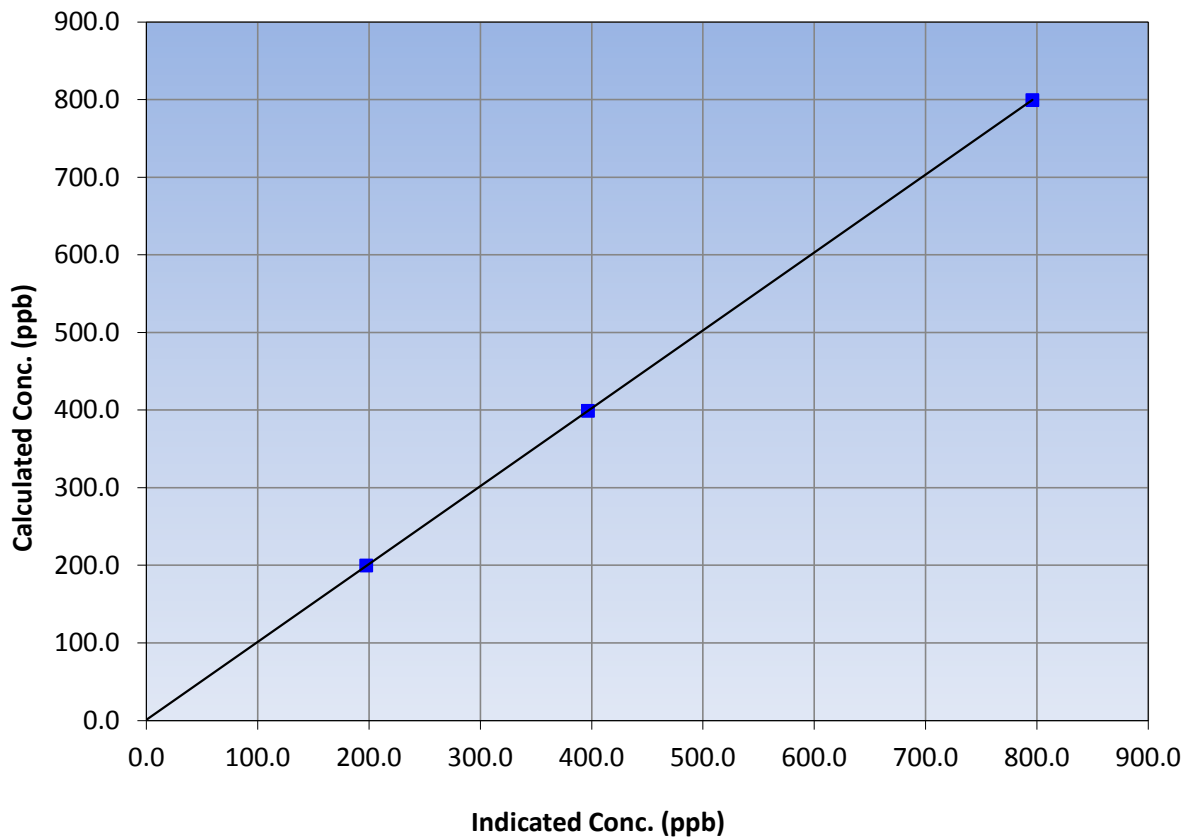
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 04 |
| Start Time (MST) | 9:15 | End Time (MST) | 14:10 |
| Analyzer make | API T200 | Analyzer serial # | 1035 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 |
| 799.5 | 795.9 | 1.0045 | | |
| 398.9 | 396.7 | 1.0056 | | |
| 199.9 | 197.5 | 1.0120 | | |
| | | | Slope | 0.90 - 1.10 |
| | | | Intercept | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

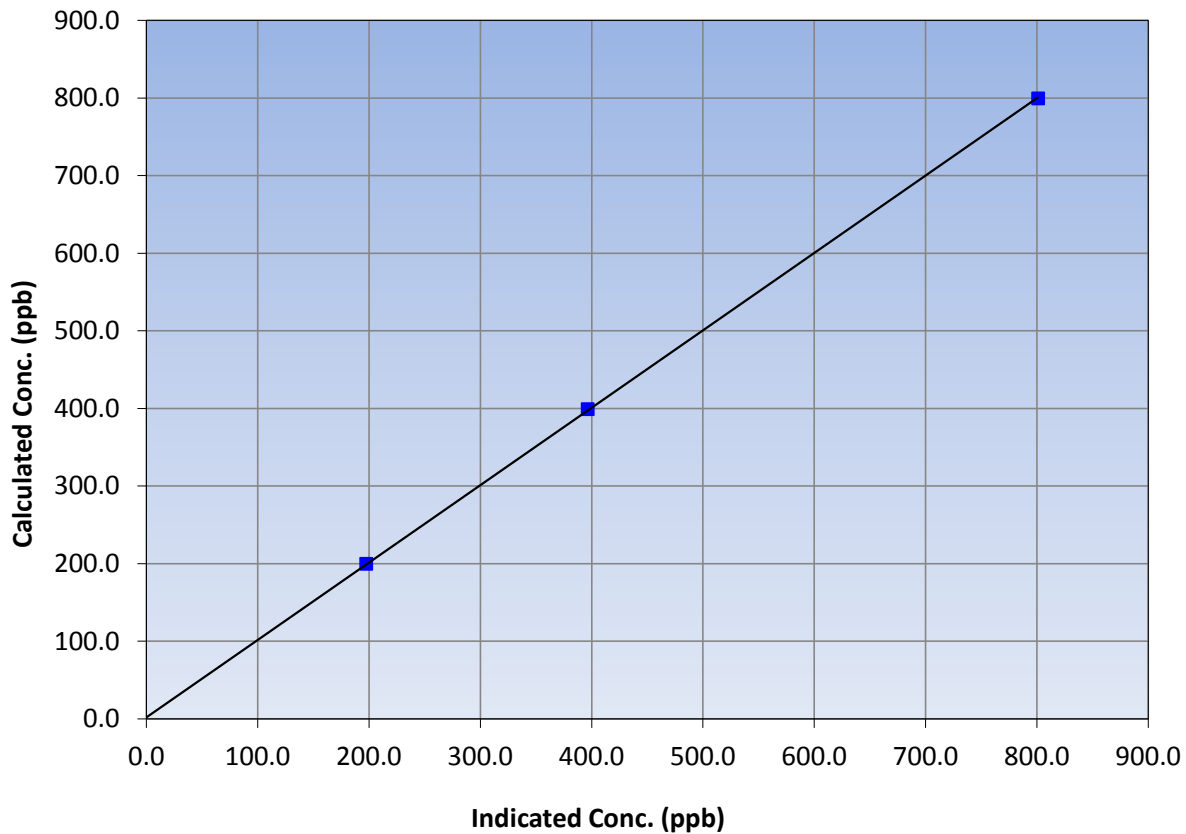
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 04 |
| Start Time (MST) | 9:15 | End Time (MST) | 14:10 |
| Analyzer make | API T200 | Analyzer serial # | 1035 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.5 | 801.0 | 0.9981 | | | |
| 398.9 | 396.4 | 1.0064 | | | |
| 199.9 | 197.4 | 1.0126 | | | |
| | | | Slope | 0.997091 | 0.90 - 1.10 |
| | | | Intercept | 1.930923 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

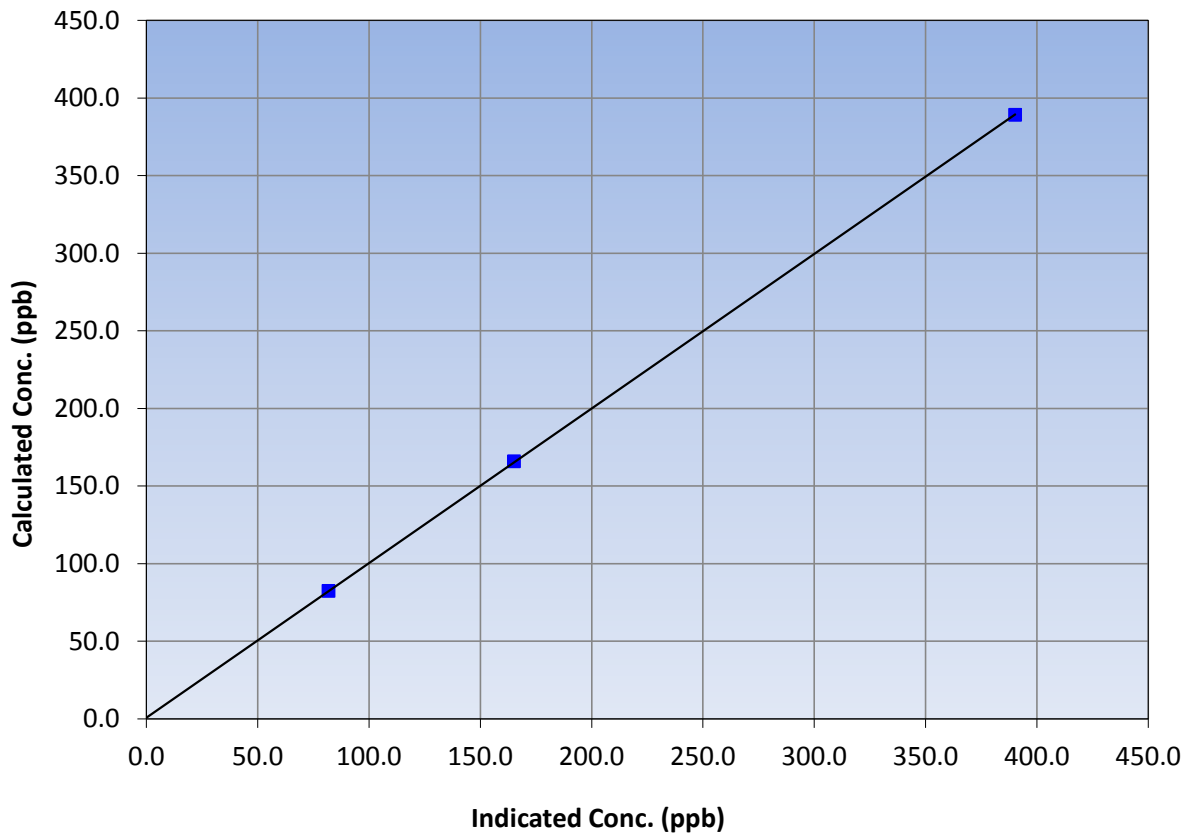
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 04 |
| Start Time (MST) | 9:15 | End Time (MST) | 14:10 |
| Analyzer make | API T200 | Analyzer serial # | 1035 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 389.1 | 390.2 | 0.9972 | | | |
| 165.9 | 165.1 | 1.0048 | | | |
| 82.5 | 81.8 | 1.0086 | | | |
| | | | Slope | 0.996230 | 0.90 - 1.10 |
| | | | Intercept | 0.725294 | +/-20 |

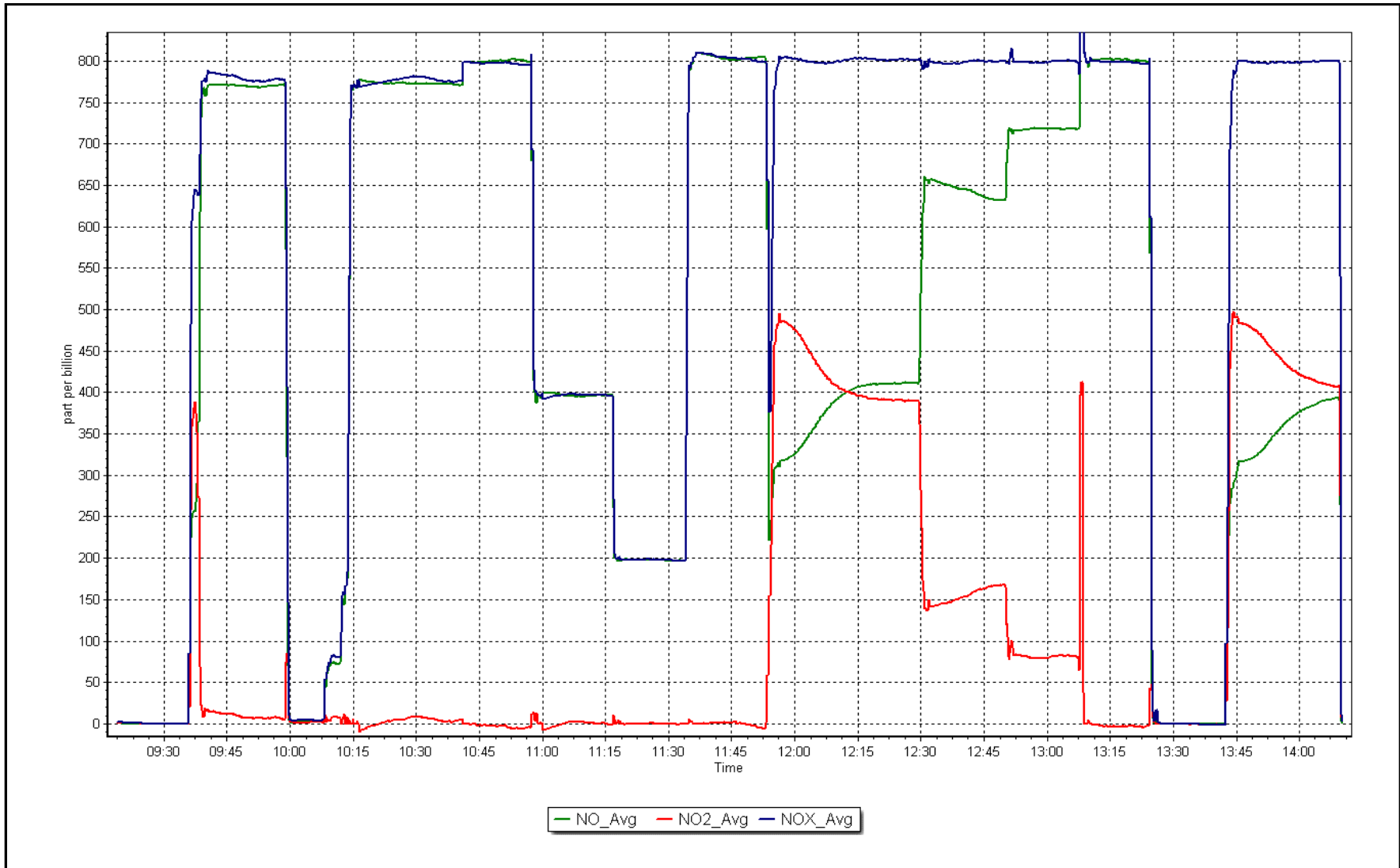
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 25, 2017

Location: Buffalo Viewpoint





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|----------------|
| Station Name: | Buffalo Viewpoint | Station number: | AMS 04 |
| Calibration Date: | September 26, 2017 | Last Cal Date: | August 4, 2017 |
| Start time (MST): | 6:16 | End time (MST): | 7:23 |
| Sharp Model: | Thermo 5030 | S/N: | 4173 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | E-803 |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1450 |
| Temp/RH standard: | Delta Cal | S/N: | 1450 |

3

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 9 | 9 | 9 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 972 | 971 | 972 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1005 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 3.1 | ----- | 0 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input checked="" type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

Leak Test: Date of check: August 4, 2017 Last Cal Date: _____
 Flow w/o adaptor: 17.12 Flow w/ adaptor: 16.82

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-------------------------------------|--|--------------------------------|-----------------|
| <input checked="" type="checkbox"/> | Foil S/N: <u>8061</u> | Foil S/N: _____ | |
| Foil Calibration | Foil Mass: <u>1159</u> | Foil Mass: _____ | |
| | Calibration Date: <u>August 26, 2017</u> | Calibration Date: _____ | |
| (Limit) +/- 5% of previous | Correction Factor: <u>7058</u> | Correction Factor: <u>7020</u> | 0.54% |

Annual Calibration Test

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

Notes: cyclone head cleaned; Nephelometer adjusted

Calibration by: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 5
MANNIX
SEPTEMBER 2017**

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

October 27, 2017

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|---|--------|-------|--------|-------|------------|------|------|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 685 | 1.3 | 4 | - | 0 | 0 | 0 | 0 | 1 | 3 | 42 |
| H2S (ppb) Average | 683 | 0.7 | 1 | - | 0 | 0 | 0 | 0 | 1 | 2 | 15 |
| THC (ppm) Average | 687 | 2.36 | 0.5 | - | 2 | 2.1 | 2.2 | 2.2 | 2.3 | 2.7 | 8.9 |
| Temperature 2 m (C) Average | 720 | 12.24 | 6 | - | -1.3 | 4.7 | 7.6 | 11.7 | 16.1 | 20.3 | 31.6 |
| Temperature 20 m (C) Average | 720 | 12.74 | 5.8 | - | -0.7 | 5.1 | 8.2 | 12.5 | 16.3 | 20.4 | 30.9 |
| Temperature 45 m (C) Average | 720 | 12.72 | 5.8 | - | -0.8 | 5.1 | 8.4 | 12.4 | 16.2 | 20.4 | 30.5 |
| Temperature 75 m (C) Average | 720 | 12.7 | 5.8 | - | -0.7 | 5.2 | 8.4 | 12.3 | 16.1 | 20.4 | 30.2 |
| Temperature 90 m (C) Average | 720 | 12.68 | 5.7 | - | -0.7 | 5.1 | 8.5 | 12.4 | 16.2 | 20.5 | 30.1 |
| Relative Humidity 2 m (%) Average | 720 | 66.6 | 20 | - | 22 | 38 | 52 | 69 | 83 | 93 | 97 |
| Relative Humidity 20 m (%) Average | 720 | 63.1 | 19 | - | 22 | 35 | 49 | 65 | 77 | 90 | 98 |
| Relative Humidity 45 m (%) Average | 720 | 62.5 | 19 | - | 22 | 35 | 48 | 63 | 77 | 89 | 98 |
| Relative Humidity 75 m (%) Average | 720 | 61.7 | 19 | - | 22 | 35 | 47 | 63 | 76 | 88 | 98 |
| Relative Humidity 90 m (%) Average | 720 | 61.7 | 19 | - | 23 | 35 | 47 | 63 | 76 | 88 | 98 |
| Wind Speed 20 m (km/h) Average | 720 | 11.5 | 7 | - | 0 | 4 | 7 | 10 | 15 | 21 | 36 |
| Wind Speed 45 m (km/h) Average | 719 | 16.1 | 8 | - | 1 | 5 | 10 | 16 | 22 | 27 | 41 |
| Wind Speed 75 m (km/h) Average | 720 | 18.5 | 10 | - | 1 | 6 | 11 | 18 | 26 | 31 | 46 |
| Wind Speed 90 m (km/h) Average | 720 | 19.7 | 10 | - | 1 | 6 | 11 | 19 | 28 | 33 | 47 |
| Wind Direction 20 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 45 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 75 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 90 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 720 | 0.17 | 0.4 | - | -1.1 | -0.3 | -0.2 | 0.1 | 0.5 | 0.7 | 2 |
| Vertical Wind Speed 45 m (km/h) Average | 719 | 0.37 | 0.8 | - | -1.8 | -0.6 | -0.2 | 0.2 | 1.1 | 1.5 | 2.5 |
| Vertical Wind Speed 75 m (km/h) Average | 720 | 0.3 | 0.4 | - | -1.5 | -0.2 | 0 | 0.2 | 0.6 | 0.9 | 1.7 |
| Vertical Wind Speed 90 m (km/h) Average | 720 | 0.35 | 0.5 | - | -1.4 | -0.1 | 0.1 | 0.3 | 0.6 | 1 | 2.4 |

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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 685 | 33 | 35 | 99.72 | 42 | 0 | 10 | 0 |
| H2S (ppb) Average | 683 | 34 | 37 | 99.58 | 15 | 2 | 3 | 0 |
| THC (ppm) Average | 687 | 33 | 33 | 100 | 8.9 | - | 2.9 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 31.6 | - | 21.2 | - |
| Temperature 20 m (C) Average | 720 | 0 | 0 | 100 | 30.9 | - | 22.3 | - |
| Temperature 45 m (C) Average | 720 | 0 | 0 | 100 | 30.5 | - | 22.5 | - |
| Temperature 75 m (C) Average | 720 | 0 | 0 | 100 | 30.2 | - | 22.8 | - |
| Temperature 90 m (C) Average | 720 | 0 | 0 | 100 | 30.1 | - | 22.9 | - |
| Relative Humidity 2 m (%) Average | 720 | 0 | 0 | 100 | 97 | - | 92 | - |
| Relative Humidity 20 m (%) Average | 720 | 0 | 0 | 100 | 98 | - | 89 | - |
| Relative Humidity 45 m (%) Average | 720 | 0 | 0 | 100 | 98 | - | 90 | - |
| Relative Humidity 75 m (%) Average | 720 | 0 | 0 | 100 | 98 | - | 90 | - |
| Relative Humidity 90 m (%) Average | 720 | 0 | 0 | 100 | 98 | - | 90 | - |
| Wind Speed 20 m (km/h) Average | 720 | 0 | 0 | 100 | 36 | - | 24 | - |
| Wind Speed 45 m (km/h) Average | 719 | 0 | 1 | 99.86 | 41 | - | 33 | - |
| Wind Speed 75 m (km/h) Average | 720 | 0 | 0 | 100 | 46 | - | 38 | - |
| Wind Speed 90 m (km/h) Average | 720 | 0 | 0 | 100 | 47 | - | 40 | - |
| Wind Direction 20 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |
| Wind Direction 45 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |
| Wind Direction 75 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |
| Wind Direction 90 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 720 | 0 | 0 | 100 | 2 | - | 1.1 | - |
| Vertical Wind Speed 45 m (km/h) Average | 719 | 0 | 1 | 99.86 | 2.5 | - | 1.7 | - |
| Vertical Wind Speed 75 m (km/h) Average | 720 | 0 | 0 | 100 | 1.7 | - | 1 | - |
| Vertical Wind Speed 90 m (km/h) Average | 720 | 0 | 0 | 100 | 2.4 | - | 1.2 | - |

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

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|--|-------------------|-------------------|------------------|-----------------------------------|
| SO2 | 20 Sep 2017 13:00 | 20 Sep 2017 14:00 | 2 | Maintenance - WBEA internal audit |
| H2S | 20 Sep 2017 11:00 | 20 Sep 2017 13:00 | 3 | Maintenance - WBEA internal audit |
| Wind Speed, Wind Direction, Vertical Wind Speed 45 m | 15 Sep 2017 07:00 | 15 Sep 2017 07:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Mannix - September 2017

| | |
|---|---|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 42 ppb on Sep 21 03:00 | Maximum Daily Average: 10.1 ppb on Sep 21 |
| Minimum Value: 0 ppb on Sep 1 03:00 | Hours of Data: 685 |
| Maximum Diurnal Average: 2.5 ppb at hour 12 | Hours of Missing Data: 35 |
| Monthly Average: 1.3 ppb | Hours of Calibration: 33 |
| Minimum Daily Average: 0.0 ppb on Sep 1 | Percent Operational Time: 99.7 |
| Minimum Diurnal Average: 0.4 ppb at hour 22 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 21 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 7 | 0 | 0 | 2 | 3 | 0.8 | 7 |
| 4-Sep | 3 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 1 | 2 | 3 | 1 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1.4 | 6 |
| 5-Sep | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 6-Sep | 2 | 1 | 1 | Z | 1 | 1 | 0 | 2 | 4 | 8 | 21 | 18 | 13 | 31 | 14 | 15 | 7 | 3 | 2 | 5 | 4 | 1 | 0 | 0 | 6.7 | 31 |
| 7-Sep | 1 | 2 | 3 | 2 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0.8 | 3 |
| 8-Sep | 1 | 2 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 4 | 8 | 1 | 2 | 0 | 0 | 1 | 1 | 5 | 3 | 1 | 0 | 1 | 1.6 | 8 |
| 9-Sep | Z | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 5 | 10 | 8 | 7 | 8 | 6 | 3 | 9 | 1 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 2.9 | 10 |
| 10-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.2 | 1 |
| 12-Sep | 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 |
| 13-Sep | 1 | 2 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 2 | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1.1 | 5 |
| 14-Sep | 3 | 2 | 0 | 0 | 0 | 5 | 4 | 3 | 1 | 0 | Z | 2 | 1 | 1 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 5 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 16-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 18-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 11 | 12 | 3 | 1 | 1 | 0 | 3 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 12 |
| 20-Sep | 0 | 0 | 0 | 2 | 15 | Z | 2 | 1 | 1 | 2 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 2 | 1 | 1 | 2.0 | 15 |
| 21-Sep | Z | 41 | 42 | 35 | 10 | 11 | 7 | 4 | 34 | 11 | 2 | 17 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 0 | 0 | 10.1 | 42 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.0 | 4 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 25-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 22 | 12 | 4 | 1 | 1 | 0 | 4 | 2 | 0 | 2 | 1 | 0 | 3 | 4 | 2.6 | 22 |
| 28-Sep | 3 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 6 | 2 | 1 | 0 | 0 | 0 | 0.8 | 6 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0.4 | 2 |

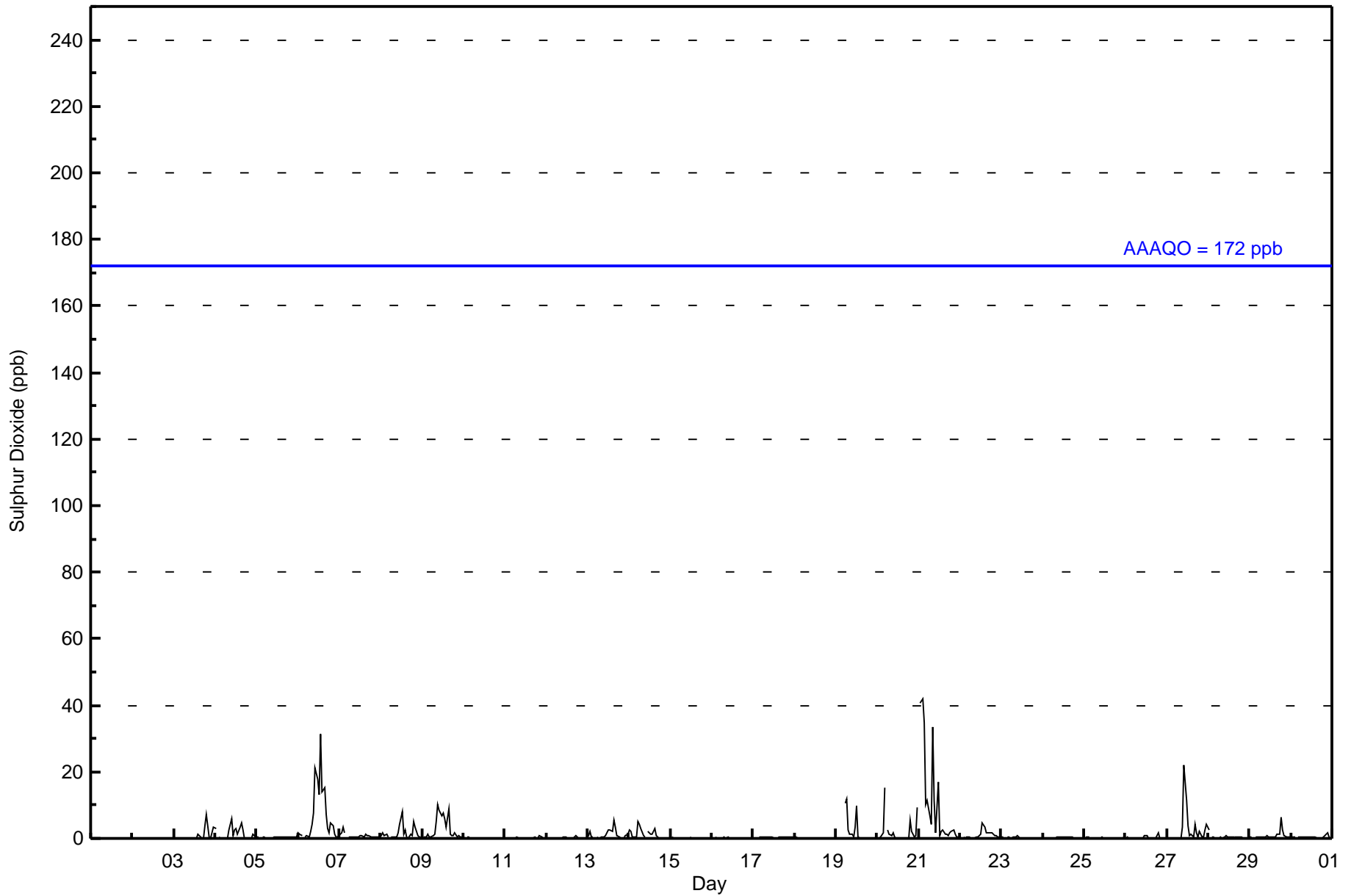
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.6 | 2.1 | 2.0 | 1.8 | 1.2 | 1.2 | 1.0 | 0.6 | 1.8 | 1.7 | 2.2 | 2.5 | 2.0 | 1.9 | 1.3 | 1.5 | 0.9 | 0.5 | 0.7 | 1.2 | 0.6 | 0.4 | 0.4 | 0.8 | Diurnal Average | |
| 3 | 41 | 42 | 35 | 15 | 11 | 12 | 4 | 34 | 11 | 22 | 18 | 13 | 31 | 14 | 15 | 7 | 3 | 6 | 7 | 4 | 2 | 3 | 9 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mannix - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 667 | 97.37 | 97.37 |
| 11 - 20 | 11 | 1.61 | 98.98 |
| 21 - 60 | 7 | 1.02 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 31 | 35 | 15 | 17 | 12 | 12 | 108 | 138 | 38 | 15 | 25 | 77 | 62 | 32 | 23 | 27 | 667 |
| 11 - 20 | 8 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 11 |
| 21 - 60 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 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 | 43 | 35 | 15 | 17 | 12 | 13 | 109 | 138 | 38 | 15 | 25 | 77 | 63 | 33 | 23 | 29 | 685 |

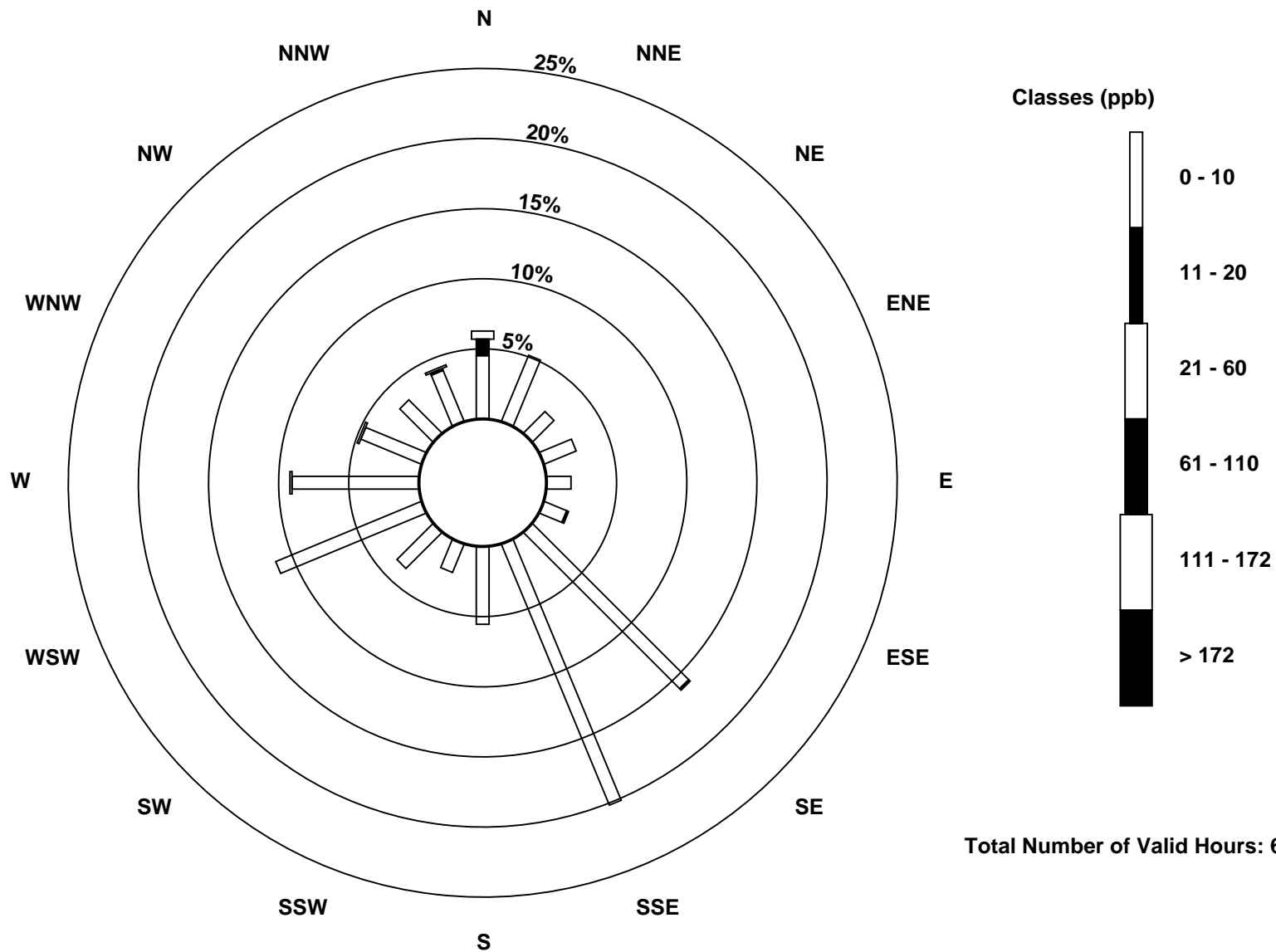
Total Number of Valid Hours: 685

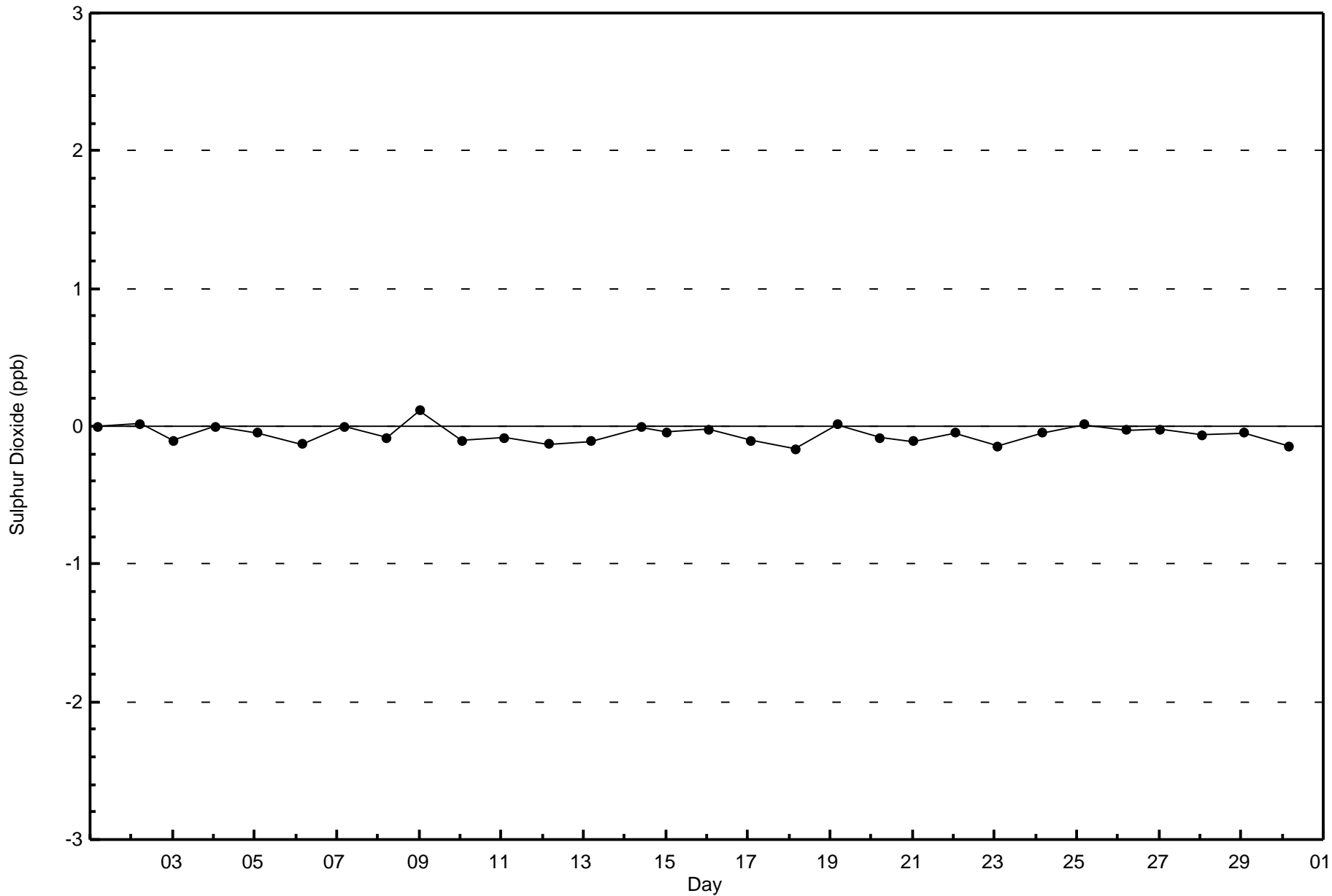
Total Number of Hours: 720

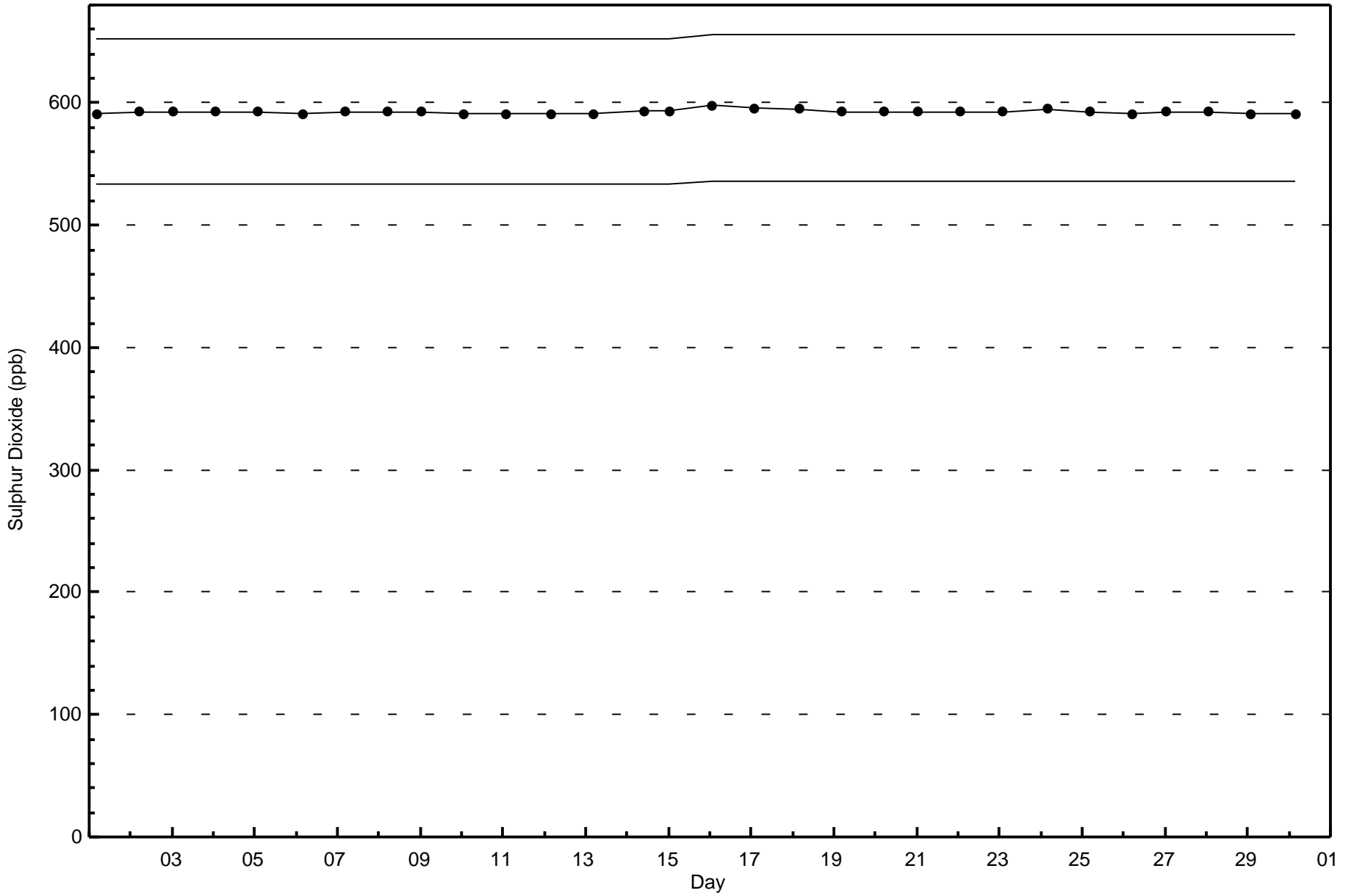


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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







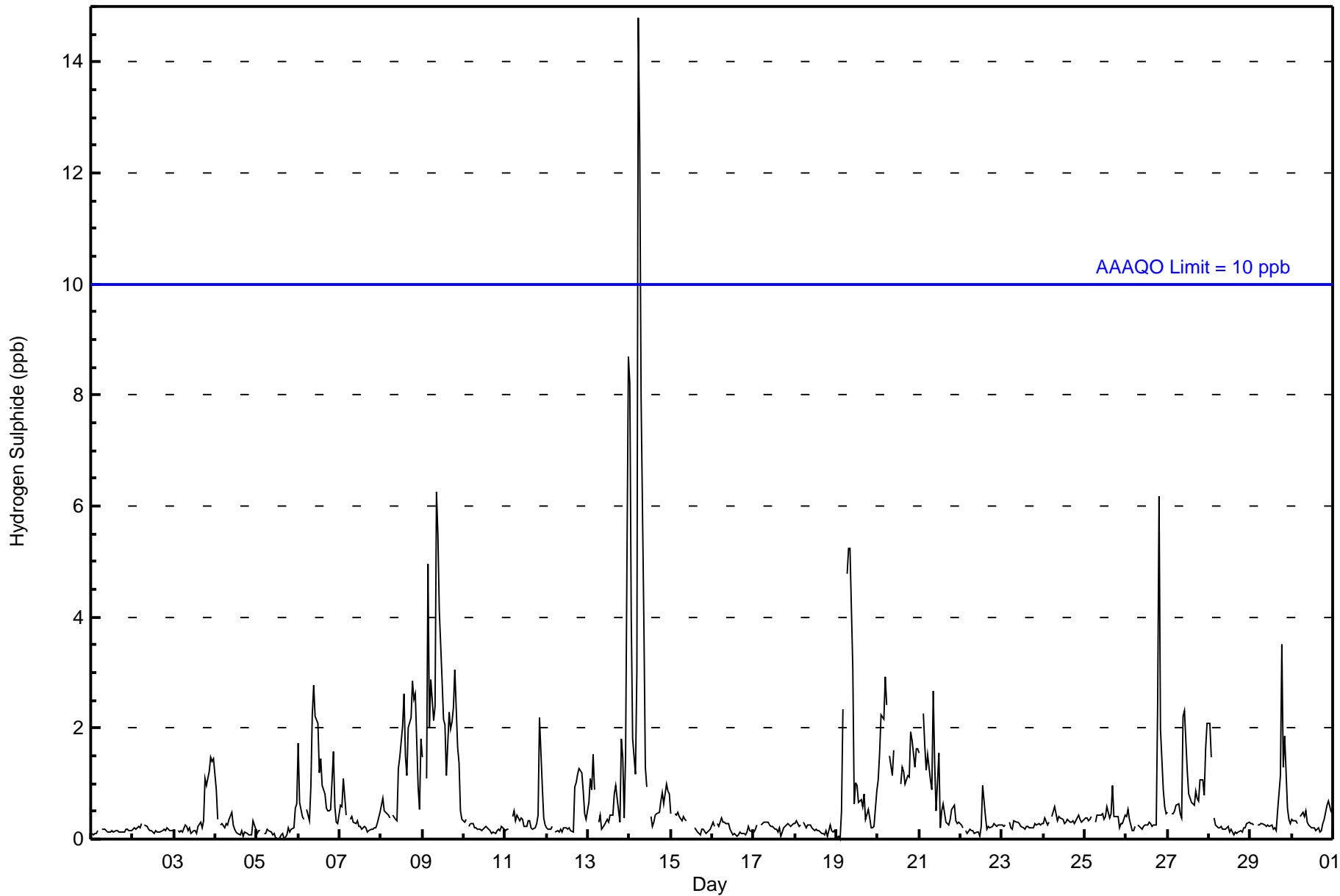


| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 2 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 15 ppb on Sep 14 06:00 | Maximum Daily Average: 2.9 ppb on Sep 14 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 19 03:00 | Minimum Daily Average: 0.1 ppb on Sep 1 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 1.1 ppb at hour 6 | Minimum Diurnal Average: 0.4 ppb at hour 15 | | Hours of Calibration: | 34 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 6 | | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 2-Sep | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 4-Sep | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.1 | 1 |
| 6-Sep | 2 | 1 | 0 | 0 | Z | 1 | 0 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 1.0 | 3 |
| 7-Sep | 1 | 1 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 8-Sep | 1 | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 2 | 1.3 | 3 |
| 9-Sep | 1 | Z | 1 | 5 | 2 | 3 | 2 | 2 | 6 | 5 | 4 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 0 | 2.5 | 6 |
| 10-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0.4 | 2 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.4 | 1 |
| 13-Sep | 1 | 1 | 1 | 2 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 2 | 1.1 | 9 |
| 14-Sep | 8 | 4 | 2 | 1 | 3 | 15 | 13 | 8 | 4 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2.9 | 15 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 16-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 1 | 2 | Z | 5 | 5 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1.3 | 5 |
| 20-Sep | 1 | 2 | 2 | 2 | 3 | 2 | Z | 1 | 1 | 2 | M | M | M | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1.6 | 3 |
| 21-Sep | 2 | Z | 2 | 2 | 1 | 2 | 1 | 1 | 3 | 1 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.9 | 3 |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 23-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 26-Sep | 0 | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 2 | 1 | 1 | 0 | 0.7 | 6 |
| 27-Sep | 0 | Z | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 0.9 | 2 |
| 28-Sep | 2 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 1 | 2 | 1 | 0 | 0 | 0.6 | 4 |
| 30-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0.3 | 1 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.8 | 0.6 | 0.6 | 0.7 | 0.7 | 1.1 | 1.0 | 0.9 | 0.9 | 0.8 | 0.6 | 0.5 | 0.4 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.9 | 0.8 | 0.5 | 0.5 | 0.8 | Diurnal Average | |
| 8 | 4 | 2 | 5 | 3 | 15 | 13 | 8 | 6 | 5 | 4 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 4 | 6 | 3 | 1 | 2 | 9 | 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
Mannix - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 655 | 95.90 | 95.90 |
| 3 - 4 | 16 | 2.34 | 98.24 |
| 5 - 7 | 7 | 1.02 | 99.27 |
| 8 - 11 | 3 | 0.44 | 99.71 |
| > 11 | 2 | 0.29 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 34 | 34 | 10 | 17 | 13 | 10 | 109 | 136 | 39 | 15 | 24 | 76 | 64 | 30 | 21 | 23 | 655 |
| 3 - 4 | 3 | 1 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 16 |
| 5 - 7 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 7 |
| 8 - 11 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 |
| > 11 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Totals | 43 | 36 | 14 | 17 | 13 | 11 | 109 | 136 | 39 | 15 | 24 | 77 | 66 | 32 | 23 | 28 | 683 |

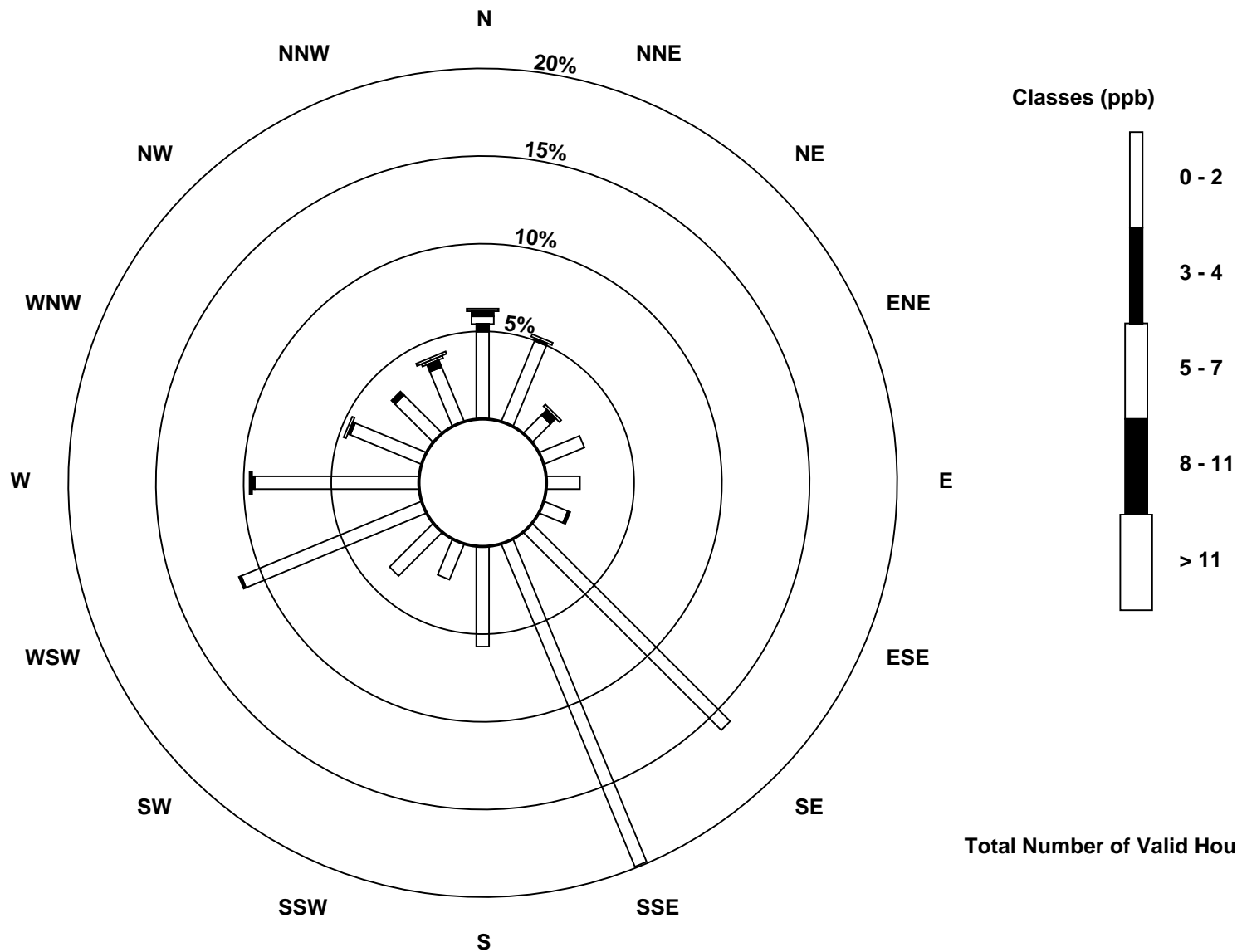
Total Number of Valid Hours: 683

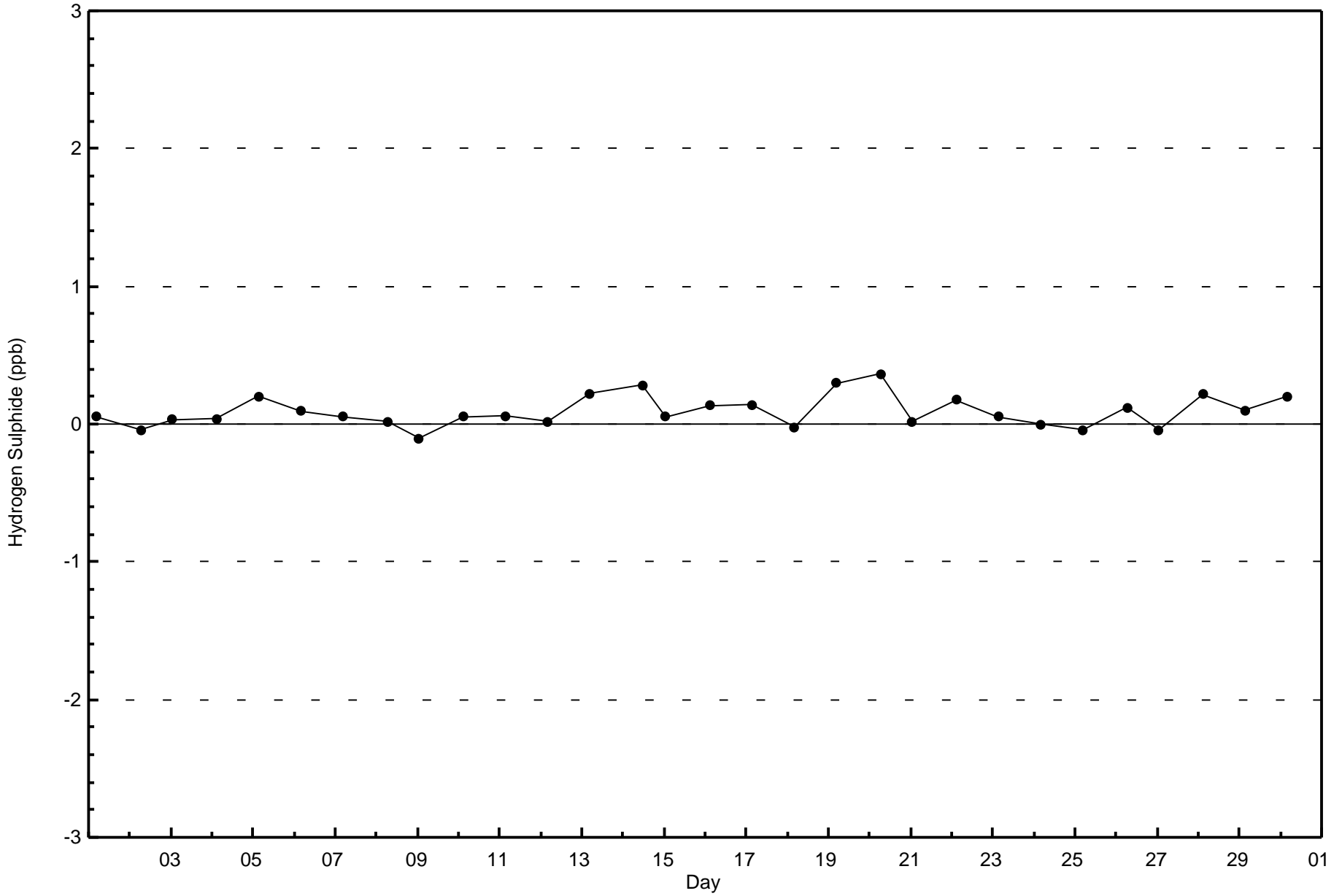
Total Number of Hours: 720

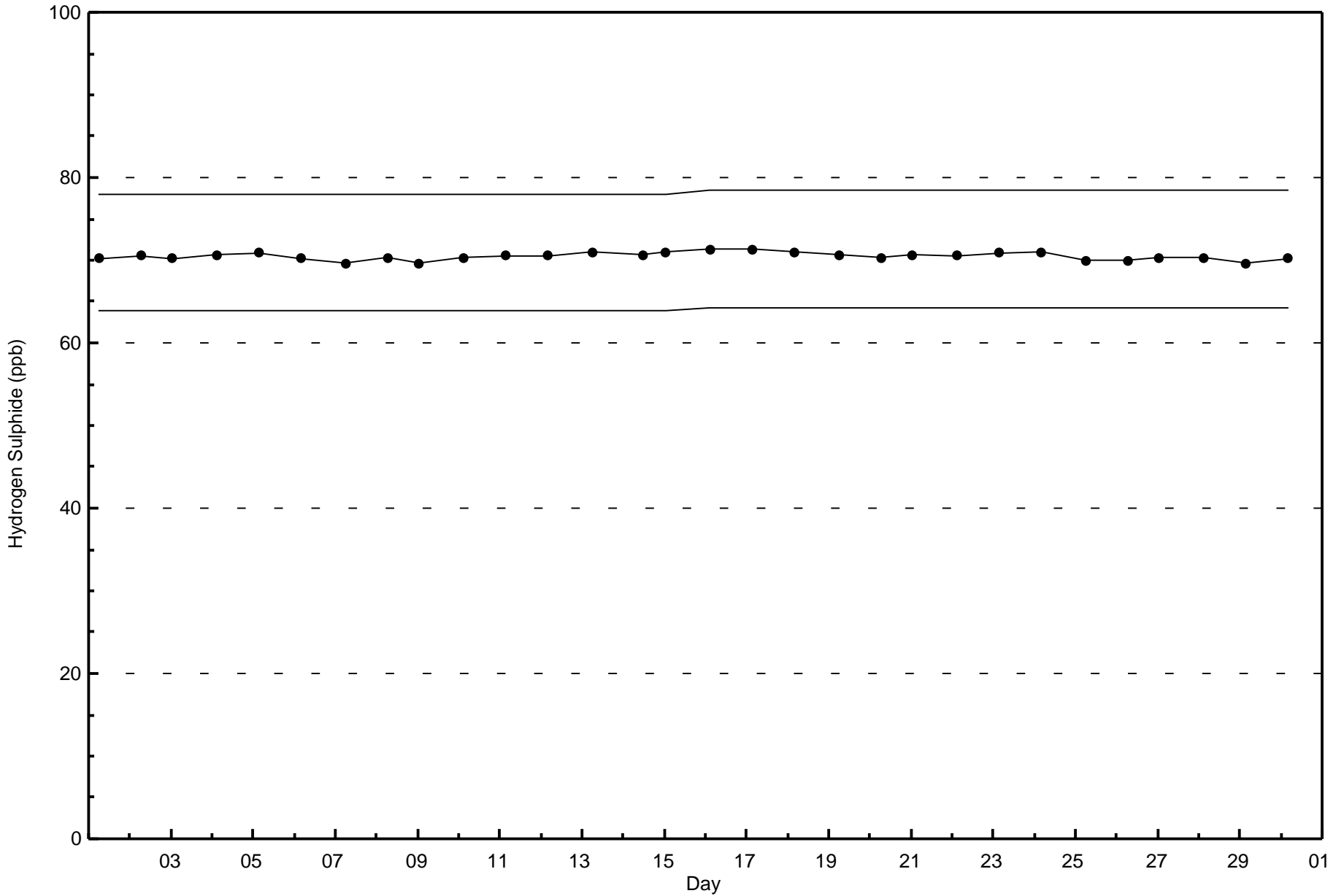


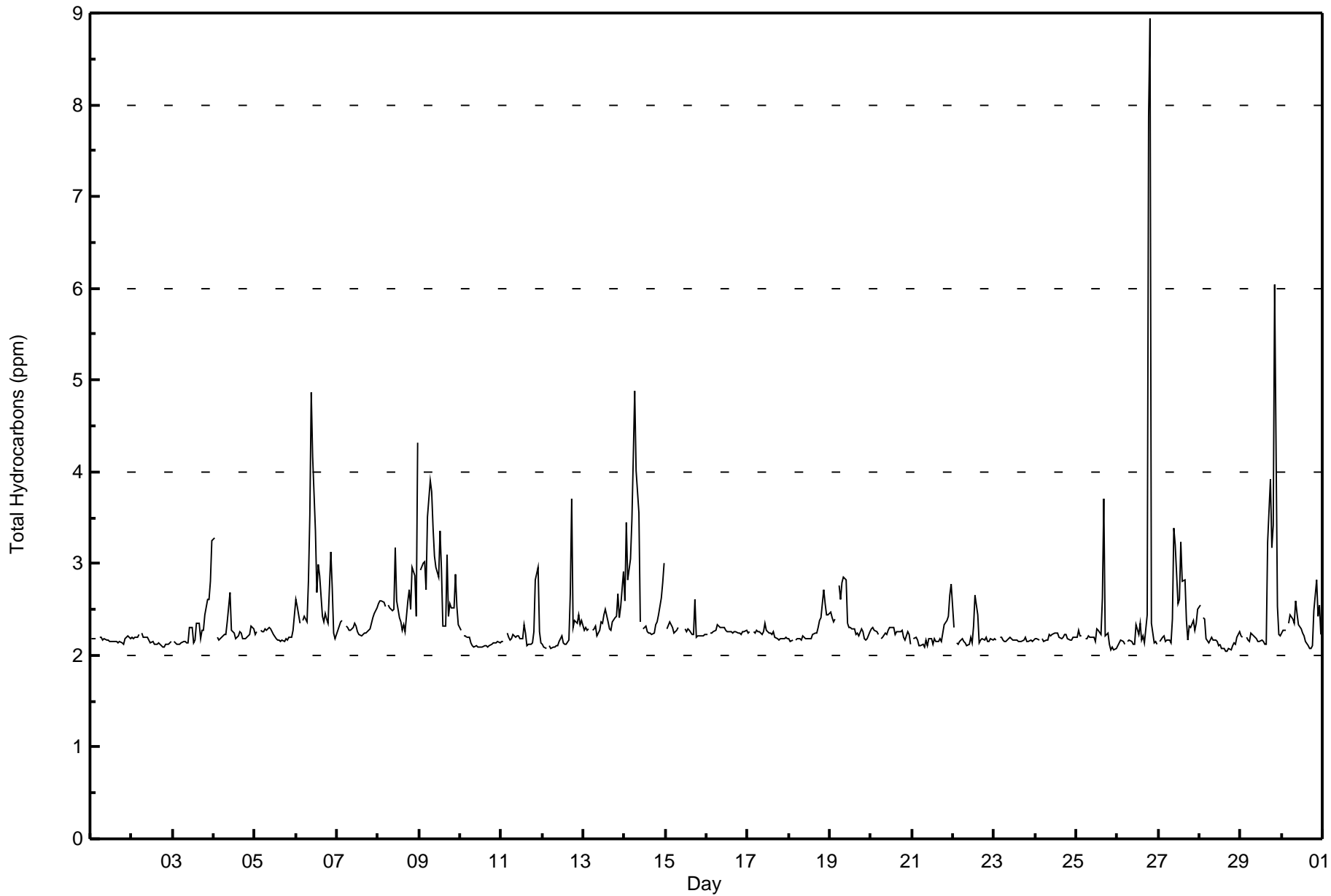
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 1 | 0.15 | 0.15 |
| 2.1 - 3.0 | 651 | 94.76 | 94.91 |
| 3.1 - 10.0 | 35 | 5.09 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 2.1 - 3.0 | 39 | 37 | 13 | 15 | 11 | 12 | 109 | 138 | 37 | 15 | 24 | 74 | 59 | 27 | 18 | 23 | 651 |
| 3.1 - 10.0 | 4 | 0 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 4 | 6 | 5 | 6 | 35 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 43 | 37 | 15 | 17 | 12 | 13 | 109 | 138 | 38 | 15 | 25 | 77 | 63 | 33 | 23 | 29 | 687 |

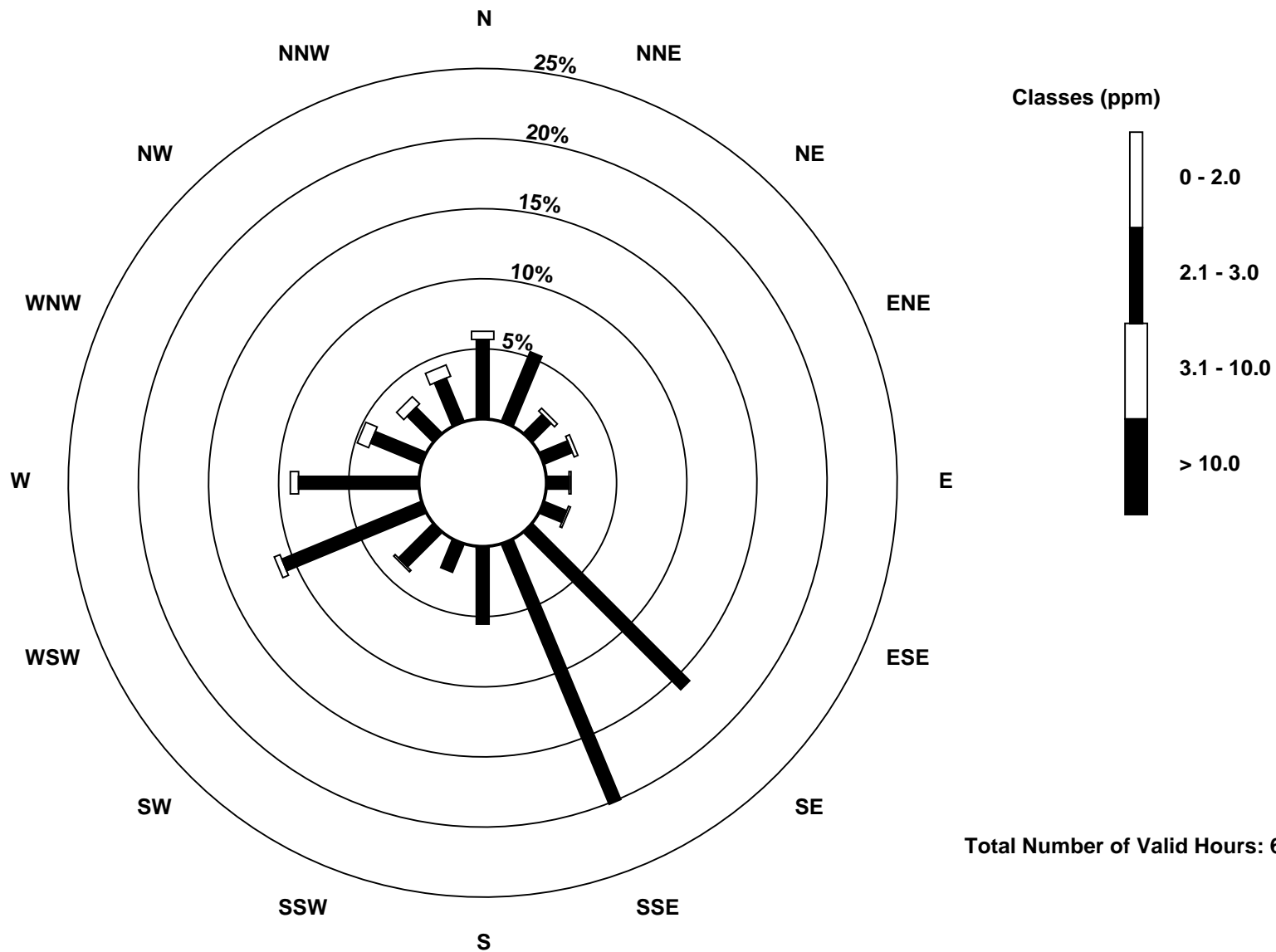
Total Number of Valid Hours: 687

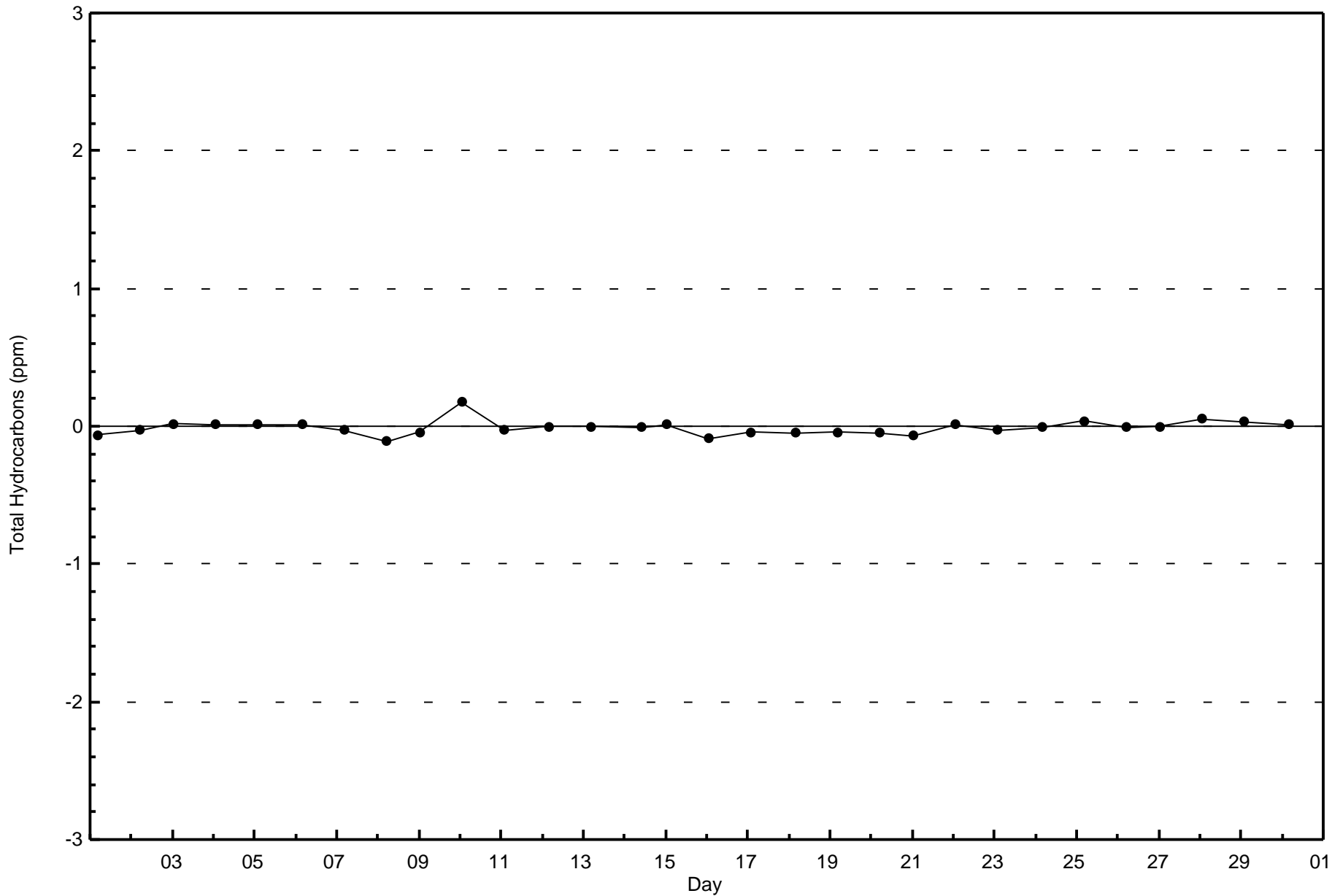
Total Number of Hours: 720

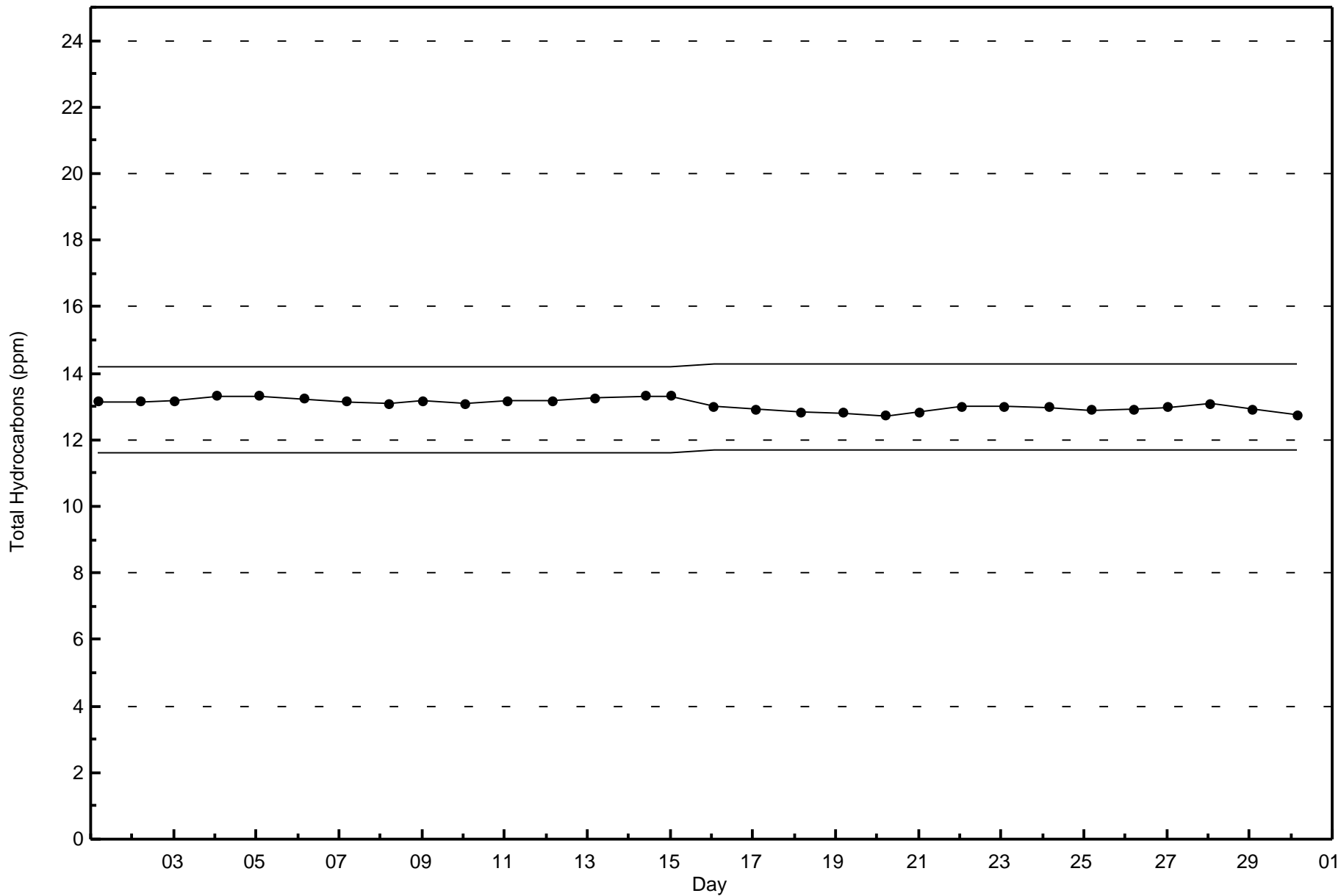


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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







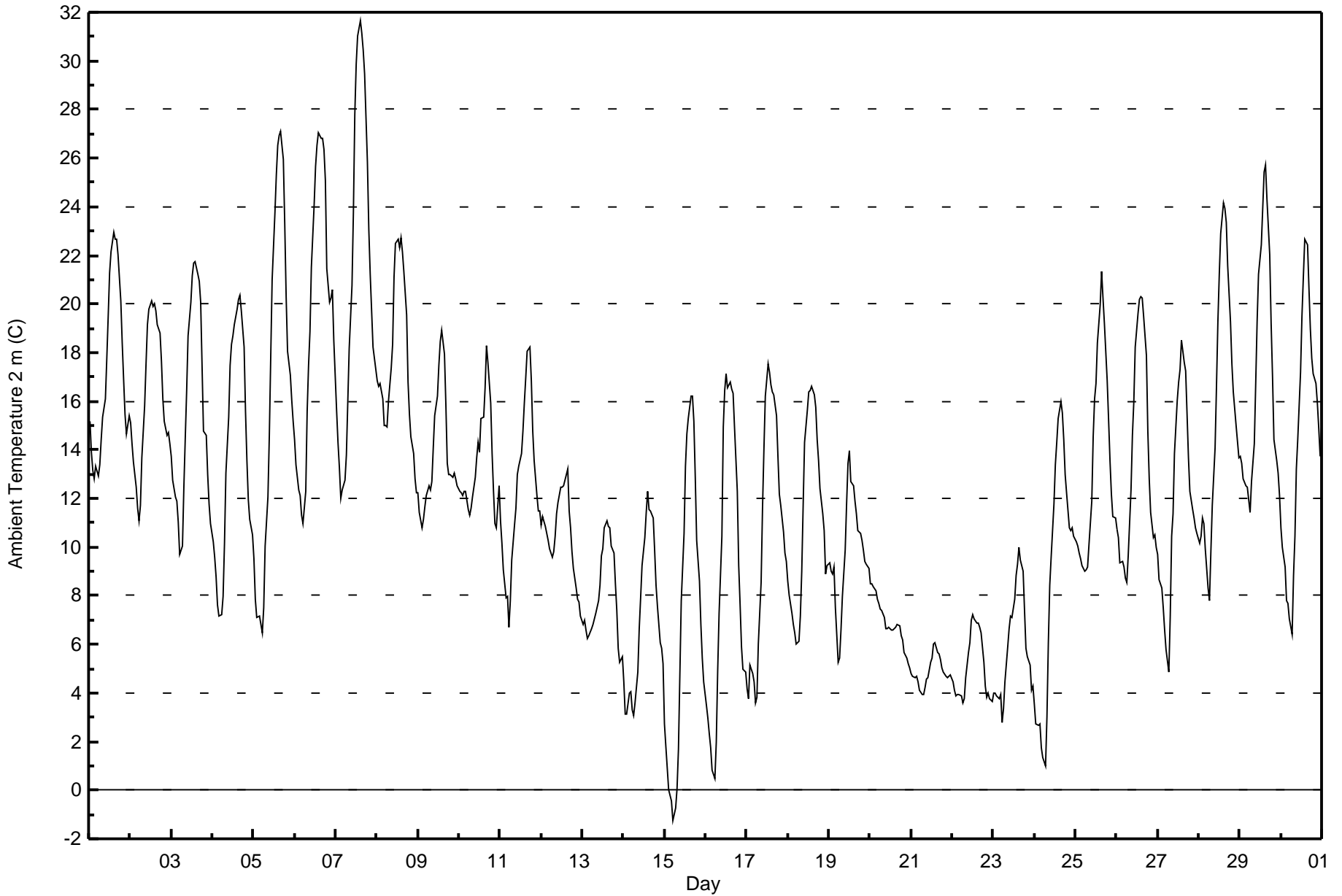


| Maximum Value: 31.6 C on Sep 7 15:00 Maximum Daily Average: 21.2 C on Sep 7 | | | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -1.3 C on Sep 15 06:00 Minimum Daily Average: 4.9 C on Sep 21 Maximum Diurnal Average: 17.7 C at hour 15 Minimum Diurnal Average: 7.4 C at hour 6 Monthly Average: 12.24 C Percentiles: P ₁ = 0.8 P ₁₀ = 4.7 Q ₁ = 7.6 Median = 11.7 O ₃ = 16.1 P ₉₀ = 20.3 P ₉₉ = 26.6 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 15.2 | 13.9 | 13.2 | 12.8 | 13.3 | 12.9 | 13.4 | 14.4 | 15.4 | 16.1 | 17.8 | 19.5 | 21.3 | 22.2 | 22.9 | 22.7 | 22.7 | 22.0 | 20.2 | 18.4 | 16.9 | 15.4 | 14.7 | 15.4 | 17.2 | 22.9 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 15.1 | 14.2 | 13.5 | 12.5 | 11.6 | 11.1 | 11.7 | 13.7 | 15.8 | 17.5 | 19.2 | 19.8 | 20.1 | 19.9 | 20.0 | 19.7 | 19.1 | 18.8 | 17.6 | 16.1 | 15.2 | 14.6 | 14.7 | 14.3 | 16.1 | 20.1 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 13.7 | 12.8 | 12.0 | 11.9 | 11.0 | 9.7 | 10.0 | 12.5 | 14.5 | 16.4 | 18.7 | 20.1 | 21.1 | 21.7 | 21.8 | 21.2 | 20.9 | 20.1 | 17.4 | 14.8 | 14.6 | 13.0 | 11.8 | 11.0 | 15.5 | 21.8 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 10.2 | 9.6 | 8.8 | 7.6 | 7.2 | 7.2 | 8.0 | 10.2 | 13.1 | 15.4 | 17.5 | 18.4 | 18.7 | 19.1 | 19.8 | 20.2 | 20.3 | 19.7 | 18.2 | 15.6 | 13.6 | 11.9 | 11.1 | 10.5 | 13.8 | 20.3 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 9.5 | 7.8 | 7.1 | 7.2 | 6.8 | 6.4 | 7.5 | 10.0 | 12.1 | 14.6 | 17.8 | 21.0 | 23.7 | 25.3 | 26.5 | 26.9 | 27.1 | 26.0 | 23.3 | 20.3 | 18.1 | 17.1 | 16.0 | 15.2 | 16.4 | 27.1 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 14.4 | 13.4 | 12.4 | 12.1 | 11.3 | 11.0 | 12.3 | 15.6 | 17.5 | 18.9 | 21.5 | 24.1 | 25.6 | 26.5 | 27.0 | 26.8 | 26.8 | 26.4 | 25.1 | 21.4 | 20.1 | 20.3 | 20.6 | 18.5 | 19.6 | 27.0 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 15.7 | 14.3 | 13.3 | 12.0 | 12.3 | 12.8 | 13.8 | 16.0 | 18.1 | 20.8 | 23.7 | 27.8 | 29.8 | 31.0 | 31.6 | 31.2 | 30.4 | 29.5 | 25.8 | 23.1 | 21.2 | 19.7 | 18.2 | 17.3 | 21.2 | 31.6 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 16.8 | 16.6 | 16.7 | 16.1 | 15.0 | 15.0 | 14.9 | 16.0 | 17.4 | 18.3 | 21.1 | 22.5 | 22.6 | 22.3 | 22.7 | 22.2 | 21.4 | 19.5 | 16.8 | 15.5 | 14.6 | 13.9 | 12.8 | 12.2 | 17.6 | 22.7 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 12.2 | 11.4 | 10.8 | 11.1 | 11.7 | 12.1 | 12.5 | 12.4 | 12.7 | 14.1 | 15.4 | 16.2 | 17.5 | 18.4 | 18.9 | 17.9 | 15.8 | 13.5 | 13.0 | 13.0 | 12.9 | 13.0 | 12.8 | 12.5 | 13.8 | 18.9 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 12.3 | 12.2 | 12.1 | 12.3 | 12.3 | 11.5 | 11.3 | 11.6 | 12.1 | 12.8 | 13.7 | 14.3 | 13.9 | 15.3 | 15.4 | 16.6 | 18.3 | 17.6 | 15.9 | 13.9 | 12.3 | 11.0 | 10.8 | 12.5 | 13.4 | 18.3 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 11.1 | 10.1 | 9.1 | 7.9 | 8.0 | 6.7 | 7.8 | 9.5 | 10.9 | 11.6 | 13.0 | 13.3 | 13.8 | 14.8 | 15.9 | 16.9 | 18.1 | 18.2 | 16.8 | 14.8 | 13.6 | 12.1 | 11.5 | 11.5 | 12.4 | 18.2 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 10.9 | 11.3 | 10.8 | 10.6 | 10.3 | 9.9 | 9.6 | 9.8 | 10.5 | 11.4 | 11.9 | 12.5 | 12.5 | 12.5 | 12.7 | 13.2 | 11.5 | 10.8 | 9.8 | 9.1 | 8.3 | 7.9 | 7.7 | 7.2 | 10.5 | 13.2 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 6.8 | 7.0 | 6.6 | 6.2 | 6.4 | 6.7 | 6.8 | 7.0 | 7.3 | 7.8 | 8.4 | 9.7 | 9.9 | 10.8 | 11.1 | 10.8 | 10.8 | 10.1 | 9.8 | 8.5 | 7.4 | 5.9 | 5.3 | 5.5 | 8.0 | 11.1 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 4.5 | 3.1 | 3.1 | 4.0 | 4.0 | 3.3 | 3.1 | 3.6 | 4.9 | 6.6 | 7.9 | 9.3 | 10.4 | 11.4 | 12.3 | 11.6 | 11.5 | 11.2 | 9.9 | 8.4 | 7.6 | 6.1 | 5.8 | 5.2 | 7.0 | 12.3 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 2.7 | 1.8 | 0.0 | -0.2 | -0.5 | -1.3 | -0.7 | 0.1 | 1.7 | 4.7 | 7.8 | 10.6 | 13.3 | 14.6 | 15.3 | 16.2 | 16.2 | 15.2 | 12.9 | 10.3 | 8.6 | 6.8 | 5.5 | 4.4 | 6.9 | 16.2 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 3.5 | 2.9 | 2.3 | 1.8 | 0.8 | 0.5 | 2.0 | 4.9 | 7.3 | 10.4 | 14.9 | 16.4 | 17.1 | 16.5 | 16.8 | 16.5 | 16.3 | 14.9 | 12.3 | 9.2 | 7.6 | 5.9 | 5.0 | 4.9 | 8.8 | 17.1 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 4.1 | 3.8 | 5.1 | 4.8 | 4.4 | 3.6 | 3.8 | 6.0 | 8.6 | 11.6 | 14.0 | 16.2 | 17.6 | 17.2 | 16.7 | 16.4 | 16.3 | 15.4 | 13.8 | 12.2 | 11.7 | 10.6 | 9.7 | 9.4 | 10.5 | 17.6 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 8.6 | 8.0 | 7.3 | 6.8 | 6.5 | 6.0 | 6.1 | 7.2 | 9.0 | 11.7 | 14.3 | 15.7 | 16.4 | 16.4 | 16.6 | 16.3 | 15.7 | 14.4 | 13.6 | 12.4 | 11.4 | 10.7 | 8.9 | 9.2 | 11.2 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 9.3 | 9.0 | 8.9 | 9.2 | 7.5 | 5.3 | 5.4 | 6.6 | 8.0 | 9.8 | 11.8 | 13.5 | 13.9 | 12.7 | 12.5 | 11.9 | 11.4 | 10.7 | 10.6 | 10.3 | 9.9 | 9.4 | 9.3 | 9.1 | 9.8 | 13.9 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 8.5 | 8.5 | 8.4 | 8.2 | 7.8 | 7.7 | 7.5 | 7.4 | 7.1 | 6.7 | 6.6 | 6.7 | 6.6 | 6.6 | 6.7 | 6.7 | 6.8 | 6.7 | 6.4 | 6.2 | 5.7 | 5.5 | 5.2 | 5.0 | 6.9 | 8.5 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 4.8 | 4.7 | 4.6 | 4.7 | 4.4 | 4.1 | 3.9 | 4.0 | 4.2 | 4.6 | 4.6 | 5.3 | 5.4 | 6.0 | 6.1 | 5.6 | 5.6 | 5.4 | 5.0 | 4.9 | 4.7 | 4.7 | 4.7 | 4.7 | 4.9 | 6.1 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 4.5 | 4.1 | 3.9 | 3.9 | 3.9 | 3.9 | 3.6 | 3.8 | 4.6 | 5.7 | 6.1 | 7.0 | 7.2 | 7.1 | 6.8 | 6.9 | 6.7 | 6.5 | 5.2 | 4.3 | 3.8 | 4.0 | 3.7 | 3.7 | 5.0 | 7.2 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 4.0 | 4.0 | 3.9 | 3.8 | 3.9 | 2.8 | 3.3 | 4.4 | 5.9 | 6.7 | 7.2 | 7.1 | 7.9 | 8.8 | 9.3 | 10.0 | 9.4 | 9.0 | 7.4 | 5.8 | 5.5 | 5.1 | 4.1 | 4.3 | 6.0 | 10.0 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 3.5 | 2.7 | 2.6 | 2.7 | 1.8 | 1.3 | 1.0 | 3.0 | 6.1 | 8.4 | 9.6 | 11.7 | 13.4 | 14.3 | 15.3 | 16.0 | 15.5 | 14.4 | 13.0 | 12.3 | 10.8 | 10.7 | 10.8 | 10.5 | 8.8 | 16.0 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 10.2 | 10.0 | 9.7 | 9.5 | 9.2 | 9.0 | 9.1 | 9.2 | 10.1 | 11.9 | 14.5 | 16.1 | 16.7 | 18.4 | 20.0 | 21.3 | 20.2 | 19.2 | 16.8 | 15.3 | 13.6 | 12.2 | 11.3 | 11.2 | 13.5 | 21.3 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 10.7 | 10.4 | 9.4 | 9.4 | 9.2 | 8.7 | 8.6 | 9.6 | 12.3 | 14.6 | 16.0 | 18.3 | 19.6 | 20.2 | 20.3 | 20.3 | 19.5 | 17.9 | 14.8 | 12.8 | 11.4 | 10.4 | 10.5 | 10.0 | 13.5 | 20.3 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 9.7 | 8.7 | 8.3 | 7.5 | 6.6 | 5.8 | 4.9 | 7.2 | 10.4 | 11.3 | 13.8 | 16.0 | 16.8 | 17.3 | 18.5 | 17.6 | 17.2 | 15.5 | 13.7 | 12.3 | 11.5 | 11.2 | 10.8 | 10.6 | 11.8 | 18.5 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 10.1 | 10.5 | 11.2 | 11.0 | 10.0 | 8.3 | 7.8 | 9.8 | 11.7 | 14.1 | 16.6 | 19.3 | 21.2 | 22.9 | 24.2 | 23.9 | 23.4 | 21.5 | 19.3 | 17.5 | 16.4 | 15.7 | 15.0 | 13.7 | 15.6 | 24.2 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 13.8 | 13.4 | 12.8 | 12.5 | 12.5 | 12.0 | 11.4 | 12.7 | 14.3 | 16.7 | 19.2 | 21.2 | 22.4 | 23.9 | 25.4 | 25.7 | 24.4 | 22.0 | 19.2 | 17.0 | 14.4 | 13.5 | 13.1 | 12.1 | 16.9 | 25.7 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 10.8 | 10.0 | 9.2 | 7.8 | 7.7 | 7.0 | 6.4 | 8.8 | 10.5 | 13.2 | 14.5 | 17.2 | 19.5 | 21.1 | 22.7 | 22.4 | 20.6 | 19.0 | 17.8 | 17.1 | 16.7 | 15.9 | 14.9 | 13.8 | 14.4 | 22.7 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.6 | 9.0 | 8.6 | 8.3 | 7.9 | 7.4 | 7.6 | 8.9 | 10.5 | 12.2 | 14.0 | 15.5 | 16.5 | 17.2 | 17.7 | 17.7 | 17.3 | 16.4 | 14.7 | 13.1 | 12.0 | 11.1 | 10.5 | 10.2 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 16.8 | 16.6 | 16.7 | 16.1 | 15.0 | 15.0 | 14.9 | 16.0 | 18.1 | 20.8 | 23.7 | 27.8 | 29.8 | 31.0 | 31.6 | 31.2 | 30.4 | 29.5 | 25.8 | 23.1 | 21.2 | 20.3 | 20.6 | 18.5 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

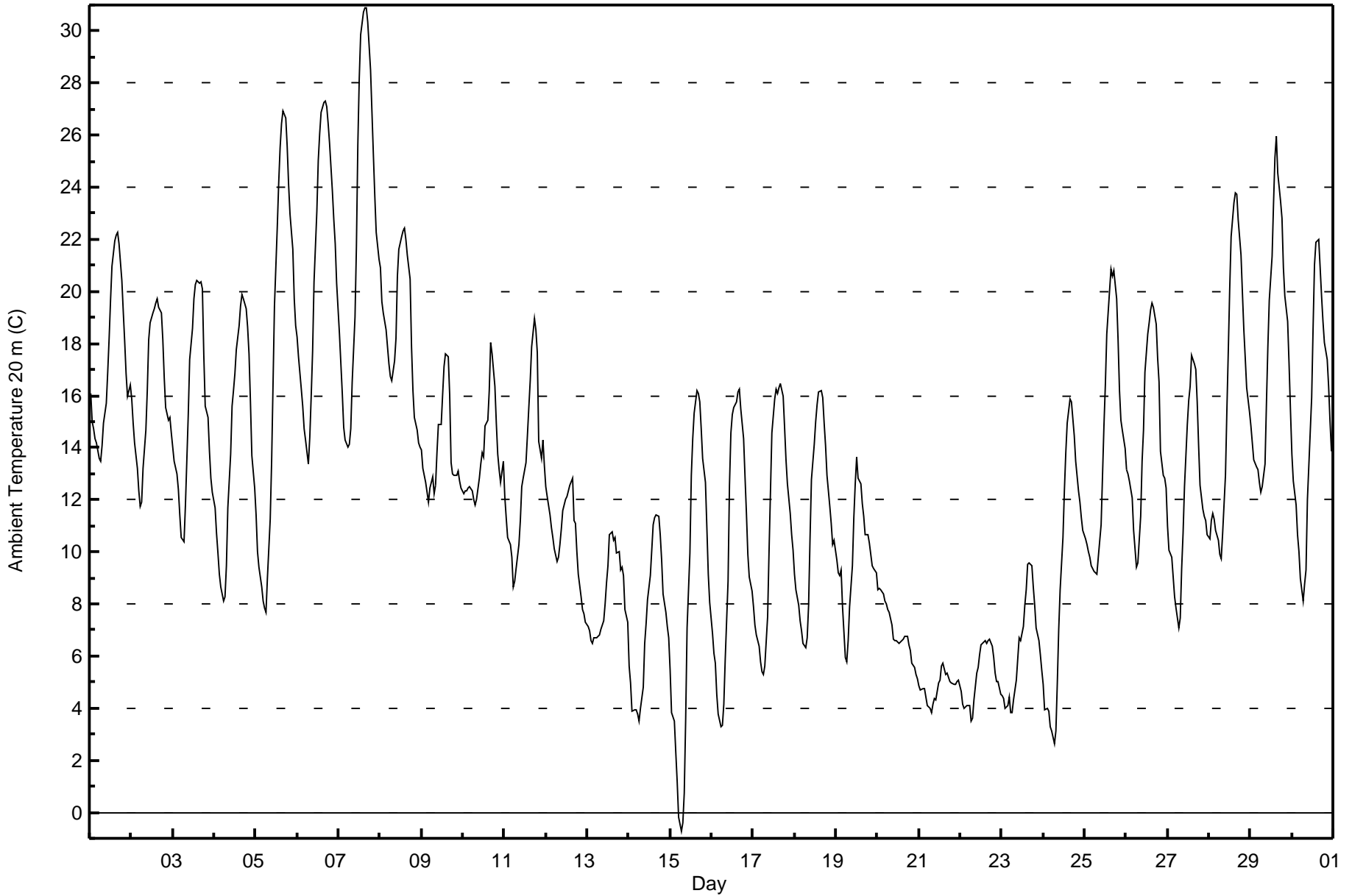
| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 4 | 0.56 | 0.56 |
| 0 - 10 | 265 | 36.81 | 37.36 |
| 10 - 20 | 370 | 51.39 | 88.75 |
| > 20 | 81 | 11.25 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 30.9 C on Sep 7 16:00 | | Maximum Daily Average: 22.3 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -0.7 C on Sep 15 07:00 | | Minimum Daily Average: 4.8 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.4 C at hour 16 | | Minimum Diurnal Average: 8.2 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.74 C | | Percentiles: P ₁ = 3.1 P ₁₀ = 5.1 Q ₁ = 8.2 Median = 12.5 Q ₃ = 16.3 P ₉₀ = 20.4 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-Sep | 16.1 | 15.0 | 14.8 | 14.4 | 14.2 | 13.6 | 13.5 | 14.1 | 15.0 | 15.7 | 16.9 | 18.2 | 19.7 | 20.9 | 22.0 | 22.1 | 22.3 | 21.9 | 20.4 | 19.2 | 18.1 | 16.9 | 16.0 | 16.4 | 17.4 | 22.3 | |
| 2-Sep | 15.9 | 14.9 | 14.2 | 13.2 | 12.3 | 11.8 | 11.9 | 13.2 | 14.7 | 16.2 | 18.1 | 18.8 | 19.2 | 19.3 | 19.6 | 19.7 | 19.4 | 19.2 | 18.1 | 16.7 | 15.5 | 15.1 | 15.2 | 14.6 | 16.1 | 19.7 | |
| 3-Sep | 14.0 | 13.5 | 13.0 | 12.4 | 11.4 | 10.6 | 10.4 | 11.8 | 13.5 | 15.3 | 17.4 | 18.6 | 19.7 | 20.3 | 20.4 | 20.3 | 20.4 | 20.1 | 17.5 | 15.6 | 15.2 | 13.9 | 12.8 | 12.3 | 15.4 | 20.4 | |
| 4-Sep | 11.7 | 10.7 | 9.9 | 9.2 | 8.6 | 8.1 | 8.2 | 9.5 | 11.7 | 13.8 | 15.6 | 16.2 | 16.9 | 17.8 | 18.7 | 19.5 | 19.9 | 19.7 | 19.4 | 18.6 | 17.6 | 15.8 | 13.7 | 12.4 | 14.3 | 19.9 | |
| 5-Sep | 11.4 | 10.0 | 9.4 | 8.7 | 8.1 | 7.8 | 7.7 | 9.0 | 11.3 | 13.5 | 16.5 | 19.5 | 22.5 | 24.2 | 25.5 | 26.5 | 26.9 | 26.7 | 25.6 | 24.1 | 23.0 | 21.6 | 19.7 | 18.7 | 17.4 | 26.9 | |
| 6-Sep | 18.3 | 17.5 | 16.3 | 15.6 | 14.7 | 14.3 | 13.4 | 14.4 | 16.0 | 17.7 | 20.4 | 23.1 | 25.1 | 26.1 | 26.9 | 27.3 | 27.3 | 27.1 | 26.4 | 25.7 | 23.8 | 22.7 | 21.8 | 20.3 | 20.9 | 27.3 | |
| 7-Sep | 18.4 | 17.2 | 16.1 | 14.8 | 14.3 | 14.0 | 14.1 | 14.7 | 16.5 | 19.0 | 21.7 | 25.6 | 28.2 | 29.8 | 30.7 | 30.9 | 30.9 | 30.4 | 28.5 | 26.9 | 25.3 | 23.7 | 22.3 | 21.3 | 22.3 | 30.9 | |
| 8-Sep | 20.9 | 19.6 | 19.2 | 18.5 | 17.9 | 17.2 | 16.7 | 16.6 | 17.4 | 18.2 | 20.6 | 21.6 | 22.1 | 22.3 | 22.4 | 22.0 | 21.4 | 20.5 | 17.9 | 16.2 | 15.2 | 14.7 | 14.2 | 14.0 | 18.6 | 22.4 | |
| 9-Sep | 13.9 | 13.2 | 12.7 | 12.3 | 11.9 | 12.4 | 12.9 | 12.2 | 12.6 | 13.8 | 14.9 | 14.9 | 16.0 | 17.1 | 17.6 | 17.5 | 16.0 | 13.5 | 13.0 | 13.0 | 13.0 | 13.1 | 12.7 | 12.5 | 13.9 | 17.6 | |
| 10-Sep | 12.3 | 12.3 | 12.4 | 12.4 | 12.5 | 12.3 | 12.0 | 11.8 | 12.0 | 12.8 | 13.4 | 13.8 | 13.7 | 14.8 | 15.1 | 16.2 | 18.0 | 17.6 | 16.4 | 14.9 | 13.8 | 13.2 | 12.7 | 13.5 | 13.7 | 18.0 | |
| 11-Sep | 12.1 | 11.3 | 10.6 | 10.3 | 9.8 | 8.7 | 8.9 | 9.3 | 10.3 | 11.2 | 12.5 | 12.9 | 13.4 | 14.5 | 15.5 | 16.6 | 17.9 | 18.9 | 18.6 | 17.7 | 14.2 | 13.6 | 14.3 | 13.3 | 13.2 | 18.9 | |
| 12-Sep | 12.5 | 12.1 | 11.4 | 10.9 | 10.6 | 10.1 | 9.7 | 9.8 | 10.3 | 10.9 | 11.6 | 12.0 | 12.1 | 12.4 | 12.6 | 12.8 | 11.2 | 11.1 | 10.0 | 9.2 | 8.3 | 7.8 | 7.6 | 7.3 | 10.6 | 12.8 | |
| 13-Sep | 7.1 | 7.0 | 6.6 | 6.5 | 6.7 | 6.7 | 6.8 | 6.8 | 7.0 | 7.3 | 8.0 | 8.8 | 9.5 | 10.6 | 10.8 | 10.4 | 10.5 | 10.0 | 9.3 | 9.4 | 9.1 | 7.8 | 7.3 | 8.3 | 10.8 | | |
| 14-Sep | 5.6 | 5.0 | 3.9 | 3.9 | 3.9 | 3.8 | 3.5 | 4.0 | 4.8 | 6.5 | 7.2 | 8.2 | 9.1 | 10.1 | 11.0 | 11.3 | 11.4 | 11.4 | 10.7 | 9.7 | 8.4 | 7.7 | 7.2 | 6.7 | 7.3 | 11.4 | |
| 15-Sep | 5.5 | 3.8 | 3.5 | 2.3 | 1.2 | -0.2 | -0.7 | -0.4 | 0.7 | 3.6 | 7.1 | 10.0 | 12.9 | 14.3 | 15.3 | 16.2 | 16.1 | 15.8 | 14.7 | 13.6 | 12.7 | 11.0 | 9.2 | 8.1 | 8.2 | 16.2 | |
| 16-Sep | 6.9 | 6.1 | 5.7 | 4.6 | 3.8 | 3.3 | 3.3 | 4.1 | 5.9 | 8.9 | 12.5 | 14.6 | 15.3 | 15.5 | 15.8 | 16.1 | 16.3 | 15.5 | 14.3 | 12.9 | 11.4 | 9.9 | 9.0 | 8.5 | 10.0 | 16.3 | |
| 17-Sep | 7.9 | 7.2 | 6.8 | 6.4 | 5.8 | 5.4 | 5.3 | 5.6 | 7.5 | 10.0 | 12.3 | 14.6 | 15.9 | 16.2 | 16.1 | 16.3 | 16.5 | 16.0 | 14.8 | 13.5 | 12.6 | 11.5 | 10.6 | 10.0 | 11.0 | 16.5 | |
| 18-Sep | 9.2 | 8.5 | 8.0 | 7.4 | 7.0 | 6.5 | 6.3 | 6.7 | 8.0 | 10.5 | 12.8 | 14.1 | 15.0 | 15.7 | 16.2 | 16.2 | 15.9 | 14.9 | 14.1 | 12.9 | 11.7 | 11.1 | 10.3 | 10.4 | 11.2 | 16.2 | |
| 19-Sep | 9.7 | 9.2 | 9.1 | 9.3 | 7.9 | 5.9 | 5.8 | 6.6 | 7.9 | 9.5 | 11.3 | 12.6 | 13.6 | 12.8 | 12.6 | 11.9 | 11.3 | 10.7 | 10.7 | 10.3 | 9.9 | 9.5 | 9.4 | 9.2 | 9.9 | 13.6 | |
| 20-Sep | 8.5 | 8.6 | 8.5 | 8.4 | 8.1 | 8.0 | 7.8 | 7.7 | 7.2 | 6.7 | 6.6 | 6.6 | 6.5 | 6.6 | 6.6 | 6.7 | 6.8 | 6.8 | 6.4 | 6.2 | 5.7 | 5.5 | 5.3 | 5.1 | 7.0 | 8.6 | |
| 21-Sep | 4.9 | 4.7 | 4.7 | 4.7 | 4.4 | 4.1 | 4.0 | 3.8 | 4.2 | 4.4 | 4.3 | 4.9 | 5.1 | 5.6 | 5.7 | 5.3 | 5.3 | 5.2 | 5.0 | 5.0 | 4.9 | 4.9 | 5.0 | 5.1 | 4.8 | 5.7 | |
| 22-Sep | 4.6 | 4.2 | 4.0 | 4.1 | 4.1 | 4.1 | 3.5 | 3.6 | 4.3 | 5.3 | 5.6 | 6.1 | 6.4 | 6.5 | 6.6 | 6.5 | 6.6 | 6.6 | 6.4 | 6.0 | 5.3 | 5.0 | 5.0 | 4.6 | 5.2 | 6.6 | |
| 23-Sep | 4.5 | 4.4 | 4.0 | 4.1 | 4.4 | 3.8 | 3.8 | 4.3 | 5.1 | 5.9 | 6.7 | 6.6 | 7.1 | 8.0 | 8.5 | 9.5 | 9.6 | 9.5 | 8.7 | 7.9 | 7.1 | 6.6 | 6.1 | 5.5 | 6.3 | 9.6 | |
| 24-Sep | 4.9 | 3.9 | 4.0 | 3.9 | 3.3 | 3.1 | 2.7 | 3.1 | 5.0 | 7.0 | 8.5 | 10.5 | 12.3 | 13.8 | 15.0 | 15.9 | 15.8 | 15.1 | 14.5 | 13.5 | 12.3 | 11.9 | 11.3 | 10.8 | 9.3 | 15.9 | |
| 25-Sep | 10.5 | 10.3 | 10.0 | 9.8 | 9.5 | 9.2 | 9.2 | 9.1 | 9.8 | 11.1 | 12.9 | 14.8 | 16.4 | 18.3 | 20.1 | 20.9 | 20.6 | 20.8 | 19.7 | 18.2 | 16.2 | 15.0 | 14.7 | 14.0 | 14.2 | 20.9 | |
| 26-Sep | 13.2 | 13.0 | 12.7 | 12.1 | 10.8 | 10.1 | 9.4 | 9.6 | 11.4 | 13.5 | 14.7 | 16.9 | 18.4 | 18.8 | 19.3 | 19.6 | 19.4 | 18.8 | 17.4 | 16.5 | 13.9 | 12.9 | 12.8 | 12.4 | 14.5 | 19.6 | |
| 27-Sep | 11.0 | 10.1 | 9.8 | 9.1 | 8.3 | 7.9 | 7.1 | 7.4 | 9.4 | 10.7 | 12.5 | 14.9 | 15.8 | 16.3 | 17.6 | 17.2 | 17.0 | 15.8 | 14.1 | 12.6 | 11.7 | 11.4 | 11.2 | 10.7 | 12.1 | 17.6 | |
| 28-Sep | 10.5 | 11.2 | 11.5 | 11.3 | 10.8 | 10.4 | 9.9 | 9.7 | 10.7 | 12.9 | 15.4 | 17.7 | 20.1 | 22.1 | 23.4 | 23.8 | 23.7 | 22.7 | 21.4 | 19.9 | 18.6 | 17.5 | 16.3 | 15.4 | 16.1 | 23.8 | |
| 29-Sep | 14.8 | 14.2 | 13.5 | 13.3 | 13.1 | 12.6 | 12.3 | 12.5 | 13.4 | 15.7 | 17.9 | 19.6 | 21.3 | 23.3 | 25.1 | 26.0 | 24.5 | 23.5 | 22.8 | 20.9 | 19.8 | 18.8 | 17.2 | 15.4 | 18.0 | 26.0 | |
| 30-Sep | 13.8 | 12.7 | 11.8 | 10.7 | 10.0 | 9.0 | 8.1 | 8.8 | 9.3 | 12.0 | 13.3 | 15.9 | 18.6 | 21.0 | 21.9 | 22.0 | 20.9 | 19.8 | 18.8 | 18.0 | 17.4 | 16.3 | 15.0 | 13.8 | 15.0 | 22.0 | |
| | | 11.0 | 10.4 | 9.9 | 9.5 | 9.0 | 8.5 | 8.2 | 8.7 | 9.8 | 11.3 | 13.0 | 14.4 | 15.6 | 16.5 | 17.2 | 17.4 | 17.3 | 16.8 | 15.9 | 14.8 | 13.7 | 12.9 | 12.2 | 11.7 | Diurnal Average | |
| | | 20.9 | 19.6 | 19.2 | 18.5 | 17.9 | 17.2 | 16.7 | 16.6 | 17.4 | 19.0 | 21.7 | 25.6 | 28.2 | 29.8 | 30.7 | 30.9 | 30.9 | 30.4 | 28.5 | 26.9 | 25.3 | 23.7 | 22.3 | 21.3 | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

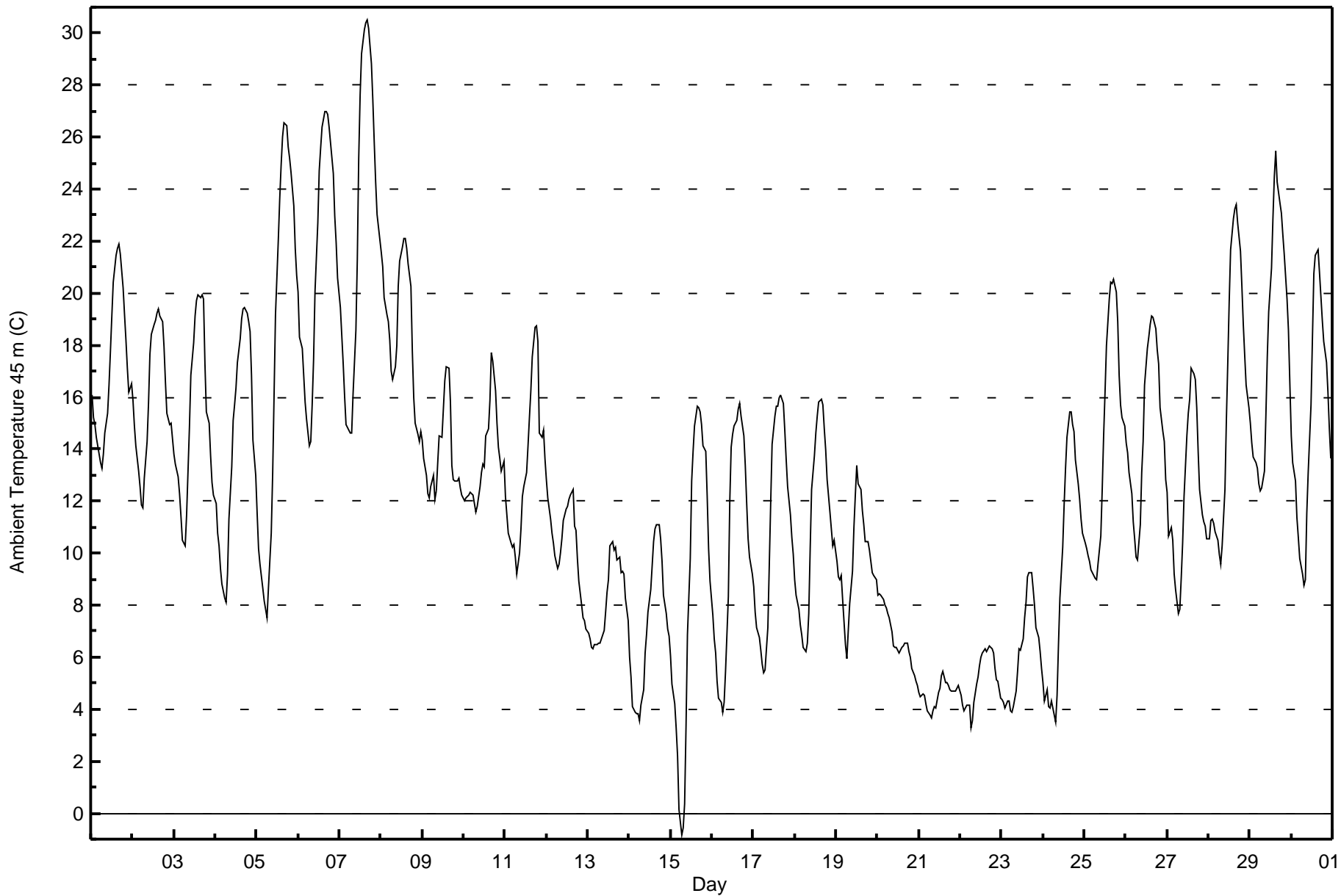
| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 3 | 0.42 | 0.42 |
| 0 - 10 | 246 | 34.17 | 34.58 |
| 10 - 20 | 390 | 54.17 | 88.75 |
| > 20 | 81 | 11.25 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 30.5 C on Sep 7 17:00 | | Maximum Daily Average: 22.5 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -0.8 C on Sep 15 07:00 | | Minimum Daily Average: 4.6 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.1 C at hour 16 | | Minimum Diurnal Average: 8.4 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.72 C | | Percentiles: P ₁ = 3.3 P ₁₀ = 5.1 O ₁ = 8.4 Median = 12.4 O ₃ = 16.2 P ₉₀ = 20.4 P ₉₉ = 26.8 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 16.1 | 15.2 | 15.0 | 14.4 | 14.1 | 13.5 | 13.3 | 13.8 | 14.6 | 15.4 | 16.5 | 17.8 | 19.1 | 20.4 | 21.5 | 21.7 | 21.9 | 21.5 | 20.2 | 19.2 | 18.2 | 17.1 | 16.2 | 16.5 | 17.2 | 21.9 | |
| 2-Sep | 15.9 | 14.9 | 14.1 | 13.2 | 12.5 | 11.9 | 11.8 | 12.9 | 14.3 | 15.7 | 17.7 | 18.4 | 18.8 | 19.0 | 19.2 | 19.4 | 19.1 | 18.9 | 17.9 | 16.6 | 15.4 | 14.9 | 15.0 | 14.4 | 15.9 | 19.4 | |
| 3-Sep | 13.8 | 13.4 | 12.9 | 12.3 | 11.4 | 10.5 | 10.3 | 11.5 | 13.1 | 14.8 | 16.9 | 18.1 | 19.1 | 19.7 | 19.9 | 19.8 | 19.9 | 19.8 | 17.3 | 15.4 | 15.0 | 13.7 | 12.7 | 12.2 | 15.2 | 19.9 | |
| 4-Sep | 11.9 | 10.8 | 10.3 | 9.4 | 8.8 | 8.3 | 8.1 | 9.2 | 11.3 | 13.3 | 15.1 | 15.7 | 16.4 | 17.3 | 18.2 | 19.0 | 19.4 | 19.4 | 19.2 | 18.9 | 18.5 | 16.9 | 14.4 | 13.0 | 14.3 | 19.4 | |
| 5-Sep | 11.5 | 10.2 | 9.5 | 8.7 | 8.1 | 7.9 | 7.5 | 8.7 | 10.8 | 13.1 | 16.1 | 19.2 | 22.1 | 23.6 | 24.9 | 26.0 | 26.5 | 26.4 | 25.7 | 25.2 | 24.7 | 23.3 | 21.7 | 20.7 | 17.6 | 26.5 | |
| 6-Sep | 20.1 | 18.3 | 17.9 | 16.8 | 15.8 | 15.1 | 14.2 | 14.3 | 15.7 | 17.4 | 20.0 | 22.7 | 24.7 | 25.6 | 26.4 | 27.0 | 27.0 | 26.9 | 26.4 | 25.8 | 24.6 | 23.0 | 22.0 | 20.6 | 21.2 | 27.0 | |
| 7-Sep | 19.4 | 18.3 | 17.3 | 16.0 | 15.0 | 14.7 | 14.6 | 14.6 | 16.1 | 18.6 | 21.3 | 25.2 | 27.7 | 29.2 | 30.1 | 30.4 | 30.5 | 30.2 | 28.8 | 27.4 | 25.8 | 24.3 | 23.0 | 22.1 | 22.5 | 30.5 | |
| 8-Sep | 21.6 | 21.0 | 19.8 | 19.2 | 18.9 | 18.2 | 17.0 | 16.7 | 17.2 | 18.0 | 20.3 | 21.2 | 21.8 | 22.1 | 22.1 | 21.7 | 21.1 | 20.3 | 17.8 | 16.0 | 15.0 | 14.6 | 14.3 | 14.6 | 18.8 | 22.1 | |
| 9-Sep | 14.4 | 13.7 | 13.0 | 12.3 | 12.1 | 12.5 | 13.0 | 12.1 | 12.4 | 13.5 | 14.5 | 14.5 | 15.6 | 16.6 | 17.2 | 17.1 | 15.8 | 13.3 | 12.8 | 12.8 | 12.8 | 12.9 | 12.5 | 12.2 | 13.7 | 17.2 | |
| 10-Sep | 12.0 | 12.1 | 12.2 | 12.3 | 12.3 | 12.2 | 11.9 | 11.6 | 11.8 | 12.6 | 13.1 | 13.4 | 13.3 | 14.5 | 14.8 | 15.9 | 17.7 | 17.4 | 16.2 | 15.0 | 14.1 | 13.7 | 13.2 | 13.6 | 13.6 | 17.7 | |
| 11-Sep | 12.2 | 11.5 | 10.7 | 10.4 | 10.2 | 10.3 | 9.8 | 9.2 | 10.0 | 11.0 | 12.2 | 12.6 | 13.1 | 14.1 | 15.2 | 16.3 | 17.5 | 18.7 | 18.7 | 18.2 | 14.6 | 14.4 | 14.7 | 13.6 | 13.3 | 18.7 | |
| 12-Sep | 12.8 | 12.1 | 11.3 | 10.8 | 10.4 | 9.9 | 9.4 | 9.6 | 10.0 | 10.5 | 11.2 | 11.7 | 11.8 | 12.1 | 12.3 | 12.5 | 11.0 | 10.9 | 9.8 | 8.9 | 8.0 | 7.5 | 7.4 | 7.1 | 10.4 | 12.8 | |
| 13-Sep | 6.9 | 6.7 | 6.4 | 6.3 | 6.5 | 6.5 | 6.5 | 6.6 | 6.7 | 7.0 | 7.7 | 8.5 | 9.0 | 10.3 | 10.5 | 10.1 | 10.2 | 9.7 | 9.8 | 9.2 | 9.3 | 9.2 | 8.3 | 7.4 | 8.1 | 10.5 | |
| 14-Sep | 6.0 | 5.3 | 4.1 | 3.9 | 3.8 | 3.8 | 3.6 | 4.2 | 4.8 | 6.2 | 6.9 | 7.7 | 8.6 | 9.5 | 10.5 | 10.9 | 11.1 | 11.1 | 10.5 | 9.7 | 8.4 | 7.7 | 7.1 | 6.8 | 7.2 | 11.1 | |
| 15-Sep | 6.1 | 5.0 | 4.2 | 3.3 | 2.2 | 0.1 | -0.8 | -0.6 | 0.4 | 3.3 | 6.9 | 9.8 | 12.8 | 13.9 | 14.9 | 15.7 | 15.6 | 15.4 | 15.0 | 14.2 | 13.9 | 12.2 | 10.1 | 8.9 | 8.4 | 15.7 | |
| 16-Sep | 7.6 | 6.7 | 6.2 | 5.1 | 4.4 | 4.3 | 3.9 | 4.2 | 5.4 | 8.3 | 12.0 | 14.1 | 14.6 | 14.9 | 15.1 | 15.6 | 15.8 | 15.3 | 14.5 | 13.4 | 11.9 | 10.5 | 9.8 | 9.2 | 10.1 | 15.8 | |
| 17-Sep | 8.7 | 7.7 | 7.1 | 6.7 | 6.2 | 5.7 | 5.4 | 5.5 | 7.1 | 9.5 | 11.9 | 14.2 | 15.3 | 15.6 | 15.7 | 16.0 | 16.1 | 15.8 | 14.7 | 13.6 | 12.6 | 11.5 | 10.6 | 9.9 | 11.0 | 16.1 | |
| 18-Sep | 9.0 | 8.4 | 7.9 | 7.3 | 6.9 | 6.4 | 6.2 | 6.5 | 7.7 | 10.2 | 12.5 | 13.8 | 14.6 | 15.3 | 15.8 | 15.9 | 15.7 | 14.8 | 14.0 | 12.8 | 11.6 | 11.0 | 10.3 | 10.5 | 11.0 | 15.9 | |
| 19-Sep | 9.7 | 9.1 | 9.0 | 9.1 | 8.2 | 6.5 | 5.9 | 7.0 | 8.1 | 9.3 | 11.0 | 12.2 | 13.4 | 12.6 | 12.4 | 11.6 | 11.1 | 10.5 | 10.5 | 10.1 | 9.7 | 9.3 | 9.2 | 9.0 | 9.8 | 13.4 | |
| 20-Sep | 8.4 | 8.4 | 8.4 | 8.2 | 8.0 | 7.9 | 7.7 | 7.5 | 7.0 | 6.4 | 6.4 | 6.4 | 6.2 | 6.3 | 6.4 | 6.5 | 6.5 | 6.5 | 6.2 | 6.0 | 5.5 | 5.3 | 5.1 | 4.9 | 6.8 | 8.4 | |
| 21-Sep | 4.7 | 4.5 | 4.6 | 4.5 | 4.2 | 3.9 | 3.8 | 3.7 | 4.0 | 4.1 | 4.0 | 4.7 | 4.8 | 5.3 | 5.5 | 5.0 | 5.0 | 4.9 | 4.8 | 4.7 | 4.7 | 4.7 | 4.8 | 4.9 | 4.6 | 5.5 | |
| 22-Sep | 4.6 | 4.1 | 3.9 | 4.0 | 4.2 | 4.2 | 3.3 | 3.6 | 4.3 | 5.0 | 5.2 | 5.7 | 6.0 | 6.1 | 6.3 | 6.2 | 6.3 | 6.4 | 6.3 | 6.1 | 5.6 | 5.2 | 5.1 | 4.4 | 5.1 | 6.4 | |
| 23-Sep | 4.4 | 4.2 | 4.1 | 4.3 | 4.3 | 3.9 | 3.9 | 4.1 | 4.7 | 5.4 | 6.3 | 6.2 | 6.7 | 7.5 | 8.1 | 9.1 | 9.3 | 9.2 | 8.7 | 8.0 | 7.2 | 6.8 | 6.2 | 5.6 | 6.2 | 9.3 | |
| 24-Sep | 5.0 | 4.3 | 4.8 | 4.1 | 4.1 | 4.3 | 3.8 | 3.5 | 4.5 | 6.5 | 8.3 | 10.2 | 11.9 | 13.3 | 14.5 | 15.4 | 15.5 | 15.0 | 14.7 | 13.6 | 12.7 | 12.1 | 11.3 | 10.8 | 9.3 | 15.5 | |
| 25-Sep | 10.4 | 10.2 | 9.9 | 9.7 | 9.3 | 9.1 | 9.0 | 9.0 | 9.6 | 10.7 | 12.4 | 14.5 | 16.2 | 18.0 | 19.8 | 20.4 | 20.4 | 20.6 | 20.0 | 18.9 | 16.9 | 15.7 | 15.2 | 14.9 | 14.2 | 20.6 | |
| 26-Sep | 14.2 | 13.9 | 13.1 | 12.3 | 11.2 | 10.6 | 9.8 | 9.7 | 11.1 | 13.1 | 14.3 | 16.5 | 17.9 | 18.3 | 18.8 | 19.1 | 19.1 | 18.6 | 17.8 | 17.3 | 15.6 | 14.7 | 14.3 | 12.8 | 14.8 | 19.1 | |
| 27-Sep | 12.3 | 10.7 | 11.0 | 10.5 | 9.2 | 8.6 | 7.7 | 7.8 | 9.0 | 10.4 | 12.2 | 14.5 | 15.4 | 15.9 | 17.1 | 16.9 | 16.7 | 15.6 | 13.9 | 12.4 | 11.5 | 11.2 | 11.1 | 10.5 | 12.2 | 17.1 | |
| 28-Sep | 10.6 | 11.2 | 11.3 | 11.2 | 10.8 | 10.5 | 10.0 | 9.6 | 10.3 | 12.5 | 15.1 | 17.3 | 19.6 | 21.7 | 22.9 | 23.3 | 23.4 | 22.7 | 21.6 | 20.3 | 18.8 | 17.6 | 16.5 | 15.6 | 16.0 | 23.4 | |
| 29-Sep | 15.0 | 14.3 | 13.7 | 13.5 | 13.3 | 12.7 | 12.4 | 12.5 | 13.1 | 15.3 | 17.6 | 19.3 | 21.0 | 22.8 | 24.5 | 25.5 | 24.2 | 23.5 | 23.1 | 22.2 | 21.5 | 19.8 | 18.6 | 16.5 | 18.2 | 25.5 | |
| 30-Sep | 14.5 | 13.5 | 12.8 | 11.4 | 10.6 | 9.8 | 9.2 | 8.8 | 9.0 | 11.5 | 13.1 | 15.7 | 18.2 | 20.8 | 21.5 | 21.7 | 20.8 | 19.9 | 19.0 | 18.1 | 17.3 | 16.2 | 14.8 | 13.6 | 15.1 | 21.7 | |
| | | 11.3 | 10.7 | 10.2 | 9.7 | 9.2 | 8.8 | 8.4 | 8.6 | 9.5 | 11.0 | 12.6 | 14.1 | 15.2 | 16.1 | 16.7 | 17.1 | 17.0 | 16.6 | 15.9 | 15.0 | 14.0 | 13.2 | 12.5 | 11.9 | Diurnal Average | |
| | | 21.6 | 21.0 | 19.8 | 19.2 | 18.9 | 18.2 | 17.0 | 16.7 | 17.2 | 18.6 | 21.3 | 25.2 | 27.7 | 29.2 | 30.1 | 30.4 | 30.5 | 30.2 | 28.8 | 27.4 | 25.8 | 24.3 | 23.0 | 22.1 | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 2 | 0.28 | 0.28 |
| 0 - 10 | 245 | 34.03 | 34.31 |
| 10 - 20 | 392 | 54.44 | 88.75 |
| > 20 | 81 | 11.25 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

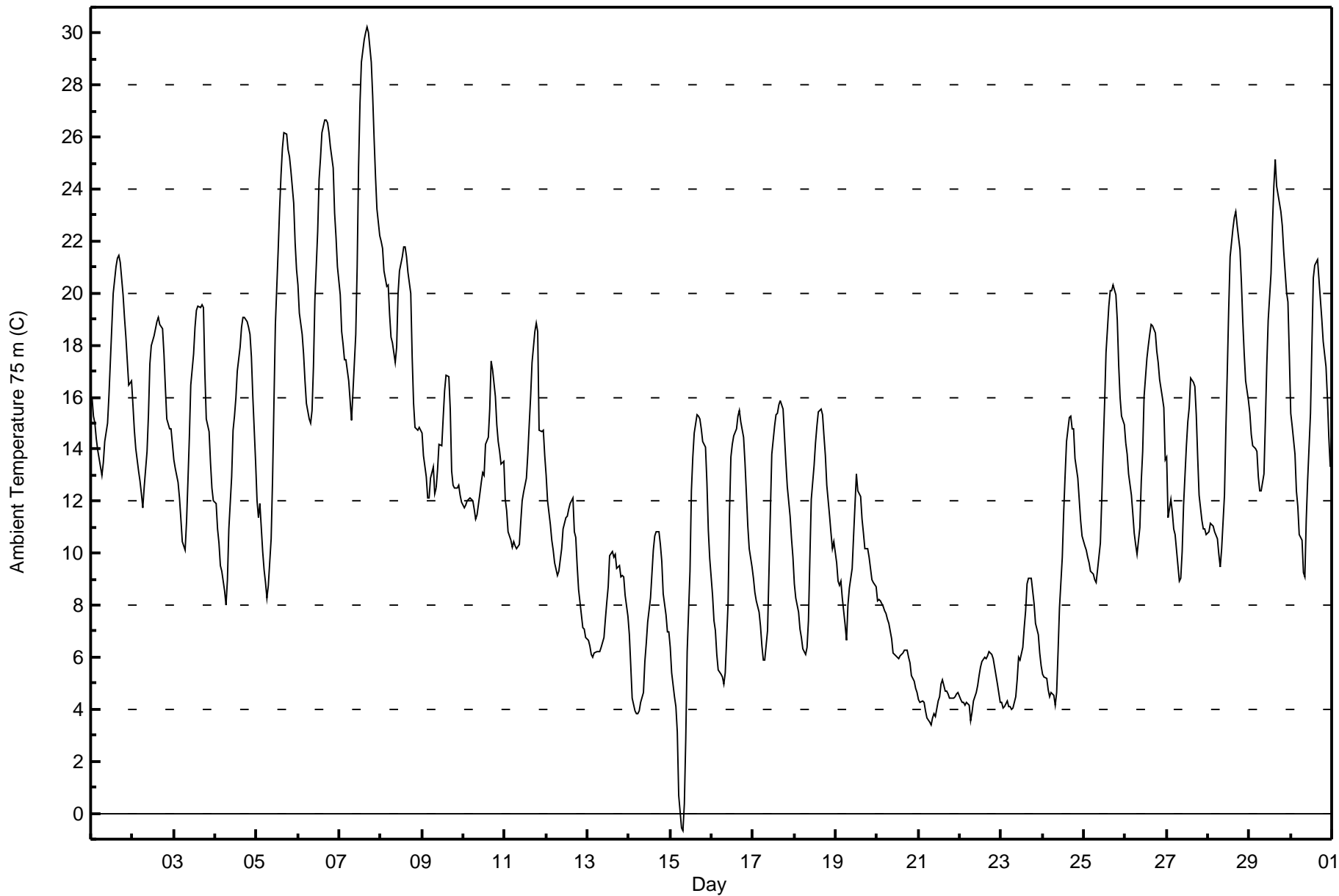


| Maximum Value: 30.2 C on Sep 7 17:00 | | Maximum Daily Average: 22.8 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -0.7 C on Sep 15 08:00 | | Minimum Daily Average: 4.3 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.7 C at hour 16 | | Minimum Diurnal Average: 8.8 C at hour 8 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.70 C | | Percentiles: P ₁ = 3.5 P ₁₀ = 5.2 Q ₁ = 8.4 Median = 12.3 Q ₃ = 16.1 P ₉₀ = 20.4 P ₉₉ = 26.7 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 16.0 | 15.3 | 15.0 | 14.4 | 14.0 | 13.3 | 13.0 | 13.5 | 14.3 | 15.0 | 16.1 | 17.4 | 18.7 | 20.0 | 21.0 | 21.3 | 21.5 | 21.2 | 19.9 | 19.1 | 18.3 | 17.4 | 16.4 | 16.6 | 17.0 | 21.5 | |
| 2-Sep | 15.7 | 14.7 | 14.0 | 13.1 | 12.8 | 12.3 | 11.7 | 12.6 | 13.9 | 15.3 | 17.3 | 18.0 | 18.4 | 18.6 | 18.9 | 19.1 | 18.8 | 18.6 | 17.7 | 16.4 | 15.2 | 14.8 | 14.8 | 14.2 | 15.7 | 19.1 | |
| 3-Sep | 13.6 | 13.3 | 12.7 | 12.1 | 11.3 | 10.5 | 10.1 | 11.2 | 12.8 | 14.5 | 16.5 | 17.6 | 18.7 | 19.3 | 19.5 | 19.4 | 19.6 | 19.5 | 17.0 | 15.2 | 14.7 | 13.5 | 12.5 | 12.0 | 14.9 | 19.6 | |
| 4-Sep | 11.9 | 10.9 | 10.4 | 9.5 | 9.3 | 8.5 | 8.0 | 9.0 | 10.9 | 13.0 | 14.7 | 15.3 | 16.0 | 17.0 | 17.9 | 18.7 | 19.1 | 19.1 | 18.9 | 18.7 | 18.4 | 17.6 | 16.0 | 13.5 | 14.3 | 19.1 | |
| 5-Sep | 12.0 | 11.4 | 11.9 | 10.1 | 9.4 | 8.9 | 8.3 | 8.8 | 10.6 | 12.8 | 15.8 | 18.8 | 21.7 | 23.2 | 24.5 | 25.6 | 26.2 | 26.1 | 25.5 | 25.3 | 24.7 | 23.5 | 21.9 | 20.9 | 17.8 | 26.2 | |
| 6-Sep | 20.3 | 19.2 | 18.4 | 17.6 | 16.6 | 15.8 | 15.2 | 15.0 | 15.5 | 17.2 | 19.7 | 22.4 | 24.4 | 25.2 | 26.2 | 26.7 | 26.7 | 26.5 | 26.2 | 25.6 | 24.8 | 23.1 | 22.2 | 21.0 | 21.3 | 26.7 | |
| 7-Sep | 20.0 | 18.5 | 18.1 | 17.5 | 17.4 | 16.7 | 15.9 | 15.1 | 16.2 | 18.4 | 21.0 | 24.8 | 27.3 | 28.9 | 29.8 | 30.0 | 30.2 | 30.0 | 28.9 | 27.6 | 26.0 | 24.5 | 23.3 | 22.2 | 22.8 | 30.2 | |
| 8-Sep | 22.0 | 21.7 | 20.9 | 20.2 | 20.3 | 19.2 | 18.3 | 18.1 | 17.3 | 17.9 | 20.0 | 20.9 | 21.4 | 21.8 | 21.8 | 21.4 | 20.8 | 20.0 | 17.5 | 15.8 | 14.8 | 14.8 | 14.8 | 14.7 | 19.0 | 22.0 | |
| 9-Sep | 14.6 | 13.8 | 12.9 | 12.1 | 12.1 | 12.9 | 13.3 | 12.3 | 12.5 | 13.2 | 14.2 | 14.1 | 15.2 | 16.3 | 16.8 | 16.8 | 15.5 | 13.2 | 12.6 | 12.5 | 12.5 | 12.6 | 12.2 | 12.0 | 13.6 | 16.8 | |
| 10-Sep | 11.7 | 11.9 | 12.0 | 12.0 | 12.1 | 12.0 | 11.7 | 11.3 | 11.5 | 12.3 | 12.7 | 13.1 | 13.0 | 14.2 | 14.4 | 15.5 | 17.4 | 17.1 | 16.0 | 14.9 | 14.3 | 13.9 | 13.4 | 13.5 | 13.4 | 17.4 | |
| 11-Sep | 12.1 | 11.6 | 10.8 | 10.5 | 10.2 | 10.4 | 10.3 | 10.1 | 10.3 | 11.2 | 12.0 | 12.3 | 12.9 | 13.8 | 15.0 | 16.0 | 17.4 | 18.5 | 18.8 | 18.5 | 14.7 | 14.7 | 14.7 | 13.7 | 13.4 | 18.8 | |
| 12-Sep | 13.0 | 12.0 | 11.1 | 10.5 | 10.1 | 9.6 | 9.2 | 9.3 | 9.7 | 10.2 | 10.9 | 11.3 | 11.4 | 11.7 | 11.9 | 12.1 | 10.8 | 10.6 | 9.5 | 8.6 | 7.6 | 7.2 | 7.1 | 6.8 | 10.1 | 13.0 | |
| 13-Sep | 6.7 | 6.4 | 6.1 | 6.0 | 6.2 | 6.2 | 6.2 | 6.2 | 6.4 | 6.8 | 7.4 | 8.1 | 8.7 | 9.9 | 10.1 | 9.8 | 9.9 | 9.4 | 9.5 | 9.1 | 9.2 | 9.1 | 8.4 | 7.5 | 7.9 | 10.1 | |
| 14-Sep | 6.9 | 5.7 | 4.4 | 3.9 | 3.8 | 3.8 | 3.9 | 4.3 | 4.6 | 5.8 | 6.5 | 7.4 | 8.3 | 9.2 | 10.1 | 10.6 | 10.8 | 10.8 | 10.3 | 9.7 | 8.5 | 7.6 | 7.0 | 7.0 | 7.1 | 10.8 | |
| 15-Sep | 6.4 | 5.4 | 4.5 | 4.1 | 3.1 | 0.7 | -0.5 | -0.7 | 0.4 | 2.9 | 6.2 | 9.3 | 12.4 | 13.7 | 14.6 | 15.3 | 15.3 | 15.1 | 14.8 | 14.3 | 14.1 | 12.7 | 10.9 | 9.8 | 8.5 | 15.3 | |
| 16-Sep | 8.4 | 7.4 | 7.0 | 6.1 | 5.5 | 5.3 | 5.2 | 4.9 | 5.4 | 8.1 | 11.5 | 13.7 | 14.2 | 14.5 | 14.8 | 15.2 | 15.5 | 15.0 | 14.5 | 13.5 | 12.3 | 11.0 | 10.2 | 9.5 | 10.4 | 15.5 | |
| 17-Sep | 9.0 | 8.5 | 8.2 | 7.7 | 7.2 | 6.4 | 5.9 | 5.9 | 7.0 | 9.2 | 11.6 | 13.8 | 14.9 | 15.3 | 15.4 | 15.7 | 15.9 | 15.5 | 14.5 | 13.5 | 12.5 | 11.4 | 10.5 | 9.8 | 11.1 | 15.9 | |
| 18-Sep | 8.8 | 8.3 | 7.7 | 7.1 | 6.8 | 6.3 | 6.1 | 6.4 | 7.4 | 9.8 | 12.1 | 13.4 | 14.3 | 14.9 | 15.4 | 15.5 | 15.3 | 14.5 | 13.8 | 12.6 | 11.4 | 10.8 | 10.2 | 10.4 | 10.8 | 15.5 | |
| 19-Sep | 9.6 | 8.9 | 8.8 | 8.9 | 8.3 | 7.3 | 6.6 | 8.0 | 8.6 | 9.4 | 10.6 | 11.8 | 13.1 | 12.4 | 12.2 | 11.3 | 10.8 | 10.2 | 10.2 | 9.8 | 9.4 | 9.0 | 8.9 | 8.7 | 9.7 | 13.1 | |
| 20-Sep | 8.2 | 8.2 | 8.1 | 8.0 | 7.8 | 7.7 | 7.5 | 7.3 | 6.7 | 6.2 | 6.1 | 6.1 | 5.9 | 6.0 | 6.1 | 6.2 | 6.3 | 6.3 | 6.0 | 5.8 | 5.3 | 5.1 | 4.8 | 4.6 | 6.5 | 8.2 | |
| 21-Sep | 4.4 | 4.3 | 4.3 | 4.3 | 3.9 | 3.7 | 3.5 | 3.4 | 3.7 | 3.8 | 3.7 | 4.3 | 4.5 | 5.0 | 5.1 | 4.7 | 4.7 | 4.6 | 4.4 | 4.4 | 4.4 | 4.5 | 4.6 | 4.6 | 4.3 | 5.1 | |
| 22-Sep | 4.4 | 4.3 | 4.2 | 4.2 | 4.2 | 4.1 | 3.6 | 3.9 | 4.3 | 4.7 | 4.9 | 5.3 | 5.6 | 5.8 | 6.0 | 5.9 | 6.1 | 6.2 | 6.1 | 5.9 | 5.6 | 5.3 | 5.0 | 4.3 | 5.0 | 6.2 | |
| 23-Sep | 4.3 | 4.0 | 4.1 | 4.3 | 4.1 | 4.1 | 4.0 | 4.0 | 4.5 | 5.1 | 6.0 | 5.9 | 6.4 | 7.1 | 7.8 | 8.8 | 9.1 | 9.1 | 8.6 | 8.1 | 7.3 | 6.9 | 6.2 | 5.6 | 6.1 | 9.1 | |
| 24-Sep | 5.4 | 5.2 | 5.2 | 4.7 | 4.5 | 4.6 | 4.5 | 4.2 | 4.7 | 6.2 | 7.9 | 9.9 | 11.6 | 13.0 | 14.3 | 15.2 | 15.3 | 14.8 | 14.8 | 13.7 | 12.9 | 12.0 | 11.3 | 10.7 | 9.4 | 15.3 | |
| 25-Sep | 10.3 | 10.1 | 9.9 | 9.6 | 9.3 | 9.2 | 9.0 | 8.9 | 9.4 | 10.4 | 12.1 | 14.1 | 15.8 | 17.7 | 19.5 | 20.1 | 20.1 | 20.3 | 19.9 | 18.9 | 17.2 | 16.0 | 15.3 | 15.0 | 14.1 | 20.3 | |
| 26-Sep | 14.3 | 13.8 | 13.0 | 12.2 | 11.5 | 10.8 | 10.3 | 10.0 | 11.0 | 12.8 | 13.9 | 16.1 | 17.5 | 18.0 | 18.4 | 18.8 | 18.7 | 18.5 | 17.8 | 17.3 | 16.7 | 16.0 | 15.6 | 13.6 | 14.8 | 18.8 | |
| 27-Sep | 13.7 | 11.4 | 12.1 | 11.6 | 10.9 | 10.7 | 9.5 | 8.9 | 9.0 | 10.1 | 11.8 | 14.2 | 15.1 | 15.6 | 16.8 | 16.6 | 16.4 | 15.3 | 13.7 | 12.2 | 11.3 | 10.9 | 10.9 | 10.7 | 12.5 | 16.8 | |
| 28-Sep | 10.8 | 11.2 | 11.1 | 11.0 | 10.8 | 10.6 | 10.0 | 9.4 | 10.2 | 12.2 | 14.8 | 17.0 | 19.4 | 21.4 | 22.5 | 22.9 | 23.1 | 22.6 | 21.7 | 20.4 | 18.9 | 17.7 | 16.6 | 15.8 | 15.9 | 23.1 | |
| 29-Sep | 15.4 | 14.6 | 14.1 | 14.0 | 13.9 | 12.9 | 12.4 | 12.4 | 13.0 | 15.1 | 17.2 | 19.0 | 20.7 | 22.6 | 24.1 | 25.2 | 24.1 | 23.5 | 23.2 | 22.6 | 21.6 | 20.0 | 19.7 | 17.6 | 18.3 | 25.2 | |
| 30-Sep | 15.4 | 14.9 | 13.8 | 12.4 | 11.8 | 10.7 | 10.5 | 9.3 | 9.1 | 11.3 | 12.8 | 15.4 | 18.1 | 20.6 | 21.1 | 21.3 | 20.5 | 19.8 | 19.0 | 18.1 | 17.2 | 16.0 | 14.5 | 13.3 | 15.3 | 21.3 | |
| | | 11.5 | 10.9 | 10.5 | 10.0 | 9.6 | 9.2 | 8.8 | 8.8 | 9.4 | 10.7 | 12.3 | 13.7 | 14.8 | 15.8 | 16.4 | 16.7 | 16.7 | 16.4 | 15.7 | 14.9 | 14.1 | 13.3 | 12.7 | 12.0 | Diurnal Average | |
| | | 22.0 | 21.7 | 20.9 | 20.2 | 20.3 | 19.2 | 18.3 | 18.1 | 17.3 | 18.4 | 21.0 | 24.8 | 27.3 | 28.9 | 29.8 | 30.0 | 30.2 | 30.0 | 28.9 | 27.6 | 26.0 | 24.5 | 23.3 | 22.2 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

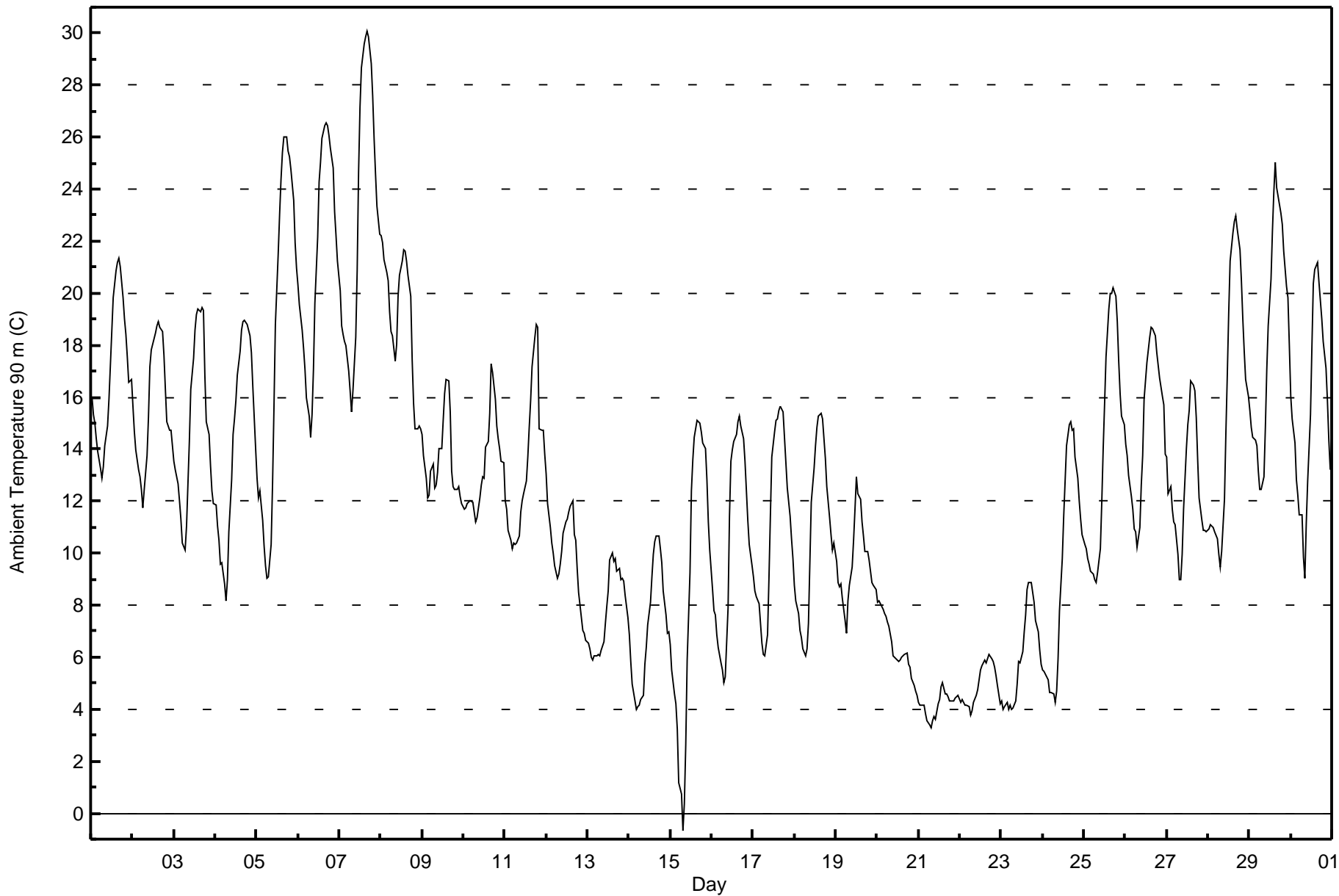
| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 2 | 0.28 | 0.28 |
| 0 - 10 | 242 | 33.61 | 33.89 |
| 10 - 20 | 395 | 54.86 | 88.75 |
| > 20 | 81 | 11.25 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 30.1 C on Sep 7 17:00 | | Maximum Daily Average: 22.9 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -0.7 C on Sep 15 08:00 | | Minimum Daily Average: 4.2 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.6 C at hour 17 | | Minimum Diurnal Average: 8.8 C at hour 8 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.68 C | | Percentiles: P ₁ = 3.4 P ₁₀ = 5.1 Q ₁ = 8.5 Median = 12.4 Q ₃ = 16.2 P ₉₀ = 20.5 P ₉₉ = 26.8 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 16.0 | 15.3 | 15.0 | 14.4 | 13.9 | 13.2 | 12.9 | 13.3 | 14.1 | 14.9 | 15.9 | 17.2 | 18.5 | 19.8 | 20.9 | 21.2 | 21.3 | 21.0 | 19.8 | 19.0 | 18.4 | 17.5 | 16.6 | 16.7 | 17.0 | 21.3 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 15.7 | 14.7 | 14.0 | 13.2 | 12.9 | 12.5 | 11.8 | 12.4 | 13.8 | 15.2 | 17.1 | 17.8 | 18.2 | 18.5 | 18.7 | 18.9 | 18.7 | 18.5 | 17.6 | 16.3 | 15.1 | 14.7 | 14.7 | 14.1 | 15.6 | 18.9 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 13.6 | 13.2 | 12.6 | 12.0 | 11.3 | 10.4 | 10.1 | 11.0 | 12.7 | 14.3 | 16.3 | 17.5 | 18.6 | 19.2 | 19.4 | 19.3 | 19.4 | 19.3 | 16.8 | 15.0 | 14.6 | 13.4 | 12.4 | 11.9 | 14.8 | 19.4 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 11.9 | 11.0 | 10.5 | 9.6 | 9.6 | 8.8 | 8.2 | 9.0 | 10.8 | 12.8 | 14.5 | 15.2 | 15.9 | 16.8 | 17.8 | 18.6 | 18.9 | 19.0 | 18.8 | 18.6 | 18.4 | 17.7 | 16.4 | 14.0 | 14.3 | 19.0 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 12.9 | 12.1 | 12.4 | 11.3 | 10.3 | 9.5 | 9.0 | 9.1 | 10.3 | 12.7 | 15.6 | 18.8 | 21.5 | 23.1 | 24.4 | 25.4 | 26.0 | 26.0 | 25.4 | 25.3 | 24.7 | 23.6 | 22.0 | 21.0 | 18.0 | 26.0 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 20.3 | 19.6 | 18.6 | 17.9 | 17.0 | 16.0 | 15.3 | 14.5 | 15.4 | 17.1 | 19.6 | 22.2 | 24.3 | 25.0 | 26.0 | 26.4 | 26.5 | 26.5 | 26.0 | 25.6 | 24.8 | 23.1 | 22.2 | 21.2 | 21.3 | 26.5 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 20.1 | 18.7 | 18.4 | 18.2 | 18.0 | 17.0 | 16.2 | 15.4 | 16.2 | 18.3 | 20.9 | 24.7 | 27.2 | 28.7 | 29.6 | 29.9 | 30.1 | 29.9 | 28.8 | 27.6 | 26.0 | 24.6 | 23.3 | 22.3 | 22.9 | 30.1 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 22.2 | 22.0 | 21.3 | 20.8 | 20.5 | 19.3 | 18.5 | 18.4 | 17.4 | 18.1 | 19.9 | 20.7 | 21.3 | 21.7 | 21.6 | 21.2 | 20.7 | 19.9 | 17.4 | 15.7 | 14.8 | 14.8 | 14.9 | 14.8 | 19.1 | 22.2 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 14.6 | 13.8 | 12.9 | 12.1 | 12.2 | 13.1 | 13.5 | 12.5 | 12.6 | 13.1 | 14.0 | 14.0 | 15.1 | 16.1 | 16.7 | 16.6 | 15.4 | 13.1 | 12.6 | 12.4 | 12.4 | 12.5 | 12.2 | 11.9 | 13.6 | 16.7 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 11.7 | 11.8 | 11.9 | 12.0 | 12.0 | 11.9 | 11.6 | 11.2 | 11.4 | 12.1 | 12.6 | 13.0 | 12.9 | 14.1 | 14.3 | 15.4 | 17.3 | 16.9 | 15.9 | 14.9 | 14.4 | 14.0 | 13.5 | 13.5 | 13.3 | 17.3 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 12.0 | 11.7 | 10.9 | 10.5 | 10.2 | 10.4 | 10.3 | 10.4 | 10.6 | 11.6 | 12.0 | 12.3 | 12.8 | 13.7 | 14.8 | 15.9 | 17.2 | 18.3 | 18.8 | 18.7 | 14.8 | 14.7 | 14.7 | 13.8 | 13.4 | 18.8 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 13.0 | 11.9 | 11.0 | 10.4 | 10.0 | 9.5 | 9.0 | 9.2 | 9.6 | 10.0 | 10.8 | 11.2 | 11.3 | 11.6 | 11.8 | 12.0 | 10.7 | 10.5 | 9.4 | 8.5 | 7.5 | 7.0 | 6.9 | 6.7 | 10.0 | 13.0 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 6.6 | 6.3 | 6.0 | 5.9 | 6.0 | 6.1 | 6.1 | 6.1 | 6.2 | 6.6 | 7.3 | 7.9 | 8.5 | 9.7 | 10.0 | 9.7 | 9.8 | 9.3 | 9.4 | 9.0 | 9.0 | 8.9 | 8.4 | 7.5 | 7.8 | 10.0 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 6.9 | 5.9 | 4.9 | 4.3 | 4.0 | 4.1 | 4.1 | 4.3 | 4.5 | 5.7 | 6.4 | 7.2 | 8.1 | 9.1 | 10.0 | 10.5 | 10.6 | 10.6 | 10.2 | 9.7 | 8.5 | 7.6 | 6.9 | 7.0 | 7.1 | 10.6 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 6.5 | 5.5 | 4.6 | 4.2 | 3.2 | 1.2 | 0.7 | -0.7 | 0.4 | 2.6 | 5.9 | 9.3 | 12.4 | 13.6 | 14.5 | 15.1 | 15.1 | 15.0 | 14.7 | 14.3 | 14.0 | 12.8 | 11.2 | 10.1 | 8.6 | 15.1 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 8.6 | 7.8 | 7.6 | 6.8 | 6.4 | 5.8 | 5.5 | 5.0 | 5.2 | 7.9 | 11.4 | 13.5 | 14.0 | 14.3 | 14.6 | 15.1 | 15.3 | 14.9 | 14.4 | 13.5 | 12.4 | 11.3 | 10.4 | 9.5 | 10.5 | 15.3 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 9.1 | 8.6 | 8.3 | 8.1 | 7.3 | 6.5 | 6.1 | 6.1 | 6.9 | 9.0 | 11.4 | 13.7 | 14.7 | 15.1 | 15.2 | 15.5 | 15.6 | 15.4 | 14.5 | 13.5 | 12.5 | 11.4 | 10.5 | 9.8 | 11.0 | 15.6 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 8.7 | 8.2 | 7.7 | 7.0 | 6.7 | 6.3 | 6.1 | 6.3 | 7.3 | 9.6 | 12.0 | 13.3 | 14.1 | 14.8 | 15.3 | 15.4 | 15.2 | 14.4 | 13.7 | 12.5 | 11.4 | 10.7 | 10.1 | 10.4 | 10.7 | 15.4 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 9.7 | 8.9 | 8.7 | 8.8 | 8.3 | 7.4 | 6.9 | 8.1 | 8.8 | 9.4 | 10.5 | 11.7 | 13.0 | 12.3 | 12.1 | 11.2 | 10.7 | 10.1 | 10.1 | 9.7 | 9.3 | 8.9 | 8.8 | 8.6 | 9.7 | 13.0 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 8.1 | 8.1 | 8.0 | 7.9 | 7.7 | 7.5 | 7.4 | 7.2 | 6.6 | 6.1 | 6.0 | 5.9 | 5.8 | 5.9 | 6.0 | 6.1 | 6.1 | 6.2 | 5.7 | 5.6 | 5.2 | 4.9 | 4.7 | 4.5 | 6.4 | 8.1 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 4.3 | 4.1 | 4.2 | 4.2 | 3.8 | 3.5 | 3.4 | 3.3 | 3.5 | 3.7 | 3.6 | 4.2 | 4.4 | 4.8 | 5.0 | 4.6 | 4.6 | 4.5 | 4.3 | 4.3 | 4.3 | 4.4 | 4.5 | 4.5 | 4.2 | 5.0 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 4.3 | 4.3 | 4.2 | 4.2 | 4.2 | 4.1 | 3.8 | 3.9 | 4.2 | 4.5 | 4.8 | 5.1 | 5.5 | 5.7 | 5.9 | 5.8 | 5.9 | 6.1 | 6.0 | 5.8 | 5.6 | 5.3 | 4.9 | 4.2 | 4.9 | 6.1 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 4.3 | 4.0 | 4.1 | 4.3 | 4.0 | 4.1 | 4.0 | 4.0 | 4.3 | 4.9 | 5.9 | 5.8 | 6.2 | 7.0 | 7.6 | 8.6 | 8.9 | 8.9 | 8.5 | 8.1 | 7.4 | 7.0 | 6.2 | 5.8 | 6.0 | 8.9 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 5.5 | 5.5 | 5.3 | 5.1 | 4.7 | 4.6 | 4.6 | 4.3 | 4.7 | 6.0 | 7.8 | 9.8 | 11.4 | 12.8 | 14.1 | 15.0 | 15.1 | 14.7 | 14.8 | 13.7 | 12.9 | 12.0 | 11.3 | 10.7 | 9.4 | 15.1 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 10.3 | 10.1 | 9.8 | 9.6 | 9.3 | 9.2 | 9.0 | 8.9 | 9.3 | 10.2 | 11.9 | 14.0 | 15.8 | 17.5 | 19.4 | 20.0 | 20.0 | 20.2 | 19.9 | 18.9 | 17.4 | 16.1 | 15.3 | 14.9 | 14.0 | 20.2 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 14.2 | 13.7 | 13.0 | 12.2 | 11.7 | 11.0 | 10.8 | 10.2 | 11.0 | 12.6 | 13.8 | 15.9 | 17.3 | 17.8 | 18.3 | 18.7 | 18.6 | 18.4 | 17.7 | 17.2 | 16.8 | 16.0 | 15.7 | 13.8 | 14.9 | 18.7 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 13.7 | 12.3 | 12.5 | 11.7 | 11.2 | 11.1 | 10.0 | 9.0 | 9.0 | 9.9 | 11.7 | 14.0 | 15.0 | 15.5 | 16.6 | 16.5 | 16.3 | 15.2 | 13.6 | 12.1 | 11.2 | 10.9 | 10.9 | 10.8 | 12.5 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 10.9 | 11.1 | 11.0 | 11.0 | 10.8 | 10.6 | 9.9 | 9.5 | 10.1 | 12.1 | 14.6 | 16.8 | 19.2 | 21.2 | 22.3 | 22.8 | 23.0 | 22.5 | 21.7 | 20.5 | 19.0 | 17.7 | 16.7 | 16.0 | 15.9 | 23.0 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 15.5 | 14.8 | 14.5 | 14.3 | 14.1 | 13.2 | 12.4 | 12.5 | 13.0 | 14.8 | 17.1 | 18.8 | 20.5 | 22.4 | 23.9 | 25.0 | 24.1 | 23.4 | 23.1 | 22.6 | 21.6 | 20.3 | 19.8 | 18.0 | 18.3 | 25.0 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 16.0 | 15.1 | 14.2 | 12.9 | 12.3 | 11.5 | 11.5 | 9.8 | 9.0 | 11.2 | 12.8 | 15.3 | 17.9 | 20.4 | 20.9 | 21.2 | 20.4 | 19.7 | 19.0 | 18.1 | 17.1 | 15.9 | 14.4 | 13.2 | 15.4 | 21.2 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 11.6 | 11.0 | 10.6 | 10.2 | 9.8 | 9.3 | 9.0 | 8.8 | 9.3 | 10.6 | 12.1 | 13.6 | 14.7 | 15.6 | 16.3 | 16.6 | 16.6 | 16.3 | 15.6 | 14.9 | 14.1 | 13.3 | 12.7 | 12.0 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 22.2 | 22.0 | 21.3 | 20.8 | 20.5 | 19.3 | 18.5 | 18.4 | 17.4 | 18.3 | 20.9 | 24.7 | 27.2 | 28.7 | 29.6 | 29.9 | 30.1 | 29.9 | 28.8 | 27.6 | 26.0 | 24.6 | 23.3 | 22.3 | Diurnal Maximum |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 1 | 0.14 | 0.14 |
| 0 - 10 | 243 | 33.75 | 33.89 |
| 10 - 20 | 398 | 55.28 | 89.17 |
| > 20 | 78 | 10.83 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

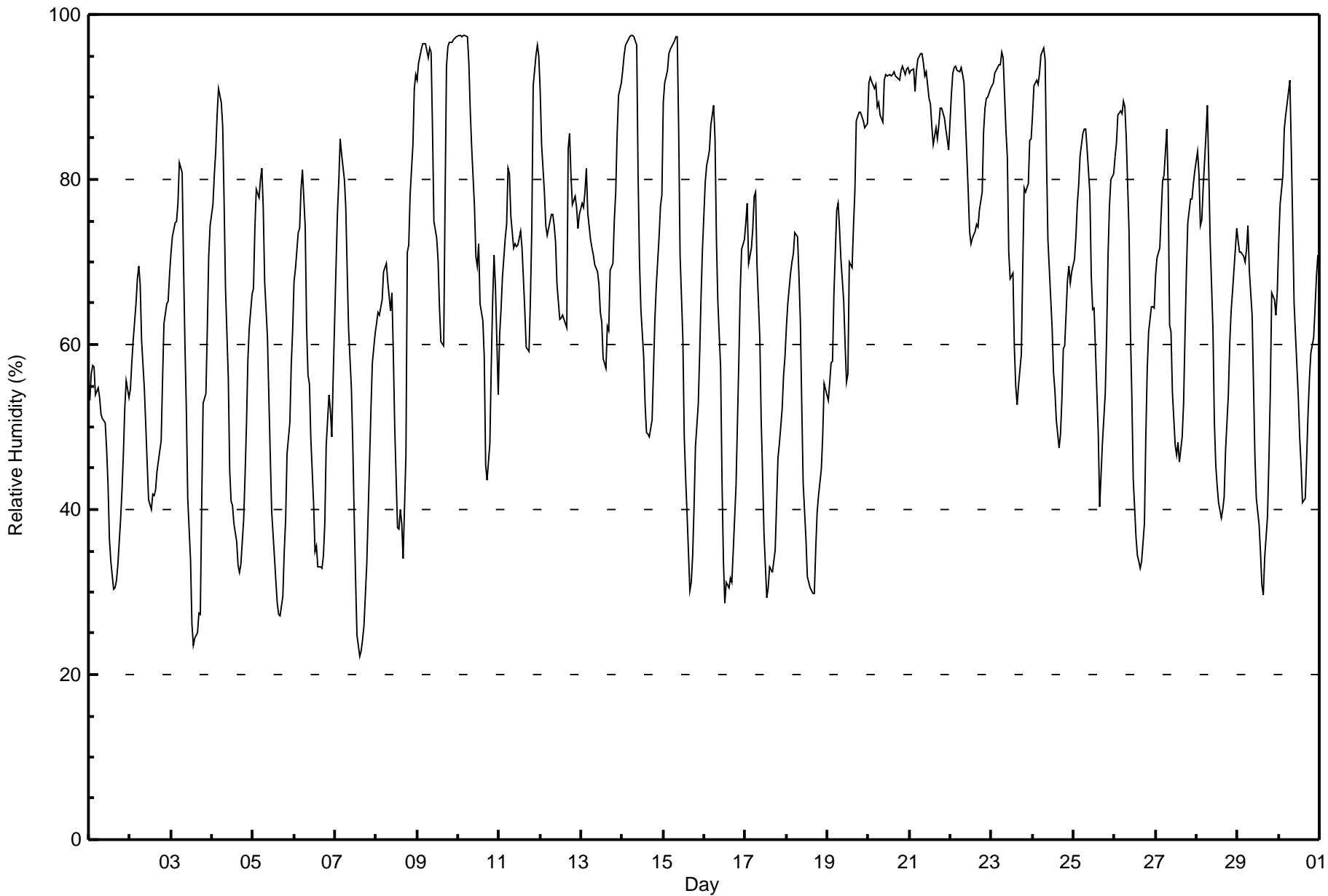
Mannix - September 2017

| Maximum Value: 97 % on Sep 14 06:00 Maximum Daily Average: 91.8 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 22 % on Sep 7 15:00 Minimum Daily Average: 46.5 % on Sep 1 Maximum Diurnal Average: 83.6 % at hour 6 Minimum Diurnal Average: 46.5 % at hour 16 Monthly Average: 66.6 % Percentiles: P ₁ = 26 P ₁₀ = 38 Q ₁ = 52 Median = 69 O ₃ = 83 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-Sep | 53 | 56 | 57 | 57 | 54 | 55 | 53 | 52 | 51 | 51 | 47 | 43 | 36 | 34 | 30 | 31 | 31 | 33 | 39 | 42 | 47 | 52 | 56 | 54 | 46.5 | 57 |
| 2-Sep | 55 | 58 | 60 | 65 | 68 | 70 | 67 | 61 | 55 | 50 | 46 | 41 | 40 | 42 | 42 | 42 | 45 | 47 | 48 | 56 | 62 | 65 | 65 | 68 | 54.9 | 70 |
| 3-Sep | 71 | 73 | 75 | 75 | 77 | 82 | 81 | 70 | 60 | 52 | 41 | 34 | 26 | 24 | 24 | 25 | 27 | 27 | 41 | 53 | 54 | 62 | 71 | 74 | 54.2 | 82 |
| 4-Sep | 77 | 80 | 83 | 88 | 91 | 89 | 86 | 77 | 67 | 56 | 45 | 41 | 40 | 38 | 36 | 33 | 32 | 33 | 39 | 44 | 50 | 58 | 62 | 66 | 58.9 | 91 |
| 5-Sep | 67 | 74 | 79 | 78 | 80 | 81 | 76 | 68 | 61 | 54 | 47 | 40 | 34 | 31 | 29 | 27 | 27 | 29 | 35 | 39 | 47 | 50 | 58 | 62 | 53.0 | 81 |
| 6-Sep | 68 | 69 | 73 | 74 | 79 | 81 | 74 | 62 | 56 | 55 | 49 | 41 | 35 | 36 | 33 | 33 | 33 | 34 | 38 | 48 | 54 | 52 | 49 | 56 | 53.4 | 81 |
| 7-Sep | 69 | 76 | 80 | 85 | 83 | 80 | 77 | 69 | 62 | 55 | 48 | 39 | 31 | 25 | 22 | 23 | 24 | 26 | 33 | 39 | 46 | 52 | 58 | 61 | 52.7 | 85 |
| 8-Sep | 63 | 64 | 64 | 65 | 69 | 69 | 70 | 68 | 64 | 66 | 59 | 50 | 38 | 38 | 40 | 38 | 34 | 47 | 71 | 72 | 78 | 84 | 91 | 93 | 62.2 | 93 |
| 9-Sep | 92 | 94 | 96 | 96 | 96 | 96 | 95 | 96 | 96 | 86 | 75 | 73 | 70 | 64 | 60 | 60 | 78 | 94 | 96 | 97 | 97 | 97 | 97 | 97 | 87.4 | 97 |
| 10-Sep | 97 | 97 | 97 | 97 | 97 | 97 | 94 | 88 | 84 | 77 | 71 | 69 | 72 | 65 | 63 | 59 | 45 | 43 | 48 | 57 | 65 | 71 | 67 | 54 | 74.0 | 97 |
| 11-Sep | 61 | 64 | 68 | 73 | 75 | 81 | 81 | 76 | 72 | 72 | 72 | 72 | 74 | 72 | 68 | 64 | 60 | 59 | 65 | 74 | 91 | 95 | 96 | 95 | 74.2 | 96 |
| 12-Sep | 91 | 84 | 78 | 74 | 73 | 74 | 76 | 76 | 74 | 72 | 67 | 63 | 63 | 64 | 63 | 62 | 84 | 86 | 81 | 77 | 78 | 77 | 74 | 76 | 74.4 | 91 |
| 13-Sep | 77 | 77 | 78 | 81 | 76 | 73 | 72 | 71 | 70 | 69 | 67 | 64 | 63 | 58 | 57 | 62 | 62 | 69 | 70 | 75 | 78 | 86 | 90 | 92 | 72.3 | 92 |
| 14-Sep | 93 | 95 | 96 | 97 | 97 | 97 | 97 | 97 | 96 | 80 | 70 | 64 | 59 | 53 | 49 | 49 | 49 | 51 | 57 | 63 | 67 | 73 | 77 | 78 | 75.3 | 97 |
| 15-Sep | 89 | 92 | 93 | 95 | 96 | 96 | 97 | 97 | 97 | 86 | 71 | 61 | 49 | 44 | 40 | 30 | 31 | 34 | 40 | 48 | 53 | 59 | 66 | 72 | 68.1 | 97 |
| 16-Sep | 80 | 82 | 82 | 84 | 87 | 89 | 85 | 73 | 65 | 57 | 43 | 34 | 29 | 31 | 31 | 32 | 31 | 35 | 43 | 50 | 58 | 66 | 71 | 73 | 58.8 | 89 |
| 17-Sep | 75 | 77 | 70 | 72 | 74 | 78 | 78 | 70 | 61 | 51 | 44 | 37 | 29 | 30 | 33 | 33 | 32 | 35 | 41 | 46 | 48 | 52 | 56 | 59 | 53.4 | 78 |
| 18-Sep | 62 | 65 | 69 | 70 | 71 | 74 | 73 | 68 | 63 | 53 | 43 | 36 | 32 | 31 | 30 | 30 | 30 | 35 | 40 | 42 | 45 | 49 | 55 | 55 | 50.8 | 74 |
| 19-Sep | 53 | 55 | 58 | 58 | 66 | 76 | 77 | 74 | 70 | 65 | 60 | 55 | 56 | 70 | 69 | 74 | 79 | 87 | 88 | 88 | 88 | 87 | 86 | 87 | 72.0 | 88 |
| 20-Sep | 92 | 92 | 92 | 91 | 92 | 89 | 89 | 88 | 87 | 92 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 92 | 92 | 93 | 94 | 93 | 93 | 94 | 91.8 | 94 |
| 21-Sep | 93 | 93 | 93 | 91 | 93 | 95 | 95 | 95 | 94 | 93 | 93 | 90 | 89 | 87 | 84 | 86 | 85 | 87 | 89 | 89 | 87 | 86 | 85 | 83 | 89.8 | 95 |
| 22-Sep | 90 | 93 | 94 | 94 | 93 | 93 | 94 | 93 | 92 | 83 | 79 | 74 | 72 | 73 | 74 | 75 | 74 | 76 | 78 | 86 | 89 | 90 | 90 | 91 | 84.9 | 94 |
| 23-Sep | 91 | 92 | 93 | 94 | 94 | 94 | 95 | 95 | 86 | 83 | 71 | 68 | 69 | 60 | 55 | 53 | 55 | 59 | 69 | 79 | 79 | 79 | 85 | 85 | 78.4 | 95 |
| 24-Sep | 88 | 91 | 92 | 92 | 93 | 95 | 96 | 94 | 83 | 73 | 69 | 62 | 57 | 54 | 51 | 47 | 49 | 53 | 59 | 60 | 68 | 69 | 67 | 69 | 72.2 | 96 |
| 25-Sep | 70 | 73 | 77 | 79 | 83 | 86 | 86 | 86 | 84 | 78 | 68 | 64 | 64 | 59 | 49 | 40 | 44 | 48 | 54 | 61 | 71 | 77 | 80 | 81 | 69.3 | 86 |
| 26-Sep | 83 | 84 | 88 | 88 | 88 | 90 | 89 | 85 | 74 | 61 | 54 | 44 | 37 | 34 | 34 | 33 | 34 | 38 | 49 | 57 | 61 | 65 | 65 | 64 | 62.4 | 90 |
| 27-Sep | 68 | 70 | 72 | 76 | 80 | 81 | 86 | 79 | 62 | 61 | 54 | 48 | 47 | 48 | 46 | 49 | 53 | 61 | 69 | 75 | 78 | 78 | 80 | 81 | 66.7 | 86 |
| 28-Sep | 83 | 81 | 74 | 75 | 79 | 85 | 89 | 81 | 72 | 62 | 51 | 45 | 43 | 41 | 39 | 40 | 42 | 47 | 54 | 60 | 64 | 66 | 69 | 74 | 63.2 | 89 |
| 29-Sep | 73 | 71 | 71 | 71 | 70 | 72 | 74 | 69 | 64 | 55 | 46 | 41 | 38 | 35 | 31 | 30 | 34 | 39 | 46 | 54 | 66 | 65 | 64 | 67 | 56.1 | 74 |
| 30-Sep | 72 | 77 | 81 | 86 | 88 | 89 | 92 | 84 | 75 | 65 | 61 | 54 | 49 | 45 | 41 | 41 | 46 | 52 | 56 | 59 | 61 | 64 | 68 | 71 | 65.7 | 92 |
| | 76.5 | 78.4 | 79.5 | 80.7 | 82.0 | 83.6 | 83.2 | 78.7 | 73.2 | 67.1 | 60.1 | 54.7 | 51.1 | 49.3 | 47.2 | 46.5 | 48.1 | 52.0 | 57.6 | 62.8 | 67.5 | 70.7 | 73.0 | 74.3 | Diurnal Average | |
| | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 94 | 96 | 97 | 97 | 97 | 97 | 97 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mannix - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 89 | 12.36 | 12.36 |
| 40 - 60 | 167 | 23.19 | 35.56 |
| 60 - 80 | 262 | 36.39 | 71.94 |
| 80 - 100 | 202 | 28.06 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

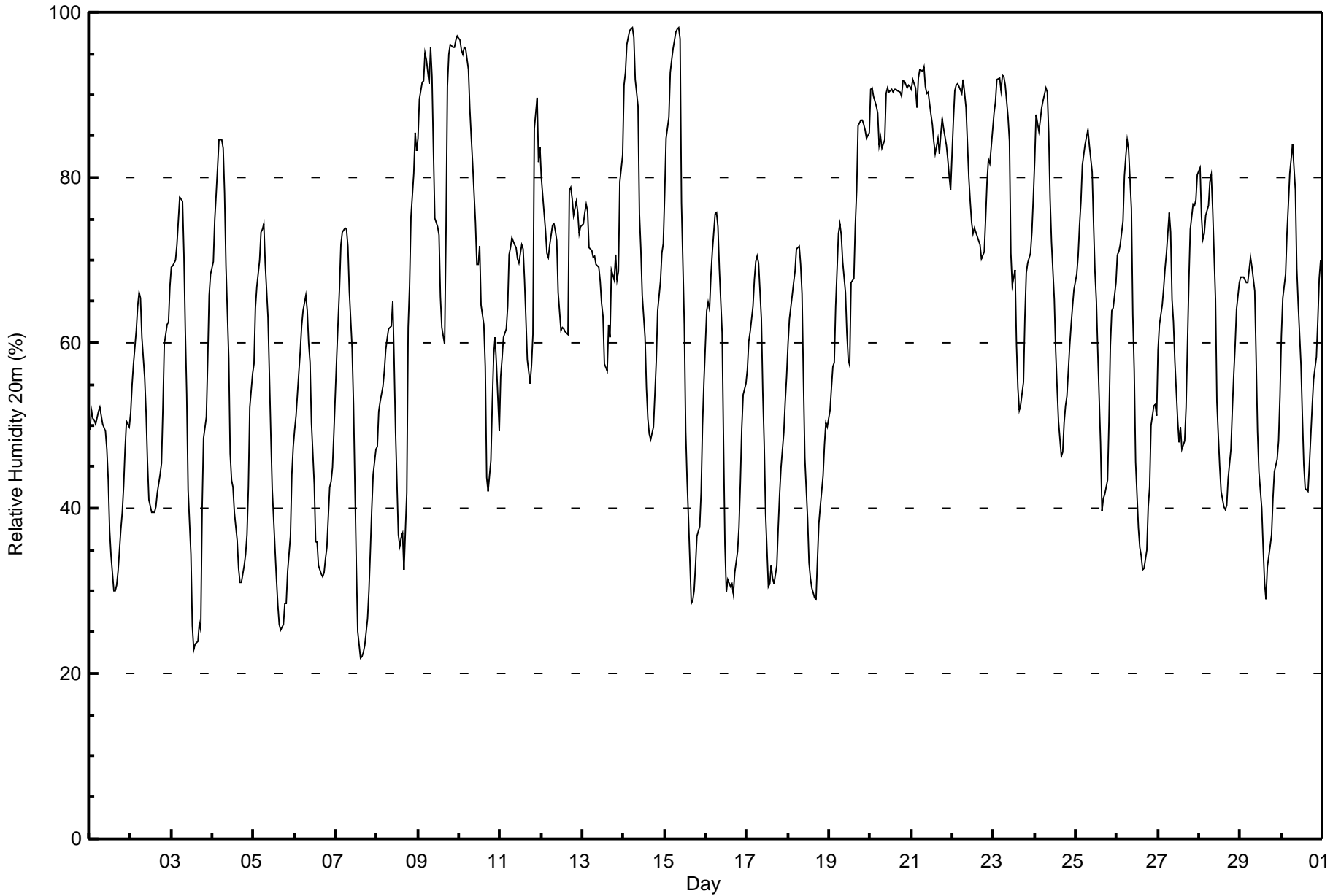


| Maximum Value: 98 % on Sep 14 06:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 89.4 % on Sep 20 | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|------|---------------------------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 22 % on Sep 7 15:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 44.2 % on Sep 1 | | | | | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 78.9 % at hour 7 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 45.5 % at hour 16 | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 63.1 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 49 Median = 65 Q ₃ = 77 P ₉₀ = 90 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-Sep | 49 | 52 | 51 | 51 | 50 | 52 | 52 | 51 | 50 | 49 | 47 | 43 | 37 | 34 | 30 | 30 | 31 | 32 | 37 | 40 | 43 | 47 | 50 | 50 | 44.2 | 52 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 52 | 55 | 58 | 62 | 64 | 66 | 65 | 61 | 56 | 52 | 46 | 41 | 40 | 40 | 39 | 40 | 42 | 44 | 45 | 52 | 60 | 62 | 63 | 67 | 52.9 | 67 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 69 | 69 | 70 | 72 | 75 | 78 | 77 | 71 | 61 | 54 | 42 | 34 | 26 | 23 | 24 | 24 | 26 | 25 | 40 | 48 | 51 | 58 | 66 | 68 | 52.1 | 78 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 70 | 75 | 78 | 81 | 85 | 85 | 84 | 78 | 69 | 58 | 47 | 43 | 42 | 40 | 36 | 33 | 31 | 31 | 33 | 34 | 37 | 43 | 52 | 56 | 55.0 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 58 | 64 | 67 | 70 | 73 | 74 | 74 | 70 | 63 | 56 | 49 | 42 | 35 | 31 | 28 | 26 | 25 | 26 | 29 | 28 | 32 | 37 | 44 | 47 | 47.9 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 49 | 51 | 56 | 59 | 62 | 64 | 66 | 64 | 60 | 58 | 50 | 43 | 36 | 36 | 33 | 32 | 32 | 34 | 35 | 42 | 43 | 45 | 49 | 47.2 | 66 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 58 | 63 | 67 | 72 | 73 | 74 | 74 | 72 | 66 | 59 | 52 | 43 | 33 | 25 | 22 | 22 | 23 | 23 | 27 | 30 | 35 | 40 | 44 | 47 | 47.6 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 48 | 52 | 53 | 55 | 57 | 59 | 61 | 62 | 62 | 65 | 58 | 49 | 37 | 35 | 36 | 37 | 33 | 42 | 62 | 67 | 75 | 81 | 85 | 83 | 56.3 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 85 | 89 | 91 | 92 | 95 | 94 | 91 | 96 | 92 | 83 | 75 | 74 | 73 | 66 | 62 | 60 | 74 | 91 | 95 | 96 | 96 | 96 | 97 | 97 | 85.8 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 97 | 95 | 95 | 96 | 96 | 93 | 88 | 85 | 82 | 75 | 70 | 69 | 72 | 65 | 62 | 57 | 44 | 42 | 46 | 53 | 58 | 61 | 57 | 49 | 71.1 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 56 | 58 | 61 | 62 | 64 | 71 | 72 | 73 | 72 | 71 | 70 | 70 | 72 | 71 | 68 | 63 | 58 | 55 | 57 | 61 | 86 | 90 | 82 | 84 | 68.5 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 80 | 78 | 74 | 71 | 70 | 72 | 74 | 74 | 74 | 72 | 66 | 62 | 62 | 62 | 61 | 61 | 79 | 79 | 78 | 75 | 77 | 76 | 73 | 74 | 71.8 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 74 | 76 | 77 | 76 | 72 | 71 | 70 | 70 | 70 | 69 | 67 | 65 | 63 | 58 | 57 | 62 | 61 | 69 | 68 | 71 | 68 | 69 | 80 | 83 | 69.3 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 91 | 93 | 96 | 98 | 98 | 98 | 97 | 92 | 89 | 76 | 71 | 66 | 61 | 55 | 51 | 49 | 48 | 50 | 54 | 58 | 64 | 68 | 71 | 72 | 73.5 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 78 | 85 | 87 | 93 | 94 | 96 | 98 | 98 | 98 | 97 | 77 | 62 | 49 | 43 | 39 | 28 | 29 | 30 | 33 | 37 | 38 | 42 | 50 | 55 | 64.0 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 64 | 65 | 64 | 68 | 71 | 76 | 76 | 74 | 69 | 61 | 48 | 36 | 30 | 31 | 31 | 31 | 30 | 32 | 35 | 38 | 43 | 50 | 54 | 55 | 51.2 | 76 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 57 | 60 | 61 | 64 | 68 | 70 | 70 | 70 | 63 | 54 | 48 | 39 | 31 | 31 | 33 | 32 | 31 | 33 | 38 | 42 | 45 | 49 | 53 | 56 | 49.9 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 60 | 63 | 66 | 67 | 69 | 71 | 72 | 69 | 66 | 56 | 46 | 39 | 33 | 32 | 30 | 29 | 29 | 34 | 38 | 40 | 44 | 48 | 50 | 50 | 50.0 | 72 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 52 | 55 | 57 | 58 | 64 | 73 | 74 | 73 | 70 | 66 | 61 | 58 | 57 | 67 | 68 | 74 | 78 | 86 | 87 | 87 | 86 | 86 | 85 | 85 | 71.2 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 91 | 91 | 90 | 89 | 88 | 84 | 85 | 83 | 85 | 90 | 91 | 90 | 91 | 90 | 91 | 91 | 91 | 90 | 90 | 92 | 92 | 91 | 91 | 91 | 89.4 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 91 | 92 | 91 | 89 | 92 | 93 | 93 | 93 | 91 | 90 | 90 | 88 | 86 | 84 | 83 | 85 | 83 | 85 | 87 | 86 | 84 | 82 | 80 | 78 | 87.4 | 93 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 87 | 90 | 91 | 91 | 91 | 90 | 92 | 90 | 89 | 80 | 77 | 75 | 73 | 74 | 73 | 72 | 72 | 70 | 71 | 75 | 79 | 82 | 82 | 86 | 81.4 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 88 | 89 | 92 | 92 | 90 | 92 | 92 | 91 | 87 | 84 | 71 | 67 | 69 | 60 | 55 | 52 | 53 | 55 | 63 | 69 | 70 | 71 | 73 | 77 | 75.1 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 82 | 88 | 86 | 87 | 88 | 89 | 91 | 90 | 85 | 78 | 72 | 65 | 59 | 55 | 50 | 46 | 47 | 50 | 52 | 54 | 60 | 62 | 64 | 66 | 69.5 | 91 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 68 | 71 | 74 | 77 | 82 | 84 | 85 | 86 | 84 | 81 | 74 | 69 | 65 | 59 | 48 | 40 | 41 | 42 | 43 | 50 | 60 | 64 | 64 | 67 | 65.7 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 71 | 71 | 72 | 75 | 80 | 83 | 85 | 83 | 76 | 63 | 57 | 46 | 38 | 35 | 34 | 33 | 33 | 35 | 40 | 43 | 50 | 52 | 52 | 51 | 56.5 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 59 | 62 | 65 | 67 | 69 | 71 | 76 | 73 | 65 | 63 | 58 | 51 | 48 | 50 | 47 | 48 | 52 | 60 | 67 | 74 | 77 | 77 | 80 | 64.0 | 80 | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 81 | 75 | 73 | 73 | 75 | 77 | 79 | 80 | 76 | 65 | 53 | 49 | 45 | 42 | 40 | 40 | 40 | 44 | 47 | 52 | 56 | 60 | 64 | 67 | 60.6 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 68 | 68 | 68 | 67 | 67 | 69 | 70 | 69 | 66 | 58 | 49 | 44 | 40 | 35 | 31 | 29 | 33 | 35 | 37 | 41 | 44 | 46 | 48 | 54 | 51.6 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 61 | 65 | 68 | 73 | 77 | 81 | 84 | 81 | 79 | 69 | 65 | 57 | 51 | 45 | 42 | 42 | 45 | 49 | 52 | 56 | 58 | 63 | 68 | 70 | 62.6 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 69.7 | 72.0 | 73.2 | 74.8 | 76.7 | 78.3 | 78.9 | 77.5 | 73.8 | 68.4 | 61.6 | 56.0 | 51.8 | 49.1 | 46.8 | 45.5 | 46.4 | 49.1 | 52.8 | 56.1 | 60.3 | 63.1 | 65.5 | 67.2 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 97 | 95 | 96 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 91 | 90 | 91 | 90 | 91 | 91 | 91 | 91 | 95 | 96 | 96 | 96 | 97 | 97 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 106 | 14.72 | 14.72 |
| 40 - 60 | 197 | 27.36 | 42.08 |
| 60 - 80 | 258 | 35.83 | 77.92 |
| 80 - 100 | 159 | 22.08 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

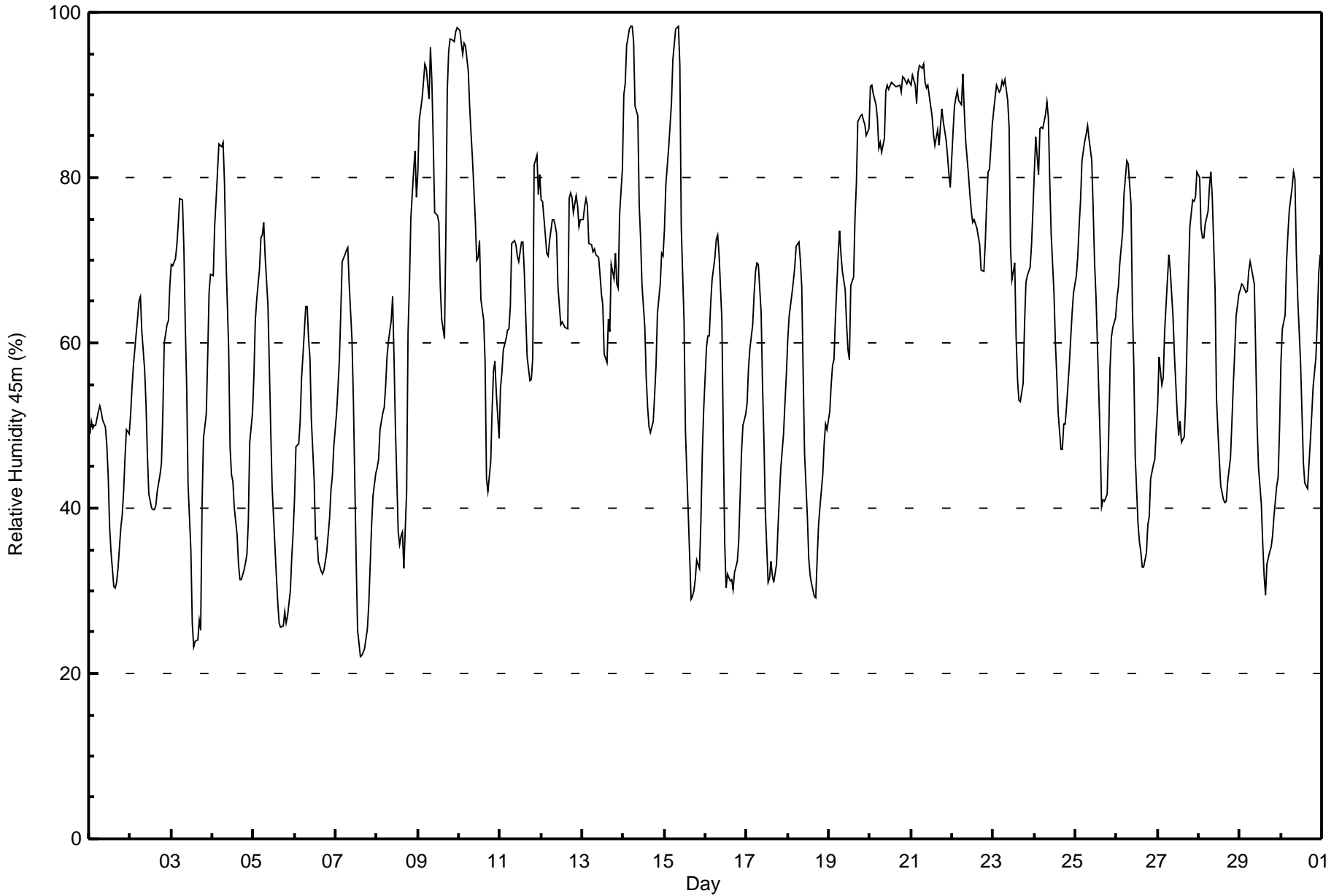
Mannix - September 2017

| Maximum Value: 98 % on Sep 14 05:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 89.7 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 22 % on Sep 7 15:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 44.1 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours of Data: 720 | | | | | | | | | | | | | |
| Maximum Diurnal Average: 77.8 % at hour 7 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 46.1 % at hour 16 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | |
| Monthly Average: 62.5 % | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 48 Median = 63 Q ₃ = 77 P ₉₀ = 89 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-Sep | 49 | 51 | 50 | 50 | 50 | 52 | 52 | 52 | 51 | 50 | 48 | 44 | 38 | 35 | 31 | 30 | 31 | 33 | 38 | 39 | 42 | 46 | 49 | 49 | 44.1 | 52 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 51 | 55 | 57 | 61 | 63 | 65 | 66 | 61 | 57 | 53 | 46 | 42 | 40 | 40 | 40 | 40 | 42 | 44 | 45 | 52 | 60 | 62 | 63 | 67 | 53.0 | 67 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 70 | 69 | 70 | 72 | 74 | 77 | 77 | 72 | 62 | 55 | 43 | 35 | 26 | 23 | 24 | 24 | 26 | 25 | 40 | 49 | 51 | 58 | 66 | 68 | 52.4 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 68 | 74 | 77 | 81 | 84 | 84 | 84 | 79 | 71 | 59 | 47 | 44 | 43 | 40 | 37 | 33 | 31 | 31 | 33 | 33 | 34 | 38 | 48 | 51 | 54.5 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 56 | 63 | 65 | 69 | 73 | 73 | 75 | 70 | 65 | 57 | 50 | 43 | 35 | 32 | 29 | 26 | 26 | 26 | 27 | 26 | 27 | 30 | 34 | 37 | 46.4 | 75 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 41 | 47 | 48 | 50 | 56 | 58 | 64 | 64 | 60 | 58 | 51 | 43 | 36 | 36 | 34 | 32 | 32 | 32 | 34 | 35 | 39 | 42 | 44 | 47 | 45.3 | 64 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 51 | 55 | 58 | 64 | 70 | 71 | 71 | 72 | 67 | 60 | 53 | 43 | 33 | 25 | 22 | 22 | 23 | 23 | 25 | 29 | 33 | 38 | 41 | 44 | 45.6 | 72 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 45 | 46 | 49 | 52 | 52 | 55 | 58 | 60 | 63 | 66 | 58 | 50 | 37 | 36 | 37 | 37 | 33 | 42 | 61 | 67 | 75 | 81 | 83 | 78 | 55.0 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 81 | 87 | 90 | 91 | 94 | 93 | 90 | 96 | 92 | 84 | 76 | 75 | 75 | 67 | 63 | 61 | 73 | 91 | 95 | 97 | 97 | 96 | 98 | 98 | 85.7 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 98 | 96 | 95 | 96 | 96 | 93 | 88 | 85 | 82 | 75 | 70 | 70 | 72 | 65 | 63 | 58 | 44 | 42 | 46 | 52 | 57 | 58 | 54 | 49 | 71.0 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 55 | 56 | 59 | 61 | 62 | 62 | 64 | 72 | 72 | 72 | 70 | 70 | 72 | 72 | 68 | 63 | 58 | 55 | 56 | 58 | 82 | 83 | 78 | 80 | 66.7 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 77 | 77 | 73 | 71 | 71 | 72 | 75 | 75 | 74 | 73 | 67 | 62 | 63 | 62 | 62 | 62 | 78 | 78 | 78 | 76 | 78 | 77 | 74 | 75 | 72.0 | 78 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 75 | 76 | 78 | 77 | 72 | 72 | 71 | 71 | 71 | 70 | 68 | 66 | 65 | 59 | 58 | 63 | 61 | 70 | 68 | 71 | 67 | 67 | 76 | 81 | 69.6 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 90 | 91 | 96 | 98 | 98 | 98 | 97 | 89 | 87 | 77 | 73 | 67 | 62 | 56 | 52 | 50 | 49 | 50 | 54 | 57 | 64 | 67 | 71 | 71 | 73.5 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 74 | 79 | 84 | 86 | 89 | 94 | 98 | 98 | 98 | 94 | 74 | 62 | 49 | 44 | 39 | 29 | 29 | 30 | 31 | 34 | 33 | 38 | 46 | 52 | 61.9 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 60 | 61 | 61 | 65 | 68 | 70 | 73 | 73 | 71 | 63 | 49 | 36 | 30 | 32 | 31 | 31 | 30 | 32 | 34 | 36 | 41 | 47 | 50 | 51 | 49.8 | 73 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 53 | 57 | 59 | 62 | 66 | 69 | 70 | 70 | 64 | 55 | 48 | 40 | 31 | 31 | 34 | 32 | 31 | 33 | 37 | 41 | 45 | 49 | 53 | 56 | 49.4 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 60 | 63 | 66 | 68 | 69 | 72 | 72 | 70 | 67 | 56 | 47 | 39 | 34 | 32 | 31 | 29 | 29 | 34 | 38 | 40 | 44 | 48 | 50 | 49 | 50.3 | 72 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 52 | 55 | 57 | 58 | 63 | 71 | 74 | 71 | 69 | 66 | 62 | 59 | 58 | 67 | 68 | 75 | 79 | 87 | 87 | 88 | 87 | 86 | 85 | 86 | 71.2 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 91 | 91 | 90 | 89 | 87 | 84 | 84 | 83 | 85 | 91 | 91 | 91 | 92 | 91 | 91 | 91 | 91 | 91 | 90 | 92 | 92 | 91 | 92 | 92 | 89.7 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 91 | 92 | 91 | 89 | 93 | 94 | 93 | 94 | 92 | 91 | 91 | 89 | 87 | 85 | 84 | 86 | 84 | 86 | 88 | 87 | 85 | 83 | 81 | 79 | 88.1 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 86 | 89 | 90 | 90 | 89 | 89 | 92 | 88 | 84 | 80 | 78 | 76 | 75 | 75 | 74 | 73 | 72 | 69 | 69 | 72 | 77 | 81 | 81 | 86 | 80.6 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 88 | 90 | 91 | 90 | 91 | 92 | 91 | 92 | 89 | 86 | 72 | 68 | 70 | 61 | 56 | 53 | 53 | 55 | 62 | 67 | 68 | 69 | 72 | 76 | 75.0 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 81 | 85 | 80 | 86 | 86 | 86 | 88 | 89 | 87 | 80 | 73 | 66 | 60 | 56 | 52 | 47 | 47 | 50 | 50 | 52 | 57 | 61 | 64 | 66 | 68.7 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 68 | 71 | 74 | 77 | 82 | 84 | 85 | 86 | 85 | 82 | 76 | 70 | 66 | 60 | 48 | 40 | 41 | 41 | 42 | 48 | 57 | 61 | 62 | 63 | 65.4 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 65 | 67 | 70 | 73 | 78 | 80 | 82 | 82 | 77 | 64 | 57 | 46 | 38 | 36 | 35 | 33 | 33 | 34 | 38 | 39 | 44 | 45 | 46 | 49 | 54.7 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 52 | 58 | 55 | 56 | 61 | 65 | 71 | 69 | 66 | 63 | 59 | 51 | 49 | 51 | 48 | 49 | 53 | 60 | 68 | 74 | 77 | 77 | 81 | 81 | 62.1 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 80 | 74 | 73 | 73 | 74 | 76 | 79 | 81 | 78 | 66 | 53 | 49 | 46 | 43 | 41 | 41 | 41 | 43 | 46 | 50 | 55 | 59 | 63 | 66 | 60.4 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 66 | 67 | 67 | 66 | 66 | 69 | 70 | 69 | 67 | 59 | 50 | 45 | 41 | 36 | 32 | 29 | 33 | 35 | 35 | 37 | 39 | 43 | 44 | 49 | 50.6 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 58 | 62 | 63 | 70 | 73 | 76 | 79 | 81 | 80 | 71 | 65 | 58 | 52 | 46 | 43 | 42 | 45 | 48 | 51 | 55 | 58 | 63 | 68 | 71 | 61.6 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 67.7 | 70.1 | 71.2 | 73.0 | 75.0 | 76.5 | 77.8 | 77.1 | 74.4 | 69.2 | 62.2 | 56.6 | 52.5 | 49.8 | 47.4 | 46.1 | 46.6 | 49.1 | 52.2 | 55.1 | 58.8 | 61.4 | 63.8 | 65.6 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 98 | 96 | 96 | 98 | 98 | 98 | 98 | 98 | 98 | 94 | 91 | 91 | 92 | 91 | 91 | 91 | 91 | 91 | 95 | 97 | 97 | 96 | 98 | 98 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 110 | 15.28 | 15.28 |
| 40 - 60 | 201 | 27.92 | 43.19 |
| 60 - 80 | 258 | 35.83 | 79.03 |
| 80 - 100 | 151 | 20.97 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



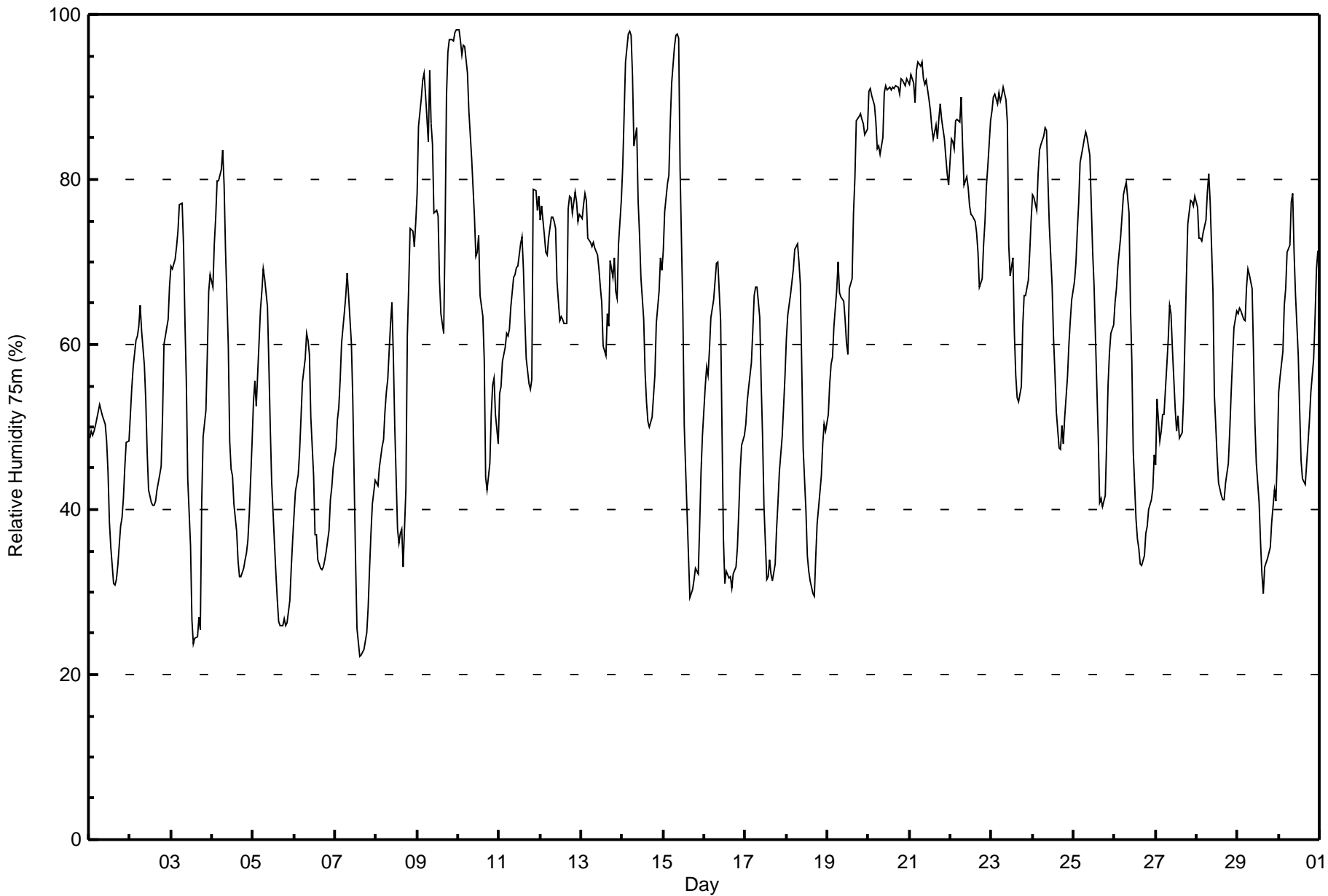
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 75m (RH75m) - %

Mannix - September 2017

| Maximum Value: 98 % on Sep 10 01:00 Maximum Daily Average: 89.7 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 22 % on Sep 7 15:00 Minimum Daily Average: 43.5 % on Sep 7 Maximum Diurnal Average: 75.2 % at hour 7 Minimum Diurnal Average: 46.6 % at hour 16 Monthly Average: 61.7 % Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 47 Median = 63 O ₃ = 76 P ₉₀ = 88 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-Sep | 49 | 50 | 49 | 50 | 50 | 52 | 53 | 52 | 51 | 50 | 48 | 45 | 38 | 35 | 31 | 31 | 32 | 33 | 38 | 39 | 41 | 45 | 48 | 48 | 44.1 | 53 |
| 2-Sep | 51 | 55 | 57 | 60 | 61 | 62 | 65 | 62 | 58 | 53 | 47 | 42 | 41 | 41 | 40 | 41 | 42 | 44 | 45 | 51 | 60 | 62 | 63 | 67 | 53.0 | 67 |
| 3-Sep | 69 | 69 | 70 | 72 | 74 | 77 | 77 | 72 | 63 | 56 | 44 | 36 | 27 | 24 | 24 | 25 | 27 | 25 | 41 | 49 | 52 | 59 | 66 | 68 | 52.7 | 77 |
| 4-Sep | 67 | 72 | 75 | 80 | 80 | 81 | 84 | 79 | 71 | 60 | 48 | 45 | 44 | 41 | 37 | 34 | 32 | 32 | 33 | 34 | 35 | 36 | 40 | 48 | 53.7 | 84 |
| 5-Sep | 53 | 56 | 53 | 60 | 64 | 66 | 69 | 68 | 65 | 58 | 50 | 43 | 36 | 32 | 29 | 27 | 26 | 26 | 27 | 26 | 26 | 29 | 33 | 36 | 44.1 | 69 |
| 6-Sep | 39 | 42 | 44 | 47 | 51 | 55 | 58 | 61 | 61 | 59 | 51 | 44 | 37 | 37 | 34 | 33 | 33 | 33 | 34 | 35 | 37 | 41 | 43 | 45 | 44.0 | 61 |
| 7-Sep | 47 | 51 | 52 | 56 | 60 | 64 | 66 | 69 | 66 | 60 | 53 | 44 | 34 | 26 | 22 | 22 | 23 | 23 | 25 | 28 | 33 | 37 | 41 | 43 | 43.5 | 69 |
| 8-Sep | 43 | 43 | 45 | 48 | 49 | 52 | 54 | 56 | 63 | 65 | 59 | 50 | 38 | 36 | 37 | 38 | 33 | 42 | 61 | 67 | 74 | 74 | 72 | 75 | 53.0 | 75 |
| 9-Sep | 78 | 86 | 90 | 92 | 93 | 90 | 85 | 93 | 87 | 84 | 76 | 76 | 76 | 68 | 64 | 61 | 74 | 90 | 95 | 97 | 97 | 97 | 98 | 98 | 85.2 | 98 |
| 10-Sep | 98 | 97 | 95 | 96 | 96 | 93 | 88 | 86 | 83 | 75 | 71 | 71 | 73 | 66 | 63 | 58 | 44 | 42 | 46 | 51 | 55 | 56 | 52 | 48 | 71.0 | 98 |
| 11-Sep | 54 | 55 | 58 | 60 | 61 | 61 | 62 | 65 | 68 | 69 | 69 | 69 | 72 | 73 | 69 | 63 | 58 | 55 | 55 | 56 | 79 | 79 | 76 | 78 | 65.2 | 79 |
| 12-Sep | 75 | 77 | 73 | 71 | 71 | 73 | 75 | 75 | 75 | 74 | 68 | 63 | 63 | 63 | 63 | 63 | 76 | 78 | 78 | 76 | 78 | 77 | 75 | 76 | 72.4 | 78 |
| 13-Sep | 75 | 77 | 78 | 77 | 73 | 72 | 72 | 72 | 72 | 71 | 69 | 67 | 65 | 60 | 59 | 64 | 62 | 70 | 68 | 71 | 66 | 66 | 72 | 78 | 69.8 | 78 |
| 14-Sep | 81 | 88 | 94 | 98 | 98 | 97 | 93 | 84 | 86 | 77 | 73 | 68 | 63 | 57 | 53 | 51 | 50 | 51 | 54 | 56 | 62 | 67 | 70 | 69 | 72.5 | 98 |
| 15-Sep | 71 | 76 | 80 | 80 | 87 | 92 | 96 | 97 | 98 | 97 | 81 | 64 | 50 | 45 | 40 | 29 | 30 | 30 | 31 | 33 | 32 | 38 | 45 | 49 | 61.3 | 98 |
| 16-Sep | 55 | 57 | 56 | 59 | 63 | 65 | 68 | 70 | 70 | 63 | 50 | 36 | 31 | 33 | 32 | 32 | 30 | 32 | 33 | 35 | 40 | 45 | 48 | 49 | 48.0 | 70 |
| 17-Sep | 50 | 53 | 55 | 58 | 62 | 66 | 67 | 67 | 63 | 55 | 49 | 40 | 31 | 32 | 34 | 32 | 31 | 33 | 38 | 41 | 45 | 49 | 52 | 56 | 48.3 | 67 |
| 18-Sep | 61 | 64 | 66 | 68 | 69 | 72 | 72 | 70 | 67 | 57 | 47 | 40 | 34 | 33 | 31 | 30 | 30 | 34 | 38 | 40 | 44 | 48 | 50 | 49 | 50.6 | 72 |
| 19-Sep | 52 | 55 | 58 | 59 | 62 | 67 | 70 | 66 | 66 | 65 | 63 | 60 | 59 | 67 | 68 | 76 | 80 | 87 | 88 | 88 | 87 | 87 | 85 | 86 | 70.9 | 88 |
| 20-Sep | 91 | 91 | 90 | 89 | 87 | 84 | 84 | 83 | 85 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 90 | 92 | 92 | 91 | 92 | 92 | 89.7 | 92 |
| 21-Sep | 92 | 93 | 92 | 89 | 93 | 94 | 94 | 94 | 92 | 92 | 92 | 90 | 88 | 86 | 85 | 87 | 85 | 87 | 89 | 87 | 85 | 83 | 81 | 79 | 88.7 | 94 |
| 22-Sep | 85 | 85 | 84 | 87 | 87 | 87 | 90 | 84 | 79 | 80 | 79 | 77 | 76 | 76 | 75 | 74 | 71 | 67 | 68 | 72 | 75 | 79 | 81 | 87 | 79.4 | 90 |
| 23-Sep | 88 | 90 | 90 | 89 | 91 | 90 | 90 | 91 | 90 | 87 | 72 | 68 | 70 | 61 | 56 | 54 | 53 | 55 | 62 | 66 | 66 | 68 | 71 | 75 | 74.8 | 91 |
| 24-Sep | 78 | 78 | 76 | 81 | 84 | 84 | 85 | 86 | 86 | 80 | 74 | 67 | 61 | 57 | 52 | 47 | 47 | 50 | 48 | 51 | 56 | 60 | 63 | 65 | 67.4 | 86 |
| 25-Sep | 68 | 70 | 74 | 77 | 82 | 84 | 85 | 86 | 85 | 83 | 77 | 71 | 67 | 61 | 49 | 41 | 41 | 40 | 42 | 48 | 55 | 59 | 61 | 62 | 65.3 | 86 |
| 26-Sep | 65 | 67 | 70 | 73 | 76 | 78 | 79 | 80 | 76 | 65 | 58 | 47 | 39 | 36 | 35 | 33 | 33 | 34 | 37 | 38 | 40 | 41 | 43 | 47 | 53.8 | 80 |
| 27-Sep | 45 | 53 | 48 | 49 | 52 | 51 | 57 | 61 | 65 | 64 | 59 | 52 | 49 | 51 | 49 | 49 | 54 | 61 | 68 | 75 | 77 | 77 | 77 | 78 | 59.3 | 78 |
| 28-Sep | 77 | 73 | 73 | 73 | 74 | 75 | 79 | 81 | 77 | 67 | 54 | 50 | 46 | 43 | 42 | 41 | 41 | 43 | 46 | 49 | 54 | 58 | 62 | 64 | 60.0 | 81 |
| 29-Sep | 64 | 64 | 64 | 63 | 63 | 67 | 69 | 69 | 67 | 59 | 51 | 46 | 41 | 36 | 32 | 30 | 33 | 34 | 35 | 35 | 38 | 42 | 41 | 46 | 49.6 | 69 |
| 30-Sep | 54 | 56 | 59 | 65 | 67 | 71 | 72 | 77 | 78 | 71 | 66 | 59 | 52 | 46 | 44 | 43 | 46 | 48 | 51 | 54 | 58 | 63 | 69 | 71 | 60.1 | 78 |
| | 65.9 | 68.1 | 69.0 | 70.9 | 72.6 | 74.1 | 75.2 | 75.2 | 73.7 | 69.5 | 63.0 | 57.4 | 53.1 | 50.4 | 48.0 | 46.6 | 46.9 | 49.2 | 52.1 | 54.7 | 58.1 | 60.4 | 62.3 | 64.5 | Diurnal Average | |
| | 98 | 97 | 95 | 98 | 98 | 97 | 96 | 97 | 98 | 97 | 92 | 91 | 91 | 91 | 91 | 91 | 91 | 91 | 95 | 97 | 97 | 97 | 98 | 98 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

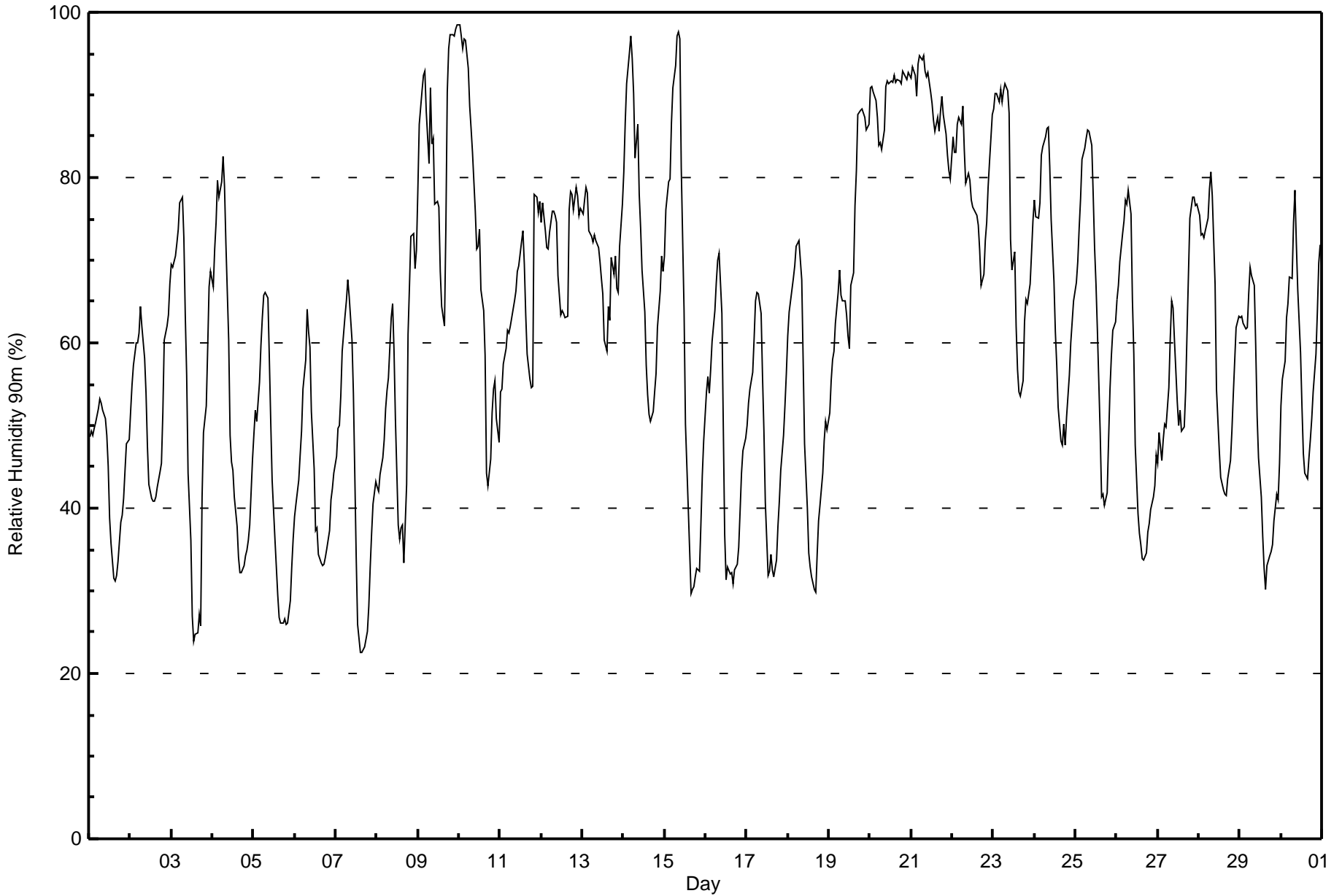
| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 110 | 15.28 | 15.28 |
| 40 - 60 | 215 | 29.86 | 45.14 |
| 60 - 80 | 261 | 36.25 | 81.39 |
| 80 - 100 | 134 | 18.61 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 98 % on Sep 10 00:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 90.2 % on Sep 20 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 23 % on Sep 7 15:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 43.0 % on Sep 5 | | | | | | | | | | | | | | | | | Hours of Data: 720 | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 74.9 % at hour 8 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 47.1 % at hour 16 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | |
| Monthly Average: 61.7 % | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 47 Median = 63 O ₃ = 76 P ₉₀ = 88 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-Sep | 49 | 49 | 49 | 50 | 50 | 52 | 53 | 53 | 52 | 51 | 49 | 45 | 39 | 36 | 31 | 31 | 32 | 34 | 38 | 39 | 41 | 45 | 48 | 48 | 44.3 | 53 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 52 | 55 | 57 | 60 | 60 | 61 | 64 | 62 | 58 | 54 | 47 | 43 | 41 | 41 | 41 | 41 | 43 | 44 | 45 | 52 | 60 | 62 | 63 | 67 | 53.1 | 67 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 69 | 69 | 71 | 72 | 74 | 77 | 78 | 73 | 63 | 56 | 44 | 36 | 27 | 24 | 25 | 25 | 27 | 26 | 41 | 49 | 52 | 59 | 67 | 69 | 53.0 | 78 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 67 | 71 | 75 | 80 | 78 | 80 | 83 | 79 | 72 | 60 | 49 | 46 | 45 | 41 | 38 | 34 | 32 | 32 | 33 | 34 | 35 | 36 | 38 | 46 | 53.4 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 49 | 52 | 50 | 55 | 60 | 63 | 66 | 66 | 65 | 58 | 51 | 43 | 36 | 33 | 29 | 27 | 26 | 26 | 27 | 26 | 26 | 29 | 33 | 36 | 43.0 | 66 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 39 | 41 | 43 | 46 | 49 | 54 | 58 | 64 | 61 | 60 | 52 | 45 | 37 | 38 | 34 | 33 | 33 | 33 | 34 | 35 | 37 | 41 | 42 | 44 | 44.0 | 64 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 46 | 50 | 50 | 54 | 59 | 63 | 65 | 68 | 66 | 60 | 54 | 44 | 34 | 26 | 23 | 23 | 23 | 23 | 25 | 28 | 33 | 37 | 40 | 43 | 43.2 | 68 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 43 | 42 | 44 | 46 | 48 | 52 | 54 | 56 | 63 | 65 | 59 | 51 | 38 | 36 | 38 | 38 | 33 | 43 | 61 | 67 | 73 | 73 | 69 | 71 | 52.6 | 73 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 78 | 86 | 91 | 92 | 93 | 88 | 82 | 91 | 84 | 85 | 77 | 77 | 76 | 69 | 64 | 62 | 74 | 90 | 96 | 97 | 97 | 97 | 98 | 98 | 85.1 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 98 | 97 | 96 | 97 | 97 | 93 | 89 | 86 | 83 | 76 | 71 | 72 | 74 | 66 | 64 | 58 | 44 | 43 | 46 | 52 | 54 | 55 | 51 | 48 | 71.3 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 54 | 54 | 58 | 59 | 61 | 61 | 62 | 63 | 65 | 66 | 69 | 69 | 72 | 74 | 69 | 63 | 59 | 56 | 55 | 55 | 78 | 78 | 76 | 77 | 64.7 | 78 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 75 | 77 | 74 | 72 | 71 | 73 | 76 | 76 | 75 | 75 | 68 | 63 | 64 | 64 | 63 | 63 | 76 | 78 | 78 | 76 | 79 | 78 | 75 | 76 | 72.7 | 79 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 76 | 77 | 79 | 78 | 74 | 73 | 72 | 73 | 72 | 70 | 68 | 66 | 60 | 59 | 64 | 63 | 70 | 68 | 70 | 67 | 66 | 72 | 77 | 77 | 70.2 | 79 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 81 | 87 | 91 | 95 | 97 | 94 | 90 | 82 | 86 | 78 | 74 | 69 | 64 | 57 | 54 | 51 | 50 | 52 | 54 | 56 | 62 | 66 | 70 | 69 | 72.1 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 71 | 76 | 80 | 80 | 87 | 91 | 94 | 97 | 98 | 97 | 81 | 64 | 50 | 45 | 40 | 30 | 30 | 31 | 32 | 33 | 32 | 38 | 44 | 48 | 61.1 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 54 | 56 | 54 | 57 | 60 | 64 | 67 | 70 | 71 | 64 | 50 | 37 | 31 | 33 | 32 | 32 | 31 | 33 | 33 | 35 | 40 | 44 | 47 | 48 | 47.6 | 71 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 50 | 53 | 54 | 56 | 61 | 65 | 66 | 66 | 64 | 56 | 49 | 41 | 32 | 32 | 34 | 33 | 32 | 34 | 38 | 41 | 45 | 49 | 52 | 56 | 48.3 | 66 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 61 | 64 | 66 | 68 | 69 | 72 | 72 | 70 | 68 | 58 | 48 | 40 | 35 | 33 | 32 | 30 | 30 | 34 | 39 | 40 | 44 | 48 | 51 | 50 | 50.9 | 72 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 51 | 55 | 58 | 59 | 62 | 66 | 69 | 66 | 65 | 65 | 63 | 61 | 59 | 67 | 68 | 77 | 81 | 88 | 88 | 88 | 88 | 87 | 86 | 86 | 71.0 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 91 | 91 | 90 | 89 | 87 | 84 | 84 | 83 | 86 | 91 | 92 | 91 | 92 | 92 | 92 | 92 | 92 | 92 | 91 | 93 | 93 | 92 | 93 | 92 | 90.2 | 93 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 92 | 93 | 92 | 90 | 94 | 95 | 94 | 95 | 93 | 92 | 93 | 90 | 89 | 87 | 86 | 87 | 86 | 88 | 90 | 88 | 85 | 83 | 81 | 80 | 89.3 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 85 | 83 | 83 | 86 | 87 | 86 | 89 | 83 | 79 | 81 | 80 | 77 | 76 | 76 | 75 | 74 | 71 | 67 | 68 | 72 | 75 | 79 | 82 | 88 | 79.3 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 88 | 90 | 90 | 89 | 91 | 89 | 90 | 91 | 91 | 88 | 73 | 69 | 71 | 62 | 57 | 54 | 54 | 55 | 62 | 65 | 65 | 67 | 71 | 75 | 74.9 | 91 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 77 | 75 | 75 | 77 | 83 | 84 | 85 | 86 | 86 | 81 | 75 | 67 | 61 | 57 | 52 | 48 | 48 | 50 | 48 | 51 | 56 | 60 | 63 | 65 | 67.1 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 67 | 70 | 74 | 77 | 82 | 84 | 85 | 86 | 86 | 84 | 78 | 72 | 67 | 62 | 49 | 41 | 42 | 40 | 42 | 48 | 54 | 58 | 62 | 63 | 65.5 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 65 | 67 | 70 | 73 | 75 | 77 | 77 | 78 | 76 | 65 | 59 | 48 | 39 | 37 | 36 | 34 | 34 | 35 | 37 | 38 | 40 | 41 | 43 | 46 | 53.7 | 78 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 45 | 49 | 46 | 48 | 50 | 50 | 55 | 61 | 65 | 64 | 60 | 53 | 50 | 52 | 49 | 50 | 54 | 61 | 68 | 75 | 78 | 78 | 77 | 77 | 58.9 | 78 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 76 | 73 | 73 | 73 | 74 | 75 | 79 | 81 | 78 | 67 | 54 | 51 | 47 | 44 | 42 | 42 | 42 | 44 | 46 | 49 | 54 | 58 | 62 | 63 | 60.1 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 63 | 63 | 62 | 62 | 62 | 66 | 69 | 68 | 67 | 60 | 51 | 46 | 41 | 37 | 33 | 30 | 33 | 34 | 35 | 36 | 38 | 42 | 41 | 45 | 49.4 | 69 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 52 | 56 | 58 | 63 | 65 | 68 | 68 | 75 | 79 | 72 | 66 | 59 | 52 | 47 | 44 | 43 | 46 | 48 | 51 | 54 | 59 | 64 | 70 | 72 | 59.6 | 79 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 65.5 | 67.4 | 68.4 | 70.1 | 72.0 | 73.4 | 74.5 | 74.9 | 73.9 | 70.0 | 63.5 | 57.9 | 53.6 | 50.9 | 48.5 | 47.1 | 47.3 | 49.5 | 52.3 | 54.8 | 58.0 | 60.3 | 62.2 | 64.2 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 98 | 97 | 96 | 97 | 97 | 95 | 94 | 97 | 98 | 97 | 93 | 91 | 92 | 92 | 92 | 92 | 92 | 92 | 96 | 97 | 97 | 97 | 98 | 98 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 109 | 15.14 | 15.14 |
| 40 - 60 | 216 | 30.00 | 45.14 |
| 60 - 80 | 264 | 36.67 | 81.81 |
| 80 - 100 | 131 | 18.19 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| | | |
|--|--|---------------------------------|
| Maximum Speed: 36 km/h on Sep 10 14:00 | Maximum Daily Speed Average: 24.1 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 9 03:00 | Minimum Daily Speed Average: 1.6 km/h on Sep 8 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 3.7 km/h at hour 15 | Minimum Diurnal Speed Average: 0.7 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 2.3 km/h 208.4 deg | Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 10 Q ₃ = 15 P ₉₀ = 21 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-Sep | W20 | WSW16 | WSW12 | WSW12 | WSW15 | WSW18 | WSW19 | WSW21 | WSW19 | WSW16 | WSW17 | WSW19 | WSW20 | WSW23 | WSW25 | W29 | WSW28 | WSW26 | WSW23 | WSW18 | WSW14 | WSW14 | WSW13 | WSW18 | WSW18.8 | W29 |
| 2-Sep | W21 | W22 | W22 | W19 | WSW16 | WSW14 | WSW13 | WSW15 | W14 | W16 | W15 | W19 | W16 | WNW11 | W11 | W15 | WSW12 | WSW13 | WSW16 | WSW20 | WSW18 | WSW13 | W14 | W16 | W15.6 | W22 |
| 3-Sep | W15 | W14 | W14 | WSW12 | WSW18 | WSW9 | SW6 | WSW9 | W19 | W25 | W26 | W24 | W27 | W24 | WNW22 | WNW22 | W24 | WNW21 | NNW24 | NNW15 | NW17 | NW15 | NW12 | NW10 | WNW16.0 | W27 |
| 4-Sep | WNW9 | W12 | WSW11 | WSW5 | WSW9 | WSW10 | W8 | W12 | WNW10 | WNW11 | NW11 | NW11 | W13 | W10 | W9 | W8 | WNW9 | W11 | WSW6 | SW7 | S8 | SSE6 | SE5 | SE10 | W6.9 | WNW13 |
| 5-Sep | SE9 | SSE9 | SE9 | SE7 | SE10 | SSE11 | SE11 | SSE9 | SE5 | SE7 | SE9 | SE10 | SW8 | SW13 | SW12 | WSW13 | WSW12 | W10 | SW4 | S7 | SSE9 | SSE6 | ESE3 | SE6.3 | WSW13 | |
| 6-Sep | ESE1 | SSW5 | SSE5 | SSE2 | SSE0 | WSW2 | SW3 | SW2 | WSW3 | W6 | W6 | NNW1 | SE3 | WNW3 | N2 | E4 | E5 | ENE4 | S1 | SE2 | E6 | SE11 | SE12 | SE12 | SSE2.0 | SE12 |
| 7-Sep | SSE12 | SE11 | SE8 | SE7 | SE9 | SE11 | SSE10 | SSE11 | SSE13 | SE12 | SSE14 | SSE15 | SSE14 | S18 | S19 | S20 | S19 | S17 | SSE14 | SSE14 | SSE14 | SSE13 | SSE12 | SSE11 | SSE13.0 | S20 |
| 8-Sep | SSE8 | SE8 | SE9 | SSE10 | SSE8 | SE10 | SSE9 | SSE5 | WSW4 | WSW3 | NW8 | NNW11 | N13 | N8 | NNW11 | NNE10 | N11 | NW9 | NNW10 | NNW9 | NW4 | W6 | W6 | WNW4 | NNW1.6 | N13 |
| 9-Sep | W3 | WNW3 | NNW0 | N2 | SE2 | NE5 | E3 | W5 | N3 | NNW2 | NNW4 | NW8 | NW9 | NNW8 | NNW12 | N11 | NW11 | NNW9 | NW7 | NNE7 | N5 | W7 | W10 | WSW9 | NW4.5 | NNW12 |
| 10-Sep | SW5 | SW7 | S5 | S5 | SSW6 | SW9 | WSW18 | WSW19 | WSW21 | WSW26 | W31 | W31 | W32 | W36 | W36 | W19 | W24 | WSW31 | WSW22 | WSW15 | SW14 | SW10 | SW15 | WSW19 | WSW18.1 | W36 |
| 11-Sep | W18 | W16 | WSW11 | SW3 | SSE5 | SSE9 | SSE7 | SSE7 | SE8 | SSE9 | SE7 | SSE9 | SE7 | ESE5 | SE5 | SSE11 | SSE14 | SSE10 | SSE14 | S7 | NNW7 | SW8 | SW8 | WSW11 | S5.3 | W18 |
| 12-Sep | WSW13 | WSW24 | W32 | W25 | WSW15 | WSW18 | WSW20 | WSW19 | W22 | W23 | W23 | WNW19 | W19 | W18 | W18 | W17 | NNW10 | NNW7 | NNE11 | NNE12 | NE12 | NE10 | NE7 | NNE6 | W12.3 | W32 |
| 13-Sep | NNE6 | NNE10 | N5 | NW4 | N4 | NE4 | NE6 | ENE6 | ENE3 | ESE2 | SSW4 | SSW2 | E3 | E7 | N6 | NNE3 | NE7 | NE5 | N2 | SE1 | SSE0 | NW4 | N5 | NE2.8 | NNE10 | |
| 14-Sep | N5 | WNW2 | SSE2 | ENE2 | NE2 | N2 | NNW2 | W1 | W3 | NNE6 | NNE8 | NNW6 | NW7 | WNW9 | NW8 | NNE7 | NNE9 | NNE8 | NNE7 | NNE9 | NNE10 | NE6 | E7 | ENE6 | NNE4.0 | NNE10 |
| 15-Sep | SSE2 | SW2 | S3 | S4 | SSE5 | SSE9 | SSE8 | SSE8 | S5 | SE4 | SE5 | SE6 | ESE5 | SE7 | SE6 | SW7 | SSW10 | SSW8 | S7 | SSW8 | S9 | SSE10 | SSE11 | SSE11 | SSE6.0 | SSE11 |
| 16-Sep | SSE13 | SSE11 | SSE12 | SSE11 | SSE11 | SSE10 | SSE12 | SSE12 | SE10 | SE9 | SSE13 | SSE21 | S20 | S17 | S19 | SSE16 | S14 | SSE15 | SSE11 | SSE11 | SSE12 | SSE13 | SSE14 | SSE13.1 | SSE21 | |
| 17-Sep | SSE14 | SSE12 | SE12 | SE11 | SE11 | SE12 | SSE13 | SSE12 | SE13 | SSE16 | SE16 | SSE17 | SSE21 | SSE19 | SSE21 | SSE18 | SSE18 | SE17 | SE14 | SE15 | SE15 | SE15 | SE16 | SSE15.0 | SSE21 | |
| 18-Sep | SE18 | SE17 | SE13 | SE16 | SE17 | SE16 | SE18 | SE20 | SE15 | SE17 | SE18 | SE23 | SE22 | SE16 | SE15 | SE15 | ESE15 | SE14 | ESE10 | ESE10 | E8 | E9 | SE5 | ESE12 | SE14.7 | SE23 |
| 19-Sep | E17 | E21 | E21 | E21 | NNE6 | N7 | N6 | NNE9 | NE9 | NE9 | ENE12 | NE12 | ENE13 | ENE15 | NE17 | ENE27 | ENE24 | ENE20 | ENE20 | ENE22 | ENE24 | E24 | ENE22 | NE16 | ENE15.3 | ENE27 |
| 20-Sep | NNE14 | NNE16 | N17 | N19 | N21 | N22 | N23 | N27 | N29 | N28 | NNE28 | NNE30 | NNE30 | NNE28 | NNE27 | NNE27 | NNE26 | NNE26 | NNE27 | N24 | N26 | NNE22 | N20 | N23 | N24.1 | NNE30 |
| 21-Sep | N25 | N23 | N24 | N30 | N18 | N16 | N16 | N16 | N18 | N16 | NNW16 | N15 | NNW16 | N15 | N17 | NNW18 | NNW20 | NNW17 | NNW14 | NNW12 | NNW10 | NW8 | NW7 | NW6 | N15.8 | N30 |
| 22-Sep | WSW4 | WSW6 | WSW4 | W5 | W3 | SW4 | SSW4 | SW6 | SSW6 | SSW4 | S5 | SSW5 | W3 | NNE6 | ESE3 | S4 | SSE5 | S4 | SSE3 | SSE8 | S6 | S6 | SSE6 | S2 | SSW3.1 | SSE8 |
| 23-Sep | SE5 | SSW3 | WSW4 | SSE5 | SE7 | SSE8 | SSE8 | SSE6 | SSE7 | SSE5 | SE8 | SSE7 | S8 | S7 | SSE7 | S7 | SSE9 | SE10 | SE10 | SE10 | SSE11 | SSE12 | SSE11 | SSE11 | SSE7.4 | SSE12 |
| 24-Sep | SE11 | SE11 | SE10 | SE9 | SE9 | SSE10 | SSE9 | SSE9 | SSE7 | SE8 | SE8 | SE8 | SSE10 | SSE11 | SSE11 | SE11 | SE11 | SE10 | SSE13 | SSE14 | SSE13 | SSE13 | SE11 | SSE10.2 | SSE14 | |
| 25-Sep | SE10 | SE11 | SE9 | SE9 | SE9 | SE10 | SE9 | SE9 | SSE10 | SSE11 | SSE9 | SE7 | ENE5 | NE5 | WNW4 | WNW9 | WNW3 | SSW3 | S5 | SW10 | SW10 | SSW7 | SSW6 | S6 | SSE5.3 | SE11 |
| 26-Sep | SSE6 | S6 | SW4 | W8 | W6 | WSW11 | WSW10 | WSW7 | WSW5 | W8 | W13 | W13 | WNW16 | WNW19 | WNW18 | WNW18 | WNW17 | WNW12 | NW7 | WNW7 | WSW8 | WSW7 | WSW2 | S6 | W8.3 | WNW19 |
| 27-Sep | S4 | SSE6 | SE3 | SSE6 | SSE8 | SSE7 | SSE8 | S3 | WSW2 | N4 | NNW4 | N6 | NNW6 | WNW10 | NW8 | WNW8 | NNW9 | N15 | NNE15 | NNE15 | NNE11 | NNE7 | N7 | NNE7 | N2.8 | NNE15 |
| 28-Sep | N3 | E3 | ESE5 | SE10 | SE9 | SE8 | SE8 | SE9 | SE9 | SE11 | SSE14 | SSE16 | SSE16 | SSE15 | S17 | S17 | S20 | SSE15 | SSE17 | SSE17 | SSE15 | SSE14 | SE11 | SE11 | SSE11.5 | S20 |
| 29-Sep | SE13 | SE14 | SE15 | SE16 | SE16 | SE13 | SE11 | SE16 | SE12 | SE9 | SE15 | SSE15 | SE16 | SSE12 | S8 | WSW4 | NNW7 | N5 | ESE3 | SW6 | WSW9 | SSE8 | SSE9 | SSE8 | SSE8.7 | SE16 |
| 30-Sep | SSE8 | SSE7 | SE8 | SSE9 | SSE6 | SE8 | SSE10 | SSE8 | SSE8 | SSE4 | SE9 | SE11 | SE10 | S3 | WSW14 | WSW14 | WSW16 | SW12 | W13 | WNW15 | WNW19 | WNW21 | WNW28 | WNW21 | SW5.0 | WNW28 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|--------|------|--------|------|------|------|--------|--------|-------|-------|--------|-------|--------|--------|--------|--------|--------|-------|--------|--------|------|-------|------|-----------------|
| S2.6 | SSW3.0 | S2.7 | SSE2.5 | S3.1 | S3.5 | S3.6 | SSW3.2 | SSW2.4 | SW2.4 | SW2.5 | SSW2.6 | SW3.2 | WSW3.3 | WSW3.7 | WSW3.4 | WSW2.8 | WSW2.2 | W0.7 | SSW1.1 | SSW1.1 | S2.7 | S2.2 | S2.1 | Diurnal Average |
| N25 | WSW24 | W32 | N30 | N21 | N22 | N23 | N27 | NNE29 | N28 | W31 | W31 | W32 | W36 | W36 | W29 | WSW28 | WSW31 | NNE27 | N24 | N26 | E24 | WNW28 | N23 | Diurnal Maximum |

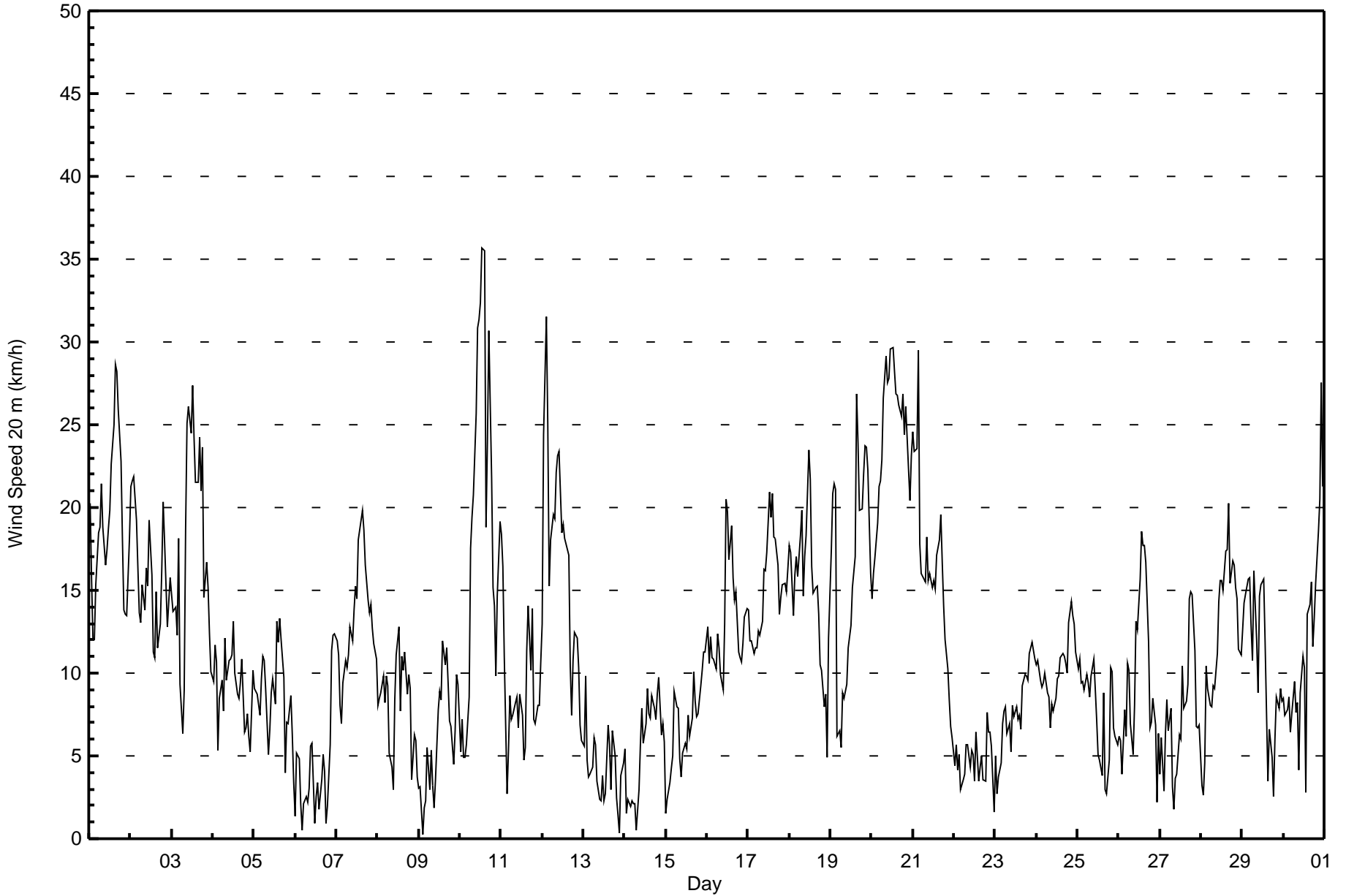
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 127 | 17.64 | 17.64 |
| 6 - 11 | 293 | 40.69 | 58.33 |
| 12 - 19 | 212 | 29.44 | 87.78 |
| 20 - 28 | 76 | 10.56 | 98.33 |
| 29 - 38 | 12 | 1.67 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 13 | 2 | 4 | 5 | 3 | 9 | 13 | 14 | 14 | 8 | 8 | 12 | 7 | 6 | 3 | 6 | 127 |
| 6 - 11 | 8 | 20 | 7 | 2 | 5 | 2 | 66 | 77 | 14 | 7 | 13 | 18 | 14 | 10 | 17 | 13 | 293 |
| 12 - 19 | 13 | 5 | 4 | 3 | 1 | 2 | 37 | 48 | 9 | 0 | 5 | 39 | 25 | 10 | 3 | 8 | 212 |
| 20 - 28 | 11 | 9 | 0 | 7 | 4 | 0 | 3 | 3 | 3 | 0 | 0 | 13 | 14 | 7 | 0 | 2 | 76 |
| 29 - 38 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 0 | 0 | 0 | 12 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 46 | 39 | 15 | 17 | 13 | 13 | 119 | 142 | 40 | 15 | 26 | 83 | 67 | 33 | 23 | 29 | 720 |

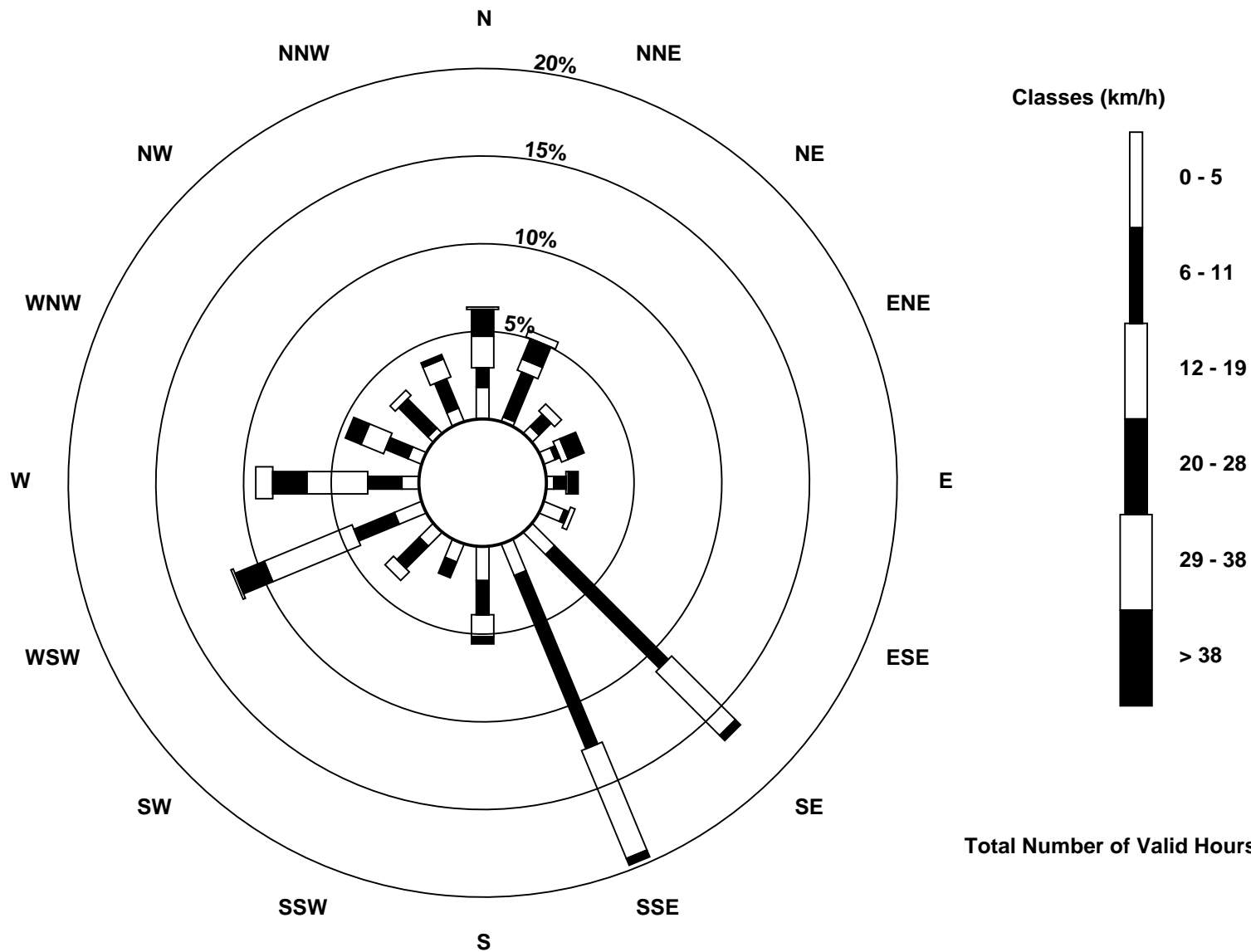
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





| | | |
|---|---|--------------------------------|
| Maximum Speed: 41 km/h on Sep 10 15:00 | Maximum Daily Speed Average: 32.9 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 6 19:00 | Minimum Daily Speed Average: 1.6 km/h on Sep 6 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 5.4 km/h at hour 7 | Minimum Diurnal Speed Average: 0.9 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 3.2 km/h 199.2 deg | Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 10 Median = 16 Q ₃ = 22 P ₉₀ = 27 P ₉₉ = 38 | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | WSW24 | WSW22 | WSW19 | WSW18 | WSW21 | WSW25 | WSW24 | WSW25 | WSW22 | WSW20 | WSW21 | SW23 | SW24 | WSW27 | WSW29 | WSW32 | WSW32 | WSW31 | WSW29 | WSW25 | WSW21 | SW22 | WSW21 | WSW26 | WSW24.1 | WSW32 | |
| 2-Sep | WSW26 | WSW26 | WSW26 | WSW23 | WSW24 | WSW21 | WSW18 | WSW19 | W16 | W18 | W17 | W22 | W19 | WNW15 | W13 | WSW17 | WSW15 | SW17 | WSW21 | WSW27 | WSW23 | WSW17 | W17 | WSW19 | WSW19.6 | WSW27 | |
| 3-Sep | WSW18 | WSW18 | W17 | WSW16 | WSW23 | WSW14 | SW10 | WSW11 | WSW21 | W27 | W30 | W29 | W33 | W29 | WNW28 | WNW29 | W30 | WNW30 | NNW34 | NW23 | NW27 | NW24 | NW20 | NW18 | WNW20.9 | NNW34 | |
| 4-Sep | WNW16 | W17 | W15 | W11 | W12 | W14 | W11 | W14 | WNW13 | WNW14 | NW16 | NW16 | W16 | W12 | W11 | W11 | WNW12 | W12 | SW8 | SW9 | S12 | SSE14 | SE12 | SE17 | W9.1 | SE17 | |
| 5-Sep | SE16 | SE15 | SE15 | SE13 | SE16 | SE18 | SE17 | SSE13 | SE6 | SE8 | SE11 | SE12 | SSW11 | SW17 | SW15 | SW16 | WSW15 | WSW12 | SW6 | S13 | S14 | S13 | S10 | SSW3 | S9.6 | SE18 | |
| 6-Sep | NW4 | SW8 | S6 | SW3 | WNW4 | WNW7 | W6 | WSW2 | SW3 | W6 | W6 | NW2 | SSE2 | W4 | NNW3 | E3 | ENE6 | NE5 | ESE1 | ESE3 | E10 | ESE14 | SE19 | SE20 | SSE1.6 | SE20 | |
| 7-Sep | SE20 | SE19 | SE16 | SSE16 | SE20 | SE21 | SE20 | SSE18 | SSE19 | SE16 | SE18 | SSE21 | SSE21 | SSE27 | S30 | S31 | SSE29 | SSE27 | SSE24 | SSE24 | SSE24 | SSE22 | SSE20 | SSE18 | SSE21.4 | S31 | |
| 8-Sep | SSE13 | SSE16 | SSE16 | SSE18 | SSE15 | SE16 | SE16 | SSE10 | WSW7 | WSW5 | NW13 | NNW17 | N18 | N11 | NNW17 | N14 | N15 | NW15 | NNW17 | NNW15 | NW6 | W8 | W9 | WNW8 | NW2.1 | N18 | |
| 9-Sep | WNW7 | NW6 | NE2 | NNE3 | SE4 | NE8 | ENE5 | WNW7 | NNW5 | NW3 | NNW5 | NW12 | NW13 | NNW13 | NNW17 | N15 | NW19 | NNW16 | NW12 | NNE10 | N7 | W8 | W11 | WSW11 | NW6.9 | NW19 | |
| 10-Sep | SW8 | SW9 | S8 | S9 | SSW10 | SW13 | WSW22 | WSW25 | WSW25 | WSW31 | WSW35 | WSW36 | W37 | WSW40 | W41 | W23 | W28 | WSW37 | WSW28 | SW23 | SW23 | SW18 | SW24 | WSW26 | WSW23.0 | W41 | |
| 11-Sep | W23 | WSW22 | WSW17 | WSW7 | S6 | S12 | S11 | SE11 | SE10 | SE11 | SE9 | SE11 | SE10 | E6 | SE7 | SE14 | SE18 | SSE14 | SSE22 | S14 | NW14 | SW11 | SW13 | WSW17 | S7.5 | W23 | |
| 12-Sep | WSW20 | WSW30 | WSW37 | W29 | WSW20 | WSW24 | WSW26 | WSW24 | WSW25 | W27 | W29 | WNW24 | W23 | W22 | W21 | W22 | NW17 | NW12 | NNE14 | NNE16 | NNE16 | NE13 | NE8 | NNE7 | W15.6 | WSW37 | |
| 13-Sep | NNE8 | NNE13 | N6 | NW5 | N6 | NNE5 | NE7 | NE6 | NE4 | ESE2 | SE2 | SSW5 | SSW3 | ENE2 | ENE7 | N7 | NNE4 | NE8 | NNE6 | N4 | E2 | E1 | WNW4 | N6 | NNE3.7 | NNE13 | |
| 14-Sep | N9 | NNW4 | ESE2 | NE3 | NNE3 | N3 | NNW4 | NNE2 | NW3 | NNE7 | NNE9 | NW8 | NW9 | WNW12 | NW12 | NNE9 | NNE11 | NNE10 | NNE10 | NNE13 | NNE15 | NE9 | ENE9 | ENE7 | N6.1 | NNE15 | |
| 15-Sep | SE4 | ESE5 | SSE7 | SSE10 | SSE12 | SSE14 | AF | SSE11 | SSE6 | SE4 | SE6 | SE6 | ESE6 | SE8 | SE7 | SSW10 | SSW14 | S14 | S14 | S14 | S14 | S18 | SSE20 | S19 | SSE18 | SSE9.9 | SSE20 |
| 16-Sep | SSE21 | SSE19 | SSE20 | SSE19 | SSE18 | SSE19 | SE21 | SE18 | SE13 | SSE12 | SSE19 | SSE28 | SSE29 | SSE26 | SSE28 | SSE24 | SSE21 | SSE22 | SSE20 | SSE19 | SSE18 | SSE19 | SSE23 | SSE23 | SSE20.6 | SSE29 | |
| 17-Sep | SSE23 | SSE20 | SE21 | SE20 | SE19 | SE19 | SE20 | SE19 | SE17 | SE21 | SE21 | SE22 | SSE30 | SSE27 | SE27 | SE24 | SSE24 | SE22 | SE19 | SE22 | SE23 | SE24 | SE22 | SE23 | SE21.8 | SSE30 | |
| 18-Sep | SE24 | SE24 | SE19 | ESE22 | SE24 | ESE22 | SE24 | SE26 | ESE18 | SE20 | SE23 | SE30 | SE27 | ESE20 | ESE18 | ESE18 | ESE19 | ESE16 | ESE13 | E13 | E11 | E11 | ESE7 | E16 | ESE19.0 | SE30 | |
| 19-Sep | E22 | E26 | E28 | ENE26 | NNE9 | N12 | N9 | NNE13 | NE13 | NE12 | ENE14 | NE15 | ENE16 | ENE20 | NE22 | ENE32 | ENE29 | ENE25 | ENE26 | ENE28 | ENE30 | ENE29 | ENE28 | NE21 | ENE19.9 | ENE32 | |
| 20-Sep | NNE20 | N22 | N25 | N26 | N32 | N31 | N32 | N36 | N40 | N37 | N38 | N40 | N39 | N38 | N37 | N36 | N35 | N35 | N37 | N33 | N35 | N30 | N27 | N31 | N32.9 | N40 | |
| 21-Sep | N33 | N32 | N32 | N39 | N25 | N23 | N24 | NNW23 | N25 | N22 | NNW24 | N21 | NNW24 | NNW23 | NNW25 | NNW26 | NNW28 | NNW25 | NNW21 | NNW19 | NNW16 | NW14 | NW11 | NW11 | NNW23.1 | N39 | |
| 22-Sep | W5 | WSW7 | W6 | W7 | WNW5 | WSW3 | SW5 | SW8 | SSW8 | SSW6 | S7 | SSW7 | W5 | NNE7 | ESE4 | S6 | SSE7 | S6 | SE5 | SSE11 | SSE12 | SSE11 | SSE9 | SSE4 | SSW4.1 | SSE12 | |
| 23-Sep | SE8 | S5 | SSW5 | SSE9 | SE10 | SE13 | SE13 | SSE9 | SE9 | SSE7 | SE10 | SSE11 | S12 | S11 | SSE10 | S9 | SE12 | SE14 | SE16 | SE16 | SE17 | SSE19 | SSE18 | SSE16 | SSE11.3 | SSE19 | |
| 24-Sep | SE17 | SE19 | SE17 | SE15 | SE16 | SE16 | SE17 | SE14 | SE9 | SSE10 | SE9 | SE10 | SE12 | SSE13 | SE14 | SSE14 | SE15 | SE15 | SE16 | SE20 | SSE23 | SSE21 | SE19 | SE17 | SE15.2 | SSE23 | |
| 25-Sep | SE16 | SE16 | SE15 | SE15 | SE13 | SE15 | SE14 | SE12 | SSE13 | SSE14 | SSE12 | SE9 | ENE5 | NE5 | WNW6 | WNW13 | WNW5 | SW5 | SSW8 | SW18 | SW19 | SW14 | SSW12 | SSW10 | SE7.7 | SW19 | |
| 26-Sep | SSW10 | SSW9 | WSW8 | W13 | W12 | WSW16 | WSW16 | WSW13 | WSW7 | W10 | W14 | W16 | WNW20 | WNW25 | WNW23 | WNW23 | W22 | WNW18 | NW12 | NW11 | W11 | W13 | W6 | S8 | W12.4 | WNW25 | |
| 27-Sep | S8 | SSE7 | SSE3 | SE8 | SSE15 | SSE12 | SSE14 | S7 | WSW2 | NNW5 | NNW5 | N8 | NW8 | WNW12 | WNW12 | WNW11 | NNW13 | N20 | N21 | N20 | NNE16 | NNE9 | N10 | NNE9 | N3.4 | N21 | |
| 28-Sep | NNE4 | ESE5 | ESE6 | ESE13 | SE14 | SE13 | SE13 | SE13 | SE11 | SE14 | SSE18 | SE19 | SE19 | SSE20 | S25 | S26 | SSE29 | SSE22 | SSE25 | SSE25 | SSE22 | SE21 | SE18 | SE18 | SSE16.6 | SSE29 | |
| 29-Sep | SE19 | SE21 | SE22 | SE23 | SE23 | SE18 | ESE15 | ESE19 | SE15 | SE11 | SE18 | SSE19 | SE19 | SSE15 | S11 | SW5 | NNW9 | NNW8 | ENE1 | SSW12 | WSW11 | SSE10 | SSE16 | SSE15 | SE12.0 | SE23 | |
| 30-Sep | SSE17 | SSE15 | SE14 | SE14 | SSE11 | SE15 | SE17 | SSE12 | SSE9 | SSE5 | SE10 | SE13 | SE12 | S4 | WSW16 | SW17 | WSW20 | SW17 | W19 | WNW23 | WNW26 | WNW28 | WNW36 | WNW28 | SW7.0 | WNW36 | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|-------|--------|------|------|------|------|--------|-------|-------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|------|-------|------|-----------------|
| S4.0 | S4.6 | S4.3 | SSE4.3 | S4.8 | S5.2 | S5.4 | S4.4 | SSW2.7 | SW2.8 | SW2.9 | SSW3.0 | SW3.9 | WSW4.0 | WSW4.6 | WSW4.2 | WSW3.6 | WSW3.0 | WSW0.9 | SSW2.1 | SSW2.0 | S4.3 | S4.0 | S3.6 | Diurnal Average |
| N33 | N32 | WSW37 | N39 | N32 | N31 | N32 | N36 | N40 | N37 | N38 | N40 | N39 | WSW40 | W41 | N36 | N35 | WSW37 | N37 | N33 | N35 | N30 | WNW36 | N31 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

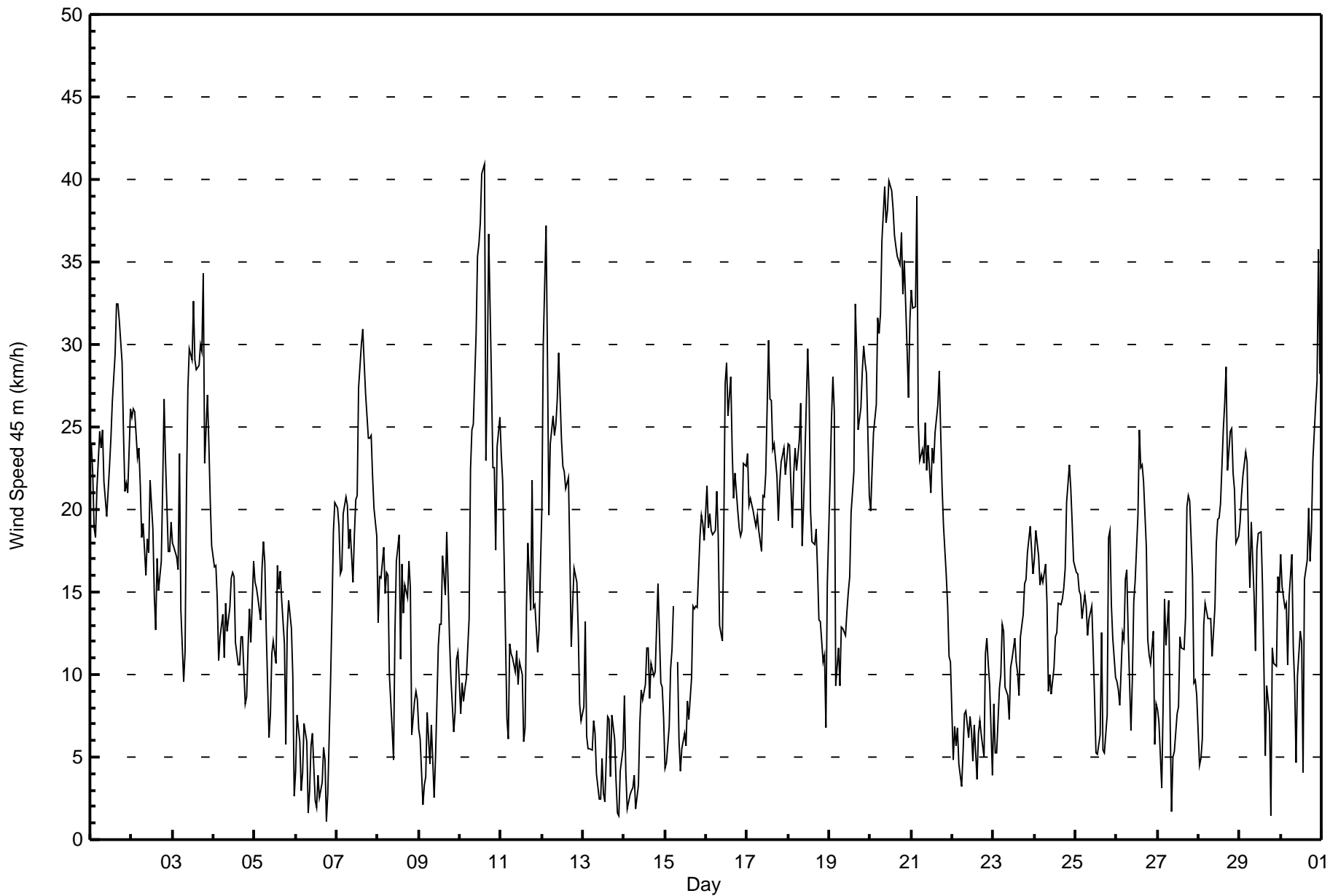
Wind Speed 45 m (WS45m) - km/h
Mannix - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 11 km/h on Sep 11 20:00 | Hours of Data: 719 |
| Minimum Value: 1 km/h on Sep 4 20:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 8 | 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-Sep | 3 | 2 | 3 | 4 | 5 | 6 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 6 | 6 | 5 | 6 | 6 | 6 | 4 | 3 | 2 | 3 | 3 | 6 |
| 2-Sep | 3 | 3 | 3 | 2 | 2 | 5 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 4 | 3 | 3 | 4 | 6 | 4 | 3 | 3 | 2 | 6 |
| 3-Sep | 2 | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 5 | 4 | 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 9 | 5 | 6 | 5 | 4 | 3 | 9 |
| 4-Sep | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 2 | 1 | 1 | 3 | 1 | 4 | 2 | 5 |
| 5-Sep | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 4 | 2 | 2 | 3 | 3 | 5 | 4 | 5 | 4 | 3 | 2 | 2 | 1 | 1 | 3 | 2 | 5 | |
| 6-Sep | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 4 | 3 | 4 |
| 7-Sep | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 6 | 5 | 7 | 6 | 6 | 6 | 3 | 2 | 3 | 2 | 1 | 1 | 7 |
| 8-Sep | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 4 | 3 | 4 | 5 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 2 | 2 | 3 | 5 |
| 9-Sep | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 1 | 2 | 4 |
| 10-Sep | 2 | 4 | 2 | 1 | 3 | 3 | 5 | 5 | 6 | 6 | 6 | 7 | 7 | 8 | 7 | 8 | 9 | 7 | 5 | 5 | 3 | 2 | 3 | 4 | 9 |
| 11-Sep | 2 | 2 | 2 | 5 | 4 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 3 | 11 | 10 | 2 | 2 | 2 | 11 |
| 12-Sep | 3 | 5 | 7 | 6 | 4 | 5 | 5 | 4 | 3 | 4 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 7 |
| 13-Sep | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 3 |
| 14-Sep | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 4 |
| 15-Sep | 1 | 1 | 1 | 1 | 2 | 3 | AF | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 5 | 5 | 4 | 2 | 2 | 1 | 2 | 1 | 1 | 5 |
| 16-Sep | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 5 | 7 | 6 | 6 | 7 | 6 | 6 | 4 | 3 | 2 | 2 | 1 | 2 | 2 | 7 |
| 17-Sep | 1 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 6 | 7 | 6 | 5 | 5 | 4 | 5 | 3 | 4 | 3 | 4 | 4 | 4 | 7 |
| 18-Sep | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 8 | 7 | 7 | 5 | 5 | 6 | 6 | 6 | 4 | 4 | 3 | 3 | 3 | 8 | 8 |
| 19-Sep | 4 | 5 | 5 | 5 | 5 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 6 | 5 | 7 | 7 | 6 | 5 | 6 | 6 | 6 | 7 | 6 | 5 | 7 |
| 20-Sep | 4 | 3 | 5 | 5 | 7 | 5 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 7 | 7 | 6 | 7 | 6 | 6 | 6 | 7 |
| 21-Sep | 6 | 8 | 9 | 6 | 6 | 5 | 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 9 |
| 22-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 4 | 3 | 2 | 2 | 4 |
| 23-Sep | 4 | 2 | 1 | 1 | 3 | 1 | 2 | 2 | 3 | 2 | 6 | 2 | 3 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 6 |
| 24-Sep | 2 | 1 | 3 | 3 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 4 |
| 25-Sep | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 8 | 4 | 2 | 1 | 3 | 2 | 1 | 3 | 1 | 2 | 8 |
| 26-Sep | 1 | 1 | 1 | 4 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 2 | 5 | 2 | 5 |
| 27-Sep | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 4 | 1 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 4 |
| 28-Sep | 2 | 3 | 2 | 4 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 4 | 3 | 2 | 3 | 3 | 2 | 2 | 6 |
| 29-Sep | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 4 | 2 | 2 | 2 | 2 | 3 | 1 | 3 | 4 |
| 30-Sep | 2 | 2 | 2 | 3 | 4 | 3 | 2 | 4 | 3 | 3 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 2 | 2 | 3 | 4 | 4 | 5 | 6 | 6 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|---|---|---|
| 6 | 8 | 9 | 6 | 7 | 6 | 6 | 7 | 7 | 7 | 7 | 8 | 7 | 7 | 8 | 8 | 8 | 8 | 9 | 7 | 9 | 11 | 10 | 7 | 6 | 8 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 70 | 9.74 | 9.74 |
| 6 - 11 | 160 | 22.25 | 31.99 |
| 12 - 19 | 255 | 35.47 | 67.45 |
| 20 - 28 | 175 | 24.34 | 91.79 |
| 29 - 38 | 53 | 7.37 | 99.17 |
| > 38 | 6 | 0.83 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 2 | 6 | 4 | 5 | 3 | 7 | 5 | 4 | 2 | 4 | 5 | 4 | 3 | 4 | 5 | 7 | 70 |
| 6 - 11 | 10 | 14 | 6 | 4 | 4 | 3 | 25 | 20 | 15 | 10 | 9 | 8 | 16 | 6 | 8 | 2 | 160 |
| 12 - 19 | 5 | 8 | 4 | 2 | 2 | 10 | 77 | 44 | 11 | 4 | 12 | 20 | 21 | 10 | 15 | 10 | 255 |
| 20 - 28 | 12 | 1 | 2 | 6 | 3 | 3 | 33 | 34 | 2 | 0 | 6 | 39 | 10 | 10 | 4 | 10 | 175 |
| 29 - 38 | 19 | 0 | 0 | 4 | 0 | 0 | 1 | 4 | 2 | 0 | 0 | 11 | 8 | 3 | 0 | 1 | 53 |
| > 38 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 6 |
| Totals | 52 | 29 | 16 | 21 | 12 | 23 | 141 | 106 | 32 | 18 | 32 | 83 | 59 | 33 | 32 | 30 | 719 |

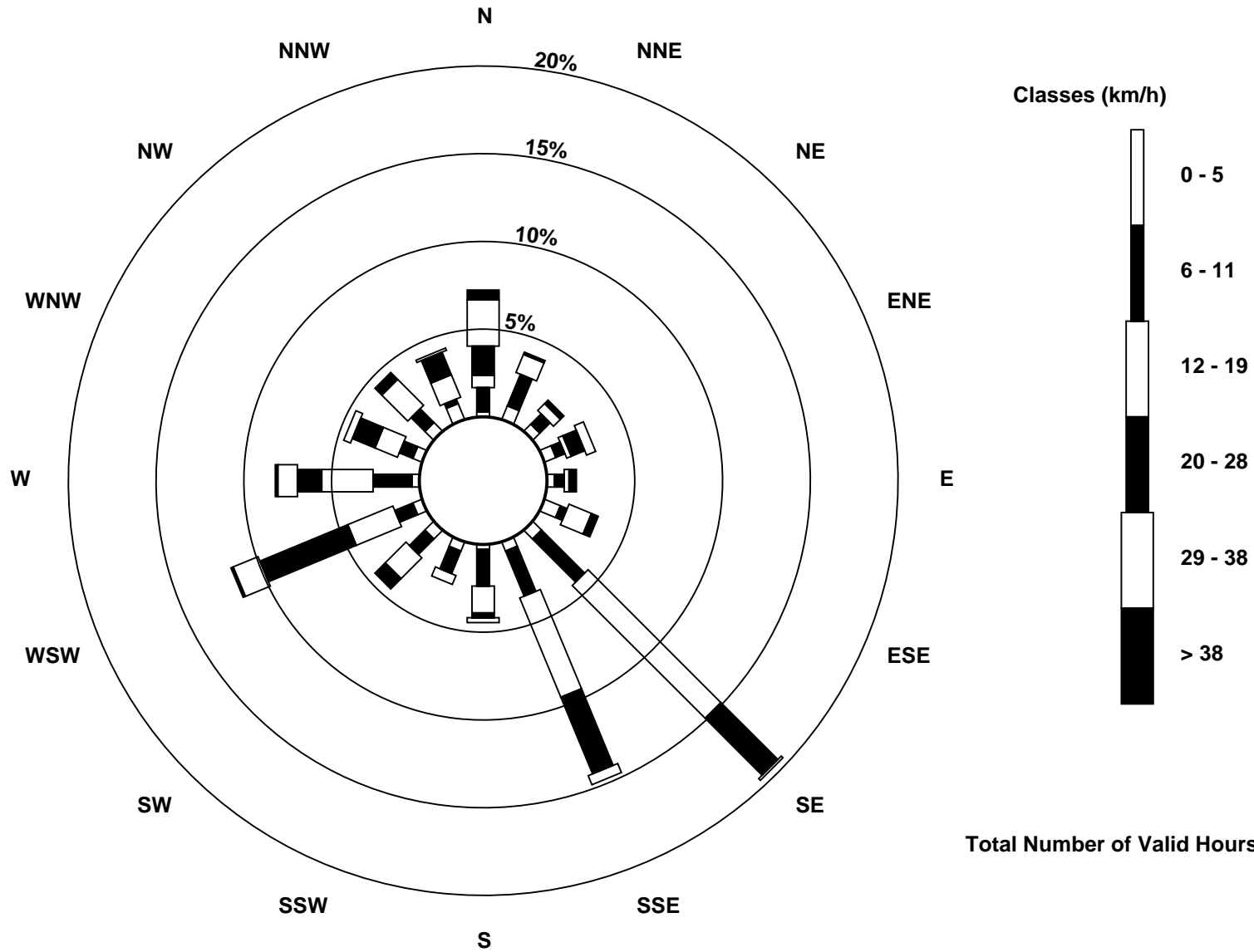
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 719



| | | |
|---|---|---------------------------------|
| Maximum Speed: 46 km/h on Sep 20 12:00 | Maximum Daily Speed Average: 38.2 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 6 08:00 | Minimum Daily Speed Average: 0.4 km/h on Sep 6 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 6.3 km/h at hour 7 | Minimum Diurnal Speed Average: 0.8 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 3.6 km/h 198.2 deg | Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 11 Median = 18 Q ₃ = 26 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-Sep | WSW28 | WSW27 | WSW24 | WSW24 | WSW26 | WSW30 | WSW28 | WSW28 | WSW23 | WSW21 | WSW23 | SW23 | SW26 | WSW28 | WSW31 | WSW34 | WSW35 | WSW34 | WSW33 | WSW30 | WSW28 | WSW29 | WSW29 | WSW33 | WSW28.1 | WSW35 |
| 2-Sep | WSW29 | WSW30 | W30 | W27 | W29 | W26 | WSW24 | WSW22 | W17 | W19 | W18 | W23 | W19 | WNW15 | W13 | WSW18 | WSW17 | WSW19 | WSW25 | WSW32 | WSW27 | WSW21 | W20 | W22 | WSW22.2 | WSW32 |
| 3-Sep | W21 | WSW21 | W20 | W19 | WSW26 | WSW17 | WSW12 | WSW14 | W22 | W28 | W31 | W30 | W34 | W30 | WNW29 | WNW30 | W31 | WNW32 | NNW39 | NNW26 | NW31 | NW28 | NW24 | NW21 | NNW23.0 | NNW39 |
| 4-Sep | WNW19 | W21 | W18 | W14 | WNW17 | W19 | W16 | W17 | WNW13 | WNW14 | NW16 | NW17 | W16 | W12 | W10 | W11 | WNW13 | W12 | WSW9 | SW9 | S11 | SSE19 | SSE16 | SE20 | W10.5 | W21 |
| 5-Sep | SE22 | SSE20 | SSE14 | SSE20 | SSE22 | SSE25 | SSE22 | SSE16 | SE6 | SE7 | SE12 | SE12 | SSW12 | SW18 | SW16 | WSW17 | WSW15 | WSW13 | SW8 | SSW13 | SSW15 | SSW14 | SW12 | W6 | S11.6 | SSE25 |
| 6-Sep | WNW8 | WSW12 | SW6 | WNW7 | WNW9 | NW5 | NW6 | NNE1 | SW2 | WNW5 | WNW6 | NNW3 | SSE1 | W4 | NNW2 | ENE3 | ENE6 | ENE5 | ENE2 | E3 | E9 | ESE9 | SE20 | SE26 | SE0.4 | SE26 |
| 7-Sep | SE25 | SE19 | SE22 | SSE25 | SSE30 | SSE29 | SSE29 | SSE24 | SSE23 | SSE18 | SSE21 | SSE21 | SSE23 | SSE30 | S33 | S34 | SSE32 | SSE32 | SSE30 | SSE31 | SSE31 | SSE29 | SSE26 | SSE23 | SSE26.1 | S34 |
| 8-Sep | S16 | S17 | SSE17 | SSE16 | S12 | SSE12 | SSE16 | S8 | W11 | W9 | NW14 | NNW18 | N21 | N13 | NNW18 | N16 | N17 | NW17 | NNW20 | NNW18 | NNW8 | WNW7 | WNW7 | NW7 | NW3.8 | N21 |
| 9-Sep | NW6 | NW9 | N3 | NNE4 | ESE4 | NE8 | E7 | NW5 | N5 | NNW3 | N5 | NW12 | NW13 | NNW13 | NNW18 | N17 | NW20 | NNW19 | NNW15 | NNE13 | N8 | WNW7 | W11 | WSW12 | NNW7.6 | NW20 |
| 10-Sep | SW9 | WSW11 | S9 | S11 | SW12 | SW17 | WSW27 | WSW29 | WSW29 | WSW34 | WSW37 | WSW38 | W40 | W43 | W43 | W24 | W30 | WSW41 | WSW32 | SW27 | SW29 | SW24 | SW31 | WSW31 | WSW26.4 | W43 |
| 11-Sep | W27 | WSW28 | WSW23 | WSW13 | SSW6 | SSW11 | SSW11 | SSE11 | SE10 | SSE14 | SSE11 | SE11 | SE10 | E6 | SE7 | SE16 | SE20 | SSE16 | SSE27 | S20 | NW18 | SW13 | WSW16 | WSW22 | SSW8.8 | WSW28 |
| 12-Sep | WSW27 | WSW35 | W41 | W31 | WSW23 | WSW28 | WSW30 | WSW28 | W27 | W28 | W31 | WNW26 | W24 | W24 | W22 | W23 | NW21 | NNW13 | NNE17 | NNE20 | NNE19 | NE14 | NE9 | NNE8 | W17.0 | W41 |
| 13-Sep | NNE11 | NNE16 | NNE7 | NNW5 | N6 | NNE7 | NE8 | NE7 | NE5 | ESE2 | SE2 | S5 | S3 | ENE3 | ENE8 | N8 | NNE4 | NE8 | NE7 | NNE5 | ENE3 | ENE3 | NNW3 | NNE6 | NNE4.6 | NNE16 |
| 14-Sep | NNE9 | NNE6 | ENE4 | ENE4 | NE5 | NE4 | NNE6 | NE7 | N4 | NNE8 | NNE10 | NNW9 | NW9 | WNW12 | NW12 | NNE9 | NNE12 | NNE11 | NNE13 | NNE18 | NNE21 | NE14 | ENE12 | E9 | NNE7.7 | NNE21 |
| 15-Sep | ESE3 | ESE5 | SSE9 | SSE11 | SE13 | SE19 | SSE15 | SSE10 | SSE6 | SSE4 | SE6 | SE6 | ESE5 | ESE8 | SE7 | SSW11 | SSW15 | S15 | S16 | S18 | S19 | S24 | S25 | S20 | SSE11.0 | S25 |
| 16-Sep | SSE25 | SSE25 | SSE28 | SSE25 | SSE26 | SSE28 | SSE28 | SE25 | SSE15 | SSE14 | SSE20 | SSE29 | SSE31 | SSE28 | SSE30 | SSE26 | SSE23 | SSE26 | SSE26 | SSE25 | SSE25 | SSE26 | SSE28 | SSE28 | SSE25.2 | SSE31 |
| 17-Sep | SSE29 | SSE29 | SSE29 | SE29 | SE26 | SE26 | SE27 | SE26 | SE21 | SE23 | SE22 | SE24 | SSE33 | SSE29 | SE29 | SE26 | SSE26 | SE25 | SE24 | SE27 | SE29 | SE31 | SE29 | SE27 | SE26.6 | SSE33 |
| 18-Sep | SE28 | SE28 | SE21 | SE21 | SE23 | SE21 | SE25 | SE27 | SE16 | SE18 | SE23 | SE31 | SE27 | ESE17 | ESE16 | ESE14 | ESE15 | ESE13 | ESE11 | E12 | E11 | E12 | ESE8 | E15 | ESE18.3 | SE31 |
| 19-Sep | E18 | E24 | E26 | ENE27 | NE11 | NNE13 | NNE13 | ENE17 | ENE18 | NE15 | ENE15 | NE16 | ENE18 | ENE23 | NE26 | ENE36 | ENE33 | ENE29 | ENE31 | ENE33 | ENE35 | ENE33 | ENE33 | NE25 | ENE23.0 | ENE36 |
| 20-Sep | NNE25 | NNE27 | N29 | N31 | N37 | N36 | N37 | N42 | N45 | N43 | N44 | N46 | N45 | N44 | N42 | N41 | N40 | N40 | N43 | N39 | N40 | N35 | N31 | N36 | N38.2 | N46 |
| 21-Sep | N38 | N37 | N38 | N44 | N29 | N26 | N28 | N27 | N29 | N25 | NNW27 | N24 | NNW27 | N26 | NNW28 | NNW30 | NNW32 | NNW28 | NNW25 | NNW22 | NNW19 | NNW17 | NW13 | NW12 | N26.5 | N44 |
| 22-Sep | WNW5 | WNW6 | NW5 | WNW7 | NW5 | NW2 | WSW4 | WSW7 | SSW8 | SSW6 | S8 | SSW7 | W4 | NNE7 | ESE3 | S7 | SSE8 | S8 | SE6 | SSE12 | SSE16 | SSE15 | SSE12 | SSE6 | S3.8 | SSE16 |
| 23-Sep | SE11 | S7 | S7 | SSE12 | SE11 | SE18 | SE15 | SE12 | SE9 | SSE8 | SE11 | SSE12 | SSE13 | S11 | SSE11 | S9 | SE13 | SE16 | SE20 | SE21 | SE24 | SSE25 | SE22 | SSE21 | SSE13.8 | SSE25 |
| 24-Sep | SE22 | SE24 | SE22 | SE19 | SE17 | SE14 | SE18 | SE17 | SE11 | SSE10 | SE9 | SE11 | SE13 | SE13 | SE15 | SSE15 | SE16 | SE18 | SE20 | SE27 | SSE27 | SSE26 | SE25 | SE22 | SE17.8 | SSE27 |
| 25-Sep | SE22 | SE21 | SE20 | SE19 | SE18 | SE20 | SE19 | SE17 | SSE16 | SSE15 | SSE12 | SSE9 | ENE5 | NE6 | WNW7 | WNW13 | WNW6 | SW8 | SW9 | SW23 | SW25 | SW20 | SW16 | SW13 | S9.4 | SW25 |
| 26-Sep | SW12 | SW11 | WSW11 | W16 | W18 | W20 | W21 | WSW18 | WSW10 | W10 | W15 | W16 | WNW21 | WNW25 | WNW24 | WNW24 | WNW22 | WNW20 | NNW15 | NW14 | WNW10 | W13 | WNW6 | SSW6 | W14.3 | WNW25 |
| 27-Sep | S8 | S8 | WSW5 | SSE2 | SSE11 | S7 | SSE11 | SW5 | WNW2 | NNW5 | NNW5 | N8 | NW8 | WNW12 | NW12 | WNW12 | NNW15 | N23 | NNE25 | NNE24 | NNE21 | NNE12 | N10 | NNE10 | N5.2 | NNE25 |
| 28-Sep | ENE6 | SE6 | ESE6 | SE11 | SE17 | SE18 | SE17 | SE16 | SE12 | SE16 | SSE19 | SE21 | SE20 | SSE22 | S27 | S29 | SSE31 | SSE27 | SSE31 | SSE32 | SSE29 | SSE28 | SE24 | SE25 | SSE19.6 | SSE32 |
| 29-Sep | SE25 | SE28 | SE30 | SE32 | SE30 | SE23 | SE17 | ESE15 | SE16 | SE14 | SE19 | SSE20 | SE20 | SSE17 | S12 | SW6 | NW9 | NW9 | WSW1 | SSW13 | WSW11 | S9 | SSE18 | SSE21 | SE14.2 | SE32 |
| 30-Sep | SSE24 | SSE21 | SE20 | SE21 | SSE17 | SE20 | SE25 | SSE18 | SSE10 | S4 | SE9 | SE13 | SE12 | S4 | WSW17 | SW18 | WSW23 | WSW20 | W23 | WNW28 | WNW30 | WNW31 | WNW39 | WNW31 | SW8.5 | WNW39 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|--------|------|------|------|------|--------|-------|-------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|------|-------|------|-----------------|--|
| S5.3 | S5.7 | S5.4 | SSE5.1 | S5.4 | S6.0 | S6.3 | S5.0 | SSW2.7 | SW3.0 | SW2.7 | SSW2.7 | SW3.7 | WSW3.8 | WSW4.4 | WSW4.0 | WSW3.8 | WSW3.1 | WSW0.8 | SSW2.3 | SSW2.3 | S5.2 | S5.0 | S4.8 | Diurnal Average | |
| N38 | N37 | W41 | N44 | N37 | N36 | N37 | N42 | N45 | N43 | N44 | N46 | N45 | N44 | W43 | N41 | N40 | WSW41 | N43 | N39 | N40 | N35 | WNW39 | N36 | 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 75 m (WS75m) - km/h

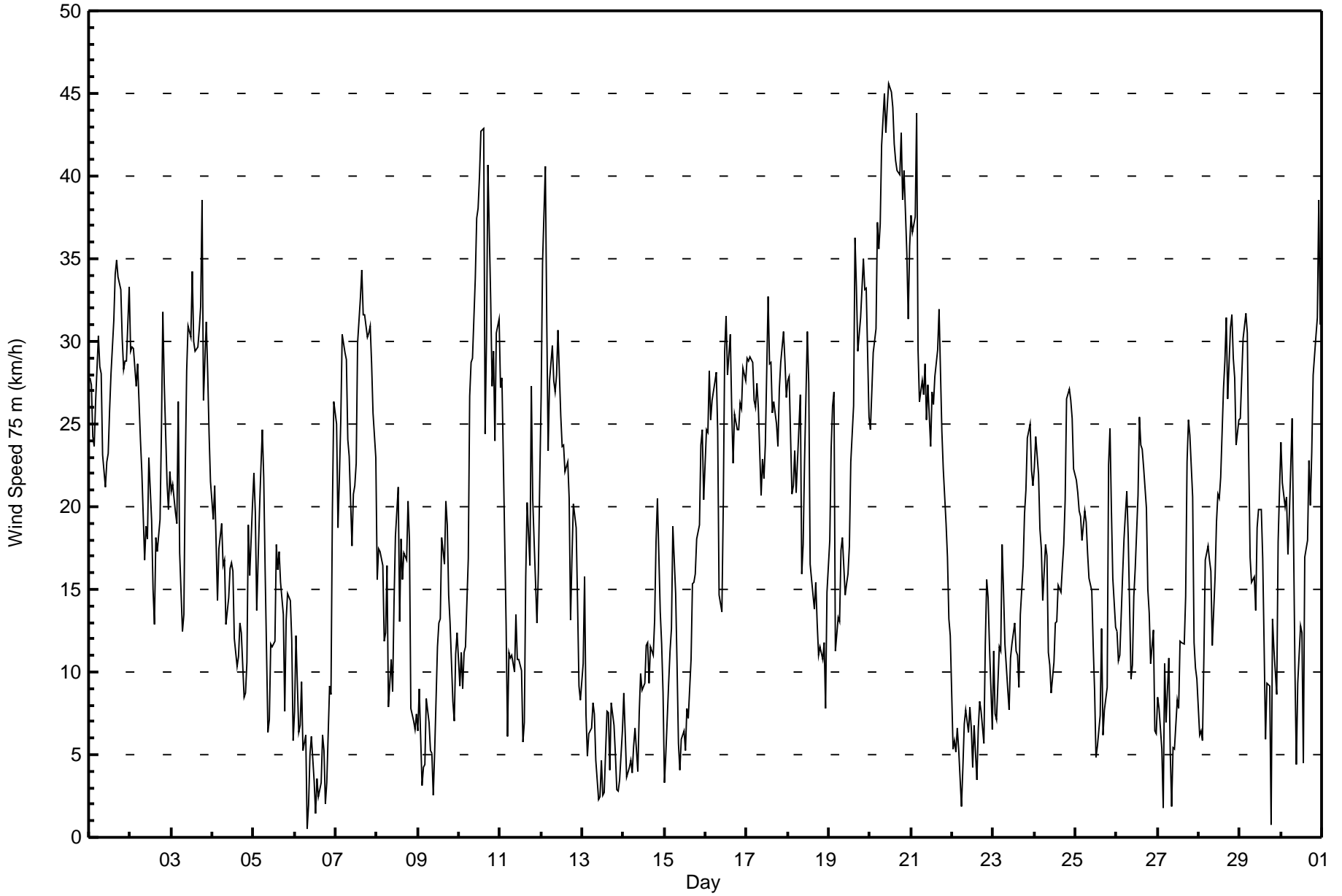
Mannix - September 2017

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



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 57 | 7.92 | 7.92 |
| 6 - 11 | 143 | 19.86 | 27.78 |
| 12 - 19 | 194 | 26.94 | 54.72 |
| 20 - 28 | 206 | 28.61 | 83.33 |
| 29 - 38 | 98 | 13.61 | 96.94 |
| > 38 | 22 | 3.06 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 4 | 4 | 2 | 10 | 1 | 6 | 1 | 3 | 4 | 0 | 2 | 3 | 1 | 4 | 4 | 8 | 57 |
| 6 - 11 | 5 | 14 | 9 | 3 | 5 | 6 | 19 | 16 | 14 | 8 | 8 | 6 | 7 | 14 | 7 | 2 | 143 |
| 12 - 19 | 4 | 10 | 4 | 5 | 4 | 6 | 38 | 31 | 8 | 6 | 10 | 15 | 19 | 10 | 12 | 12 | 194 |
| 20 - 28 | 7 | 7 | 2 | 2 | 2 | 0 | 55 | 48 | 4 | 0 | 7 | 29 | 21 | 8 | 5 | 9 | 206 |
| 29 - 38 | 13 | 0 | 0 | 8 | 0 | 0 | 9 | 22 | 3 | 0 | 1 | 23 | 10 | 6 | 1 | 2 | 98 |
| > 38 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 1 | 22 |
| Totals | 48 | 35 | 17 | 28 | 12 | 18 | 122 | 120 | 33 | 14 | 28 | 77 | 62 | 43 | 29 | 34 | 720 |

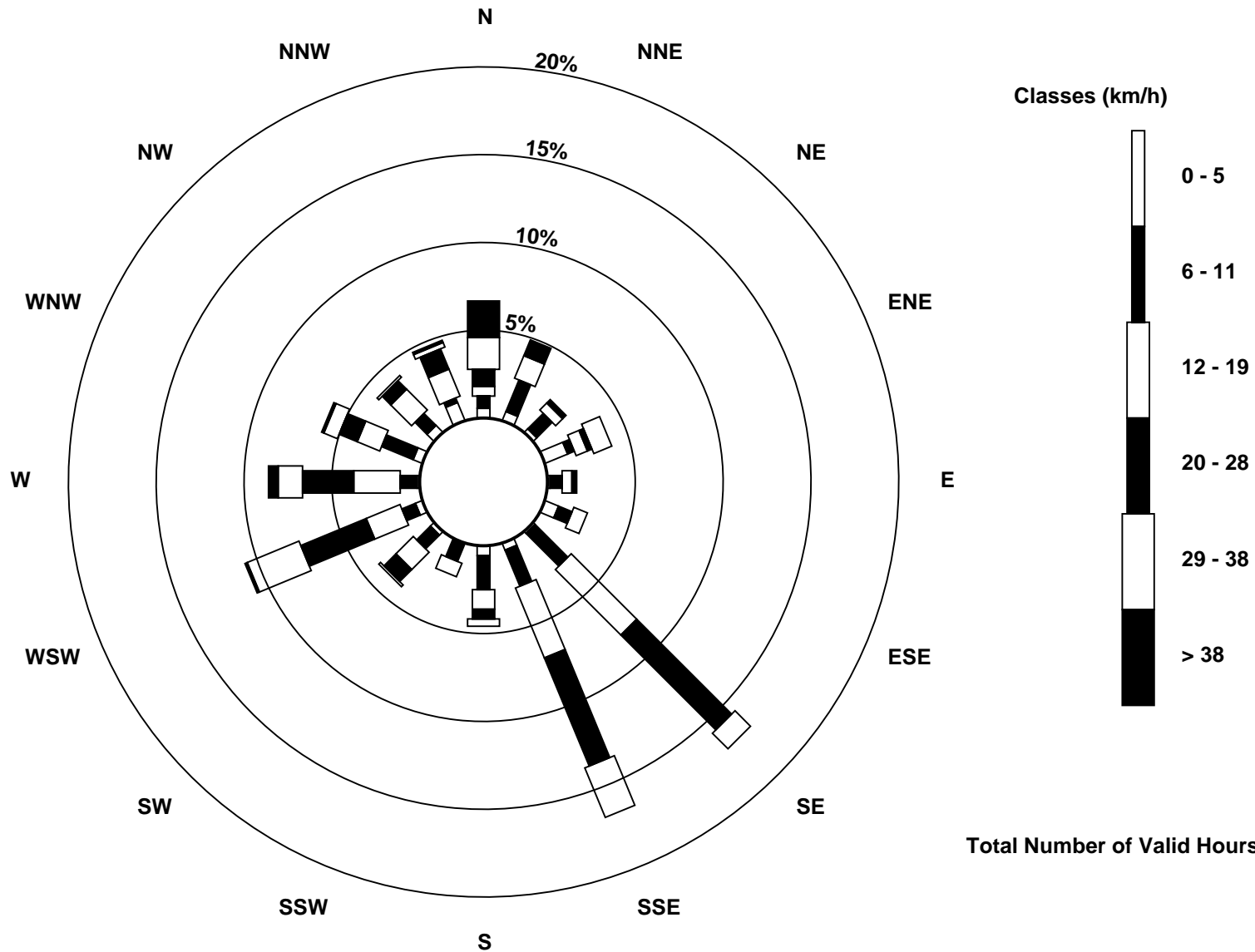
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





| | | |
|---|---|---------------------------------|
| Maximum Speed: 47 km/h on Sep 20 09:00 | Maximum Daily Speed Average: 39.7 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 6 08:00 | Minimum Daily Speed Average: 0.7 km/h on Sep 6 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 6.6 km/h at hour 7 | Minimum Diurnal Speed Average: 1.1 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 4.0 km/h 205.1 deg | Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 11 Median = 19 Q ₃ = 28 P ₉₀ = 33 P ₉₉ = 45 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | W31 | WSW30 | WSW27 | WSW26 | WSW29 | WSW32 | WSW31 | WSW30 | WSW24 | WSW22 | WSW24 | SW24 | SW26 | WSW29 | WSW33 | W35 | WSW36 | WSW35 | WSW35 | WSW33 | WSW32 | WSW33 | WSW33 | WSW36 | WSW30.0 | WSW36 |
| 2-Sep | WSW32 | WSW32 | W32 | W30 | W32 | W29 | W27 | WSW24 | W18 | W19 | W19 | W24 | W20 | WNW15 | W13 | WSW19 | WSW18 | WSW20 | WSW26 | WSW34 | WSW30 | WSW23 | W22 | W24 | W24.0 | WSW34 |
| 3-Sep | W23 | W24 | W22 | W21 | W28 | W19 | WSW14 | WSW15 | W23 | W29 | W32 | W31 | W36 | W31 | WNW31 | WNW31 | W32 | WNW34 | NNW41 | NNW28 | NW34 | NW31 | NW27 | NW24 | WNW24.7 | NNW41 |
| 4-Sep | NW21 | WNW23 | WNW21 | W16 | WNW20 | W22 | W21 | WNW19 | WNW14 | WNW15 | NW17 | NW17 | W17 | W13 | W11 | W11 | WNW13 | W13 | WSW9 | SW9 | SSW10 | S19 | S17 | SSE20 | W11.7 | WNW23 |
| 5-Sep | SSE22 | S18 | S11 | SSE17 | SSE19 | SSE23 | SSE22 | S17 | SSE7 | SE7 | SE13 | SE12 | SSW13 | SW18 | SW17 | WSW18 | WSW16 | WSW15 | SW9 | SSW13 | SSW15 | SW16 | SW13 | W9 | SSW12.0 | SSE23 |
| 6-Sep | WNW10 | WSW15 | WSW9 | WNW9 | NW9 | NW6 | NNW6 | NNW1 | SW2 | WNW5 | WNW6 | NNW3 | SSE2 | WNW4 | NNW2 | ENE3 | ENE6 | ENE5 | ENE2 | E4 | E12 | ESE15 | SE22 | SE28 | SE0.7 | SE28 |
| 7-Sep | SE28 | SE21 | SE24 | SSE28 | SSE31 | SSE29 | SSE31 | SSE27 | SSE25 | SSE19 | SSE21 | SSE22 | SSE23 | S30 | S33 | S35 | SSE32 | S32 | SSE32 | SSE32 | S33 | S31 | S28 | S25 | SSE27.4 | S35 |
| 8-Sep | SSW18 | S18 | S16 | S13 | SSW11 | SSE10 | SSE13 | SSW5 | W14 | W12 | NW15 | NNW19 | N22 | N14 | NNW19 | NNE16 | N18 | NW18 | NNW22 | NNW19 | NNW8 | NW6 | WNW5 | NW7 | NNW5.4 | N22 |
| 9-Sep | NW6 | NW10 | NNW4 | NNE4 | SE5 | NE8 | E9 | NW3 | N5 | NNW2 | N5 | NW12 | NNW13 | NNW13 | NNW19 | N17 | NW21 | NNW20 | NNW16 | NNE14 | NNE9 | WNW7 | W11 | WSW13 | NNW7.7 | NW21 |
| 10-Sep | WSW11 | WSW12 | S9 | SSW12 | SW13 | WSW19 | WSW29 | WSW30 | WSW31 | WSW35 | W39 | WSW39 | W42 | W44 | W45 | W26 | W32 | WSW42 | WSW34 | WSW30 | WSW33 | WSW27 | WSW34 | WSW34 | WSW28.3 | W45 |
| 11-Sep | W30 | WSW31 | WSW26 | WSW16 | SW7 | SSW11 | SW11 | S9 | SSE9 | SSE13 | SSE11 | SE11 | SE11 | ESE7 | SE8 | SE17 | SSE21 | SSE18 | SSE29 | S23 | NW20 | WSW15 | WSW18 | WSW25 | SSW9.8 | WSW31 |
| 12-Sep | WSW30 | WSW37 | W43 | W33 | WSW25 | WSW29 | WSW31 | WSW29 | W29 | W30 | WNW32 | WNW27 | W25 | W25 | W23 | W24 | NW22 | NNW14 | NNE18 | NNE21 | NNE19 | NE14 | NE9 | NE9 | W18.2 | W43 |
| 13-Sep | NNE11 | NNE16 | NNE8 | NNW5 | N6 | NNE7 | NE8 | NE7 | ENE5 | SE2 | SE3 | SSW5 | S3 | ENE3 | ENE8 | N7 | NNE4 | NE8 | NE7 | NE6 | ENE4 | E3 | N4 | NNE7 | NE4.7 | NNE16 |
| 14-Sep | NNE8 | NNE6 | ENE5 | ENE5 | NE5 | NE4 | NNE6 | NE8 | NNE4 | NNE7 | NNE10 | NNW9 | NW10 | NW12 | NW12 | NNE9 | NNE12 | NNE11 | NNE13 | NNE18 | NNE22 | NE15 | ENE13 | E12 | NNE8.1 | NNE22 |
| 15-Sep | ESE5 | SE6 | SSE9 | SSE11 | SE12 | SSE20 | SSE17 | SSE12 | S6 | S4 | SSE6 | SE7 | ESE6 | SE8 | SE8 | SSW11 | SSW16 | SSW16 | S16 | S19 | SSW19 | S24 | SSW27 | SSW22 | S11.5 | SSW27 |
| 16-Sep | S24 | S24 | SSE30 | SSE27 | SSE31 | SSE30 | SSE29 | SSE26 | SSE16 | SSE14 | SSE20 | SSE30 | S31 | S28 | S31 | SSE26 | SSE23 | SSE26 | SSE26 | SSE27 | SSE29 | SSE29 | SSE30 | SSE29 | SSE26.3 | S31 |
| 17-Sep | SSE30 | SSE30 | SSE30 | SSE30 | SE28 | SE28 | SE30 | SE29 | SSE22 | SSE24 | SE23 | SSE24 | SSE33 | SSE29 | SE29 | SSE26 | SSE27 | SE26 | SE25 | SE29 | SE31 | SE33 | SE31 | SE29 | SSE28.0 | SE33 |
| 18-Sep | SE30 | SE30 | SE24 | SE24 | SE26 | ESE23 | SE27 | SE30 | SE20 | SE21 | SE24 | SE32 | SE29 | ESE20 | ESE20 | ESE19 | ESE20 | ESE17 | ESE16 | ESE19 | E15 | E16 | ESE11 | E20 | ESE21.8 | SE32 |
| 19-Sep | E27 | E30 | E33 | E30 | NE12 | NE14 | NE14 | ENE19 | ENE20 | ENE15 | ENE16 | NE16 | ENE19 | ENE25 | NE27 | ENE37 | ENE34 | ENE31 | ENE33 | ENE34 | ENE36 | ENE35 | ENE35 | NE26 | ENE24.9 | ENE37 |
| 20-Sep | NNE26 | NNE28 | N31 | N32 | N39 | N37 | N39 | N44 | N47 | N44 | NNE46 | NNE47 | NNE47 | NNE46 | N44 | N42 | N42 | N42 | N44 | N40 | N42 | NNE37 | N33 | N37 | N39.7 | N47 |
| 21-Sep | N39 | N37 | N39 | N46 | N31 | N28 | N29 | N28 | N29 | N26 | NNW29 | N24 | NNW29 | N28 | N30 | NNW31 | NNW34 | NNW30 | NNW26 | NNW24 | NNW21 | NNW19 | NNW14 | NW13 | N28.0 | N46 |
| 22-Sep | NW6 | WNW5 | NW5 | NW6 | NNW5 | NNW2 | WSW3 | WSW7 | SW8 | SSW6 | S8 | SSW7 | W5 | NNE6 | SE4 | S7 | SSE9 | S8 | SE6 | SSE12 | SSE16 | SSE16 | SSE13 | SSE8 | S3.9 | SSE16 |
| 23-Sep | SSE13 | S9 | S8 | SSE12 | SE12 | SE19 | SE16 | SE13 | SSE9 | SSE8 | SSE11 | SSE12 | S13 | S12 | SSE11 | S10 | SSE14 | SE17 | SE21 | SE23 | SSE27 | SSE28 | SSE25 | SSE24 | SSE15.0 | SSE28 |
| 24-Sep | SSE24 | SSE25 | SE23 | SE23 | SE21 | SE18 | SE20 | SE18 | SE13 | SSE11 | SE9 | SE11 | SSE14 | SE16 | SSE15 | SE17 | SE19 | SE22 | SSE29 | SSE28 | SSE28 | SSE28 | SSE28 | SSE25 | SE19.3 | SSE29 |
| 25-Sep | SE24 | SE22 | SE21 | SE21 | SE19 | SE22 | SSE21 | SSE19 | SSE17 | SSE15 | SSE12 | SSE10 | E5 | NE5 | WNW8 | WNW13 | WNW7 | WSW9 | SW10 | SW25 | SW28 | SW23 | SW18 | SW15 | S10.3 | SW28 |
| 26-Sep | SW14 | SW12 | WSW13 | W18 | W22 | W22 | W24 | WSW21 | WSW12 | W11 | W15 | WNW17 | WNW22 | WNW27 | WNW25 | WNW25 | WNW24 | WNW21 | NNW16 | NW15 | WNW11 | W11 | NW6 | SSW5 | W15.7 | WNW27 |
| 27-Sep | SSW7 | SSW10 | WSW8 | SW2 | S7 | SSW5 | S7 | WSW5 | NW2 | NNW6 | NNW5 | N8 | NW8 | WNW12 | NW12 | NW12 | NNW15 | N24 | NNE27 | NNE26 | NNE22 | NNE13 | NNE9 | NE9 | NNW5.9 | NNE27 |
| 28-Sep | E8 | SE9 | ESE8 | ESE13 | SE18 | SE19 | SE19 | SE19 | SE14 | SE17 | SSE19 | SSE21 | SSE21 | SSE22 | S27 | S29 | S32 | SSE27 | SSE33 | SSE34 | SSE32 | SSE31 | SE26 | SSE28 | SSE21.0 | SSE34 |
| 29-Sep | SE28 | SE31 | SE33 | SE35 | SE33 | SE26 | SE21 | ESE20 | SE18 | SE15 | SSE19 | SSE20 | SSE20 | SSE17 | S12 | SW6 | NW9 | NW9 | WSW1 | SSW13 | WSW12 | S9 | SSE17 | SSE22 | SSE15.5 | SE35 |
| 30-Sep | SSE25 | SSE19 | SSE20 | SSE23 | SSE20 | SSE22 | SSE27 | SSE22 | S11 | S5 | SE10 | SE13 | SE13 | S6 | WSW18 | SW19 | WSW24 | WSW22 | WNW26 | WNW31 | WNW33 | WNW34 | WNW41 | WNW33 | SW9.8 | WNW41 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|--------|------|------|------|------|------|------|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|-----------------|
| S6.1 | SSW6.4 | S5.9 | S5.5 | S5.6 | S6.2 | S6.6 | S5.4 | SSW3.3 | SW3.5 | SW3.1 | SW3.1 | SW4.1 | WSW4.0 | WSW4.7 | WSW4.3 | WSW4.0 | WSW3.5 | WSW1.1 | SSW2.7 | SSW2.8 | S5.8 | SSW5.7 | SSW5.5 | Diurnal Average |
| N39 | N37 | W43 | N46 | N39 | N37 | N39 | N44 | N47 | N44 | NNE46 | NNE47 | NNE47 | NNE46 | W45 | N42 | N42 | WSW42 | N44 | N40 | N42 | NNE37 | WNW41 | N37 | Diurnal Maximum |

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

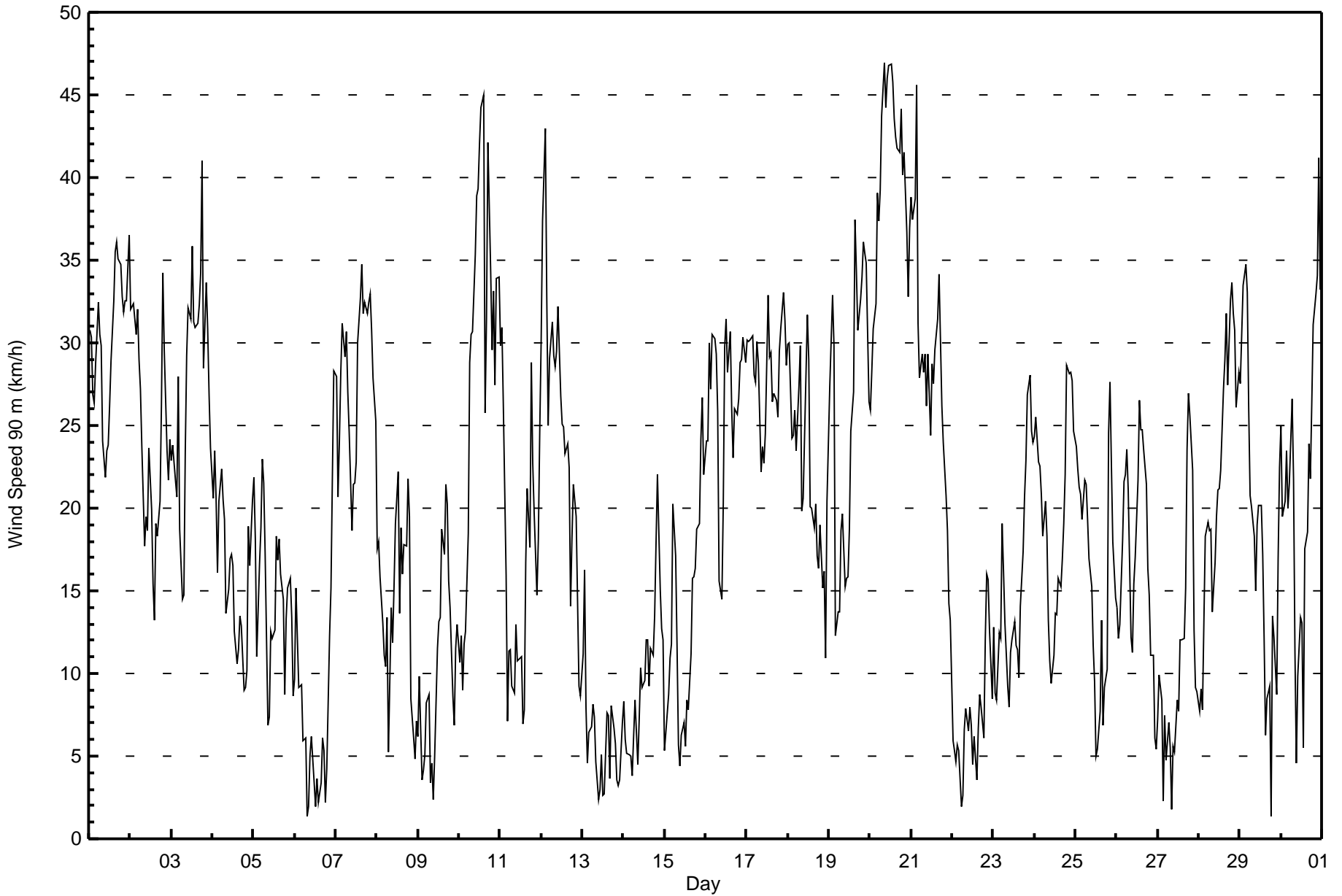
Wind Speed 90 m (WS90m) - km/h

Mannix - September 2017

| | | | | |
|--------------------------------|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: | 12 km/h on Sep 11 21:00 | | Hours of Data: | 720 |
| Minimum Value: | 1 km/h on Sep 22 06:00 | | Hours of Missing Data: | 0 |
| Percentiles: | P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 8 | | 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-Sep | 3 | 3 | 3 | 4 | 5 | 6 | 5 | 5 | 4 | 4 | 3 | 4 | 4 | 6 | 5 | 5 | 6 | 6 | 6 | 3 | 3 | 2 | 3 | 3 | 6 |
| 2-Sep | 4 | 4 | 4 | 3 | 2 | 4 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 4 | 3 | 3 | 4 | 7 | 4 | 3 | 3 | 2 | 7 |
| 3-Sep | 2 | 2 | 3 | 4 | 4 | 2 | 2 | 3 | 6 | 4 | 4 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 10 | 5 | 6 | 4 | 3 | 4 | 10 |
| 4-Sep | 2 | 2 | 4 | 2 | 1 | 1 | 2 | 4 | 3 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 5 |
| 5-Sep | 3 | 5 | 2 | 2 | 2 | 2 | 2 | 4 | 2 | 2 | 3 | 3 | 5 | 4 | 4 | 4 | 3 | 3 | 1 | 2 | 1 | 2 | 4 | 3 | 5 |
| 6-Sep | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 3 | 4 | 5 | 3 | 5 |
| 7-Sep | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 4 | 2 | 3 | 4 | 6 | 5 | 7 | 5 | 6 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 7 |
| 8-Sep | 3 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 2 | 2 | 1 | 5 |
| 9-Sep | 1 | 2 | 2 | 2 | 1 | 1 | 4 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 1 | 1 | 4 |
| 10-Sep | 2 | 5 | 3 | 2 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 7 | 7 | 8 | 8 | 9 | 10 | 6 | 5 | 5 | 3 | 3 | 3 | 4 | 10 |
| 11-Sep | 3 | 2 | 2 | 7 | 3 | 3 | 3 | 2 | 1 | 3 | 2 | 2 | 3 | 3 | 4 | 5 | 3 | 5 | 2 | 10 | 12 | 5 | 3 | 4 | 12 |
| 12-Sep | 3 | 5 | 7 | 6 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 3 | 5 | 5 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 7 |
| 13-Sep | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 4 | 1 | 3 | 1 | 1 | 2 | 1 | 4 |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 4 | 2 | 3 | 2 | 2 | 2 | 4 |
| 15-Sep | 2 | 2 | 1 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 5 | 4 | 4 | 2 | 2 | 1 | 2 | 2 | 2 | 5 |
| 16-Sep | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 3 | 3 | 3 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 6 |
| 17-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 4 | 4 | 4 | 6 | 7 | 5 | 5 | 5 | 4 | 5 | 3 | 4 | 4 | 3 | 3 | 3 | 7 |
| 18-Sep | 4 | 3 | 4 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 7 | 7 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 8 | 8 |
| 19-Sep | 4 | 5 | 4 | 6 | 6 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 6 | 5 | 7 | 8 | 6 | 5 | 5 | 5 | 6 | 7 | 6 | 5 | 8 |
| 20-Sep | 3 | 3 | 4 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 5 | 7 |
| 21-Sep | 6 | 8 | 8 | 6 | 6 | 5 | 5 | 5 | 6 | 5 | 6 | 5 | 5 | 6 | 6 | 6 | 5 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 8 |
| 22-Sep | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3 |
| 23-Sep | 4 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 2 | 2 | 6 | 2 | 2 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 6 |
| 24-Sep | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 4 |
| 25-Sep | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 8 | 4 | 2 | 2 | 3 | 4 | 3 | 5 | 2 | 2 | 8 |
| 26-Sep | 1 | 1 | 2 | 5 | 3 | 2 | 4 | 2 | 2 | 3 | 2 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 5 |
| 27-Sep | 2 | 2 | 3 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 4 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 1 | 1 | 4 |
| 28-Sep | 2 | 3 | 3 | 4 | 1 | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 3 | 3 | 2 | 2 | 5 |
| 29-Sep | 2 | 2 | 2 | 2 | 2 | 5 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 2 | 2 | 1 | 1 | 4 | 1 | 5 |
| 30-Sep | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 6 | 2 | 3 | 2 | 2 | 2 | 5 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 6 | 6 | 6 |

Diurnal Maximum





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 55 | 7.64 | 7.64 |
| 6 - 11 | 129 | 17.92 | 25.56 |
| 12 - 19 | 182 | 25.28 | 50.83 |
| 20 - 28 | 184 | 25.56 | 76.39 |
| 29 - 38 | 142 | 19.72 | 96.11 |
| > 38 | 28 | 3.89 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 3 | 3 | 3 | 8 | 3 | 1 | 4 | 1 | 3 | 4 | 2 | 3 | 1 | 4 | 3 | 9 | 55 |
| 6 - 11 | 3 | 14 | 10 | 2 | 2 | 4 | 13 | 15 | 15 | 8 | 7 | 6 | 5 | 8 | 13 | 4 | 129 |
| 12 - 19 | 3 | 9 | 6 | 5 | 4 | 6 | 26 | 30 | 12 | 9 | 10 | 18 | 13 | 8 | 11 | 12 | 182 |
| 20 - 28 | 7 | 7 | 2 | 2 | 2 | 5 | 33 | 51 | 8 | 2 | 5 | 17 | 20 | 11 | 6 | 6 | 184 |
| 29 - 38 | 10 | 1 | 0 | 8 | 3 | 0 | 17 | 27 | 10 | 0 | 0 | 34 | 17 | 8 | 2 | 5 | 142 |
| > 38 | 15 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 1 | 0 | 1 | 28 |
| Totals | 41 | 38 | 21 | 25 | 14 | 16 | 93 | 124 | 48 | 23 | 24 | 80 | 61 | 40 | 35 | 37 | 720 |

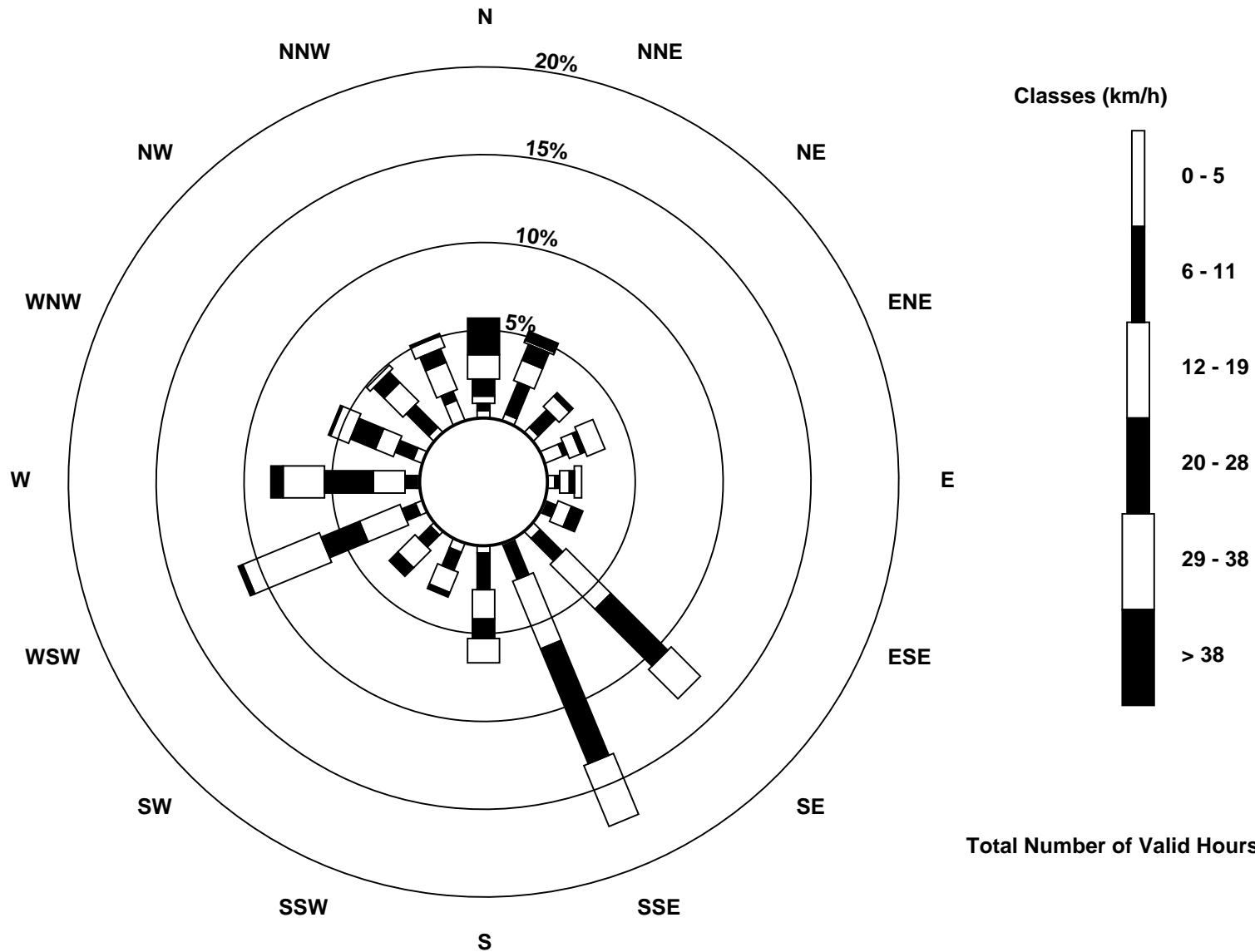
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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 - September 2017

| | | |
|--|--|---------------------------------|
| Direction of Maximum Speed: 264 deg on Sep 10 14:00 | | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 11.0 deg on Sep 20 | | Hours of Data: 720 |
| Direction of Minimum Speed: 333 deg on Sep 9 03:00 | Direction of Minimum Daily Speed Average: 1.6 deg on Sep 8 | Hours of Missing Data: 0 |
| Monthly Average Direction: 232.3 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-Sep | 263 | 255 | 243 | 240 | 250 | 253 | 254 | 258 | 255 | 248 | 244 | 237 | 239 | 251 | 255 | 260 | 256 | 251 | 251 | 253 | 249 | 240 | 247 | 250 | 251.1 |
| 2-Sep | 261 | 259 | 263 | 261 | 254 | 253 | 255 | 256 | 271 | 270 | 265 | 264 | 273 | 288 | 276 | 261 | 244 | 240 | 242 | 244 | 247 | 250 | 269 | 262 | 259.2 |
| 3-Sep | 261 | 262 | 265 | 257 | 258 | 248 | 217 | 256 | 264 | 264 | 270 | 273 | 276 | 278 | 294 | 291 | 281 | 292 | 334 | 328 | 321 | 323 | 318 | 315 | 282.6 |
| 4-Sep | 286 | 270 | 256 | 247 | 258 | 256 | 262 | 272 | 287 | 295 | 310 | 317 | 281 | 275 | 277 | 280 | 290 | 266 | 239 | 215 | 186 | 164 | 129 | 140 | 266.8 |
| 5-Sep | 139 | 150 | 144 | 140 | 144 | 149 | 145 | 149 | 131 | 131 | 135 | 137 | 216 | 234 | 233 | 240 | 246 | 259 | 218 | 189 | 180 | 168 | 155 | 120 | 175.7 |
| 6-Sep | 123 | 208 | 164 | 149 | 147 | 245 | 228 | 227 | 246 | 259 | 273 | 341 | 133 | 283 | 350 | 101 | 81 | 67 | 185 | 128 | 85 | 134 | 137 | 144 | 151.7 |
| 7-Sep | 147 | 146 | 142 | 144 | 143 | 142 | 148 | 153 | 154 | 143 | 147 | 154 | 164 | 173 | 178 | 175 | 170 | 171 | 164 | 168 | 164 | 161 | 158 | 155 | 159.4 |
| 8-Sep | 158 | 144 | 146 | 152 | 153 | 146 | 148 | 167 | 253 | 242 | 310 | 333 | 360 | 8 | 339 | 15 | 6 | 321 | 333 | 333 | 314 | 275 | 272 | 302 | 334.6 |
| 9-Sep | 271 | 285 | 333 | 11 | 136 | 42 | 79 | 280 | 355 | 328 | 342 | 319 | 326 | 329 | 340 | 0 | 310 | 336 | 324 | 26 | 7 | 277 | 269 | 252 | 324.4 |
| 10-Sep | 230 | 234 | 170 | 181 | 204 | 228 | 253 | 250 | 248 | 255 | 260 | 260 | 265 | 264 | 268 | 276 | 268 | 254 | 252 | 238 | 234 | 230 | 236 | 254 | 253.6 |
| 11-Sep | 272 | 262 | 257 | 235 | 153 | 163 | 160 | 149 | 144 | 147 | 145 | 147 | 140 | 102 | 130 | 148 | 149 | 152 | 153 | 189 | 330 | 215 | 230 | 252 | 182.6 |
| 12-Sep | 244 | 258 | 264 | 265 | 250 | 241 | 245 | 254 | 263 | 272 | 281 | 286 | 279 | 275 | 274 | 280 | 328 | 331 | 15 | 26 | 34 | 53 | 49 | 30 | 277.0 |
| 13-Sep | 24 | 26 | 10 | 316 | 2 | 37 | 42 | 60 | 71 | 114 | 133 | 195 | 193 | 81 | 79 | 3 | 31 | 48 | 34 | 349 | 134 | 165 | 309 | 1 | 35.1 |
| 14-Sep | 357 | 297 | 163 | 72 | 37 | 358 | 335 | 260 | 271 | 23 | 20 | 327 | 308 | 293 | 322 | 27 | 29 | 25 | 23 | 24 | 24 | 45 | 81 | 77 | 11.5 |
| 15-Sep | 158 | 225 | 181 | 188 | 160 | 165 | 151 | 158 | 172 | 135 | 124 | 127 | 110 | 133 | 136 | 215 | 211 | 195 | 188 | 193 | 187 | 168 | 164 | 161 | 168.1 |
| 16-Sep | 159 | 157 | 154 | 159 | 161 | 152 | 147 | 148 | 143 | 145 | 167 | 157 | 169 | 170 | 171 | 168 | 170 | 162 | 166 | 158 | 157 | 156 | 159 | 157 | 160.1 |
| 17-Sep | 159 | 153 | 142 | 142 | 140 | 145 | 147 | 147 | 146 | 151 | 144 | 147 | 167 | 157 | 148 | 148 | 153 | 143 | 144 | 145 | 141 | 144 | 144 | 136 | 147.8 |
| 18-Sep | 136 | 138 | 131 | 130 | 134 | 131 | 136 | 134 | 130 | 133 | 137 | 142 | 140 | 128 | 124 | 125 | 122 | 129 | 113 | 107 | 89 | 90 | 125 | 104 | 128.7 |
| 19-Sep | 97 | 92 | 93 | 82 | 21 | 360 | 356 | 22 | 40 | 36 | 67 | 41 | 70 | 69 | 55 | 78 | 71 | 68 | 65 | 65 | 73 | 79 | 70 | 51 | 67.6 |
| 20-Sep | 19 | 16 | 7 | 7 | 3 | 5 | 7 | 9 | 11 | 11 | 13 | 14 | 14 | 14 | 12 | 12 | 13 | 13 | 13 | 8 | 9 | 14 | 11 | 6 | 11.0 |
| 21-Sep | 7 | 5 | 4 | 8 | 354 | 354 | 353 | 352 | 4 | 355 | 343 | 357 | 343 | 350 | 350 | 337 | 339 | 339 | 332 | 329 | 331 | 326 | 325 | 314 | 350.4 |
| 22-Sep | 253 | 240 | 254 | 266 | 267 | 236 | 211 | 231 | 213 | 204 | 177 | 208 | 279 | 33 | 121 | 188 | 158 | 181 | 148 | 159 | 169 | 176 | 151 | 177 | 198.8 |
| 23-Sep | 145 | 200 | 246 | 166 | 140 | 147 | 152 | 161 | 148 | 153 | 145 | 167 | 175 | 187 | 168 | 178 | 149 | 146 | 144 | 141 | 147 | 156 | 156 | 151 | 156.5 |
| 24-Sep | 146 | 146 | 138 | 135 | 145 | 150 | 158 | 153 | 149 | 137 | 141 | 150 | 154 | 147 | 156 | 147 | 135 | 136 | 147 | 158 | 157 | 147 | 145 | 147.4 | |
| 25-Sep | 144 | 137 | 138 | 138 | 141 | 144 | 145 | 146 | 150 | 152 | 151 | 146 | 76 | 55 | 303 | 300 | 296 | 210 | 180 | 227 | 221 | 209 | 198 | 171 | 160.8 |
| 26-Sep | 165 | 173 | 219 | 263 | 264 | 250 | 257 | 245 | 243 | 278 | 275 | 280 | 287 | 297 | 287 | 287 | 282 | 290 | 314 | 287 | 245 | 252 | 239 | 181 | 270.4 |
| 27-Sep | 182 | 162 | 138 | 151 | 161 | 157 | 161 | 175 | 256 | 358 | 342 | 5 | 312 | 284 | 306 | 299 | 333 | 7 | 15 | 14 | 25 | 15 | 3 | 14 | 357.8 |
| 28-Sep | 10 | 97 | 117 | 129 | 133 | 139 | 138 | 138 | 141 | 144 | 155 | 147 | 148 | 157 | 175 | 176 | 171 | 164 | 164 | 157 | 152 | 151 | 141 | 145 | 152.3 |
| 29-Sep | 138 | 138 | 141 | 142 | 136 | 134 | 127 | 128 | 134 | 139 | 146 | 151 | 144 | 156 | 185 | 243 | 335 | 352 | 110 | 214 | 250 | 165 | 155 | 153 | 146.5 |
| 30-Sep | 154 | 147 | 146 | 148 | 150 | 144 | 156 | 153 | 149 | 149 | 137 | 136 | 138 | 187 | 251 | 239 | 249 | 235 | 276 | 289 | 297 | 292 | 299 | 292 | 234.2 |

188.5 193.6 187.0 166.7 177.5 178.3 180.9 194.0 208.8 222.4 219.4 212.0 232.0 249.5 256.2 253.7 252.7 248.1 260.4 213.1 194.8 171.4 180.8 182.6

Diurnal Average

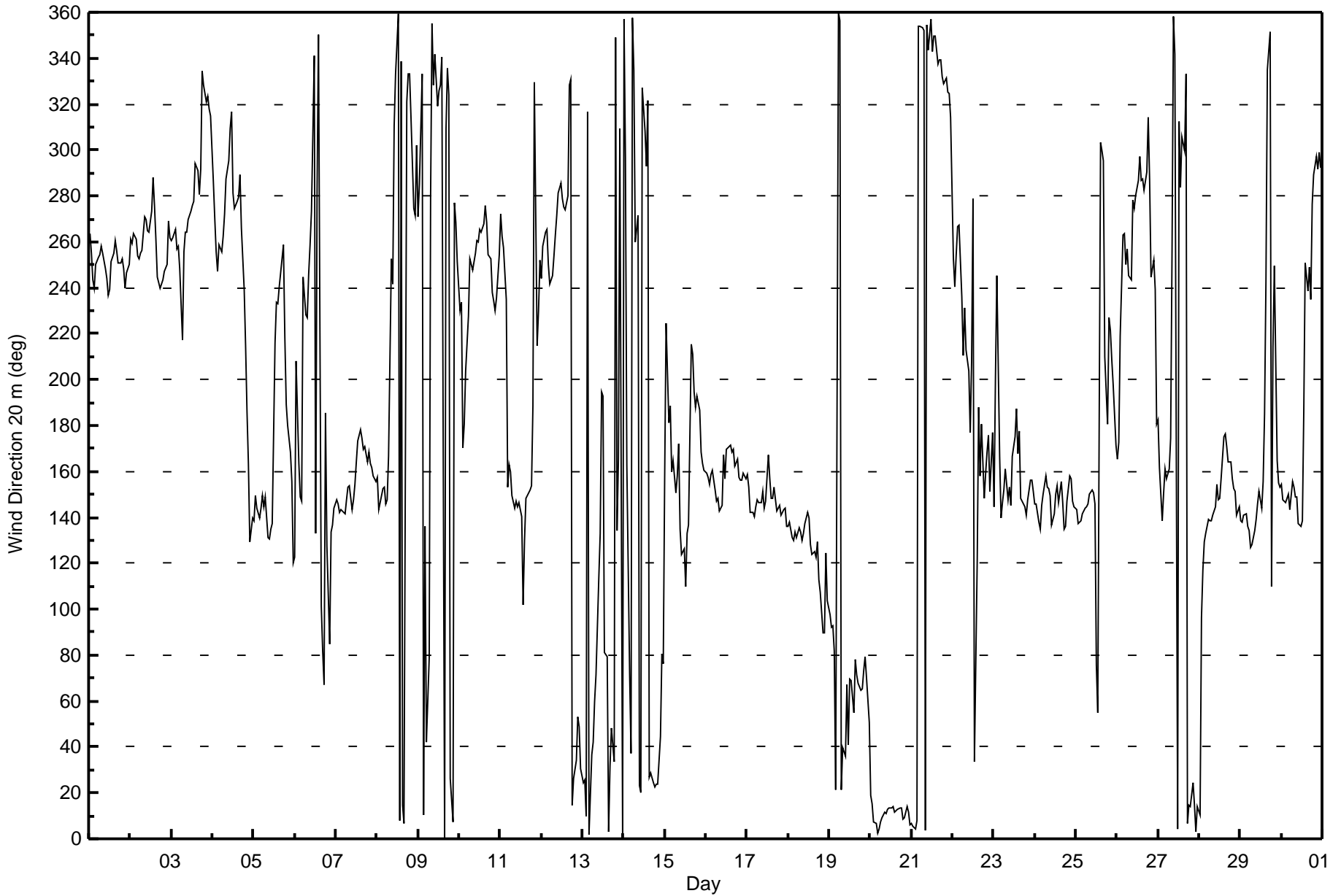
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Sep 9 03:00 Minimum Value: 6 deg on Sep 11 02:00 Percentiles: P ₁ = 7 P ₁₀ = 9 Q ₁ = 11 Median = 14 Q ₃ = 21 P ₉₀ = 38 P ₉₉ = 83 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|---|-------------------------------|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 6 | 8 | 11 | 14 | 13 | 12 | 11 | 11 | 11 | 14 | 14 | 11 | 14 | 16 | 16 | 12 | 11 | 15 | 11 | 10 | 10 | 9 | 9 | 10 | 16 |
| 2-Sep | 7 | 8 | 7 | 6 | 9 | 13 | 12 | 10 | 15 | 11 | 14 | 14 | 16 | 15 | 16 | 12 | 13 | 10 | 11 | 11 | 11 | 11 | 10 | 8 | 16 |
| 3-Sep | 8 | 7 | 7 | 10 | 7 | 13 | 18 | 17 | 10 | 10 | 11 | 13 | 13 | 16 | 17 | 17 | 14 | 12 | 28 | 18 | 16 | 14 | 15 | 15 | 28 |
| 4-Sep | 14 | 9 | 16 | 21 | 8 | 11 | 17 | 12 | 17 | 23 | 23 | 24 | 27 | 31 | 36 | 42 | 35 | 14 | 15 | 9 | 11 | 16 | 13 | 9 | 42 |
| 5-Sep | 10 | 11 | 9 | 11 | 12 | 11 | 12 | 15 | 19 | 17 | 15 | 15 | 54 | 24 | 25 | 21 | 17 | 13 | 27 | 11 | 9 | 8 | 20 | 35 | 54 |
| 6-Sep | 67 | 35 | 13 | 21 | 92 | 55 | 43 | 25 | 38 | 20 | 31 | 91 | 61 | 58 | 89 | 47 | 32 | 23 | 82 | 37 | 17 | 10 | 10 | 10 | 92 |
| 7-Sep | 8 | 9 | 9 | 12 | 12 | 10 | 11 | 14 | 15 | 12 | 13 | 16 | 21 | 18 | 20 | 19 | 16 | 16 | 12 | 11 | 10 | 10 | 7 | 7 | 21 |
| 8-Sep | 16 | 9 | 11 | 10 | 8 | 9 | 10 | 38 | 68 | 47 | 29 | 21 | 24 | 37 | 19 | 26 | 17 | 20 | 18 | 16 | 27 | 13 | 10 | 22 | 68 |
| 9-Sep | 23 | 21 | 100 | 62 | 59 | 19 | 82 | 26 | 41 | 68 | 59 | 24 | 22 | 24 | 19 | 24 | 20 | 18 | 18 | 30 | 28 | 19 | 11 | 13 | 100 |
| 10-Sep | 20 | 24 | 15 | 17 | 20 | 15 | 12 | 12 | 12 | 11 | 10 | 11 | 10 | 10 | 12 | 12 | 13 | 11 | 11 | 13 | 10 | 12 | 11 | 13 | 24 |
| 11-Sep | 6 | 6 | 9 | 68 | 20 | 10 | 15 | 13 | 11 | 14 | 15 | 17 | 23 | 40 | 58 | 12 | 12 | 13 | 9 | 56 | 62 | 15 | 19 | 9 | 68 |
| 12-Sep | 12 | 9 | 12 | 10 | 13 | 12 | 11 | 11 | 8 | 10 | 12 | 14 | 11 | 13 | 10 | 17 | 20 | 36 | 13 | 13 | 14 | 13 | 17 | 25 | 36 |
| 13-Sep | 20 | 15 | 30 | 20 | 40 | 35 | 20 | 27 | 40 | 57 | 62 | 63 | 64 | 69 | 23 | 29 | 43 | 17 | 21 | 38 | 38 | 57 | 37 | 17 | 69 |
| 14-Sep | 21 | 62 | 39 | 53 | 38 | 51 | 43 | 96 | 40 | 42 | 21 | 45 | 42 | 29 | 40 | 35 | 21 | 17 | 12 | 10 | 11 | 17 | 11 | 15 | 96 |
| 15-Sep | 51 | 44 | 19 | 14 | 17 | 9 | 12 | 16 | 28 | 30 | 24 | 20 | 28 | 29 | 25 | 50 | 25 | 19 | 12 | 11 | 9 | 10 | 8 | 7 | 51 |
| 16-Sep | 8 | 9 | 9 | 8 | 8 | 7 | 9 | 10 | 12 | 15 | 20 | 18 | 21 | 21 | 23 | 21 | 22 | 19 | 13 | 10 | 8 | 7 | 8 | 7 | 23 |
| 17-Sep | 7 | 9 | 9 | 9 | 10 | 9 | 9 | 10 | 11 | 13 | 13 | 15 | 20 | 18 | 13 | 14 | 13 | 13 | 10 | 9 | 10 | 11 | 10 | 10 | 20 |
| 18-Sep | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 11 | 13 | 14 | 14 | 16 | 17 | 15 | 15 | 12 | 13 | 12 | 18 | 16 | 30 | 24 | 30 |
| 19-Sep | 9 | 10 | 9 | 12 | 46 | 21 | 28 | 13 | 18 | 15 | 21 | 24 | 35 | 21 | 20 | 12 | 13 | 13 | 13 | 13 | 13 | 12 | 13 | 19 | 46 |
| 20-Sep | 11 | 11 | 12 | 12 | 14 | 12 | 12 | 11 | 11 | 12 | 12 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 13 | 13 | 12 | 14 |
| 21-Sep | 12 | 13 | 16 | 11 | 16 | 16 | 17 | 16 | 15 | 16 | 17 | 16 | 16 | 17 | 17 | 15 | 15 | 14 | 15 | 15 | 16 | 16 | 16 | 20 | 20 |
| 22-Sep | 43 | 10 | 14 | 10 | 26 | 30 | 17 | 14 | 11 | 23 | 21 | 27 | 63 | 25 | 47 | 22 | 19 | 20 | 25 | 13 | 19 | 23 | 15 | 65 | 65 |
| 23-Sep | 19 | 39 | 25 | 18 | 11 | 9 | 10 | 14 | 21 | 29 | 24 | 25 | 21 | 27 | 29 | 37 | 19 | 10 | 9 | 9 | 9 | 10 | 9 | 9 | 39 |
| 24-Sep | 9 | 9 | 11 | 11 | 8 | 6 | 10 | 9 | 13 | 19 | 16 | 18 | 22 | 23 | 17 | 17 | 14 | 10 | 10 | 11 | 8 | 10 | 10 | 11 | 23 |
| 25-Sep | 11 | 10 | 10 | 11 | 10 | 10 | 10 | 11 | 11 | 13 | 18 | 26 | 35 | 37 | 85 | 22 | 36 | 20 | 14 | 14 | 10 | 27 | 13 | 24 | 85 |
| 26-Sep | 12 | 13 | 38 | 14 | 15 | 11 | 19 | 12 | 24 | 18 | 12 | 19 | 17 | 14 | 17 | 16 | 12 | 16 | 17 | 20 | 8 | 19 | 72 | 17 | 72 |
| 27-Sep | 65 | 13 | 32 | 20 | 9 | 13 | 12 | 24 | 89 | 51 | 53 | 39 | 39 | 20 | 20 | 16 | 18 | 13 | 11 | 11 | 13 | 15 | 11 | 10 | 89 |
| 28-Sep | 34 | 60 | 17 | 9 | 9 | 9 | 10 | 11 | 13 | 11 | 12 | 12 | 14 | 25 | 19 | 17 | 13 | 12 | 8 | 7 | 8 | 8 | 9 | 8 | 60 |
| 29-Sep | 8 | 8 | 8 | 8 | 8 | 9 | 8 | 8 | 11 | 14 | 12 | 14 | 11 | 23 | 33 | 60 | 55 | 20 | 38 | 35 | 12 | 21 | 9 | 13 | 60 |
| 30-Sep | 14 | 9 | 6 | 7 | 10 | 10 | 11 | 12 | 15 | 45 | 13 | 11 | 12 | 76 | 18 | 16 | 13 | 10 | 12 | 10 | 12 | 10 | 10 | 10 | 76 |
| | | | | | | | | | | | | | | | | | | 67 62 100 68 92 55 82 96 89 68 62 91 64 76 89 60 55 36 82 56 62 57 72 65 | | | | | | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - September 2017

| | | | |
|---|--|---------------------------|------|
| Direction of Maximum Speed: 262 deg on Sep 10 15:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 5.3 deg on Sep 20 | | Hours of Data: | 719 |
| Direction of Minimum Speed: 115 deg on Sep 6 19:00 | | Hours of Missing Data: | 1 |
| Direction of Minimum Daily Speed Average: 1.6 deg on Sep 6 | | Percent Operational Time: | 99.9 |
| Monthly Average Direction: 237.1 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-Sep | 258 | 251 | 242 | 239 | 247 | 249 | 249 | 252 | 249 | 242 | 238 | 231 | 233 | 245 | 250 | 255 | 251 | 244 | 245 | 248 | 245 | 236 | 240 | 245 | 245.5 |
| 2-Sep | 255 | 254 | 258 | 258 | 254 | 251 | 251 | 251 | 265 | 264 | 260 | 260 | 268 | 283 | 271 | 255 | 240 | 235 | 237 | 239 | 242 | 245 | 265 | 258 | 254.2 |
| 3-Sep | 256 | 256 | 261 | 255 | 254 | 248 | 227 | 251 | 258 | 259 | 265 | 269 | 271 | 274 | 291 | 288 | 277 | 288 | 331 | 324 | 317 | 320 | 316 | 312 | 281.3 |
| 4-Sep | 292 | 272 | 265 | 260 | 269 | 266 | 266 | 269 | 284 | 295 | 308 | 313 | 277 | 270 | 274 | 277 | 285 | 261 | 233 | 214 | 182 | 161 | 137 | 130 | 264.7 |
| 5-Sep | 135 | 145 | 141 | 140 | 143 | 145 | 142 | 148 | 130 | 128 | 132 | 131 | 208 | 226 | 226 | 236 | 240 | 250 | 221 | 191 | 190 | 184 | 190 | 203 | 173.8 |
| 6-Sep | 323 | 235 | 181 | 223 | 293 | 283 | 277 | 246 | 230 | 264 | 277 | 325 | 156 | 272 | 342 | 88 | 65 | 56 | 115 | 102 | 84 | 120 | 129 | 135 | 150.8 |
| 7-Sep | 133 | 139 | 146 | 153 | 144 | 141 | 146 | 151 | 150 | 144 | 145 | 151 | 161 | 167 | 172 | 169 | 164 | 166 | 160 | 162 | 161 | 162 | 160 | 158 | 156.0 |
| 8-Sep | 165 | 152 | 148 | 150 | 158 | 145 | 146 | 162 | 258 | 258 | 309 | 330 | 354 | 3 | 336 | 6 | 3 | 319 | 331 | 331 | 318 | 276 | 278 | 301 | 318.2 |
| 9-Sep | 296 | 321 | 39 | 14 | 124 | 43 | 63 | 288 | 343 | 315 | 343 | 315 | 322 | 327 | 337 | 353 | 307 | 335 | 325 | 12 | 3 | 276 | 263 | 247 | 326.0 |
| 10-Sep | 225 | 234 | 170 | 178 | 206 | 229 | 248 | 246 | 243 | 250 | 255 | 254 | 260 | 258 | 262 | 271 | 264 | 248 | 247 | 232 | 231 | 230 | 232 | 249 | 246.9 |
| 11-Sep | 265 | 254 | 250 | 248 | 171 | 180 | 172 | 146 | 137 | 144 | 142 | 139 | 132 | 99 | 127 | 142 | 143 | 148 | 151 | 181 | 324 | 217 | 235 | 249 | 185.6 |
| 12-Sep | 242 | 252 | 258 | 261 | 247 | 239 | 240 | 249 | 258 | 267 | 278 | 282 | 275 | 271 | 269 | 277 | 323 | 325 | 12 | 18 | 25 | 43 | 38 | 24 | 273.6 |
| 13-Sep | 15 | 15 | 5 | 322 | 353 | 28 | 35 | 51 | 56 | 120 | 136 | 193 | 197 | 71 | 64 | 352 | 22 | 40 | 29 | 1 | 88 | 81 | 300 | 360 | 23.7 |
| 14-Sep | 356 | 343 | 106 | 52 | 28 | 10 | 345 | 25 | 311 | 13 | 12 | 324 | 307 | 294 | 318 | 15 | 21 | 15 | 18 | 20 | 20 | 45 | 69 | 77 | 7.0 |
| 15-Sep | 126 | 121 | 155 | 163 | 155 | 151 | AF | 152 | 167 | 142 | 126 | 127 | 110 | 127 | 135 | 205 | 202 | 188 | 184 | 185 | 187 | 167 | 171 | 165 | 165.4 |
| 16-Sep | 152 | 151 | 150 | 159 | 153 | 147 | 144 | 143 | 147 | 163 | 152 | 165 | 165 | 167 | 163 | 165 | 160 | 161 | 153 | 150 | 149 | 154 | 153 | 155.5 | |
| 17-Sep | 155 | 148 | 141 | 138 | 132 | 138 | 142 | 141 | 143 | 146 | 139 | 143 | 163 | 152 | 142 | 143 | 147 | 137 | 138 | 140 | 138 | 139 | 140 | 131 | 142.8 |
| 18-Sep | 131 | 132 | 125 | 123 | 126 | 123 | 128 | 126 | 122 | 124 | 131 | 137 | 134 | 122 | 116 | 117 | 115 | 119 | 105 | 101 | 88 | 87 | 111 | 95 | 121.8 |
| 19-Sep | 92 | 86 | 85 | 76 | 25 | 1 | 2 | 33 | 45 | 34 | 59 | 34 | 62 | 60 | 47 | 69 | 62 | 60 | 58 | 57 | 64 | 72 | 63 | 43 | 59.9 |
| 20-Sep | 14 | 10 | 3 | 2 | 358 | 360 | 2 | 3 | 6 | 5 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 2 | 4 | 8 | 5 | 0 | 5.3 |
| 21-Sep | 1 | 360 | 359 | 2 | 349 | 351 | 349 | 348 | 358 | 351 | 339 | 353 | 339 | 345 | 346 | 334 | 336 | 335 | 329 | 327 | 328 | 324 | 320 | 310 | 345.4 |
| 22-Sep | 278 | 251 | 267 | 275 | 297 | 255 | 217 | 232 | 210 | 200 | 173 | 200 | 279 | 24 | 118 | 183 | 157 | 174 | 142 | 152 | 158 | 163 | 151 | 165 | 192.5 |
| 23-Sep | 143 | 185 | 209 | 157 | 134 | 142 | 143 | 151 | 145 | 155 | 142 | 163 | 169 | 182 | 163 | 174 | 143 | 141 | 140 | 137 | 143 | 147 | 147 | 147 | 150.7 |
| 24-Sep | 144 | 142 | 128 | 125 | 127 | 126 | 134 | 137 | 142 | 147 | 134 | 138 | 146 | 149 | 143 | 151 | 141 | 129 | 135 | 144 | 154 | 153 | 143 | 141 | 140.0 |
| 25-Sep | 139 | 133 | 133 | 133 | 135 | 137 | 142 | 144 | 149 | 150 | 148 | 146 | 69 | 39 | 290 | 296 | 290 | 222 | 199 | 226 | 221 | 214 | 212 | 201 | 167.1 |
| 26-Sep | 207 | 207 | 241 | 262 | 265 | 254 | 256 | 247 | 244 | 270 | 270 | 277 | 284 | 293 | 283 | 283 | 279 | 288 | 320 | 307 | 264 | 260 | 276 | 181 | 270.2 |
| 27-Sep | 175 | 168 | 157 | 144 | 160 | 159 | 159 | 176 | 253 | 342 | 332 | 356 | 310 | 282 | 303 | 297 | 330 | 2 | 8 | 8 | 16 | 12 | 358 | 12 | 350.5 |
| 28-Sep | 32 | 114 | 113 | 120 | 128 | 134 | 131 | 131 | 133 | 139 | 150 | 145 | 144 | 153 | 169 | 170 | 166 | 160 | 159 | 152 | 148 | 146 | 138 | 142 | 147.3 |
| 29-Sep | 134 | 133 | 137 | 137 | 131 | 130 | 122 | 119 | 129 | 136 | 143 | 148 | 141 | 154 | 181 | 233 | 327 | 332 | 75 | 196 | 252 | 161 | 152 | 151 | 143.3 |
| 30-Sep | 153 | 149 | 138 | 143 | 159 | 142 | 146 | 150 | 149 | 155 | 134 | 133 | 135 | 186 | 244 | 232 | 244 | 233 | 275 | 288 | 294 | 287 | 294 | 288 | 223.8 |

177.6 181.8 172.9 161.8 170.2 169.7 172.5 179.7 199.5 217.5 215.7 211.4 227.0 243.2 252.6 248.9 251.9 245.8 248.9 204.7 200.6 175.3 183.5 182.8

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

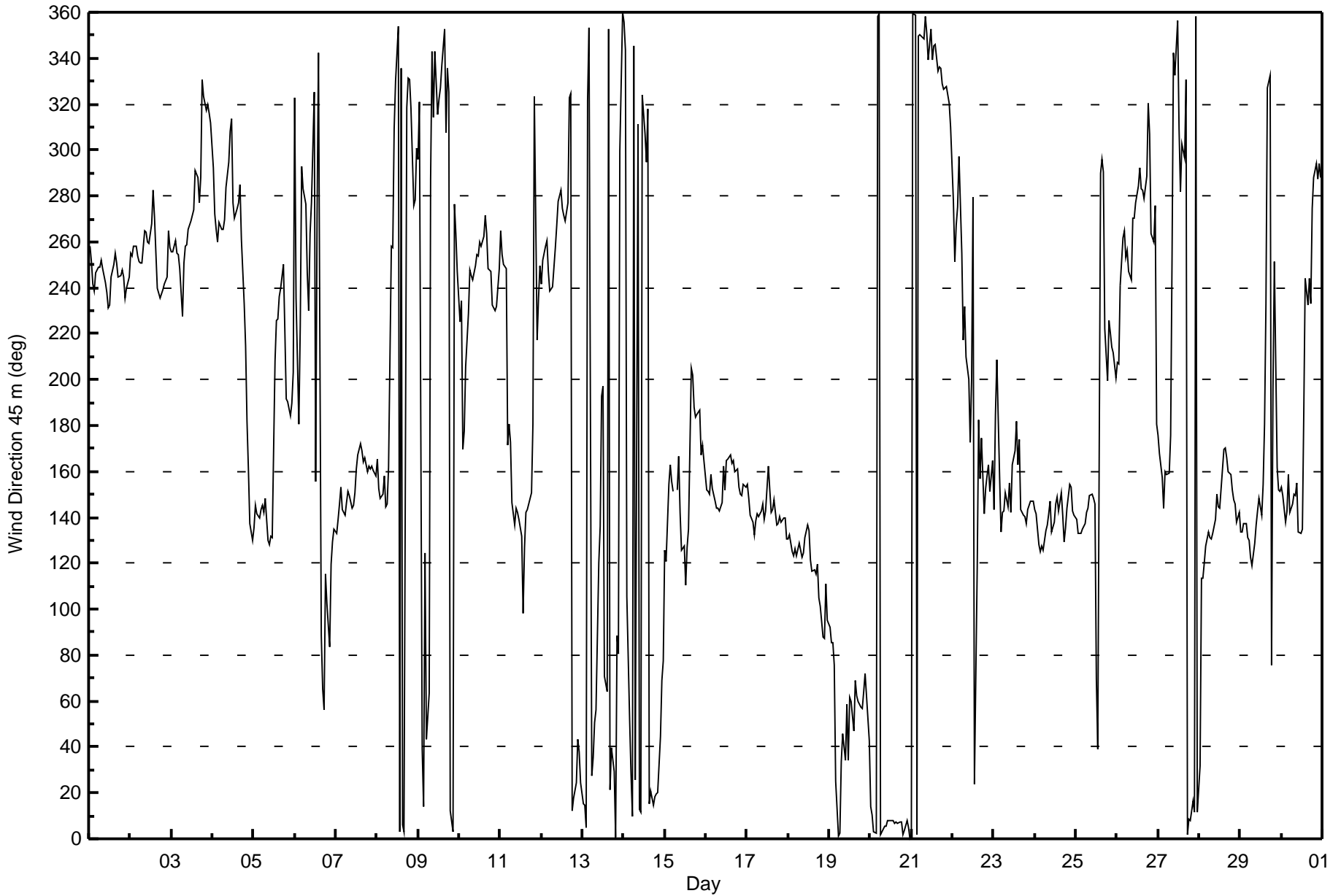
Wind Direction 45 m (WD45m) - deg
Mannix - September 2017

| | |
|--|--|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Sep 25 15:00 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9 |
| Minimum Value: 2 deg on Sep 17 00:00 | |
| Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 7 Median = 10 Q ₃ = 16 P ₉₀ = 31 P ₉₉ = 69 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 6 | 5 | 7 | 10 | 10 | 9 | 9 | 9 | 8 | 11 | 10 | 9 | 10 | 13 | 14 | 11 | 9 | 12 | 8 | 6 | 6 | 5 | 5 | 7 | 14 |
| 2-Sep | 6 | 6 | 6 | 4 | 4 | 7 | 7 | 7 | 12 | 9 | 12 | 12 | 14 | 11 | 14 | 11 | 10 | 8 | 7 | 8 | 7 | 9 | 8 | 6 | 14 |
| 3-Sep | 6 | 5 | 7 | 7 | 4 | 8 | 9 | 12 | 9 | 8 | 10 | 12 | 11 | 14 | 14 | 14 | 12 | 8 | 26 | 13 | 11 | 8 | 9 | 8 | 26 |
| 4-Sep | 9 | 7 | 10 | 8 | 5 | 5 | 9 | 9 | 12 | 19 | 17 | 17 | 23 | 29 | 34 | 37 | 28 | 11 | 13 | 9 | 10 | 6 | 11 | 5 | 37 |
| 5-Sep | 6 | 5 | 5 | 7 | 6 | 6 | 6 | 11 | 15 | 12 | 11 | 11 | 50 | 19 | 21 | 17 | 13 | 10 | 24 | 10 | 6 | 5 | 13 | 72 | 72 |
| 6-Sep | 27 | 16 | 12 | 33 | 20 | 11 | 15 | 40 | 41 | 18 | 28 | 69 | 81 | 50 | 73 | 46 | 29 | 20 | 71 | 37 | 14 | 7 | 6 | 5 | 81 |
| 7-Sep | 4 | 4 | 6 | 6 | 5 | 5 | 5 | 7 | 9 | 8 | 8 | 12 | 17 | 11 | 11 | 11 | 9 | 8 | 6 | 4 | 4 | 4 | 3 | 3 | 17 |
| 8-Sep | 8 | 5 | 7 | 5 | 4 | 5 | 5 | 29 | 29 | 37 | 25 | 13 | 19 | 38 | 13 | 21 | 11 | 16 | 13 | 10 | 20 | 9 | 5 | 12 | 38 |
| 9-Sep | 16 | 19 | 34 | 53 | 53 | 13 | 67 | 24 | 39 | 52 | 43 | 15 | 13 | 15 | 11 | 18 | 15 | 10 | 12 | 21 | 23 | 19 | 9 | 10 | 67 |
| 10-Sep | 15 | 21 | 12 | 9 | 15 | 11 | 10 | 9 | 9 | 9 | 8 | 9 | 9 | 9 | 11 | 9 | 11 | 8 | 9 | 9 | 6 | 8 | 7 | 10 | 21 |
| 11-Sep | 5 | 4 | 6 | 32 | 40 | 11 | 19 | 9 | 6 | 11 | 9 | 10 | 14 | 36 | 57 | 7 | 7 | 10 | 4 | 54 | 40 | 17 | 14 | 6 | 57 |
| 12-Sep | 9 | 7 | 10 | 8 | 10 | 8 | 8 | 8 | 7 | 9 | 10 | 10 | 10 | 11 | 8 | 16 | 15 | 34 | 9 | 10 | 11 | 10 | 12 | 20 | 34 |
| 13-Sep | 15 | 10 | 24 | 18 | 28 | 25 | 17 | 25 | 35 | 62 | 62 | 46 | 54 | 77 | 21 | 23 | 29 | 15 | 15 | 33 | 40 | 54 | 45 | 15 | 77 |
| 14-Sep | 6 | 49 | 46 | 31 | 31 | 29 | 27 | 53 | 36 | 29 | 18 | 34 | 32 | 23 | 29 | 32 | 16 | 13 | 9 | 8 | 7 | 15 | 8 | 12 | 53 |
| 15-Sep | 15 | 8 | 15 | 8 | 6 | 5 | AF | 8 | 19 | 28 | 22 | 18 | 25 | 25 | 24 | 31 | 20 | 13 | 5 | 7 | 6 | 5 | 5 | 7 | 31 |
| 16-Sep | 3 | 4 | 5 | 3 | 4 | 3 | 3 | 5 | 7 | 12 | 13 | 14 | 15 | 15 | 18 | 17 | 18 | 14 | 6 | 5 | 4 | 3 | 3 | 2 | 18 |
| 17-Sep | 2 | 4 | 5 | 4 | 5 | 6 | 5 | 6 | 8 | 8 | 9 | 13 | 15 | 14 | 9 | 10 | 9 | 9 | 7 | 6 | 6 | 7 | 7 | 6 | 15 |
| 18-Sep | 6 | 6 | 6 | 5 | 5 | 5 | 6 | 6 | 9 | 9 | 11 | 11 | 12 | 14 | 16 | 12 | 13 | 11 | 11 | 11 | 16 | 14 | 23 | 17 | 23 |
| 19-Sep | 7 | 8 | 7 | 11 | 40 | 12 | 17 | 11 | 13 | 13 | 16 | 21 | 33 | 19 | 17 | 11 | 9 | 10 | 9 | 9 | 10 | 10 | 10 | 16 | 40 |
| 20-Sep | 8 | 7 | 7 | 7 | 8 | 7 | 8 | 7 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 7 | 8 |
| 21-Sep | 7 | 9 | 10 | 7 | 11 | 11 | 12 | 11 | 10 | 11 | 11 | 11 | 10 | 12 | 11 | 10 | 9 | 9 | 10 | 9 | 10 | 10 | 10 | 12 | 12 |
| 22-Sep | 35 | 9 | 13 | 8 | 23 | 27 | 12 | 12 | 5 | 19 | 14 | 21 | 55 | 22 | 53 | 15 | 16 | 12 | 11 | 9 | 10 | 17 | 10 | 48 | 55 |
| 23-Sep | 13 | 27 | 21 | 10 | 7 | 5 | 5 | 9 | 17 | 22 | 21 | 20 | 12 | 18 | 23 | 33 | 15 | 7 | 4 | 4 | 6 | 5 | 4 | 6 | 33 |
| 24-Sep | 4 | 4 | 5 | 5 | 3 | 3 | 5 | 6 | 9 | 14 | 14 | 15 | 18 | 20 | 13 | 14 | 10 | 5 | 7 | 7 | 4 | 7 | 6 | 7 | 20 |
| 25-Sep | 7 | 6 | 6 | 6 | 5 | 6 | 6 | 7 | 8 | 8 | 13 | 23 | 34 | 33 | 91 | 18 | 24 | 15 | 17 | 8 | 6 | 15 | 7 | 12 | 91 |
| 26-Sep | 8 | 11 | 20 | 10 | 5 | 9 | 9 | 6 | 18 | 16 | 10 | 17 | 14 | 10 | 15 | 13 | 9 | 13 | 8 | 13 | 11 | 12 | 33 | 13 | 33 |
| 27-Sep | 12 | 26 | 39 | 18 | 5 | 6 | 8 | 18 | 70 | 30 | 38 | 30 | 32 | 17 | 14 | 12 | 14 | 9 | 7 | 7 | 9 | 10 | 6 | 8 | 70 |
| 28-Sep | 26 | 49 | 16 | 7 | 5 | 5 | 5 | 7 | 9 | 9 | 8 | 10 | 10 | 22 | 14 | 10 | 8 | 9 | 5 | 4 | 5 | 5 | 5 | 4 | 49 |
| 29-Sep | 5 | 5 | 6 | 5 | 5 | 6 | 7 | 7 | 9 | 11 | 10 | 11 | 9 | 20 | 24 | 47 | 54 | 15 | 65 | 27 | 9 | 31 | 5 | 7 | 65 |
| 30-Sep | 6 | 5 | 7 | 8 | 11 | 6 | 7 | 11 | 14 | 39 | 12 | 9 | 10 | 65 | 15 | 15 | 10 | 8 | 12 | 8 | 8 | 7 | 7 | 8 | 65 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 35 | 49 | 46 | 53 | 53 | 29 | 67 | 53 | 70 | 62 | 62 | 69 | 81 | 77 | 91 | 47 | 54 | 34 | 71 | 54 | 40 | 54 | 45 | 72 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





| | |
|---|---------------------------------|
| Direction of Maximum Speed: 11 deg on Sep 20 12:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 8.6 deg on Sep 20 | Hours of Data: 720 |
| Direction of Minimum Speed: 15 deg on Sep 6 08:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 0.4 deg on Sep 6 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 239.7 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-Sep | 257 | 252 | 244 | 242 | 248 | 250 | 249 | 252 | 248 | 242 | 238 | 232 | 233 | 245 | 251 | 256 | 252 | 245 | 245 | 249 | 248 | 239 | 241 | 247 | 246.5 |
| 2-Sep | 256 | 255 | 260 | 261 | 260 | 259 | 255 | 253 | 266 | 265 | 261 | 260 | 270 | 284 | 274 | 256 | 242 | 237 | 238 | 240 | 243 | 247 | 266 | 260 | 255.9 |
| 3-Sep | 259 | 257 | 262 | 259 | 258 | 254 | 241 | 253 | 261 | 260 | 267 | 271 | 273 | 275 | 292 | 290 | 279 | 291 | 333 | 327 | 319 | 322 | 320 | 316 | 283.9 |
| 4-Sep | 302 | 281 | 279 | 271 | 285 | 274 | 272 | 276 | 290 | 300 | 314 | 315 | 278 | 273 | 276 | 279 | 284 | 264 | 237 | 223 | 188 | 168 | 160 | 136 | 269.7 |
| 5-Sep | 141 | 158 | 158 | 150 | 149 | 154 | 155 | 157 | 140 | 133 | 136 | 132 | 208 | 226 | 226 | 237 | 239 | 250 | 228 | 193 | 201 | 201 | 214 | 260 | 180.4 |
| 6-Sep | 295 | 253 | 236 | 292 | 294 | 310 | 322 | 15 | 227 | 288 | 293 | 331 | 164 | 281 | 342 | 67 | 63 | 59 | 66 | 94 | 86 | 113 | 128 | 131 | 131.1 |
| 7-Sep | 130 | 132 | 145 | 152 | 152 | 150 | 149 | 154 | 153 | 153 | 149 | 153 | 162 | 167 | 172 | 169 | 164 | 166 | 160 | 163 | 164 | 168 | 168 | 166 | 157.8 |
| 8-Sep | 186 | 174 | 168 | 166 | 191 | 153 | 150 | 173 | 264 | 275 | 313 | 334 | 359 | 6 | 338 | 11 | 7 | 324 | 336 | 335 | 330 | 296 | 285 | 309 | 313.8 |
| 9-Sep | 304 | 323 | 359 | 20 | 122 | 49 | 80 | 308 | 356 | 327 | 351 | 321 | 326 | 331 | 339 | 357 | 311 | 343 | 334 | 16 | 10 | 284 | 267 | 250 | 334.4 |
| 10-Sep | 231 | 241 | 179 | 183 | 216 | 233 | 249 | 247 | 245 | 250 | 256 | 254 | 261 | 260 | 263 | 273 | 265 | 250 | 249 | 235 | 236 | 235 | 236 | 249 | 248.3 |
| 11-Sep | 264 | 253 | 251 | 253 | 206 | 200 | 200 | 159 | 143 | 150 | 148 | 138 | 130 | 100 | 126 | 140 | 144 | 147 | 153 | 182 | 317 | 232 | 245 | 252 | 197.5 |
| 12-Sep | 244 | 252 | 260 | 262 | 249 | 241 | 242 | 251 | 260 | 269 | 280 | 285 | 277 | 273 | 271 | 278 | 324 | 331 | 18 | 20 | 28 | 44 | 38 | 32 | 275.6 |
| 13-Sep | 17 | 14 | 14 | 335 | 4 | 30 | 39 | 52 | 56 | 118 | 137 | 190 | 183 | 70 | 61 | 357 | 23 | 44 | 37 | 27 | 64 | 75 | 347 | 12 | 30.5 |
| 14-Sep | 20 | 13 | 58 | 59 | 37 | 35 | 14 | 40 | 0 | 16 | 15 | 328 | 312 | 301 | 322 | 21 | 24 | 18 | 23 | 23 | 28 | 51 | 70 | 85 | 19.2 |
| 15-Sep | 112 | 123 | 153 | 152 | 138 | 146 | 150 | 149 | 166 | 166 | 141 | 133 | 110 | 123 | 138 | 203 | 200 | 188 | 185 | 186 | 191 | 175 | 187 | 186 | 168.2 |
| 16-Sep | 162 | 158 | 156 | 151 | 150 | 150 | 149 | 146 | 150 | 156 | 161 | 152 | 165 | 166 | 167 | 163 | 164 | 161 | 162 | 154 | 153 | 153 | 158 | 158 | 157.1 |
| 17-Sep | 160 | 156 | 150 | 144 | 133 | 135 | 139 | 138 | 144 | 145 | 139 | 144 | 162 | 152 | 142 | 144 | 147 | 137 | 137 | 140 | 139 | 140 | 140 | 132 | 143.6 |
| 18-Sep | 132 | 133 | 128 | 126 | 127 | 125 | 128 | 127 | 124 | 125 | 132 | 137 | 135 | 123 | 118 | 116 | 116 | 117 | 108 | 101 | 93 | 91 | 103 | 95 | 123.2 |
| 19-Sep | 94 | 87 | 86 | 78 | 45 | 23 | 26 | 62 | 65 | 51 | 62 | 38 | 62 | 62 | 50 | 70 | 65 | 64 | 61 | 60 | 67 | 74 | 65 | 47 | 63.6 |
| 20-Sep | 21 | 16 | 8 | 6 | 2 | 4 | 6 | 6 | 8 | 9 | 11 | 11 | 11 | 11 | 10 | 10 | 9 | 9 | 10 | 5 | 6 | 11 | 7 | 4 | 8.6 |
| 21-Sep | 4 | 2 | 1 | 4 | 353 | 355 | 353 | 352 | 1 | 354 | 343 | 356 | 343 | 349 | 348 | 338 | 340 | 339 | 334 | 332 | 333 | 332 | 326 | 315 | 349.0 |
| 22-Sep | 303 | 285 | 306 | 300 | 326 | 313 | 241 | 238 | 211 | 201 | 173 | 200 | 277 | 28 | 116 | 179 | 158 | 171 | 138 | 148 | 156 | 157 | 154 | 158 | 183.4 |
| 23-Sep | 145 | 171 | 180 | 152 | 132 | 141 | 134 | 140 | 144 | 155 | 143 | 161 | 167 | 181 | 162 | 174 | 143 | 141 | 140 | 138 | 144 | 147 | 146 | 150 | 148.6 |
| 24-Sep | 146 | 144 | 135 | 128 | 128 | 126 | 127 | 134 | 149 | 135 | 139 | 146 | 149 | 142 | 150 | 140 | 131 | 140 | 146 | 159 | 155 | 145 | 143 | 141.2 | |
| 25-Sep | 140 | 133 | 133 | 133 | 133 | 135 | 143 | 144 | 152 | 152 | 151 | 148 | 73 | 41 | 290 | 296 | 287 | 234 | 216 | 229 | 226 | 223 | 223 | 219 | 170.8 |
| 26-Sep | 222 | 225 | 253 | 262 | 268 | 260 | 264 | 251 | 253 | 269 | 271 | 280 | 286 | 293 | 285 | 285 | 282 | 292 | 331 | 319 | 292 | 273 | 302 | 198 | 275.1 |
| 27-Sep | 183 | 178 | 252 | 167 | 167 | 179 | 167 | 216 | 294 | 347 | 338 | 2 | 313 | 287 | 307 | 302 | 334 | 5 | 12 | 12 | 20 | 19 | 7 | 29 | 350.2 |
| 28-Sep | 67 | 125 | 117 | 124 | 131 | 134 | 130 | 130 | 130 | 138 | 150 | 145 | 145 | 153 | 169 | 170 | 167 | 162 | 159 | 154 | 149 | 147 | 140 | 143 | 147.9 |
| 29-Sep | 135 | 134 | 138 | 139 | 134 | 131 | 127 | 121 | 130 | 140 | 144 | 148 | 143 | 155 | 178 | 224 | 326 | 318 | 257 | 202 | 256 | 169 | 153 | 157 | 145.6 |
| 30-Sep | 158 | 157 | 145 | 144 | 162 | 146 | 146 | 154 | 159 | 175 | 136 | 135 | 138 | 187 | 245 | 233 | 246 | 238 | 281 | 293 | 298 | 290 | 296 | 290 | 219.3 |

| | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 181.0 | 188.4 | 181.5 | 165.8 | 173.6 | 170.5 | 171.0 | 176.1 | 198.1 | 220.2 | 217.9 | 211.7 | 227.6 | 246.3 | 255.5 | 251.7 | 254.3 | 248.0 | 243.6 | 197.8 | 201.1 | 179.1 | 186.1 | 186.4 |
| Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | |

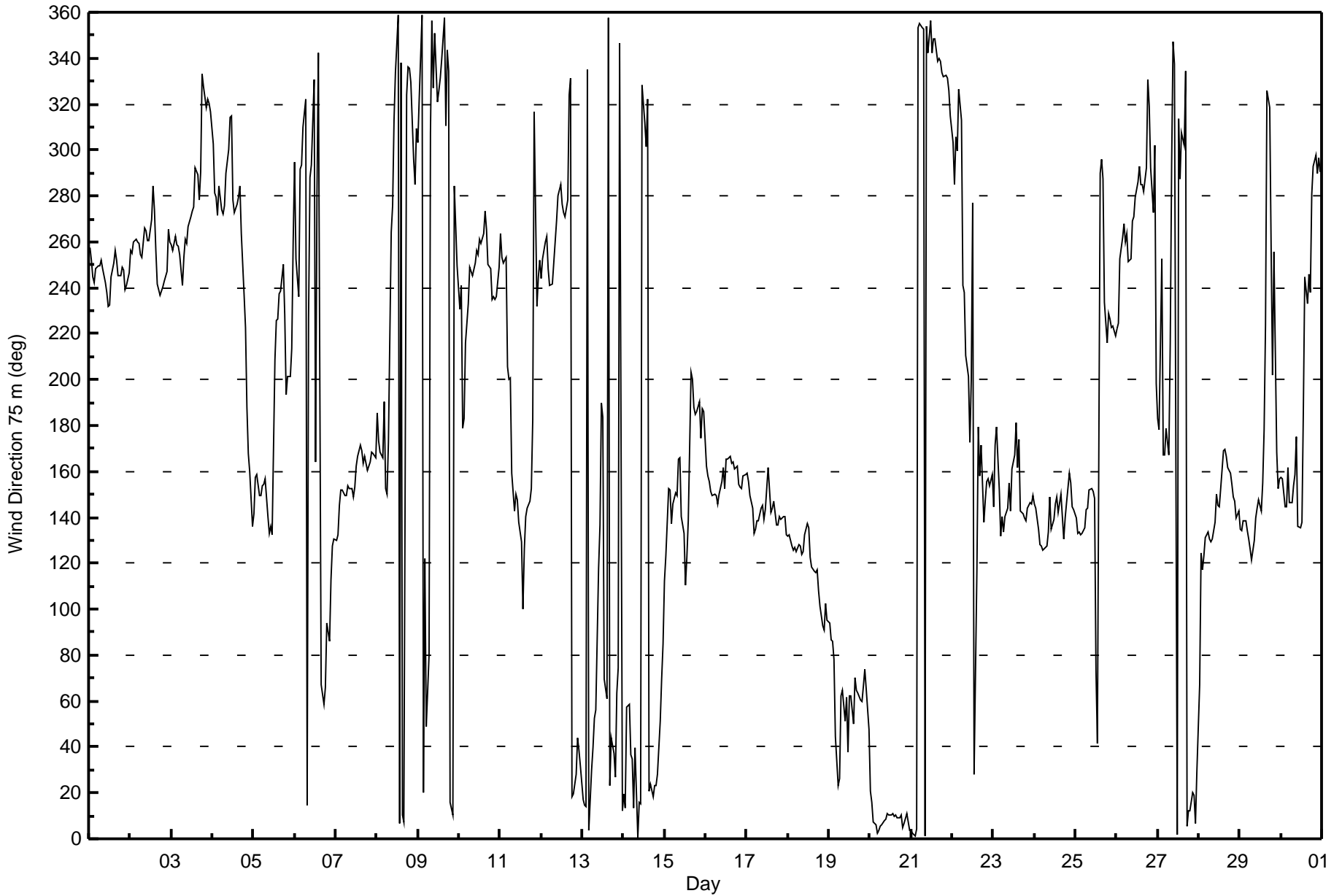
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 89 deg on Sep 29 19:00 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|---------------|----|
| Minimum Value: 2 deg on Sep 17 02:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentiles: P ₁ = 3 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 15 P ₉₀ = 26 P ₉₉ = 73 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | | 24 |
| 1-Sep | 5 | 4 | 5 | 9 | 8 | 7 | 8 | 8 | 7 | 9 | 8 | 7 | 10 | 12 | 13 | 10 | 8 | 11 | 7 | 5 | 4 | 4 | 3 | 5 | 13 |
| 2-Sep | 6 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 11 | 8 | 11 | 11 | 13 | 10 | 12 | 11 | 8 | 7 | 6 | 6 | 6 | 8 | 8 | 5 | 13 |
| 3-Sep | 5 | 5 | 6 | 6 | 3 | 5 | 8 | 11 | 9 | 7 | 9 | 11 | 11 | 12 | 13 | 13 | 11 | 7 | 25 | 12 | 9 | 7 | 7 | 6 | 25 |
| 4-Sep | 6 | 5 | 8 | 4 | 6 | 4 | 5 | 9 | 12 | 18 | 16 | 16 | 22 | 28 | 36 | 33 | 26 | 11 | 12 | 9 | 11 | 3 | 15 | 6 | 36 |
| 5-Sep | 4 | 7 | 6 | 4 | 4 | 4 | 6 | 9 | 15 | 13 | 10 | 10 | 45 | 17 | 20 | 15 | 11 | 9 | 21 | 4 | 6 | 7 | 13 | 31 | 45 |
| 6-Sep | 15 | 7 | 15 | 17 | 5 | 9 | 18 | 89 | 57 | 25 | 30 | 56 | 84 | 56 | 73 | 47 | 24 | 14 | 48 | 26 | 16 | 14 | 8 | 4 | 89 |
| 7-Sep | 4 | 5 | 4 | 3 | 2 | 5 | 3 | 4 | 7 | 8 | 7 | 11 | 16 | 10 | 10 | 9 | 8 | 7 | 5 | 4 | 4 | 4 | 3 | 3 | 16 |
| 8-Sep | 11 | 9 | 8 | 6 | 9 | 15 | 5 | 34 | 10 | 19 | 22 | 12 | 16 | 22 | 13 | 20 | 11 | 16 | 12 | 8 | 21 | 10 | 17 | 16 | 34 |
| 9-Sep | 20 | 12 | 27 | 48 | 45 | 11 | 38 | 34 | 37 | 47 | 38 | 14 | 14 | 13 | 10 | 15 | 15 | 9 | 11 | 17 | 22 | 21 | 8 | 8 | 48 |
| 10-Sep | 12 | 19 | 15 | 10 | 15 | 9 | 8 | 7 | 8 | 8 | 7 | 8 | 8 | 8 | 10 | 9 | 10 | 7 | 7 | 7 | 5 | 7 | 5 | 8 | 19 |
| 11-Sep | 5 | 4 | 5 | 13 | 40 | 13 | 14 | 9 | 7 | 9 | 9 | 10 | 12 | 34 | 38 | 7 | 7 | 10 | 2 | 53 | 29 | 10 | 11 | 6 | 53 |
| 12-Sep | 7 | 7 | 9 | 8 | 9 | 7 | 6 | 7 | 7 | 8 | 9 | 10 | 10 | 10 | 8 | 15 | 12 | 35 | 8 | 7 | 9 | 9 | 12 | 15 | 35 |
| 13-Sep | 12 | 7 | 23 | 27 | 22 | 21 | 12 | 18 | 30 | 64 | 56 | 45 | 56 | 67 | 24 | 21 | 26 | 14 | 11 | 21 | 23 | 17 | 32 | 12 | 67 |
| 14-Sep | 7 | 7 | 23 | 20 | 18 | 17 | 17 | 11 | 38 | 23 | 16 | 30 | 31 | 22 | 28 | 30 | 14 | 10 | 7 | 4 | 4 | 11 | 7 | 13 | 38 |
| 15-Sep | 17 | 17 | 9 | 12 | 5 | 6 | 6 | 11 | 21 | 40 | 22 | 19 | 29 | 26 | 25 | 27 | 17 | 13 | 5 | 7 | 5 | 6 | 6 | 10 | 40 |
| 16-Sep | 4 | 4 | 3 | 4 | 2 | 3 | 3 | 3 | 7 | 13 | 12 | 13 | 13 | 14 | 15 | 15 | 17 | 13 | 6 | 4 | 3 | 3 | 5 | 2 | 17 |
| 17-Sep | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 7 | 7 | 9 | 12 | 13 | 14 | 8 | 9 | 8 | 8 | 6 | 5 | 5 | 5 | 5 | 5 | 14 |
| 18-Sep | 6 | 5 | 6 | 8 | 6 | 7 | 6 | 6 | 11 | 10 | 10 | 10 | 11 | 14 | 16 | 15 | 15 | 15 | 14 | 15 | 15 | 14 | 21 | 17 | 21 |
| 19-Sep | 12 | 9 | 9 | 10 | 33 | 15 | 18 | 10 | 9 | 11 | 13 | 19 | 30 | 18 | 15 | 9 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 14 | 33 |
| 20-Sep | 6 | 6 | 6 | 7 | 6 | 5 | 6 | 6 | 6 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 8 | 6 | 8 |
| 21-Sep | 6 | 8 | 9 | 6 | 9 | 10 | 10 | 10 | 9 | 10 | 11 | 10 | 9 | 11 | 10 | 8 | 7 | 8 | 8 | 8 | 9 | 9 | 9 | 11 | 11 |
| 22-Sep | 30 | 17 | 21 | 9 | 17 | 36 | 24 | 10 | 4 | 20 | 11 | 18 | 58 | 25 | 54 | 17 | 15 | 10 | 10 | 7 | 5 | 7 | 7 | 29 | 58 |
| 23-Sep | 10 | 20 | 14 | 5 | 6 | 3 | 6 | 8 | 12 | 18 | 23 | 18 | 10 | 17 | 19 | 33 | 13 | 5 | 4 | 2 | 3 | 4 | 3 | 4 | 33 |
| 24-Sep | 3 | 3 | 5 | 5 | 6 | 7 | 5 | 6 | 8 | 13 | 14 | 13 | 17 | 18 | 12 | 13 | 9 | 5 | 7 | 6 | 3 | 7 | 5 | 4 | 18 |
| 25-Sep | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 7 | 8 | 11 | 22 | 33 | 27 | 87 | 17 | 22 | 13 | 12 | 7 | 6 | 8 | 5 | 7 | 87 |
| 26-Sep | 7 | 11 | 15 | 8 | 5 | 7 | 9 | 3 | 11 | 13 | 9 | 16 | 13 | 10 | 14 | 11 | 8 | 11 | 5 | 9 | 13 | 8 | 23 | 14 | 23 |
| 27-Sep | 10 | 14 | 21 | 84 | 9 | 18 | 8 | 28 | 59 | 22 | 32 | 24 | 30 | 16 | 14 | 11 | 12 | 6 | 5 | 6 | 7 | 8 | 7 | 13 | 84 |
| 28-Sep | 23 | 18 | 17 | 11 | 5 | 5 | 5 | 7 | 10 | 10 | 8 | 9 | 10 | 20 | 12 | 9 | 8 | 7 | 4 | 3 | 4 | 4 | 5 | 3 | 23 |
| 29-Sep | 4 | 3 | 4 | 3 | 3 | 5 | 9 | 10 | 9 | 10 | 10 | 9 | 9 | 17 | 21 | 41 | 62 | 7 | 89 | 27 | 8 | 32 | 3 | 5 | 89 |
| 30-Sep | 3 | 3 | 7 | 6 | 7 | 5 | 5 | 9 | 11 | 43 | 11 | 8 | 9 | 73 | 14 | 15 | 8 | 8 | 12 | 6 | 7 | 6 | 6 | 6 | 73 |
| | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | |
| | | | | | | | | | | | | | | | | | 30 20 27 84 45 36 38 89 59 64 56 56 84 73 87 47 62 35 89 53 29 32 32 31 | | | | | | | | |





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

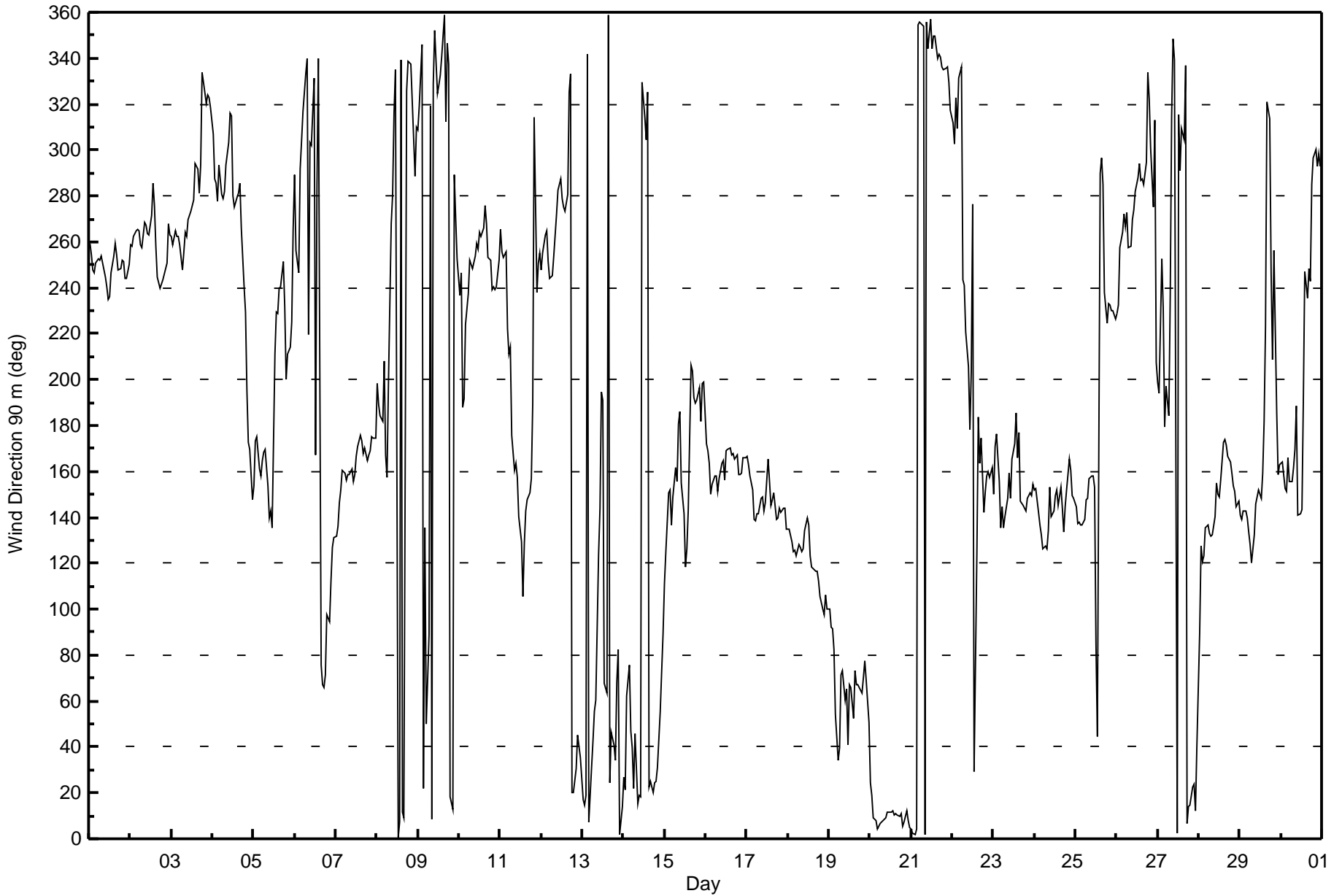
Wind Direction 90 m (WD90m) - deg

Mannix - September 2017

| | | | | |
|---|---------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 84 deg on Sep 6 15:00 | | | Hours of Data: | 720 |
| Minimum Value: 1 deg on Sep 17 02:00 | | | Hours of Missing Data: | 0 |
| | | | Hours of Calibration: | 0 |
| | | | Percent Operational Time: | 100.0 |
| Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 14 P ₉₀ = 25 P ₉₉ = 74 | | | | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 6 | 4 | 5 | 8 | 8 | 6 | 7 | 8 | 7 | 8 | 7 | 7 | 9 | 11 | 12 | 10 | 8 | 11 | 7 | 5 | 4 | 4 | 3 | 5 | 12 |
| 2-Sep | 5 | 5 | 5 | 4 | 3 | 4 | 4 | 5 | 11 | 7 | 10 | 10 | 12 | 10 | 12 | 10 | 7 | 7 | 5 | 6 | 6 | 7 | 7 | 4 | 12 |
| 3-Sep | 5 | 4 | 6 | 6 | 3 | 5 | 7 | 10 | 9 | 7 | 8 | 11 | 10 | 12 | 13 | 13 | 11 | 6 | 25 | 11 | 8 | 6 | 6 | 25 | |
| 4-Sep | 5 | 6 | 8 | 4 | 4 | 3 | 4 | 8 | 11 | 17 | 16 | 14 | 21 | 27 | 35 | 31 | 25 | 10 | 10 | 8 | 11 | 4 | 12 | 6 | 35 |
| 5-Sep | 4 | 11 | 8 | 5 | 5 | 3 | 6 | 8 | 15 | 12 | 10 | 10 | 43 | 15 | 18 | 15 | 10 | 8 | 17 | 3 | 6 | 7 | 11 | 22 | 43 |
| 6-Sep | 10 | 7 | 14 | 12 | 6 | 10 | 10 | 78 | 50 | 27 | 31 | 57 | 74 | 57 | 84 | 54 | 26 | 16 | 39 | 19 | 13 | 7 | 6 | 3 | 84 |
| 7-Sep | 2 | 6 | 2 | 3 | 4 | 6 | 2 | 3 | 7 | 7 | 7 | 11 | 16 | 10 | 10 | 9 | 8 | 7 | 4 | 3 | 4 | 4 | 3 | 4 | 16 |
| 8-Sep | 12 | 8 | 9 | 7 | 8 | 20 | 7 | 39 | 8 | 14 | 18 | 11 | 15 | 20 | 12 | 20 | 11 | 16 | 11 | 7 | 22 | 11 | 35 | 19 | 39 |
| 9-Sep | 15 | 8 | 25 | 50 | 43 | 14 | 26 | 80 | 35 | 53 | 41 | 14 | 14 | 12 | 10 | 15 | 15 | 8 | 11 | 16 | 21 | 21 | 7 | 8 | 80 |
| 10-Sep | 9 | 16 | 16 | 12 | 13 | 8 | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 10 | 9 | 10 | 7 | 7 | 7 | 4 | 5 | 5 | 8 | 16 |
| 11-Sep | 5 | 3 | 5 | 9 | 37 | 13 | 11 | 11 | 11 | 9 | 11 | 11 | 8 | 29 | 31 | 7 | 7 | 9 | 2 | 51 | 25 | 8 | 10 | 6 | 51 |
| 12-Sep | 7 | 6 | 9 | 8 | 9 | 6 | 6 | 7 | 6 | 8 | 8 | 10 | 9 | 9 | 8 | 15 | 12 | 34 | 7 | 7 | 9 | 9 | 12 | 14 | 34 |
| 13-Sep | 12 | 7 | 21 | 29 | 21 | 21 | 12 | 18 | 33 | 71 | 53 | 41 | 52 | 66 | 25 | 20 | 29 | 15 | 11 | 16 | 23 | 14 | 25 | 10 | 71 |
| 14-Sep | 8 | 7 | 19 | 17 | 19 | 18 | 17 | 9 | 36 | 26 | 16 | 31 | 29 | 22 | 28 | 30 | 14 | 10 | 6 | 4 | 3 | 10 | 7 | 7 | 36 |
| 15-Sep | 9 | 15 | 11 | 9 | 7 | 8 | 6 | 11 | 26 | 37 | 24 | 19 | 28 | 25 | 24 | 25 | 17 | 12 | 5 | 7 | 5 | 6 | 5 | 9 | 37 |
| 16-Sep | 5 | 5 | 3 | 3 | 5 | 2 | 4 | 3 | 7 | 12 | 11 | 13 | 14 | 15 | 15 | 15 | 17 | 13 | 6 | 4 | 3 | 2 | 4 | 2 | 17 |
| 17-Sep | 2 | 1 | 3 | 2 | 3 | 2 | 2 | 2 | 7 | 7 | 9 | 12 | 13 | 14 | 8 | 9 | 9 | 8 | 5 | 4 | 5 | 4 | 4 | 5 | 14 |
| 18-Sep | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 8 | 7 | 9 | 10 | 10 | 12 | 13 | 10 | 11 | 10 | 10 | 8 | 11 | 11 | 17 | 14 | 17 |
| 19-Sep | 6 | 7 | 6 | 9 | 29 | 16 | 19 | 10 | 8 | 11 | 12 | 19 | 29 | 18 | 15 | 9 | 8 | 8 | 7 | 8 | 8 | 9 | 8 | 14 | 29 |
| 20-Sep | 6 | 5 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 5 | 7 |
| 21-Sep | 5 | 7 | 8 | 5 | 9 | 10 | 9 | 9 | 8 | 10 | 10 | 9 | 8 | 10 | 9 | 8 | 7 | 7 | 7 | 8 | 8 | 9 | 9 | 11 | 11 |
| 22-Sep | 30 | 19 | 21 | 11 | 13 | 29 | 39 | 10 | 5 | 20 | 10 | 17 | 53 | 27 | 53 | 17 | 15 | 10 | 10 | 7 | 5 | 5 | 7 | 17 | 53 |
| 23-Sep | 9 | 15 | 12 | 6 | 4 | 3 | 5 | 7 | 11 | 17 | 22 | 17 | 9 | 16 | 19 | 33 | 12 | 5 | 3 | 2 | 2 | 4 | 3 | 4 | 33 |
| 24-Sep | 2 | 3 | 4 | 3 | 5 | 4 | 3 | 4 | 6 | 12 | 14 | 12 | 16 | 18 | 12 | 13 | 9 | 4 | 7 | 7 | 3 | 7 | 4 | 4 | 18 |
| 25-Sep | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 6 | 8 | 11 | 20 | 34 | 29 | 84 | 16 | 21 | 11 | 9 | 7 | 5 | 6 | 4 | 5 | 84 |
| 26-Sep | 6 | 10 | 12 | 7 | 5 | 5 | 11 | 6 | 8 | 13 | 9 | 15 | 12 | 9 | 12 | 11 | 7 | 10 | 5 | 8 | 10 | 8 | 26 | 21 | 26 |
| 27-Sep | 13 | 16 | 9 | 53 | 14 | 23 | 17 | 26 | 73 | 19 | 33 | 23 | 30 | 16 | 14 | 10 | 11 | 6 | 5 | 5 | 6 | 7 | 9 | 15 | 73 |
| 28-Sep | 20 | 13 | 11 | 6 | 5 | 3 | 3 | 5 | 8 | 10 | 8 | 9 | 10 | 20 | 12 | 9 | 7 | 6 | 4 | 3 | 3 | 3 | 4 | 2 | 20 |
| 29-Sep | 2 | 2 | 3 | 2 | 2 | 4 | 7 | 6 | 8 | 9 | 10 | 9 | 10 | 16 | 19 | 37 | 75 | 8 | 81 | 26 | 8 | 29 | 3 | 4 | 81 |
| 30-Sep | 4 | 5 | 6 | 4 | 4 | 2 | 4 | 8 | 11 | 43 | 12 | 8 | 10 | 64 | 13 | 15 | 8 | 8 | 11 | 5 | 6 | 5 | 5 | 6 | 64 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| | 30 | 19 | 25 | 53 | 43 | 29 | 39 | 80 | 73 | 71 | 53 | 57 | 74 | 66 | 84 | 54 | 75 | 34 | 81 | 51 | 25 | 29 | 35 | 22 | |
| | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |





| Maximum Value: 2.0 km/h on Sep 19 03:00 | | Maximum Daily Average: 1.1 km/h on Sep 19 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.1 km/h on Sep 30 23:00 | | Minimum Daily Average: -0.4 km/h on Sep 1 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.2 km/h at hour 11 | | Minimum Diurnal Average: 0.1 km/h at hour 20 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.17 km/h | | Percentiles: P ₁ = -0.7 P ₁₀ = -0.3 Q ₁ = -0.2 Median = 0.1 Q ₃ = 0.5 P ₉₀ = 0.7 P ₉₉ = 1.7 | | 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-Sep | -0.1 | -0.3 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 | -0.2 | -0.2 | -0.3 | -0.3 | -0.4 | -0.6 | -0.6 | -0.2 | -0.5 | -0.7 | -0.7 | -0.5 | -0.3 | -0.4 | -0.4 | -0.4 | -0.5 | -0.4 | -0.1 |
| 2-Sep | -0.1 | -0.3 | 0.1 | -0.1 | -0.3 | -0.3 | -0.1 | 0.0 | 0.2 | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | -0.4 | -0.5 | -0.6 | -0.5 | -0.1 | 0.1 | 0.1 | -0.2 | 0.2 |
| 3-Sep | 0.1 | 0.1 | 0.2 | 0.0 | -0.2 | -0.2 | -0.3 | 0.0 | 0.0 | -0.2 | -0.1 | -0.2 | -0.2 | -0.4 | -0.7 | -0.5 | -0.4 | -0.8 | -0.7 | -0.4 | -0.5 | -0.5 | -0.5 | -0.3 | -0.3 | 0.2 |
| 4-Sep | -0.2 | 0.1 | 0.0 | -0.1 | -0.3 | -0.4 | 0.0 | 0.2 | 0.0 | -0.2 | -0.2 | -0.3 | -0.3 | -0.5 | -0.1 | -0.3 | 0.0 | 0.0 | -0.3 | -0.1 | 0.2 | 0.5 | 0.5 | -0.1 | 0.5 | 0.5 |
| 5-Sep | 0.4 | 0.4 | 0.3 | 0.5 | 0.5 | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 | 0.6 | 0.4 | 0.1 | -0.3 | -0.1 | 0.0 | -0.3 | -0.1 | -0.2 | -0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.6 |
| 6-Sep | 0.1 | -0.2 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | -0.3 | 0.0 | -0.4 | -0.1 | 0.4 | 0.4 | 0.2 | 0.3 | 0.4 | 0.6 | 0.6 | 0.1 | 0.1 | 0.4 | 0.7 | 0.6 | 0.6 | 0.2 | 0.7 |
| 7-Sep | 0.5 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.7 | 0.8 | 0.6 | 0.3 | 0.3 | 0.0 | 0.2 | 0.3 | 0.2 | 0.5 | 0.2 | 0.5 | 0.6 | 0.6 | 0.6 | 0.5 | 0.8 |
| 8-Sep | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 | 0.5 | 0.5 | 0.2 | 0.0 | -0.1 | -0.2 | -0.1 | 0.0 | 0.2 | -0.1 | 0.1 | -0.1 | -0.3 | -0.1 | -0.2 | 0.1 | 0.1 | 0.1 | -0.1 | 0.1 | 0.5 |
| 9-Sep | 0.1 | 0.0 | 0.1 | 0.0 | 0.2 | 0.2 | 0.4 | -0.1 | 0.1 | 0.4 | 0.6 | -0.1 | -0.2 | 0.1 | -0.2 | -0.1 | -0.4 | -0.2 | -0.2 | 0.3 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.6 |
| 10-Sep | 0.0 | -0.2 | 0.2 | 0.1 | -0.1 | -0.3 | -0.3 | -0.3 | -0.6 | -0.5 | -0.6 | -0.5 | -0.3 | -0.4 | -0.7 | -0.1 | -0.3 | -0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.5 | -0.4 | -0.3 | 0.2 |
| 11-Sep | 0.0 | 0.0 | -0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.4 | 0.4 | 0.5 | 0.6 | 0.4 | 0.4 | 0.7 | 0.4 | 0.6 | 0.6 | 0.5 | 0.7 | 0.2 | -0.2 | -0.2 | -0.3 | -0.3 | 0.2 | 0.7 |
| 12-Sep | -0.4 | -0.5 | -0.6 | -0.2 | -0.4 | -0.5 | -0.5 | -0.5 | -0.3 | -0.3 | -0.6 | -0.4 | -0.4 | -0.3 | -0.1 | -0.2 | -0.2 | -0.1 | 0.0 | 0.3 | 0.4 | 0.6 | 0.4 | 0.2 | -0.2 | 0.6 |
| 13-Sep | 0.3 | 0.3 | 0.0 | -0.1 | 0.0 | 0.2 | 0.3 | 0.8 | 0.2 | 0.0 | 0.1 | -0.1 | 0.6 | 0.0 | 0.6 | -0.1 | 0.1 | 0.5 | 0.2 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | 0.2 | 0.8 |
| 14-Sep | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | -0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.0 | 0.1 | -0.3 | 0.2 | 0.4 | 0.3 | 0.3 | 0.1 | 0.1 | 0.2 | 0.3 | 0.7 | 0.6 | 0.2 | 0.7 |
| 15-Sep | 0.1 | -0.1 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.2 | -0.1 | 0.5 | 0.6 | 0.4 | 0.3 | 0.3 | 0.3 | -0.1 | -0.2 | 0.0 | -0.1 | -0.2 | -0.1 | 0.3 | 0.4 | 0.5 | 0.2 | 0.6 |
| 16-Sep | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.5 | 0.6 | 0.5 | 0.6 | 0.2 | 0.9 | 0.5 | 0.4 | 0.5 | 0.5 | 0.3 | 0.5 | 0.3 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.9 |
| 17-Sep | 0.5 | 0.5 | 0.6 | 0.5 | 0.6 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.9 | 0.8 | 0.5 | 0.9 | 1.0 | 0.9 | 0.7 | 0.9 | 0.6 | 0.6 | 0.8 | 0.8 | 0.9 | 0.8 | 0.7 | 1.0 |
| 18-Sep | 0.7 | 0.7 | 0.7 | 0.9 | 1.0 | 1.0 | 0.7 | 1.0 | 0.8 | 0.8 | 1.0 | 1.1 | 1.0 | 1.2 | 1.1 | 1.2 | 1.1 | 1.0 | 1.1 | 0.7 | 0.7 | 0.7 | 0.3 | 1.0 | 0.9 | 1.2 |
| 19-Sep | 1.7 | 1.9 | 2.0 | 1.9 | 0.3 | -0.1 | -0.2 | 0.1 | 0.4 | 0.3 | 0.9 | 0.6 | 1.0 | 1.3 | 1.0 | 1.7 | 1.8 | 1.6 | 1.8 | 1.4 | 1.8 | 1.7 | 1.7 | 1.1 | 1.1 | 2.0 |
| 20-Sep | 0.1 | -0.1 | 0.0 | -0.3 | -0.1 | -0.3 | -0.3 | -0.3 | -0.3 | -0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | -0.1 | -0.1 | -0.3 | 0.0 | -0.1 | -0.3 | -0.1 | 0.1 |
| 21-Sep | -0.3 | -0.2 | -0.2 | -0.5 | -0.4 | -0.2 | -0.1 | -0.2 | -0.2 | -0.3 | -0.1 | -0.2 | -0.1 | -0.1 | -0.4 | -0.7 | -0.5 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | -0.3 | -0.1 | -0.3 | -0.1 |
| 22-Sep | -0.1 | -0.1 | -0.1 | 0.1 | -0.1 | -0.2 | -0.1 | -0.1 | -0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.4 | 0.1 | 0.3 | 0.0 | 0.2 | 0.3 | 0.2 | 0.1 | 0.3 | 0.1 | 0.1 | 0.4 |
| 23-Sep | 0.3 | 0.2 | 0.0 | 0.1 | 0.3 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.2 | 0.3 | 0.2 | 0.2 | -0.1 | 0.5 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.5 |
| 24-Sep | 0.5 | 0.6 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.6 | 0.5 | 0.4 | 0.7 | 0.6 | 0.7 | 0.6 | 0.6 | 0.5 | 0.7 |
| 25-Sep | 0.7 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.5 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.0 | -0.2 | 0.1 | 0.1 | -0.1 | -0.4 | -0.4 | -0.2 | -0.1 | 0.0 | 0.2 | 0.7 |
| 26-Sep | -0.1 | 0.0 | -0.1 | -0.1 | -0.1 | -0.4 | -0.2 | -0.3 | -0.3 | -0.2 | -0.3 | -0.1 | -0.2 | -0.8 | -0.3 | -0.4 | -0.2 | -0.3 | -0.3 | -0.2 | -0.2 | -0.1 | 0.0 | 0.0 | -0.2 | 0.0 |
| 27-Sep | 0.1 | 0.2 | 0.1 | 0.3 | 0.3 | 0.2 | 0.3 | 0.2 | -0.1 | 0.4 | 0.2 | 0.1 | 0.0 | -0.3 | 0.1 | -0.2 | -0.2 | -0.2 | -0.1 | 0.0 | 0.3 | 0.0 | 0.0 | 0.1 | 0.1 | 0.4 |
| 28-Sep | 0.1 | 0.2 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.6 | 0.7 | 0.5 | 0.7 | 0.9 | 0.9 | 0.8 | 0.3 | 0.2 | 0.2 | 0.5 | 0.5 | 0.7 | 0.8 | 0.8 | 0.5 | 0.6 | 0.5 | 0.9 |
| 29-Sep | 0.6 | 0.5 | 0.6 | 0.6 | 0.7 | 0.5 | 0.6 | 0.5 | 0.5 | 0.4 | 0.7 | 0.8 | 0.8 | 0.4 | 0.1 | 0.3 | 0.1 | 0.0 | 0.1 | -0.1 | -0.1 | 0.2 | 0.4 | 0.3 | 0.4 | 0.8 |
| 30-Sep | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.4 | 0.3 | 0.5 | 0.4 | 0.6 | 0.5 | 0.6 | 0.2 | -0.4 | -0.3 | -0.4 | -0.4 | -0.3 | -0.5 | -0.6 | -0.7 | -1.1 | -0.5 | 0.0 | 0.6 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |



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



| Maximum Value: 2.5 km/h on Sep 16 12:00 | | Maximum Daily Average: 1.7 km/h on Sep 17 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.8 km/h on Sep 3 19:00 | | Minimum Daily Average: -1.1 km/h on Sep 20 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.5 km/h at hour 12 | | Minimum Diurnal Average: 0.2 km/h at hour 20 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.37 km/h | | Percentiles: P ₁ = -1.4 P ₁₀ = -0.6 Q ₁ = -0.2 Median = 0.2 Q ₃ = 1.1 P ₉₀ = 1.5 P ₉₉ = 2.0 | | 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-Sep | -0.4 | -0.4 | -0.2 | 0.0 | 0.1 | 0.0 | -0.2 | 0.0 | -0.2 | 0.0 | -0.1 | -0.3 | -0.8 | -0.2 | 0.0 | -0.6 | -0.6 | -0.3 | -0.2 | -0.3 | -0.4 | -0.3 | -0.4 | -0.4 | -0.3 | 0.1 |
| 2-Sep | -0.3 | -0.4 | -0.1 | -0.3 | -0.4 | -0.1 | 0.0 | 0.1 | 0.5 | -0.3 | -0.1 | -0.2 | -0.3 | -0.2 | -0.3 | -0.1 | 0.0 | -0.3 | -0.2 | -0.4 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 0.5 |
| 3-Sep | -0.2 | -0.1 | 0.0 | 0.0 | -0.3 | -0.2 | -0.2 | 0.1 | 0.1 | -0.1 | -0.2 | -0.2 | -0.3 | -0.5 | -0.5 | -0.7 | -0.1 | -0.9 | -1.8 | -1.0 | -0.8 | -1.2 | -0.8 | -0.7 | -0.4 | 0.1 |
| 4-Sep | -0.5 | -0.1 | -0.1 | -0.4 | -0.7 | -0.6 | 0.1 | 0.4 | -0.2 | -0.4 | -0.1 | -0.6 | -0.1 | -0.7 | -0.1 | -0.4 | 0.1 | -0.1 | 0.1 | 0.0 | 0.3 | 0.8 | 1.1 | 1.6 | 0.0 | 1.6 |
| 5-Sep | 1.3 | 1.0 | 0.7 | 0.9 | 1.3 | 1.4 | 1.4 | 1.1 | 0.7 | 0.8 | 1.0 | 0.7 | 0.4 | 0.3 | 0.3 | 0.3 | -0.2 | 0.1 | -0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.1 | 0.6 | 1.4 |
| 6-Sep | -0.1 | 0.0 | 0.2 | 0.1 | -0.1 | -0.1 | -0.1 | 0.0 | 0.3 | -0.2 | -0.1 | 1.0 | 0.6 | 0.6 | 0.7 | 0.6 | 0.6 | 0.8 | 0.2 | 0.1 | 0.4 | 1.1 | 1.5 | 1.6 | 0.4 | 1.6 |
| 7-Sep | 1.4 | 1.3 | 1.1 | 1.2 | 1.5 | 1.6 | 1.7 | 1.4 | 1.8 | 1.4 | 1.7 | 1.8 | 1.3 | 1.6 | 1.5 | 1.6 | 2.0 | 1.6 | 1.6 | 1.3 | 1.5 | 1.4 | 1.4 | 1.4 | 1.5 | 2.0 |
| 8-Sep | 0.7 | 1.1 | 1.2 | 1.3 | 0.8 | 1.2 | 1.2 | 0.7 | 0.0 | -0.2 | -0.5 | -0.5 | -0.5 | -0.1 | -0.6 | -0.3 | -0.6 | -0.5 | -0.8 | -0.6 | -0.1 | 0.0 | -0.1 | -0.1 | 0.1 | 1.3 |
| 9-Sep | -0.2 | -0.2 | 0.0 | 0.0 | 0.3 | 0.2 | 0.4 | -0.2 | 0.0 | 0.6 | 0.8 | -0.3 | -0.4 | 0.1 | -0.9 | -0.4 | -0.6 | -0.7 | -0.5 | -0.1 | 0.0 | 0.1 | 0.2 | 0.1 | -0.1 | 0.8 |
| 10-Sep | 0.1 | -0.1 | 0.5 | 0.4 | 0.1 | 0.0 | 0.0 | -0.1 | -0.2 | -0.1 | -0.4 | -0.3 | -0.2 | -0.1 | -0.6 | 0.0 | -0.3 | -0.7 | -0.5 | -0.3 | -0.2 | -0.1 | -0.3 | -0.4 | -0.2 | 0.5 |
| 11-Sep | -0.3 | -0.2 | -0.2 | -0.1 | 0.3 | 0.3 | 0.3 | 0.9 | 1.0 | 1.1 | 1.2 | 0.8 | 0.8 | 0.9 | 0.5 | 1.3 | 1.5 | 1.2 | 1.7 | 0.8 | -0.8 | -0.1 | -0.3 | -0.4 | 0.5 | 1.7 |
| 12-Sep | -0.3 | -0.5 | -0.7 | -0.2 | -0.2 | -0.2 | -0.3 | -0.4 | -0.2 | -0.2 | -0.8 | -0.3 | -0.4 | -0.3 | -0.1 | -0.4 | -0.7 | -0.1 | -0.1 | -0.2 | -0.1 | 0.2 | 0.1 | -0.2 | -0.3 | 0.2 |
| 13-Sep | 0.0 | -0.2 | -0.2 | -0.1 | -0.4 | -0.1 | 0.1 | 1.0 | 0.2 | 0.0 | 0.3 | 0.3 | 0.9 | -0.1 | 0.5 | -0.2 | -0.1 | 0.3 | 0.1 | 0.0 | 0.0 | 0.1 | -0.1 | -0.1 | 0.1 | 1.0 |
| 14-Sep | -0.2 | -0.1 | 0.2 | 0.1 | 0.1 | 0.0 | -0.2 | 0.2 | 0.3 | -0.1 | -0.1 | 0.0 | 0.1 | -0.3 | 0.4 | 0.2 | 0.1 | 0.1 | 0.0 | -0.2 | -0.3 | 0.2 | 0.5 | 0.5 | 0.1 | 0.5 |
| 15-Sep | 0.4 | 0.3 | 0.4 | 0.5 | 0.9 | 0.9 | AF | 0.6 | 0.3 | 0.9 | 0.8 | 0.7 | 0.3 | 0.5 | 0.4 | 0.4 | 0.2 | 0.5 | 0.5 | 0.3 | 0.4 | 1.2 | 0.8 | 1.1 | 0.6 | 1.2 |
| 16-Sep | 1.6 | 1.5 | 1.3 | 1.2 | 1.5 | 1.3 | 1.7 | 1.5 | 1.2 | 1.5 | 1.5 | 2.5 | 2.2 | 1.9 | 1.5 | 1.6 | 1.6 | 1.6 | 1.3 | 1.5 | 1.4 | 1.4 | 1.7 | 1.8 | 1.6 | 2.5 |
| 17-Sep | 1.7 | 1.5 | 1.6 | 1.5 | 1.6 | 1.3 | 1.3 | 1.5 | 1.3 | 1.6 | 1.5 | 1.7 | 2.1 | 2.5 | 1.9 | 2.1 | 1.6 | 2.1 | 1.4 | 1.5 | 1.8 | 1.9 | 1.9 | 1.7 | 1.7 | 2.5 |
| 18-Sep | 1.7 | 1.6 | 1.3 | 1.3 | 1.8 | 1.5 | 1.7 | 1.7 | 1.0 | 1.1 | 1.6 | 2.4 | 1.6 | 1.6 | 1.5 | 1.5 | 1.7 | 1.5 | 1.6 | 0.6 | 0.4 | 0.5 | 0.5 | 0.8 | 1.3 | 2.4 |
| 19-Sep | 1.3 | 1.6 | 1.9 | 1.5 | 0.3 | -0.4 | -0.4 | 0.2 | 0.4 | 0.2 | 0.8 | 0.3 | 0.9 | 0.9 | 0.6 | 1.3 | 1.2 | 1.2 | 1.2 | 0.7 | 1.2 | 1.3 | 1.2 | 0.8 | 0.8 | 1.9 |
| 20-Sep | -0.3 | -0.6 | -0.9 | -0.9 | -1.1 | -1.2 | -1.2 | -1.4 | -1.4 | -1.3 | -1.1 | -1.4 | -1.0 | -1.2 | -1.2 | -1.1 | -1.2 | -1.3 | -1.1 | -1.2 | -1.2 | -0.6 | -0.4 | -1.2 | -1.1 | -0.3 |
| 21-Sep | -1.4 | -1.0 | -0.8 | -1.7 | -0.6 | -0.4 | -0.6 | -0.5 | -0.3 | -0.5 | -0.7 | -0.6 | -1.0 | -0.5 | -0.8 | -1.5 | -1.6 | -1.3 | -1.1 | -0.9 | -0.7 | -0.6 | -0.7 | -0.3 | -0.9 | -0.3 |
| 22-Sep | -0.2 | -0.1 | -0.1 | 0.1 | -0.1 | -0.1 | -0.1 | 0.0 | 0.0 | 0.3 | 0.4 | 0.4 | 0.2 | 0.2 | 0.9 | 0.3 | 0.7 | 0.2 | 0.4 | 0.8 | 0.9 | 0.6 | 0.7 | 0.2 | 0.3 | 0.9 |
| 23-Sep | 0.6 | 0.3 | 0.1 | 0.5 | 0.8 | 0.9 | 0.8 | 0.8 | 0.9 | 1.1 | 1.0 | 0.8 | 0.9 | 0.9 | 0.7 | 0.3 | 1.2 | 1.2 | 1.1 | 1.1 | 1.5 | 1.5 | 1.3 | 1.2 | 0.9 | 1.5 |
| 24-Sep | 1.4 | 1.5 | 1.6 | 1.0 | 1.1 | 1.0 | 1.2 | 0.9 | 0.7 | 0.9 | 0.6 | 0.5 | 0.8 | 0.9 | 1.1 | 1.2 | 1.3 | 1.1 | 1.2 | 1.6 | 1.7 | 1.6 | 1.5 | 1.4 | 1.2 | 1.7 |
| 25-Sep | 1.4 | 1.2 | 1.1 | 0.9 | 1.0 | 1.0 | 1.1 | 1.0 | 1.3 | 1.3 | 1.1 | 0.9 | 0.4 | 0.6 | -0.2 | -0.1 | 0.0 | 0.0 | 0.0 | -0.2 | -0.2 | 0.0 | 0.0 | 0.1 | 0.6 | 1.4 |
| 26-Sep | 0.0 | 0.0 | -0.1 | -0.2 | -0.2 | -0.3 | -0.2 | -0.2 | -0.1 | -0.2 | -0.1 | 0.3 | 0.0 | -0.8 | -0.2 | -0.5 | -0.2 | -0.5 | -0.6 | -0.5 | 0.0 | -0.1 | 0.0 | 0.2 | -0.2 | 0.3 |
| 27-Sep | 0.2 | 0.4 | 0.1 | 0.5 | 0.8 | 0.6 | 0.8 | 0.2 | 0.1 | 0.6 | 0.0 | 0.1 | -0.2 | -0.2 | 0.0 | -0.3 | -0.8 | -0.9 | -0.6 | -0.6 | -0.2 | -0.2 | -0.2 | -0.1 | 0.0 | 0.8 |
| 28-Sep | 0.2 | 0.5 | 0.8 | 0.7 | 1.1 | 0.9 | 0.9 | 1.2 | 1.4 | 1.0 | 1.6 | 2.0 | 2.0 | 1.8 | 1.5 | 1.2 | 1.5 | 1.5 | 1.6 | 1.8 | 1.7 | 1.7 | 1.2 | 1.4 | 1.3 | 2.0 |
| 29-Sep | 1.2 | 1.2 | 1.5 | 1.5 | 1.5 | 1.3 | 1.0 | 0.4 | 0.8 | 0.6 | 1.5 | 1.6 | 1.6 | 1.3 | 0.4 | 0.6 | 0.0 | -0.4 | 0.0 | 0.3 | -0.1 | 0.6 | 1.2 | 1.0 | 0.9 | 1.6 |
| 30-Sep | 1.2 | 0.9 | 0.9 | 1.0 | 0.5 | 1.0 | 1.2 | 0.9 | 0.7 | 0.5 | 0.9 | 0.7 | 1.0 | 0.4 | 0.0 | 0.0 | -0.2 | -0.2 | -0.5 | -0.8 | -0.9 | -1.0 | -1.4 | -0.9 | 0.2 | 1.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| AF - Analyzer Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 45 m (VW45m) - km/h
Mannix - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.2 km/h on Sep 3 19:00 | Hours of Data: 719 |
| Minimum Value: 0.1 km/h on Sep 4 20:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.6 Q ₃ = 2.4 P ₉₀ = 3.0 P ₉₉ = 3.9 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 1.8 | 1.4 | 1.6 | 2.2 | 3.0 | 3.0 | 3.1 | 3.1 | 2.3 | 2.5 | 2.8 | 2.6 | 2.8 | 3.4 | 3.4 | 3.2 | 3.3 | 3.2 | 3.4 | 2.3 | 1.8 | 1.3 | 1.5 | 2.2 | 3.4 |
| 2-Sep | 2.0 | 2.0 | 1.9 | 1.2 | 1.1 | 1.3 | 1.7 | 2.0 | 2.3 | 2.0 | 2.2 | 2.6 | 2.2 | 1.9 | 1.6 | 1.8 | 1.8 | 1.6 | 2.0 | 2.4 | 2.4 | 1.5 | 1.2 | 1.3 | 2.6 |
| 3-Sep | 1.3 | 1.3 | 1.6 | 1.3 | 1.1 | 0.8 | 0.9 | 1.8 | 2.3 | 2.7 | 2.9 | 3.0 | 3.3 | 3.0 | 3.3 | 3.0 | 2.9 | 2.8 | 4.2 | 2.9 | 3.3 | 2.8 | 2.4 | 1.9 | 4.2 |
| 4-Sep | 0.9 | 0.8 | 0.7 | 0.7 | 0.6 | 0.7 | 1.2 | 1.5 | 1.8 | 2.3 | 2.7 | 2.8 | 2.7 | 2.6 | 2.3 | 2.6 | 2.1 | 1.4 | 0.7 | 0.1 | 0.2 | 0.4 | 1.0 | 1.0 | 2.8 |
| 5-Sep | 1.2 | 1.1 | 0.9 | 1.2 | 1.3 | 1.5 | 1.5 | 1.4 | 1.3 | 1.5 | 1.7 | 2.1 | 2.4 | 2.7 | 2.6 | 2.4 | 1.8 | 1.3 | 0.2 | 0.3 | 0.4 | 0.6 | 1.1 | 0.8 | 2.7 |
| 6-Sep | 0.5 | 0.3 | 0.3 | 0.3 | 0.4 | 0.6 | 0.3 | 0.6 | 1.3 | 1.5 | 1.9 | 2.1 | 1.9 | 2.1 | 1.9 | 1.7 | 1.6 | 1.2 | 0.4 | 0.3 | 0.8 | 1.5 | 1.7 | 1.8 | 2.1 |
| 7-Sep | 1.0 | 0.7 | 0.5 | 0.6 | 1.4 | 1.2 | 1.1 | 1.4 | 1.8 | 1.7 | 2.3 | 2.6 | 2.5 | 2.9 | 3.0 | 2.9 | 2.7 | 2.5 | 1.6 | 1.3 | 1.3 | 1.2 | 0.7 | 0.5 | 3.0 |
| 8-Sep | 0.6 | 0.5 | 0.8 | 0.6 | 0.5 | 0.9 | 0.9 | 0.8 | 1.0 | 1.0 | 1.9 | 2.7 | 2.5 | 1.7 | 2.2 | 1.9 | 1.8 | 1.5 | 1.8 | 1.7 | 0.8 | 0.4 | 0.4 | 0.3 | 2.7 |
| 9-Sep | 0.3 | 0.3 | 0.3 | 0.5 | 0.4 | 0.7 | 0.7 | 0.5 | 0.8 | 1.3 | 1.5 | 1.9 | 2.2 | 2.4 | 2.5 | 2.1 | 1.7 | 1.6 | 1.4 | 1.4 | 1.1 | 0.7 | 1.0 | 1.2 | 2.5 |
| 10-Sep | 0.7 | 1.0 | 0.6 | 0.7 | 1.2 | 1.4 | 2.6 | 2.9 | 3.2 | 3.2 | 3.3 | 3.5 | 3.4 | 3.7 | 3.8 | 2.4 | 3.0 | 3.8 | 3.1 | 1.9 | 1.5 | 1.0 | 1.6 | 2.5 | 3.8 |
| 11-Sep | 1.4 | 1.1 | 1.3 | 1.0 | 1.1 | 0.8 | 0.7 | 0.9 | 1.1 | 1.2 | 1.2 | 1.1 | 1.4 | 1.4 | 1.4 | 1.8 | 2.0 | 1.6 | 1.1 | 2.5 | 1.7 | 0.2 | 0.9 | 1.0 | 2.5 |
| 12-Sep | 1.5 | 2.9 | 3.3 | 2.8 | 2.6 | 2.5 | 2.8 | 2.5 | 2.2 | 2.3 | 2.4 | 2.4 | 2.1 | 2.0 | 1.9 | 2.0 | 2.1 | 1.3 | 1.7 | 1.9 | 2.1 | 1.6 | 1.4 | 1.1 | 3.3 |
| 13-Sep | 1.4 | 1.7 | 1.3 | 0.8 | 1.2 | 1.1 | 1.1 | 1.5 | 1.4 | 1.5 | 1.5 | 2.1 | 1.6 | 1.8 | 1.9 | 1.5 | 1.1 | 1.2 | 0.8 | 0.8 | 0.4 | 0.4 | 0.3 | 0.3 | 2.1 |
| 14-Sep | 0.2 | 0.3 | 0.3 | 0.5 | 0.6 | 0.3 | 0.4 | 0.6 | 1.1 | 1.5 | 2.1 | 2.0 | 2.3 | 2.5 | 2.8 | 2.2 | 2.1 | 1.8 | 1.1 | 1.2 | 1.4 | 1.1 | 0.9 | 0.6 | 2.8 |
| 15-Sep | 0.5 | 0.4 | 0.2 | 0.3 | 0.5 | 0.6 | AF | 1.2 | 1.1 | 1.7 | 1.8 | 1.8 | 1.9 | 2.1 | 2.2 | 2.4 | 1.9 | 1.5 | 0.6 | 0.3 | 0.3 | 0.5 | 0.6 | 0.7 | 2.4 |
| 16-Sep | 0.8 | 0.9 | 1.2 | 0.6 | 0.7 | 0.8 | 1.1 | 1.3 | 1.5 | 1.9 | 2.5 | 3.5 | 3.3 | 3.1 | 3.1 | 2.8 | 2.5 | 2.2 | 1.2 | 0.8 | 0.9 | 0.6 | 0.7 | 0.5 | 3.5 |
| 17-Sep | 0.6 | 1.0 | 1.3 | 1.2 | 1.3 | 1.1 | 1.4 | 1.6 | 2.0 | 2.4 | 2.6 | 3.3 | 3.3 | 3.2 | 3.0 | 2.7 | 2.4 | 2.7 | 2.1 | 1.9 | 2.0 | 2.5 | 2.3 | 2.2 | 3.3 |
| 18-Sep | 2.5 | 2.3 | 1.7 | 2.0 | 2.1 | 2.0 | 2.2 | 2.6 | 2.6 | 2.5 | 2.8 | 3.5 | 3.4 | 2.9 | 2.9 | 2.9 | 3.0 | 2.6 | 2.5 | 2.1 | 1.9 | 2.0 | 1.8 | 3.0 | 3.5 |
| 19-Sep | 2.1 | 2.5 | 2.6 | 3.0 | 1.8 | 1.2 | 1.1 | 1.1 | 1.4 | 1.4 | 2.0 | 2.2 | 2.4 | 2.4 | 2.7 | 3.8 | 3.5 | 3.2 | 3.3 | 3.3 | 3.7 | 3.8 | 3.6 | 2.6 | 3.8 |
| 20-Sep | 2.0 | 2.1 | 2.6 | 2.9 | 3.3 | 2.8 | 3.2 | 3.7 | 4.1 | 4.0 | 4.0 | 4.1 | 4.1 | 3.8 | 3.8 | 3.8 | 3.7 | 3.9 | 4.0 | 3.4 | 3.4 | 3.4 | 3.3 | 3.1 | 4.1 |
| 21-Sep | 3.1 | 3.5 | 3.9 | 3.6 | 3.5 | 3.4 | 3.2 | 2.9 | 3.5 | 2.9 | 3.2 | 2.9 | 2.9 | 3.1 | 3.4 | 3.2 | 3.1 | 2.9 | 2.6 | 2.2 | 2.1 | 1.7 | 1.3 | 1.2 | 3.9 |
| 22-Sep | 0.8 | 0.4 | 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 1.1 | 1.0 | 1.5 | 1.7 | 1.9 | 1.3 | 0.7 | 0.9 | 0.6 | 0.4 | 0.3 | 0.7 | 0.8 | 0.5 | 0.8 | 1.9 |
| 23-Sep | 0.9 | 0.9 | 0.4 | 0.3 | 0.8 | 0.7 | 0.6 | 1.0 | 1.4 | 1.6 | 1.8 | 1.4 | 1.6 | 1.9 | 2.0 | 2.1 | 1.6 | 1.3 | 0.9 | 1.0 | 1.4 | 1.4 | 1.1 | 1.0 | 2.1 |
| 24-Sep | 1.0 | 0.8 | 1.1 | 1.3 | 0.8 | 0.6 | 0.8 | 0.8 | 1.1 | 1.7 | 1.8 | 2.0 | 2.3 | 2.2 | 2.2 | 2.3 | 1.7 | 1.3 | 0.9 | 1.5 | 0.9 | 1.3 | 1.7 | 1.6 | 2.3 |
| 25-Sep | 1.6 | 1.4 | 1.2 | 1.4 | 1.1 | 1.3 | 1.2 | 1.1 | 1.4 | 1.6 | 1.8 | 2.0 | 1.8 | 1.9 | 1.9 | 1.8 | 0.8 | 0.6 | 0.4 | 0.6 | 0.5 | 0.5 | 0.6 | 0.5 | 2.0 |
| 26-Sep | 0.6 | 0.4 | 0.7 | 0.6 | 0.5 | 0.3 | 0.5 | 0.9 | 1.1 | 1.4 | 1.9 | 2.4 | 2.8 | 2.8 | 2.6 | 2.4 | 1.9 | 1.2 | 0.6 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 2.8 |
| 27-Sep | 0.3 | 0.4 | 0.3 | 0.6 | 0.4 | 0.4 | 0.5 | 0.6 | 1.0 | 1.5 | 1.9 | 2.2 | 1.7 | 1.9 | 2.3 | 1.4 | 1.6 | 1.6 | 2.0 | 2.0 | 1.8 | 1.0 | 0.6 | 0.7 | 2.3 |
| 28-Sep | 0.6 | 1.2 | 1.1 | 1.1 | 0.8 | 0.9 | 0.9 | 1.6 | 1.7 | 1.8 | 2.2 | 2.7 | 2.8 | 2.8 | 2.9 | 2.6 | 2.6 | 1.7 | 1.6 | 1.4 | 1.5 | 1.7 | 1.3 | 1.3 | 2.9 |
| 29-Sep | 1.3 | 1.8 | 1.8 | 1.8 | 1.8 | 1.7 | 1.5 | 2.1 | 1.7 | 1.8 | 2.2 | 2.4 | 2.5 | 2.5 | 2.0 | 1.9 | 1.5 | 0.5 | 0.5 | 0.6 | 0.2 | 0.5 | 0.3 | 0.5 | 2.5 |
| 30-Sep | 0.7 | 0.5 | 0.6 | 0.6 | 0.5 | 0.6 | 0.8 | 1.0 | 1.0 | 1.3 | 1.7 | 1.6 | 1.9 | 1.7 | 2.2 | 2.1 | 1.7 | 1.0 | 1.1 | 1.5 | 2.1 | 2.3 | 2.8 | 2.6 | 2.8 |
| | 3.1 | 3.5 | 3.9 | 3.6 | 3.5 | 3.4 | 3.2 | 3.7 | 4.1 | 4.0 | 4.0 | 4.1 | 4.1 | 3.8 | 3.8 | 3.8 | 3.7 | 3.9 | 4.2 | 3.4 | 3.7 | 3.8 | 3.6 | 3.1 | |

Diurnal Maximum

AF - Analyzer Failure



| Maximum Value: 1.7 km/h on Sep 17 14:00 Maximum Daily Average: 1.0 km/h on Sep 16 | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | |
|--|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.5 km/h on Sep 21 04:00 Minimum Daily Average: -0.6 km/h on Sep 20 Maximum Diurnal Average: 0.5 km/h at hour 12 Minimum Diurnal Average: 0.2 km/h at hour 20 Monthly Average: 0.30 km/h Percentiles: $P_1 = -0.8$ $P_{10} = -0.2$ $Q_1 = 0.0$ Median = 0.2 $Q_3 = 0.6$ $P_{90} = 0.9$ $P_{99} = 1.3$ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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-Sep | -0.1 | -0.1 | 0.3 | 0.4 | 0.7 | 0.5 | 0.4 | 0.5 | 0.1 | 0.4 | 0.1 | 0.0 | -0.9 | 0.2 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | -0.1 | 0.1 | 0.2 | 0.8 |
| 2-Sep | 0.0 | -0.1 | 0.4 | 0.1 | 0.2 | 0.7 | 0.7 | 0.6 | 1.2 | 0.1 | 0.4 | 0.4 | 0.3 | 0.2 | 0.0 | 0.2 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.1 | 0.3 | 0.3 | 1.2 |
| 3-Sep | 0.2 | 0.3 | 0.5 | 0.5 | 0.2 | 0.1 | -0.1 | 0.4 | 0.6 | 0.5 | 0.5 | 1.0 | 0.7 | 0.4 | 0.7 | 0.4 | 1.2 | 0.3 | -0.7 | -0.3 | 0.1 | -0.3 | -0.2 | 0.0 | 0.3 | 1.2 |
| 4-Sep | 0.4 | 0.4 | 0.4 | 0.0 | -0.5 | -0.3 | 0.6 | 1.0 | 0.1 | 0.2 | 0.7 | 0.2 | 0.5 | -0.2 | 0.3 | -0.1 | 0.6 | 0.1 | 0.2 | 0.0 | 0.1 | 0.5 | 0.6 | 0.5 | 0.3 | 1.0 |
| 5-Sep | 0.6 | 0.6 | 0.2 | 0.6 | 1.0 | 1.0 | 1.0 | 0.6 | 0.3 | 0.4 | 0.3 | 0.0 | 0.4 | 0.3 | 0.6 | 0.6 | -0.1 | 0.4 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.4 | 1.0 |
| 6-Sep | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 | -0.1 | 0.2 | 1.5 | 0.9 | 1.2 | 1.0 | 0.6 | 0.6 | 0.7 | 0.6 | 0.1 | 0.3 | 0.3 | 0.1 | 0.4 | 0.4 | 1.5 |
| 7-Sep | 0.0 | 0.1 | 0.8 | 1.3 | 1.6 | 1.4 | 1.5 | 1.2 | 1.1 | 0.8 | 1.0 | 1.3 | 0.6 | 0.8 | 0.7 | 0.9 | 1.1 | 0.9 | 1.1 | 0.8 | 0.9 | 0.6 | 0.6 | 0.6 | 0.9 | 1.6 |
| 8-Sep | 0.1 | 0.4 | 0.5 | 0.5 | 0.2 | 0.5 | 0.7 | 0.4 | 0.2 | -0.1 | -0.1 | -0.1 | -0.1 | 0.1 | -0.1 | -0.2 | -0.2 | 0.0 | -0.1 | -0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.1 | 0.7 |
| 9-Sep | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.7 | 1.0 | -0.1 | 0.1 | 0.5 | -0.4 | 0.3 | 0.1 | -0.3 | -0.1 | 0.0 | -0.1 | 0.4 | 0.5 | 0.3 | 0.2 | 1.0 |
| 10-Sep | 0.1 | 0.0 | 0.2 | 0.2 | 0.1 | 0.2 | 0.6 | 0.4 | 0.3 | 0.5 | 0.2 | 0.8 | 0.6 | 1.2 | 0.6 | 0.9 | 0.6 | -0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.3 | 1.2 |
| 11-Sep | 0.4 | 0.2 | 0.3 | 0.3 | 0.1 | 0.0 | -0.1 | 0.4 | 0.3 | 0.6 | 0.6 | 0.2 | 0.1 | 0.8 | 0.0 | 0.4 | 0.6 | 0.6 | 1.1 | 0.6 | -0.2 | -0.1 | -0.2 | 0.0 | 0.3 | 1.1 |
| 12-Sep | 0.1 | 0.2 | 0.2 | 0.5 | 0.2 | 0.2 | 0.1 | 0.1 | 0.4 | 0.6 | 0.3 | 0.6 | 0.3 | 0.3 | 0.7 | 0.3 | -0.1 | 0.1 | 0.0 | -0.2 | -0.1 | 0.2 | 0.0 | -0.3 | 0.2 | 0.7 |
| 13-Sep | -0.1 | -0.2 | -0.4 | -0.1 | -0.5 | -0.2 | 0.1 | 1.2 | 0.0 | -0.3 | 0.0 | 0.3 | 1.0 | -0.2 | 0.4 | -0.1 | -0.3 | 0.3 | 0.1 | 0.1 | -0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 1.2 |
| 14-Sep | 0.2 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.5 | 0.1 | -0.1 | 0.1 | 0.4 | 0.2 | 1.2 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 0.2 | 1.2 |
| 15-Sep | 0.1 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.1 | 0.6 | 0.6 | 0.2 | 0.0 | 0.0 | -0.2 | 0.3 | -0.1 | 0.4 | 0.3 | 0.2 | 0.2 | 0.7 | 0.2 | 0.3 | 0.3 | 0.7 |
| 16-Sep | 1.0 | 1.1 | 0.9 | 1.1 | 1.1 | 0.8 | 1.0 | 1.0 | 0.6 | 1.1 | 0.9 | 1.5 | 1.3 | 1.2 | 0.6 | 1.0 | 1.3 | 0.8 | 0.9 | 1.2 | 1.1 | 1.1 | 1.0 | 1.2 | 1.0 | 1.5 |
| 17-Sep | 1.2 | 1.3 | 1.3 | 0.8 | 0.3 | 0.2 | 0.1 | 0.3 | 0.6 | 0.6 | 0.1 | 0.9 | 1.2 | 1.7 | 0.3 | 0.9 | 0.6 | 0.5 | 0.1 | 0.3 | 0.3 | 0.7 | 0.6 | 0.2 | 0.6 | 1.7 |
| 18-Sep | 0.1 | 0.0 | 0.1 | -0.2 | 0.0 | -0.3 | 0.2 | -0.1 | -0.2 | -0.2 | 0.2 | 0.8 | -0.1 | 0.3 | 0.6 | 0.6 | 0.8 | 0.7 | 1.6 | 0.4 | 0.1 | 0.0 | 0.3 | 0.2 | 0.2 | 1.6 |
| 19-Sep | 0.6 | 0.5 | 0.7 | 0.5 | 0.4 | 0.1 | 0.0 | 0.7 | 0.7 | 0.4 | 0.7 | 0.2 | 0.4 | 0.4 | 0.5 | 0.5 | 0.8 | 0.8 | 0.7 | 0.4 | 0.5 | 0.6 | 0.4 | 0.7 | 0.5 | 0.8 |
| 20-Sep | 0.0 | -0.3 | -0.4 | -0.5 | -0.7 | -0.6 | -0.6 | -0.8 | -0.9 | -0.6 | -0.5 | -0.9 | -0.3 | -0.7 | -0.8 | -0.6 | -0.7 | -0.7 | -0.6 | -0.8 | -0.8 | -0.5 | -0.1 | -0.8 | -0.6 | 0.0 |
| 21-Sep | -0.9 | -0.3 | -0.1 | -1.5 | 0.3 | 0.9 | 0.1 | 0.5 | 0.3 | 0.5 | 0.2 | 0.4 | 0.0 | 0.5 | 0.0 | -0.8 | -1.0 | -0.7 | -0.3 | -0.5 | -0.2 | -0.2 | -0.4 | 0.1 | -0.1 | 0.9 |
| 22-Sep | -0.1 | 0.1 | 0.1 | 0.4 | 0.1 | 0.1 | 0.0 | 0.1 | -0.1 | 0.3 | 0.2 | 0.2 | 0.3 | 0.0 | 0.9 | 0.2 | 0.4 | 0.1 | 0.2 | 0.4 | 0.9 | 0.7 | 0.5 | 0.2 | 0.3 | 0.9 |
| 23-Sep | 0.5 | 0.3 | 0.1 | 0.4 | 0.1 | 0.3 | 0.1 | 0.3 | 0.3 | 1.0 | 0.3 | 0.6 | 0.8 | 0.9 | 0.4 | 0.0 | 0.8 | 0.4 | 0.3 | 0.2 | 0.7 | 0.8 | 0.7 | 0.8 | 0.5 | 1.0 |
| 24-Sep | 0.8 | 0.9 | 0.4 | 0.1 | -0.2 | -0.3 | 0.1 | 0.1 | 0.3 | 0.6 | 0.0 | 0.0 | 0.4 | 0.4 | 0.4 | 0.7 | 0.6 | 0.1 | 0.3 | 0.9 | 1.2 | 1.1 | 0.8 | 0.7 | 0.4 | 1.2 |
| 25-Sep | 0.7 | 0.1 | 0.2 | -0.1 | 0.1 | 0.1 | 0.7 | 0.5 | 0.8 | 0.7 | 0.7 | 0.6 | 0.3 | 0.9 | -0.1 | 0.5 | 0.3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 | 0.9 |
| 26-Sep | 0.0 | 0.1 | 0.1 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.0 | 0.4 | 1.4 | 0.9 | 0.3 | 0.9 | 0.5 | 0.8 | 0.3 | -0.2 | -0.2 | 0.3 | 0.3 | 0.2 | 0.1 | 0.3 | 1.4 |
| 27-Sep | 0.2 | 0.2 | 0.0 | 0.2 | 0.3 | 0.2 | 0.3 | 0.1 | 0.2 | 0.7 | 0.2 | 0.2 | 0.0 | 0.3 | 0.1 | 0.2 | -0.5 | -0.4 | -0.5 | -0.3 | -0.2 | -0.1 | -0.1 | 0.0 | 0.1 | 0.7 |
| 28-Sep | 0.5 | 0.2 | 0.5 | -0.2 | 0.1 | 0.2 | 0.0 | 0.2 | 0.5 | 0.2 | 0.9 | 1.1 | 1.2 | 1.1 | 1.2 | 0.7 | 0.9 | 1.0 | 1.1 | 1.4 | 1.1 | 1.1 | 0.4 | 0.7 | 0.7 | 1.4 |
| 29-Sep | 0.0 | -0.1 | 0.3 | 0.1 | -0.1 | 0.2 | -0.1 | -0.6 | -0.2 | 0.1 | 0.8 | 0.9 | 0.9 | 0.7 | 0.2 | 0.7 | 0.5 | 0.0 | 0.2 | 0.2 | 0.1 | 0.4 | 0.9 | 0.9 | 0.3 | 0.9 |
| 30-Sep | 1.0 | 0.8 | 0.4 | 0.6 | 0.4 | 0.8 | 0.8 | 0.8 | 0.4 | 0.3 | 0.4 | 0.1 | 0.4 | 0.5 | 0.4 | 0.4 | 0.2 | 0.0 | 0.3 | 0.3 | 0.3 | 0.1 | 0.2 | 0.2 | 0.4 | 1.0 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 75 m (VW75m) - km/h
Mannix - September 2017

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



| Maximum Value: 2.4 km/h on Sep 21 06:00 | | Maximum Daily Average: 1.2 km/h on Sep 20 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -1.4 km/h on Sep 1 13:00 | | Minimum Daily Average: -0.1 km/h on Sep 1 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.6 km/h at hour 12 | | Minimum Diurnal Average: 0.2 km/h at hour 23 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.35 km/h | | Percentiles: $P_1 = -0.4$ $P_{10} = -0.1$ $Q_1 = 0.1$ Median = 0.3 $Q_3 = 0.6$ $P_{90} = 1.0$ $P_{99} = 1.7$ | | 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-Sep | -0.4 | -0.3 | 0.0 | 0.2 | 0.4 | 0.2 | 0.1 | 0.1 | -0.1 | 0.1 | -0.2 | -0.4 | -1.4 | -0.1 | 0.6 | -0.4 | -0.4 | -0.3 | -0.3 | -0.1 | 0.0 | -0.1 | -0.3 | -0.2 | -0.1 | 0.6 | |
| 2-Sep | -0.2 | -0.4 | 0.2 | -0.2 | 0.0 | 0.6 | 0.6 | 0.5 | 1.1 | -0.2 | 0.2 | 0.3 | 0.2 | 0.3 | -0.1 | 0.0 | 0.1 | -0.1 | -0.2 | -0.4 | -0.3 | -0.1 | 0.0 | 0.1 | 0.1 | 1.1 | |
| 3-Sep | 0.0 | 0.1 | 0.4 | 0.4 | -0.1 | 0.0 | -0.2 | 0.3 | 0.5 | 0.3 | 0.3 | 0.8 | 0.5 | 0.2 | 0.9 | 0.5 | 1.3 | 0.4 | 0.3 | 0.4 | 0.5 | 0.2 | 0.2 | 0.3 | 0.4 | 1.3 | |
| 4-Sep | 0.5 | 0.5 | 0.5 | -0.1 | -0.4 | -0.4 | 0.7 | 1.1 | 0.2 | 0.3 | 1.0 | 0.4 | 0.6 | -0.3 | 0.3 | -0.1 | 0.7 | 0.0 | 0.0 | -0.1 | -0.1 | 0.2 | 0.5 | 0.8 | 0.3 | 1.1 | |
| 5-Sep | 0.7 | 0.0 | -0.2 | 0.1 | 0.3 | 0.1 | 0.2 | 0.0 | 0.2 | 0.4 | 0.3 | -0.1 | 0.2 | 0.0 | 0.5 | 0.4 | -0.4 | 0.3 | -0.1 | -0.1 | -0.2 | -0.1 | -0.1 | 0.2 | 0.1 | 0.7 | |
| 6-Sep | 0.2 | 0.2 | 0.1 | 0.3 | 0.4 | 0.2 | 0.2 | 0.3 | 0.3 | 0.0 | 0.3 | 1.7 | 1.1 | 1.5 | 1.1 | 0.7 | 0.7 | 0.9 | 0.7 | 0.2 | 0.2 | 0.2 | -0.1 | 1.1 | 0.5 | 1.7 | |
| 7-Sep | 0.6 | 0.7 | 0.6 | 0.6 | 0.7 | 0.8 | 0.9 | 0.6 | 0.6 | 0.4 | 0.6 | 0.9 | 0.1 | 0.1 | 0.1 | 0.0 | 0.3 | 0.2 | 0.3 | -0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.4 | 0.9 | |
| 8-Sep | -0.2 | 0.0 | 0.0 | 0.0 | -0.1 | 0.2 | 0.2 | 0.2 | 0.1 | -0.1 | 0.1 | 0.4 | 0.6 | 0.7 | 0.5 | 0.3 | 0.5 | 0.3 | 0.5 | 0.4 | 0.5 | 0.3 | 0.2 | 0.3 | 0.2 | 0.7 | |
| 9-Sep | 0.2 | 0.3 | 0.1 | 0.1 | 0.1 | 0.3 | 0.6 | 0.3 | 0.4 | 0.8 | 1.2 | 0.2 | 0.4 | 0.8 | 0.1 | 1.1 | 0.4 | 0.5 | 0.3 | 0.5 | 0.3 | 0.3 | 0.4 | 0.1 | 0.4 | 1.2 | |
| 10-Sep | -0.1 | -0.1 | 0.0 | -0.1 | -0.2 | -0.1 | 0.5 | 0.1 | -0.2 | 0.3 | -0.1 | 0.5 | 0.1 | 0.7 | 0.2 | 0.6 | 0.4 | -0.5 | -0.2 | -0.2 | -0.3 | -0.1 | -0.4 | -0.1 | 0.0 | 0.7 | |
| 11-Sep | 0.2 | 0.0 | 0.1 | 0.3 | 0.1 | -0.3 | -0.2 | 0.1 | 0.2 | 0.3 | 0.4 | 0.2 | 0.1 | 1.0 | 0.0 | 0.3 | 0.3 | 0.3 | 0.4 | 0.1 | 0.2 | -0.3 | -0.3 | -0.1 | 0.1 | 1.0 | |
| 12-Sep | -0.2 | -0.1 | -0.2 | 0.2 | -0.1 | 0.0 | -0.3 | 0.0 | 0.2 | 0.3 | 0.2 | 0.7 | 0.2 | 0.1 | 0.6 | 0.2 | 0.3 | 0.5 | 0.5 | 0.6 | 0.4 | 0.5 | 0.4 | -0.2 | 0.2 | 0.7 | |
| 13-Sep | 0.2 | 0.3 | -0.2 | 0.0 | -0.4 | 0.0 | 0.3 | 1.4 | 0.1 | -0.4 | 0.0 | 0.1 | 0.7 | -0.3 | 0.5 | 0.2 | -0.2 | 0.5 | 0.3 | 0.3 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 1.4 | |
| 14-Sep | 0.5 | 0.3 | 0.2 | 0.0 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.4 | 0.2 | 0.3 | 0.6 | 0.3 | 1.8 | 0.5 | 0.4 | 0.5 | 0.5 | 0.7 | 0.8 | 0.6 | 0.4 | 0.3 | 0.5 | 1.8 | |
| 15-Sep | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.0 | 0.2 | 0.1 | 0.5 | 0.6 | 0.0 | 0.0 | 0.0 | -0.3 | 0.0 | -0.6 | -0.1 | -0.1 | -0.2 | -0.3 | 0.0 | -0.6 | -0.4 | 0.0 | 0.6 | |
| 16-Sep | 0.2 | 0.3 | 0.2 | 0.5 | 0.6 | 0.2 | 0.3 | 0.6 | 0.3 | 0.8 | 0.4 | 1.0 | 0.6 | 0.6 | 0.0 | 0.5 | 1.0 | 0.4 | 0.2 | 0.5 | 0.5 | 0.4 | 0.1 | 0.2 | 0.4 | 1.0 | |
| 17-Sep | 0.1 | 0.4 | 0.6 | 0.7 | 1.2 | 1.0 | 0.6 | 0.7 | 0.5 | 0.2 | -0.2 | 0.8 | 0.4 | 1.3 | 0.2 | 0.6 | 0.2 | 0.5 | 0.3 | 0.4 | 0.5 | 0.8 | 0.8 | 0.7 | 0.6 | 1.3 | |
| 18-Sep | 0.7 | 0.7 | 0.3 | -0.4 | -0.3 | -0.7 | 0.3 | 0.1 | -0.1 | -0.4 | 0.3 | 0.9 | -0.2 | 0.3 | 0.5 | 0.4 | 0.5 | 0.4 | 1.1 | 0.2 | 0.1 | 0.2 | 0.2 | -0.2 | 0.2 | 1.1 | |
| 19-Sep | 0.5 | 1.0 | 1.4 | 1.0 | 0.6 | 0.6 | 0.5 | 1.2 | 1.2 | 0.8 | 1.3 | 0.5 | 1.1 | 1.0 | 1.2 | 1.3 | 1.5 | 1.5 | 1.7 | 1.7 | 1.6 | 1.5 | 1.6 | 1.5 | 1.2 | 1.7 | |
| 20-Sep | 1.2 | 1.2 | 1.0 | 0.9 | 0.8 | 0.9 | 1.1 | 1.1 | 1.1 | 1.3 | 1.7 | 1.4 | 1.9 | 1.3 | 1.1 | 1.3 | 1.0 | 1.2 | 1.4 | 0.9 | 1.0 | 1.3 | 1.3 | 0.8 | 1.2 | 1.9 | |
| 21-Sep | 0.7 | 1.3 | 1.7 | 0.2 | 1.8 | 2.4 | 1.4 | 1.8 | 2.1 | 1.7 | 1.3 | 1.7 | 0.9 | 1.6 | 1.2 | 0.1 | -0.1 | 0.0 | 0.4 | 0.1 | 0.4 | 0.3 | 0.0 | 0.4 | 1.0 | 2.4 | |
| 22-Sep | 0.0 | 0.2 | 0.2 | 0.4 | 0.2 | 0.2 | 0.0 | -0.1 | -0.2 | 0.1 | 0.0 | 0.1 | 0.3 | 0.2 | 1.0 | 0.0 | 0.3 | -0.1 | 0.3 | 0.1 | 0.6 | 0.4 | 0.2 | 0.0 | 0.2 | 1.0 | |
| 23-Sep | 0.6 | 0.1 | 0.0 | 0.1 | 0.3 | 0.4 | 0.3 | 0.4 | 0.2 | 0.9 | 0.1 | 0.3 | 0.6 | 0.6 | 0.2 | -0.2 | 0.8 | 0.4 | 0.4 | 0.4 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.9 | |
| 24-Sep | 0.4 | 0.7 | 1.0 | 1.0 | 0.3 | -0.3 | 0.0 | -0.2 | 0.5 | 0.5 | 0.0 | 0.0 | 0.3 | 0.2 | 0.1 | 0.4 | 0.6 | 0.4 | 0.3 | 0.6 | 0.2 | 0.3 | 0.6 | 0.6 | 0.4 | 1.0 | |
| 25-Sep | 0.9 | 0.6 | 0.7 | 0.5 | 0.7 | 0.6 | 0.7 | 0.5 | 0.5 | 0.4 | 0.5 | 0.4 | 1.0 | -0.1 | 0.5 | 0.4 | 0.0 | 0.1 | -0.3 | -0.4 | -0.2 | -0.1 | -0.2 | 0.3 | 1.0 | | |
| 26-Sep | -0.2 | -0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.2 | 0.2 | 0.2 | 0.0 | 0.3 | 1.5 | 0.9 | 0.5 | 1.0 | 0.5 | 0.7 | 0.4 | 0.3 | 0.0 | 0.3 | 0.2 | 0.3 | 0.0 | 0.3 | 1.5 | |
| 27-Sep | -0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.3 | 0.8 | 0.3 | 0.4 | 0.0 | 0.5 | 0.1 | 0.3 | -0.1 | 0.5 | 0.5 | 0.6 | 0.7 | 0.3 | 0.3 | 0.3 | 0.3 | 0.8 | |
| 28-Sep | 0.5 | 0.2 | 0.3 | -0.3 | 0.5 | 0.7 | 0.6 | 0.5 | 0.5 | 0.1 | 0.4 | 1.0 | 1.0 | 0.9 | 0.7 | 0.0 | 0.2 | 0.3 | 0.3 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.5 | 1.0 | |
| 29-Sep | 0.5 | 0.6 | 0.7 | 0.5 | 0.5 | 0.9 | 0.1 | -1.1 | -0.1 | 0.0 | 0.7 | 0.7 | 0.9 | 0.4 | 0.0 | 0.8 | 0.7 | 0.1 | 0.3 | -0.1 | 0.0 | 0.1 | 0.4 | 0.2 | 0.3 | 0.9 | |
| 30-Sep | 0.2 | 0.1 | 0.3 | 0.5 | -0.1 | 0.7 | 0.5 | 0.4 | 0.1 | 0.1 | 0.4 | 0.3 | 0.3 | 0.4 | 0.2 | 0.2 | -0.1 | -0.2 | 0.4 | 0.6 | 0.5 | 0.3 | 0.5 | 0.4 | 0.3 | 0.7 | |
| | | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.6 | 0.4 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.3 | Diurnal Average | |
| | | 1.2 | 1.3 | 1.7 | 1.0 | 1.8 | 2.4 | 1.4 | 1.8 | 2.1 | 1.7 | 1.7 | 1.7 | 1.9 | 1.6 | 1.8 | 1.3 | 1.5 | 1.5 | 1.7 | 1.7 | 1.6 | 1.5 | 1.6 | 1.5 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Vertical Wind Speed 90 m (VW90m) - km/h
Mannix - September 2017

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



Wood Buffalo Environmental Association

SO₂ Calibration Summary

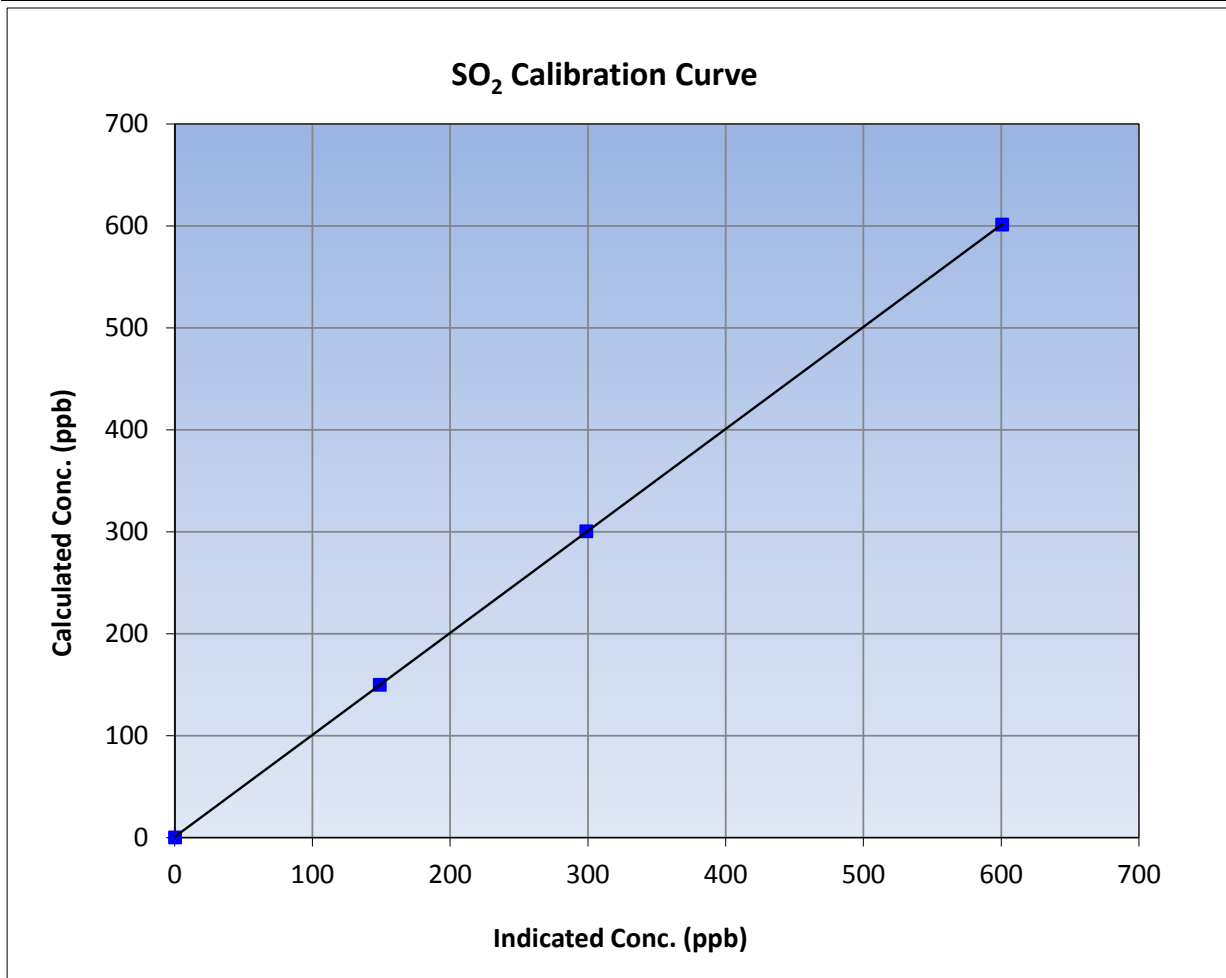
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | Mannix | Station Number | AMS 05 |
| Start Time (MST) | 8:25 | End Time (MST) | 11:04 |
| Analyzer make | Thermo 43i | Analyzer serial # | 108841399 |

Calibration Data

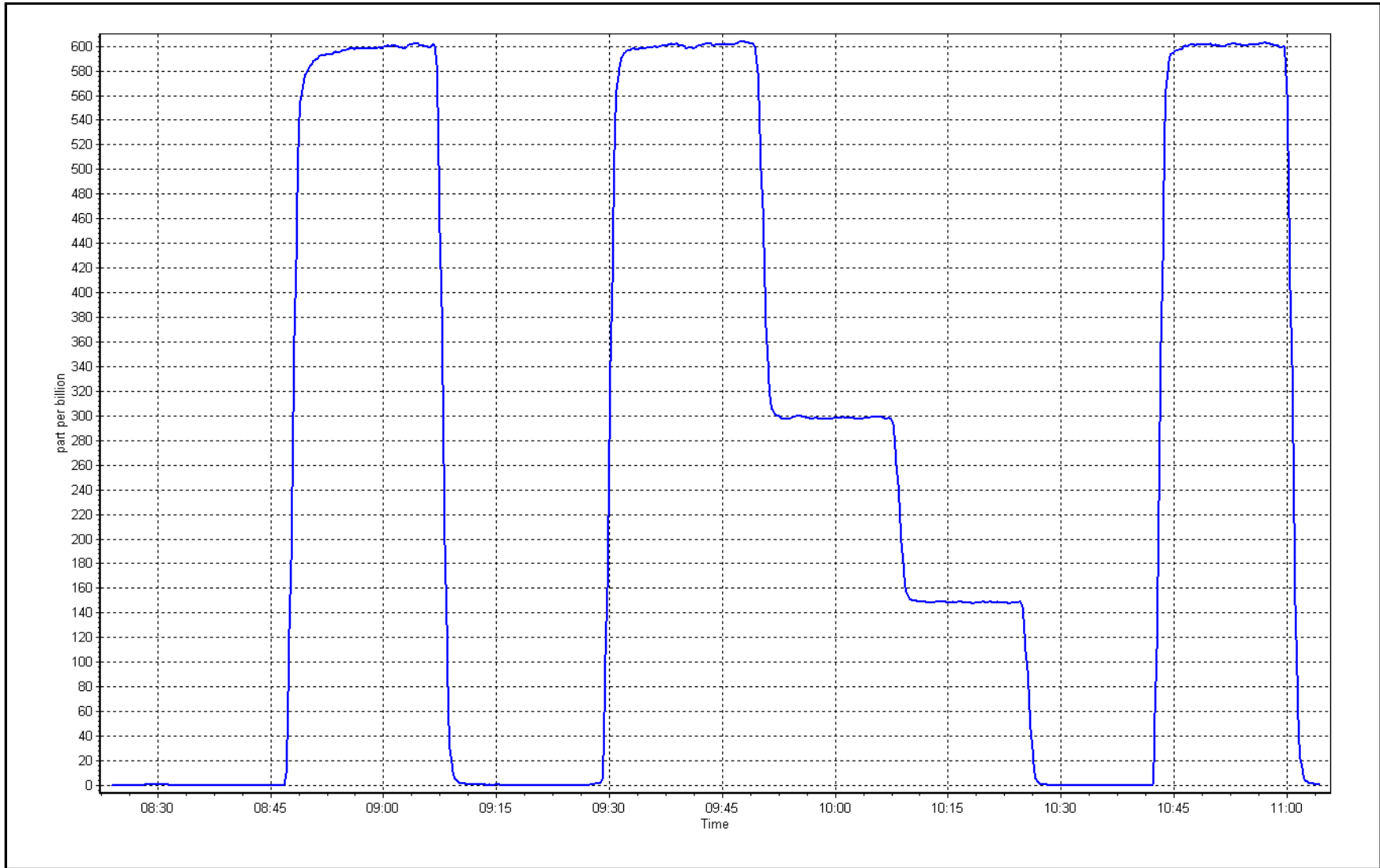
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999993 | |
| 601.0 | 600.4 | 1.0009 | | | ≥0.995 |
| 300.1 | 298.4 | 1.0057 | Slope | 1.000275 | |
| 149.7 | 148.4 | 1.0086 | | | 0.90 - 1.10 |
| | | | Intercept | 0.861264 | +/-30 |



SO2 Calibration Plot

Date: September 15, 2017

Location: Mannix





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Mannix | Station number: | AMS 05 |
| Calibration Date: | September 15, 2017 | Last Cal Date: | August 10, 2017 |
| Start time (MST): | 11:00 | End time (MST): | 13:57 |
| Reason: | Routine | | |

Calibration Standards

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

Analyzer Information

| | | | |
|----------------------|--------------|--------------------|---------------|
| Analyzer make: | Thermo 430i | Analyzer serial #: | 815129108 |
| | <u>Start</u> | <u>Finish</u> | |
| Analyzer Range | 0 - 100 ppb | PMT voltage | -644 |
| Calculated slope | 0.998932 | Lamp voltage | 794 |
| Calculated intercept | -0.033394 | Pressure | 534.3 |
| Analyzer Background | 16.7 | Flow | 1.043 |
| Analyzer Coefficient | 0.973 | Intensity | 96 |
| | | | <u>Finish</u> |
| | | | -644 |
| | | | 799 |
| | | | 542.2 |
| | | | 1.050 |
| | | | 96 |

H₂S Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5997 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5912 | 85.2 | 71.5 | 71.0 | 1.006 |
| calibrator zero | 5997 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5912 | 85.2 | 71.5 | 71.0 | 1.006 |
| second point | 5953 | 45.5 | 38.2 | 38.3 | 0.996 |
| third point | 5967 | 28.5 | 23.9 | 24.1 | 0.992 |
| as left zero | 5997 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 5912 | 85.2 | 71.5 | 71.6 | 0.998 |
| SO2 Scrubber Check | 4982 | 15.2 | 152.1 | 1.1 | ---- |
| Average Correction Factor | | | | | 0.998 |
| Corrected As found | 71.00 | Previous response | 71.57 | *% change | 0.8% |

* = > +/-5% change initiates investigation

Notes:

Chnaged inlet filter after asfinds. Completed scrubber check with mixed gas cylinder at site. No adjustments made.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

H₂S Calibration Summary

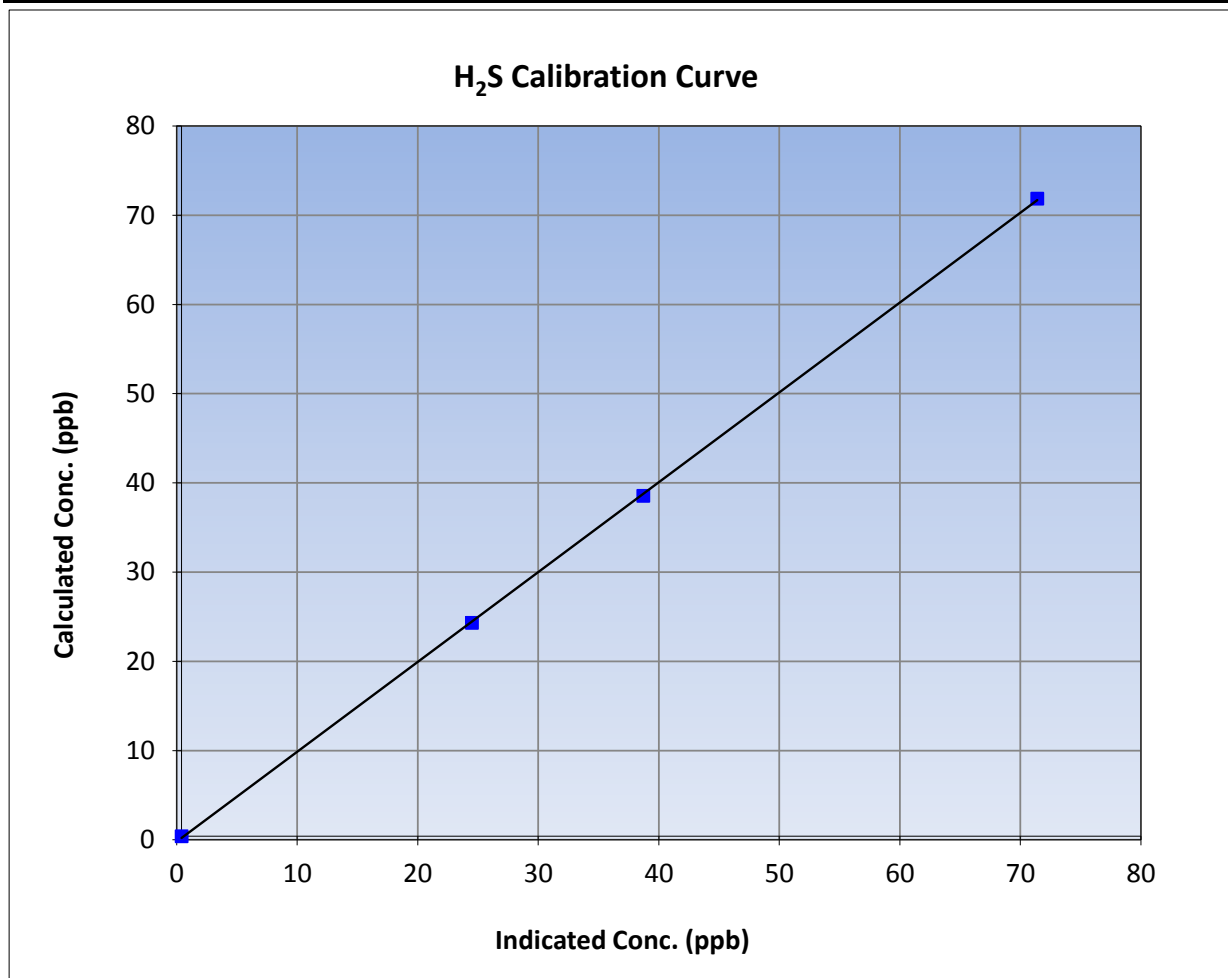
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Mannix | Station Number | AMS 05 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:57 |
| Analyzer make | Thermo 430i | Analyzer serial # | 815129108 |

Calibration Data

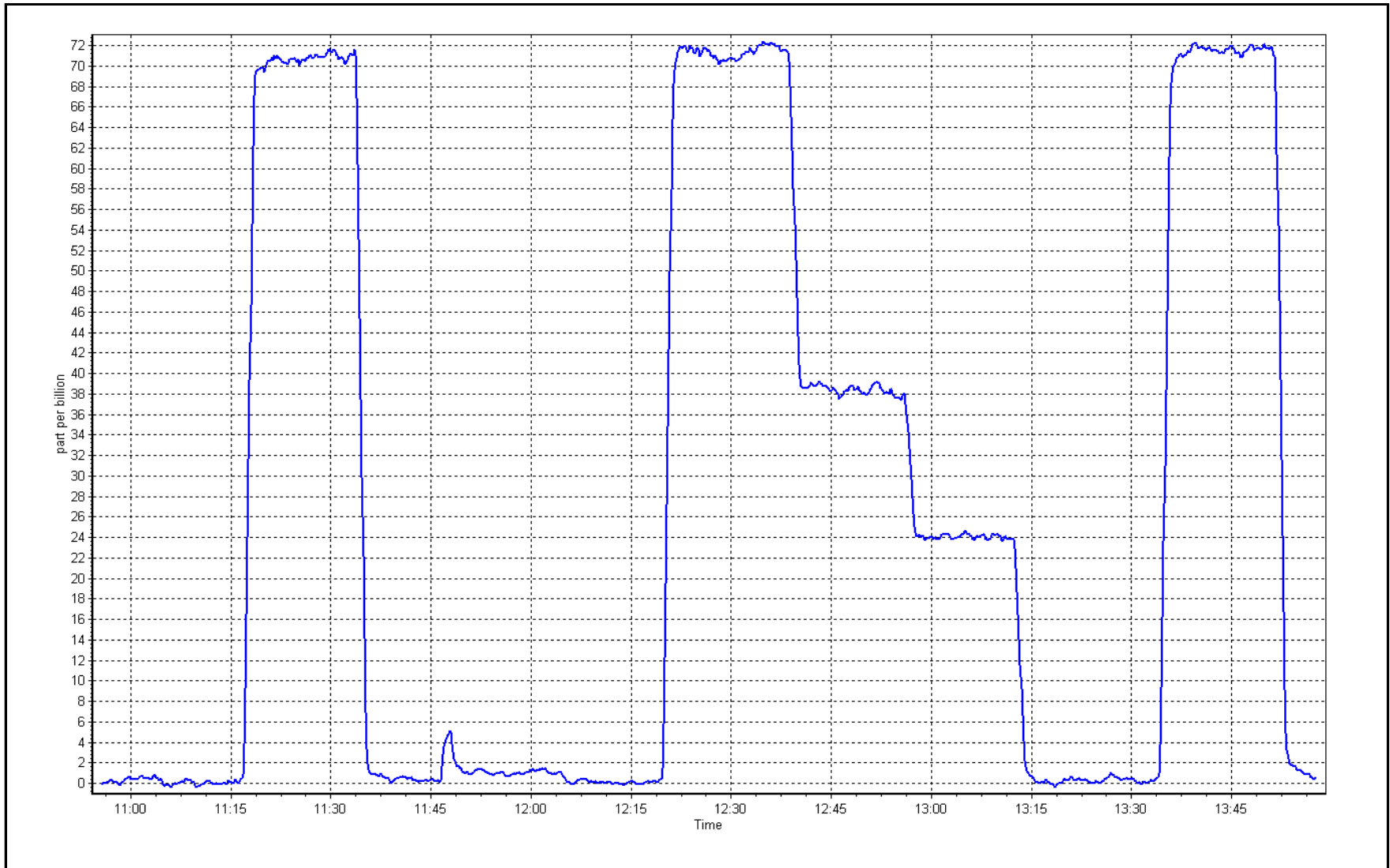
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999949 | ≥0.995 |
| 71.5 | 71.0 | 1.0065 | Slope | 1.006941 | 0.90 - 1.10 |
| 38.2 | 38.3 | 0.9962 | Intercept | -0.200622 | +/-3 |
| 23.9 | 24.1 | 0.9921 | | | |



H₂S Calibration Plot

Date: September 15, 2017

Location: Mannix





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Mannix | Station number: | AMS 05 |
| Calibration Date: | September 15, 2017 | Last Cal Date: | August 14, 2017 |
| Start time (MST): | 8:23 | End time (MST): | 11:04 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|------------------|
| Gas Cert Reference | EY0000646 | Cal Gas Expiry Date | November 4, 2019 |
| CH4 Cal Gas Conc. | <u>514.0</u> ppm | CH4 Equiv Conc. | 1064.0 ppm |
| C3H8 Cal Gas Conc. | <u>200.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Sabio 4080 | Serial Number | 14300410 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 146 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|--------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1317958295 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -295 |
| Calculated slope | 1.004153 | Sample pressure | 9.4 |
| Calculated intercept | 0.021018 | Fuel pressure | 20.2 |
| Analyzer Background | 3.45 | Air pressure | 42.3 |
| Analyzer Coefficient | 3.669 | Flame temperature | 163.0 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 4997 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4935 | 61.0 | 12.99 | 13.23 | 0.982 |
| calibrator zero | 4997 | 0.0 | 0.00 | -0.08 | ---- |
| high point | 4935 | 61.0 | 12.99 | 12.99 | 1.000 |
| second point | 4970 | 30.5 | 6.49 | 6.43 | 1.009 |
| third point | 4983 | 15.2 | 3.24 | 3.24 | 0.998 |
| as left zero | 4997 | 0.0 | 0.00 | 0.05 | ---- |
| as left span | 4933 | 61.0 | 13.00 | 13.06 | 0.995 |
| Average Correction Factor | | | | | 1.002 |
| Corrected As found | 13.23 | Previous response | 12.92 | *% change | -2.4% |

* = > +/-5% change initiates investigation

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

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

Version-03-2017

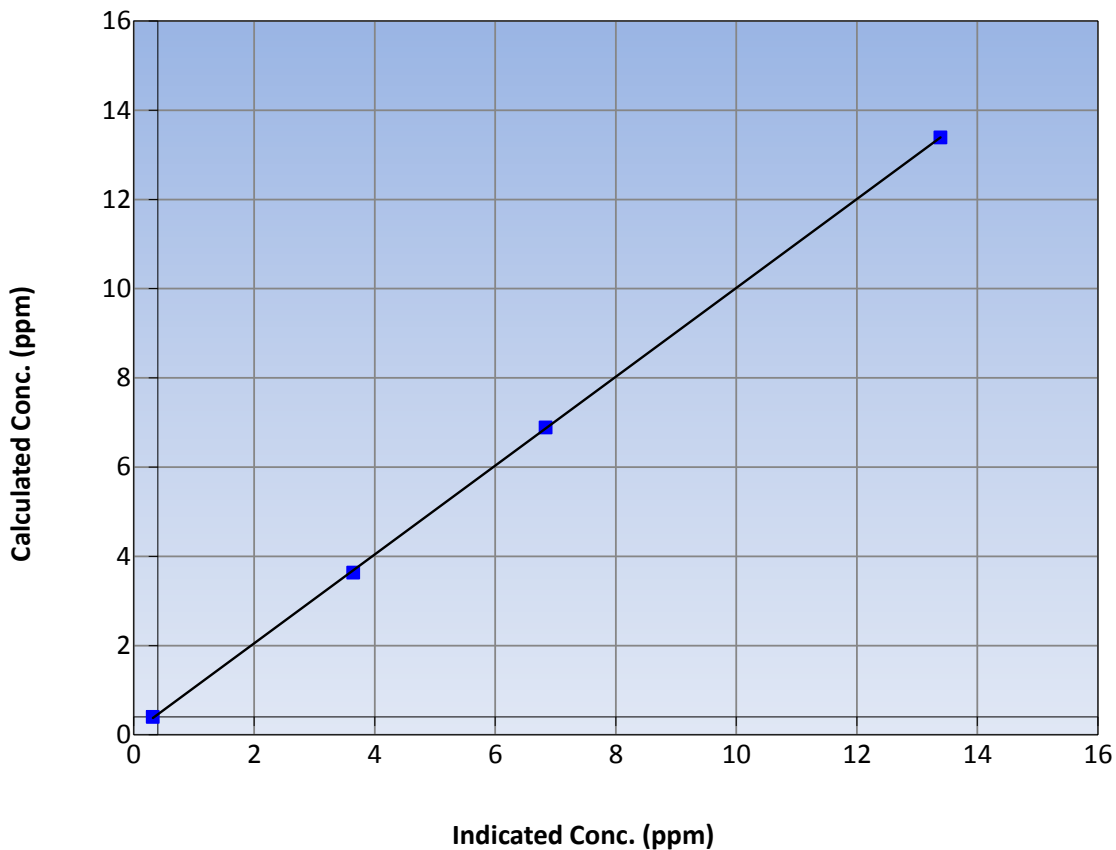
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | Mannix | Station Number | AMS 05 |
| Start Time (MST) | 8:23 | End Time (MST) | 11:04 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1317958295 |

Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999960 | ≥0.995 |
| 13.0 | 13.0 | 1.0002 | | | |
| 6.5 | 6.4 | 1.0087 | Slope | 0.995842 | 0.90 - 1.10 |
| 3.2 | 3.2 | 0.9981 | | | |
| | | | Intercept | 0.057141 | +/-1.5 |

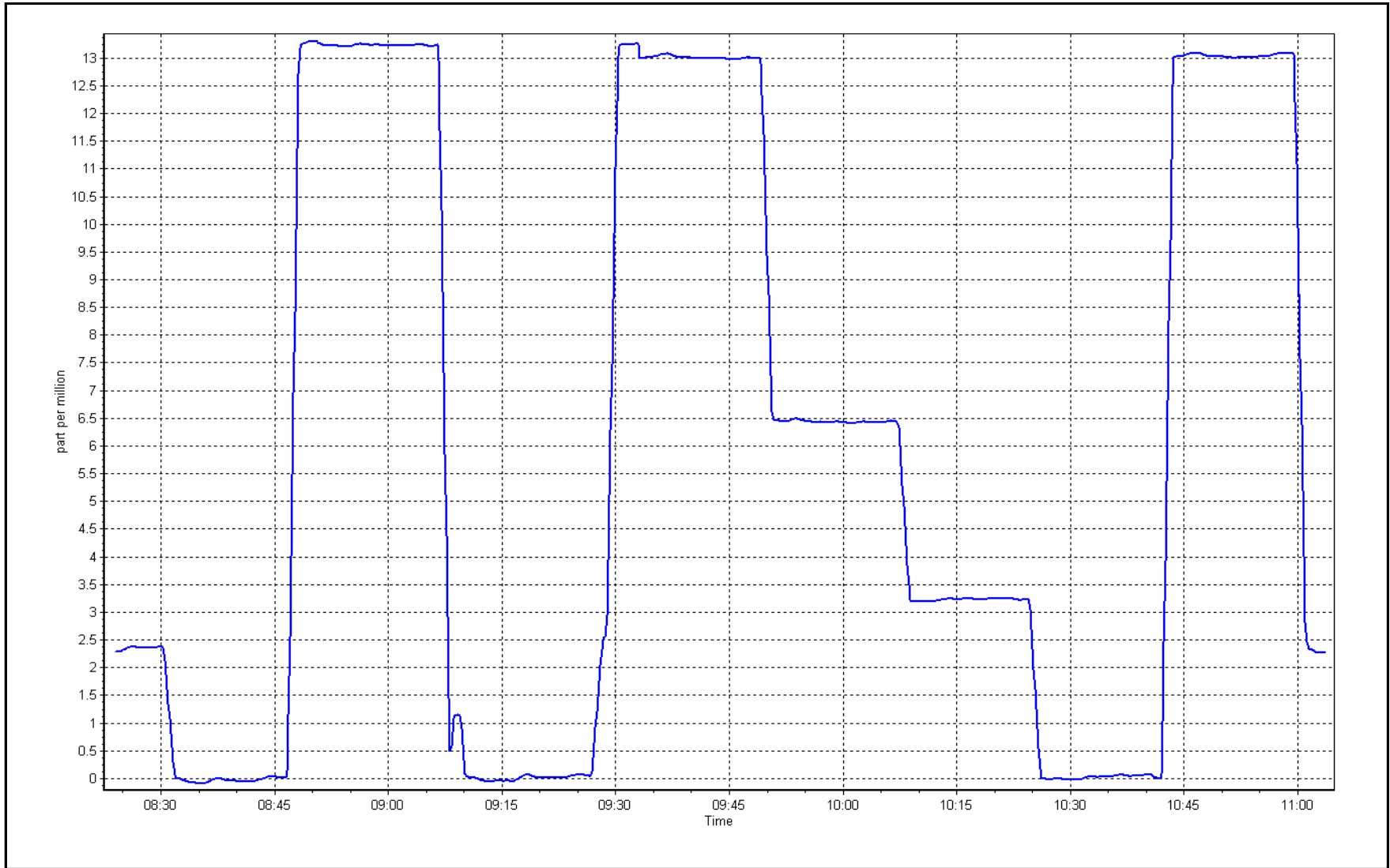
THC Calibration Curve



THC Calibration Plot

Date: September 15, 2017

Location: Mannix





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 6
PATRICIA MCINNES
SEPTEMBER 2017**

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

October 27, 2017

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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 681 | 35 | 39 | 99.44 | 11 | 0 | 2 | 0 |
| TRS (ppb) Average | 682 | 36 | 38 | 99.72 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 669 | 34 | 51 | 97.64 | 2.3 | - | 2 | - |
| NMHC(ppm) Average | 669 | 34 | 51 | 97.64 | 0.174 | - | 0.016 | - |
| CH4(ppm) Average | 669 | 34 | 51 | 97.64 | 2.2 | - | 2 | - |
| O3 (ppb) Average | 683 | 35 | 37 | 99.72 | 71 | 0 | 43 | - |
| NO2 (ppb) Average | 669 | 36 | 51 | 97.92 | 18 | 0 | 8 | - |
| NO (ppb) Average | 669 | 36 | 51 | 97.92 | 35 | - | 4 | - |
| NOX (ppb) Average | 669 | 36 | 51 | 97.92 | 51 | - | 10 | - |
| NH3 (ppb) Average | 617 | 49 | 103 | 92.5 | 0 | 0 | 0 | - |
| PM2.5 (ug/m3) Average | 718 | 2 | 2 | 100 | 90 | - | 17.7 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 31.3 | - | 20.8 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 99 | - | 93 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 29 | - | 22 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 681 | 0.6 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 11 |
| TRS (ppb) Average | 682 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 669 | 1.92 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2 | 2.3 |
| NMHC(ppm) Average | 669 | 0.002 | 0.013 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0.174 |
| CH4(ppm) Average | 669 | 1.92 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2 | 2.2 |
| O3 (ppb) Average | 683 | 26.9 | 11 | - | 4 | 12 | 20 | 27 | 33 | 39 | 71 |
| NO2 (ppb) Average | 669 | 3.2 | 3 | - | 0 | 0 | 1 | 3 | 5 | 7 | 18 |
| NO (ppb) Average | 669 | 1.1 | 2 | - | 0 | 0 | 0 | 0 | 1 | 3 | 35 |
| NOX (ppb) Average | 669 | 4.3 | 5 | - | 0 | 0 | 1 | 3 | 6 | 10 | 51 |
| NH3 (ppb) Average | 617 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PM2.5 (ug/m3) Average | 718 | 6.46 | 7.9 | - | 0.6 | 1.4 | 2.3 | 4.2 | 7.3 | 12.6 | 90 |
| Temperature 2 m (C) Average | 720 | 12.12 | 6.3 | - | -2.6 | 4.3 | 7.3 | 11.7 | 16.3 | 20.3 | 31.3 |
| Relative Humidity (%) Average | 720 | 65.3 | 20 | - | 22 | 35 | 51 | 66 | 83 | 93 | 99 |
| Wind Speed 10 m (km/h) Average | 720 | 10.4 | 6 | - | 0 | 3 | 6 | 9 | 15 | 20 | 29 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-------------------|-------------------|-------------------|---------------------|---|
| O3, SO2, THC, TRS | 18 Sep 2017 13:00 | 18 Sep 2017 14:00 | 2 | Maintenance - manifold cleaning |
| NO2, NO, NOX, NH3 | 07 Sep 2017 13:00 | 08 Sep 2017 01:00 | 13 | Unstable Operation - station temperature fluctuations |
| NO2, NO, NOX, SO2 | 25 Sep 2017 12:00 | 25 Sep 2017 13:00 | 2 | Maintenance - calibration cylinder replacement |
| NMHC, CH4, THC | 07 Sep 2017 16:00 | 08 Sep 2017 02:00 | 11 | Unstable Operation - station temperature fluctuations |
| NMHC, CH4, THC | 25 Sep 2017 12:00 | 25 Sep 2017 13:00 | 2 | Maintenance - calibration cylinder replacement |
| NH3 | 01 Sep 2017 06:00 | 30 Sep 2017 06:00 | 38 | Stabilization after daily span |
| NH3 | 25 Sep 2017 12:00 | 25 Sep 2017 14:00 | 4 | Maintenance - calibration cylinder replacement |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

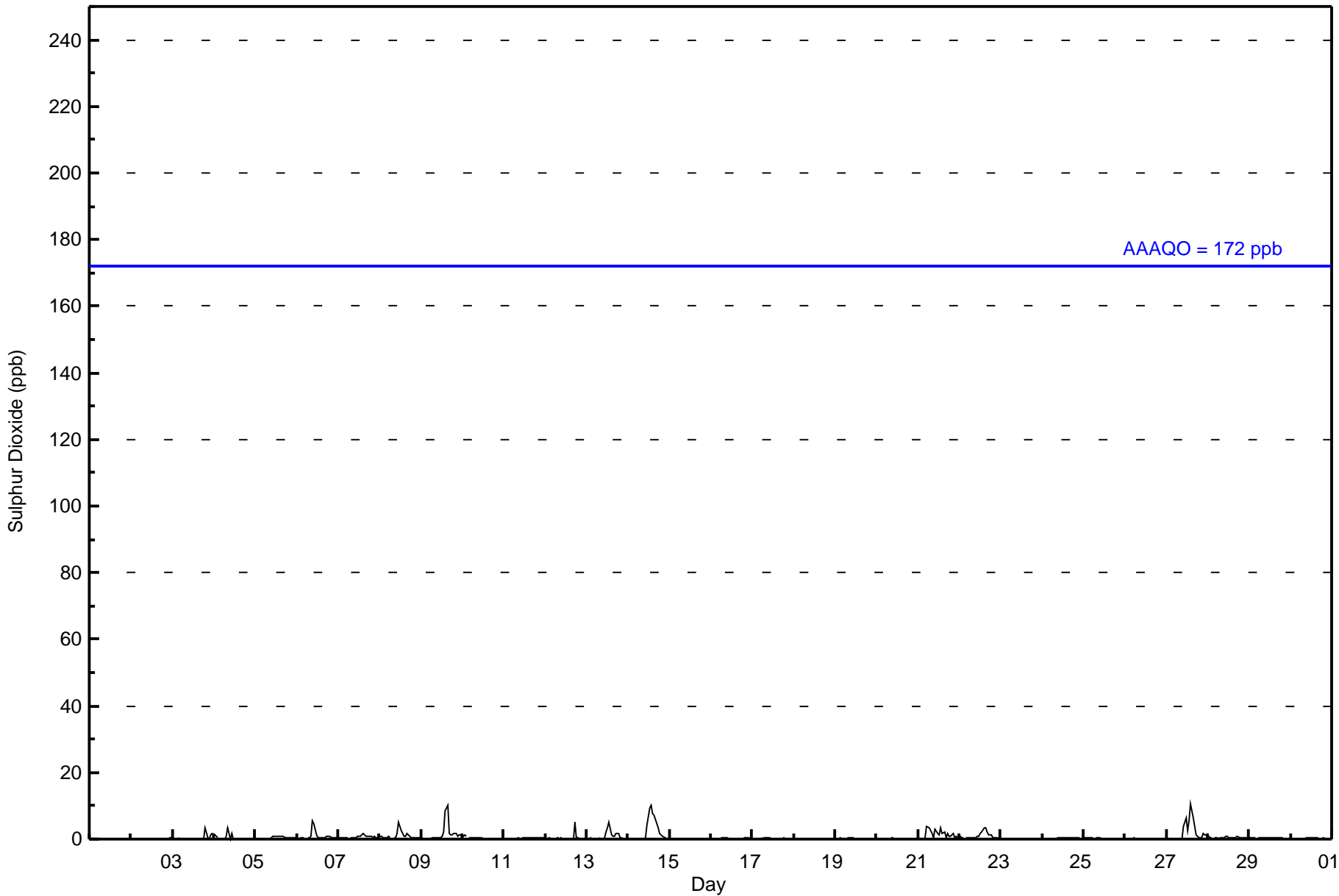
Patricia McInnes - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 11 ppb on Sep 27 15:00 | Maximum Daily Average: 2.3 ppb on Sep 14 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 14 02:00 | Minimum Daily Average: 0.1 ppb on Sep 1 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 1.3 ppb at hour 15 | Minimum Diurnal Average: 0.2 ppb at hour 4 | | Hours of Calibration: | 35 |
| Monthly Average: 0.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 7 | | Percent Operational Time: | 99.4 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 2-Sep | 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 |
| 3-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 2 | 0.4 | 3 |
| 4-Sep | 1 | 1 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 5-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.9 | 5 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 2 |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 5 | 2 | 2 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 5 |
| 9-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 8 | 10 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1.5 | 10 |
| 10-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 11-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 5 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 3 | 5 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 4 | 9 | 10 | 8 | 7 | 6 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 2.3 | 10 |
| 15-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 20-Sep | 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 |
| 21-Sep | 0 | 0 | Z | 0 | 0 | 4 | 3 | 3 | 2 | 0 | 3 | 2 | 1 | 3 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1.4 | 4 |
| 22-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.9 | 3 |
| 23-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 26-Sep | 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 |
| 27-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 6 | 3 | 5 | 11 | 6 | 4 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 2.0 | 11 |
| 28-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 29-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 30-Sep | 0 | 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 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 1.0 | 1.0 | 1.2 | 1.3 | 1.2 | 0.7 | 0.7 | 0.5 | 0.5 | 0.3 | 0.3 | 0.3 | 0.3 | Diurnal Average |
| 1 | 1 | 1 | 1 | 1 | 4 | 3 | 3 | 3 | 3 | 5 | 4 | 6 | 9 | 10 | 11 | 10 | 6 | 5 | 2 | 3 | 2 | 2 | 1 | 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
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 680 | 99.85 | 99.85 |
| 11 - 20 | 1 | 0.15 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 64 | 19 | 10 | 20 | 17 | 36 | 57 | 44 | 69 | 70 | 58 | 59 | 56 | 32 | 31 | 38 | 680 |
| 11 - 20 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 65 | 19 | 10 | 20 | 17 | 36 | 57 | 44 | 69 | 70 | 58 | 59 | 56 | 32 | 31 | 38 | 681 |

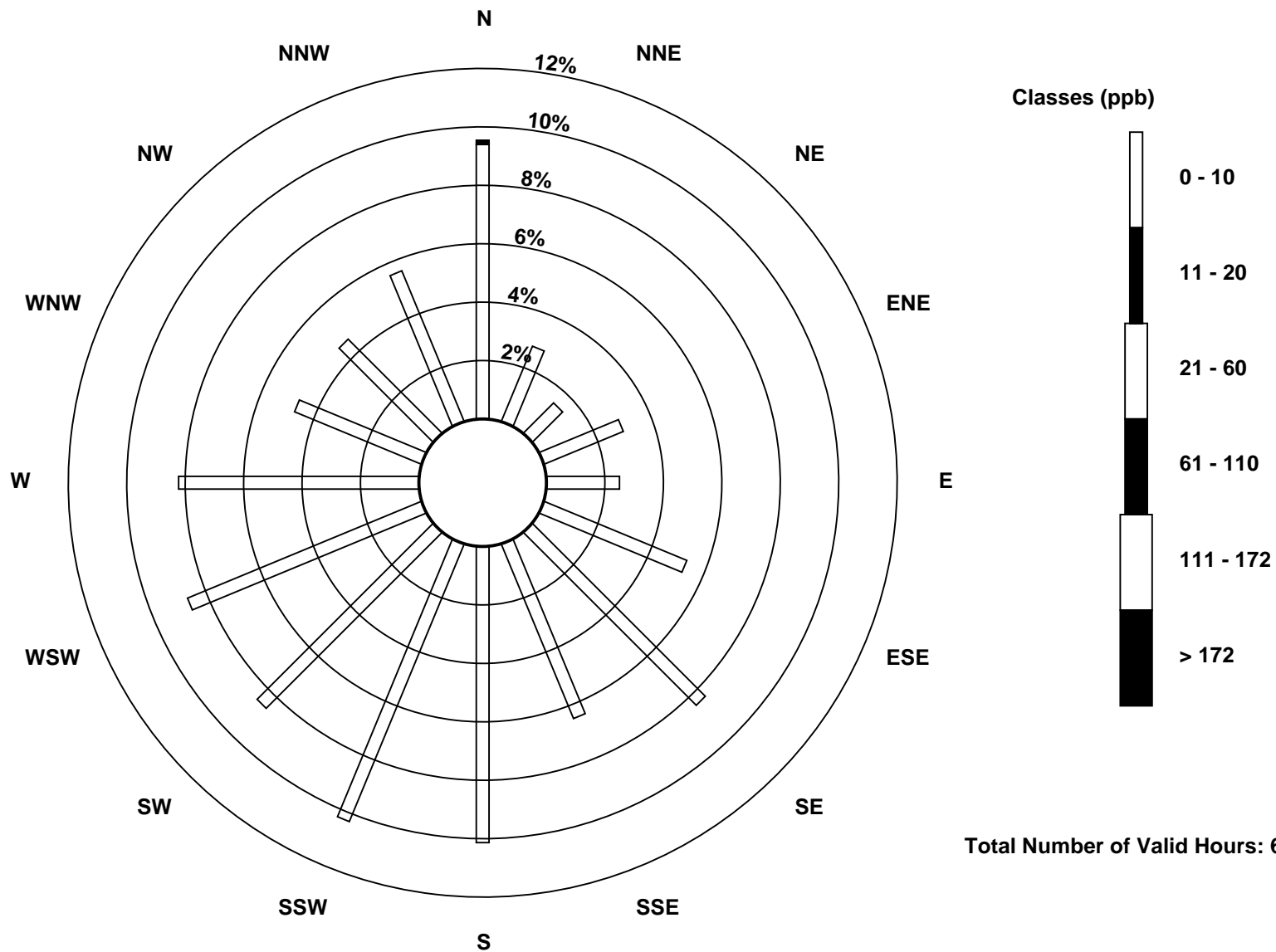
Total Number of Valid Hours: 681

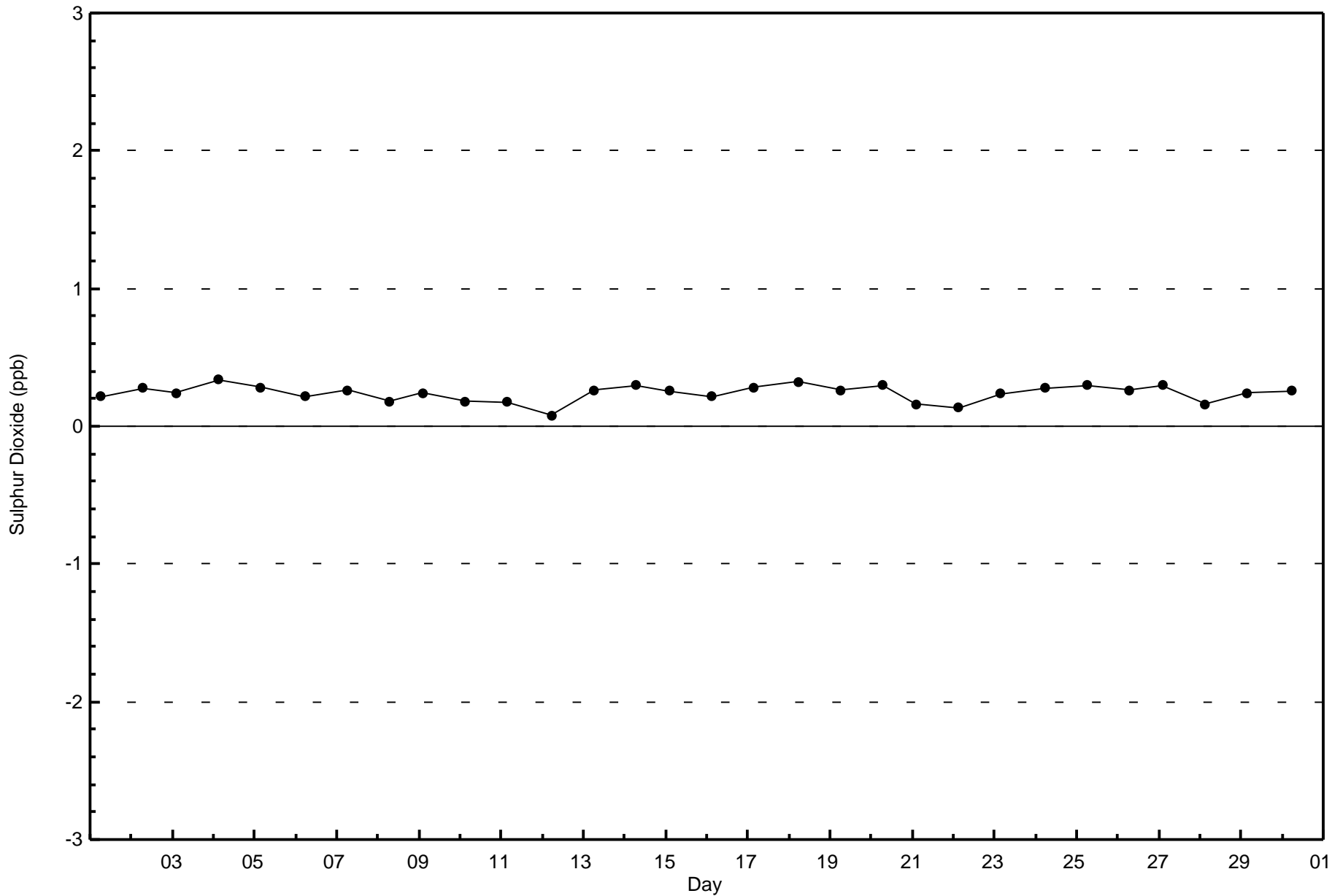
Total Number of Hours: 720

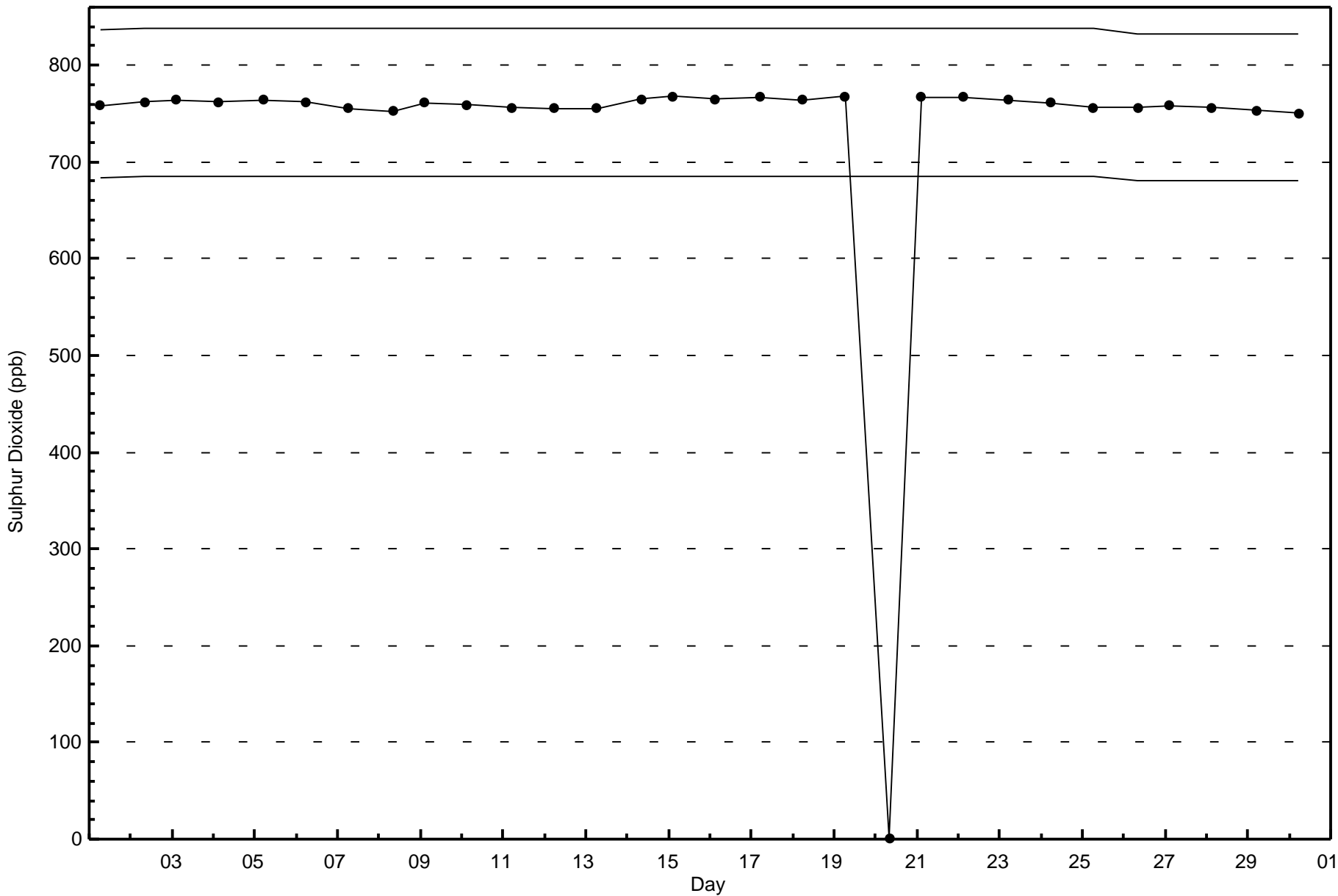


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



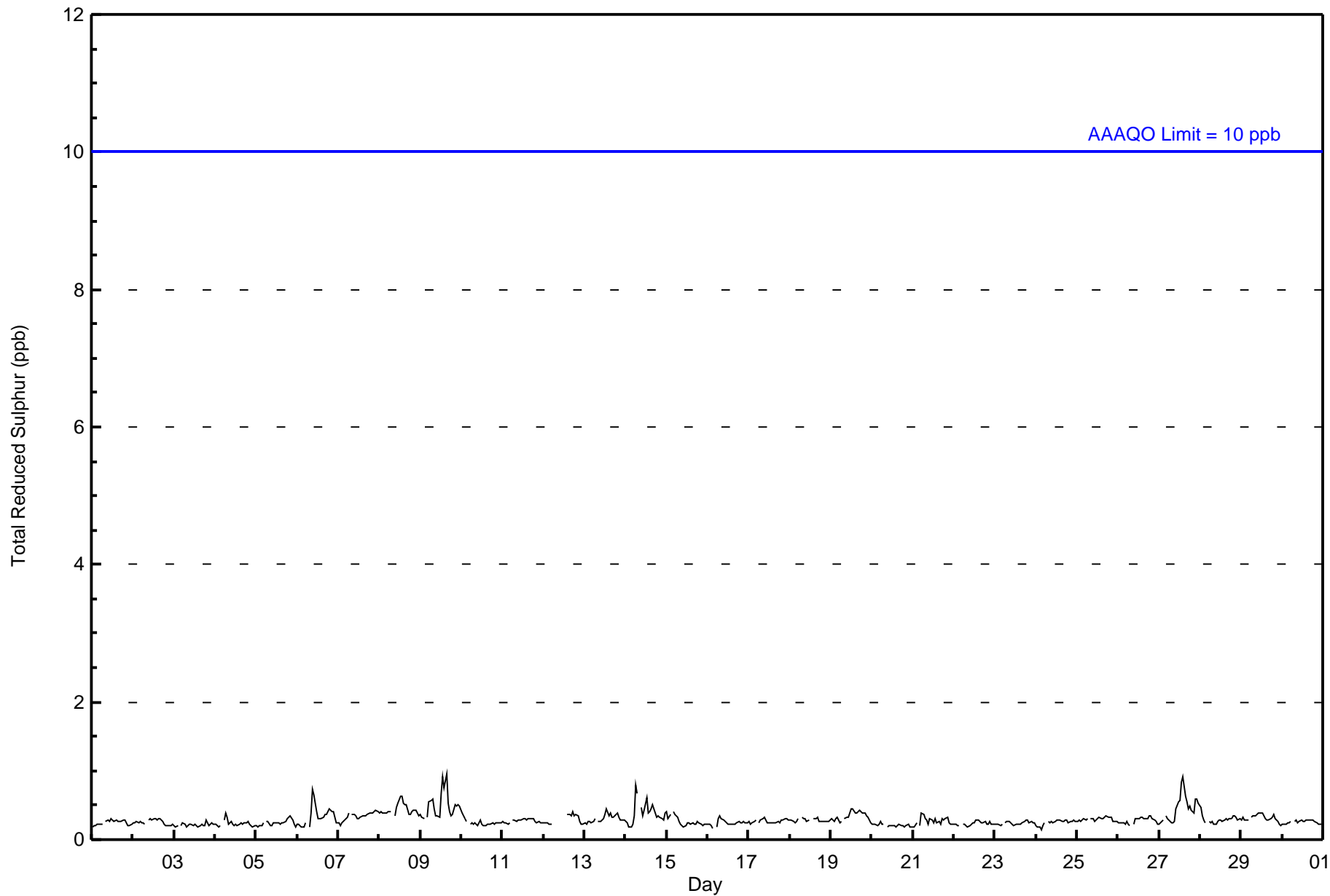






Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

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

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 66 | 19 | 11 | 20 | 16 | 38 | 56 | 46 | 66 | 70 | 57 | 65 | 54 | 29 | 32 | 37 | 682 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 66 | 19 | 11 | 20 | 16 | 38 | 56 | 46 | 66 | 70 | 57 | 65 | 54 | 29 | 32 | 37 | 682 |

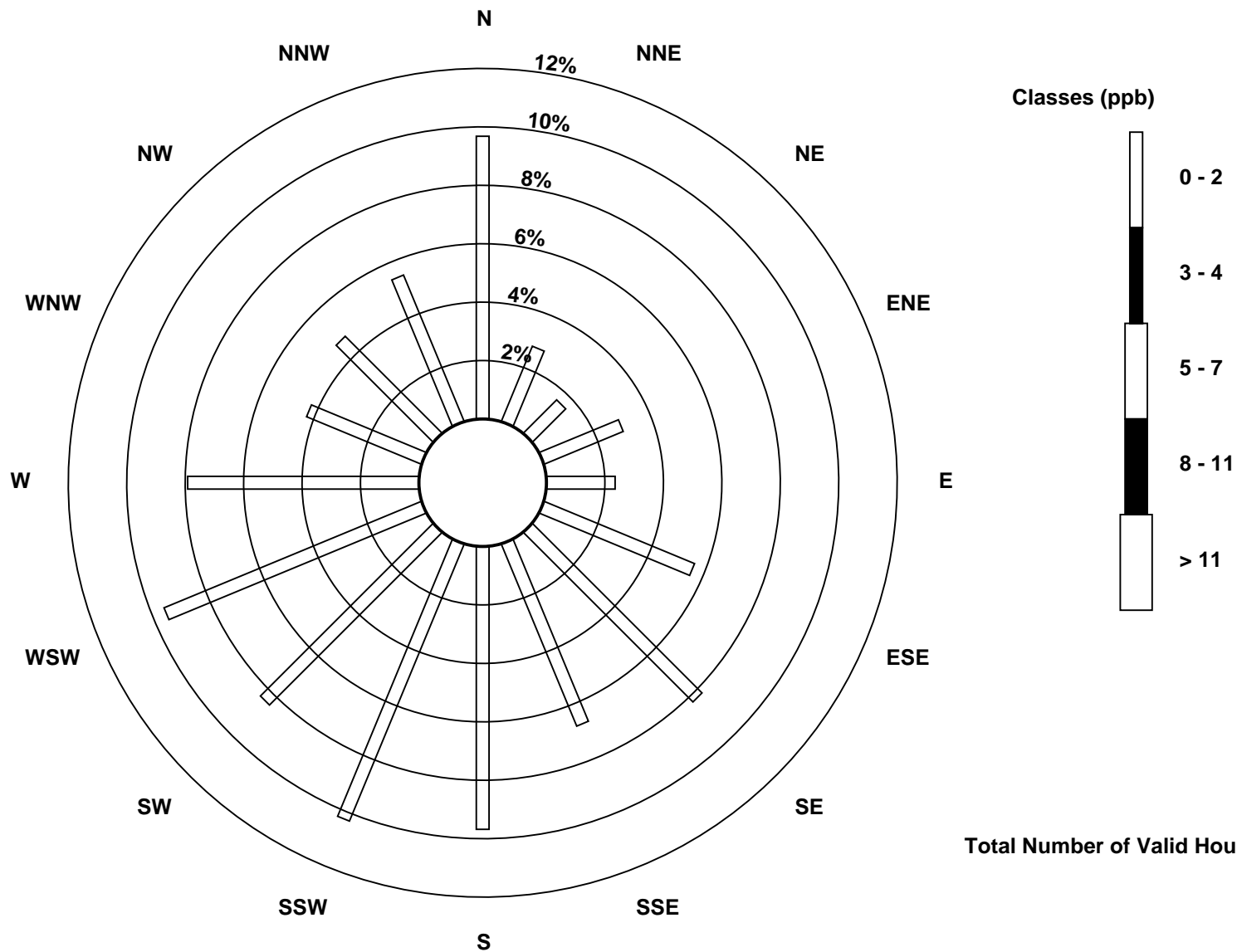
Total Number of Valid Hours: 682

Total Number of Hours: 720

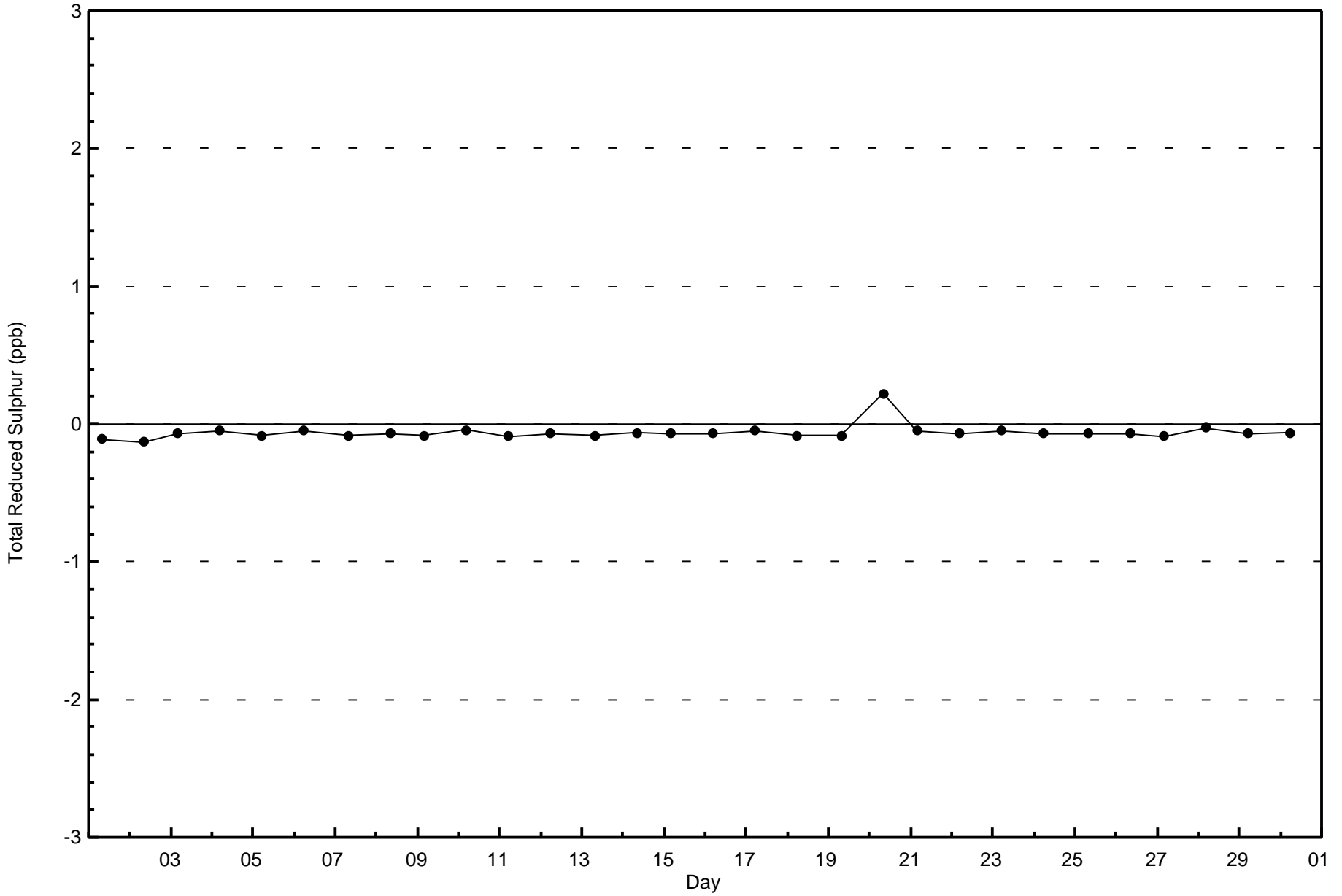


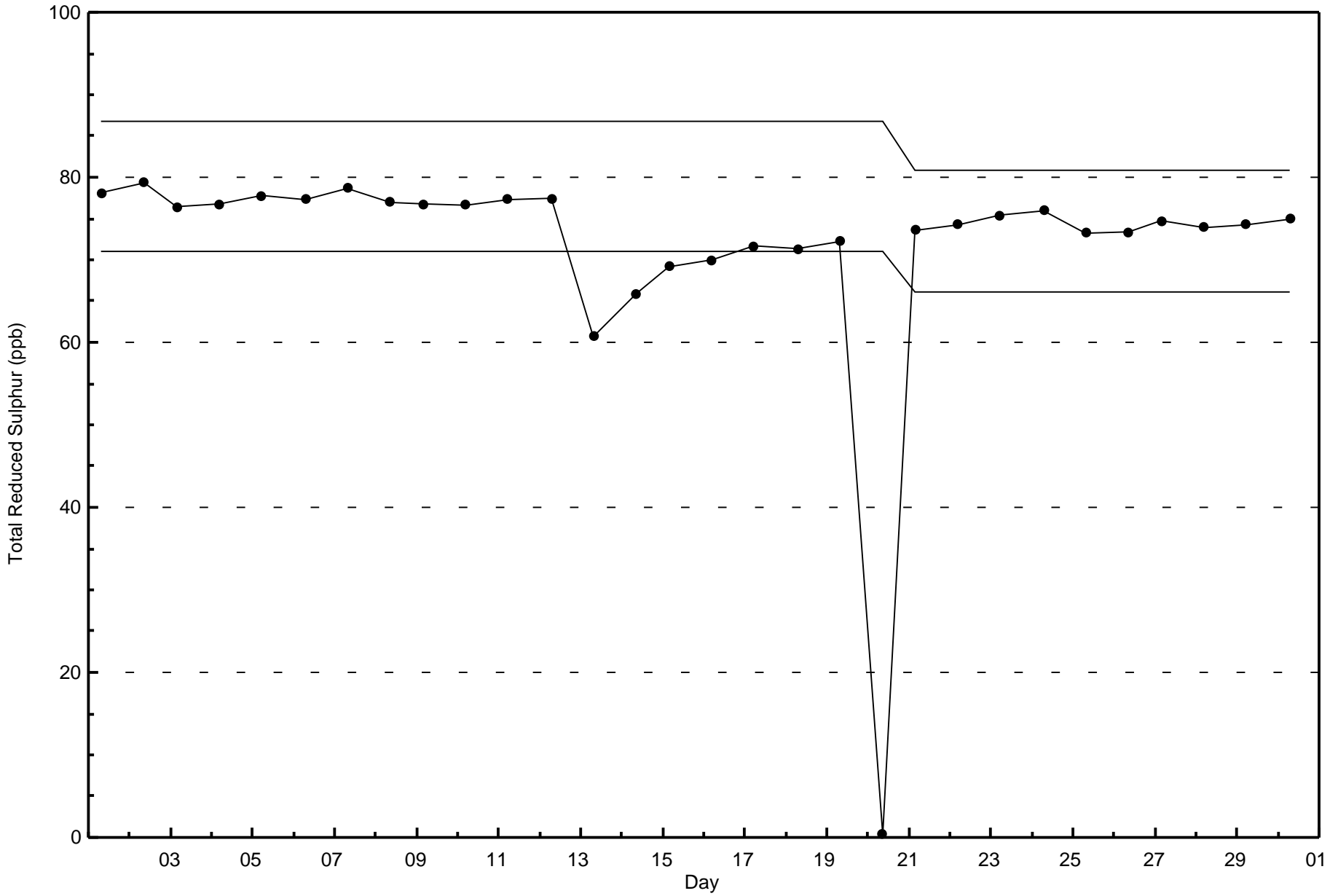
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 682

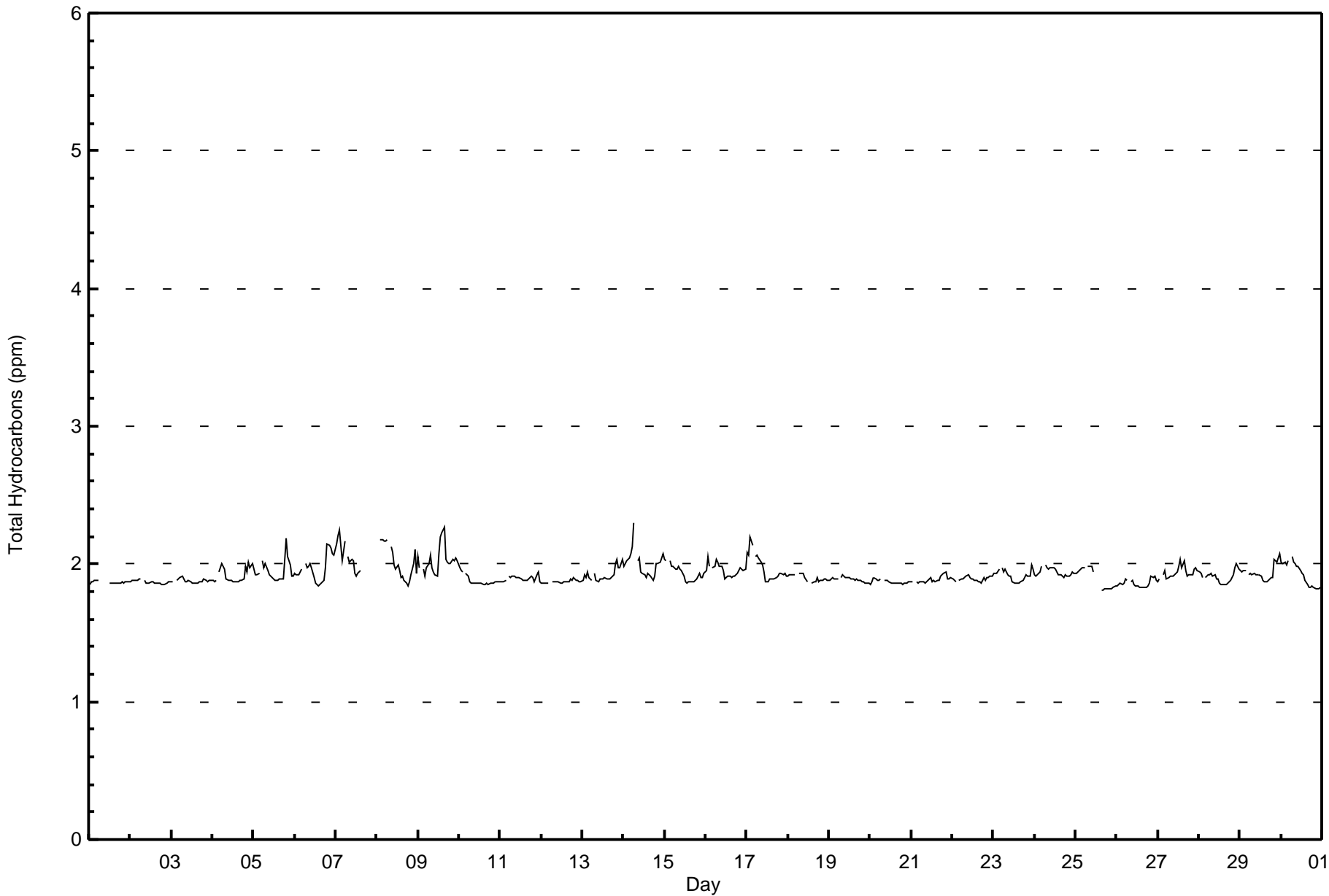






Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 629 | 94.02 | 94.02 |
| 2.1 - 3.0 | 40 | 5.98 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 669

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 62 | 18 | 10 | 20 | 15 | 34 | 55 | 43 | 57 | 60 | 52 | 56 | 54 | 31 | 29 | 33 | 629 |
| 2.1 - 3.0 | 3 | 1 | 0 | 0 | 2 | 2 | 2 | 1 | 5 | 8 | 4 | 2 | 2 | 1 | 2 | 5 | 40 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 65 | 19 | 10 | 20 | 17 | 36 | 57 | 44 | 62 | 68 | 56 | 58 | 56 | 32 | 31 | 38 | 669 |

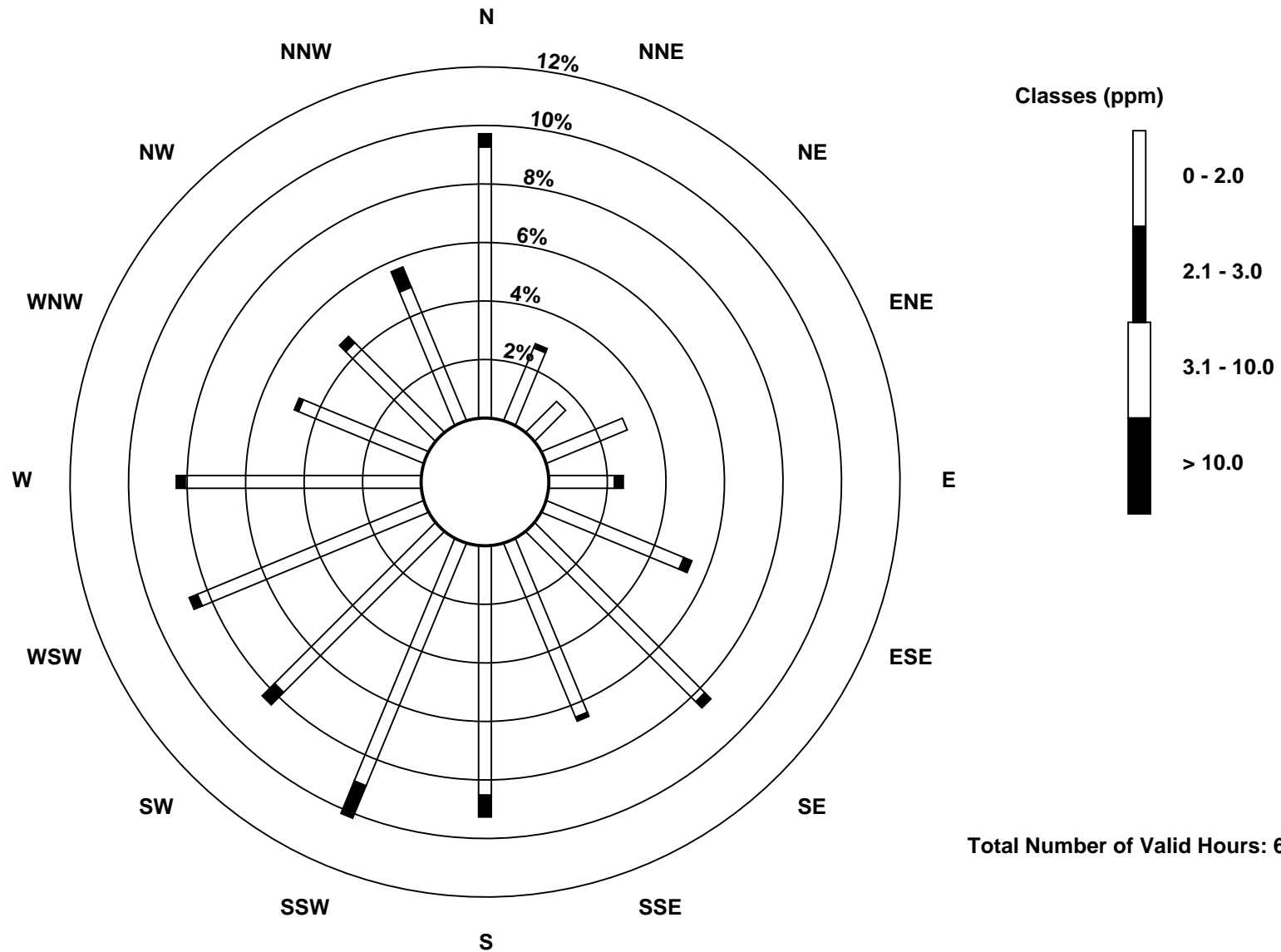
Total Number of Valid Hours: 669

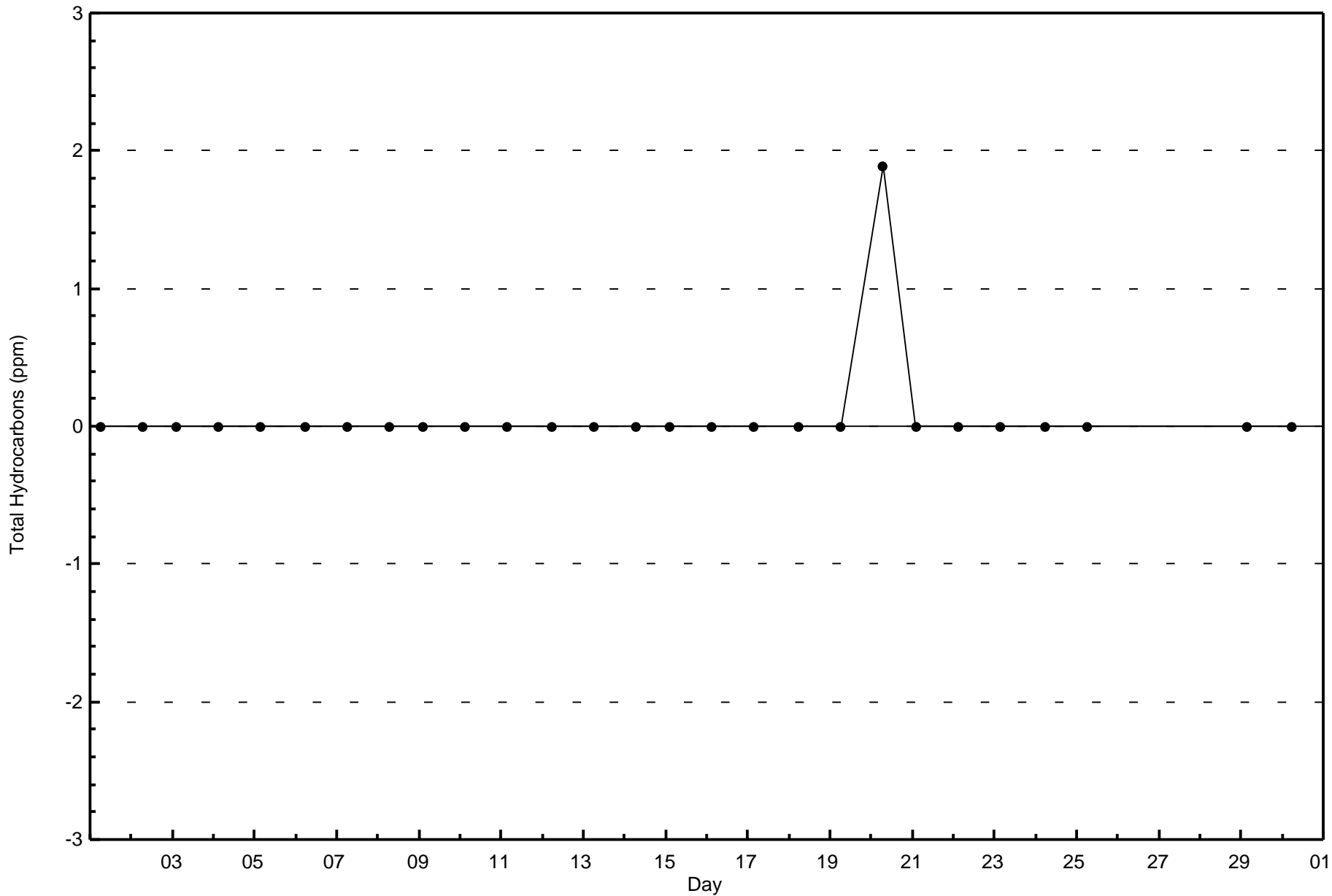
Total Number of Hours: 720

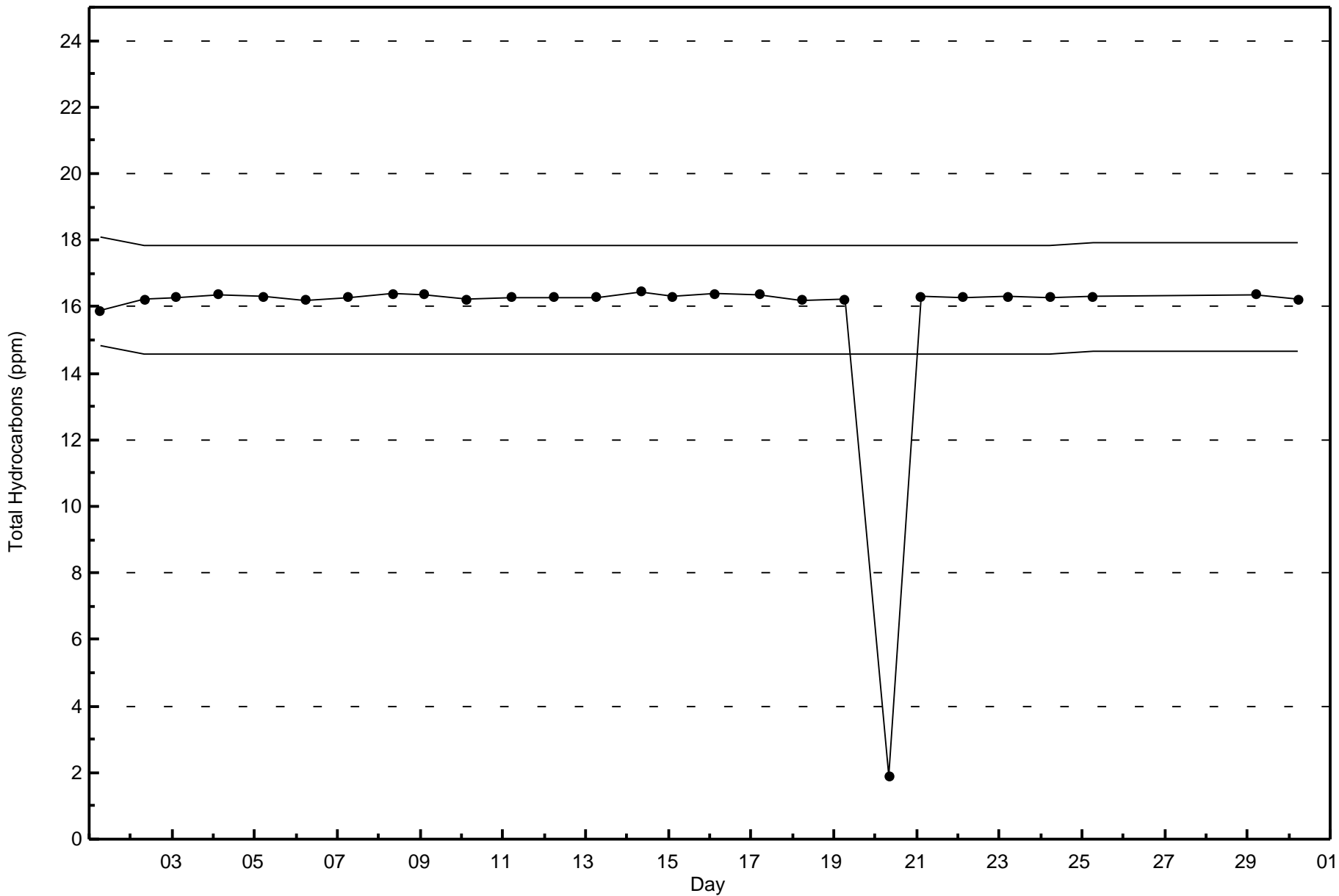


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



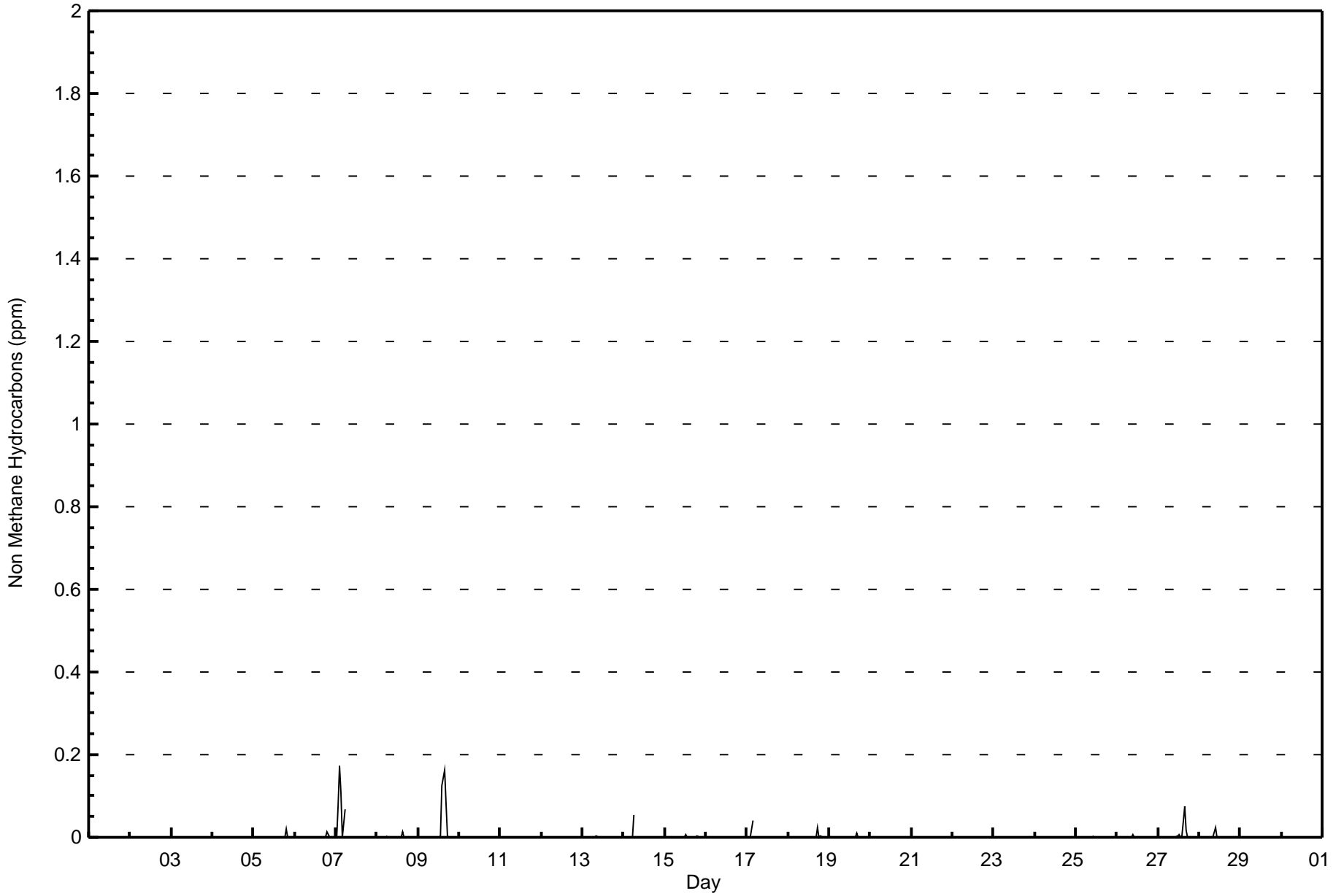






Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 649 | 97.01 | 97.01 |
| 0.006 - 0.05 | 12 | 1.79 | 98.80 |
| 0.06 - 0.1 | 6 | 0.90 | 99.70 |
| > 0.1 | 2 | 0.30 | 100.00 |

Total Number of Valid Hours: 669

Total Number of Hours: 720



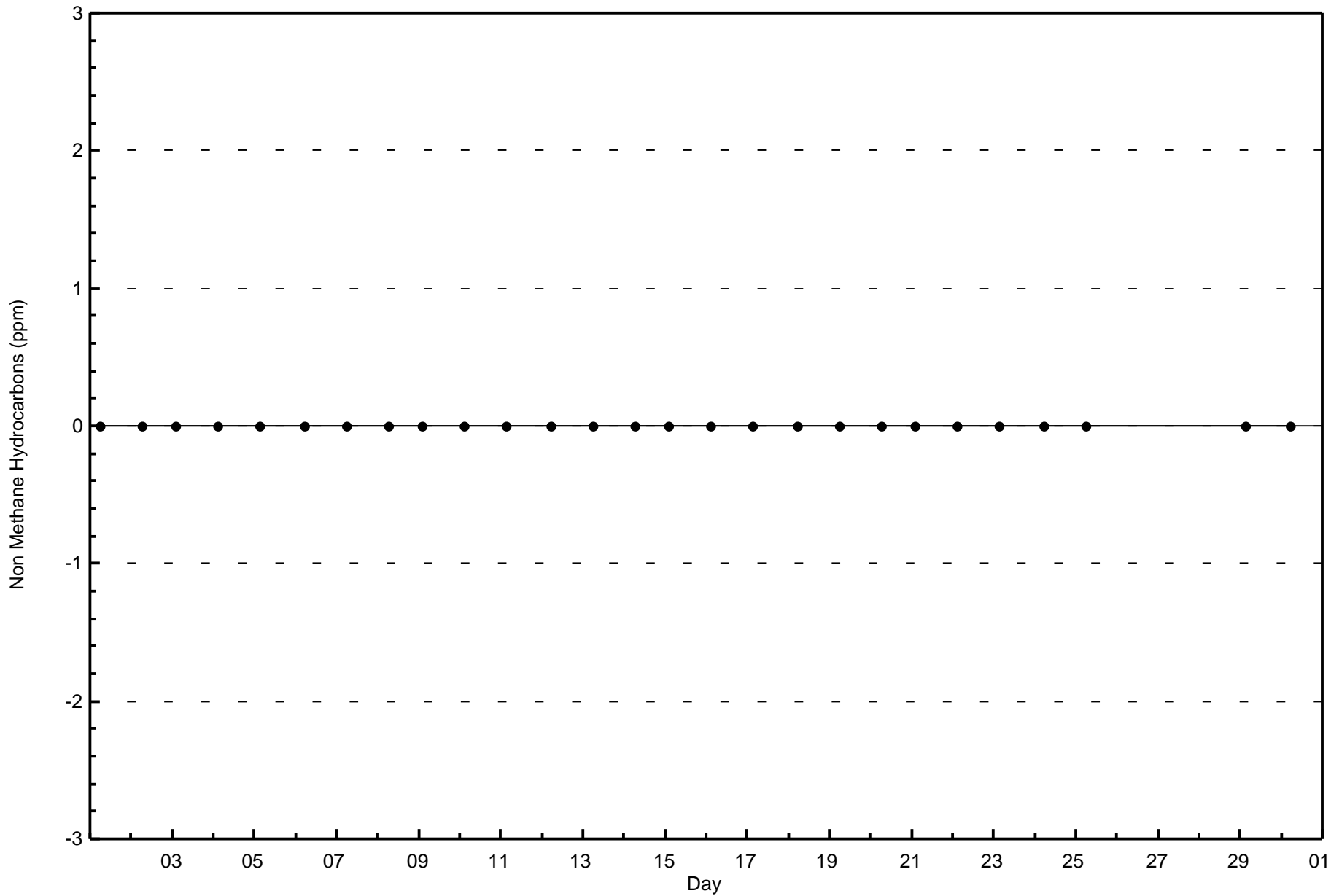
**Wood Buffalo Environmental Association
Frequency Distribution**

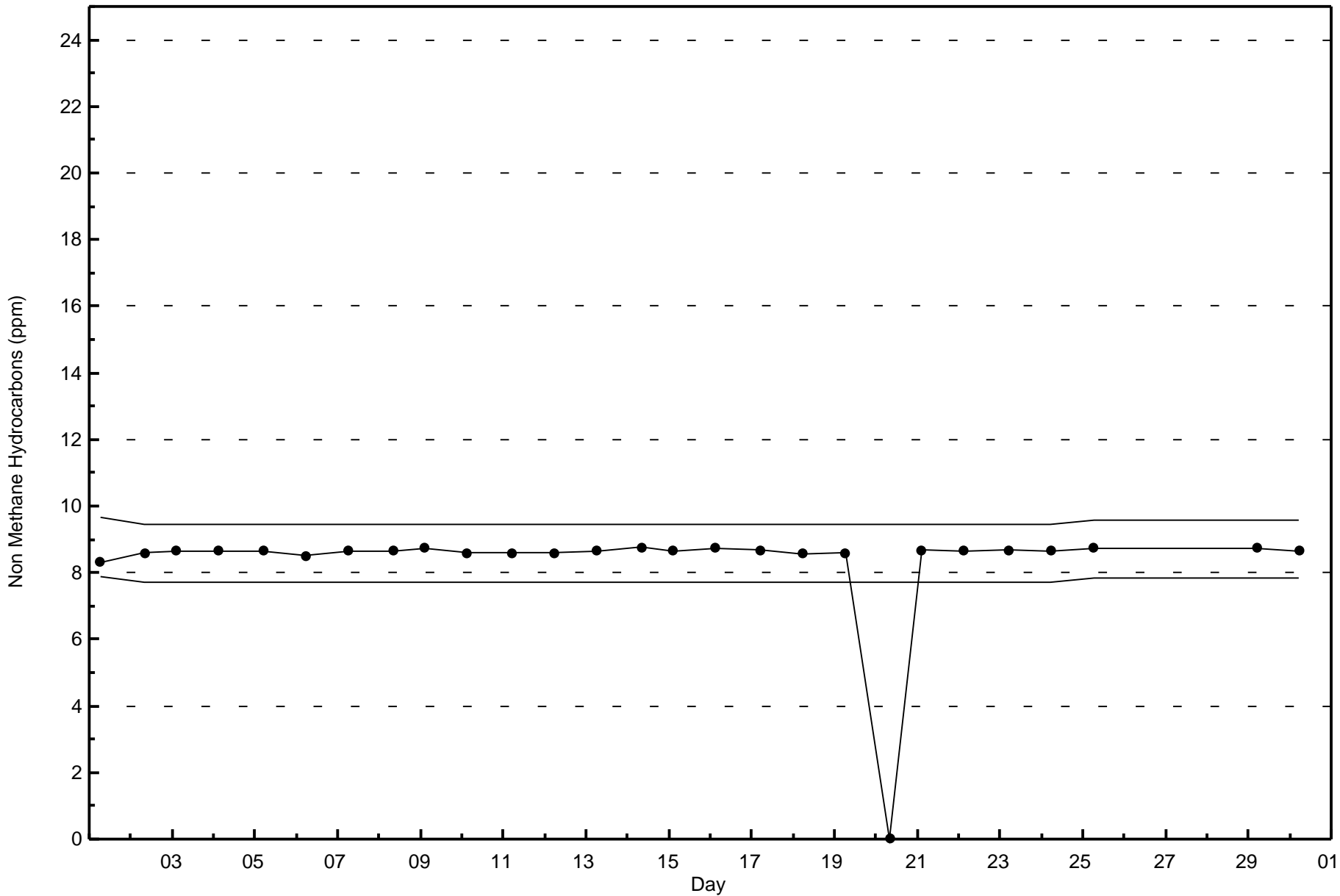
**Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - September 2017**

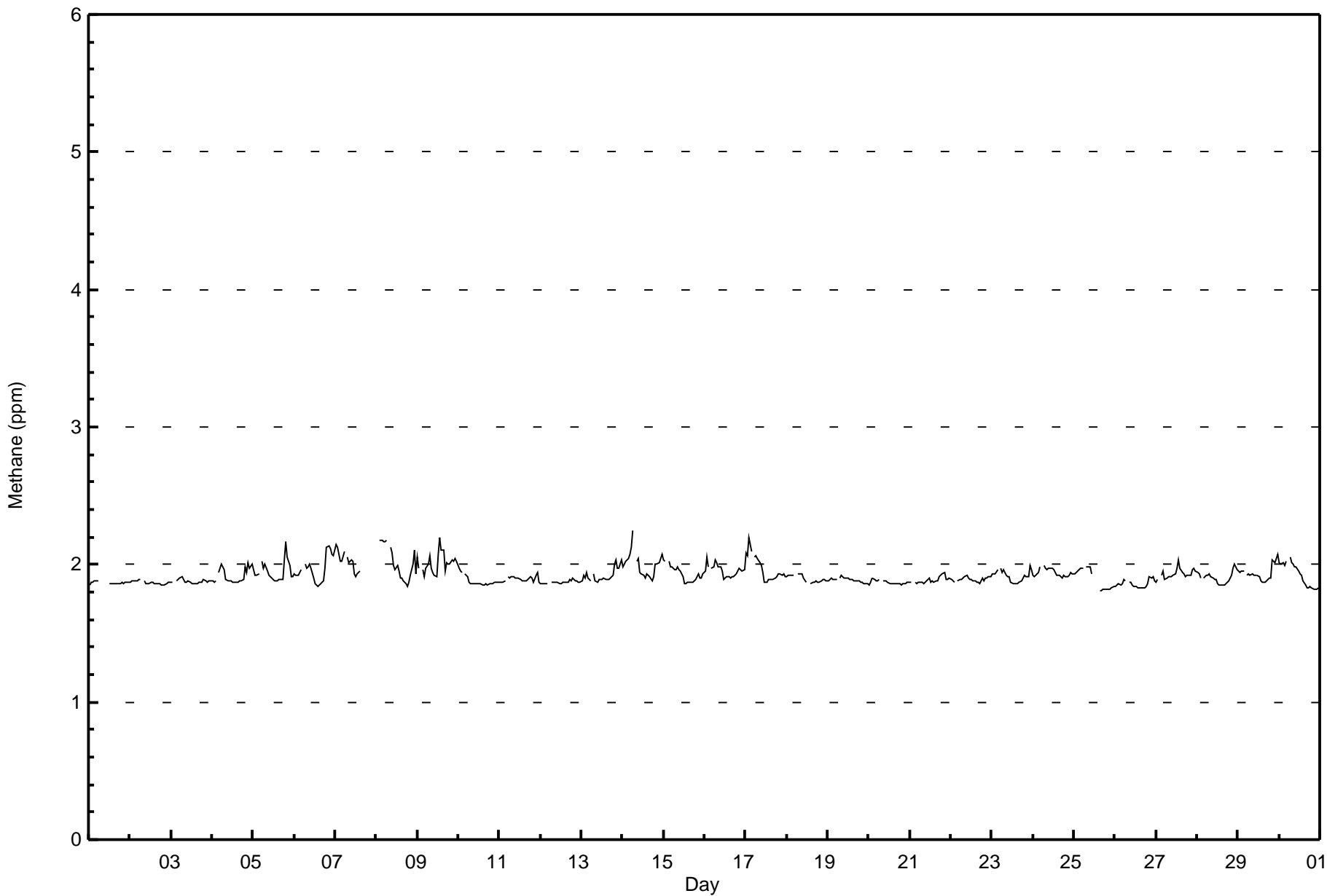
| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 63 | 17 | 10 | 19 | 17 | 34 | 56 | 44 | 59 | 66 | 55 | 58 | 56 | 31 | 31 | 33 | 649 |
| 0.006 - 0.05 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 12 |
| 0.06 - 0.1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 6 |
| > 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Totals | 65 | 19 | 10 | 20 | 17 | 36 | 57 | 44 | 62 | 68 | 56 | 58 | 56 | 32 | 31 | 38 | 669 |

Total Number of Valid Hours: 669

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 630 | 94.17 | 94.17 |
| 2.1 - 3.0 | 39 | 5.83 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 669

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 62 | 18 | 10 | 20 | 15 | 34 | 55 | 43 | 57 | 61 | 52 | 56 | 54 | 31 | 29 | 33 | 630 |
| 2.1 - 3.0 | 3 | 1 | 0 | 0 | 2 | 2 | 2 | 1 | 5 | 7 | 4 | 2 | 2 | 1 | 2 | 5 | 39 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 65 | 19 | 10 | 20 | 17 | 36 | 57 | 44 | 62 | 68 | 56 | 58 | 56 | 32 | 31 | 38 | 669 |

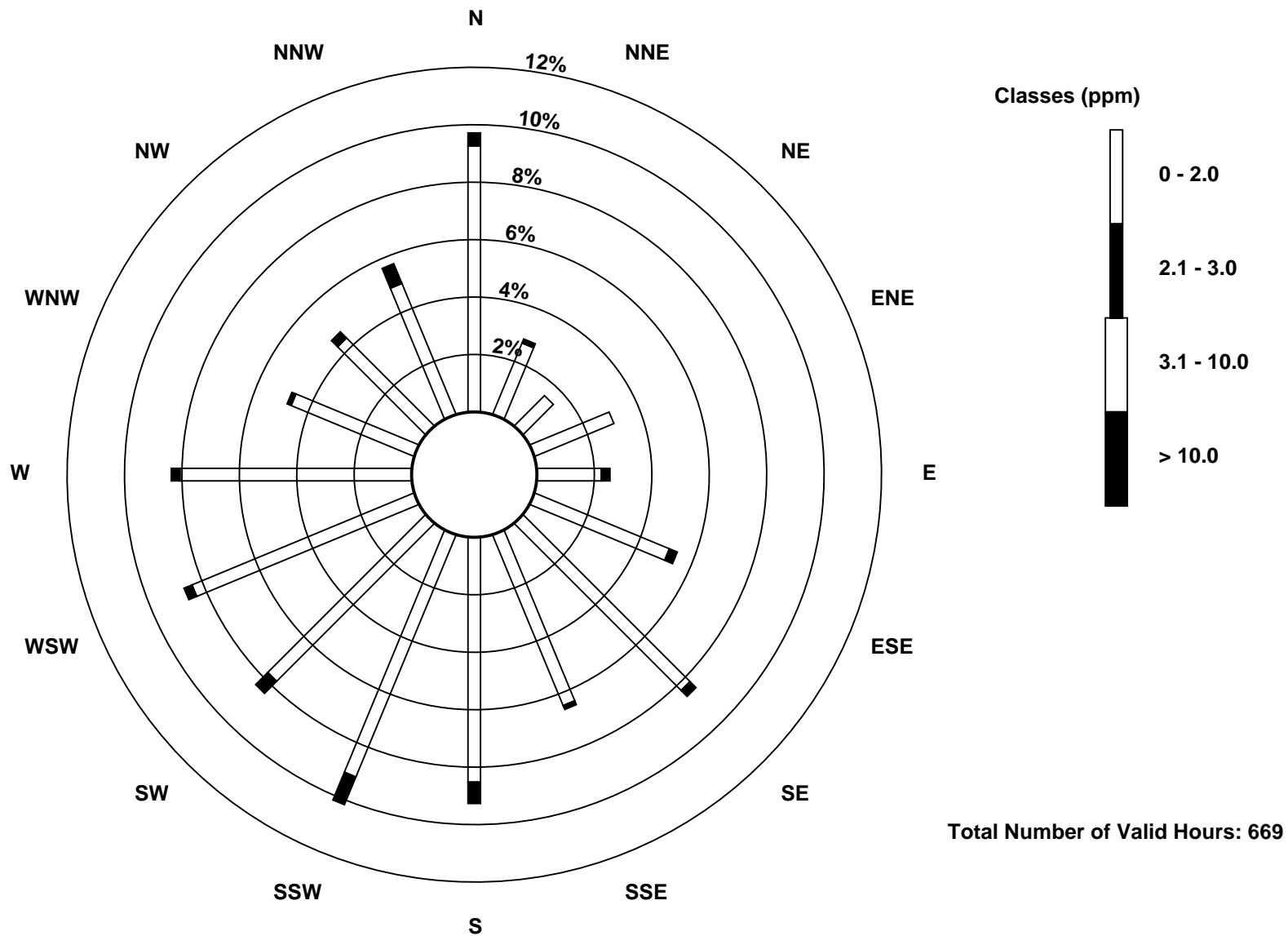
Total Number of Valid Hours: 669

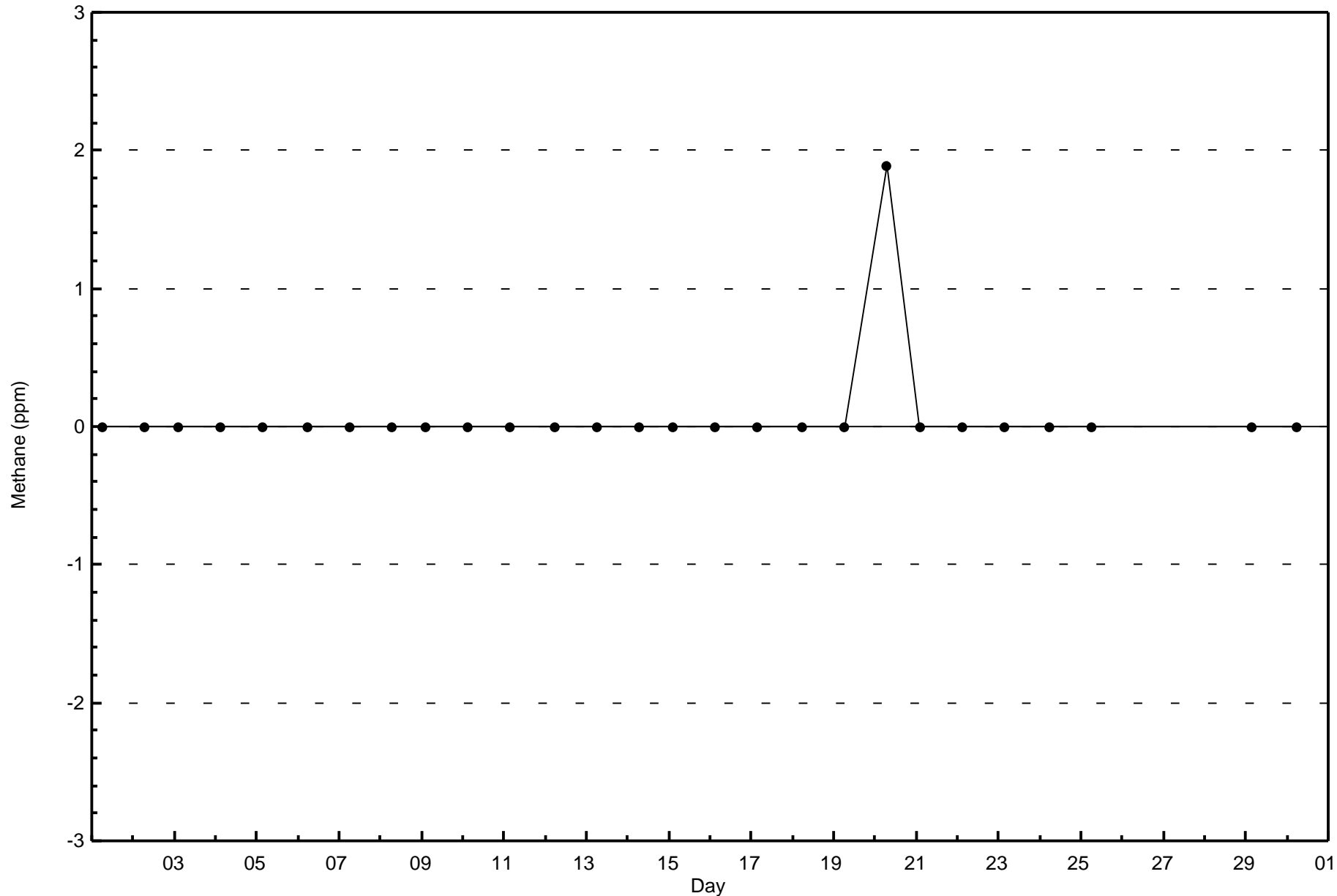
Total Number of Hours: 720

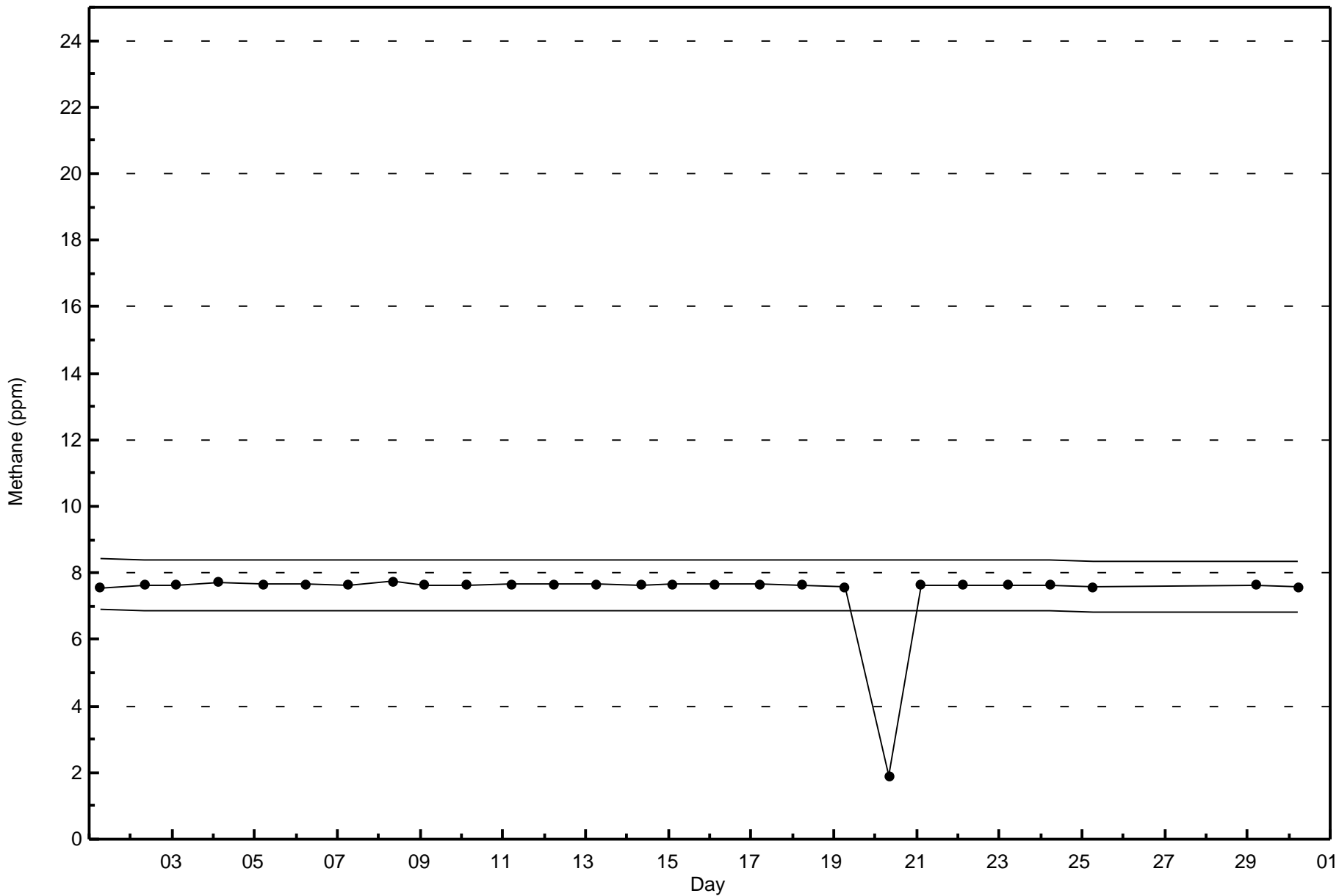


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

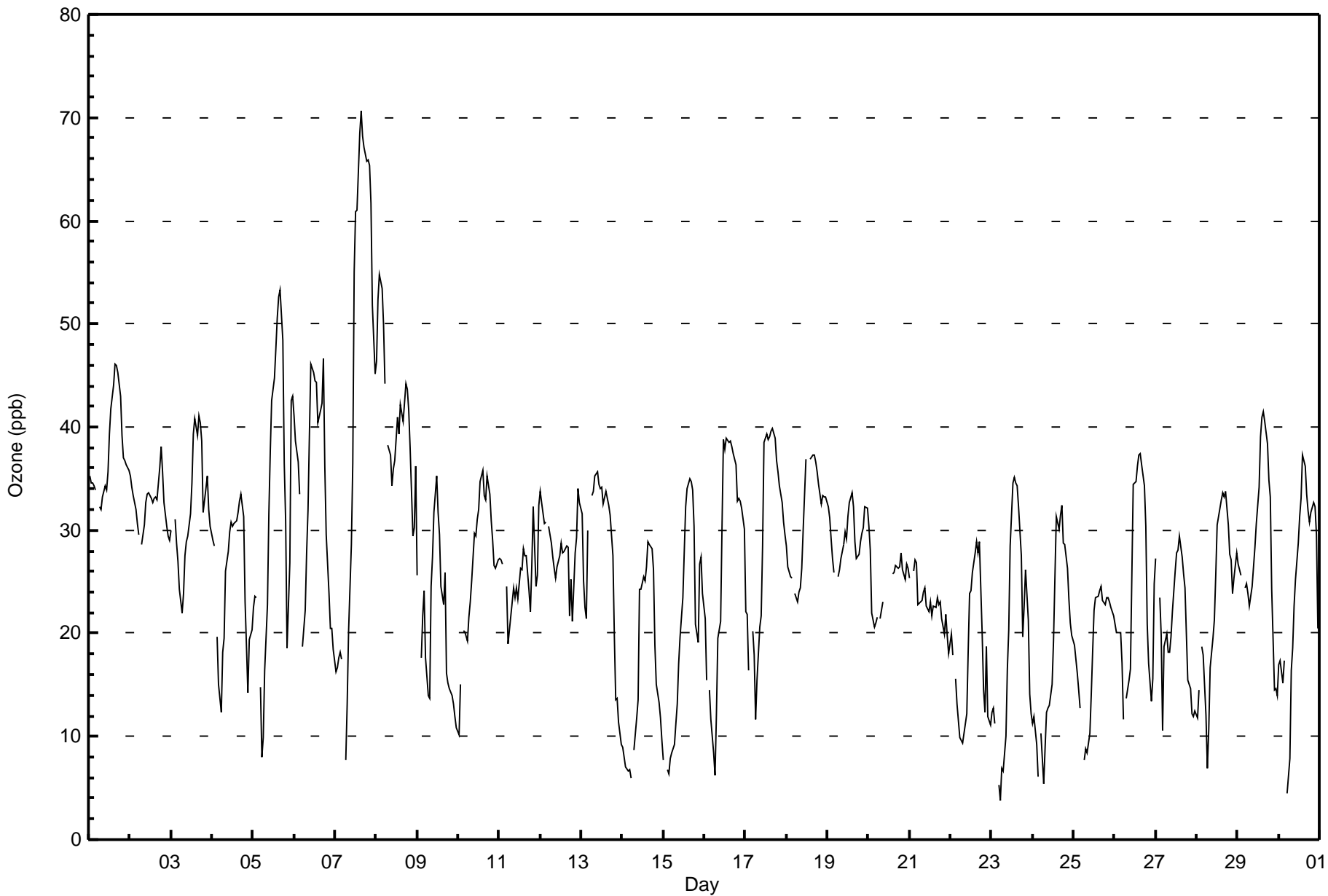
Patricia McInnes - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 71 ppb on Sep 7 16:00 | Maximum Daily Average: 43.5 ppb on Sep 7 | | Hours of Data: | 683 |
| Minimum Value: 4 ppb on Sep 23 06:00 | Minimum Daily Average: 16.7 ppb on Sep 14 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 35.2 ppb at hour 16 | Minimum Diurnal Average: 16.7 ppb at hour 7 | | Hours of Calibration: | 35 |
| Monthly Average: 26.9 ppb | Percentiles: P ₁ = 6 P ₁₀ = 12 O ₁ = 20 Median = 27 O ₃ = 33 P ₉₀ = 39 P ₉₉ = 65 | | 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-Sep | 35 | 35 | 35 | 34 | 34 | Z | 32 | 32 | 33 | 34 | 34 | 36 | 39 | 42 | 44 | 46 | 46 | 45 | 43 | 39 | 37 | 37 | 36 | 36 | 37.6 | 46 |
| 2-Sep | 35 | 34 | 33 | 32 | 31 | 30 | Z | 29 | 31 | 33 | 34 | 34 | 33 | 33 | 33 | 33 | 33 | 36 | 38 | 36 | 33 | 30 | 29 | 29 | 32.6 | 38 |
| 3-Sep | 30 | Z | 31 | 29 | 27 | 24 | 22 | 24 | 27 | 29 | 29 | 32 | 35 | 39 | 41 | 39 | 41 | 40 | 39 | 32 | 34 | 35 | 32 | 30 | 32.3 | 41 |
| 4-Sep | 29 | 28 | Z | 20 | 15 | 12 | 18 | 19 | 26 | 28 | 30 | 31 | 30 | 31 | 31 | 32 | 33 | 33 | 31 | 23 | 19 | 14 | 19 | 20 | 24.9 | 33 |
| 5-Sep | 23 | 24 | 23 | Z | 15 | 8 | 10 | 16 | 23 | 32 | 38 | 43 | 45 | 48 | 51 | 53 | 53 | 48 | 36 | 31 | 19 | 27 | 43 | 43 | 32.6 | 53 |
| 6-Sep | 41 | 39 | 37 | 33 | Z | 19 | 22 | 28 | 32 | 39 | 46 | 45 | 44 | 44 | 40 | 42 | 42 | 47 | 36 | 30 | 24 | 21 | 21 | 18 | 34.4 | 47 |
| 7-Sep | 16 | 17 | 18 | 18 | 18 | Z | 8 | 13 | 20 | 29 | 36 | 55 | 61 | 61 | 68 | 71 | 68 | 67 | 66 | 66 | 65 | 62 | 52 | 45 | 43.5 | 71 |
| 8-Sep | 46 | 52 | 55 | 53 | 50 | 44 | Z | 38 | 37 | 34 | 36 | 37 | 41 | 39 | 42 | 41 | 40 | 44 | 44 | 42 | 38 | 29 | 30 | 36 | 41.4 | 55 |
| 9-Sep | 26 | Z | 18 | 22 | 24 | 18 | 14 | 14 | 25 | 27 | 32 | 35 | 32 | 30 | 25 | 23 | 26 | 16 | 15 | 15 | 14 | 13 | 12 | 11 | 21.0 | 35 |
| 10-Sep | 10 | 15 | Z | 20 | 20 | 19 | 22 | 23 | 25 | 30 | 29 | 31 | 32 | 35 | 36 | 33 | 33 | 35 | 34 | 31 | 29 | 27 | 26 | 27 | 27.1 | 36 |
| 11-Sep | 27 | 27 | 27 | Z | 25 | 19 | 20 | 22 | 24 | 23 | 24 | 23 | 26 | 26 | 28 | 28 | 27 | 24 | 22 | 27 | 32 | 25 | 26 | 32 | 25.5 | 32 |
| 12-Sep | 34 | 33 | 31 | 31 | Z | 30 | 29 | 27 | 26 | 25 | 26 | 28 | 29 | 28 | 28 | 28 | 28 | 22 | 25 | 21 | 28 | 29 | 34 | 33 | 28.4 | 34 |
| 13-Sep | 32 | 25 | 23 | 21 | 30 | Z | 33 | 34 | 35 | 36 | 34 | 34 | 34 | 33 | 34 | 33 | 32 | 31 | 27 | 20 | 14 | 14 | 11 | 9 | 27.4 | 36 |
| 14-Sep | 9 | 8 | 7 | 7 | 7 | 6 | Z | 9 | 12 | 14 | 24 | 24 | 26 | 25 | 26 | 29 | 29 | 28 | 26 | 19 | 15 | 13 | 12 | 10 | 16.7 | 29 |
| 15-Sep | 8 | Z | 7 | 6 | 8 | 8 | 9 | 11 | 13 | 17 | 20 | 23 | 28 | 32 | 34 | 35 | 35 | 34 | 30 | 21 | 19 | 27 | 27 | 24 | 20.7 | 35 |
| 16-Sep | 21 | 15 | Z | 15 | 12 | 8 | 6 | 12 | 19 | 21 | 30 | 39 | 38 | 39 | 39 | 39 | 38 | 37 | 36 | 33 | 33 | 33 | 32 | 30 | 27.2 | 39 |
| 17-Sep | 22 | 22 | 16 | Z | 20 | 18 | 12 | 15 | 21 | 22 | 29 | 38 | 39 | 39 | 39 | 40 | 40 | 39 | 37 | 36 | 34 | 33 | 31 | 30 | 29.1 | 40 |
| 18-Sep | 29 | 26 | 26 | 25 | Z | 24 | 23 | 24 | 24 | 26 | 30 | 37 | M | M | 37 | 37 | 37 | 37 | 36 | 34 | 33 | 33 | 33 | 33 | 30.7 | 37 |
| 19-Sep | 32 | 31 | 29 | 27 | 26 | Z | 25 | 26 | 27 | 29 | 30 | 29 | 31 | 33 | 34 | 32 | 29 | 27 | 28 | 29 | 30 | 30 | 32 | 32 | 29.5 | 34 |
| 20-Sep | 30 | 28 | 22 | 21 | 21 | 21 | Z | 21 | 23 | C | C | C | C | C | 26 | 26 | 27 | 26 | 26 | 28 | 26 | 25 | 27 | 26 | 25.1 | 30 |
| 21-Sep | 25 | Z | 26 | 27 | 27 | 23 | 23 | 23 | 24 | 24 | 23 | 22 | 23 | 22 | 23 | 23 | 23 | 23 | 23 | 21 | 20 | 22 | 20 | 18 | 22.9 | 27 |
| 22-Sep | 20 | 18 | Z | 16 | 13 | 10 | 10 | 9 | 10 | 12 | 18 | 24 | 24 | 26 | 28 | 29 | 28 | 29 | 20 | 14 | 12 | 19 | 12 | 11 | 17.9 | 29 |
| 23-Sep | 12 | 13 | 11 | Z | 5 | 4 | 7 | 7 | 10 | 17 | 20 | 28 | 35 | 35 | 35 | 34 | 32 | 27 | 20 | 23 | 26 | 21 | 14 | 12 | 19.5 | 35 |
| 24-Sep | 11 | 12 | 9 | 6 | Z | 10 | 5 | 9 | 12 | 13 | 13 | 15 | 19 | 25 | 31 | 30 | 31 | 32 | 29 | 29 | 26 | 23 | 21 | 20 | 18.9 | 32 |
| 25-Sep | 19 | 18 | 16 | 14 | 13 | Z | 8 | 9 | 8 | 10 | 14 | 18 | 22 | 23 | 24 | 24 | 24 | 23 | 23 | 23 | 23 | 23 | 22 | 22 | 18.5 | 24 |
| 26-Sep | 21 | 20 | 20 | 20 | 17 | 12 | Z | 14 | 15 | 17 | 26 | 34 | 35 | 36 | 37 | 37 | 36 | 34 | 30 | 21 | 17 | 13 | 16 | 25 | 24.1 | 37 |
| 27-Sep | 27 | Z | 23 | 20 | 11 | 19 | 20 | 18 | 18 | 20 | 22 | 26 | 28 | 28 | 29 | 27 | 26 | 24 | 20 | 15 | 15 | 12 | 12 | 12 | 20.6 | 29 |
| 28-Sep | 12 | 15 | Z | 19 | 18 | 12 | 7 | 11 | 17 | 20 | 21 | 26 | 30 | 31 | 33 | 34 | 33 | 34 | 30 | 28 | 27 | 24 | 25 | 28 | 23.2 | 34 |
| 29-Sep | 27 | 26 | 26 | Z | 24 | 25 | 24 | 23 | 24 | 26 | 28 | 31 | 34 | 39 | 41 | 42 | 41 | 38 | 35 | 33 | 24 | 14 | 15 | 14 | 28.4 | 42 |
| 30-Sep | 17 | 17 | 15 | 17 | Z | 4 | 8 | 16 | 19 | 23 | 25 | 29 | 31 | 33 | 37 | 36 | 33 | 32 | 31 | 32 | 33 | 32 | 30 | 20 | 24.9 | 37 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 24.2 | 23.9 | 23.3 | 22.2 | 20.4 | 17.1 | 16.7 | 19.2 | 22.1 | 24.4 | 27.7 | 31.3 | 33.0 | 34.1 | 35.1 | 35.2 | 34.9 | 33.9 | 31.2 | 28.3 | 26.6 | 25.4 | 25.1 | 24.6 | Diurnal Average | |
| 46 | 52 | 55 | 53 | 50 | 44 | 33 | 38 | 37 | 39 | 46 | 55 | 61 | 61 | 68 | 71 | 68 | 67 | 66 | 66 | 65 | 62 | 52 | 45 | Diurnal Maximum | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 185 | 27.09 | 27.09 |
| 21 - 50 | 480 | 70.28 | 97.36 |
| 51 - 82 | 18 | 2.64 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 7 | 2 | 1 | 0 | 4 | 1 | 29 | 20 | 25 | 32 | 23 | 6 | 7 | 6 | 13 | 9 | 185 |
| 21 - 50 | 54 | 17 | 9 | 21 | 12 | 35 | 30 | 26 | 31 | 36 | 33 | 58 | 45 | 26 | 19 | 28 | 480 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 18 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 61 | 19 | 10 | 21 | 16 | 36 | 59 | 46 | 67 | 69 | 59 | 66 | 53 | 32 | 32 | 37 | 683 |

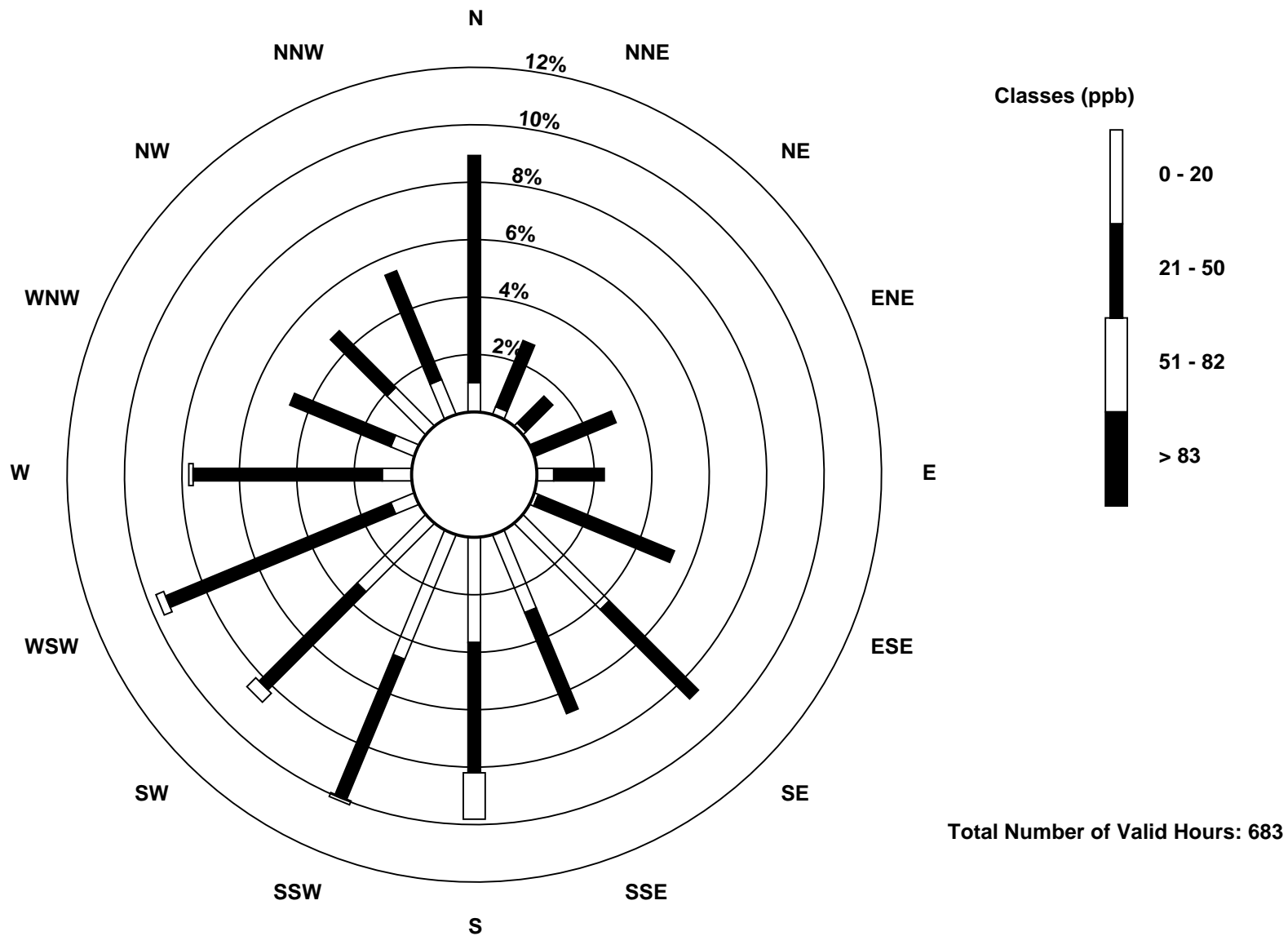
Total Number of Valid Hours: 683

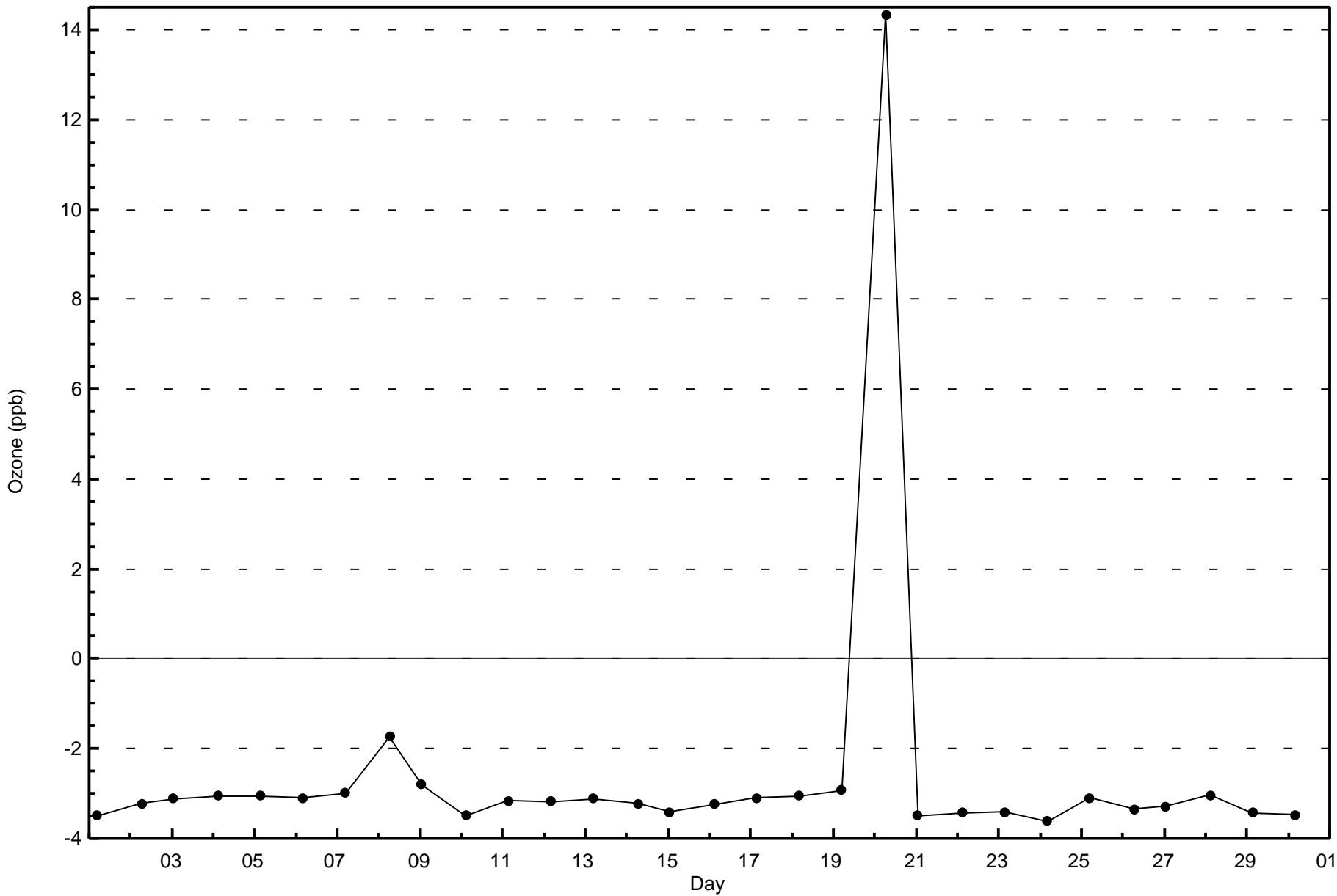
Total Number of Hours: 720

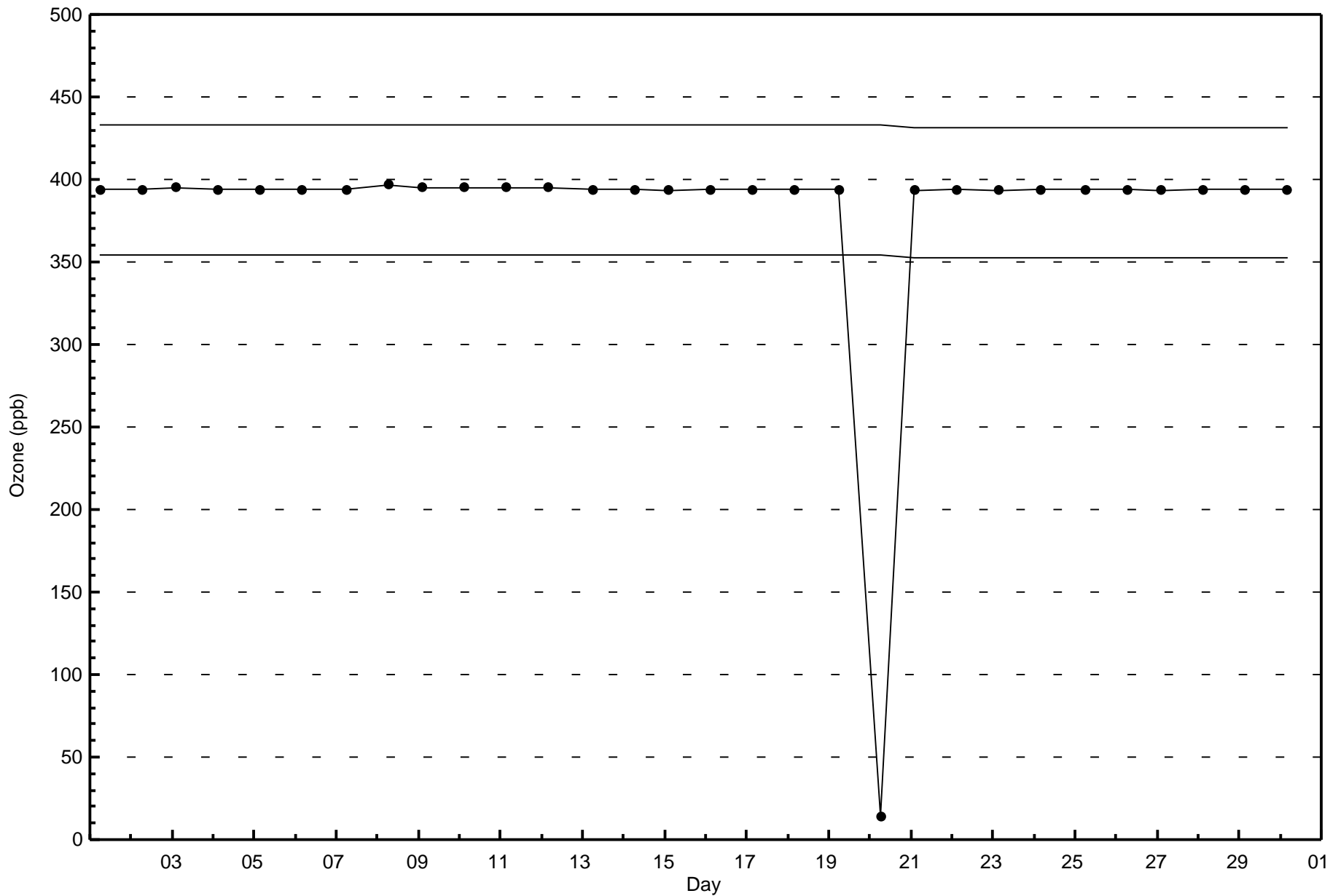


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

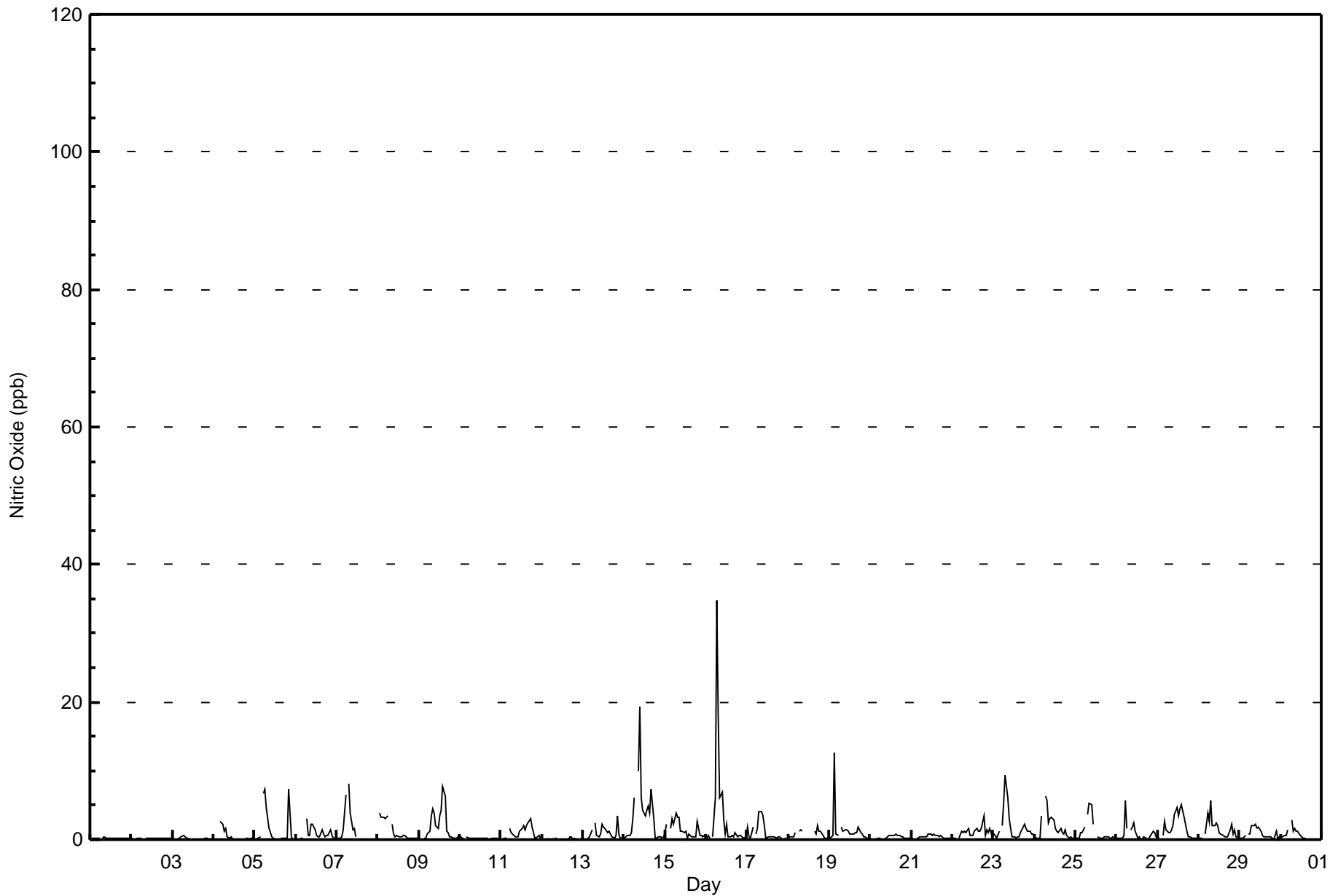








| Maximum Value: 35 ppb on Sep 16 07:00 Maximum Daily Average: 3.7 ppb on Sep 16 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 669 Hours of Missing Data: 51 Hours of Calibration: 36 Percent Operational Time: 97.9 | | | | | | | | | |
|--|-------------------------------|---|---|----|---|---|----|----|----|----|----|----|----|----|----|----|--|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 4 12:00 Minimum Daily Average: 0.1 ppb on Sep 12 Maximum Diurnal Average: 3.5 ppb at hour 7 Minimum Diurnal Average: 0.2 ppb at hour 24 Monthly Average: 1.1 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 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-Sep | 0 | 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-Sep | 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 |
| 3-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 4-Sep | 0 | 0 | 0 | Z | 3 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 5-Sep | 0 | 0 | 0 | 0 | Z | 7 | 7 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 1.4 | 7 |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | Z | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0.8 | 3 |
| 7-Sep | 0 | 0 | 0 | 0 | 1 | 6 | Z | 8 | 4 | 1 | 2 | 0 | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | -- | 8 |
| 8-Sep | UO | 4 | 3 | 3 | 3 | 3 | 4 | Z | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 4 |
| 9-Sep | 0 | 0 | Z | 0 | 0 | 1 | 1 | 3 | 5 | 4 | 2 | 2 | 3 | 4 | 8 | 6 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1.9 | 8 |
| 10-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 1 | 0 | 0 | 1 | 0 | 1.0 | 3 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 2 | Z | 3 | 1 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0.9 | 3 |
| 14-Sep | 0 | 0 | 1 | 1 | 1 | 3 | 6 | Z | 10 | 19 | 6 | 4 | 4 | 4 | 5 | 4 | 7 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 19 |
| 15-Sep | 1 | 2 | Z | 2 | 3 | 2 | 4 | 3 | 3 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 0 | 1 | 1.4 | 4 |
| 16-Sep | 0 | 1 | 0 | Z | 0 | 6 | 35 | 18 | 6 | 7 | 3 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 3.7 | 35 |
| 17-Sep | 2 | 0 | 0 | 2 | Z | 1 | 2 | 4 | 4 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1.0 | 4 |
| 18-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 1 | 1 | C | C | C | C | C | C | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | -- | 2 |
| 19-Sep | 0 | 0 | 1 | 13 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1.4 | 13 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 21-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 22-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 0 | 0 | 1.0 | 3 |
| 23-Sep | 1 | 1 | 0 | 1 | Z | 2 | 5 | 9 | 6 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.9 | 9 |
| 24-Sep | 0 | 0 | 0 | 0 | 3 | Z | 6 | 6 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1.7 | 6 |
| 25-Sep | 0 | 0 | 0 | 1 | 1 | 2 | Z | 4 | 5 | 5 | 2 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 5 |
| 26-Sep | 0 | 0 | 0 | 0 | 1 | 6 | 2 | Z | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0.9 | 6 |
| 27-Sep | 0 | 0 | Z | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 4 | 5 | 3 | 4 | 5 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 5 |
| 28-Sep | 0 | 0 | 0 | Z | 1 | 4 | 3 | 6 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 1.4 | 6 |
| 29-Sep | 0 | 0 | 0 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.8 | 2 |
| 30-Sep | 0 | 0 | 1 | 1 | 2 | Z | 3 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 668 | 99.85 | 99.85 |
| 21 - 40 | 1 | 0.15 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 669

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 65 | 19 | 10 | 20 | 17 | 33 | 56 | 43 | 59 | 68 | 57 | 64 | 56 | 32 | 31 | 38 | 668 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 65 | 19 | 10 | 20 | 17 | 33 | 56 | 44 | 59 | 68 | 57 | 64 | 56 | 32 | 31 | 38 | 669 |

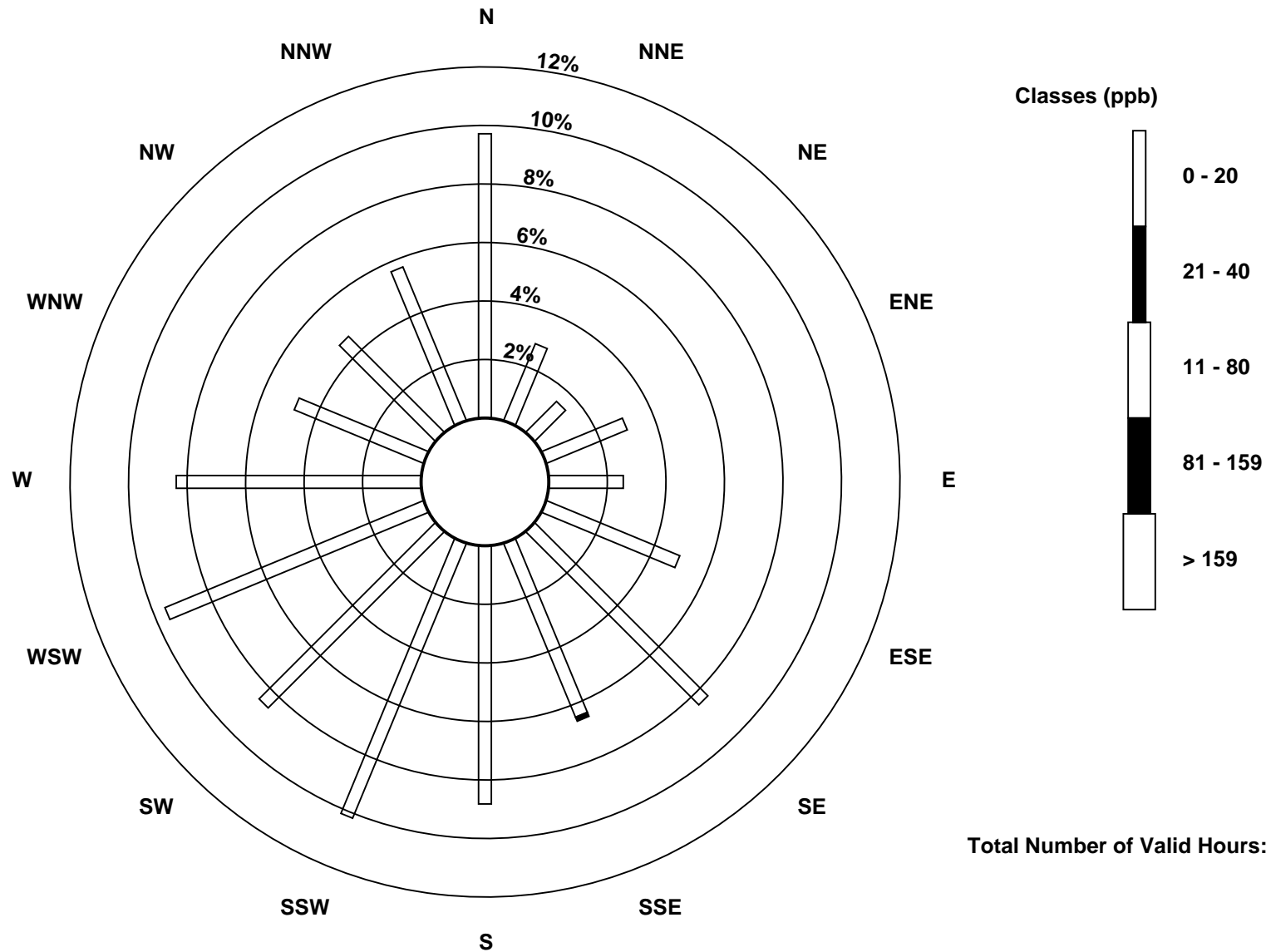
Total Number of Valid Hours: 669

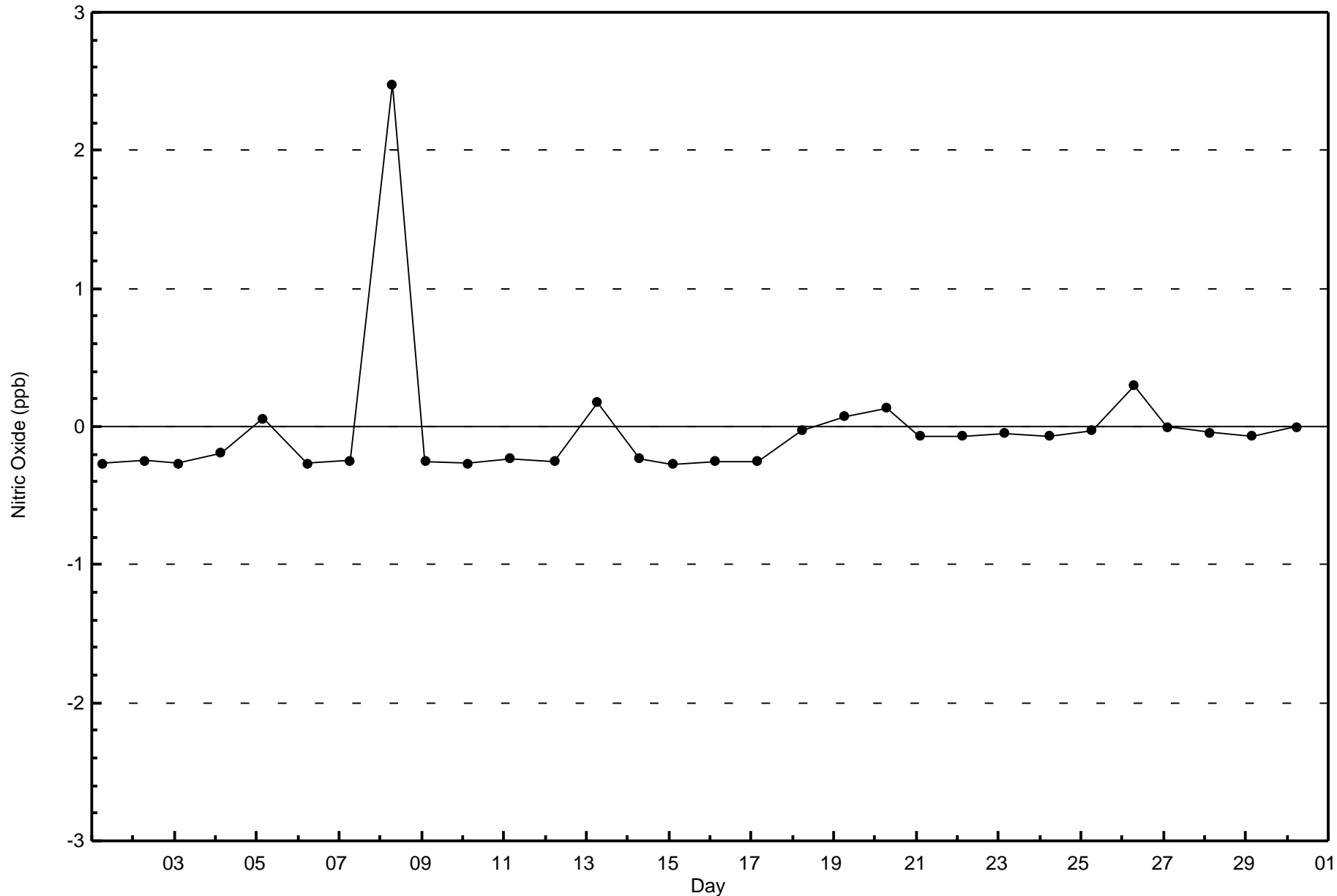
Total Number of Hours: 720

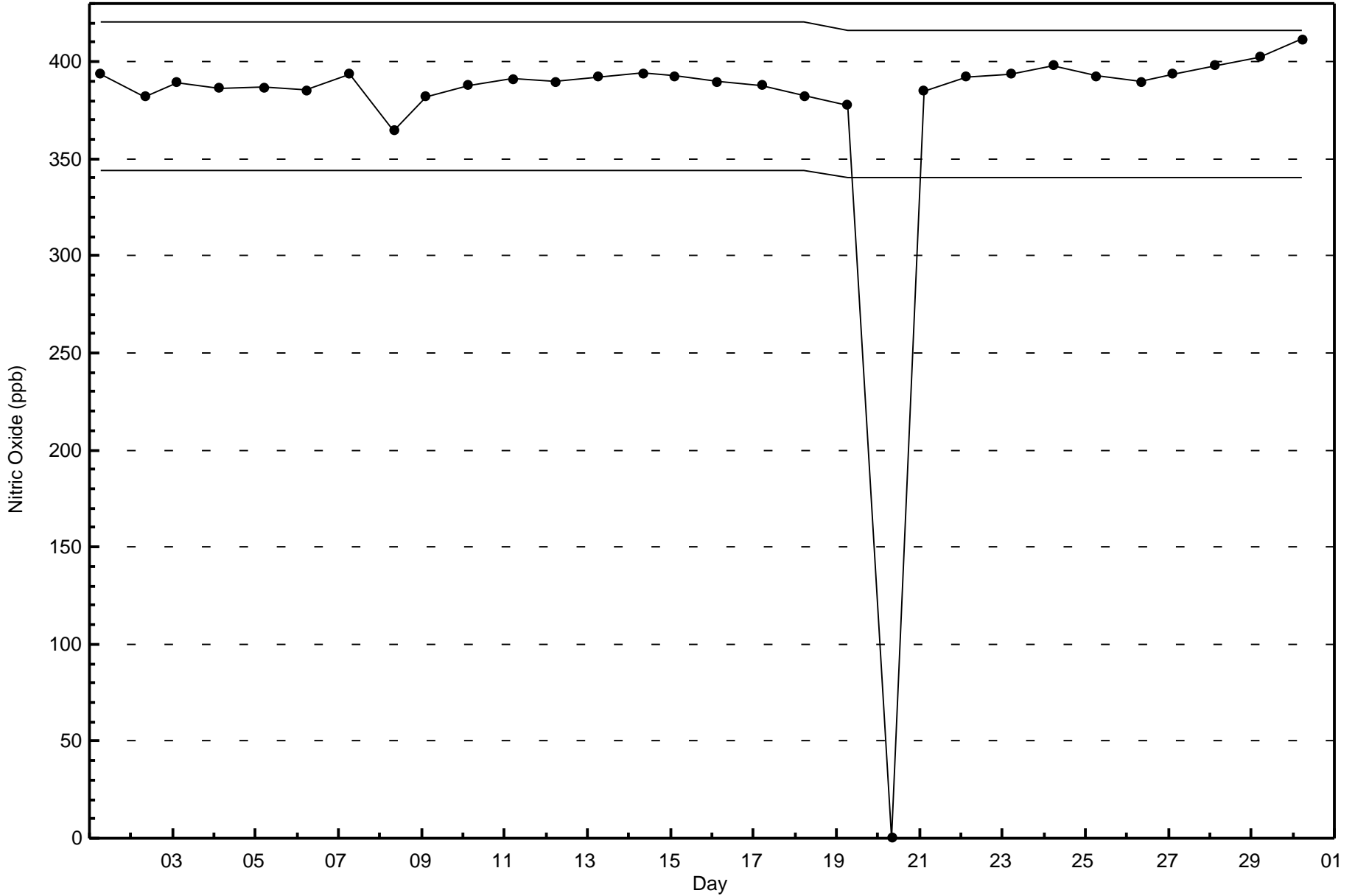


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

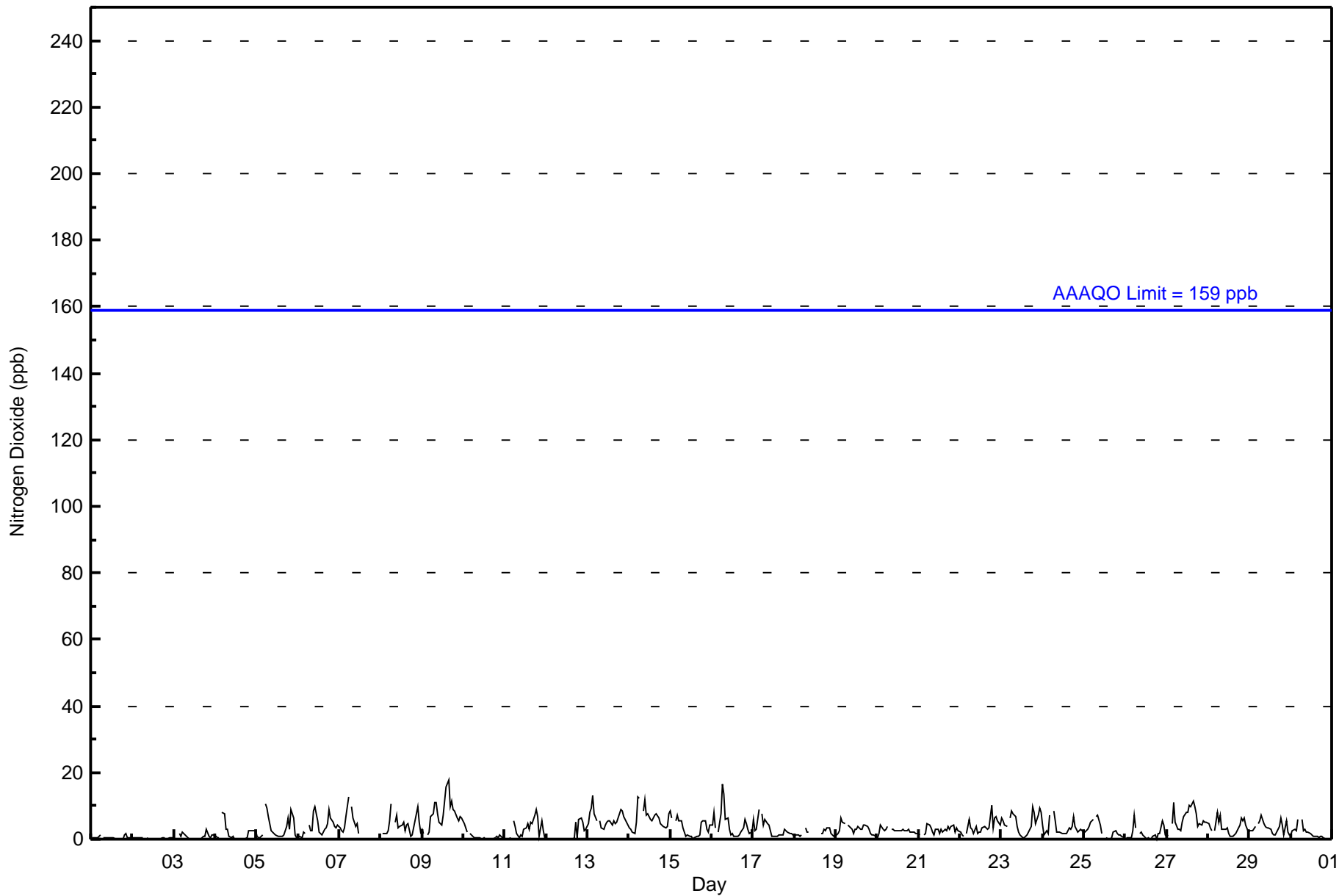
Patricia McInnes - September 2017

| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 18 ppb on Sep 9 16:00 | Maximum Daily Average: 7.7 ppb on Sep 9 | | Hours of Data: | 669 |
| Minimum Value: 0 ppb on Sep 3 12:00 | Minimum Daily Average: 0.3 ppb on Sep 2 | | Hours of Missing Data: | 51 |
| Maximum Diurnal Average: 5.9 ppb at hour 6 | Minimum Diurnal Average: 2.1 ppb at hour 3 | | Hours of Calibration: | 36 |
| Monthly Average: 3.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 O ₃ = 5 P ₉₀ = 7 P ₉₉ = 12 | | Percent Operational Time: | 97.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 0 | 0 | 0 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0.5 | 2 | |
| 2-Sep | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 | |
| 3-Sep | 0 | 0 | Z | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 1 | 0 | 1 | 1 | 0.7 | 3 | |
| 4-Sep | 1 | 1 | 0 | Z | 8 | 8 | 3 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 3 | 3 | 3 | 1.7 | 8 | |
| 5-Sep | 1 | 1 | 1 | 1 | Z | 11 | 10 | 7 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 6 | 3 | 9 | 6 | 1 | 1 | 3.2 | 11 | |
| 6-Sep | 1 | 1 | 1 | 2 | 2 | Z | 4 | 2 | 3 | 9 | 10 | 6 | 2 | 2 | 1 | 3 | 4 | 5 | 9 | 6 | 5 | 4 | 4 | 4 | 3.8 | 10 | |
| 7-Sep | 3 | 3 | 2 | 3 | 7 | 13 | Z | 10 | 6 | 4 | 5 | 2 | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | -- | 13 | | |
| 8-Sep | UO | 2 | 2 | 2 | 3 | 6 | 11 | Z | 5 | 7 | 3 | 4 | 4 | 5 | 3 | 4 | 5 | 1 | 1 | 3 | 6 | 10 | 5 | 2 | 4.2 | 11 | |
| 9-Sep | 3 | 2 | Z | 1 | 2 | 7 | 8 | 11 | 11 | 8 | 5 | 4 | 7 | 12 | 16 | 18 | 10 | 12 | 9 | 8 | 6 | 5 | 7 | 6 | 7.7 | 18 | |
| 10-Sep | 5 | 3 | 2 | Z | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0.8 | 5 | |
| 11-Sep | 0 | 0 | 0 | 1 | Z | 6 | 4 | 2 | 1 | 1 | 1 | 3 | 3 | 5 | 3 | 5 | 5 | 7 | 9 | 7 | 1 | 5 | 3 | 0 | 3.0 | 9 | |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 6 | 7 | 5 | 3 | 3 | 1.3 | 7 | |
| 13-Sep | 5 | 8 | 10 | 13 | 8 | 6 | Z | 6 | 3 | 3 | 4 | 5 | 5 | 6 | 4 | 5 | 5 | 5 | 8 | 9 | 9 | 7 | 6 | 4 | 6.2 | 13 | |
| 14-Sep | 4 | 3 | 2 | 2 | 5 | 13 | 12 | Z | 8 | 12 | 7 | 8 | 6 | 6 | 7 | 7 | 8 | 6 | 5 | 4 | 4 | 3 | 4 | 8 | 6.2 | 13 | |
| 15-Sep | 8 | 6 | Z | 5 | 7 | 5 | 5 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 5 | 6 | 6 | 3 | 2 | 4 | 3.3 | 8 | |
| 16-Sep | 4 | 8 | 3 | Z | 2 | 8 | 17 | 14 | 6 | 6 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 6 | 5 | 3 | 2 | 2 | 4.4 | 17 | |
| 17-Sep | 6 | 3 | 3 | 9 | Z | 8 | 4 | 6 | 5 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 2 | 1 | 3.0 | 9 | |
| 18-Sep | 1 | 1 | 1 | 1 | 1 | Z | 3 | 2 | 2 | C | C | C | C | C | C | C | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 1 | 1 | -- | 4 |
| 19-Sep | 1 | 2 | 3 | 6 | 5 | 5 | Z | 4 | 4 | 3 | 2 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 1 | 1 | 1 | 3.0 | 6 | |
| 20-Sep | 1 | 2 | 4 | 3 | 3 | 3 | 4 | Z | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2.6 | 4 | |
| 21-Sep | 2 | 1 | Z | 1 | 2 | 5 | 4 | 3 | 2 | 1 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 4 | 3 | 4 | 4 | 2 | 4 | 3 | 2.7 | 5 | |
| 22-Sep | 2 | 1 | 1 | Z | 2 | 6 | 4 | 3 | 2 | 4 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 3 | 10 | 3 | 6 | 7 | 6 | 4 | 3.6 | 10 | |
| 23-Sep | 6 | 6 | 4 | 4 | Z | 7 | 9 | 8 | 7 | 4 | 2 | 1 | 1 | 0 | 1 | 1 | 2 | 4 | 10 | 8 | 5 | 7 | 10 | 8 | 4.9 | 10 | |
| 24-Sep | 4 | 1 | 2 | 2 | 7 | Z | 9 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 7 | 4 | 2 | 3 | 3 | 3 | 3 | 3.3 | 9 | |
| 25-Sep | 2 | 2 | 3 | 4 | 5 | 6 | Z | 7 | 7 | 4 | 2 | M | M | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2.5 | 7 | |
| 26-Sep | 0 | 0 | 0 | 1 | 2 | 7 | 3 | Z | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 2 | 5 | 4 | 1 | 1.6 | 7 | |
| 27-Sep | 1 | 1 | Z | 5 | 11 | 5 | 3 | 3 | 3 | 5 | 7 | 8 | 8 | 10 | 10 | 12 | 10 | 8 | 4 | 5 | 4 | 5 | 5 | 5 | 5.9 | 12 | |
| 28-Sep | 5 | 4 | 3 | Z | 3 | 8 | 5 | 7 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 4 | 7 | 5 | 6 | 4 | 2 | 3.7 | 8 | |
| 29-Sep | 3 | 3 | 3 | 4 | Z | 5 | 6 | 7 | 5 | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 4 | 6 | 4 | 1 | 5 | 2 | 1 | 3.4 | 7 | |
| 30-Sep | 1 | 3 | 3 | 3 | 6 | Z | 6 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1.7 | 6 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 2.4 | 2.2 | 2.1 | 3.0 | 3.7 | 5.9 | 5.4 | 4.7 | 3.3 | 3.3 | 2.6 | 2.4 | 2.2 | 2.4 | 2.3 | 2.8 | 2.6 | 3.2 | 4.0 | 3.9 | 3.6 | 3.7 | 3.0 | 2.5 | Diurnal Average | |
| 8 | 8 | 10 | 13 | 11 | 13 | 17 | 14 | 11 | 12 | 10 | 8 | 8 | 12 | 16 | 18 | 10 | 12 | 10 | 9 | 9 | 10 | 10 | 8 | Diurnal Maximum | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 669 | 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: 669

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 65 | 19 | 10 | 20 | 17 | 33 | 56 | 44 | 59 | 68 | 57 | 64 | 56 | 32 | 31 | 38 | 669 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 65 | 19 | 10 | 20 | 17 | 33 | 56 | 44 | 59 | 68 | 57 | 64 | 56 | 32 | 31 | 38 | 669 |

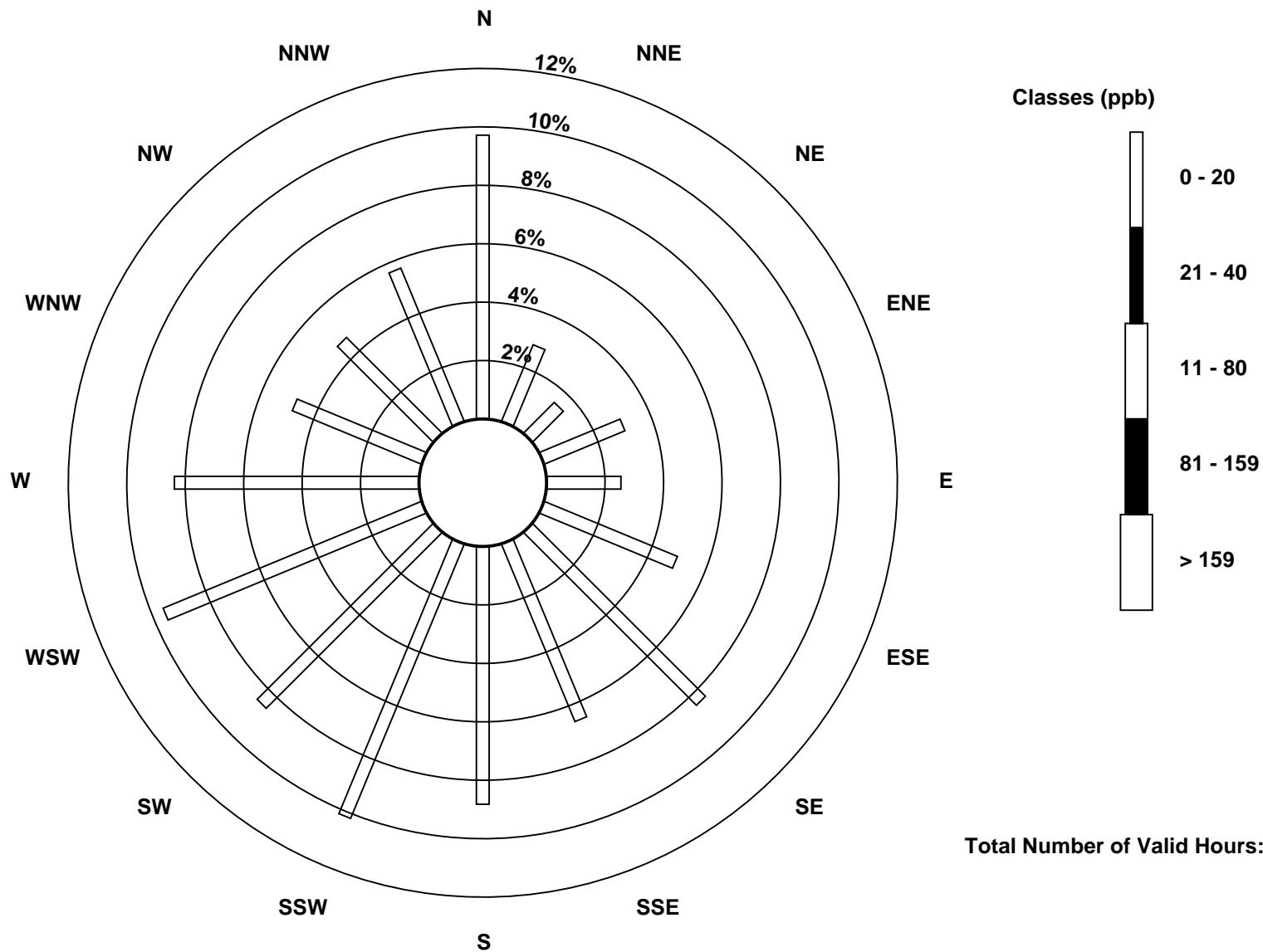
Total Number of Valid Hours: 669

Total Number of Hours: 720

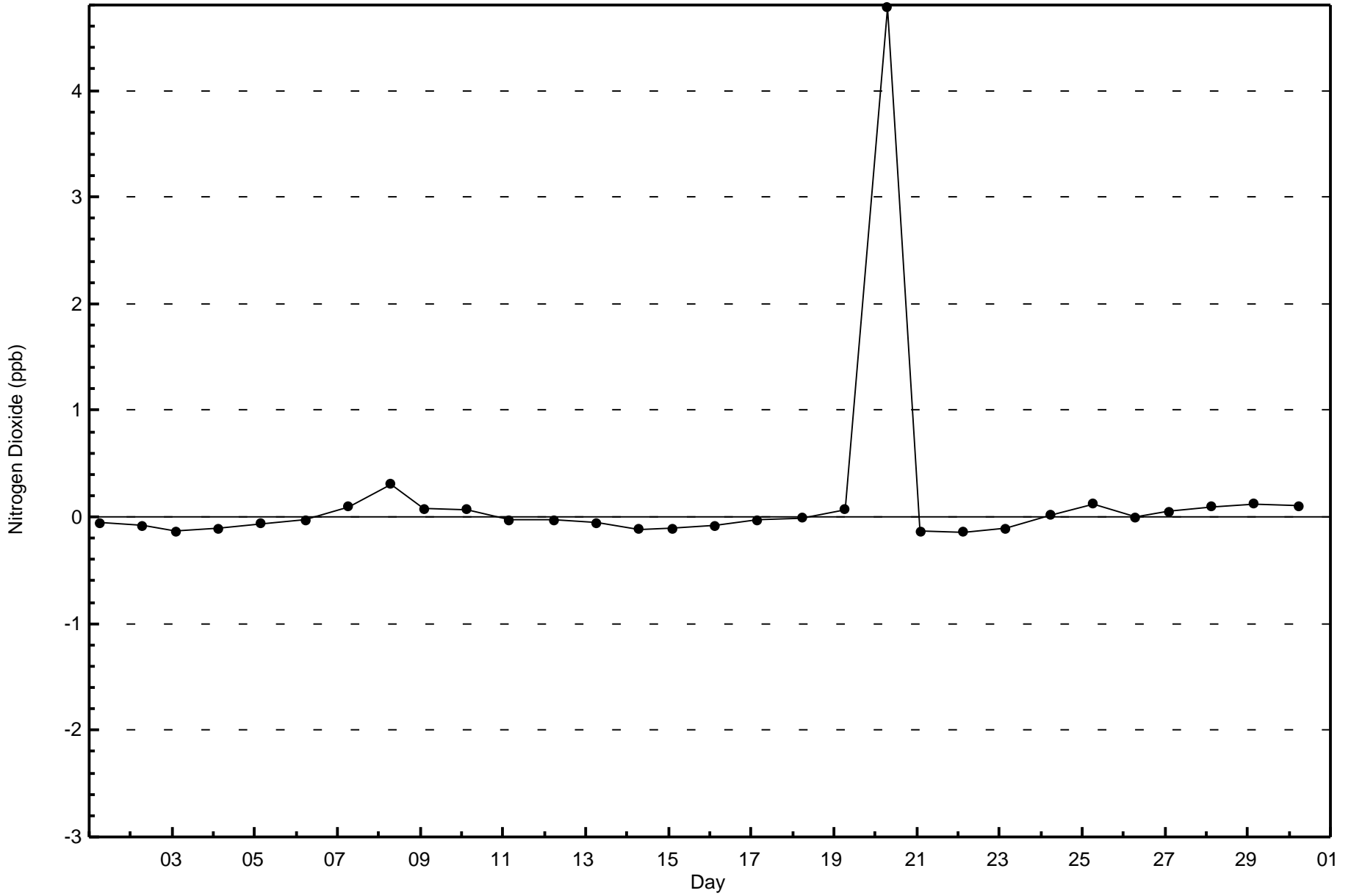


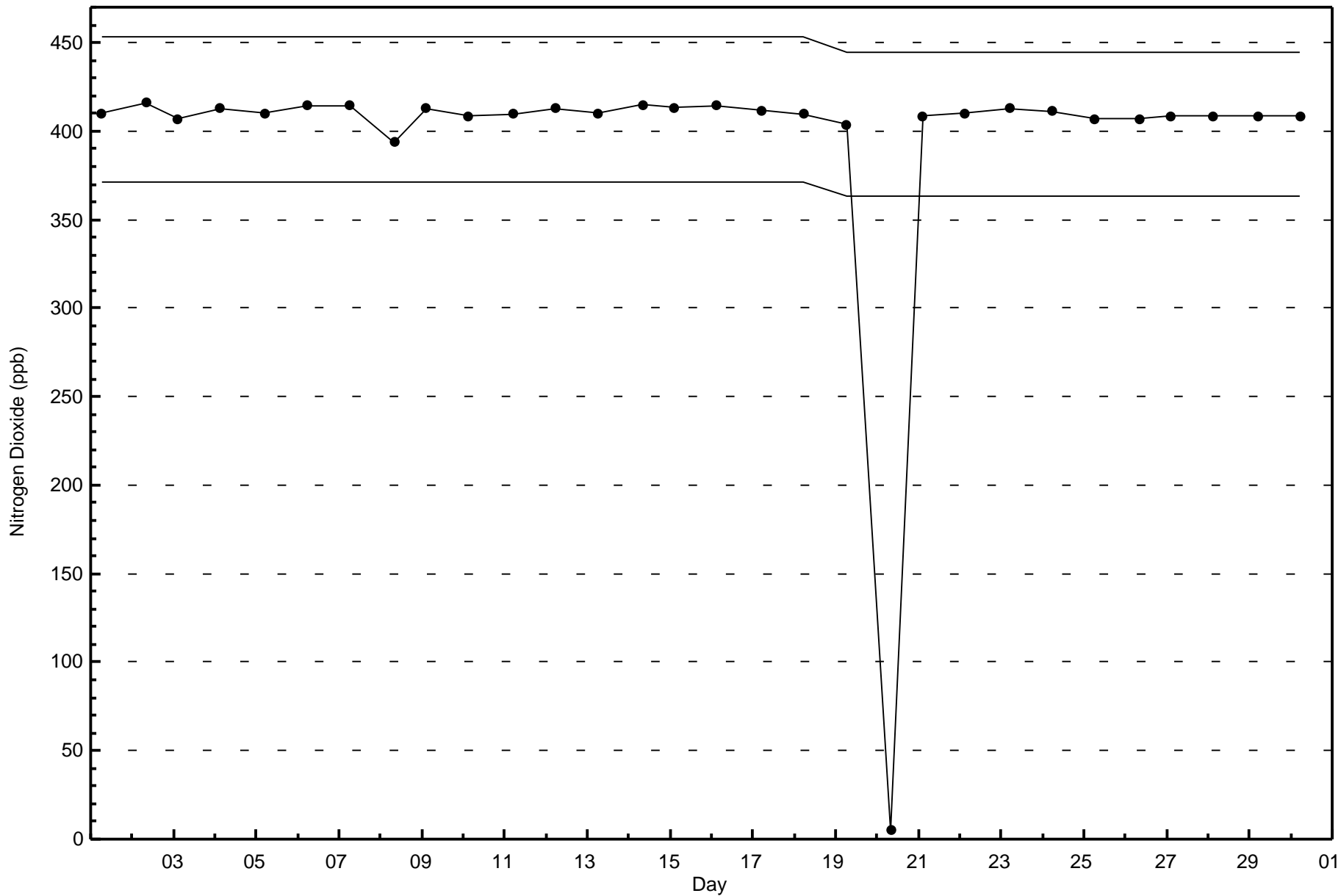
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 669







Wood Buffalo Environmental Association
Summary of Hour Averages

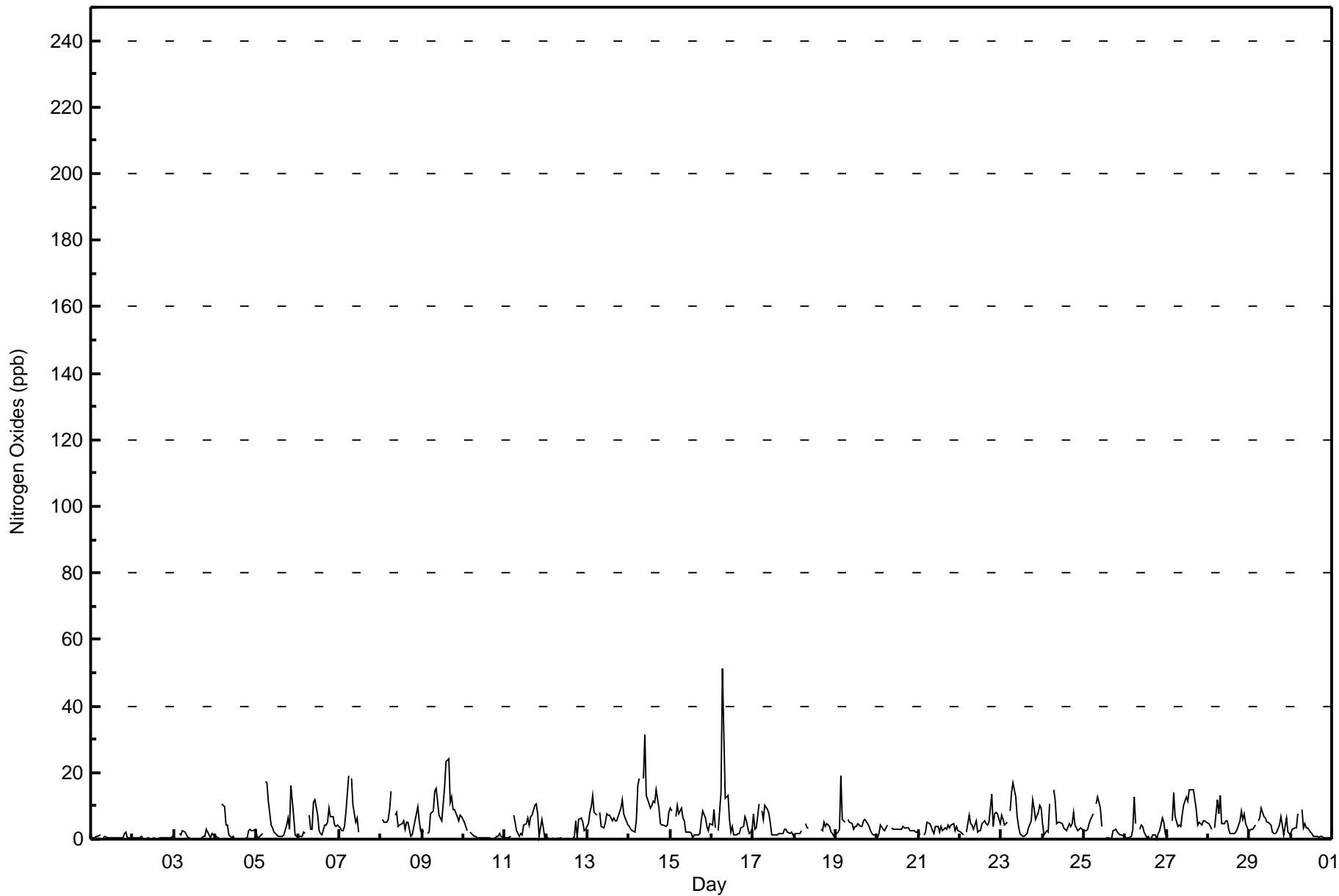
Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - September 2017

| Maximum Value: 51 ppb on Sep 16 07:00 Maximum Daily Average: 9.7 ppb on Sep 14 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 669 | | | | | | | | |
|--|-------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 4 14:00 Minimum Daily Average: 0.4 ppb on Sep 2 Maximum Diurnal Average: 8.9 ppb at hour 7 Minimum Diurnal Average: 2.5 ppb at hour 3 Monthly Average: 4.3 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 3 Q ₃ = 6 P ₉₀ = 10 P ₉₉ = 19 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 51 Hours of Calibration: 36 Percent Operational Time: 97.9 | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 1 | 0 | 1 | 1 | 1 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 0.6 | 2 |
| 2-Sep | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 3-Sep | 0 | 0 | Z | 2 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 1 | 0 | 2 | 1 | 0.9 | 3 |
| 4-Sep | 1 | 1 | 1 | Z | 11 | 10 | 4 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 3 | 3 | 2.1 | 11 |
| 5-Sep | 1 | 1 | 1 | 2 | Z | 17 | 17 | 11 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 6 | 3 | 16 | 7 | 1 | 1 | 4.5 | 17 |
| 6-Sep | 1 | 1 | 1 | 2 | 2 | Z | 7 | 3 | 3 | 11 | 12 | 7 | 2 | 2 | 1 | 4 | 4 | 5 | 9 | 7 | 7 | 4 | 4 | 4 | 4.6 | 12 |
| 7-Sep | 3 | 3 | 2 | 4 | 8 | 19 | Z | 18 | 10 | 5 | 6 | 2 | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | -- | 19 | |
| 8-Sep | UO | 6 | 5 | 5 | 6 | 9 | 14 | Z | 7 | 8 | 4 | 4 | 5 | 6 | 3 | 5 | 5 | 1 | 1 | 3 | 6 | 10 | 5 | 2 | 5.5 | 14 |
| 9-Sep | 3 | 2 | Z | 2 | 2 | 8 | 9 | 14 | 15 | 12 | 7 | 6 | 10 | 16 | 23 | 24 | 11 | 13 | 9 | 9 | 7 | 5 | 7 | 7 | 9.6 | 24 |
| 10-Sep | 5 | 4 | 3 | Z | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1.0 | 5 |
| 11-Sep | 0 | 0 | 0 | 1 | Z | 7 | 5 | 2 | 1 | 2 | 1 | 4 | 5 | 7 | 4 | 7 | 7 | 10 | 11 | 8 | 1 | 6 | 3 | 0 | 4.1 | 11 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 1 | 6 | 6 | 5 | 3 | 3 | 1.4 | 6 |
| 13-Sep | 5 | 8 | 10 | 13 | 8 | 7 | Z | 8 | 4 | 3 | 5 | 7 | 7 | 7 | 5 | 7 | 6 | 5 | 8 | 9 | 12 | 8 | 6 | 4 | 7.1 | 13 |
| 14-Sep | 4 | 3 | 3 | 2 | 6 | 16 | 18 | Z | 18 | 31 | 13 | 12 | 9 | 10 | 12 | 11 | 15 | 9 | 5 | 4 | 4 | 4 | 4 | 8 | 9.7 | 31 |
| 15-Sep | 9 | 9 | Z | 7 | 10 | 8 | 9 | 6 | 5 | 2 | 2 | 2 | 2 | 0 | 1 | 1 | 1 | 2 | 5 | 8 | 6 | 4 | 3 | 5 | 4.7 | 10 |
| 16-Sep | 4 | 9 | 4 | Z | 3 | 14 | 51 | 32 | 12 | 13 | 6 | 2 | 4 | 1 | 1 | 2 | 2 | 3 | 4 | 7 | 5 | 3 | 2 | 3 | 8.1 | 51 |
| 17-Sep | 8 | 3 | 3 | 11 | Z | 8 | 6 | 10 | 9 | 8 | 5 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 4.1 | 11 |
| 18-Sep | 1 | 2 | 2 | 2 | 2 | Z | 5 | 4 | 3 | C | C | C | C | C | C | 3 | 3 | 5 | 4 | 5 | 4 | 2 | 2 | 1 | -- | 5 |
| 19-Sep | 2 | 2 | 3 | 19 | 6 | 5 | Z | 6 | 5 | 4 | 3 | 4 | 4 | 5 | 4 | 4 | 5 | 6 | 5 | 4 | 2 | 2 | 1 | 1 | 4.4 | 19 |
| 20-Sep | 1 | 2 | 4 | 3 | 3 | 3 | 4 | Z | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2.9 | 4 |
| 21-Sep | 2 | 1 | Z | 1 | 2 | 5 | 4 | 4 | 3 | 2 | 4 | 4 | 2 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 5 | 2 | 4 | 3 | 3.2 | 5 |
| 22-Sep | 2 | 2 | 1 | Z | 2 | 7 | 5 | 4 | 3 | 6 | 2 | 3 | 3 | 5 | 5 | 5 | 4 | 5 | 13 | 4 | 8 | 8 | 7 | 4 | 4.7 | 13 |
| 23-Sep | 7 | 6 | 4 | 5 | Z | 9 | 14 | 17 | 13 | 7 | 4 | 2 | 1 | 1 | 1 | 2 | 3 | 6 | 12 | 9 | 6 | 8 | 10 | 9 | 6.8 | 17 |
| 24-Sep | 5 | 1 | 3 | 2 | 10 | Z | 15 | 11 | 5 | 5 | 5 | 3 | 3 | 2 | 5 | 4 | 5 | 8 | 4 | 2 | 3 | 3 | 3 | 3 | 4.9 | 15 |
| 25-Sep | 2 | 3 | 3 | 5 | 6 | 8 | Z | 10 | 13 | 9 | 4 | M | M | 1 | 0 | 0 | 0 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 3.6 | 13 |
| 26-Sep | 0 | 0 | 0 | 1 | 3 | 13 | 5 | Z | 3 | 4 | 4 | 2 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | 3 | 6 | 5 | 2 | 2.5 | 13 |
| 27-Sep | 1 | 1 | Z | 5 | 14 | 7 | 4 | 4 | 4 | 7 | 10 | 13 | 11 | 15 | 15 | 15 | 12 | 9 | 4 | 5 | 4 | 6 | 6 | 5 | 7.7 | 15 |
| 28-Sep | 5 | 4 | 3 | Z | 4 | 12 | 7 | 13 | 5 | 5 | 5 | 5 | 3 | 2 | 1 | 2 | 2 | 3 | 5 | 9 | 6 | 8 | 5 | 3 | 5.1 | 13 |
| 29-Sep | 3 | 3 | 3 | 4 | Z | 5 | 6 | 9 | 7 | 6 | 5 | 5 | 4 | 2 | 2 | 2 | 2 | 4 | 7 | 4 | 1 | 6 | 2 | 2 | 4.2 | 9 |
| 30-Sep | 2 | 3 | 3 | 3 | 8 | Z | 9 | 4 | 5 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2.3 | 9 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 664 | 99.25 | 99.25 |
| 21 - 40 | 4 | 0.60 | 99.85 |
| 41 - 80 | 1 | 0.15 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 669

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 64 | 18 | 10 | 20 | 17 | 33 | 56 | 42 | 59 | 68 | 57 | 64 | 56 | 32 | 31 | 37 | 664 |
| 21 - 40 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 65 | 19 | 10 | 20 | 17 | 33 | 56 | 44 | 59 | 68 | 57 | 64 | 56 | 32 | 31 | 38 | 669 |

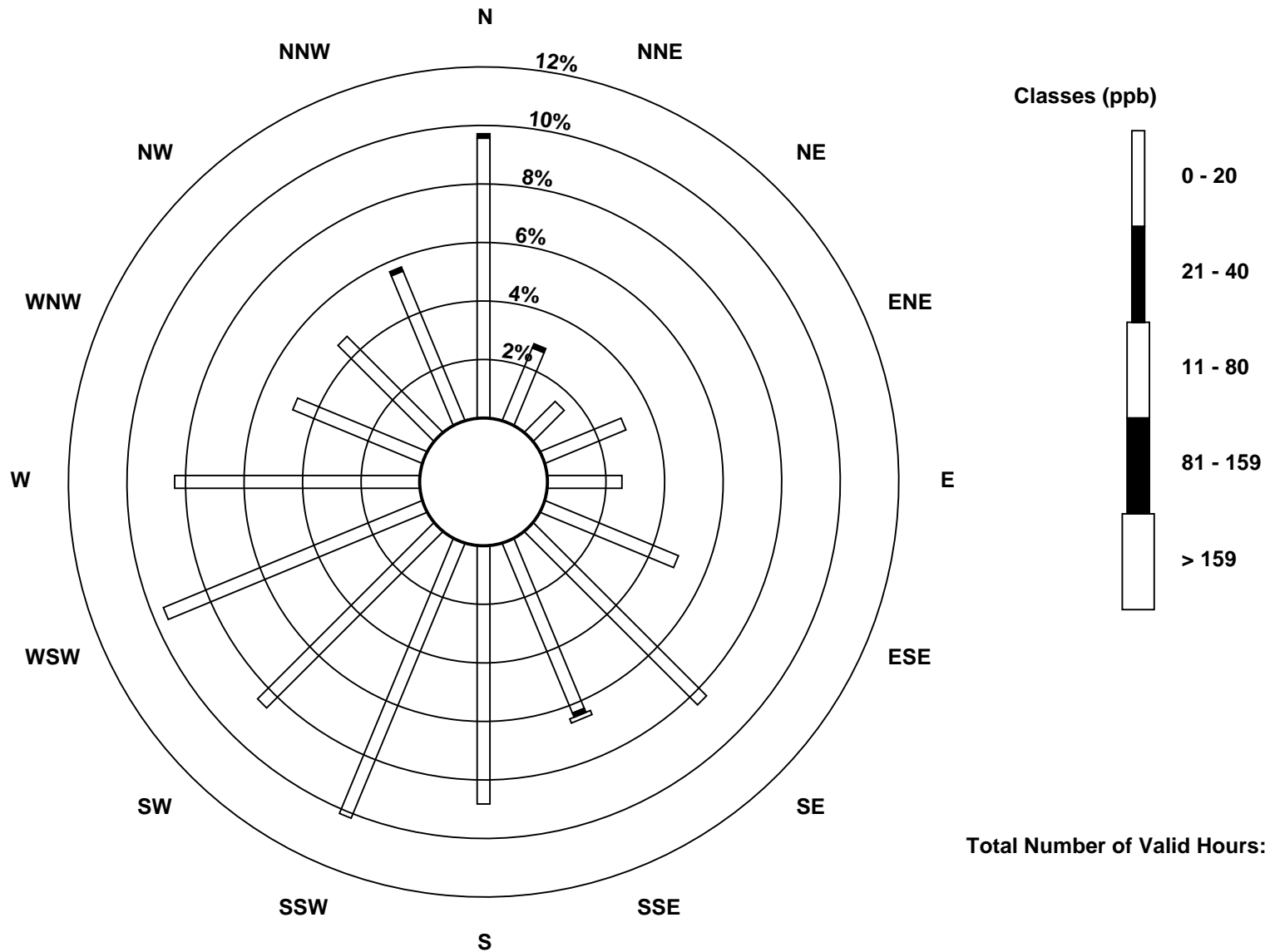
Total Number of Valid Hours: 669

Total Number of Hours: 720

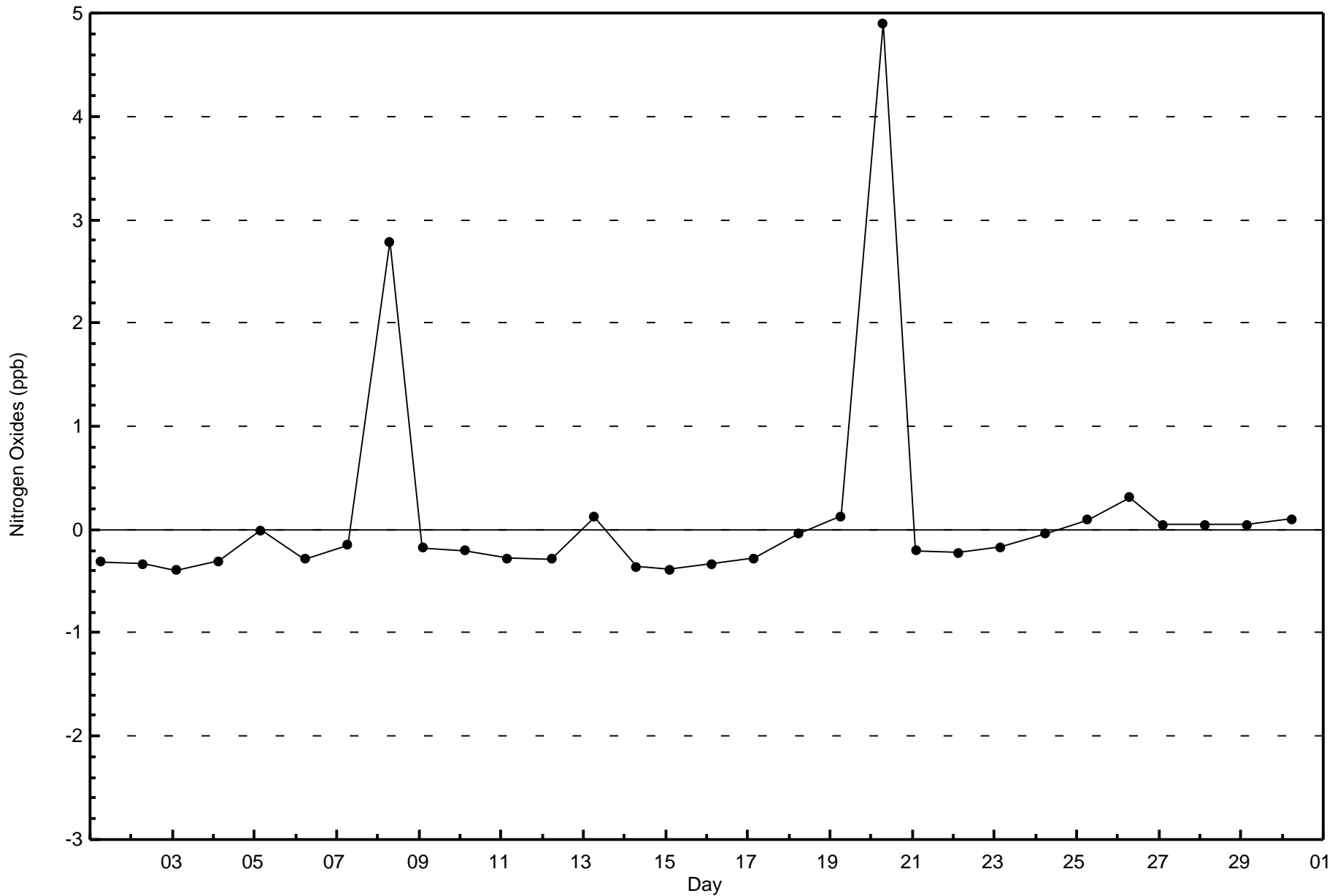


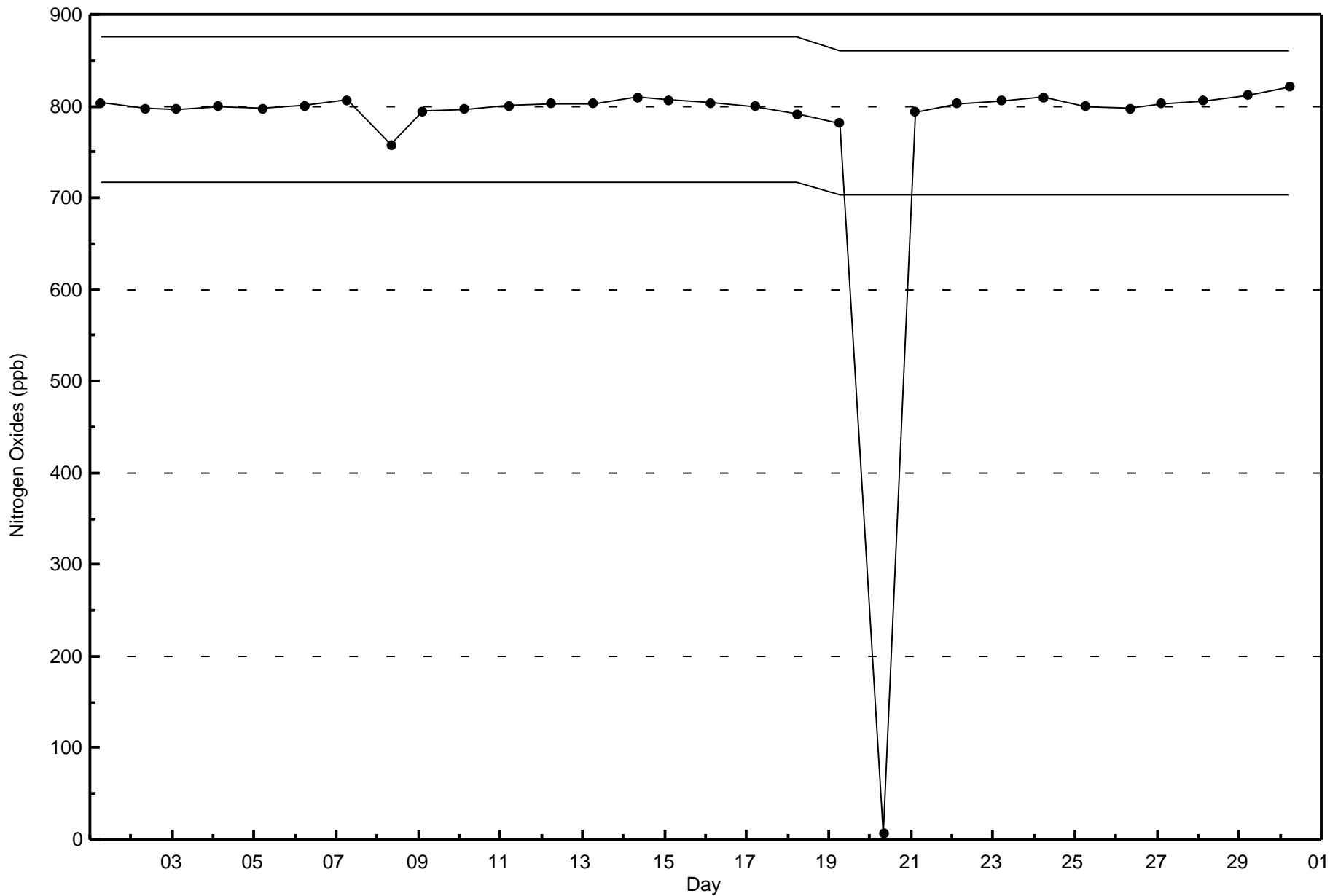
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 669







| | | | |
|--|--|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 | Maximum Value: 0 ppb on Sep 1 01:00 | Maximum Daily Average: 0.0 ppb on Sep 1 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Maximum Diurnal Average: 0.0 ppb at hour 1 | Minimum Daily Average: 0.0 ppb on Sep 1 | Hours of Data: 617 |
| 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 | Minimum Diurnal Average: 0.0 ppb at hour 1 | Hours of Missing Data: 103 |
| | | | Hours of Calibration: 49 |
| | | | Percent Operational Time: 92.5 |

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

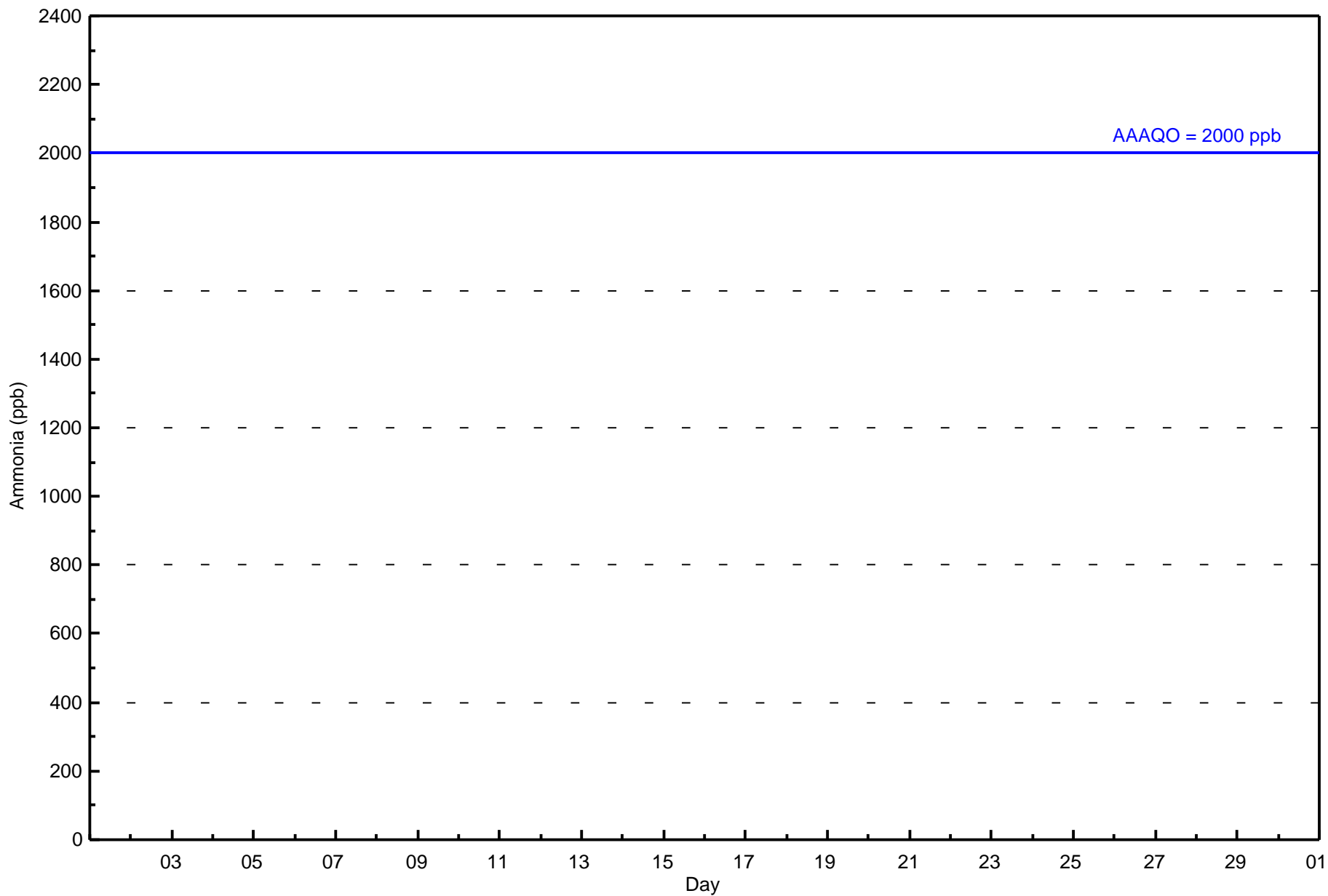
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Diurnal Average |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Patricia McInnes - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 617 | 100.00 | 100.00 |
| 6 - 10 | 0 | 0.00 | 100.00 |
| 11 - 15 | 0 | 0.00 | 100.00 |
| 16 - 20 | 0 | 0.00 | 100.00 |
| 21 - 25 | 0 | 0.00 | 100.00 |
| > 26 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 617

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ammonia (NH₃) - ppb
Patricia McInnes - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 63 | 19 | 6 | 12 | 11 | 31 | 55 | 43 | 54 | 60 | 54 | 61 | 49 | 30 | 32 | 37 | 617 |
| 6 - 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 63 | 19 | 6 | 12 | 11 | 31 | 55 | 43 | 54 | 60 | 54 | 61 | 49 | 30 | 32 | 37 | 617 |

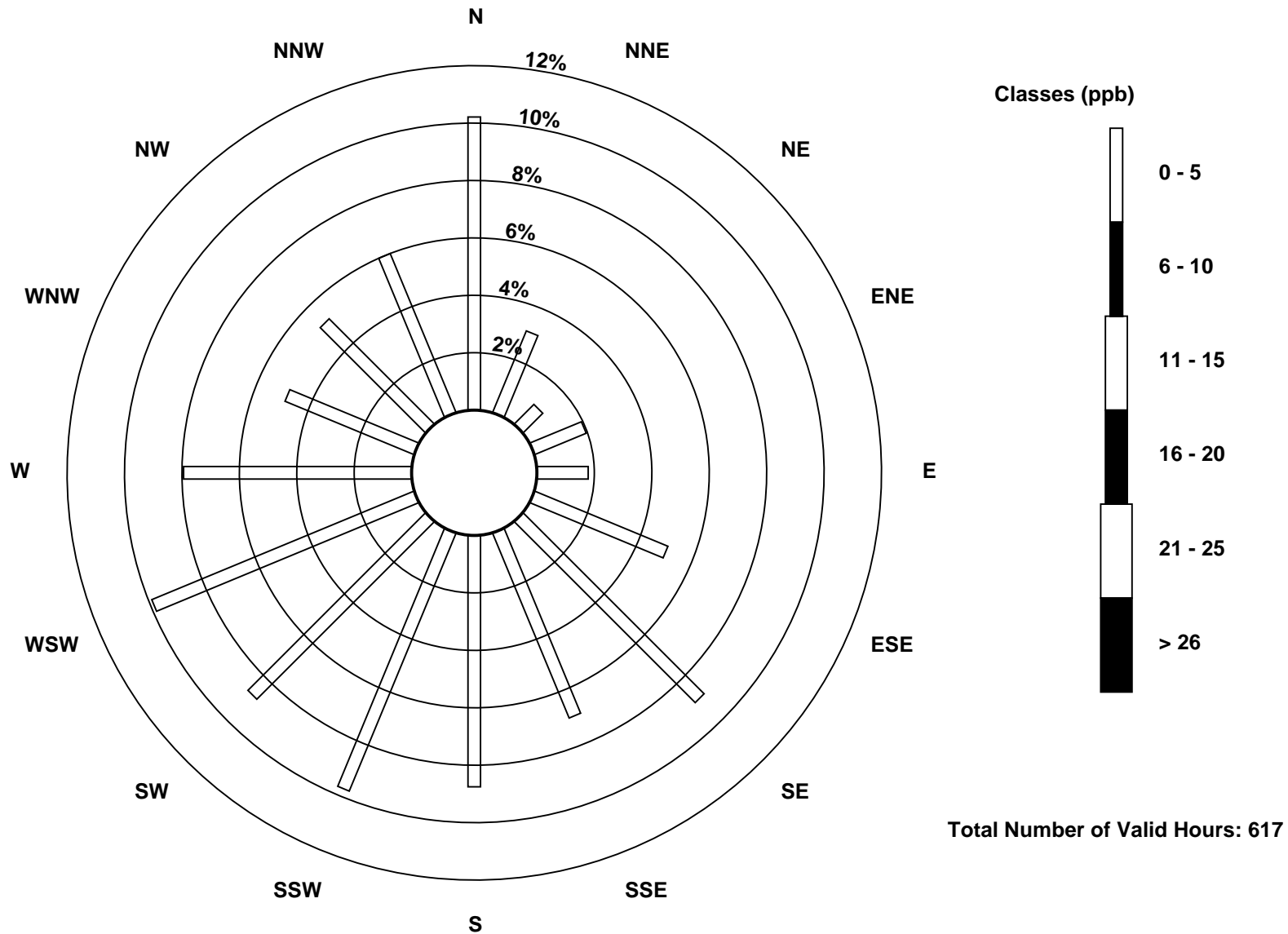
Total Number of Valid Hours: 617

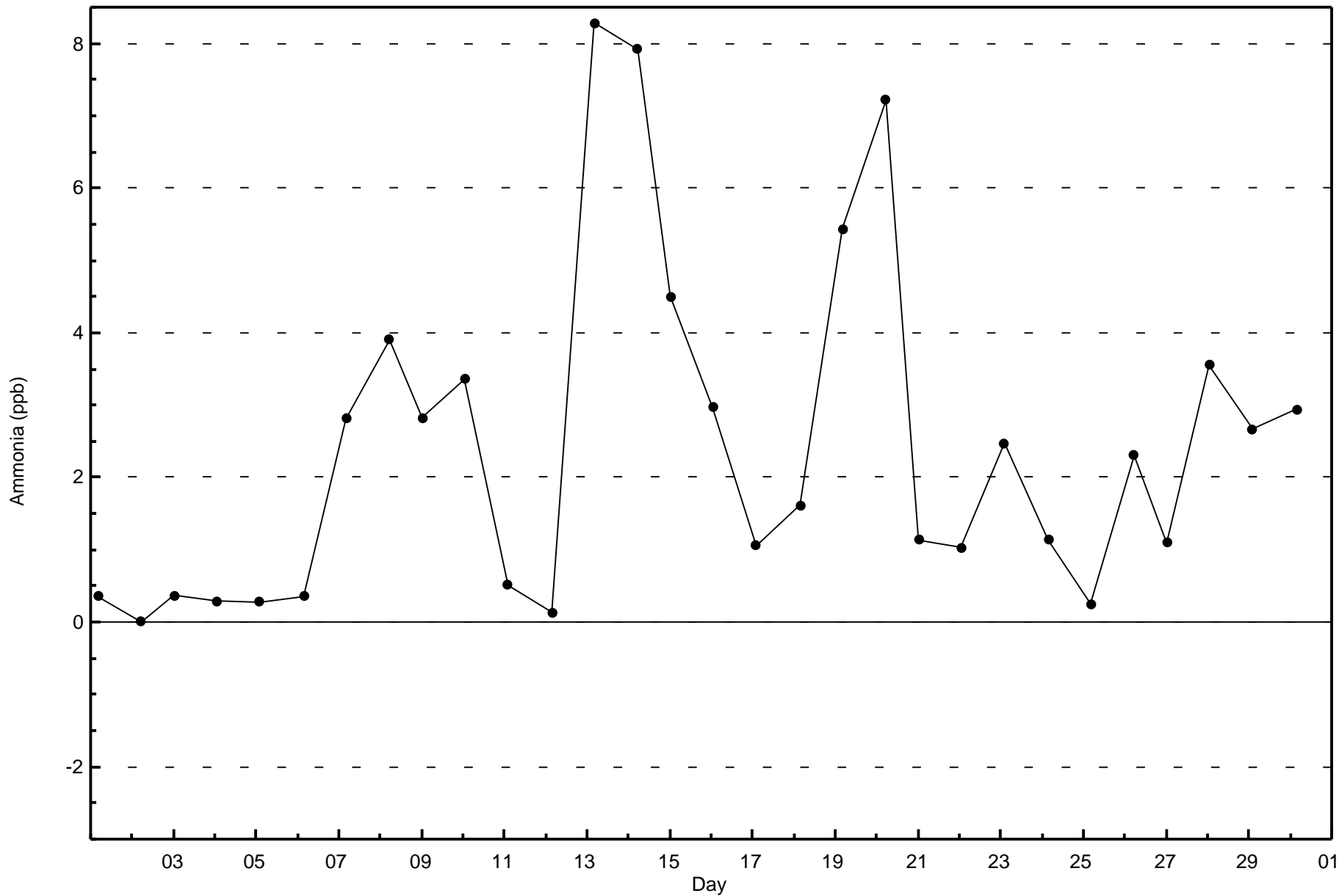
Total Number of Hours: 720

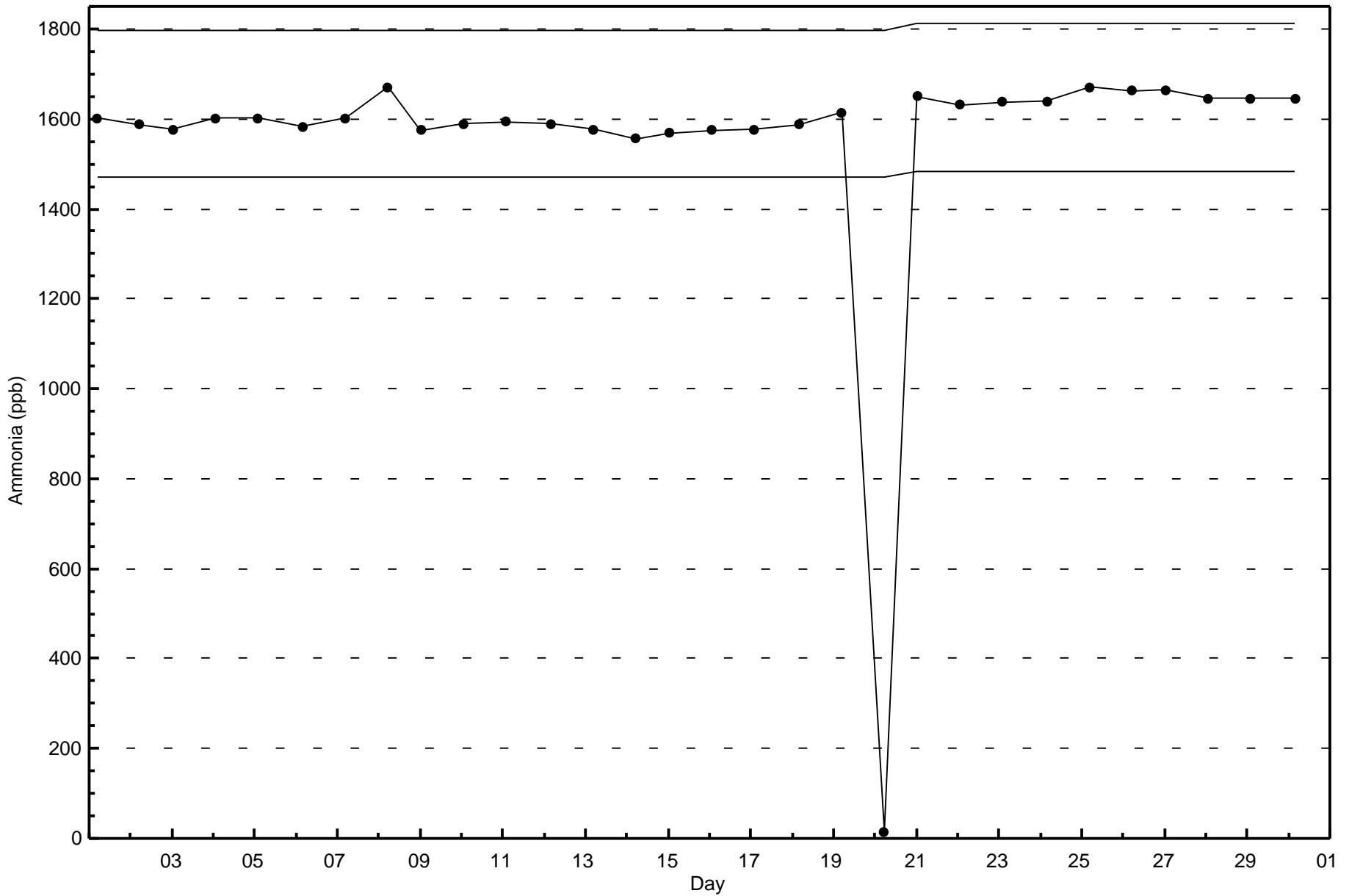


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









| | | | |
|--|--|---------------------------|-------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 90.0 µg/m ³ on Sep 4 07:00 | Maximum Daily Average: 17.7 µg/m ³ on Sep 19 | Hours of Data: | 718 |
| Minimum Value: 0.6 µg/m ³ on Sep 25 22:00 | Minimum Daily Average: 1.7 µg/m ³ on Sep 26 | Hours of Missing Data: | 2 |
| Maximum Diurnal Average: 9.3 µg/m ³ at hour 7 | Minimum Diurnal Average: 3.9 µg/m ³ at hour 16 | Hours of Calibration: | 2 |
| Monthly Average: 6.46 µg/m ³ | Percentiles: P ₁ = 0.7 P ₁₀ = 1.4 Q ₁ = 2.3 Median = 4.2 Q ₃ = 7.3 P ₉₀ = 12.6 P ₉₉ = 42.9 | 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-Sep | 2.3 | 2.7 | 3.0 | 3.0 | 3.0 | 3.1 | 2.7 | 2.1 | 2.1 | 1.9 | 1.7 | 1.3 | 1.3 | 1.2 | 1.3 | 1.3 | 1.5 | 2.3 | 2.8 | 2.9 | 3.1 | 3.3 | 3.1 | 3.4 | 2.3 | 3.4 |
| 2-Sep | 4.3 | 4.7 | 4.4 | 4.5 | 4.2 | 4.3 | 3.8 | 2.5 | 1.7 | 1.7 | 1.6 | 1.5 | 1.5 | 1.5 | 2.0 | 2.4 | 3.1 | 2.4 | 2.1 | 2.1 | 2.4 | 3.0 | 3.1 | 3.1 | 2.8 | 4.7 |
| 3-Sep | 3.9 | 4.4 | 4.5 | 4.9 | 5.2 | 5.3 | 4.7 | 2.7 | 1.9 | 2.6 | 2.9 | 3.8 | 4.4 | 4.8 | 4.8 | 3.0 | 9.6 | 17.1 | 16.9 | 21.4 | 9.7 | 5.9 | 3.8 | 3.3 | 6.3 | 21.4 |
| 4-Sep | 3.5 | 3.2 | 3.5 | 4.1 | 4.8 | 7.8 | 90.0 | 52.0 | 7.3 | 4.3 | 2.4 | 1.6 | 1.3 | 1.2 | 0.9 | 1.0 | 2.4 | 6.7 | 6.7 | 7.6 | 21.8 | 21.4 | 6.0 | 5.2 | 11.1 | 90.0 |
| 5-Sep | 3.7 | 2.8 | 2.9 | 3.1 | 3.7 | 4.6 | 5.8 | 5.0 | 4.0 | 3.1 | 2.3 | 1.9 | 1.8 | 1.8 | 2.1 | 2.1 | 2.6 | 4.1 | 8.7 | 11.2 | 56.3 | 20.6 | 7.2 | 6.4 | 7.0 | 56.3 |
| 6-Sep | 6.4 | 6.6 | 6.8 | 7.1 | 8.0 | 9.4 | 15.0 | 28.2 | 49.5 | 45.3 | 24.3 | 9.9 | 5.2 | 4.2 | 2.9 | 3.9 | 4.4 | 6.8 | 10.8 | 11.4 | 11.9 | 25.6 | 36.4 | 39.0 | 15.8 | 49.5 |
| 7-Sep | 33.8 | 18.6 | 12.0 | 11.6 | 12.8 | 13.4 | 14.3 | 14.0 | 12.6 | 10.4 | 9.7 | 6.6 | 4.8 | 4.4 | 5.4 | 7.6 | 10.5 | 15.2 | 19.0 | 23.0 | 24.8 | 27.3 | 43.9 | 17.7 | 15.6 | 43.9 |
| 8-Sep | 16.8 | 14.4 | 12.7 | 12.0 | 11.7 | 12.2 | 12.5 | 12.1 | 13.5 | 16.3 | 40.0 | 48.0 | 27.8 | 22.5 | 17.8 | 9.0 | 7.4 | 4.8 | 4.5 | 4.7 | 4.9 | 6.2 | 5.5 | 7.1 | 14.4 | 48.0 |
| 9-Sep | 7.7 | 7.5 | 6.9 | 9.2 | 12.1 | 12.8 | 12.3 | 12.2 | 6.3 | 4.9 | 4.0 | 3.4 | 7.0 | 8.5 | 8.3 | 9.3 | 11.0 | 16.2 | 14.9 | 14.0 | 17.4 | 23.5 | 29.1 | 23.2 | 11.7 | 29.1 |
| 10-Sep | 22.0 | 20.3 | 16.1 | 16.1 | 14.7 | 11.2 | 5.6 | 3.5 | 2.5 | 1.5 | 1.4 | 2.5 | 4.2 | 3.1 | 2.5 | 1.5 | 0.8 | 0.8 | 0.8 | 1.1 | 1.4 | 1.9 | 1.8 | 1.2 | 5.8 | 22.0 |
| 11-Sep | 1.3 | 1.5 | 1.7 | 1.9 | 1.9 | 2.2 | 1.9 | 2.9 | 1.7 | 1.5 | 1.4 | 1.6 | 1.6 | 1.6 | 1.5 | 1.8 | 1.8 | 2.1 | 2.7 | 5.3 | 3.1 | 5.3 | 4.3 | 2.5 | 2.3 | 5.3 |
| 12-Sep | 2.4 | 2.6 | 2.5 | 2.4 | 2.2 | 2.4 | 2.5 | 2.4 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 4.7 | 6.0 | 2.6 | 2.5 | 3.0 | 2.3 | 2.2 | 2.0 | 2.5 | 6.0 |
| 13-Sep | 3.3 | 4.2 | 4.6 | 4.7 | 4.0 | 3.7 | 4.3 | 5.7 | 2.8 | 2.9 | 3.1 | 4.1 | 3.4 | 3.5 | 3.0 | 4.0 | 3.3 | 3.4 | 4.9 | 5.5 | 5.5 | 9.7 | 7.7 | 7.2 | 4.5 | 9.7 |
| 14-Sep | 7.2 | 7.6 | 7.4 | 6.9 | 6.5 | 7.8 | 7.5 | 5.0 | 4.2 | 2.8 | 1.6 | 2.1 | 3.6 | 6.2 | 4.8 | 3.7 | 2.6 | 2.5 | 2.8 | 3.2 | 4.1 | 5.0 | 4.4 | 5.1 | 4.8 | 7.8 |
| 15-Sep | 5.9 | 8.9 | 6.3 | 8.0 | 5.7 | 4.2 | 4.0 | 3.9 | 3.6 | 1.8 | 1.5 | 1.3 | 1.2 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 24.6 | 5.9 | 5.3 | 3.3 | 2.8 | 3.8 | 4.5 | 24.6 |
| 16-Sep | 3.7 | 14.2 | 3.5 | 2.8 | 3.4 | 5.1 | 6.8 | 5.8 | 2.9 | 2.3 | 1.6 | 1.3 | 1.4 | 1.3 | 1.3 | 1.5 | 1.6 | 1.7 | 2.6 | 5.2 | 6.2 | 4.7 | 3.4 | 3.6 | 3.7 | 14.2 |
| 17-Sep | 7.5 | 8.4 | 7.1 | 10.0 | 6.9 | 6.2 | 6.3 | 7.0 | 5.7 | 4.6 | 6.4 | 8.3 | 7.3 | 6.4 | 5.4 | 4.9 | 4.4 | 4.7 | 6.4 | 7.7 | 7.5 | 7.2 | 7.4 | 7.4 | 6.7 | 10.0 |
| 18-Sep | 7.3 | 9.0 | 10.7 | 11.8 | 11.4 | 10.4 | 9.9 | 9.0 | 7.8 | 6.3 | 4.5 | 3.8 | 4.0 | 4.0 | 4.5 | 4.9 | 5.4 | 6.2 | 5.8 | 6.6 | 8.5 | 9.6 | 10.1 | 11.2 | 7.6 | 11.8 |
| 19-Sep | 11.6 | 12.2 | 12.1 | 12.4 | 14.0 | 15.6 | 20.7 | 28.3 | 34.4 | 35.9 | 33.6 | 34.4 | 41.5 | 41.3 | 29.8 | 18.0 | 6.8 | 4.1 | 3.8 | 3.1 | 2.3 | 2.4 | 3.0 | 3.3 | 17.7 | 41.5 |
| 20-Sep | 3.1 | 3.3 | 3.9 | 3.8 | 4.3 | 3.9 | 3.0 | 2.3 | 2.3 | 2.5 | 2.2 | 1.7 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 2.1 | 4.3 |
| 21-Sep | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.5 | 1.4 | 1.4 | 1.3 | 1.3 | 1.6 | 1.7 | 1.7 | 1.9 | 1.7 | 1.8 | 1.6 | 1.8 | 1.9 | 2.2 | 2.3 | 2.0 | 3.2 | 2.4 | 1.7 | 3.2 |
| 22-Sep | 4.2 | 4.2 | 3.5 | 3.5 | 3.5 | 3.7 | 3.2 | 3.2 | 2.7 | 3.2 | 2.9 | 2.7 | 2.6 | 3.7 | 5.5 | 5.8 | 5.2 | 4.9 | 8.6 | 6.5 | 9.7 | 10.7 | 7.6 | 5.5 | 4.9 | 10.7 |
| 23-Sep | 4.7 | 4.9 | 4.5 | 4.7 | 5.1 | 4.3 | 4.2 | 4.5 | 3.7 | 2.3 | 1.7 | 1.5 | 1.1 | 1.2 | 1.3 | 1.8 | 2.6 | 4.6 | 6.6 | 8.4 | 9.1 | 10.8 | 10.1 | 13.4 | 4.9 | 13.4 |
| 24-Sep | 8.8 | 7.9 | 7.6 | 6.8 | 5.5 | 5.0 | 5.1 | 4.6 | 3.0 | 2.1 | 1.5 | 1.6 | 1.5 | 1.6 | 1.6 | 2.1 | 2.5 | 3.7 | 6.9 | 5.3 | 4.3 | 5.2 | 4.2 | 4.0 | 4.3 | 8.8 |
| 25-Sep | 4.1 | 4.4 | 4.5 | 4.6 | 4.7 | 4.6 | 4.6 | 4.8 | 4.4 | 4.1 | 2.6 | 1.7 | C | C | 0.8 | 0.7 | 0.7 | 0.8 | 0.8 | 0.7 | 0.9 | 0.6 | 0.7 | 0.6 | 2.6 | 4.8 |
| 26-Sep | 0.6 | 0.7 | 0.7 | 0.7 | 0.9 | 1.0 | 1.0 | 0.9 | 0.9 | 1.5 | 2.0 | 2.3 | 2.0 | 1.5 | 1.1 | 0.8 | 0.8 | 1.1 | 1.0 | 1.7 | 3.6 | 9.3 | 3.7 | 1.4 | 1.7 | 9.3 |
| 27-Sep | 1.2 | 1.2 | 1.6 | 2.1 | 4.2 | 2.5 | 2.6 | 2.7 | 2.7 | 2.6 | 11.5 | 4.8 | 3.7 | 4.7 | 4.2 | 8.7 | 12.4 | 9.8 | 8.4 | 9.2 | 8.8 | 9.9 | 8.5 | 7.6 | 5.7 | 12.4 |
| 28-Sep | 7.7 | 6.7 | 5.9 | 5.1 | 5.0 | 5.9 | 6.0 | 7.1 | 4.2 | 3.2 | 2.9 | 2.3 | 1.2 | 1.5 | 1.8 | 2.2 | 2.6 | 3.1 | 4.9 | 6.1 | 5.4 | 5.6 | 5.9 | 5.1 | 4.5 | 7.7 |
| 29-Sep | 6.0 | 6.5 | 6.0 | 6.9 | 6.8 | 7.0 | 7.5 | 7.3 | 5.8 | 5.2 | 4.3 | 4.1 | 3.9 | 3.7 | 4.4 | 4.8 | 5.3 | 7.1 | 10.5 | 11.7 | 10.8 | 24.1 | 14.9 | 9.9 | 7.7 | 24.1 |
| 30-Sep | 9.6 | 14.6 | 9.7 | 9.1 | 10.5 | 10.7 | 8.8 | 8.3 | 7.9 | 6.3 | 6.5 | 6.1 | 5.5 | 5.0 | 5.0 | 4.4 | 4.4 | 4.7 | 4.7 | 3.9 | 2.6 | 2.6 | 3.4 | 2.5 | 6.5 | 14.6 |

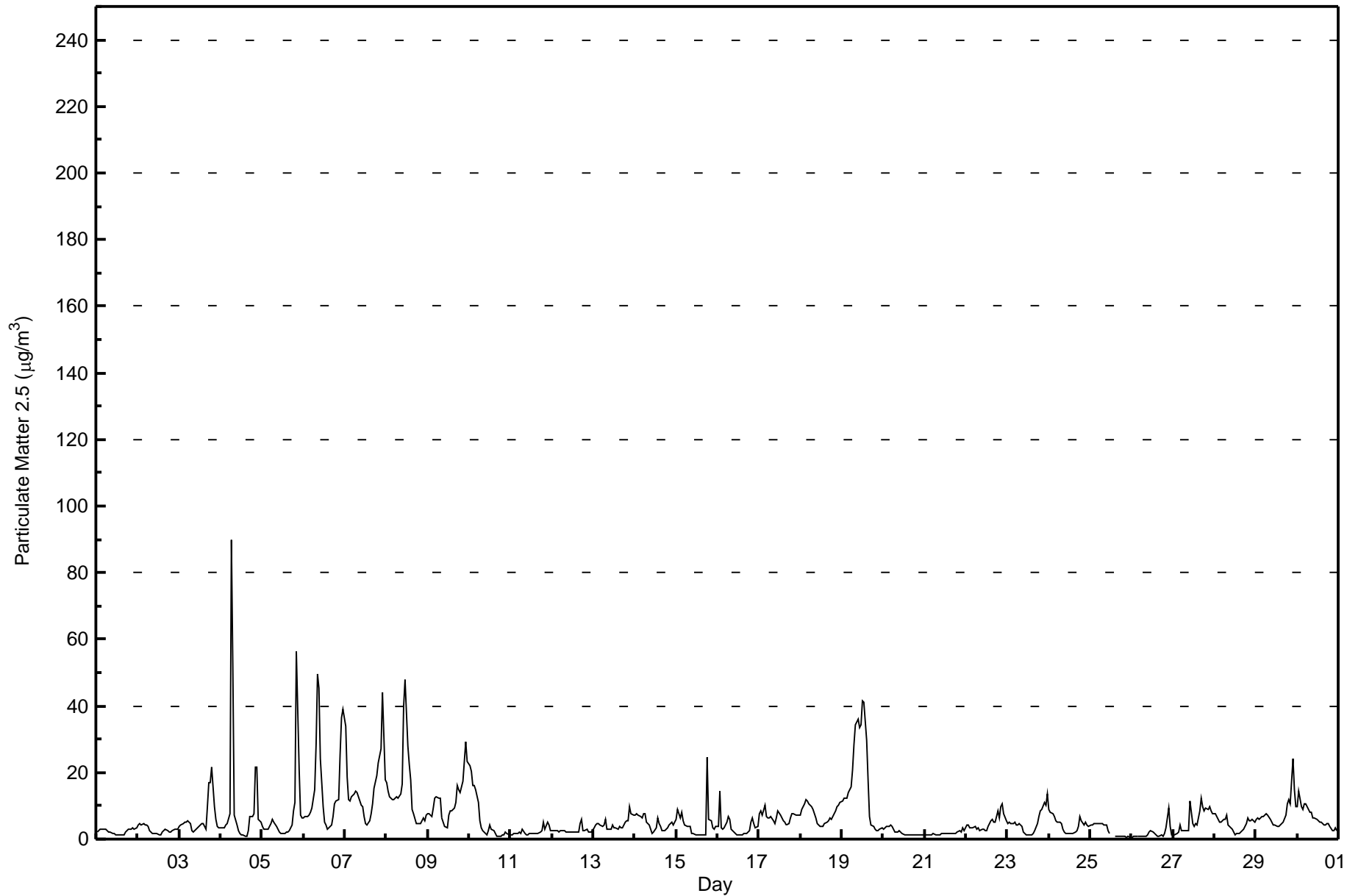
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 6.9 | 7.0 | 5.9 | 6.2 | 6.3 | 6.4 | 9.3 | 8.4 | 6.8 | 6.2 | 6.2 | 5.7 | 5.2 | 5.1 | 4.3 | 3.9 | 4.2 | 5.0 | 6.6 | 6.7 | 8.6 | 9.0 | 8.3 | 7.0 | Diurnal Average | |
| 33.8 | 20.3 | 16.1 | 16.1 | 14.7 | 15.6 | 90.0 | 52.0 | 49.5 | 45.3 | 40.0 | 48.0 | 41.5 | 41.3 | 29.8 | 18.0 | 12.4 | 17.1 | 24.6 | 23.0 | 56.3 | 27.3 | 43.9 | 39.0 | Diurnal Maximum | |

C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - September 2017**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 435 | 60.58 | 60.59 |
| 6 - 15 | 204 | 28.41 | 89.00 |
| 16 - 25 | 29 | 4.04 | 93.04 |
| 26 - 80 | 23 | 3.20 | 96.24 |
| > 81.0 | 1 | 0.14 | 96.38 |

Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Patricia McInnes - September 2017

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 54 | 13 | 5 | 11 | 5 | 18 | 39 | 25 | 41 | 43 | 24 | 52 | 44 | 23 | 21 | 17 | 435 |
| 6 - 15 | 12 | 5 | 2 | 5 | 9 | 20 | 24 | 22 | 26 | 18 | 17 | 7 | 8 | 7 | 7 | 15 | 204 |
| 16 - 25 | 2 | 0 | 3 | 0 | 1 | 1 | 0 | 0 | 3 | 4 | 9 | 0 | 0 | 2 | 2 | 2 | 29 |
| 26 - 80 | 0 | 1 | 1 | 5 | 2 | 0 | 0 | 0 | 1 | 5 | 1 | 1 | 3 | 0 | 0 | 3 | 23 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Totals | 68 | 19 | 11 | 21 | 17 | 39 | 63 | 47 | 71 | 71 | 51 | 60 | 55 | 32 | 30 | 37 | 692 |

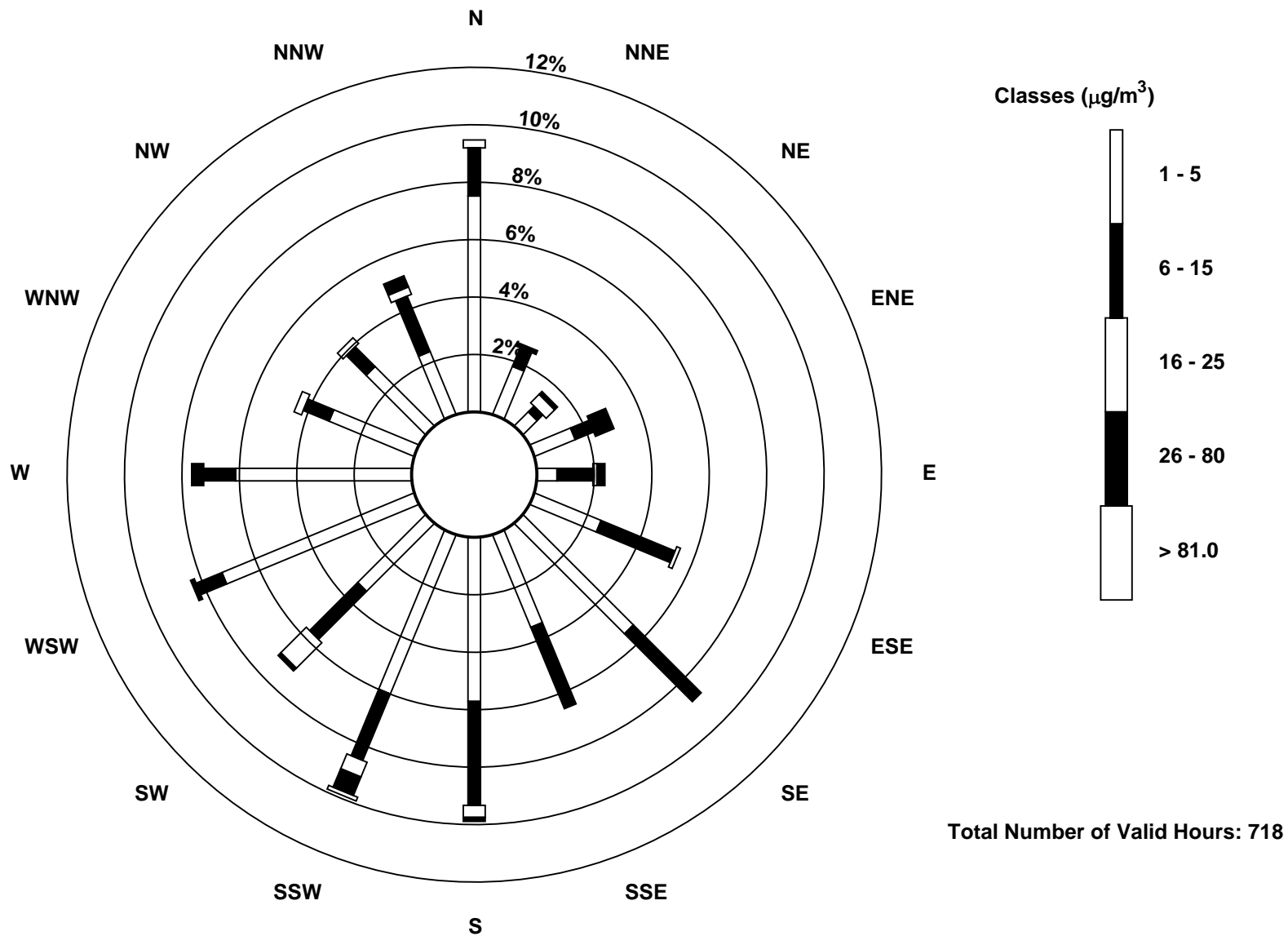
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

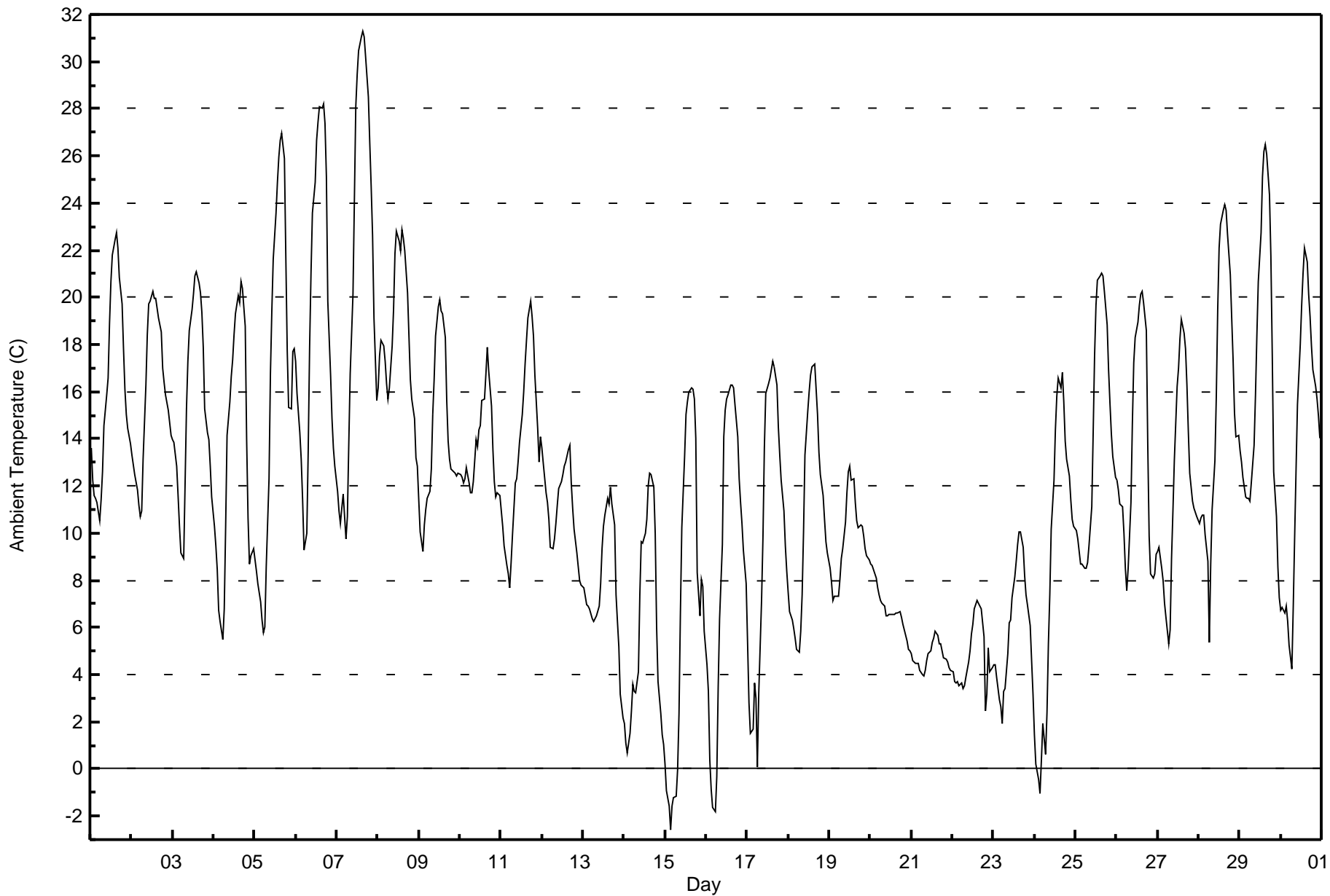




Wood Buffalo Environmental Association
Summary of Hour Averages

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

| Maximum Value: 31.3 C on Sep 7 16:00 Minimum Value: -2.6 C on Sep 15 04:00 Maximum Diurnal Average: 17.9 C at hour 16 Monthly Average: 12.12 C | | Maximum Daily Average: 20.8 C on Sep 7 Minimum Daily Average: 4.8 C on Sep 22 Minimum Diurnal Average: 6.8 C at hour 7 Percentiles: P ₁ = -1.0 P ₁₀ = 4.3 Q ₁ = 7.3 Median = 11.7 Q ₃ = 16.3 P ₉₀ = 20.3 P ₉₉ = 27.8 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 13.6 | 12.2 | 11.6 | 11.5 | 11.3 | 10.6 | 11.4 | 12.6 | 14.6 | 15.8 | 16.5 | 18.9 | 20.7 | 21.8 | 22.4 | 22.7 | 22.1 | 20.8 | 19.7 | 17.8 | 16.1 | 15.1 | 14.4 | 13.8 | 16.2 | 22.7 | |
| 2-Sep | 13.3 | 12.9 | 12.5 | 11.8 | 11.2 | 10.7 | 10.9 | 13.1 | 16.3 | 18.4 | 19.7 | 19.9 | 20.3 | 19.9 | 20.0 | 19.5 | 19.2 | 18.6 | 17.0 | 16.4 | 15.9 | 15.2 | 14.7 | 14.2 | 15.9 | 20.3 | |
| 3-Sep | 14.0 | 13.9 | 12.9 | 11.6 | 10.3 | 9.2 | 8.9 | 12.1 | 15.2 | 17.3 | 18.6 | 19.5 | 20.1 | 20.9 | 21.1 | 20.6 | 20.2 | 19.4 | 17.9 | 15.2 | 14.3 | 13.9 | 12.9 | 11.6 | 15.5 | 21.1 | |
| 4-Sep | 10.3 | 9.5 | 8.5 | 6.7 | 6.2 | 5.5 | 6.8 | 10.3 | 14.1 | 15.5 | 16.6 | 17.4 | 18.4 | 19.3 | 20.1 | 19.8 | 20.6 | 20.4 | 18.8 | 14.0 | 10.7 | 8.7 | 9.0 | 9.3 | 13.2 | 20.6 | |
| 5-Sep | 8.9 | 8.4 | 7.9 | 7.1 | 6.3 | 5.8 | 6.0 | 8.6 | 12.3 | 16.7 | 19.4 | 21.6 | 23.6 | 24.9 | 25.9 | 26.7 | 27.0 | 25.9 | 21.7 | 17.7 | 15.3 | 15.3 | 17.7 | 17.8 | 16.2 | 27.0 | |
| 6-Sep | 17.3 | 15.9 | 14.3 | 13.2 | 11.4 | 9.3 | 10.0 | 13.5 | 17.9 | 21.0 | 23.6 | 24.9 | 26.6 | 27.4 | 28.1 | 28.0 | 28.2 | 27.4 | 25.1 | 19.8 | 16.7 | 14.8 | 13.6 | 12.8 | 19.2 | 28.2 | |
| 7-Sep | 11.8 | 11.0 | 10.4 | 11.0 | 11.7 | 9.7 | 10.7 | 13.8 | 16.8 | 20.1 | 24.1 | 28.1 | 29.5 | 30.5 | 31.0 | 31.3 | 31.0 | 30.2 | 28.5 | 26.5 | 24.7 | 22.6 | 19.1 | 15.6 | 20.8 | 31.3 | |
| 8-Sep | 16.2 | 17.5 | 18.2 | 17.9 | 17.3 | 16.4 | 15.7 | 16.2 | 18.0 | 19.5 | 21.9 | 22.8 | 22.4 | 22.0 | 22.9 | 22.5 | 22.0 | 20.2 | 18.4 | 16.5 | 15.7 | 14.8 | 13.2 | 12.8 | 18.4 | 22.9 | |
| 9-Sep | 11.4 | 10.1 | 9.2 | 10.4 | 11.0 | 11.4 | 11.8 | 12.7 | 15.0 | 16.5 | 18.4 | 19.6 | 19.9 | 19.4 | 19.3 | 18.3 | 15.6 | 13.9 | 13.1 | 12.7 | 12.6 | 12.5 | 12.5 | 12.5 | 14.2 | 19.9 | |
| 10-Sep | 12.5 | 12.3 | 12.1 | 12.3 | 12.8 | 12.1 | 11.7 | 11.7 | 12.2 | 14.0 | 13.7 | 14.4 | 14.6 | 15.6 | 15.7 | 16.7 | 17.9 | 16.9 | 15.4 | 13.5 | 12.2 | 11.5 | 11.7 | 11.6 | 13.6 | 17.9 | |
| 11-Sep | 10.9 | 10.3 | 9.5 | 8.6 | 8.3 | 7.7 | 8.7 | 9.9 | 12.1 | 12.3 | 13.0 | 13.8 | 15.1 | 16.0 | 17.2 | 18.2 | 19.1 | 19.8 | 19.2 | 18.3 | 16.7 | 14.4 | 13.0 | 14.1 | 13.6 | 19.8 | |
| 12-Sep | 13.6 | 13.0 | 11.7 | 11.3 | 10.6 | 9.4 | 9.3 | 9.7 | 10.4 | 11.2 | 11.9 | 12.2 | 12.5 | 12.8 | 13.0 | 13.5 | 13.7 | 12.1 | 11.1 | 10.2 | 9.2 | 8.6 | 8.0 | 7.8 | 11.1 | 13.7 | |
| 13-Sep | 7.7 | 7.3 | 7.0 | 6.9 | 6.8 | 6.4 | 6.2 | 6.4 | 6.5 | 6.9 | 7.9 | 9.3 | 10.3 | 10.8 | 11.5 | 11.2 | 11.9 | 11.2 | 10.4 | 7.4 | 6.3 | 5.2 | 3.2 | 2.2 | 7.8 | 11.9 | |
| 14-Sep | 1.9 | 1.1 | 0.7 | 1.5 | 2.5 | 3.6 | 3.3 | 3.2 | 4.1 | 7.4 | 9.6 | 9.6 | 10.0 | 10.6 | 12.0 | 12.6 | 12.5 | 11.9 | 10.0 | 6.0 | 3.7 | 2.3 | 1.4 | 1.1 | 5.9 | 12.6 | |
| 15-Sep | 0.2 | -0.9 | -1.6 | -2.6 | -1.6 | -1.2 | -1.2 | -0.1 | 2.4 | 6.6 | 10.2 | 13.3 | 15.1 | 15.6 | 16.0 | 16.2 | 16.1 | 15.7 | 14.0 | 8.3 | 6.5 | 8.0 | 7.7 | 5.8 | 7.0 | 16.2 | |
| 16-Sep | 4.4 | 3.3 | 0.4 | -0.8 | -1.6 | -1.8 | -0.3 | 3.5 | 6.3 | 9.5 | 14.1 | 15.2 | 15.7 | 15.9 | 16.3 | 16.3 | 16.1 | 15.4 | 14.1 | 12.3 | 11.3 | 10.4 | 9.3 | 7.8 | 8.9 | 16.3 | |
| 17-Sep | 5.4 | 2.8 | 1.5 | 1.7 | 3.6 | 3.0 | 0.1 | 3.2 | 7.1 | 9.8 | 13.6 | 15.9 | 16.3 | 16.6 | 16.9 | 17.3 | 17.1 | 16.3 | 14.5 | 13.3 | 12.3 | 10.9 | 9.5 | 8.4 | 9.9 | 17.3 | |
| 18-Sep | 7.5 | 6.7 | 6.3 | 5.9 | 5.5 | 5.1 | 4.9 | 5.9 | 7.4 | 10.0 | 13.3 | 15.1 | 16.0 | 16.7 | 17.0 | 17.1 | 16.1 | 15.0 | 13.5 | 12.5 | 11.6 | 10.6 | 9.6 | 9.2 | 10.8 | 17.1 | |
| 19-Sep | 8.5 | 7.9 | 7.2 | 7.3 | 7.3 | 7.3 | 8.0 | 8.9 | 9.3 | 10.4 | 11.7 | 12.6 | 12.8 | 12.2 | 12.3 | 11.3 | 10.5 | 10.3 | 10.3 | 10.3 | 9.8 | 9.3 | 9.0 | 8.9 | 9.7 | 12.8 | |
| 20-Sep | 8.7 | 8.6 | 8.4 | 8.1 | 7.7 | 7.4 | 7.2 | 7.0 | 6.9 | 6.5 | 6.5 | 6.5 | 6.5 | 6.6 | 6.6 | 6.6 | 6.6 | 6.7 | 6.5 | 6.1 | 5.9 | 5.4 | 5.1 | 5.0 | 6.8 | 8.7 | |
| 21-Sep | 4.9 | 4.6 | 4.5 | 4.5 | 4.5 | 4.2 | 4.0 | 3.9 | 4.2 | 4.6 | 4.9 | 5.0 | 5.4 | 5.6 | 5.9 | 5.7 | 5.3 | 5.3 | 5.0 | 4.7 | 4.7 | 4.5 | 4.3 | 4.2 | 4.8 | 5.9 | |
| 22-Sep | 4.1 | 3.7 | 3.6 | 3.7 | 3.6 | 3.7 | 3.4 | 3.5 | 3.9 | 4.6 | 5.0 | 5.7 | 6.1 | 6.8 | 7.2 | 7.1 | 6.9 | 6.8 | 5.6 | 2.5 | 3.2 | 5.1 | 4.1 | 4.3 | 4.8 | 7.2 | |
| 23-Sep | 4.4 | 4.4 | 3.9 | 2.9 | 2.6 | 1.9 | 3.3 | 3.4 | 4.9 | 6.2 | 6.3 | 7.3 | 8.2 | 8.8 | 9.5 | 10.1 | 10.0 | 9.4 | 8.2 | 7.4 | 6.9 | 6.1 | 4.6 | 3.2 | 6.0 | 10.1 | |
| 24-Sep | 1.5 | 0.2 | -0.5 | -1.0 | 0.4 | 1.9 | 0.6 | 2.4 | 5.3 | 7.4 | 10.1 | 12.2 | 14.4 | 15.8 | 16.6 | 16.2 | 16.8 | 15.6 | 13.9 | 13.1 | 12.4 | 11.4 | 10.6 | 10.3 | 8.7 | 16.8 | |
| 25-Sep | 10.1 | 9.8 | 9.2 | 8.7 | 8.7 | 8.5 | 8.5 | 8.7 | 9.5 | 11.1 | 14.2 | 17.5 | 19.6 | 20.7 | 20.9 | 21.0 | 20.9 | 20.2 | 18.8 | 17.0 | 15.5 | 14.2 | 13.2 | 12.4 | 14.1 | 21.0 | |
| 26-Sep | 12.2 | 11.8 | 11.2 | 11.1 | 10.0 | 8.5 | 7.6 | 8.5 | 11.3 | 14.6 | 17.2 | 18.3 | 18.9 | 19.7 | 20.1 | 20.3 | 19.8 | 18.6 | 13.8 | 9.9 | 8.3 | 8.1 | 8.3 | 9.1 | 13.2 | 20.3 | |
| 27-Sep | 9.2 | 9.4 | 8.5 | 8.0 | 7.1 | 6.4 | 5.3 | 5.9 | 8.9 | 11.0 | 13.1 | 16.2 | 17.0 | 18.2 | 19.1 | 18.5 | 17.8 | 16.3 | 14.3 | 12.6 | 11.3 | 11.1 | 10.9 | 10.7 | 11.9 | 19.1 | |
| 28-Sep | 10.4 | 10.7 | 10.8 | 10.8 | 9.9 | 8.8 | 5.3 | 8.7 | 11.0 | 13.1 | 15.8 | 19.5 | 22.1 | 23.1 | 23.7 | 23.9 | 23.7 | 22.7 | 20.9 | 19.2 | 17.3 | 15.1 | 14.1 | 14.1 | 15.6 | 23.9 | |
| 29-Sep | 13.5 | 13.0 | 12.3 | 11.5 | 11.5 | 11.5 | 11.4 | 12.2 | 13.7 | 15.9 | 18.4 | 20.7 | 22.7 | 25.1 | 26.2 | 26.5 | 26.1 | 24.4 | 21.7 | 17.5 | 12.6 | 10.7 | 8.6 | 7.3 | 16.5 | 26.5 | |
| 30-Sep | 6.7 | 6.8 | 6.6 | 6.9 | 6.3 | 5.2 | 4.2 | 6.9 | 9.9 | 12.7 | 15.5 | 18.0 | 19.7 | 21.0 | 22.1 | 21.5 | 20.1 | 19.2 | 17.9 | 17.0 | 16.2 | 15.7 | 15.0 | 14.0 | 13.5 | 22.1 | |
| | | 9.2 | 8.6 | 8.0 | 7.6 | 7.4 | 6.9 | 6.8 | 8.2 | 10.2 | 12.2 | 14.2 | 15.7 | 16.7 | 17.3 | 17.9 | 17.9 | 17.7 | 16.9 | 15.3 | 13.2 | 11.9 | 11.1 | 10.3 | 9.7 | Diurnal Average | |
| | | 17.3 | 17.5 | 18.2 | 17.9 | 17.3 | 16.4 | 15.7 | 16.2 | 18.0 | 21.0 | 24.1 | 28.1 | 29.5 | 30.5 | 31.0 | 31.3 | 31.0 | 30.2 | 28.5 | 26.5 | 24.7 | 22.6 | 19.1 | 17.8 | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 13 | 1.81 | 1.81 |
| 0 - 10 | 264 | 36.67 | 38.47 |
| 10 - 20 | 363 | 50.42 | 88.89 |
| > 20 | 80 | 11.11 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



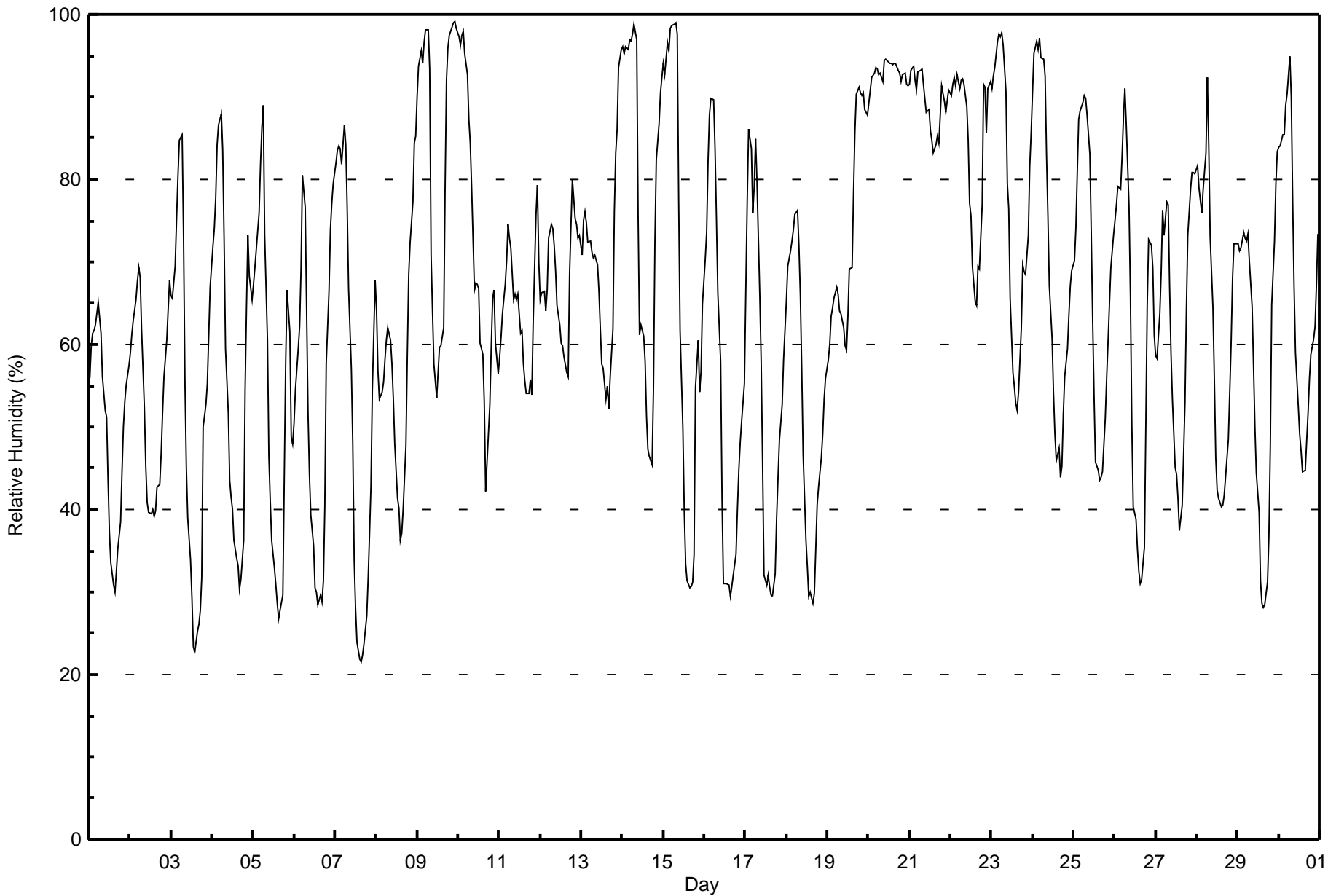
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Patricia McInnes - September 2017

| Maximum Value: 99 % on Sep 9 23:00 Maximum Daily Average: 92.9 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 22 % on Sep 7 16:00 Minimum Daily Average: 49.7 % on Sep 1 Maximum Diurnal Average: 83.7 % at hour 7 Minimum Diurnal Average: 44.7 % at hour 16 Monthly Average: 65.3 % Percentiles: P ₁ = 25 P ₁₀ = 35 Q ₁ = 51 Median = 66 Q ₃ = 83 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-Sep | 56 | 60 | 61 | 62 | 62 | 65 | 63 | 61 | 56 | 52 | 51 | 44 | 37 | 34 | 31 | 30 | 32 | 35 | 38 | 45 | 50 | 53 | 55 | 57 | 49.7 | 65 |
| 2-Sep | 59 | 61 | 63 | 65 | 68 | 69 | 68 | 62 | 52 | 45 | 41 | 40 | 39 | 40 | 39 | 40 | 43 | 43 | 47 | 52 | 56 | 60 | 64 | 68 | 53.5 | 69 |
| 3-Sep | 66 | 66 | 70 | 75 | 80 | 85 | 85 | 73 | 56 | 45 | 39 | 34 | 29 | 23 | 25 | 26 | 28 | 32 | 50 | 53 | 55 | 61 | 67 | 51.9 | 85 | |
| 4-Sep | 72 | 74 | 78 | 84 | 87 | 88 | 84 | 73 | 60 | 52 | 44 | 42 | 40 | 36 | 34 | 30 | 31 | 36 | 54 | 64 | 73 | 68 | 65 | 58.4 | 88 | |
| 5-Sep | 67 | 69 | 72 | 76 | 82 | 86 | 89 | 73 | 61 | 47 | 41 | 36 | 33 | 31 | 29 | 27 | 28 | 30 | 44 | 57 | 67 | 62 | 49 | 48 | 54.2 | 89 |
| 6-Sep | 50 | 55 | 59 | 62 | 69 | 80 | 77 | 64 | 52 | 44 | 39 | 36 | 31 | 30 | 28 | 30 | 29 | 31 | 40 | 58 | 66 | 74 | 77 | 79 | 52.6 | 80 |
| 7-Sep | 82 | 84 | 84 | 84 | 82 | 87 | 84 | 77 | 67 | 57 | 48 | 34 | 28 | 24 | 22 | 22 | 22 | 24 | 27 | 32 | 37 | 43 | 55 | 68 | 53.0 | 87 |
| 8-Sep | 64 | 57 | 53 | 54 | 55 | 58 | 60 | 62 | 61 | 58 | 53 | 48 | 41 | 40 | 36 | 37 | 40 | 48 | 59 | 68 | 72 | 77 | 84 | 85 | 57.2 | 85 |
| 9-Sep | 90 | 94 | 96 | 94 | 97 | 98 | 98 | 93 | 71 | 64 | 58 | 54 | 57 | 60 | 60 | 62 | 79 | 92 | 96 | 97 | 98 | 99 | 99 | 98 | 83.5 | 99 |
| 10-Sep | 97 | 96 | 97 | 98 | 95 | 93 | 87 | 84 | 79 | 67 | 67 | 67 | 67 | 60 | 59 | 53 | 42 | 46 | 53 | 60 | 66 | 67 | 60 | 56 | 71.5 | 98 |
| 11-Sep | 59 | 61 | 64 | 67 | 70 | 75 | 73 | 72 | 65 | 66 | 65 | 66 | 61 | 62 | 58 | 56 | 54 | 54 | 56 | 54 | 63 | 76 | 79 | 70 | 64.4 | 79 |
| 12-Sep | 65 | 66 | 66 | 64 | 67 | 73 | 75 | 74 | 72 | 69 | 65 | 62 | 60 | 60 | 59 | 57 | 56 | 68 | 74 | 80 | 75 | 75 | 73 | 73 | 67.9 | 80 |
| 13-Sep | 71 | 75 | 76 | 75 | 72 | 72 | 71 | 71 | 70 | 66 | 62 | 58 | 57 | 53 | 55 | 52 | 56 | 62 | 76 | 83 | 86 | 94 | 96 | 96 | 70.0 | 96 |
| 14-Sep | 96 | 95 | 96 | 96 | 97 | 97 | 98 | 99 | 97 | 76 | 61 | 62 | 61 | 58 | 51 | 47 | 46 | 45 | 55 | 72 | 82 | 87 | 91 | 92 | 77.4 | 99 |
| 15-Sep | 94 | 93 | 97 | 96 | 98 | 99 | 99 | 99 | 98 | 78 | 62 | 50 | 40 | 33 | 31 | 31 | 31 | 31 | 35 | 55 | 61 | 54 | 57 | 65 | 66.0 | 99 |
| 16-Sep | 70 | 74 | 82 | 88 | 90 | 90 | 84 | 75 | 66 | 58 | 41 | 31 | 31 | 31 | 31 | 29 | 31 | 32 | 35 | 40 | 45 | 48 | 51 | 55 | 54.5 | 90 |
| 17-Sep | 66 | 77 | 86 | 84 | 76 | 79 | 85 | 80 | 66 | 58 | 46 | 32 | 31 | 32 | 31 | 30 | 29 | 32 | 39 | 44 | 48 | 53 | 58 | 62 | 55.1 | 86 |
| 18-Sep | 65 | 69 | 71 | 73 | 74 | 76 | 76 | 72 | 66 | 57 | 47 | 36 | 33 | 30 | 30 | 29 | 30 | 35 | 40 | 43 | 46 | 49 | 53 | 56 | 52.3 | 76 |
| 19-Sep | 58 | 60 | 63 | 64 | 66 | 67 | 66 | 64 | 64 | 62 | 60 | 59 | 63 | 69 | 69 | 78 | 86 | 90 | 91 | 91 | 90 | 91 | 88 | 88 | 72.9 | 91 |
| 20-Sep | 89 | 91 | 92 | 93 | 94 | 93 | 93 | 93 | 92 | 94 | 95 | 94 | 94 | 94 | 94 | 94 | 94 | 93 | 93 | 92 | 93 | 93 | 92 | 91 | 92.9 | 95 |
| 21-Sep | 92 | 93 | 94 | 92 | 91 | 93 | 93 | 93 | 92 | 90 | 88 | 88 | 86 | 85 | 83 | 84 | 85 | 84 | 88 | 91 | 90 | 88 | 90 | 91 | 89.3 | 94 |
| 22-Sep | 90 | 92 | 92 | 91 | 93 | 91 | 92 | 92 | 91 | 89 | 85 | 77 | 76 | 69 | 65 | 65 | 70 | 69 | 77 | 92 | 91 | 86 | 91 | 92 | 84.0 | 93 |
| 23-Sep | 91 | 93 | 94 | 97 | 98 | 97 | 98 | 96 | 91 | 79 | 76 | 66 | 57 | 55 | 53 | 52 | 54 | 62 | 70 | 69 | 69 | 73 | 82 | 86 | 77.3 | 98 |
| 24-Sep | 90 | 95 | 97 | 96 | 97 | 95 | 95 | 93 | 83 | 76 | 67 | 61 | 54 | 49 | 46 | 48 | 44 | 45 | 52 | 56 | 60 | 63 | 67 | 69 | 70.7 | 97 |
| 25-Sep | 70 | 74 | 81 | 87 | 88 | 89 | 90 | 90 | 88 | 83 | 73 | 63 | 54 | 46 | 45 | 44 | 44 | 45 | 51 | 56 | 60 | 65 | 69 | 73 | 67.9 | 90 |
| 26-Sep | 75 | 77 | 79 | 79 | 83 | 87 | 91 | 87 | 77 | 66 | 50 | 40 | 39 | 35 | 33 | 31 | 32 | 35 | 50 | 65 | 73 | 72 | 69 | 61 | 61.9 | 91 |
| 27-Sep | 59 | 58 | 64 | 69 | 76 | 73 | 77 | 77 | 67 | 59 | 53 | 45 | 44 | 41 | 37 | 40 | 47 | 53 | 64 | 73 | 79 | 81 | 81 | 81 | 62.5 | 81 |
| 28-Sep | 82 | 79 | 77 | 76 | 79 | 83 | 92 | 84 | 73 | 64 | 56 | 46 | 42 | 41 | 40 | 40 | 42 | 44 | 48 | 54 | 60 | 68 | 72 | 72 | 63.2 | 92 |
| 29-Sep | 72 | 71 | 72 | 74 | 73 | 73 | 73 | 70 | 65 | 57 | 50 | 44 | 40 | 31 | 29 | 28 | 28 | 31 | 37 | 48 | 65 | 72 | 80 | 83 | 56.9 | 83 |
| 30-Sep | 84 | 84 | 86 | 85 | 89 | 90 | 95 | 90 | 77 | 67 | 59 | 52 | 49 | 47 | 45 | 45 | 48 | 52 | 56 | 59 | 61 | 62 | 67 | 73 | 67.6 | 95 |
| | | | | | | | | | | | | | | | | | | 74.8 76.4 78.7 80.0 81.6 83.4 83.7 79.7 72.4 64.9 58.2 52.4 49.1 46.8 44.8 44.7 45.8 48.9 54.8 62.7 67.4 70.2 72.5 74.1 | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | 97 96 97 98 98 99 99 99 98 94 95 94 94 94 94 94 94 93 96 97 98 99 99 98 | | | | | | Diurnal Maximum | | |





| | | |
|--|---|---------------------------------|
| Maximum Speed: 29 km/h on Sep 10 14:00 | Maximum Daily Speed Average: 21.4 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 13 11:00 | Minimum Daily Speed Average: 1.1 km/h on Sep 6 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 4.3 km/h at hour 14 | Minimum Diurnal Speed Average: 0.9 km/h at hour 11 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 2.1 km/h 249.9 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 9 Q ₃ = 15 P ₉₀ = 20 P ₉₉ = 26 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | WSW11 | WSW11 | SW11 | SW13 | WSW14 | SW10 | WSW14 | WSW18 | WSW17 | WSW21 | WSW19 | WSW16 | WSW17 | W22 | W25 | W26 | W24 | W23 | W17 | WSW10 | WSW10 | WSW13 | WSW15 | WSW15 | WSW15.9 | W26 |
| 2-Sep | WSW15 | WSW15 | WSW15 | WSW14 | WSW12 | WSW13 | WSW17 | WSW14 | W12 | W12 | W13 | W15 | W14 | WSW14 | W15 | W15 | W10 | WSW15 | WSW13 | W17 | W16 | W15 | W13 | WNW10 | W13.7 | W17 |
| 3-Sep | WNW14 | W15 | W14 | WSW5 | SW7 | SSW7 | SSW6 | SW7 | W15 | W20 | WNW22 | WNW23 | WNW25 | WNW26 | WNW26 | WNW25 | WNW24 | WNW21 | NW18 | NNW18 | NW12 | NW14 | NNW14 | NW11 | WNW14.5 | WNW26 |
| 4-Sep | WNW9 | W9 | W6 | SSW2 | SSW1 | SW3 | SSW4 | SSW3 | NNW7 | NNW13 | NNW15 | NW15 | NW13 | NW11 | NNW12 | WNW11 | WNW9 | NW7 | WNW3 | WNW3 | SW3 | SW4 | SSW5 | SSW6 | WNW5.4 | NW15 |
| 5-Sep | SSW6 | SSW8 | SSW8 | SSW6 | S6 | S6 | S5 | S5 | S6 | SSW9 | SSW10 | SSW10 | SW13 | SSW14 | WSW13 | W13 | WSW11 | SW7 | SSW1 | WNW4 | SW4 | SW6 | SW9 | SSW11 | SW7.2 | WSW14 |
| 6-Sep | SSW5 | SSW6 | SW6 | SW5 | SW6 | WSW3 | SW5 | SSW4 | W2 | NNE3 | NE2 | NNE5 | E1 | SW1 | NNE2 | ESE4 | ESE3 | NNE4 | N3 | NNW2 | W2 | W1 | WSW2 | SSW3 | SW1.1 | SW6 |
| 7-Sep | SSW3 | SSW5 | SSW5 | SSW6 | S6 | S5 | SSE4 | S5 | SSE7 | SSE8 | SE8 | S15 | S17 | S19 | S21 | S20 | S19 | S16 | S14 | S12 | S9 | SSW7 | S4 | SSW4 | S9.6 | S21 |
| 8-Sep | SW6 | SW8 | SW9 | SW8 | SSW7 | SSW8 | S6 | SSW6 | S2 | ESE2 | NNW8 | NNW18 | NNW18 | N12 | N14 | N13 | NNW12 | NNW12 | NNW12 | NNW11 | NNW10 | NNW6 | NW6 | WNW3 | NW4.9 | NNW18 |
| 9-Sep | WSW1 | W3 | W1 | SW4 | NW1 | NE1 | NNE0 | NW1 | ENE4 | ENE5 | ENE4 | NNE5 | NNE10 | N12 | N15 | NNW15 | NNW11 | NNW11 | NNW9 | N8 | NW4 | WNW7 | W6 | SW4 | NNW4.3 | NNW15 |
| 10-Sep | SW7 | SW8 | SSW7 | SSW6 | SW10 | WSW12 | WSW17 | WSW20 | WSW22 | W28 | W28 | W25 | W28 | W29 | WNW29 | WNW19 | W24 | W24 | WSW16 | WSW13 | WSW13 | WSW14 | WSW20 | WSW19 | W17.3 | W29 |
| 11-Sep | WSW19 | WSW17 | WSW16 | WSW12 | SW8 | SSE6 | SSW6 | SSW6 | SW10 | SSW9 | S7 | ESE5 | ESE6 | ESE8 | ESE8 | ESE7 | SE9 | SE8 | SSE5 | SSW8 | NW11 | S2 | SW6 | WSW11 | SSW4.9 | WSW19 |
| 12-Sep | WSW14 | W23 | W24 | W19 | W16 | WSW18 | WSW19 | W18 | W19 | W20 | WNW19 | WNW20 | WNW18 | WNW17 | W15 | WNW16 | NW13 | N14 | NNW11 | N11 | N13 | NNE11 | NNE10 | NE7 | WNW12.7 | W24 |
| 13-Sep | NNE9 | N6 | N7 | NNE7 | NE6 | E7 | ENE7 | E6 | SE4 | WSW3 | S0 | NW3 | NE5 | NE5 | ENE6 | ESE6 | NNW5 | NNW6 | N5 | NW3 | WNW3 | WSW3 | W3 | NW3 | NNE2.8 | NNE9 |
| 14-Sep | W2 | WSW3 | W3 | WNW3 | NNW4 | N5 | NNW6 | N5 | N3 | NNE2 | NNE7 | N10 | N11 | N12 | N6 | N7 | NNE8 | NNE9 | NNW5 | NW6 | NW5 | NW5 | NW5 | NNW5 | N4.9 | N12 |
| 15-Sep | W2 | W2 | NW2 | SW2 | S3 | SW4 | SSW6 | SSW8 | S8 | S7 | S7 | SSE7 | S8 | SSW11 | SSW12 | SW12 | SW10 | SSW5 | SSW4 | SSW5 | SSW4 | SSW5 | SSW7 | SSW5 | SSW6.0 | SSW12 |
| 16-Sep | S5 | SSE6 | SSW3 | SW3 | SSW3 | S3 | SSE4 | SSE6 | SE6 | SSE7 | SSE14 | S22 | S17 | SSW18 | S18 | S18 | S16 | S15 | SSE12 | SSE9 | SSE9 | SSE11 | SSW10 | SSW6 | S9.7 | S22 |
| 17-Sep | SE1 | E2 | E3 | ESE4 | SE8 | SE6 | S1 | SE7 | SE8 | ESE10 | SE13 | S21 | S21 | SSE19 | SSE18 | SSE17 | SSE17 | SSE17 | SE15 | SE15 | SE15 | SE12 | SE10 | ESE15 | SSE10.8 | S21 |
| 18-Sep | ESE15 | ESE13 | ESE14 | ESE16 | ESE16 | ESE16 | ESE15 | ESE19 | ESE16 | ESE15 | ESE17 | SE25 | SE20 | SE18 | ESE17 | ESE17 | ESE17 | ESE17 | ESE14 | ESE13 | E9 | E10 | E10 | E10 | ESE15.1 | SE25 |
| 19-Sep | E10 | ENE7 | ENE6 | ENE7 | NE7 | NE8 | NE9 | ENE12 | ENE14 | ENE13 | E16 | ENE14 | ENE16 | NE15 | E21 | E22 | ENE17 | ENE16 | ENE17 | ENE20 | ENE22 | ENE19 | ENE18 | ENE16 | ENE14.0 | E22 |
| 20-Sep | NE15 | NNE14 | N15 | N17 | N19 | N21 | N21 | N23 | N24 | N24 | N25 | N23 | N25 | N24 | N24 | N23 | N23 | N23 | N23 | N24 | N21 | N23 | N22 | N21 | N21.4 | N25 |
| 21-Sep | N21 | N21 | N23 | N23 | N22 | N21 | N21 | N21 | N22 | N20 | N21 | N20 | N20 | N19 | N19 | N20 | N18 | N16 | N16 | NNW13 | NNW9 | NNW8 | NW7 | NW8 | N17.5 | N23 |
| 22-Sep | NW8 | WNW6 | W5 | WNW4 | W3 | SW2 | SW4 | SW3 | SW4 | SSW4 | SW6 | W5 | W3 | SE4 | S5 | SSE7 | S8 | S5 | SSE6 | SW3 | S4 | SSE6 | SSE2 | SE2 | SSW2.7 | S8 |
| 23-Sep | SSE2 | SE3 | SSW2 | S2 | SE4 | SE2 | SSE4 | S2 | SSE4 | SE6 | SSE9 | SSW8 | SW13 | SW8 | S7 | S8 | SE9 | SE10 | SE7 | SSE8 | SSE9 | SSE5 | SE4 | S4 | SSE5.1 | SW13 |
| 24-Sep | S3 | SSW1 | SSE3 | S3 | SSE6 | SE7 | S4 | SSE6 | SE9 | SSE8 | SE6 | E7 | E5 | E6 | SE8 | ESE10 | SE9 | SSE10 | SSE9 | S10 | S11 | SSE7 | SE7 | SE7 | SE6.1 | S11 |
| 25-Sep | SE8 | SE8 | SE7 | SE7 | SE6 | SE8 | SE7 | SE7 | SE7 | SSE8 | S10 | S9 | SW14 | WSW16 | WSW16 | WSW13 | WSW11 | SW8 | SW9 | SW9 | SW10 | SW8 | SW9 | SW9 | SSW6.3 | WSW16 |
| 26-Sep | WSW12 | SW11 | WSW12 | WSW7 | SW6 | SSW5 | SSW6 | SSW6 | SSW7 | S6 | N4 | NW13 | NW17 | NW17 | WNW17 | NW17 | NW16 | NNW9 | W3 | WSW6 | WNW6 | SW2 | SSW3 | SSW5 | W6.1 | NW17 |
| 27-Sep | SSW7 | SSW5 | SSE5 | S5 | S5 | SSW6 | SSW7 | SSW5 | SE1 | SSW1 | NNW4 | N5 | NNE7 | NNE6 | N9 | NNE9 | NNW11 | NNW9 | N10 | N11 | NNW9 | NNW7 | N6 | N6 | NNW2.8 | NNW11 |
| 28-Sep | N3 | E5 | ESE6 | ESE9 | SE9 | SE6 | SSE4 | SE8 | SE9 | SE9 | SE8 | ESE9 | SSE12 | S17 | S18 | S17 | S16 | S16 | SSE12 | SSE9 | SE9 | ESE6 | ESE7 | ESE9 | SSE8.3 | S18 |
| 29-Sep | SE10 | SE11 | SE10 | SE9 | SE10 | SE12 | SE13 | ESE13 | SE12 | SE12 | SE9 | ESE8 | SE9 | SSE13 | SSW12 | SSW11 | SSW11 | S11 | SSW8 | SW5 | WSW3 | SW2 | SSW3 | SSW5 | SSE7.5 | SSE13 |
| 30-Sep | SSW6 | SSE5 | S6 | SW6 | S5 | SSE4 | SSW6 | SSW8 | S7 | S8 | S10 | S11 | SSW13 | WSW14 | WSW14 | WSW15 | W13 | WSW10 | WSW10 | W13 | W14 | WNW15 | NW15 | NW14 | WSW7.3 | WSW15 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|-------|--------|------|--------|--------|--------|-------|--------|------|------|------|-------|------|-------|------|------|--------|--------|------|------|------|-----------------|--|
| WSW2.4 | WSW3.0 | WSW3.0 | SW2.2 | SSW2.0 | S2.0 | SSW2.5 | SSW2.3 | SSW1.6 | SW1.5 | WSW0.9 | W2.0 | W3.2 | W4.3 | W3.8 | W3.2 | W3.3 | W2.2 | W1.4 | NNW1.5 | NNW1.8 | W1.6 | W2.0 | W1.7 | Diurnal Average | |
| N21 | W23 | W24 | N23 | N22 | N21 | N21 | N23 | N24 | W28 | W28 | W25 | W28 | W29 | WNW29 | W26 | WNW24 | W24 | N23 | N24 | ENE22 | N23 | N22 | N21 | Diurnal Maximum | |

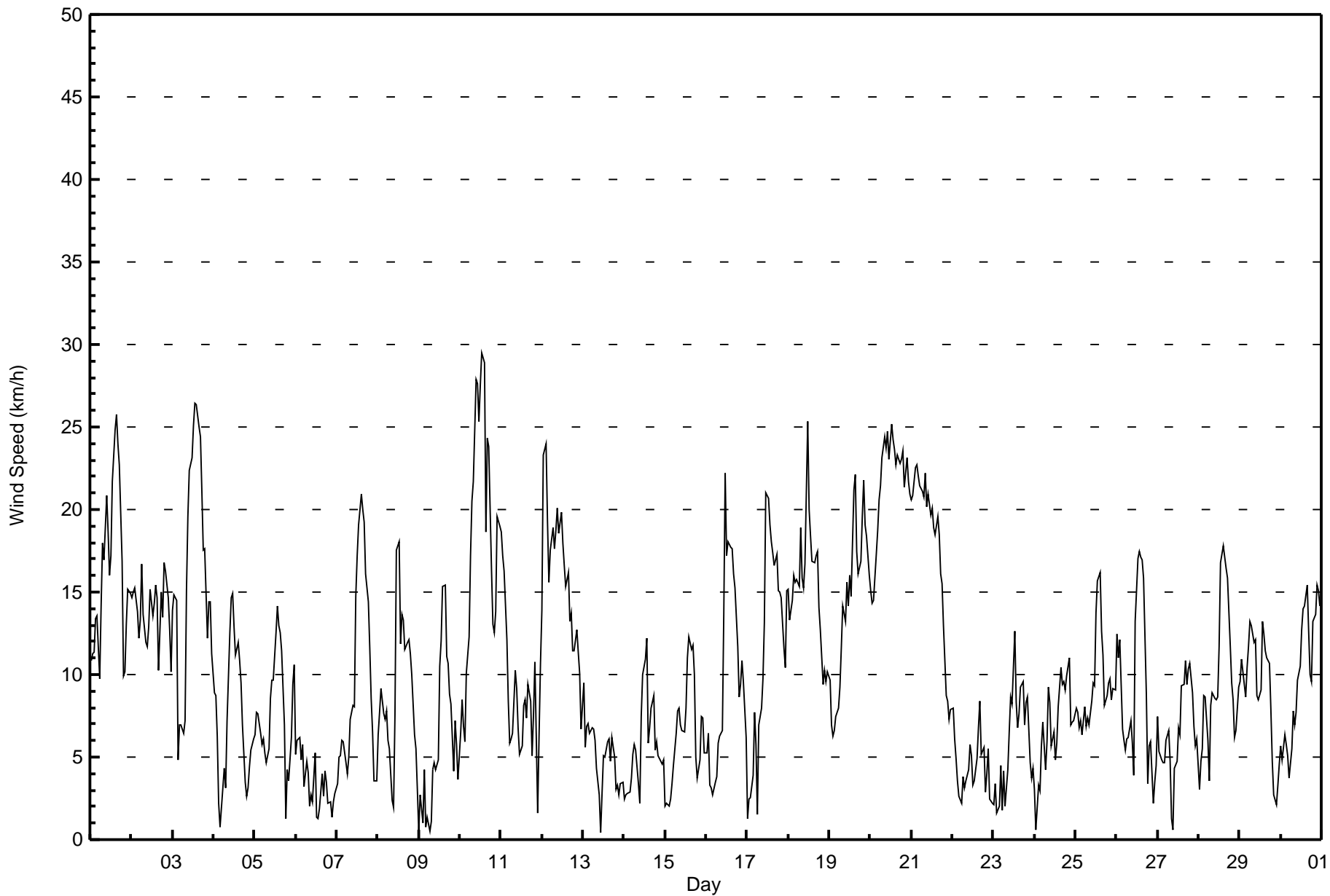
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 174 | 24.17 | 24.17 |
| 6 - 11 | 273 | 37.92 | 62.08 |
| 12 - 19 | 199 | 27.64 | 89.72 |
| 20 - 28 | 72 | 10.00 | 99.72 |
| 29 - 38 | 2 | 0.28 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 7 | 7 | 4 | 3 | 5 | 5 | 9 | 13 | 24 | 29 | 21 | 8 | 15 | 7 | 10 | 7 | 174 |
| 6 - 11 | 12 | 11 | 5 | 5 | 9 | 15 | 42 | 24 | 25 | 41 | 34 | 11 | 4 | 7 | 9 | 19 | 273 |
| 12 - 19 | 16 | 1 | 2 | 11 | 1 | 19 | 10 | 10 | 17 | 4 | 6 | 45 | 23 | 9 | 13 | 12 | 199 |
| 20 - 28 | 33 | 0 | 0 | 2 | 2 | 0 | 2 | 0 | 5 | 0 | 0 | 4 | 15 | 9 | 0 | 0 | 72 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 68 | 19 | 11 | 21 | 17 | 39 | 63 | 47 | 71 | 74 | 61 | 68 | 58 | 33 | 32 | 38 | 720 |

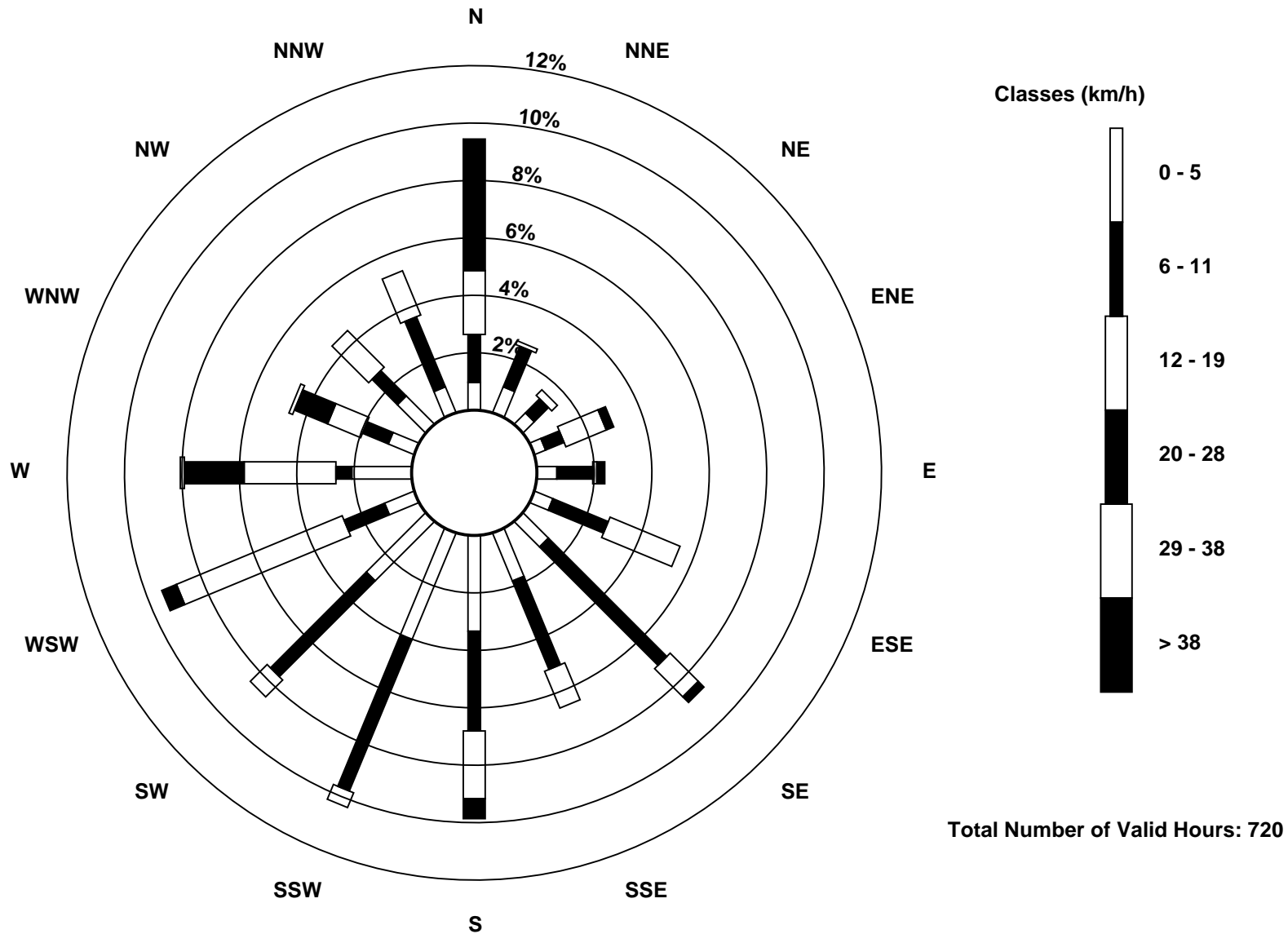
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|--|---|
| Direction of Maximum Speed: 276 deg on Sep 10 14:00 Direction of Maximum Daily Speed Average: 7.2 deg on Sep 20 | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 |
| Direction of Minimum Speed: 175 deg on Sep 13 11:00 Direction of Minimum Daily Speed Average: 1.1 deg on Sep 6 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 244.8 deg | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 244 | 238 | 234 | 234 | 239 | 231 | 239 | 252 | 255 | 249 | 244 | 246 | 242 | 263 | 272 | 272 | 264 | 262 | 264 | 243 | 242 | 245 | 247 | 255 | 252.0 |
| 2-Sep | 255 | 256 | 253 | 253 | 250 | 248 | 251 | 252 | 264 | 273 | 276 | 272 | 261 | 257 | 260 | 265 | 272 | 255 | 249 | 264 | 280 | 266 | 271 | 290 | 261.7 |
| 3-Sep | 294 | 281 | 277 | 238 | 229 | 209 | 195 | 232 | 275 | 276 | 289 | 288 | 299 | 292 | 297 | 295 | 302 | 302 | 313 | 346 | 324 | 323 | 327 | 325 | 294.5 |
| 4-Sep | 297 | 281 | 268 | 210 | 202 | 221 | 213 | 208 | 345 | 344 | 344 | 315 | 318 | 312 | 331 | 303 | 299 | 306 | 286 | 285 | 221 | 221 | 209 | 199 | 300.3 |
| 5-Sep | 196 | 206 | 196 | 201 | 187 | 181 | 190 | 175 | 182 | 199 | 199 | 212 | 231 | 242 | 239 | 259 | 238 | 214 | 192 | 293 | 219 | 219 | 224 | 224 | 217.9 |
| 6-Sep | 206 | 213 | 229 | 217 | 232 | 238 | 229 | 212 | 260 | 32 | 54 | 29 | 91 | 229 | 26 | 110 | 102 | 24 | 9 | 330 | 259 | 261 | 254 | 193 | 228.8 |
| 7-Sep | 208 | 217 | 206 | 207 | 179 | 171 | 167 | 171 | 147 | 150 | 135 | 176 | 187 | 181 | 177 | 176 | 172 | 175 | 169 | 176 | 191 | 195 | 190 | 194 | 177.3 |
| 8-Sep | 230 | 224 | 220 | 215 | 207 | 192 | 178 | 211 | 183 | 112 | 347 | 345 | 347 | 352 | 349 | 359 | 341 | 330 | 337 | 335 | 337 | 340 | 321 | 292 | 321.8 |
| 9-Sep | 253 | 260 | 260 | 225 | 324 | 35 | 18 | 326 | 68 | 78 | 70 | 17 | 19 | 4 | 352 | 345 | 334 | 345 | 330 | 356 | 317 | 287 | 270 | 235 | 345.2 |
| 10-Sep | 236 | 225 | 204 | 204 | 234 | 244 | 251 | 248 | 250 | 265 | 264 | 274 | 277 | 276 | 285 | 286 | 280 | 268 | 249 | 238 | 242 | 248 | 249 | 251 | 260.1 |
| 11-Sep | 254 | 257 | 251 | 241 | 217 | 165 | 194 | 211 | 221 | 196 | 178 | 105 | 113 | 114 | 103 | 116 | 135 | 130 | 168 | 192 | 318 | 175 | 232 | 253 | 207.8 |
| 12-Sep | 255 | 269 | 277 | 281 | 263 | 254 | 252 | 261 | 273 | 278 | 285 | 283 | 292 | 285 | 278 | 296 | 310 | 351 | 332 | 3 | 4 | 26 | 30 | 39 | 289.4 |
| 13-Sep | 27 | 4 | 6 | 24 | 48 | 85 | 78 | 84 | 136 | 257 | 175 | 313 | 40 | 46 | 57 | 103 | 336 | 333 | 357 | 319 | 297 | 253 | 277 | 308 | 25.7 |
| 14-Sep | 268 | 239 | 265 | 294 | 341 | 1 | 341 | 5 | 349 | 26 | 26 | 10 | 3 | 356 | 352 | 352 | 24 | 28 | 341 | 310 | 321 | 316 | 321 | 327 | 350.0 |
| 15-Sep | 271 | 278 | 310 | 230 | 183 | 225 | 195 | 195 | 184 | 187 | 169 | 149 | 170 | 213 | 198 | 217 | 216 | 222 | 205 | 206 | 209 | 215 | 215 | 198 | 203.4 |
| 16-Sep | 190 | 157 | 193 | 231 | 212 | 178 | 168 | 153 | 142 | 154 | 162 | 169 | 181 | 197 | 180 | 186 | 181 | 181 | 162 | 162 | 163 | 162 | 196 | 193 | 176.2 |
| 17-Sep | 131 | 96 | 99 | 116 | 127 | 132 | 179 | 130 | 124 | 116 | 133 | 171 | 182 | 167 | 160 | 155 | 158 | 148 | 139 | 146 | 142 | 143 | 127 | 123 | 147.0 |
| 18-Sep | 123 | 123 | 123 | 122 | 123 | 120 | 120 | 118 | 121 | 112 | 113 | 134 | 138 | 132 | 113 | 116 | 115 | 107 | 105 | 104 | 98 | 93 | 91 | 93 | 117.1 |
| 19-Sep | 87 | 77 | 57 | 64 | 56 | 39 | 48 | 58 | 71 | 76 | 85 | 73 | 75 | 53 | 80 | 79 | 72 | 68 | 66 | 70 | 74 | 74 | 70 | 58 | 69.8 |
| 20-Sep | 36 | 12 | 1 | 355 | 355 | 360 | 4 | 5 | 8 | 9 | 7 | 9 | 8 | 8 | 7 | 10 | 7 | 7 | 8 | 8 | 9 | 8 | 10 | 6 | 7.2 |
| 21-Sep | 5 | 1 | 1 | 2 | 5 | 359 | 2 | 2 | 1 | 4 | 358 | 360 | 2 | 3 | 4 | 356 | 352 | 353 | 350 | 348 | 340 | 327 | 318 | 311 | 357.4 |
| 22-Sep | 321 | 303 | 278 | 285 | 277 | 216 | 226 | 223 | 216 | 199 | 232 | 265 | 265 | 128 | 175 | 164 | 185 | 187 | 166 | 219 | 169 | 155 | 165 | 133 | 212.9 |
| 23-Sep | 155 | 128 | 192 | 180 | 127 | 130 | 148 | 177 | 148 | 134 | 161 | 206 | 218 | 225 | 169 | 175 | 143 | 127 | 134 | 153 | 159 | 161 | 146 | 169 | 163.5 |
| 24-Sep | 187 | 201 | 157 | 178 | 154 | 138 | 170 | 147 | 137 | 155 | 137 | 99 | 85 | 101 | 135 | 112 | 129 | 163 | 151 | 177 | 180 | 157 | 124 | 127 | 143.2 |
| 25-Sep | 134 | 128 | 138 | 132 | 137 | 138 | 136 | 134 | 141 | 148 | 173 | 180 | 227 | 244 | 251 | 254 | 258 | 229 | 231 | 231 | 233 | 230 | 229 | 232 | 203.2 |
| 26-Sep | 238 | 232 | 239 | 247 | 229 | 209 | 205 | 210 | 205 | 170 | 1 | 316 | 305 | 314 | 300 | 312 | 320 | 336 | 276 | 247 | 292 | 226 | 207 | 198 | 274.9 |
| 27-Sep | 211 | 206 | 167 | 189 | 169 | 204 | 211 | 209 | 145 | 206 | 345 | 6 | 28 | 16 | 355 | 27 | 347 | 341 | 353 | 349 | 343 | 343 | 360 | 5 | 344.8 |
| 28-Sep | 3 | 99 | 102 | 113 | 132 | 141 | 166 | 140 | 134 | 125 | 127 | 112 | 162 | 181 | 184 | 181 | 179 | 172 | 165 | 154 | 139 | 121 | 119 | 120 | 150.5 |
| 29-Sep | 125 | 127 | 127 | 131 | 124 | 125 | 125 | 122 | 129 | 126 | 124 | 122 | 138 | 168 | 202 | 207 | 206 | 189 | 192 | 220 | 257 | 222 | 211 | 200 | 151.6 |
| 30-Sep | 209 | 166 | 190 | 216 | 185 | 165 | 199 | 211 | 181 | 181 | 176 | 187 | 212 | 248 | 247 | 257 | 264 | 250 | 255 | 261 | 273 | 293 | 313 | 312 | 241.4 |

248.2 245.4 245.3 231.3 199.4 188.9 209.0 202.4 202.1 214.2 241.1 260.4 265.7 265.8 266.2 269.3 269.1 266.3 273.4 282.2 281.7 268.2 269.9 260.3

Diurnal Average

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



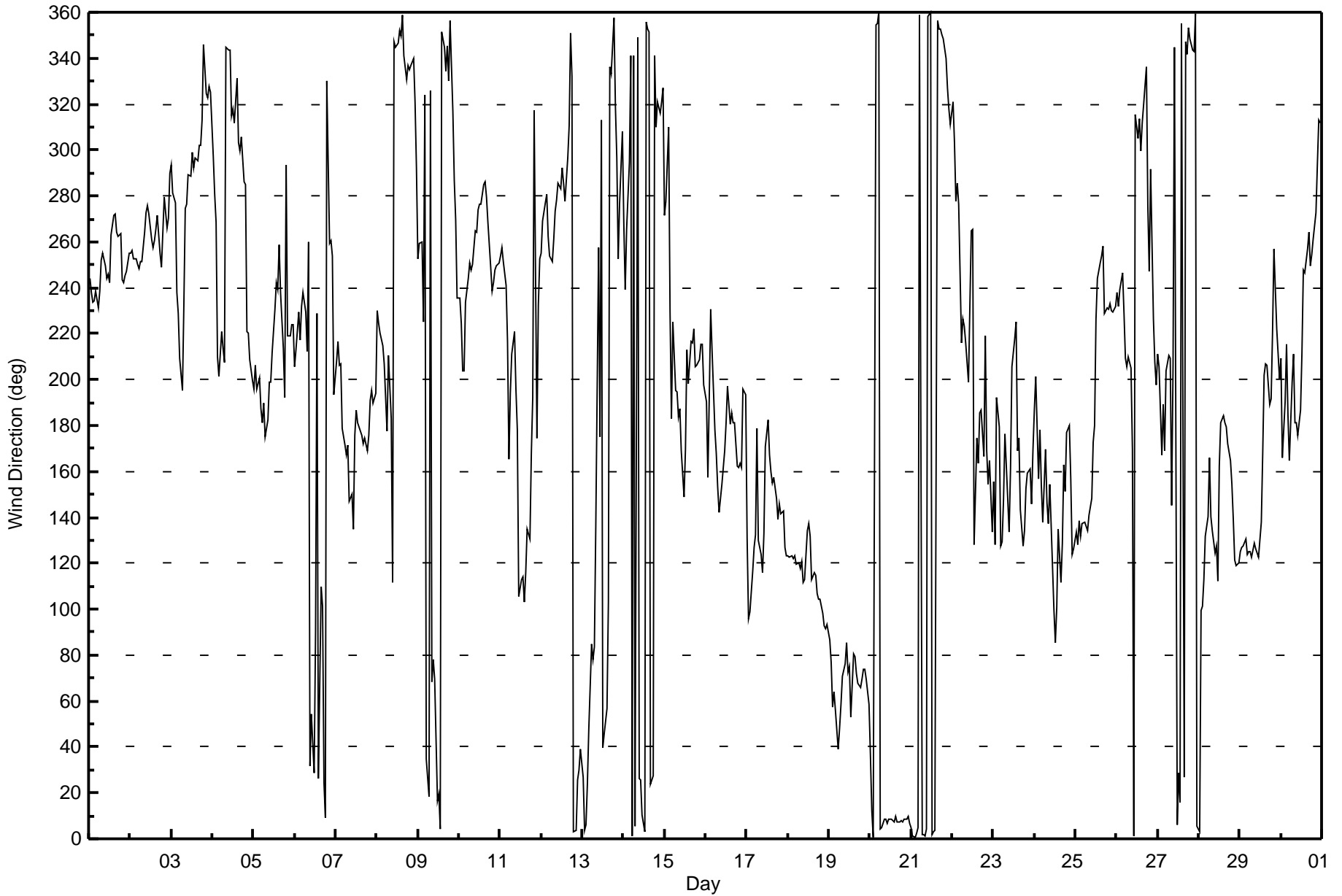
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|--|---------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 99 deg on Sep 13 11:00 | Hours of Data: 720 |
| Minimum Value: 7 deg on Sep 22 02:00 | Hours of Missing Data: 0 |
| | Hours of Calibration: 0 |
| | Percent Operational Time: 100.0 |
| Percentiles: P ₁ = 8 P ₁₀ = 11 Q ₁ = 13 Median = 16 Q ₃ = 23 P ₉₀ = 38 P ₉₉ = 87 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 9 | 9 | 10 | 11 | 12 | 15 | 15 | 11 | 11 | 12 | 12 | 15 | 23 | 19 | 16 | 15 | 14 | 13 | 12 | 8 | 8 | 8 | 8 | 8 | 23 |
| 2-Sep | 9 | 8 | 8 | 9 | 10 | 10 | 9 | 12 | 18 | 21 | 21 | 19 | 25 | 17 | 13 | 12 | 13 | 15 | 12 | 14 | 14 | 12 | 15 | 18 | 25 |
| 3-Sep | 11 | 11 | 12 | 63 | 14 | 20 | 18 | 26 | 14 | 16 | 17 | 18 | 15 | 16 | 16 | 15 | 13 | 12 | 26 | 17 | 11 | 10 | 10 | 8 | 63 |
| 4-Sep | 11 | 10 | 15 | 68 | 92 | 33 | 32 | 53 | 27 | 21 | 23 | 21 | 29 | 34 | 25 | 24 | 26 | 26 | 21 | 24 | 18 | 11 | 10 | 10 | 92 |
| 5-Sep | 11 | 12 | 13 | 13 | 12 | 11 | 12 | 21 | 28 | 24 | 24 | 32 | 26 | 21 | 29 | 23 | 18 | 27 | 63 | 18 | 17 | 13 | 8 | 10 | 63 |
| 6-Sep | 26 | 19 | 12 | 16 | 9 | 23 | 11 | 18 | 62 | 53 | 84 | 38 | 88 | 95 | 94 | 70 | 67 | 32 | 18 | 46 | 17 | 32 | 15 | 29 | 95 |
| 7-Sep | 12 | 8 | 17 | 12 | 20 | 13 | 15 | 15 | 14 | 18 | 22 | 25 | 19 | 18 | 15 | 15 | 14 | 14 | 13 | 13 | 16 | 16 | 28 | 21 | 28 |
| 8-Sep | 19 | 12 | 13 | 16 | 20 | 19 | 26 | 34 | 55 | 81 | 65 | 17 | 17 | 23 | 18 | 18 | 24 | 21 | 14 | 11 | 12 | 13 | 13 | 52 | 81 |
| 9-Sep | 88 | 28 | 46 | 38 | 87 | 73 | 81 | 83 | 40 | 41 | 63 | 56 | 22 | 16 | 17 | 14 | 11 | 13 | 19 | 17 | 25 | 12 | 18 | 26 | 88 |
| 10-Sep | 13 | 15 | 18 | 20 | 13 | 12 | 11 | 11 | 12 | 14 | 13 | 15 | 15 | 16 | 14 | 14 | 16 | 15 | 11 | 9 | 9 | 9 | 10 | 9 | 20 |
| 11-Sep | 9 | 9 | 9 | 13 | 23 | 18 | 17 | 18 | 19 | 18 | 20 | 27 | 21 | 23 | 17 | 21 | 16 | 17 | 34 | 13 | 43 | 85 | 18 | 17 | 85 |
| 12-Sep | 12 | 12 | 14 | 14 | 16 | 12 | 12 | 13 | 14 | 14 | 15 | 13 | 13 | 17 | 15 | 16 | 14 | 16 | 12 | 17 | 15 | 20 | 14 | 18 | 20 |
| 13-Sep | 12 | 24 | 27 | 19 | 27 | 16 | 19 | 27 | 32 | 47 | 99 | 72 | 61 | 44 | 47 | 38 | 51 | 23 | 35 | 33 | 24 | 41 | 17 | 27 | 99 |
| 14-Sep | 51 | 27 | 21 | 32 | 23 | 23 | 22 | 24 | 44 | 77 | 35 | 30 | 29 | 23 | 61 | 49 | 33 | 16 | 10 | 10 | 18 | 21 | 11 | 25 | 77 |
| 15-Sep | 54 | 51 | 53 | 28 | 28 | 17 | 16 | 17 | 18 | 24 | 30 | 32 | 47 | 37 | 29 | 28 | 23 | 14 | 13 | 13 | 17 | 12 | 12 | 19 | 54 |
| 16-Sep | 11 | 11 | 19 | 11 | 22 | 16 | 14 | 17 | 18 | 21 | 28 | 18 | 23 | 20 | 19 | 19 | 24 | 17 | 12 | 12 | 12 | 15 | 16 | 14 | 28 |
| 17-Sep | 70 | 24 | 33 | 40 | 10 | 13 | 53 | 13 | 15 | 15 | 31 | 18 | 17 | 19 | 18 | 22 | 18 | 15 | 13 | 12 | 12 | 12 | 12 | 12 | 70 |
| 18-Sep | 12 | 13 | 13 | 12 | 13 | 12 | 13 | 12 | 14 | 15 | 17 | 16 | 20 | 21 | 19 | 20 | 16 | 13 | 12 | 13 | 13 | 13 | 11 | 13 | 21 |
| 19-Sep | 14 | 21 | 25 | 15 | 16 | 14 | 16 | 15 | 16 | 20 | 15 | 17 | 17 | 15 | 18 | 14 | 14 | 15 | 15 | 15 | 13 | 14 | 15 | 18 | 25 |
| 20-Sep | 15 | 15 | 15 | 14 | 16 | 17 | 16 | 15 | 14 | 15 | 14 | 14 | 14 | 15 | 16 | 14 | 15 | 14 | 15 | 15 | 15 | 14 | 14 | 15 | 17 |
| 21-Sep | 15 | 15 | 16 | 16 | 15 | 16 | 16 | 15 | 17 | 16 | 16 | 17 | 17 | 15 | 16 | 17 | 15 | 15 | 15 | 15 | 15 | 11 | 13 | 9 | 17 |
| 22-Sep | 10 | 7 | 13 | 21 | 25 | 26 | 23 | 30 | 18 | 24 | 24 | 19 | 31 | 48 | 28 | 23 | 23 | 24 | 10 | 11 | 32 | 17 | 35 | 24 | 48 |
| 23-Sep | 58 | 40 | 43 | 31 | 19 | 39 | 27 | 63 | 30 | 21 | 16 | 29 | 19 | 41 | 35 | 30 | 17 | 12 | 10 | 13 | 13 | 22 | 16 | 12 | 63 |
| 24-Sep | 21 | 59 | 29 | 28 | 17 | 12 | 22 | 15 | 16 | 16 | 38 | 33 | 69 | 43 | 43 | 15 | 39 | 19 | 10 | 17 | 14 | 16 | 12 | 11 | 69 |
| 25-Sep | 11 | 11 | 11 | 11 | 12 | 12 | 12 | 13 | 13 | 14 | 22 | 26 | 22 | 20 | 17 | 15 | 16 | 16 | 10 | 10 | 8 | 8 | 8 | 8 | 26 |
| 26-Sep | 8 | 9 | 10 | 30 | 8 | 18 | 16 | 19 | 18 | 25 | 77 | 24 | 15 | 18 | 19 | 18 | 14 | 14 | 26 | 7 | 10 | 44 | 58 | 26 | 77 |
| 27-Sep | 14 | 18 | 29 | 19 | 32 | 17 | 15 | 27 | 85 | 79 | 35 | 45 | 32 | 32 | 27 | 18 | 14 | 11 | 14 | 12 | 11 | 12 | 17 | 12 | 85 |
| 28-Sep | 17 | 35 | 26 | 16 | 10 | 11 | 19 | 13 | 17 | 19 | 19 | 19 | 38 | 18 | 20 | 18 | 16 | 14 | 12 | 10 | 17 | 9 | 10 | 10 | 38 |
| 29-Sep | 10 | 10 | 10 | 10 | 11 | 10 | 11 | 11 | 13 | 14 | 17 | 19 | 20 | 25 | 24 | 23 | 19 | 12 | 11 | 22 | 18 | 49 | 27 | 10 | 49 |
| 30-Sep | 8 | 19 | 11 | 13 | 30 | 23 | 15 | 16 | 18 | 21 | 15 | 18 | 25 | 17 | 19 | 16 | 14 | 11 | 11 | 13 | 13 | 12 | 13 | 14 | 30 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 88 | 59 | 53 | 68 | 92 | 73 | 81 | 83 | 85 | 81 | 99 | 72 | 88 | 95 | 94 | 70 | 67 | 32 | 63 | 46 | 43 | 85 | 58 | 52 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association

SO₂ Calibration Summary

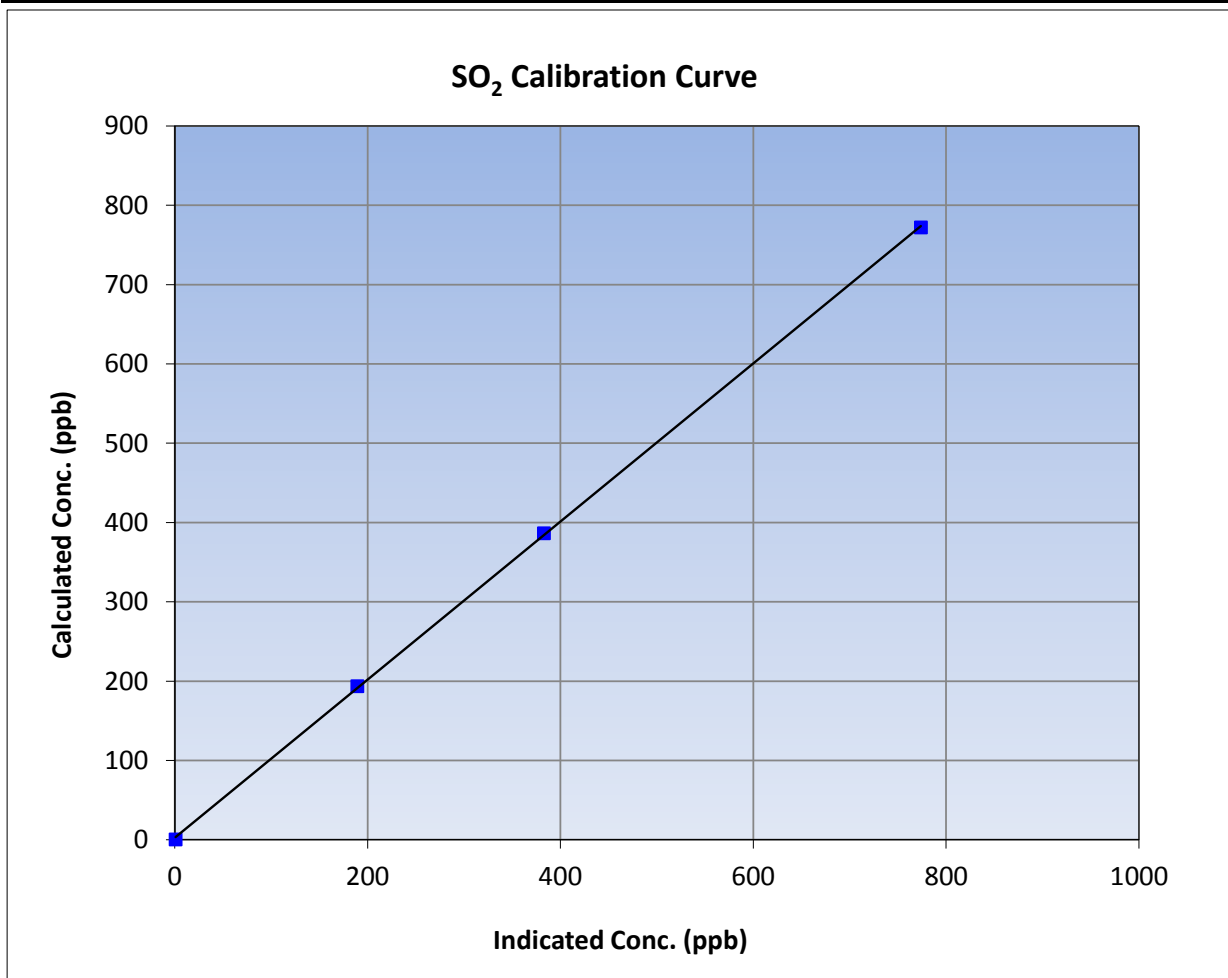
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 1, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:15 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1008841397 |

Calibration Data

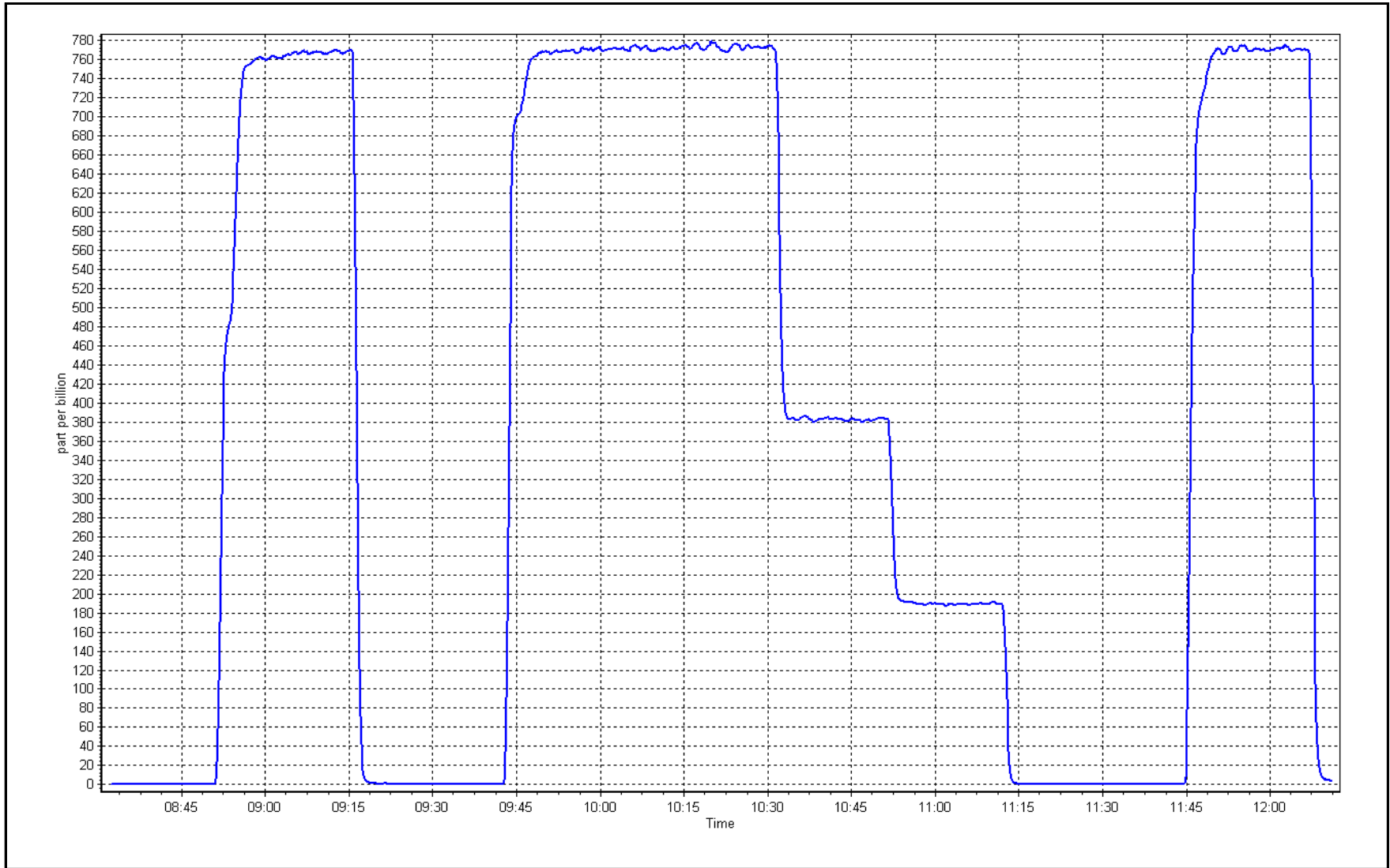
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Serial Number | Limits | |
|--|---------------------------------------|------------------------------|---------------|----------|-------------|
| 0.0 | 0.5 | ---- | Serial Number | 0.999932 | ≥0.995 |
| 771.8 | 773.4 | 0.9979 | Slope | 0.996861 | 0.90 - 1.10 |
| 386.0 | 382.6 | 1.0088 | Intercept | 2.460722 | +/-30 |
| 193.4 | 189.0 | 1.0231 | | | |



SO2 Calibration Plot

Date: September 1, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

SO₂ Calibration Summary

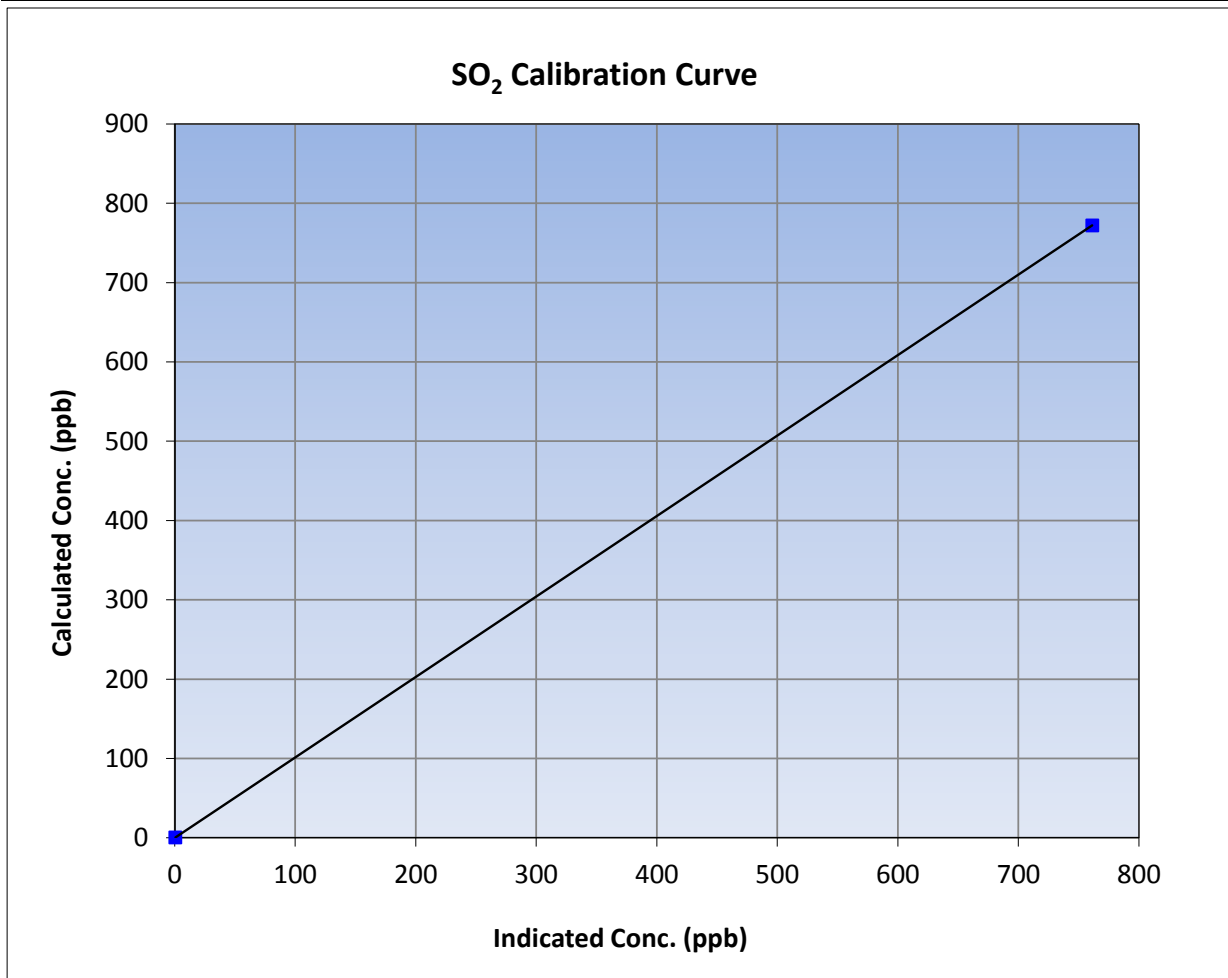
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:03 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1008841397 |

Calibration Data

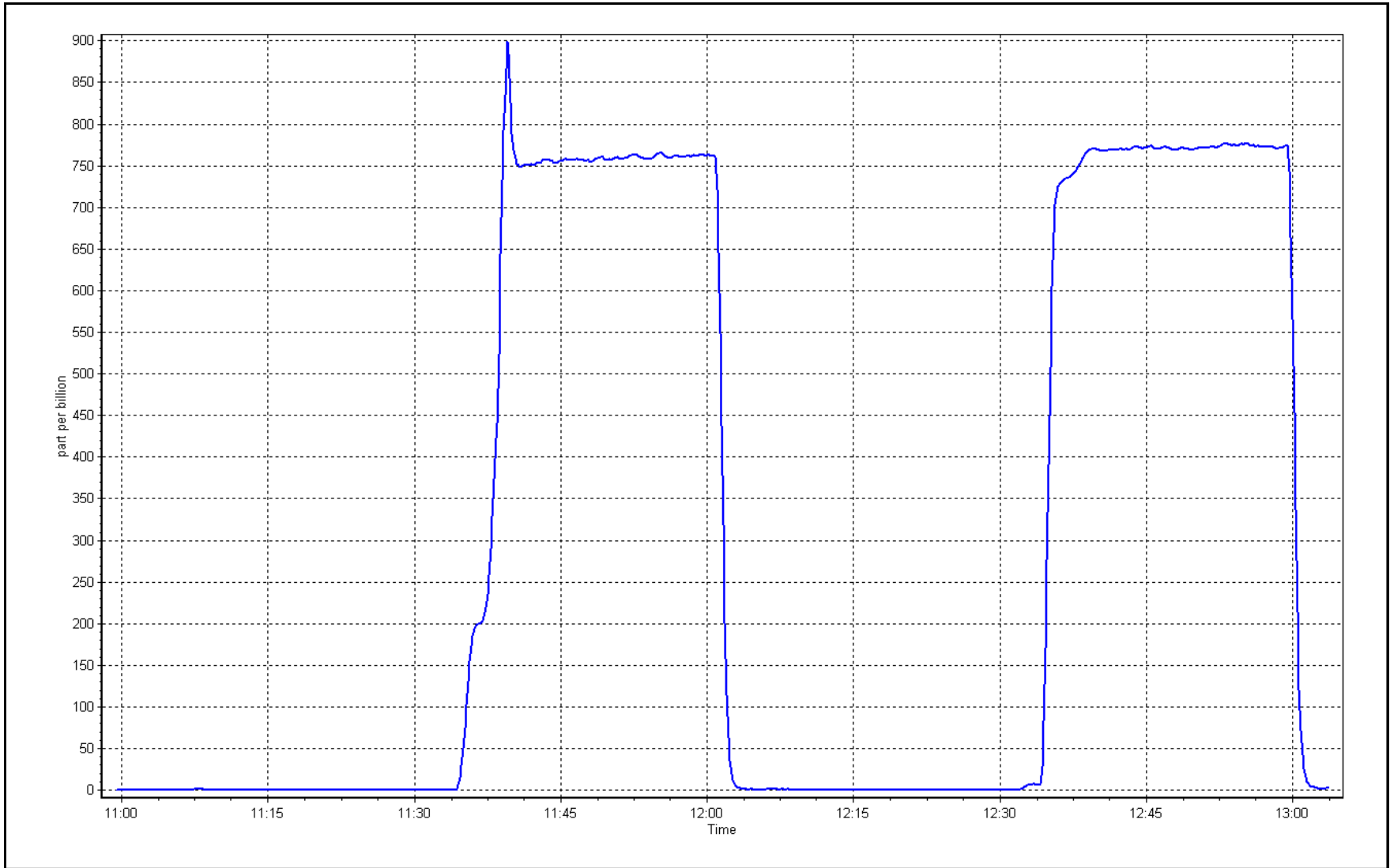
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Serial Number | <i>Limits</i> | |
|--|---------------------------------------|------------------------------|---------------|---------------|--------------------|
| 0.0 | 0.2 | ---- | Serial Number | 1.000000 | <i>≥0.995</i> |
| 771.8 | 760.8 | 1.0144 | Slope | 1.014699 | <i>0.90 - 1.10</i> |
| | | | Intercept | -0.202940 | <i>+/-30</i> |



SO2 Calibration Plot

Date: September 25, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

SO₂ Calibration Summary

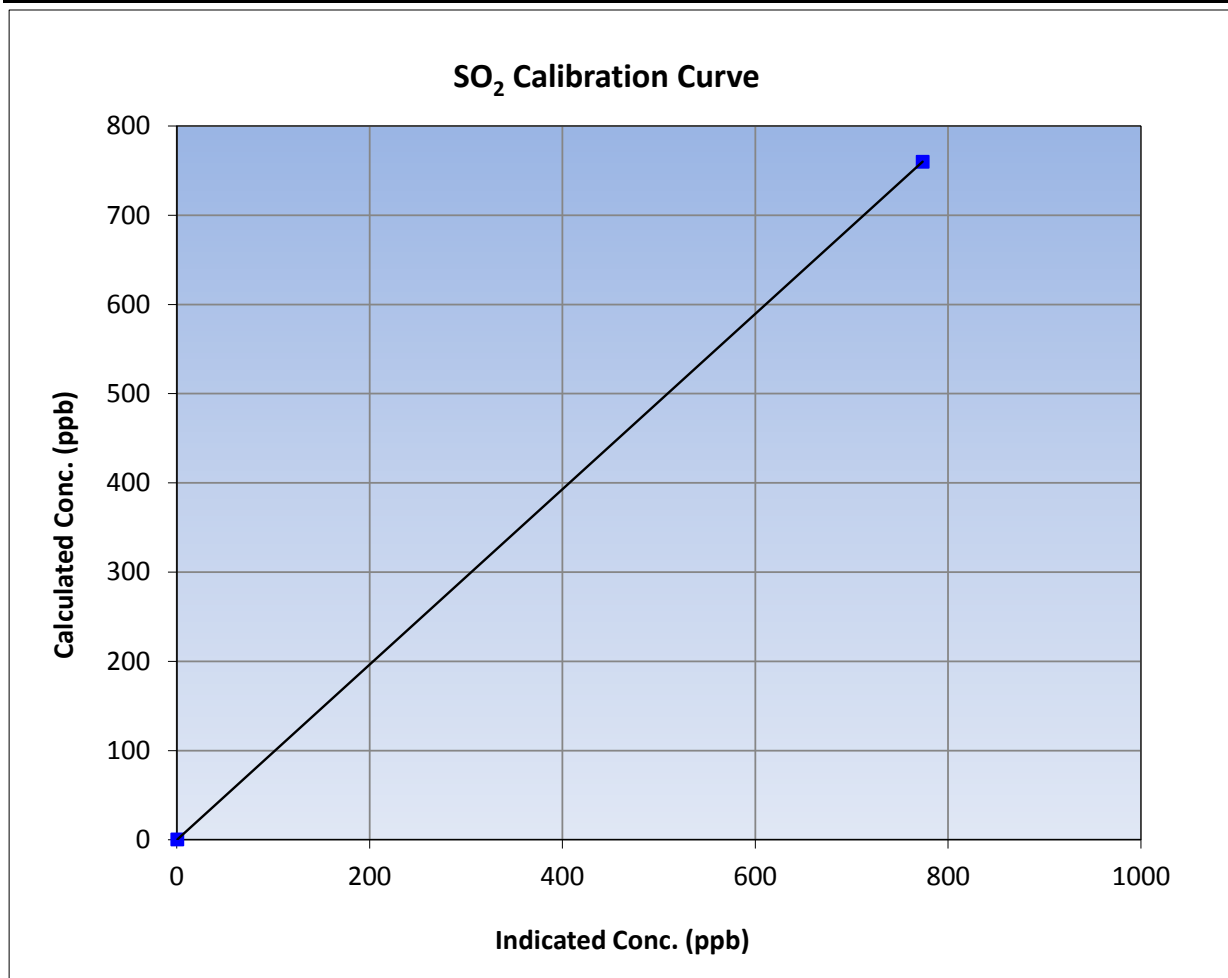
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:03 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1008841397 |

Calibration Data

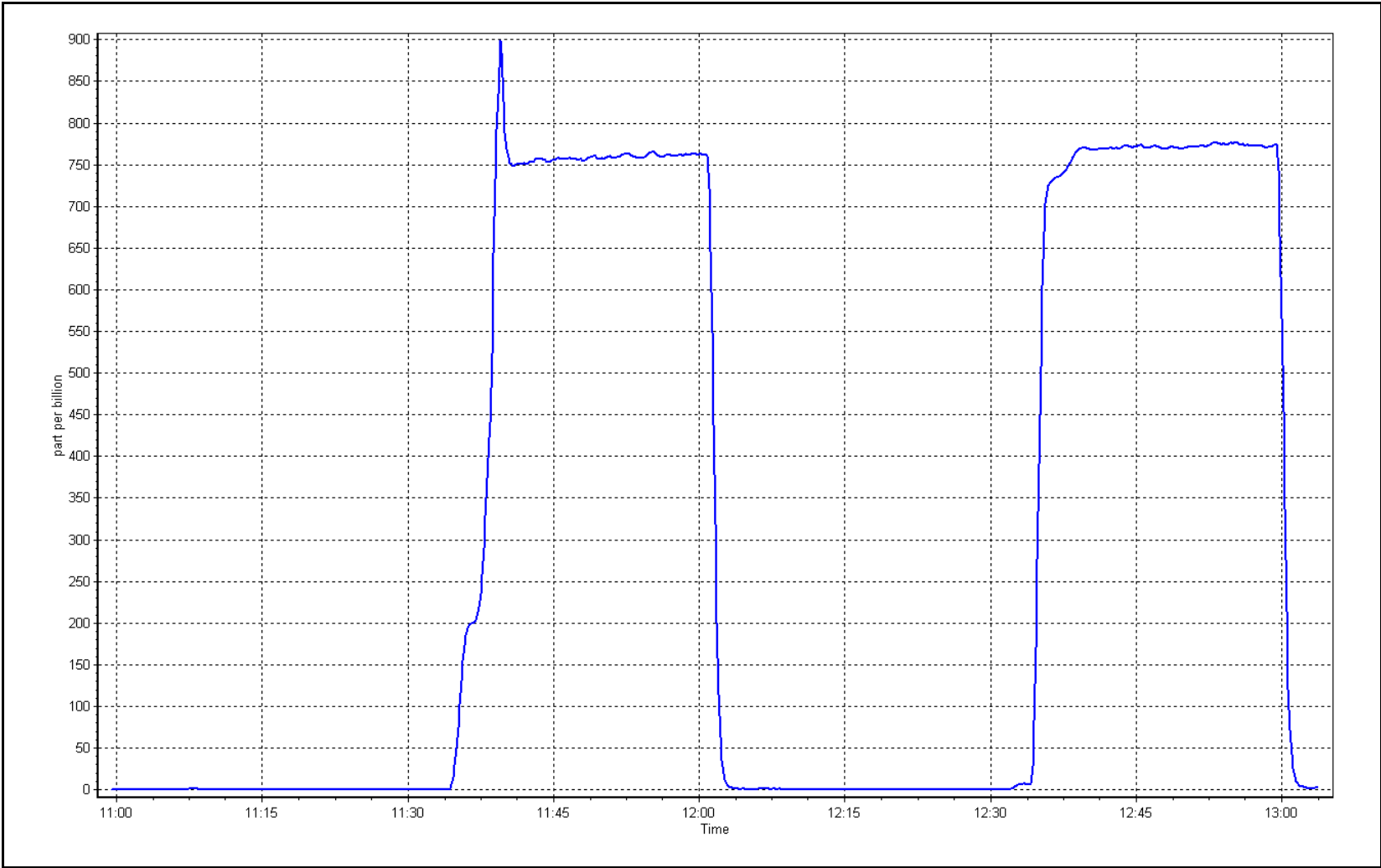
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Serial Number | Limits | |
|-------------------------------------|------------------------------------|---------------------------|---------------|-----------|-------------|
| 0.0 | 0.3 | ---- | Serial Number | 1.000000 | ≥0.995 |
| 759.6 | 773.2 | 0.9825 | Slope | 0.982842 | 0.90 - 1.10 |
| | | | Intercept | -0.294853 | +/-30 |



SO2 Calibration Plot

Date: September 25, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

TRS Calibration Summary

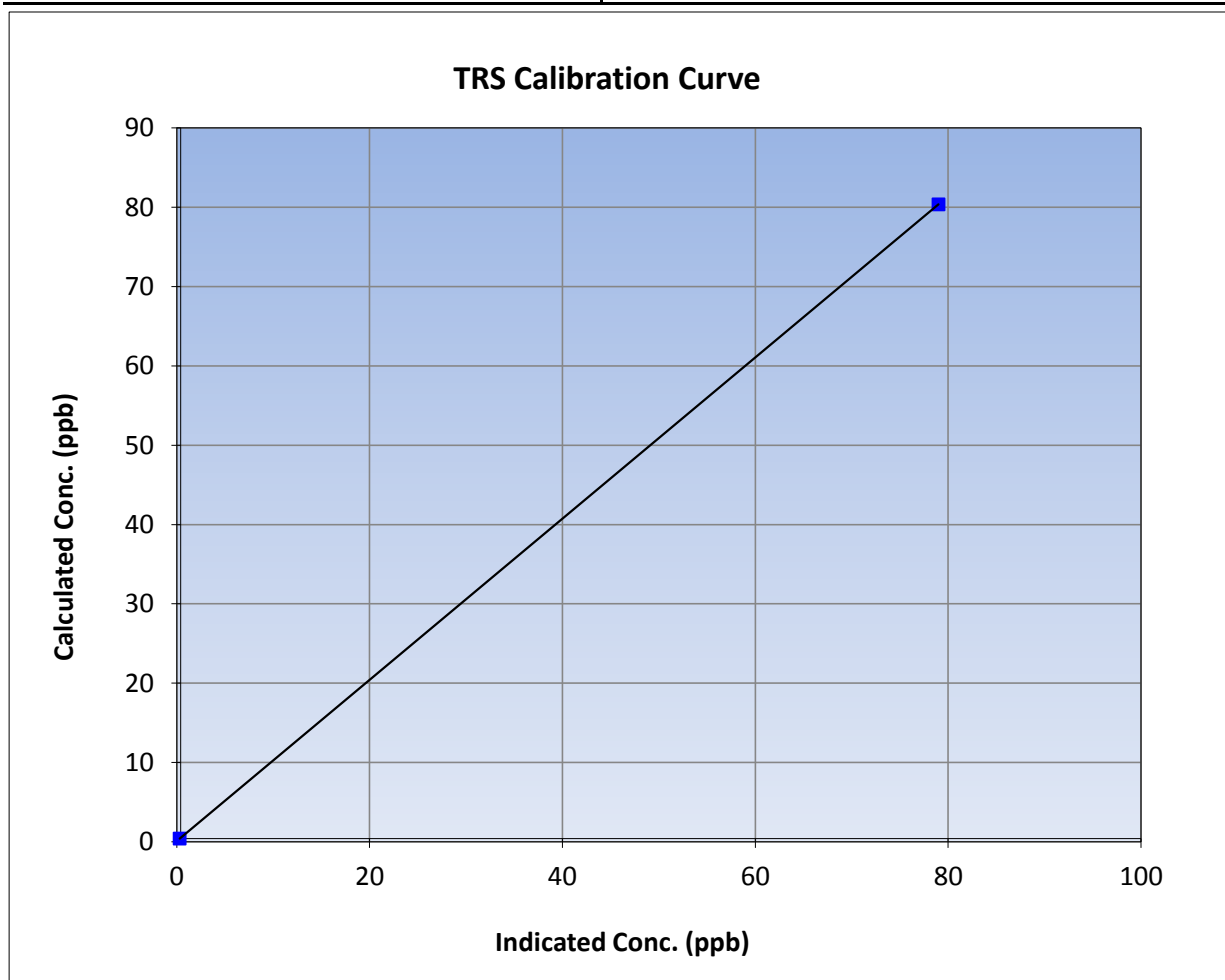
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 8:41 | End Time (MST) | 13:37 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1218153358 |

Calibration Data

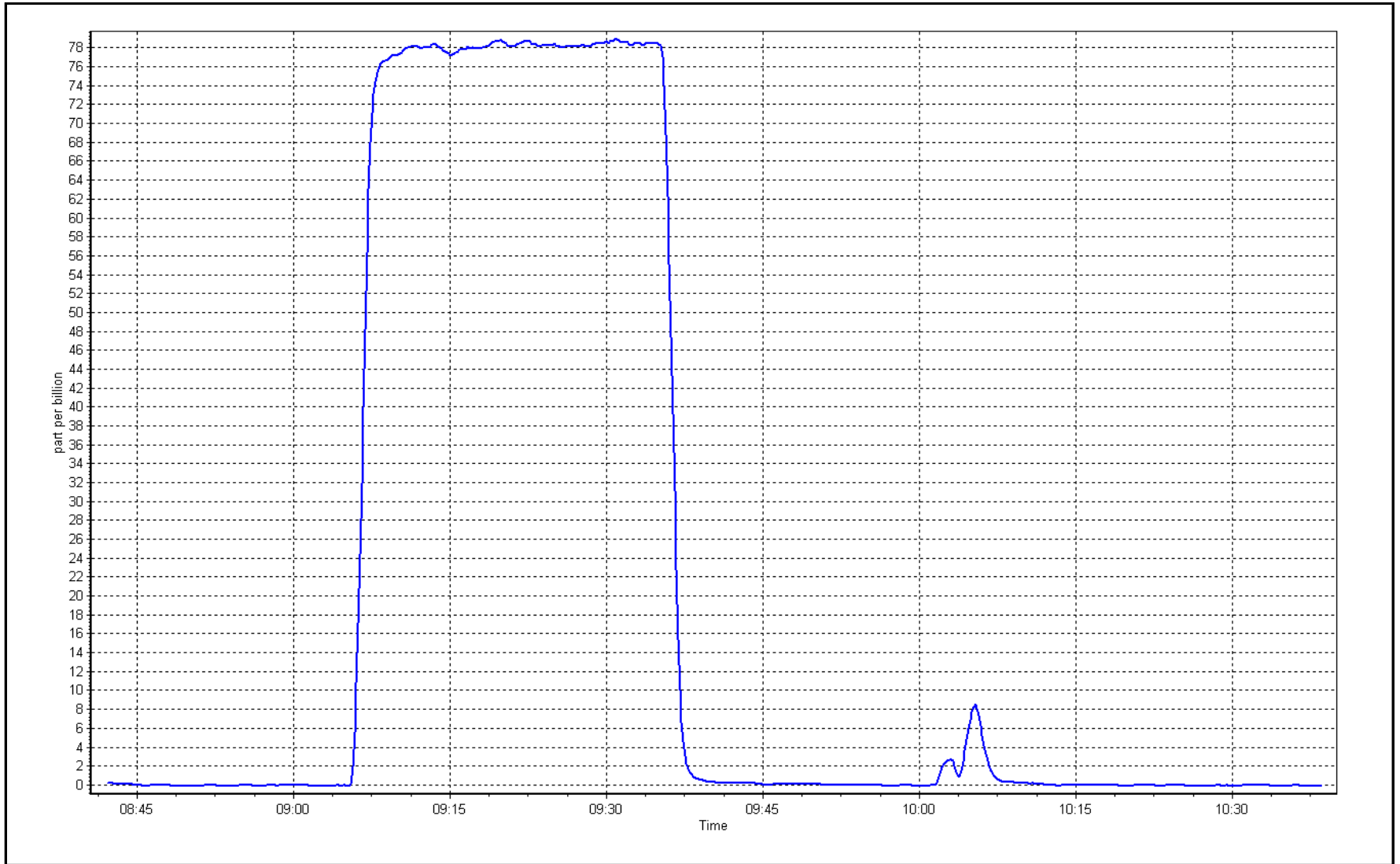
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|--------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 80.0 | 78.6 | 1.0173 | Slope | 1.016056 | 0.90 - 1.10 |
| | | | Intercept | 0.101606 | +/-3 |



TRS Calibration Plot

Date: September 12, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

TRS Calibration Summary

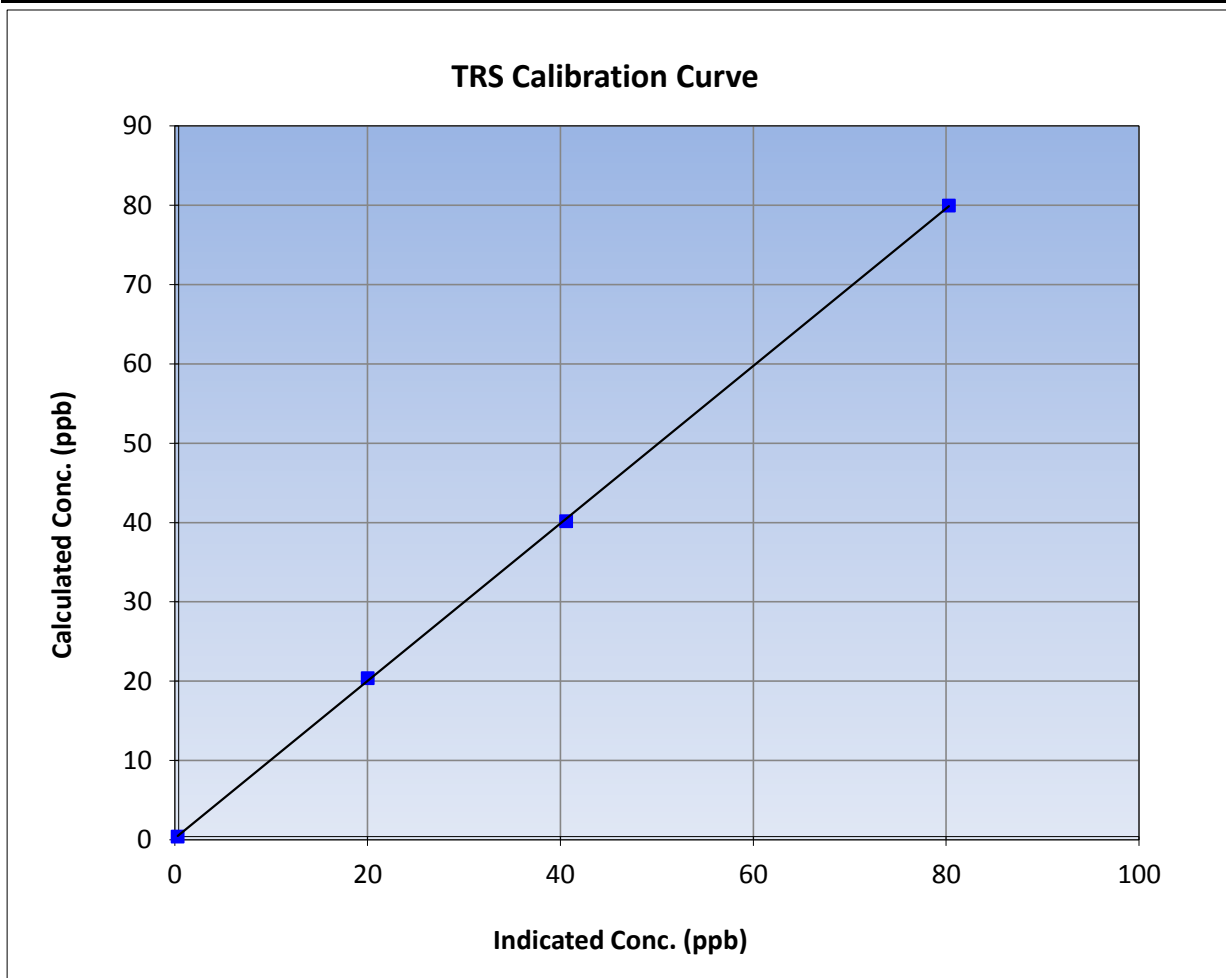
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 8:41 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1218153358 |

Calibration Data

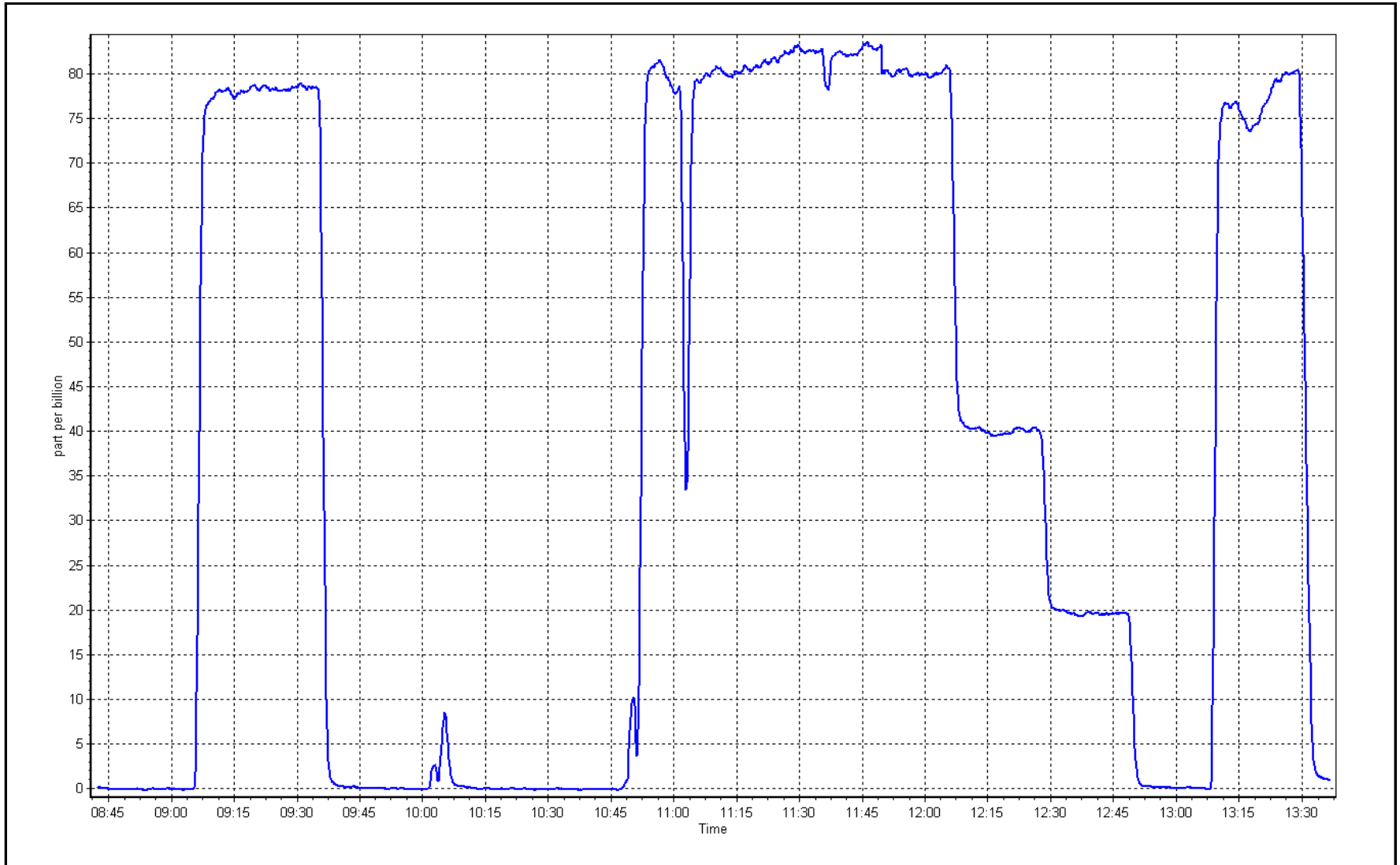
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999937 | ≥0.995 |
| 79.6 | 79.9 | 0.9958 | | | |
| 39.8 | 40.2 | 0.9897 | Slope | 0.992387 | 0.90 - 1.10 |
| 20.0 | 19.6 | 1.0192 | | | |
| | | | Intercept | 0.196621 | +/-3 |



TRS Calibration Plot

Date: September 12, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|----------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | September 1, 2017 | Last Cal Date: | August 1, 2017 |
| Start time (MST): | 8:30 | End time (MST): | 12:15 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|--------------------|------------------|---------------------|-------------------|
| Gas Cert Reference | LL107926 | Cal Gas Expiry Date | February 16, 2019 |
| CH4 Cal Gas Conc. | <u>505.0</u> ppm | CH4 Equiv Conc. | 1068.8 ppm |
| C3H8 Cal Gas Conc. | <u>205.0</u> ppm | Station temp. | 21 Deg C |
| Calibrator Model | API T700 | Serial Number | 2449 |
| ZAG make/model | API T701 | Serial Number | 260 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1331259521

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.0 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.1 | 175.0 |
| CH4 SP Ratio | 2.11E-04 | 2.12E-04 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 12.3 | 12.3 | Carrier Pressure | 35.8 | 35.8 |
| NMHC SP Ratio | 4.74E-05 | 4.79E-05 | Fuel Pressure | 42.3 | 42.3 |
| NMHC Peak Area | 180610 | 178860 | Air Pressure | 37.4 | 37.4 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.994829 | 1.001747 |
| THC Cal Offset | 0.033106 | 0.033758 |
| CH4 Cal Slope | 0.999004 | 0.999190 |
| CH4 Cal Offset | 0.035161 | 0.031297 |
| NMHC Cal Slope | 0.990593 | 1.004139 |
| NMHC Cal Offset | -0.000906 | 0.002298 |

Notes: N2 cylinder changed after as founds. Span adjusted. H2 generator filled with deionized water.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5458 | 84.2 | 16.24 | 15.87 | 1.023 |
| calibrator zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5458 | 84.2 | 16.24 | 16.20 | 1.002 |
| second point | 5499 | 42.1 | 8.12 | 8.03 | 1.012 |
| third point | 5522 | 21.1 | 4.07 | 4.01 | 1.014 |
| as left zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5458 | 84.2 | 16.24 | 16.14 | 1.006 |
| Average Correction Factor | | | | | 1.009 |
| Corrected As found | 15.87 | Prev response | 16.29 | *% change | 2.6% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5537 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5458 | 84.2 | 8.56 | 8.27 | 1.036 |
| calibrator zero | 5537 | 0 | 0.00 | 0.00 | ---- |
| high point | 5458 | 84.2 | 8.56 | 8.53 | 1.004 |
| second point | 5499 | 42.1 | 4.28 | 4.25 | 1.008 |
| third point | 5522 | 21.1 | 2.15 | 2.14 | 1.002 |
| as left zero | 5537 | 0 | 0.00 | 0.00 | ---- |
| as left span | 5458 | 84.2 | 8.56 | 8.48 | 1.010 |
| Average Correction Factor | | | | | 1.005 |
| Corrected As found | 8.27 | Prev response | 8.65 | *% change | 4.6% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5458 | 84.2 | 7.67 | 7.60 | 1.009 |
| calibrator zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5458 | 84.2 | 7.67 | 7.67 | 1.001 |
| second point | 5499 | 42.1 | 3.84 | 3.78 | 1.015 |
| third point | 5522 | 21.1 | 1.92 | 1.87 | 1.027 |
| as left zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5458 | 84.2 | 7.67 | 7.65 | 1.002 |
| Average Correction Factor | | | | | 1.014 |
| Corrected As found | 7.60 | Prev response | 7.64 | *% change | 0.6% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

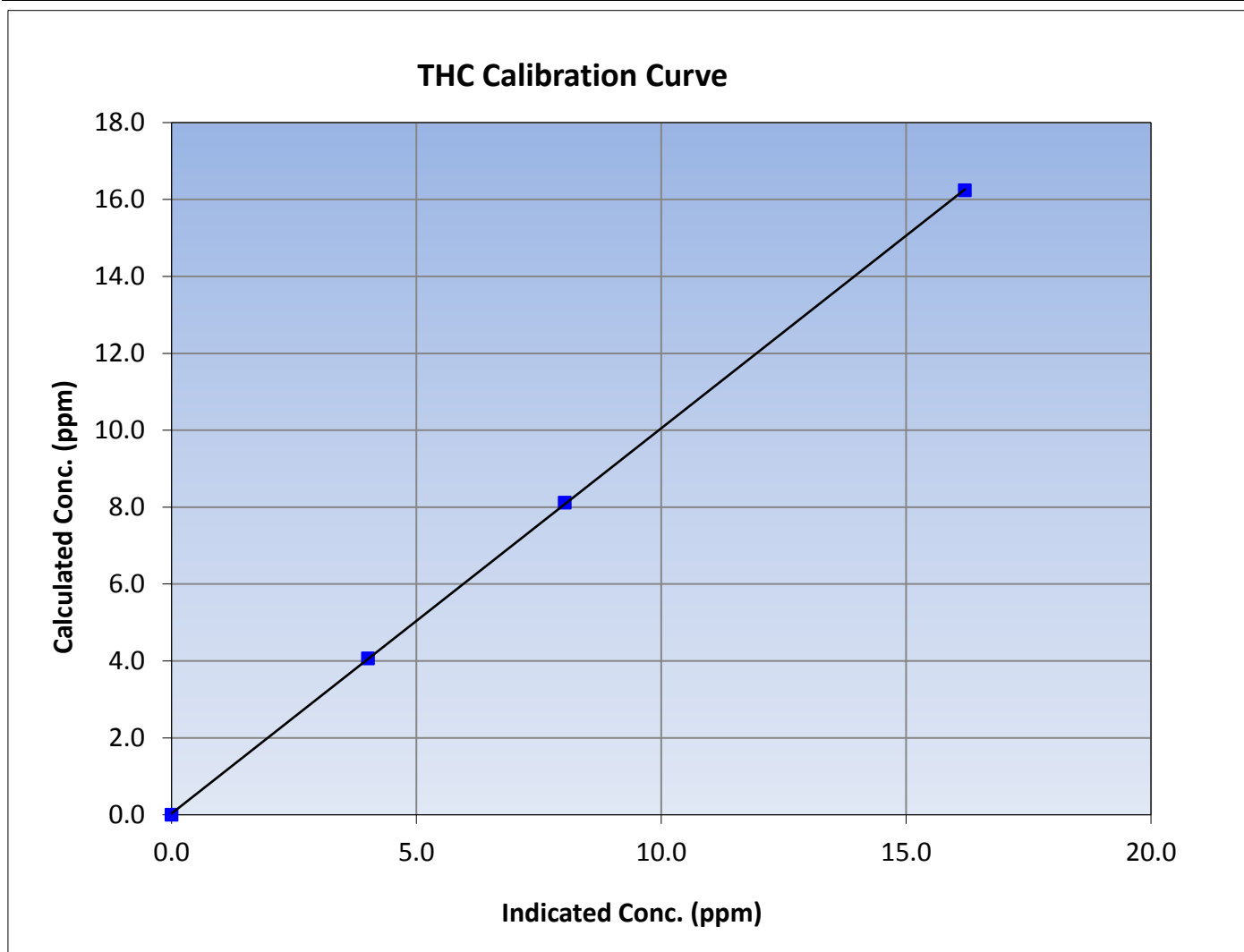
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 1, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:15 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999972 | ≥ 0.995 | | | |
| 16.24 | 16.20 | 1.0022 | | | | | | |
| 8.12 | 8.03 | 1.0116 | | | | Slope | 1.001747 | 0.90 - 1.10 |
| 4.07 | 4.01 | 1.0138 | | | | | | |
| | | | Intercept | 0.033758 | ± 0.5 | | | |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

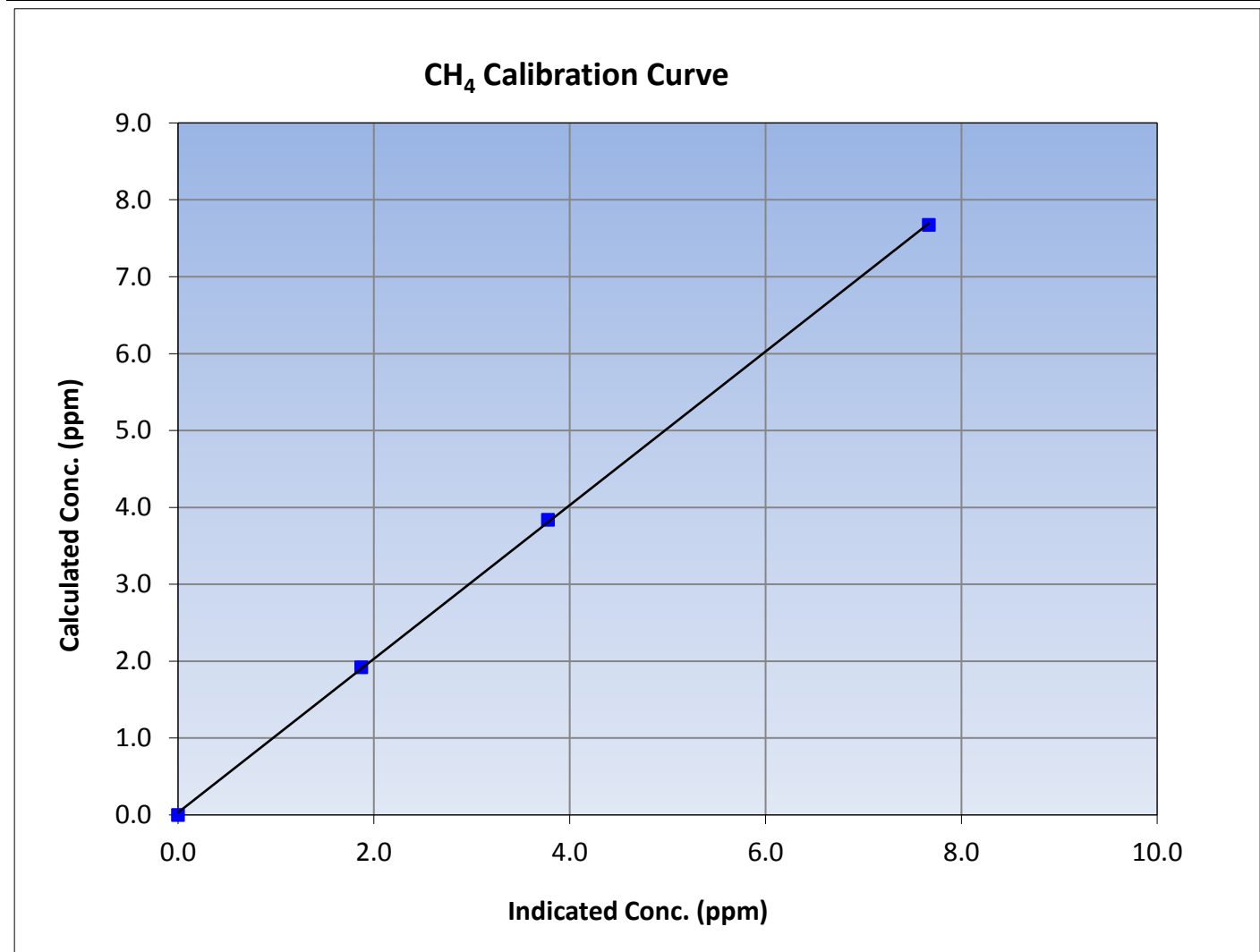
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 1, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:15 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999916 | ≥ 0.995 |
| 7.67 | 7.67 | 1.0007 | | | |
| 3.84 | 3.78 | 1.0153 | | | |
| 1.92 | 1.87 | 1.0274 | | | |
| | | | Slope | 0.999190 | 0.90 - 1.10 |
| | | | Intercept | 0.031297 | +/-0.5 |





Wood Buffalo Environmental Association

NMHC Calibration Summary

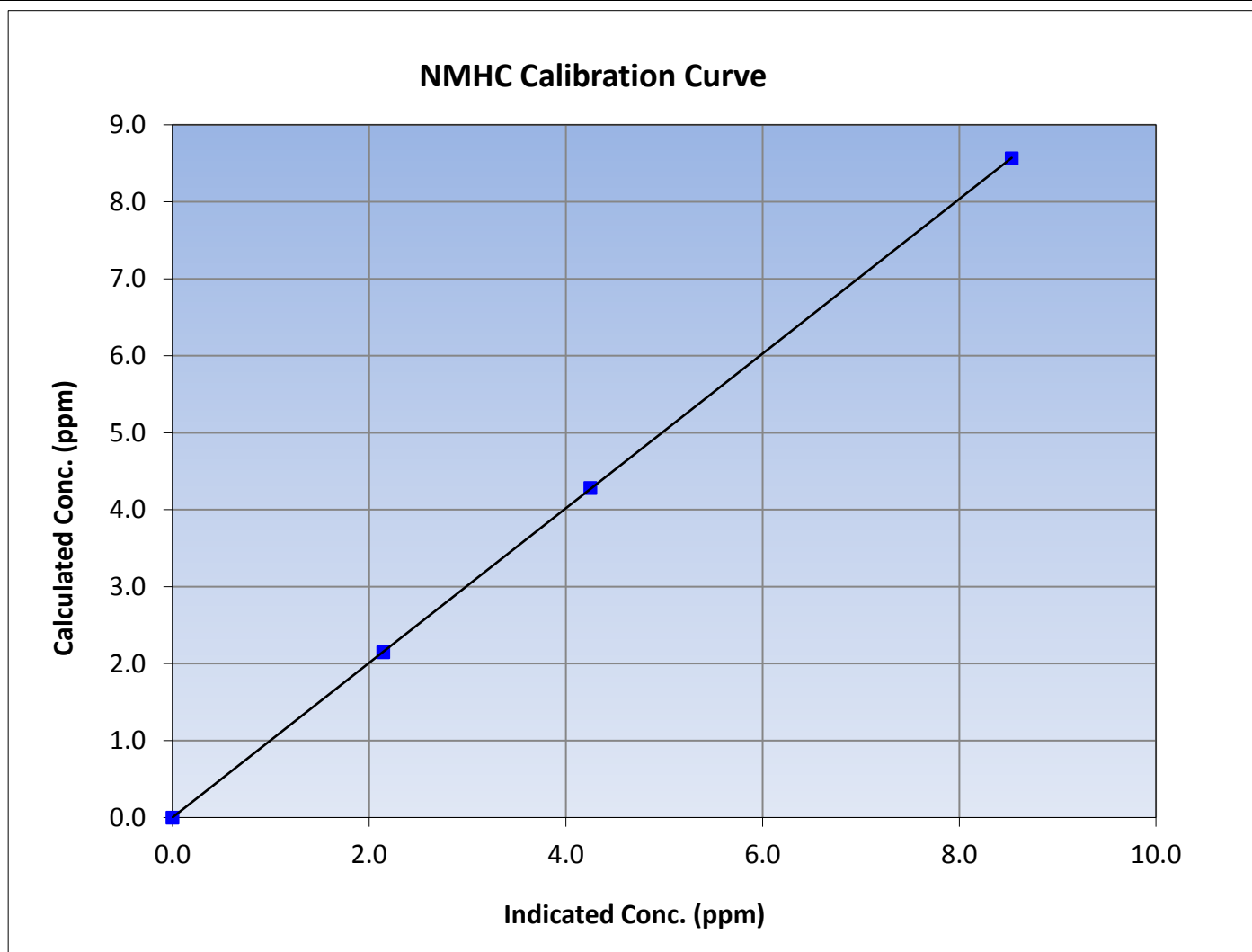
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 1, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:15 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

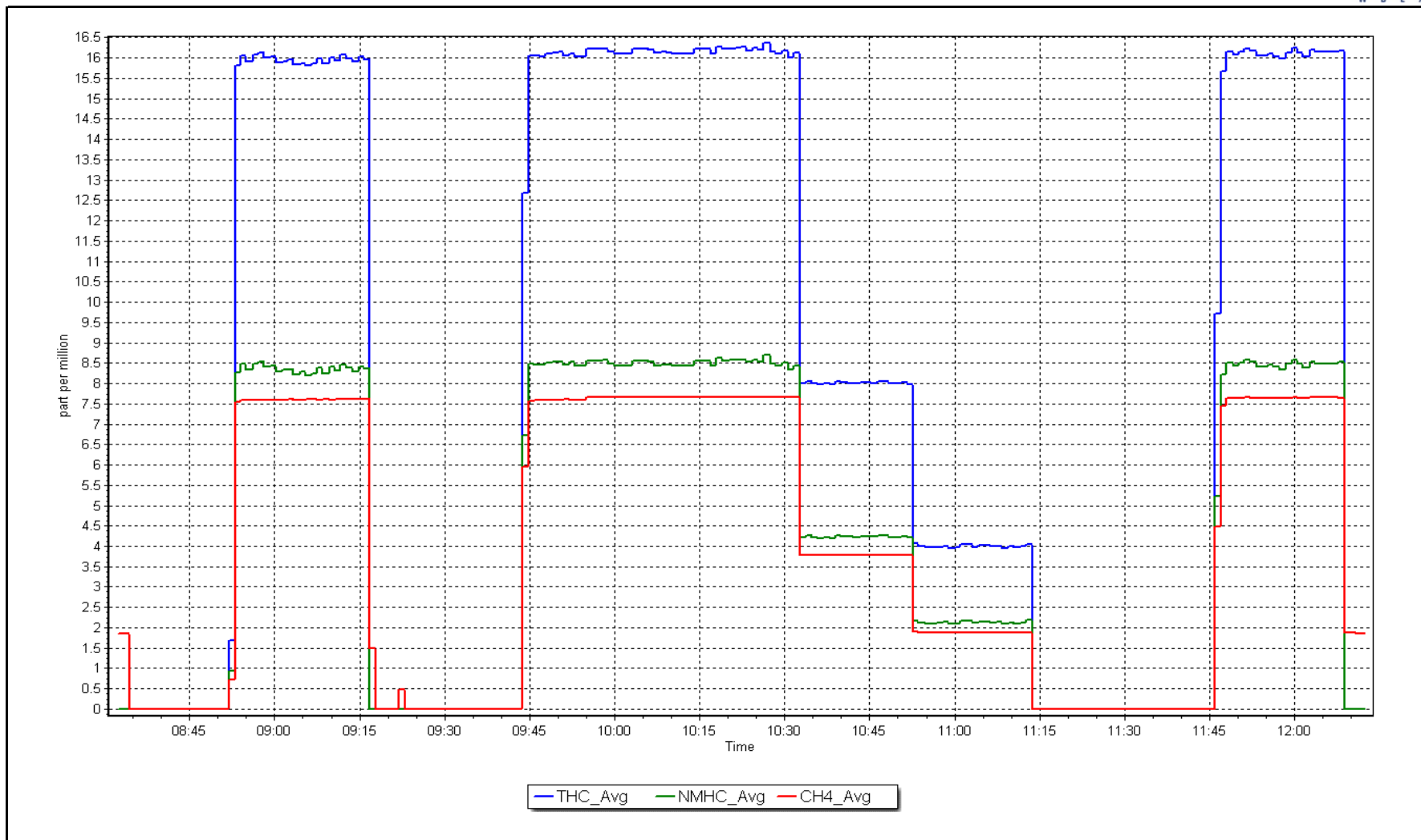
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999992 | ≥ 0.995 | | | |
| 8.56 | 8.53 | 1.0037 | | | | | | |
| 4.28 | 4.25 | 1.0083 | | | | Slope | 1.004139 | 0.90 - 1.10 |
| 2.15 | 2.14 | 1.0018 | | | | | | |
| | | | Intercept | 0.002298 | ± 0.5 | | | |



NMHC Calibration Plot

Date: September 1, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-------------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | September 1, 2017 |
| Start time (MST): | 11:00 | End time (MST): | 13:03 |
| Reason: | Cylinder Change | | |

Calibration Standards

| | | | |
|--------------------|------------------|---------------------|-------------------|
| Gas Cert Reference | LL107926 | Cal Gas Expiry Date | February 16, 2019 |
| CH4 Cal Gas Conc. | <u>505.0</u> ppm | CH4 Equiv Conc. | 1068.8 ppm |
| C3H8 Cal Gas Conc. | <u>205.0</u> ppm | Station temp. | 21 Deg C |
| Calibrator Model | API T700 | Serial Number | 2449 |
| ZAG make/model | API T701 | Serial Number | 260 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1331259521

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.0 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 2.12E-04 | 2.12E-04 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 12.3 | 8.1 | Carrier Pressure | 35.8 | 35.8 |
| NMHC SP Ratio | 4.79E-05 | 4.79E-05 | Fuel Pressure | 42.3 | 42.3 |
| NMHC Peak Area | 178860 | 178860 | Air Pressure | 37.4 | 37.4 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 1.001747 | 0.996563 |
| THC Cal Offset | 0.033758 | 0.000000 |
| CH4 Cal Slope | 0.999190 | 1.010567 |
| CH4 Cal Offset | 0.031297 | 0.000000 |
| NMHC Cal Slope | 1.004139 | 0.984345 |
| NMHC Cal Offset | 0.002298 | 0.000000 |

Notes:

Cal gas change, no adjustments

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5458 | 84.2 | 16.24 | 16.29 | 0.997 |
| calibrator zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5458 | 84.2 | 16.24 | 16.29 | 0.997 |
| second point | 5499 | 42.1 | 8.12 | | |
| third point | 5522 | 21.1 | 4.07 | | |
| as left zero | 5537 | 0.0 | 0.00 | | ---- |
| as left span | 5458 | 84.2 | 16.24 | | |
| Average Correction Factor | | | | | 0.997 |
| Corrected As found | 16.29 | Prev response | 16.17 | *% change | -0.7% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5537 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5458 | 84.2 | 8.56 | 8.70 | 0.984 |
| calibrator zero | 5537 | 0 | 0.00 | 0.00 | ---- |
| high point | 5458 | 84.2 | 8.56 | 8.70 | 0.984 |
| second point | 5499 | 42.1 | 4.28 | | |
| third point | 5522 | 21.1 | 2.15 | | |
| as left zero | 5537 | 0 | 0.00 | | ---- |
| as left span | 5458 | 84.2 | 8.56 | | |
| Average Correction Factor | | | | | 0.984 |
| Corrected As found | 8.70 | Prev response | 8.53 | *% change | -2.0% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5458 | 84.2 | 7.67 | 7.59 | 1.011 |
| calibrator zero | 5537 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5458 | 84.2 | 7.67 | 7.59 | 1.011 |
| second point | 5499 | 42.1 | 3.84 | | |
| third point | 5522 | 21.1 | 1.92 | | |
| as left zero | 5537 | 0.0 | 0.00 | | ---- |
| as left span | 5458 | 84.2 | 7.67 | | |
| Average Correction Factor | | | | | 1.011 |
| Corrected As found | 7.59 | Prev response | 7.65 | *% change | 0.7% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

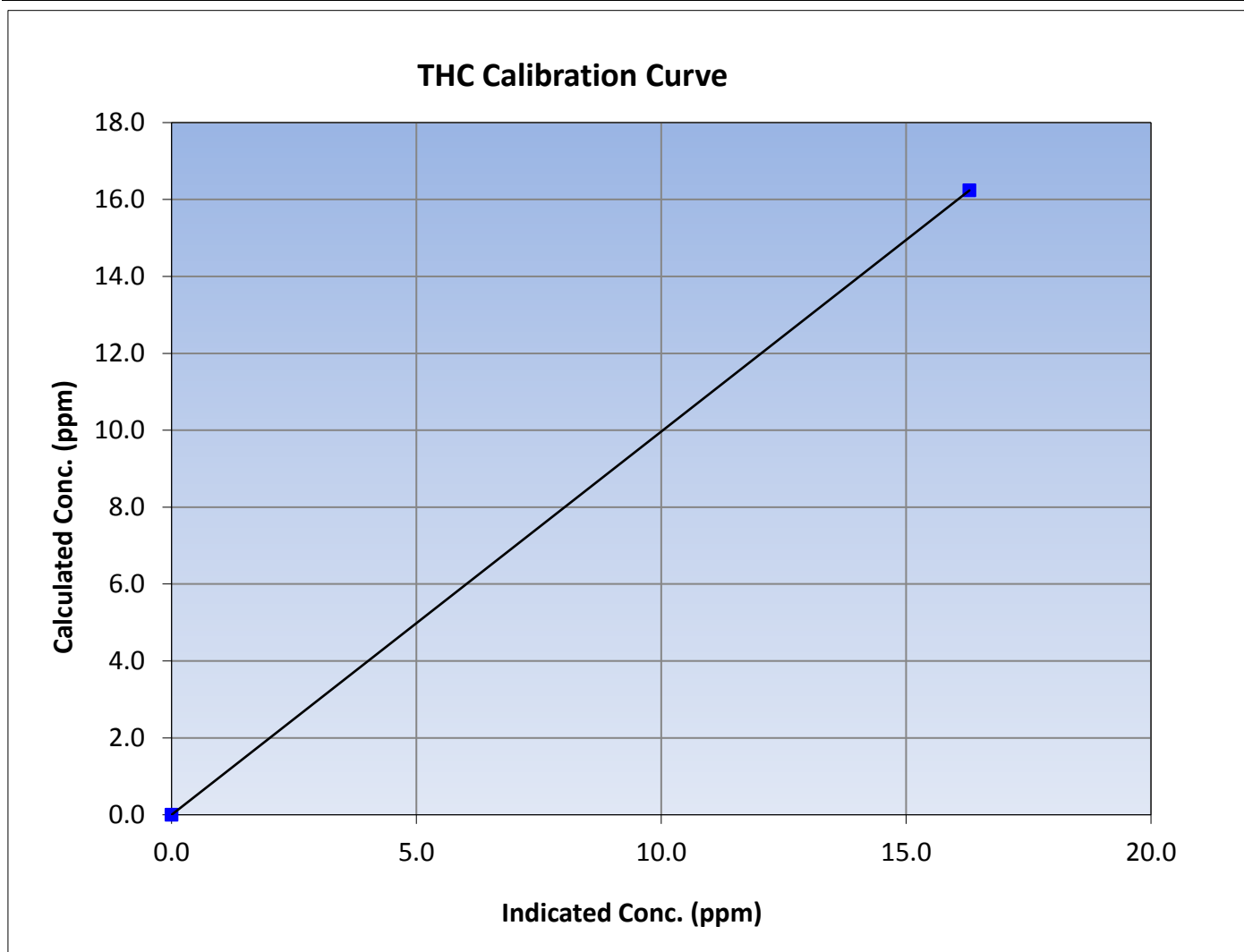
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:03 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | ≥ 0.995 | |
| 16.24 | 16.29 | 0.9966 | | | |
| 8.12 | | | | | |
| 4.07 | | | | | |
| | | | Slope | 0.996563 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-0.5 |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

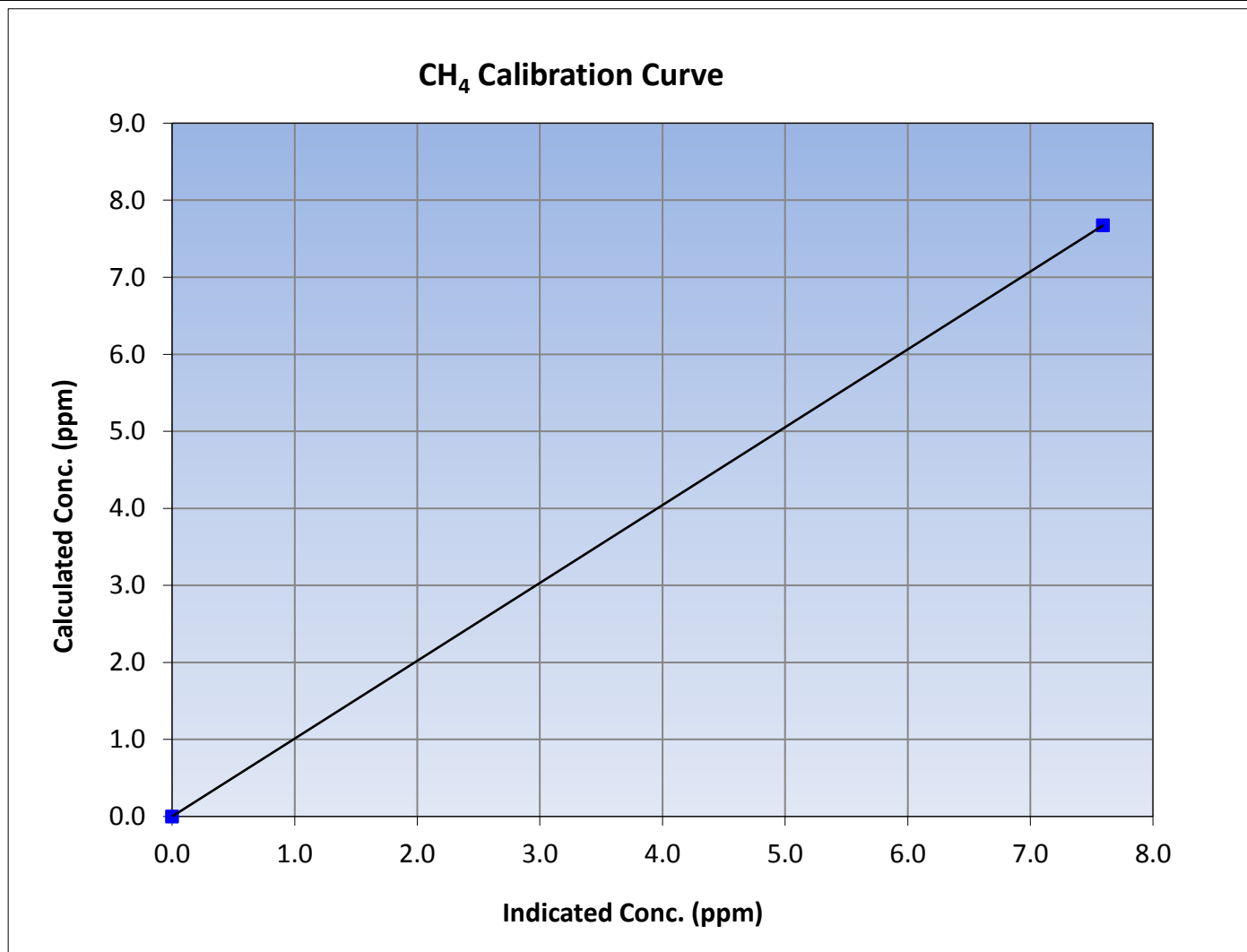
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:03 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 | | | |
| 7.67 | 7.59 | 1.0106 | | | | | | |
| 3.84 | | | | | | Slope | 1.010567 | 0.90 - 1.10 |
| 1.92 | | | | | | | | |
| | | | Intercept | 0.000000 | ± 0.5 | | | |





Wood Buffalo Environmental Association

NMHC Calibration Summary

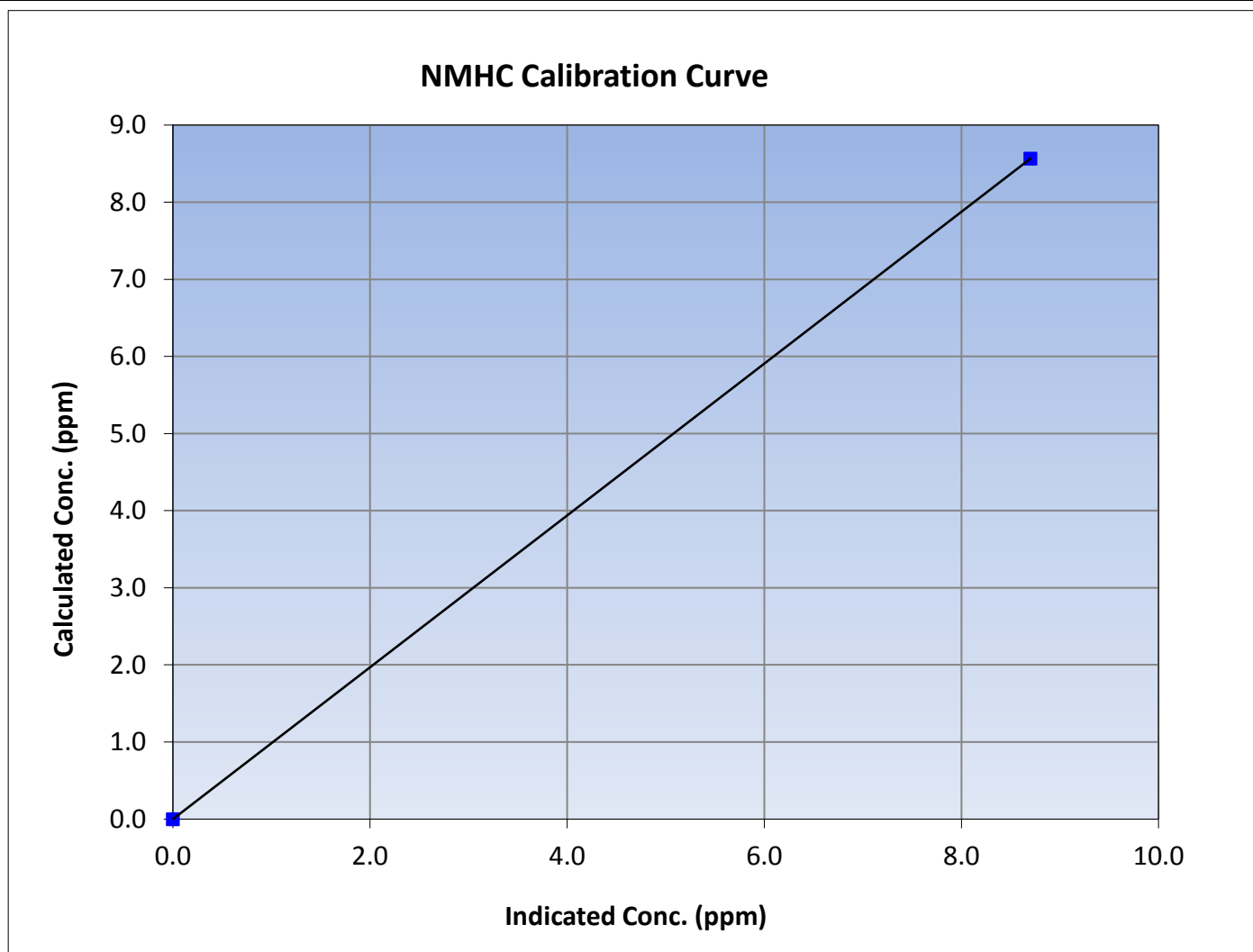
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:03 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

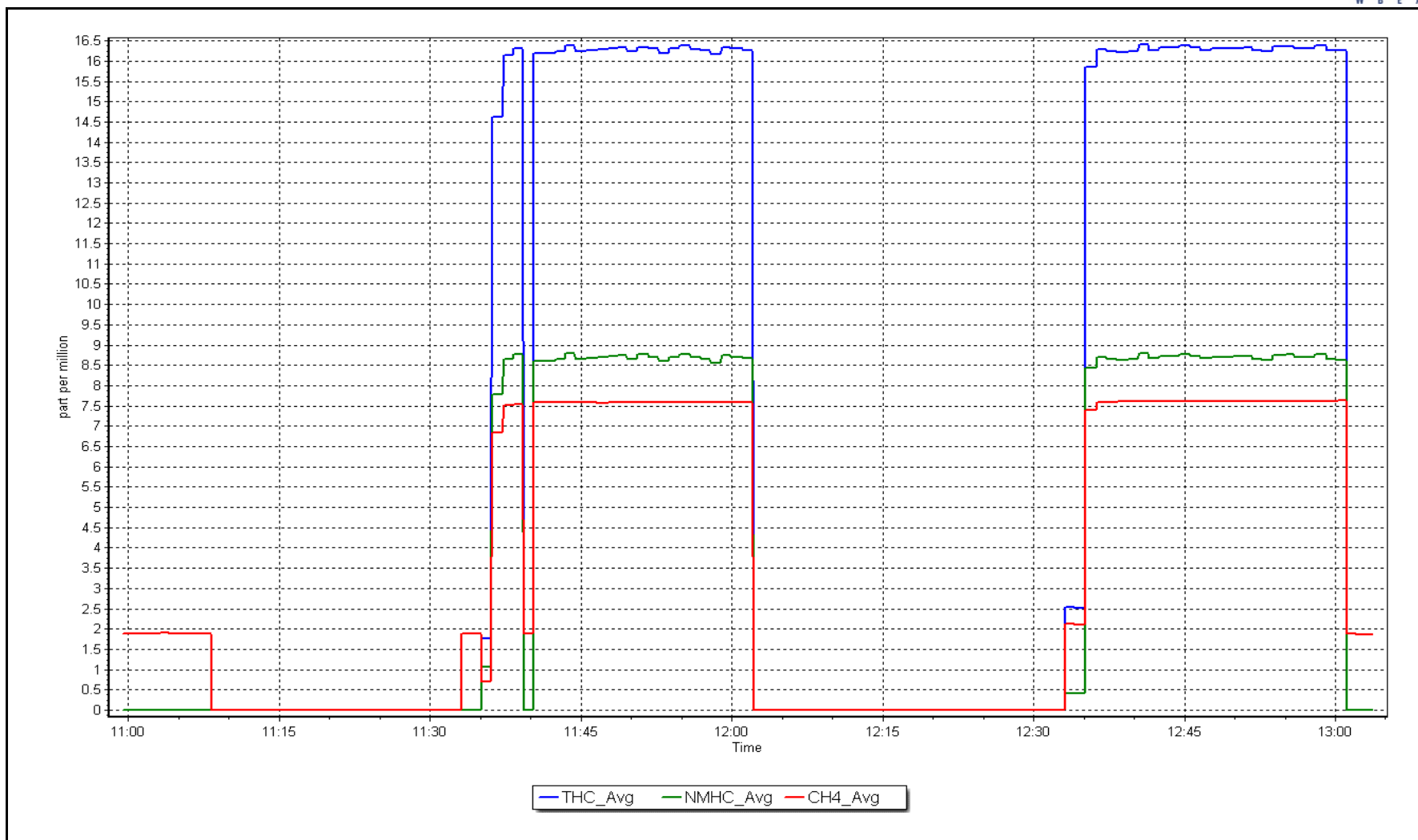
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 | | | |
| 8.56 | 8.70 | 0.9843 | | | | | | |
| 4.28 | | | | | | Slope | 0.984345 | 0.90 - 1.10 |
| 2.15 | | | | | | | | |
| | | | Intercept | 0.000000 | ± 0.5 | | | |



NMHC Calibration Plot

Date: September 25, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

O₃ Calibration Summary

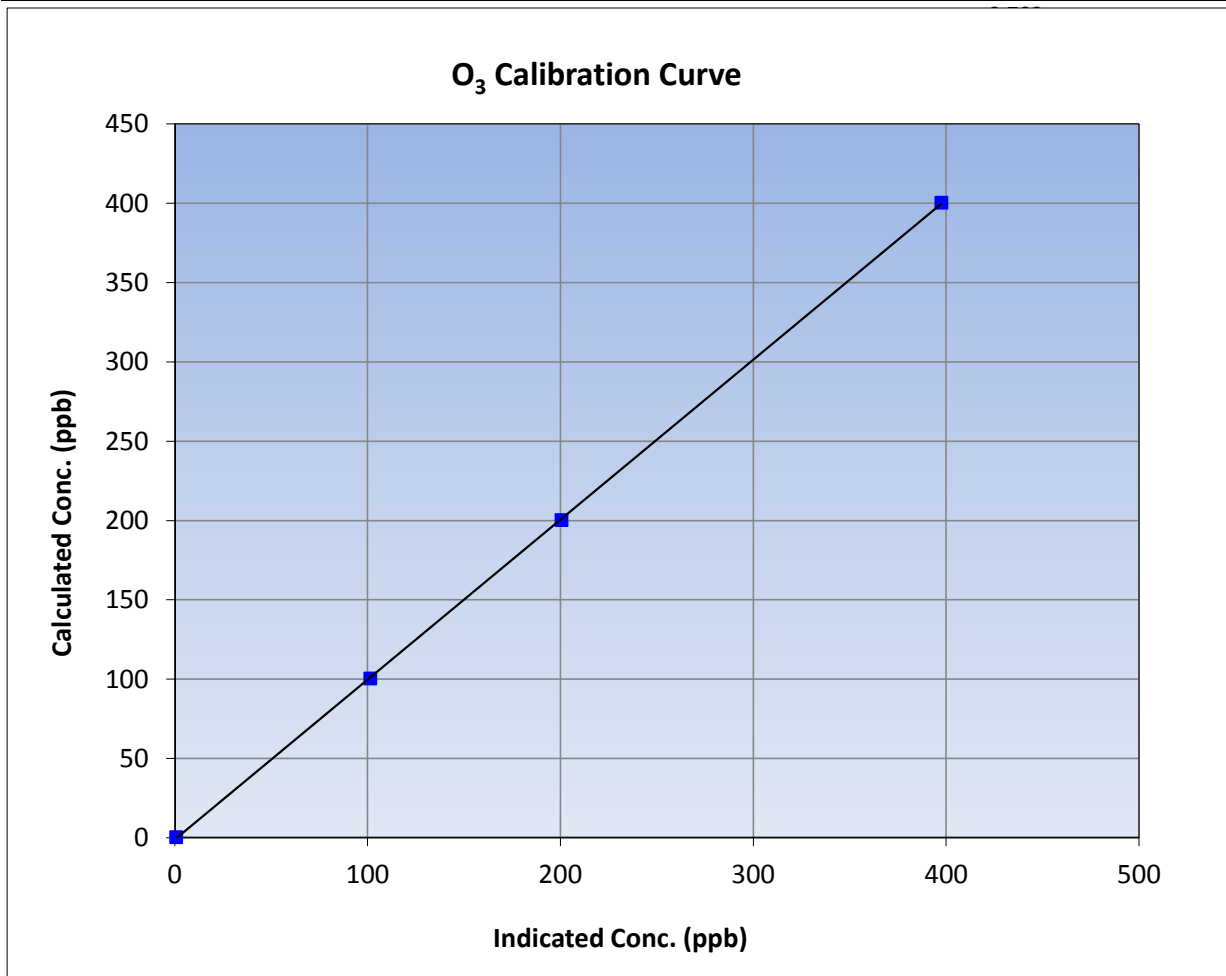
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 20, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:43 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1300156234 |

Calibration Data

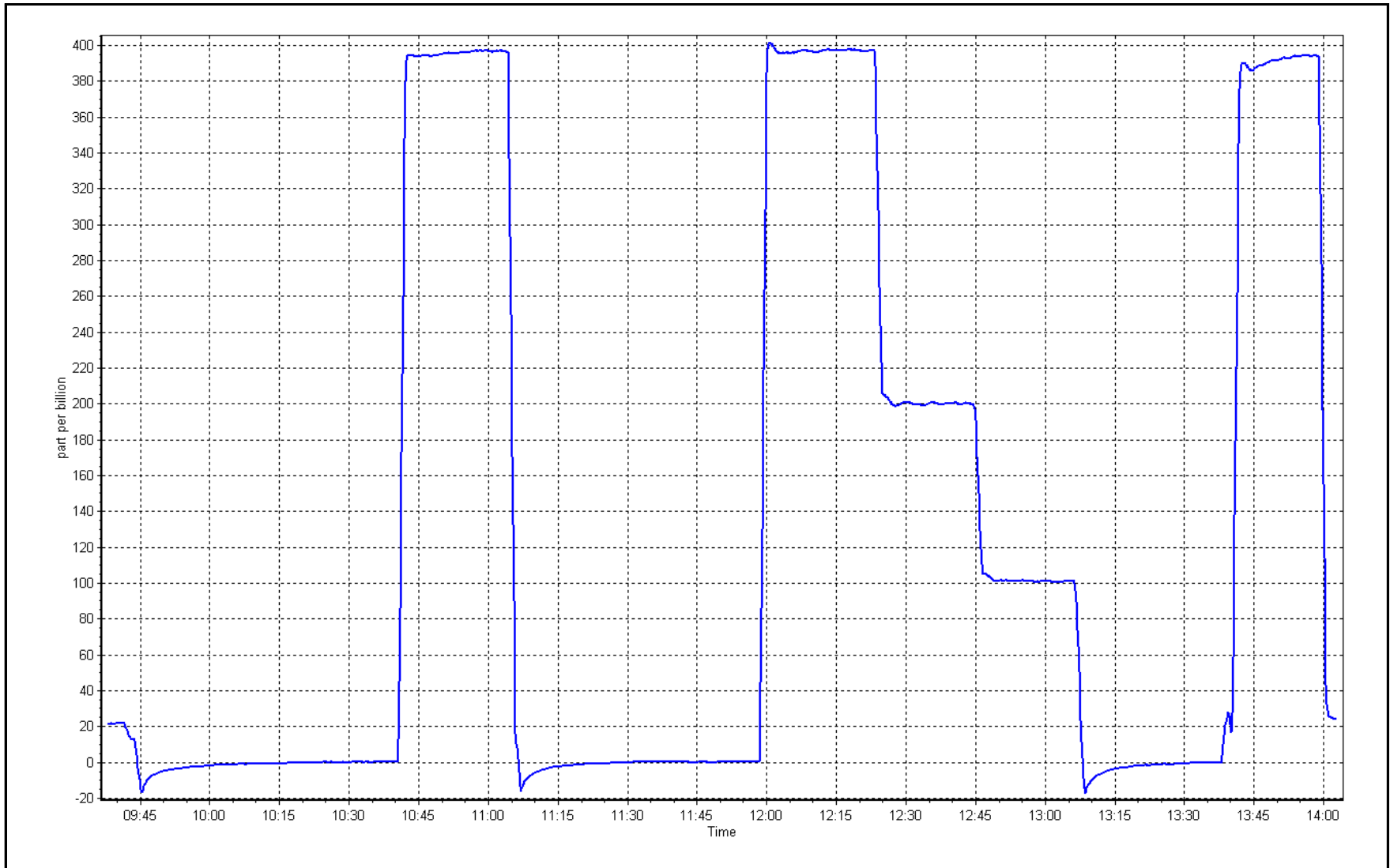
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 0.999976 | ≥0.995 |
| 400.0 | 397.2 | 1.0070 | | | |
| 200.0 | 200.2 | 0.9990 | Slope | 1.008650 | 0.90 - 1.10 |
| 100.0 | 101.0 | 0.9901 | | | |
| | | | Intercept | -1.185983 | +/- 10 |



O₃ Calibration Plot

Date: September 20, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | September 18, 2017 | Last Cal Date: | August 9, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 15:02 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-------------------|
| NO Gas Cylinder # | LL107926 | Cal Gas Expiry Date | February 16, 2019 |
| NOX Cal Gas Conc. | <u>52.4</u> ppb | NO Cal Gas Conc. | <u>52.4</u> ppb |
| Calibrator Model | API T700 | Serial Number | 2449 |
| ZAG make/model | API T701 | Serial Number | 260 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1218153460 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.020 | 1.015 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 1.001 | 1.001 | PMT Temperature | -2.6 | -2.8 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 186.2 | 181.2 |
| NO bkgrnd | 3.0 | 2.8 | Sample Flow | 0.763 | 0.742 |
| NOX bkgrnd | 3.3 | 3.0 | PMT Voltage | -772.6 | -772.9 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.000864 | 0.998870 |
| NO _x Cal Offset | 2.382983 | 1.662121 |
| NO Cal Slope | 1.000980 | 0.998137 |
| NO Cal Offset | 2.442702 | 1.741541 |
| NO ₂ Cal Slope | 0.983629 | 1.000026 |
| NO ₂ Cal Offset | -0.943619 | 0.195175 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | 0.0 | ---- | ---- |
| as found span | 5539 | 84.1 | 795.6 | 795.6 | 0.0 | 796.4 | 795.1 | 1.4 | 0.9990 | 1.0006 |
| calibrator zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| high point | 5543 | 84.1 | 795.0 | 795.0 | 0.0 | 795.0 | 795.6 | -0.6 | 1.0000 | 0.9993 |
| second point | 5543 | 42.1 | 398.0 | 398.0 | 0.0 | 396.2 | 396.2 | 0.0 | 1.0045 | 1.0045 |
| third point | 5543 | 21.1 | 199.5 | 199.5 | 0.0 | 196.2 | 196.3 | -0.1 | 1.0166 | 1.0161 |
| as left zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | ---- | ---- |
| as left span | 5543 | 84.2 | 796.0 | 376.9 | 419.1 | 790.6 | 377.1 | 413.4 | 1.0068 | 0.9995 |
| Average Correction Factor | | | | | | | | | 1.0071 | 1.0066 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 796.7 ppb | NO = 795.4 ppb | | *Percent Change | NO _x = -0.5% |
| Previous Response | NO _x = 792.5 ppb | NO = 792.4 ppb | | *Percent Change | NO = -0.4% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 792.3 | 791.1 | 1.3 | 1.0034 | 1.0050 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 376.9 | 414.2 | 791.2 | 376.9 | 414.2 | 1.0048 | ---- | 1.0000 | 100.0% |
| 2nd NO2 (200 ppb O3) | 577.3 | 213.8 | 790.5 | 577.3 | 213.2 | 1.0057 | ---- | 1.0028 | 99.7% |
| 3rd NO2 (100 ppb O3) | 681.1 | 110.0 | 790.9 | 681.1 | 109.8 | 1.0052 | ---- | 1.0018 | 99.8% |
| 2nd NO ref point | ---- | 0.0 | 788.7 | 787.6 | 1.1 | 1.0080 | 1.0094 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0060 | 1.0072 | 1.0015 | 99.8% |

Notes: Zero and Span with slight adjustments, filter changed after As Finds. Long points while waiting for NH3 analyzer to settle during

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

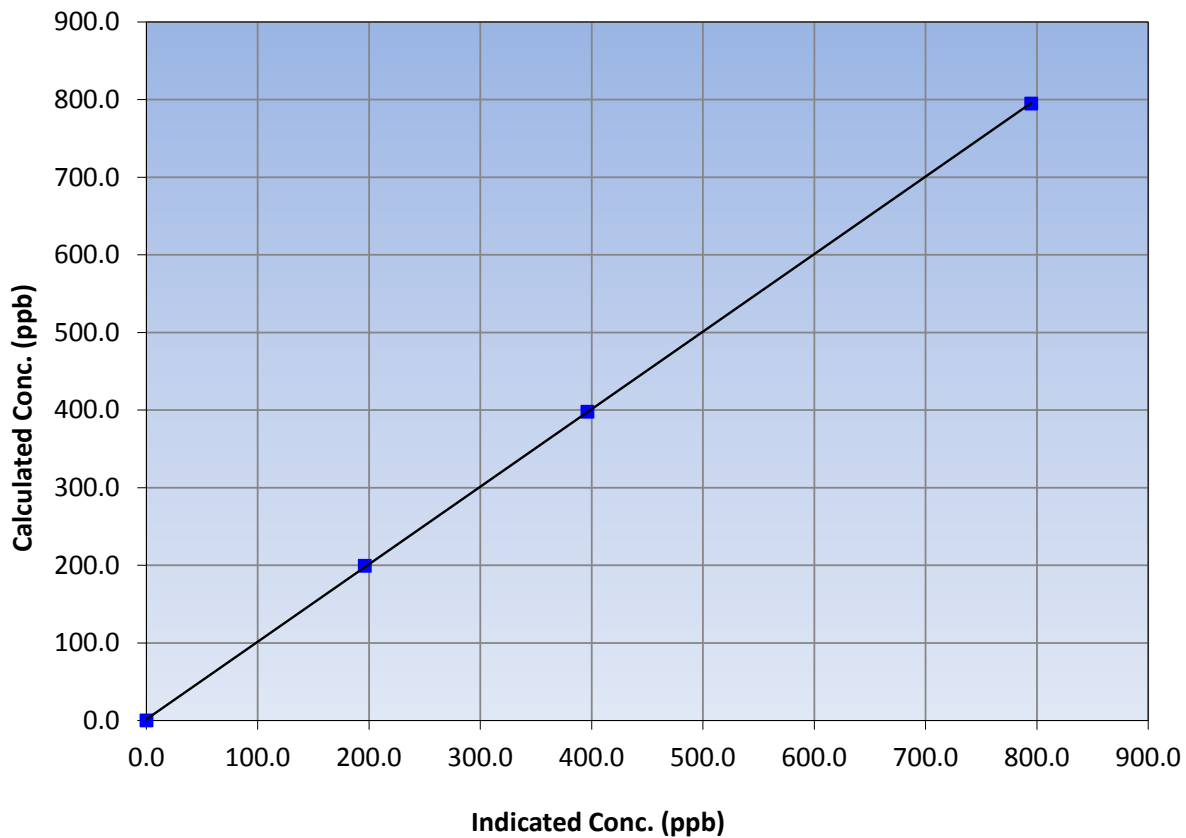
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:15 | End Time (MST) | 15:02 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 795.0 | 795.0 | 1.0000 | | | |
| 398.0 | 396.2 | 1.0045 | | | |
| 199.5 | 196.2 | 1.0166 | | | |
| | | | Slope | 0.998870 | 0.90 - 1.10 |
| | | | Intercept | 1.662121 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

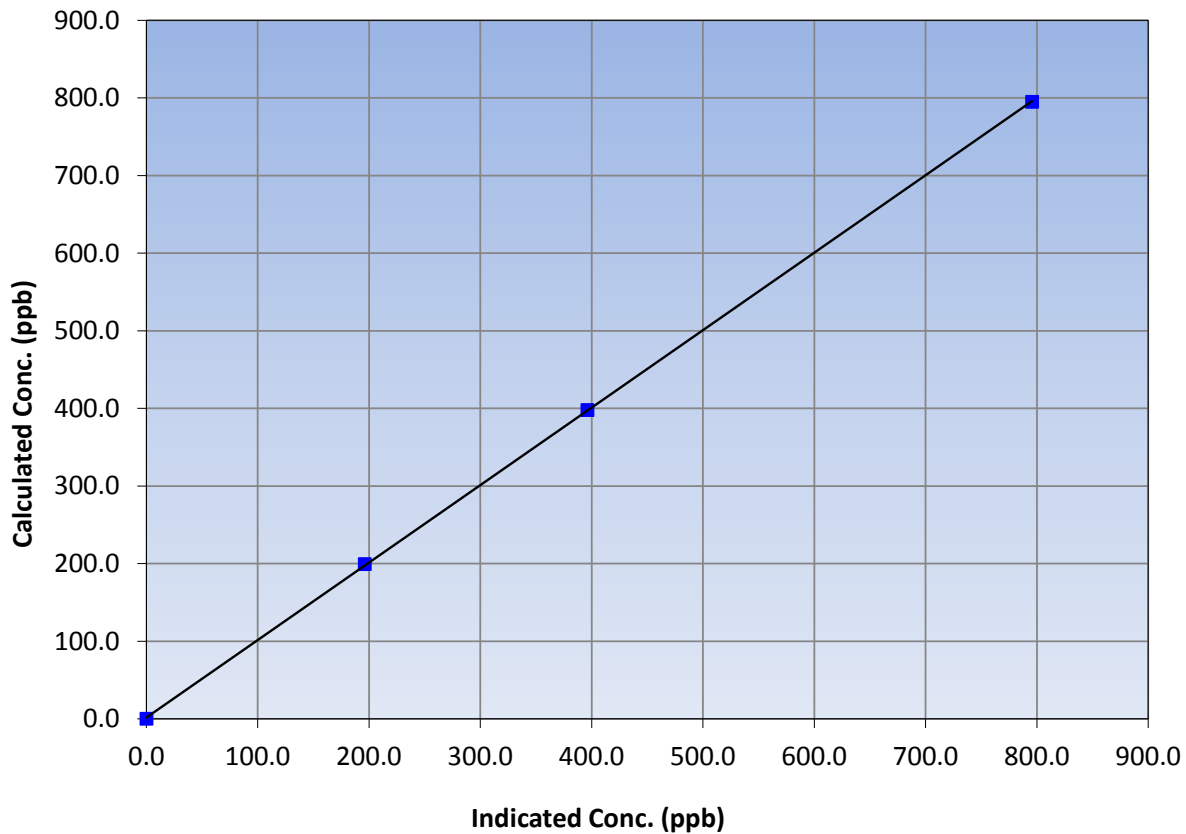
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:15 | End Time (MST) | 15:02 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 795.0 | 795.6 | 0.9993 | | | |
| 398.0 | 396.2 | 1.0045 | | | |
| 199.5 | 196.3 | 1.0161 | | | |
| | | | Slope | 0.998137 | 0.90 - 1.10 |
| | | | Intercept | 1.741541 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

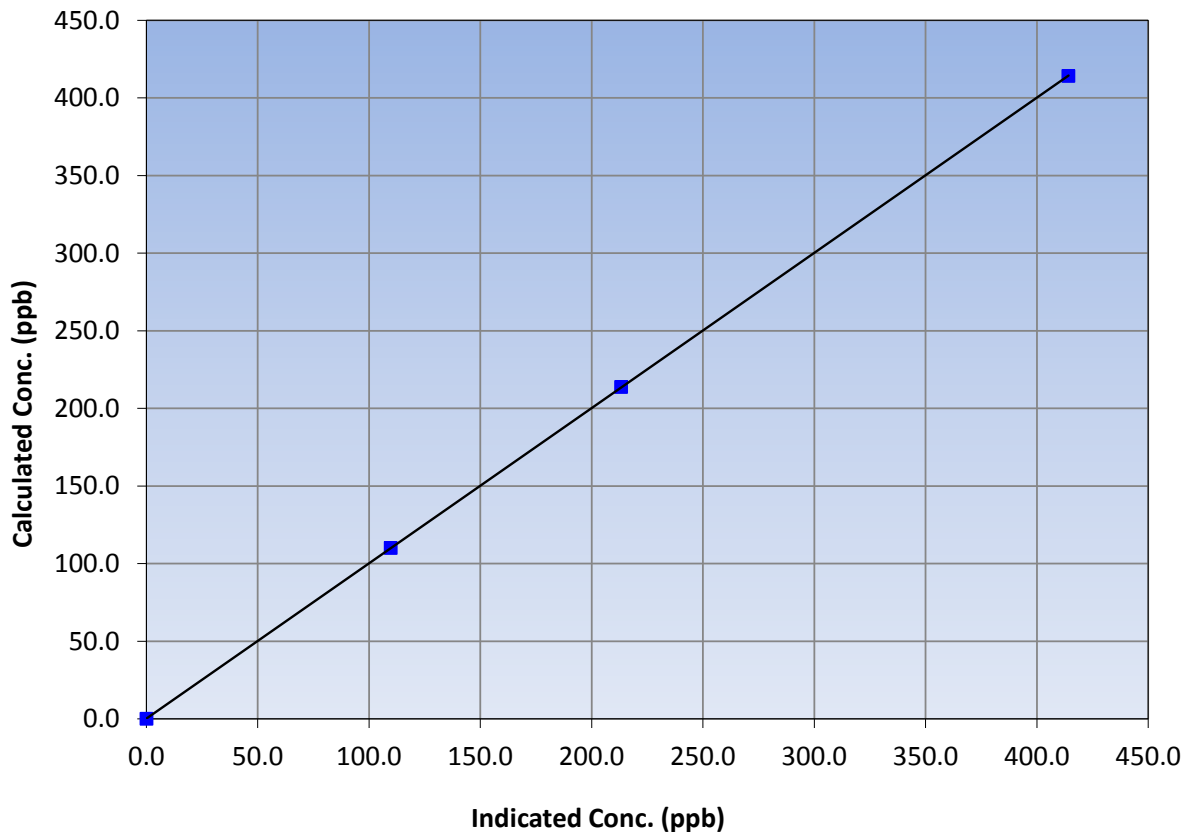
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:15 | End Time (MST) | 15:02 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 414.2 | 414.2 | 1.0000 | | | |
| 213.8 | 213.2 | 1.0028 | | | |
| 110.0 | 109.8 | 1.0018 | | | |
| | | | Slope | 0.999997 | 0.90 - 1.10 |
| | | | Intercept | 1.000026 | +/-20 |
| | | | | 0.195175 | |

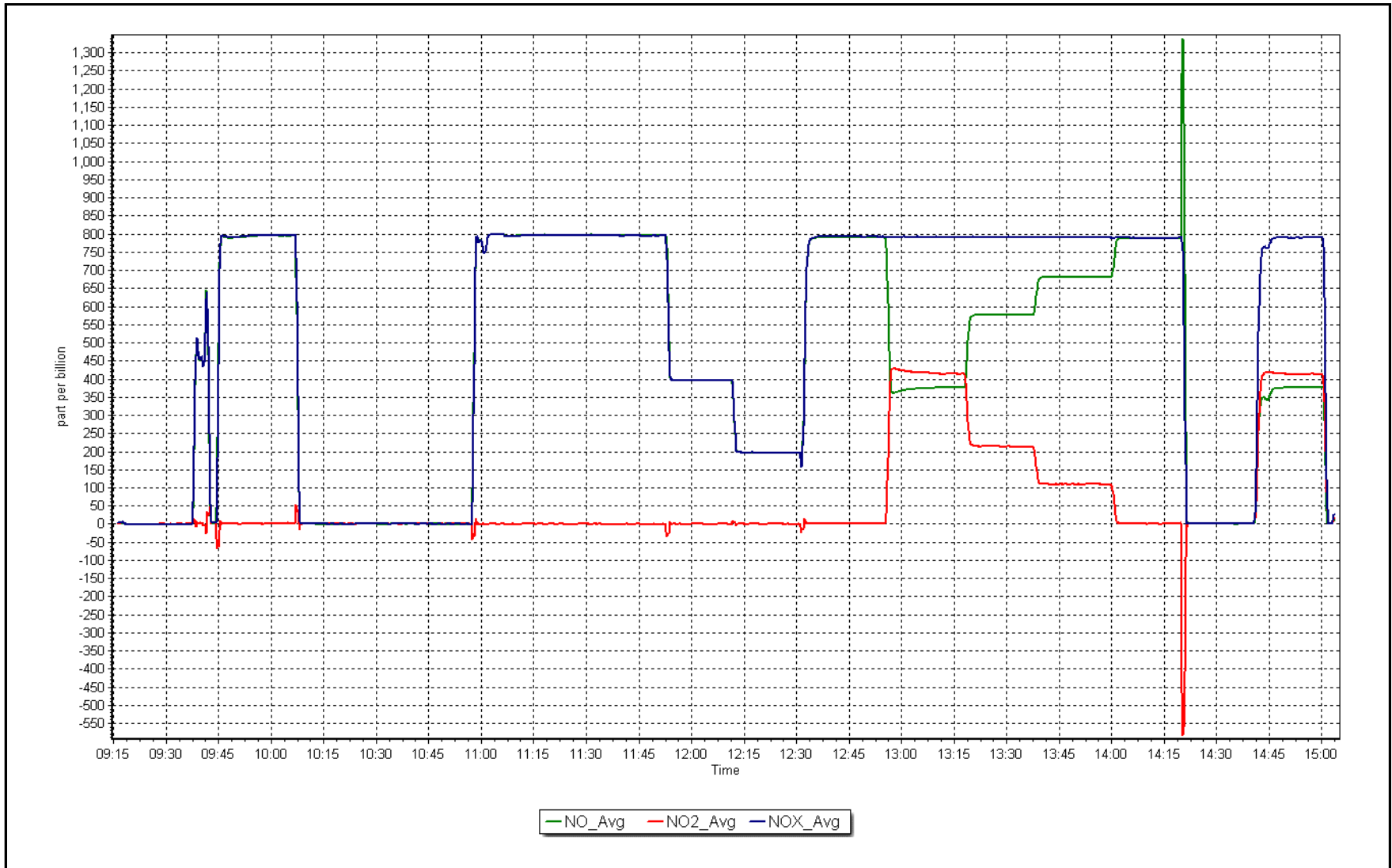
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 18, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|--------------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | September 18, 2017 |
| Start time (MST): | 11:00 | End time (MST): | 13:03 |
| Reason: | Cylinder Change | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-------------------|
| NO Gas Cylinder # | LL107926 | Cal Gas Expiry Date | February 16, 2019 |
| NOX Cal Gas Conc. | <u>52.4</u> ppb | NO Cal Gas Conc. | <u>52.4</u> ppb |
| Calibrator Model | API T700 | Serial Number | 2449 |
| ZAG make/model | API T701 | Serial Number | 260 |

Analyzer Information

| | | | | | |
|---------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1218153460 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.015 | 1.015 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 1.001 | 1.001 | PMT Temperature | -2.6 | -3.0 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 186.2 | 182.4 |
| NO bkgrnd | 2.8 | 2.8 | Sample Flow | 0.763 | 0.744 |
| NOX bkgrnd | 3.0 | 3.0 | PMT Voltage | -772.6 | -772.6 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.998870 | 0.985287 |
| NO _x Cal Offset | 1.662121 | 0.000000 |
| NO Cal Slope | 0.998137 | 0.987244 |
| NO Cal Offset | 1.741541 | 0.098724 |
| NO ₂ Cal Slope | 1.000026 | |
| NO ₂ Cal Offset | 0.195175 | |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | 9/18/17 | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|------------------------|---------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5500 | | | | | 0.0 | -0.1 | 0.1 | ---- | ---- |
| as found span | 5539 | 84.1 | 795.6 | 795.6 | 0.0 | 806.9 | 805.2 | 1.6 | 0.9860 | 0.9881 |
| calibrator zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | ---- | ---- |
| high point | 5543 | 84.1 | 795.0 | 795.0 | 0.0 | 806.9 | 805.2 | 1.6 | 0.9853 | 0.9874 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 0.9853 | 0.9874 |

| | | | | | |
|--------------------|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 806.9 ppb | NO = 805.3 ppb | | *Percent Change | NO _x = -1.5% |
| Previous Response | NO _x = 794.8 ppb | NO = 795.3 ppb | | *Percent Change | NO = -1.2% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | | | | | | | | |
| 1st NO2 (400 ppb O3) | | | | | | | | | |
| 2nd NO2 (200 ppb O3) | | | | | | | | | |
| 3rd NO2 (100 ppb O3) | | | | | | | | | |
| 2nd NO ref point | | | | | | | | | |
| Average Correction Factor | | | | | | | | | |

Notes:

Cal gas change, no adjustments

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

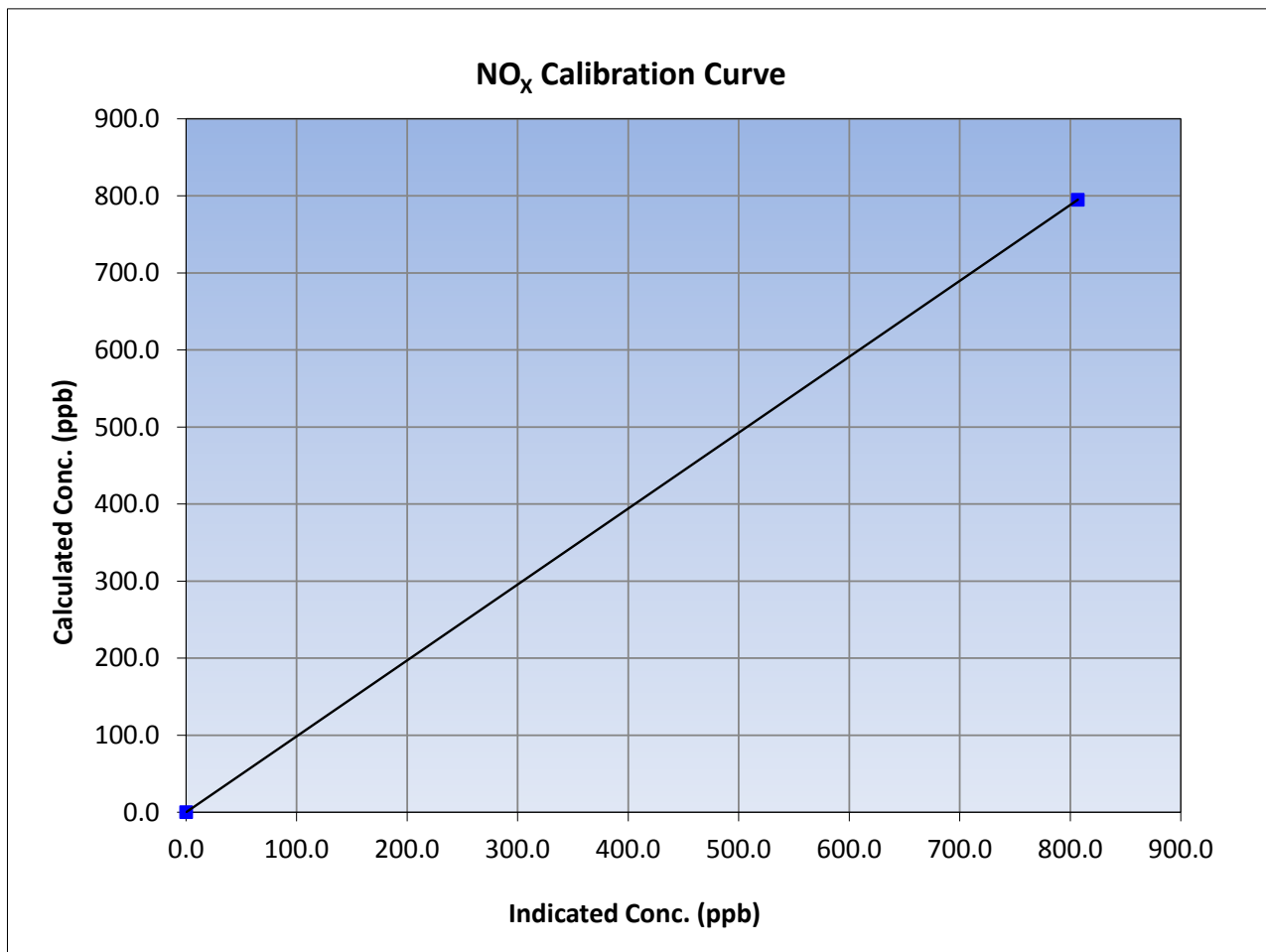
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 18, 2017 |
| Station Name | September 25, 2017 | Station Number | 9/18/17 |
| Start Time (MST) | 11:00 | End Time (MST) | |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 1.000000 | |
| 795.0 | 806.9 | 0.9853 | | | ≥0.995 |
| | | | Slope | 0.985287 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-20 |





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

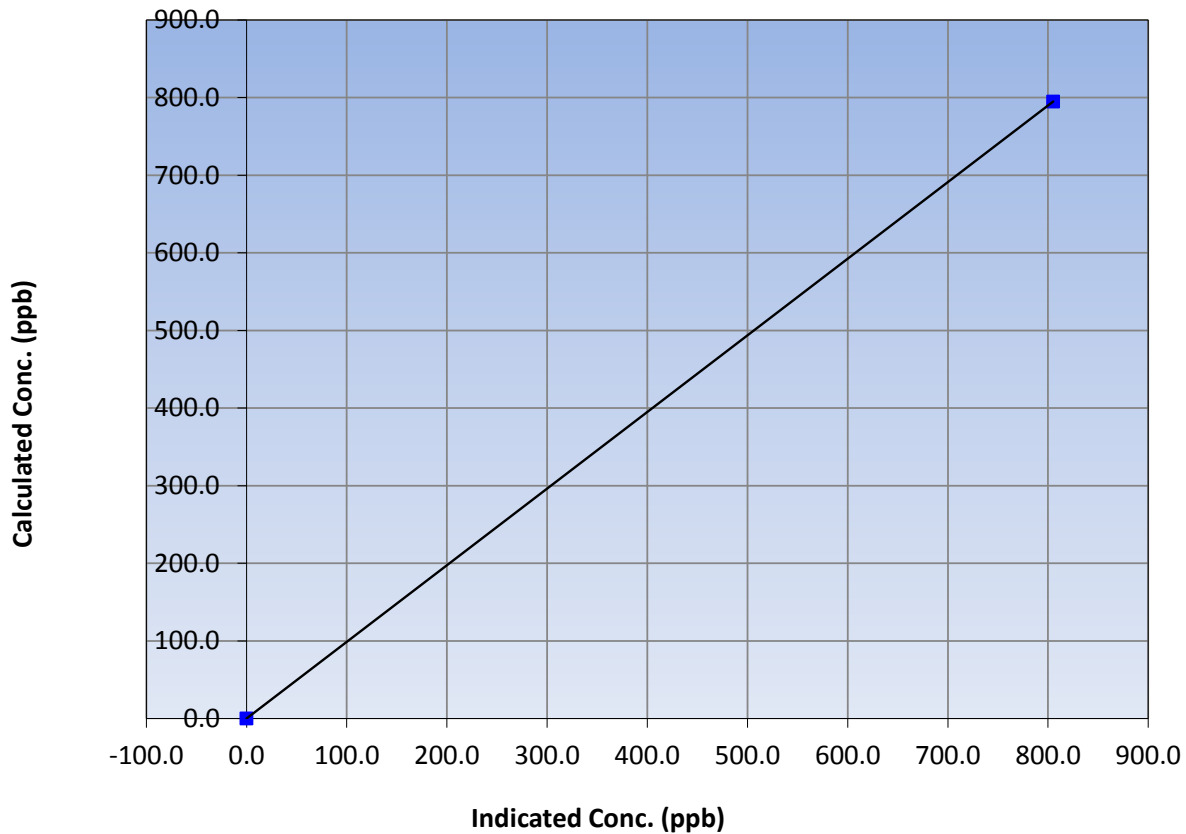
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 18, 2017 |
| Station Name | September 25, 2017 | Station Number | 9/18/17 |
| Start Time (MST) | 11:00 | End Time (MST) | |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 1.000000 | |
| 795.0 | 805.2 | 0.9874 | | | ≥0.995 |
| | | | Slope | 0.987244 | 0.90 - 1.10 |
| | | | Intercept | 0.098724 | +/-20 |

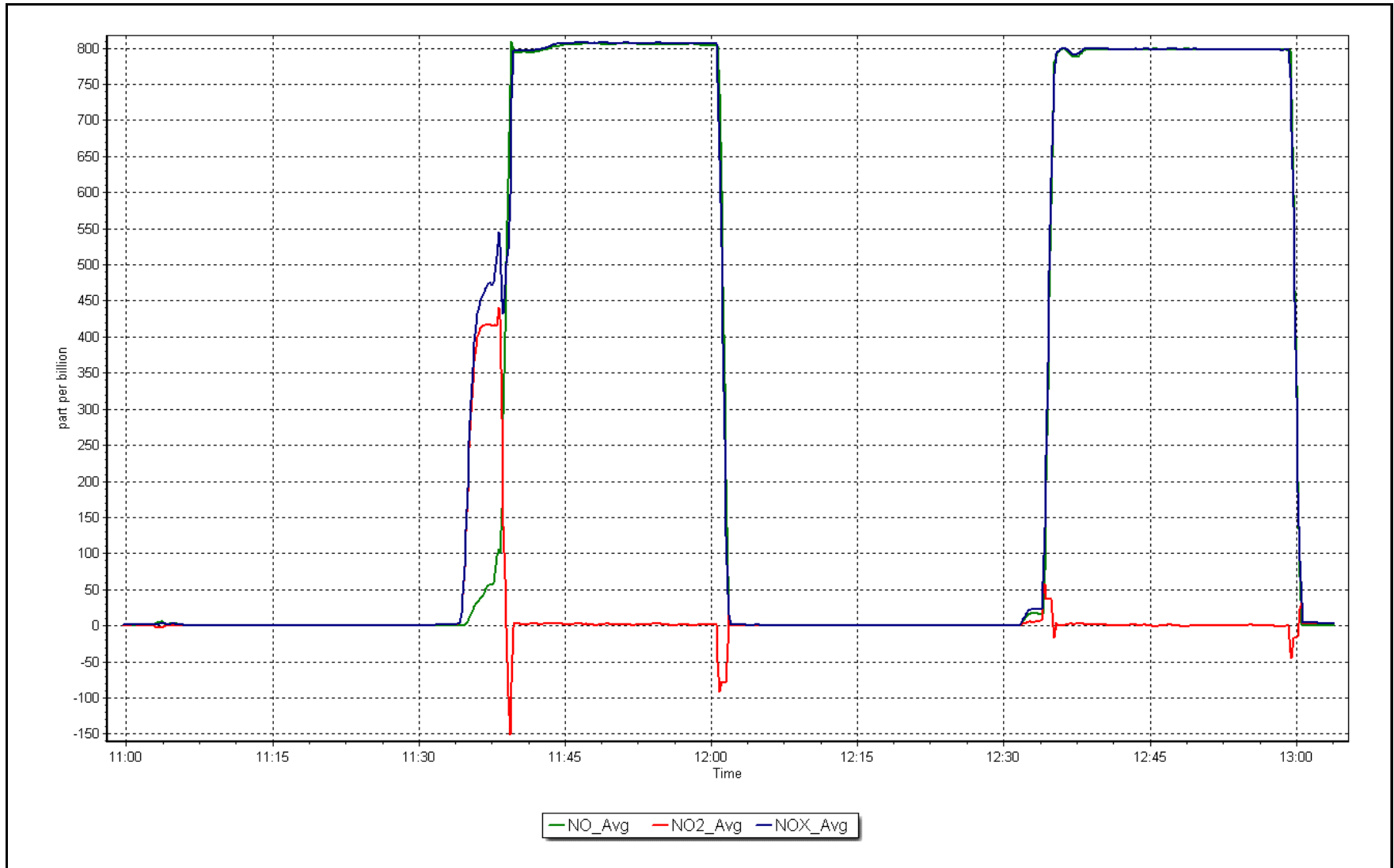
NO Calibration Curve



NO_x Calibration Plot

Date: September 25, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|--------------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | September 18, 2017 |
| Start time (MST): | 11:00 | End time (MST): | 13:03 |
| Reason: | Cylinder Change | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-----------------|
| NO Gas Cylinder # | LL57837 | Cal Gas Expiry Date | August 18, 2020 |
| NOX Cal Gas Conc. | <u>51.6</u> ppb | NO Cal Gas Conc. | <u>51.6</u> ppb |
| Calibrator Model | API T700 | Serial Number | 2449 |
| ZAG make/model | API T701 | Serial Number | 260 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1218153460 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.015 | 1.015 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 1.001 | 1.001 | PMT Temperature | -2.8 | -3.0 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 181.2 | 182.4 |
| NO bkgrnd | 2.8 | 2.8 | Sample Flow | 0.742 | 0.744 |
| NOX bkgrnd | 3.0 | 3.0 | PMT Voltage | -772.9 | -772.6 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.985287 | 0.997185 |
| NO _x Cal Offset | 0.000000 | -0.299156 |
| NO Cal Slope | 0.987244 | 0.997310 |
| NO Cal Offset | 0.098724 | 0.000000 |
| NO ₂ Cal Slope | | |
| NO ₂ Cal Offset | | |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | 9/18/17 | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|---------|---|--|---|--|---|--|--|---|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 | ---- | ---- |
| as found span | 5537 | 85.4 | 795.9 | 795.9 | 0.0 | 798.4 | 798.0 | 0.4 | 0.9968 | 0.9973 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 | ---- | ---- |
| high point | 5537 | 85.4 | 795.9 | 795.9 | 0.0 | 798.4 | 798.0 | 0.4 | 0.9968 | 0.9973 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 0.9968 | 0.9973 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 798.1 ppb | NO = 798.0 ppb | | *Percent Change | NO _x = 1.2% |
| Previous Response | NO _x = 807.7 ppb | NO = 806.0 ppb | | *Percent Change | NO = 1.0% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|---------------------------------|---|--|---|--|--|---|--|---|
| 1st NO ref point | | | | | | | | | |
| 1st NO2 (400 ppb O3) | | | | | | | | | |
| 2nd NO2 (200 ppb O3) | | | | | | | | | |
| 3rd NO2 (100 ppb O3) | | | | | | | | | |
| 2nd NO ref point | | | | | | | | | |
| Average Correction Factor | | | | | | | | | |

Notes: Cal gas change, no adjustments

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

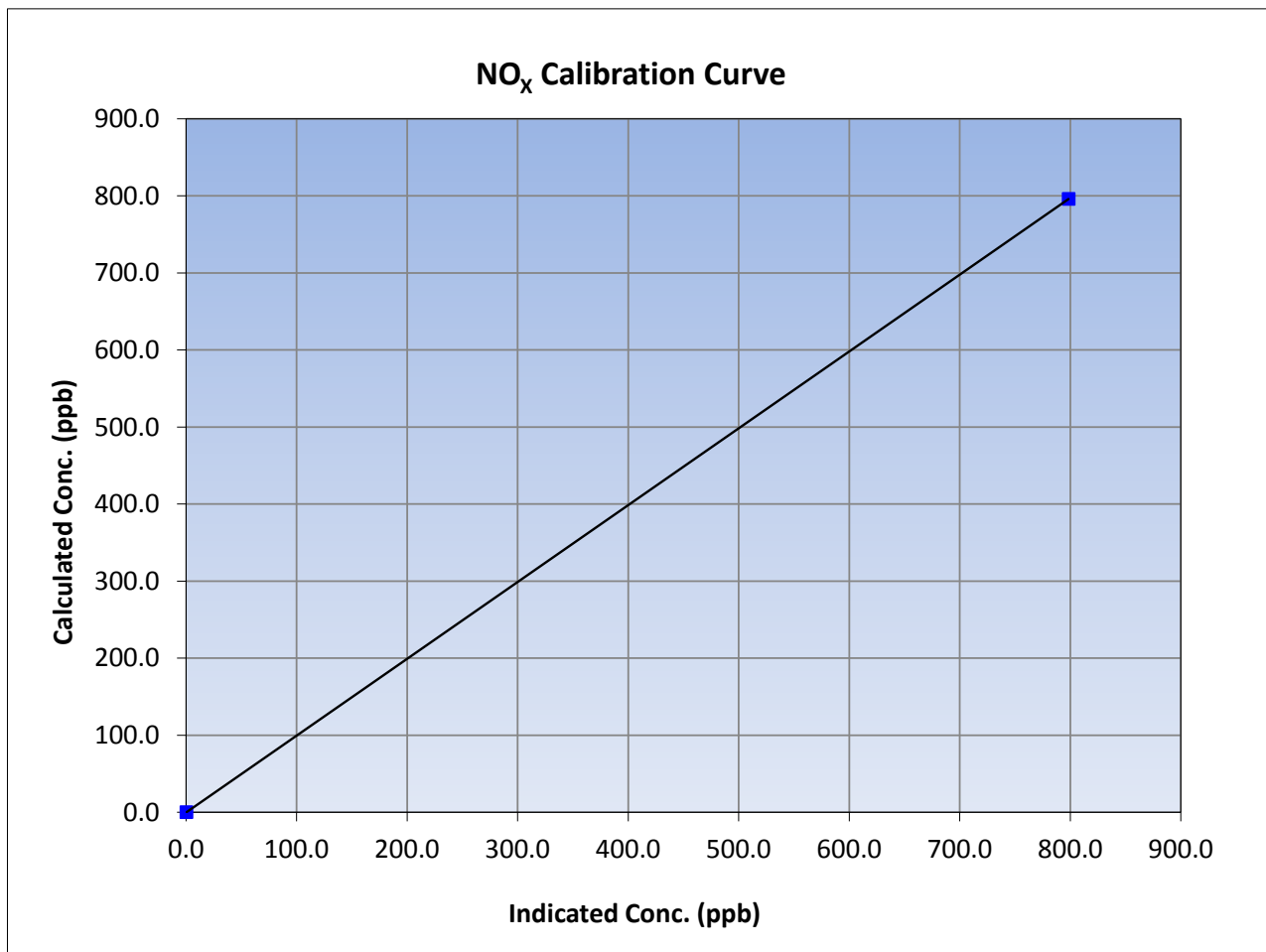
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 18, 2017 |
| Station Name | September 25, 2017 | Station Number | 9/18/17 |
| Start Time (MST) | 11:00 | End Time (MST) | |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 795.9 | 798.4 | 0.9968 | | | |
| | | | Slope | 0.997185 | 0.90 - 1.10 |
| | | | Intercept | -0.299156 | +/-20 |





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

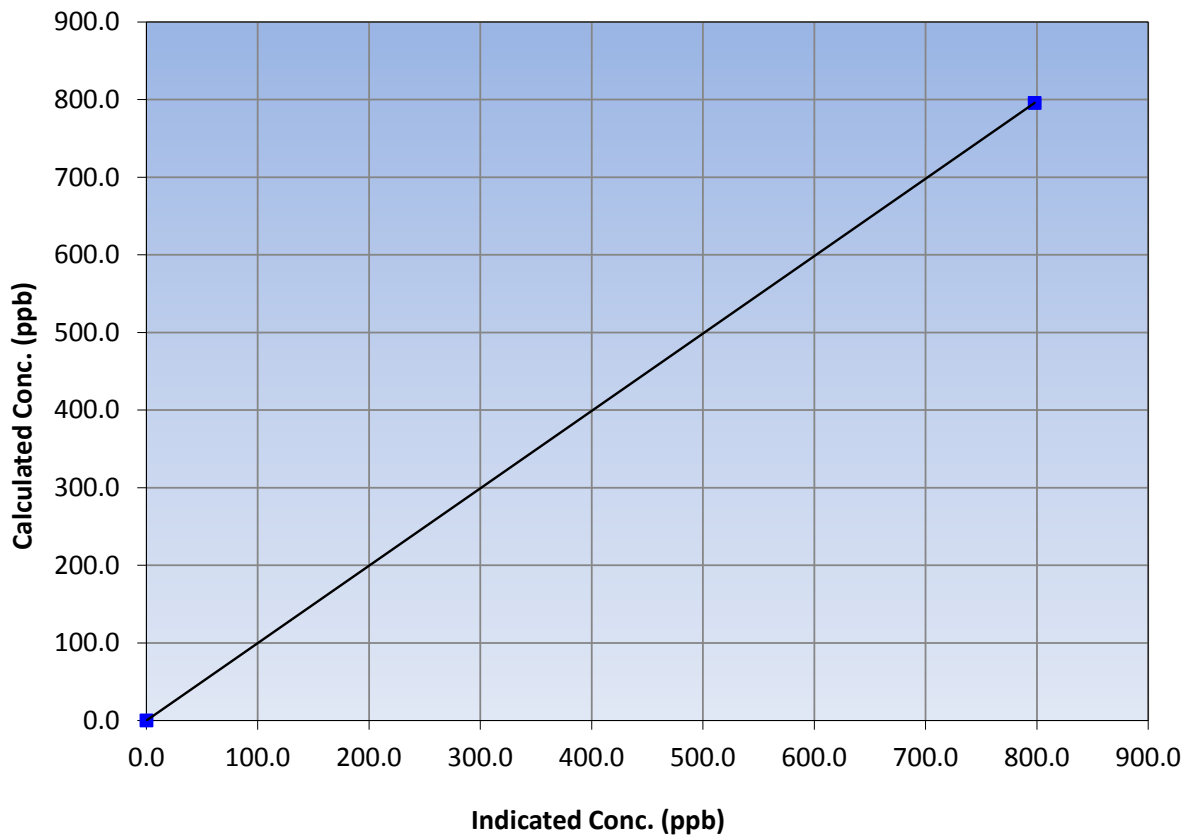
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 18, 2017 |
| Station Name | September 25, 2017 | Station Number | 9/18/17 |
| Start Time (MST) | 11:00 | End Time (MST) | |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 1.000000 | |
| 795.9 | 798.0 | 0.9973 | | | ≥0.995 |
| | | | Slope | 0.997310 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-20 |

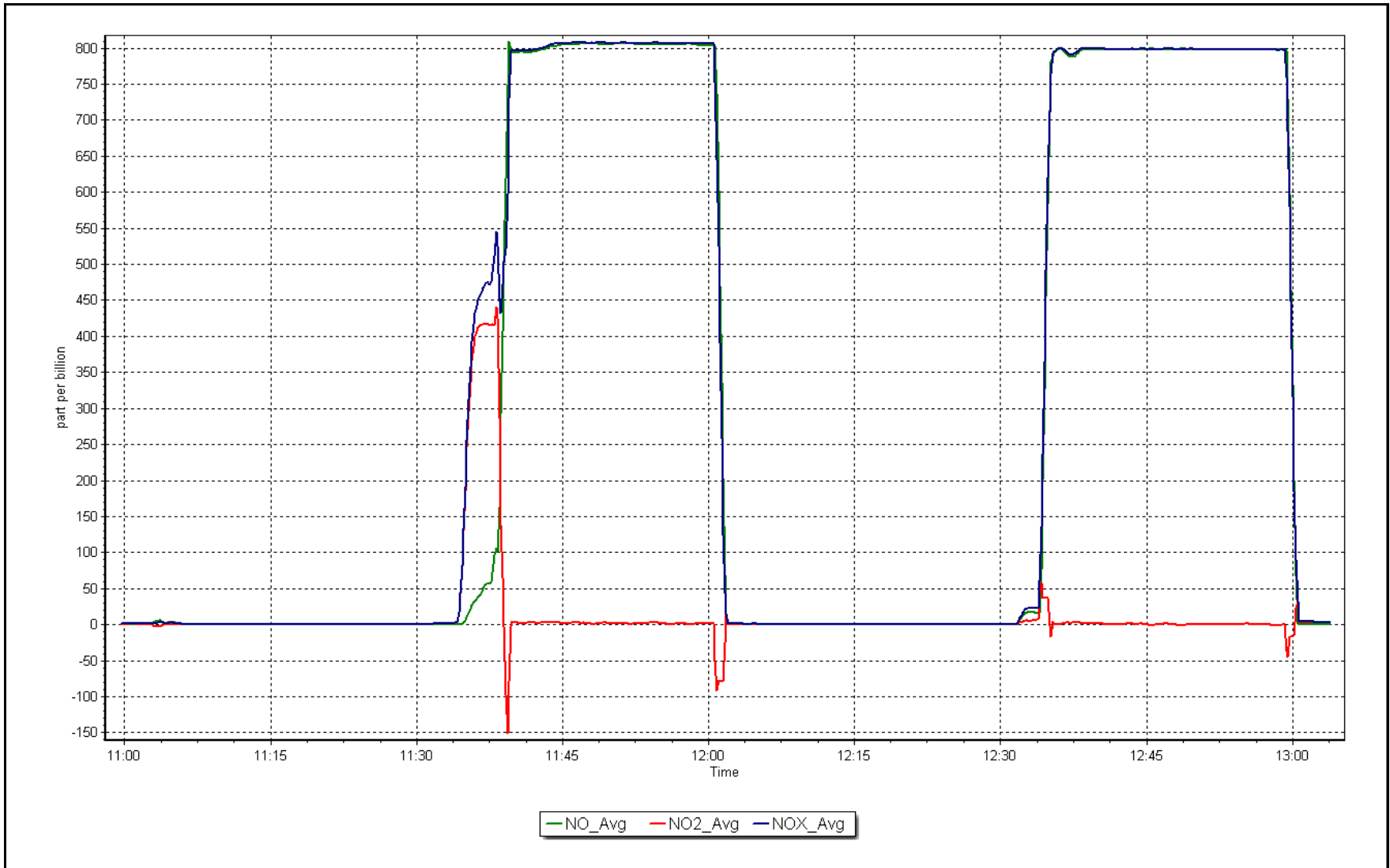
NO Calibration Curve



NO_x Calibration Plot

Date: September 25, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| NOX Cal Date: | September 18, 2017 | Last Cal Date: | August 9, 2017 |
| Start time (MST): | 9:15 | End time (MST): | 14:30 |
| NH3 Cal Date: | September 19, 2017 | Last Cal Date: | August 10, 2017 |
| Start time (MST): | 9:00 | End time (MST): | 18:02 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-------------------|-------------|-----|--------------------|-------------------|
| NOX Cal Gas Conc. | <u>52.4</u> | ppb | NO Gas Cylinder # | LL107926 |
| NO Cal Gas Conc. | <u>52.4</u> | ppb | NO Cal Gas Expiry | February 16, 2019 |
| NH3 Cal Gas Conc. | <u>95.4</u> | ppm | NH3 Gas Cylinder # | SA25992 |
| | | | NH3 Cal Gas Expiry | May 24, 2017 |
| Calibrator Model | API T700 | | Serial Number | 2449 |
| ZAG make/model | API T701 | | Serial Number | 260 |

Analyzer Information

| | | | | |
|-----------------|--------------|---------------------|---------------------|----------------------------------|
| Analyzer make: | API T201 | Analyzer serial #: | 215 | |
| Converter make: | API 501 | Converter serial #: | 217 | |
| | <u>Start</u> | <u>Finish</u> | | |
| NO coefficient | 1.365 | 1.398 | NH3 Range (ppb) | 0 - 1000 ppb |
| NOX coefficient | 1.389 | 1.466 | NOX Range (ppb) | 0 - 1000 ppb |
| NO2 coefficient | 1.000 | 1.000 | PMT Temperature | 7.0 7.0 |
| NH3 coefficient | 1.051 | 1.029 | Reaction cell Press | 4.5 4.4 |
| TN coefficient | 1.404 | 1.441 | Sample Flow | 565 556 |
| NO bkgrnd | 0.00 | 0.0 | PMT Voltage | 693 693 |
| NOX bkgrnd | 0.000 | 0.0 | Moly Temperature | 315.5 315.8 |
| TN bkgrnd | 1.2 | 0.9 | NH3 Conv Temp | 825 825 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.998577 | 0.998888 |
| NO _x Cal Offset | 3.098443 | 2.754539 |
| NO Cal Slope | 0.998157 | 1.000065 |
| NO Cal Offset | 4.391452 | 3.122622 |
| NO ₂ Cal Slope | 1.000720 | 1.006439 |
| NO ₂ Cal Offset | -1.726792 | -0.208343 |
| NH3 Cal Slope | 0.999896 | 0.995822 |
| NH3 Cal Offset | -7.795377 | 2.323278 |
| TN Cal Slope | 0.981940 | 0.987104 |
| TN Cal Offset | -8.815064 | 2.275247 |



Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | Source gas flow rate (sccm) | Calculated TN concentration (ppb) (Cc) | Calculated NO _x concentration (ppb) (Cc) | Calculated NH ₃ concentration (ppb) (Cc) | Indicated TN concentration (ppb) (Ic) | Indicated NO _x concentration (ppb) (Ic) | Indicated NH ₃ concentration (ppb) (Ic) | TN Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NH ₃ Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|------------------------|-----------------------------|--|---|---|---------------------------------------|--|--|--|---|
| as found zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | ---- | ---- |
| as found NO | 5539 | 84.1 | 795.6 | 795.6 | ---- | 794.2 | 779.2 | 15.0 | 1.002 | ---- |
| calibrator zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | ---- | ---- |
| high NO point | 5543 | 84.2 | 796.0 | 796.0 | ---- | 795.8 | 794.5 | 1.3 | 1.000 | ---- |
| NO/O ₃ point | 5543 | 84.2 | 796.0 | 796.0 | ---- | 809.4 | 806.3 | 3.1 | 0.983 | ---- |
| as found NH ₃ | 4544 | 85.1 | 1786.7 | NA | 1786.7 | 1768.5 | ---- | 1752.5 | 1.010 | 1.019 |
| first NH ₃ | 4544 | 85.1 | 1786.7 | NA | 1786.7 | 1809.2 | ---- | 1793.2 | 0.988 | 0.996 |
| second NH ₃ | 4544 | 47.4 | 995.1 | NA | 995.1 | 1004.4 | ---- | 995.7 | 0.991 | 0.999 |
| third NH ₃ | 4544 | 23.7 | 497.6 | NA | 497.6 | 499.2 | ---- | 494.9 | 0.997 | 1.005 |
| Average Correction Factor | | | | | | | | | 0.9918 | 1.0004 |

Corrected As found TN = 794.2 ppb NO_x = 779.1 ppb NH₃ = 1752.6 ppb

Previous Response TN = 819.1 ppb NO_x = 793.6 ppb NH₃ = 1794.6 ppb

NH₃ Previous Converter Efficiency = 105.1 %

NH₃ Current Converter Efficiency = 102.9 %

*Percent Change TN = 3.1%

*Percent Change NO_x = 1.9%

*Percent Change NH₃ = 2.4%

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | Source gas flow rate (sccm) | Calculated NO _x concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated TN concentration (ppb) (Cc) | Indicated NO _x concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated TN concentration (ppb) (Ic) | NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|------------------------|-----------------------------|---|--|--|--|---------------------------------------|---------------------------------------|---|--|
| as found zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.3 | ---- | ---- |
| as found span | 5543 | 84.2 | 796.0 | 796.0 | 796.0 | 779.0 | 780.6 | 789.2 | 1.0218 | 1.0197 |
| calibrator zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.2 | ---- | ---- |
| high point | 5543 | 84.1 | 795.0 | 795.0 | 795.0 | 794.5 | 793.4 | 795.8 | 1.0007 | 1.0021 |
| second point | 5543 | 42.1 | 398.0 | 398.0 | 398.0 | 394.5 | 393.4 | 192.5 | 1.0088 | 1.0117 |
| third point | 5543 | 21.1 | 199.5 | 199.5 | 199.5 | 193.8 | 192.9 | 193.9 | 1.0292 | 1.0340 |
| Average Correction Factor | | | | | | | | | 1.0129 | 1.0159 |

| | | | | | |
|--------------------|----------------|-----------------------------|----------------|-----------------|------------------------|
| Corrected As found | TN = 788.9 ppb | NO _x = 778.5 ppb | NO = 780.6 ppb | *Percent Change | TN = 3.9% |
| Previous Response | TN = 819.4 ppb | NO _x = 794.0 ppb | NO = 793.1 ppb | *Percent Change | NO _x = 2.0% |
| | | | | *Percent Change | NO = 1.6% |

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

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO ₂ concentration (ppb) (Cc) | Indicated NO _x concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO ₂ concentration (ppb) (Ic) | NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO ₂ Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|---|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | ---- | 0.0 | 806.3 | 798.8 | 7.6 | 0.9860 | 0.9953 | ---- | ---- |
| 1st NO ₂ (400 ppb O ₃) | 377.2 | 421.6 | 795.8 | 377.2 | 418.6 | 0.9990 | ---- | 1.0072 | 99.3% |
| 2nd NO ₂ (200 ppb O ₃) | 581.2 | 217.6 | 799.1 | 581.2 | 217.9 | 0.9949 | ---- | 0.9986 | 100.1% |
| 3rd NO ₂ (100 ppb O ₃) | 683.4 | 115.4 | 797.3 | 683.4 | 113.9 | 0.9972 | ---- | 1.0132 | 98.7% |
| 2nd NO ref point | ---- | 0.0 | 794.9 | 788.5 | 6.4 | 1.0002 | 1.0083 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9978 | 1.0018 | 1.0063 | 99.4% |

Notes: NO_x/NO/Nt zero adjusted. Full GPT cal carried out on day two for Nox concentration having dropped 15 ppb from yesterdays NO_x cal. Second as founds are of high NO point of day 2.

Calibration Performed By: Ryan Power



Wood Buffalo Environmental Association

TN Calibration Summary

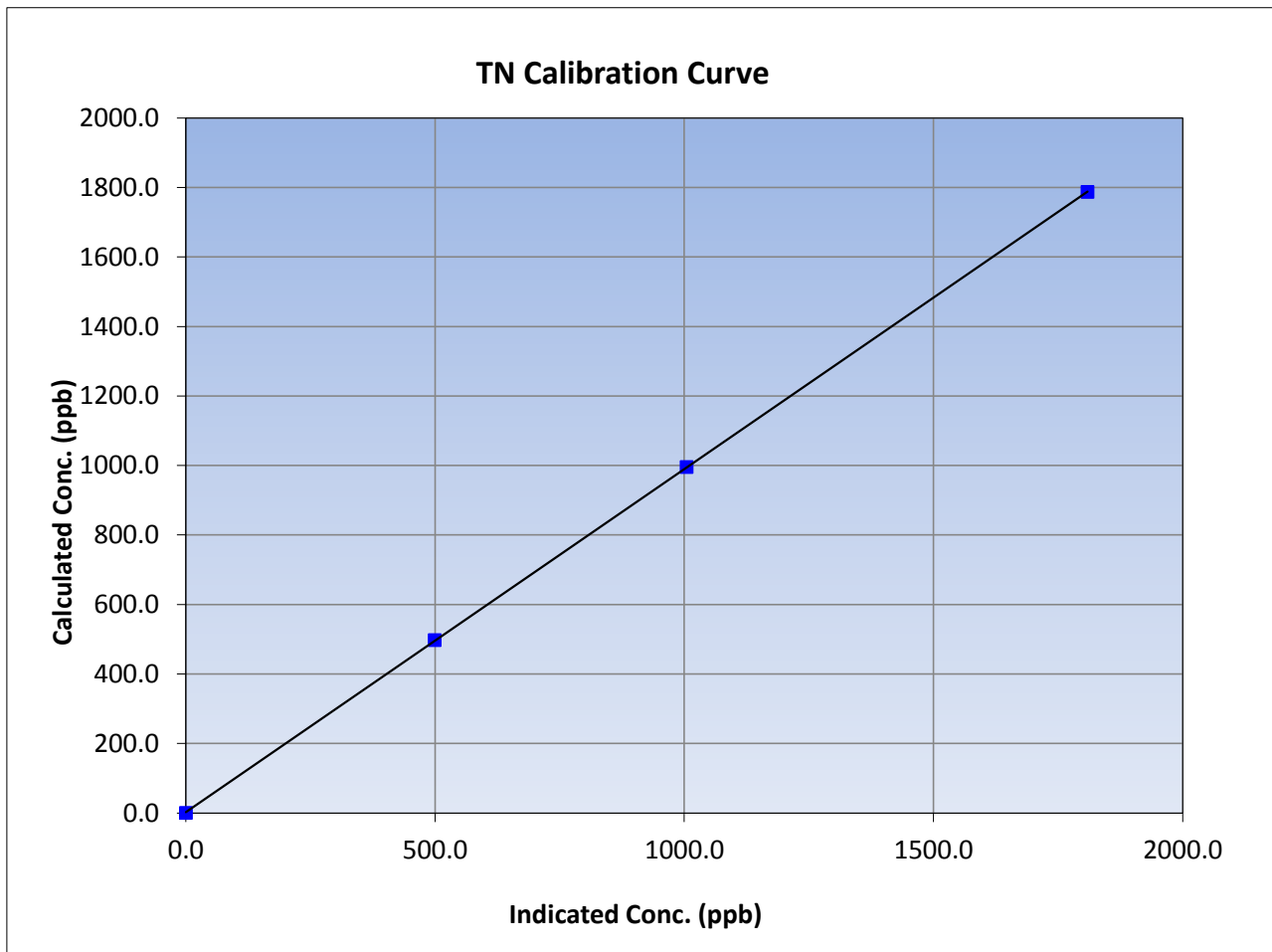
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:00 | End Time (MST) | 18:02 |
| Analyzer make | API T201 | Analyzer serial # | 215 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 1786.7 | 1809.2 | 0.9875 | | | |
| 995.1 | 1004.4 | 0.9908 | | | |
| 497.6 | 499.2 | 0.9967 | | | |
| | | | Slope | 0.987104 | 0.90 - 1.10 |
| | | | Intercept | 2.275247 | +/-20 |





Wood Buffalo Environmental Association

NH₃ Calibration Summary

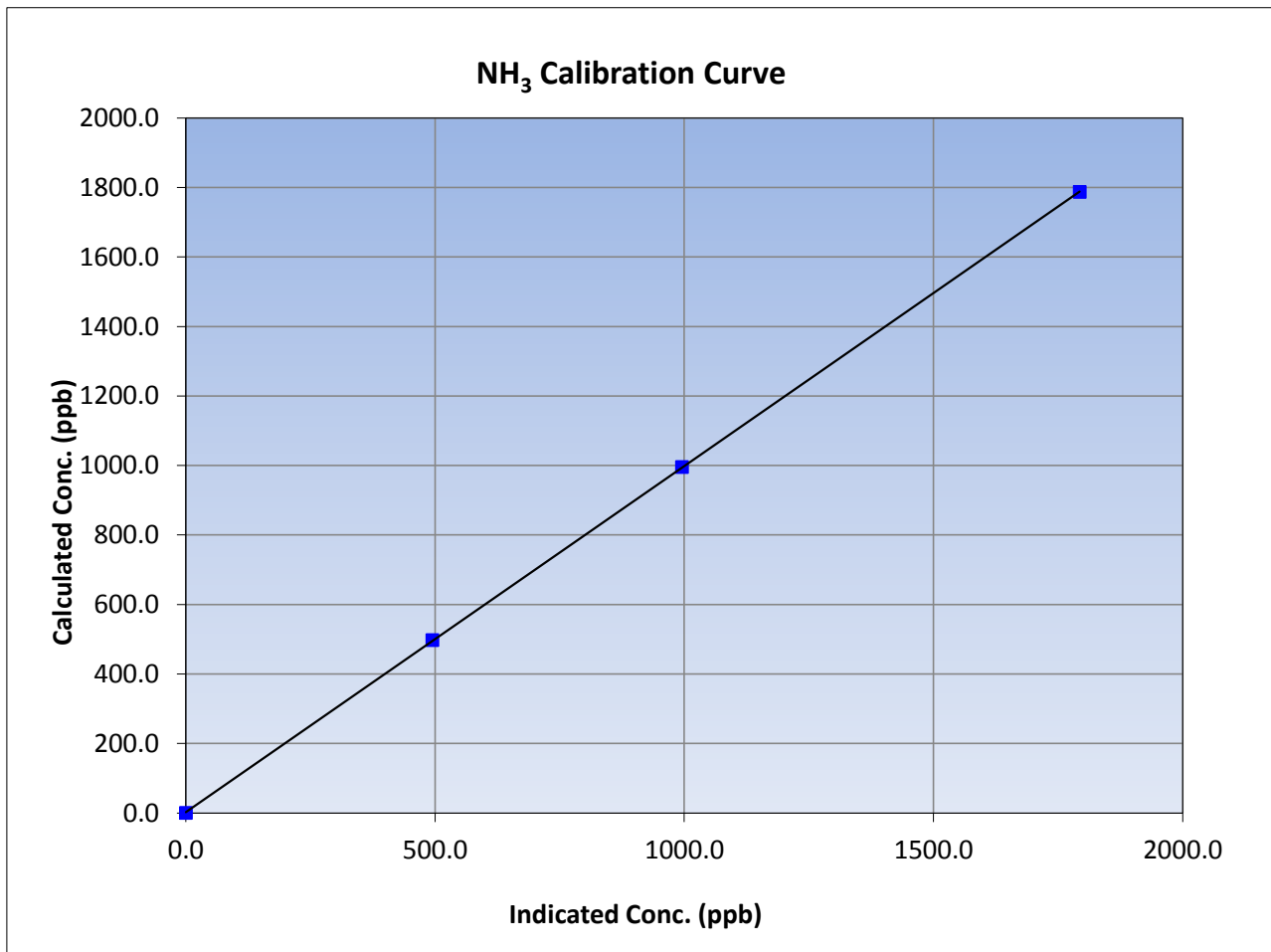
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:00 | End Time (MST) | 18:02 |
| Analyzer make | API T201 | Analyzer serial # | 215 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999991 | ≥0.995 |
| 1786.7 | 1793.2 | 0.9963 | | | |
| 995.1 | 995.7 | 0.9994 | | | |
| 497.6 | 494.9 | 1.0054 | | | |
| | | | Slope | 0.995822 | 0.90 - 1.10 |
| | | | Intercept | 2.323278 | +/-20 |





Wood Buffalo Environmental Association

NO_x Calibration Summary

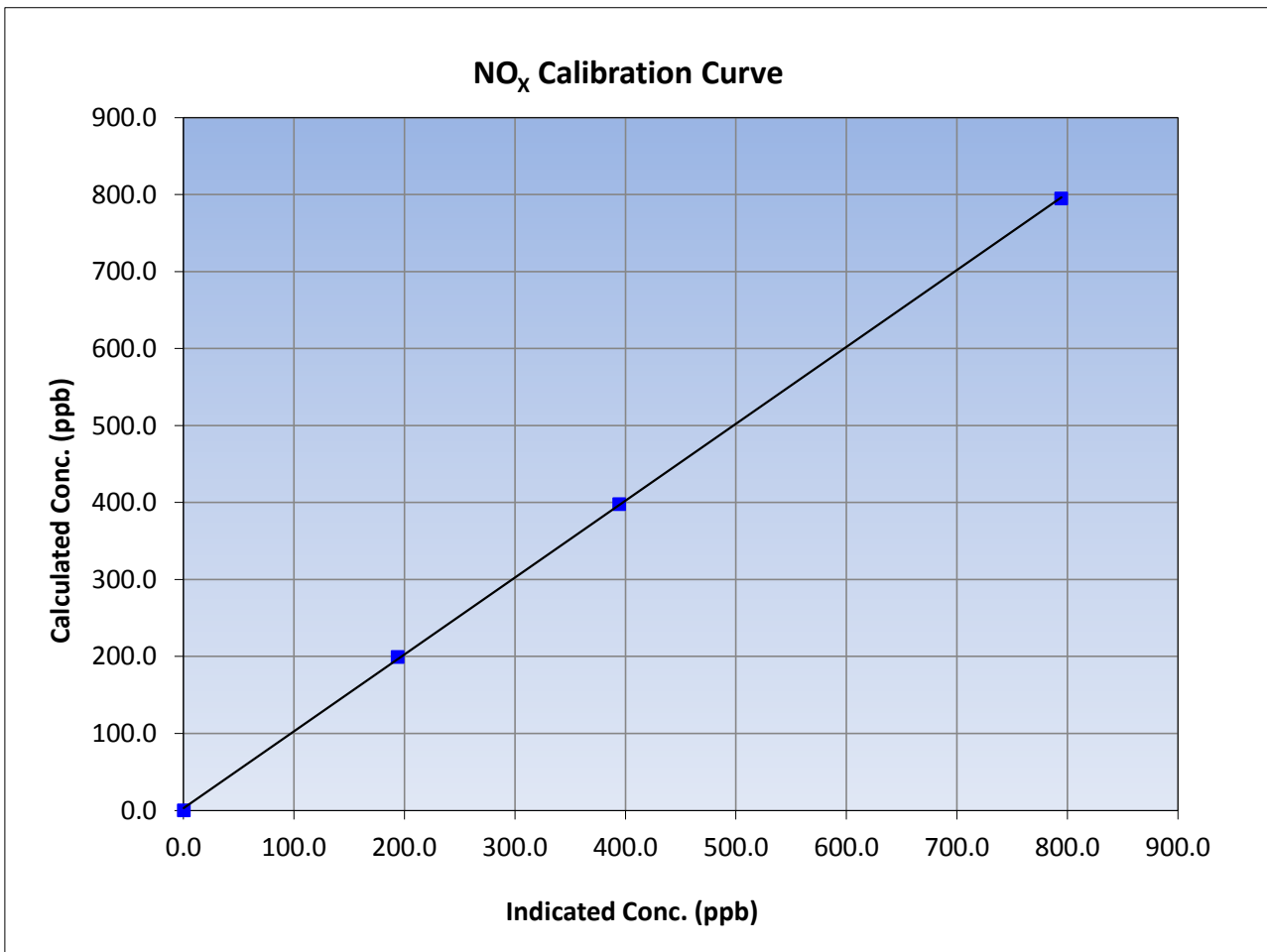
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:15 | End Time (MST) | 14:30 |
| Analyzer make | API T201 | Analyzer serial # | 215 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 795.0 | 794.5 | 1.0007 | | | |
| 398.0 | 394.5 | 1.0088 | | | |
| 199.5 | 193.8 | 1.0292 | | | |
| | | | Slope | 0.998888 | 0.90 - 1.10 |
| | | | Intercept | 2.754539 | +/-20 |





Wood Buffalo Environmental Association

NO Calibration Summary

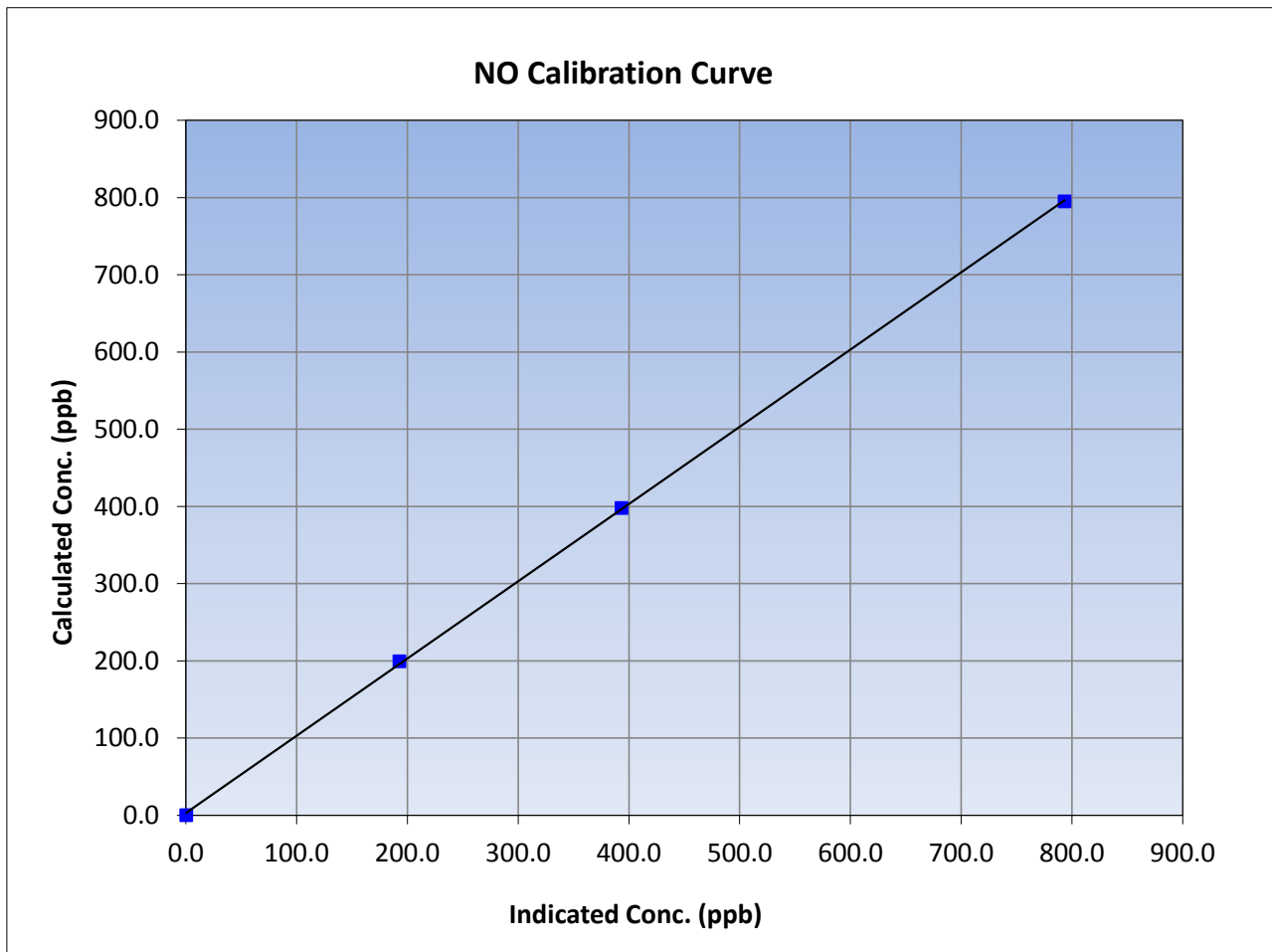
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:15 | End Time (MST) | 14:30 |
| Analyzer make | API T201 | Analyzer serial # | 215 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 795.0 | 793.4 | 1.0021 | | | |
| 398.0 | 393.4 | 1.0117 | | | |
| 199.5 | 192.9 | 1.0340 | | | |
| | | | Slope | 1.000065 | 0.90 - 1.10 |
| | | | Intercept | 3.122622 | +/-20 |





Wood Buffalo Environmental Association

NO₂ Calibration Summary

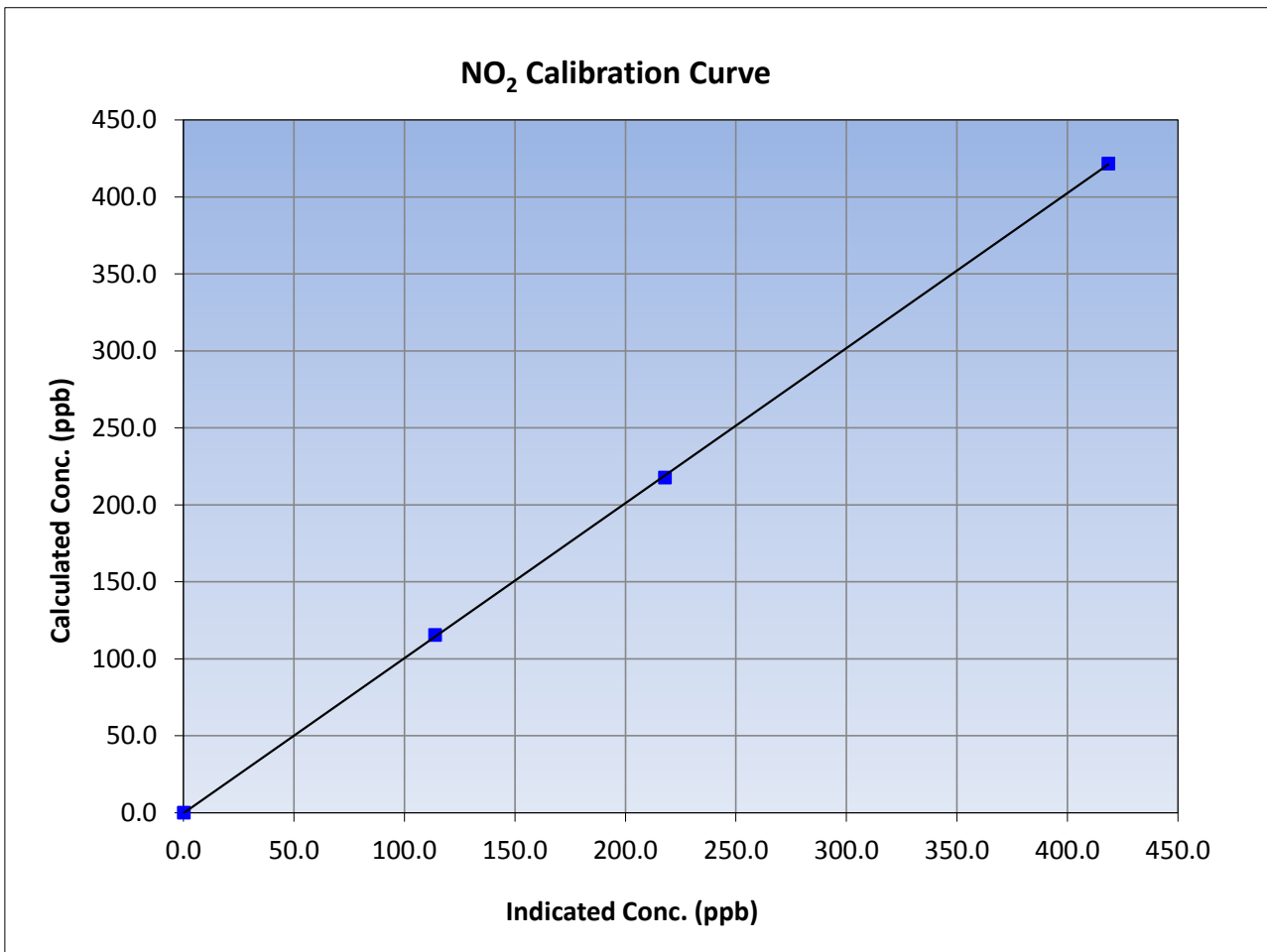
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 9:15 | End Time (MST) | 14:30 |
| Analyzer make | API T201 | Analyzer serial # | 215 |

Calibration Data

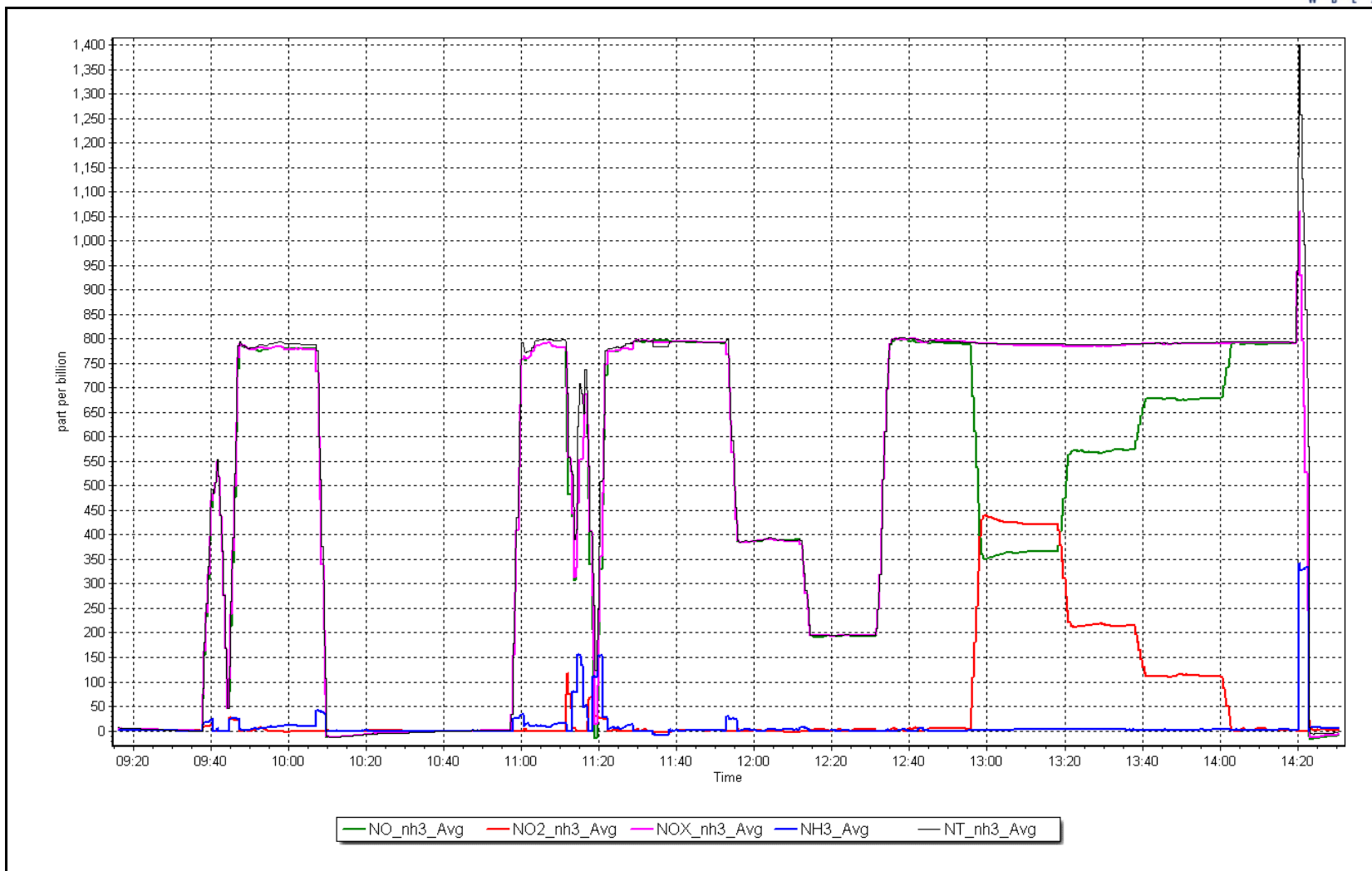
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 421.6 | 418.6 | 1.0072 | | | |
| 217.6 | 217.9 | 0.9986 | | | |
| 115.4 | 113.9 | 1.0132 | | | |
| | | | Slope | 1.006439 | 0.90 - 1.10 |
| | | | Intercept | -0.208343 | +/-20 |



NO_x Calibration Plot

Date: September 18, 2017

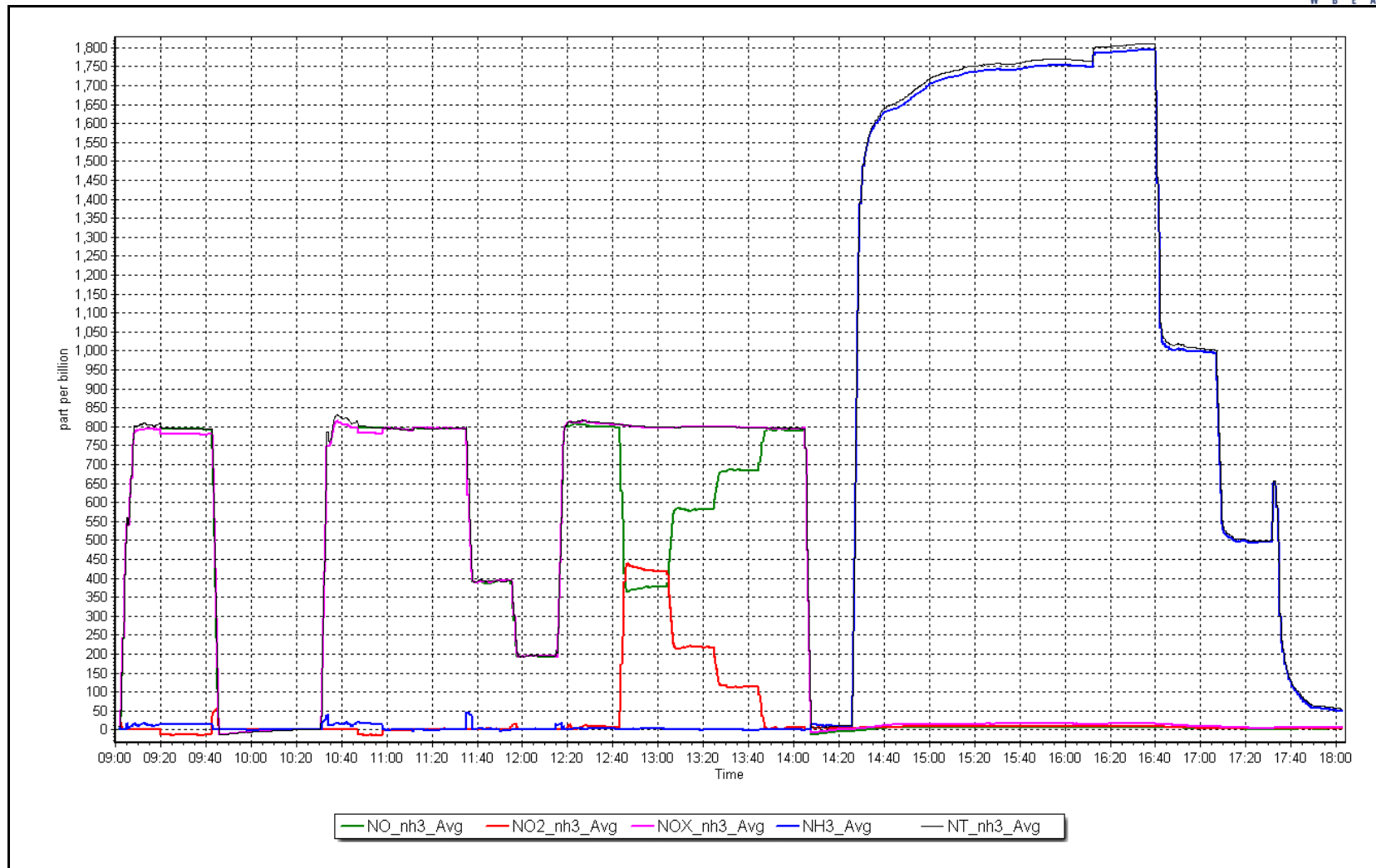
Location: Patricia McInnes



NH₃ Calibration Plot

Date: September 19, 2017

Location: Patricia McInnes





Wood Buffalo Environmental Association

TN - NO_x - NH₃ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|--------------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| NOX Cal Date: | September 25, 2017 | Last Cal Date: | September 19, 2017 |
| Start time (MST): | 11:00 | End time (MST): | 13:03 |
| NH3 Cal Date: | September 19, 2017 | Last Cal Date: | August 10, 2017 |
| Start time (MST): | | End time (MST): | |
| Reason: | Cylinder Change | | |

Calibration Standards

| | | | | |
|-------------------|-------------|-----|--------------------|-------------------|
| NOX Cal Gas Conc. | <u>52.4</u> | ppb | NO Gas Cylinder # | LL107926 |
| NO Cal Gas Conc. | <u>52.4</u> | ppb | NO Cal Gas Expiry | February 16, 2019 |
| NH3 Cal Gas Conc. | <u>95.4</u> | ppm | NH3 Gas Cylinder # | SA25992 |
| | | | NH3 Cal Gas Expiry | May 24, 2017 |
| Calibrator Model | API T700 | | Serial Number | 2449 |
| ZAG make/model | API T701 | | Serial Number | 260 |

Analyzer Information

| | | | | |
|-----------------|--------------|---------------------|---------------------|------------------|
| Analyzer make: | API T201 | Analyzer serial #: | 215 | |
| Converter make: | API 501 | Converter serial #: | 217 | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.398 | 1.398 | NH3 Range (ppb) | 0 - 1000 ppb |
| NOX coefficient | 1.466 | 1.466 | NOX Range (ppb) | 0 - 1000 ppb |
| NO2 coefficient | 1.000 | 1.000 | PMT Temperature | 7.0 7.0 |
| NH3 coefficient | 1.029 | 1.029 | Reaction cell Press | 4.4 4.4 |
| TN coefficient | 1.441 | 1.441 | Sample Flow | 556 556 |
| NO bkgnd | 0.00 | 0.0 | PMT Voltage | 693 693 |
| NOX bkgnd | 0.000 | 0.0 | Moly Temperature | 315.8 315.8 |
| TN bkgnd | 0.9 | 0.9 | NH3 Conv Temp | 825 825 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.998888 | 0.966574 |
| NO _x Cal Offset | 2.754539 | -0.289972 |
| NO Cal Slope | 1.000065 | 0.988910 |
| NO Cal Offset | 3.122622 | -0.098891 |
| NO ₂ Cal Slope | 1.006439 | |
| NO ₂ Cal Offset | -0.208343 | |
| NH3 Cal Slope | 0.995822 | |
| NH3 Cal Offset | 2.323278 | |
| TN Cal Slope | 0.987104 | |
| TN Cal Offset | 2.275247 | |



Wood Buffalo Environmental Association

TN - NOX - NH₃ Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | Source gas flow rate (sccm) | Calculated TN concentration (ppb) (Cc) | Calculated NOX concentration (ppb) (Cc) | Calculated NH3 concentration (ppb) (Cc) | Indicated TN concentration (ppb) (Ic) | Indicated NOX concentration (ppb) (Ic) | Indicated NH3 concentration (ppb) (Ic) | TN Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NH3 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|------------------------|-----------------------------|--|---|---|---------------------------------------|--|--|--|---|
| as found zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 0.3 | -0.5 | ---- | ---- |
| as found NO | 5539 | 84.1 | 795.6 | 795.6 | ---- | 810.2 | 823.8 | -13.7 | 0.982 | ---- |
| calibrator zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 0.3 | -0.5 | ---- | ---- |
| high NO point | 5543 | 84.2 | 796.0 | 796.0 | ---- | 810.2 | 823.8 | -13.7 | 0.982 | ---- |
| NO/O3 point | 5543 | 84.2 | 796.0 | 796.0 | ---- | | | | | |
| as found NH3 | 4544 | 85.1 | 1786.7 | NA | 1786.7 | | | | | |
| first NH3 | 4544 | 85.1 | 1786.7 | NA | 1786.7 | | | | | |
| second NH3 | 4544 | 47.4 | 995.1 | NA | 995.1 | | | | | |
| third NH3 | 4544 | 23.7 | 497.6 | NA | 497.6 | | | | | |

| | |
|---------------------------|--------|
| Average Correction Factor | 0.9824 |
|---------------------------|--------|

Corrected As found TN = 810.4 ppb NO_x = 823.5 ppb NH3 = NA ppb

Previous Response TN = 803.7 ppb NO_x = 793.7 ppb NH3 = 1791.8 ppb

*Percent Change TN = -0.8%

*Percent Change NO_x = -3.6%

*Percent Change NH3 = NA

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

NH3 Previous Converter Efficiency = 102.9 %

NH3 Current Converter Efficiency = 102.9 %



Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | Source gas flow rate (sccm) | Calculated NO _x concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated TN concentration (ppb) (Cc) | Indicated NO _x concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated TN concentration (ppb) (Ic) | NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|------------------------|-----------------------------|---|--|--|--|---------------------------------------|---------------------------------------|---|--|
| as found zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | -0.2 | ---- | ---- |
| as found span | 5543 | 84.2 | 796.0 | 796.0 | 796.0 | 823.8 | 805.0 | 810.2 | 0.9662 | 0.9888 |
| calibrator zero | 5543 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | -0.2 | ---- | ---- |
| high point | 5543 | 84.2 | 796.0 | 796.0 | 796.0 | 823.8 | 805.0 | 810.2 | 0.9662 | 0.9888 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 0.9662 | 0.9888 |

| | | | | | |
|--------------------|----------------|-----------------------------|----------------|-----------------|-------------------------|
| Corrected As found | TN = 810.4 ppb | NO _x = 823.5 ppb | NO = 804.9 ppb | *Percent Change | TN = -0.8% |
| Previous Response | TN = 804.1 ppb | NO _x = 794.1 ppb | NO = 792.8 ppb | *Percent Change | NO _x = -3.6% |
| | | | | *Percent Change | NO = -1.5% |

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

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO ₂ concentration (ppb) (Cc) | Indicated NO _x concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO ₂ concentration (ppb) (Ic) | NO _x Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO ₂ Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|---|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | | | | | | | | |
| 1st NO ₂ (400 ppb O ₃) | | | | | | | | | |
| 2nd NO ₂ (200 ppb O ₃) | | | | | | | | | |
| 3rd NO ₂ (100 ppb O ₃) | | | | | | | | | |
| 2nd NO ref point | | | | | | | | | |
| Average Correction Factor | | | | | | | | | |

Notes:

Cal gas change, no adjustment.

Calibration Performed By:

Ryan Power



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

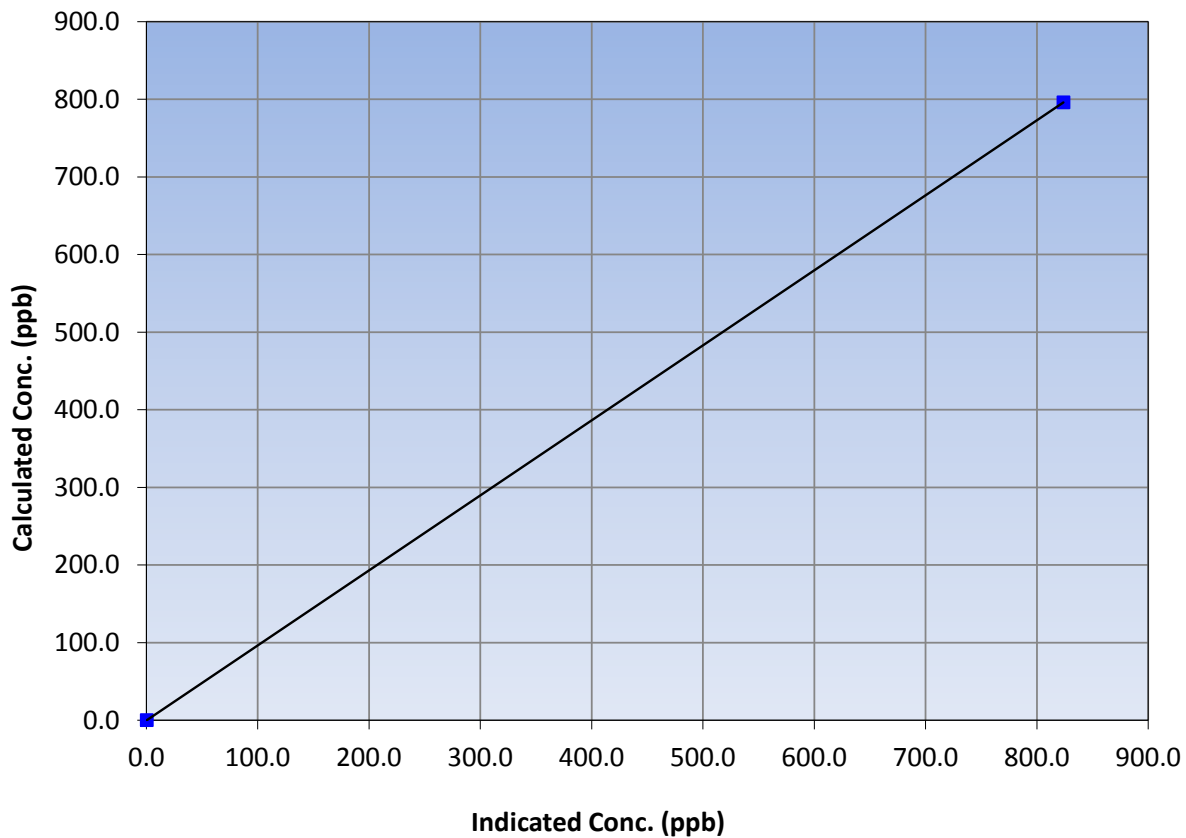
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 19, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:03 |
| Analyzer make | API T201 | Analyzer serial # | 215 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 1.000000 | |
| 796.0 | 823.8 | 0.9662 | | | ≥0.995 |
| | | | Slope | 0.966574 | 0.90 - 1.10 |
| | | | Intercept | -0.289972 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

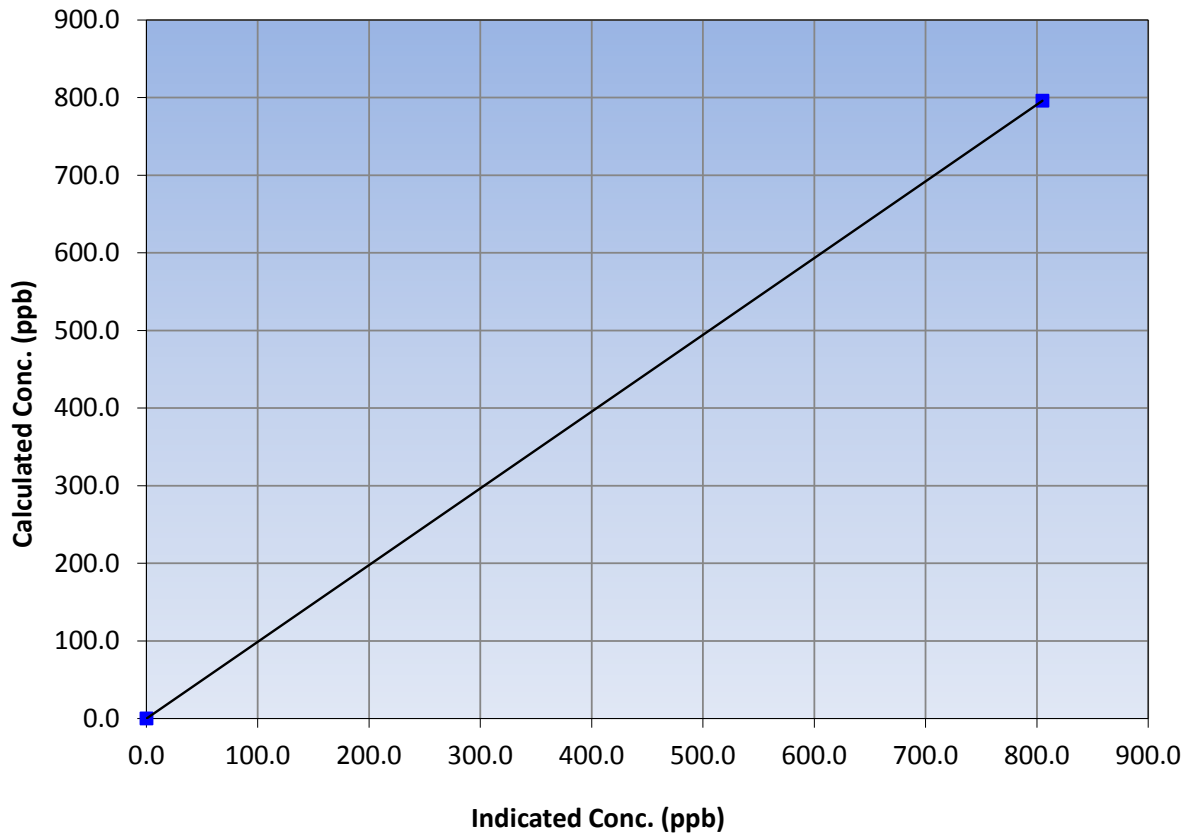
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 25, 2017 | Previous Calibration | September 19, 2017 |
| Station Name | Patricia McInnes | Station Number | AMS 06 |
| Start Time (MST) | 11:00 | End Time (MST) | 13:03 |
| Analyzer make | API T201 | Analyzer serial # | 215 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 1.000000 | |
| 796.0 | 805.0 | 0.9888 | | | ≥0.995 |
| | | | Slope | 0.988910 | 0.90 - 1.10 |
| | | | Intercept | -0.098891 | +/-20 |

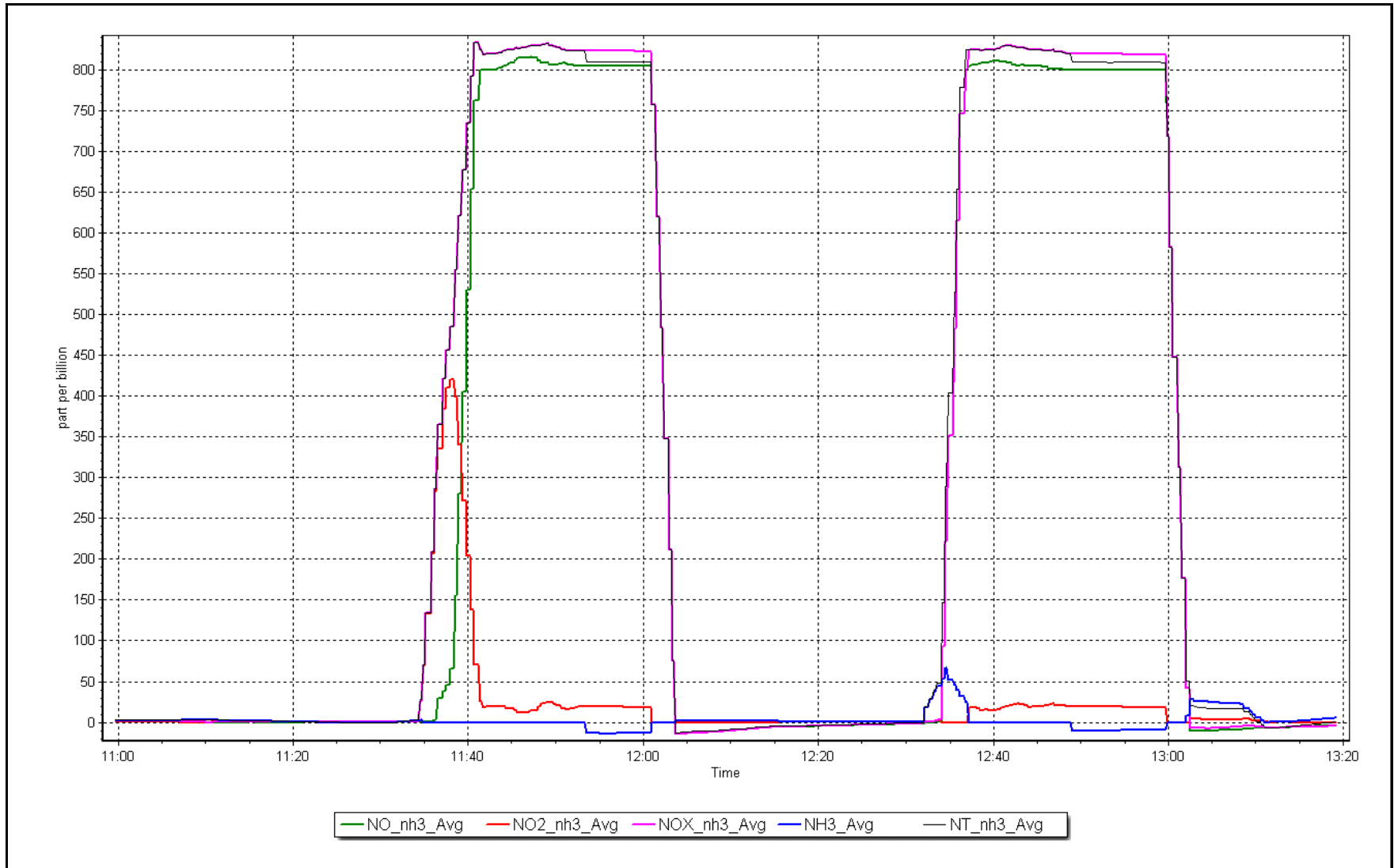
NO Calibration Curve



NO_x Calibration Plot

Date: September 25, 2017

Location: Patricia McInnes



NH₃ Calibration Plot

Date: September 19, 2017

Location: Patricia McInnes



PASTE CHART ON THIS CELL



Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|-----------------|
| Station Name: | Patricia McInnes | Station number: | AMS 06 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 10, 2017 |
| Start time (MST): | 11:50 | End time (MST): | 13:22 |
| Sharp Model: | Thermo SHARP 5030 | S/N: | E-1475 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 5680 |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1451 |
| Temp/RH standard: | Delta Cal | S/N: | 1451 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 19 | 20 | 19 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 965 | 962 | 965 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 994.5 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.9 | ----- | 0 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input checked="" type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

| | | | | |
|------------|-------------------|------------------------|------------------|---------------------|
| Leak Test: | Date of check: | <u>August 10, 2017</u> | Last Cal Date: | <u>June 7, 2017</u> |
| | Flow w/o adaptor: | <u>16.58</u> | Flow w/ adaptor: | <u>16.44</u> |

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-----------------------------------|--|--|-----------------|
| <input type="checkbox"/> | Foil S/N: <u>2/09/07</u> | Foil S/N: <u>2597</u> | |
| Foil Calibration | Foil Mass: <u>1167</u> | Foil Mass: <u>1167</u> | |
| | Calibration Date: <u>August 10, 2017</u> | Calibration Date: <u>April 4, 2017</u> | |
| (Limit) +/- 5% of previous | Correction Factor: <u>6945</u> | Correction Factor: <u>6887</u> | 0.84% |

Annual Calibration Test

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

Notes: Nephelometer zeroed, cyclone head and cyclone cleaned.

Calibration by: Ryan Power



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 7
ATHABASCA VALLEY
SEPTEMBER 2017**

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

October 27, 2017

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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 686 | 34 | 34 | 100 | 11 | 0 | 2 | 0 |
| TRS (ppb) Average | 682 | 33 | 38 | 99.31 | 2 | 0 | 1 | 0 |
| THC (ppm) Average | 686 | 34 | 34 | 100 | 3.4 | - | 2.3 | - |
| NMHC (ppm) Average | 686 | 34 | 34 | 100 | 0.559 | - | 0.121 | - |
| CH4(ppm) Average | 686 | 34 | 34 | 100 | 3.4 | - | 2.3 | - |
| O3 (ppb) Average | 687 | 33 | 33 | 100 | 75 | 0 | 39 | - |
| NO2 (ppb) Average | 686 | 34 | 34 | 100 | 28 | 0 | 10 | - |
| NO (ppb) Average | 686 | 34 | 34 | 100 | 22 | - | 5 | - |
| NOX (ppb) Average | 686 | 34 | 34 | 100 | 39 | - | 14 | - |
| PM2.5 (ug/m3) Average | 719 | 1 | 1 | 100 | 52.3 | - | 20.3 | 0 |
| CO(ppm) Average | 687 | 33 | 33 | 100 | 0.7 | 0 | 0.2 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 32.4 | - | 21.5 | - |
| Barometric Pressure (inHg) Average | 720 | 0 | 0 | 100 | 29.4 | - | 29.3 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 97 | - | 90 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 34 | - | 17 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|------------------------------------|--------|-------|--------|-------|------------|------|------|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 686 | 0.6 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 11 |
| TRS (ppb) Average | 682 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| THC (ppm) Average | 686 | 1.98 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.1 | 3.4 |
| NMHC (ppm) Average | 686 | 0.011 | 0.046 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0.559 |
| CH4(ppm) Average | 686 | 1.97 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.1 | 3.4 |
| O3 (ppb) Average | 687 | 26.6 | 11 | - | 6 | 12 | 17 | 27 | 34 | 40 | 75 |
| NO2 (ppb) Average | 686 | 5.5 | 4 | - | 0 | 1 | 2 | 5 | 8 | 12 | 28 |
| NO (ppb) Average | 686 | 1.7 | 3 | - | 0 | 0 | 0 | 1 | 2 | 5 | 22 |
| NOX (ppb) Average | 686 | 7.2 | 6 | - | 0 | 1 | 2 | 6 | 10 | 16 | 39 |
| PM2.5 (ug/m3) Average | 719 | 7.62 | 7 | - | 0.2 | 2.7 | 3.6 | 5.2 | 9.4 | 14.1 | 52.3 |
| CO(ppm) Average | 687 | 0.13 | 0.1 | - | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.7 |
| Temperature 2 m (C) Average | 720 | 12.81 | 6.1 | - | -1.4 | 5.4 | 8.2 | 12.3 | 16.7 | 20.9 | 32.4 |
| Barometric Pressure (inHg) Average | 720 | 28.93 | 0.2 | - | 28.5 | 28.6 | 28.8 | 28.9 | 29.1 | 29.2 | 29.4 |
| Relative Humidity (%) Average | 720 | 66.3 | 19 | - | 20 | 37 | 52 | 69 | 83 | 90 | 97 |
| Wind Speed 10 m (km/h) Average | 720 | 9.2 | 6 | - | 0 | 2 | 4 | 8 | 13 | 17 | 34 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|---------------------|--|
| TRS | 25 Sep 2017 13:00 | 25 Sep 2017 14:00 | 2 | Maintenance - cylinder purged |
| TRS | 26 Sep 2017 13:00 | 26 Sep 2017 14:00 | 2 | Maintenance - cylinder purged |
| TRS | 28 Sep 2017 11:00 | 28 Sep 2017 11:00 | 1 | Maintenance - calibration gas installation |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Athabasca Valley - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 11 ppb on Sep 14 14:00 | Maximum Daily Average: 1.9 ppb on Sep 14 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 14 01:00 | Minimum Daily Average: 0.1 ppb on Sep 18 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 1.3 ppb at hour 15 | Minimum Diurnal Average: 0.3 ppb at hour 1 | | Hours of Calibration: | 34 |
| Monthly Average: 0.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 7 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 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 |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 3-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 5 | 2 | 1 | 2 | 3 | 0.9 | 5 |
| 4-Sep | Z | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 8 | 3 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1.0 | 8 |
| 5-Sep | 0 | Z | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.6 | 1 |
| 6-Sep | 0 | 0 | Z | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.0 | 8 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 2 |
| 8-Sep | 1 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1.0 | 5 |
| 9-Sep | 1 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 4 | 10 | 10 | 5 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1.9 | 10 |
| 10-Sep | 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 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 11 | 9 | 6 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1.9 | 11 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 16-Sep | Z | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 0.6 | 2 |
| 22-Sep | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1.0 | 3 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0 |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 25-Sep | 1 | 1 | 1 | Z | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 8 | 7 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 8 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 29-Sep | 0 | Z | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |

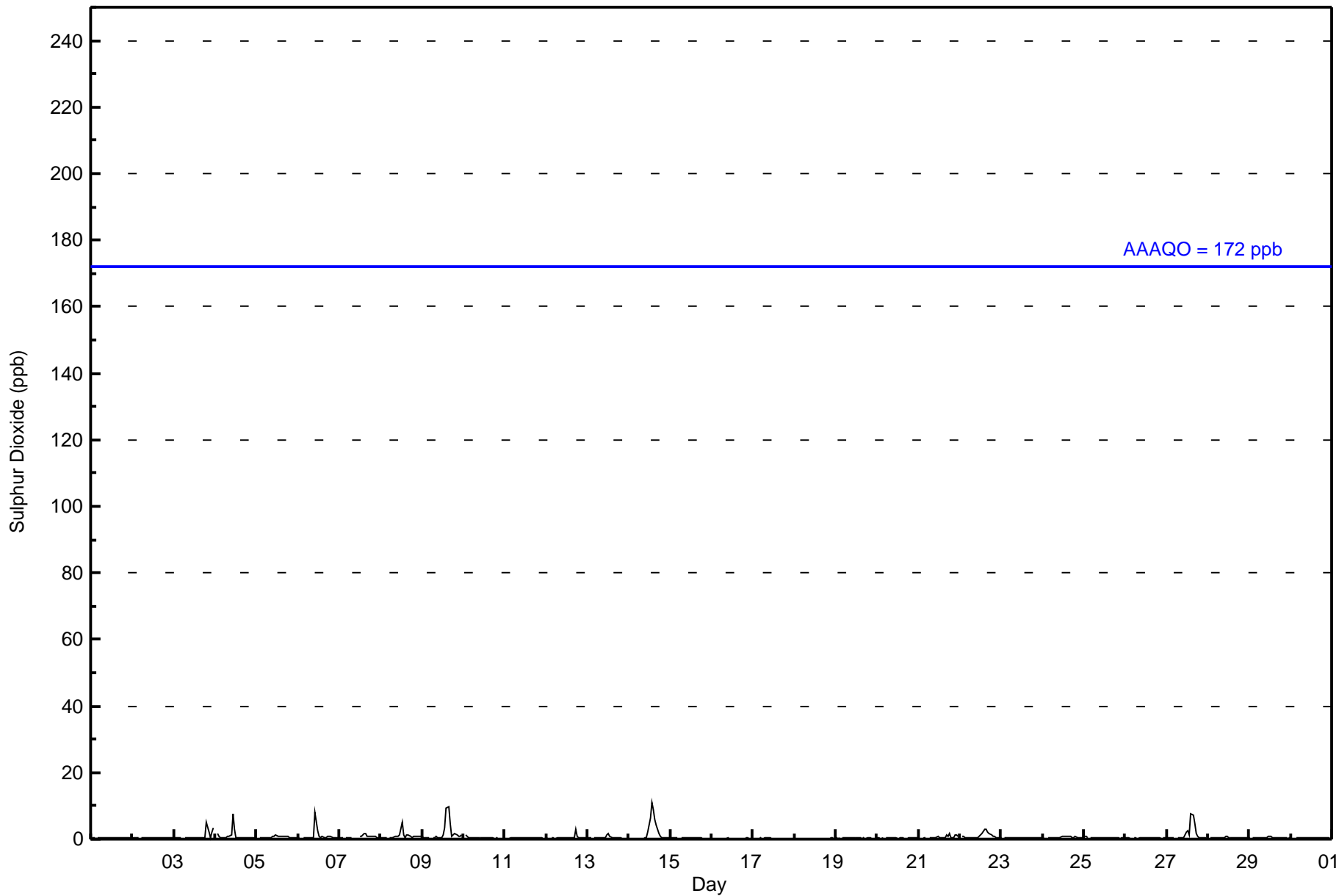
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 1.0 | 0.8 | 0.9 | 1.0 | 1.3 | 1.3 | 0.9 | 0.7 | 0.5 | 0.6 | 0.5 | 0.4 | 0.5 | 0.5 | Diurnal Average | |
| 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | 3 | 6 | 11 | 10 | 10 | 5 | 3 | 2 | 5 | 2 | 1 | 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
Athabasca Valley - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 685 | 99.85 | 99.85 |
| 11 - 20 | 1 | 0.15 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 60 | 685 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 686 |

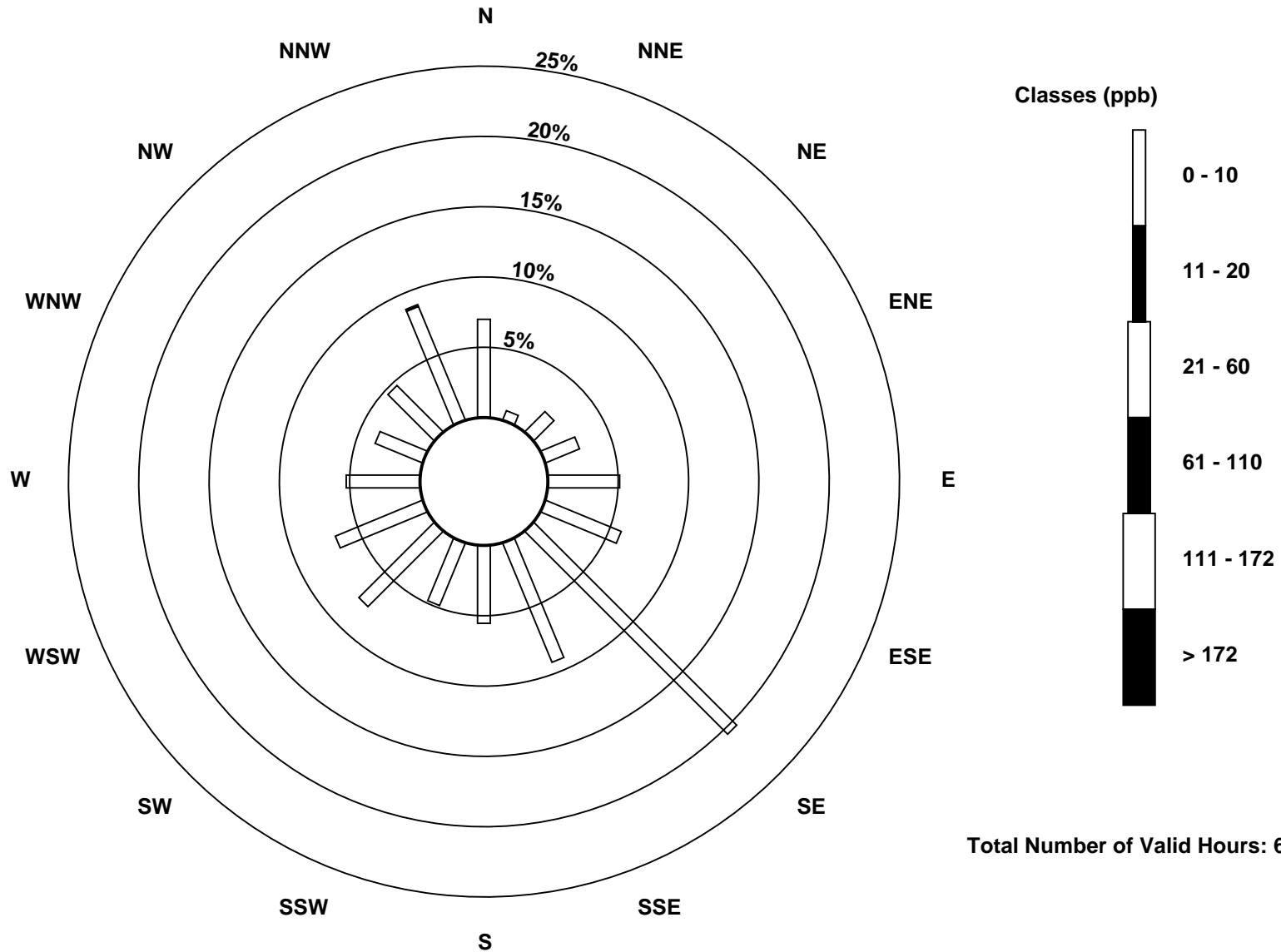
Total Number of Valid Hours: 686

Total Number of Hours: 720

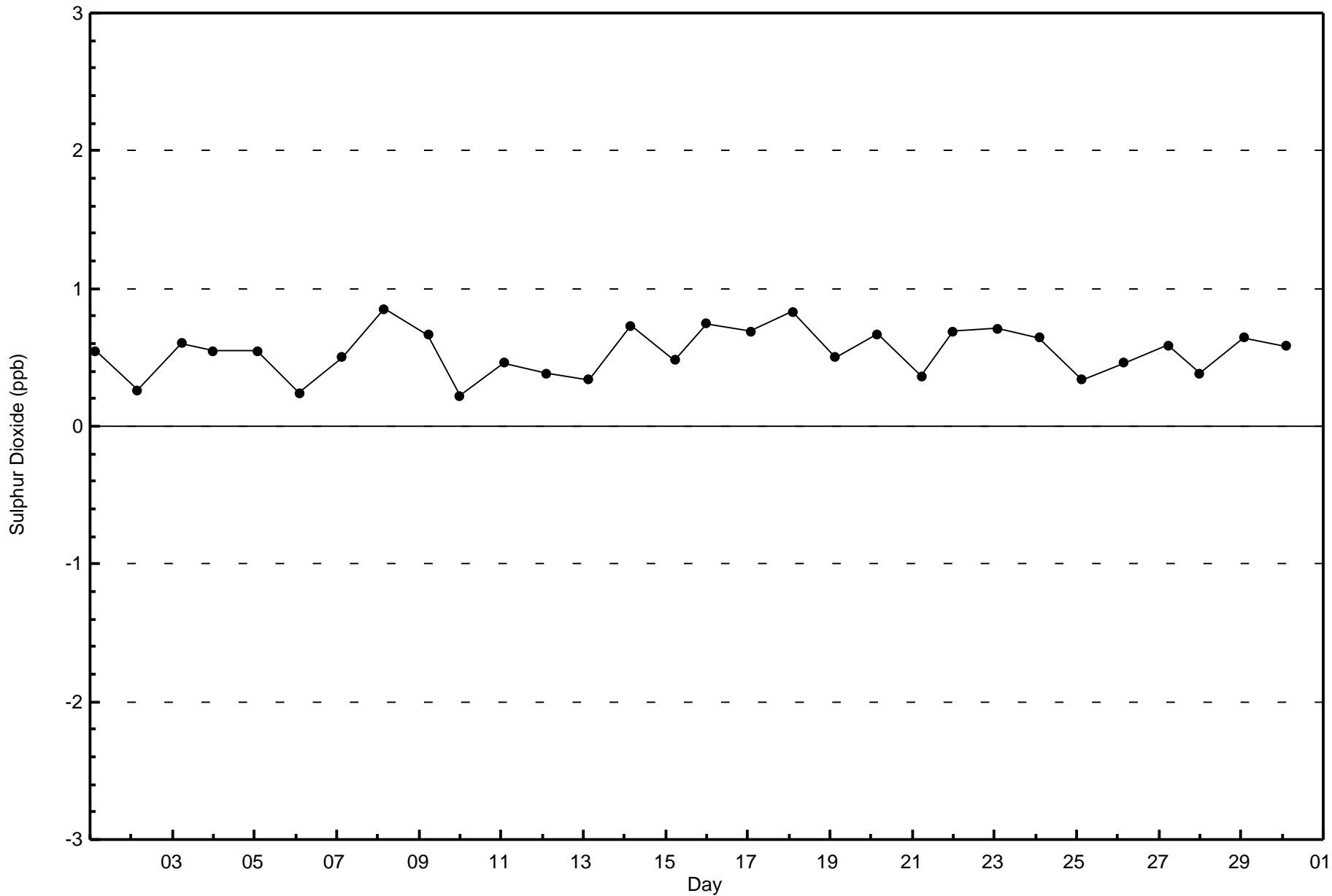


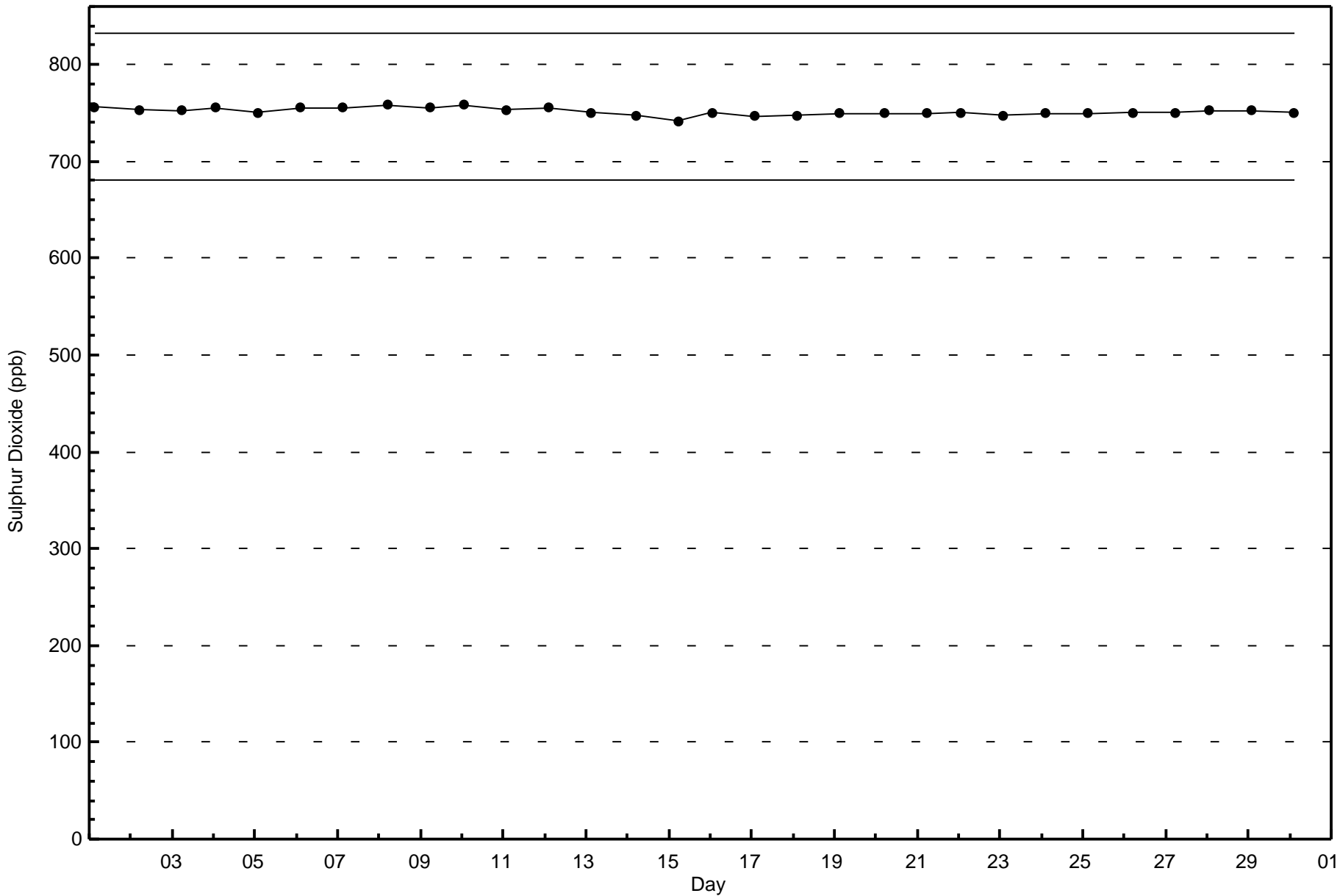
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 8 23:00 | Maximum Daily Average: 0.8 ppb on Sep 9 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 23 13:00 | Minimum Daily Average: 0.2 ppb on Sep 20 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 0.4 ppb at hour 21 | Minimum Diurnal Average: 0.3 ppb at hour 2 | | Hours of Calibration: | 33 |
| 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: | 99.3 |

| 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 5-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.4 | 1 | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 0.5 | 2 |
| 9-Sep | 1 | 1 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 | |
| 10-Sep | 0 | 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-Sep | 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 | 0.3 | 1 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 13-Sep | 0 | 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-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.5 | 1 | |
| 15-Sep | 0 | 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 | |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 17-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 19-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | |
| 28-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 29-Sep | 0 | 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 | |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |

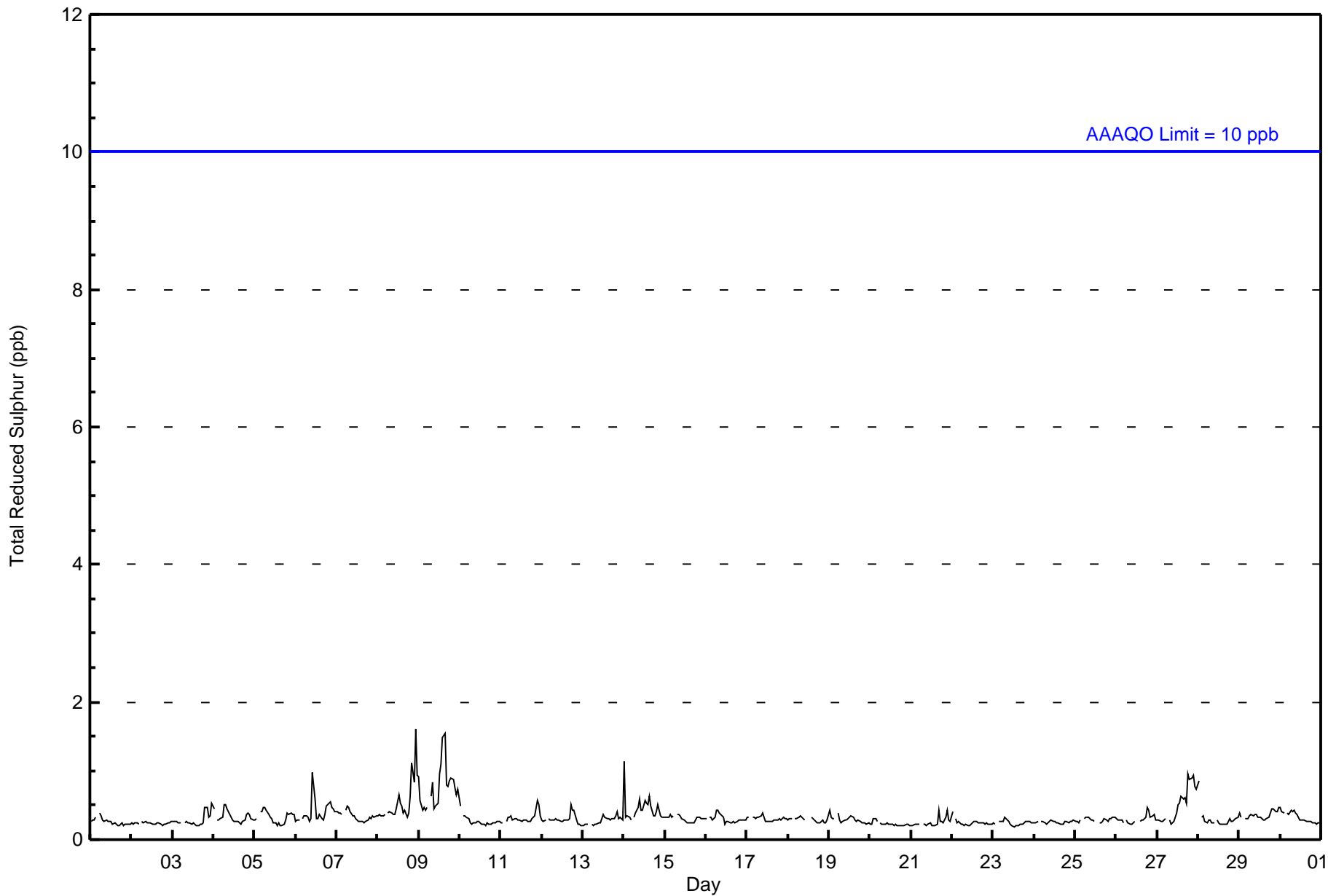
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | Diurnal Average | | |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2017**

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

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 47 | 7 | 12 | 19 | 35 | 40 | 137 | 62 | 39 | 36 | 49 | 45 | 36 | 25 | 31 | 62 | 682 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 47 | 7 | 12 | 19 | 35 | 40 | 137 | 62 | 39 | 36 | 49 | 45 | 36 | 25 | 31 | 62 | 682 |

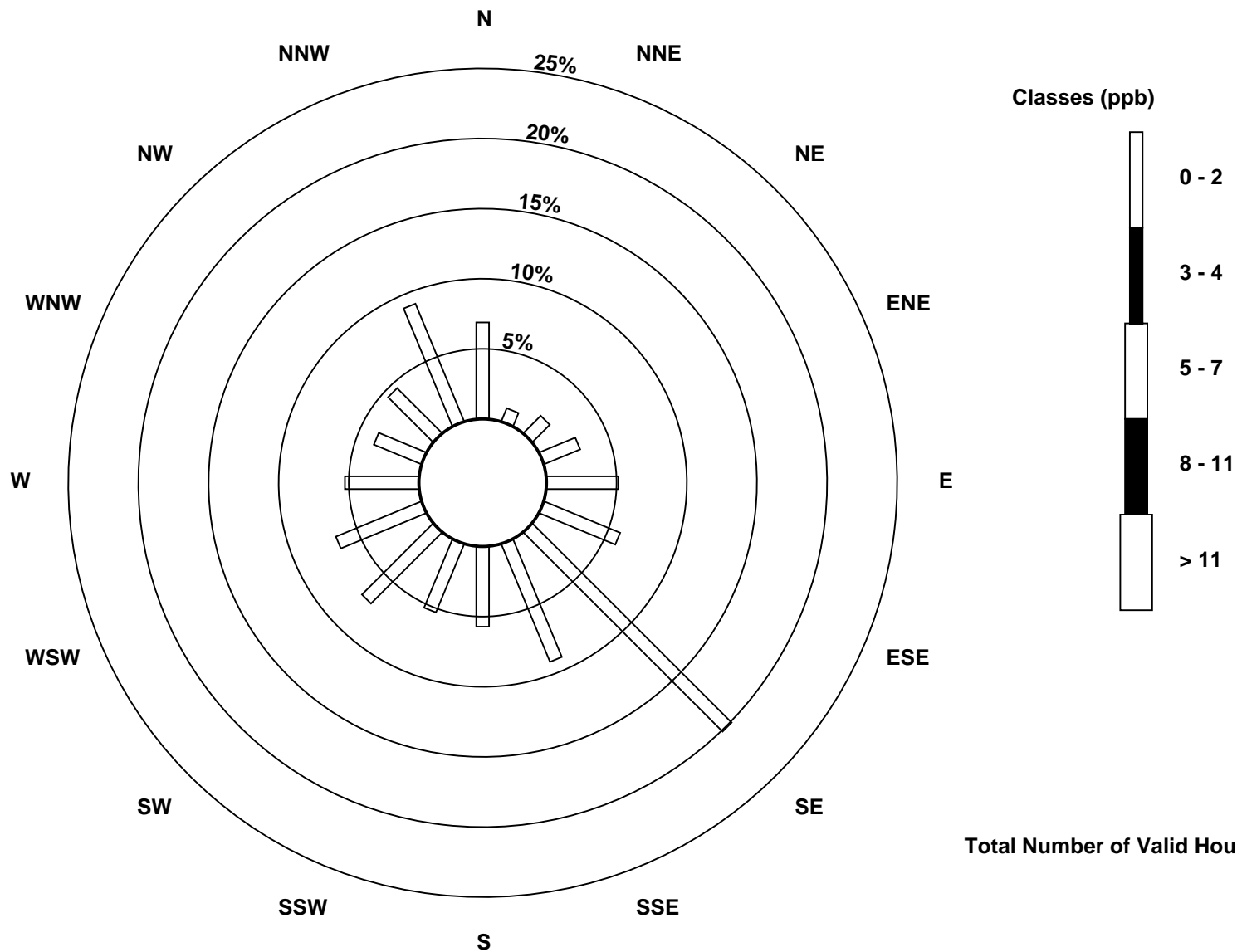
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

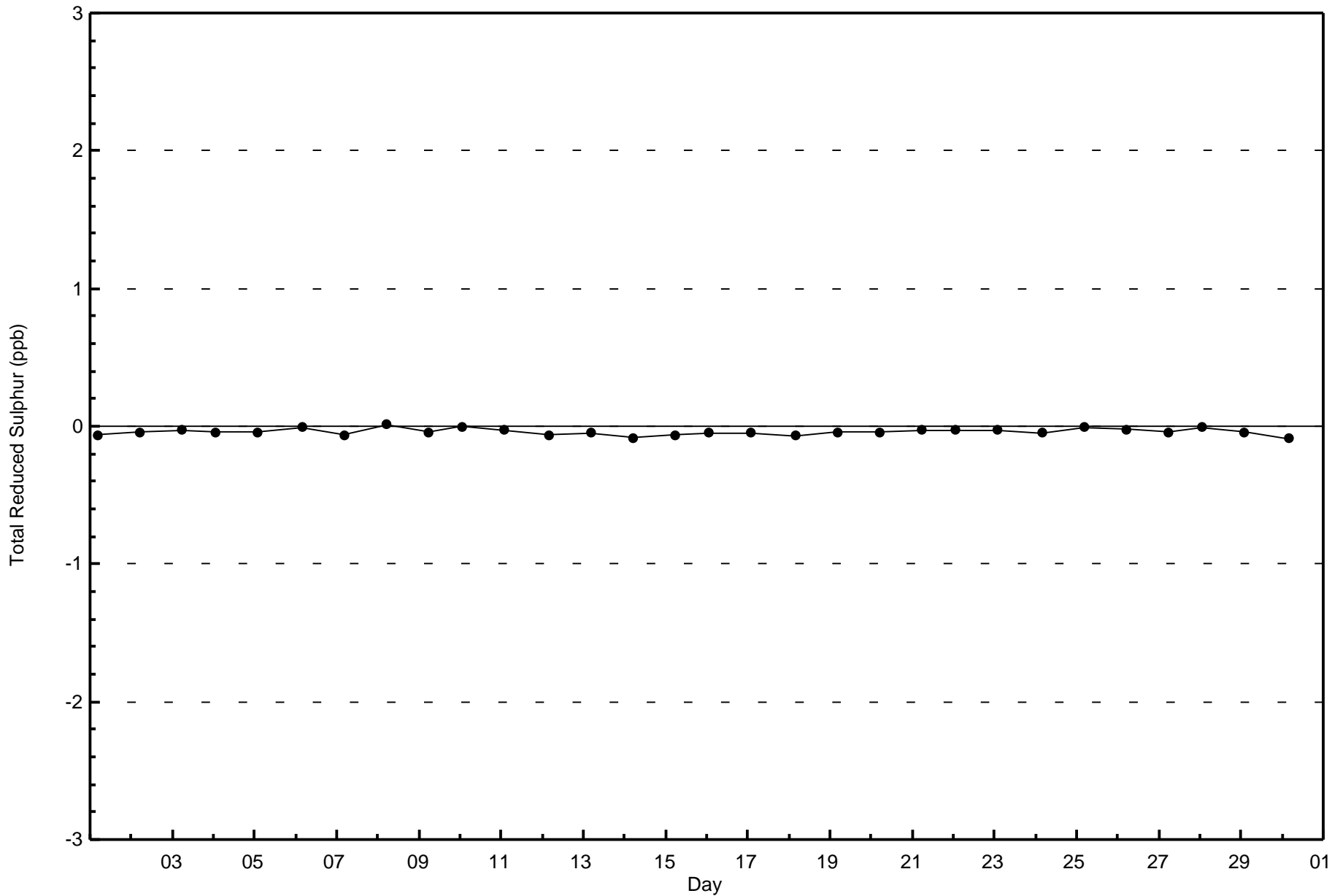


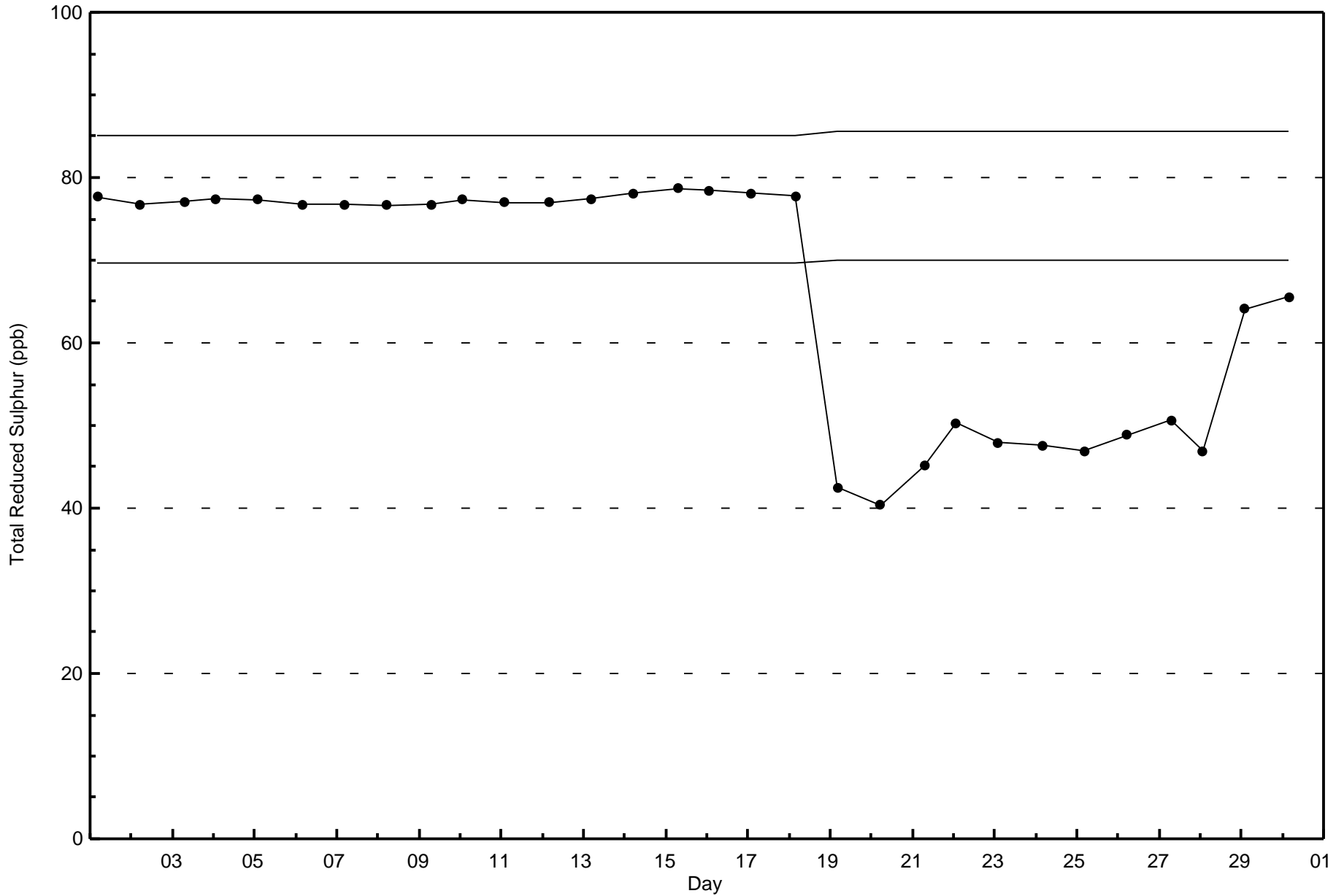
Total Number of Valid Hours: 682



Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2017

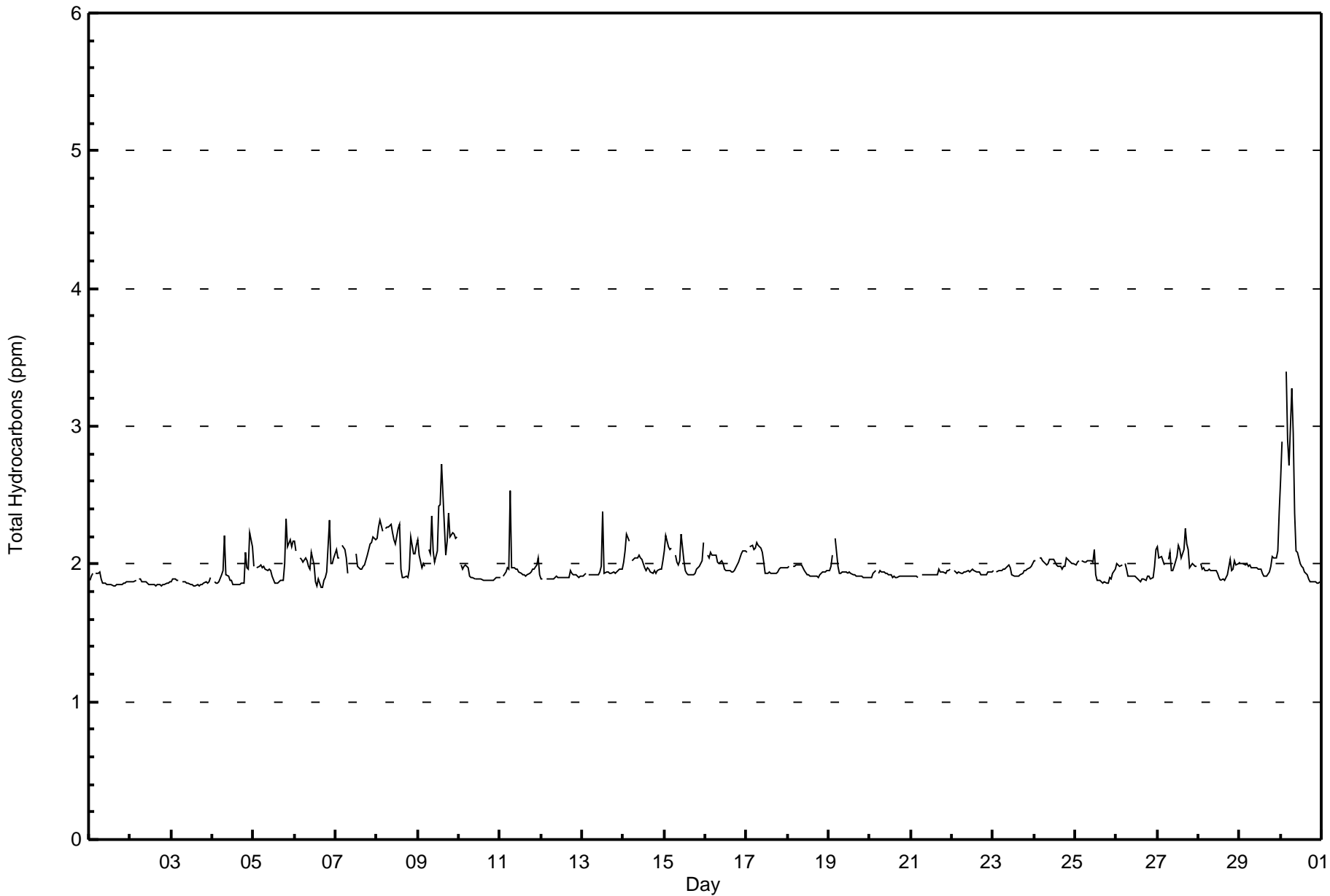






Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 569 | 82.94 | 82.94 |
| 2.1 - 3.0 | 115 | 16.76 | 99.71 |
| 3.1 - 10.0 | 2 | 0.29 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Athabasca Valley - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 46 | 5 | 12 | 16 | 29 | 30 | 110 | 45 | 27 | 30 | 50 | 45 | 35 | 23 | 25 | 41 | 569 |
| 2.1 - 3.0 | 2 | 0 | 2 | 2 | 5 | 10 | 29 | 18 | 11 | 3 | 2 | 1 | 1 | 2 | 7 | 20 | 115 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 686 |

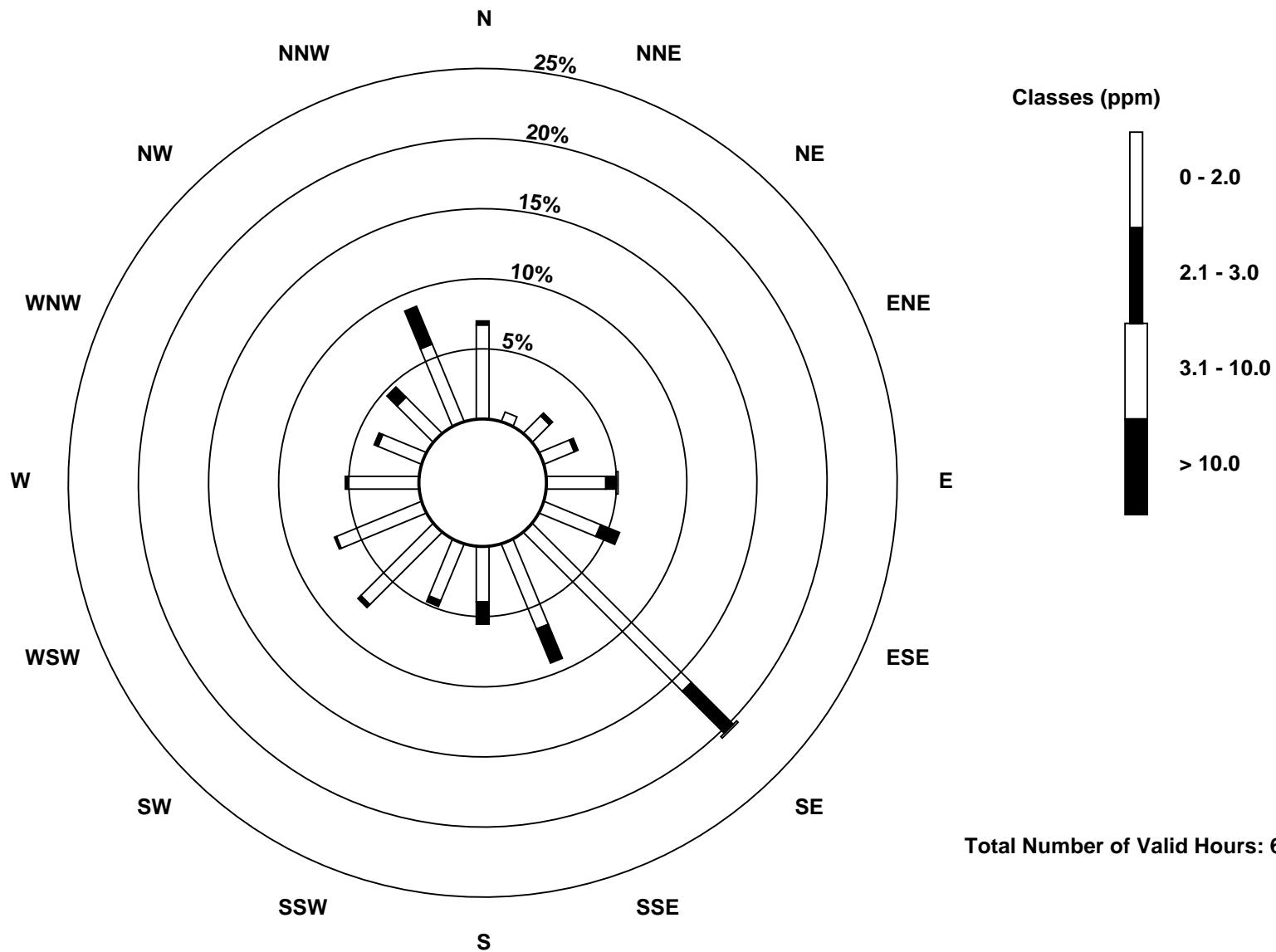
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

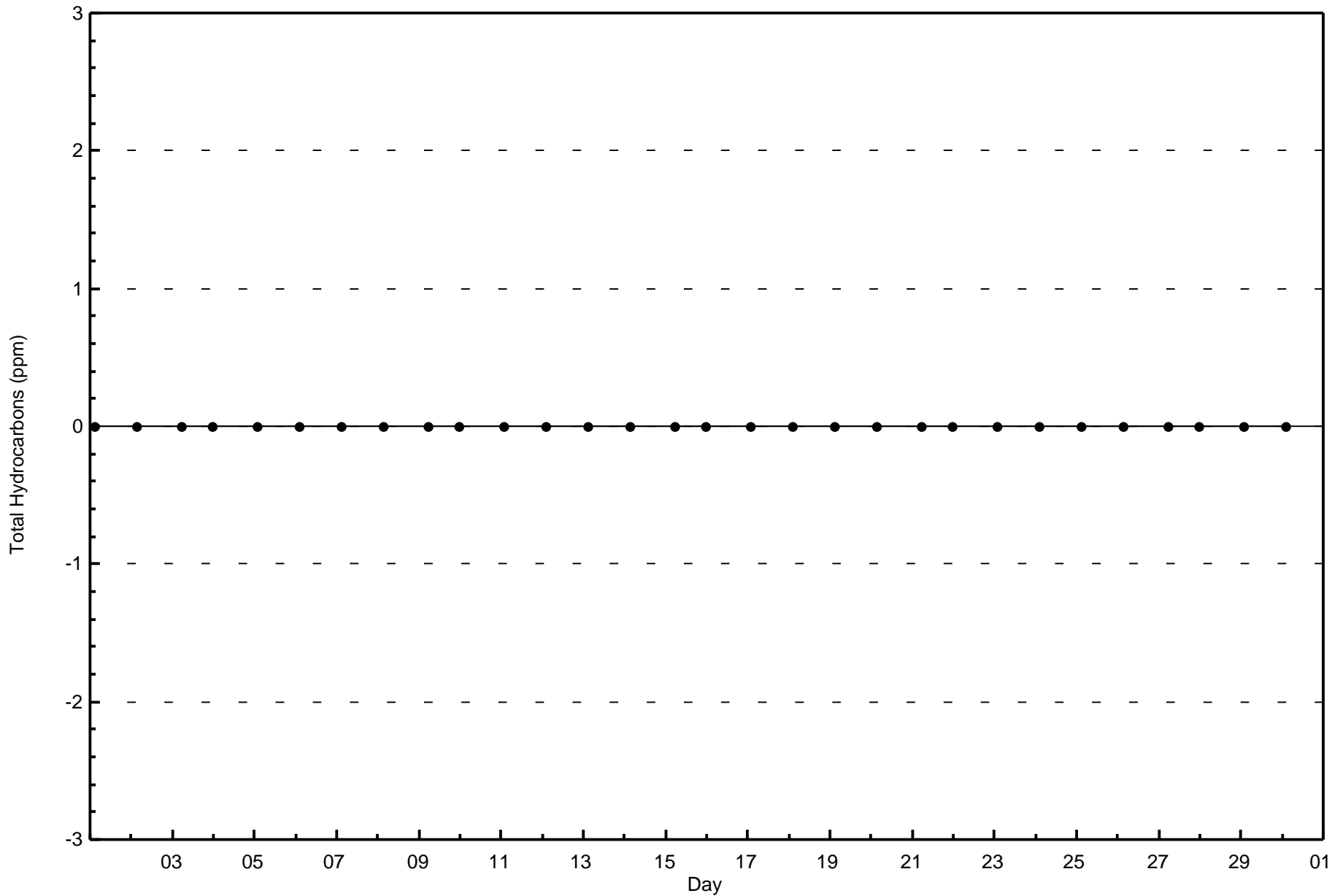


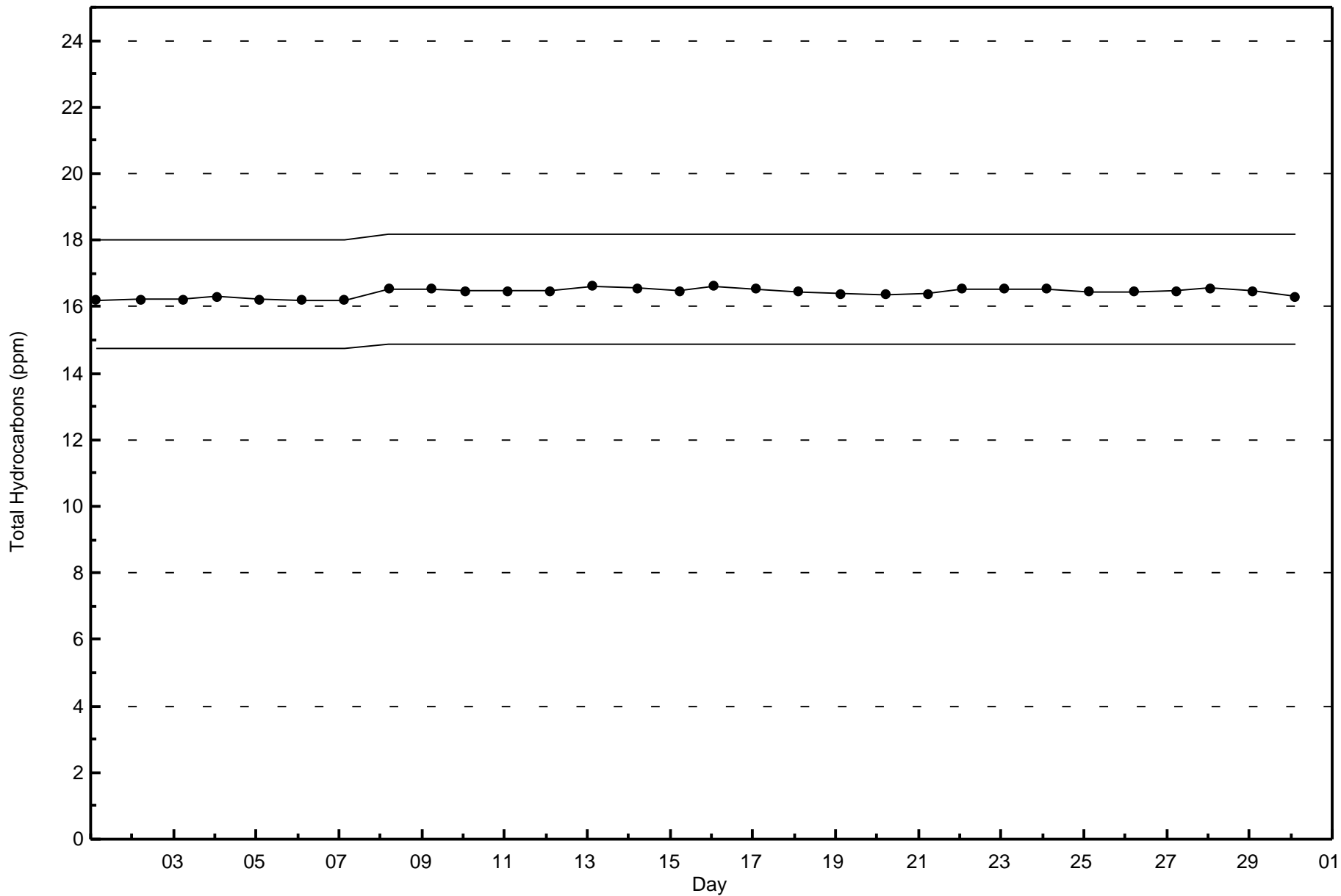
Total Number of Valid Hours: 686

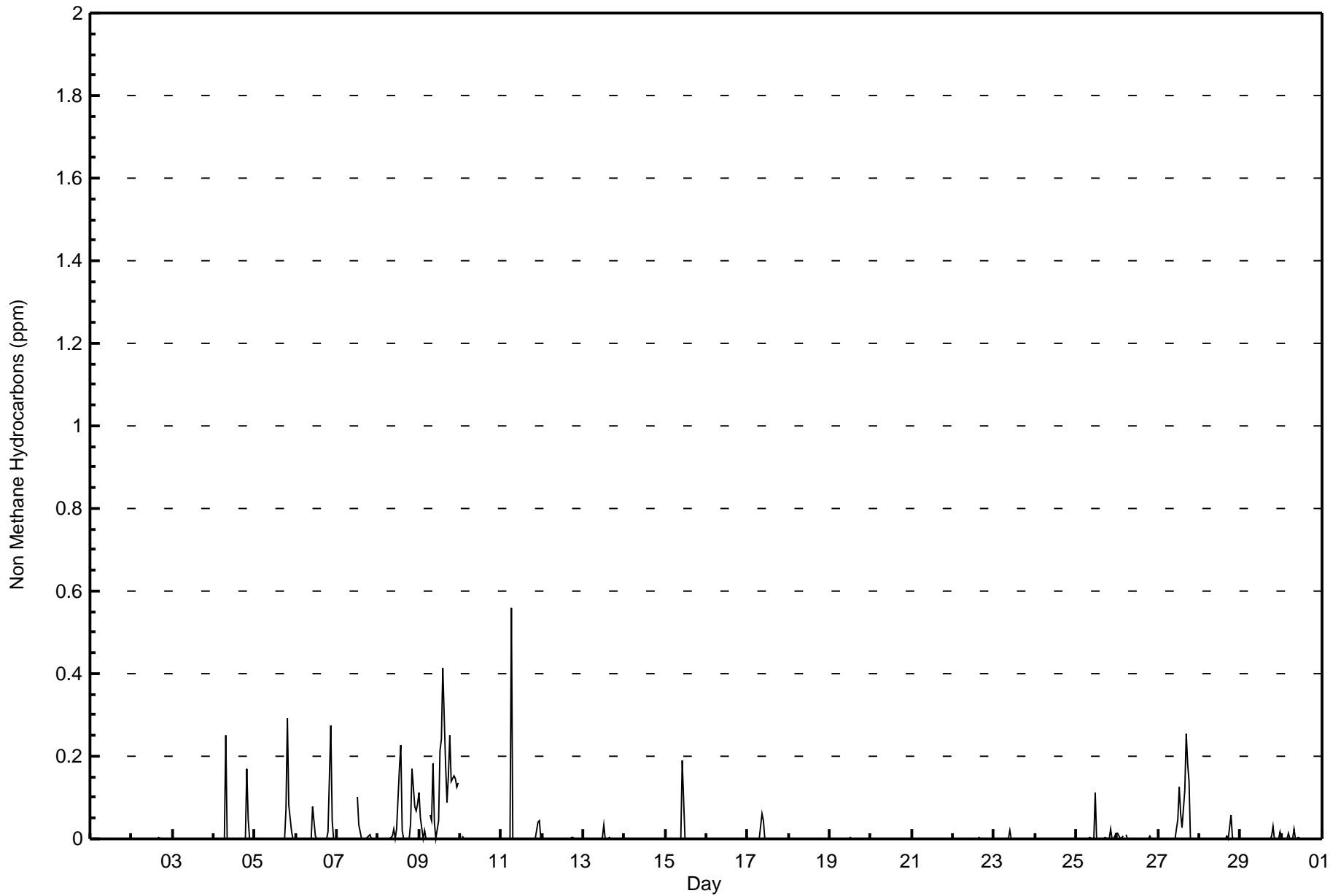


Wood Buffalo Environmental Association
Zero Responses

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









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 608 | 88.63 | 88.63 |
| 0.006 - 0.05 | 38 | 5.54 | 94.17 |
| 0.06 - 0.1 | 21 | 3.06 | 97.23 |
| > 0.1 | 19 | 2.77 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 46 | 5 | 13 | 17 | 35 | 36 | 129 | 53 | 31 | 30 | 50 | 44 | 34 | 23 | 24 | 38 | 608 |
| 0.006 - 0.05 | 0 | 0 | 1 | 0 | 0 | 2 | 7 | 6 | 6 | 3 | 1 | 1 | 2 | 0 | 3 | 6 | 38 |
| 0.06 - 0.1 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 1 | 1 | 0 | 2 | 3 | 5 | 21 |
| > 0.1 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | 19 |
| Totals | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 686 |

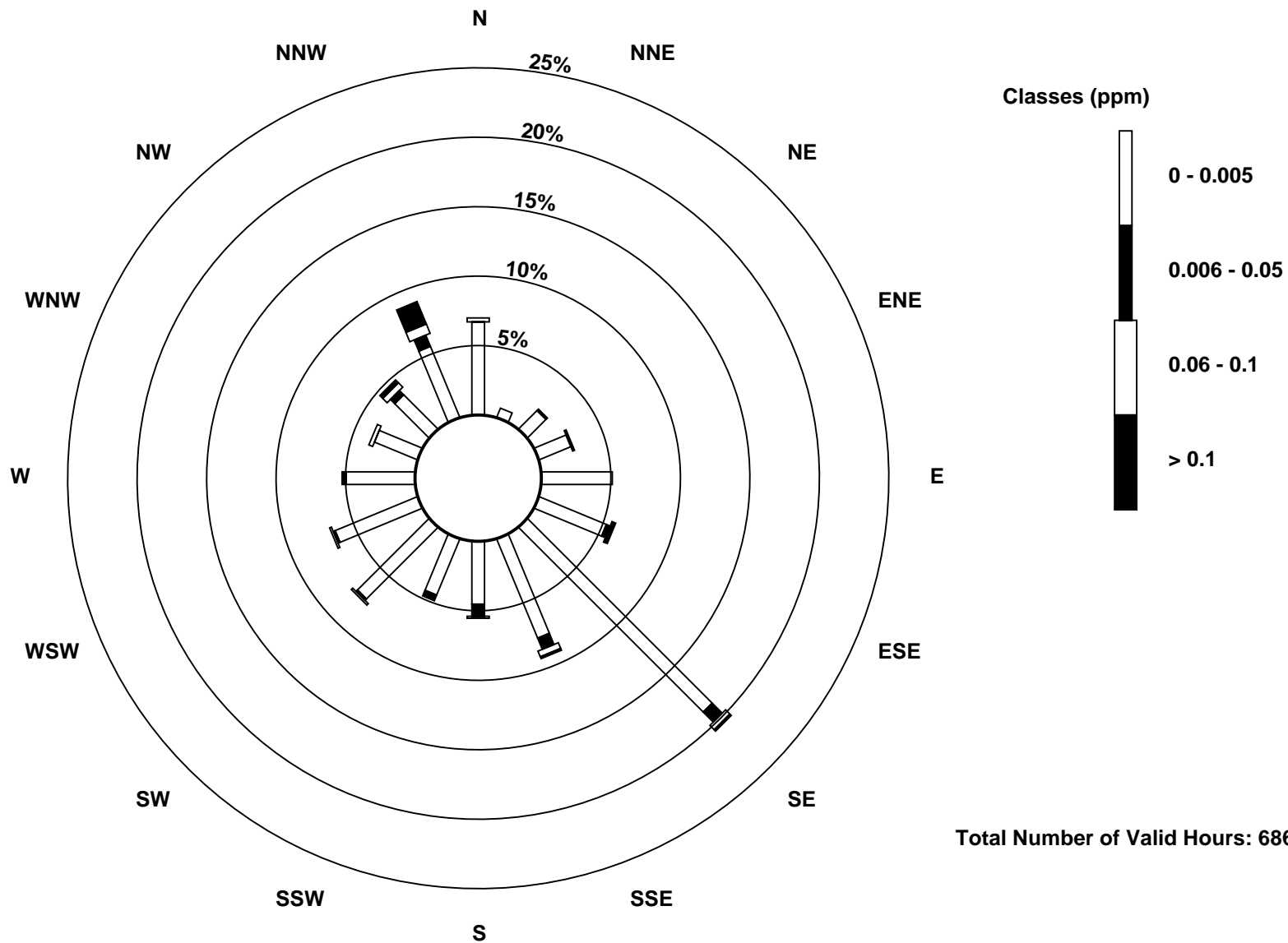
Total Number of Valid Hours: 686

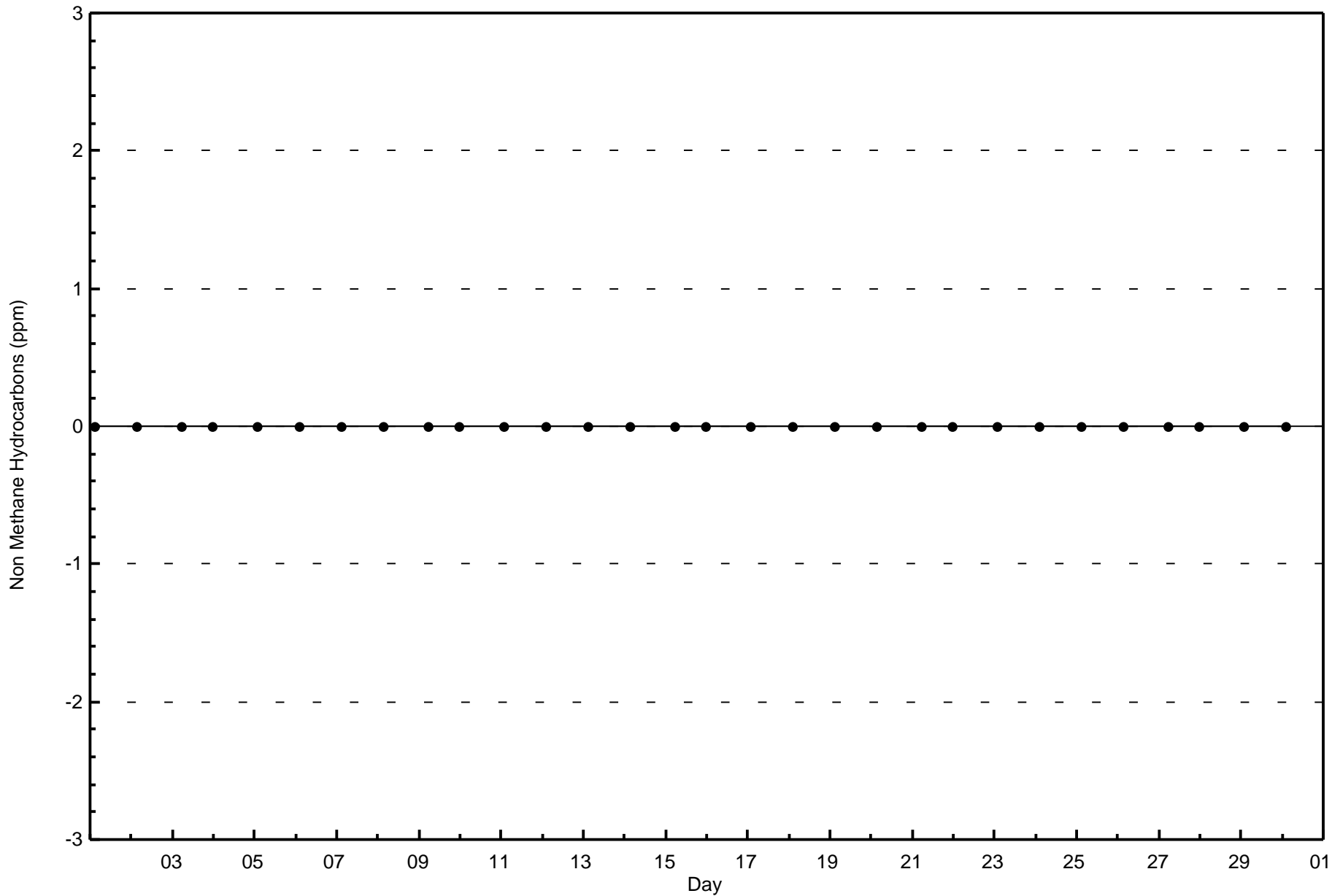
Total Number of Hours: 720

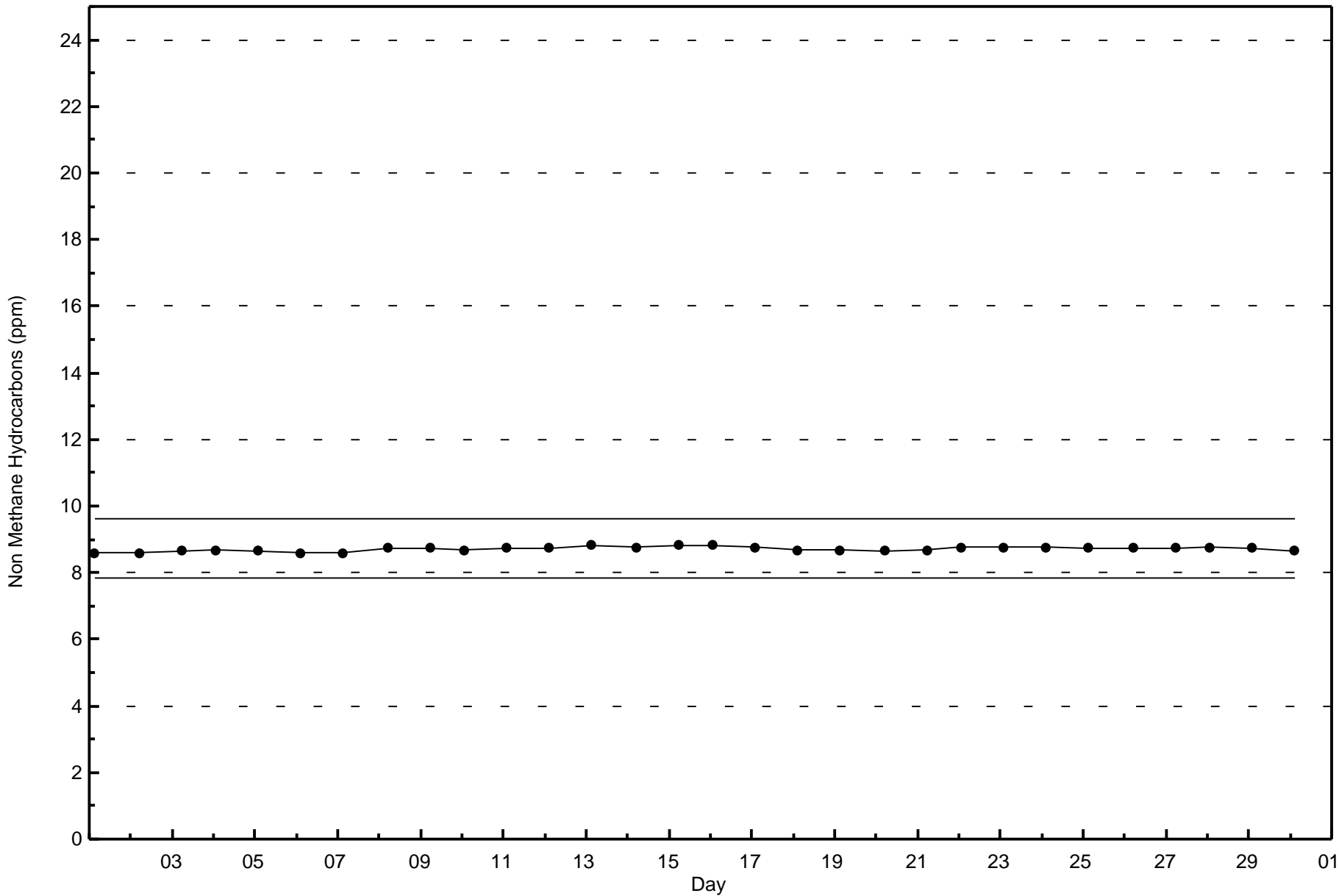


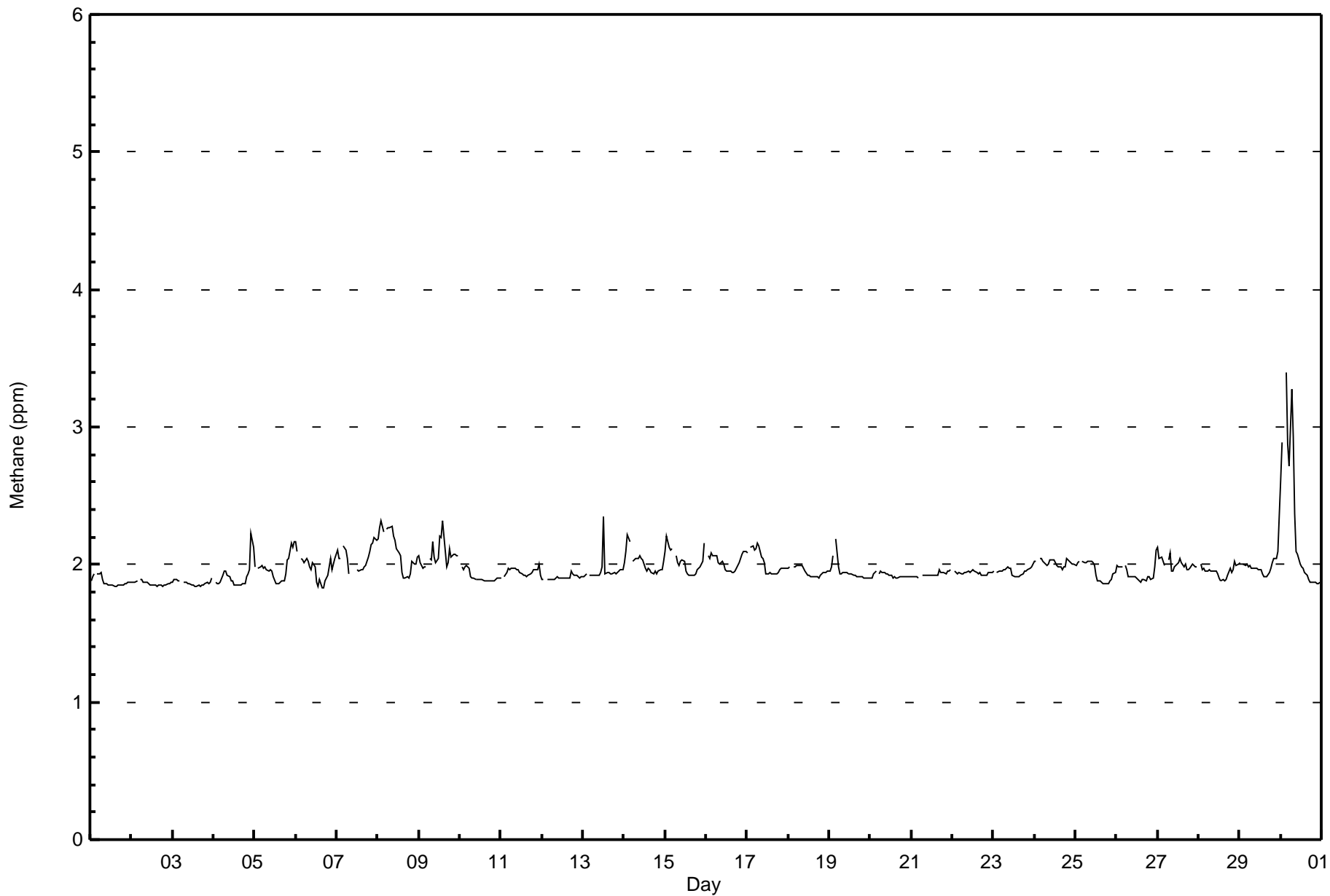
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 597 | 87.03 | 87.03 |
| 2.1 - 3.0 | 87 | 12.68 | 99.71 |
| 3.1 - 10.0 | 2 | 0.29 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Athabasca Valley - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 48 | 5 | 13 | 17 | 29 | 32 | 114 | 48 | 28 | 30 | 51 | 45 | 36 | 24 | 26 | 51 | 597 |
| 2.1 - 3.0 | 0 | 0 | 1 | 1 | 5 | 8 | 25 | 15 | 10 | 3 | 1 | 1 | 0 | 1 | 6 | 10 | 87 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 686 |

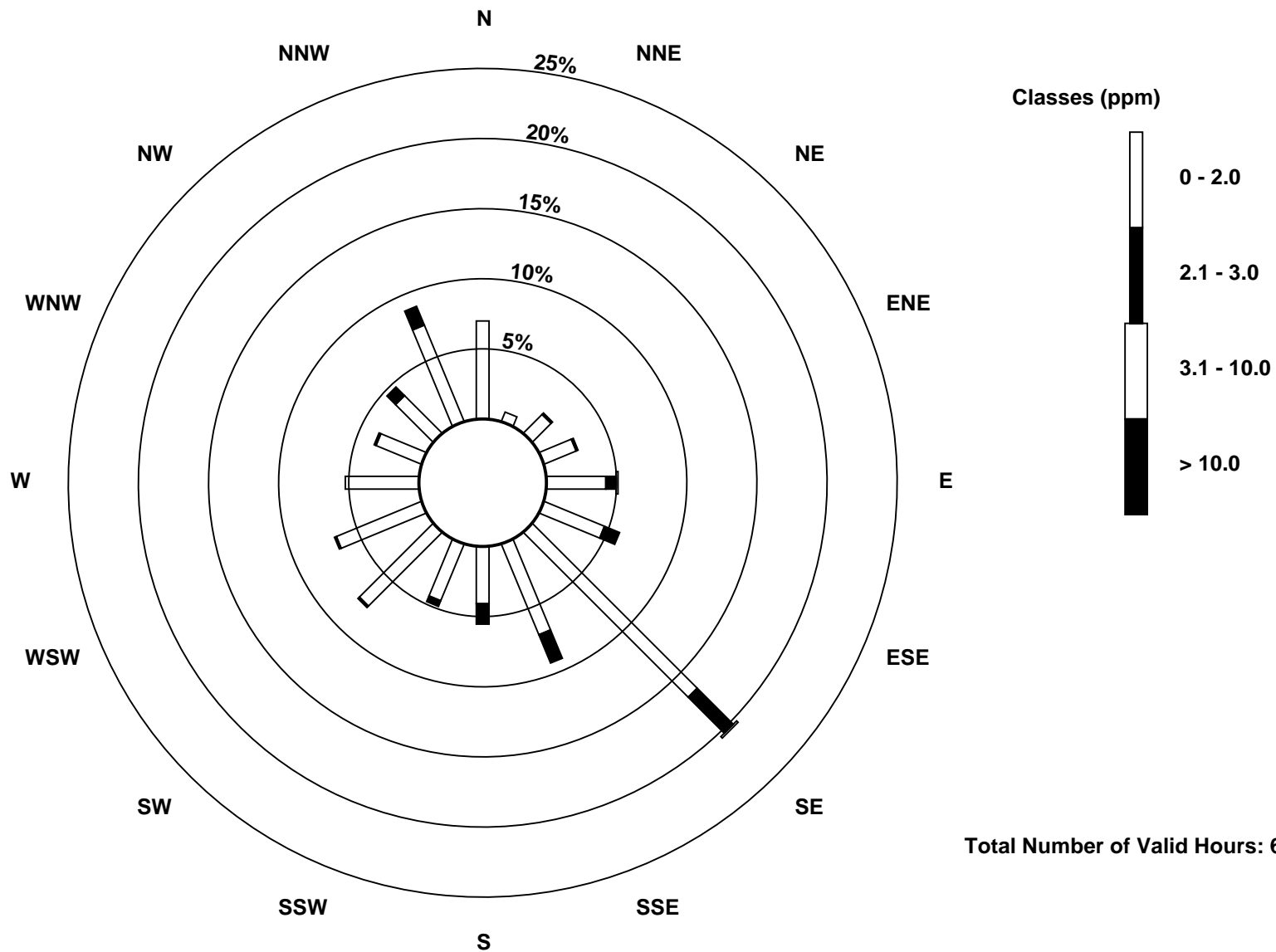
Total Number of Valid Hours: 686

Total Number of Hours: 720

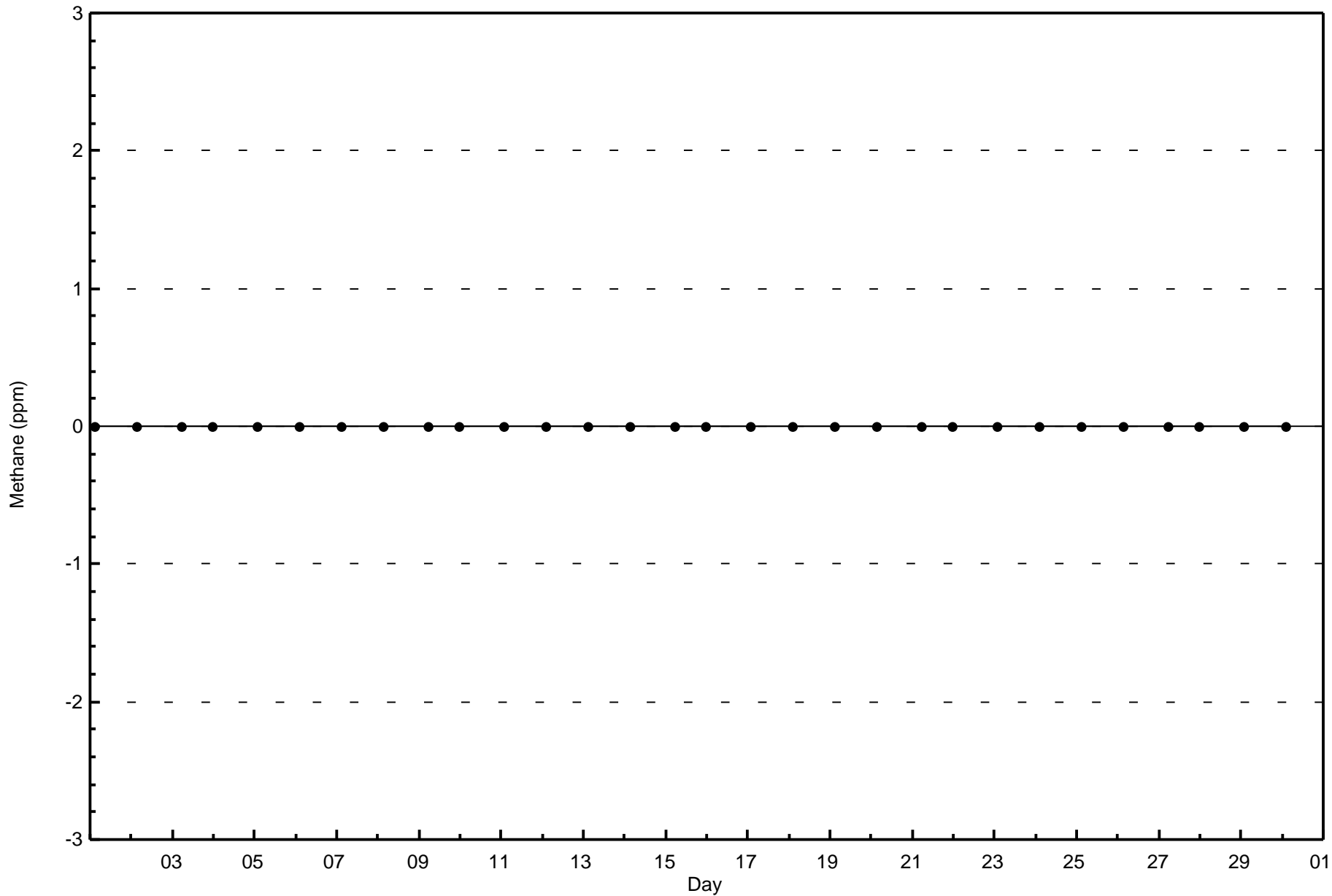


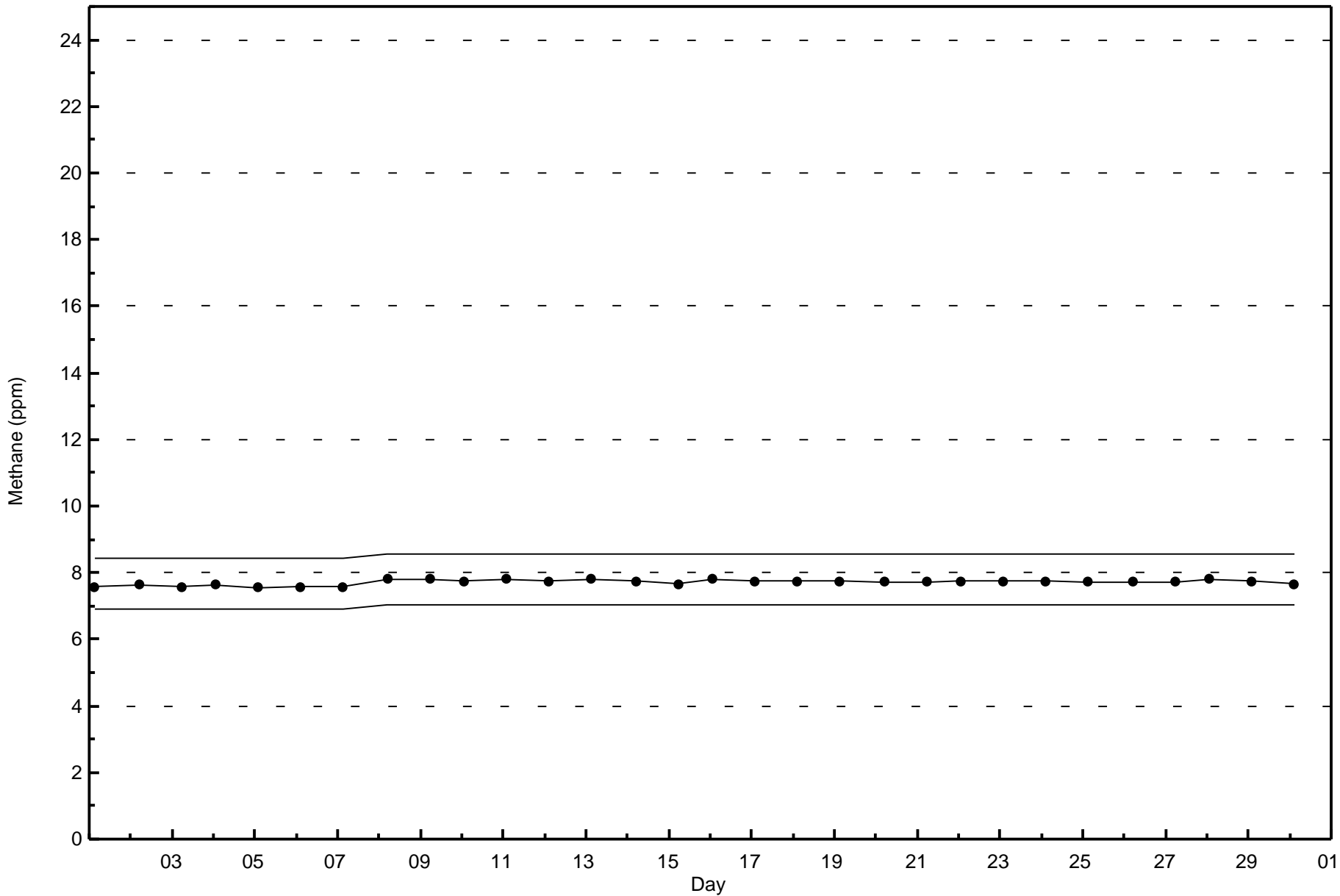
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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



Total Number of Valid Hours: 686







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

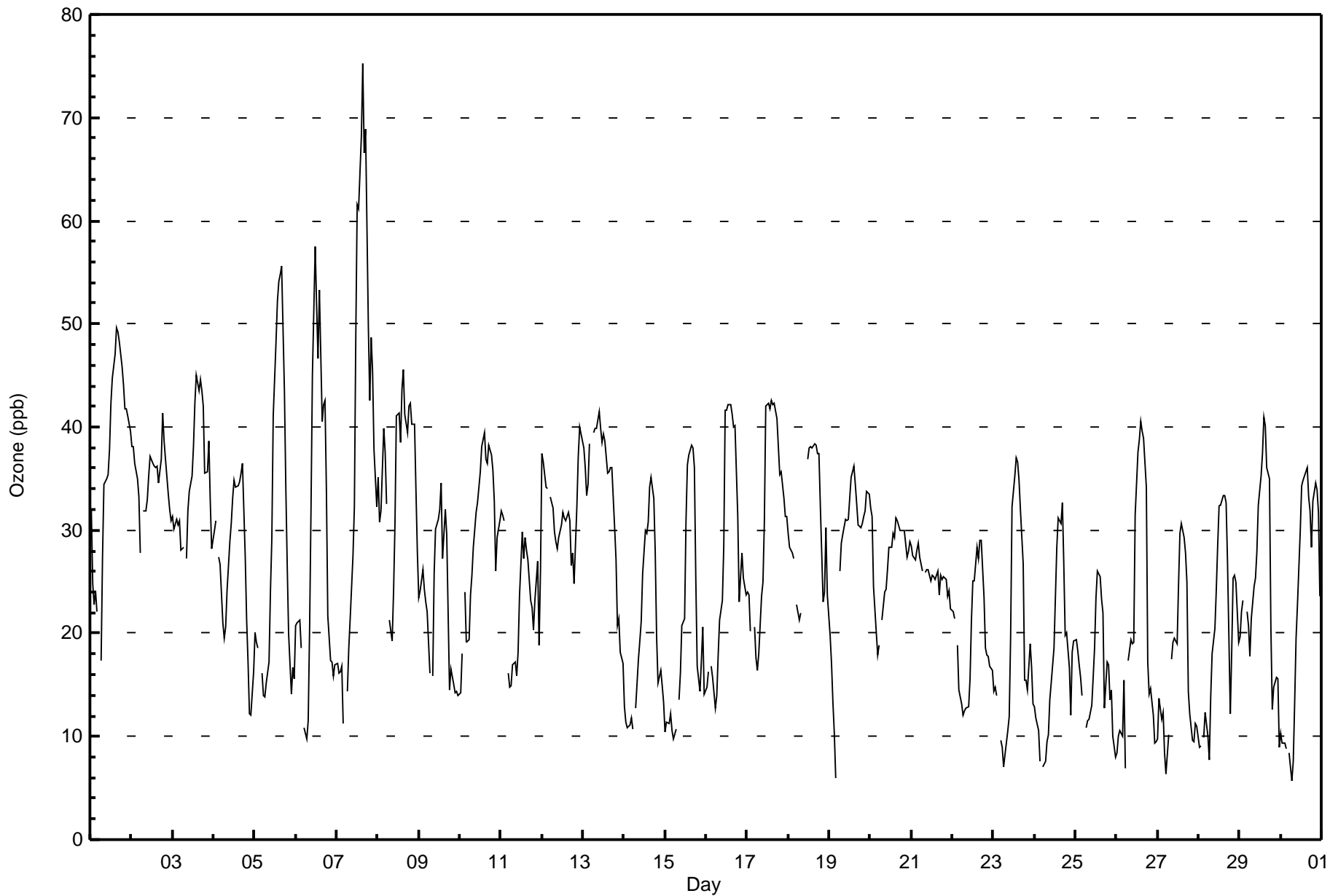
Athabasca Valley - September 2017

| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 75 ppb on Sep 7 16:00 | Maximum Daily Average: 39.1 ppb on Sep 7 | | Hours of Data: | 687 |
| Minimum Value: 6 ppb on Sep 30 07:00 | Minimum Daily Average: 16.5 ppb on Sep 25 | | Hours of Missing Data: | 33 |
| Maximum Diurnal Average: 37.6 ppb at hour 15 | Minimum Diurnal Average: 16.9 ppb at hour 7 | | Hours of Calibration: | 33 |
| Monthly Average: 26.6 ppb | Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 17 Median = 27 Q ₃ = 34 P ₉₀ = 40 P ₉₉ = 56 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 32 | 25 | 23 | 24 | 22 | Z | 17 | 27 | 34 | 35 | 35 | 38 | 42 | 45 | 47 | 50 | 49 | 48 | 46 | 44 | 42 | 42 | 41 | 40 | 36.9 | 50 |
| 2-Sep | 38 | 38 | 36 | 35 | 33 | 28 | Z | 32 | 32 | 33 | 35 | 37 | 36 | 36 | 36 | 36 | 35 | 37 | 41 | 39 | 37 | 34 | 32 | 31 | 35.1 | 41 |
| 3-Sep | 31 | 30 | 31 | 30 | 31 | 28 | 28 | Z | 27 | 32 | 34 | 35 | 38 | 42 | 45 | 44 | 45 | 44 | 42 | 36 | 36 | 39 | 33 | 28 | 35.1 | 45 |
| 4-Sep | 30 | 31 | Z | 27 | 27 | 21 | 20 | 21 | 24 | 29 | 31 | 33 | 35 | 34 | 34 | 35 | 36 | 36 | 27 | 21 | 17 | 12 | 12 | 16 | 26.5 | 36 |
| 5-Sep | 20 | 19 | 19 | Z | 16 | 14 | 14 | 15 | 17 | 24 | 29 | 41 | 48 | 52 | 54 | 55 | 56 | 44 | 34 | 27 | 20 | 14 | 17 | 16 | 28.9 | 56 |
| 6-Sep | 21 | 21 | 21 | 19 | Z | 11 | 10 | 12 | 20 | 32 | 45 | 57 | 52 | 47 | 53 | 41 | 42 | 43 | 34 | 22 | 17 | 17 | 16 | 17 | 29.1 | 57 |
| 7-Sep | 17 | 16 | 16 | 17 | 11 | Z | 14 | 19 | 21 | 28 | 32 | 49 | 62 | 61 | 68 | 75 | 67 | 69 | 50 | 43 | 49 | 45 | 38 | 32 | 39.1 | 75 |
| 8-Sep | 35 | 31 | 32 | 40 | 38 | 33 | Z | 21 | 19 | 24 | 30 | 41 | 41 | 38 | 44 | 46 | 41 | 40 | 42 | 42 | 40 | 40 | 34 | 28 | 35.7 | 46 |
| 9-Sep | 23 | 24 | 26 | 24 | 23 | 22 | 16 | Z | 16 | 26 | 30 | 31 | 32 | 35 | 27 | 32 | 30 | 22 | 15 | 17 | 15 | 14 | 14 | 14 | 23.0 | 35 |
| 10-Sep | 14 | 18 | Z | 24 | 19 | 19 | 24 | 26 | 28 | 32 | 33 | 34 | 36 | 38 | 39 | 37 | 36 | 38 | 37 | 36 | 33 | 26 | 29 | 31 | 29.9 | 39 |
| 11-Sep | 32 | 31 | 31 | Z | 16 | 15 | 15 | 17 | 17 | 16 | 18 | 24 | 30 | 27 | 29 | 28 | 27 | 23 | 23 | 20 | 23 | 27 | 19 | 26 | 23.2 | 32 |
| 12-Sep | 37 | 37 | 34 | 34 | Z | 33 | 32 | 30 | 29 | 28 | 29 | 30 | 32 | 31 | 31 | 32 | 31 | 27 | 28 | 25 | 32 | 37 | 40 | 39 | 32.1 | 40 |
| 13-Sep | 38 | 36 | 33 | 34 | 38 | Z | 40 | 40 | 40 | 42 | 40 | 39 | 39 | 39 | 36 | 36 | 36 | 30 | 27 | 21 | 21 | 18 | 17 | 17 | 33.7 | 42 |
| 14-Sep | 13 | 11 | 11 | 11 | 12 | 11 | Z | 13 | 17 | 19 | 21 | 26 | 30 | 30 | 31 | 34 | 35 | 33 | 28 | 20 | 15 | 16 | 15 | 13 | 20.2 | 35 |
| 15-Sep | 10 | 11 | 11 | 12 | 11 | 10 | 11 | Z | 14 | 16 | 21 | 21 | 31 | 36 | 37 | 38 | 38 | 36 | 25 | 17 | 14 | 17 | 21 | 14 | 20.6 | 38 |
| 16-Sep | 15 | 16 | Z | 17 | 16 | 13 | 14 | 18 | 21 | 23 | 29 | 42 | 42 | 42 | 42 | 41 | 40 | 40 | 31 | 23 | 25 | 28 | 25 | 24 | 27.3 | 42 |
| 17-Sep | 24 | 24 | 20 | Z | 21 | 18 | 16 | 18 | 24 | 25 | 31 | 42 | 42 | 42 | 43 | 42 | 42 | 41 | 38 | 35 | 36 | 33 | 31 | 31 | 31.2 | 43 |
| 18-Sep | 30 | 28 | 28 | 27 | Z | 23 | 21 | 22 | C | C | C | 37 | 38 | 38 | 38 | 38 | 38 | 37 | 37 | 32 | 23 | 24 | 30 | 24 | 30.8 | 38 |
| 19-Sep | 20 | 17 | 13 | 10 | 6 | Z | 26 | 29 | 30 | 31 | 31 | 31 | 33 | 35 | 36 | 34 | 33 | 31 | 30 | 31 | 31 | 32 | 34 | 34 | 27.7 | 36 |
| 20-Sep | 32 | 31 | 24 | 20 | 18 | 19 | Z | 21 | 24 | 24 | 26 | 28 | 28 | 30 | 29 | 31 | 31 | 30 | 30 | 30 | 30 | 27 | 28 | 29 | 27.1 | 32 |
| 21-Sep | 28 | 28 | 27 | 28 | 29 | 27 | 26 | Z | 26 | 26 | 26 | 25 | 26 | 26 | 25 | 26 | 24 | 26 | 25 | 26 | 25 | 24 | 24 | 22 | 25.8 | 29 |
| 22-Sep | 22 | 21 | Z | 19 | 14 | 13 | 12 | 13 | 13 | 13 | 16 | 21 | 25 | 25 | 28 | 27 | 29 | 29 | 23 | 19 | 18 | 18 | 17 | 16 | 19.6 | 29 |
| 23-Sep | 14 | 15 | 14 | Z | 10 | 9 | 7 | 8 | 11 | 12 | 20 | 32 | 35 | 37 | 37 | 35 | 32 | 27 | 15 | 16 | 14 | 19 | 17 | 13 | 19.5 | 37 |
| 24-Sep | 13 | 12 | 11 | 8 | Z | 7 | 8 | 9 | 10 | 14 | 15 | 19 | 23 | 28 | 31 | 31 | 33 | 27 | 20 | 20 | 17 | 12 | 18 | 19 | 17.5 | 33 |
| 25-Sep | 19 | 18 | 17 | 16 | 14 | Z | 11 | 11 | 12 | 13 | 16 | 19 | 23 | 26 | 26 | 23 | 22 | 13 | 17 | 17 | 14 | 15 | 10 | 8 | 16.5 | 26 |
| 26-Sep | 8 | 10 | 11 | 10 | 16 | 7 | Z | 17 | 19 | 19 | 19 | 31 | 38 | 39 | 41 | 40 | 39 | 34 | 17 | 14 | 15 | 12 | 9 | 9 | 20.6 | 41 |
| 27-Sep | 10 | 14 | 12 | 12 | 8 | 6 | 10 | Z | 18 | 19 | 20 | 19 | 25 | 30 | 31 | 29 | 28 | 25 | 14 | 12 | 10 | 10 | 11 | 11 | 16.6 | 31 |
| 28-Sep | 9 | 9 | Z | 10 | 12 | 10 | 8 | 14 | 18 | 20 | 24 | 29 | 32 | 32 | 33 | 33 | 33 | 27 | 12 | 18 | 25 | 26 | 25 | 19 | 20.9 | 33 |
| 29-Sep | 20 | 22 | 23 | Z | 22 | 21 | 18 | 21 | 25 | 25 | 28 | 32 | 35 | 37 | 41 | 40 | 36 | 35 | 21 | 13 | 15 | 16 | 16 | 9 | 24.8 | 41 |
| 30-Sep | 10 | 9 | 9 | 9 | Z | 8 | 6 | 8 | 13 | 19 | 23 | 30 | 34 | 35 | 35 | 36 | 33 | 32 | 28 | 33 | 35 | 34 | 32 | 24 | 23.3 | 36 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|-----------------|--|
| 22.2 | 21.8 | 21.4 | 20.7 | 19.3 | 17.0 | 16.9 | 19.3 | 21.4 | 24.1 | 27.1 | 32.5 | 35.5 | 36.5 | 37.6 | 37.5 | 36.5 | 34.3 | 28.8 | 25.7 | 24.8 | 24.4 | 23.5 | 21.8 | Diurnal Average | | |
| 38 | 38 | 36 | 40 | 38 | 33 | 40 | 40 | 40 | 40 | 42 | 45 | 57 | 62 | 61 | 68 | 75 | 67 | 69 | 50 | 44 | 49 | 45 | 41 | 40 | Diurnal Maximum | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 229 | 33.33 | 33.33 |
| 21 - 50 | 445 | 64.77 | 98.11 |
| 51 - 82 | 13 | 1.89 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 6 | 2 | 2 | 5 | 15 | 21 | 75 | 36 | 13 | 19 | 12 | 7 | 4 | 2 | 4 | 6 | 229 |
| 21 - 50 | 41 | 5 | 11 | 14 | 20 | 18 | 67 | 24 | 19 | 17 | 32 | 41 | 31 | 23 | 27 | 55 | 445 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 4 | 0 | 0 | 0 | 2 | 1 | 13 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 47 | 7 | 13 | 19 | 35 | 39 | 142 | 61 | 37 | 36 | 48 | 48 | 35 | 25 | 33 | 62 | 687 |

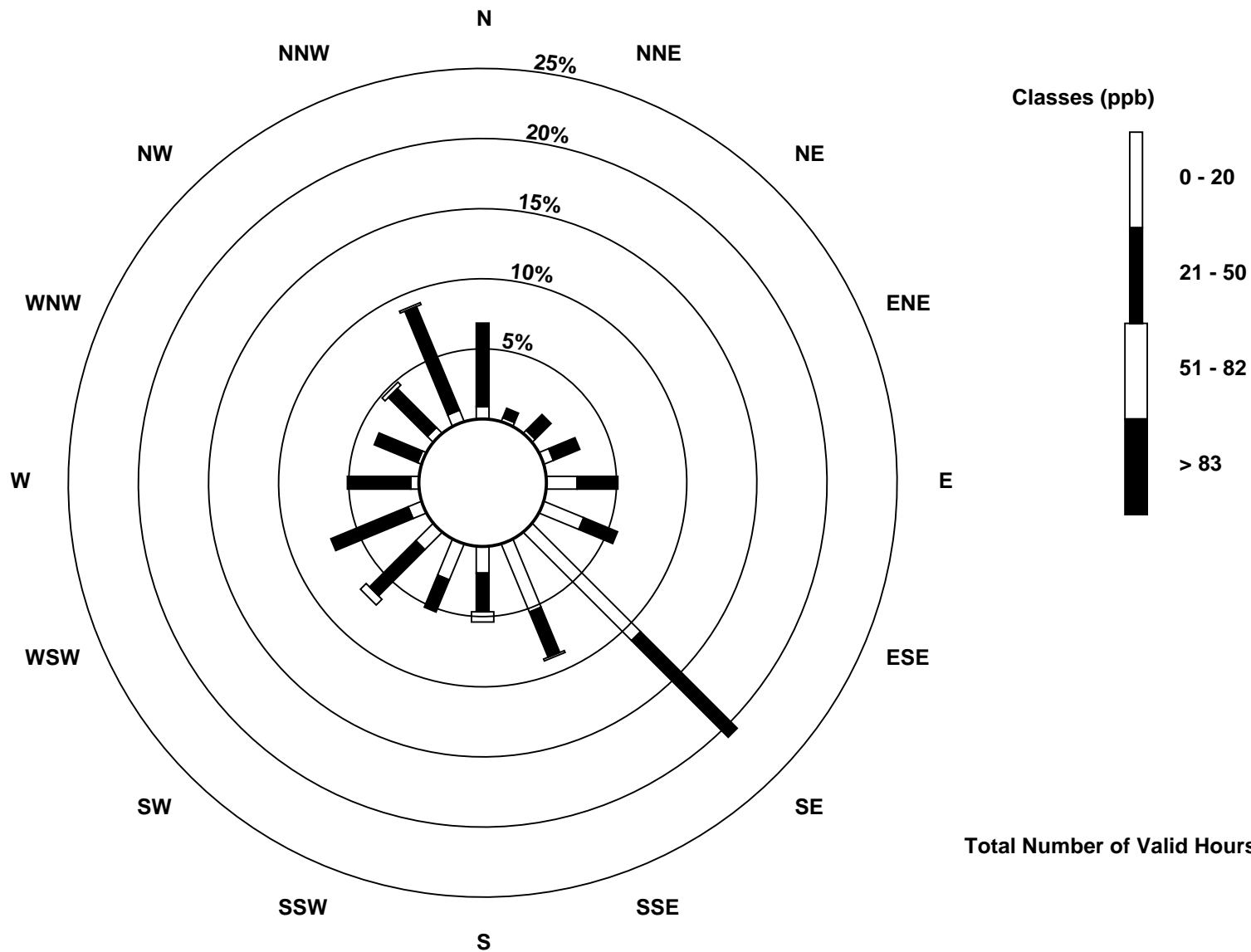
Total Number of Valid Hours: 687

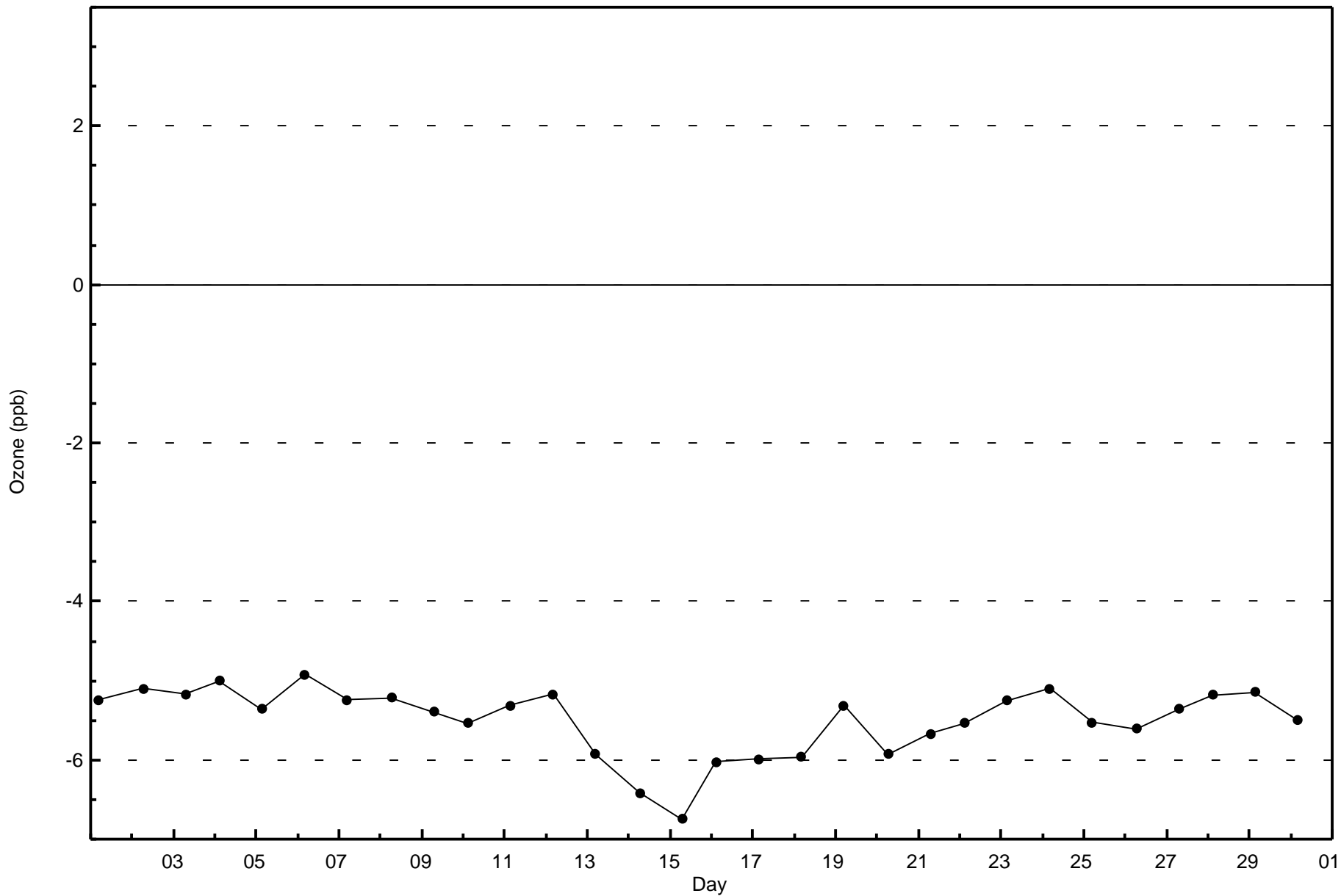
Total Number of Hours: 720

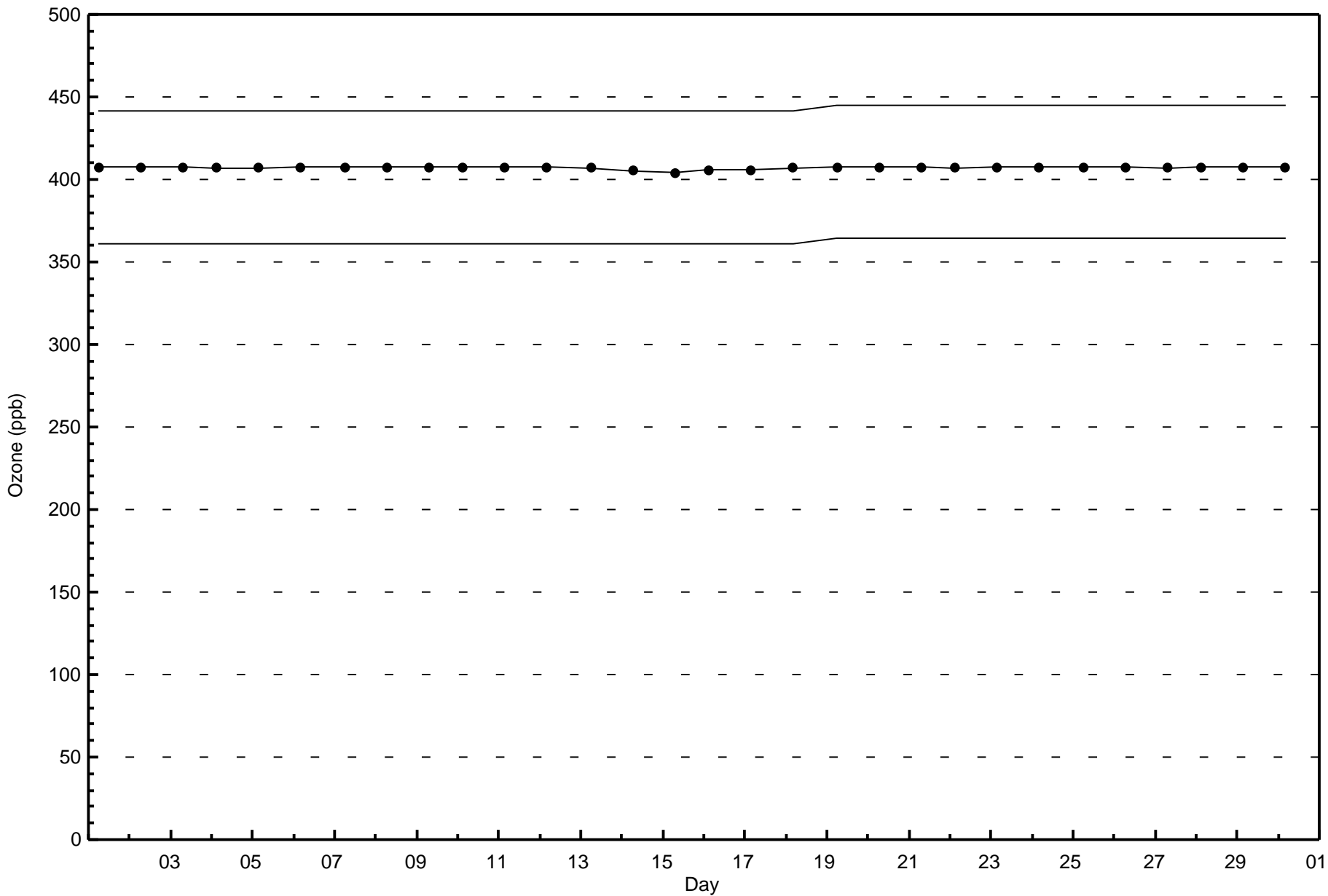


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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







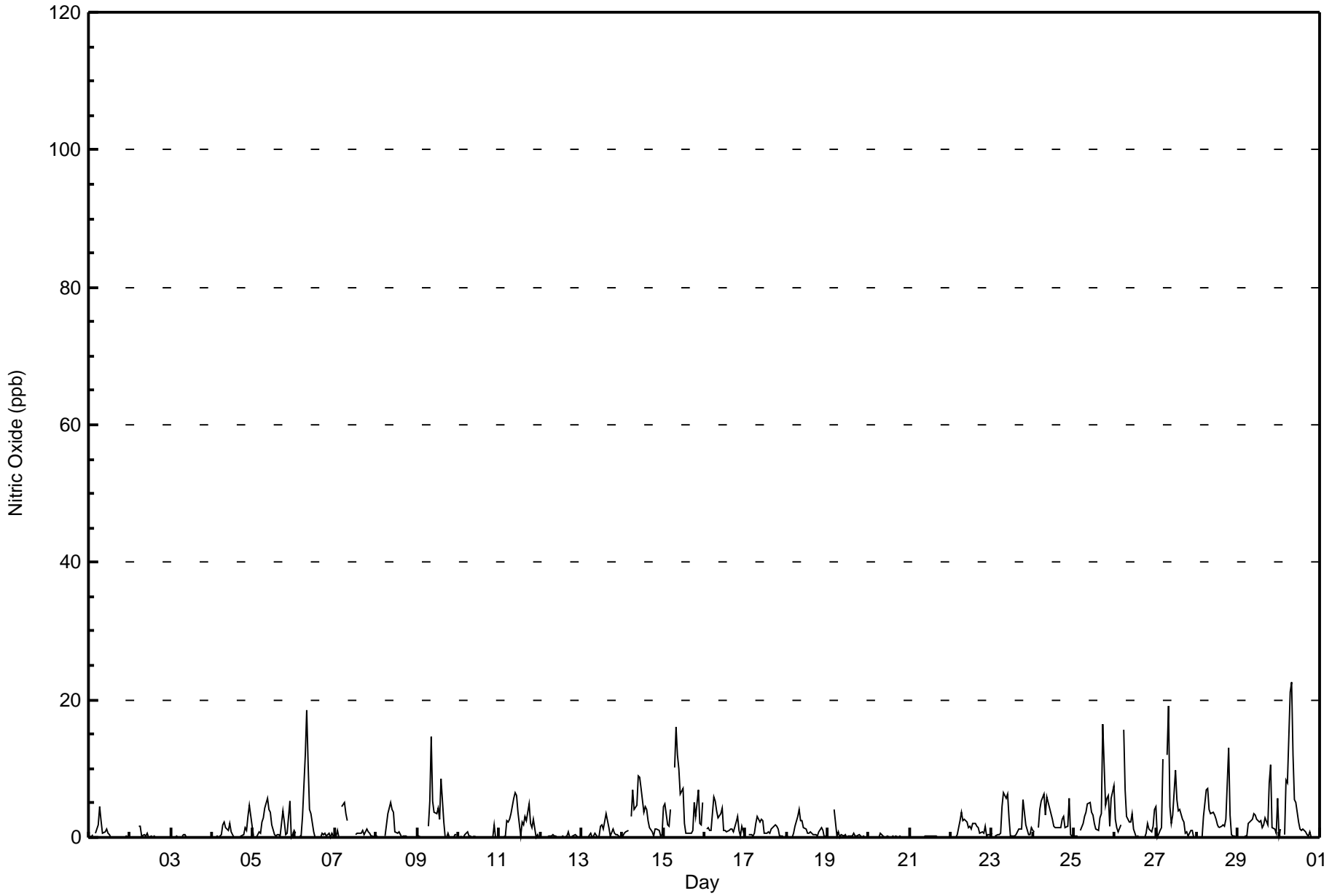


| Maximum Value: 22 ppb on Sep 30 08:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 4.7 ppb on Sep 15 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|--|-------------------------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|-----------------|---------------|---------------|---|--|--|--|--|--|--|---------------------------------|--|--|--|
| Minimum Value: 0 ppb on Sep 1 16:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 3 | | | | | | | | | | | | | | | | | Hours of Data: 686 | | | |
| Maximum Diurnal Average: 4.7 ppb at hour 8 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.3 ppb at hour 3 | | | | | | | | | | | | | | | | | Hours of Missing Data: 34 | | | |
| Monthly Average: 1.7 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 5 P ₉₉ = 16 | | | | | | | | | | | | | | | | | Hours of Calibration: 34 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | Z | 1 | 2 | 5 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 | | | | | | | | | | | |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 | | | | | | | | | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | | | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 5 | 2 | 1.0 | 5 | | | | | | | | | | | |
| 5-Sep | 0 | Z | 0 | 1 | 1 | 2 | 3 | 4 | 6 | 4 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 1 | 5 | 0 | 0 | 1.8 | 6 | | | | | | | | | | | |
| 6-Sep | 1 | 1 | Z | 0 | 0 | 3 | 12 | 19 | 11 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 2.5 | 19 | | | | | | | | | | | |
| 7-Sep | 0 | 1 | 0 | Z | 4 | 5 | 3 | 2 | C | C | C | C | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1.2 | 5 | | | | | | | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | Z | 0 | 2 | 3 | 5 | 4 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 | | | | | | | | | | | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 2 | 5 | 15 | 5 | 4 | 4 | 4 | 3 | 9 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2.3 | 15 | | | | | | | | | | | |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0.2 | 2 | | | | | | | | | | |
| 11-Sep | 0 | Z | 0 | 0 | 2 | 2 | 3 | 3 | 6 | 6 | 6 | 4 | 0 | 2 | 2 | 3 | 2 | 5 | 2 | 1 | 3 | 0 | 0 | 0 | 2.4 | 6 | | | | | | | | | | | |
| 12-Sep | 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 | | | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 2 | 1 | 3 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.7 | 3 | | | | | | | | | | | |
| 14-Sep | 0 | 1 | 1 | 1 | Z | 3 | 7 | 4 | 5 | 9 | 9 | 7 | 4 | 4 | 4 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 2.9 | 9 | | | | | | | | | | | |
| 15-Sep | 5 | 5 | 2 | 2 | 4 | Z | 10 | 16 | 12 | 10 | 6 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | 5 | 3 | 7 | 2 | 2 | 5 | 4.7 | 16 | | | | | | | | | | | |
| 16-Sep | Z | 1 | 1 | 1 | 1 | 6 | 5 | 4 | 3 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 0 | 2 | 0 | 2.0 | 6 | | | | | | | | | | | |
| 17-Sep | 0 | Z | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 1.1 | 3 | | | | | | | | | | | |
| 18-Sep | 0 | 0 | Z | 0 | 1 | 2 | 3 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 1.1 | 4 | | | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | Z | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 4 | | | | | | | | | | | |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | | |
| 21-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 2 | 4 | 2 | 3 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 1.3 | 4 | | | | | | | | | | | |
| 23-Sep | 1 | Z | 0 | 0 | 0 | 1 | 4 | 7 | 6 | 6 | 3 | 0 | 0 | 0 | 1 | 1 | 1 | 5 | 4 | 2 | 1 | 0 | 1 | 2.0 | 7 | | | | | | | | | | | | |
| 24-Sep | 1 | 1 | Z | 1 | 4 | 5 | 6 | 3 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 1 | 3 | 3 | 1 | 2 | 6 | 0 | 0 | 2.7 | 6 | | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | Z | 1 | 2 | 3 | 4 | 5 | 5 | 4 | 3 | 2 | 1 | 1 | 3 | 3 | 17 | 5 | 6 | 6 | 2 | 6 | 8 | 3.7 | 17 | | | | | | | | | | | |
| 26-Sep | 3 | 1 | 1 | 2 | Z | 16 | 7 | 3 | 2 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 2 | 4 | 2.3 | 16 | | | | | | | | | | | |
| 27-Sep | 4 | 0 | 1 | 2 | 11 | Z | 12 | 19 | 5 | 2 | 3 | 10 | 5 | 4 | 4 | 3 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 4.0 | 19 | | | | | | | | | | | |
| 28-Sep | Z | 0 | 0 | 0 | 3 | 7 | 7 | 4 | 4 | 4 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 13 | 3 | 1 | 0 | 0 | 0 | 2.7 | 13 | | | | | | | | | | | |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 3 | 2 | 8 | 11 | 2 | 1 | 1 | 6 | 2.4 | 11 | | | | | | | | | | | |
| 30-Sep | 0 | 1 | Z | 0 | 8 | 8 | 21 | 22 | 12 | 5 | 5 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4.0 | 22 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 684 | 99.71 | 99.71 |
| 21 - 40 | 2 | 0.29 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 48 | 5 | 14 | 18 | 35 | 39 | 139 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 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 | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 686 |

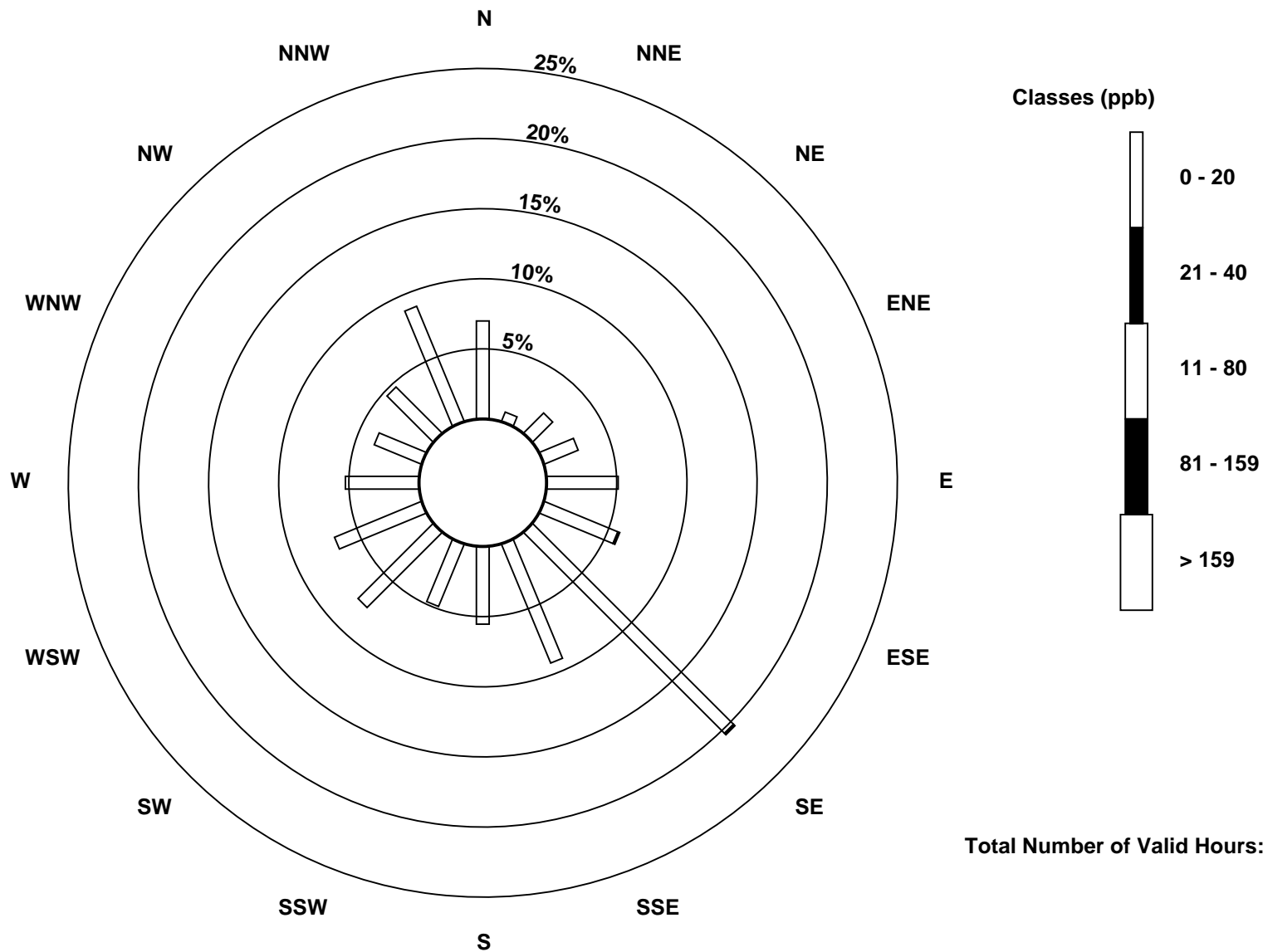
Total Number of Valid Hours: 686

Total Number of Hours: 720

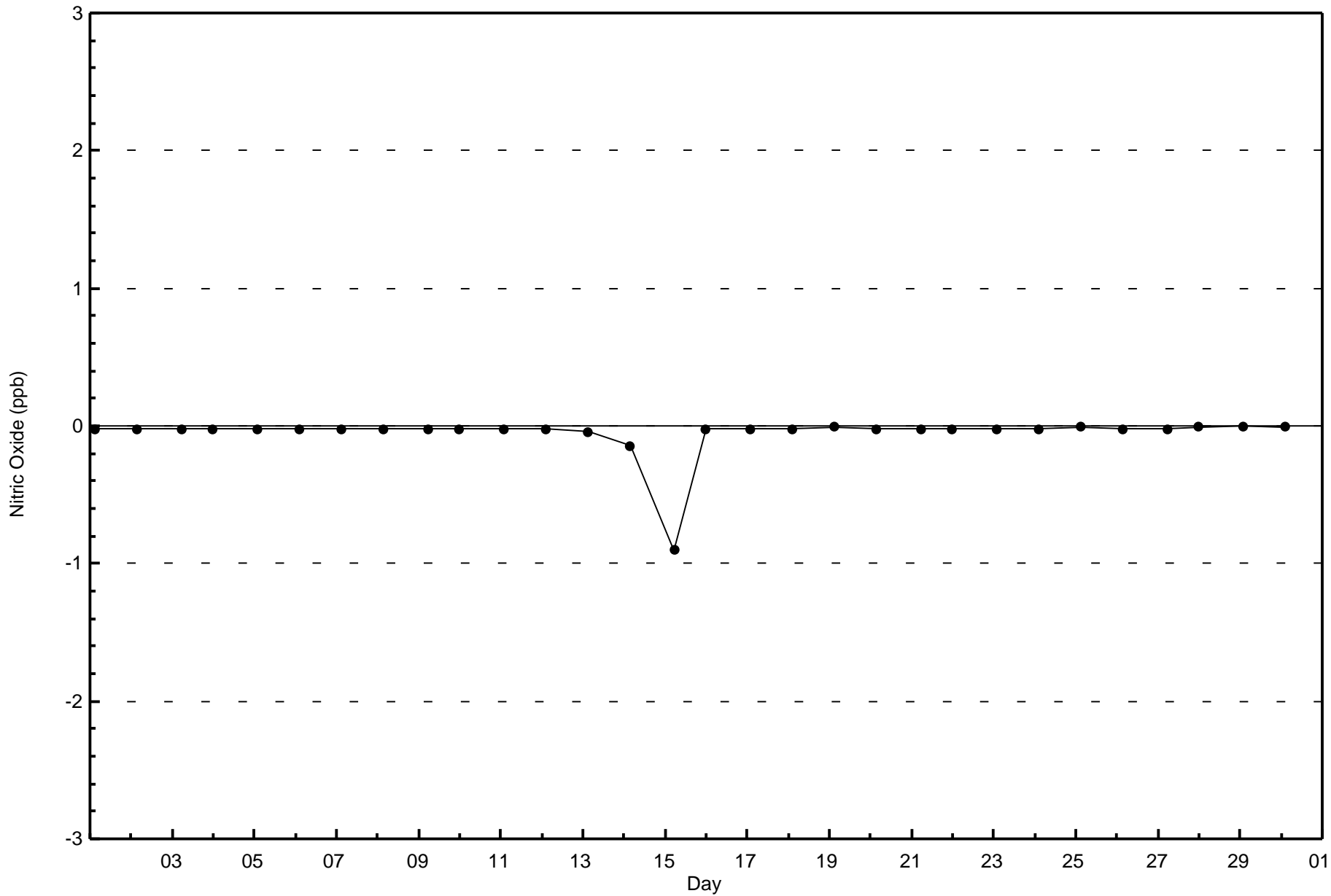


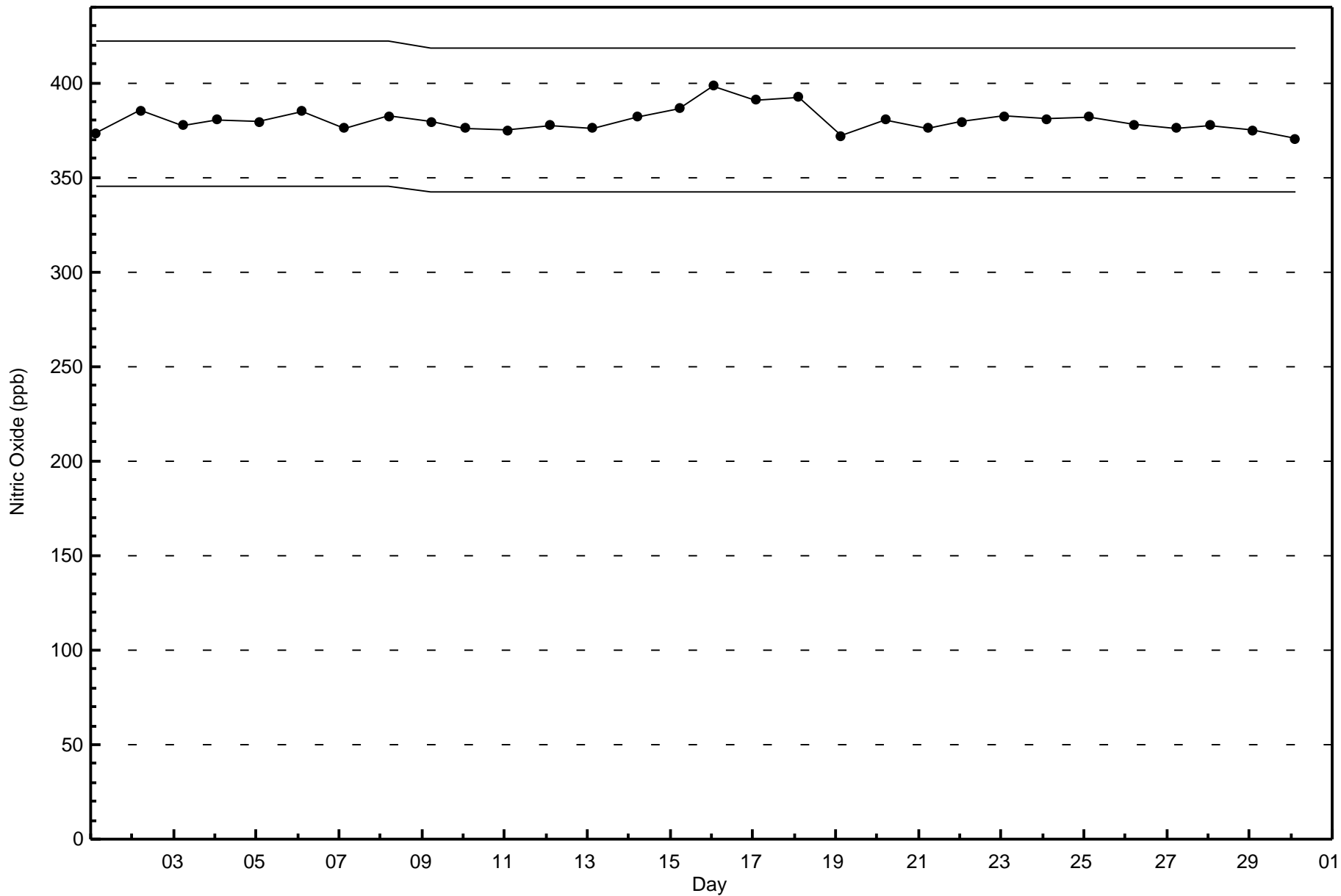
Wood Buffalo Environmental Association
Wind Rose Sep 2017

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 - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 28 ppb on Sep 7 20:00 | Maximum Daily Average: 9.6 ppb on Sep 27 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 3 13:00 | Minimum Daily Average: 1.3 ppb on Sep 3 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 9.9 ppb at hour 19 | Minimum Diurnal Average: 3.0 ppb at hour 13 | | Hours of Calibration: | 34 |
| Monthly Average: 5.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 O ₃ = 8 P ₉₀ = 12 P ₉₉ = 20 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 4 | 8 | 8 | Z | 8 | 12 | 11 | 7 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 3.5 | 12 |
| 2-Sep | 0 | 0 | 1 | 1 | Z | 6 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1.5 | 6 |
| 3-Sep | 1 | 2 | 1 | 2 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 1 | 4 | 6 | 1.3 | 6 |
| 4-Sep | Z | 1 | 1 | 1 | 1 | 4 | 5 | 6 | 3 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 8 | 6 | 12 | 12 | 8 | 3.6 | 12 |
| 5-Sep | 3 | Z | 2 | 3 | 3 | 5 | 5 | 4 | 5 | 5 | 6 | 5 | 3 | 2 | 3 | 3 | 4 | 14 | 14 | 10 | 7 | 15 | 8 | 9 | 5.9 | 15 |
| 6-Sep | 11 | 7 | Z | 4 | 9 | 12 | 11 | 13 | 13 | 9 | 13 | 8 | 2 | 1 | 2 | 1 | 4 | 8 | 16 | 13 | 10 | 5 | 5 | 5 | 7.9 | 16 |
| 7-Sep | 5 | 6 | 4 | Z | 9 | 7 | 7 | 5 | C | C | C | C | 3 | 4 | 5 | 5 | 9 | 7 | 23 | 28 | 20 | 14 | 12 | 7 | 9.4 | 28 |
| 8-Sep | 5 | 3 | 8 | 6 | Z | 9 | 14 | 16 | 21 | 17 | 15 | 7 | 10 | 12 | 6 | 4 | 8 | 8 | 5 | 6 | 5 | 4 | 7 | 9 | 8.8 | 21 |
| 9-Sep | 9 | 6 | 3 | 4 | 4 | Z | 10 | 12 | 14 | 9 | 7 | 8 | 9 | 9 | 18 | 11 | 9 | 10 | 13 | 9 | 8 | 8 | 7 | 8 | 9.0 | 18 |
| 10-Sep | Z | 4 | 3 | 3 | 5 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 1 | 0 | 1.6 | 5 |
| 11-Sep | 0 | Z | 0 | 4 | 9 | 10 | 10 | 9 | 9 | 10 | 9 | 7 | 2 | 6 | 5 | 7 | 7 | 10 | 9 | 10 | 8 | 5 | 6 | 4 | 6.8 | 10 |
| 12-Sep | 0 | 0 | Z | 0 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 2 | 4 | 3 | 1 | 0 | 0 | 1.4 | 4 |
| 13-Sep | 0 | 2 | 4 | Z | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 5 | 5 | 5 | 8 | 8 | 6 | 5 | 9 | 10 | 10 | 6 | 6 | 3 | 4.7 | 10 |
| 14-Sep | 9 | 8 | 7 | 7 | Z | 7 | 9 | 7 | 5 | 7 | 8 | 10 | 6 | 6 | 7 | 6 | 5 | 5 | 10 | 14 | 13 | 7 | 7 | 7 | 7.6 | 14 |
| 15-Sep | 10 | 9 | 8 | 7 | 8 | Z | 6 | 6 | 4 | 5 | 5 | 6 | 3 | 1 | 1 | 2 | 2 | 5 | 14 | 15 | 13 | 11 | 11 | 18 | 7.3 | 18 |
| 16-Sep | Z | 8 | 7 | 7 | 7 | 9 | 9 | 6 | 4 | 4 | 5 | 3 | 3 | 2 | 3 | 4 | 4 | 4 | 14 | 20 | 15 | 11 | 9 | 9 | 7.2 | 20 |
| 17-Sep | 5 | Z | 7 | 9 | 7 | 8 | 7 | 6 | 5 | 4 | 4 | 2 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 5 | 4 | 4 | 3 | 5.0 | 9 |
| 18-Sep | 3 | 3 | Z | 3 | 3 | 6 | 7 | 7 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 6 | 14 | 12 | 3 | 3 | 4.2 | 14 |
| 19-Sep | 3 | 3 | 6 | Z | 14 | 8 | 4 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 14 |
| 20-Sep | 0 | 0 | 2 | 4 | Z | 5 | 4 | 4 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 5 |
| 21-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 2.6 | 5 |
| 22-Sep | Z | 4 | 4 | 3 | 6 | 4 | 4 | 4 | 3 | 2 | 2 | 4 | 4 | 5 | 6 | 8 | 6 | 5 | 8 | 7 | 7 | 5 | 4 | 5 | 4.8 | 8 |
| 23-Sep | 6 | Z | 4 | 3 | 2 | 4 | 6 | 6 | 5 | 6 | 4 | 2 | 2 | 1 | 2 | 3 | 5 | 7 | 17 | 14 | 12 | 8 | 7 | 9 | 5.7 | 17 |
| 24-Sep | 6 | 6 | Z | 7 | 7 | 6 | 5 | 3 | 3 | 3 | 3 | 2 | 3 | 4 | 5 | 5 | 13 | 18 | 14 | 13 | 16 | 7 | 5 | 6.8 | 18 | |
| 25-Sep | 5 | 5 | 5 | Z | 7 | 7 | 8 | 7 | 7 | 5 | 3 | 4 | 3 | 2 | 2 | 5 | 6 | 16 | 10 | 10 | 11 | 9 | 12 | 13 | 7.0 | 16 |
| 26-Sep | 10 | 9 | 6 | 6 | Z | 8 | 6 | 4 | 2 | 3 | 4 | 2 | 1 | 1 | 0 | 1 | 2 | 4 | 16 | 10 | 6 | 5 | 9 | 13 | 5.5 | 16 |
| 27-Sep | 12 | 6 | 8 | 8 | 11 | Z | 11 | 13 | 5 | 4 | 5 | 10 | 10 | 9 | 10 | 11 | 13 | 11 | 17 | 12 | 12 | 11 | 7 | 7 | 9.6 | 17 |
| 28-Sep | Z | 5 | 5 | 5 | 8 | 12 | 11 | 8 | 5 | 5 | 5 | 5 | 4 | 3 | 4 | 5 | 6 | 12 | 26 | 18 | 9 | 7 | 5 | 3 | 7.6 | 26 |
| 29-Sep | 3 | Z | 4 | 5 | 7 | 8 | 13 | 9 | 7 | 7 | 6 | 6 | 6 | 6 | 4 | 6 | 11 | 12 | 25 | 26 | 13 | 8 | 6 | 13 | 9.0 | 26 |
| 30-Sep | 10 | 11 | Z | 10 | 12 | 9 | 14 | 12 | 10 | 8 | 7 | 5 | 3 | 3 | 4 | 4 | 5 | 5 | 5 | 2 | 2 | 1 | 1 | 0 | 6.1 | 14 |

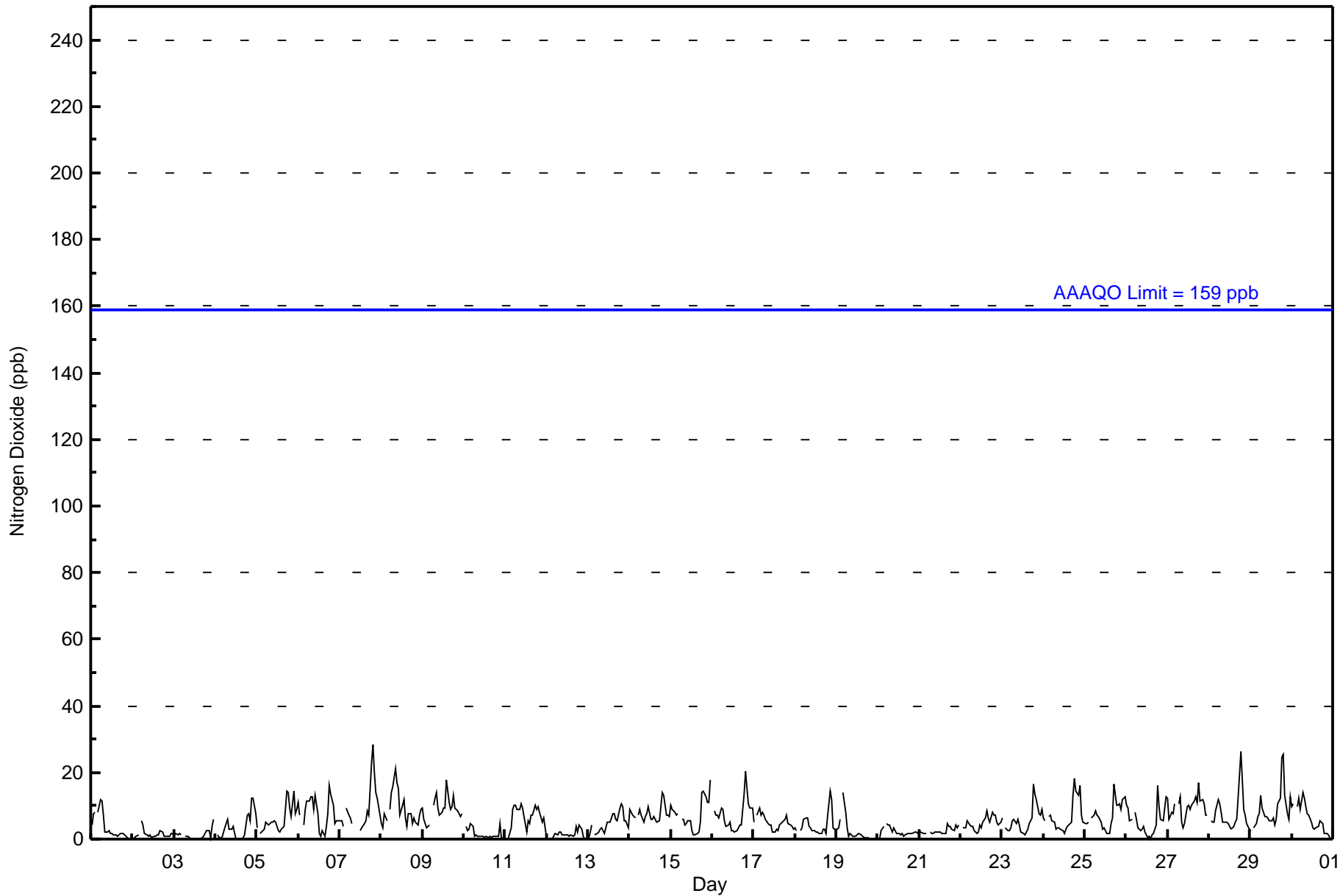
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 4.9 | 4.7 | 4.3 | 4.4 | 6.0 | 6.9 | 6.9 | 6.1 | 5.1 | 4.6 | 4.6 | 3.9 | 3.0 | 3.1 | 3.5 | 3.7 | 4.6 | 6.3 | 9.9 | 9.4 | 7.7 | 6.5 | 5.6 | 5.8 | Diurnal Average | |
| 12 | 11 | 8 | 10 | 14 | 12 | 14 | 16 | 21 | 17 | 15 | 10 | 10 | 12 | 18 | 11 | 13 | 16 | 26 | 28 | 20 | 16 | 12 | 18 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 99.13 | 99.13 |
| 21 - 40 | 6 | 0.87 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 48 | 5 | 14 | 18 | 35 | 40 | 138 | 59 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 680 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 686 |

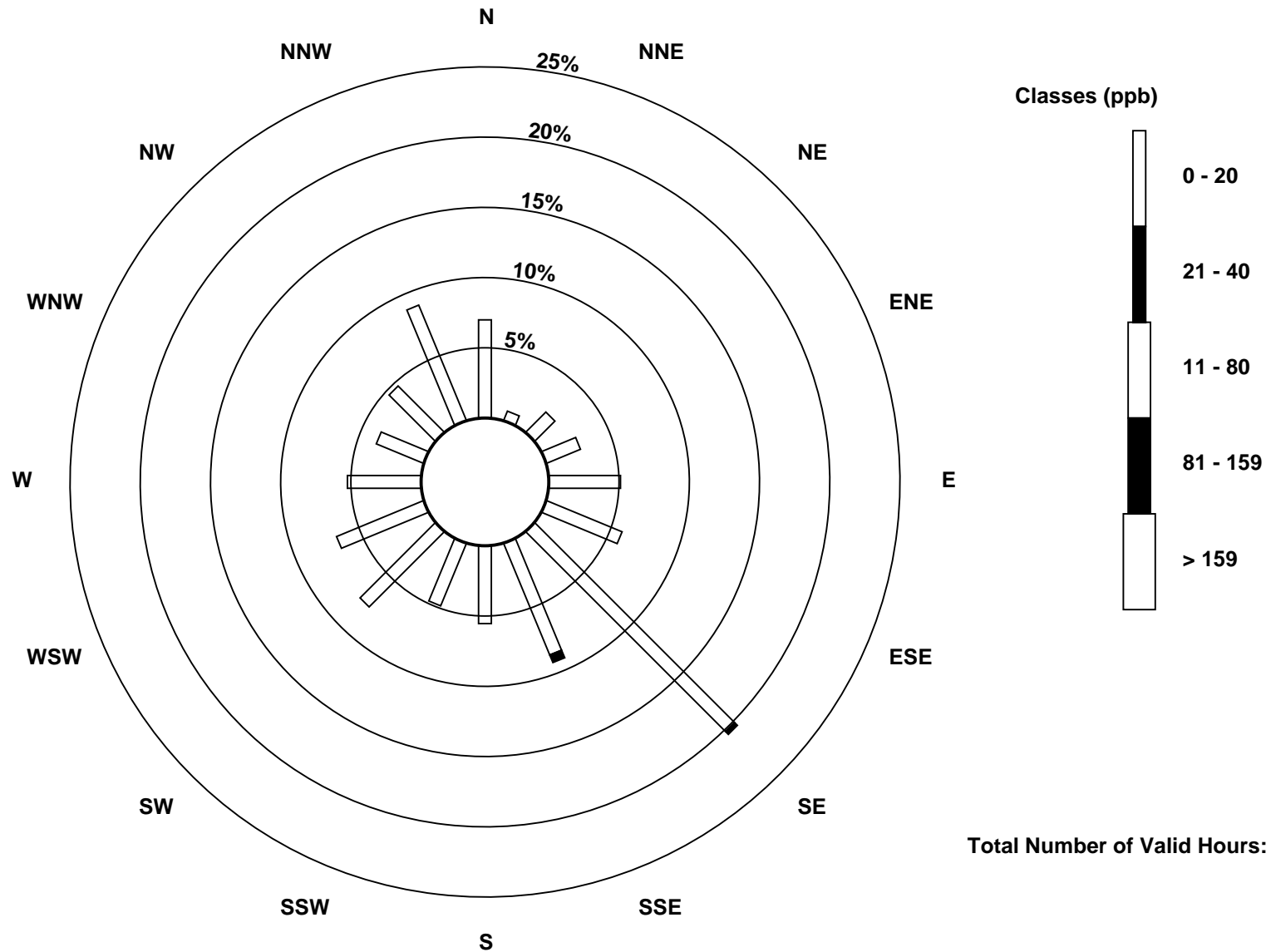
Total Number of Valid Hours: 686

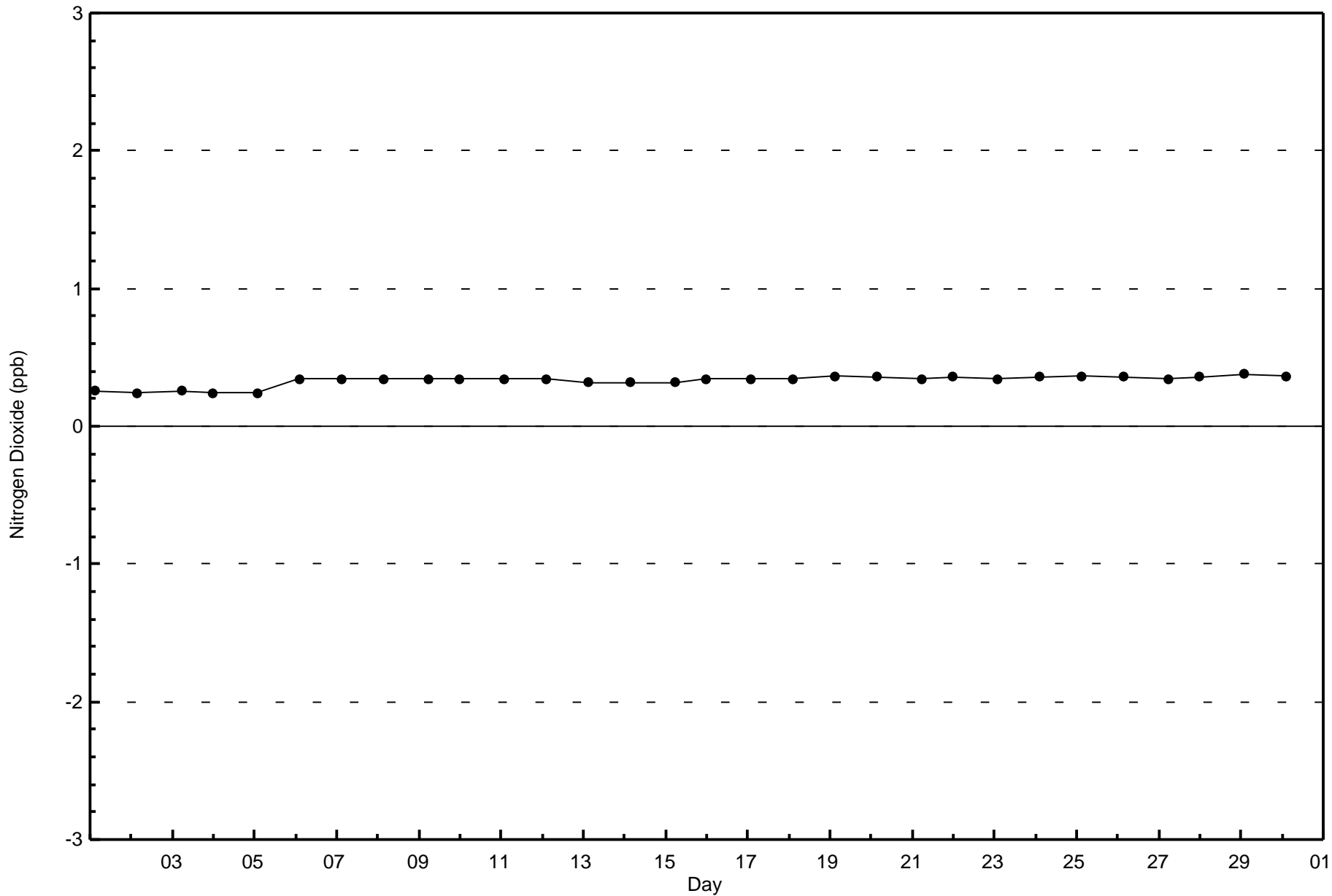
Total Number of Hours: 720

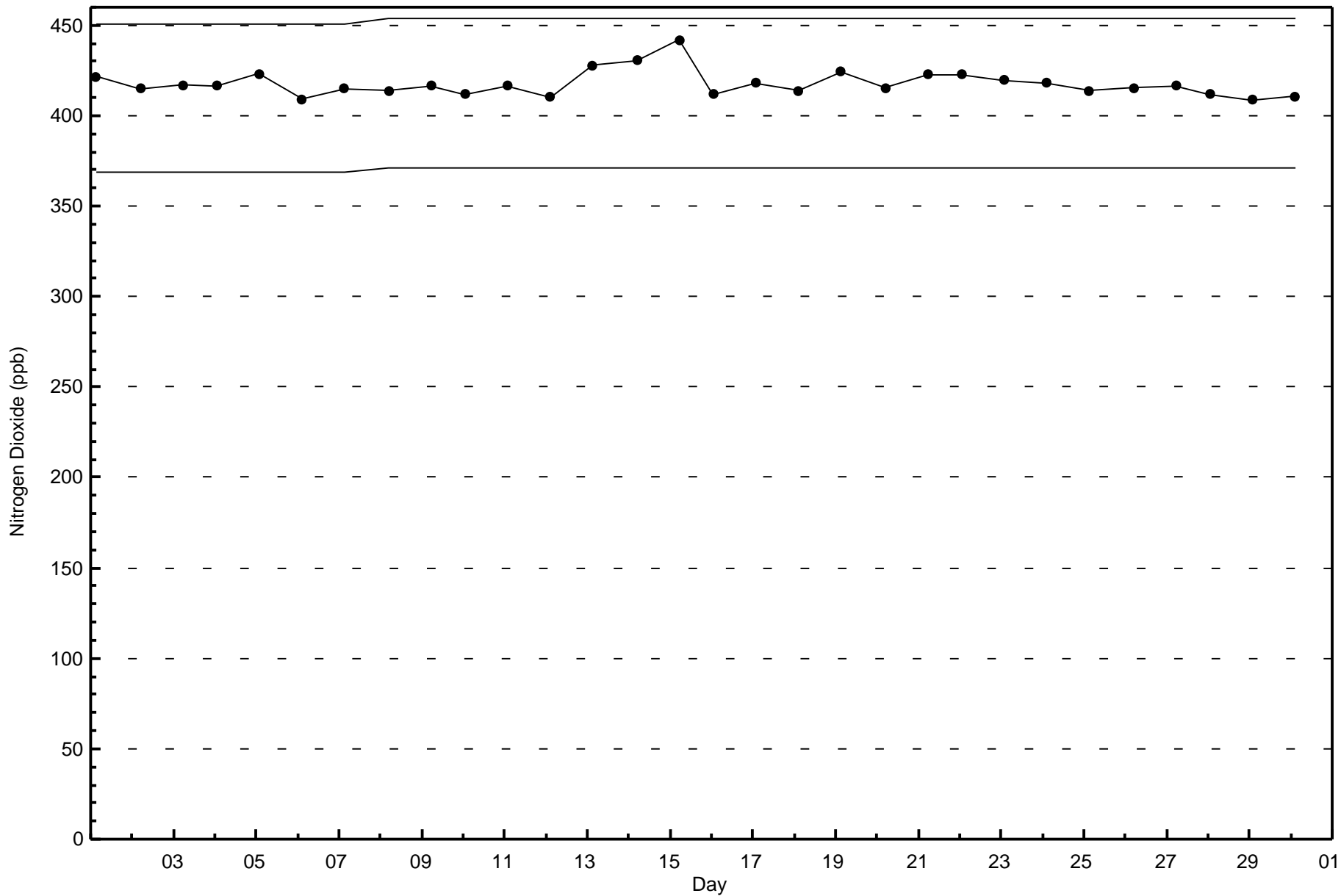


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









Wood Buffalo Environmental Association
Summary of Hour Averages

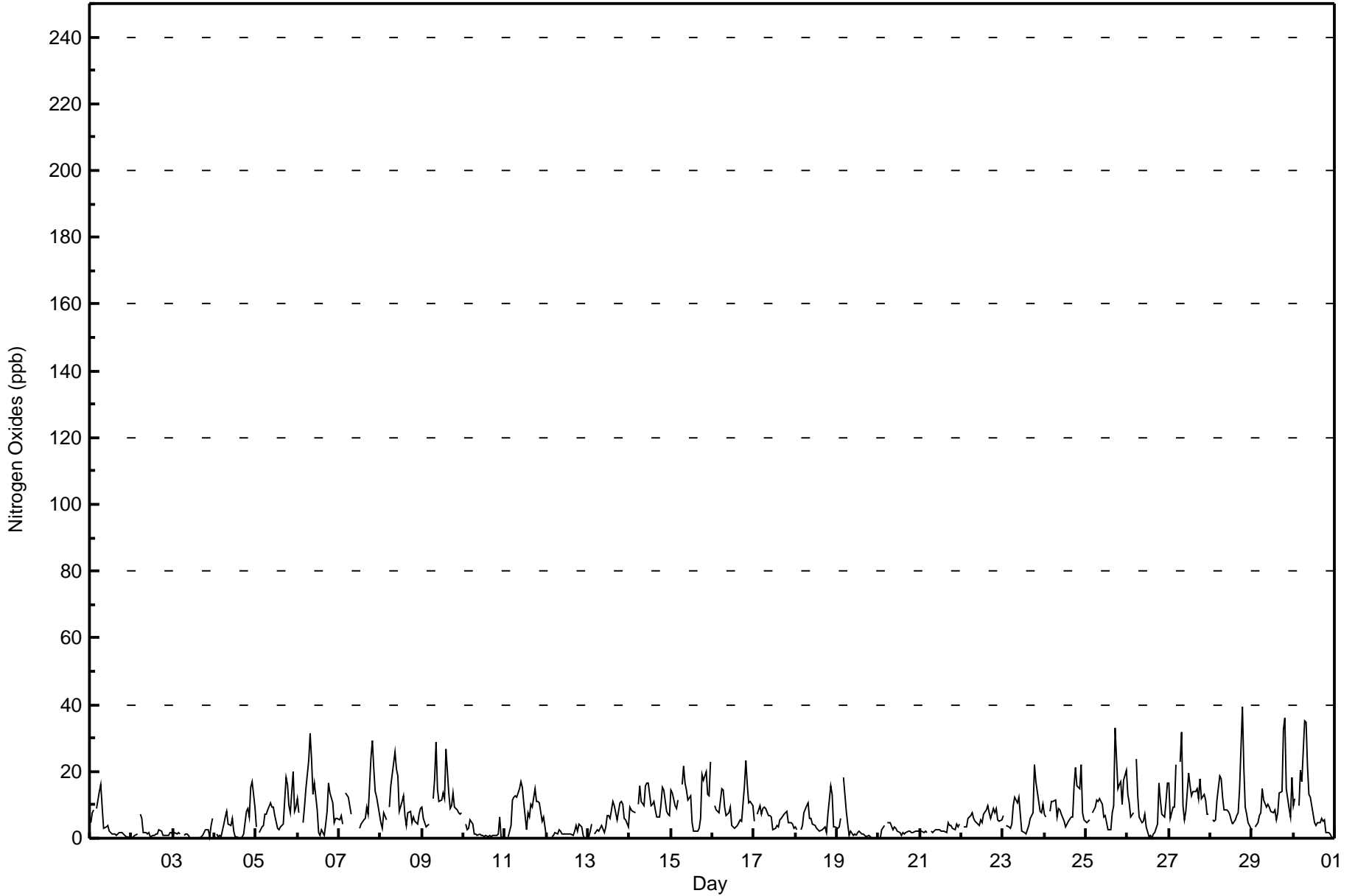
Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - September 2017

| Maximum Value: 39 ppb on Sep 28 19:00 Maximum Daily Average: 13.5 ppb on Sep 27 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 686 Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 20 00:00 Minimum Daily Average: 1.3 ppb on Sep 3 Maximum Diurnal Average: 11.7 ppb at hour 19 Minimum Diurnal Average: 4.1 ppb at hour 14 Monthly Average: 7.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 6 Q ₃ = 10 P ₉₀ = 16 P ₉₉ = 31 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 5 | 8 | 9 | Z | 9 | 14 | 16 | 10 | 3 | 3 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 4.1 | 16 |
| 2-Sep | 0 | 0 | 1 | 1 | Z | 7 | 6 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1.7 | 7 |
| 3-Sep | 1 | 2 | 1 | 2 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 1 | 4 | 6 | 1.3 | 6 |
| 4-Sep | Z | 1 | 1 | 1 | 0 | 4 | 6 | 8 | 4 | 4 | 6 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 8 | 9 | 6 | 15 | 17 | 9 | 4.6 | 17 |
| 5-Sep | 3 | Z | 2 | 3 | 4 | 7 | 7 | 8 | 11 | 9 | 9 | 7 | 3 | 2 | 3 | 4 | 4 | 18 | 16 | 10 | 7 | 20 | 8 | 9 | 7.7 | 20 |
| 6-Sep | 12 | 8 | Z | 4 | 9 | 15 | 23 | 31 | 24 | 13 | 17 | 8 | 2 | 1 | 2 | 1 | 4 | 8 | 17 | 14 | 11 | 5 | 6 | 6 | 10.4 | 31 |
| 7-Sep | 6 | 7 | 4 | Z | 14 | 12 | 10 | 7 | C | C | C | C | 3 | 4 | 5 | 6 | 10 | 7 | 24 | 29 | 21 | 14 | 12 | 7 | 10.6 | 29 |
| 8-Sep | 5 | 3 | 8 | 6 | Z | 9 | 16 | 19 | 26 | 21 | 19 | 8 | 11 | 13 | 7 | 4 | 8 | 8 | 5 | 6 | 5 | 4 | 7 | 9 | 9.8 | 26 |
| 9-Sep | 9 | 6 | 3 | 4 | 4 | Z | 12 | 18 | 29 | 15 | 11 | 12 | 14 | 12 | 27 | 13 | 9 | 10 | 13 | 9 | 8 | 8 | 7 | 8 | 11.3 | 29 |
| 10-Sep | Z | 4 | 3 | 3 | 5 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 6 | 1 | 0 | 1.7 | 6 |
| 11-Sep | 0 | Z | 0 | 4 | 11 | 12 | 13 | 12 | 15 | 17 | 15 | 11 | 3 | 8 | 6 | 10 | 9 | 15 | 11 | 11 | 11 | 5 | 7 | 4 | 9.1 | 17 |
| 12-Sep | 0 | 0 | Z | 0 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 2 | 4 | 3 | 1 | 0 | 0 | 1.5 | 4 |
| 13-Sep | 0 | 2 | 4 | Z | 1 | 3 | 2 | 3 | 4 | 2 | 3 | 7 | 7 | 6 | 11 | 10 | 7 | 6 | 10 | 11 | 10 | 6 | 6 | 3 | 5.4 | 11 |
| 14-Sep | 9 | 9 | 8 | 7 | Z | 10 | 16 | 11 | 10 | 16 | 16 | 17 | 10 | 10 | 11 | 8 | 6 | 6 | 10 | 15 | 15 | 8 | 7 | 7 | 10.6 | 17 |
| 15-Sep | 15 | 14 | 10 | 9 | 12 | Z | 16 | 22 | 16 | 15 | 12 | 13 | 5 | 2 | 2 | 3 | 6 | 19 | 18 | 20 | 13 | 13 | 23 | 23 | 12.0 | 23 |
| 16-Sep | Z | 10 | 9 | 8 | 8 | 15 | 14 | 9 | 7 | 8 | 9 | 4 | 4 | 3 | 4 | 5 | 6 | 5 | 16 | 23 | 16 | 11 | 11 | 10 | 9.2 | 23 |
| 17-Sep | 5 | Z | 7 | 10 | 7 | 9 | 9 | 9 | 7 | 7 | 6 | 3 | 3 | 4 | 3 | 5 | 6 | 7 | 8 | 8 | 5 | 4 | 4 | 3 | 6.1 | 10 |
| 18-Sep | 4 | 3 | Z | 3 | 4 | 8 | 10 | 10 | 6 | 6 | 4 | 4 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 7 | 16 | 13 | 3 | 3 | 5.3 | 16 |
| 19-Sep | 3 | 3 | 6 | Z | 18 | 8 | 4 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2.5 | 18 |
| 20-Sep | 0 | 0 | 2 | 4 | Z | 4 | 5 | 5 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 5 |
| 21-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 5 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 2.7 | 5 |
| 22-Sep | Z | 3 | 3 | 3 | 6 | 7 | 8 | 6 | 5 | 4 | 4 | 6 | 5 | 7 | 8 | 10 | 8 | 6 | 9 | 8 | 9 | 6 | 5 | 5 | 6.1 | 10 |
| 23-Sep | 7 | Z | 4 | 3 | 3 | 4 | 10 | 12 | 10 | 12 | 7 | 2 | 2 | 1 | 2 | 4 | 6 | 8 | 22 | 17 | 14 | 8 | 8 | 10 | 7.7 | 22 |
| 24-Sep | 7 | 6 | Z | 8 | 11 | 11 | 12 | 6 | 9 | 9 | 7 | 5 | 4 | 4 | 5 | 6 | 6 | 16 | 21 | 16 | 15 | 22 | 8 | 5 | 9.5 | 22 |
| 25-Sep | 5 | 5 | 5 | Z | 8 | 9 | 11 | 11 | 12 | 10 | 6 | 7 | 5 | 3 | 3 | 7 | 10 | 33 | 15 | 16 | 17 | 10 | 17 | 20 | 10.7 | 33 |
| 26-Sep | 13 | 11 | 6 | 8 | Z | 24 | 13 | 7 | 5 | 5 | 7 | 3 | 1 | 1 | 0 | 1 | 2 | 4 | 17 | 12 | 7 | 6 | 11 | 17 | 7.8 | 24 |
| 27-Sep | 16 | 6 | 9 | 9 | 22 | Z | 23 | 32 | 10 | 6 | 8 | 20 | 16 | 13 | 14 | 14 | 15 | 12 | 18 | 12 | 13 | 12 | 7 | 7 | 13.5 | 32 |
| 28-Sep | Z | 5 | 5 | 5 | 11 | 19 | 18 | 12 | 9 | 9 | 8 | 7 | 6 | 4 | 6 | 7 | 8 | 15 | 39 | 21 | 9 | 7 | 5 | 3 | 10.3 | 39 |
| 29-Sep | 3 | Z | 4 | 5 | 7 | 8 | 15 | 11 | 9 | 10 | 9 | 8 | 8 | 9 | 6 | 8 | 14 | 14 | 33 | 36 | 15 | 9 | 7 | 18 | 11.4 | 36 |
| 30-Sep | 10 | 12 | Z | 10 | 21 | 17 | 35 | 35 | 22 | 13 | 12 | 7 | 5 | 4 | 5 | 5 | 6 | 5 | 5 | 2 | 2 | 1 | 1 | 0 | 10.1 | 35 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 5.6 5.2 4.7 4.9 7.9 9.7 11.2 10.8 9.1 7.7 7.3 5.8 4.1 4.1 4.8 4.7 5.4 7.7 11.7 10.8 8.8 7.4 6.2 6.7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 14 10 10 22 24 35 35 29 21 19 20 16 13 27 14 15 33 39 36 21 22 17 23 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 657 | 95.77 | 95.77 |
| 21 - 40 | 29 | 4.23 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 48 | 5 | 14 | 18 | 32 | 38 | 129 | 56 | 35 | 32 | 52 | 46 | 36 | 25 | 32 | 59 | 657 |
| 21 - 40 | 0 | 0 | 0 | 0 | 3 | 2 | 11 | 7 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 29 |
| 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 | 48 | 5 | 14 | 18 | 35 | 40 | 140 | 63 | 38 | 33 | 52 | 46 | 36 | 25 | 32 | 61 | 686 |

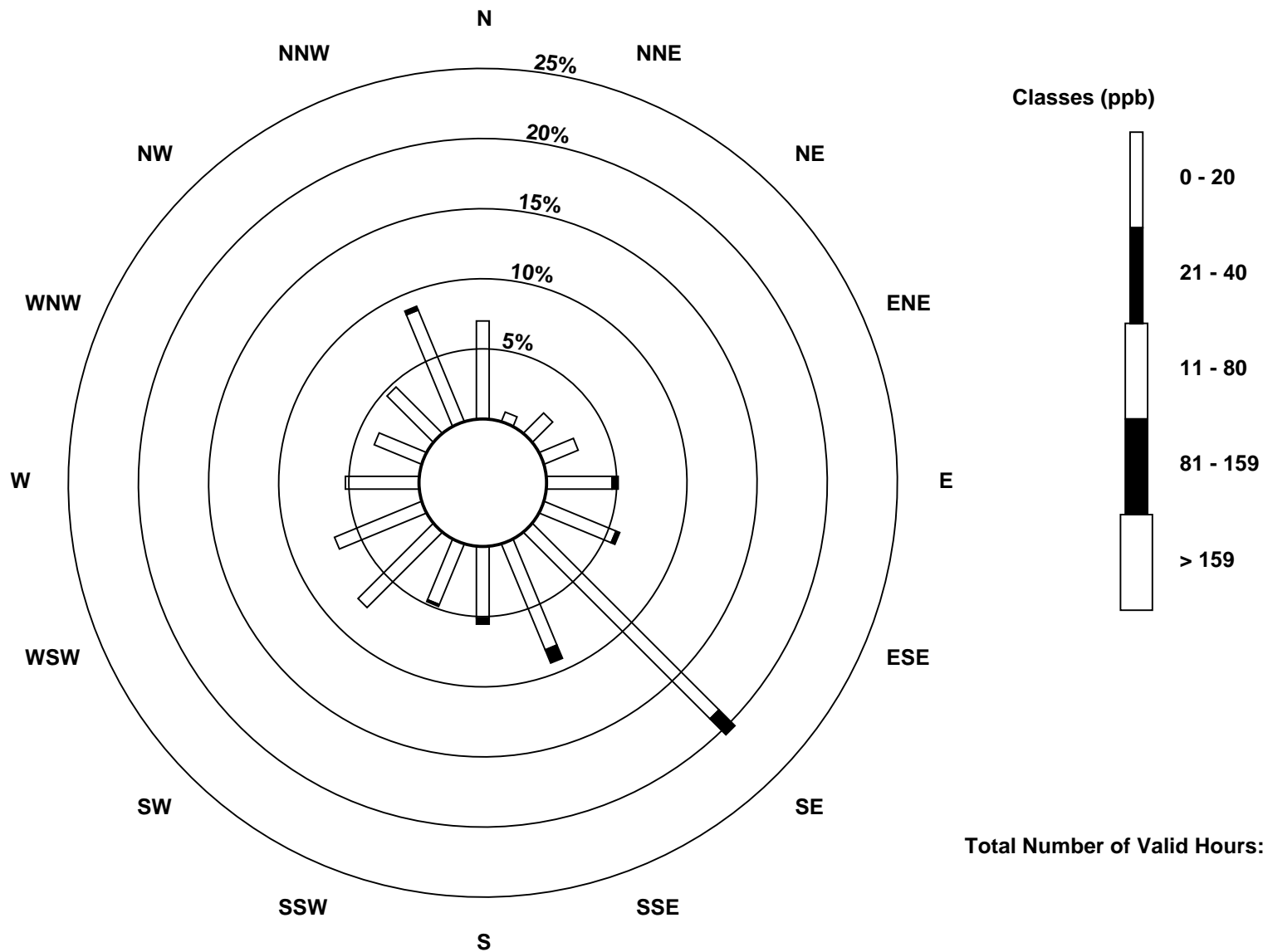
Total Number of Valid Hours: 686

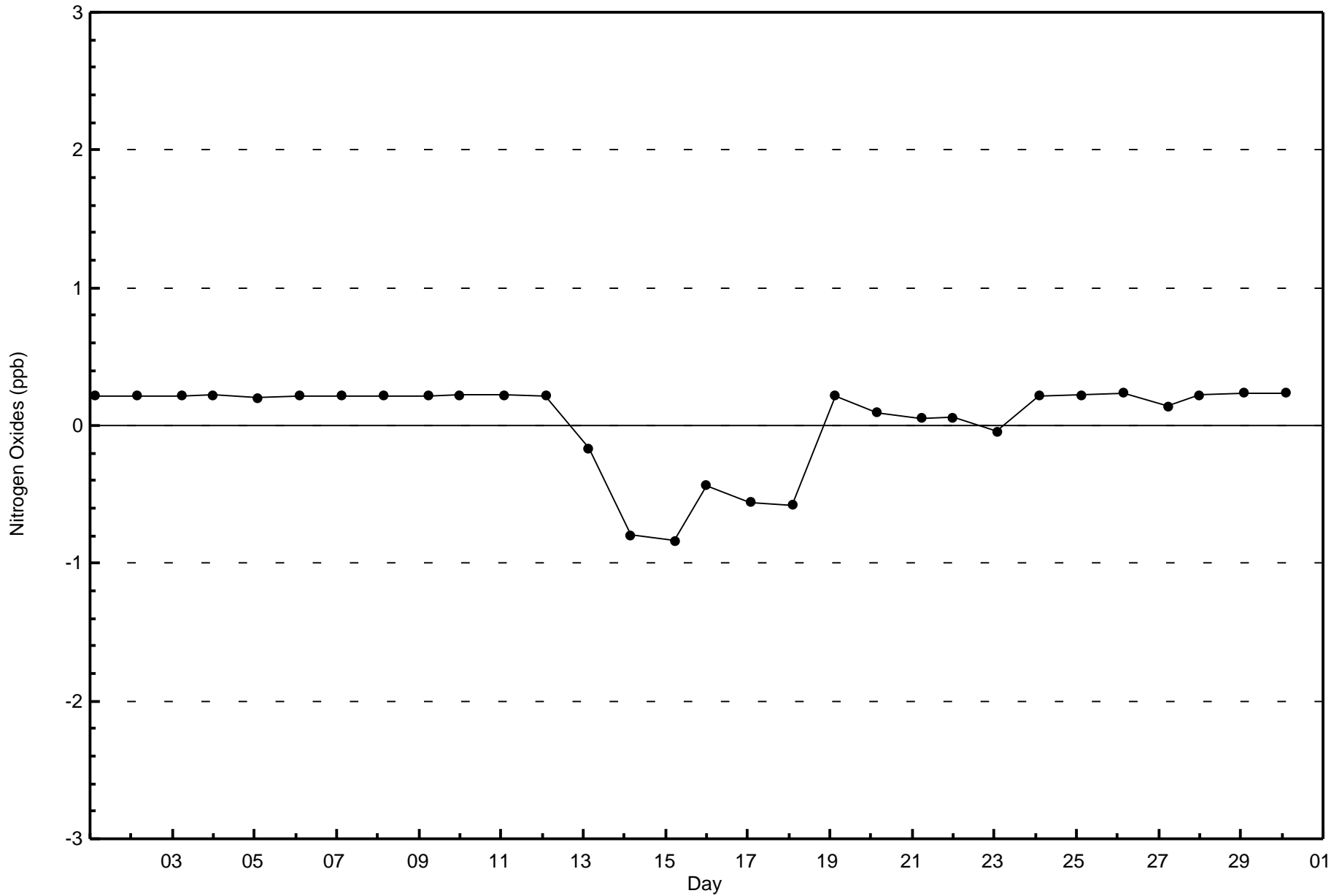
Total Number of Hours: 720

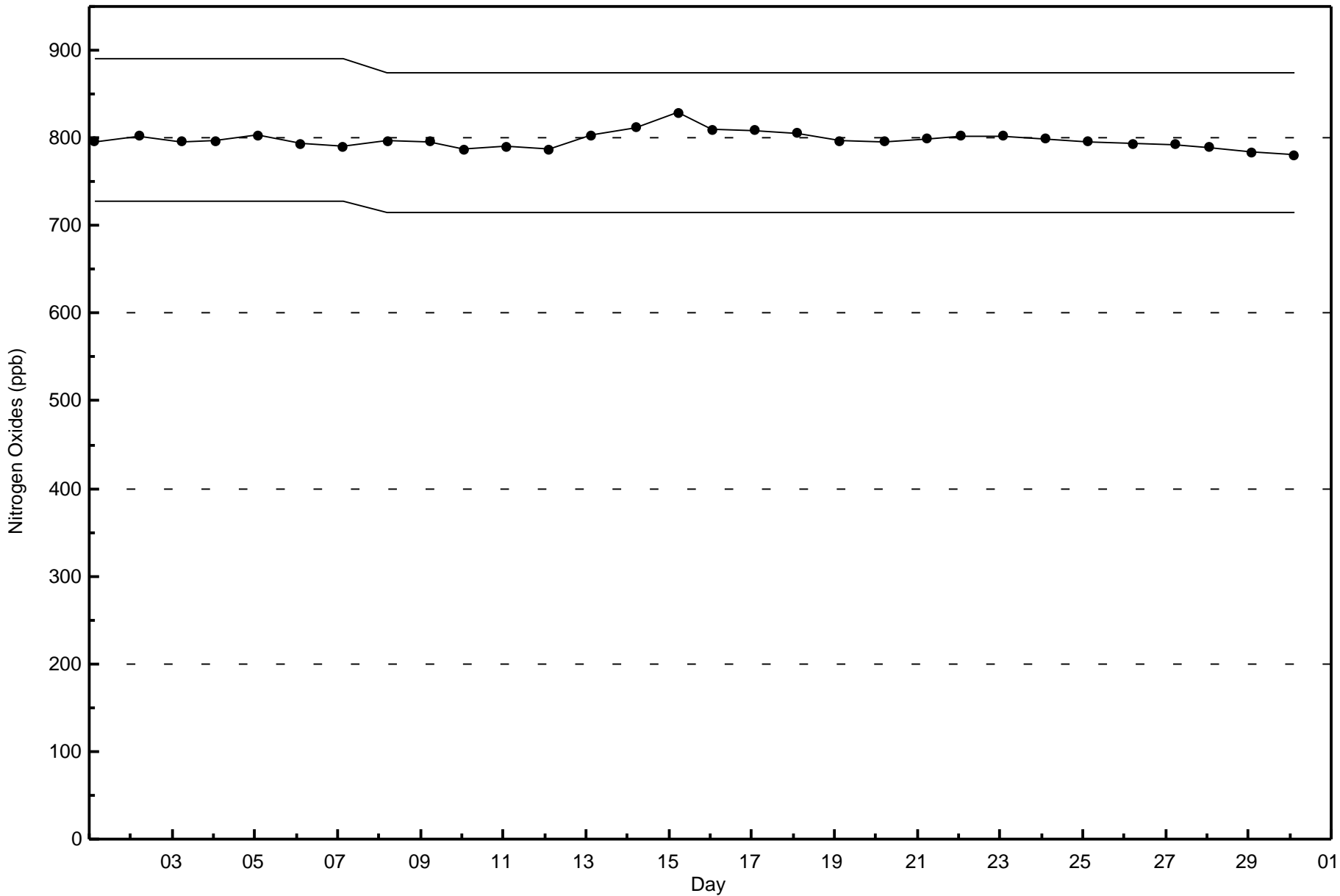


Wood Buffalo Environmental Association
Wind Rose Sep 2017

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









| | | | |
|--|--|---------------------------|-------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 52.3 µg/m ³ on Sep 8 13:00 | Maximum Daily Average: 20.3 µg/m ³ on Sep 19 | Hours of Data: | 719 |
| Minimum Value: 0.2 µg/m ³ on Sep 25 15:00 | Minimum Daily Average: 2.8 µg/m ³ on Sep 12 | Hours of Missing Data: | 1 |
| Maximum Diurnal Average: 10.1 µg/m ³ at hour 20 | Minimum Diurnal Average: 5.7 µg/m ³ at hour 16 | Hours of Calibration: | 1 |
| Monthly Average: 7.62 µg/m ³ | Percentiles: P ₁ = 1.4 P ₁₀ = 2.7 Q ₁ = 3.6 Median = 5.2 Q ₃ = 9.4 P ₉₀ = 14.1 P ₉₉ = 42.0 | Percent Operational Time: | 100.0 |

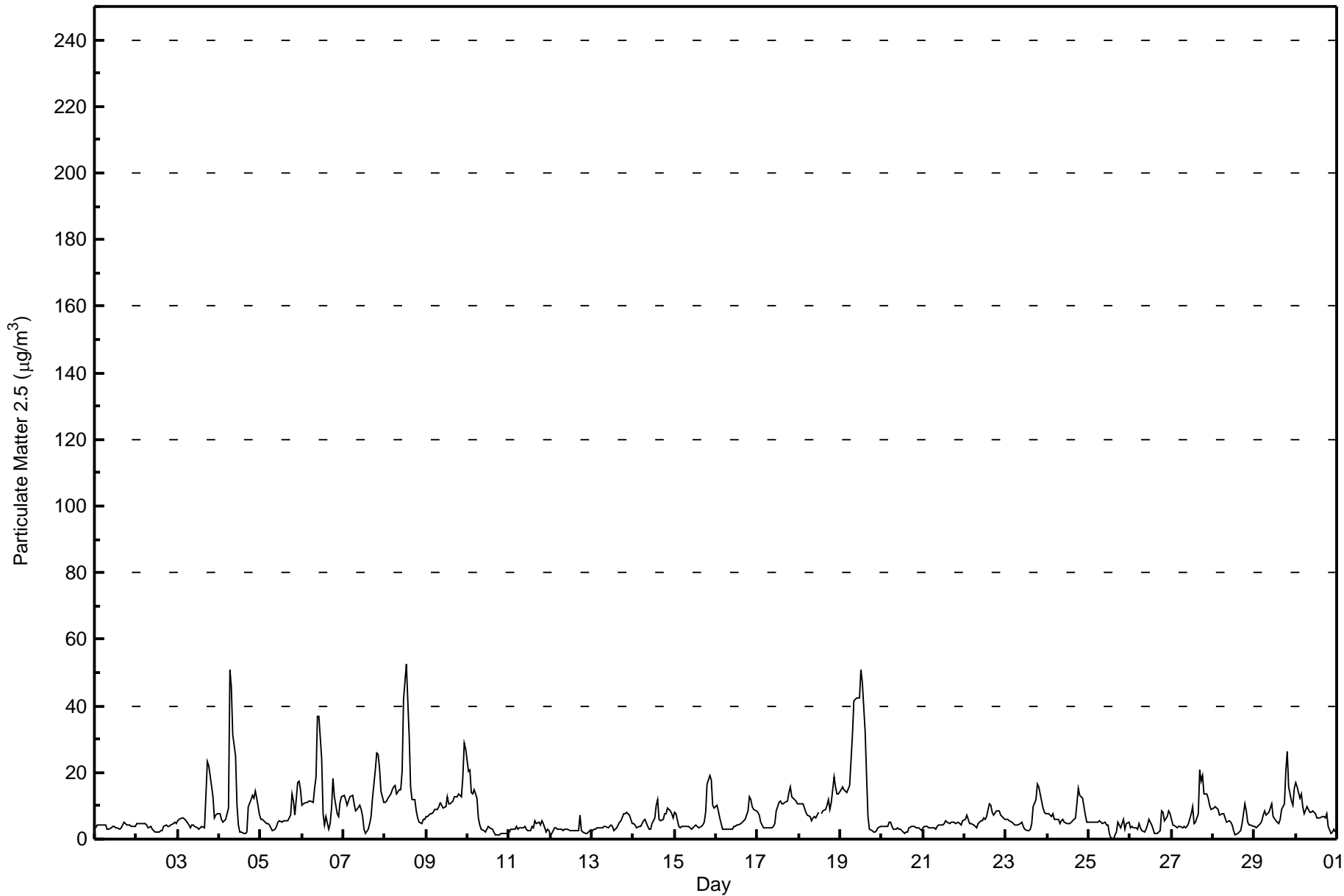
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 3.3 | 4.1 | 4.2 | 4.3 | 4.3 | 4.2 | 4.3 | 2.8 | 3.0 | 3.5 | 3.8 | 3.8 | 3.3 | 3.3 | 3.0 | 3.4 | 4.4 | 5.3 | 4.4 | 4.3 | 4.2 | 3.9 | 3.6 | 3.9 | 3.9 | 5.3 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 4.8 | 4.8 | 4.7 | 4.6 | 4.8 | 4.8 | 4.2 | 3.5 | 3.6 | 3.1 | 2.5 | 2.2 | 2.0 | 2.2 | 2.3 | 2.4 | 3.7 | 4.3 | 3.7 | 3.9 | 4.3 | 4.8 | 4.9 | 4.7 | 4.9 | 4.9 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 5.5 | 6.1 | 6.3 | 6.5 | 5.8 | 5.4 | 4.4 | 3.6 | 4.2 | 4.2 | 3.8 | 3.3 | 3.1 | 3.2 | 3.6 | 3.6 | 13.2 | 23.2 | 22.2 | 18.9 | 12.5 | 6.2 | 7.0 | 7.7 | 23.2 | 7.6 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 7.4 | 6.0 | 5.2 | 5.4 | 5.9 | 9.4 | 51.0 | 45.6 | 31.5 | 25.1 | 10.2 | 4.3 | 2.1 | 2.0 | 1.7 | 1.7 | 2.3 | 9.9 | 12.1 | 13.2 | 12.2 | 14.5 | 12.2 | 7.3 | 12.4 | 51.0 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 5.8 | 5.8 | 5.4 | 4.7 | 4.6 | 4.1 | 3.2 | 2.5 | 3.1 | 3.9 | 5.3 | 5.4 | 4.9 | 5.4 | 5.7 | 5.4 | 5.5 | 7.1 | 13.7 | 11.5 | 7.1 | 16.8 | 17.4 | 14.7 | 7.0 | 17.4 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 10.1 | 10.4 | 11.1 | 10.8 | 11.3 | 11.5 | 11.0 | 15.1 | 18.4 | 36.9 | 36.8 | 24.1 | 7.6 | 4.0 | 6.8 | 3.0 | 4.7 | 9.1 | 18.1 | 12.7 | 7.7 | 6.9 | 10.9 | 12.8 | 13.0 | 36.9 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 13.2 | 11.9 | 10.3 | 11.3 | 12.7 | 13.0 | 10.5 | 8.5 | 8.8 | 10.0 | 8.9 | 6.8 | 2.8 | 1.8 | 3.1 | 4.5 | 6.9 | 12.2 | 20.6 | 26.0 | 25.5 | 21.1 | 14.6 | 10.9 | 11.5 | 26.0 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 11.2 | 11.5 | 12.3 | 13.4 | 14.8 | 15.7 | 16.1 | 13.7 | 14.7 | 14.8 | 20.5 | 42.0 | 52.3 | 41.7 | 31.0 | 15.5 | 12.0 | 12.0 | 8.3 | 6.4 | 5.1 | 4.8 | 5.8 | 6.0 | 16.7 | 52.3 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 6.6 | 6.8 | 7.5 | 7.5 | 8.1 | 8.9 | 9.1 | 9.6 | 11.1 | 10.0 | 9.4 | 9.7 | 12.9 | 10.6 | 10.6 | 11.5 | 12.5 | 12.7 | 12.7 | 13.7 | 12.7 | 18.6 | 28.7 | 27.3 | 12.0 | 28.7 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 20.3 | 20.8 | 14.1 | 13.8 | 14.8 | 12.4 | 6.5 | 4.3 | 3.1 | 2.4 | 2.3 | 3.1 | 3.9 | 3.2 | 2.9 | 2.3 | 1.4 | 1.4 | 1.4 | 1.5 | 1.6 | 1.8 | 1.8 | 1.6 | 5.9 | 20.8 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 2.3 | 2.9 | 3.0 | 3.1 | 3.6 | 3.1 | 3.2 | 3.4 | 3.6 | 3.8 | 3.1 | 2.4 | 2.7 | 3.9 | 3.2 | 5.4 | 4.5 | 4.9 | 4.4 | 5.3 | 4.6 | 2.2 | 3.0 | 2.4 | 3.5 | 5.4 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1.2 | 1.8 | 3.4 | 3.4 | 3.1 | 3.1 | 2.9 | 2.7 | 2.9 | 3.0 | 2.9 | 2.7 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 | 7.0 | 2.6 | 2.2 | 1.9 | 1.8 | 2.2 | 2.4 | 2.8 | 7.0 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 2.6 | 2.9 | 3.2 | 3.4 | 3.4 | 3.5 | 3.5 | 3.6 | 3.6 | 3.5 | 3.8 | 4.4 | 3.7 | 2.7 | 3.3 | 4.2 | 5.0 | 5.7 | 7.5 | 7.8 | 8.2 | 7.4 | 7.2 | 4.6 | 4.5 | 8.2 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 4.8 | 4.4 | 3.4 | 3.7 | 3.6 | 4.6 | 5.6 | 6.0 | 3.7 | 3.2 | 3.1 | 4.8 | 6.2 | 10.3 | 11.7 | 6.0 | 5.4 | 5.9 | 7.8 | 7.7 | 9.1 | 8.4 | 7.7 | 6.4 | 6.0 | 11.7 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 7.9 | 7.8 | 3.9 | 3.6 | 3.8 | 4.0 | 3.7 | 3.9 | 3.7 | 3.5 | 2.8 | 3.8 | 4.1 | 3.7 | 3.5 | 3.8 | 4.4 | 5.1 | 7.9 | 16.4 | 19.1 | 17.7 | 10.3 | 9.5 | 6.6 | 19.1 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 10.2 | 8.4 | 6.4 | 4.7 | 3.2 | 2.8 | 2.8 | 2.9 | 2.9 | 2.9 | 3.7 | 3.9 | 4.3 | 4.4 | 4.9 | 4.9 | 5.5 | 5.8 | 8.7 | 12.7 | 12.0 | 9.6 | 8.7 | 8.7 | 6.0 | 12.7 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 8.1 | 7.1 | 5.0 | 3.5 | 3.3 | 3.3 | 3.4 | 3.4 | 3.5 | 3.7 | 4.7 | 8.3 | 11.0 | 11.5 | 10.7 | 10.7 | 10.8 | 11.5 | 13.8 | 15.7 | 12.8 | 12.1 | 11.6 | 10.6 | 8.3 | 15.7 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 10.4 | 10.7 | 10.5 | 9.1 | 8.0 | 7.2 | 6.6 | 5.6 | 6.4 | 6.8 | 6.5 | 8.1 | C | 7.5 | 8.6 | 9.1 | 10.2 | 11.7 | 8.9 | 10.9 | 18.8 | 15.7 | 13.4 | 13.4 | 9.7 | 18.8 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 14.9 | 15.6 | 14.8 | 14.2 | 14.0 | 16.2 | 23.7 | 31.2 | 41.6 | 42.6 | 42.2 | 42.2 | 50.7 | 47.0 | 32.1 | 19.2 | 6.7 | 3.0 | 2.4 | 2.0 | 1.9 | 2.5 | 3.4 | 3.8 | 20.3 | 50.7 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 3.7 | 3.7 | 3.7 | 3.8 | 5.0 | 5.1 | 3.9 | 2.9 | 3.1 | 3.5 | 3.2 | 2.8 | 2.0 | 1.9 | 2.1 | 2.1 | 3.2 | 3.9 | 3.7 | 3.7 | 3.4 | 3.3 | 3.0 | 2.6 | 3.3 | 5.1 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 3.2 | 3.7 | 3.6 | 3.6 | 3.3 | 3.3 | 3.3 | 3.0 | 3.9 | 4.2 | 4.2 | 4.3 | 4.5 | 5.4 | 5.1 | 4.7 | 5.0 | 5.0 | 5.0 | 4.9 | 4.9 | 4.8 | 4.3 | 5.5 | 4.3 | 5.5 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 6.1 | 7.2 | 5.9 | 4.7 | 4.6 | 4.1 | 3.6 | 3.4 | 4.6 | 5.3 | 5.7 | 6.5 | 6.1 | 6.7 | 10.5 | 10.2 | 8.2 | 7.0 | 8.3 | 8.6 | 8.4 | 7.1 | 6.7 | 5.9 | 6.5 | 10.5 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 5.9 | 6.0 | 5.5 | 5.2 | 4.8 | 4.4 | 4.4 | 4.3 | 4.6 | 5.0 | 3.8 | 2.8 | 2.7 | 2.6 | 3.0 | 4.7 | 9.6 | 12.1 | 16.7 | 15.5 | 13.6 | 9.2 | 8.1 | 7.4 | 6.7 | 16.7 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 7.7 | 7.5 | 6.8 | 7.5 | 6.0 | 5.9 | 6.0 | 4.8 | 5.4 | 5.9 | 5.2 | 4.6 | 4.5 | 4.8 | 4.9 | 6.1 | 6.5 | 10.7 | 15.2 | 13.3 | 12.3 | 9.8 | 7.4 | 5.2 | 7.2 | 15.2 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 5.0 | 4.9 | 4.9 | 5.2 | 5.2 | 5.3 | 5.4 | 5.2 | 4.6 | 5.1 | 4.4 | 4.2 | 1.7 | 0.3 | 0.2 | 1.3 | 2.3 | 5.0 | 3.4 | 4.7 | 6.1 | 3.1 | 4.6 | 4.9 | 4.0 | 6.1 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 3.6 | 3.8 | 3.5 | 3.2 | 2.8 | 4.6 | 3.5 | 2.3 | 2.1 | 3.1 | 4.4 | 5.9 | 4.4 | 2.8 | 1.7 | 1.6 | 1.6 | 2.4 | 8.3 | 8.0 | 5.6 | 6.9 | 8.6 | 7.7 | 4.3 | 8.6 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 5.8 | 4.3 | 3.8 | 3.2 | 3.7 | 3.8 | 3.6 | 3.8 | 3.2 | 3.8 | 4.7 | 7.8 | 9.6 | 4.7 | 5.3 | 7.7 | 20.7 | 17.2 | 18.9 | 13.7 | 13.7 | 12.5 | 10.0 | 8.7 | 8.1 | 20.7 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 9.5 | 9.7 | 9.2 | 8.9 | 7.4 | 7.6 | 7.5 | 6.2 | 5.2 | 5.4 | 5.0 | 4.4 | 2.5 | 1.3 | 1.7 | 1.9 | 2.4 | 4.6 | 10.8 | 8.5 | 4.9 | 4.4 | 4.1 | 3.8 | 5.7 | 10.8 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 3.8 | 3.3 | 3.6 | 4.6 | 5.6 | 7.4 | 8.4 | 7.2 | 8.0 | 9.1 | 10.5 | 7.0 | 5.7 | 4.9 | 4.5 | 6.0 | 9.1 | 10.6 | 20.4 | 26.5 | 15.8 | 11.5 | 10.2 | 15.1 | 9.1 | 26.5 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 16.9 | 15.8 | 12.2 | 13.5 | 9.8 | 7.7 | 9.8 | 8.8 | 8.1 | 8.0 | 8.5 | 7.6 | 6.3 | 6.2 | 6.5 | 6.6 | 7.0 | 6.2 | 7.6 | 3.6 | 1.9 | 2.2 | 3.1 | 1.9 | 7.7 | 16.9 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 7.4 | 7.3 | 6.6 | 6.5 | 6.4 | 6.5 | 7.8 | 7.5 | 7.5 | 8.2 | 7.9 | 8.1 | 7.9 | 7.1 | 6.6 | 5.7 | 6.6 | 8.1 | 10.0 | 10.1 | 9.1 | 8.4 | 8.2 | 7.6 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 20.3 | 20.8 | 14.8 | 14.2 | 14.8 | 16.2 | 51.0 | 45.6 | 41.6 | 42.6 | 42.2 | 42.2 | 52.3 | 47.0 | 32.1 | 19.2 | 20.7 | 23.2 | 22.2 | 26.5 | 25.5 | 21.1 | 28.7 | 27.3 | Diurnal Maximum |

C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 378 | 52.57 | 52.57 |
| 6 - 15 | 281 | 39.08 | 91.66 |
| 16 - 25 | 37 | 5.15 | 96.80 |
| 26 - 80 | 21 | 2.92 | 99.72 |
| > 81.0 | 0 | 0.00 | 99.72 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 36 | 4 | 8 | 8 | 14 | 23 | 67 | 16 | 22 | 15 | 35 | 36 | 31 | 19 | 17 | 27 | 378 |
| 6 - 15 | 10 | 2 | 5 | 7 | 16 | 18 | 73 | 42 | 16 | 18 | 16 | 8 | 6 | 4 | 13 | 27 | 281 |
| 16 - 25 | 2 | 1 | 1 | 0 | 4 | 1 | 9 | 4 | 2 | 2 | 0 | 2 | 0 | 2 | 2 | 5 | 37 |
| 26 - 80 | 0 | 0 | 0 | 4 | 4 | 0 | 2 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 5 | 21 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 7 | 14 | 19 | 38 | 42 | 151 | 64 | 40 | 36 | 52 | 47 | 37 | 25 | 33 | 64 | 717 |

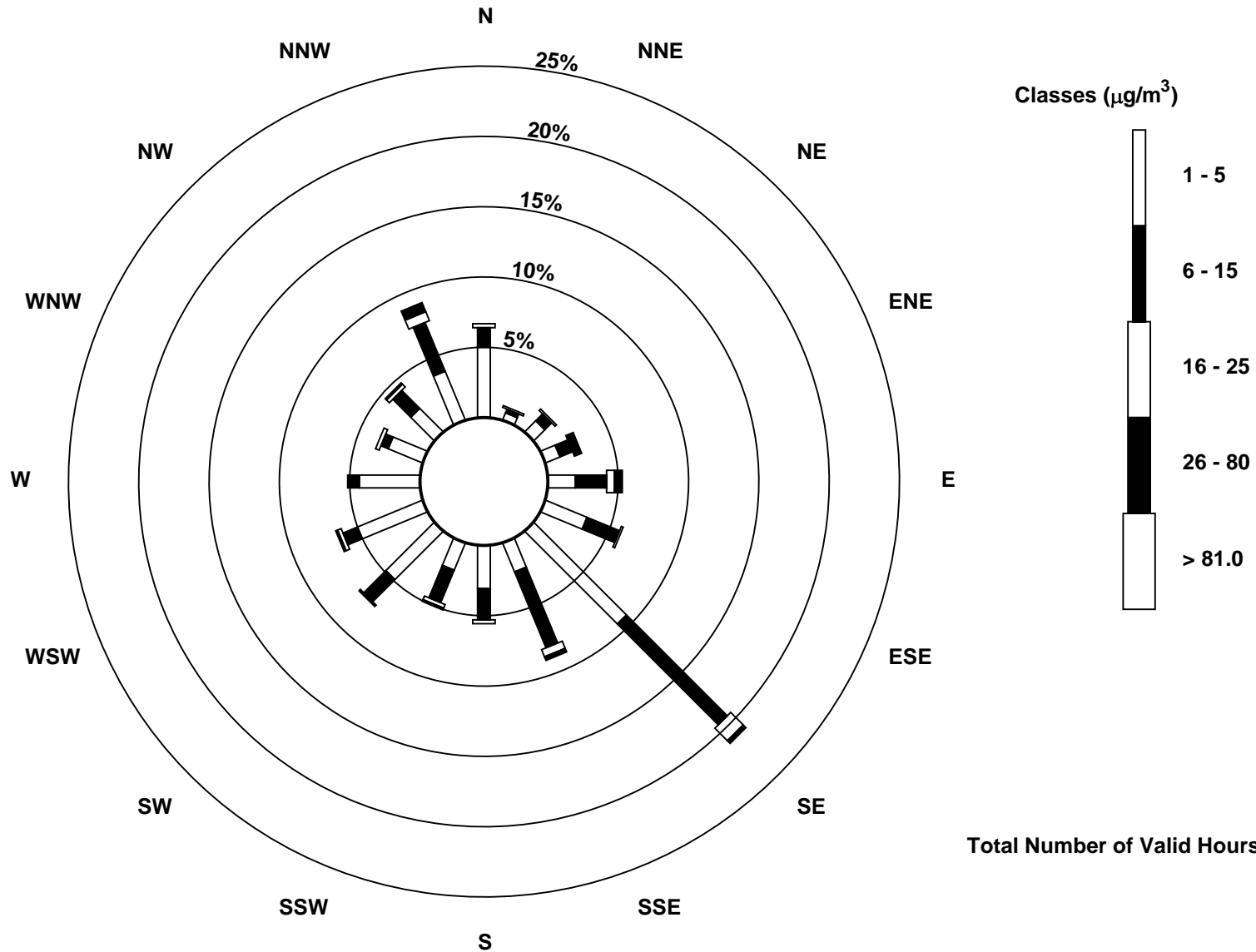
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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

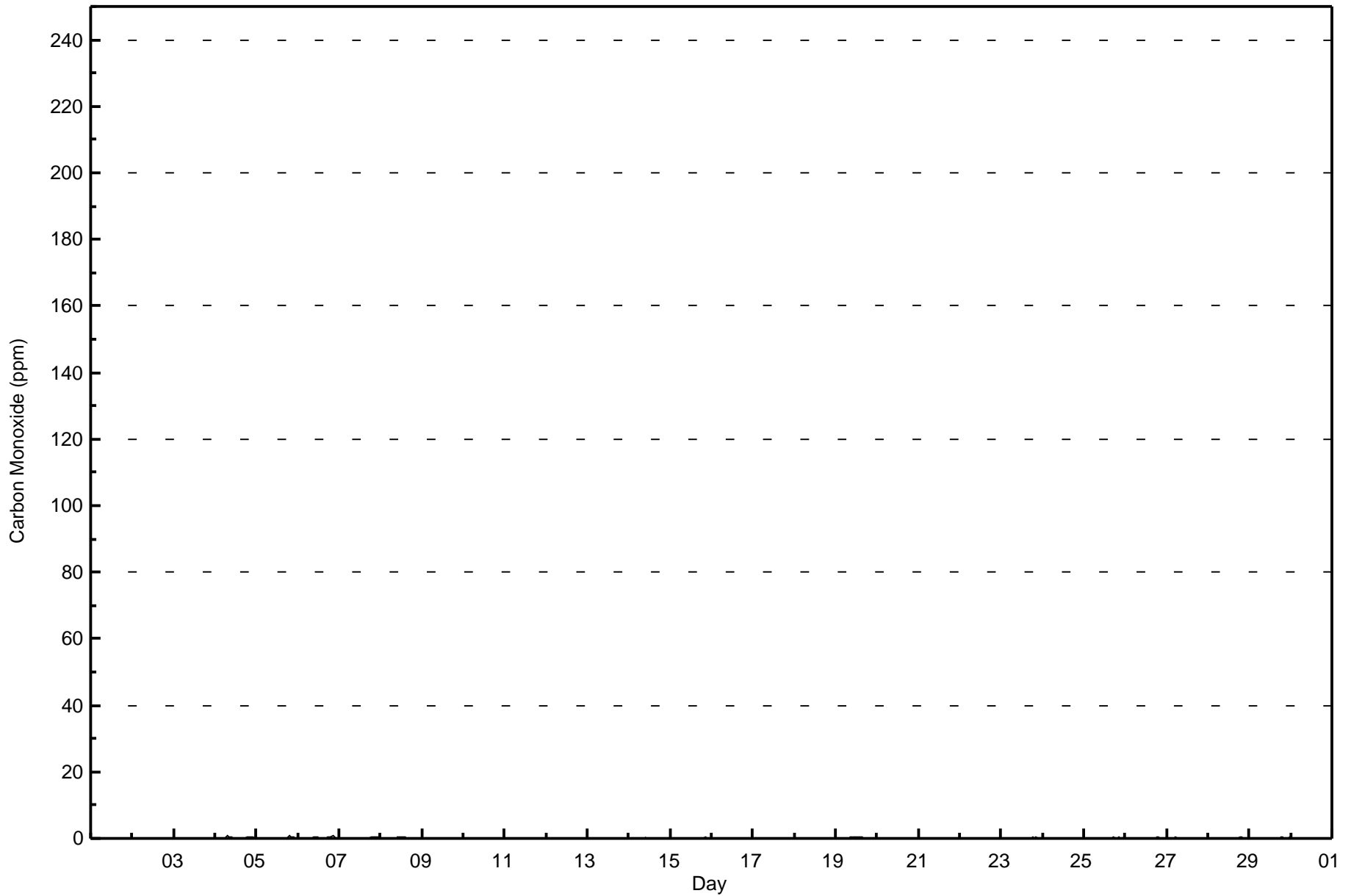


Total Number of Valid Hours: 719



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 667 | 97.09 | 97.09 |
| 0.4 - 0.5 | 16 | 2.33 | 99.42 |
| 0.6 - 0.7 | 4 | 0.58 | 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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.3 | 45 | 7 | 13 | 15 | 35 | 37 | 141 | 58 | 40 | 33 | 48 | 45 | 35 | 25 | 32 | 58 | 667 |
| 0.4 - 0.5 | 0 | 0 | 1 | 2 | 1 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 4 | 16 |
| 0.6 - 0.7 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| 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 | 45 | 7 | 14 | 18 | 36 | 38 | 144 | 61 | 40 | 34 | 48 | 45 | 36 | 25 | 33 | 63 | 687 |

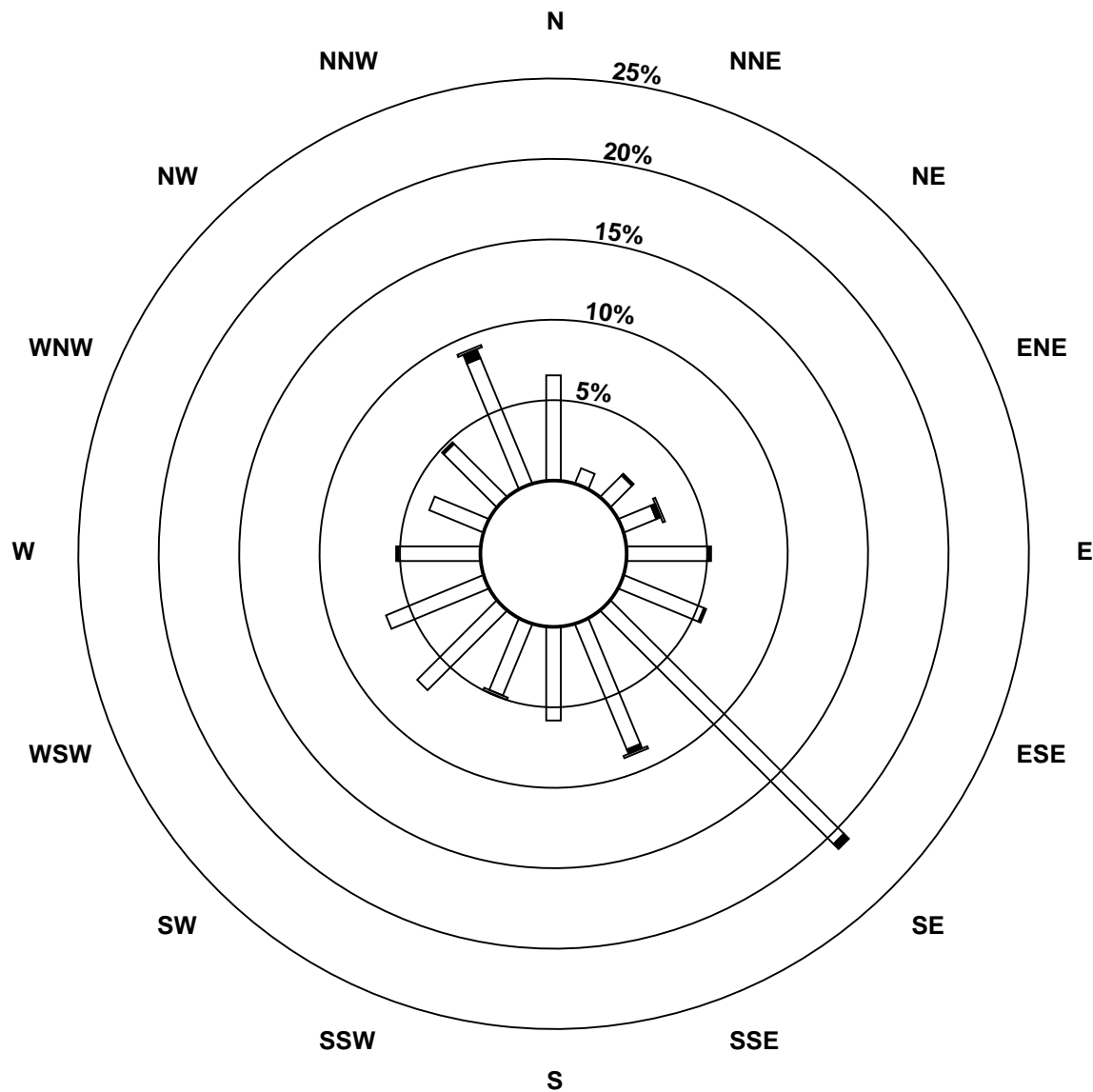
Total Number of Valid Hours: 687

Total Number of Hours: 720

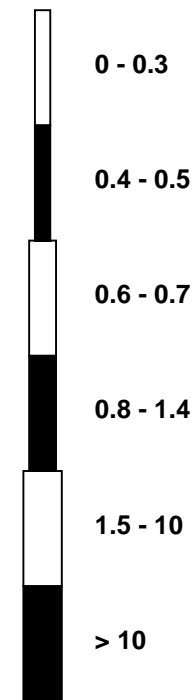


Wood Buffalo Environmental Association
Wind Rose Sep 2017

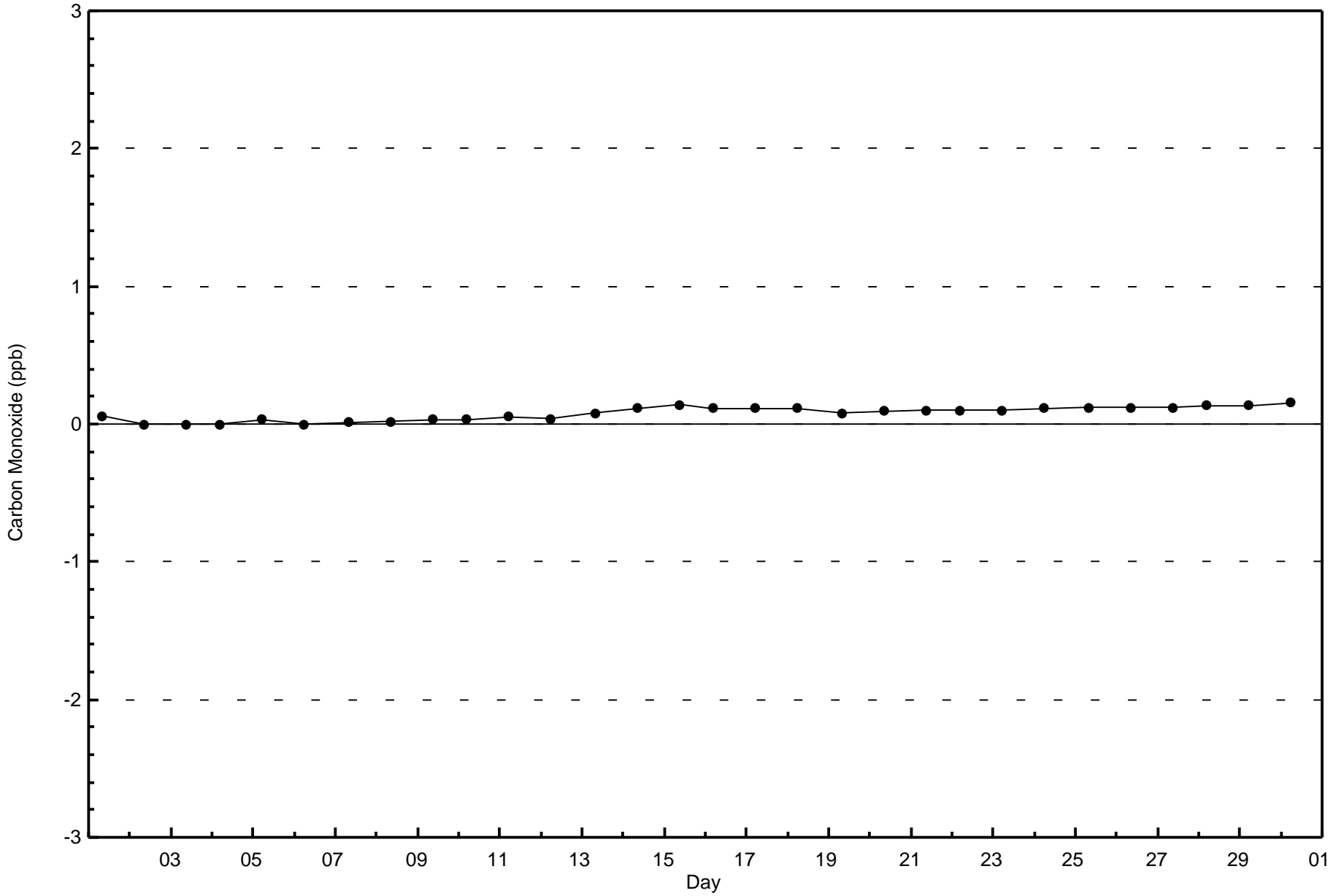
Carbon Monoxide (CO) - ppm
Athabasca Valley (AMS 7)

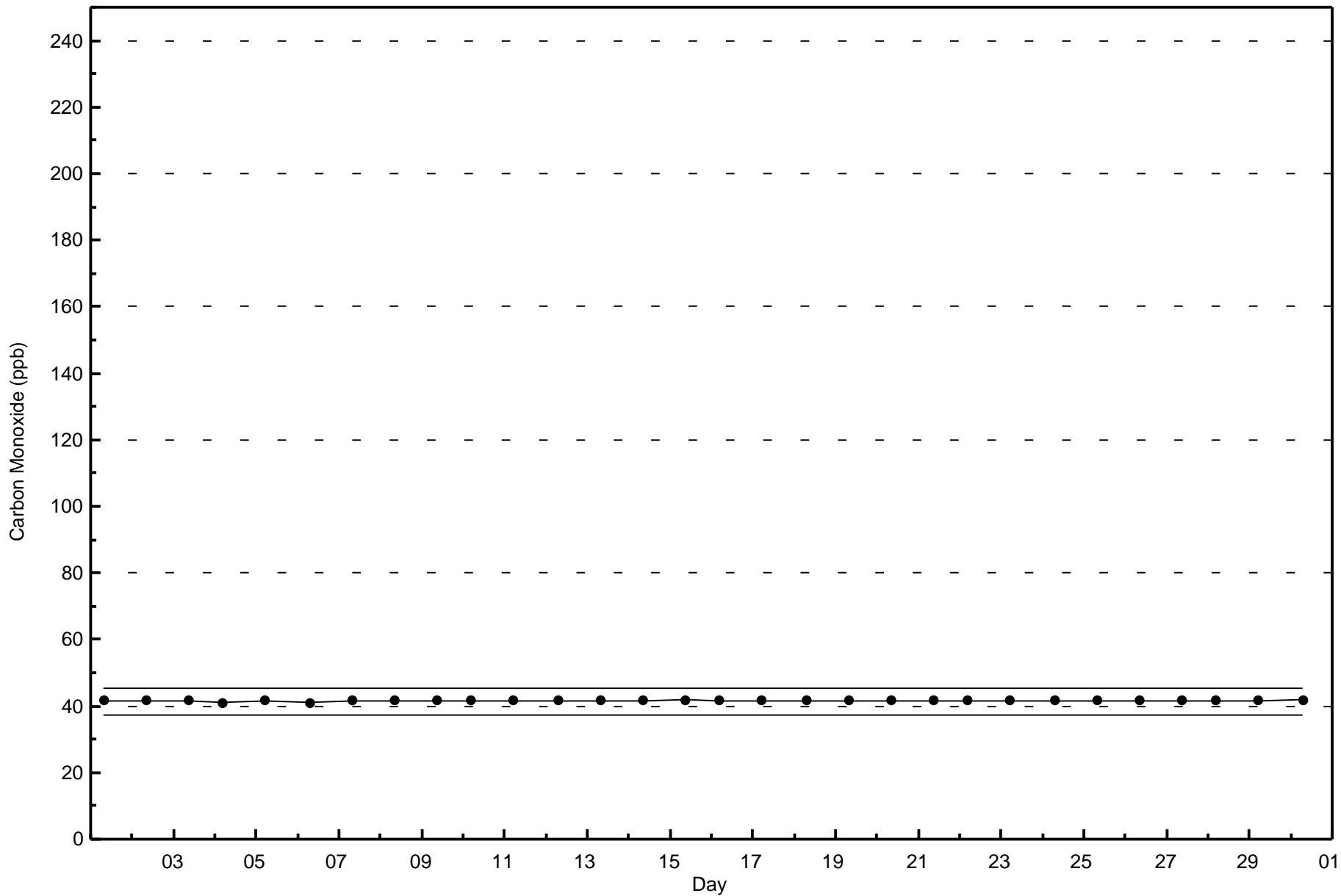


Classes (ppm)



Total Number of Valid Hours: 687



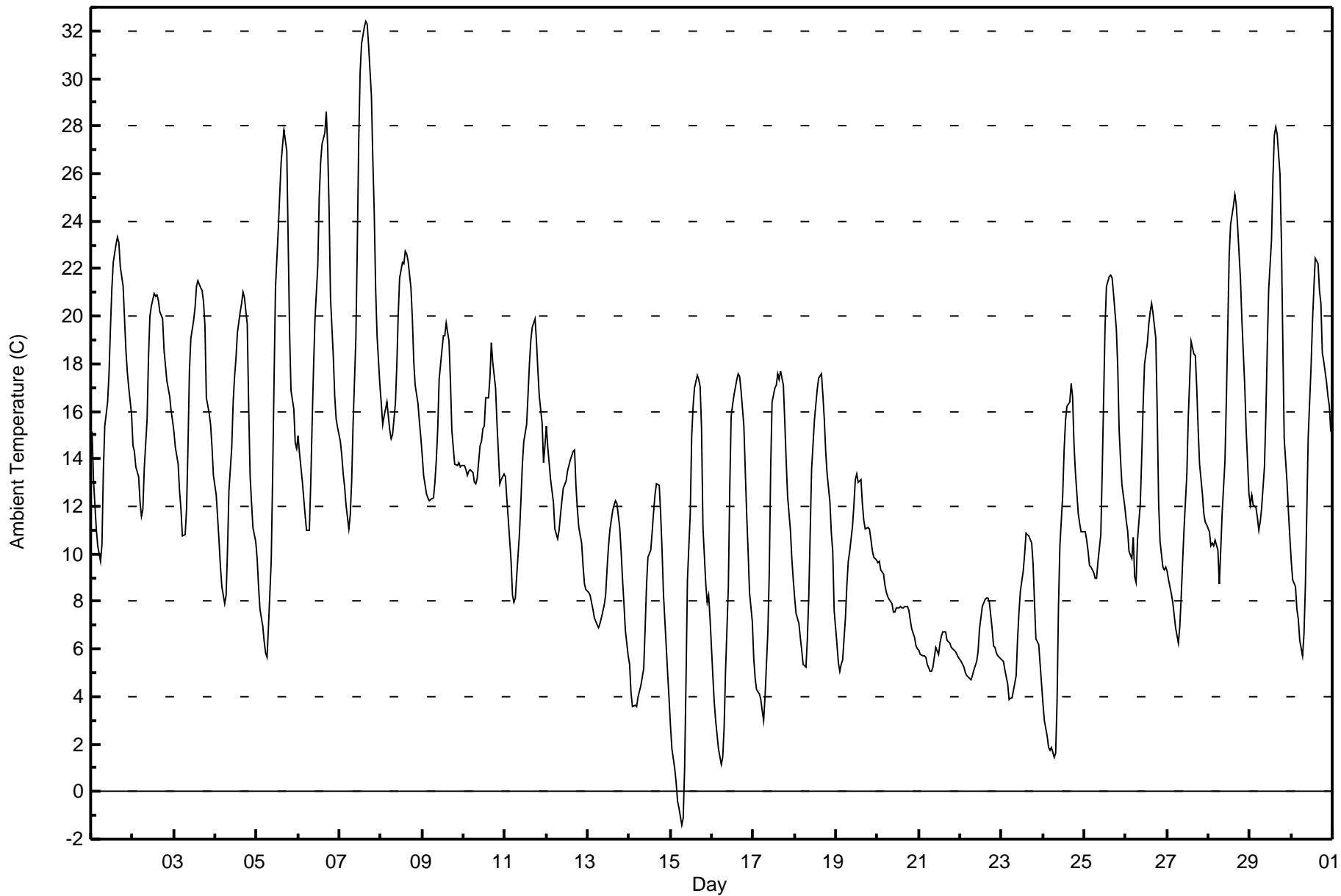




Wood Buffalo Environmental Association
Summary of Hour Averages

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

| Maximum Value: 32.4 C on Sep 7 16:00 Maximum Daily Average: 21.5 C on Sep 7 | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|------|---------------|---------------|
| Minimum Value: -1.4 C on Sep 15 07:00 Minimum Daily Average: 5.9 C on Sep 21 Maximum Diurnal Average: 18.6 C at hour 16 Minimum Diurnal Average: 7.7 C at hour 7 Monthly Average: 12.81 C Percentiles: P ₁ = 1.0 P ₁₀ = 5.4 Q ₁ = 8.2 Median = 12.3 Q ₃ = 16.7 P ₉₀ = 20.9 P ₉₉ = 28.6 | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 15.2 | 13.1 | 12.1 | 11.1 | 10.4 | 9.7 | 10.4 | 13.5 | 15.4 | 16.4 | 17.6 | 19.5 | 21.2 | 22.3 | 23.0 | 23.3 | 23.1 | 22.1 | 21.3 | 19.9 | 18.5 | 17.6 | 17.0 | 15.8 | 17.1 | 23.3 |
| 2-Sep | 14.5 | 14.3 | 13.7 | 13.2 | 12.2 | 11.6 | 11.9 | 13.6 | 15.7 | 18.3 | 20.0 | 20.4 | 20.9 | 20.8 | 20.9 | 20.6 | 20.2 | 19.9 | 18.6 | 17.9 | 17.3 | 16.6 | 16.0 | 15.6 | 16.9 | 20.9 |
| 3-Sep | 15.1 | 14.5 | 13.8 | 12.7 | 11.9 | 10.7 | 10.8 | 11.9 | 14.5 | 17.7 | 19.1 | 19.8 | 20.3 | 21.2 | 21.5 | 21.2 | 21.1 | 20.6 | 19.6 | 16.5 | 15.9 | 15.5 | 14.5 | 13.3 | 16.4 | 21.5 |
| 4-Sep | 12.5 | 11.5 | 10.5 | 9.4 | 8.6 | 7.9 | 8.2 | 10.1 | 12.6 | 14.5 | 16.4 | 17.4 | 18.3 | 19.3 | 20.2 | 20.5 | 21.0 | 20.8 | 19.6 | 16.2 | 13.3 | 12.2 | 11.1 | 10.5 | 14.3 | 21.0 |
| 5-Sep | 9.8 | 8.6 | 7.6 | 6.9 | 6.3 | 5.8 | 5.6 | 6.9 | 9.7 | 13.3 | 17.3 | 21.2 | 23.7 | 25.1 | 26.5 | 27.2 | 27.8 | 26.9 | 23.2 | 19.3 | 16.8 | 16.1 | 14.7 | 14.4 | 15.9 | 27.8 |
| 6-Sep | 15.0 | 14.2 | 13.1 | 12.4 | 11.6 | 11.0 | 11.0 | 13.0 | 15.6 | 17.9 | 19.9 | 22.2 | 25.0 | 26.5 | 27.3 | 27.7 | 28.6 | 27.2 | 24.5 | 20.8 | 18.3 | 16.6 | 15.7 | 15.3 | 18.8 | 28.6 |
| 7-Sep | 14.7 | 14.1 | 13.4 | 12.8 | 12.0 | 11.1 | 11.7 | 13.1 | 15.4 | 19.1 | 23.0 | 27.4 | 30.2 | 31.4 | 32.1 | 32.4 | 32.3 | 31.4 | 29.3 | 26.6 | 24.3 | 21.1 | 19.2 | 17.1 | 21.5 | 32.4 |
| 8-Sep | 16.3 | 15.4 | 15.8 | 16.4 | 15.8 | 15.2 | 14.9 | 15.0 | 16.3 | 17.9 | 20.1 | 21.6 | 22.3 | 22.2 | 22.7 | 22.6 | 22.3 | 21.2 | 20.0 | 18.1 | 17.1 | 16.3 | 15.5 | 14.9 | 18.2 | 22.7 |
| 9-Sep | 14.1 | 13.3 | 12.6 | 12.4 | 12.2 | 12.3 | 12.4 | 13.0 | 13.9 | 15.3 | 17.3 | 18.6 | 19.2 | 19.2 | 19.7 | 18.9 | 17.3 | 15.2 | 14.5 | 13.8 | 13.7 | 13.9 | 13.6 | 13.7 | 15.0 | 19.7 |
| 10-Sep | 13.7 | 13.6 | 13.3 | 13.5 | 13.6 | 13.5 | 13.0 | 12.9 | 13.2 | 14.5 | 14.8 | 15.3 | 15.4 | 16.6 | 16.6 | 17.4 | 18.9 | 18.1 | 17.0 | 15.5 | 14.2 | 12.9 | 13.1 | 13.4 | 14.7 | 18.9 |
| 11-Sep | 13.2 | 12.3 | 11.4 | 9.7 | 8.3 | 8.0 | 8.1 | 9.1 | 10.9 | 12.3 | 13.8 | 14.7 | 15.5 | 16.7 | 18.0 | 19.0 | 19.5 | 19.9 | 19.0 | 17.7 | 16.6 | 15.5 | 13.8 | 14.5 | 14.1 | 19.9 |
| 12-Sep | 15.4 | 14.5 | 13.1 | 12.7 | 12.2 | 11.1 | 10.7 | 11.0 | 11.6 | 12.2 | 12.8 | 13.1 | 13.5 | 13.7 | 13.9 | 14.3 | 14.4 | 12.8 | 11.9 | 11.1 | 10.5 | 9.5 | 8.8 | 8.5 | 12.2 | 15.4 |
| 13-Sep | 8.4 | 8.2 | 8.0 | 7.6 | 7.3 | 7.0 | 6.9 | 7.1 | 7.3 | 7.8 | 8.2 | 9.3 | 10.3 | 11.0 | 11.8 | 12.1 | 12.3 | 12.1 | 11.1 | 10.1 | 8.9 | 7.9 | 6.8 | 5.7 | 8.9 | 12.3 |
| 14-Sep | 5.4 | 4.2 | 3.6 | 3.6 | 4.0 | 4.2 | 4.5 | 5.2 | 6.8 | 8.7 | 9.9 | 10.2 | 10.9 | 11.7 | 12.5 | 12.9 | 12.9 | 11.7 | 10.2 | 8.3 | 6.1 | 5.0 | 3.8 | 7.5 | 12.9 | |
| 15-Sep | 2.8 | 1.8 | 0.9 | 0.4 | -0.4 | -0.7 | -1.4 | -1.1 | 1.0 | 4.7 | 8.9 | 11.7 | 14.9 | 16.2 | 17.0 | 17.5 | 17.3 | 17.0 | 15.2 | 11.1 | 8.7 | 8.0 | 8.3 | 7.3 | 7.8 | 17.5 |
| 16-Sep | 4.9 | 3.8 | 3.0 | 2.4 | 1.8 | 1.1 | 1.4 | 2.7 | 5.1 | 8.6 | 12.8 | 15.8 | 16.3 | 16.7 | 17.3 | 17.6 | 17.5 | 16.8 | 15.4 | 13.5 | 11.6 | 10.1 | 8.4 | 7.1 | 9.6 | 17.6 |
| 17-Sep | 5.6 | 4.8 | 4.3 | 4.1 | 3.9 | 3.4 | 3.0 | 4.0 | 6.7 | 9.2 | 13.6 | 16.4 | 17.0 | 17.1 | 17.6 | 17.4 | 17.7 | 17.1 | 15.5 | 13.9 | 12.4 | 11.0 | 9.8 | 8.9 | 10.6 | 17.7 |
| 18-Sep | 8.1 | 7.5 | 7.1 | 6.5 | 5.9 | 5.4 | 5.3 | 6.4 | 8.2 | 10.8 | 13.5 | 15.6 | 16.3 | 16.9 | 17.4 | 17.6 | 16.7 | 15.7 | 14.3 | 13.3 | 12.2 | 10.9 | 10.1 | 7.6 | 11.2 | 17.6 |
| 19-Sep | 6.2 | 5.4 | 5.0 | 5.4 | 5.5 | 7.3 | 8.7 | 9.7 | 10.1 | 11.2 | 12.0 | 13.1 | 13.4 | 13.0 | 13.1 | 12.1 | 11.4 | 11.1 | 11.1 | 11.1 | 10.6 | 10.1 | 9.9 | 9.7 | 9.8 | 13.4 |
| 20-Sep | 9.7 | 9.7 | 9.3 | 9.2 | 8.6 | 8.4 | 8.2 | 8.1 | 7.9 | 7.6 | 7.6 | 7.7 | 7.7 | 7.8 | 7.7 | 7.8 | 7.8 | 7.8 | 7.6 | 7.2 | 6.9 | 6.5 | 6.1 | 6.0 | 7.9 | 9.7 |
| 21-Sep | 6.0 | 5.8 | 5.7 | 5.7 | 5.7 | 5.4 | 5.1 | 5.1 | 5.2 | 5.7 | 6.1 | 5.7 | 6.2 | 6.5 | 6.7 | 6.7 | 6.3 | 6.3 | 6.2 | 6.1 | 6.0 | 5.9 | 5.7 | 5.7 | 5.9 | 6.7 |
| 22-Sep | 5.5 | 5.3 | 5.2 | 5.0 | 4.9 | 4.7 | 4.7 | 4.9 | 5.1 | 5.5 | 5.9 | 6.8 | 7.3 | 7.8 | 8.1 | 8.2 | 8.2 | 8.0 | 6.9 | 6.1 | 6.1 | 5.9 | 5.7 | 5.6 | 6.1 | 8.2 |
| 23-Sep | 5.5 | 5.5 | 5.1 | 4.5 | 3.9 | 3.9 | 3.9 | 4.2 | 4.9 | 6.4 | 7.6 | 8.4 | 9.2 | 10.0 | 10.9 | 10.8 | 10.7 | 10.4 | 9.6 | 7.9 | 6.4 | 6.2 | 5.4 | 4.6 | 6.9 | 10.9 |
| 24-Sep | 3.7 | 3.0 | 2.3 | 1.8 | 1.7 | 1.8 | 1.4 | 1.6 | 3.8 | 7.8 | 10.3 | 12.5 | 14.4 | 15.6 | 16.2 | 16.4 | 17.2 | 16.6 | 14.6 | 13.4 | 11.7 | 11.3 | 11.0 | 11.0 | 9.2 | 17.2 |
| 25-Sep | 10.9 | 10.6 | 10.1 | 9.5 | 9.4 | 9.2 | 8.9 | 9.0 | 9.7 | 10.8 | 13.5 | 16.5 | 19.5 | 21.2 | 21.7 | 21.7 | 21.6 | 21.0 | 19.5 | 17.8 | 15.2 | 14.0 | 12.9 | 12.0 | 14.4 | 21.7 |
| 26-Sep | 11.4 | 11.0 | 10.1 | 9.8 | 10.7 | 9.0 | 8.8 | 10.6 | 12.1 | 14.1 | 16.3 | 18.0 | 18.9 | 19.7 | 20.2 | 20.5 | 20.1 | 19.1 | 15.9 | 12.1 | 10.5 | 9.5 | 9.3 | 9.4 | 13.6 | 20.5 |
| 27-Sep | 9.3 | 8.9 | 8.3 | 8.0 | 7.4 | 6.9 | 6.2 | 7.0 | 8.2 | 9.7 | 11.0 | 13.3 | 15.7 | 17.4 | 19.0 | 18.4 | 18.4 | 17.0 | 15.2 | 13.8 | 12.6 | 11.7 | 11.4 | 11.2 | 11.9 | 19.0 |
| 28-Sep | 10.9 | 10.4 | 10.5 | 10.3 | 10.6 | 10.1 | 8.7 | 10.1 | 11.7 | 13.9 | 16.5 | 19.5 | 22.5 | 23.9 | 24.6 | 25.1 | 24.7 | 23.8 | 21.6 | 19.8 | 18.5 | 17.1 | 15.3 | 12.5 | 16.4 | 25.1 |
| 29-Sep | 12.0 | 12.5 | 12.1 | 12.0 | 11.6 | 11.0 | 11.3 | 12.0 | 13.6 | 15.9 | 18.7 | 21.1 | 23.2 | 25.8 | 27.6 | 28.0 | 27.6 | 26.0 | 23.2 | 18.9 | 14.9 | 13.0 | 11.7 | 10.7 | 17.3 | 28.0 |
| 30-Sep | 9.7 | 8.9 | 8.6 | 7.7 | 7.3 | 6.4 | 5.7 | 6.6 | 8.6 | 11.7 | 14.9 | 17.8 | 19.7 | 21.2 | 22.4 | 22.2 | 21.0 | 20.5 | 18.5 | 18.1 | 17.2 | 16.6 | 16.2 | 15.2 | 14.3 | 22.4 |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 4 | 0.56 | 0.56 |
| 0 - 10 | 243 | 33.75 | 34.31 |
| 10 - 20 | 384 | 53.33 | 87.64 |
| > 20 | 89 | 12.36 | 100.00 |

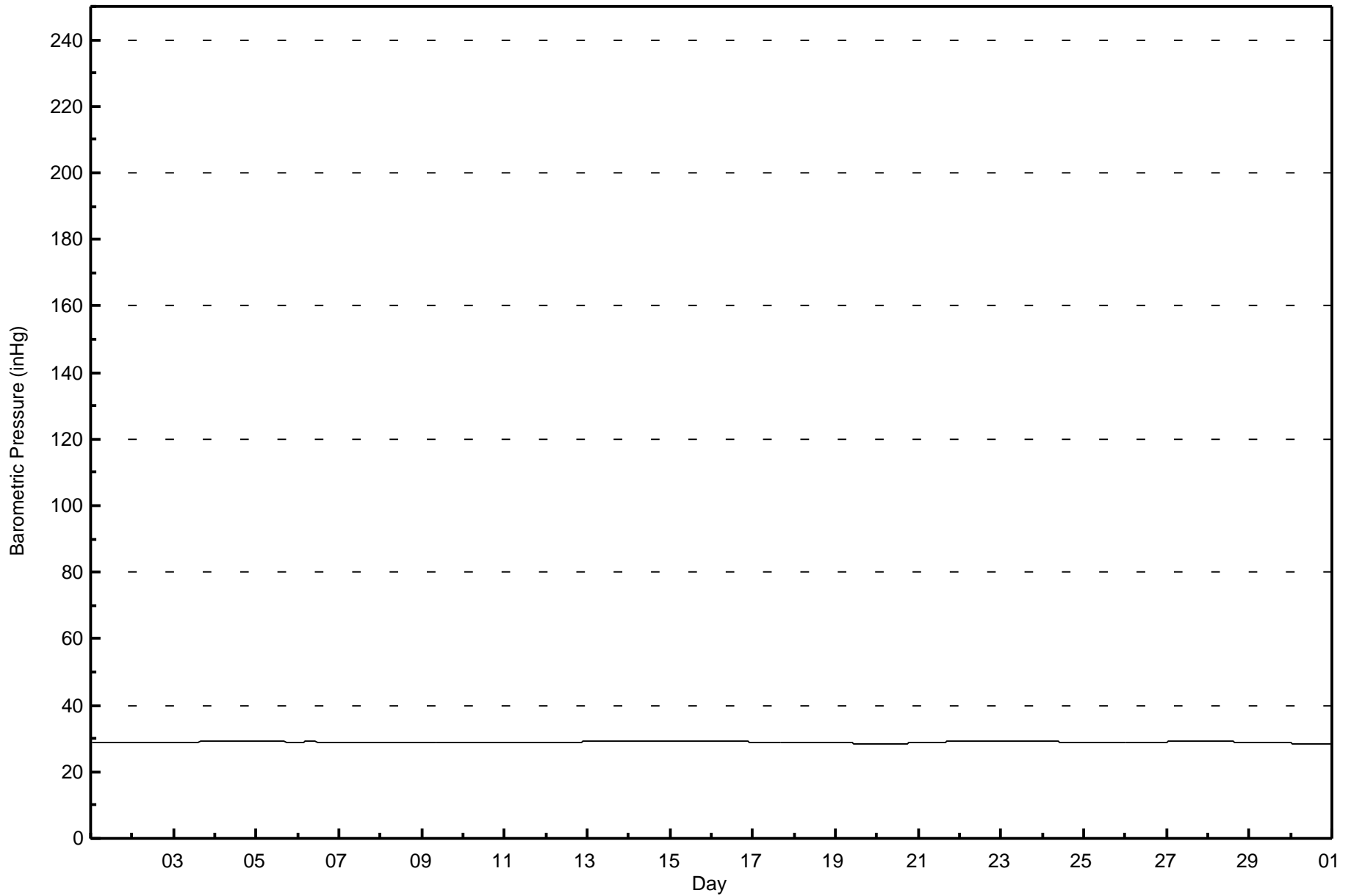
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Hourly Averages

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





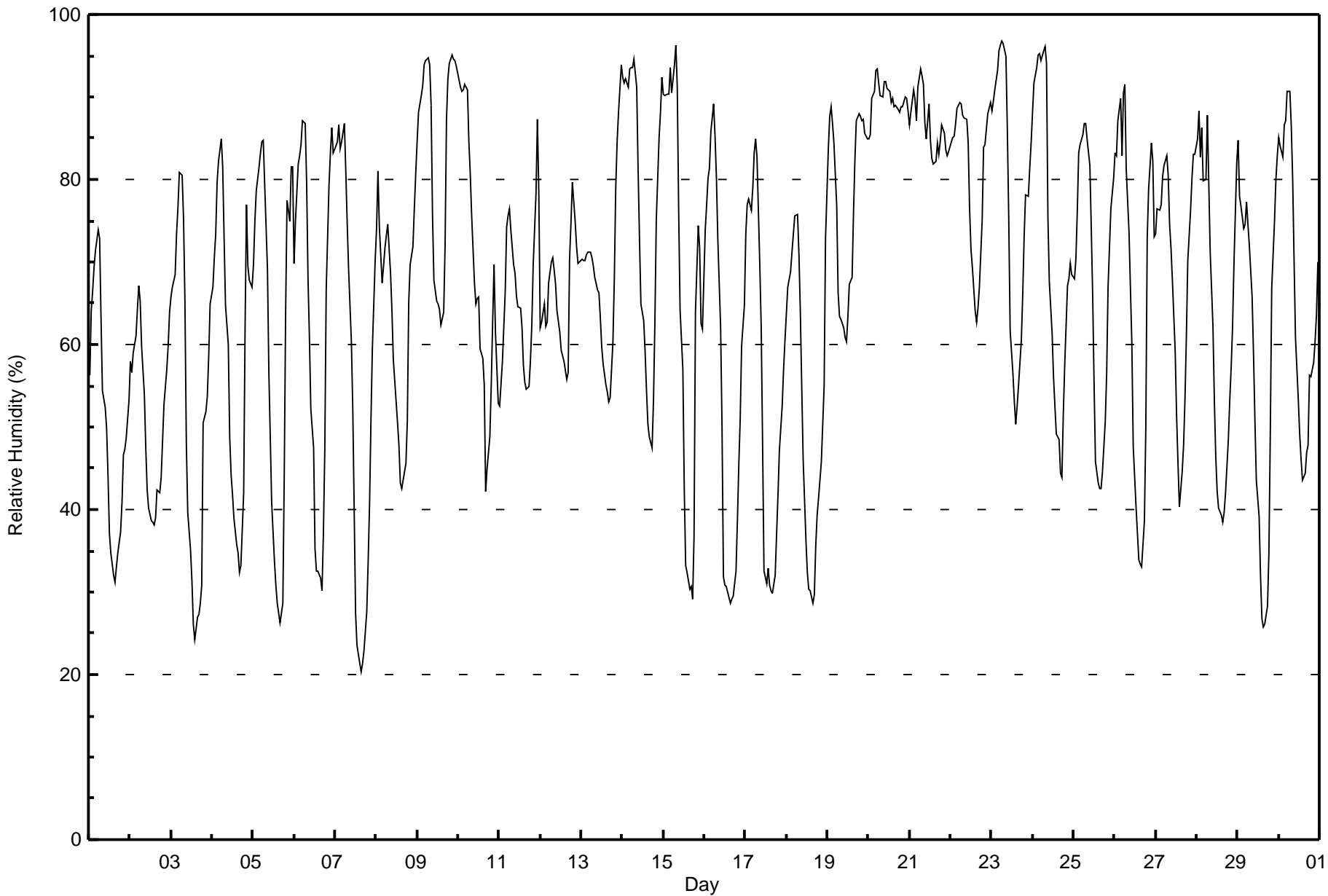
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Athabasca Valley - September 2017

| Maximum Value: 97 % on Sep 23 07:00 Maximum Daily Average: 89.8 % on Sep 20 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 20 % on Sep 7 16:00 Minimum Daily Average: 50.6 % on Sep 1 Maximum Diurnal Average: 83.8 % at hour 6 Minimum Diurnal Average: 44.9 % at hour 16 Monthly Average: 66.3 % Percentiles: P ₁ = 26 P ₁₀ = 37 Q ₁ = 52 Median = 69 O ₃ = 83 P ₉₀ = 90 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-Sep | 56 | 64 | 66 | 69 | 71 | 74 | 73 | 63 | 54 | 52 | 50 | 44 | 37 | 35 | 32 | 31 | 33 | 35 | 37 | 41 | 47 | 47 | 49 | 53 | 50.6 | 74 |
| 2-Sep | 58 | 57 | 59 | 61 | 64 | 67 | 65 | 60 | 54 | 47 | 42 | 40 | 39 | 38 | 38 | 39 | 42 | 42 | 44 | 48 | 53 | 57 | 60 | 64 | 51.6 | 67 |
| 3-Sep | 66 | 67 | 68 | 73 | 77 | 81 | 80 | 75 | 65 | 48 | 40 | 35 | 31 | 26 | 24 | 27 | 27 | 29 | 31 | 50 | 52 | 54 | 59 | 65 | 52.1 | 81 |
| 4-Sep | 67 | 70 | 73 | 80 | 82 | 85 | 82 | 73 | 65 | 60 | 49 | 44 | 42 | 39 | 36 | 35 | 32 | 33 | 42 | 62 | 77 | 70 | 68 | 67 | 59.7 | 85 |
| 5-Sep | 70 | 75 | 79 | 82 | 83 | 85 | 85 | 79 | 69 | 57 | 49 | 41 | 34 | 31 | 29 | 27 | 26 | 29 | 44 | 64 | 77 | 75 | 81 | 81 | 60.5 | 85 |
| 6-Sep | 70 | 75 | 82 | 83 | 84 | 87 | 87 | 80 | 68 | 61 | 52 | 47 | 35 | 33 | 33 | 32 | 30 | 37 | 47 | 67 | 79 | 83 | 86 | 83 | 63.4 | 87 |
| 7-Sep | 84 | 85 | 87 | 84 | 85 | 87 | 81 | 75 | 69 | 60 | 52 | 40 | 27 | 24 | 21 | 20 | 21 | 23 | 28 | 34 | 41 | 51 | 59 | 70 | 54.5 | 87 |
| 8-Sep | 74 | 81 | 74 | 67 | 69 | 72 | 73 | 75 | 69 | 64 | 58 | 56 | 51 | 48 | 43 | 42 | 44 | 46 | 51 | 65 | 70 | 72 | 76 | 81 | 63.3 | 81 |
| 9-Sep | 85 | 88 | 90 | 91 | 94 | 94 | 95 | 94 | 89 | 76 | 68 | 65 | 65 | 64 | 62 | 64 | 72 | 87 | 92 | 94 | 95 | 95 | 94 | 94 | 83.6 | 95 |
| 10-Sep | 92 | 91 | 91 | 91 | 92 | 91 | 85 | 81 | 76 | 68 | 65 | 66 | 66 | 59 | 58 | 55 | 42 | 45 | 49 | 55 | 63 | 70 | 62 | 53 | 69.3 | 92 |
| 11-Sep | 52 | 55 | 58 | 66 | 74 | 76 | 76 | 74 | 70 | 69 | 66 | 65 | 64 | 62 | 58 | 55 | 55 | 55 | 58 | 62 | 70 | 78 | 87 | 78 | 66.0 | 87 |
| 12-Sep | 62 | 63 | 65 | 62 | 63 | 67 | 70 | 70 | 69 | 67 | 64 | 61 | 59 | 59 | 58 | 56 | 57 | 70 | 75 | 80 | 75 | 72 | 70 | 70 | 66.0 | 80 |
| 13-Sep | 70 | 70 | 70 | 71 | 71 | 71 | 71 | 69 | 68 | 67 | 66 | 63 | 60 | 58 | 55 | 54 | 53 | 54 | 60 | 68 | 79 | 85 | 88 | 94 | 68.2 | 94 |
| 14-Sep | 92 | 92 | 92 | 91 | 93 | 94 | 94 | 95 | 91 | 81 | 73 | 65 | 63 | 59 | 54 | 50 | 49 | 48 | 53 | 63 | 75 | 85 | 88 | 92 | 76.4 | 95 |
| 15-Sep | 90 | 90 | 90 | 90 | 93 | 91 | 94 | 96 | 91 | 76 | 64 | 57 | 43 | 33 | 32 | 30 | 31 | 29 | 37 | 64 | 74 | 72 | 62 | 62 | 66.4 | 96 |
| 16-Sep | 74 | 77 | 80 | 81 | 86 | 89 | 85 | 80 | 73 | 62 | 50 | 32 | 31 | 31 | 29 | 29 | 29 | 30 | 32 | 39 | 45 | 51 | 60 | 65 | 55.8 | 89 |
| 17-Sep | 73 | 77 | 78 | 76 | 79 | 83 | 85 | 83 | 70 | 62 | 48 | 33 | 31 | 33 | 31 | 30 | 30 | 32 | 37 | 42 | 47 | 52 | 57 | 61 | 55.4 | 85 |
| 18-Sep | 64 | 67 | 69 | 71 | 73 | 76 | 76 | 71 | 64 | 55 | 46 | 36 | 32 | 30 | 30 | 29 | 30 | 36 | 39 | 41 | 46 | 50 | 55 | 73 | 52.4 | 76 |
| 19-Sep | 84 | 88 | 89 | 87 | 84 | 77 | 66 | 63 | 63 | 62 | 61 | 60 | 63 | 67 | 68 | 76 | 82 | 87 | 88 | 88 | 87 | 87 | 86 | 85 | 77.0 | 89 |
| 20-Sep | 85 | 85 | 90 | 91 | 93 | 93 | 92 | 90 | 90 | 92 | 92 | 91 | 91 | 89 | 90 | 89 | 89 | 88 | 88 | 89 | 89 | 90 | 90 | 88 | 89.8 | 93 |
| 21-Sep | 87 | 88 | 91 | 90 | 87 | 91 | 93 | 92 | 92 | 87 | 85 | 89 | 85 | 83 | 82 | 82 | 84 | 83 | 85 | 87 | 86 | 84 | 83 | 83 | 86.6 | 93 |
| 22-Sep | 85 | 85 | 85 | 87 | 89 | 89 | 89 | 88 | 88 | 87 | 84 | 77 | 72 | 69 | 64 | 63 | 64 | 67 | 75 | 84 | 84 | 86 | 88 | 89 | 80.7 | 89 |
| 23-Sep | 88 | 89 | 91 | 93 | 96 | 96 | 97 | 97 | 95 | 86 | 75 | 62 | 57 | 53 | 50 | 53 | 55 | 60 | 66 | 73 | 78 | 78 | 81 | 84 | 77.3 | 97 |
| 24-Sep | 88 | 92 | 94 | 95 | 95 | 94 | 96 | 96 | 94 | 76 | 68 | 61 | 56 | 53 | 49 | 48 | 44 | 44 | 52 | 57 | 67 | 68 | 70 | 68 | 71.9 | 96 |
| 25-Sep | 68 | 70 | 76 | 83 | 84 | 85 | 87 | 87 | 85 | 82 | 74 | 66 | 55 | 46 | 43 | 43 | 43 | 45 | 51 | 56 | 67 | 72 | 76 | 80 | 67.6 | 87 |
| 26-Sep | 83 | 83 | 87 | 90 | 83 | 91 | 92 | 81 | 74 | 67 | 60 | 48 | 40 | 37 | 34 | 33 | 33 | 39 | 50 | 73 | 79 | 84 | 82 | 73 | 66.5 | 92 |
| 27-Sep | 73 | 76 | 76 | 77 | 80 | 82 | 83 | 81 | 75 | 72 | 68 | 59 | 51 | 46 | 40 | 45 | 48 | 53 | 61 | 70 | 76 | 80 | 83 | 83 | 68.3 | 83 |
| 28-Sep | 85 | 88 | 83 | 86 | 80 | 80 | 88 | 80 | 71 | 62 | 53 | 47 | 42 | 40 | 39 | 39 | 40 | 42 | 48 | 53 | 57 | 62 | 70 | 82 | 63.2 | 88 |
| 29-Sep | 85 | 78 | 77 | 74 | 75 | 77 | 75 | 72 | 66 | 59 | 51 | 44 | 39 | 32 | 27 | 26 | 26 | 28 | 35 | 49 | 67 | 75 | 80 | 83 | 58.2 | 85 |
| 30-Sep | 85 | 84 | 83 | 87 | 87 | 91 | 91 | 86 | 80 | 70 | 61 | 53 | 49 | 46 | 44 | 44 | 47 | 48 | 56 | 56 | 58 | 60 | 64 | 70 | 66.6 | 91 |
| | | | | | | | | | | | | | | | | | | | 76.5 78.4 79.7 81.0 82.3 83.8 83.4 80.2 74.8 67.8 61.1 54.9 50.3 47.4 45.2 44.9 45.3 48.1 53.7 62.5 68.6 71.5 73.8 75.9 | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | 92 92 94 95 96 96 97 97 95 92 92 91 91 89 90 89 89 88 92 94 95 95 94 94 | | | | | Diurnal Maximum | | |





| | | |
|--|---|---------------------------------|
| Maximum Speed: 34 km/h on Sep 10 14:00 | Maximum Daily Speed Average: 15.8 km/h on Sep 10 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 4 20:00 | Minimum Daily Speed Average: 0.4 km/h on Sep 6 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 4.8 km/h at hour 14 | Minimum Diurnal Speed Average: 0.4 km/h at hour 22 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 1.4 km/h 227.5 deg | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 8 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 28 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | SSW6 | SE7 | SE8 | SE8 | SE9 | SE10 | ESE7 | ESE4 | SW8 | SW12 | SW12 | SW16 | WSW16 | W21 | W24 | W31 | W29 | W24 | W20 | WSW13 | WSW15 | WSW19 | WSW21 | WSW20 | WSW11.0 | W31 |
| 2-Sep | SW18 | SW17 | SW16 | SW16 | SW12 | SW10 | SW10 | SW10 | SSW12 | SSW11 | WSW12 | W17 | W14 | W16 | W17 | W18 | WNW12 | W14 | WSW15 | W16 | W18 | W13 | W4 | WNW2 | WSW12.0 | SW18 |
| 3-Sep | WSW8 | S4 | SSW7 | SSW8 | SW10 | SW10 | SW11 | SW10 | SSW12 | W22 | WNW26 | WNW25 | NW27 | WNW28 | WNW30 | WNW29 | WNW26 | WNW24 | NW19 | N17 | NNW13 | NNW12 | NW14 | NNW10 | WNW13.4 | WNW30 |
| 4-Sep | NW6 | WSW7 | SW8 | SW10 | SW10 | SSW4 | SSW6 | SSE3 | SE2 | NE2 | N9 | NNW14 | NW13 | NNW12 | N12 | NNW10 | WNW9 | NW9 | WNW2 | ESE0 | SE2 | SE3 | SSE3 | SSE6 | WNW3.0 | NNW14 |
| 5-Sep | SE11 | SE12 | SE14 | SE14 | SE14 | SE13 | SE12 | SE10 | SE8 | SE10 | ESE9 | ESE5 | SW12 | SW16 | SW12 | SW12 | SW10 | SW6 | SSE1 | NNW0 | SE1 | S3 | S3 | SSE3 | SSE6.5 | SW16 |
| 6-Sep | S5 | SSE3 | SE2 | ESE3 | ESE3 | ESE2 | E4 | E4 | E4 | NNW2 | NW4 | NW5 | NNW6 | NW4 | NW6 | WNW4 | WSW5 | NW2 | NNW2 | W3 | ENE1 | ESE1 | SSE1 | SSE2 | NNW0.4 | NW6 |
| 7-Sep | SSE1 | SE2 | S2 | SSW2 | SSE3 | S3 | SE7 | SE9 | SE9 | SE10 | SE9 | S5 | S14 | S15 | S15 | S15 | S13 | SSE13 | SSE9 | SE8 | SE6 | SE6 | SE3 | S2 | SSE7.1 | S15 |
| 8-Sep | SSW4 | S2 | SSE4 | SE9 | SE11 | SE11 | SE7 | SE4 | SE5 | SE4 | E2 | NNW6 | NNW17 | NNW10 | NNW13 | N10 | NNW10 | NNW9 | NNW8 | NNW12 | NNW10 | NNW9 | N4 | NW2 | N2.7 | NNW17 |
| 9-Sep | NW2 | SW5 | WSW5 | SSW4 | E3 | ENE3 | SSE1 | NE1 | N6 | NNW6 | NW5 | NNW6 | NNW13 | NNW13 | NNW14 | NNW15 | NNW13 | NNW10 | NW9 | NNW9 | NW6 | WNW9 | WSW7 | SW4 | NW5.2 | NNW15 |
| 10-Sep | WSW7 | WSW11 | SW6 | SSE4 | SSE4 | WSW7 | WSW13 | WSW13 | WSW13 | W21 | W25 | W28 | WNW33 | W34 | WNW33 | WNW16 | WNW28 | W31 | WSW15 | WSW13 | WSW12 | SW7 | WSW13 | WSW23 | W15.8 | W34 |
| 11-Sep | WSW24 | WSW15 | WSW16 | S8 | SE8 | SE11 | SE11 | SE10 | SE8 | ESE7 | SE6 | NE2 | NW4 | ESE5 | E3 | SE5 | SE9 | SSE9 | SE11 | SE11 | N7 | NW5 | S0 | WSW7 | SSE3.9 | WSW24 |
| 12-Sep | WSW13 | W22 | W27 | W22 | W14 | WSW14 | WSW18 | W20 | W26 | W26 | WNW21 | WNW22 | WNW20 | WNW21 | W20 | WNW18 | NNW16 | NNW14 | NNW12 | N7 | N8 | NE7 | NEE7 | NNE5 | WNW13.7 | W27 |
| 13-Sep | NE4 | NE4 | NE7 | NNE5 | NE4 | E5 | E4 | E5 | E4 | WSW2 | WNW4 | WSW5 | NW6 | NNW4 | E4 | SE5 | NNW1 | N5 | NE5 | N4 | NE2 | E3 | SW1 | ESE1 | NE2.0 | NE7 |
| 14-Sep | NE2 | E3 | ESE4 | ESE4 | E5 | E3 | E5 | ENE4 | N3 | NW3 | NW5 | NNW11 | N12 | NNW10 | NW8 | NNW9 | NNW11 | NNW10 | NW7 | WNW3 | W3 | E1 | E0 | E3 | N3.4 | N12 |
| 15-Sep | SE2 | SE4 | SE5 | SSE5 | SE8 | SE7 | SE10 | SE9 | SE9 | SE8 | ESE4 | ENE6 | SSW3 | SW11 | SW9 | WSW8 | WSW11 | SW8 | SSW3 | S1 | SE2 | SSE5 | SSE7 | SE7 | SSE4.3 | SW11 |
| 16-Sep | SE5 | SE5 | SSE6 | S5 | SSE2 | S2 | SE6 | SE9 | SE10 | SE8 | SE9 | S17 | S14 | S14 | S13 | S14 | S12 | SSE13 | SSE9 | SSE8 | SE9 | SE10 | E3 | ESE2 | SSE8.0 | S17 |
| 17-Sep | E3 | E5 | SE4 | SE5 | ESE5 | ESE3 | SSW3 | SE4 | SE13 | SE15 | SE14 | SSE18 | SSE17 | SSE16 | SSE16 | SSE15 | SSE14 | SE16 | SE14 | SE11 | SE14 | SE13 | SE13 | SE12 | SE10.5 | SSE18 |
| 18-Sep | SE11 | SE11 | SE11 | SE12 | SE12 | SE11 | SE11 | SE11 | SE13 | SE14 | SE17 | SE20 | SE19 | SE17 | ESE14 | SE15 | ESE15 | ESE13 | ESE10 | SE6 | SE3 | SE2 | ESE4 | NE2 | SE11.2 | SE20 |
| 19-Sep | ENE2 | E2 | ENE1 | ESE2 | NE1 | NNW5 | NNE6 | ENE6 | ENE9 | E14 | E17 | E12 | ENE14 | ENE14 | E22 | E22 | ENE19 | ENE17 | ENE18 | ENE19 | E21 | ENE21 | ENE17 | ENE15 | ENE12.0 | E22 |
| 20-Sep | NE13 | NNE11 | N9 | N12 | NNW14 | N12 | N13 | N14 | N14 | N15 | N15 | N13 | N15 | N15 | N14 | N16 | N15 | N14 | N14 | N15 | N15 | N15 | N15 | N16 | N13.6 | N16 |
| 21-Sep | N15 | N16 | NNW16 | N16 | N16 | NNW17 | NNW16 | NNW15 | NNW18 | N16 | N17 | NNW16 | N16 | N15 | N14 | N17 | NNW20 | N17 | NNW17 | NNW13 | NNW12 | NW11 | NW9 | NW8 | NNW14.9 | NNW20 |
| 22-Sep | NNW7 | NNW4 | W4 | W5 | WSW5 | SW6 | SW6 | SW5 | SW6 | SW6 | SW4 | SW4 | SW4 | ENE3 | SE3 | SSE7 | SSW7 | SSW6 | SSW4 | SW3 | S2 | SSW4 | SW4 | SE3 | SW3.1 | NNW7 |
| 23-Sep | SSE6 | SE7 | SE6 | SSE1 | E1 | ESE4 | SE2 | ESE2 | SSE3 | SSW2 | SSW4 | WSW7 | WSW8 | WSW7 | SW7 | SE6 | SE9 | SE8 | SE6 | SE4 | ESE3 | SE6 | SE5 | SSE5 | SSE3.4 | SE9 |
| 24-Sep | SE4 | SE6 | E2 | SE2 | SSE3 | S3 | SW3 | SW4 | SE3 | SSE9 | SE8 | ESE8 | E8 | E8 | ESE10 | ESE8 | SE7 | SSE8 | SE7 | SE9 | SE3 | S4 | SE6 | SE8 | SE5.1 | ESE10 |
| 25-Sep | SE9 | SE8 | SE8 | SE8 | SE9 | SE12 | SE11 | SE12 | SE12 | SE12 | SE11 | SE4 | SW9 | SW16 | WSW14 | SW9 | WSW8 | SSW4 | SSW6 | SSW7 | SSW4 | ESE2 | SSE2 | S3 | S6.1 | SW16 |
| 26-Sep | SSE3 | SE5 | SE5 | SSE3 | SSW7 | SE3 | SW5 | SW9 | SSW9 | SSW5 | E2 | N6 | NW12 | NW16 | NW17 | NNW16 | NW16 | NNW7 | W3 | SSE1 | SSW2 | ESE2 | ESE3 | SSE3 | WNW2.6 | NW17 |
| 27-Sep | SE3 | ESE3 | SSE4 | SE5 | SSE4 | SSE4 | S3 | ESE3 | SW5 | WSW4 | NW3 | W4 | WNW4 | NNW9 | NNW9 | N8 | NNW9 | NNW5 | NNW8 | NNW11 | NNW9 | N7 | N5 | N5 | WNW2.6 | NNW11 |
| 28-Sep | NNE3 | E3 | E2 | NNE1 | SSE5 | SSE5 | SSE3 | SSE9 | SSE10 | SSE9 | SE11 | SE12 | SSE11 | S14 | S14 | S13 | S15 | SSE11 | SSE8 | SE8 | SE11 | SSE8 | SE7 | ENE3 | SSE7.4 | S15 |
| 29-Sep | ESE6 | ESE7 | ESE7 | ESE10 | SE10 | ESE6 | SE9 | SE12 | SE13 | SE13 | SE11 | SSE8 | SE7 | S8 | S13 | SSW12 | S10 | S9 | SSE6 | SSE3 | SSW2 | SSW3 | SSW2 | SSE2 | SSE6.9 | SE13 |
| 30-Sep | ESE2 | SSE2 | S3 | E2 | S3 | S2 | SE3 | ESE3 | SE8 | SE6 | E4 | SW5 | SW11 | SW13 | SW13 | SW13 | W12 | WSW6 | WSW7 | WSW18 | WSW15 | W14 | NW16 | NW17 | WSW5.1 | WSW18 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|------|------|--------|--------|--------|--------|--------|--------|------|--------|------|--------|------|-------|------|------|------|------|--------|-------|-------|--------|--------|-----------------|
| SSW1.5 | S2.1 | S2.4 | SSE2.6 | SSE3.0 | SSE2.9 | SSE3.0 | SSE2.9 | SSE3.3 | S2.4 | SSW0.8 | W2.5 | WNW4.1 | W4.8 | W4.5 | W3.7 | W4.1 | W2.5 | W1.2 | WNW0.9 | NW0.9 | W0.4 | WSW0.5 | WSW0.7 | Diurnal Average |
| WSW24 | W22 | W27 | W22 | N16 | NNW17 | WSW18 | W20 | W26 | W26 | WNW26 | W28 | WNW33 | W34 | WNW33 | W31 | W29 | W31 | W20 | ENE19 | E21 | ENE21 | WSW21 | WSW23 | Diurnal Maximum |

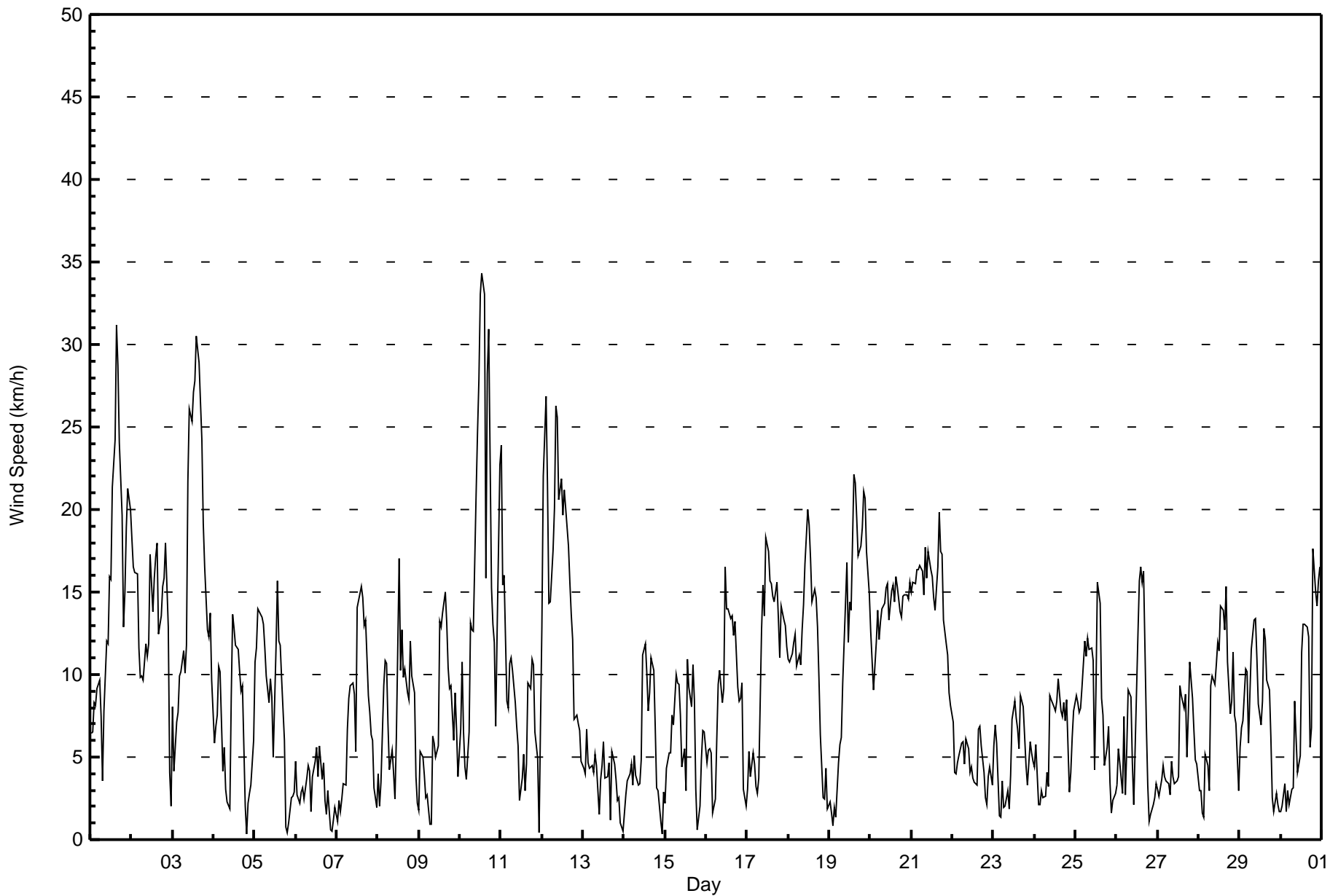
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 250 | 34.72 | 34.72 |
| 6 - 11 | 233 | 32.36 | 67.08 |
| 12 - 19 | 193 | 26.81 | 93.89 |
| 20 - 28 | 36 | 5.00 | 98.89 |
| 29 - 38 | 8 | 1.11 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 6 | 4 | 11 | 7 | 30 | 27 | 38 | 35 | 20 | 20 | 12 | 7 | 7 | 6 | 12 | 8 | 250 |
| 6 - 11 | 9 | 3 | 2 | 3 | 2 | 12 | 83 | 21 | 4 | 11 | 27 | 15 | 0 | 2 | 11 | 28 | 233 |
| 12 - 19 | 33 | 0 | 1 | 8 | 3 | 3 | 30 | 8 | 16 | 5 | 14 | 22 | 11 | 3 | 9 | 27 | 193 |
| 20 - 28 | 0 | 0 | 0 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 15 | 10 | 1 | 1 | 36 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 0 | 0 | 8 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 7 | 14 | 19 | 38 | 42 | 152 | 64 | 40 | 36 | 53 | 48 | 37 | 25 | 33 | 64 | 720 |

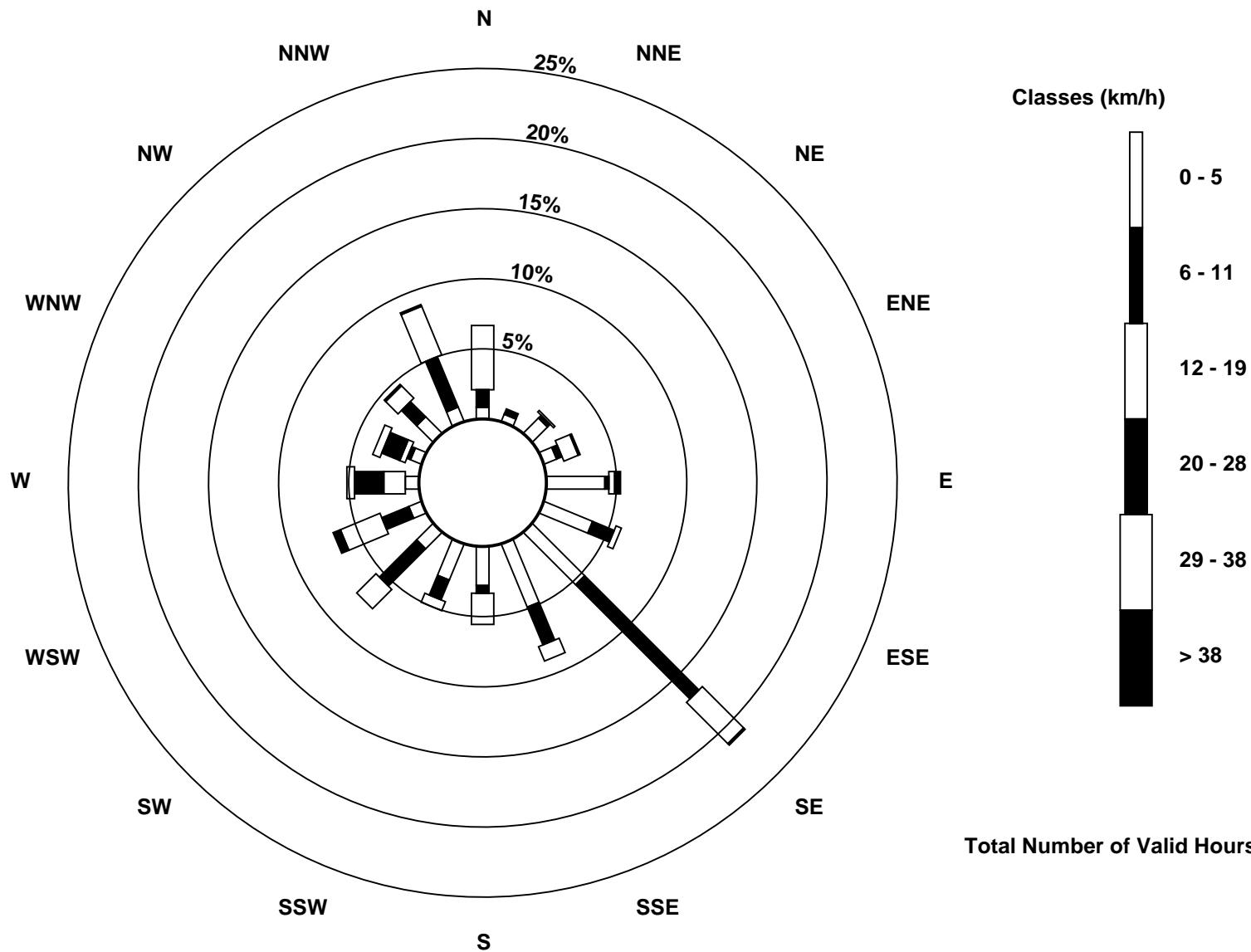
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|---|---------------------------------|
| Direction of Maximum Speed: 277 deg on Sep 10 14:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 264.4 deg on Sep 10 | Hours of Data: 720 |
| Direction of Minimum Speed: 102 deg on Sep 4 20:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 0.4 deg on Sep 6 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 248.9 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-Sep | 193 | 131 | 139 | 135 | 134 | 135 | 121 | 107 | 223 | 220 | 226 | 217 | 249 | 262 | 268 | 279 | 276 | 261 | 269 | 253 | 251 | 253 | 250 | 248 | 244.9 |
| 2-Sep | 236 | 225 | 218 | 222 | 214 | 216 | 223 | 224 | 211 | 206 | 249 | 274 | 263 | 269 | 271 | 279 | 286 | 259 | 243 | 260 | 279 | 264 | 259 | 285 | 248.1 |
| 3-Sep | 251 | 175 | 208 | 213 | 221 | 218 | 224 | 219 | 209 | 273 | 286 | 290 | 306 | 292 | 297 | 298 | 301 | 300 | 307 | 351 | 330 | 341 | 319 | 333 | 288.9 |
| 4-Sep | 304 | 247 | 234 | 227 | 224 | 195 | 202 | 152 | 142 | 52 | 356 | 329 | 324 | 334 | 349 | 347 | 295 | 320 | 302 | 102 | 131 | 131 | 163 | 147 | 296.9 |
| 5-Sep | 136 | 138 | 136 | 136 | 137 | 141 | 134 | 130 | 133 | 129 | 118 | 104 | 223 | 221 | 220 | 219 | 222 | 216 | 152 | 345 | 125 | 170 | 171 | 164 | 160.2 |
| 6-Sep | 177 | 161 | 126 | 119 | 107 | 111 | 101 | 89 | 82 | 333 | 317 | 318 | 327 | 307 | 321 | 298 | 253 | 317 | 328 | 280 | 76 | 121 | 164 | 162 | 332.0 |
| 7-Sep | 152 | 145 | 169 | 194 | 156 | 177 | 142 | 137 | 137 | 137 | 132 | 184 | 172 | 185 | 174 | 185 | 173 | 164 | 152 | 145 | 144 | 138 | 136 | 186 | 160.7 |
| 8-Sep | 202 | 181 | 159 | 145 | 140 | 139 | 143 | 130 | 133 | 133 | 85 | 344 | 341 | 342 | 335 | 350 | 342 | 340 | 346 | 334 | 339 | 340 | 352 | 319 | 356.6 |
| 9-Sep | 318 | 234 | 239 | 211 | 85 | 73 | 161 | 42 | 349 | 341 | 321 | 340 | 344 | 346 | 345 | 342 | 330 | 337 | 317 | 336 | 306 | 289 | 242 | 222 | 325.4 |
| 10-Sep | 247 | 239 | 223 | 159 | 165 | 241 | 244 | 249 | 251 | 261 | 267 | 275 | 283 | 277 | 282 | 296 | 287 | 275 | 252 | 249 | 242 | 235 | 251 | 244 | 264.4 |
| 11-Sep | 256 | 249 | 239 | 173 | 135 | 137 | 133 | 129 | 131 | 106 | 129 | 39 | 310 | 119 | 85 | 144 | 139 | 150 | 139 | 135 | 355 | 312 | 179 | 246 | 167.9 |
| 12-Sep | 252 | 269 | 277 | 279 | 262 | 248 | 248 | 264 | 271 | 275 | 290 | 287 | 289 | 283 | 278 | 296 | 328 | 345 | 339 | 359 | 11 | 46 | 28 | 30 | 286.1 |
| 13-Sep | 56 | 35 | 49 | 31 | 40 | 95 | 92 | 82 | 87 | 257 | 288 | 250 | 321 | 329 | 90 | 127 | 340 | 353 | 38 | 358 | 44 | 90 | 220 | 121 | 42.1 |
| 14-Sep | 50 | 99 | 113 | 108 | 86 | 90 | 84 | 69 | 8 | 326 | 309 | 343 | 350 | 346 | 311 | 330 | 335 | 333 | 321 | 299 | 265 | 91 | 95 | 79 | 352.5 |
| 15-Sep | 136 | 136 | 127 | 156 | 131 | 134 | 135 | 138 | 136 | 127 | 115 | 67 | 201 | 222 | 235 | 241 | 238 | 227 | 207 | 191 | 124 | 157 | 148 | 139 | 164.0 |
| 16-Sep | 128 | 144 | 154 | 169 | 167 | 174 | 144 | 138 | 134 | 130 | 143 | 185 | 181 | 178 | 179 | 186 | 178 | 166 | 158 | 150 | 141 | 135 | 101 | 108 | 159.8 |
| 17-Sep | 99 | 100 | 124 | 139 | 120 | 112 | 209 | 136 | 136 | 137 | 138 | 161 | 163 | 158 | 161 | 162 | 149 | 145 | 139 | 138 | 136 | 140 | 143 | 136 | 145.0 |
| 18-Sep | 135 | 143 | 137 | 134 | 135 | 134 | 139 | 135 | 131 | 129 | 124 | 137 | 130 | 131 | 120 | 128 | 117 | 104 | 103 | 128 | 132 | 128 | 110 | 52 | 128.1 |
| 19-Sep | 62 | 80 | 66 | 103 | 44 | 347 | 15 | 60 | 68 | 80 | 83 | 81 | 78 | 68 | 87 | 82 | 76 | 72 | 73 | 75 | 79 | 78 | 76 | 68 | 74.7 |
| 20-Sep | 50 | 24 | 355 | 350 | 343 | 350 | 360 | 3 | 6 | 1 | 2 | 7 | 4 | 8 | 6 | 10 | 8 | 8 | 7 | 357 | 3 | 359 | 358 | 355 | 3.7 |
| 21-Sep | 2 | 355 | 347 | 352 | 358 | 343 | 341 | 346 | 341 | 355 | 351 | 346 | 357 | 0 | 360 | 350 | 339 | 351 | 343 | 347 | 341 | 325 | 324 | 316 | 347.4 |
| 22-Sep | 331 | 340 | 279 | 272 | 240 | 218 | 219 | 220 | 219 | 222 | 236 | 225 | 221 | 76 | 144 | 157 | 198 | 202 | 206 | 234 | 183 | 202 | 214 | 128 | 218.7 |
| 23-Sep | 156 | 139 | 145 | 161 | 94 | 114 | 137 | 103 | 151 | 199 | 201 | 246 | 252 | 257 | 226 | 133 | 131 | 128 | 141 | 128 | 116 | 135 | 135 | 149 | 158.7 |
| 24-Sep | 136 | 130 | 80 | 130 | 150 | 184 | 218 | 230 | 128 | 148 | 138 | 121 | 87 | 100 | 102 | 114 | 139 | 158 | 146 | 137 | 131 | 189 | 136 | 133 | 133.5 |
| 25-Sep | 139 | 139 | 143 | 136 | 138 | 136 | 137 | 137 | 139 | 137 | 139 | 136 | 216 | 222 | 243 | 231 | 238 | 211 | 211 | 213 | 202 | 114 | 167 | 173 | 169.0 |
| 26-Sep | 154 | 142 | 128 | 154 | 211 | 141 | 223 | 225 | 211 | 208 | 92 | 5 | 311 | 304 | 309 | 332 | 322 | 337 | 261 | 161 | 204 | 111 | 121 | 157 | 283.8 |
| 27-Sep | 146 | 112 | 163 | 146 | 168 | 151 | 180 | 122 | 228 | 248 | 309 | 271 | 301 | 341 | 347 | 349 | 348 | 337 | 343 | 345 | 347 | 352 | 353 | 356 | 338.2 |
| 28-Sep | 29 | 86 | 80 | 20 | 161 | 158 | 147 | 150 | 153 | 150 | 143 | 132 | 150 | 170 | 172 | 184 | 177 | 163 | 152 | 141 | 142 | 150 | 134 | 62 | 152.6 |
| 29-Sep | 103 | 122 | 106 | 119 | 126 | 119 | 138 | 131 | 135 | 139 | 136 | 152 | 139 | 191 | 181 | 202 | 188 | 178 | 154 | 147 | 196 | 192 | 208 | 161 | 149.0 |
| 30-Sep | 114 | 160 | 184 | 100 | 172 | 181 | 125 | 117 | 141 | 134 | 98 | 214 | 227 | 214 | 217 | 232 | 260 | 242 | 257 | 250 | 250 | 275 | 309 | 315 | 239.5 |

197.2 177.0 186.8 168.0 156.3 155.7 165.9 152.8 160.9 175.3 200.9 266.3 281.8 267.7 269.7 277.2 280.9 274.7 278.4 302.8 308.9 278.9 251.1 250.8

Diurnal Average

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

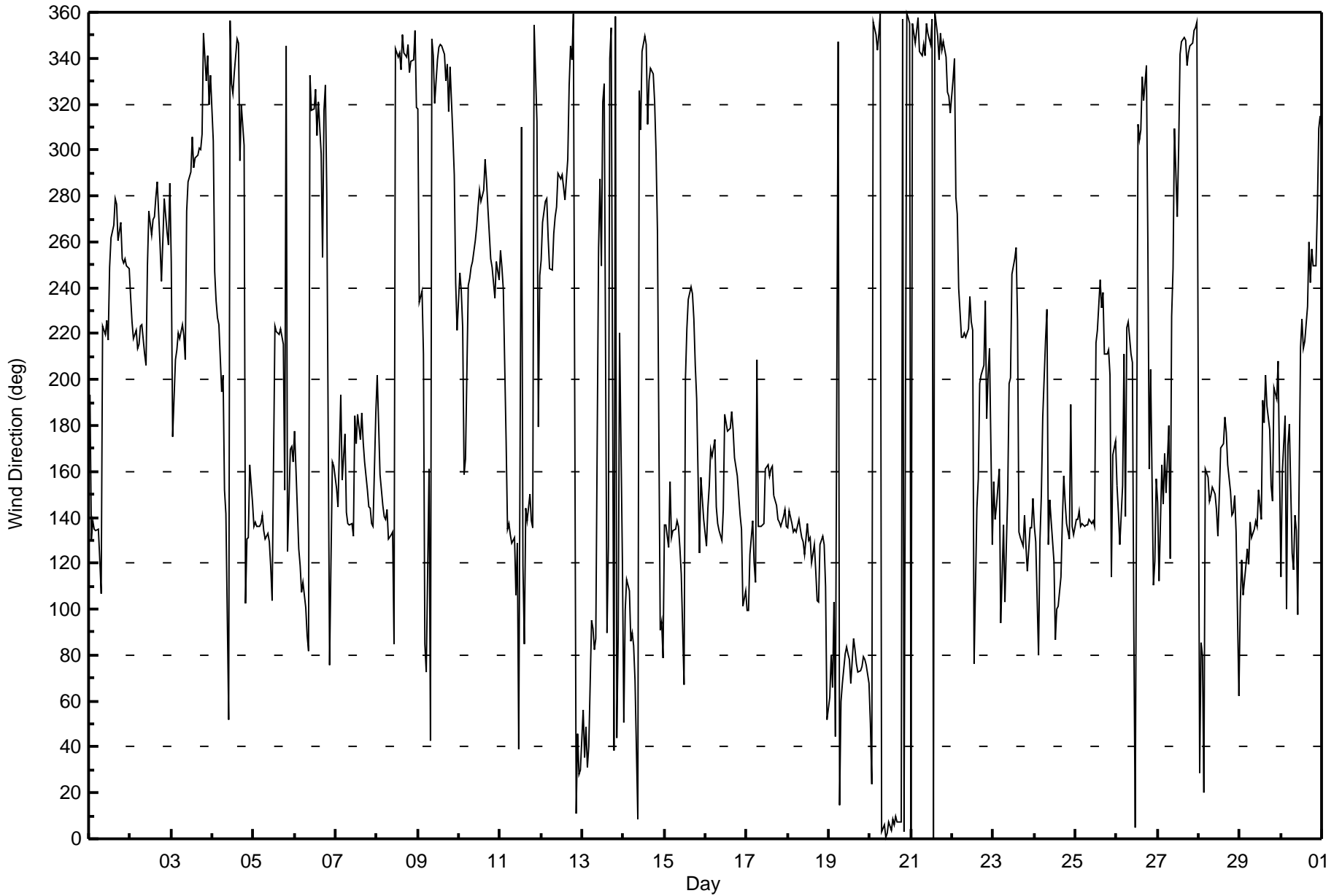
Wind Direction (WD) - deg
Athabasca Valley - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Sep 15 13:00 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| Minimum Value: 8 deg on Sep 4 04:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentiles: P ₁ = 10 P ₁₀ = 13 Q ₁ = 15 Median = 21 Q ₃ = 36 P ₉₀ = 60 P ₉₉ = 89 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 49 | 19 | 10 | 10 | 11 | 13 | 24 | 77 | 35 | 19 | 17 | 11 | 31 | 21 | 17 | 14 | 14 | 15 | 12 | 12 | 10 | 9 | 10 | 10 | 77 |
| 2-Sep | 10 | 16 | 19 | 18 | 14 | 26 | 26 | 18 | 11 | 14 | 36 | 16 | 23 | 20 | 19 | 14 | 13 | 18 | 13 | 19 | 14 | 28 | 48 | 84 | 84 |
| 3-Sep | 28 | 40 | 25 | 18 | 15 | 11 | 10 | 15 | 12 | 15 | 18 | 16 | 19 | 19 | 17 | 15 | 18 | 12 | 29 | 20 | 12 | 14 | 9 | 11 | 40 |
| 4-Sep | 24 | 22 | 17 | 8 | 9 | 70 | 68 | 59 | 72 | 76 | 23 | 25 | 29 | 32 | 30 | 23 | 33 | 28 | 38 | 87 | 66 | 45 | 41 | 27 | 87 |
| 5-Sep | 13 | 12 | 10 | 9 | 11 | 15 | 13 | 14 | 17 | 13 | 22 | 40 | 36 | 14 | 20 | 12 | 13 | 24 | 83 | 84 | 89 | 32 | 21 | 36 | 89 |
| 6-Sep | 15 | 41 | 37 | 25 | 21 | 22 | 23 | 19 | 36 | 65 | 15 | 24 | 27 | 21 | 11 | 17 | 18 | 40 | 44 | 31 | 83 | 85 | 83 | 58 | 85 |
| 7-Sep | 79 | 38 | 53 | 62 | 54 | 54 | 26 | 18 | 17 | 18 | 17 | 80 | 23 | 22 | 23 | 23 | 20 | 17 | 15 | 12 | 14 | 15 | 34 | 45 | 80 |
| 8-Sep | 40 | 61 | 51 | 23 | 13 | 14 | 28 | 60 | 28 | 58 | 70 | 47 | 16 | 26 | 17 | 20 | 17 | 29 | 26 | 11 | 14 | 13 | 28 | 63 | 70 |
| 9-Sep | 60 | 25 | 20 | 76 | 60 | 42 | 83 | 88 | 28 | 15 | 12 | 39 | 14 | 16 | 16 | 14 | 13 | 13 | 21 | 17 | 15 | 14 | 26 | 34 | 88 |
| 10-Sep | 20 | 13 | 40 | 25 | 27 | 51 | 15 | 17 | 24 | 16 | 17 | 14 | 13 | 12 | 14 | 18 | 17 | 13 | 13 | 12 | 10 | 13 | 14 | 10 | 51 |
| 11-Sep | 9 | 13 | 28 | 37 | 16 | 12 | 10 | 11 | 16 | 25 | 25 | 53 | 26 | 42 | 65 | 45 | 21 | 21 | 16 | 12 | 76 | 60 | 83 | 47 | 83 |
| 12-Sep | 12 | 13 | 11 | 12 | 16 | 14 | 13 | 13 | 11 | 11 | 15 | 15 | 15 | 13 | 11 | 18 | 17 | 16 | 15 | 21 | 23 | 27 | 18 | 26 | 27 |
| 13-Sep | 26 | 35 | 18 | 27 | 37 | 27 | 39 | 24 | 34 | 95 | 43 | 44 | 30 | 57 | 53 | 51 | 93 | 25 | 32 | 27 | 43 | 51 | 84 | 85 | 95 |
| 14-Sep | 66 | 52 | 24 | 24 | 21 | 23 | 16 | 40 | 55 | 55 | 33 | 17 | 21 | 26 | 26 | 20 | 13 | 14 | 20 | 41 | 39 | 83 | 86 | 39 | 86 |
| 15-Sep | 52 | 30 | 27 | 22 | 19 | 14 | 11 | 13 | 10 | 20 | 45 | 25 | 99 | 22 | 27 | 32 | 19 | 18 | 49 | 80 | 66 | 24 | 16 | 24 | 99 |
| 16-Sep | 58 | 26 | 21 | 20 | 64 | 57 | 27 | 15 | 14 | 20 | 42 | 25 | 28 | 29 | 27 | 30 | 29 | 22 | 14 | 15 | 16 | 15 | 58 | 77 | 77 |
| 17-Sep | 28 | 17 | 30 | 18 | 26 | 46 | 49 | 73 | 14 | 13 | 17 | 20 | 20 | 25 | 30 | 17 | 21 | 18 | 13 | 14 | 13 | 13 | 12 | 14 | 73 |
| 18-Sep | 15 | 15 | 14 | 14 | 13 | 14 | 13 | 16 | 17 | 16 | 17 | 19 | 18 | 23 | 24 | 22 | 20 | 19 | 20 | 24 | 51 | 72 | 30 | 91 | 91 |
| 19-Sep | 73 | 78 | 90 | 76 | 82 | 25 | 20 | 34 | 18 | 18 | 14 | 14 | 16 | 19 | 17 | 13 | 13 | 14 | 14 | 14 | 13 | 13 | 14 | 17 | 90 |
| 20-Sep | 18 | 21 | 22 | 21 | 18 | 21 | 19 | 19 | 18 | 19 | 19 | 19 | 17 | 18 | 18 | 18 | 17 | 18 | 18 | 20 | 18 | 20 | 20 | 20 | 22 |
| 21-Sep | 21 | 20 | 19 | 19 | 21 | 17 | 16 | 18 | 15 | 20 | 19 | 18 | 20 | 21 | 22 | 20 | 14 | 19 | 17 | 19 | 15 | 14 | 15 | 19 | 22 |
| 22-Sep | 14 | 21 | 34 | 26 | 20 | 11 | 11 | 19 | 11 | 16 | 29 | 36 | 32 | 52 | 60 | 28 | 33 | 18 | 63 | 64 | 74 | 54 | 21 | 52 | 74 |
| 23-Sep | 26 | 19 | 24 | 73 | 50 | 35 | 50 | 58 | 68 | 73 | 52 | 25 | 31 | 31 | 42 | 53 | 24 | 18 | 17 | 34 | 58 | 23 | 25 | 27 | 73 |
| 24-Sep | 24 | 22 | 40 | 31 | 39 | 58 | 45 | 18 | 78 | 20 | 24 | 31 | 41 | 34 | 23 | 22 | 37 | 16 | 15 | 15 | 56 | 29 | 19 | 17 | 78 |
| 25-Sep | 14 | 14 | 17 | 14 | 13 | 11 | 12 | 11 | 11 | 12 | 15 | 64 | 46 | 14 | 17 | 21 | 19 | 15 | 13 | 14 | 41 | 73 | 40 | 45 | 73 |
| 26-Sep | 22 | 25 | 29 | 58 | 39 | 59 | 50 | 14 | 13 | 70 | 81 | 42 | 34 | 21 | 14 | 18 | 14 | 21 | 21 | 70 | 71 | 52 | 39 | 51 | 81 |
| 27-Sep | 41 | 49 | 41 | 36 | 50 | 28 | 35 | 52 | 23 | 33 | 30 | 16 | 35 | 14 | 20 | 19 | 18 | 25 | 14 | 13 | 15 | 19 | 58 | 31 | 58 |
| 28-Sep | 40 | 25 | 64 | 89 | 26 | 43 | 51 | 18 | 19 | 17 | 18 | 17 | 31 | 23 | 22 | 29 | 19 | 16 | 14 | 15 | 13 | 17 | 29 | 48 | 89 |
| 29-Sep | 24 | 19 | 19 | 13 | 14 | 21 | 15 | 16 | 12 | 11 | 14 | 25 | 26 | 53 | 22 | 23 | 21 | 17 | 39 | 44 | 67 | 47 | 74 | 71 | 74 |
| 30-Sep | 63 | 59 | 22 | 53 | 31 | 60 | 32 | 46 | 16 | 32 | 47 | 56 | 18 | 14 | 13 | 14 | 20 | 18 | 26 | 11 | 10 | 17 | 13 | 12 | 63 |
| | 79 | 78 | 90 | 89 | 82 | 70 | 83 | 88 | 78 | 95 | 81 | 80 | 99 | 57 | 65 | 53 | 93 | 40 | 83 | 87 | 89 | 85 | 86 | 91 | |
| | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|----------------|
| Station Name: | Athabasca Valley | Station number: | AMS 07 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 3, 2017 |
| Start time (MST): | 7:52 | End time (MST): | 12:12 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|------------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>49.2</u> | ppm | Cal Gas Exp Date | February 16, 2019 |
| Calibrator Make/Model | Teledyne API 700 | | Serial Number | 2445 |
| ZAG Make/Model | Teledyne API 701 | | Serial Number | 1864 |

Analyzer Information

Analyzer make: Thermo 45C

Analyzer serial #: 630718530

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -619 | -619 |
| Calculated slope | 0.992550 | 0.993695 | Lamp voltage | 801 | 801 |
| Calculated intercept | 1.665681 | 1.129502 | Pressure | 694.4 | 694.4 |
| Analyzer Background | 18.1 | 18.1 | Flow | 0.479 | 0.479 |
| Analyzer Coefficient | 1.012 | 1.012 | Intensity | 43765 | 43765 |

SO₂ Calibration Data

| Set Point | Total air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|----------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 4978 | 78.8 | 766.7 | 767.0 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.8 | ---- |
| high point | 4978 | 78.8 | 766.7 | 772.0 | 0.993 |
| second point | 4973 | 39.5 | 387.7 | 386.2 | 1.004 |
| third point | 4994 | 19.8 | 194.3 | 193.7 | 1.003 |
| as left zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as left span | 5000 | 78.8 | 763.4 | 771.7 | 0.989 |
| Average Correction Factor | | | | | 1.000 |

| | | | | | |
|--------------------|--------|-------------------|--------|-----------|------|
| Corrected As found | 766.40 | Previous response | 770.77 | *% change | 0.6% |
|--------------------|--------|-------------------|--------|-----------|------|

* = > +/-5% change initiates investigation

Notes:

No adjustments or maintenance done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

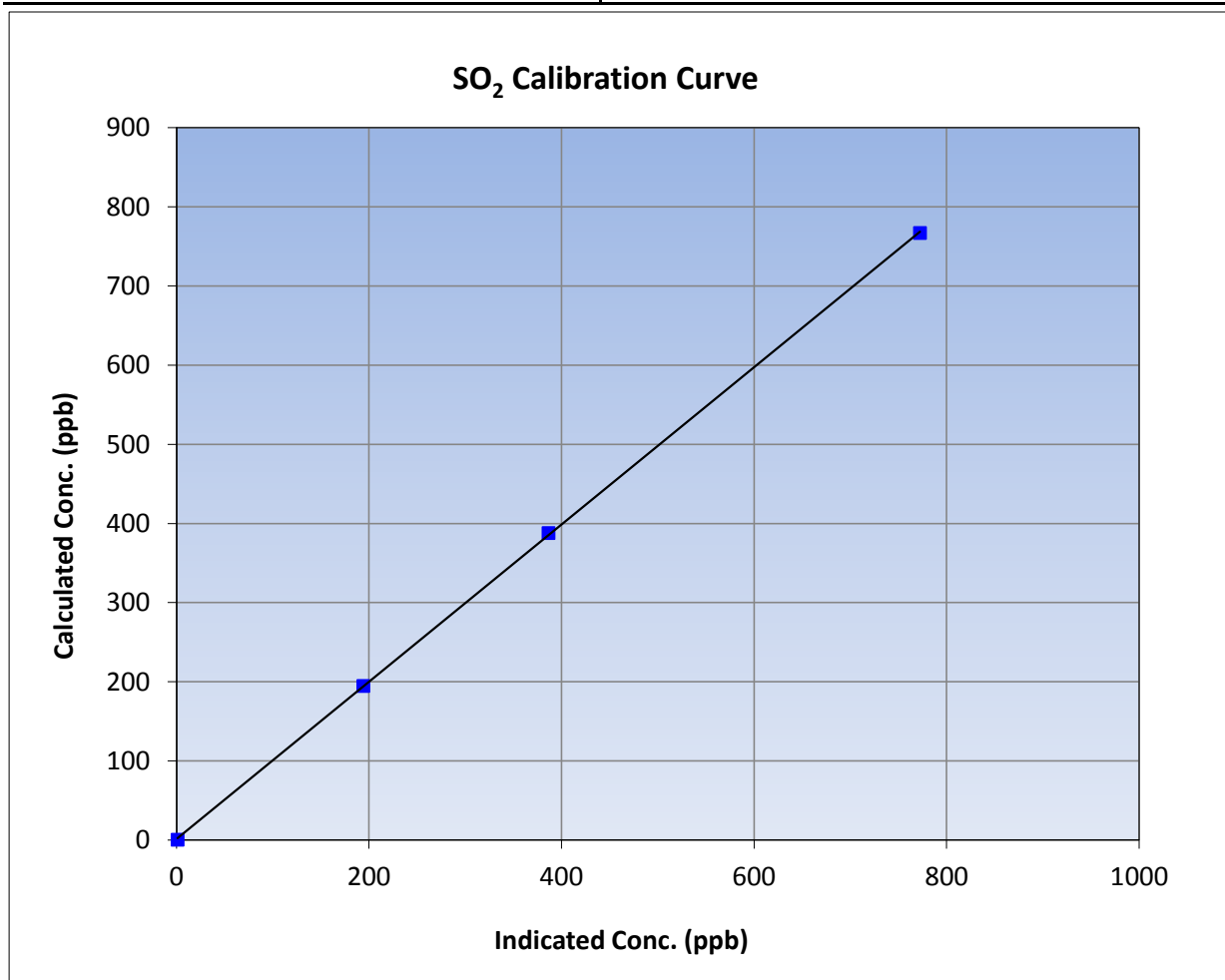
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:52 | End Time (MST) | 12:12 |
| Analyzer make | Thermo 45C | Analyzer serial # | 630718530 |

Calibration Data

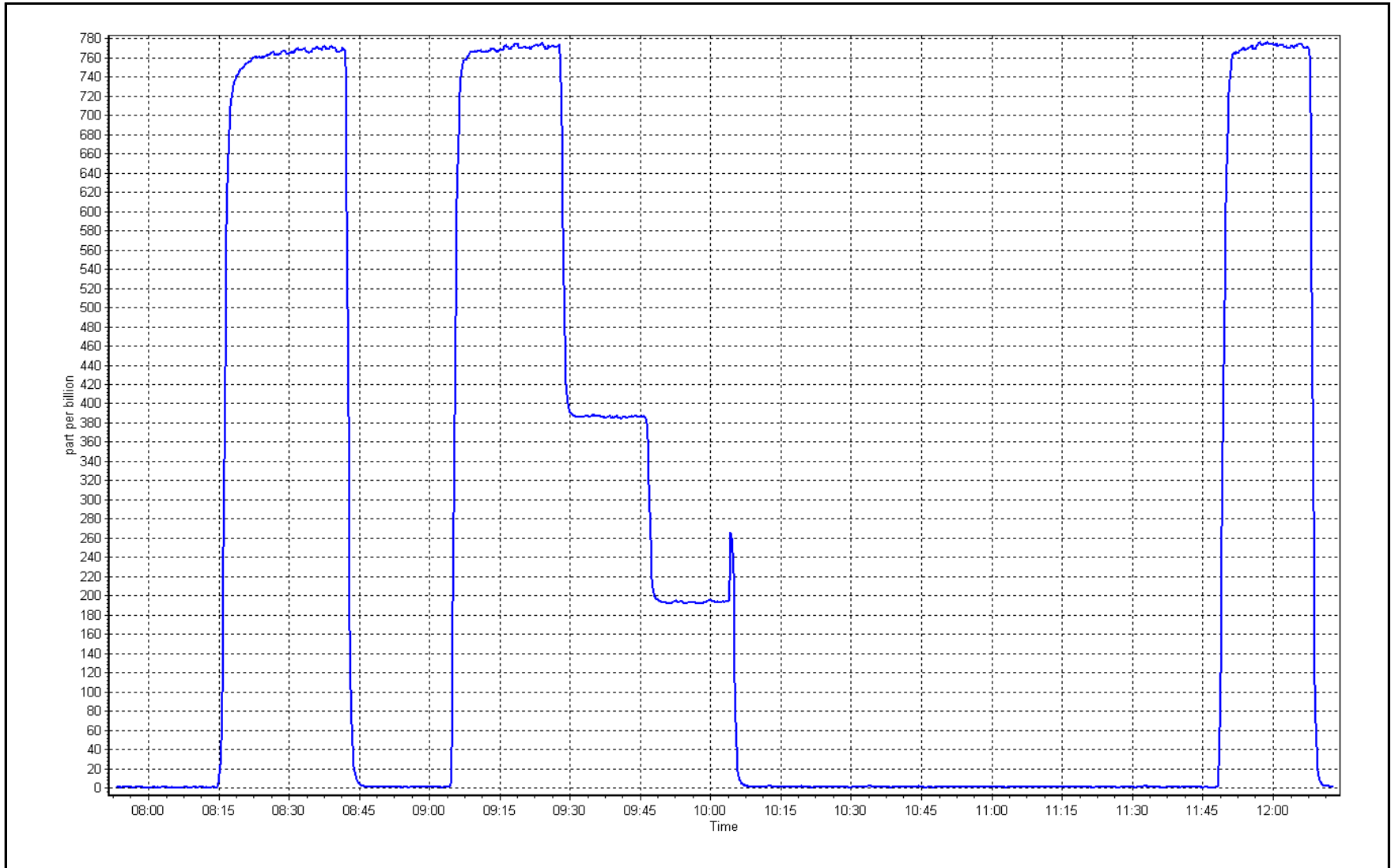
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.8 | ---- | Correlation Coefficient | 0.999955 | ≥0.995 |
| 766.7 | 772.0 | 0.9931 | | | |
| 387.7 | 386.2 | 1.0039 | Slope | 0.993695 | 0.90 - 1.10 |
| 194.3 | 193.7 | 1.0031 | | | |
| | | | Intercept | 1.129502 | +/-30 |



SO2 Calibration Plot

Date: September 7, 2017

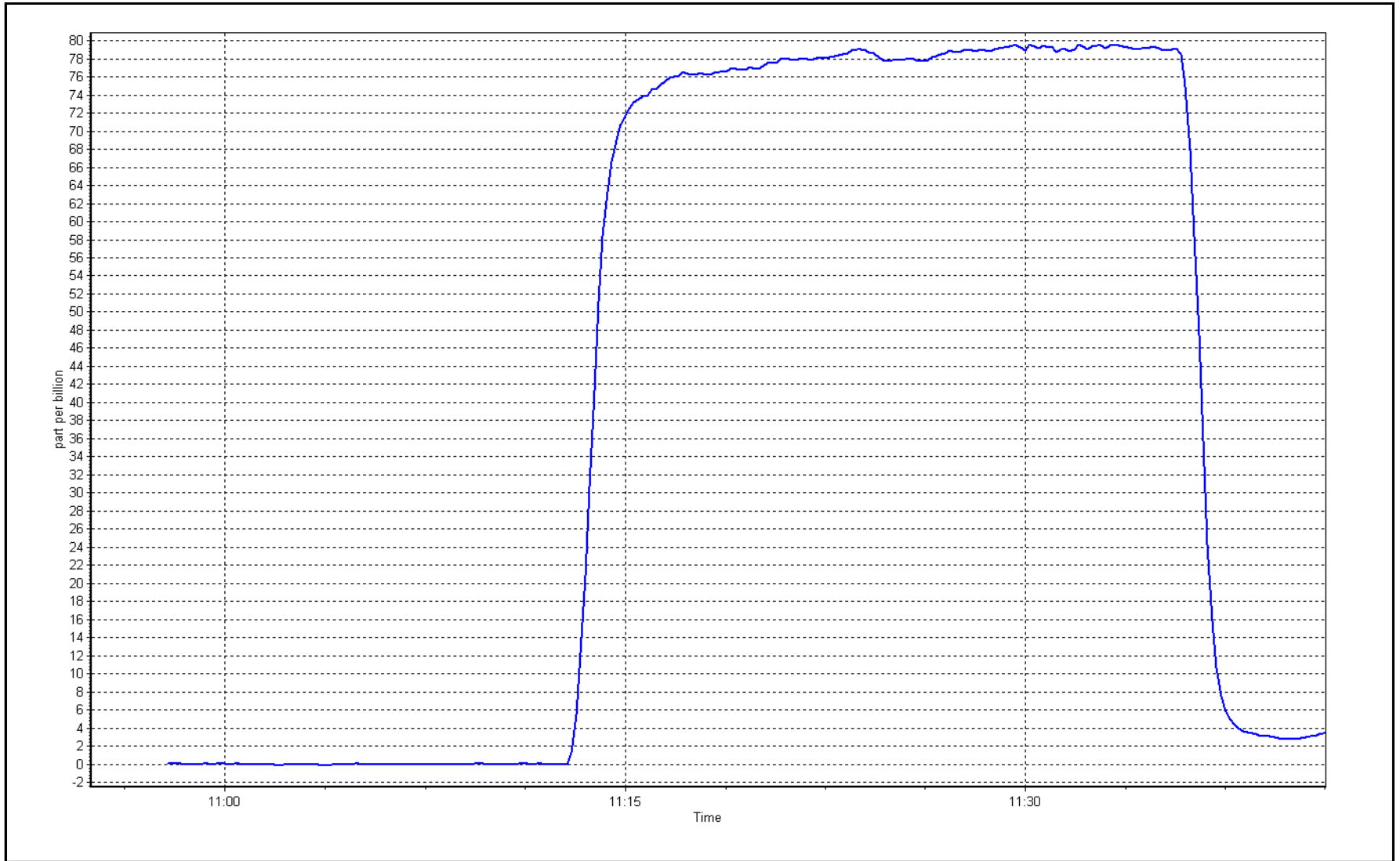
Location: Athabasca Valley



TRS Calibration Plot

Date: September 18, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

TRS Calibration Summary

Version-03-2017

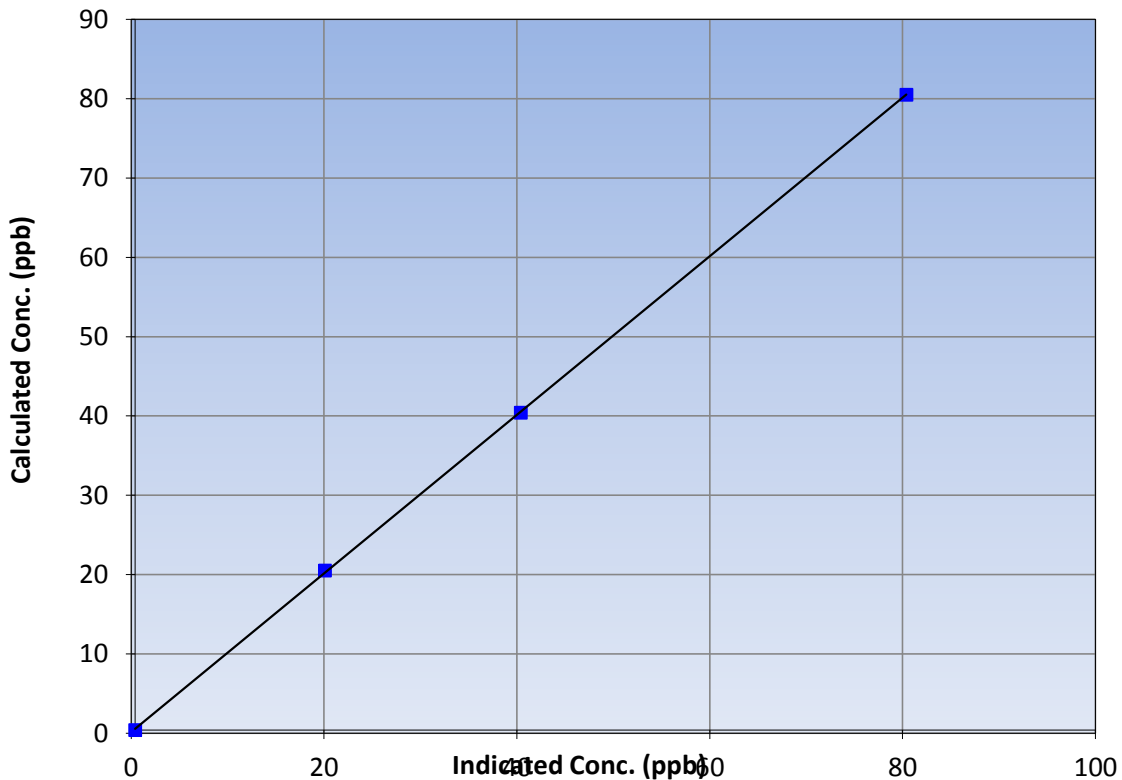
Station Information

| | | | |
|------------------|--------------------|----------------------|------------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | AMS 7 | Station Number | Athabasca Valley |
| Start Time (MST) | 10:58 | End Time (MST) | 13:42 |
| Analyzer make | Thermo 43i LTE | Analyzer serial # | 1507864683 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999970 | ≥0.995 |
| 80.1 | 80.0 | 1.0012 | | | |
| 40.0 | 40.0 | 1.0005 | Slope | 0.999539 | 0.90 - 1.10 |
| 20.1 | 19.7 | 1.0206 | | | |
| | | | Intercept | 0.147040 | +/-3 |

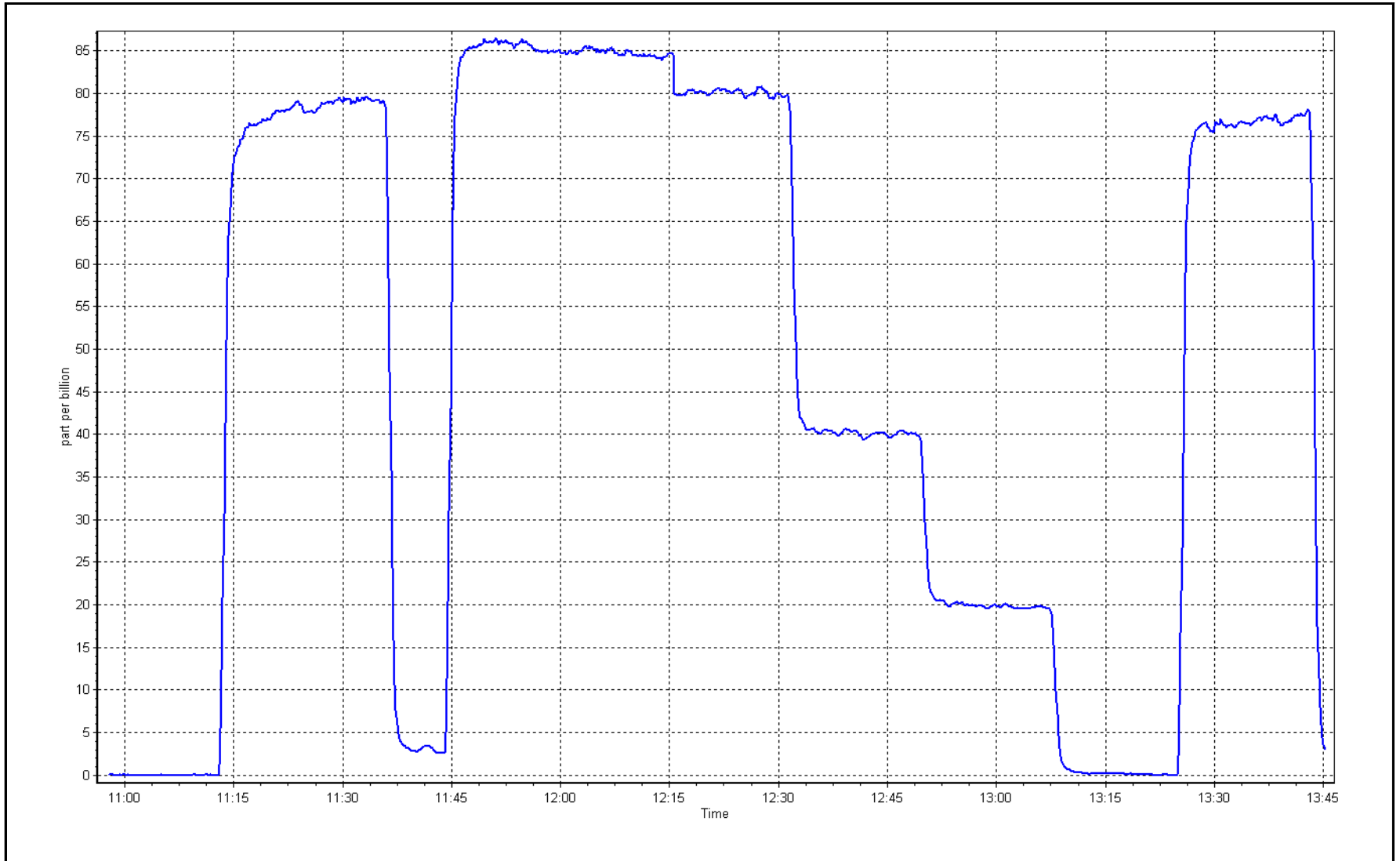
TRS Calibration Curve



TRS Calibration Plot

Date: September 18, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|----------------|
| Station Name: | Athabasca Valley | Station number: | AMS 07 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 3, 2017 |
| Start time (MST): | 7:52 | End time (MST): | 12:10 |
| Reason: | Maintenance | | |

Calibration Standards

| | | | |
|--------------------|------------------|---------------------|----------------|
| Gas Cert Reference | LL110103 | Cal Gas Expiry Date | February-16-19 |
| CH4 Cal Gas Conc. | <u>488.0</u> ppm | CH4 Equiv Conc. | 1035.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 25 Deg C |
| Calibrator Model | Teledyne API 700 | Serial Number | 2445 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1864 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1426262594

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.0 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 0.000216 | 0.000222 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 13.0 | 13.0 | Carrier Pressure | 36.1 | 36.1 |
| NMHC SP Ratio | 4.15E-05 | 4.21E-05 | Fuel Pressure | 44.8 | 44.8 |
| NMHC Peak Area | 210660 | 207389 | Air Pressure | 26.0 | 26.0 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 1.001693 | 0.993929 |
| THC Cal Offset | 0.035802 | 0.031561 |
| CH4 Cal Slope | 1.007524 | 0.996003 |
| CH4 Cal Offset | 0.043432 | 0.036831 |
| NMHC Cal Slope | 0.996460 | 0.991518 |
| NMHC Cal Offset | -0.006999 | -0.003005 |

Notes: span adjusted, hydrogen and nitrogen changed

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4973 | 78.8 | 16.40 | 16.15 | 1.016 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4973 | 78.8 | 16.40 | 16.50 | 0.994 |
| second point | 4973 | 39.5 | 8.22 | 8.19 | 1.004 |
| third point | 4994 | 19.8 | 4.10 | 4.09 | 1.004 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4932 | 78.8 | 16.54 | 16.59 | 0.997 |
| Average Correction Factor | | | | | 1.001 |
| Corrected As found | 16.15 | Prev response | 16.34 | *% change | 1.2% |

NMHC Calibration Data

| Set Point | Total air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|----------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4973 | 78.8 | 8.67 | 8.60 | 1.008 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4973 | 78.8 | 8.67 | 8.75 | 0.991 |
| second point | 4973 | 39.5 | 4.35 | 4.38 | 0.992 |
| third point | 4994 | 19.8 | 2.17 | 2.20 | 0.986 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4932 | 78.8 | 8.74 | 8.76 | 0.998 |
| Average Correction Factor | | | | | 0.990 |
| Corrected As found | 8.60 | Prev response | 8.71 | *% change | 1.3% |

CH4 Calibration Data

| Set Point | Total air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|----------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4973 | 78.8 | 7.73 | 7.55 | 1.024 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4973 | 78.8 | 7.73 | 7.75 | 0.998 |
| second point | 4973 | 39.5 | 3.88 | 3.82 | 1.015 |
| third point | 4994 | 19.8 | 1.93 | 1.88 | 1.029 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4932 | 78.8 | 7.80 | 7.83 | 0.996 |
| Average Correction Factor | | | | | 1.014 |
| Corrected As found | 7.55 | Prev response | 7.63 | *% change | 1.1% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

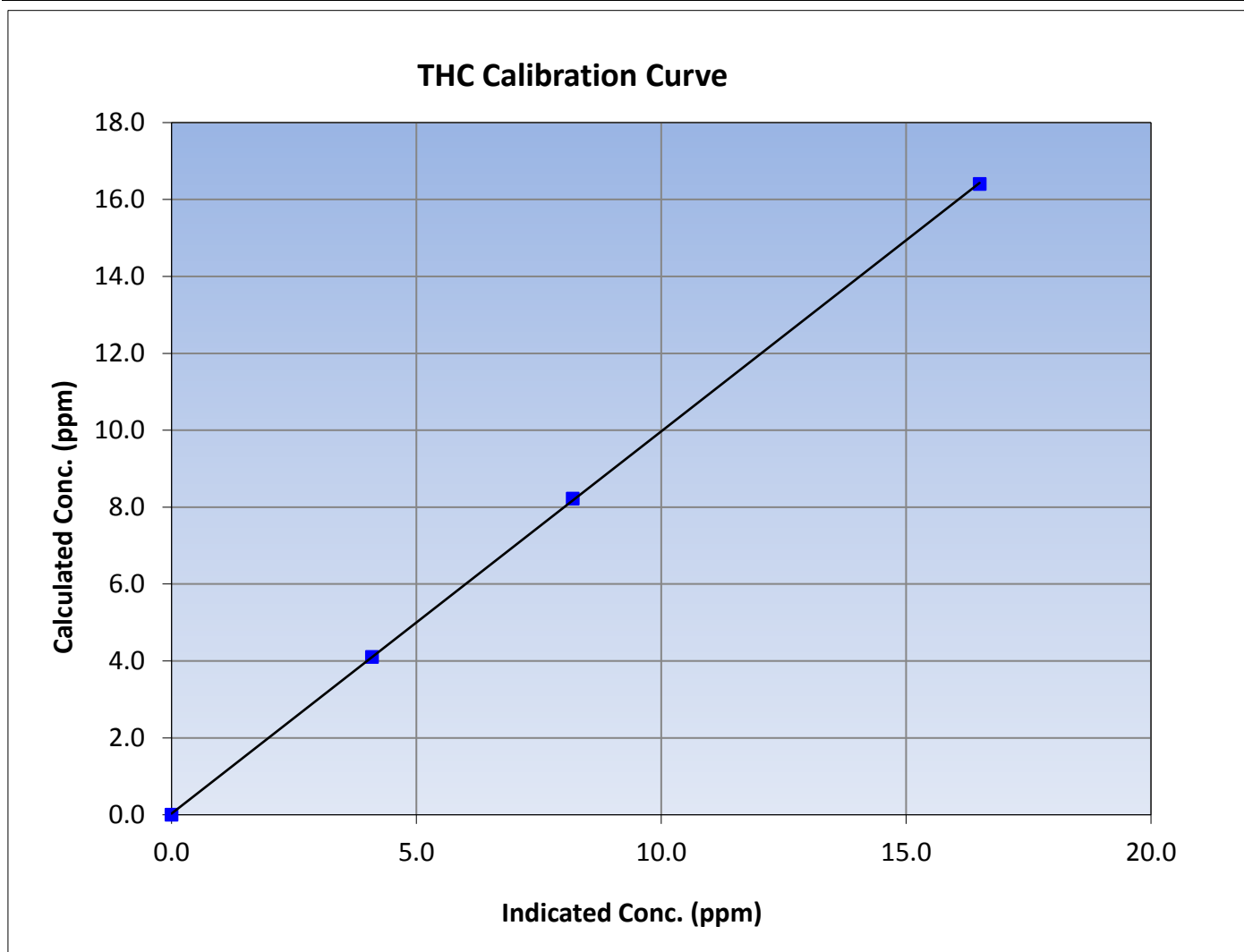
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:52 | End Time (MST) | 12:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999970 | ≥ 0.995 | | | |
| 16.40 | 16.50 | 0.9942 | | | | | | |
| 8.22 | 8.19 | 1.0040 | | | | Slope | 0.993929 | 0.90 - 1.10 |
| 4.10 | 4.09 | 1.0035 | | | | | | |
| | | | Intercept | 0.031561 | ± 0.5 | | | |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

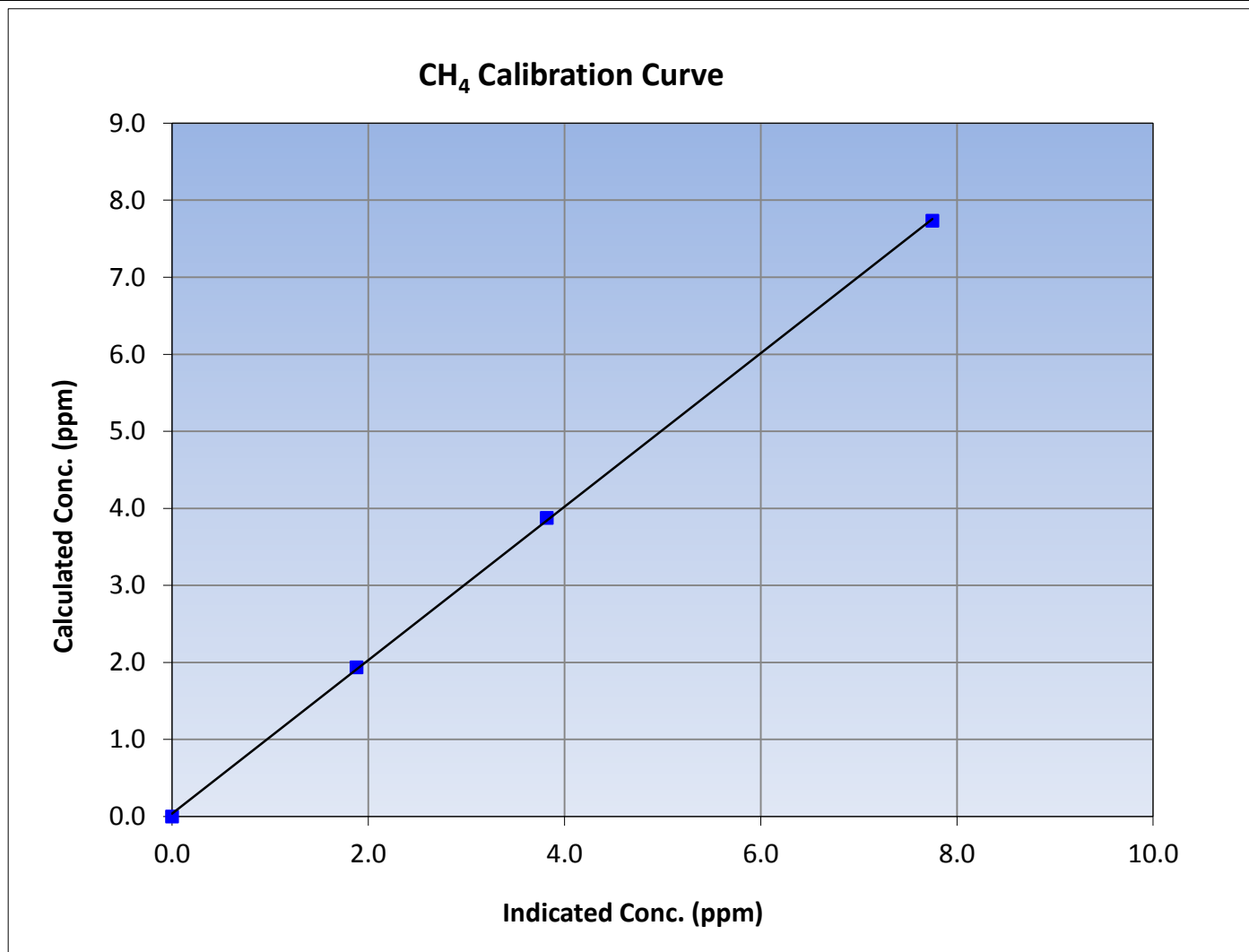
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:52 | End Time (MST) | 12:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999886 | ≥ 0.995 | | | |
| 7.73 | 7.75 | 0.9978 | | | | | | |
| 3.88 | 3.82 | 1.0147 | | | | Slope | 0.996003 | 0.90 - 1.10 |
| 1.93 | 1.88 | 1.0291 | | | | | | |
| | | | Intercept | 0.036831 | ± 0.5 | | | |





Wood Buffalo Environmental Association

NMHC Calibration Summary

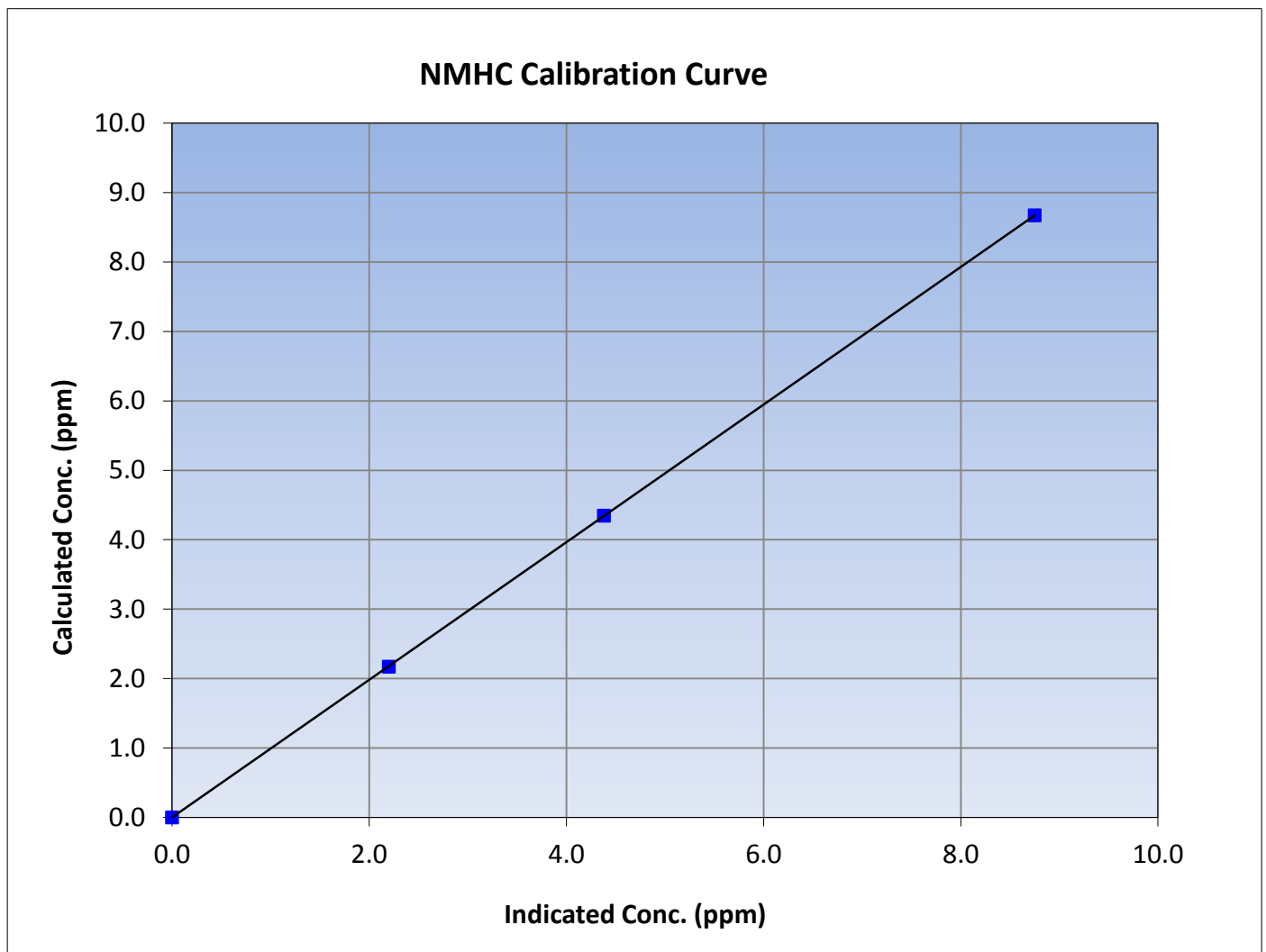
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:52 | End Time (MST) | 12:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

Calibration Data

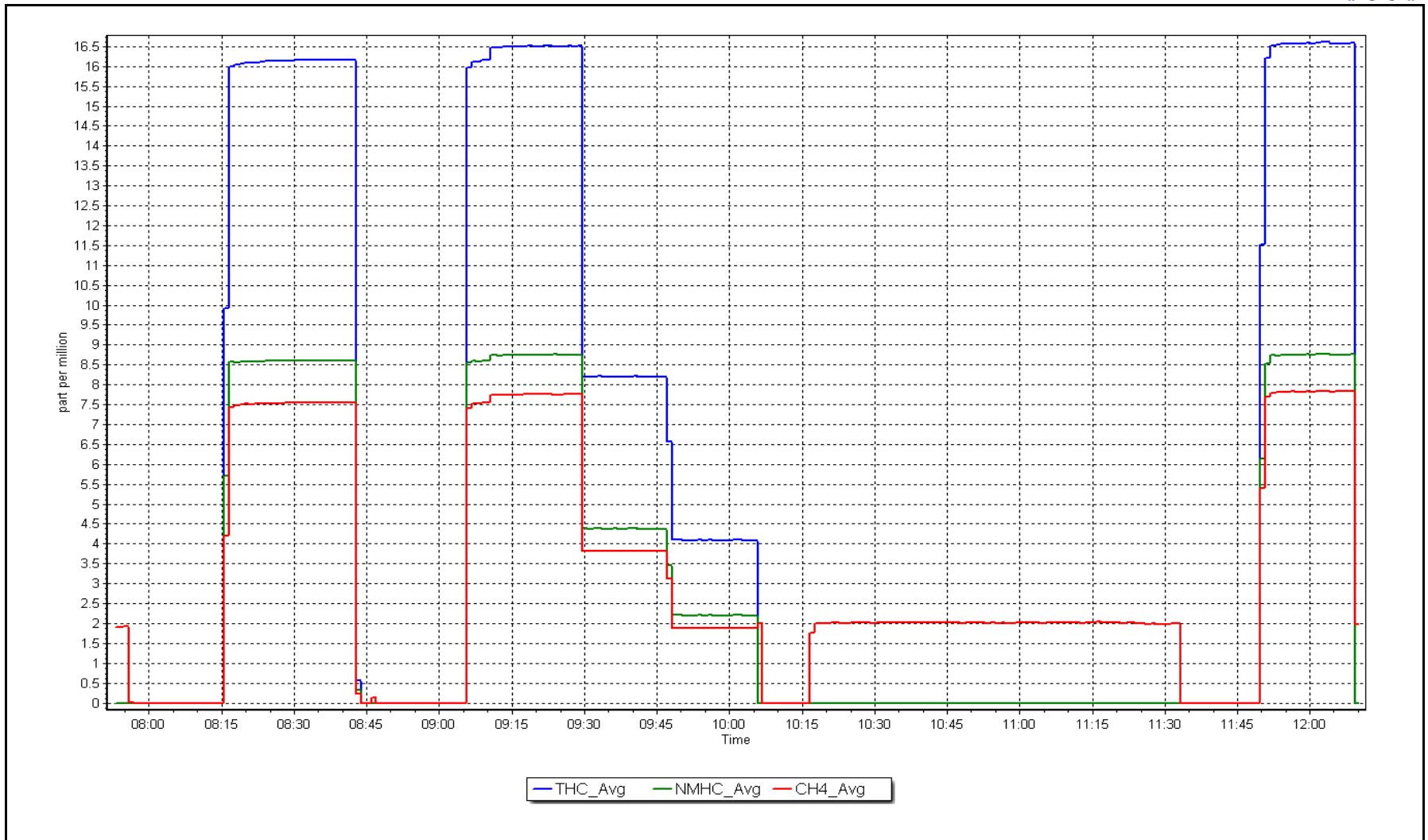
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999997 | ≥ 0.995 |
| 8.67 | 8.75 | 0.9910 | | | |
| 4.35 | 4.38 | 0.9924 | | | |
| 2.17 | 2.20 | 0.9862 | | | |
| | | | Slope | 0.991518 | 0.90 - 1.10 |
| | | | Intercept | -0.003005 | +/-0.5 |



NMHC Calibration Plot

Date: September 7, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

O₃ Calibration Summary

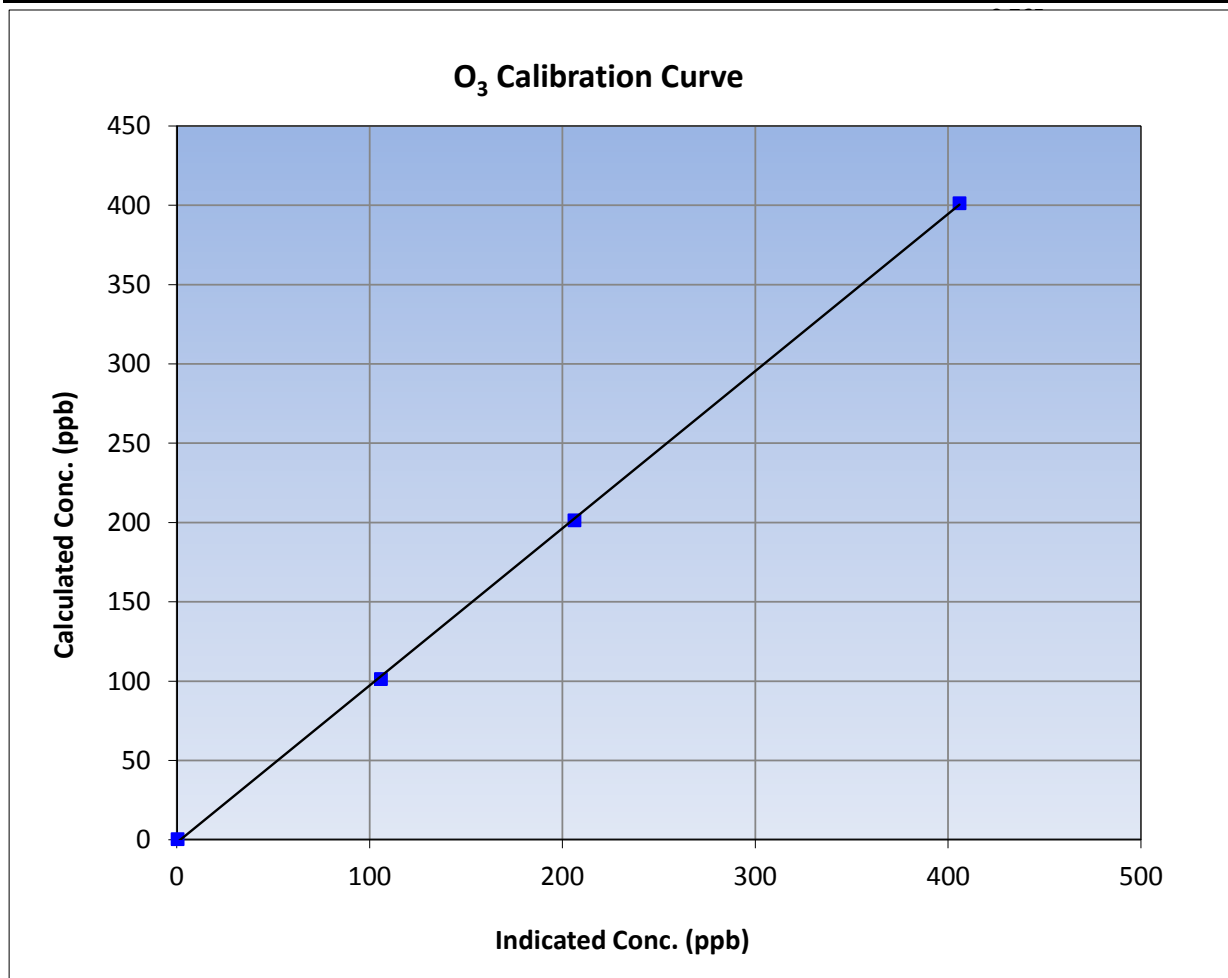
Version-03-2017

Station Information

| | | | |
|------------------|------------------|----------------------|-----------------|
| Calibration Date | August 18, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 8:10 | End Time (MST) | 11:00 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1507964700 |

Calibration Data

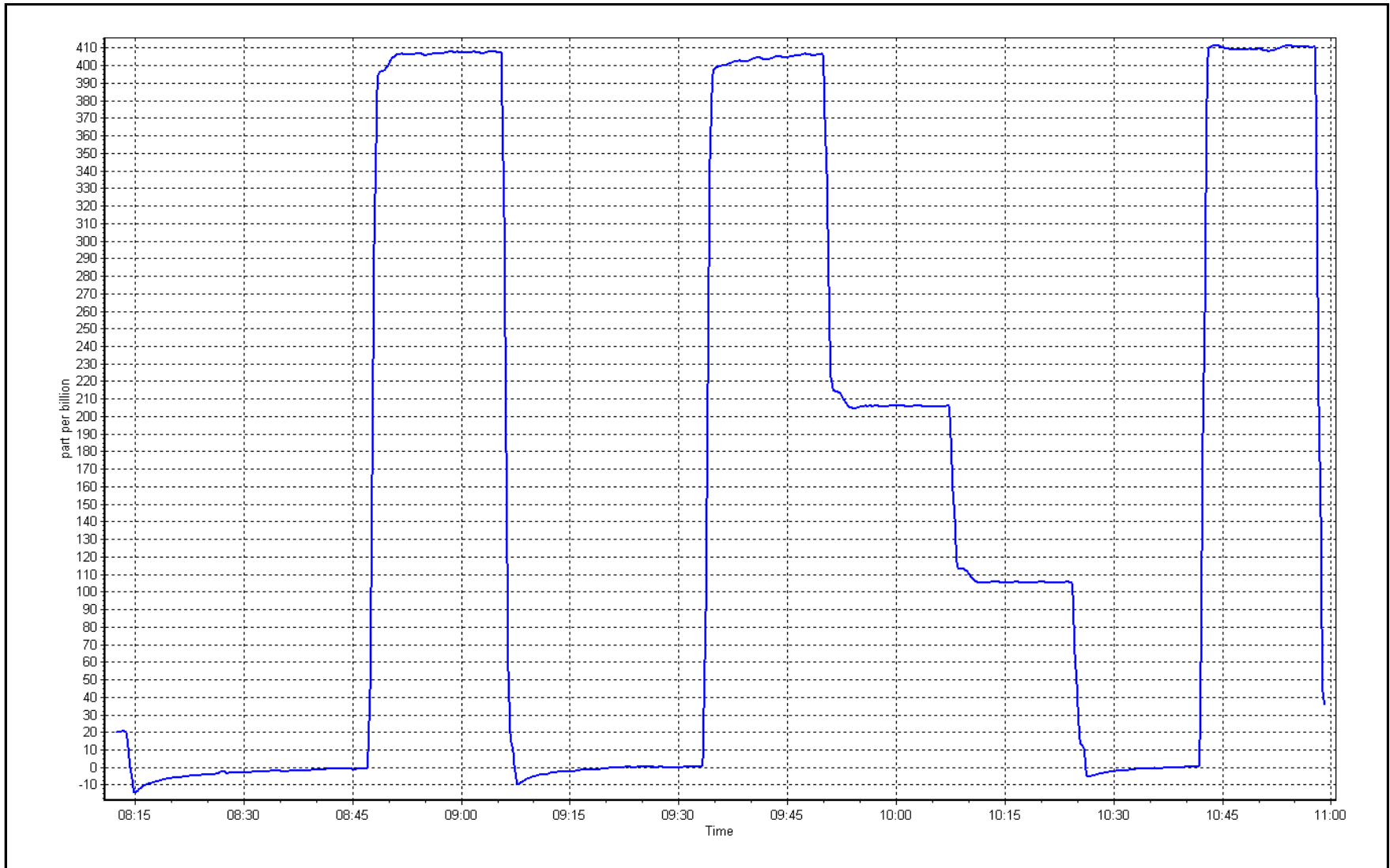
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999907 | |
| 401.0 | 405.5 | 0.9889 | | | ≥0.995 |
| 201.0 | 205.8 | 0.9767 | Slope | 0.991098 | |
| 101.0 | 105.5 | 0.9573 | | | 0.90 - 1.10 |
| | | | Intercept | -1.879466 | +/- 10 |



O₃ Calibration Plot

Date: August 18, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|----------------|
| Station Name: | Athabasca Valley | Station number: | AMS 07 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 3, 2017 |
| Start time (MST): | 7:52 | End time (MST): | 12:11 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-----------------|
| NO Gas Cylinder # | LL110103 | Cal Gas Expiry Date | February-16-19 |
| NOX Cal Gas Conc. | <u>50.8</u> ppb | NO Cal Gas Conc. | <u>50.8</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 2445 |
| ZAG make/model | Teledyne API T701 | Serial Number | 1864 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|------------------------------|--------------|---------------|
| Analyzer make: Thermo 42C | | | Analyzer serial #: 601114773 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.526 | 1.526 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.999 | 0.999 | PMT Temperature | -3.5 | -3.5 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 174.3 | 174.3 |
| NO bkgrnd | 4.3 | 4.3 | Sample Flow | 0.744 | 0.744 |
| NOX bkgrnd | 4.5 | 4.5 | PMT Voltage | -784 | -784 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.006052 | 1.008144 |
| NO _x Cal Offset | -1.352697 | -1.814116 |
| NO Cal Slope | 1.003779 | 1.007300 |
| NO Cal Offset | -1.051779 | -1.793020 |
| NO ₂ Cal Slope | 1.008434 | 0.998209 |
| NO ₂ Cal Offset | 1.477046 | 1.089320 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | | | | | | 0.2 | 0.0 | 0.3 | ---- | ---- |
| as found span | 4932 | 78.8 | 811.6 | 811.6 | 0.0 | 803.8 | 804.1 | -0.1 | 1.0098 | 1.0094 |
| calibrator zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.3 | ---- | ---- |
| high point | 4932 | 78.8 | 811.6 | 811.6 | 0.0 | 805.8 | 806.4 | -0.5 | 1.0073 | 1.0065 |
| second point | 4973 | 39.5 | 403.5 | 403.5 | 0.0 | 403.7 | 404.0 | -0.3 | 0.9995 | 0.9988 |
| third point | 4994 | 19.7 | 200.4 | 200.4 | 0.0 | 201.6 | 202.0 | -0.2 | 0.9940 | 0.9920 |
| as left zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.3 | ---- | ---- |
| as left span | 4973 | 78.8 | 805.0 | 386.9 | 418.1 | 792.5 | 385.5 | 407.2 | 1.0157 | 1.0036 |
| Average Correction Factor | | | | | | | | | 1.0003 | 0.9991 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 803.6 ppb | NO = 804.1 ppb | | *Percent Change | NO _x = 0.6% |
| Previous Response | NO _x = 808.1 ppb | NO = 809.6 ppb | | *Percent Change | NO = 0.7% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 801.6 | 803.6 | -2.0 | 1.0125 | 1.0100 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 386.9 | 416.7 | 803.9 | 386.9 | 416.9 | 1.0096 | ---- | 0.9995 | 100.0% |
| 2nd NO2 (200 ppb O3) | 578.9 | 224.7 | 802.9 | 578.9 | 224.0 | 1.0109 | ---- | 1.0031 | 99.7% |
| 3rd NO2 (100 ppb O3) | 684.1 | 119.5 | 800.7 | 684.1 | 116.7 | 1.0137 | ---- | 1.0240 | 97.7% |
| 2nd NO ref point | ---- | 0.0 | 805.6 | 807.3 | -1.5 | 1.0075 | 1.0054 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0104 | 1.0077 | 1.0089 | 99.1% |

Notes: No adjustments or maintenance done; due to drifting during GPT 2nd NO ref point used

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

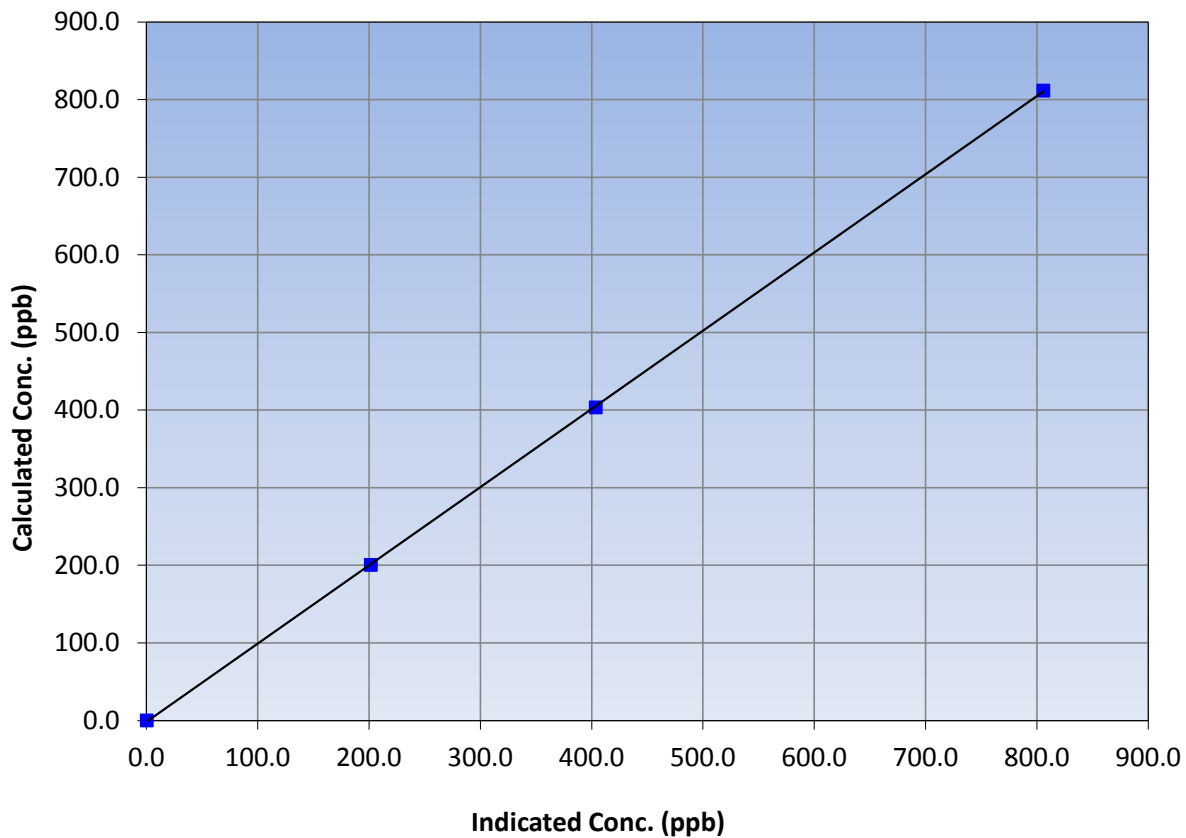
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:52 | End Time (MST) | 12:11 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 811.6 | 805.8 | 1.0073 | | | |
| 403.5 | 403.7 | 0.9995 | | | |
| 200.4 | 201.6 | 0.9940 | | | |
| | | | Slope | 1.008144 | 0.90 - 1.10 |
| | | | Intercept | -1.814116 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

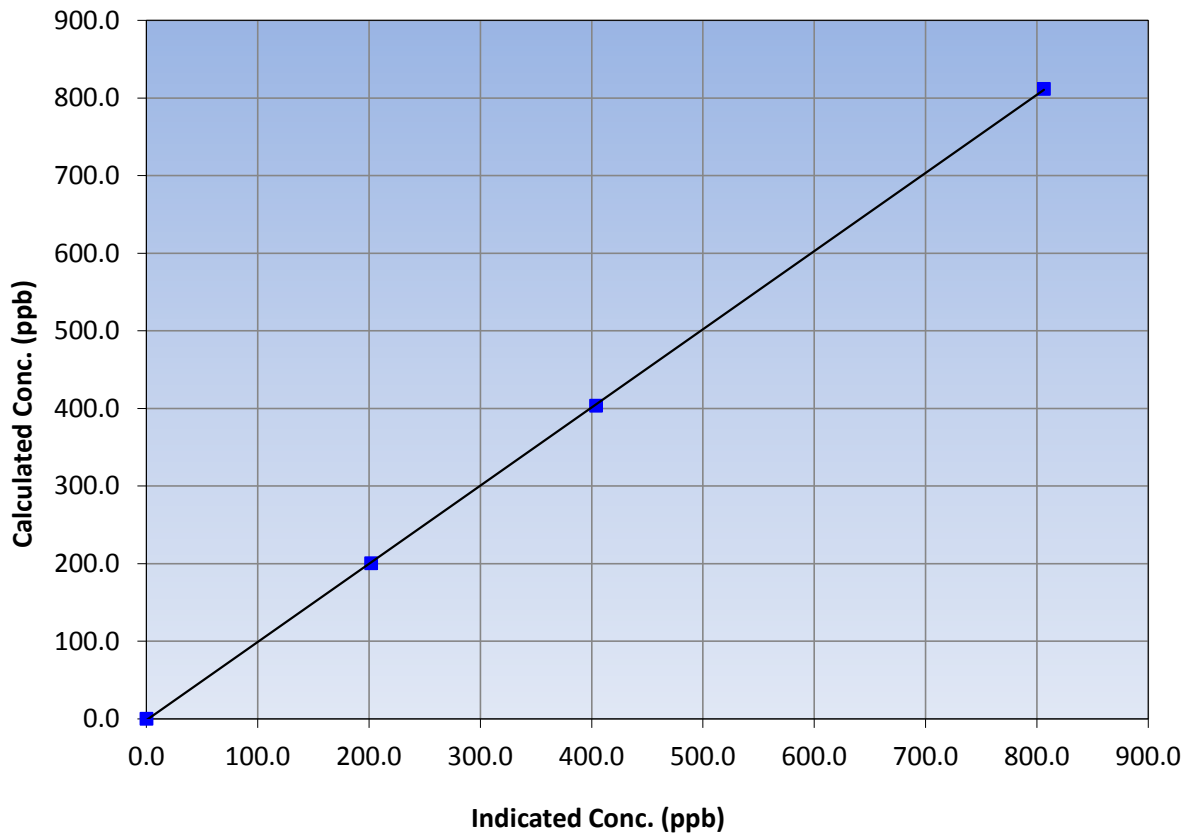
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:52 | End Time (MST) | 12:11 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 811.6 | 806.4 | 1.0065 | | | |
| 403.5 | 404.0 | 0.9988 | | | |
| 200.4 | 202.0 | 0.9920 | | | |
| | | | Slope | 1.007300 | 0.90 - 1.10 |
| | | | Intercept | -1.793020 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

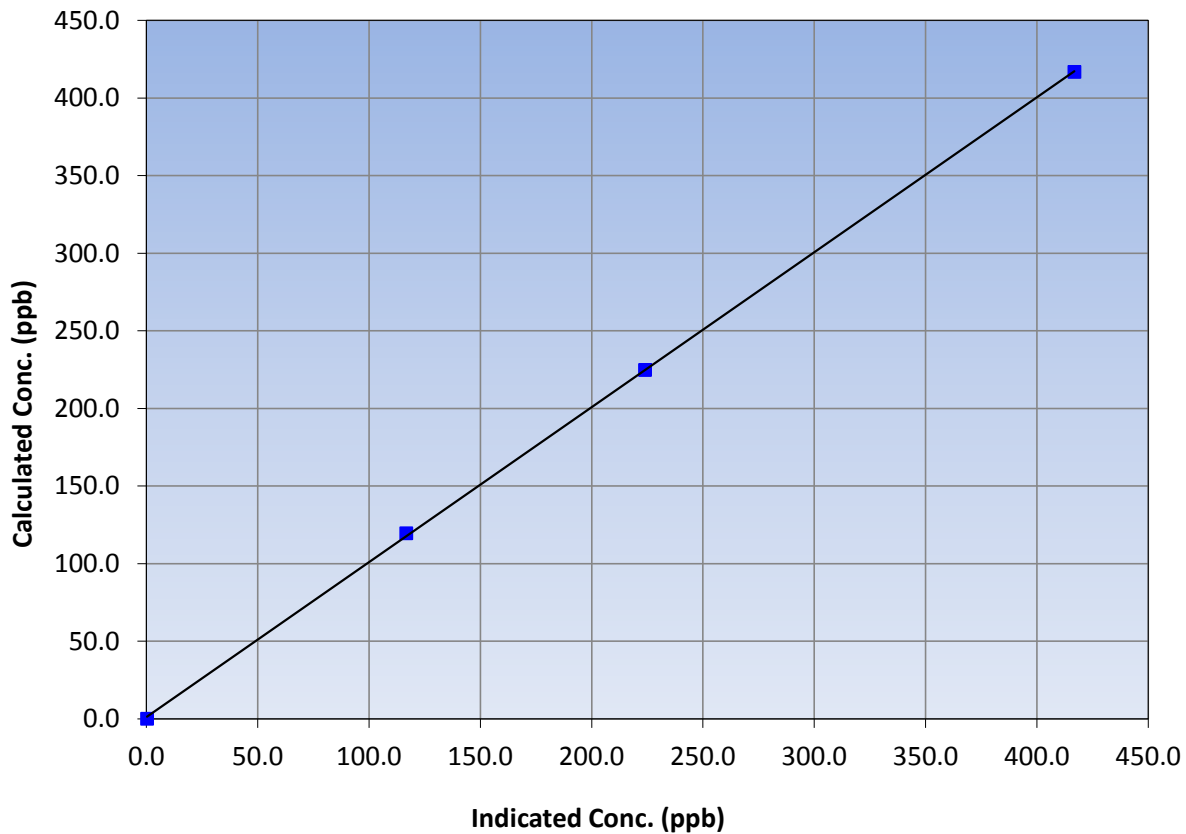
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:52 | End Time (MST) | 12:11 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | ≥0.995 | |
| 416.7 | 416.9 | 0.9995 | | | |
| 224.7 | 224.0 | 1.0031 | | | |
| 119.5 | 116.7 | 1.0240 | | | |
| | | | Slope | 0.998209 | 0.90 - 1.10 |
| | | | Intercept | 1.089320 | +/-20 |

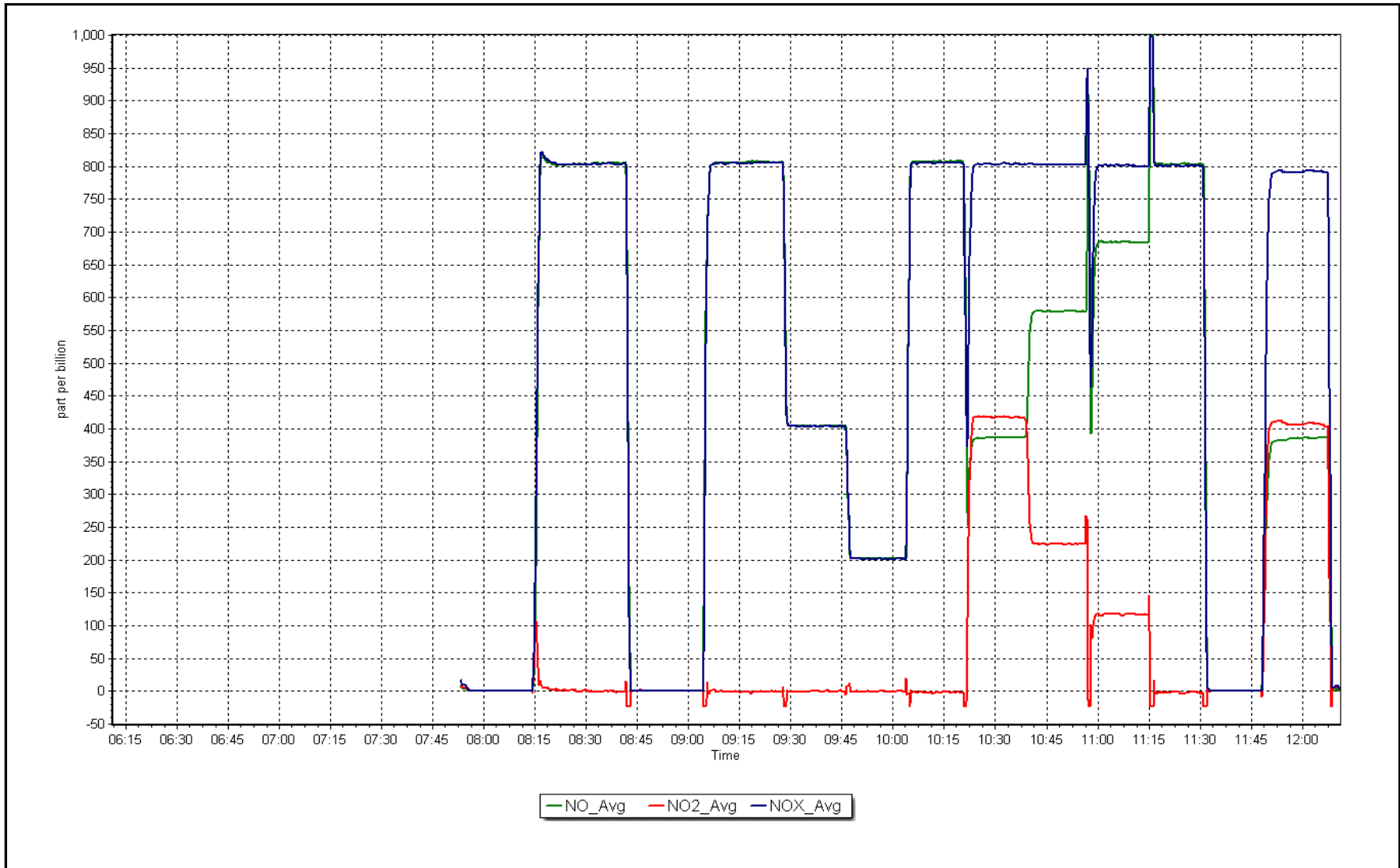
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 7, 2017

Location: Athabasca Valley





Wood Buffalo Environmental Association

CO Calibration Summary

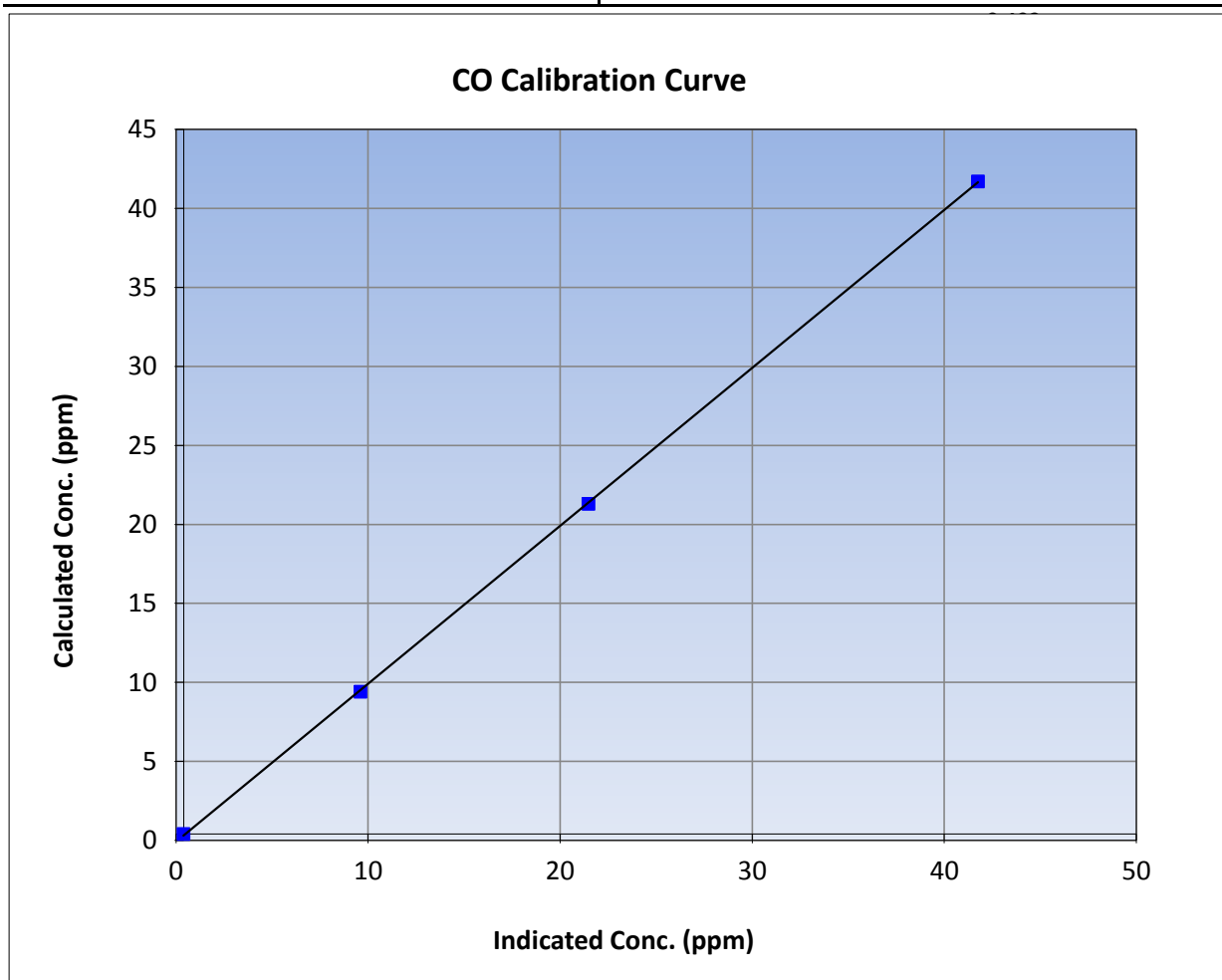
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 1, 2017 | Previous Calibration | August 18, 2017 |
| Station Name | Athabasca Valley | Station Number | AMS 07 |
| Start Time (MST) | 7:15 | End Time (MST) | 10:23 |
| Analyzer make | Thermo 48i-LTE | Analyzer serial # | 1408761381 |

Calibration Data

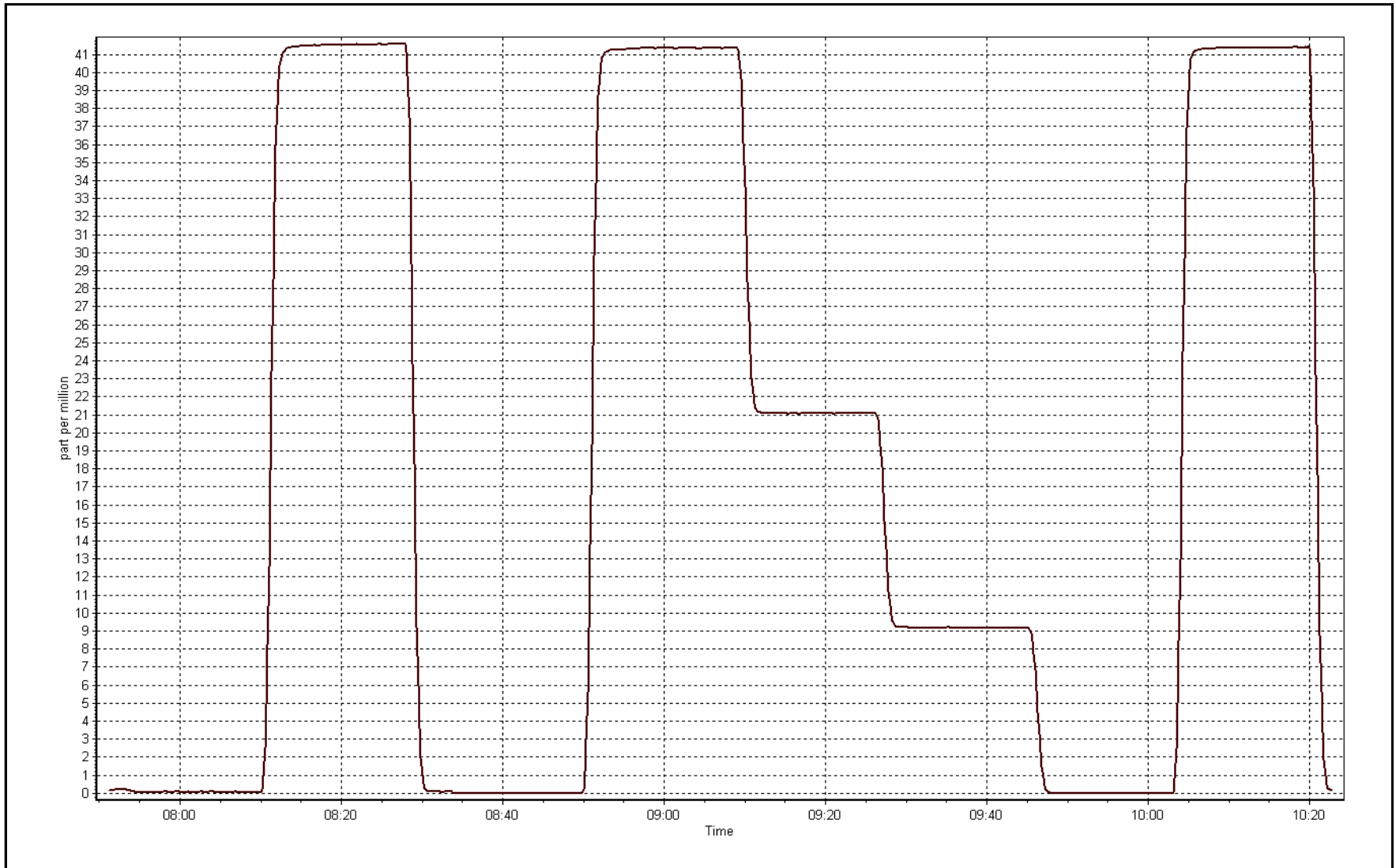
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999970 | ≥0.995 |
| 41.3 | 41.4 | 0.9988 | | | |
| 20.9 | 21.1 | 0.9919 | Slope | 0.999832 | 0.90 - 1.10 |
| 9.0 | 9.2 | 0.9787 | | | |
| | | | Intercept | -0.098457 | +/-1.5 |



CO Calibration Plot

Date: September 1, 2017

Location: Athabasca Valley





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 8
FORT CHIPEWYAN
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 684 | 36 | 36 | 100 | 4 | 0 | 2 | 0 |
| O3(ppb) Average | 687 | 33 | 33 | 100 | 72 | 0 | 52 | - |
| NO2(ppb) Average | 684 | 36 | 36 | 100 | 9 | 0 | 3 | - |
| NO(ppb) Average | 684 | 36 | 36 | 100 | 5 | - | 1 | - |
| NOX(ppb) Average | 684 | 36 | 36 | 100 | 13 | - | 3 | - |
| PM2.5(ug/m3) Average | 711 | 2 | 9 | 99.03 | 75.9 | - | 10.9 | 0 |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 41 | - | 28 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 29.1 | - | 21.6 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 98 | - | 93 | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100 | 2.3 | - | 7.6 | - |
| Leaf Wetness (% of range) Average | 720 | 0 | 0 | 100 | 44 | - | 12 | - |
| Global Solar Radiation (W/m2) Average | 720 | 0 | 0 | 100 | 679 | - | 222 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|---------------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2(ppb) Average | 684 | 0.3 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| O3(ppb) Average | 687 | 25.5 | 8 | - | 8 | 16 | 20 | 25 | 29 | 34 | 72 |
| NO2(ppb) Average | 684 | 0.7 | 1 | - | 0 | 0 | 0 | 0 | 1 | 2 | 9 |
| NO(ppb) Average | 684 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| NOX(ppb) Average | 684 | 0.8 | 1 | - | 0 | 0 | 0 | 0 | 1 | 2 | 13 |
| PM2.5(ug/m3) Average | 711 | 3.91 | 6.9 | - | 0 | 0.2 | 0.5 | 1.6 | 4.1 | 10.5 | 75.9 |
| Wind Speed 10 m (km/h) Average | 720 | 14.8 | 7 | - | 1 | 6 | 9 | 13 | 19 | 26 | 41 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 11.8 | 4.7 | - | 3.9 | 6.3 | 8 | 11.2 | 14.6 | 18.2 | 29.1 |
| Relative Humidity (%) Average | 720 | 72 | 16 | - | 32 | 49 | 62 | 74 | 84 | 92 | 98 |
| Precipitation (mm) Total | 720 | - | - | 16.26 | - | - | - | - | - | - | - |
| Leaf Wetness (% of range) Average | 720 | 1.6 | 6 | - | -1 | -1 | 0 | 0 | 0 | 5 | 44 |
| Global Solar Radiation (W/m2) Average | 720 | 133.7 | 188 | - | 0 | 1 | 1 | 16 | 216 | 462 | 679 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|---|
| PM2.5 | 02 Sep 2017 09:00 | 02 Sep 2017 13:00 | 5 | Unstable operation - excessive baseline drift |
| PM2.5 | 04 Sep 2017 12:00 | 04 Sep 2017 13:00 | 2 | Unstable operation - excessive baseline drift |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort Chipewyan - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 4 ppb on Sep 7 16:00 | Maximum Daily Average: 1.7 ppb on Sep 7 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.0 ppb on Sep 1 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 0.4 ppb at hour 12 | Minimum Diurnal Average: 0.1 ppb at hour 2 | | Hours of Calibration: | 36 |
| 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 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 0 | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 1.7 | 4 |
| 8-Sep | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 10-Sep | Z | 0 | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 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-Sep | 0 | 0 | Z | 0 | 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-Sep | 0 | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 16-Sep | Z | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 17-Sep | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 18-Sep | 0 | 0 | Z | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 22-Sep | Z | 0 | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0.6 | 3 |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 25-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 3 |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1.3 | 2 |
| 30-Sep | 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 | 0.2 | 2 |

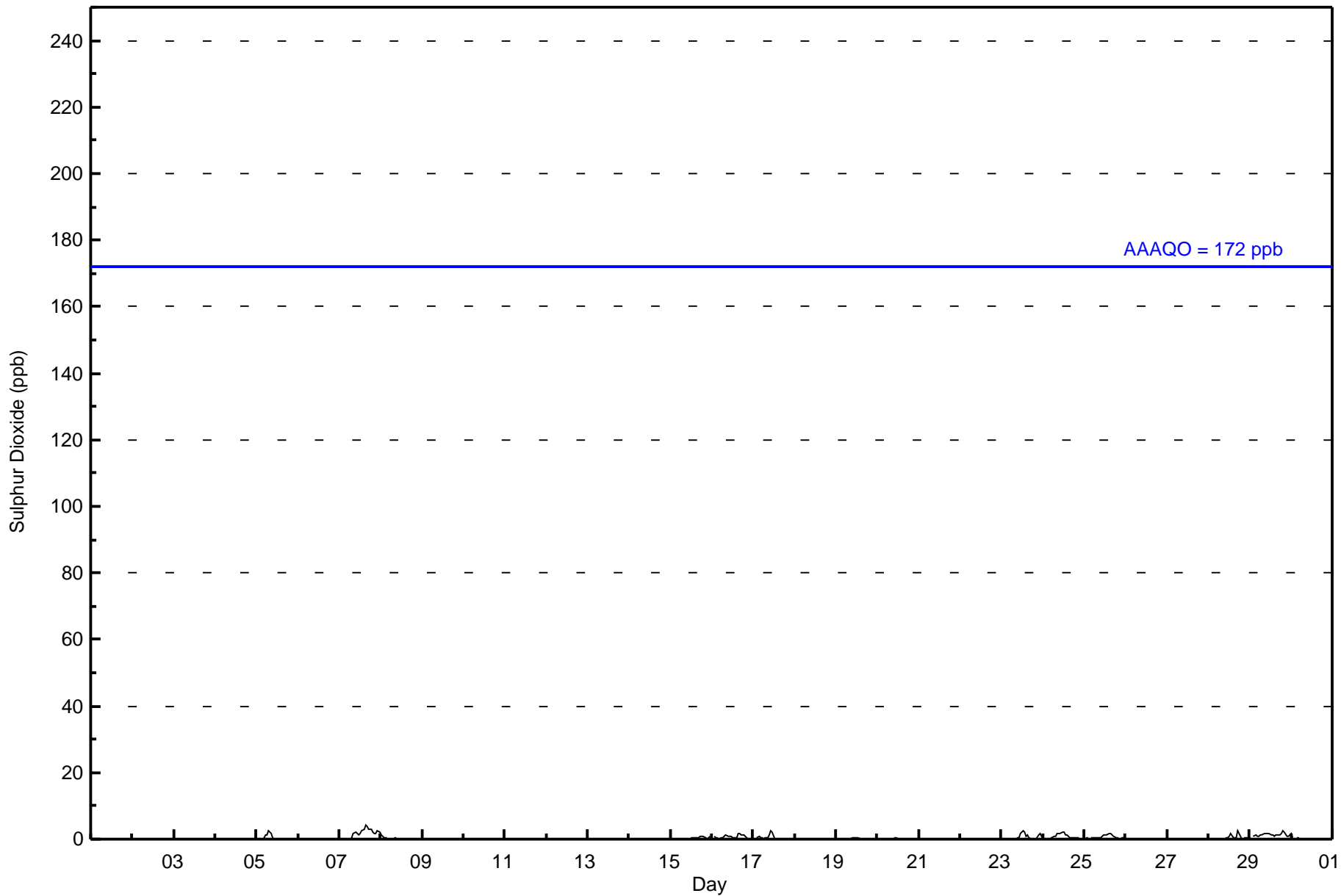
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average | |
| 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | Diurnal Maximum | | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 684 | 100.00 | 100.00 |
| 11 - 20 | 0 | 0.00 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |

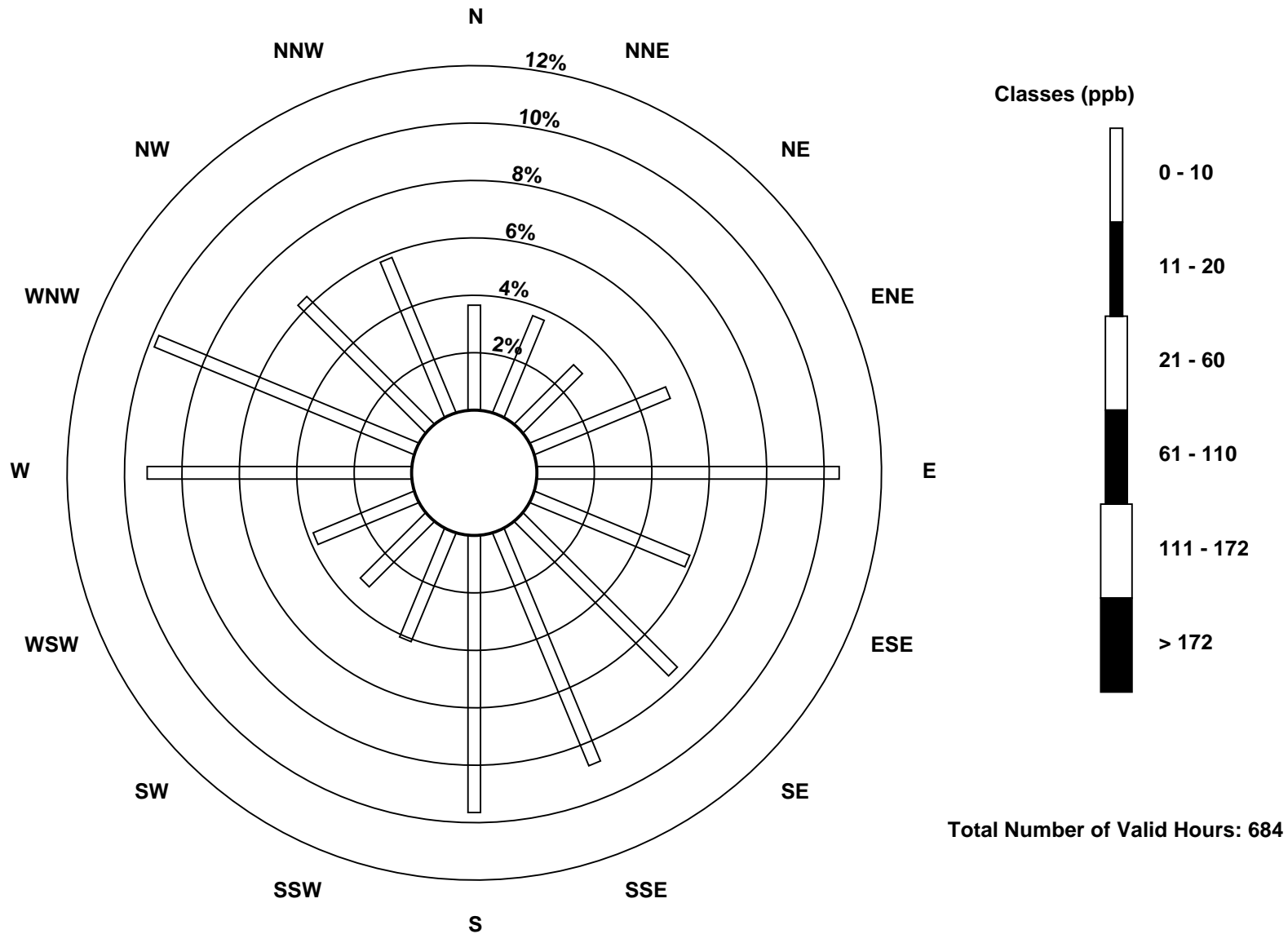
Total Number of Valid Hours: 684

Total Number of Hours: 720

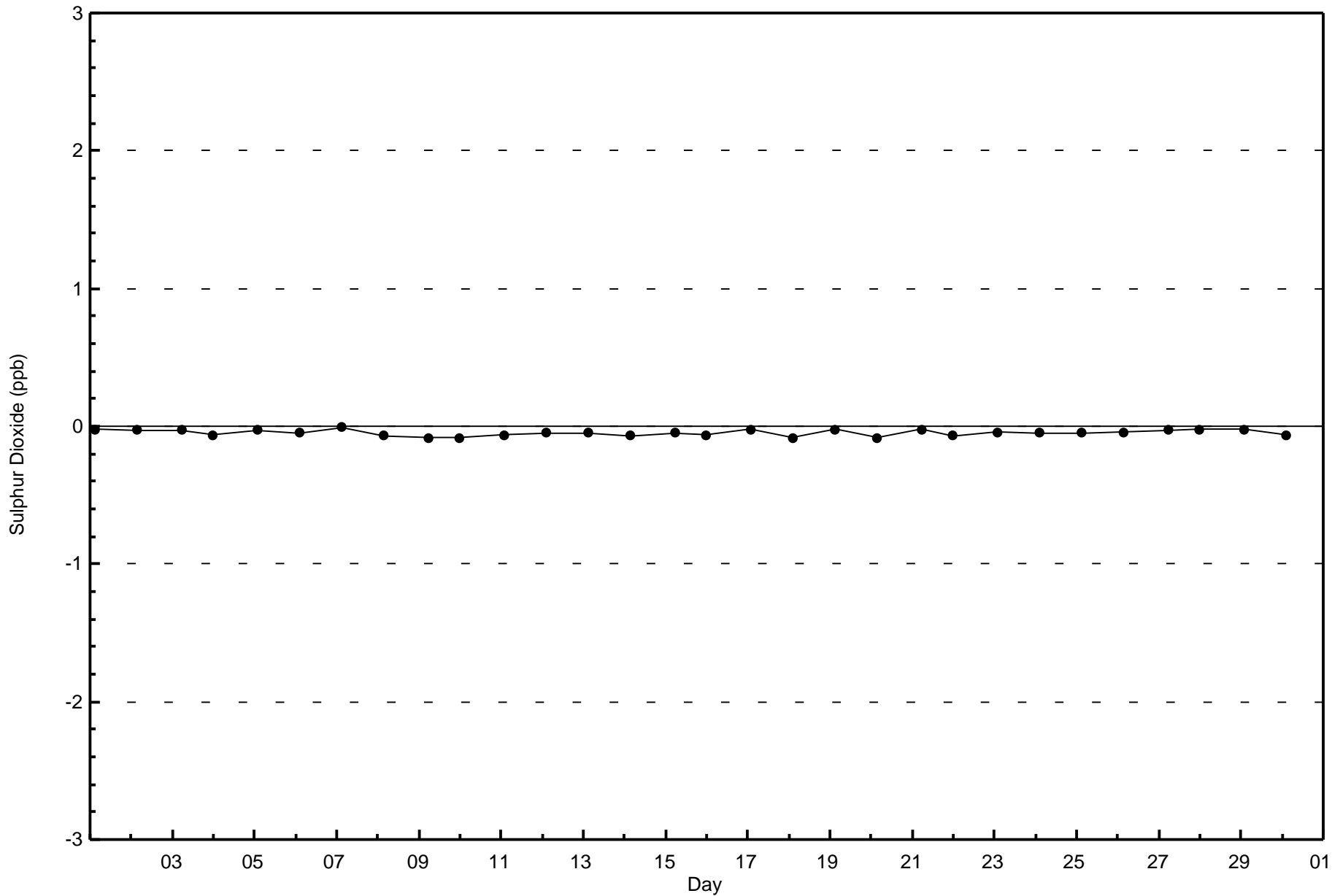


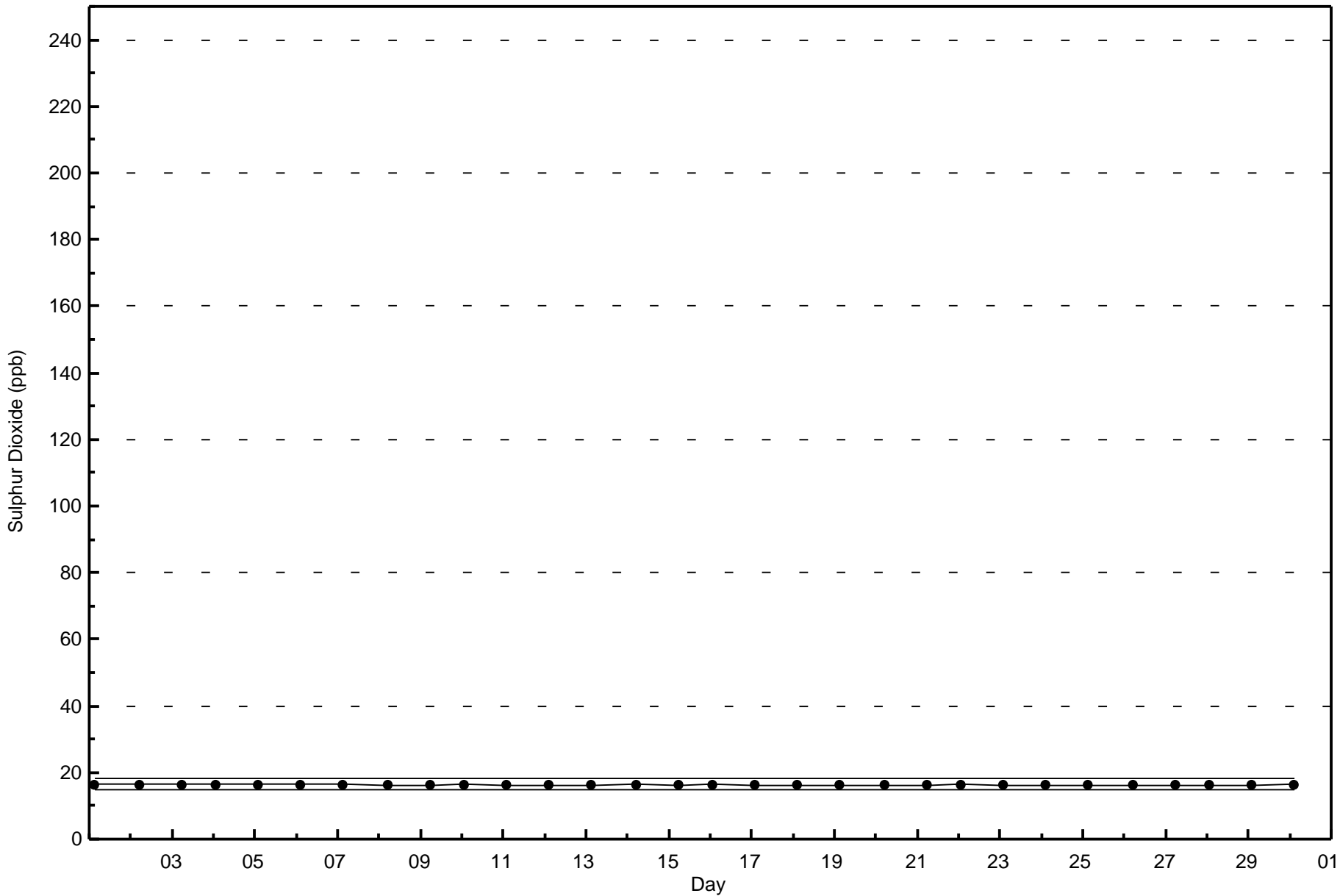
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 684





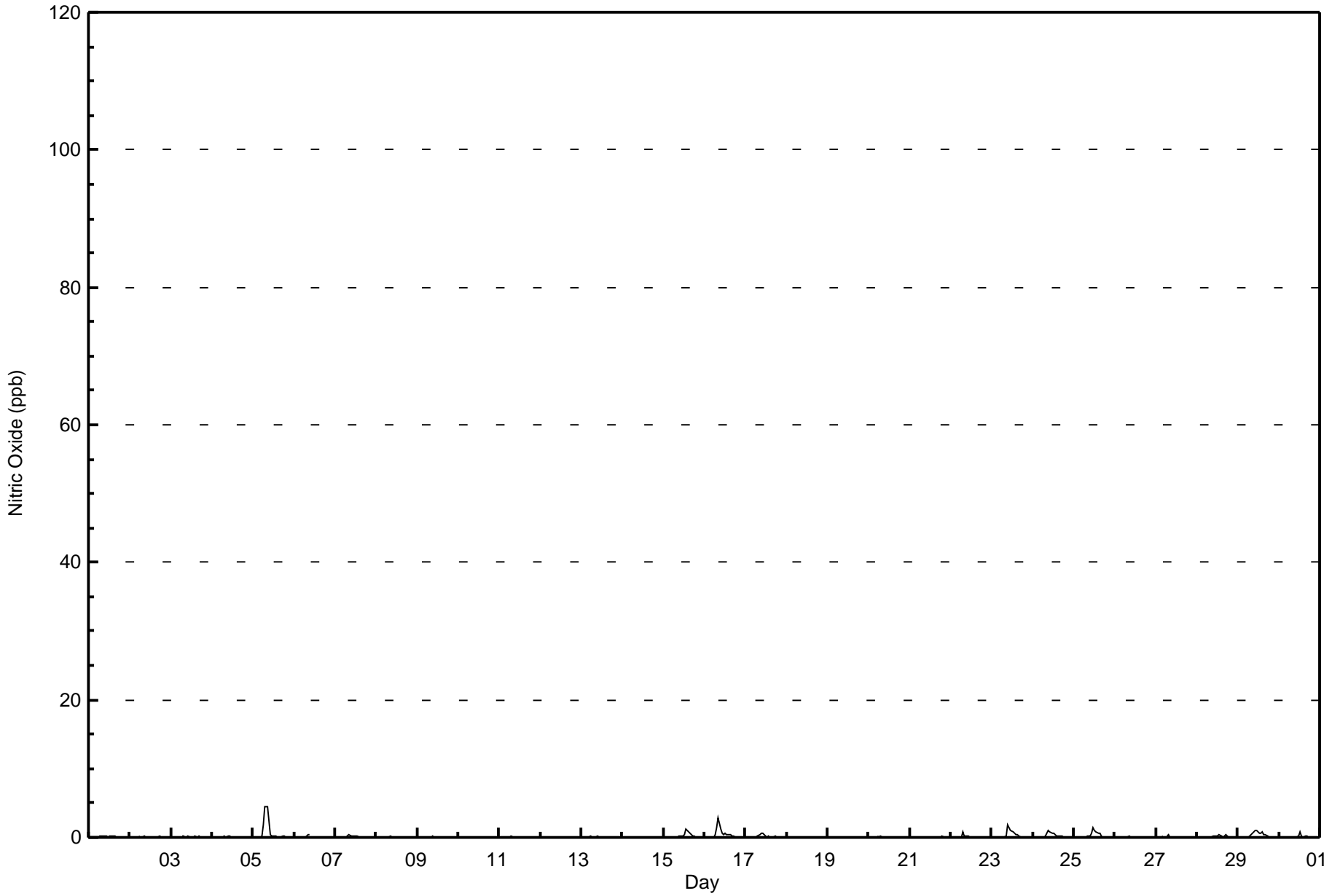


| Maximum Value: 5 ppb on Sep 5 09:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 0.7 ppb on Sep 5 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|--|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|----|----|----|----|----|----|-----------------|---------------|---------------|---|--|--|--|--|--|--|---------------------------------|--|--|--|
| Minimum Value: 0 ppb on Sep 7 01:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 18 | | | | | | | | | | | | | | | | | Hours of Data: 684 | | | |
| Maximum Diurnal Average: 0.4 ppb at hour 9 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.0 ppb at hour 22 | | | | | | | | | | | | | | | | | Hours of Missing Data: 36 | | | |
| 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 = 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-Sep | 0 | 0 | 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-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 2 | 4 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 5 | | | | | | | | | | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 | | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | | |
| 10-Sep | Z | 0 | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 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-Sep | 0 | 0 | Z | 0 | 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-Sep | 0 | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | | |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | | | | | | | | | | |
| 17-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | |
| 18-Sep | 0 | 0 | Z | 0 | 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-Sep | 0 | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | | |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | | | | | | | | | | |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | | |
| 28-Sep | Z | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 684 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |

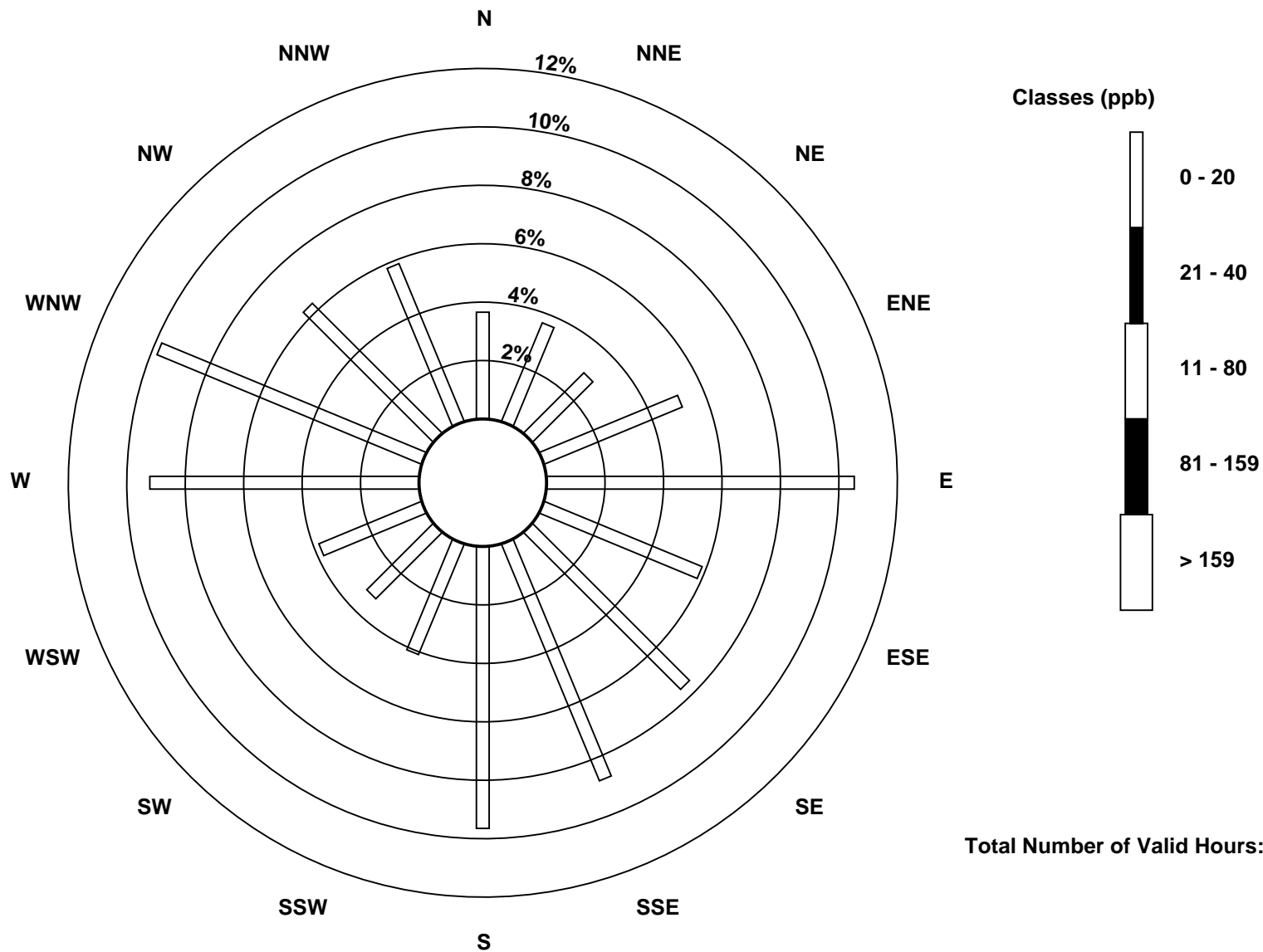
Total Number of Valid Hours: 684

Total Number of Hours: 720

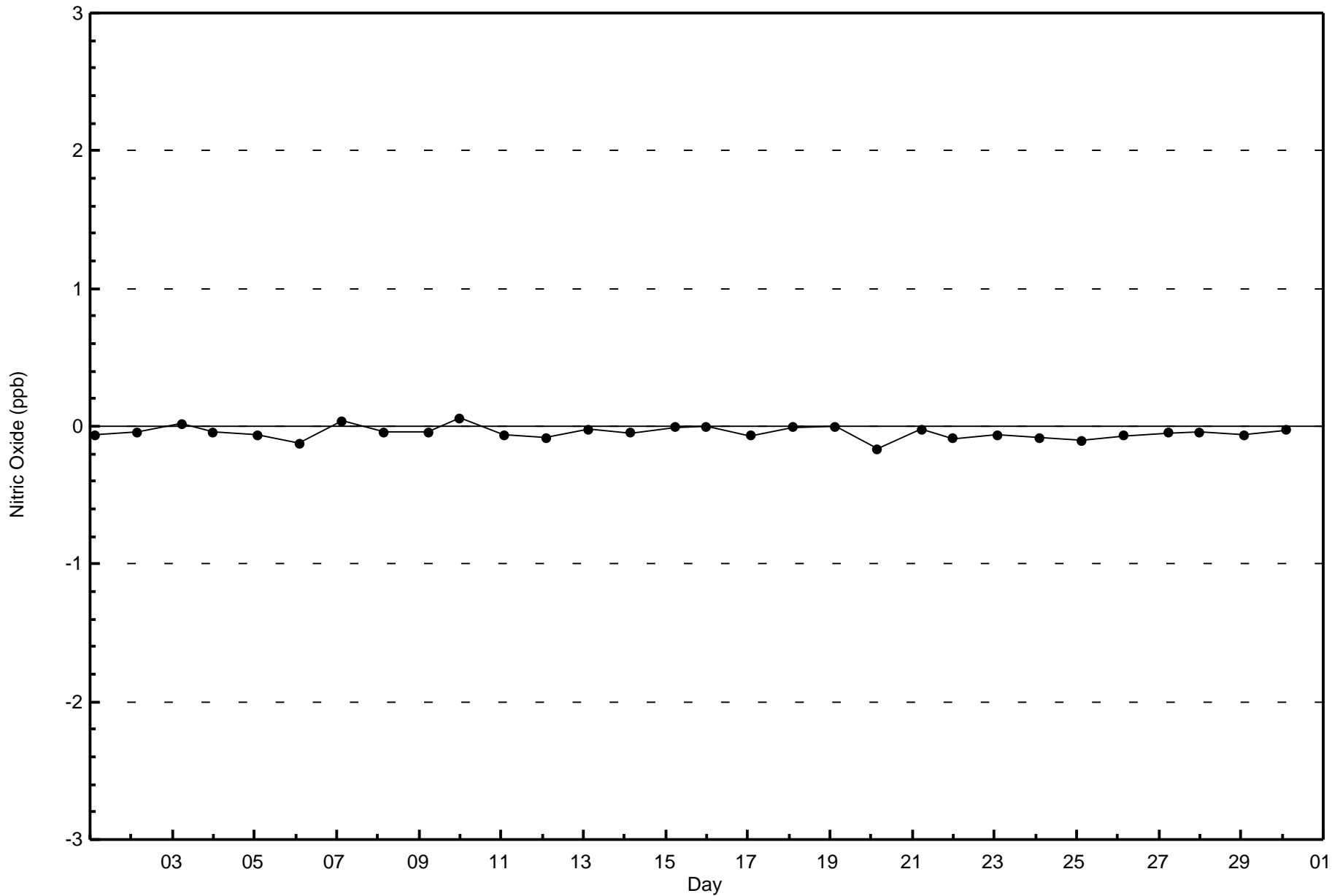


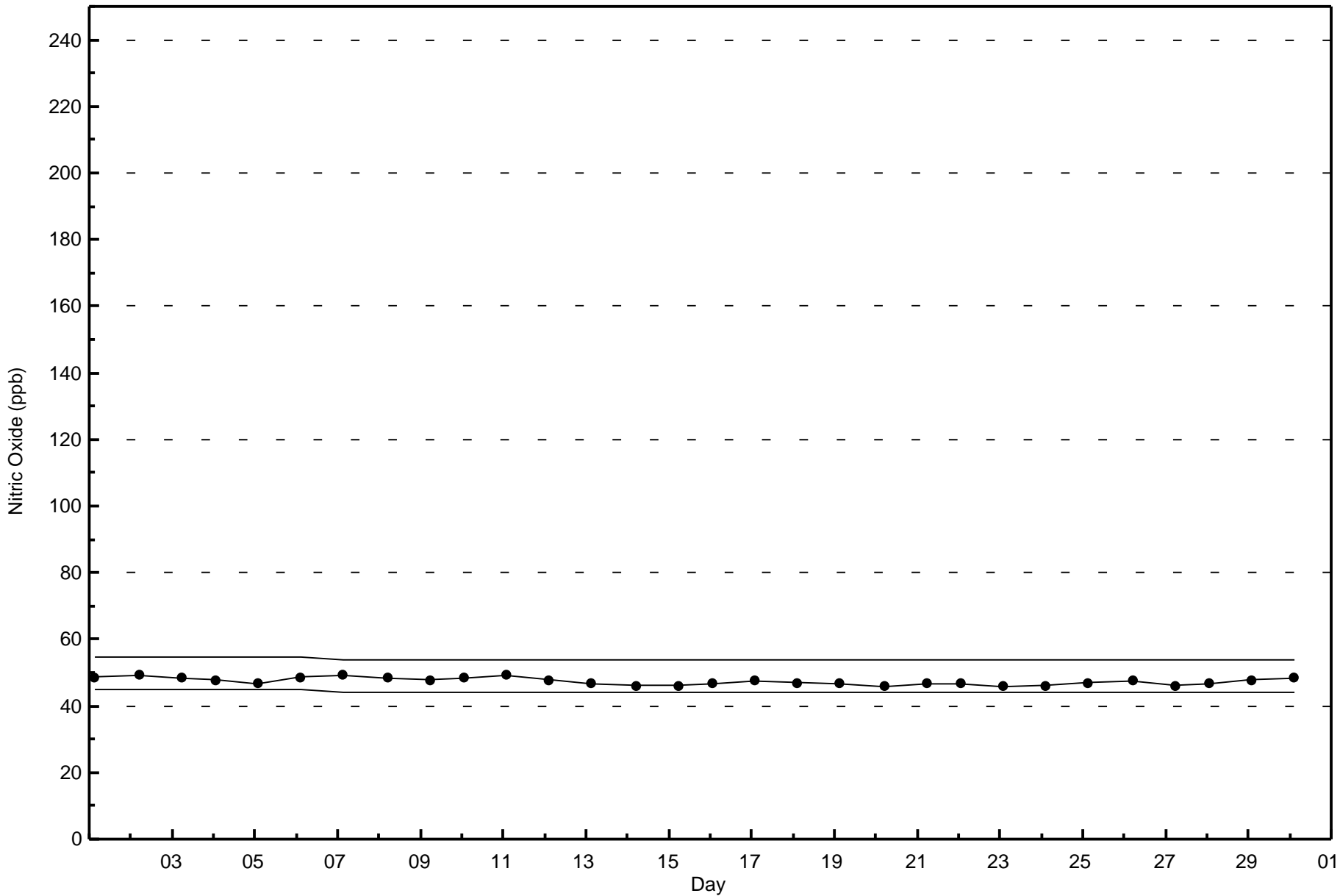
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 684







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort Chipewyan - September 2017

| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 9 ppb on Sep 5 07:00 | Maximum Daily Average: 3.1 ppb on Sep 29 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 1 02:00 | Minimum Daily Average: 0.1 ppb on Sep 3 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 1.0 ppb at hour 8 | Minimum Diurnal Average: 0.4 ppb at hour 2 | | Hours of Calibration: | 36 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 6 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 2-Sep | 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 |
| 3-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.1 | 1 |
| 5-Sep | 0 | Z | 0 | 1 | 4 | 8 | 9 | 8 | 7 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2.0 | 9 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 |
| 7-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1.3 | 3 |
| 8-Sep | 2 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 10-Sep | 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 |
| 11-Sep | 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 |
| 12-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0.2 | 1 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 0.9 | 2 | |
| 16-Sep | Z | 4 | 5 | 6 | 6 | 6 | 5 | 5 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2.6 | 6 |
| 17-Sep | 1 | Z | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.9 | 2 |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0.2 | 1 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0.2 | 1 |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 2 | 0.9 | 2 |
| 24-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 1.1 | 2 |
| 25-Sep | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 |
| 26-Sep | 1 | 0 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 27-Sep | 0 | 0 | 0 | 2 | 4 | Z | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.7 | 4 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 5 | 3 | 1 | 1 | 1 | 1 | 2 | 0.9 | 5 |
| 29-Sep | 3 | Z | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 3.1 | 5 |
| 30-Sep | 2 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |

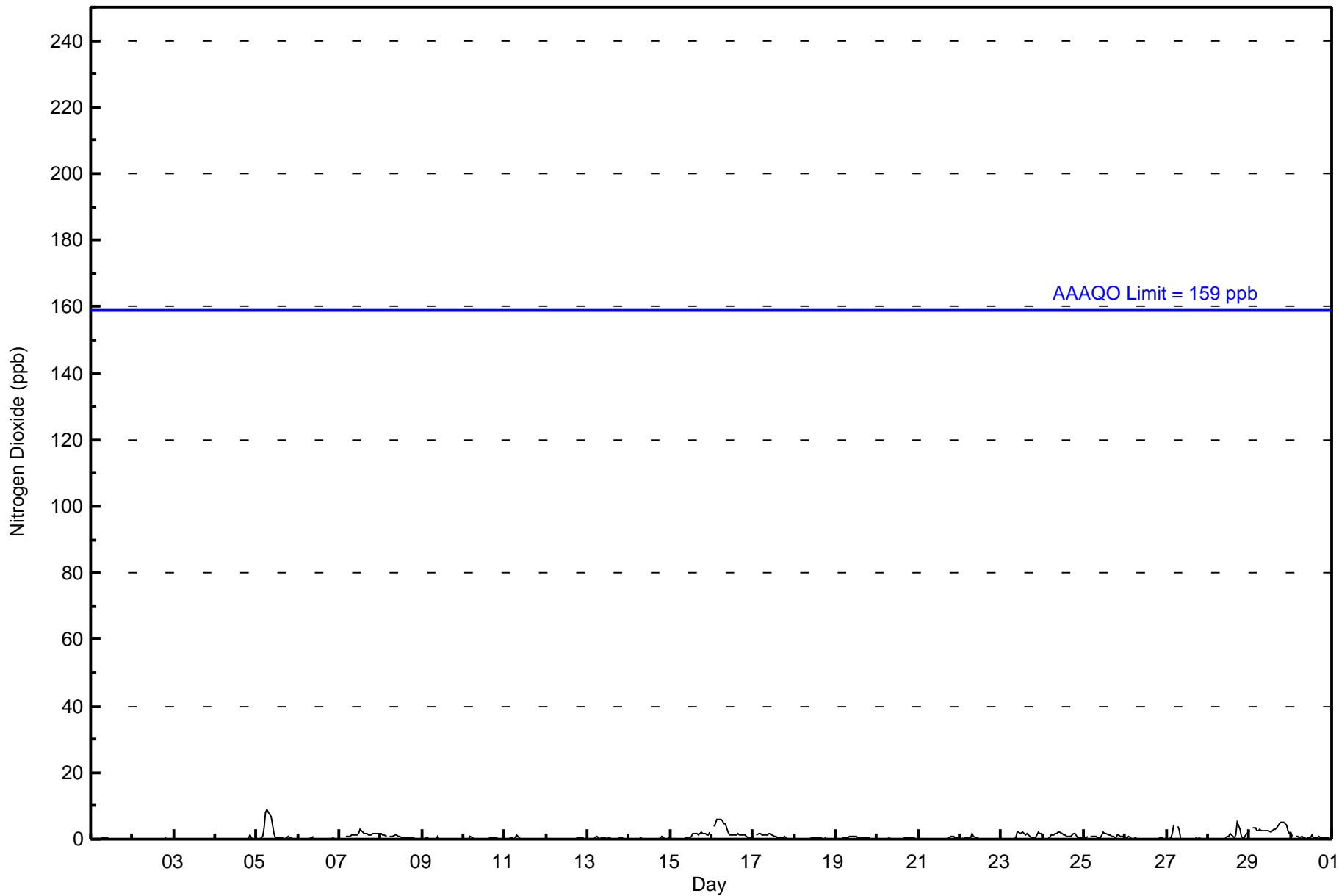
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.4 | 0.4 | 0.6 | 0.7 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 | 0.7 | 0.7 | 0.6 | 0.6 | 0.5 | 0.7 | 0.7 | 0.7 | 0.6 | 0.5 | 0.4 | 0.5 | Diurnal Average | |
| 3 | 4 | 5 | 6 | 6 | 8 | 9 | 8 | 7 | 4 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 684 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |

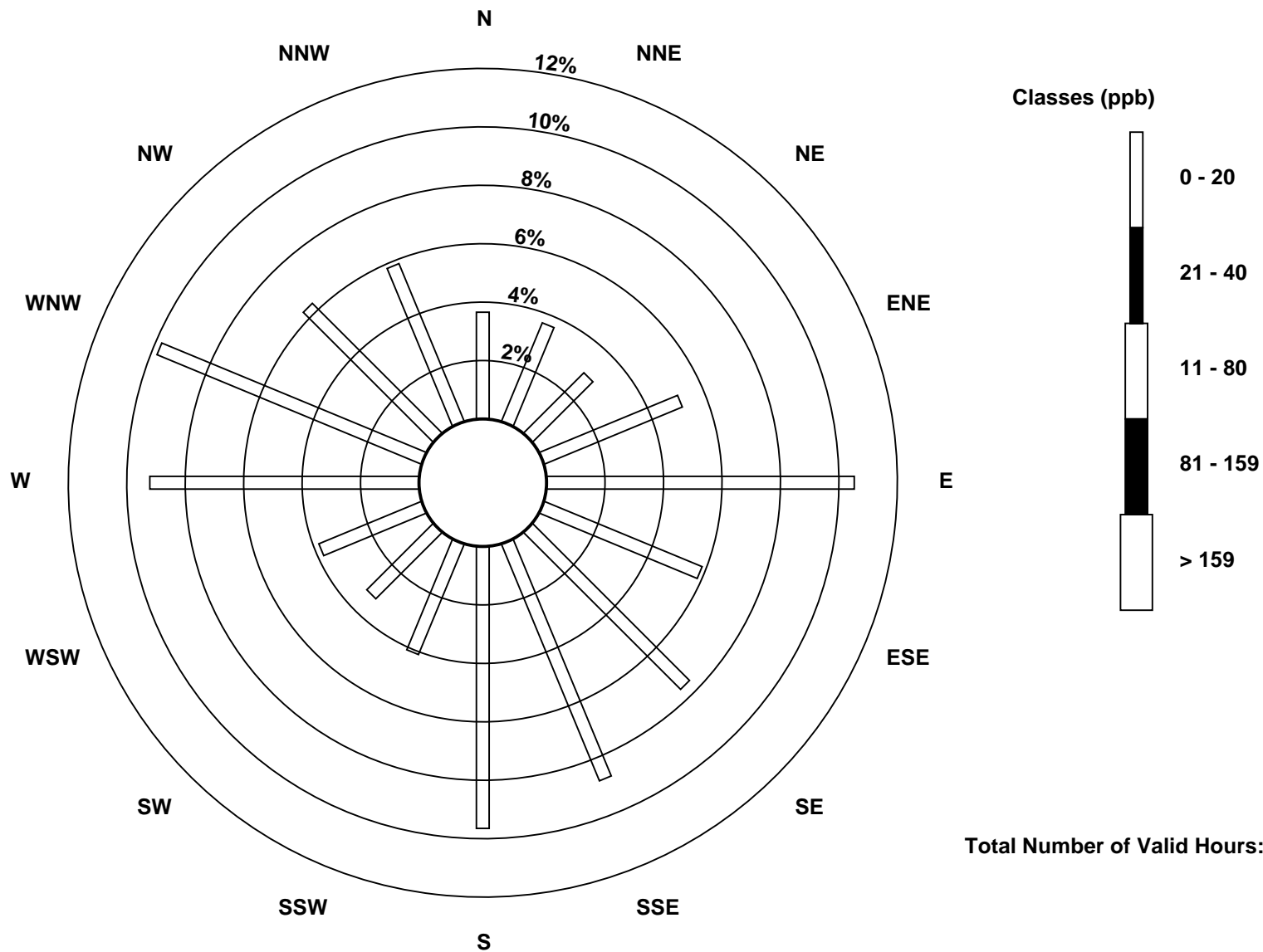
Total Number of Valid Hours: 684

Total Number of Hours: 720

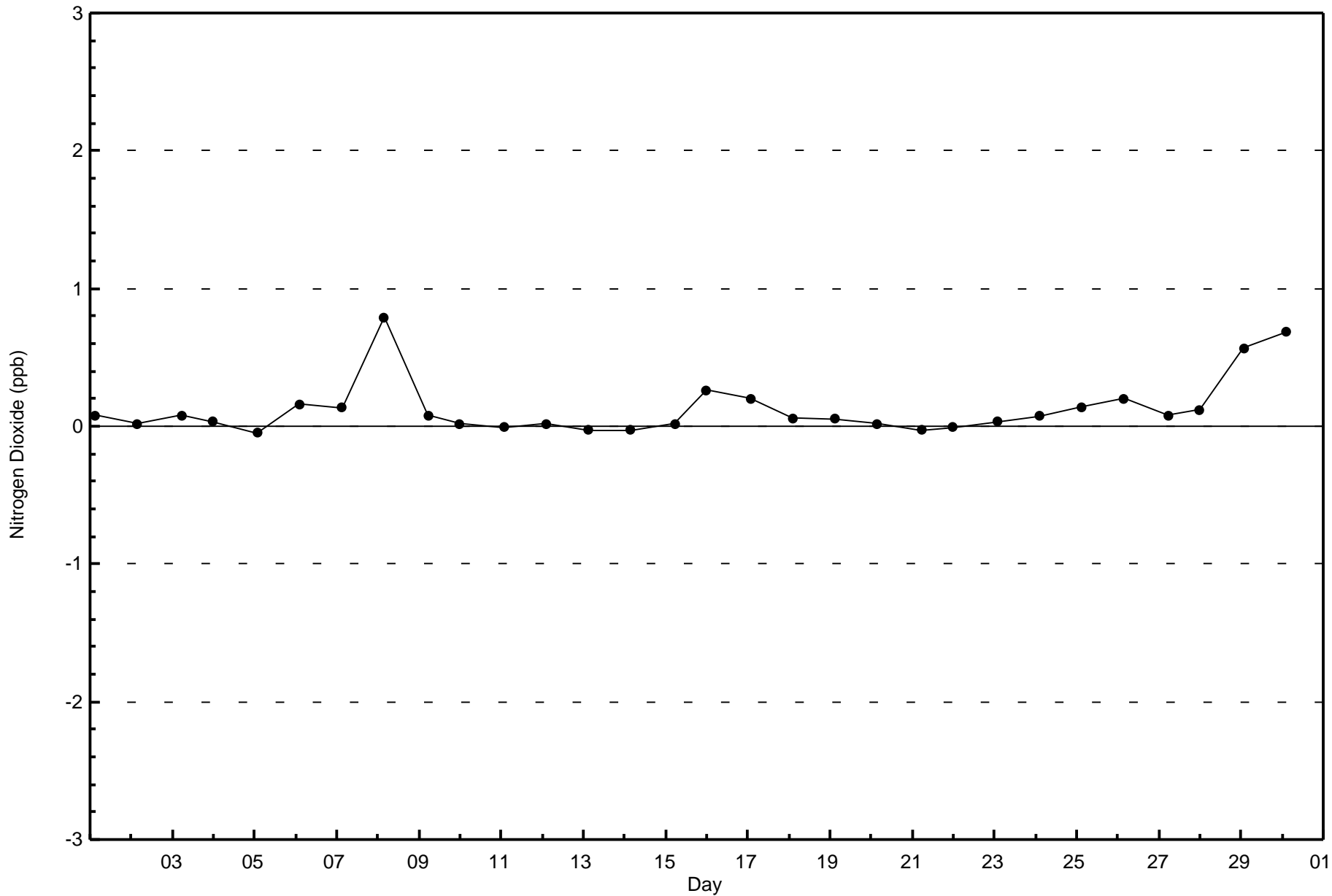


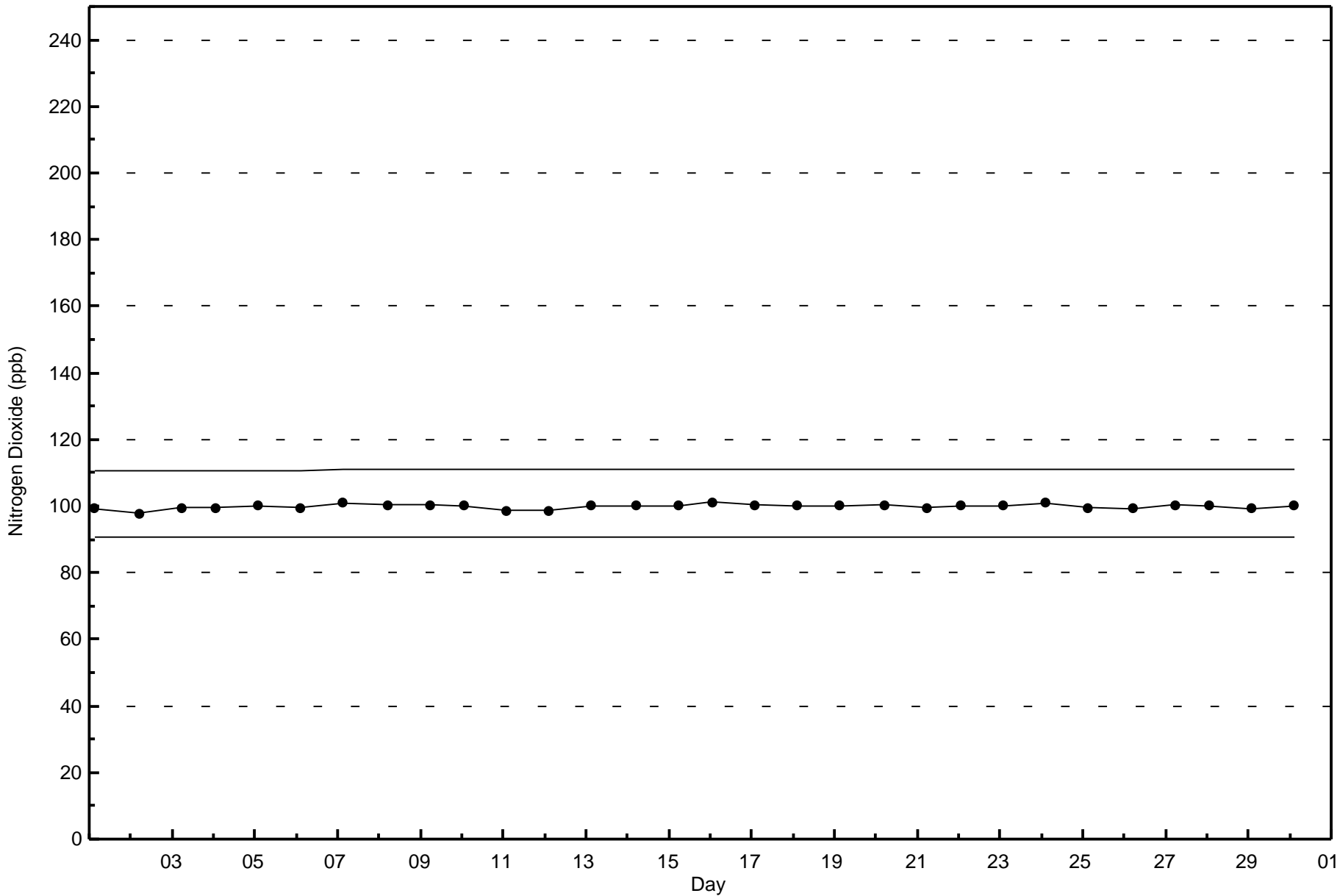
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 684







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

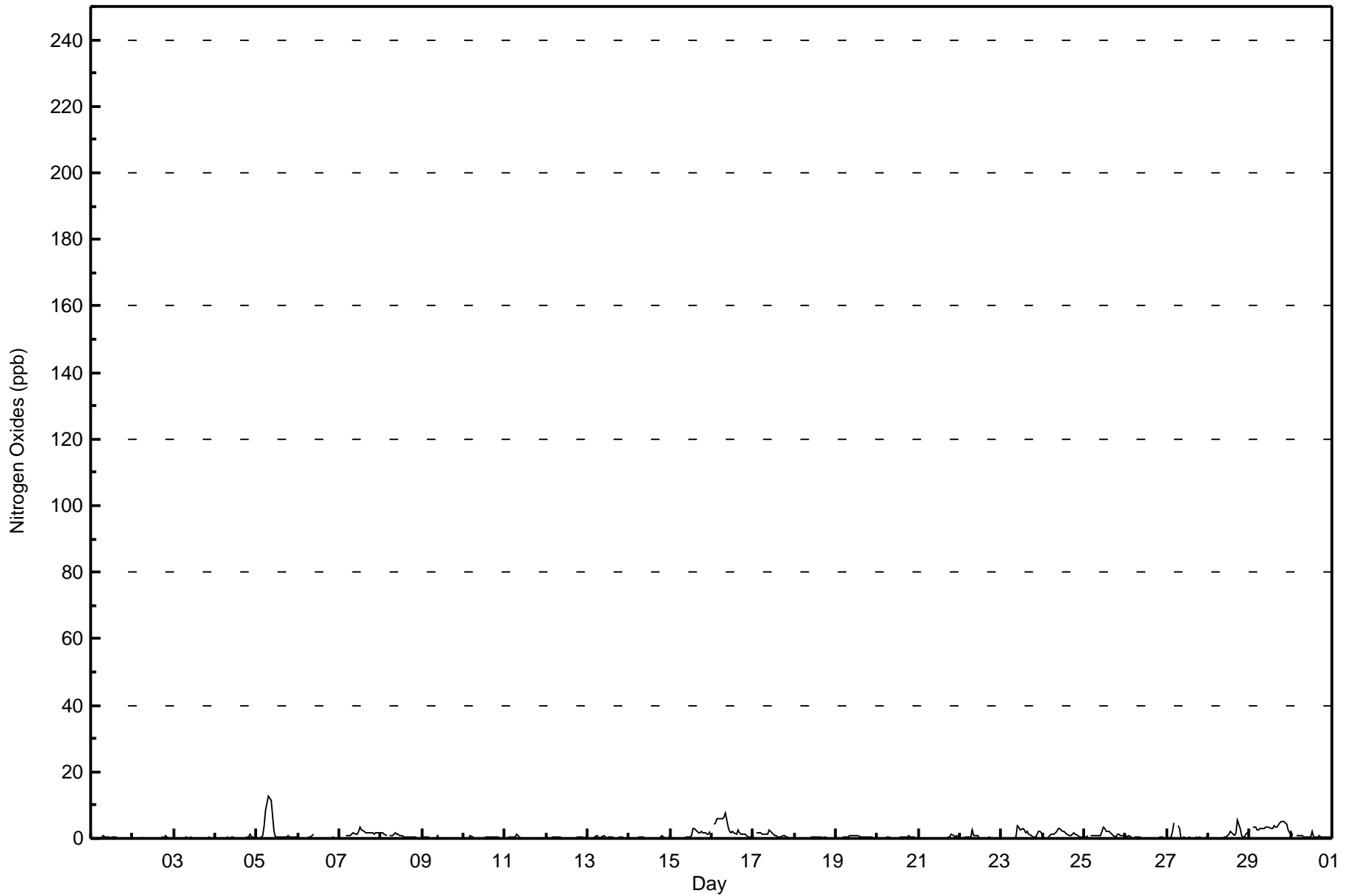
Fort Chipewyan - September 2017

| Maximum Value: 13 ppb on Sep 5 08:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 3.4 ppb on Sep 29 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--|-------------------------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|--|----|----|----|----|----|----|------------------------------|---------------|---------------|---|--|--|--|--|--|--|---------------------------|--|
| Minimum Value: 0 ppb on Sep 7 01:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.2 ppb on Sep 9 | | | | | | | | | | | | | | | | | Hours of Data: 684 | |
| Maximum Diurnal Average: 1.3 ppb at hour 8 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.4 ppb at hour 2 | | | | | | | | | | | | | | | | | Hours of Missing Data: 36 | |
| 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 | | | | | | | | | | | | | | | | | 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-Sep | 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 | | | | | | | | | |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 3-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 5-Sep | 0 | Z | 0 | 1 | 4 | 8 | 10 | 13 | 11 | 7 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2.7 | 13 | | | | | | | | | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1.4 | 3 | | | | | | | | | |
| 8-Sep | 2 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 | | | | | | | | | |
| 9-Sep | 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 | | | | | | | | | |
| 10-Sep | 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 | | | | | | | | | |
| 11-Sep | 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 | | | | | | | | | |
| 12-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1.1 | 3 | | | | | | | | |
| 16-Sep | Z | 4 | 5 | 6 | 6 | 6 | 6 | 8 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 3.0 | 8 | | | | | | | | | |
| 17-Sep | 1 | Z | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1.0 | 2 | | | | | | | | | |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | | | | | | | |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0.3 | 1 | | | | | | | | | |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | | | | | | | | | |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 1 | 1.3 | 4 | | | | | | | | | |
| 24-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1.3 | 3 | | | | | | | | | |
| 25-Sep | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.2 | 4 | | | | | | | | | |
| 26-Sep | 1 | 0 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 27-Sep | 0 | 0 | 0 | 2 | 5 | Z | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.7 | 5 | | | | | | | | | |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 5 | 3 | 1 | 1 | 1 | 1 | 2 | 1.0 | 5 | | | | | | | | | |
| 29-Sep | 3 | Z | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 3.4 | 5 | | | | | | | | |
| 30-Sep | 2 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 684 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 25 | 20 | 35 | 72 | 40 | 52 | 60 | 66 | 28 | 22 | 26 | 63 | 67 | 43 | 40 | 684 |

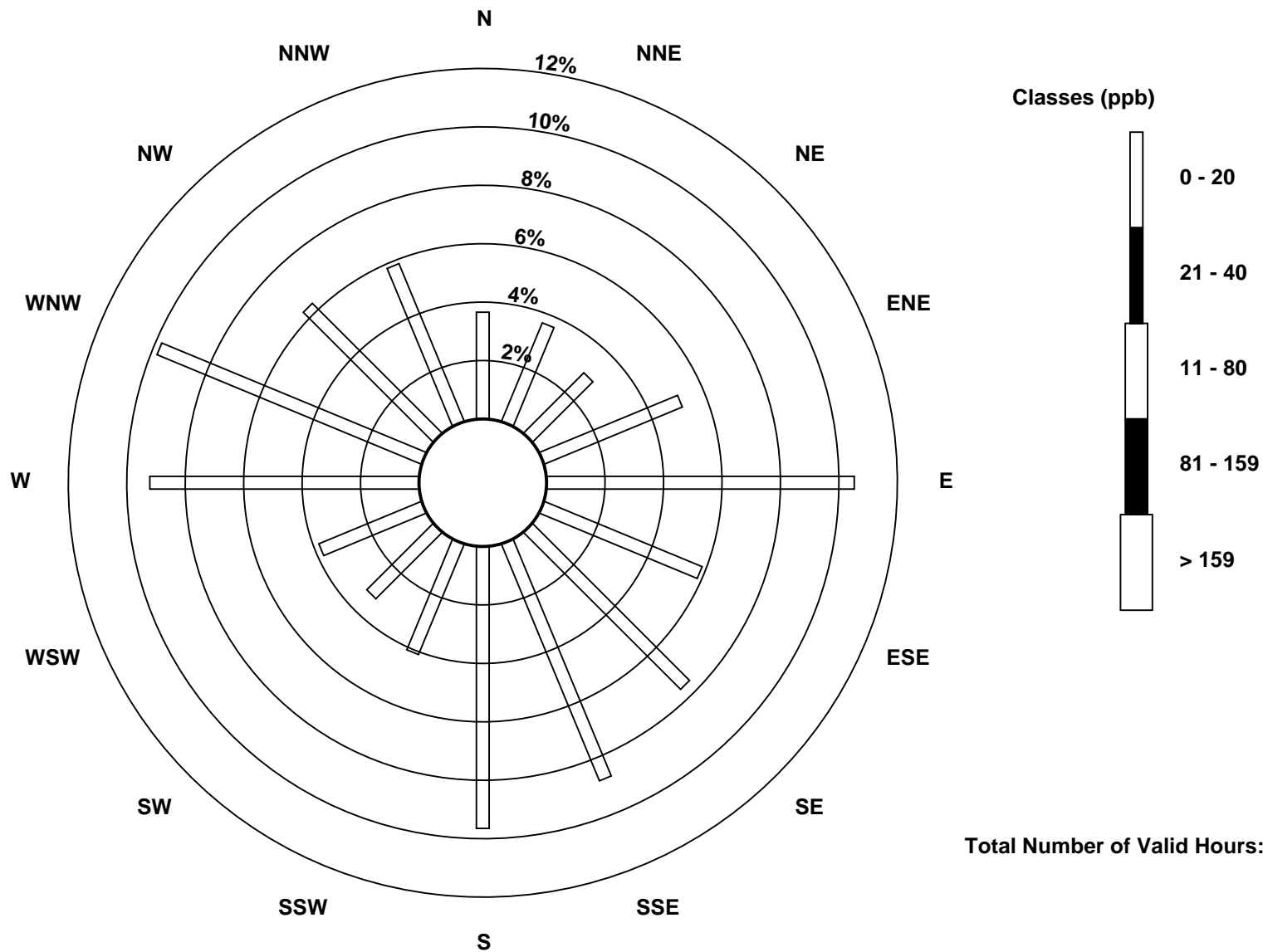
Total Number of Valid Hours: 684

Total Number of Hours: 720

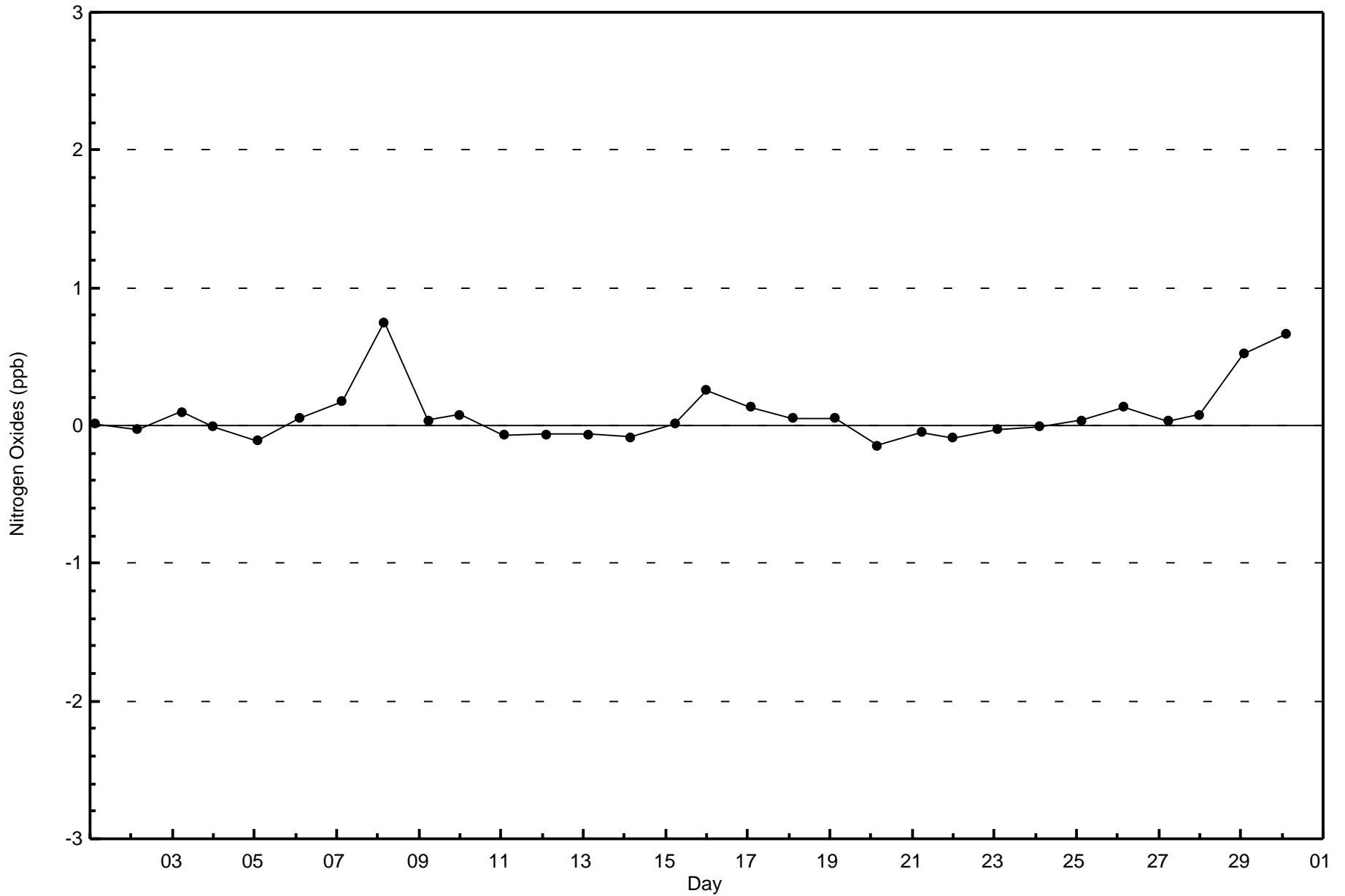


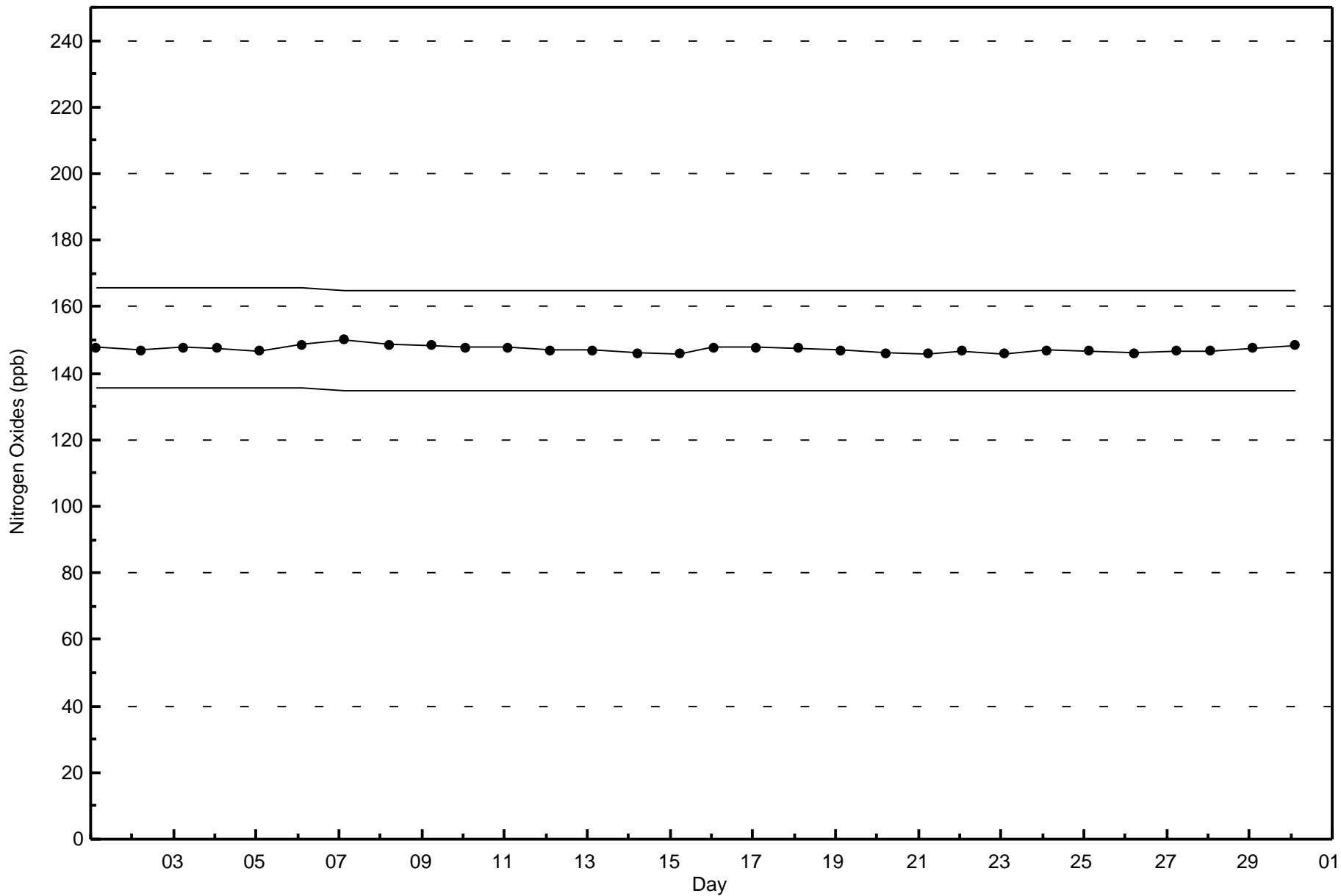
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 684







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort Chipewyan - September 2017

| | | | | |
|--|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 72 ppb on Sep 7 14:00 | Maximum Daily Average: 51.6 ppb on Sep 7 | | Hours of Data: | 687 |
| Minimum Value: 8 ppb on Sep 11 04:00 | Minimum Daily Average: 18.4 ppb on Sep 10 | | Hours of Missing Data: | 33 |
| Maximum Diurnal Average: 31.1 ppb at hour 17 | Minimum Diurnal Average: 19.2 ppb at hour 7 | | Hours of Calibration: | 33 |
| Monthly Average: 25.5 ppb | Percentiles: P ₁ = 11 P ₁₀ = 16 Q ₁ = 20 Median = 25 Q ₃ = 29 P ₉₀ = 34 P ₉₉ = 66 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 28 | 27 | 26 | 26 | 26 | 27 | Z | 29 | 30 | 31 | 31 | 31 | 32 | 33 | 34 | 33 | 32 | 30 | 29 | 27 | 30 | 29 | 28 | 28 | 29.4 | 34 |
| 2-Sep | 25 | 25 | 26 | 23 | 19 | 16 | 14 | Z | 13 | 13 | 13 | 15 | 19 | 23 | 27 | 27 | 26 | 23 | 23 | 19 | 20 | 23 | 25 | 21 | 20.7 | 27 |
| 3-Sep | 19 | 17 | 17 | 18 | 18 | 17 | 16 | 17 | Z | 20 | 21 | 22 | 22 | 23 | 25 | 24 | 29 | 30 | 26 | 25 | 22 | 21 | 19 | 18 | 21.0 | 30 |
| 4-Sep | 20 | 18 | 16 | Z | 15 | 15 | 14 | 14 | 16 | 18 | 24 | 26 | 26 | 26 | 25 | 25 | 25 | 24 | 22 | 22 | 21 | 21 | 23 | 23 | 20.9 | 26 |
| 5-Sep | 23 | 23 | 22 | 22 | Z | 13 | 12 | 13 | 17 | 24 | 32 | 35 | 34 | 34 | 38 | 38 | 38 | 35 | 34 | 34 | 27 | 25 | 26 | 26 | 27.3 | 38 |
| 6-Sep | 25 | 20 | 19 | 19 | 19 | Z | 17 | 14 | 16 | 23 | 25 | 23 | 23 | 23 | 26 | 30 | 34 | 34 | 32 | 32 | 32 | 31 | 35 | 35 | 25.6 | 35 |
| 7-Sep | 31 | 29 | 28 | 29 | 27 | 26 | Z | C | C | C | 41 | 56 | 66 | 72 | 71 | 70 | 69 | 68 | 68 | 65 | 60 | 55 | 53 | 51 | 51.6 | 72 |
| 8-Sep | 48 | 44 | 41 | 41 | 40 | 38 | 34 | Z | 29 | 27 | 27 | 32 | 31 | 33 | 32 | 31 | 31 | 30 | 27 | 25 | 29 | 31 | 32 | 29 | 33.2 | 48 |
| 9-Sep | 26 | 22 | 20 | 18 | 17 | 22 | 26 | 23 | Z | 36 | 34 | 28 | 28 | 29 | 30 | 29 | 28 | 28 | 30 | 31 | 30 | 28 | 27 | 29 | 26.8 | 36 |
| 10-Sep | 29 | 27 | 24 | Z | 14 | 13 | 14 | 16 | 16 | 20 | 20 | 20 | 22 | 18 | 18 | 17 | 21 | 21 | 18 | 20 | 20 | 12 | 12 | 11 | 18.4 | 29 |
| 11-Sep | 10 | 10 | 10 | 8 | Z | 9 | 14 | 19 | 26 | 26 | 27 | 27 | 28 | 24 | 23 | 25 | 28 | 29 | 29 | 30 | 31 | 32 | 31 | 29 | 22.8 | 32 |
| 12-Sep | 27 | 21 | 17 | 18 | 18 | Z | 20 | 28 | 32 | 32 | 31 | 31 | 32 | 32 | 32 | 33 | 32 | 30 | 28 | 25 | 23 | 21 | 18 | 13 | 25.7 | 33 |
| 13-Sep | 15 | 18 | 16 | 15 | 11 | 13 | Z | 19 | 23 | 22 | 18 | 21 | 20 | 23 | 23 | 22 | 26 | 27 | 28 | 25 | 24 | 24 | 23 | 21 | 20.8 | 28 |
| 14-Sep | 19 | 20 | 20 | 19 | 19 | 19 | 18 | Z | 21 | 23 | 21 | 20 | 21 | 20 | 19 | 19 | 18 | 20 | 18 | 18 | 21 | 24 | 24 | 24 | 20.1 | 24 |
| 15-Sep | 14 | 18 | 19 | 16 | 16 | 19 | 17 | 17 | Z | 20 | 20 | 23 | 24 | 24 | 26 | 28 | 30 | 31 | 26 | 27 | 26 | 23 | 22 | 21 | 22.1 | 31 |
| 16-Sep | 19 | 18 | 16 | Z | 13 | 13 | 15 | 17 | 19 | 25 | 29 | 33 | 34 | 36 | 37 | 37 | 39 | 37 | 36 | 34 | 32 | 31 | 30 | 30 | 27.4 | 39 |
| 17-Sep | 28 | 27 | 27 | 26 | Z | 24 | 23 | 23 | 23 | 23 | 26 | 31 | 34 | 37 | 39 | 39 | 38 | 37 | 35 | 32 | 30 | 27 | 26 | 25 | 29.6 | 39 |
| 18-Sep | 25 | 24 | 23 | 22 | 21 | Z | 22 | 22 | 22 | 24 | 27 | 32 | 34 | 34 | 34 | 35 | 35 | 35 | 34 | 33 | 32 | 31 | 31 | 30 | 28.7 | 35 |
| 19-Sep | 28 | 27 | 28 | 26 | 24 | 25 | Z | 25 | 25 | 27 | 29 | 30 | 31 | 31 | 31 | 32 | 31 | 30 | 30 | 30 | 30 | 28 | 28 | 29 | 28.6 | 32 |
| 20-Sep | 30 | 31 | 29 | 27 | 28 | 28 | 27 | Z | 29 | 28 | 28 | 29 | 30 | 30 | 30 | 28 | 27 | 27 | 27 | 28 | 27 | 28 | 28 | 28 | 28.3 | 31 |
| 21-Sep | 29 | 29 | 29 | 29 | 28 | 28 | 27 | 25 | Z | 26 | 26 | 27 | 28 | 28 | 28 | 29 | 28 | 26 | 26 | 22 | 21 | 21 | 18 | 17 | 26.0 | 29 |
| 22-Sep | 17 | 14 | 13 | Z | 17 | 16 | 14 | 13 | 15 | 16 | 20 | 25 | 29 | 28 | 27 | 27 | 27 | 26 | 26 | 25 | 22 | 22 | 21 | 23 | 21.0 | 29 |
| 23-Sep | 22 | 20 | 21 | 21 | Z | 21 | 20 | 18 | 16 | 16 | 22 | 26 | 28 | 31 | 32 | 33 | 32 | 31 | 29 | 27 | 26 | 25 | 24 | 23 | 24.6 | 33 |
| 24-Sep | 21 | 20 | 21 | 20 | 19 | Z | 17 | 18 | 17 | 17 | 18 | 22 | 24 | 28 | 34 | 36 | 34 | 34 | 29 | 27 | 25 | 23 | 22 | 20 | 23.7 | 36 |
| 25-Sep | 20 | 21 | 20 | 18 | 18 | 17 | Z | 16 | 16 | 16 | 16 | 16 | 17 | 19 | 21 | 22 | 24 | 24 | 24 | 22 | 22 | 23 | 23 | 21 | 19.7 | 24 |
| 26-Sep | 18 | 21 | 20 | 15 | 14 | 18 | 18 | Z | 16 | 21 | 24 | 25 | 23 | 24 | 26 | 28 | 28 | 27 | 26 | 25 | 25 | 20 | 19 | 18 | 21.7 | 28 |
| 27-Sep | 17 | 16 | 15 | 11 | 11 | 15 | 15 | 15 | Z | 21 | 23 | 24 | 28 | 27 | 26 | 26 | 26 | 23 | 22 | 21 | 22 | 22 | 23 | 23 | 20.5 | 28 |
| 28-Sep | 20 | 20 | 19 | Z | 20 | 19 | 18 | 18 | 18 | 20 | 23 | 27 | 29 | 31 | 33 | 33 | 32 | 30 | 29 | 27 | 27 | 27 | 26 | 24 | 24.9 | 33 |
| 29-Sep | 23 | 22 | 22 | 24 | Z | 24 | 24 | 25 | 26 | 28 | 30 | 31 | 35 | 38 | 37 | 41 | 40 | 39 | 38 | 38 | 34 | 25 | 32 | 34 | 30.7 | 41 |
| 30-Sep | 33 | 33 | 32 | 30 | 28 | Z | 25 | 26 | 27 | 23 | 23 | 25 | 24 | 25 | 26 | 27 | 26 | 25 | 24 | 23 | 24 | 20 | 16 | 14 | 25.2 | 33 |

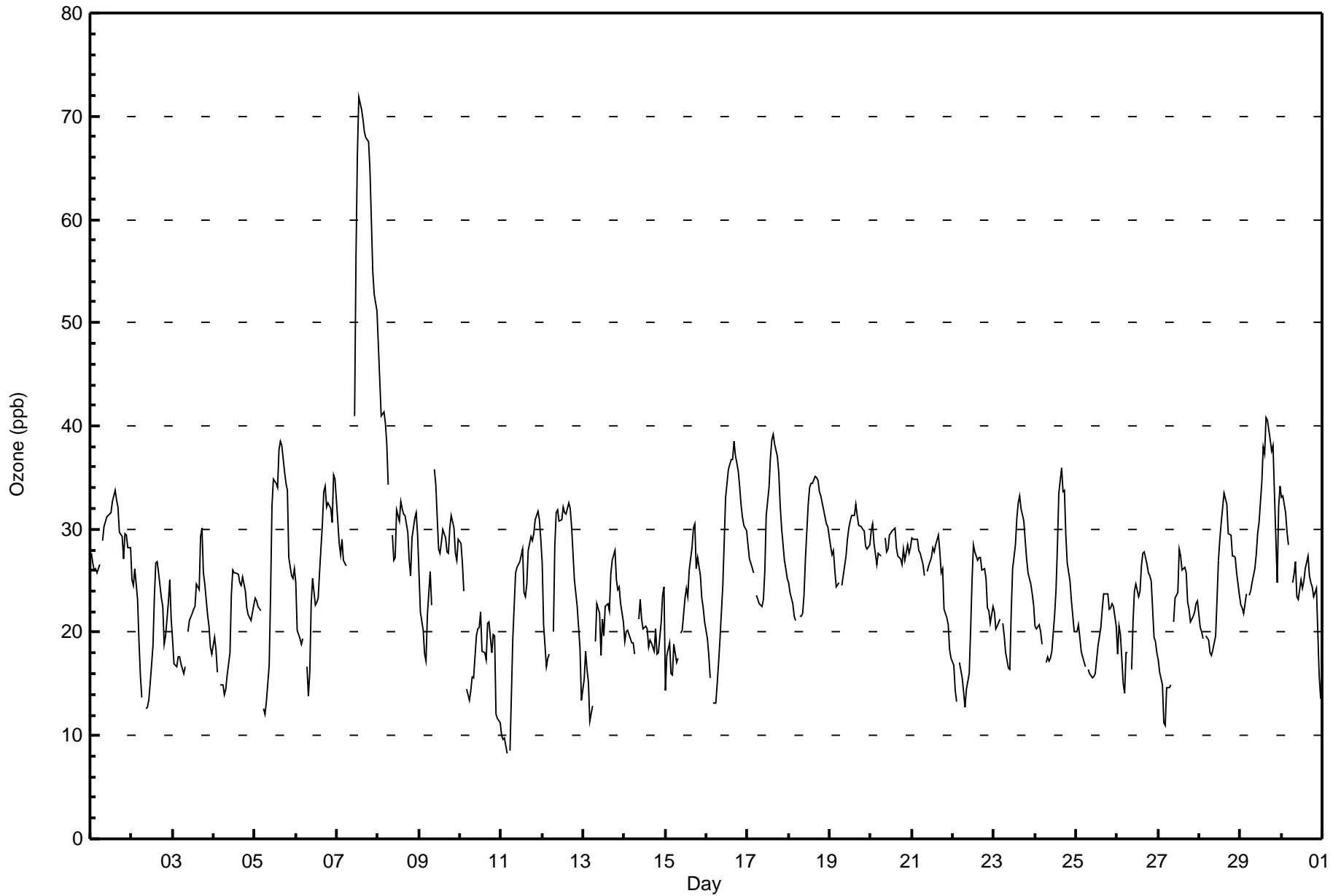
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 23.6 | 22.7 | 21.8 | 21.6 | 20.0 | 19.7 | 19.2 | 19.6 | 21.2 | 22.9 | 25.0 | 27.2 | 28.6 | 29.4 | 30.3 | 30.9 | 31.1 | 30.3 | 29.2 | 28.1 | 27.1 | 25.7 | 25.3 | 24.6 | Diurnal Average | |
| 48 | 44 | 41 | 41 | 40 | 38 | 34 | 29 | 32 | 36 | 41 | 56 | 66 | 72 | 71 | 70 | 69 | 68 | 68 | 65 | 60 | 55 | 53 | 51 | 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 - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 185 | 26.93 | 26.93 |
| 21 - 50 | 489 | 71.18 | 98.11 |
| 51 - 82 | 13 | 1.89 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Fort Chipewyan - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 6 | 6 | 1 | 6 | 13 | 7 | 13 | 5 | 9 | 9 | 8 | 6 | 21 | 36 | 21 | 18 | 185 |
| 21 - 50 | 20 | 18 | 18 | 30 | 65 | 34 | 34 | 58 | 47 | 19 | 10 | 22 | 43 | 25 | 24 | 22 | 489 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 13 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 24 | 19 | 36 | 78 | 41 | 47 | 63 | 64 | 29 | 22 | 28 | 64 | 61 | 45 | 40 | 687 |

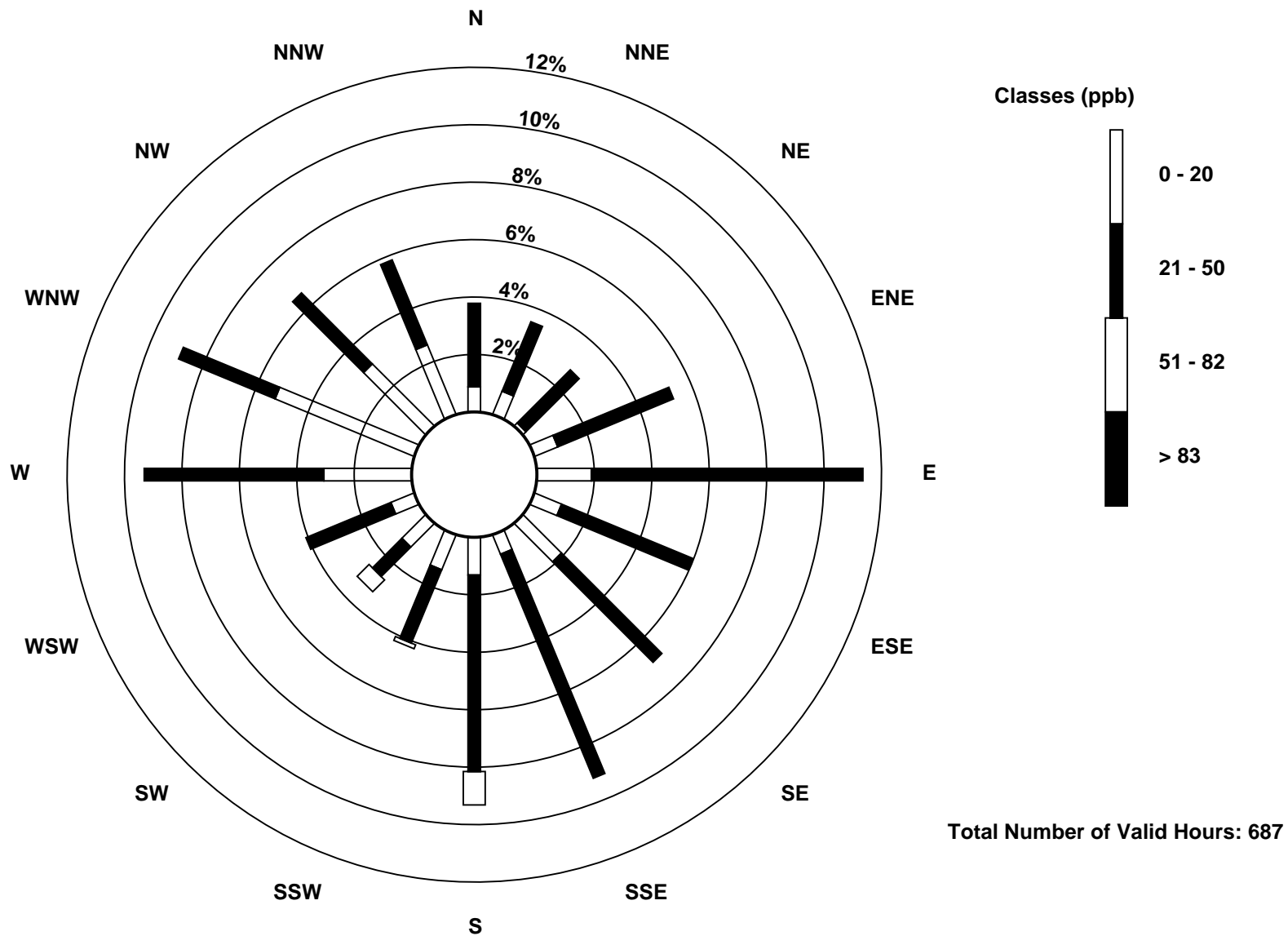
Total Number of Valid Hours: 687

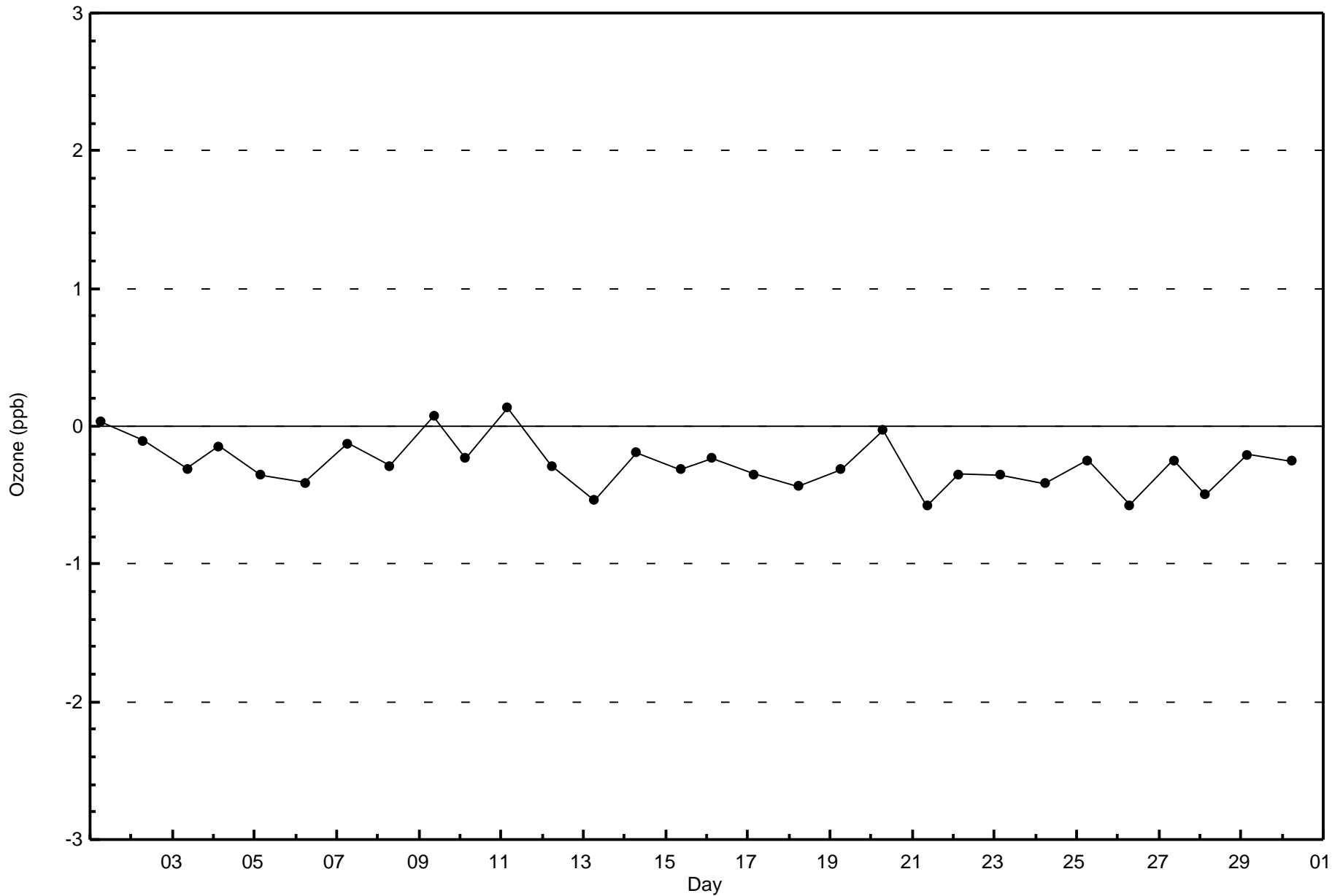
Total Number of Hours: 720

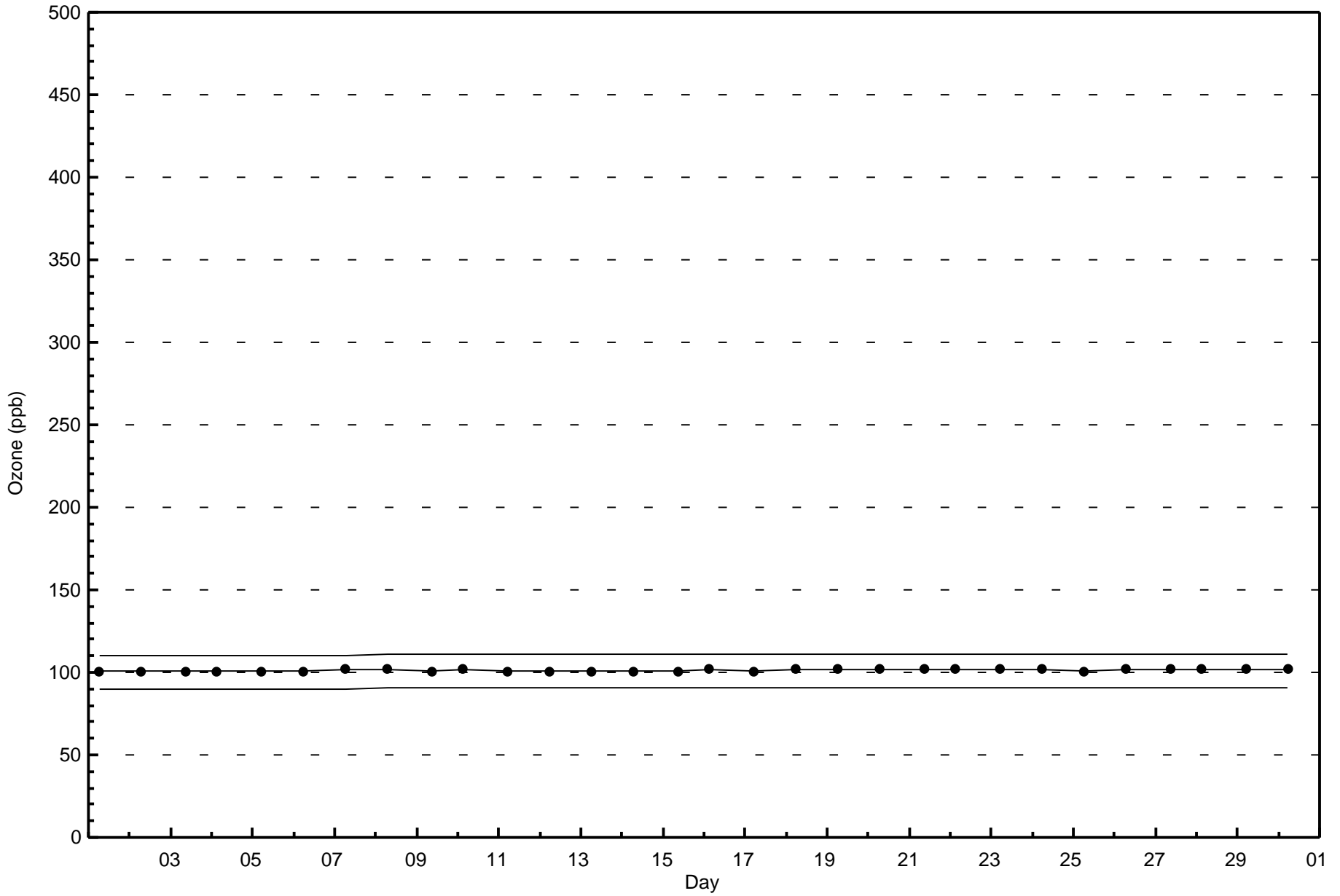


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Ozone (O₃) - ppb
Fort Chipewyan (AMS 8)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Chipewyan - September 2017

| | | | |
|--|--|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 75.9 µg/m ³ on Sep 19 08:00 | Maximum Daily Average: 10.9 µg/m ³ on Sep 19 | Hours of Data: | 711 |
| Minimum Value: 0.0 µg/m ³ on Sep 22 22:00 | Minimum Daily Average: 0.1 µg/m ³ on Sep 22 | Hours of Missing Data: | 9 |
| Maximum Diurnal Average: 8.6 µg/m ³ at hour 8 | Minimum Diurnal Average: 1.6 µg/m ³ at hour 1 | Hours of Calibration: | 2 |
| Monthly Average: 3.91 µg/m ³ | Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 0.5 Median = 1.6 Q ₃ = 4.1 P ₉₀ = 10.5 P ₉₉ = 35.4 | Percent Operational Time: | 99.0 |

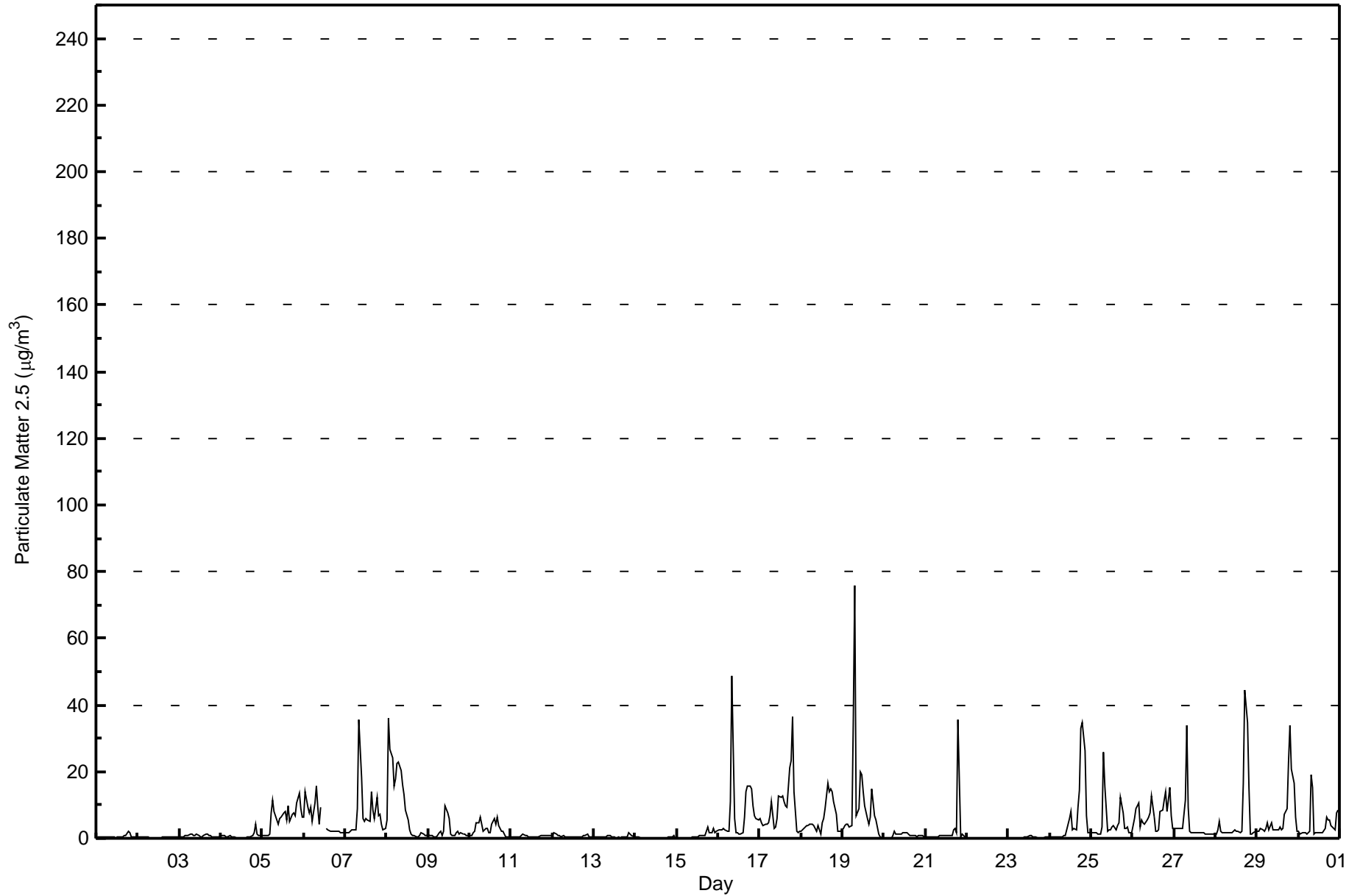
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.2 | 0.3 | 0.5 | 0.5 | 0.4 | 0.8 | 1.0 | 2.2 | 1.6 | 0.6 | 0.4 | 0.4 | 0.3 | 0.5 | 2.2 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 0.5 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.1 | UO | UO | UO | UO | UO | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.5 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 0.4 | 0.5 | 0.6 | 0.7 | 0.7 | 0.9 | 1.1 | 1.3 | 0.9 | 0.8 | 1.1 | 1.0 | 0.6 | 0.6 | 0.7 | 1.3 | 1.4 | 0.8 | 0.7 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.8 | 1.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 0.6 | 0.7 | 0.7 | 0.6 | 0.6 | 0.7 | 0.4 | 0.3 | 0.3 | 0.2 | 0.1 | UO | UO | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.8 | 1.7 | 4.1 | 1.3 | 1.0 | 0.8 | 0.7 | 4.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0.8 | 0.8 | 0.7 | 1.0 | 1.4 | 7.5 | 11.4 | 8.1 | 5.5 | 4.2 | 5.8 | 6.6 | 7.5 | 8.0 | 5.5 | 9.8 | 5.0 | 7.3 | 7.4 | 6.8 | 10.6 | 13.5 | 8.7 | 6.6 | 6.3 | 13.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 6.5 | 14.1 | 9.4 | 7.6 | 9.3 | 5.1 | 10.6 | 15.5 | 9.5 | 4.2 | 9.2 | C | C | 3.2 | 2.5 | 2.0 | 1.9 | 2.0 | 2.1 | 2.1 | 2.1 | 1.8 | 1.5 | 1.6 | 5.6 | 15.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 1.7 | 1.8 | 1.8 | 2.2 | 2.4 | 2.4 | 2.3 | 8.7 | 35.5 | 18.1 | 6.1 | 5.2 | 5.8 | 5.7 | 5.3 | 14.0 | 8.5 | 5.8 | 12.5 | 6.8 | 7.4 | 4.4 | 2.6 | 2.9 | 7.1 | 35.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 5.5 | 35.8 | 26.6 | 24.2 | 15.9 | 17.6 | 22.3 | 23.0 | 20.2 | 16.3 | 13.0 | 8.5 | 5.5 | 2.4 | 1.1 | 0.7 | 0.8 | 0.6 | 0.4 | 1.0 | 1.7 | 1.2 | 1.0 | 1.0 | 10.3 | 35.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 1.1 | 0.7 | 0.8 | 0.5 | 0.4 | 0.4 | 1.8 | 2.0 | 0.7 | 2.0 | 9.8 | 7.6 | 6.1 | 1.2 | 0.8 | 1.0 | 1.8 | 2.1 | 1.4 | 1.8 | 1.5 | 1.2 | 1.0 | 0.9 | 2.0 | 9.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0.8 | 1.0 | 1.7 | 1.9 | 4.5 | 4.5 | 6.4 | 4.0 | 2.3 | 3.0 | 2.8 | 1.7 | 1.6 | 4.2 | 6.0 | 4.3 | 6.3 | 3.7 | 1.9 | 1.9 | 1.3 | 0.4 | 0.2 | 0.3 | 2.8 | 6.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0.2 | 0.2 | 0.3 | 0.6 | 0.6 | 0.6 | 1.0 | 1.2 | 0.8 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.7 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.7 | 1.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1.0 | 1.6 | 1.5 | 0.7 | 0.9 | 0.6 | 0.7 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.7 | 1.1 | 0.6 | 0.4 | 0.4 | 0.6 | 1.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 0.7 | 0.4 | 0.4 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 | 0.4 | 0.5 | 0.6 | 1.7 | 1.4 | 0.7 | 0.4 | 0.5 | 1.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 0.3 | 0.2 | 0.7 | 0.2 | 0.2 | 0.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.9 | 1.0 | 0.8 | 1.0 | 2.1 | 3.5 | 1.8 | 1.8 | 2.9 | 1.6 | 2.0 | 0.9 | 3.5 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2.3 | 2.4 | 2.6 | 2.9 | 2.4 | 2.0 | 2.0 | 11.0 | 48.6 | 5.9 | 1.6 | 1.5 | 1.4 | 1.2 | 1.9 | 6.4 | 13.8 | 15.6 | 15.5 | 14.8 | 9.9 | 6.8 | 6.0 | 5.6 | 7.7 | 48.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 6.1 | 4.7 | 3.7 | 4.4 | 4.2 | 4.8 | 6.9 | 10.9 | 2.9 | 3.4 | 5.9 | 12.6 | 12.2 | 12.8 | 11.0 | 9.6 | 9.5 | 21.2 | 23.2 | 36.4 | 14.1 | 2.0 | 1.8 | 1.9 | 9.4 | 36.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 2.3 | 2.8 | 3.2 | 3.7 | 4.0 | 4.1 | 4.1 | 3.7 | 2.9 | 1.9 | 3.7 | 1.3 | 4.8 | 5.8 | 8.7 | 16.7 | 14.2 | 15.0 | 14.2 | 10.9 | 7.2 | 2.2 | 2.0 | 2.3 | 5.9 | 16.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 3.1 | 3.8 | 4.1 | 4.1 | 3.5 | 3.9 | 35.9 | 75.9 | 7.0 | 8.8 | 20.0 | 19.0 | 14.1 | 10.0 | 6.0 | 4.1 | 6.5 | 14.9 | 6.9 | 5.3 | 3.5 | 1.3 | 0.4 | 0.2 | 10.9 | 75.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.8 | 2.2 | 1.2 | 1.1 | 1.2 | 1.5 | 1.7 | 1.9 | 1.5 | 1.3 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 | 0.9 | 0.8 | 0.9 | 0.3 | 0.9 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.6 | 0.8 | 0.9 | 0.8 | 0.9 | 0.9 | 1.0 | 1.1 | 0.9 | 2.7 | 2.8 | 1.8 | 35.5 | 0.5 | 1.2 | 0.7 | 0.3 | 2.3 | 35.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.5 | 0.5 | 0.4 | 0.7 | 0.7 | 0.5 | 0.4 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.6 | 0.6 | 0.5 | 0.3 | 0.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0.2 | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 | 0.6 | 0.8 | 0.8 | 2.6 | 5.9 | 7.9 | 2.7 | 2.8 | 2.6 | 9.4 | 14.3 | 33.0 | 34.8 | 26.2 | 6.8 | 1.8 | 1.7 | 6.5 | 34.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 1.6 | 1.6 | 1.7 | 1.6 | 1.4 | 1.2 | 3.5 | 25.8 | 15.7 | 2.0 | 2.4 | 2.6 | 3.4 | 4.0 | 2.4 | 3.8 | 4.5 | 12.4 | 7.7 | 3.1 | 3.1 | 3.3 | 1.7 | 1.7 | 4.7 | 25.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 3.8 | 5.9 | 9.0 | 10.6 | 3.4 | 5.4 | 4.5 | 4.4 | 5.5 | 6.4 | 7.7 | 12.7 | 6.3 | 2.3 | 2.0 | 2.4 | 8.2 | 8.3 | 11.4 | 13.9 | 8.2 | 15.3 | 6.7 | 2.9 | 7.0 | 15.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 2.9 | 2.9 | 3.2 | 3.0 | 3.0 | 2.8 | 11.4 | 33.9 | 9.1 | 1.9 | 1.8 | 1.8 | 1.5 | 1.6 | 1.6 | 1.8 | 1.7 | 1.7 | 1.4 | 1.4 | 1.4 | 1.3 | 1.2 | 1.2 | 4.0 | 33.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 1.4 | 2.6 | 5.3 | 2.2 | 1.9 | 1.8 | 1.7 | 1.6 | 1.6 | 1.8 | 2.3 | 2.4 | 2.3 | 2.3 | 1.9 | 2.1 | 16.5 | 44.4 | 34.6 | 15.3 | 1.3 | 1.4 | 1.8 | 2.2 | 6.4 | 44.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 2.3 | 2.3 | 2.8 | 2.6 | 2.2 | 2.8 | 4.5 | 2.6 | 4.5 | 2.5 | 2.6 | 2.6 | 2.6 | 3.2 | 2.7 | 2.8 | 7.1 | 9.0 | 23.0 | 34.0 | 20.9 | 16.5 | 6.5 | 2.1 | 6.9 | 34.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 2.2 | 1.4 | 1.8 | 1.6 | 1.7 | 1.4 | 1.9 | 19.1 | 15.1 | 1.4 | 1.6 | 1.8 | 1.8 | 1.7 | 1.6 | 2.8 | 6.5 | 5.6 | 5.5 | 3.7 | 3.0 | 2.7 | 7.5 | 8.5 | 4.2 | 19.1 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 1.6 | 3.0 | 2.8 | 2.6 | 2.2 | 2.4 | 4.6 | 8.6 | 6.7 | 3.1 | 3.6 | 3.7 | 3.4 | 2.6 | 2.4 | 3.1 | 4.4 | 6.5 | 7.2 | 8.0 | 4.5 | 3.1 | 2.0 | 1.7 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 6.5 | 35.8 | 26.6 | 24.2 | 15.9 | 17.6 | 35.9 | 75.9 | 48.6 | 18.1 | 20.0 | 19.0 | 14.1 | 12.8 | 11.0 | 16.7 | 16.5 | 44.4 | 34.6 | 36.4 | 26.2 | 16.5 | 8.7 | 8.5 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 268 | 37.69 | 37.69 |
| 6 - 15 | 111 | 15.61 | 53.31 |
| 16 - 25 | 22 | 3.09 | 56.40 |
| 26 - 80 | 16 | 2.25 | 58.65 |
| > 81.0 | 0 | 0.00 | 58.65 |

Total Number of Valid Hours: 711

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - September 2017**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 4 | 9 | 12 | 17 | 47 | 24 | 21 | 27 | 31 | 19 | 11 | 7 | 13 | 13 | 6 | 7 | 268 |
| 6 - 15 | 6 | 6 | 1 | 7 | 14 | 3 | 6 | 14 | 19 | 3 | 3 | 7 | 7 | 13 | 0 | 2 | 111 |
| 16 - 25 | 0 | 0 | 0 | 1 | 5 | 1 | 1 | 2 | 4 | 0 | 0 | 1 | 3 | 3 | 1 | 0 | 22 |
| 26 - 80 | 0 | 1 | 0 | 1 | 3 | 3 | 0 | 1 | 4 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 16 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 10 | 16 | 13 | 26 | 69 | 31 | 28 | 44 | 58 | 22 | 14 | 17 | 23 | 29 | 8 | 9 | 417 |

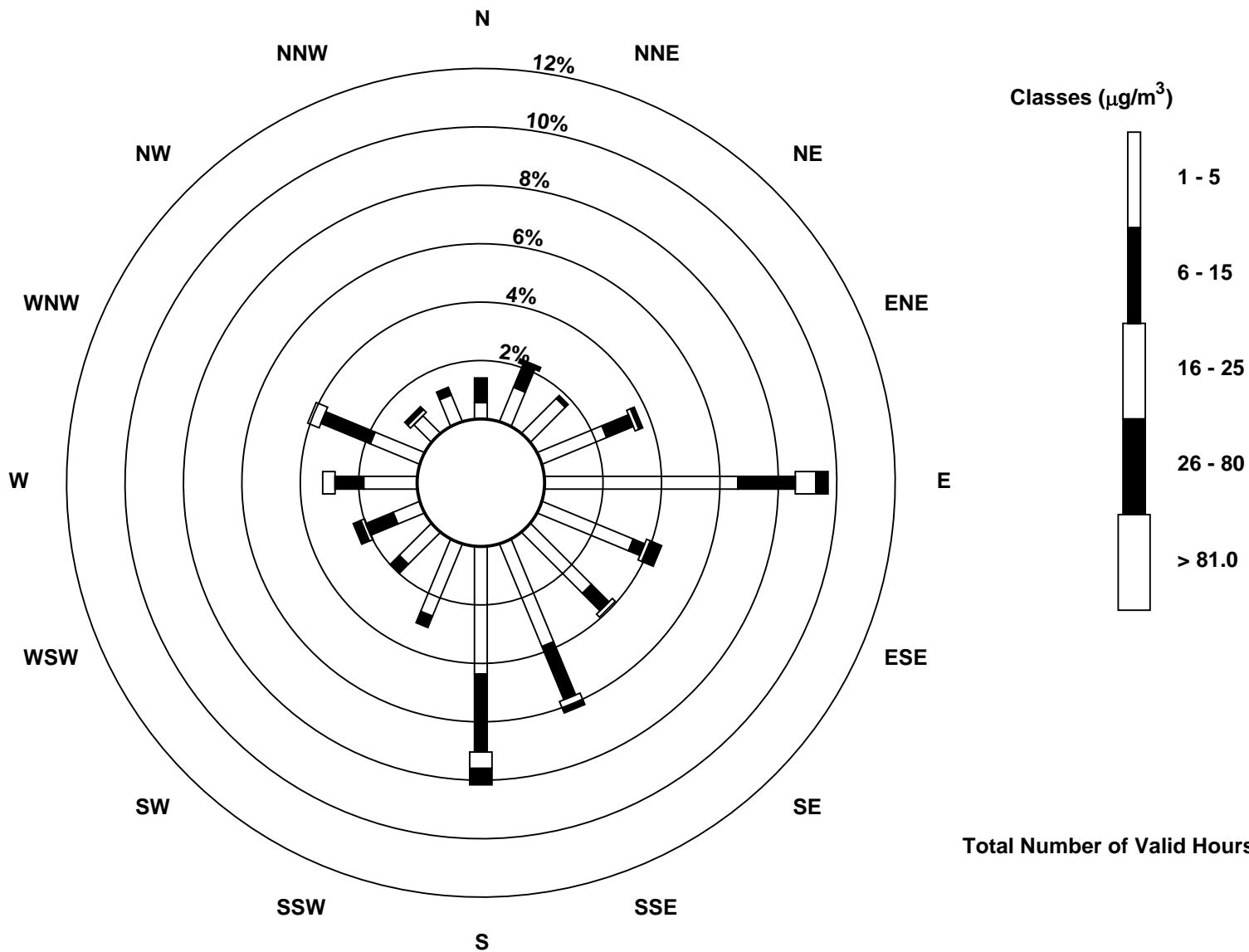
Total Number of Valid Hours: 711

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 711

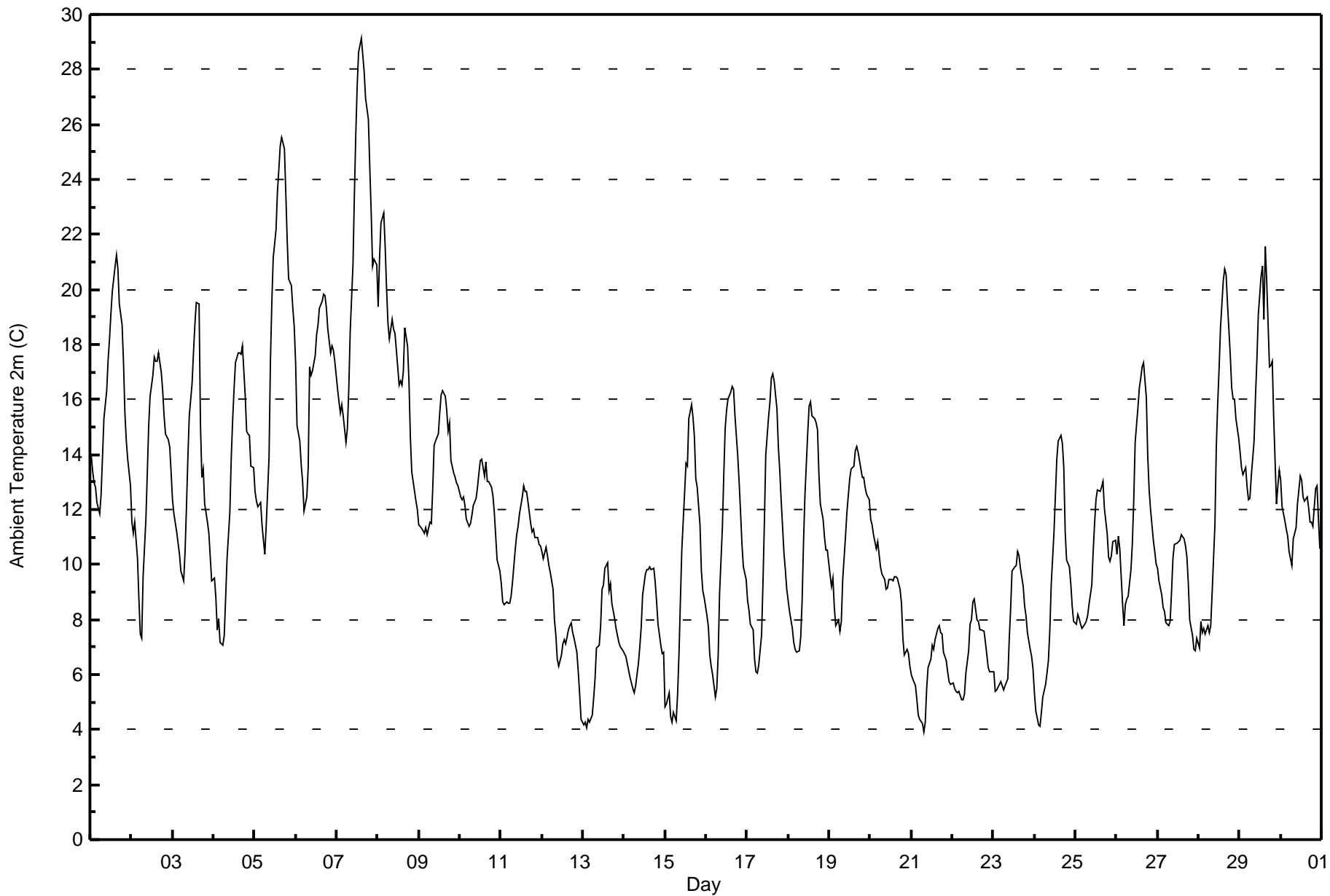


| Maximum Value: 29.1 C on Sep 7 15:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 21.6 C on Sep 7 | | | | | Hours in Service: 720 | |
|--|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|------|------|-----------------|---------------------------------|---------------|
| Minimum Value: 3.9 C on Sep 21 08:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 6.0 C on Sep 21 | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 15.3 C at hour 16 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 8.7 C at hour 7 | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 11.80 C | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 4.3 P ₁₀ = 6.3 Q ₁ = 8.0 Median = 11.2 O ₃ = 14.6 P ₉₀ = 18.2 P ₉₉ = 25.7 | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 13.9 | 13.3 | 13.0 | 12.8 | 12.3 | 11.9 | 12.5 | 13.9 | 15.3 | 16.3 | 17.4 | 18.2 | 19.1 | 19.9 | 20.8 | 21.3 | 20.8 | 19.5 | 18.7 | 17.4 | 15.5 | 14.5 | 13.8 | 12.9 | 16.0 | 21.3 |
| 2-Sep | 11.6 | 11.1 | 11.5 | 10.2 | 8.7 | 7.5 | 7.3 | 9.6 | 11.7 | 13.3 | 15.0 | 16.1 | 16.9 | 17.5 | 17.4 | 17.4 | 17.7 | 17.0 | 16.3 | 15.4 | 14.7 | 14.6 | 14.3 | 13.4 | 13.6 | 17.7 |
| 3-Sep | 12.4 | 11.8 | 11.2 | 10.8 | 10.4 | 9.7 | 9.4 | 10.5 | 12.1 | 13.9 | 15.4 | 16.6 | 17.7 | 18.7 | 19.5 | 19.5 | 15.1 | 13.2 | 13.5 | 12.2 | 11.5 | 11.1 | 10.3 | 9.4 | 13.2 | 19.5 |
| 4-Sep | 9.5 | 8.8 | 7.6 | 8.0 | 7.2 | 7.1 | 7.4 | 8.8 | 10.2 | 11.9 | 13.9 | 15.3 | 16.4 | 17.4 | 17.7 | 17.7 | 17.6 | 18.0 | 16.1 | 14.8 | 14.7 | 14.7 | 13.6 | 13.5 | 12.8 | 18.0 |
| 5-Sep | 12.7 | 12.3 | 12.1 | 12.2 | 11.4 | 10.9 | 10.4 | 11.5 | 13.9 | 17.4 | 19.5 | 21.2 | 22.2 | 23.5 | 24.3 | 25.2 | 25.5 | 25.1 | 23.5 | 21.7 | 20.4 | 20.1 | 19.3 | 18.7 | 18.1 | 25.5 |
| 6-Sep | 17.4 | 15.0 | 14.5 | 13.6 | 13.0 | 12.0 | 12.4 | 13.5 | 17.2 | 16.9 | 17.1 | 17.6 | 18.4 | 18.7 | 19.3 | 19.6 | 19.8 | 19.8 | 19.3 | 18.5 | 17.7 | 17.9 | 17.8 | 17.4 | 16.9 | 19.8 |
| 7-Sep | 16.4 | 15.9 | 15.5 | 15.8 | 15.4 | 14.5 | 15.0 | 16.4 | 18.4 | 20.9 | 23.5 | 25.6 | 27.4 | 28.6 | 29.1 | 28.5 | 27.9 | 27.0 | 26.2 | 24.5 | 22.8 | 20.9 | 21.1 | 20.9 | 21.6 | 29.1 |
| 8-Sep | 19.4 | 21.2 | 22.4 | 22.8 | 21.5 | 20.1 | 18.8 | 18.2 | 18.9 | 18.6 | 18.4 | 17.8 | 16.5 | 16.7 | 16.5 | 17.0 | 18.6 | 18.0 | 16.7 | 14.6 | 13.4 | 12.7 | 12.3 | 12.0 | 17.6 | 22.8 |
| 9-Sep | 11.5 | 11.4 | 11.2 | 11.2 | 11.4 | 11.1 | 11.6 | 11.5 | 12.7 | 14.3 | 14.5 | 14.8 | 15.5 | 16.2 | 16.3 | 16.1 | 15.6 | 14.8 | 15.2 | 13.8 | 13.3 | 13.2 | 13.0 | 12.9 | 13.5 | 16.3 |
| 10-Sep | 12.4 | 12.4 | 12.4 | 12.2 | 11.6 | 11.4 | 11.5 | 11.8 | 12.1 | 12.4 | 12.8 | 13.3 | 13.8 | 13.8 | 13.2 | 13.7 | 13.0 | 13.0 | 12.8 | 12.5 | 11.9 | 11.1 | 10.2 | 9.8 | 12.3 | 13.8 |
| 11-Sep | 9.3 | 8.7 | 8.6 | 8.7 | 8.6 | 8.6 | 8.8 | 9.4 | 10.6 | 11.1 | 11.4 | 11.9 | 12.5 | 12.9 | 12.6 | 12.7 | 12.3 | 11.5 | 11.2 | 11.3 | 11.0 | 11.0 | 10.7 | 10.7 | 10.7 | 12.9 |
| 12-Sep | 10.5 | 10.2 | 10.6 | 10.3 | 10.0 | 9.7 | 9.1 | 8.0 | 7.4 | 6.6 | 6.3 | 6.7 | 7.1 | 7.3 | 7.1 | 7.6 | 7.8 | 7.9 | 7.5 | 7.3 | 6.8 | 6.1 | 5.3 | 4.4 | 7.8 | 10.6 |
| 13-Sep | 4.2 | 4.3 | 4.1 | 4.4 | 4.3 | 4.5 | 5.1 | 5.9 | 7.0 | 7.1 | 7.8 | 9.1 | 9.3 | 9.8 | 10.1 | 9.1 | 9.3 | 8.6 | 8.0 | 7.7 | 7.4 | 7.2 | 7.0 | 6.9 | 7.0 | 10.1 |
| 14-Sep | 6.7 | 6.7 | 6.4 | 5.9 | 5.7 | 5.5 | 5.4 | 5.6 | 6.4 | 7.0 | 7.7 | 8.9 | 9.7 | 9.8 | 9.8 | 9.9 | 9.8 | 9.8 | 9.4 | 8.7 | 7.8 | 7.1 | 6.8 | 6.8 | 7.6 | 9.9 |
| 15-Sep | 4.8 | 4.9 | 5.3 | 4.5 | 4.3 | 4.6 | 4.3 | 5.3 | 6.8 | 8.7 | 10.5 | 12.6 | 13.7 | 13.6 | 15.3 | 15.8 | 15.3 | 14.6 | 13.1 | 12.8 | 11.5 | 9.8 | 9.1 | 8.8 | 9.6 | 15.8 |
| 16-Sep | 8.1 | 7.7 | 6.7 | 6.3 | 6.0 | 5.2 | 5.5 | 6.7 | 9.0 | 11.3 | 13.2 | 14.9 | 15.6 | 16.0 | 16.3 | 16.5 | 16.4 | 15.4 | 13.9 | 13.0 | 11.9 | 10.7 | 9.9 | 9.5 | 11.1 | 16.5 |
| 17-Sep | 8.7 | 8.3 | 7.8 | 7.6 | 6.6 | 6.1 | 6.0 | 6.3 | 7.4 | 9.3 | 11.5 | 14.0 | 15.3 | 15.9 | 16.8 | 16.9 | 16.7 | 15.6 | 14.3 | 13.4 | 12.4 | 10.4 | 9.8 | 9.1 | 11.1 | 16.9 |
| 18-Sep | 8.7 | 8.3 | 7.7 | 7.2 | 6.9 | 6.8 | 6.9 | 7.4 | 8.7 | 10.9 | 12.5 | 14.8 | 15.8 | 15.9 | 15.4 | 15.3 | 15.2 | 14.9 | 13.3 | 12.2 | 11.6 | 11.0 | 10.5 | 10.5 | 11.2 | 15.9 |
| 19-Sep | 9.6 | 9.2 | 9.5 | 8.4 | 7.8 | 8.0 | 7.6 | 7.9 | 9.4 | 11.0 | 11.9 | 12.5 | 13.1 | 13.5 | 13.6 | 14.2 | 14.3 | 14.1 | 13.5 | 13.2 | 13.2 | 12.8 | 12.5 | 12.4 | 11.4 | 14.3 |
| 20-Sep | 11.7 | 11.4 | 11.1 | 10.6 | 10.8 | 10.4 | 9.9 | 9.7 | 9.4 | 9.1 | 9.1 | 9.5 | 9.5 | 9.4 | 9.6 | 9.6 | 9.5 | 9.1 | 8.6 | 7.3 | 6.7 | 6.9 | 6.7 | 6.3 | 9.2 | 11.7 |
| 21-Sep | 6.0 | 5.8 | 5.6 | 5.1 | 4.5 | 4.4 | 4.2 | 3.9 | 4.3 | 5.5 | 6.3 | 6.6 | 7.1 | 6.9 | 7.3 | 7.7 | 7.8 | 7.5 | 7.5 | 6.8 | 6.5 | 6.1 | 5.8 | 5.6 | 6.0 | 7.8 |
| 22-Sep | 5.7 | 5.5 | 5.4 | 5.3 | 5.4 | 5.1 | 5.1 | 5.3 | 6.1 | 6.9 | 7.8 | 8.0 | 8.6 | 8.7 | 8.0 | 7.9 | 7.6 | 7.6 | 7.6 | 7.2 | 6.7 | 6.3 | 6.1 | 6.1 | 6.7 | 8.7 |
| 23-Sep | 6.1 | 5.4 | 5.4 | 5.7 | 5.7 | 5.6 | 5.4 | 5.6 | 5.9 | 7.3 | 8.4 | 9.8 | 9.9 | 9.9 | 10.5 | 10.3 | 9.9 | 9.2 | 8.5 | 8.1 | 7.5 | 6.9 | 6.6 | 6.2 | 7.5 | 10.5 |
| 24-Sep | 5.3 | 4.7 | 4.2 | 4.1 | 4.6 | 5.2 | 5.7 | 6.1 | 6.5 | 7.6 | 9.3 | 11.2 | 12.5 | 13.8 | 14.5 | 14.7 | 14.4 | 13.5 | 11.2 | 10.2 | 9.9 | 9.3 | 8.5 | 7.9 | 8.9 | 14.7 |
| 25-Sep | 7.8 | 8.2 | 8.1 | 7.8 | 7.7 | 7.8 | 7.9 | 8.1 | 8.5 | 9.2 | 10.5 | 11.5 | 12.3 | 12.7 | 12.7 | 12.8 | 13.0 | 12.0 | 11.1 | 10.3 | 10.1 | 10.3 | 10.8 | 10.9 | 10.1 | 13.0 |
| 26-Sep | 10.4 | 11.0 | 10.6 | 8.6 | 7.8 | 8.6 | 8.8 | 8.8 | 9.8 | 10.8 | 12.4 | 14.4 | 15.7 | 16.4 | 16.8 | 17.2 | 17.3 | 16.1 | 13.9 | 12.7 | 12.0 | 10.9 | 10.5 | 10.0 | 12.1 | 17.3 |
| 27-Sep | 9.8 | 9.4 | 8.9 | 8.5 | 8.3 | 7.9 | 7.8 | 7.9 | 9.0 | 10.2 | 10.7 | 10.8 | 10.8 | 10.9 | 11.1 | 10.9 | 10.7 | 10.3 | 9.3 | 8.0 | 7.4 | 6.9 | 6.9 | 7.3 | 9.2 | 11.1 |
| 28-Sep | 7.0 | 7.9 | 7.5 | 7.7 | 7.5 | 7.8 | 7.5 | 7.8 | 8.9 | 11.4 | 14.3 | 15.9 | 17.1 | 18.6 | 20.3 | 20.8 | 20.5 | 19.5 | 17.6 | 16.4 | 16.0 | 16.0 | 15.3 | 14.6 | 13.5 | 20.8 |
| 29-Sep | 14.1 | 13.5 | 13.3 | 13.5 | 12.8 | 12.4 | 12.4 | 13.2 | 14.5 | 16.1 | 17.4 | 19.1 | 20.5 | 20.8 | 18.9 | 21.5 | 20.3 | 17.2 | 17.2 | 17.4 | 15.3 | 12.2 | 12.9 | 13.4 | 15.8 | 21.5 |
| 30-Sep | 13.0 | 12.1 | 11.6 | 11.3 | 11.0 | 10.5 | 10.0 | 10.9 | 11.1 | 11.3 | 12.2 | 13.2 | 13.1 | 12.5 | 12.3 | 12.4 | 12.0 | 11.5 | 11.5 | 11.4 | 12.8 | 12.8 | 11.7 | 10.6 | 11.8 | 13.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 289 | 40.14 | 40.14 |
| 10 - 20 | 390 | 54.17 | 94.31 |
| > 20 | 41 | 5.69 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



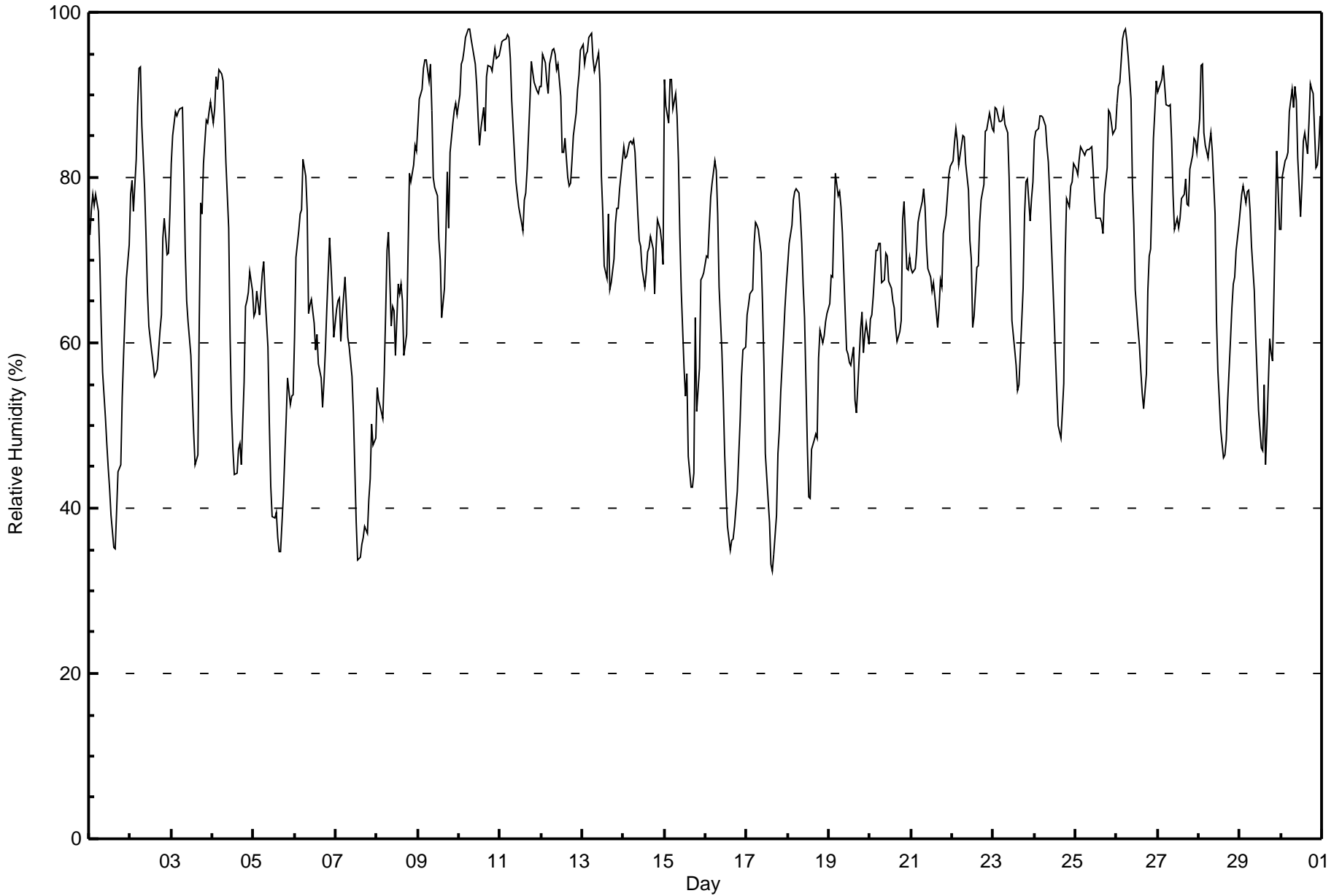
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort Chipewyan - September 2017

| Maximum Value: 98 % on Sep 26 06:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 92.7 % on Sep 10 | | | | | | Hours in Service: 720 | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|------|------|---------------------------------|---------------|
| Minimum Value: 32 % on Sep 17 16:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 50.3 % on Sep 7 | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 84.1 % at hour 6 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 57.5 % at hour 16 | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 72.0 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 35 P ₁₀ = 49 Q ₁ = 62 Median = 74 O ₃ = 84 P ₉₀ = 92 P ₉₉ = 97 | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 73 | 76 | 78 | 77 | 78 | 76 | 70 | 62 | 56 | 51 | 48 | 45 | 42 | 39 | 35 | 35 | 40 | 44 | 45 | 53 | 59 | 63 | 68 | 72 | 57.8 | 78 |
| 2-Sep | 78 | 80 | 76 | 82 | 89 | 93 | 93 | 86 | 79 | 73 | 66 | 62 | 59 | 58 | 56 | 56 | 57 | 62 | 63 | 73 | 75 | 71 | 71 | 76 | 72.2 | 93 |
| 3-Sep | 82 | 85 | 88 | 87 | 88 | 88 | 88 | 81 | 71 | 65 | 63 | 58 | 54 | 49 | 45 | 46 | 63 | 77 | 76 | 82 | 87 | 87 | 88 | 89 | 74.5 | 89 |
| 4-Sep | 87 | 88 | 92 | 91 | 93 | 93 | 92 | 87 | 82 | 74 | 61 | 52 | 47 | 44 | 44 | 47 | 48 | 45 | 55 | 64 | 65 | 66 | 69 | 66 | 68.8 | 93 |
| 5-Sep | 63 | 64 | 66 | 63 | 66 | 68 | 70 | 66 | 59 | 50 | 43 | 39 | 39 | 40 | 36 | 35 | 35 | 42 | 46 | 51 | 56 | 52 | 53 | 54 | 52.3 | 70 |
| 6-Sep | 61 | 70 | 74 | 76 | 76 | 82 | 80 | 76 | 64 | 65 | 65 | 62 | 59 | 61 | 57 | 56 | 52 | 55 | 59 | 64 | 73 | 69 | 66 | 61 | 66.0 | 82 |
| 7-Sep | 64 | 65 | 65 | 60 | 63 | 68 | 64 | 61 | 59 | 56 | 51 | 45 | 38 | 34 | 34 | 36 | 36 | 38 | 37 | 41 | 44 | 50 | 48 | 49 | 50.3 | 68 |
| 8-Sep | 55 | 53 | 52 | 51 | 56 | 63 | 71 | 73 | 62 | 64 | 64 | 59 | 67 | 66 | 67 | 65 | 58 | 61 | 71 | 81 | 79 | 82 | 84 | 83 | 66.2 | 84 |
| 9-Sep | 86 | 90 | 91 | 93 | 94 | 94 | 92 | 94 | 88 | 80 | 79 | 78 | 73 | 70 | 63 | 67 | 73 | 81 | 74 | 83 | 87 | 88 | 89 | 88 | 83.0 | 94 |
| 10-Sep | 90 | 94 | 94 | 95 | 97 | 98 | 98 | 97 | 96 | 94 | 91 | 87 | 84 | 86 | 89 | 86 | 92 | 94 | 93 | 93 | 94 | 96 | 94 | 95 | 92.7 | 98 |
| 11-Sep | 96 | 96 | 97 | 97 | 97 | 97 | 94 | 89 | 83 | 79 | 78 | 76 | 75 | 74 | 77 | 78 | 81 | 89 | 94 | 93 | 92 | 90 | 90 | 91 | 87.6 | 97 |
| 12-Sep | 91 | 95 | 94 | 92 | 90 | 94 | 95 | 96 | 95 | 93 | 94 | 90 | 83 | 83 | 85 | 80 | 79 | 79 | 82 | 85 | 88 | 91 | 92 | 95 | 89.2 | 96 |
| 13-Sep | 96 | 94 | 95 | 95 | 97 | 97 | 94 | 93 | 94 | 95 | 91 | 80 | 76 | 69 | 68 | 76 | 66 | 67 | 70 | 74 | 76 | 76 | 79 | 82 | 83.4 | 97 |
| 14-Sep | 84 | 82 | 83 | 84 | 84 | 84 | 85 | 83 | 76 | 72 | 72 | 69 | 67 | 68 | 71 | 72 | 73 | 71 | 66 | 71 | 75 | 74 | 72 | 70 | 75.3 | 85 |
| 15-Sep | 92 | 89 | 87 | 92 | 92 | 88 | 90 | 87 | 82 | 73 | 66 | 57 | 54 | 56 | 46 | 43 | 43 | 44 | 63 | 52 | 57 | 68 | 68 | 68 | 69.0 | 92 |
| 16-Sep | 70 | 70 | 74 | 78 | 79 | 82 | 81 | 76 | 67 | 59 | 53 | 46 | 42 | 38 | 35 | 36 | 36 | 38 | 42 | 46 | 51 | 56 | 59 | 60 | 57.2 | 82 |
| 17-Sep | 63 | 65 | 66 | 66 | 72 | 75 | 74 | 74 | 71 | 65 | 57 | 47 | 41 | 38 | 33 | 32 | 34 | 39 | 47 | 50 | 54 | 61 | 64 | 67 | 56.5 | 75 |
| 18-Sep | 69 | 72 | 74 | 77 | 78 | 79 | 78 | 76 | 72 | 67 | 63 | 48 | 41 | 41 | 47 | 48 | 49 | 48 | 58 | 61 | 60 | 61 | 63 | 64 | 62.3 | 79 |
| 19-Sep | 65 | 68 | 68 | 75 | 81 | 78 | 78 | 76 | 73 | 64 | 59 | 59 | 58 | 57 | 59 | 53 | 51 | 55 | 62 | 64 | 59 | 61 | 62 | 60 | 64.4 | 81 |
| 20-Sep | 63 | 63 | 66 | 71 | 71 | 72 | 72 | 67 | 68 | 71 | 70 | 67 | 67 | 65 | 64 | 62 | 60 | 61 | 63 | 75 | 77 | 69 | 69 | 70 | 67.7 | 77 |
| 21-Sep | 69 | 69 | 69 | 71 | 75 | 76 | 77 | 79 | 76 | 72 | 69 | 68 | 66 | 67 | 66 | 62 | 64 | 68 | 67 | 73 | 75 | 78 | 80 | 81 | 71.5 | 81 |
| 22-Sep | 82 | 84 | 86 | 84 | 81 | 84 | 85 | 85 | 82 | 78 | 72 | 70 | 62 | 63 | 69 | 69 | 75 | 77 | 79 | 86 | 86 | 87 | 88 | 86 | 79.2 | 88 |
| 23-Sep | 86 | 88 | 88 | 87 | 87 | 87 | 88 | 86 | 86 | 80 | 72 | 63 | 59 | 57 | 54 | 55 | 59 | 67 | 75 | 79 | 80 | 75 | 77 | 79 | 75.6 | 88 |
| 24-Sep | 85 | 86 | 86 | 87 | 87 | 87 | 86 | 84 | 82 | 78 | 73 | 64 | 59 | 54 | 50 | 48 | 52 | 55 | 70 | 78 | 76 | 79 | 80 | 82 | 73.7 | 87 |
| 25-Sep | 81 | 80 | 82 | 84 | 83 | 83 | 83 | 83 | 83 | 84 | 81 | 77 | 75 | 75 | 75 | 75 | 73 | 78 | 81 | 88 | 88 | 87 | 85 | 86 | 81.3 | 88 |
| 26-Sep | 89 | 91 | 91 | 97 | 98 | 98 | 97 | 95 | 89 | 79 | 74 | 66 | 62 | 60 | 57 | 54 | 52 | 56 | 66 | 71 | 71 | 85 | 88 | 92 | 78.2 | 98 |
| 27-Sep | 90 | 91 | 92 | 94 | 91 | 89 | 89 | 89 | 84 | 78 | 74 | 75 | 74 | 75 | 78 | 78 | 80 | 77 | 77 | 81 | 83 | 85 | 84 | 83 | 82.9 | 94 |
| 28-Sep | 87 | 94 | 94 | 86 | 84 | 82 | 84 | 85 | 83 | 76 | 63 | 57 | 53 | 50 | 46 | 46 | 48 | 53 | 60 | 64 | 67 | 68 | 71 | 74 | 69.8 | 94 |
| 29-Sep | 76 | 78 | 79 | 77 | 78 | 78 | 76 | 72 | 66 | 61 | 56 | 52 | 47 | 47 | 55 | 45 | 50 | 60 | 59 | 58 | 66 | 83 | 78 | 74 | 65.5 | 83 |
| 30-Sep | 74 | 80 | 82 | 82 | 83 | 88 | 91 | 88 | 91 | 89 | 82 | 75 | 79 | 84 | 86 | 83 | 87 | 91 | 91 | 90 | 81 | 81 | 84 | 87 | 84.6 | 91 |
| | 78.2 | 80.0 | 80.9 | 81.7 | 83.0 | 84.1 | 83.9 | 81.5 | 77.3 | 72.8 | 68.4 | 63.1 | 60.0 | 59.0 | 58.3 | 57.5 | 58.9 | 62.5 | 66.4 | 70.8 | 72.7 | 74.6 | 75.5 | 76.1 | Diurnal Average | |
| | 96 | 96 | 97 | 97 | 98 | 98 | 98 | 97 | 96 | 95 | 94 | 90 | 84 | 86 | 89 | 86 | 92 | 94 | 94 | 93 | 94 | 96 | 94 | 95 | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Chipewyan - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 27 | 3.75 | 3.75 |
| 40 - 60 | 135 | 18.75 | 22.50 |
| 60 - 80 | 305 | 42.36 | 64.86 |
| 80 - 100 | 253 | 35.14 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

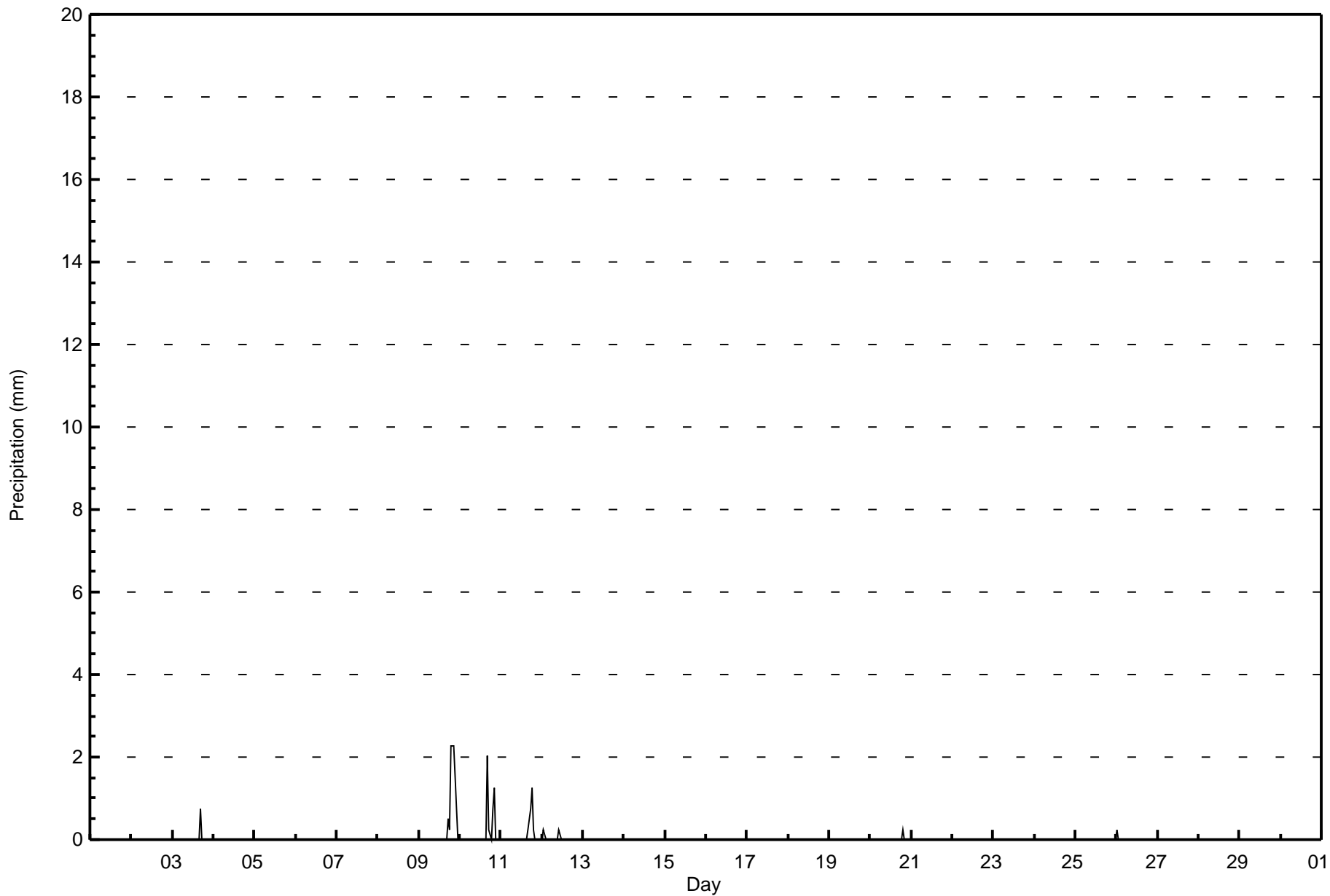
Fort Chipewyan - September 2017

| Maximum Value: 2.3 mm on Sep 9 20:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Total: 7.6 mm on Sep 9 | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|-----|-----|-----|---------------------------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| Minimum Value: 0.0 mm on Sep 1 01:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Total: 0.0 mm on Sep 1 | | | | | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Total: 3.6 mm at hour 20 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Total: 0.0 mm at hour 3 | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Total: 16.26 mm | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.4 | | | | | | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 | 2.3 | 2.3 | 1.5 | 0.8 | 0.0 | 0.0 | 7.6 | 2.3 | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.3 | 0.0 | 0.8 | 1.3 | 0.0 | 0.0 | 0.0 | 4.3 | 2.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.8 | 1.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 2.5 | 1.3 | 0.0 | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.3 | 0.0 | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.0 | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 1.5 | 1.5 | 3.6 | 3.6 | 1.5 | 0.8 | 0.0 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.3 | 0.3 | 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 | 2.0 | 0.8 | 1.3 | 2.3 | 2.3 | 1.5 | 0.8 | 0.0 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort Chipewyan - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Precipitation (PC) - mm
Fort Chipewyan - September 2017**

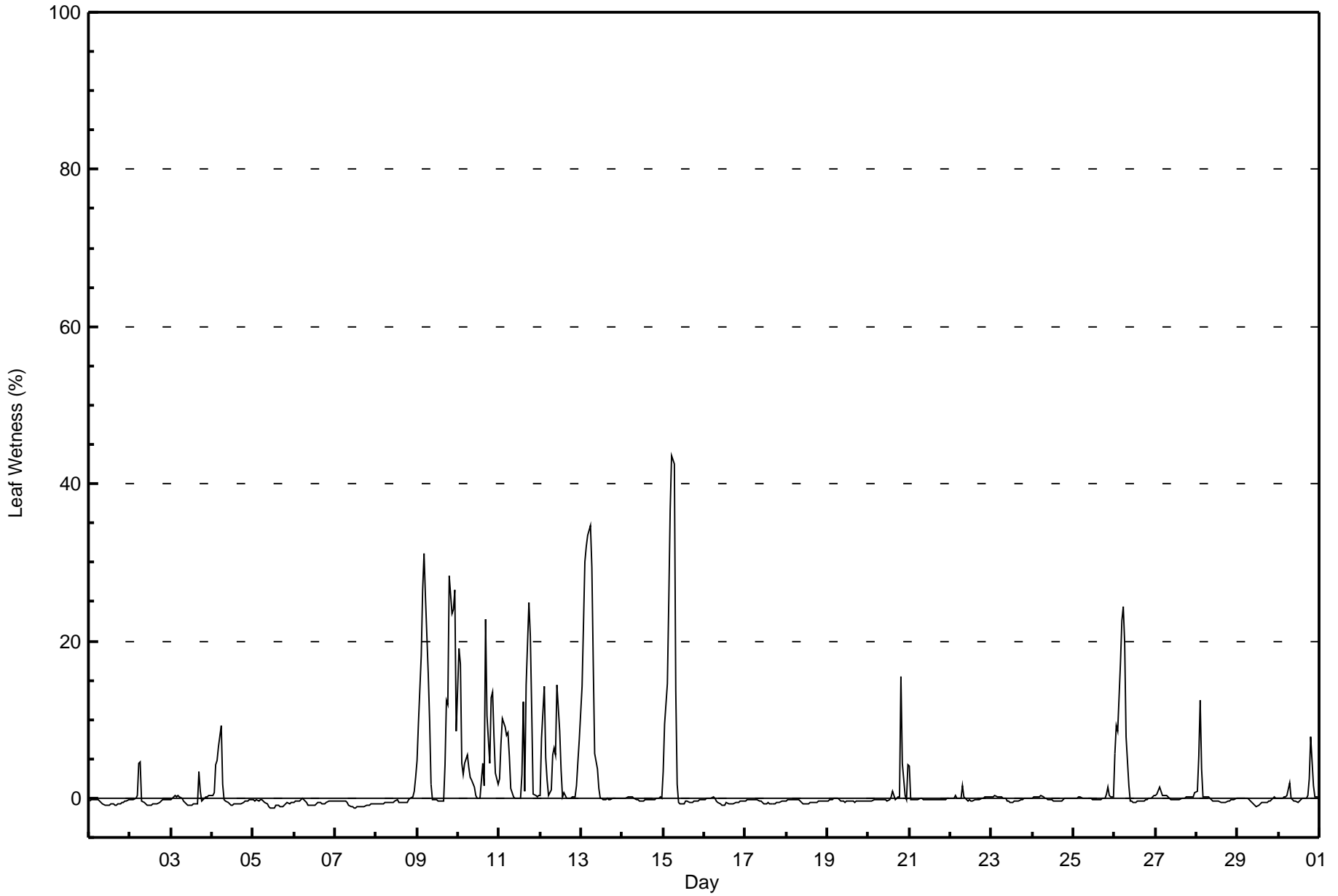
| Concentration Ranges (mm) | Number of Hours | % | Cumulative % |
|----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 709 | 98.47 | 98.47 |
| 0.4 - 0.5 | 1 | 0.14 | 98.61 |
| 0.6 - 0.7 | 0 | 0.00 | 98.61 |
| 0.8 - 1.4 | 6 | 0.83 | 99.44 |
| 1.5 - 10 | 4 | 0.56 | 100.00 |
| > 10 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 44 % on Sep 15 06:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 11.7 % on Sep 9 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|---------------|---------------|--|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: -1 % on Sep 7 13:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: -0.8 % on Sep 7 | | | | | | | | | | | | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 5.2 % at hour 6 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: -0.4 % at hour 13 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 1.6 % | | | | | | | | | | | | | | | | | Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 5 P ₉₉ = 30 | | | | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | -0.6 | 0 | | | | | | | | | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 5 | | | | | | | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 3 | | | | | | | | | |
| 4-Sep | 0 | 1 | 4 | 5 | 7 | 9 | 2 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0.8 | 9 | | | | | | | | | |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -0.7 | 0 | | | | | | | | | |
| 6-Sep | -1 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | -0.6 | 0 | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -0.8 | 0 | | | | | | | | | |
| 8-Sep | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | -1 | -1 | -1 | 0 | 0 | -1 | 0 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 1 | 3 | -0.3 | 3 | | | | | | | | | |
| 9-Sep | 5 | 10 | 18 | 26 | 31 | 26 | 16 | 10 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 12 | 12 | 28 | 23 | 24 | 27 | 9 | 11.7 | 31 | | | | | | | | | |
| 10-Sep | 19 | 17 | 4 | 3 | 4 | 6 | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | 23 | 11 | 4 | 13 | 13 | 8 | 3 | 2 | 6.1 | 23 | | | | | | | | | |
| 11-Sep | 3 | 7 | 10 | 9 | 8 | 8 | 5 | 1 | 0 | 0 | 0 | 0 | 3 | 12 | 1 | 14 | 25 | 21 | 11 | 0 | 0 | 0 | 0 | 0 | 5.8 | 25 | | | | | | | | | |
| 12-Sep | 0 | 8 | 14 | 5 | 2 | 0 | 1 | 5 | 6 | 5 | 14 | 9 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 7 | 3.7 | 14 | | | | | | | | | |
| 13-Sep | 14 | 22 | 30 | 32 | 33 | 35 | 29 | 17 | 6 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.3 | 35 | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 | | | | | | | | | |
| 15-Sep | 3 | 9 | 15 | 25 | 37 | 44 | 43 | 14 | 2 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 7.7 | 44 | | | | | | | | | |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | -0.4 | 0 | | | | | | | | | |
| 17-Sep | 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 | | | | | | | | | |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | -0.4 | 0 | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.3 | 0 | | | | | | | | | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 15 | 4 | 0 | 4 | 0.9 | 15 | | | | | | | | | |
| 21-Sep | 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 | 4 | | | | | | | | | |
| 22-Sep | 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 | 2 | | | | | | | | | |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 | | | | | | | | | |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.1 | 1 | | | | | | | | | |
| 26-Sep | 6 | 9 | 8 | 17 | 23 | 24 | 20 | 8 | 2 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.7 | 24 | | | | | | | | | |
| 27-Sep | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.2 | 1 | | | | | | | | | |
| 28-Sep | 1 | 5 | 12 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 12 | | | | | | | | | |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.3 | 0 | | | | | | | | | |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 8 | 2 | 0 | 0 | 0.5 | 8 | | | | | | | | | |
| 1.7 | | | | | | | | | | | | | | | | | 2.8 | | | | | | | | | | | | | | | | | Diurnal Average | |
| 19 | | | | | | | | | | | | | | | | | 30 | | | | | | | | | | | | | | | | | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Fort Chipewyan - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 111 | 44.40 | 44.40 |
| 0.4 - 0.5 | 11 | 4.40 | 48.80 |
| 0.6 - 0.7 | 4 | 1.60 | 50.40 |
| 0.8 - 1.4 | 12 | 4.80 | 55.20 |
| 1.5 - 10 | 66 | 26.40 | 81.60 |
| > 10 | 45 | 18.00 | 99.60 |

Total Number of Valid Hours: 250

Total Number of Hours: 720



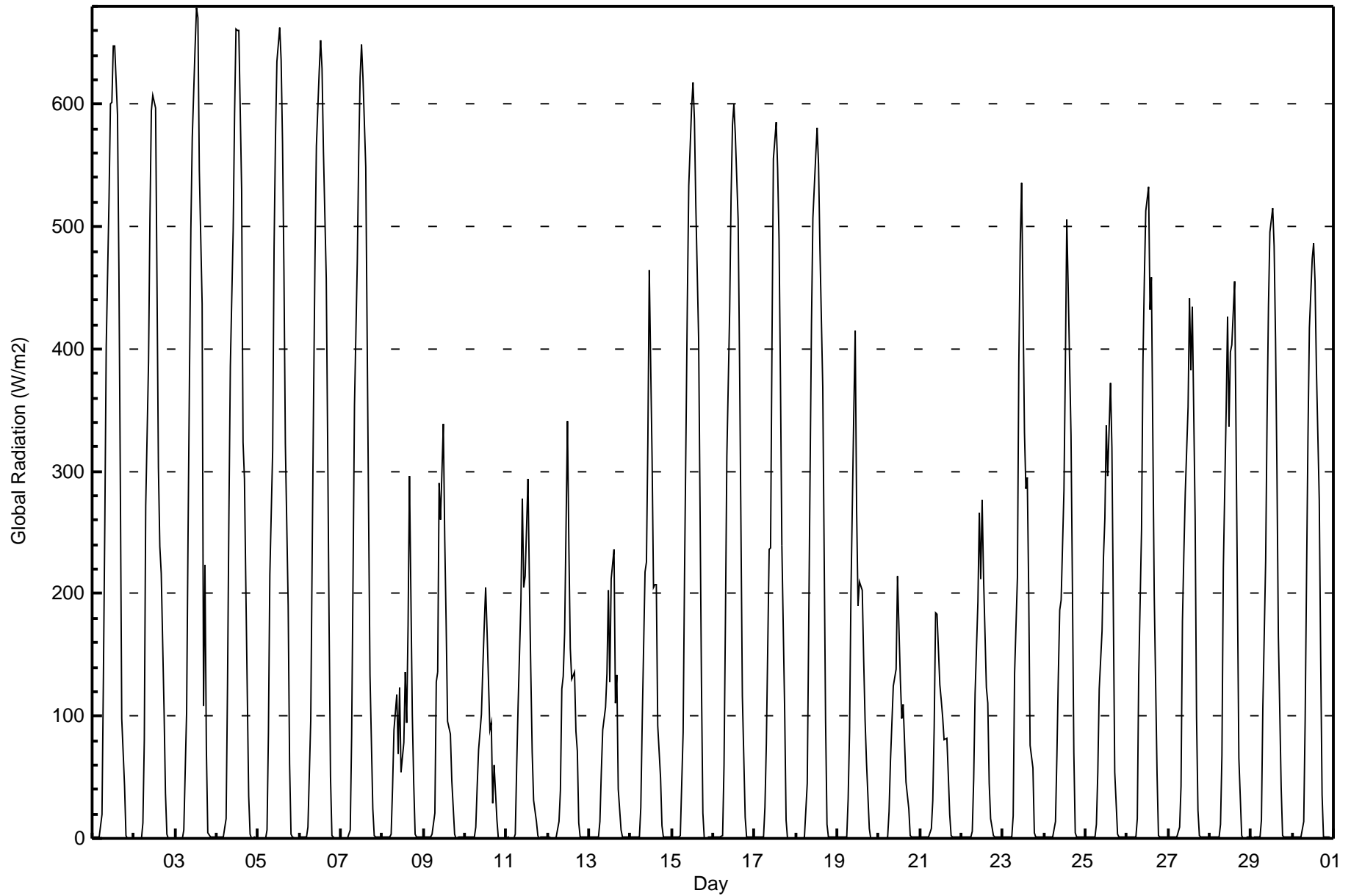
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Fort Chipewyan - September 2017

| Maximum Value: 679 W/m2 on Sep 3 13:00 | | Maximum Daily Average: 222.0 W/m2 on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|-----|---------------------------------|-----|-----|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|-----|-----|-----|---------------|-----------------|--|
| Minimum Value: 0 W/m2 on Sep 7 03:00 | | Minimum Daily Average: 45.2 W/m2 on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 419.2 W/m2 at hour 13 | | Minimum Diurnal Average: 0.6 W/m2 at hour 21 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 133.7 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 16 Q ₃ = 216 P ₉₀ = 462 P ₉₉ = 648 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 2 | 2 | 2 | 2 | 2 | 20 | 132 | 257 | 403 | 524 | 600 | 602 | 648 | 648 | 591 | 463 | 291 | 98 | 42 | 2 | 0 | 0 | 0 | 0 | 222.0 | 648 | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 13 | 81 | 272 | 389 | 508 | 595 | 607 | 597 | 453 | 304 | 239 | 217 | 105 | 37 | 3 | 0 | 0 | 0 | 0 | 184.2 | 607 | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 104 | 247 | 374 | 498 | 573 | 647 | 679 | 671 | 546 | 437 | 108 | 223 | 73 | 5 | 1 | 1 | 1 | 1 | 216.5 | 679 | |
| 4-Sep | 1 | 1 | 1 | 1 | 1 | 16 | 126 | 268 | 387 | 497 | 592 | 661 | 660 | 660 | 530 | 324 | 294 | 204 | 35 | 3 | 0 | 0 | 1 | 0 | 219.3 | 661 | |
| 5-Sep | 0 | 0 | 0 | 0 | 1 | 7 | 87 | 216 | 316 | 483 | 573 | 635 | 663 | 636 | 568 | 462 | 323 | 190 | 61 | 3 | 1 | 0 | 1 | 1 | 217.8 | 663 | |
| 6-Sep | 1 | 1 | 1 | 1 | 1 | 9 | 97 | 231 | 358 | 473 | 566 | 627 | 653 | 629 | 562 | 457 | 322 | 175 | 51 | 3 | 0 | 0 | 0 | 0 | 217.4 | 653 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 84 | 216 | 354 | 471 | 558 | 623 | 649 | 623 | 549 | 408 | 267 | 134 | 24 | 2 | 1 | 1 | 1 | 1 | 207.2 | 649 | |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | 4 | 41 | 89 | 117 | 69 | 123 | 54 | 79 | 136 | 95 | 174 | 296 | 102 | 45 | 4 | 1 | 1 | 1 | 1 | 59.9 | 296 | |
| 9-Sep | 1 | 1 | 1 | 1 | 1 | 3 | 21 | 128 | 136 | 290 | 261 | 338 | 244 | 176 | 96 | 85 | 47 | 25 | 4 | 0 | 1 | 1 | 1 | 1 | 77.6 | 338 | |
| 10-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 9 | 43 | 72 | 102 | 140 | 174 | 205 | 170 | 89 | 94 | 29 | 60 | 15 | 0 | 0 | 0 | 0 | 0 | 50.3 | 205 | |
| 11-Sep | 0 | 1 | 0 | 0 | 0 | 4 | 58 | 108 | 194 | 277 | 205 | 214 | 294 | 210 | 138 | 71 | 31 | 13 | 2 | 1 | 1 | 1 | 1 | 1 | 76.0 | 294 | |
| 12-Sep | 1 | 1 | 0 | 0 | 0 | 1 | 14 | 39 | 122 | 132 | 168 | 341 | 239 | 155 | 131 | 136 | 87 | 71 | 13 | 1 | 1 | 1 | 1 | 1 | 68.9 | 341 | |
| 13-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 14 | 55 | 88 | 107 | 135 | 203 | 128 | 212 | 236 | 111 | 133 | 40 | 7 | 1 | 1 | 1 | 1 | 1 | 61.7 | 236 | |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 26 | 96 | 218 | 226 | 325 | 464 | 311 | 206 | 207 | 208 | 93 | 49 | 10 | 1 | 1 | 1 | 1 | 1 | 102.0 | 464 | |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 87 | 216 | 326 | 439 | 534 | 597 | 617 | 588 | 518 | 408 | 271 | 127 | 21 | 1 | 0 | 1 | 1 | 1 | 198.3 | 617 | |
| 16-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 60 | 179 | 313 | 431 | 524 | 584 | 601 | 575 | 506 | 392 | 255 | 116 | 17 | 1 | 1 | 1 | 1 | 1 | 190.1 | 601 | |
| 17-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 25 | 77 | 237 | 237 | 405 | 556 | 586 | 548 | 489 | 375 | 239 | 104 | 15 | 1 | 0 | 0 | 0 | 0 | 162.6 | 586 | |
| 18-Sep | 1 | 0 | 1 | 0 | 0 | 1 | 45 | 167 | 297 | 420 | 507 | 558 | 581 | 550 | 481 | 368 | 232 | 95 | 12 | 1 | 1 | 1 | 1 | 1 | 180.1 | 581 | |
| 19-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 32 | 88 | 201 | 348 | 415 | 269 | 191 | 209 | 203 | 146 | 97 | 62 | 8 | 0 | 0 | 0 | 0 | 0 | 94.8 | 415 | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 22 | 63 | 124 | 131 | 138 | 214 | 130 | 98 | 109 | 78 | 46 | 25 | 2 | 1 | 1 | 1 | 1 | 1 | 49.4 | 214 | |
| 21-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 9 | 32 | 92 | 185 | 184 | 126 | 113 | 99 | 80 | 82 | 52 | 20 | 3 | 1 | 1 | 1 | 1 | 1 | 45.2 | 185 | |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 49 | 119 | 193 | 267 | 212 | 277 | 213 | 124 | 110 | 45 | 16 | 2 | 1 | 1 | 1 | 1 | 1 | 68.4 | 277 | |
| 23-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 18 | 135 | 213 | 388 | 486 | 536 | 332 | 286 | 295 | 203 | 76 | 57 | 5 | 1 | 1 | 1 | 1 | 1 | 126.7 | 536 | |
| 24-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 14 | 68 | 133 | 187 | 195 | 285 | 387 | 507 | 450 | 330 | 206 | 70 | 4 | 1 | 1 | 1 | 1 | 1 | 118.5 | 507 | |
| 25-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 11 | 54 | 122 | 169 | 229 | 262 | 338 | 296 | 372 | 319 | 188 | 54 | 4 | 1 | 1 | 1 | 1 | 1 | 101.2 | 372 | |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 17 | 133 | 253 | 390 | 457 | 513 | 533 | 432 | 459 | 329 | 200 | 54 | 3 | 1 | 1 | 1 | 1 | 1 | 157.6 | 533 | |
| 27-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 9 | 43 | 178 | 233 | 283 | 353 | 441 | 383 | 434 | 263 | 100 | 23 | 2 | 1 | 1 | 1 | 1 | 1 | 114.7 | 441 | |
| 28-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 11 | 68 | 222 | 350 | 427 | 336 | 398 | 403 | 455 | 331 | 200 | 65 | 2 | 0 | 1 | 1 | 1 | 1 | 136.5 | 455 | |
| 29-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 15 | 107 | 227 | 343 | 435 | 496 | 515 | 484 | 408 | 300 | 166 | 42 | 2 | 1 | 1 | 1 | 1 | 1 | 147.9 | 515 | |
| 30-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 14 | 96 | 215 | 329 | 417 | 473 | 487 | 456 | 383 | 276 | 149 | 36 | 1 | 1 | 1 | 1 | 1 | 0 | 139.2 | 487 | |
| | | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 3.8 | 43.0 | 127.9 | 226.7 | 314.4 | 377.2 | 418.7 | 419.2 | 390.4 | 346.9 | 265.9 | 168.6 | 81.9 | 17.5 | 1.3 | 0.6 | 0.6 | 0.7 | 0.7 | Diurnal Average | |
| | | 2 | 2 | 2 | 2 | 2 | 20 | 132 | 272 | 403 | 524 | 600 | 661 | 679 | 671 | 591 | 463 | 323 | 223 | 73 | 5 | 1 | 1 | 1 | 1 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m²
Fort Chipewyan - September 2017

| Concentration Ranges (W/m²) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 0 - 20 | 367 | 50.97 | 50.97 |
| 21 - 100 | 83 | 11.53 | 62.50 |
| 101 - 300 | 136 | 18.89 | 81.39 |
| 301 - 600 | 113 | 15.69 | 97.08 |
| 601 - 900 | 21 | 2.92 | 100.00 |
| > 900 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort Chipewyan - September 2017

| | | |
|--|--|---------------------------------|
| Maximum Speed: 41 km/h on Sep 11 19:00 | Maximum Daily Speed Average: 27.5 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 6 06:00 | Minimum Daily Speed Average: 6.0 km/h on Sep 14 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 5.6 km/h at hour 20 | Minimum Diurnal Speed Average: 2.1 km/h at hour 8 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 3.3 km/h 146.1 deg | Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 13 Q ₃ = 19 P ₉₀ = 26 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-Sep | W14 | W13 | W13 | WSW13 | WSW15 | W16 | W14 | W18 | W22 | W26 | W28 | W31 | W30 | W27 | W26 | W24 | W22 | W13 | W9 | W9 | W9 | NNE10 | NNW4 | W6 | WSW7 | W16.3 | W31 |
| 2-Sep | W9 | W8 | W6 | W7 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9.8 | NNW15 |
| 3-Sep | W9 | W11 | W12 | W13 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | W14 | NNW11.9 | NNW18 |
| 4-Sep | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | NNW9.2 | NW17 |
| 5-Sep | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | W15 | WSW9.1 | WSW22 |
| 6-Sep | N6 | NNW6 | N12 | N11 | N8 | NNW1 | NNW2 | NW4 | S2 | E8 | ESE8 | ESE9 | E8 | E11 | E12 | E14 | E14 | E14 | E12 | E11 | E12 | E14 | E16 | ESE17 | E7.2 | ESE17 | |
| 7-Sep | ESE16 | SE15 | SE14 | SSE23 | S19 | ESE10 | SE11 | SE11 | S17 | S22 | S25 | S27 | S27 | S29 | S25 | S29 | S26 | S23 | S25 | SSW20 | SW17 | SW16 | SW18 | SW13 | S17.6 | S29 | |
| 8-Sep | SW11 | WSW14 | WSW16 | WSW17 | W14 | W12 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | WSW10.5 | WSW17 |
| 9-Sep | SSW5 | ESE4 | ENE3 | ENE7 | ENE8 | SSE8 | SE9 | SE11 | E13 | E17 | E19 | E19 | E21 | ENE20 | ENE18 | ENE19 | ENE21 | ENE27 | E32 | E36 | E36 | ENE30 | E30 | E29 | E17.3 | E36 | |
| 10-Sep | ENE20 | E18 | ENE12 | NNE7 | NW4 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9.9 | W24 |
| 11-Sep | NW6 | NW7 | NW5 | W9 | NW4 | N5 | NNE5 | ENE7 | SE10 | SE15 | SE18 | SE21 | ESE21 | SE23 | ESE25 | ESE31 | ESE39 | ESE41 | E41 | E40 | ENE28 | E34 | E31 | E21 | E16.8 | E41 | |
| 12-Sep | SE12 | SW10 | W15 | WSW18 | W20 | W18 | NNW16 | NNW16 | N11 | N10 | NNW12 | NNW12 | NNW11 | NNE9 | NNW9 | NNW8 | NW6 | NNW7 | NNW6 | NNW6 | NNW7 | NNW8 | NW8 | NW8 | NW8.2 | W20 | |
| 13-Sep | NW10 | NNW8 | NW6 | NW7 | NW8 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | W9 | NW7.5 | NNW12 | |
| 14-Sep | NNW7 | NNW7 | NNW8 | NW8 | NNW6 | NNW6 | NNW7 | NW5 | NW7 | NW7 | NNW8 | W9 | NNW8 | NW8 | NNW9 | W12 | NNW9 | NW4 | N5 | NNW5 | NNW6 | N6 | NNE2 | NNW1 | NW6.0 | W12 | |
| 15-Sep | W5 | SW4 | SW6 | SW6 | SW7 | SSW6 | SSW11 | S14 | S12 | S15 | S11 | S11 | SSE12 | SE14 | S12 | S10 | SSE14 | SSE14 | SE15 | SSE21 | S22 | S18 | SSW14 | SSW15 | S10.7 | S22 | |
| 16-Sep | SSW12 | SSW12 | SSW13 | SSW16 | S14 | SSW16 | S18 | S18 | S17 | S21 | S26 | S31 | S34 | S38 | S36 | SSW28 | S27 | S22 | S22 | S21 | SSE20 | SSE19 | S20 | S23 | S21.5 | S38 | |
| 17-Sep | S23 | S24 | S25 | S25 | SSE21 | SSE20 | SSE24 | SSE24 | SSE22 | S21 | SSE20 | S26 | S27 | SSE28 | S26 | S25 | SSE20 | SSE18 | SSE16 | SSE18 | SSE22 | SSE22 | SSE23 | SSE22 | SSE22.3 | SSE28 | |
| 18-Sep | SSE20 | SSE22 | SSE21 | SSE20 | SSE19 | SSE22 | SSE23 | SSE23 | SSE19 | SE15 | SE17 | SSE23 | SSE25 | SSE22 | SE20 | SE22 | ESE22 | ESE22 | SE19 | SE20 | SE24 | SE23 | SE21 | ESE18 | SE20.0 | SSE25 | |
| 19-Sep | ESE17 | E16 | E18 | E15 | E15 | ENE16 | ENE15 | E19 | E21 | E32 | E32 | ENE27 | ENE26 | ENE29 | ENE25 | ENE27 | ENE30 | ENE28 | ENE27 | ENE28 | ENE27 | ENE27 | ENE26 | ENE24 | ENE23.2 | E32 | |
| 20-Sep | ENE28 | ENE28 | NE28 | NE29 | ENE33 | NE30 | NE26 | NE28 | NE33 | NE33 | NE36 | NE40 | NE38 | NE36 | NE34 | NE30 | NE27 | NE24 | NE25 | NE22 | NNE14 | NNE18 | NNE14 | NNE14 | NE27.5 | NE40 | |
| 21-Sep | NNE14 | N13 | NNE13 | N14 | N13 | N14 | N13 | N14 | N13 | N13 | N13 | N13 | N13 | N12 | NNW11 | NNW9 | N8 | NW5 | NW5 | NNE5 | NW6 | W9 | NW7 | NW3 | NW3 | N9.5 | NNE14 |
| 22-Sep | NW5 | NNW5 | NNW4 | W9 | N2 | NW4 | W9 | NNW5 | W2 | SW4 | S4 | SSE5 | SSW11 | ESE7 | E12 | E12 | E15 | ESE16 | ESE19 | ESE24 | SE18 | SE18 | SE17 | SSE18 | SE6.0 | ESE24 | |
| 23-Sep | SSE15 | SSE13 | SSE14 | SE17 | SE20 | SE20 | SE18 | SSE18 | SSE17 | S15 | SSE18 | S19 | SSE17 | SSE16 | SSE9 | SSE14 | S18 | SSE15 | SE15 | SE18 | SSE17 | SSE15 | SE15 | SE17 | SSE16.0 | SE20 | |
| 24-Sep | SSE21 | SSE17 | SSE15 | SE8 | SE8 | SE9 | SE13 | SE12 | SE13 | SE14 | SSE12 | SSE18 | SSE17 | SSE16 | SSE18 | SSE18 | SSE16 | SSE11 | ESE10 | ESE13 | ESE13 | E9 | ESE9 | E7 | SE12.3 | SSE21 | |
| 25-Sep | E9 | ESE12 | E10 | E10 | ESE11 | ESE15 | E15 | E15 | E15 | E13 | ESE12 | SE11 | ESE9 | E11 | E13 | E14 | E14 | E11 | E11 | ESE10 | E10 | E9 | E9 | WSW3 | E10.9 | ESE15 | |
| 26-Sep | W9 | N11 | NNE3 | WSW9 | WSW9 | WSW6 | WSW13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W13 | W9.7 | W17 | |
| 27-Sep | E9 | E7 | ENE7 | NNE10 | NNE11 | NNE10 | NE10 | NNE9 | NNE9 | NNE10 | NE12 | E11 | ESE16 | ESE12 | ESE13 | ESE12 | ESE8 | NNE5 | NNE8 | N9 | N9 | N9 | N11 | NE7 | NE7.2 | ESE16 | |
| 28-Sep | E10 | ESE13 | ESE14 | SE16 | SE18 | SE23 | SE22 | SE20 | ESE20 | SE16 | SSE21 | SSE22 | S24 | S30 | S30 | S29 | S24 | S26 | S20 | SSE22 | S25 | S23 | SSW17 | SSW17 | SSE18.8 | S30 | |
| 29-Sep | S18 | S25 | S26 | SSW24 | S20 | S16 | SSW13 | S11 | S16 | SSW17 | SSW18 | S16 | SSW11 | SE4 | SE11 | SSW7 | SE4 | E7 | ESE7 | E4 | E7 | E8 | E14 | ENE12 | S10.3 | S26 | |
| 30-Sep | E11 | E16 | E12 | ENE8 | ENE8 | E12 | E10 | E13 | E18 | E20 | E15 | E10 | ESE10 | ESE14 | E15 | E16 | E13 | E11 | ESE8 | SW4 | W15 | W19 | W9 | W20 | W9 | E6.7 | W9 |

| | |
|--|-----------------|
| SE2.9 SSE3.1 SSE2.6 S2.9 S2.5 S2.5 S2.3 SSE2.1 SSE2.5 SSE2.8 SSE3.3 S4.6 S4.4 SSE4.8 SSE4.0 SSE4.0 SE4.1 ESE4.7 ESE5.5 ESE5.6 ESE4.8 ESE4.7 ESE4.1 SE3.6 | Diurnal Average |
| ENE28 ENE28 NE28 NE29 ENE33 NE30 NE26 NE28 NE33 NE33 NE36 NE40 NE38 S38 S36 ESE31 ESE39 ESE41 E41 E40 E36 E34 E31 E29 | Diurnal Maximum |

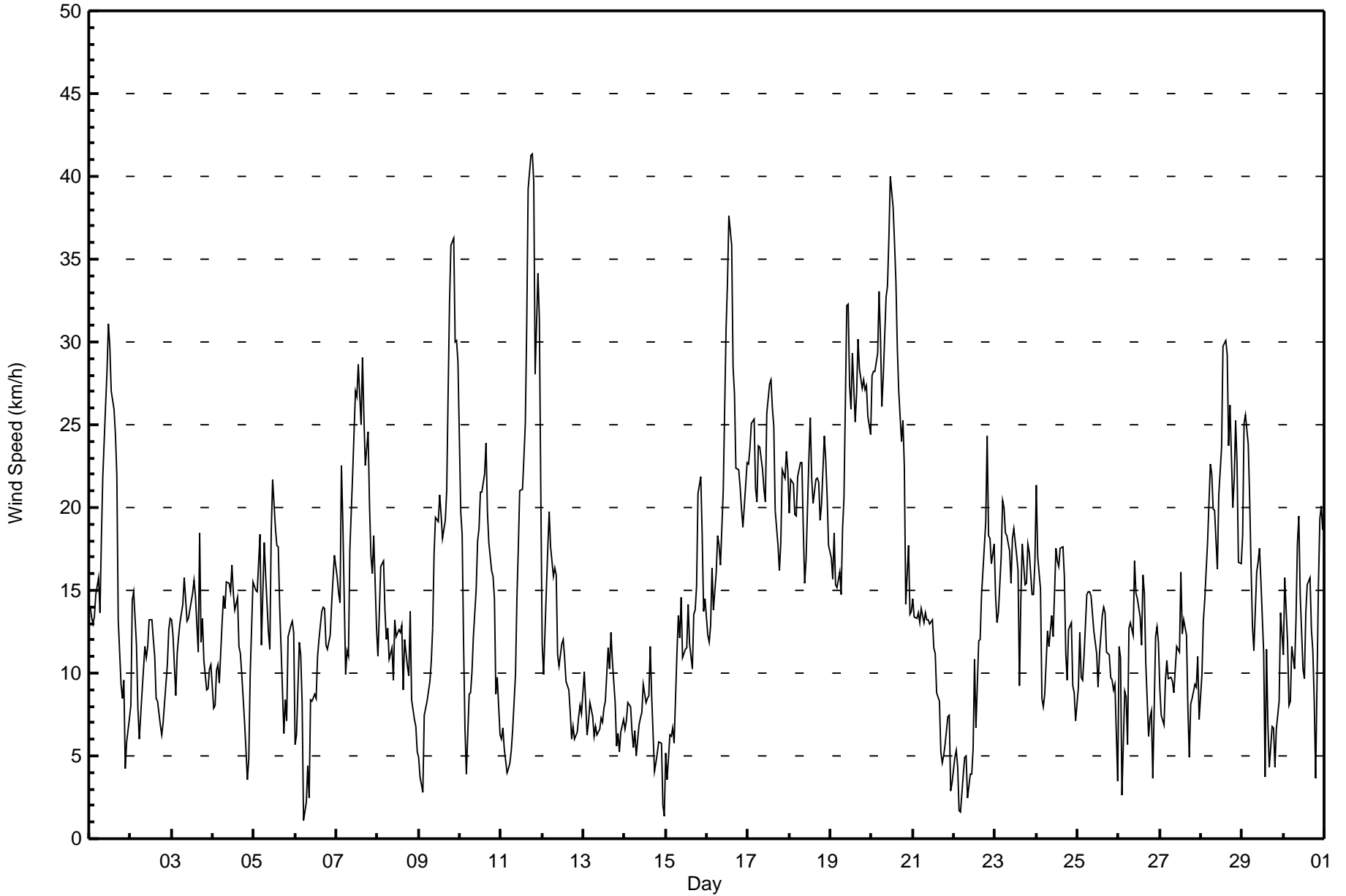
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Chipewyan - September 2017

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - September 2017

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 52 | 7.22 | 7.22 |
| 6 - 11 | 211 | 29.31 | 36.53 |
| 12 - 19 | 288 | 40.00 | 76.53 |
| 20 - 28 | 130 | 18.06 | 94.58 |
| 29 - 38 | 34 | 4.72 | 99.31 |
| > 38 | 5 | 0.69 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 3 | 6 | 0 | 1 | 1 | 1 | 3 | 2 | 3 | 1 | 4 | 1 | 2 | 3 | 12 | 9 | 52 |
| 6 - 11 | 12 | 10 | 2 | 6 | 26 | 13 | 10 | 3 | 4 | 6 | 11 | 14 | 14 | 28 | 26 | 26 | 211 |
| 12 - 19 | 12 | 10 | 1 | 8 | 38 | 19 | 26 | 31 | 17 | 21 | 7 | 12 | 37 | 34 | 9 | 6 | 288 |
| 20 - 28 | 0 | 0 | 7 | 18 | 4 | 6 | 13 | 29 | 35 | 3 | 0 | 1 | 12 | 2 | 0 | 0 | 130 |
| 29 - 38 | 0 | 0 | 9 | 4 | 9 | 1 | 0 | 0 | 9 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 34 |
| > 38 | 0 | 0 | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| Totals | 27 | 26 | 20 | 37 | 80 | 42 | 52 | 65 | 68 | 31 | 22 | 28 | 67 | 67 | 47 | 41 | 720 |

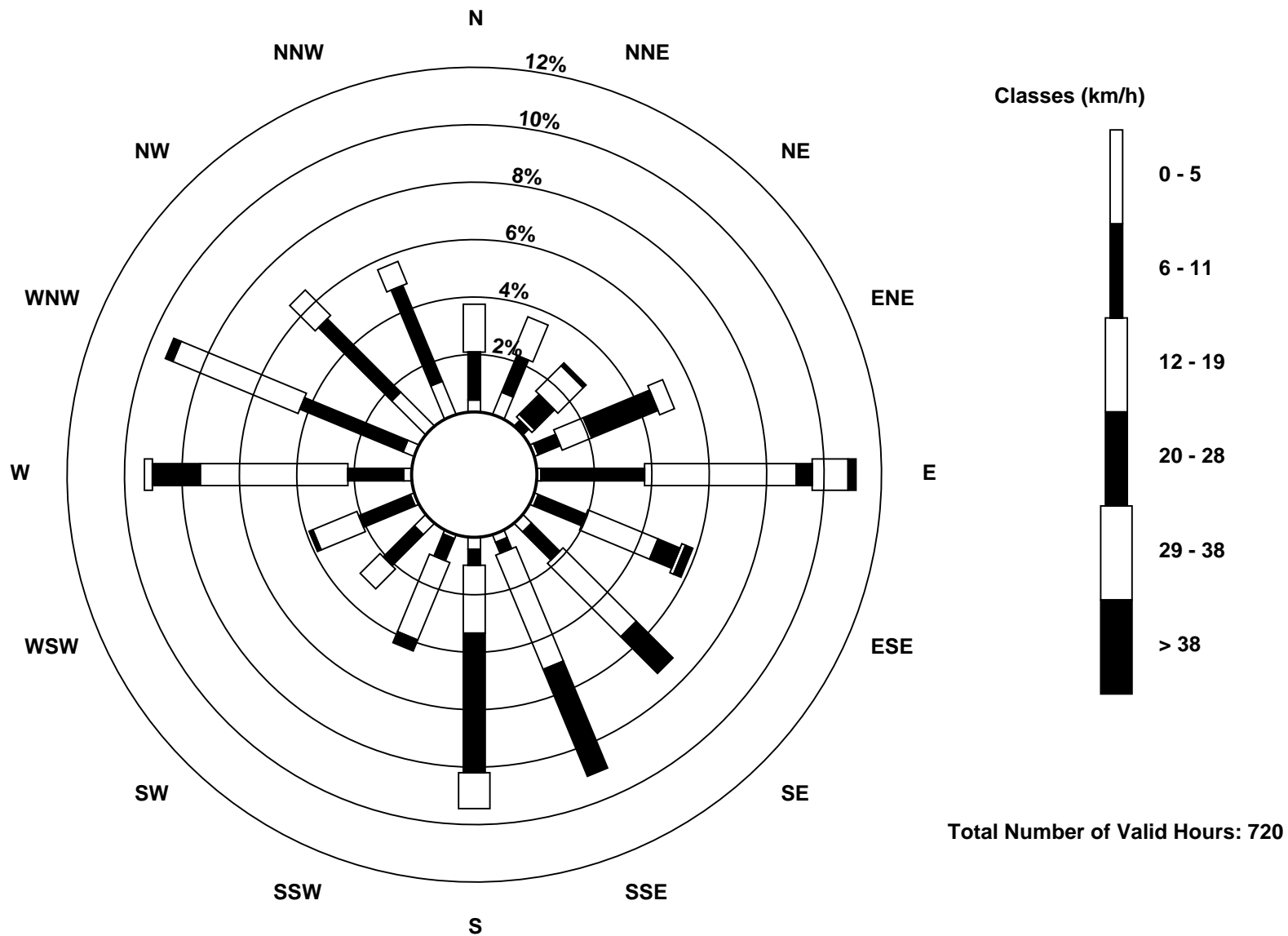
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - September 2017

| | |
|--|---|
| Direction of Maximum Speed: 94 deg on Sep 11 19:00 Direction of Maximum Daily Speed Average: 46.0 deg on Sep 20 | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 |
| Direction of Minimum Speed: 330 deg on Sep 6 06:00 Direction of Minimum Daily Speed Average: 6.0 deg on Sep 14 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 267.2 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-Sep | 265 | 262 | 259 | 251 | 254 | 262 | 263 | 265 | 262 | 262 | 263 | 269 | 266 | 267 | 273 | 271 | 269 | 278 | 276 | 283 | 18 | 342 | 265 | 254 | 267.5 |
| 2-Sep | 291 | 287 | 289 | 284 | 280 | 265 | 270 | 272 | 287 | 289 | 270 | 280 | 284 | 277 | 272 | 257 | 229 | 241 | 257 | 233 | 241 | 286 | 269 | 278 | 273.5 |
| 3-Sep | 283 | 283 | 276 | 272 | 277 | 279 | 286 | 286 | 290 | 283 | 281 | 271 | 286 | 279 | 301 | 331 | 337 | 336 | 322 | 317 | 313 | 304 | 293 | 290 | 294.4 |
| 4-Sep | 305 | 293 | 288 | 299 | 289 | 291 | 288 | 288 | 287 | 291 | 307 | 308 | 314 | 311 | 297 | 274 | 259 | 253 | 245 | 222 | 133 | 148 | 209 | 196 | 282.2 |
| 5-Sep | 197 | 195 | 193 | 198 | 200 | 207 | 219 | 215 | 208 | 221 | 244 | 249 | 255 | 247 | 268 | 273 | 275 | 240 | 246 | 282 | 3 | 16 | 15 | 13 | 238.5 |
| 6-Sep | 10 | 345 | 352 | 353 | 359 | 330 | 340 | 305 | 187 | 100 | 105 | 103 | 96 | 95 | 91 | 93 | 91 | 87 | 88 | 91 | 91 | 101 | 93 | 105 | 80.1 |
| 7-Sep | 105 | 130 | 136 | 154 | 169 | 115 | 125 | 144 | 180 | 182 | 181 | 188 | 186 | 183 | 175 | 185 | 185 | 188 | 189 | 201 | 214 | 218 | 222 | 224 | 179.0 |
| 8-Sep | 236 | 248 | 258 | 256 | 263 | 263 | 279 | 290 | 300 | 290 | 281 | 271 | 272 | 261 | 253 | 276 | 262 | 251 | 228 | 218 | 232 | 225 | 218 | 190 | 258.0 |
| 9-Sep | 204 | 122 | 74 | 69 | 71 | 152 | 136 | 129 | 96 | 90 | 94 | 89 | 86 | 70 | 67 | 62 | 62 | 71 | 87 | 86 | 84 | 78 | 79 | 84 | 84.2 |
| 10-Sep | 78 | 81 | 67 | 28 | 315 | 284 | 286 | 293 | 281 | 286 | 292 | 290 | 284 | 269 | 267 | 266 | 269 | 281 | 280 | 287 | 305 | 324 | 330 | 327 | 292.2 |
| 11-Sep | 311 | 320 | 311 | 299 | 315 | 3 | 32 | 66 | 132 | 139 | 128 | 128 | 117 | 126 | 117 | 108 | 108 | 104 | 94 | 89 | 77 | 83 | 87 | 84 | 99.4 |
| 12-Sep | 138 | 227 | 259 | 258 | 272 | 282 | 313 | 324 | 346 | 357 | 354 | 343 | 340 | 332 | 12 | 341 | 333 | 315 | 333 | 337 | 329 | 334 | 331 | 319 | 315.7 |
| 13-Sep | 322 | 331 | 312 | 318 | 308 | 303 | 288 | 278 | 276 | 300 | 327 | 333 | 296 | 311 | 321 | 337 | 328 | 329 | 325 | 318 | 306 | 334 | 318 | 320 | 315.9 |
| 14-Sep | 327 | 330 | 333 | 321 | 333 | 341 | 329 | 321 | 315 | 324 | 303 | 262 | 304 | 315 | 299 | 278 | 283 | 324 | 5 | 341 | 341 | 3 | 24 | 335 | 317.1 |
| 15-Sep | 266 | 236 | 228 | 225 | 222 | 211 | 201 | 186 | 183 | 184 | 171 | 171 | 154 | 140 | 189 | 186 | 164 | 149 | 129 | 150 | 170 | 190 | 194 | 194 | 177.7 |
| 16-Sep | 203 | 201 | 196 | 197 | 186 | 192 | 191 | 187 | 177 | 180 | 182 | 180 | 185 | 183 | 185 | 192 | 181 | 177 | 178 | 178 | 161 | 167 | 173 | 175 | 182.8 |
| 17-Sep | 181 | 177 | 173 | 176 | 166 | 162 | 161 | 164 | 166 | 170 | 159 | 170 | 173 | 165 | 171 | 169 | 167 | 161 | 152 | 156 | 148 | 155 | 148 | 155 | 165.0 |
| 18-Sep | 157 | 159 | 160 | 160 | 157 | 155 | 153 | 153 | 148 | 134 | 126 | 150 | 159 | 147 | 125 | 127 | 121 | 113 | 124 | 128 | 129 | 128 | 125 | 109 | 140.0 |
| 19-Sep | 115 | 92 | 97 | 80 | 79 | 72 | 60 | 82 | 81 | 82 | 81 | 76 | 69 | 73 | 70 | 67 | 61 | 61 | 67 | 74 | 72 | 68 | 61 | 61 | 73.7 |
| 20-Sep | 64 | 63 | 56 | 54 | 57 | 47 | 44 | 46 | 50 | 48 | 49 | 47 | 46 | 45 | 43 | 36 | 41 | 39 | 39 | 42 | 24 | 32 | 24 | 19 | 46.0 |
| 21-Sep | 14 | 11 | 13 | 7 | 355 | 359 | 354 | 350 | 354 | 354 | 356 | 358 | 359 | 333 | 344 | 5 | 322 | 319 | 22 | 306 | 297 | 304 | 310 | 326 | 352.2 |
| 22-Sep | 318 | 327 | 332 | 295 | 3 | 319 | 291 | 336 | 277 | 220 | 173 | 162 | 197 | 111 | 95 | 88 | 89 | 115 | 118 | 116 | 139 | 140 | 144 | 148 | 125.8 |
| 23-Sep | 150 | 158 | 152 | 143 | 141 | 144 | 145 | 152 | 156 | 170 | 164 | 178 | 168 | 160 | 151 | 156 | 171 | 150 | 133 | 128 | 148 | 153 | 145 | 146 | 152.4 |
| 24-Sep | 155 | 153 | 163 | 129 | 129 | 142 | 131 | 130 | 138 | 146 | 151 | 168 | 161 | 154 | 157 | 161 | 161 | 158 | 113 | 119 | 116 | 90 | 120 | 99 | 144.2 |
| 25-Sep | 79 | 107 | 90 | 100 | 105 | 105 | 101 | 101 | 100 | 97 | 119 | 131 | 111 | 91 | 94 | 94 | 90 | 88 | 94 | 102 | 92 | 92 | 90 | 257 | 99.3 |
| 26-Sep | 302 | 360 | 33 | 238 | 243 | 239 | 255 | 269 | 283 | 293 | 299 | 292 | 282 | 257 | 264 | 267 | 282 | 292 | 287 | 299 | 14 | 78 | 83 | 86 | 285.5 |
| 27-Sep | 94 | 93 | 65 | 19 | 32 | 29 | 35 | 12 | 18 | 24 | 44 | 96 | 107 | 110 | 110 | 111 | 108 | 18 | 15 | 356 | 353 | 354 | 7 | 43 | 52.0 |
| 28-Sep | 81 | 118 | 113 | 126 | 142 | 138 | 133 | 124 | 118 | 140 | 164 | 165 | 171 | 176 | 177 | 178 | 174 | 182 | 173 | 161 | 180 | 179 | 194 | 194 | 159.5 |
| 29-Sep | 191 | 184 | 188 | 192 | 188 | 189 | 193 | 177 | 190 | 199 | 196 | 179 | 204 | 145 | 129 | 192 | 135 | 88 | 112 | 97 | 88 | 101 | 84 | 74 | 172.7 |
| 30-Sep | 80 | 85 | 81 | 77 | 73 | 88 | 79 | 86 | 93 | 91 | 92 | 101 | 103 | 102 | 95 | 99 | 101 | 100 | 115 | 233 | 268 | 272 | 283 | 291 | 89.4 |

143.3 148.3 161.9 181.1 174.2 170.2 177.4 168.3 159.5 157.6 161.2 178.0 180.1 165.0 158.2 155.0 140.1 123.2 114.7 120.4 116.0 108.8 113.8 124.2

Diurnal Average

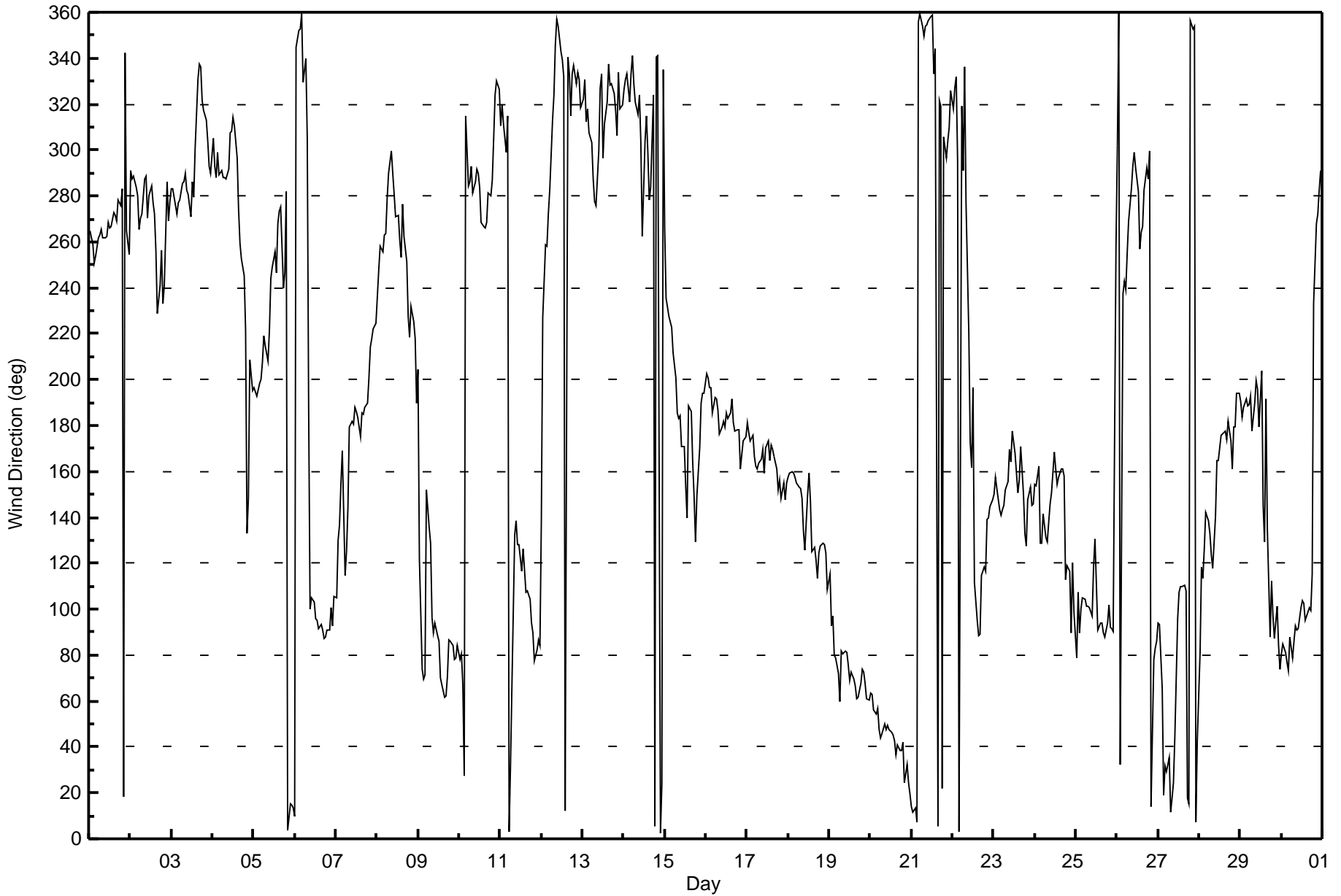
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Chipewyan - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Sep 6 06:00 Minimum Value: 3 deg on Sep 25 16:00 Percentiles: P ₁ = 5 P ₁₀ = 6 Q ₁ = 8 Median = 13 Q ₃ = 18 P ₉₀ = 25 P ₉₉ = 73 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 13 | 12 | 14 | 12 | 13 | 13 | 14 | 16 | 17 | 17 | 17 | 16 | 16 | 17 | 17 | 16 | 16 | 15 | 17 | 42 | 18 | 27 | 18 | 13 | 42 |
| 2-Sep | 20 | 13 | 13 | 13 | 14 | 13 | 11 | 15 | 18 | 23 | 25 | 22 | 20 | 23 | 17 | 21 | 18 | 18 | 9 | 9 | 14 | 16 | 14 | 13 | 25 |
| 3-Sep | 14 | 12 | 12 | 13 | 13 | 13 | 13 | 15 | 16 | 20 | 19 | 21 | 21 | 20 | 25 | 38 | 32 | 27 | 19 | 17 | 17 | 17 | 15 | 14 | 38 |
| 4-Sep | 15 | 14 | 14 | 16 | 14 | 14 | 15 | 16 | 16 | 18 | 24 | 24 | 25 | 25 | 22 | 23 | 19 | 16 | 13 | 13 | 27 | 48 | 11 | 7 | 48 |
| 5-Sep | 7 | 8 | 7 | 7 | 12 | 12 | 9 | 9 | 10 | 21 | 14 | 15 | 18 | 18 | 16 | 17 | 16 | 27 | 12 | 21 | 21 | 12 | 14 | 13 | 27 |
| 6-Sep | 73 | 37 | 17 | 16 | 33 | 91 | 80 | 25 | 57 | 12 | 9 | 9 | 9 | 6 | 6 | 5 | 5 | 5 | 5 | 6 | 5 | 8 | 8 | 7 | 91 |
| 7-Sep | 7 | 8 | 12 | 8 | 11 | 28 | 13 | 16 | 16 | 9 | 9 | 7 | 8 | 7 | 6 | 7 | 6 | 6 | 7 | 11 | 8 | 9 | 8 | 10 | 28 |
| 8-Sep | 12 | 13 | 14 | 14 | 13 | 13 | 15 | 16 | 16 | 16 | 15 | 17 | 15 | 17 | 14 | 19 | 18 | 15 | 16 | 10 | 15 | 12 | 13 | 23 | 23 |
| 9-Sep | 24 | 28 | 42 | 7 | 9 | 28 | 16 | 17 | 8 | 8 | 7 | 6 | 8 | 11 | 9 | 10 | 10 | 9 | 11 | 7 | 8 | 8 | 8 | 8 | 42 |
| 10-Sep | 9 | 9 | 12 | 26 | 41 | 13 | 14 | 15 | 16 | 15 | 16 | 16 | 17 | 17 | 16 | 16 | 15 | 15 | 15 | 16 | 17 | 22 | 22 | 25 | 41 |
| 11-Sep | 15 | 12 | 22 | 19 | 17 | 20 | 19 | 12 | 24 | 8 | 9 | 9 | 8 | 7 | 8 | 6 | 5 | 5 | 7 | 8 | 11 | 8 | 7 | 19 | 24 |
| 12-Sep | 16 | 25 | 14 | 15 | 15 | 16 | 20 | 21 | 25 | 24 | 24 | 24 | 25 | 27 | 26 | 23 | 22 | 19 | 17 | 17 | 15 | 15 | 13 | 13 | 27 |
| 13-Sep | 12 | 13 | 12 | 12 | 7 | 8 | 16 | 13 | 23 | 27 | 26 | 34 | 23 | 31 | 25 | 27 | 22 | 21 | 22 | 19 | 18 | 24 | 13 | 14 | 34 |
| 14-Sep | 18 | 18 | 17 | 11 | 19 | 19 | 21 | 26 | 24 | 35 | 40 | 33 | 27 | 25 | 26 | 17 | 19 | 24 | 24 | 17 | 21 | 68 | 44 | 76 | 76 |
| 15-Sep | 28 | 32 | 13 | 8 | 10 | 12 | 9 | 9 | 11 | 11 | 11 | 12 | 16 | 19 | 19 | 17 | 14 | 7 | 4 | 9 | 12 | 6 | 7 | 7 | 32 |
| 16-Sep | 10 | 10 | 10 | 8 | 11 | 9 | 7 | 7 | 9 | 9 | 8 | 8 | 11 | 10 | 12 | 12 | 8 | 7 | 6 | 7 | 8 | 8 | 9 | 8 | 12 |
| 17-Sep | 7 | 7 | 8 | 8 | 7 | 6 | 7 | 7 | 9 | 11 | 9 | 11 | 11 | 12 | 12 | 10 | 9 | 8 | 8 | 9 | 6 | 8 | 7 | 8 | 12 |
| 18-Sep | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 7 | 11 | 6 | 19 | 14 | 15 | 9 | 6 | 6 | 6 | 5 | 4 | 4 | 5 | 6 | 14 | 19 |
| 19-Sep | 10 | 11 | 10 | 9 | 8 | 10 | 8 | 10 | 11 | 8 | 8 | 10 | 9 | 9 | 10 | 11 | 10 | 10 | 9 | 9 | 9 | 9 | 9 | 10 | 11 |
| 20-Sep | 9 | 10 | 11 | 10 | 11 | 12 | 12 | 13 | 12 | 12 | 12 | 13 | 13 | 12 | 14 | 15 | 14 | 14 | 14 | 12 | 16 | 15 | 17 | 18 | 18 |
| 21-Sep | 20 | 21 | 21 | 20 | 19 | 19 | 20 | 20 | 21 | 22 | 23 | 25 | 23 | 24 | 29 | 24 | 24 | 20 | 22 | 22 | 10 | 14 | 46 | 43 | 46 |
| 22-Sep | 16 | 15 | 28 | 74 | 56 | 35 | 46 | 22 | 45 | 39 | 37 | 43 | 16 | 46 | 12 | 10 | 8 | 15 | 6 | 8 | 7 | 6 | 6 | 7 | 74 |
| 23-Sep | 10 | 9 | 5 | 6 | 6 | 6 | 6 | 7 | 9 | 12 | 12 | 14 | 19 | 15 | 24 | 13 | 9 | 8 | 6 | 6 | 9 | 6 | 5 | 7 | 24 |
| 24-Sep | 6 | 7 | 8 | 26 | 13 | 14 | 11 | 12 | 12 | 10 | 11 | 12 | 14 | 10 | 10 | 9 | 9 | 9 | 16 | 6 | 6 | 13 | 42 | 30 | 42 |
| 25-Sep | 19 | 10 | 14 | 12 | 11 | 9 | 8 | 7 | 9 | 6 | 18 | 9 | 15 | 4 | 3 | 3 | 5 | 6 | 6 | 6 | 6 | 10 | 6 | 82 | 82 |
| 26-Sep | 26 | 20 | 83 | 15 | 14 | 28 | 20 | 14 | 17 | 14 | 19 | 18 | 30 | 38 | 17 | 17 | 27 | 20 | 15 | 10 | 50 | 9 | 7 | 7 | 83 |
| 27-Sep | 15 | 8 | 24 | 13 | 14 | 12 | 15 | 21 | 21 | 21 | 19 | 24 | 5 | 8 | 6 | 5 | 11 | 20 | 13 | 13 | 16 | 17 | 15 | 47 | 47 |
| 28-Sep | 12 | 4 | 7 | 7 | 8 | 7 | 8 | 7 | 6 | 17 | 9 | 10 | 10 | 10 | 10 | 8 | 9 | 6 | 10 | 9 | 7 | 7 | 8 | 9 | 17 |
| 29-Sep | 5 | 5 | 6 | 6 | 6 | 8 | 8 | 11 | 11 | 10 | 13 | 12 | 13 | 56 | 12 | 25 | 51 | 13 | 15 | 26 | 7 | 8 | 13 | 6 | 56 |
| 30-Sep | 9 | 10 | 14 | 15 | 21 | 8 | 8 | 7 | 5 | 5 | 5 | 6 | 6 | 7 | 8 | 6 | 6 | 7 | 22 | 70 | 14 | 14 | 14 | 14 | 70 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |
| 73 37 83 74 56 91 80 26 57 39 40 43 30 56 29 38 51 27 24 70 50 68 46 82 | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association

SO₂ Calibration Summary

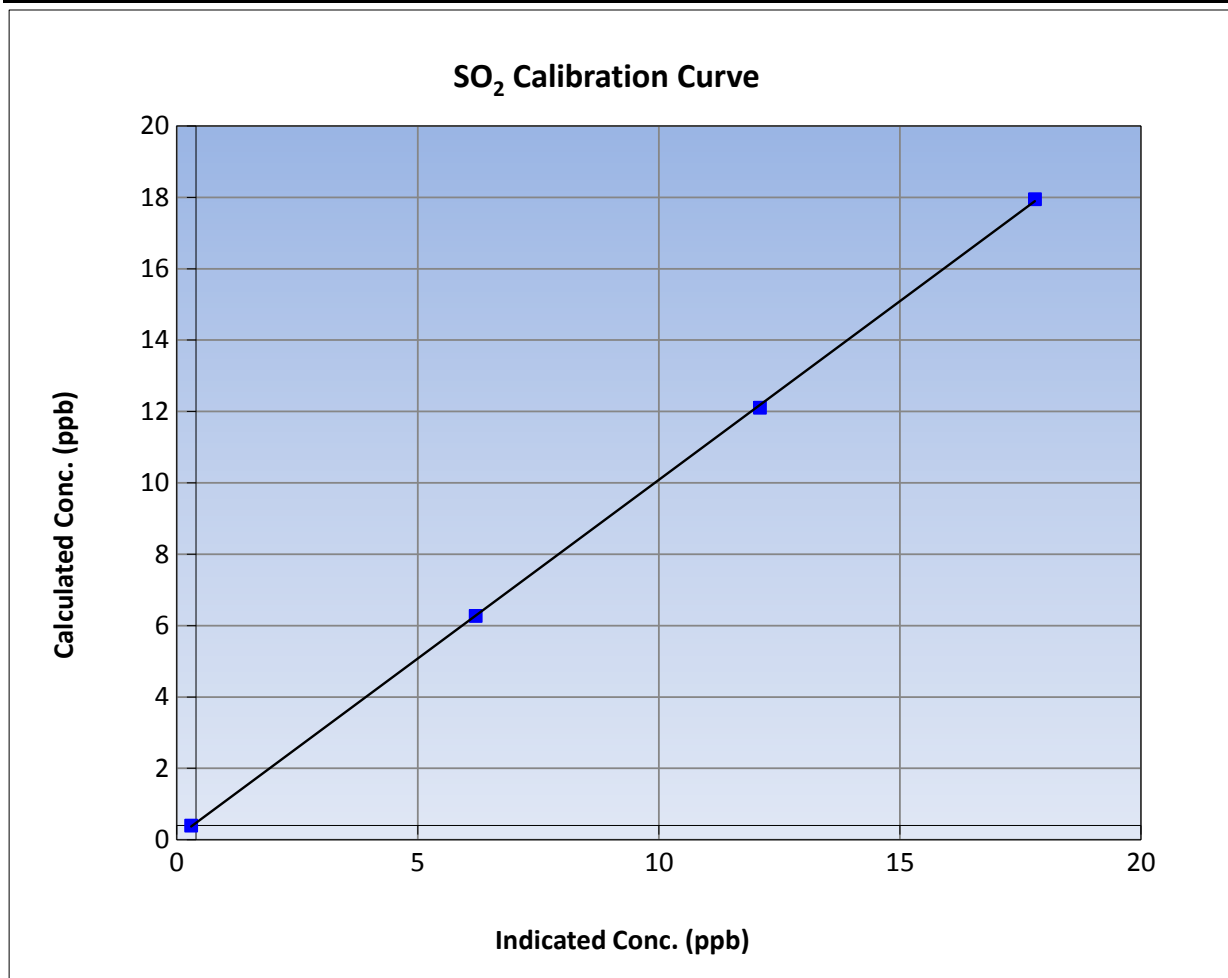
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Fort Chipewyan | Station Number | AMS 08 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:45 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1136451241 |

Calibration Data

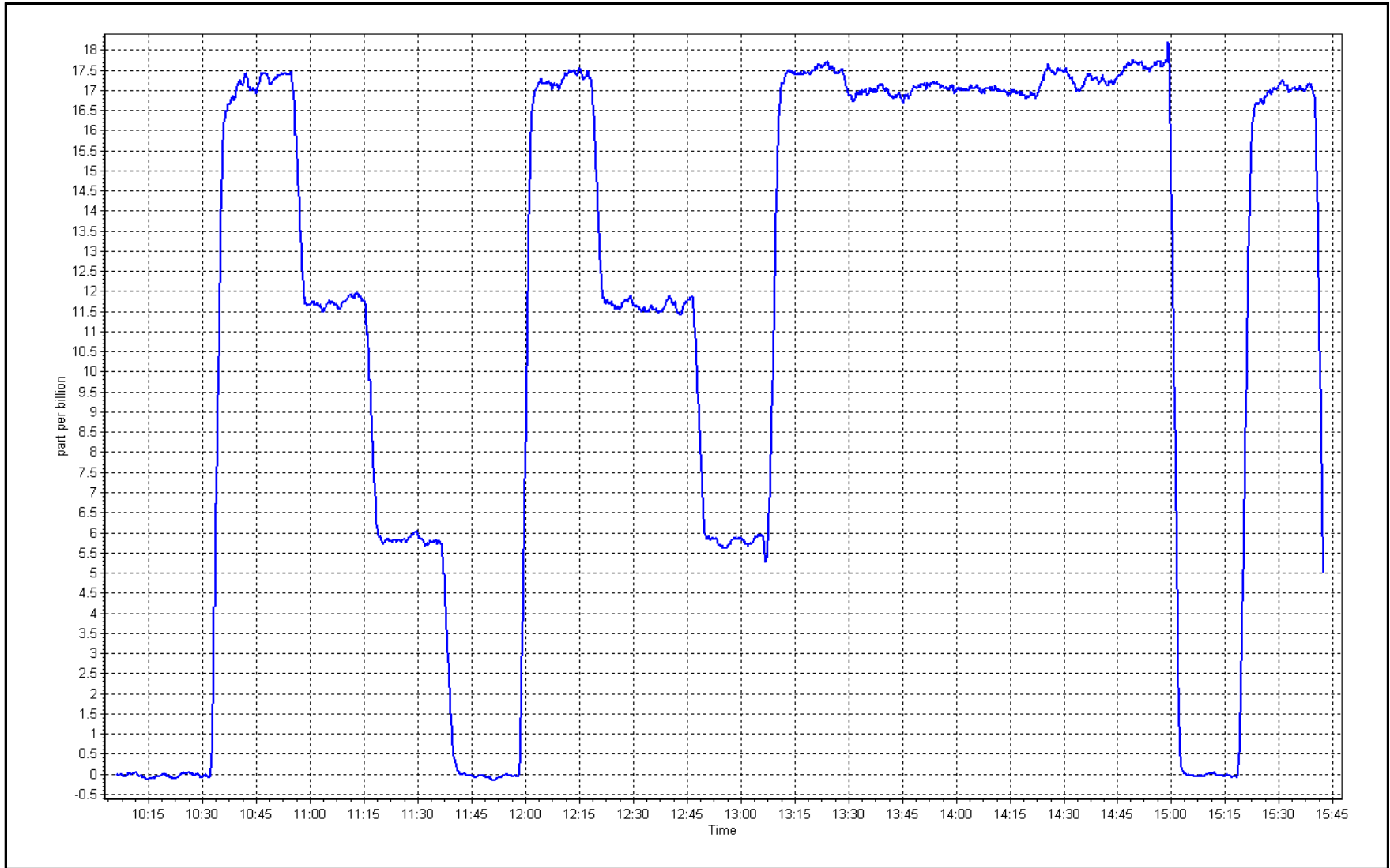
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999945 | ≥0.995 |
| 17.5 | 17.4 | 1.0085 | | | |
| 11.7 | 11.7 | 1.0009 | Slope | 1.001271 | 0.90 - 1.10 |
| 5.9 | 5.8 | 1.0129 | | | |
| | | | Intercept | 0.072267 | +/-30 |



SO2 Calibration Plot

Date: September 6, 2017

Location: Fort Chipewyan





Wood Buffalo Environmental Association

O₃ Calibration Summary

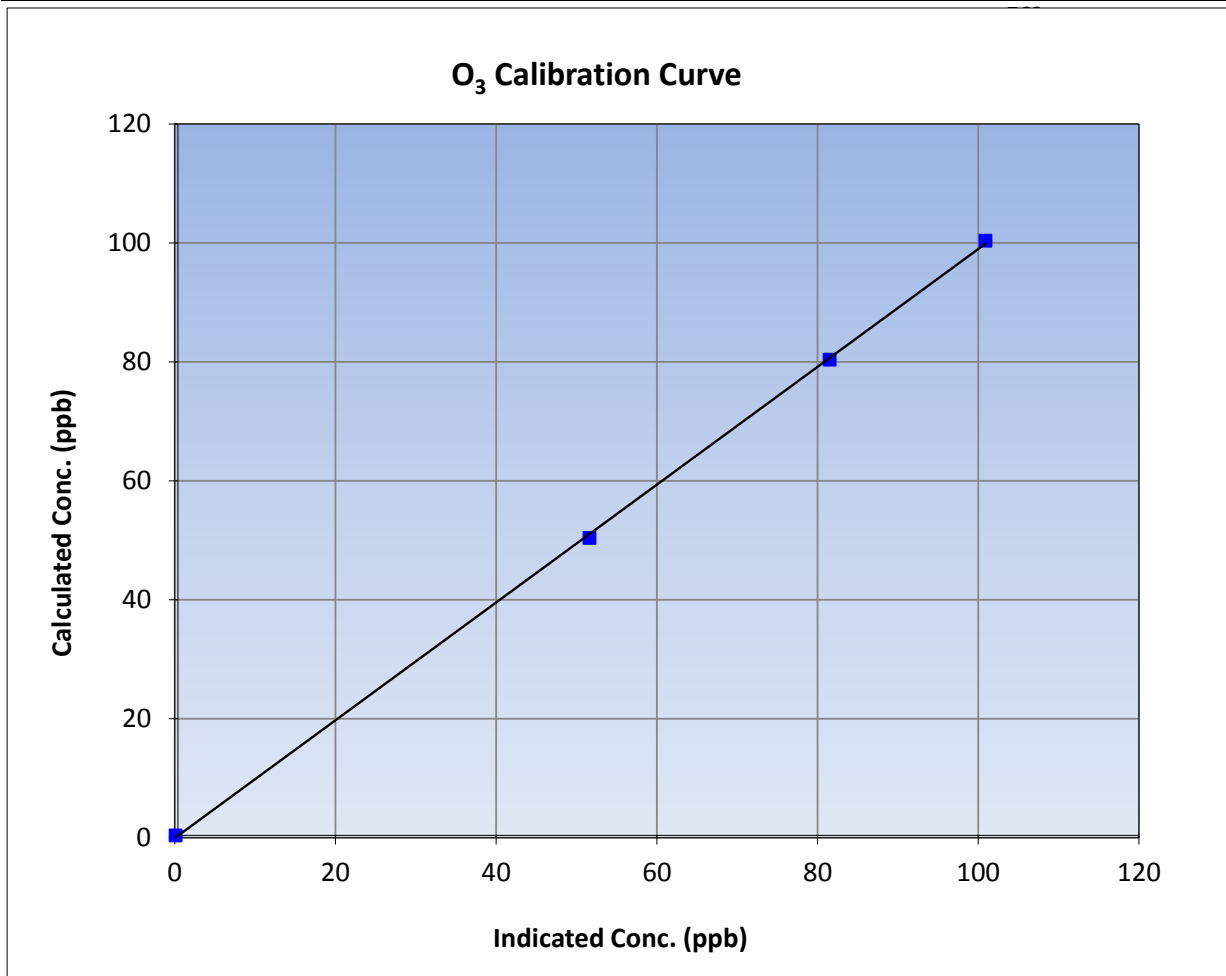
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Fort Chipewyan | Station Number | AMS 08 |
| Start Time (MST) | 6:50 | End Time (MST) | 9:10 |
| Analyzer make | API T400 | Analyzer serial # | 1020 |

Calibration Data

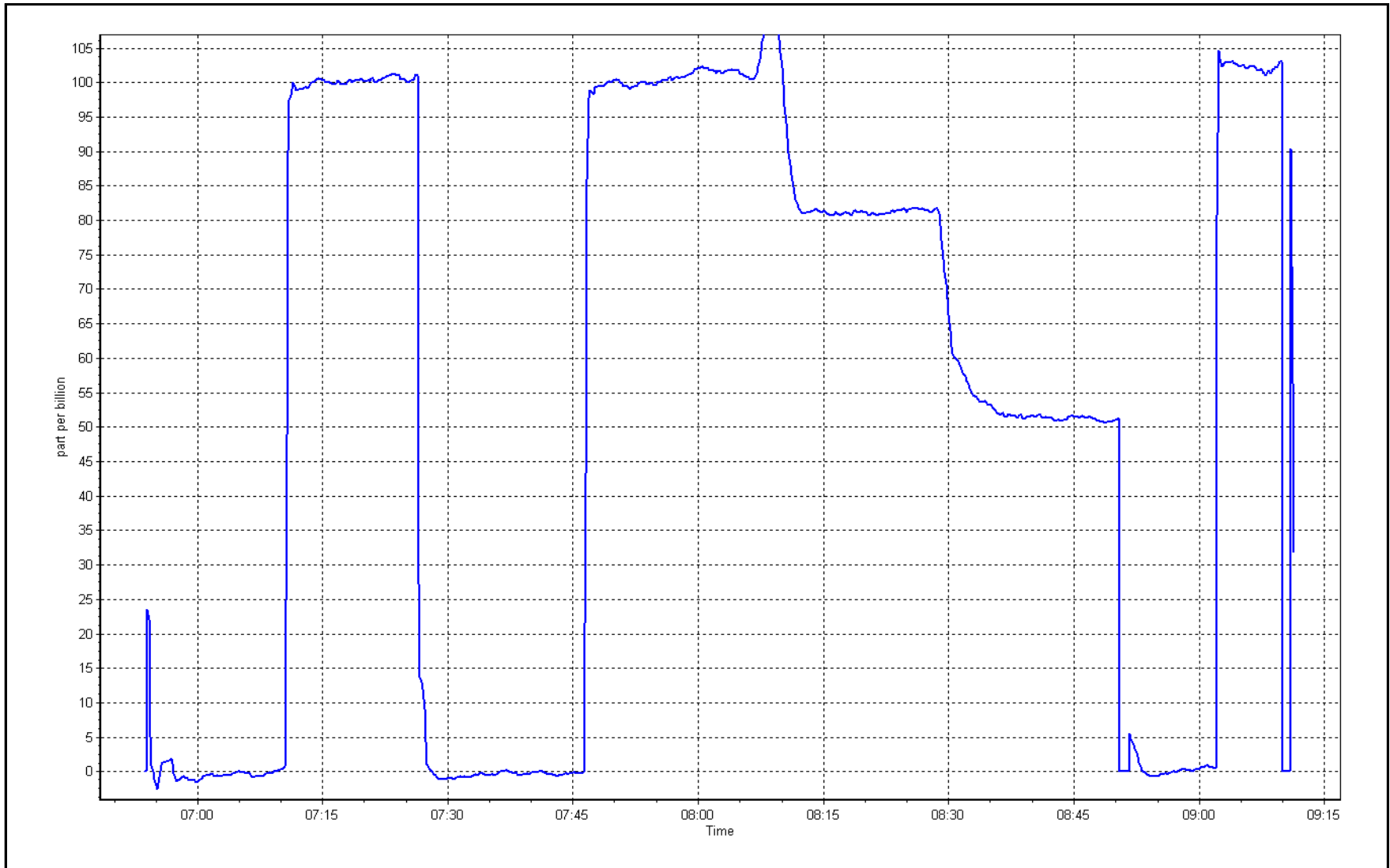
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 |
| 100.0 | 100.5 | 0.9950 | | |
| 80.0 | 81.1 | 0.9864 | Slope | 0.90 - 1.10 |
| 50.0 | 51.2 | 0.9766 | | |
| | | | Intercept | +/- 10 |



O₃ Calibration Plot

Date: September 7, 2017

Location: Fort Chipewyan





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|-----------------|
| Station Name: | Fort Chipewyan | Station number: | AMS 08 |
| Calibration Date: | September 6, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 10:05 | End time (MST): | 15:45 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-------------------|
| NO Gas Cylinder # | LL79696 | Cal Gas Expiry Date | February 13, 2018 |
| NOX Cal Gas Conc. | <u>20.1</u> ppb | NO Cal Gas Conc. | <u>20.1</u> ppb |
| Calibrator Model | API T700 | Serial Number | 2656 |
| ZAG make/model | ATI T701 | Serial Number | 4698 |

Analyzer Information

Analyzer make: API T200u

Analyzer serial #: 11039

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|------------|--------------|---------------|---------------------|--------------|---------------|
| NO slope | 1.325 | 1.325 | NOX Range (ppb) | 0 - 1000 | ppb |
| NOX slope | 1.344 | 1.344 | PMT Temperature | 5.1 | 5.1 |
| NO2 slope | 1.000 | 1.000 | Reaction cell Press | 5.3 | 5.2 |
| NO offset | 0.1 | 0.1 | Sample Flow | 1118 | 1113 |
| NOX offset | 0.2 | 0.2 | PMT Voltage | 502.0 | 502.0 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|----------------------------|--------------|---------------|
| NO _x Cal Slope | 0.996543 | 1.002939 |
| NO _x Cal Offset | -0.088701 | 0.080473 |
| NO Cal Slope | 0.995759 | 1.001538 |
| NO Cal Offset | 0.119878 | 0.110196 |
| NO ₂ Cal Slope | 1.005642 | 1.008087 |
| NO ₂ Cal Offset | -0.014409 | 0.260104 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5996 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| as found span | 5955 | 44.8 | 150.1 | 150.1 | 0.0 | 150.5 | 149.9 | 0.6 | 0.9972 | 1.0012 |
| calibrator zero | 5996 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | ---- | ---- |
| high point | 5955 | 44.8 | 150.1 | 150.1 | 0.0 | 149.4 | 149.7 | -0.2 | 1.0046 | 1.0026 |
| second point | 5970 | 29.9 | 100.2 | 100.2 | 0.0 | 100.1 | 100.1 | 0.0 | 1.0007 | 1.0007 |
| third point | 5985 | 15.0 | 50.3 | 50.3 | 0.0 | 49.9 | 49.8 | 0.1 | 1.0070 | 1.0090 |
| as left zero | 5996 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as left span | 5955 | 44.8 | 150.1 | 41.9 | 108.2 | 148.6 | 46.5 | 102.1 | 1.0100 | 0.9011 |
| Average Correction Factor | | | | | | | | | 1.0041 | 1.0041 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 150.4 ppb | NO = 149.9 ppb | | *Percent Change | NO _x = 0.2% |
| Previous Response | NO _x = 150.7 ppb | NO = 150.6 ppb | | *Percent Change | NO = 0.5% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 150.0 | 150.3 | -0.3 | 1.0006 | 0.9986 | ---- | ---- |
| 1st NO2 (100 ppb O3) | 41.9 | 108.4 | 149.1 | 41.9 | 107.2 | 1.0066 | ---- | 1.0112 | 98.9% |
| 2nd NO2 (80 ppb O3) | 37.4 | 112.9 | 149.5 | 37.4 | 112.1 | 1.0039 | ---- | 1.0071 | 99.3% |
| 3rd NO2 (50 ppb O3) | 88.9 | 61.4 | 149.0 | 88.9 | 60.1 | 1.0073 | ---- | 1.0216 | 97.9% |
| 2nd NO ref point | ---- | 0.0 | 149.1 | 149.3 | -0.2 | 1.0066 | 1.0053 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0061 | 1.0019 | 1.0133 | 98.7% |

Notes:

No adjustments made.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

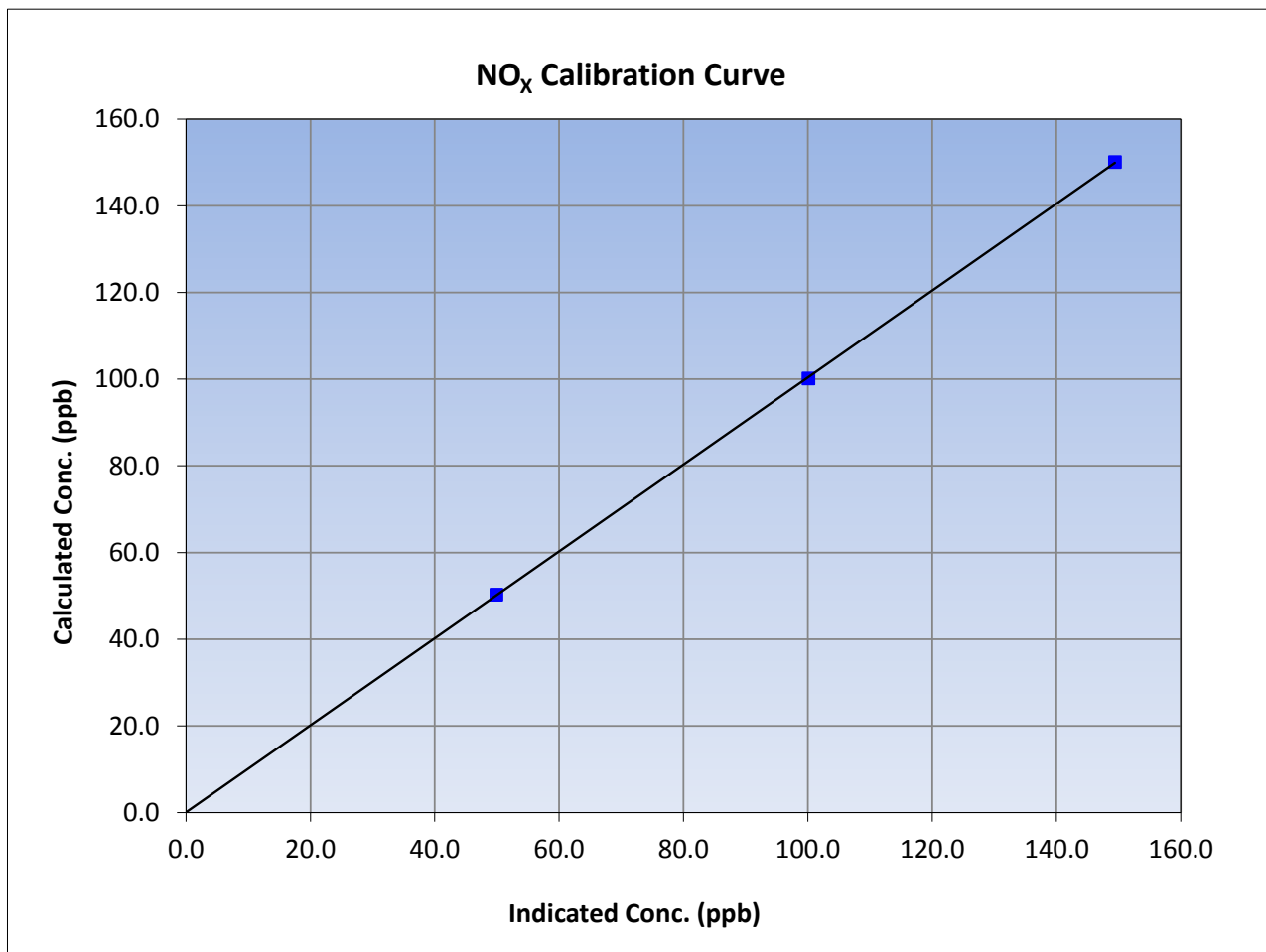
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Fort Chipewyan | Station Number | AMS 08 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:45 |
| Analyzer make | API T200u | Analyzer serial # | 11039 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 150.1 | 149.4 | 1.0046 | | | |
| 100.2 | 100.1 | 1.0007 | | | |
| 50.3 | 49.9 | 1.0070 | | | |
| | | | Slope | 1.002939 | 0.90 - 1.10 |
| | | | Intercept | 0.080473 | +/-20 |





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

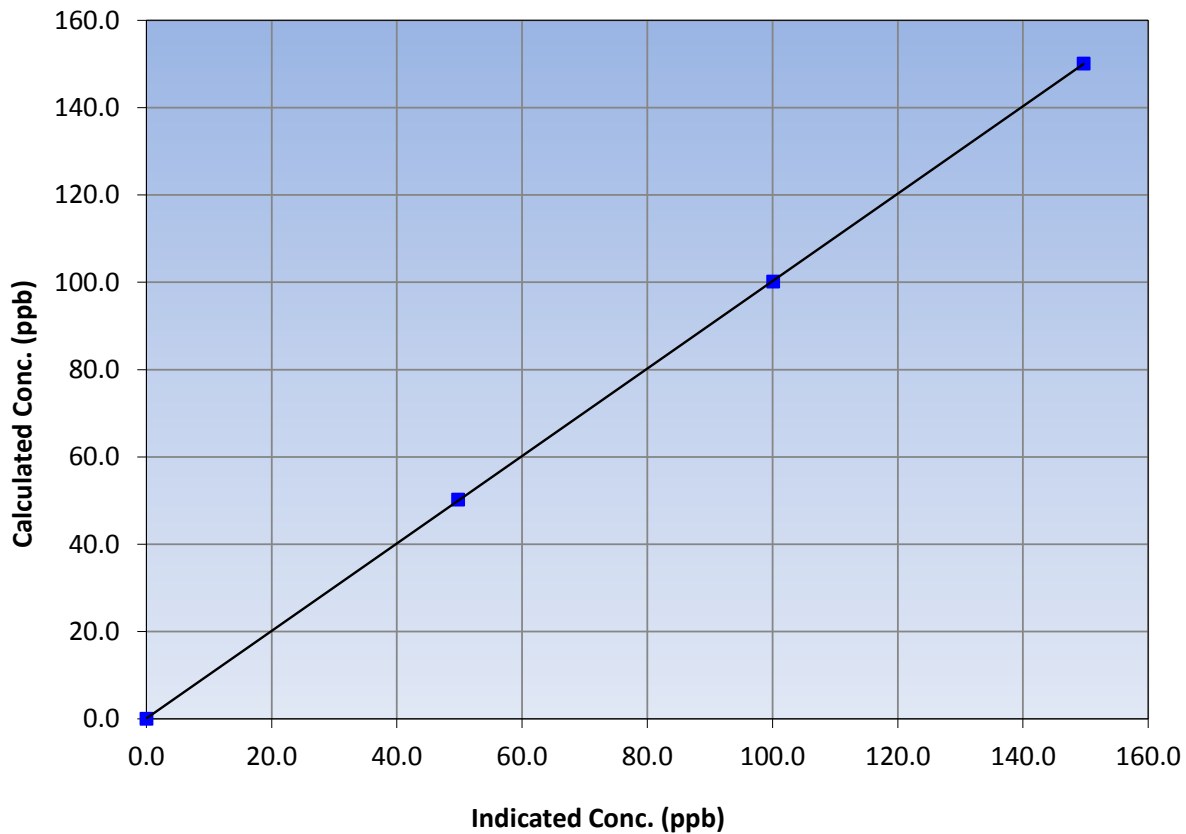
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Fort Chipewyan | Station Number | AMS 08 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:45 |
| Analyzer make | API T200u | Analyzer serial # | 11039 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 150.1 | 149.7 | 1.0026 | | | |
| 100.2 | 100.1 | 1.0007 | | | |
| 50.3 | 49.8 | 1.0090 | | | |
| | | | Slope | 1.001538 | 0.90 - 1.10 |
| | | | Intercept | 0.110196 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

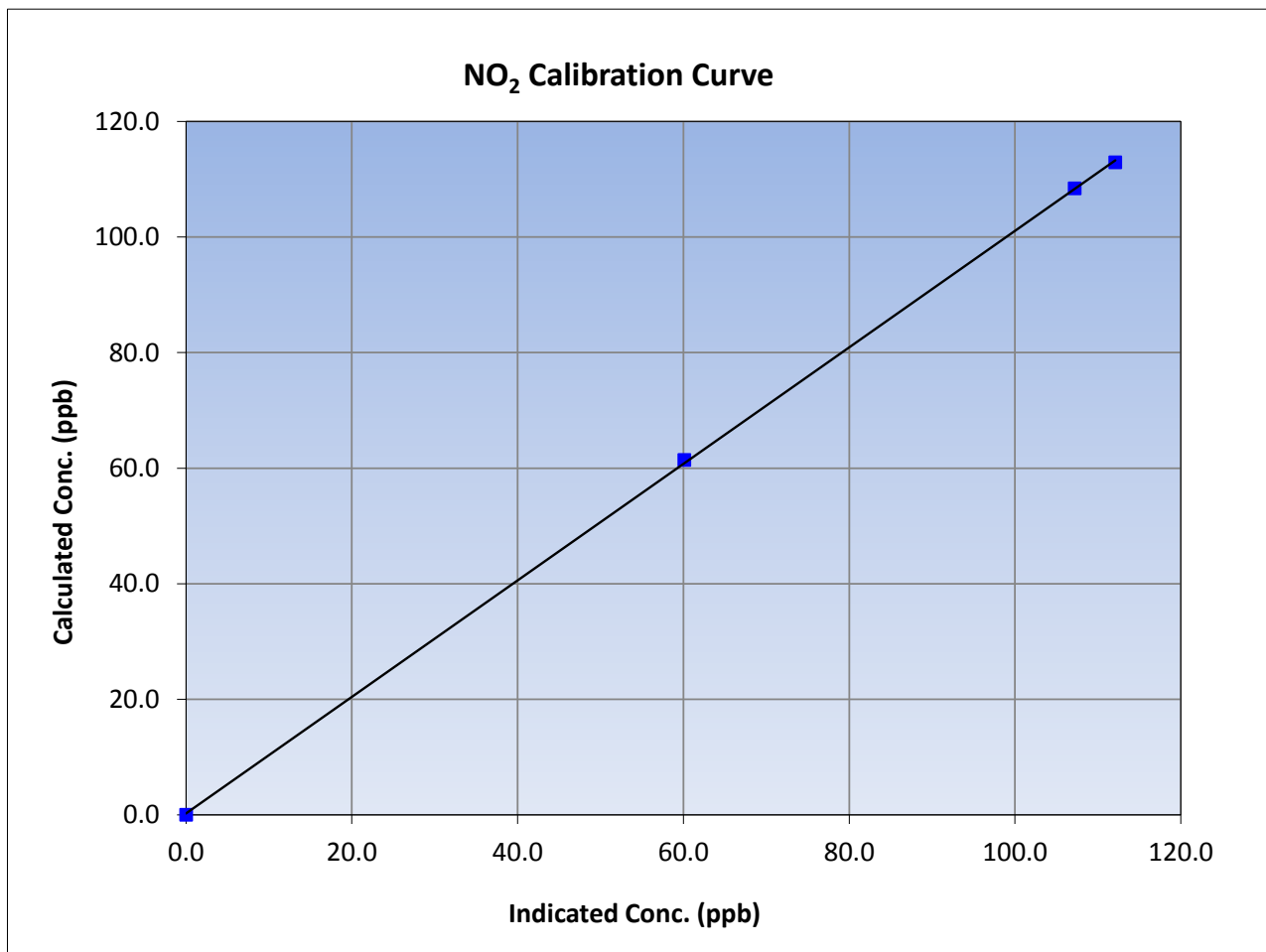
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Fort Chipewyan | Station Number | AMS 08 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:45 |
| Analyzer make | API T200u | Analyzer serial # | 11039 |

Calibration Data

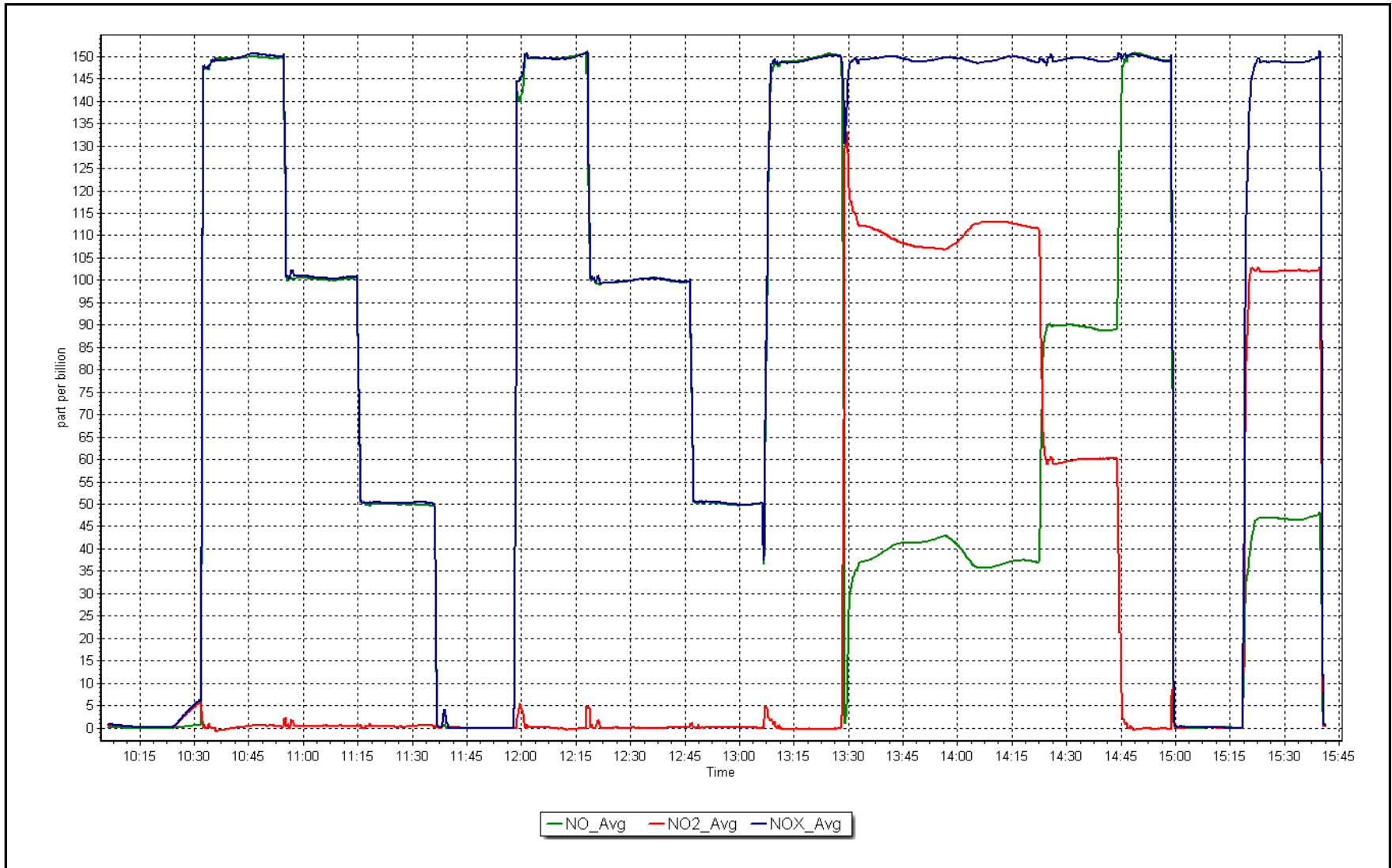
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 108.4 | 107.2 | 1.0112 | | | |
| 112.9 | 112.1 | 1.0071 | | | |
| 61.4 | 60.1 | 1.0216 | | | |
| | | | Slope | 1.008087 | 0.90 - 1.10 |
| | | | Intercept | 0.260104 | +/-20 |



NO_x Calibration Plot

Date: September 6, 2017

Location: Fort Chipewyan





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|-------------------|-----------------|-----------------|
| Station Name: | Fort Chipewyan | Station number: | AMS 08 |
| Calibration Date: | September 6, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 11:05 | End time (MST): | 12:50 |
| Sharp Model: | Thermo 5030 | S/N: | CM-2383 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 10384 |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1451 |
| Temp/RH standard: | Delta Cal | S/N: | 1451 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 18 | 17 | 18 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 986 | 987.25 | 986 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 996 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | -0.5 | ----- | 0 | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input checked="" type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: June 2, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: _____

(Limit) 0.4 LPM

Adjusted

Foil Calibration

(Limit) +/- 5% of previous

| <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|--------------------------|--------------------------|-----------------|
| Foil S/N: _____ | Foil S/N: _____ | |
| Foil Mass: _____ | Foil Mass: _____ | |
| Calibration Date: _____ | Calibration Date: _____ | |
| Correction Factor: _____ | Correction Factor: _____ | --- |

Annual Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-----------------|----------------|--------------------------|-----------------|
| T2 (°C) | | | | <input type="checkbox"/> | +/- 2 °C |
| T3 (°C) | | | | <input type="checkbox"/> | +/- 2 °C |
| T4 (°C) | | | | <input type="checkbox"/> | +/- 2 °C |
| RH (%) | | | | <input type="checkbox"/> | +/- 10% |
| Date Sample Tube Cleaned: | | June 2, 2017 | | | |
| Date Pump Rebuilt/Replaced: | | Not available | | | |

Notes: Status 4000 present. Reset analyzer after as founds and status cleared. No adjustments made.
 Cyclone head cleaned.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 9
BARGE LANDING
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| TRS(ppb) Average | 683 | 36 | 37 | 99.86 | 5 | 0 | 1 | 0 |
| THC(ppm) Average | 684 | 34 | 36 | 99.72 | 4 | - | 2.6 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100 | 32.5 | - | 22.2 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 99 | - | 91 | - |
| Wind Speed 10 m (km/h) Average | 717 | 0 | 3 | 99.58 | 18 | - | 14 | - |
| Wind Direction 10 m (deg) Average | 717 | 0 | 3 | 99.58 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| TRS(ppb) Average | 683 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| THC(ppm) Average | 684 | 2.16 | 0.2 | - | 1.9 | 1.9 | 2 | 2.1 | 2.2 | 2.4 | 4 |
| Temperature (C) Average | 720 | 12.21 | 6.5 | - | -2.5 | 4.3 | 7.1 | 11.4 | 16.5 | 21.4 | 32.5 |
| Relative Humidity (%) Average | 720 | 68.7 | 21 | - | 22 | 36 | 52 | 72 | 86 | 95 | 99 |
| Wind Speed 10 m (km/h) Average | 717 | 6.4 | 4 | - | 0 | 2 | 3 | 6 | 9 | 12 | 18 |
| Wind Direction 10 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|---------------------|--|
| THC | 06 Sep 2017 14:00 | 06 Sep 2017 15:00 | 2 | Maintenance - Station operator on site |
| TRS | 07 Sep 2017 11:00 | 07 Sep 2017 11:00 | 1 | Maintenance - sample manifold cleaned |
| Wind Speed, Wind Direction | 07 Sep 2017 01:00 | 07 Sep 2017 01:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 13 Sep 2017 21:00 | 13 Sep 2017 21:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 14 Sep 2017 03:00 | 14 Sep 2017 03:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 5 ppb on Sep 8 05:00 | Maximum Daily Average: 0.7 ppb on Sep 8 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 15 17:00 | Minimum Daily Average: 0.2 ppb on Sep 21 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 0.5 ppb at hour 5 | Minimum Diurnal Average: 0.2 ppb at hour 17 | | Hours of Calibration: | 36 |
| 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 = 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 4-Sep | 0 | 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-Sep | 0 | 0 | Z | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 6-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 2 | 1 | 1 | M | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.6 | 2 |
| 8-Sep | 1 | 1 | 1 | 1 | 5 | Z | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 5 | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 10-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 12-Sep | 0 | 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-Sep | 1 | 0 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 14-Sep | 0 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0.5 | 3 | |
| 15-Sep | 1 | 0 | 0 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 1 | |
| 16-Sep | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0.4 | 1 |
| 17-Sep | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 18-Sep | 0 | 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-Sep | 0 | 0 | 1 | 1 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 20-Sep | 0 | 0 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 21-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.4 | 1 | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 27-Sep | 0 | 0 | 0 | 0 | 1 | 1 | Z | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0.4 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.4 | 1 | |
| 29-Sep | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |

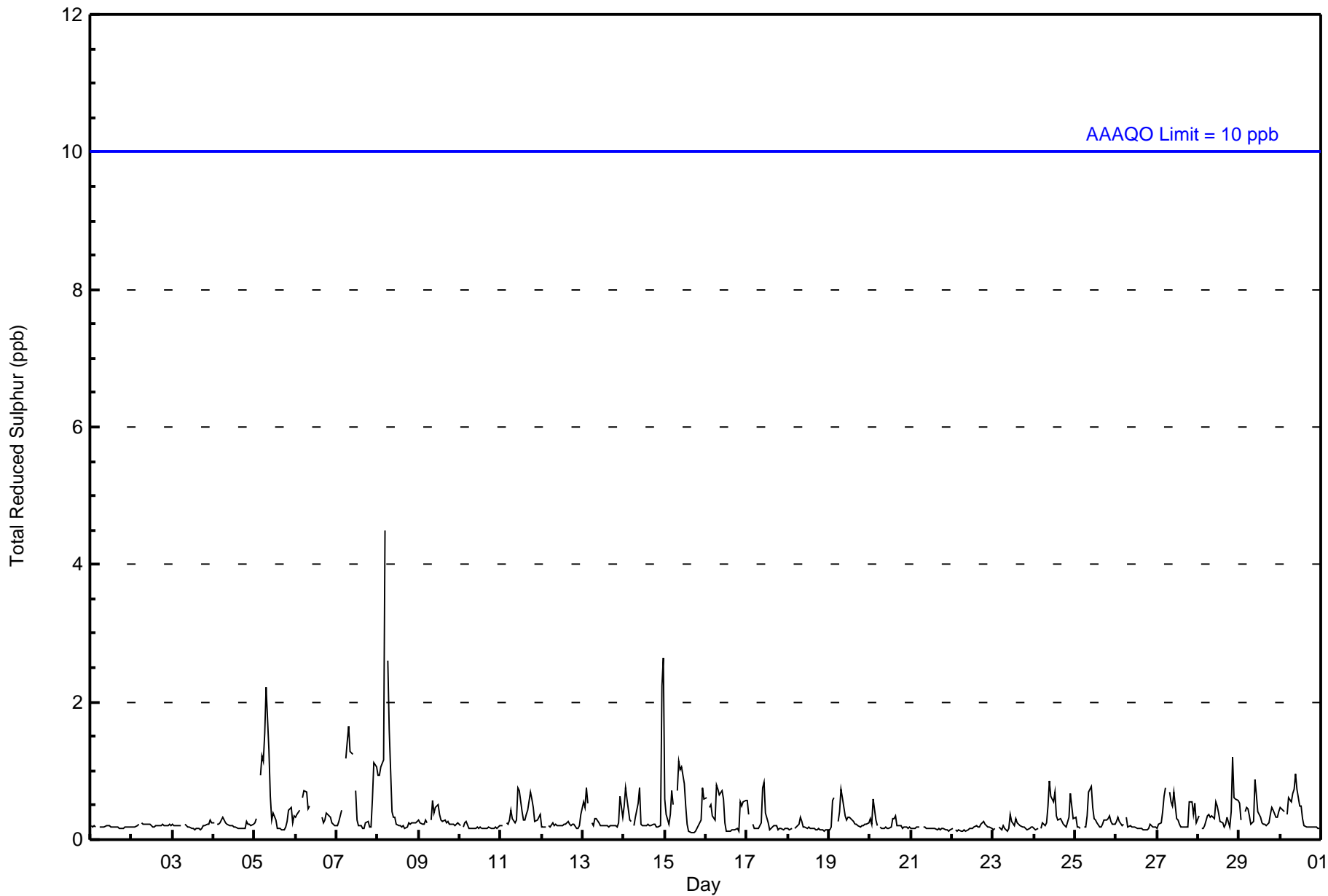
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.3 | 0.3 | 0.3 | 0.3 | 0.5 | 0.4 | 0.5 | 0.5 | 0.4 | 0.5 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | Diurnal Average | | |
| 1 | 1 | 1 | 1 | 5 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 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
Barge Landing - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 680 | 99.56 | 99.56 |
| 3 - 4 | 2 | 0.29 | 99.85 |
| 5 - 7 | 1 | 0.15 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 51 | 43 | 18 | 17 | 12 | 13 | 60 | 93 | 79 | 46 | 37 | 67 | 45 | 13 | 30 | 53 | 677 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 51 | 43 | 18 | 17 | 12 | 13 | 60 | 94 | 79 | 46 | 38 | 67 | 45 | 14 | 30 | 53 | 680 |

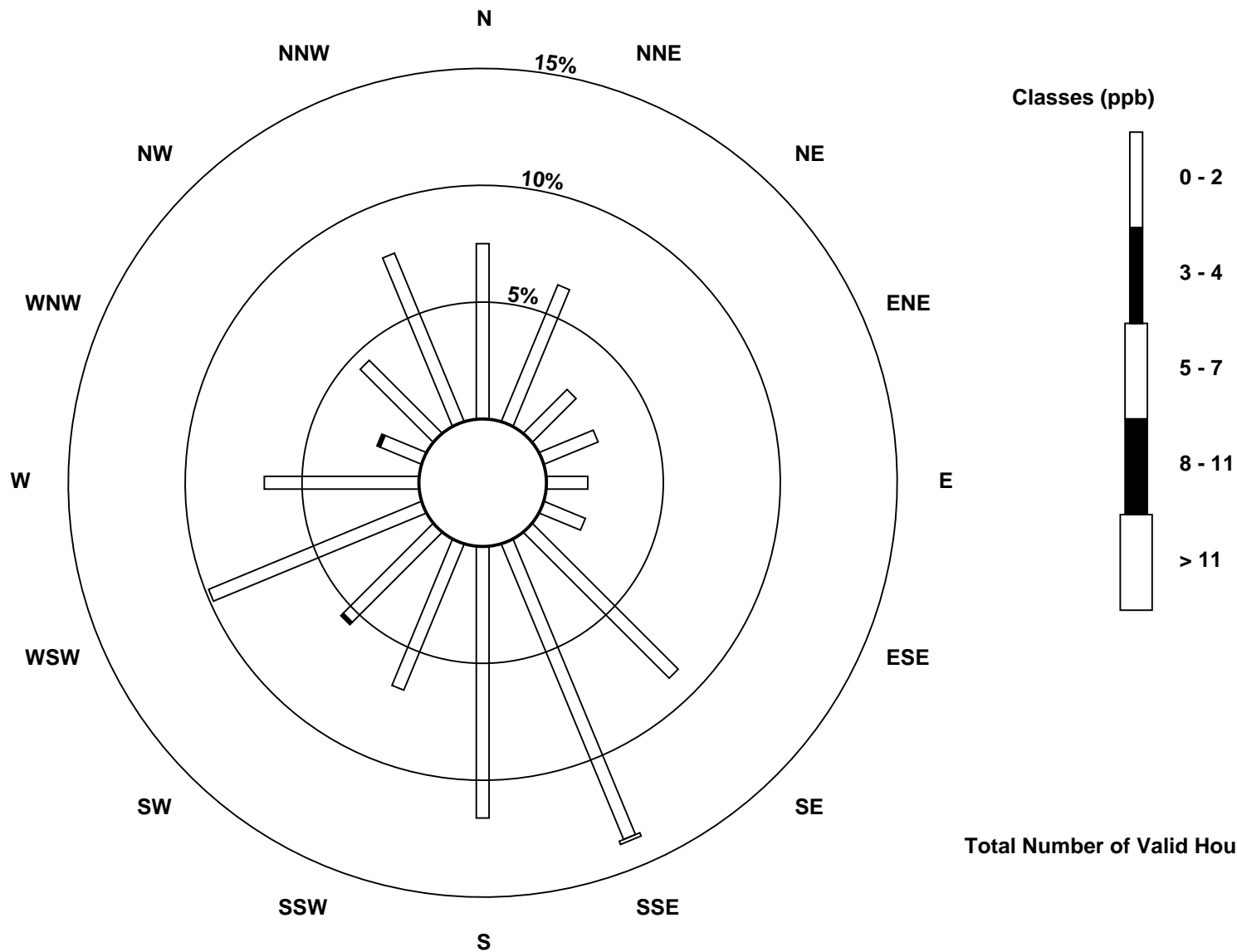
Total Number of Valid Hours: 680

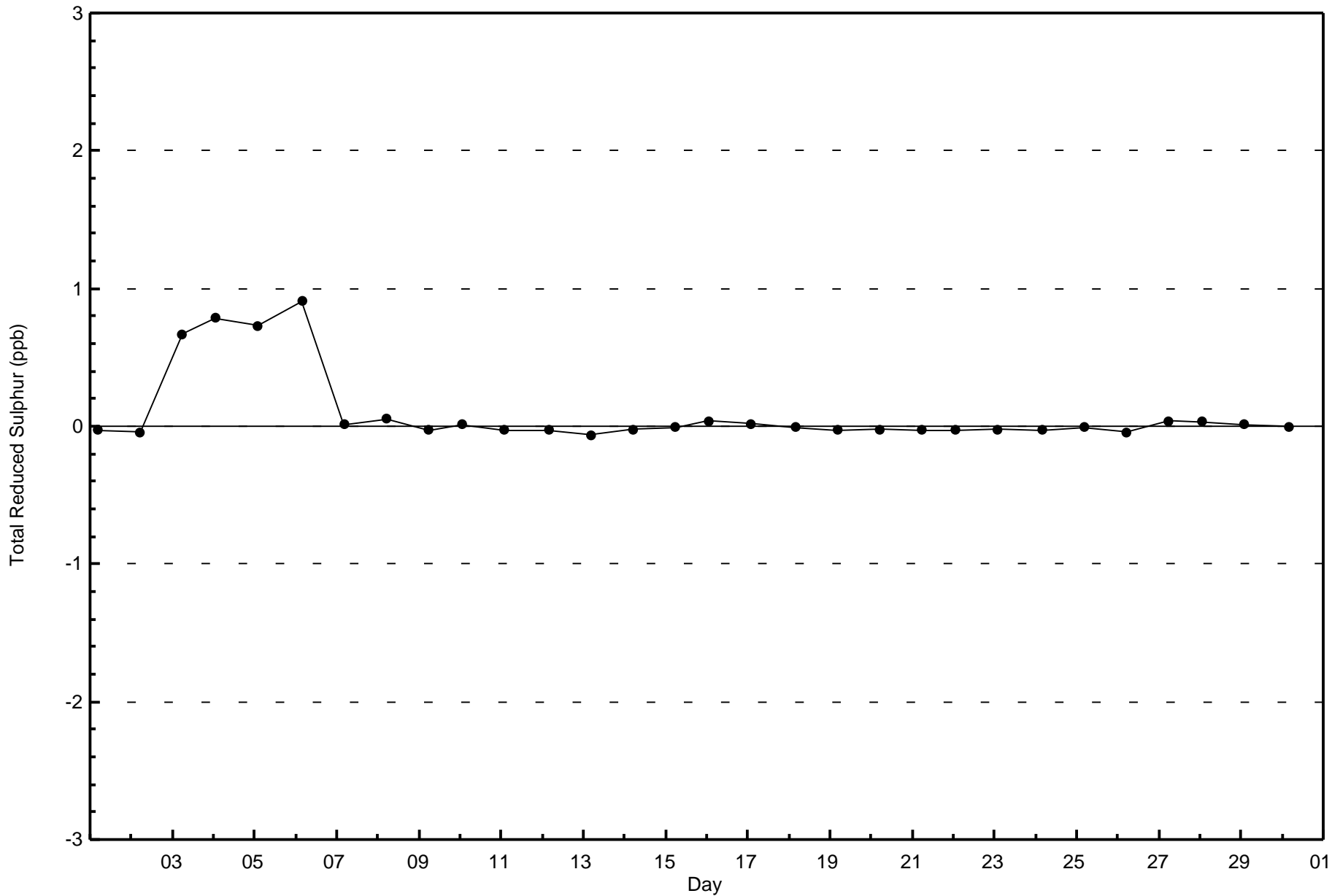
Total Number of Hours: 720

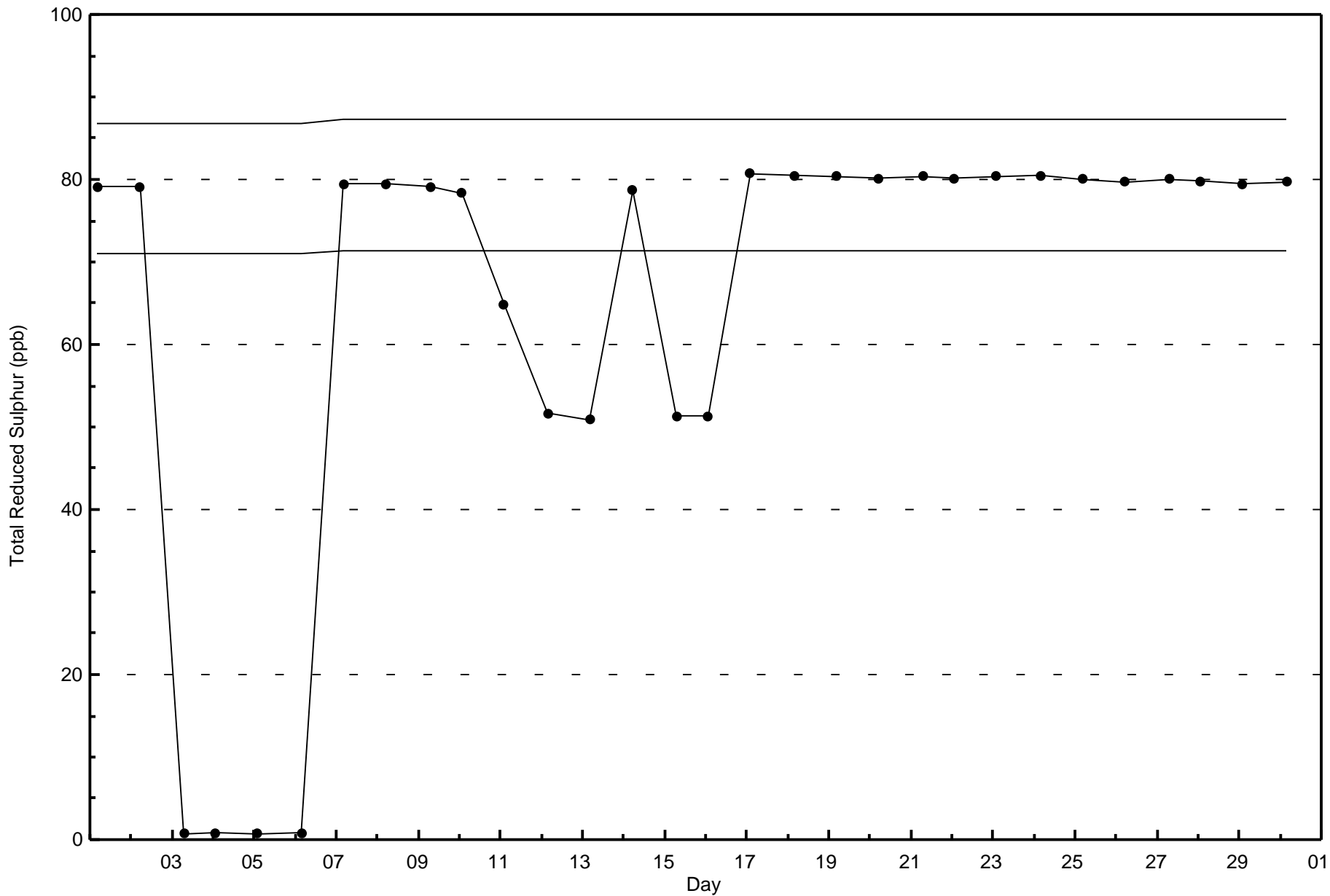


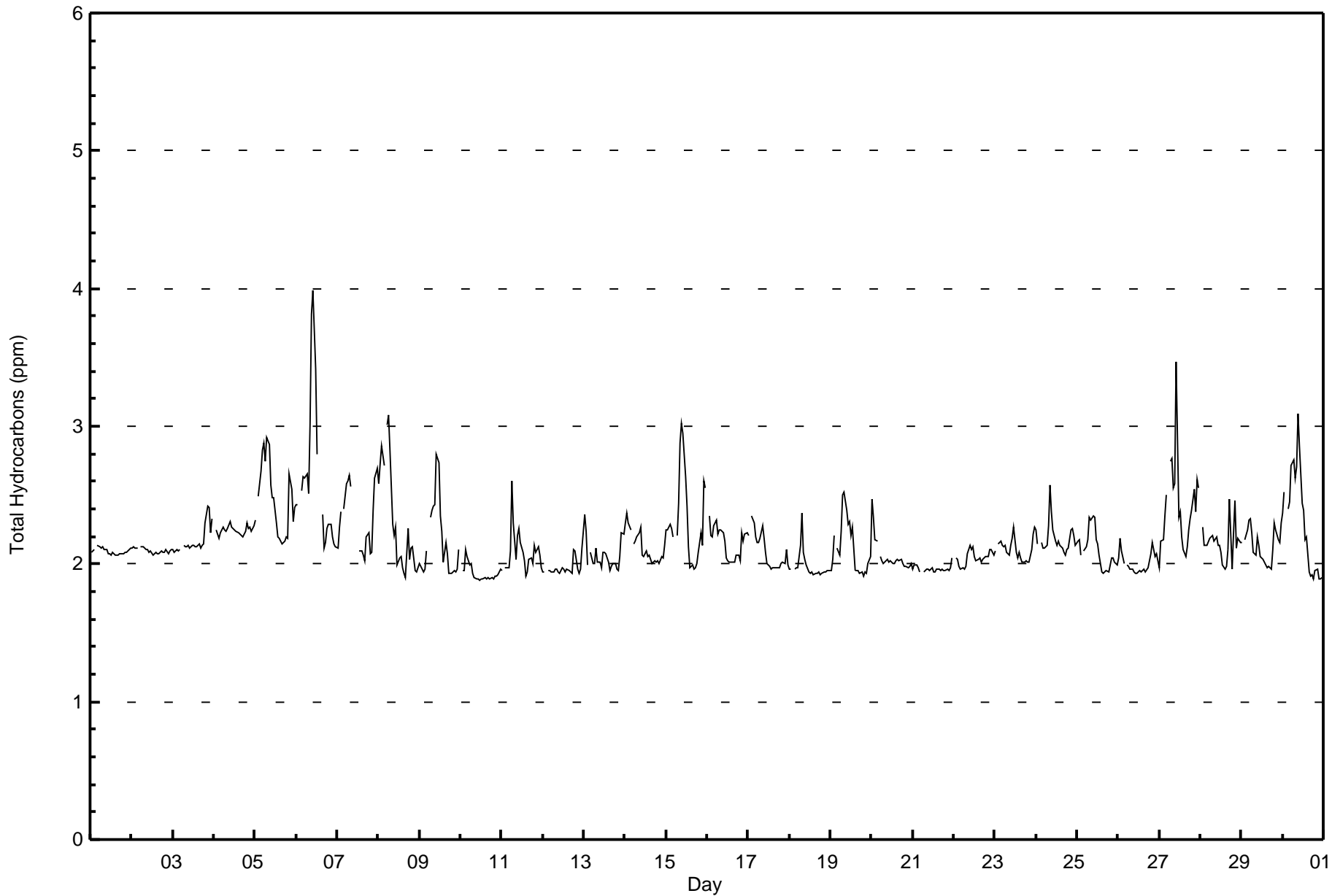
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 256 | 37.43 | 37.43 |
| 2.1 - 3.0 | 422 | 61.70 | 99.12 |
| 3.1 - 10.0 | 6 | 0.88 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 30 | 19 | 7 | 13 | 4 | 5 | 21 | 21 | 25 | 12 | 17 | 28 | 17 | 6 | 12 | 18 | 255 |
| 2.1 - 3.0 | 20 | 24 | 11 | 5 | 8 | 7 | 37 | 75 | 49 | 36 | 18 | 42 | 27 | 8 | 19 | 34 | 420 |
| 3.1 - 10.0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 6 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 52 | 43 | 18 | 19 | 12 | 12 | 58 | 96 | 75 | 48 | 36 | 70 | 44 | 14 | 31 | 53 | 681 |

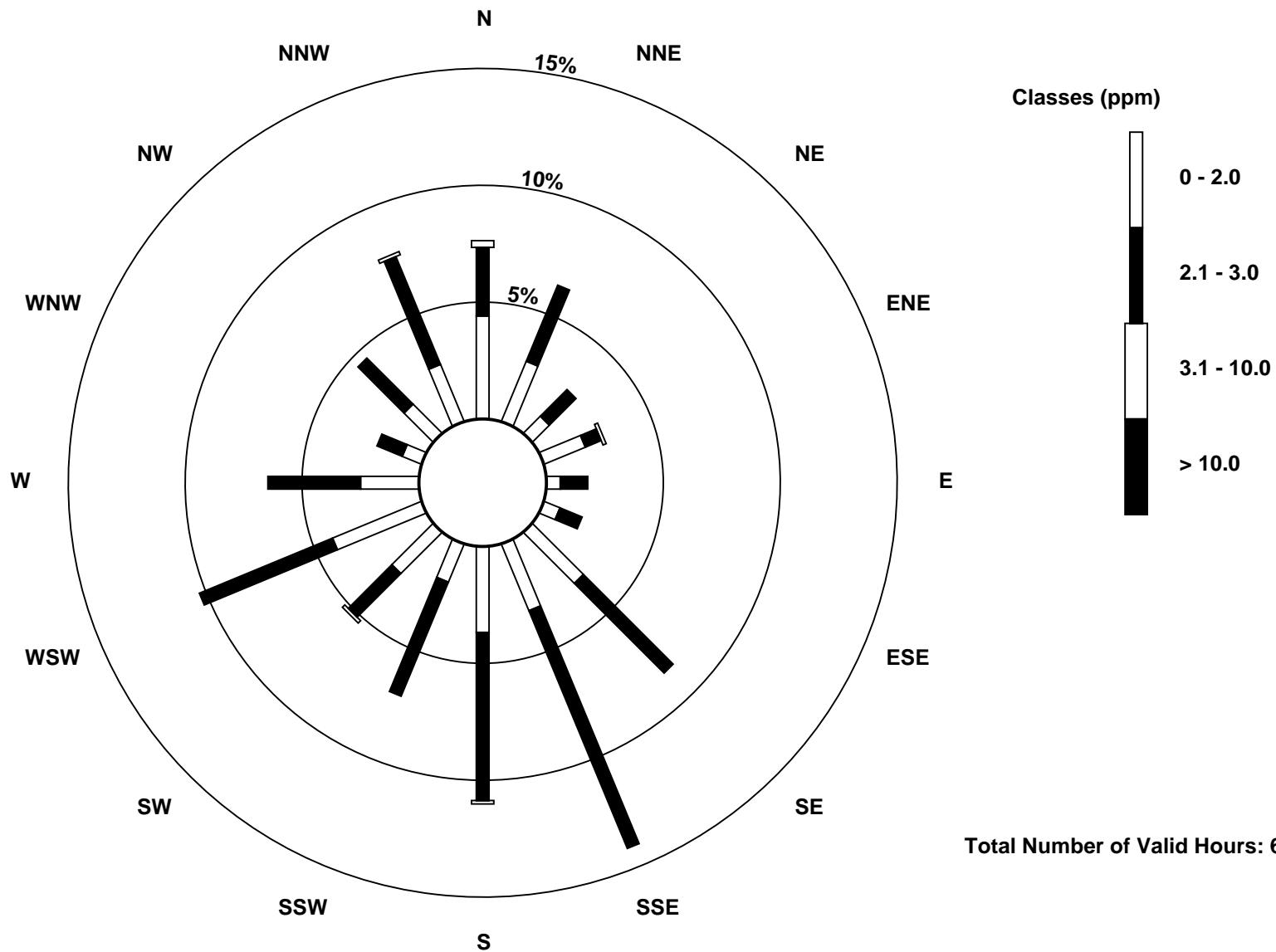
Total Number of Valid Hours: 681

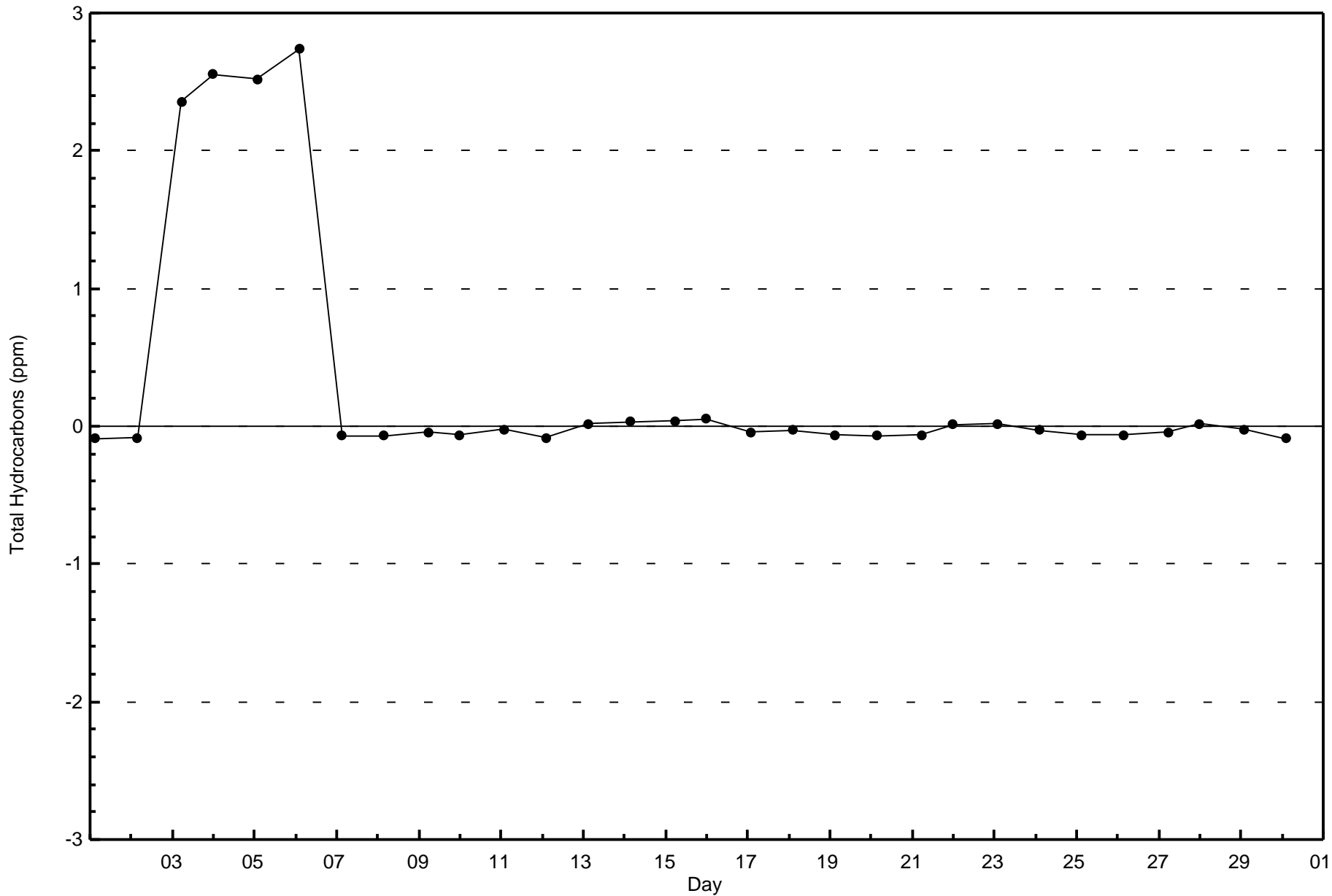
Total Number of Hours: 720

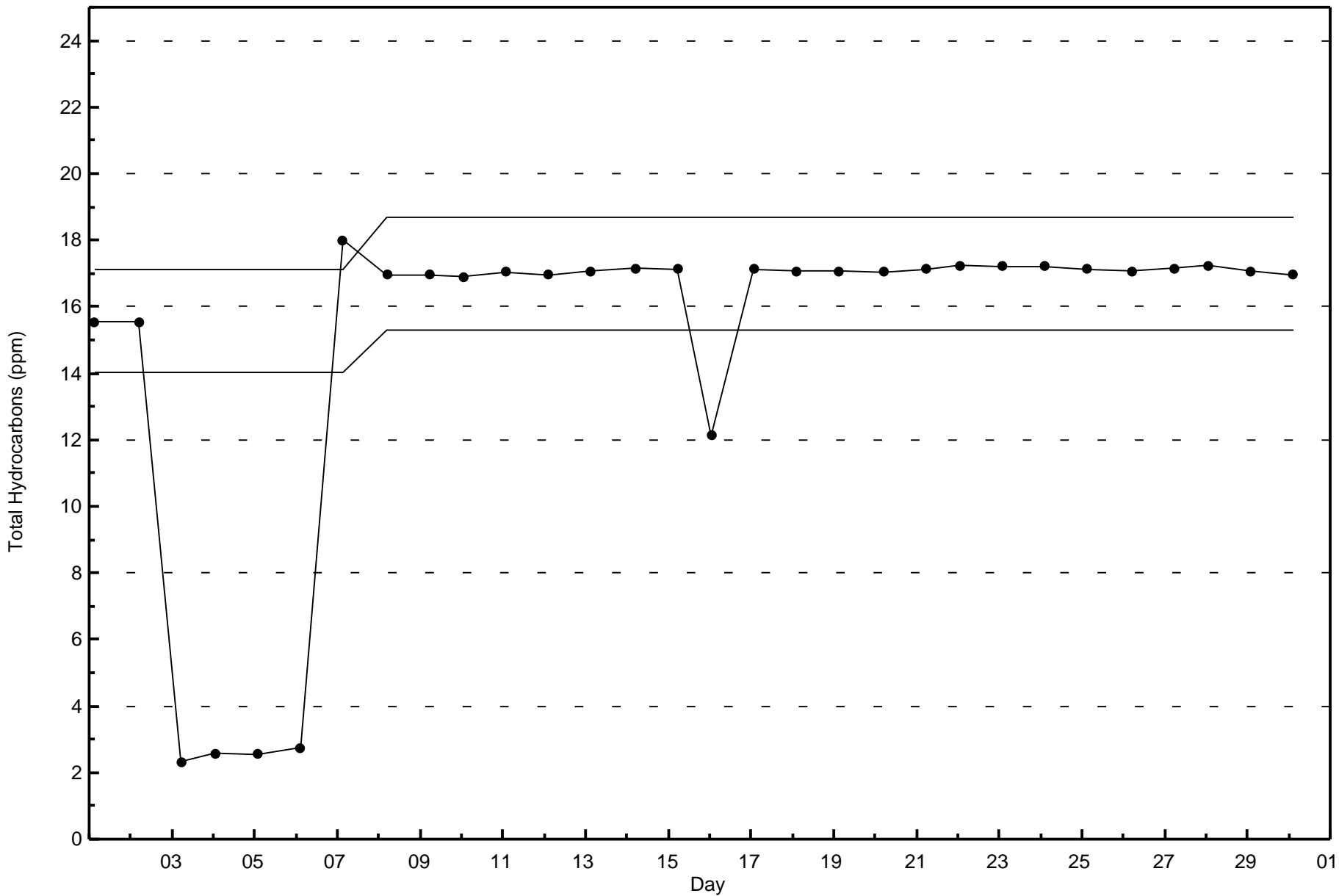


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Barge Landing (AMS 9)









Wood Buffalo Environmental Association
Summary of Hour Averages

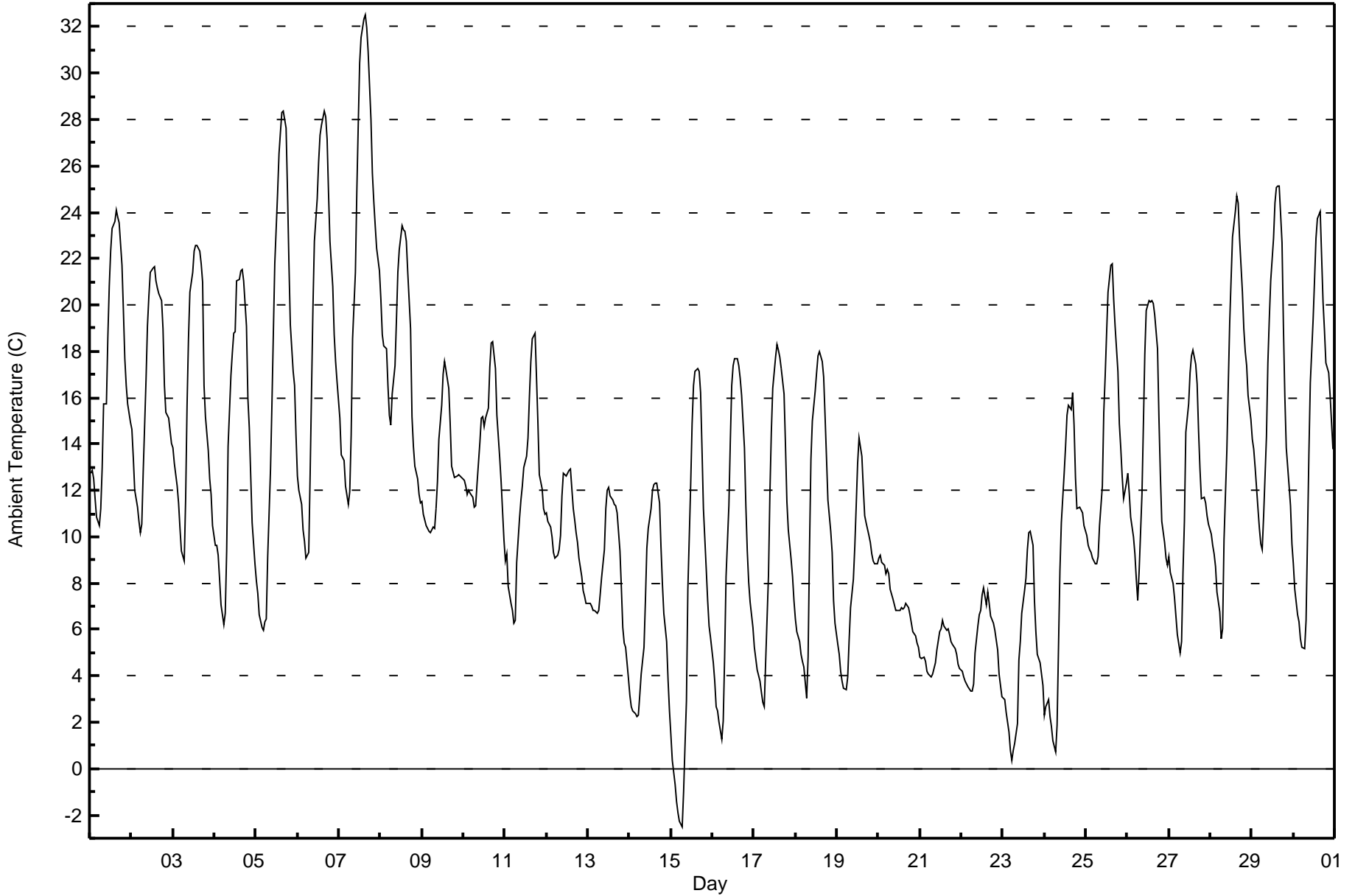
Ambient Temperature (AT) - C
Barge Landing - September 2017

| Maximum Value: 32.5 C on Sep 7 16:00 | | Maximum Daily Average: 22.2 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -2.5 C on Sep 15 07:00 | | Minimum Daily Average: 4.9 C on Sep 23 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 18.3 C at hour 16 | | Minimum Diurnal Average: 6.5 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.21 C | | Percentiles: P ₁ = 0.3 P ₁₀ = 4.3 O ₁ = 7.1 Median = 11.4 O ₃ = 16.5 P ₉₀ = 21.4 P ₉₉ = 26.9 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 12.7 | 12.9 | 12.5 | 11.7 | 10.9 | 10.5 | 11.2 | 13.0 | 15.7 | 15.8 | 18.6 | 20.8 | 22.3 | 23.3 | 23.6 | 24.1 | 23.8 | 23.5 | 21.7 | 19.8 | 17.7 | 16.5 | 15.7 | 14.9 | 17.2 | 24.1 | |
| 2-Sep | 14.7 | 13.4 | 12.0 | 11.3 | 10.6 | 10.2 | 10.6 | 12.8 | 16.8 | 19.1 | 20.4 | 21.4 | 21.6 | 21.7 | 21.0 | 20.8 | 20.5 | 20.2 | 19.0 | 16.5 | 15.4 | 15.1 | 14.5 | 14.0 | 16.4 | 21.7 | |
| 3-Sep | 13.9 | 13.2 | 12.2 | 11.4 | 10.4 | 9.4 | 9.0 | 11.7 | 15.7 | 18.6 | 20.5 | 21.4 | 22.3 | 22.6 | 22.6 | 22.3 | 21.8 | 21.0 | 16.5 | 15.2 | 13.7 | 12.5 | 11.8 | 10.5 | 15.8 | 22.6 | |
| 4-Sep | 9.7 | 9.6 | 9.2 | 8.2 | 7.1 | 6.2 | 6.7 | 9.4 | 13.9 | 16.9 | 17.9 | 18.8 | 18.8 | 21.1 | 21.1 | 21.4 | 21.5 | 21.1 | 19.1 | 16.0 | 14.7 | 12.6 | 10.6 | 8.8 | 14.2 | 21.5 | |
| 5-Sep | 8.1 | 7.5 | 6.6 | 6.1 | 5.9 | 6.3 | 6.4 | 9.2 | 12.9 | 15.7 | 18.8 | 21.8 | 24.8 | 26.5 | 27.4 | 28.3 | 28.4 | 27.6 | 24.9 | 21.8 | 19.1 | 17.1 | 16.5 | 14.4 | 16.8 | 28.4 | |
| 6-Sep | 12.6 | 12.0 | 11.4 | 10.3 | 9.8 | 9.1 | 9.3 | 12.7 | 16.3 | 19.9 | 22.7 | 24.6 | 26.2 | 27.3 | 27.8 | 28.3 | 28.1 | 27.1 | 24.8 | 22.7 | 20.8 | 18.8 | 17.6 | 16.7 | 19.0 | 28.3 | |
| 7-Sep | 15.1 | 13.5 | 13.4 | 13.3 | 12.2 | 11.4 | 12.0 | 14.4 | 18.5 | 21.4 | 24.9 | 27.8 | 30.4 | 31.6 | 32.4 | 32.5 | 31.9 | 30.9 | 28.0 | 25.7 | 24.4 | 23.4 | 22.4 | 21.5 | 22.2 | 32.5 | |
| 8-Sep | 20.2 | 18.7 | 18.2 | 18.1 | 16.5 | 15.3 | 14.8 | 16.2 | 17.4 | 19.3 | 21.4 | 22.4 | 23.4 | 23.3 | 23.2 | 22.7 | 21.4 | 19.0 | 15.2 | 13.9 | 13.0 | 12.5 | 11.8 | 11.5 | 17.9 | 23.4 | |
| 9-Sep | 11.5 | 10.9 | 10.5 | 10.4 | 10.2 | 10.2 | 10.4 | 10.4 | 11.2 | 12.4 | 14.2 | 15.7 | 17.0 | 17.6 | 17.2 | 16.4 | 14.9 | 13.0 | 12.8 | 12.6 | 12.6 | 12.7 | 12.6 | 12.6 | 12.9 | 17.6 | |
| 10-Sep | 12.4 | 12.2 | 11.8 | 12.0 | 11.9 | 11.7 | 11.3 | 11.3 | 12.3 | 14.1 | 15.1 | 15.2 | 14.8 | 15.1 | 15.6 | 17.3 | 18.3 | 18.4 | 17.3 | 15.3 | 14.3 | 13.4 | 12.4 | 9.9 | 13.9 | 18.4 | |
| 11-Sep | 8.9 | 9.3 | 7.9 | 7.2 | 6.8 | 6.3 | 6.4 | 8.9 | 10.8 | 11.6 | 12.2 | 13.0 | 13.5 | 14.3 | 16.1 | 17.6 | 18.5 | 18.8 | 16.9 | 14.9 | 12.7 | 12.1 | 11.2 | 11.0 | 11.9 | 18.8 | |
| 12-Sep | 11.0 | 10.7 | 10.4 | 10.0 | 9.3 | 9.1 | 9.2 | 9.4 | 10.1 | 11.7 | 12.8 | 12.6 | 12.7 | 12.9 | 12.9 | 11.2 | 10.7 | 10.2 | 9.8 | 9.1 | 8.3 | 7.7 | 7.5 | 7.2 | 10.3 | 12.9 | |
| 13-Sep | 7.1 | 7.1 | 7.0 | 6.8 | 6.8 | 6.7 | 6.8 | 7.5 | 8.3 | 9.4 | 11.2 | 12.0 | 12.2 | 11.7 | 11.6 | 11.4 | 11.3 | 11.0 | 9.4 | 7.8 | 6.1 | 5.4 | 5.2 | 3.9 | 8.5 | 12.2 | |
| 14-Sep | 3.2 | 2.6 | 2.5 | 2.4 | 2.2 | 2.3 | 3.2 | 4.1 | 5.2 | 7.2 | 9.5 | 10.4 | 11.2 | 12.0 | 12.2 | 12.3 | 12.3 | 11.5 | 9.6 | 8.0 | 6.7 | 5.5 | 3.8 | 2.5 | 6.8 | 12.3 | |
| 15-Sep | 1.5 | 0.3 | -0.7 | -1.4 | -1.9 | -2.3 | -2.5 | -1.0 | 1.0 | 2.9 | 7.7 | 12.3 | 14.9 | 16.5 | 17.2 | 17.2 | 17.1 | 16.2 | 13.8 | 11.2 | 8.6 | 7.3 | 6.2 | 5.7 | 7.0 | 17.2 | |
| 16-Sep | 4.6 | 3.8 | 2.7 | 2.5 | 2.0 | 1.3 | 2.1 | 4.8 | 8.3 | 11.3 | 14.1 | 16.6 | 17.4 | 17.7 | 17.7 | 17.4 | 16.9 | 16.1 | 13.9 | 11.3 | 9.4 | 8.0 | 7.2 | 6.1 | 9.7 | 17.7 | |
| 17-Sep | 5.2 | 4.8 | 4.3 | 3.8 | 3.3 | 2.8 | 2.7 | 4.6 | 8.4 | 11.9 | 14.5 | 16.4 | 17.8 | 18.3 | 18.1 | 17.7 | 17.3 | 16.2 | 14.0 | 11.5 | 10.3 | 9.0 | 8.3 | 7.3 | 10.3 | 18.3 | |
| 18-Sep | 6.4 | 5.9 | 5.5 | 4.9 | 4.6 | 4.4 | 3.0 | 4.8 | 9.5 | 13.4 | 15.0 | 16.3 | 17.1 | 17.8 | 18.0 | 17.6 | 16.9 | 15.2 | 13.4 | 11.6 | 10.3 | 9.3 | 7.3 | 6.3 | 10.6 | 18.0 | |
| 19-Sep | 5.4 | 4.9 | 4.2 | 3.8 | 3.5 | 3.4 | 3.9 | 5.6 | 6.9 | 8.2 | 9.6 | 11.3 | 13.2 | 14.2 | 13.4 | 12.1 | 10.9 | 10.6 | 10.1 | 9.7 | 9.3 | 9.0 | 8.8 | 8.9 | 8.4 | 14.2 | |
| 20-Sep | 9.1 | 9.2 | 8.9 | 8.8 | 8.4 | 8.6 | 8.4 | 7.7 | 7.3 | 7.0 | 6.8 | 6.8 | 6.8 | 6.9 | 6.9 | 7.0 | 7.1 | 7.0 | 6.7 | 6.3 | 5.9 | 5.7 | 5.4 | 5.3 | 7.3 | 9.2 | |
| 21-Sep | 4.8 | 4.8 | 4.8 | 4.6 | 4.2 | 4.0 | 4.0 | 4.1 | 4.3 | 4.6 | 5.1 | 5.9 | 6.0 | 6.4 | 6.2 | 6.0 | 6.0 | 5.8 | 5.5 | 5.3 | 5.2 | 4.9 | 4.5 | 4.3 | 5.1 | 6.4 | |
| 22-Sep | 4.2 | 4.0 | 3.7 | 3.7 | 3.5 | 3.3 | 3.4 | 3.6 | 5.0 | 6.2 | 6.6 | 6.8 | 7.5 | 7.8 | 7.1 | 7.6 | 7.1 | 6.6 | 6.3 | 6.0 | 5.5 | 5.1 | 4.1 | 3.1 | 5.3 | 7.8 | |
| 23-Sep | 3.1 | 3.0 | 2.4 | 1.6 | 0.8 | 0.4 | 0.8 | 1.1 | 1.9 | 4.7 | 5.5 | 6.7 | 7.7 | 8.2 | 9.5 | 10.2 | 10.2 | 9.7 | 7.3 | 5.9 | 4.9 | 4.5 | 4.1 | 3.6 | 4.9 | 10.2 | |
| 24-Sep | 2.3 | 2.7 | 3.0 | 2.3 | 1.8 | 1.2 | 0.7 | 1.9 | 5.2 | 8.5 | 10.6 | 12.8 | 13.9 | 15.2 | 15.7 | 15.5 | 16.2 | 14.8 | 12.6 | 11.2 | 11.3 | 11.2 | 11.0 | 10.5 | 8.8 | 16.2 | |
| 25-Sep | 10.1 | 9.6 | 9.5 | 9.3 | 9.1 | 8.9 | 8.8 | 9.2 | 10.5 | 12.2 | 15.4 | 16.9 | 18.8 | 20.6 | 21.7 | 21.7 | 20.2 | 19.1 | 17.2 | 14.9 | 13.8 | 12.6 | 11.6 | 12.3 | 13.9 | 21.7 | |
| 26-Sep | 12.7 | 11.9 | 10.8 | 10.0 | 9.3 | 8.1 | 7.3 | 8.5 | 11.8 | 14.8 | 17.8 | 19.8 | 20.2 | 20.1 | 20.2 | 20.0 | 19.6 | 18.1 | 15.1 | 12.7 | 10.7 | 9.8 | 9.1 | 8.8 | 13.6 | 20.2 | |
| 27-Sep | 9.1 | 8.5 | 8.0 | 7.4 | 6.6 | 5.8 | 5.0 | 5.5 | 8.5 | 10.7 | 14.5 | 15.8 | 17.1 | 17.8 | 18.1 | 17.5 | 16.6 | 14.6 | 12.9 | 11.6 | 11.7 | 11.5 | 10.9 | 10.6 | 11.5 | 18.1 | |
| 28-Sep | 10.1 | 9.6 | 9.3 | 8.7 | 7.6 | 6.8 | 5.6 | 6.0 | 9.9 | 13.7 | 16.5 | 19.2 | 21.1 | 22.9 | 24.1 | 24.7 | 24.4 | 22.8 | 20.6 | 19.0 | 18.0 | 17.4 | 16.1 | 15.0 | 15.4 | 24.7 | |
| 29-Sep | 14.2 | 13.8 | 13.0 | 11.2 | 10.4 | 9.7 | 9.5 | 10.9 | 14.3 | 17.5 | 19.4 | 21.0 | 22.8 | 24.4 | 25.0 | 25.1 | 25.1 | 22.7 | 19.1 | 16.0 | 13.8 | 12.2 | 11.3 | 9.7 | 16.3 | 25.1 | |
| 30-Sep | 8.8 | 7.7 | 6.6 | 6.3 | 5.6 | 5.2 | 5.2 | 6.4 | 9.9 | 13.6 | 16.7 | 19.4 | 21.1 | 22.9 | 23.8 | 24.0 | 22.1 | 20.1 | 18.9 | 17.5 | 17.1 | 16.1 | 15.0 | 13.8 | 14.3 | 24.0 | |
| | | 9.1 | 8.6 | 8.1 | 7.5 | 7.0 | 6.5 | 6.5 | 7.8 | 10.3 | 12.5 | 14.5 | 16.1 | 17.2 | 18.0 | 18.2 | 18.3 | 17.9 | 17.0 | 15.1 | 13.4 | 12.2 | 11.3 | 10.5 | 9.7 | Diurnal Average | |
| | | 20.2 | 18.7 | 18.2 | 18.1 | 16.5 | 15.3 | 14.8 | 16.2 | 18.5 | 21.4 | 24.9 | 27.8 | 30.4 | 31.6 | 32.4 | 32.5 | 31.9 | 30.9 | 28.0 | 25.7 | 24.4 | 23.4 | 22.4 | 21.5 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Barge Landing - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 6 | 0.83 | 0.83 |
| 0 - 10 | 283 | 39.31 | 40.14 |
| 10 - 20 | 331 | 45.97 | 86.11 |
| > 20 | 100 | 13.89 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

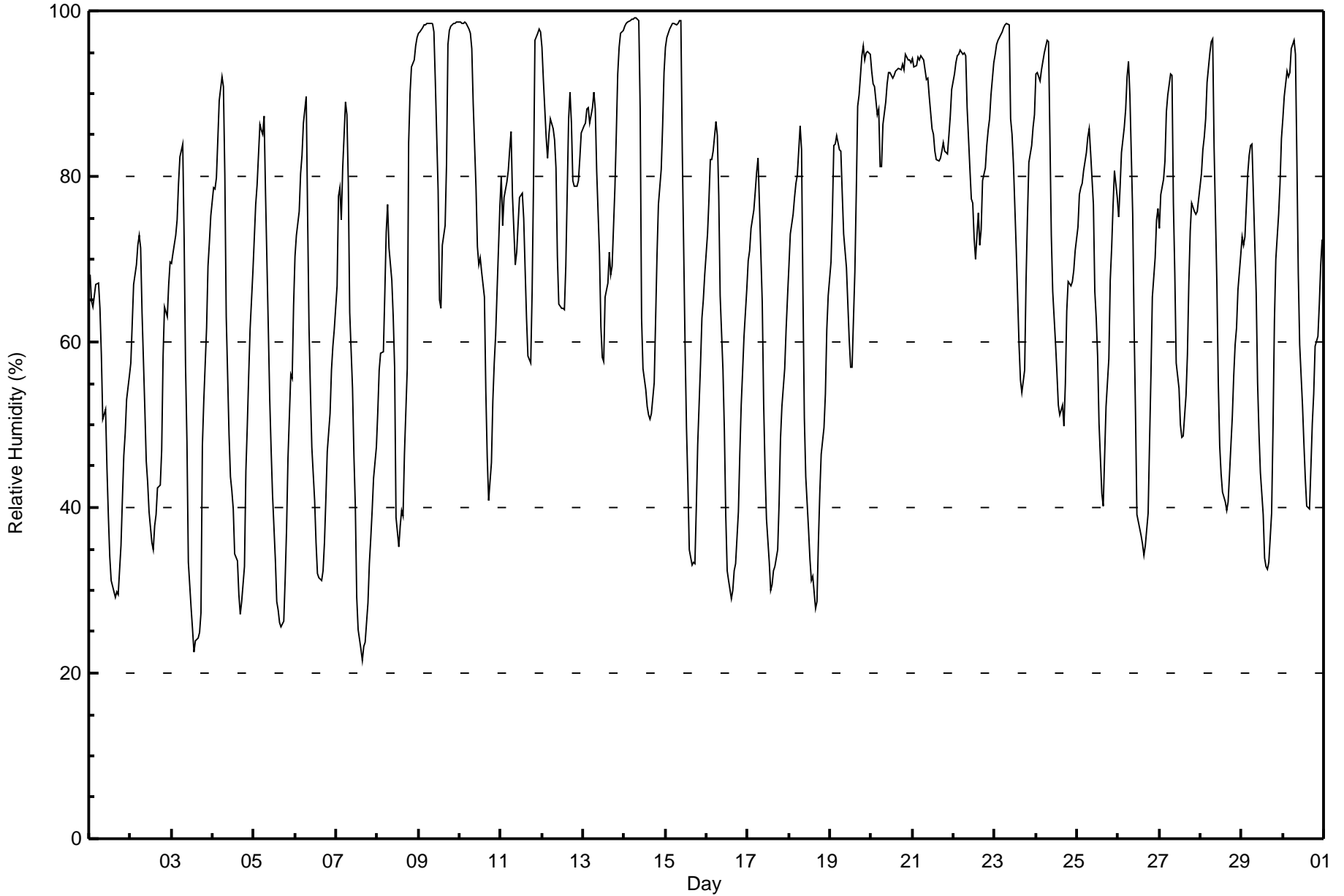
Barge Landing - September 2017

| Maximum Value: 99 % on Sep 14 08:00 Maximum Daily Average: 91.4 % on Sep 9 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|------|------|------|-----------------|-----------------|--|
| Minimum Value: 22 % on Sep 7 16:00 Minimum Daily Average: 48.8 % on Sep 1 Maximum Diurnal Average: 88.5 % at hour 7 Minimum Diurnal Average: 47.8 % at hour 16 Monthly Average: 68.7 % Percentiles: P ₁ = 25 P ₁₀ = 36 Q ₁ = 52 Median = 72 O ₃ = 86 P ₉₀ = 95 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-Sep | 68 | 65 | 64 | 66 | 67 | 67 | 64 | 58 | 51 | 52 | 45 | 39 | 34 | 31 | 30 | 29 | 30 | 29 | 35 | 41 | 46 | 49 | 53 | 56 | 48.8 | 68 | |
| 2-Sep | 58 | 62 | 67 | 69 | 72 | 73 | 71 | 64 | 52 | 46 | 43 | 39 | 36 | 35 | 38 | 39 | 42 | 43 | 47 | 58 | 64 | 63 | 67 | 70 | 54.9 | 73 | |
| 3-Sep | 69 | 71 | 73 | 75 | 79 | 82 | 84 | 72 | 57 | 48 | 33 | 28 | 25 | 23 | 24 | 24 | 25 | 27 | 47 | 53 | 62 | 69 | 72 | 75 | 54.1 | 84 | |
| 4-Sep | 79 | 78 | 80 | 84 | 89 | 92 | 91 | 80 | 63 | 49 | 44 | 42 | 40 | 34 | 34 | 30 | 27 | 29 | 33 | 44 | 50 | 56 | 61 | 68 | 57.4 | 92 | |
| 5-Sep | 73 | 77 | 79 | 86 | 86 | 85 | 87 | 78 | 62 | 53 | 47 | 41 | 34 | 29 | 28 | 26 | 26 | 26 | 31 | 37 | 46 | 56 | 56 | 64 | 54.7 | 87 | |
| 6-Sep | 70 | 73 | 76 | 80 | 82 | 86 | 90 | 75 | 62 | 54 | 47 | 41 | 36 | 32 | 32 | 31 | 32 | 36 | 41 | 47 | 51 | 57 | 59 | 62 | 56.4 | 90 | |
| 7-Sep | 67 | 78 | 79 | 75 | 81 | 89 | 88 | 79 | 63 | 54 | 46 | 40 | 29 | 25 | 23 | 22 | 23 | 24 | 29 | 33 | 36 | 40 | 44 | 47 | 50.6 | 89 | |
| 8-Sep | 52 | 57 | 59 | 59 | 66 | 73 | 77 | 71 | 67 | 63 | 57 | 39 | 35 | 38 | 40 | 39 | 46 | 57 | 84 | 90 | 93 | 94 | 96 | 97 | 64.5 | 97 | |
| 9-Sep | 97 | 97 | 98 | 98 | 98 | 98 | 99 | 98 | 99 | 97 | 92 | 78 | 65 | 64 | 72 | 74 | 81 | 96 | 98 | 98 | 98 | 99 | 99 | 99 | 91.4 | 99 | |
| 10-Sep | 99 | 98 | 98 | 99 | 98 | 98 | 97 | 95 | 89 | 79 | 72 | 69 | 70 | 69 | 65 | 54 | 46 | 41 | 45 | 53 | 57 | 61 | 66 | 76 | 74.8 | 99 | |
| 11-Sep | 80 | 74 | 78 | 79 | 81 | 83 | 85 | 78 | 69 | 71 | 74 | 77 | 78 | 75 | 69 | 63 | 58 | 57 | 66 | 80 | 96 | 97 | 98 | 97 | 77.7 | 98 | |
| 12-Sep | 96 | 92 | 85 | 82 | 85 | 87 | 86 | 84 | 81 | 70 | 65 | 64 | 64 | 64 | 69 | 87 | 90 | 86 | 80 | 79 | 79 | 80 | 82 | 85 | 80.1 | 96 | |
| 13-Sep | 86 | 87 | 88 | 88 | 86 | 88 | 90 | 88 | 81 | 71 | 62 | 58 | 58 | 65 | 67 | 71 | 68 | 69 | 79 | 85 | 92 | 96 | 97 | 98 | 79.9 | 98 | |
| 14-Sep | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 88 | 63 | 57 | 54 | 52 | 51 | 51 | 55 | 63 | 71 | 77 | 81 | 86 | 93 | 78.4 | 99 | |
| 15-Sep | 96 | 97 | 98 | 98 | 99 | 99 | 98 | 99 | 99 | 99 | 83 | 60 | 50 | 43 | 35 | 33 | 33 | 33 | 40 | 48 | 57 | 63 | 65 | 68 | 70.4 | 99 | |
| 16-Sep | 73 | 77 | 82 | 82 | 83 | 87 | 85 | 78 | 66 | 57 | 49 | 39 | 32 | 31 | 29 | 30 | 32 | 33 | 39 | 46 | 52 | 56 | 61 | 66 | 57.0 | 87 | |
| 17-Sep | 70 | 71 | 74 | 76 | 78 | 80 | 82 | 77 | 65 | 53 | 45 | 39 | 33 | 30 | 31 | 32 | 33 | 35 | 41 | 48 | 52 | 57 | 62 | 65 | 55.3 | 82 | |
| 18-Sep | 69 | 73 | 75 | 78 | 79 | 80 | 86 | 83 | 66 | 51 | 44 | 37 | 34 | 31 | 32 | 28 | 29 | 36 | 42 | 46 | 50 | 54 | 62 | 66 | 55.4 | 86 | |
| 19-Sep | 70 | 76 | 84 | 84 | 85 | 83 | 83 | 78 | 73 | 69 | 65 | 60 | 57 | 57 | 68 | 78 | 88 | 90 | 95 | 96 | 94 | 95 | 95 | 95 | 79.9 | 96 | |
| 20-Sep | 93 | 91 | 91 | 88 | 88 | 81 | 81 | 86 | 89 | 91 | 92 | 93 | 92 | 92 | 93 | 93 | 93 | 93 | 94 | 93 | 95 | 94 | 94 | 94 | 91.0 | 95 | |
| 21-Sep | 94 | 93 | 93 | 94 | 94 | 95 | 94 | 93 | 92 | 92 | 90 | 86 | 85 | 83 | 82 | 82 | 82 | 83 | 84 | 83 | 83 | 85 | 87 | 90 | 88.3 | 95 | |
| 22-Sep | 92 | 94 | 95 | 95 | 95 | 95 | 95 | 95 | 88 | 81 | 77 | 77 | 73 | 70 | 76 | 72 | 74 | 80 | 81 | 84 | 86 | 87 | 90 | 94 | 85.1 | 95 | |
| 23-Sep | 95 | 96 | 97 | 97 | 97 | 98 | 98 | 99 | 98 | 87 | 85 | 82 | 71 | 65 | 60 | 56 | 54 | 57 | 67 | 75 | 82 | 84 | 86 | 88 | 82.2 | 99 | |
| 24-Sep | 92 | 92 | 92 | 93 | 94 | 95 | 96 | 96 | 85 | 73 | 66 | 60 | 56 | 52 | 51 | 52 | 50 | 55 | 64 | 67 | 67 | 67 | 69 | 71 | 73.2 | 96 | |
| 25-Sep | 74 | 78 | 79 | 79 | 81 | 83 | 85 | 86 | 83 | 77 | 66 | 63 | 58 | 50 | 42 | 40 | 46 | 52 | 58 | 68 | 71 | 76 | 81 | 77 | 68.9 | 86 | |
| 26-Sep | 75 | 79 | 83 | 86 | 88 | 92 | 94 | 90 | 75 | 62 | 51 | 39 | 37 | 37 | 36 | 34 | 35 | 39 | 48 | 56 | 65 | 70 | 75 | 76 | 63.5 | 94 | |
| 27-Sep | 74 | 78 | 80 | 82 | 88 | 90 | 92 | 92 | 77 | 68 | 57 | 54 | 50 | 48 | 49 | 54 | 59 | 67 | 73 | 77 | 76 | 75 | 76 | 77 | 71.4 | 92 | |
| 28-Sep | 80 | 83 | 85 | 87 | 91 | 95 | 96 | 97 | 84 | 67 | 55 | 48 | 44 | 42 | 41 | 40 | 41 | 44 | 51 | 56 | 60 | 62 | 66 | 70 | 66.0 | 97 | |
| 29-Sep | 73 | 72 | 73 | 80 | 83 | 84 | 84 | 78 | 66 | 55 | 49 | 44 | 39 | 34 | 33 | 33 | 33 | 39 | 50 | 63 | 70 | 75 | 79 | 85 | 61.4 | 85 | |
| 30-Sep | 87 | 90 | 93 | 92 | 93 | 95 | 97 | 95 | 82 | 68 | 60 | 52 | 48 | 44 | 40 | 40 | 45 | 50 | 54 | 59 | 61 | 65 | 69 | 72 | 68.7 | 97 | |
| | 79.9 | 81.5 | 83.1 | 84.3 | 86.2 | 87.8 | 88.5 | 84.7 | 76.1 | 68.1 | 60.8 | 54.8 | 50.6 | 48.2 | 47.9 | 47.8 | 49.2 | 52.1 | 58.6 | 64.5 | 69.0 | 72.1 | 75.1 | 78.1 | Diurnal Average | | |
| | 99 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 92 | 93 | 92 | 92 | 93 | 93 | 93 | 96 | 98 | 98 | 98 | 99 | 99 | 99 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Barge Landing - September 2017





| | | |
|--|--|--------------------------------|
| Maximum Speed: 18 km/h on Sep 18 12:00 | Maximum Daily Speed Average: 14.1 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 15 03:00 | Minimum Daily Speed Average: 1.1 km/h on Sep 8 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 2.5 km/h at hour 14 | Minimum Diurnal Speed Average: 0.2 km/h at hour 19 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 1.2 km/h 218.9 deg | Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 16 | 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-Sep | SSE2 | WSW5 | WSW6 | WSW6 | SSW5 | SW6 | SW4 | WSW6 | WSW7 | WSW10 | WSW12 | WSW13 | WSW13 | WSW14 | W16 | W16 | W15 | W15 | WSW15 | W11 | WSW8 | WSW10 | WSW9 | WSW11 | WSW9.5 | W16 | |
| 2-Sep | W11 | W5 | WSW2 | W6 | W7 | W8 | W8 | WSW8 | WSW5 | W8 | W8 | W9 | W10 | W9 | WSW8 | WSW9 | WSW8 | WSW9 | W7 | WSW5 | SSE5 | SW4 | SW4 | SW5 | WSW6.6 | W11 | |
| 3-Sep | WSW6 | WSW6 | WSW8 | WSW7 | WSW7 | SW6 | WSW6 | W6 | W7 | W8 | NN12 | NN13 | NN10 | NN12 | NN11 | NN12 | NN12 | NN12 | NN12 | NN13 | NN10 | NNW8 | NNW7 | NNW6 | NNW5 | WNW7.1 | NNW13 |
| 4-Sep | NW4 | NW6 | NW5 | NW5 | WNW4 | WNW4 | W4 | W4 | WNW5 | NNW6 | NNW7 | NNW5 | N4 | NW6 | NW7 | NNW8 | NNW7 | NNW5 | NNW2 | E3 | ESE4 | ESE5 | SE4 | SE4 | NW3.1 | NNW8 | |
| 5-Sep | SSE5 | SSE3 | SSE4 | SSE4 | SSE6 | SSE7 | SSE6 | S6 | SSW6 | SSW7 | SSW8 | S9 | SSW10 | WSW11 | WSW9 | WSW8 | WSW9 | WSW8 | SSW4 | SSW3 | WSW2 | WSW2 | SSW3 | SSE1 | SSW4.9 | WSW11 | |
| 6-Sep | SSE2 | SE4 | SSE3 | SSE2 | SE3 | WNW1 | WSW1 | NW1 | NW3 | NNW4 | N3 | ENE3 | ENE3 | NNE2 | NE3 | NE4 | ENE3 | E3 | E2 | E3 | E3 | SE4 | S3 | SSE3 | E1.2 | NE4 | |
| 7-Sep | AF | W1 | SSE6 | S4 | SSW2 | SSW4 | S4 | SSW4 | S8 | S9 | S8 | S10 | SW13 | SSW14 | SSW13 | SSW13 | S12 | SSW11 | S8 | S8 | S9 | S9 | S9 | SSW7 | S7.8 | SSW14 | |
| 8-Sep | S6 | SSE5 | S5 | SSW6 | SSE5 | S2 | SW3 | SSW4 | SW3 | NNW2 | NNW6 | N7 | N6 | N5 | N6 | N6 | NNW7 | NNW7 | N4 | NW2 | WSW3 | W2 | S1 | SE1 | NW1.1 | N7 | |
| 9-Sep | SE1 | NNW2 | NNW3 | WSW1 | SW4 | ESE1 | NNW2 | NNW4 | NNW4 | NNW3 | NNW5 | NNW6 | N5 | NNW6 | N8 | N8 | NNW7 | N6 | NNW5 | N3 | NW3 | WNW3 | W4 | WSW4 | NNW3.2 | N8 | |
| 10-Sep | SW4 | SW3 | S3 | SSW5 | WSW6 | WSW5 | WSW5 | SW6 | WSW7 | W11 | W14 | W14 | W14 | W15 | W15 | WNW12 | W12 | W14 | WSW13 | WSW11 | WSW13 | WSW11 | W8 | SSW1 | W8.6 | W15 | |
| 11-Sep | SW5 | SW5 | WSW5 | WSW4 | SW4 | SSE4 | S3 | SW4 | SW4 | S1 | SSE3 | SE3 | E3 | E4 | SSE7 | S6 | S8 | S7 | SSE8 | NW4 | S3 | S3 | SW3 | W6 | SSW3.0 | SSE8 | |
| 12-Sep | W10 | W14 | W13 | WSW9 | SW5 | SW7 | WSW9 | WSW8 | W7 | WNW9 | NW11 | NW9 | NNW9 | NW8 | NNW6 | NNW4 | NE3 | ENE5 | NE6 | NE6 | ENE6 | ENE5 | NE3 | NNE3 | WNW4.0 | W14 | |
| 13-Sep | N3 | N3 | N3 | N1 | NW2 | NW0 | WSW1 | E0 | SSE3 | N3 | ENE5 | ENE4 | E4 | NNE1 | S2 | NNW3 | E4 | NE3 | ESE2 | SSE3 | AF | N3 | N2 | N2 | NE1.2 | ENE5 | |
| 14-Sep | NNE0 | ESE0 | AF | W1 | S1 | WSW0 | W1 | WNW0 | WNW2 | NNW3 | NNE5 | NNE5 | ENE5 | ENE5 | E5 | NE5 | ENE4 | NE5 | NE5 | ENE4 | NE2 | NNE2 | S1 | WNW1 | NE2.1 | ENE5 | |
| 15-Sep | NNW0 | NNE1 | SW0 | SSW1 | S3 | S3 | SSE3 | SSE3 | S4 | SSE6 | SW6 | SSW6 | SSW7 | SSW6 | SW8 | SSW8 | SSW8 | SSW7 | SSW5 | S5 | SSE6 | SSE6 | SSE6 | SSE6 | S4.3 | SW8 | |
| 16-Sep | SSE6 | SSE6 | SSE6 | SSE7 | SE6 | SSE7 | SSE6 | SSE7 | S10 | SSE9 | SSE9 | S13 | S13 | S14 | SSW13 | SSW12 | S12 | SSW9 | S6 | SSE6 | SSE7 | SSE6 | SSE6 | SSE6 | S8.1 | S14 | |
| 17-Sep | SSE6 | SE6 | SE7 | SE8 | SE8 | SSE6 | SE5 | SSE4 | S6 | S11 | S12 | S14 | S13 | S13 | SSE13 | SSE13 | SSE10 | SSE9 | SE9 | SE9 | SE9 | SE8 | SE7 | SE8 | SSE8.7 | S14 | |
| 18-Sep | SE7 | SE7 | SE8 | SE6 | SSE5 | SSE5 | SE2 | SE3 | SSW4 | S9 | SSE14 | SSE18 | SSE16 | SSE12 | SE11 | SE12 | SSE10 | SE10 | SE9 | ESE7 | ESE7 | ESE5 | ESE2 | SE1 | SSE7.6 | SSE18 | |
| 19-Sep | NNE1 | N3 | N5 | NNW6 | N7 | N6 | N4 | N5 | NNE7 | NNE9 | NNE9 | NNE10 | NNE10 | NE9 | ENE8 | ENE8 | E8 | ENE10 | ENE8 | ENE10 | E10 | ENE9 | NE9 | NE11 | NE6.6 | NE11 | |
| 20-Sep | NE10 | NNE10 | NNE10 | NNE11 | NNE12 | NNE14 | NNE14 | NNE14 | NNE14 | NNE15 | NNE16 | NNE17 | NNE17 | NNE16 | NNE16 | NNE15 | NNE15 | NNE16 | NNE15 | NNE15 | NNE14 | NNE14 | NNE14 | NNE13 | NNE14.1 | NNE17 | |
| 21-Sep | N14 | N12 | N14 | N11 | N12 | N11 | N11 | N11 | N11 | N11 | N11 | N11 | N10 | N10 | N11 | N11 | N10 | N10 | N8 | N7 | NNW6 | NW5 | WNW4 | W4 | N9.5 | N14 | |
| 22-Sep | WNW2 | WNW1 | WSW1 | WSW1 | WSW2 | SSW2 | SW3 | S2 | SSW3 | SW4 | SW4 | SSW3 | SSE4 | SW5 | SW4 | SSE5 | SE5 | SE4 | ESE3 | ESE3 | SSE4 | SSE4 | SE3 | ESE3 | S2.2 | SSE5 | |
| 23-Sep | NW1 | NNW1 | SW1 | SSE1 | NNW1 | NNW2 | NNW2 | NNW3 | NW3 | WNW3 | W4 | NNW3 | SE3 | SSE6 | SSE6 | SE7 | SE7 | SE7 | SE5 | SE6 | SE7 | SE6 | SE6 | SE3 | SSE2.0 | SE7 | |
| 24-Sep | SE4 | SE7 | SE5 | SSE5 | SSE3 | SE3 | SE4 | SSE4 | S6 | S7 | S6 | S7 | S8 | SSW6 | S7 | SSE8 | SE7 | SE5 | SE5 | SSE6 | SSE7 | SSE6 | SSE8 | SE7 | SSE5.6 | SSE8 | |
| 25-Sep | SE7 | SE6 | SE5 | SE5 | SSE6 | SSE5 | SSE5 | SSE5 | S6 | S7 | SSW7 | S8 | SW8 | WSW8 | WSW9 | WSW7 | S3 | SSE4 | S4 | S3 | SSE4 | SSW5 | S5 | SSW5 | S4.6 | WSW9 | |
| 26-Sep | SW5 | SW5 | SW4 | WSW3 | W3 | W3 | SW3 | WSW4 | WSW6 | WSW7 | WSW5 | NNW8 | NNW9 | NNW9 | NNW8 | NNW8 | NNW8 | NNW5 | NNW3 | NW2 | SSE2 | W2 | SSE1 | SW3 | WNW3.0 | NNW9 | |
| 27-Sep | WSW1 | SSE3 | S4 | S3 | SSE3 | S4 | SSE3 | SE2 | W2 | NNW2 | N4 | N6 | NNE5 | NE7 | NE6 | NE7 | NE8 | NNE7 | NNE7 | N5 | NNE5 | NNE5 | NNE5 | NNE4 | NE2.6 | NE8 | |
| 28-Sep | N2 | N2 | N1 | NE1 | N2 | N2 | SSE1 | SSE0 | WSW2 | SW5 | SSW9 | S10 | S12 | S10 | S11 | SSW12 | SSW11 | SSW9 | S8 | SSE8 | SSE9 | S9 | S9 | SSE8 | S5.4 | SSW12 | |
| 29-Sep | SSE8 | SSE9 | S5 | S3 | SSE5 | SSE5 | SSE6 | S6 | S7 | S10 | S11 | S12 | SSW10 | SW11 | WSW8 | SW7 | WSW5 | NNW2 | NE0 | SE3 | SE5 | SE1 | SSE4 | SE3 | S5.1 | S12 | |
| 30-Sep | SE3 | SE3 | SE4 | SE4 | SSE3 | SSE4 | S5 | SSE4 | SSE6 | S8 | S8 | SSW8 | SSW8 | SSW10 | SW9 | WSW8 | SW8 | WNW7 | NW9 | NW7 | NW9 | NW9 | NW11 | NW9 | SW3.0 | NW11 | |

| | |
|---|-----------------|
| S1.2SSW1.0SSW1.1SSW1.3SSW1.3SSW1.3SSW1.3 SW1.4 SW2.2 SW2.2WSW1.9 SW1.6 SW1.8WSW2.9WSW2.4WSW1.7 SW1.5 W0.8NNW0.2 ESE0.5 SE1.5 SSE1.0 S1.2 S0.9 | Diurnal Average |
| N14 W14 N14 N11 NNE12 NNE14 NNE14 NNE14 NNE14 NNE14 NNE15 NNE16 SSE18 NNE17 NNE16 W16 W16 W15 NNE16 NNE15 NNE15 NNE14 NNE14 NNE14 NNE13 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

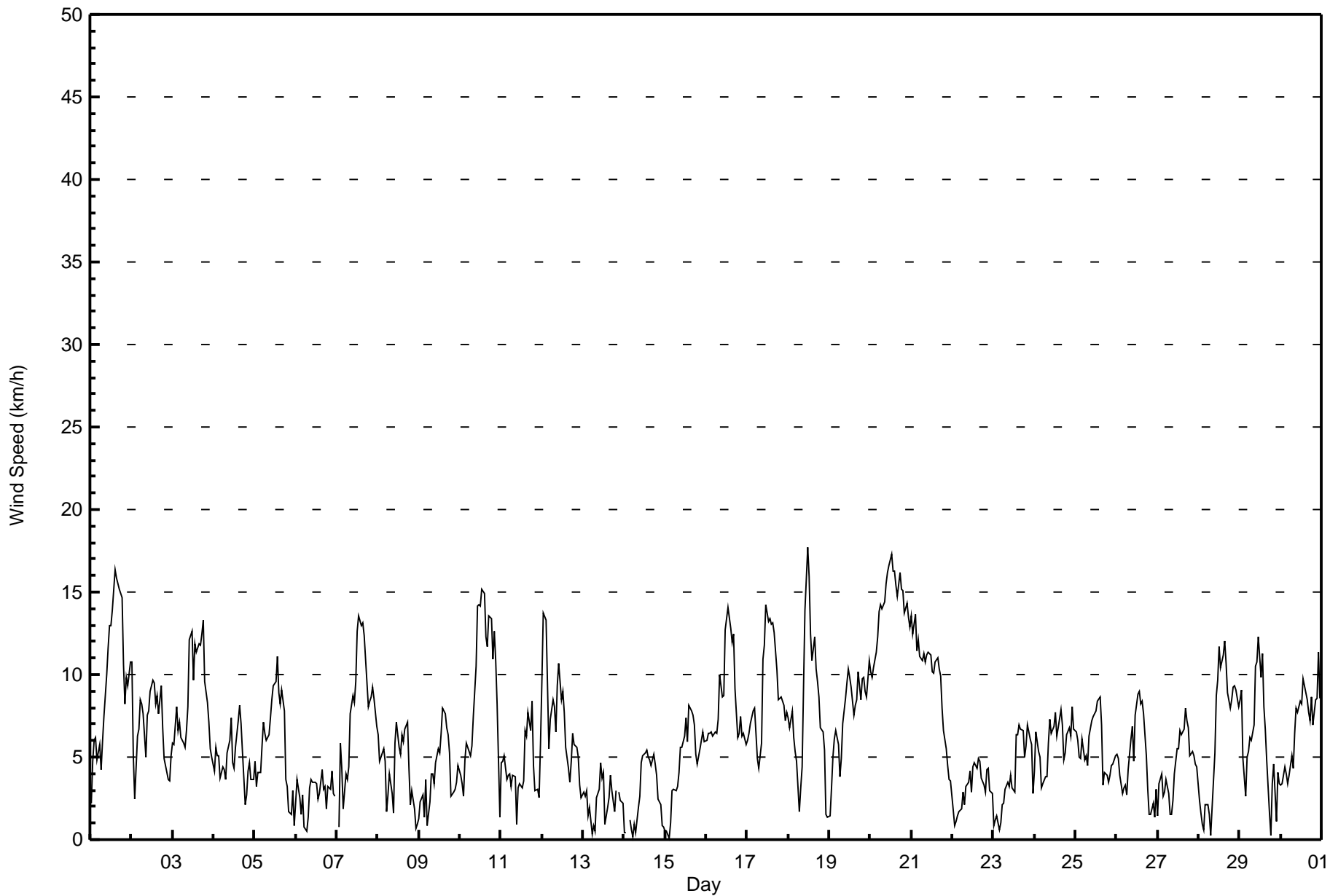
Wind Speed (WS) - km/h
Barge Landing - September 2017

| | |
|--|--|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Sep 11 20:00 | Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 |
| Minimum Value: 0 km/h on Sep 23 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-Sep | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 4 | 5 | 6 | 6 | 6 | 6 | 5 | 4 | 2 | 3 | 3 | 3 | 6 |
| 2-Sep | 4 | 4 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 1 | 2 | 1 | 2 | 4 |
| 3-Sep | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 3 | 3 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 2 | 1 | 1 | 5 |
| 4-Sep | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 |
| 5-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 4 |
| 6-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 7-Sep | AF | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 2 | 3 | 3 | 3 | 3 | 2 | 5 |
| 8-Sep | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 |
| 9-Sep | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| 10-Sep | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 6 | 4 | 3 | 4 | 3 | 4 | 1 | 6 |
| 11-Sep | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 2 | 7 | 1 | 1 | 2 | 2 | 7 |
| 12-Sep | 3 | 5 | 5 | 3 | 2 | 3 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 5 |
| 13-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | AF | 1 | 1 | 2 |
| 14-Sep | 1 | 1 | AF | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 16-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 5 |
| 17-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 5 |
| 18-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 6 |
| 19-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 4 |
| 20-Sep | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 |
| 21-Sep | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 4 |
| 22-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 3 |
| 23-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 |
| 24-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 25-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 |
| 26-Sep | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 4 |
| 27-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 |
| 28-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 4 |
| 29-Sep | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 30-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 4 | 4 | 2 | 3 | 3 | 4 | 3 | 4 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 7 | 4 | 5 | 4 | 4 | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 334 | 46.58 | 46.58 |
| 6 - 11 | 305 | 42.54 | 89.12 |
| 12 - 19 | 78 | 10.88 | 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: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 25 | 15 | 9 | 12 | 10 | 11 | 35 | 48 | 29 | 19 | 28 | 25 | 14 | 12 | 13 | 29 | 334 |
| 6 - 11 | 26 | 10 | 10 | 7 | 2 | 2 | 27 | 47 | 41 | 23 | 11 | 39 | 20 | 2 | 14 | 24 | 305 |
| 12 - 19 | 4 | 20 | 0 | 0 | 0 | 0 | 1 | 6 | 12 | 6 | 1 | 7 | 13 | 1 | 5 | 2 | 78 |
| 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 | 55 | 45 | 19 | 19 | 12 | 13 | 63 | 101 | 82 | 48 | 40 | 71 | 47 | 15 | 32 | 55 | 717 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Barge Landing - September 2017

| | |
|--|--------------------------------|
| Direction of Maximum Speed: 156 deg on Sep 18 12:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 22.2 deg on Sep 20 | Hours of Data: 717 |
| Direction of Minimum Speed: 216 deg on Sep 15 03:00 | Hours of Missing Data: 3 |
| Direction of Minimum Daily Speed Average: 1.1 deg on Sep 8 | Percent Operational Time: 99.6 |
| Monthly Average Direction: 248.2 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-Sep | 168 | 245 | 248 | 239 | 203 | 233 | 217 | 243 | 249 | 246 | 255 | 254 | 256 | 251 | 264 | 259 | 263 | 267 | 258 | 266 | 253 | 254 | 256 | 258 | 253.4 |
| 2-Sep | 262 | 271 | 243 | 262 | 273 | 263 | 266 | 257 | 249 | 273 | 262 | 264 | 274 | 273 | 255 | 249 | 250 | 258 | 273 | 249 | 163 | 233 | 236 | 235 | 258.6 |
| 3-Sep | 243 | 244 | 252 | 240 | 245 | 233 | 253 | 262 | 281 | 268 | 311 | 310 | 316 | 310 | 308 | 321 | 310 | 330 | 347 | 338 | 338 | 341 | 343 | 331 | 302.7 |
| 4-Sep | 311 | 316 | 310 | 307 | 301 | 286 | 280 | 265 | 282 | 338 | 338 | 334 | 4 | 323 | 315 | 329 | 328 | 336 | 345 | 98 | 104 | 121 | 142 | 134 | 322.2 |
| 5-Sep | 166 | 161 | 168 | 163 | 161 | 159 | 156 | 177 | 193 | 198 | 194 | 188 | 212 | 237 | 250 | 238 | 251 | 246 | 195 | 203 | 246 | 251 | 192 | 148 | 203.0 |
| 6-Sep | 162 | 144 | 159 | 158 | 139 | 290 | 240 | 313 | 324 | 336 | 355 | 61 | 60 | 27 | 48 | 34 | 66 | 80 | 87 | 101 | 97 | 144 | 173 | 162 | 85.3 |
| 7-Sep | AF | 270 | 162 | 177 | 192 | 195 | 184 | 202 | 183 | 182 | 182 | 174 | 219 | 202 | 199 | 199 | 191 | 195 | 186 | 183 | 180 | 181 | 187 | 201 | 190.8 |
| 8-Sep | 180 | 168 | 175 | 197 | 167 | 171 | 215 | 199 | 220 | 337 | 340 | 359 | 359 | 350 | 352 | 3 | 342 | 333 | 352 | 326 | 239 | 275 | 179 | 134 | 312.9 |
| 9-Sep | 143 | 343 | 328 | 244 | 216 | 105 | 329 | 338 | 346 | 335 | 341 | 341 | 359 | 343 | 349 | 6 | 336 | 352 | 339 | 350 | 325 | 292 | 265 | 253 | 334.8 |
| 10-Sep | 218 | 218 | 189 | 196 | 237 | 240 | 237 | 233 | 239 | 263 | 275 | 275 | 281 | 275 | 279 | 301 | 277 | 279 | 258 | 253 | 257 | 256 | 260 | 213 | 262.8 |
| 11-Sep | 226 | 233 | 244 | 237 | 233 | 162 | 178 | 214 | 234 | 180 | 149 | 125 | 96 | 81 | 149 | 189 | 181 | 174 | 159 | 314 | 186 | 181 | 236 | 261 | 193.2 |
| 12-Sep | 263 | 266 | 272 | 255 | 231 | 235 | 246 | 253 | 270 | 300 | 316 | 317 | 327 | 315 | 347 | 336 | 56 | 68 | 35 | 46 | 71 | 65 | 54 | 29 | 298.2 |
| 13-Sep | 349 | 0 | 353 | 354 | 316 | 315 | 255 | 98 | 158 | 359 | 62 | 78 | 100 | 19 | 171 | 333 | 99 | 52 | 113 | 152 | AF | 355 | 351 | 352 | 39.7 |
| 14-Sep | 32 | 103 | AF | 281 | 176 | 254 | 277 | 287 | 302 | 329 | 27 | 31 | 59 | 76 | 84 | 51 | 57 | 46 | 47 | 58 | 54 | 12 | 186 | 295 | 45.4 |
| 15-Sep | 345 | 19 | 216 | 195 | 184 | 177 | 161 | 161 | 173 | 167 | 215 | 201 | 201 | 211 | 225 | 213 | 210 | 212 | 195 | 180 | 153 | 159 | 166 | 162 | 190.4 |
| 16-Sep | 156 | 150 | 149 | 157 | 142 | 150 | 159 | 163 | 179 | 166 | 167 | 185 | 191 | 178 | 195 | 192 | 189 | 200 | 188 | 159 | 150 | 159 | 157 | 146 | 172.3 |
| 17-Sep | 147 | 138 | 136 | 146 | 146 | 147 | 142 | 154 | 180 | 179 | 174 | 174 | 178 | 185 | 176 | 165 | 161 | 158 | 148 | 143 | 139 | 144 | 142 | 144 | 159.6 |
| 18-Sep | 143 | 138 | 141 | 146 | 161 | 161 | 125 | 133 | 195 | 169 | 164 | 156 | 158 | 162 | 138 | 144 | 152 | 136 | 126 | 119 | 117 | 119 | 107 | 125 | 147.5 |
| 19-Sep | 31 | 1 | 354 | 348 | 351 | 355 | 359 | 11 | 22 | 28 | 31 | 30 | 25 | 45 | 78 | 65 | 81 | 77 | 63 | 66 | 80 | 76 | 55 | 47 | 43.2 |
| 20-Sep | 39 | 31 | 25 | 18 | 19 | 20 | 22 | 18 | 20 | 24 | 26 | 31 | 31 | 27 | 25 | 25 | 23 | 21 | 15 | 16 | 12 | 16 | 14 | 15 | 22.2 |
| 21-Sep | 8 | 6 | 8 | 3 | 2 | 359 | 353 | 354 | 356 | 354 | 357 | 5 | 356 | 0 | 0 | 359 | 354 | 358 | 354 | 352 | 348 | 326 | 299 | 276 | 356.9 |
| 22-Sep | 283 | 291 | 254 | 249 | 241 | 206 | 225 | 188 | 200 | 222 | 214 | 194 | 157 | 224 | 223 | 159 | 142 | 130 | 111 | 113 | 150 | 147 | 137 | 115 | 178.1 |
| 23-Sep | 311 | 336 | 220 | 167 | 342 | 332 | 332 | 328 | 323 | 295 | 262 | 333 | 145 | 151 | 152 | 145 | 154 | 145 | 127 | 132 | 138 | 145 | 138 | 138 | 148.8 |
| 24-Sep | 134 | 143 | 138 | 149 | 157 | 138 | 144 | 162 | 179 | 174 | 184 | 178 | 175 | 199 | 175 | 153 | 141 | 138 | 127 | 147 | 159 | 159 | 150 | 152 | 157.9 |
| 25-Sep | 142 | 141 | 141 | 136 | 148 | 153 | 152 | 157 | 176 | 185 | 193 | 180 | 220 | 240 | 248 | 253 | 176 | 162 | 190 | 174 | 167 | 195 | 186 | 204 | 183.3 |
| 26-Sep | 214 | 219 | 236 | 252 | 272 | 273 | 224 | 238 | 243 | 245 | 241 | 328 | 338 | 337 | 339 | 333 | 340 | 335 | 333 | 326 | 164 | 273 | 152 | 216 | 290.9 |
| 27-Sep | 239 | 164 | 177 | 190 | 166 | 188 | 152 | 132 | 277 | 346 | 1 | 351 | 27 | 38 | 44 | 44 | 40 | 32 | 26 | 11 | 19 | 33 | 26 | 14 | 34.2 |
| 28-Sep | 2 | 350 | 351 | 34 | 356 | 354 | 147 | 147 | 244 | 226 | 192 | 184 | 176 | 172 | 175 | 194 | 197 | 192 | 177 | 165 | 163 | 174 | 179 | 166 | 181.8 |
| 29-Sep | 161 | 165 | 175 | 188 | 159 | 155 | 163 | 171 | 185 | 178 | 183 | 183 | 201 | 235 | 238 | 233 | 258 | 346 | 37 | 145 | 138 | 141 | 158 | 128 | 184.5 |
| 30-Sep | 124 | 142 | 129 | 137 | 161 | 156 | 173 | 150 | 162 | 183 | 187 | 194 | 199 | 202 | 232 | 237 | 224 | 289 | 320 | 321 | 321 | 319 | 316 | 311 | 228.4 |

190.5 194.5 200.6 209.5 200.5 203.2 208.9 222.4 230.5 234.9 242.1 224.7 229.2 245.2 245.2 247.3 226.7 274.6 347.7 114.8 139.5 166.3 181.7 188.9

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

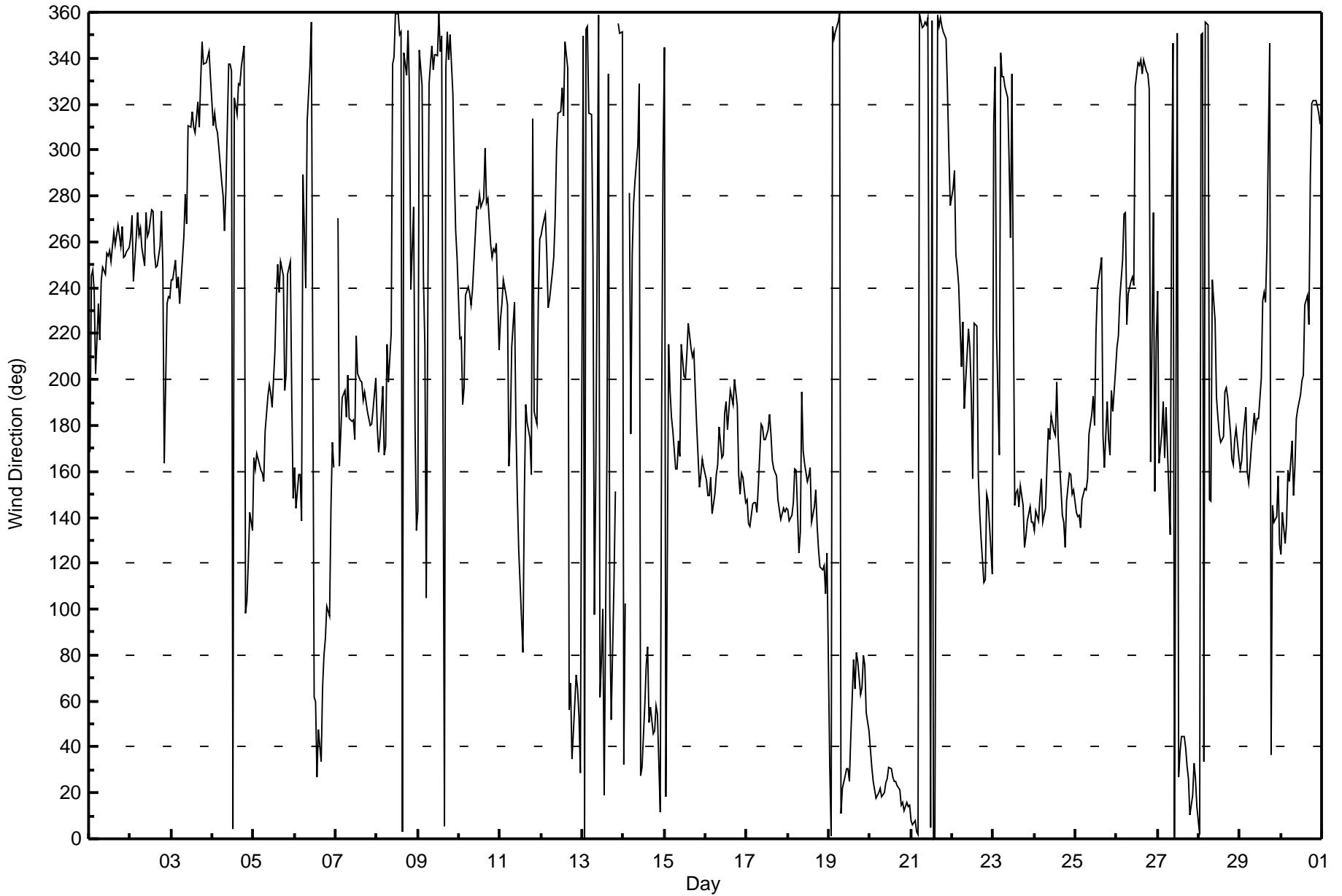
Wind Direction (WD) - deg
Barge Landing - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 98 deg on Sep 14 06:00 | Hours of Data: 717 |
| Minimum Value: 7 deg on Sep 16 21:00 | Hours of Missing Data: 3 |
| | Hours of Calibration: 0 |
| | Percent Operational Time: 99.6 |
| Percentiles: P ₁ = 8 P ₁₀ = 14 Q ₁ = 21 Median = 27 Q ₃ = 35 P ₉₀ = 51 P ₉₉ = 91 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 56 | 20 | 18 | 23 | 33 | 32 | 37 | 40 | 29 | 24 | 23 | 26 | 26 | 28 | 28 | 26 | 30 | 27 | 24 | 24 | 17 | 19 | 18 | 22 | 56 |
| 2-Sep | 24 | 63 | 81 | 25 | 25 | 20 | 21 | 25 | 39 | 32 | 34 | 33 | 36 | 34 | 25 | 23 | 21 | 22 | 29 | 65 | 22 | 26 | 21 | 22 | 81 |
| 3-Sep | 22 | 18 | 15 | 26 | 25 | 23 | 20 | 35 | 41 | 36 | 36 | 34 | 37 | 36 | 36 | 31 | 34 | 34 | 29 | 26 | 24 | 21 | 21 | 14 | 41 |
| 4-Sep | 19 | 19 | 25 | 23 | 25 | 21 | 21 | 32 | 37 | 43 | 34 | 56 | 58 | 60 | 42 | 32 | 33 | 31 | 16 | 36 | 13 | 15 | 20 | 9 | 60 |
| 5-Sep | 15 | 22 | 17 | 16 | 19 | 14 | 14 | 26 | 30 | 38 | 32 | 34 | 34 | 27 | 35 | 36 | 23 | 25 | 23 | 18 | 61 | 52 | 43 | 62 | 62 |
| 6-Sep | 32 | 15 | 31 | 20 | 39 | 37 | 80 | 43 | 36 | 34 | 50 | 58 | 60 | 93 | 75 | 46 | 47 | 22 | 19 | 12 | 12 | 14 | 21 | 47 | 93 |
| 7-Sep | AF | 85 | 11 | 26 | 44 | 27 | 36 | 32 | 30 | 29 | 31 | 30 | 32 | 32 | 34 | 32 | 31 | 28 | 22 | 22 | 21 | 22 | 23 | 25 | 85 |
| 8-Sep | 24 | 16 | 17 | 23 | 16 | 80 | 56 | 34 | 53 | 71 | 25 | 28 | 32 | 36 | 25 | 32 | 22 | 22 | 29 | 81 | 41 | 45 | 89 | 64 | 89 |
| 9-Sep | 18 | 49 | 34 | 28 | 37 | 49 | 26 | 28 | 21 | 22 | 24 | 22 | 29 | 23 | 26 | 25 | 32 | 22 | 24 | 36 | 20 | 31 | 28 | 24 | 49 |
| 10-Sep | 27 | 47 | 42 | 30 | 28 | 30 | 28 | 30 | 31 | 32 | 33 | 34 | 32 | 32 | 32 | 36 | 31 | 33 | 22 | 19 | 19 | 18 | 32 | 94 | 94 |
| 11-Sep | 36 | 51 | 30 | 49 | 31 | 30 | 31 | 32 | 41 | 91 | 31 | 29 | 36 | 32 | 35 | 33 | 36 | 31 | 15 | 76 | 57 | 31 | 53 | 30 | 91 |
| 12-Sep | 23 | 24 | 28 | 25 | 31 | 25 | 20 | 19 | 29 | 35 | 30 | 32 | 25 | 32 | 23 | 38 | 53 | 26 | 24 | 24 | 22 | 22 | 22 | 22 | 53 |
| 13-Sep | 18 | 35 | 17 | 66 | 51 | 87 | 61 | 83 | 74 | 47 | 51 | 62 | 51 | 96 | 70 | 57 | 34 | 32 | 48 | 19 | AF | 13 | 47 | 28 | 96 |
| 14-Sep | 52 | 67 | AF | 50 | 96 | 98 | 43 | 40 | 42 | 56 | 42 | 51 | 45 | 43 | 40 | 38 | 28 | 19 | 18 | 57 | 38 | 65 | 47 | 98 | |
| 15-Sep | 30 | 40 | 82 | 66 | 31 | 22 | 24 | 26 | 35 | 31 | 42 | 47 | 41 | 53 | 37 | 40 | 35 | 28 | 18 | 15 | 8 | 7 | 14 | 12 | 82 |
| 16-Sep | 9 | 11 | 11 | 12 | 9 | 11 | 14 | 22 | 26 | 28 | 31 | 34 | 37 | 31 | 33 | 35 | 28 | 30 | 22 | 14 | 7 | 12 | 10 | 12 | 37 |
| 17-Sep | 7 | 8 | 9 | 7 | 9 | 9 | 9 | 24 | 33 | 31 | 29 | 30 | 33 | 33 | 33 | 29 | 27 | 21 | 13 | 11 | 12 | 12 | 11 | 10 | 33 |
| 18-Sep | 9 | 10 | 11 | 12 | 15 | 18 | 38 | 30 | 52 | 33 | 26 | 23 | 26 | 32 | 27 | 23 | 24 | 16 | 15 | 15 | 15 | 20 | 27 | 64 | 64 |
| 19-Sep | 57 | 24 | 20 | 16 | 17 | 18 | 40 | 27 | 26 | 22 | 23 | 23 | 23 | 33 | 26 | 23 | 23 | 23 | 21 | 22 | 21 | 23 | 24 | 20 | 57 |
| 20-Sep | 20 | 21 | 21 | 22 | 21 | 21 | 21 | 21 | 22 | 21 | 21 | 21 | 20 | 21 | 21 | 21 | 22 | 21 | 23 | 22 | 22 | 22 | 22 | 24 | 24 |
| 21-Sep | 22 | 22 | 22 | 24 | 23 | 23 | 23 | 23 | 24 | 23 | 22 | 25 | 25 | 24 | 25 | 24 | 23 | 23 | 23 | 21 | 22 | 16 | 22 | 24 | 25 |
| 22-Sep | 37 | 68 | 70 | 12 | 29 | 36 | 28 | 26 | 35 | 38 | 31 | 33 | 37 | 49 | 34 | 29 | 17 | 12 | 15 | 15 | 19 | 31 | 14 | 8 | 70 |
| 23-Sep | 65 | 77 | 44 | 73 | 38 | 14 | 16 | 23 | 30 | 40 | 33 | 37 | 73 | 25 | 41 | 47 | 33 | 23 | 11 | 9 | 10 | 8 | 10 | 70 | 77 |
| 24-Sep | 22 | 10 | 9 | 11 | 14 | 9 | 18 | 24 | 27 | 30 | 45 | 46 | 39 | 47 | 43 | 27 | 22 | 12 | 10 | 15 | 14 | 15 | 13 | 12 | 47 |
| 25-Sep | 11 | 12 | 14 | 15 | 14 | 14 | 13 | 16 | 27 | 30 | 39 | 43 | 33 | 38 | 28 | 33 | 36 | 11 | 25 | 29 | 17 | 23 | 21 | 26 | 43 |
| 26-Sep | 29 | 28 | 27 | 44 | 27 | 23 | 38 | 19 | 17 | 17 | 52 | 42 | 28 | 27 | 27 | 26 | 24 | 21 | 17 | 17 | 68 | 56 | 68 | 50 | 68 |
| 27-Sep | 76 | 27 | 22 | 36 | 29 | 31 | 31 | 62 | 51 | 62 | 48 | 39 | 35 | 25 | 27 | 24 | 21 | 21 | 22 | 20 | 21 | 22 | 20 | 21 | 76 |
| 28-Sep | 42 | 55 | 69 | 62 | 25 | 13 | 79 | 91 | 52 | 35 | 35 | 34 | 28 | 32 | 30 | 28 | 26 | 23 | 21 | 17 | 18 | 22 | 22 | 18 | 91 |
| 29-Sep | 16 | 19 | 31 | 15 | 13 | 9 | 15 | 21 | 25 | 26 | 31 | 30 | 36 | 27 | 30 | 28 | 33 | 45 | 24 | 20 | 9 | 82 | 18 | 21 | 82 |
| 30-Sep | 13 | 22 | 7 | 10 | 21 | 30 | 25 | 14 | 28 | 30 | 33 | 34 | 34 | 30 | 28 | 25 | 27 | 41 | 27 | 20 | 21 | 22 | 25 | 25 | 41 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 76 | 85 | 82 | 73 | 96 | 98 | 80 | 91 | 74 | 91 | 52 | 62 | 73 | 96 | 75 | 57 | 53 | 45 | 48 | 81 | 68 | 82 | 89 | 94 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





Wood Buffalo Environmental Association

TRS Calibration Summary

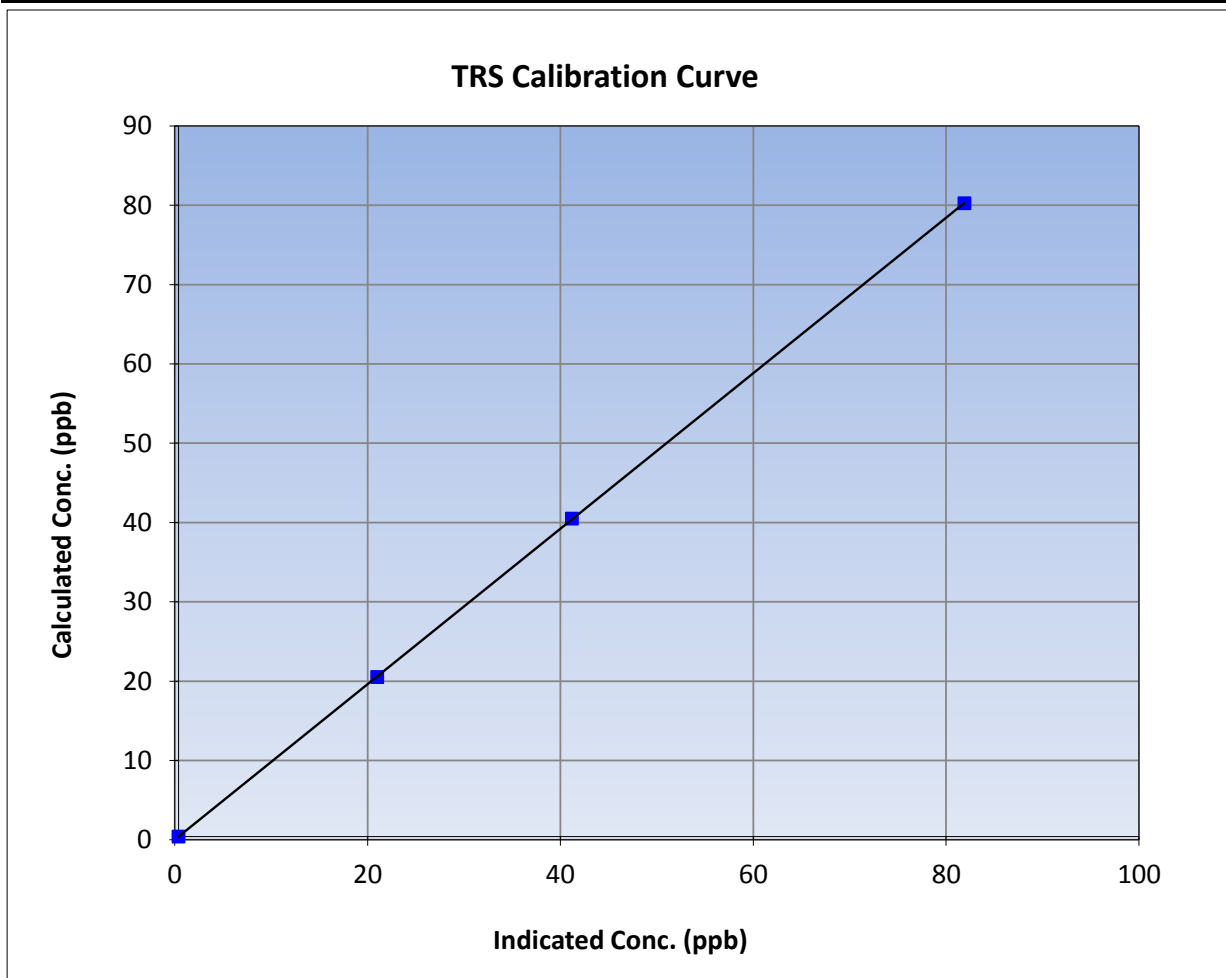
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 6, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Barge Landing | Station Number | AMS 09 |
| Start Time (MST) | 9:18 | End Time (MST) | 14:16 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1331259320 |

Calibration Data

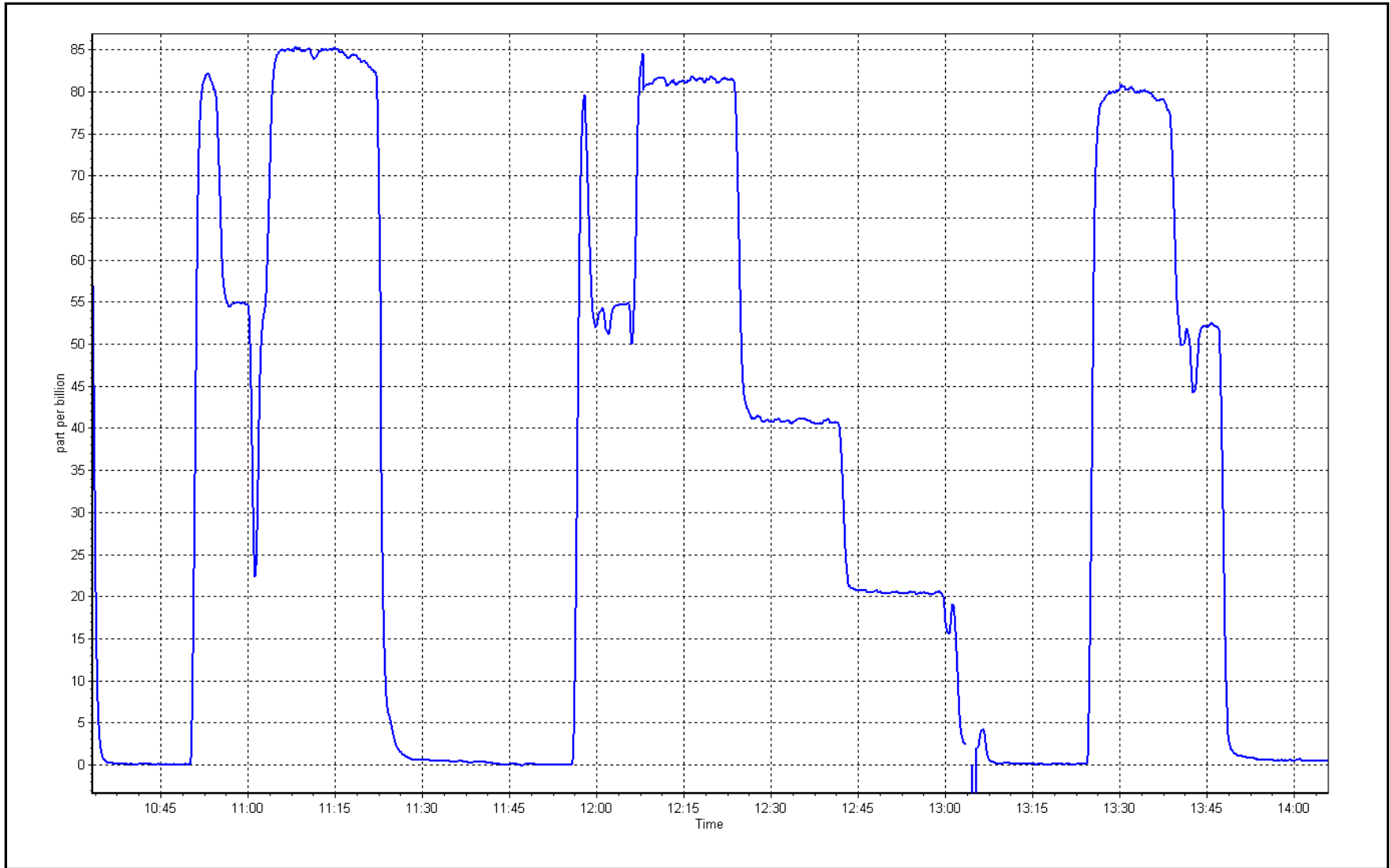
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999995 | ≥0.995 |
| 79.9 | 81.5 | 0.9799 | | | |
| 40.1 | 40.8 | 0.9829 | Slope | 0.980345 | 0.90 - 1.10 |
| 20.1 | 20.6 | 0.9765 | | | |
| | | | Intercept | -0.002546 | +/-3 |



TRS Calibration Plot

Date: September 6, 2017

Location: Barge Landing





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|----------------|
| Station Name: | Barge Landing | Station number: | AMS 09 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 9, 2017 |
| Start time (MST): | 9:05 | End time (MST): | 12:14 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|------------------|
| Gas Cert Reference | EY0000675 | Cal Gas Expiry Date | November 4, 2019 |
| CH4 Cal Gas Conc. | <u>511.0</u> ppm | CH4 Equiv Conc. | 1055.5 ppm |
| C3H8 Cal Gas Conc. | <u>198.0</u> ppm | Station temp. | 27 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 746 |
| ZAG Make/Model | API 701 | Serial Number | 4888 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|--------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1327059296 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -299 |
| Calculated slope | 0.998574 | Sample pressure | 9.2 |
| Calculated intercept | 0.008941 | Fuel pressure | 24.1 |
| Analyzer Background | 6.04 | Air pressure | 34.7 |
| Analyzer Coefficient | 4.541 | Flame temperature | 159.7 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5007 | 0.0 | 0.00 | 0.01 | ---- |
| as found span | 4942 | 75.1 | 15.80 | 16.81 | 0.940 |
| calibrator zero | 5007 | 0.0 | 0.00 | 0.01 | ---- |
| high point | 4940 | 80.2 | 16.86 | 16.77 | 1.006 |
| second point | 4980 | 40.1 | 8.43 | 8.40 | 1.004 |
| third point | 4998 | 20.1 | 4.23 | 4.16 | 1.018 |
| as left zero | 5007 | 0.0 | 0.00 | -0.06 | ---- |
| as left span | | | | | |

| | | | | |
|---------------------------|-------|-------------------|-------|-----------------|
| Average Correction Factor | | | | 1.009 |
| Corrected As found | 16.80 | Previous response | 15.81 | *% change -5.9% |

* = > +/-5% change initiates investigation

Notes: New calibrator installed yesterday. Changed inlet filter after as founds. Changed the span target to 16.84ppm. Adjusted the span. Could not capture as left span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

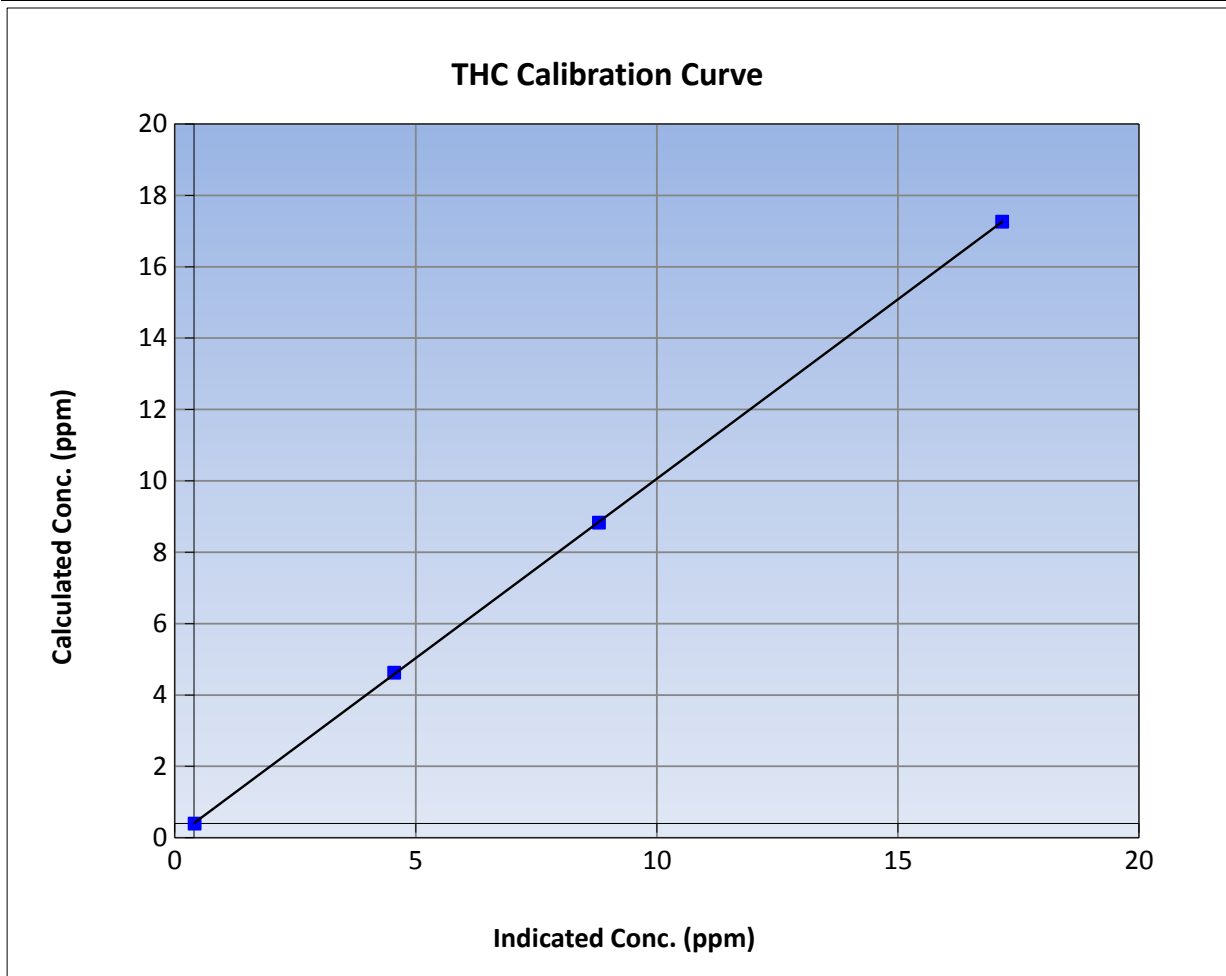
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Barge Landing | Station Number | AMS 09 |
| Start Time (MST) | 9:05 | End Time (MST) | 12:14 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1327059296 |

Calibration Data

| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999983 | |
| 16.9 | 16.8 | 1.0058 | | | ≥0.995 |
| 8.4 | 8.4 | 1.0037 | Slope | 1.005143 | |
| 4.2 | 4.2 | 1.0175 | | | 0.90 - 1.10 |
| | | | Intercept | 0.010071 | +/-1.5 |



THC Calibration Plot

Date: September 7, 2017

Location: Barge Landing





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 11
LOWER CAMP
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|------------------|-------------------------|-----------------------|---------------------|-------------------------|-----------------------|--------------------------|------------------------|
| SO2 (ppb) Average | 687 | 33 | 33 | 100 | 84 | 0 | 12 | 0 |
| H2S (ppb) Average | 684 | 36 | 36 | 100 | 8 | 0 | 1 | 0 |
| THC (ppm) Average | 687 | 32 | 33 | 99.86 | 7 | - | 3.1 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100 | 33 | - | 22.6 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 98 | - | 89 | - |
| Wind Speed 10 m (km/h) Average | 712 | 2 | 8 | 99.17 | 29 | - | 19 | - |
| Wind Direction 10 m (deg) Average | 712 | 2 | 8 | 99.17 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|-----|--------|------|------|-----|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 687 | 2.1 | 7 | - | 0 | 0 | 0 | 1 | 2 | 4 | 84 |
| H2S (ppb) Average | 684 | 0.5 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 8 |
| THC (ppm) Average | 687 | 2.4 | 0.5 | - | 2 | 2.1 | 2.2 | 2.3 | 2.5 | 2.8 | 7 |
| Temperature 2 m (C) Average | 720 | 12.7 | 6 | - | 0.9 | 5.4 | 8.3 | 12.2 | 16.6 | 20.7 | 33 |
| Relative Humidity (%) Average | 720 | 69.2 | 20 | - | 20 | 38 | 54 | 73 | 86 | 94 | 98 |
| Wind Speed 10 m (km/h) Average | 712 | 9.2 | 6 | - | 0 | 2 | 4 | 8 | 13 | 19 | 29 |
| Wind Direction 10 m (deg) Average | 712 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|-----------------------------------|
| THC | 07 Sep 2017 10:00 | 07 Sep 2017 10:00 | 1 | Maintenace - fuel gas replacement |
| Wind Speed, Wind Direction | 25 Sep 2017 17:00 | 25 Sep 2017 18:00 | 2 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 29 Sep 2017 23:00 | 30 Sep 2017 00:00 | 2 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 30 Sep 2017 03:00 | 30 Sep 2017 04:00 | 2 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Lower Camp - September 2017

| | | | | |
|---|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 84 ppb on Sep 15 19:00 | Maximum Daily Average: 12.4 ppb on Sep 15 | | Hours of Data: | 687 |
| Minimum Value: 0 ppb on Sep 23 07:00 | Minimum Daily Average: 0.1 ppb on Sep 21 | | Hours of Missing Data: | 33 |
| Maximum Diurnal Average: 6.2 ppb at hour 19 | Minimum Diurnal Average: 0.6 ppb at hour 2 | | Hours of Calibration: | 33 |
| Monthly Average: 2.1 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 32 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 3 | 2 | 2 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 3 | 1 | 0 | 1.0 | 3 |
| 2-Sep | 0 | 0 | 0 | 2 | Z | 2 | 2 | 1 | 0 | 1 | 6 | 10 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1.6 | 10 |
| 3-Sep | 1 | 1 | 0 | 0 | 1 | Z | 1 | 2 | 1 | 1 | 13 | 8 | 4 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 2 | 3 | 2.0 | 13 |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 2 | 1 | 1 | 0.8 | 5 |
| 5-Sep | 0 | Z | 2 | 2 | 2 | 34 | 74 | 20 | 3 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 | 21 | 9 | 2 | 2 | 1 | 8.3 | 74 |
| 6-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 4 | 5 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | 6 | 4 | 2 | 3 | 1 | 1 | 0 | 1.6 | 6 |
| 7-Sep | 1 | 1 | 1 | Z | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 4 | 9 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1.9 | 9 |
| 8-Sep | 2 | 2 | 2 | 2 | Z | 1 | 0 | 1 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 1.0 | 3 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 10-Sep | Z | 2 | 11 | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 13 | 8 | 3 | 0 | 2 | 2 | 1 | 1 | 1 | 2.6 | 13 |
| 11-Sep | 1 | Z | 1 | 0 | 3 | 15 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1.6 | 15 |
| 12-Sep | 1 | 0 | Z | 1 | 0 | 1 | 0 | 1 | 2 | 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 4 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 1 | 0 | 0 | 0.7 | 6 |
| 14-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 54 | 58 | 10 | 9 | 3 | 2 | 2 | 1 | 15 | 84 | 39 | 2 | 1 | 1 | 1 | 12.4 | 84 |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 4 | 5 | 3 | 2 | 3 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1.3 | 5 |
| 17-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 | 3 | 10 | 2 | 4 | 9 | 2 | 3 | 27 | 31 | 24 | 9 | 15 | 7 | 1 | 6.8 | 31 |
| 18-Sep | 2 | 2 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 10 | 26 | 15 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.2 | 26 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 20-Sep | 0 | 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-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 29 | 6 | 4 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 5 | 1 | 0 | 0 | 2.9 | 29 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 2 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 7 | 4 | 1 | 1 | 1 | 0 | 1 | 0 | 1.3 | 7 |
| 25-Sep | 1 | 0 | 0 | Z | 1 | 0 | 1 | 0 | 1 | 1 | 1 | C | C | C | 3 | 6 | 1 | 1 | 13 | 4 | 8 | 2 | 1 | 1 | 2.3 | 13 |
| 26-Sep | 1 | 1 | 4 | 2 | Z | 2 | 2 | 6 | 3 | 1 | 1 | 5 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1.6 | 6 |
| 27-Sep | 1 | 1 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 5 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0.7 | 3 |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 4 | 2 | 1 | 1 | 2 | 6 | 32 | 32 | 3 | 5 | 1 | 1 | 4.3 | 32 |
| 30-Sep | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |

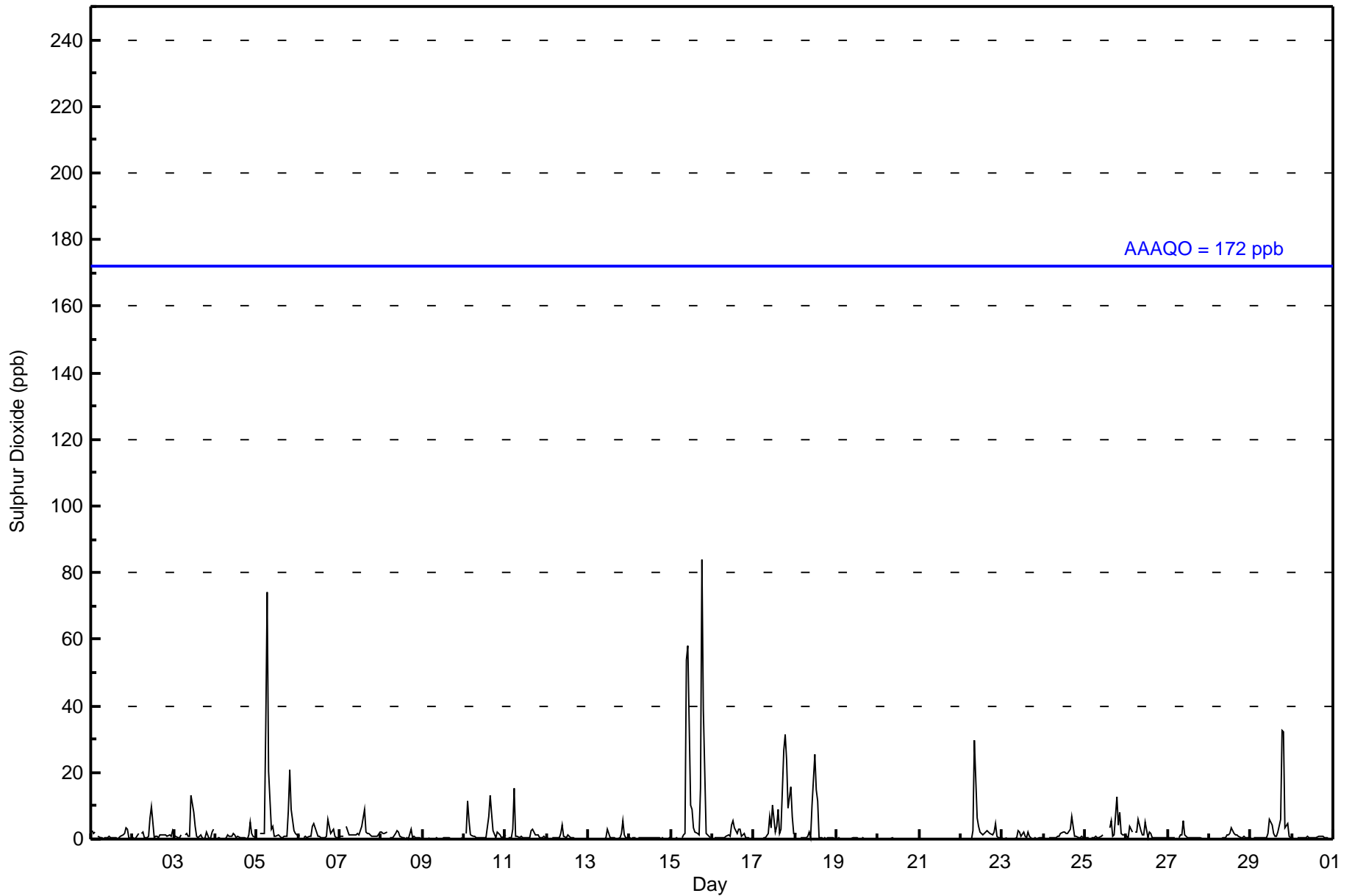
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.7 | 0.6 | 1.0 | 0.7 | 0.7 | 2.4 | 3.0 | 1.5 | 1.9 | 3.4 | 4.0 | 3.3 | 2.0 | 1.5 | 1.6 | 1.5 | 1.4 | 2.5 | 6.2 | 4.7 | 2.0 | 1.3 | 0.8 | 0.6 | Diurnal Average | |
| 3 | 2 | 11 | 5 | 4 | 34 | 74 | 20 | 29 | 54 | 58 | 26 | 15 | 11 | 9 | 13 | 8 | 27 | 84 | 39 | 9 | 15 | 7 | 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
Lower Camp - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 663 | 96.51 | 96.51 |
| 11 - 20 | 10 | 1.46 | 97.96 |
| 21 - 60 | 12 | 1.75 | 99.71 |
| 61 - 110 | 2 | 0.29 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Lower Camp - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 54 | 27 | 12 | 21 | 23 | 31 | 113 | 70 | 17 | 3 | 6 | 35 | 79 | 42 | 65 | 60 | 658 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 10 |
| 21 - 60 | 1 | 0 | 0 | 0 | 0 | 2 | 6 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 55 | 27 | 12 | 21 | 23 | 33 | 124 | 74 | 18 | 6 | 6 | 35 | 79 | 44 | 65 | 60 | 682 |

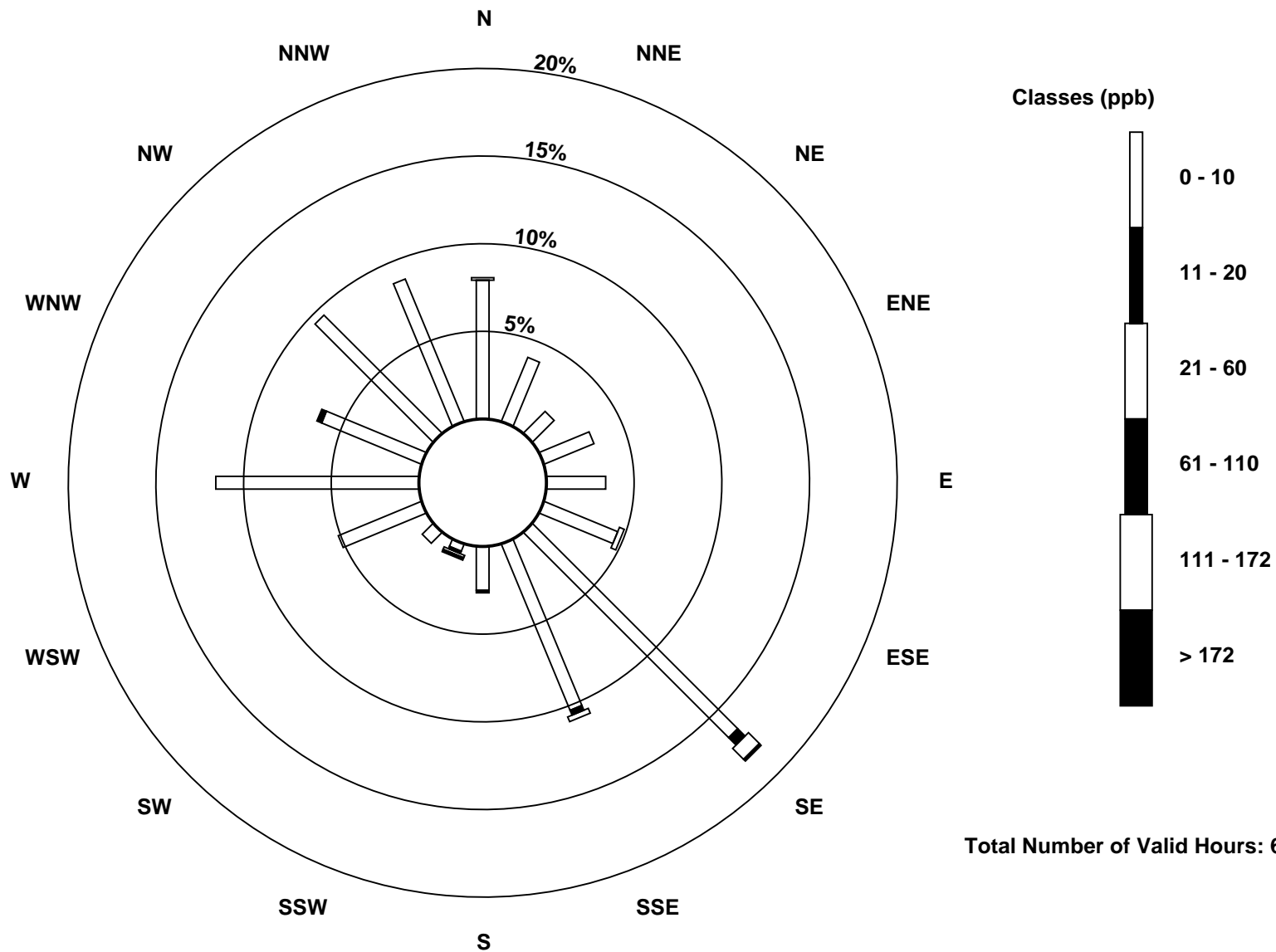
Total Number of Valid Hours: 682

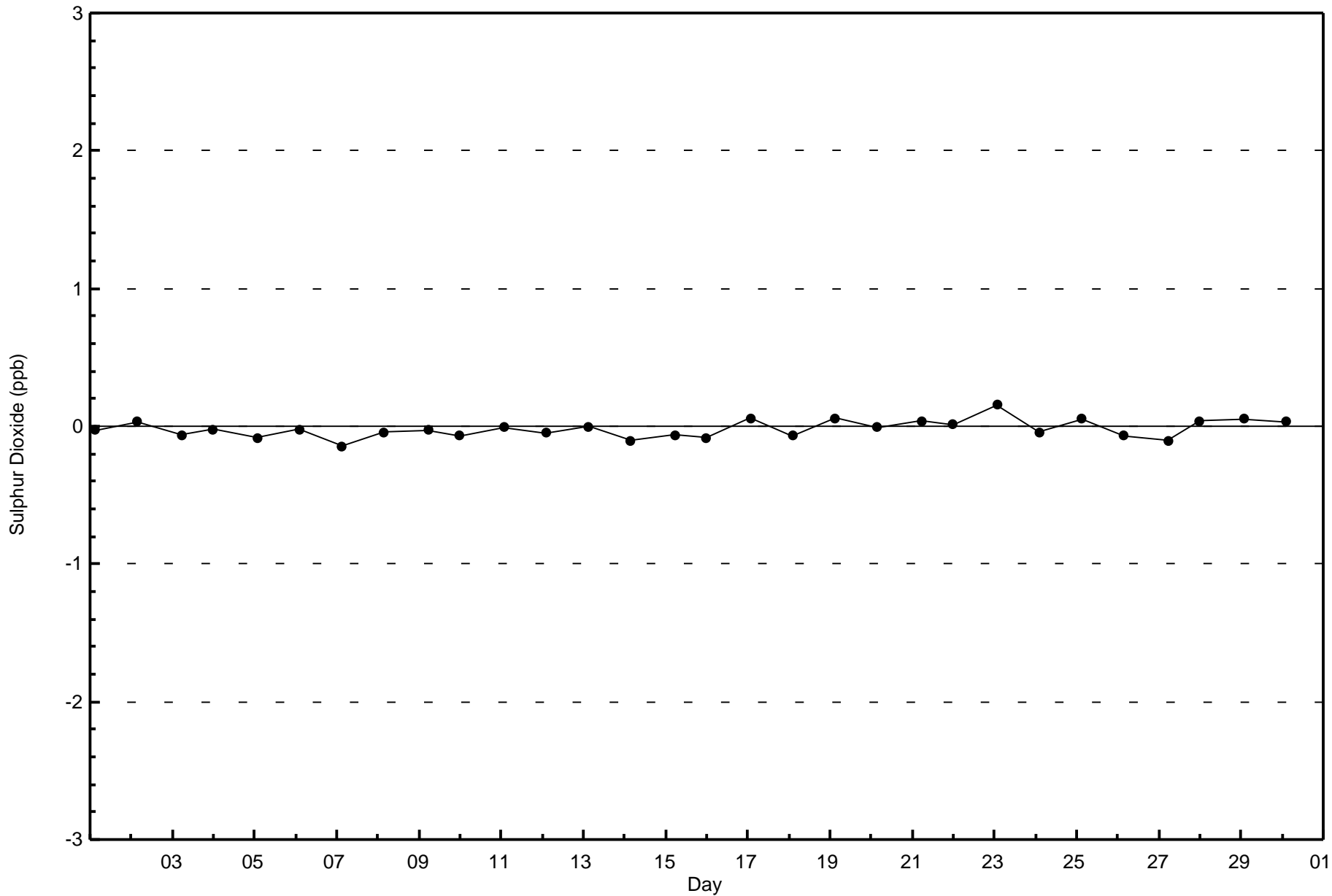
Total Number of Hours: 720

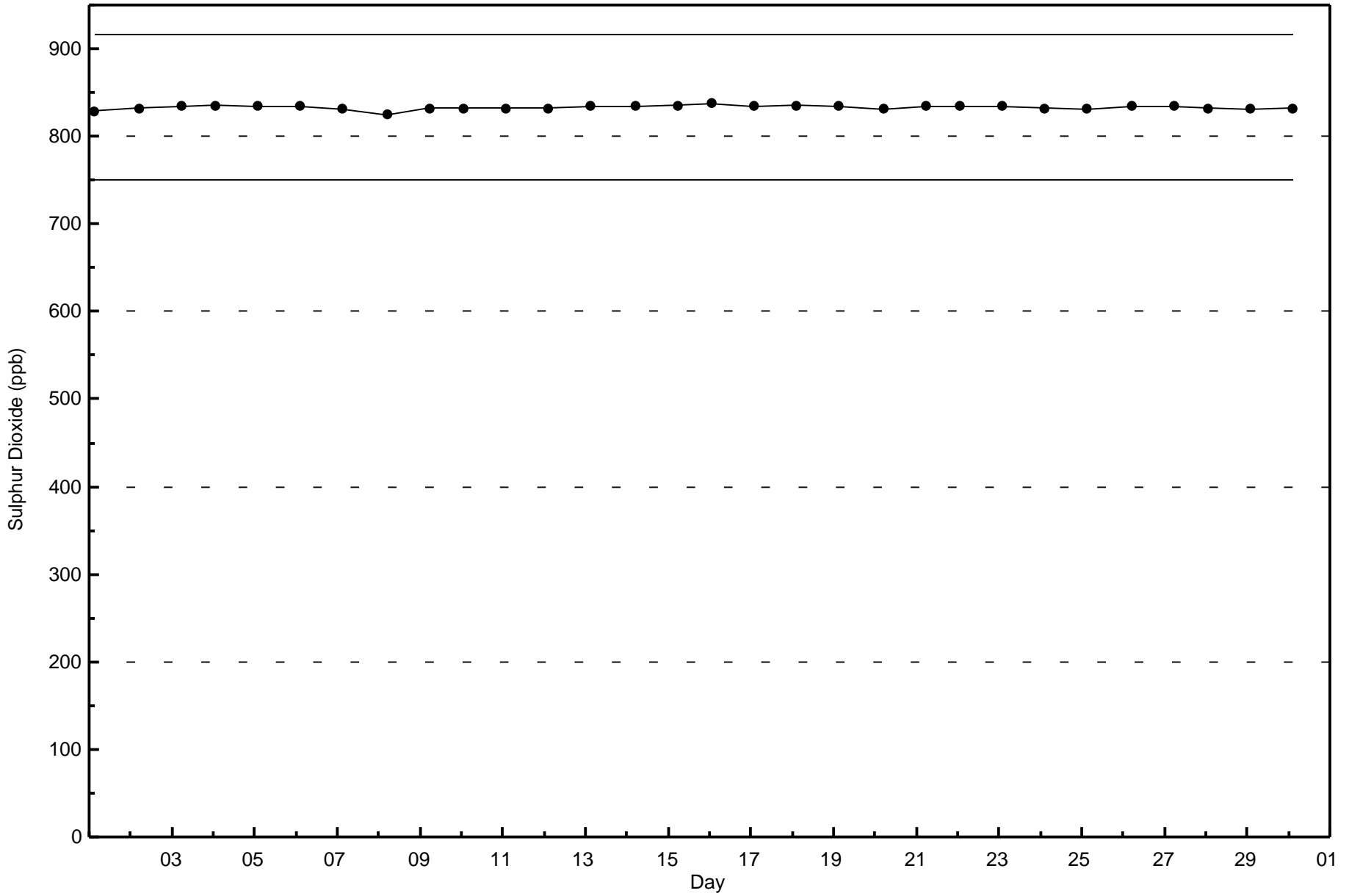


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Lower Camp - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 8 ppb on Sep 15 19:00 | Maximum Daily Average: 1.4 ppb on Sep 15 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 2 00:00 | Minimum Daily Average: 0.1 ppb on Sep 1 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 1.0 ppb at hour 19 | Minimum Diurnal Average: 0.2 ppb at hour 16 | | Hours of Calibration: | 36 |
| Monthly Average: 0.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 4 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 4-Sep | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0.4 | 2 |
| 5-Sep | 1 | 1 | Z | 6 | 2 | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 1 | 1.2 | 6 |
| 6-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.6 | 2 |
| 7-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 0.8 | 3 |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.6 | 1 |
| 9-Sep | 0 | 1 | 0 | 0 | 0 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0.4 | 1 |
| 10-Sep | 2 | Z | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 |
| 11-Sep | 0 | 0 | Z | 0 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 3 | 0 | 1 | 2 | 0 | 0.8 | 3 |
| 12-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0.3 | 3 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 15-Sep | 0 | 0 | 0 | 0 | 1 | 1 | Z | 2 | 2 | 4 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 8 | 4 | 1 | 1 | 1 | 1 | 1.4 | 8 |
| 16-Sep | 1 | Z | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 1 | 1 | 1 | 0.7 | 3 |
| 17-Sep | 1 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 5 | 5 | 4 | 2 | 2 | 1 | 0 | 1.2 | 5 |
| 18-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 20-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0.6 | 4 |
| 23-Sep | 0 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 24-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0.4 | 1 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 1 | 1 | 1 | 0.5 | 3 |
| 26-Sep | 1 | 1 | 2 | 0 | 0 | Z | 1 | 1 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 1 | -- | 4 |
| 27-Sep | 1 | 1 | 1 | 1 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0.7 | 2 |
| 28-Sep | 0 | Z | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 29-Sep | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 2 | 6 | 1 | 2 | 1.1 | 6 |
| 30-Sep | 4 | 2 | 1 | Z | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 |

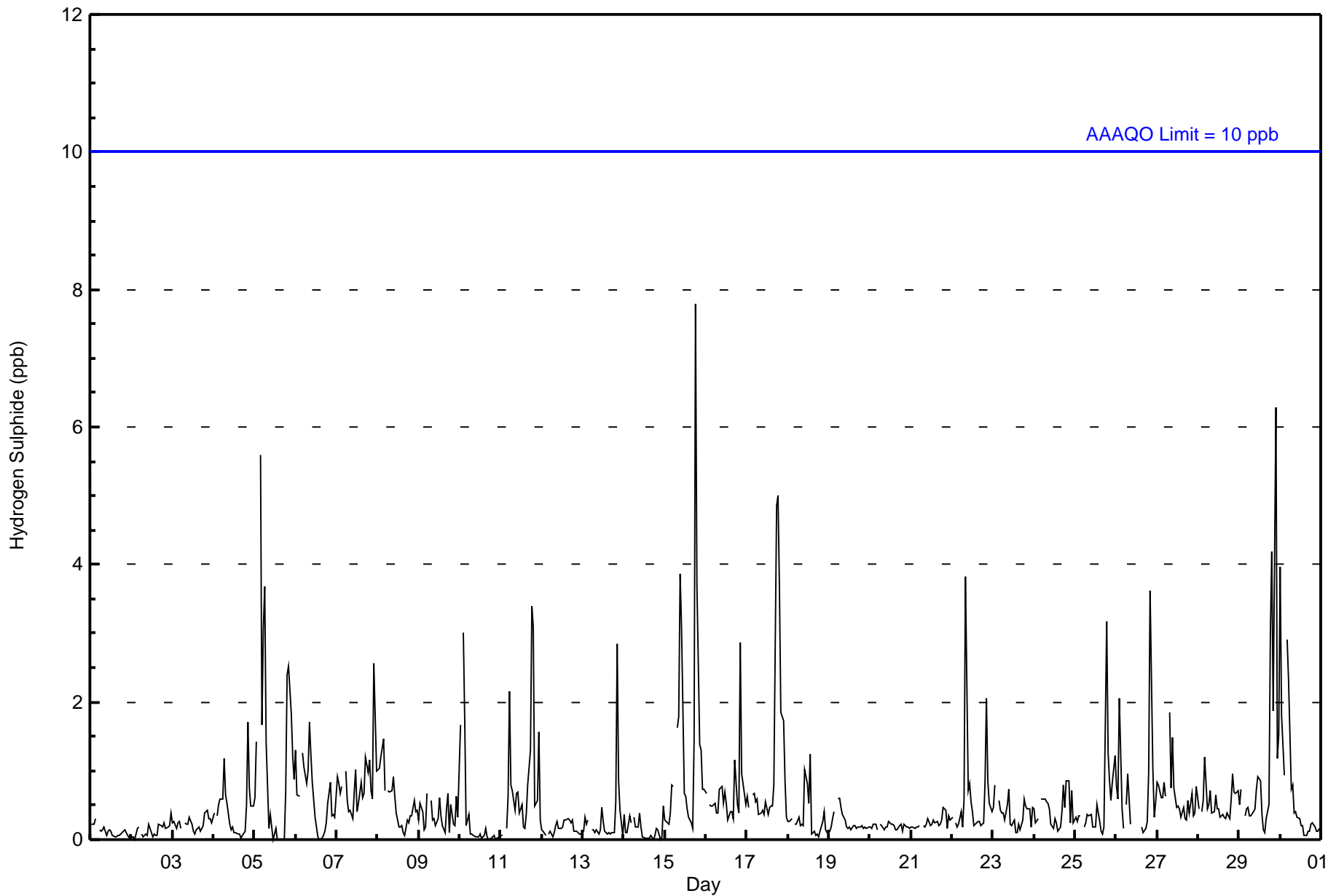
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.6 | 0.5 | 0.5 | 0.7 | 0.6 | 0.7 | 0.6 | 0.5 | 0.5 | 0.6 | 0.5 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.5 | 1.0 | 1.0 | 1.0 | 0.7 | 0.6 | 0.4 | Diurnal Average | |
| 4 | 2 | 3 | 6 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 8 | 4 | 4 | 6 | 3 | 2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 659 | 96.35 | 96.35 |
| 3 - 4 | 20 | 2.92 | 99.27 |
| 5 - 7 | 4 | 0.58 | 99.85 |
| 8 - 11 | 1 | 0.15 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 54 | 27 | 11 | 21 | 21 | 31 | 116 | 68 | 17 | 4 | 6 | 35 | 74 | 47 | 62 | 58 | 652 |
| 3 - 4 | 1 | 0 | 0 | 0 | 1 | 2 | 6 | 5 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 20 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 55 | 27 | 11 | 21 | 22 | 33 | 126 | 73 | 18 | 7 | 6 | 35 | 74 | 47 | 64 | 58 | 677 |

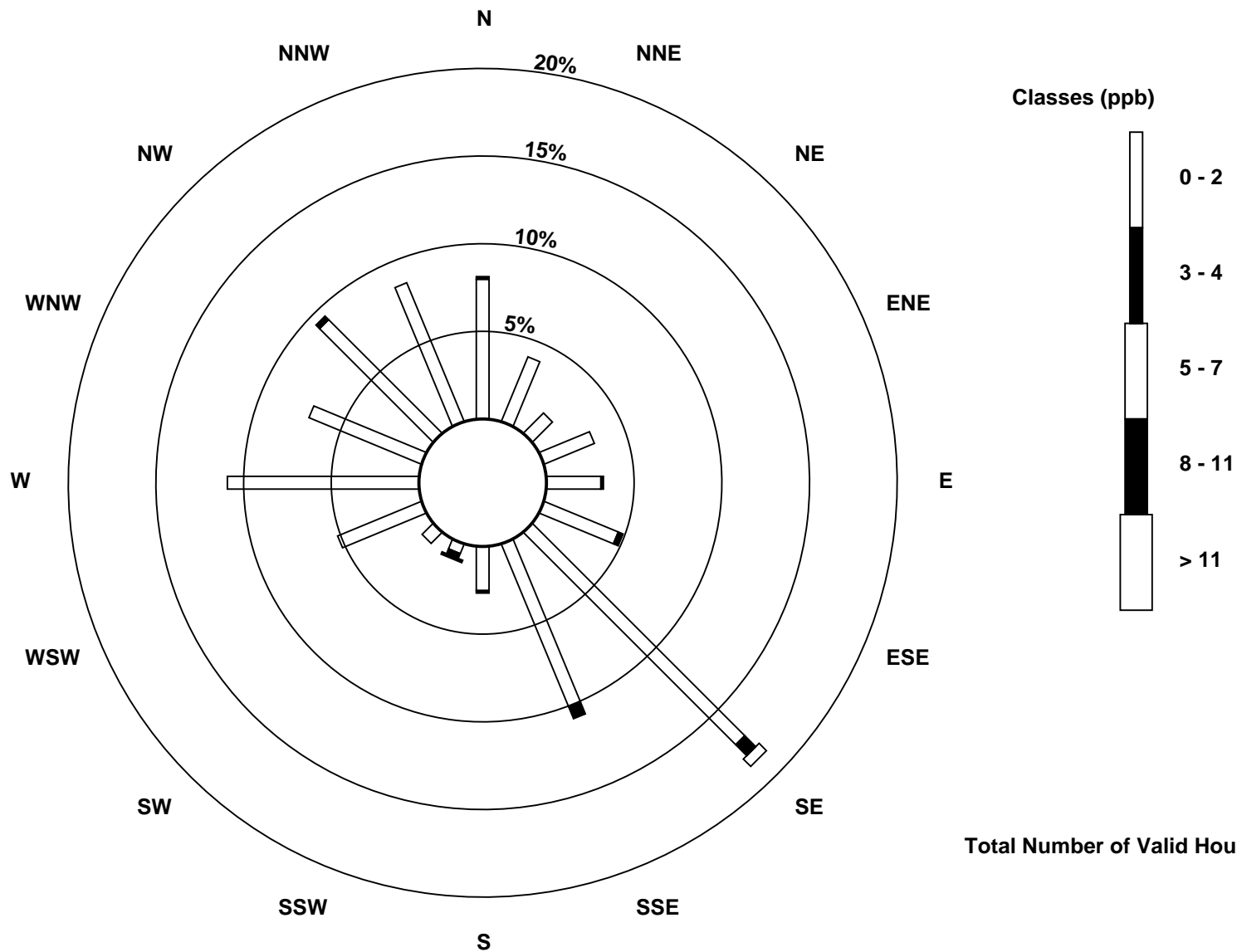
Total Number of Valid Hours: 677

Total Number of Hours: 720

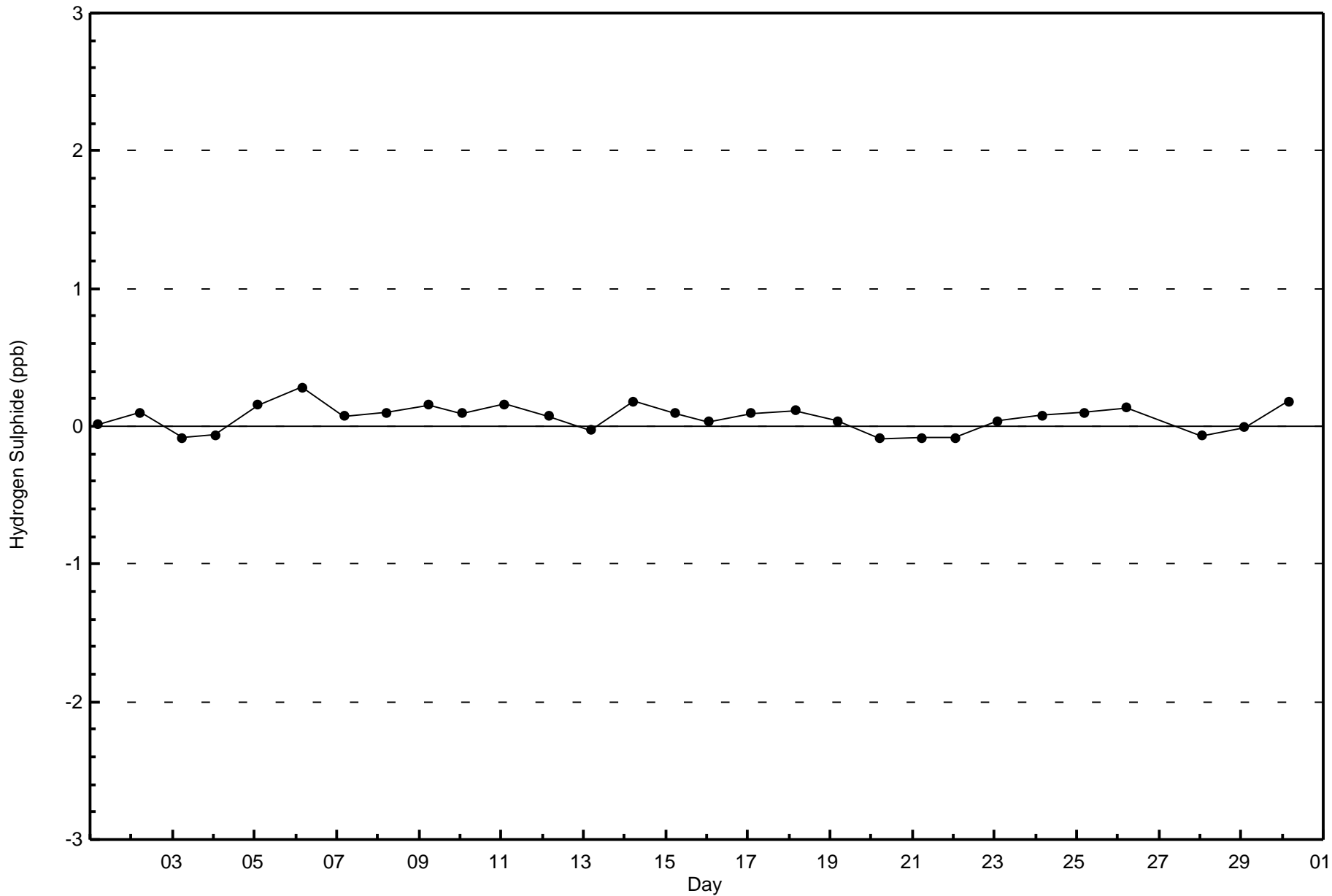


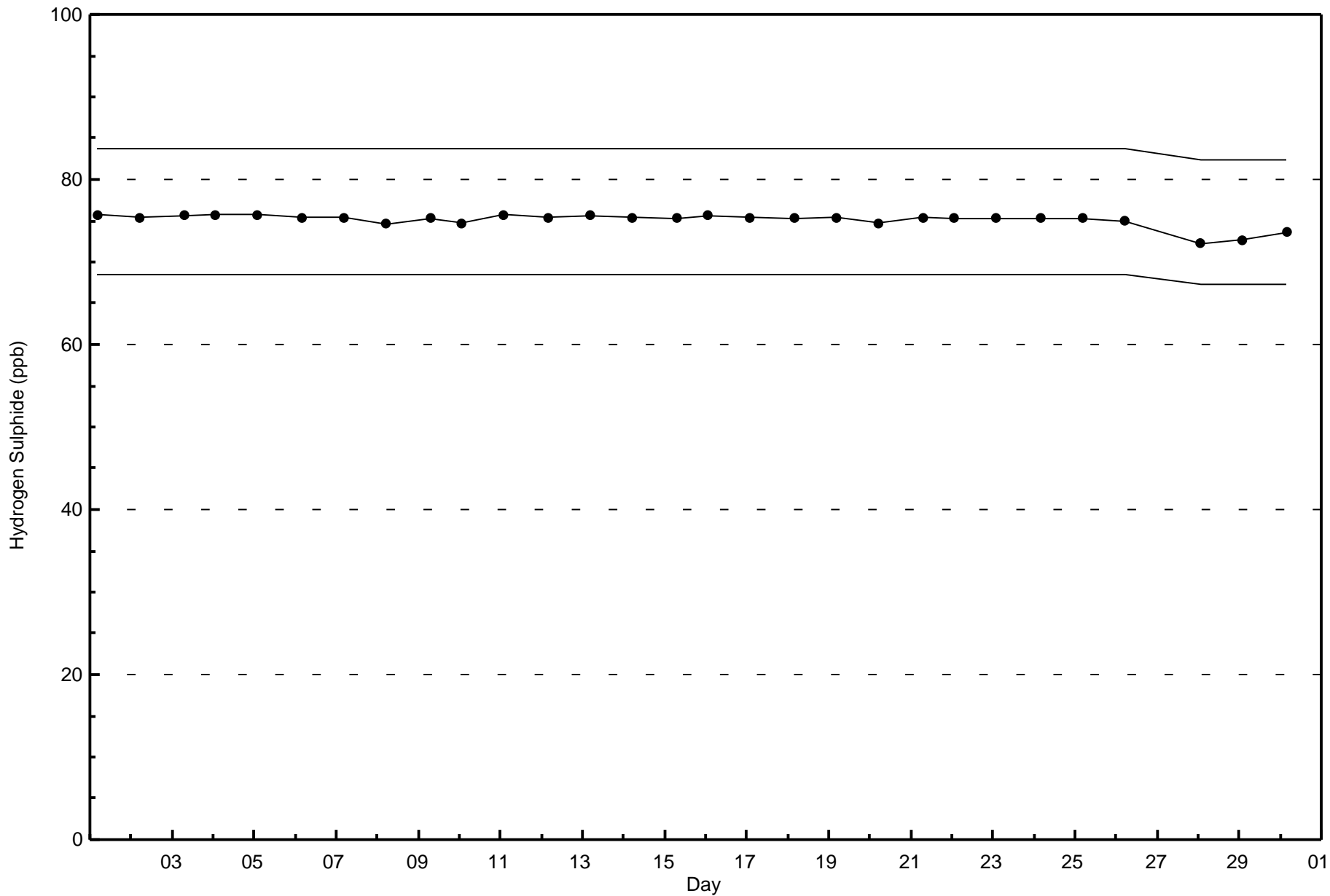
Wood Buffalo Environmental Association
Wind Rose Sep 2017

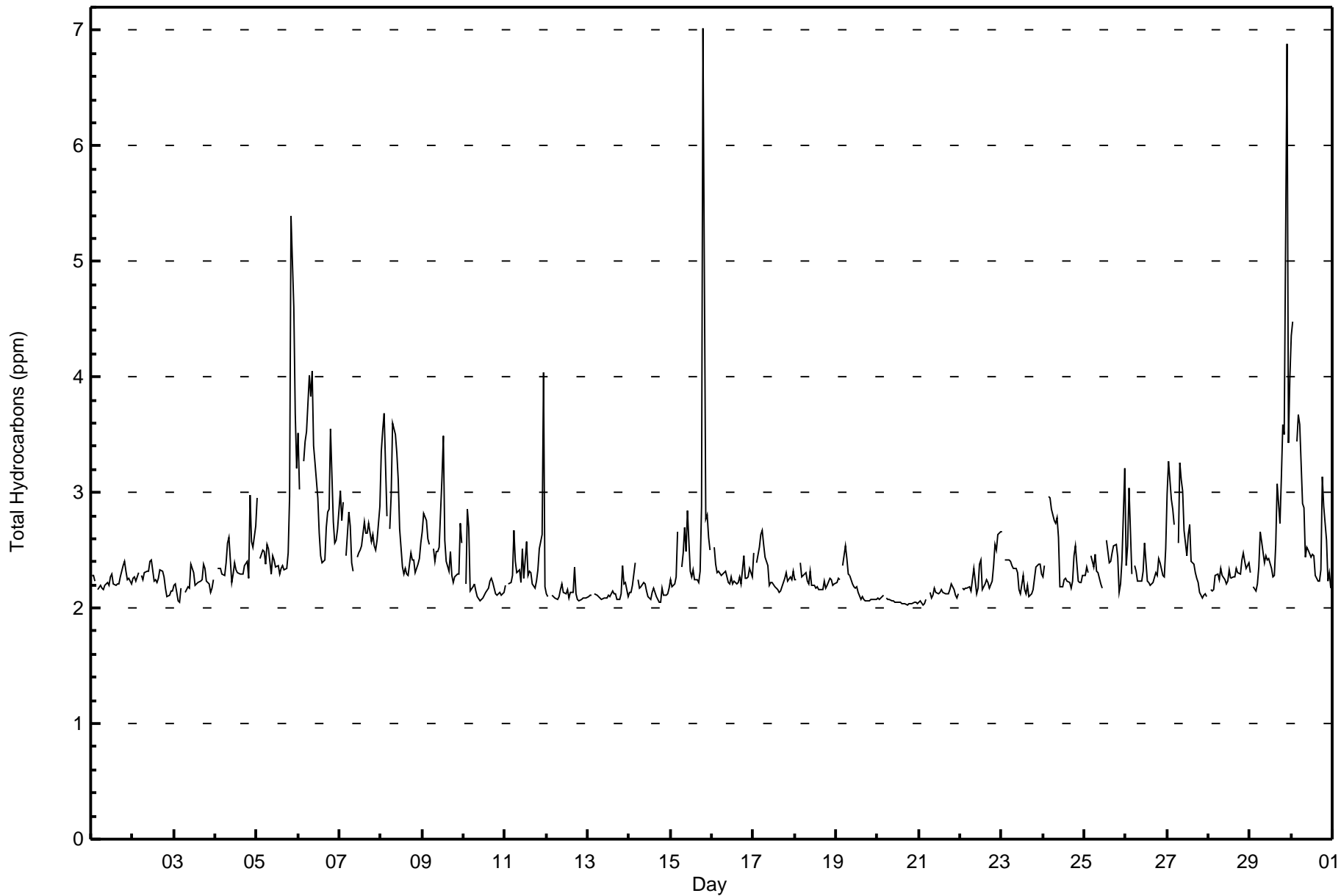
Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)



Total Number of Valid Hours: 677









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 15 | 2.18 | 2.18 |
| 2.1 - 3.0 | 630 | 91.70 | 93.89 |
| 3.1 - 10.0 | 42 | 6.11 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 11 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| 2.1 - 3.0 | 37 | 20 | 12 | 20 | 21 | 29 | 116 | 70 | 18 | 6 | 6 | 35 | 78 | 43 | 60 | 56 | 627 |
| 3.1 - 10.0 | 7 | 3 | 0 | 1 | 2 | 3 | 8 | 4 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 4 | 39 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 55 | 27 | 12 | 21 | 23 | 32 | 124 | 74 | 18 | 6 | 6 | 35 | 79 | 44 | 65 | 60 | 681 |

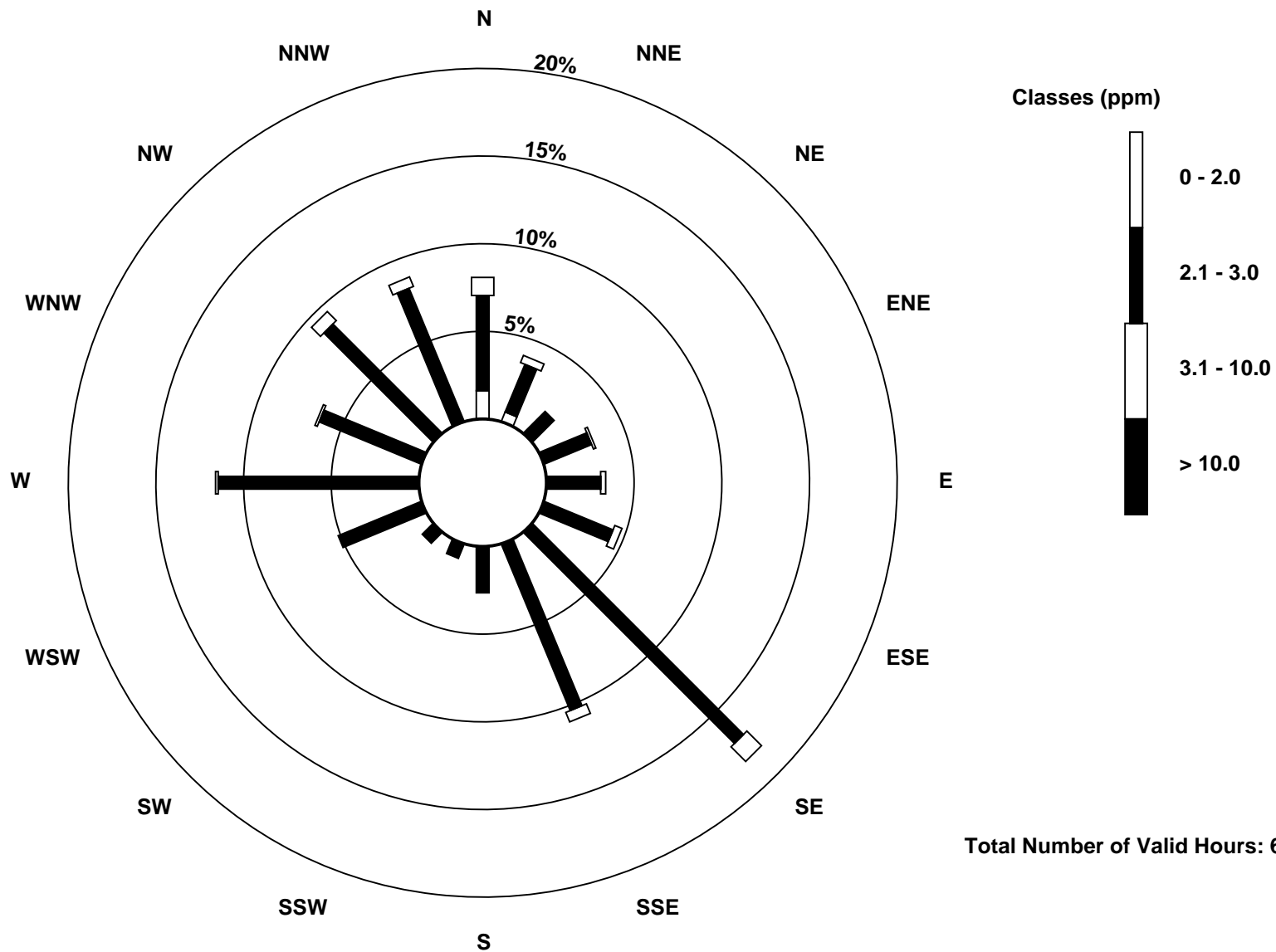
Total Number of Valid Hours: 681

Total Number of Hours: 720

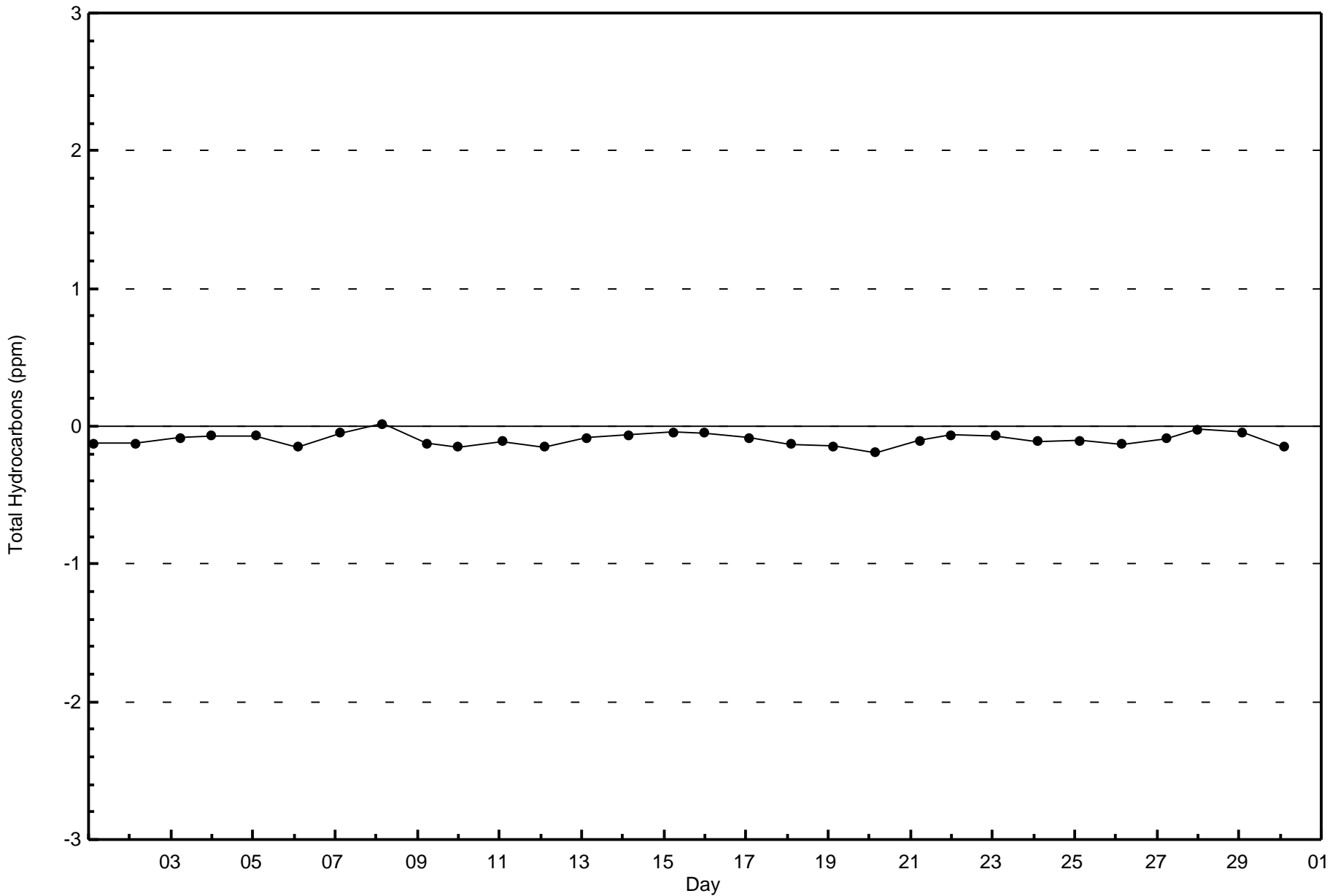


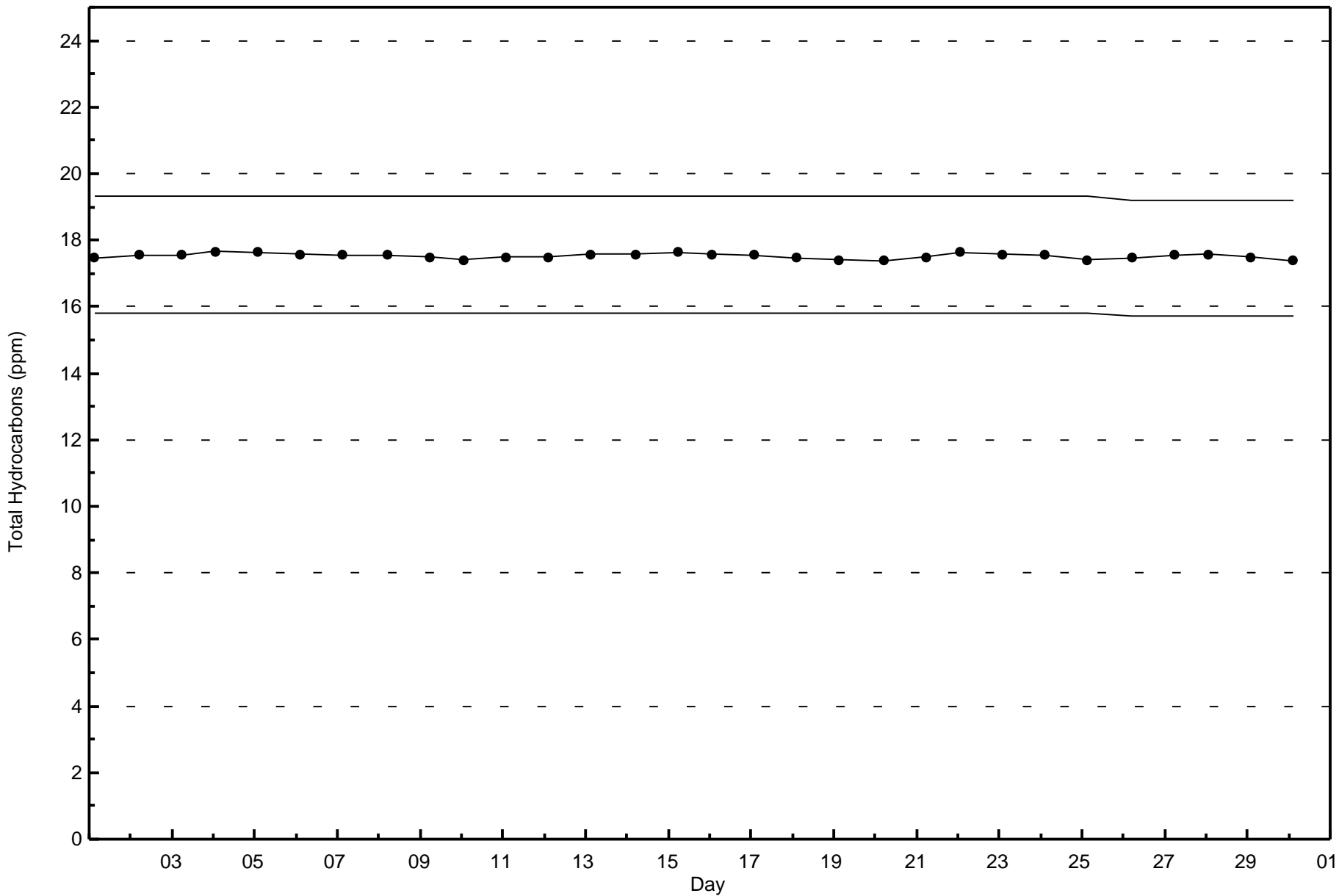
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)



Total Number of Valid Hours: 681



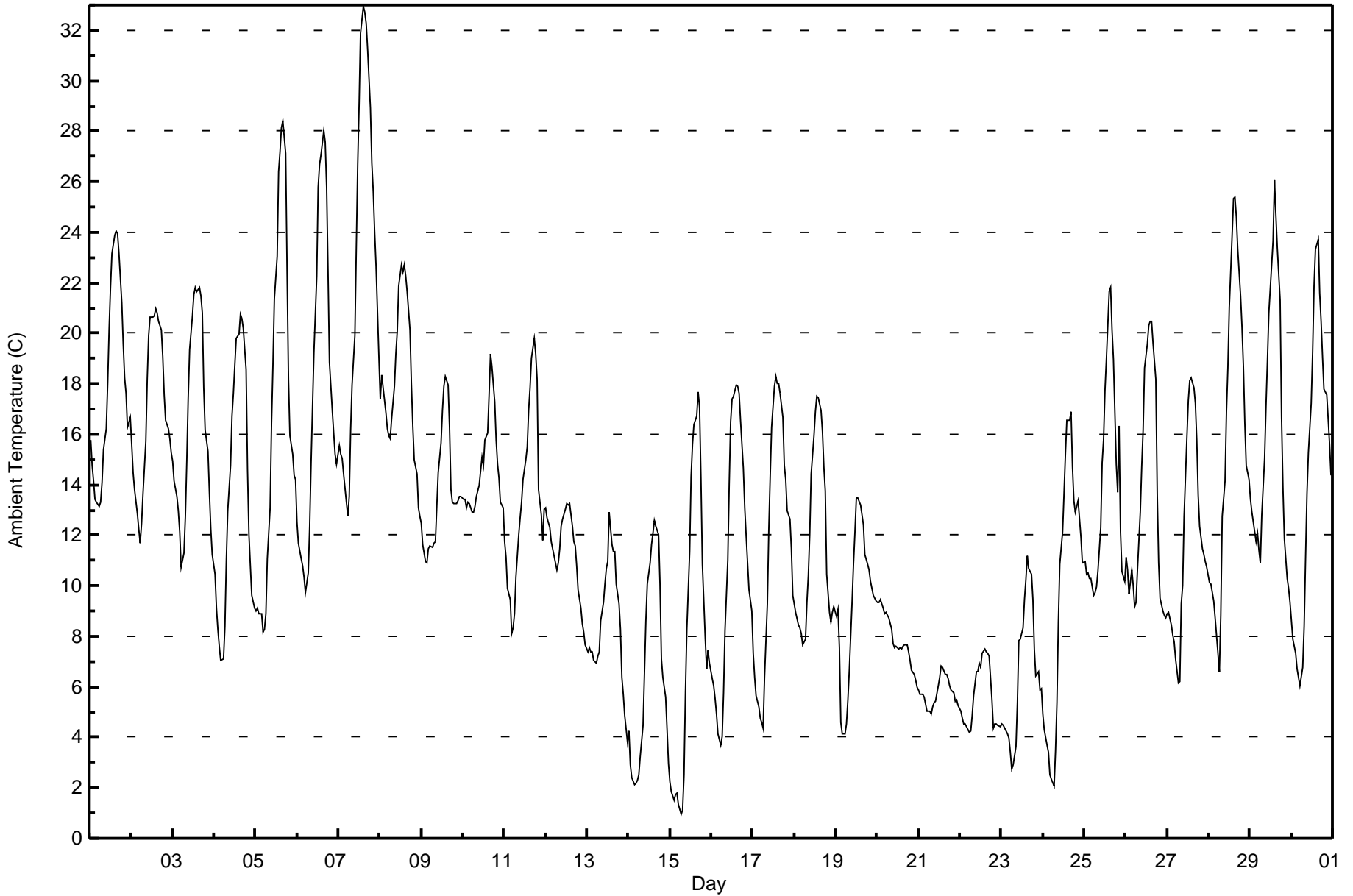




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Lower Camp - September 2017

| Maximum Value: 33.0 C on Sep 7 15:00 Maximum Daily Average: 22.6 C on Sep 7 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 0.9 C on Sep 15 07:00 Maximum Diurnal Average: 18.5 C at hour 16 Monthly Average: 12.70 C | | Minimum Daily Average: 5.6 C on Sep 22 Minimum Diurnal Average: 8.0 C at hour 6 Percentiles: P ₁ = 2.0 P ₁₀ = 5.4 Q ₁ = 8.3 Median = 12.2 Q ₃ = 16.6 P ₉₀ = 20.7 P ₉₉ = 28.8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 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-Sep | 15.8 | 14.8 | 14.1 | 13.4 | 13.3 | 13.2 | 13.3 | 14.1 | 15.4 | 16.2 | 18.0 | 20.1 | 21.8 | 23.1 | 23.9 | 24.0 | 23.9 | 23.2 | 21.2 | 19.6 | 18.3 | 17.6 | 16.3 | 16.6 | 18.0 | 24.0 |
| 2-Sep | 15.6 | 14.5 | 13.8 | 12.9 | 12.2 | 11.7 | 12.4 | 13.6 | 15.7 | 18.2 | 19.9 | 20.7 | 20.7 | 21.0 | 20.8 | 20.4 | 20.2 | 19.1 | 17.6 | 16.5 | 16.2 | 15.8 | 15.3 | 16.9 | 21.0 | |
| 3-Sep | 14.9 | 14.2 | 13.5 | 13.0 | 12.1 | 10.7 | 11.3 | 12.8 | 15.0 | 17.5 | 19.4 | 20.7 | 21.6 | 21.8 | 21.6 | 21.8 | 21.5 | 20.8 | 17.9 | 16.2 | 15.3 | 13.7 | 12.2 | 11.2 | 16.3 | 21.8 |
| 4-Sep | 10.5 | 9.1 | 8.3 | 7.6 | 7.1 | 7.1 | 8.4 | 11.0 | 12.9 | 14.8 | 16.7 | 17.6 | 18.7 | 19.8 | 20.0 | 20.7 | 20.6 | 20.2 | 18.5 | 14.6 | 12.1 | 10.8 | 9.6 | 9.1 | 13.6 | 20.7 |
| 5-Sep | 9.0 | 9.1 | 8.9 | 8.9 | 8.2 | 8.3 | 8.9 | 11.1 | 13.1 | 16.4 | 18.7 | 21.4 | 23.1 | 26.4 | 27.2 | 28.1 | 28.4 | 27.1 | 22.5 | 18.2 | 16.0 | 15.2 | 14.4 | 14.2 | 16.8 | 28.4 |
| 6-Sep | 12.5 | 11.7 | 11.1 | 10.8 | 10.4 | 9.7 | 10.5 | 12.3 | 14.9 | 17.0 | 19.2 | 22.3 | 25.8 | 26.7 | 27.1 | 28.0 | 27.6 | 25.8 | 22.4 | 18.8 | 17.0 | 16.1 | 15.2 | 14.8 | 17.8 | 28.0 |
| 7-Sep | 15.6 | 15.2 | 15.1 | 14.4 | 13.9 | 12.7 | 13.6 | 16.1 | 18.0 | 19.9 | 23.4 | 26.7 | 29.1 | 31.9 | 33.0 | 32.7 | 32.3 | 31.3 | 28.9 | 26.8 | 25.6 | 24.0 | 22.7 | 19.1 | 22.6 | 33.0 |
| 8-Sep | 17.4 | 18.3 | 17.8 | 16.9 | 16.2 | 15.9 | 15.8 | 16.6 | 17.9 | 19.2 | 20.1 | 21.9 | 22.7 | 22.4 | 22.7 | 22.3 | 21.6 | 20.1 | 18.0 | 16.3 | 15.0 | 14.4 | 13.1 | 12.7 | 18.1 | 22.7 |
| 9-Sep | 12.5 | 11.6 | 10.9 | 10.9 | 11.5 | 11.6 | 11.5 | 11.7 | 11.7 | 13.2 | 14.5 | 15.6 | 16.9 | 17.9 | 18.3 | 18.0 | 16.3 | 13.8 | 13.3 | 13.3 | 13.2 | 13.4 | 13.5 | 13.5 | 13.7 | 18.3 |
| 10-Sep | 13.4 | 13.4 | 13.1 | 13.3 | 13.3 | 12.9 | 12.9 | 13.1 | 13.5 | 14.0 | 14.5 | 15.1 | 14.8 | 15.8 | 16.1 | 17.6 | 19.2 | 18.7 | 17.3 | 15.8 | 14.8 | 14.3 | 13.3 | 13.1 | 14.7 | 19.2 |
| 11-Sep | 11.7 | 11.1 | 9.9 | 9.4 | 8.1 | 8.3 | 8.9 | 10.3 | 12.0 | 12.7 | 13.3 | 14.2 | 15.0 | 15.5 | 17.0 | 17.8 | 19.0 | 19.8 | 19.2 | 18.2 | 13.8 | 12.8 | 11.8 | 13.0 | 13.5 | 19.8 |
| 12-Sep | 13.1 | 12.7 | 12.3 | 11.7 | 11.5 | 11.2 | 10.6 | 10.9 | 11.5 | 12.4 | 12.7 | 13.0 | 13.2 | 13.2 | 13.2 | 12.3 | 11.8 | 11.6 | 10.8 | 9.9 | 9.1 | 8.5 | 8.2 | 7.7 | 11.4 | 13.2 |
| 13-Sep | 7.4 | 7.5 | 7.4 | 7.4 | 7.1 | 6.9 | 7.2 | 7.4 | 8.6 | 9.3 | 10.0 | 10.7 | 11.0 | 12.9 | 11.6 | 11.4 | 11.4 | 10.1 | 9.3 | 8.3 | 6.4 | 5.7 | 4.9 | 3.8 | 8.5 | 12.9 |
| 14-Sep | 4.3 | 2.9 | 2.4 | 2.1 | 2.2 | 2.3 | 2.5 | 3.2 | 4.5 | 6.5 | 8.6 | 10.0 | 10.9 | 11.6 | 12.1 | 12.6 | 12.4 | 12.0 | 10.1 | 7.1 | 6.4 | 5.6 | 4.3 | 3.0 | 6.7 | 12.6 |
| 15-Sep | 2.2 | 1.8 | 1.5 | 1.7 | 1.8 | 1.3 | 0.9 | 1.1 | 2.5 | 5.7 | 8.3 | 11.3 | 14.3 | 15.6 | 16.4 | 16.8 | 17.7 | 17.0 | 14.2 | 10.9 | 8.0 | 6.7 | 7.4 | 6.9 | 8.0 | 17.7 |
| 16-Sep | 6.3 | 6.0 | 5.6 | 4.9 | 4.2 | 3.7 | 4.0 | 5.7 | 8.2 | 11.0 | 14.0 | 16.5 | 17.4 | 17.5 | 17.9 | 17.9 | 17.6 | 16.6 | 14.6 | 13.1 | 12.0 | 10.9 | 9.8 | 9.0 | 11.0 | 17.9 |
| 17-Sep | 7.3 | 6.4 | 5.6 | 5.2 | 4.8 | 4.6 | 4.3 | 6.4 | 9.3 | 12.2 | 14.3 | 16.3 | 17.9 | 18.3 | 18.0 | 18.0 | 17.6 | 16.7 | 14.8 | 14.2 | 13.0 | 12.7 | 11.4 | 9.6 | 11.6 | 18.3 |
| 18-Sep | 9.3 | 9.0 | 8.4 | 8.4 | 8.1 | 7.7 | 7.9 | 9.3 | 10.4 | 12.0 | 14.4 | 15.9 | 16.9 | 17.5 | 17.4 | 16.9 | 16.1 | 14.7 | 13.8 | 10.4 | 9.0 | 8.6 | 8.9 | 9.2 | 11.7 | 17.5 |
| 19-Sep | 8.8 | 9.1 | 7.6 | 4.6 | 4.1 | 4.1 | 4.5 | 5.5 | 6.7 | 9.4 | 10.9 | 12.2 | 13.5 | 13.5 | 13.2 | 12.8 | 12.4 | 11.3 | 10.8 | 10.6 | 10.2 | 9.9 | 9.6 | 9.4 | 9.4 | 13.5 |
| 20-Sep | 9.4 | 9.4 | 9.4 | 9.1 | 8.9 | 8.9 | 8.9 | 8.7 | 8.3 | 7.7 | 7.6 | 7.6 | 7.5 | 7.5 | 7.5 | 7.6 | 7.7 | 7.7 | 7.4 | 7.0 | 6.7 | 6.5 | 6.3 | 6.0 | 7.9 | 9.4 |
| 21-Sep | 5.9 | 5.7 | 5.7 | 5.6 | 5.3 | 5.0 | 5.0 | 4.9 | 5.2 | 5.3 | 5.4 | 6.0 | 6.4 | 6.8 | 6.8 | 6.5 | 6.5 | 6.3 | 6.1 | 5.9 | 5.7 | 5.4 | 5.5 | 5.3 | 5.8 | 6.8 |
| 22-Sep | 5.0 | 4.7 | 4.5 | 4.5 | 4.4 | 4.2 | 4.2 | 4.9 | 5.7 | 6.6 | 6.6 | 7.0 | 6.8 | 7.3 | 7.5 | 7.4 | 7.3 | 7.2 | 5.5 | 4.4 | 4.5 | 4.5 | 4.5 | 4.4 | 5.6 | 7.5 |
| 23-Sep | 4.5 | 4.5 | 4.3 | 4.1 | 4.0 | 3.4 | 2.7 | 2.9 | 3.6 | 5.4 | 7.8 | 7.9 | 8.3 | 9.5 | 10.2 | 11.2 | 10.7 | 10.5 | 9.4 | 7.5 | 6.4 | 6.6 | 5.9 | 5.9 | 6.6 | 11.2 |
| 24-Sep | 4.9 | 4.3 | 3.7 | 3.4 | 2.5 | 2.3 | 2.1 | 3.4 | 5.4 | 8.5 | 10.8 | 12.1 | 13.7 | 15.2 | 16.5 | 16.6 | 16.9 | 14.7 | 13.4 | 12.9 | 13.4 | 12.7 | 11.9 | 10.9 | 9.7 | 16.9 |
| 25-Sep | 11.0 | 10.5 | 10.5 | 10.3 | 10.3 | 9.6 | 9.7 | 9.9 | 10.6 | 12.3 | 14.9 | 15.8 | 17.7 | 19.0 | 21.6 | 21.8 | 20.1 | 19.0 | 14.8 | 13.7 | 16.3 | 12.1 | 10.6 | 10.2 | 13.8 | 21.8 |
| 26-Sep | 11.1 | 10.7 | 9.7 | 10.6 | 10.0 | 9.2 | 9.3 | 10.6 | 12.9 | 14.7 | 16.1 | 18.6 | 19.6 | 20.3 | 20.5 | 20.4 | 19.6 | 18.2 | 13.7 | 10.9 | 9.5 | 9.0 | 8.9 | 8.7 | 13.5 | 20.5 |
| 27-Sep | 8.9 | 9.0 | 8.5 | 8.0 | 7.8 | 7.1 | 6.1 | 6.2 | 9.3 | 10.0 | 12.7 | 15.9 | 17.4 | 18.1 | 18.3 | 17.8 | 17.2 | 15.8 | 13.6 | 12.4 | 11.5 | 11.3 | 11.0 | 10.7 | 11.9 | 18.3 |
| 28-Sep | 10.1 | 10.1 | 9.7 | 9.4 | 8.7 | 7.3 | 6.6 | 8.8 | 12.8 | 14.1 | 16.9 | 18.6 | 21.0 | 22.5 | 25.3 | 25.4 | 24.6 | 23.3 | 21.5 | 20.2 | 18.7 | 16.5 | 14.7 | 14.2 | 15.9 | 25.4 |
| 29-Sep | 13.4 | 12.9 | 12.5 | 11.8 | 12.1 | 11.4 | 10.9 | 12.8 | 15.1 | 17.1 | 18.9 | 20.8 | 22.7 | 23.7 | 26.1 | 24.7 | 23.4 | 21.3 | 16.6 | 13.9 | 11.9 | 10.3 | 9.9 | 9.4 | 16.0 | 26.1 |
| 30-Sep | 8.6 | 7.9 | 7.4 | 6.7 | 6.4 | 6.0 | 6.8 | 8.4 | 11.1 | 13.7 | 15.3 | 17.2 | 19.2 | 21.8 | 23.3 | 23.7 | 21.6 | 20.5 | 19.1 | 17.8 | 17.6 | 16.6 | 15.6 | 14.4 | 14.4 | 23.7 |
| | 10.0 | 9.6 | 9.1 | 8.7 | 8.3 | 8.0 | 8.1 | 9.1 | 10.7 | 12.4 | 14.1 | 15.7 | 16.8 | 17.8 | 18.4 | 18.5 | 18.1 | 17.2 | 15.3 | 13.5 | 12.5 | 11.6 | 10.9 | 10.4 | Diurnal Average | |
| | 17.4 | 18.3 | 17.8 | 16.9 | 16.2 | 15.9 | 15.8 | 16.6 | 18.0 | 19.9 | 23.4 | 26.7 | 29.1 | 31.9 | 33.0 | 32.7 | 32.3 | 31.3 | 28.9 | 26.8 | 25.6 | 24.0 | 22.7 | 19.1 | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Lower Camp - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 257 | 35.69 | 35.69 |
| 10 - 20 | 375 | 52.08 | 87.78 |
| > 20 | 88 | 12.22 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

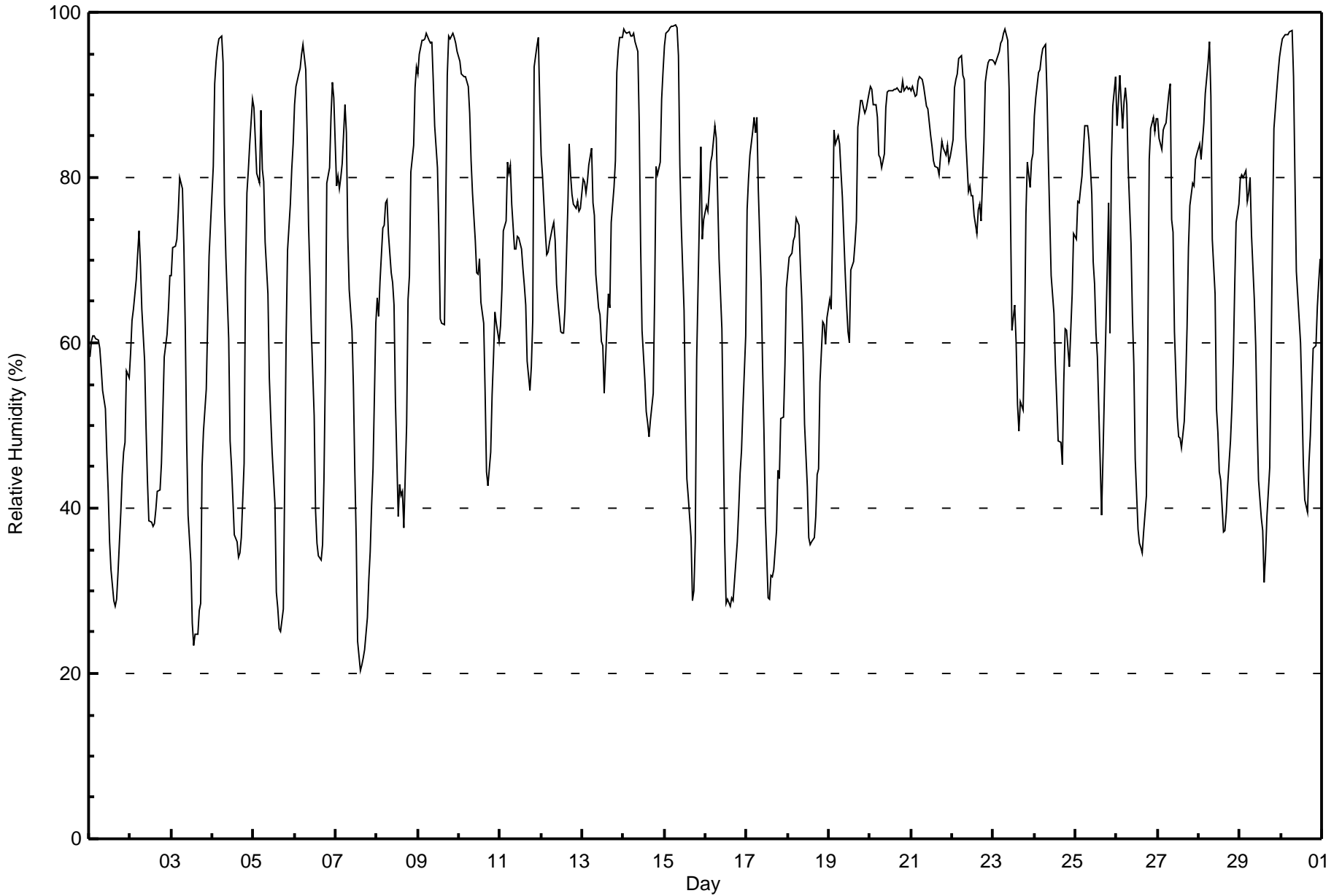


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Lower Camp - September 2017**

| Maximum Value: 98 % on Sep 15 07:00 Maximum Daily Average: 88.9 % on Sep 9 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|-----------------|----|---------------|---------------|
| Minimum Value: 20 % on Sep 7 15:00 Minimum Daily Average: 47.9 % on Sep 1 Maximum Diurnal Average: 86.7 % at hour 6 Minimum Diurnal Average: 46.9 % at hour 16 Monthly Average: 69.2 % Percentiles: P ₁ = 25 P ₁₀ = 38 Q ₁ = 54 Median = 73 O ₃ = 86 P ₉₀ = 94 P ₉₉ = 98 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 58 | 60 | 61 | 61 | 61 | 60 | 59 | 57 | 54 | 52 | 47 | 42 | 36 | 33 | 29 | 28 | 29 | 32 | 40 | 44 | 47 | 48 | 57 | 56 | 47.9 | 61 |
| 2-Sep | 59 | 63 | 64 | 68 | 71 | 74 | 70 | 64 | 58 | 50 | 43 | 38 | 38 | 38 | 38 | 40 | 42 | 42 | 45 | 52 | 58 | 61 | 64 | 68 | 54.5 | 74 |
| 3-Sep | 68 | 72 | 72 | 73 | 76 | 80 | 79 | 72 | 62 | 48 | 39 | 33 | 26 | 23 | 25 | 25 | 28 | 28 | 45 | 49 | 54 | 63 | 71 | 74 | 53.5 | 80 |
| 4-Sep | 81 | 91 | 94 | 96 | 97 | 97 | 94 | 77 | 70 | 60 | 48 | 45 | 41 | 37 | 36 | 34 | 34 | 36 | 45 | 68 | 78 | 81 | 84 | 89 | 67.3 | 97 |
| 5-Sep | 88 | 85 | 81 | 79 | 88 | 81 | 80 | 72 | 66 | 56 | 51 | 47 | 41 | 30 | 28 | 26 | 25 | 28 | 44 | 61 | 71 | 77 | 81 | 84 | 61.1 | 88 |
| 6-Sep | 89 | 91 | 92 | 93 | 95 | 96 | 93 | 85 | 74 | 68 | 61 | 51 | 40 | 36 | 34 | 34 | 36 | 43 | 57 | 79 | 81 | 87 | 91 | 90 | 70.8 | 96 |
| 7-Sep | 79 | 80 | 79 | 80 | 82 | 89 | 85 | 73 | 67 | 62 | 55 | 45 | 36 | 24 | 20 | 21 | 22 | 23 | 27 | 31 | 35 | 40 | 45 | 62 | 52.5 | 89 |
| 8-Sep | 65 | 63 | 68 | 74 | 74 | 77 | 77 | 73 | 68 | 67 | 65 | 53 | 39 | 43 | 42 | 42 | 38 | 50 | 65 | 68 | 81 | 84 | 91 | 93 | 65.0 | 93 |
| 9-Sep | 93 | 95 | 97 | 97 | 97 | 97 | 97 | 96 | 97 | 92 | 86 | 81 | 73 | 63 | 62 | 62 | 77 | 92 | 97 | 97 | 97 | 97 | 96 | 95 | 88.9 | 97 |
| 10-Sep | 94 | 92 | 92 | 92 | 92 | 91 | 88 | 82 | 78 | 72 | 68 | 68 | 70 | 65 | 62 | 54 | 44 | 43 | 47 | 54 | 58 | 64 | 62 | 60 | 70.6 | 94 |
| 11-Sep | 62 | 66 | 74 | 75 | 82 | 80 | 82 | 77 | 71 | 71 | 73 | 73 | 71 | 69 | 67 | 65 | 58 | 54 | 57 | 63 | 93 | 96 | 97 | 89 | 73.6 | 97 |
| 12-Sep | 83 | 80 | 73 | 71 | 71 | 72 | 74 | 75 | 72 | 67 | 65 | 61 | 61 | 61 | 64 | 76 | 84 | 80 | 78 | 77 | 76 | 77 | 76 | 76 | 73.0 | 84 |
| 13-Sep | 80 | 80 | 78 | 79 | 82 | 83 | 77 | 75 | 68 | 64 | 63 | 60 | 60 | 54 | 62 | 66 | 64 | 75 | 79 | 82 | 93 | 96 | 97 | 97 | 75.6 | 97 |
| 14-Sep | 98 | 98 | 98 | 98 | 97 | 97 | 97 | 96 | 95 | 87 | 72 | 62 | 56 | 52 | 50 | 49 | 51 | 54 | 66 | 81 | 80 | 82 | 90 | 93 | 79.0 | 98 |
| 15-Sep | 96 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 95 | 82 | 74 | 64 | 52 | 44 | 41 | 36 | 29 | 30 | 36 | 58 | 76 | 84 | 72 | 75 | 72.1 | 98 |
| 16-Sep | 77 | 76 | 78 | 82 | 83 | 86 | 85 | 78 | 70 | 62 | 49 | 36 | 28 | 29 | 28 | 29 | 29 | 31 | 36 | 40 | 44 | 47 | 52 | 61 | 54.8 | 86 |
| 17-Sep | 76 | 80 | 83 | 86 | 87 | 86 | 87 | 79 | 67 | 58 | 50 | 39 | 29 | 29 | 32 | 32 | 33 | 37 | 45 | 44 | 51 | 51 | 57 | 67 | 57.6 | 87 |
| 18-Sep | 69 | 70 | 71 | 72 | 73 | 75 | 74 | 70 | 65 | 59 | 50 | 43 | 36 | 36 | 36 | 36 | 39 | 44 | 45 | 55 | 63 | 62 | 60 | 63 | 56.9 | 75 |
| 19-Sep | 65 | 64 | 73 | 86 | 84 | 85 | 84 | 81 | 78 | 68 | 65 | 61 | 60 | 69 | 70 | 72 | 75 | 86 | 89 | 89 | 89 | 88 | 88 | 90 | 77.5 | 90 |
| 20-Sep | 91 | 91 | 89 | 89 | 87 | 83 | 82 | 81 | 83 | 88 | 90 | 90 | 90 | 91 | 91 | 91 | 91 | 90 | 90 | 92 | 91 | 91 | 91 | 91 | 88.9 | 92 |
| 21-Sep | 90 | 91 | 90 | 90 | 92 | 92 | 92 | 91 | 90 | 89 | 88 | 85 | 84 | 82 | 81 | 81 | 80 | 82 | 84 | 84 | 83 | 84 | 82 | 83 | 86.3 | 92 |
| 22-Sep | 85 | 91 | 92 | 93 | 94 | 95 | 92 | 92 | 85 | 78 | 79 | 78 | 78 | 75 | 73 | 76 | 77 | 75 | 84 | 91 | 93 | 94 | 94 | 94 | 85.8 | 95 |
| 23-Sep | 94 | 94 | 94 | 95 | 96 | 97 | 98 | 98 | 97 | 91 | 75 | 61 | 65 | 60 | 53 | 49 | 53 | 52 | 60 | 76 | 82 | 79 | 82 | 83 | 78.4 | 98 |
| 24-Sep | 88 | 90 | 93 | 93 | 95 | 96 | 96 | 90 | 82 | 75 | 68 | 64 | 57 | 53 | 48 | 48 | 45 | 55 | 62 | 62 | 57 | 62 | 66 | 73 | 71.5 | 96 |
| 25-Sep | 73 | 77 | 77 | 79 | 80 | 86 | 86 | 86 | 85 | 78 | 70 | 67 | 61 | 58 | 46 | 39 | 46 | 54 | 69 | 77 | 61 | 82 | 89 | 92 | 71.6 | 92 |
| 26-Sep | 86 | 89 | 92 | 86 | 89 | 91 | 89 | 81 | 72 | 63 | 57 | 46 | 38 | 36 | 35 | 35 | 37 | 41 | 60 | 82 | 86 | 87 | 86 | 87 | 68.8 | 92 |
| 27-Sep | 87 | 85 | 83 | 86 | 86 | 87 | 90 | 91 | 75 | 73 | 61 | 51 | 49 | 48 | 47 | 50 | 55 | 62 | 72 | 77 | 79 | 79 | 82 | 83 | 72.5 | 91 |
| 28-Sep | 84 | 82 | 84 | 87 | 90 | 94 | 96 | 90 | 73 | 66 | 52 | 49 | 44 | 43 | 37 | 37 | 39 | 43 | 48 | 52 | 58 | 67 | 75 | 77 | 65.3 | 96 |
| 29-Sep | 80 | 80 | 80 | 81 | 77 | 78 | 80 | 73 | 65 | 60 | 50 | 43 | 39 | 37 | 31 | 34 | 39 | 45 | 59 | 74 | 86 | 90 | 93 | 95 | 65.4 | 95 |
| 30-Sep | 96 | 97 | 97 | 97 | 97 | 98 | 98 | 92 | 80 | 69 | 66 | 60 | 53 | 45 | 41 | 40 | 45 | 49 | 54 | 59 | 60 | 64 | 67 | 70 | 70.6 | 98 |
| | | | | | | | | | | | | | | | | | | | 81.1 82.3 83.2 84.4 85.8 86.7 86.0 81.5 75.4 69.2 62.7 56.6 51.7 48.7 47.0 46.9 48.2 52.0 59.5 67.2 72.0 75.4 77.9 80.4 | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | 98 98 98 98 98 98 98 98 98 97 92 90 90 90 91 91 91 91 92 97 97 97 97 97 | | | | Diurnal Maximum | | | |





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Lower Camp - September 2017

| | | |
|--|---|--------------------------------|
| Maximum Speed: 29 km/h on Sep 10 15:00 | Maximum Daily Speed Average: 19.1 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 22 20:00 | Minimum Daily Speed Average: 0.5 km/h on Sep 22 | Hours of Data: 712 |
| Maximum Diurnal Speed Average: 3.5 km/h at hour 15 | Minimum Diurnal Speed Average: 0.3 km/h at hour 23 | Hours of Missing Data: 8 |
| Monthly Average Velocity: 1.1 km/h 260.1 deg | Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 4 Median = 8 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 25 | Percent Operational Time: 99.2 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | W16 | W14 | W9 | SSW2 | W13 | W21 | W23 | W25 | W20 | W20 | WSW22 | WSW18 | WSW17 | WSW19 | W23 | W25 | W24 | WSW23 | WSW22 | W14 | W12 | W14 | W12 | W18 | W17.6 | W25 | |
| 2-Sep | W21 | W21 | WSW21 | WSW14 | WNW9 | W7 | W10 | W12 | W12 | W15 | W15 | W17 | W15 | W13 | WSW12 | W13 | WSW12 | WSW14 | WSW16 | WSW22 | WSW19 | W13 | W13 | WSW12 | W14.4 | WSW22 | |
| 3-Sep | W13 | W10 | W14 | WSW18 | WSW19 | WSW7 | WSW8 | WSW11 | W15 | W19 | WNW21 | W20 | WNW21 | WNW23 | WNW21 | WNW21 | WNW20 | WNW21 | NNW23 | NNW15 | NW13 | NW10 | WNW8 | WNW9 | WNW14.3 | WNW23 | |
| 4-Sep | NNW3 | NE1 | ENE2 | NW1 | WNW1 | NNW3 | NW4 | WNW7 | NNW6 | N9 | NNW13 | NNW11 | NW12 | WNW11 | NW10 | WNW10 | NNW6 | N4 | NNW1 | NE1 | ENE2 | NE1 | NNE1 | ENE1 | NNW4.2 | NNW13 | |
| 5-Sep | ESE2 | SE6 | SE6 | SE6 | SE7 | SE11 | SE11 | SE12 | SE12 | SE10 | SE11 | SE10 | ESE5 | WSW13 | W14 | W12 | WSW12 | W10 | SSW0 | ESE3 | ESE3 | E2 | SE3 | ENE2 | SSE3.9 | W14 | |
| 6-Sep | WNW2 | SE1 | ENE1 | NNE1 | NNW1 | NNE1 | N1 | N3 | NNE3 | N5 | N5 | NNW4 | WNW6 | NW5 | NNW6 | NW6 | NW5 | NNW2 | N0 | N1 | E1 | NE2 | NE1 | E2 | NNW2.1 | NW6 | |
| 7-Sep | SE7 | SE8 | SSE9 | SE7 | SE7 | SE7 | SE8 | SE9 | SE9 | ESE17 | SE11 | SE11 | SSE10 | S11 | S12 | SSE11 | SSE11 | SSE9 | SSE7 | SSE8 | SSE9 | SSE7 | SSE6 | SE3 | SSE8.5 | ESE17 | |
| 8-Sep | SE6 | SE9 | SE11 | SE11 | SE8 | SE9 | SE6 | SE3 | SSE2 | SSE3 | N3 | NW7 | N9 | NW6 | NNW8 | NNE7 | NNE8 | NW7 | NNW8 | NNW8 | NW4 | NW3 | W1 | NW2 | NE1.2 | SE11 | |
| 9-Sep | N2 | W4 | N0 | NE1 | ESE3 | WNW3 | NNW3 | NW6 | WNW6 | WNW5 | NW7 | NW9 | NNW9 | NNW9 | NNW12 | N12 | NW12 | NW8 | WNW7 | NNW3 | WNW6 | WNW5 | NW5 | W8 | NW5.2 | NW12 | |
| 10-Sep | SW6 | SW8 | S4 | SW6 | SW8 | SW6 | W16 | W18 | W22 | W26 | W25 | W24 | W24 | W26 | W29 | WNW20 | W18 | W25 | W23 | WSW16 | W13 | W10 | W12 | W13 | W16.0 | W29 | |
| 11-Sep | W15 | W10 | W3 | NW3 | S3 | SSE5 | SE7 | SE11 | SE11 | SE10 | ESE10 | ESE8 | SE7 | ESE6 | SE7 | SE9 | SE10 | SSE9 | SSE11 | SSW4 | SW0 | ESE2 | W0 | WSW13 | SSE4.3 | W15 | |
| 12-Sep | WSW16 | W20 | W25 | W22 | W16 | WSW18 | WSW20 | WSW20 | W18 | WNW20 | WNW19 | NW17 | WNW16 | NW10 | NW10 | NW8 | NW9 | NNE9 | N8 | NNE9 | NNE8 | NE6 | ENE3 | N3 | WNW10.5 | W25 | |
| 13-Sep | NW4 | NNW4 | N3 | NNE3 | E2 | E3 | E5 | ENE4 | NE4 | NNE2 | NW4 | W3 | NNW2 | ESE4 | N5 | NNW4 | NNE5 | E5 | ENE3 | ESE0 | E2 | N1 | NNW2 | NNE2 | NNE1.9 | NNE5 | |
| 14-Sep | NW4 | NNW3 | NNW3 | N2 | NNW3 | NNW3 | NW2 | NNW3 | W4 | NW4 | NNW6 | NW8 | NW7 | NNW7 | N7 | N5 | NNE8 | NNE9 | NNE4 | W3 | WNW4 | WNW3 | NE2 | WNW3 | NNW3.7 | NNE9 | |
| 15-Sep | W4 | W4 | W2 | W1 | ENE3 | E7 | SSE4 | SSW4 | SE4 | SE7 | ESE8 | SE8 | ESE8 | E4 | ESE5 | N3 | WSW10 | SSW7 | SSW5 | SSE2 | ENE2 | SE9 | SE7 | SE2.7 | WSW10 | | |
| 16-Sep | SE10 | SE10 | SE12 | SE12 | SE11 | SE13 | SE13 | SE13 | SE13 | SE12 | SE11 | SSE12 | S13 | S12 | SSE12 | S10 | S9 | SSE9 | S7 | SSE7 | SSE8 | SSE8 | SSE8 | SE9 | SSE10.1 | SE13 | |
| 17-Sep | SE9 | SE9 | SE10 | SE10 | SE10 | SE11 | SE10 | SE10 | SE10 | SE10 | SE11 | SSE14 | SSE13 | SSE14 | SSE14 | SSE12 | SSE11 | SE15 | SE11 | SSE10 | SE10 | SSE13 | SE11 | SE12 | SE11.1 | SE15 | |
| 18-Sep | ESE16 | ESE17 | ESE18 | ESE20 | SE21 | SE20 | SE20 | SE22 | SE24 | ESE21 | SE23 | SE25 | SE17 | SE16 | ESE18 | ESE19 | SE19 | ESE15 | E12 | ESE4 | WNW6 | WNW3 | E4 | ESE14 | ESE15.5 | SE25 | |
| 19-Sep | E14 | E14 | NE4 | WNW6 | WNW5 | NW7 | NW6 | NW6 | WNW7 | NNW9 | NNE13 | N13 | N11 | E14 | NE15 | ENE18 | ENE20 | ENE13 | NE12 | ENE14 | ENE14 | ENE15 | ENE12 | NNE12 | NE8.0 | ENE20 | |
| 20-Sep | N12 | N13 | N14 | N15 | N14 | N15 | N18 | N22 | NNE24 | NNE23 | NNE23 | NNE24 | NNE24 | NNE22 | NNE22 | N21 | N20 | N21 | NNE20 | N20 | N21 | N19 | N17 | N18 | N19.1 | NNE24 | |
| 21-Sep | N17 | N18 | N19 | N18 | N18 | N16 | N16 | N17 | N17 | NNW14 | NNW14 | N16 | N17 | N15 | NNW16 | NNW16 | NNW16 | NNW13 | NNW11 | NW9 | NW8 | WNW6 | NNW5 | NW4 | N13.7 | N19 | |
| 22-Sep | WNW1 | ENE1 | NW1 | WNW3 | NW2 | E0 | E1 | ENE1 | SSW4 | WSW4 | E4 | ENE5 | N5 | ENE4 | E5 | ESE4 | ESE3 | ESE2 | NNE0 | SW0 | WNW1 | SE1 | W3 | WNW3 | ENE0.5 | N5 | |
| 23-Sep | WNW4 | NW3 | NW2 | NW1 | WNW3 | NW4 | W5 | WNW4 | NW4 | NNW2 | E5 | SSE6 | S4 | SSE6 | SSE7 | SSE5 | SE7 | SSE8 | SSE9 | SE6 | SE6 | SE7 | SE9 | SE8 | SSE2.5 | SE9 | |
| 24-Sep | SE8 | SE6 | SE6 | E6 | ESE6 | SE3 | SE2 | ESE4 | E2 | SE6 | SE10 | SE11 | SE9 | SE9 | SE8 | SE7 | SSE7 | SE7 | SE7 | SSE8 | SSE8 | SSE9 | SE11 | SE11 | SE6.9 | SE11 | |
| 25-Sep | SE10 | SE8 | SE7 | SE7 | SE8 | SE9 | SE8 | SE7 | SE9 | SE12 | SE11 | SE10 | C | C | WNW6 | NW8 | AF | AF | SE2 | WSW2 | W8 | E1 | SE2 | SE3 | SE4.7 | SE12 | |
| 26-Sep | SSE6 | SSE3 | S1 | NW3 | WNW4 | W5 | WNW2 | WSW5 | W6 | W10 | W10 | WNW10 | NNW12 | NW15 | NW15 | NNW15 | NNW12 | NNW6 | NW1 | N1 | SE2 | SE1 | SE1 | SE1 | NW4.3 | NNW15 | |
| 27-Sep | SE4 | SE4 | SE5 | SE3 | SSE5 | SSE4 | SSE2 | NNW2 | ESE3 | NNE5 | NW4 | NNW6 | NW8 | NNW8 | NNW8 | NNW8 | N10 | N9 | NNW7 | NNW6 | NNW5 | NW6 | NNW3 | NNW4 | NNW2.8 | N10 | |
| 28-Sep | NW4 | NNW4 | NW3 | NNW1 | NW3 | NW5 | WNW4 | S2 | SSE10 | SE12 | SSE10 | SSE12 | SSE12 | SSE14 | S9 | S10 | S10 | S8 | S8 | S9 | SSE10 | SSE11 | SSE9 | SSE11 | S6.0 | SSE14 | |
| 29-Sep | SSE10 | SSE10 | SSE10 | SSE9 | SSE10 | SE5 | SSE9 | SE15 | SE13 | SSE12 | SSE12 | SSE12 | SSE12 | SSE11 | S4 | NNW7 | NNW5 | NW1 | SE1 | N1 | E1 | SE3 | AF | AF | SSE6.4 | SE15 | |
| 30-Sep | NW1 | NW2 | AF | AF | NW1 | ESE1 | SE4 | E1 | SSE9 | SSE10 | SSE12 | SSE12 | SSE12 | SSE12 | W5 | WNW13 | W13 | W13 | W13 | NW12 | NW12 | NW14 | NW14 | NW18 | NNW16 | WNW3.9 | NW18 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|--------|--------|--------|--------|------|--------|-------|--------|--------|--------|--------|------|------|--------|--------|--------|------|--------|--------|--------|--------|--------|------|-----------------|
| SW1.7 | SSW1.1 | SSW1.1 | SSW0.8 | SSW1.2 | S1.2 | SSW1.4 | SW1.2 | SSW1.3 | SSW1.2 | WSW0.7 | WSW1.1 | W2.1 | W2.4 | NNW3.5 | NNW3.2 | NNW2.7 | W1.9 | NNW1.5 | NNW1.5 | NNW1.4 | NNW0.5 | WSW0.3 | W0.8 | Diurnal Average |
| W21 | W21 | W25 | W22 | SE21 | W21 | W23 | W25 | NNE24 | W26 | W25 | SE25 | W24 | W26 | W29 | W25 | W24 | W25 | W23 | WSW22 | N21 | N19 | NW18 | N18 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

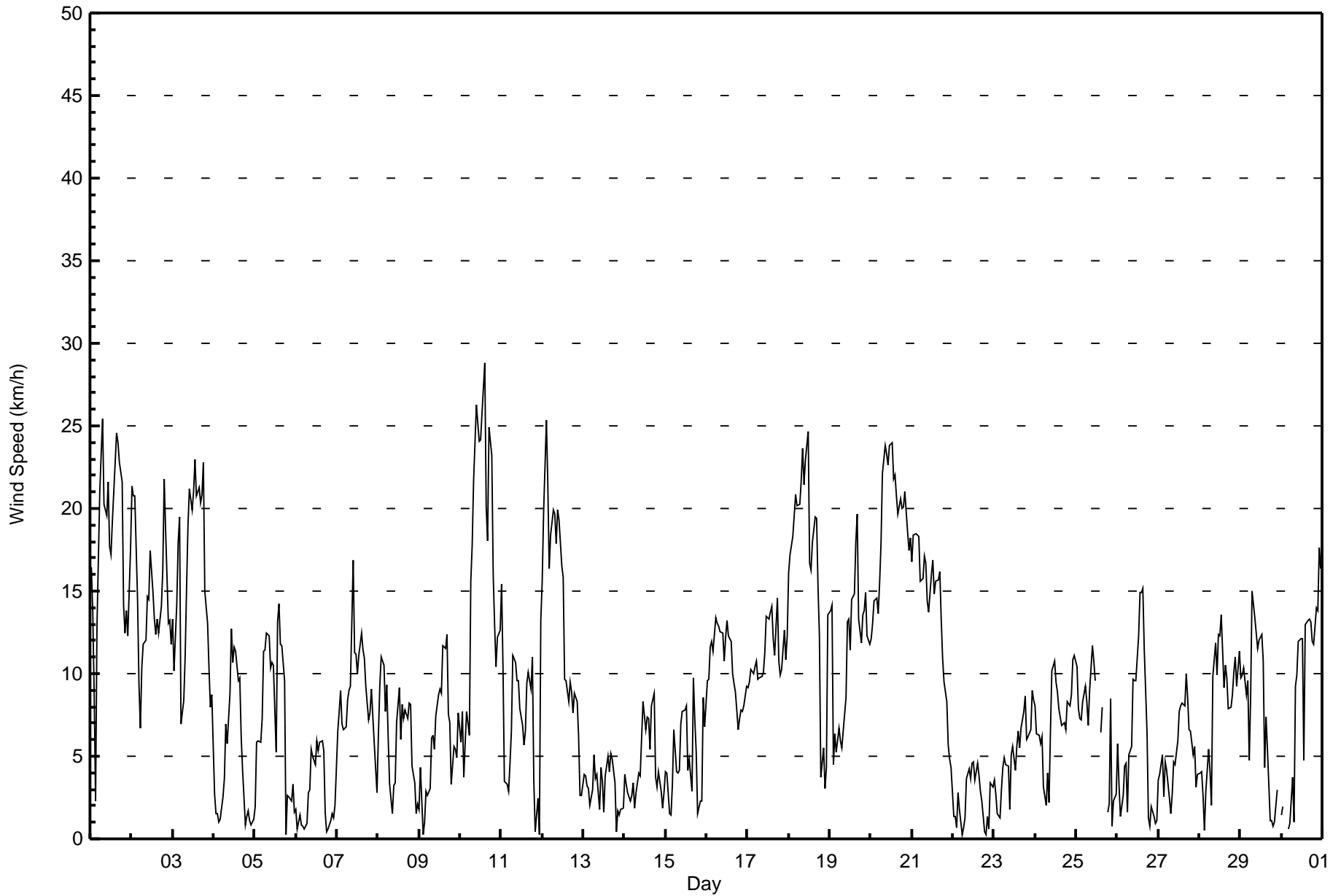
Wind Speed (WS) - km/h
Lower Camp - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 10 km/h on Sep 11 20:00 | Hours of Data: 712 |
| Minimum Value: 1 km/h on Sep 14 20:00 | Hours of Missing Data: 8 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 4 P ₉₉ = 6 | Hours of Calibration: 2 |
| | Percent Operational Time: 99.2 |

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

Diurnal Maximum

C - Calibration AF - Analyzer Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - September 2017

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 234 | 32.87 | 32.87 |
| 6 - 11 | 248 | 34.83 | 67.70 |
| 12 - 19 | 166 | 23.31 | 91.01 |
| 20 - 28 | 63 | 8.85 | 99.86 |
| 29 - 38 | 1 | 0.14 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 712

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - September 2017

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 20 | 11 | 9 | 15 | 18 | 17 | 20 | 13 | 6 | 6 | 2 | 4 | 13 | 21 | 32 | 27 | 234 |
| 6 - 11 | 7 | 7 | 1 | 0 | 2 | 6 | 88 | 44 | 10 | 1 | 5 | 5 | 11 | 16 | 24 | 21 | 248 |
| 12 - 19 | 24 | 2 | 2 | 6 | 4 | 8 | 18 | 19 | 2 | 0 | 0 | 20 | 34 | 3 | 11 | 13 | 166 |
| 20 - 28 | 6 | 8 | 0 | 1 | 0 | 3 | 6 | 0 | 0 | 0 | 0 | 7 | 22 | 9 | 0 | 1 | 63 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 57 | 28 | 12 | 22 | 24 | 34 | 132 | 76 | 18 | 7 | 7 | 36 | 81 | 49 | 67 | 62 | 712 |

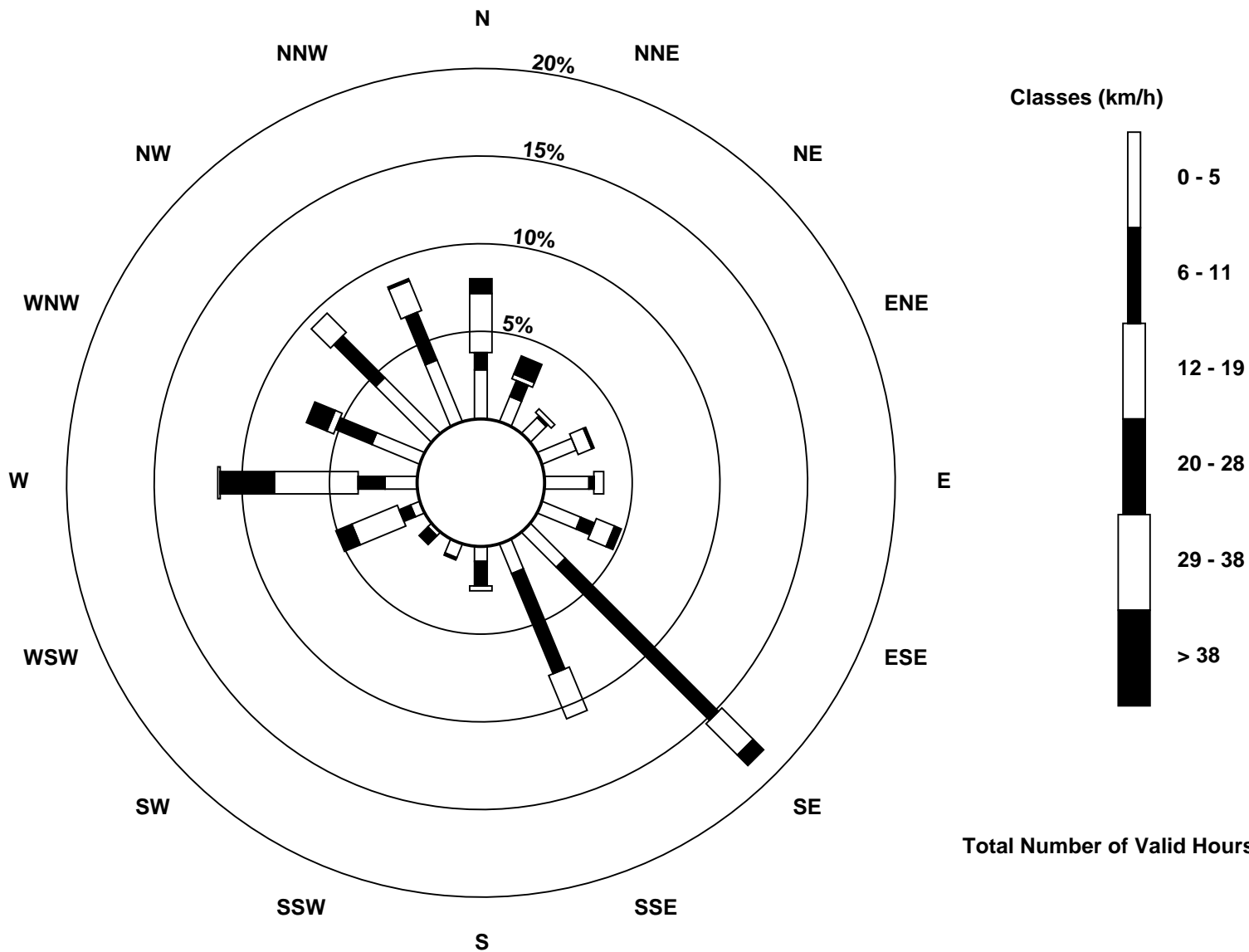
Total Number of Valid Hours: 712

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Lower Camp (AMS 11)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Lower Camp - September 2017

| | | |
|---|---|--------------------------------|
| Direction of Maximum Speed: 271 deg on Sep 10 15:00 | | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 9.2 deg on Sep 20 | | Hours of Data: 712 |
| Direction of Minimum Speed: 214 deg on Sep 22 20:00 | Direction of Minimum Daily Speed Average: 0.5 deg on Sep 22 | Hours of Missing Data: 8 |
| Monthly Average Direction: 288.4 deg | | Percent Operational Time: 99.2 |

| 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-Sep | 259 | 263 | 267 | 193 | 269 | 266 | 264 | 263 | 261 | 260 | 256 | 255 | 249 | 256 | 264 | 262 | 261 | 257 | 254 | 260 | 265 | 266 | 274 | 270 | 260.9 |
| 2-Sep | 261 | 261 | 258 | 257 | 284 | 281 | 280 | 271 | 264 | 260 | 259 | 267 | 263 | 267 | 258 | 260 | 251 | 246 | 247 | 248 | 248 | 259 | 259 | 255 | 259.5 |
| 3-Sep | 261 | 262 | 263 | 255 | 249 | 241 | 253 | 255 | 260 | 263 | 283 | 275 | 285 | 294 | 298 | 285 | 300 | 294 | 342 | 331 | 321 | 316 | 302 | 293 | 284.2 |
| 4-Sep | 327 | 35 | 62 | 325 | 303 | 343 | 317 | 289 | 340 | 358 | 345 | 340 | 305 | 299 | 308 | 289 | 337 | 360 | 337 | 49 | 71 | 40 | 19 | 58 | 327.5 |
| 5-Sep | 115 | 125 | 137 | 132 | 131 | 143 | 140 | 129 | 126 | 131 | 128 | 128 | 116 | 253 | 265 | 263 | 256 | 259 | 202 | 103 | 108 | 100 | 129 | 60 | 157.9 |
| 6-Sep | 289 | 127 | 62 | 30 | 342 | 31 | 6 | 6 | 12 | 10 | 6 | 338 | 295 | 326 | 339 | 309 | 313 | 334 | 4 | 9 | 92 | 43 | 35 | 101 | 344.7 |
| 7-Sep | 139 | 144 | 150 | 141 | 134 | 125 | 127 | 136 | 131 | 119 | 132 | 139 | 149 | 173 | 186 | 165 | 164 | 165 | 157 | 154 | 151 | 150 | 152 | 132 | 147.3 |
| 8-Sep | 136 | 131 | 135 | 136 | 138 | 137 | 133 | 142 | 154 | 157 | 3 | 322 | 351 | 326 | 334 | 19 | 14 | 320 | 340 | 331 | 305 | 313 | 260 | 308 | 39.0 |
| 9-Sep | 5 | 278 | 1 | 35 | 106 | 301 | 341 | 318 | 293 | 291 | 323 | 316 | 340 | 332 | 346 | 350 | 305 | 321 | 285 | 339 | 290 | 296 | 309 | 263 | 316.8 |
| 10-Sep | 228 | 236 | 182 | 230 | 234 | 228 | 264 | 269 | 266 | 264 | 267 | 264 | 270 | 272 | 271 | 288 | 275 | 263 | 262 | 255 | 260 | 271 | 261 | 272 | 264.1 |
| 11-Sep | 259 | 270 | 279 | 314 | 177 | 148 | 134 | 126 | 129 | 133 | 123 | 123 | 130 | 107 | 130 | 135 | 146 | 149 | 150 | 197 | 219 | 121 | 279 | 245 | 156.2 |
| 12-Sep | 253 | 263 | 270 | 273 | 266 | 253 | 246 | 258 | 273 | 289 | 297 | 304 | 294 | 325 | 316 | 324 | 304 | 22 | 5 | 15 | 28 | 53 | 58 | 6 | 286.9 |
| 13-Sep | 318 | 338 | 349 | 18 | 100 | 101 | 80 | 76 | 48 | 24 | 325 | 275 | 339 | 112 | 5 | 331 | 20 | 97 | 73 | 104 | 90 | 5 | 331 | 15 | 26.9 |
| 14-Sep | 323 | 346 | 339 | 349 | 343 | 333 | 319 | 340 | 281 | 311 | 337 | 309 | 314 | 335 | 350 | 11 | 24 | 31 | 31 | 277 | 283 | 291 | 51 | 301 | 337.6 |
| 15-Sep | 280 | 271 | 259 | 262 | 76 | 96 | 163 | 193 | 126 | 126 | 123 | 130 | 123 | 83 | 104 | 0 | 243 | 208 | 199 | 154 | 57 | 69 | 143 | 141 | 145.2 |
| 16-Sep | 136 | 137 | 137 | 133 | 143 | 131 | 135 | 134 | 129 | 129 | 145 | 152 | 169 | 174 | 167 | 170 | 170 | 168 | 174 | 167 | 159 | 165 | 160 | 145 | 149.5 |
| 17-Sep | 137 | 134 | 133 | 135 | 134 | 142 | 138 | 134 | 135 | 134 | 139 | 151 | 165 | 152 | 150 | 154 | 152 | 142 | 143 | 151 | 143 | 147 | 142 | 127 | 142.8 |
| 18-Sep | 123 | 121 | 109 | 119 | 130 | 132 | 130 | 127 | 124 | 119 | 128 | 133 | 139 | 132 | 122 | 123 | 127 | 123 | 96 | 105 | 300 | 290 | 101 | 105 | 123.7 |
| 19-Sep | 95 | 94 | 44 | 289 | 299 | 306 | 317 | 313 | 296 | 343 | 16 | 3 | 9 | 88 | 42 | 77 | 75 | 65 | 50 | 59 | 70 | 78 | 58 | 21 | 46.8 |
| 20-Sep | 5 | 5 | 2 | 360 | 358 | 3 | 8 | 10 | 13 | 12 | 15 | 15 | 16 | 14 | 12 | 10 | 11 | 11 | 13 | 4 | 10 | 6 | 8 | 3 | 9.2 |
| 21-Sep | 4 | 358 | 356 | 359 | 353 | 350 | 356 | 354 | 357 | 347 | 341 | 353 | 354 | 349 | 348 | 342 | 346 | 346 | 341 | 325 | 321 | 302 | 329 | 306 | 348.8 |
| 22-Sep | 289 | 73 | 315 | 298 | 313 | 84 | 97 | 74 | 212 | 253 | 93 | 76 | 9 | 59 | 96 | 102 | 108 | 119 | 20 | 214 | 283 | 141 | 278 | 289 | 59.9 |
| 23-Sep | 285 | 318 | 310 | 306 | 291 | 304 | 281 | 289 | 307 | 344 | 91 | 158 | 182 | 160 | 147 | 155 | 144 | 163 | 168 | 139 | 137 | 132 | 133 | 135 | 159.3 |
| 24-Sep | 135 | 139 | 141 | 82 | 106 | 133 | 137 | 112 | 81 | 129 | 132 | 130 | 134 | 137 | 144 | 139 | 155 | 143 | 135 | 151 | 151 | 149 | 146 | 139 | 136.0 |
| 25-Sep | 138 | 138 | 139 | 146 | 137 | 137 | 134 | 133 | 135 | 137 | 133 | 128 | C | C | 303 | 312 | AF | AF | 128 | 246 | 268 | 97 | 154 | 155 | 142.9 |
| 26-Sep | 160 | 147 | 179 | 318 | 302 | 275 | 283 | 254 | 268 | 271 | 281 | 302 | 332 | 317 | 323 | 329 | 332 | 329 | 320 | 351 | 132 | 124 | 133 | 129 | 306.4 |
| 27-Sep | 138 | 140 | 146 | 133 | 151 | 153 | 158 | 338 | 102 | 19 | 323 | 337 | 307 | 333 | 343 | 348 | 3 | 3 | 337 | 347 | 327 | 305 | 335 | 345 | 348.5 |
| 28-Sep | 318 | 339 | 323 | 343 | 323 | 309 | 300 | 179 | 150 | 146 | 165 | 161 | 166 | 159 | 188 | 188 | 189 | 186 | 183 | 177 | 168 | 162 | 159 | 159 | 172.5 |
| 29-Sep | 159 | 157 | 157 | 159 | 149 | 145 | 154 | 137 | 146 | 153 | 162 | 160 | 163 | 160 | 179 | 335 | 341 | 306 | 133 | 2 | 98 | 143 | AF | AF | 153.9 |
| 30-Sep | 320 | 316 | AF | AF | 324 | 115 | 144 | 99 | 150 | 158 | 155 | 154 | 156 | 271 | 282 | 270 | 272 | 266 | 306 | 319 | 319 | 325 | 320 | 335 | 282.2 |

219.3 208.1 196.6 203.0 195.7 184.2 203.4 219.9 199.4 208.6 247.6 239.0 274.0 279.3 298.3 301.8 294.7 274.6 296.6 295.8 291.9 290.6 251.0 270.4

Diurnal Average

C - Calibration AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

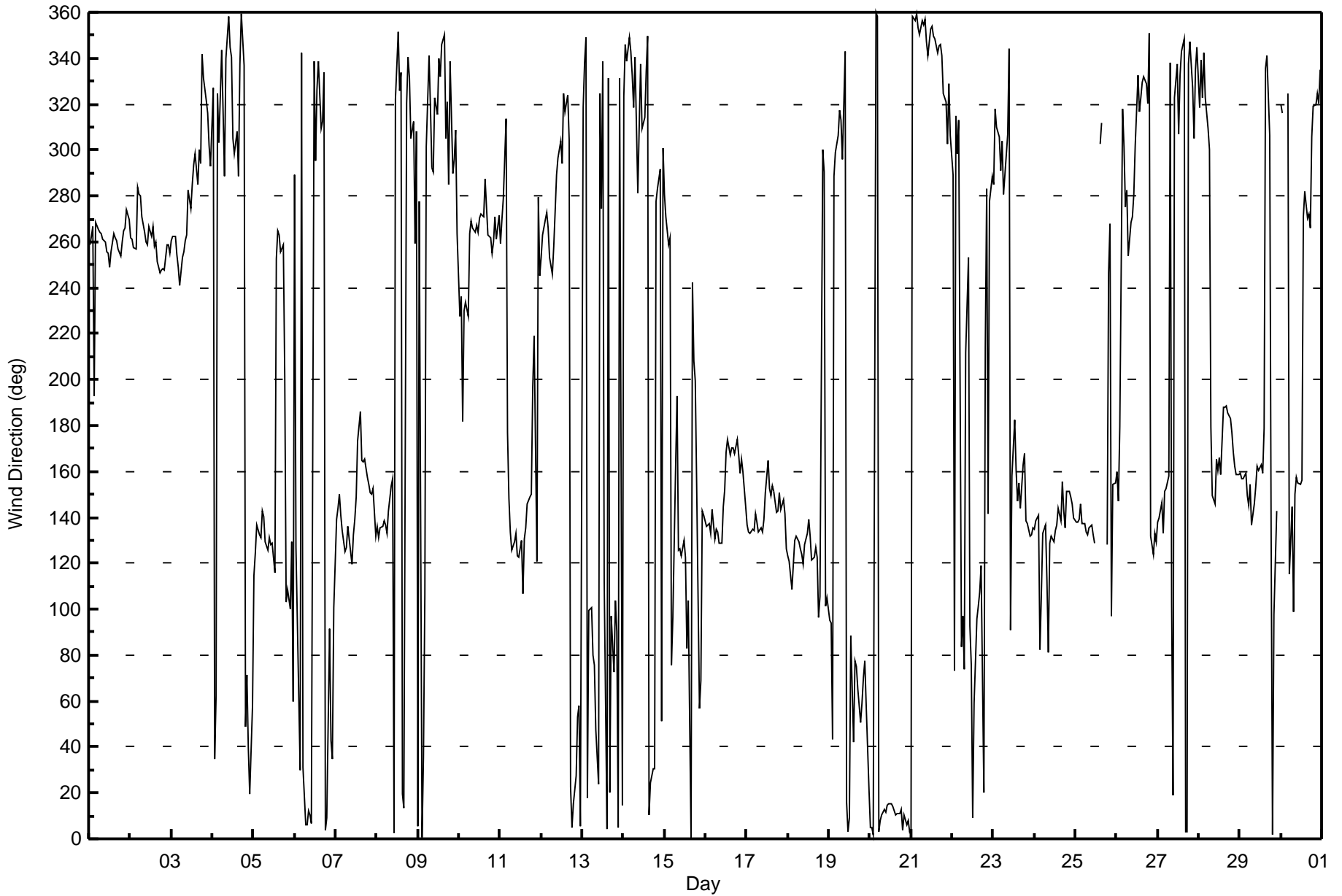
Wind Direction (WD) - deg
Lower Camp - September 2017

| | |
|---|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 105 deg on Sep 11 23:00 | Hours of Data: 712 |
| Minimum Value: 7 deg on Sep 30 13:00 | Hours of Missing Data: 8 |
| Percentiles: P ₁ = 11 P ₁₀ = 14 Q ₁ = 17 Median = 23 Q ₃ = 36 P ₉₀ = 54 P ₉₉ = 90 | Hours of Calibration: 2 |
| | Percent Operational Time: 99.2 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 12 | 14 | 61 | 82 | 28 | 14 | 13 | 12 | 13 | 13 | 13 | 16 | 18 | 17 | 16 | 14 | 14 | 14 | 14 | 12 | 12 | 12 | 13 | 11 | 82 |
| 2-Sep | 11 | 12 | 13 | 15 | 26 | 29 | 21 | 19 | 16 | 14 | 15 | 14 | 14 | 17 | 16 | 14 | 14 | 13 | 12 | 13 | 12 | 15 | 15 | 13 | 29 |
| 3-Sep | 14 | 16 | 13 | 12 | 12 | 42 | 24 | 18 | 15 | 14 | 16 | 17 | 18 | 16 | 15 | 15 | 15 | 13 | 28 | 17 | 14 | 15 | 19 | 10 | 42 |
| 4-Sep | 55 | 37 | 47 | 65 | 56 | 37 | 31 | 33 | 30 | 19 | 24 | 26 | 32 | 27 | 27 | 25 | 30 | 29 | 75 | 42 | 28 | 31 | 45 | 44 | 75 |
| 5-Sep | 50 | 40 | 37 | 42 | 36 | 21 | 20 | 20 | 20 | 23 | 20 | 19 | 65 | 20 | 16 | 18 | 15 | 13 | 90 | 18 | 28 | 33 | 32 | 58 | 90 |
| 6-Sep | 54 | 90 | 45 | 21 | 49 | 24 | 58 | 34 | 29 | 17 | 17 | 37 | 24 | 30 | 26 | 27 | 10 | 43 | 47 | 50 | 50 | 47 | 24 | 45 | 90 |
| 7-Sep | 28 | 24 | 25 | 25 | 27 | 31 | 22 | 20 | 22 | 15 | 28 | 24 | 35 | 37 | 38 | 34 | 31 | 31 | 26 | 24 | 22 | 23 | 28 | 84 | 84 |
| 8-Sep | 35 | 15 | 14 | 18 | 24 | 26 | 35 | 40 | 70 | 58 | 68 | 32 | 30 | 39 | 19 | 33 | 31 | 25 | 25 | 18 | 23 | 25 | 53 | 72 | 72 |
| 9-Sep | 55 | 21 | 80 | 75 | 54 | 54 | 53 | 20 | 20 | 17 | 22 | 20 | 22 | 20 | 20 | 21 | 18 | 23 | 13 | 53 | 17 | 21 | 21 | 16 | 80 |
| 10-Sep | 22 | 31 | 24 | 39 | 19 | 22 | 18 | 14 | 14 | 13 | 13 | 13 | 13 | 14 | 14 | 17 | 15 | 14 | 13 | 14 | 16 | 13 | 15 | 22 | 39 |
| 11-Sep | 16 | 23 | 67 | 67 | 57 | 34 | 25 | 16 | 21 | 22 | 16 | 22 | 20 | 60 | 52 | 25 | 27 | 26 | 22 | 72 | 89 | 50 | 105 | 16 | 105 |
| 12-Sep | 13 | 14 | 13 | 12 | 14 | 14 | 12 | 13 | 13 | 14 | 14 | 14 | 17 | 15 | 20 | 18 | 23 | 15 | 30 | 28 | 17 | 18 | 24 | 47 | 47 |
| 13-Sep | 25 | 35 | 65 | 39 | 51 | 41 | 22 | 34 | 51 | 85 | 53 | 76 | 72 | 55 | 54 | 32 | 42 | 26 | 45 | 93 | 50 | 45 | 54 | 69 | 93 |
| 14-Sep | 25 | 35 | 46 | 52 | 45 | 24 | 77 | 45 | 31 | 36 | 30 | 36 | 40 | 42 | 31 | 53 | 34 | 17 | 37 | 22 | 28 | 74 | 45 | 33 | 77 |
| 15-Sep | 30 | 22 | 54 | 57 | 70 | 14 | 33 | 37 | 49 | 19 | 18 | 19 | 18 | 36 | 39 | 61 | 24 | 31 | 15 | 71 | 16 | 41 | 18 | 20 | 71 |
| 16-Sep | 19 | 21 | 21 | 20 | 20 | 21 | 20 | 18 | 19 | 23 | 29 | 35 | 35 | 35 | 37 | 34 | 34 | 29 | 25 | 26 | 22 | 24 | 23 | 21 | 37 |
| 17-Sep | 23 | 27 | 23 | 22 | 21 | 17 | 22 | 21 | 23 | 26 | 27 | 31 | 34 | 33 | 28 | 29 | 32 | 25 | 26 | 26 | 28 | 26 | 26 | 23 | 34 |
| 18-Sep | 17 | 18 | 8 | 13 | 13 | 14 | 13 | 14 | 12 | 12 | 15 | 17 | 27 | 18 | 19 | 15 | 14 | 17 | 15 | 79 | 22 | 53 | 49 | 11 | 79 |
| 19-Sep | 10 | 10 | 71 | 26 | 28 | 19 | 24 | 26 | 20 | 25 | 13 | 17 | 34 | 25 | 11 | 20 | 16 | 17 | 13 | 17 | 17 | 17 | 21 | 12 | 71 |
| 20-Sep | 15 | 14 | 16 | 19 | 18 | 17 | 16 | 17 | 15 | 16 | 14 | 15 | 15 | 16 | 16 | 15 | 16 | 17 | 16 | 17 | 18 | 17 | 17 | 18 | 19 |
| 21-Sep | 18 | 19 | 19 | 19 | 19 | 20 | 20 | 20 | 18 | 21 | 20 | 19 | 20 | 20 | 20 | 20 | 20 | 19 | 20 | 13 | 17 | 16 | 16 | 18 | 21 |
| 22-Sep | 67 | 54 | 79 | 23 | 48 | 82 | 68 | 57 | 38 | 25 | 80 | 23 | 30 | 38 | 11 | 38 | 38 | 41 | 69 | 87 | 70 | 88 | 28 | 34 | 88 |
| 23-Sep | 42 | 41 | 82 | 42 | 23 | 25 | 17 | 16 | 22 | 66 | 56 | 31 | 42 | 43 | 46 | 48 | 30 | 30 | 30 | 15 | 18 | 25 | 17 | 29 | 82 |
| 24-Sep | 26 | 34 | 53 | 28 | 21 | 36 | 43 | 27 | 30 | 28 | 19 | 18 | 20 | 27 | 29 | 27 | 32 | 21 | 21 | 24 | 21 | 20 | 22 | 16 | 53 |
| 25-Sep | 15 | 26 | 31 | 25 | 20 | 17 | 18 | 22 | 20 | 15 | 22 | 18 | C | C | 58 | 32 | AF | AF | 14 | 87 | 41 | 90 | 34 | 46 | 90 |
| 26-Sep | 22 | 41 | 76 | 63 | 54 | 55 | 91 | 52 | 42 | 16 | 16 | 24 | 25 | 19 | 22 | 16 | 19 | 15 | 49 | 29 | 67 | 58 | 86 | 99 | 99 |
| 27-Sep | 51 | 17 | 11 | 53 | 21 | 20 | 81 | 52 | 40 | 26 | 38 | 30 | 26 | 23 | 23 | 20 | 19 | 19 | 20 | 21 | 22 | 11 | 37 | 22 | 81 |
| 28-Sep | 16 | 16 | 49 | 94 | 53 | 21 | 19 | 87 | 24 | 21 | 25 | 22 | 26 | 17 | 36 | 31 | 30 | 27 | 24 | 24 | 21 | 14 | 16 | 13 | 94 |
| 29-Sep | 24 | 24 | 23 | 34 | 30 | 38 | 18 | 11 | 14 | 16 | 21 | 19 | 20 | 20 | 66 | 21 | 21 | 67 | 54 | 81 | 64 | 21 | AF | AF | 81 |
| 30-Sep | 54 | 33 | AF | AF | 46 | 54 | 38 | 71 | 24 | 17 | 13 | 12 | 7 | 72 | 15 | 15 | 14 | 14 | 15 | 12 | 14 | 12 | 14 | 14 | 72 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|--|
| 67 | 90 | 82 | 94 | 70 | 82 | 91 | 87 | 70 | 85 | 80 | 76 | 72 | 72 | 66 | 61 | 42 | 67 | 90 | 93 | 89 | 90 | 105 | 99 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

C - Calibration AF - Analyzer Failure





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Lower Camp | Station number: | AMS 11 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 9, 2017 |
| Start time (MST): | 10:48 | End time (MST): | 13:15 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|-----------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>49.5</u> | ppm | Cal Gas Exp Date | February 16, 2019 |
| Cal Gas Cylinder # | <u>LL101792</u> | | | |
| Calibrator Make/Model | Sabio 4010 | | Serial Number | 11051107 |
| ZAG Make/Model | API 701 | | Serial Number | 3411 |

Analyzer Information

Analyzer make: TEI 43i

Analyzer serial #: 100841398

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -674.9 | -674.9 |
| Calculated slope | 0.998699 | 0.999688 | Lamp voltage | 798 | 793 |
| Calculated intercept | 0.451561 | 1.152970 | Pressure | 707.2 | 705.1 |
| Analyzer Background | 12.0 | 12.0 | Flow | 0.629 | 0.628 |
| Analyzer Coefficient | 1.049 | 1.049 | Intensity | 91 | 91 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5002 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4916 | 83.8 | 829.7 | 829.6 | 1.000 |
| calibrator zero | 5005 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4916 | 83.8 | 829.7 | 829.6 | 1.000 |
| second point | 4961 | 42.4 | 419.5 | 417.1 | 1.006 |
| third point | 4980 | 21.2 | 209.8 | 208.1 | 1.008 |
| as left zero | 5004 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4915 | 83.8 | 829.8 | 826.5 | 1.004 |

| | | | | |
|---------------------------|--|--|--|-------|
| Average Correction Factor | | | | 1.005 |
|---------------------------|--|--|--|-------|

| | | | | | |
|--------------------|--------|-------------------|--------|-----------|------|
| Corrected As found | 829.60 | Previous response | 830.28 | *% change | 0.1% |
|--------------------|--------|-------------------|--------|-----------|------|

* = > +/-5% change initiates investigation

Notes:

No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

SO₂ Calibration Summary

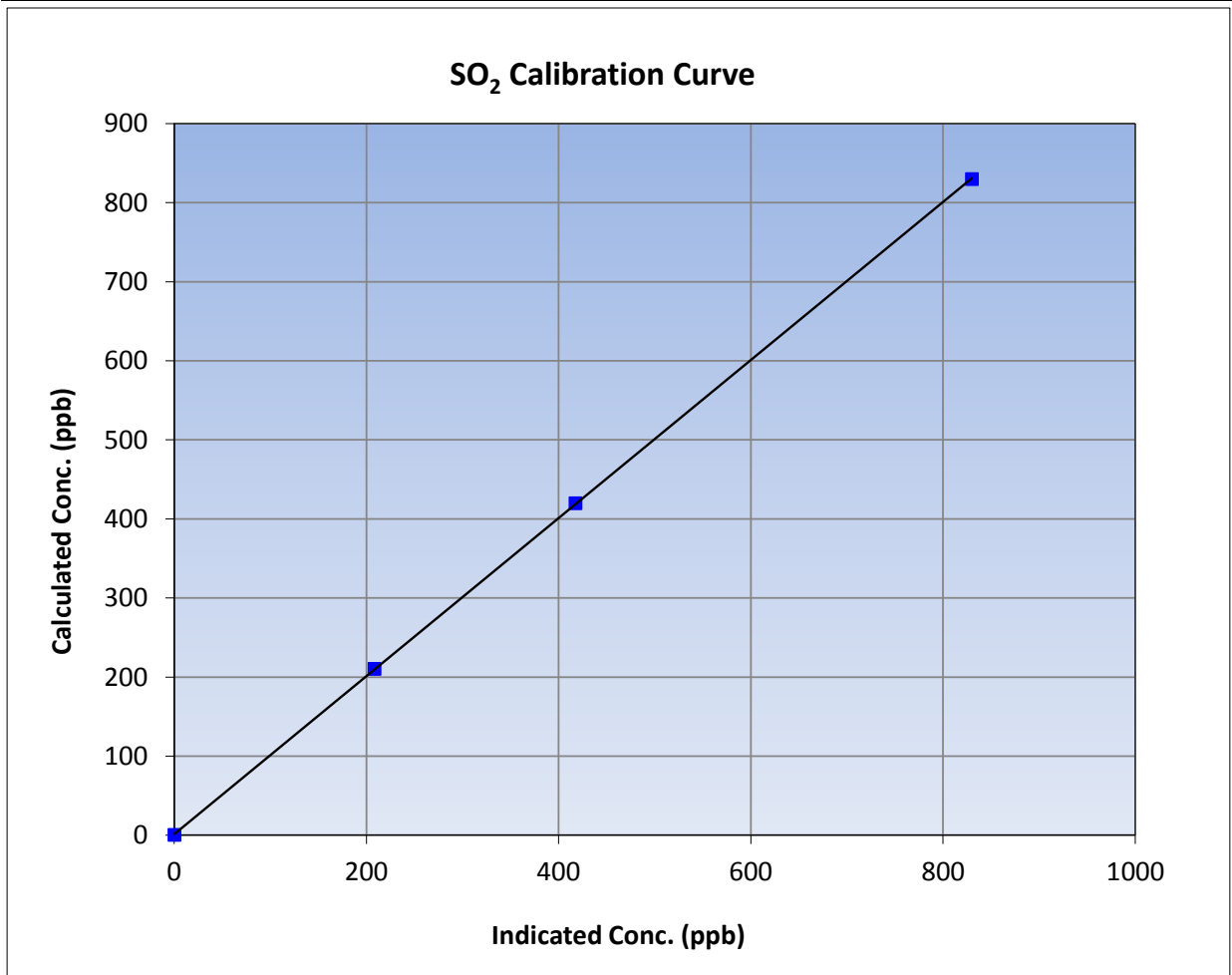
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Start Time (MST) | 10:48 | End Time (MST) | 13:15 |
| Analyzer make | TEI 43i | Analyzer serial # | 100841398 |

Calibration Data

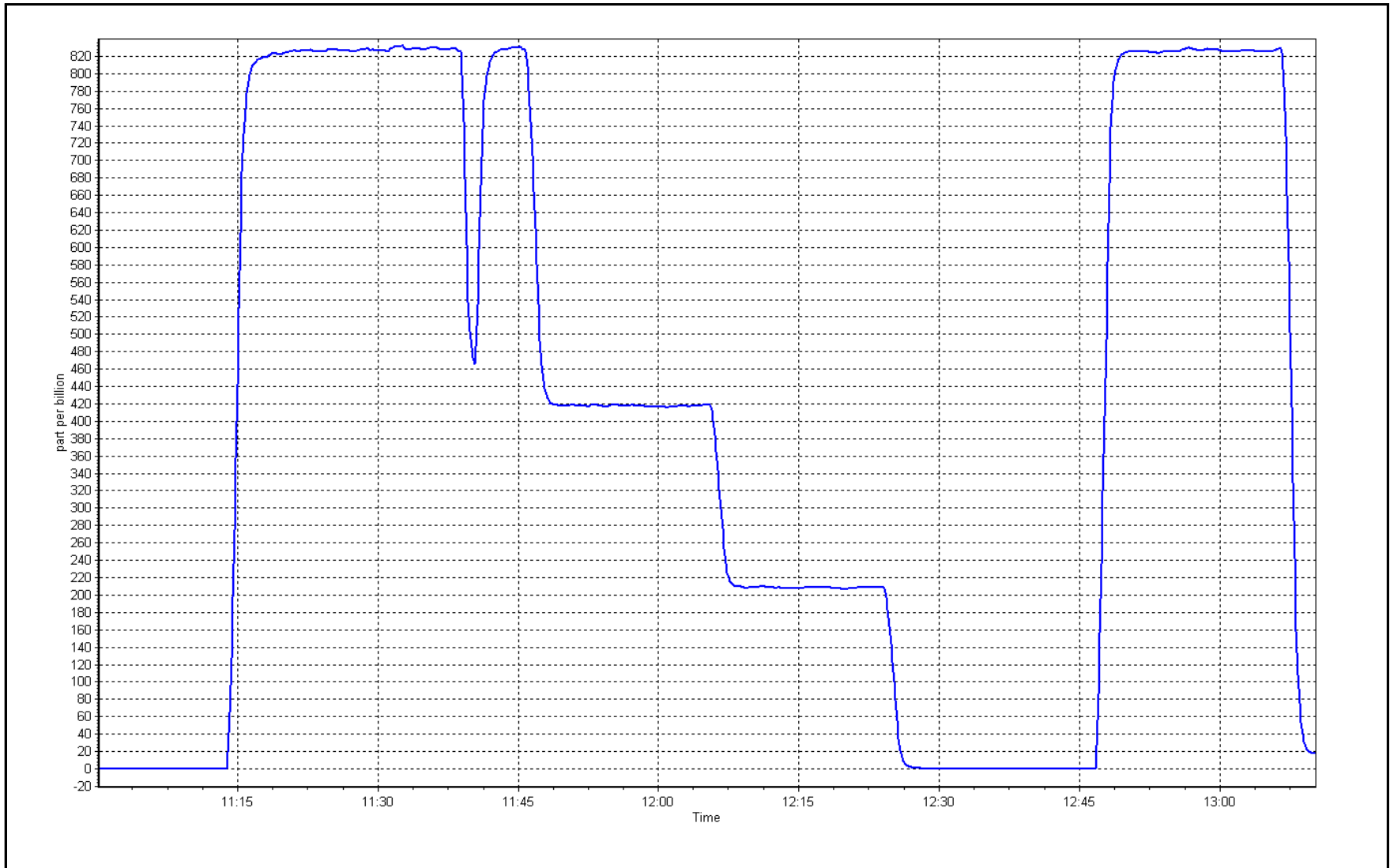
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 |
| 829.7 | 829.6 | 1.0001 | | |
| 419.5 | 417.1 | 1.0057 | Slope | 0.90 - 1.10 |
| 209.8 | 208.1 | 1.0083 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: 25-Sep

Location: Lower Camp





Wood Buffalo Environmental Association

H₂S Calibration Summary

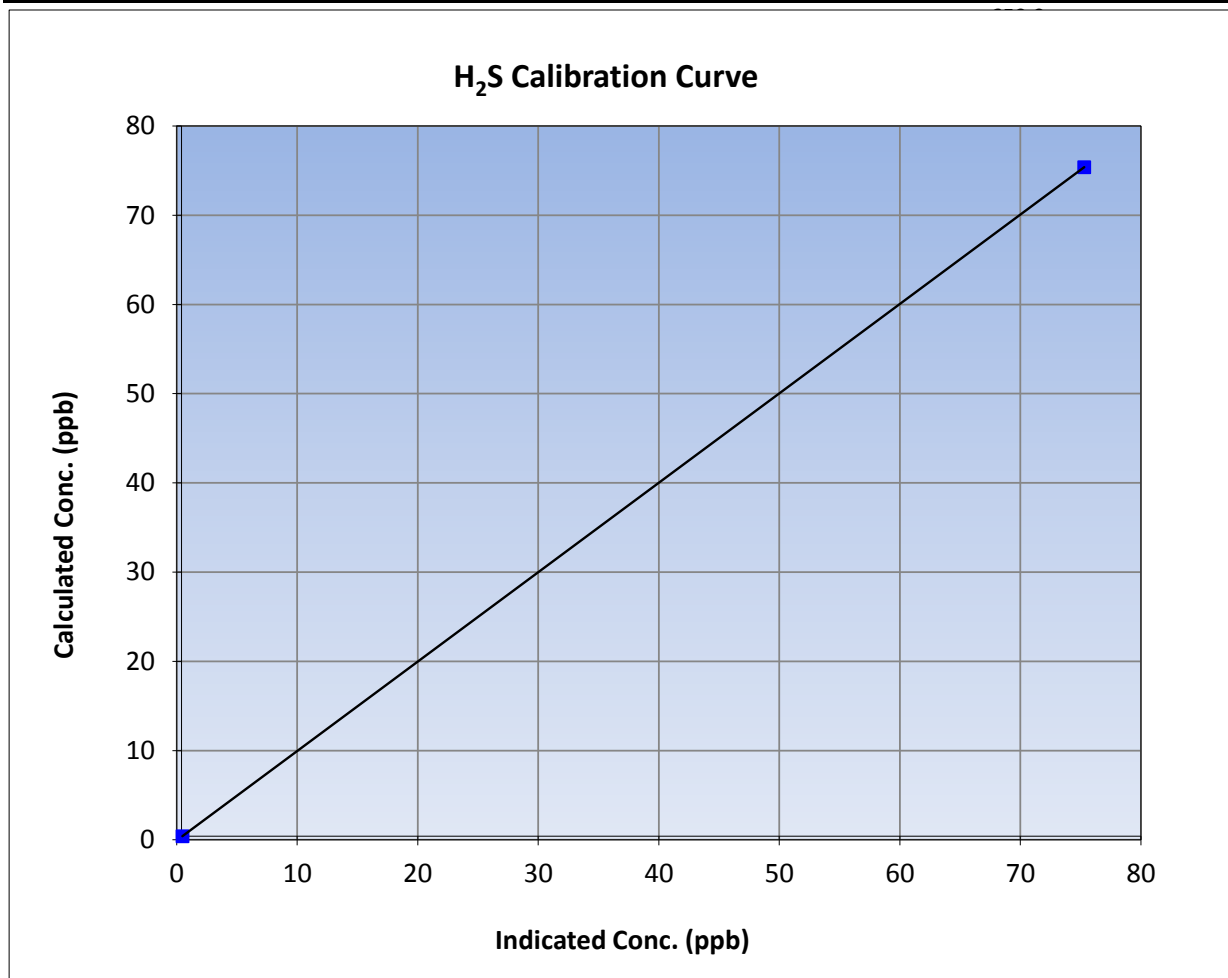
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 8, 2017 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Start Time (MST) | 9:27 | End Time (MST) | 14:57 |
| Analyzer make | Thermo 450i | Analyzer serial # | 1410661328 |

Calibration Data

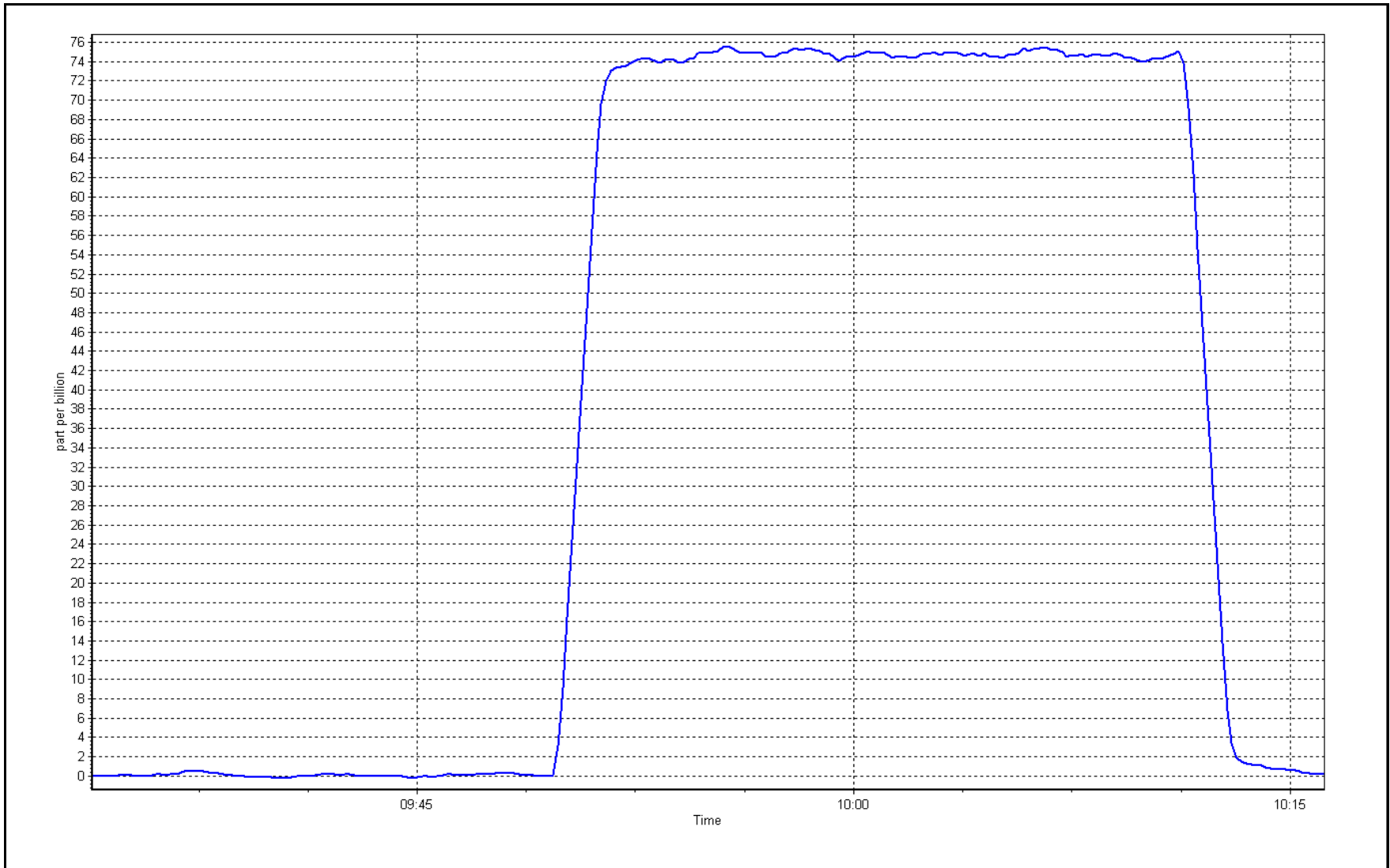
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|---------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 75.0 | 74.9 | 1.0012 | | Slope | 1.002098 |
| | | | Intercept | -0.070147 | +/-3 |



H₂S Calibration Plot

Date: 26-Sep

Location: Lower Camp





Wood Buffalo Environmental Association

H₂S Calibration Summary

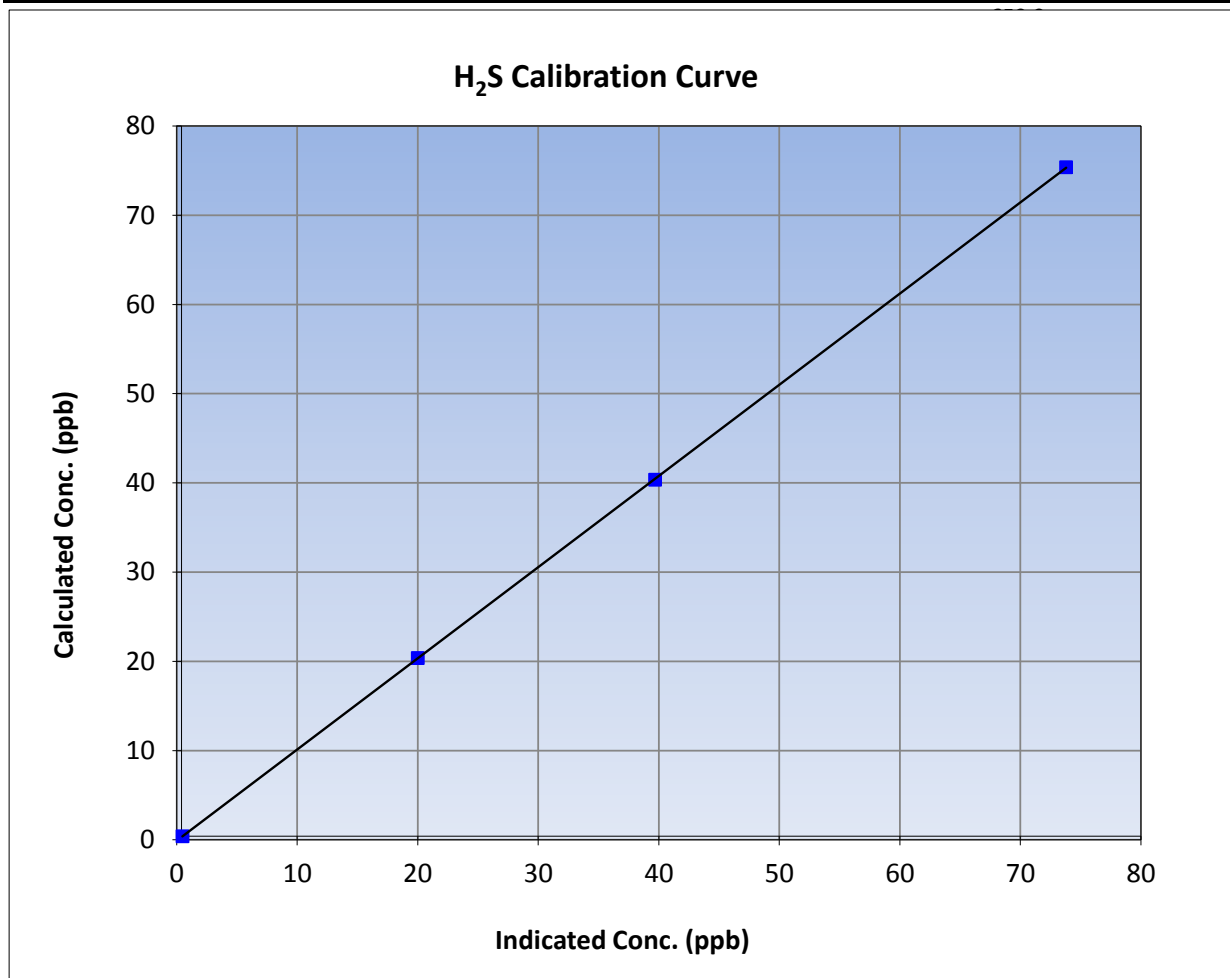
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 8, 2017 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Start Time (MST) | 9:27 | End Time (MST) | 14:57 |
| Analyzer make | Thermo 450i | Analyzer serial # | 1410661328 |

Calibration Data

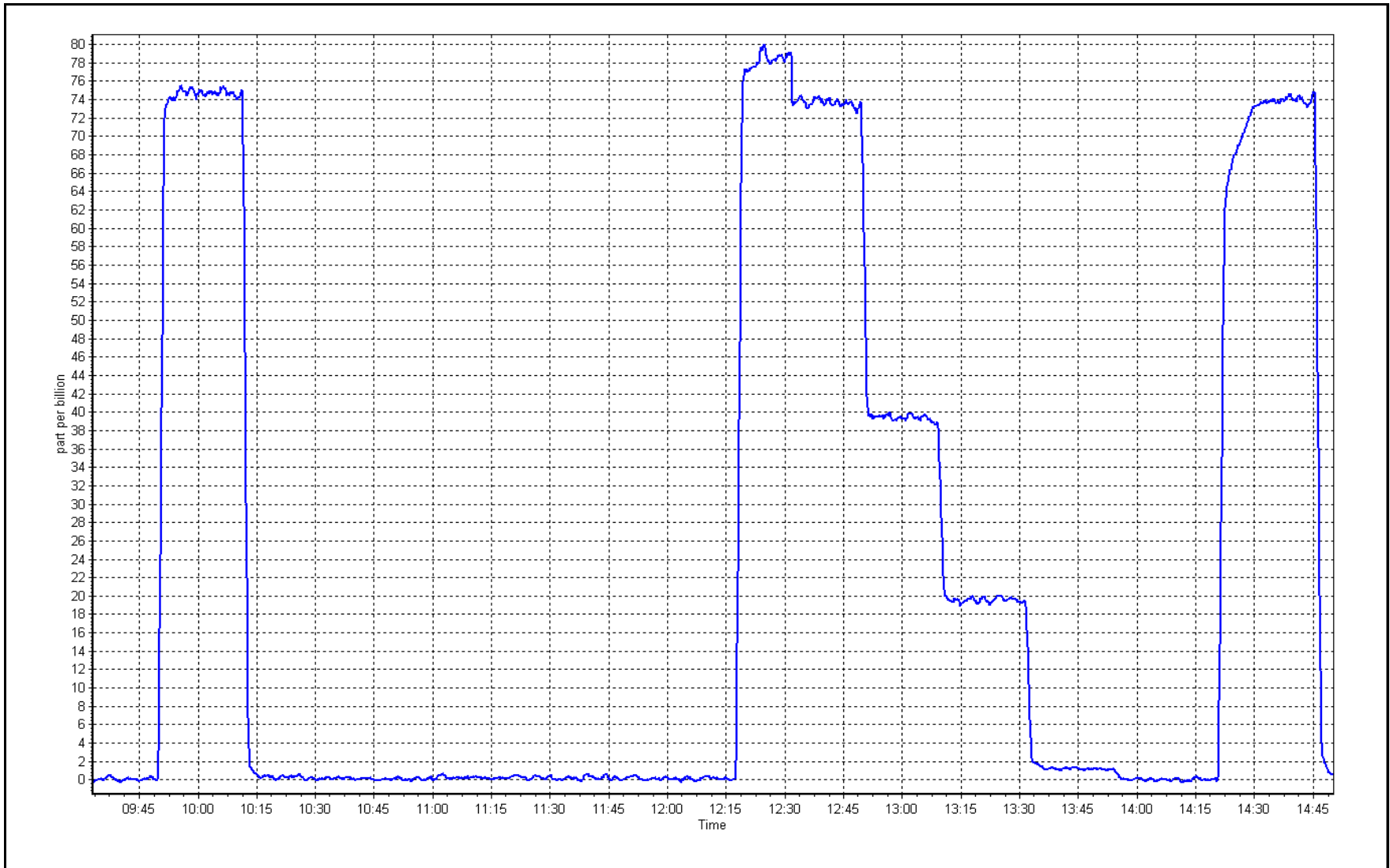
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999994 | |
| 75.0 | 73.4 | 1.0214 | | | ≥0.995 |
| 40.0 | 39.3 | 1.0166 | Slope | 1.022023 | |
| 20.0 | 19.6 | 1.0194 | | | 0.90 - 1.10 |
| | | | Intercept | -0.094752 | +/-3 |



H₂S Calibration Plot

Date: 26-Sep

Location: Lower Camp





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Lower Camp | Station number: | AMS 11 |
| Calibration Date: | September 25, 2017 | Last Cal Date: | August 9, 2017 |
| Start time (MST): | 10:48 | End time (MST): | 13:15 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|-------------------|
| Gas Cert Reference | LL101792 | Cal Gas Expiry Date | February 16, 2019 |
| CH4 Cal Gas Conc. | <u>493.0</u> ppm | CH4 Equiv Conc. | 1043.0 ppm |
| C3H8 Cal Gas Conc. | <u>200.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11051107 |
| ZAG Make/Model | API 701 | Serial Number | 3411 |

Analyzer Information

| | | | |
|----------------------|--------------|---------------------|---------------|
| Analyzer make: | 51-i-LT | Analyzer serial #: | 1218153353 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -297.6 |
| Calculated slope | 0.998832 | Sample pressure | 7.8 |
| Calculated intercept | -0.025664 | Fuel pressure | 25.1 |
| Analyzer Background | 3.440 | Air pressure | 40.3 |
| Analyzer Coefficient | 4.444 | Flame temperature | 166.5 |
| | | | <u>Finish</u> |
| | | | -298.0 |
| | | | 7.8 |
| | | | 25.2 |
| | | | 40.3 |
| | | | 166.8 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5002 | 0.0 | 0.00 | -0.04 | ---- |
| as found span | 4916 | 83.8 | 17.48 | 17.36 | 1.007 |
| calibrator zero | 5002 | 0.0 | 0.00 | -0.04 | ---- |
| high point | 4916 | 83.8 | 17.48 | 17.36 | 1.007 |
| second point | 4961 | 42.4 | 8.84 | 8.77 | 1.008 |
| third point | 4980 | 21.2 | 4.42 | 4.40 | 1.006 |
| as left zero | 5004 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4915 | 83.8 | 17.48 | 17.50 | 0.999 |
| Average Correction Factor | | | | | 1.007 |
| Corrected As found | 17.40 | Previous response | 17.53 | *% change | 0.7% |

* = > +/-5% change initiates investigation

Notes: No adjustments needed.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

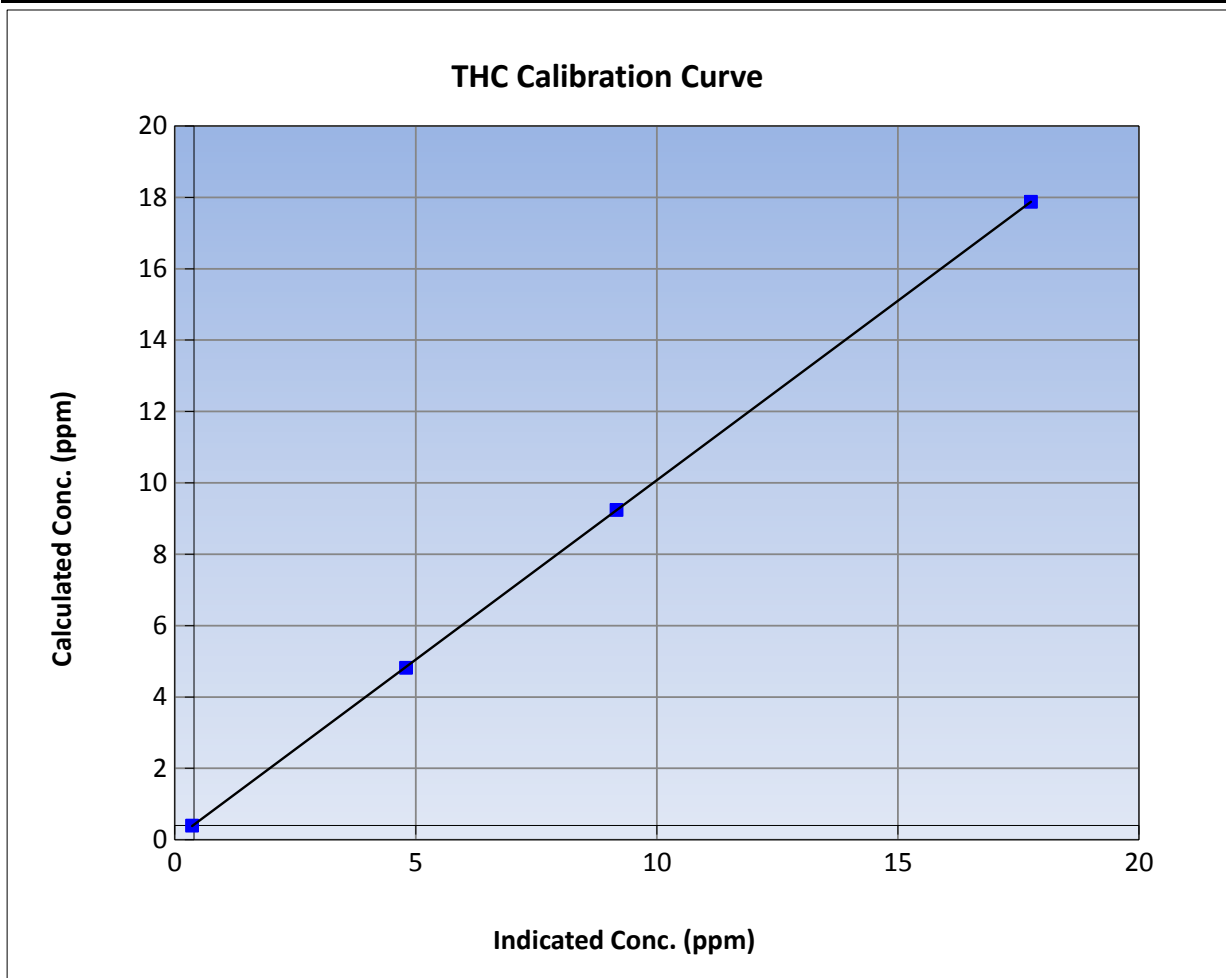
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 25, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Start Time (MST) | 10:48 | End Time (MST) | 13:15 |
| Analyzer make | 51-i-LT | Analyzer serial # | 1218153353 |

Calibration Data

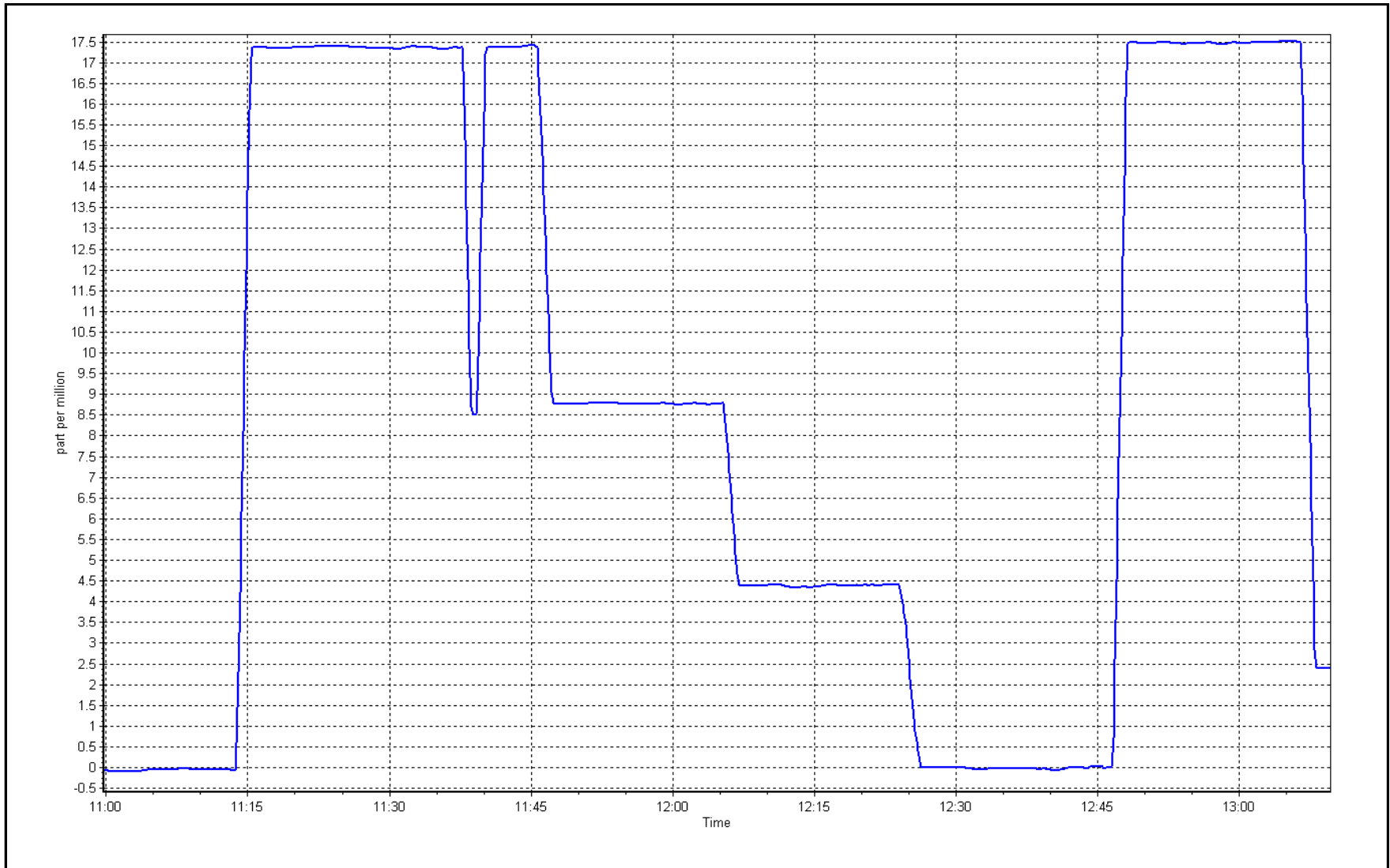
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999995 | |
| 17.5 | 17.4 | 1.0070 | | | ≥0.995 |
| 8.8 | 8.8 | 1.0082 | Slope | 1.005303 | |
| 4.4 | 4.4 | 1.0057 | | | 0.90 - 1.10 |
| | | | Intercept | 0.024153 | +/-1.5 |



THC Calibration Plot

Date: 25-Sep

Location: Lower Camp





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
SEPTEMBER 2017

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 SEPTMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|----------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 686 | 34 | 34 | 100 | 27 | 0 | 4 | 0 |
| TRS(ppb) Average | 686 | 34 | 34 | 100 | 1 | 0 | 1 | 0 |
| THC(ppm) Average | 686 | 34 | 34 | 100 | 3.7 | - | 2.7 | - |
| O3(ppb) Average | 687 | 33 | 33 | 100 | 67 | 0 | 33 | - |
| NO2(ppb) Average | 686 | 34 | 34 | 100 | 30 | 0 | 9 | - |
| NO(ppb) Average | 686 | 34 | 34 | 100 | 41 | - | 7 | - |
| NOX(ppb) Average | 686 | 34 | 34 | 100 | 51 | - | 15 | - |
| PM2.5(ug/m3) Average | 708 | 1 | 12 | 98.47 | 38.3 | - | 15.7 | 0 |
| ET(C) Average | 720 | 0 | 0 | 100 | 32.5 | - | 20.2 | - |
| RH(%) Average | 720 | 0 | 0 | 100 | 98 | - | 91 | - |
| WS(km/h) Average | 720 | 0 | 0 | 100 | 26 | - | 23 | - |
| WD(deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|-----|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2(ppb) Average | 686 | 0.9 | 2 | - | 0 | 0 | 0 | 0 | 1 | 2 | 27 |
| TRS(ppb) Average | 686 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC(ppm) Average | 686 | 2.31 | 0.3 | - | 2 | 2.1 | 2.1 | 2.2 | 2.4 | 2.7 | 3.7 |
| O3(ppb) Average | 687 | 18.1 | 12 | - | 1 | 2 | 8 | 18 | 26 | 33 | 67 |
| NO2(ppb) Average | 686 | 3.4 | 4 | - | 0 | 0 | 0 | 2 | 5 | 9 | 30 |
| NO(ppb) Average | 686 | 1.8 | 4 | - | 0 | 0 | 0 | 0 | 1 | 6 | 41 |
| NOX(ppb) Average | 686 | 5.2 | 8 | - | 0 | 0 | 0 | 2 | 6 | 15 | 51 |
| PM2.5(ug/m3) Average | 708 | 5.45 | 5.2 | - | 0 | 1.4 | 2.2 | 4 | 6.6 | 10.9 | 38.3 |
| Temperature 2 m (C) Average | 720 | 11.27 | 6.9 | - | -4.1 | 2.3 | 6.4 | 10.8 | 16 | 20.7 | 32.5 |
| Relative Humidity (%) Average | 720 | 71.3 | 21 | - | 22 | 38 | 55 | 76 | 91 | 96 | 98 |
| Wind Speed 10 m (km/h) Average | 720 | 7.7 | 6 | - | 0 | 2 | 3 | 6 | 11 | 16 | 26 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|-------------------------------------|
| PM2.5 | 14 Sep 2017 16:00 | 14 Sep 2017 20:00 | 5 | Unstable operation - baseline drift |
| PM2.5 | 15 Sep 2017 15:00 | 15 Sep 2017 18:00 | 4 | Unstable operation - baseline drift |
| PM2.5 | 16 Sep 2017 16:00 | 16 Sep 2017 16:00 | 1 | Unstable operation - baseline drift |
| PM2.5 | 25 Sep 2017 14:00 | 25 Sep 2017 14:00 | 1 | Unstable operation - baseline drift |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort McKay South - September 2017

| | | | | |
|---|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 27 ppb on Sep 24 13:00 | Maximum Daily Average: 4.3 ppb on Sep 24 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 15 07:00 | Minimum Daily Average: 0.1 ppb on Sep 12 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 2.9 ppb at hour 12 | Minimum Diurnal Average: 0.3 ppb at hour 4 | | Hours of Calibration: | 34 |
| Monthly Average: 0.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 16 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 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-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0.4 | 4 |
| 4-Sep | 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 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 5 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1.4 | 5 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 2 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 10-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 5 | 8 | 6 | 4 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 1.6 | 8 |
| 12-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.4 | 1 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 7 | 6 | 3 | 2 | 4 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1.9 | 7 |
| 17-Sep | 1 | 0 | Z | 1 | 1 | 0 | 0 | 1 | 2 | 9 | 6 | 2 | 2 | 4 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.9 | 9 |
| 18-Sep | 0 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 8 | 16 | 10 | 7 | 4 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 16 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | C | C | C | C | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 20-Sep | 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 |
| 21-Sep | Z | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 9 | 17 | 27 | 19 | 10 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4.3 | 27 |
| 25-Sep | 1 | 1 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 14 | 19 | 21 | 7 | 8 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 3.7 | 21 |
| 29-Sep | 3 | 3 | Z | 1 | 1 | 4 | 3 | 8 | 9 | 7 | 11 | 18 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3.7 | 18 |
| 30-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.8 | 1 |

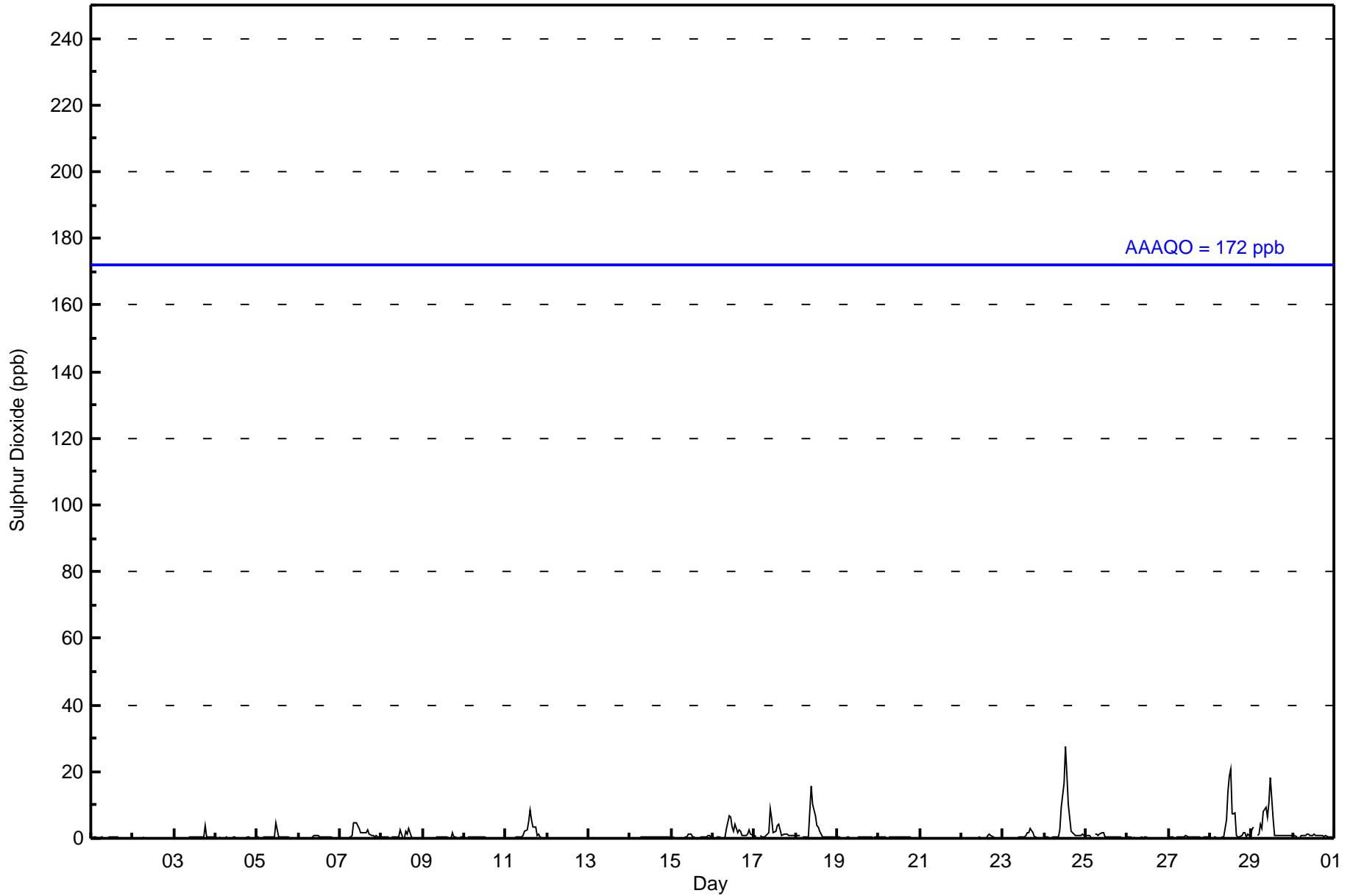
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.6 | 1.2 | 2.1 | 2.4 | 2.9 | 2.5 | 1.8 | 1.5 | 0.8 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | Diurnal Average | |
| 3 | 3 | 1 | 1 | 1 | 4 | 3 | 8 | 9 | 16 | 14 | 19 | 27 | 19 | 10 | 6 | 4 | 3 | 4 | 2 | 2 | 2 | 1 | 1 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 677 | 98.69 | 98.69 |
| 11 - 20 | 7 | 1.02 | 99.71 |
| 21 - 60 | 2 | 0.29 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 79 | 36 | 15 | 1 | 2 | 5 | 24 | 49 | 98 | 74 | 73 | 78 | 38 | 41 | 39 | 25 | 677 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 79 | 36 | 15 | 1 | 2 | 5 | 26 | 55 | 99 | 74 | 73 | 78 | 38 | 41 | 39 | 25 | 686 |

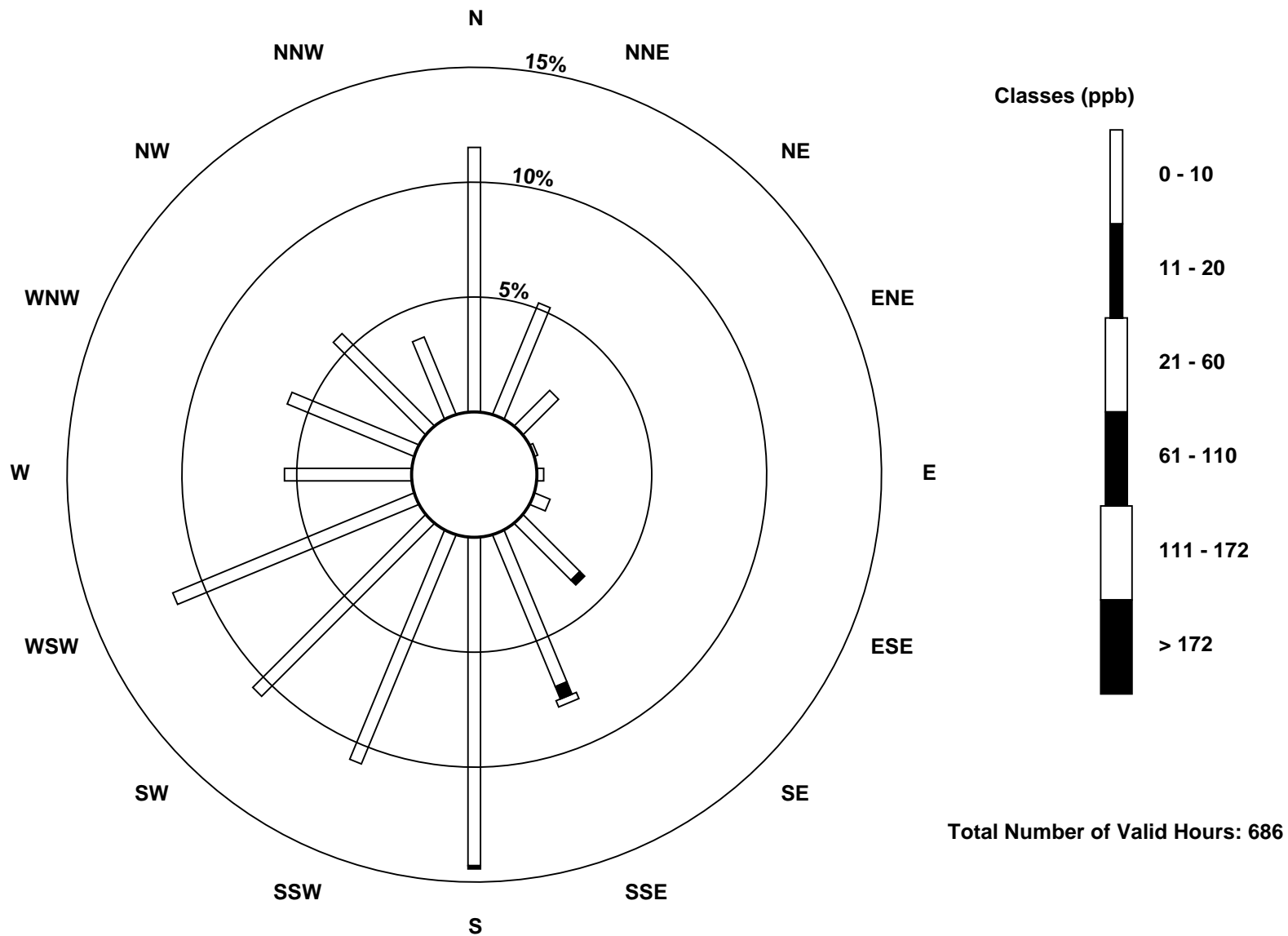
Total Number of Valid Hours: 686

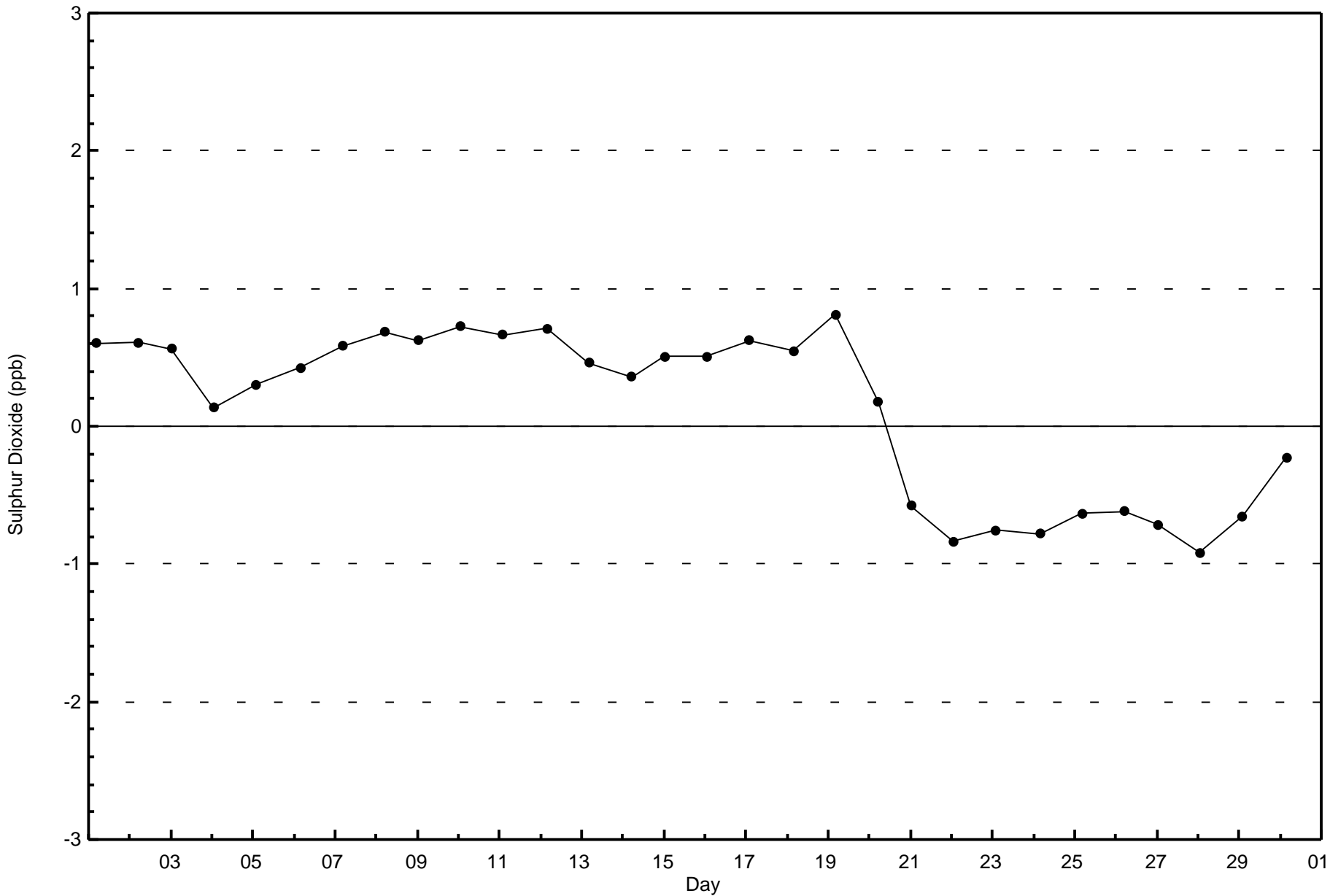
Total Number of Hours: 720

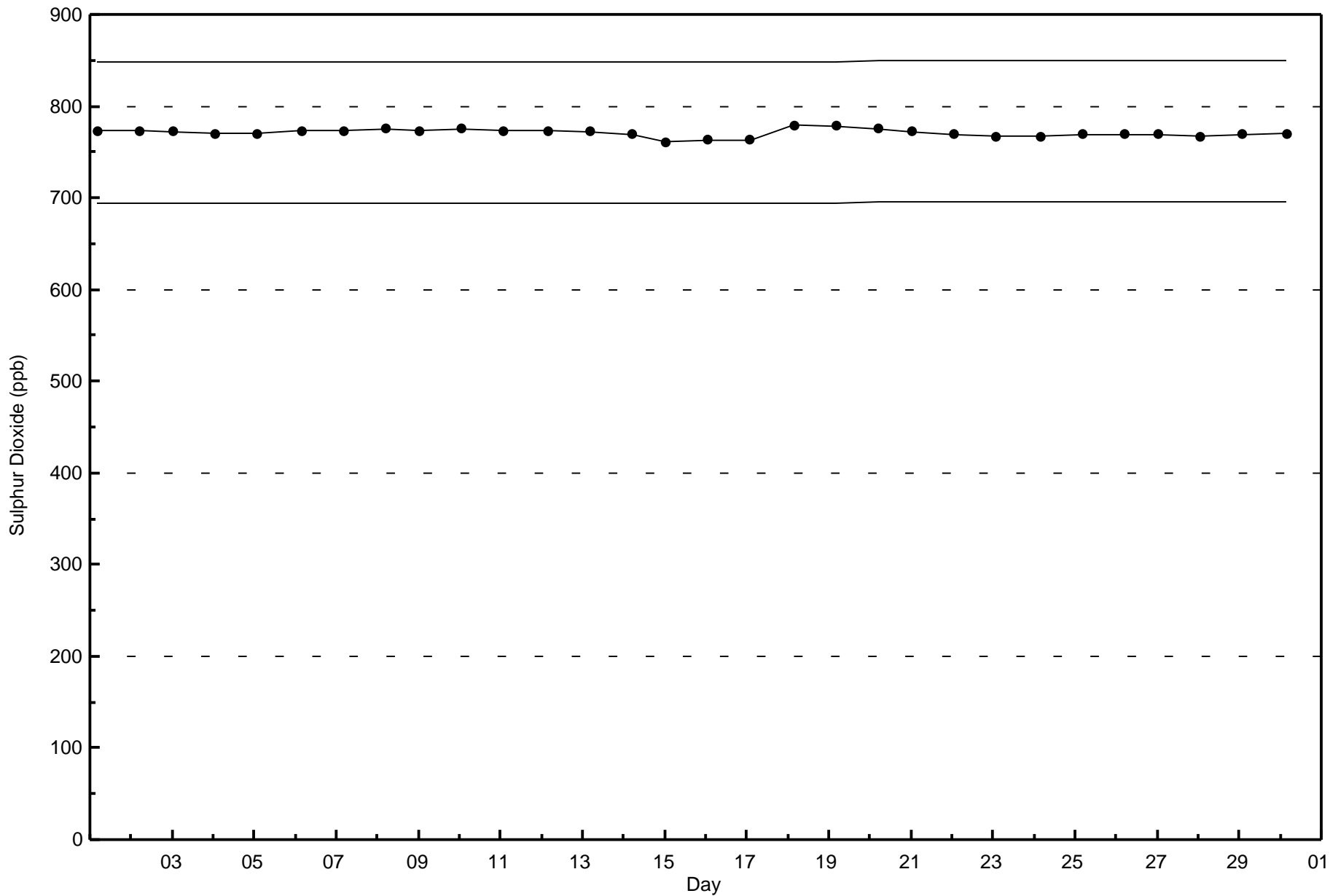


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay South - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 29 06:00 | Maximum Daily Average: 0.6 ppb on Sep 29 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 1 17:00 | Minimum Daily Average: 0.0 ppb on Sep 13 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 0.4 ppb at hour 11 | Minimum Diurnal Average: 0.1 ppb at hour 18 | | Hours of Calibration: | 34 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | Percent Operational Time: | 100.0 |

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

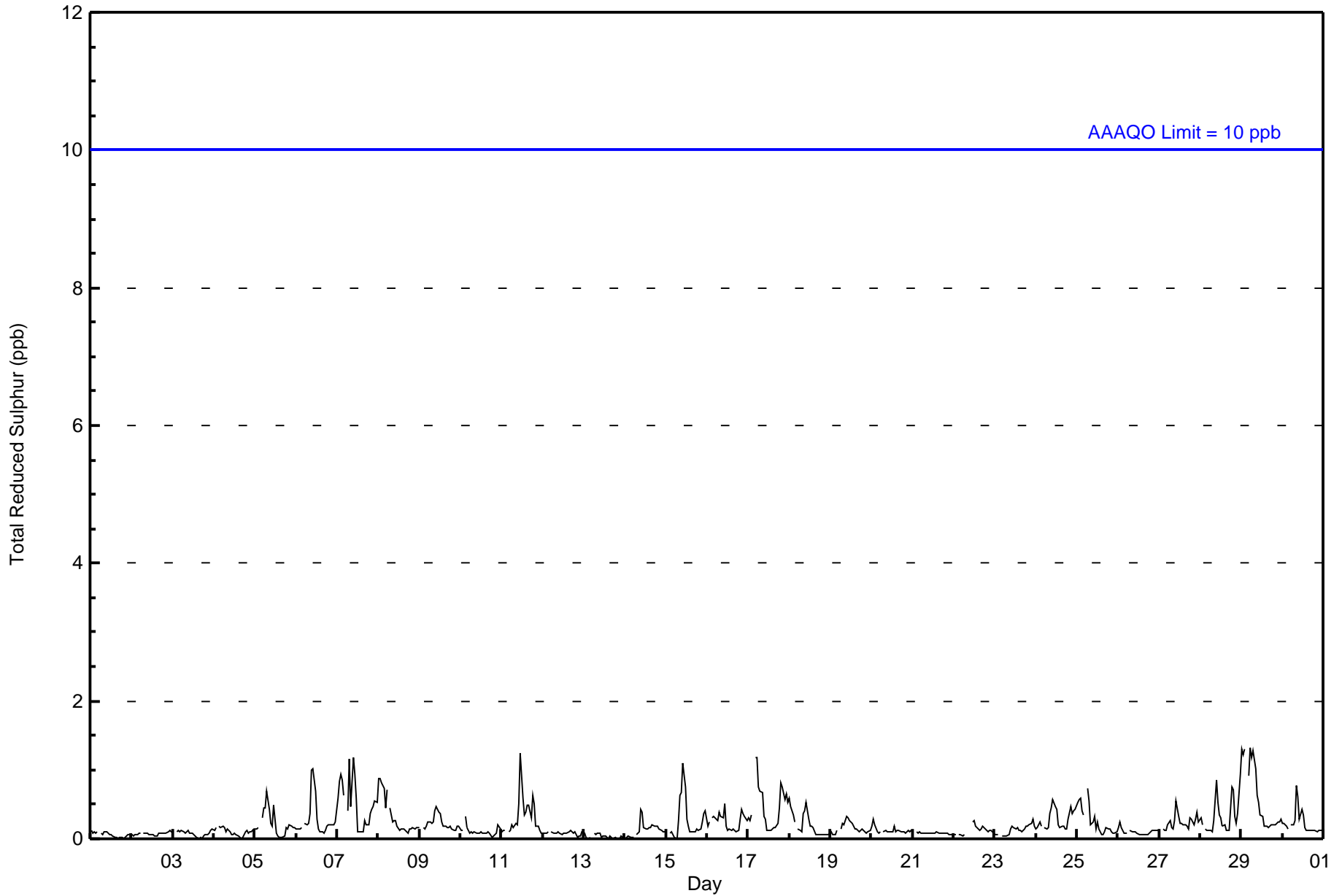
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.2 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 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
Fort McKay South - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - September 2017**

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 81 | 37 | 15 | 1 | 2 | 6 | 26 | 53 | 98 | 70 | 71 | 79 | 40 | 42 | 39 | 26 | 686 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 81 | 37 | 15 | 1 | 2 | 6 | 26 | 53 | 98 | 70 | 71 | 79 | 40 | 42 | 39 | 26 | 686 |

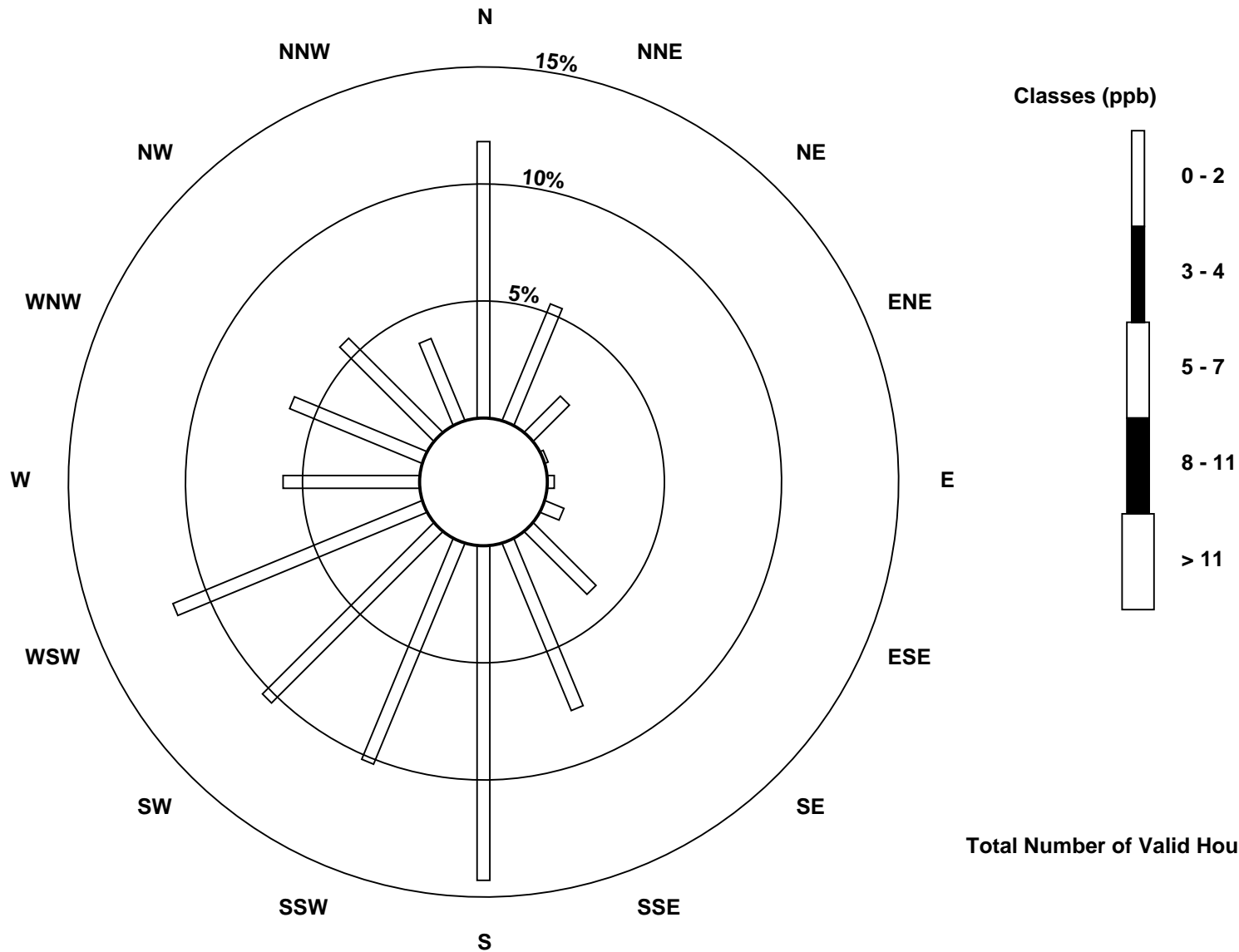
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

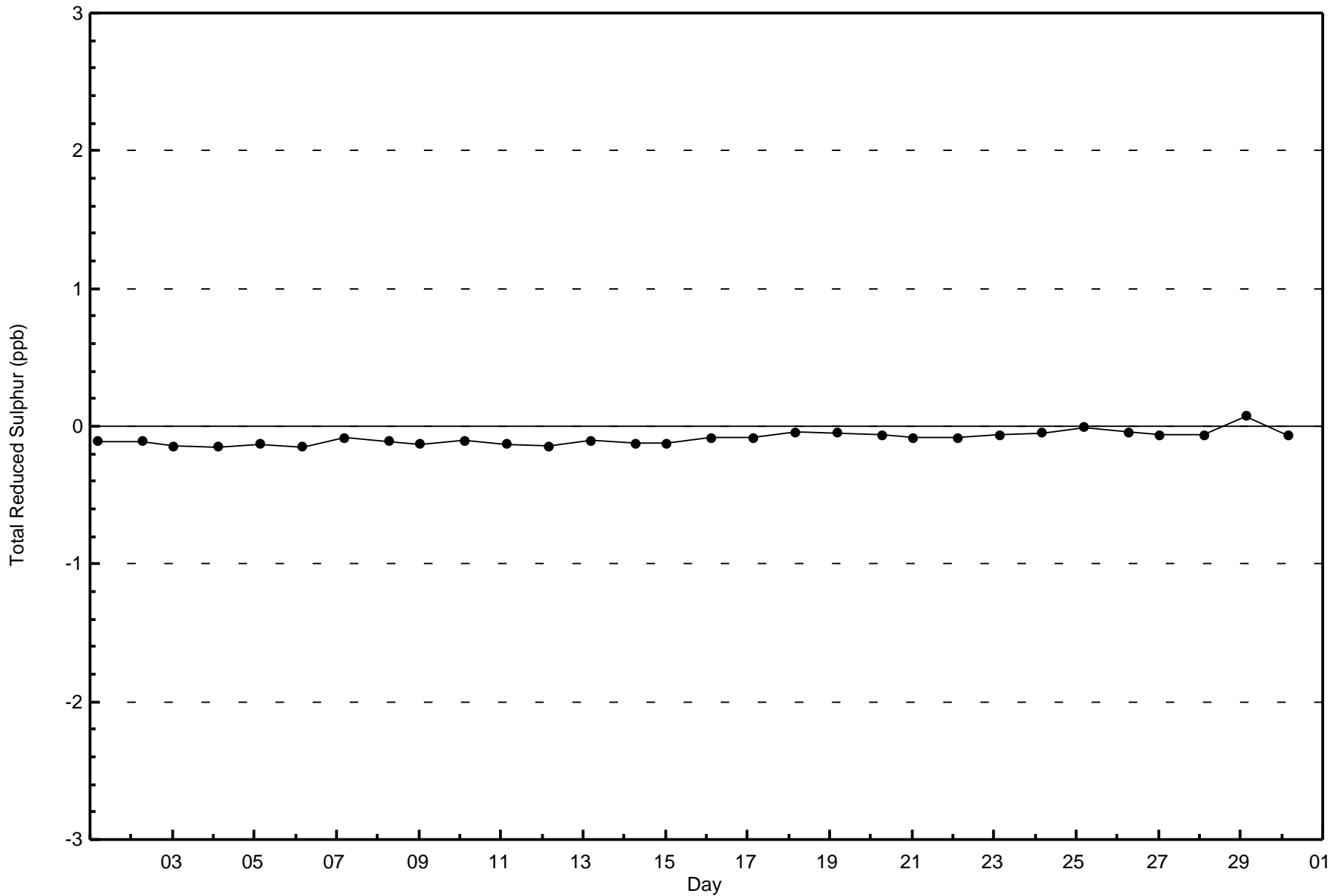
Total Reduced Sulphur (TRS) - ppb
Fort McKay South (AMS 13)

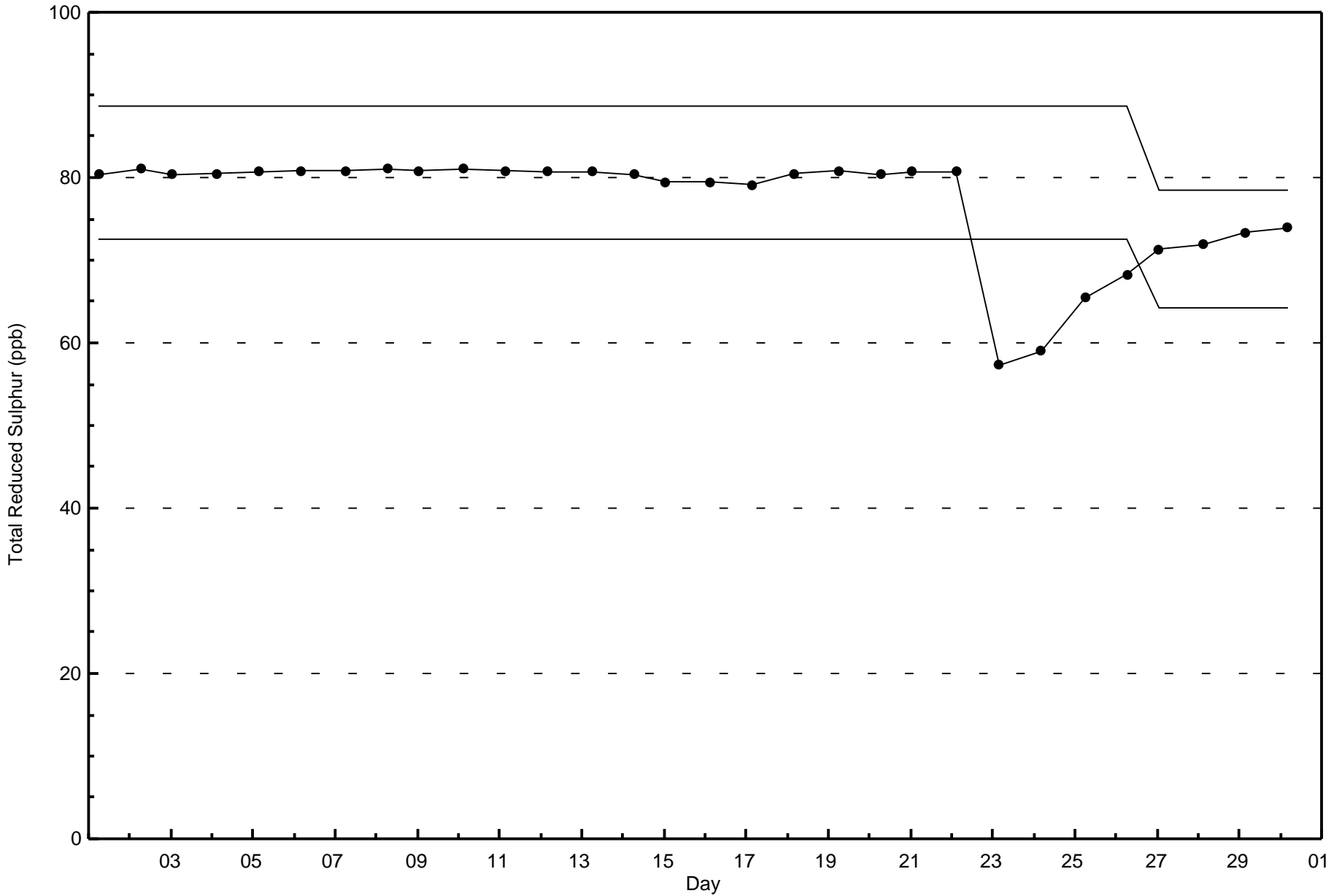




Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - September 2017

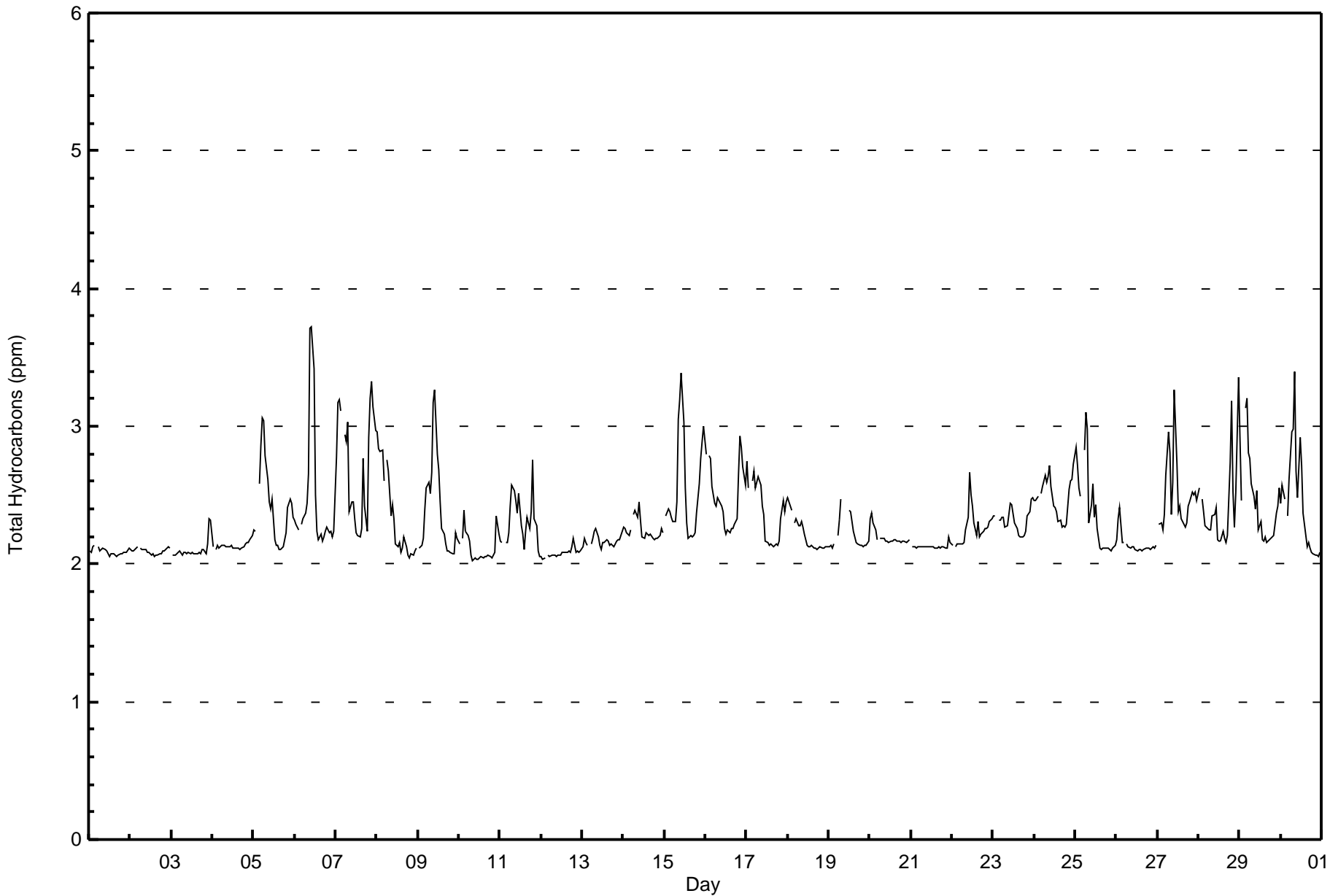






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay South - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 10 | 1.46 | 1.46 |
| 2.1 - 3.0 | 654 | 95.34 | 96.79 |
| 3.1 - 10.0 | 22 | 3.21 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay South - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals | |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|----|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 5 | 0 | 1 | 0 | 10 |
| 2.1 - 3.0 | 73 | 36 | 15 | 1 | 2 | 5 | 24 | 53 | 92 | 70 | 71 | 76 | 32 | 41 | 38 | 25 | 654 | |
| 3.1 - 10.0 | 6 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 7 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 22 | |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Totals | 79 | 36 | 15 | 1 | 2 | 5 | 26 | 55 | 99 | 74 | 73 | 78 | 38 | 41 | 39 | 25 | 686 | |

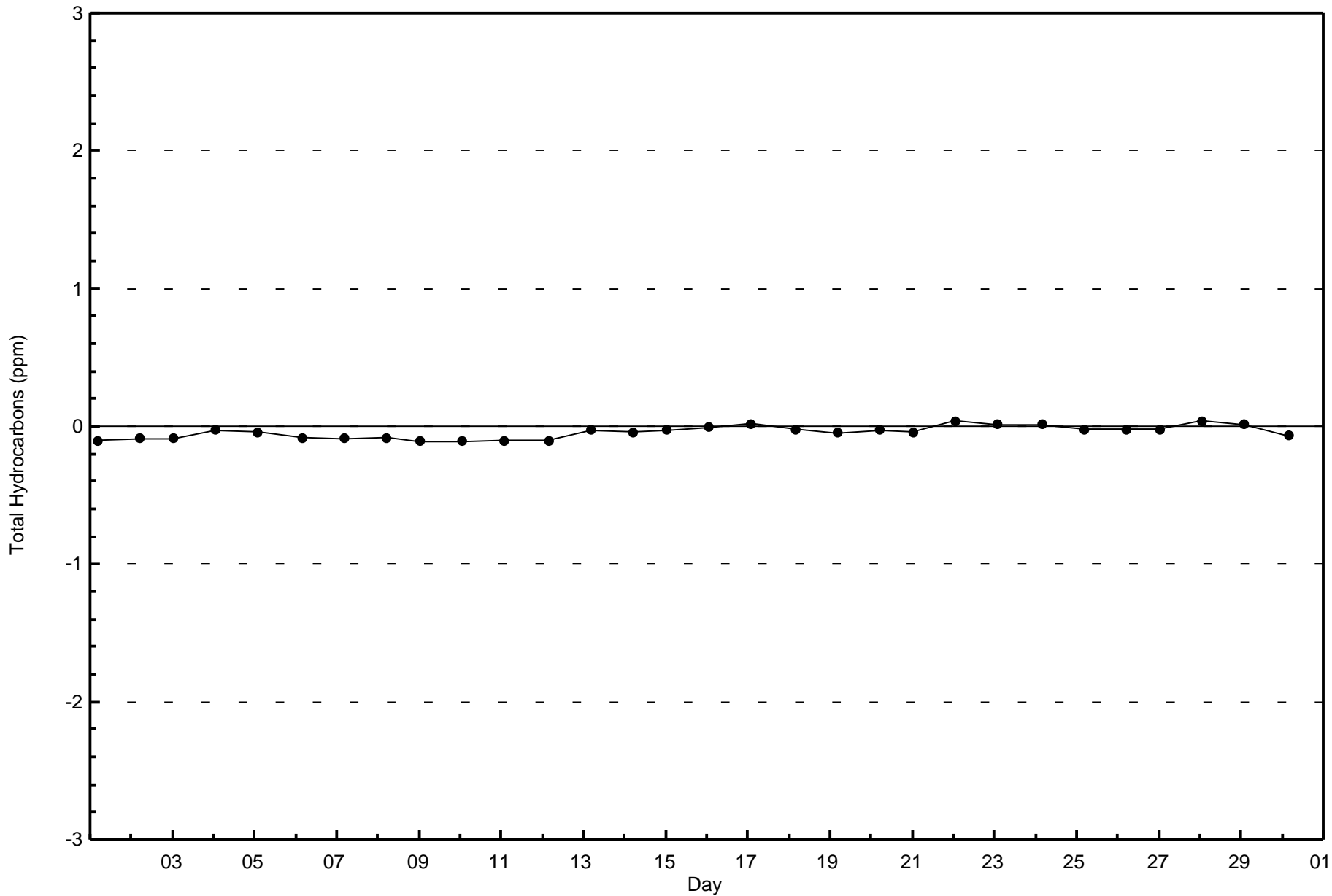
Total Number of Valid Hours: 686

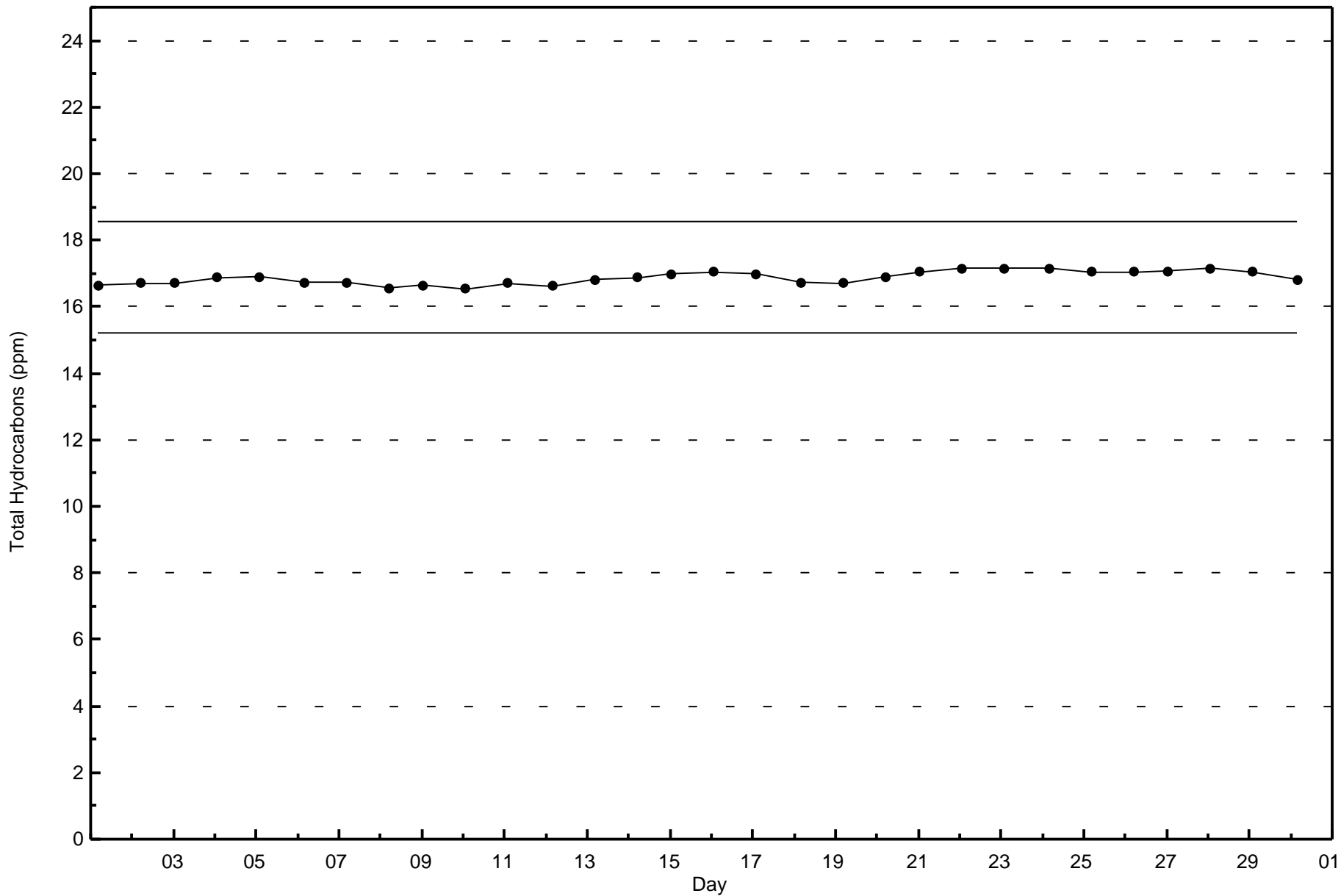
Total Number of Hours: 720



Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Fort McKay South - September 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort McKay South - September 2017

| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 67 ppb on Sep 7 17:00 | Maximum Daily Average: 33.4 ppb on Sep 7 | | Hours of Data: | 687 |
| Minimum Value: 1 ppb on Sep 27 06:00 | Minimum Daily Average: 9.0 ppb on Sep 9 | | Hours of Missing Data: | 33 |
| Maximum Diurnal Average: 30.8 ppb at hour 15 | Minimum Diurnal Average: 7.6 ppb at hour 7 | | Hours of Calibration: | 33 |
| Monthly Average: 18.1 ppb | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 8 Median = 18 Q ₃ = 26 P ₉₀ = 33 P ₉₉ = 55 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 27 | 27 | 24 | 22 | 18 | 23 | Z | 31 | 30 | 29 | 30 | 32 | 34 | 35 | 37 | 37 | 38 | 38 | 37 | 35 | 33 | 33 | 31 | 29 | 30.9 | 38 |
| 2-Sep | 30 | 29 | 27 | 26 | 25 | 24 | 23 | Z | 23 | 23 | 25 | 26 | 28 | 28 | 28 | 26 | 25 | 25 | 23 | 25 | 25 | 19 | 14 | 19 | 24.5 | 30 |
| 3-Sep | 22 | 23 | Z | 24 | 23 | 20 | 20 | 20 | 20 | 21 | 26 | 30 | 33 | 35 | 34 | 32 | 33 | 32 | 31 | 34 | 32 | 26 | 19 | 19 | 26.5 | 35 |
| 4-Sep | 23 | 22 | 18 | Z | 16 | 13 | 12 | 14 | 17 | 23 | 25 | 25 | 27 | 27 | 28 | 29 | 29 | 27 | 19 | 11 | 9 | 9 | 7 | 7 | 19.0 | 29 |
| 5-Sep | 6 | 5 | 3 | 1 | Z | 1 | 2 | 7 | 12 | 16 | 23 | 29 | 36 | 40 | 42 | 44 | 45 | 44 | 24 | 17 | 10 | 8 | 12 | 12 | 19.1 | 45 |
| 6-Sep | 12 | 11 | 10 | 9 | 8 | Z | 4 | 9 | 13 | 12 | 17 | 23 | 38 | 41 | 42 | 44 | 40 | 33 | 20 | 14 | 14 | 12 | 10 | 6 | 19.2 | 44 |
| 7-Sep | 2 | 1 | 3 | 4 | 4 | 3 | Z | 6 | 20 | 26 | 35 | 49 | 61 | 63 | 64 | 63 | 67 | 61 | 57 | 44 | 38 | 36 | 33 | 29 | 33.4 | 67 |
| 8-Sep | 18 | 16 | 12 | 13 | 17 | 12 | 8 | Z | 30 | 25 | 28 | 37 | 38 | 37 | 38 | 41 | 43 | 44 | 31 | 24 | 12 | 20 | 15 | 6 | 24.5 | 44 |
| 9-Sep | 4 | 3 | Z | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 5 | 10 | 13 | 20 | 21 | 18 | 17 | 15 | 14 | 14 | 12 | 11 | 8 | 9 | 9.0 | 21 |
| 10-Sep | 10 | 10 | 6 | Z | 11 | 11 | 9 | 14 | 15 | 18 | 20 | 22 | 24 | 25 | 28 | 28 | 25 | 28 | 29 | 27 | 22 | 17 | 11 | 12 | 18.3 | 29 |
| 11-Sep | 18 | 17 | 11 | 6 | Z | 2 | 2 | 2 | 5 | 5 | 8 | 12 | 13 | 12 | 18 | 18 | 23 | 23 | 18 | 15 | 12 | 11 | 17 | 18 | 12.3 | 23 |
| 12-Sep | 18 | 20 | 19 | 21 | 20 | Z | 18 | 17 | 16 | 21 | 23 | 24 | 24 | 23 | 21 | 20 | 19 | 23 | 23 | 25 | 28 | 28 | 22 | 16 | 21.3 | 28 |
| 13-Sep | 9 | 8 | 12 | 7 | 7 | 8 | Z | 9 | 16 | 24 | 31 | 34 | 32 | 28 | 26 | 26 | 26 | 14 | 8 | 4 | 3 | 2 | 2 | 2 | 14.6 | 34 |
| 14-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | Z | 5 | 7 | 17 | 26 | 28 | 27 | 27 | 25 | 25 | 16 | 8 | 5 | 5 | 4 | 3 | 3 | 11.5 | 28 |
| 15-Sep | 2 | 1 | Z | 1 | 1 | 1 | 2 | 3 | 3 | 6 | 10 | 14 | 21 | 24 | 29 | 28 | 29 | 28 | 18 | 5 | 2 | 2 | 2 | 2 | 10.2 | 29 |
| 16-Sep | 2 | 3 | 3 | Z | 6 | 8 | 7 | 12 | 18 | 17 | 22 | 31 | 35 | 34 | 35 | 35 | 35 | 33 | 29 | 28 | 23 | 21 | 19 | 16 | 20.5 | 35 |
| 17-Sep | 13 | 14 | 12 | 11 | Z | 6 | 3 | 7 | 16 | 22 | 27 | 31 | 34 | 36 | 35 | 35 | 36 | 34 | 31 | 27 | 25 | 23 | 22 | 19 | 22.6 | 36 |
| 18-Sep | 9 | 2 | 2 | 3 | 5 | Z | 3 | 5 | 12 | 15 | 20 | 30 | 33 | 33 | 33 | 34 | 35 | 34 | 32 | 26 | 22 | 26 | 26 | 23 | 20.1 | 35 |
| 19-Sep | 17 | 13 | 10 | 8 | 10 | 10 | Z | 7 | 10 | 10 | 17 | 17 | 18 | 19 | 31 | 26 | 27 | 26 | 23 | 22 | 25 | 24 | 23 | 20 | 18.0 | 31 |
| 20-Sep | 16 | 13 | 14 | 18 | 20 | 19 | 20 | Z | 20 | 22 | 23 | 23 | 23 | 24 | 25 | 25 | 24 | 24 | 24 | 25 | 24 | 24 | 25 | 23 | 21.7 | 25 |
| 21-Sep | 25 | 26 | Z | 25 | 25 | 25 | 24 | 24 | 23 | 23 | 22 | 22 | 22 | 22 | 23 | 24 | 24 | 24 | 23 | 20 | 15 | 17 | 12 | 14 | 21.9 | 26 |
| 22-Sep | 12 | 9 | 7 | Z | 3 | 3 | 4 | 7 | 8 | 9 | C | C | C | 22 | 26 | 24 | 21 | 14 | 5 | 3 | 2 | 3 | 3 | 1 | 9.4 | 26 |
| 23-Sep | 1 | 1 | 1 | 2 | Z | 1 | 1 | 2 | 3 | 4 | 3 | 5 | 16 | 25 | 27 | 30 | 30 | 28 | 15 | 7 | 5 | 3 | 4 | 6 | 9.6 | 30 |
| 24-Sep | 4 | 4 | 4 | 2 | 1 | Z | 1 | 2 | 5 | 9 | 10 | 12 | 14 | 18 | 22 | 26 | 30 | 20 | 11 | 7 | 3 | 7 | 13 | 14 | 10.4 | 30 |
| 25-Sep | 12 | 7 | 6 | 2 | 1 | 7 | Z | 7 | 8 | 9 | 13 | 14 | 17 | 20 | 24 | 25 | 20 | 11 | 9 | 11 | 14 | 15 | 9 | 7 | 11.6 | 25 |
| 26-Sep | 3 | 1 | 5 | 13 | 10 | 12 | 9 | Z | 14 | 18 | 25 | 33 | 33 | 33 | 33 | 34 | 33 | 29 | 19 | 12 | 10 | 9 | 7 | 8 | 17.6 | 34 |
| 27-Sep | 5 | 2 | Z | 5 | 1 | 1 | 1 | 2 | 12 | 9 | 9 | 14 | 20 | 19 | 23 | 18 | 16 | 15 | 6 | 3 | 4 | 6 | 12 | 6 | 9.2 | 23 |
| 28-Sep | 2 | 2 | 3 | Z | 3 | 3 | 2 | 2 | 6 | 10 | 18 | 20 | 23 | 29 | 28 | 31 | 31 | 27 | 25 | 22 | 20 | 24 | 21 | 24 | 16.4 | 31 |
| 29-Sep | 19 | 19 | 20 | 21 | Z | 16 | 12 | 7 | 11 | 23 | 25 | 25 | 33 | 37 | 38 | 39 | 37 | 24 | 16 | 14 | 11 | 2 | 2 | 1 | 19.7 | 39 |
| 30-Sep | 2 | 1 | 2 | 2 | 2 | Z | 1 | 1 | 5 | 12 | 21 | 30 | 31 | 34 | 37 | 34 | 27 | 27 | 29 | 29 | 31 | 27 | 18 | 14 | 18.1 | 37 |

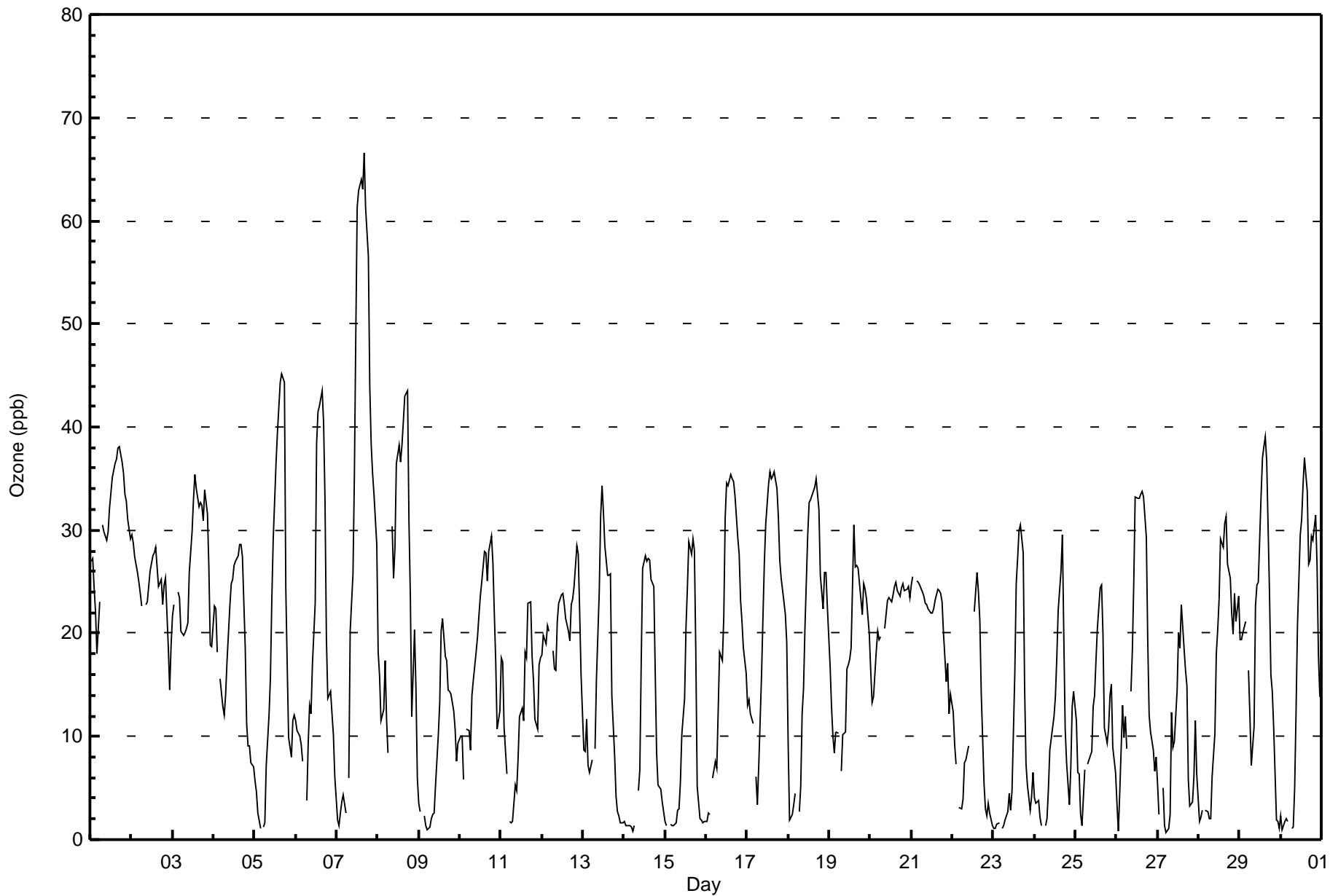
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|-----|------|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 11.4 | 10.3 | 9.4 | 10.1 | 9.6 | 9.2 | 7.6 | 8.8 | 13.4 | 15.7 | 19.9 | 24.1 | 27.6 | 29.0 | 30.8 | 30.7 | 30.3 | 27.6 | 22.2 | 18.6 | 16.5 | 15.7 | 14.0 | 12.8 | Diurnal Average | |
| 30 | 29 | 27 | 26 | 25 | 25 | 24 | 31 | 30 | 29 | 35 | 49 | 61 | 63 | 64 | 63 | 67 | 61 | 57 | 44 | 38 | 36 | 33 | 29 | 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 - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 390 | 56.77 | 56.77 |
| 21 - 50 | 290 | 42.21 | 98.98 |
| 51 - 82 | 7 | 1.02 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 38 | 16 | 6 | 0 | 2 | 3 | 10 | 26 | 56 | 53 | 49 | 49 | 25 | 26 | 19 | 12 | 390 |
| 21 - 50 | 43 | 21 | 9 | 1 | 0 | 2 | 15 | 29 | 35 | 16 | 23 | 32 | 13 | 16 | 20 | 15 | 290 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 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 | 81 | 37 | 15 | 1 | 2 | 5 | 25 | 55 | 97 | 70 | 72 | 81 | 38 | 42 | 39 | 27 | 687 |

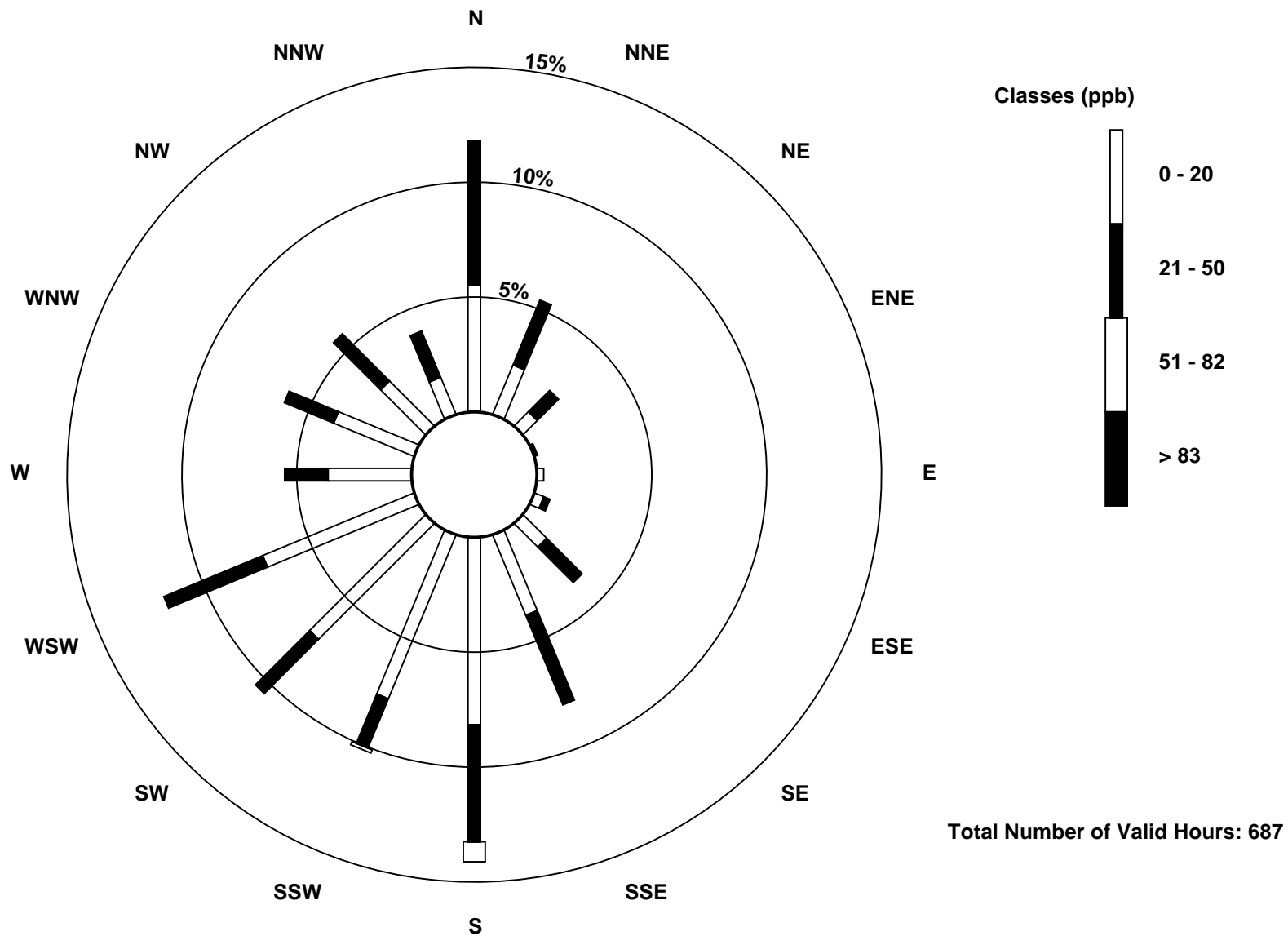
Total Number of Valid Hours: 687

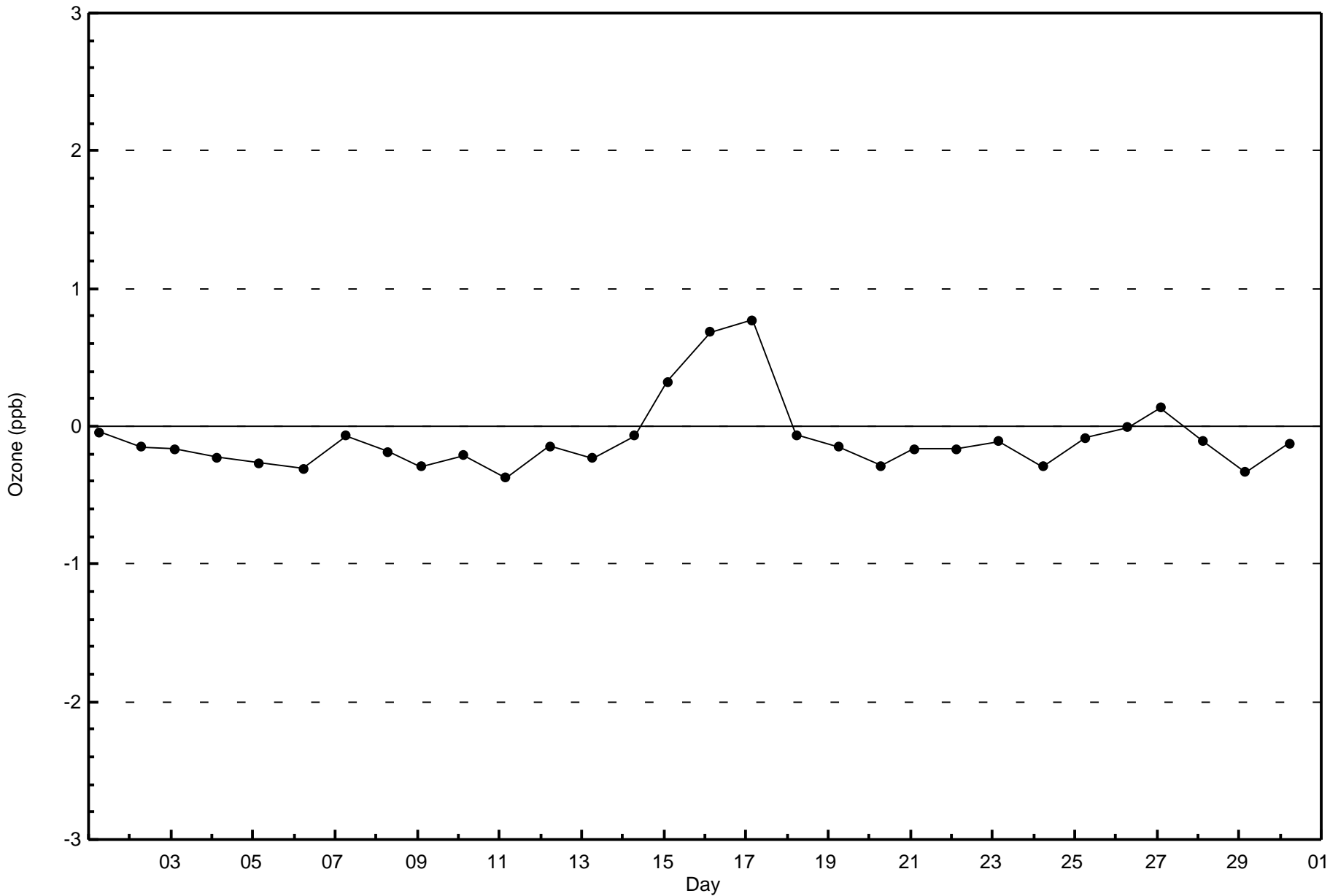
Total Number of Hours: 720

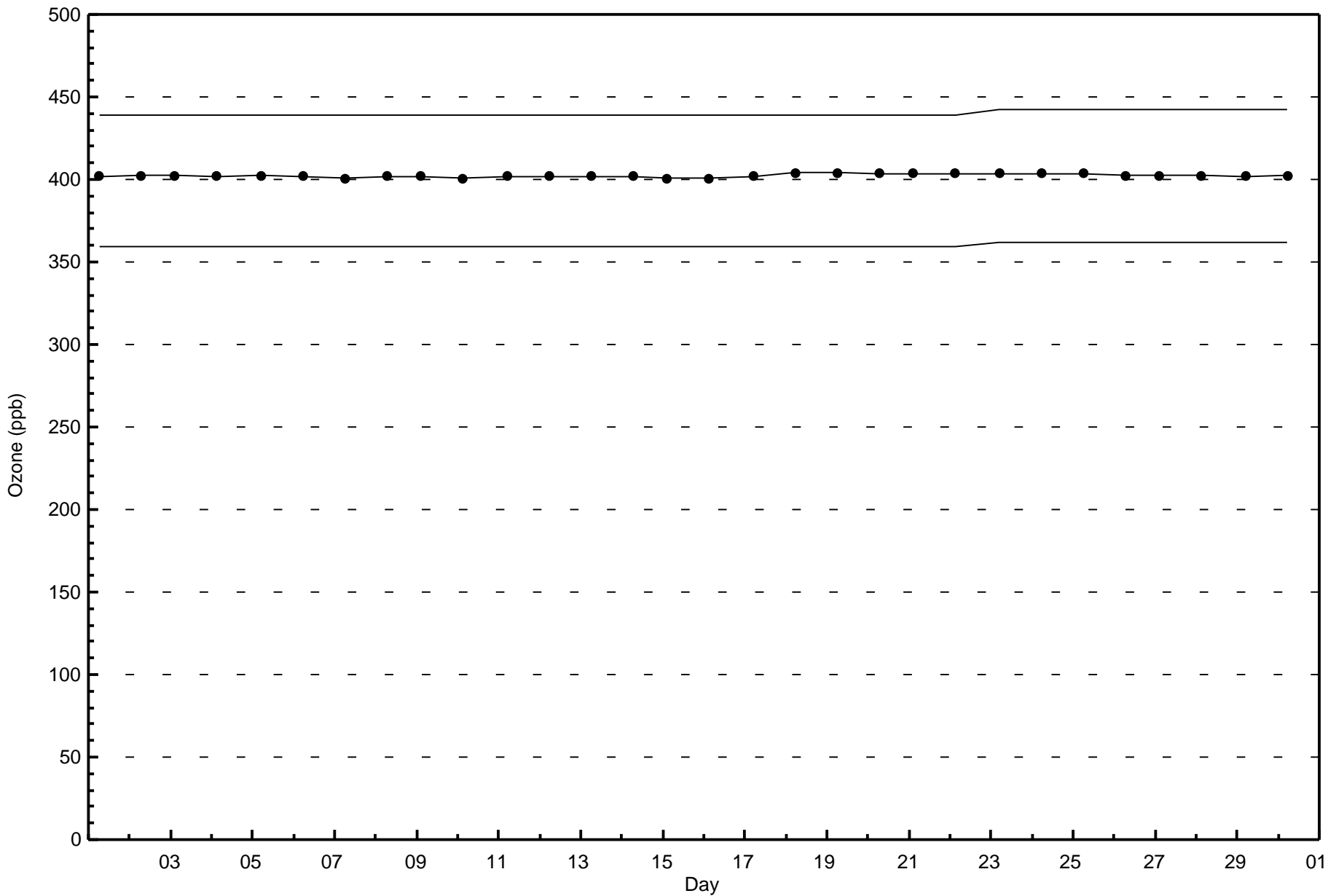


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Ozone (O₃) - ppb
Fort McKay South (AMS 13)







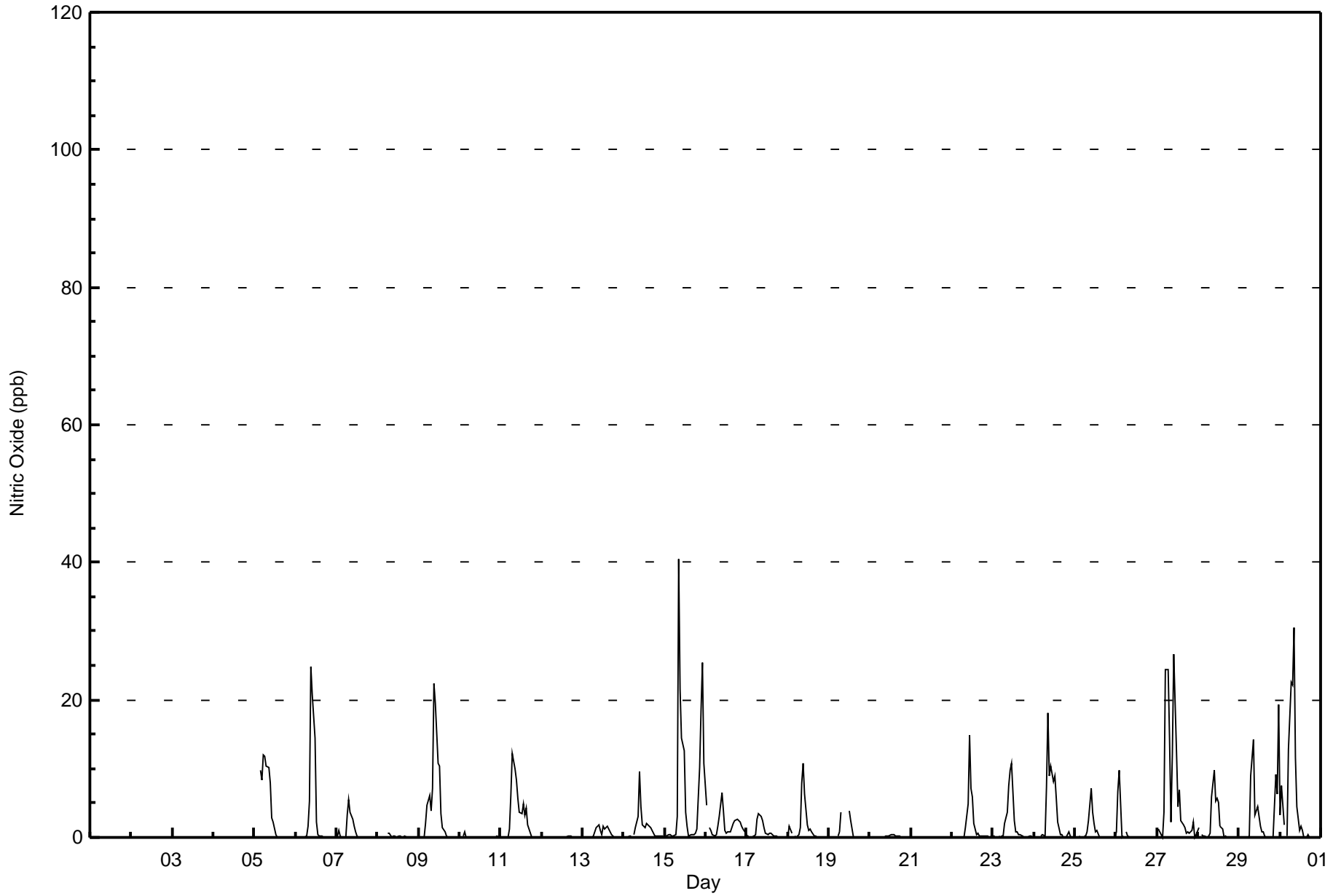


| Maximum Value: 41 ppb on Sep 15 09:00 | | Maximum Daily Average: 7.3 ppb on Sep 15 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|-----|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|-----------------|--|
| Minimum Value: 0 ppb on Sep 1 01:00 | | Minimum Daily Average: 0.0 ppb on Sep 1 | | Hours of Data: 686 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 6.3 ppb at hour 10 | | Minimum Diurnal Average: 0.2 ppb at hour 20 | | Hours of Missing Data: 34 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.8 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 6 P ₉₉ = 25 | | Hours of Calibration: 34 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 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-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 10 | 8 | 12 | 12 | 10 | 10 | 8 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.3 | 12 | |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 2 | 5 | 25 | 21 | 14 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.0 | 25 | |
| 7-Sep | 0 | 1 | 0 | 0 | Z | 0 | 3 | 6 | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 6 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | |
| 9-Sep | Z | 0 | 0 | 0 | 2 | 5 | 6 | 4 | 7 | 22 | 19 | 11 | 10 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.1 | 22 | |
| 10-Sep | 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 | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 1 | 6 | 12 | 10 | 8 | 6 | 4 | 3 | 5 | 3 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.9 | 12 | |
| 12-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 3 | 10 | 5 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 10 | |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 41 | 22 | 14 | 13 | 4 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 10 | 19 | 25 | 11 | 7.3 | 41 | |
| 16-Sep | 5 | Z | 1 | 1 | 0 | 0 | 0 | 2 | 3 | 6 | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 0 | 1.9 | 6 | |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 3 | 3 | 3 | 2 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 | |
| 18-Sep | 0 | 2 | 1 | Z | 0 | 0 | 0 | 1 | 8 | 11 | 6 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 11 | |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 4 | C | C | C | C | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 4 | |
| 20-Sep | 0 | 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-Sep | Z | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 15 | 7 | 6 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 | 15 | |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 4 | 8 | 10 | 11 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 11 | |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 7 | 18 | 9 | 10 | 8 | 9 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3.2 | 18 | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 7 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 7 | |
| 26-Sep | 1 | 7 | 10 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 10 | |
| 27-Sep | Z | 1 | 0 | 0 | 4 | 25 | 25 | 14 | 2 | 12 | 27 | 12 | 5 | 7 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 6.3 | 27 | |
| 28-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 10 | 5 | 6 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 10 | |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 9 | 14 | 3 | 4 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 6 | 3.2 | 19 | |
| 30-Sep | 3 | 7 | 2 | Z | 0 | 13 | 23 | 22 | 31 | 12 | 4 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.3 | 31 | |
| | | 0.4 | 0.8 | 0.6 | 0.5 | 0.6 | 2.3 | 2.7 | 3.5 | 6.0 | 6.3 | 5.6 | 3.5 | 2.0 | 1.3 | 0.6 | 0.5 | 0.4 | 0.2 | 0.2 | 0.2 | 0.5 | 1.1 | 1.1 | 1.1 | Diurnal Average | |
| | | 5 | 7 | 10 | 10 | 8 | 25 | 25 | 22 | 41 | 25 | 27 | 14 | 10 | 7 | 3 | 4 | 2 | 2 | 3 | 3 | 10 | 19 | 25 | 19 | Diurnal Maximum | |
| Z - zerspan | | C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay South - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 674 | 98.25 | 98.25 |
| 21 - 40 | 11 | 1.60 | 99.85 |
| 41 - 80 | 1 | 0.15 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 75 | 36 | 15 | 1 | 2 | 5 | 25 | 53 | 98 | 73 | 70 | 78 | 38 | 41 | 39 | 25 | 674 |
| 21 - 40 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 11 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 79 | 36 | 15 | 1 | 2 | 5 | 26 | 55 | 99 | 74 | 73 | 78 | 38 | 41 | 39 | 25 | 686 |

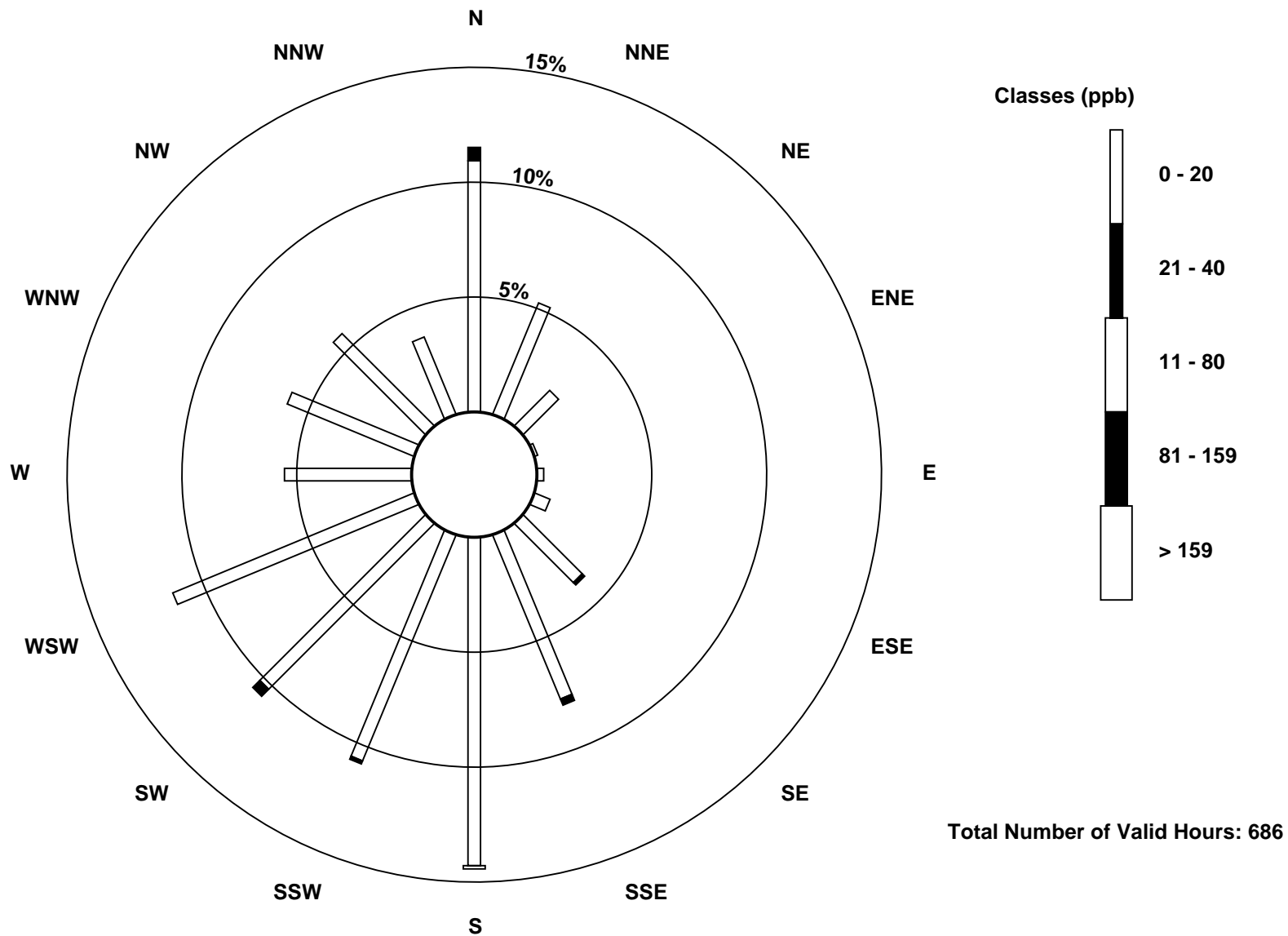
Total Number of Valid Hours: 686

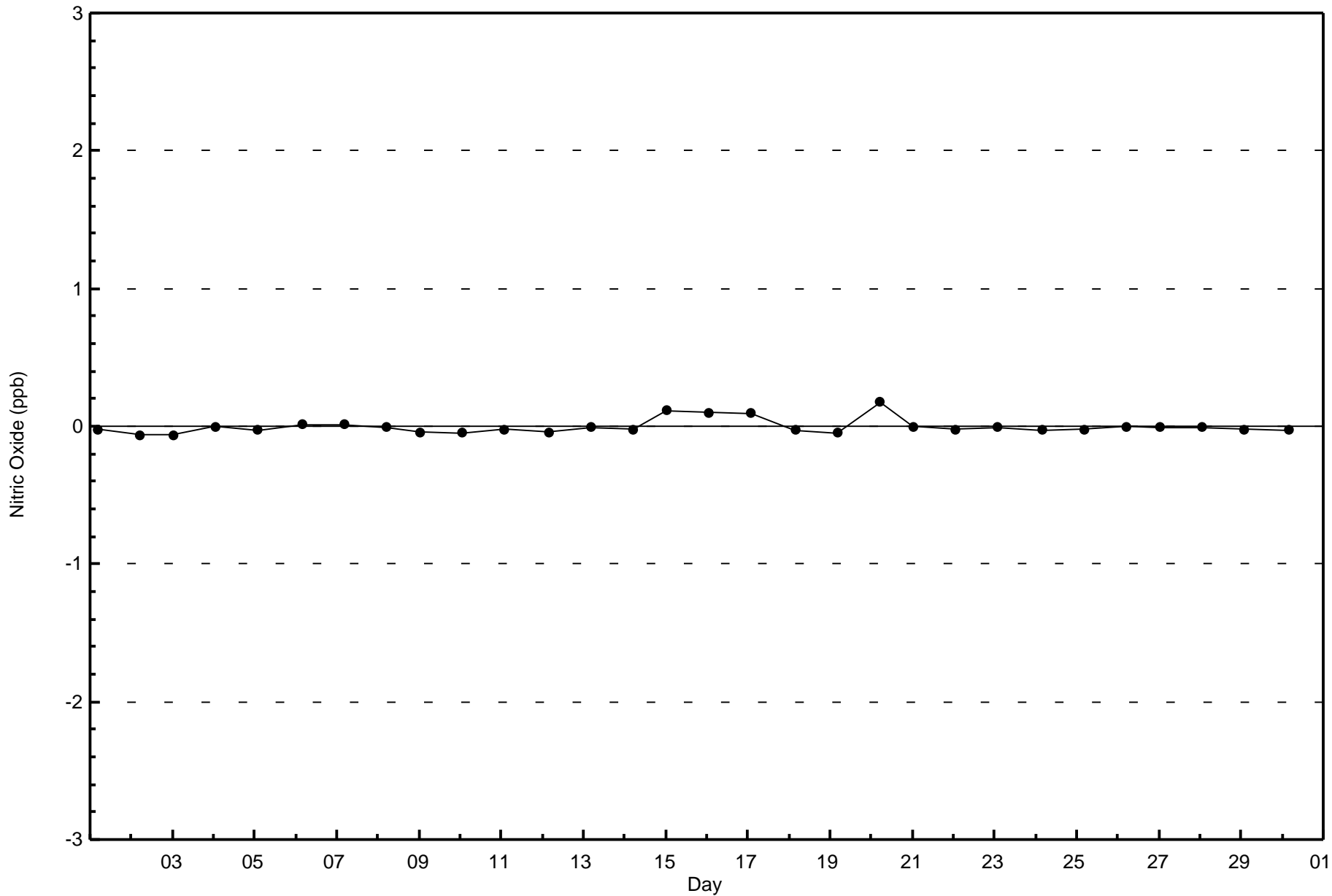
Total Number of Hours: 720

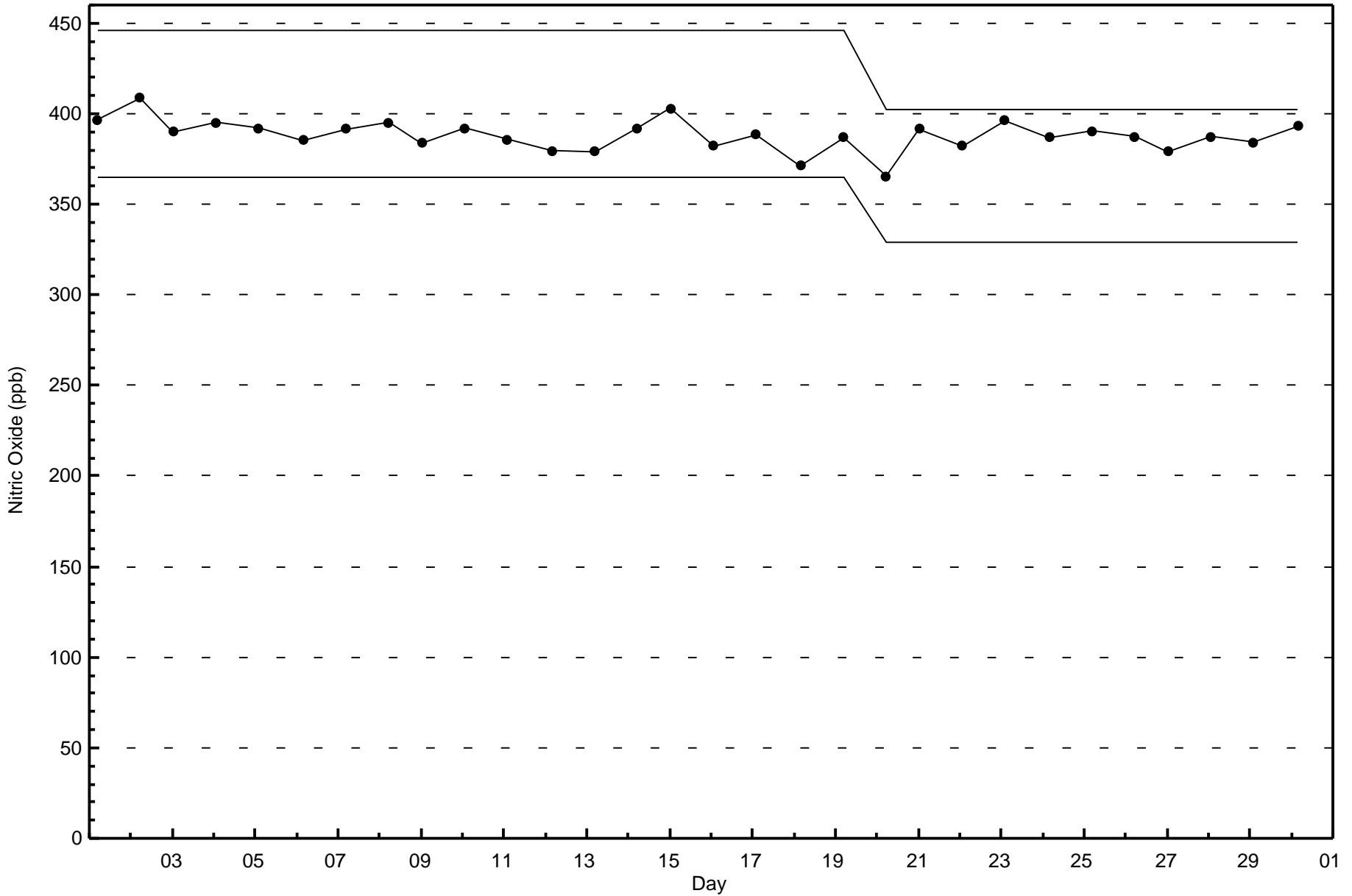


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort McKay South - September 2017

| | | | | |
|---|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 30 ppb on Sep 6 11:00 | Maximum Daily Average: 9.0 ppb on Sep 27 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 23 06:00 | Minimum Daily Average: 0.2 ppb on Sep 2 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 6.4 ppb at hour 11 | Minimum Diurnal Average: 1.9 ppb at hour 18 | | Hours of Calibration: | 34 |
| Monthly Average: 3.4 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 O ₃ = 5 P ₉₀ = 9 P ₉₉ = 18 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 2-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 7 | 5 | 0.8 | 7 |
| 4-Sep | 1 | 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 |
| 5-Sep | 1 | 0 | Z | 5 | 6 | 8 | 6 | 7 | 11 | 10 | 6 | 6 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 8 | 9 | 9 | 5 | 4.4 | 11 |
| 6-Sep | 2 | 1 | 1 | Z | 0 | 1 | 0 | 3 | 7 | 27 | 30 | 27 | 8 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 5.8 | 30 |
| 7-Sep | 7 | 11 | 7 | 4 | Z | 3 | 4 | 6 | 9 | 8 | 7 | 5 | 3 | 2 | 2 | 1 | 3 | 3 | 2 | 3 | 5 | 5 | 4 | 4 | 4.6 | 11 |
| 8-Sep | 8 | 17 | 16 | 13 | 8 | Z | 12 | 6 | 1 | 3 | 2 | 2 | 2 | 3 | 1 | 2 | 4 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 4.6 | 17 |
| 9-Sep | Z | 0 | 0 | 1 | 4 | 4 | 5 | 5 | 6 | 9 | 14 | 17 | 18 | 12 | 5 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 1 | 5.1 | 18 |
| 10-Sep | 1 | Z | 3 | 8 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 2 | 1.3 | 8 |
| 11-Sep | 0 | 0 | Z | 1 | 0 | 2 | 3 | 5 | 9 | 10 | 11 | 8 | 7 | 9 | 7 | 10 | 5 | 4 | 3 | 7 | 4 | 6 | 1 | 0 | 4.9 | 11 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 5 | 1 | 1 | 1 | 3 | 0.9 | 5 | |
| 13-Sep | 3 | 4 | 3 | 1 | Z | 1 | 1 | 4 | 4 | 5 | 3 | 2 | 4 | 5 | 5 | 5 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 2 | 2.7 | 5 |
| 14-Sep | 1 | 1 | 0 | 0 | 1 | Z | 1 | 1 | 3 | 8 | 6 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2.3 | 8 |
| 15-Sep | Z | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 9 | 9 | 9 | 11 | 5 | 3 | 1 | 1 | 1 | 1 | 6 | 15 | 15 | 13 | 13 | 13 | 5.8 | 15 |
| 16-Sep | 14 | Z | 7 | 5 | 4 | 3 | 3 | 4 | 6 | 9 | 6 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 4 | 2 | 3 | 6 | 5 | 5 | 4.1 | 14 |
| 17-Sep | 5 | 5 | Z | 3 | 3 | 8 | 9 | 6 | 6 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3.6 | 9 |
| 18-Sep | 9 | 18 | 15 | Z | 5 | 4 | 2 | 1 | 10 | 12 | 9 | 4 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 4.6 | 18 |
| 19-Sep | 0 | 0 | 0 | 2 | Z | 7 | 10 | 16 | C | C | C | C | 8 | 7 | 2 | 4 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 3 | 3.8 | 16 |
| 20-Sep | 6 | 9 | 8 | 4 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 3.2 | 9 |
| 21-Sep | Z | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 0.6 | 4 |
| 22-Sep | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 8 | 15 | 14 | 10 | 7 | 3 | 5 | 4 | 4 | 4 | 2 | 2 | 3 | 2 | 2 | 3.9 | 15 |
| 23-Sep | 2 | 2 | Z | 1 | 0 | 0 | 0 | 1 | 2 | 5 | 5 | 6 | 6 | 3 | 2 | 1 | 3 | 4 | 2 | 1 | 2 | 6 | 4 | 2 | 2.5 | 6 |
| 24-Sep | 1 | 1 | 1 | Z | 1 | 2 | 1 | 2 | 8 | 6 | 7 | 6 | 8 | 7 | 5 | 2 | 3 | 2 | 2 | 3 | 16 | 10 | 6 | 3 | 4.4 | 16 |
| 25-Sep | 2 | 2 | 3 | 4 | Z | 6 | 6 | 6 | 6 | 7 | 4 | 3 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2.5 | 7 |
| 26-Sep | 3 | 7 | 6 | 1 | 2 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 7 |
| 27-Sep | Z | 7 | 5 | 2 | 4 | 8 | 10 | 5 | 4 | 9 | 20 | 13 | 8 | 11 | 8 | 6 | 6 | 5 | 13 | 15 | 14 | 13 | 9 | 14 | 9.0 | 20 |
| 28-Sep | 18 | Z | 9 | 5 | 3 | 2 | 1 | 1 | 4 | 9 | 9 | 9 | 9 | 4 | 4 | 1 | 2 | 4 | 3 | 6 | 7 | 4 | 4 | 3 | 5.1 | 18 |
| 29-Sep | 5 | 5 | Z | 3 | 3 | 5 | 9 | 17 | 17 | 8 | 9 | 9 | 5 | 3 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 11 | 13 | 12 | 6.4 | 17 |
| 30-Sep | 7 | 7 | 4 | Z | 1 | 3 | 3 | 3 | 12 | 12 | 8 | 4 | 6 | 4 | 1 | 1 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3.6 | 12 |

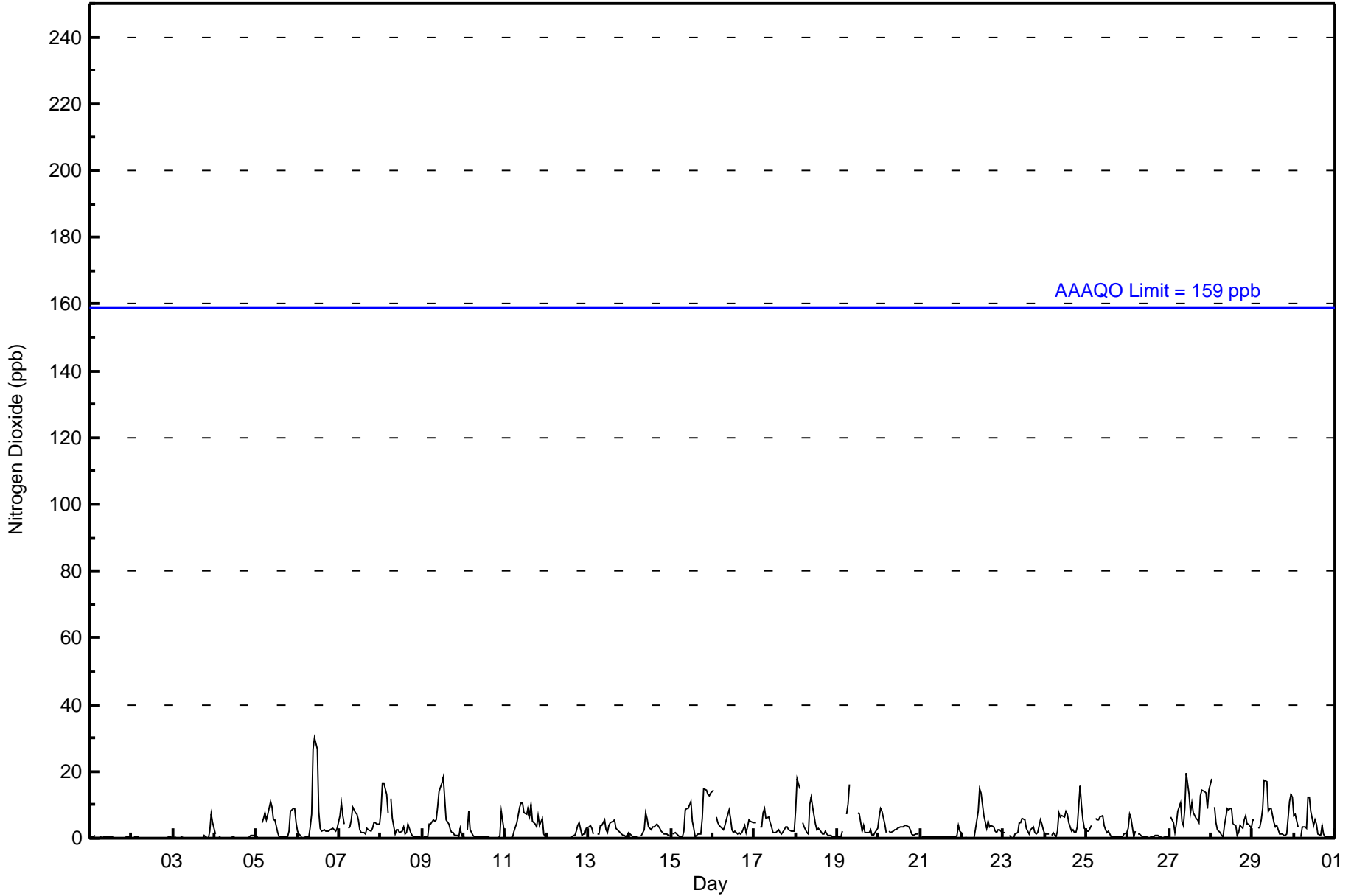
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 4.0 | 4.0 | 3.6 | 2.6 | 2.1 | 2.7 | 3.1 | 3.5 | 4.8 | 6.3 | 6.4 | 5.4 | 4.1 | 3.4 | 2.2 | 2.2 | 2.0 | 1.9 | 2.1 | 2.6 | 3.0 | 3.4 | 3.6 | 3.1 | Diurnal Average | |
| 18 | 18 | 16 | 13 | 8 | 8 | 12 | 17 | 17 | 27 | 30 | 27 | 18 | 12 | 8 | 10 | 6 | 5 | 13 | 15 | 16 | 13 | 13 | 14 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 683 | 99.56 | 99.56 |
| 21 - 40 | 3 | 0.44 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 76 | 36 | 15 | 1 | 2 | 5 | 26 | 55 | 99 | 74 | 73 | 78 | 38 | 41 | 39 | 25 | 683 |
| 21 - 40 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 79 | 36 | 15 | 1 | 2 | 5 | 26 | 55 | 99 | 74 | 73 | 78 | 38 | 41 | 39 | 25 | 686 |

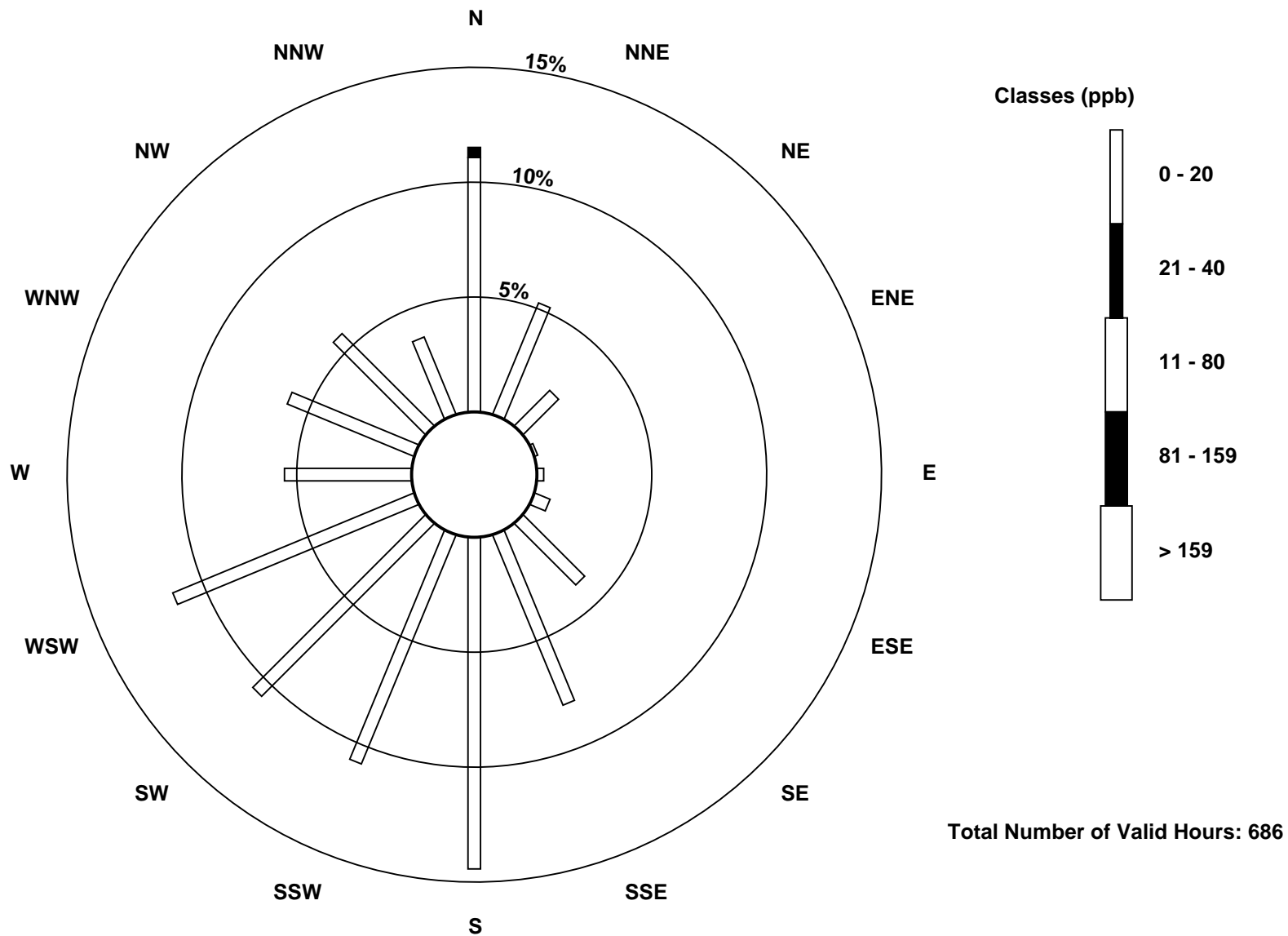
Total Number of Valid Hours: 686

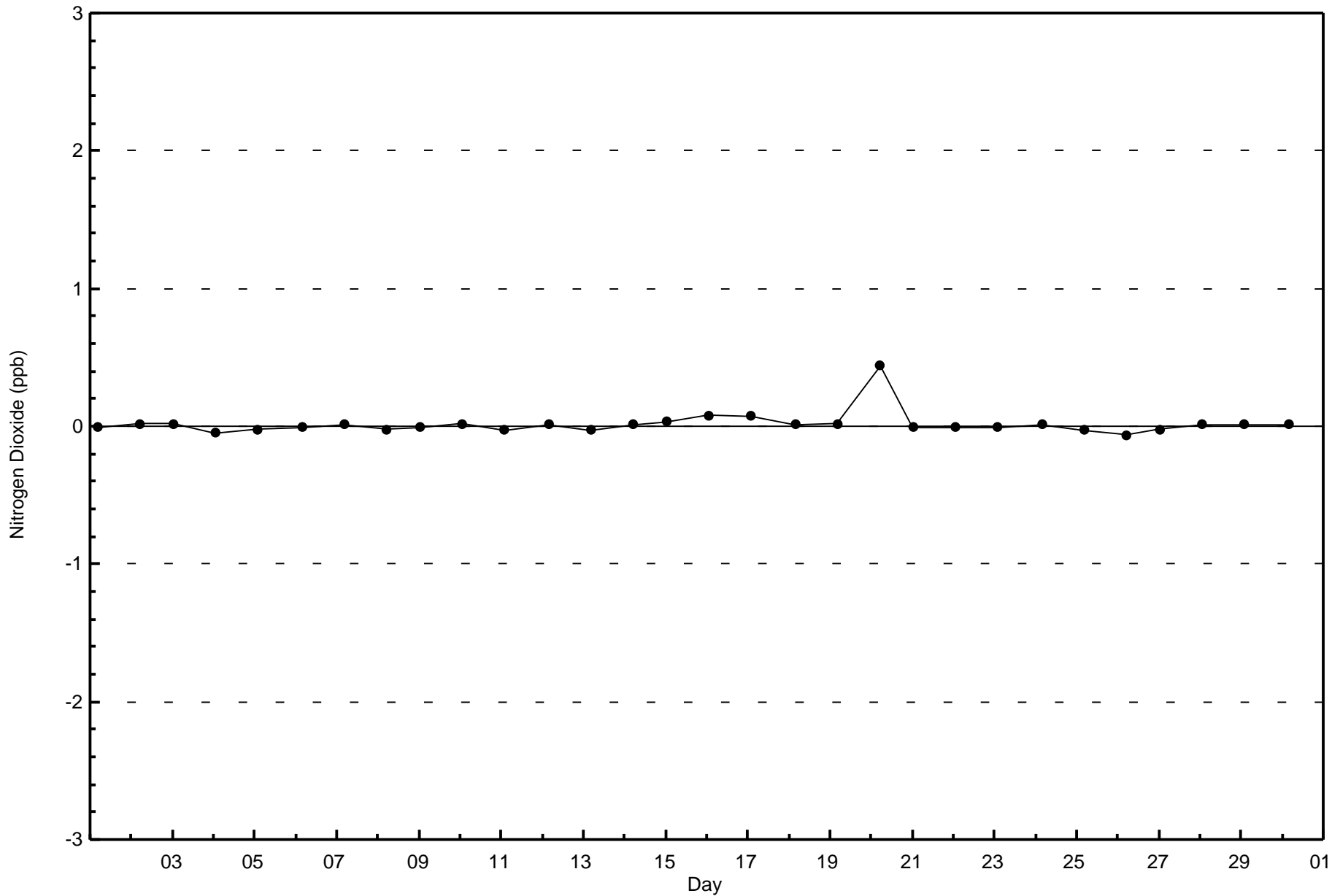
Total Number of Hours: 720

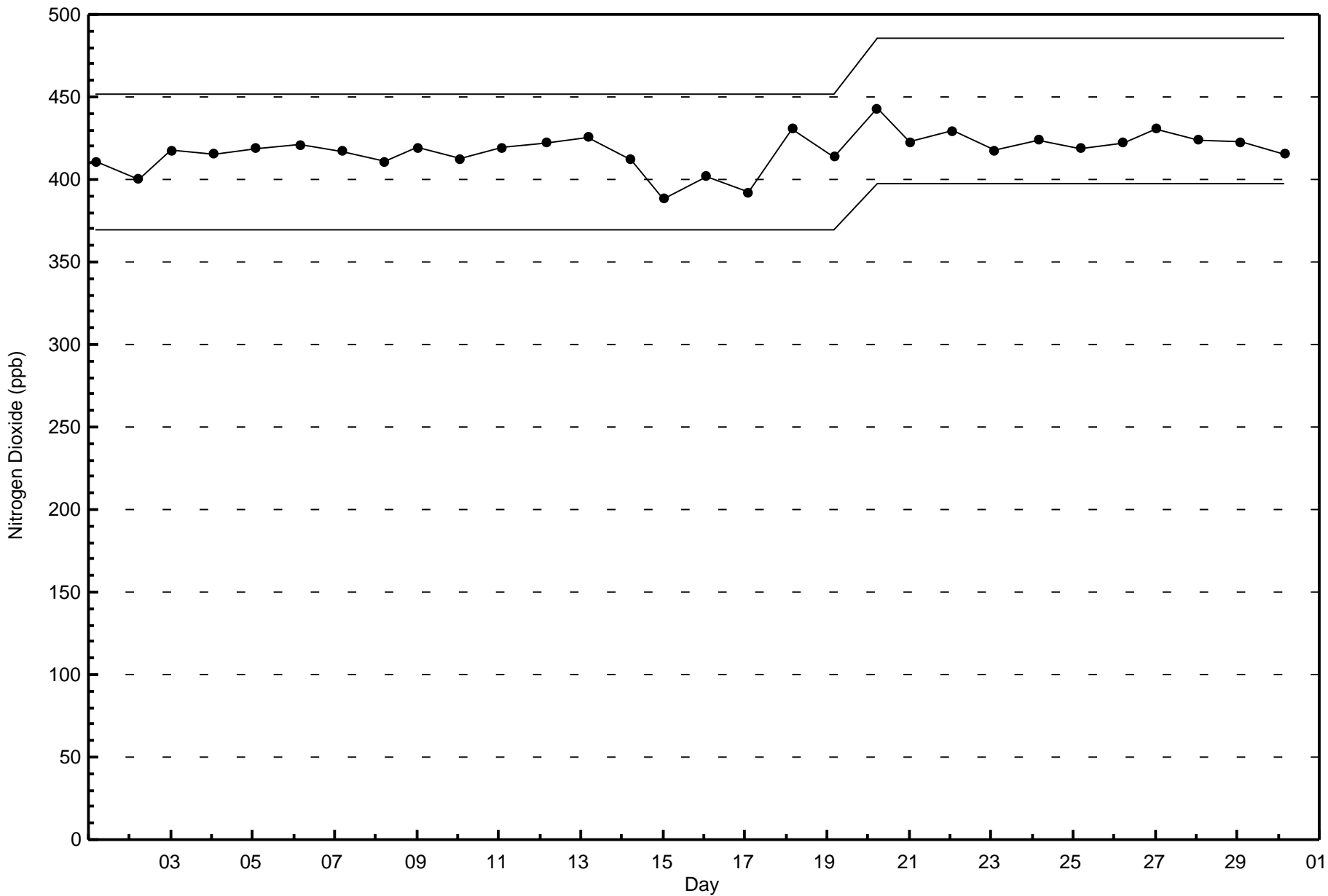


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

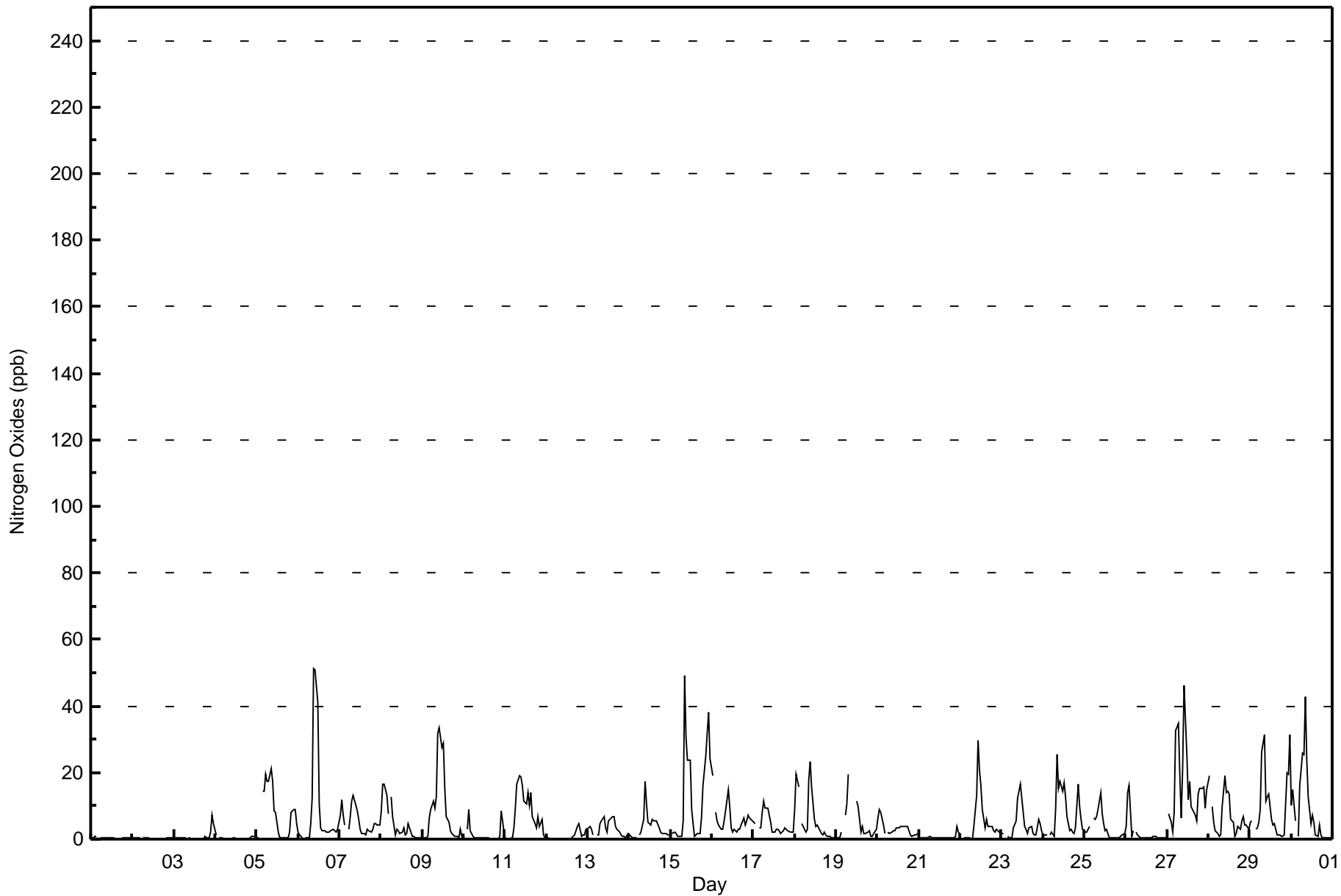
Fort McKay South - September 2017

| Maximum Value: 51 ppb on Sep 6 10:00 | | Maximum Daily Average: 15.3 ppb on Sep 27 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|----|---------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Minimum Value: 0 ppb on Sep 4 17:00 | | Minimum Daily Average: 0.2 ppb on Sep 2 | | Hours of Data: 686 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 12.6 ppb at hour 10 | | Minimum Diurnal Average: 2.1 ppb at hour 18 | | Hours of Missing Data: 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 5.2 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 6 P ₉₀ = 15 P ₉₉ = 37 | | Hours of Calibration: 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 7 | 5 | 0.8 | 7 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0 | 0 | Z | 15 | 14 | 19 | 17 | 18 | 21 | 17 | 8 | 8 | 2 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 8 | 9 | 9 | 5 | 7.7 | 21 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 2 | 1 | 0 | Z | 0 | 0 | 1 | 5 | 12 | 51 | 51 | 41 | 10 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 8.8 | 51 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 7 | 12 | 7 | 4 | Z | 3 | 7 | 11 | 13 | 10 | 9 | 6 | 3 | 2 | 2 | 1 | 3 | 2 | 2 | 3 | 5 | 5 | 4 | 4 | 5.4 | 13 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 8 | 17 | 16 | 13 | 7 | Z | 13 | 7 | 1 | 3 | 3 | 2 | 2 | 3 | 1 | 2 | 5 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 4.7 | 17 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 0 | 0 | 1 | 6 | 9 | 12 | 9 | 13 | 32 | 34 | 27 | 29 | 15 | 7 | 5 | 3 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 9.2 | 34 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0 | Z | 3 | 9 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 2 | 1.4 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0 | 0 | Z | 1 | 0 | 3 | 9 | 17 | 19 | 19 | 16 | 12 | 11 | 14 | 10 | 14 | 7 | 5 | 4 | 7 | 4 | 6 | 1 | 0 | 7.8 | 19 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 5 | 1 | 1 | 1 | 3 | 1.0 | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 4 | 4 | 3 | 1 | Z | 1 | 1 | 5 | 5 | 7 | 4 | 2 | 5 | 6 | 7 | 7 | 4 | 3 | 2 | 1 | 1 | 1 | 2 | 3.3 | 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 1 | 1 | 1 | 0 | 1 | Z | 1 | 2 | 6 | 17 | 11 | 5 | 4 | 6 | 6 | 5 | 6 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 3.7 | 17 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 1 | 2 | 2 | 1 | 1 | 1 | 5 | 49 | 30 | 24 | 24 | 9 | 5 | 1 | 2 | 2 | 2 | 7 | 16 | 25 | 32 | 38 | 24 | 13.1 | 49 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 19 | Z | 8 | 6 | 4 | 3 | 3 | 6 | 9 | 15 | 10 | 3 | 2 | 3 | 2 | 3 | 3 | 4 | 6 | 4 | 6 | 7 | 6 | 5 | 6.0 | 19 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 5 | 5 | Z | 3 | 3 | 8 | 12 | 9 | 9 | 7 | 5 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 4.3 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 9 | 19 | 15 | Z | 5 | 4 | 2 | 3 | 18 | 23 | 16 | 6 | 4 | 4 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 6.1 | 23 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | 2 | Z | 7 | 11 | 20 | C | C | C | C | 12 | 10 | 2 | 4 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 3 | 4.3 | 20 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 6 | 9 | 8 | 4 | 2 | Z | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 3.3 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 0.6 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 30 | 21 | 16 | 9 | 4 | 6 | 4 | 4 | 4 | 2 | 2 | 3 | 2 | 2 | 5.5 | 30 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 2 | 2 | Z | 1 | 0 | 0 | 0 | 3 | 5 | 12 | 14 | 17 | 8 | 4 | 3 | 2 | 3 | 4 | 2 | 1 | 1 | 6 | 4 | 2 | 4.3 | 17 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 1 | 1 | 1 | Z | 1 | 2 | 1 | 9 | 26 | 15 | 17 | 14 | 17 | 13 | 7 | 3 | 3 | 2 | 2 | 3 | 17 | 10 | 6 | 3 | 7.6 | 26 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 2 | 2 | 3 | 4 | Z | 6 | 6 | 7 | 9 | 14 | 7 | 5 | 3 | 3 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 3.4 | 14 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 4 | 14 | 16 | 1 | 2 | Z | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 16 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 8 | 5 | 2 | 8 | 32 | 35 | 19 | 6 | 21 | 46 | 25 | 12 | 18 | 10 | 8 | 7 | 5 | 14 | 15 | 15 | 16 | 9 | 15 | 15.3 | 46 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 19 | Z | 10 | 5 | 3 | 2 | 1 | 1 | 10 | 19 | 14 | 15 | 14 | 6 | 5 | 1 | 2 | 4 | 3 | 6 | 7 | 4 | 4 | 3 | 6.7 | 19 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 5 | 5 | Z | 3 | 3 | 5 | 9 | 26 | 31 | 11 | 13 | 13 | 6 | 4 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 20 | 20 | 32 | 9.6 | 32 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 10 | 15 | 5 | Z | 1 | 16 | 26 | 25 | 43 | 24 | 13 | 5 | 7 | 5 | 1 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8.9 | 43 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.4 | 4.7 | 4.3 | 3.1 | 2.7 | 5.0 | 5.8 | 7.1 | 10.8 | 12.6 | 12.0 | 8.9 | 6.1 | 4.7 | 2.9 | 2.7 | 2.3 | 2.1 | 2.3 | 2.8 | 3.5 | 4.5 | 4.7 | 4.2 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 19 | 19 | 16 | 15 | 14 | 32 | 35 | 26 | 49 | 51 | 51 | 41 | 29 | 18 | 10 | 14 | 7 | 5 | 14 | 16 | 25 | 32 | 38 | 32 | Diurnal Maximum |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 654 | 95.34 | 95.34 |
| 21 - 40 | 26 | 3.79 | 99.13 |
| 41 - 80 | 6 | 0.87 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 71 | 34 | 15 | 1 | 2 | 4 | 24 | 49 | 91 | 73 | 69 | 78 | 38 | 41 | 39 | 25 | 654 |
| 21 - 40 | 4 | 2 | 0 | 0 | 0 | 1 | 2 | 5 | 7 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 26 |
| 11 - 80 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 79 | 36 | 15 | 1 | 2 | 5 | 26 | 55 | 99 | 74 | 73 | 78 | 38 | 41 | 39 | 25 | 686 |

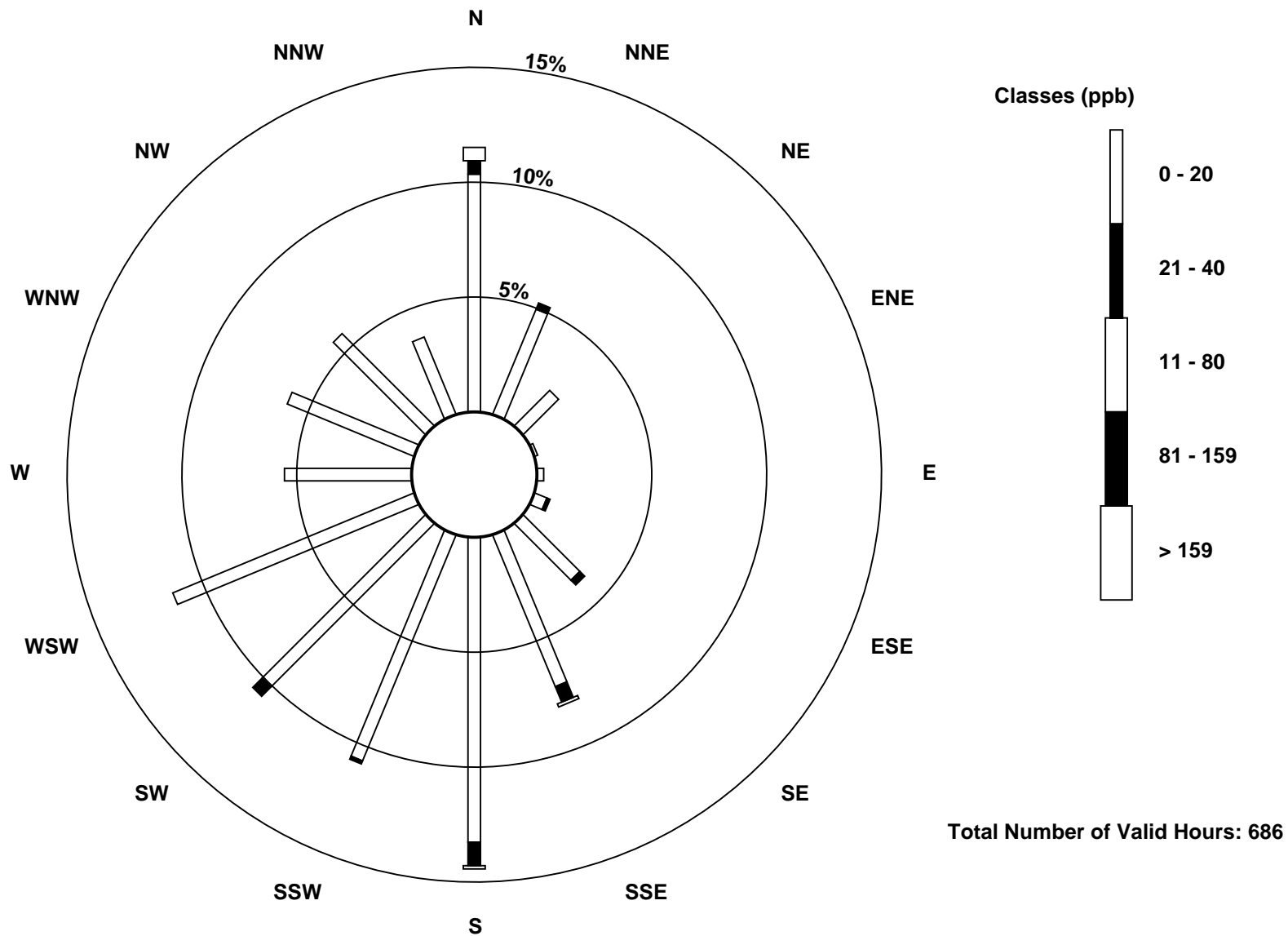
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

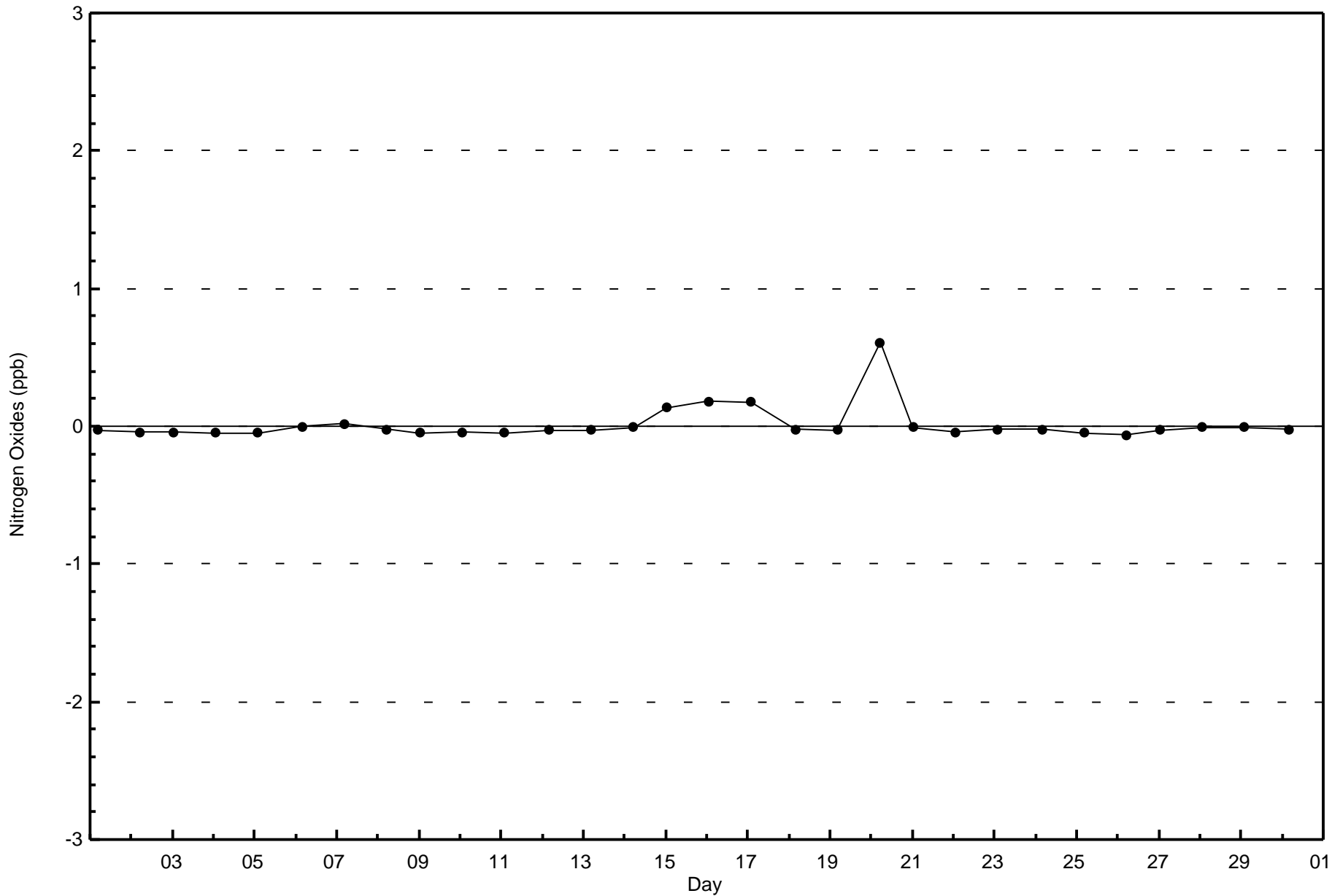
Nitrogen Oxides (NO_x) - ppb
Fort McKay South (AMS 13)

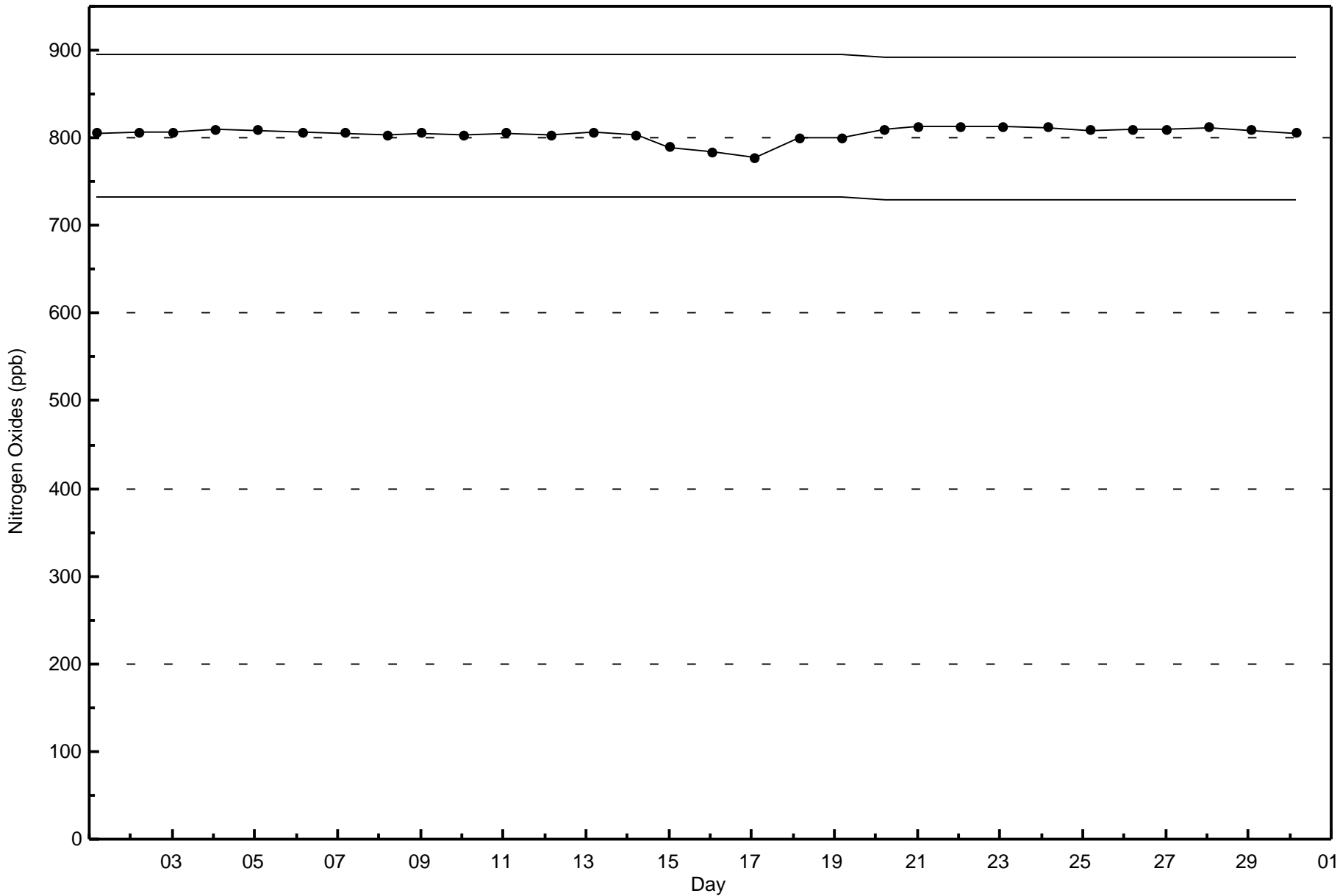




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - September 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - September 2017

| | | | |
|--|--|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 38.3 µg/m ³ on Sep 19 12:00 | Maximum Daily Average: 15.7 µg/m ³ on Sep 19 | Hours of Data: | 708 |
| Minimum Value: 0.0 µg/m ³ on Sep 25 15:00 | Minimum Daily Average: 1.6 µg/m ³ on Sep 14 | Hours of Missing Data: | 12 |
| Maximum Diurnal Average: 7.2 µg/m ³ at hour 7 | Minimum Diurnal Average: 3.6 µg/m ³ at hour 17 | Hours of Calibration: | 1 |
| Monthly Average: 5.45 µg/m ³ | Percentiles: P ₁ = 0.2 P ₁₀ = 1.4 Q ₁ = 2.2 Median = 4.0 Q ₃ = 6.6 P ₉₀ = 10.9 P ₉₉ = 30.7 | 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-Sep | 5.2 | 5.6 | 5.6 | 5.6 | 5.6 | 5.2 | 4.7 | 3.7 | 2.3 | 2.3 | 2.0 | 1.5 | 1.4 | 2.1 | 1.3 | 1.6 | 2.1 | 1.5 | 1.9 | 2.7 | 3.1 | 3.0 | 3.2 | 3.7 | 3.2 | 5.6 | |
| 2-Sep | 3.1 | 2.5 | 2.9 | 3.5 | 3.6 | 3.6 | 3.9 | 3.4 | 2.1 | 2.0 | 1.8 | 1.7 | 1.4 | 1.7 | 1.5 | 1.6 | 1.7 | 1.6 | 1.6 | 1.6 | 1.7 | 1.8 | 1.7 | 1.7 | 2.2 | 3.9 | |
| 3-Sep | 1.6 | 2.2 | 3.3 | 4.1 | 4.3 | 5.0 | 5.8 | 3.5 | 2.0 | 1.9 | 1.4 | 1.0 | 0.9 | 0.7 | 0.8 | 1.0 | 1.1 | 1.2 | 3.3 | 4.6 | 4.3 | 4.3 | 4.5 | 4.3 | 2.8 | 5.8 | |
| 4-Sep | 4.8 | 5.2 | 4.9 | 5.6 | 5.5 | 5.0 | 5.8 | 5.6 | 2.2 | 1.6 | 1.3 | 1.4 | 1.2 | 1.1 | 1.0 | 1.0 | 1.1 | 1.1 | 1.5 | 3.3 | 4.7 | 4.8 | 5.0 | 7.3 | 3.4 | 7.3 | |
| 5-Sep | 8.0 | 8.2 | 8.8 | 8.7 | 8.0 | 7.7 | 8.4 | 11.3 | 5.2 | 4.7 | 5.9 | 7.5 | 3.9 | 2.9 | 3.1 | 3.1 | 3.3 | 3.4 | 4.0 | 2.8 | 2.1 | 2.1 | 5.4 | 7.7 | 5.7 | 11.3 | |
| 6-Sep | 8.9 | 9.2 | 9.5 | 9.7 | 12.7 | 24.1 | 32.4 | 21.6 | 11.2 | 5.7 | 5.4 | 6.2 | 5.3 | 5.2 | 6.0 | 7.7 | 6.2 | 4.2 | 4.2 | 5.5 | 5.9 | 5.7 | 6.3 | 9.0 | 9.5 | 32.4 | |
| 7-Sep | 13.6 | 15.8 | 13.1 | 13.4 | 12.7 | 13.2 | 14.6 | 15.8 | 15.8 | 9.6 | 8.8 | 6.9 | 5.6 | 6.6 | 9.3 | 11.6 | 14.5 | 23.2 | 23.5 | 22.8 | 21.3 | 17.3 | 16.0 | 17.5 | 14.3 | 23.5 | |
| 8-Sep | 19.3 | 20.9 | 19.1 | 18.4 | 19.4 | 21.3 | 17.4 | 16.0 | 24.9 | 34.5 | 31.3 | 15.6 | 11.0 | 12.2 | 11.1 | 9.1 | 8.9 | 7.7 | 6.2 | 4.1 | 3.0 | 2.5 | 2.3 | 3.2 | 14.1 | 34.5 | |
| 9-Sep | 5.5 | 8.5 | 12.4 | 11.7 | 11.7 | 9.6 | 10.9 | 7.8 | 6.8 | 6.3 | 4.6 | 3.8 | 5.2 | 8.0 | 10.5 | 9.0 | 7.0 | 6.5 | 5.9 | 5.5 | 5.6 | 5.8 | 7.1 | 8.5 | 7.7 | 12.4 | |
| 10-Sep | 9.9 | 9.2 | 9.9 | 15.4 | 12.4 | 8.1 | 8.5 | 8.4 | 7.2 | 4.8 | 4.3 | 5.4 | 8.1 | 7.1 | 5.6 | 4.4 | 4.4 | 2.4 | 2.5 | 3.4 | 4.0 | 4.2 | 4.3 | 3.8 | 6.6 | 15.4 | |
| 11-Sep | 3.9 | 3.8 | 4.0 | 4.0 | 3.9 | 3.7 | 3.9 | 3.5 | 3.1 | 2.4 | 2.4 | 2.5 | 2.3 | 2.7 | 2.2 | 1.9 | 1.9 | 1.8 | 1.7 | 2.1 | 1.9 | 1.5 | 1.2 | 2.4 | 2.7 | 4.0 | |
| 12-Sep | 3.5 | 3.8 | 3.7 | 4.2 | 4.7 | 4.5 | 4.0 | 4.5 | 4.1 | 2.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.1 | 2.3 | 2.2 | 2.1 | 2.0 | 1.7 | 1.6 | 1.7 | 1.8 | 2.1 | 2.8 | 4.7 | |
| 13-Sep | 2.2 | 2.8 | 3.2 | 3.5 | 3.0 | 2.6 | 2.8 | 2.8 | 2.4 | 2.0 | 1.7 | 1.5 | 1.6 | 1.7 | 2.1 | 2.1 | 1.9 | 2.2 | 2.4 | 2.6 | 3.0 | 2.9 | 2.6 | 2.6 | 2.4 | 3.5 | |
| 14-Sep | 2.7 | 2.4 | 2.4 | 2.4 | 2.1 | 2.3 | 2.8 | 3.1 | 3.2 | 3.1 | 1.6 | 0.9 | 0.6 | 0.4 | 0.2 | UO | UO | UO | UO | UO | UO | 0.1 | 0.1 | 0.2 | 0.2 | 1.6 | 3.2 |
| 15-Sep | 0.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.7 | 1.5 | 2.6 | 6.1 | 7.4 | 4.3 | 1.2 | 0.5 | UO | UO | UO | UO | UO | 0.2 | 1.7 | 2.4 | 3.4 | 4.3 | 3.4 | 2.1 | 7.4 |
| 16-Sep | 3.2 | 3.7 | 3.4 | 3.8 | 3.6 | 3.9 | 4.0 | 3.7 | 4.9 | 7.5 | 3.8 | 1.6 | 1.2 | 2.1 | 0.9 | UO | 1.3 | 2.5 | 0.8 | 0.6 | 1.1 | 4.6 | 6.1 | 7.2 | 3.3 | 7.5 | |
| 17-Sep | 5.9 | 4.5 | 2.6 | 3.2 | 3.2 | 3.0 | 3.5 | 3.5 | 3.0 | 5.5 | 6.3 | 10.0 | 14.9 | 6.8 | 3.4 | 3.1 | 2.7 | 3.0 | 4.1 | 5.7 | 6.8 | 6.7 | 7.0 | 6.2 | 5.2 | 14.9 | |
| 18-Sep | 6.8 | 7.9 | 8.8 | 9.1 | 9.4 | 9.3 | 8.8 | 9.8 | 9.1 | 8.3 | 6.6 | 5.9 | 5.7 | 5.5 | 5.7 | 5.1 | 5.2 | 6.3 | 7.8 | 7.9 | 7.8 | 7.3 | 7.4 | 8.2 | 7.5 | 9.8 | |
| 19-Sep | 9.3 | 10.4 | 11.2 | 11.0 | 10.9 | 11.7 | 12.7 | 16.6 | 19.1 | 28.2 | 36.2 | 38.3 | 35.2 | 33.2 | 26.1 | 17.7 | 9.5 | 5.4 | 4.9 | 4.8 | 5.3 | 5.9 | 6.7 | 6.7 | 15.7 | 38.3 | |
| 20-Sep | 6.0 | 5.8 | 5.6 | 5.9 | 5.6 | 4.8 | 4.4 | 4.3 | 4.3 | 4.4 | 4.2 | 3.7 | 3.2 | 2.8 | 2.5 | 2.3 | 2.3 | 2.2 | 2.0 | 1.8 | 1.9 | 1.7 | 1.7 | 1.7 | 3.6 | 6.0 | |
| 21-Sep | 1.6 | 1.7 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.8 | 2.0 | |
| 22-Sep | 2.1 | 2.4 | 2.9 | 3.0 | 2.8 | 2.7 | 2.6 | 2.4 | 2.6 | 2.2 | C | 0.4 | 0.3 | 0.3 | 0.2 | 0.7 | 1.0 | 1.7 | 2.6 | 3.2 | 3.8 | 4.7 | 4.3 | 4.1 | 2.3 | 4.7 | |
| 23-Sep | 4.8 | 4.6 | 4.5 | 3.6 | 3.5 | 3.2 | 3.5 | 4.0 | 4.6 | 5.2 | 3.9 | 3.8 | 1.6 | 1.2 | 0.5 | 0.3 | 1.3 | 1.5 | 2.9 | 4.3 | 4.9 | 4.7 | 5.6 | 5.1 | 3.5 | 5.6 | |
| 24-Sep | 3.9 | 4.2 | 5.5 | 5.0 | 3.5 | 4.4 | 5.9 | 6.9 | 15.0 | 10.8 | 22.6 | 18.7 | 16.0 | 10.0 | 6.7 | 3.2 | 2.7 | 3.8 | 4.4 | 4.5 | 6.6 | 7.6 | 6.0 | 4.5 | 7.6 | 22.6 | |
| 25-Sep | 4.6 | 5.4 | 5.6 | 6.2 | 5.6 | 6.1 | 6.2 | 6.2 | 4.7 | 4.2 | 1.9 | 0.6 | 0.2 | UO | 0.0 | 0.3 | 1.0 | 1.7 | 1.4 | 0.8 | 0.6 | 1.0 | 2.6 | 4.0 | 3.1 | 6.2 | |
| 26-Sep | 3.4 | 3.3 | 4.3 | 3.2 | 2.6 | 3.5 | 4.2 | 4.4 | 3.5 | 3.8 | 3.3 | 1.3 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 | 1.3 | 3.1 | 5.3 | 5.0 | 4.2 | 3.5 | 3.1 | 2.9 | 5.3 | |
| 27-Sep | 2.8 | 2.7 | 3.0 | 3.3 | 3.6 | 4.7 | 4.8 | 4.8 | 2.8 | 2.7 | 4.0 | 3.9 | 3.7 | 4.0 | 4.5 | 5.4 | 3.3 | 2.1 | 2.8 | 4.8 | 5.9 | 6.2 | 5.9 | 5.9 | 4.1 | 6.2 | |
| 28-Sep | 6.7 | 6.8 | 6.9 | 6.6 | 6.3 | 5.8 | 5.7 | 5.9 | 5.5 | 5.0 | 7.0 | 7.8 | 9.5 | 4.3 | 1.7 | 0.7 | 0.9 | 2.1 | 3.0 | 3.3 | 5.6 | 3.8 | 6.8 | 5.0 | 5.1 | 9.5 | |
| 29-Sep | 5.8 | 7.1 | 9.0 | 8.3 | 10.0 | 11.7 | 11.9 | 13.5 | 9.2 | 8.0 | 11.3 | 12.2 | 8.0 | 6.2 | 6.5 | 6.6 | 7.1 | 6.5 | 5.3 | 3.9 | 4.6 | 8.7 | 10.3 | 11.9 | 8.5 | 13.5 | |
| 30-Sep | 9.6 | 9.8 | 8.5 | 8.0 | 7.6 | 8.2 | 8.6 | 10.9 | 16.2 | 7.4 | 5.9 | 5.8 | 4.7 | 4.5 | 4.4 | 4.8 | 4.8 | 3.1 | 3.1 | 4.8 | 5.1 | 3.5 | 3.2 | 3.0 | 6.5 | 16.2 | |

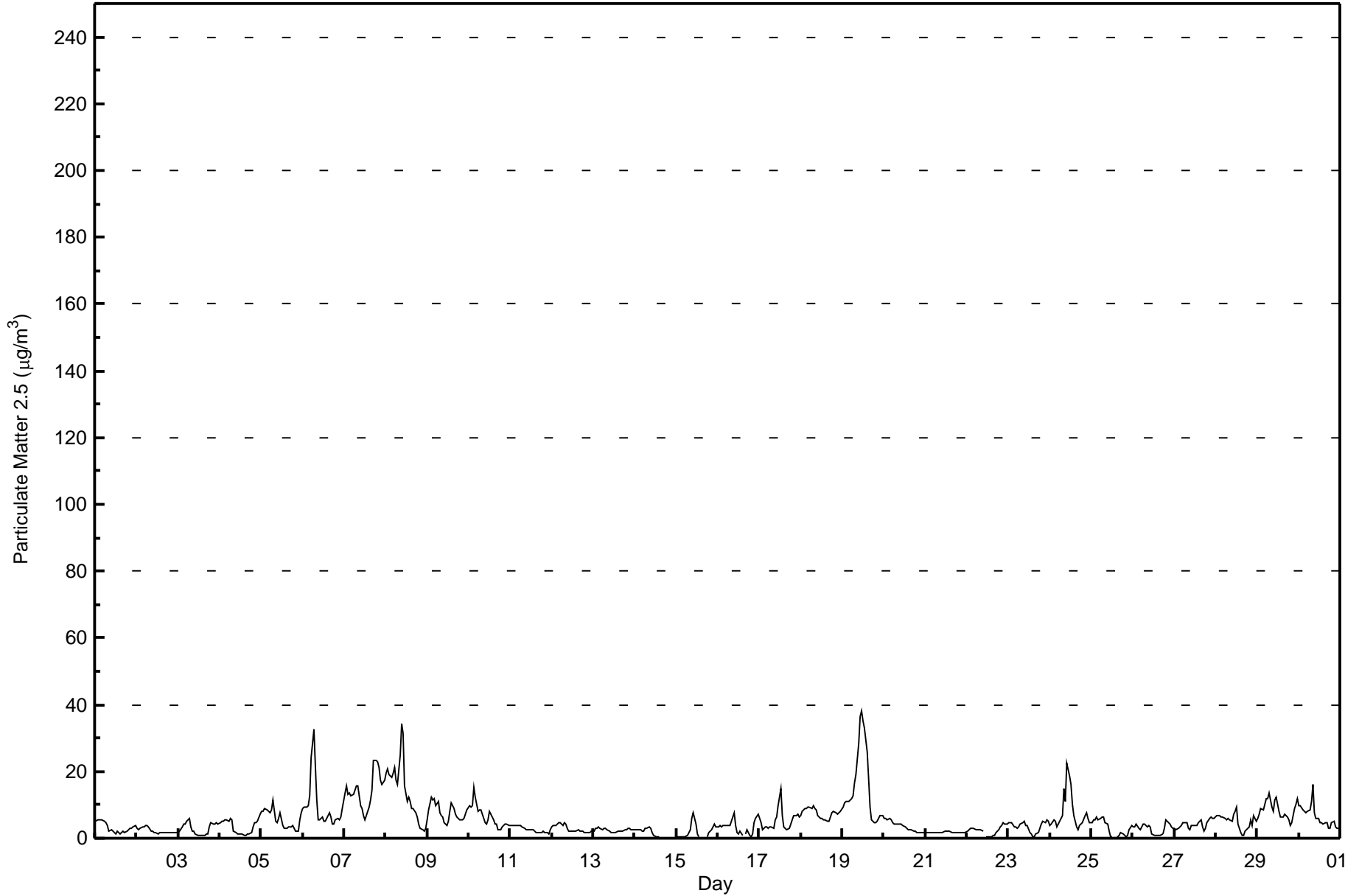
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|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 5.6 | 6.0 | 6.2 | 6.4 | 6.3 | 6.7 | 7.2 | 7.0 | 6.7 | 6.5 | 6.9 | 5.9 | 5.3 | 4.8 | 4.2 | 4.1 | 3.6 | 3.7 | 3.8 | 4.2 | 4.4 | 4.5 | 4.8 | 5.2 | Diurnal Average | |
| 19.3 | 20.9 | 19.1 | 18.4 | 19.4 | 24.1 | 32.4 | 21.6 | 24.9 | 34.5 | 36.2 | 38.3 | 35.2 | 33.2 | 26.1 | 17.7 | 14.5 | 23.2 | 23.5 | 22.8 | 21.3 | 17.3 | 16.0 | 17.5 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 413 | 58.33 | 58.33 |
| 6 - 15 | 210 | 29.66 | 87.99 |
| 16 - 25 | 29 | 4.10 | 92.09 |
| 26 - 80 | 9 | 1.27 | 93.36 |
| > 81.0 | 0 | 0.00 | 93.36 |

Total Number of Valid Hours: 708

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 56 | 26 | 6 | 0 | 1 | 2 | 9 | 26 | 41 | 39 | 50 | 63 | 30 | 29 | 28 | 7 | 413 |
| 6 - 15 | 20 | 7 | 3 | 0 | 0 | 2 | 12 | 25 | 42 | 25 | 21 | 13 | 11 | 10 | 5 | 14 | 210 |
| 16 - 25 | 2 | 0 | 1 | 0 | 1 | 0 | 2 | 4 | 7 | 6 | 1 | 2 | 1 | 1 | 0 | 1 | 29 |
| 26 - 80 | 4 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 9 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 82 | 35 | 12 | 0 | 2 | 4 | 23 | 55 | 90 | 70 | 72 | 78 | 42 | 40 | 34 | 22 | 661 |

Total Number of Valid Hours: 708

Total Number of Hours: 720



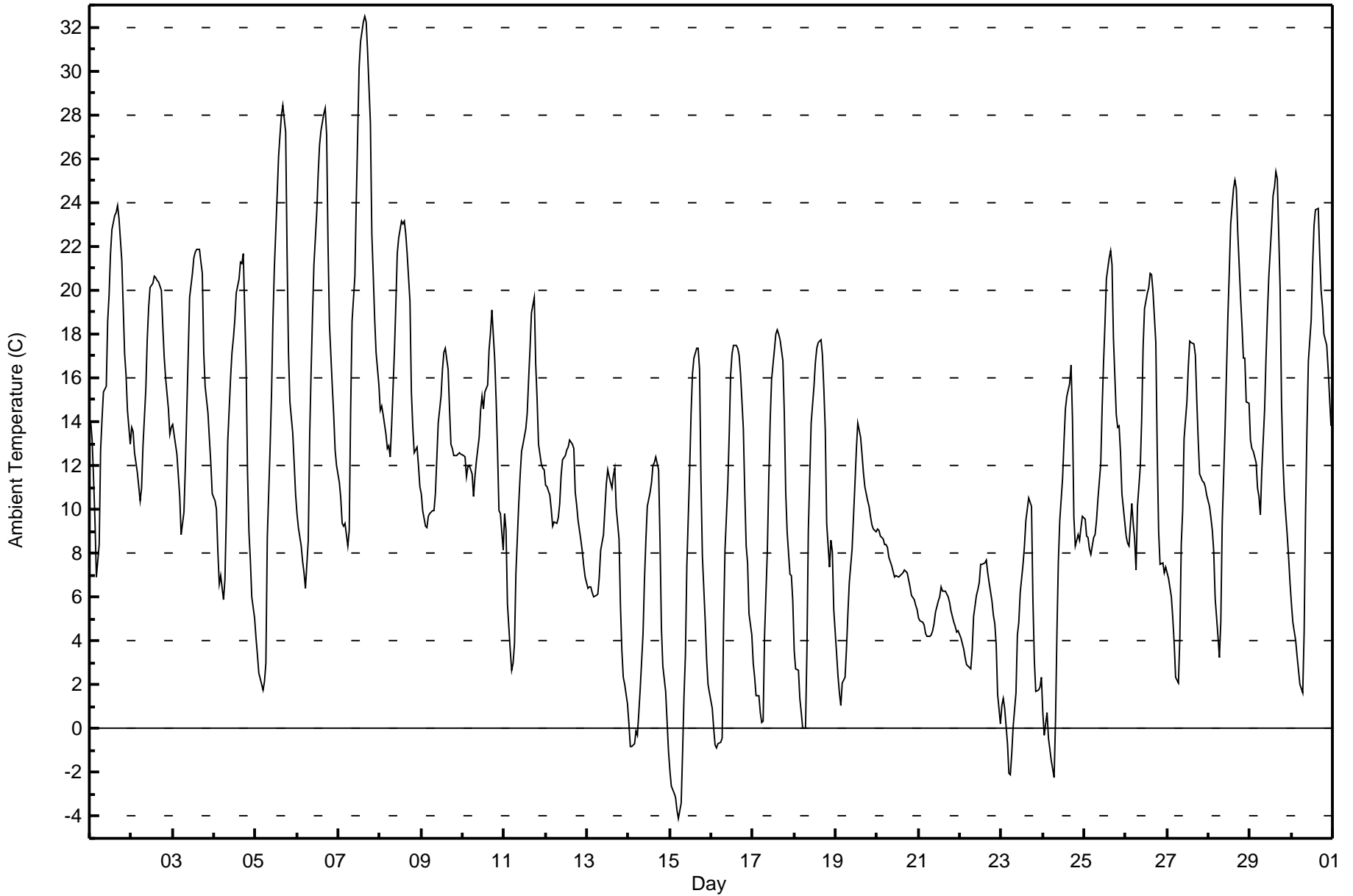
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Fort McKay South - September 2017

| Maximum Value: 32.5 C on Sep 7 16:00 Maximum Daily Average: 20.2 C on Sep 7 | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -4.1 C on Sep 15 06:00 Minimum Daily Average: 3.6 C on Sep 23 Maximum Diurnal Average: 18.3 C at hour 16 Minimum Diurnal Average: 5.0 C at hour 6 Monthly Average: 11.27 C Percentiles: P₁ = -2.1 P₁₀ = 2.3 Q₁ = 6.4 Median = 10.8 Q₃ = 16.0 P₉₀ = 20.7 P₉₉ = 27.3 | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 14.0 | 13.2 | 11.4 | 9.5 | 6.9 | 8.4 | 12.7 | 14.1 | 15.4 | 15.6 | 18.6 | 19.8 | 21.7 | 22.7 | 23.4 | 23.5 | 23.8 | 23.3 | 21.3 | 19.2 | 17.1 | 16.2 | 14.5 | 12.9 | 16.6 | 23.8 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 13.7 | 13.5 | 12.6 | 11.7 | 11.1 | 10.4 | 11.0 | 12.9 | 15.5 | 17.8 | 19.2 | 20.1 | 20.3 | 20.6 | 20.6 | 20.4 | 20.4 | 20.0 | 18.4 | 17.0 | 16.0 | 14.6 | 13.4 | 13.8 | 16.0 | 20.6 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 13.9 | 13.4 | 12.5 | 11.5 | 10.6 | 8.9 | 9.9 | 12.0 | 14.5 | 17.0 | 19.7 | 20.8 | 21.5 | 21.7 | 21.8 | 21.9 | 21.3 | 20.7 | 17.1 | 15.6 | 14.4 | 13.2 | 12.1 | 10.7 | 15.7 | 21.9 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 10.4 | 10.0 | 8.1 | 6.6 | 7.0 | 5.9 | 6.8 | 9.7 | 13.1 | 16.0 | 17.2 | 17.8 | 18.7 | 19.9 | 20.5 | 21.3 | 21.2 | 21.7 | 16.5 | 11.7 | 9.0 | 7.7 | 6.0 | 5.1 | 12.8 | 21.7 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 4.1 | 3.3 | 2.5 | 2.0 | 1.8 | 2.1 | 3.0 | 8.7 | 12.8 | 15.3 | 18.7 | 21.0 | 24.4 | 26.1 | 27.0 | 28.0 | 28.5 | 27.2 | 21.7 | 17.2 | 14.9 | 13.5 | 12.1 | 10.7 | 14.4 | 28.5 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 9.8 | 9.2 | 8.3 | 7.6 | 7.1 | 6.4 | 8.6 | 13.4 | 16.3 | 18.8 | 21.2 | 23.5 | 25.3 | 26.6 | 27.3 | 28.0 | 28.3 | 27.1 | 22.1 | 18.4 | 15.6 | 14.3 | 12.7 | 12.0 | 17.0 | 28.3 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 11.3 | 10.5 | 9.4 | 9.3 | 9.4 | 8.3 | 9.0 | 14.5 | 18.6 | 20.6 | 24.1 | 27.2 | 30.1 | 31.3 | 32.2 | 32.5 | 32.2 | 30.9 | 27.6 | 22.6 | 20.7 | 18.7 | 17.2 | 15.7 | 20.2 | 32.5 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 14.5 | 14.7 | 14.3 | 13.4 | 12.8 | 12.9 | 12.4 | 13.8 | 17.2 | 19.3 | 21.7 | 22.4 | 23.1 | 23.0 | 23.2 | 22.6 | 21.7 | 19.5 | 15.3 | 13.8 | 12.6 | 12.9 | 12.0 | 11.0 | 16.7 | 23.2 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 10.7 | 10.0 | 9.2 | 9.2 | 9.7 | 9.8 | 9.9 | 9.9 | 10.7 | 12.3 | 14.0 | 15.2 | 16.4 | 17.2 | 17.4 | 16.4 | 14.6 | 13.0 | 12.7 | 12.5 | 12.4 | 12.5 | 12.6 | 12.5 | 12.5 | 17.4 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 12.5 | 12.4 | 11.5 | 11.9 | 12.0 | 11.6 | 10.6 | 11.5 | 12.2 | 13.3 | 14.5 | 15.2 | 14.6 | 15.3 | 15.7 | 17.3 | 18.0 | 19.1 | 16.8 | 15.0 | 12.6 | 9.9 | 9.8 | 8.1 | 13.4 | 19.1 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 9.8 | 9.0 | 5.7 | 3.5 | 2.7 | 3.0 | 3.9 | 7.1 | 10.2 | 11.5 | 12.7 | 13.0 | 13.7 | 14.4 | 15.9 | 17.3 | 19.0 | 19.7 | 16.6 | 15.0 | 13.0 | 12.1 | 11.9 | 11.8 | 11.4 | 19.7 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 11.1 | 11.0 | 10.6 | 10.0 | 9.2 | 9.4 | 9.4 | 9.6 | 10.3 | 11.5 | 12.3 | 12.4 | 12.7 | 12.8 | 13.2 | 12.9 | 12.7 | 10.8 | 10.2 | 9.5 | 8.6 | 8.0 | 7.5 | 6.9 | 10.5 | 13.2 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 6.4 | 6.4 | 6.5 | 6.2 | 6.0 | 6.1 | 6.1 | 6.9 | 8.2 | 8.9 | 10.0 | 11.1 | 11.8 | 11.5 | 11.0 | 11.6 | 11.9 | 10.1 | 8.7 | 5.6 | 3.6 | 2.3 | 2.0 | 1.1 | 7.5 | 11.9 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 0.2 | -0.8 | -0.8 | -0.7 | -0.1 | -0.3 | 0.8 | 1.8 | 4.4 | 6.8 | 8.6 | 10.1 | 10.8 | 11.2 | 12.0 | 12.1 | 12.4 | 11.8 | 8.7 | 4.6 | 2.8 | 1.7 | 0.4 | -1.0 | 4.9 | 12.4 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | -1.9 | -2.6 | -2.9 | -3.1 | -3.7 | -4.1 | -3.4 | -1.1 | 1.5 | 3.4 | 7.4 | 11.8 | 14.4 | 16.2 | 16.9 | 17.3 | 17.3 | 16.4 | 11.3 | 7.9 | 4.9 | 3.2 | 2.0 | 1.7 | 5.5 | 17.3 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 0.9 | 0.0 | -0.7 | -0.9 | -0.7 | -0.6 | -0.4 | 4.8 | 8.1 | 11.2 | 13.4 | 16.1 | 17.1 | 17.4 | 17.5 | 17.4 | 17.0 | 16.2 | 13.7 | 10.8 | 8.3 | 7.5 | 5.2 | 4.3 | 8.5 | 17.5 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 3.0 | 2.3 | 1.5 | 1.5 | 0.7 | 0.3 | 0.4 | 4.2 | 8.2 | 11.3 | 14.1 | 16.0 | 17.3 | 18.0 | 18.2 | 18.0 | 17.7 | 16.8 | 14.4 | 10.8 | 9.0 | 7.0 | 7.0 | 5.8 | 9.3 | 18.2 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 3.6 | 2.7 | 2.7 | 1.4 | 0.7 | 0.1 | 0.0 | 3.5 | 9.1 | 11.5 | 13.9 | 15.6 | 16.7 | 17.3 | 17.6 | 17.7 | 17.1 | 15.5 | 13.6 | 9.4 | 7.4 | 8.6 | 8.1 | 5.4 | 9.1 | 17.7 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 3.5 | 2.4 | 1.7 | 1.1 | 2.1 | 2.3 | 3.6 | 5.3 | 6.6 | 8.2 | 9.7 | 11.2 | 12.7 | 13.9 | 13.3 | 12.5 | 11.7 | 11.0 | 10.4 | 10.1 | 9.7 | 9.3 | 9.1 | 9.0 | 7.9 | 13.9 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 9.1 | 9.0 | 8.8 | 8.6 | 8.4 | 8.4 | 8.3 | 7.8 | 7.4 | 7.2 | 6.9 | 7.0 | 6.9 | 7.0 | 7.0 | 7.1 | 7.2 | 7.1 | 6.8 | 6.4 | 6.1 | 5.9 | 5.6 | 5.4 | 7.3 | 9.1 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 5.0 | 4.9 | 4.9 | 4.8 | 4.4 | 4.2 | 4.2 | 4.3 | 4.5 | 4.8 | 5.3 | 5.8 | 6.0 | 6.5 | 6.3 | 6.3 | 6.2 | 6.0 | 5.7 | 5.4 | 4.9 | 4.6 | 4.4 | 4.4 | 5.2 | 6.5 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 4.2 | 3.9 | 3.7 | 3.2 | 2.9 | 2.8 | 2.7 | 3.6 | 5.1 | 6.1 | 6.3 | 6.6 | 7.5 | 7.5 | 7.6 | 7.7 | 7.1 | 6.6 | 5.8 | 5.2 | 4.8 | 3.8 | 1.6 | 0.2 | 4.9 | 7.7 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 1.0 | 1.3 | 0.9 | -0.7 | -2.0 | -2.1 | -1.1 | 0.1 | 1.6 | 4.3 | 4.8 | 6.2 | 7.5 | 8.3 | 9.5 | 10.0 | 10.5 | 10.1 | 5.9 | 3.1 | 1.7 | 1.7 | 1.9 | 2.3 | 3.6 | 10.5 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0.7 | -0.3 | 0.7 | -0.4 | -1.0 | -1.5 | -2.2 | 0.4 | 4.4 | 7.6 | 9.5 | 11.4 | 13.1 | 14.6 | 15.2 | 15.8 | 16.6 | 14.1 | 9.6 | 8.3 | 8.9 | 8.6 | 9.2 | 9.7 | 7.2 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 9.6 | 8.8 | 8.7 | 8.2 | 8.0 | 8.7 | 8.9 | 9.5 | 10.5 | 12.1 | 14.7 | 16.7 | 18.4 | 20.5 | 21.5 | 21.8 | 21.1 | 17.8 | 14.3 | 13.7 | 13.8 | 12.6 | 10.7 | 9.4 | 13.3 | 21.8 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 8.8 | 8.4 | 8.3 | 10.3 | 9.4 | 8.6 | 7.2 | 10.1 | 11.9 | 14.1 | 17.4 | 19.2 | 19.9 | 20.1 | 20.8 | 20.7 | 19.9 | 17.6 | 12.6 | 9.0 | 7.5 | 7.6 | 7.1 | 7.4 | 12.7 | 20.8 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 7.1 | 6.8 | 6.0 | 5.0 | 3.9 | 2.3 | 2.1 | 4.1 | 8.4 | 9.9 | 13.3 | 14.9 | 16.5 | 17.6 | 17.6 | 17.5 | 17.0 | 14.9 | 13.1 | 11.6 | 11.3 | 11.3 | 11.1 | 10.6 | 10.6 | 17.6 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 10.1 | 9.6 | 9.1 | 8.1 | 5.9 | 4.2 | 3.2 | 4.9 | 9.4 | 13.6 | 16.2 | 18.8 | 20.8 | 23.0 | 24.6 | 25.0 | 24.6 | 22.6 | 19.6 | 18.4 | 16.9 | 16.9 | 14.9 | 14.8 | 14.8 | 25.0 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 13.2 | 12.8 | 12.7 | 12.2 | 11.0 | 10.6 | 9.8 | 11.7 | 14.5 | 16.9 | 18.9 | 20.6 | 23.0 | 24.3 | 24.7 | 25.4 | 25.1 | 20.0 | 14.8 | 12.2 | 10.6 | 8.9 | 7.8 | 6.7 | 15.3 | 25.4 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 5.7 | 4.8 | 4.0 | 3.3 | 2.6 | 2.0 | 1.6 | 4.4 | 9.8 | 13.7 | 16.7 | 18.7 | 21.1 | 22.9 | 23.6 | 23.7 | 21.7 | 20.0 | 19.2 | 18.0 | 17.5 | 16.4 | 15.1 | 13.8 | 13.4 | 23.7 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 7.5 | 7.0 | 6.4 | 5.8 | 5.3 | 5.0 | 5.3 | 7.5 | 10.0 | 12.0 | 14.0 | 15.5 | 16.8 | 17.7 | 18.1 | 18.3 | 18.1 | 16.9 | 14.2 | 11.9 | 10.6 | 9.7 | 8.8 | 8.1 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 14.5 | 14.7 | 14.3 | 13.4 | 12.8 | 12.9 | 12.7 | 14.5 | 18.6 | 20.6 | 24.1 | 27.2 | 30.1 | 31.3 | 32.2 | 32.5 | 32.2 | 30.9 | 27.6 | 22.6 | 20.7 | 18.7 | 17.2 | 15.7 | Diurnal Maximum |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort McKay South - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 28 | 3.89 | 3.89 |
| 0 - 10 | 302 | 41.94 | 45.83 |
| 10 - 20 | 305 | 42.36 | 88.19 |
| > 20 | 85 | 11.81 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



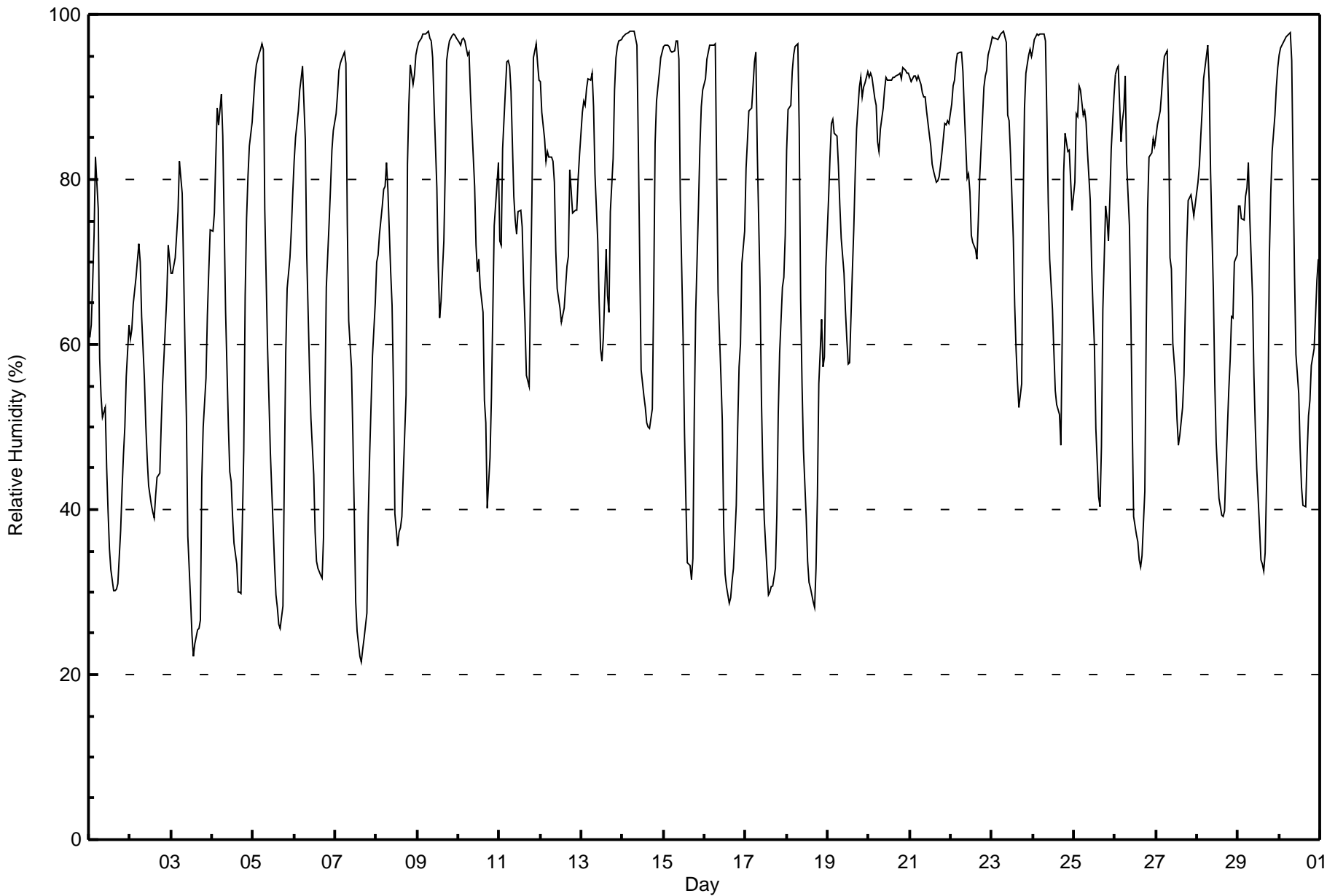
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay South - September 2017

| Maximum Value: 98 % on Sep 14 08:00 Maximum Daily Average: 91.1 % on Sep 20 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 22 % on Sep 7 16:00 Minimum Daily Average: 50.3 % on Sep 1 Maximum Diurnal Average: 90.8 % at hour 6 Minimum Diurnal Average: 46.8 % at hour 16 Monthly Average: 71.3 % Percentiles: P ₁ = 25 P ₁₀ = 38 Q ₁ = 55 Median = 76 O ₃ = 91 P ₉₀ = 96 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-Sep | 61 | 62 | 67 | 73 | 83 | 76 | 58 | 54 | 51 | 52 | 45 | 40 | 35 | 33 | 30 | 30 | 30 | 31 | 37 | 42 | 47 | 50 | 56 | 62 | 50.3 | 83 | | | | | | | | | | | | | | | | | | |
| 2-Sep | 61 | 62 | 65 | 68 | 70 | 72 | 70 | 63 | 56 | 50 | 46 | 43 | 40 | 40 | 39 | 42 | 44 | 44 | 50 | 55 | 59 | 66 | 72 | 70 | 56.2 | 72 | | | | | | | | | | | | | | | | | | |
| 3-Sep | 69 | 69 | 70 | 73 | 76 | 82 | 78 | 69 | 60 | 51 | 37 | 29 | 25 | 22 | 24 | 26 | 26 | 27 | 44 | 50 | 56 | 64 | 69 | 74 | 52.8 | 82 | | | | | | | | | | | | | | | | | | |
| 4-Sep | 74 | 76 | 83 | 89 | 87 | 90 | 85 | 75 | 64 | 50 | 45 | 43 | 39 | 36 | 33 | 30 | 30 | 30 | 47 | 66 | 75 | 80 | 84 | 87 | 62.4 | 90 | | | | | | | | | | | | | | | | | | |
| 5-Sep | 90 | 92 | 94 | 95 | 96 | 96 | 96 | 76 | 60 | 53 | 47 | 42 | 33 | 30 | 28 | 26 | 26 | 28 | 44 | 59 | 67 | 70 | 74 | 78 | 62.6 | 96 | | | | | | | | | | | | | | | | | | |
| 6-Sep | 82 | 85 | 88 | 91 | 92 | 94 | 85 | 71 | 64 | 57 | 51 | 44 | 37 | 34 | 33 | 32 | 32 | 37 | 53 | 67 | 75 | 79 | 84 | 86 | 64.6 | 94 | | | | | | | | | | | | | | | | | | |
| 7-Sep | 88 | 90 | 93 | 94 | 95 | 95 | 94 | 75 | 63 | 57 | 49 | 40 | 29 | 25 | 22 | 22 | 23 | 24 | 27 | 39 | 47 | 53 | 59 | 65 | 57.0 | 95 | | | | | | | | | | | | | | | | | | |
| 8-Sep | 70 | 71 | 73 | 77 | 79 | 79 | 82 | 79 | 69 | 65 | 55 | 40 | 36 | 37 | 38 | 39 | 44 | 54 | 82 | 89 | 94 | 92 | 93 | 95 | 67.9 | 95 | | | | | | | | | | | | | | | | | | |
| 9-Sep | 96 | 97 | 97 | 98 | 98 | 98 | 98 | 97 | 97 | 95 | 89 | 79 | 69 | 63 | 65 | 72 | 81 | 94 | 96 | 97 | 97 | 98 | 97 | 97 | 90.2 | 98 | | | | | | | | | | | | | | | | | | |
| 10-Sep | 97 | 96 | 97 | 97 | 97 | 95 | 95 | 90 | 87 | 79 | 72 | 69 | 70 | 67 | 64 | 53 | 51 | 40 | 46 | 53 | 64 | 74 | 77 | 82 | 75.6 | 97 | | | | | | | | | | | | | | | | | | |
| 11-Sep | 72 | 72 | 84 | 91 | 94 | 94 | 94 | 91 | 78 | 75 | 73 | 76 | 76 | 74 | 67 | 62 | 56 | 55 | 67 | 78 | 95 | 96 | 94 | 92 | 79.5 | 96 | | | | | | | | | | | | | | | | | | |
| 12-Sep | 92 | 88 | 85 | 82 | 83 | 83 | 83 | 82 | 80 | 71 | 67 | 64 | 63 | 64 | 64 | 70 | 71 | 81 | 79 | 76 | 76 | 76 | 80 | 83 | 76.8 | 92 | | | | | | | | | | | | | | | | | | |
| 13-Sep | 88 | 89 | 89 | 91 | 92 | 92 | 93 | 89 | 81 | 73 | 65 | 59 | 58 | 61 | 72 | 66 | 64 | 76 | 83 | 91 | 95 | 96 | 97 | 97 | 81.5 | 97 | | | | | | | | | | | | | | | | | | |
| 14-Sep | 97 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 96 | 84 | 70 | 57 | 54 | 52 | 51 | 50 | 50 | 52 | 66 | 84 | 89 | 93 | 95 | 95 | 80.1 | 98 | | | | | | | | | | | | | | | | | | |
| 15-Sep | 96 | 96 | 96 | 96 | 96 | 95 | 96 | 97 | 97 | 95 | 78 | 61 | 49 | 41 | 34 | 33 | 32 | 34 | 52 | 64 | 77 | 84 | 89 | 91 | 74.0 | 97 | | | | | | | | | | | | | | | | | | |
| 16-Sep | 92 | 95 | 95 | 96 | 96 | 96 | 97 | 81 | 66 | 56 | 51 | 38 | 32 | 31 | 29 | 29 | 31 | 33 | 41 | 50 | 57 | 60 | 70 | 74 | 62.3 | 97 | | | | | | | | | | | | | | | | | | |
| 17-Sep | 81 | 85 | 88 | 89 | 91 | 94 | 95 | 84 | 67 | 53 | 45 | 39 | 33 | 30 | 30 | 31 | 31 | 33 | 39 | 51 | 59 | 67 | 68 | 73 | 60.7 | 95 | | | | | | | | | | | | | | | | | | |
| 18-Sep | 84 | 89 | 89 | 93 | 95 | 96 | 96 | 86 | 66 | 55 | 47 | 39 | 34 | 31 | 30 | 29 | 28 | 33 | 42 | 55 | 63 | 57 | 59 | 69 | 61.1 | 96 | | | | | | | | | | | | | | | | | | |
| 19-Sep | 78 | 83 | 87 | 87 | 86 | 85 | 82 | 77 | 73 | 69 | 64 | 61 | 58 | 58 | 69 | 74 | 81 | 86 | 91 | 92 | 90 | 91 | 92 | 93 | 79.4 | 93 | | | | | | | | | | | | | | | | | | |
| 20-Sep | 92 | 93 | 92 | 90 | 89 | 85 | 83 | 86 | 89 | 91 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 93 | 93 | 92 | 94 | 93 | 93 | 93 | 91.1 | 94 | | | | | | | | | | | | | | | | | | |
| 21-Sep | 92 | 92 | 93 | 93 | 92 | 93 | 92 | 90 | 90 | 90 | 88 | 85 | 84 | 82 | 81 | 80 | 80 | 80 | 82 | 83 | 87 | 87 | 87 | 87 | 87.0 | 93 | | | | | | | | | | | | | | | | | | |
| 22-Sep | 89 | 91 | 92 | 94 | 95 | 95 | 95 | 93 | 88 | 80 | 81 | 78 | 73 | 72 | 72 | 70 | 75 | 80 | 88 | 91 | 92 | 93 | 95 | 96 | 86.3 | 96 | | | | | | | | | | | | | | | | | | |
| 23-Sep | 97 | 97 | 97 | 97 | 97 | 98 | 98 | 98 | 97 | 88 | 87 | 83 | 73 | 65 | 59 | 55 | 52 | 55 | 76 | 89 | 93 | 95 | 96 | 95 | 84.9 | 98 | | | | | | | | | | | | | | | | | | |
| 24-Sep | 96 | 97 | 98 | 97 | 98 | 98 | 98 | 97 | 88 | 77 | 70 | 64 | 59 | 54 | 53 | 52 | 48 | 61 | 81 | 86 | 83 | 84 | 80 | 76 | 78.9 | 98 | | | | | | | | | | | | | | | | | | |
| 25-Sep | 80 | 88 | 88 | 91 | 91 | 88 | 88 | 87 | 83 | 78 | 69 | 64 | 60 | 50 | 41 | 40 | 48 | 64 | 77 | 75 | 73 | 78 | 84 | 90 | 73.9 | 91 | | | | | | | | | | | | | | | | | | |
| 26-Sep | 93 | 93 | 94 | 85 | 87 | 88 | 93 | 82 | 74 | 64 | 51 | 39 | 37 | 36 | 34 | 33 | 34 | 42 | 61 | 76 | 83 | 83 | 85 | 84 | 68.0 | 94 | | | | | | | | | | | | | | | | | | |
| 27-Sep | 85 | 87 | 88 | 90 | 93 | 95 | 96 | 88 | 71 | 69 | 60 | 56 | 51 | 48 | 49 | 52 | 56 | 65 | 72 | 77 | 78 | 77 | 76 | 77 | 73.2 | 96 | | | | | | | | | | | | | | | | | | |
| 28-Sep | 80 | 82 | 85 | 88 | 92 | 95 | 96 | 92 | 81 | 66 | 55 | 48 | 45 | 41 | 39 | 39 | 40 | 45 | 54 | 58 | 63 | 63 | 70 | 71 | 66.3 | 96 | | | | | | | | | | | | | | | | | | |
| 29-Sep | 77 | 77 | 75 | 75 | 78 | 79 | 82 | 75 | 66 | 56 | 50 | 45 | 38 | 34 | 33 | 33 | 35 | 51 | 70 | 78 | 83 | 88 | 91 | 94 | 65.1 | 94 | | | | | | | | | | | | | | | | | | |
| 30-Sep | 95 | 96 | 97 | 97 | 97 | 98 | 98 | 94 | 81 | 68 | 59 | 54 | 47 | 43 | 41 | 40 | 47 | 51 | 53 | 57 | 59 | 63 | 68 | 70 | 69.8 | 98 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | 84.8 | 86.2 | 87.9 | 89.2 | 90.4 | 90.8 | 89.8 | 83.9 | 76.0 | 68.9 | 62.0 | 55.7 | 51.0 | 48.2 | 47.2 | 46.8 | 47.9 | 52.7 | 63.2 | 70.8 | 75.7 | 78.3 | 81.0 | 83.3 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | 97 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 95 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 94 | 96 | 97 | 97 | 98 | 97 | 97 | Diurnal Maximum | |





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - September 2017

| | | |
|---|---|---------------------------------|
| Maximum Speed: 26 km/h on Sep 20 14:00 | Maximum Daily Speed Average: 22.7 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 23 07:00 | Minimum Daily Speed Average: 1.6 km/h on Sep 13 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 2.4 km/h at hour 1 | Minimum Diurnal Speed Average: 0.2 km/h at hour 11 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 1.4 km/h 254.0 deg | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 11 P ₉₀ = 16 P ₉₉ = 25 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|---|-------------------------------|-------|-------|-------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | WSW9 | SW8 | SSW4 | SW1 | ESE2 | SW5 | SW8 | WSW12 | WSW11 | SW11 | WSW11 | WSW13 | WSW13 | SW14 | WSW15 | WSW15 | WSW14 | WSW13 | WSW11 | WSW8 | SW7 | SW8 | WSW6 | WSW8 | WSW9.2 | WSW15 |
| 2-Sep | WSW10 | WSW10 | WSW11 | W11 | W10 | W9 | WSW10 | W9 | W8 | W9 | WSW9 | WSW11 | WSW11 | WSW9 | SW8 | SW7 | SW6 | WSW7 | SW4 | SW6 | SW5 | S1 | WSW3 | WSW4 | WSW7.7 | WSW11 |
| 3-Sep | WSW6 | SW5 | W7 | WSW11 | WSW9 | SSW5 | WSW6 | W9 | W12 | W11 | WNW13 | WNW14 | NW14 | WNW15 | WNW14 | NW13 | NW13 | NW13 | N23 | NNW17 | NW13 | NW13 | NW10 | WNW6 | WNW9.4 | N23 |
| 4-Sep | WNW7 | WNW6 | NW3 | W3 | WNW4 | W7 | W4 | WNW3 | NW7 | NNW11 | NNW14 | NW10 | NW9 | WNW6 | NW10 | WNW8 | WNW8 | WNW2 | WSW3 | WSW2 | WSW3 | SW2 | SW3 | SSW3 | WNW4.9 | NNW14 |
| 5-Sep | WSW4 | SSW3 | SW3 | SW4 | SSW4 | S4 | S4 | SSE6 | S10 | S12 | S13 | SSE13 | SSW12 | SSW11 | SW11 | SW8 | SW8 | SW5 | SSW2 | SW3 | SW2 | W2 | S4 | WSW2 | SSW5.5 | S13 |
| 6-Sep | SSW1 | S2 | SW2 | SSW2 | W1 | WSW1 | NW1 | E1 | NE4 | N9 | N6 | N5 | N5 | NNE5 | NNE7 | NNW6 | N4 | N3 | WNW2 | WSW3 | WSW3 | WSW2 | WSW3 | WSW1 | NNW1.8 | N9 |
| 7-Sep | WNW1 | W2 | SSW3 | SSW4 | W1 | SW3 | SSW2 | SSE4 | SSE11 | SE11 | SE8 | SSE13 | SSW18 | S22 | S21 | S21 | S18 | S13 | S10 | S6 | S6 | SSW4 | SSW5 | SSW5 | S8.2 | S22 |
| 8-Sep | SSW5 | SSW3 | S3 | S6 | S4 | WNW1 | SW2 | S4 | SW4 | NE4 | N9 | N11 | N10 | NNW8 | NNW10 | NNW11 | NNW10 | NNW10 | NNW6 | NW3 | SW4 | WSW6 | S1 | W1 | NW2.7 | N11 |
| 9-Sep | WSW2 | WNW3 | WNW2 | SW1 | SSW3 | NNW3 | NW4 | NNW5 | NNW3 | N3 | N8 | N8 | N10 | N13 | N15 | N15 | NW9 | N8 | NNW6 | N5 | WNW4 | W4 | WSW5 | WSW6 | NNW4.7 | N15 |
| 10-Sep | SSW4 | S3 | SSW4 | S7 | SSW5 | SSW3 | SW4 | SW6 | SW10 | WSW13 | W14 | W14 | W14 | W16 | W15 | WNW13 | WNW5 | WSW13 | WSW11 | SW9 | SSW7 | SSW5 | SW6 | W4 | WSW7.4 | W16 |
| 11-Sep | WSW11 | WSW7 | SSW3 | SSW4 | SW2 | SW3 | W1 | NW2 | N1 | NNE1 | SE3 | E3 | NE3 | NNE5 | SE10 | SSE11 | SSE13 | SSE7 | S10 | NW6 | SSW4 | SW5 | WSW7 | WSW9 | SSW2.9 | SSE13 |
| 12-Sep | SW7 | WSW11 | W10 | SW9 | SSW7 | SSW8 | SW7 | SW7 | W6 | WNW8 | WNW10 | NW9 | NW9 | NW7 | NW6 | NNW6 | NW5 | NNE6 | NNE7 | NNE9 | NNE8 | NNE6 | N4 | N3 | WNW4.1 | WSW11 |
| 13-Sep | WNW3 | WNW2 | WNW3 | W2 | WSW2 | WSW1 | S2 | WNW1 | SSE1 | N4 | NNE6 | NNE8 | NNE5 | N6 | WSW2 | WNW2 | NNE4 | N2 | NW1 | WSW3 | W2 | W1 | WNW2 | WNW3 | NNW1.6 | NNE8 |
| 14-Sep | WSW1 | SW2 | SW1 | SSW2 | WNW1 | WSW2 | SSW2 | SW2 | NNW1 | NNE3 | NE6 | NNE10 | NE7 | NE8 | ENE6 | NE8 | N7 | NNE7 | N3 | NW4 | NW4 | NW3 | WSW2 | SW2 | NNE2.2 | NNE10 |
| 15-Sep | WSW2 | WSW2 | SW2 | SSW1 | WSW3 | S3 | SW2 | SSW2 | S5 | SE7 | SE7 | SSE9 | SSE11 | S9 | SSW8 | S11 | SSW10 | S9 | SSW6 | SSW6 | S3 | S3 | SSE4 | S3 | S4.8 | SSE11 |
| 16-Sep | SSW3 | SSW3 | SSW4 | SSW4 | S4 | S4 | S4 | S7 | SSE9 | SSE11 | SE13 | S21 | S21 | S22 | S21 | S22 | S20 | S14 | SSW10 | S7 | S6 | S5 | SSE5 | S2 | S9.8 | S22 |
| 17-Sep | SW3 | SW4 | SW4 | SSW5 | SSW4 | SSW3 | SSW3 | SSE3 | SSE12 | SSE14 | SSE18 | SSE21 | S22 | S21 | S19 | SSE19 | SSE17 | SSE14 | SSE11 | S5 | S5 | S3 | SSE7 | S2 | SSE9.5 | SSE22 |
| 18-Sep | S2 | S4 | SSW2 | WSW2 | W2 | WNW2 | WNW2 | NNW4 | SE10 | SSE16 | SE16 | SSE23 | SSE22 | SE18 | SSE16 | SE14 | SE14 | SE10 | SE6 | SSE3 | SSE3 | SE6 | SSE6 | S5 | SSE7.6 | SSE23 |
| 19-Sep | SW3 | NW3 | NW4 | NNW7 | NNW8 | N8 | N9 | N11 | NNW12 | N17 | N17 | N18 | N19 | NNE13 | NE9 | NE9 | NE11 | NE11 | NNE11 | NNE11 | NE11 | NNE9 | NNE11 | NNE14 | NNE9.8 | N19 |
| 20-Sep | NNE15 | N13 | N17 | N18 | N21 | N20 | N24 | N24 | N23 | N24 | N25 | NNE26 | NNE26 | NNE26 | N25 | N24 | N24 | N24 | N26 | N26 | N25 | N23 | N24 | N22 | N22.7 | NNE26 |
| 21-Sep | N24 | N22 | N22 | N22 | N21 | N20 | N18 | N19 | N19 | N21 | N19 | N19 | N19 | N20 | N20 | N20 | N19 | N16 | N12 | NNW5 | NW5 | WNW5 | WNW3 | WNW5 | N16.2 | N24 |
| 22-Sep | W3 | W3 | SSE2 | SSW1 | SSW1 | SSW1 | SSW3 | SW2 | S3 | S4 | SSE4 | ESE3 | SE7 | SSW3 | SSW6 | SE5 | SE6 | ESE2 | NNE2 | SW1 | SSW2 | WSW2 | W2 | W2 | S1.8 | SE7 |
| 23-Sep | WSW2 | SSW1 | SSW2 | WSW2 | WSW1 | WSW1 | NE0 | NNE1 | N3 | NNE3 | WNW2 | N3 | ESE4 | SE8 | SE9 | ESE9 | SSE8 | SSE8 | S2 | WSW1 | WSW2 | SW3 | SSW3 | SSW3 | SSE1.7 | SE9 |
| 24-Sep | SSW2 | S4 | S2 | W1 | WSW3 | WSW1 | SW2 | S3 | SSE5 | SE7 | SE9 | SE8 | SSE10 | SE8 | ESE9 | SE8 | SE9 | S4 | WSW3 | S3 | S3 | S3 | S6 | S9 | SSE4.2 | SSE10 |
| 25-Sep | S4 | S3 | S3 | SSW0 | SSE3 | S6 | S6 | S6 | SSE8 | SSE10 | SSE9 | S11 | S9 | SSW8 | WSW8 | WSW6 | S4 | WSW5 | WSW5 | SW5 | SW5 | SW5 | SSW3 | S2 | SSW4.8 | S11 |
| 26-Sep | SW2 | WSW1 | WSW4 | W7 | NW2 | WNW2 | SSW4 | SW6 | WSW6 | WSW5 | W6 | NW11 | NNW12 | NNW14 | NNW13 | NNW14 | NNW12 | NW6 | WNW5 | SSW3 | SW1 | WNW1 | S2 | SW3 | WNW4.2 | NNW14 |
| 27-Sep | S1 | SSE4 | SSW3 | SW2 | SSW2 | SW3 | SW4 | WNW1 | NE2 | NNE5 | N9 | NNE9 | NNE10 | N10 | N10 | N9 | NNE11 | N12 | N11 | N8 | N7 | NNE6 | NNE9 | N7 | N4.8 | N12 |
| 28-Sep | N6 | N3 | WNW1 | W2 | WNW2 | SW2 | SSW3 | NW1 | NE3 | SSE8 | SSE13 | SSE14 | SSE19 | SSE17 | S16 | S18 | S15 | S11 | S11 | S10 | SSE11 | SSE15 | SSE10 | SSE12 | S7.7 | SSE19 |
| 29-Sep | S8 | S10 | S9 | S10 | S11 | S12 | S11 | S12 | S11 | S16 | S16 | SSE17 | S14 | SSW12 | SW10 | SW7 | W3 | WNW2 | WSW3 | SW3 | WSW2 | SSW2 | WSW2 | SW2 | S7.8 | SSE17 |
| 30-Sep | SW2 | SW2 | SW2 | SW2 | SSW2 | SSW3 | SW3 | SSW1 | SSE7 | S9 | S10 | SSE13 | S13 | S12 | SSW12 | SW9 | SSW8 | W6 | NW10 | NW7 | NW11 | NW12 | NW14 | NW11 | SW3.8 | NW14 |
| W2.4WSW2.2 W2.1WSW2.3 W1.9WSW1.8WSW2.0 W1.7 SW1.3 S0.7 SSE0.2 SE0.6SSW1.4 SW1.8 SW2.0 SW1.3 SW1.3 W1.2WNW1.8WNW1.9 W1.3 W1.3WSW1.3 W1.9 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| N24 N22 N22 N22 N21 N20 N24 N24 N23 N24 N25 NNE26 NNE26 NNE26 NNE25 N24 N24 N24 N26 N26 N25 N23 N24 N22 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

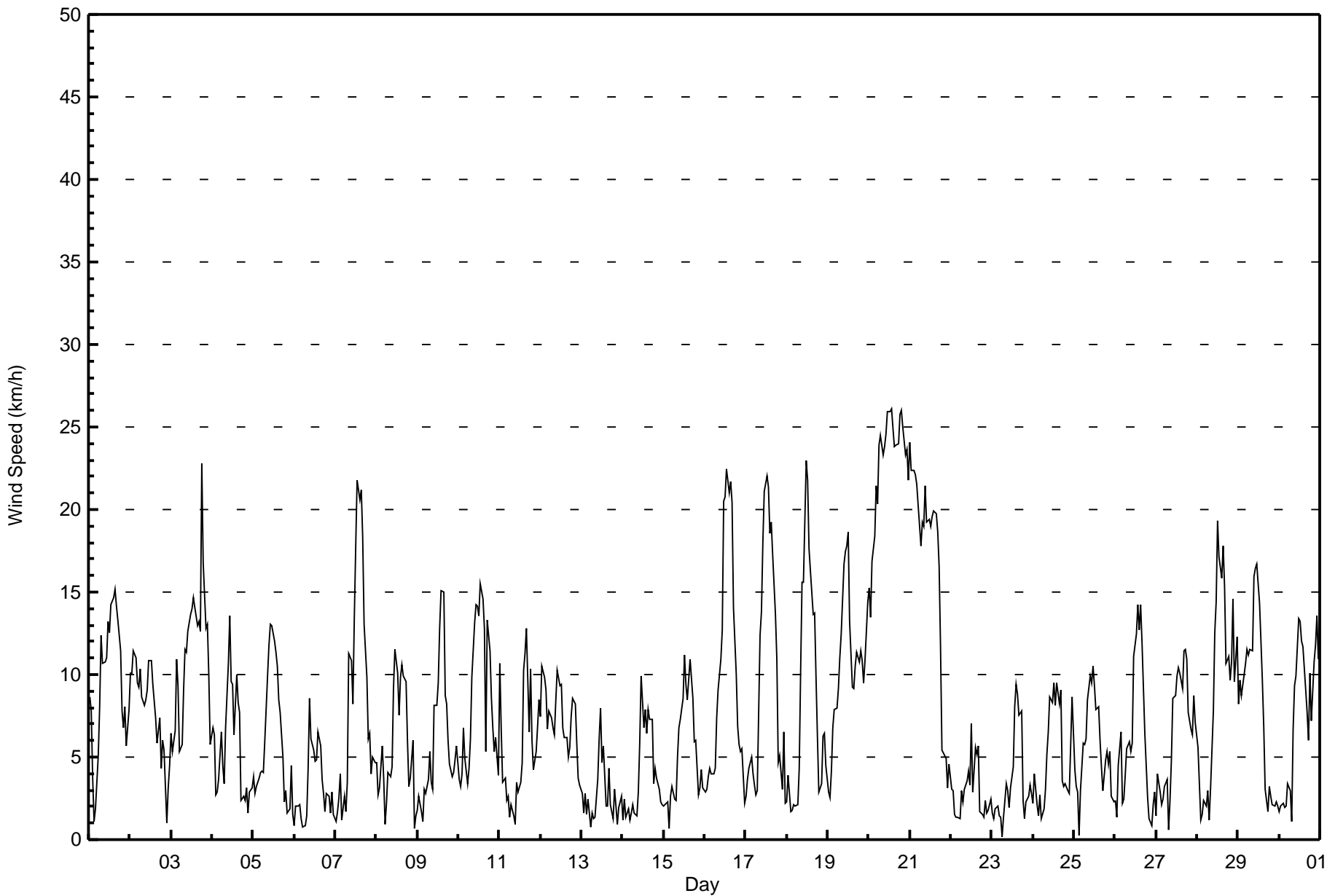
Wind Speed (WS) - km/h
Fort McKay South - September 2017

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Fort McKay South - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 326 | 45.28 | 45.28 |
| 6 - 11 | 245 | 34.03 | 79.31 |
| 12 - 19 | 104 | 14.44 | 93.75 |
| 20 - 28 | 45 | 6.25 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 15 | 10 | 6 | 0 | 2 | 4 | 2 | 12 | 44 | 61 | 53 | 44 | 21 | 31 | 14 | 7 | 326 |
| 6 - 11 | 23 | 19 | 9 | 1 | 0 | 2 | 19 | 21 | 32 | 13 | 23 | 31 | 15 | 8 | 17 | 12 | 245 |
| 12 - 19 | 19 | 4 | 0 | 0 | 0 | 0 | 5 | 19 | 16 | 4 | 1 | 9 | 6 | 5 | 8 | 8 | 104 |
| 20 - 28 | 27 | 4 | 0 | 0 | 0 | 0 | 0 | 4 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45 |
| 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 | 84 | 37 | 15 | 1 | 2 | 6 | 26 | 56 | 102 | 78 | 77 | 84 | 42 | 44 | 39 | 27 | 720 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort McKay South - September 2017

| | |
|---|---|
| Direction of Maximum Speed: 13 deg on Sep 20 14:00 Direction of Maximum Daily Speed Average: 6.9 deg on Sep 20 | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 |
| Direction of Minimum Speed: 51 deg on Sep 23 07:00 Direction of Minimum Daily Speed Average: 1.6 deg on Sep 13 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 248.2 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-Sep | 242 | 235 | 211 | 215 | 122 | 224 | 235 | 245 | 242 | 235 | 243 | 255 | 243 | 220 | 245 | 251 | 240 | 247 | 238 | 237 | 226 | 227 | 237 | 244 | 238.9 |
| 2-Sep | 250 | 248 | 254 | 260 | 265 | 261 | 258 | 260 | 263 | 260 | 257 | 256 | 248 | 237 | 230 | 236 | 223 | 238 | 236 | 225 | 216 | 178 | 237 | 240 | 248.3 |
| 3-Sep | 238 | 234 | 260 | 249 | 242 | 210 | 252 | 263 | 266 | 270 | 283 | 295 | 308 | 298 | 294 | 304 | 305 | 316 | 350 | 336 | 324 | 325 | 316 | 303 | 295.7 |
| 4-Sep | 290 | 288 | 326 | 271 | 284 | 263 | 265 | 283 | 313 | 328 | 345 | 325 | 321 | 293 | 320 | 297 | 298 | 303 | 247 | 257 | 250 | 234 | 225 | 209 | 300.5 |
| 5-Sep | 238 | 212 | 216 | 230 | 203 | 182 | 181 | 164 | 180 | 180 | 177 | 148 | 204 | 212 | 224 | 235 | 236 | 226 | 212 | 231 | 227 | 270 | 177 | 249 | 200.0 |
| 6-Sep | 210 | 190 | 234 | 211 | 275 | 243 | 317 | 98 | 38 | 8 | 5 | 351 | 8 | 17 | 24 | 342 | 0 | 358 | 288 | 250 | 252 | 251 | 244 | 242 | 345.7 |
| 7-Sep | 298 | 262 | 205 | 204 | 269 | 216 | 204 | 162 | 165 | 137 | 126 | 167 | 195 | 173 | 178 | 172 | 177 | 182 | 183 | 191 | 185 | 192 | 197 | 210 | 177.7 |
| 8-Sep | 195 | 195 | 191 | 175 | 176 | 294 | 226 | 181 | 236 | 36 | 6 | 356 | 354 | 345 | 346 | 345 | 331 | 331 | 333 | 325 | 227 | 249 | 180 | 275 | 325.7 |
| 9-Sep | 258 | 297 | 284 | 236 | 207 | 332 | 306 | 329 | 334 | 6 | 8 | 4 | 5 | 352 | 359 | 358 | 322 | 349 | 332 | 351 | 301 | 272 | 251 | 251 | 337.2 |
| 10-Sep | 209 | 169 | 208 | 179 | 207 | 193 | 220 | 214 | 236 | 248 | 263 | 267 | 270 | 265 | 267 | 286 | 295 | 252 | 238 | 219 | 196 | 204 | 221 | 268 | 245.0 |
| 11-Sep | 249 | 238 | 207 | 197 | 232 | 221 | 261 | 306 | 6 | 20 | 145 | 82 | 50 | 33 | 138 | 151 | 166 | 152 | 180 | 313 | 199 | 223 | 247 | 250 | 196.7 |
| 12-Sep | 236 | 253 | 266 | 233 | 211 | 211 | 218 | 229 | 260 | 296 | 300 | 306 | 312 | 312 | 305 | 333 | 319 | 25 | 15 | 14 | 31 | 25 | 5 | 351 | 294.1 |
| 13-Sep | 285 | 295 | 299 | 277 | 258 | 251 | 183 | 289 | 164 | 351 | 31 | 30 | 15 | 349 | 255 | 295 | 27 | 354 | 307 | 248 | 267 | 262 | 293 | 293 | 330.6 |
| 14-Sep | 246 | 231 | 230 | 204 | 283 | 239 | 208 | 224 | 337 | 21 | 38 | 18 | 38 | 34 | 70 | 49 | 6 | 27 | 3 | 325 | 325 | 307 | 247 | 219 | 13.0 |
| 15-Sep | 241 | 242 | 226 | 200 | 251 | 187 | 222 | 206 | 173 | 141 | 131 | 166 | 163 | 180 | 210 | 189 | 199 | 191 | 202 | 211 | 186 | 183 | 164 | 177 | 185.2 |
| 16-Sep | 211 | 211 | 211 | 209 | 188 | 182 | 171 | 170 | 147 | 152 | 139 | 173 | 174 | 175 | 178 | 175 | 179 | 187 | 194 | 188 | 177 | 176 | 160 | 175 | 175.1 |
| 17-Sep | 225 | 220 | 230 | 207 | 201 | 204 | 211 | 147 | 153 | 161 | 157 | 152 | 169 | 174 | 174 | 160 | 157 | 163 | 165 | 169 | 177 | 178 | 164 | 170 | 168.2 |
| 18-Sep | 185 | 180 | 207 | 251 | 280 | 299 | 303 | 347 | 144 | 148 | 143 | 147 | 155 | 146 | 153 | 144 | 143 | 141 | 126 | 155 | 151 | 137 | 151 | 189 | 150.0 |
| 19-Sep | 230 | 321 | 326 | 335 | 336 | 350 | 351 | 353 | 348 | 360 | 7 | 11 | 8 | 17 | 42 | 41 | 41 | 42 | 26 | 29 | 36 | 30 | 16 | 15 | 11.7 |
| 20-Sep | 13 | 4 | 3 | 359 | 358 | 1 | 4 | 4 | 6 | 8 | 9 | 13 | 13 | 13 | 11 | 11 | 9 | 8 | 7 | 6 | 5 | 6 | 5 | 4 | 6.9 |
| 21-Sep | 0 | 359 | 359 | 357 | 355 | 353 | 353 | 355 | 357 | 356 | 353 | 358 | 355 | 358 | 359 | 354 | 352 | 355 | 356 | 345 | 319 | 297 | 299 | 293 | 353.9 |
| 22-Sep | 275 | 266 | 162 | 211 | 198 | 205 | 204 | 229 | 173 | 183 | 147 | 118 | 130 | 213 | 204 | 141 | 134 | 117 | 16 | 223 | 192 | 251 | 271 | 265 | 181.4 |
| 23-Sep | 240 | 205 | 210 | 247 | 240 | 249 | 51 | 16 | 1 | 21 | 293 | 4 | 118 | 141 | 130 | 114 | 148 | 156 | 189 | 254 | 237 | 220 | 194 | 208 | 155.5 |
| 24-Sep | 213 | 183 | 183 | 262 | 253 | 250 | 230 | 177 | 147 | 131 | 138 | 145 | 148 | 134 | 110 | 134 | 141 | 178 | 237 | 186 | 186 | 169 | 172 | 185 | 157.5 |
| 25-Sep | 186 | 185 | 171 | 211 | 153 | 183 | 184 | 169 | 164 | 152 | 167 | 180 | 179 | 204 | 255 | 241 | 179 | 223 | 245 | 233 | 227 | 228 | 194 | 188 | 192.2 |
| 26-Sep | 214 | 240 | 258 | 274 | 313 | 287 | 200 | 227 | 243 | 239 | 281 | 319 | 331 | 337 | 328 | 344 | 338 | 326 | 291 | 200 | 222 | 290 | 186 | 230 | 302.9 |
| 27-Sep | 188 | 157 | 201 | 227 | 211 | 227 | 229 | 292 | 54 | 29 | 4 | 20 | 13 | 2 | 9 | 9 | 12 | 11 | 7 | 2 | 351 | 13 | 13 | 10 | 7.4 |
| 28-Sep | 356 | 0 | 290 | 280 | 290 | 225 | 200 | 319 | 36 | 157 | 166 | 159 | 155 | 163 | 176 | 178 | 184 | 187 | 182 | 172 | 166 | 168 | 166 | 167 | 171.0 |
| 29-Sep | 187 | 180 | 186 | 185 | 181 | 181 | 185 | 183 | 173 | 170 | 176 | 158 | 183 | 205 | 221 | 219 | 271 | 303 | 252 | 220 | 244 | 206 | 240 | 220 | 187.6 |
| 30-Sep | 227 | 225 | 221 | 215 | 201 | 206 | 221 | 201 | 165 | 173 | 175 | 163 | 176 | 189 | 196 | 218 | 204 | 268 | 307 | 310 | 315 | 314 | 309 | 317 | 229.0 |

261.5 253.1 261.8 256.9 267.0 255.4 256.2 267.3 218.8 186.2 149.0 145.7 202.2 219.2 229.2 231.6 224.6 280.7 298.8 296.8 276.0 273.7 257.7 268.6

Diurnal Average

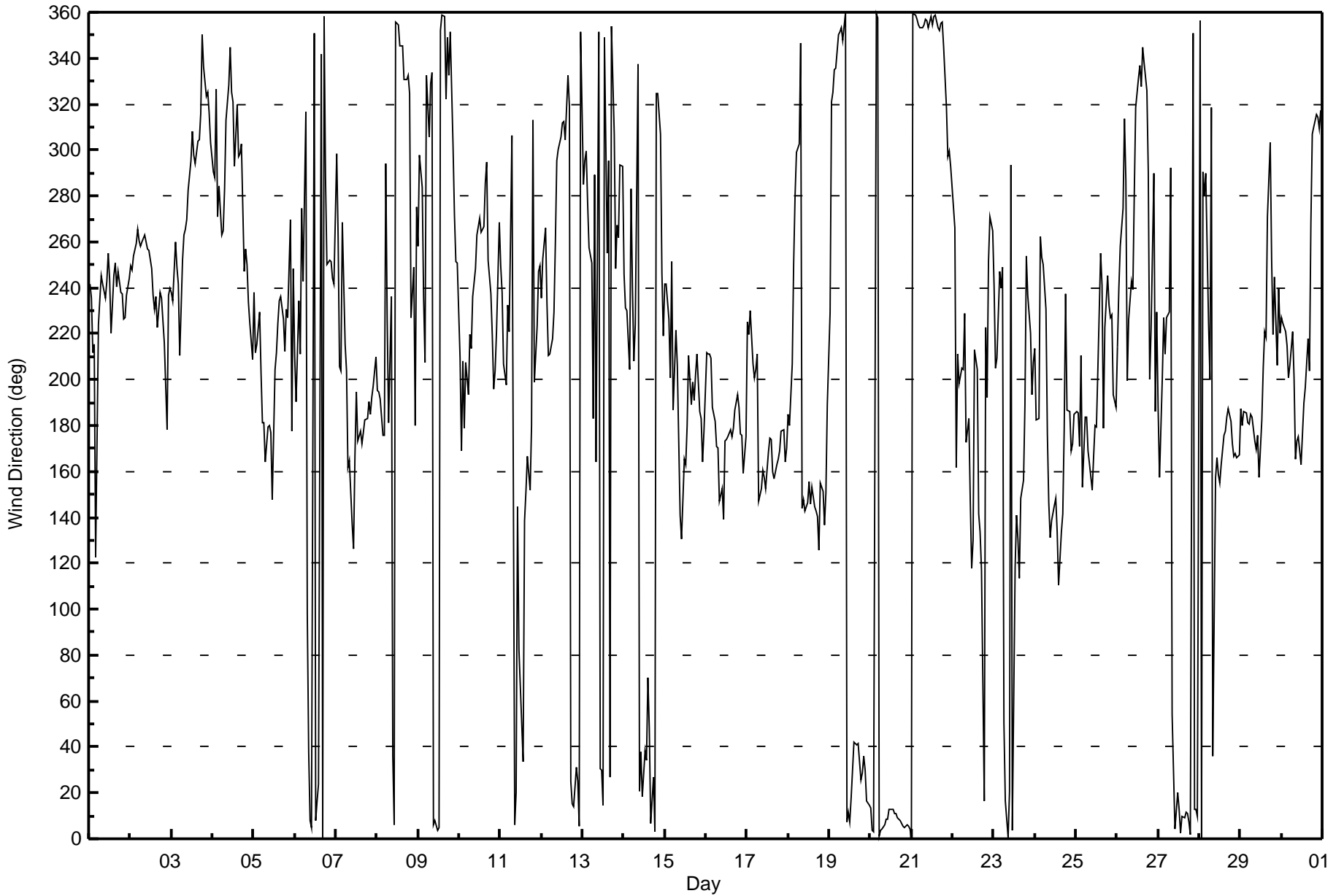
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay South - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Sep 8 06:00 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| Minimum Value: 6 deg on Sep 29 05:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentiles: P ₁ = 8 P ₁₀ = 13 Q ₁ = 17 Median = 24 Q ₃ = 35 P ₉₀ = 53 P ₉₉ = 85 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 16 | 17 | 45 | 95 | 70 | 46 | 28 | 22 | 27 | 23 | 33 | 29 | 36 | 31 | 32 | 30 | 27 | 27 | 25 | 22 | 18 | 20 | 13 | 13 | 95 |
| 2-Sep | 17 | 17 | 20 | 22 | 26 | 24 | 22 | 30 | 30 | 35 | 32 | 31 | 27 | 30 | 26 | 24 | 26 | 22 | 22 | 27 | 34 | 90 | 29 | 26 | 90 |
| 3-Sep | 25 | 33 | 30 | 15 | 18 | 25 | 40 | 28 | 28 | 32 | 35 | 38 | 33 | 31 | 35 | 32 | 26 | 25 | 23 | 19 | 20 | 17 | 17 | 35 | 40 |
| 4-Sep | 23 | 33 | 60 | 58 | 51 | 32 | 49 | 65 | 29 | 28 | 27 | 31 | 45 | 63 | 39 | 50 | 27 | 59 | 22 | 53 | 22 | 51 | 29 | 33 | 65 |
| 5-Sep | 26 | 28 | 29 | 21 | 23 | 17 | 18 | 23 | 16 | 18 | 21 | 19 | 30 | 32 | 33 | 32 | 33 | 32 | 26 | 19 | 58 | 58 | 11 | 68 | 68 |
| 6-Sep | 90 | 69 | 29 | 18 | 54 | 50 | 38 | 54 | 29 | 18 | 33 | 47 | 53 | 66 | 40 | 44 | 51 | 33 | 22 | 13 | 19 | 35 | 16 | 36 | 90 |
| 7-Sep | 40 | 49 | 26 | 18 | 63 | 26 | 55 | 23 | 13 | 12 | 21 | 30 | 19 | 16 | 15 | 13 | 12 | 10 | 9 | 10 | 8 | 8 | 10 | 23 | 63 |
| 8-Sep | 24 | 33 | 20 | 15 | 33 | 101 | 57 | 59 | 60 | 29 | 30 | 19 | 23 | 35 | 25 | 22 | 19 | 17 | 26 | 74 | 35 | 23 | 94 | 78 | 101 |
| 9-Sep | 31 | 40 | 55 | 66 | 68 | 40 | 26 | 27 | 22 | 43 | 15 | 19 | 17 | 15 | 19 | 16 | 27 | 15 | 25 | 30 | 23 | 22 | 24 | 21 | 68 |
| 10-Sep | 27 | 41 | 27 | 13 | 29 | 40 | 32 | 29 | 30 | 31 | 33 | 34 | 31 | 28 | 32 | 34 | 51 | 36 | 28 | 24 | 17 | 15 | 14 | 52 | 52 |
| 11-Sep | 15 | 33 | 56 | 31 | 40 | 21 | 49 | 31 | 71 | 84 | 45 | 36 | 49 | 47 | 20 | 19 | 18 | 25 | 12 | 80 | 61 | 15 | 23 | 19 | 84 |
| 12-Sep | 21 | 27 | 31 | 23 | 26 | 22 | 22 | 24 | 29 | 29 | 27 | 25 | 23 | 28 | 31 | 50 | 48 | 28 | 16 | 17 | 18 | 26 | 22 | 30 | 50 |
| 13-Sep | 25 | 43 | 40 | 47 | 36 | 78 | 48 | 73 | 75 | 60 | 43 | 34 | 64 | 60 | 62 | 71 | 43 | 49 | 62 | 14 | 30 | 44 | 40 | 19 | 78 |
| 14-Sep | 47 | 27 | 66 | 56 | 39 | 43 | 34 | 37 | 72 | 48 | 45 | 28 | 59 | 39 | 53 | 34 | 36 | 21 | 40 | 13 | 20 | 44 | 29 | 20 | 72 |
| 15-Sep | 52 | 40 | 43 | 87 | 23 | 20 | 28 | 26 | 20 | 16 | 22 | 33 | 22 | 47 | 32 | 25 | 24 | 11 | 10 | 12 | 27 | 19 | 23 | 29 | 87 |
| 16-Sep | 21 | 22 | 15 | 16 | 20 | 13 | 12 | 12 | 16 | 19 | 19 | 19 | 16 | 15 | 17 | 16 | 13 | 15 | 12 | 10 | 11 | 16 | 20 | 57 | 57 |
| 17-Sep | 34 | 25 | 13 | 13 | 13 | 13 | 26 | 70 | 10 | 18 | 14 | 15 | 19 | 16 | 21 | 16 | 16 | 15 | 12 | 13 | 15 | 16 | 12 | 57 | 70 |
| 18-Sep | 22 | 19 | 38 | 20 | 27 | 19 | 21 | 11 | 52 | 12 | 15 | 14 | 18 | 17 | 21 | 22 | 17 | 17 | 18 | 38 | 23 | 22 | 22 | 22 | 52 |
| 19-Sep | 47 | 43 | 20 | 10 | 11 | 12 | 10 | 15 | 13 | 16 | 16 | 16 | 16 | 37 | 32 | 27 | 29 | 22 | 19 | 20 | 21 | 20 | 17 | 15 | 47 |
| 20-Sep | 15 | 14 | 15 | 16 | 17 | 17 | 14 | 16 | 16 | 16 | 16 | 16 | 16 | 17 | 16 | 16 | 16 | 17 | 18 | 16 | 19 | 19 | 19 | 19 | 19 |
| 21-Sep | 18 | 20 | 21 | 19 | 17 | 20 | 17 | 18 | 19 | 19 | 18 | 19 | 17 | 17 | 17 | 18 | 17 | 16 | 16 | 24 | 17 | 23 | 33 | 24 | 33 |
| 22-Sep | 57 | 46 | 51 | 55 | 58 | 62 | 20 | 30 | 26 | 22 | 29 | 42 | 26 | 71 | 31 | 31 | 15 | 30 | 45 | 45 | 42 | 55 | 16 | 24 | 71 |
| 23-Sep | 45 | 50 | 57 | 31 | 42 | 46 | 85 | 54 | 33 | 44 | 61 | 45 | 39 | 24 | 27 | 21 | 39 | 20 | 30 | 33 | 15 | 29 | 15 | 34 | 85 |
| 24-Sep | 30 | 9 | 63 | 52 | 24 | 55 | 42 | 11 | 14 | 28 | 19 | 26 | 25 | 34 | 24 | 23 | 18 | 22 | 16 | 13 | 16 | 26 | 16 | 9 | 63 |
| 25-Sep | 19 | 17 | 21 | 94 | 18 | 15 | 12 | 11 | 12 | 16 | 26 | 27 | 29 | 50 | 47 | 39 | 17 | 33 | 12 | 12 | 15 | 15 | 50 | 20 | 94 |
| 26-Sep | 30 | 54 | 52 | 41 | 75 | 79 | 47 | 47 | 30 | 42 | 47 | 31 | 25 | 24 | 29 | 21 | 18 | 19 | 19 | 17 | 32 | 74 | 43 | 58 | 79 |
| 27-Sep | 60 | 19 | 37 | 50 | 32 | 24 | 22 | 80 | 53 | 26 | 24 | 21 | 25 | 21 | 20 | 21 | 16 | 16 | 16 | 14 | 14 | 16 | 13 | 12 | 80 |
| 28-Sep | 21 | 22 | 71 | 44 | 25 | 22 | 35 | 82 | 41 | 23 | 16 | 18 | 13 | 16 | 17 | 15 | 13 | 9 | 7 | 8 | 9 | 8 | 11 | 8 | 82 |
| 29-Sep | 12 | 11 | 13 | 9 | 6 | 7 | 9 | 8 | 13 | 11 | 17 | 18 | 19 | 24 | 25 | 31 | 53 | 47 | 11 | 22 | 21 | 54 | 43 | 48 | 54 |
| 30-Sep | 33 | 51 | 37 | 41 | 32 | 31 | 17 | 75 | 18 | 23 | 20 | 15 | 19 | 24 | 23 | 27 | 20 | 35 | 20 | 18 | 23 | 23 | 26 | 25 | 75 |
| | 90 | 69 | 71 | 95 | 75 | 101 | 85 | 82 | 75 | 84 | 61 | 47 | 64 | 71 | 62 | 71 | 53 | 59 | 62 | 80 | 61 | 90 | 94 | 78 | |
| | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Fort McKay South | Station number: | AMS 13 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 2, 2017 |
| Start time (MST): | 7:45 | End time (MST): | 11:58 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|-----------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>49.8</u> | ppm | Cal Gas Exp Date | September 8, 2018 |
| Cal Gas Cylinder # | <u>LL110515</u> | | | |
| Calibrator Make/Model | API T700 | | Serial Number | 2448 |
| ZAG Make/Model | API 701 | | Serial Number | 5613 |

Analyzer Information

Analyzer make: API T100

Analyzer serial #: 599

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | HVPS voltage | 524 | 524 |
| Calculated slope | 0.994422 | 0.989192 | Lamp voltage | 2004 | 2004 |
| Calculated intercept | 2.810375 | 3.095379 | Pressure | 25.8 | 25.8 |
| Analyzer Background | 34.9 | 37.6 | Flow | 673 | 673 |
| Analyzer Coefficient | 1.062 | 1.056 | Lamp Ratio | 67.7 | 67.7 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5009 | 0.0 | 0.0 | 1.0 | ---- |
| as found span | 4935 | 79.0 | 784.6 | 793.2 | 0.989 |
| calibrator zero | 5009 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 4935 | 79.0 | 784.6 | 791.8 | 0.991 |
| second point | 4978 | 39.6 | 393.0 | 391.9 | 1.003 |
| third point | 4995 | 19.9 | 197.6 | 194.3 | 1.017 |
| as left zero | 5009 | 0.0 | 0.0 | -0.3 | ---- |
| as left span | 4935 | 79.0 | 784.6 | 785.0 | 1.000 |
| Average Correction Factor | | | | | 1.004 |
| Corrected As found | 792.20 | Previous response | 786.23 | *% change | -0.8% |

* = > +/-5% change initiates investigation

Notes:

zero and span adjusted, no maintenance done

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

SO₂ Calibration Summary

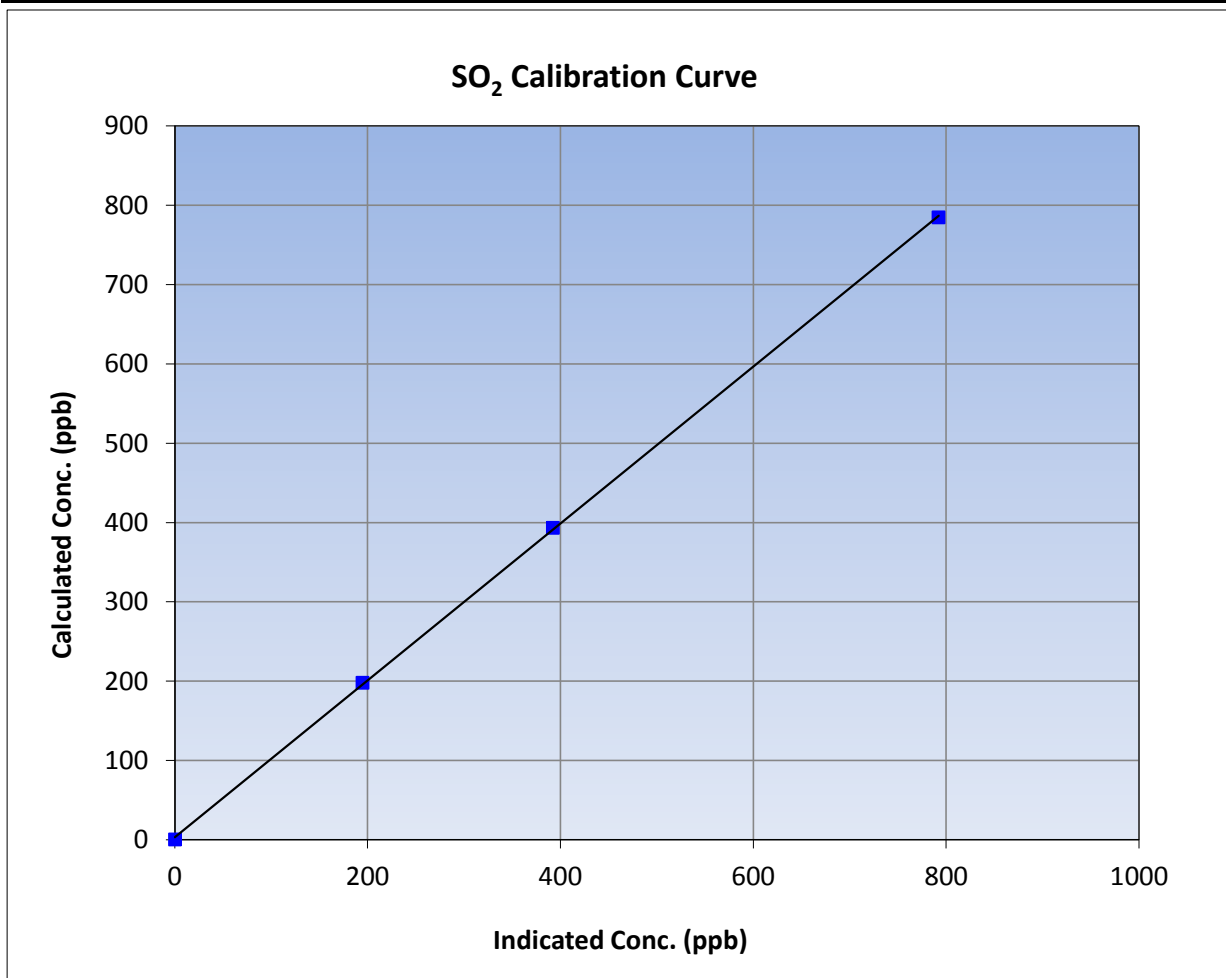
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:45 | End Time (MST) | 11:58 |
| Analyzer make | API T100 | Analyzer serial # | 599 |

Calibration Data

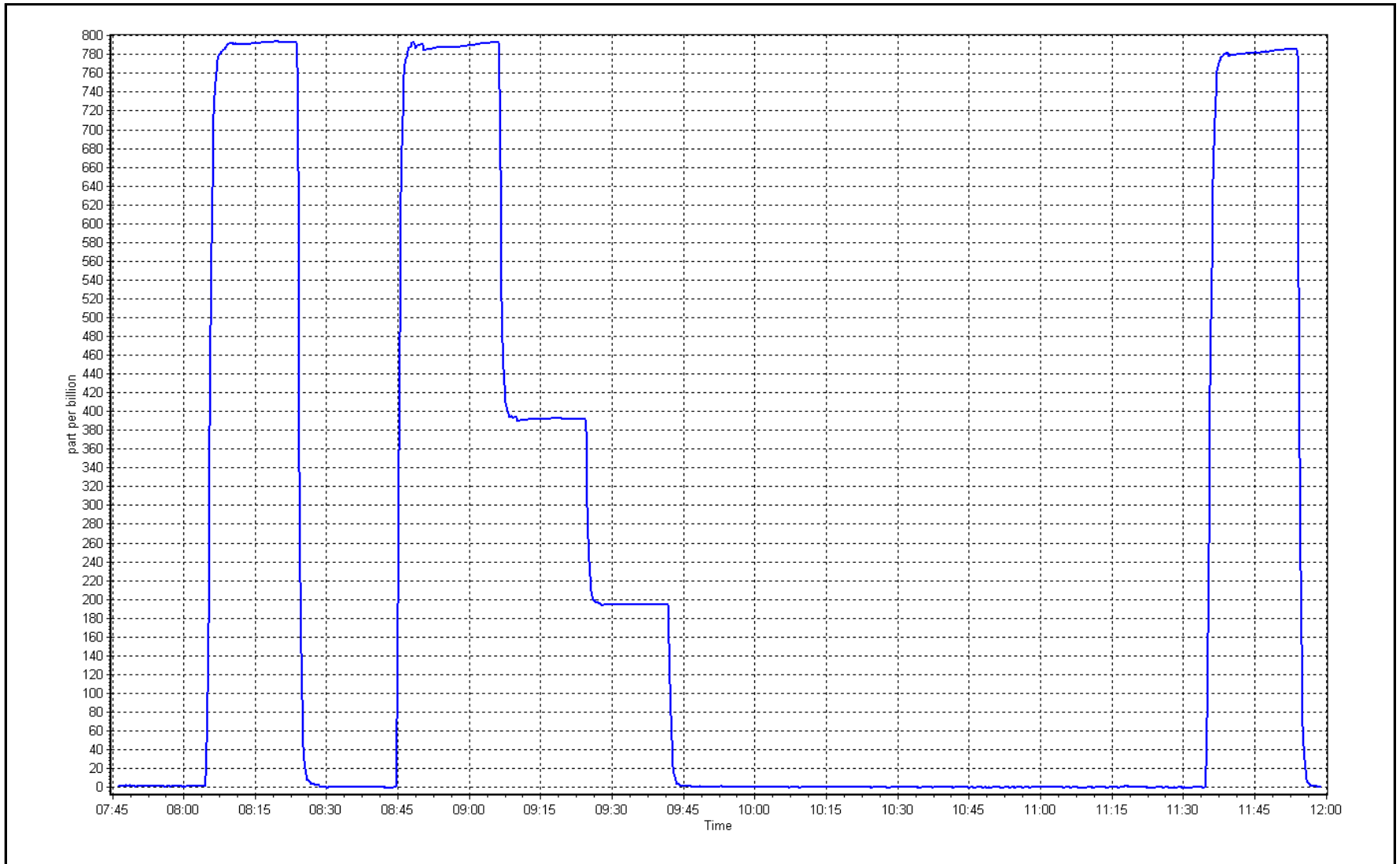
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999935 | ≥0.995 |
| 784.6 | 791.8 | 0.9910 | | | |
| 393.0 | 391.9 | 1.0029 | Slope | 0.989192 | 0.90 - 1.10 |
| 197.6 | 194.3 | 1.0171 | | | |
| | | | Intercept | 3.095379 | +/-30 |



SO2 Calibration Plot

Date: September 19, 2017

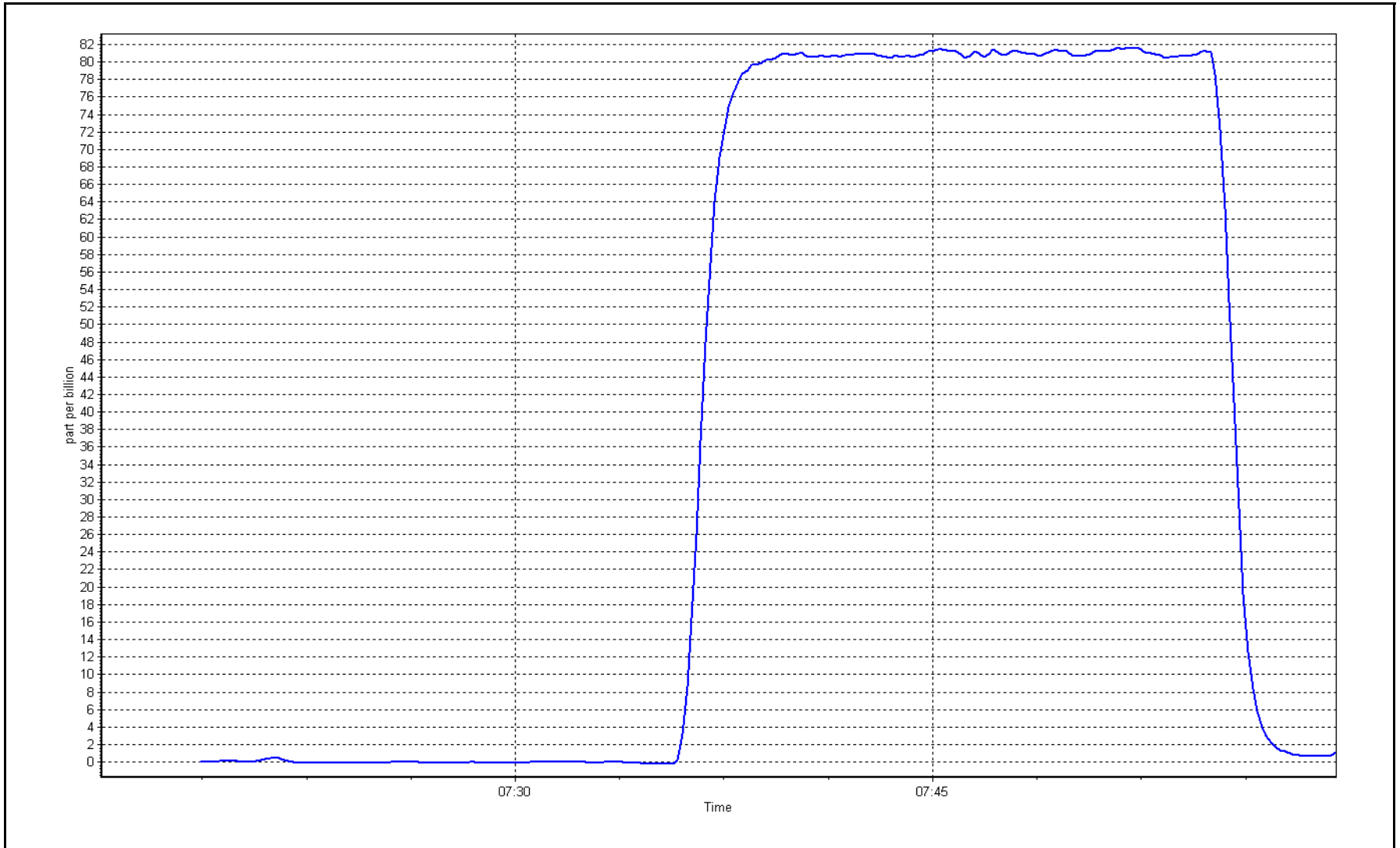
Location: Fort McKay South



TRS Calibration Plot

Date: September 22, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

TRS Calibration Summary

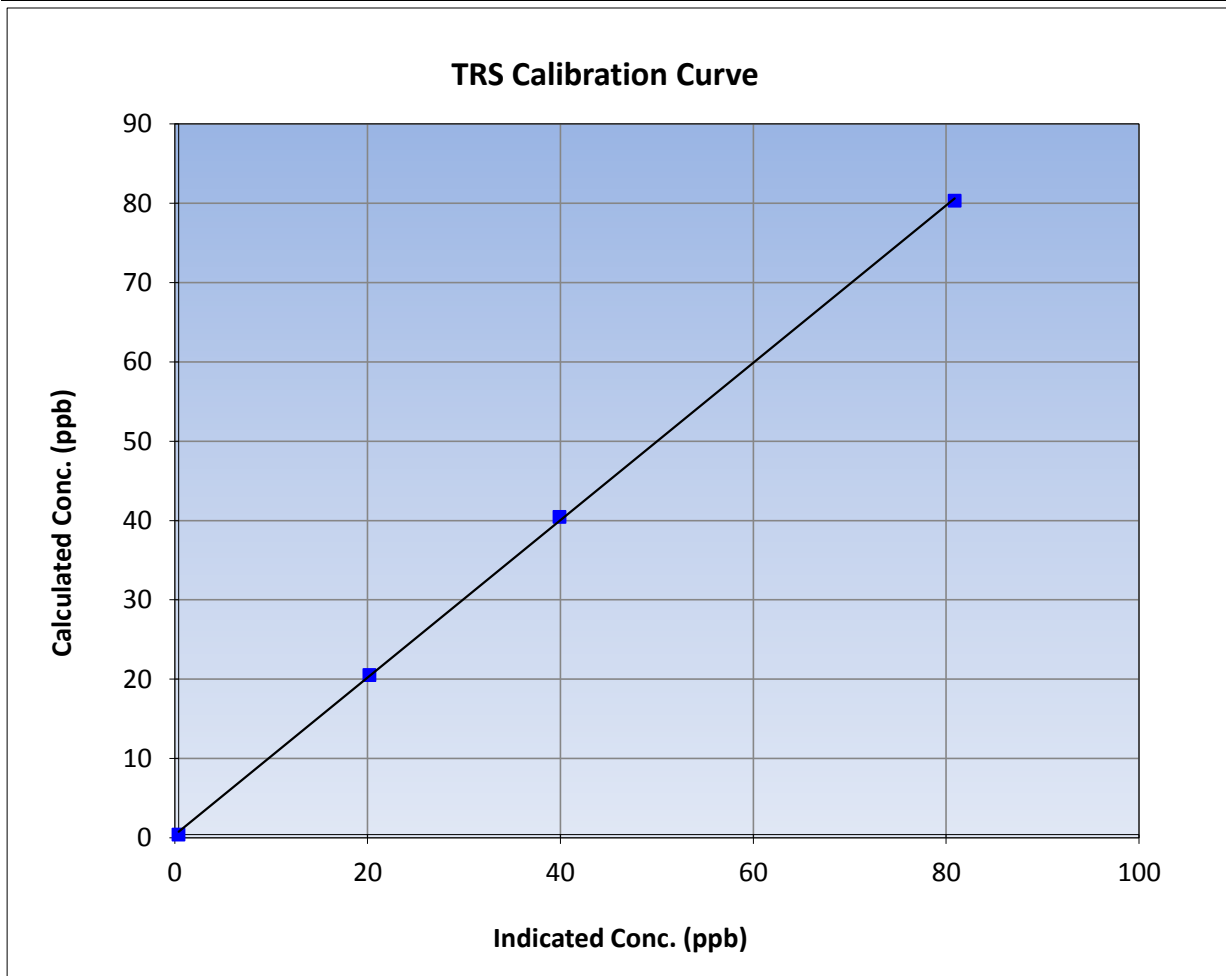
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:15 | End Time (MST) | 10:34 |
| Analyzer make | Thermo 43i-LTE | Analyzer serial # | 1218153359 |

Calibration Data

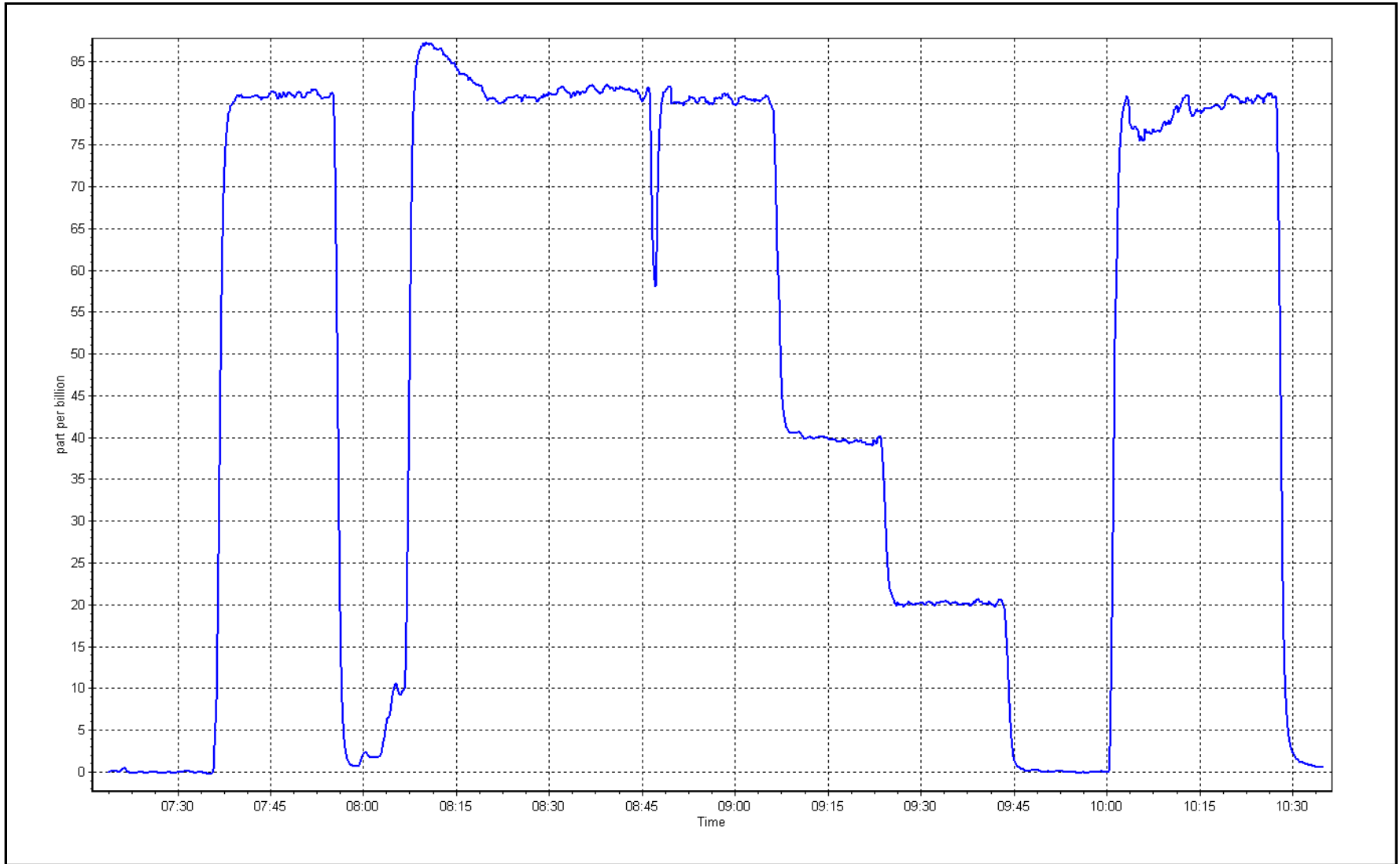
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999858 | ≥0.995 |
| 79.9 | 80.5 | 0.9930 | | | |
| 40.1 | 39.5 | 1.0142 | Slope | 0.992031 | 0.90 - 1.10 |
| 20.1 | 19.8 | 1.0171 | | | |
| | | | Intercept | 0.362772 | +/-3 |



TRS Calibration Plot

Date: September 22, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Fort McKay South | Station number: | AMS 13 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 2, 2017 |
| Start time (MST): | 7:45 | End time (MST): | 11:57 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|-----------------|
| Gas Cert Reference | LL110515 | Cal Gas Expiry Date | September-08-18 |
| CH4 Cal Gas Conc. | <u>517.0</u> ppm | CH4 Equiv Conc. | 1067.0 ppm |
| C3H8 Cal Gas Conc. | <u>200.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Teledyne API 700 | Serial Number | 2448 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 5613 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|--------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1505164380 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -303.5 |
| Calculated slope | 0.996663 | Sample pressure | 9.2 |
| Calculated intercept | 0.073558 | Fuel pressure | 23.1 |
| Analyzer Background | 3.016 | Air pressure | 34.3 |
| Analyzer Coefficient | 1.470 | Flame temperature | 151.9 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5009 | 0.0 | 0.00 | -0.04 | ---- |
| as found span | 4935 | 79.0 | 16.81 | 16.51 | 1.018 |
| calibrator zero | 5009 | 0.0 | 0.00 | -0.06 | ---- |
| high point | 4935 | 79.0 | 16.81 | 16.82 | 0.999 |
| second point | 4978 | 39.6 | 8.42 | 8.31 | 1.013 |
| third point | 4995 | 19.9 | 4.23 | 4.13 | 1.025 |
| as left zero | 5009 | 0.0 | 0.00 | -0.05 | ---- |
| as left span | 4935 | 79.0 | 16.81 | 16.89 | 0.995 |
| Average Correction Factor | | | | | 1.013 |
| Corrected As found | 16.55 | Previous response | 16.79 | *% change | 1.5% |

* = > +/-5% change initiates investigation

Notes: no maintenance done, span adjusted

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

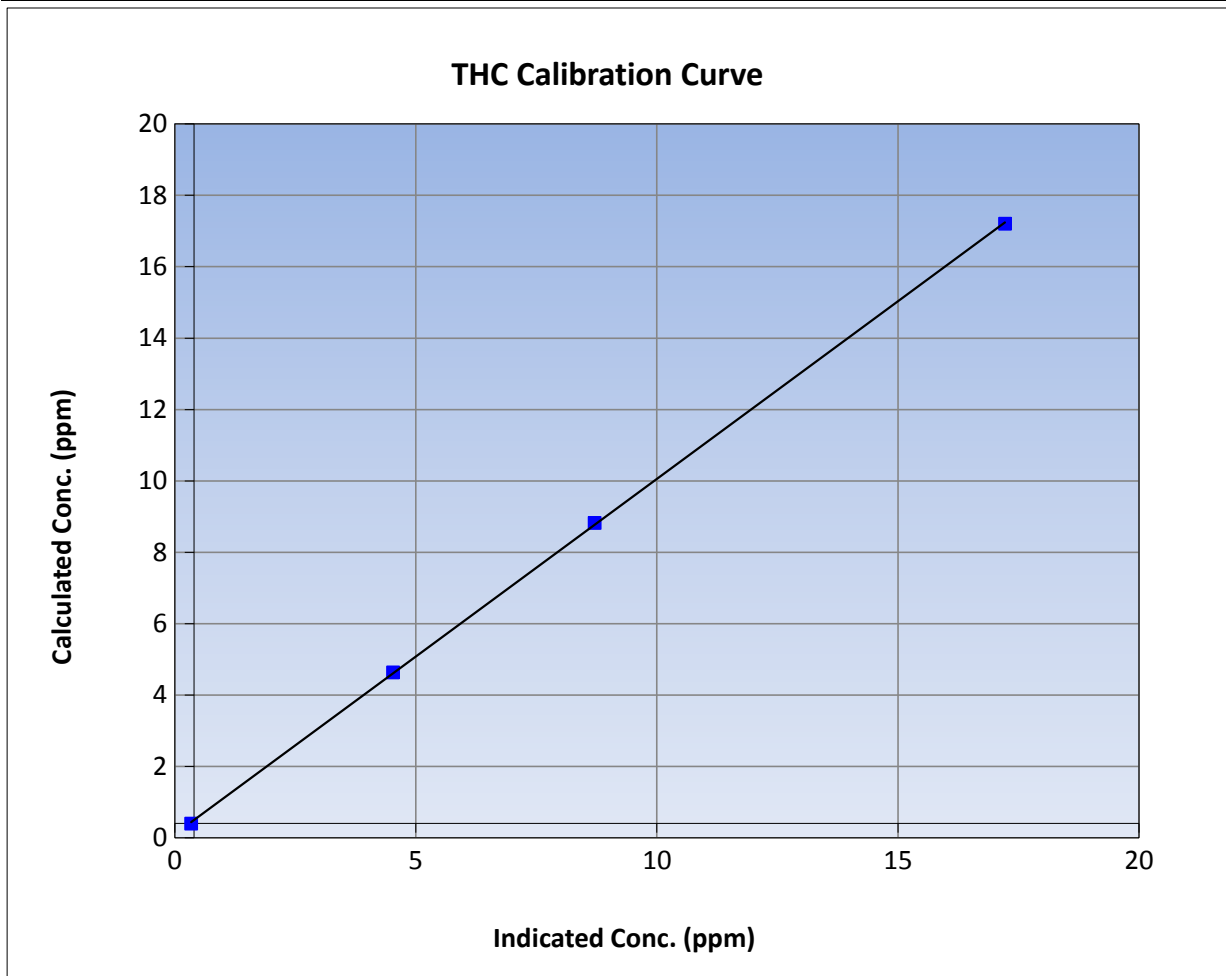
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:45 | End Time (MST) | 11:57 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1505164380 |

Calibration Data

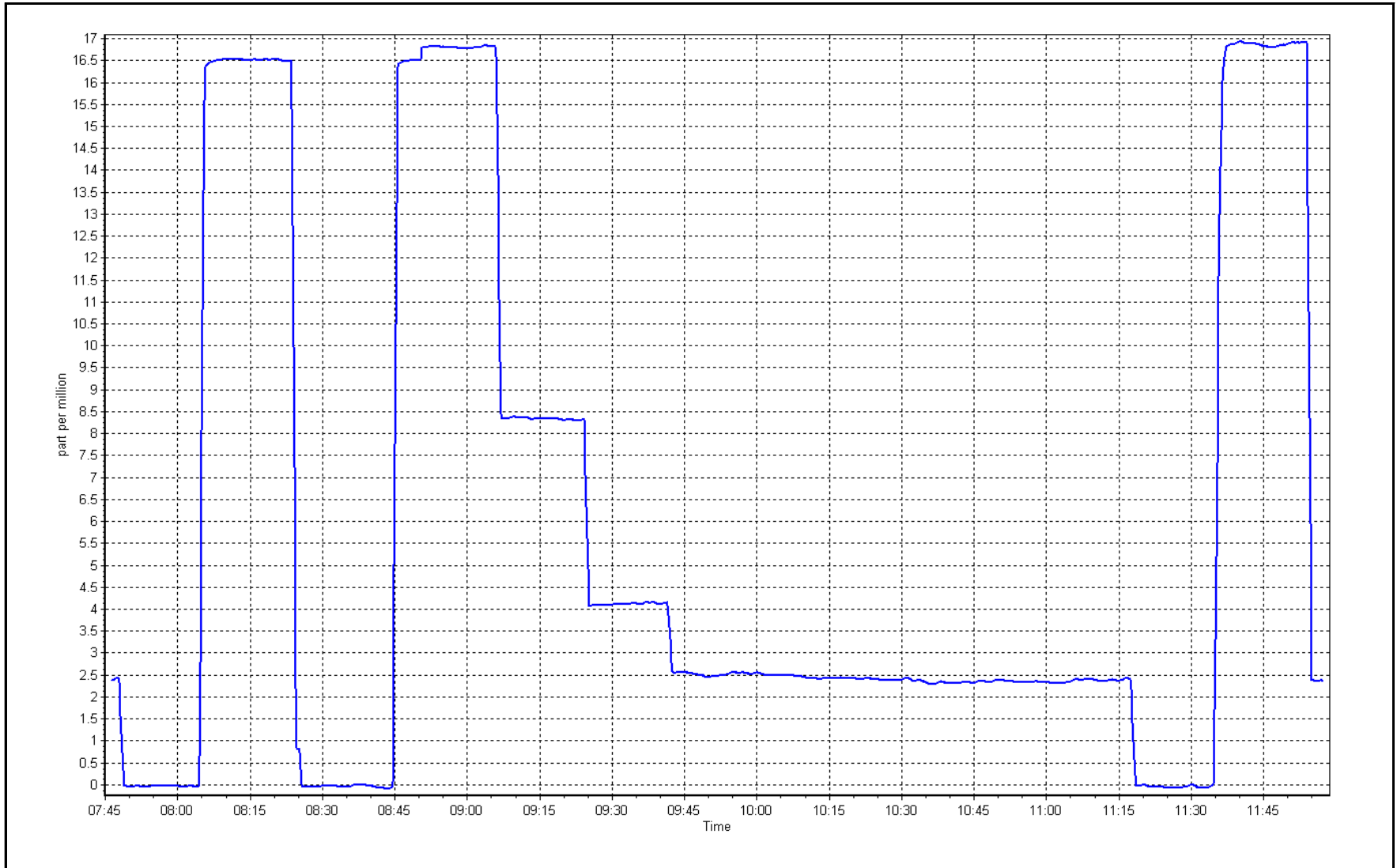
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999964 | ≥0.995 |
| 16.8 | 16.8 | 0.9995 | | | |
| 8.4 | 8.3 | 1.0134 | Slope | 0.995253 | 0.90 - 1.10 |
| 4.2 | 4.1 | 1.0252 | | | |
| | | | Intercept | 0.101298 | +/-1.5 |



THC Calibration Plot

Date: September 19, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

O₃ Calibration Summary

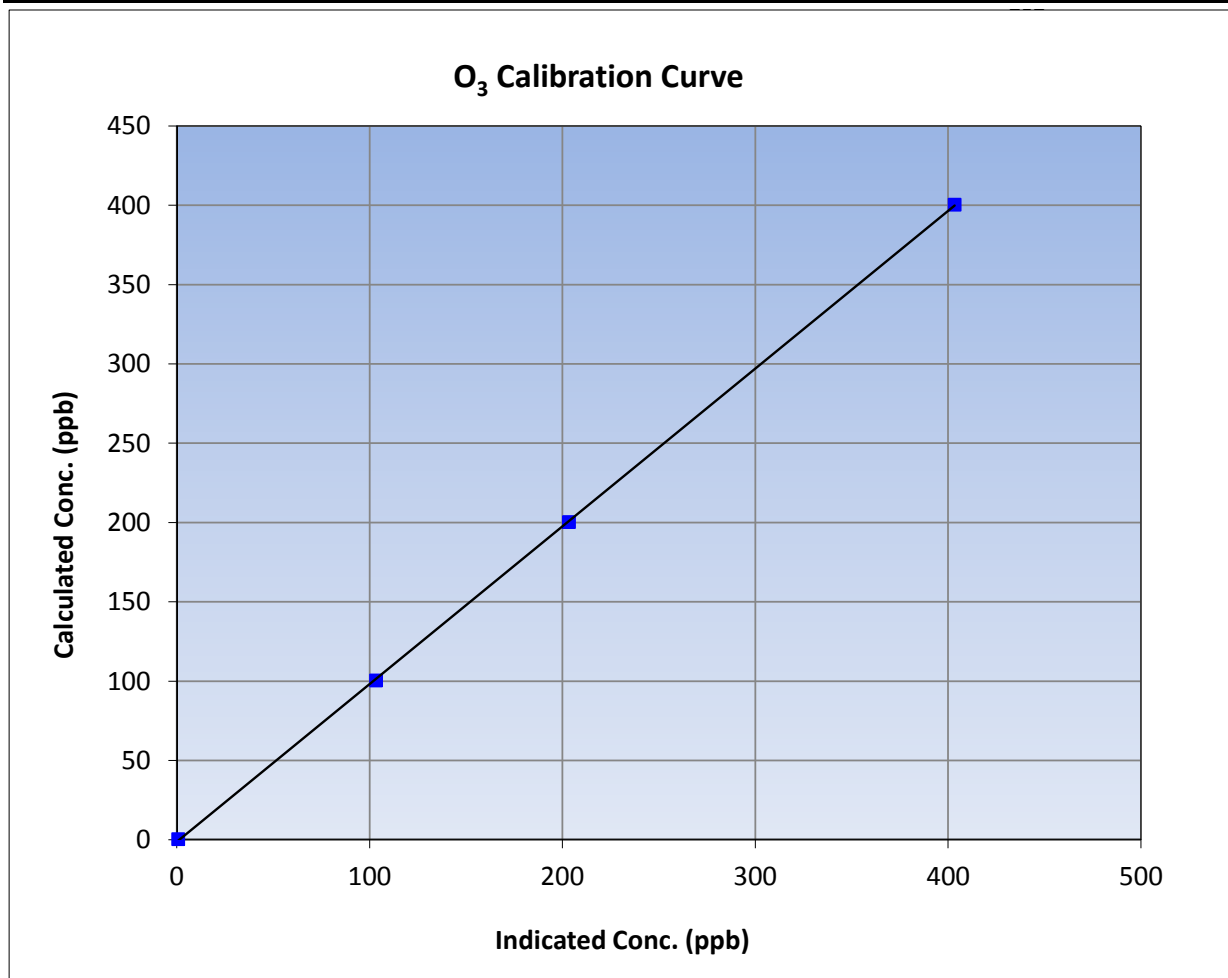
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 10:30 | End Time (MST) | 12:33 |
| Analyzer make | API T400 | Analyzer serial # | 825 |

Calibration Data

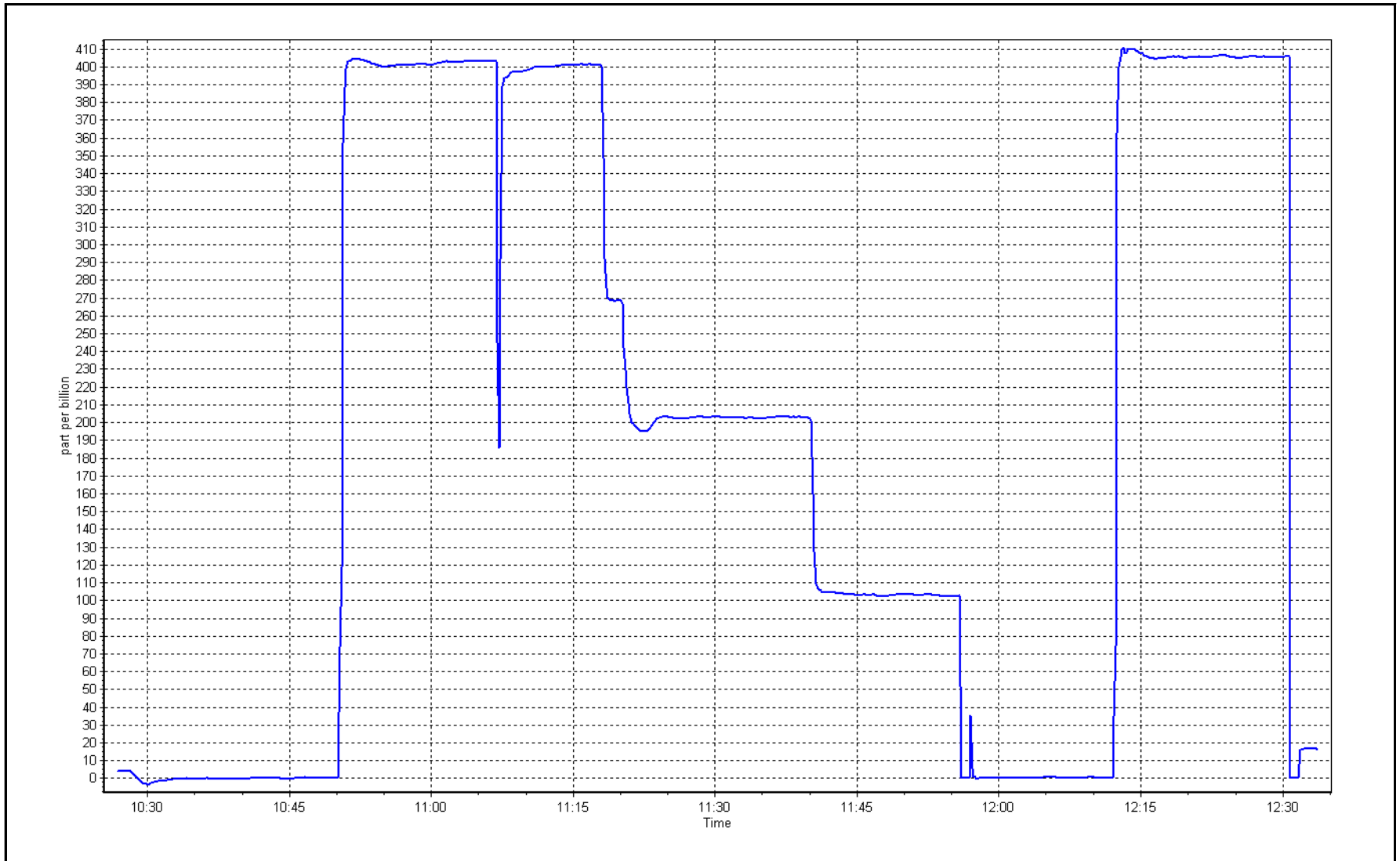
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 0.999969 | |
| 400.0 | 403.0 | 0.9926 | | | ≥0.995 |
| 200.0 | 203.0 | 0.9852 | Slope | 0.994514 | |
| 100.0 | 102.9 | 0.9718 | | | 0.90 - 1.10 |
| | | | Intercept | -1.327294 | +/- 10 |



O₃ Calibration Plot

Date: September 22, 2017

Location: Fort McKay South





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Fort McKay South | Station number: | AMS 13 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 8, 2017 |
| Start time (MST): | 7:45 | End time (MST): | 11:58 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-------------------|
| NO Gas Cylinder # | LL110515 | Cal Gas Expiry Date | September 8, 2018 |
| NOX Cal Gas Conc. | <u>50.9</u> ppb | NO Cal Gas Conc. | <u>50.7</u> ppb |
| Calibrator Model | API T700 | Serial Number | 2448 |
| ZAG make/model | API T701 | Serial Number | 5613 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1410661329 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.021 | 1.032 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 1.003 | 1.004 | PMT Temperature | -2.9 | -2.9 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 174.9 | 174.9 |
| NO bkgrnd | 7.5 | 7.6 | Sample Flow | 0.892 | 0.892 |
| NOX bkgrnd | 7.6 | 7.7 | PMT Voltage | -827.7 | -827.7 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.000928 | 0.996852 |
| NO _x Cal Offset | 1.142538 | 2.244680 |
| NO Cal Slope | 0.999676 | 0.997790 |
| NO Cal Offset | 1.299182 | 2.181689 |
| NO ₂ Cal Slope | 0.996604 | 0.998692 |
| NO ₂ Cal Offset | 0.055516 | 0.776030 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as found span | 4935 | 79.0 | 802.0 | 798.8 | 3.2 | 792.7 | 789.6 | 3.1 | 1.0117 | 1.0117 |
| calibrator zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| high point | 4935 | 79.0 | 802.0 | 798.8 | 3.2 | 803.5 | 799.5 | 4.0 | 0.9981 | 0.9992 |
| second point | 4978 | 39.6 | 401.7 | 400.1 | 1.6 | 399.3 | 397.7 | 1.6 | 1.0060 | 1.0061 |
| third point | 4995 | 19.9 | 202.0 | 201.2 | 0.8 | 198.2 | 197.3 | 0.9 | 1.0191 | 1.0197 |
| as left zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as left span | 4935 | 79.0 | 802.0 | 380.0 | 422.0 | 810.4 | 370.0 | 440.5 | 0.9896 | 1.0270 |
| Average Correction Factor | | | | | | | | | 1.0077 | 1.0083 |

| | | | | | |
|--------------------|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 792.7 ppb | NO = 789.6 ppb | | *Percent Change | NO _x = 0.9% |
| Previous Response | NO _x = 800.1 ppb | NO = 797.8 ppb | | *Percent Change | NO = 1.0% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 3.2 | 802.1 | 799.1 | 3.0 | 0.9998 | 0.9997 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 380.0 | 422.3 | 802.4 | 380.0 | 422.4 | 0.9995 | ---- | 0.9996 | 100.0% |
| 2nd NO2 (200 ppb O3) | 530.2 | 272.1 | 801.7 | 530.2 | 271.5 | 1.0003 | ---- | 1.0020 | 99.8% |
| 3rd NO2 (100 ppb O3) | 691.4 | 110.9 | 800.5 | 691.4 | 109.1 | 1.0018 | ---- | 1.0161 | 98.4% |
| 2nd NO ref point | ---- | 3.2 | 799.8 | 796.6 | 3.2 | 1.0027 | 1.0028 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0011 | 1.0012 | 1.0059 | 99.4% |

Notes: span adjusted, no maintenance done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

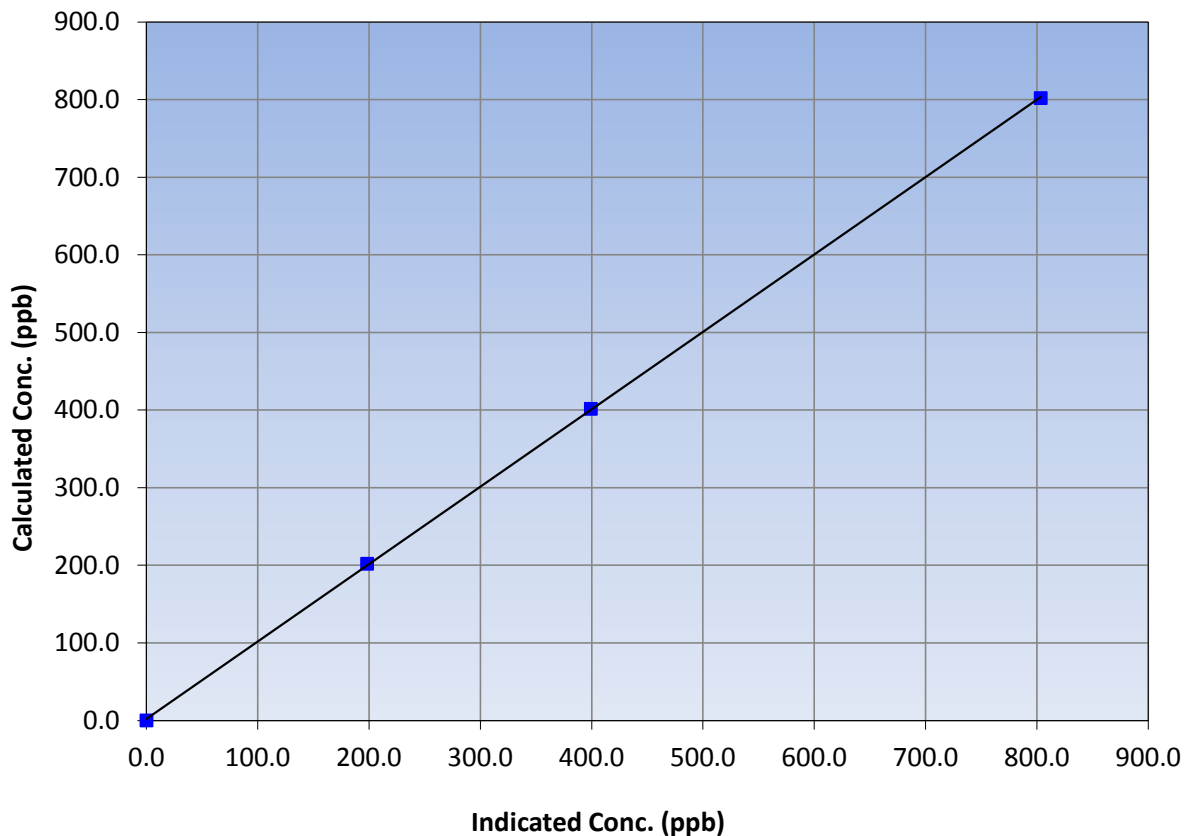
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 8, 2017 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:45 | End Time (MST) | 11:58 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661329 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 802.0 | 803.5 | 0.9981 | | | |
| 401.7 | 399.3 | 1.0060 | | | |
| 202.0 | 198.2 | 1.0191 | | | |
| | | | Slope | 0.996852 | 0.90 - 1.10 |
| | | | Intercept | 2.244680 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

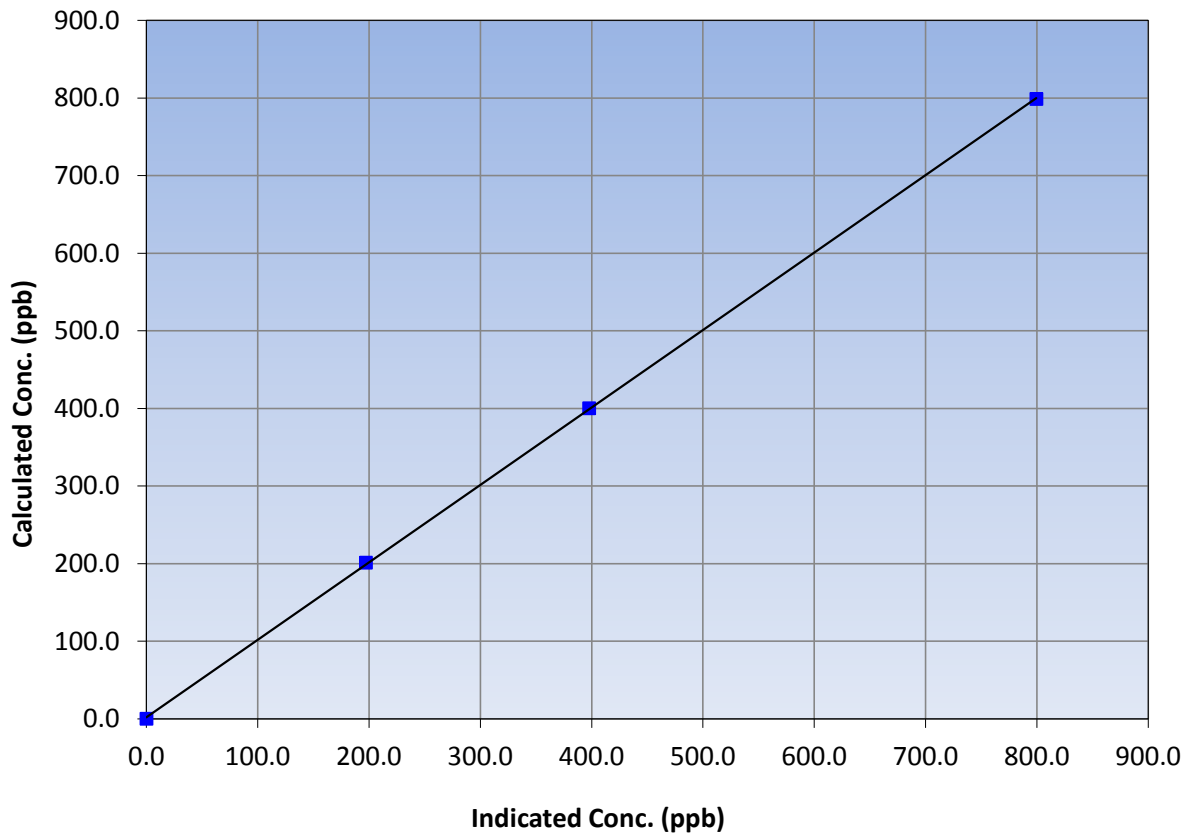
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 8, 2017 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:45 | End Time (MST) | 11:58 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661329 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 798.8 | 799.5 | 0.9992 | | | |
| 400.1 | 397.7 | 1.0061 | | | |
| 201.2 | 197.3 | 1.0197 | | | |
| | | | Slope | 0.997790 | 0.90 - 1.10 |
| | | | Intercept | 2.181689 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

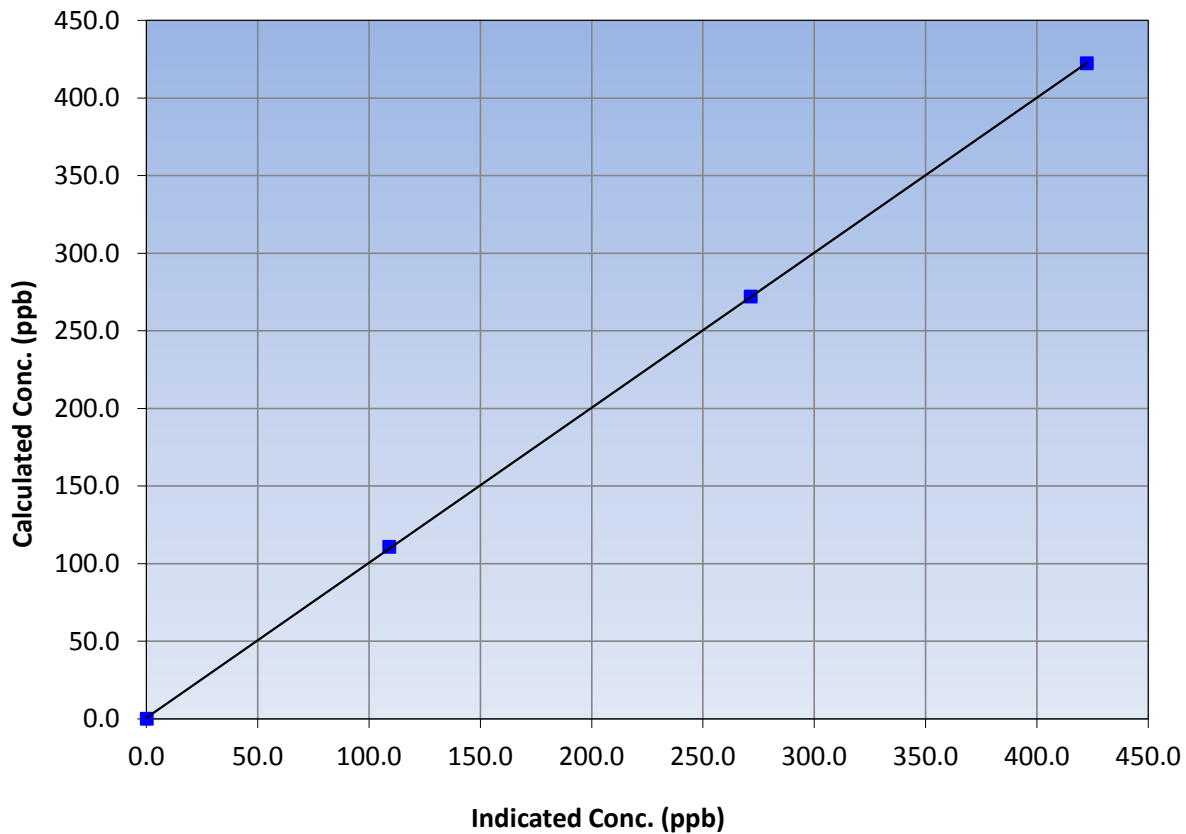
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 8, 2017 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:45 | End Time (MST) | 11:58 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661329 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 422.3 | 422.4 | 0.9996 | | | |
| 272.1 | 271.5 | 1.0020 | | | |
| 110.9 | 109.1 | 1.0161 | | | |
| | | | Slope | 0.998692 | 0.90 - 1.10 |
| | | | Intercept | 0.776030 | +/-20 |

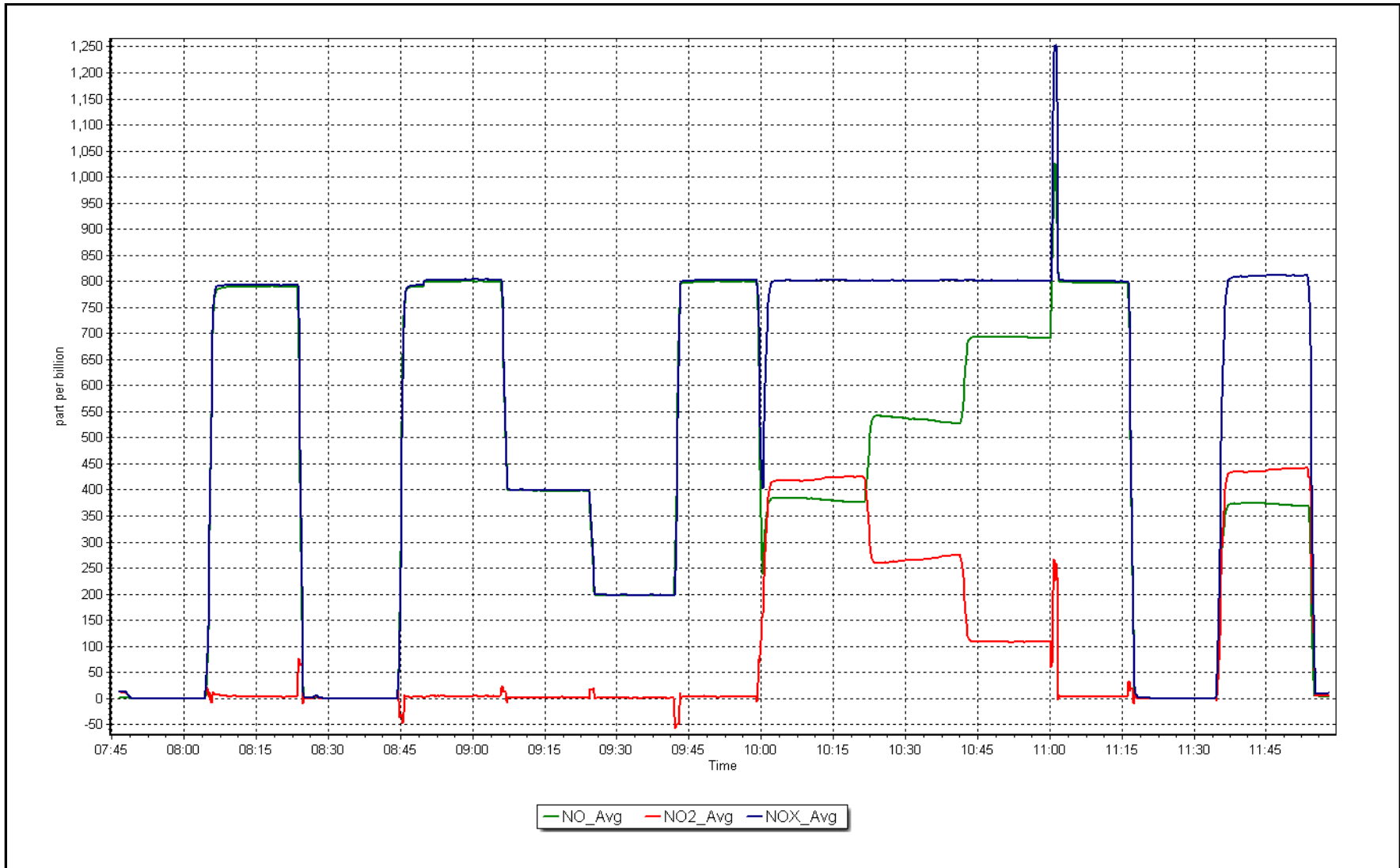
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 19, 2017

Location: Fort McKay South





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 14
ANZAC
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 676 | 35 | 44 | 98.75 | 10 | 0 | 2 | 0 |
| TRS(ppb) Average | 679 | 34 | 41 | 99.03 | 1 | 0 | 0 | 0 |
| THC(ppm) Average | 672 | 35 | 48 | 98.19 | 2.4 | - | 2.1 | - |
| NMHC(ppm) Average | 672 | 35 | 48 | 98.19 | 0.273 | - | 0.078 | - |
| CH4(ppm) Average | 672 | 35 | 48 | 98.19 | 2.2 | - | 2.1 | - |
| NO2(ppb) Average | 676 | 35 | 44 | 98.75 | 9 | 0 | 4 | - |
| NO(ppb) Average | 676 | 35 | 44 | 98.75 | 5 | - | 1 | - |
| NOX(ppb) Average | 676 | 35 | 44 | 98.75 | 12 | - | 5 | - |
| O3(ppb) Average | 680 | 33 | 40 | 99.03 | 69 | 0 | 46 | - |
| PM2.5(ug/m3) Average | 707 | 2 | 13 | 98.47 | 49.1 | - | 19.6 | 0 |
| AT 2m(C) Average | 720 | 0 | 0 | 100 | 30.1 | - | 21.9 | - |
| RH(%) Average | 720 | 0 | 0 | 100 | 98 | - | 96 | - |
| Leaf Wetness (% of range) Average | 686 | 0 | 34 | 95.28 | 44 | - | 28 | - |
| WS(km/h) Average | 719 | 0 | 1 | 99.86 | 25 | - | 18 | - |
| WD(deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |
| PC(mm) Total | 720 | 0 | 0 | 100 | 0.8 | - | 2.5 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2(ppb) Average | 676 | 0.4 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 10 |
| TRS(ppb) Average | 679 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC(ppm) Average | 672 | 2.01 | 0.1 | - | 1.9 | 1.9 | 2 | 2 | 2 | 2.1 | 2.4 |
| NMHC (ppm) Average | 672 | 0.018 | 0.038 | - | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.273 |
| CH4(ppm) Average | 672 | 1.99 | 0.1 | - | 1.9 | 1.9 | 2 | 2 | 2 | 2.1 | 2.2 |
| NO2(ppb) Average | 676 | 1.4 | 1 | - | 0 | 0 | 0 | 1 | 2 | 3 | 9 |
| NO(ppb) Average | 676 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| NOX(ppb) Average | 676 | 1.7 | 2 | - | 0 | 0 | 1 | 1 | 2 | 4 | 12 |
| O3(ppb) Average | 680 | 26.9 | 10 | - | 4 | 14 | 21 | 27 | 33 | 37 | 69 |
| PM2.5(ug/m3) Average | 707 | 6.08 | 6.6 | - | 0.9 | 1.7 | 2.4 | 4.1 | 7.3 | 11.5 | 49.1 |
| Temperature 2 m (C) Average | 720 | 11.75 | 6.4 | - | -2.2 | 3.4 | 6.5 | 11.9 | 15.8 | 20.3 | 30.1 |
| Relative Humidity (%) Average | 720 | 67.1 | 20 | - | 24 | 38 | 51 | 68 | 83 | 95 | 98 |
| Leaf Wetness (% of range) Average | 686 | 3.5 | 8 | - | -1 | 0 | 0 | 0 | 1 | 14 | 44 |
| Wind Speed 20 m (km/h) Average | 719 | 10.1 | 5 | - | 0 | 4 | 6 | 10 | 14 | 16 | 25 |
| Wind Direction 20 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |
| Precipitation (mm) Total | 720 | - | - | 5.08 | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-------------------------------|-------------------|-------------------|------------------|---|
| O3, PM2.5, TRS | 03 Sep 2017 12:00 | 03 Sep 2017 14:00 | 3 | Station power failure |
| NOX, SO2, THC | 03 Sep 2017 12:00 | 03 Sep 2017 15:00 | 4 | Station power failure |
| NOX, O3, PM2.5, SO2, THC, TRS | 13 Sep 2017 16:00 | 13 Sep 2017 17:00 | 2 | Station power failure |
| NOX, SO2, THC | 14 Sep 2017 08:00 | 14 Sep 2017 10:00 | 3 | Station power failure |
| O3, PM2.5, TRS | 14 Sep 2017 08:00 | 14 Sep 2017 09:00 | 2 | Station power failure |
| THC | 06 Sep 2017 05:00 | 06 Sep 2017 05:00 | 1 | DAS collection error |
| THC | 13 Sep 2017 16:00 | 13 Sep 2017 18:00 | 3 | Station power failure |
| THC | 29 Sep 2017 14:00 | 29 Sep 2017 15:00 | 2 | Maintenance - replaced carrier gas |
| PM2.5 | 11 Sep 2017 08:00 | 11 Sep 2017 08:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 14 Sep 2017 21:00 | 14 Sep 2017 21:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 25 Sep 2017 11:00 | 25 Sep 2017 11:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 26 Sep 2017 20:00 | 26 Sep 2017 20:00 | 1 | Unstable operation - excessive baseline drift |
| Surface Leaf Wetness | 29 Sep 2017 15:00 | 01 Oct 2017 00:00 | 34 | DAS collection error |
| Wind Speed, Wind Direction | 23 Sep 2017 00:00 | 23 Sep 2017 00:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Anzac - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 10 ppb on Sep 8 13:00 | Maximum Daily Average: 1.6 ppb on Sep 8 | | Hours of Data: | 676 |
| Minimum Value: 0 ppb on Sep 13 08:00 | Minimum Daily Average: 0.1 ppb on Sep 26 | | Hours of Missing Data: | 44 |
| Maximum Diurnal Average: 0.8 ppb at hour 13 | Minimum Diurnal Average: 0.3 ppb at hour 1 | | Hours of Calibration: | 35 |
| Monthly Average: 0.4 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 4 | | Percent Operational Time: | 98.8 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | PF | PF | PF | PF | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 0.6 | 5 |
| 4-Sep | Z | 4 | 1 | 1 | 1 | 0 | 1 | 1 | 5 | 7 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 7 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.8 | 3 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 7-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 0 | C | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 0 | 1 | 1 | 1 | 10 | 8 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 2 | 1.6 | 10 | |
| 9-Sep | 1 | 0 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0.5 | 2 |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 1 | 0 | 0 | 0.4 | 4 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | PF | PF | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | PF | PF | PF | 0 | 1 | 2 | 1 | 1 | 3 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0.8 | 3 |
| 15-Sep | 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 |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 17-Sep | 1 | Z | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 18-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 22-Sep | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 25-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 26-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |

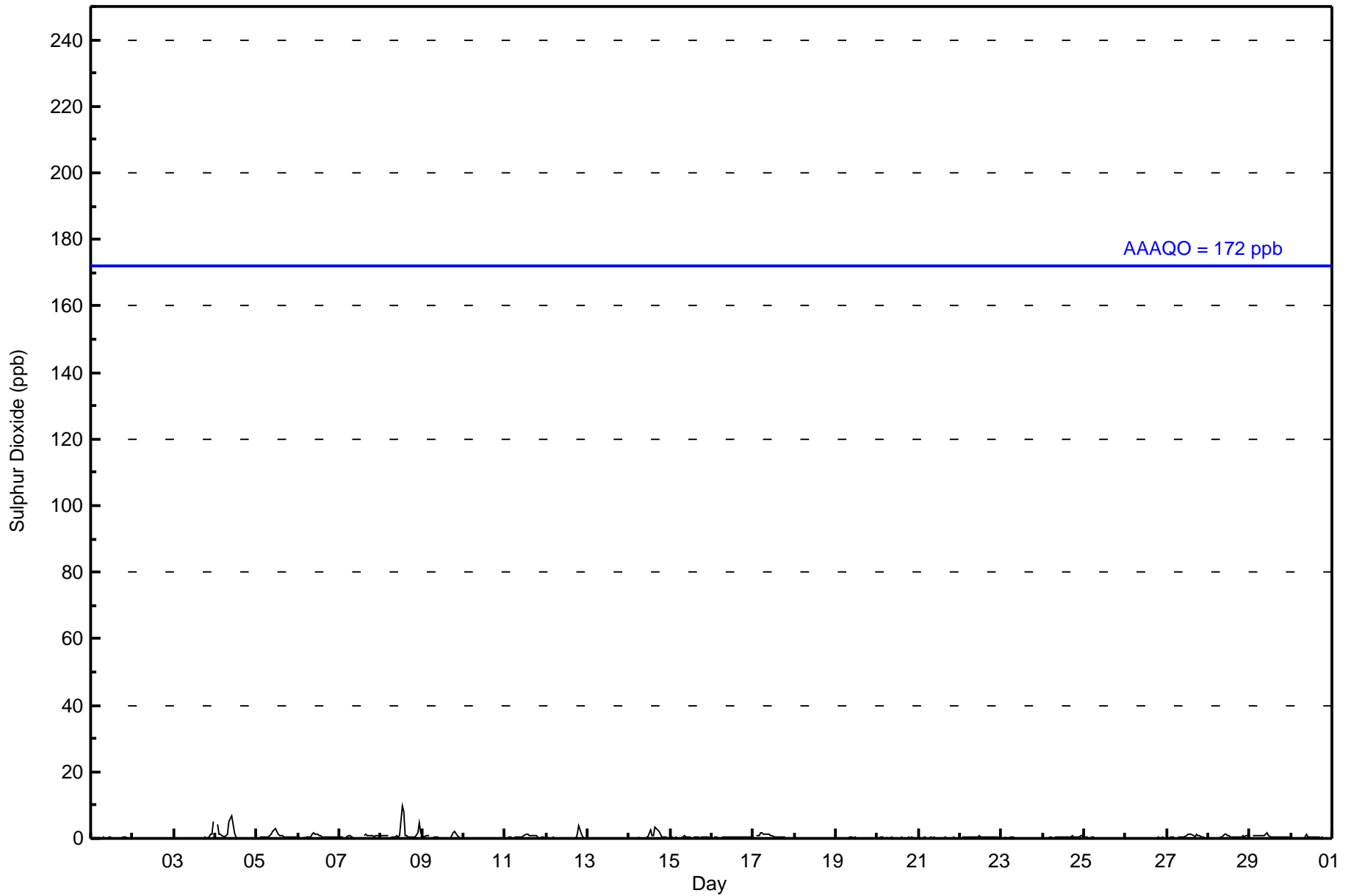
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| 0.3 | 0.4 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.5 | 0.8 | 0.6 | 0.5 | 0.8 | 0.6 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.5 | Diurnal Average |
| 1 | 4 | 1 | 1 | 2 | 2 | 1 | 1 | 5 | 7 | 4 | 3 | 10 | 8 | 1 | 3 | 3 | 2 | 2 | 4 | 1 | 2 | 5 | 5 | Diurnal Maximum | |

Z - zerspan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Anzac - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 676 | 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: 676

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Anzac - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | Totals |
| 0 - 10 | 35 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |
| 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 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |

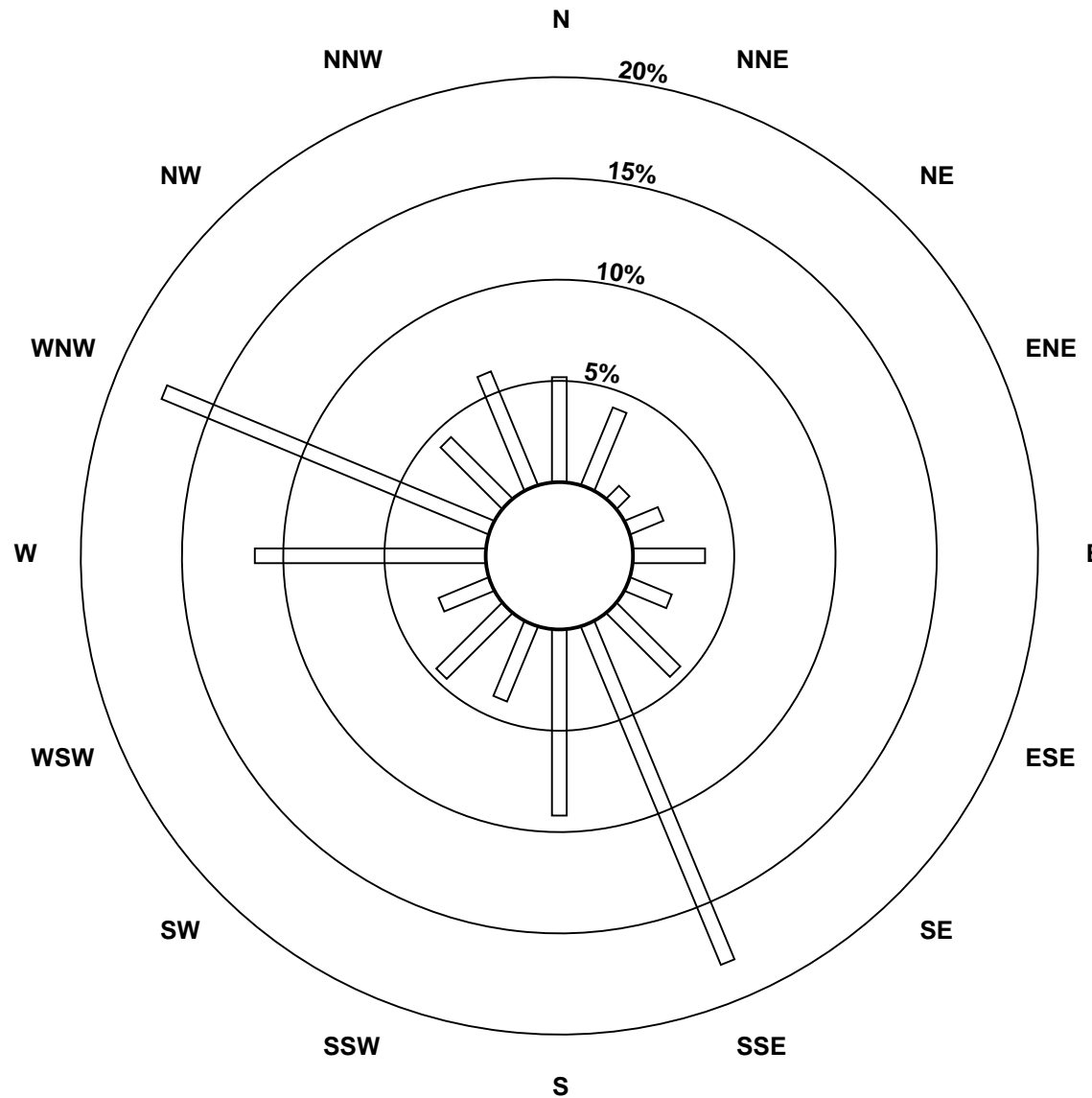
Total Number of Valid Hours: 675

Total Number of Hours: 720

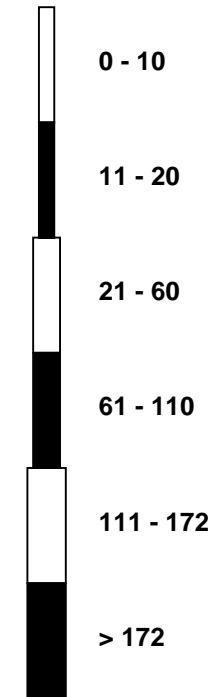


Wood Buffalo Environmental Association
Wind Rose Sep 2017

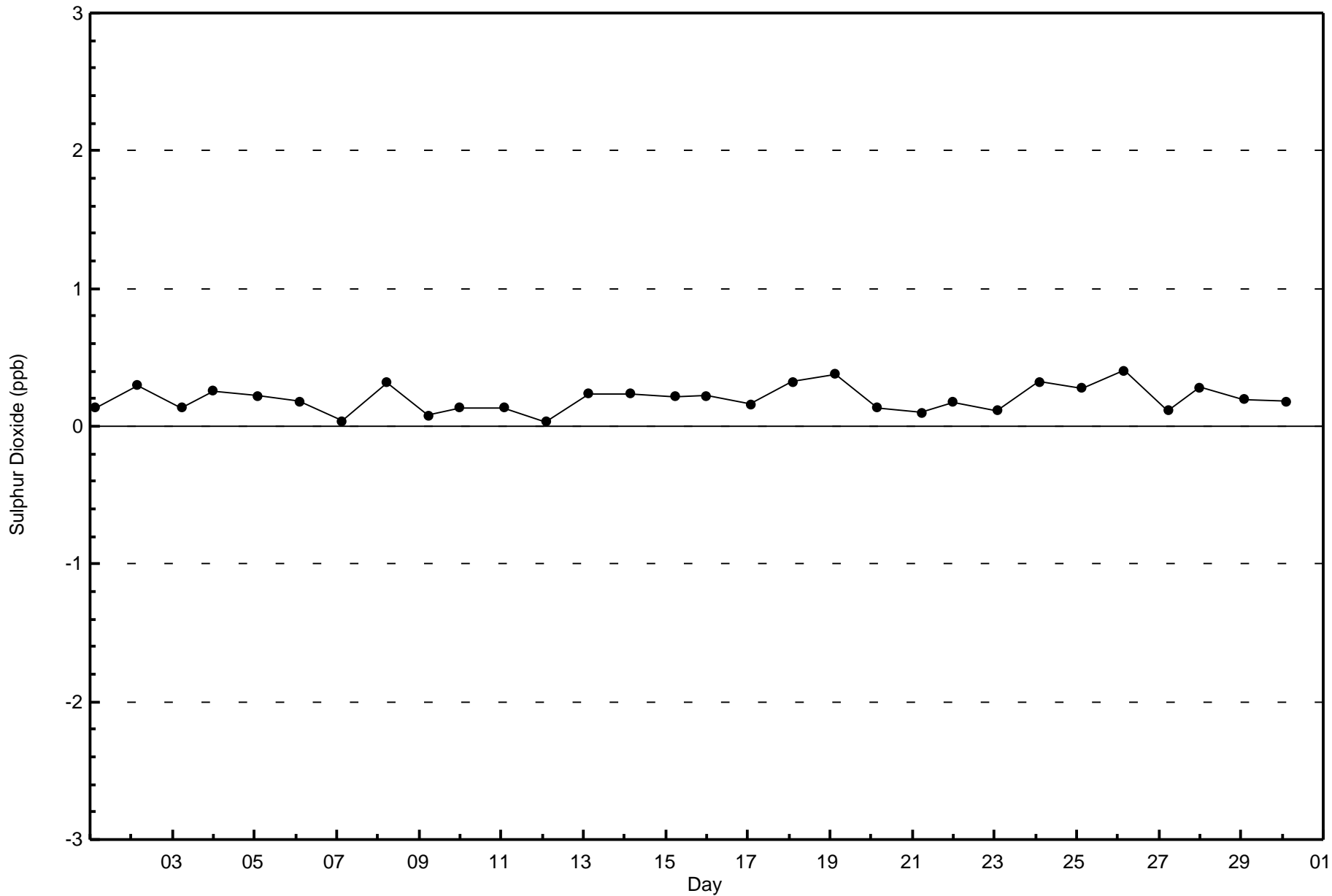
Sulphur Dioxide (SO₂) - ppb
Anzac (AMS 14)

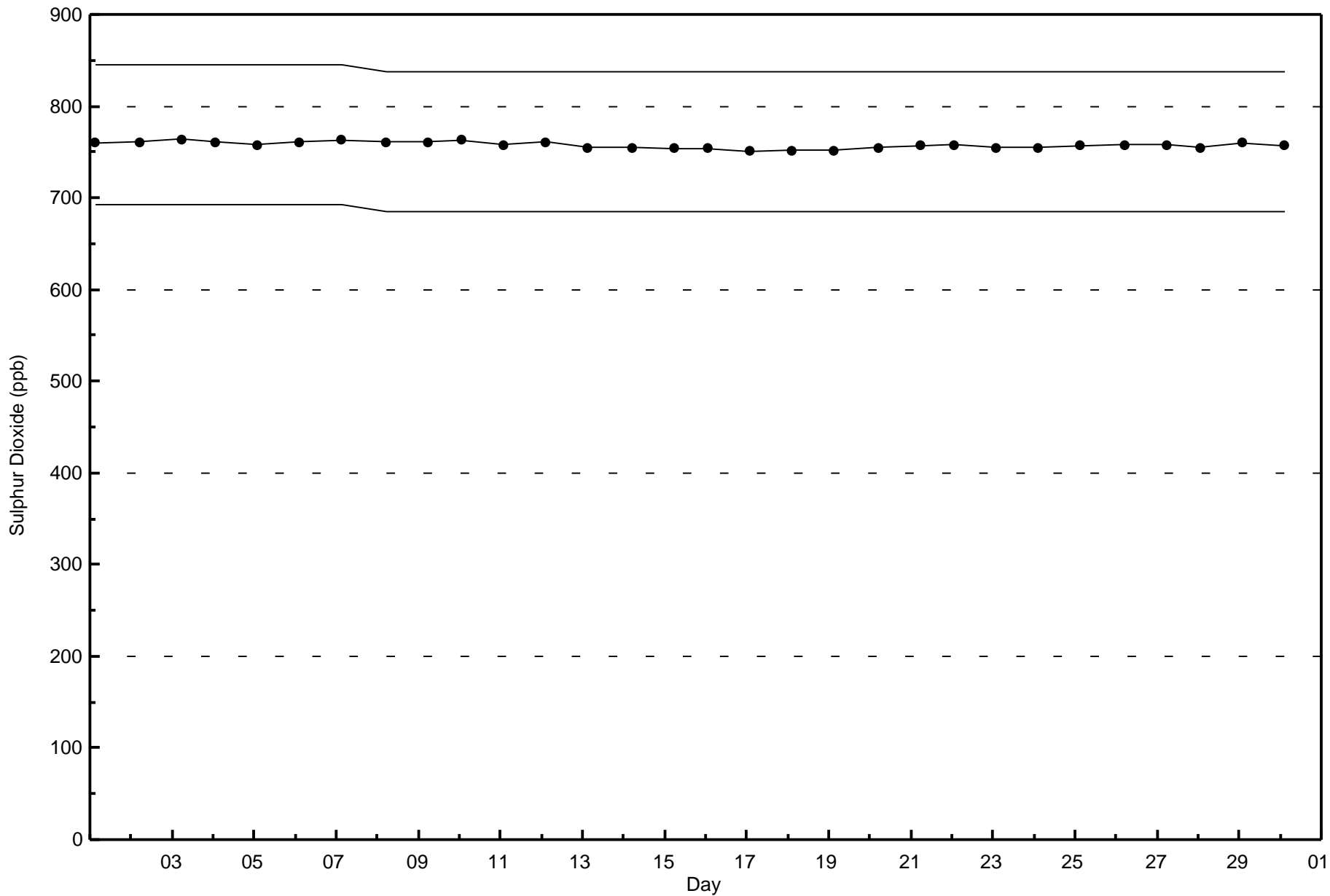


Classes (ppb)



Total Number of Valid Hours: 675

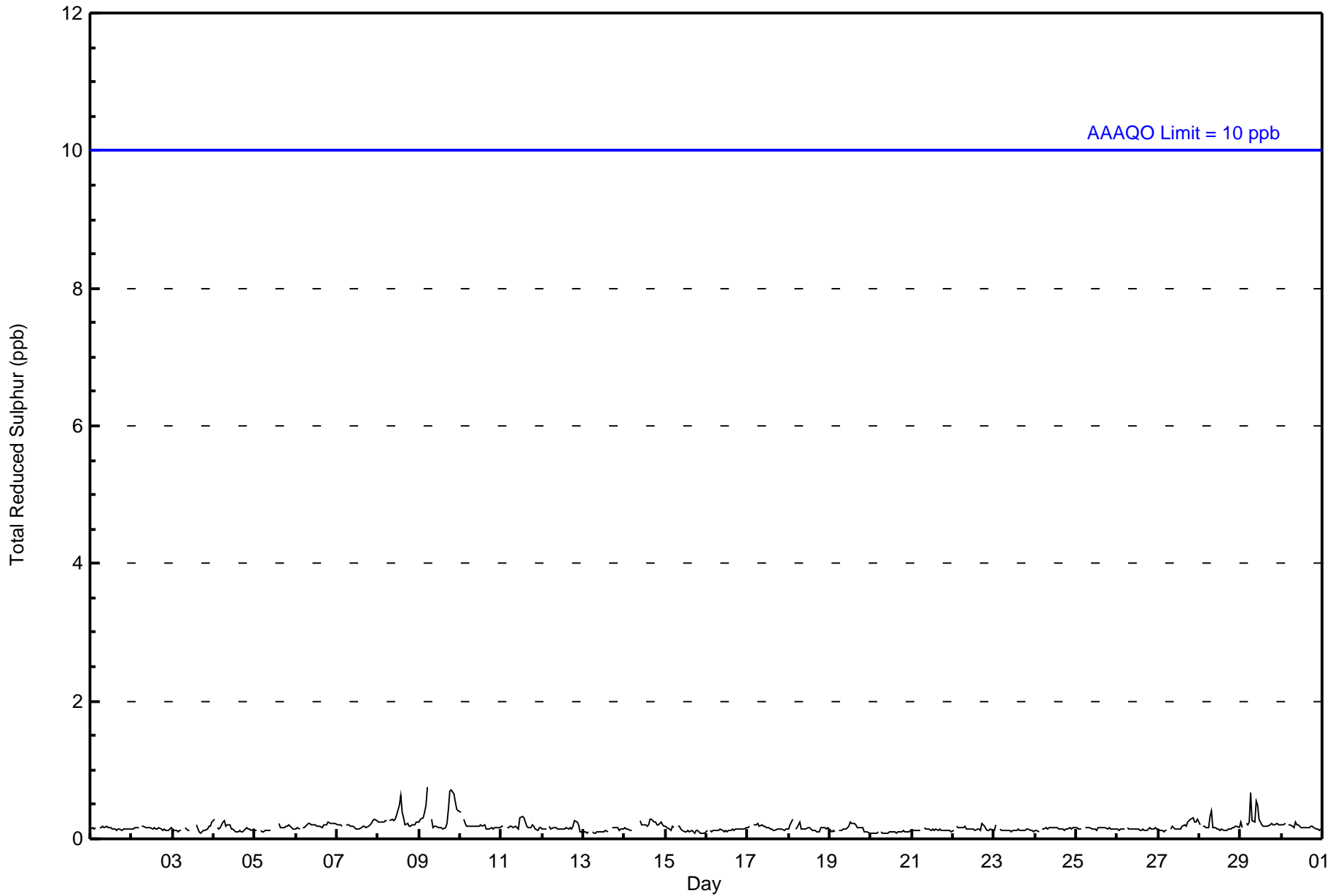






Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Anzac - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 679 | 100.00 | 100.00 |
| 3 - 4 | 0 | 0.00 | 100.00 |
| 5 - 7 | 0 | 0.00 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 679

Total Number of Hours: 720



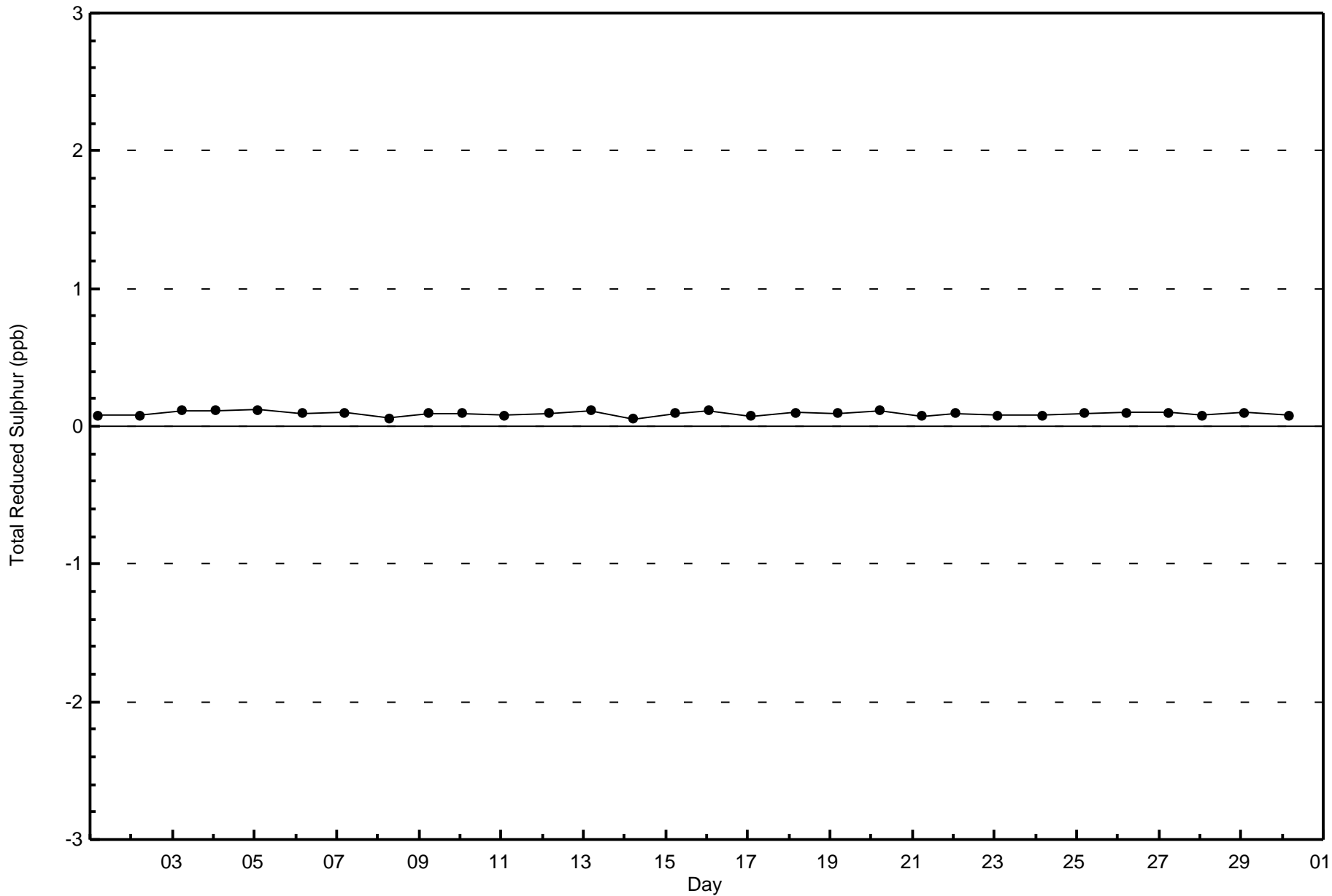
Wood Buffalo Environmental Association
Frequency Distribution

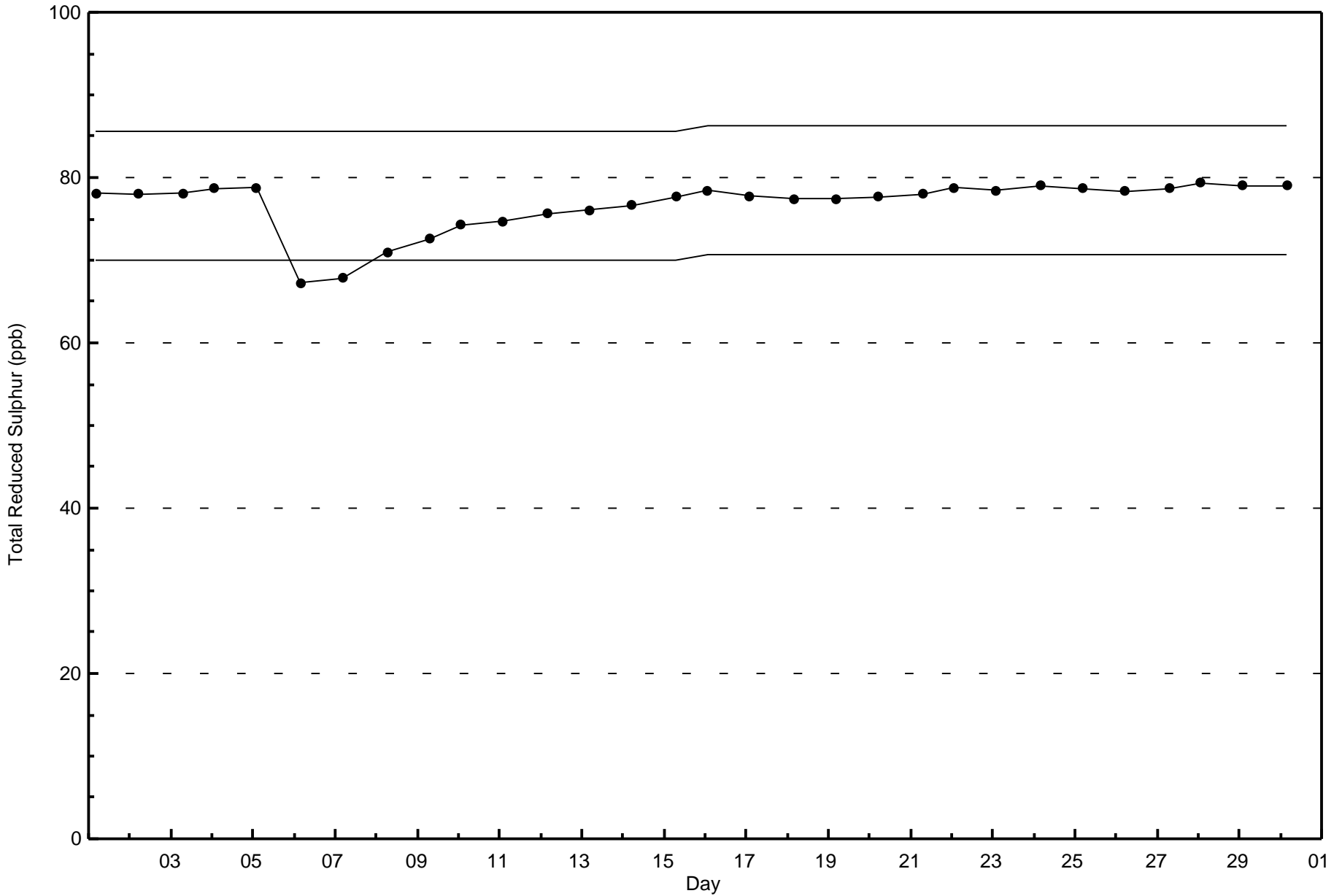
Total Reduced Sulphur (TRS) - ppb
Anzac - September 2017

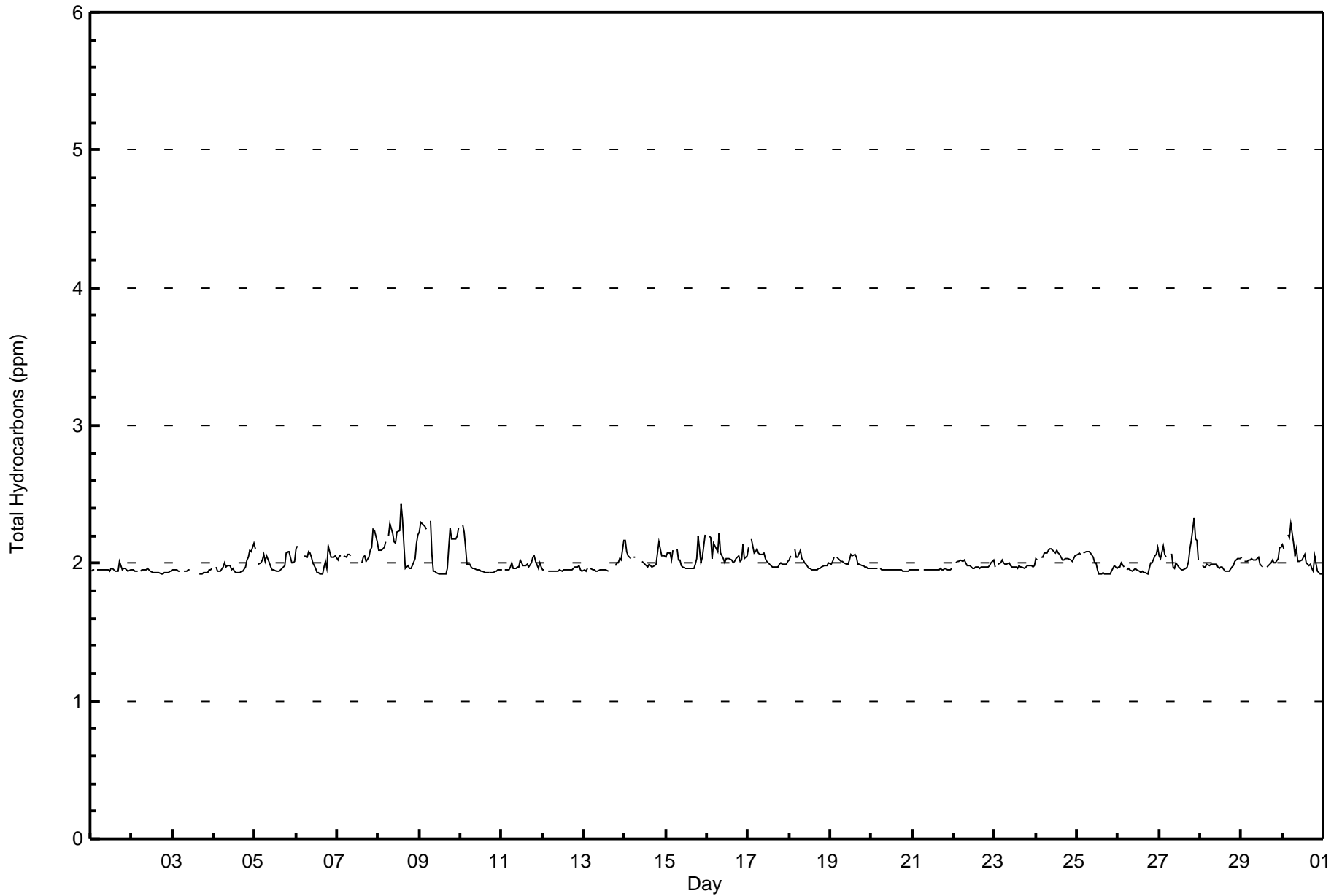
| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 34 | 28 | 6 | 12 | 24 | 15 | 31 | 120 | 66 | 28 | 32 | 19 | 76 | 115 | 30 | 42 | 678 |
| 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 | 34 | 28 | 6 | 12 | 24 | 15 | 31 | 120 | 66 | 28 | 32 | 19 | 76 | 115 | 30 | 42 | 678 |

Total Number of Valid Hours: 678

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 526 | 78.27 | 78.27 |
| 2.1 - 3.0 | 146 | 21.73 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 672

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Anzac - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 31 | 27 | 5 | 8 | 21 | 15 | 27 | 74 | 39 | 16 | 19 | 13 | 72 | 99 | 25 | 34 | 525 |
| 2.1 - 3.0 | 4 | 1 | 1 | 3 | 3 | 0 | 3 | 48 | 21 | 11 | 12 | 5 | 5 | 18 | 4 | 7 | 146 |
| 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 | 35 | 28 | 6 | 11 | 24 | 15 | 30 | 122 | 60 | 27 | 31 | 18 | 77 | 117 | 29 | 41 | 671 |

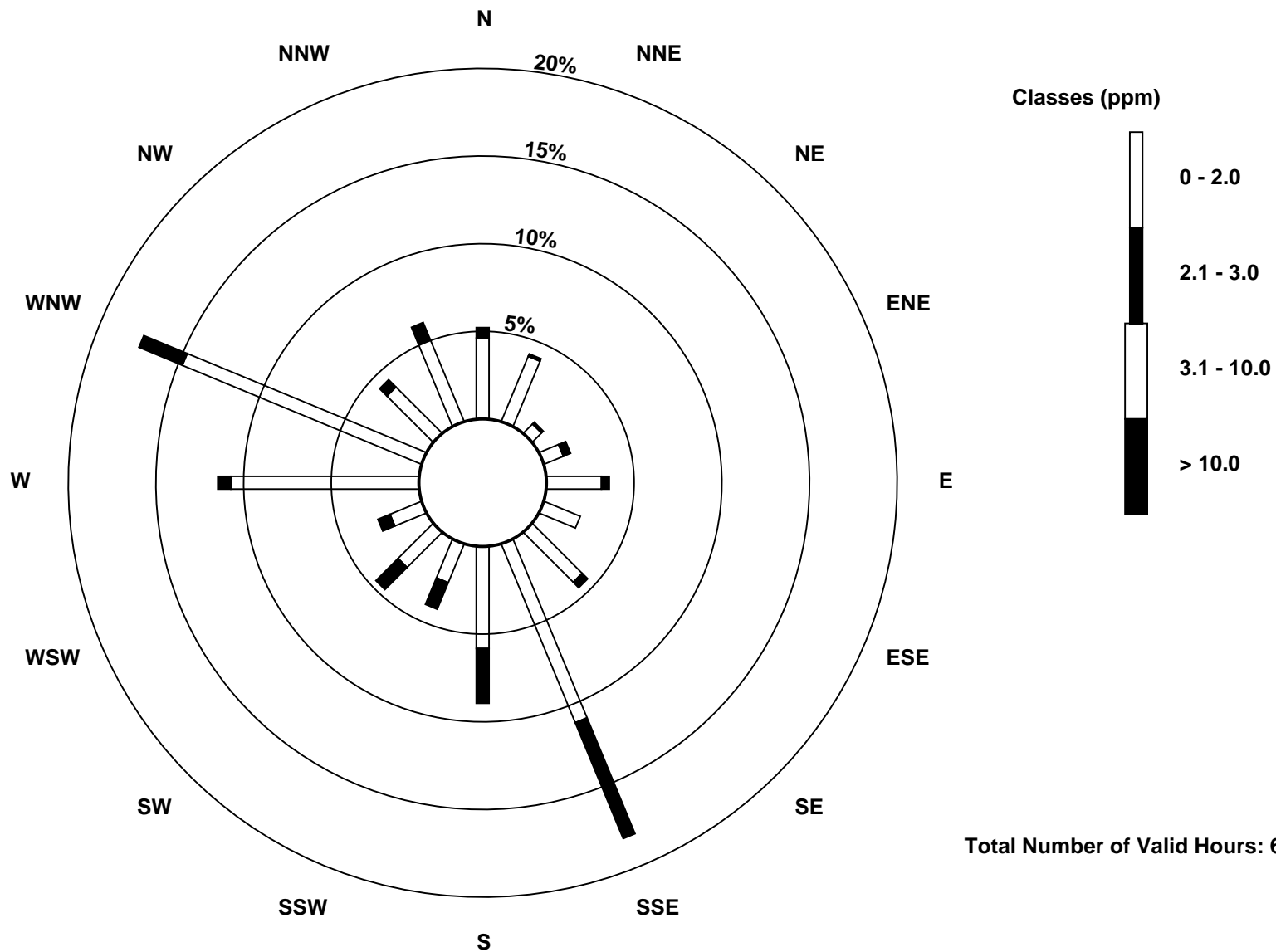
Total Number of Valid Hours: 671

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)



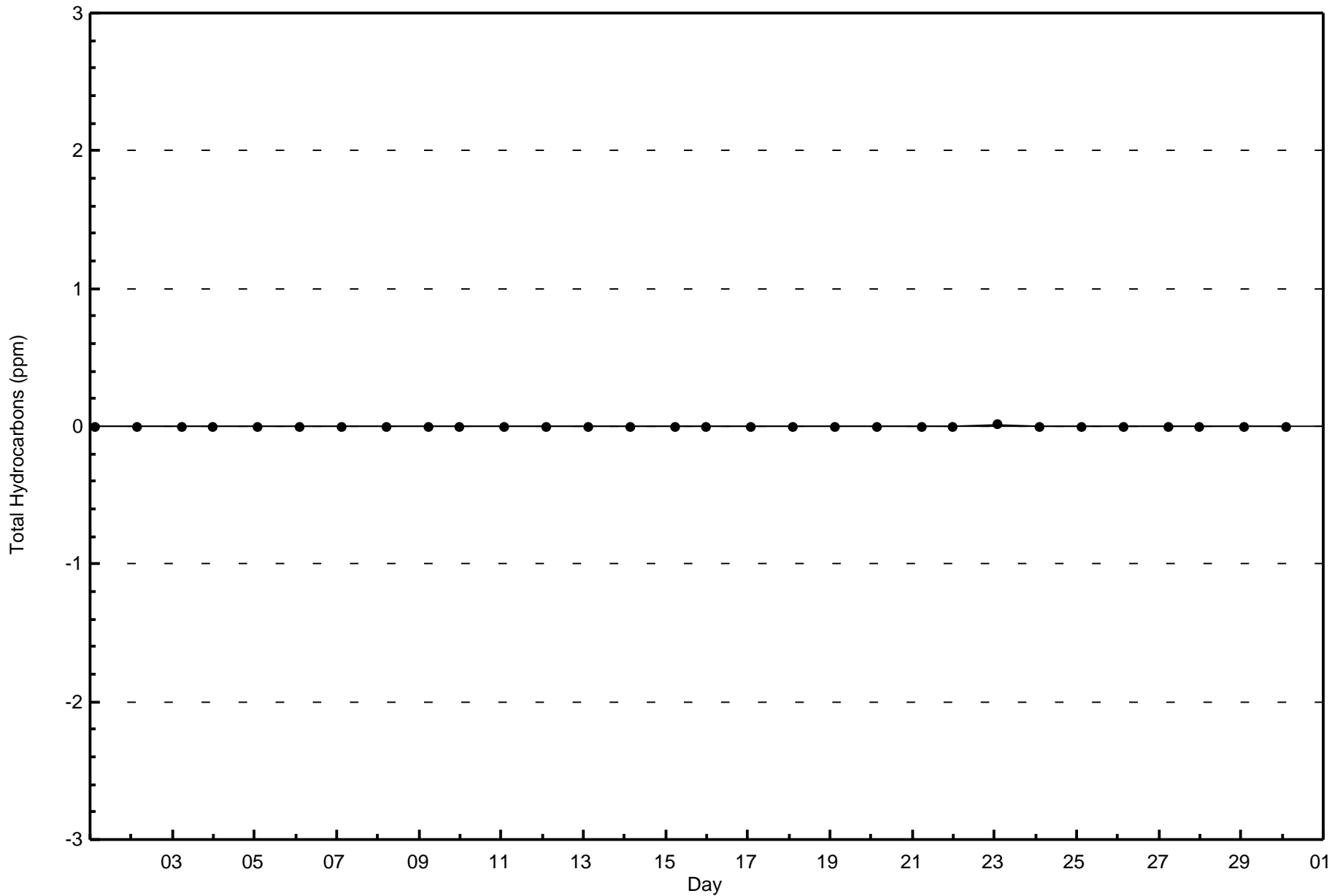


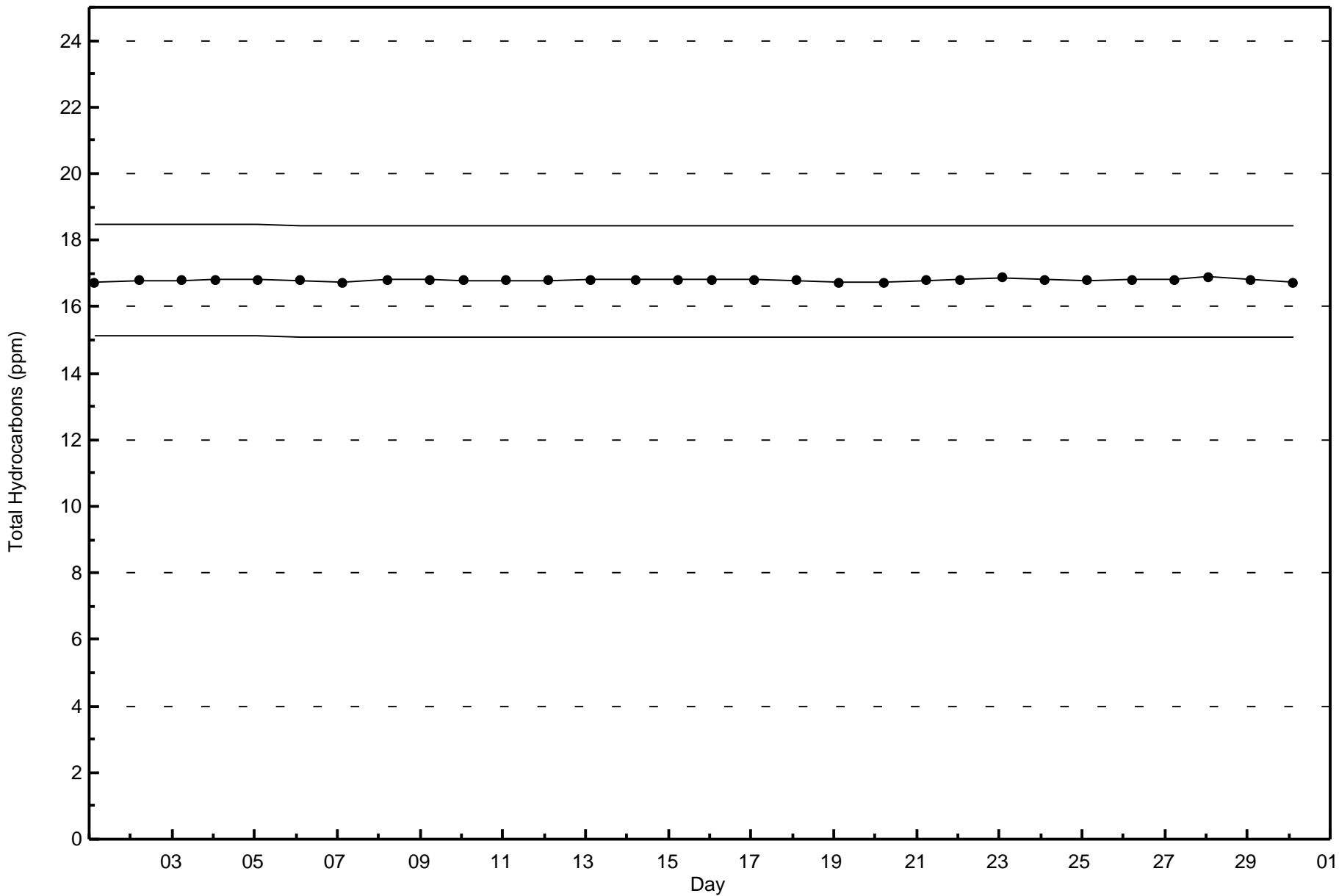
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Anzac - September 2017



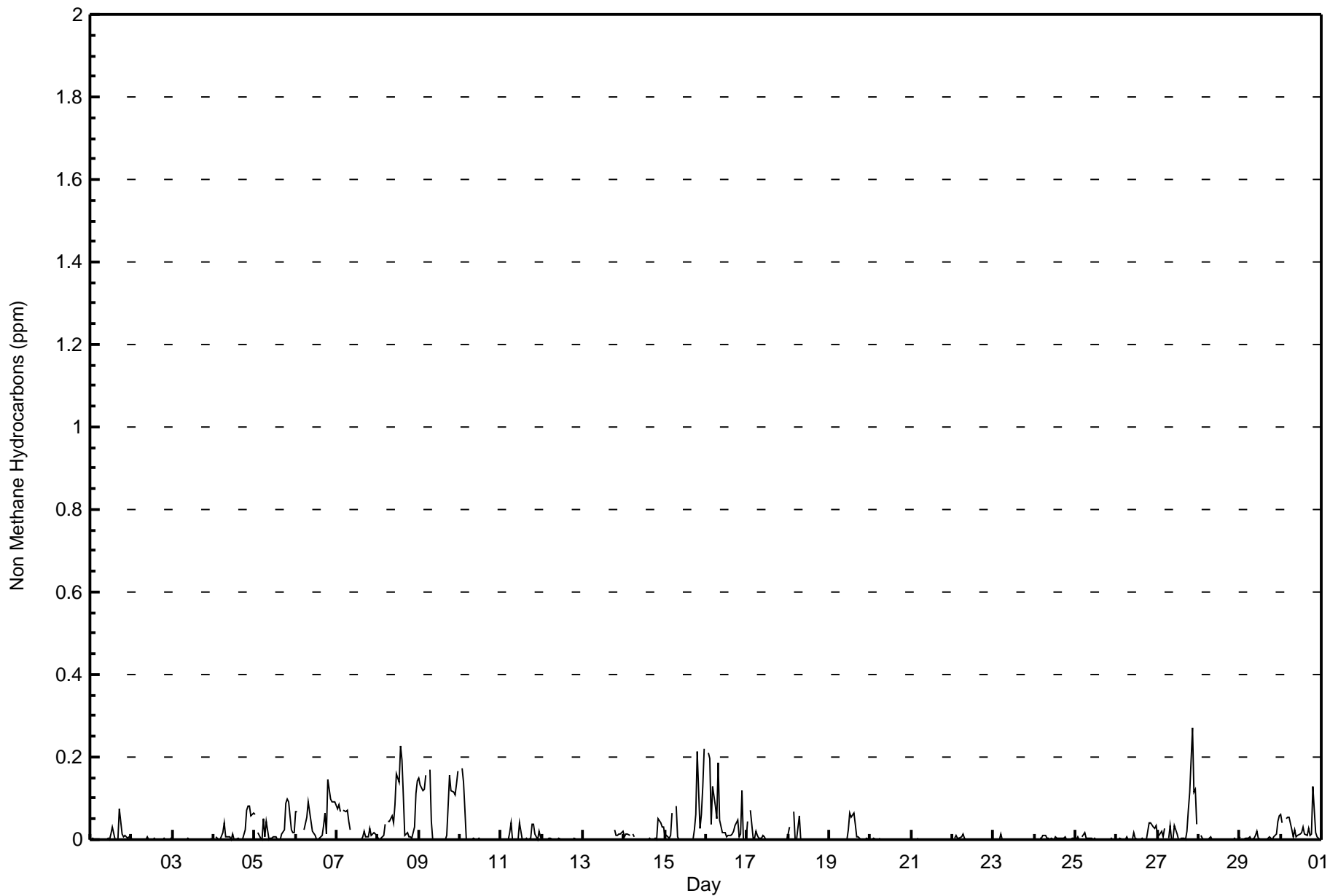




Summary of Hour Averages

Anzac - September 2017

| Maximum Value: 0.273 ppm on Sep 27 21:00 | | Maximum Daily Average: 0.078 ppm on Sep 9 | | Hours in Service: | 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|-----------------|---------------------------|-------|-----------------|-------|-------|------------------|-------|-------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|---------------|---------------|-------|-------|--|-------|--|-------|--|-------|--|-------|--|-------|--|-------|--|-------|--|-------|--|-------|--|
| Minimum Value: 0.000 ppm on Sep 1 01:00 | | Minimum Daily Average: 0.000 ppm on Sep 21 | | Hours of Data: | 672 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.035 ppm at hour 20 | | Minimum Diurnal Average: 0.005 ppm at hour 17 | | Hours of Missing Data: | 48 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.018 ppm | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.2 | | Hours of Calibration: | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: | 98.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 0.000 | 0.002 | 0.000 | Z | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.014 | 0.029 | 0.001 | 0.001 | 0.000 | 0.075 | 0.013 | 0.008 | 0.011 | 0.006 | 0.004 | 0.010 | 0.008 | 0.075 | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 0.002 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.001 | 0.001 | 0.001 | 0.002 | 0.008 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.002 | 0.002 | 0.001 | 0.008 | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.002 | 0.001 | 0.000 | 0.000 | 0.005 | 0.000 | PF | PF | PF | PF | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.004 | 0.001 | 0.005 | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | Z | 0.008 | 0.003 | 0.000 | 0.000 | 0.016 | 0.041 | 0.006 | 0.007 | 0.006 | 0.000 | 0.015 | 0.001 | 0.000 | 0.002 | 0.001 | 0.000 | 0.000 | 0.024 | 0.072 | 0.082 | 0.081 | 0.059 | 0.065 | 0.021 | 0.082 | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0.060 | Z | 0.017 | 0.005 | 0.000 | 0.049 | 0.005 | 0.043 | 0.001 | 0.002 | 0.004 | 0.006 | 0.005 | 0.001 | 0.001 | 0.000 | 0.015 | 0.024 | 0.087 | 0.099 | 0.092 | 0.024 | 0.016 | 0.016 | 0.025 | 0.099 | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 0.069 | 0.069 | Z | 0.027 | DF | 0.025 | 0.054 | 0.091 | 0.067 | 0.045 | 0.022 | 0.011 | 0.000 | 0.001 | 0.005 | 0.009 | 0.033 | 0.065 | 0.015 | 0.144 | 0.097 | 0.093 | 0.093 | 0.092 | 0.051 | 0.144 | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 0.073 | 0.086 | 0.069 | Z | 0.070 | 0.069 | 0.071 | 0.043 | 0.023 | C | C | C | C | C | 0.001 | 0.006 | 0.019 | 0.007 | 0.006 | 0.027 | 0.012 | 0.015 | 0.017 | 0.010 | 0.035 | 0.086 | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 0.003 | 0.001 | 0.005 | 0.010 | 0.037 | Z | 0.045 | 0.044 | 0.058 | 0.041 | 0.085 | 0.161 | 0.140 | 0.229 | 0.194 | 0.106 | 0.010 | 0.018 | 0.006 | 0.008 | 0.003 | 0.031 | 0.111 | 0.143 | 0.065 | 0.229 | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 0.148 | 0.132 | 0.118 | 0.121 | 0.158 | Z | 0.171 | 0.046 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.083 | 0.155 | 0.117 | 0.116 | 0.110 | 0.135 | 0.165 | 0.078 | 0.171 | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | Z | 0.174 | 0.140 | 0.073 | 0.001 | 0.000 | 0.002 | 0.000 | 0.004 | 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 | 0.017 | 0.174 | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0.000 | Z | 0.001 | 0.000 | 0.002 | 0.016 | 0.042 | 0.000 | 0.000 | 0.000 | 0.000 | 0.040 | 0.000 | 0.001 | 0.000 | 0.004 | 0.000 | 0.003 | 0.037 | 0.037 | 0.013 | 0.000 | 0.020 | 0.008 | 0.010 | 0.042 | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0.000 | 0.000 | Z | 0.001 | 0.002 | 0.002 | 0.001 | 0.000 | 0.000 | 0.001 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.004 | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0.001 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | PF | PF | PF | 0.024 | 0.011 | 0.011 | 0.012 | 0.014 | 0.019 | 0.005 | 0.024 | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 0.008 | 0.015 | 0.015 | 0.009 | Z | 0.014 | 0.006 | PF | PF | PF | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.002 | 0.000 | 0.001 | 0.002 | 0.001 | 0.049 | 0.039 | 0.031 | 0.029 | 0.011 | 0.049 | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 0.008 | 0.009 | 0.002 | 0.010 | 0.064 | Z | 0.081 | 0.006 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.025 | 0.060 | 0.213 | 0.027 | 0.062 | 0.129 | 0.220 | 0.040 | 0.220 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | Z | 0.212 | 0.195 | 0.036 | 0.128 | 0.081 | 0.051 | 0.187 | 0.046 | 0.016 | 0.016 | 0.017 | 0.008 | 0.011 | 0.012 | 0.012 | 0.019 | 0.034 | 0.047 | 0.005 | 0.014 | 0.118 | 0.001 | 0.000 | 0.055 | 0.212 | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 0.044 | Z | 0.070 | 0.004 | 0.003 | 0.021 | 0.009 | 0.003 | 0.004 | 0.010 | 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 | 0.008 | 0.070 | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0.013 | 0.032 | Z | 0.068 | 0.000 | 0.000 | 0.059 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 | 0.068 | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.024 | 0.065 | 0.056 | 0.066 | 0.037 | 0.008 | 0.006 | 0.001 | 0.000 | 0.000 | 0.004 | 0.000 | 0.012 | 0.066 | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 0.000 | 0.000 | 0.002 | 0.000 | Z | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.003 | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | Z | 0.005 | 0.009 | 0.002 | 0.004 | 0.006 | 0.012 | 0.004 | 0.002 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.012 | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0.001 | Z | 0.000 | 0.001 | 0.015 | 0.002 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.015 | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0.002 | 0.001 | Z | 0.004 | 0.003 | 0.009 | 0.009 | 0.003 | 0.003 | 0.001 | 0.003 | 0.000 | 0.008 | 0.004 | 0.004 | 0.002 | 0.005 | 0.005 | 0.005 | 0.000 | 0.000 | 0.000 | 0.002 | 0.003 | 0.003 | 0.009 | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 0.001 | 0.006 | 0.002 | Z | 0.008 | 0.017 | 0.005 | 0.005 | 0.004 | 0.003 | 0.001 | 0.004 | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.003 | 0.017 | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 0.000 | 0.000 | 0.003 | 0.000 | Z | 0.000 | 0.006 | 0.000 | 0.001 | 0.000 | 0.017 | 0.004 | 0.002 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.022 | 0.042 | 0.042 | 0.029 | 0.026 | 0.035 | 0.010 | 0.042 | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 0.011 | 0.011 | 0.021 | 0.007 | 0.028 | Z | 0.004 | 0.033 | 0.000 | 0.000 | 0.034 | 0.013 | 0.000 | 0.001 | 0.003 | 0.003 | 0.000 | 0.019 | 0.072 | 0.116 | 0.273 | 0.114 | 0.121 | 0.037 | 0.040 | 0.273 | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | Z | 0.011 | 0.002 | 0.000 | 0.000 | 0.000 | 0.003 | 0.007 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.002 | 0.000 | 0.001 | 0.001 | 0.011 | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 0.006 | Z | 0.001 | 0.004 | 0.004 | 0.003 | 0.007 | 0.000 | 0.002 | 0.011 | 0.020 | 0.002 | 0.000 | M | M | 0.001 | 0.001 | 0.006 | 0.004 | 0.001 | 0.006 | 0.014 | 0.045 | 0.056 | 0.009 | 0.056 | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 0.062 | 0.042 | Z | 0.051 | 0.053 | 0.054 | 0.023 | 0.008 | 0.025 | 0.007 | 0.011 | 0.014 | 0.016 | 0.030 | 0.015 | 0.009 | 0.028 | 0.012 | 0.013 | 0.129 | 0.015 | 0.008 | 0.002 | 0.000 | 0.027 | 0.129 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| 0.020 | | 0.033 | | 0.027 | | 0.017 | | 0.023 | | 0.016 | | 0.024 | | 0.018 | | 0.009 | | 0.006 | | 0.008 | | 0.011 | | 0.010 | | 0.014 | | 0.011 | | 0.007 | | 0.005 | | 0.013 | | 0.020 | | 0.035 | | 0.029 | | 0.025 | | 0.028 | | 0.031 | |
| 0.148 | | 0.212 | | 0.195 | | 0.121 | | 0.158 | | 0.081 | | 0.171 | | 0.187 | | 0.067 | | 0.045 | | 0.085 | | 0.161 | | 0.140 | | 0.229 | | 0.194 | | 0.106 | | 0.033 | | 0.083 | | 0.155 | | 0.213 | | 0.273 | | 0.118 | | 0.135 | | 0.220 | |
| Z - zerspan | | | C - Calibration | | | M - Maintenance | | | DF - DAS Failure | | | PF - Power Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Anzac - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 427 | 63.54 | 63.54 |
| 0.006 - 0.05 | 167 | 24.85 | 88.39 |
| 0.06 - 0.1 | 64 | 9.52 | 97.92 |
| > 0.1 | 14 | 2.08 | 100.00 |

Total Number of Valid Hours: 672

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 31 | 27 | 4 | 7 | 17 | 14 | 18 | 80 | 23 | 10 | 12 | 8 | 55 | 73 | 20 | 27 | 426 |
| 0.006 - 0.05 | 0 | 1 | 1 | 2 | 4 | 1 | 8 | 28 | 24 | 11 | 17 | 10 | 18 | 29 | 6 | 7 | 167 |
| 0.06 - 0.1 | 3 | 0 | 0 | 2 | 3 | 0 | 4 | 11 | 11 | 6 | 2 | 0 | 3 | 13 | 2 | 4 | 64 |
| > 0.1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 1 | 2 | 1 | 3 | 14 |
| Totals | 35 | 28 | 6 | 11 | 24 | 15 | 30 | 122 | 60 | 27 | 31 | 18 | 77 | 117 | 29 | 41 | 671 |

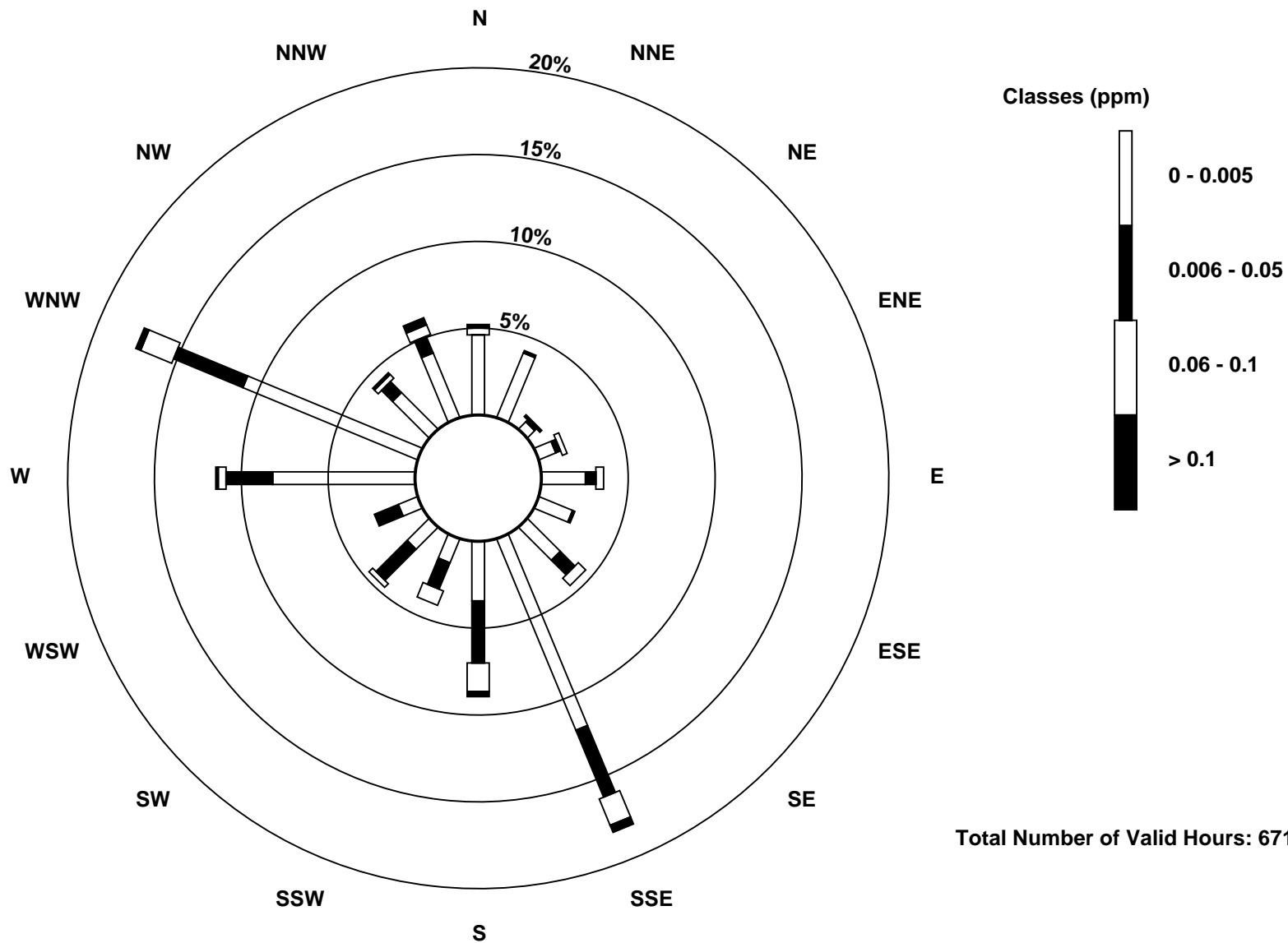
Total Number of Valid Hours: 671

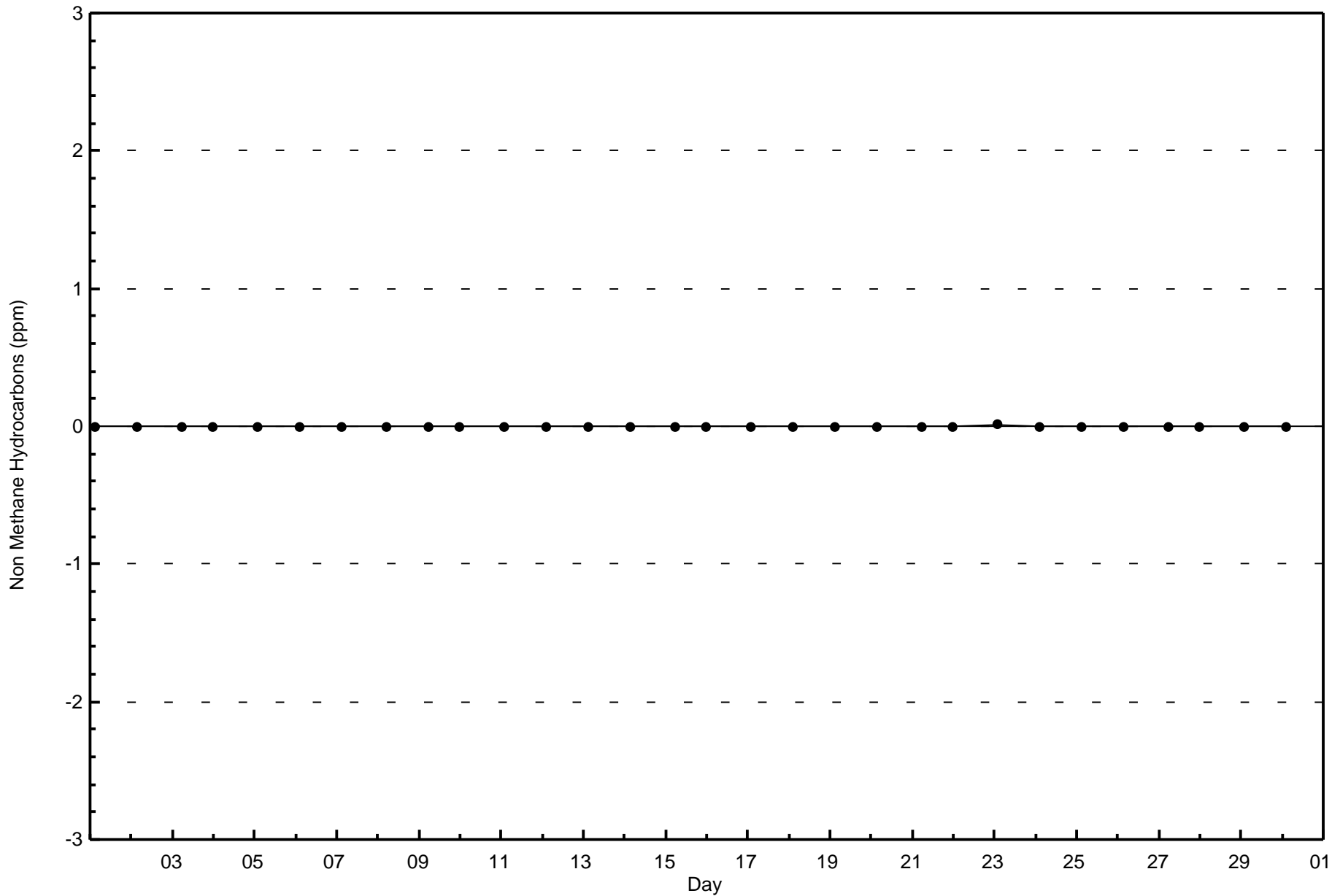
Total Number of Hours: 720

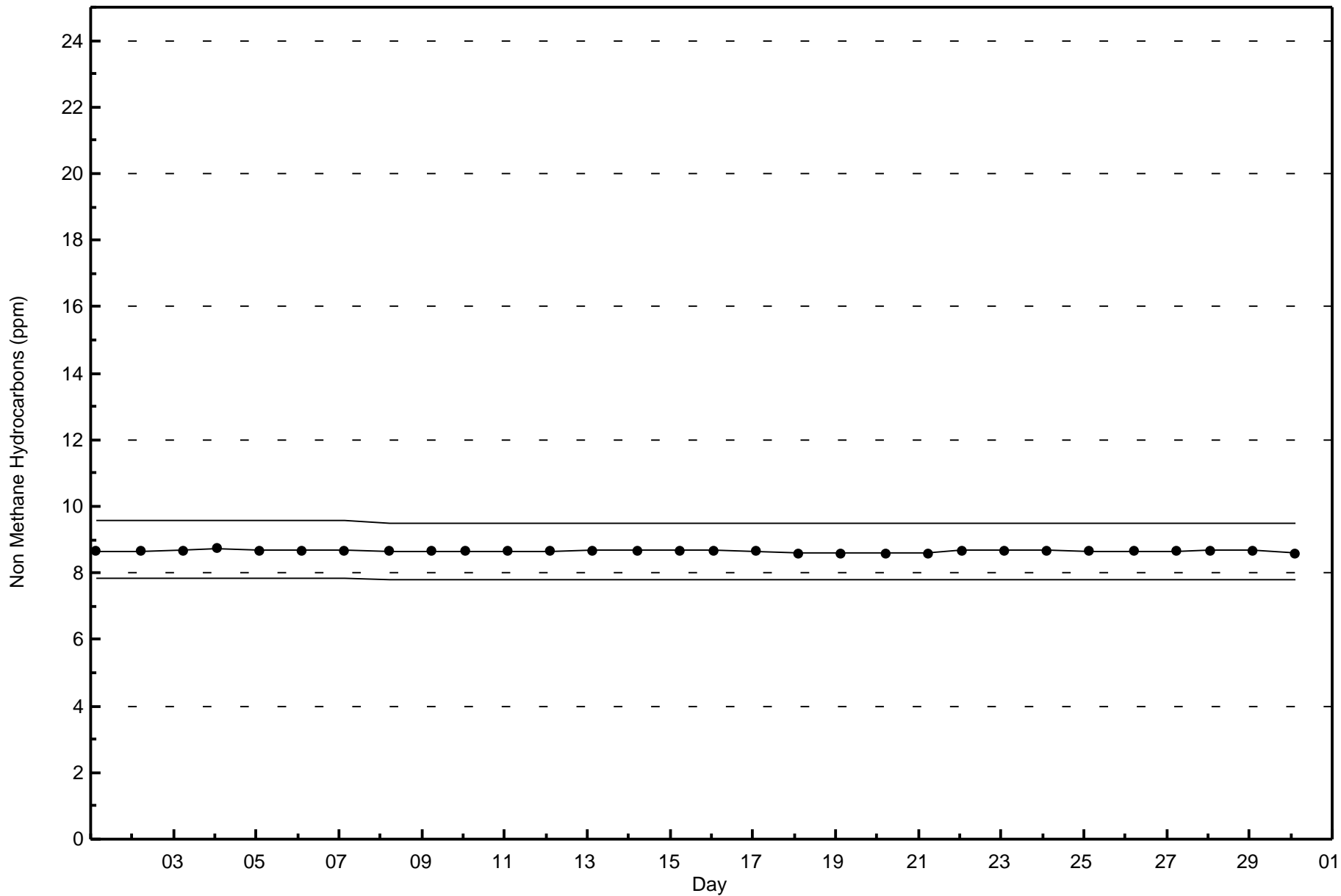


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Non Methane Hydrocarbons (NMHC) - ppm
Anzac (AMS 14)



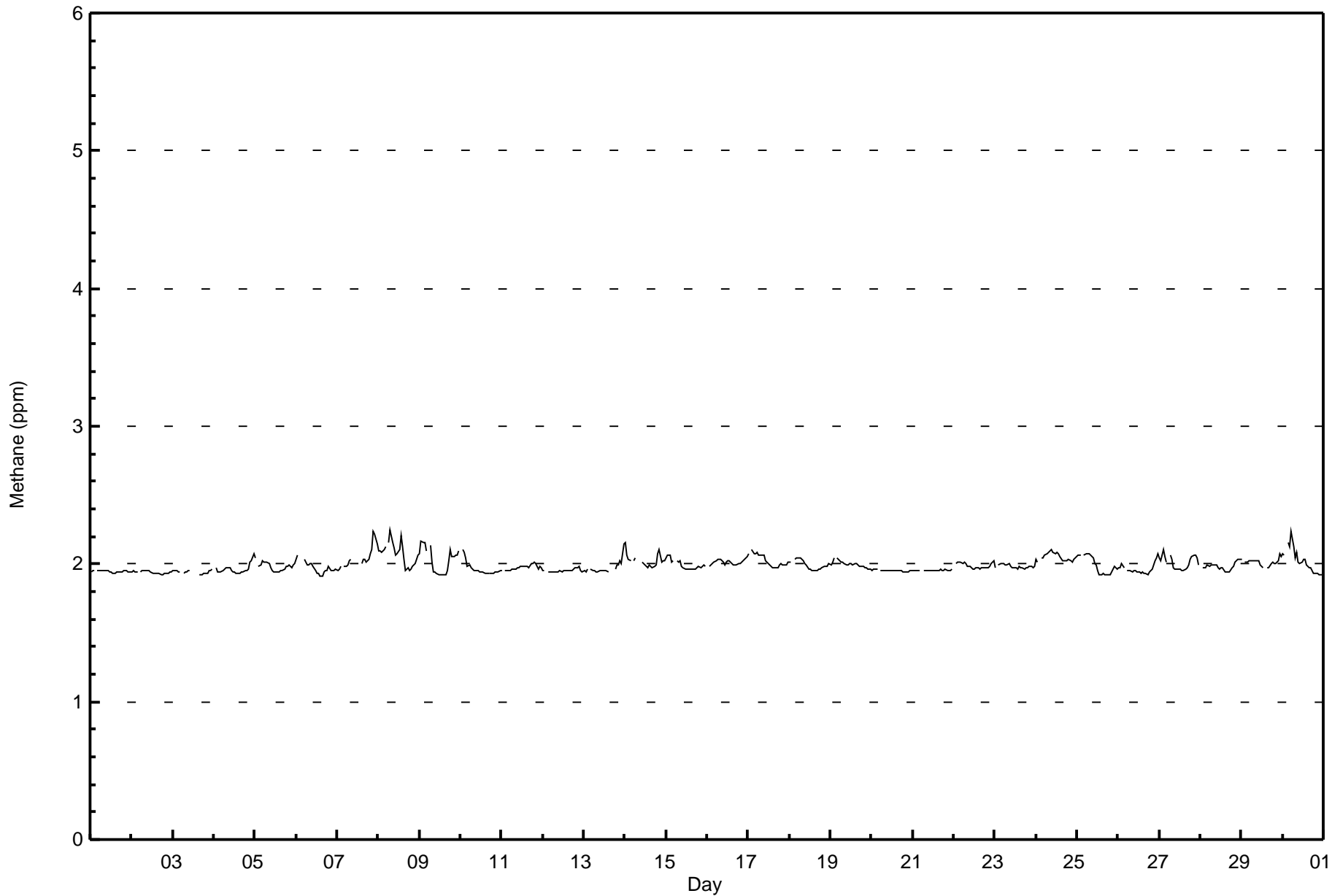






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Anzac - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Anzac - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 585 | 87.05 | 87.05 |
| 2.1 - 3.0 | 87 | 12.95 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 672

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Anzac - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 33 | 27 | 5 | 9 | 24 | 15 | 29 | 89 | 53 | 21 | 24 | 14 | 75 | 106 | 26 | 34 | 584 |
| 2.1 - 3.0 | 2 | 1 | 1 | 2 | 0 | 0 | 1 | 33 | 7 | 6 | 7 | 4 | 2 | 11 | 3 | 7 | 87 |
| 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 | 35 | 28 | 6 | 11 | 24 | 15 | 30 | 122 | 60 | 27 | 31 | 18 | 77 | 117 | 29 | 41 | 671 |

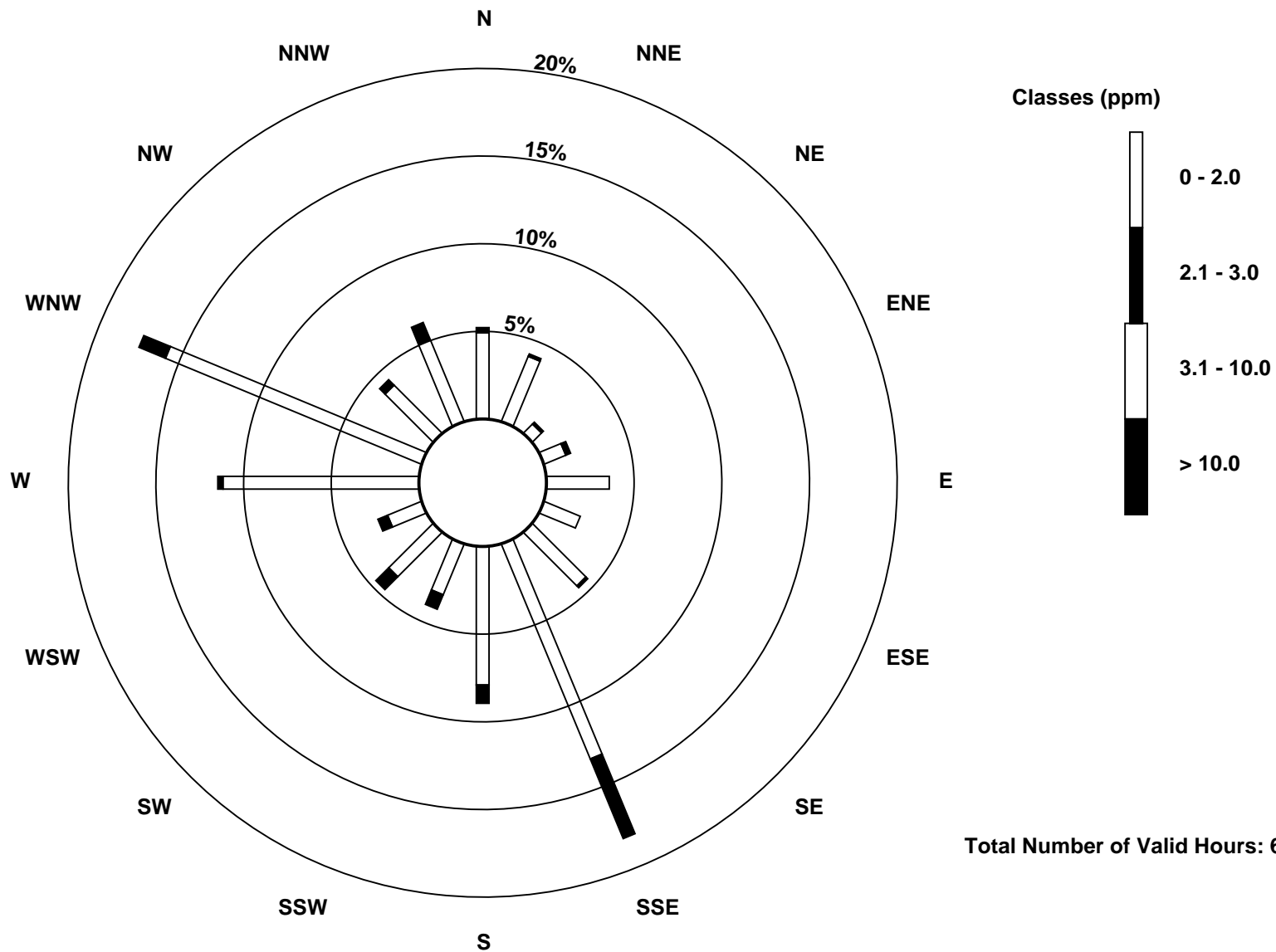
Total Number of Valid Hours: 671

Total Number of Hours: 720

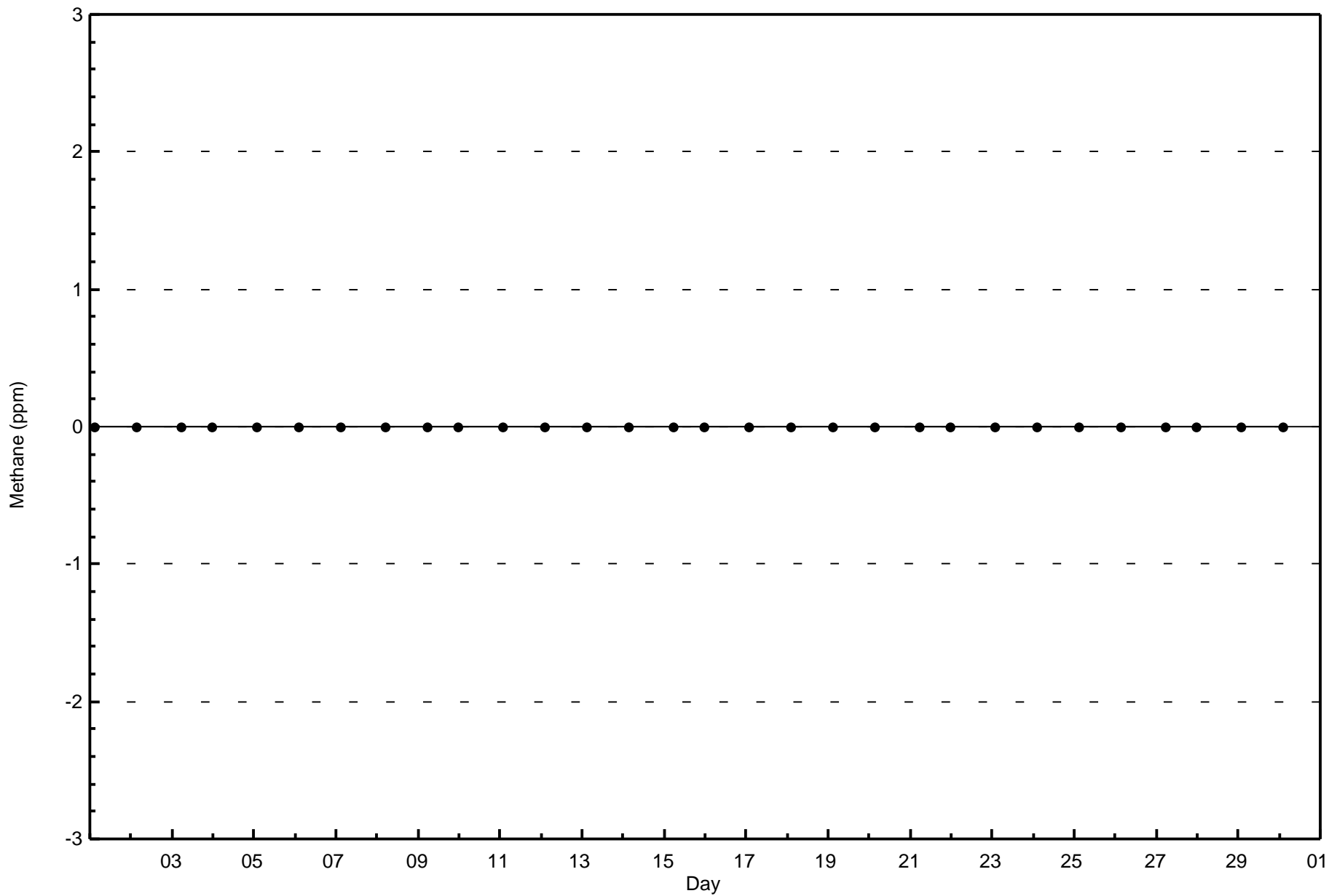


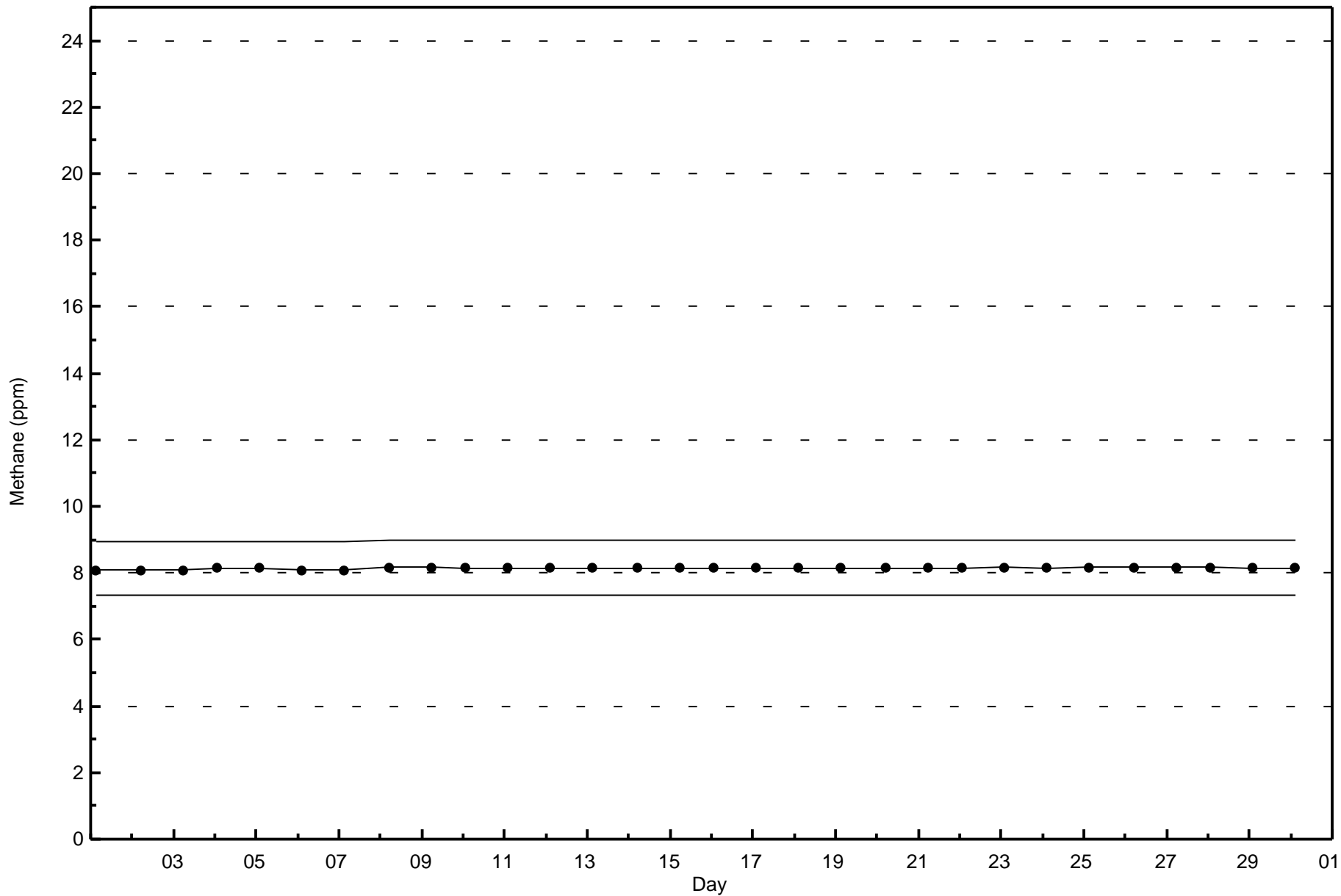
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Methane (CH₄) - ppm
Anzac (AMS 14)



Total Number of Valid Hours: 671

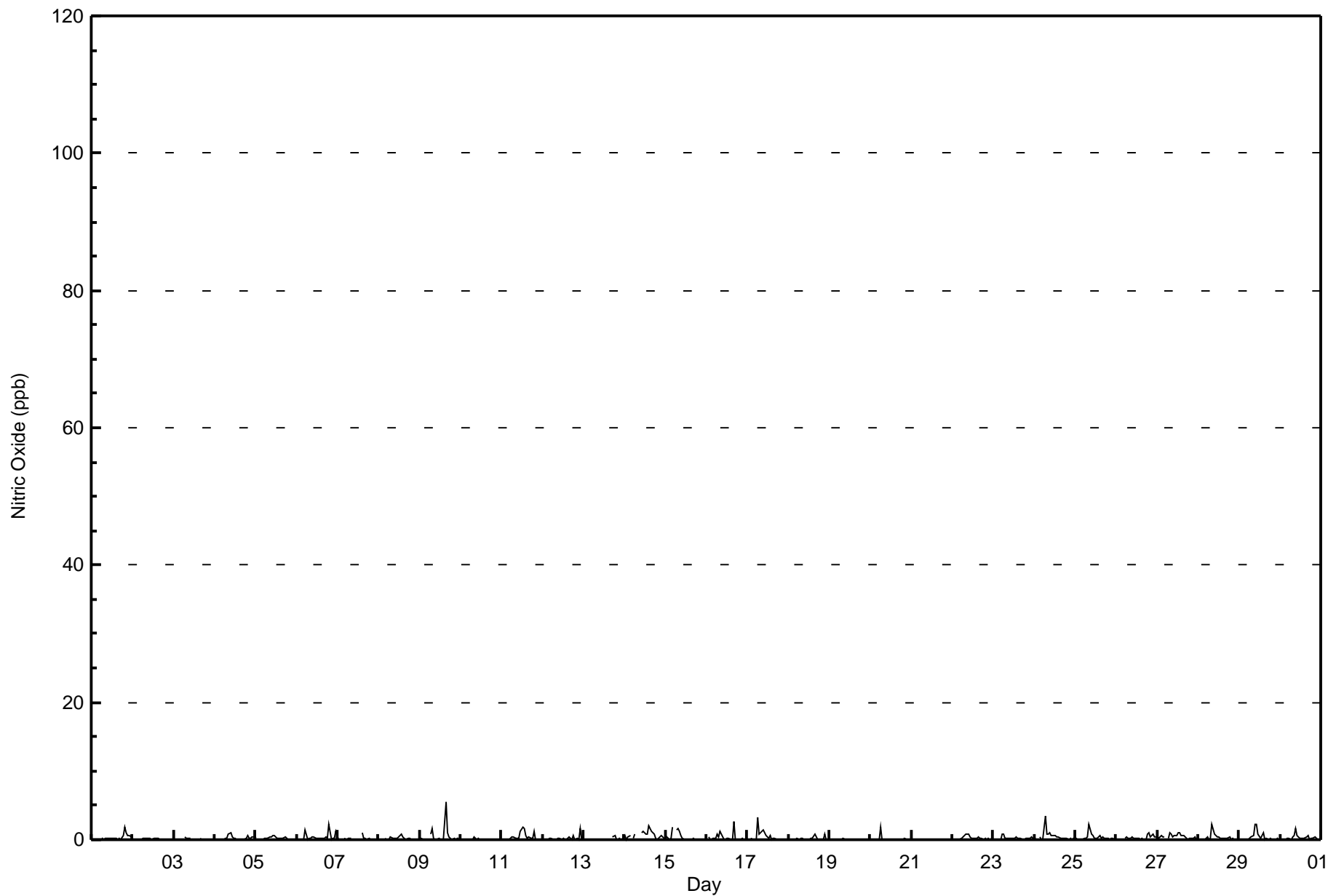






Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 676 | 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: 676

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 35 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |
| 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 | 35 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |

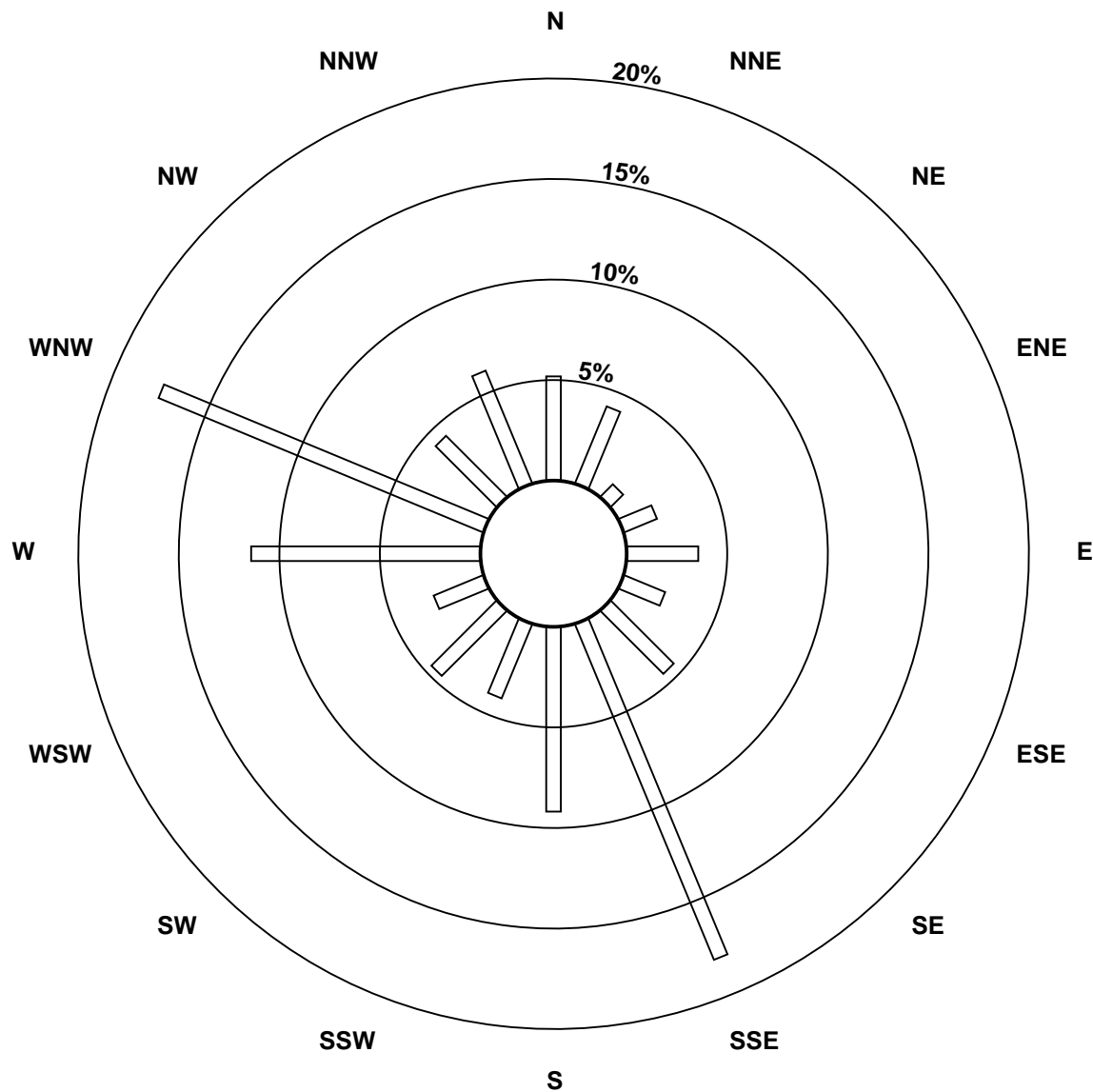
Total Number of Valid Hours: 675

Total Number of Hours: 720

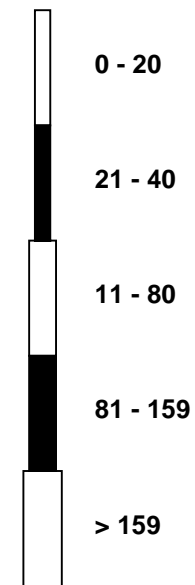


Wood Buffalo Environmental Association
Wind Rose Sep 2017

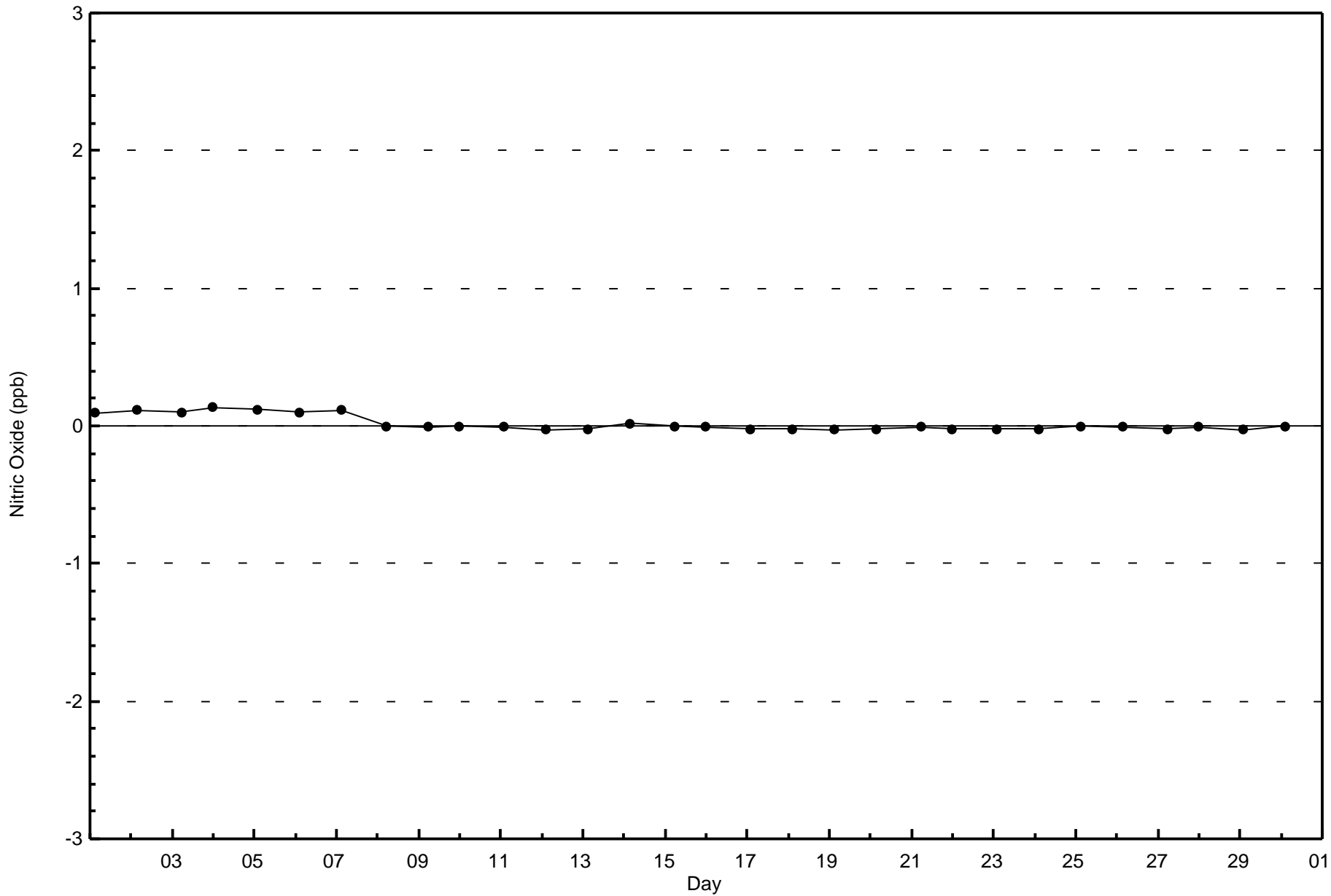
Nitric Oxide (NO) - ppb
Anzac (AMS 14)

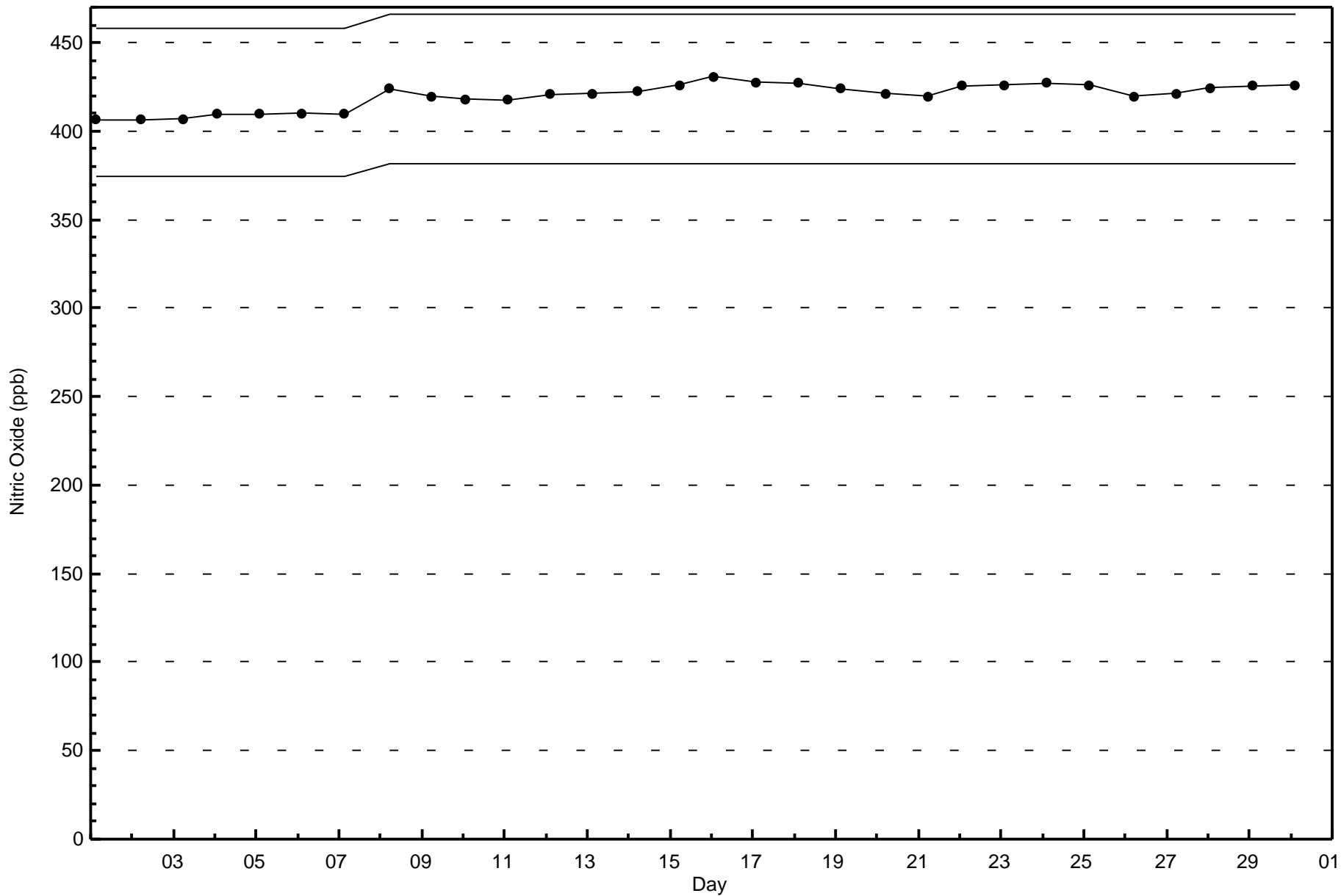


Classes (ppb)



Total Number of Valid Hours: 675







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Anzac - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 9 ppb on Sep 8 14:00 | Maximum Daily Average: 4.1 ppb on Sep 9 | | Hours of Data: | 676 |
| Minimum Value: 0 ppb on Sep 20 15:00 | Minimum Daily Average: 0.2 ppb on Sep 20 | | Hours of Missing Data: | 44 |
| Maximum Diurnal Average: 2.1 ppb at hour 20 | Minimum Diurnal Average: 1.1 ppb at hour 12 | | Hours of Calibration: | 35 |
| Monthly Average: 1.4 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 2 P ₉₀ = 3 P ₉₉ = 7 | | Percent Operational Time: | 98.8 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 3 | 2 | 1 | 1 | 0.8 | 4 | |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | PF | PF | PF | PF | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 0.7 | 3 |
| 4-Sep | Z | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 2 | 1.0 | 3 | |
| 5-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 1.5 | 3 | |
| 6-Sep | 1 | 2 | Z | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 4 | 2 | 7 | 2 | 1 | 1 | 1.9 | 7 | |
| 7-Sep | 2 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | C | C | C | C | C | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.2 | 2 | |
| 8-Sep | 1 | 1 | 1 | 1 | 2 | Z | 2 | 2 | 4 | 2 | 2 | 2 | 5 | 9 | 6 | 4 | 2 | 6 | 3 | 1 | 3 | 6 | 6 | 7 | 3.3 | 9 |
| 9-Sep | 7 | 5 | 4 | 5 | 5 | Z | 8 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 7 | 5 | 9 | 8 | 6 | 5 | 4 | 6 | 6 | 4.1 | 9 |
| 10-Sep | Z | 5 | 4 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.9 | 5 |
| 11-Sep | 0 | Z | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 3 | 4 | 4 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1.4 | 4 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 2 | 2 | 2 | 0 | 0.8 | 4 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | PF | PF | 1 | 3 | 2 | 1 | 1 | 1 | 0.6 | 3 |
| 14-Sep | 1 | 1 | 3 | 3 | Z | 1 | 1 | PF | PF | PF | 2 | 3 | 2 | 2 | 4 | 4 | 4 | 5 | 4 | 3 | 3 | 5 | 4 | 3 | 2.9 | 5 |
| 15-Sep | 4 | 3 | 2 | 1 | 2 | Z | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1.1 | 4 |
| 16-Sep | Z | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1.2 | 2 |
| 17-Sep | 2 | Z | 2 | 3 | 4 | 4 | 6 | 4 | 4 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1.9 | 6 |
| 18-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.6 | 1 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 22-Sep | Z | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 0 | 2.1 | 4 |
| 23-Sep | 0 | Z | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0.8 | 2 |
| 24-Sep | 1 | 1 | Z | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | 1.5 | 3 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.2 | 2 |
| 26-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 3 | 3 | 2 | 2 | 1.2 | 4 |
| 27-Sep | 2 | 1 | 3 | 3 | 2 | Z | 1 | 3 | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 5 | 7 | 8 | 7 | 5 | 3 | 2 | 3.1 | 8 |
| 28-Sep | Z | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1.2 | 2 |
| 29-Sep | 3 | Z | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 4 | 5 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 2.1 | 5 |
| 30-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 3 | 2 | 2 | 2 | 1 | 2 | 5 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1.7 | 6 |

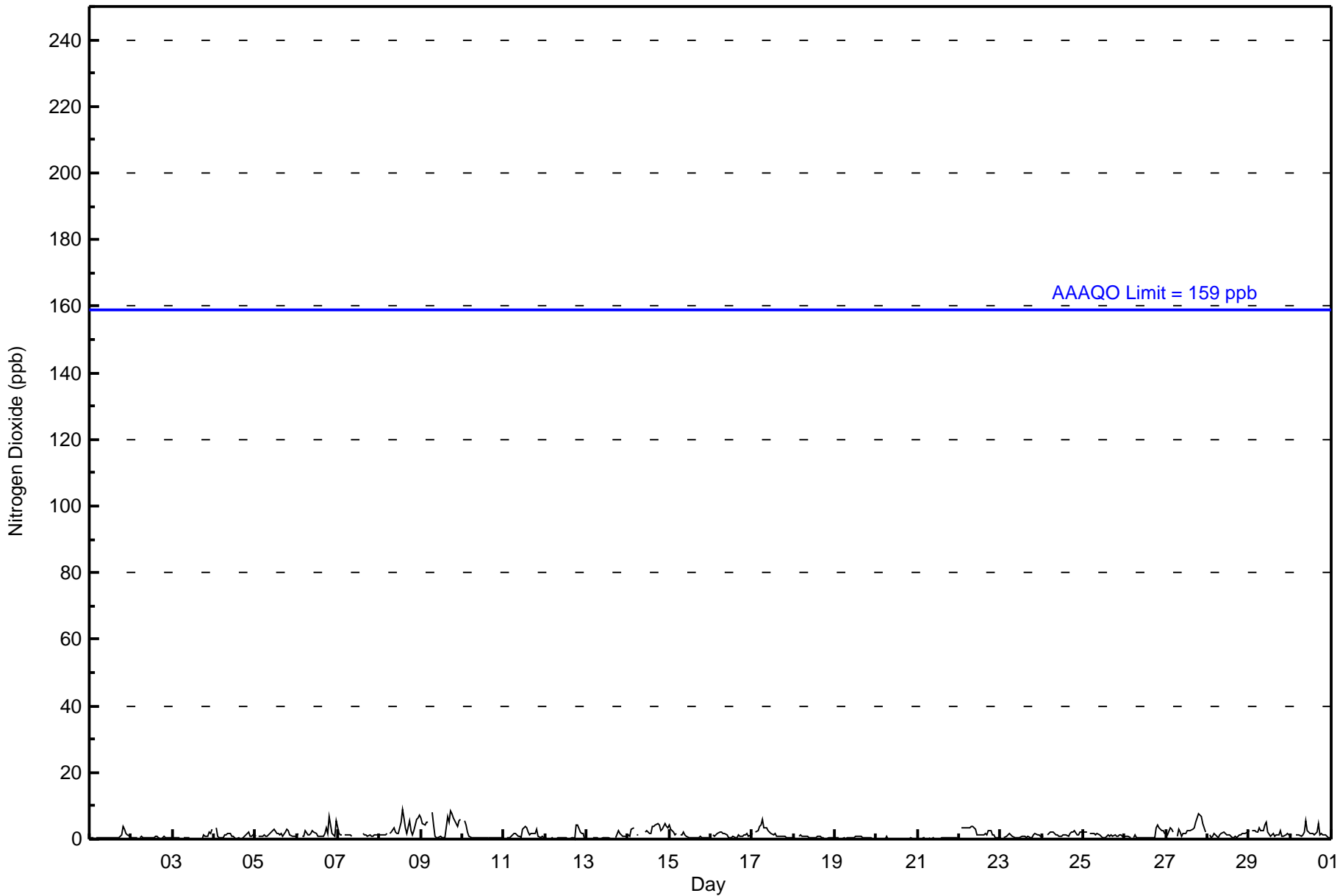
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 1.3 | 1.4 | 1.5 | 1.4 | 1.4 | 1.3 | 1.6 | 1.3 | 1.4 | 1.3 | 1.1 | 1.1 | 1.1 | 1.2 | 1.1 | 1.2 | 1.3 | 1.6 | 2.0 | 2.1 | 1.6 | 1.5 | 1.5 | 1.6 | Diurnal Average |
| 7 | 5 | 4 | 5 | 5 | 4 | 8 | 4 | 4 | 6 | 5 | 3 | 5 | 9 | 6 | 7 | 5 | 9 | 8 | 8 | 7 | 6 | 6 | 7 | Diurnal Maximum |

Z - zerspan 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
Anzac - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 676 | 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: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 35 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |
| 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 | 35 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |

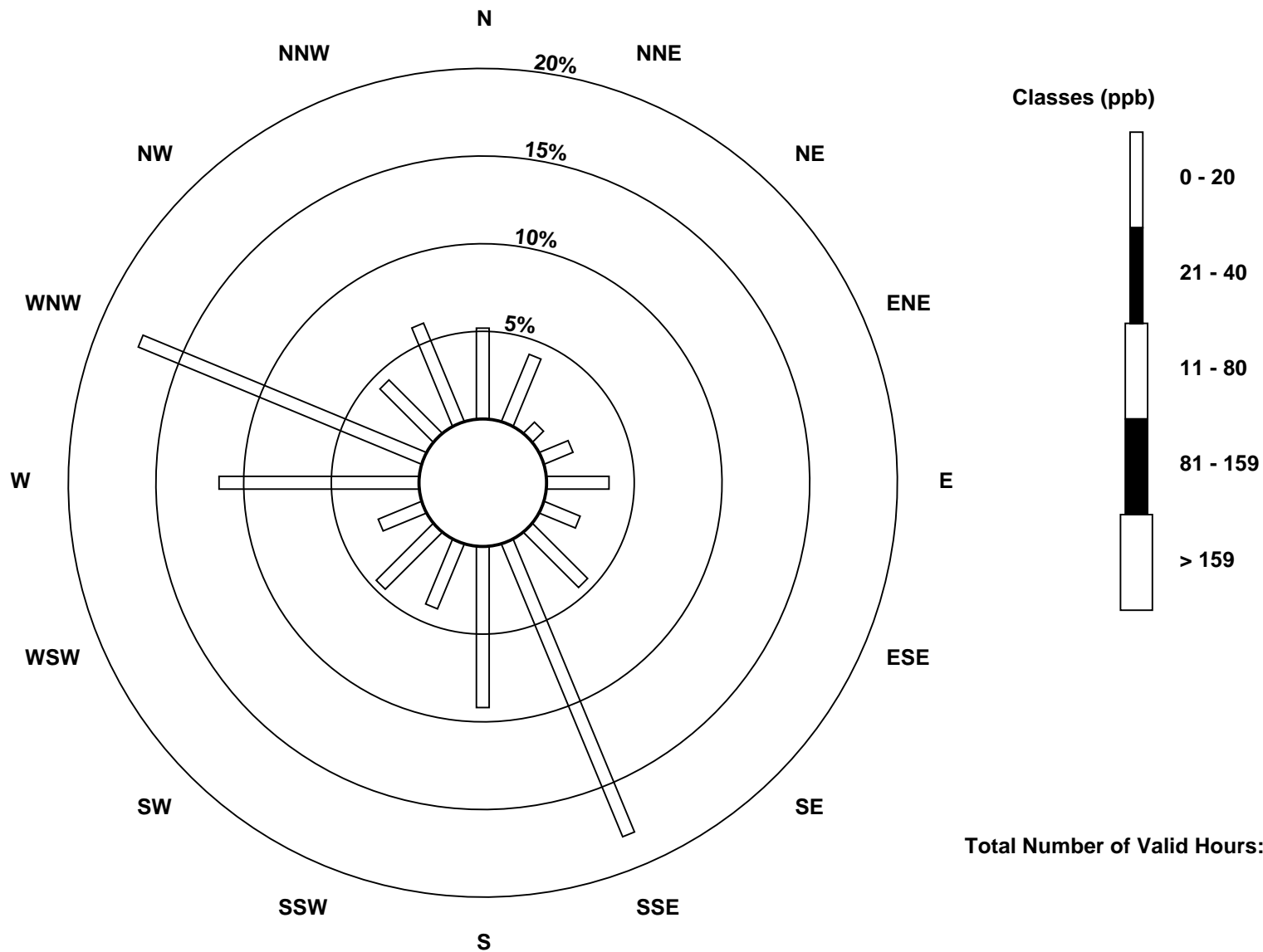
Total Number of Valid Hours: 675

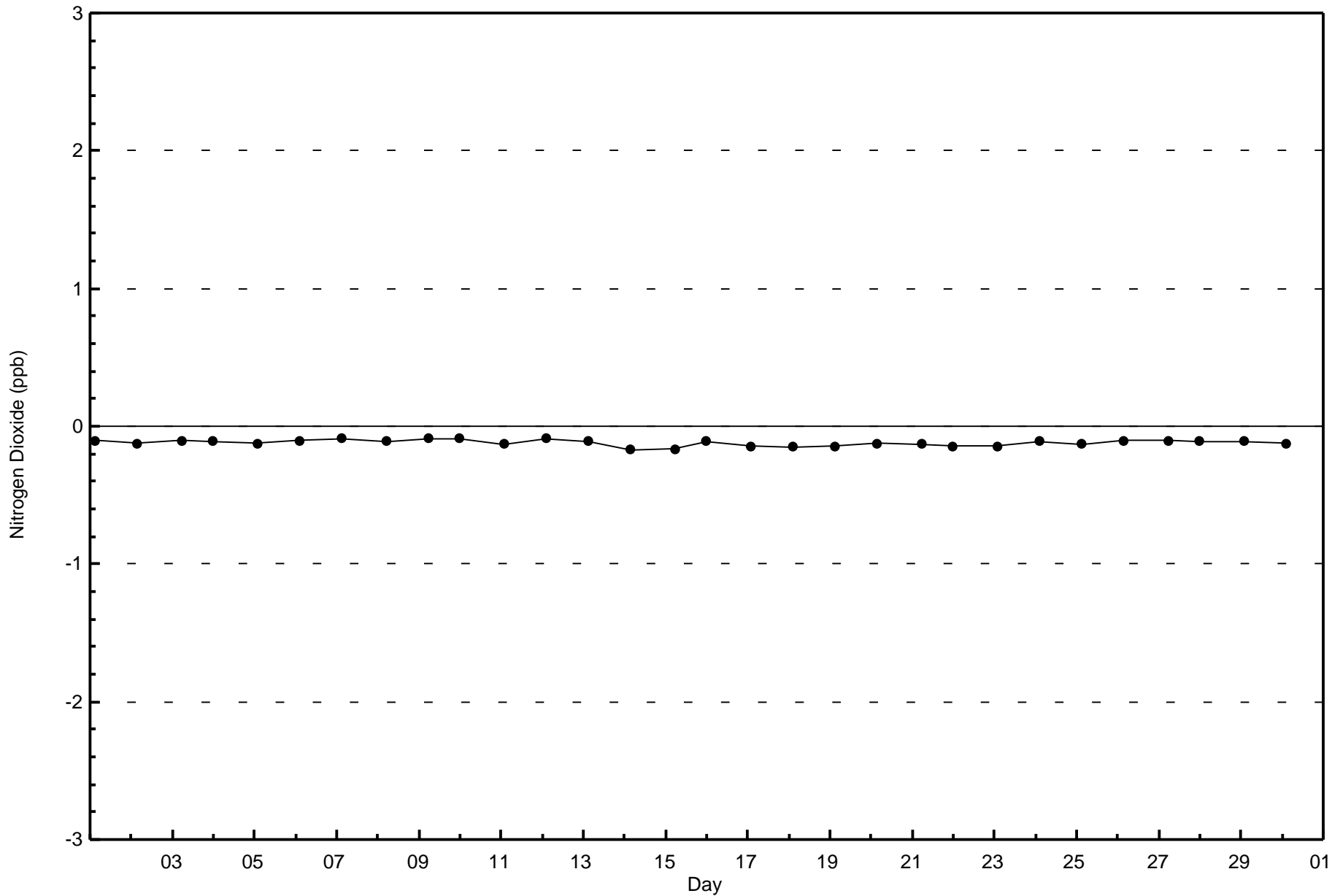
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)

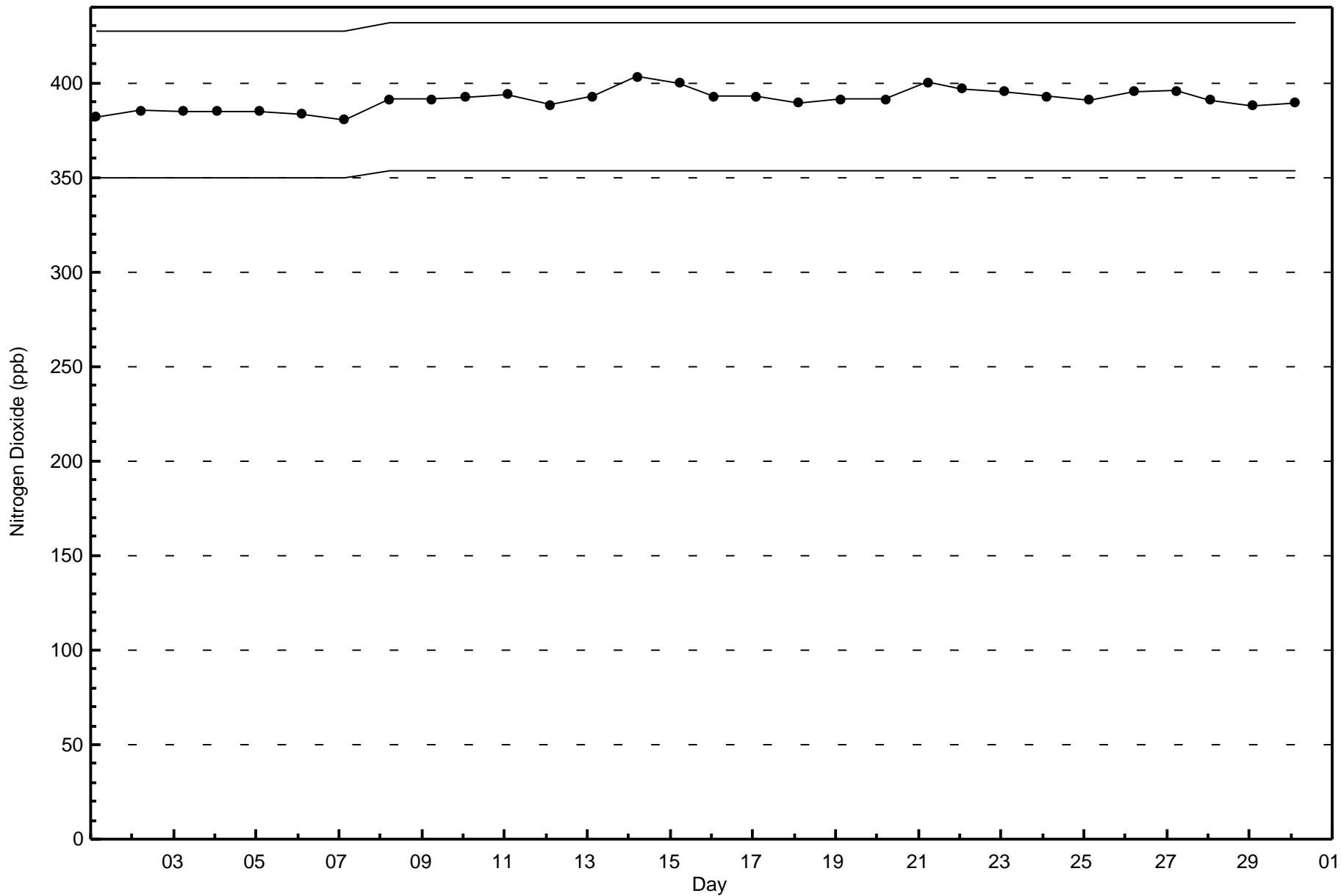






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Anzac - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

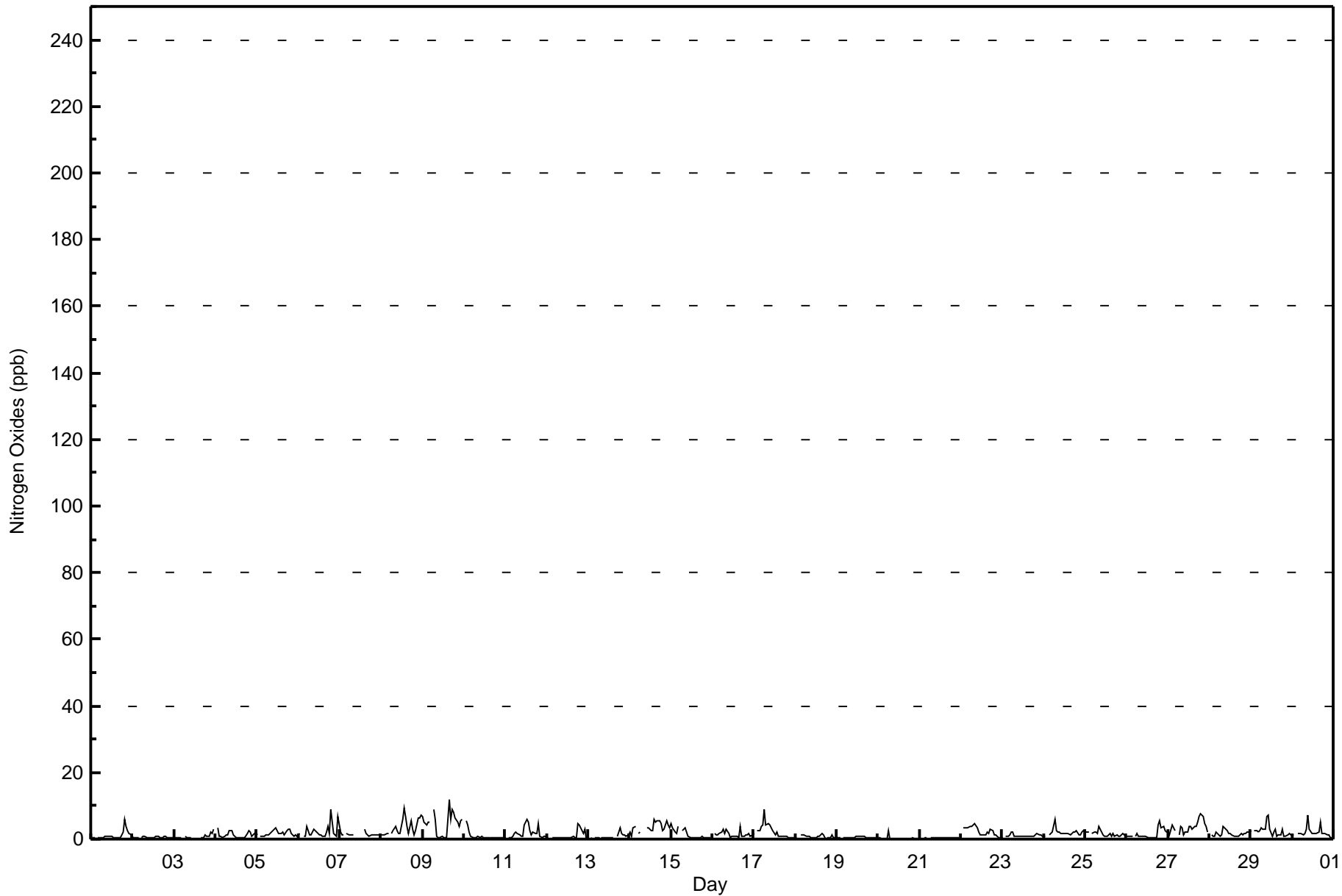
Anzac - September 2017

| Maximum Value: 12 ppb on Sep 9 16:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 4.6 ppb on Sep 9 | | | | | | Hours in Service: 720 | | |
|---|-------------------------------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|--|----|----|----|----|----|---------------------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 21 01:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.3 ppb on Sep 20 | | | | | | Hours of Data: 676 | | |
| Maximum Diurnal Average: 2.4 ppb at hour 20 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 1.4 ppb at hour 12 | | | | | | Hours of Missing Data: 44 | | |
| 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 = 8 | | | | | | Hours of Calibration: 35 | | |
| | | | | | | | | | | | | | | | | | | Percent Operational Time: 98.8 | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 4 | 2 | 2 | 1 | 1.2 | 6 |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0.6 | 1 |
| 3-Sep | 1 | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | PF | PF | PF | PF | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 0.8 | 3 |
| 4-Sep | Z | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 1 | 2 | 1.3 | 3 |
| 5-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1.7 | 3 |
| 6-Sep | 1 | 2 | Z | 1 | 1 | 4 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 4 | 2 | 9 | 2 | 1 | 1 | 7 | 2.2 | 9 |
| 7-Sep | 2 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 1 | C | C | C | C | C | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.4 | 3 |
| 8-Sep | 1 | 1 | 1 | 2 | 2 | Z | 2 | 2 | 4 | 2 | 2 | 2 | 6 | 9 | 7 | 4 | 2 | 6 | 3 | 1 | 3 | 6 | 7 | 7 | 3.5 | 9 |
| 9-Sep | 7 | 5 | 4 | 5 | 5 | Z | 9 | 6 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 12 | 6 | 9 | 8 | 6 | 5 | 4 | 6 | 6 | 4.6 | 12 |
| 10-Sep | Z | 5 | 4 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 |
| 11-Sep | 0 | Z | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 4 | 6 | 5 | 3 | 1 | 2 | 2 | 2 | 4 | 1 | 1 | 1 | 1 | 1.8 | 6 |
| 12-Sep | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 4 | 2 | 2 | 3 | 0 | 1.0 | 5 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | PF | PF | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 0.7 | 3 |
| 14-Sep | 2 | 1 | 3 | 4 | Z | 2 | 2 | 2 | PF | PF | PF | 3 | 4 | 3 | 2 | 6 | 5 | 5 | 5 | 2 | 3 | 5 | 4 | 3 | 3.5 | 6 |
| 15-Sep | 4 | 3 | 2 | 2 | 4 | Z | 3 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1.5 | 4 |
| 16-Sep | Z | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1.5 | 4 |
| 17-Sep | 2 | Z | 2 | 3 | 4 | 4 | 9 | 4 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2.3 | 9 |
| 18-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.7 | 2 |
| 19-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 22-Sep | Z | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 0 | 2.4 | 5 |
| 23-Sep | 0 | Z | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1.0 | 2 |
| 24-Sep | 1 | 1 | Z | 1 | 2 | 2 | 6 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | 2.0 | 6 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.6 | 4 |
| 26-Sep | 1 | 1 | 1 | 1 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 4 | 5 | 4 | 4 | 3 | 2 | 1.5 | 5 |
| 27-Sep | 2 | 1 | 4 | 3 | 3 | Z | 1 | 4 | 3 | 1 | 2 | 2 | 4 | 4 | 3 | 4 | 4 | 5 | 7 | 8 | 7 | 5 | 4 | 2 | 3.5 | 8 |
| 28-Sep | Z | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1.6 | 4 |
| 29-Sep | 3 | Z | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 7 | 7 | 3 | 1 | 2 | 3 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 2.5 | 7 |
| 30-Sep | 1 | 1 | Z | 1 | 2 | 2 | 1 | 2 | 3 | 7 | 3 | 2 | 2 | 2 | 2 | 2 | 5 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 2.0 | 7 |
| | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | 7 | | | | | | 7 | | |
| Z - zerospan | | | | | | | | | | | | | | | | | | C - Calibration | | | | | | PF - Power Failure | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Anzac - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 676 | 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: 676

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 35 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |
| 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 | 35 | 28 | 6 | 12 | 24 | 15 | 30 | 122 | 62 | 27 | 31 | 18 | 77 | 118 | 29 | 41 | 675 |

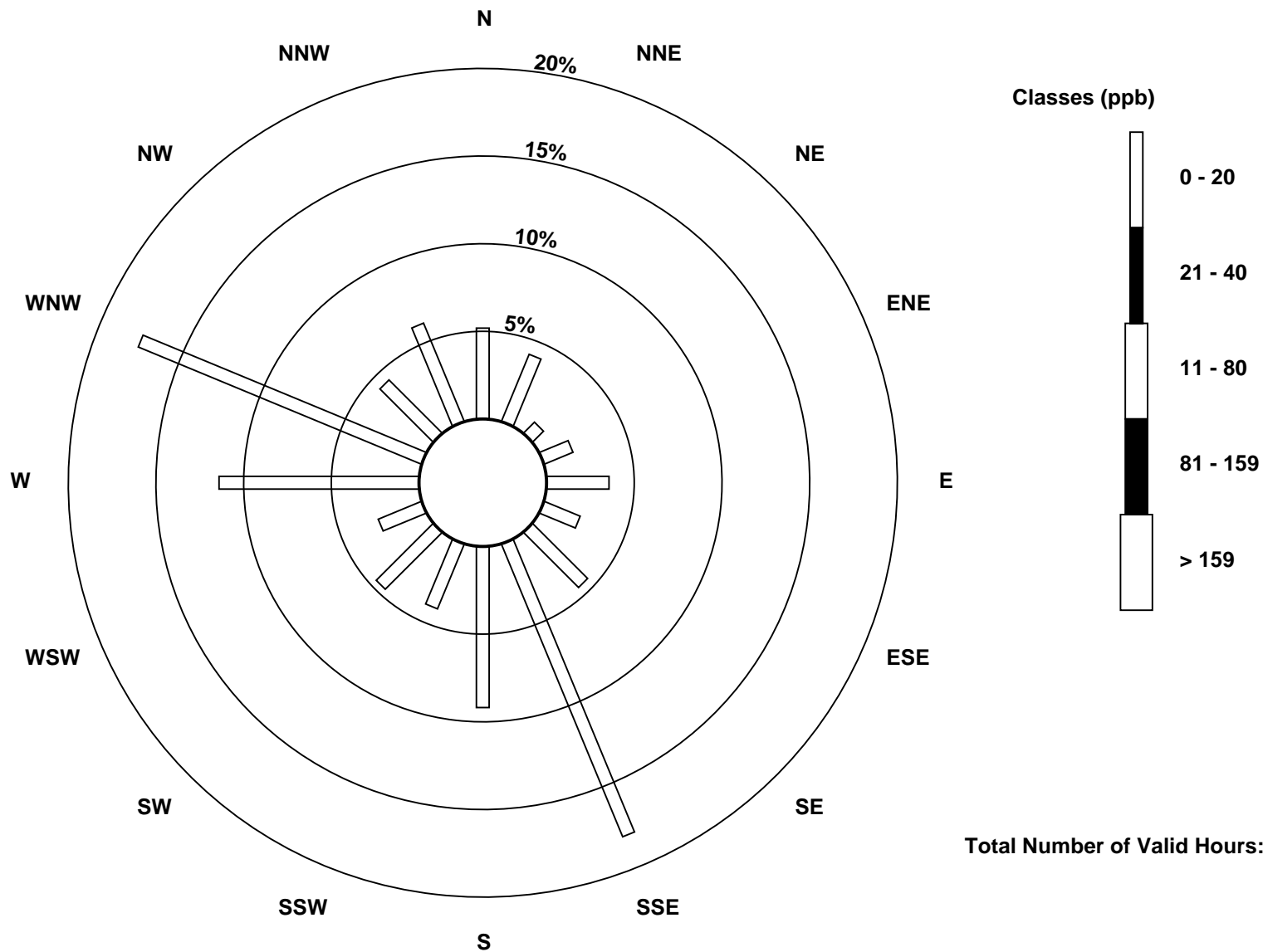
Total Number of Valid Hours: 675

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxides (NO_x) - ppb
Anzac (AMS 14)

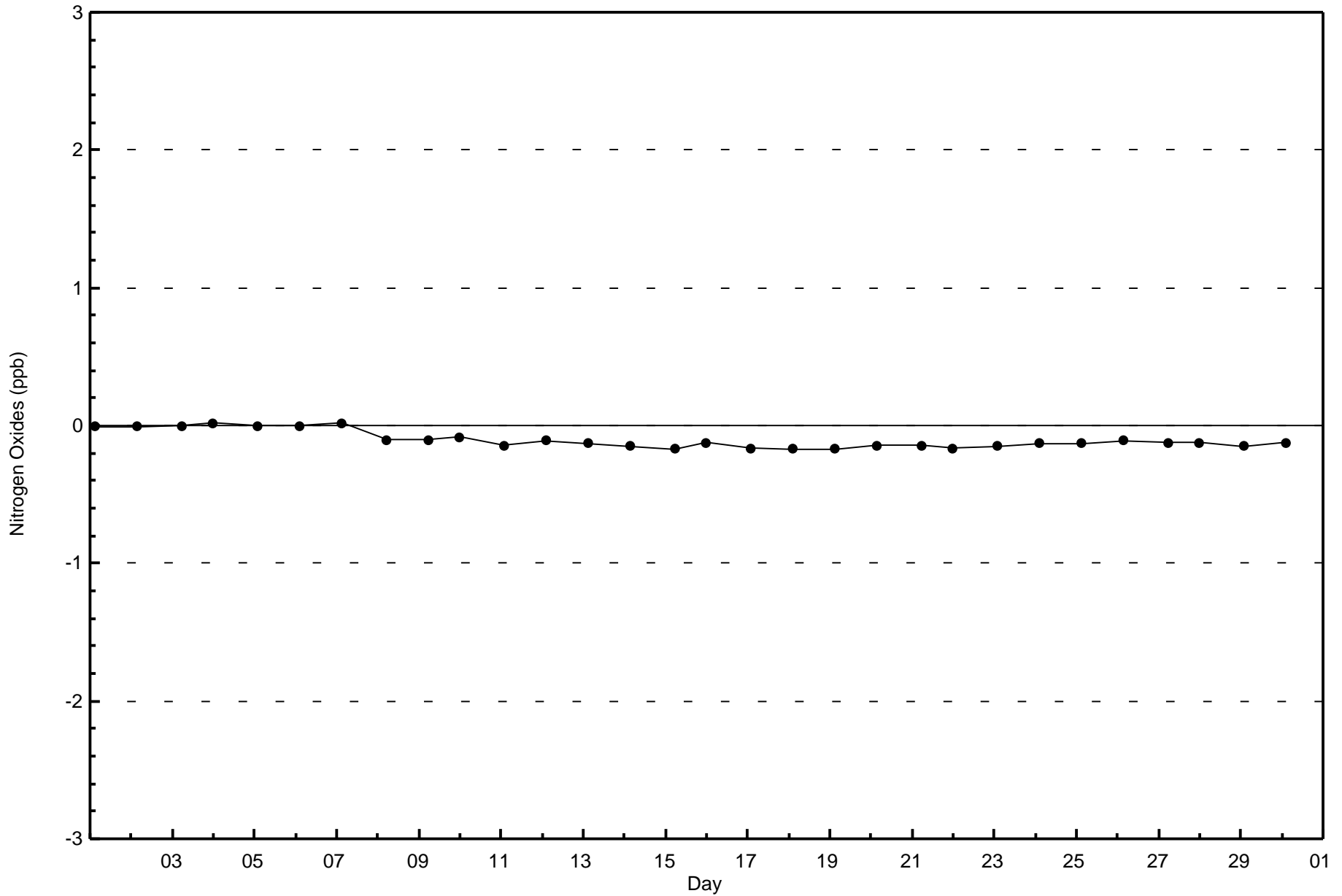


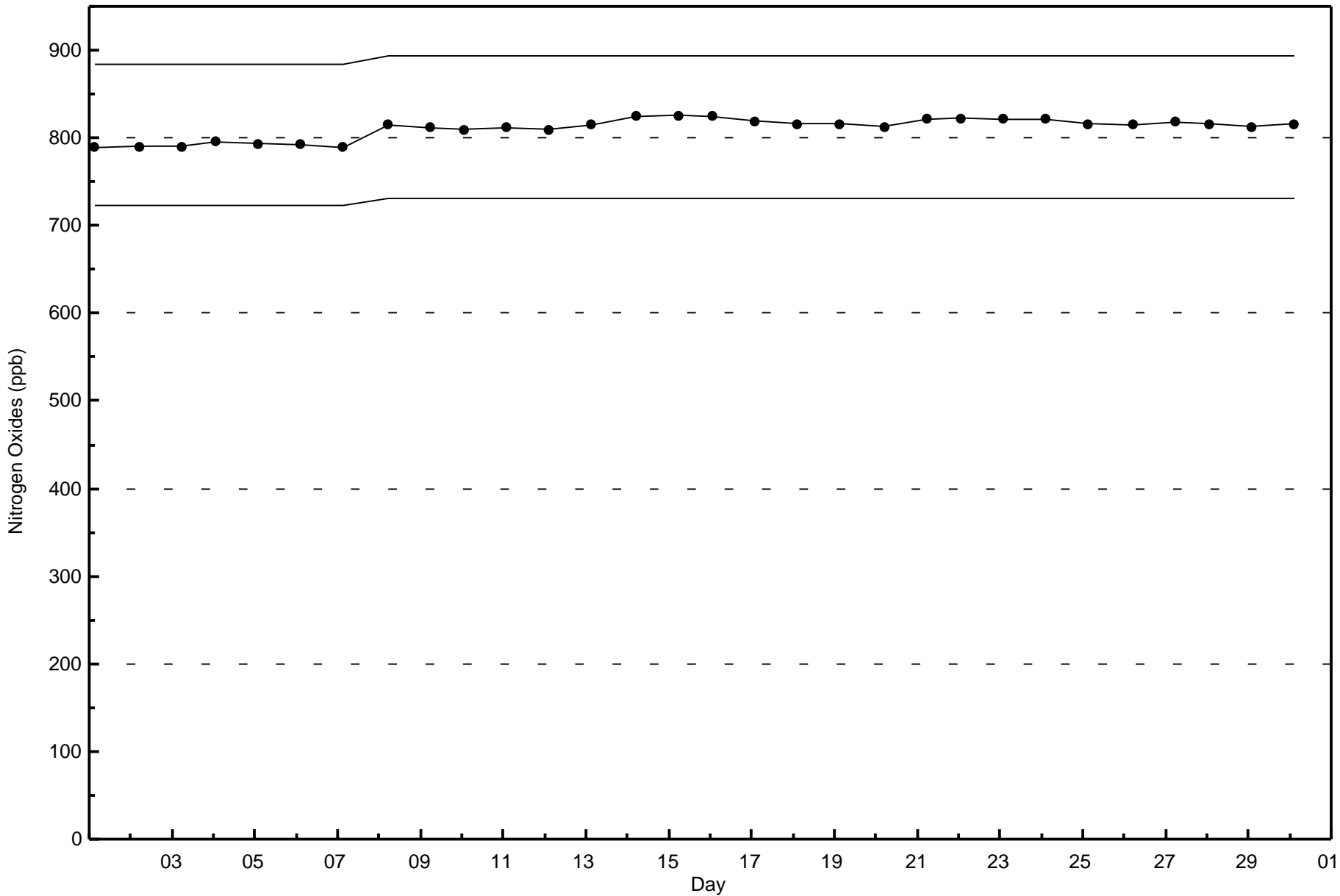
Total Number of Valid Hours: 675



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Anzac - September 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Anzac - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 69 ppb on Sep 7 18:00 | Maximum Daily Average: 45.8 ppb on Sep 7 | | Hours of Data: | 680 |
| Minimum Value: 4 ppb on Sep 14 04:00 | Minimum Daily Average: 15.4 ppb on Sep 14 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 33.8 ppb at hour 17 | Minimum Diurnal Average: 21.0 ppb at hour 7 | | Hours of Calibration: | 33 |
| Monthly Average: 26.9 ppb | Percentiles: P ₁ = 6 P ₁₀ = 14 O ₁ = 21 Median = 27 O ₃ = 33 P ₉₀ = 37 P ₉₉ = 65 | | Percent Operational Time: | 99.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 37 | 36 | 36 | 36 | 35 | Z | 35 | 33 | 33 | 32 | 32 | 34 | 36 | 39 | 41 | 43 | 40 | 41 | 40 | 37 | 36 | 37 | 37 | 37 | 36.6 | 43 |
| 2-Sep | 35 | 34 | 33 | 32 | 31 | 31 | Z | 29 | 28 | 28 | 29 | 29 | 30 | 31 | 30 | 30 | 31 | 33 | 33 | 32 | 29 | 28 | 27 | 27 | 30.5 | 35 |
| 3-Sep | 26 | 24 | 25 | 28 | 31 | 29 | 27 | Z | 23 | 22 | 22 | PF | PF | PF | 35 | 36 | 36 | 36 | 40 | 34 | 30 | 27 | 28 | 26 | 29.3 | 40 |
| 4-Sep | 23 | 22 | Z | 26 | 25 | 24 | 23 | 23 | 23 | 27 | 29 | 29 | 28 | 28 | 28 | 29 | 29 | 26 | 19 | 12 | 10 | 8 | 7 | 22.7 | 29 | |
| 5-Sep | 10 | 13 | 17 | Z | 24 | 25 | 18 | 21 | 35 | 41 | 44 | 47 | 51 | 53 | 55 | 54 | 51 | 48 | 38 | 33 | 30 | 39 | 40 | 41 | 36.1 | 55 |
| 6-Sep | 38 | 37 | 39 | 37 | Z | 34 | 34 | 35 | 36 | 40 | 39 | 39 | 38 | 38 | 35 | 34 | 33 | 32 | 33 | 19 | 22 | 17 | 18 | 14 | 32.3 | 40 |
| 7-Sep | 21 | 22 | 19 | 19 | 20 | Z | 22 | 30 | 38 | 43 | 49 | 52 | 48 | C | C | C | 68 | 69 | 66 | 66 | 64 | 67 | 67 | 65 | 45.8 | 69 |
| 8-Sep | 64 | 60 | 58 | 54 | 49 | 43 | 36 | Z | 36 | 43 | 40 | 36 | 38 | 42 | 43 | 44 | 40 | 34 | 37 | 34 | 31 | 32 | 26 | 21 | 40.8 | 64 |
| 9-Sep | 17 | 14 | 17 | 21 | 24 | 19 | 15 | Z | 35 | 36 | 39 | 41 | 44 | 46 | 45 | 39 | 31 | 20 | 17 | 15 | 13 | 12 | 10 | 8 | 25.2 | 46 |
| 10-Sep | 9 | 13 | Z | 19 | 24 | 22 | 22 | 24 | 26 | 26 | 26 | 27 | 28 | 30 | 33 | 32 | 30 | 33 | 32 | 29 | 29 | 29 | 29 | 28 | 26.1 | 33 |
| 11-Sep | 28 | 28 | 28 | Z | 27 | 26 | 24 | 24 | 25 | 24 | 24 | 23 | 23 | 21 | 23 | 30 | 33 | 32 | 27 | 25 | 26 | 31 | 27 | 28 | 26.4 | 33 |
| 12-Sep | 30 | 31 | 29 | 29 | Z | 28 | 28 | 27 | 26 | 24 | 24 | 24 | 24 | 25 | 24 | 24 | 25 | 24 | 19 | 18 | 17 | 17 | 29 | 30 | 25.0 | 31 |
| 13-Sep | 28 | 30 | 27 | 23 | 28 | Z | 33 | 34 | 34 | 34 | 35 | 35 | 35 | 34 | 34 | PF | PF | 33 | 22 | 19 | 17 | 13 | 14 | 12 | 27.3 | 35 |
| 14-Sep | 7 | 12 | 7 | 4 | 8 | 8 | Z | PF | PF | 21 | 20 | 23 | 24 | 24 | 24 | 26 | 26 | 23 | 11 | 10 | 9 | 6 | 5 | 15.4 | 26 | |
| 15-Sep | 6 | 6 | 5 | 6 | 7 | 7 | Z | Z | 19 | 25 | 28 | 31 | 31 | 32 | 32 | 33 | 33 | 34 | 31 | 28 | 25 | 24 | 19 | 20 | 21.2 | 34 |
| 16-Sep | 12 | 21 | Z | 19 | 17 | 16 | 17 | 20 | 24 | 28 | 35 | 35 | 36 | 36 | 37 | 37 | 36 | 35 | 34 | 30 | 27 | 25 | 25 | 26 | 27.4 | 37 |
| 17-Sep | 24 | 20 | 19 | Z | 20 | 18 | 18 | 19 | 20 | 23 | 28 | 30 | 34 | 37 | 38 | 38 | 37 | 36 | 35 | 32 | 29 | 28 | 28 | 26 | 27.7 | 38 |
| 18-Sep | 25 | 23 | 22 | 21 | Z | 21 | 21 | 21 | 23 | 27 | 30 | 34 | 34 | 36 | 36 | 36 | 37 | 36 | 35 | 33 | 31 | 31 | 30 | 24 | 28.9 | 37 |
| 19-Sep | 19 | 18 | 21 | 21 | 22 | Z | 24 | 24 | 26 | 27 | 27 | 28 | 28 | 29 | 27 | 25 | 25 | 27 | 27 | 26 | 26 | 28 | 30 | 29 | 25.5 | 30 |
| 20-Sep | 29 | 28 | 25 | 24 | 23 | 24 | Z | 27 | 28 | 29 | 29 | 28 | 28 | 28 | 28 | 27 | 27 | 27 | 28 | 29 | 29 | 28 | 26 | 26 | 27.2 | 29 |
| 21-Sep | 26 | 25 | 25 | 24 | 23 | 23 | 23 | Z | 23 | 22 | 22 | 22 | 22 | 21 | 21 | 21 | 21 | 20 | 21 | 21 | 22 | 22 | 20 | 19 | 22.1 | 26 |
| 22-Sep | 18 | 17 | Z | 17 | 16 | 14 | 12 | 14 | 17 | 22 | 27 | 32 | 28 | 25 | 26 | 26 | 26 | 23 | 17 | 23 | 20 | 13 | 9 | 6 | 19.5 | 32 |
| 23-Sep | 7 | 14 | 15 | Z | 15 | 14 | 16 | 16 | 15 | 18 | 22 | 25 | 26 | 29 | 25 | 28 | 31 | 32 | 24 | 17 | 15 | 14 | 13 | 11 | 19.1 | 32 |
| 24-Sep | 10 | 11 | 10 | 13 | Z | 11 | 10 | 12 | 13 | 13 | 16 | 20 | 21 | 25 | 28 | 32 | 34 | 32 | 27 | 24 | 23 | 21 | 19 | 18 | 19.3 | 34 |
| 25-Sep | 16 | 16 | 15 | 14 | 14 | Z | 12 | 13 | 12 | 15 | 17 | 18 | 22 | 24 | 23 | 23 | 23 | 23 | 21 | 21 | 20 | 17 | 16 | 19 | 18.1 | 24 |
| 26-Sep | 19 | 20 | 19 | 23 | 24 | 23 | Z | 21 | 21 | 21 | 24 | 30 | 34 | 35 | 36 | 36 | 38 | 37 | 30 | 25 | 26 | 14 | 13 | 15 | 25.4 | 38 |
| 27-Sep | 18 | 20 | 16 | 14 | 15 | 10 | 10 | Z | 22 | 24 | 23 | 28 | 30 | 33 | 36 | 36 | 35 | 31 | 25 | 21 | 13 | 12 | 9 | 15 | 21.6 | 36 |
| 28-Sep | 19 | 21 | Z | 21 | 18 | 18 | 18 | 18 | 21 | 25 | 28 | 30 | 31 | 32 | 32 | 33 | 32 | 32 | 31 | 29 | 29 | 29 | 29 | 29 | 26.3 | 33 |
| 29-Sep | 27 | 27 | 28 | Z | 29 | 28 | 26 | 27 | 28 | 27 | 27 | 35 | 39 | 40 | 40 | 41 | 42 | 41 | 36 | 35 | 33 | 34 | 30 | 28 | 32.5 | 42 |
| 30-Sep | 24 | 19 | 19 | 19 | Z | 13 | 15 | 15 | 22 | 29 | 35 | 36 | 36 | 35 | 33 | 28 | 31 | 31 | 32 | 34 | 33 | 31 | 29 | 27.7 | 36 | |

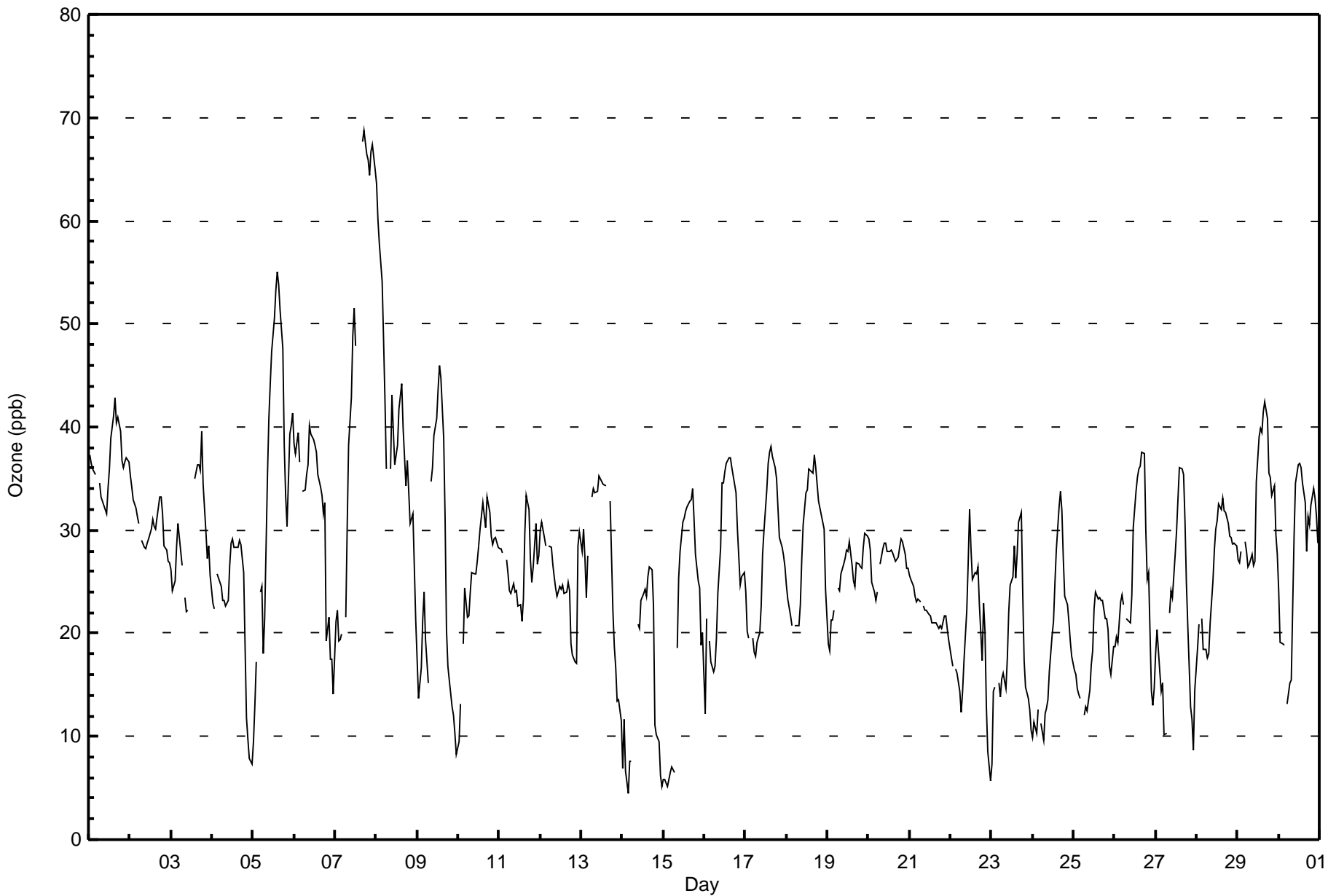
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 22.4 | 22.8 | 23.0 | 22.6 | 22.7 | 21.2 | 21.0 | 23.0 | 25.2 | 27.1 | 28.9 | 31.0 | 32.0 | 32.5 | 32.7 | 33.0 | 33.8 | 32.9 | 30.1 | 27.3 | 25.6 | 24.7 | 23.7 | 22.9 | Diurnal Average | |
| 64 | 60 | 58 | 54 | 49 | 43 | 36 | 35 | 38 | 43 | 49 | 52 | 51 | 53 | 55 | 54 | 68 | 69 | 66 | 66 | 64 | 67 | 67 | 65 | 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
Anzac - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Anzac - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 163 | 23.97 | 23.97 |
| 21 - 50 | 499 | 73.38 | 97.35 |
| 51 - 82 | 18 | 2.65 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



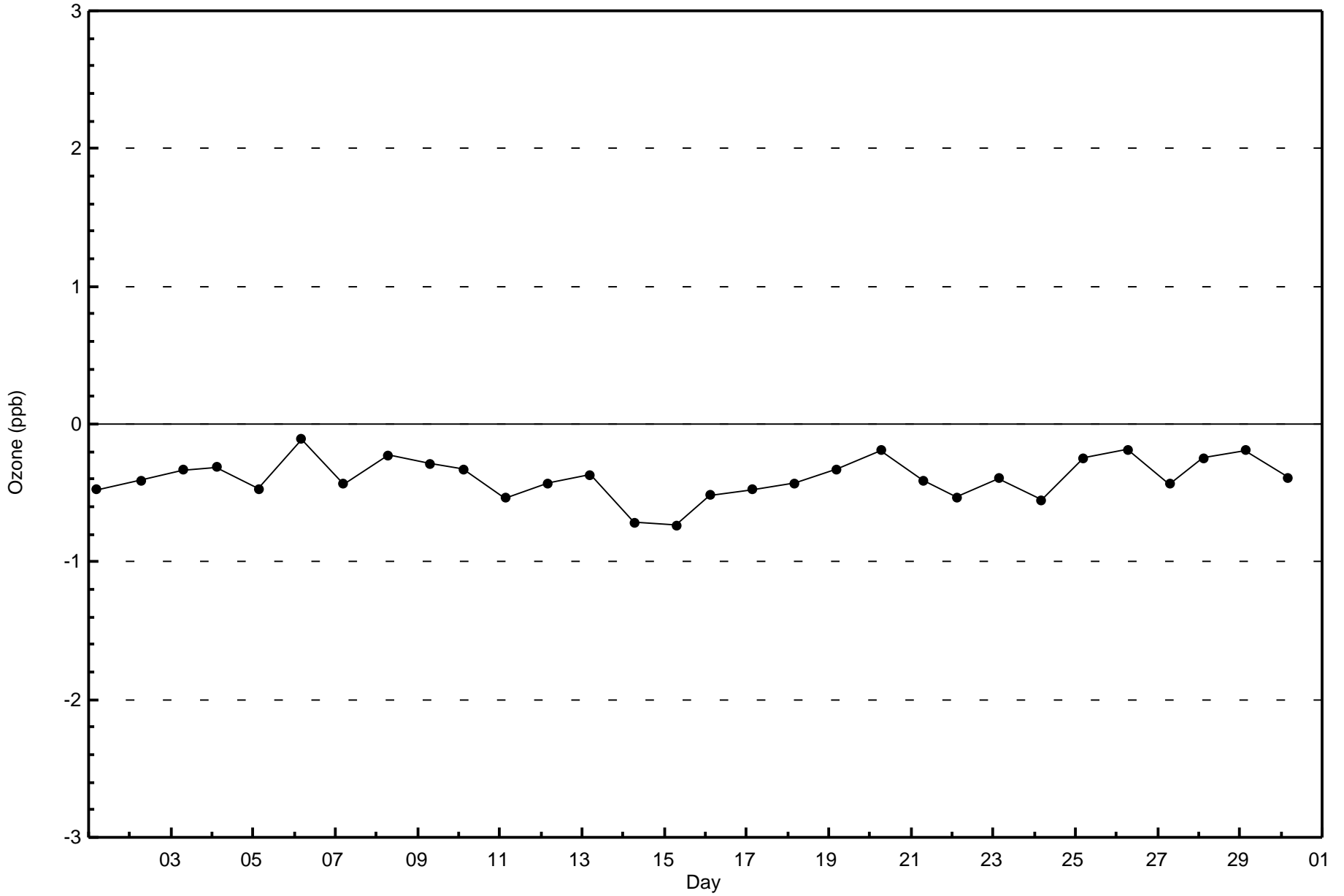
**Wood Buffalo Environmental Association
Frequency Distribution**

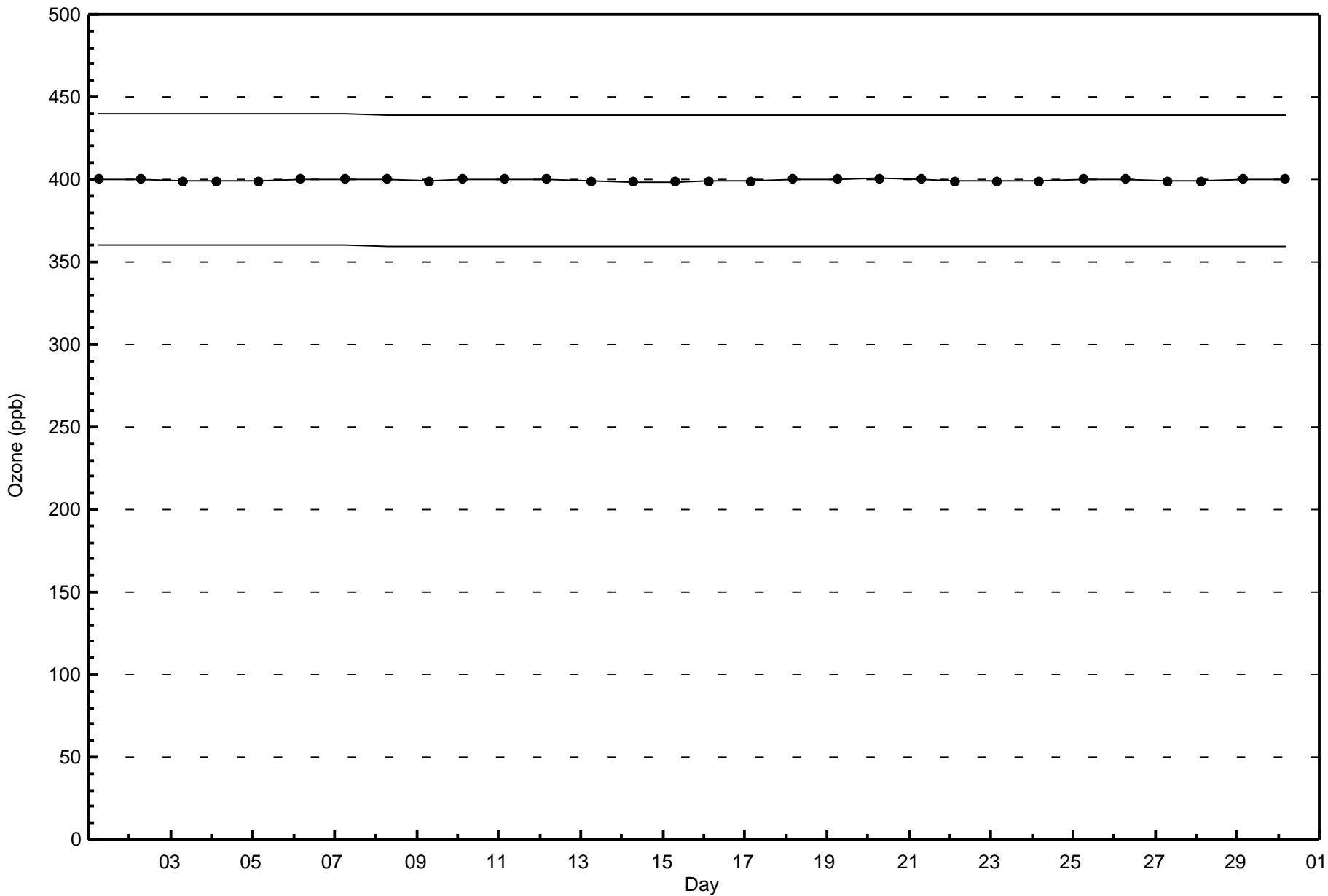
**Ozone (O₃) - ppb
Anzac - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 5 | 1 | 1 | 2 | 2 | 1 | 6 | 58 | 23 | 11 | 16 | 9 | 2 | 9 | 4 | 12 | 162 |
| 21 - 50 | 31 | 26 | 5 | 9 | 22 | 14 | 25 | 60 | 36 | 15 | 13 | 9 | 69 | 109 | 26 | 30 | 499 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 2 | 3 | 1 | 2 | 3 | 0 | 0 | 18 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 36 | 27 | 6 | 11 | 24 | 15 | 31 | 121 | 63 | 28 | 32 | 19 | 73 | 121 | 30 | 42 | 679 |

Total Number of Valid Hours: 679

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

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

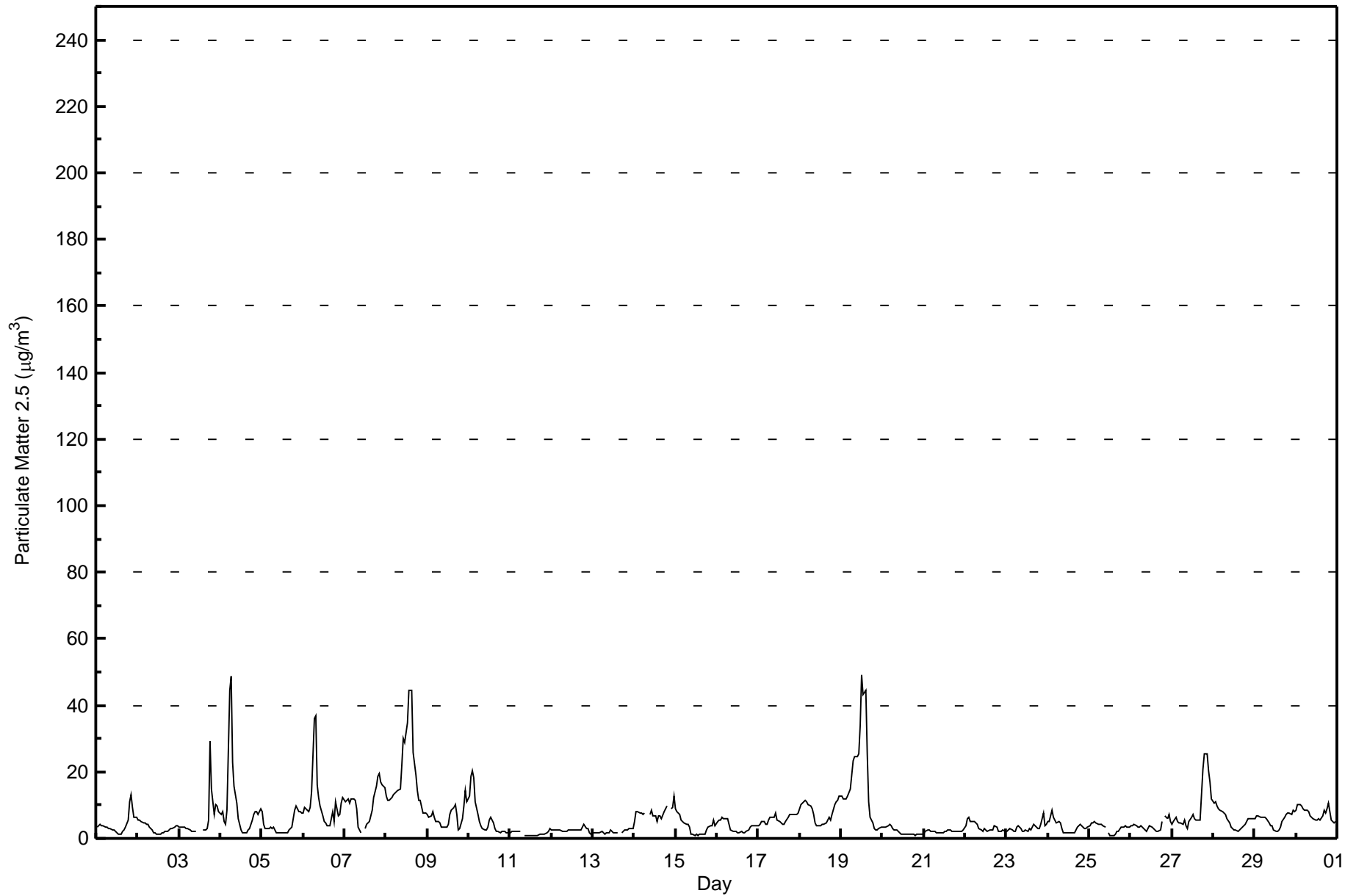
Anzac - September 2017

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Number of Exceedences (AAAQO): 24-hr: 0 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Value: 49.1 µg/m ³ on Sep 19 13:00 | | Maximum Daily Average: 19.6 µg/m ³ on Sep 8 | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Value: 0.9 µg/m ³ on Sep 11 10:00 | | Hours of Data: 707 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 8.1 µg/m ³ at hour 7 | | Hours of Missing Data: 13 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 6.08 µg/m ³ | | Hours of Calibration: 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Daily Average: 1.5 µg/m ³ on Sep 11 | | Percent Operational Time: 98.5 | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Diurnal Average: 4.7 µg/m ³ at hour 17 | | Percentiles: P ₁ = 1.0 P ₁₀ = 1.7 Q ₁ = 2.4 Median = 4.1 Q ₃ = 7.3 P ₉₀ = 11.5 P ₉₉ = 44.3 | | | | | | | | | | | | | | | | | | | | | | | | |
| 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-Sep | 3.5 | 3.8 | 4.1 | 4.0 | 3.8 | 3.4 | 3.3 | 3.0 | 3.0 | 2.6 | 2.4 | 2.0 | 1.5 | 1.3 | 1.5 | 2.1 | 2.7 | 3.3 | 5.6 | 11.0 | 13.1 | 9.3 | 6.3 | 6.2 | 4.3 | 13.1 |
| 2-Sep | 5.4 | 5.5 | 5.0 | 4.6 | 4.5 | 4.2 | 4.2 | 3.6 | 2.5 | 1.9 | 1.8 | 1.4 | 1.3 | 1.4 | 1.5 | 1.9 | 2.2 | 2.1 | 2.6 | 3.0 | 3.0 | 3.2 | 3.7 | 3.9 | 3.1 | 5.5 |
| 3-Sep | 3.4 | 3.2 | 3.2 | 3.2 | 3.1 | 2.8 | 2.5 | 2.1 | 2.1 | 2.0 | 2.1 | PF | PF | PF | 2.6 | 2.7 | 2.8 | 5.3 | 29.4 | 14.7 | 7.1 | 10.0 | 9.6 | 8.0 | 5.8 | 29.4 |
| 4-Sep | 7.3 | 8.0 | 5.0 | 4.3 | 8.4 | 44.3 | 48.8 | 23.1 | 15.5 | 10.4 | 5.7 | 4.4 | 2.6 | 1.7 | 1.5 | 1.8 | 2.7 | 3.1 | 5.4 | 7.3 | 8.1 | 8.2 | 7.4 | 9.0 | 10.2 | 48.8 |
| 5-Sep | 8.1 | 4.2 | 3.0 | 2.8 | 3.0 | 3.3 | 2.9 | 3.3 | 1.8 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 1.5 | 1.6 | 2.4 | 3.6 | 5.8 | 8.5 | 9.8 | 8.2 | 7.9 | 7.4 | 4.1 | 9.8 |
| 6-Sep | 7.6 | 9.1 | 8.4 | 8.0 | 9.2 | 14.0 | 36.1 | 36.7 | 16.2 | 12.4 | 9.9 | 6.8 | 5.2 | 4.5 | 3.8 | 4.0 | 5.8 | 8.1 | 4.9 | 10.9 | 6.7 | 7.4 | 10.6 | 12.1 | 10.8 | 36.7 |
| 7-Sep | 10.9 | 11.5 | 12.0 | 10.6 | 12.1 | 11.3 | 8.7 | 3.6 | 1.7 | C | C | 2.9 | 4.1 | 5.0 | 6.6 | 8.5 | 12.3 | 15.7 | 18.6 | 19.3 | 17.1 | 16.3 | 15.3 | 10.7 | 19.3 | |
| 8-Sep | 12.7 | 11.3 | 11.4 | 12.2 | 13.0 | 13.6 | 13.9 | 14.4 | 14.8 | 21.8 | 29.9 | 28.6 | 34.7 | 44.5 | 44.3 | 44.3 | 25.7 | 19.1 | 14.4 | 11.5 | 11.3 | 7.7 | 7.8 | 7.6 | 19.6 | 44.5 |
| 9-Sep | 7.1 | 6.4 | 6.9 | 8.1 | 6.4 | 5.0 | 5.1 | 4.6 | 3.3 | 3.4 | 3.3 | 3.6 | 4.1 | 7.1 | 8.5 | 9.2 | 10.1 | 7.3 | 2.4 | 2.8 | 6.1 | 9.9 | 14.2 | 11.0 | 6.5 | 14.2 |
| 10-Sep | 12.6 | 18.7 | 20.5 | 18.2 | 10.9 | 7.3 | 5.1 | 3.8 | 2.8 | 2.4 | 2.6 | 3.3 | 5.6 | 6.4 | 4.8 | 3.0 | 2.1 | 1.9 | 1.9 | 2.2 | 2.1 | 2.0 | 1.9 | 1.7 | 6.0 | 20.5 |
| 11-Sep | 1.9 | 2.2 | 2.3 | 2.1 | 2.2 | 2.2 | 2.1 | UO | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 0.9 | 1.0 | 1.0 | 1.1 | 1.1 | 1.2 | 1.4 | 1.8 | 2.2 | 3.0 | 1.5 | 3.0 |
| 12-Sep | 2.6 | 2.5 | 2.5 | 2.6 | 2.3 | 2.4 | 2.3 | 2.2 | 2.1 | 2.2 | 2.5 | 2.4 | 2.4 | 2.4 | 2.6 | 2.5 | 2.4 | 2.5 | 3.6 | 4.2 | 3.1 | 2.8 | 1.7 | 1.4 | 2.5 | 4.2 |
| 13-Sep | 1.5 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 | 1.7 | 1.4 | 1.5 | 1.6 | 2.4 | 1.9 | 1.8 | 1.8 | 1.6 | PF | PF | 1.9 | 2.6 | 2.4 | 2.6 | 2.9 | 2.9 | 3.1 | 2.0 | 3.1 |
| 14-Sep | 5.1 | 8.0 | 8.1 | 7.8 | 7.4 | 7.2 | 7.6 | PF | PF | 7.2 | 8.7 | 6.9 | 6.8 | 5.2 | 6.6 | 6.7 | 5.8 | 8.2 | 9.1 | 9.7 | UO | 8.8 | 9.5 | 12.9 | 7.8 | 12.9 |
| 15-Sep | 8.9 | 7.9 | 7.1 | 5.4 | 5.1 | 4.9 | 4.2 | 4.0 | 3.3 | 1.4 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.4 | 2.4 | 3.4 | 3.8 | 3.7 | 5.5 | 3.9 | 3.5 | 8.9 |
| 16-Sep | 4.9 | 5.4 | 5.6 | 6.3 | 5.8 | 6.1 | 5.9 | 4.1 | 2.5 | 2.0 | 2.0 | 2.0 | 1.8 | 1.9 | 1.9 | 1.8 | 1.7 | 2.0 | 2.7 | 3.5 | 3.9 | 3.8 | 4.0 | 4.0 | 3.6 | 6.3 |
| 17-Sep | 3.9 | 4.4 | 4.9 | 5.1 | 4.1 | 4.1 | 5.3 | 6.4 | 6.3 | 6.4 | 7.8 | 5.4 | 5.3 | 4.6 | 4.2 | 4.4 | 5.0 | 6.4 | 7.0 | 7.3 | 7.0 | 7.3 | 7.2 | 7.6 | 5.7 | 7.8 |
| 18-Sep | 8.9 | 10.0 | 11.0 | 11.4 | 11.0 | 10.2 | 9.6 | 8.9 | 7.2 | 4.8 | 3.8 | 3.7 | 3.8 | 4.1 | 4.2 | 4.7 | 5.3 | 6.4 | 5.5 | 7.0 | 10.1 | 11.2 | 11.4 | 12.6 | 7.8 | 12.6 |
| 19-Sep | 12.6 | 11.9 | 11.9 | 11.7 | 12.7 | 14.7 | 19.0 | 23.2 | 24.6 | 24.8 | 25.5 | 33.9 | 49.1 | 43.2 | 44.3 | 25.5 | 10.9 | 6.3 | 4.5 | 3.0 | 2.4 | 2.7 | 3.0 | 3.2 | 17.7 | 49.1 |
| 20-Sep | 3.4 | 3.3 | 3.5 | 3.6 | 4.1 | 3.7 | 2.9 | 2.7 | 2.6 | 2.3 | 1.9 | 1.5 | 1.4 | 1.2 | 1.2 | 1.3 | 1.1 | 1.1 | 1.1 | 1.0 | 1.1 | 1.2 | 1.2 | 1.2 | 2.1 | 4.1 |
| 21-Sep | 1.5 | 2.3 | 2.5 | 2.4 | 2.2 | 2.3 | 2.1 | 1.9 | 1.7 | 1.7 | 1.7 | 1.7 | 1.9 | 2.1 | 2.6 | 2.7 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.6 | 2.1 | 2.7 |
| 22-Sep | 4.0 | 5.8 | 6.2 | 5.1 | 5.1 | 4.9 | 4.5 | 4.1 | 3.0 | 2.5 | 2.1 | 3.1 | 2.5 | 2.1 | 2.5 | 2.6 | 2.4 | 4.0 | 3.3 | 2.0 | 2.0 | 2.3 | 2.6 | 2.2 | 3.4 | 6.2 |
| 23-Sep | 2.2 | 2.4 | 2.8 | 2.6 | 2.3 | 2.3 | 3.2 | 3.7 | 3.0 | 2.2 | 2.1 | 2.3 | 2.3 | 2.8 | 2.7 | 3.4 | 4.1 | 3.3 | 3.1 | 3.1 | 4.3 | 7.5 | 3.8 | 4.1 | 3.1 | 7.5 |
| 24-Sep | 5.1 | 4.9 | 8.3 | 6.3 | 5.4 | 4.7 | 5.0 | 4.5 | 2.9 | 1.8 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 1.8 | 2.4 | 3.5 | 3.9 | 4.4 | 3.6 | 3.1 | 3.1 | 3.2 | 3.6 | 8.3 |
| 25-Sep | 3.6 | 4.8 | 4.9 | 5.1 | 4.7 | 4.3 | 4.3 | 4.2 | 3.6 | 3.4 | UO | 1.5 | 1.1 | 1.0 | 1.0 | 1.1 | 1.9 | 2.2 | 3.2 | 3.3 | 3.5 | 3.7 | 3.6 | 3.4 | 3.2 | 5.1 |
| 26-Sep | 3.6 | 3.9 | 4.1 | 3.9 | 3.4 | 3.5 | 3.6 | 3.2 | 2.5 | 2.3 | 3.0 | 3.9 | 3.3 | 3.1 | 2.4 | 2.2 | 2.2 | 2.4 | 5.0 | UO | 6.8 | 5.9 | 7.2 | 4.9 | 3.7 | 7.2 |
| 27-Sep | 4.4 | 4.9 | 6.3 | 5.1 | 4.6 | 4.8 | 4.3 | 5.4 | 3.8 | 3.1 | 5.0 | 6.3 | 7.1 | 5.8 | 5.5 | 5.6 | 5.4 | 13.2 | 20.6 | 25.4 | 25.4 | 20.5 | 17.1 | 12.0 | 9.2 | 25.4 |
| 28-Sep | 10.6 | 11.0 | 9.7 | 9.0 | 8.5 | 8.2 | 7.7 | 7.1 | 5.8 | 4.5 | 3.4 | 2.8 | 2.4 | 2.5 | 2.1 | 2.4 | 2.8 | 3.4 | 4.2 | 5.2 | 6.0 | 5.9 | 6.1 | 6.0 | 5.7 | 11.0 |
| 29-Sep | 6.0 | 6.7 | 7.0 | 6.3 | 6.2 | 6.5 | 6.4 | 5.8 | 4.7 | 4.0 | 3.8 | 2.7 | 2.1 | 2.2 | 2.6 | 3.4 | 5.3 | 6.3 | 7.3 | 7.7 | 7.8 | 7.4 | 8.5 | 8.0 | 5.6 | 8.5 |
| 30-Sep | 8.4 | 10.3 | 10.1 | 9.5 | 8.9 | 8.4 | 8.4 | 8.2 | 6.7 | 6.5 | 5.8 | 5.5 | 5.5 | 5.7 | 5.7 | 6.7 | 8.6 | 7.8 | 9.0 | 10.5 | 5.4 | 5.0 | 4.5 | 5.1 | 7.3 | 10.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 6.1 6.5 6.7 6.3 6.1 7.2 8.1 7.3 5.3 4.9 5.2 5.1 5.6 5.8 5.8 5.4 4.7 5.1 6.3 6.8 6.5 6.4 6.4 6.2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12.7 18.7 20.5 18.2 13.0 44.3 48.8 36.7 24.6 24.8 29.9 33.9 49.1 44.5 44.3 44.3 25.7 19.1 29.4 25.4 25.4 20.5 17.1 15.3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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}) - $\mu\text{g}/\text{m}^3$
Anzac - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 444 | 62.80 | 62.80 |
| 6 - 15 | 216 | 30.55 | 93.35 |
| 16 - 25 | 21 | 2.97 | 96.32 |
| 26 - 80 | 18 | 2.55 | 98.87 |
| > 81.0 | 0 | 0.00 | 98.87 |

Total Number of Valid Hours: 707

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Anzac - September 2017

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 32 | 28 | 5 | 4 | 9 | 8 | 6 | 82 | 39 | 16 | 19 | 14 | 62 | 82 | 18 | 19 | 443 |
| 6 - 15 | 2 | 2 | 0 | 7 | 6 | 6 | 20 | 43 | 24 | 13 | 13 | 5 | 16 | 31 | 8 | 20 | 216 |
| 16 - 25 | 1 | 0 | 1 | 2 | 3 | 0 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 6 | 0 | 2 | 21 |
| 26 - 80 | 2 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 2 | 18 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 37 | 30 | 6 | 13 | 24 | 14 | 27 | 128 | 65 | 29 | 32 | 19 | 78 | 124 | 29 | 43 | 698 |

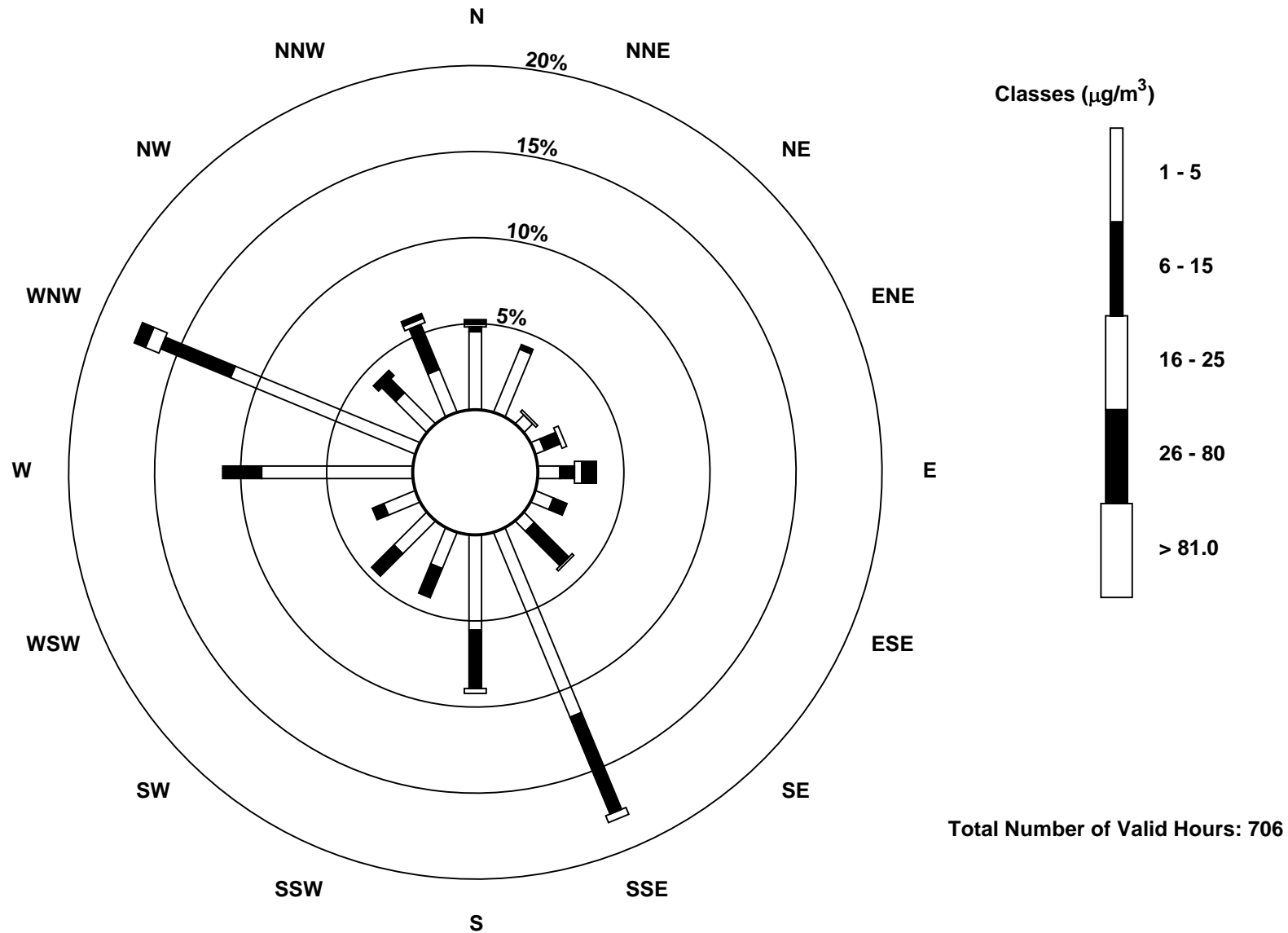
Total Number of Valid Hours: 706

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac (AMS 14)



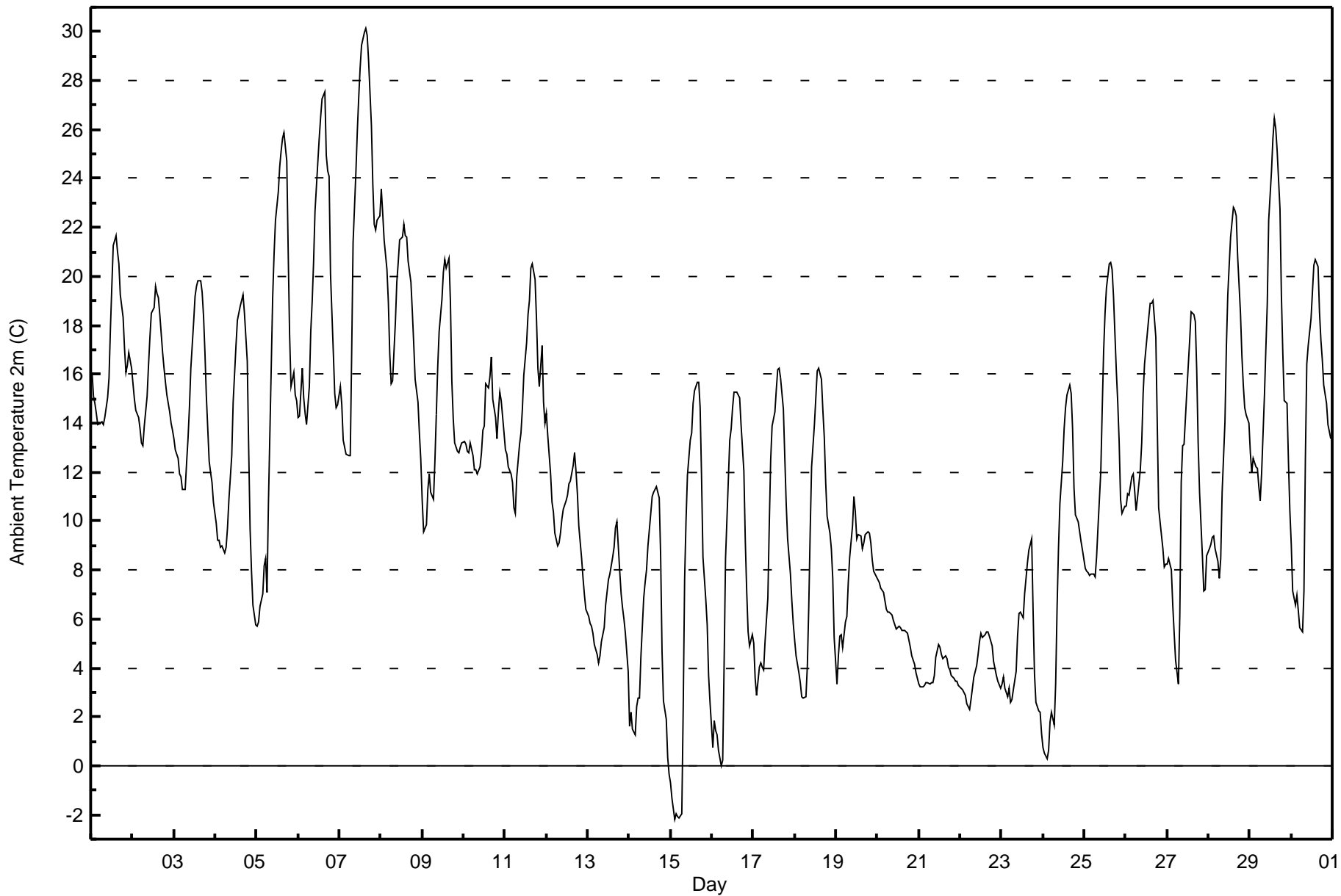


| Maximum Value: 30.1 C on Sep 7 16:00 Maximum Daily Average: 21.9 C on Sep 7 | | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -2.2 C on Sep 15 03:00 Minimum Daily Average: 3.8 C on Sep 21 Maximum Diurnal Average: 17.0 C at hour 16 Minimum Diurnal Average: 7.4 C at hour 7 Monthly Average: 11.75 C Percentiles: P ₁ = -0.5 P ₁₀ = 3.4 Q ₁ = 6.5 Median = 11.9 Q ₃ = 15.8 P ₉₀ = 20.3 P ₉₉ = 26.8 | | | | | | | | | | | | | | | | | | | | | | | 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-Sep | 16.1 | 15.1 | 14.8 | 14.4 | 14.0 | 14.0 | 14.0 | 14.0 | 14.2 | 15.0 | 15.8 | 17.8 | 19.6 | 21.2 | 21.7 | 21.0 | 20.5 | 19.2 | 18.3 | 17.0 | 16.0 | 16.4 | 16.9 | 16.2 | 16.8 | 21.7 | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 15.6 | 15.0 | 14.5 | 14.2 | 13.8 | 13.2 | 13.1 | 13.9 | 15.1 | 16.4 | 17.5 | 18.5 | 18.7 | 19.6 | 19.3 | 19.1 | 18.5 | 16.9 | 16.3 | 15.7 | 15.1 | 14.4 | 14.0 | 13.7 | 15.9 | 19.6 | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 13.4 | 12.9 | 12.6 | 11.9 | 11.8 | 11.3 | 11.3 | 12.4 | 13.4 | 14.7 | 16.3 | 18.1 | 19.2 | 19.6 | 19.8 | 19.8 | 19.4 | 18.4 | 16.9 | 15.1 | 12.4 | 12.0 | 11.6 | 10.8 | 14.8 | 19.8 | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 9.9 | 9.2 | 9.2 | 8.9 | 9.0 | 8.7 | 8.9 | 9.7 | 10.9 | 12.7 | 14.9 | 16.0 | 17.2 | 18.2 | 18.8 | 19.0 | 19.2 | 18.5 | 16.5 | 12.9 | 9.7 | 7.9 | 6.5 | 5.7 | 12.4 | 19.2 | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 5.7 | 5.9 | 6.5 | 7.0 | 8.2 | 8.5 | 7.1 | 10.7 | 16.3 | 19.1 | 20.9 | 22.3 | 23.4 | 24.5 | 25.1 | 25.7 | 25.9 | 24.7 | 21.0 | 17.6 | 15.5 | 16.1 | 15.2 | 14.9 | 16.2 | 25.9 | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 14.2 | 14.3 | 16.3 | 15.1 | 14.4 | 13.9 | 15.5 | 17.7 | 19.0 | 20.6 | 22.7 | 24.7 | 25.6 | 26.5 | 27.3 | 27.5 | 24.9 | 24.3 | 24.1 | 20.1 | 16.9 | 15.2 | 14.6 | 14.7 | 19.6 | 27.5 | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 15.5 | 14.7 | 13.3 | 13.0 | 12.7 | 12.7 | 12.7 | 16.8 | 21.4 | 24.2 | 25.9 | 27.3 | 28.6 | 29.4 | 30.0 | 30.1 | 29.8 | 28.8 | 26.2 | 23.7 | 22.2 | 21.9 | 22.3 | 22.5 | 21.9 | 30.1 | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 23.6 | 22.6 | 21.5 | 20.3 | 19.0 | 16.8 | 15.6 | 15.7 | 18.2 | 19.8 | 20.6 | 21.5 | 21.6 | 22.1 | 21.7 | 21.6 | 20.6 | 19.8 | 18.6 | 17.3 | 15.8 | 14.9 | 13.6 | 12.5 | 19.0 | 23.6 | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 10.8 | 9.6 | 9.8 | 11.3 | 11.9 | 11.2 | 10.9 | 12.4 | 14.4 | 16.3 | 17.8 | 19.1 | 20.1 | 20.7 | 20.4 | 20.8 | 19.0 | 15.7 | 14.2 | 13.2 | 12.8 | 12.8 | 13.0 | 13.2 | 14.6 | 20.8 | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 13.3 | 13.2 | 12.8 | 12.8 | 13.2 | 12.7 | 12.1 | 12.1 | 11.9 | 12.2 | 12.8 | 13.7 | 13.9 | 15.6 | 15.5 | 15.9 | 16.7 | 15.0 | 14.2 | 13.4 | 14.5 | 15.3 | 14.9 | 13.6 | 13.8 | 16.7 | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 12.9 | 12.7 | 12.2 | 11.9 | 11.6 | 10.6 | 10.3 | 11.8 | 13.1 | 13.6 | 14.6 | 16.0 | 17.3 | 18.4 | 19.0 | 20.3 | 20.5 | 19.9 | 18.3 | 16.3 | 15.5 | 17.2 | 14.9 | 14.0 | 15.1 | 20.5 | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 14.4 | 13.5 | 11.9 | 10.8 | 10.3 | 9.5 | 9.0 | 9.1 | 9.5 | 10.1 | 10.5 | 10.8 | 11.1 | 11.5 | 11.7 | 12.3 | 12.8 | 12.1 | 11.1 | 9.8 | 8.5 | 7.6 | 6.9 | 6.4 | 10.5 | 14.4 | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 6.1 | 5.8 | 5.7 | 5.4 | 4.9 | 4.5 | 4.2 | 4.5 | 5.1 | 5.6 | 6.6 | 7.1 | 7.6 | 7.8 | 8.5 | 8.9 | 9.8 | 10.0 | 8.0 | 7.0 | 6.5 | 6.0 | 5.4 | 3.8 | 6.5 | 10.0 | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 1.6 | 2.2 | 1.5 | 1.2 | 2.4 | 2.8 | 2.8 | 4.4 | 6.9 | 7.5 | 8.0 | 9.0 | 10.3 | 11.0 | 11.2 | 11.3 | 11.4 | 10.9 | 8.6 | 4.7 | 2.7 | 1.9 | 0.4 | -0.3 | 5.6 | 11.4 | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | -0.7 | -1.3 | -2.2 | -2.0 | -2.1 | -2.1 | -1.9 | 2.4 | 7.6 | 10.0 | 11.9 | 13.3 | 13.6 | 14.8 | 15.3 | 15.7 | 15.7 | 14.6 | 11.8 | 8.5 | 6.8 | 5.8 | 3.7 | 2.6 | 6.7 | 15.7 | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 0.7 | 1.8 | 1.4 | 1.2 | 0.6 | 0.0 | 0.2 | 4.2 | 8.5 | 11.7 | 13.3 | 13.8 | 14.7 | 15.3 | 15.3 | 15.1 | 15.0 | 14.0 | 12.1 | 9.2 | 7.1 | 5.5 | 4.9 | 5.3 | 8.0 | 15.3 | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 5.0 | 3.6 | 2.9 | 4.0 | 4.2 | 4.0 | 3.9 | 5.1 | 6.9 | 9.9 | 12.5 | 13.9 | 14.5 | 15.4 | 16.2 | 16.2 | 15.8 | 14.6 | 12.6 | 10.7 | 9.3 | 7.8 | 6.7 | 5.8 | 9.2 | 16.2 | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 5.1 | 4.5 | 3.8 | 3.4 | 2.8 | 2.8 | 2.8 | 4.1 | 6.5 | 9.6 | 12.2 | 13.9 | 15.0 | 16.1 | 16.2 | 15.8 | 14.5 | 13.4 | 11.6 | 10.2 | 9.5 | 8.9 | 7.7 | 5.3 | 9.0 | 16.2 | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 3.3 | 4.5 | 5.3 | 5.3 | 4.8 | 5.9 | 6.1 | 7.5 | 8.5 | 9.8 | 11.0 | 10.4 | 9.3 | 9.5 | 9.4 | 8.9 | 9.1 | 9.4 | 9.6 | 9.5 | 9.1 | 8.4 | 7.9 | 7.7 | 7.9 | 11.0 | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 7.6 | 7.5 | 7.3 | 7.1 | 6.7 | 6.4 | 6.3 | 6.3 | 6.2 | 5.9 | 5.8 | 5.6 | 5.7 | 5.7 | 5.5 | 5.5 | 5.5 | 5.4 | 5.1 | 4.8 | 4.5 | 4.1 | 3.8 | 3.6 | 5.7 | 7.6 | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 3.3 | 3.2 | 3.2 | 3.3 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.7 | 4.4 | 4.9 | 4.9 | 4.5 | 4.4 | 4.5 | 4.4 | 4.0 | 3.9 | 3.7 | 3.6 | 3.5 | 3.4 | 3.3 | 3.8 | 4.9 | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 3.2 | 3.1 | 3.0 | 2.9 | 2.5 | 2.3 | 2.7 | 3.2 | 3.7 | 4.1 | 4.6 | 5.1 | 5.4 | 5.2 | 5.4 | 5.5 | 5.4 | 5.3 | 4.9 | 4.3 | 4.0 | 3.7 | 3.5 | 3.2 | 4.0 | 5.5 | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 3.3 | 3.6 | 3.2 | 2.8 | 3.1 | 2.6 | 2.7 | 3.1 | 3.8 | 5.3 | 6.2 | 6.3 | 6.1 | 7.0 | 7.6 | 8.3 | 8.8 | 9.3 | 6.3 | 3.8 | 2.6 | 2.3 | 2.2 | 1.3 | 4.7 | 9.3 | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0.7 | 0.5 | 0.3 | 0.6 | 1.8 | 2.2 | 1.7 | 3.3 | 6.4 | 8.9 | 10.7 | 12.4 | 13.8 | 14.7 | 15.2 | 15.5 | 15.2 | 13.8 | 11.3 | 10.3 | 10.0 | 9.6 | 9.1 | 8.8 | 8.2 | 15.5 | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 8.1 | 8.0 | 7.9 | 7.8 | 7.8 | 7.8 | 7.7 | 8.5 | 9.8 | 12.0 | 14.6 | 16.9 | 18.5 | 19.5 | 20.5 | 20.6 | 20.3 | 19.2 | 16.1 | 14.9 | 13.3 | 10.9 | 10.3 | 10.6 | 13.0 | 20.6 | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 10.6 | 11.1 | 11.0 | 11.8 | 11.9 | 11.2 | 10.4 | 10.9 | 12.1 | 13.2 | 15.2 | 16.4 | 17.7 | 18.3 | 18.9 | 18.9 | 19.0 | 17.5 | 14.0 | 10.5 | 10.0 | 8.8 | 8.1 | 8.2 | 13.2 | 19.0 | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 8.2 | 8.5 | 8.0 | 6.6 | 5.4 | 4.3 | 3.4 | 6.1 | 11.6 | 13.1 | 13.1 | 15.3 | 16.3 | 17.4 | 18.6 | 18.4 | 18.2 | 16.1 | 13.2 | 11.2 | 8.6 | 7.2 | 7.2 | 8.6 | 11.0 | 18.6 | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 8.9 | 9.1 | 9.3 | 9.4 | 8.9 | 8.3 | 7.7 | 8.5 | 11.2 | 14.1 | 17.1 | 19.2 | 20.5 | 21.6 | 22.8 | 22.7 | 22.5 | 20.8 | 18.5 | 16.7 | 15.5 | 14.6 | 14.3 | 14.0 | 14.8 | 22.8 | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 12.8 | 12.0 | 12.6 | 12.2 | 12.1 | 11.4 | 10.8 | 12.0 | 15.1 | 17.1 | 18.9 | 22.3 | 24.3 | 25.6 | 26.5 | 26.1 | 25.1 | 22.7 | 19.3 | 16.9 | 14.9 | 14.8 | 12.4 | 10.4 | 17.0 | 26.5 | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 9.1 | 7.2 | 6.6 | 7.0 | 6.4 | 5.7 | 5.4 | 7.1 | 12.5 | 16.4 | 17.1 | 18.3 | 19.4 | 20.5 | 20.7 | 20.4 | 18.6 | 17.4 | 16.6 | 15.5 | 14.8 | 14.0 | 13.7 | 13.4 | 13.5 | 20.7 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | 8.7 | 8.4 | 8.2 | 8.1 | 7.9 | 7.6 | 7.4 | 8.7 | 10.8 | 12.4 | 13.8 | 15.0 | 15.8 | 16.6 | 16.9 | 17.0 | 16.7 | 15.7 | 14.0 | 12.1 | 10.9 | 10.3 | 9.6 | 9.1 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | 23.6 | 22.6 | 21.5 | 20.3 | 19.0 | 16.8 | 15.6 | 17.7 | 21.4 | 24.2 | 25.9 | 27.3 | 28.6 | 29.4 | 30.0 | 30.1 | 29.8 | 28.8 | 26.2 | 23.7 | 22.2 | 21.9 | 22.3 | 22.5 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Anzac - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Anzac - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 8 | 1.11 | 1.11 |
| 0 - 10 | 293 | 40.69 | 41.81 |
| 10 - 20 | 343 | 47.64 | 89.44 |
| > 20 | 76 | 10.56 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



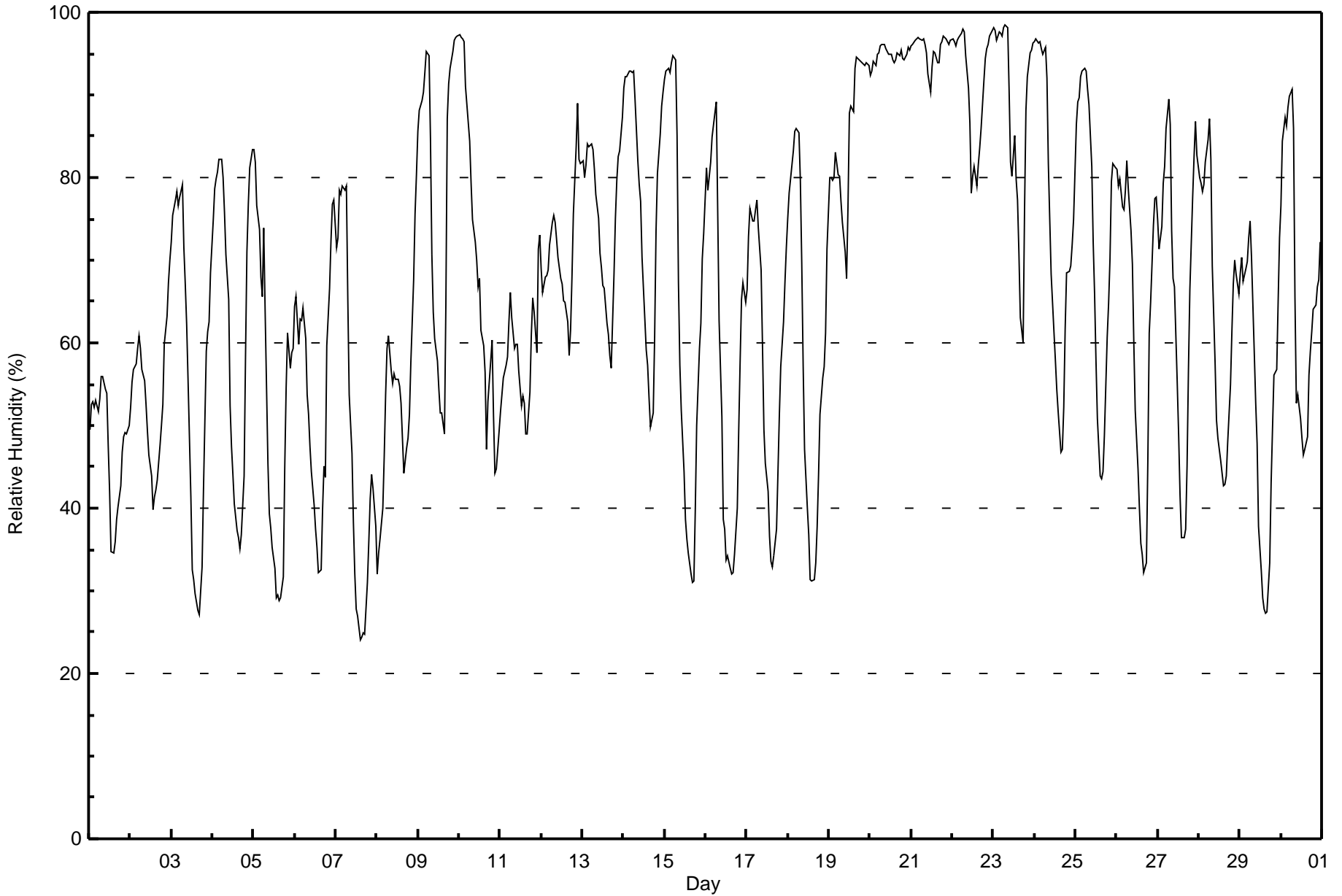
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Anzac - September 2017

| Maximum Value: 98 % on Sep 23 08:00 Maximum Daily Average: 95.6 % on Sep 21 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|-----------------|----|---------------|---------------|
| Minimum Value: 24 % on Sep 7 15:00 Minimum Daily Average: 47.7 % on Sep 1 Maximum Diurnal Average: 82.3 % at hour 7 Minimum Diurnal Average: 48.3 % at hour 16 Monthly Average: 67.1 % Percentiles: P ₁ = 28 P ₁₀ = 38 Q ₁ = 51 Median = 68 O ₃ = 83 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-Sep | 50 | 53 | 53 | 52 | 53 | 52 | 53 | 56 | 56 | 54 | 54 | 48 | 42 | 35 | 35 | 36 | 39 | 40 | 43 | 47 | 49 | 49 | 49 | 50 | 47.7 | 56 |
| 2-Sep | 52 | 55 | 57 | 57 | 59 | 61 | 59 | 57 | 55 | 53 | 49 | 46 | 44 | 40 | 41 | 42 | 43 | 48 | 50 | 53 | 60 | 63 | 67 | 70 | 53.5 | 70 |
| 3-Sep | 72 | 75 | 77 | 78 | 77 | 78 | 79 | 71 | 67 | 62 | 55 | 41 | 32 | 31 | 30 | 28 | 27 | 30 | 33 | 42 | 59 | 61 | 62 | 69 | 55.8 | 79 |
| 4-Sep | 75 | 79 | 80 | 81 | 82 | 82 | 80 | 76 | 71 | 65 | 52 | 47 | 44 | 41 | 37 | 36 | 35 | 37 | 44 | 58 | 71 | 77 | 81 | 83 | 63.1 | 83 |
| 5-Sep | 83 | 82 | 77 | 74 | 68 | 66 | 74 | 64 | 45 | 39 | 38 | 35 | 33 | 29 | 29 | 29 | 29 | 32 | 45 | 55 | 61 | 57 | 59 | 59 | 52.6 | 83 |
| 6-Sep | 64 | 66 | 60 | 63 | 63 | 64 | 61 | 54 | 51 | 48 | 44 | 40 | 37 | 35 | 32 | 33 | 40 | 45 | 44 | 60 | 67 | 72 | 77 | 77 | 54.0 | 77 |
| 7-Sep | 71 | 73 | 79 | 78 | 79 | 79 | 79 | 65 | 54 | 47 | 38 | 32 | 28 | 27 | 24 | 24 | 25 | 25 | 31 | 36 | 41 | 44 | 42 | 38 | 48.3 | 79 |
| 8-Sep | 32 | 35 | 36 | 40 | 46 | 54 | 59 | 61 | 57 | 55 | 56 | 56 | 56 | 55 | 53 | 48 | 44 | 47 | 48 | 51 | 58 | 68 | 76 | 80 | 52.9 | 80 |
| 9-Sep | 86 | 88 | 89 | 90 | 93 | 95 | 95 | 85 | 71 | 64 | 61 | 58 | 54 | 51 | 51 | 49 | 65 | 87 | 91 | 93 | 95 | 97 | 97 | 97 | 79.3 | 97 |
| 10-Sep | 97 | 97 | 97 | 96 | 91 | 87 | 84 | 79 | 75 | 72 | 70 | 67 | 68 | 61 | 60 | 56 | 47 | 53 | 58 | 60 | 51 | 44 | 45 | 49 | 69.4 | 97 |
| 11-Sep | 52 | 54 | 56 | 57 | 58 | 62 | 66 | 63 | 59 | 60 | 60 | 57 | 52 | 54 | 53 | 49 | 49 | 54 | 61 | 65 | 64 | 59 | 71 | 73 | 58.7 | 73 |
| 12-Sep | 69 | 66 | 68 | 68 | 69 | 72 | 75 | 75 | 75 | 73 | 70 | 68 | 67 | 65 | 65 | 63 | 58 | 62 | 68 | 76 | 84 | 89 | 82 | 82 | 71.1 | 89 |
| 13-Sep | 82 | 80 | 81 | 84 | 84 | 84 | 83 | 81 | 78 | 75 | 71 | 69 | 67 | 67 | 62 | 61 | 58 | 57 | 68 | 75 | 80 | 83 | 83 | 87 | 75.1 | 87 |
| 14-Sep | 91 | 92 | 92 | 93 | 93 | 93 | 93 | 89 | 82 | 79 | 77 | 70 | 63 | 59 | 57 | 53 | 50 | 52 | 61 | 74 | 80 | 85 | 89 | 90 | 77.4 | 93 |
| 15-Sep | 92 | 93 | 93 | 93 | 94 | 95 | 94 | 85 | 67 | 57 | 52 | 44 | 39 | 36 | 34 | 32 | 31 | 31 | 40 | 50 | 59 | 62 | 70 | 73 | 63.3 | 95 |
| 16-Sep | 81 | 79 | 80 | 82 | 85 | 88 | 89 | 76 | 63 | 51 | 39 | 38 | 34 | 34 | 33 | 32 | 32 | 34 | 40 | 49 | 58 | 65 | 67 | 65 | 58.1 | 89 |
| 17-Sep | 67 | 73 | 76 | 75 | 75 | 76 | 77 | 74 | 69 | 60 | 50 | 45 | 42 | 37 | 33 | 33 | 34 | 38 | 44 | 51 | 57 | 63 | 67 | 72 | 57.8 | 77 |
| 18-Sep | 75 | 78 | 82 | 83 | 86 | 86 | 86 | 80 | 70 | 57 | 47 | 40 | 37 | 31 | 31 | 31 | 33 | 38 | 44 | 51 | 56 | 57 | 61 | 71 | 58.8 | 86 |
| 19-Sep | 80 | 80 | 80 | 80 | 83 | 80 | 80 | 77 | 75 | 71 | 68 | 77 | 88 | 89 | 88 | 93 | 95 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 85.0 | 95 |
| 20-Sep | 92 | 93 | 94 | 94 | 95 | 95 | 96 | 96 | 96 | 96 | 95 | 95 | 95 | 94 | 94 | 94 | 95 | 95 | 95 | 94 | 94 | 95 | 96 | 95 | 94.7 | 96 |
| 21-Sep | 96 | 96 | 97 | 97 | 97 | 97 | 97 | 97 | 96 | 95 | 92 | 90 | 93 | 95 | 95 | 94 | 94 | 96 | 96 | 97 | 97 | 96 | 96 | 97 | 95.6 | 97 |
| 22-Sep | 97 | 96 | 96 | 97 | 97 | 98 | 98 | 98 | 95 | 91 | 87 | 78 | 80 | 81 | 79 | 81 | 84 | 86 | 92 | 94 | 96 | 96 | 97 | 98 | 91.2 | 98 |
| 23-Sep | 98 | 98 | 97 | 98 | 97 | 97 | 98 | 98 | 98 | 91 | 82 | 80 | 85 | 80 | 77 | 71 | 63 | 60 | 76 | 88 | 92 | 95 | 95 | 96 | 88.0 | 98 |
| 24-Sep | 96 | 97 | 96 | 96 | 96 | 95 | 96 | 92 | 82 | 75 | 68 | 61 | 58 | 54 | 52 | 47 | 47 | 52 | 62 | 68 | 69 | 69 | 72 | 75 | 74.0 | 97 |
| 25-Sep | 87 | 89 | 90 | 92 | 93 | 93 | 93 | 91 | 89 | 81 | 72 | 66 | 58 | 51 | 44 | 44 | 44 | 49 | 61 | 65 | 70 | 80 | 82 | 81 | 73.5 | 93 |
| 26-Sep | 81 | 79 | 80 | 76 | 76 | 79 | 82 | 79 | 74 | 69 | 60 | 52 | 45 | 40 | 36 | 34 | 32 | 33 | 46 | 61 | 65 | 74 | 77 | 78 | 62.8 | 82 |
| 27-Sep | 75 | 71 | 74 | 79 | 81 | 86 | 89 | 86 | 74 | 68 | 67 | 55 | 49 | 41 | 36 | 36 | 37 | 45 | 57 | 67 | 78 | 83 | 87 | 83 | 66.9 | 89 |
| 28-Sep | 80 | 79 | 78 | 79 | 82 | 85 | 87 | 82 | 69 | 58 | 51 | 49 | 47 | 46 | 43 | 43 | 44 | 48 | 55 | 61 | 67 | 70 | 68 | 66 | 64.0 | 87 |
| 29-Sep | 68 | 70 | 68 | 69 | 70 | 73 | 75 | 70 | 59 | 53 | 48 | 38 | 32 | 29 | 28 | 27 | 28 | 33 | 43 | 50 | 56 | 57 | 65 | 73 | 53.4 | 75 |
| 30-Sep | 77 | 84 | 87 | 86 | 88 | 90 | 91 | 86 | 66 | 53 | 54 | 51 | 49 | 46 | 47 | 49 | 56 | 59 | 61 | 64 | 65 | 67 | 68 | 72 | 67.3 | 91 |
| | | | | | | | | | | | | | | | | | | | 77.3 78.3 79.0 79.6 80.3 81.3 82.3 78.1 71.2 65.7 60.9 56.4 53.9 51.2 49.3 48.3 48.6 52.0 58.3 65.0 69.7 72.4 74.8 76.4 | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | 98 98 97 98 97 98 98 98 98 96 95 95 95 95 95 94 95 96 96 97 97 97 97 98 | | | | Diurnal Maximum | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 86 | 11.94 | 11.94 |
| 40 - 60 | 193 | 26.81 | 38.75 |
| 60 - 80 | 216 | 30.00 | 68.75 |
| 80 - 100 | 225 | 31.25 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Leaf Wetness (SW) - %
Anzac - September 2017

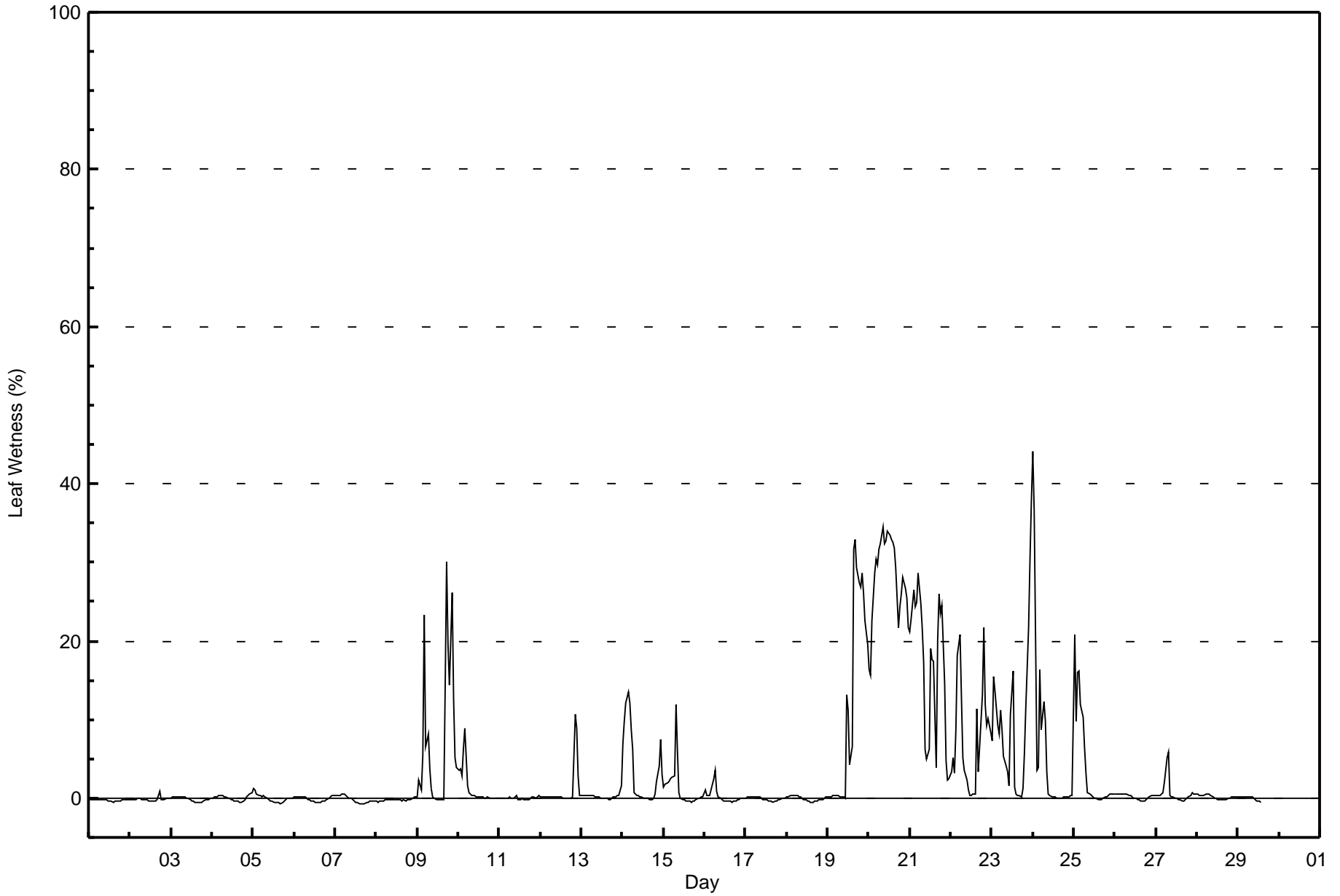
| Maximum Value: 44 % on Sep 24 01:00 | | Maximum Daily Average: 28.1 % on Sep 20 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|-----|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|---------------|-----------------|
| Minimum Value: -1 % on Sep 7 18:00 | | Minimum Daily Average: -0.3 % on Sep 1 | | Hours of Data: 686 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 5.6 % at hour 5 | | Minimum Diurnal Average: 1.4 % at hour 11 | | Hours of Missing Data: 34 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 3.5 % | | Percentiles: P ₁ = -1 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 14 P ₉₉ = 33 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 95.3 | | | | | | | | | | | | | | | | | | | | | | |
| 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.3 | 0 |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 1 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 1 | 1 | 0.0 | 1 |
| 5-Sep | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 1 | |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | -0.2 | 0 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.2 | 0 | |
| 9-Sep | 0 | 2 | 1 | 5 | 23 | 7 | 8 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 30 | 20 | 14 | 26 | 13 | 5 | 4 | 7.4 | 30 | |
| 10-Sep | 4 | 4 | 3 | 6 | 9 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 9 | |
| 11-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 9 | 3 | 1.0 | 11 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.2 | 2 | |
| 14-Sep | 7 | 10 | 12 | 14 | 12 | 9 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 7 | 3 | 3.7 | 14 | |
| 15-Sep | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 12 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 12 | |
| 16-Sep | 1 | 0 | 0 | 0 | 1 | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 4 | |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 | |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 11 | 4 | 6 | 32 | 33 | 29 | 27 | 27 | 29 | 26 | 23 | 20 | 11.8 | 33 | |
| 20-Sep | 16 | 16 | 23 | 29 | 30 | 30 | 32 | 32 | 34 | 32 | 33 | 34 | 34 | 33 | 33 | 32 | 29 | 22 | 24 | 26 | 28 | 27 | 25 | 22 | 28.1 | 34 |
| 21-Sep | 21 | 23 | 27 | 24 | 25 | 29 | 25 | 22 | 17 | 6 | 5 | 6 | 19 | 18 | 17 | 4 | 20 | 26 | 23 | 25 | 15 | 5 | 2 | 2 | 16.9 | 29 |
| 22-Sep | 3 | 5 | 3 | 8 | 18 | 21 | 13 | 5 | 4 | 2 | 1 | 0 | 0 | 0 | 1 | 11 | 3 | 7 | 13 | 22 | 12 | 9 | 10 | 8 | 7.6 | 22 |
| 23-Sep | 7 | 15 | 13 | 9 | 8 | 11 | 9 | 5 | 4 | 3 | 2 | 11 | 16 | 1 | 0 | 0 | 0 | 0 | 1 | 6 | 12 | 22 | 30 | 38 | 9.4 | 38 |
| 24-Sep | 44 | 37 | 4 | 4 | 16 | 9 | 12 | 10 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.9 | 44 |
| 25-Sep | 21 | 10 | 16 | 16 | 12 | 10 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4.1 | 21 |
| 26-Sep | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 27-Sep | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.7 | 6 |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | -- | 0 |
| 30-Sep | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | DF | -- | -- |
| | | 4.5 | 4.4 | 3.7 | 4.2 | 5.6 | 4.7 | 4.4 | 3.6 | 2.5 | 1.6 | 1.4 | 2.1 | 2.6 | 1.7 | 1.8 | 2.6 | 3.3 | 3.9 | 3.7 | 4.2 | 4.8 | 4.1 | 3.9 | 3.6 | Diurnal Average |
| | | 44 | 37 | 27 | 29 | 30 | 30 | 32 | 32 | 34 | 32 | 33 | 34 | 34 | 33 | 33 | 32 | 33 | 30 | 27 | 27 | 29 | 27 | 30 | 38 | Diurnal Maximum |

DF - DAS Failure



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (SW) - %
Anzac - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Leaf Wetness (SW) - %
Anzac - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 193 | 44.78 | 44.78 |
| 0.4 - 0.5 | 51 | 11.83 | 56.61 |
| 0.6 - 0.7 | 11 | 2.55 | 59.16 |
| 0.8 - 1.4 | 11 | 2.55 | 61.72 |
| 1.5 - 10 | 73 | 16.94 | 78.65 |
| > 10 | 90 | 20.88 | 99.54 |

Total Number of Valid Hours: 431

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Anzac - September 2017

| | | |
|--|--|--------------------------------|
| Maximum Speed: 25 km/h on Sep 10 23:00 | Maximum Daily Speed Average: 17.9 km/h on Sep 10 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 9 21:00 | Minimum Daily Speed Average: 1.8 km/h on Sep 9 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 3.6 km/h at hour 17 | Minimum Diurnal Speed Average: 1.0 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 2.5 km/h 252.5 deg | Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 10 Q ₃ = 14 P ₉₀ = 16 P ₉₉ = 22 | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | WNW14 | W15 | W17 | W14 | W15 | W16 | W17 | W19 | W17 | W16 | W13 | W11 | W14 | W17 | W16 | W18 | W19 | W18 | W14 | W11 | WSW10 | W13 | W16 | W15 | W15.1 | W19 |
| 2-Sep | WNW16 | WNW16 | W17 | W15 | W15 | W11 | W11 | W13 | WNW13 | W12 | WNW12 | WNW13 | WNW13 | WNW14 | WNW12 | WNW11 | WNW12 | NW9 | W8 | W10 | WNW12 | WNW11 | WNW10 | WNW11 | WNW12.3 | W17 |
| 3-Sep | WNW13 | WNW14 | WNW14 | WNW15 | WNW14 | WNW14 | WNW12 | W13 | W14 | W15 | W15 | WNW19 | WNW19 | WNW19 | WNW19 | NW18 | NW20 | NW18 | NW15 | NNW16 | NNW10 | NW9 | NW12 | NNW12 | WNW14.2 | NW20 |
| 4-Sep | NNW11 | WNW9 | WNW11 | WNW12 | WNW12 | WNW12 | WNW13 | WNW13 | WNW11 | WNW12 | NNW13 | NNW13 | NW12 | NW12 | WNW9 | WNW10 | WNW10 | NNW6 | NW3 | SSW3 | S5 | S6 | S5 | S4 | WNW7.7 | NNW13 |
| 5-Sep | S5 | SW6 | SW6 | SW7 | SW7 | SW7 | SSW5 | SSW4 | SW8 | WSW8 | WNW10 | WNW11 | WNW12 | WNW13 | WNW11 | W10 | W8 | WNW5 | SW3 | SSW4 | SW6 | SW7 | SW6 | SW7 | WSW6.0 | WNW13 |
| 6-Sep | W6 | WNW7 | WNW9 | WNW9 | WNW7 | WNW8 | NW9 | WNW9 | WNW7 | W6 | W4 | WNW5 | WNW5 | WNW7 | WSW7 | W6 | WNW5 | NNW3 | NE3 | SSW2 | SE2 | SE4 | SSE6 | SSE8 | W4.2 | WNW9 |
| 7-Sep | SSE10 | SSE9 | SSE9 | S7 | S7 | S8 | S7 | SSE6 | SSE8 | S11 | S13 | S13 | SSW15 | SSW15 | S17 | S16 | S15 | SSW11 | SSE10 | S12 | SSE14 | S14 | S13 | SSW14 | S11.2 | S17 |
| 8-Sep | SW18 | SW16 | WSW11 | SW9 | SSW6 | SSW7 | SSE5 | SSW2 | W3 | WNW6 | WNW8 | WNW9 | N12 | NNW13 | NW13 | N11 | NNW11 | NNW9 | NNE7 | NNW5 | NNW8 | NNW8 | NW6 | NNW5 | WNW4.9 | SW18 |
| 9-Sep | NW4 | WNW4 | WNW5 | WNW7 | NNW6 | N5 | N3 | ENE6 | E9 | ESE9 | E10 | ESE9 | ESE9 | E9 | ENE11 | ESE6 | WSW3 | WNW4 | NNW3 | NNW5 | ENE0 | WNW4 | WNW6 | W2 | NE1.8 | ENE11 |
| 10-Sep | WNW6 | WNW10 | WNW11 | WNW9 | W12 | W18 | W19 | W20 | W21 | W23 | W22 | W25 | W25 | WNW22 | WNW23 | WNW16 | WNW19 | W22 | WNW15 | W10 | W17 | W25 | W25 | W21 | W17.9 | W25 |
| 11-Sep | W16 | WNW18 | W14 | W13 | W9 | WSW6 | WSW5 | SW5 | SSW6 | SSW5 | SE5 | SE9 | ESE10 | SE10 | SE7 | SE8 | S8 | S9 | S6 | S9 | SW10 | WNW12 | W6 | WNW7 | SW4.7 | WNW18 |
| 12-Sep | W10 | WNW16 | WNW20 | WNW19 | WNW17 | W16 | WNW19 | WNW18 | WNW17 | WNW18 | WNW18 | WNW16 | WNW17 | WNW15 | WNW15 | WNW13 | WNW12 | NW8 | N9 | NNW8 | NNW4 | N6 | NNE9 | NNE7 | WNW12.4 | WNW20 |
| 13-Sep | NNE4 | NNE5 | NNW2 | NNE4 | N5 | NNE7 | NE8 | NNE5 | N6 | N6 | N8 | N7 | NNE6 | N6 | E3 | NW2 | SE2 | ENE2 | NW1 | SW2 | SW3 | WSW1 | S1 | WSW5 | N2.9 | N8 |
| 14-Sep | WSW5 | SW5 | SW4 | SW4 | WSW4 | SSW2 | NNE4 | NW4 | WNW8 | NW6 | N6 | NNW6 | NNW9 | N10 | NNW10 | N9 | NNW7 | NW6 | NNW6 | NNW5 | NW2 | S4 | S4 | S4 | NW3.3 | N10 |
| 15-Sep | S4 | SSW5 | SSE2 | SSE3 | S4 | S6 | SSW5 | S4 | SSE1 | W4 | WNW7 | NW10 | WNW9 | WNW7 | NW7 | WNW6 | WSW5 | SW9 | SSW6 | S7 | S8 | S7 | SSW6 | S6 | SW3.5 | NW10 |
| 16-Sep | S6 | SSE7 | SSE8 | SSE9 | SSE7 | SSE6 | SSE7 | SSE7 | SSE10 | S17 | S14 | S15 | SSE15 | S15 | S12 | S15 | S12 | S10 | SSE8 | SSE8 | SSE8 | SSE8 | SSE9 | SSE10 | S9.9 | S17 |
| 17-Sep | SSE10 | SSE8 | SSE8 | SSE11 | SSE12 | SSE11 | SSE10 | SSE10 | SSE10 | SE12 | SSE15 | SSE18 | S17 | SSE18 | SSE17 | SSE17 | SSE15 | SSE15 | SSE12 | SSE10 | SSE9 | SSE9 | SE9 | SE10 | SSE12.0 | SSE18 |
| 18-Sep | SE10 | SE10 | SE10 | SSE12 | SSE12 | SE13 | SE13 | SSE14 | SSE15 | SSE16 | SSE18 | SSE20 | SE17 | SE17 | SE15 | ESE15 | ESE17 | ESE13 | ESE11 | E10 | ESE11 | E10 | ESE7 | ESE5 | SE12.3 | SSE20 |
| 19-Sep | E5 | E4 | ENE6 | ENE5 | ENE8 | ENE10 | ENE10 | E12 | E14 | E16 | E16 | E16 | E15 | E18 | E19 | E19 | ENE19 | E20 | E22 | E22 | E22 | E22 | E19 | ENE18 | E14.6 | E22 |
| 20-Sep | ENE17 | NE15 | NE14 | NE13 | NNE11 | NNE13 | NNE13 | NNE14 | NNE14 | NNE14 | NNE15 | NNE15 | NNE15 | NNE16 | NNE16 | NNE15 | NNE15 | NNE14 | NNE14 | NNE15 | NNE16 | NNE14 | N12 | N14 | NNE14.0 | ENE17 |
| 21-Sep | N13 | N14 | N15 | N14 | N15 | N16 | N16 | N16 | N17 | N16 | N15 | N15 | N16 | N14 | N17 | N15 | N17 | NNW14 | NNW14 | NNW13 | N14 | NNW11 | NNW10 | NNW9 | N14.2 | N17 |
| 22-Sep | NNW8 | NNW9 | NNW7 | NNW7 | NNW6 | NW4 | NW3 | WNW2 | WSW2 | W5 | NNW7 | NNW4 | NW5 | N5 | NNE2 | ESE2 | W2 | W2 | S1 | SSW4 | SSE5 | SSE3 | S3 | AF | NW2.5 | NNW9 |
| 23-Sep | ESE4 | SSE6 | SSE6 | SSE6 | SSE7 | SSE7 | SSE8 | SSE6 | S5 | SSE5 | SSE6 | S5 | S4 | SSE8 | SSE8 | SSE7 | SSW5 | SSE7 | SE5 | SSE6 | SSE7 | SSE8 | SSE7 | SSE8 | SSE6.1 | SSE8 |
| 24-Sep | S7 | SSE7 | SSE8 | SSE9 | SSE9 | SSE7 | SSE8 | SSE12 | SSE10 | SSE9 | SSE12 | SSE13 | SSE11 | SSE11 | S9 | S13 | SSE10 | SSE8 | S9 | SSE11 | SSE12 | SSE12 | SSE12 | SSE12 | SSE10.0 | SSE13 |
| 25-Sep | SSE13 | SSE12 | SSE10 | SSE9 | SSE8 | SSE7 | SSE8 | SSE7 | SSE6 | S6 | SSE6 | WNW4 | WNW10 | W12 | W10 | W9 | WSW8 | SW8 | WSW9 | SW7 | SW6 | SSW8 | SW7 | SW7 | SSW5.3 | SSE13 |
| 26-Sep | SW7 | SW6 | WSW7 | W10 | WNW11 | WNW11 | W9 | WNW12 | WNW12 | WNW12 | WNW13 | WNW13 | WNW12 | WNW15 | WNW14 | NW13 | WNW12 | NW12 | WNW6 | W7 | W6 | W5 | WSW4 | WSW5 | WNW9.2 | WNW15 |
| 27-Sep | SW6 | WSW5 | SSW5 | SW6 | SSW3 | SW2 | NNE2 | W6 | WNW11 | WNW8 | WNW8 | WNW8 | W9 | NW6 | NW9 | NW9 | NNW10 | NNW9 | N9 | NNW6 | NE4 | ENE4 | SE4 | SE6 | WNW3.7 | WNW11 |
| 28-Sep | SSE8 | SSE8 | SSE10 | SSE11 | SSE12 | SSE12 | SE11 | SE10 | SE10 | SE11 | SSE13 | SSE14 | SSE16 | SSE15 | S14 | SSW15 | S13 | S12 | S12 | SSE12 | S13 | S14 | S17 | SSE14 | SSE12.0 | S17 |
| 29-Sep | SE11 | SE9 | SE12 | SE11 | SSE13 | SSE13 | SE12 | SE11 | SE11 | ESE11 | E12 | SSE9 | S12 | S13 | S13 | S15 | SSW13 | SSW10 | S8 | S8 | SSE9 | SSE10 | S6 | S8 | SSE9.7 | SSW15 |
| 30-Sep | SSE6 | SE6 | SSE6 | S6 | S6 | SSW6 | SW5 | S4 | SW3 | W5 | WNW12 | WNW12 | WNW11 | WNW11 | WNW13 | W9 | WNW8 | WNW9 | WNW8 | WNW13 | WNW14 | WNW16 | WNW14 | NW14 | W6.6 | WNW16 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|------|------|------|-------|-------|-------|------|------|------|-------|--------|-------|-------|-------|-----------------|-----------------|--|
| SW2.7 | WSW3.0 | WSW3.1 | WSW3.1 | WSW2.9 | WSW2.8 | WSW2.0 | WSW2.5 | WSW2.7 | W2.5 | W2.9 | W3.5 | W3.2 | W3.2 | W3.0 | W3.6 | W2.4 | W1.0 | SW1.3 | SSW1.7 | SW2.0 | SW2.3 | SW2.4 | Diurnal Average | | |
| SW18 | WNW18 | WNW20 | WNW19 | WNW17 | W18 | WNW19 | W20 | W21 | W23 | W22 | W25 | WNW25 | WNW22 | WNW23 | E19 | NW20 | W22 | E22 | E22 | E22 | W25 | W25 | W21 | 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 - September 2017

| | |
|--|--|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Sep 10 12:00 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9 |
| Minimum Value: 0 km/h on Sep 15 03:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8 | |

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

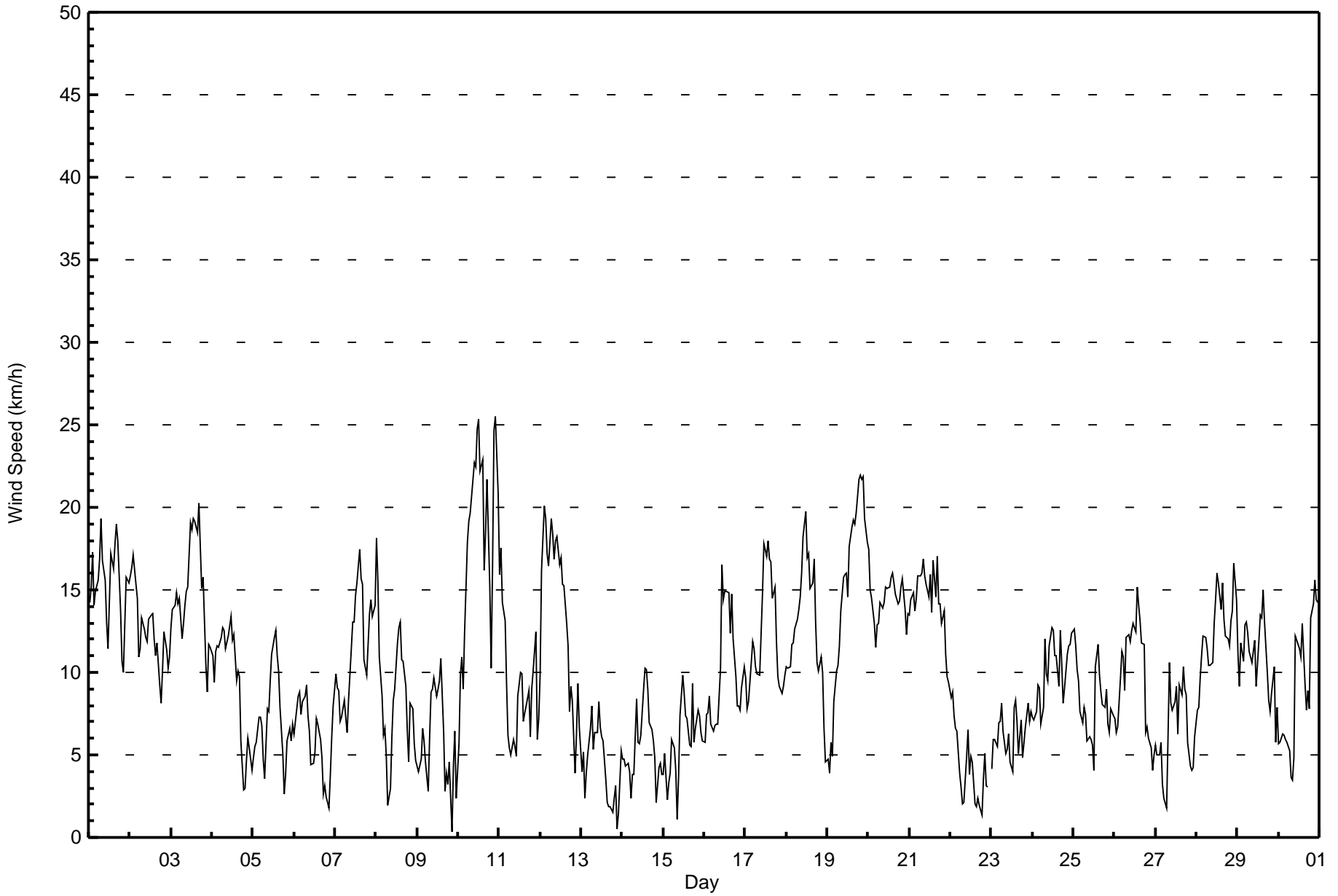
Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Anzac - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 125 | 17.39 | 17.39 |
| 6 - 11 | 316 | 43.95 | 61.34 |
| 12 - 19 | 258 | 35.88 | 97.22 |
| 20 - 28 | 20 | 2.78 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 4 | 7 | 2 | 4 | 3 | 3 | 6 | 7 | 17 | 14 | 10 | 11 | 9 | 10 | 9 | 9 | 125 |
| 6 - 11 | 12 | 6 | 1 | 6 | 5 | 9 | 20 | 81 | 27 | 9 | 21 | 8 | 23 | 50 | 12 | 26 | 316 |
| 12 - 19 | 21 | 17 | 3 | 3 | 11 | 3 | 7 | 39 | 24 | 7 | 2 | 0 | 38 | 65 | 10 | 8 | 258 |
| 20 - 28 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 9 | 4 | 1 | 0 | 20 |
| 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 | 37 | 30 | 6 | 13 | 24 | 15 | 33 | 128 | 68 | 30 | 33 | 19 | 79 | 129 | 32 | 43 | 719 |

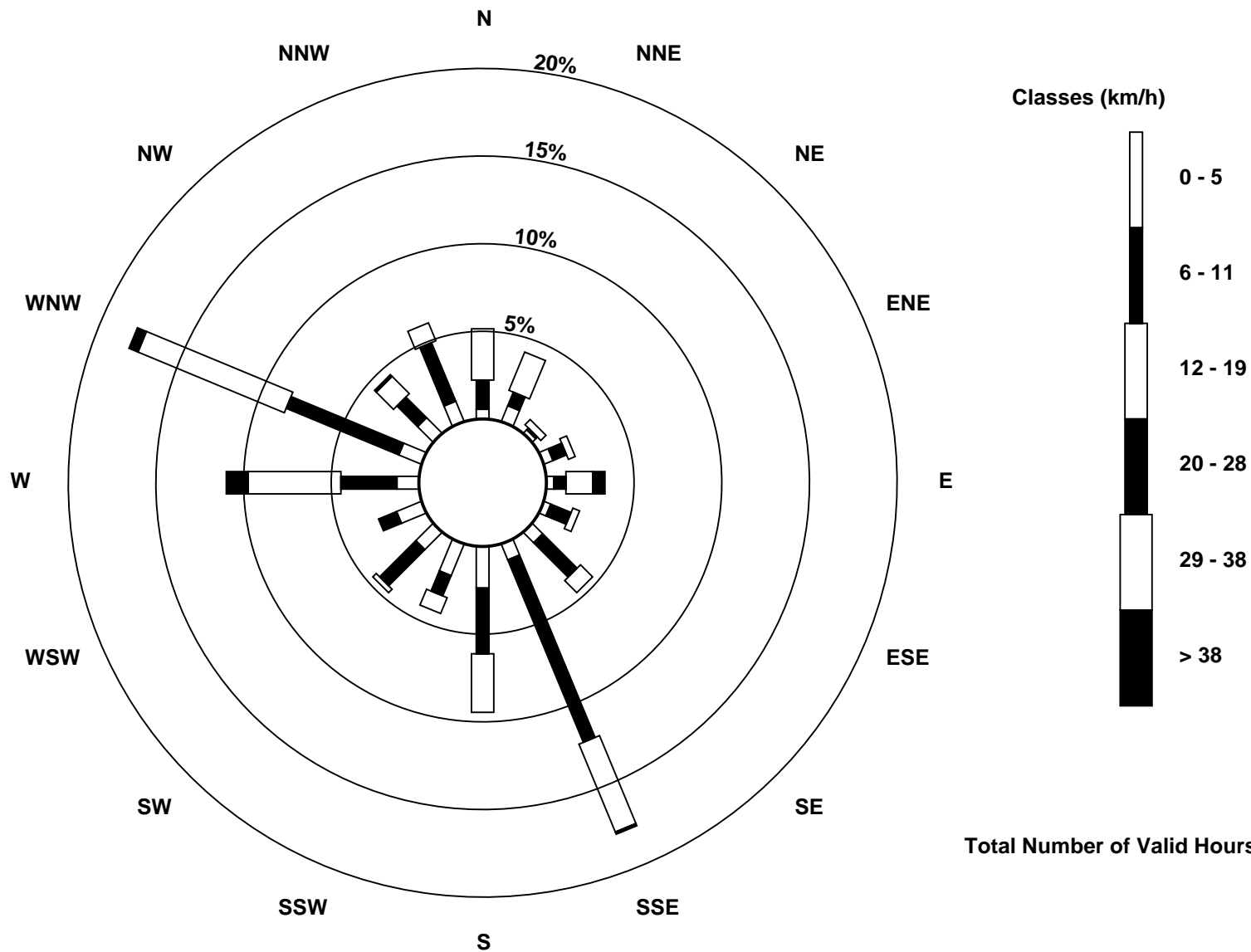
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Anzac (AMS 14)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - September 2017

| | |
|---|--------------------------------|
| Direction of Maximum Speed: 278 deg on Sep 10 23:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 280.0 deg on Sep 10 | Hours of Data: 719 |
| Direction of Minimum Speed: 59 deg on Sep 9 21:00 | Hours of Missing Data: 1 |
| Direction of Minimum Daily Speed Average: 1.8 deg on Sep 9 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 267.5 deg | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 282 | 279 | 277 | 270 | 271 | 266 | 270 | 280 | 280 | 274 | 276 | 264 | 268 | 281 | 277 | 268 | 261 | 266 | 266 | 261 | 255 | 268 | 279 | 279 | 272.1 | |
| 2-Sep | 282 | 283 | 279 | 275 | 274 | 269 | 265 | 268 | 282 | 280 | 284 | 290 | 289 | 292 | 296 | 294 | 291 | 312 | 265 | 265 | 284 | 292 | 285 | 288 | 282.5 | |
| 3-Sep | 291 | 293 | 288 | 291 | 288 | 287 | 285 | 278 | 280 | 279 | 278 | 291 | 303 | 294 | 294 | 306 | 313 | 316 | 321 | 339 | 344 | 314 | 321 | 328 | 300.2 | |
| 4-Sep | 327 | 303 | 297 | 295 | 290 | 294 | 295 | 290 | 290 | 287 | 330 | 330 | 319 | 320 | 300 | 297 | 293 | 327 | 307 | 195 | 179 | 177 | 182 | 186 | 298.3 | |
| 5-Sep | 188 | 216 | 228 | 227 | 225 | 229 | 198 | 205 | 227 | 237 | 294 | 293 | 294 | 282 | 290 | 278 | 281 | 282 | 231 | 210 | 228 | 232 | 225 | 233 | 252.7 | |
| 6-Sep | 259 | 290 | 290 | 292 | 296 | 299 | 304 | 300 | 288 | 266 | 280 | 289 | 295 | 283 | 251 | 275 | 291 | 331 | 37 | 194 | 138 | 134 | 158 | 162 | 279.8 | |
| 7-Sep | 159 | 163 | 168 | 174 | 175 | 175 | 170 | 166 | 159 | 184 | 181 | 185 | 205 | 194 | 183 | 191 | 187 | 194 | 167 | 169 | 156 | 177 | 176 | 198 | 179.4 | |
| 8-Sep | 216 | 231 | 237 | 231 | 205 | 205 | 167 | 213 | 271 | 289 | 291 | 297 | 349 | 330 | 326 | 357 | 335 | 335 | 12 | 341 | 335 | 328 | 314 | 343 | 295.4 | |
| 9-Sep | 325 | 295 | 293 | 294 | 335 | 353 | 351 | 59 | 96 | 106 | 100 | 102 | 113 | 98 | 77 | 118 | 241 | 297 | 336 | 328 | 59 | 297 | 300 | 272 | 52.2 | |
| 10-Sep | 298 | 296 | 295 | 285 | 269 | 277 | 275 | 270 | 272 | 275 | 276 | 278 | 281 | 287 | 289 | 300 | 295 | 280 | 282 | 262 | 267 | 278 | 278 | 277 | 280.0 | |
| 11-Sep | 272 | 283 | 277 | 272 | 260 | 251 | 243 | 217 | 205 | 201 | 143 | 124 | 117 | 129 | 126 | 141 | 187 | 177 | 179 | 184 | 224 | 288 | 273 | 286 | 227.5 | |
| 12-Sep | 272 | 283 | 290 | 299 | 293 | 277 | 286 | 283 | 286 | 288 | 293 | 291 | 291 | 294 | 297 | 295 | 298 | 322 | 355 | 348 | 331 | 11 | 22 | 17 | 298.0 | |
| 13-Sep | 29 | 27 | 341 | 13 | 6 | 24 | 36 | 13 | 354 | 5 | 351 | 357 | 12 | 11 | 95 | 322 | 144 | 69 | 314 | 227 | 228 | 243 | 184 | 242 | 7.2 | |
| 14-Sep | 249 | 225 | 217 | 231 | 242 | 211 | 31 | 308 | 293 | 314 | 355 | 341 | 338 | 350 | 345 | 353 | 334 | 325 | 330 | 330 | 330 | 330 | 176 | 182 | 182 | 314.9 |
| 15-Sep | 188 | 211 | 164 | 163 | 177 | 188 | 195 | 187 | 155 | 259 | 295 | 306 | 293 | 296 | 317 | 295 | 256 | 216 | 200 | 173 | 173 | 180 | 198 | 180 | 225.3 | |
| 16-Sep | 186 | 167 | 157 | 159 | 163 | 161 | 157 | 162 | 163 | 161 | 177 | 185 | 191 | 167 | 173 | 182 | 181 | 173 | 175 | 165 | 166 | 168 | 160 | 164 | 171.2 | |
| 17-Sep | 162 | 167 | 161 | 152 | 156 | 161 | 159 | 152 | 148 | 146 | 154 | 162 | 172 | 166 | 161 | 166 | 168 | 156 | 158 | 150 | 158 | 150 | 143 | 141 | 158.1 | |
| 18-Sep | 143 | 145 | 144 | 148 | 148 | 146 | 145 | 147 | 154 | 153 | 155 | 148 | 139 | 139 | 126 | 123 | 122 | 119 | 102 | 100 | 102 | 93 | 105 | 111 | 134.7 | |
| 19-Sep | 87 | 79 | 74 | 72 | 70 | 69 | 73 | 84 | 98 | 98 | 98 | 88 | 88 | 90 | 87 | 82 | 78 | 79 | 79 | 82 | 85 | 82 | 79 | 73 | 83.2 | |
| 20-Sep | 69 | 56 | 46 | 43 | 33 | 33 | 29 | 27 | 29 | 26 | 26 | 28 | 30 | 29 | 27 | 29 | 27 | 27 | 21 | 23 | 21 | 14 | 10 | 9 | 29.8 | |
| 21-Sep | 5 | 3 | 2 | 360 | 358 | 357 | 354 | 358 | 358 | 0 | 2 | 357 | 354 | 355 | 352 | 352 | 350 | 346 | 347 | 347 | 350 | 342 | 339 | 332 | 354.0 | |
| 22-Sep | 330 | 332 | 332 | 327 | 333 | 322 | 308 | 284 | 248 | 267 | 330 | 346 | 324 | 351 | 13 | 123 | 264 | 276 | 176 | 198 | 158 | 168 | 170 | AF | 315.2 | |
| 23-Sep | 121 | 150 | 150 | 150 | 151 | 156 | 148 | 167 | 173 | 154 | 167 | 188 | 171 | 160 | 159 | 167 | 192 | 159 | 144 | 156 | 164 | 165 | 162 | 164 | 159.8 | |
| 24-Sep | 172 | 166 | 154 | 156 | 158 | 156 | 151 | 157 | 164 | 157 | 166 | 163 | 159 | 156 | 163 | 179 | 169 | 166 | 165 | 173 | 165 | 165 | 164 | 165 | 163.0 | |
| 25-Sep | 168 | 155 | 154 | 154 | 148 | 154 | 157 | 157 | 158 | 156 | 178 | 155 | 293 | 292 | 274 | 275 | 265 | 239 | 236 | 237 | 233 | 216 | 209 | 221 | 201.2 | |
| 26-Sep | 226 | 229 | 251 | 271 | 282 | 283 | 280 | 286 | 289 | 283 | 288 | 290 | 292 | 292 | 295 | 313 | 297 | 317 | 295 | 275 | 272 | 268 | 251 | 240 | 283.6 | |
| 27-Sep | 232 | 241 | 212 | 229 | 208 | 231 | 26 | 273 | 284 | 302 | 284 | 293 | 269 | 304 | 326 | 321 | 342 | 347 | 352 | 343 | 37 | 75 | 141 | 139 | 299.1 | |
| 28-Sep | 155 | 154 | 154 | 150 | 155 | 150 | 146 | 145 | 142 | 142 | 150 | 160 | 158 | 165 | 190 | 193 | 184 | 179 | 174 | 167 | 171 | 169 | 173 | 156 | 163.1 | |
| 29-Sep | 140 | 143 | 146 | 143 | 154 | 149 | 137 | 137 | 130 | 110 | 97 | 153 | 184 | 186 | 182 | 191 | 200 | 195 | 190 | 181 | 167 | 167 | 180 | 170 | 159.7 | |
| 30-Sep | 165 | 138 | 160 | 181 | 173 | 209 | 222 | 181 | 217 | 277 | 291 | 290 | 286 | 290 | 295 | 281 | 285 | 292 | 291 | 286 | 288 | 294 | 303 | 305 | 276.7 | |

229.9 248.4 249.9 247.4 242.4 241.0 243.1 247.5 252.4 250.4 264.7 264.8 272.9 274.7 276.7 269.7 266.6 270.7 277.6 228.6 208.7 229.5 227.2 226.4

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Anzac - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 90 deg on Sep 27 06:00 | Hours of Data: 719 |
| Minimum Value: 7 deg on Sep 4 22:00 | Hours of Missing Data: 1 |
| | Hours of Calibration: 0 |
| | Percent Operational Time: 99.9 |
| Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 16 Median = 20 Q ₃ = 24 P ₉₀ = 33 P ₉₉ = 82 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 20 | 19 | 20 | 22 | 22 | 21 | 21 | 21 | 22 | 24 | 26 | 29 | 28 | 25 | 27 | 24 | 24 | 22 | 22 | 19 | 21 | 25 | 23 | 23 | 29 |
| 2-Sep | 22 | 21 | 21 | 21 | 22 | 23 | 20 | 19 | 22 | 25 | 23 | 22 | 21 | 19 | 20 | 18 | 19 | 20 | 27 | 20 | 27 | 22 | 21 | 21 | 27 |
| 3-Sep | 24 | 21 | 20 | 19 | 21 | 19 | 19 | 21 | 20 | 22 | 22 | 20 | 22 | 21 | 22 | 19 | 18 | 16 | 26 | 18 | 15 | 14 | 14 | 26 | |
| 4-Sep | 16 | 15 | 16 | 17 | 18 | 16 | 18 | 18 | 19 | 21 | 28 | 26 | 25 | 26 | 35 | 34 | 28 | 33 | 41 | 20 | 10 | 7 | 10 | 10 | 41 |
| 5-Sep | 11 | 21 | 14 | 15 | 13 | 19 | 18 | 28 | 25 | 30 | 22 | 22 | 22 | 23 | 24 | 25 | 25 | 22 | 21 | 36 | 15 | 11 | 10 | 9 | 36 |
| 6-Sep | 12 | 14 | 13 | 14 | 14 | 16 | 16 | 17 | 24 | 26 | 76 | 53 | 40 | 26 | 28 | 39 | 21 | 51 | 16 | 23 | 57 | 36 | 11 | 11 | 76 |
| 7-Sep | 12 | 10 | 12 | 13 | 13 | 14 | 15 | 19 | 16 | 27 | 28 | 31 | 27 | 26 | 24 | 27 | 25 | 25 | 16 | 14 | 12 | 18 | 18 | 23 | 31 |
| 8-Sep | 19 | 40 | 26 | 21 | 28 | 23 | 30 | 85 | 52 | 21 | 18 | 27 | 21 | 18 | 20 | 19 | 20 | 16 | 22 | 27 | 13 | 17 | 13 | 14 | 85 |
| 9-Sep | 14 | 12 | 21 | 30 | 24 | 22 | 38 | 24 | 21 | 26 | 26 | 35 | 29 | 24 | 19 | 32 | 64 | 40 | 26 | 25 | 84 | 48 | 17 | 46 | 84 |
| 10-Sep | 25 | 19 | 19 | 22 | 23 | 23 | 22 | 22 | 23 | 23 | 22 | 23 | 20 | 22 | 21 | 21 | 22 | 22 | 23 | 24 | 25 | 22 | 22 | 23 | 25 |
| 11-Sep | 24 | 22 | 23 | 25 | 21 | 21 | 15 | 24 | 26 | 27 | 34 | 25 | 25 | 22 | 44 | 30 | 27 | 18 | 18 | 16 | 23 | 27 | 20 | 28 | 44 |
| 12-Sep | 25 | 23 | 23 | 20 | 20 | 22 | 22 | 24 | 22 | 22 | 20 | 22 | 21 | 20 | 20 | 22 | 22 | 20 | 20 | 14 | 24 | 22 | 14 | 16 | 25 |
| 13-Sep | 20 | 15 | 39 | 27 | 19 | 20 | 21 | 29 | 29 | 39 | 22 | 30 | 34 | 37 | 62 | 86 | 82 | 70 | 48 | 31 | 30 | 83 | 77 | 8 | 86 |
| 14-Sep | 10 | 11 | 9 | 11 | 24 | 51 | 70 | 44 | 24 | 27 | 48 | 31 | 30 | 27 | 27 | 36 | 36 | 18 | 10 | 8 | 66 | 16 | 9 | 11 | 70 |
| 15-Sep | 26 | 18 | 28 | 17 | 16 | 8 | 16 | 20 | 70 | 70 | 33 | 23 | 25 | 41 | 58 | 42 | 51 | 19 | 15 | 14 | 13 | 19 | 14 | 13 | 70 |
| 16-Sep | 19 | 11 | 13 | 11 | 15 | 14 | 11 | 15 | 17 | 22 | 24 | 27 | 29 | 25 | 29 | 26 | 24 | 19 | 18 | 11 | 12 | 11 | 12 | 11 | 29 |
| 17-Sep | 13 | 14 | 13 | 13 | 12 | 13 | 13 | 12 | 16 | 19 | 21 | 23 | 24 | 24 | 21 | 21 | 25 | 18 | 17 | 17 | 17 | 16 | 16 | 15 | 25 |
| 18-Sep | 16 | 14 | 15 | 16 | 15 | 15 | 15 | 15 | 16 | 20 | 21 | 23 | 26 | 26 | 27 | 24 | 20 | 20 | 21 | 19 | 20 | 19 | 25 | 23 | 27 |
| 19-Sep | 23 | 27 | 17 | 16 | 13 | 13 | 15 | 18 | 20 | 21 | 21 | 21 | 21 | 20 | 20 | 17 | 17 | 19 | 17 | 18 | 19 | 19 | 17 | 16 | 27 |
| 20-Sep | 15 | 17 | 16 | 16 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 18 | 17 | 18 | 18 | 17 | 18 | 18 | 17 | 18 | 17 | 18 | 17 | 18 |
| 21-Sep | 16 | 17 | 16 | 17 | 16 | 16 | 16 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 18 | 15 | 14 | 15 | 15 | 14 | 16 | 15 | 15 | 18 |
| 22-Sep | 14 | 13 | 16 | 16 | 13 | 25 | 37 | 44 | 42 | 34 | 22 | 47 | 30 | 30 | 42 | 69 | 36 | 51 | 80 | 19 | 11 | 26 | 24 | AF | 80 |
| 23-Sep | 13 | 12 | 15 | 13 | 14 | 14 | 15 | 20 | 24 | 20 | 26 | 40 | 47 | 19 | 16 | 24 | 26 | 18 | 13 | 11 | 9 | 11 | 13 | 13 | 47 |
| 24-Sep | 13 | 12 | 11 | 11 | 11 | 13 | 12 | 11 | 17 | 20 | 20 | 21 | 22 | 21 | 21 | 30 | 18 | 17 | 14 | 14 | 17 | 14 | 14 | 14 | 30 |
| 25-Sep | 15 | 13 | 13 | 13 | 16 | 14 | 13 | 14 | 23 | 20 | 34 | 55 | 84 | 19 | 24 | 25 | 27 | 19 | 16 | 15 | 14 | 11 | 14 | 14 | 84 |
| 26-Sep | 11 | 11 | 20 | 18 | 19 | 19 | 16 | 19 | 19 | 21 | 19 | 18 | 27 | 23 | 24 | 21 | 22 | 15 | 26 | 14 | 14 | 11 | 16 | 20 | 27 |
| 27-Sep | 15 | 10 | 16 | 13 | 37 | 90 | 59 | 22 | 19 | 20 | 20 | 27 | 27 | 46 | 40 | 32 | 17 | 14 | 12 | 16 | 32 | 35 | 17 | 15 | 90 |
| 28-Sep | 15 | 14 | 16 | 16 | 13 | 12 | 13 | 14 | 16 | 18 | 18 | 19 | 20 | 22 | 28 | 25 | 22 | 19 | 14 | 14 | 15 | 15 | 14 | 18 | 28 |
| 29-Sep | 17 | 19 | 18 | 17 | 16 | 16 | 19 | 18 | 20 | 22 | 25 | 42 | 26 | 28 | 26 | 25 | 23 | 22 | 16 | 18 | 12 | 12 | 25 | 12 | 42 |
| 30-Sep | 37 | 16 | 14 | 9 | 10 | 23 | 18 | 25 | 34 | 33 | 17 | 18 | 17 | 19 | 19 | 23 | 19 | 16 | 19 | 19 | 20 | 18 | 18 | 18 | 37 |

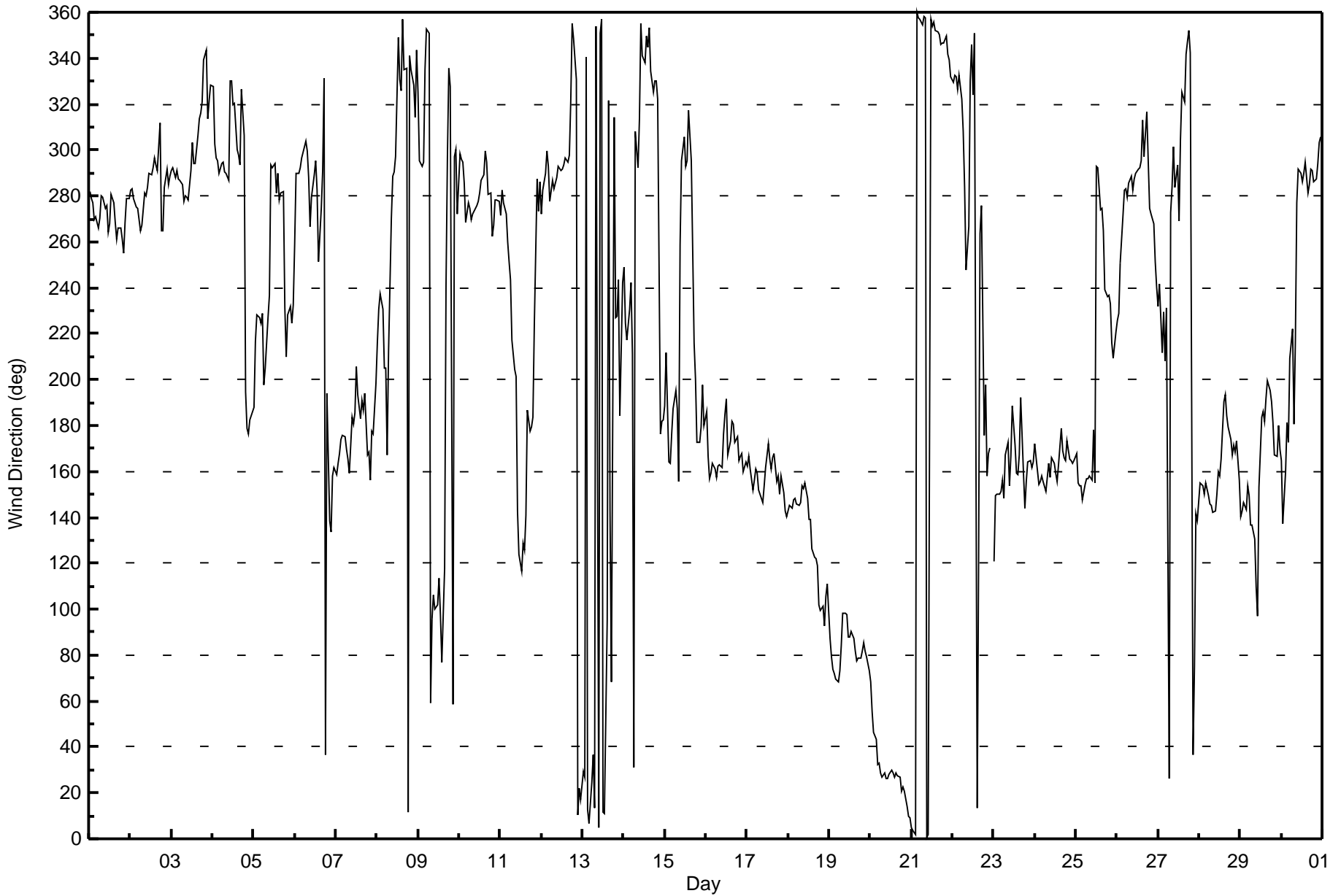
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 37 | 40 | 39 | 30 | 37 | 90 | 70 | 85 | 70 | 70 | 70 | 76 | 55 | 84 | 46 | 62 | 86 | 82 | 70 | 80 | 36 | 84 | 83 | 77 | 46 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Anzac - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

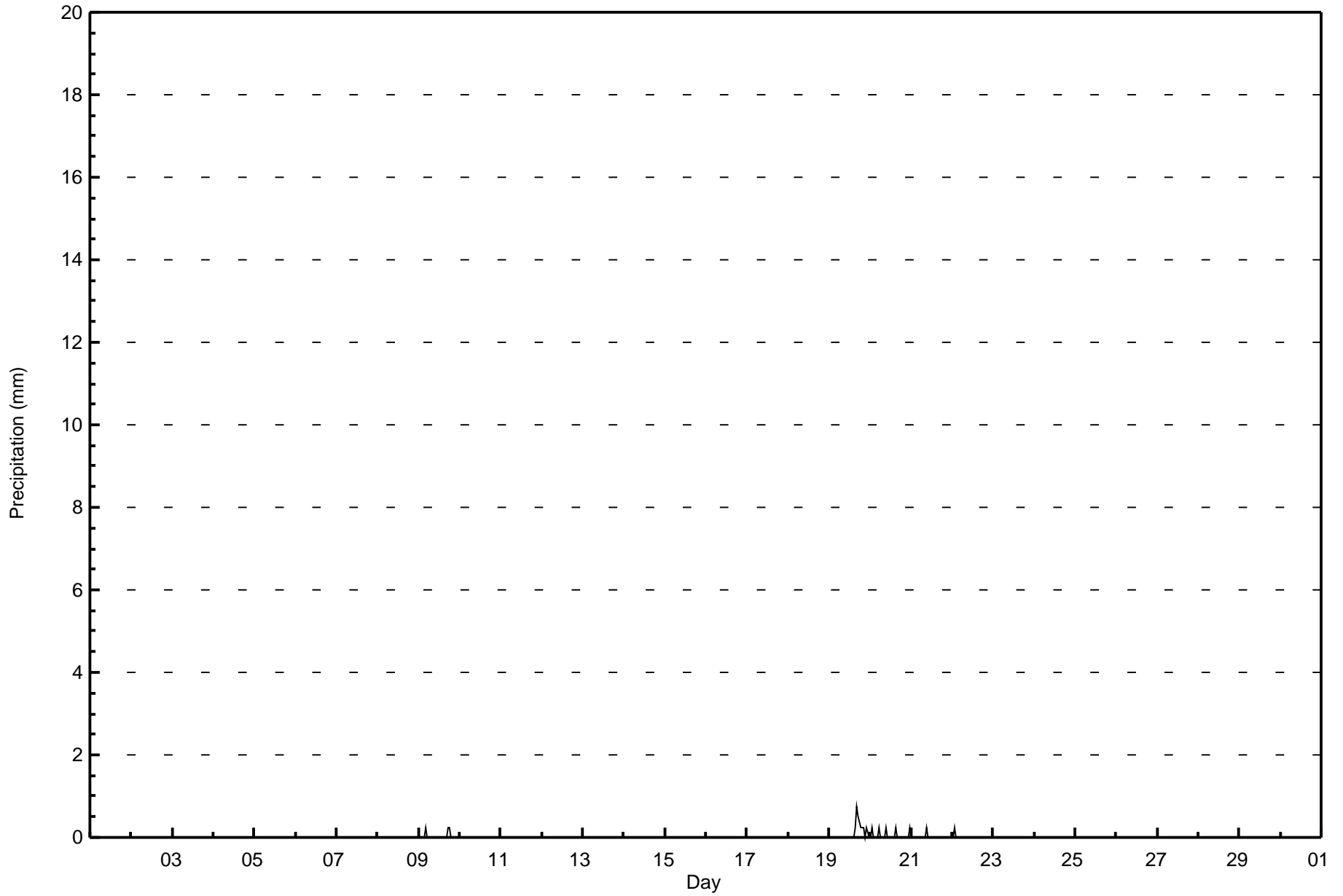
Anzac - September 2017

| Maximum Value: 0.8 mm on Sep 19 17:00 | | Maximum Daily Total: 2.5 mm on Sep 19 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|-----|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|-----|-----|
| Minimum Value: 0.0 mm on Sep 1 01:00 | | Minimum Daily Total: 0.0 mm on Sep 1 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Total: 0.8 mm at hour 17 | | Minimum Diurnal Total: 0.0 mm at hour 1 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Total: 5.08 mm | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.3 | | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.3 |
| 10-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.8 | 0.5 | 0.3 | 0.3 | 0.3 | 0.3 | 0.0 | 0.3 | 0.0 | 2.5 | 0.8 | 0.8 | |
| 20-Sep | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 1.3 | 0.3 | 0.3 | |
| 21-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | |
| 22-Sep | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.3 | |
| 23-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 28-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Anzac - September 2017





Wood Buffalo Environmental Association

SO₂ Calibration Summary

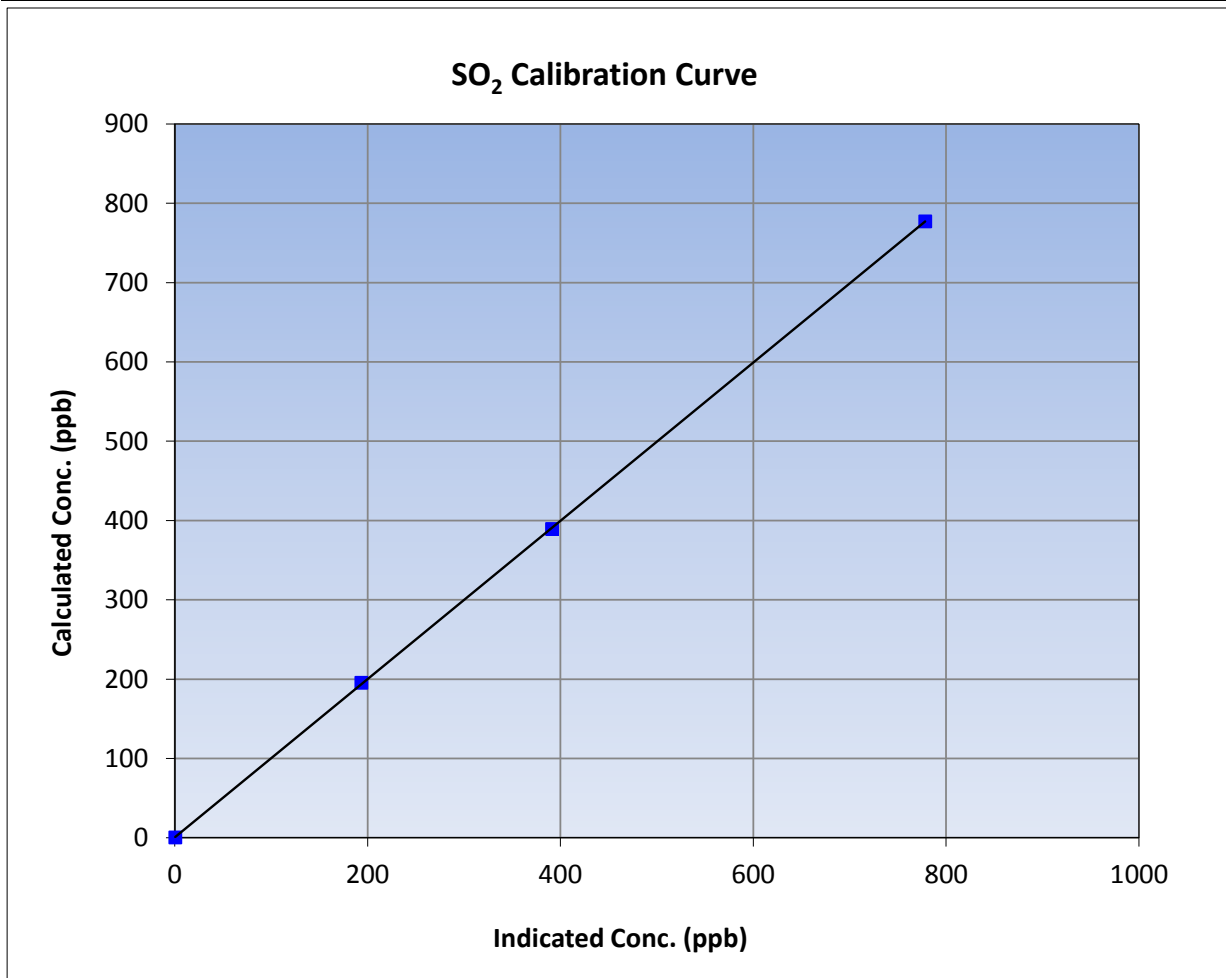
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:20 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1152430005 |

Calibration Data

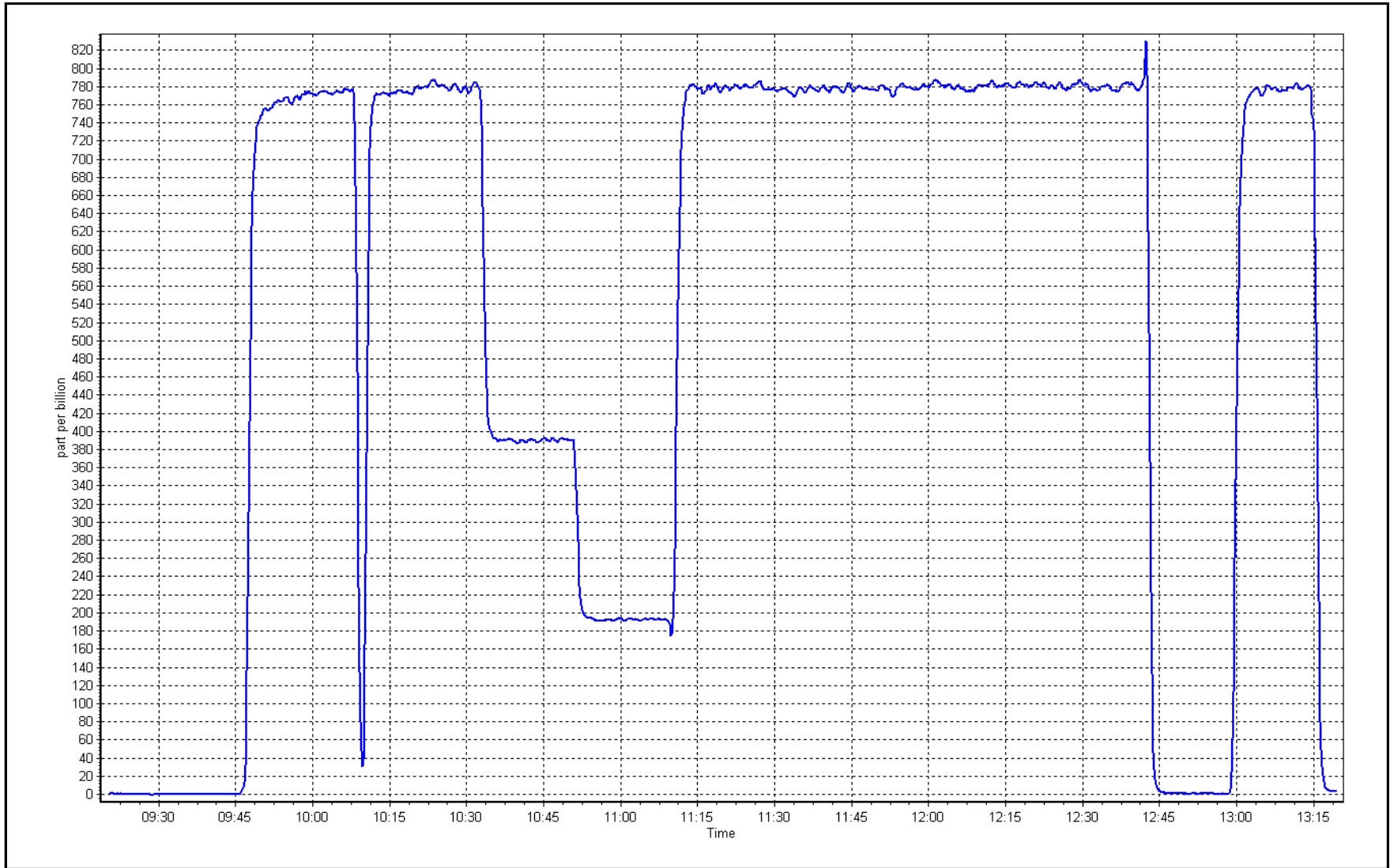
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 |
| 777.0 | 777.9 | 0.9988 | | |
| 389.1 | 390.8 | 0.9956 | Slope | 0.90 - 1.10 |
| 195.0 | 193.3 | 1.0086 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 7, 2017

Location: Anzac





Wood Buffalo Environmental Association

TRS Calibration Summary

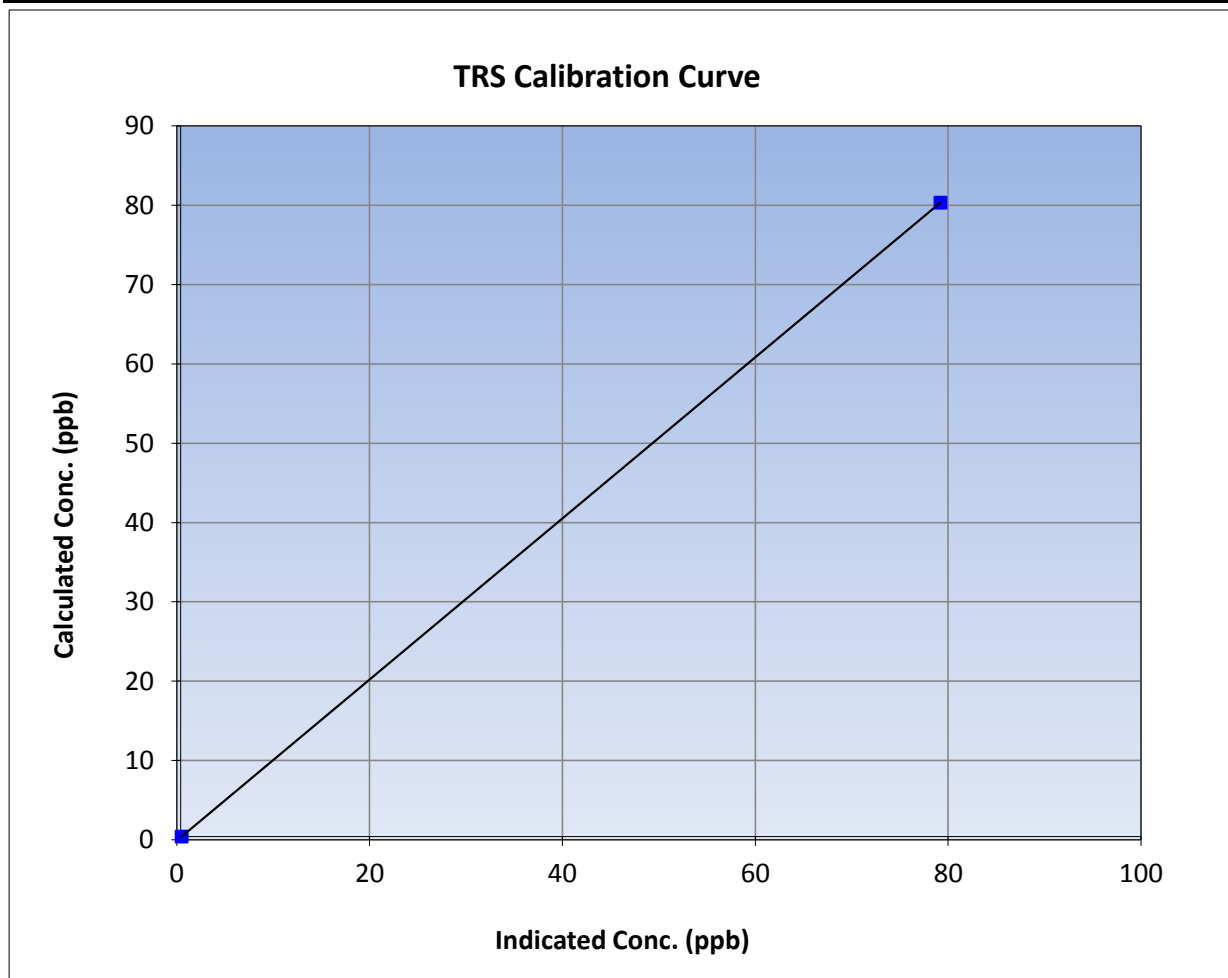
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 5, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:45 | End Time (MST) | |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1300156232 |

Calibration Data

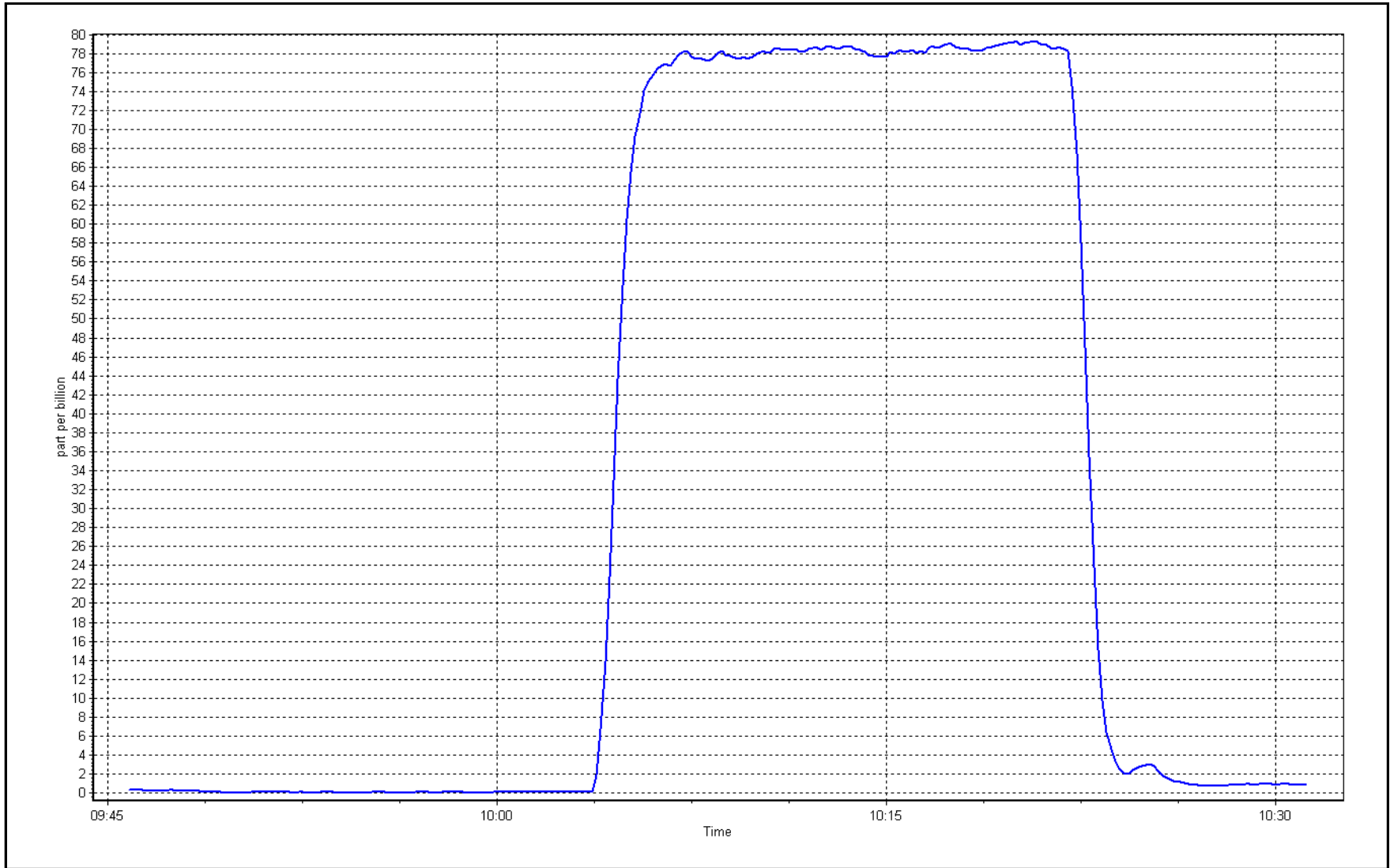
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|--------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 79.9 | 78.8 | 1.0145 | Slope | 1.015811 | 0.90 - 1.10 |
| | | | Intercept | -0.101581 | +/-3 |



TRS Calibration Plot

Date: September 5, 2017

Location: Anzac





Wood Buffalo Environmental Association

TRS Calibration Summary

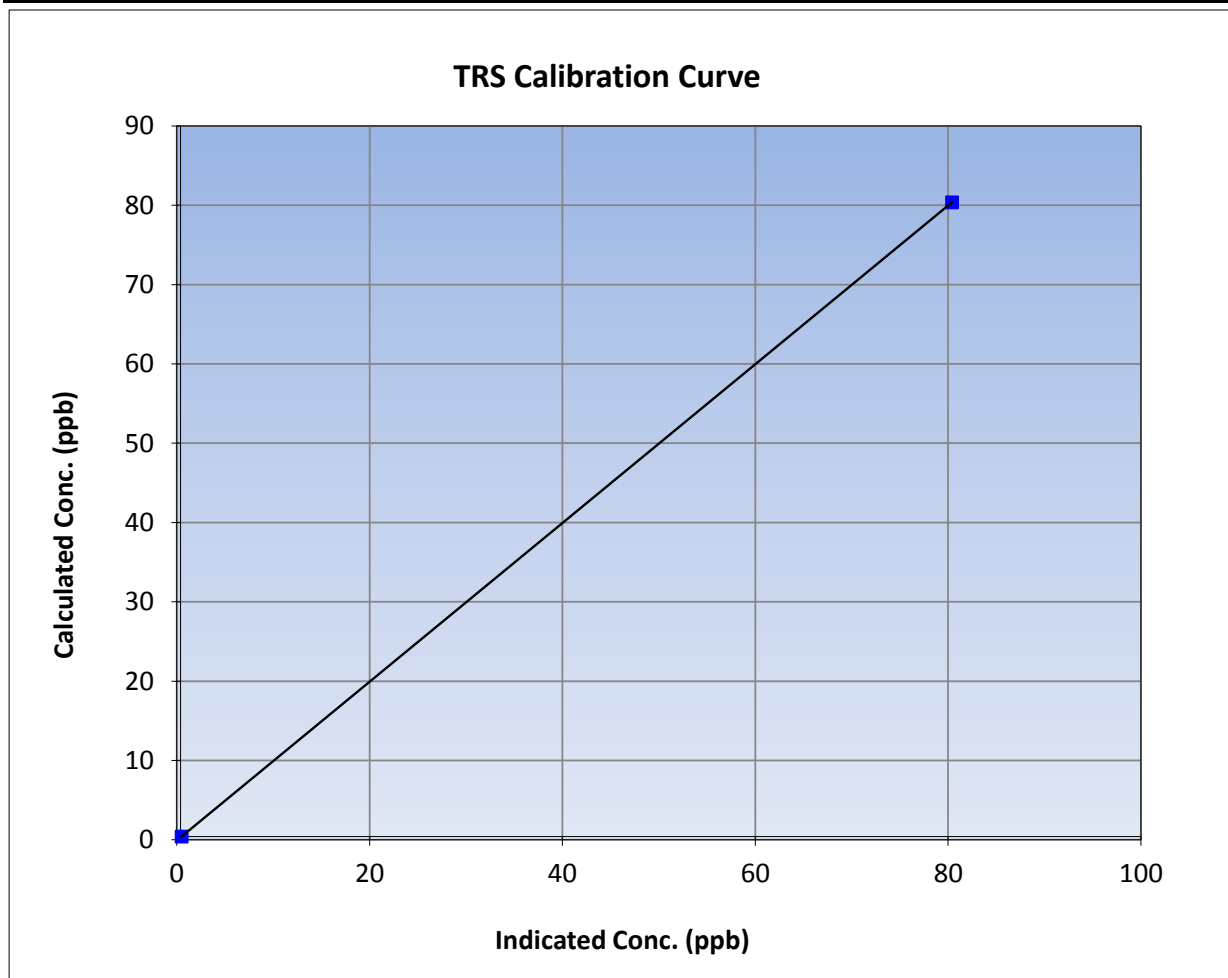
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 5, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:45 | End Time (MST) | 13:35 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1300156232 |

Calibration Data

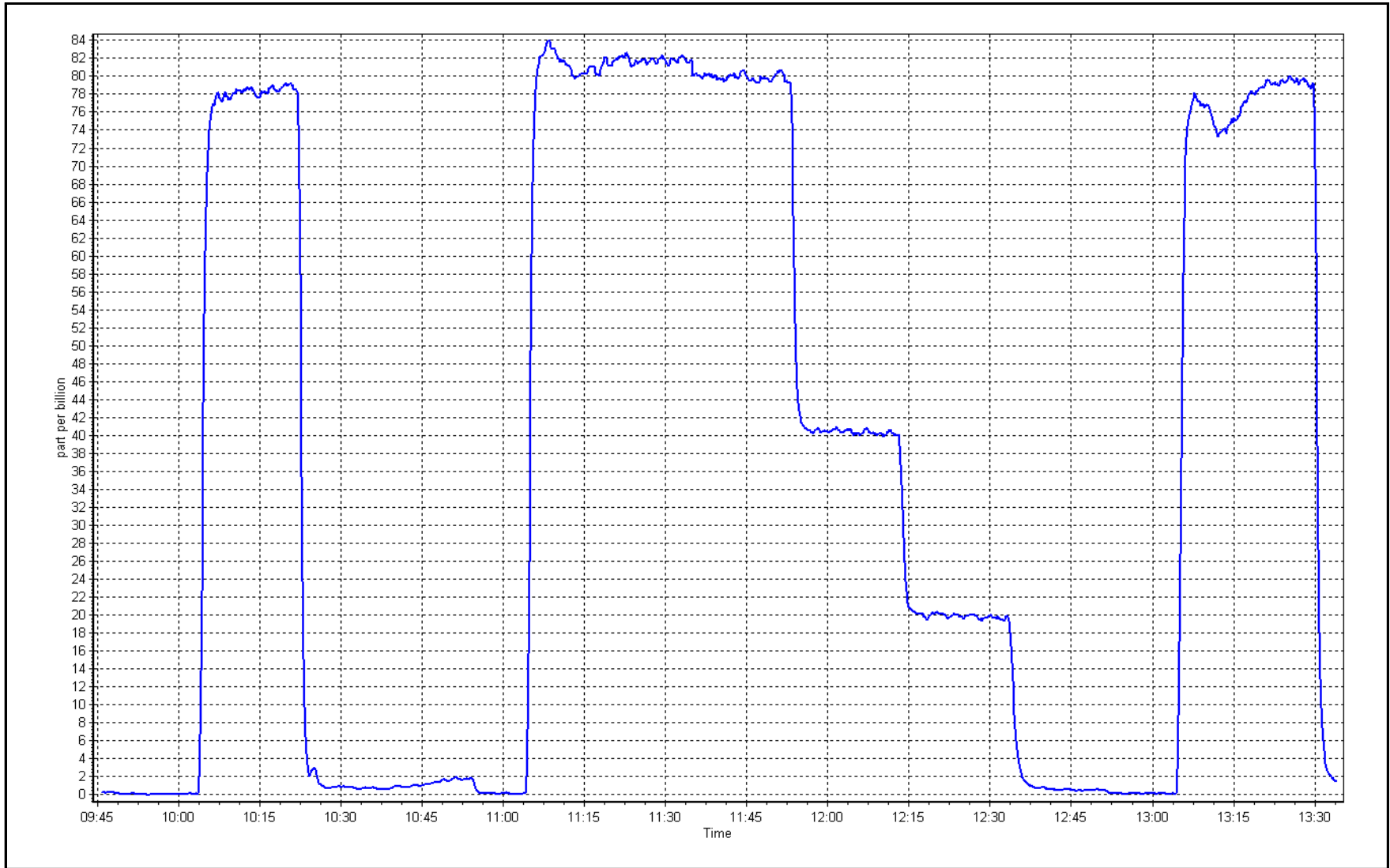
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 |
| 80.0 | 80.0 | 0.9996 | | |
| 40.1 | 40.3 | 0.9950 | Slope | 0.90 - 1.10 |
| 20.1 | 19.9 | 1.0092 | | |
| | | | Intercept | +/-3 |



TRS Calibration Plot

Date: September 5, 2017

Location: Anzac





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|----------------|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 9, 2017 |
| Start time (MST): | 9:20 | End time (MST): | 13:15 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|--------------------|-------------------|---------------------|------------------|
| Gas Cert Reference | EY0000647 | Cal Gas Expiry Date | November 4, 2019 |
| CH4 Cal Gas Conc. | <u>513.0</u> ppm | CH4 Equiv Conc. | 1060.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Model | Teledyne API T700 | Serial Number | 2659 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4764 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1218153355

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 0.000201 | 0.000203 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 11.6 | 11.6 | Carrier Pressure | 33.4 | 33.4 |
| NMHC SP Ratio | 3.89E-05 | 3.89E-05 | Fuel Pressure | 47.9 | 47.9 |
| NMHC Peak Area | 222859 | 222680 | Air Pressure | 36.6 | 36.6 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.995253 | 0.997384 |
| THC Cal Offset | 0.015506 | 0.010527 |
| CH4 Cal Slope | 0.996507 | 0.993365 |
| CH4 Cal Offset | 0.028221 | 0.030151 |
| NMHC Cal Slope | 0.994023 | 1.000903 |
| NMHC Cal Offset | -0.012445 | -0.019510 |

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

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4931 | 79.3 | 16.78 | 16.74 | 1.003 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4932 | 79.3 | 16.78 | 16.81 | 0.998 |
| second point | 4972 | 39.7 | 8.40 | 8.41 | 0.998 |
| third point | 4992 | 19.9 | 4.21 | 4.20 | 1.004 |
| as left zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4931 | 79.3 | 16.78 | 16.78 | 1.000 |
| Average Correction Factor | | | | | 1.000 |
| Corrected As found | 16.74 | Prev response | 16.85 | *% change | 0.6% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4931 | 79.3 | 8.66 | 8.66 | 1.000 |
| calibrator zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| high point | 4932 | 79.3 | 8.66 | 8.66 | 1.000 |
| second point | 4972 | 39.7 | 4.34 | 4.37 | 0.992 |
| third point | 4992 | 19.9 | 2.17 | 2.21 | 0.985 |
| as left zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4931 | 79.3 | 8.66 | 8.63 | 1.004 |
| Average Correction Factor | | | | | 0.993 |
| Corrected As found | 8.66 | Prev response | 8.73 | *% change | 0.7% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4931 | 79.3 | 8.12 | 8.07 | 1.006 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4932 | 79.3 | 8.12 | 8.16 | 0.995 |
| second point | 4972 | 39.7 | 4.06 | 4.04 | 1.005 |
| third point | 4992 | 19.9 | 2.04 | 1.99 | 1.023 |
| as left zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4931 | 79.3 | 8.12 | 8.14 | 0.997 |
| Average Correction Factor | | | | | 1.008 |
| Corrected As found | 8.07 | Prev response | 8.12 | *% change | 0.6% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

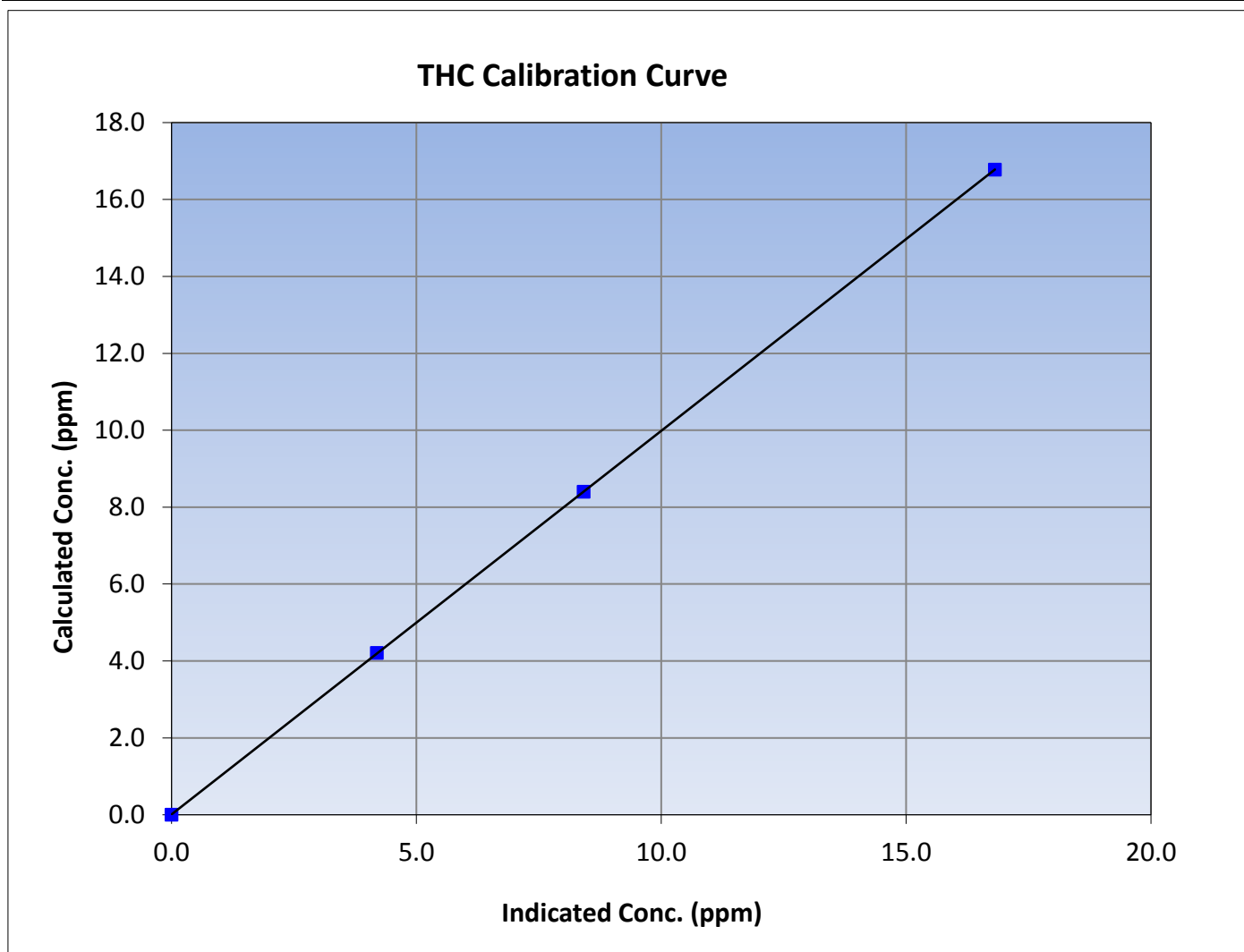
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:20 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999998 | ≥ 0.995 | | | |
| 16.78 | 16.81 | 0.9978 | | | | | | |
| 8.40 | 8.41 | 0.9984 | | | | Slope | 0.997384 | 0.90 - 1.10 |
| 4.21 | 4.20 | 1.0035 | | | | | | |
| | | | Intercept | 0.010527 | ± 0.5 | | | |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

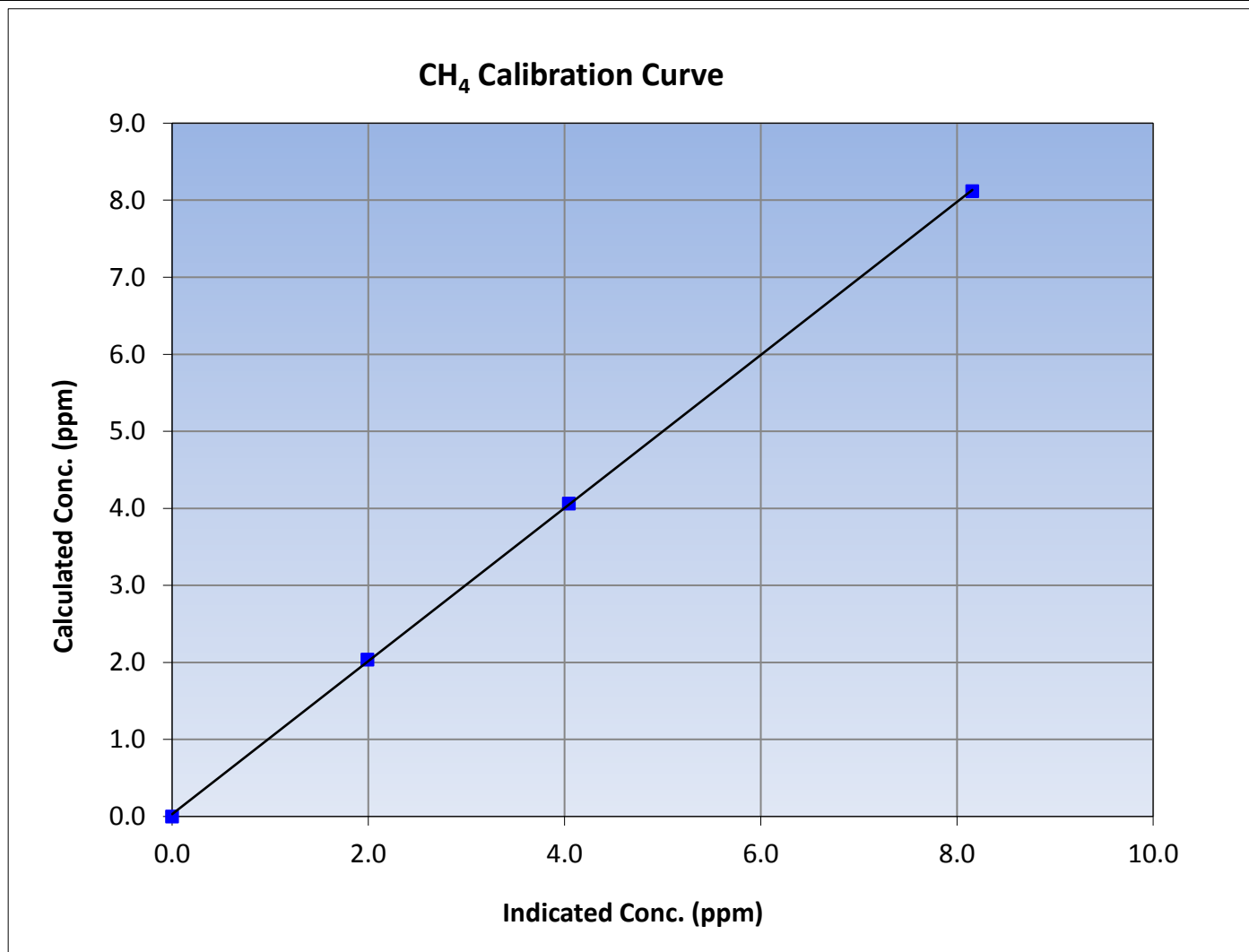
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:20 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999938 | ≥ 0.995 | | | |
| 8.12 | 8.16 | 0.9952 | | | | | | |
| 4.06 | 4.04 | 1.0049 | | | | Slope | 0.993365 | 0.90 - 1.10 |
| 2.04 | 1.99 | 1.0230 | | | | | | |
| | | | Intercept | 0.030151 | ± 0.5 | | | |





Wood Buffalo Environmental Association

NMHC Calibration Summary

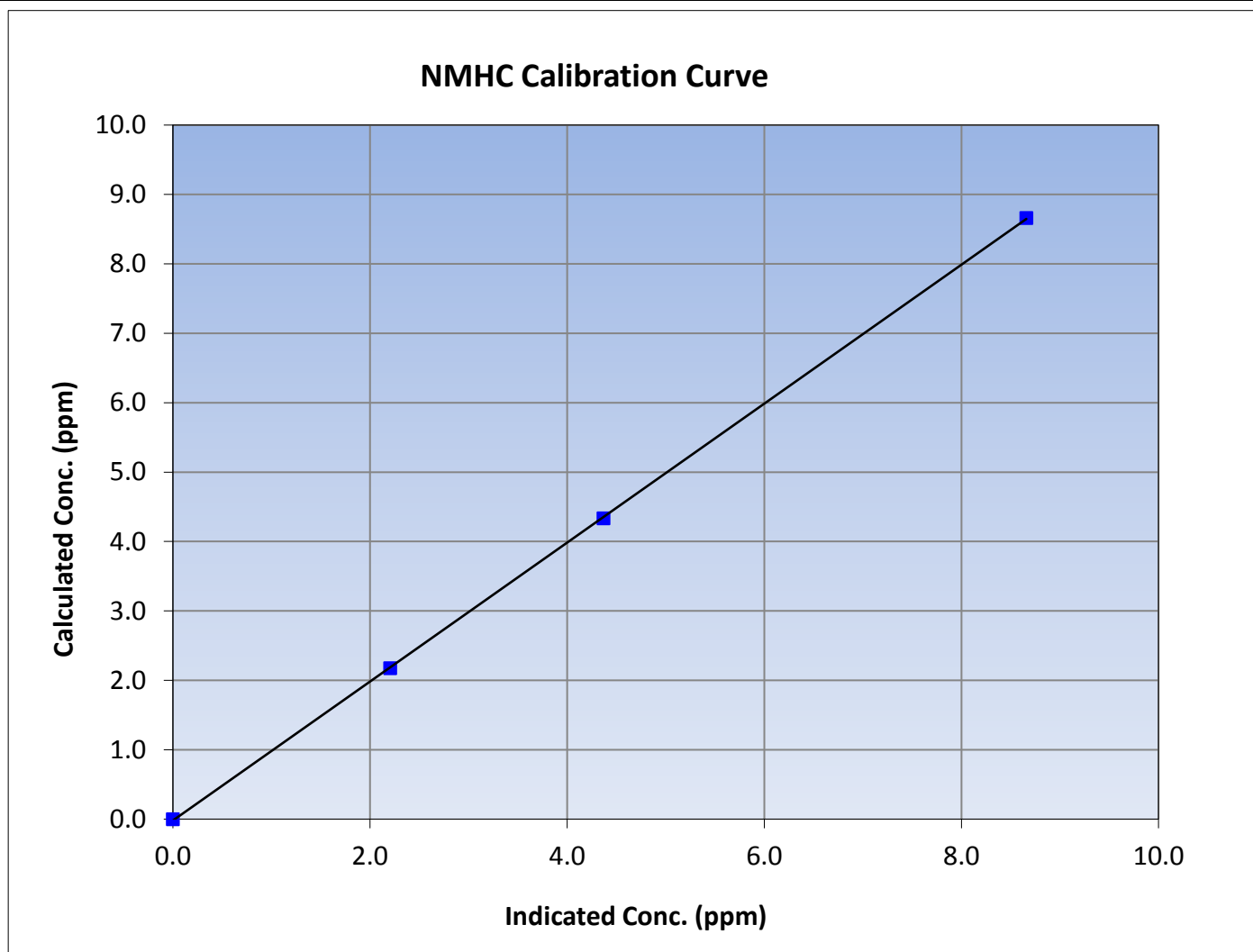
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:20 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

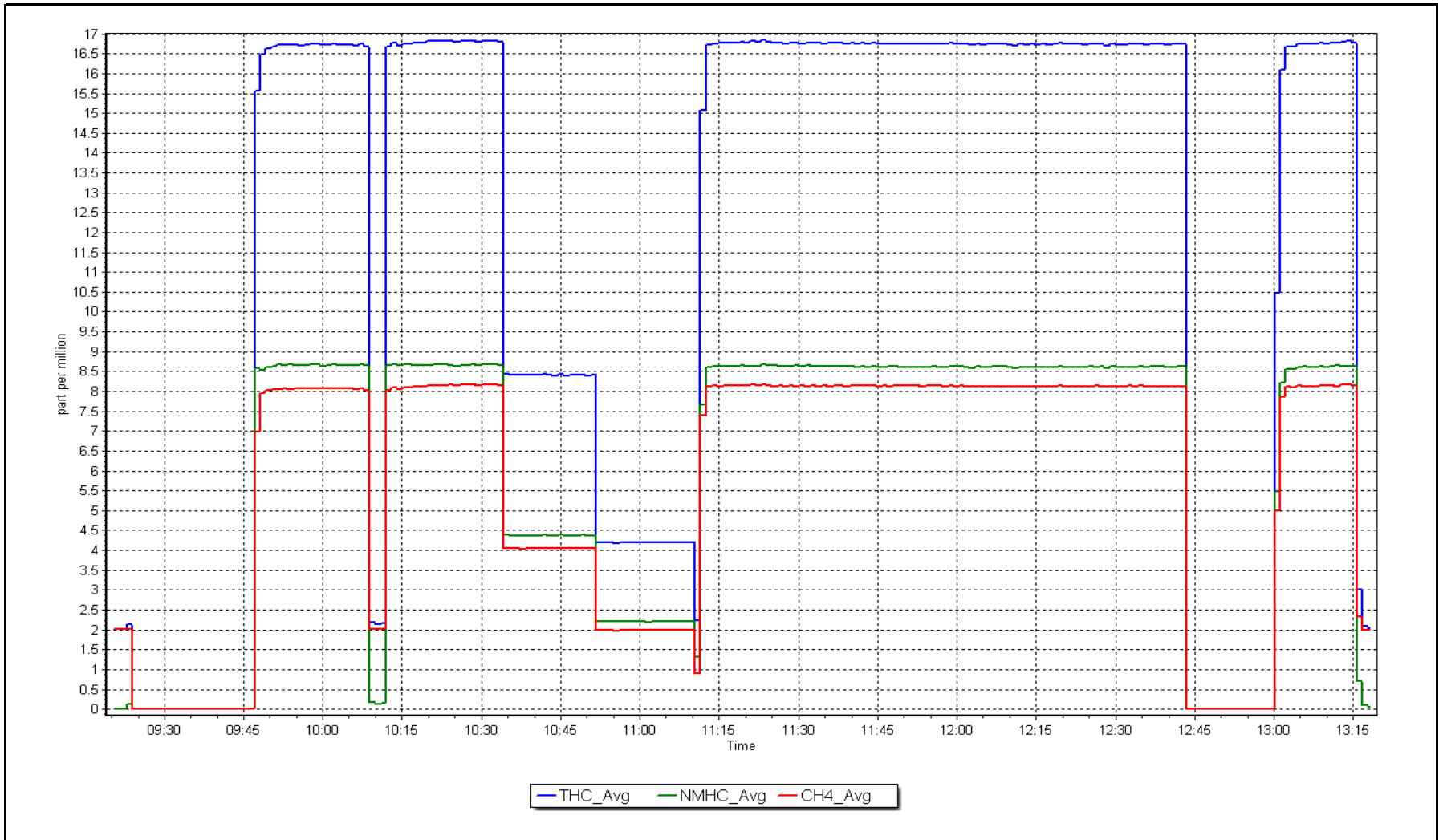
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999974 | ≥ 0.995 | | | |
| 8.66 | 8.66 | 1.0001 | | | | | | |
| 4.34 | 4.37 | 0.9924 | | | | Slope | 1.000903 | 0.90 - 1.10 |
| 2.17 | 2.21 | 0.9854 | | | | | | |
| | | | Intercept | -0.019510 | ± 0.5 | | | |



NMHC Calibration Plot

Date: September 7, 2017

Location: Anzac





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|---------------------------|-----------------|-------------------|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | September 29, 2017 | Last Cal Date: | September 7, 2017 |
| Start time (MST): | 13:34 | End time (MST): | 14:23 |
| Reason: | Cylinder Change N2 Change | | |

Calibration Standards

| | | | |
|--------------------|-------------------|---------------------|------------------|
| Gas Cert Reference | EY0000647 | Cal Gas Expiry Date | November 4, 2019 |
| CH4 Cal Gas Conc. | <u>513.0</u> ppm | CH4 Equiv Conc. | 1060.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Model | Teledyne API T700 | Serial Number | 2659 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4764 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1218153355

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 0.000203 | 0.000203 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 11.6 | 11.6 | Carrier Pressure | 33.4 | 33.4 |
| NMHC SP Ratio | 3.89E-05 | 3.89E-05 | Fuel Pressure | 47.9 | 47.9 |
| NMHC Peak Area | 222680 | 222680 | Air Pressure | 36.6 | 36.6 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.997384 | 1.000934 |
| THC Cal Offset | 0.010527 | 0.000000 |
| CH4 Cal Slope | 0.993365 | 0.997399 |
| CH4 Cal Offset | 0.030151 | 0.000000 |
| NMHC Cal Slope | 1.000903 | 1.004153 |
| NMHC Cal Offset | -0.019510 | 0.000000 |

Notes: N2 cylinder changed after as founds. No adjustments made.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4931 | 79.3 | 16.78 | 16.76 | 1.001 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4932 | 79.3 | 16.78 | 16.76 | 1.001 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.001 |
| Corrected As found | 16.76 | Prev response | 16.81 | *% change | 0.3% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4931 | 79.3 | 8.66 | 8.62 | 1.004 |
| calibrator zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| high point | 4932 | 79.3 | 8.66 | 8.62 | 1.004 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.004 |
| Corrected As found | 8.62 | Prev response | 8.67 | *% change | 0.6% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4931 | 79.3 | 8.12 | 8.14 | 0.998 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4932 | 79.3 | 8.12 | 8.14 | 0.997 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 0.997 |
| Corrected As found | 8.14 | Prev response | 8.14 | *% change | 0.1% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

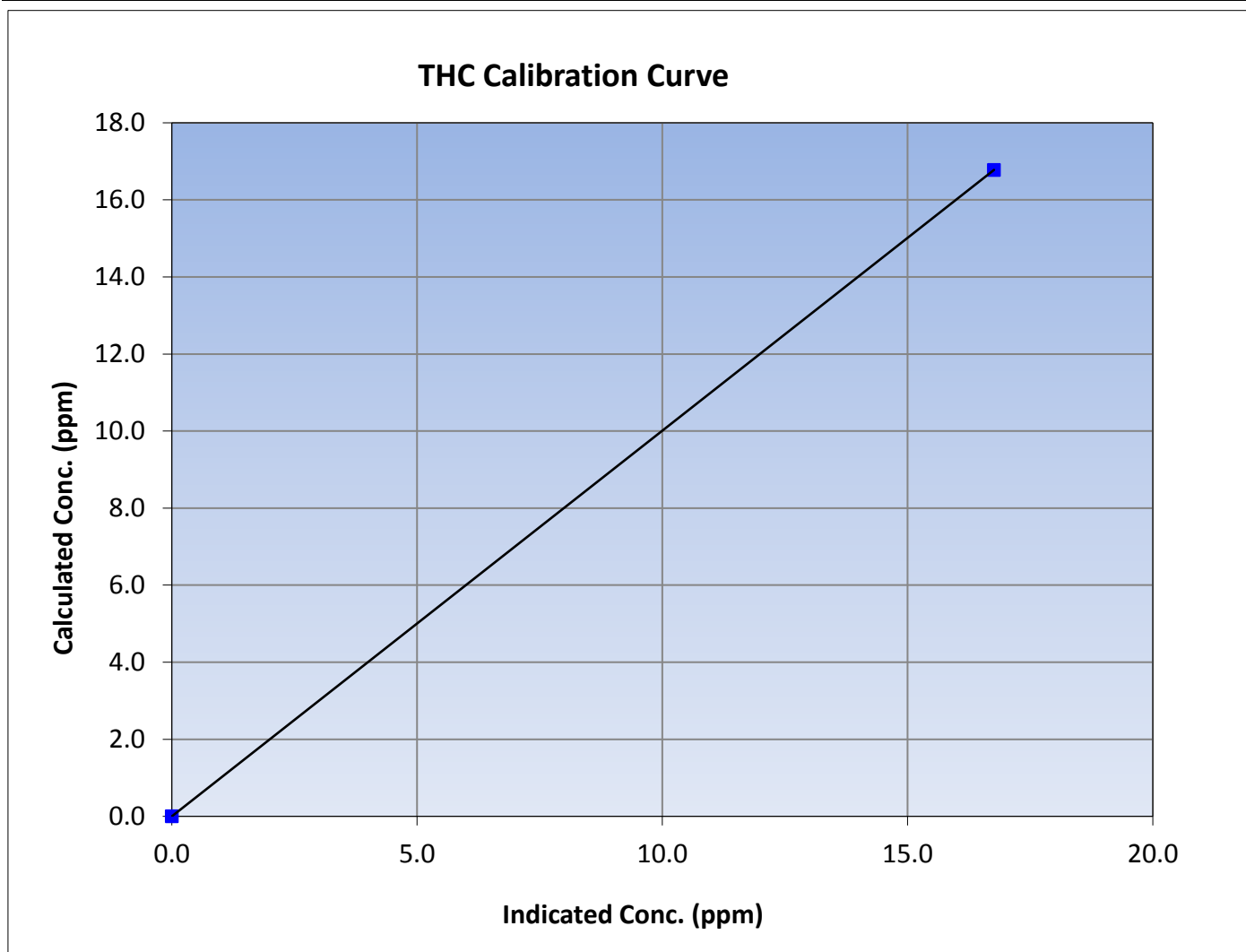
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 7, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 13:34 | End Time (MST) | 14:23 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 16.78 | 16.76 | 1.0009 | | | |
| | | | Slope | 1.000934 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-0.5 |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

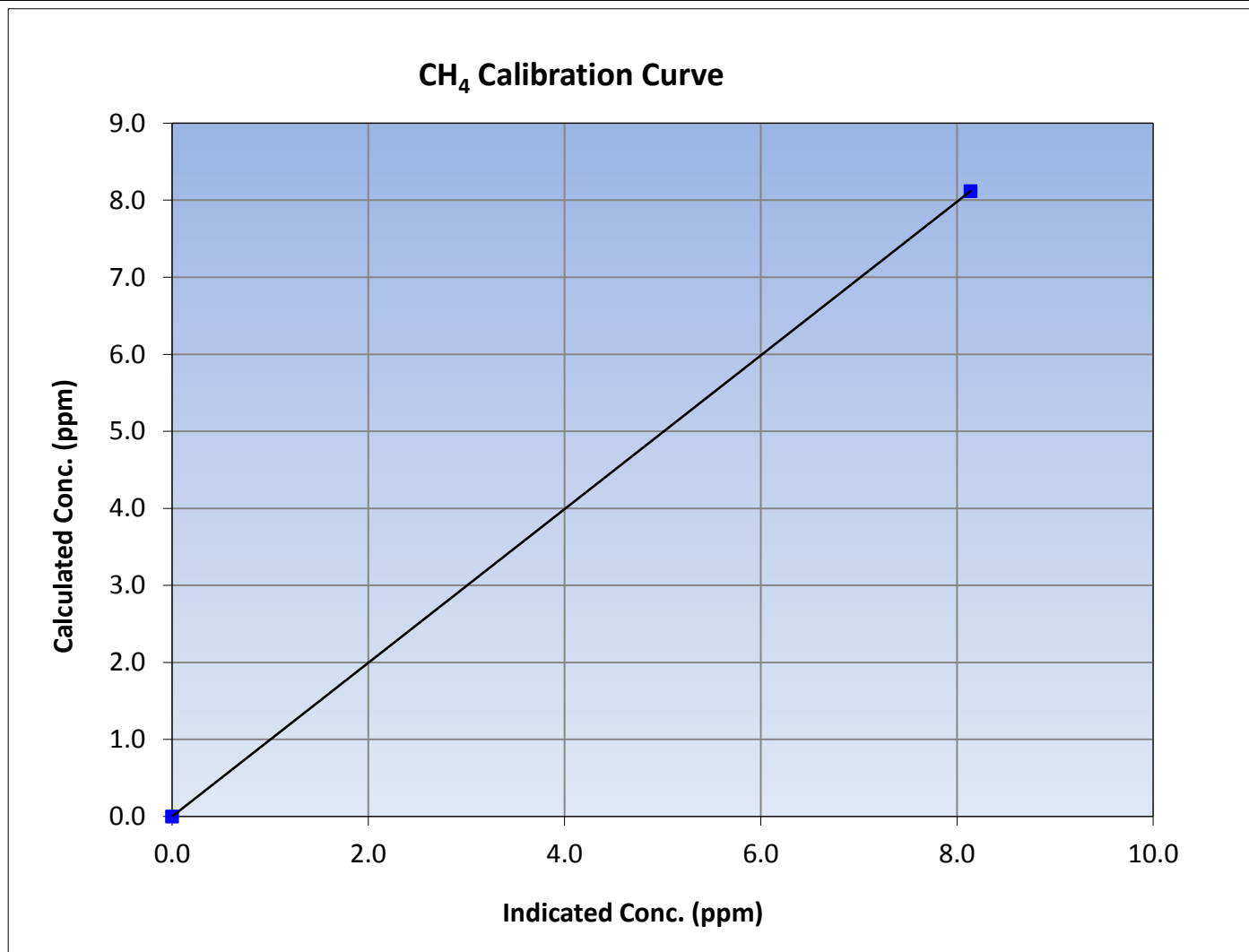
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 7, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 13:34 | End Time (MST) | 14:23 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 8.12 | 8.14 | 0.9974 | | | |
| | | | | | |
| | | | Intercept | 0.000000 | +/-0.5 |





Wood Buffalo Environmental Association

NMHC Calibration Summary

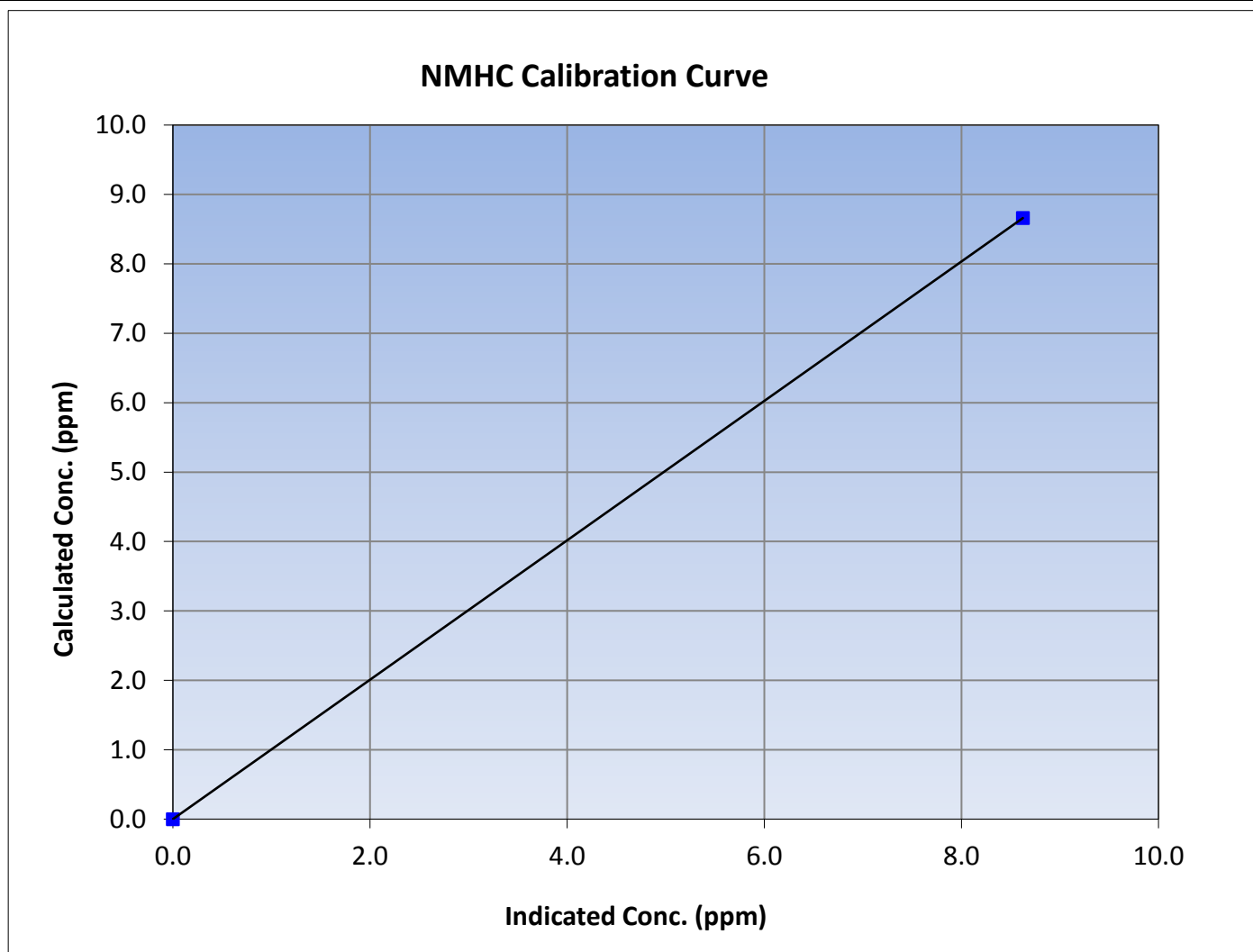
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 7, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 13:34 | End Time (MST) | 14:23 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

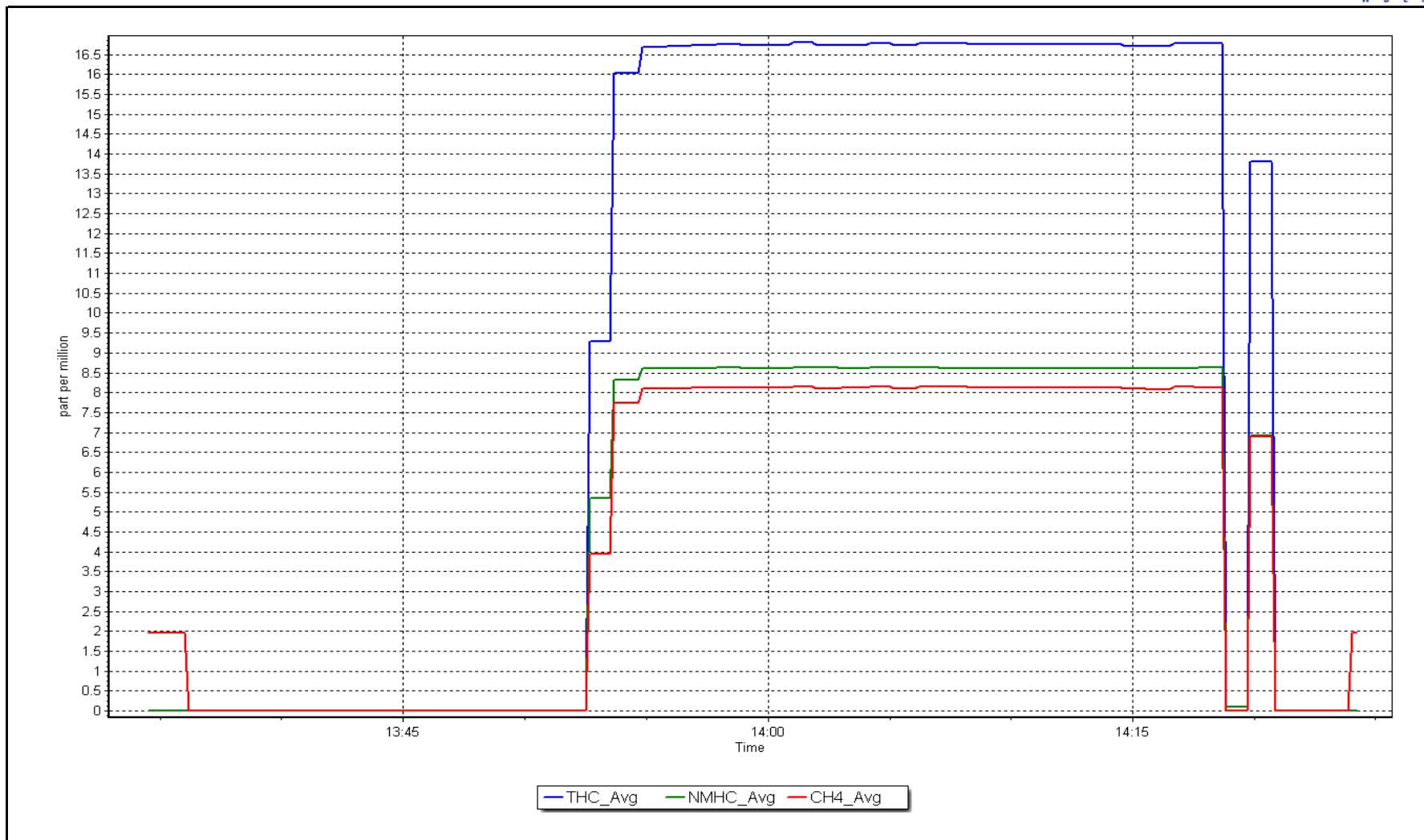
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 8.66 | 8.62 | 1.0042 | | | |
| | | | Slope | 1.004153 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-0.5 |



NMHC Calibration Plot

Date: September 29, 2017

Location: Anzac





Wood Buffalo Environmental Association

O₃ Calibration Summary

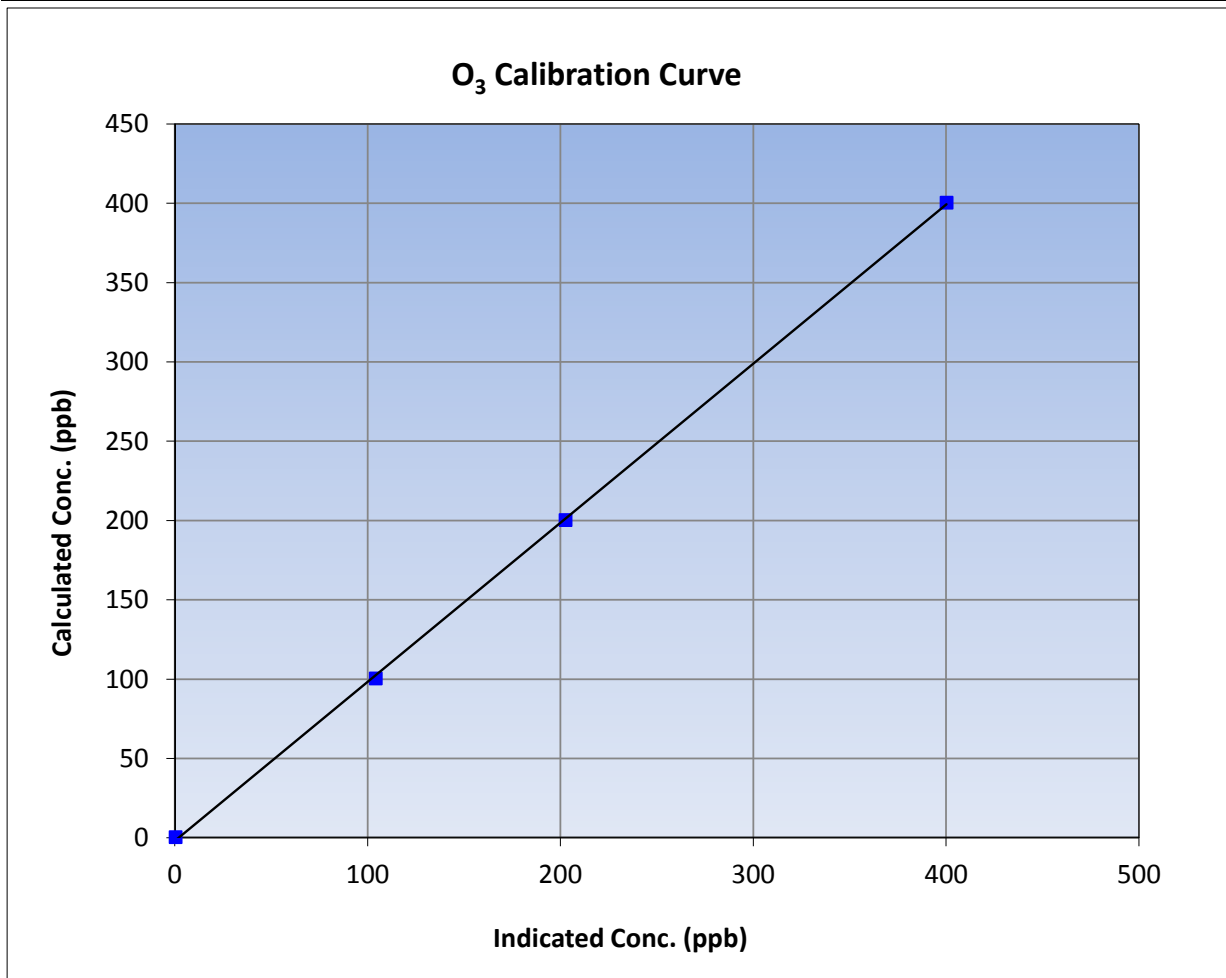
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 4, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 13:15 | End Time (MST) | 15:40 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1426262595 |

Calibration Data

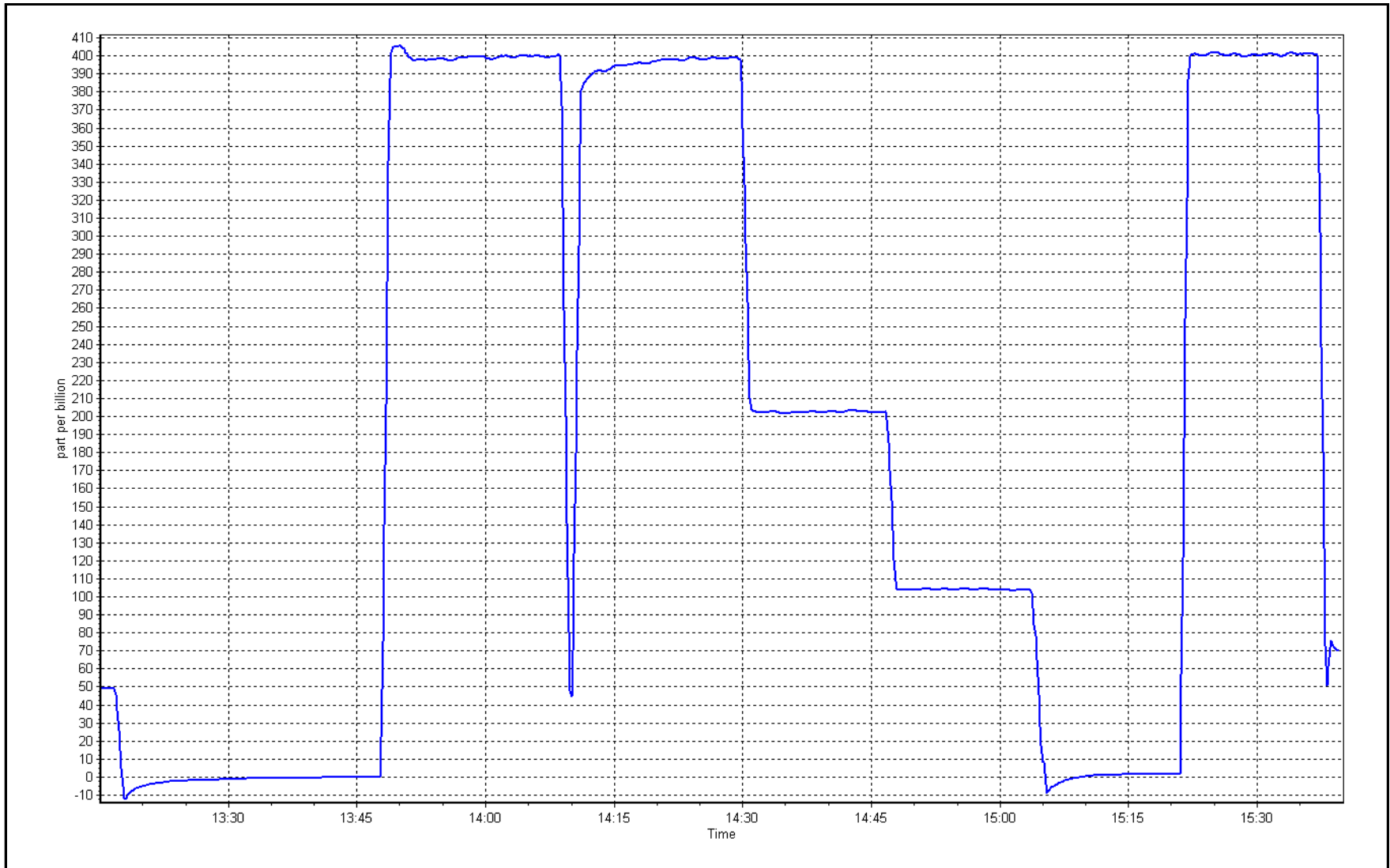
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|--|---------------------------------------|------------------------------|-------------------------|---------------|--------------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999878 | ≥0.995 |
| 400.0 | 399.8 | 1.0005 | Slope | 1.003087 | 0.90 - 1.10 |
| 200.0 | 202.3 | 0.9886 | Intercept | -2.044938 | +/- 10 |
| 100.0 | 103.9 | 0.9625 | | | |



O₃ Calibration Plot

Date: September 7, 2017

Location: Anzac





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|----------------|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 9, 2017 |
| Start time (MST): | 9:20 | End time (MST): | 13:15 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|------------------|
| NO Gas Cylinder # | EY0000647 | Cal Gas Expiry Date | November 4, 2019 |
| NOX Cal Gas Conc. | <u>50.5</u> ppb | NO Cal Gas Conc. | <u>50.5</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 2659 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4764 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1426262592 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.104 | 1.140 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 1.001 | 1.000 | PMT Temperature | -3.1 | -3.0 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 177.9 | 181.3 |
| NO bkgrnd | 4.1 | 4.3 | Sample Flow | 0.681 | 0.710 |
| NOX bkgrnd | 4.3 | 4.4 | PMT Voltage | -808.0 | -807.7 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.997577 | 0.998873 |
| NO _x Cal Offset | 0.291992 | 0.511899 |
| NO Cal Slope | 0.996834 | 0.998214 |
| NO Cal Offset | 0.452739 | 0.493018 |
| NO ₂ Cal Slope | 0.999441 | 0.998052 |
| NO ₂ Cal Offset | 1.070191 | 0.457694 |



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

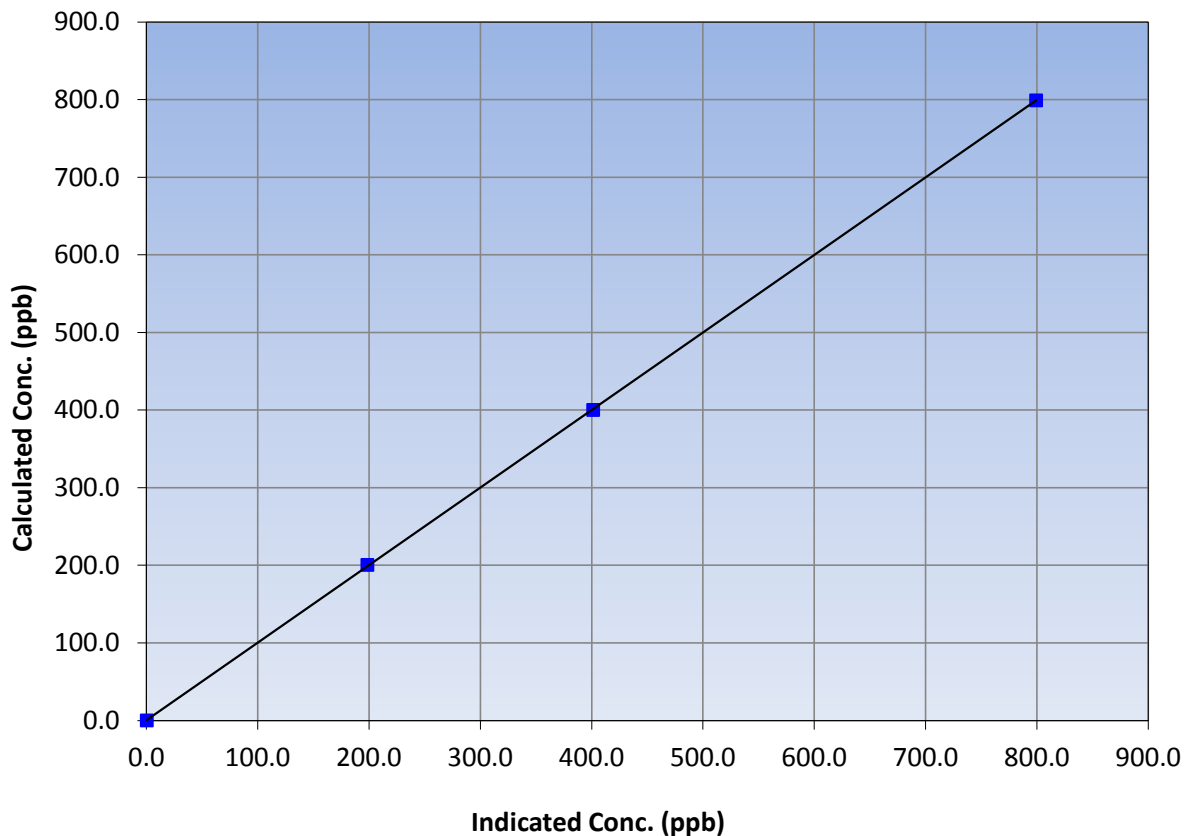
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:20 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262592 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.1 | 799.3 | 0.9998 | | | |
| 400.0 | 401.3 | 0.9968 | | | |
| 200.5 | 198.4 | 1.0106 | | | |
| | | | Slope | 0.998873 | 0.90 - 1.10 |
| | | | Intercept | 0.511899 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

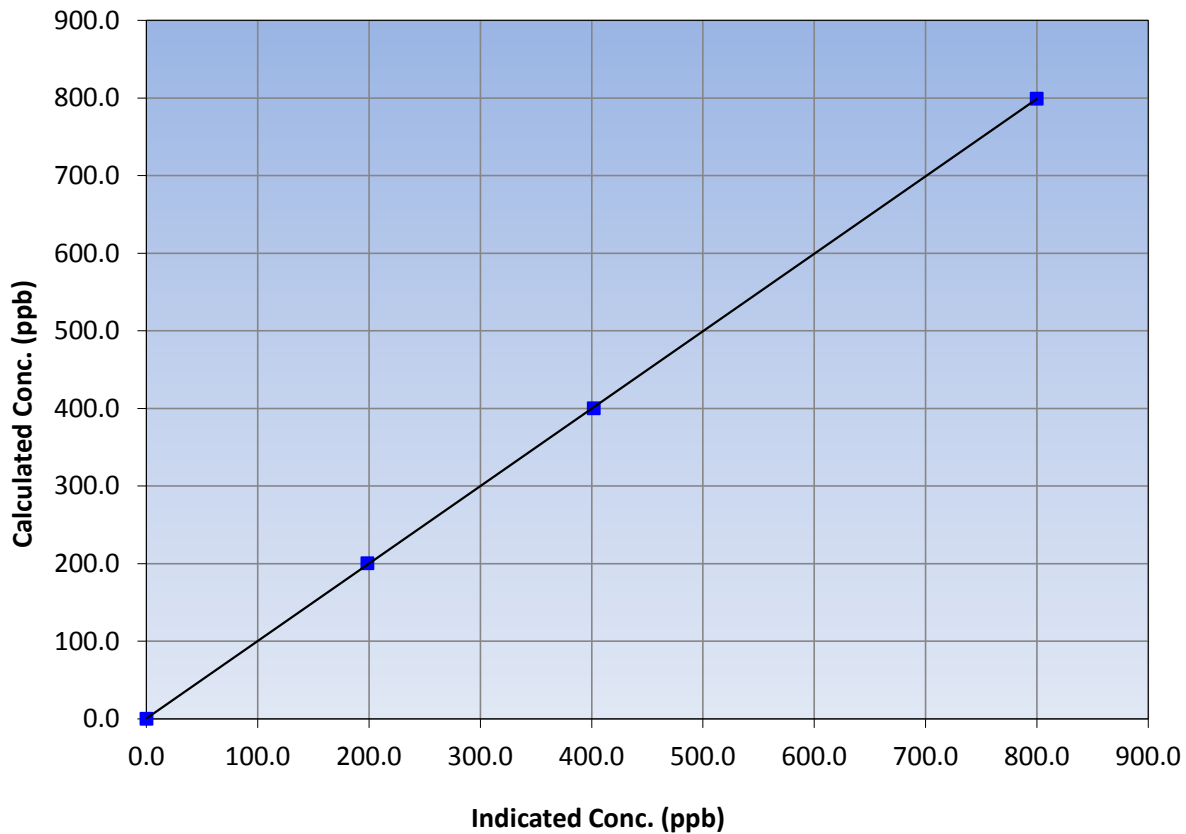
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:20 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262592 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.1 | 799.7 | 0.9993 | | | |
| 400.0 | 401.9 | 0.9954 | | | |
| 200.5 | 198.5 | 1.0101 | | | |
| | | | Slope | 0.998214 | 0.90 - 1.10 |
| | | | Intercept | 0.493018 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

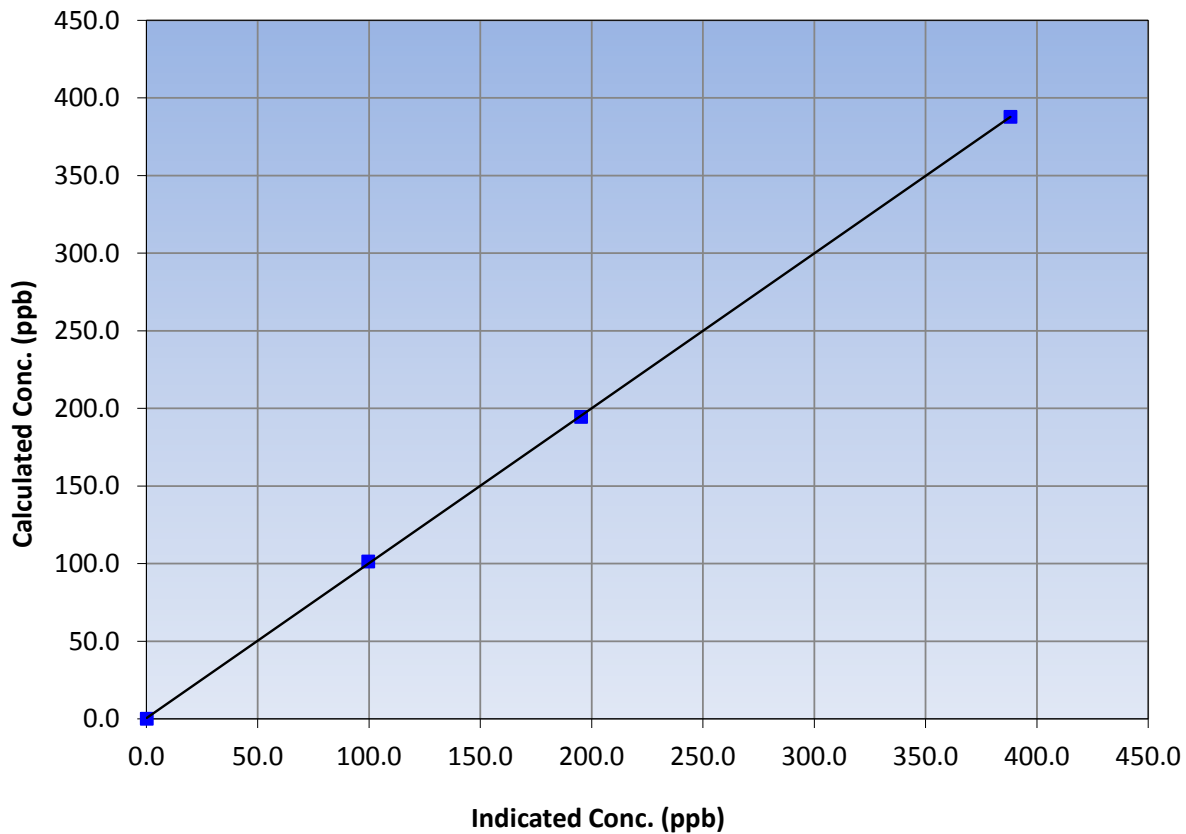
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 9, 2017 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 9:20 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262592 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 387.9 | 388.1 | 0.9995 | | | |
| 194.5 | 195.3 | 0.9959 | | | |
| 101.3 | 99.7 | 1.0160 | | | |
| | | | Slope | 0.998052 | 0.90 - 1.10 |
| | | | Intercept | 0.457694 | +/-20 |

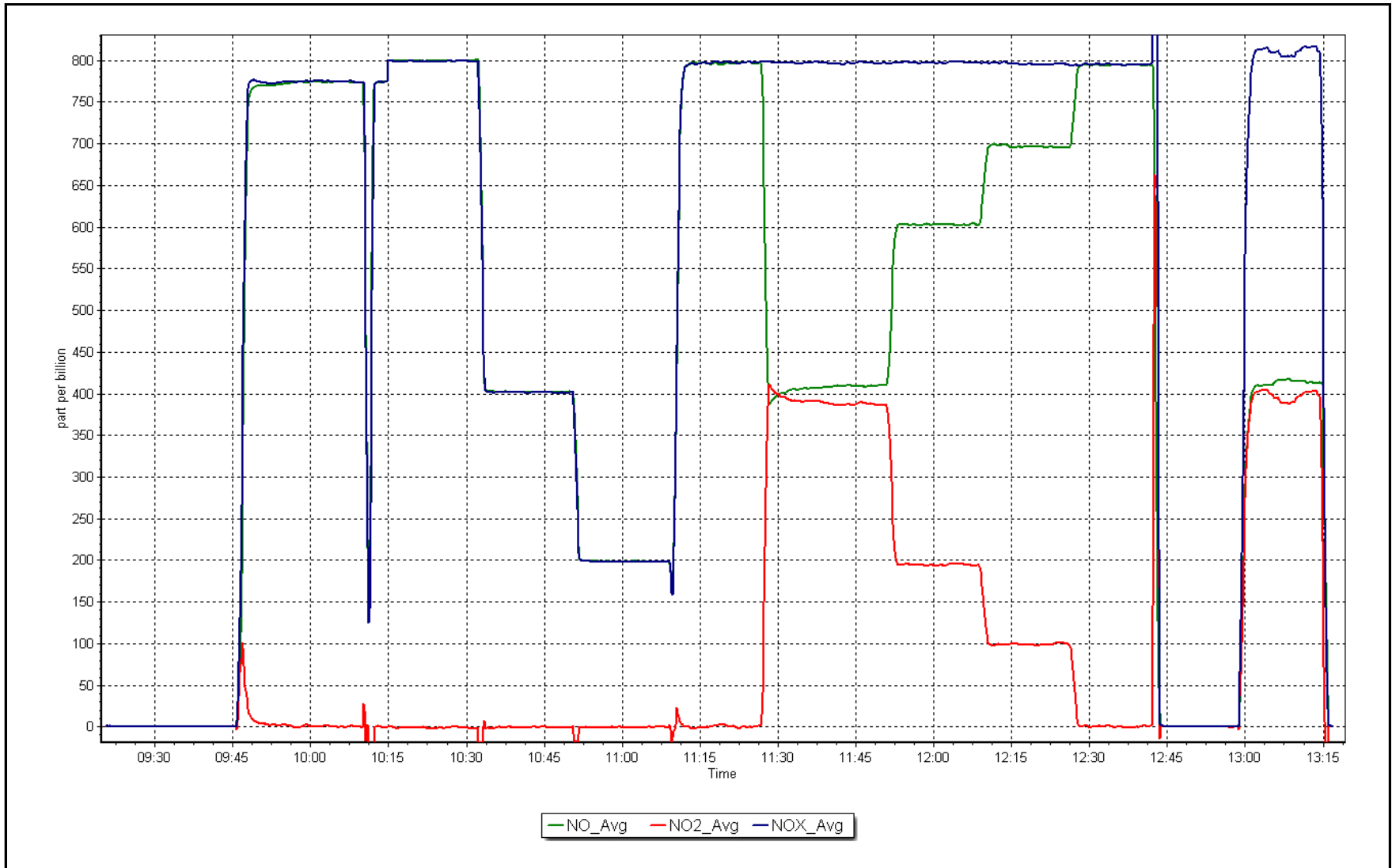
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 7, 2017

Location: Anzac





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 15
HORIZON
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 685 | 35 | 35 | 100 | 18 | 0 | 2 | 0 |
| TRS (ppb) Average | 687 | 33 | 33 | 100 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 684 | 35 | 36 | 99.86 | 4.8 | - | 2.8 | - |
| NO2 (ppb) Average | 685 | 35 | 35 | 100 | 35 | 0 | 13 | - |
| NO (ppb) Average | 685 | 35 | 35 | 100 | 67 | - | 10 | - |
| NOX (ppb) Average | 685 | 35 | 35 | 100 | 92 | - | 23 | - |
| PM2.5 (ug/m3) Average | 719 | 1 | 1 | 100 | 61.4 | - | 19.7 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 32.6 | - | 20.7 | - |
| Wind Speed 10 m (km/h) Average | 717 | 0 | 3 | 99.58 | 29 | - | 23 | - |
| Wind Direction 10 m (deg) Average | 717 | 0 | 3 | 99.58 | - | - | - | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100 | 3 | - | 19.3 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 100 | - | 92 | - |
| Global Solar Radiation (W/m2) Average | 720 | 0 | 0 | 100 | 701 | - | 224 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - HORIZON (AMS 15)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|---------------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 685 | 0.8 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 18 |
| TRS (ppb) Average | 687 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 684 | 2.25 | 0.3 | - | 1.9 | 2 | 2.1 | 2.2 | 2.3 | 2.5 | 4.8 |
| NO2 (ppb) Average | 685 | 4.2 | 5 | - | 0 | 0 | 1 | 2 | 6 | 12 | 35 |
| NO (ppb) Average | 685 | 1.7 | 5 | - | 0 | 0 | 0 | 0 | 1 | 4 | 67 |
| NOX (ppb) Average | 685 | 5.9 | 9 | - | 0 | 0 | 1 | 2 | 7 | 15 | 92 |
| PM2.5 (ug/m3) Average | 719 | 6.54 | 7.1 | - | 0.5 | 1.4 | 2 | 4.1 | 8.2 | 15.6 | 61.4 |
| Temperature 2 m (C) Average | 720 | 11.47 | 6.8 | - | -2.9 | 3.3 | 6.7 | 10.6 | 16.1 | 21.2 | 32.6 |
| Wind Speed 10 m (km/h) Average | 717 | 9.7 | 6 | - | 0 | 3 | 6 | 8 | 13 | 18 | 29 |
| Wind Direction 10 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |
| Precipitation (mm) Total | 720 | - | - | 49.28 | - | - | - | - | - | - | - |
| Relative Humidity (%) Average | 720 | 69.5 | 22 | - | 20 | 35 | 53 | 73 | 89 | 96 | 100 |
| Global Solar Radiation (W/m2) Average | 720 | 136.3 | 194 | - | 0 | 0 | 0 | 10 | 221 | 491 | 701 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -HORIZON (AMS 15)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|-----------------------------------|
| THC | 26 Sep 2017 15:00 | 26 Sep 2017 15:00 | 1 | Power failure |
| Wind Speed, Wind Direction | 14 Sep 2017 05:00 | 14 Sep 2017 05:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 15 Sep 2017 02:00 | 15 Sep 2017 02:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 29 Sep 2017 19:00 | 29 Sep 2017 19:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Horizon - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 18 ppb on Sep 9 17:00 | Maximum Daily Average: 2.4 ppb on Sep 24 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 5 20:00 | Minimum Daily Average: 0.2 ppb on Sep 10 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 1.9 ppb at hour 17 | Minimum Diurnal Average: 0.4 ppb at hour 6 | | Hours of Calibration: | 35 |
| Monthly Average: 0.8 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 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-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 1 |
| 2-Sep | 1 | 1 | 1 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 |
| 3-Sep | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 10 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 10 |
| 4-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.0 | 3 |
| 5-Sep | 1 | 1 | Z | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 7-Sep | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0.6 | 2 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 1 | 6 | 4 | 0 | 0 | 9 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1.2 | 9 |
| 9-Sep | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 18 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1.6 | 18 |
| 10-Sep | 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 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 10 | 10 | 6 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 1.7 | 10 |
| 12-Sep | 0 | 1 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.3 | 1 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 9 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1.7 | 9 |
| 18-Sep | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 3 | 5 | 5 | 5 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 5 |
| 19-Sep | 0 | 0 | 1 | 1 | Z | 1 | 1 | 1 | C | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.6 | 1 |
| 20-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0.6 | 1 |
| 21-Sep | Z | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 2 | 2 | 2 | 1 | 0 | 0 | 0.7 | 2 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 7 | 7 | 4 | 7 | 10 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 2.4 | 10 |
| 25-Sep | 2 | 1 | 2 | 2 | Z | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 6 | 3 | 7 | 7 | 4 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1.7 | 7 |
| 29-Sep | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.7 | 3 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 |

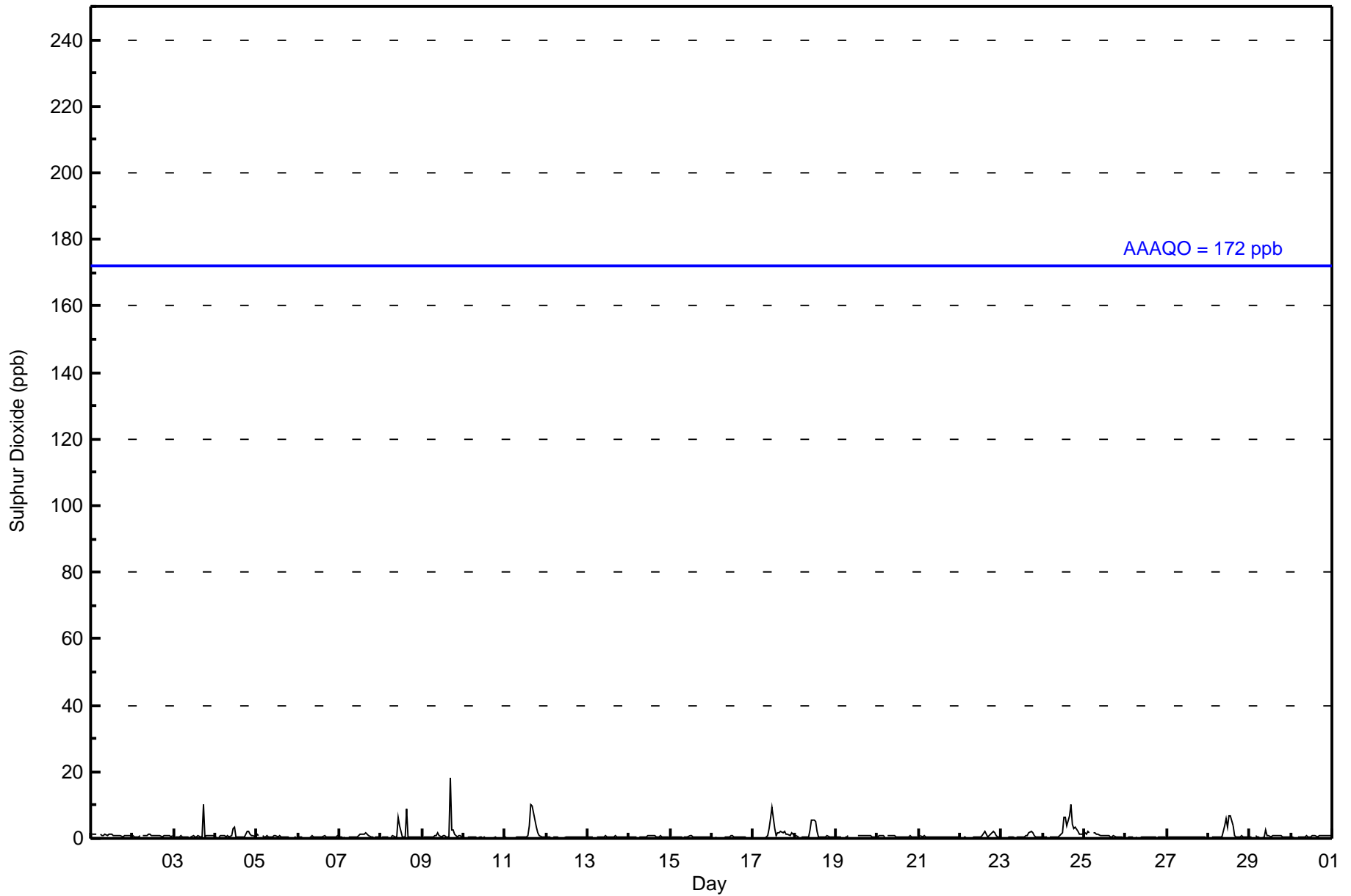
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.9 | 1.4 | 1.4 | 1.3 | 1.1 | 1.0 | 1.5 | 1.9 | 1.3 | 0.9 | 0.8 | 0.6 | 0.5 | 0.5 | 0.5 | Diurnal Average | |
| 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 4 | 6 | 9 | 7 | 7 | 4 | 10 | 18 | 10 | 3 | 3 | 2 | 1 | 2 | 1 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Horizon - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Horizon - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 684 | 99.85 | 99.85 |
| 11 - 20 | 1 | 0.15 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



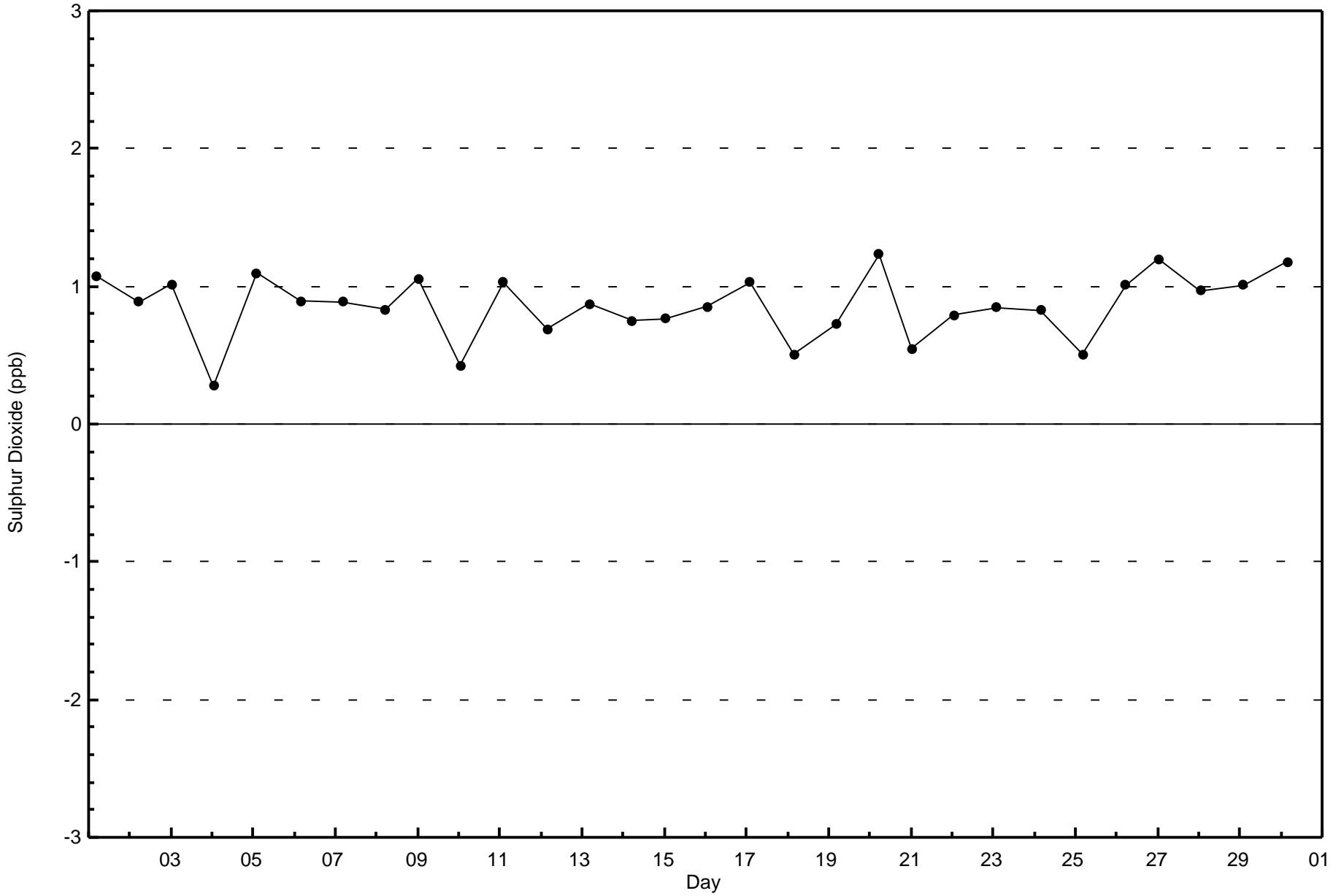
**Wood Buffalo Environmental Association
Frequency Distribution**

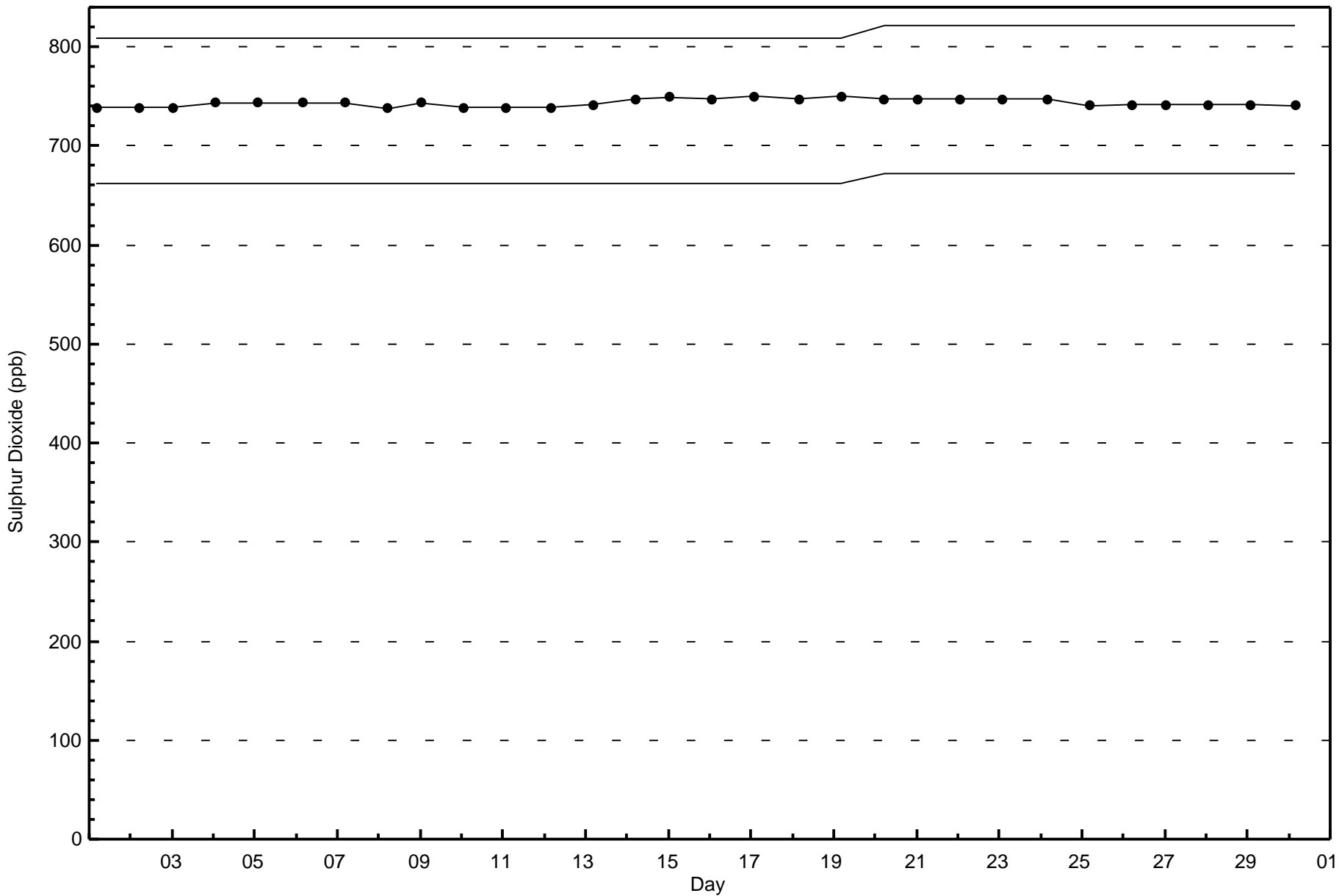
**Sulphur Dioxide (SO₂) - ppb
Horizon - September 2017**

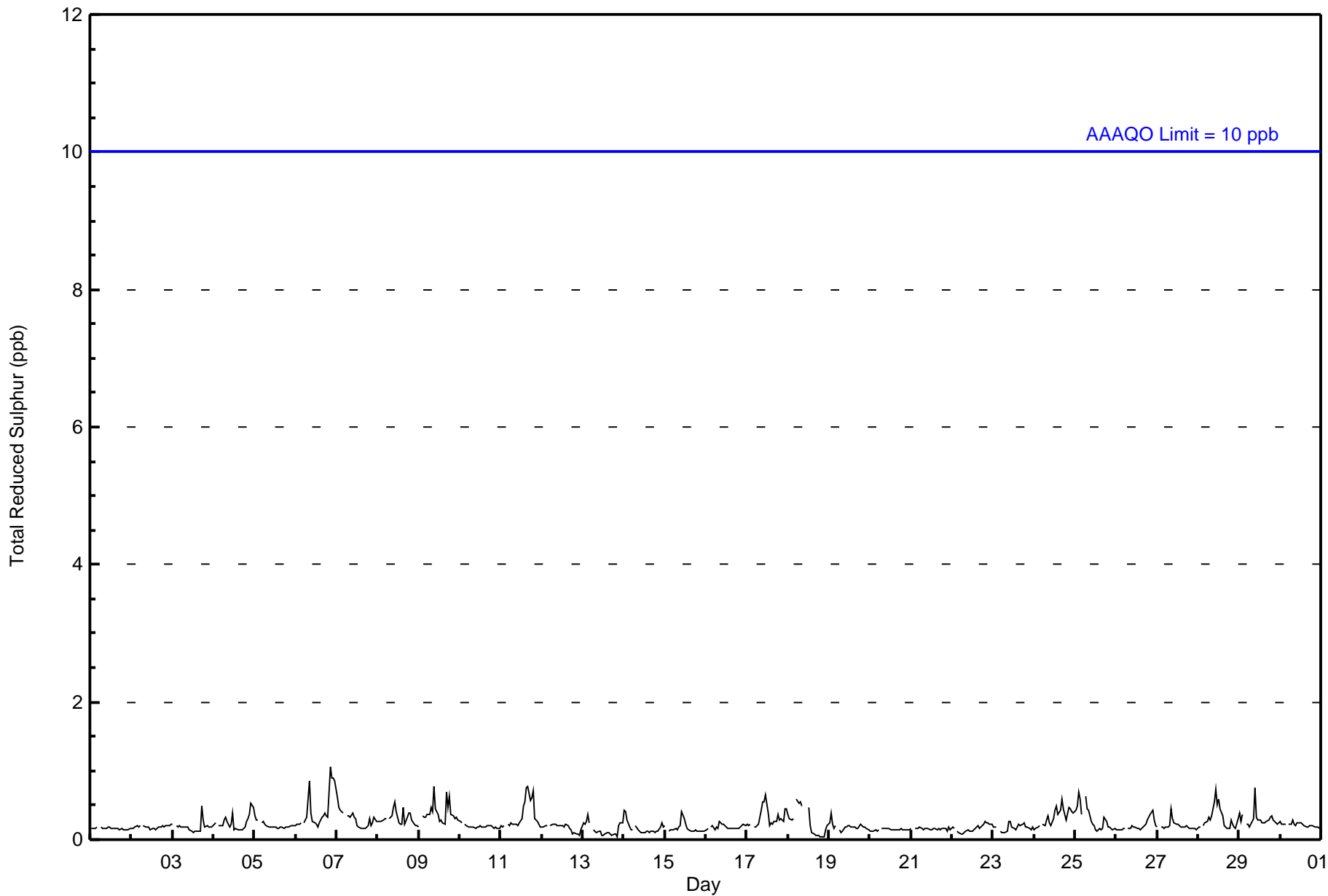
| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 23 | 79 | 33 | 23 | 2 | 15 | 15 | 26 | 50 | 145 | 103 | 40 | 28 | 52 | 34 | 13 | 681 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 79 | 33 | 23 | 2 | 15 | 15 | 26 | 50 | 145 | 103 | 40 | 28 | 52 | 34 | 14 | 682 |

Total Number of Valid Hours: 682

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Horizon - September 2017

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

Total Number of Valid Hours: 687

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Horizon - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 20 | 83 | 36 | 23 | 2 | 15 | 14 | 24 | 51 | 144 | 105 | 40 | 29 | 51 | 34 | 14 | 685 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 20 | 83 | 36 | 23 | 2 | 15 | 14 | 24 | 51 | 144 | 105 | 40 | 29 | 51 | 34 | 14 | 685 |

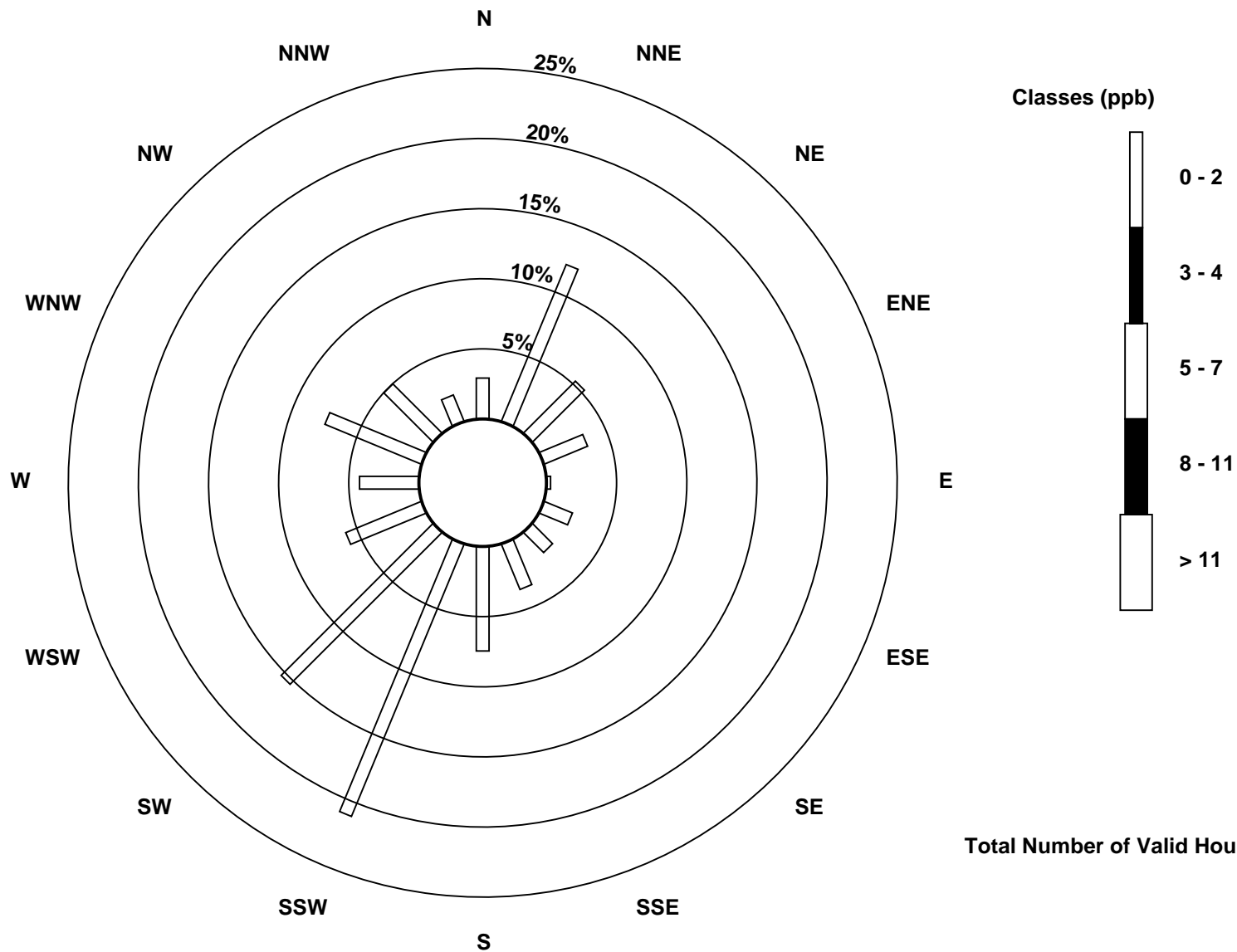
Total Number of Valid Hours: 685

Total Number of Hours: 720

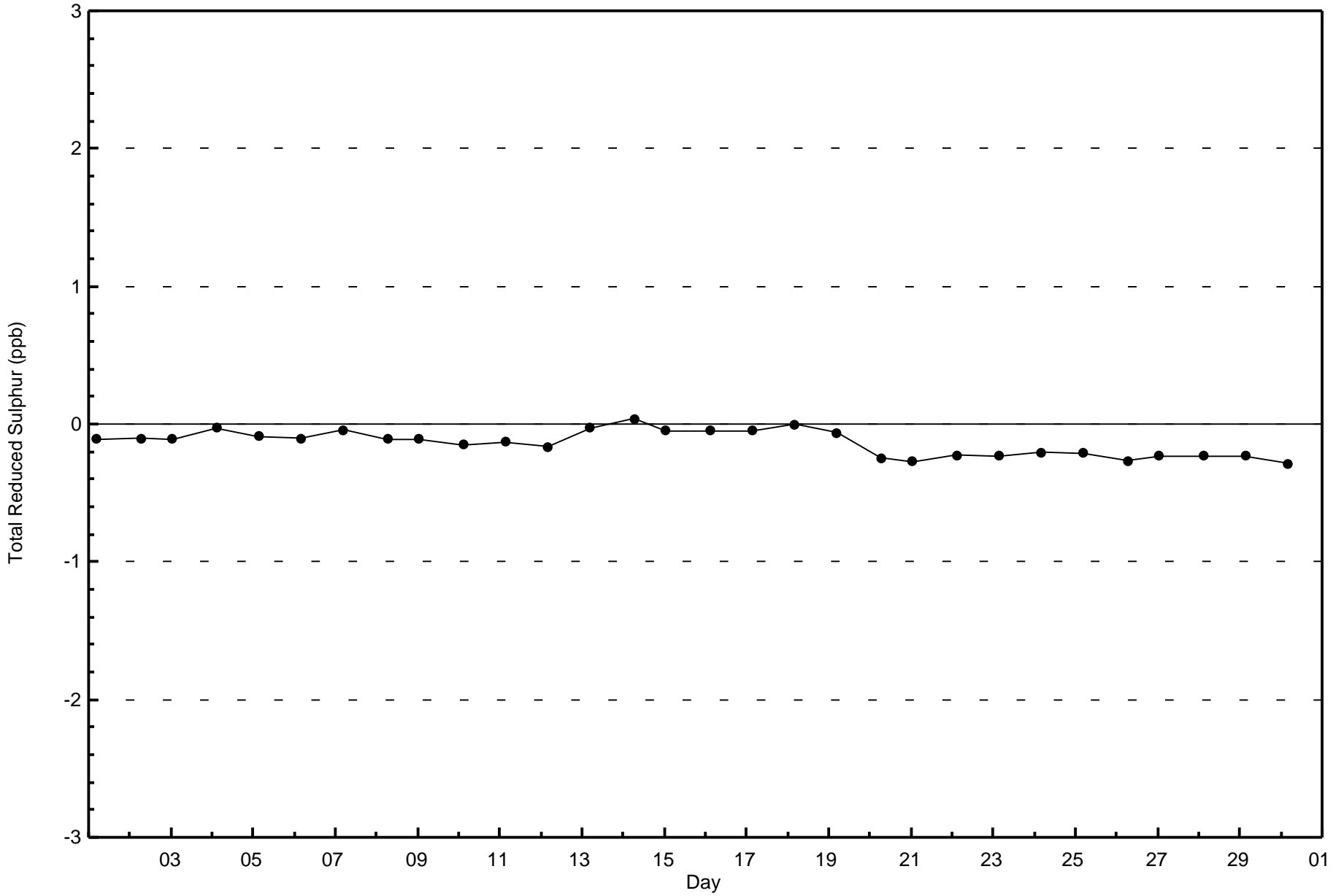


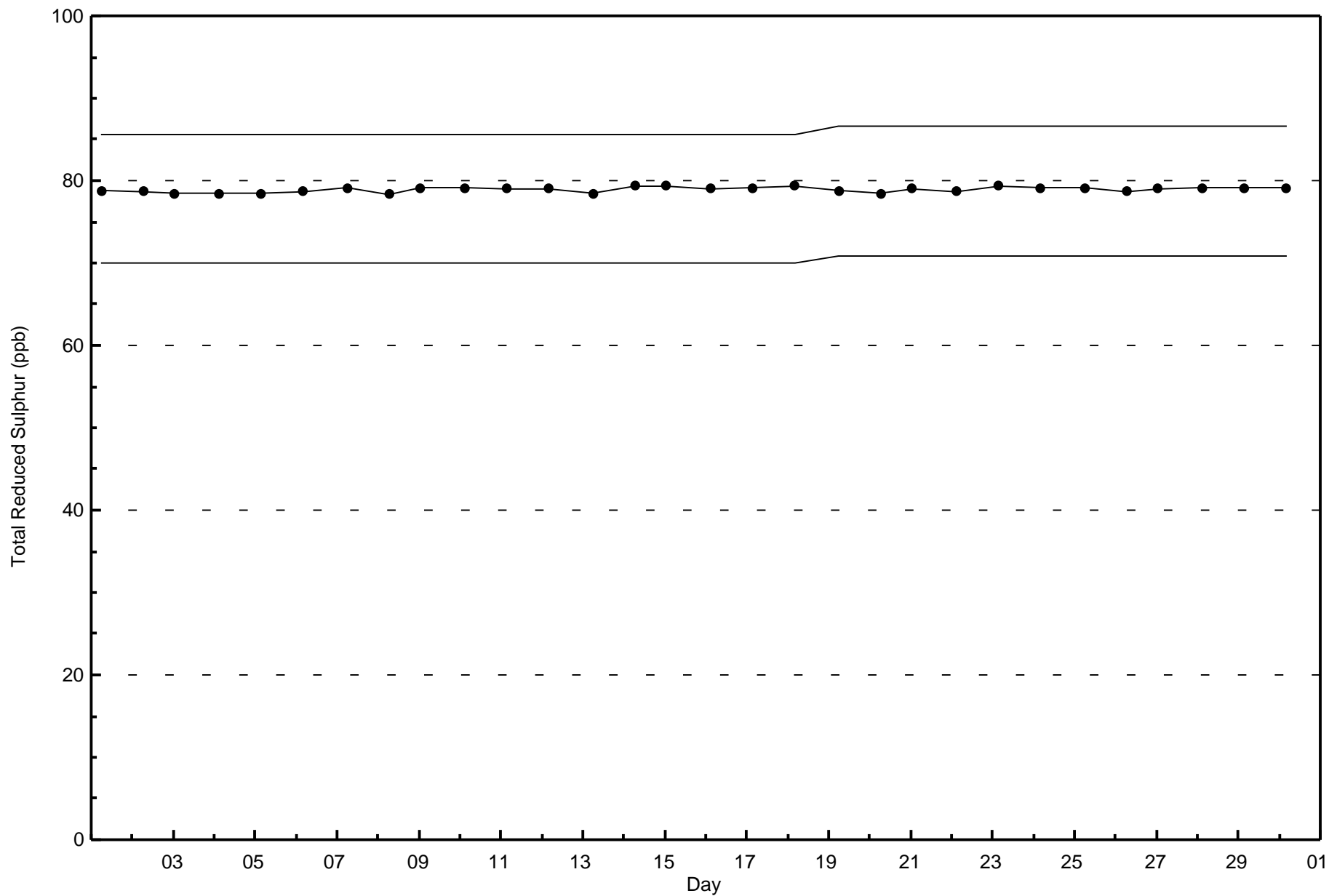
Wood Buffalo Environmental Association
Wind Rose Sep 2017

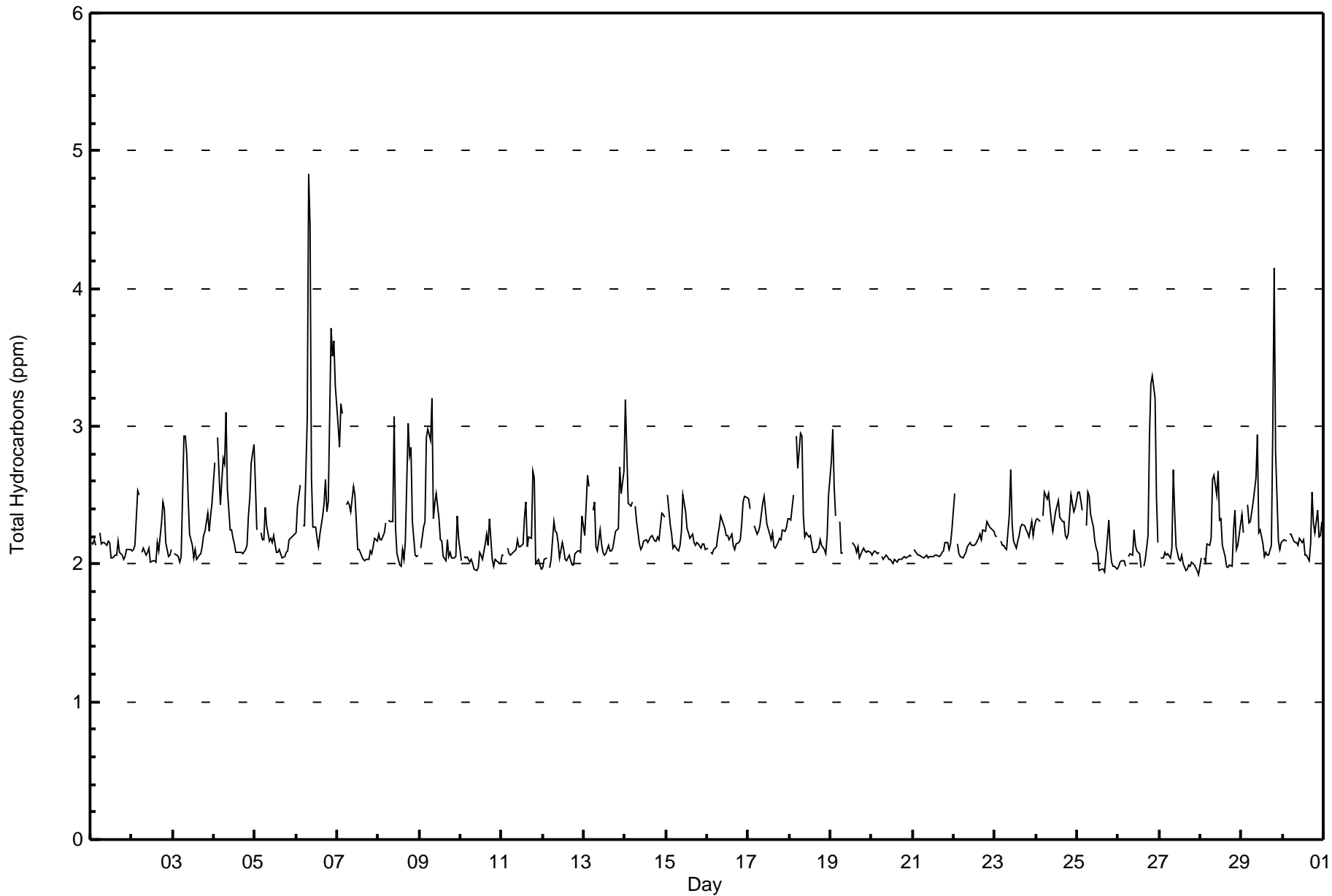
Total Reduced Sulphur (TRS) - ppb
Horizon (AMS 15)



Total Number of Valid Hours: 685









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Horizon - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 107 | 15.64 | 15.64 |
| 2.1 - 3.0 | 560 | 81.87 | 97.51 |
| 3.1 - 10.0 | 17 | 2.49 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Horizon - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 1 | 24 | 10 | 2 | 0 | 0 | 0 | 0 | 4 | 14 | 19 | 16 | 8 | 2 | 6 | 1 | 107 |
| 2.1 - 3.0 | 20 | 55 | 23 | 20 | 2 | 14 | 15 | 26 | 46 | 131 | 80 | 22 | 20 | 46 | 26 | 11 | 557 |
| 3.1 - 10.0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 4 | 1 | 2 | 17 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 79 | 33 | 23 | 2 | 15 | 15 | 26 | 50 | 145 | 103 | 40 | 28 | 52 | 33 | 14 | 681 |

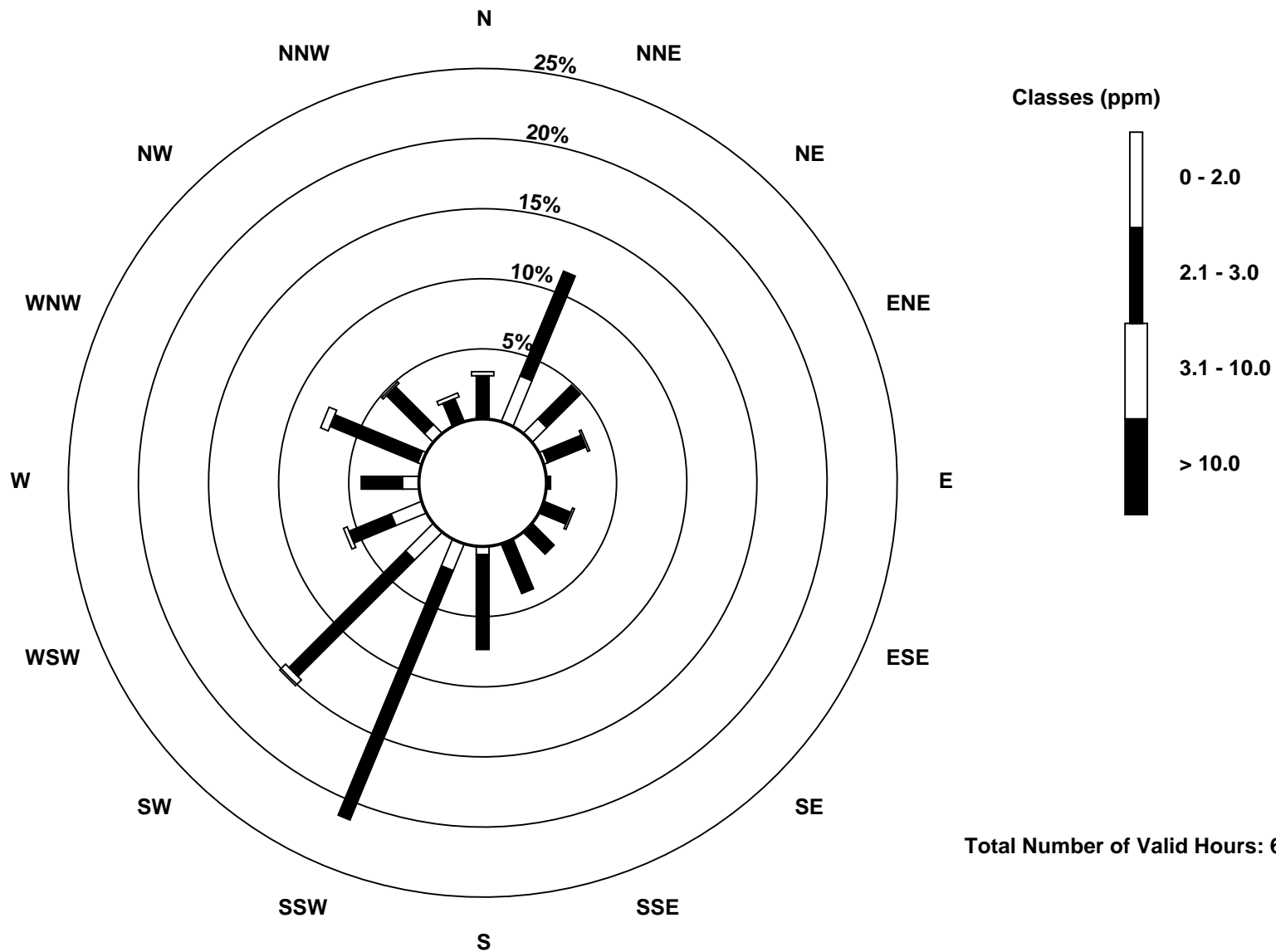
Total Number of Valid Hours: 681

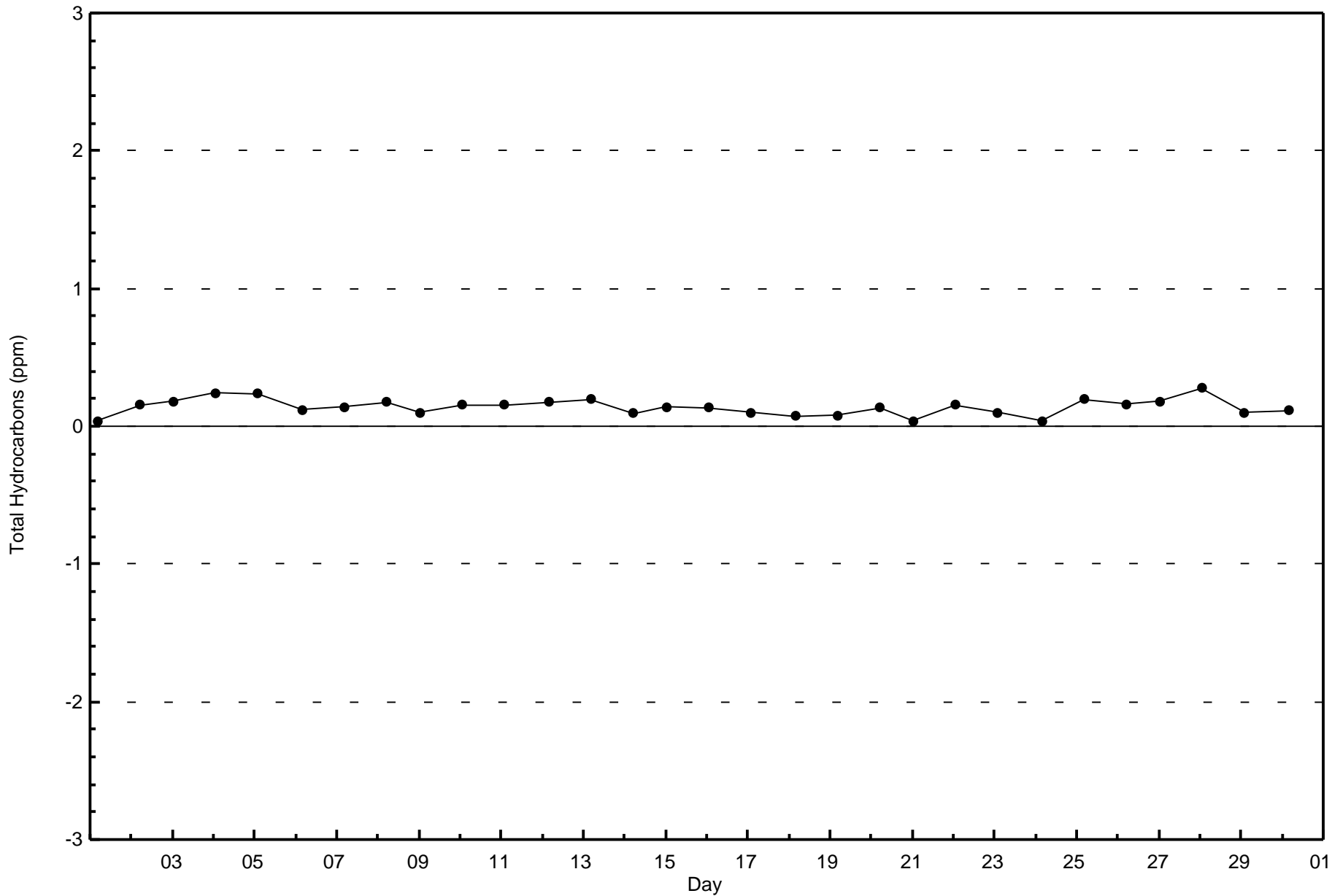
Total Number of Hours: 720

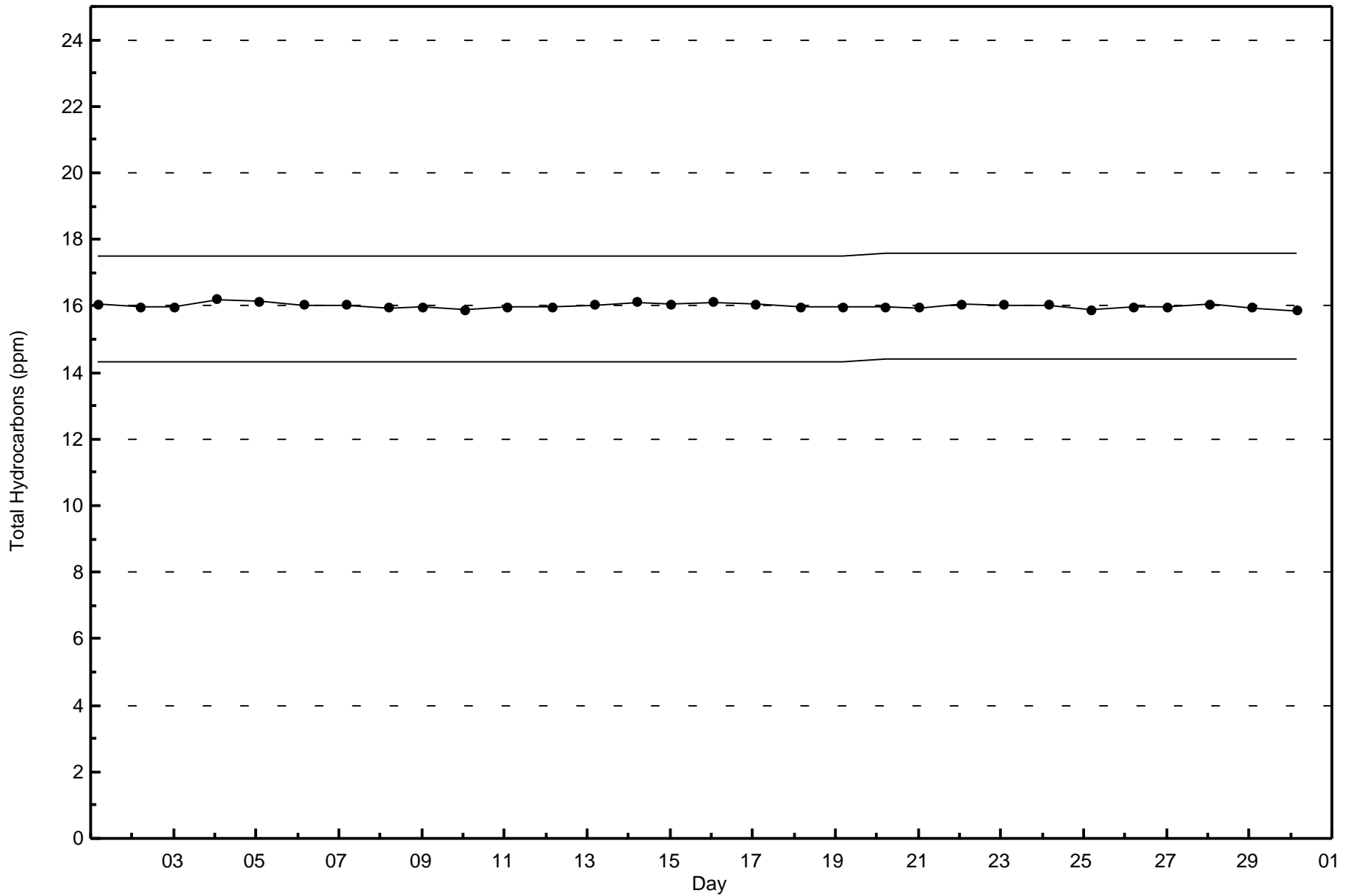


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

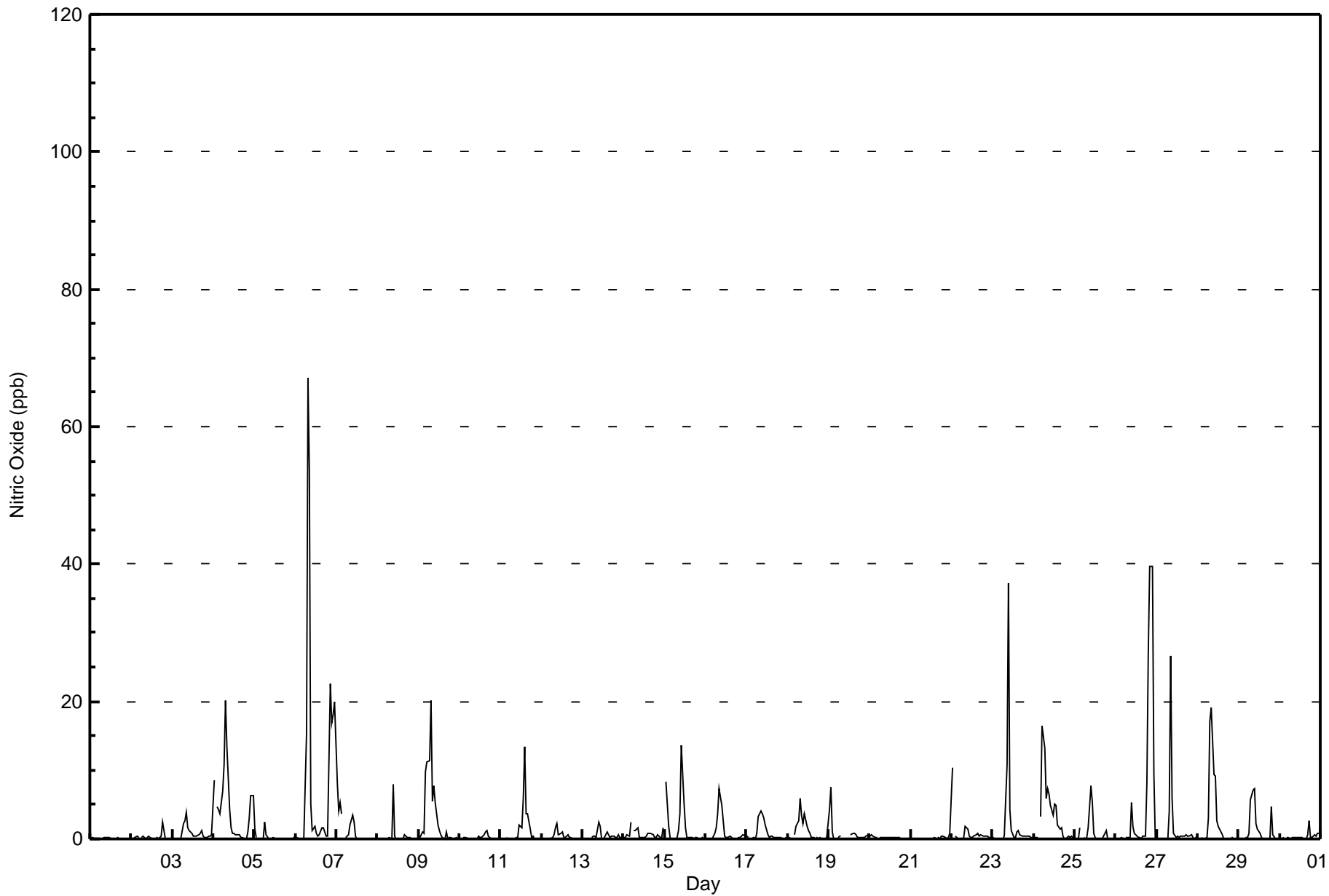
Nitric Oxide (NO) - ppb
Horizon - September 2017

| Maximum Value: 67 ppb on Sep 6 08:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 10.0 ppb on Sep 6 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|--|-------------------------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|---------------|---------------|--|--|--|--|--|--|--|---------------------------------|--|--|--|
| Minimum Value: 0 ppb on Sep 1 14:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 1 | | | | | | | | | | | | | | | | | Hours of Data: 685 | | | |
| Maximum Diurnal Average: 6.0 ppb at hour 9 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.4 ppb at hour 18 | | | | | | | | | | | | | | | | | Hours of Missing Data: 35 | | | |
| Monthly Average: 1.7 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 27 | | | | | | | | | | | | | | | | | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0.3 | 2 | | | | | | | | | | | |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.8 | 4 | | | | | | | | | | | |
| 4-Sep | 9 | Z | 5 | 4 | 4 | 7 | 11 | 20 | 14 | 4 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 6 | 4.3 | 20 | | | | | | | | | | | |
| 5-Sep | 1 | 0 | Z | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 | | | | | | | | | | | |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 15 | 67 | 53 | 5 | 1 | 2 | 1 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 23 | 17 | 18 | 20 | 10.0 | 67 | | | | | | | | | | | |
| 7-Sep | 8 | 4 | 5 | 4 | Z | 0 | 0 | 1 | 2 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 8 | | | | | | | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 8 | | | | | | | | | | | |
| 9-Sep | Z | 0 | 1 | 1 | 10 | 11 | 11 | 20 | 5 | 8 | 5 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 20 | | | | | | | | | | | |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 6 | 13 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 13 | | | | | | | | | | | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | | | |
| 14-Sep | 0 | 0 | 1 | 0 | 2 | Z | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0.7 | 2 | | | | | | | | | | | |
| 15-Sep | Z | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 14 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 14 | | | | | | | | | | | |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 1 | 2 | 4 | 7 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1.1 | 7 | | | | | | | | | | | |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 4 | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 4 | | | | | | | | | | | |
| 18-Sep | 0 | 0 | 0 | Z | 1 | 2 | 3 | 6 | 4 | 2 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 | | | | | | | | | | | |
| 19-Sep | 4 | 7 | 1 | 0 | Z | 0 | 0 | 0 | C | C | C | C | C | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1.0 | 7 | | | | | | | | | | | |
| 20-Sep | 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 | | | | | | | | | | | |
| 21-Sep | Z | 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 | | | | | | | | | | | |
| 22-Sep | 10 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 10 | | | | | | | | | | | |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 11 | 37 | 4 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.6 | 37 | | | | | | | | | | | |
| 24-Sep | 0 | 0 | 0 | Z | 3 | 16 | 13 | 6 | 7 | 7 | 5 | 3 | 5 | 5 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.4 | 16 | | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 2 | Z | 0 | 0 | 0 | 2 | 8 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.9 | 8 | | | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 27 | 40 | 40 | 10 | 0 | 5.9 | 40 | | | | | | | | | | | |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 27 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1.8 | 27 | | | | | | | | | | | |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 3 | 17 | 19 | 9 | 9 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 19 | | | | | | | | | | | |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 6 | 7 | 7 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 1.4 | 7 | | | | | | | | | | | |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 1 | 1 | 0.3 | 3 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan | | | | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Horizon - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Horizon - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 677 | 98.83 | 98.83 |
| 21 - 40 | 6 | 0.88 | 99.71 |
| 41 - 80 | 2 | 0.29 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Horizon - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 21 | 79 | 33 | 23 | 2 | 14 | 15 | 26 | 50 | 144 | 102 | 39 | 28 | 50 | 34 | 14 | 674 |
| 21 - 40 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 6 |
| 41 - 80 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 79 | 33 | 23 | 2 | 15 | 15 | 26 | 50 | 145 | 103 | 40 | 28 | 52 | 34 | 14 | 682 |

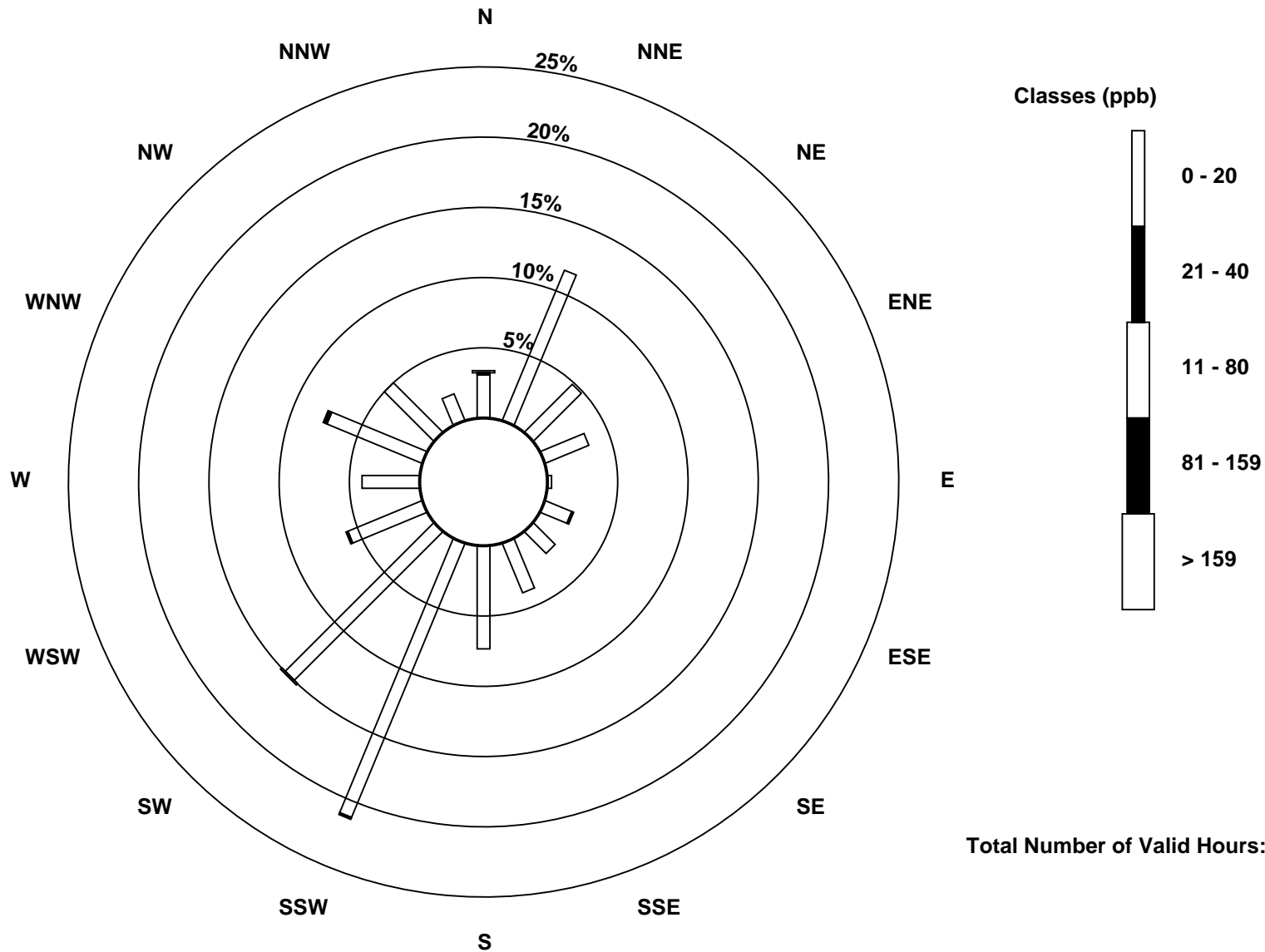
Total Number of Valid Hours: 682

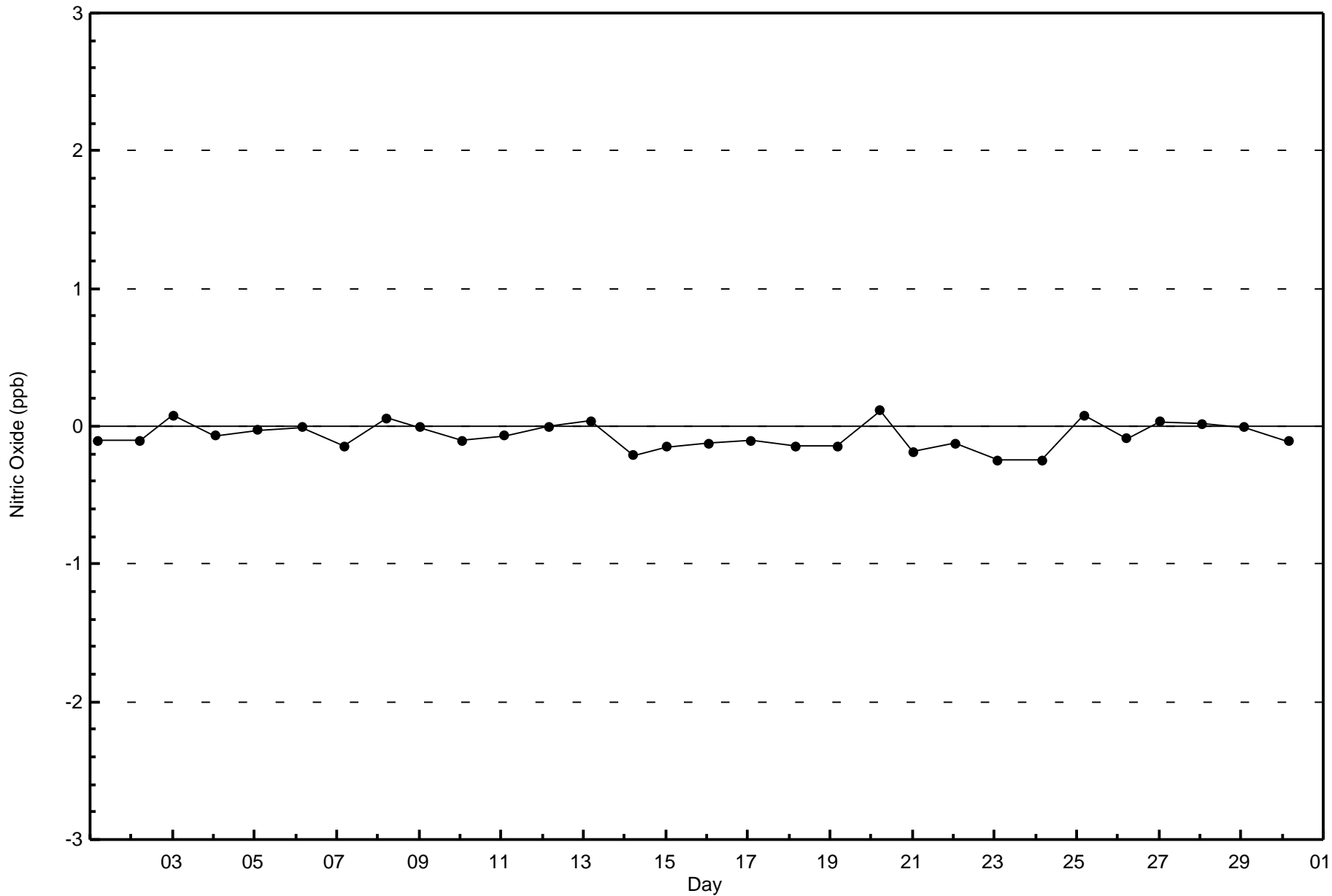
Total Number of Hours: 720

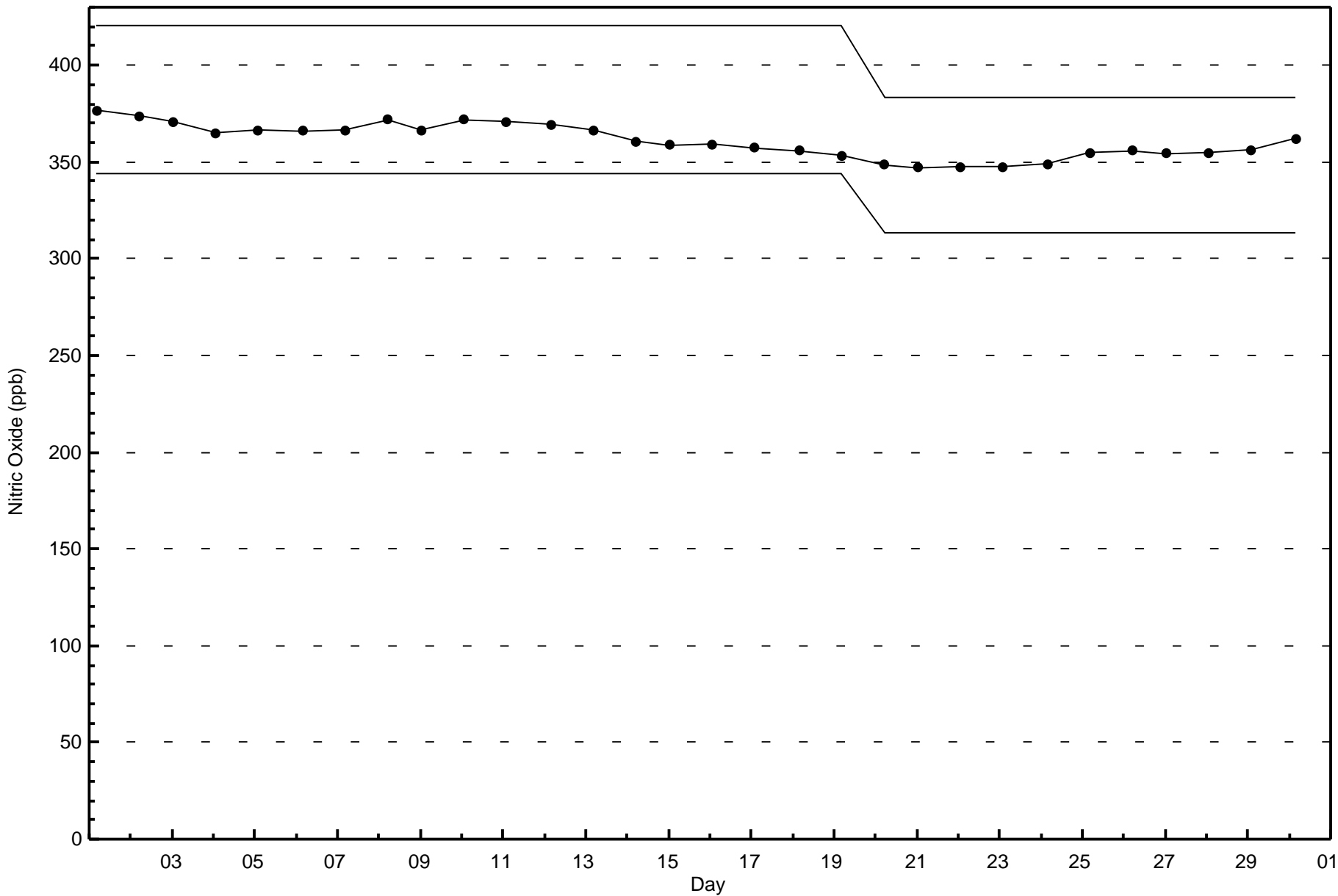


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Horizon - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 35 ppb on Sep 6 21:00 | Maximum Daily Average: 12.9 ppb on Sep 6 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 3 05:00 | Minimum Daily Average: 0.3 ppb on Sep 20 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 7.0 ppb at hour 21 | Minimum Diurnal Average: 1.6 ppb at hour 14 | | Hours of Calibration: | 35 |
| Monthly Average: 4.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 6 P ₉₀ = 12 P ₉₉ = 27 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 2-Sep | 0 | 0 | 4 | 12 | 11 | Z | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 2 | 6 | 22 | 11 | 2 | 1 | 0 | 0 | 3.5 | 22 |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 1 | 12 | 8 | 8 | 4 | 3 | 2 | 1 | 1 | 2 | 3 | 4 | 6 | 6 | 9 | 8 | 9 | 10 | 13 | 4.8 | 13 |
| 4-Sep | 22 | Z | 16 | 10 | 7 | 13 | 15 | 15 | 13 | 7 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 4 | 12 | 16 | 18 | 15 | 8.6 | 22 |
| 5-Sep | 6 | 2 | Z | 1 | 0 | 1 | 9 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 9 |
| 6-Sep | 2 | 8 | 10 | Z | 1 | 1 | 10 | 25 | 29 | 11 | 4 | 6 | 5 | 3 | 5 | 10 | 13 | 14 | 13 | 12 | 35 | 28 | 28 | 27 | 12.9 | 35 |
| 7-Sep | 21 | 17 | 14 | 12 | Z | 5 | 3 | 3 | 7 | 10 | 9 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 5.2 | 21 |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 22 | 6 | 3 | 1 | 1 | 3 | 3 | 12 | 16 | 14 | 18 | 2 | 1 | 0 | 0 | 4.8 | 22 |
| 9-Sep | Z | 2 | 5 | 5 | 7 | 9 | 7 | 8 | 10 | 12 | 13 | 10 | 5 | 3 | 1 | 1 | 7 | 2 | 4 | 2 | 1 | 2 | 8 | 2 | 5.5 | 13 |
| 10-Sep | 0 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 3 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 9 | 14 | 8 | 10 | 8 | 8 | 9 | 1 | 2 | 1 | 0 | 3.5 | 14 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 1 | 9 | 7 | 9 | 6 | 4 | 4 | 4 | 2 | 1 | 4 | 4 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2.7 | 9 |
| 13-Sep | 2 | 1 | 1 | 1 | Z | 6 | 7 | 2 | 2 | 6 | 5 | 0 | 0 | 1 | 3 | 2 | 1 | 3 | 5 | 4 | 3 | 4 | 1 | 5 | 2.8 | 7 |
| 14-Sep | 2 | 3 | 4 | 3 | 2 | Z | 2 | 5 | 5 | 1 | 0 | 1 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 6 | 7 | 4 | 5 | 5 | 2.7 | 7 |
| 15-Sep | Z | 6 | 4 | 2 | 1 | 1 | 0 | 0 | 1 | 3 | 8 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1.7 | 8 |
| 16-Sep | 0 | Z | 1 | 0 | 0 | 4 | 7 | 6 | 9 | 8 | 6 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 18 | 25 | 24 | 19 | 5.8 | 25 |
| 17-Sep | 19 | 17 | Z | 8 | 5 | 5 | 6 | 5 | 8 | 7 | 7 | 6 | 3 | 1 | 2 | 2 | 2 | 2 | 4 | 8 | 12 | 10 | 11 | 14 | 7.1 | 19 |
| 18-Sep | 11 | 8 | 7 | Z | 12 | 14 | 10 | 10 | 6 | 5 | 7 | 5 | 3 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 4 | 10 | 5.3 | 14 |
| 19-Sep | 18 | 21 | 10 | 4 | Z | 2 | 2 | 3 | C | C | C | C | C | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 4.3 | 21 |
| 20-Sep | 0 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 21-Sep | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 5 | 7 | 8 | 4 | 9 | 7 | 2.1 | 9 |
| 22-Sep | 20 | Z | 5 | 2 | 1 | 0 | 0 | 1 | 4 | 3 | 1 | 1 | 0 | 1 | 3 | 5 | 2 | 4 | 6 | 6 | 6 | 4 | 3 | 3 | 3.5 | 20 |
| 23-Sep | 2 | 2 | Z | 1 | 1 | 1 | 0 | 1 | 5 | 12 | 6 | 2 | 1 | 1 | 3 | 4 | 2 | 3 | 3 | 4 | 4 | 7 | 4 | 5 | 3.1 | 12 |
| 24-Sep | 6 | 8 | 7 | Z | 10 | 13 | 12 | 8 | 7 | 6 | 4 | 4 | 6 | 8 | 5 | 5 | 6 | 4 | 5 | 7 | 11 | 9 | 8 | 6 | 7.1 | 13 |
| 25-Sep | 4 | 4 | 4 | 11 | Z | 10 | 6 | 3 | 4 | 7 | 5 | 1 | 1 | 1 | 0 | 0 | 1 | 4 | 13 | 3 | 1 | 1 | 0 | 0 | 3.7 | 13 |
| 26-Sep | 0 | 0 | 0 | 1 | 0 | Z | 0 | 0 | 0 | 9 | 4 | 2 | 1 | 1 | 1 | 1 | 3 | 7 | 27 | 29 | 23 | 20 | 15 | 3 | 6.3 | 29 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | 6 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1.6 | 12 |
| 28-Sep | 2 | Z | 2 | 1 | 3 | 5 | 8 | 7 | 12 | 10 | 12 | 6 | 5 | 5 | 3 | 1 | 0 | 0 | 1 | 11 | 20 | 2 | 2 | 3 | 5.3 | 20 |
| 29-Sep | 2 | 3 | Z | 4 | 6 | 5 | 10 | 11 | 11 | 12 | 5 | 4 | 3 | 1 | 1 | 1 | 1 | 2 | 10 | 31 | 13 | 2 | 1 | 1 | 6.1 | 31 |
| 30-Sep | 1 | 0 | 0 | Z | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 16 | 13 | 12 | 15 | 8 | 6 | 6 | 3.9 | 16 |

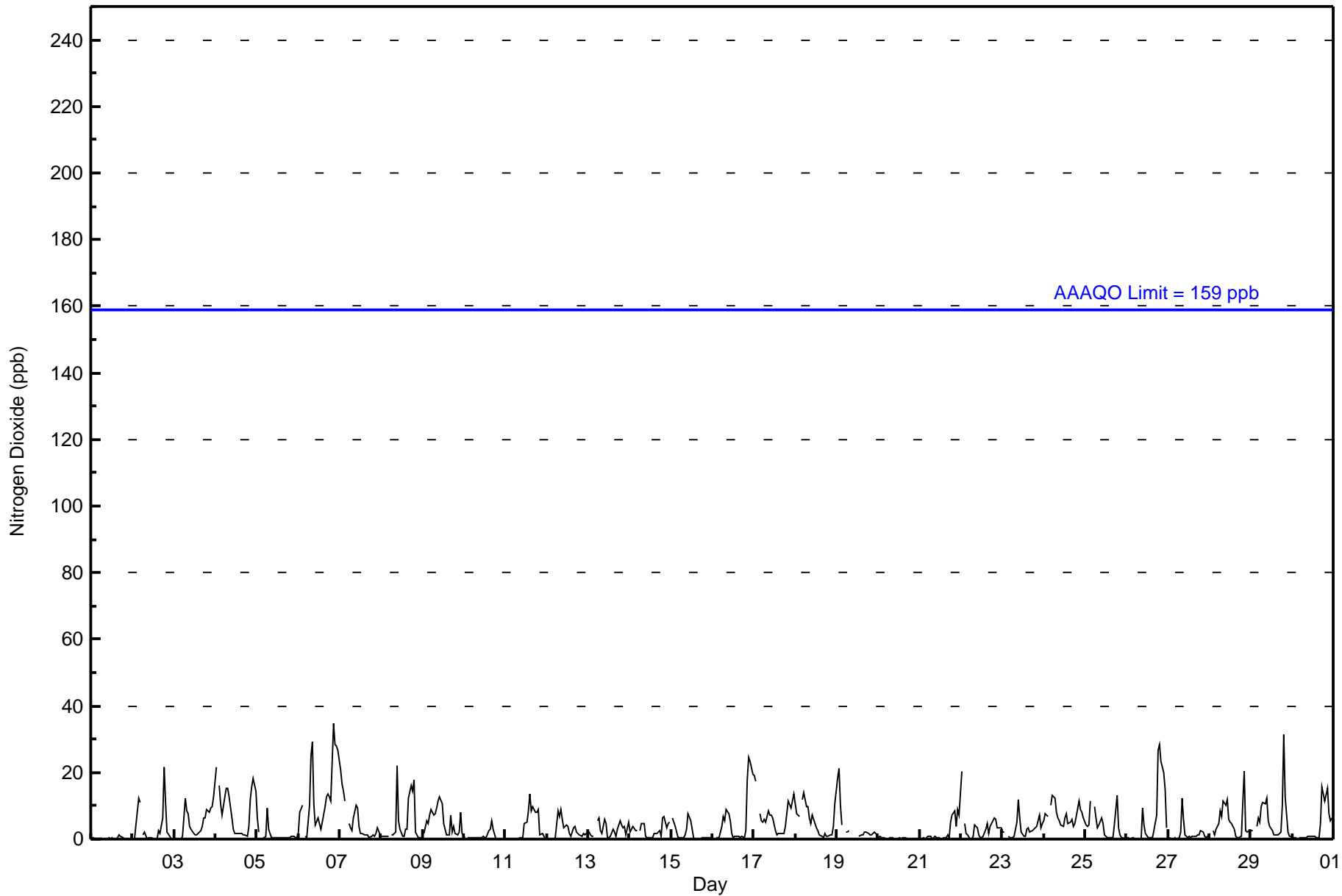
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 5.7 | 4.2 | 3.9 | 3.2 | 2.9 | 3.9 | 4.7 | 4.6 | 5.7 | 5.8 | 4.0 | 2.7 | 1.9 | 1.6 | 2.0 | 2.1 | 3.0 | 3.8 | 5.6 | 6.8 | 7.0 | 5.5 | 5.5 | 5.0 | Diurnal Average |
| 22 | 21 | 16 | 12 | 12 | 14 | 15 | 25 | 29 | 22 | 13 | 10 | 6 | 9 | 14 | 10 | 13 | 16 | 27 | 31 | 35 | 28 | 28 | 27 | 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
Horizon - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Horizon - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 668 | 97.52 | 97.52 |
| 21 - 40 | 17 | 2.48 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Horizon - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 22 | 79 | 32 | 22 | 2 | 14 | 15 | 26 | 48 | 145 | 101 | 40 | 27 | 47 | 33 | 12 | 665 |
| 21 - 40 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 0 | 1 | 5 | 1 | 2 | 17 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 79 | 33 | 23 | 2 | 15 | 15 | 26 | 50 | 145 | 103 | 40 | 28 | 52 | 34 | 14 | 682 |

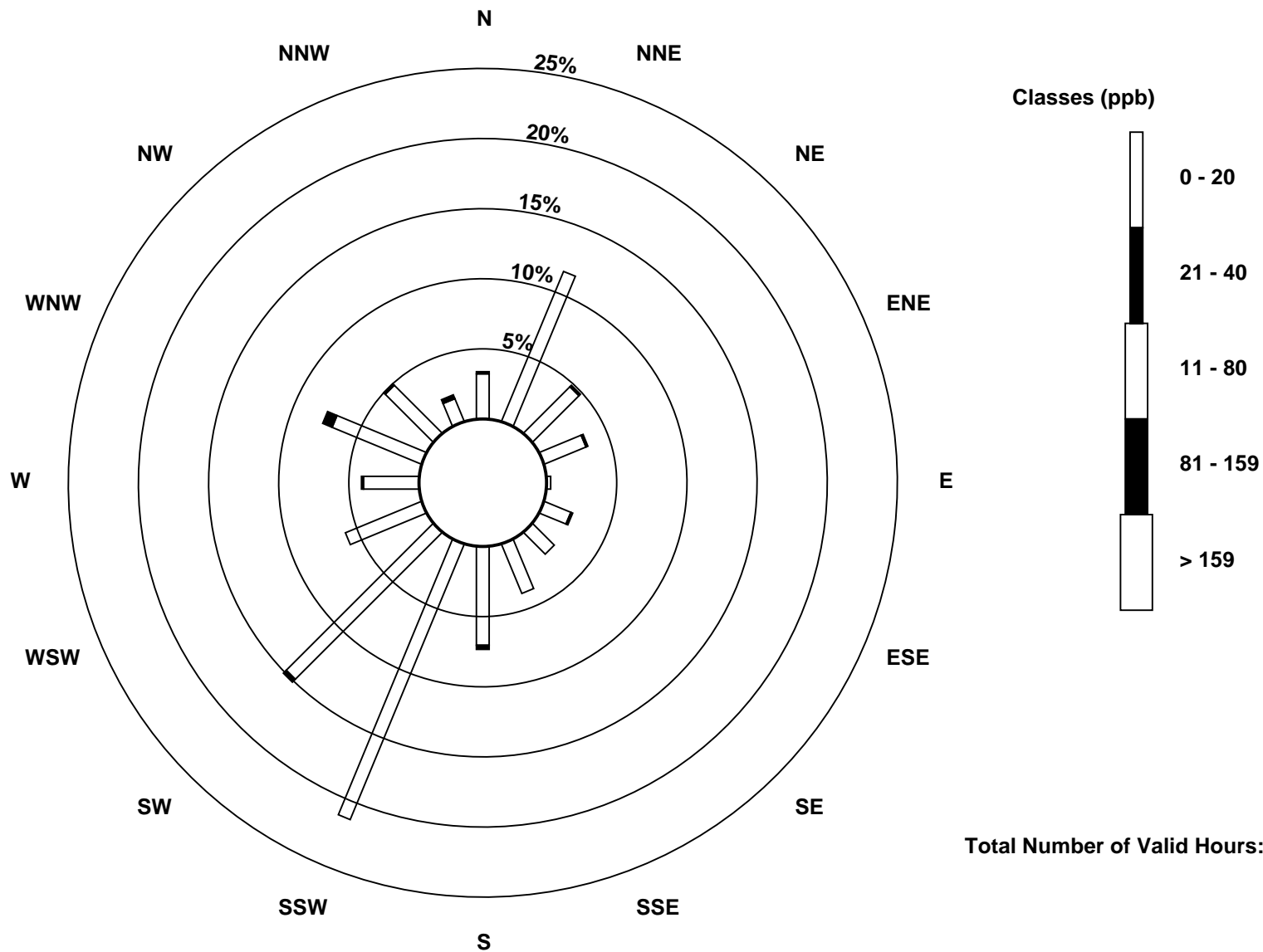
Total Number of Valid Hours: 682

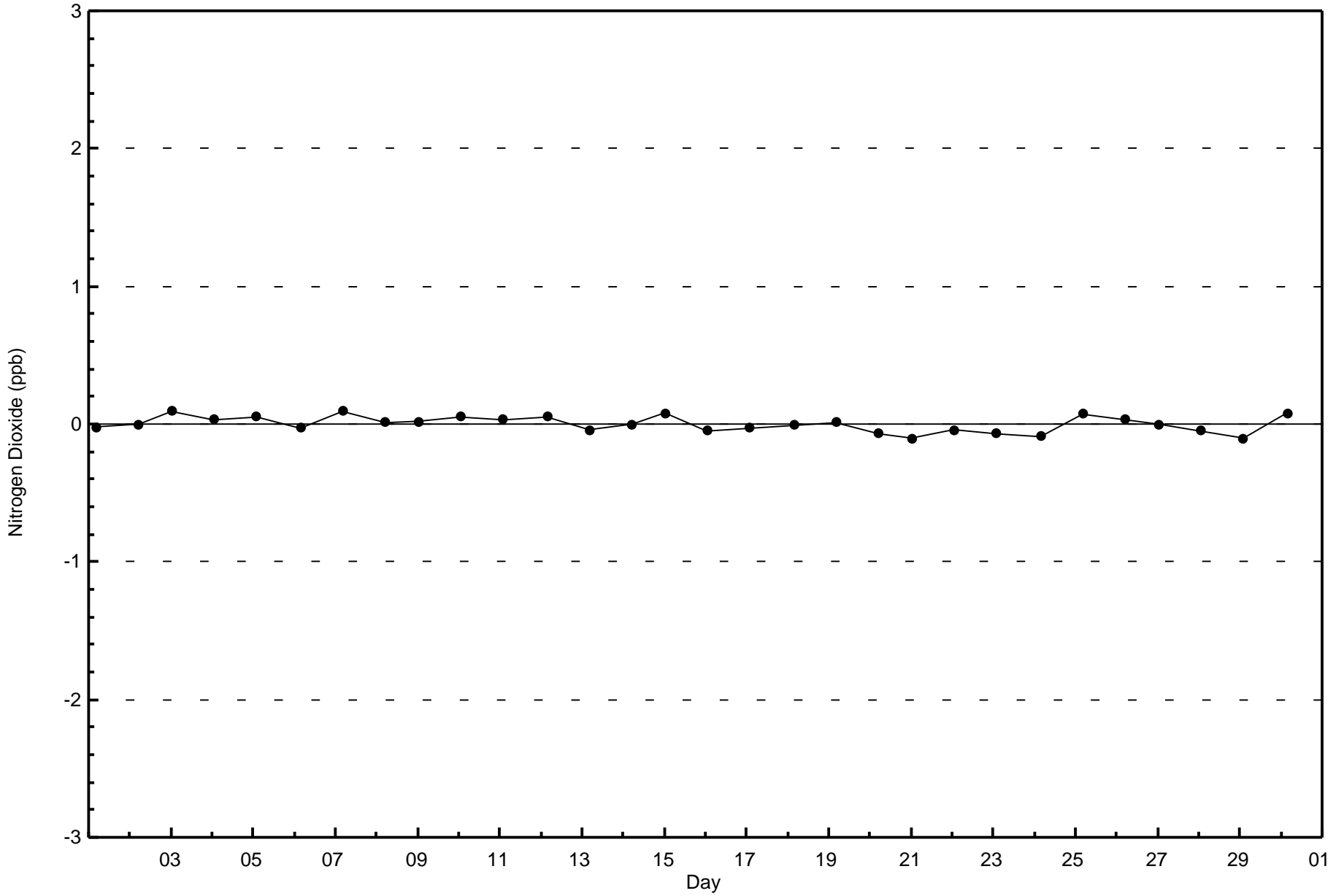
Total Number of Hours: 720

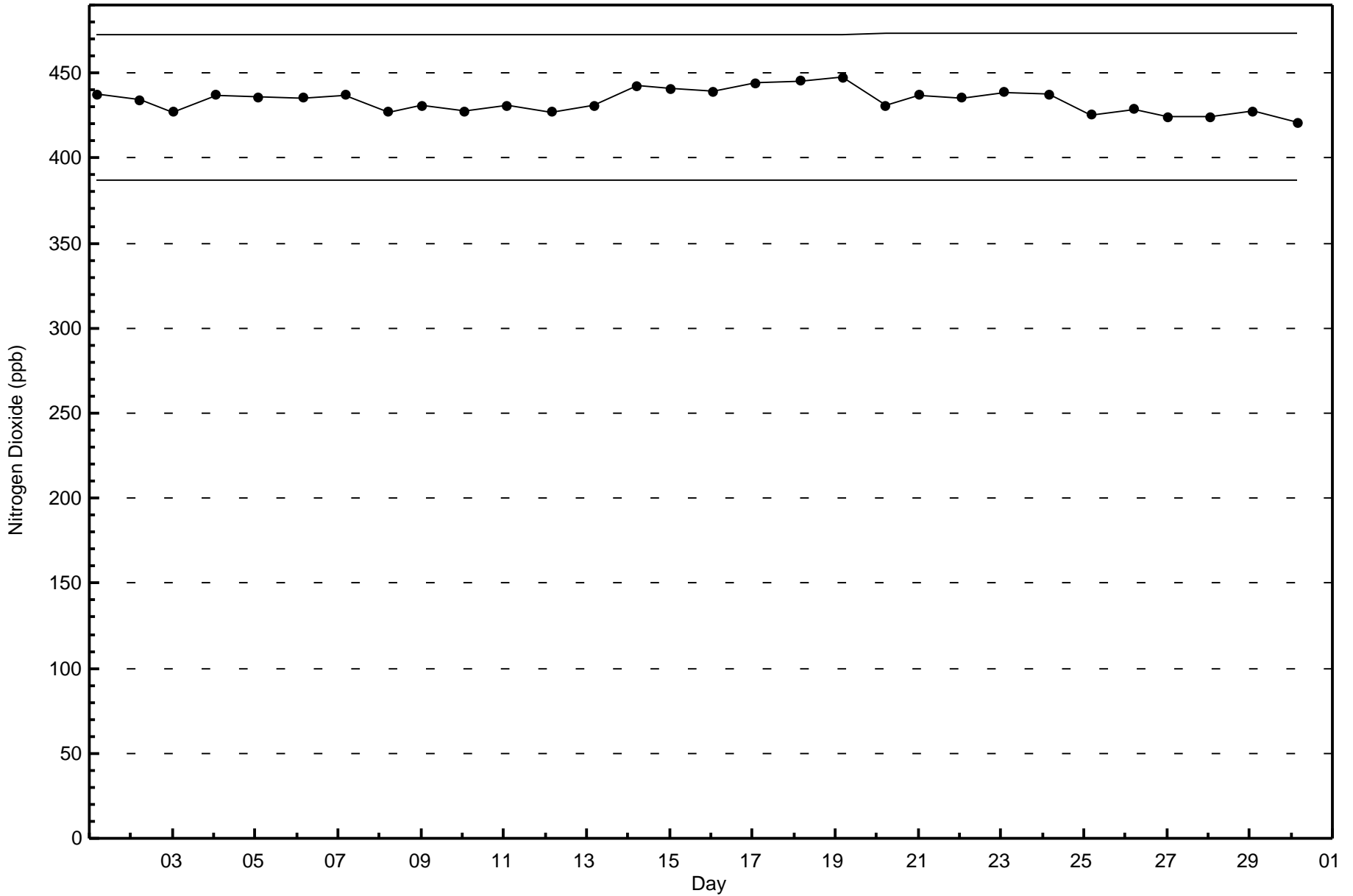


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

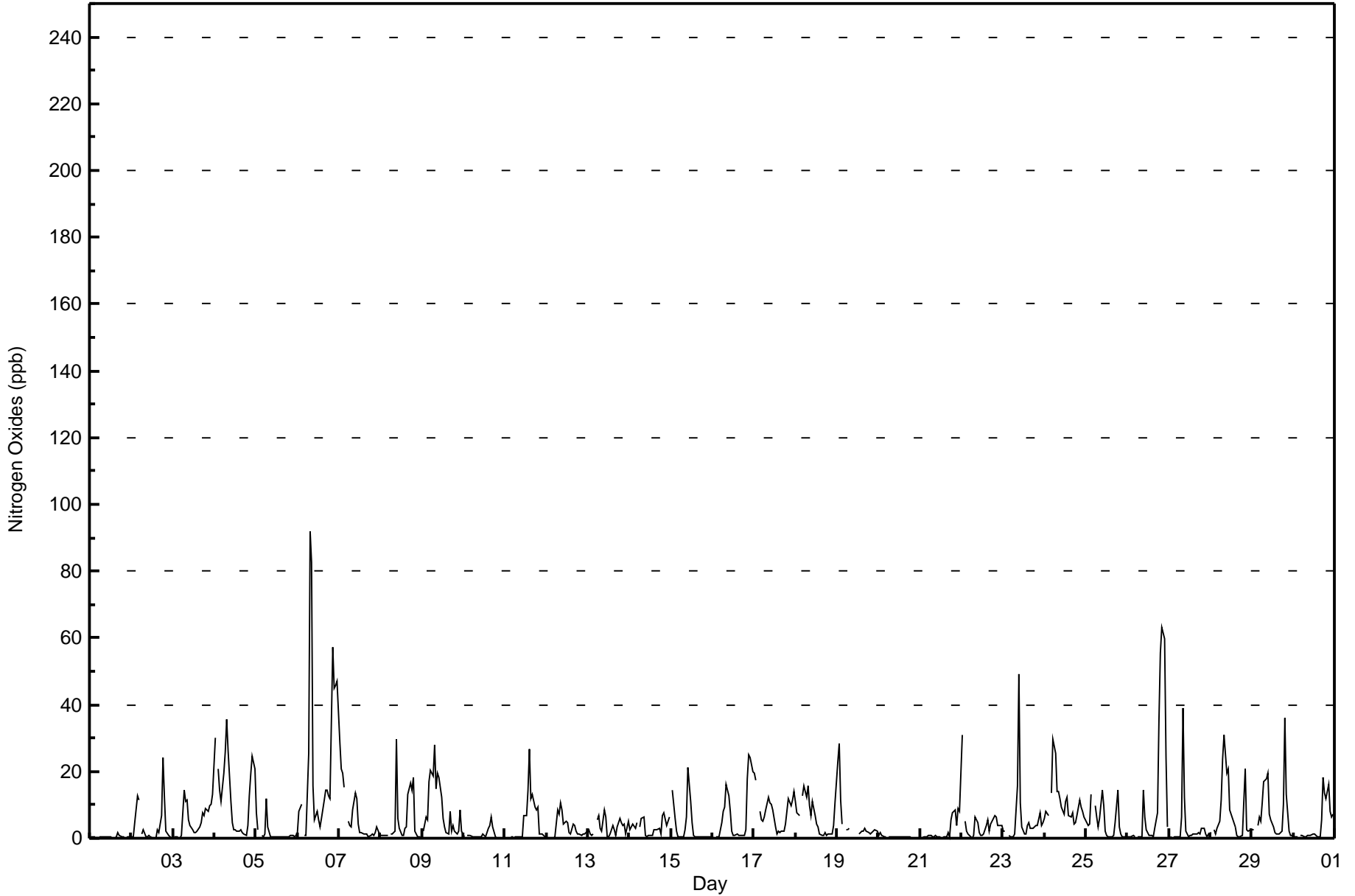
Horizon - September 2017

| Maximum Value: 92 ppb on Sep 6 08:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 22.9 ppb on Sep 6 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|----|----|----|----|----|----|------|---------------|---------------|----|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: 0 ppb on Sep 3 05:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.4 ppb on Sep 1 | | | | | | | | | | | | | | | | | Hours of Data: 685 | |
| Maximum Diurnal Average: 11.7 ppb at hour 9 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.2 ppb at hour 14 | | | | | | | | | | | | | | | | | Hours of Missing Data: 35 | |
| Monthly Average: 5.9 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 7 P ₉₀ = 15 P ₉₉ = 47 | | | | | | | | | | | | | | | | | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | |
| 2-Sep | 0 | 0 | 5 | 13 | 11 | Z | 1 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 2 | 7 | 24 | 12 | 2 | 1 | 0 | 0 | 3.7 | 24 | | | | | | | | | |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 1 | 15 | 11 | 12 | 5 | 4 | 3 | 2 | 2 | 3 | 5 | 7 | 7 | 9 | 8 | 10 | 10 | 13 | 5.6 | 15 | | | | | | | | | | |
| 4-Sep | 30 | Z | 21 | 15 | 11 | 20 | 26 | 36 | 26 | 11 | 5 | 2 | 3 | 2 | 3 | 2 | 1 | 1 | 4 | 13 | 19 | 25 | 21 | 12.9 | 36 | | | | | | | | | | |
| 5-Sep | 8 | 2 | Z | 1 | 0 | 1 | 12 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1.6 | 12 | | | | | | | | | | |
| 6-Sep | 2 | 8 | 10 | Z | 1 | 1 | 26 | 92 | 83 | 16 | 5 | 8 | 5 | 3 | 6 | 12 | 15 | 15 | 13 | 12 | 57 | 45 | 46 | 47 | 22.9 | 92 | | | | | | | | | |
| 7-Sep | 29 | 21 | 20 | 15 | Z | 5 | 4 | 3 | 8 | 14 | 12 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 6.5 | 29 | | | | | | | | | | |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 30 | 6 | 3 | 1 | 1 | 3 | 3 | 13 | 16 | 15 | 18 | 2 | 1 | 0 | 0 | 5.3 | 30 | | | | | | | | | |
| 9-Sep | Z | 2 | 6 | 6 | 17 | 20 | 19 | 28 | 15 | 19 | 18 | 12 | 6 | 3 | 2 | 1 | 8 | 2 | 4 | 2 | 1 | 2 | 8 | 2 | 8.9 | 28 | | | | | | | | | |
| 10-Sep | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 4 | 7 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 7 | | | | | | | | | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 7 | 7 | 15 | 27 | 12 | 13 | 9 | 8 | 9 | 1 | 1 | 1 | 0 | 4.9 | 27 | | | | | | | | | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 9 | 7 | 11 | 8 | 4 | 5 | 5 | 2 | 1 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3.1 | 11 | | | | | | | | | |
| 13-Sep | 2 | 1 | 1 | 1 | Z | 6 | 7 | 3 | 2 | 8 | 6 | 0 | 0 | 1 | 4 | 3 | 1 | 3 | 6 | 5 | 4 | 4 | 1 | 5 | 3.3 | 8 | | | | | | | | | |
| 14-Sep | 2 | 3 | 4 | 3 | 5 | Z | 4 | 6 | 6 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 1 | 7 | 7 | 4 | 5 | 6 | 3.4 | 7 | | | | | | | | | |
| 15-Sep | Z | 15 | 6 | 2 | 1 | 0 | 0 | 0 | 2 | 6 | 21 | 11 | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 3.3 | 21 | | | | | | | | | |
| 16-Sep | 0 | Z | 1 | 0 | 0 | 4 | 8 | 9 | 16 | 13 | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 18 | 25 | 24 | 20 | 6.9 | 25 | | | | | | | | | |
| 17-Sep | 19 | 17 | Z | 8 | 5 | 5 | 7 | 8 | 12 | 11 | 10 | 8 | 3 | 1 | 2 | 2 | 2 | 2 | 4 | 8 | 12 | 10 | 12 | 14 | 8.0 | 19 | | | | | | | | | |
| 18-Sep | 11 | 8 | 7 | Z | 13 | 16 | 12 | 15 | 10 | 7 | 11 | 7 | 4 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 4 | 11 | 6.4 | 16 | | | | | | | | | |
| 19-Sep | 23 | 28 | 11 | 4 | Z | 2 | 3 | 3 | C | C | C | C | C | 1 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 5.4 | 28 | | | | | | | | | |
| 20-Sep | 1 | 2 | 1 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | |
| 21-Sep | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 6 | 8 | 8 | 4 | 9 | 8 | 2.2 | 9 | | | | | | | | | |
| 22-Sep | 31 | Z | 5 | 2 | 1 | 0 | 0 | 1 | 6 | 5 | 2 | 1 | 1 | 1 | 4 | 5 | 2 | 4 | 6 | 7 | 6 | 4 | 4 | 4 | 4.4 | 31 | | | | | | | | | |
| 23-Sep | 2 | 2 | Z | 1 | 1 | 1 | 0 | 1 | 16 | 49 | 11 | 3 | 1 | 1 | 4 | 5 | 3 | 3 | 3 | 4 | 4 | 8 | 4 | 5 | 5.7 | 49 | | | | | | | | | |
| 24-Sep | 6 | 8 | 7 | Z | 13 | 30 | 26 | 14 | 14 | 12 | 9 | 7 | 11 | 12 | 7 | 6 | 8 | 4 | 5 | 7 | 12 | 9 | 8 | 6 | 10.5 | 30 | | | | | | | | | |
| 25-Sep | 5 | 4 | 4 | 13 | Z | 10 | 6 | 4 | 6 | 14 | 10 | 2 | 1 | 1 | 0 | 0 | 1 | 5 | 14 | 3 | 1 | 1 | 0 | 0 | 4.6 | 14 | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 1 | 1 | Z | 0 | 0 | 0 | 15 | 6 | 3 | 1 | 1 | 1 | 1 | 3 | 8 | 35 | 56 | 63 | 60 | 24 | 3 | 12.2 | 63 | | | | | | | | | |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 39 | 12 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 1 | 1 | 3.4 | 39 | | | | | | | | |
| 28-Sep | 2 | Z | 3 | 1 | 3 | 5 | 11 | 24 | 31 | 20 | 21 | 8 | 7 | 6 | 3 | 1 | 0 | 0 | 1 | 11 | 21 | 2 | 2 | 3 | 8.1 | 31 | | | | | | | | | |
| 29-Sep | 2 | 3 | Z | 4 | 6 | 5 | 10 | 17 | 18 | 20 | 7 | 5 | 3 | 2 | 1 | 1 | 1 | 2 | 10 | 36 | 13 | 2 | 1 | 1 | 7.5 | 36 | | | | | | | | | |
| 30-Sep | 1 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 18 | 14 | 12 | 16 | 8 | 6 | 7 | 4.3 | 18 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 7.1 5.1 4.6 3.7 3.7 5.4 7.0 10.0 11.7 10.3 6.3 3.8 2.5 2.2 2.8 2.7 3.6 4.2 6.2 8.0 9.3 7.6 6.8 6.1 | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | 31 28 21 15 17 30 26 92 83 49 21 12 11 15 27 12 15 18 35 56 63 60 46 47 | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Horizon - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Horizon - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 645 | 94.16 | 94.16 |
| 21 - 40 | 30 | 4.38 | 98.54 |
| 41 - 80 | 8 | 1.17 | 99.71 |
| 81 - 159 | 2 | 0.29 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Horizon - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 20 | 79 | 32 | 22 | 2 | 14 | 14 | 26 | 45 | 139 | 100 | 37 | 25 | 44 | 31 | 12 | 642 |
| 21 - 40 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 5 | 5 | 2 | 2 | 3 | 5 | 2 | 2 | 30 |
| 11 - 80 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 3 | 1 | 0 | 8 |
| 81 - 159 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 79 | 33 | 23 | 2 | 15 | 15 | 26 | 50 | 145 | 103 | 40 | 28 | 52 | 34 | 14 | 682 |

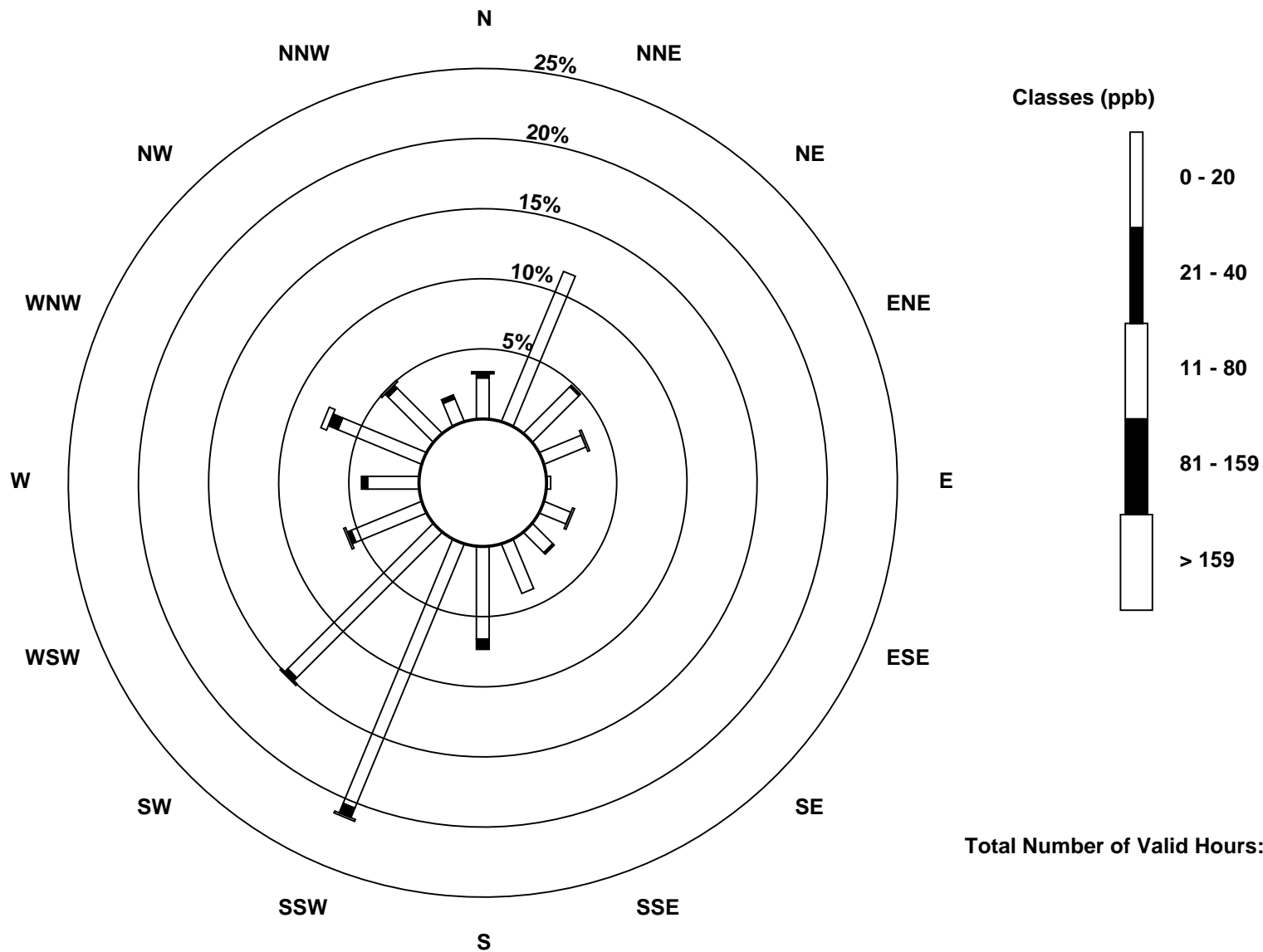
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

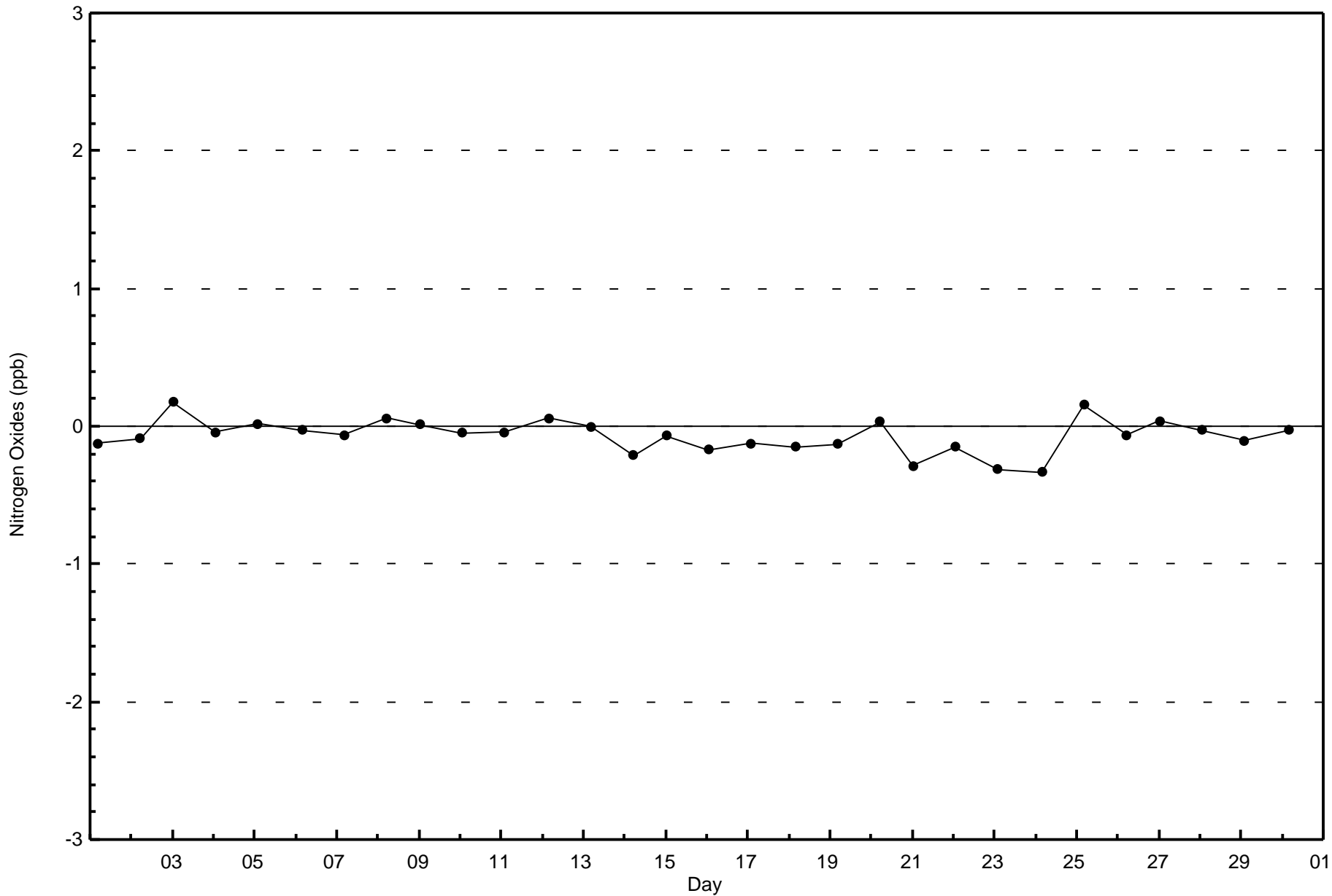
Nitrogen Oxides (NO_x) - ppb
Horizon (AMS 15)

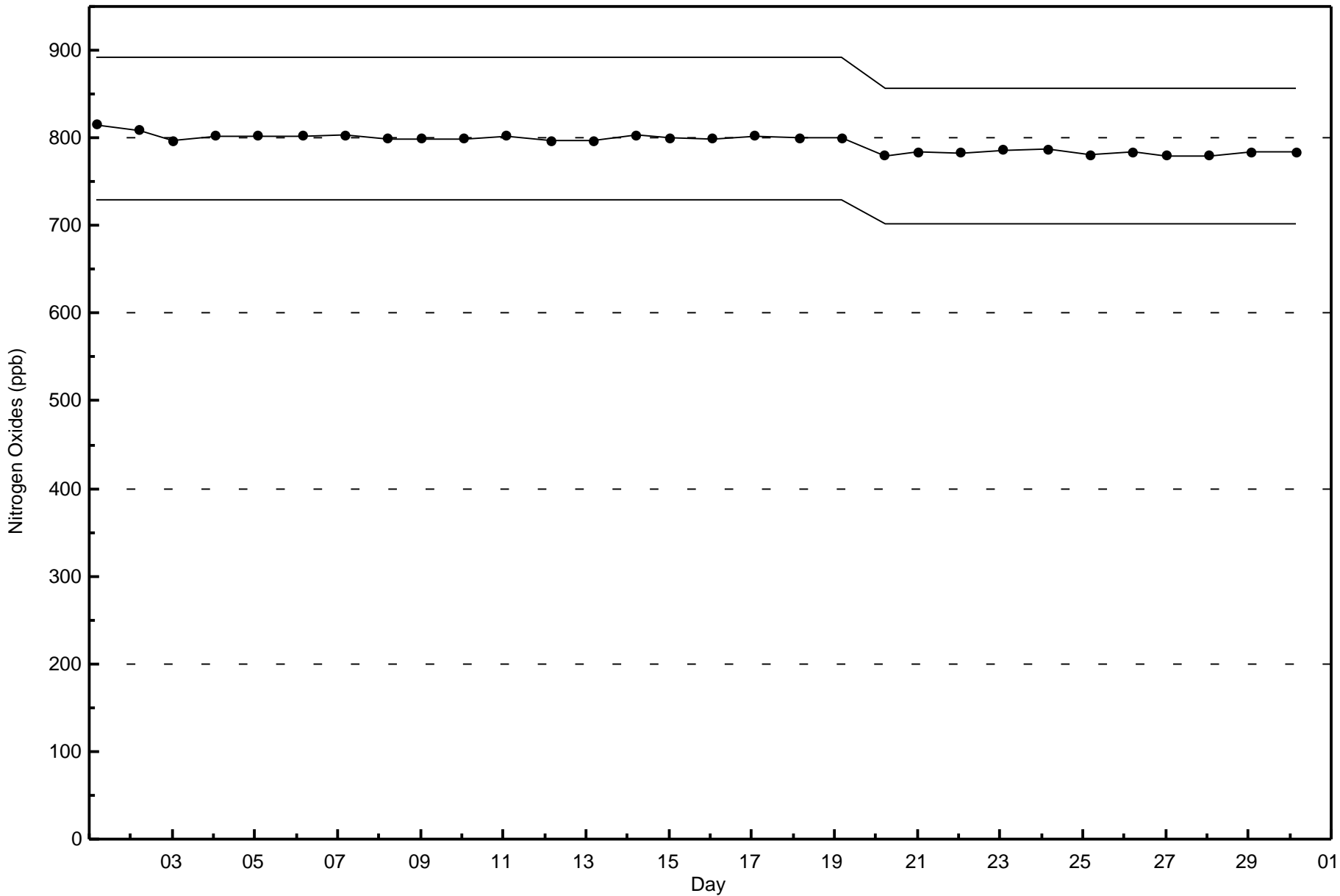




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Horizon - September 2017







| | | | |
|---|--|---------------------------|-------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 61.4 µg/m ³ on Sep 8 10:00 | Maximum Daily Average: 19.7 µg/m ³ on Sep 19 | Hours of Data: | 719 |
| Minimum Value: 0.5 µg/m ³ on Sep 21 00:00 | Minimum Daily Average: 1.1 µg/m ³ on Sep 21 | Hours of Missing Data: | 1 |
| Maximum Diurnal Average: 9.2 µg/m ³ at hour 19 | Minimum Diurnal Average: 5.1 µg/m ³ at hour 14 | Hours of Calibration: | 1 |
| Monthly Average: 6.54 µg/m ³ | Percentiles: P ₁ = 0.7 P ₁₀ = 1.4 Q ₁ = 2.0 Median = 4.1 Q ₃ = 8.2 P ₉₀ = 15.6 P ₉₉ = 33.4 | Percent Operational Time: | 100.0 |

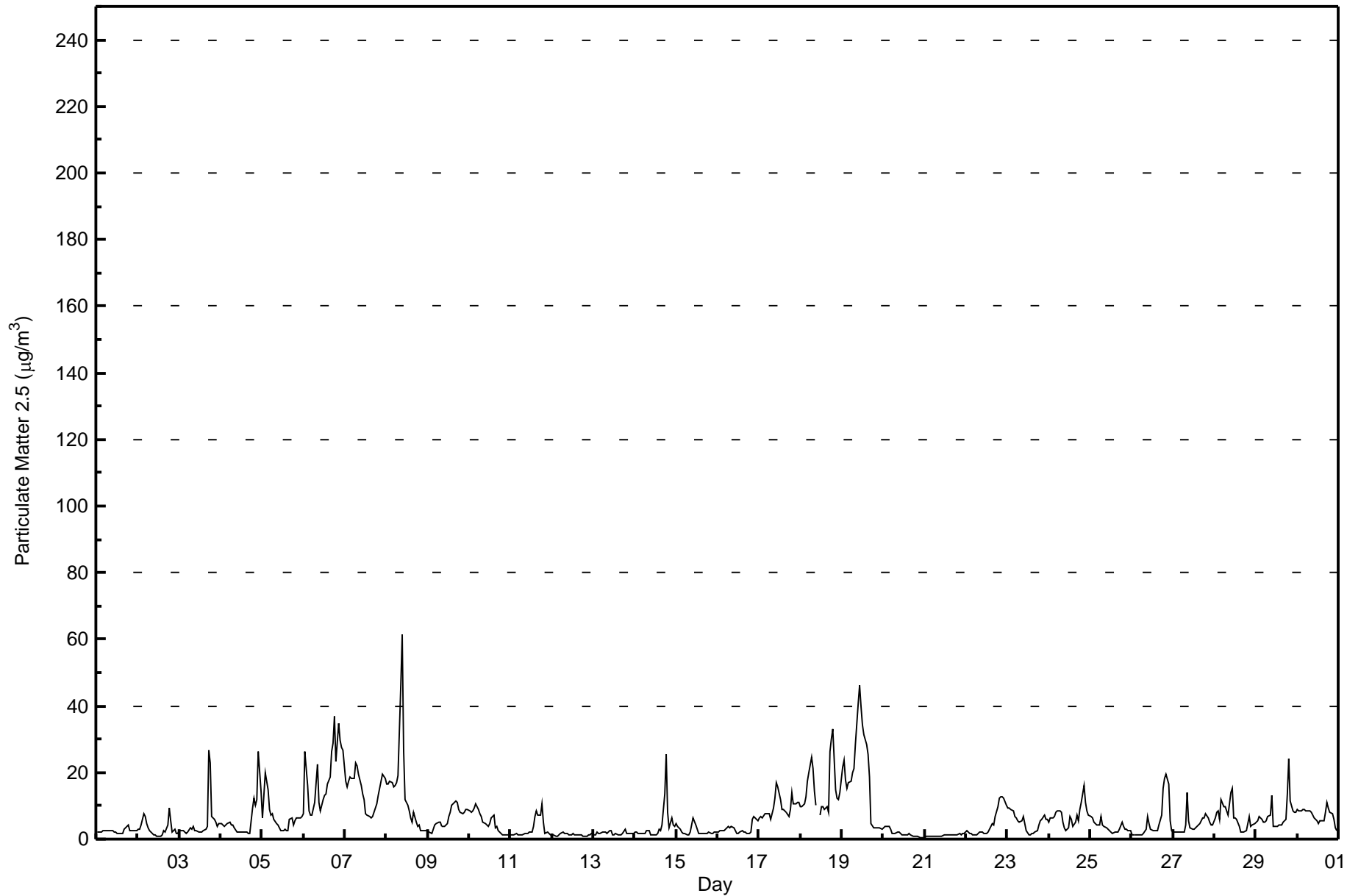
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.5 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 1.9 | 1.7 | 1.6 | 1.6 | 1.7 | 3.0 | 3.4 | 4.2 | 2.5 | 2.5 | 2.5 | 2.5 | 2.7 | 2.4 | 4.2 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 2.8 | 3.0 | 4.2 | 7.7 | 6.6 | 4.5 | 3.5 | 2.4 | 1.7 | 1.3 | 1.2 | 1.0 | 0.9 | 1.0 | 1.2 | 2.3 | 2.3 | 4.2 | 9.4 | 5.4 | 2.0 | 2.9 | 1.6 | 1.7 | 3.1 | 9.4 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 2.4 | 2.7 | 2.5 | 1.9 | 1.9 | 2.0 | 3.2 | 2.9 | 3.6 | 2.7 | 2.3 | 2.1 | 2.2 | 2.2 | 2.6 | 3.0 | 3.9 | 26.5 | 22.9 | 6.6 | 6.0 | 4.9 | 3.8 | 4.6 | 5.0 | 26.5 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 4.8 | 4.4 | 3.9 | 4.2 | 4.5 | 5.2 | 4.3 | 4.2 | 3.2 | 2.3 | 2.1 | 2.1 | 2.3 | 2.2 | 1.9 | 2.0 | 1.7 | 1.7 | 9.4 | 12.1 | 10.0 | 11.9 | 26.5 | 14.5 | 5.9 | 26.5 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 6.5 | 13.2 | 19.9 | 14.7 | 9.0 | 7.0 | 7.7 | 5.8 | 4.8 | 4.1 | 3.4 | 2.6 | 2.6 | 2.8 | 2.4 | 2.5 | 5.9 | 6.4 | 4.0 | 5.4 | 6.5 | 6.3 | 6.4 | 6.7 | 6.5 | 19.9 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 7.5 | 26.4 | 16.0 | 8.3 | 7.3 | 7.0 | 10.8 | 16.8 | 22.3 | 11.1 | 8.7 | 11.8 | 12.9 | 13.6 | 16.6 | 18.6 | 26.1 | 28.8 | 36.7 | 23.5 | 34.8 | 29.7 | 27.4 | 26.9 | 18.7 | 36.7 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 17.3 | 15.6 | 17.5 | 18.8 | 18.3 | 18.1 | 22.7 | 22.0 | 19.5 | 16.0 | 13.8 | 12.0 | 7.7 | 7.3 | 6.8 | 6.4 | 6.9 | 7.9 | 10.7 | 13.3 | 15.1 | 17.4 | 19.7 | 18.2 | 14.5 | 22.7 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 16.6 | 16.7 | 17.3 | 16.7 | 15.5 | 16.0 | 17.1 | 18.9 | 46.3 | 61.4 | 26.8 | 11.8 | 10.4 | 8.7 | 6.5 | 5.0 | 8.2 | 5.0 | 3.9 | 4.0 | 2.6 | 2.5 | 2.6 | 2.7 | 14.3 | 61.4 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 2.7 | 2.3 | 1.9 | 3.2 | 4.4 | 4.5 | 4.9 | 5.2 | 4.0 | 4.0 | 3.9 | 4.7 | 6.9 | 7.9 | 10.3 | 11.0 | 11.4 | 10.9 | 9.0 | 8.2 | 7.6 | 7.9 | 9.0 | 9.1 | 6.5 | 11.4 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 8.6 | 8.2 | 8.4 | 9.5 | 10.6 | 8.8 | 7.5 | 6.7 | 5.3 | 4.5 | 4.4 | 3.6 | 4.8 | 6.4 | 7.2 | 3.5 | 3.7 | 2.6 | 1.5 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 5.1 | 10.6 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 1.2 | 1.3 | 1.4 | 1.5 | 1.5 | 1.4 | 1.4 | 1.5 | 1.5 | 1.6 | 1.5 | 1.9 | 2.2 | 4.0 | 6.8 | 8.3 | 7.2 | 7.0 | 10.6 | 5.0 | 1.8 | 2.2 | 1.9 | 1.3 | 3.2 | 10.6 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1.1 | 1.2 | 1.0 | 0.7 | 1.1 | 1.6 | 2.0 | 1.8 | 1.8 | 1.7 | 1.3 | 1.5 | 1.7 | 1.4 | 1.3 | 1.2 | 1.2 | 1.2 | 1.0 | 1.1 | 1.0 | 1.1 | 1.2 | 1.6 | 1.3 | 2.0 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 1.4 | 1.5 | 2.0 | 1.8 | 1.8 | 2.1 | 2.3 | 2.2 | 1.7 | 2.4 | 2.5 | 1.2 | 1.3 | 1.7 | 1.4 | 1.2 | 1.1 | 1.9 | 2.8 | 1.9 | 1.7 | 1.8 | 1.6 | 1.8 | 1.8 | 2.8 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 2.2 | 2.0 | 1.8 | 1.6 | 1.6 | 1.6 | 1.7 | 2.5 | 2.4 | 1.3 | 1.2 | 1.4 | 1.4 | 1.6 | 2.9 | 2.7 | 4.2 | 13.6 | 25.6 | 7.9 | 3.4 | 6.5 | 4.3 | 3.7 | 4.1 | 25.6 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 4.6 | 3.6 | 2.8 | 2.0 | 1.5 | 1.6 | 1.4 | 1.4 | 2.0 | 4.4 | 6.4 | 4.1 | 3.0 | 1.8 | 1.7 | 1.7 | 1.6 | 1.7 | 1.7 | 2.2 | 1.7 | 1.9 | 2.1 | 2.1 | 2.5 | 6.4 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2.3 | 2.4 | 2.6 | 2.6 | 2.5 | 3.3 | 3.8 | 3.4 | 3.6 | 3.2 | 2.6 | 1.9 | 1.6 | 2.2 | 2.4 | 2.3 | 2.0 | 1.8 | 1.7 | 1.9 | 6.1 | 6.9 | 6.5 | 5.7 | 3.1 | 6.9 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 6.2 | 6.9 | 6.5 | 7.5 | 7.5 | 7.5 | 7.6 | 5.9 | 9.1 | 12.3 | 17.0 | 15.8 | 11.8 | 9.0 | 9.1 | 8.6 | 8.0 | 6.8 | 9.0 | 14.1 | 10.5 | 10.5 | 10.9 | 10.8 | 9.5 | 17.0 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 9.8 | 9.8 | 10.6 | 12.9 | 17.3 | 20.0 | 24.7 | 21.1 | 14.3 | 10.1 | C | 7.2 | 9.9 | 9.8 | 9.0 | 9.8 | 8.0 | 26.4 | 30.0 | 33.1 | 14.9 | 12.5 | 11.8 | 13.8 | 15.1 | 33.1 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 21.8 | 23.5 | 17.7 | 15.1 | 16.8 | 17.5 | 20.0 | 21.4 | 28.3 | 40.8 | 46.2 | 39.7 | 34.4 | 31.3 | 28.4 | 25.6 | 18.6 | 4.5 | 3.3 | 3.5 | 3.5 | 3.5 | 3.3 | 3.2 | 19.7 | 46.2 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 3.4 | 3.9 | 3.7 | 3.9 | 2.9 | 1.8 | 1.9 | 1.9 | 2.1 | 2.2 | 1.7 | 1.5 | 1.3 | 1.3 | 1.4 | 1.7 | 1.2 | 0.9 | 0.9 | 0.8 | 0.7 | 0.5 | 0.5 | 0.5 | 1.8 | 3.9 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0.5 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 1.0 | 1.2 | 1.3 | 1.2 | 1.4 | 1.3 | 1.1 | 1.1 | 1.1 | 1.3 | 1.5 | 1.4 | 1.7 | 1.6 | 1.1 | 1.7 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 2.6 | 2.2 | 1.7 | 1.5 | 1.5 | 1.4 | 1.4 | 1.5 | 2.1 | 2.0 | 1.6 | 1.6 | 1.6 | 2.0 | 3.9 | 4.8 | 4.3 | 6.7 | 9.9 | 12.4 | 12.9 | 12.7 | 12.5 | 10.4 | 4.8 | 12.9 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 9.3 | 9.4 | 8.9 | 8.4 | 6.8 | 6.3 | 5.7 | 5.2 | 5.4 | 6.7 | 4.8 | 2.5 | 1.4 | 1.5 | 1.8 | 1.9 | 2.2 | 2.5 | 4.2 | 5.5 | 6.1 | 7.1 | 6.1 | 6.1 | 5.2 | 9.4 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 5.2 | 6.5 | 6.3 | 7.0 | 7.9 | 8.3 | 8.5 | 8.0 | 5.1 | 3.4 | 2.6 | 3.4 | 6.7 | 6.1 | 3.9 | 5.0 | 7.1 | 5.7 | 9.1 | 11.0 | 15.9 | 10.9 | 8.3 | 7.0 | 7.0 | 15.9 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 6.6 | 6.5 | 5.0 | 4.5 | 4.1 | 4.4 | 6.7 | 4.2 | 3.6 | 3.6 | 3.0 | 2.4 | 2.0 | 1.8 | 1.9 | 2.0 | 2.0 | 3.0 | 5.2 | 3.7 | 3.1 | 3.0 | 2.8 | 2.5 | 3.6 | 6.7 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 1.2 | 1.1 | 1.2 | 1.4 | 1.4 | 1.3 | 1.4 | 1.8 | 3.0 | 6.9 | 4.8 | 3.0 | 2.4 | 2.5 | 2.6 | 2.6 | 4.3 | 7.3 | 15.3 | 18.4 | 19.6 | 16.6 | 5.4 | 2.6 | 5.3 | 19.6 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 2.0 | 1.9 | 1.9 | 2.1 | 2.2 | 2.1 | 2.1 | 4.2 | 14.0 | 5.3 | 3.4 | 2.8 | 3.1 | 3.2 | 3.7 | 4.8 | 5.3 | 6.5 | 6.5 | 7.5 | 6.5 | 5.2 | 4.3 | 4.3 | 4.4 | 14.0 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 6.4 | 8.2 | 8.6 | 6.1 | 11.9 | 9.9 | 9.6 | 8.4 | 7.2 | 13.9 | 15.4 | 6.2 | 6.3 | 5.8 | 3.6 | 2.1 | 2.0 | 2.1 | 2.6 | 4.7 | 6.6 | 3.9 | 4.2 | 4.5 | 6.7 | 15.4 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 4.9 | 5.3 | 6.8 | 5.9 | 4.9 | 5.0 | 5.6 | 6.9 | 7.1 | 13.0 | 3.7 | 3.8 | 3.6 | 4.2 | 4.1 | 4.4 | 4.9 | 5.8 | 13.6 | 24.0 | 11.4 | 8.6 | 7.9 | 7.9 | 7.2 | 24.0 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 9.0 | 8.4 | 8.6 | 9.0 | 8.8 | 8.7 | 8.5 | 8.5 | 8.1 | 7.4 | 6.2 | 5.4 | 4.8 | 5.7 | 5.7 | 5.6 | 7.9 | 11.2 | 9.2 | 8.2 | 7.4 | 5.8 | 3.4 | 2.5 | 7.2 | 11.2 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.8 | 6.7 | 6.4 | 6.1 | 6.2 | 6.1 | 6.7 | 6.7 | 7.9 | 8.4 | 6.8 | 5.4 | 5.1 | 5.1 | 5.1 | 5.1 | 5.6 | 7.2 | 9.2 | 8.3 | 7.5 | 7.0 | 6.7 | 6.1 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 21.8 | 26.4 | 19.9 | 18.8 | 18.3 | 20.0 | 24.7 | 22.0 | 46.3 | 61.4 | 46.2 | 39.7 | 34.4 | 31.3 | 28.4 | 25.6 | 26.1 | 28.8 | 36.7 | 33.1 | 34.8 | 29.7 | 27.4 | 26.9 | Diurnal Maximum |

C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Horizon - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Horizon - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 407 | 56.61 | 56.61 |
| 6 - 15 | 217 | 30.18 | 86.79 |
| 16 - 25 | 48 | 6.68 | 93.46 |
| 26 - 80 | 25 | 3.48 | 96.94 |
| > 81.0 | 0 | 0.00 | 96.94 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Horizon - September 2017

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 12 | 44 | 21 | 14 | 1 | 4 | 3 | 7 | 26 | 73 | 78 | 32 | 21 | 39 | 21 | 9 | 405 |
| 6 - 15 | 5 | 17 | 9 | 6 | 0 | 5 | 10 | 17 | 24 | 65 | 26 | 6 | 5 | 10 | 9 | 2 | 216 |
| 16 - 25 | 3 | 6 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 17 | 7 | 1 | 1 | 2 | 1 | 2 | 48 |
| 26 - 80 | 1 | 5 | 3 | 2 | 0 | 5 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 3 | 1 | 25 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 21 | 72 | 36 | 23 | 2 | 15 | 15 | 25 | 51 | 156 | 111 | 40 | 27 | 52 | 34 | 14 | 694 |

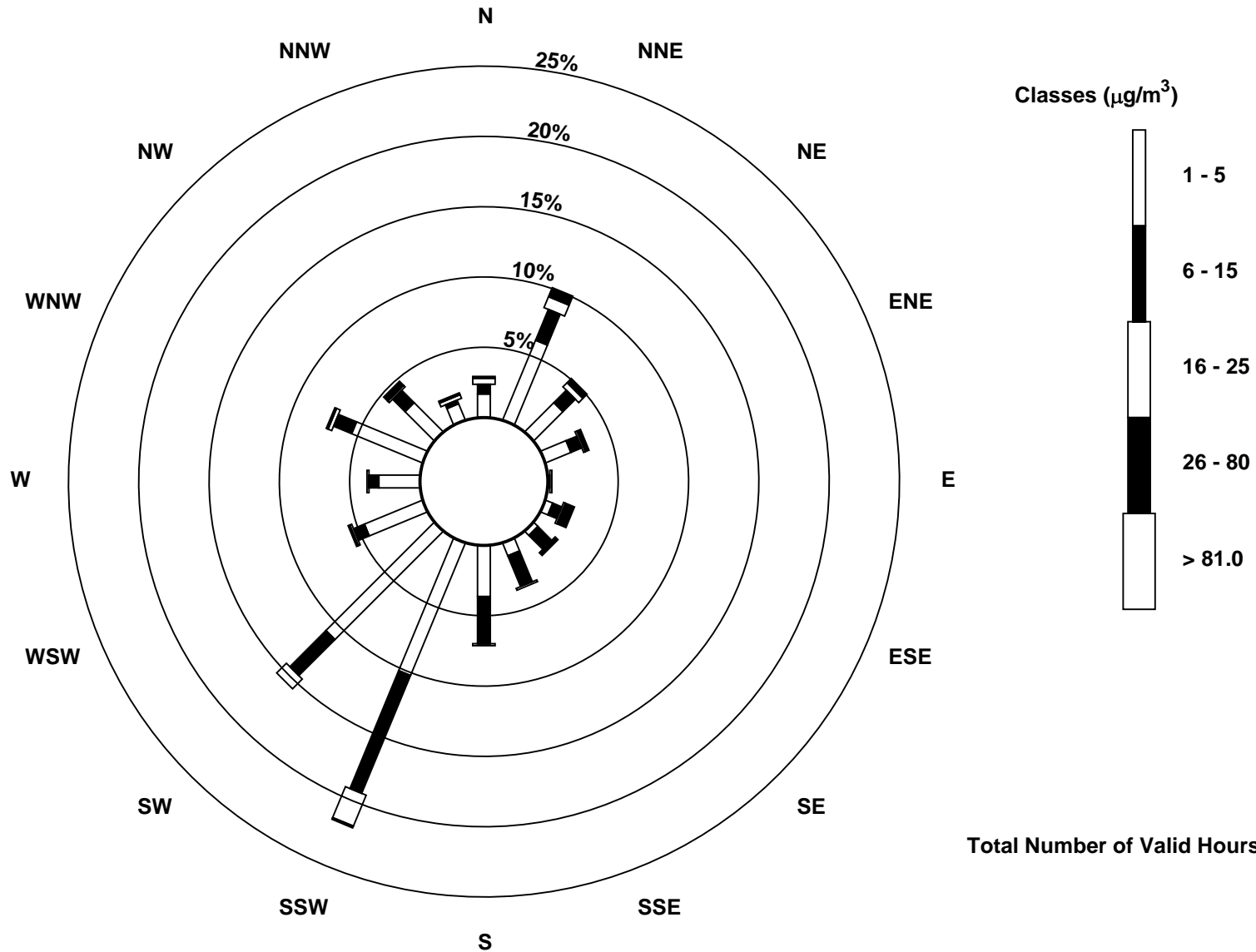
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Horizon (AMS 15)



Total Number of Valid Hours: 716



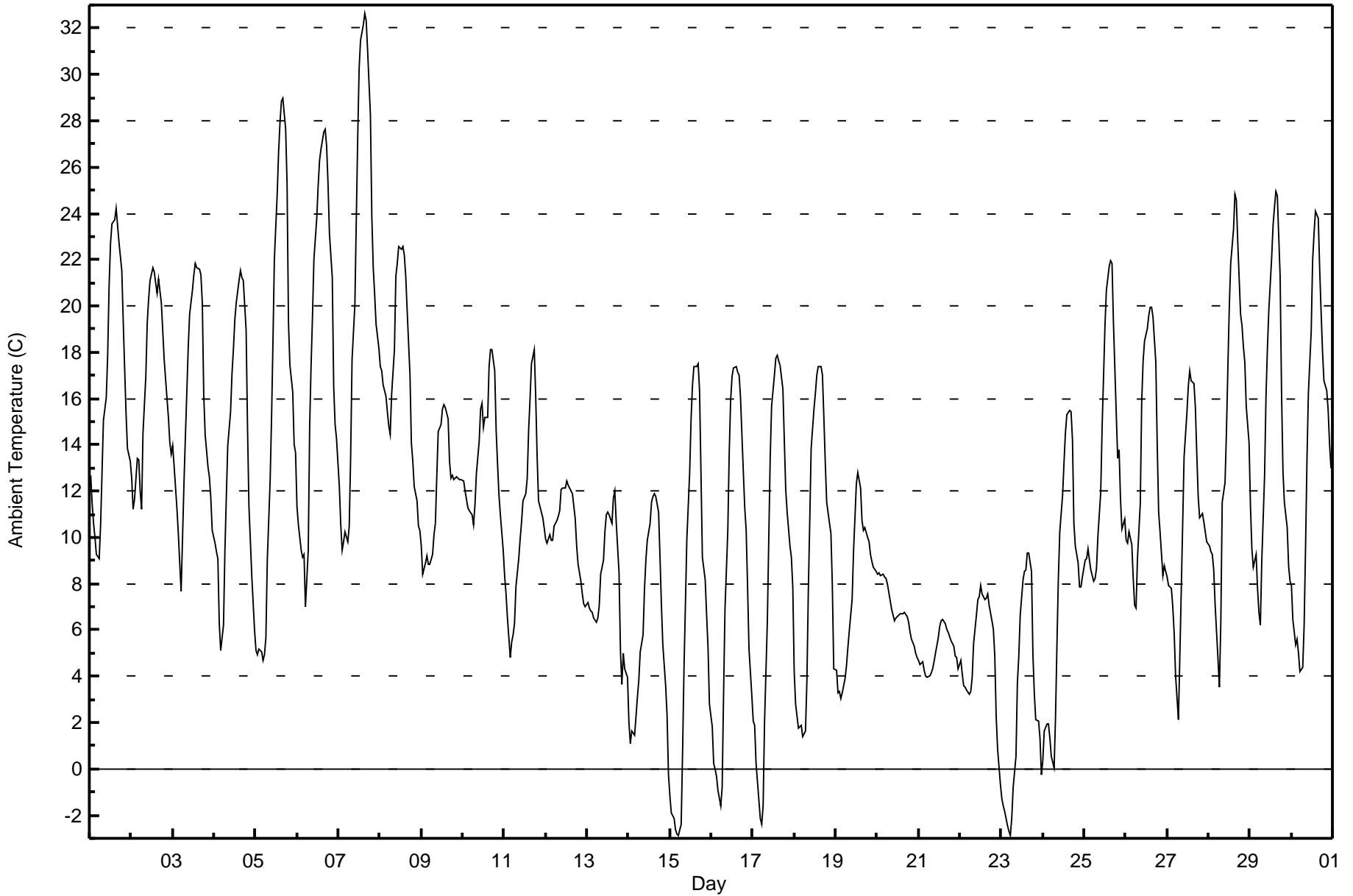
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Horizon - September 2017

| Maximum Value: 32.6 C on Sep 7 16:00 | | Maximum Daily Average: 20.7 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -2.9 C on Sep 23 06:00 | | Minimum Daily Average: 2.7 C on Sep 23 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 18.0 C at hour 16 | | Minimum Diurnal Average: 5.4 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.47 C | | Percentiles: P ₁ = -2.4 P ₁₀ = 3.3 Q ₁ = 6.7 Median = 10.6 Q ₃ = 16.1 P ₉₀ = 21.2 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-Sep | 12.7 | 11.5 | 10.6 | 10.0 | 9.3 | 9.1 | 10.6 | 12.8 | 15.1 | 16.0 | 17.9 | 20.9 | 22.7 | 23.6 | 23.8 | 24.2 | 23.5 | 22.8 | 21.5 | 19.3 | 17.3 | 15.4 | 13.8 | 13.3 | 16.6 | 24.2 | |
| 2-Sep | 12.5 | 11.2 | 11.7 | 13.4 | 13.3 | 12.0 | 11.2 | 14.5 | 17.0 | 19.3 | 20.3 | 21.1 | 21.6 | 21.5 | 21.0 | 20.6 | 21.1 | 20.1 | 18.9 | 17.7 | 16.8 | 15.2 | 14.1 | 13.6 | 16.7 | 21.6 | |
| 3-Sep | 14.0 | 13.1 | 11.3 | 10.2 | 8.9 | 7.7 | 12.3 | 14.3 | 16.2 | 18.2 | 19.6 | 20.7 | 21.3 | 21.8 | 21.7 | 21.6 | 21.4 | 20.2 | 16.1 | 14.4 | 13.1 | 12.6 | 11.7 | 10.3 | 15.5 | 21.8 | |
| 4-Sep | 9.8 | 9.4 | 9.1 | 6.3 | 5.1 | 6.2 | 9.5 | 11.8 | 14.0 | 15.4 | 17.1 | 18.1 | 19.4 | 20.1 | 21.1 | 21.5 | 21.2 | 21.1 | 19.0 | 14.8 | 11.4 | 9.9 | 8.4 | 6.0 | 13.6 | 21.5 | |
| 5-Sep | 5.1 | 4.9 | 5.2 | 5.1 | 4.7 | 5.0 | 5.6 | 9.0 | 12.4 | 15.1 | 18.4 | 22.0 | 24.8 | 26.6 | 27.9 | 28.8 | 29.0 | 27.6 | 25.2 | 19.2 | 17.5 | 16.3 | 14.0 | 13.7 | 16.0 | 29.0 | |
| 6-Sep | 11.3 | 10.5 | 9.5 | 9.2 | 9.2 | 7.0 | 9.4 | 14.8 | 17.5 | 19.6 | 22.0 | 23.8 | 25.2 | 26.3 | 26.8 | 27.5 | 27.6 | 26.9 | 25.3 | 23.1 | 21.2 | 16.5 | 14.9 | 14.3 | 18.3 | 27.6 | |
| 7-Sep | 12.2 | 10.5 | 9.5 | 9.8 | 10.3 | 9.8 | 10.5 | 13.5 | 17.7 | 20.1 | 23.8 | 27.3 | 30.3 | 31.5 | 32.1 | 32.6 | 32.3 | 31.0 | 28.2 | 23.9 | 21.7 | 20.5 | 19.2 | 18.1 | 20.7 | 32.6 | |
| 8-Sep | 17.4 | 17.2 | 16.6 | 16.1 | 15.5 | 14.8 | 14.5 | 16.2 | 18.1 | 21.3 | 21.8 | 22.5 | 22.4 | 22.5 | 22.2 | 21.3 | 19.8 | 17.0 | 14.1 | 13.3 | 12.2 | 11.6 | 10.5 | 10.3 | 17.0 | 22.5 | |
| 9-Sep | 9.6 | 8.4 | 8.9 | 9.2 | 8.8 | 8.9 | 9.2 | 10.1 | 10.6 | 12.7 | 14.6 | 14.9 | 15.5 | 15.7 | 15.6 | 15.1 | 13.3 | 12.5 | 12.7 | 12.5 | 12.6 | 12.5 | 12.5 | 12.5 | 12.0 | 15.7 | |
| 10-Sep | 12.4 | 12.0 | 11.6 | 11.3 | 11.2 | 10.9 | 10.5 | 11.4 | 12.7 | 14.2 | 15.6 | 15.8 | 14.8 | 15.2 | 15.2 | 17.3 | 18.1 | 18.1 | 17.2 | 14.6 | 13.2 | 11.8 | 11.0 | 9.4 | 13.6 | 18.1 | |
| 11-Sep | 8.4 | 7.5 | 6.5 | 4.8 | 5.5 | 5.8 | 6.3 | 7.9 | 9.1 | 9.9 | 10.6 | 11.6 | 11.9 | 12.6 | 14.7 | 16.0 | 17.5 | 18.1 | 16.1 | 13.5 | 11.6 | 11.1 | 10.9 | 10.4 | 10.8 | 18.1 | |
| 12-Sep | 9.9 | 9.8 | 10.1 | 9.9 | 9.8 | 10.5 | 10.7 | 10.9 | 11.2 | 12.1 | 12.1 | 12.1 | 12.4 | 12.3 | 12.1 | 11.9 | 11.4 | 10.8 | 9.6 | 8.9 | 8.1 | 7.6 | 7.2 | 7.0 | 10.3 | 12.4 | |
| 13-Sep | 7.2 | 6.9 | 6.8 | 6.7 | 6.5 | 6.3 | 6.5 | 7.1 | 8.4 | 9.0 | 10.3 | 10.9 | 11.1 | 11.0 | 10.6 | 11.7 | 12.0 | 10.6 | 8.5 | 5.1 | 3.6 | 5.0 | 4.3 | 3.9 | 7.9 | 12.0 | |
| 14-Sep | 2.0 | 1.1 | 1.7 | 1.5 | 2.2 | 3.1 | 3.8 | 5.0 | 5.8 | 7.7 | 9.0 | 9.9 | 10.6 | 11.5 | 11.8 | 11.9 | 11.8 | 11.1 | 9.1 | 7.1 | 5.4 | 3.6 | 2.3 | -0.2 | 6.2 | 11.9 | |
| 15-Sep | -1.2 | -1.9 | -2.1 | -2.6 | -2.8 | -2.9 | -2.4 | 0.8 | 4.4 | 7.1 | 10.0 | 12.8 | 15.1 | 16.6 | 17.4 | 17.4 | 17.5 | 16.3 | 12.8 | 9.1 | 8.1 | 6.7 | 5.3 | 2.8 | 6.8 | 17.5 | |
| 16-Sep | 1.8 | 0.2 | 0.0 | -0.3 | -0.9 | -1.6 | -0.8 | 3.2 | 6.9 | 10.3 | 13.6 | 15.9 | 17.0 | 17.3 | 17.4 | 17.1 | 17.0 | 16.1 | 12.8 | 11.3 | 10.3 | 7.8 | 5.2 | 3.2 | 8.4 | 17.4 | |
| 17-Sep | 2.1 | 1.9 | 0.2 | -1.3 | -2.1 | -2.4 | -1.6 | 2.0 | 6.4 | 9.9 | 13.4 | 15.7 | 17.0 | 17.7 | 17.9 | 17.6 | 17.4 | 16.4 | 14.2 | 12.1 | 11.1 | 9.6 | 9.1 | 7.9 | 8.8 | 17.9 | |
| 18-Sep | 4.2 | 2.8 | 1.8 | 1.8 | 1.9 | 1.4 | 1.7 | 3.8 | 7.7 | 10.6 | 13.8 | 15.5 | 16.2 | 17.0 | 17.4 | 17.4 | 17.0 | 15.2 | 13.3 | 11.6 | 10.6 | 10.2 | 7.9 | 4.3 | 9.4 | 17.4 | |
| 19-Sep | 4.3 | 3.3 | 3.3 | 3.1 | 3.3 | 3.9 | 4.4 | 5.2 | 6.0 | 7.3 | 9.4 | 10.9 | 12.3 | 12.8 | 12.2 | 10.7 | 10.3 | 10.4 | 10.0 | 9.8 | 9.2 | 9.0 | 8.7 | 8.6 | 7.8 | 12.8 | |
| 20-Sep | 8.4 | 8.5 | 8.4 | 8.4 | 8.3 | 8.2 | 8.0 | 7.6 | 6.9 | 6.6 | 6.4 | 6.5 | 6.6 | 6.7 | 6.7 | 6.7 | 6.7 | 6.6 | 6.3 | 5.9 | 5.6 | 5.3 | 5.0 | 4.8 | 6.9 | 8.5 | |
| 21-Sep | 4.7 | 4.5 | 4.6 | 4.2 | 4.0 | 3.9 | 4.0 | 4.2 | 4.3 | 4.6 | 5.0 | 5.7 | 6.1 | 6.4 | 6.4 | 6.3 | 6.0 | 5.9 | 5.7 | 5.5 | 5.3 | 4.9 | 4.8 | 4.3 | 5.1 | 6.4 | |
| 22-Sep | 4.7 | 4.1 | 3.6 | 3.5 | 3.4 | 3.2 | 3.4 | 4.0 | 5.4 | 6.7 | 7.3 | 7.4 | 7.9 | 7.6 | 7.3 | 7.4 | 7.6 | 7.0 | 6.4 | 6.0 | 4.8 | 2.2 | 0.8 | -0.7 | 5.0 | 7.9 | |
| 23-Sep | -1.3 | -1.6 | -1.9 | -2.4 | -2.7 | -2.9 | -2.2 | -0.8 | 0.5 | 3.7 | 4.9 | 6.6 | 8.2 | 8.5 | 8.6 | 9.3 | 9.3 | 8.5 | 5.0 | 3.2 | 2.1 | 2.1 | 1.3 | -0.2 | 2.7 | 9.3 | |
| 24-Sep | 0.3 | 1.7 | 2.0 | 1.9 | 1.3 | 0.5 | 0.0 | 2.3 | 5.3 | 8.2 | 10.2 | 11.8 | 13.3 | 14.5 | 15.3 | 15.5 | 15.4 | 14.2 | 10.6 | 9.6 | 8.9 | 7.9 | 7.9 | 8.3 | 7.8 | 15.5 | |
| 25-Sep | 9.0 | 9.1 | 9.5 | 9.0 | 8.6 | 8.1 | 8.2 | 8.7 | 10.1 | 11.9 | 14.8 | 17.0 | 19.2 | 20.7 | 21.7 | 21.9 | 21.8 | 19.3 | 15.3 | 13.4 | 13.8 | 11.6 | 10.4 | 10.8 | 13.5 | 21.9 | |
| 26-Sep | 9.9 | 9.7 | 10.2 | 9.7 | 8.2 | 7.1 | 7.0 | 9.1 | 11.5 | 15.8 | 17.6 | 18.5 | 19.0 | 19.6 | 19.9 | 19.9 | 19.5 | 17.5 | 14.0 | 11.1 | 10.2 | 8.3 | 8.8 | 8.5 | 12.9 | 19.9 | |
| 27-Sep | 8.3 | 7.9 | 7.8 | 7.0 | 5.8 | 4.0 | 2.1 | 4.9 | 7.7 | 10.5 | 13.5 | 15.4 | 16.5 | 17.2 | 16.8 | 16.7 | 15.6 | 13.6 | 11.8 | 10.8 | 11.0 | 10.7 | 10.2 | 9.8 | 10.6 | 17.2 | |
| 28-Sep | 9.6 | 9.4 | 9.3 | 8.6 | 7.1 | 4.7 | 3.6 | 6.3 | 11.5 | 12.4 | 14.6 | 17.3 | 20.0 | 21.8 | 23.3 | 24.8 | 24.6 | 22.8 | 19.6 | 19.2 | 18.3 | 17.5 | 15.7 | 14.1 | 14.8 | 24.8 | |
| 29-Sep | 11.3 | 9.5 | 8.7 | 9.2 | 7.8 | 6.7 | 6.2 | 9.0 | 12.7 | 16.1 | 18.2 | 19.8 | 22.1 | 23.5 | 24.3 | 25.0 | 24.8 | 21.3 | 16.3 | 12.9 | 11.5 | 10.5 | 8.8 | 8.1 | 14.3 | 25.0 | |
| 30-Sep | 7.9 | 6.4 | 5.4 | 5.6 | 5.0 | 4.2 | 4.4 | 6.2 | 9.6 | 13.4 | 16.2 | 18.9 | 22.0 | 23.1 | 24.1 | 23.8 | 21.6 | 19.7 | 18.0 | 16.8 | 16.4 | 15.5 | 14.0 | 13.0 | 13.8 | 24.1 | |
| | | 7.6 | 7.0 | 6.7 | 6.3 | 5.9 | 5.4 | 5.9 | 7.9 | 10.1 | 12.2 | 14.1 | 15.6 | 16.8 | 17.4 | 17.8 | 18.0 | 17.7 | 16.6 | 14.5 | 12.5 | 11.4 | 10.3 | 9.3 | 8.3 | Diurnal Average | |
| | | 17.4 | 17.2 | 16.6 | 16.1 | 15.5 | 14.8 | 14.5 | 16.2 | 18.1 | 21.3 | 23.8 | 27.3 | 30.3 | 31.5 | 32.1 | 32.6 | 32.3 | 31.0 | 28.2 | 23.9 | 21.7 | 20.5 | 19.2 | 18.1 | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Horizon - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 27 | 3.75 | 3.75 |
| 0 - 10 | 298 | 41.39 | 45.14 |
| 10 - 20 | 308 | 42.78 | 87.92 |
| > 20 | 87 | 12.08 | 100.00 |

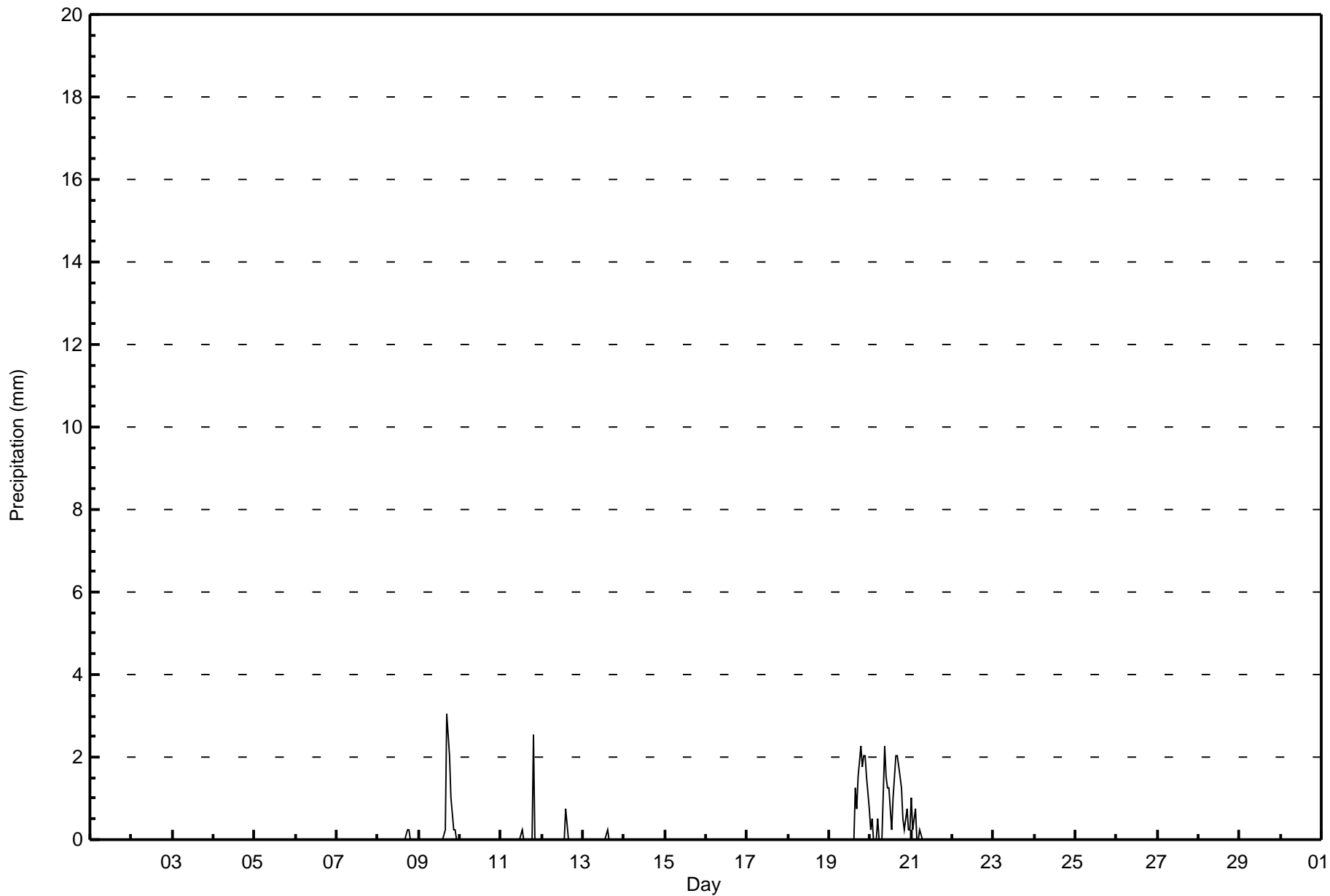
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Horizon - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

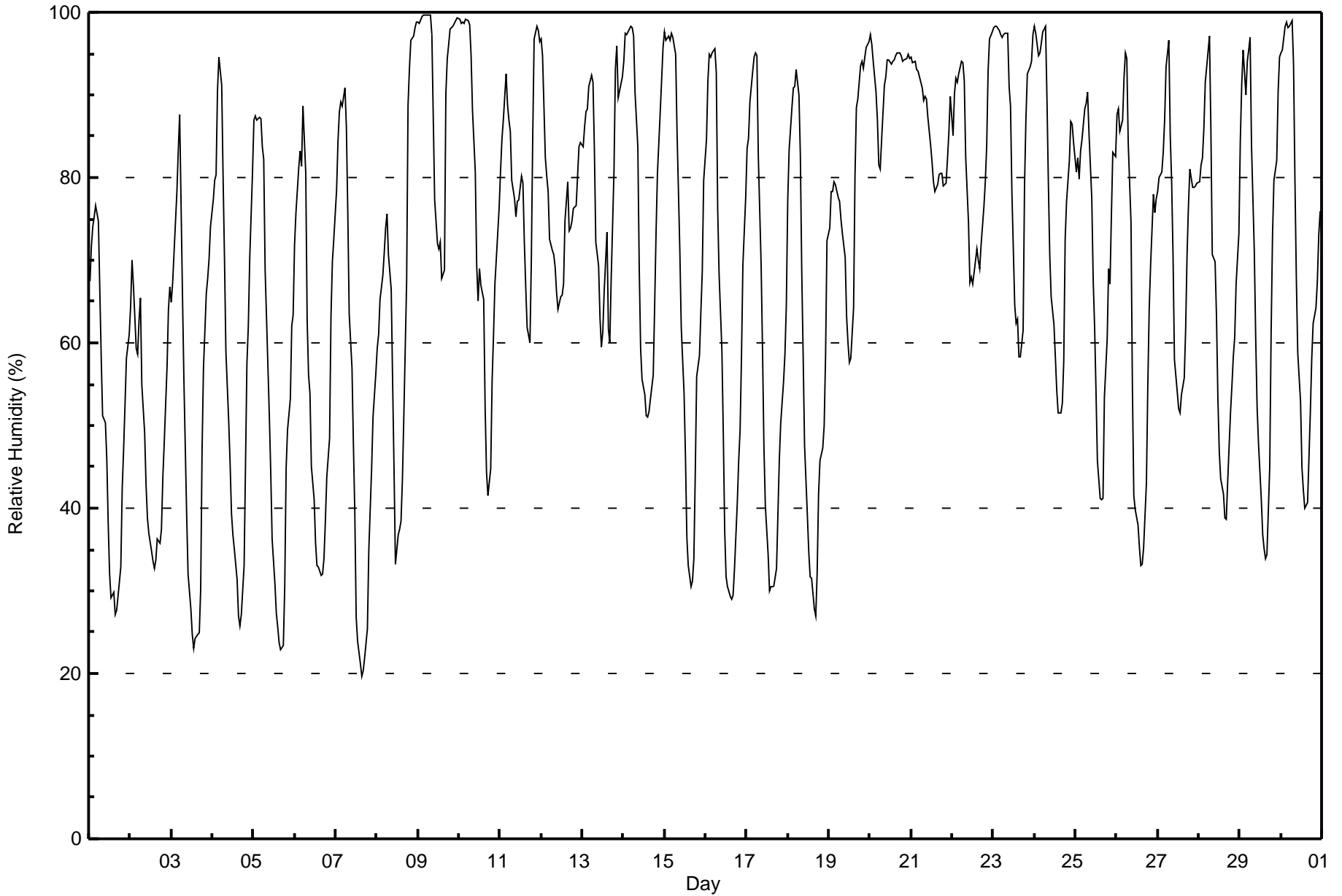
Horizon - September 2017

| Maximum Value: 100 % on Sep 9 04:00 Maximum Daily Average: 92.4 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|----|----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 20 % on Sep 7 16:00 Minimum Daily Average: 49.8 % on Sep 2 Maximum Diurnal Average: 89.6 % at hour 6 Minimum Diurnal Average: 46.9 % at hour 16 Monthly Average: 69.5 % Percentiles: P ₁ = 24 P ₁₀ = 35 Q ₁ = 53 Median = 73 O ₃ = 89 P ₉₀ = 96 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-Sep | 67 | 72 | 74 | 75 | 77 | 75 | 66 | 58 | 51 | 50 | 46 | 38 | 32 | 29 | 30 | 27 | 28 | 29 | 33 | 42 | 47 | 53 | 58 | 61 | 50.8 | 77 |
| 2-Sep | 64 | 70 | 67 | 59 | 59 | 63 | 65 | 55 | 49 | 43 | 39 | 37 | 35 | 34 | 33 | 34 | 36 | 36 | 38 | 44 | 48 | 57 | 64 | 67 | 49.8 | 70 |
| 3-Sep | 65 | 67 | 75 | 78 | 83 | 88 | 66 | 56 | 48 | 39 | 32 | 28 | 25 | 23 | 24 | 25 | 25 | 30 | 47 | 57 | 66 | 68 | 70 | 74 | 52.4 | 88 |
| 4-Sep | 77 | 80 | 80 | 91 | 95 | 91 | 80 | 70 | 59 | 51 | 45 | 39 | 37 | 35 | 31 | 27 | 26 | 27 | 33 | 45 | 57 | 62 | 70 | 81 | 57.9 | 95 |
| 5-Sep | 87 | 87 | 87 | 87 | 87 | 84 | 82 | 69 | 57 | 51 | 44 | 36 | 31 | 27 | 26 | 24 | 23 | 23 | 31 | 45 | 49 | 53 | 62 | 63 | 54.9 | 87 |
| 6-Sep | 72 | 76 | 81 | 83 | 81 | 89 | 81 | 63 | 56 | 54 | 45 | 41 | 36 | 33 | 33 | 32 | 32 | 34 | 38 | 44 | 49 | 63 | 70 | 72 | 56.5 | 89 |
| 7-Sep | 78 | 84 | 88 | 89 | 89 | 91 | 86 | 76 | 64 | 57 | 48 | 40 | 27 | 24 | 21 | 20 | 20 | 22 | 25 | 35 | 40 | 45 | 51 | 56 | 53.1 | 91 |
| 8-Sep | 59 | 61 | 65 | 68 | 71 | 74 | 76 | 71 | 66 | 55 | 45 | 33 | 37 | 37 | 38 | 44 | 51 | 67 | 89 | 93 | 97 | 97 | 98 | 99 | 66.3 | 99 |
| 9-Sep | 99 | 99 | 99 | 100 | 100 | 100 | 100 | 100 | 97 | 87 | 77 | 72 | 71 | 72 | 68 | 69 | 90 | 94 | 96 | 98 | 98 | 99 | 99 | 99 | 91.0 | 100 |
| 10-Sep | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 95 | 88 | 81 | 69 | 65 | 69 | 67 | 65 | 52 | 44 | 41 | 45 | 55 | 61 | 67 | 70 | 76 | 75.2 | 99 |
| 11-Sep | 81 | 85 | 87 | 93 | 89 | 87 | 86 | 80 | 77 | 75 | 77 | 77 | 80 | 79 | 72 | 67 | 62 | 60 | 70 | 85 | 97 | 98 | 98 | 97 | 81.6 | 98 |
| 12-Sep | 97 | 95 | 82 | 80 | 78 | 73 | 71 | 71 | 69 | 66 | 64 | 66 | 66 | 67 | 75 | 80 | 74 | 74 | 75 | 76 | 77 | 80 | 84 | 84 | 75.9 | 97 |
| 13-Sep | 84 | 86 | 88 | 88 | 91 | 92 | 92 | 83 | 72 | 69 | 63 | 60 | 61 | 66 | 73 | 62 | 60 | 68 | 81 | 93 | 96 | 90 | 90 | 92 | 79.2 | 96 |
| 14-Sep | 94 | 97 | 97 | 98 | 98 | 98 | 97 | 90 | 84 | 69 | 59 | 56 | 54 | 51 | 51 | 52 | 53 | 56 | 64 | 73 | 81 | 88 | 92 | 96 | 77.1 | 98 |
| 15-Sep | 98 | 97 | 97 | 97 | 97 | 97 | 95 | 86 | 78 | 71 | 62 | 54 | 46 | 36 | 33 | 31 | 31 | 34 | 44 | 56 | 59 | 64 | 69 | 80 | 67.1 | 98 |
| 16-Sep | 85 | 92 | 95 | 95 | 95 | 96 | 93 | 76 | 68 | 59 | 49 | 37 | 32 | 30 | 29 | 29 | 29 | 33 | 41 | 46 | 49 | 58 | 70 | 78 | 61.0 | 96 |
| 17-Sep | 84 | 85 | 89 | 93 | 95 | 95 | 95 | 82 | 69 | 59 | 47 | 40 | 34 | 30 | 31 | 31 | 31 | 33 | 39 | 46 | 50 | 55 | 59 | 65 | 59.8 | 95 |
| 18-Sep | 77 | 83 | 88 | 91 | 91 | 93 | 90 | 83 | 69 | 58 | 48 | 39 | 35 | 32 | 32 | 28 | 27 | 32 | 42 | 46 | 47 | 50 | 58 | 72 | 58.8 | 93 |
| 19-Sep | 74 | 78 | 78 | 79 | 79 | 78 | 77 | 75 | 73 | 70 | 63 | 60 | 58 | 58 | 64 | 80 | 88 | 90 | 93 | 94 | 93 | 95 | 96 | 96 | 78.8 | 96 |
| 20-Sep | 97 | 96 | 94 | 90 | 87 | 82 | 81 | 85 | 91 | 92 | 94 | 94 | 94 | 94 | 94 | 95 | 95 | 95 | 95 | 94 | 94 | 94 | 95 | 94 | 92.4 | 97 |
| 21-Sep | 95 | 94 | 94 | 93 | 93 | 92 | 91 | 89 | 90 | 89 | 87 | 84 | 82 | 79 | 78 | 79 | 80 | 81 | 80 | 79 | 79 | 82 | 85 | 90 | 86.1 | 95 |
| 22-Sep | 85 | 90 | 92 | 92 | 93 | 94 | 94 | 92 | 82 | 75 | 67 | 68 | 67 | 68 | 71 | 70 | 69 | 72 | 76 | 79 | 84 | 93 | 97 | 98 | 82.0 | 98 |
| 23-Sep | 98 | 98 | 98 | 98 | 97 | 97 | 97 | 98 | 97 | 91 | 89 | 78 | 65 | 62 | 63 | 58 | 58 | 61 | 79 | 87 | 93 | 93 | 94 | 97 | 85.3 | 98 |
| 24-Sep | 98 | 97 | 95 | 95 | 96 | 98 | 98 | 90 | 79 | 71 | 66 | 62 | 58 | 54 | 52 | 52 | 53 | 58 | 72 | 77 | 82 | 87 | 86 | 84 | 77.5 | 98 |
| 25-Sep | 81 | 82 | 80 | 83 | 85 | 88 | 89 | 90 | 85 | 77 | 68 | 62 | 54 | 46 | 41 | 41 | 41 | 53 | 60 | 69 | 67 | 75 | 83 | 83 | 70.2 | 90 |
| 26-Sep | 88 | 88 | 86 | 87 | 92 | 95 | 94 | 84 | 75 | 55 | 42 | 40 | 38 | 35 | 33 | 33 | 35 | 43 | 55 | 64 | 69 | 78 | 76 | 77 | 65.1 | 95 |
| 27-Sep | 78 | 80 | 81 | 83 | 87 | 93 | 97 | 85 | 79 | 71 | 58 | 54 | 52 | 51 | 54 | 56 | 62 | 71 | 77 | 81 | 79 | 79 | 79 | 79 | 73.5 | 97 |
| 28-Sep | 79 | 82 | 82 | 86 | 92 | 95 | 97 | 86 | 71 | 70 | 63 | 53 | 47 | 44 | 42 | 39 | 39 | 43 | 51 | 55 | 58 | 61 | 67 | 73 | 65.6 | 97 |
| 29-Sep | 84 | 91 | 95 | 90 | 94 | 95 | 97 | 84 | 71 | 60 | 52 | 48 | 41 | 37 | 35 | 34 | 34 | 45 | 61 | 73 | 80 | 82 | 90 | 95 | 69.6 | 97 |
| 30-Sep | 95 | 95 | 98 | 99 | 98 | 98 | 99 | 94 | 80 | 68 | 59 | 53 | 45 | 42 | 40 | 41 | 46 | 52 | 58 | 62 | 64 | 67 | 73 | 76 | 71.0 | 99 |
| 84.0 86.2 87.1 88.0 88.9 89.6 87.7 80.5 73.2 66.2 58.9 53.8 50.2 48.2 47.8 46.9 48.1 51.9 59.7 66.5 70.4 74.5 78.5 81.8 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 99 99 99 100 100 100 100 100 100 97 92 94 94 94 94 95 95 95 95 96 98 98 99 99 99 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Horizon - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Horizon - September 2017

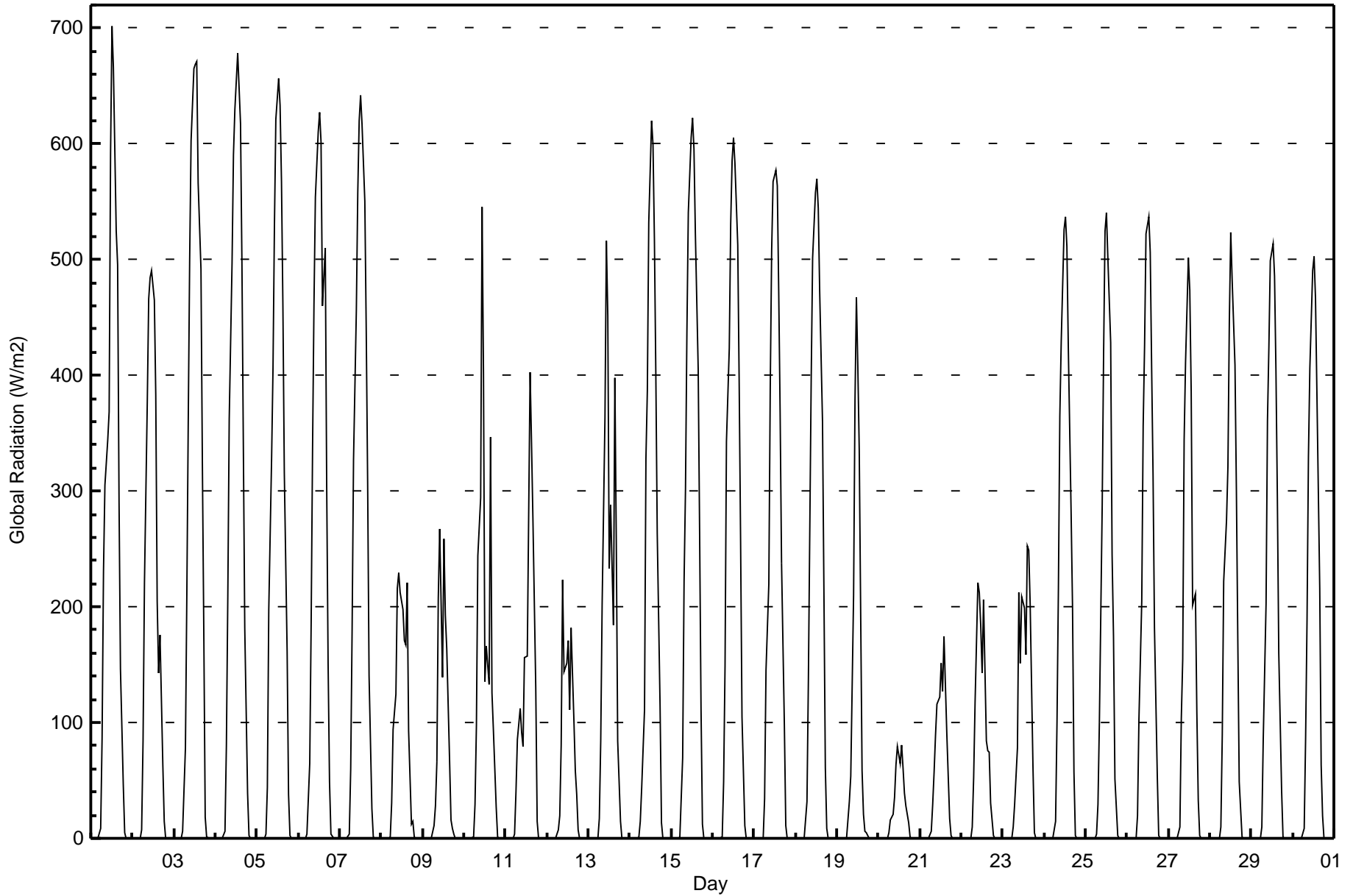
| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 1 | 0.14 | 0.14 |
| 20 - 40 | 101 | 14.03 | 14.17 |
| 40 - 60 | 134 | 18.61 | 32.78 |
| 60 - 80 | 202 | 28.06 | 60.83 |
| 80 - 100 | 282 | 39.17 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 701 W/m2 on Sep 1 13:00 | | Maximum Daily Average: 224.3 W/m2 on Sep 4 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|-----|---------------------------------|-----|-----|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|-----|-----|-------|---------------|-----------------|
| Minimum Value: 0 W/m2 on Sep 1 03:00 | | Minimum Daily Average: 21.2 W/m2 on Sep 20 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 438.7 W/m2 at hour 12 | | Minimum Diurnal Average: 0.0 W/m2 at hour 5 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 136.3 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 10 Q ₃ = 221 P ₉₀ = 491 P ₉₉ = 651 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | 0 | 8 | 86 | 231 | 305 | 344 | 369 | 592 | 701 | 667 | 525 | 495 | 291 | 147 | 47 | 5 | 0 | 0 | 0 | 0 | 200.6 | 701 |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 85 | 221 | 377 | 466 | 485 | 490 | 465 | 383 | 204 | 143 | 175 | 64 | 15 | 0 | 0 | 0 | 0 | 149.2 | 490 | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 6 | 78 | 211 | 361 | 501 | 602 | 665 | 669 | 671 | 567 | 492 | 323 | 179 | 18 | 2 | 0 | 0 | 0 | 222.7 | 671 | |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 6 | 80 | 208 | 362 | 497 | 590 | 629 | 654 | 679 | 617 | 497 | 339 | 182 | 40 | 3 | 0 | 0 | 0 | 224.3 | 679 | |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 44 | 198 | 328 | 406 | 528 | 621 | 657 | 634 | 568 | 461 | 316 | 161 | 38 | 2 | 0 | 0 | 0 | 206.9 | 657 | |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 65 | 185 | 336 | 462 | 555 | 611 | 627 | 601 | 460 | 510 | 305 | 151 | 49 | 4 | 0 | 0 | 0 | 205.2 | 627 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 60 | 180 | 327 | 457 | 558 | 620 | 642 | 618 | 551 | 438 | 306 | 141 | 26 | 1 | 0 | 0 | 0 | 205.3 | 642 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 31 | 94 | 124 | 216 | 229 | 212 | 198 | 171 | 167 | 221 | 93 | 13 | 14 | 2 | 0 | 0 | 0 | 74.4 | 229 | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 28 | 66 | 208 | 268 | 139 | 259 | 193 | 164 | 67 | 16 | 9 | 4 | 0 | 0 | 0 | 0 | 59.6 | 268 | |
| 10-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 30 | 98 | 244 | 295 | 546 | 402 | 135 | 166 | 133 | 347 | 126 | 94 | 27 | 1 | 0 | 0 | 0 | 110.2 | 546 | |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 40 | 86 | 112 | 91 | 79 | 157 | 157 | 280 | 403 | 342 | 275 | 130 | 15 | 0 | 0 | 0 | 0 | 90.5 | 403 | |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 20 | 80 | 223 | 143 | 151 | 171 | 111 | 182 | 103 | 58 | 38 | 7 | 0 | 0 | 0 | 0 | 54.0 | 223 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 85 | 202 | 364 | 516 | 452 | 233 | 288 | 185 | 398 | 259 | 84 | 15 | 0 | 0 | 0 | 0 | 129.1 | 516 | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 14 | 43 | 111 | 328 | 387 | 532 | 620 | 600 | 518 | 402 | 264 | 115 | 13 | 0 | 0 | 0 | 0 | 164.5 | 620 | |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 69 | 222 | 301 | 437 | 540 | 605 | 623 | 596 | 522 | 406 | 265 | 112 | 12 | 0 | 0 | 0 | 0 | 196.3 | 623 | |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 49 | 149 | 343 | 423 | 531 | 586 | 605 | 583 | 513 | 394 | 258 | 105 | 11 | 0 | 0 | 0 | 0 | 189.7 | 605 | |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 145 | 220 | 389 | 507 | 568 | 578 | 563 | 472 | 367 | 238 | 97 | 11 | 0 | 0 | 0 | 0 | 174.6 | 578 | |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 32 | 136 | 267 | 397 | 501 | 558 | 570 | 544 | 472 | 360 | 213 | 61 | 9 | 0 | 0 | 0 | 0 | 171.8 | 570 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 32 | 53 | 210 | 379 | 467 | 407 | 336 | 58 | 20 | 7 | 5 | 0 | 0 | 0 | 0 | 0 | 82.9 | 467 | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 16 | 21 | 36 | 63 | 80 | 65 | 81 | 61 | 39 | 28 | 13 | 2 | 0 | 0 | 0 | 0 | 21.2 | 81 | |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 30 | 57 | 89 | 115 | 123 | 151 | 126 | 174 | 91 | 54 | 17 | 2 | 0 | 0 | 0 | 0 | 43.1 | 174 | |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 52 | 117 | 221 | 213 | 184 | 143 | 206 | 84 | 75 | 74 | 31 | 3 | 0 | 0 | 0 | 0 | 58.9 | 221 | |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 29 | 79 | 212 | 152 | 208 | 198 | 158 | 253 | 249 | 202 | 61 | 5 | 0 | 0 | 0 | 0 | 75.7 | 253 | |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 100 | 216 | 365 | 429 | 525 | 537 | 511 | 425 | 280 | 199 | 57 | 3 | 0 | 0 | 0 | 0 | 152.6 | 537 | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 29 | 99 | 289 | 420 | 525 | 540 | 502 | 428 | 245 | 175 | 51 | 3 | 0 | 0 | 0 | 0 | 137.9 | 540 | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 103 | 205 | 356 | 426 | 522 | 538 | 506 | 406 | 313 | 182 | 53 | 2 | 0 | 0 | 0 | 0 | 151.3 | 538 | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 103 | 155 | 344 | 411 | 501 | 473 | 386 | 202 | 211 | 109 | 33 | 2 | 0 | 0 | 0 | 0 | 122.4 | 501 | |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 89 | 222 | 274 | 321 | 446 | 523 | 482 | 409 | 300 | 171 | 49 | 2 | 0 | 0 | 0 | 0 | 137.4 | 523 | |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 85 | 202 | 362 | 425 | 499 | 514 | 485 | 404 | 294 | 160 | 41 | 1 | 0 | 0 | 0 | 0 | 145.1 | 514 | |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 87 | 188 | 330 | 407 | 491 | 503 | 467 | 384 | 216 | 63 | 20 | 0 | 0 | 0 | 0 | 0 | 131.8 | 503 | |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 31.7 | 109.9 | 202.8 | 319.7 | 389.9 | 438.7 | 438.5 | 419.9 | 350.3 | 292.6 | 184.7 | 77.1 | 13.1 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | Diurnal Average |
| | | 0 | 0 | 0 | 0 | 0 | 8 | 86 | 231 | 377 | 501 | 602 | 665 | 701 | 679 | 617 | 510 | 339 | 182 | 49 | 5 | 0 | 0 | 0 | 0 | Diurnal Maximum |





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Horizon - September 2017

| | | |
|---|---|--------------------------------|
| Maximum Speed: 29 km/h on Sep 3 19:00 | Maximum Daily Speed Average: 22.5 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 6 08:00 | Minimum Daily Speed Average: 2.2 km/h on Sep 6 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 4.4 km/h at hour 5 | Minimum Diurnal Speed Average: 0.9 km/h at hour 20 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 2.8 km/h 250.4 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 8 Q ₃ = 13 P ₉₀ = 18 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-Sep | SW13 | SW13 | SW15 | SW17 | SW17 | SW16 | SW15 | SW18 | WSW19 | SW17 | SW16 | SW16 | SW19 | SW20 | WSW18 | W21 | W21 | W17 | W13 | WSW11 | SW11 | SW12 | WSW9 | WSW15 | WSW15.1 | WNW21 |
| 2-Sep | WSW14 | WSW15 | WSW13 | W15 | W13 | W13 | WSW13 | W12 | W13 | W12 | W13 | W11 | WSW13 | W14 | W14 | W12 | WSW7 | WNW12 | WNW10 | WSW6 | WSW4 | S5 | SSW7 | SW9 | W10.6 | W15 |
| 3-Sep | SW10 | SW11 | SW11 | SW12 | SW11 | SW9 | WNW16 | W16 | WNW19 | WNW21 | WNW24 | WNW22 | WNW20 | WNW20 | WNW21 | WNW24 | WNW23 | NW26 | NNW29 | NW21 | NW21 | NW17 | NW14 | WNW13 | WNW15.7 | NNW29 |
| 4-Sep | W8 | W8 | W6 | W5 | W3 | WNW8 | WNW12 | NW12 | WNW17 | WNW16 | WNW8 | NW9 | WNW12 | WNW13 | W14 | WNW14 | WNW12 | WNW6 | NNE1 | SE5 | SSE4 | NW5 | NW3 | S3 | WNW7.4 | WNW17 |
| 5-Sep | SSW8 | SSW9 | SW11 | SSW12 | SSW11 | SSW10 | SSW12 | SSW13 | SSW14 | SSW15 | SSW13 | SSW14 | SW17 | SW16 | SW15 | SW13 | SW13 | SW12 | SW6 | SW7 | SSW9 | SW8 | SW7 | SW7 | SW10.9 | SW17 |
| 6-Sep | SSW3 | SSW2 | SSW4 | SSW5 | SW6 | SW2 | WSW1 | SW0 | N3 | NNE6 | NE7 | ENE5 | ENE4 | ENE5 | ENE7 | E9 | ESE8 | ESE7 | ESE6 | ESE6 | ESE6 | NW2 | WNW1 | ENE2 | E2.2 | E9 |
| 7-Sep | NE1 | SW1 | SW4 | SW10 | SSW8 | SSW9 | SSW9 | SSW9 | SW9 | SSW11 | SSW12 | SSW12 | SSW19 | SSW19 | SSW22 | SSW21 | S19 | SSW16 | S12 | SSW12 | SSW12 | SSW10 | SSW8 | SSW8 | SSW11.1 | SSW22 |
| 8-Sep | SSW7 | SSW10 | SSW11 | SSW11 | SSW8 | SSW6 | SSW9 | SSW8 | WSW4 | NNW7 | N12 | NNE9 | NE7 | NE7 | NNW15 | NNW12 | NW13 | WNW12 | NW7 | SW2 | SW6 | SW6 | SW4 | SSW4 | W3.1 | NNW15 |
| 9-Sep | SW4 | N3 | N3 | SSW2 | SSW6 | ENE1 | NW3 | N1 | NNE4 | NNE4 | NE7 | NNE9 | NNE8 | NNE11 | NNE14 | NNE13 | NNW10 | N8 | N9 | NNE7 | NNE6 | W3 | SW4 | SW6 | N4.1 | NNE14 |
| 10-Sep | SW7 | SSW7 | SSW7 | SSW11 | SSW10 | SSW7 | SSW6 | SW8 | WSW14 | WSW17 | W20 | WNW23 | W21 | W21 | W25 | WNW25 | WNW22 | WNW17 | WSW9 | SW12 | SW13 | SW8 | WSW10 | WSW9 | WSW11.9 | W25 |
| 11-Sep | WSW13 | WSW13 | SW8 | SSW8 | SW11 | SW9 | SW10 | SW9 | SSW8 | SSW10 | S6 | SE3 | ENE3 | ENE4 | SE8 | ESE6 | SE4 | SSE6 | NE3 | NW16 | SSW8 | SW9 | WSW10 | SW10 | SW5.5 | NW16 |
| 12-Sep | SW11 | SW13 | W17 | WSW13 | WSW14 | W15 | WNW15 | NW18 | WNW19 | NW22 | NW19 | NW19 | NW15 | NW14 | NW13 | WNW9 | ENE9 | NE8 | NE10 | NE8 | NE7 | ENE4 | NE3 | NNE4 | WNW8.2 | NW22 |
| 13-Sep | NNE5 | NNE5 | NNE3 | NNE3 | SSW2 | WNW2 | ENE1 | NE3 | WSW2 | NNW5 | N6 | NE8 | NNW3 | NNW3 | NW5 | NNE3 | NNE6 | E7 | ENE2 | SW3 | NW5 | NNE7 | N5 | NNE5 | NNE2.8 | NE8 |
| 14-Sep | NNW2 | NNW2 | N3 | WNW2 | AF | NE2 | N1 | NNE3 | NE4 | NE7 | NNE7 | NNW4 | NNE2 | NE4 | ENE7 | NE7 | ENE9 | ENE8 | ENE7 | NE7 | NNE5 | N4 | N5 | SSW4 | NE3.4 | ENE9 |
| 15-Sep | SW3 | AF | S3 | SW5 | SSW6 | SSW7 | SSW7 | SSW6 | S6 | S7 | S7 | S9 | S10 | SW14 | SW13 | SSW13 | SW10 | SSW10 | S8 | S8 | SSW9 | SSW8 | SSW9 | SSW7 | SSW7.7 | SW14 |
| 16-Sep | SSW7 | SSW5 | S7 | SSW6 | SSW7 | SW8 | SSW6 | SSW6 | SSW7 | SSW8 | SSW11 | SSW20 | SSW21 | S17 | S20 | S19 | SSW18 | SSW14 | SSW9 | S10 | S10 | S8 | S8 | SSW6 | SSW10.6 | SSW21 |
| 17-Sep | SSW6 | SSW6 | SSW4 | SW4 | SW2 | WSW2 | NW2 | NW3 | SW2 | S5 | S10 | SSE14 | S17 | S19 | S16 | S16 | S14 | SSE11 | SSE8 | SSE8 | SSE8 | SSE9 | SSE9 | SSE7 | S7.7 | S19 |
| 18-Sep | S3 | SE2 | NNE3 | NE3 | N4 | NNE4 | NE5 | NNE5 | ENE3 | SE7 | SSE12 | SSE17 | SSE18 | SE13 | SE13 | SE12 | SSE11 | SE7 | SE8 | ESE7 | ESE8 | ESE8 | ESE4 | NW3 | SE5.6 | SSE18 |
| 19-Sep | NW4 | NNW5 | N7 | NNE8 | NNE8 | NNE10 | NNE10 | NNE11 | NNE13 | NNE14 | NE18 | NNE18 | NNE19 | NNE19 | NE17 | NE15 | NE11 | ENE16 | ENE16 | ENE16 | ENE15 | ENE14 | NE12 | NE13 | NE12.1 | NNE19 |
| 20-Sep | NNE15 | NE15 | NNE17 | NNE18 | NNE18 | NNE18 | NNE21 | NNE21 | NNE22 | NNE25 | NNE27 | NNE27 | NNE28 | NNE27 | NNE26 | NNE25 | NNE24 | NNE25 | NNE24 | NNE24 | NNE24 | NNE23 | NNE22 | NNE22 | NNE22.5 | NNE28 |
| 21-Sep | NNE21 | NNE21 | NNE20 | NNE20 | NNE18 | N16 | NNE15 | NNE16 | NNE16 | N16 | N14 | NNE16 | NNE15 | NNE17 | NNE17 | NNE16 | N15 | NNE13 | N12 | N13 | NNW9 | WNW6 | NNW3 | WSW4 | N14.0 | NNE21 |
| 22-Sep | W6 | WSW3 | SW3 | SW4 | SSW4 | S4 | SSW5 | SSW5 | SSW5 | S6 | S6 | SSE5 | SSW4 | E5 | SE7 | SSE6 | SSE7 | SE7 | SSE8 | SSE1 | SSW3 | SSW6 | SW6 | WNW3 | S3.8 | SSE8 |
| 23-Sep | SSW3 | SSW6 | SSW6 | SSW5 | SW6 | SSW5 | SW5 | SW4 | SSW4 | SSW4 | SSW6 | SSW3 | SW4 | S5 | SE6 | SSE7 | ESE6 | ESE5 | ESE4 | SE3 | SSE2 | SW3 | SW3 | S4 | S3.6 | SSE7 |
| 24-Sep | SSW5 | SW6 | SSW6 | SSW6 | SSW6 | SSW7 | SSW7 | SW8 | SSW9 | SSW8 | S6 | S6 | S7 | SSW9 | S8 | S7 | SE6 | ESE5 | ENE4 | NE2 | W1 | SSW4 | S4 | S5 | SSW5.0 | SSW9 |
| 25-Sep | S4 | S6 | S5 | SSE4 | S4 | S5 | SSW6 | SSW7 | SSW8 | SSW8 | SSW8 | SSW9 | SW12 | SW13 | WSW10 | WSW8 | SW5 | WSW2 | SW5 | SW5 | WSW8 | WSW8 | WSW8 | SW10 | SW6.4 | SW13 |
| 26-Sep | SSW9 | SW9 | SW10 | WSW6 | SW7 | SW8 | SW9 | SW9 | SW9 | WNW10 | WNW18 | NW19 | NW20 | NW20 | NW19 | NW16 | NW13 | WNW9 | WNW6 | WNW6 | WNW5 | WSW3 | SSW6 | SW7 | W8.0 | NW20 |
| 27-Sep | SW4 | SSW5 | SSW6 | SSW7 | SSW7 | SSW6 | SW2 | WNW1 | N3 | N5 | NE7 | NE9 | NE10 | NNE8 | NE9 | NE11 | NE13 | NE12 | NNE10 | NNE6 | NE8 | NNE7 | NNE6 | NNE7 | NNE3.9 | NNE13 |
| 28-Sep | NNE7 | NNE6 | NNE5 | NNE4 | N4 | NW4 | SW4 | WSW2 | SSW3 | SSW9 | S6 | S7 | S12 | S13 | S14 | SSW17 | SSW18 | SSW13 | S11 | S12 | S13 | S15 | SSW12 | SSW8 | S6.6 | SSW18 |
| 29-Sep | SW6 | SW6 | SSW6 | SSW9 | SSW8 | SW7 | SW7 | SW6 | SW7 | SSW9 | SSW15 | SSW16 | SW11 | SW10 | SSW10 | SW9 | SW7 | WNW6 | AF | SW4 | SW6 | WSW6 | SSW5 | SSW7 | SW7.7 | SSW16 |
| 30-Sep | SSW7 | SW5 | SSW6 | SSW8 | SSW9 | SSW7 | SSW9 | SSW9 | SSW10 | SSW8 | SSE6 | SSE7 | SSW12 | SSW13 | SSW13 | SSW13 | WSW10 | WNW18 | WNW14 | WNW11 | WNW16 | NW18 | WNW18 | WNW14 | WSW7.2 | WNW18 |

| | |
|--|-----------------|
| WSW3.5 SW3.5WSW3.4 SW4.0 SW4.4WSW3.7WSW3.7WSW3.6WSW3.9 W3.6 W2.9WSW2.2WSW3.6WSW3.3 W3.0WSW3.1 W2.5WNW1.8 N1.5WNW0.9WSW1.6WSW2.1WSW2.5WSW3.0 | Diurnal Average |
| NNE21 NNE21 NNE20 NNE20 NNE18 NNE18 NNE21 NNE21 NNE22 NNE25 NNE27 NNE27 NNE28 NNE27 NNE26WNW25 NNE24 NW26NNW29 NNE24 NNE24 NNE23 NNE22 NNE22 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Horizon - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 12 km/h on Sep 11 20:00 | Hours of Data: 717 |
| Minimum Value: 0 km/h on Sep 22 05:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.6 |

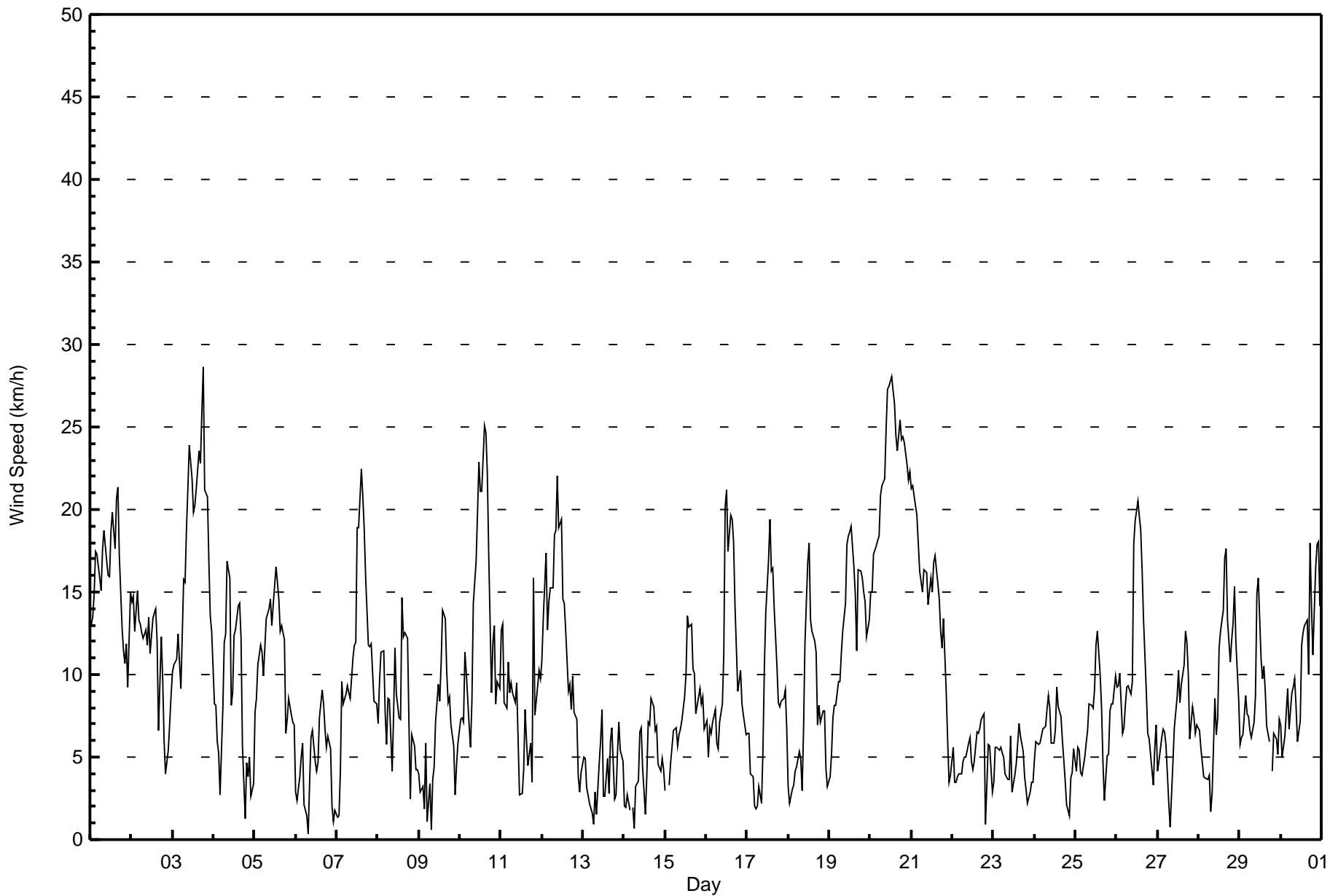
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|---|---|----|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |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

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Horizon - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Horizon - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 177 | 24.69 | 24.69 |
| 6 - 11 | 301 | 41.98 | 66.67 |
| 12 - 19 | 187 | 26.08 | 92.75 |
| 20 - 28 | 51 | 7.11 | 99.86 |
| 29 - 38 | 1 | 0.14 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Horizon - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 12 | 19 | 10 | 12 | 0 | 5 | 5 | 5 | 13 | 28 | 29 | 10 | 4 | 6 | 11 | 8 | 177 |
| 6 - 11 | 4 | 23 | 19 | 6 | 2 | 10 | 7 | 17 | 22 | 97 | 54 | 18 | 5 | 12 | 2 | 3 | 301 |
| 12 - 19 | 7 | 23 | 7 | 5 | 0 | 0 | 3 | 4 | 15 | 27 | 27 | 14 | 16 | 22 | 15 | 2 | 187 |
| 20 - 28 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 5 | 12 | 6 | 0 | 51 |
| 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 | 23 | 87 | 36 | 23 | 2 | 15 | 15 | 26 | 51 | 156 | 111 | 42 | 30 | 52 | 34 | 14 | 717 |

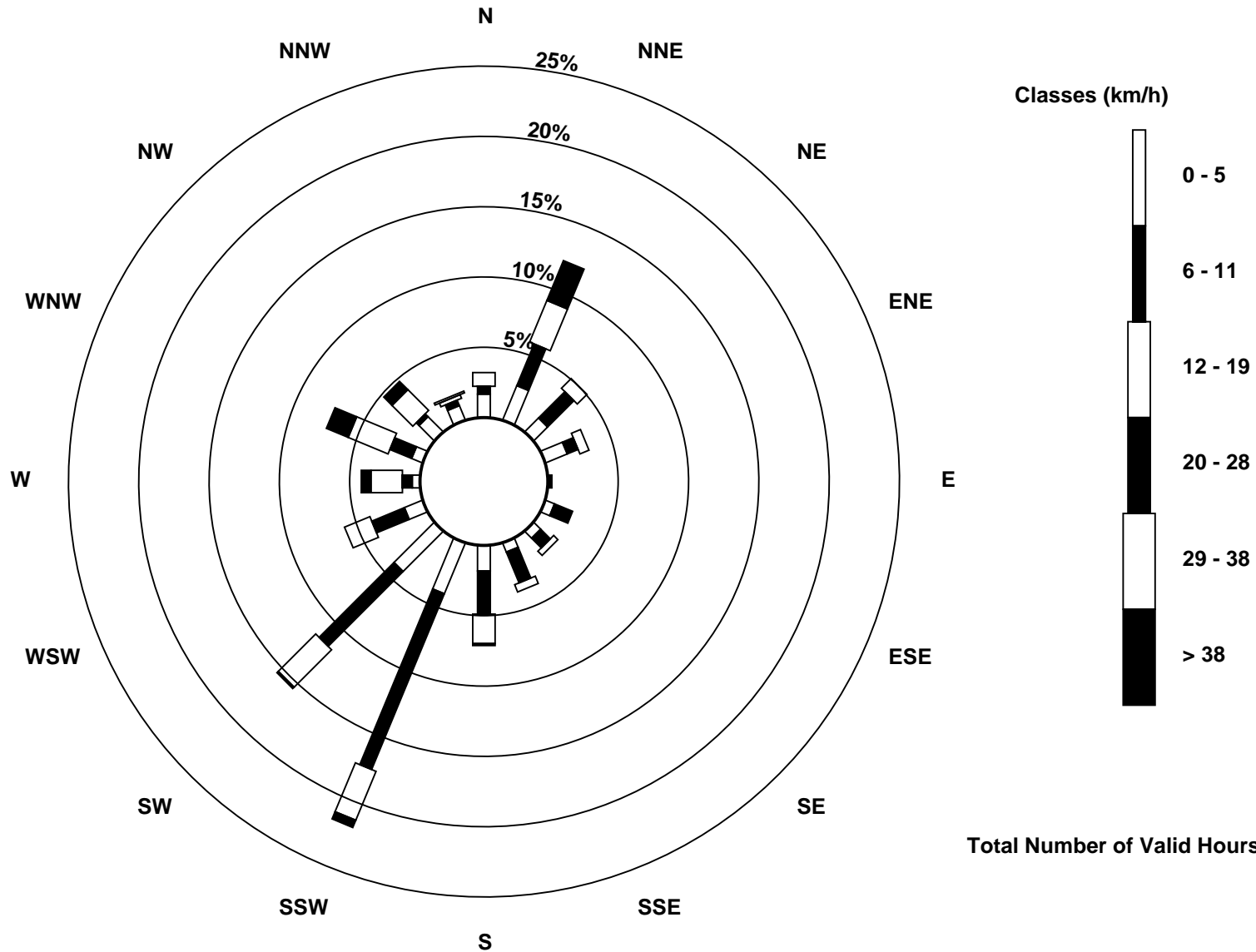
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Horizon (AMS 15)



Total Number of Valid Hours: 717



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Horizon - September 2017

| | |
|--|---|
| Direction of Maximum Speed: 327 deg on Sep 3 19:00 Direction of Maximum Daily Speed Average: 23.4 deg on Sep 20 | Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 |
| Direction of Minimum Speed: 220 deg on Sep 6 08:00 Direction of Minimum Daily Speed Average: 2.2 deg on Sep 6 | Percent Operational Time: 99.6 |
| Monthly Average Direction: 236.3 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-Sep | 234 | 235 | 232 | 232 | 228 | 231 | 233 | 234 | 237 | 234 | 235 | 229 | 229 | 236 | 254 | 271 | 281 | 274 | 264 | 252 | 236 | 231 | 250 | 243 | 242.7 |
| 2-Sep | 249 | 246 | 256 | 274 | 273 | 259 | 247 | 265 | 261 | 263 | 276 | 265 | 252 | 272 | 261 | 280 | 252 | 292 | 294 | 250 | 240 | 185 | 211 | 222 | 260.3 |
| 3-Sep | 234 | 232 | 225 | 229 | 224 | 227 | 283 | 278 | 282 | 283 | 291 | 291 | 303 | 294 | 298 | 297 | 295 | 319 | 327 | 310 | 309 | 322 | 319 | 302 | 291.5 |
| 4-Sep | 279 | 266 | 277 | 276 | 279 | 289 | 293 | 304 | 299 | 299 | 293 | 316 | 286 | 284 | 280 | 282 | 289 | 300 | 29 | 132 | 148 | 324 | 308 | 175 | 289.0 |
| 5-Sep | 198 | 199 | 216 | 210 | 207 | 210 | 195 | 199 | 200 | 202 | 198 | 202 | 219 | 224 | 227 | 235 | 224 | 230 | 221 | 221 | 245 | 233 | 221 | 222 | 214.2 |
| 6-Sep | 199 | 193 | 199 | 204 | 216 | 233 | 240 | 220 | 9 | 21 | 36 | 71 | 59 | 66 | 70 | 87 | 107 | 103 | 111 | 120 | 112 | 322 | 302 | 65 | 95.5 |
| 7-Sep | 43 | 222 | 234 | 214 | 208 | 199 | 204 | 206 | 214 | 210 | 209 | 205 | 210 | 198 | 195 | 195 | 190 | 197 | 186 | 195 | 196 | 193 | 200 | 202 | 200.7 |
| 8-Sep | 209 | 200 | 199 | 196 | 197 | 205 | 198 | 212 | 239 | 330 | 355 | 24 | 39 | 42 | 334 | 327 | 306 | 303 | 312 | 216 | 218 | 223 | 230 | 199 | 265.6 |
| 9-Sep | 218 | 350 | 352 | 206 | 205 | 60 | 320 | 357 | 21 | 20 | 34 | 25 | 27 | 14 | 22 | 22 | 344 | 8 | 5 | 23 | 12 | 278 | 233 | 228 | 6.9 |
| 10-Sep | 221 | 202 | 193 | 206 | 199 | 205 | 209 | 221 | 238 | 246 | 265 | 282 | 268 | 273 | 279 | 286 | 294 | 286 | 258 | 229 | 222 | 229 | 249 | 241 | 254.7 |
| 11-Sep | 237 | 238 | 219 | 211 | 229 | 219 | 216 | 223 | 204 | 198 | 179 | 144 | 73 | 73 | 132 | 114 | 146 | 160 | 47 | 308 | 197 | 220 | 240 | 233 | 213.9 |
| 12-Sep | 225 | 233 | 261 | 249 | 257 | 270 | 284 | 306 | 299 | 304 | 317 | 305 | 306 | 318 | 323 | 286 | 62 | 47 | 44 | 40 | 54 | 66 | 42 | 17 | 301.0 |
| 13-Sep | 21 | 23 | 14 | 25 | 209 | 288 | 68 | 42 | 239 | 347 | 349 | 56 | 346 | 331 | 308 | 23 | 21 | 81 | 74 | 223 | 325 | 12 | 11 | 12 | 11.7 |
| 14-Sep | 341 | 329 | 353 | 291 | AF | 37 | 5 | 18 | 42 | 37 | 18 | 348 | 17 | 47 | 69 | 53 | 72 | 78 | 75 | 54 | 26 | 9 | 354 | 202 | 39.5 |
| 15-Sep | 225 | AF | 179 | 220 | 195 | 207 | 202 | 200 | 183 | 180 | 172 | 174 | 189 | 219 | 225 | 205 | 214 | 202 | 182 | 187 | 200 | 205 | 206 | 203 | 200.2 |
| 16-Sep | 201 | 194 | 191 | 206 | 211 | 215 | 212 | 206 | 200 | 203 | 196 | 192 | 205 | 179 | 183 | 185 | 192 | 192 | 193 | 178 | 180 | 183 | 183 | 208 | 193.3 |
| 17-Sep | 207 | 199 | 211 | 226 | 227 | 239 | 314 | 307 | 220 | 187 | 180 | 165 | 178 | 187 | 173 | 169 | 171 | 166 | 156 | 150 | 154 | 152 | 159 | 157 | 175.9 |
| 18-Sep | 186 | 144 | 13 | 54 | 3 | 28 | 34 | 31 | 76 | 134 | 158 | 161 | 154 | 143 | 140 | 140 | 156 | 139 | 130 | 123 | 121 | 112 | 123 | 326 | 132.7 |
| 19-Sep | 319 | 344 | 7 | 12 | 13 | 14 | 29 | 31 | 20 | 25 | 34 | 32 | 32 | 31 | 36 | 35 | 47 | 73 | 64 | 64 | 66 | 61 | 46 | 37 | 37.5 |
| 20-Sep | 28 | 35 | 27 | 18 | 23 | 20 | 20 | 19 | 15 | 22 | 23 | 24 | 28 | 27 | 27 | 26 | 24 | 24 | 24 | 22 | 21 | 21 | 20 | 24 | 23.4 |
| 21-Sep | 20 | 19 | 16 | 15 | 12 | 9 | 12 | 13 | 12 | 9 | 11 | 13 | 17 | 18 | 14 | 14 | 9 | 17 | 3 | 351 | 348 | 303 | 333 | 244 | 10.2 |
| 22-Sep | 273 | 246 | 233 | 220 | 209 | 190 | 203 | 203 | 192 | 187 | 169 | 168 | 209 | 101 | 130 | 151 | 164 | 146 | 149 | 152 | 192 | 212 | 226 | 287 | 186.1 |
| 23-Sep | 207 | 203 | 213 | 212 | 216 | 211 | 215 | 217 | 200 | 201 | 200 | 195 | 220 | 191 | 133 | 152 | 117 | 120 | 115 | 130 | 164 | 234 | 226 | 182 | 187.0 |
| 24-Sep | 211 | 214 | 204 | 203 | 207 | 205 | 213 | 214 | 209 | 204 | 182 | 178 | 179 | 199 | 180 | 178 | 135 | 116 | 60 | 53 | 260 | 201 | 184 | 182 | 191.6 |
| 25-Sep | 177 | 178 | 176 | 158 | 172 | 191 | 201 | 199 | 196 | 193 | 199 | 198 | 216 | 231 | 246 | 245 | 230 | 242 | 236 | 223 | 238 | 244 | 241 | 222 | 214.3 |
| 26-Sep | 206 | 222 | 236 | 237 | 224 | 229 | 226 | 227 | 220 | 284 | 291 | 314 | 313 | 320 | 319 | 311 | 309 | 303 | 290 | 291 | 300 | 243 | 207 | 221 | 279.1 |
| 27-Sep | 228 | 209 | 203 | 205 | 211 | 210 | 215 | 288 | 10 | 7 | 36 | 44 | 39 | 24 | 36 | 37 | 34 | 35 | 31 | 32 | 34 | 28 | 28 | 29 | 32.5 |
| 28-Sep | 13 | 14 | 30 | 14 | 359 | 321 | 217 | 241 | 203 | 195 | 191 | 190 | 180 | 177 | 174 | 202 | 200 | 192 | 187 | 180 | 181 | 185 | 193 | 197 | 189.8 |
| 29-Sep | 216 | 215 | 208 | 201 | 211 | 226 | 218 | 232 | 216 | 193 | 202 | 200 | 217 | 224 | 208 | 215 | 230 | 285 | AF | 228 | 222 | 239 | 196 | 202 | 214.6 |
| 30-Sep | 203 | 215 | 193 | 192 | 213 | 209 | 195 | 205 | 204 | 195 | 166 | 163 | 206 | 203 | 206 | 199 | 254 | 293 | 302 | 303 | 298 | 304 | 299 | 289 | 241.8 |

236.7 233.3 236.5 231.1 231.1 240.6 245.1 256.9 255.1 262.9 268.6 258.1 246.8 255.3 259.1 257.1 264.3 298.9 349.7 284.1 240.4 247.6 248.7 239.1

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
Horizon - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 93 deg on Sep 22 20:00 | Hours of Data: 717 |
| Minimum Value: 4 deg on Sep 23 19:00 | Hours of Missing Data: 3 |
| | Hours of Calibration: 0 |
| | Percent Operational Time: 99.6 |
| Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 15 Median = 20 Q ₃ = 26 P ₉₀ = 43 P ₉₉ = 80 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 11 | 10 | 12 | 13 | 13 | 15 | 15 | 15 | 14 | 16 | 20 | 21 | 23 | 24 | 23 | 22 | 18 | 17 | 17 | 14 | 14 | 13 | 25 | 13 | 25 | |
| 2-Sep | 12 | 12 | 15 | 18 | 16 | 14 | 14 | 16 | 17 | 27 | 23 | 29 | 23 | 25 | 20 | 16 | 25 | 14 | 10 | 28 | 41 | 30 | 13 | 12 | 41 | |
| 3-Sep | 14 | 15 | 12 | 11 | 11 | 16 | 12 | 14 | 15 | 16 | 15 | 18 | 18 | 21 | 17 | 17 | 15 | 27 | 21 | 10 | 8 | 10 | 14 | 8 | 27 | |
| 4-Sep | 16 | 18 | 68 | 29 | 39 | 15 | 10 | 12 | 13 | 17 | 58 | 46 | 34 | 26 | 24 | 26 | 24 | 47 | 73 | 26 | 17 | 12 | 43 | 42 | 73 | |
| 5-Sep | 10 | 12 | 11 | 11 | 14 | 13 | 14 | 17 | 18 | 19 | 21 | 21 | 21 | 22 | 24 | 25 | 19 | 15 | 11 | 7 | 13 | 23 | 14 | 9 | 25 | |
| 6-Sep | 56 | 62 | 27 | 21 | 14 | 29 | 79 | 86 | 43 | 33 | 36 | 57 | 68 | 75 | 33 | 30 | 27 | 20 | 17 | 7 | 18 | 41 | 63 | 74 | 86 | |
| 7-Sep | 54 | 59 | 30 | 14 | 16 | 13 | 16 | 17 | 21 | 20 | 21 | 25 | 19 | 22 | 19 | 19 | 19 | 17 | 16 | 12 | 12 | 13 | 13 | 19 | 59 | |
| 8-Sep | 35 | 14 | 14 | 13 | 16 | 46 | 18 | 19 | 35 | 40 | 25 | 33 | 28 | 26 | 26 | 31 | 11 | 16 | 20 | 66 | 25 | 29 | 26 | 27 | 66 | |
| 9-Sep | 27 | 45 | 18 | 54 | 22 | 84 | 36 | 69 | 25 | 30 | 24 | 21 | 24 | 24 | 22 | 21 | 33 | 21 | 23 | 20 | 21 | 50 | 18 | 16 | 84 | |
| 10-Sep | 17 | 22 | 19 | 17 | 17 | 16 | 27 | 21 | 15 | 16 | 17 | 17 | 19 | 18 | 16 | 16 | 16 | 14 | 27 | 14 | 13 | 36 | 17 | 16 | 36 | |
| 11-Sep | 10 | 11 | 27 | 19 | 11 | 20 | 14 | 16 | 19 | 19 | 22 | 38 | 50 | 48 | 31 | 39 | 48 | 35 | 55 | 44 | 19 | 11 | 19 | 15 | 55 | |
| 12-Sep | 15 | 16 | 19 | 18 | 19 | 18 | 18 | 12 | 12 | 13 | 15 | 15 | 20 | 13 | 17 | 16 | 30 | 19 | 18 | 19 | 18 | 16 | 23 | 17 | 30 | |
| 13-Sep | 21 | 22 | 20 | 22 | 56 | 37 | 55 | 23 | 88 | 46 | 48 | 35 | 80 | 77 | 63 | 70 | 46 | 19 | 49 | 45 | 14 | 16 | 13 | 12 | 88 | |
| 14-Sep | 40 | 44 | 21 | 47 | AF | 18 | 53 | 20 | 34 | 32 | 35 | 71 | 92 | 76 | 47 | 51 | 24 | 20 | 14 | 12 | 22 | 21 | 21 | 21 | 92 | |
| 15-Sep | 21 | AF | 33 | 22 | 12 | 10 | 13 | 17 | 21 | 29 | 31 | 31 | 34 | 30 | 25 | 24 | 27 | 20 | 11 | 8 | 11 | 11 | 13 | 10 | 34 | |
| 16-Sep | 11 | 18 | 12 | 12 | 10 | 10 | 12 | 18 | 20 | 23 | 27 | 21 | 19 | 22 | 22 | 21 | 21 | 20 | 15 | 12 | 14 | 11 | 8 | 13 | 27 | |
| 17-Sep | 8 | 7 | 21 | 33 | 69 | 40 | 17 | 11 | 50 | 41 | 30 | 26 | 25 | 22 | 23 | 25 | 21 | 21 | 20 | 16 | 18 | 17 | 19 | 22 | 69 | |
| 18-Sep | 27 | 47 | 25 | 31 | 26 | 24 | 11 | 15 | 57 | 35 | 34 | 27 | 25 | 30 | 28 | 29 | 23 | 22 | 17 | 11 | 14 | 16 | 20 | 33 | 57 | |
| 19-Sep | 39 | 15 | 14 | 15 | 17 | 20 | 18 | 19 | 20 | 20 | 20 | 20 | 21 | 21 | 19 | 19 | 25 | 18 | 16 | 16 | 16 | 16 | 17 | 19 | 39 | |
| 20-Sep | 20 | 20 | 20 | 20 | 21 | 21 | 20 | 20 | 21 | 20 | 20 | 21 | 18 | 20 | 20 | 20 | 19 | 19 | 20 | 19 | 20 | 20 | 21 | 20 | 21 | 21 |
| 21-Sep | 19 | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 22 | 22 | 22 | 21 | 22 | 21 | 23 | 22 | 22 | 20 | 21 | 18 | 20 | 13 | 38 | 27 | 38 | |
| 22-Sep | 14 | 24 | 21 | 14 | 11 | 15 | 15 | 17 | 21 | 26 | 31 | 32 | 41 | 45 | 27 | 28 | 24 | 22 | 20 | 93 | 61 | 9 | 10 | 46 | 93 | |
| 23-Sep | 28 | 16 | 13 | 11 | 13 | 17 | 12 | 21 | 27 | 27 | 20 | 81 | 53 | 46 | 40 | 34 | 29 | 18 | 4 | 19 | 56 | 58 | 21 | 16 | 81 | |
| 24-Sep | 10 | 10 | 11 | 13 | 11 | 13 | 12 | 14 | 19 | 23 | 42 | 46 | 46 | 28 | 32 | 31 | 27 | 18 | 14 | 41 | 62 | 15 | 12 | 12 | 62 | |
| 25-Sep | 18 | 11 | 13 | 20 | 16 | 19 | 12 | 15 | 17 | 23 | 30 | 25 | 23 | 23 | 36 | 33 | 55 | 45 | 34 | 23 | 20 | 12 | 15 | 17 | 55 | |
| 26-Sep | 12 | 13 | 15 | 22 | 16 | 14 | 13 | 12 | 15 | 25 | 14 | 19 | 14 | 16 | 13 | 14 | 15 | 11 | 10 | 12 | 44 | 56 | 16 | 20 | 56 | |
| 27-Sep | 23 | 19 | 19 | 15 | 10 | 15 | 74 | 51 | 22 | 34 | 30 | 27 | 25 | 30 | 22 | 19 | 20 | 19 | 18 | 18 | 17 | 18 | 19 | 16 | 74 | |
| 28-Sep | 18 | 16 | 22 | 19 | 18 | 15 | 18 | 53 | 48 | 21 | 27 | 32 | 26 | 24 | 23 | 20 | 17 | 15 | 12 | 14 | 15 | 15 | 14 | 16 | 53 | |
| 29-Sep | 12 | 8 | 14 | 12 | 9 | 12 | 14 | 13 | 17 | 24 | 20 | 20 | 27 | 24 | 24 | 22 | 27 | 14 | AF | 15 | 7 | 17 | 12 | 10 | 27 | |
| 30-Sep | 12 | 21 | 18 | 10 | 11 | 20 | 10 | 13 | 19 | 23 | 30 | 32 | 26 | 23 | 21 | 18 | 49 | 11 | 8 | 9 | 11 | 10 | 14 | 12 | 49 | |

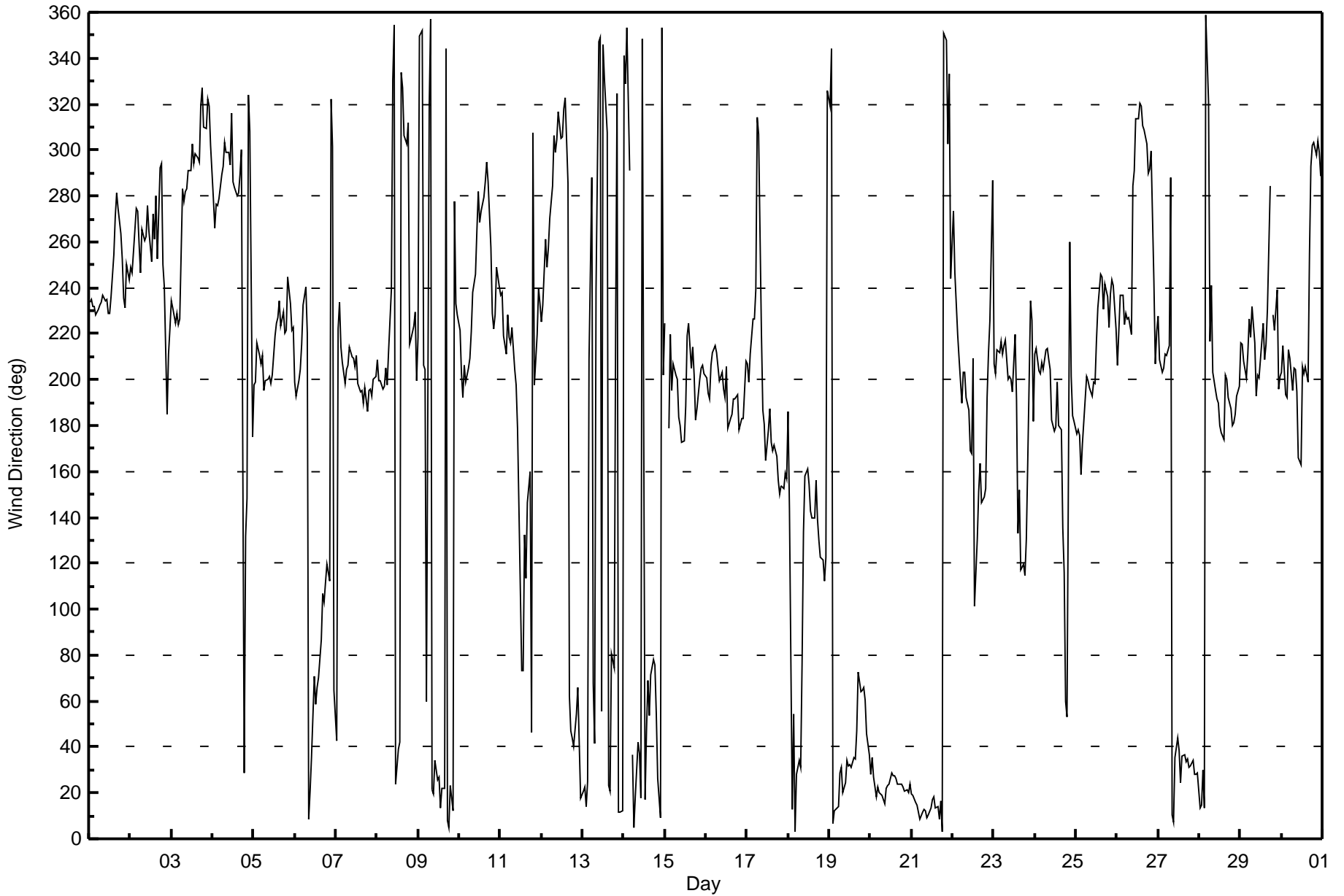
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 56 | 62 | 68 | 54 | 69 | 84 | 79 | 86 | 88 | 46 | 58 | 81 | 92 | 77 | 63 | 70 | 55 | 47 | 73 | 93 | 62 | 58 | 63 | 74 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Horizon - September 2017





Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Horizon | Station number: | AMS 15 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 8:30 | End time (MST): | 12:51 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|-------------------|-----|------------------|--------------|
| Cal Gas Concentration | <u>50.9</u> | ppm | Cal Gas Exp Date | May 22, 2020 |
| Cal Gas Cylinder # | <u>EY0000368</u> | | | |
| Calibrator Make/Model | Teledyne API T700 | | Serial Number | 1223 |
| ZAG Make/Model | Teledyne API 701 | | Serial Number | 1004 |

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 710321322

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -623 | -623 |
| Calculated slope | 1.002847 | 1.002728 | Lamp voltage | 870 | 870 |
| Calculated intercept | -0.138721 | -1.277851 | Pressure | 701.1 | 702.4 |
| Analyzer Background | 19.1 | 19.1 | Flow | 0.550 | 0.552 |
| Analyzer Coefficient | 0.960 | 0.956 | Intensity | 91 | 91 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5080 | 0.0 | 0.0 | 1.0 | ---- |
| as found span | 5012 | 75.8 | 758.3 | 759.2 | 0.999 |
| calibrator zero | 5080 | 0.0 | 0.0 | 1.0 | ---- |
| high point | 5012 | 75.8 | 758.3 | 758.0 | 1.000 |
| second point | 5045 | 37.8 | 378.5 | 377.1 | 1.004 |
| third point | 5070 | 18.8 | 188.0 | 190.3 | 0.988 |
| as left zero | 5080 | 0.0 | 0.0 | 0.8 | ---- |
| as left span | 5012 | 75.8 | 758.3 | 756.9 | 1.002 |
| Average Correction Factor | | | | | 0.997 |
| Corrected As found | 758.20 | Previous response | 756.31 | *% change | -0.2% |

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfound. Adjusted the span.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association

SO₂ Calibration Summary

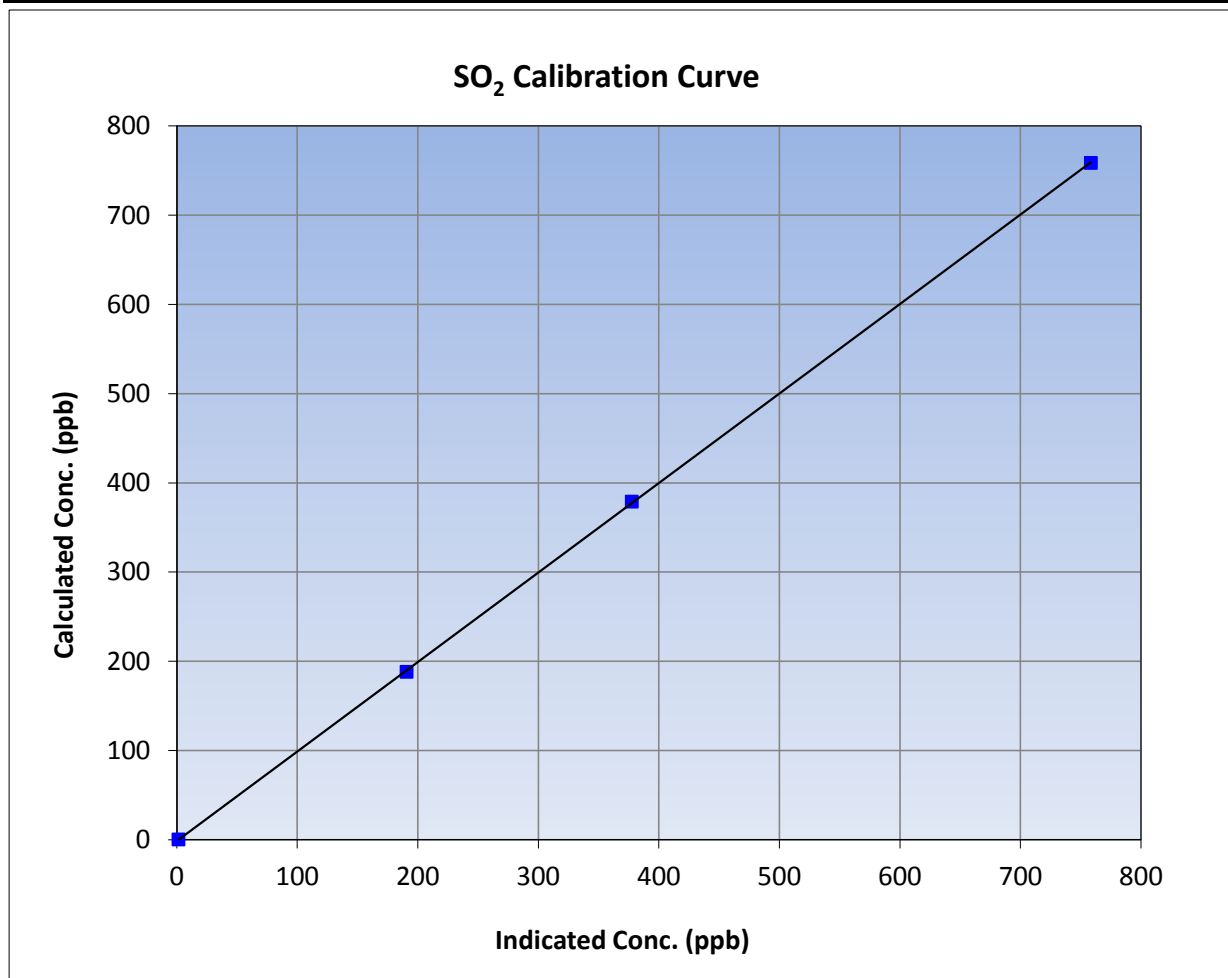
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:51 |
| Analyzer make | Thermo 43i | Analyzer serial # | 710321322 |

Calibration Data

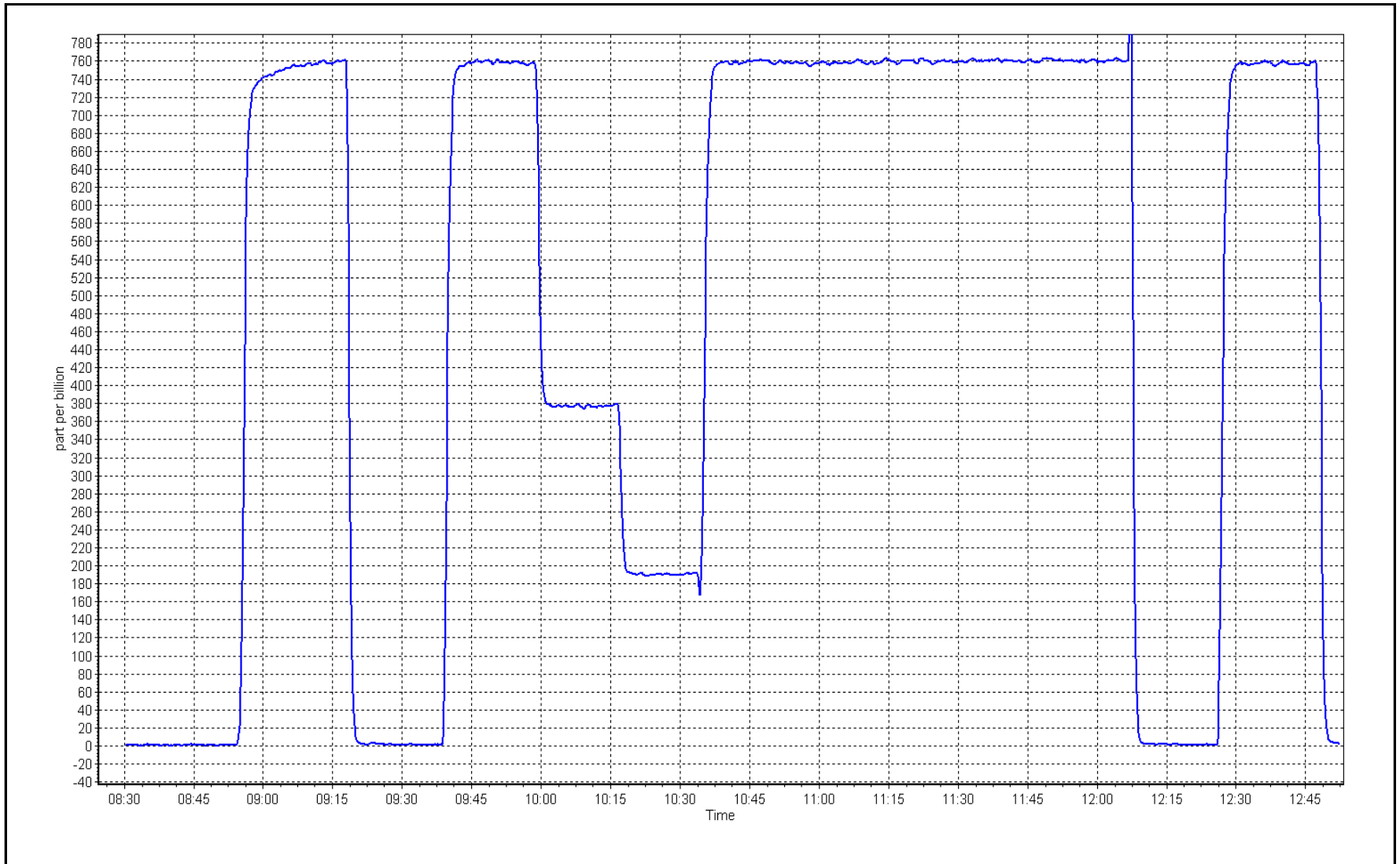
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 1.0 | ---- | Correlation Coefficient | 0.999983 | |
| 758.3 | 758.0 | 1.0004 | | | ≥0.995 |
| 378.5 | 377.1 | 1.0038 | Slope | 1.002728 | |
| 188.0 | 190.3 | 0.9881 | | | 0.90 - 1.10 |
| | | | Intercept | -1.277851 | +/-30 |



SO2 Calibration Plot

Date: September 19, 2017

Location: Horizon





Wood Buffalo Environmental Association

TRS Calibration Summary

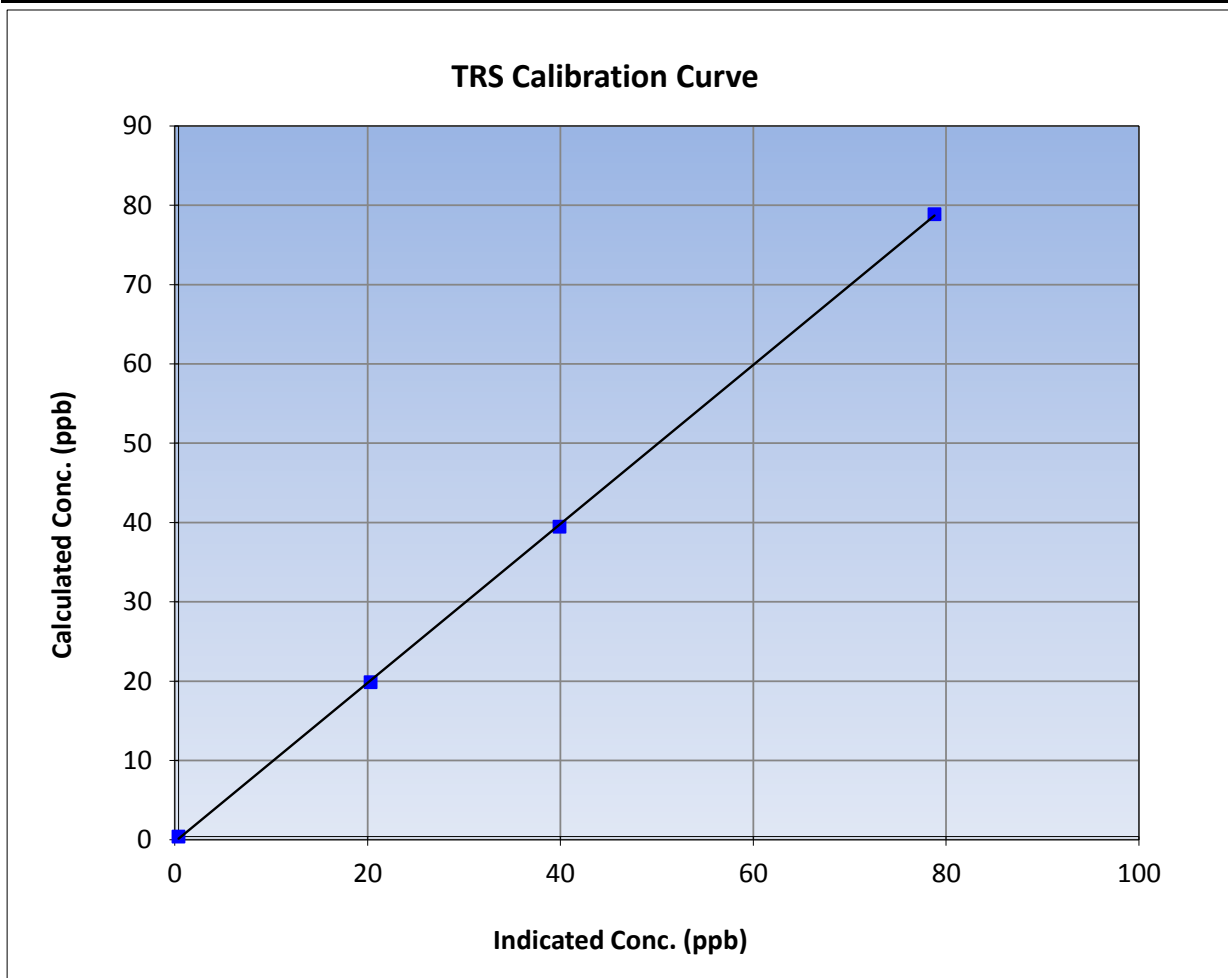
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 8, 2017 |
| Station Name | Horizon | Station Number | AMS 15 |
| Start Time (MST) | 9:02 | End Time (MST) | 12:07 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1151680032 |

Calibration Data

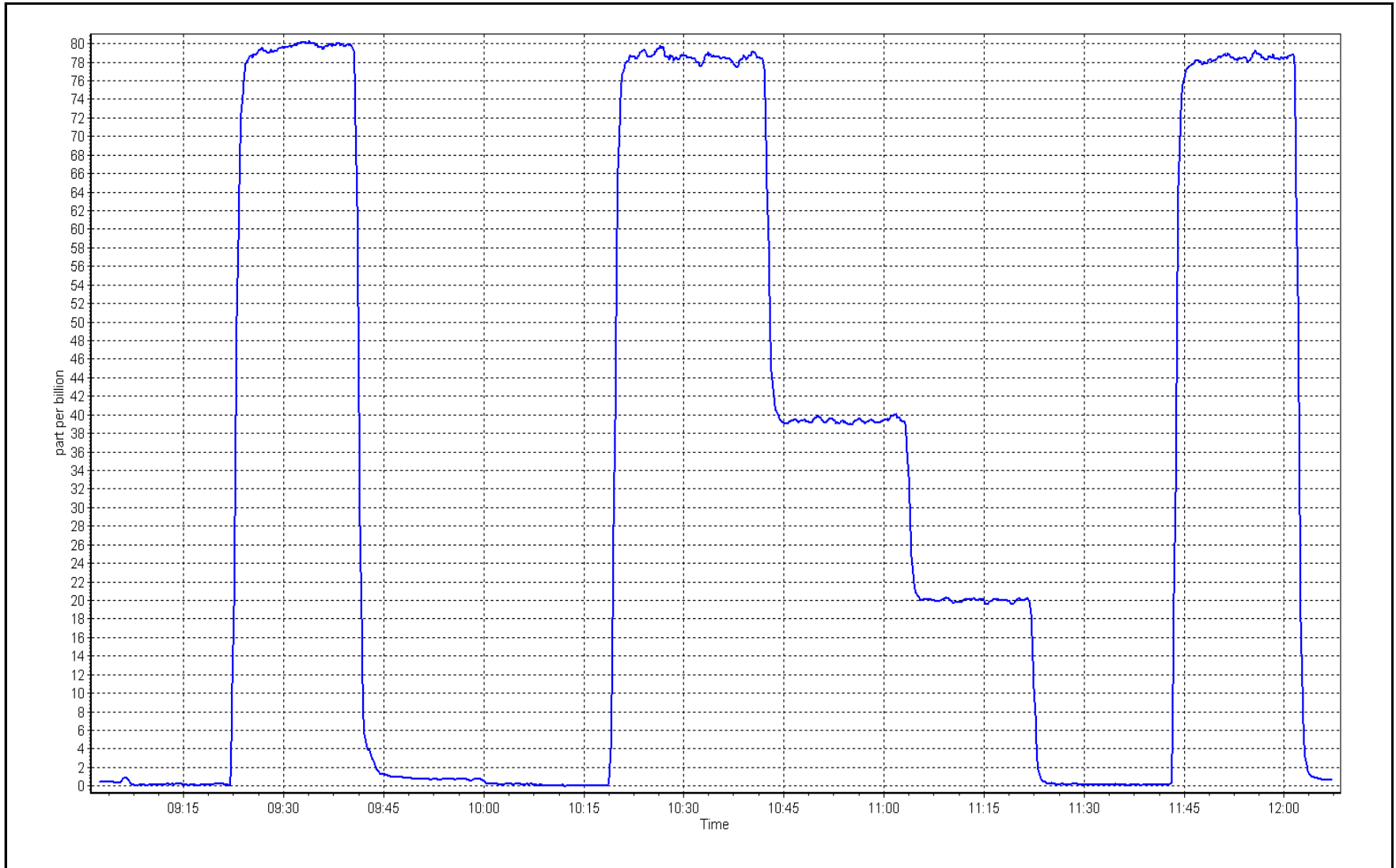
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999941 | ≥0.995 |
| 78.5 | 78.4 | 1.0010 | | | |
| 39.1 | 39.5 | 0.9894 | Slope | 1.002259 | 0.90 - 1.10 |
| 19.5 | 19.9 | 0.9789 | | | |
| | | | Intercept | -0.267064 | +/-3 |



TRS Calibration Plot

Date: September 18, 2017

Location: Horizon





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Horizon | Station number: | AMS 15 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 8:30 | End time (MST): | 14:49 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|-------------------|---------------------|--------------|
| Gas Cert Reference | EY0000368 | Cal Gas Expiry Date | May 22, 2020 |
| CH4 Cal Gas Conc. | <u>506.0</u> ppm | CH4 Equiv Conc. | 1067.0 ppm |
| C3H8 Cal Gas Conc. | <u>204.0</u> ppm | Station temp. | Deg C |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 1223 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 1004 |

Analyzer Information

| | | | |
|----------------------|--------------|---------------------|---------------|
| Analyzer make: | Thermo 51-LT | Analyzer serial #: | 1327059295 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -300 |
| Calculated slope | 1.006883 | Sample pressure | 8.8 |
| Calculated intercept | -0.079167 | Fuel pressure | 26.3 |
| Analyzer Background | 2.14 | Air pressure | 38.0 |
| Analyzer Coefficient | 3.211 | Flame temperature | 154.7 |
| | | | <u>Finish</u> |
| | | | -300 |
| | | | 8.7 |
| | | | 26.3 |
| | | | 38.0 |
| | | | 155.0 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5080 | 0.0 | 0.00 | -0.01 | ---- |
| as found span | 5012 | 75.8 | 15.90 | 15.86 | 1.002 |
| calibrator zero | 5080 | 0.0 | 0.00 | -0.01 | ---- |
| high point | 5012 | 75.8 | 15.90 | 15.86 | 1.002 |
| second point | 5040 | 37.8 | 7.94 | 7.94 | 1.000 |
| third point | 5070 | 18.8 | 3.94 | 4.05 | 0.973 |
| as left zero | 5080 | 0.0 | 0.00 | 0.14 | ---- |
| as left span | 5012 | 75.8 | 15.90 | 15.95 | 0.997 |
| Average Correction Factor | | | | | 0.992 |
| Corrected As found | 15.87 | Previous response | 15.87 | *% change | 0.0% |

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfound. Installed new hydrogen cylinder. No adjustments made.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

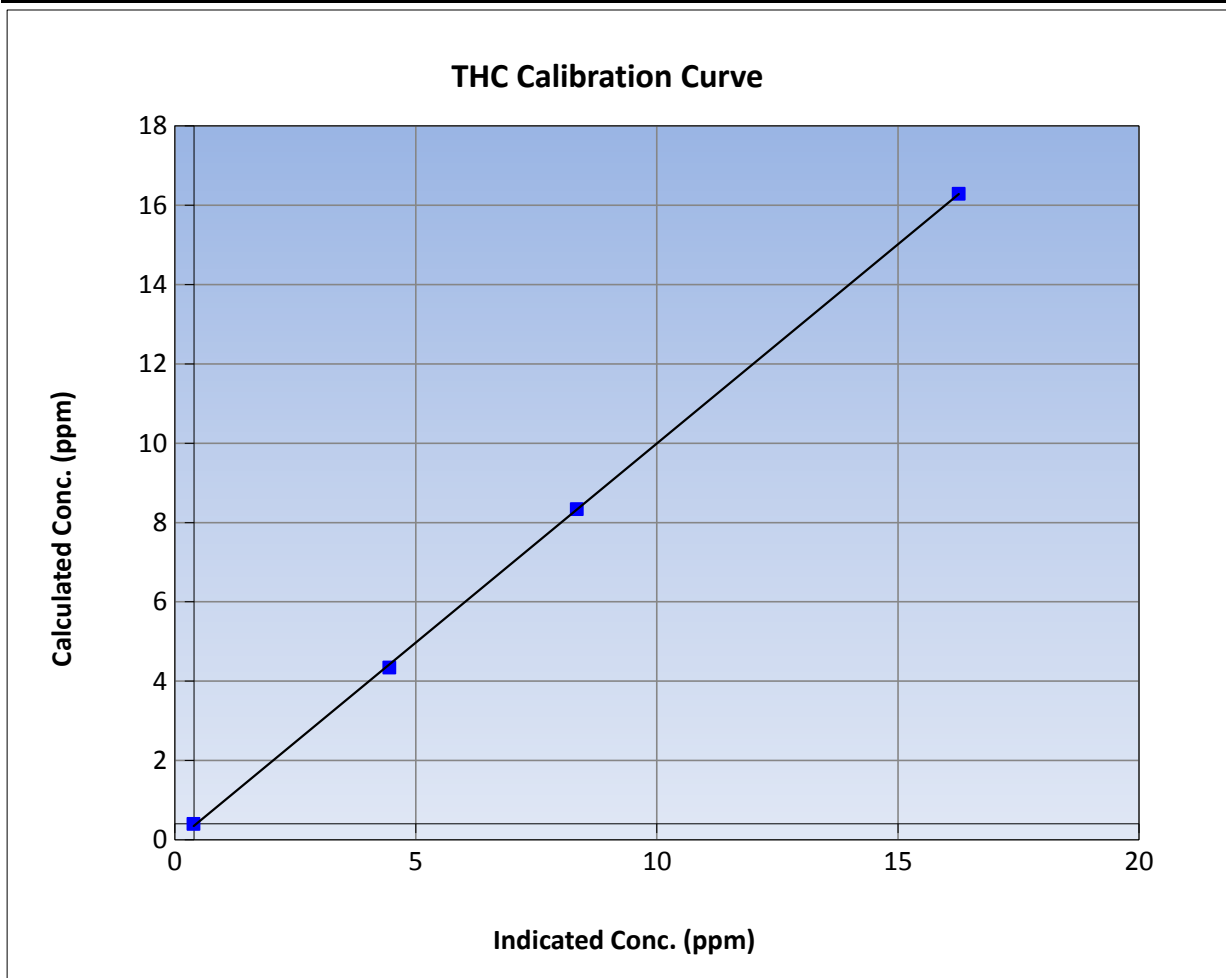
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:47 | End Time (MST) | 14:49 |
| Analyzer make | Thermo 51-LT | Analyzer serial # | 1327059295 |

Calibration Data

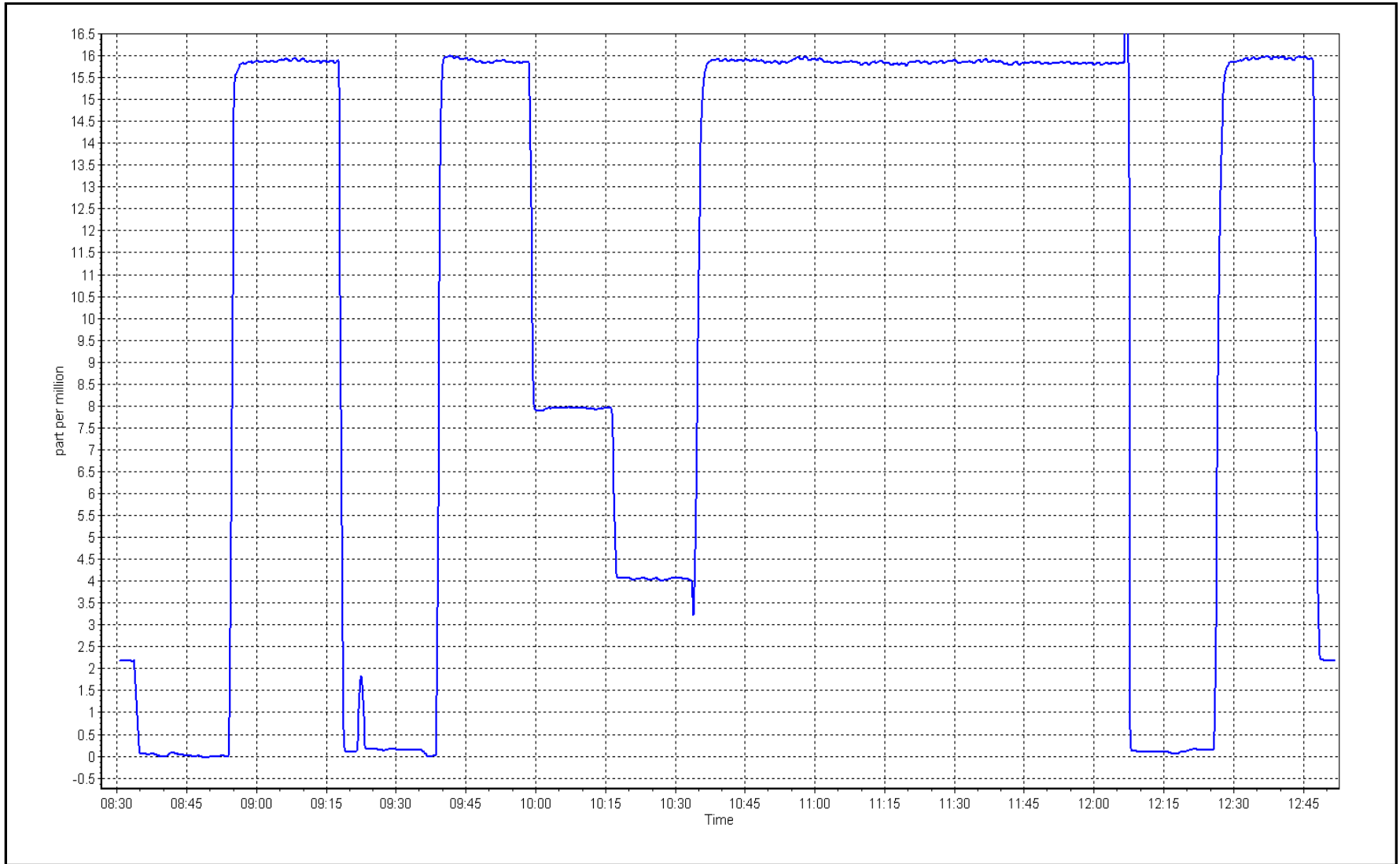
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999930 | |
| 15.9 | 15.9 | 1.0021 | | | ≥0.995 |
| 7.9 | 7.9 | 1.0004 | Slope | 1.004034 | |
| 3.9 | 4.1 | 0.9733 | | | 0.90 - 1.10 |
| | | | Intercept | -0.043725 | +/-1.5 |



THC Calibration Plot

Date: September 19, 2017

Location: Horizon





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Horizon | Station number: | AMS 15 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 8:30 | End time (MST): | 12:51 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-----------------|
| NO Gas Cylinder # | EY0000368 | Cal Gas Expiry Date | May 22, 2020 |
| NOX Cal Gas Conc. | <u>52.6</u> ppb | NO Cal Gas Conc. | <u>52.6</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 1223 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1004 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 710321429 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.208 | 1.187 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.999 | 0.999 | PMT Temperature | -3.0 | -3.0 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 179.1 | 178.8 |
| NO bkgrnd | 14.1 | 13.9 | Sample Flow | 0.630 | 0.622 |
| NOX bkgrnd | 14.0 | 14.1 | PMT Voltage | -779.2 | -779.2 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.001537 | 1.003998 |
| NO _x Cal Offset | -1.441742 | -0.504556 |
| NO Cal Slope | 1.002459 | 1.001998 |
| NO Cal Offset | -1.482737 | -0.322558 |
| NO ₂ Cal Slope | 1.002469 | 0.999462 |
| NO ₂ Cal Offset | -0.522386 | 0.552798 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5080 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 0.2 | 0.0 | ---- | ---- |
| as found span | 5012 | 75.8 | 783.7 | 783.7 | 0.0 | 800.5 | 800.1 | 0.4 | 0.9790 | 0.9794 |
| calibrator zero | 5080 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | -0.2 | ---- | ---- |
| high point | 5012 | 75.8 | 783.7 | 783.7 | 0.0 | 781.3 | 783.0 | -1.7 | 1.0030 | 1.0008 |
| second point | 5040 | 37.8 | 391.6 | 391.6 | 0.0 | 389.1 | 389.1 | 0.0 | 1.0063 | 1.0063 |
| third point | 5070 | 18.8 | 194.3 | 194.3 | 0.0 | 195.8 | 195.9 | -0.1 | 0.9925 | 0.9920 |
| as left zero | 5080 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 3.2 | 0.1 | ---- | ---- |
| as left span | 5012 | 75.8 | 783.7 | 350.9 | 432.8 | 771.6 | 349.9 | 421.6 | 1.0156 | 1.0029 |
| Average Correction Factor | | | | | | | | | 1.0006 | 0.9997 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 800.7 ppb | NO = 799.9 ppb | | *Percent Change | NO _x = -2.1% |
| Previous Response | NO _x = 783.9 ppb | NO = 783.2 ppb | | *Percent Change | NO = -2.1% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 778.0 | 777.0 | 1.0 | 1.0073 | 1.0086 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 350.9 | 426.1 | 776.9 | 350.9 | 426.0 | 1.0087 | ---- | 1.0002 | 100.0% |
| 2nd NO2 (200 ppb O3) | 554.8 | 222.2 | 776.3 | 554.8 | 221.5 | 1.0095 | ---- | 1.0032 | 99.7% |
| 3rd NO2 (100 ppb O3) | 659.7 | 117.3 | 776.2 | 659.7 | 116.5 | 1.0096 | ---- | 1.0069 | 99.3% |
| 2nd NO ref point | ---- | 0.0 | 778.1 | 776.7 | 1.5 | 1.0071 | 1.0090 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0087 | 1.0088 | 1.0034 | 99.7% |

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

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

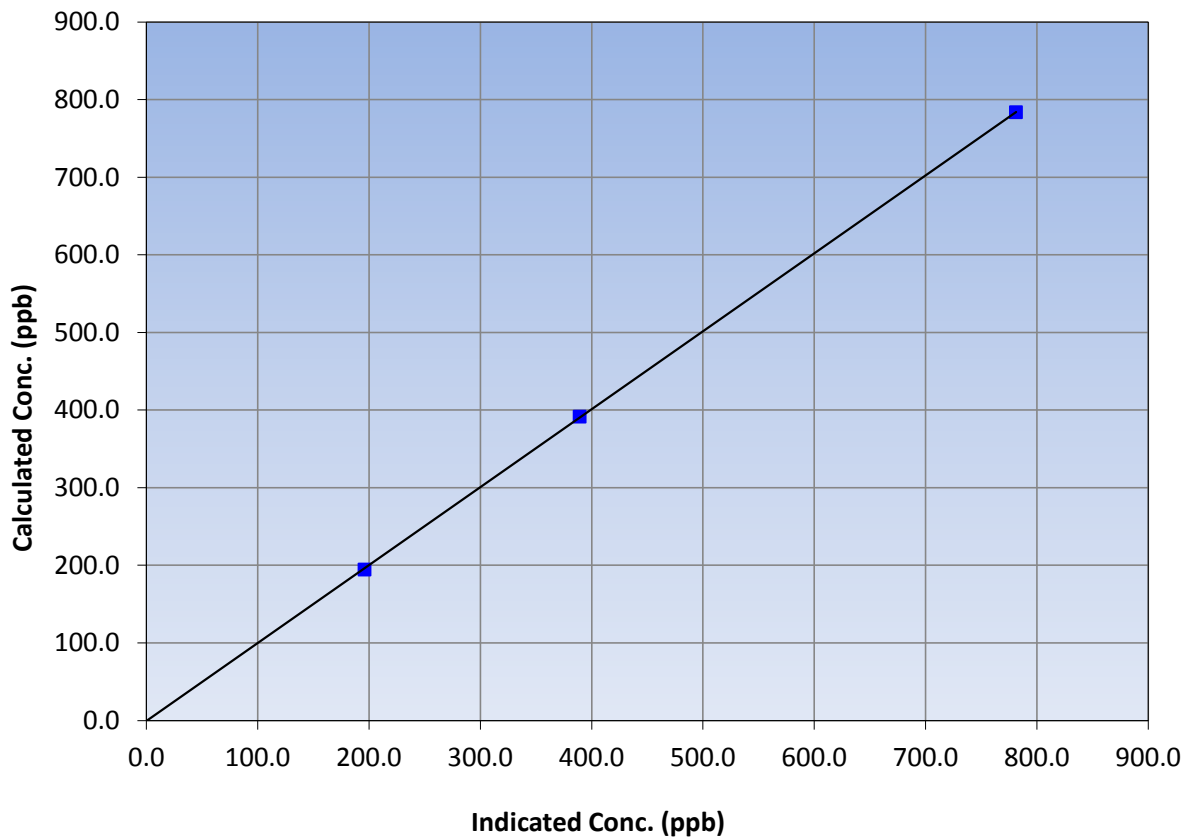
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:51 |
| Analyzer make | Thermo 42i | Analyzer serial # | 710321429 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 783.7 | 781.3 | 1.0030 | | | |
| 391.6 | 389.1 | 1.0063 | | | |
| 194.3 | 195.8 | 0.9925 | | | |
| | | | Slope | 1.003998 | 0.90 - 1.10 |
| | | | Intercept | -0.504556 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

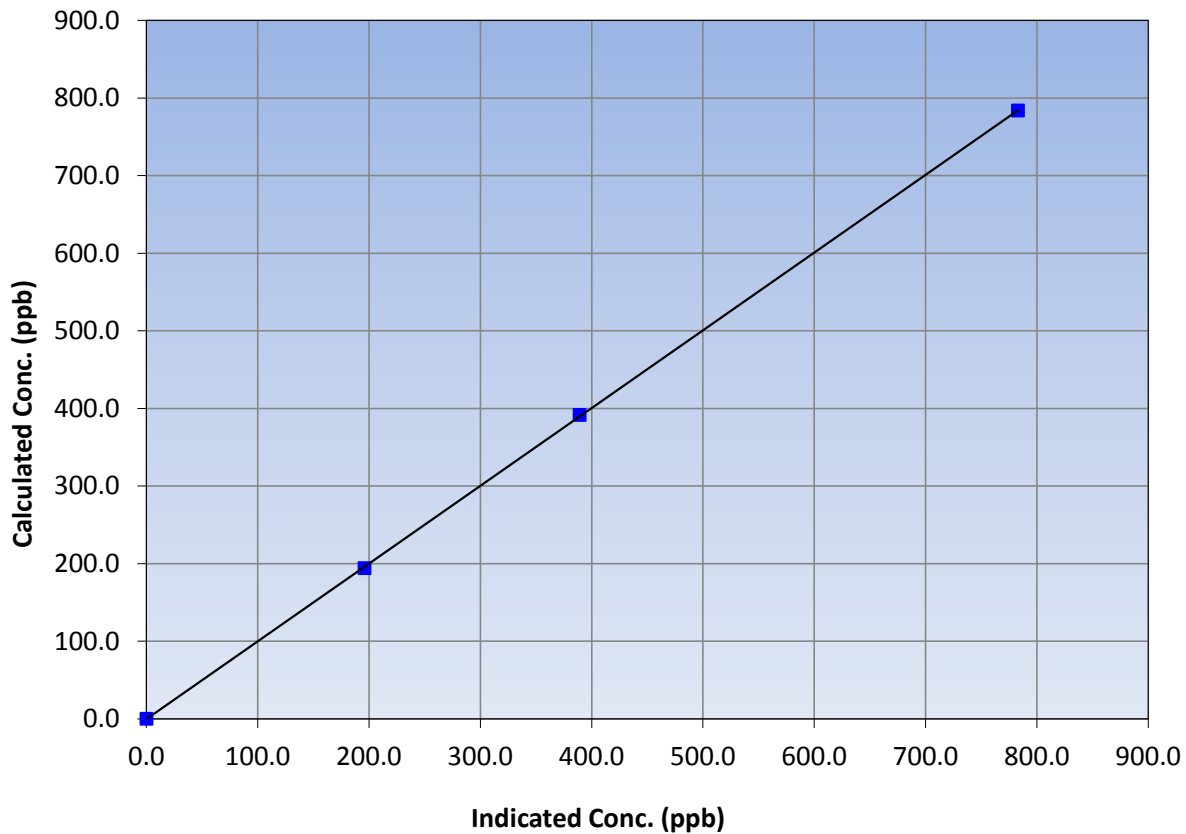
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:51 |
| Analyzer make | Thermo 42i | Analyzer serial # | 710321429 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 783.7 | 783.0 | 1.0008 | | | |
| 391.6 | 389.1 | 1.0063 | | | |
| 194.3 | 195.9 | 0.9920 | | | |
| | | | Slope | 1.001998 | 0.90 - 1.10 |
| | | | Intercept | -0.322558 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

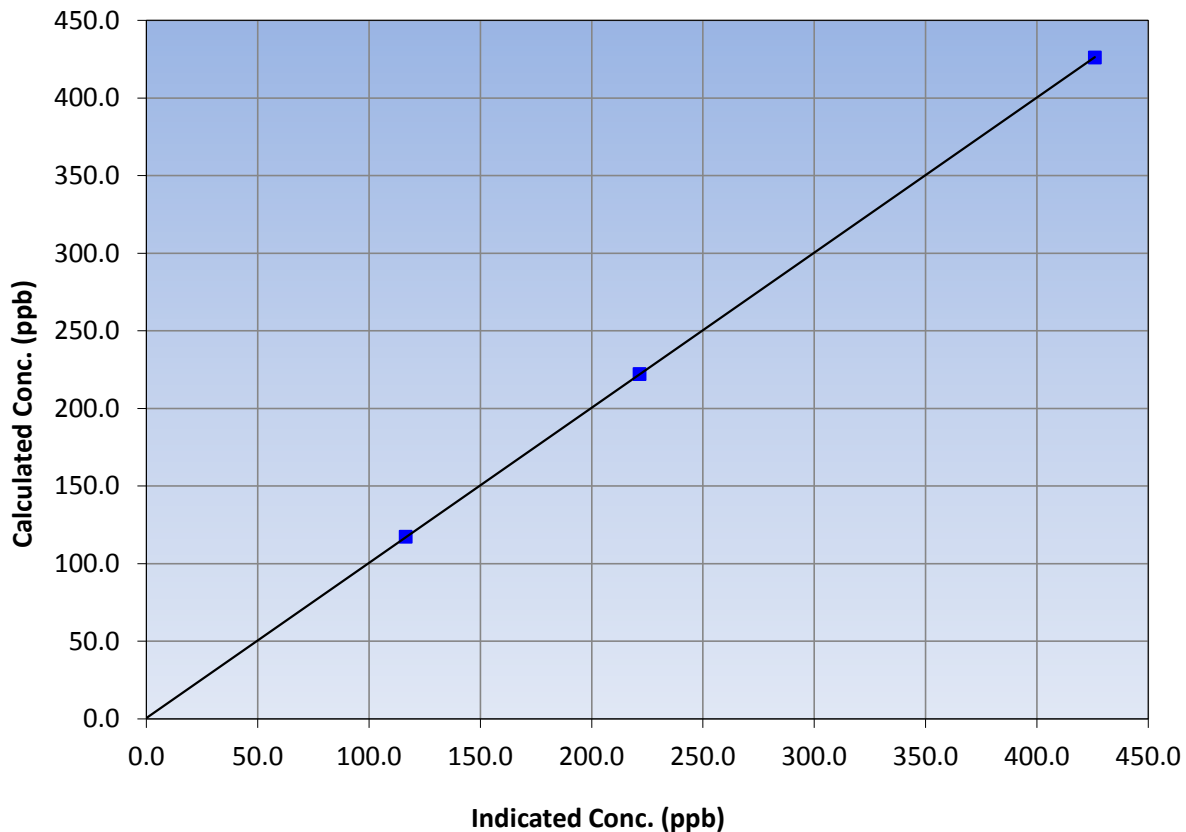
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:30 | End Time (MST) | 12:51 |
| Analyzer make | Thermo 42i | Analyzer serial # | 710321429 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 426.1 | 426.0 | 1.0002 | | | |
| 222.2 | 221.5 | 1.0032 | | | |
| 117.3 | 116.5 | 1.0069 | | | |
| | | | Slope | 0.999462 | 0.90 - 1.10 |
| | | | Intercept | 0.552798 | +/-20 |

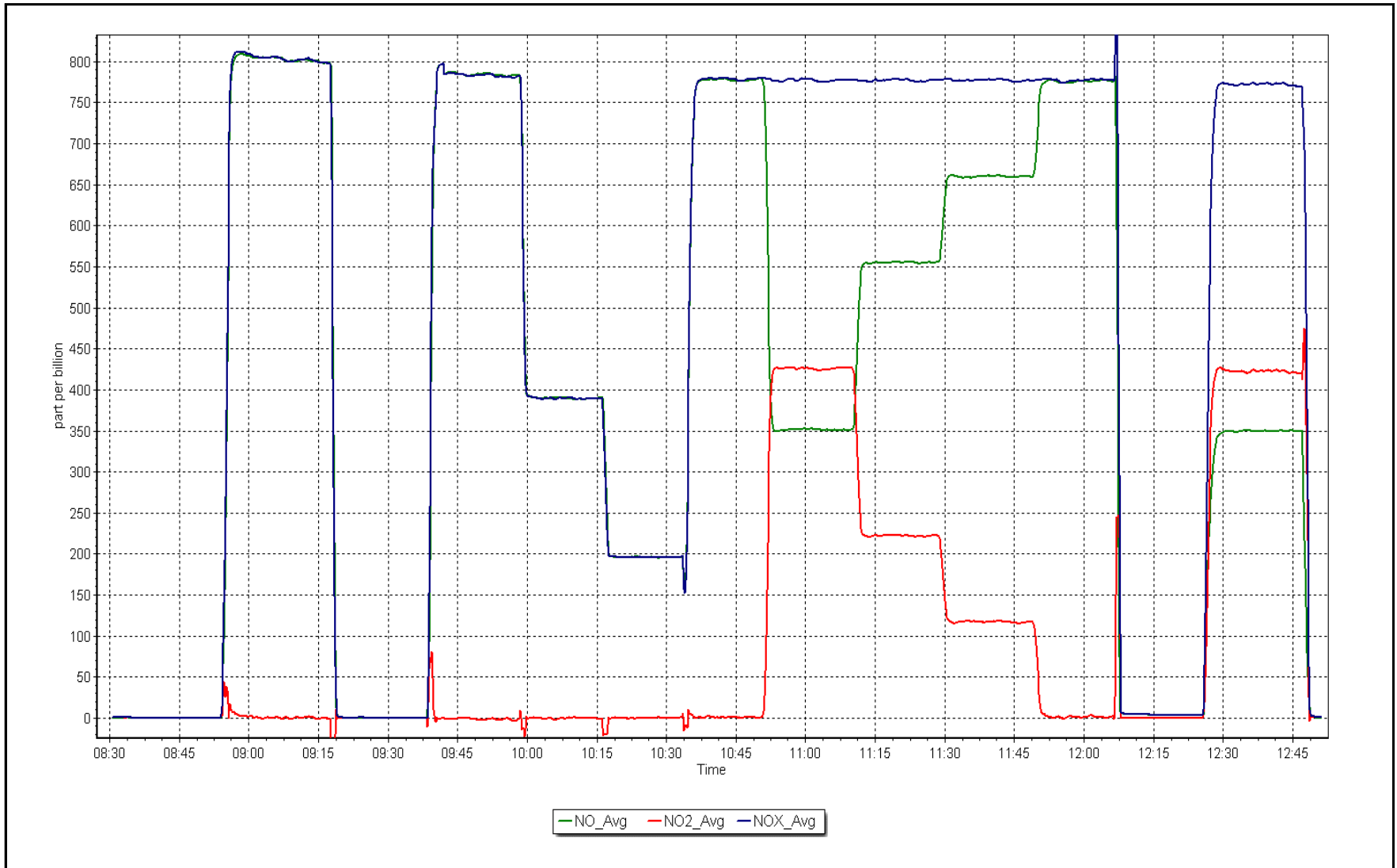
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 19, 2017

Location: Horizon





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|-----------------|
| Station Name: | Horizon | Station number: | AMS 15 |
| Calibration Date: | September 18, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 9:50 | End time (MST): | 10:45 |
| Sharp Model: | 5030 | S/N: | E-2020 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 7409 |
| Flow Meter Make/Model: | Delta cal | S/N: | 628 |
| Temp/RH standard: | NA | S/N: | NA |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 12.5 | 12.0 | 12.5 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 967 | 969 | 967 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000.0 | 1000.0 | 1000.0 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | -0.3 | ----- | -0.1 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

| | | | | |
|------------|-------------------|---------------------------|------------------|---------------------|
| Leak Test: | Date of check: | <u>September 18, 2017</u> | Last Cal Date: | <u>May 12, 2017</u> |
| | Flow w/o adaptor: | <u>16.66</u> | Flow w/ adaptor: | <u>16.57</u> |

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-----------------------------------|--|---|-----------------|
| <input type="checkbox"/> | Foil S/N: <u>2022</u> | Foil S/N: <u>2022</u> | |
| Foil Calibration | Foil Mass: <u>1507</u> | Foil Mass: <u>2395</u> | |
| | Calibration Date: <u>July 21, 2017</u> | Calibration Date: <u>February 6, 2017</u> | |
| (Limit) +/- 5% of previous | Correction Factor: <u>7016</u> | Correction Factor: <u>7041</u> | -0.36% |

Annual Calibration Test

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

Notes: Completed leak check. Adjusted nephelometer. Cyclone head cleaned at site.

Calibration by: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 16
MUSKEG RIVER
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 682 | 35 | 38 | 99.58 | 23 | 0 | 4 | 0 |
| THC (ppm) Average | 682 | 35 | 38 | 99.58 | 6.5 | - | 3.1 | - |
| NO2 (ppb) Average | 682 | 35 | 38 | 99.58 | 37 | 0 | 21 | - |
| NO (ppb) Average | 682 | 35 | 38 | 99.58 | 176 | - | 45 | - |
| NOX (ppb) Average | 682 | 35 | 38 | 99.58 | 203 | - | 66 | - |
| PM2.5 (ug/m3) Average | 711 | 2 | 9 | 99.03 | 47.1 | - | 17.9 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 31.6 | - | 21 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 99 | - | 89 | - |
| Barometric Pressure (inHg) Average | 720 | 0 | 0 | 100 | 29.3 | - | 29.2 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 38 | - | 30 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MUSKEG RIVER (AMS 16)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|------------------------------------|--------|-------|--------|-------|------------|------|------|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 682 | 0.9 | 2 | - | 0 | 0 | 0 | 0 | 1 | 2 | 23 |
| THC (ppm) Average | 682 | 2.41 | 0.4 | - | 1.9 | 2.1 | 2.2 | 2.3 | 2.5 | 2.8 | 6.5 |
| NO2 (ppb) Average | 682 | 6.9 | 7 | - | 0 | 1 | 2 | 5 | 10 | 17 | 37 |
| NO (ppb) Average | 682 | 5.2 | 13 | - | 0 | 0 | 0 | 0 | 5 | 14 | 176 |
| NOX (ppb) Average | 682 | 12 | 18 | - | 0 | 1 | 2 | 6 | 15 | 28 | 203 |
| PM2.5 (ug/m3) Average | 711 | 6.88 | 6.8 | - | 0.2 | 1.4 | 2.6 | 4.8 | 8.7 | 15.2 | 47.1 |
| Temperature 2 m (C) Average | 720 | 11.47 | 6.3 | - | -3.1 | 3.9 | 7 | 10.6 | 15.6 | 20.4 | 31.6 |
| Relative Humidity (%) Average | 720 | 70 | 20 | - | 23 | 37 | 56 | 73 | 86 | 95 | 99 |
| Barometric Pressure (inHg) Average | 720 | 28.83 | 0.2 | - | 28.4 | 28.6 | 28.7 | 28.8 | 29 | 29.1 | 29.3 |
| Wind Speed 10 m (km/h) Average | 720 | 11.2 | 7 | - | 1 | 5 | 6 | 9 | 15 | 21 | 38 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MUSKEG RIVER (AMS 16)
 SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|------------------------|-------------------|-------------------|---------------------|---|
| NO2, NO, NOX, SO2, THC | 26 Sep 2017 00:00 | 26 Sep 2017 02:00 | 3 | Station power failure |
| PM2.5 | 11 Sep 2017 16:00 | 11 Sep 2017 16:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 12 Sep 2017 01:00 | 12 Sep 2017 04:00 | 4 | Unstable operation - excessive baseline drift |
| PM2.5 | 26 Sep 2017 00:00 | 26 Sep 2017 01:00 | 2 | Station power failure |



| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 23 ppb on Sep 16 11:00 | Maximum Daily Average: 4.3 ppb on Sep 24 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.0 ppb on Sep 1 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 3.6 ppb at hour 11 | Minimum Diurnal Average: 0.1 ppb at hour 6 | | Hours of Calibration: | 35 |
| Monthly Average: 0.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 13 | | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 1.1 | 19 |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 1 | 1 | 4 | 5 | 6 | 5 | 2 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 1.7 | 6 |
| 5-Sep | 0 | 0 | Z | 1 | 1 | 0 | 0 | 2 | 11 | 4 | 2 | 6 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 11 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 6 | 12 | 11 | 9 | 7 | 6 | 3 | 1 | 1 | 1 | 1 | 4 | 4 | 3 | 3 | 2 | 3.4 | 12 |
| 8-Sep | 1 | 2 | 2 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 9-Sep | 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 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 2 | 1 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 3 |
| 13-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 5 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 6 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 9 | 23 | 3 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 23 |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 2 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 18-Sep | 0 | 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-Sep | 0 | 0 | 1 | 0 | Z | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 20-Sep | 0 | 0 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 |
| 21-Sep | 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 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 3 | 2 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 8 | 22 | 12 | 7 | 16 | 10 | 10 | 6 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 4.3 | 22 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 4 | 5 | 17 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 17 |
| 26-Sep | PF | PF | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 11 | 6 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1.7 | 11 |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 11 | 8 | 6 | 8 | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 11 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 4 | 14 | 14 | 3 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 14 |

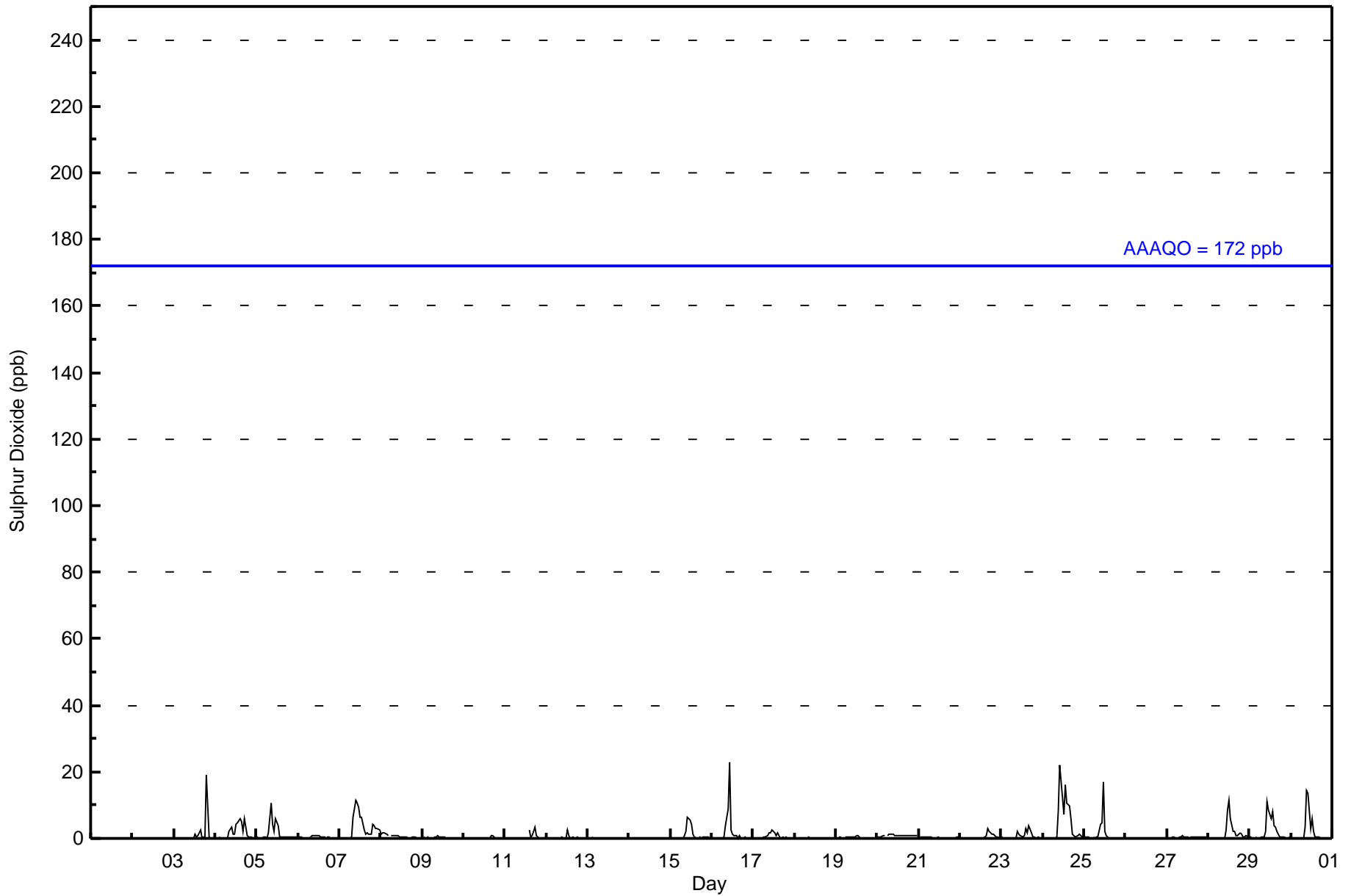
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.3 | 1.2 | 2.4 | 3.6 | 2.8 | 2.2 | 1.8 | 1.3 | 1.1 | 0.9 | 0.7 | 0.4 | 1.0 | 0.3 | 0.3 | 0.3 | 0.2 | Diurnal Average | |
| 1 | 2 | 2 | 1 | 1 | 0 | 1 | 2 | 11 | 14 | 23 | 17 | 11 | 16 | 10 | 10 | 6 | 6 | 2 | 19 | 4 | 3 | 3 | 2 | Diurnal Maximum | |

Z - zerspan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Muskeg River - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Muskeg River - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 669 | 98.09 | 98.09 |
| 11 - 20 | 11 | 1.61 | 99.71 |
| 21 - 60 | 2 | 0.29 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Muskeg River - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 25 | 49 | 51 | 16 | 10 | 11 | 18 | 55 | 147 | 88 | 49 | 53 | 32 | 19 | 27 | 19 | 669 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 11 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 49 | 51 | 16 | 10 | 11 | 18 | 55 | 156 | 90 | 50 | 53 | 32 | 19 | 28 | 19 | 682 |

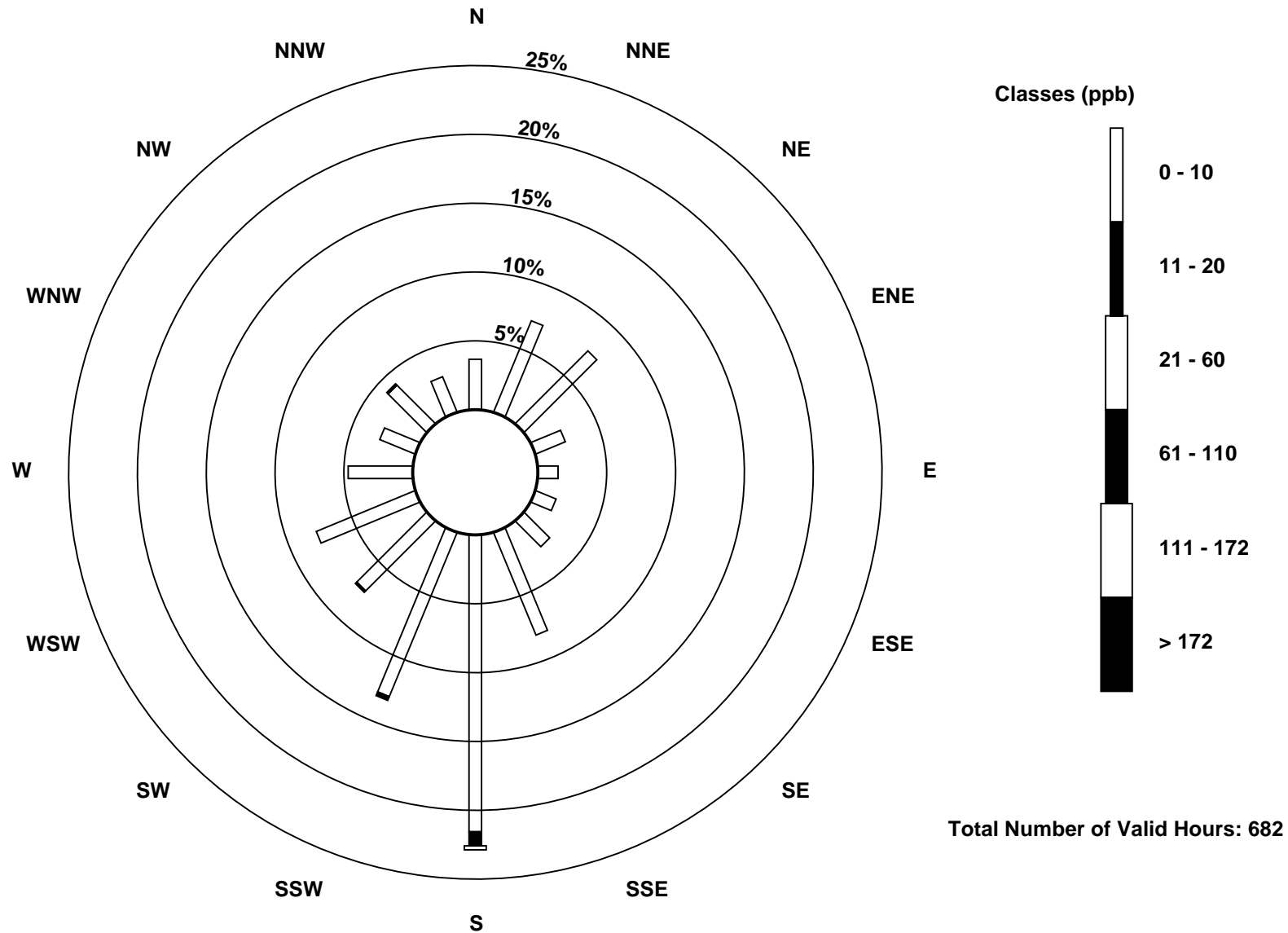
Total Number of Valid Hours: 682

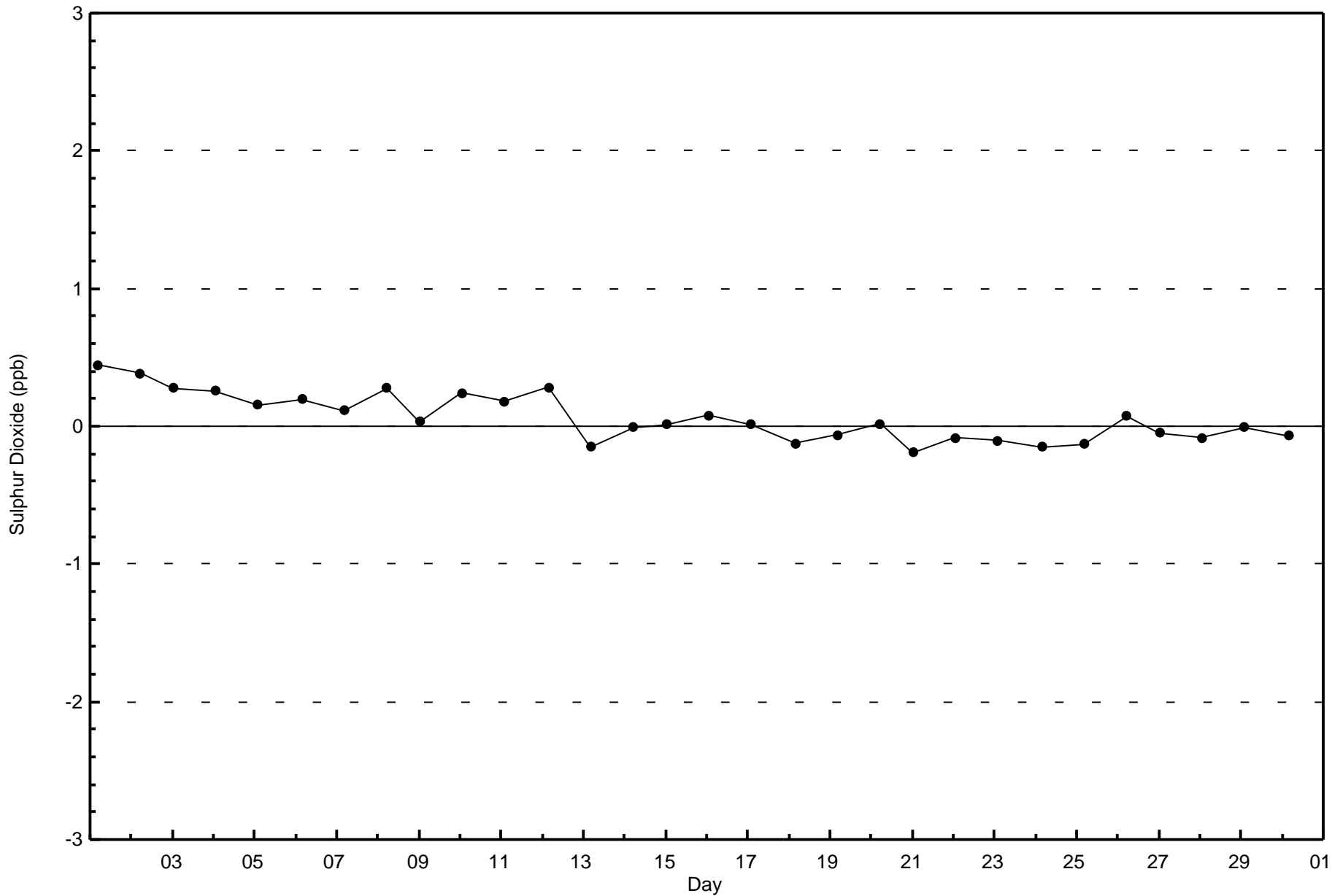
Total Number of Hours: 720

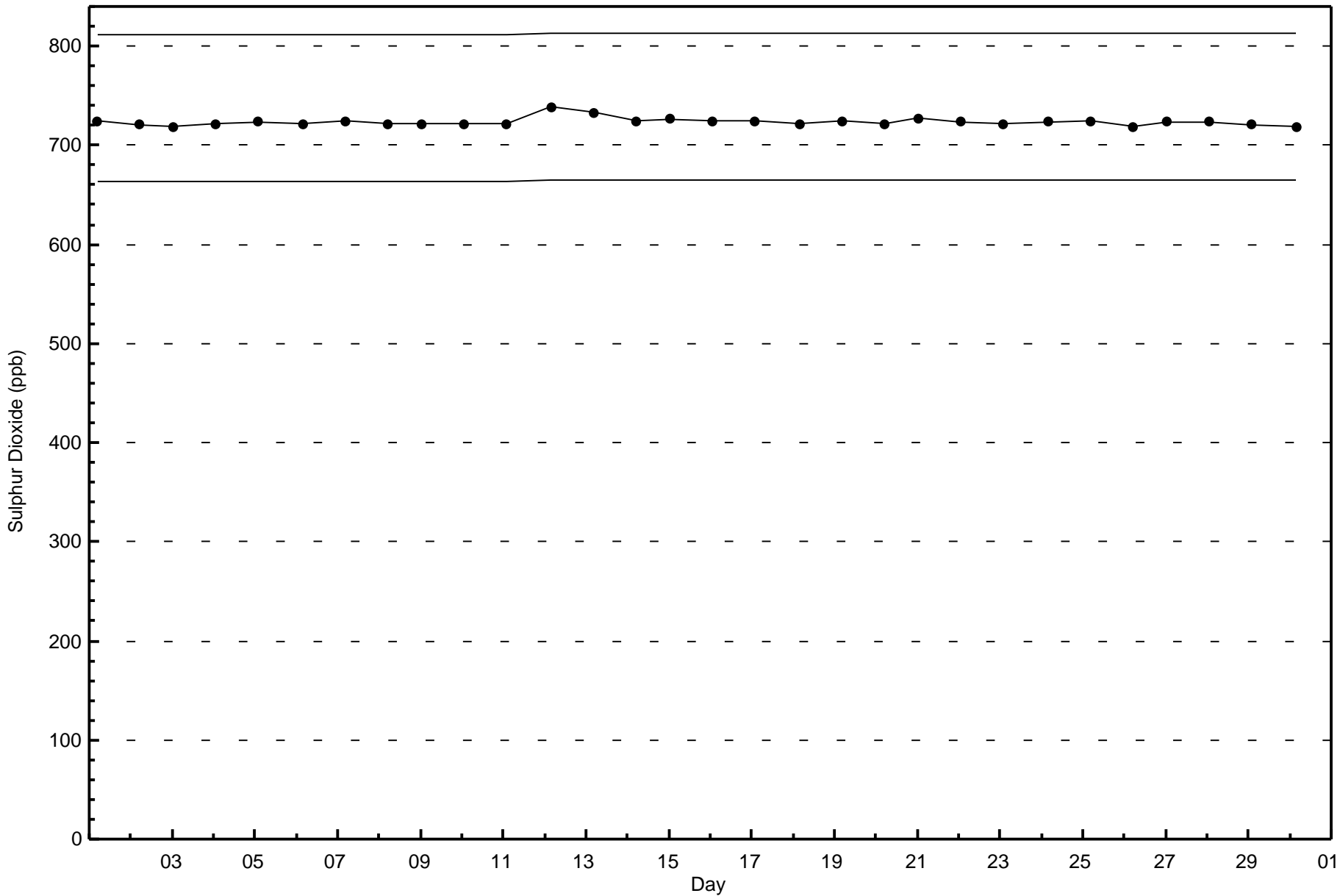


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

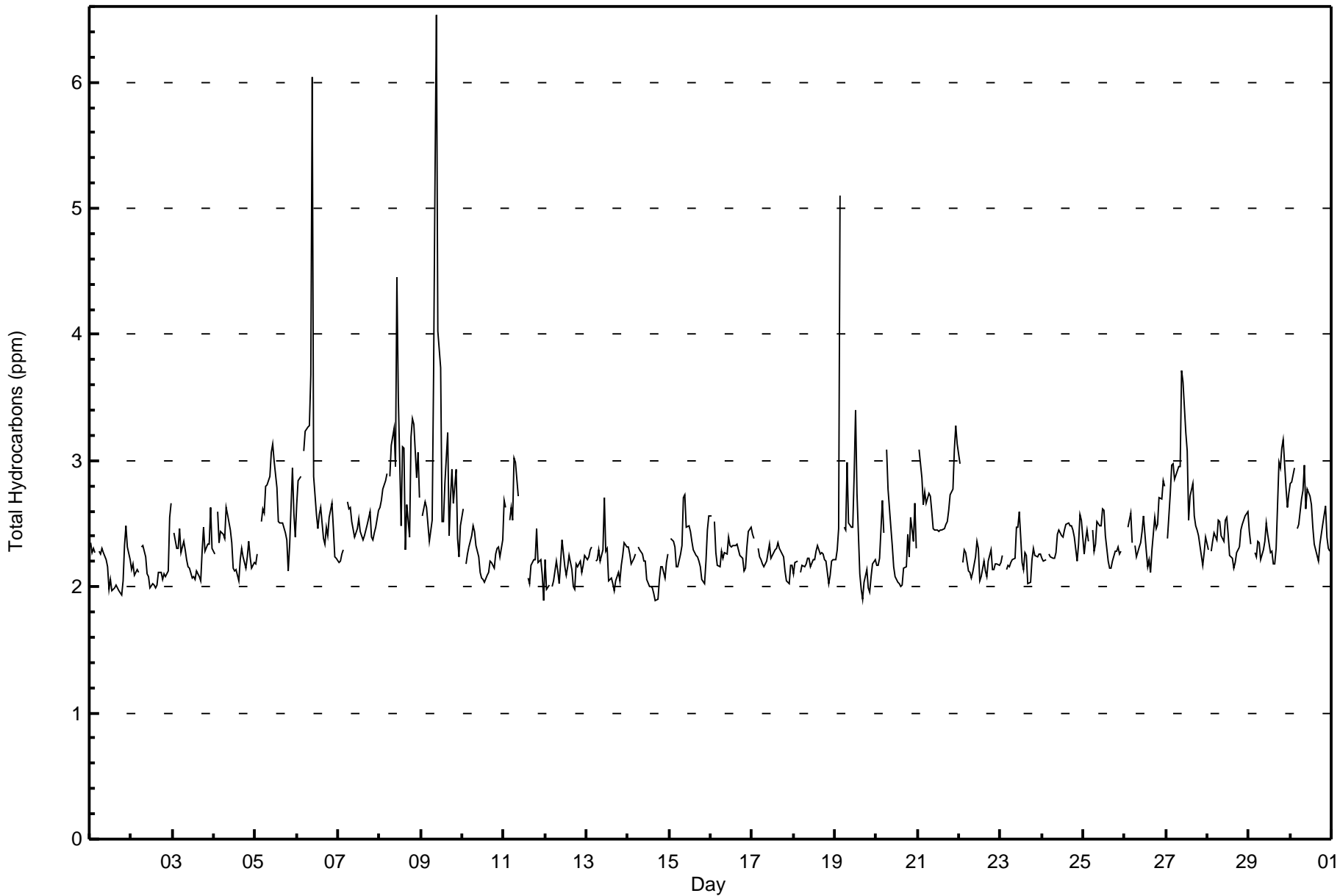
Total Hydrocarbons (THC) - ppm
Muskeg River - September 2017

| Maximum Value: 6.5 ppm on Sep 9 10:00 | | Maximum Daily Average: 3.1 ppm on Sep 9 | | Hours in Service: | 720 | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|-----|---------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|
| Minimum Value: 1.9 ppm on Sep 12 00:00 | | Minimum Daily Average: 2.1 ppm on Sep 12 | | Hours of Data: | 682 | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.7 ppm at hour 10 | | Minimum Diurnal Average: 2.2 ppm at hour 17 | | Hours of Missing Data: | 38 | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.41 ppm | | Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.5 P ₉₀ = 2.8 P ₉₉ = 3.6 | | Hours of Calibration: | 35 | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: | 99.6 | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 2.4 | 2.3 | 2.3 | 2.3 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.3 | 2.5 | 2.3 | 2.2 | 2.2 | 2.5 |
| 2-Sep | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | Z | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.5 | 2.7 | 2.2 | 2.7 |
| 3-Sep | Z | 2.4 | 2.3 | 2.3 | 2.5 | 2.3 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.5 | 2.3 | 2.3 | 2.3 | 2.6 | 2.3 | 2.3 | 2.6 |
| 4-Sep | 2.3 | Z | 2.6 | 2.3 | 2.4 | 2.4 | 2.4 | 2.6 | 2.6 | 2.4 | 2.4 | 2.2 | 2.1 | 2.1 | 2.0 | 2.2 | 2.3 | 2.2 | 2.1 | 2.2 | 2.4 | 2.2 | 2.2 | 2.2 | 2.3 | 2.6 |
| 5-Sep | 2.2 | 2.3 | Z | 2.5 | 2.6 | 2.6 | 2.8 | 2.8 | 2.9 | 3.1 | 3.1 | 3.0 | 2.8 | 2.5 | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.1 | 2.3 | 2.9 | 2.6 | 2.4 | 2.6 | 3.1 |
| 6-Sep | 2.6 | 2.8 | 2.9 | Z | 3.1 | 3.2 | 3.3 | 3.3 | 3.7 | 6.0 | 2.9 | 2.6 | 2.5 | 2.6 | 2.6 | 2.4 | 2.3 | 2.5 | 2.4 | 2.6 | 2.7 | 2.5 | 2.2 | 2.2 | 2.9 | 6.0 |
| 7-Sep | 2.2 | 2.2 | 2.3 | 2.3 | Z | 2.7 | 2.6 | 2.6 | 2.5 | 2.4 | 2.4 | 2.5 | 2.5 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.6 | 2.4 | 2.4 | 2.4 | 2.5 | 2.6 | 2.4 | 2.7 |
| 8-Sep | 2.6 | 2.7 | 2.8 | 2.8 | 2.9 | Z | 2.9 | 3.1 | 3.3 | 3.0 | 4.5 | 3.5 | 2.5 | 3.1 | 3.1 | 2.3 | 2.6 | 2.4 | 3.2 | 3.3 | 3.3 | 2.9 | 3.1 | 2.7 | 3.0 | 4.5 |
| 9-Sep | Z | 2.6 | 2.7 | 2.6 | 2.5 | 2.4 | 2.5 | 3.7 | 5.2 | 6.5 | 4.0 | 3.7 | 2.5 | 2.5 | 2.8 | 3.2 | 2.4 | 2.7 | 2.9 | 2.7 | 2.9 | 2.4 | 2.2 | 2.5 | 3.1 | 6.5 |
| 10-Sep | 2.6 | Z | 2.2 | 2.3 | 2.3 | 2.4 | 2.5 | 2.4 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.4 | 2.3 | 2.6 |
| 11-Sep | 2.7 | 2.6 | Z | 2.5 | 2.6 | 2.5 | 3.0 | 3.0 | 2.7 | C | C | C | C | C | 2.1 | 2.0 | 2.2 | 2.2 | 2.2 | 2.5 | 2.2 | 2.2 | 2.1 | 1.9 | 2.4 | 3.0 |
| 12-Sep | 2.2 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.2 | 2.1 | 2.0 | 2.2 | 2.4 | 2.2 | 2.1 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.1 | 2.4 |
| 13-Sep | 2.2 | 2.2 | 2.3 | 2.3 | Z | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.7 | 2.3 | 2.3 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.3 | 2.4 | 2.3 | 2.2 | 2.7 |
| 14-Sep | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | Z | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.1 | 2.3 |
| 15-Sep | Z | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.7 | 2.7 | 2.5 | 2.5 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 2.2 | 2.5 | 2.6 | 2.3 | 2.7 |
| 16-Sep | 2.6 | Z | 2.5 | 2.3 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.3 | 2.6 |
| 17-Sep | 2.4 | 2.4 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.2 | 2.2 | 2.2 | 2.4 |
| 18-Sep | 2.1 | 2.2 | 2.2 | Z | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 |
| 19-Sep | 2.2 | 2.3 | 2.5 | 5.1 | Z | 2.5 | 2.4 | 3.0 | 2.5 | 2.5 | 2.5 | 2.9 | 3.4 | 2.7 | 2.1 | 2.0 | 1.9 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.2 | 2.2 | 2.5 | 5.1 |
| 20-Sep | 2.2 | 2.2 | 2.2 | 2.7 | 2.4 | Z | 3.1 | 2.8 | 2.5 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 | 2.4 | 2.2 | 2.6 | 2.4 | 2.7 | 2.3 | 2.3 | 3.1 |
| 21-Sep | Z | 3.1 | 2.9 | 2.7 | 2.8 | 2.7 | 2.7 | 2.7 | 2.6 | 2.5 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 2.7 | 2.8 | 3.1 | 3.3 | 3.1 | 2.7 | 3.3 |
| 22-Sep | 3.0 | Z | 2.2 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | 2.3 | 2.0 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 3.0 |
| 23-Sep | 2.2 | 2.3 | Z | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.5 | 2.5 | 2.6 | 2.2 | 2.1 | 2.3 | 2.2 | 2.0 | 2.0 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.2 | 2.6 |
| 24-Sep | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.2 | 2.3 | 2.6 | 2.5 | 2.4 | 2.6 |
| 25-Sep | 2.3 | 2.4 | 2.5 | 2.4 | Z | 2.4 | 2.3 | 2.3 | 2.5 | 2.5 | 2.5 | 2.6 | 2.6 | 2.4 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.6 |
| 26-Sep | PF | PF | 2.5 | 2.6 | 2.3 | Z | 2.3 | 2.2 | 2.3 | 2.4 | 2.4 | 2.6 | 2.3 | 2.2 | 2.2 | 2.1 | 2.3 | 2.6 | 2.5 | 2.5 | 2.7 | 2.7 | 2.8 | 2.8 | 2.4 | 2.8 |
| 27-Sep | Z | 2.4 | 2.7 | 3.0 | 3.0 | 2.9 | 2.9 | 3.0 | 3.0 | 3.7 | 3.6 | 3.2 | 3.1 | 2.5 | 2.7 | 2.8 | 2.6 | 2.5 | 2.5 | 2.4 | 2.2 | 2.2 | 2.3 | 2.4 | 2.8 | 3.7 |
| 28-Sep | 2.3 | Z | 2.3 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.4 | 2.4 | 2.5 | 2.6 | 2.4 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.3 | 2.5 | 2.5 | 2.5 | 2.6 | 2.6 | 2.4 | 2.6 |
| 29-Sep | 2.4 | 2.3 | Z | 2.3 | 2.2 | 2.4 | 2.3 | 2.2 | 2.3 | 2.4 | 2.5 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 3.0 | 2.9 | 3.1 | 3.2 | 2.8 | 2.6 | 2.7 | 2.5 | 3.2 |
| 30-Sep | 2.8 | 2.8 | 2.9 | Z | 2.5 | 2.5 | 2.7 | 2.8 | 3.0 | 2.6 | 2.8 | 2.7 | 2.6 | 2.5 | 2.3 | 2.3 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.4 | 2.3 | 2.3 | 2.6 | 3.0 |
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Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Muskeg River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Muskeg River - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 50 | 7.33 | 7.33 |
| 2.1 - 3.0 | 595 | 87.24 | 94.57 |
| 3.1 - 10.0 | 37 | 5.43 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Muskeg River - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 4 | 8 | 7 | 0 | 1 | 1 | 4 | 4 | 0 | 3 | 6 | 11 | 1 | 0 | 0 | 50 |
| 2.1 - 3.0 | 20 | 34 | 41 | 9 | 10 | 10 | 17 | 47 | 148 | 86 | 47 | 47 | 21 | 18 | 26 | 14 | 595 |
| 3.1 - 10.0 | 5 | 11 | 2 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 2 | 5 | 37 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 49 | 51 | 16 | 10 | 11 | 18 | 55 | 156 | 90 | 50 | 53 | 32 | 19 | 28 | 19 | 682 |

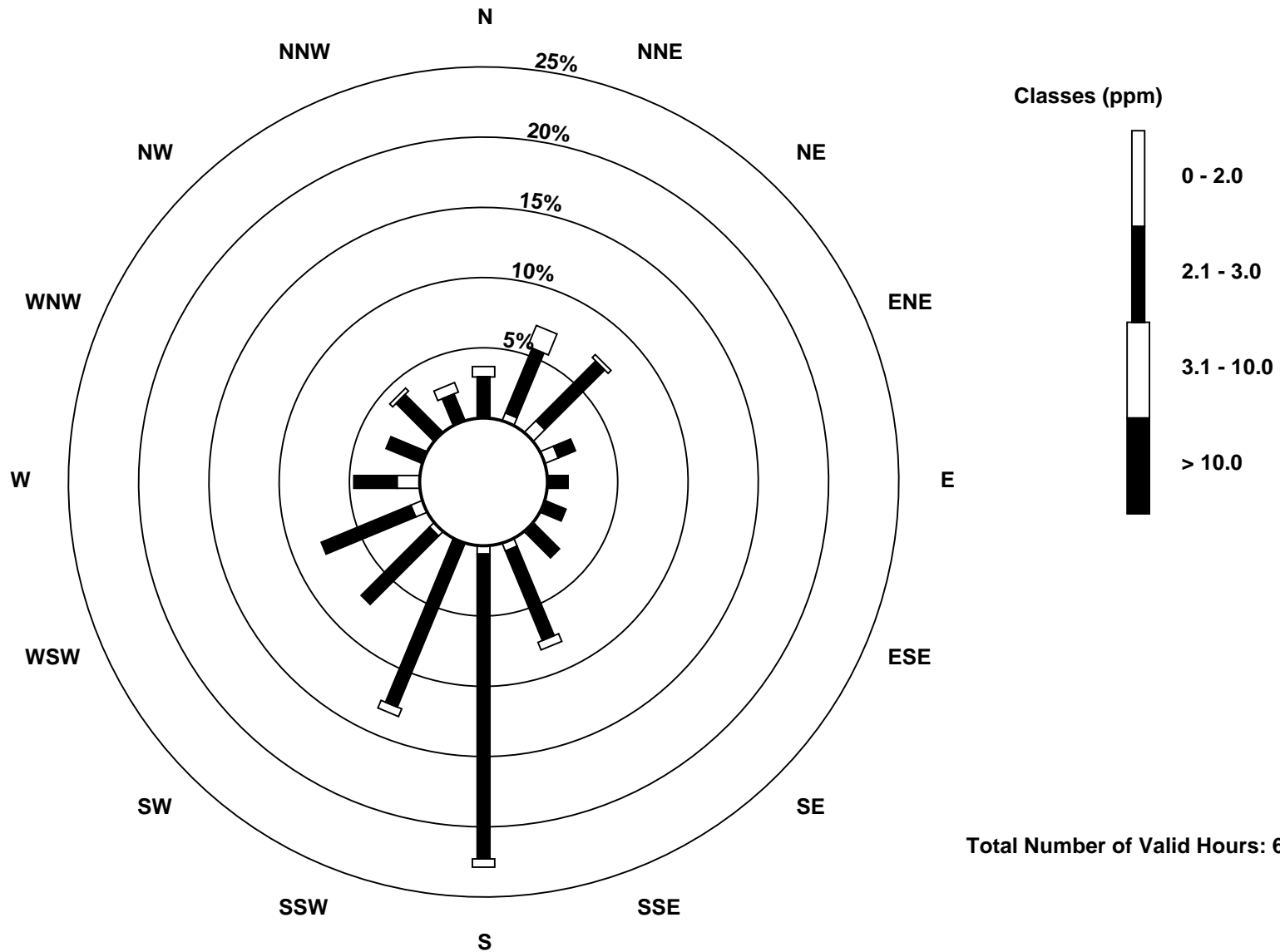
Total Number of Valid Hours: 682

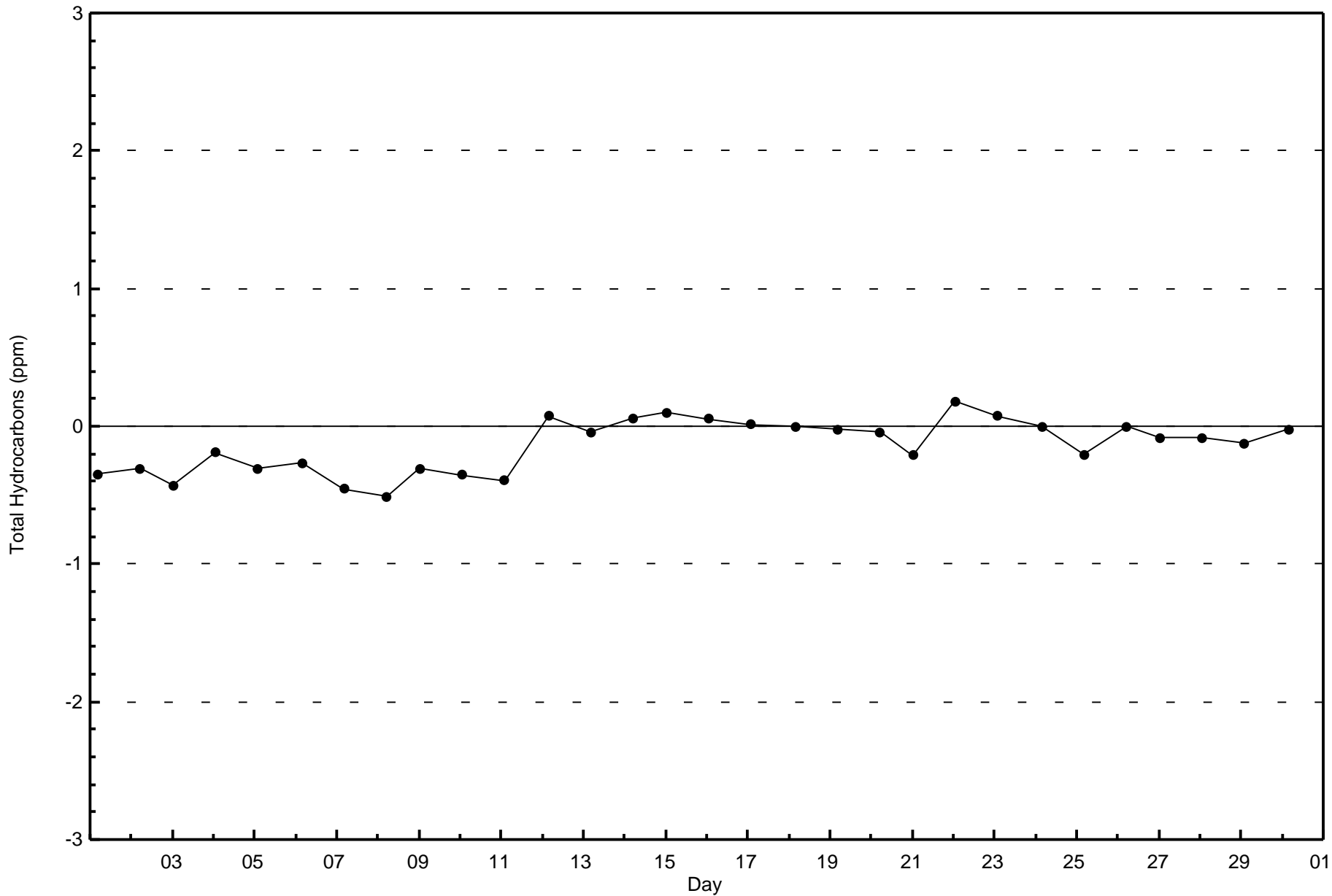
Total Number of Hours: 720

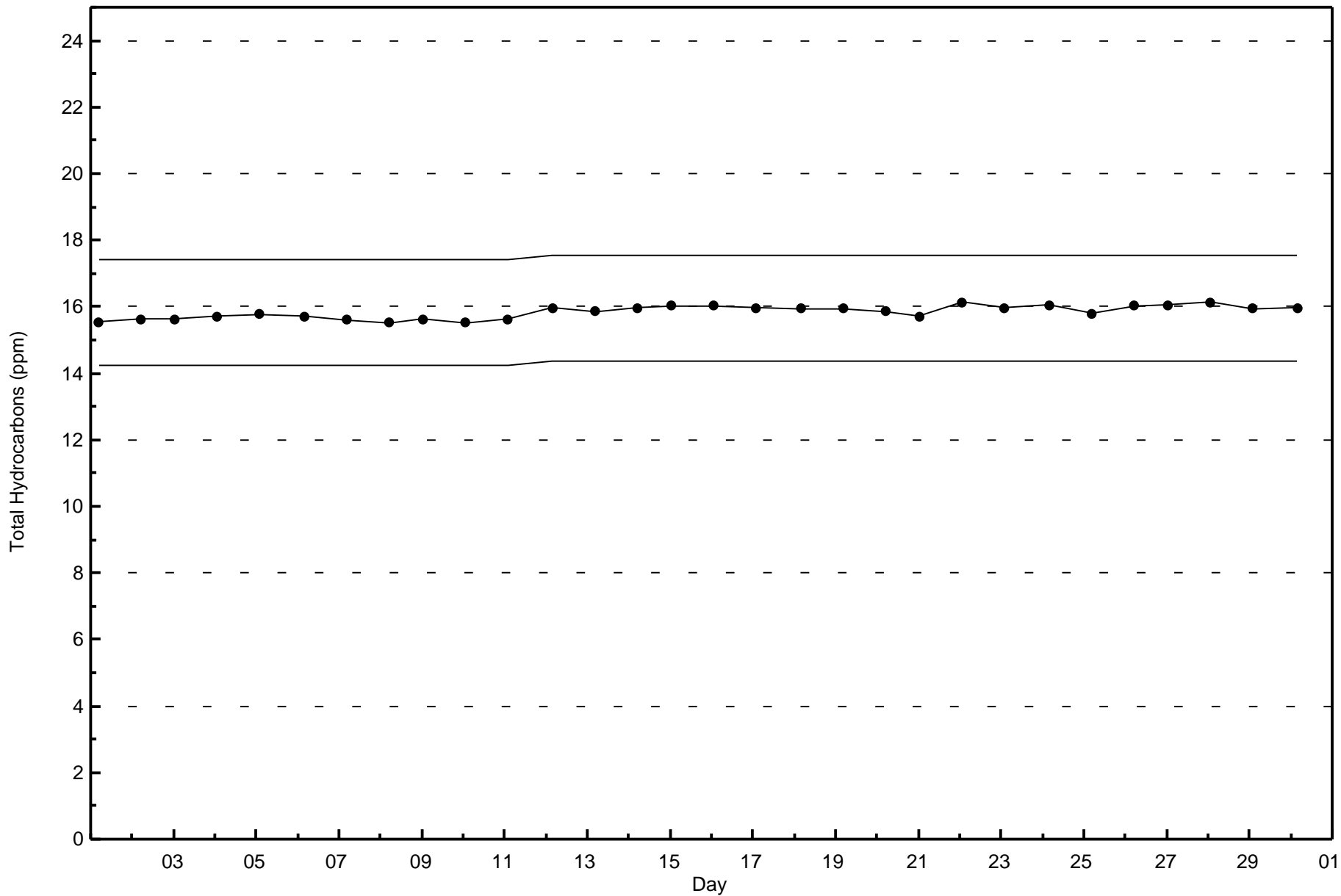


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Muskeg River (AMS 16)







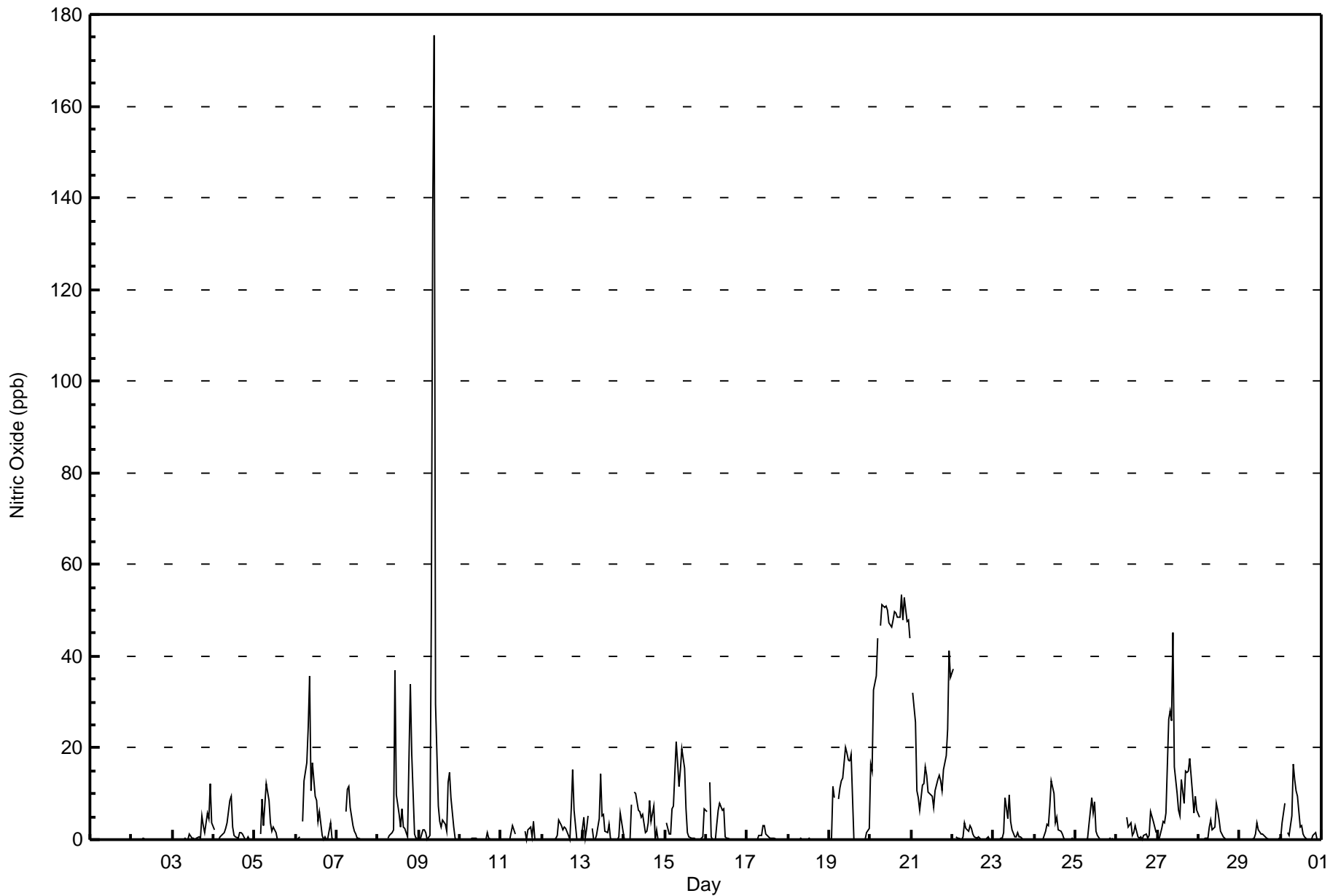


| Maximum Value: 176 ppb on Sep 9 10:00 | | Maximum Daily Average: 44.6 ppb on Sep 20 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|----|--------------------------------|----|----|----|----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 1 01:00 | | Minimum Daily Average: 0.0 ppb on Sep 1 | | Hours of Data: 682 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 14.3 ppb at hour 10 | | Minimum Diurnal Average: 2.2 ppb at hour 6 | | Hours of Missing Data: 38 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 5.2 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 5 P ₉₀ = 14 P ₉₉ = 51 | | Hours of Calibration: 35 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 3 | 1 | 6 | 5 | 12 | 4 | 1.7 | 12 |
| 4-Sep | 2 | Z | 0 | 0 | 0 | 1 | 2 | 2 | 4 | 9 | 9 | 3 | 1 | 1 | 0 | 2 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1.7 | 9 |
| 5-Sep | 0 | 0 | Z | 1 | 9 | 3 | 8 | 12 | 9 | 4 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.3 | 12 |
| 6-Sep | 0 | 0 | 1 | Z | 4 | 13 | 17 | 24 | 36 | 11 | 17 | 9 | 8 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 6.7 | 36 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 6 | 11 | 12 | 7 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 12 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 2 | 37 | 10 | 6 | 3 | 7 | 3 | 2 | 0 | 17 | 34 | 19 | 1 | 0 | 0 | 6.2 | 37 |
| 9-Sep | Z | 0 | 2 | 2 | 2 | 0 | 1 | 49 | 137 | 176 | 30 | 7 | 4 | 3 | 4 | 3 | 2 | 13 | 15 | 9 | 3 | 0 | 0 | 0 | 20.1 | 176 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 1 | C | C | C | C | C | 2 | 0 | 2 | 3 | 1 | 4 | 0 | 0 | 0 | 0 | 0.9 | 4 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 2 | 3 | 2 | 1 | 0 | 7 | 15 | 6 | 0 | 0 | 0 | 0 | 2.0 | 15 |
| 13-Sep | 5 | 0 | 2 | 5 | Z | 2 | 0 | 0 | 1 | 5 | 14 | 5 | 5 | 2 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 6 | 2 | 2 | 2.7 | 14 |
| 14-Sep | 0 | 0 | 0 | 0 | 8 | Z | 10 | 10 | 6 | 6 | 5 | 5 | 2 | 2 | 4 | 9 | 4 | 7 | 0 | 2 | 0 | 0 | 0 | 0 | 3.5 | 10 |
| 15-Sep | Z | 4 | 1 | 1 | 7 | 7 | 21 | 17 | 12 | 15 | 20 | 15 | 7 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 6.0 | 21 |
| 16-Sep | 6 | Z | 13 | 1 | 0 | 0 | 4 | 6 | 8 | 6 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.2 | 13 |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 18-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 12 | 9 | Z | 9 | 11 | 13 | 13 | 20 | 19 | 17 | 17 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 7.1 | 20 |
| 20-Sep | 17 | 15 | 33 | 36 | 44 | Z | 47 | 51 | 51 | 51 | 50 | 47 | 46 | 48 | 50 | 50 | 48 | 49 | 53 | 48 | 53 | 48 | 48 | 44 | 44.6 | 53 |
| 21-Sep | Z | 32 | 26 | 11 | 9 | 6 | 12 | 12 | 16 | 14 | 10 | 10 | 10 | 7 | 11 | 13 | 14 | 13 | 11 | 15 | 18 | 24 | 41 | 35 | 16.1 | 41 |
| 22-Sep | 37 | Z | 1 | 0 | 0 | 0 | 1 | 4 | 3 | 2 | 3 | 3 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2.5 | 37 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 2 | 9 | 5 | 10 | 4 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 10 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 2 | 3 | 3 | 7 | 13 | 10 | 4 | 5 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.3 | 13 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 3 | 9 | 6 | 8 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 9 |
| 26-Sep | PF | PF | 0 | 0 | 0 | Z | 5 | 3 | 4 | 1 | 1 | 3 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 6 | 4 | 3 | 2 | 1.7 | 6 |
| 27-Sep | Z | 0 | 2 | 4 | 4 | 6 | 26 | 28 | 26 | 45 | 16 | 10 | 6 | 5 | 13 | 8 | 15 | 15 | 15 | 18 | 10 | 6 | 9 | 6 | 12.8 | 45 |
| 28-Sep | 5 | Z | 0 | 0 | 0 | 0 | 3 | 4 | 2 | 3 | 8 | 6 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 | 8 |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 4 |
| 30-Sep | 0 | 4 | 8 | Z | 2 | 1 | 5 | 17 | 13 | 11 | 9 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 3.5 | 17 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration PF - Power Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Muskeg River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Muskeg River - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 642 | 94.13 | 94.13 |
| 21 - 40 | 16 | 2.35 | 96.48 |
| 41 - 80 | 22 | 3.23 | 99.71 |
| 81 - 159 | 1 | 0.15 | 99.85 |
| > 159 | 1 | 0.15 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Muskeg River - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 24 | 25 | 49 | 16 | 10 | 11 | 18 | 55 | 153 | 88 | 50 | 53 | 32 | 19 | 25 | 14 | 642 |
| 21 - 40 | 1 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | 16 |
| 11 - 80 | 0 | 19 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 22 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Totals | 25 | 49 | 51 | 16 | 10 | 11 | 18 | 55 | 156 | 90 | 50 | 53 | 32 | 19 | 28 | 19 | 682 |

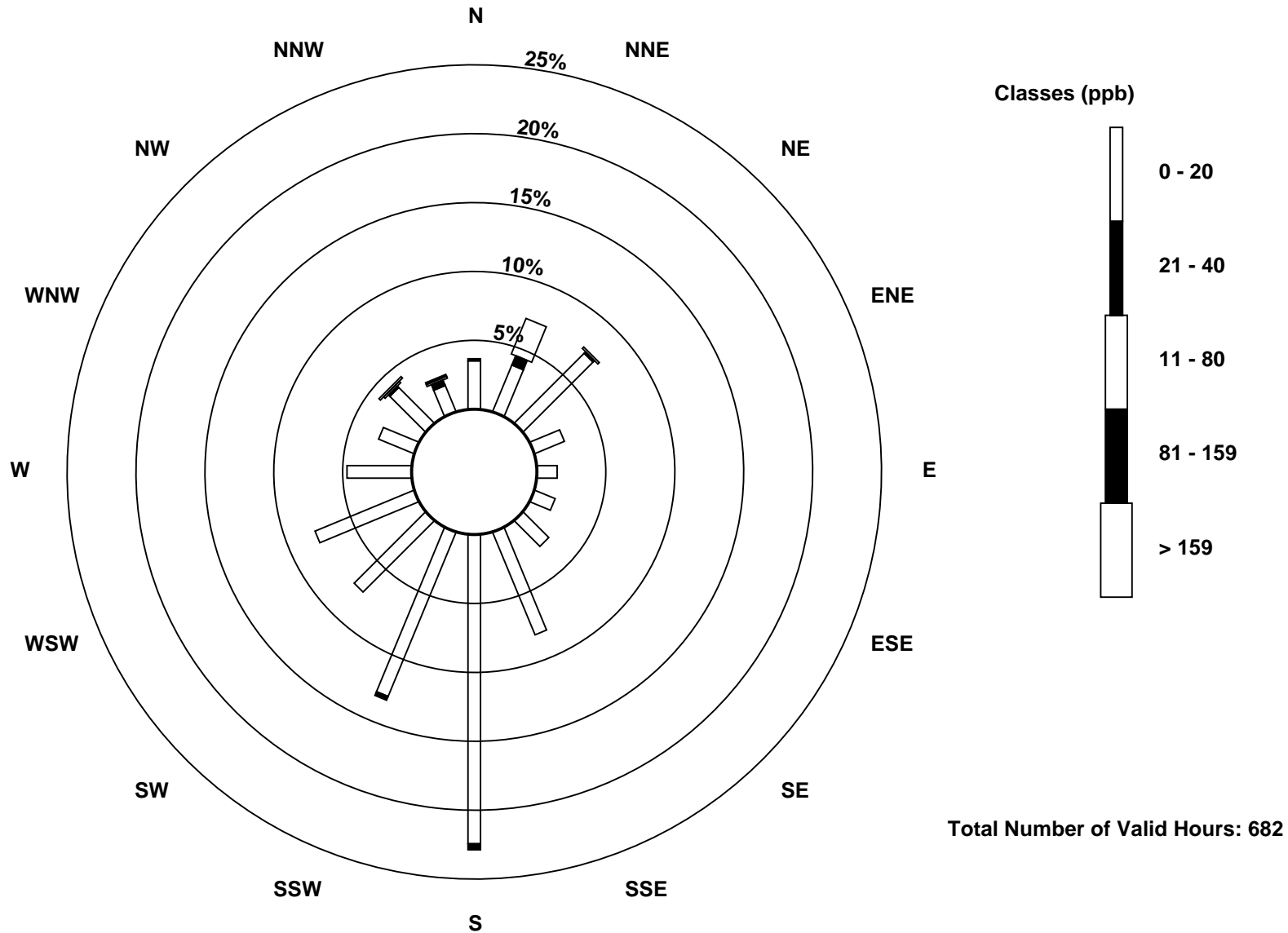
Total Number of Valid Hours: 682

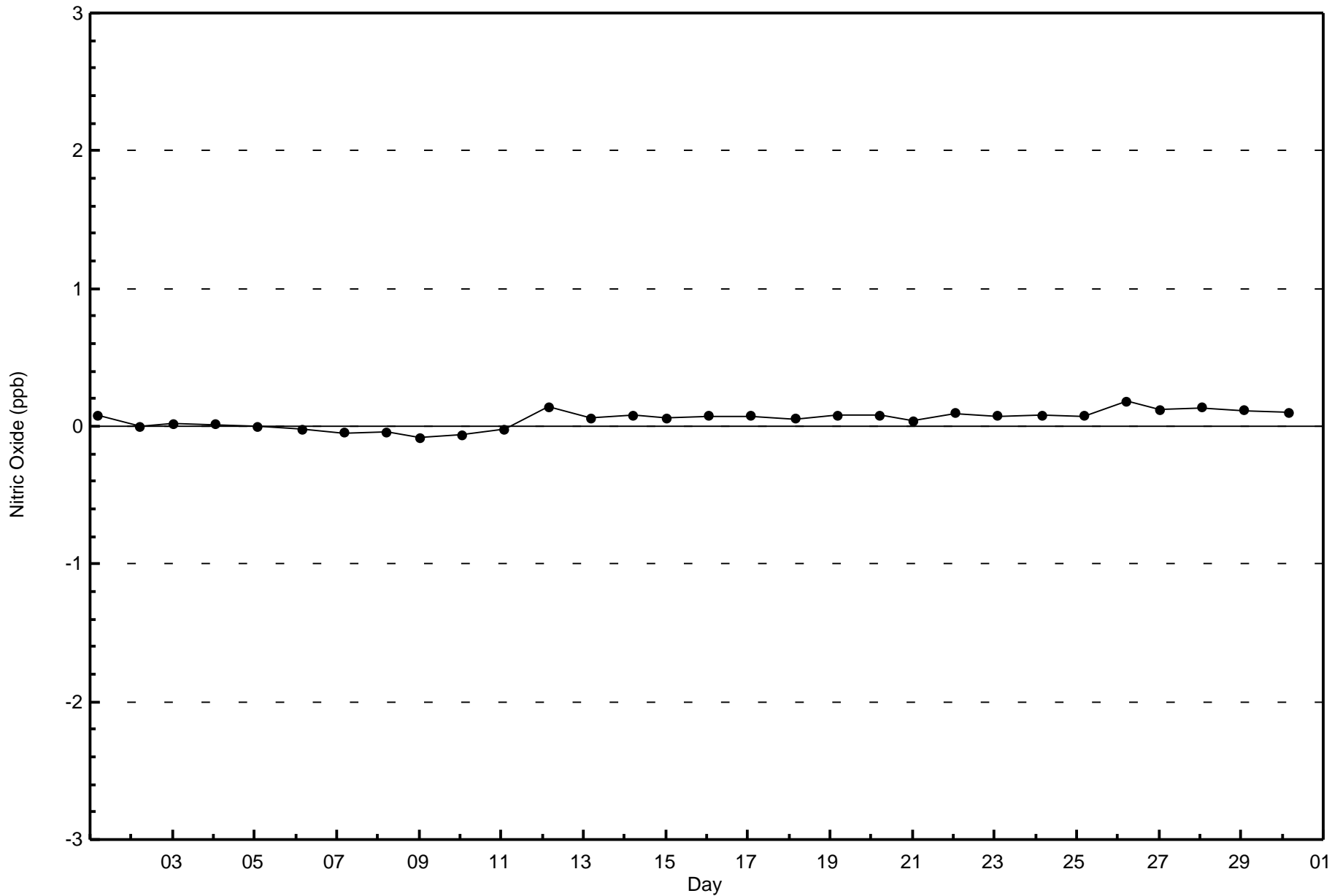
Total Number of Hours: 720

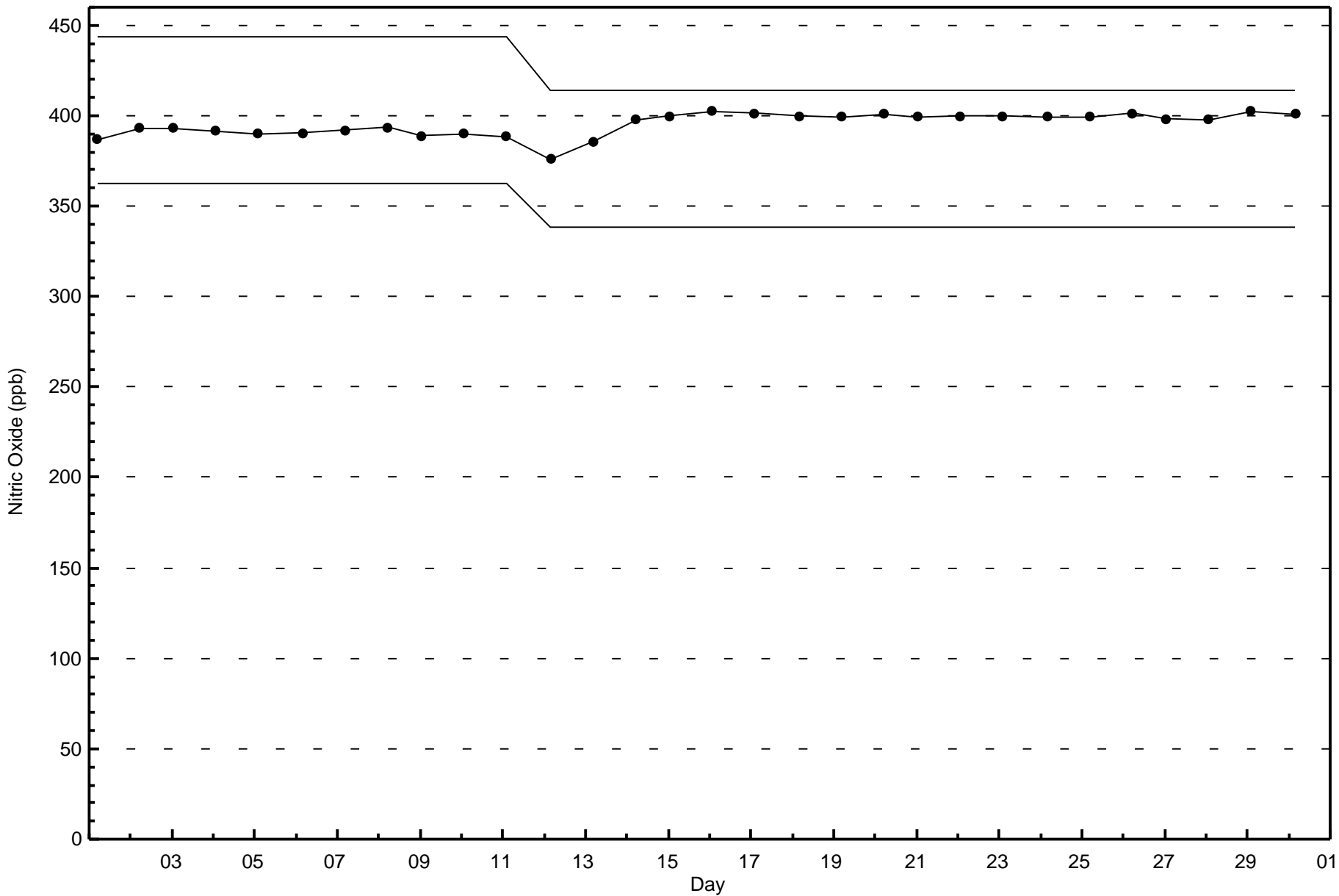


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Muskeg River (AMS 16)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Muskeg River - September 2017

| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 37 ppb on Sep 8 20:00 | Maximum Daily Average: 21.0 ppb on Sep 20 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 5 15:00 | Minimum Daily Average: 0.4 ppb on Sep 18 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 9.5 ppb at hour 11 | Minimum Diurnal Average: 3.7 ppb at hour 16 | | Hours of Calibration: | 35 |
| Monthly Average: 6.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 O ₃ = 10 P ₉₀ = 17 P ₉₉ = 27 | | 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-Sep | 2 | 4 | 2 | 2 | Z | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 1 | 1 | 1.3 | 4 |
| 2-Sep | 1 | 2 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 0.7 | 2 |
| 3-Sep | Z | 0 | 1 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 7 | 14 | 18 | 25 | 21 | 23 | 12 | 5.8 | 25 |
| 4-Sep | 10 | Z | 10 | 5 | 9 | 10 | 5 | 4 | 4 | 7 | 8 | 3 | 1 | 1 | 1 | 4 | 5 | 6 | 1 | 1 | 13 | 4 | 1 | 1 | 4.9 | 13 |
| 5-Sep | 3 | 5 | Z | 16 | 18 | 16 | 14 | 12 | 10 | 6 | 4 | 6 | 4 | 0 | 0 | 0 | 0 | 1 | 2 | 10 | 10 | 13 | 9 | 7.0 | 18 | |
| 6-Sep | 10 | 10 | 14 | Z | 16 | 16 | 14 | 16 | 24 | 21 | 19 | 13 | 13 | 6 | 9 | 2 | 1 | 6 | 4 | 8 | 22 | 13 | 3 | 2 | 11.3 | 24 |
| 7-Sep | 2 | 2 | 3 | 4 | Z | 23 | 19 | 15 | 13 | 9 | 8 | 6 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 6 | 7 | 8 | 6 | 6 | 6.4 | 23 |
| 8-Sep | 6 | 12 | 10 | 12 | 18 | Z | 17 | 17 | 17 | 9 | 34 | 19 | 9 | 7 | 11 | 5 | 19 | 15 | 36 | 37 | 27 | 10 | 5 | 8 | 15.6 | 37 |
| 9-Sep | Z | 6 | 6 | 9 | 4 | 2 | 4 | 10 | 20 | 28 | 17 | 16 | 7 | 4 | 5 | 4 | 6 | 17 | 23 | 16 | 4 | 2 | 3 | 4 | 9.4 | 28 |
| 10-Sep | 4 | Z | 2 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 3 | 1 | 1 | 4 | 1 | 1 | 1 | 1.7 | 5 |
| 11-Sep | 2 | 2 | Z | 4 | 2 | 4 | 8 | 8 | 4 | C | C | C | C | C | 4 | 2 | 7 | 11 | 10 | 12 | 4 | 5 | 4 | 1 | 5.1 | 12 |
| 12-Sep | 2 | 1 | 0 | Z | 1 | 2 | 3 | 2 | 3 | 5 | 12 | 10 | 6 | 10 | 7 | 3 | 0 | 5 | 14 | 6 | 0 | 0 | 7 | 4 | 4.4 | 14 |
| 13-Sep | 8 | 1 | 5 | 9 | Z | 5 | 3 | 2 | 4 | 11 | 18 | 9 | 11 | 4 | 5 | 6 | 2 | 1 | 1 | 2 | 5 | 3 | 10 | 4 | 5.6 | 18 |
| 14-Sep | 1 | 1 | 1 | 2 | 5 | Z | 7 | 7 | 8 | 6 | 4 | 4 | 2 | 2 | 4 | 8 | 3 | 6 | 0 | 2 | 1 | 1 | 4 | 5 | 3.7 | 8 |
| 15-Sep | Z | 6 | 4 | 4 | 6 | 7 | 7 | 6 | 7 | 7 | 10 | 11 | 8 | 3 | 2 | 1 | 1 | 2 | 2 | 6 | 10 | 14 | 13 | 21 | 6.9 | 21 |
| 16-Sep | 20 | Z | 19 | 10 | 4 | 4 | 13 | 11 | 11 | 9 | 9 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 4 | 8 | 12 | 18 | 17 | 7.6 | 20 |
| 17-Sep | 15 | 12 | Z | 4 | 2 | 1 | 2 | 3 | 2 | 5 | 6 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 0 | 3.2 | 15 |
| 18-Sep | 0 | 0 | 1 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0.4 | 2 |
| 19-Sep | 2 | 9 | 17 | 15 | Z | 10 | 11 | 11 | 10 | 11 | 9 | 10 | 9 | 11 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 5 | 6.5 | 17 |
| 20-Sep | 11 | 10 | 18 | 17 | 20 | Z | 20 | 22 | 21 | 21 | 23 | 22 | 22 | 23 | 24 | 23 | 25 | 24 | 25 | 22 | 25 | 23 | 24 | 19 | 21.0 | 25 |
| 21-Sep | Z | 18 | 17 | 13 | 14 | 14 | 14 | 15 | 20 | 17 | 14 | 11 | 11 | 10 | 14 | 18 | 19 | 19 | 20 | 24 | 26 | 27 | 28 | 28 | 17.8 | 28 |
| 22-Sep | 26 | Z | 8 | 5 | 4 | 3 | 3 | 5 | 4 | 4 | 7 | 9 | 4 | 2 | 3 | 7 | 4 | 5 | 5 | 4 | 5 | 5 | 2 | 5 | 5.6 | 26 |
| 23-Sep | 3 | 3 | Z | 4 | 4 | 4 | 4 | 7 | 5 | 8 | 6 | 5 | 3 | 3 | 5 | 2 | 3 | 2 | 4 | 5 | 2 | 2 | 1 | 1 | 3.6 | 8 |
| 24-Sep | 1 | 1 | 2 | Z | 1 | 2 | 8 | 5 | 3 | 5 | 7 | 7 | 5 | 7 | 5 | 6 | 5 | 5 | 3 | 3 | 2 | 11 | 19 | 16 | 5.5 | 19 |
| 25-Sep | 4 | 2 | 2 | 2 | Z | 3 | 2 | 3 | 6 | 9 | 5 | 7 | 3 | 3 | 1 | 1 | 1 | 2 | 5 | 9 | 12 | 13 | PF | 4.3 | 13 | |
| 26-Sep | PF | PF | 6 | 4 | 3 | Z | 8 | 6 | 5 | 2 | 3 | 7 | 2 | 2 | 3 | 1 | 5 | 11 | 7 | 11 | 17 | 15 | 12 | 12 | 6.7 | 17 |
| 27-Sep | Z | 7 | 13 | 16 | 17 | 16 | 18 | 12 | 15 | 24 | 15 | 10 | 7 | 5 | 8 | 7 | 10 | 9 | 10 | 14 | 7 | 5 | 11 | 10 | 11.6 | 24 |
| 28-Sep | 8 | Z | 4 | 3 | 6 | 8 | 8 | 6 | 4 | 4 | 10 | 11 | 9 | 5 | 3 | 2 | 1 | 1 | 4 | 6 | 6 | 14 | 19 | 14 | 6.7 | 19 |
| 29-Sep | 6 | 2 | Z | 3 | 5 | 5 | 3 | 2 | 2 | 4 | 9 | 6 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 8 | 6 | 9 | 9 | 12 | 5.3 | 12 |
| 30-Sep | 10 | 14 | 14 | Z | 14 | 15 | 18 | 16 | 15 | 14 | 15 | 8 | 9 | 6 | 4 | 2 | 2 | 5 | 6 | 8 | 14 | 5 | 4 | 4 | 9.6 | 18 |

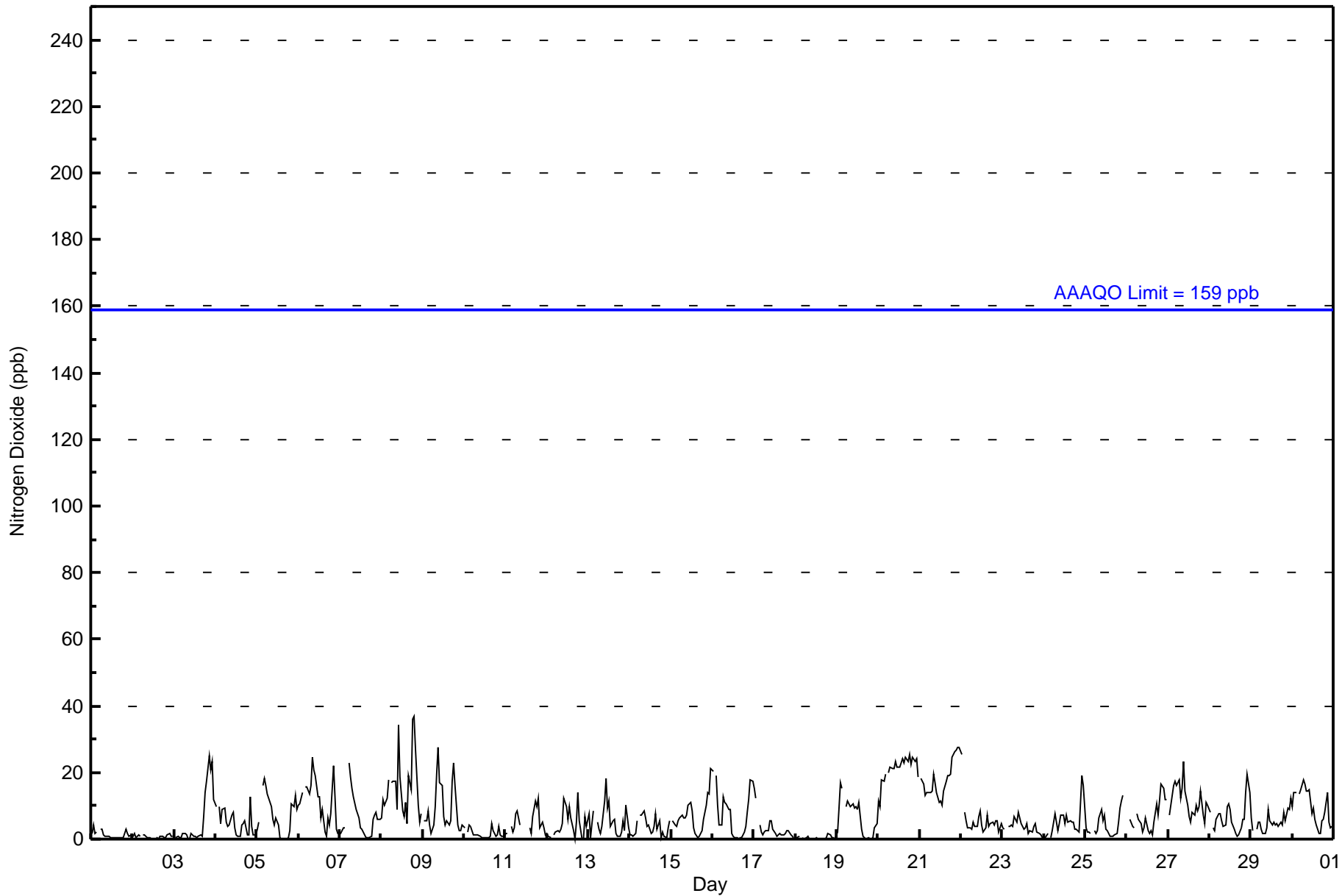
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 6.5 | 5.4 | 7.1 | 6.7 | 7.1 | 7.0 | 7.9 | 7.6 | 7.9 | 8.5 | 9.5 | 7.4 | 5.4 | 4.3 | 4.3 | 3.7 | 4.4 | 5.6 | 6.8 | 8.0 | 8.9 | 7.9 | 8.6 | 7.6 | Diurnal Average |
| 26 | 18 | 19 | 17 | 20 | 23 | 20 | 22 | 24 | 28 | 34 | 22 | 22 | 23 | 24 | 23 | 25 | 24 | 36 | 37 | 27 | 27 | 28 | 28 | Diurnal Maximum |

Z - zerspan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Muskeg River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Muskeg River - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 645 | 94.57 | 94.57 |
| 21 - 40 | 37 | 5.43 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Muskeg River - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 22 | 32 | 49 | 16 | 10 | 10 | 18 | 55 | 154 | 89 | 50 | 53 | 32 | 19 | 26 | 10 | 645 |
| 21 - 40 | 3 | 17 | 2 | 0 | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 9 | 37 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 49 | 51 | 16 | 10 | 11 | 18 | 55 | 156 | 90 | 50 | 53 | 32 | 19 | 28 | 19 | 682 |

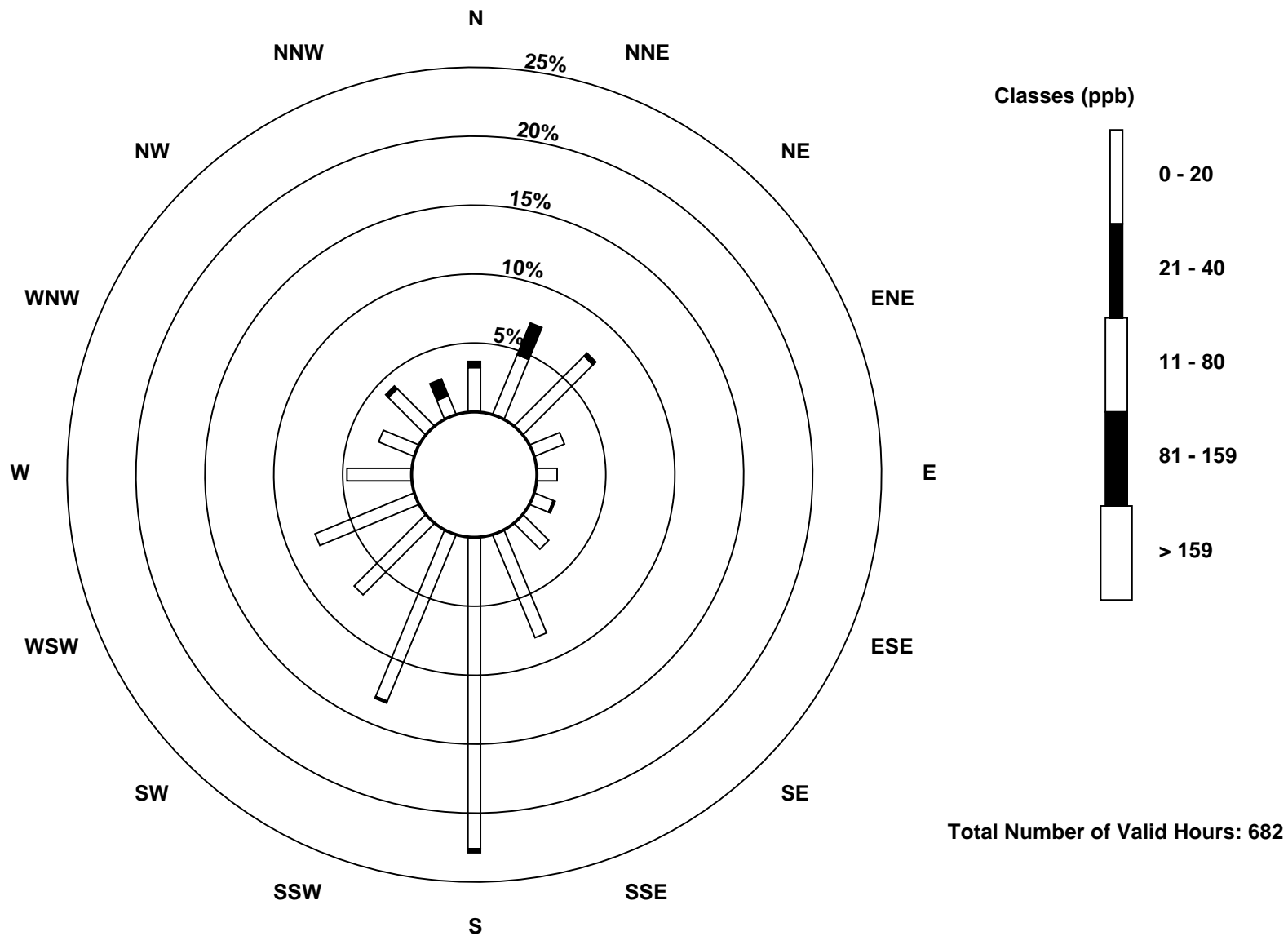
Total Number of Valid Hours: 682

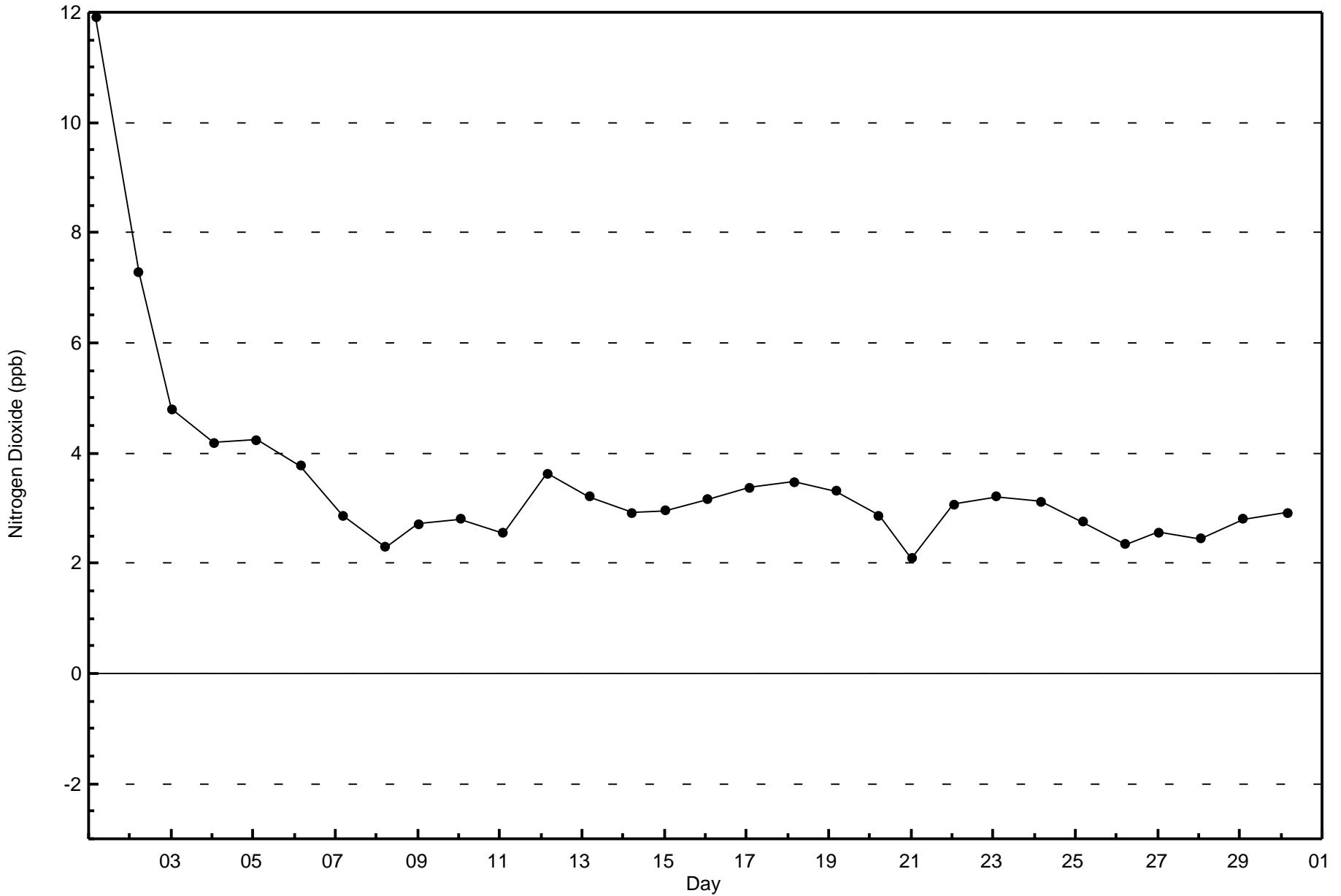
Total Number of Hours: 720

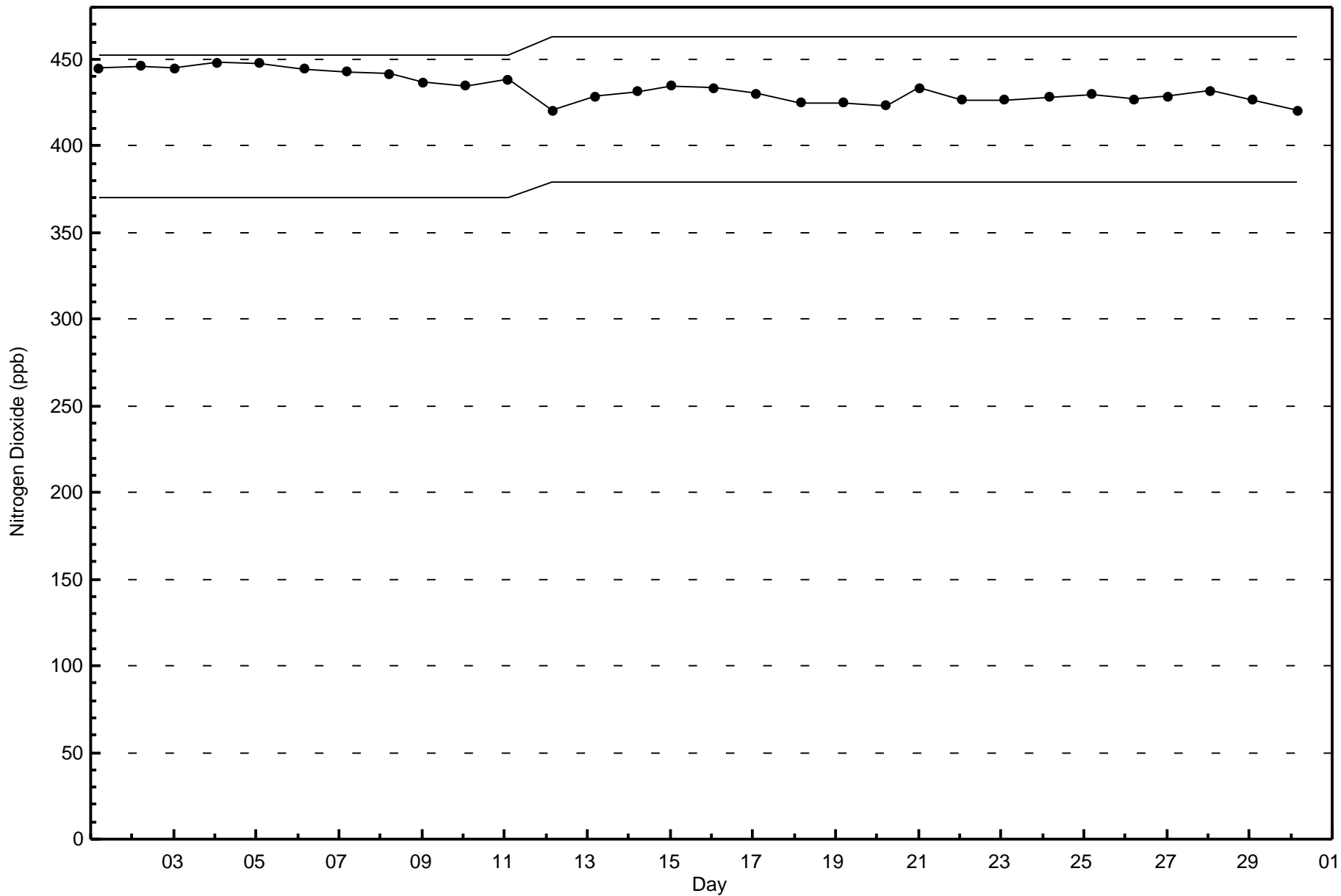


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

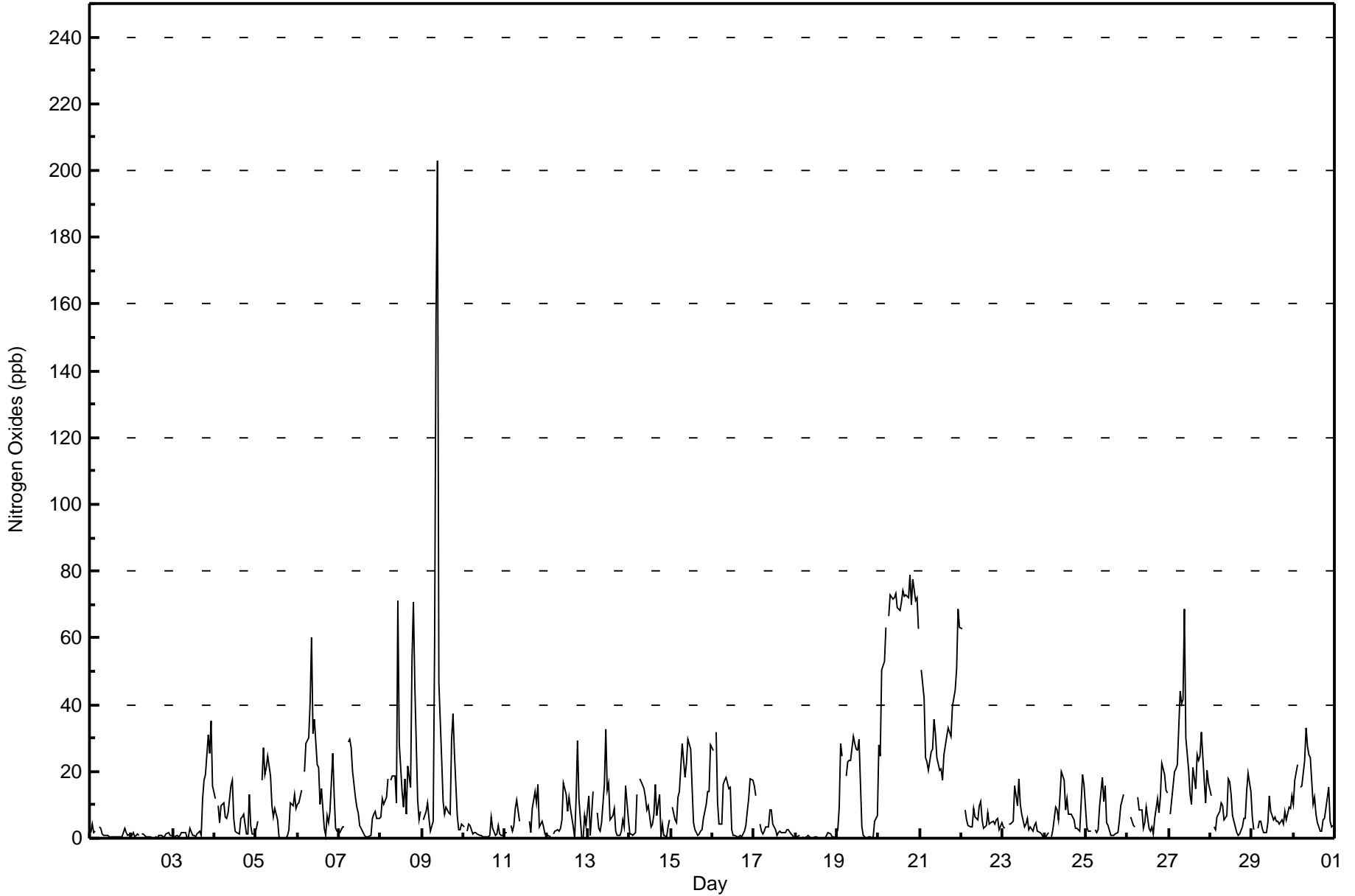
Nitrogen Oxides (NO_x) - ppb
Muskeg River - September 2017

| Maximum Value: 203 ppb on Sep 9 10:00 | | Maximum Daily Average: 65.5 ppb on Sep 20 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|-----|--------------------------------|-----|--------------------|-----|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: 0 ppb on Sep 18 00:00 | | Minimum Daily Average: 0.4 ppb on Sep 18 | | Hours of Data: 682 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 22.8 ppb at hour 10 | | Minimum Diurnal Average: 7.0 ppb at hour 16 | | Hours of Missing Data: 38 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.0 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 6 Q ₃ = 15 P ₉₀ = 28 P ₉₉ = 73 | | Hours of Calibration: 35 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 2 | 4 | 2 | 2 | Z | 3 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 1 | 1 | 1.3 | 4 | |
| 2-Sep | 1 | 2 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 0.7 | 2 | |
| 3-Sep | Z | 0 | 1 | 0 | 1 | 2 | 2 | 2 | 0 | 0 | 3 | 1 | 1 | 1 | 2 | 1 | 12 | 17 | 19 | 31 | 25 | 35 | 16 | 7.5 | 35 | | |
| 4-Sep | 12 | Z | 10 | 5 | 10 | 11 | 6 | 6 | 8 | 16 | 17 | 6 | 2 | 2 | 1 | 6 | 6 | 7 | 1 | 1 | 13 | 4 | 1 | 1 | 6.6 | 17 | |
| 5-Sep | 3 | 5 | Z | 17 | 27 | 19 | 21 | 25 | 19 | 10 | 6 | 9 | 6 | 0 | 0 | 0 | 0 | 1 | 2 | 10 | 10 | 13 | 9 | 9.2 | 27 | | |
| 6-Sep | 10 | 10 | 14 | Z | 20 | 28 | 30 | 41 | 60 | 31 | 36 | 22 | 21 | 10 | 15 | 3 | 1 | 7 | 5 | 8 | 26 | 13 | 3 | 2 | 18.1 | 60 | |
| 7-Sep | 2 | 2 | 3 | 3 | Z | 29 | 30 | 27 | 20 | 12 | 9 | 8 | 4 | 3 | 1 | 0 | 1 | 0 | 1 | 6 | 7 | 8 | 6 | 6 | 8.2 | 30 | |
| 8-Sep | 6 | 12 | 10 | 12 | 18 | Z | 17 | 19 | 19 | 11 | 71 | 28 | 14 | 9 | 18 | 7 | 21 | 15 | 53 | 71 | 46 | 11 | 5 | 8 | 21.9 | 71 | |
| 9-Sep | Z | 6 | 8 | 11 | 6 | 2 | 5 | 59 | 157 | 203 | 47 | 23 | 11 | 7 | 9 | 8 | 7 | 30 | 37 | 25 | 7 | 3 | 3 | 4 | 29.4 | 203 | |
| 10-Sep | 3 | Z | 2 | 4 | 4 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 3 | 1 | 1 | 4 | 1 | 1 | 1 | 1.8 | 6 | |
| 11-Sep | 2 | 2 | Z | 4 | 2 | 4 | 9 | 11 | 5 | C | C | C | C | C | 5 | 2 | 9 | 14 | 11 | 16 | 4 | 5 | 4 | 1 | 6.0 | 16 | |
| 12-Sep | 1 | 1 | 0 | Z | 1 | 2 | 3 | 2 | 3 | 5 | 17 | 13 | 8 | 12 | 9 | 3 | 0 | 12 | 29 | 12 | 0 | 0 | 7 | 4 | 6.3 | 29 | |
| 13-Sep | 13 | 1 | 7 | 14 | Z | 8 | 3 | 2 | 5 | 16 | 33 | 14 | 17 | 6 | 7 | 9 | 2 | 1 | 1 | 2 | 5 | 3 | 16 | 5 | 8.2 | 33 | |
| 14-Sep | 1 | 1 | 1 | 2 | 13 | Z | 18 | 17 | 15 | 12 | 9 | 10 | 3 | 4 | 7 | 16 | 7 | 13 | 0 | 4 | 1 | 1 | 3 | 5 | 7.1 | 18 | |
| 15-Sep | Z | 9 | 5 | 5 | 12 | 14 | 29 | 23 | 18 | 23 | 30 | 27 | 15 | 5 | 2 | 1 | 1 | 2 | 2 | 6 | 10 | 14 | 14 | 28 | 12.9 | 30 | |
| 16-Sep | 26 | Z | 32 | 11 | 4 | 4 | 16 | 18 | 18 | 15 | 15 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 4 | 8 | 12 | 18 | 17 | 9.9 | 32 | |
| 17-Sep | 15 | 13 | Z | 4 | 2 | 1 | 2 | 3 | 3 | 8 | 9 | 4 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 0 | 3.7 | 15 | |
| 18-Sep | 0 | 0 | 1 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0.4 | 2 | |
| 19-Sep | 2 | 9 | 29 | 25 | Z | 19 | 23 | 24 | 23 | 31 | 28 | 27 | 26 | 30 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 7 | 13.6 | 31 | |
| 20-Sep | 28 | 25 | 50 | 53 | 63 | Z | 66 | 73 | 72 | 72 | 73 | 69 | 68 | 71 | 74 | 72 | 73 | 72 | 79 | 70 | 77 | 71 | 72 | 63 | 65.5 | 79 | |
| 21-Sep | Z | 50 | 42 | 24 | 23 | 20 | 26 | 27 | 35 | 31 | 24 | 21 | 21 | 17 | 25 | 31 | 33 | 32 | 30 | 39 | 45 | 51 | 69 | 63 | 33.9 | 69 | |
| 22-Sep | 63 | Z | 9 | 6 | 4 | 3 | 3 | 9 | 7 | 6 | 10 | 11 | 5 | 3 | 4 | 8 | 4 | 5 | 5 | 4 | 6 | 6 | 2 | 5 | 8.1 | 63 | |
| 23-Sep | 3 | 3 | Z | 4 | 4 | 5 | 5 | 16 | 10 | 18 | 10 | 7 | 3 | 4 | 6 | 2 | 3 | 2 | 4 | 5 | 2 | 1 | 1 | 1 | 5.2 | 18 | |
| 24-Sep | 0 | 0 | 2 | Z | 1 | 2 | 9 | 9 | 6 | 12 | 20 | 17 | 9 | 12 | 7 | 7 | 6 | 5 | 3 | 3 | 2 | 11 | 19 | 16 | 7.8 | 20 | |
| 25-Sep | 4 | 2 | 2 | 2 | Z | 2 | 2 | 3 | 10 | 18 | 11 | 16 | 5 | 4 | 1 | 1 | 1 | 2 | 5 | 10 | 12 | 13 | PF | 5.7 | 18 | | |
| 26-Sep | PF | PF | 6 | 4 | 3 | Z | 12 | 9 | 9 | 3 | 5 | 9 | 3 | 2 | 3 | 1 | 6 | 12 | 8 | 12 | 23 | 19 | 15 | 13 | 8.5 | 23 | |
| 27-Sep | Z | 7 | 16 | 20 | 21 | 22 | 44 | 40 | 41 | 68 | 30 | 20 | 13 | 10 | 21 | 15 | 25 | 23 | 25 | 32 | 17 | 11 | 20 | 17 | 24.3 | 68 | |
| 28-Sep | 13 | Z | 4 | 3 | 6 | 8 | 10 | 10 | 6 | 7 | 18 | 17 | 13 | 7 | 4 | 2 | 1 | 1 | 3 | 6 | 6 | 14 | 19 | 14 | 8.3 | 19 | |
| 29-Sep | 6 | 2 | Z | 3 | 5 | 5 | 3 | 2 | 2 | 5 | 13 | 8 | 5 | 6 | 5 | 5 | 4 | 5 | 4 | 8 | 6 | 10 | 9 | 13 | 5.8 | 13 | |
| 30-Sep | 10 | 17 | 22 | Z | 15 | 16 | 23 | 33 | 28 | 25 | 24 | 10 | 12 | 7 | 5 | 2 | 2 | 5 | 6 | 9 | 15 | 5 | 3 | 4 | 13.0 | 33 | |
| | | 9.5 | 7.7 | 11.1 | 9.5 | 10.7 | 9.2 | 14.2 | 17.1 | 20.0 | 22.8 | 19.6 | 13.9 | 10.1 | 8.1 | 8.0 | 7.0 | 7.5 | 9.5 | 11.2 | 12.6 | 12.9 | 10.8 | 12.7 | 11.2 | Diurnal Average | |
| | | 63 | 50 | 50 | 53 | 63 | 29 | 66 | 73 | 157 | 203 | 73 | 69 | 68 | 71 | 74 | 72 | 73 | 72 | 79 | 71 | 77 | 71 | 72 | 63 | Diurnal Maximum | |
| Z - zerospan | | C - Calibration | | | | PF - Power Failure | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Muskeg River - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Muskeg River - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 566 | 82.99 | 82.99 |
| 21 - 40 | 75 | 11.00 | 93.99 |
| 41 - 80 | 39 | 5.72 | 99.71 |
| 81 - 159 | 1 | 0.15 | 99.85 |
| > 159 | 1 | 0.15 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Muskeg River - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 6 | 9 | 40 | 16 | 10 | 10 | 18 | 53 | 140 | 81 | 48 | 53 | 32 | 19 | 24 | 7 | 566 |
| 21 - 40 | 17 | 16 | 9 | 0 | 0 | 1 | 0 | 2 | 13 | 8 | 2 | 0 | 0 | 0 | 1 | 6 | 75 |
| 11 - 80 | 2 | 24 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 5 | 39 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Totals | 25 | 49 | 51 | 16 | 10 | 11 | 18 | 55 | 156 | 90 | 50 | 53 | 32 | 19 | 28 | 19 | 682 |

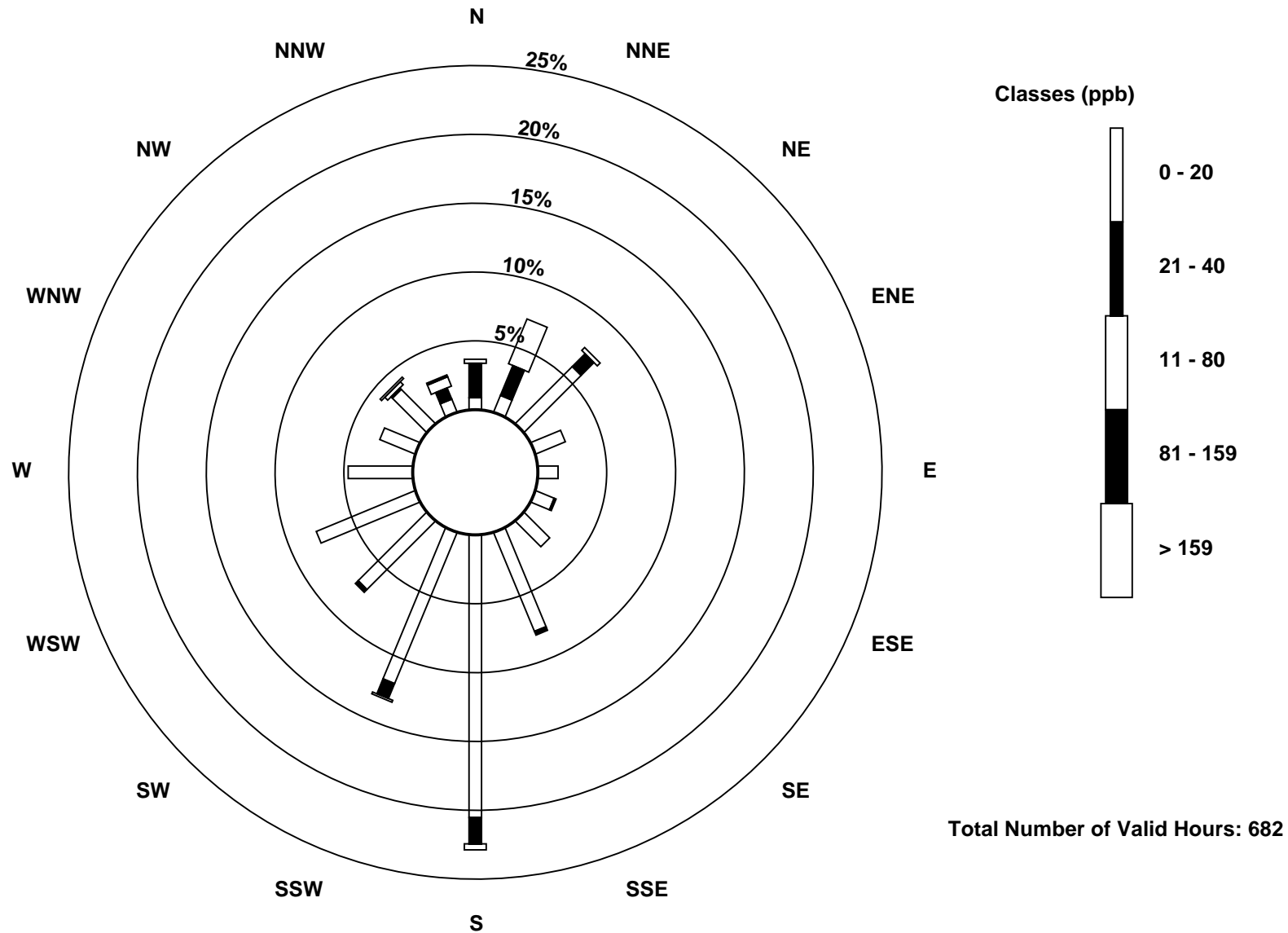
Total Number of Valid Hours: 682

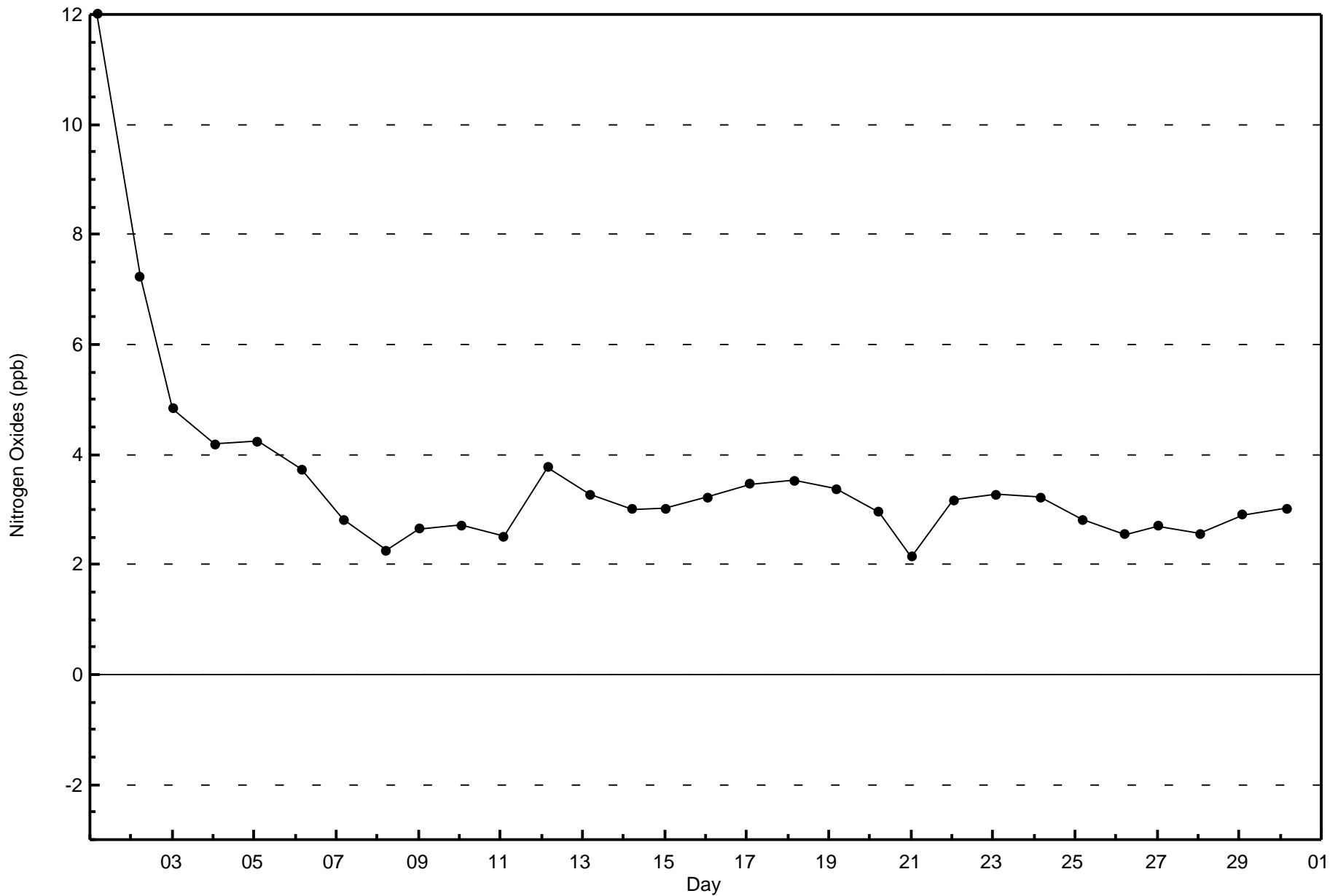
Total Number of Hours: 720

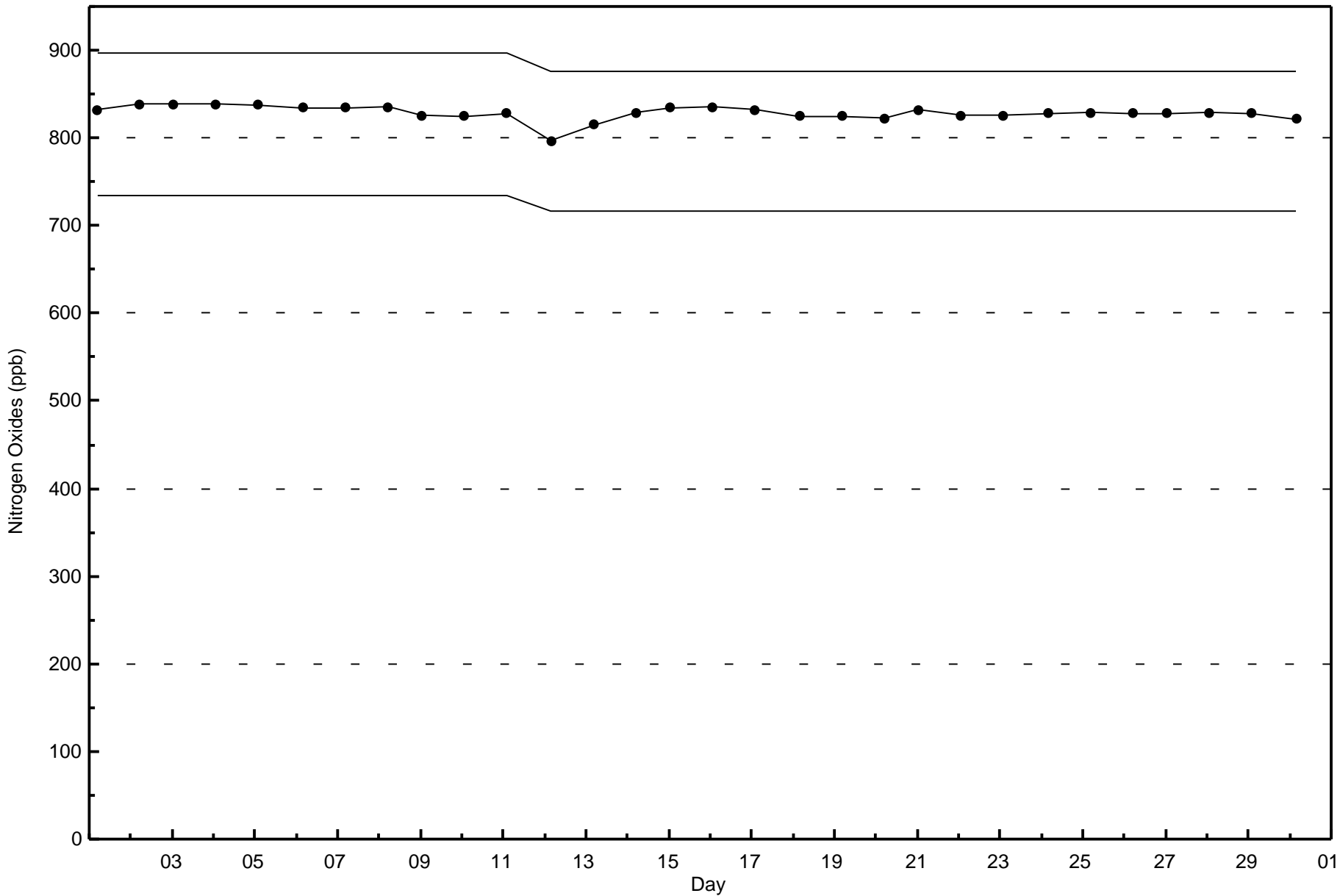


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxides (NO_x) - ppb
Muskeg River (AMS 16)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Muskeg River - September 2017

| | | | |
|---|--|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 47.1 µg/m ³ on Sep 8 11:00 | Maximum Daily Average: 17.9 µg/m ³ on Sep 19 | Hours of Data: | 711 |
| Minimum Value: 0.2 µg/m ³ on Sep 12 17:00 | Minimum Daily Average: 1.1 µg/m ³ on Sep 12 | Hours of Missing Data: | 9 |
| Maximum Diurnal Average: 9.3 µg/m ³ at hour 11 | Minimum Diurnal Average: 5.6 µg/m ³ at hour 17 | Hours of Calibration: | 2 |
| Monthly Average: 6.88 µg/m ³ | Percentiles: P ₁ = 0.3 P ₁₀ = 1.4 Q ₁ = 2.6 Median = 4.8 Q ₃ = 8.7 P ₉₀ = 15.2 P ₉₉ = 34.4 | Percent Operational Time: | 99.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 3.8 | 5.0 | 3.5 | 4.2 | 5.5 | 7.0 | 5.2 | 4.6 | 4.2 | 4.9 | 2.2 | 1.8 | 5.6 | 6.4 | 5.4 | 7.2 | 5.1 | 3.5 | 2.8 | 1.4 | 2.3 | 4.6 | 7.3 | 3.2 | 4.5 | 7.3 |
| 2-Sep | 2.2 | 3.6 | 2.1 | 3.2 | 6.5 | 6.8 | 3.9 | 4.8 | 2.4 | 1.5 | 1.8 | 2.1 | 2.8 | 2.8 | 4.6 | 5.1 | 3.5 | 1.5 | 1.8 | 2.6 | 2.9 | 1.4 | 1.1 | 1.8 | 3.0 | 6.8 |
| 3-Sep | 4.4 | 1.9 | 1.9 | 4.2 | 3.9 | 1.8 | 3.7 | 4.9 | 2.1 | 2.1 | 4.0 | 4.6 | 4.9 | 3.8 | 4.1 | 5.5 | 4.8 | 46.0 | 17.9 | 5.9 | 7.0 | 4.4 | 2.7 | 5.5 | 6.3 | 46.0 |
| 4-Sep | 8.2 | 6.9 | 4.6 | 5.3 | 8.7 | 8.1 | 3.8 | 4.3 | 4.8 | 1.8 | 5.1 | 4.9 | 4.2 | 7.2 | 4.5 | 6.5 | 5.3 | 5.9 | 5.7 | 6.8 | 4.2 | 3.3 | 3.7 | 9.7 | 5.6 | 9.7 |
| 5-Sep | 9.9 | 13.5 | 9.4 | 7.9 | 4.3 | 3.3 | 5.8 | 8.1 | 10.4 | 9.6 | 28.8 | 30.9 | 18.4 | 13.6 | 12.7 | 13.2 | 12.4 | 12.8 | 17.4 | 15.6 | 19.0 | 28.9 | 34.2 | 15.3 | 14.8 | 34.2 |
| 6-Sep | 18.2 | 18.3 | 15.5 | 14.9 | 18.3 | 27.8 | 30.1 | 23.0 | 16.9 | 11.0 | 9.4 | 16.1 | 13.6 | 8.1 | 11.8 | 15.5 | 6.6 | 10.0 | 11.9 | 11.3 | 9.5 | 7.8 | 7.4 | 8.4 | 14.2 | 30.1 |
| 7-Sep | 6.2 | 8.4 | 8.1 | 7.8 | 6.9 | 6.4 | 7.6 | 5.8 | 3.5 | 5.4 | 15.2 | 15.9 | 11.3 | 15.4 | 14.4 | 17.6 | 16.9 | 17.6 | 22.2 | 19.9 | 16.7 | 19.5 | 14.7 | 17.3 | 12.5 | 22.2 |
| 8-Sep | 21.9 | 21.9 | 23.1 | 25.1 | 23.6 | 22.7 | 19.1 | 18.7 | 20.5 | 31.7 | 47.1 | 33.7 | 20.6 | 19.5 | 21.0 | 10.1 | 13.0 | 7.2 | 2.9 | 2.5 | 2.2 | 3.6 | 4.6 | 5.8 | 17.6 | 47.1 |
| 9-Sep | 5.1 | 3.4 | 4.7 | 6.2 | 6.3 | 3.5 | 2.8 | 5.5 | 5.6 | 5.7 | 5.8 | 13.6 | 16.8 | 15.8 | 10.8 | 6.6 | 5.0 | 4.8 | 5.8 | 6.0 | 7.5 | 9.7 | 8.0 | 9.7 | 7.3 | 16.8 |
| 10-Sep | 10.9 | 11.4 | 12.4 | 10.9 | 9.3 | 10.5 | 9.7 | 6.1 | 6.0 | 4.0 | 2.4 | 4.0 | 6.6 | 6.1 | 2.9 | 2.8 | 3.7 | 3.7 | 3.4 | 3.8 | 1.5 | 0.8 | 1.5 | 2.6 | 5.7 | 12.4 |
| 11-Sep | 2.0 | 3.3 | 5.2 | 6.2 | 5.5 | 5.5 | 6.8 | 3.6 | 1.7 | 2.3 | C | C | 1.7 | 5.4 | 2.1 | UO | 2.1 | 5.4 | 6.1 | 10.6 | 1.9 | 0.6 | 0.6 | 0.2 | 3.8 | 10.6 |
| 12-Sep | UO | UO | UO | UO | 0.6 | 1.0 | 1.2 | 1.7 | 1.5 | 1.5 | 1.9 | 1.8 | 2.0 | 2.5 | 1.7 | 0.8 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.8 | 0.9 | 1.1 | 2.5 |
| 13-Sep | 1.1 | 1.0 | 1.1 | 0.8 | 0.9 | 0.9 | 1.0 | 0.8 | 0.8 | 1.8 | 2.9 | 1.5 | 2.1 | 1.0 | 1.5 | 2.1 | 1.1 | 0.5 | 0.4 | 0.5 | 0.9 | 0.9 | 1.1 | 1.0 | 1.1 | 2.9 |
| 14-Sep | 1.0 | 1.1 | 1.2 | 1.8 | 2.8 | 2.7 | 3.1 | 3.8 | 2.9 | 1.5 | 1.0 | 0.9 | 1.0 | 1.3 | 1.3 | 1.4 | 1.5 | 1.5 | 1.2 | 1.5 | 1.4 | 1.4 | 2.7 | 2.8 | 1.8 | 3.8 |
| 15-Sep | 2.9 | 3.4 | 2.8 | 4.8 | 6.7 | 3.6 | 4.6 | 4.1 | 9.8 | 13.7 | 9.6 | 9.0 | 11.7 | 4.2 | 1.2 | 0.3 | 0.5 | 0.7 | 4.2 | 21.0 | 22.2 | 14.8 | 6.2 | 6.3 | 7.0 | 22.2 |
| 16-Sep | 5.7 | 4.9 | 4.5 | 3.1 | 2.6 | 2.7 | 3.7 | 3.7 | 2.8 | 5.5 | 10.2 | 1.9 | 1.8 | 1.6 | 2.1 | 2.0 | 1.7 | 1.2 | 2.9 | 7.6 | 10.1 | 9.3 | 9.4 | 9.8 | 4.6 | 10.2 |
| 17-Sep | 7.7 | 4.6 | 3.4 | 3.0 | 3.2 | 3.6 | 3.8 | 4.1 | 4.0 | 6.6 | 9.5 | 9.3 | 11.0 | 8.9 | 8.9 | 9.1 | 7.9 | 7.2 | 9.0 | 10.4 | 10.5 | 9.0 | 8.2 | 7.0 | 7.1 | 11.0 |
| 18-Sep | 8.6 | 12.6 | 13.4 | 14.0 | 12.8 | 10.8 | 9.5 | 8.6 | 6.1 | 4.3 | 2.8 | 3.5 | 4.0 | 4.4 | 4.0 | 4.2 | 6.6 | 10.9 | 12.5 | 9.8 | 10.0 | 9.7 | 10.3 | 11.6 | 8.5 | 14.0 |
| 19-Sep | 12.7 | 13.3 | 13.1 | 15.0 | 16.1 | 17.4 | 25.8 | 27.9 | 35.8 | 40.8 | 41.3 | 41.6 | 38.1 | 34.8 | 23.9 | 12.0 | 4.5 | 2.4 | 1.9 | 1.1 | 1.6 | 2.1 | 2.6 | 3.1 | 17.9 | 41.6 |
| 20-Sep | 3.4 | 4.0 | 3.7 | 3.7 | 2.7 | 1.7 | 1.7 | 2.1 | 2.7 | 2.8 | 1.8 | 1.0 | 1.0 | 0.8 | 0.6 | 0.6 | 0.9 | 0.6 | 0.9 | 1.3 | 1.4 | 1.5 | 1.3 | 1.2 | 1.8 | 4.0 |
| 21-Sep | 1.8 | 2.3 | 3.0 | 2.8 | 2.5 | 2.5 | 2.3 | 2.5 | 2.6 | 2.3 | 2.2 | 2.3 | 2.6 | 2.5 | 2.7 | 2.7 | 2.8 | 2.6 | 3.1 | 3.4 | 3.3 | 3.3 | 4.3 | 3.9 | 2.8 | 4.3 |
| 22-Sep | 5.3 | 4.3 | 4.4 | 4.6 | 4.4 | 4.5 | 3.7 | 3.5 | 2.9 | 2.3 | 2.2 | 2.3 | 1.7 | 1.2 | 1.9 | 6.7 | 11.9 | 10.4 | 8.0 | 7.4 | 8.0 | 7.0 | 6.5 | 6.3 | 5.1 | 11.9 |
| 23-Sep | 6.2 | 7.1 | 6.5 | 7.5 | 6.4 | 6.0 | 5.1 | 5.7 | 3.8 | 2.7 | 3.3 | 3.3 | 1.3 | 2.3 | 2.0 | 1.2 | 2.0 | 2.5 | 3.6 | 5.0 | 5.7 | 6.1 | 5.1 | 4.0 | 4.3 | 7.5 |
| 24-Sep | 3.8 | 4.0 | 4.5 | 4.3 | 4.2 | 4.9 | 5.9 | 6.2 | 3.3 | 3.1 | 3.8 | 3.2 | 3.6 | 5.0 | 8.3 | 8.6 | 6.8 | 5.0 | 6.1 | 8.0 | 7.1 | 7.6 | 6.5 | 4.5 | 5.4 | 8.6 |
| 25-Sep | 3.3 | 3.0 | 2.6 | 2.6 | 3.0 | 2.8 | 2.9 | 2.0 | 1.3 | 4.2 | 5.6 | 11.6 | 2.9 | 2.9 | 1.5 | 1.7 | 1.8 | 2.0 | 3.3 | 5.4 | 8.3 | 4.4 | 4.4 | PF | 3.6 | 11.6 |
| 26-Sep | PF | 4.7 | 2.3 | 1.2 | 1.5 | 2.5 | 2.8 | 3.7 | 4.8 | 4.7 | 8.2 | 8.3 | 4.1 | 3.9 | 4.1 | 4.3 | 7.8 | 9.6 | 6.1 | 6.8 | 8.6 | 8.3 | 5.5 | 4.2 | 5.1 | 9.6 |
| 27-Sep | 5.1 | 4.2 | 6.4 | 6.7 | 8.7 | 8.7 | 7.5 | 9.2 | 6.1 | 5.1 | 4.1 | 3.8 | 4.2 | 4.4 | 4.6 | 6.5 | 8.7 | 9.6 | 9.4 | 7.5 | 6.2 | 3.8 | 3.9 | 4.3 | 6.2 | 9.6 |
| 28-Sep | 6.0 | 6.9 | 5.8 | 5.6 | 8.0 | 7.9 | 5.6 | 6.0 | 2.0 | 1.5 | 1.9 | 2.5 | 3.0 | 3.3 | 3.3 | 3.0 | 1.0 | 2.3 | 2.5 | 3.5 | 4.3 | 7.3 | 10.3 | 9.2 | 4.7 | 10.3 |
| 29-Sep | 7.4 | 6.7 | 7.1 | 8.3 | 9.9 | 10.2 | 6.9 | 5.9 | 2.2 | 1.7 | 5.1 | 7.0 | 8.5 | 10.7 | 9.6 | 11.4 | 15.2 | 21.1 | 21.9 | 22.4 | 18.9 | 16.7 | 17.2 | 15.6 | 11.2 | 22.4 |
| 30-Sep | 10.8 | 10.6 | 11.5 | 11.6 | 11.1 | 11.9 | 12.0 | 11.0 | 9.0 | 14.2 | 29.8 | 12.3 | 16.8 | 10.8 | 5.9 | 5.3 | 7.9 | 7.1 | 7.6 | 9.5 | 10.5 | 5.6 | 4.2 | 1.5 | 10.4 | 29.8 |

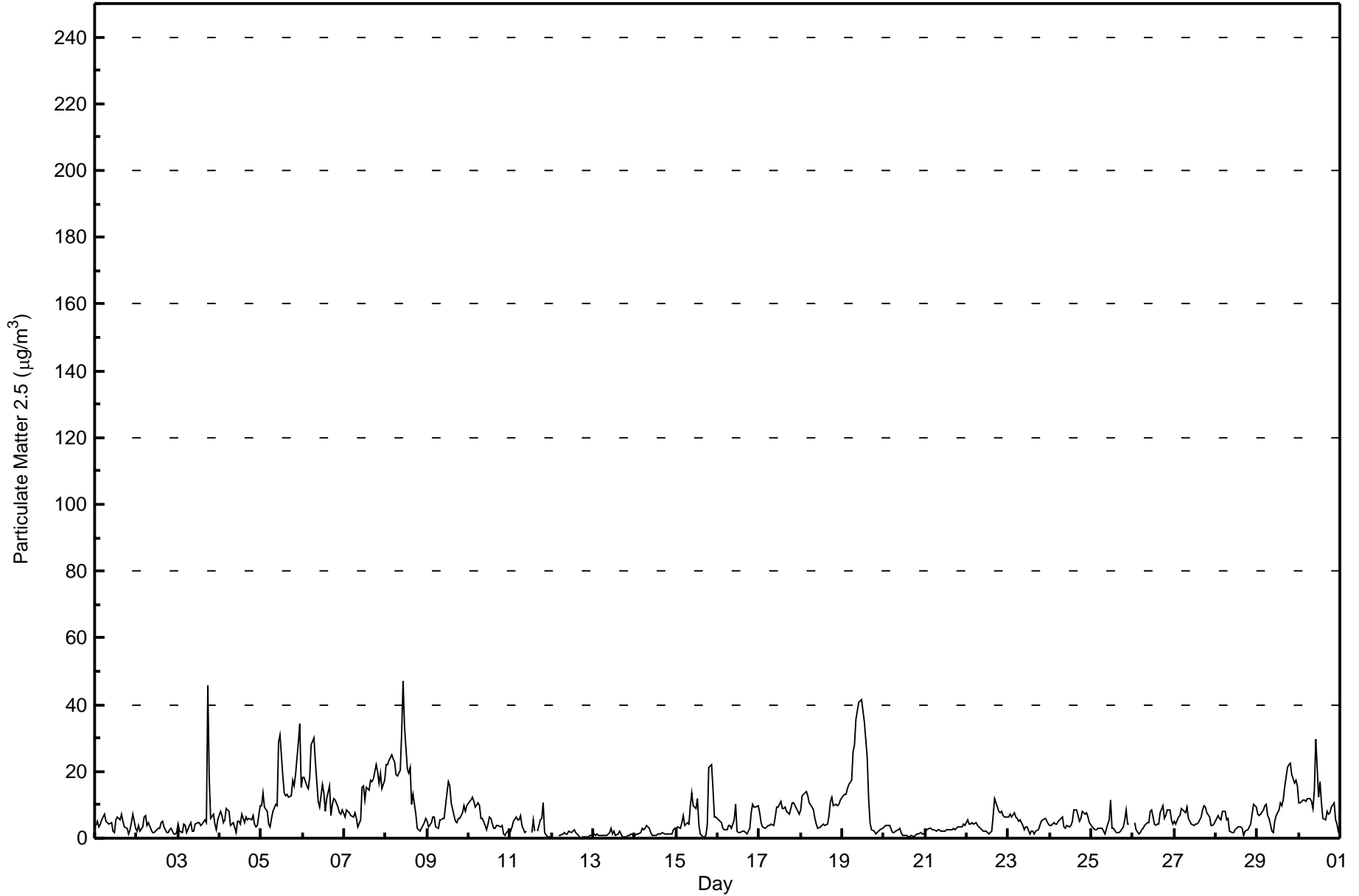
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 6.6 | 6.8 | 6.5 | 6.8 | 6.9 | 7.0 | 6.9 | 6.7 | 6.1 | 6.7 | 9.3 | 8.8 | 7.6 | 7.0 | 6.1 | 6.0 | 5.6 | 7.2 | 6.8 | 7.3 | 7.1 | 6.8 | 6.5 | 6.1 | Diurnal Average | |
| 21.9 | 21.9 | 23.1 | 25.1 | 23.6 | 27.8 | 30.1 | 27.9 | 35.8 | 40.8 | 47.1 | 41.6 | 38.1 | 34.8 | 23.9 | 17.6 | 16.9 | 46.0 | 22.2 | 22.4 | 22.2 | 28.9 | 34.2 | 17.3 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Muskeg River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Muskeg River - September 2017**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 356 | 50.07 | 50.07 |
| 6 - 15 | 249 | 35.02 | 85.09 |
| 16 - 25 | 47 | 6.61 | 91.70 |
| 26 - 80 | 19 | 2.67 | 94.37 |
| > 81.0 | 0 | 0.00 | 94.37 |

Total Number of Valid Hours: 711

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Muskeg River - September 2017

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 21 | 23 | 24 | 9 | 3 | 5 | 9 | 26 | 74 | 33 | 27 | 42 | 21 | 16 | 12 | 11 | 356 |
| 6 - 15 | 3 | 11 | 9 | 4 | 8 | 8 | 8 | 29 | 63 | 49 | 18 | 8 | 7 | 3 | 16 | 5 | 249 |
| 16 - 25 | 0 | 5 | 4 | 1 | 0 | 0 | 0 | 3 | 22 | 9 | 1 | 0 | 0 | 1 | 0 | 1 | 47 |
| 26 - 80 | 1 | 7 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 0 | 1 | 0 | 0 | 2 | 19 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 46 | 38 | 14 | 11 | 13 | 17 | 60 | 161 | 94 | 46 | 50 | 29 | 20 | 28 | 19 | 671 |

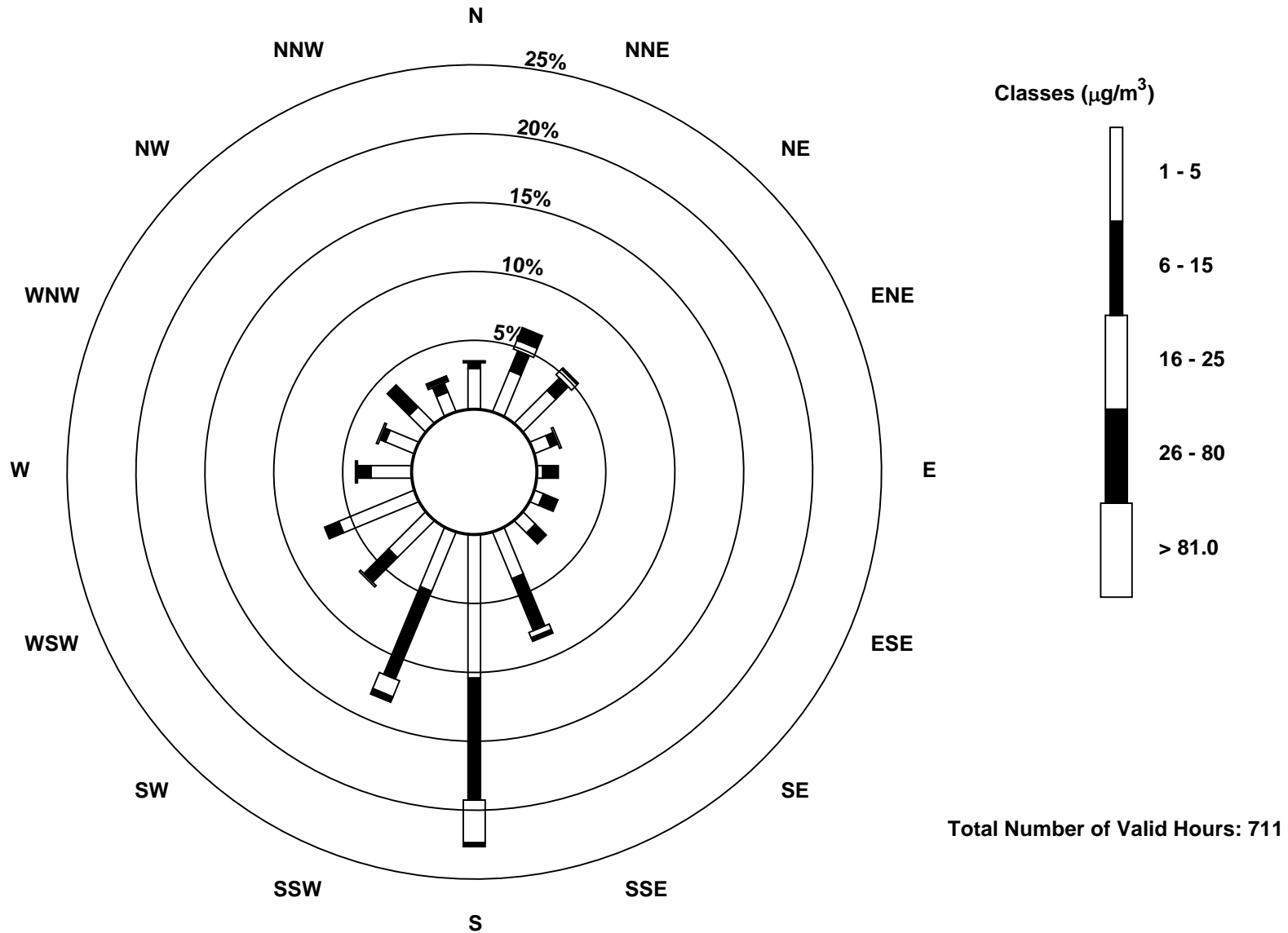
Total Number of Valid Hours: 711

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Muskeg River (AMS 16)



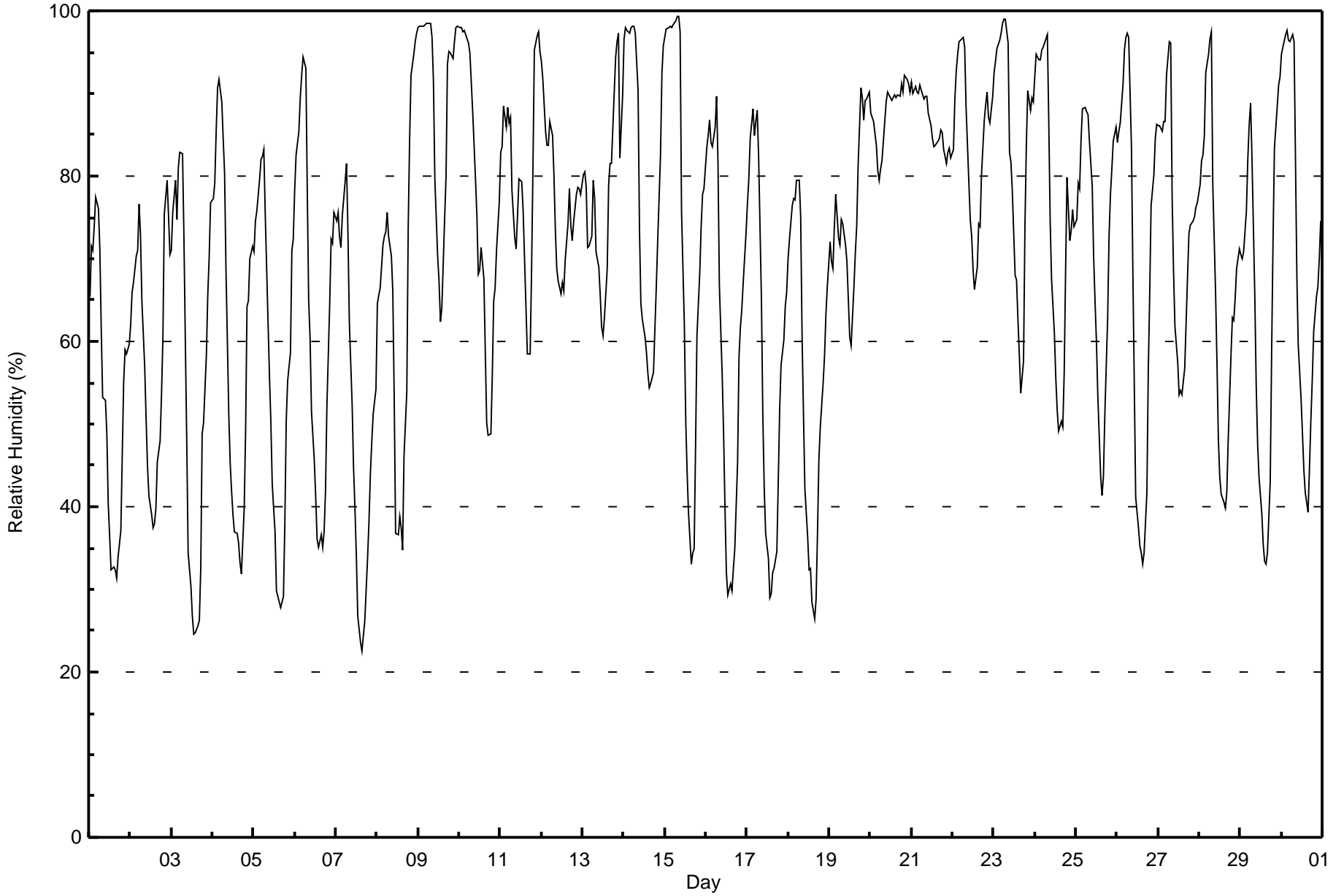


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Muskeg River - September 2017**

| Maximum Value: 99 % on Sep 15 09:00 Maximum Daily Average: 89.3 % on Sep 9 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|------|------|------|------|------|------|-----------------|-----------------|--|
| Minimum Value: 23 % on Sep 7 16:00 Minimum Daily Average: 51.2 % on Sep 7 Maximum Diurnal Average: 88.1 % at hour 7 Minimum Diurnal Average: 48.3 % at hour 15 Monthly Average: 70.0 % Percentiles: P ₁ = 26 P ₁₀ = 37 Q ₁ = 56 Median = 73 O ₃ = 86 P ₉₀ = 95 P ₉₉ = 98 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 65 | 72 | 71 | 74 | 77 | 76 | 71 | 62 | 53 | 53 | 49 | 40 | 36 | 32 | 33 | 32 | 31 | 34 | 37 | 46 | 55 | 59 | 59 | 60 | 53.3 | 77 | |
| 2-Sep | 62 | 66 | 67 | 70 | 71 | 77 | 73 | 65 | 57 | 51 | 45 | 41 | 39 | 37 | 38 | 40 | 45 | 48 | 54 | 61 | 75 | 80 | 75 | 70 | 58.6 | 80 | |
| 3-Sep | 71 | 76 | 80 | 75 | 81 | 83 | 83 | 73 | 60 | 48 | 34 | 30 | 27 | 25 | 25 | 26 | 26 | 33 | 49 | 50 | 58 | 66 | 70 | 77 | 55.1 | 83 | |
| 4-Sep | 77 | 79 | 85 | 91 | 92 | 89 | 84 | 80 | 69 | 51 | 45 | 42 | 39 | 37 | 37 | 36 | 33 | 32 | 40 | 49 | 64 | 65 | 70 | 72 | 60.8 | 92 | |
| 5-Sep | 71 | 75 | 76 | 80 | 82 | 82 | 83 | 75 | 62 | 56 | 50 | 43 | 37 | 30 | 29 | 28 | 28 | 29 | 38 | 50 | 55 | 59 | 71 | 72 | 56.7 | 83 | |
| 6-Sep | 78 | 82 | 85 | 89 | 92 | 94 | 93 | 78 | 65 | 60 | 51 | 46 | 41 | 36 | 35 | 37 | 35 | 37 | 42 | 52 | 65 | 72 | 72 | 76 | 63.1 | 94 | |
| 7-Sep | 74 | 76 | 73 | 71 | 75 | 79 | 81 | 73 | 62 | 52 | 45 | 40 | 34 | 27 | 24 | 23 | 24 | 26 | 34 | 38 | 44 | 48 | 51 | 54 | 51.2 | 81 | |
| 8-Sep | 65 | 66 | 66 | 72 | 73 | 73 | 76 | 73 | 70 | 66 | 53 | 37 | 37 | 39 | 38 | 35 | 46 | 54 | 74 | 84 | 92 | 95 | 96 | 97 | 65.6 | 97 | |
| 9-Sep | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 91 | 80 | 70 | 67 | 62 | 64 | 75 | 80 | 94 | 95 | 95 | 94 | 96 | 98 | 98 | 89.3 | 98 | |
| 10-Sep | 98 | 98 | 98 | 98 | 97 | 96 | 95 | 91 | 88 | 80 | 75 | 68 | 69 | 71 | 68 | 59 | 50 | 49 | 49 | 56 | 65 | 66 | 71 | 77 | 76.3 | 98 | |
| 11-Sep | 83 | 84 | 88 | 86 | 88 | 86 | 87 | 78 | 73 | 71 | 75 | 80 | 79 | 76 | 70 | 64 | 58 | 58 | 69 | 81 | 95 | 97 | 97 | 95 | 80.0 | 97 | |
| 12-Sep | 94 | 92 | 85 | 84 | 84 | 87 | 85 | 80 | 73 | 69 | 67 | 66 | 67 | 66 | 70 | 74 | 78 | 74 | 72 | 74 | 78 | 79 | 78 | 78 | 77.3 | 94 | |
| 13-Sep | 80 | 81 | 79 | 71 | 72 | 73 | 79 | 77 | 71 | 69 | 66 | 62 | 61 | 63 | 69 | 79 | 82 | 82 | 90 | 94 | 96 | 97 | 82 | 90 | 77.7 | 97 | |
| 14-Sep | 97 | 98 | 98 | 97 | 98 | 98 | 98 | 97 | 90 | 74 | 65 | 63 | 60 | 59 | 56 | 54 | 55 | 56 | 61 | 67 | 72 | 82 | 92 | 96 | 78.5 | 98 | |
| 15-Sep | 97 | 98 | 98 | 98 | 98 | 98 | 99 | 99 | 99 | 98 | 76 | 62 | 50 | 44 | 39 | 33 | 34 | 35 | 47 | 61 | 68 | 74 | 78 | 78 | 73.4 | 99 | |
| 16-Sep | 83 | 85 | 87 | 84 | 84 | 86 | 90 | 82 | 67 | 56 | 49 | 40 | 32 | 29 | 31 | 30 | 33 | 35 | 45 | 58 | 62 | 64 | 67 | 73 | 60.4 | 90 | |
| 17-Sep | 77 | 80 | 85 | 88 | 85 | 87 | 88 | 82 | 65 | 51 | 42 | 37 | 34 | 29 | 30 | 32 | 33 | 35 | 43 | 52 | 57 | 60 | 64 | 66 | 58.3 | 88 | |
| 18-Sep | 70 | 72 | 76 | 77 | 77 | 79 | 80 | 75 | 61 | 51 | 42 | 36 | 32 | 32 | 28 | 26 | 29 | 37 | 46 | 50 | 55 | 58 | 63 | 67 | 55.1 | 80 | |
| 19-Sep | 72 | 70 | 69 | 74 | 78 | 72 | 72 | 75 | 74 | 72 | 70 | 65 | 60 | 60 | 67 | 71 | 74 | 81 | 91 | 89 | 87 | 89 | 89 | 90 | 75.4 | 91 | |
| 20-Sep | 88 | 87 | 87 | 84 | 81 | 80 | 81 | 82 | 87 | 89 | 90 | 90 | 89 | 90 | 90 | 89 | 90 | 90 | 91 | 90 | 92 | 92 | 91 | 90 | 87.8 | 92 | |
| 21-Sep | 91 | 90 | 91 | 90 | 90 | 91 | 90 | 89 | 90 | 90 | 88 | 86 | 85 | 83 | 84 | 84 | 85 | 86 | 85 | 83 | 82 | 83 | 83 | 82 | 86.7 | 91 | |
| 22-Sep | 83 | 89 | 93 | 95 | 96 | 97 | 97 | 96 | 88 | 79 | 75 | 73 | 69 | 66 | 69 | 74 | 74 | 80 | 87 | 89 | 90 | 87 | 86 | 90 | 84.2 | 97 | |
| 23-Sep | 92 | 94 | 95 | 96 | 97 | 98 | 99 | 99 | 96 | 83 | 82 | 78 | 68 | 68 | 63 | 58 | 54 | 58 | 74 | 84 | 90 | 88 | 89 | 89 | 83.0 | 99 | |
| 24-Sep | 92 | 95 | 94 | 94 | 95 | 96 | 97 | 97 | 87 | 75 | 67 | 61 | 56 | 52 | 49 | 50 | 50 | 56 | 69 | 80 | 72 | 73 | 76 | 74 | 75.2 | 97 | |
| 25-Sep | 75 | 79 | 78 | 84 | 88 | 88 | 88 | 87 | 84 | 79 | 70 | 65 | 60 | 53 | 44 | 41 | 44 | 51 | 63 | 73 | 78 | 81 | 84 | 86 | 71.9 | 88 | |
| 26-Sep | 84 | 85 | 86 | 91 | 95 | 97 | 97 | 97 | 83 | 68 | 55 | 41 | 37 | 35 | 34 | 33 | 34 | 42 | 56 | 66 | 77 | 80 | 85 | 86 | 68.6 | 97 | |
| 27-Sep | 86 | 86 | 85 | 87 | 87 | 92 | 96 | 96 | 78 | 69 | 62 | 57 | 54 | 54 | 54 | 57 | 62 | 68 | 73 | 74 | 75 | 75 | 76 | 77 | 74.1 | 96 | |
| 28-Sep | 79 | 82 | 83 | 85 | 92 | 95 | 97 | 97 | 79 | 66 | 58 | 48 | 44 | 42 | 40 | 40 | 42 | 48 | 58 | 63 | 63 | 65 | 69 | 71 | 66.9 | 97 | |
| 29-Sep | 71 | 70 | 71 | 76 | 82 | 86 | 89 | 82 | 65 | 55 | 48 | 43 | 39 | 35 | 33 | 33 | 34 | 43 | 59 | 72 | 83 | 88 | 91 | 92 | 64.2 | 92 | |
| 30-Sep | 95 | 96 | 97 | 98 | 96 | 96 | 97 | 96 | 82 | 68 | 60 | 53 | 49 | 44 | 42 | 39 | 45 | 51 | 55 | 61 | 65 | 67 | 70 | 74 | 70.7 | 98 | |
| | 81.6 | 83.3 | 84.1 | 85.2 | 86.7 | 87.7 | 88.1 | 84.5 | 75.9 | 67.9 | 61.1 | 55.4 | 51.7 | 49.2 | 48.3 | 48.4 | 49.6 | 53.3 | 61.5 | 68.1 | 73.5 | 76.2 | 78.2 | 79.9 | Diurnal Average | | |
| | 98 | 98 | 98 | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 98 | 90 | 90 | 89 | 90 | 90 | 89 | 90 | 94 | 95 | 95 | 96 | 97 | 98 | 98 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Muskeg River - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 89 | 12.36 | 12.36 |
| 40 - 60 | 120 | 16.67 | 29.03 |
| 60 - 80 | 247 | 34.31 | 63.33 |
| 80 - 100 | 264 | 36.67 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

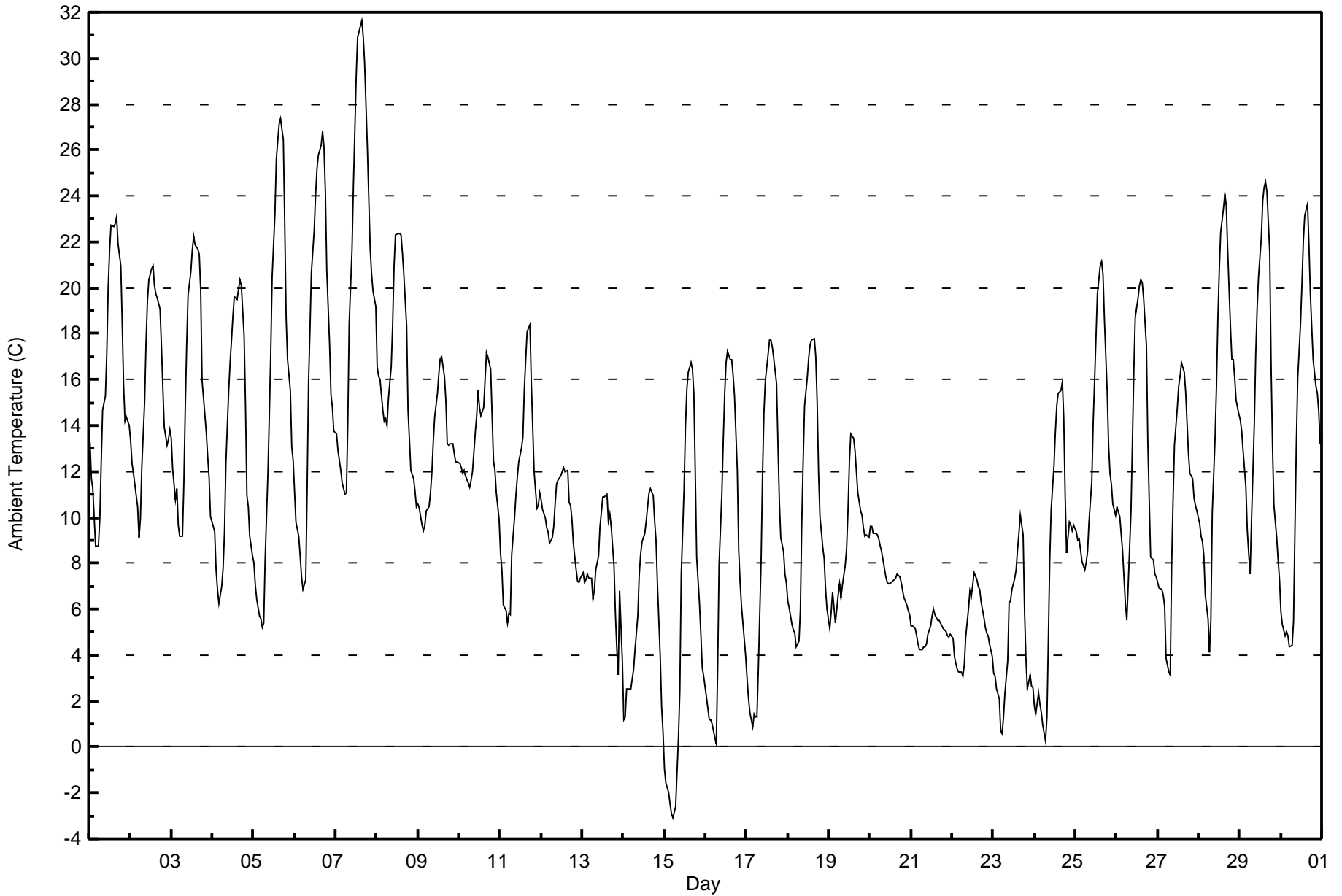
Ambient Temperature (AT) - C
Muskeg River - September 2017

| Maximum Value: 31.6 C on Sep 7 16:00 Minimum Value: -3.1 C on Sep 15 06:00 Maximum Diurnal Average: 17.6 C at hour 16 Monthly Average: 11.47 C | | Maximum Daily Average: 21.0 C on Sep 7 Minimum Daily Average: 4.7 C on Sep 23 Minimum Diurnal Average: 6.1 C at hour 7 Percentiles: P ₁ = -1.3 P ₁₀ = 3.9 Q ₁ = 7.0 Median = 10.6 Q ₃ = 15.6 P ₉₀ = 20.4 P ₉₉ = 26.1 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 13.3 | 11.7 | 11.3 | 10.0 | 8.8 | 8.7 | 9.9 | 12.4 | 14.7 | 15.3 | 17.2 | 20.0 | 21.6 | 22.7 | 22.7 | 22.8 | 23.1 | 21.9 | 20.9 | 18.5 | 15.7 | 14.2 | 14.4 | 14.0 | 16.1 | 23.1 | |
| 2-Sep | 13.3 | 12.4 | 11.9 | 10.9 | 10.5 | 9.1 | 10.0 | 12.3 | 15.0 | 17.6 | 19.4 | 20.4 | 20.9 | 21.0 | 20.1 | 19.7 | 19.6 | 19.1 | 17.5 | 15.6 | 14.0 | 13.2 | 13.4 | 13.8 | 15.4 | 21.0 | |
| 3-Sep | 13.4 | 12.1 | 10.7 | 11.2 | 9.7 | 9.2 | 9.2 | 11.5 | 14.7 | 17.5 | 19.7 | 20.7 | 21.6 | 22.2 | 21.8 | 21.7 | 21.5 | 19.9 | 15.9 | 15.2 | 13.7 | 12.7 | 11.8 | 10.1 | 15.3 | 22.2 | |
| 4-Sep | 9.6 | 9.4 | 7.7 | 6.9 | 6.3 | 7.0 | 7.8 | 9.4 | 12.3 | 15.5 | 16.7 | 17.8 | 18.8 | 19.6 | 19.5 | 19.9 | 20.3 | 20.1 | 17.9 | 14.9 | 11.0 | 10.4 | 9.2 | 8.3 | 13.2 | 20.3 | |
| 5-Sep | 8.0 | 7.1 | 6.5 | 5.7 | 5.6 | 5.2 | 5.4 | 8.2 | 11.9 | 14.5 | 17.1 | 20.5 | 23.2 | 25.6 | 26.4 | 27.1 | 27.4 | 26.4 | 22.8 | 18.7 | 16.9 | 15.5 | 13.1 | 12.5 | 15.5 | 27.4 | |
| 6-Sep | 11.1 | 9.8 | 9.2 | 8.4 | 7.4 | 6.9 | 7.3 | 11.3 | 15.9 | 18.2 | 20.7 | 22.5 | 24.0 | 25.2 | 25.8 | 26.2 | 26.8 | 26.1 | 24.2 | 20.8 | 17.5 | 15.4 | 14.8 | 13.7 | 17.0 | 26.8 | |
| 7-Sep | 13.6 | 12.9 | 12.5 | 12.0 | 11.5 | 11.0 | 11.1 | 14.1 | 18.4 | 21.6 | 24.5 | 26.8 | 29.2 | 30.9 | 31.4 | 31.6 | 30.9 | 29.8 | 26.1 | 23.9 | 21.7 | 20.6 | 19.9 | 19.2 | 21.0 | 31.6 | |
| 8-Sep | 16.6 | 16.2 | 16.0 | 14.7 | 14.2 | 14.3 | 14.0 | 15.2 | 16.5 | 18.3 | 20.9 | 22.3 | 22.3 | 22.3 | 22.3 | 21.5 | 20.6 | 18.3 | 14.7 | 13.4 | 12.1 | 11.7 | 11.2 | 10.4 | 16.7 | 22.3 | |
| 9-Sep | 10.6 | 10.4 | 9.7 | 9.4 | 9.7 | 10.3 | 10.5 | 11.1 | 11.9 | 13.3 | 14.4 | 15.4 | 16.2 | 16.9 | 17.0 | 16.1 | 15.1 | 13.2 | 13.2 | 13.2 | 13.2 | 12.8 | 12.4 | 12.4 | 12.8 | 17.0 | |
| 10-Sep | 12.4 | 12.2 | 11.9 | 12.0 | 11.8 | 11.5 | 11.3 | 11.6 | 12.0 | 13.7 | 14.4 | 15.5 | 14.8 | 14.4 | 14.8 | 16.0 | 17.2 | 17.0 | 16.4 | 14.4 | 12.5 | 12.0 | 11.1 | 9.9 | 13.4 | 17.2 | |
| 11-Sep | 8.5 | 7.7 | 6.2 | 5.9 | 5.4 | 5.8 | 5.8 | 8.4 | 10.0 | 11.0 | 11.8 | 12.4 | 13.0 | 13.5 | 15.6 | 16.9 | 18.1 | 18.4 | 15.9 | 14.0 | 12.0 | 10.4 | 10.5 | 11.1 | 11.2 | 18.4 | |
| 12-Sep | 10.8 | 10.4 | 10.0 | 9.6 | 9.4 | 8.9 | 9.1 | 9.6 | 10.6 | 11.4 | 11.6 | 11.8 | 12.0 | 12.2 | 12.0 | 12.1 | 10.6 | 10.5 | 9.9 | 8.9 | 7.7 | 7.2 | 7.2 | 7.3 | 10.0 | 12.2 | |
| 13-Sep | 7.6 | 7.2 | 7.3 | 7.6 | 7.3 | 7.4 | 6.5 | 6.9 | 7.7 | 8.3 | 9.6 | 10.2 | 10.9 | 10.9 | 11.0 | 9.8 | 10.2 | 9.6 | 7.9 | 5.8 | 4.3 | 3.1 | 6.8 | 3.7 | 7.8 | 11.0 | |
| 14-Sep | 1.2 | 1.3 | 2.5 | 2.6 | 2.5 | 2.9 | 3.4 | 4.2 | 5.7 | 7.5 | 8.4 | 8.9 | 9.3 | 9.8 | 10.5 | 11.1 | 11.3 | 10.9 | 9.8 | 9.0 | 7.1 | 4.0 | 1.8 | 0.6 | 6.1 | 11.3 | |
| 15-Sep | -0.9 | -1.6 | -2.0 | -2.5 | -2.9 | -3.1 | -2.6 | -1.1 | 0.4 | 2.5 | 7.5 | 11.2 | 13.9 | 15.6 | 16.3 | 16.8 | 16.5 | 15.4 | 11.9 | 8.3 | 6.3 | 4.9 | 3.4 | 3.1 | 5.7 | 16.8 | |
| 16-Sep | 2.2 | 1.7 | 1.2 | 1.2 | 1.0 | 0.4 | 0.1 | 3.5 | 8.0 | 11.0 | 13.4 | 15.4 | 16.8 | 17.2 | 16.8 | 16.9 | 16.2 | 15.3 | 12.0 | 8.6 | 7.2 | 6.1 | 5.4 | 3.9 | 8.4 | 17.2 | |
| 17-Sep | 2.9 | 2.1 | 1.5 | 0.9 | 1.4 | 1.3 | 1.3 | 3.4 | 8.1 | 11.9 | 14.6 | 16.0 | 17.1 | 17.7 | 17.7 | 17.4 | 16.9 | 15.8 | 13.2 | 10.7 | 9.1 | 8.5 | 7.5 | 7.1 | 9.3 | 17.7 | |
| 18-Sep | 6.4 | 6.1 | 5.3 | 5.1 | 5.0 | 4.4 | 4.6 | 5.9 | 9.8 | 12.5 | 14.8 | 16.1 | 17.0 | 17.5 | 17.7 | 17.8 | 17.0 | 15.0 | 11.9 | 10.0 | 8.7 | 8.2 | 6.9 | 6.0 | 10.4 | 17.8 | |
| 19-Sep | 5.1 | 5.9 | 6.8 | 6.1 | 5.4 | 6.6 | 7.1 | 6.5 | 7.1 | 7.9 | 8.6 | 10.3 | 12.4 | 13.6 | 13.5 | 12.9 | 12.0 | 11.1 | 10.3 | 10.1 | 9.6 | 9.2 | 9.2 | 9.1 | 9.0 | 13.6 | |
| 20-Sep | 9.6 | 9.6 | 9.3 | 9.3 | 9.2 | 9.0 | 8.8 | 8.5 | 7.8 | 7.4 | 7.2 | 7.1 | 7.2 | 7.2 | 7.3 | 7.4 | 7.5 | 7.4 | 7.2 | 6.8 | 6.5 | 6.2 | 6.0 | 5.8 | 7.7 | 9.6 | |
| 21-Sep | 5.3 | 5.3 | 5.2 | 4.9 | 4.5 | 4.2 | 4.3 | 4.3 | 4.3 | 4.5 | 4.9 | 5.3 | 5.7 | 6.0 | 5.8 | 5.5 | 5.5 | 5.4 | 5.3 | 5.1 | 5.0 | 4.8 | 4.8 | 4.9 | 5.0 | 6.0 | |
| 22-Sep | 4.7 | 3.9 | 3.6 | 3.4 | 3.3 | 3.2 | 3.1 | 3.6 | 4.8 | 6.0 | 6.8 | 6.6 | 7.0 | 7.6 | 7.3 | 7.0 | 6.9 | 6.3 | 5.7 | 5.2 | 5.0 | 4.9 | 4.5 | 3.9 | 5.2 | 7.6 | |
| 23-Sep | 3.2 | 3.1 | 2.5 | 2.1 | 0.7 | 0.6 | 1.3 | 2.4 | 3.7 | 6.2 | 6.4 | 6.8 | 7.3 | 7.7 | 8.5 | 9.3 | 10.1 | 9.3 | 6.0 | 3.9 | 2.6 | 3.1 | 2.6 | 2.6 | 4.7 | 10.1 | |
| 24-Sep | 1.8 | 1.4 | 2.4 | 1.8 | 1.5 | 0.9 | 0.3 | 1.3 | 4.7 | 8.1 | 10.3 | 12.3 | 13.7 | 14.9 | 15.4 | 15.5 | 15.9 | 14.3 | 11.0 | 8.5 | 9.8 | 9.7 | 9.4 | 9.7 | 8.1 | 15.9 | |
| 25-Sep | 9.4 | 9.0 | 9.1 | 8.6 | 8.1 | 7.7 | 8.0 | 8.5 | 9.8 | 11.6 | 14.1 | 15.9 | 17.9 | 19.7 | 21.0 | 21.1 | 20.6 | 18.6 | 15.4 | 13.1 | 11.9 | 11.5 | 10.6 | 10.1 | 13.0 | 21.1 | |
| 26-Sep | 10.4 | 10.2 | 10.0 | 8.5 | 7.3 | 6.3 | 5.5 | 7.0 | 10.3 | 13.3 | 16.4 | 18.7 | 19.6 | 20.1 | 20.3 | 20.2 | 19.6 | 17.5 | 13.3 | 10.8 | 8.3 | 8.1 | 7.5 | 7.4 | 12.4 | 20.3 | |
| 27-Sep | 7.2 | 6.9 | 6.9 | 6.6 | 6.1 | 3.9 | 3.3 | 3.1 | 7.9 | 10.7 | 13.1 | 14.7 | 15.7 | 16.1 | 16.8 | 16.3 | 15.4 | 14.1 | 12.8 | 11.9 | 11.7 | 10.9 | 10.5 | 10.3 | 10.5 | 16.8 | |
| 28-Sep | 9.7 | 9.2 | 8.9 | 8.3 | 6.6 | 5.6 | 4.1 | 5.5 | 10.2 | 13.5 | 15.7 | 18.6 | 20.8 | 22.4 | 23.4 | 24.1 | 23.6 | 21.6 | 18.3 | 16.9 | 16.9 | 16.1 | 15.1 | 14.5 | 14.6 | 24.1 | |
| 29-Sep | 14.2 | 13.7 | 12.9 | 11.3 | 9.4 | 8.4 | 7.5 | 9.9 | 14.0 | 17.1 | 19.1 | 20.4 | 22.2 | 23.8 | 24.4 | 24.6 | 24.2 | 21.6 | 16.5 | 13.1 | 10.5 | 9.1 | 8.1 | 7.3 | 15.1 | 24.6 | |
| 30-Sep | 5.9 | 5.3 | 4.9 | 5.0 | 4.8 | 4.4 | 4.4 | 5.4 | 9.4 | 13.2 | 16.1 | 18.5 | 20.2 | 22.1 | 23.2 | 23.6 | 21.9 | 19.7 | 18.3 | 16.9 | 15.7 | 15.4 | 14.6 | 13.2 | 13.4 | 23.6 | |
| | | 8.2 | 7.7 | 7.4 | 6.9 | 6.4 | 6.1 | 6.1 | 7.5 | 9.9 | 12.0 | 13.8 | 15.3 | 16.4 | 17.2 | 17.5 | 17.6 | 17.4 | 16.3 | 14.1 | 12.2 | 10.8 | 10.0 | 9.5 | 8.9 | Diurnal Average | |
| | | 16.6 | 16.2 | 16.0 | 14.7 | 14.2 | 14.3 | 14.0 | 15.2 | 18.4 | 21.6 | 24.5 | 26.8 | 29.2 | 30.9 | 31.4 | 31.6 | 30.9 | 29.8 | 26.1 | 23.9 | 21.7 | 20.6 | 19.9 | 19.2 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Muskeg River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Muskeg River - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 8 | 1.11 | 1.11 |
| 0 - 10 | 321 | 44.58 | 45.69 |
| 10 - 20 | 309 | 42.92 | 88.61 |
| > 20 | 82 | 11.39 | 100.00 |

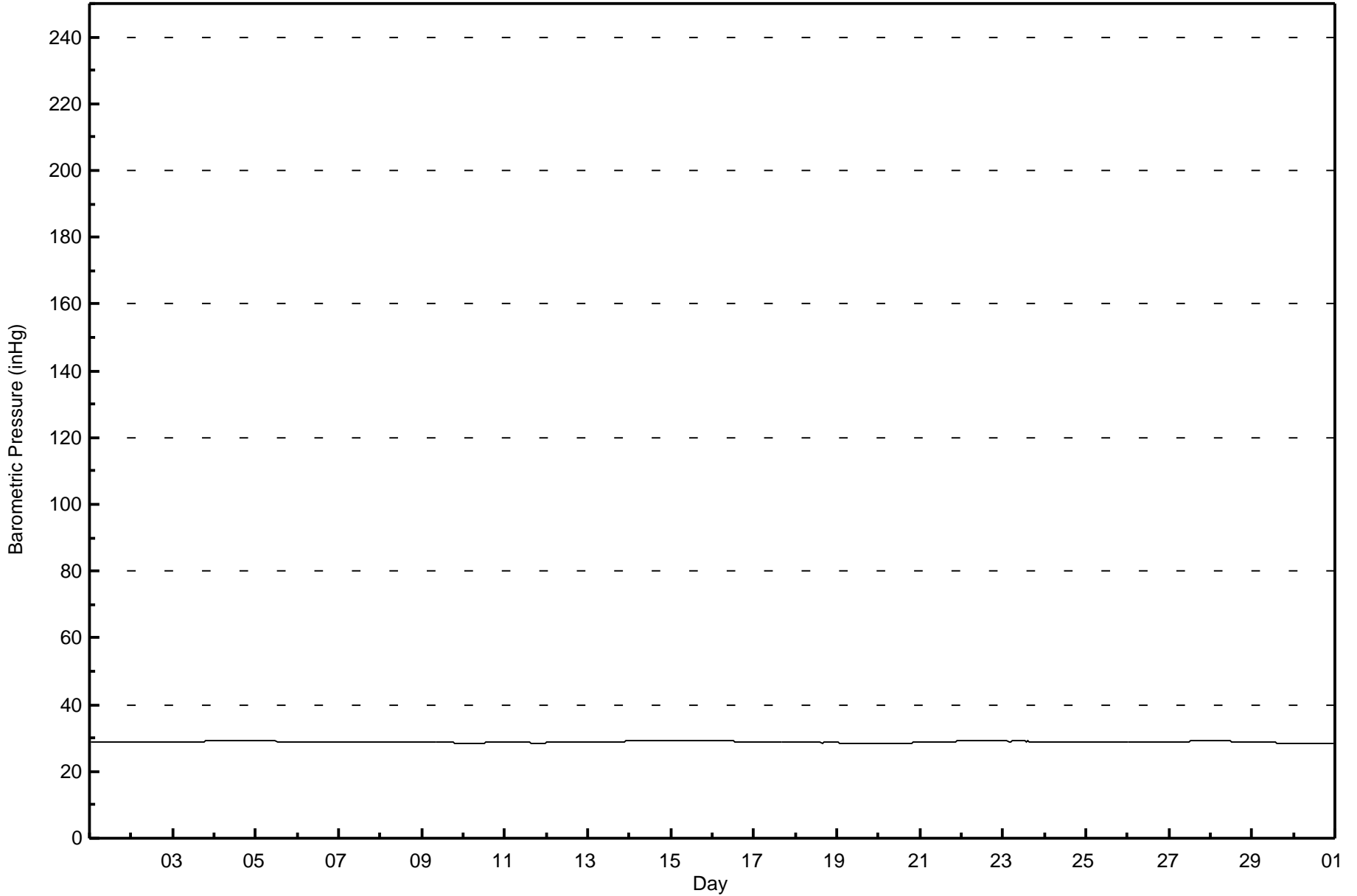
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Muskeg River - September 2017





| | | |
|---|---|---------------------------------|
| Maximum Speed: 38 km/h on Sep 20 14:00 | Maximum Daily Speed Average: 30.3 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 8 20:00 | Minimum Daily Speed Average: 1.2 km/h on Sep 8 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 3.5 km/h at hour 9 | Minimum Diurnal Speed Average: 1.1 km/h at hour 20 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 1.8 km/h 218.6 deg | Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 6 Median = 9 Q ₃ = 15 P ₉₀ = 21 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-Sep | WSW10 | SW4 | SSW8 | SSE9 | SSE10 | SSE9 | SSE8 | SW10 | WSW20 | WSW21 | WSW21 | WSW23 | WSW23 | SW22 | WSW24 | W22 | W24 | W18 | W21 | WSW16 | WSW12 | WSW14 | WSW15 | WSW18 | WSW14.2 | WSW24 |
| 2-Sep | W20 | WSW18 | W17 | WSW10 | W10 | SSW2 | WSW8 | WSW9 | WSW11 | WSW12 | WSW14 | WSW15 | WSW16 | W16 | W17 | W13 | WSW12 | WSW12 | W11 | WSW14 | SSW8 | SW8 | WSW12 | WSW13 | WSW12.1 | W20 |
| 3-Sep | WSW13 | SW8 | SW11 | WSW14 | SSW9 | SSW9 | SSW7 | SW6 | W15 | W16 | NNW21 | NNW21 | NNW18 | NNW19 | NNW20 | NNW19 | NNW21 | NNW22 | NNW23 | NNW15 | NNW13 | NNW12 | NNW9 | NNW9 | NNW11.8 | NNW23 |
| 4-Sep | NW10 | NNW12 | WSW6 | NNW7 | NW7 | NNW4 | SW5 | W6 | NNW10 | NNW14 | NW11 | W8 | W6 | W5 | ENE3 | ESE6 | N3 | E7 | E9 | ESE6 | SE6 | S6 | SSW7 | NNW2.7 | NNW14 | |
| 5-Sep | SSW8 | S7 | S9 | S9 | S9 | S8 | S8 | S8 | SSW9 | SSW11 | SSW12 | SSW13 | SSW15 | SW18 | WSW15 | WSW14 | SW14 | SW15 | SW7 | SSW6 | SSW5 | SSW5 | S6 | SSW6 | SSW9.2 | SW18 |
| 6-Sep | S6 | S6 | S6 | S4 | SSE5 | SSE2 | SSE4 | S2 | NE4 | NNE7 | NE6 | NE7 | NE6 | NE7 | NE8 | NE7 | ENE8 | E6 | E7 | E8 | ESE7 | SE5 | SE4 | SW5 | E3.3 | ENE8 |
| 7-Sep | SSW6 | SSW8 | SSW10 | SSW9 | SSW6 | SSW7 | SSW6 | SSW6 | S11 | S15 | S13 | S17 | S18 | S19 | S20 | S20 | S17 | S12 | S13 | S13 | S13 | S13 | SSW9 | S12.4 | S20 | |
| 8-Sep | SSE8 | S9 | S8 | S7 | S8 | S6 | SSW7 | SSW8 | SSW5 | W2 | NNW8 | N18 | NNE15 | NNE12 | NNE16 | NE14 | NNW13 | NW12 | N12 | N1 | S5 | WSW6 | SSE2 | SSW5 | N1.2 | N18 |
| 9-Sep | SSE3 | W2 | NW2 | SE3 | SSW6 | ESE4 | NW1 | NW5 | NNW5 | NW4 | NNE8 | NNE9 | NE13 | NNE11 | N17 | N18 | NNW14 | N13 | NNW9 | NNE11 | NNE11 | SSW2 | W7 | WSW7 | N5.0 | N18 |
| 10-Sep | SW7 | SSW6 | S5 | SSW7 | SW11 | SW11 | SW12 | SW14 | SW12 | WSW20 | W22 | W21 | W24 | W23 | W26 | NNW21 | NNW17 | NNW15 | WSW20 | WSW18 | WSW17 | WSW16 | W15 | WSW13 | WSW14.4 | W26 |
| 11-Sep | WSW11 | WSW9 | SSE6 | SSW7 | SW10 | S7 | SSW7 | SW9 | SSW8 | SSW6 | SSE6 | SE4 | ESE4 | ESE6 | SE9 | S9 | S9 | S8 | SSE10 | NW12 | SSW5 | SW5 | WSW10 | W15 | SSW5.7 | W15 |
| 12-Sep | WSW16 | WSW23 | W23 | WSW16 | SW16 | SW16 | WSW14 | W13 | NNW15 | NW16 | NNW11 | NW14 | NW13 | NW9 | NW8 | W9 | ENE10 | NE15 | NE21 | NE20 | ENE9 | NE8 | NE8 | NE14 | WNW6.0 | W23 |
| 13-Sep | NE12 | NE9 | NE11 | NE14 | NE9 | NE9 | S3 | S5 | SSW6 | W5 | NNW6 | NE4 | NNE4 | NE5 | SSW5 | ENE4 | SSE4 | SE2 | SSW2 | SW2 | WSW2 | NE9 | NNE13 | NE7 | NE3.5 | NE14 |
| 14-Sep | ENE3 | E6 | E2 | SE2 | S4 | S3 | SW3 | SSW3 | ENE3 | NE9 | NE11 | NE12 | NE13 | NE11 | NE10 | NE11 | NE13 | NE14 | NE13 | NE15 | NE12 | E6 | SE3 | SW2 | ENE6.2 | NE15 |
| 15-Sep | S5 | SSE4 | S5 | S6 | S6 | S6 | SSW6 | SSW5 | SSW7 | SSW8 | SW8 | SSW9 | SSW11 | SSW10 | SSW11 | SSW11 | SSW9 | SSW8 | SSW7 | S7 | S7 | S7 | S8 | S8 | SSW7.3 | SW11 |
| 16-Sep | S8 | S10 | S9 | S10 | S9 | S9 | S9 | S10 | S13 | S14 | S12 | S22 | S19 | S20 | S22 | SSW17 | S16 | S11 | SSE12 | SSE9 | S8 | S8 | SSW8 | S9 | S12.1 | S22 |
| 17-Sep | S10 | S9 | S8 | S10 | SSE13 | SSE11 | SSE10 | S9 | S10 | S14 | S17 | S21 | S20 | S19 | SSE21 | SSE19 | SSE19 | SSE16 | SSE12 | SSE12 | SSE12 | SSE13 | SSE12 | S11 | S13.4 | SSE21 |
| 18-Sep | S8 | SSW7 | SSW5 | S7 | SSE8 | SSE8 | S5 | S5 | S11 | SSE14 | SSE20 | SSE23 | SSE21 | SE15 | SSE17 | SE15 | SE14 | SE13 | SE10 | ESE9 | ESE8 | ESE7 | ESE6 | ESE6 | SSE10.1 | SSE23 |
| 19-Sep | ESE3 | ENE6 | NNE11 | NNE11 | NNE13 | NE15 | NNE18 | NNE18 | NNE19 | NNE22 | NNE23 | NNE21 | NNE21 | NE16 | ENE13 | ENE22 | ENE25 | ENE24 | ENE18 | ENE20 | ENE21 | ENE19 | NE22 | NE24 | NE16.8 | ENE25 |
| 20-Sep | NE23 | NE23 | NNE26 | NNE26 | NNE28 | NNE24 | NNE24 | NNE27 | NNE30 | NNE32 | NNE35 | NNE37 | NNE37 | NNE38 | NNE37 | NNE36 | NNE33 | NNE36 | NNE30 | NNE31 | NNE27 | NNE29 | NNE29 | NNE28 | NNE30.3 | NNE38 |
| 21-Sep | NNE25 | NNE26 | NNE27 | N29 | N28 | N24 | N27 | N25 | N20 | N22 | N22 | N22 | N22 | N21 | N21 | N21 | N20 | N19 | N16 | N13 | NNW12 | NNW8 | NNW9 | NNW7 | N19.9 | N29 |
| 22-Sep | NW6 | WSW3 | S4 | SW5 | SSW4 | S5 | S4 | SSW5 | SSE6 | S8 | S7 | SW6 | S6 | SSE5 | SSW5 | SSW5 | S7 | SSE6 | SSE4 | SSE3 | SSE6 | SSE7 | SSE7 | S4 | S4.4 | S8 |
| 23-Sep | S5 | SW4 | SSW5 | SSW5 | SSE6 | S4 | S5 | SW3 | SW3 | SSW6 | SW9 | WSW9 | SW4 | S7 | SSE7 | SE6 | S9 | SSE9 | SE7 | SSE7 | SSE10 | S8 | S9 | S9 | S5.6 | SSE10 |
| 24-Sep | S8 | S7 | S6 | SSW5 | SW6 | SW7 | SSW6 | SSW6 | SSW5 | S8 | S8 | S11 | SSW11 | SW10 | SSW9 | S10 | SSE8 | SE7 | SE6 | SSE7 | S8 | S8 | S11 | S12 | S7.4 | S12 |
| 25-Sep | SSE11 | SSE9 | SSE9 | SSE8 | SSE7 | S7 | S8 | S7 | S8 | S10 | SSW9 | SSW11 | SSW11 | SW11 | WSW14 | WSW11 | SSW7 | S5 | SSW5 | SSW5 | SSW8 | SSW6 | S8 | S7 | SSW7.6 | WSW14 |
| 26-Sep | S8 | SSW8 | SW6 | WSW4 | SW7 | SW5 | SSW5 | SSW5 | SSW6 | SW9 | WSW7 | NW11 | NW15 | NW13 | NW12 | NNW16 | NW13 | NW9 | NW9 | NNW4 | NW2 | SSW4 | S5 | S5 | W5.2 | NNW16 |
| 27-Sep | S5 | S6 | SSW7 | S7 | SW4 | S5 | SSW5 | S4 | S2 | NE7 | NNE8 | N9 | NNE11 | NE14 | NE15 | NNE17 | NNE18 | NNE22 | NE16 | NNE16 | NE17 | NE19 | NE14 | NE13 | NE7.3 | NNE22 |
| 28-Sep | NE9 | E3 | E4 | E3 | ESE2 | SE2 | S5 | S5 | SSW5 | SW6 | SW8 | S11 | S15 | S17 | S18 | S18 | S17 | S11 | S10 | S12 | S14 | S12 | S14 | S16 | S8.5 | S18 |
| 29-Sep | S18 | SSE19 | S15 | S8 | SSW9 | SSW6 | S10 | S8 | S12 | S15 | S16 | S18 | SW15 | SSW11 | SW11 | WSW10 | WSW6 | NNW4 | SSW1 | S3 | S6 | SSE5 | S5 | S7 | S9.0 | SSE19 |
| 30-Sep | SSE5 | SSE6 | S6 | SSW6 | SSW7 | S7 | SSW7 | S5 | S9 | S11 | S9 | SSW10 | SSW11 | SSW11 | SSW11 | SW11 | SW14 | W17 | NNW19 | NW14 | NW10 | NNW15 | NNW16 | NNW15 | SW6.8 | NNW19 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|------------------|-------|-------|--------|--------|--------|--------|--------|-------|-------|--------|--------|-------|-------|--------|--------|-------|-----------------|-------|-------|-------|-------|-------|-----------------|--|--|--|--|--|
| SSW2.9SSW3.2SSW2.7SSW2.4SSW3.0 | S2.5SSW3.0SSW2.8 | SW3.5 | SW3.2 | WSW2.6 | WSW2.5 | WSW2.6 | WSW2.4 | WSW2.9 | W2.1 | SW1.4 | NNW1.3 | NNE1.5 | NE1.1 | SE1.6 | SSE1.7 | SSW1.5 | SW2.3 | Diurnal Average | | | | | | | | | | | |
| NNE25 | NNE26 | NNE27 | N29 | NNE28 | NNE24 | N27 | NNE27 | NNE30 | NNE32 | NNE35 | NNE37 | NNE37 | NNE38 | NNE37 | NNE36 | NNE33 | NNE36 | NNE30 | NNE31 | NNE27 | NNE29 | NNE29 | NNE28 | Diurnal Maximum | | | | | |

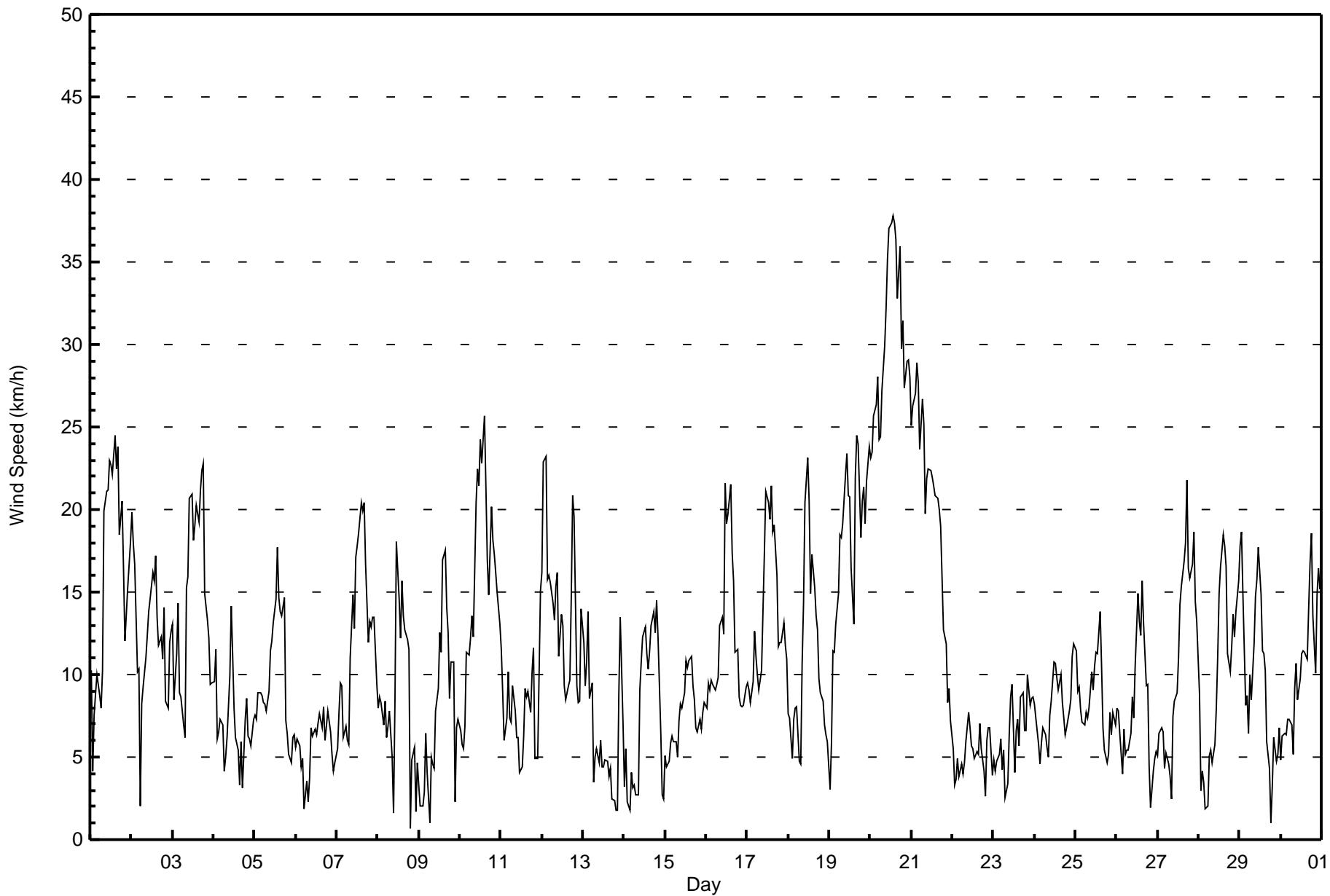
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Muskeg River - September 2017

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Muskeg River - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 127 | 17.64 | 17.64 |
| 6 - 11 | 321 | 44.58 | 62.22 |
| 12 - 19 | 178 | 24.72 | 86.94 |
| 20 - 28 | 79 | 10.97 | 97.92 |
| 29 - 38 | 15 | 2.08 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Muskeg River - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 2 | 1 | 3 | 4 | 4 | 4 | 8 | 12 | 31 | 27 | 15 | 3 | 4 | 2 | 5 | 2 | 127 |
| 6 - 11 | 1 | 10 | 21 | 4 | 7 | 9 | 7 | 31 | 94 | 66 | 25 | 17 | 7 | 1 | 12 | 9 | 321 |
| 12 - 19 | 8 | 11 | 22 | 3 | 0 | 0 | 4 | 14 | 34 | 5 | 10 | 27 | 11 | 12 | 11 | 6 | 178 |
| 20 - 28 | 13 | 16 | 6 | 5 | 0 | 0 | 0 | 4 | 8 | 0 | 1 | 9 | 10 | 5 | 0 | 2 | 79 |
| 29 - 38 | 1 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 25 | 52 | 52 | 16 | 11 | 13 | 19 | 61 | 167 | 98 | 51 | 56 | 32 | 20 | 28 | 19 | 720 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Muskeg River - September 2017

| | |
|--|---------------------------------|
| Direction of Maximum Speed: 29 deg on Sep 20 14:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 27.6 deg on Sep 20 | Hours of Data: 720 |
| Direction of Minimum Speed: 350 deg on Sep 8 20:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 1.2 deg on Sep 8 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 217.8 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-Sep | 246 | 228 | 198 | 167 | 157 | 160 | 164 | 215 | 243 | 241 | 243 | 253 | 242 | 232 | 256 | 260 | 260 | 270 | 262 | 256 | 245 | 242 | 253 | 255 | 242.6 |
| 2-Sep | 261 | 258 | 261 | 258 | 261 | 205 | 241 | 239 | 250 | 257 | 254 | 257 | 252 | 264 | 264 | 261 | 257 | 258 | 264 | 253 | 207 | 216 | 243 | 245 | 253.4 |
| 3-Sep | 247 | 221 | 232 | 253 | 212 | 205 | 195 | 230 | 264 | 271 | 299 | 292 | 293 | 287 | 292 | 299 | 291 | 330 | 343 | 322 | 327 | 327 | 330 | 315 | 289.5 |
| 4-Sep | 308 | 300 | 252 | 289 | 306 | 320 | 292 | 217 | 263 | 332 | 341 | 321 | 266 | 271 | 280 | 63 | 103 | 349 | 84 | 97 | 121 | 132 | 171 | 193 | 300.3 |
| 5-Sep | 194 | 191 | 190 | 183 | 183 | 182 | 179 | 185 | 201 | 201 | 202 | 201 | 193 | 231 | 238 | 238 | 234 | 234 | 220 | 199 | 196 | 213 | 185 | 195 | 206.8 |
| 6-Sep | 173 | 181 | 169 | 175 | 165 | 157 | 165 | 175 | 52 | 29 | 38 | 43 | 48 | 47 | 48 | 46 | 70 | 90 | 87 | 95 | 103 | 135 | 144 | 216 | 94.9 |
| 7-Sep | 205 | 210 | 197 | 193 | 203 | 207 | 198 | 204 | 191 | 181 | 188 | 182 | 187 | 191 | 190 | 186 | 183 | 184 | 185 | 189 | 185 | 184 | 183 | 195 | 189.1 |
| 8-Sep | 164 | 186 | 186 | 181 | 180 | 184 | 201 | 194 | 199 | 259 | 336 | 7 | 27 | 26 | 24 | 45 | 336 | 325 | 352 | 350 | 188 | 241 | 160 | 192 | 358.4 |
| 9-Sep | 165 | 261 | 322 | 142 | 207 | 106 | 321 | 316 | 338 | 314 | 24 | 23 | 49 | 23 | 7 | 6 | 340 | 350 | 347 | 19 | 22 | 208 | 272 | 256 | 360.0 |
| 10-Sep | 216 | 213 | 191 | 194 | 223 | 230 | 230 | 235 | 230 | 245 | 259 | 268 | 273 | 262 | 279 | 290 | 287 | 283 | 253 | 244 | 240 | 250 | 260 | 253 | 254.6 |
| 11-Sep | 246 | 242 | 168 | 208 | 230 | 170 | 192 | 214 | 206 | 211 | 165 | 128 | 123 | 104 | 142 | 181 | 187 | 185 | 166 | 306 | 199 | 215 | 255 | 260 | 205.2 |
| 12-Sep | 252 | 255 | 262 | 242 | 236 | 235 | 240 | 278 | 283 | 308 | 330 | 320 | 309 | 320 | 322 | 280 | 78 | 52 | 34 | 45 | 65 | 51 | 49 | 42 | 303.4 |
| 13-Sep | 47 | 49 | 40 | 39 | 34 | 42 | 188 | 181 | 206 | 262 | 343 | 39 | 15 | 39 | 211 | 73 | 163 | 139 | 196 | 220 | 247 | 47 | 32 | 42 | 44.8 |
| 14-Sep | 63 | 91 | 100 | 126 | 175 | 188 | 214 | 200 | 78 | 38 | 38 | 45 | 43 | 48 | 49 | 45 | 52 | 47 | 55 | 51 | 52 | 92 | 135 | 214 | 56.9 |
| 15-Sep | 189 | 160 | 172 | 186 | 183 | 183 | 200 | 199 | 207 | 200 | 215 | 210 | 206 | 210 | 203 | 218 | 202 | 204 | 193 | 188 | 187 | 182 | 190 | 181 | 197.1 |
| 16-Sep | 182 | 176 | 182 | 189 | 189 | 183 | 182 | 185 | 183 | 185 | 189 | 178 | 187 | 183 | 176 | 197 | 191 | 190 | 166 | 164 | 177 | 185 | 196 | 185 | 183.6 |
| 17-Sep | 186 | 183 | 176 | 176 | 165 | 167 | 168 | 178 | 182 | 177 | 178 | 182 | 173 | 185 | 167 | 164 | 159 | 160 | 148 | 147 | 149 | 156 | 159 | 170 | 169.0 |
| 18-Sep | 180 | 195 | 206 | 170 | 166 | 161 | 177 | 176 | 170 | 166 | 167 | 163 | 156 | 138 | 156 | 143 | 137 | 129 | 125 | 122 | 114 | 112 | 121 | 123 | 152.5 |
| 19-Sep | 111 | 71 | 32 | 17 | 18 | 35 | 33 | 24 | 28 | 27 | 28 | 26 | 22 | 38 | 75 | 58 | 70 | 67 | 59 | 65 | 68 | 67 | 44 | 44 | 44.9 |
| 20-Sep | 42 | 41 | 31 | 25 | 27 | 20 | 22 | 26 | 26 | 27 | 29 | 29 | 30 | 29 | 29 | 29 | 27 | 28 | 25 | 25 | 23 | 25 | 24 | 25 | 27.6 |
| 21-Sep | 14 | 15 | 12 | 9 | 9 | 7 | 8 | 8 | 1 | 360 | 0 | 4 | 3 | 2 | 358 | 352 | 353 | 355 | 1 | 351 | 345 | 335 | 327 | 331 | 2.0 |
| 22-Sep | 311 | 239 | 190 | 219 | 197 | 178 | 186 | 204 | 166 | 174 | 190 | 218 | 171 | 161 | 209 | 200 | 178 | 148 | 160 | 166 | 156 | 153 | 167 | 184 | 183.4 |
| 23-Sep | 175 | 214 | 210 | 195 | 165 | 189 | 177 | 219 | 230 | 196 | 236 | 258 | 228 | 181 | 163 | 137 | 177 | 163 | 141 | 153 | 158 | 180 | 184 | 184 | 184.8 |
| 24-Sep | 184 | 185 | 190 | 205 | 223 | 218 | 199 | 205 | 206 | 186 | 191 | 188 | 197 | 219 | 198 | 182 | 153 | 145 | 130 | 153 | 191 | 184 | 170 | 171 | 185.8 |
| 25-Sep | 159 | 163 | 163 | 160 | 164 | 174 | 177 | 178 | 187 | 189 | 193 | 198 | 220 | 227 | 242 | 244 | 197 | 173 | 208 | 219 | 211 | 197 | 188 | 190 | 194.2 |
| 26-Sep | 191 | 199 | 223 | 238 | 234 | 230 | 204 | 202 | 193 | 235 | 248 | 314 | 306 | 305 | 304 | 301 | 311 | 308 | 307 | 330 | 326 | 210 | 173 | 187 | 268.6 |
| 27-Sep | 188 | 179 | 193 | 186 | 221 | 180 | 200 | 176 | 175 | 46 | 18 | 9 | 27 | 50 | 35 | 27 | 33 | 27 | 36 | 28 | 36 | 45 | 44 | 46 | 40.8 |
| 28-Sep | 48 | 98 | 79 | 96 | 122 | 127 | 173 | 190 | 196 | 214 | 223 | 191 | 190 | 184 | 180 | 187 | 184 | 183 | 175 | 172 | 176 | 186 | 178 | 176 | 178.9 |
| 29-Sep | 172 | 168 | 169 | 189 | 192 | 193 | 173 | 179 | 178 | 179 | 188 | 186 | 216 | 207 | 230 | 241 | 239 | 295 | 193 | 173 | 189 | 154 | 173 | 170 | 189.3 |
| 30-Sep | 150 | 151 | 171 | 192 | 197 | 190 | 193 | 170 | 180 | 187 | 190 | 201 | 198 | 197 | 205 | 222 | 227 | 266 | 294 | 309 | 304 | 297 | 290 | 284 | 233.0 |

204.3 200.4 200.0 200.4 201.6 183.3 194.4 213.5 221.2 232.6 258.4 254.4 242.6 238.6 243.3 266.4 224.1 342.6 12.4 36.8 136.0 164.3 201.5 214.9

Diurnal Average

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



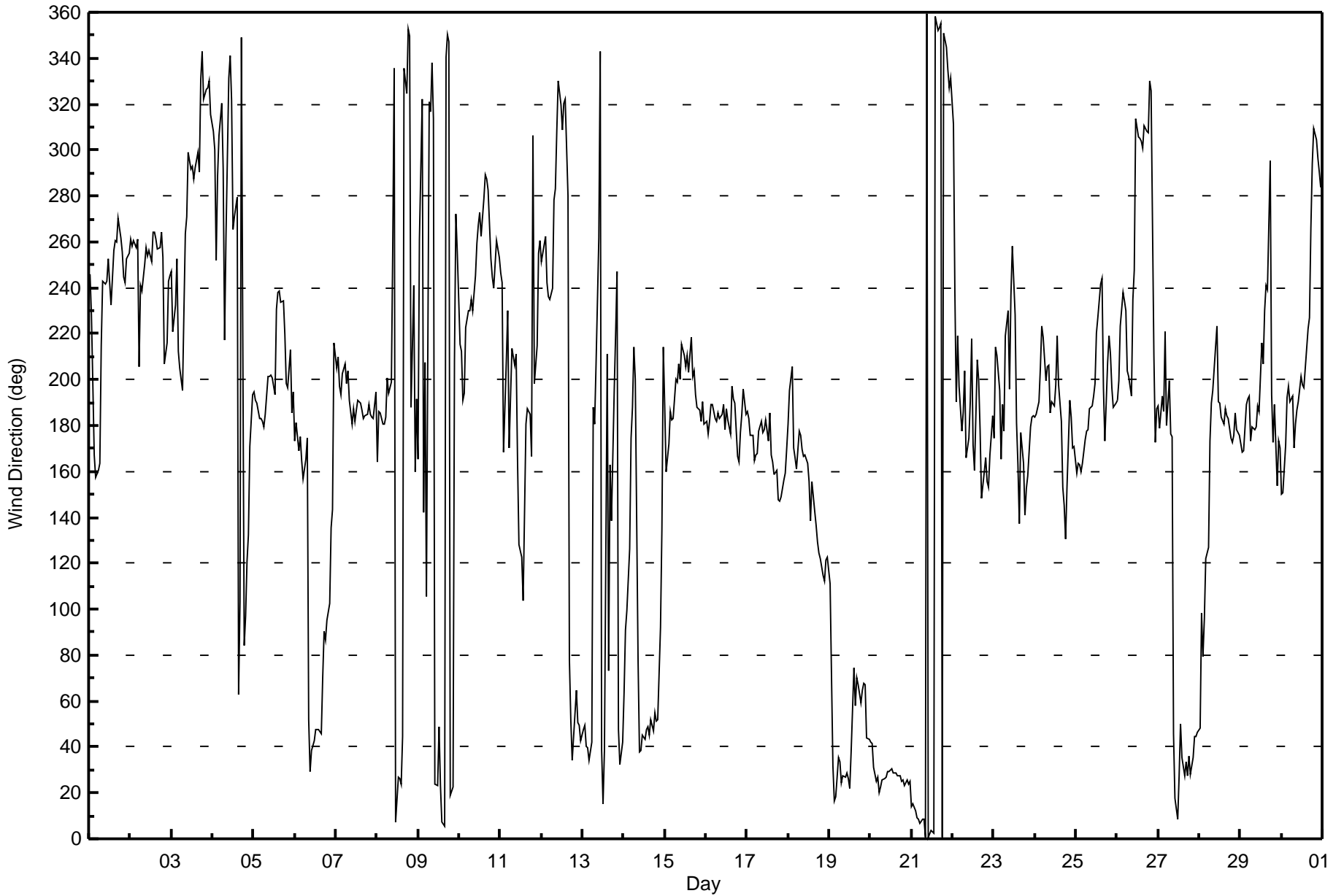
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Muskeg River - September 2017

| | |
|--|---------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 98 deg on Sep 8 20:00 | Hours of Data: 720 |
| Minimum Value: 6 deg on Sep 23 05:00 | Hours of Missing Data: 0 |
| Percentiles: P ₁ = 8 P ₁₀ = 10 Q ₁ = 14 Median = 18 Q ₃ = 25 P ₉₀ = 33 P ₉₉ = 76 | 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-Sep | 54 | 70 | 16 | 18 | 13 | 16 | 41 | 33 | 12 | 12 | 12 | 15 | 16 | 20 | 15 | 16 | 14 | 14 | 13 | 9 | 12 | 8 | 9 | 10 | 70 |
| 2-Sep | 10 | 9 | 11 | 17 | 18 | 76 | 19 | 17 | 20 | 17 | 18 | 17 | 17 | 19 | 12 | 12 | 11 | 10 | 9 | 19 | 18 | 20 | 10 | 10 | 76 |
| 3-Sep | 8 | 19 | 20 | 11 | 19 | 18 | 24 | 41 | 14 | 18 | 18 | 18 | 21 | 23 | 20 | 22 | 17 | 36 | 25 | 24 | 27 | 26 | 24 | 16 | 41 |
| 4-Sep | 15 | 14 | 35 | 17 | 19 | 19 | 60 | 28 | 36 | 34 | 32 | 30 | 48 | 54 | 59 | 85 | 47 | 89 | 34 | 12 | 19 | 21 | 16 | 17 | 89 |
| 5-Sep | 15 | 14 | 15 | 12 | 17 | 15 | 16 | 18 | 27 | 24 | 24 | 25 | 25 | 21 | 20 | 20 | 18 | 10 | 18 | 26 | 29 | 22 | 23 | 10 | 29 |
| 6-Sep | 11 | 9 | 13 | 10 | 10 | 63 | 13 | 31 | 78 | 22 | 15 | 18 | 19 | 20 | 13 | 34 | 27 | 20 | 12 | 11 | 13 | 13 | 15 | 23 | 78 |
| 7-Sep | 19 | 16 | 16 | 18 | 19 | 17 | 21 | 23 | 24 | 17 | 23 | 19 | 22 | 24 | 22 | 22 | 19 | 17 | 15 | 18 | 15 | 15 | 15 | 20 | 24 |
| 8-Sep | 18 | 18 | 15 | 15 | 14 | 32 | 19 | 19 | 34 | 78 | 25 | 22 | 24 | 26 | 19 | 24 | 25 | 27 | 24 | 98 | 39 | 29 | 90 | 22 | 98 |
| 9-Sep | 50 | 62 | 81 | 57 | 18 | 30 | 67 | 40 | 28 | 27 | 27 | 25 | 16 | 29 | 16 | 17 | 30 | 20 | 20 | 29 | 16 | 68 | 14 | 11 | 81 |
| 10-Sep | 25 | 28 | 30 | 20 | 19 | 14 | 14 | 14 | 21 | 14 | 14 | 14 | 15 | 13 | 14 | 16 | 22 | 17 | 11 | 9 | 9 | 8 | 9 | 9 | 30 |
| 11-Sep | 8 | 19 | 33 | 36 | 24 | 23 | 22 | 17 | 24 | 26 | 16 | 25 | 29 | 26 | 28 | 22 | 29 | 30 | 10 | 65 | 35 | 19 | 27 | 10 | 65 |
| 12-Sep | 9 | 10 | 12 | 13 | 10 | 13 | 13 | 19 | 18 | 20 | 27 | 24 | 22 | 20 | 29 | 28 | 24 | 23 | 10 | 9 | 25 | 28 | 22 | 8 | 29 |
| 13-Sep | 24 | 27 | 20 | 19 | 35 | 35 | 29 | 26 | 31 | 34 | 46 | 68 | 70 | 70 | 47 | 71 | 31 | 67 | 51 | 41 | 48 | 20 | 13 | 27 | 71 |
| 14-Sep | 35 | 19 | 58 | 63 | 20 | 19 | 16 | 27 | 73 | 29 | 26 | 25 | 14 | 23 | 25 | 14 | 14 | 10 | 18 | 13 | 12 | 23 | 42 | 34 | 73 |
| 15-Sep | 15 | 14 | 14 | 17 | 9 | 19 | 17 | 18 | 21 | 25 | 24 | 26 | 27 | 32 | 29 | 25 | 29 | 22 | 19 | 15 | 13 | 13 | 16 | 11 | 32 |
| 16-Sep | 13 | 10 | 13 | 17 | 17 | 16 | 14 | 17 | 19 | 20 | 24 | 18 | 24 | 22 | 19 | 25 | 23 | 22 | 11 | 11 | 14 | 17 | 18 | 13 | 25 |
| 17-Sep | 14 | 13 | 10 | 9 | 8 | 8 | 9 | 12 | 19 | 23 | 19 | 22 | 19 | 23 | 18 | 22 | 16 | 13 | 11 | 10 | 12 | 11 | 11 | 14 | 23 |
| 18-Sep | 21 | 22 | 25 | 20 | 17 | 15 | 27 | 26 | 18 | 18 | 17 | 17 | 17 | 29 | 18 | 22 | 21 | 17 | 15 | 16 | 18 | 19 | 20 | 23 | 29 |
| 19-Sep | 66 | 33 | 10 | 14 | 12 | 12 | 12 | 12 | 9 | 8 | 8 | 12 | 15 | 21 | 21 | 14 | 12 | 11 | 12 | 11 | 10 | 10 | 9 | 8 | 66 |
| 20-Sep | 10 | 11 | 10 | 12 | 10 | 14 | 13 | 12 | 12 | 11 | 10 | 10 | 11 | 10 | 10 | 10 | 10 | 11 | 12 | 11 | 13 | 12 | 13 | 12 | 14 |
| 21-Sep | 16 | 15 | 15 | 14 | 13 | 15 | 14 | 14 | 18 | 18 | 17 | 16 | 17 | 17 | 19 | 19 | 19 | 18 | 18 | 19 | 18 | 21 | 15 | 21 | 21 |
| 22-Sep | 28 | 27 | 17 | 18 | 33 | 9 | 14 | 22 | 18 | 19 | 32 | 25 | 29 | 44 | 27 | 21 | 16 | 13 | 14 | 16 | 12 | 23 | 16 | 23 | 44 |
| 23-Sep | 11 | 18 | 17 | 21 | 6 | 17 | 15 | 32 | 28 | 38 | 15 | 16 | 44 | 21 | 27 | 43 | 32 | 18 | 9 | 10 | 9 | 17 | 14 | 16 | 44 |
| 24-Sep | 15 | 15 | 19 | 22 | 10 | 13 | 15 | 19 | 28 | 27 | 30 | 27 | 30 | 28 | 29 | 22 | 22 | 13 | 11 | 20 | 20 | 15 | 12 | 11 | 30 |
| 25-Sep | 10 | 9 | 12 | 10 | 11 | 17 | 15 | 15 | 20 | 21 | 30 | 29 | 27 | 25 | 18 | 29 | 25 | 15 | 19 | 19 | 16 | 16 | 13 | 22 | 30 |
| 26-Sep | 23 | 27 | 27 | 39 | 15 | 25 | 33 | 31 | 26 | 18 | 28 | 28 | 20 | 25 | 28 | 16 | 16 | 12 | 11 | 29 | 84 | 30 | 20 | 28 | 84 |
| 27-Sep | 21 | 10 | 16 | 11 | 36 | 14 | 16 | 25 | 39 | 37 | 35 | 32 | 28 | 10 | 14 | 12 | 12 | 8 | 12 | 10 | 12 | 8 | 9 | 9 | 39 |
| 28-Sep | 24 | 44 | 23 | 16 | 58 | 52 | 24 | 19 | 31 | 29 | 26 | 26 | 22 | 22 | 19 | 21 | 19 | 16 | 13 | 14 | 15 | 17 | 14 | 12 | 58 |
| 29-Sep | 11 | 10 | 12 | 18 | 15 | 19 | 15 | 17 | 17 | 18 | 21 | 22 | 23 | 27 | 22 | 15 | 19 | 23 | 76 | 21 | 12 | 27 | 24 | 9 | 76 |
| 30-Sep | 11 | 7 | 14 | 16 | 15 | 15 | 16 | 22 | 17 | 22 | 25 | 29 | 27 | 27 | 27 | 21 | 16 | 25 | 11 | 13 | 18 | 11 | 12 | 10 | 29 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 66 | 70 | 81 | 63 | 58 | 76 | 67 | 41 | 78 | 78 | 46 | 68 | 70 | 70 | 59 | 85 | 47 | 89 | 76 | 98 | 84 | 68 | 90 | 34 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association

SO₂ Calibration Summary

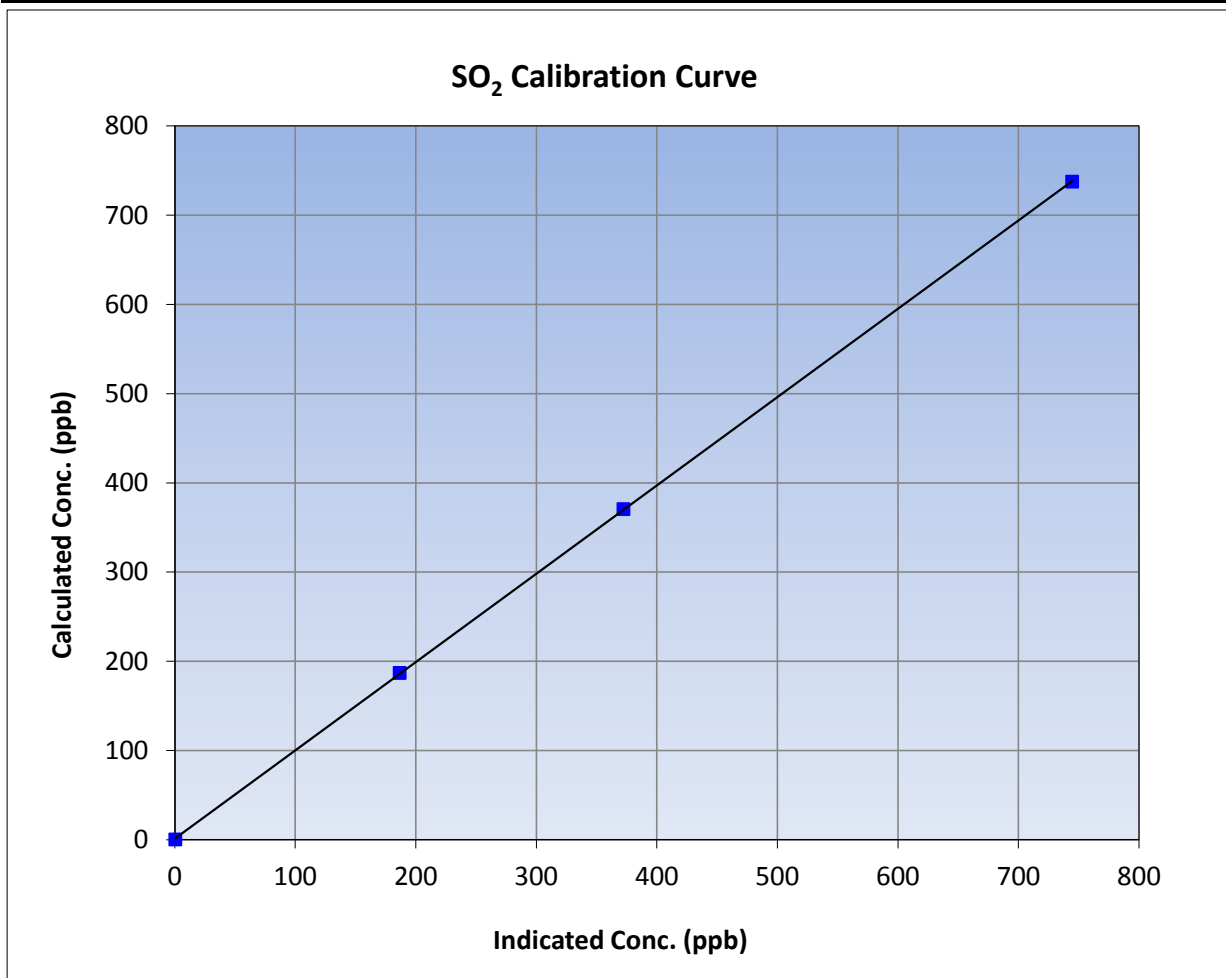
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 8:39 | End Time (MST) | 13:31 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1118148498 |

Calibration Data

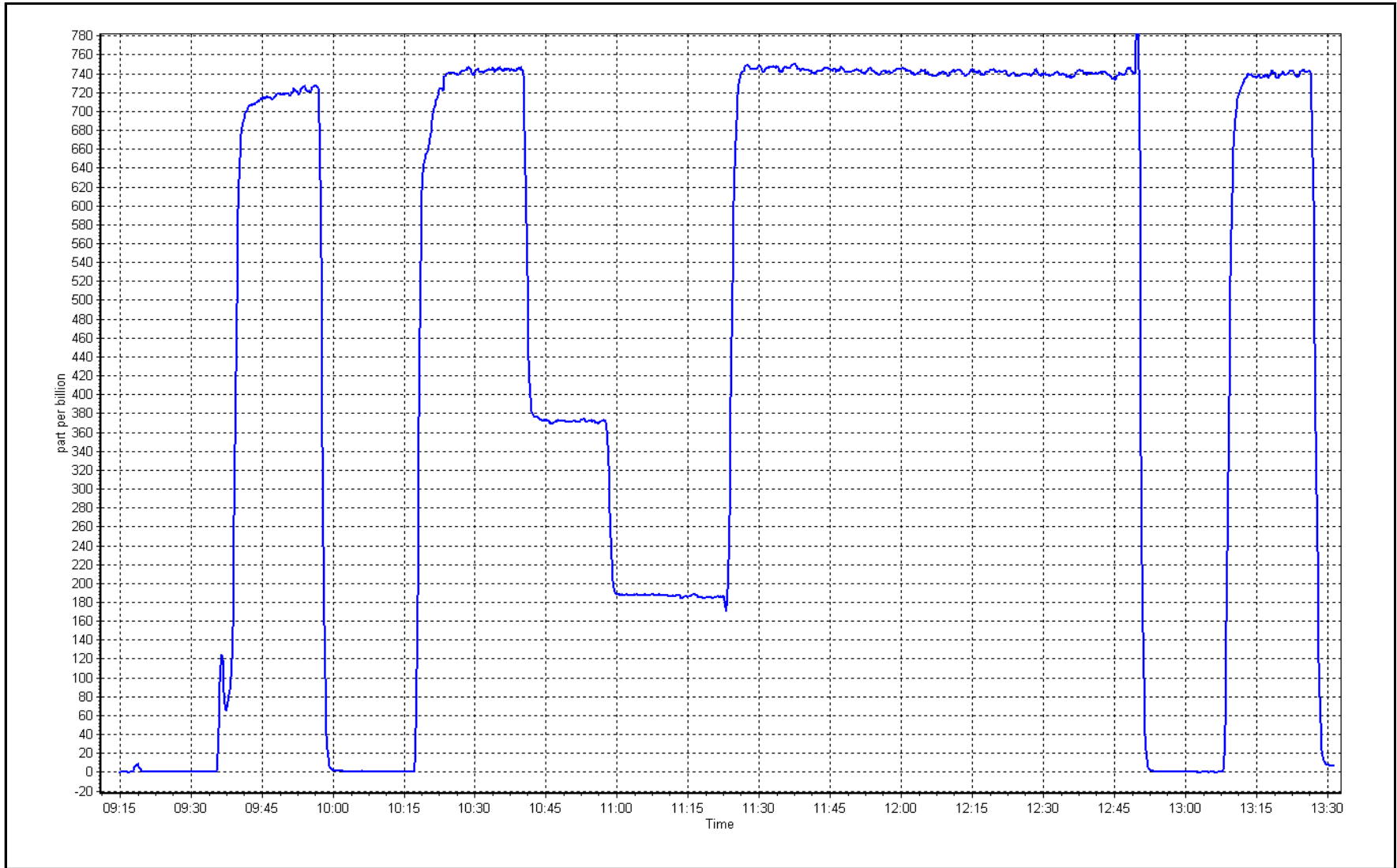
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999986 | ≥0.995 |
| 737.5 | 744.3 | 0.9908 | | | |
| 370.4 | 372.0 | 0.9956 | Slope | 0.990332 | 0.90 - 1.10 |
| 186.6 | 186.2 | 1.0019 | | | |
| | | | Intercept | 1.065297 | +/-30 |



SO2 Calibration Plot

Date: September 11, 2017

Location: Muskeg River





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Muskeg River | Station number: | AMS 16 |
| Calibration Date: | September 11, 2017 | Last Cal Date: | August 1, 2017 |
| Start time (MST): | 9:14 | End time (MST): | 13:29 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|------------------|
| Gas Cert Reference | EY0000638 | Cal Gas Expiry Date | November 4, 2017 |
| CH4 Cal Gas Conc. | <u>502.0</u> ppm | CH4 Equiv Conc. | 1035.5 ppm |
| C3H8 Cal Gas Conc. | <u>194.0</u> ppm | Station temp. | 23 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 493 |
| ZAG Make/Model | API 701 | Serial Number | 2155 |

Analyzer Information

| | | | | |
|------------------------------|--------------|-------------------------------|---------------------|---------------|
| Analyzer make: Thermo 51i-LT | | Analyzer serial #: 1218153458 | | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> |
| Analyzer Range | 0 - 25 ppm | | Bias voltage supply | -287 |
| Calculated slope | 1.004718 | 1.003692 | Sample pressure | 8.2 |
| Calculated intercept | -0.102463 | 0.054763 | Fuel pressure | 24.2 |
| Analyzer Background | 2.21 | 2.52 | Air pressure | 34.9 |
| Analyzer Coefficient | 4.792 | 4.808 | Flame temperature | 156.5 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 4998 | 0.0 | 0.00 | 0.28 | ---- |
| as found span | 4930 | 76.6 | 15.84 | 16.14 | 0.982 |
| calibrator zero | 4998 | 0.0 | 0.00 | 0.12 | ---- |
| high point | 4930 | 76.6 | 15.84 | 15.84 | 1.000 |
| second point | 4970 | 38.5 | 7.96 | 7.70 | 1.033 |
| third point | 4993 | 19.2 | 3.97 | 3.79 | 1.048 |
| as left zero | 4998 | 0.0 | 0.00 | 0.06 | ---- |
| as left span | 4930 | 76.6 | 15.84 | 15.90 | 0.996 |
| Average Correction Factor | | | | | 1.027 |
| Corrected As found | 15.86 | Previous response | 15.87 | *% change | 0.1% |

* = > +/-5% change initiates investigation

Notes: Changed inlet filter after as founds. Adjusted the zero and the span. Temperature fluctated during multipoint calibration.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

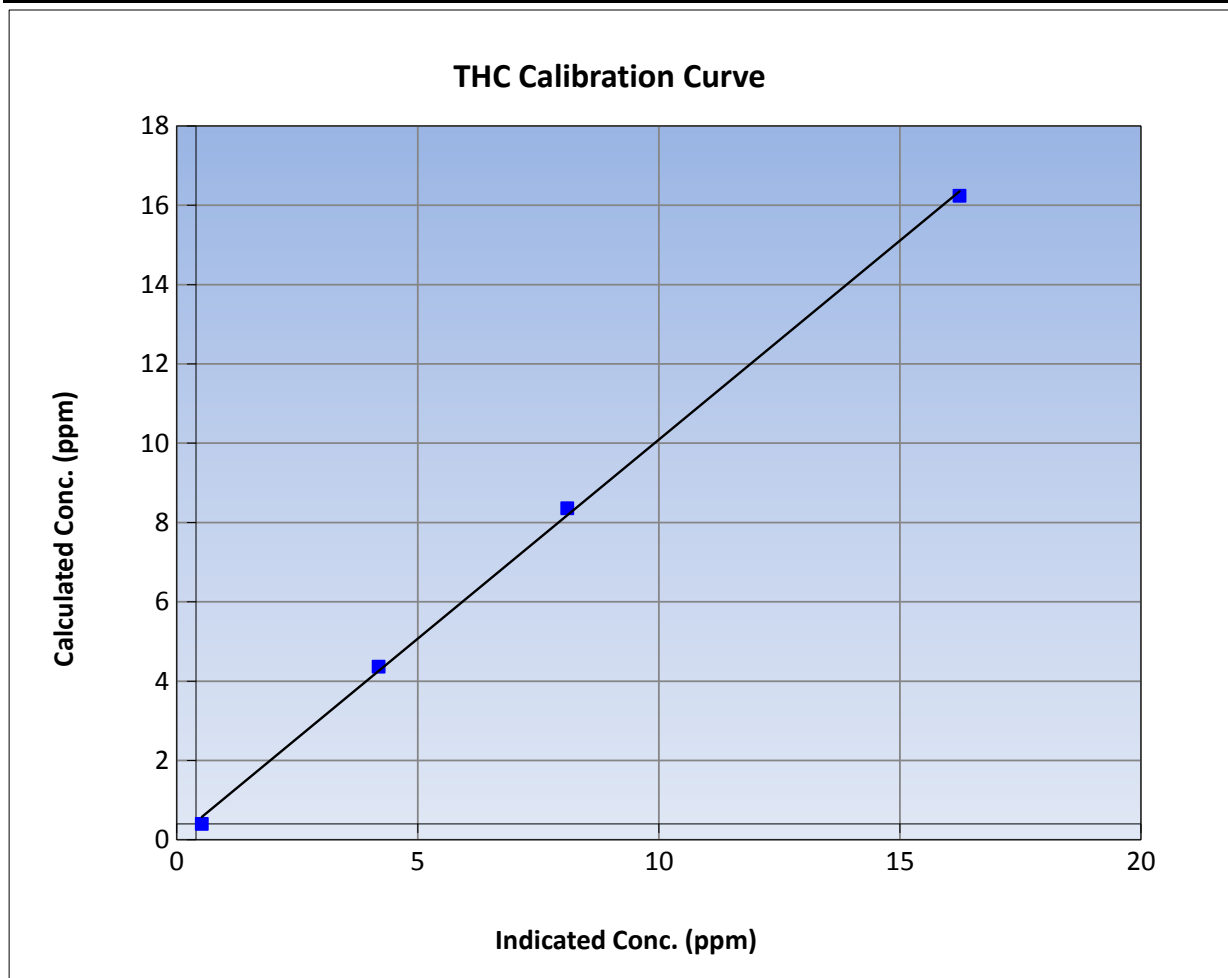
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 8:37 | End Time (MST) | 13:29 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1218153458 |

Calibration Data

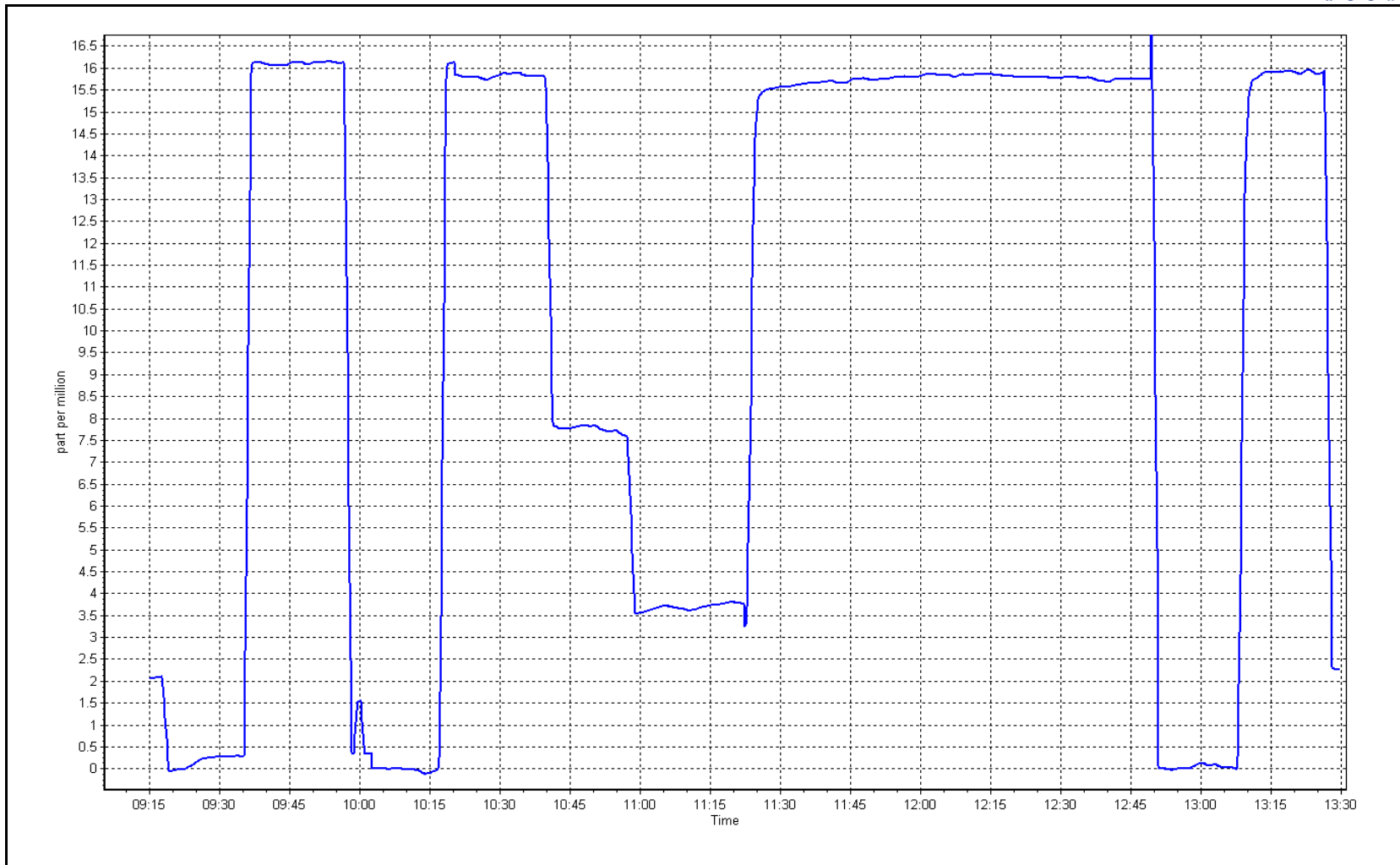
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999372 | ≥0.995 |
| 15.8 | 15.8 | 1.0002 | | | |
| 8.0 | 7.7 | 1.0335 | Slope | 1.003692 | 0.90 - 1.10 |
| 4.0 | 3.8 | 1.0477 | | | |
| | | | Intercept | 0.054763 | +/-1.5 |



THC Calibration Plot

Date: September 11, 2017

Location: Muskeg River





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Muskeg River | Station number: | AMS 16 |
| Calibration Date: | September 11, 2017 | Last Cal Date: | August 1, 2017 |
| Start time (MST): | 9:14 | End time (MST): | 13:30 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-----------------|
| NO Gas Cylinder # | EY0000638 | Cal Gas Expiry Date | November-04-19 |
| NOX Cal Gas Conc. | <u>52.4</u> ppb | NO Cal Gas Conc. | <u>52.4</u> ppb |
| Calibrator Model | API T700 | Serial Number | 493 |
| ZAG make/model | API T701 | Serial Number | 2155 |

Analyzer Information

| | | | | | |
|---------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1426262593 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.061 | 1.061 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.997 | 0.997 | PMT Temperature | -3.1 | -3.0 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 159.5 | 159.2 |
| NO bkgrnd | 8.8 | 8.9 | Sample Flow | 0.953 | 0.958 |
| NOX bkgrnd | 9.0 | 9.1 | PMT Voltage | -744.8 | -744.8 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.000436 | 1.005243 |
| NO _x Cal Offset | 1.055525 | -0.006533 |
| NO Cal Slope | 0.999649 | 1.005144 |
| NO Cal Offset | 1.356558 | 0.455165 |
| NO ₂ Cal Slope | 0.998012 | 0.985700 |
| NO ₂ Cal Offset | -0.009671 | -0.209170 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Dilution flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|---------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 4998 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| as found span | 4930 | 76.6 | 801.7 | 801.7 | 0.0 | 803.9 | 802.4 | 1.5 | 0.9973 | 0.9991 |
| calibrator zero | 4998 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| high point | 4930 | 76.6 | 801.7 | 801.7 | 0.0 | 797.7 | 797.4 | 0.2 | 1.0050 | 1.0054 |
| second point | 4970 | 38.5 | 402.8 | 402.8 | 0.0 | 400.3 | 400.0 | 0.3 | 1.0062 | 1.0070 |
| third point | 4993 | 19.4 | 202.8 | 202.8 | 0.0 | 201.9 | 200.9 | 1.0 | 1.0045 | 1.0095 |
| as left zero | 4998 | 0.0 | 0.0 | 0.0 | 0.0 | 5.3 | 0.1 | 5.1 | ---- | ---- |
| as left span | 4930 | 76.6 | 801.7 | 391.2 | 410.5 | 790.0 | 379.1 | 410.9 | 1.0148 | 1.0319 |
| Average Correction Factor | | | | | | | | | 1.0053 | 1.0073 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 803.8 ppb | NO = 802.4 ppb | | *Percent Change | NO _x = -0.4% |
| Previous Response | NO _x = 800.3 ppb | NO = 800.6 ppb | | *Percent Change | NO = -0.2% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 791.3 | 790.5 | 0.8 | 1.0132 | 1.0142 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 391.2 | 399.3 | 796.4 | 391.2 | 405.3 | 1.0067 | ---- | 0.9852 | 101.5% |
| 2nd NO2 (200 ppb O3) | 584.0 | 206.5 | 793.8 | 584.0 | 209.6 | 1.0100 | ---- | 0.9852 | 101.5% |
| 3rd NO2 (100 ppb O3) | 682.8 | 107.7 | 792.5 | 682.8 | 109.7 | 1.0116 | ---- | 0.9818 | 101.9% |
| 2nd NO ref point | ---- | 0.0 | 791.3 | 790.5 | 0.8 | 1.0132 | 1.0142 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0104 | 1.0142 | 0.9841 | 101.6% |

Notes: Changed inlet filter after asfinds. Adjusted the span. Used second GPT point due to drift.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

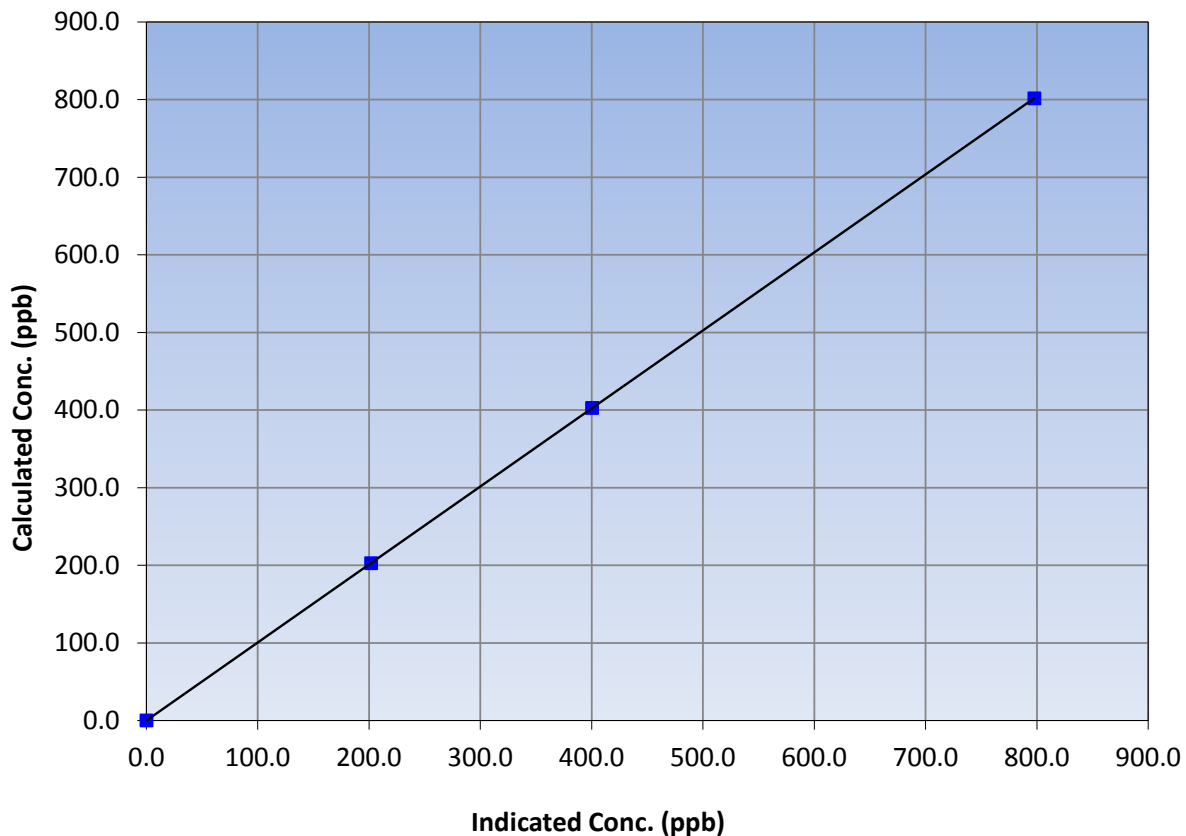
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 9:14 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262593 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 801.7 | 797.7 | 1.0050 | | | |
| 402.8 | 400.3 | 1.0062 | | | |
| 202.8 | 201.9 | 1.0045 | | | |
| | | | Slope | 1.005243 | 0.90 - 1.10 |
| | | | Intercept | -0.006533 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

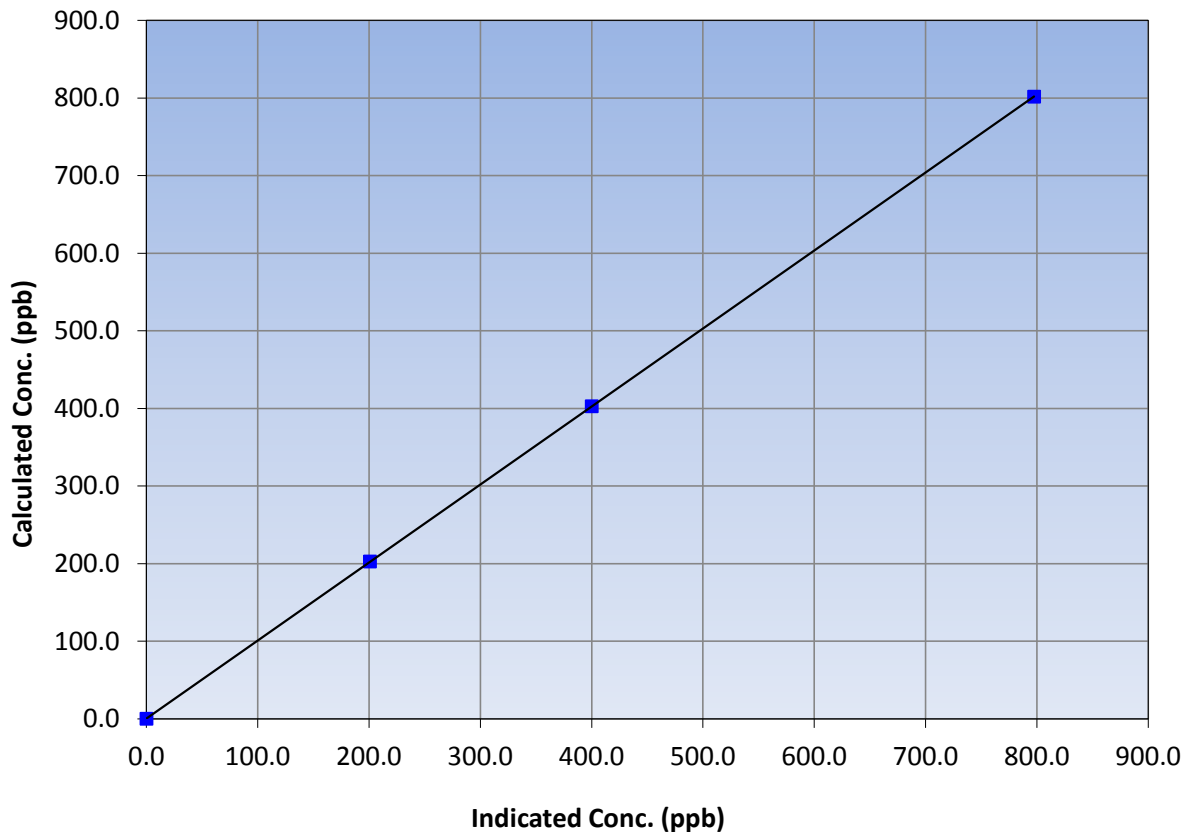
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 9:14 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262593 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 801.7 | 797.4 | 1.0054 | | | |
| 402.8 | 400.0 | 1.0070 | | | |
| 202.8 | 200.9 | 1.0095 | | | |
| | | | Slope | 1.005144 | 0.90 - 1.10 |
| | | | Intercept | 0.455165 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

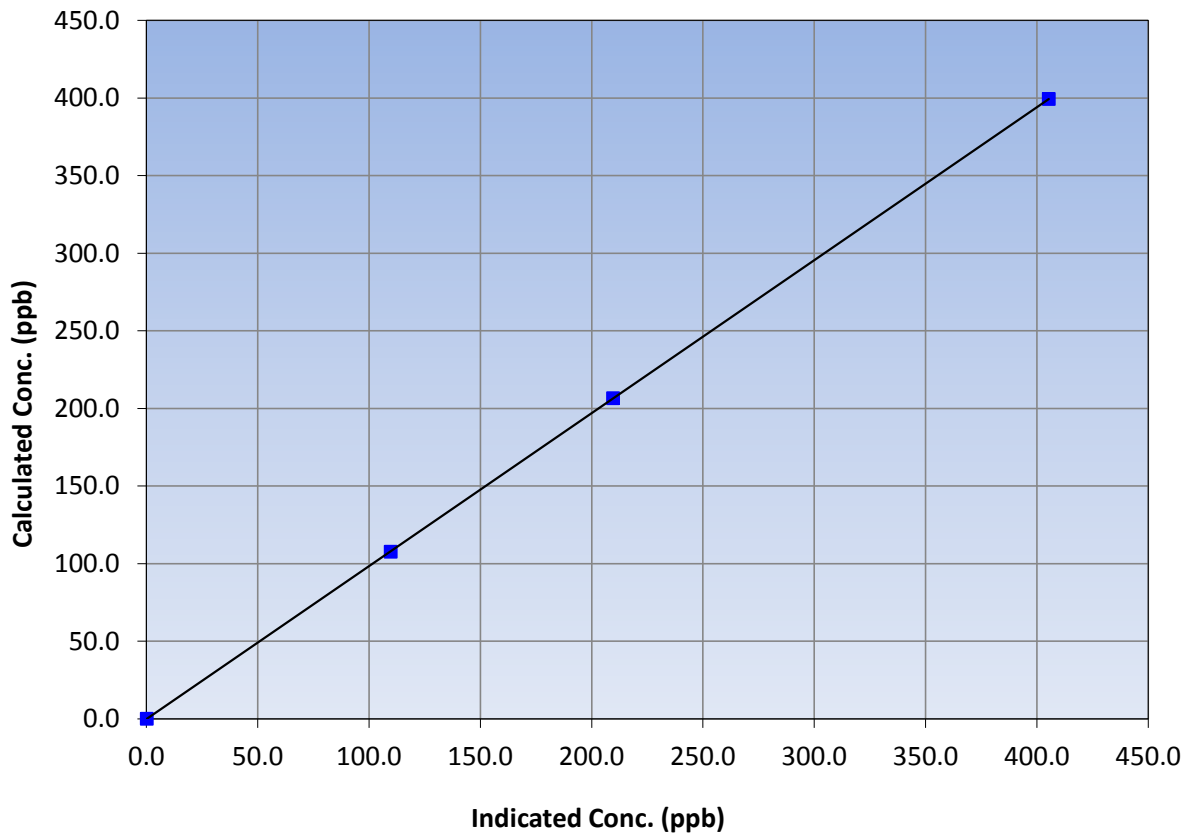
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 11, 2017 | Previous Calibration | August 1, 2017 |
| Station Name | Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 9:14 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262593 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 399.3 | 405.3 | 0.9852 | | | |
| 206.5 | 209.6 | 0.9852 | | | |
| 107.7 | 109.7 | 0.9818 | | | |
| | | | Slope | 0.985700 | 0.90 - 1.10 |
| | | | Intercept | -0.209170 | +/-20 |

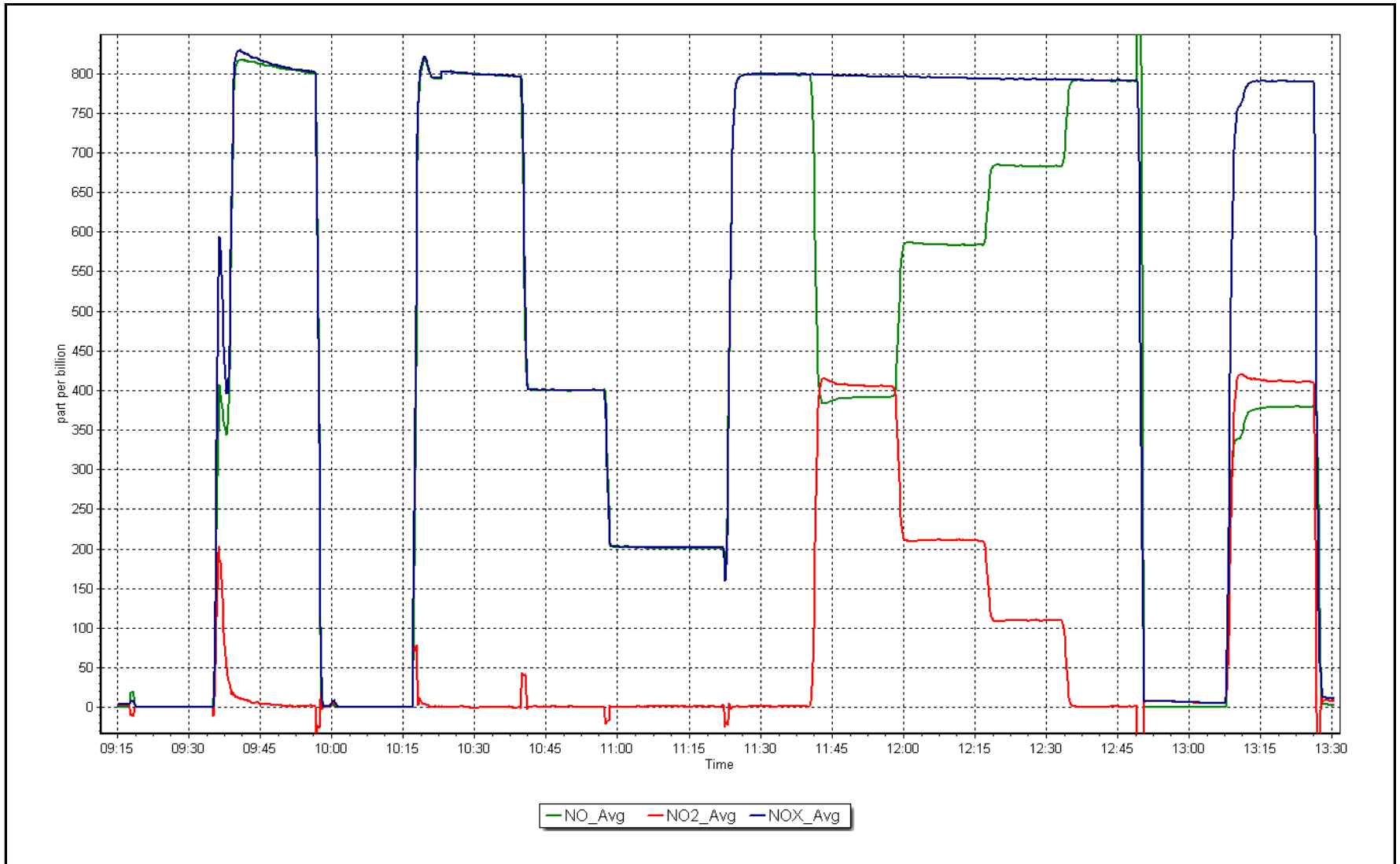
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 11, 2017

Location: Muskeg River





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|-----------------|
| Station Name: | Muskeg River | Station number: | AMS 16 |
| Calibration Date: | September 11, 2017 | Last Cal Date: | August 11, 2017 |
| Start time (MST): | 10:09 | End time (MST): | 11:32 |
| Sharp Model: | Thermo/Sharp 5030 | S/N: | E-798 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 4142 |
| Flow Meter Make/Model: | DeltaCal | S/N: | 628 |
| Temp/RH standard: | NA | S/N: | NA |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 13.1 | 12.9 | 13.1 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 972 | 792 | 972 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1005 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 4.2 | NA | 0.2 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: August 11, 2017
 Flow w/o adaptor: 16.8 Flow w/ adaptor: 16.68

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-----------------------------------|--------------------------|--|-----------------|
| <input type="checkbox"/> | Foil S/N: _____ | Foil S/N: <u>8074</u> | |
| Foil Calibration | Foil Mass: _____ | Foil Mass: <u>1258</u> | |
| | Calibration Date: _____ | Calibration Date: <u>July 12, 2017</u> | |
| (Limit) +/- 5% of previous | Correction Factor: _____ | Correction Factor: <u>7151</u> | --- |

Annual Calibration Test

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

Notes: Cleaned the cyclone head. Adjusted the nephelometer.

Calibration by: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 17
WAPASU
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 685 | 35 | 35 | 100 | 14 | 0 | 3 | 0 |
| H2S (ppb) Average | 686 | 33 | 34 | 99.86 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 685 | 35 | 35 | 100 | 2.5 | - | 2.2 | - |
| O3 (ppb) Average | 685 | 34 | 35 | 99.86 | 67 | 0 | 50 | - |
| NO2 (ppb) Average | 685 | 35 | 35 | 100 | 11 | 0 | 3 | - |
| NO (ppb) Average | 685 | 35 | 35 | 100 | 5 | - | 1 | - |
| NOX (ppb) Average | 685 | 35 | 35 | 100 | 12 | - | 4 | - |
| PM2.5 (ug/m3) Average | 695 | 1 | 25 | 96.67 | 69 | - | 19.9 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 30.2 | - | 22.9 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 100 | - | 99 | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100 | 5.4 | - | 26.9 | - |
| Wind Speed 10 m (km/h) Average | 715 | 0 | 5 | 99.31 | 19 | - | 14 | - |
| Wind Direction 10 m (deg) Average | 715 | 0 | 5 | 99.31 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 685 | 0.5 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 14 |
| H2S (ppb) Average | 686 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 685 | 2.12 | 0.1 | - | 1.9 | 2 | 2 | 2.1 | 2.2 | 2.3 | 2.5 |
| O3 (ppb) Average | 685 | 25.7 | 10 | - | 1 | 13 | 19 | 26 | 32 | 37 | 67 |
| NO2 (ppb) Average | 685 | 1.5 | 2 | - | 0 | 0 | 0 | 1 | 2 | 4 | 11 |
| NO (ppb) Average | 685 | 0.4 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| NOX (ppb) Average | 685 | 1.9 | 2 | - | 0 | 0 | 1 | 1 | 2 | 5 | 12 |
| PM2.5 (ug/m3) Average | 695 | 5.64 | 6.7 | - | 0 | 0.9 | 1.9 | 3.9 | 6.8 | 11.8 | 69 |
| Temperature 2 m (C) Average | 720 | 11 | 6.1 | - | -2.6 | 3.3 | 6.4 | 10.4 | 15.3 | 19 | 30.2 |
| Relative Humidity (%) Average | 720 | 69.1 | 20 | - | 23 | 40 | 53 | 69 | 86 | 98 | 100 |
| Precipitation (mm) Total | 720 | - | - | 44.91 | - | - | - | - | - | - | - |
| Wind Speed 10 m (km/h) Average | 715 | 9.4 | 4 | - | 1 | 4 | 6 | 9 | 13 | 15 | 19 |
| Wind Direction 10 m (deg) Average | 715 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|---------------------|---|
| H2S, O3 | 27 Sep 2017 08:00 | 27 Sep 2017 08:00 | 1 | Maintenance - cleaned glass manifold |
| PM2.5 | 04 Sep 2017 10:00 | 04 Sep 2017 11:00 | 2 | Unstable operation - excessive baseline drift |
| PM2.5 | 12 Sep 2017 16:00 | 12 Sep 2017 22:00 | 7 | Unstable operation - excessive baseline drift |
| PM2.5 | 13 Sep 2017 02:00 | 13 Sep 2017 03:00 | 2 | Unstable operation - excessive baseline drift |
| PM2.5 | 13 Sep 2017 05:00 | 13 Sep 2017 07:00 | 3 | Unstable operation - excessive baseline drift |
| PM2.5 | 14 Sep 2017 00:00 | 14 Sep 2017 06:00 | 7 | Unstable operation - excessive baseline drift |
| PM2.5 | 15 Sep 2017 05:00 | 15 Sep 2017 07:00 | 3 | Unstable operation - excessive baseline drift |
| Wind Speed, Wind Direction | 13 Sep 2017 20:00 | 13 Sep 2017 21:00 | 2 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 22 Sep 2017 03:00 | 22 Sep 2017 04:00 | 2 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 22 Sep 2017 07:00 | 22 Sep 2017 07:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Wapasu - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 14 ppb on Sep 15 15:00 | Maximum Daily Average: 2.5 ppb on Sep 5 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 4 21:00 | Minimum Daily Average: 0.0 ppb on Sep 14 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 1.2 ppb at hour 10 | Minimum Diurnal Average: 0.2 ppb at hour 23 | | Hours of Calibration: | 35 |
| Monthly Average: 0.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 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-Sep | 1 | 1 | 0 | Z | 3 | 3 | 4 | 2 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 2 | 2 | 3 | 5 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1.1 | 5 | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 5-Sep | 0 | Z | 0 | 2 | 1 | 0 | 0 | 0 | 5 | 11 | 2 | 3 | 3 | 8 | 6 | 6 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 2.5 | 11 | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.5 | 1 | |
| 8-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 4 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 | |
| 10-Sep | Z | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 5 | 6 | 5 | 8 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 8 | |
| 12-Sep | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 7 | 2 | 1 | 5 | 14 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 14 | |
| 16-Sep | Z | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 3 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | |
| 20-Sep | 0 | 0 | 0 | 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-Sep | 0 | 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-Sep | Z | 0 | 0 | 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-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 25-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 0.9 | 5 | |
| 26-Sep | 2 | 2 | 2 | 1 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 | |
| 29-Sep | 1 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 6 | 4 | 6 | 11 | 6 | 2 | 1 | 1 | 0 | 0 | 0 | 1.8 | 11 | |

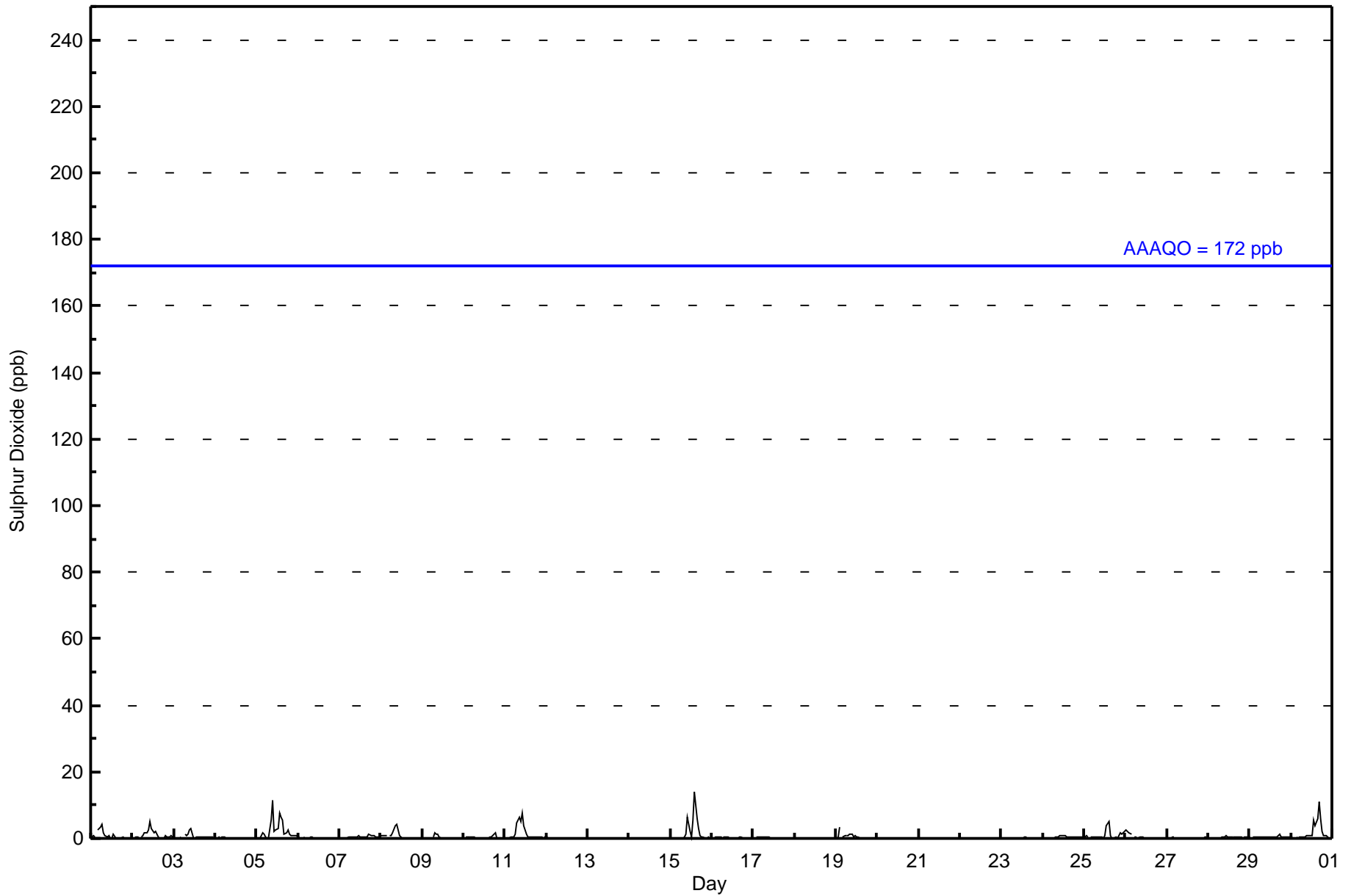
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| 0.3 | 0.3 | 0.4 | 0.3 | 0.4 | 0.4 | 0.5 | 0.6 | 0.9 | 1.2 | 1.1 | 0.6 | 0.4 | 1.0 | 1.1 | 0.7 | 0.6 | 0.5 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average |
| 2 | 2 | 3 | 2 | 3 | 3 | 4 | 5 | 6 | 11 | 8 | 4 | 3 | 8 | 14 | 6 | 11 | 6 | 3 | 1 | 1 | 2 | 1 | 2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Wapasu - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 682 | 99.56 | 99.56 |
| 11 - 20 | 3 | 0.44 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 45 | 43 | 60 | 11 | 11 | 20 | 30 | 677 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 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 | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |

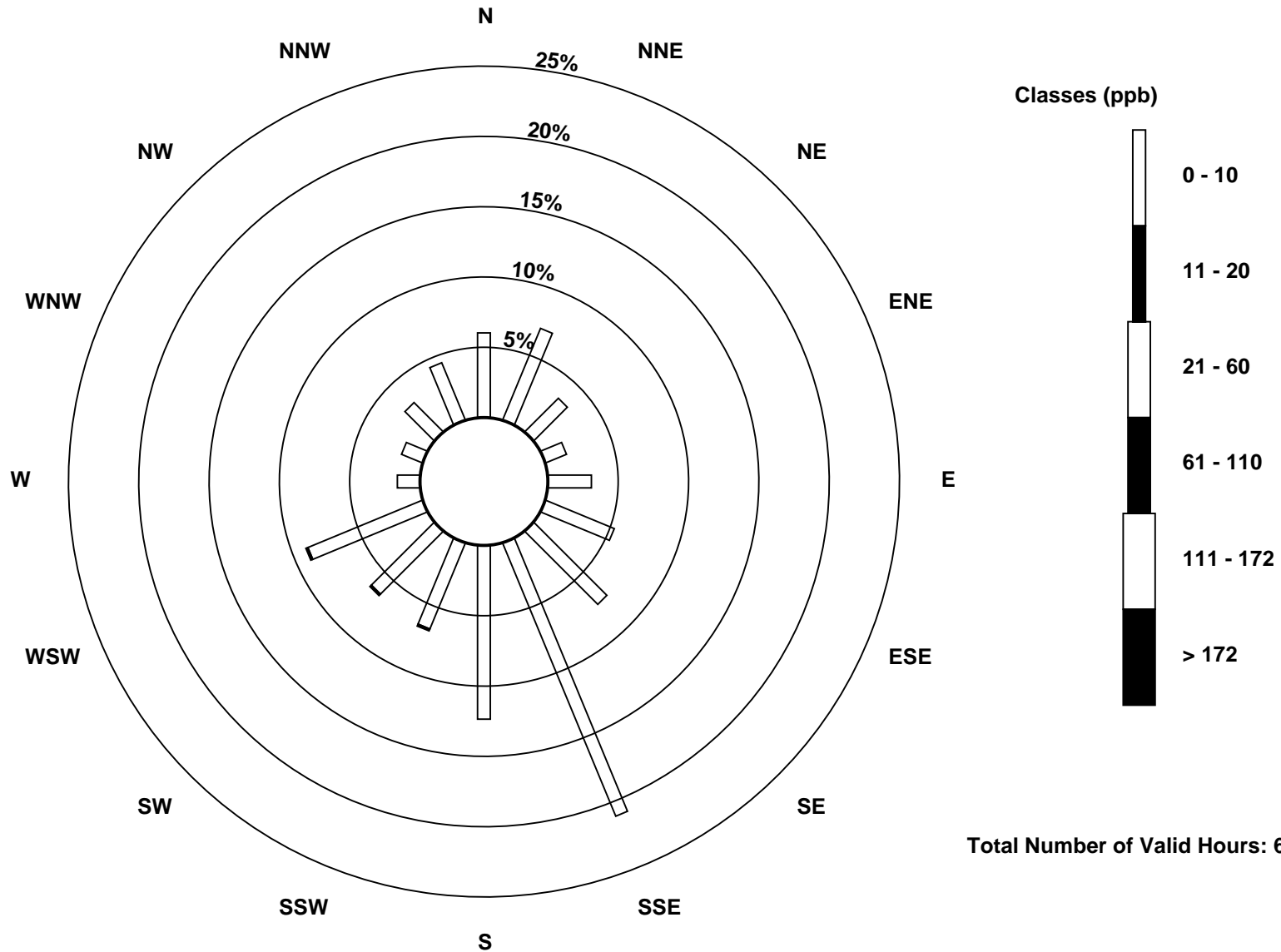
Total Number of Valid Hours: 680

Total Number of Hours: 720

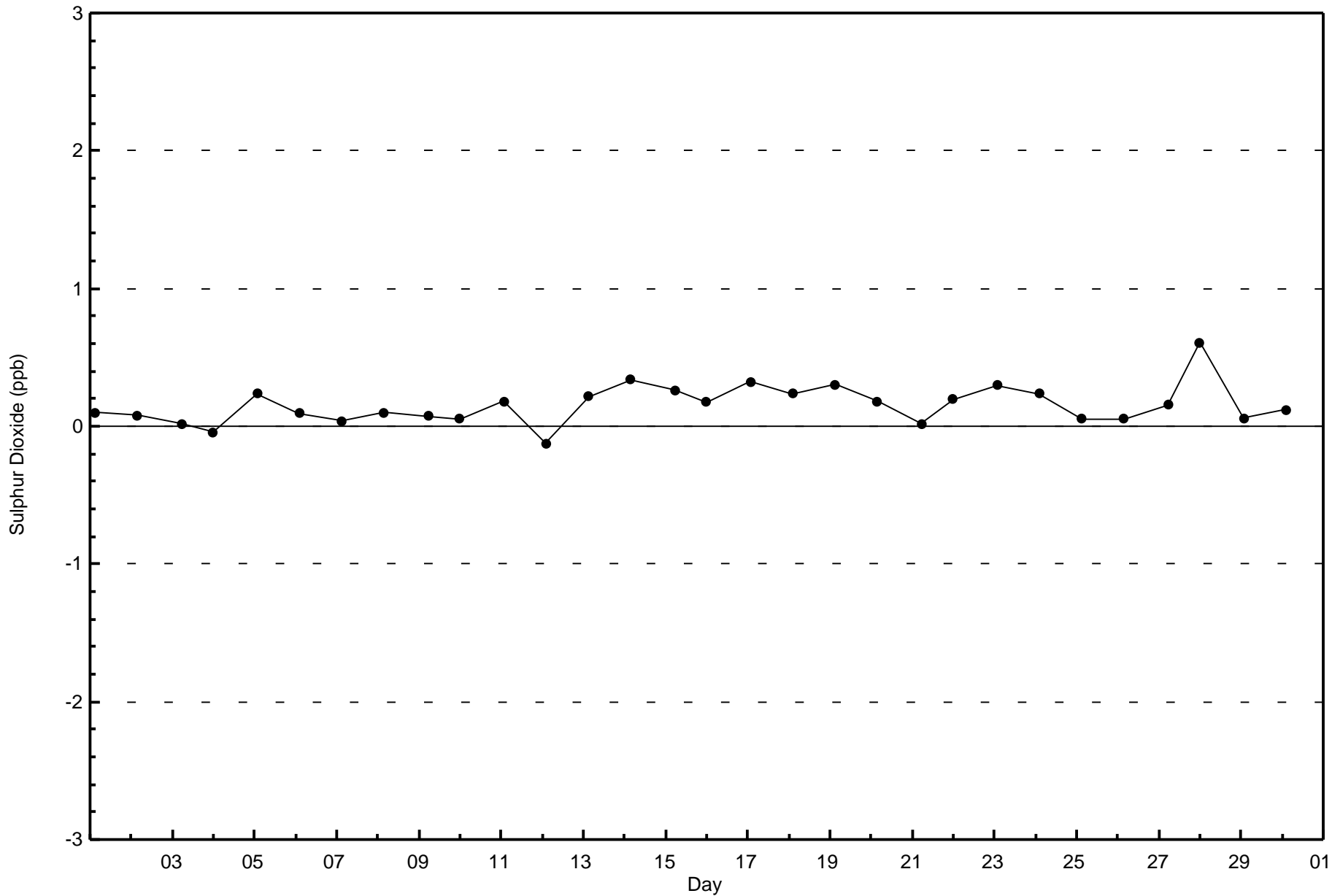


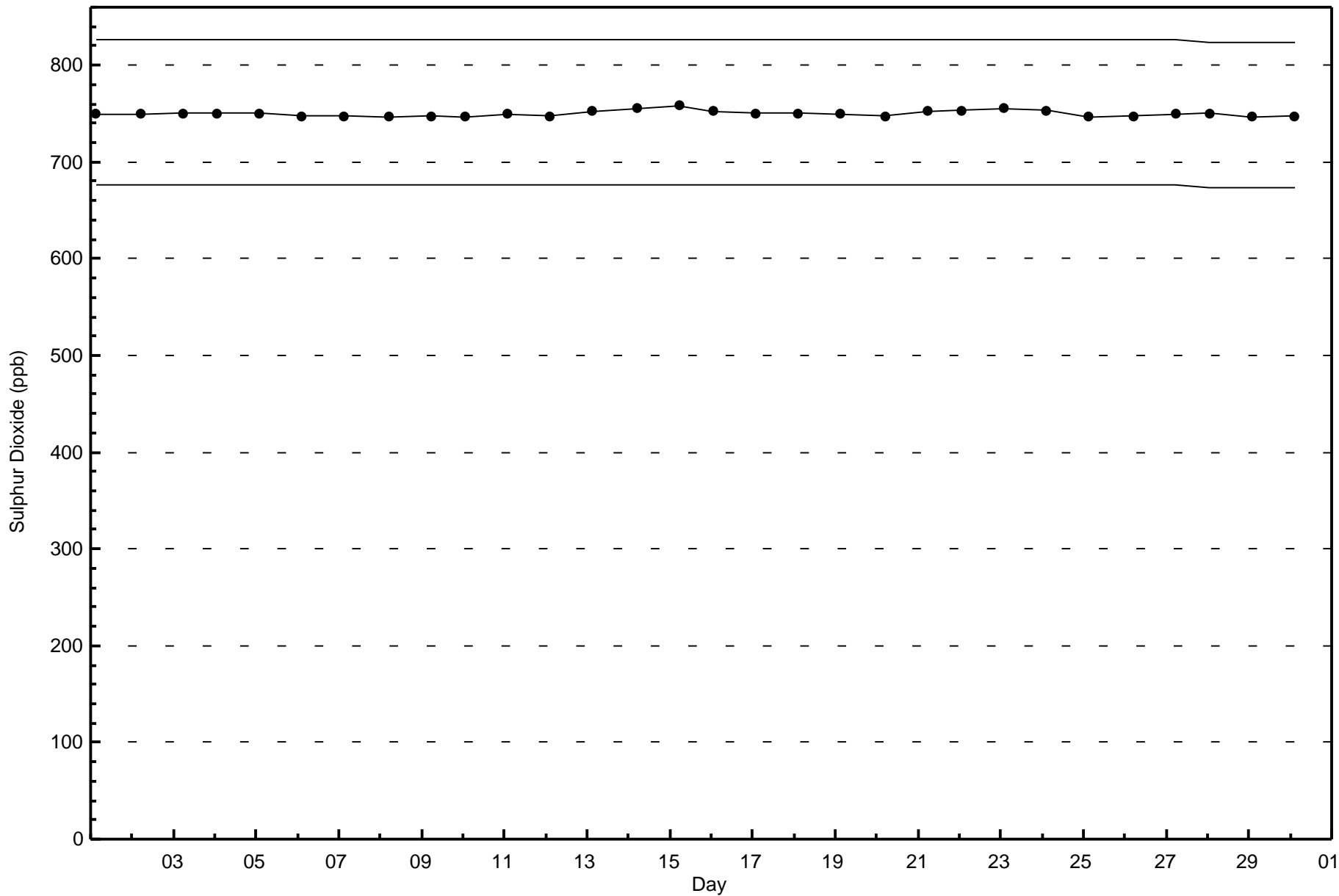
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 680





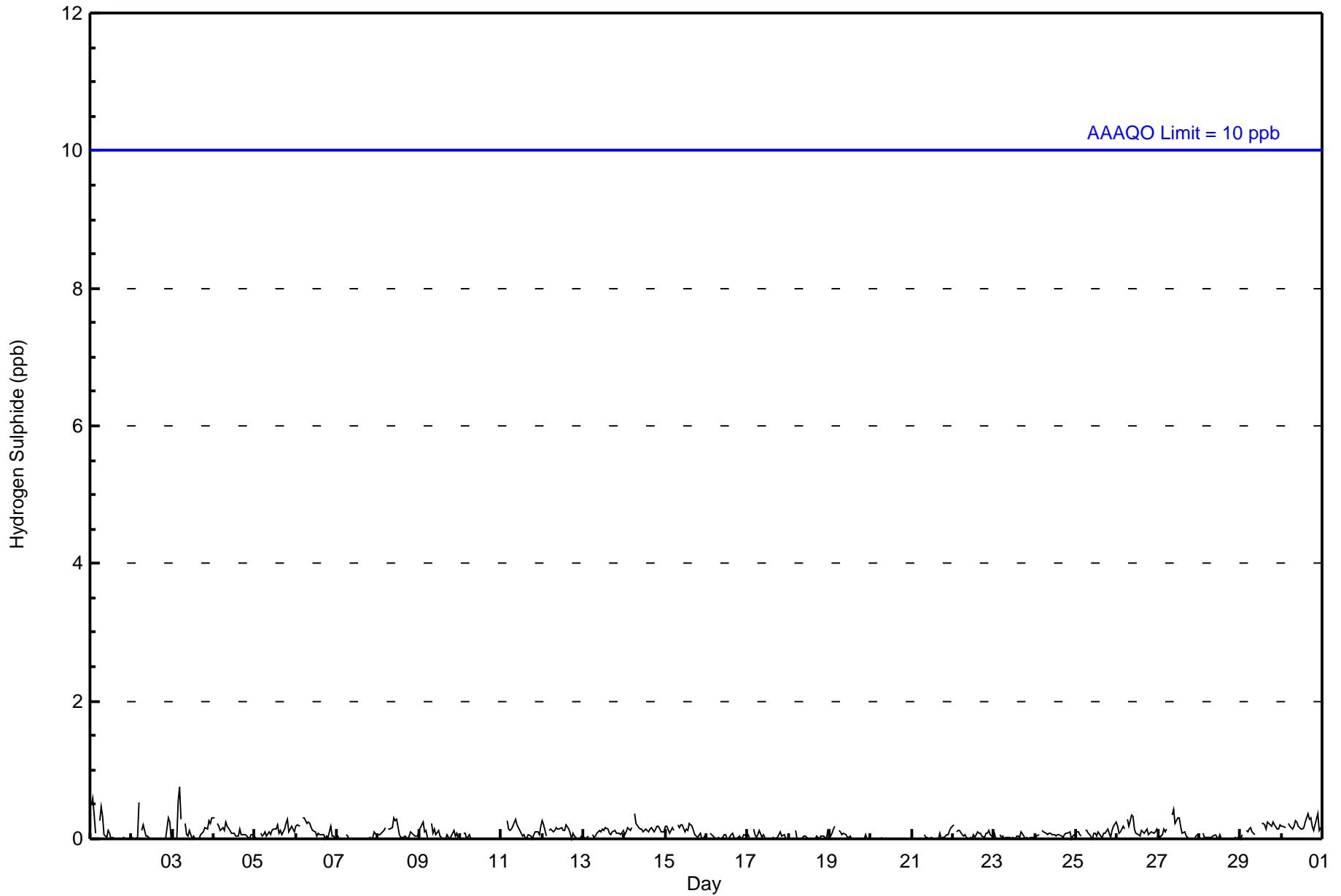


| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 3 05:00 | Maximum Daily Average: 0.2 ppb on Sep 30 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 1 13:00 | Minimum Daily Average: 0.0 ppb on Sep 20 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 0.1 ppb at hour 5 | Minimum Diurnal Average: 0.1 ppb at hour 18 | | Hours of Calibration: | 33 |
| Monthly Average: 0.1 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 0 P ₉₉ = 0 | | Percent Operational Time: | 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 2-Sep | 0 | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 3-Sep | 0 | 0 | 0 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 5-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 8-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 12-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 15-Sep | 0 | 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-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 22-Sep | 0 | 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-Sep | 0 | 0 | Z | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 28-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 30-Sep | 0 | 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 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Diurnal Average |
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - September 2017**

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 42 | 47 | 23 | 11 | 21 | 35 | 50 | 147 | 78 | 48 | 42 | 62 | 11 | 11 | 21 | 32 | 681 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 47 | 23 | 11 | 21 | 35 | 50 | 147 | 78 | 48 | 42 | 62 | 11 | 11 | 21 | 32 | 681 |

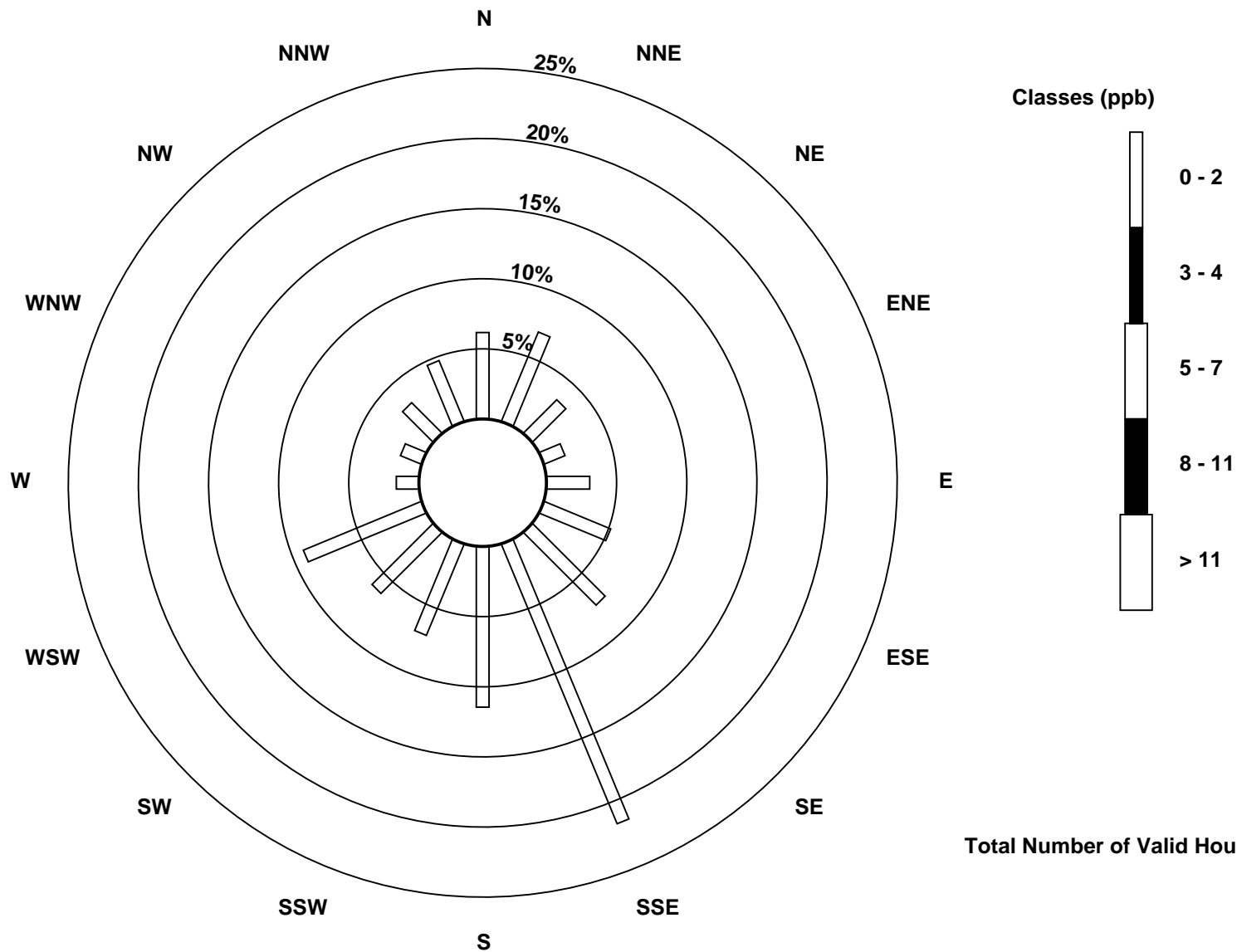
Total Number of Valid Hours: 681

Total Number of Hours: 720

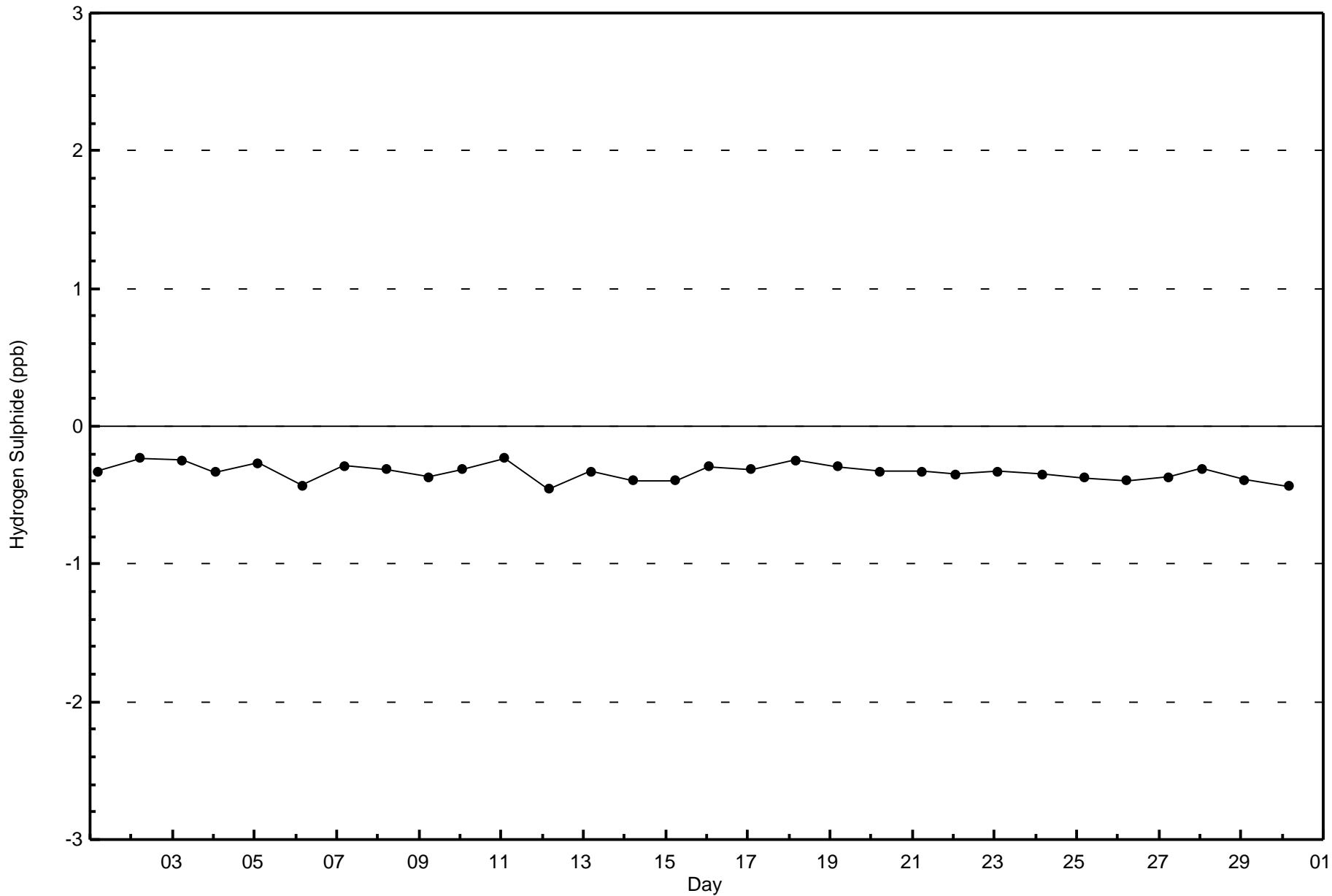


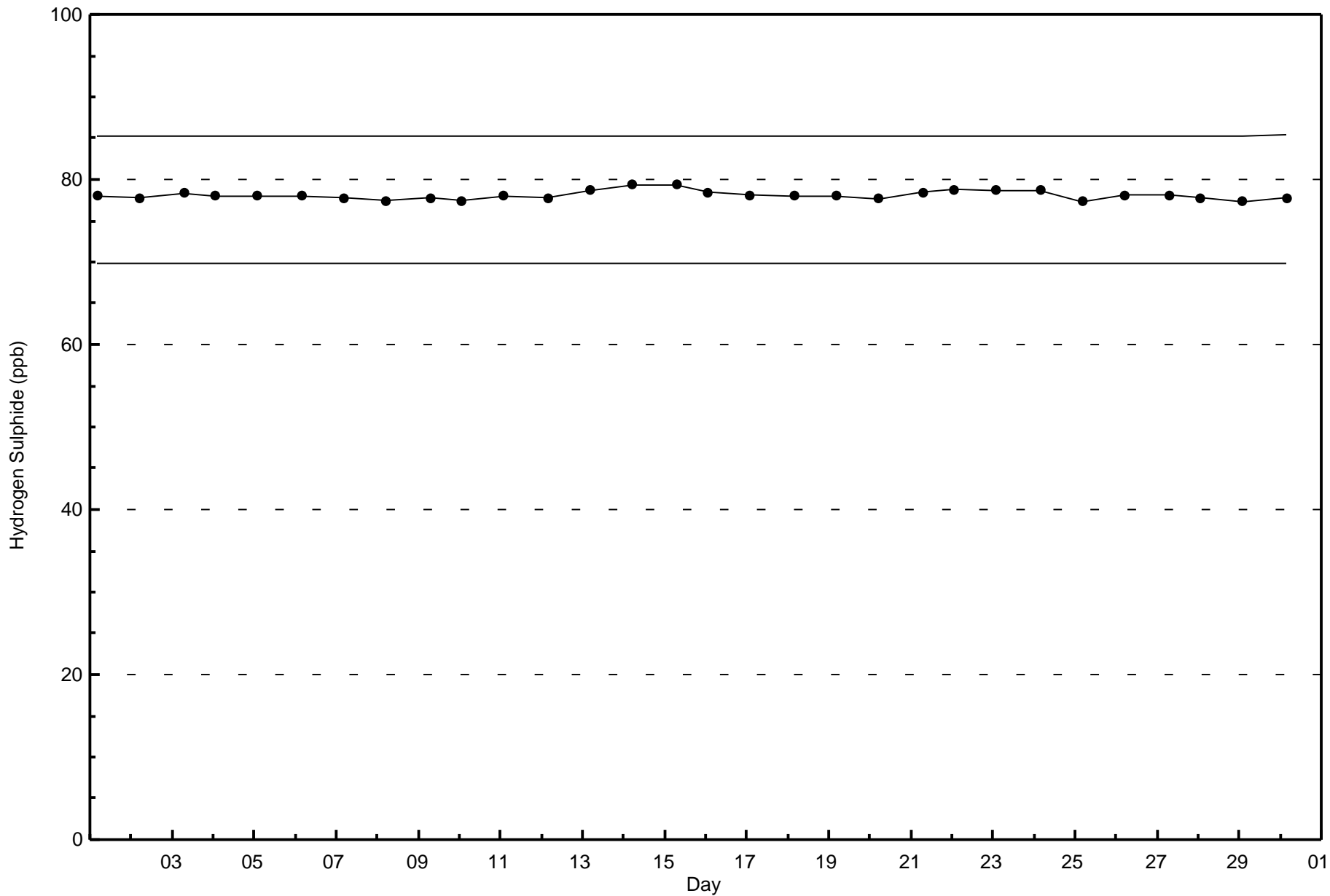
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Hydrogen Sulphide (H₂S) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 681



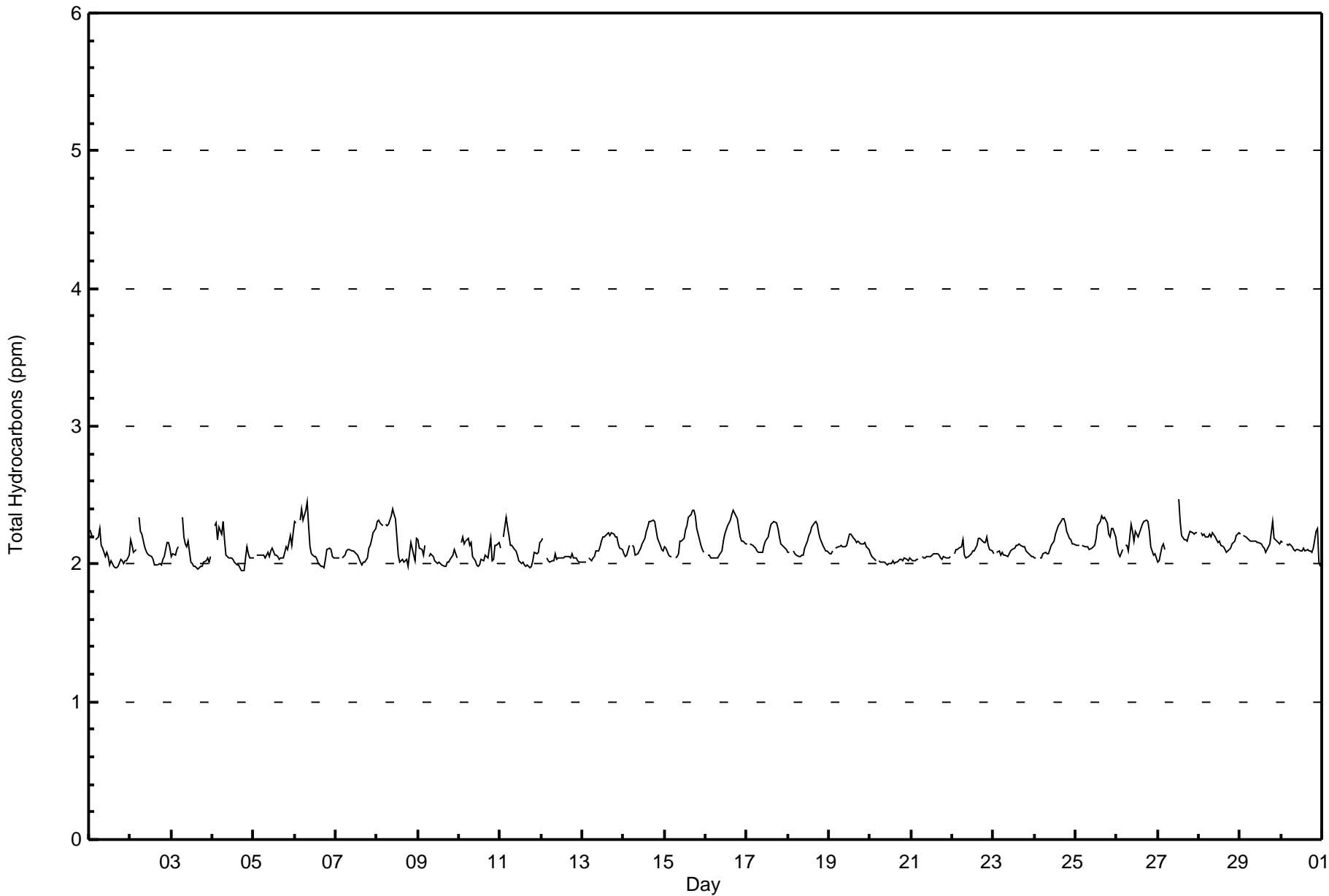




Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Wapasu - September 2017

| Maximum Value: 2.5 ppm on Sep 27 13:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.2 ppm on Sep 25 | | | | | Hours in Service: 720 | | |
|--|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|-----|------------------------------|---------------------------------|---------------|-----|
| Minimum Value: 1.9 ppm on Sep 4 18:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.0 ppm on Sep 20 | | | | | Hours of Data: 685 | | |
| Maximum Diurnal Average: 2.1 ppm at hour 7 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.1 ppm at hour 23 | | | | | Hours of Missing Data: 35 | | |
| Monthly Average: 2.12 ppm | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.4 | | | | | Hours of Calibration: 35 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 2.3 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.3 | |
| 2-Sep | 2.2 | 2.1 | 2.1 | 2.1 | Z | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.3 |
| 3-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.3 | 2.2 | 2.1 | 2.1 | 2.2 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.3 | |
| 4-Sep | Z | 2.3 | 2.3 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.3 | |
| 5-Sep | 2.0 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 | |
| 6-Sep | 2.3 | 2.3 | Z | 2.3 | 2.4 | 2.3 | 2.4 | 2.5 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.2 | 2.5 | |
| 7-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.1 | 2.3 | |
| 8-Sep | 2.3 | 2.3 | 2.3 | 2.3 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.1 | 2.0 | 2.2 | 2.2 | 2.4 | |
| 9-Sep | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | |
| 10-Sep | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.2 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | |
| 11-Sep | 2.1 | Z | 2.2 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.3 | |
| 12-Sep | 2.2 | 2.2 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | |
| 13-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | |
| 14-Sep | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.3 | |
| 15-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.4 | |
| 16-Sep | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.4 | |
| 17-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | |
| 18-Sep | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | |
| 19-Sep | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | |
| 20-Sep | 2.1 | 2.1 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | |
| 21-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | |
| 22-Sep | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | |
| 23-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | |
| 24-Sep | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.3 | |
| 25-Sep | 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 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | |
| 26-Sep | 2.1 | 2.1 | 2.0 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.2 | 2.3 | |
| 27-Sep | 2.0 | 2.0 | 2.1 | 2.2 | 2.1 | Z | 2.2 | C | C | C | C | C | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.5 | |
| 28-Sep | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | |
| 29-Sep | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | |
| 30-Sep | 2.2 | 2.2 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.0 | 2.0 | 2.1 | 2.3 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Wapasu - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 175 | 25.55 | 25.55 |
| 2.1 - 3.0 | 510 | 74.45 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 18 | 26 | 13 | 2 | 3 | 3 | 6 | 20 | 6 | 5 | 3 | 28 | 6 | 2 | 14 | 20 | 175 |
| 2.1 - 3.0 | 23 | 22 | 10 | 9 | 18 | 33 | 44 | 123 | 78 | 41 | 41 | 33 | 5 | 9 | 6 | 10 | 505 |
| 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 | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |

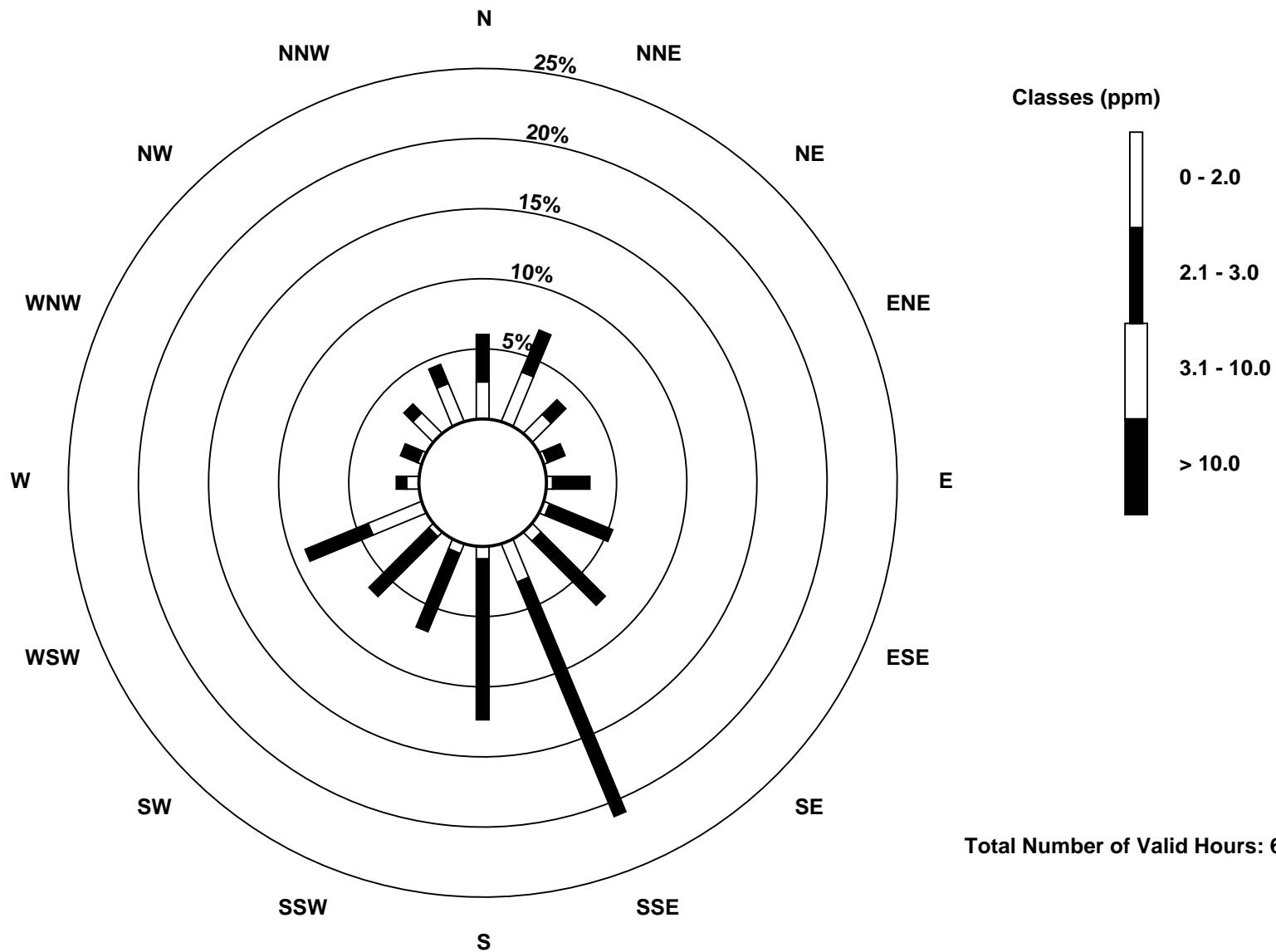
Total Number of Valid Hours: 680

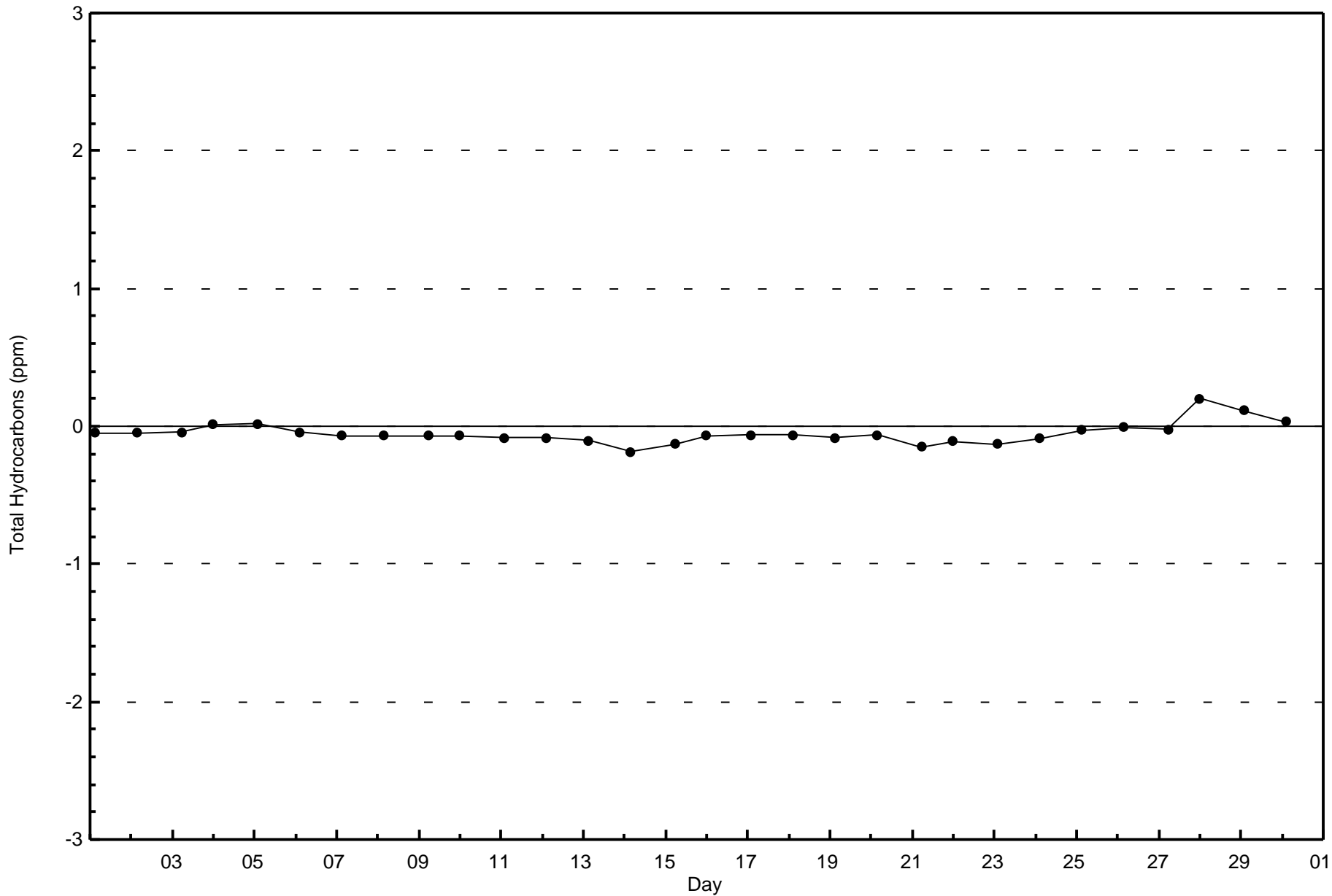
Total Number of Hours: 720

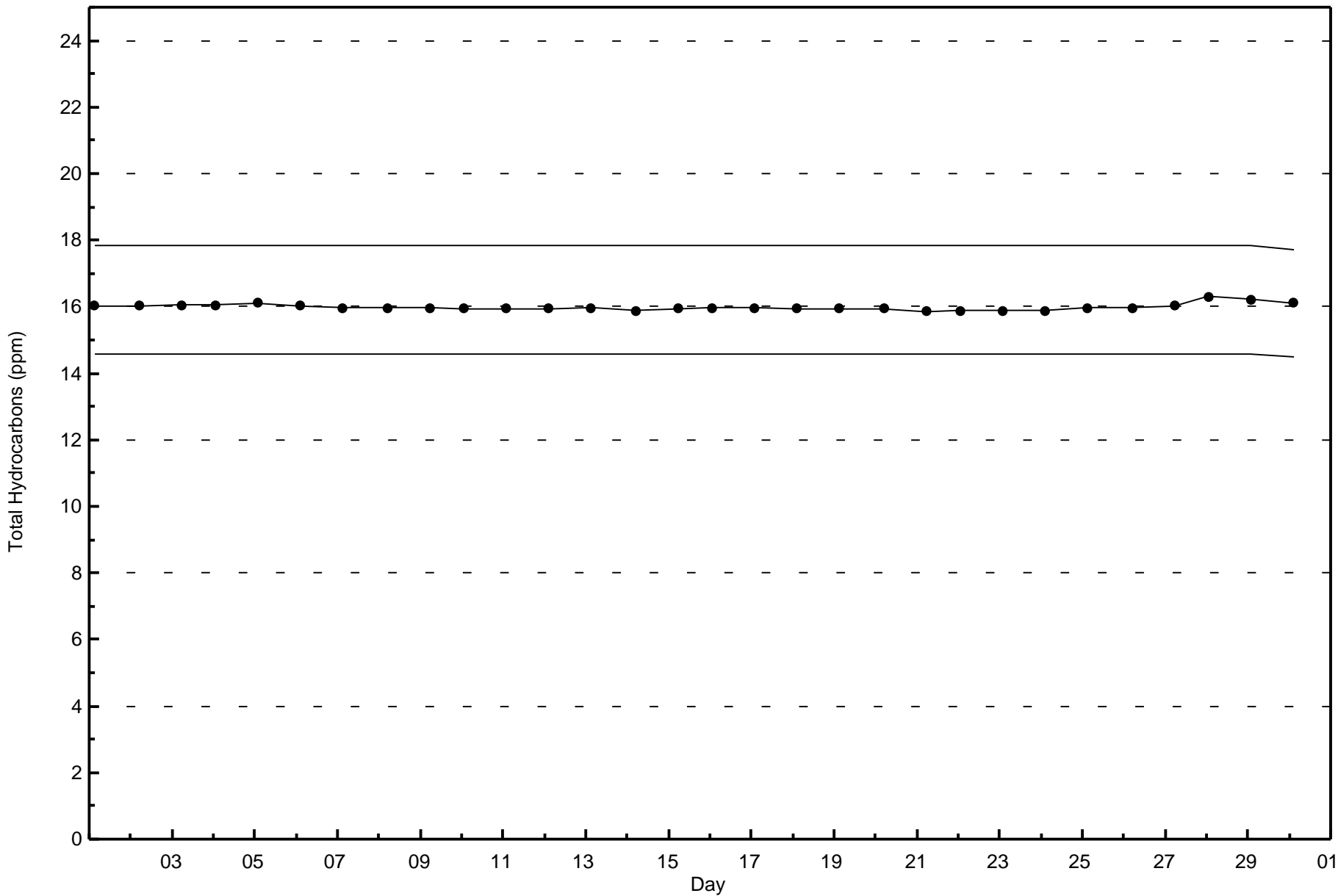


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Wapasu - September 2017

| | |
|--|--|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 67 ppb on Sep 7 18:00 | Maximum Daily Average: 50.3 ppb on Sep 7 |
| Minimum Value: 1 ppb on Sep 4 05:00 | Hours of Data: 685 |
| Maximum Diurnal Average: 32.6 ppb at hour 16 | Hours of Missing Data: 35 |
| Monthly Average: 25.7 ppb | Hours of Calibration: 34 |
| Minimum Daily Average: 15.1 ppb on Sep 22 | Percent Operational Time: 99.9 |
| Minimum Diurnal Average: 18.3 ppb at hour 7 | |
| Percentiles: P ₁ = 4 P ₁₀ = 13 Q ₁ = 19 Median = 26 Q ₃ = 32 P ₉₀ = 37 P ₉₉ = 62 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 21 | 23 | 24 | 21 | 21 | 21 | Z | 29 | 31 | 32 | 32 | 33 | 34 | 36 | 37 | 36 | 37 | 37 | 33 | 35 | 35 | 35 | 34 | 30 | 30.6 | 37 |
| 2-Sep | 24 | 23 | 26 | 20 | 22 | 18 | 18 | Z | 25 | 28 | 29 | 31 | 31 | 32 | 32 | 30 | 28 | 27 | 25 | 25 | 26 | 25 | 19 | 16 | 25.2 | 32 |
| 3-Sep | 19 | 17 | 18 | 19 | 21 | 15 | 14 | 19 | Z | 23 | 26 | 31 | 32 | 32 | 33 | 32 | 33 | 31 | 32 | 30 | 25 | 20 | 24 | 16 | 24.5 | 33 |
| 4-Sep | 12 | 4 | 4 | Z | 1 | 2 | 2 | 12 | 18 | 22 | 25 | 25 | 26 | 25 | 26 | 28 | 29 | 28 | 23 | 15 | 16 | 23 | 25 | 25 | 18.2 | 29 |
| 5-Sep | 26 | 26 | 26 | 24 | Z | 24 | 24 | 26 | 29 | 30 | 34 | 35 | 42 | 45 | 49 | 51 | 53 | 52 | 46 | 42 | 39 | 35 | 37 | 29 | 35.9 | 53 |
| 6-Sep | 19 | 14 | 14 | 10 | 6 | Z | 6 | 14 | 28 | 31 | 33 | 35 | 36 | 35 | 34 | 33 | 27 | 29 | 21 | 17 | 22 | 24 | 27 | 29 | 23.6 | 36 |
| 7-Sep | 34 | 38 | 39 | 37 | 32 | 30 | Z | 36 | 42 | 45 | 52 | 57 | 54 | 52 | 52 | 52 | 58 | 67 | 64 | 62 | 65 | 65 | 63 | 63 | 50.3 | 67 |
| 8-Sep | 62 | 59 | 58 | 54 | 53 | 52 | 50 | Z | 38 | 33 | 36 | 34 | 40 | 40 | 39 | 39 | 39 | 40 | 41 | 34 | 26 | 33 | 28 | 18 | 41.1 | 62 |
| 9-Sep | 14 | 18 | 16 | 23 | 27 | 25 | 31 | 32 | Z | 22 | 36 | 35 | 21 | 21 | 21 | 23 | 24 | 21 | 15 | 11 | 7 | 4 | 4 | 7 | 19.9 | 36 |
| 10-Sep | 8 | 11 | 15 | Z | 16 | 14 | 13 | 12 | 14 | 17 | 17 | 18 | 19 | 23 | 23 | 25 | 23 | 21 | 15 | 26 | 26 | 22 | 20 | 16 | 18.1 | 26 |
| 11-Sep | 16 | 16 | 13 | 10 | Z | 11 | 11 | 12 | 16 | 16 | 14 | 17 | 20 | 23 | 26 | 27 | 26 | 26 | 24 | 22 | 25 | 22 | 23 | 19 | 18.9 | 27 |
| 12-Sep | 17 | 16 | 19 | 20 | 20 | Z | 20 | 18 | 19 | 25 | 30 | 31 | 28 | 27 | 29 | 31 | 32 | 33 | 31 | 27 | 27 | 24 | 24 | 26 | 25.1 | 33 |
| 13-Sep | 28 | 32 | 31 | 32 | 29 | 28 | Z | 29 | 32 | 33 | 34 | 34 | 34 | 32 | 30 | 30 | 25 | 21 | 17 | 13 | 6 | 4 | 4 | 3 | 24.4 | 34 |
| 14-Sep | 4 | 7 | 8 | 6 | 3 | 4 | 8 | Z | 25 | 28 | 27 | 26 | 26 | 26 | 26 | 27 | 26 | 21 | 14 | 12 | 14 | 14 | 10 | 16.8 | 28 | |
| 15-Sep | 8 | 11 | 11 | 13 | 15 | 14 | 16 | 17 | Z | 21 | 23 | 26 | 27 | 26 | 26 | 30 | 29 | 27 | 24 | 24 | 24 | 23 | 27 | 26 | 21.2 | 30 |
| 16-Sep | 25 | 26 | 27 | Z | 28 | 27 | 27 | 26 | 28 | 30 | 33 | 37 | 36 | 35 | 35 | 37 | 37 | 36 | 34 | 31 | 31 | 31 | 29 | 29 | 31.0 | 37 |
| 17-Sep | 28 | 26 | 25 | 25 | Z | 23 | 22 | 23 | 25 | 28 | 31 | 32 | 33 | 35 | 34 | 35 | 38 | 37 | 34 | 32 | 32 | 30 | 28 | 27 | 29.6 | 38 |
| 18-Sep | 26 | 26 | 26 | 25 | 25 | Z | 26 | 26 | 28 | 31 | 34 | 35 | 35 | 35 | 36 | 38 | 38 | 37 | 33 | 30 | 30 | 30 | 29 | 30 | 30.8 | 38 |
| 19-Sep | 30 | 29 | 26 | 22 | 18 | 18 | Z | 28 | 25 | 25 | 27 | 28 | 32 | 32 | 32 | 33 | 32 | 29 | 28 | 29 | 28 | 27 | 26 | 24 | 27.3 | 33 |
| 20-Sep | 22 | 21 | 20 | 20 | 19 | 20 | 20 | Z | 23 | 25 | 26 | 26 | 27 | 27 | 28 | 29 | 28 | 29 | 29 | 27 | 26 | 27 | 28 | 28 | 25.0 | 29 |
| 21-Sep | 27 | 27 | 27 | 27 | 27 | 27 | 26 | 25 | Z | 25 | 24 | 23 | 23 | 21 | 21 | 23 | 22 | 21 | 22 | 21 | 18 | 15 | 13 | 14 | 22.7 | 27 |
| 22-Sep | 14 | 11 | 5 | Z | 5 | 8 | 6 | 15 | 20 | 25 | 23 | 26 | 25 | 26 | 24 | 21 | 20 | 13 | 9 | 8 | 5 | 10 | 13 | 14 | 15.1 | 26 |
| 23-Sep | 15 | 16 | 17 | 18 | Z | 18 | 18 | 20 | 24 | 25 | 27 | 30 | 32 | 32 | 31 | 33 | 33 | 28 | 21 | 21 | 23 | 25 | 26 | 24 | 24.1 | 33 |
| 24-Sep | 21 | 20 | 19 | 20 | 19 | Z | 17 | 16 | 16 | 16 | 17 | 20 | 25 | 30 | 33 | 34 | 31 | 30 | 25 | 27 | 26 | 26 | 23 | 20 | 23.1 | 34 |
| 25-Sep | 19 | 18 | 17 | 18 | 17 | 16 | Z | 16 | 15 | 15 | 16 | 20 | 22 | 22 | 23 | 26 | 26 | 22 | 17 | 17 | 17 | 13 | 10 | 7 | 17.7 | 26 |
| 26-Sep | 8 | 10 | 12 | 8 | 5 | 6 | 6 | Z | 13 | 18 | 27 | 30 | 36 | 39 | 38 | 37 | 35 | 29 | 14 | 7 | 7 | 11 | 10 | 19 | 18.4 | 39 |
| 27-Sep | 23 | 23 | 16 | 15 | 17 | 14 | 5 | M | Z | 19 | 23 | 25 | 22 | 26 | 28 | 24 | 21 | 20 | 17 | 17 | 17 | 19 | 20 | 21 | 19.7 | 28 |
| 28-Sep | 22 | 21 | 21 | Z | 24 | 24 | 23 | 22 | 23 | 27 | 30 | 31 | 32 | 32 | 33 | 33 | 33 | 32 | 30 | 30 | 30 | 31 | 32 | 32 | 28.1 | 33 |
| 29-Sep | 31 | 30 | 32 | 32 | Z | 32 | C | C | C | C | 37 | 39 | 40 | 42 | 44 | 45 | 45 | 36 | 22 | 18 | 29 | 37 | 38 | 33 | 34.9 | 45 |
| 30-Sep | 33 | 34 | 34 | 33 | 32 | Z | 31 | 31 | 30 | 32 | 33 | 38 | 41 | 40 | 40 | 40 | 35 | 29 | 25 | 18 | 21 | 23 | 27 | 24 | 31.5 | 41 |

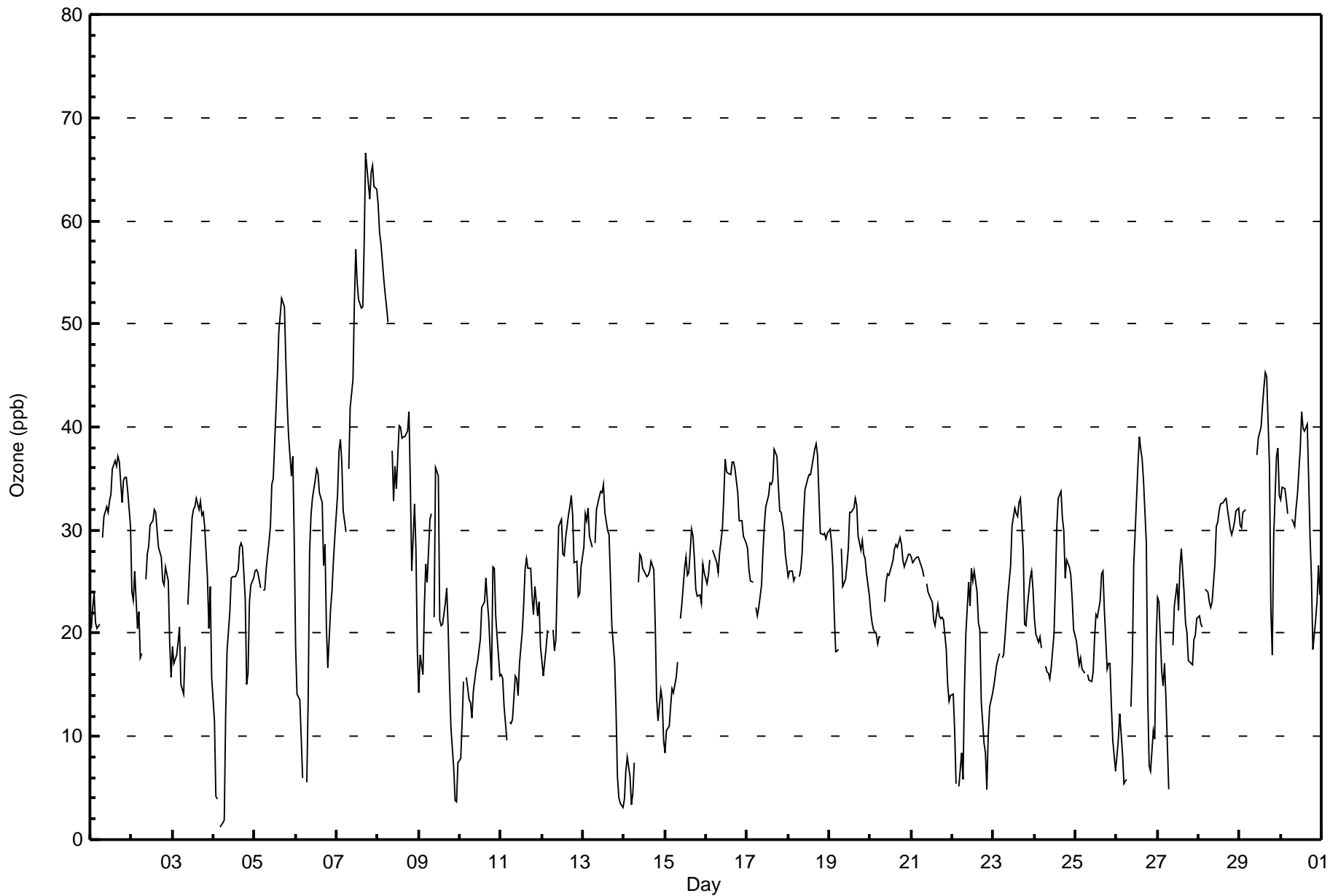
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 21.8 | 21.7 | 21.5 | 22.1 | 20.1 | 19.6 | 18.3 | 21.9 | 24.5 | 25.7 | 28.5 | 30.3 | 31.0 | 31.7 | 32.1 | 32.6 | 32.2 | 30.6 | 26.5 | 24.3 | 24.0 | 24.3 | 24.1 | 22.7 | Diurnal Average | |
| 62 | 59 | 58 | 54 | 53 | 52 | 50 | 36 | 42 | 45 | 52 | 57 | 54 | 52 | 52 | 52 | 58 | 67 | 64 | 62 | 65 | 65 | 63 | 63 | 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
Wapasu - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Wapasu - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 195 | 28.47 | 28.47 |
| 21 - 50 | 467 | 68.18 | 96.64 |
| 51 - 82 | 23 | 3.36 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 1 | 5 | 8 | 5 | 7 | 15 | 23 | 47 | 19 | 8 | 16 | 24 | 0 | 1 | 3 | 9 | 191 |
| 21 - 50 | 41 | 43 | 16 | 5 | 14 | 20 | 28 | 98 | 48 | 32 | 24 | 36 | 11 | 10 | 18 | 23 | 467 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 11 | 8 | 2 | 1 | 0 | 0 | 0 | 0 | 23 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 48 | 24 | 10 | 21 | 35 | 51 | 146 | 78 | 48 | 42 | 61 | 11 | 11 | 21 | 32 | 681 |

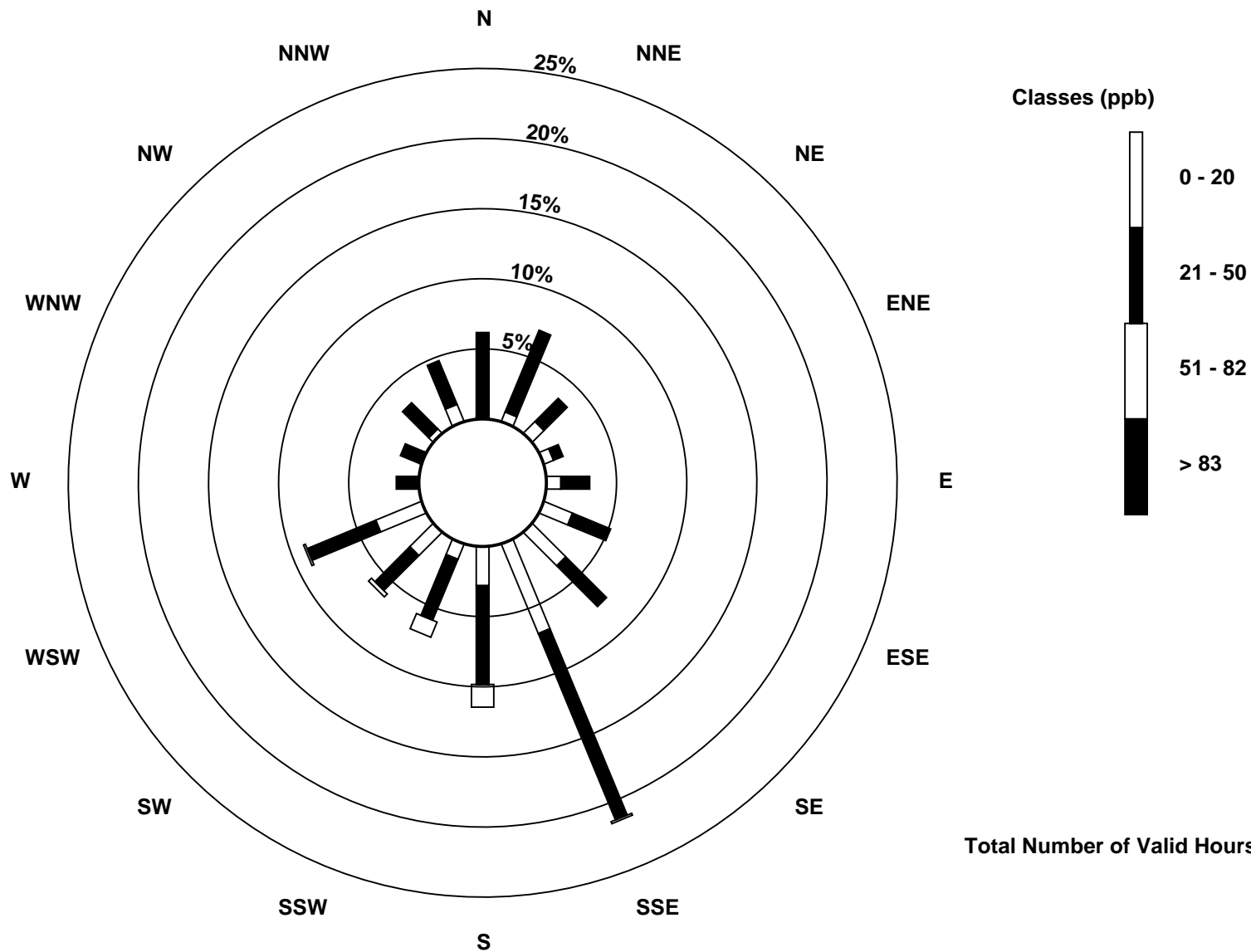
Total Number of Valid Hours: 681

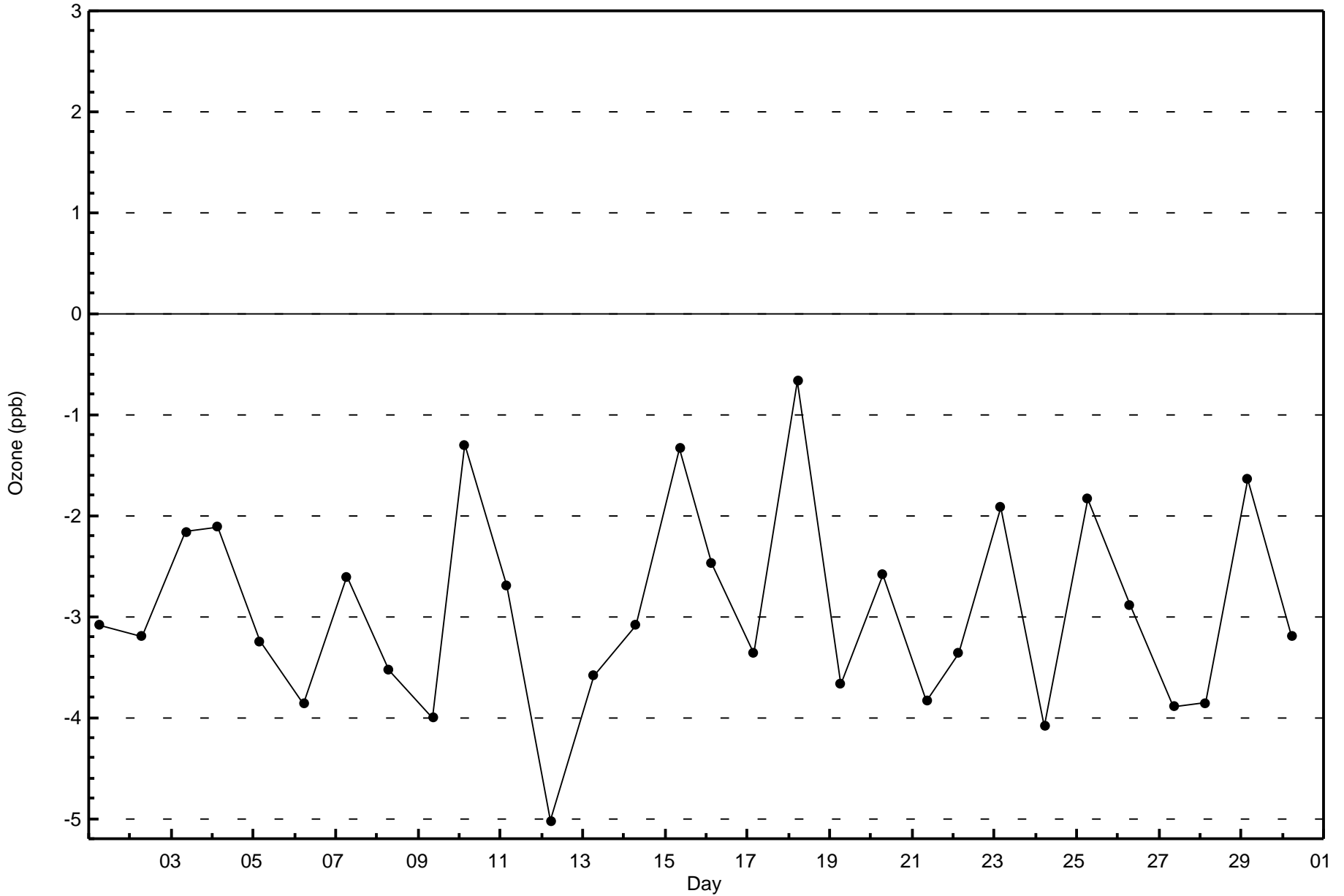
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Ozone (O₃) - ppb
Wapasu (AMS 17)

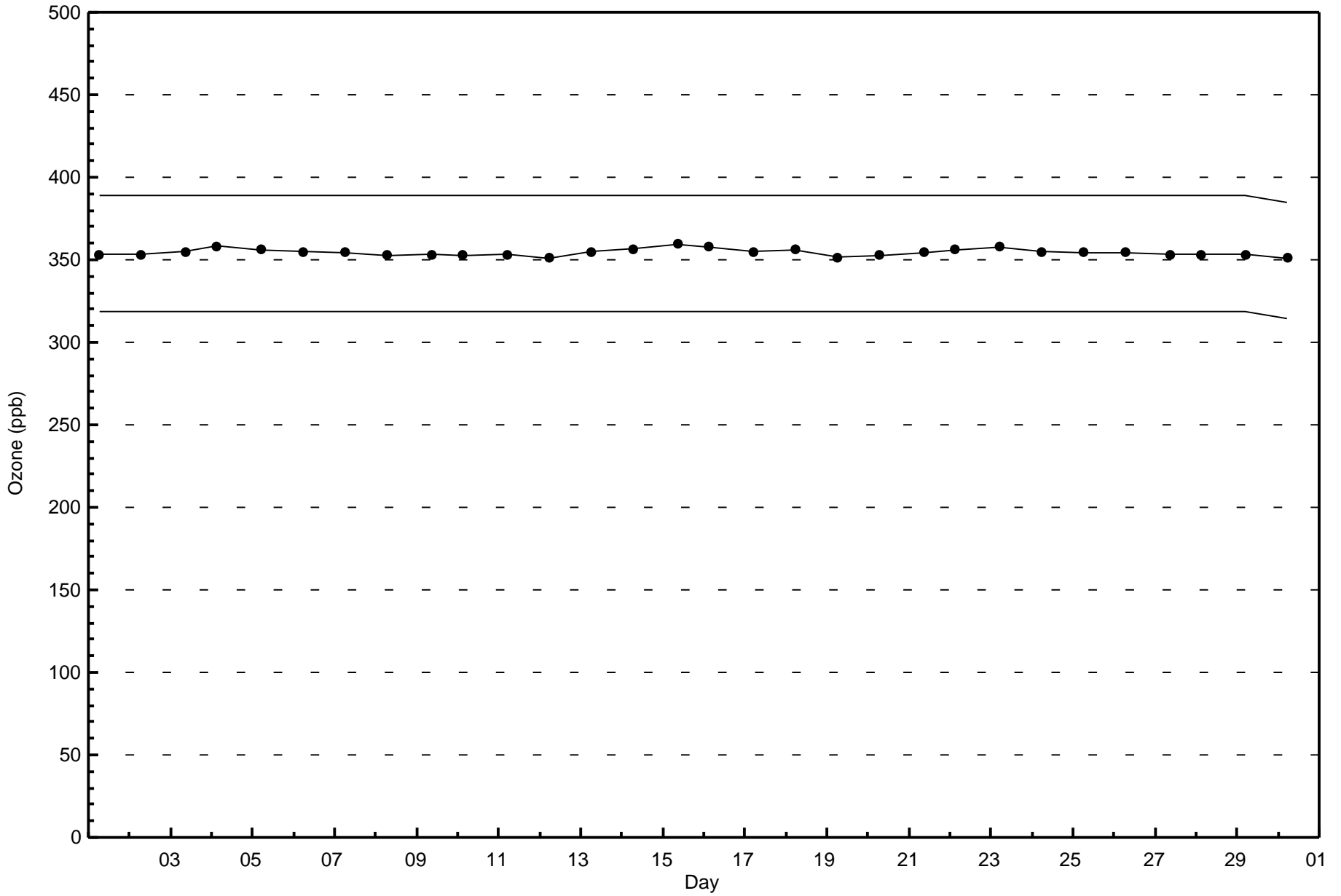






Wood Buffalo Environmental Association
Span Responses

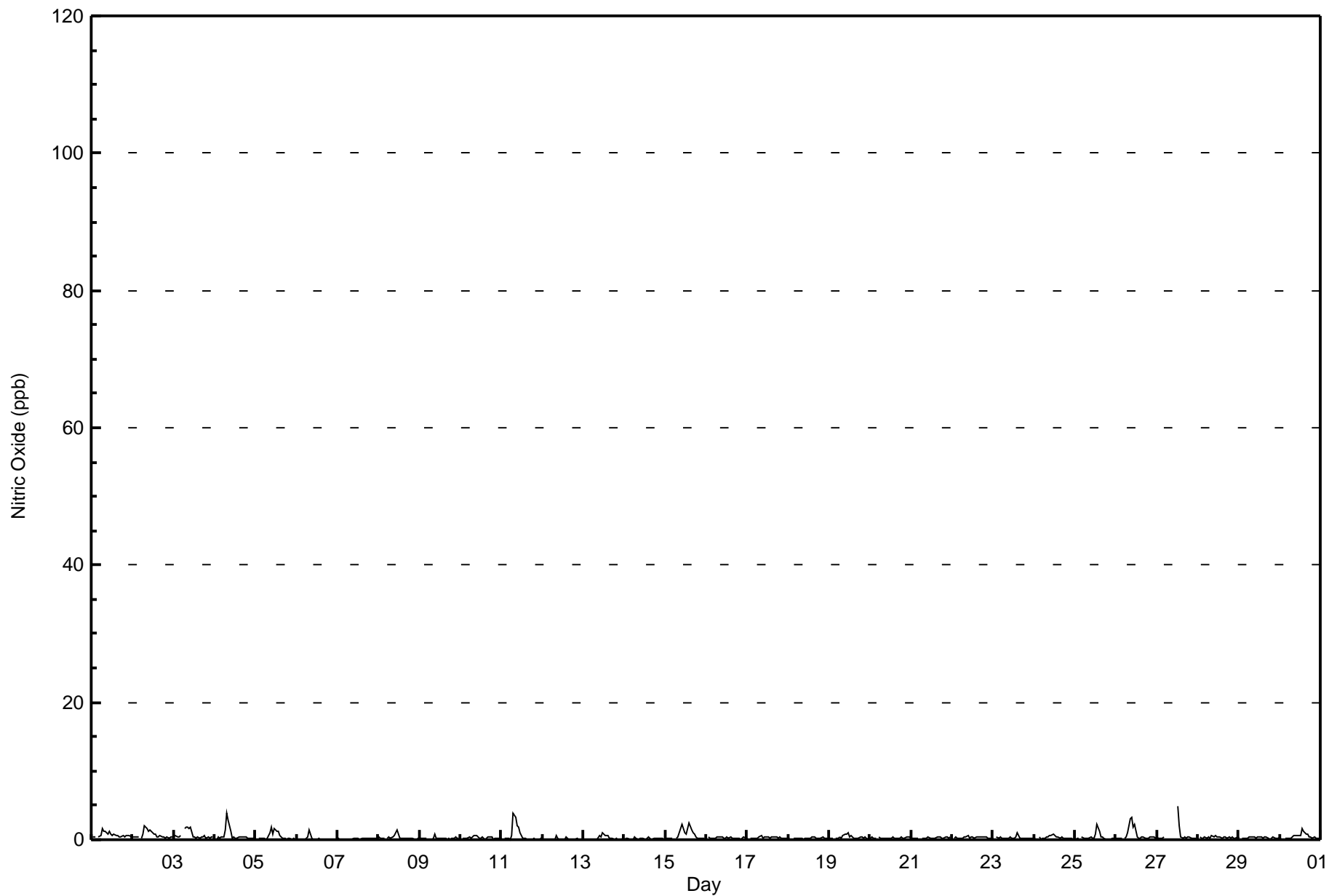
Ozone (O₃) - ppb
Wapasu - September 2017





Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |

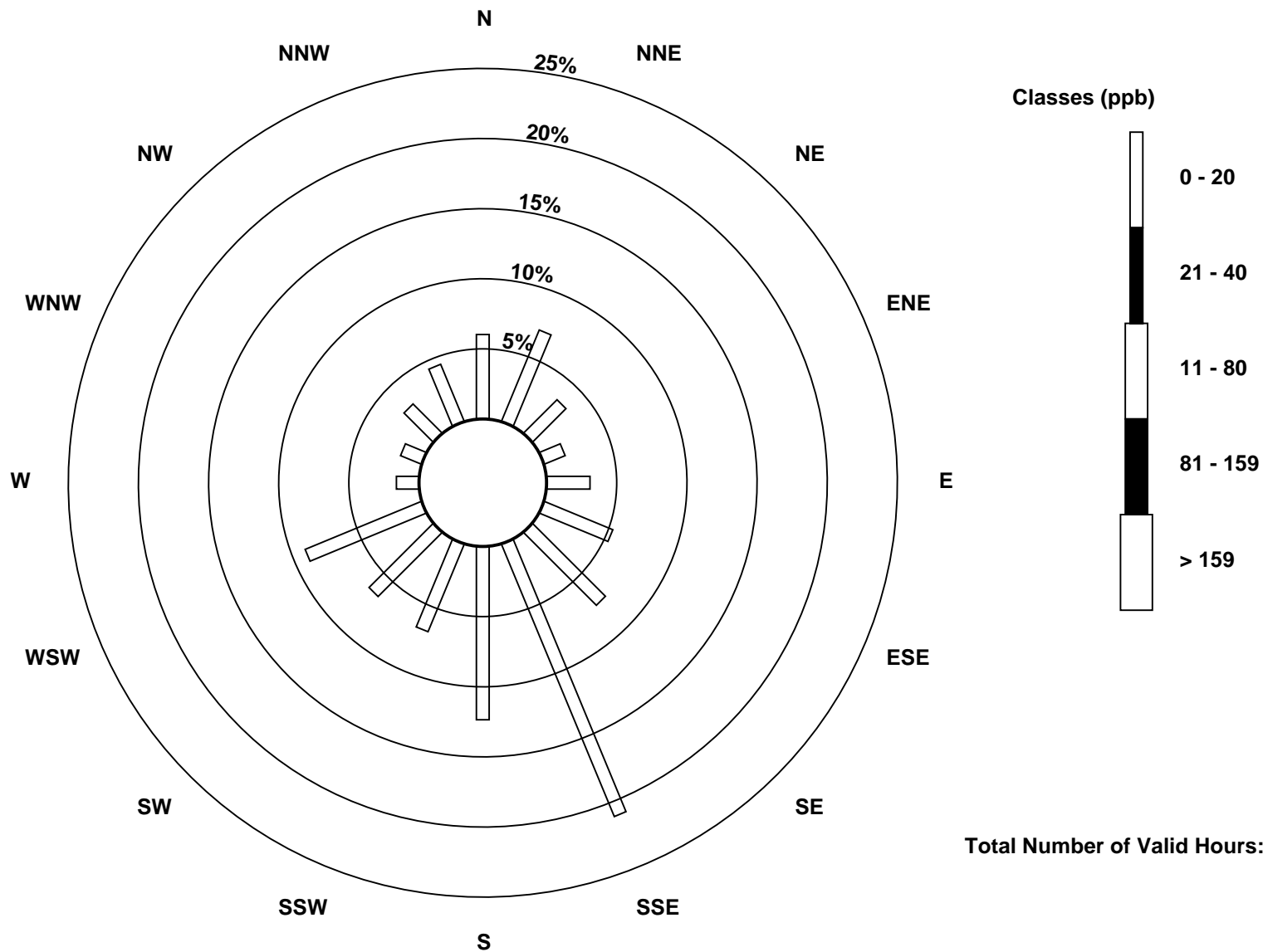
Total Number of Valid Hours: 680

Total Number of Hours: 720

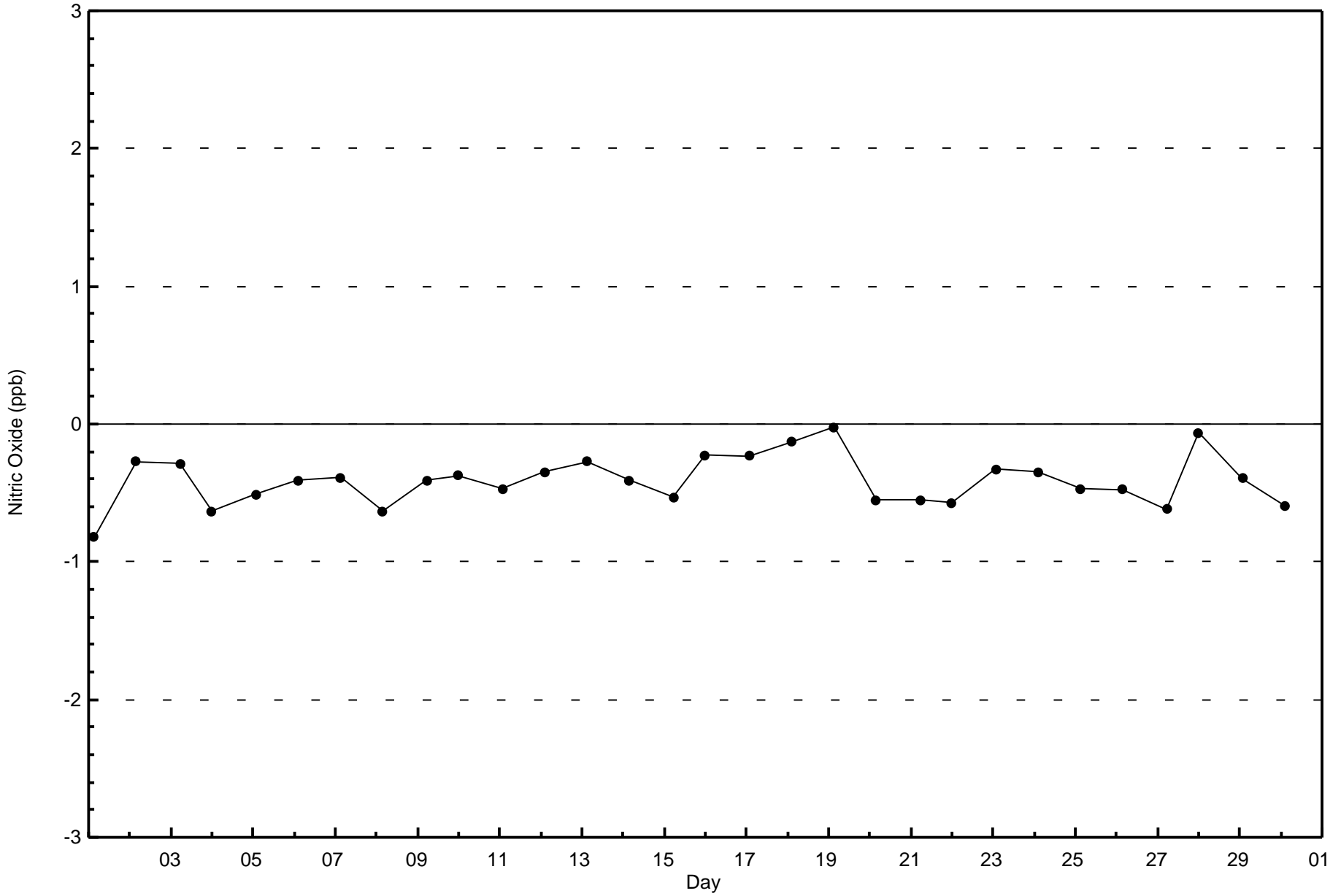


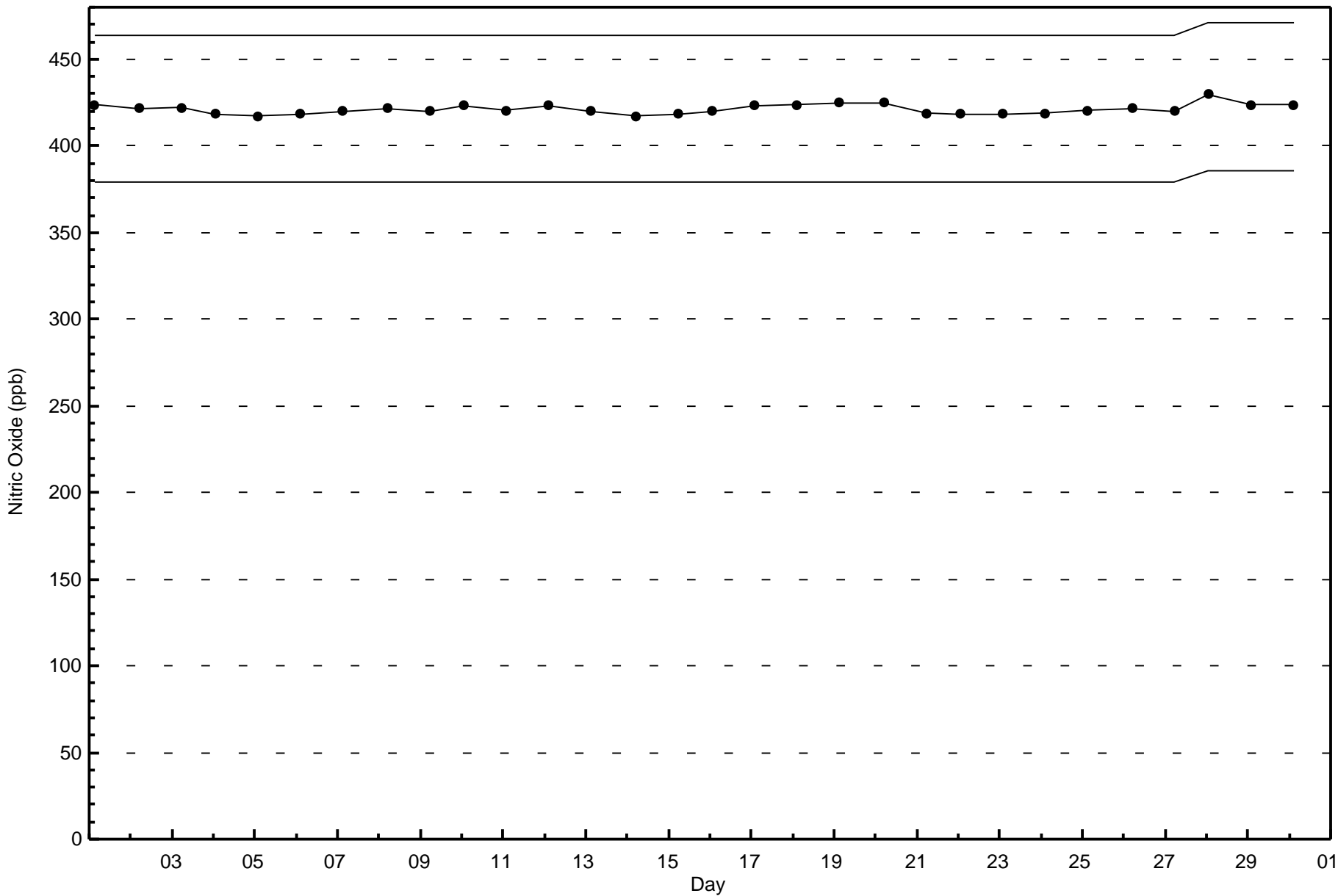
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 680







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Wapasu - September 2017

| | | | | |
|--|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 11 ppb on Sep 26 00:00 | Maximum Daily Average: 3.3 ppb on Sep 26 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 1 13:00 | Minimum Daily Average: 0.1 ppb on Sep 20 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 2.1 ppb at hour 7 | Minimum Diurnal Average: 1.0 ppb at hour 16 | | Hours of Calibration: | 35 |
| Monthly Average: 1.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 8 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 6 | 5 | 3 | Z | 6 | 6 | 9 | 3 | 2 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 2 | 2.3 | 9 |
| 2-Sep | 7 | 7 | 3 | 6 | Z | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 3 | 2 | 4 | 5 | 2.5 | 7 |
| 3-Sep | 2 | 1 | 3 | 2 | 2 | Z | 7 | 4 | 3 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 7 | 2 | 6 | 2.2 | 7 |
| 4-Sep | Z | 1 | 0 | 1 | 2 | 2 | 1 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.8 | 4 |
| 5-Sep | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 2 | 4 | 4 | 4 | 3 | 3 | 2 | 3 | 4 | 3 | 2 | 5 | 4 | 4 | 2.5 | 5 |
| 6-Sep | 4 | 4 | Z | 5 | 4 | 3 | 2 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.8 | 5 |
| 7-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 |
| 8-Sep | 1 | 1 | 2 | 2 | Z | 1 | 1 | 2 | 4 | 6 | 6 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 1.9 | 9 |
| 9-Sep | 1 | 1 | 0 | 0 | 0 | Z | 2 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 2 | 1 | 1 | 0.8 | 4 |
| 10-Sep | Z | 3 | 4 | 4 | 4 | 4 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 2 | 2 | 7 | 0 | 0 | 3 | 3 | 5 | 2.2 | 7 |
| 11-Sep | 5 | Z | 5 | 7 | 5 | 5 | 4 | 8 | 8 | 7 | 7 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 3 | 3.3 | 8 |
| 12-Sep | 3 | 4 | Z | 1 | 1 | 1 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.9 | 4 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 4 | 4 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1.3 | 4 |
| 14-Sep | 1 | 1 | 1 | 1 | Z | 1 | 4 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 0 | 0.8 | 4 |
| 15-Sep | 1 | 1 | 1 | 0 | 1 | Z | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 3 | 5 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 1.6 | 5 |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 17-Sep | 1 | Z | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 18-Sep | 0 | 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-Sep | 0 | 0 | 1 | Z | 8 | 9 | 9 | 0 | 4 | 4 | 2 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1.9 | 9 |
| 20-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 4 | 5 | 6 | 4 | 1.6 | 6 |
| 22-Sep | Z | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1.6 | 3 |
| 23-Sep | 1 | Z | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 3 |
| 24-Sep | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1.4 | 2 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 5 | 8 | 11 | 2.5 | 11 |
| 26-Sep | 10 | 8 | 5 | 6 | Z | 6 | 5 | 3 | 5 | 5 | 4 | 5 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3.3 | 10 |
| 27-Sep | 1 | 2 | 6 | 9 | 6 | Z | 3 | C | C | C | C | C | 7 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2.2 | 9 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.4 | 1 |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 4 | 3 | 3 | 2 | 0 | 0 | 0 | 1.1 | 4 |
| 30-Sep | 1 | 1 | Z | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 6 | 5 | 5 | 6 | 5 | 3 | 3 | 5 | 4 | 1 | 0 | 2.4 | 6 |

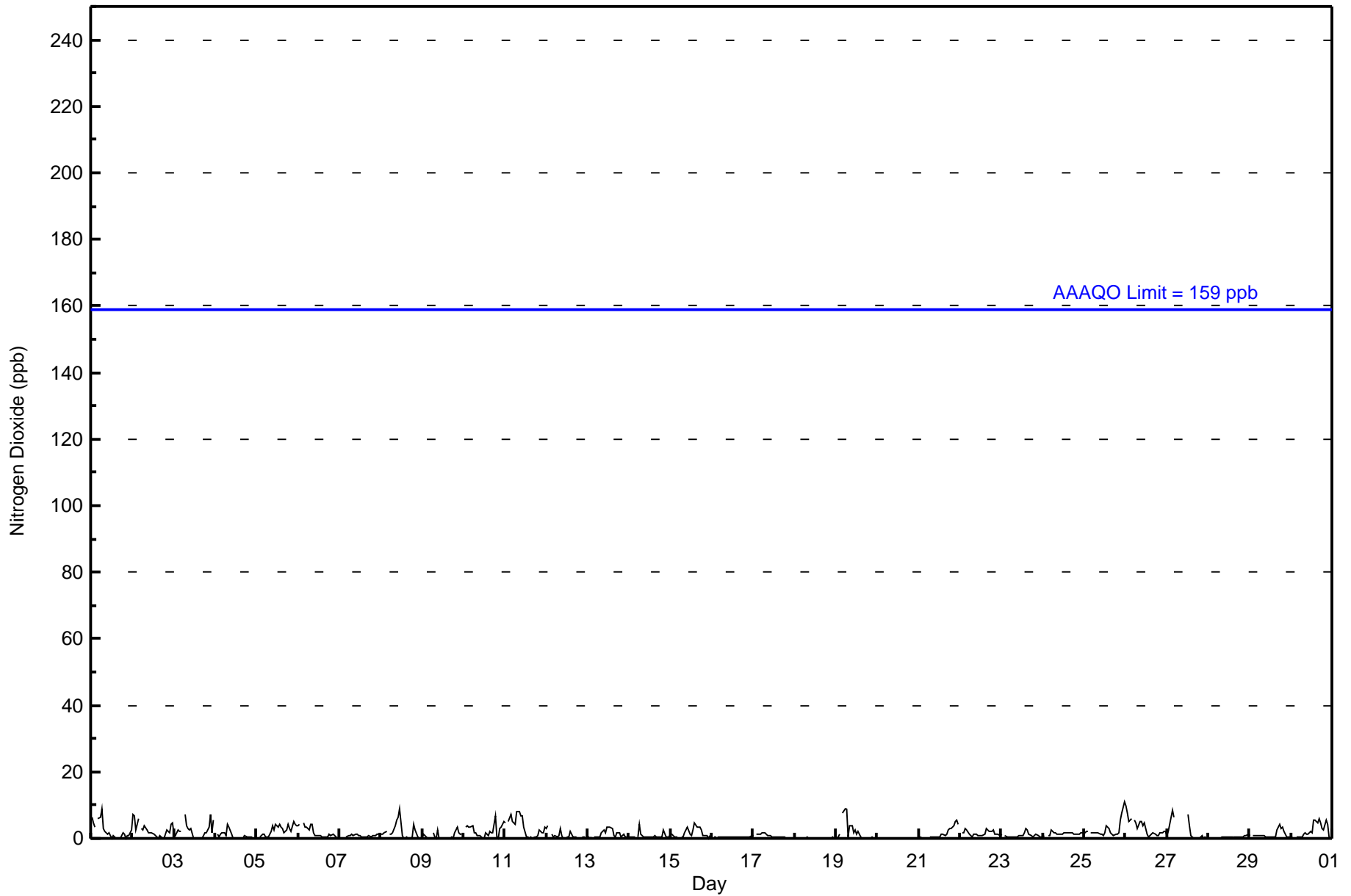
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.9 | 1.8 | 1.6 | 2.1 | 1.9 | 2.1 | 2.1 | 1.7 | 1.9 | 1.8 | 1.5 | 1.4 | 1.1 | 1.3 | 1.2 | 1.0 | 1.0 | 1.1 | 1.3 | 1.2 | 1.5 | 1.6 | 1.4 | 1.8 | Diurnal Average | |
| 10 | 8 | 6 | 9 | 8 | 9 | 9 | 8 | 8 | 7 | 7 | 9 | 7 | 6 | 5 | 5 | 6 | 5 | 7 | 4 | 5 | 7 | 8 | 11 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wapasu - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |

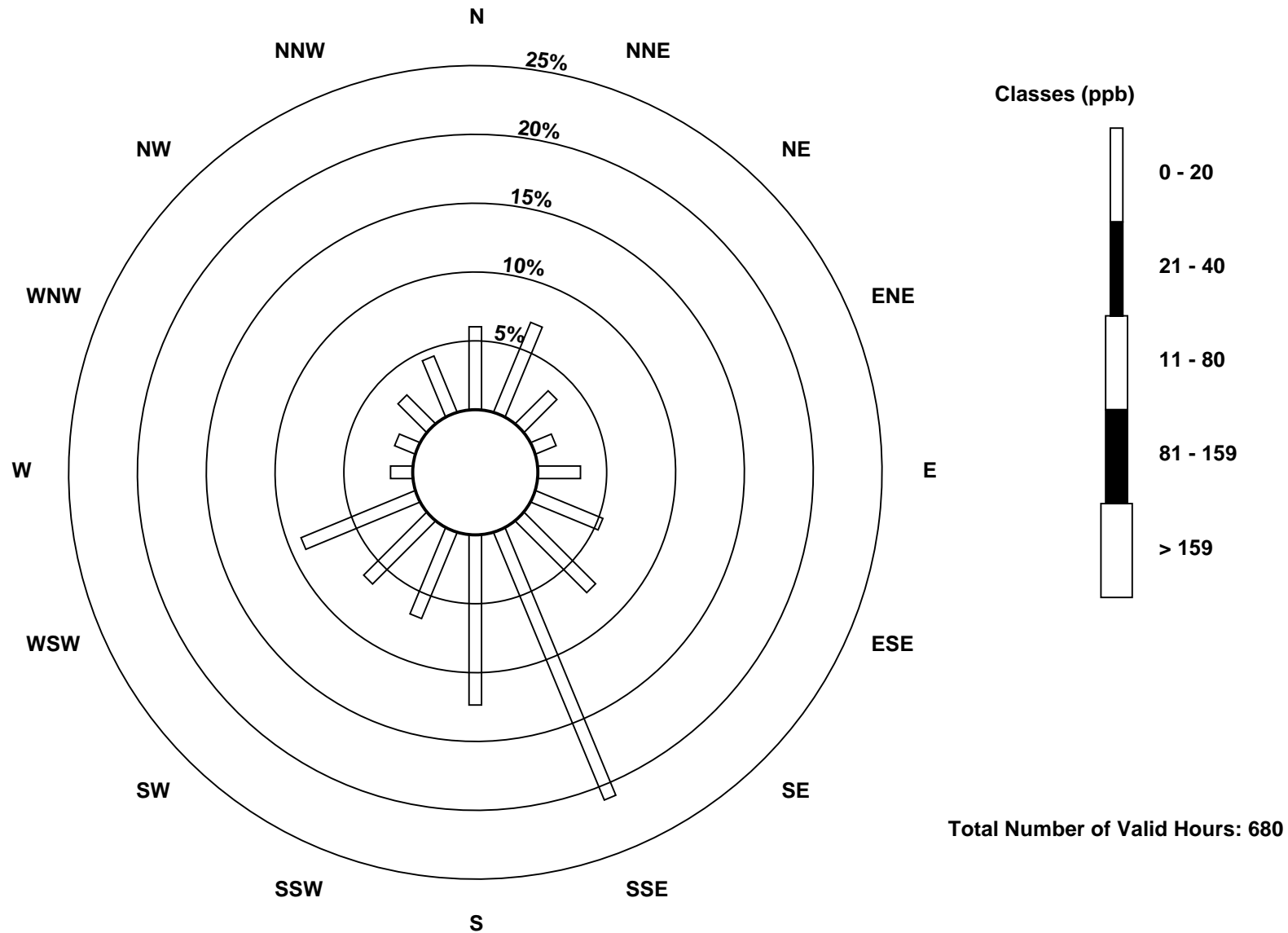
Total Number of Valid Hours: 680

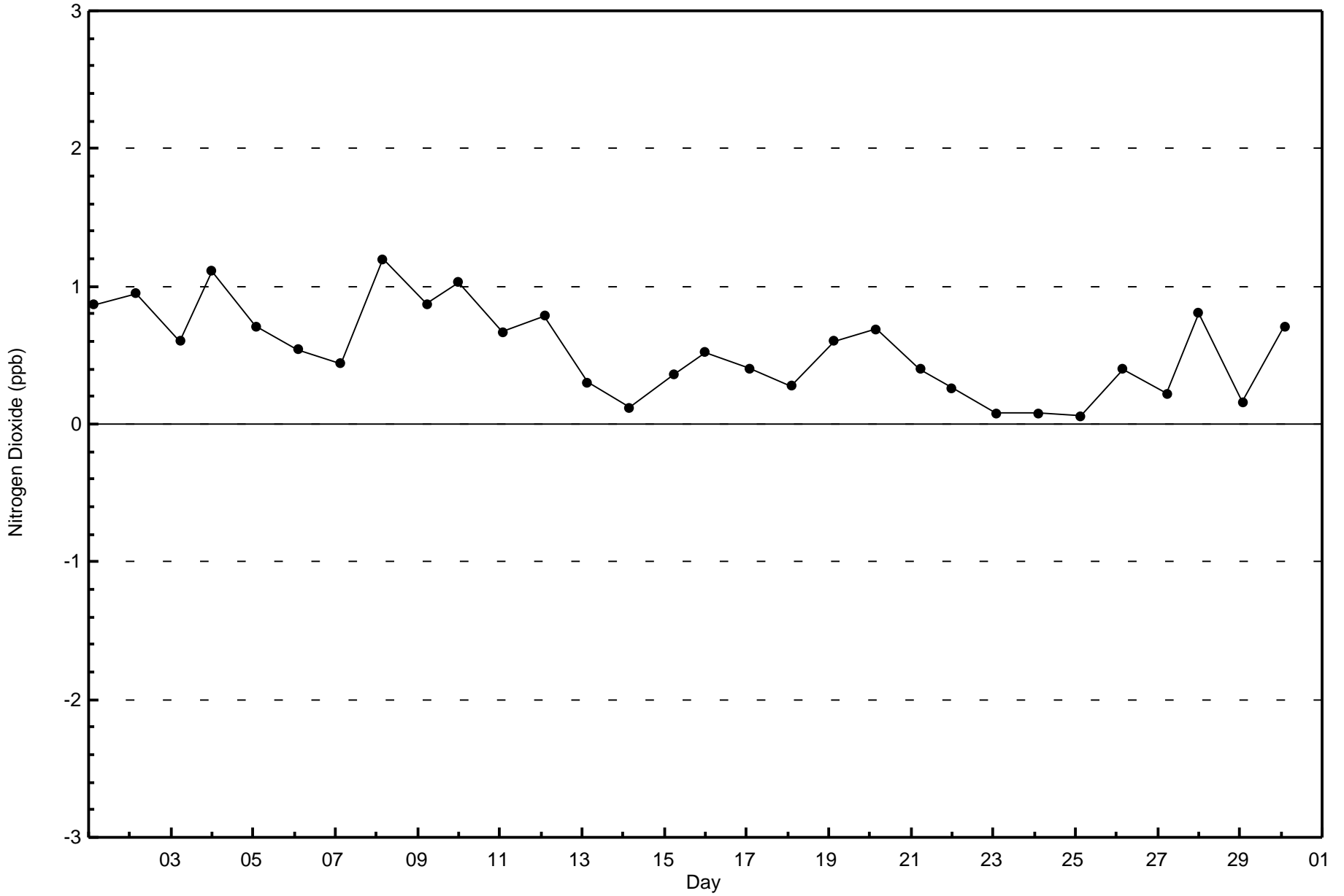
Total Number of Hours: 720

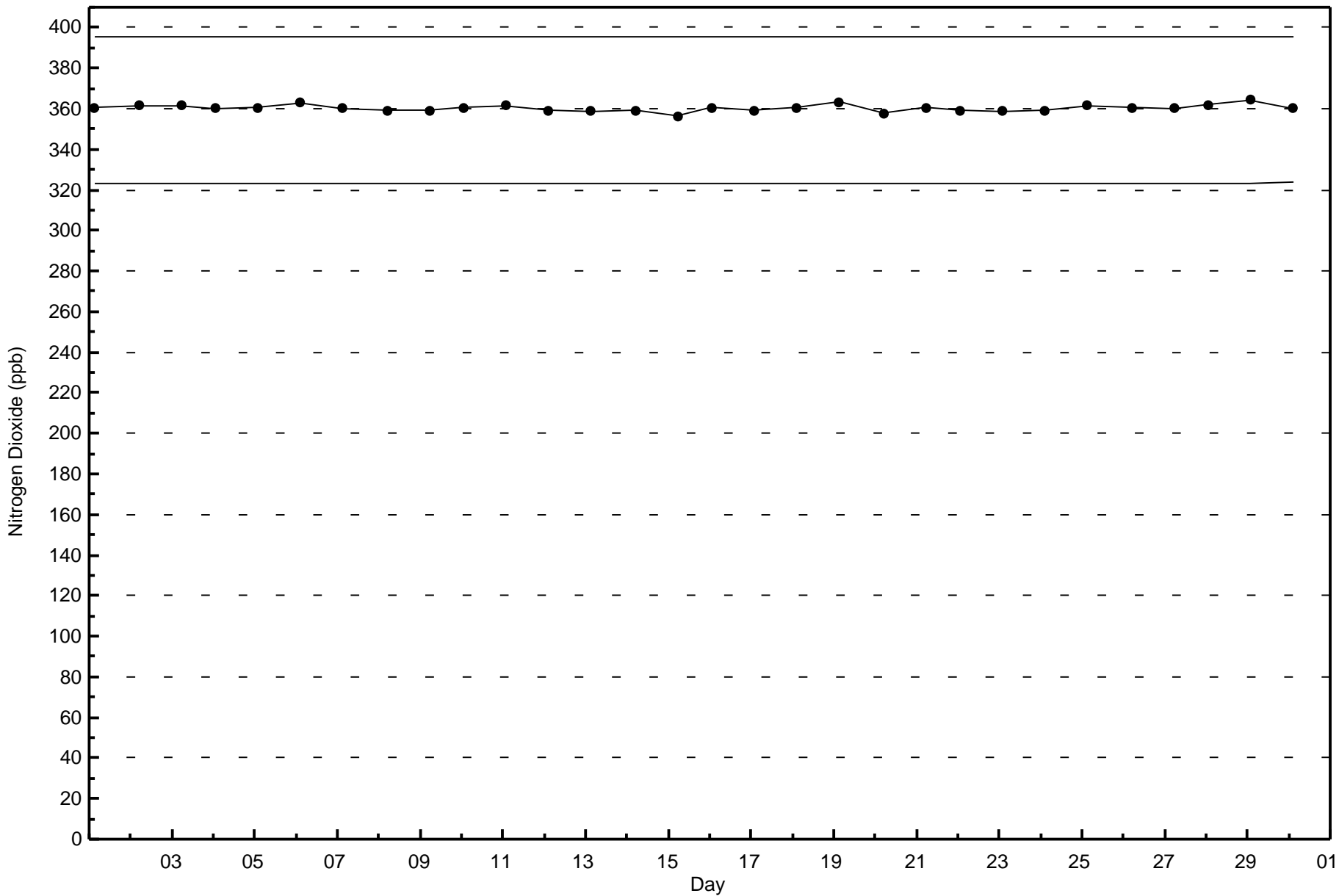


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Wapasu (AMS 17)









Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2017

| | | |
|--|---|---------------------------------|
| Maximum Value: 12 ppb on Sep 27 13:00 | Maximum Daily Average: 4.1 ppb on Sep 26 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 9 19:00 | Minimum Daily Average: 0.3 ppb on Sep 18 | Hours of Data: 685 |
| Maximum Diurnal Average: 2.7 ppb at hour 9 | Minimum Diurnal Average: 1.3 ppb at hour 17 | Hours of Missing Data: 35 |
| Monthly Average: 1.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 5 P ₉₉ = 10 | Hours of Calibration: 35 |
| | | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 7 | 5 | 4 | Z | 6 | 7 | 11 | 4 | 3 | 2 | 3 | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 2 | 2 | 1 | 1 | 1 | 3 | 2.9 | 11 |
| 2-Sep | 7 | 7 | 3 | 7 | Z | 3 | 3 | 6 | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 3 | 2 | 4 | 5 | 3.2 | 7 |
| 3-Sep | 2 | 1 | 3 | 2 | 3 | Z | 9 | 6 | 5 | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 7 | 2 | 6 | 2.9 | 9 |
| 4-Sep | Z | 1 | 1 | 1 | 2 | 2 | 2 | 8 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.5 | 8 |
| 5-Sep | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 3 | 6 | 3 | 6 | 5 | 6 | 4 | 4 | 2 | 3 | 4 | 3 | 2 | 5 | 4 | 4 | 3.0 | 6 |
| 6-Sep | 4 | 4 | Z | 5 | 4 | 3 | 3 | 6 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 2.0 | 6 |
| 7-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 |
| 8-Sep | 2 | 2 | 2 | 2 | Z | 1 | 1 | 2 | 4 | 6 | 7 | 11 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 5 | 3 | 0 | 0 | 0 | 2.3 | 11 |
| 9-Sep | 1 | 2 | 1 | 0 | 0 | Z | 2 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 4 | 2 | 1 | 2 | 1.0 | 4 |
| 10-Sep | Z | 3 | 4 | 4 | 4 | 4 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 2 | 1 | 2 | 2 | 2 | 7 | 0 | 0 | 3 | 3 | 5 | 2.5 | 7 |
| 11-Sep | 5 | Z | 5 | 7 | 5 | 5 | 5 | 12 | 11 | 9 | 8 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 3 | 3.9 | 12 |
| 12-Sep | 3 | 4 | Z | 1 | 1 | 1 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1.0 | 4 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 5 | 4 | 4 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.6 | 5 |
| 14-Sep | 1 | 1 | 1 | 1 | Z | 1 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 0 | 0.9 | 5 |
| 15-Sep | 1 | 2 | 1 | 1 | 1 | Z | 1 | 1 | 3 | 4 | 6 | 2 | 2 | 4 | 7 | 5 | 4 | 4 | 3 | 1 | 1 | 1 | 0 | 1 | 2.4 | 7 |
| 16-Sep | Z | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0.7 | 1 |
| 17-Sep | 1 | Z | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1.0 | 2 |
| 18-Sep | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 1 |
| 19-Sep | 0 | 1 | 2 | Z | 8 | 9 | 9 | 1 | 4 | 4 | 3 | 4 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2.3 | 9 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.3 | 1 |
| 21-Sep | 1 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 6 | 5 | 1.8 | 6 |
| 22-Sep | Z | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 2.0 | 3 |
| 23-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.2 | 4 |
| 24-Sep | 1 | 1 | Z | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1.7 | 3 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 6 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 6 | 8 | 11 | 2.9 | 11 |
| 26-Sep | 10 | 8 | 5 | 6 | Z | 6 | 5 | 4 | 8 | 8 | 6 | 7 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 4.1 | 10 |
| 27-Sep | 1 | 2 | 6 | 9 | 7 | Z | 3 | C | C | C | C | C | 12 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2.9 | 12 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 0.7 | 2 |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 5 | 3 | 3 | 2 | 1 | 0 | 1 | 1.4 | 5 |
| 30-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 7 | 7 | 6 | 7 | 5 | 3 | 3 | 6 | 5 | 1 | 0 | 2.9 | 7 |

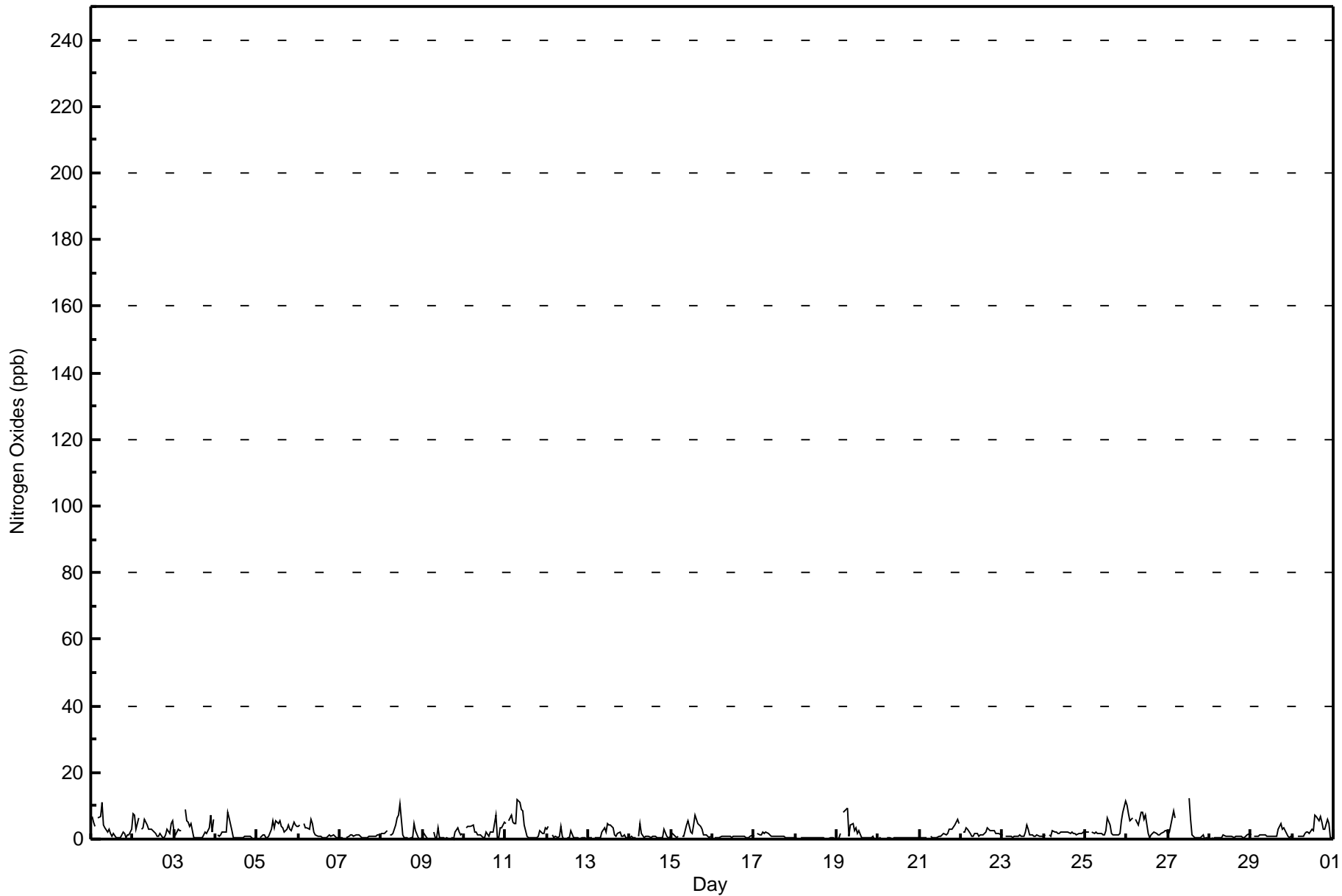
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 2.1 | 2.1 | 1.9 | 2.3 | 2.1 | 2.3 | 2.5 | 2.4 | 2.7 | 2.6 | 2.2 | 2.1 | 1.6 | 1.9 | 1.6 | 1.4 | 1.3 | 1.4 | 1.5 | 1.4 | 1.7 | 1.8 | 1.6 | 2.0 | Diurnal Average | |
| 10 | 8 | 6 | 9 | 8 | 9 | 11 | 12 | 11 | 9 | 8 | 11 | 12 | 7 | 7 | 6 | 7 | 5 | 7 | 5 | 6 | 7 | 8 | 11 | Diurnal Maximum | |

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 41 | 48 | 23 | 11 | 21 | 36 | 50 | 143 | 84 | 46 | 44 | 61 | 11 | 11 | 20 | 30 | 680 |

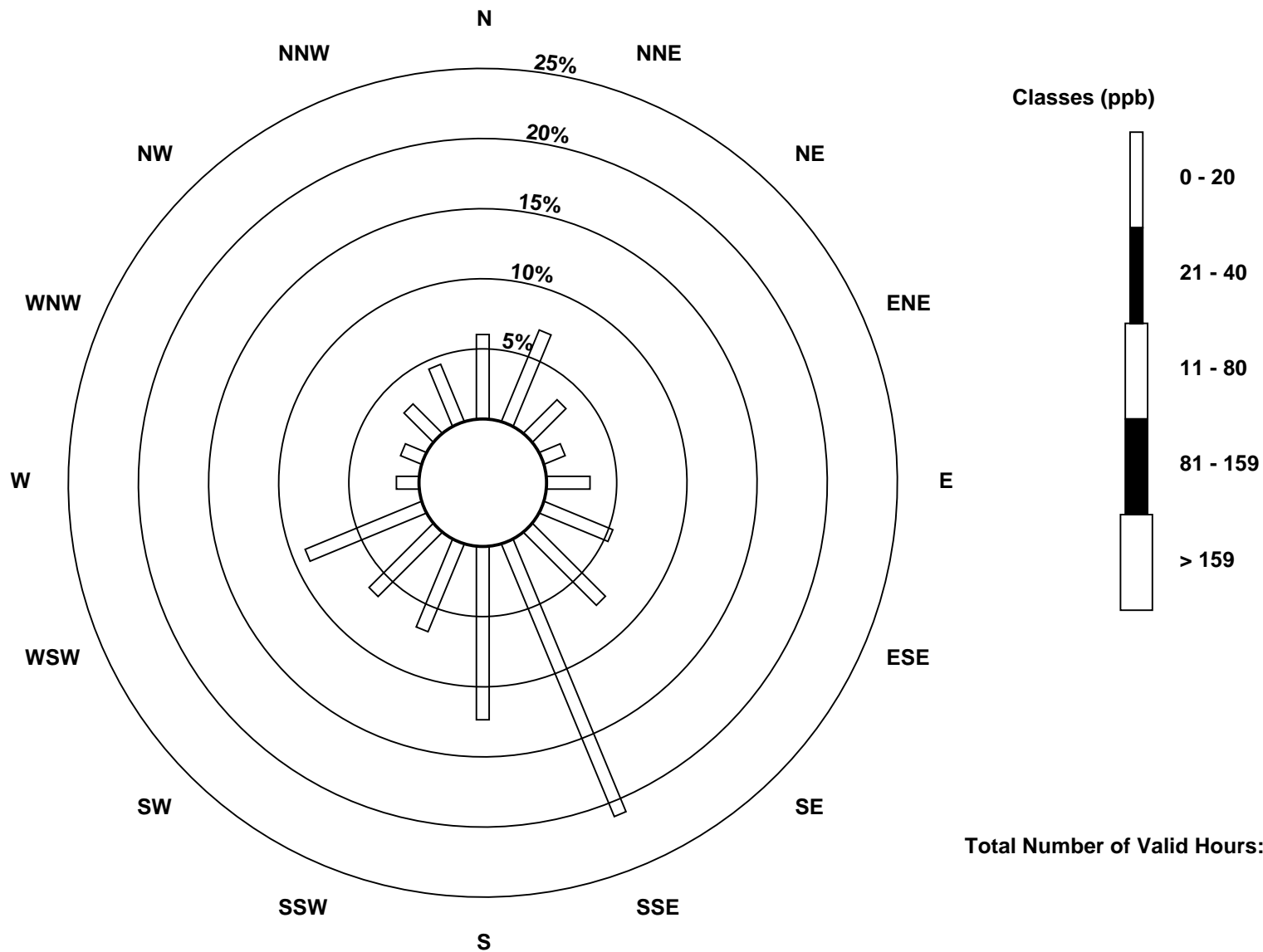
Total Number of Valid Hours: 680

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

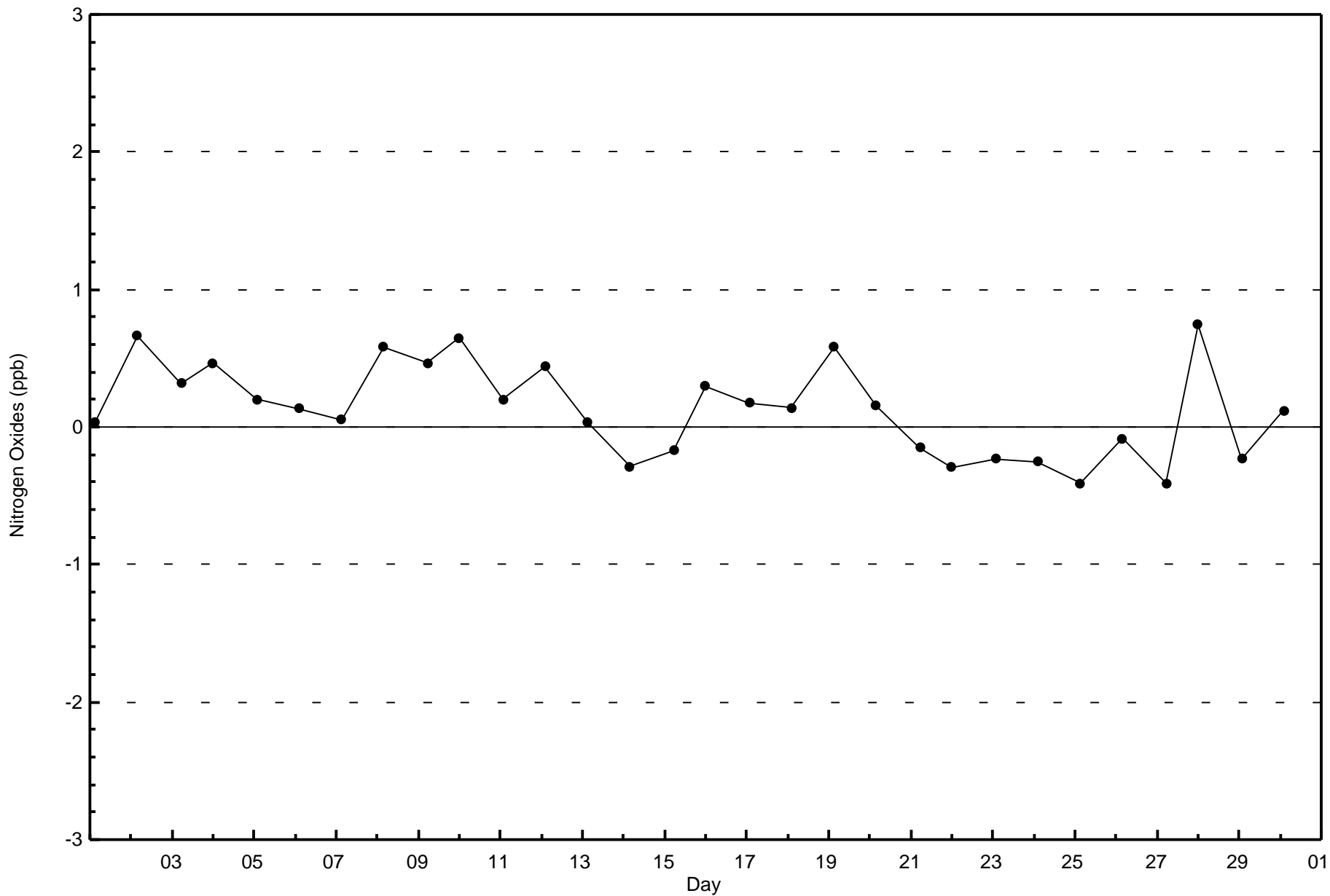
Nitrogen Oxides (NO_x) - ppb
Wapasu (AMS 17)

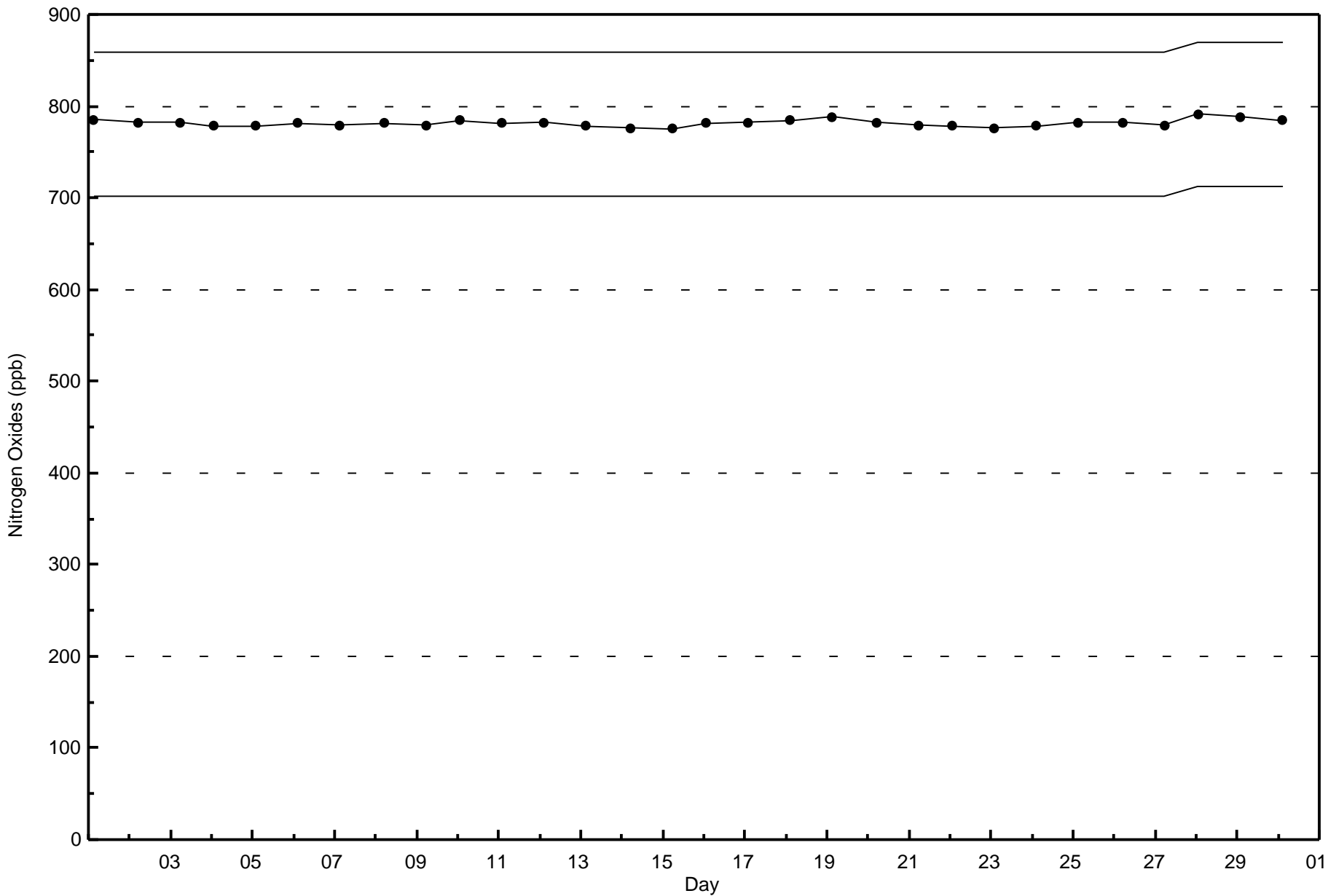




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Wapasu - September 2017

| | | | |
|---|--|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 69.0 µg/m ³ on Sep 8 11:00 | Maximum Daily Average: 19.9 µg/m ³ on Sep 19 | Hours of Data: | 695 |
| Minimum Value: 0.0 µg/m ³ on Sep 13 04:00 | Minimum Daily Average: 0.6 µg/m ³ on Sep 13 | Hours of Missing Data: | 25 |
| Maximum Diurnal Average: 7.4 µg/m ³ at hour 11 | Minimum Diurnal Average: 4.6 µg/m ³ at hour 24 | Hours of Calibration: | 1 |
| Monthly Average: 5.64 µg/m ³ | Percentiles: P ₁ = 0.2 P ₁₀ = 0.9 Q ₁ = 1.9 Median = 3.9 Q ₃ = 6.8 P ₉₀ = 11.8 P ₉₉ = 42.7 | Percent Operational Time: | 96.7 |

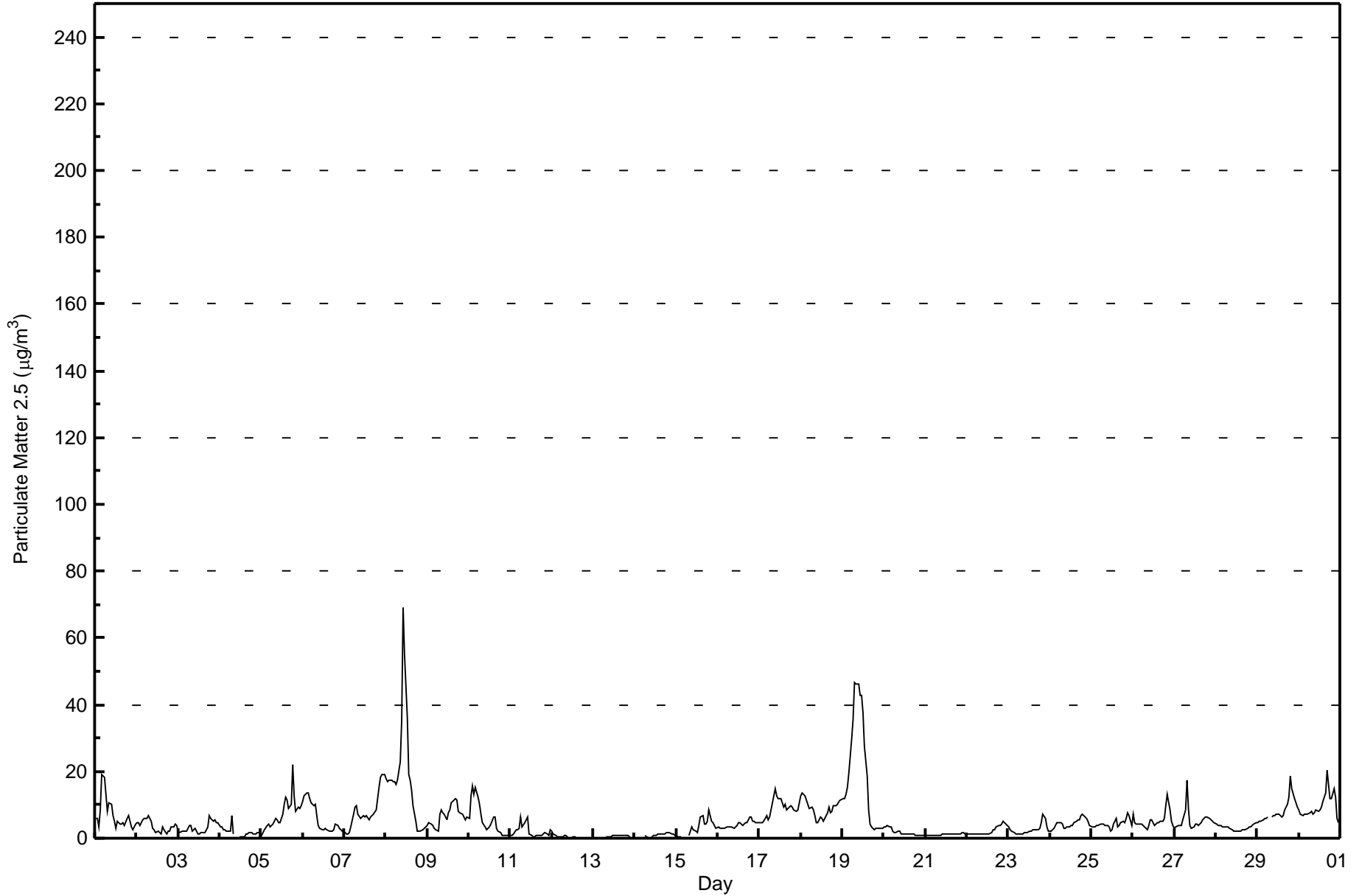
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 5.8 | 6.1 | 3.3 | 8.7 | 18.9 | 18.4 | 13.1 | 8.2 | 10.7 | 10.1 | 6.6 | 5.0 | 2.9 | 5.0 | 4.3 | 4.2 | 4.5 | 4.0 | 6.0 | 6.8 | 5.2 | 3.4 | 2.7 | 4.2 | 7.0 | 18.9 |
| 2-Sep | 4.6 | 4.5 | 3.8 | 5.7 | 5.9 | 5.7 | 6.1 | 6.8 | 5.0 | 2.8 | 2.4 | 1.9 | 2.2 | 1.6 | 1.2 | 3.3 | 2.6 | 1.2 | 2.2 | 1.9 | 3.2 | 3.4 | 4.3 | 3.7 | 3.6 | 6.8 |
| 3-Sep | 2.1 | 1.9 | 2.0 | 2.2 | 2.1 | 2.3 | 3.9 | 4.0 | 2.3 | 2.3 | 3.0 | 1.4 | 1.3 | 1.6 | 1.7 | 1.9 | 2.7 | 3.4 | 7.0 | 6.0 | 5.2 | 5.5 | 4.8 | 4.5 | 3.1 | 7.0 |
| 4-Sep | 3.6 | 3.3 | 2.7 | 2.4 | 2.1 | 1.9 | 2.2 | 6.7 | 1.4 | UO | UO | 0.1 | 0.4 | 0.4 | 0.5 | 1.1 | 1.3 | 1.6 | 1.6 | 1.2 | 1.4 | 1.3 | 1.5 | 1.5 | 1.8 | 6.7 |
| 5-Sep | 1.0 | 1.7 | 2.5 | 3.9 | 4.2 | 3.4 | 4.0 | 4.4 | 6.0 | 5.4 | 4.5 | 4.6 | 7.4 | 10.2 | 12.3 | 11.5 | 8.7 | 10.3 | 22.2 | 12.6 | 8.1 | 9.3 | 8.8 | 9.6 | 7.4 | 22.2 |
| 6-Sep | 11.0 | 12.6 | 13.6 | 13.4 | 11.8 | 10.6 | 9.6 | 10.0 | 6.7 | 3.7 | 2.9 | 2.6 | 2.7 | 2.8 | 2.4 | 2.2 | 2.2 | 2.1 | 2.4 | 4.2 | 3.9 | 3.0 | 2.4 | 2.1 | 5.9 | 13.6 |
| 7-Sep | 1.5 | 1.3 | 1.3 | 1.7 | 3.4 | 7.3 | 9.4 | 9.6 | 7.4 | 6.1 | 6.3 | 6.9 | 6.2 | 6.7 | 5.3 | 6.4 | 6.8 | 7.1 | 8.5 | 11.9 | 15.4 | 18.1 | 19.2 | 18.9 | 8.0 | 19.2 |
| 8-Sep | 17.7 | 17.1 | 17.3 | 17.4 | 17.0 | 17.1 | 16.0 | 17.5 | 23.1 | 35.0 | 69.0 | 55.1 | 35.9 | 19.0 | 17.5 | 14.3 | 9.7 | 5.0 | 2.3 | 2.1 | 2.2 | 2.5 | 3.1 | 3.4 | 18.2 | 69.0 |
| 9-Sep | 4.0 | 4.7 | 4.4 | 3.9 | 3.0 | 2.4 | 2.2 | 7.0 | 8.5 | 7.7 | 7.3 | 5.3 | 7.8 | 8.3 | 10.5 | 11.4 | 11.7 | 11.3 | 8.1 | 7.5 | 7.4 | 6.3 | 5.4 | 6.2 | 6.8 | 11.7 |
| 10-Sep | 6.0 | 12.6 | 15.8 | 13.1 | 15.4 | 12.2 | 10.2 | 7.3 | 4.6 | 3.2 | 2.6 | 2.8 | 3.3 | 4.1 | 6.3 | 6.2 | 3.1 | 2.1 | 1.7 | 0.8 | 0.6 | 0.9 | 0.8 | 0.9 | 5.7 | 15.8 |
| 11-Sep | 0.9 | 0.8 | 1.1 | 2.6 | 2.5 | 2.8 | 6.5 | 3.5 | 4.5 | 5.4 | 6.3 | 1.3 | 0.8 | 0.5 | 0.3 | 0.7 | 0.9 | 0.9 | 0.8 | 1.2 | 1.7 | 1.1 | 1.0 | 2.5 | 2.1 | 6.5 |
| 12-Sep | 2.3 | 1.4 | 0.6 | 0.3 | 0.3 | 0.6 | 0.6 | 0.8 | 0.8 | 0.4 | 0.2 | 0.2 | 0.6 | 0.6 | 0.4 | UO | UO | UO | UO | UO | UO | UO | 0.1 | 0.2 | -- | 2.3 |
| 13-Sep | 0.3 | UO | UO | 0.0 | UO | UO | UO | 0.2 | 0.5 | 0.6 | 0.6 | 1.0 | 1.0 | 1.0 | 0.9 | 0.7 | 0.8 | 1.0 | 0.9 | 0.8 | 0.7 | 0.4 | 0.2 | UO | 0.6 | 1.0 |
| 14-Sep | UO | UO | UO | UO | UO | UO | 0.8 | 0.4 | 0.2 | 0.1 | 0.4 | 0.8 | 0.9 | 1.1 | 1.3 | 1.5 | 1.4 | 1.5 | 1.6 | 1.5 | 1.7 | 1.3 | 1.2 | 1.0 | 1.0 | 1.7 |
| 15-Sep | 0.8 | 0.5 | 0.3 | 0.1 | UO | UO | UO | 0.7 | 2.1 | 3.4 | 2.4 | 2.2 | 1.9 | 3.8 | 6.2 | 6.8 | 4.0 | 4.1 | 5.2 | 8.6 | 5.2 | 4.8 | 3.9 | 3.2 | 3.3 | 8.6 |
| 16-Sep | 3.5 | 3.1 | 3.0 | 3.1 | 3.2 | 3.3 | 3.2 | 3.6 | 3.3 | 2.9 | 3.5 | 3.9 | 4.5 | 4.7 | 4.0 | 4.3 | 4.6 | 4.9 | 6.3 | 6.3 | 5.3 | 5.0 | 4.6 | 4.5 | 4.1 | 6.3 |
| 17-Sep | 4.7 | 4.9 | 4.8 | 6.0 | 6.8 | 5.7 | 6.4 | 8.5 | 12.8 | 14.8 | 12.9 | 11.7 | 11.8 | 10.6 | 9.5 | 10.0 | 8.6 | 9.1 | 9.9 | 9.5 | 8.4 | 8.1 | 8.4 | 10.7 | 8.9 | 14.8 |
| 18-Sep | 12.7 | 13.5 | 12.7 | 11.4 | 10.1 | 9.1 | 9.1 | 8.6 | 6.8 | 4.6 | 4.7 | 6.2 | 5.9 | 5.3 | 6.1 | 7.5 | 9.1 | 7.5 | 8.0 | 9.6 | 9.6 | 10.1 | 10.8 | 11.3 | 8.8 | 13.5 |
| 19-Sep | 12.0 | 12.0 | 13.1 | 15.0 | 19.4 | 29.6 | 35.5 | 46.4 | 46.2 | 46.3 | 42.7 | 42.7 | 37.8 | 27.5 | 18.5 | 8.5 | 4.1 | 3.2 | 2.8 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 19.9 | 46.4 |
| 20-Sep | 3.3 | 3.3 | 3.6 | 3.5 | 3.2 | 2.1 | 1.7 | 1.7 | 1.9 | 1.9 | 1.3 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.2 | 1.1 | 1.0 | 1.0 | 1.0 | 0.9 | 0.8 | 0.8 | 1.7 | 3.6 |
| 21-Sep | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.2 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.4 | 1.5 | 1.5 | 1.4 | 1.1 | 1.5 |
| 22-Sep | 1.3 | 1.2 | 1.3 | 1.4 | 1.4 | 1.3 | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.7 | 2.4 | 2.7 | 3.3 | 3.8 | 3.9 | 4.1 | 5.1 | 4.9 | 3.6 | 2.2 | 5.1 |
| 23-Sep | 3.2 | 2.6 | 2.0 | 1.5 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.5 | 1.6 | 1.7 | 2.0 | 2.2 | 2.5 | 2.4 | 2.3 | 2.4 | 2.9 | 4.8 | 7.0 | 5.8 | 3.5 | 2.3 | 2.5 | 7.0 |
| 24-Sep | 1.9 | 2.2 | 2.9 | 3.6 | 4.8 | 4.5 | 4.5 | 4.1 | 3.1 | 3.1 | 3.4 | 3.6 | 4.0 | 3.8 | 4.8 | 5.3 | 5.5 | 5.7 | 6.6 | 7.2 | 6.3 | 5.9 | 5.0 | 3.8 | 4.4 | 7.2 |
| 25-Sep | 3.4 | 3.5 | 3.5 | 3.6 | 3.8 | 4.1 | 4.2 | 4.1 | 3.8 | 3.8 | 3.3 | 2.3 | 2.7 | 4.1 | 5.8 | 3.6 | 3.9 | 4.5 | 5.1 | 4.6 | 5.9 | 7.5 | 6.9 | 4.0 | 4.2 | 7.5 |
| 26-Sep | 7.0 | 4.5 | 4.1 | 4.4 | 4.0 | 4.4 | 3.9 | 3.2 | 2.6 | 4.0 | 5.5 | 5.3 | 3.7 | 4.1 | 4.5 | 4.6 | 5.0 | 5.2 | 6.0 | 9.9 | 13.1 | 8.6 | 5.1 | 4.0 | 5.3 | 13.1 |
| 27-Sep | 3.1 | 3.2 | 3.7 | 3.8 | 3.6 | 5.6 | 8.5 | 17.4 | 8.8 | 3.9 | 3.0 | 3.3 | 4.3 | 4.1 | 4.0 | 4.5 | 5.5 | 5.9 | 6.5 | 6.5 | 6.0 | 5.3 | 5.1 | 4.8 | 5.4 | 17.4 |
| 28-Sep | 4.3 | 3.9 | 3.8 | 3.8 | 3.3 | 3.2 | 3.3 | 3.6 | 3.2 | 2.6 | 2.2 | 2.1 | 2.3 | 2.2 | 2.1 | 2.3 | 2.7 | 2.7 | 3.1 | 3.2 | 3.5 | 3.8 | 4.1 | 4.5 | 3.2 | 4.5 |
| 29-Sep | 4.8 | 4.9 | 5.3 | 5.4 | 5.8 | 5.9 | 6.5 | C | 6.5 | 6.6 | 6.9 | 7.1 | 7.2 | 6.9 | 6.5 | 6.7 | 8.3 | 10.1 | 12.2 | 18.7 | 14.8 | 12.0 | 10.6 | 9.3 | 8.2 | 18.7 |
| 30-Sep | 8.3 | 7.3 | 6.8 | 7.2 | 7.4 | 7.3 | 7.7 | 8.1 | 7.0 | 7.8 | 8.3 | 8.2 | 8.3 | 9.5 | 11.2 | 13.8 | 20.5 | 16.0 | 11.7 | 12.0 | 14.6 | 12.1 | 5.8 | 4.5 | 9.6 | 20.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |

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



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 384 | 55.25 | 55.25 |
| 6 - 15 | 197 | 28.35 | 83.60 |
| 16 - 25 | 24 | 3.45 | 87.05 |
| 26 - 80 | 13 | 1.87 | 88.92 |
| > 81.0 | 0 | 0.00 | 88.92 |

Total Number of Valid Hours: 695

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 22 | 24 | 13 | 6 | 14 | 13 | 22 | 93 | 42 | 30 | 21 | 38 | 7 | 7 | 10 | 19 | 381 |
| 6 - 15 | 6 | 5 | 3 | 2 | 2 | 12 | 23 | 54 | 29 | 16 | 22 | 11 | 3 | 1 | 3 | 5 | 197 |
| 16 - 25 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 2 | 12 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 24 |
| 26 - 80 | 1 | 1 | 0 | 1 | 2 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 13 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 31 | 16 | 9 | 20 | 32 | 46 | 149 | 84 | 48 | 44 | 50 | 10 | 8 | 13 | 25 | 615 |

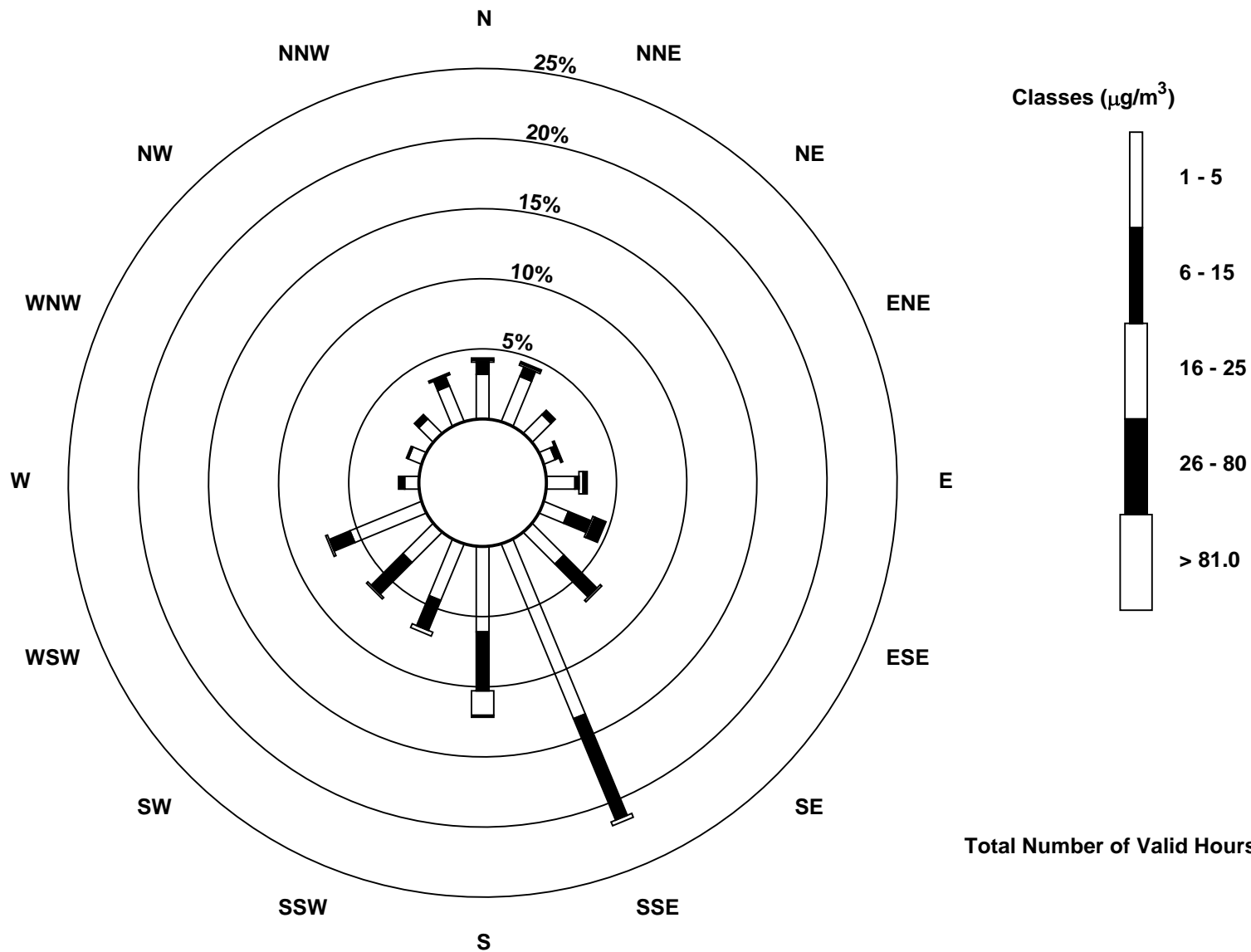
Total Number of Valid Hours: 690

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu (AMS 17)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

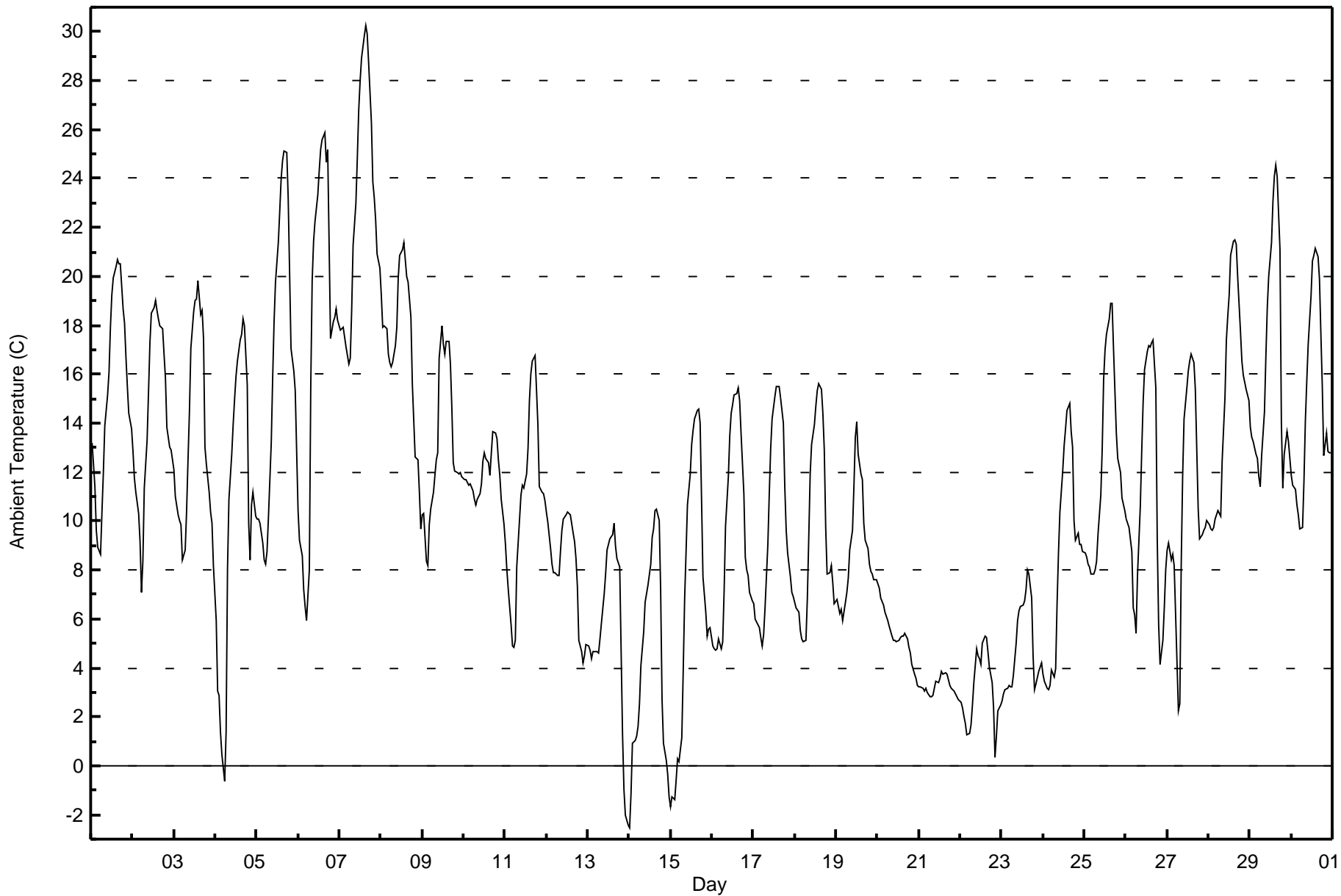
Wapasu - September 2017

| Maximum Value: 30.2 C on Sep 7 16:00 | | Maximum Daily Average: 22.9 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -2.6 C on Sep 14 01:00 | | Minimum Daily Average: 3.0 C on Sep 22 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.0 C at hour 16 | | Minimum Diurnal Average: 6.8 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.00 C | | Percentiles: P ₁ = -1.2 P ₁₀ = 3.3 Q ₁ = 6.4 Median = 10.4 Q ₃ = 15.3 P ₉₀ = 19.0 P ₉₉ = 25.9 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 13.2 | 12.3 | 11.4 | 9.6 | 8.9 | 8.6 | 10.3 | 12.0 | 13.9 | 15.2 | 16.1 | 17.9 | 19.3 | 19.9 | 20.4 | 20.7 | 20.5 | 20.5 | 18.7 | 18.1 | 16.7 | 15.5 | 14.4 | 13.8 | 15.3 | 20.7 |
| 2-Sep | 12.9 | 11.8 | 11.2 | 10.3 | 9.2 | 7.1 | 8.4 | 11.3 | 13.3 | 15.3 | 17.3 | 18.5 | 18.7 | 19.0 | 18.6 | 18.3 | 18.0 | 17.9 | 16.8 | 15.8 | 13.8 | 13.0 | 12.9 | 12.5 | 14.2 | 19.0 |
| 3-Sep | 12.1 | 11.0 | 10.3 | 10.0 | 9.8 | 8.4 | 8.8 | 10.5 | 12.5 | 14.5 | 17.0 | 18.6 | 19.0 | 19.1 | 19.8 | 18.4 | 18.6 | 17.5 | 13.0 | 12.3 | 11.2 | 10.4 | 9.9 | 8.2 | 13.4 | 19.8 |
| 4-Sep | 5.9 | 3.1 | 2.9 | 1.4 | 0.4 | -0.6 | 1.4 | 8.1 | 10.9 | 12.7 | 14.0 | 15.0 | 15.9 | 16.6 | 17.4 | 17.6 | 18.3 | 18.0 | 15.6 | 9.9 | 8.4 | 10.7 | 11.2 | 10.2 | 10.2 | 18.3 |
| 5-Sep | 10.1 | 10.1 | 9.9 | 9.1 | 8.4 | 8.2 | 8.8 | 10.1 | 13.2 | 15.8 | 18.1 | 19.8 | 21.4 | 22.6 | 24.0 | 24.7 | 25.1 | 25.0 | 23.2 | 20.2 | 17.0 | 16.1 | 15.3 | 12.8 | 16.2 | 25.1 |
| 6-Sep | 10.5 | 9.2 | 8.6 | 7.2 | 6.5 | 6.0 | 8.0 | 15.5 | 19.8 | 21.4 | 22.2 | 23.3 | 24.3 | 25.2 | 25.6 | 25.9 | 24.7 | 25.2 | 21.4 | 17.4 | 18.2 | 18.3 | 18.7 | 18.2 | 17.6 | 25.9 |
| 7-Sep | 17.8 | 17.9 | 17.9 | 17.5 | 17.1 | 16.4 | 16.6 | 18.6 | 21.3 | 23.0 | 24.8 | 26.8 | 28.0 | 28.9 | 29.9 | 30.2 | 29.9 | 28.8 | 26.3 | 23.8 | 23.2 | 22.3 | 20.9 | 20.4 | 22.9 | 30.2 |
| 8-Sep | 19.2 | 17.9 | 18.0 | 17.8 | 16.8 | 16.5 | 16.3 | 16.5 | 17.2 | 17.9 | 19.9 | 20.9 | 21.1 | 21.4 | 20.7 | 20.0 | 19.8 | 18.3 | 15.6 | 14.1 | 12.6 | 12.5 | 11.2 | 9.7 | 17.2 | 21.4 |
| 9-Sep | 10.2 | 10.3 | 8.4 | 8.2 | 9.8 | 10.5 | 11.2 | 11.9 | 12.5 | 12.8 | 16.6 | 18.0 | 17.2 | 16.8 | 17.3 | 17.3 | 16.4 | 14.6 | 12.4 | 12.1 | 12.0 | 11.9 | 12.0 | 11.8 | 13.0 | 18.0 |
| 10-Sep | 11.7 | 11.7 | 11.6 | 11.5 | 11.5 | 11.3 | 10.9 | 10.7 | 10.9 | 11.1 | 11.5 | 12.5 | 12.8 | 12.6 | 12.4 | 11.9 | 12.8 | 13.6 | 13.6 | 13.4 | 12.5 | 11.8 | 10.9 | 9.9 | 11.9 | 13.6 |
| 11-Sep | 9.1 | 8.0 | 7.2 | 5.8 | 4.9 | 4.9 | 5.1 | 8.1 | 10.1 | 11.1 | 11.5 | 11.4 | 11.9 | 13.0 | 14.9 | 16.0 | 16.6 | 16.8 | 15.4 | 13.9 | 11.4 | 11.2 | 11.1 | 10.8 | 10.8 | 16.8 |
| 12-Sep | 10.4 | 10.0 | 8.9 | 8.2 | 7.9 | 7.9 | 7.8 | 7.8 | 8.8 | 9.6 | 10.1 | 10.3 | 10.4 | 10.3 | 10.2 | 9.5 | 9.2 | 8.5 | 7.3 | 5.1 | 4.6 | 4.2 | 4.5 | 4.9 | 8.2 | 10.4 |
| 13-Sep | 4.9 | 4.7 | 4.4 | 4.6 | 4.7 | 4.7 | 4.6 | 5.2 | 5.8 | 7.0 | 7.9 | 8.8 | 9.0 | 9.2 | 9.4 | 9.9 | 9.0 | 8.5 | 8.1 | 4.7 | 1.3 | -1.0 | -2.0 | -2.4 | 5.5 | 9.9 |
| 14-Sep | -2.6 | -1.2 | 0.9 | 1.0 | 1.2 | 1.6 | 2.5 | 4.1 | 5.5 | 6.7 | 7.0 | 7.4 | 8.3 | 9.3 | 9.7 | 10.4 | 10.5 | 10.0 | 7.2 | 2.7 | 0.9 | 0.2 | -0.3 | -1.3 | 4.2 | 10.5 |
| 15-Sep | -1.7 | -1.3 | -1.4 | -0.6 | 0.3 | 0.1 | 1.1 | 3.8 | 6.8 | 8.7 | 10.7 | 11.9 | 13.1 | 13.7 | 14.2 | 14.5 | 14.6 | 14.0 | 10.9 | 7.7 | 6.3 | 5.3 | 5.6 | 5.6 | 6.8 | 14.6 |
| 16-Sep | 4.9 | 4.8 | 4.7 | 4.8 | 5.2 | 4.8 | 5.1 | 7.2 | 9.8 | 11.8 | 13.5 | 14.4 | 14.8 | 15.1 | 15.2 | 15.4 | 14.9 | 13.6 | 11.1 | 8.5 | 8.0 | 7.7 | 7.1 | 6.8 | 9.6 | 15.4 |
| 17-Sep | 6.6 | 6.0 | 5.9 | 5.7 | 5.3 | 4.9 | 5.3 | 6.4 | 9.0 | 11.1 | 13.0 | 14.2 | 15.1 | 15.5 | 15.5 | 15.5 | 15.0 | 14.0 | 11.4 | 9.6 | 8.7 | 7.7 | 7.1 | 6.9 | 9.8 | 15.5 |
| 18-Sep | 6.7 | 6.5 | 6.3 | 5.6 | 5.2 | 5.1 | 5.1 | 6.9 | 9.4 | 11.9 | 13.2 | 14.0 | 14.7 | 15.3 | 15.6 | 15.4 | 14.4 | 12.9 | 9.7 | 7.8 | 7.9 | 8.2 | 7.5 | 6.6 | 9.7 | 15.6 |
| 19-Sep | 6.8 | 6.5 | 6.2 | 6.4 | 5.9 | 6.7 | 7.1 | 7.7 | 8.8 | 9.6 | 11.4 | 13.4 | 14.0 | 12.7 | 11.9 | 11.7 | 9.9 | 9.2 | 8.9 | 8.2 | 7.9 | 7.8 | 7.6 | 7.6 | 8.9 | 14.0 |
| 20-Sep | 7.4 | 7.2 | 6.9 | 6.6 | 6.3 | 6.1 | 5.9 | 5.7 | 5.3 | 5.1 | 5.1 | 5.1 | 5.1 | 5.3 | 5.3 | 5.3 | 5.4 | 5.2 | 4.9 | 4.6 | 4.1 | 3.8 | 3.6 | 3.3 | 5.4 | 7.4 |
| 21-Sep | 3.2 | 3.2 | 3.2 | 3.1 | 3.2 | 3.0 | 2.8 | 2.8 | 2.9 | 3.2 | 3.4 | 3.4 | 3.6 | 3.9 | 3.8 | 3.8 | 3.7 | 3.5 | 3.3 | 3.2 | 3.1 | 2.9 | 2.8 | 2.7 | 3.2 | 3.9 |
| 22-Sep | 2.6 | 2.3 | 2.0 | 1.7 | 1.3 | 1.3 | 1.7 | 2.5 | 3.4 | 4.8 | 4.5 | 4.4 | 4.1 | 5.0 | 5.3 | 5.2 | 4.6 | 4.0 | 3.4 | 2.4 | 0.3 | 1.2 | 2.2 | 2.5 | 3.0 | 5.3 |
| 23-Sep | 2.6 | 2.9 | 3.1 | 3.1 | 3.3 | 3.2 | 3.2 | 3.7 | 5.0 | 5.9 | 6.3 | 6.5 | 6.6 | 6.7 | 7.2 | 8.0 | 7.8 | 6.9 | 4.5 | 3.1 | 3.4 | 3.9 | 4.0 | 4.2 | 4.8 | 8.0 |
| 24-Sep | 3.7 | 3.5 | 3.2 | 3.1 | 3.3 | 3.9 | 3.7 | 4.0 | 6.6 | 8.7 | 10.4 | 12.0 | 13.1 | 13.8 | 14.5 | 14.8 | 13.6 | 13.0 | 10.0 | 9.2 | 9.5 | 9.0 | 9.0 | 8.8 | 8.5 | 14.8 |
| 25-Sep | 8.7 | 8.5 | 8.2 | 8.1 | 7.8 | 7.8 | 8.0 | 8.4 | 9.5 | 11.0 | 13.0 | 15.8 | 17.0 | 17.6 | 18.3 | 18.9 | 18.9 | 17.1 | 13.6 | 12.6 | 12.3 | 12.0 | 10.9 | 10.4 | 12.3 | 18.9 |
| 26-Sep | 10.1 | 9.9 | 9.7 | 8.8 | 6.4 | 6.2 | 5.4 | 7.8 | 10.6 | 12.8 | 14.9 | 16.2 | 17.0 | 17.2 | 17.1 | 17.3 | 17.4 | 15.4 | 9.3 | 5.8 | 4.2 | 5.1 | 6.5 | 8.0 | 10.8 | 17.4 |
| 27-Sep | 8.8 | 9.1 | 8.4 | 8.6 | 8.2 | 6.2 | 2.2 | 2.5 | 8.2 | 11.8 | 14.2 | 15.4 | 16.1 | 16.6 | 16.8 | 16.5 | 15.4 | 13.0 | 10.5 | 9.3 | 9.5 | 9.6 | 9.7 | 10.0 | 10.7 | 16.8 |
| 28-Sep | 9.8 | 9.7 | 9.6 | 9.7 | 10.1 | 10.4 | 10.3 | 10.2 | 12.5 | 15.1 | 17.4 | 18.4 | 19.3 | 20.8 | 21.4 | 21.5 | 21.3 | 20.0 | 17.8 | 16.5 | 15.9 | 15.7 | 15.4 | 14.9 | 15.2 | 21.5 |
| 29-Sep | 13.8 | 13.4 | 13.3 | 12.8 | 12.5 | 11.8 | 11.4 | 12.7 | 14.4 | 16.7 | 18.7 | 20.0 | 21.4 | 23.1 | 24.1 | 24.6 | 24.1 | 21.1 | 14.0 | 11.4 | 12.8 | 13.6 | 13.2 | 12.6 | 16.1 | 24.6 |
| 30-Sep | 11.9 | 11.5 | 11.3 | 10.6 | 10.2 | 9.7 | 9.7 | 11.6 | 14.1 | 15.7 | 17.2 | 19.2 | 20.6 | 20.8 | 21.2 | 20.8 | 19.9 | 17.6 | 15.5 | 12.7 | 13.6 | 12.9 | 12.8 | 12.8 | 14.7 | 21.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Wapasu - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 12 | 1.67 | 1.67 |
| 0 - 10 | 324 | 45.00 | 46.67 |
| 10 - 20 | 326 | 45.28 | 91.94 |
| > 20 | 58 | 8.06 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

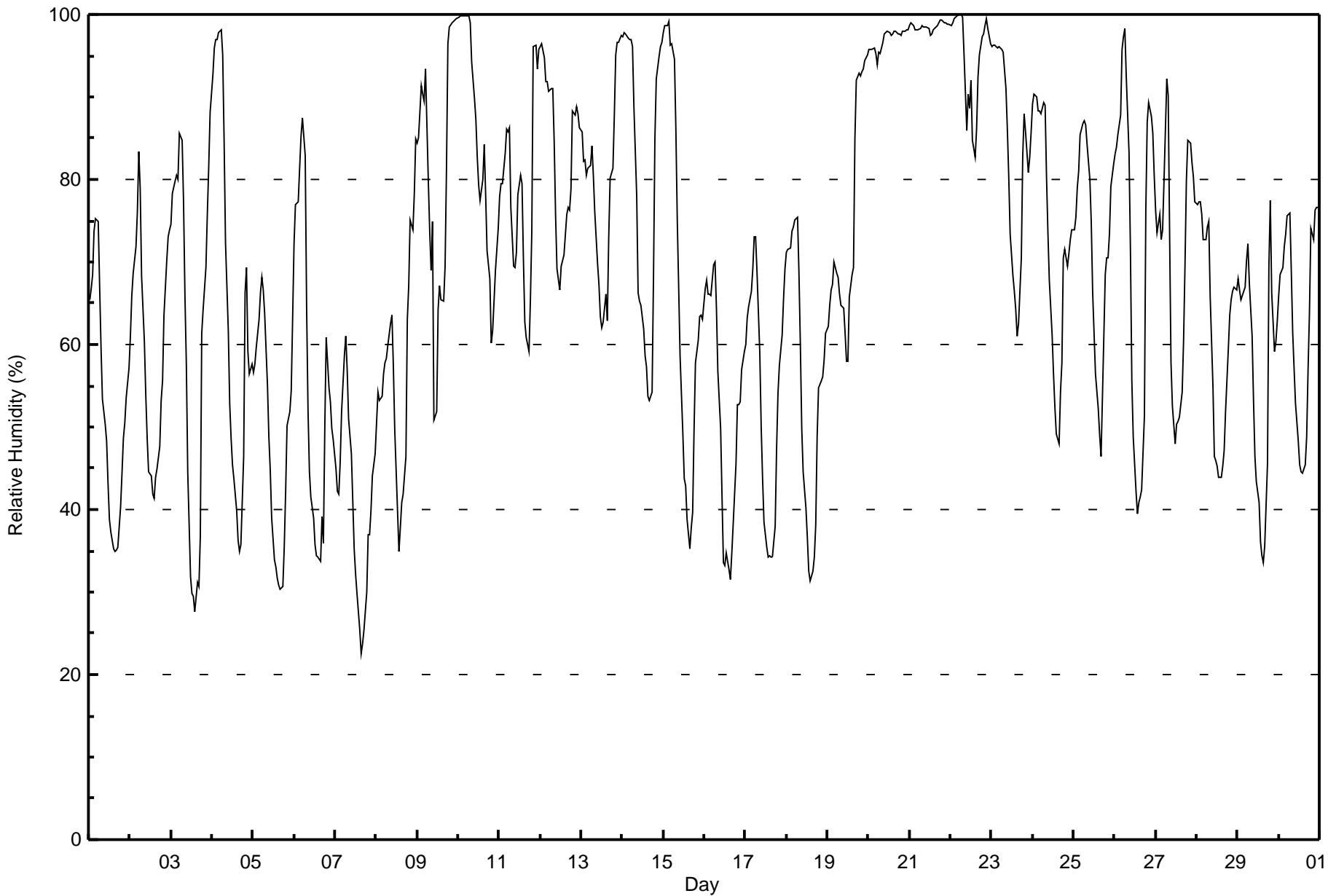
Wapasu - September 2017

| Maximum Value: 100 % on Sep 22 07:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 98.5 % on Sep 21 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|---|-------------------------------|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|--|----|----|----|----|-----|----|-----|---------------|---------------|--|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: 23 % on Sep 7 16:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 40.5 % on Sep 7 | | | | | | | | | | | | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 83.5 % at hour 6 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 51.4 % at hour 16 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 69.1 % | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 30 P ₁₀ = 40 Q ₁ = 53 Median = 69 Q ₃ = 86 P ₉₀ = 98 P ₉₉ = 100 | | | | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 65 | 67 | 68 | 74 | 75 | 75 | 67 | 60 | 53 | 50 | 48 | 43 | 39 | 37 | 35 | 35 | 35 | 35 | 40 | 44 | 49 | 51 | 54 | 57 | 52.4 | 75 | | | | | | | | | |
| 2-Sep | 61 | 66 | 69 | 72 | 76 | 83 | 79 | 68 | 60 | 54 | 49 | 45 | 44 | 42 | 41 | 44 | 45 | 48 | 53 | 56 | 64 | 70 | 73 | 74 | 59.8 | 83 | | | | | | | | | |
| 3-Sep | 75 | 78 | 80 | 81 | 80 | 86 | 85 | 77 | 66 | 58 | 45 | 32 | 30 | 30 | 28 | 31 | 31 | 37 | 61 | 64 | 69 | 76 | 82 | 88 | 61.1 | 88 | | | | | | | | | |
| 4-Sep | 93 | 96 | 97 | 97 | 98 | 98 | 95 | 85 | 72 | 62 | 53 | 49 | 45 | 44 | 40 | 36 | 35 | 36 | 47 | 66 | 69 | 59 | 56 | 58 | 66.1 | 98 | | | | | | | | | |
| 5-Sep | 57 | 58 | 60 | 63 | 66 | 68 | 67 | 64 | 55 | 49 | 45 | 39 | 34 | 33 | 32 | 31 | 30 | 31 | 35 | 42 | 50 | 52 | 54 | 63 | 49.0 | 68 | | | | | | | | | |
| 6-Sep | 72 | 77 | 77 | 81 | 85 | 87 | 83 | 64 | 52 | 45 | 41 | 39 | 36 | 34 | 34 | 34 | 39 | 36 | 50 | 61 | 55 | 53 | 50 | 48 | 55.6 | 87 | | | | | | | | | |
| 7-Sep | 45 | 42 | 42 | 46 | 52 | 59 | 61 | 57 | 51 | 47 | 41 | 35 | 32 | 30 | 25 | 23 | 24 | 25 | 30 | 37 | 37 | 40 | 44 | 47 | 40.5 | 61 | | | | | | | | | |
| 8-Sep | 51 | 54 | 53 | 54 | 57 | 58 | 58 | 60 | 62 | 63 | 57 | 50 | 40 | 35 | 38 | 41 | 42 | 46 | 63 | 67 | 75 | 74 | 78 | 85 | 56.7 | 85 | | | | | | | | | |
| 9-Sep | 84 | 85 | 91 | 90 | 90 | 93 | 80 | 74 | 69 | 75 | 51 | 52 | 64 | 67 | 65 | 65 | 70 | 81 | 96 | 98 | 99 | 99 | 99 | 100 | 80.8 | 100 | | | | | | | | | |
| 10-Sep | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 94 | 90 | 87 | 83 | 79 | 78 | 80 | 84 | 78 | 71 | 68 | 60 | 62 | 65 | 69 | 74 | 84.2 | 100 | | | | | | | | | |
| 11-Sep | 78 | 79 | 79 | 83 | 86 | 86 | 86 | 77 | 70 | 69 | 71 | 78 | 80 | 79 | 70 | 63 | 61 | 59 | 65 | 74 | 96 | 96 | 93 | 96 | 78.2 | 96 | | | | | | | | | |
| 12-Sep | 96 | 96 | 95 | 92 | 92 | 91 | 91 | 91 | 85 | 76 | 69 | 67 | 69 | 70 | 71 | 76 | 77 | 76 | 79 | 88 | 88 | 89 | 88 | 86 | 83.2 | 96 | | | | | | | | | |
| 13-Sep | 86 | 82 | 82 | 80 | 81 | 82 | 84 | 81 | 76 | 70 | 67 | 63 | 62 | 63 | 66 | 63 | 73 | 80 | 81 | 88 | 95 | 97 | 97 | 97 | 79.0 | 97 | | | | | | | | | |
| 14-Sep | 97 | 98 | 98 | 97 | 97 | 97 | 96 | 89 | 78 | 66 | 65 | 65 | 62 | 59 | 57 | 54 | 53 | 54 | 68 | 85 | 92 | 95 | 96 | 97 | 79.8 | 98 | | | | | | | | | |
| 15-Sep | 98 | 99 | 99 | 99 | 96 | 96 | 95 | 86 | 75 | 67 | 59 | 49 | 44 | 43 | 39 | 35 | 38 | 40 | 50 | 58 | 61 | 63 | 64 | 63 | 67.2 | 99 | | | | | | | | | |
| 16-Sep | 67 | 68 | 66 | 66 | 66 | 70 | 70 | 64 | 57 | 50 | 41 | 34 | 33 | 35 | 33 | 32 | 35 | 38 | 46 | 53 | 53 | 53 | 57 | 59 | 51.8 | 70 | | | | | | | | | |
| 17-Sep | 60 | 63 | 65 | 66 | 69 | 73 | 73 | 69 | 59 | 50 | 44 | 39 | 35 | 34 | 34 | 34 | 34 | 38 | 47 | 54 | 57 | 61 | 66 | 69 | 54.0 | 73 | | | | | | | | | |
| 18-Sep | 71 | 72 | 72 | 74 | 74 | 75 | 75 | 69 | 60 | 50 | 45 | 40 | 37 | 33 | 31 | 33 | 34 | 38 | 49 | 55 | 56 | 56 | 58 | 61 | 54.8 | 75 | | | | | | | | | |
| 19-Sep | 62 | 65 | 67 | 67 | 70 | 69 | 68 | 66 | 65 | 64 | 61 | 58 | 58 | 66 | 68 | 69 | 85 | 92 | 93 | 93 | 93 | 93 | 94 | 95 | 74.3 | 95 | | | | | | | | | |
| 20-Sep | 96 | 96 | 96 | 96 | 95 | 94 | 95 | 95 | 97 | 98 | 98 | 98 | 98 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 96.9 | 98 | | | | | | | | | |
| 21-Sep | 99 | 99 | 99 | 98 | 98 | 98 | 98 | 99 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98.5 | 99 | | | | | | | | | |
| 22-Sep | 99 | 99 | 99 | 100 | 100 | 100 | 100 | 100 | 95 | 86 | 90 | 89 | 92 | 85 | 83 | 86 | 92 | 95 | 97 | 98 | 99 | 100 | 98 | 97 | 94.9 | 100 | | | | | | | | | |
| 23-Sep | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 95 | 91 | 86 | 80 | 73 | 68 | 67 | 64 | 61 | 63 | 70 | 83 | 88 | 86 | 81 | 83 | 86 | 83.2 | 96 | | | | | | | | | |
| 24-Sep | 89 | 90 | 90 | 88 | 88 | 88 | 89 | 89 | 80 | 74 | 68 | 61 | 56 | 52 | 49 | 48 | 54 | 58 | 70 | 71 | 69 | 71 | 73 | 74 | 72.6 | 90 | | | | | | | | | |
| 25-Sep | 74 | 75 | 79 | 81 | 85 | 87 | 87 | 87 | 84 | 80 | 75 | 66 | 61 | 56 | 52 | 49 | 46 | 54 | 68 | 70 | 71 | 73 | 79 | 82 | 71.8 | 87 | | | | | | | | | |
| 26-Sep | 83 | 84 | 85 | 88 | 96 | 97 | 98 | 93 | 83 | 71 | 56 | 49 | 42 | 40 | 41 | 41 | 42 | 51 | 76 | 87 | 89 | 88 | 86 | 80 | 72.8 | 98 | | | | | | | | | |
| 27-Sep | 76 | 74 | 76 | 73 | 74 | 80 | 92 | 90 | 74 | 58 | 53 | 48 | 50 | 51 | 51 | 54 | 61 | 69 | 80 | 85 | 84 | 82 | 80 | 77 | 70.5 | 92 | | | | | | | | | |
| 28-Sep | 77 | 77 | 77 | 76 | 73 | 73 | 74 | 75 | 66 | 55 | 46 | 46 | 45 | 44 | 44 | 45 | 47 | 52 | 59 | 64 | 65 | 66 | 67 | 67 | 61.7 | 77 | | | | | | | | | |
| 29-Sep | 68 | 67 | 65 | 66 | 67 | 70 | 72 | 67 | 61 | 53 | 46 | 43 | 41 | 36 | 34 | 34 | 36 | 46 | 69 | 77 | 66 | 59 | 60 | 63 | 57.0 | 77 | | | | | | | | | |
| 30-Sep | 66 | 68 | 69 | 72 | 73 | 76 | 76 | 69 | 62 | 57 | 53 | 48 | 45 | 45 | 44 | 45 | 49 | 57 | 64 | 74 | 73 | 76 | 77 | 77 | 63.1 | 77 | | | | | | | | | |
| 78.0 | | | | | | | | | | | | | | | | | 79.0 | | | | | | | | | | | | | | | | | Diurnal Average | |
| 100 | | | | | | | | | | | | | | | | | 100 | | | | | | | | | | | | | | | | | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Wapasu - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Wapasu - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 75 | 10.42 | 10.42 |
| 40 - 60 | 165 | 22.92 | 33.33 |
| 60 - 80 | 241 | 33.47 | 66.81 |
| 80 - 100 | 238 | 33.06 | 99.86 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

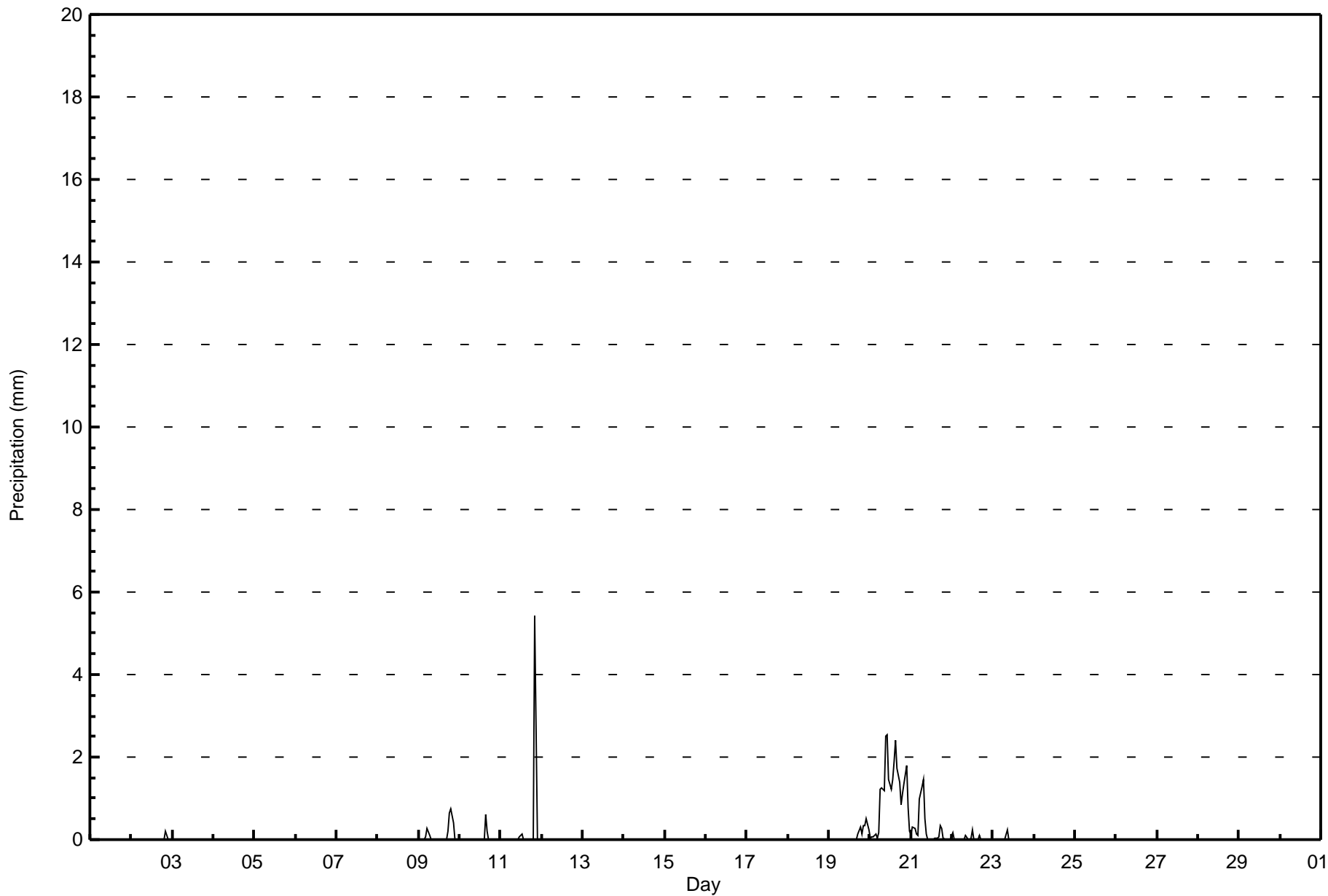
Wapasu - September 2017

| Maximum Value: 5.4 mm on Sep 11 21:00 Maximum Daily Total: 26.9 mm on Sep 20 | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | |
|--|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----|-----|-----|-----------------|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|
| Minimum Value: 0.0 mm on Sep 1 01:00 Minimum Daily Total: 0.0 mm on Sep 1 Maximum Diurnal Total: 7.7 mm at hour 21 Minimum Diurnal Total: 0.2 mm at hour 5 Monthly Total: 44.91 mm Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 3-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.6 | 0.7 | 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 | 2.4 | 0.7 |
| 10-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.6 |
| 11-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.6 | 5.4 | |
| 12-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 | 0.1 | 0.3 | 0.4 | 0.5 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.5 | |
| 20-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 1.2 | 1.3 | 1.2 | 2.5 | 2.5 | 1.5 | 1.2 | 1.5 | 1.9 | 2.4 | 1.7 | 1.4 | 0.8 | 1.1 | 1.4 | 1.8 | 0.8 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 26.9 | 2.5 |
| 21-Sep | 0.1 | 0.3 | 0.3 | 0.1 | 0.1 | 1.0 | 1.3 | 1.5 | 0.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.3 | 0.3 | 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 | 6.1 | 1.5 | |
| 22-Sep | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.2 | 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 | 0.6 | 0.2 | | |
| 23-Sep | 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 | 0.0 | 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 | | |
| 24-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 28-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Wapasu - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

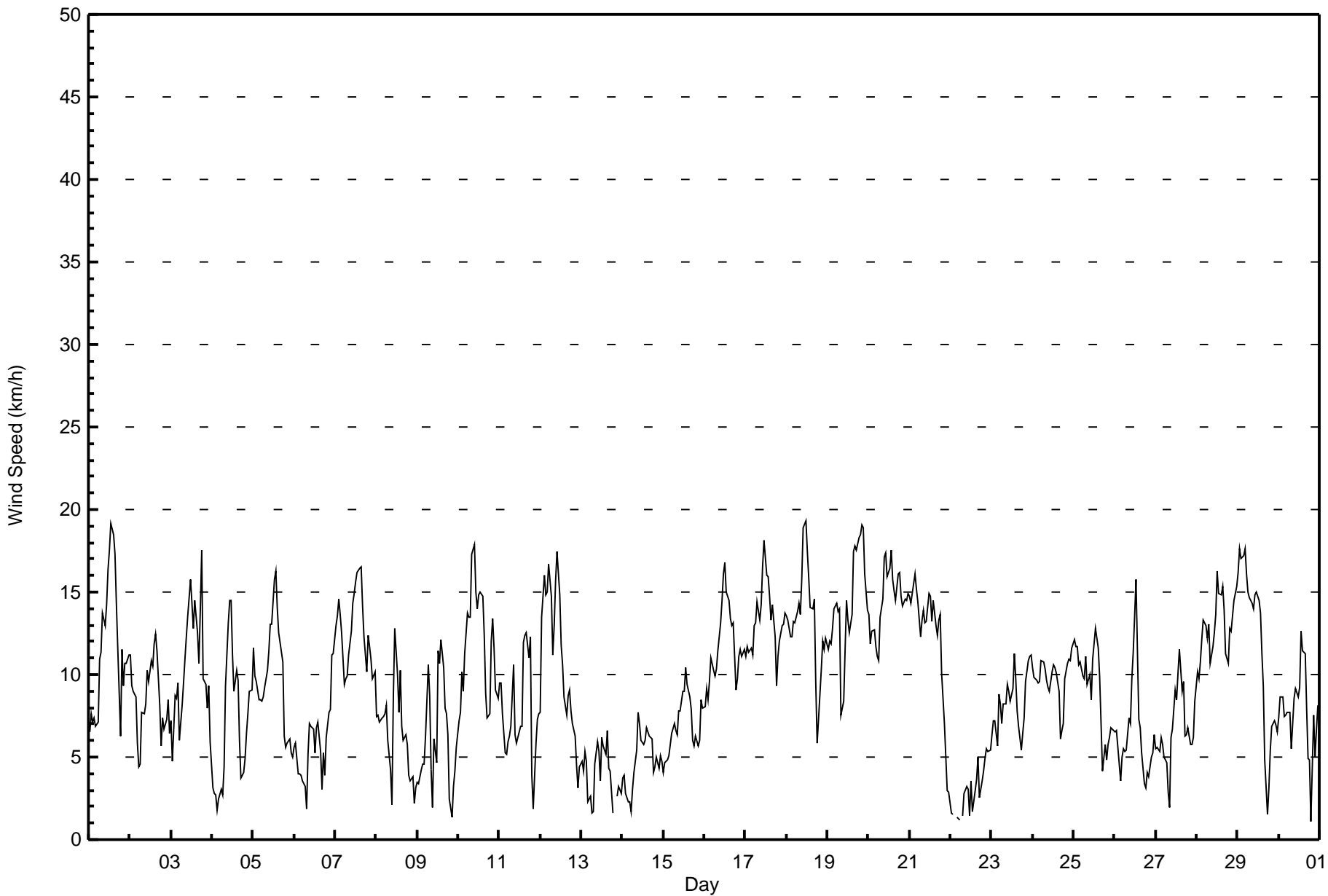
Wapasu - September 2017

| | | |
|---|---|--------------------------------|
| Maximum Speed: 19 km/h on Sep 18 12:00 | Maximum Daily Speed Average: 14.3 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 30 20:00 | Minimum Daily Speed Average: 0.9 km/h on Sep 8 | Hours of Data: 715 |
| Maximum Diurnal Speed Average: 5.8 km/h at hour 7 | Minimum Diurnal Speed Average: 0.9 km/h at hour 18 | Hours of Missing Data: 5 |
| Monthly Average Velocity: 3.1 km/h 174.7 deg | Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 15 P ₉₉ = 18 | 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-Sep | SW7 | SW8 | SSW7 | S7 | S7 | S7 | SW11 | SW11 | SW14 | SW13 | WSW14 | WSW16 | W18 | WSW19 | WSW18 | WSW17 | W14 | W12 | W6 | WSW12 | WSW9 | WSW11 | WSW11 | WSW11 | WSW10.9 | WSW19 |
| 2-Sep | WSW11 | SW9 | WSW9 | SW9 | SSW6 | S4 | S5 | SW8 | WSW8 | W8 | W10 | NNW10 | W11 | WSW11 | WSW12 | WSW12 | WSW11 | WSW8 | WSW6 | WSW7 | WSW7 | SW7 | SW8 | SW6 | WSW7.9 | WSW12 |
| 3-Sep | WSW7 | WSW5 | SW9 | SW9 | SSW6 | SW8 | SW9 | WSW11 | WSW12 | NNW14 | NNW16 | NNW14 | NNW13 | NNW14 | NNW13 | NNW11 | NNW14 | N18 | NNW10 | N9 | NNW8 | NNW9 | NNW6 | WNW7.4 | N18 | |
| 4-Sep | NNW3 | S3 | S3 | SE2 | S2 | SE3 | SSE3 | WSW4 | NW9 | NNW13 | NNW14 | NNW15 | NW11 | NW9 | NNW10 | NNW10 | NNW6 | NNE4 | ENE4 | ESE5 | SE6 | SE8 | SE9 | SE9 | NNW2.2 | NNW15 |
| 5-Sep | SSE12 | SSE10 | SSE10 | S8 | S8 | S8 | S9 | S9 | SSW10 | SSW11 | SSW13 | SW13 | SW16 | SW16 | WSW14 | WSW13 | SW12 | SW11 | SSW6 | SSW6 | SSE6 | SSE6 | SSE5 | SSE5 | SSW8.5 | SW16 |
| 6-Sep | SSE6 | SSE6 | SE4 | ESE4 | SE4 | ESE4 | SSE3 | NE2 | NNE5 | NNE7 | NNE7 | N7 | NNE5 | N7 | NNW7 | N5 | NNE3 | NE5 | ESE4 | ESE6 | ESE8 | SE8 | SE11 | SE11 | E3.1 | SE11 |
| 7-Sep | SSE13 | SSE14 | SSE15 | SSE14 | SSE13 | SSE9 | SSE10 | S10 | S11 | SSW13 | SSW14 | SSW15 | SSW16 | SSW16 | SSW16 | SSW16 | SSW14 | SSW12 | S10 | S12 | S12 | S11 | S10 | S10 | S12.1 | SSW16 |
| 8-Sep | S7 | S8 | S7 | S7 | SSE7 | S8 | SSE8 | S6 | S4 | S2 | NNW9 | N13 | NNE10 | NNE8 | N10 | NNE7 | N6 | NNW6 | N6 | NNE4 | ESE4 | ESE4 | E2 | SE3 | ENE0.9 | N13 |
| 9-Sep | SE4 | E3 | E4 | E5 | SSE5 | ESE6 | ESE11 | SE9 | ESE4 | NNE2 | E6 | E5 | NNW11 | N11 | N12 | NNE10 | N8 | NW8 | NNW6 | N2 | ENE1 | SE3 | WSW4 | SW6 | NE2.4 | N12 |
| 10-Sep | WSW7 | SW8 | WSW10 | SW9 | SW11 | SW14 | WSW13 | WSW13 | WSW17 | WSW18 | WSW15 | WSW14 | WSW15 | W15 | W15 | NNW12 | NNW9 | WSW7 | WSW8 | WSW12 | WSW13 | WSW12 | WSW9 | WSW9 | WSW11.6 | WSW18 |
| 11-Sep | WSW9 | SW9 | SW8 | S5 | S5 | SSE6 | S6 | SSW7 | SW11 | SSW6 | S6 | SSE6 | SE7 | ESE7 | SE12 | SSE12 | SSE13 | S11 | SSE12 | S4 | SSW2 | SSW6 | SW7 | SW8 | S6.4 | SSE13 |
| 12-Sep | SW8 | WSW13 | WSW16 | WSW15 | WSW15 | WSW17 | WSW15 | WSW11 | NNW13 | NW16 | NW17 | NW15 | NNW12 | NW11 | NNW9 | N8 | N9 | N9 | NNE8 | NE7 | NE6 | NE4 | NE3 | NNE4 | WNW6.6 | NW17 |
| 13-Sep | NNE5 | NNE4 | NE5 | NE5 | N2 | N3 | NNE2 | NW2 | W5 | NW6 | NNW5 | N4 | NNW6 | NNE6 | N5 | N7 | NNE4 | WSW4 | NNW2 | AF | AF | ESE3 | ESE3 | SE3 | N2.7 | N7 |
| 14-Sep | ESE4 | E4 | E3 | ESE2 | SE2 | NE2 | NE3 | ENE4 | NE5 | NNE8 | N7 | N6 | NNE6 | NE6 | N7 | N7 | NNE6 | NNE6 | NNE4 | NE4 | ENE5 | E4 | E5 | ESE5 | NE3.8 | NNE8 |
| 15-Sep | SE4 | SE5 | SE5 | SSE5 | SSE6 | SE7 | SE7 | SE7 | S6 | SSW8 | SW8 | WSW9 | W9 | WSW10 | WSW9 | SW9 | SW8 | S6 | S6 | SSE6 | SSE6 | SSE6 | SSE8 | S8 | S5.4 | WSW10 |
| 16-Sep | SSE8 | SSE9 | SSE8 | SSE10 | SSE11 | SSE10 | SSE10 | S10 | S11 | SSW13 | SSW14 | SSW16 | SSW17 | SSW15 | SSW14 | SSW13 | S13 | SSE13 | SSE9 | SSE10 | SSE11 | SSE12 | SSE11 | SSE11 | S11.2 | SSW17 |
| 17-Sep | SSE11 | SSE12 | SSE11 | SSE12 | SSE11 | SSE13 | SSE13 | SSE14 | SSE13 | S14 | S17 | S18 | S16 | S16 | S15 | S13 | S14 | SSE12 | SSE9 | SE11 | SSE12 | SSE13 | SSE13 | SSE14 | SSE12.9 | S18 |
| 18-Sep | SSE14 | SSE13 | SE12 | SE12 | SE13 | SE13 | SSE14 | SE14 | SSE14 | SSE16 | SSE19 | SSE19 | SSE17 | SSE16 | SSE14 | SE14 | SE15 | SSE10 | SE6 | ESE7 | SE10 | SE12 | ESE12 | ESE12 | SE13.0 | SSE19 |
| 19-Sep | ESE11 | ESE12 | ESE12 | ESE13 | ESE14 | ESE14 | ESE14 | ESE14 | ENE8 | E8 | ESE11 | ESE15 | ESE13 | E13 | E14 | E17 | E18 | E18 | E18 | E18 | E19 | ESE19 | E16 | ENE14 | E14.0 | E19 |
| 20-Sep | ENE14 | NE12 | NE13 | NE13 | NNE12 | NNE11 | NNE11 | NNE13 | NNE15 | NNE17 | NE17 | NE16 | NE16 | NE18 | NE16 | NE15 | NNE15 | NE16 | NNE16 | NNE15 | NNE14 | NNE15 | NNE14 | NNE15 | NE14.3 | NE18 |
| 21-Sep | NNE15 | NNE14 | NNE15 | NNE16 | N15 | N14 | NNE12 | N13 | N14 | N13 | N13 | N15 | N15 | N13 | N14 | N13 | N12 | N13 | NNW14 | N10 | N7 | NNW5 | NNW3 | NW3 | N12.0 | NNE16 |
| 22-Sep | NW2 | NNE2 | AF | AF | ENE1 | E1 | AF | SSW1 | SSW3 | NW3 | WNW3 | NNW1 | NE4 | ESE2 | SSW3 | SSW4 | SE5 | ESE3 | ESE4 | SE4 | SE5 | SE5 | SE5 | SSE5 | SE1.6 | SE5 |
| 23-Sep | SSE6 | SSE7 | SSE7 | SSE6 | SSE9 | SSE8 | SSE7 | SSE8 | SSE8 | S9 | S9 | S8 | SSW9 | SW11 | SW10 | SSW8 | S7 | SSE5 | SE6 | SSE7 | SSE10 | SSE11 | SSE11 | SSE11 | SSE7.6 | SW11 |
| 24-Sep | SSE10 | SSE10 | SSE10 | SSE10 | SSE10 | SSE11 | SSE11 | SSE10 | SSE10 | S9 | S9 | S10 | SSW11 | SSW10 | SSW10 | SSW9 | S6 | SSE7 | SE7 | SE10 | SSE11 | SSE11 | SSE11 | SSE12 | SSE9.1 | SSE12 |
| 25-Sep | SSE12 | SSE12 | SSE12 | SSE11 | SSE11 | SSE10 | SSE11 | S9 | S10 | S9 | SSW11 | SW12 | SW13 | WSW12 | WSW10 | WSW7 | S4 | SSE6 | SSE5 | S6 | S6 | SSE7 | S7 | S7.5 | SW13 | |
| 26-Sep | SSE6 | S7 | S6 | S4 | SSE5 | SSE6 | SSE5 | S5 | SSW7 | WSW7 | NNW10 | NNW11 | NW16 | NW11 | NNW7 | N7 | NNE5 | NNE3 | SE3 | SE4 | ESE4 | ESE5 | SSE5 | SSE6 | SW1.1 | NW16 |
| 27-Sep | SSE5 | SSE6 | SSE5 | SSE6 | SSE5 | SE5 | E3 | SE2 | NNW6 | N7 | N9 | N9 | N10 | N12 | NNE9 | NNE10 | NNE6 | NE6 | NE7 | ENE6 | ENE6 | E6 | SE8 | NE3.0 | N12 | |
| 28-Sep | SE10 | SE10 | SE11 | SE12 | SSE13 | SSE13 | SSE12 | SSE13 | SSE11 | S12 | S13 | S14 | SSE16 | S15 | S15 | S15 | S14 | SSE11 | SSE11 | SSE13 | SSE13 | S14 | SSE15 | S15 | SSE12.5 | SSE16 |
| 29-Sep | SSE16 | SSE18 | SSE17 | SSE17 | SSE18 | SSE16 | SSE15 | SSE15 | S14 | S14 | S15 | S15 | S14 | SSW14 | SSW11 | SSW9 | W5 | NW1 | SE3 | SE5 | SSE7 | SSE7 | SSE7 | SE7 | S10.8 | SSE18 |
| 30-Sep | SE7 | SE9 | SSE9 | SSE7 | SSE8 | SSE8 | SSE8 | S6 | S7 | SSW9 | SSW9 | SW9 | SW9 | SW13 | WSW11 | SW11 | SW8 | SSW5 | S5 | SSE1 | NNW8 | NNW5 | NW7 | NNW8 | SSW4.5 | SW13 |

| | | |
|--|-----------------|-----------------|
| SSE5.0 SSE5.3 SSE5.2 SSE5.2 SSE5.6 SSE5.5 SSE5.8 S5.1 SSW4.1 SW3.6 SW3.2 SW3.3 WSW3.3 WSW3.8 WSW3.4 WSW2.1 SSW1.3 S0.9 ESE2.0 SE2.9 SE3.5 SSE4.3 SSE4.2 SSE4.4 SSE16 SSE18 SSE17 SSE17 SSE18 WSW17 SSE15 SSE15 WSW17 WSW18 SSE19 SSE19 W18 WSW19 WSW18 E17 E18 E18 E18 E18 E19 ESE19 E16 S15 | Diurnal Average | Diurnal Maximum |
|--|-----------------|-----------------|

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 143 | 20.00 | 20.00 |
| 6 - 11 | 340 | 47.55 | 67.55 |
| 12 - 19 | 232 | 32.45 | 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: 715

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 6 | 15 | 10 | 6 | 10 | 18 | 22 | 17 | 14 | 6 | 0 | 4 | 2 | 1 | 5 | 7 | 143 |
| 6 - 11 | 21 | 17 | 5 | 3 | 3 | 8 | 22 | 88 | 46 | 24 | 35 | 31 | 4 | 5 | 9 | 19 | 340 |
| 12 - 19 | 16 | 18 | 9 | 2 | 9 | 12 | 10 | 52 | 25 | 18 | 10 | 28 | 5 | 5 | 7 | 6 | 232 |
| 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 | 43 | 50 | 24 | 11 | 22 | 38 | 54 | 157 | 85 | 48 | 45 | 63 | 11 | 11 | 21 | 32 | 715 |

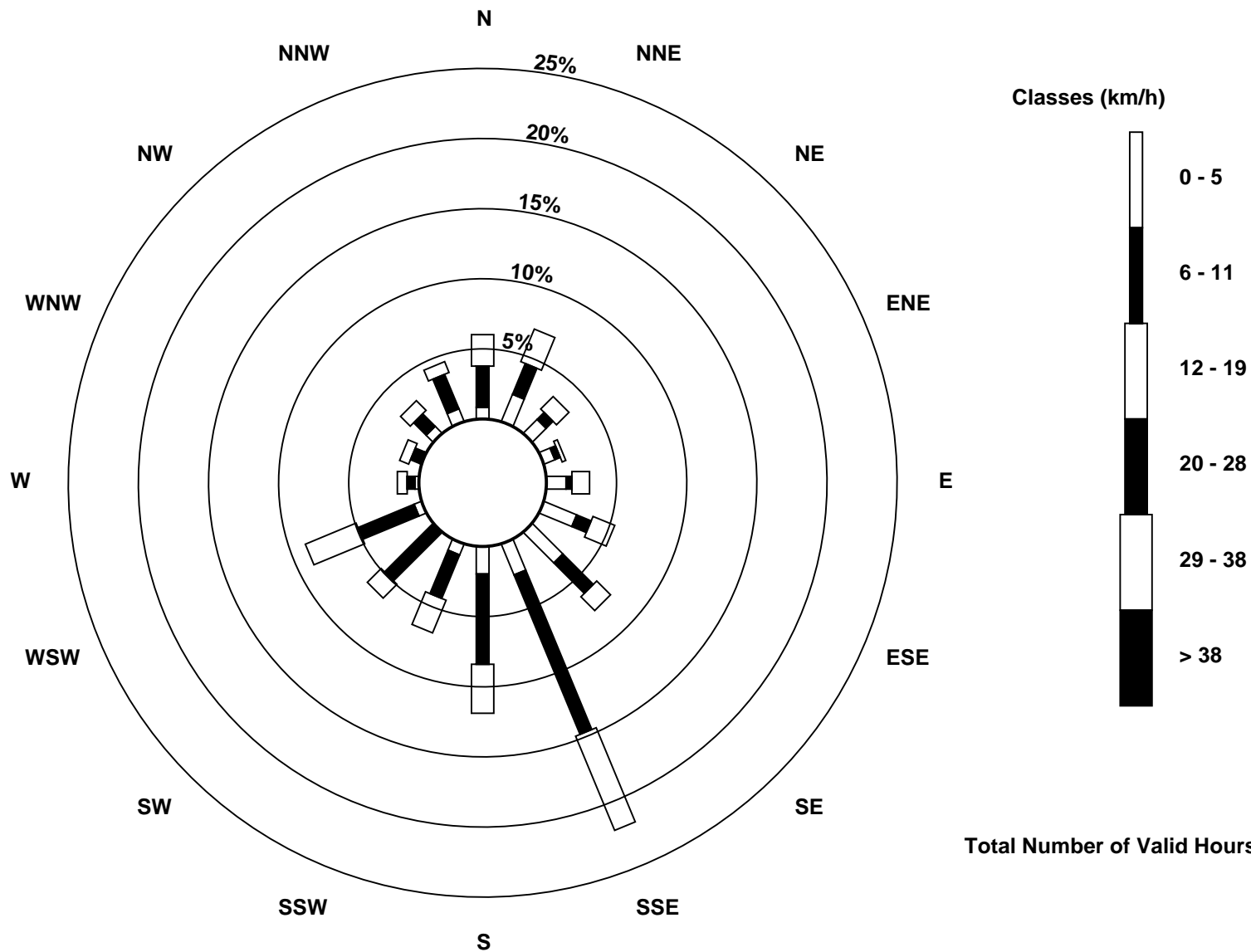
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Wapasu (AMS 17)



Total Number of Valid Hours: 715



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Wapasu - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 8 km/h on Sep 3 18:00 | Hours of Data: 715 |
| Minimum Value: 0 km/h on Sep 27 08:00 | Hours of Missing Data: 5 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6 | 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-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 3 | 4 | 4 | 5 | 5 | 6 | 5 | 5 | 6 | 4 | 2 | 4 | 2 | 2 | 2 | 3 | 6 |
| 2-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 1 | 2 | 3 | 3 | 2 | 1 | 4 |
| 3-Sep | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 8 | 6 | 3 | 3 | 2 | 2 | 2 | 8 |
| 4-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 4 | 4 | 5 | 3 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 5 |
| 5-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 4 |
| 6-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 3 |
| 7-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 6 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 6 |
| 8-Sep | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 4 |
| 9-Sep | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 4 |
| 10-Sep | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 5 |
| 11-Sep | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 3 | 6 | 3 | 2 | 2 | 2 | 6 |
| 12-Sep | 2 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 5 |
| 13-Sep | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | AF | AF | 1 | 1 | 2 | 3 |
| 14-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 4 |
| 16-Sep | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 4 | 4 | 5 | 6 | 6 | 5 | 6 | 5 | 5 | 4 | 2 | 2 | 2 | 3 | 3 | 3 | 6 |
| 17-Sep | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 4 | 4 | 5 | 6 | 6 | 6 | 6 | 5 | 5 | 4 | 5 | 2 | 2 | 2 | 3 | 3 | 3 | 6 |
| 18-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 6 | 6 | 6 | 6 | 5 | 4 | 4 | 4 | 4 | 1 | 1 | 3 | 3 | 3 | 3 | 6 |
| 19-Sep | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 6 | 3 | 3 | 4 | 5 | 5 | 5 | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 4 | 6 |
| 20-Sep | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 5 | 6 | 7 | 6 | 6 | 6 | 5 | 5 | 5 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 7 |
| 21-Sep | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 1 | 2 | 1 | 5 |
| 22-Sep | 1 | 1 | AF | AF | 1 | 1 | AF | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 23-Sep | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 3 |
| 24-Sep | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 4 |
| 25-Sep | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 4 |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 27-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 4 |
| 28-Sep | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 2 | 3 | 4 | 4 | 4 | 5 | 5 |
| 29-Sep | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 5 |
| 30-Sep | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 6 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 8 | 6 | 6 | 6 | 6 | 5 | 5 | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Wapasu - September 2017

| | |
|--|--------------------------------|
| Direction of Maximum Speed: 163 deg on Sep 18 12:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 34.2 deg on Sep 20 | Hours of Data: 715 |
| Direction of Minimum Speed: 165 deg on Sep 30 20:00 | Hours of Missing Data: 5 |
| Direction of Minimum Daily Speed Average: 0.9 deg on Sep 8 | Percent Operational Time: 99.3 |
| Monthly Average Direction: 203.3 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-Sep | 218 | 216 | 204 | 185 | 186 | 188 | 215 | 222 | 232 | 235 | 237 | 245 | 261 | 244 | 244 | 257 | 260 | 269 | 263 | 251 | 251 | 243 | 244 | 243 | 238.9 |
| 2-Sep | 240 | 235 | 244 | 232 | 210 | 178 | 184 | 220 | 254 | 275 | 274 | 290 | 259 | 247 | 246 | 242 | 243 | 252 | 255 | 251 | 258 | 218 | 228 | 233 | 244.0 |
| 3-Sep | 245 | 237 | 233 | 227 | 225 | 205 | 214 | 228 | 244 | 254 | 287 | 310 | 312 | 302 | 317 | 331 | 319 | 337 | 350 | 337 | 349 | 334 | 337 | 348 | 296.8 |
| 4-Sep | 330 | 170 | 187 | 138 | 175 | 133 | 163 | 257 | 322 | 331 | 338 | 338 | 326 | 308 | 322 | 337 | 327 | 33 | 67 | 110 | 124 | 134 | 139 | 142 | 339.8 |
| 5-Sep | 155 | 158 | 168 | 175 | 169 | 171 | 174 | 173 | 198 | 202 | 212 | 220 | 232 | 233 | 238 | 244 | 231 | 229 | 204 | 195 | 166 | 164 | 166 | 160 | 200.1 |
| 6-Sep | 149 | 148 | 130 | 104 | 125 | 102 | 151 | 54 | 27 | 28 | 30 | 355 | 21 | 349 | 348 | 359 | 16 | 49 | 103 | 112 | 117 | 126 | 132 | 136 | 83.2 |
| 7-Sep | 147 | 153 | 155 | 155 | 158 | 166 | 166 | 175 | 191 | 196 | 195 | 207 | 195 | 201 | 195 | 199 | 195 | 193 | 177 | 172 | 179 | 182 | 177 | 175 | 180.5 |
| 8-Sep | 177 | 175 | 173 | 171 | 160 | 169 | 168 | 176 | 182 | 187 | 339 | 358 | 15 | 15 | 355 | 20 | 351 | 332 | 4 | 31 | 104 | 119 | 87 | 135 | 73.1 |
| 9-Sep | 126 | 87 | 89 | 96 | 152 | 116 | 122 | 124 | 108 | 24 | 91 | 88 | 345 | 352 | 1 | 13 | 6 | 309 | 344 | 349 | 62 | 126 | 256 | 231 | 45.4 |
| 10-Sep | 242 | 231 | 241 | 226 | 230 | 235 | 242 | 240 | 237 | 237 | 243 | 246 | 252 | 263 | 261 | 282 | 284 | 258 | 251 | 251 | 246 | 248 | 250 | 251 | 247.5 |
| 11-Sep | 242 | 233 | 223 | 186 | 185 | 167 | 182 | 202 | 222 | 204 | 190 | 157 | 139 | 113 | 145 | 161 | 163 | 170 | 157 | 173 | 199 | 211 | 234 | 232 | 185.5 |
| 12-Sep | 229 | 245 | 254 | 256 | 241 | 241 | 249 | 258 | 290 | 317 | 316 | 322 | 303 | 323 | 343 | 2 | 7 | 11 | 21 | 42 | 45 | 56 | 54 | 19 | 297.2 |
| 13-Sep | 14 | 26 | 50 | 36 | 7 | 357 | 15 | 326 | 278 | 304 | 333 | 355 | 335 | 13 | 358 | 357 | 14 | 258 | 341 | AF | AF | 109 | 112 | 130 | 359.5 |
| 14-Sep | 108 | 96 | 93 | 111 | 125 | 39 | 50 | 58 | 37 | 15 | 6 | 0 | 26 | 36 | 10 | 9 | 30 | 18 | 25 | 53 | 78 | 86 | 101 | 108 | 44.4 |
| 15-Sep | 133 | 129 | 145 | 155 | 153 | 149 | 145 | 159 | 178 | 201 | 219 | 237 | 259 | 245 | 240 | 225 | 214 | 190 | 169 | 158 | 159 | 157 | 162 | 172 | 187.8 |
| 16-Sep | 159 | 164 | 165 | 158 | 158 | 159 | 167 | 176 | 184 | 194 | 196 | 195 | 197 | 192 | 195 | 196 | 177 | 164 | 158 | 152 | 155 | 157 | 160 | 160 | 174.9 |
| 17-Sep | 164 | 155 | 154 | 151 | 151 | 151 | 152 | 151 | 159 | 170 | 179 | 182 | 187 | 184 | 178 | 175 | 171 | 164 | 148 | 146 | 148 | 149 | 148 | 150 | 162.5 |
| 18-Sep | 148 | 147 | 142 | 140 | 142 | 143 | 147 | 146 | 152 | 160 | 160 | 163 | 151 | 147 | 149 | 136 | 142 | 147 | 127 | 119 | 125 | 131 | 122 | 114 | 143.9 |
| 19-Sep | 116 | 116 | 116 | 115 | 103 | 110 | 113 | 115 | 76 | 89 | 104 | 108 | 106 | 98 | 81 | 83 | 91 | 93 | 95 | 97 | 99 | 103 | 91 | 75 | 99.6 |
| 20-Sep | 65 | 55 | 42 | 38 | 33 | 31 | 29 | 30 | 28 | 31 | 34 | 34 | 34 | 35 | 36 | 34 | 32 | 36 | 33 | 29 | 25 | 29 | 29 | 27 | 34.2 |
| 21-Sep | 18 | 17 | 16 | 14 | 10 | 11 | 16 | 10 | 10 | 11 | 5 | 0 | 360 | 359 | 355 | 358 | 353 | 352 | 348 | 351 | 349 | 340 | 331 | 321 | 3.5 |
| 22-Sep | 307 | 22 | AF | AF | 68 | 99 | AF | 196 | 205 | 304 | 299 | 340 | 36 | 119 | 197 | 197 | 128 | 106 | 122 | 124 | 144 | 135 | 139 | 149 | 139.0 |
| 23-Sep | 149 | 151 | 152 | 156 | 154 | 153 | 153 | 159 | 152 | 171 | 176 | 183 | 194 | 224 | 226 | 209 | 171 | 163 | 146 | 149 | 151 | 150 | 151 | 152 | 166.7 |
| 24-Sep | 151 | 156 | 154 | 155 | 154 | 154 | 151 | 153 | 166 | 178 | 188 | 191 | 195 | 195 | 211 | 192 | 181 | 159 | 137 | 145 | 151 | 157 | 157 | 153 | 165.6 |
| 25-Sep | 152 | 156 | 154 | 154 | 154 | 155 | 158 | 167 | 178 | 184 | 180 | 205 | 233 | 233 | 248 | 258 | 245 | 191 | 154 | 158 | 169 | 173 | 167 | 170 | 182.6 |
| 26-Sep | 167 | 171 | 185 | 174 | 156 | 159 | 164 | 174 | 212 | 243 | 294 | 300 | 325 | 318 | 332 | 349 | 27 | 32 | 134 | 141 | 117 | 118 | 149 | 150 | 224.3 |
| 27-Sep | 152 | 162 | 159 | 159 | 158 | 150 | 146 | 100 | 146 | 327 | 7 | 3 | 358 | 353 | 352 | 16 | 32 | 33 | 38 | 54 | 66 | 69 | 99 | 127 | 53.2 |
| 28-Sep | 137 | 139 | 144 | 145 | 151 | 155 | 159 | 152 | 162 | 173 | 174 | 181 | 168 | 186 | 186 | 171 | 174 | 165 | 159 | 158 | 165 | 169 | 167 | 170 | 164.1 |
| 29-Sep | 162 | 163 | 159 | 157 | 162 | 157 | 158 | 163 | 172 | 183 | 188 | 189 | 184 | 205 | 200 | 205 | 279 | 325 | 128 | 141 | 154 | 163 | 148 | 143 | 171.1 |
| 30-Sep | 142 | 144 | 147 | 148 | 149 | 154 | 156 | 171 | 179 | 196 | 198 | 217 | 218 | 235 | 241 | 233 | 228 | 192 | 179 | 165 | 334 | 328 | 324 | 329 | 199.5 |

157.6 159.1 161.4 156.4 158.8 156.6 161.7 169.2 195.2 215.5 224.7 236.1 245.0 243.5 252.0 242.8 207.2 171.7 110.6 132.4 137.8 147.0 150.6 153.2

Diurnal Average

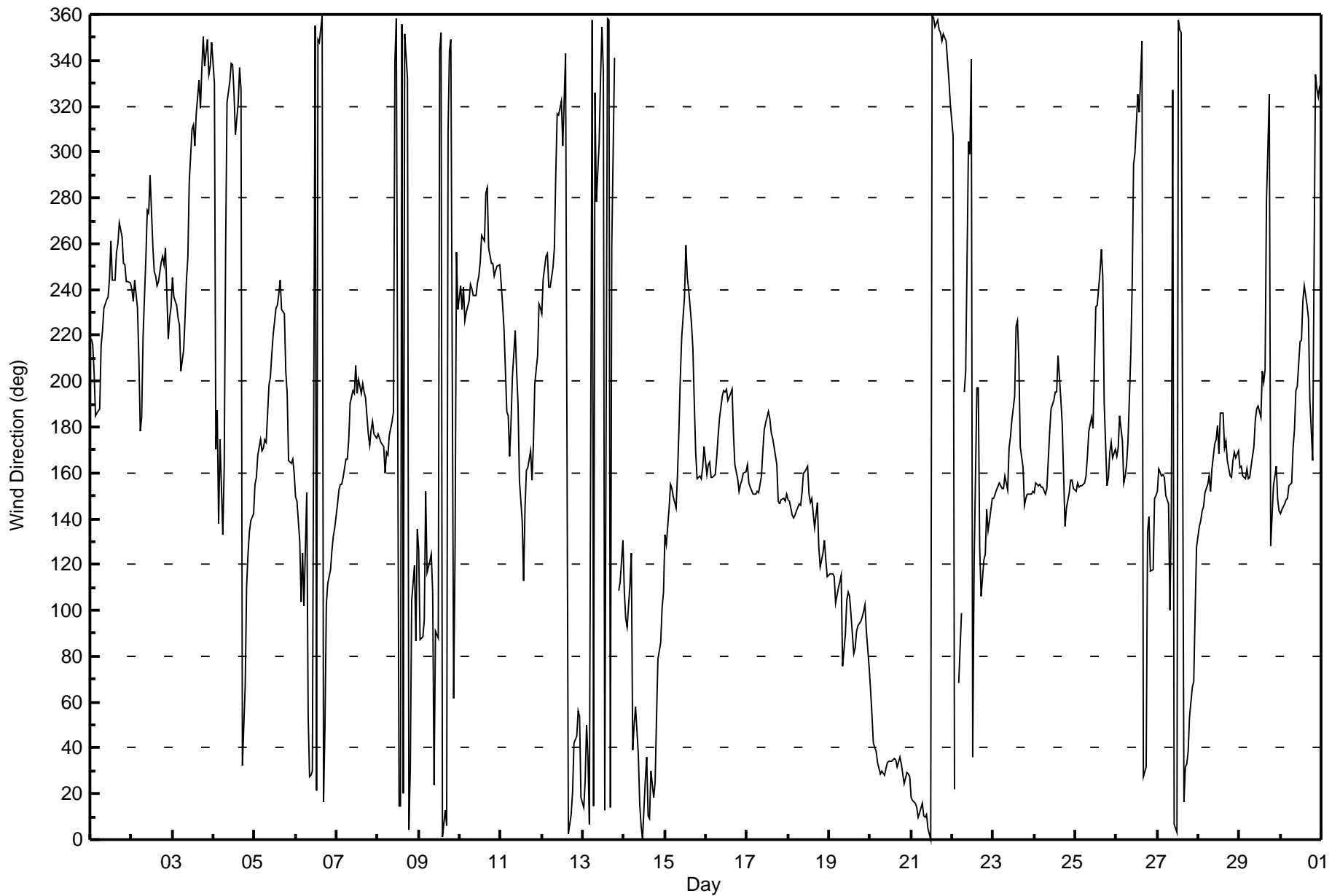
AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Wapasu - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Wapasu - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 88 deg on Sep 9 10:00 | Hours of Data: 715 |
| Minimum Value: 6 deg on Sep 26 23:00 | Hours of Missing Data: 5 |
| Percentiles: P ₁ = 7 P ₁₀ = 15 Q ₁ = 18 Median = 24 Q ₃ = 30 P ₉₀ = 36 P ₉₉ = 74 | 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-Sep | 21 | 21 | 26 | 23 | 25 | 25 | 23 | 21 | 17 | 19 | 19 | 25 | 29 | 23 | 22 | 27 | 28 | 29 | 27 | 22 | 22 | 17 | 17 | 17 | 29 |
| 2-Sep | 18 | 19 | 20 | 15 | 22 | 36 | 21 | 22 | 36 | 35 | 33 | 39 | 33 | 36 | 24 | 20 | 19 | 23 | 23 | 21 | 40 | 20 | 16 | 16 | 40 |
| 3-Sep | 18 | 27 | 14 | 15 | 15 | 27 | 22 | 16 | 24 | 27 | 30 | 29 | 30 | 30 | 20 | 28 | 26 | 22 | 20 | 20 | 15 | 14 | 19 | 30 | |
| 4-Sep | 50 | 36 | 30 | 55 | 34 | 20 | 28 | 38 | 25 | 27 | 26 | 26 | 38 | 36 | 31 | 30 | 42 | 56 | 26 | 12 | 13 | 13 | 10 | 56 | |
| 5-Sep | 15 | 17 | 22 | 21 | 17 | 23 | 24 | 27 | 27 | 27 | 28 | 25 | 18 | 21 | 24 | 25 | 22 | 17 | 24 | 22 | 10 | 9 | 9 | 28 | |
| 6-Sep | 6 | 6 | 22 | 20 | 19 | 23 | 23 | 53 | 36 | 37 | 38 | 39 | 66 | 51 | 46 | 53 | 31 | 36 | 15 | 13 | 13 | 15 | 17 | 16 | 66 |
| 7-Sep | 16 | 17 | 17 | 17 | 18 | 23 | 22 | 27 | 30 | 29 | 30 | 29 | 32 | 30 | 31 | 30 | 31 | 30 | 25 | 24 | 28 | 28 | 24 | 24 | 32 |
| 8-Sep | 23 | 23 | 24 | 21 | 16 | 22 | 22 | 23 | 25 | 65 | 33 | 27 | 33 | 37 | 25 | 35 | 23 | 17 | 36 | 31 | 21 | 18 | 55 | 31 | 65 |
| 9-Sep | 23 | 25 | 13 | 13 | 32 | 21 | 18 | 22 | 37 | 88 | 37 | 63 | 22 | 26 | 25 | 32 | 29 | 28 | 20 | 59 | 46 | 15 | 46 | 24 | 88 |
| 10-Sep | 19 | 18 | 18 | 21 | 17 | 18 | 19 | 18 | 16 | 17 | 19 | 21 | 23 | 25 | 27 | 30 | 31 | 23 | 21 | 22 | 17 | 18 | 22 | 21 | 31 |
| 11-Sep | 16 | 13 | 17 | 21 | 25 | 25 | 24 | 28 | 21 | 27 | 29 | 22 | 21 | 29 | 25 | 24 | 23 | 25 | 19 | 75 | 77 | 25 | 21 | 20 | 77 |
| 12-Sep | 18 | 18 | 22 | 24 | 17 | 17 | 20 | 24 | 30 | 27 | 25 | 24 | 29 | 30 | 24 | 29 | 28 | 29 | 29 | 23 | 25 | 16 | 32 | 30 | 32 |
| 13-Sep | 35 | 30 | 26 | 28 | 51 | 65 | 54 | 70 | 36 | 51 | 74 | 81 | 39 | 37 | 50 | 37 | 56 | 31 | 48 | AF | AF | 35 | 27 | 39 | 81 |
| 14-Sep | 16 | 15 | 19 | 46 | 19 | 33 | 15 | 21 | 34 | 33 | 43 | 52 | 58 | 57 | 51 | 43 | 44 | 32 | 19 | 17 | 11 | 13 | 12 | 12 | 58 |
| 15-Sep | 7 | 8 | 7 | 7 | 7 | 8 | 11 | 20 | 28 | 30 | 37 | 34 | 38 | 34 | 39 | 37 | 32 | 28 | 15 | 10 | 8 | 14 | 17 | 19 | 39 |
| 16-Sep | 15 | 18 | 20 | 18 | 19 | 19 | 24 | 26 | 29 | 30 | 31 | 32 | 31 | 31 | 32 | 33 | 31 | 23 | 17 | 14 | 17 | 18 | 19 | 21 | 33 |
| 17-Sep | 21 | 17 | 17 | 17 | 16 | 17 | 18 | 17 | 23 | 26 | 30 | 30 | 33 | 32 | 31 | 33 | 27 | 24 | 16 | 15 | 15 | 16 | 16 | 18 | 33 |
| 18-Sep | 17 | 16 | 17 | 16 | 16 | 16 | 15 | 16 | 23 | 25 | 26 | 26 | 26 | 27 | 28 | 26 | 24 | 20 | 12 | 13 | 17 | 17 | 16 | 17 | 28 |
| 19-Sep | 17 | 17 | 19 | 20 | 21 | 22 | 21 | 28 | 46 | 30 | 28 | 27 | 28 | 28 | 24 | 26 | 25 | 24 | 26 | 25 | 25 | 23 | 25 | 24 | 46 |
| 20-Sep | 23 | 24 | 25 | 26 | 29 | 26 | 30 | 29 | 31 | 29 | 29 | 29 | 28 | 28 | 27 | 29 | 29 | 28 | 30 | 31 | 32 | 31 | 32 | 32 | 32 |
| 21-Sep | 31 | 32 | 30 | 30 | 28 | 29 | 31 | 30 | 29 | 30 | 28 | 25 | 24 | 27 | 23 | 24 | 20 | 21 | 18 | 19 | 18 | 13 | 35 | 35 | 35 |
| 22-Sep | 31 | 20 | AF | AF | 35 | 49 | AF | 32 | 29 | 50 | 29 | 81 | 25 | 65 | 37 | 31 | 23 | 37 | 17 | 13 | 6 | 10 | 13 | 16 | 81 |
| 23-Sep | 14 | 17 | 17 | 23 | 19 | 17 | 17 | 20 | 20 | 28 | 30 | 29 | 31 | 26 | 25 | 30 | 28 | 17 | 10 | 12 | 15 | 16 | 16 | 16 | 31 |
| 24-Sep | 17 | 19 | 17 | 19 | 17 | 18 | 17 | 19 | 24 | 29 | 34 | 34 | 36 | 33 | 27 | 34 | 26 | 19 | 10 | 13 | 16 | 18 | 19 | 18 | 36 |
| 25-Sep | 18 | 20 | 18 | 20 | 19 | 18 | 20 | 23 | 27 | 29 | 30 | 30 | 25 | 23 | 26 | 28 | 25 | 31 | 10 | 16 | 15 | 17 | 14 | 14 | 31 |
| 26-Sep | 15 | 17 | 22 | 32 | 31 | 10 | 9 | 22 | 23 | 42 | 33 | 31 | 24 | 32 | 49 | 43 | 33 | 27 | 10 | 22 | 20 | 34 | 6 | 11 | 49 |
| 27-Sep | 9 | 11 | 9 | 12 | 7 | 9 | 7 | 12 | 71 | 32 | 35 | 31 | 37 | 29 | 27 | 33 | 33 | 25 | 25 | 24 | 24 | 26 | 24 | 24 | 71 |
| 28-Sep | 19 | 16 | 17 | 17 | 18 | 19 | 20 | 19 | 25 | 29 | 29 | 30 | 26 | 31 | 31 | 27 | 27 | 21 | 19 | 18 | 21 | 24 | 24 | 25 | 31 |
| 29-Sep | 22 | 21 | 21 | 21 | 23 | 20 | 20 | 22 | 27 | 30 | 30 | 29 | 29 | 28 | 32 | 30 | 35 | 77 | 24 | 25 | 12 | 12 | 10 | 10 | 77 |
| 30-Sep | 9 | 11 | 13 | 13 | 12 | 14 | 15 | 23 | 29 | 32 | 30 | 31 | 32 | 22 | 24 | 19 | 21 | 20 | 20 | 81 | 17 | 21 | 19 | 18 | 81 |
| | 50 | 36 | 30 | 55 | 51 | 65 | 54 | 70 | 71 | 88 | 74 | 81 | 66 | 65 | 51 | 53 | 56 | 77 | 48 | 81 | 77 | 35 | 55 | 39 | |

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Summary

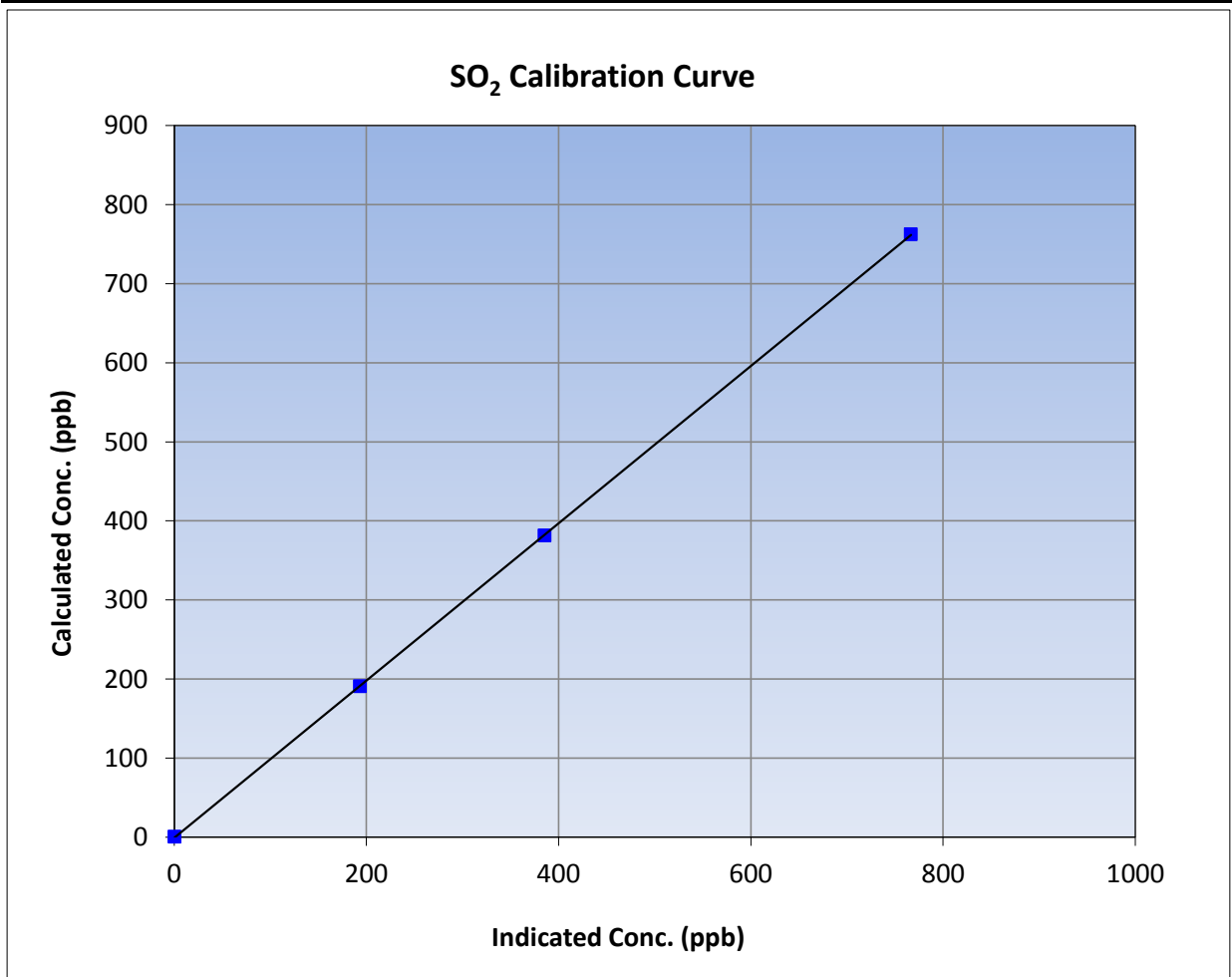
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 4, 2017 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 7:00 | End Time (MST) | 12:10 |
| Analyzer make | Routine | Analyzer serial # | 1218153459 |

Calibration Data

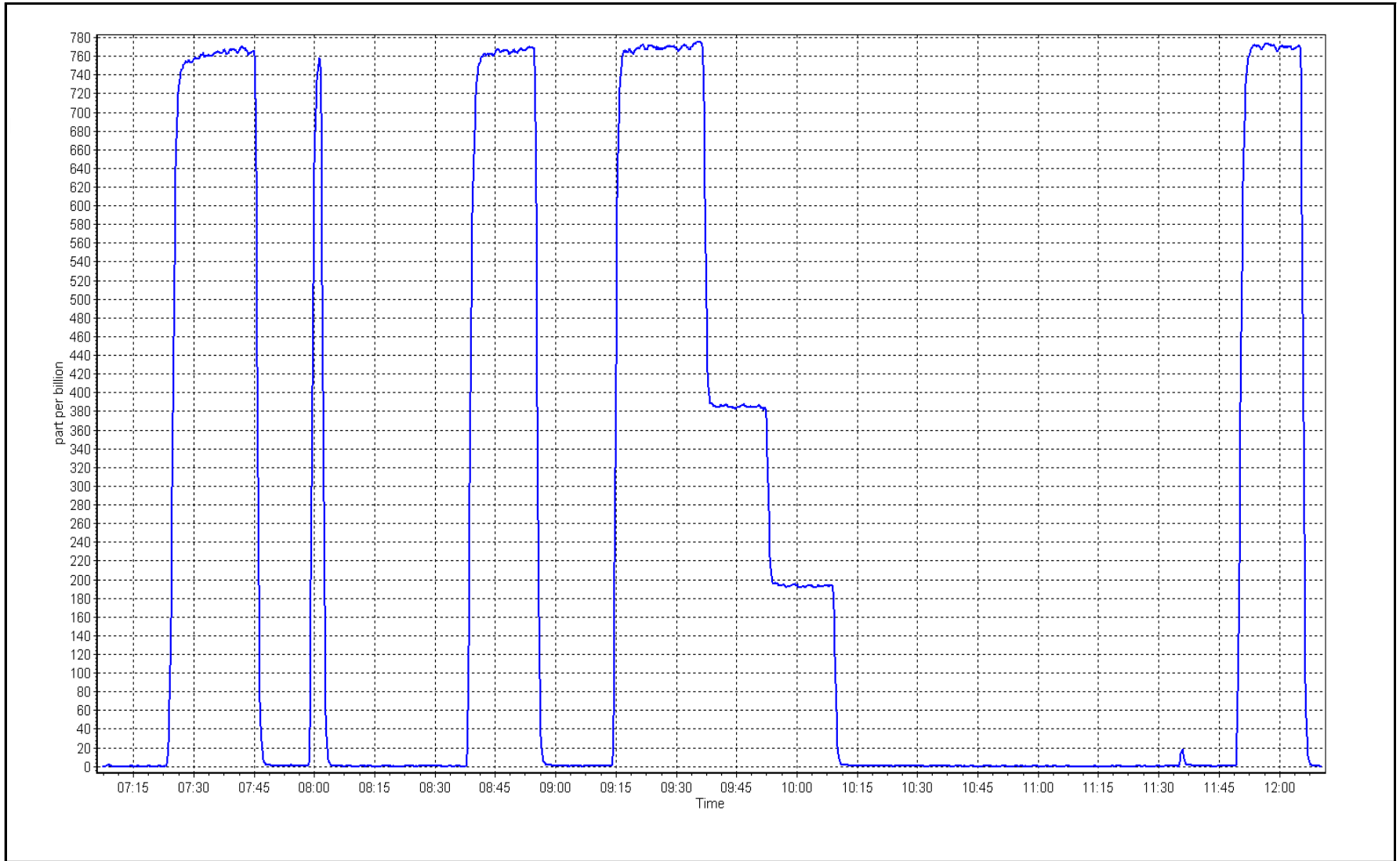
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 |
| 762.0 | 766.3 | 0.9944 | | |
| 381.1 | 385.2 | 0.9893 | Slope | 0.90 - 1.10 |
| 190.5 | 193.1 | 0.9867 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 27, 2017

Location: Wapasu





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Wapasu | Station number: | AMS 17 |
| Calibration Date: | September 29, 2017 | Last Cal Date: | August 24, 2017 |
| Start time (MST): | 9:23 | End time (MST): | 11:25 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|-----------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>5.10</u> | ppm | Cal Gas Exp Date | September 9, 2017 |
| Cal Gas Cylinder # | <u>CC107167</u> | | | |
| Calibrator Make/Model | API T700 | | Serial Number | 997 |
| ZAG Make/Model | API T701 | | Serial Number | 4427 |

Analyzer Information

| | | | | | |
|----------------------|--------------|--------------------|--------------|---------------|-------|
| Analyzer make: | Thermo 450i | Analyzer serial #: | 1218153583 | | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> | |
| Analyzer Range | 0 - 100 ppb | PMT voltage | -627.2 | -627.2 | |
| Calculated slope | 0.991670 | 0.991959 | Lamp voltage | 825 | 825 |
| Calculated intercept | 0.340314 | 0.280837 | Pressure | 551.0 | 551.0 |
| Analyzer Background | 11.0 | 11.0 | Flow | 0.987 | 0.987 |
| Analyzer Coefficient | 0.988 | 0.988 | Intensity | 91 | 91 |

H₂S Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5095 | 0.0 | 0.0 | -0.4 | ---- |
| as found span | 5025 | 78.4 | 78.3 | 78.3 | 1.001 |
| calibrator zero | 5095 | 0.0 | 0.0 | -0.3 | ---- |
| high point | 5025 | 78.4 | 78.3 | 78.7 | 0.996 |
| second point | 5063 | 39.2 | 39.2 | 39.2 | 1.000 |
| third point | 5083 | 19.6 | 19.6 | 19.5 | 1.005 |
| as left zero | 5095 | 0.0 | 0.0 | -0.2 | ---- |
| as left span | 5025 | 78.4 | 78.3 | 78.7 | 0.996 |

SO₂ Scrubber Check

| | | | | | |
|--------------------|-------|-------------------|---------------------------|-----------|------|
| | | | Average Correction Factor | 1.000 | |
| Corrected As found | 78.70 | Previous response | 78.67 | *% change | 0.0% |

* = > +/-5% change initiates investigation

Notes:

No Maintenance or adjustments done;

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

H₂S Calibration Summary

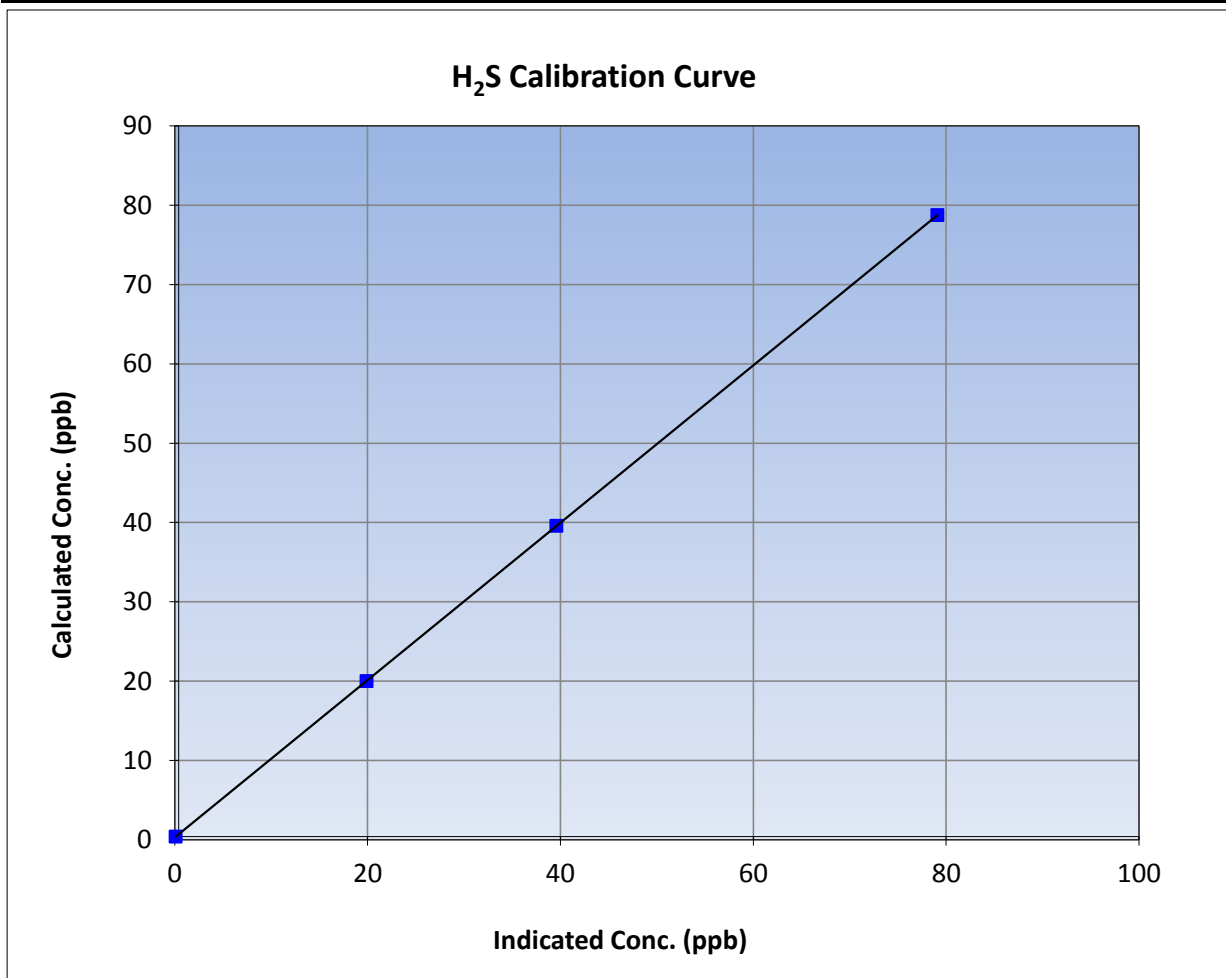
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 29, 2017 | Previous Calibration | August 24, 2017 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 9:23 | End Time (MST) | 11:25 |
| Analyzer make | Thermo 450i | Analyzer serial # | 1218153583 |

Calibration Data

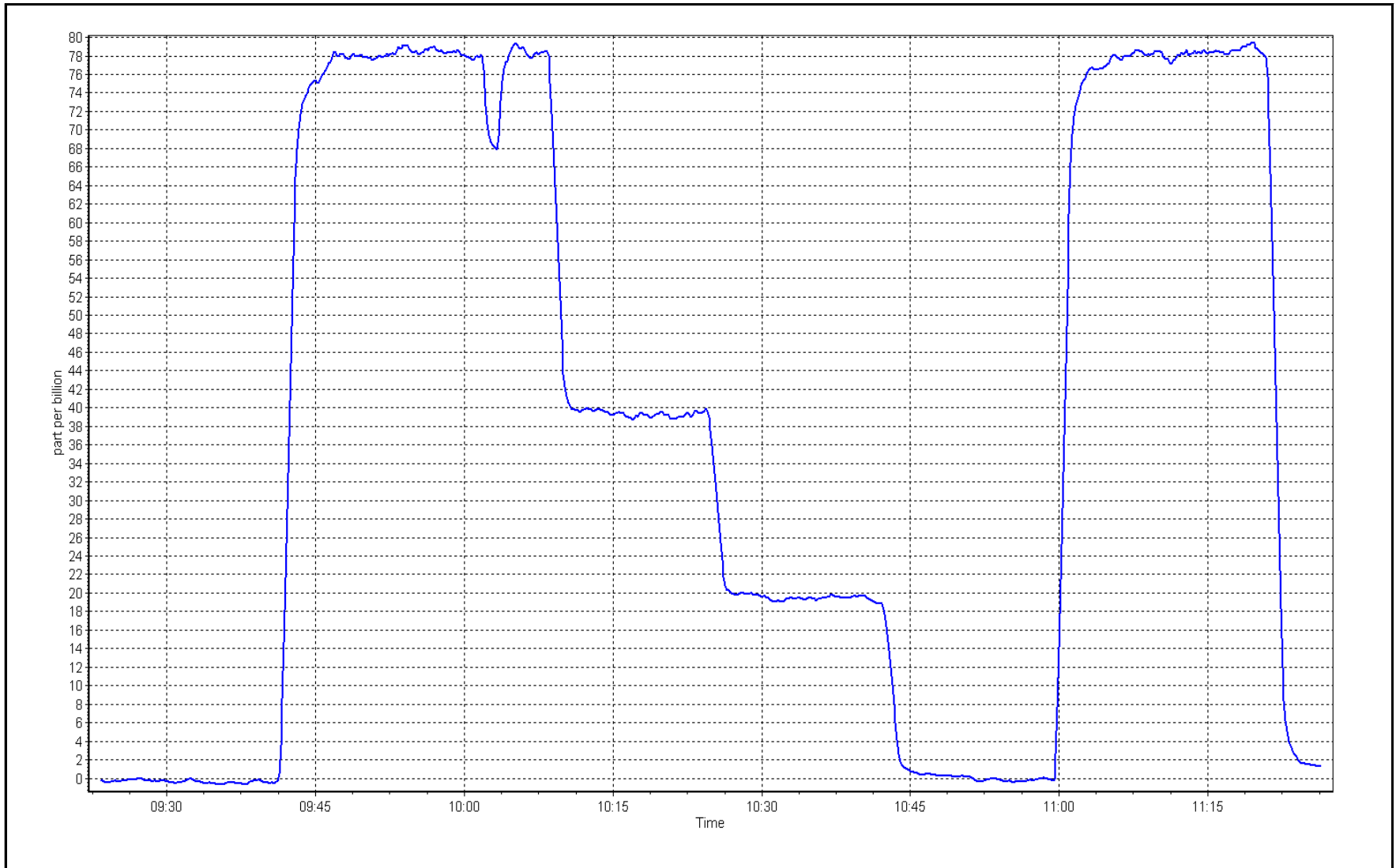
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 |
| 78.3 | 78.7 | 0.9955 | | |
| 39.2 | 39.2 | 0.9996 | Slope | 0.90 - 1.10 |
| 19.6 | 19.5 | 1.0046 | | |
| | | | Intercept | +/-3 |



H₂S Calibration Plot

Date: September 29, 2017

Location: Wapasu





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Wapasu | Station number: | AMS 17 |
| Calibration Date: | September 27, 2017 | Last Cal Date: | August 4, 2017 |
| Start time (MST): | 7:07 | End time (MST): | 12:10 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|------------|
| Gas Cert Reference | EY0000753 | Cal Gas Expiry Date | 2/22/2020 |
| CH4 Cal Gas Conc. | <u>505.0</u> ppm | CH4 Equiv Conc. | 1055.0 ppm |
| C3H8 Cal Gas Conc. | <u>200.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 997 |
| ZAG Make/Model | API T701 | Serial Number | 4427 |

Analyzer Information

| | | | | |
|------------------------------|--------------|-------------------------------|---------------------|---------------|
| Analyzer make: Thermo 51i-LT | | Analyzer serial #: 1218153352 | | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> |
| Analyzer Range | 0 - 25 ppm | | Bias voltage supply | -296.3 |
| Calculated slope | 0.998189 | 1.006393 | Sample pressure | 8.5 |
| Calculated intercept | -0.013308 | -0.067425 | Fuel pressure | 24.8 |
| Analyzer Background | 4.292 | 4.323 | Air pressure | 38.4 |
| Analyzer Coefficient | 3.080 | 2.970 | Flame temperature | 159.5 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5097 | 0.0 | 0.00 | -0.12 | ---- |
| as found span | 5025 | 78.4 | 16.21 | 15.88 | 1.021 |
| calibrator zero | 5097 | 0.0 | 0.00 | 0.03 | ---- |
| high point | 5025 | 78.4 | 16.21 | 16.16 | 1.003 |
| second point | 5063 | 39.2 | 8.11 | 8.12 | 0.998 |
| third point | 5083 | 19.6 | 4.05 | 4.14 | 0.979 |
| as left zero | 5097 | 0.0 | 0.00 | 0.06 | ---- |
| as left span | 5025 | 78.4 | 16.21 | 16.21 | 1.000 |
| Average Correction Factor | | | | | 0.993 |
| Corrected As found | 16.00 | Previous response | 16.25 | *% change | 1.6% |

* = > +/-5% change initiates investigation

Notes: No maintenance done, zero and span adjusted

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC Calibration Summary

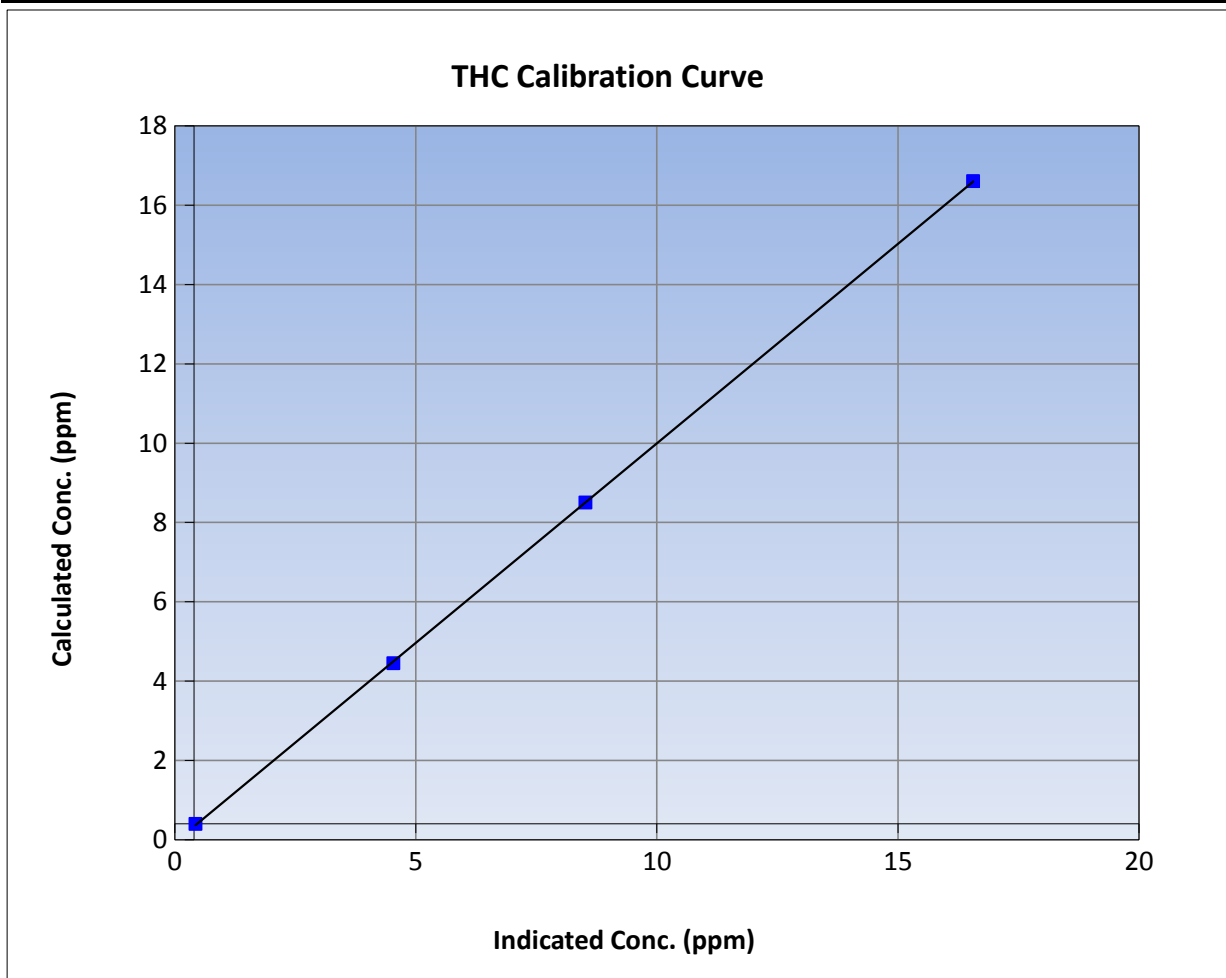
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 4, 2017 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 7:07 | End Time (MST) | 12:10 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1218153352 |

Calibration Data

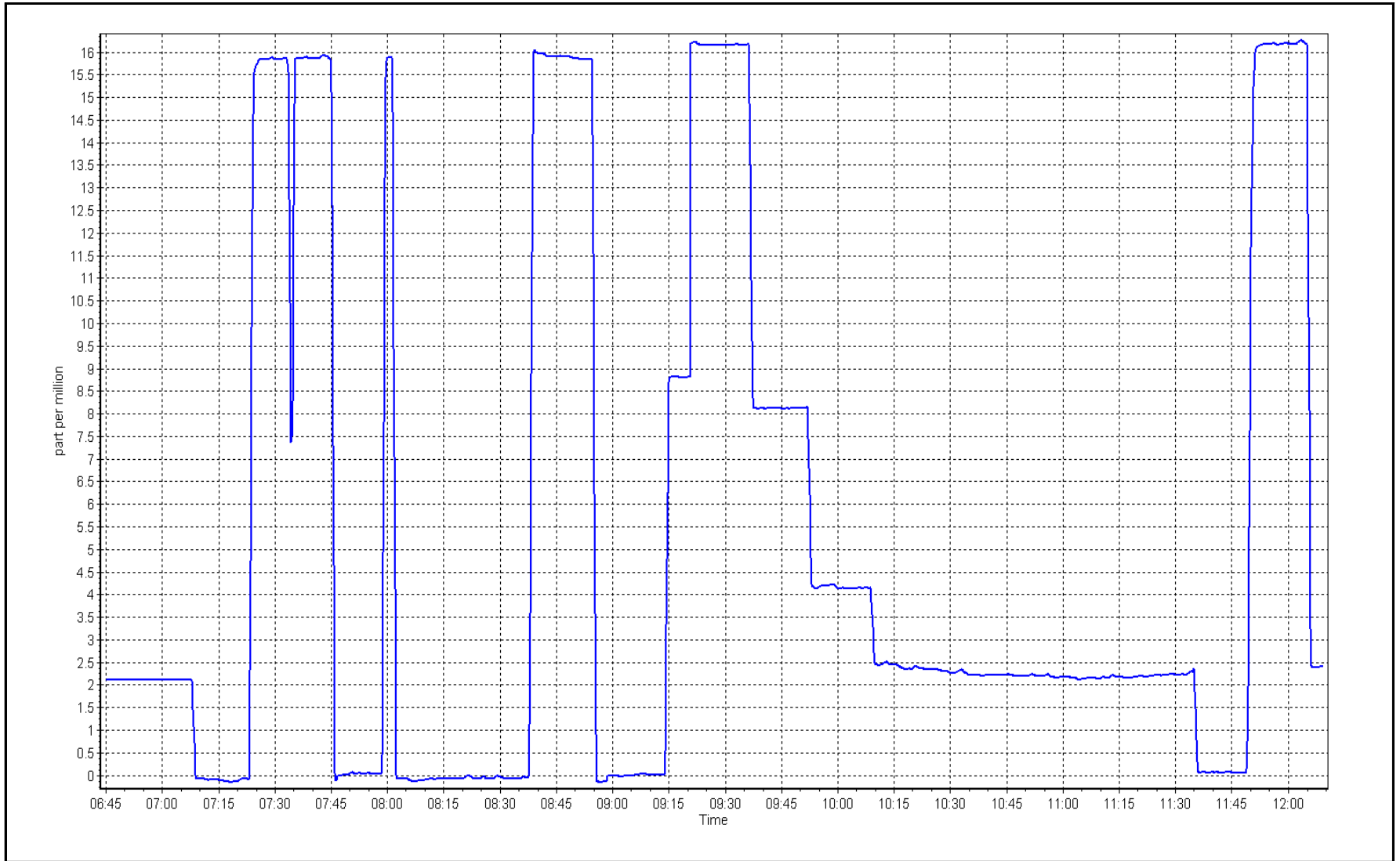
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999976 | ≥0.995 |
| 16.2 | 16.2 | 1.0029 | | | |
| 8.1 | 8.1 | 0.9982 | Slope | 1.006393 | 0.90 - 1.10 |
| 4.1 | 4.1 | 0.9789 | | | |
| | | | Intercept | -0.067425 | +/-1.5 |



THC Calibration Plot

Date: September 27, 2017

Location: Wapasu





Wood Buffalo Environmental Association

O₃ Calibration Summary

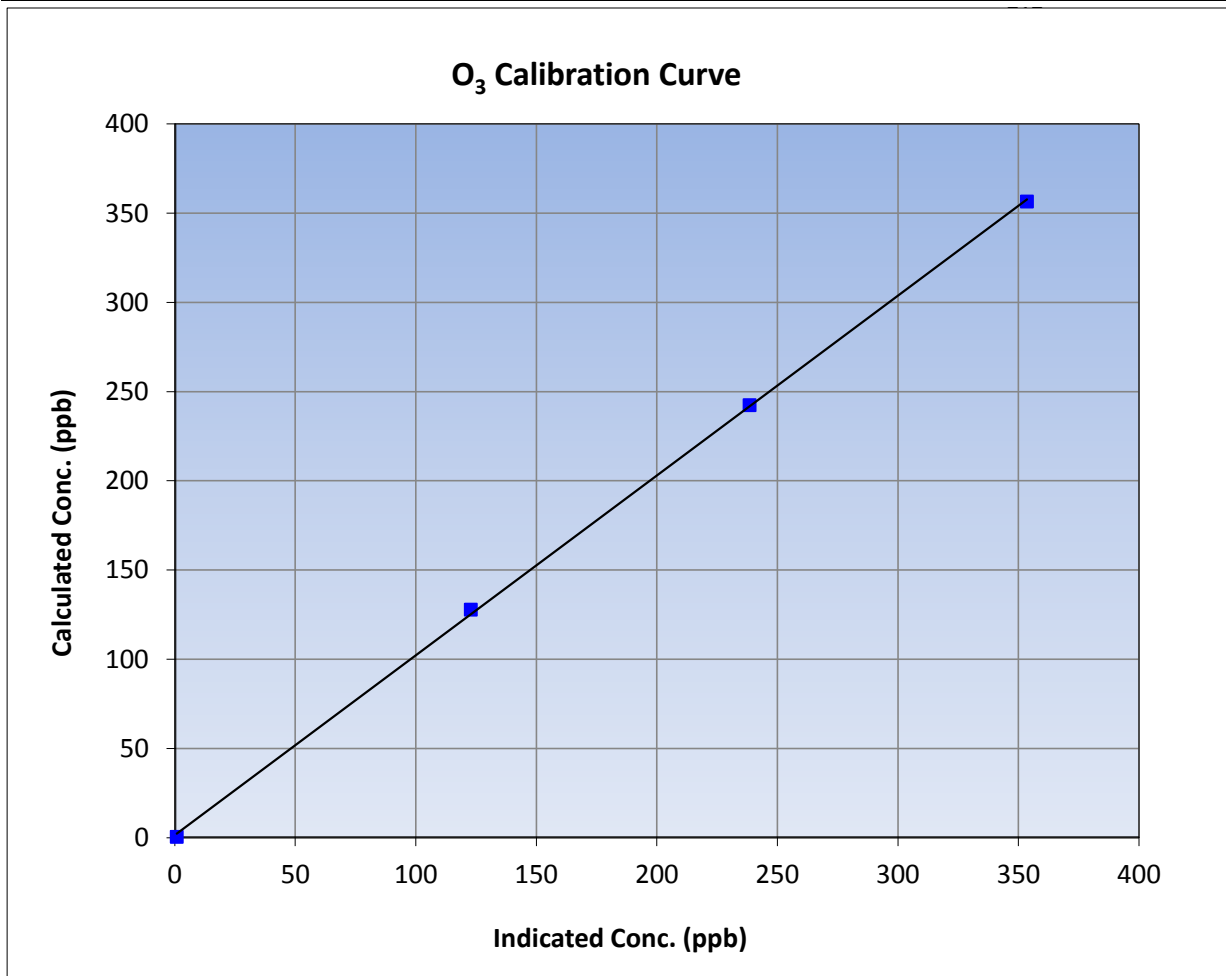
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 29, 2017 | Previous Calibration | August 24, 2017 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 8:30 | End Time (MST) | 9:24 |
| Analyzer make | Teledyne T400 | Analyzer serial # | 824 |

Calibration Data

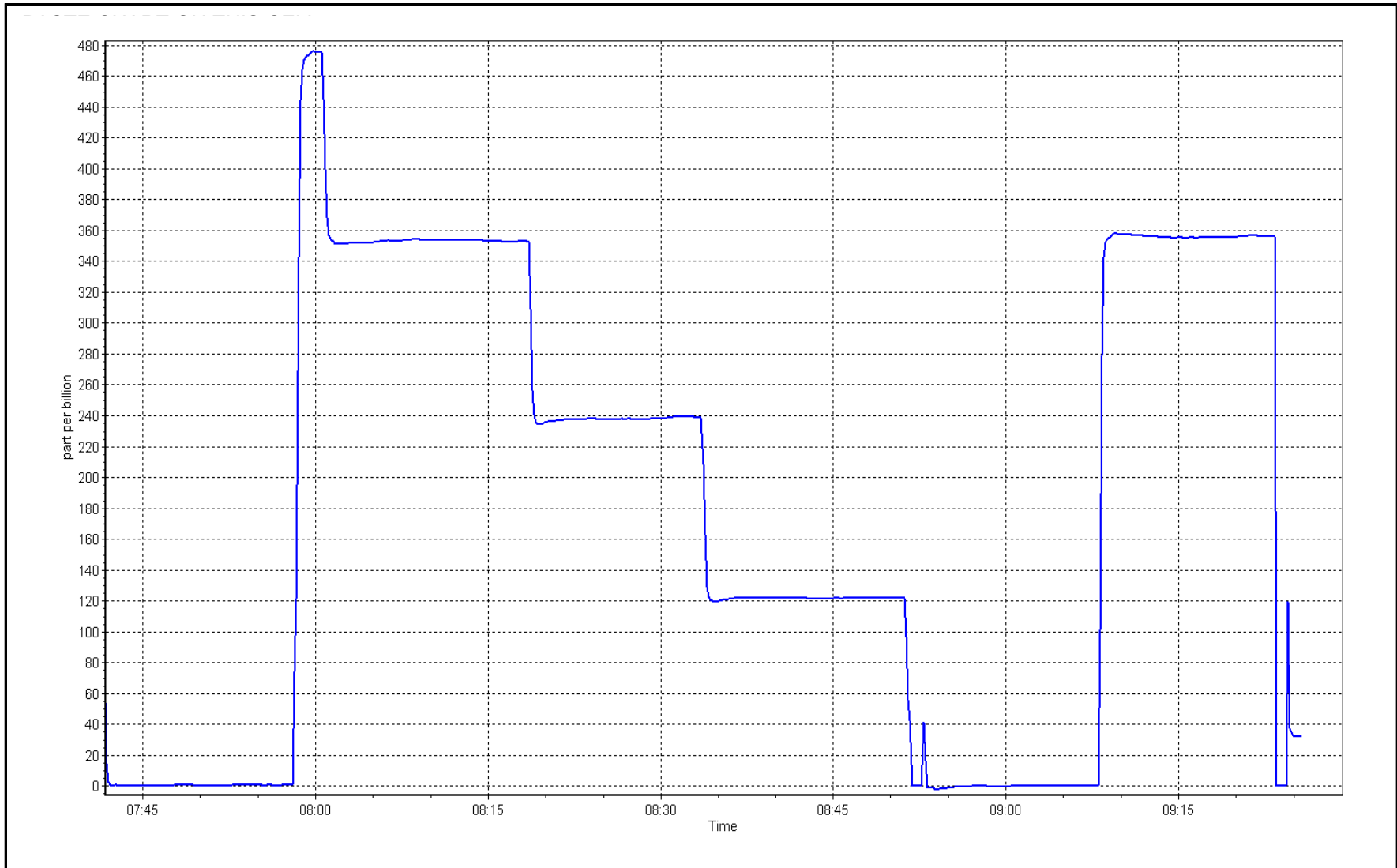
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|--------------|
| 0.0 | 0.5 | ---- | Correlation Coefficient | 0.999836 | ≥ 0.995 |
| 356.1 | 353.2 | 1.0082 | Slope | 1.008020 | 0.90 - 1.10 |
| 242.0 | 238.2 | 1.0160 | Intercept | 1.317683 | +/- 10 |
| 127.3 | 122.5 | 1.0392 | | | |



O₃ Calibration Plot

Date: September 29, 2017

Location: Wapasu





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Wapasu | Station number: | AMS 17 |
| Calibration Date: | September 27, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 7:07 | End time (MST): | 12:11 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-----------------|
| NO Gas Cylinder # | EY0000753 | Cal Gas Expiry Date | 2/22/2020 |
| NOX Cal Gas Conc. | <u>51.0</u> ppb | NO Cal Gas Conc. | <u>51.0</u> ppb |
| Calibrator Model | API T700 | Serial Number | 997 |
| ZAG make/model | API T701 | Serial Number | 4427 |

Analyzer Information

| | | | |
|-------------------------|--------------|------------------------|------------------------------|
| Analyzer make: API T200 | | Analyzer serial #: 722 | |
| | <u>Start</u> | <u>Finish</u> | |
| NO coefficient | 0.924 | 0.924 | NOX Range (ppb) 0 - 1000 ppb |
| NOX coefficient | 0.926 | 0.926 | PMT Temperature 7.0 7.0 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press 3.2 3.2 |
| NO bkgrnd | 0.8 | 0.8 | Sample Flow 441 441 |
| NOX bkgrnd | 1.6 | 1.6 | HVPS Voltage 781 781 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.996743 | 1.001204 |
| NO _x Cal Offset | 1.891006 | 2.017393 |
| NO Cal Slope | 1.000549 | 1.005663 |
| NO Cal Offset | 1.940180 | 1.580905 |
| NO ₂ Cal Slope | 1.002845 | 1.019105 |
| NO ₂ Cal Offset | -0.158491 | 0.433367 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5097 | 0.0 | 0.0 | 0.0 | 0.0 | -0.7 | -0.8 | 0.1 | ---- | ---- |
| as found span | 5025 | 78.4 | 783.5 | 783.5 | 0.0 | 781.2 | 777.9 | 3.4 | 1.0029 | 1.0072 |
| calibrator zero | 5097 | 0.0 | 0.0 | 0.0 | 0.0 | -0.7 | -0.8 | 0.1 | ---- | ---- |
| high point | 5025 | 78.4 | 783.5 | 783.5 | 0.0 | 781.2 | 777.9 | 3.4 | 1.0029 | 1.0072 |
| second point | 5063 | 39.2 | 391.8 | 391.8 | 0.0 | 388.6 | 387.6 | 1.1 | 1.0083 | 1.0109 |
| third point | 5083 | 19.6 | 195.9 | 195.9 | 0.0 | 192.4 | 192.5 | -0.2 | 1.0182 | 1.0177 |
| as left zero | 5097 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.2 | -0.2 | ---- | ---- |
| as left span | 5025 | 78.4 | 783.5 | 423.3 | 360.2 | 768.6 | 422.6 | 346.0 | 1.0194 | 1.0017 |
| Average Correction Factor | | | | | | | | | 1.0098 | 1.0119 |

| | | | | | |
|--------------------|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 781.9 ppb | NO = 778.7 ppb | | *Percent Change | NO _x = 0.3% |
| Previous Response | NO _x = 784.1 ppb | NO = 781.1 ppb | | *Percent Change | NO = 0.3% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 779.3 | 779.4 | -0.1 | 1.0054 | 1.0052 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 423.3 | 356.1 | 773.3 | 423.3 | 349.9 | 1.0132 | ---- | 1.0177 | 98.3% |
| 2nd NO2 (200 ppb O3) | 537.4 | 242.0 | 773.2 | 537.4 | 235.8 | 1.0133 | ---- | 1.0263 | 97.4% |
| 3rd NO2 (100 ppb O3) | 652.1 | 127.3 | 775.3 | 652.1 | 124.3 | 1.0105 | ---- | 1.0241 | 97.6% |
| 2nd NO ref point | ---- | 0.0 | 774.6 | 775.3 | -0.7 | 1.0115 | 1.0105 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0121 | 1.0079 | 1.0227 | 97.8% |

Notes: no maintenance or adjustments done,

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

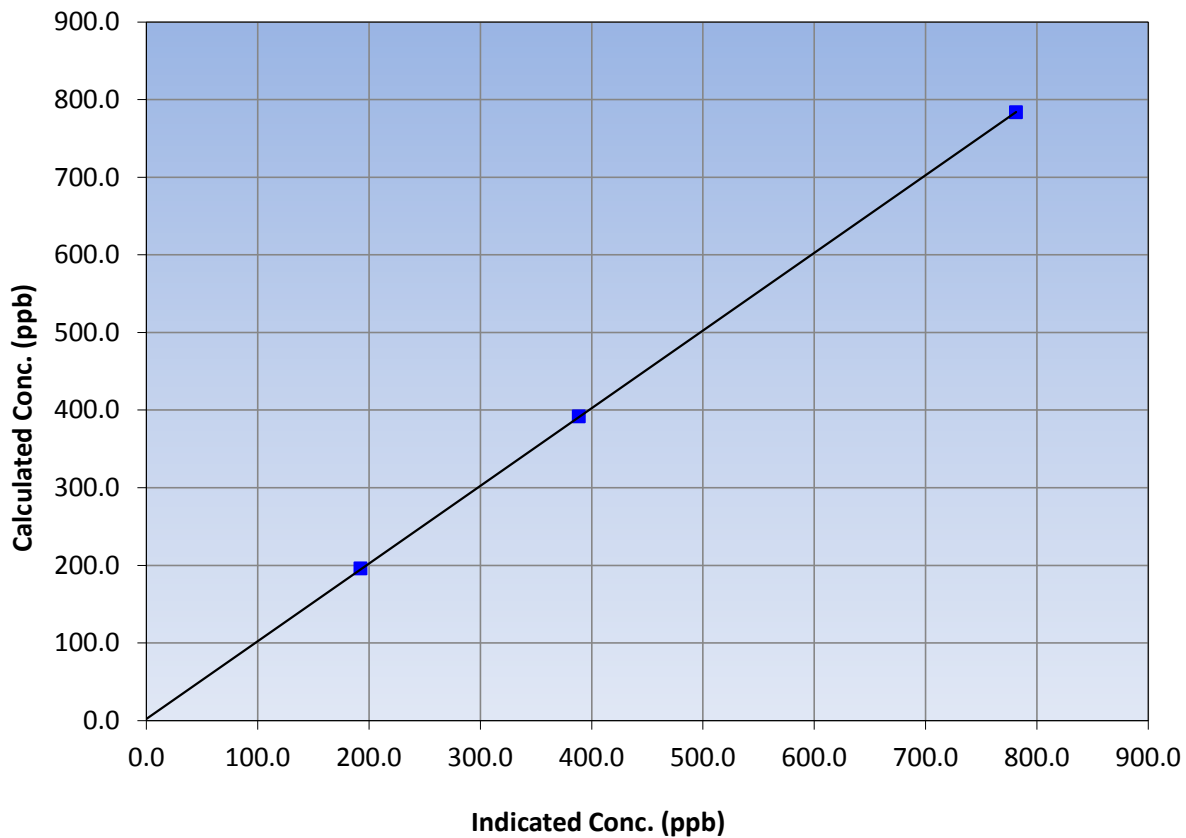
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 7:07 | End Time (MST) | 12:11 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.7 | ---- | Correlation Coefficient | ≥0.995 | |
| 783.5 | 781.2 | 1.0029 | | | |
| 391.8 | 388.6 | 1.0083 | | | |
| 195.9 | 192.4 | 1.0182 | | | |
| | | | Slope | 1.001204 | 0.90 - 1.10 |
| | | | Intercept | 2.017393 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

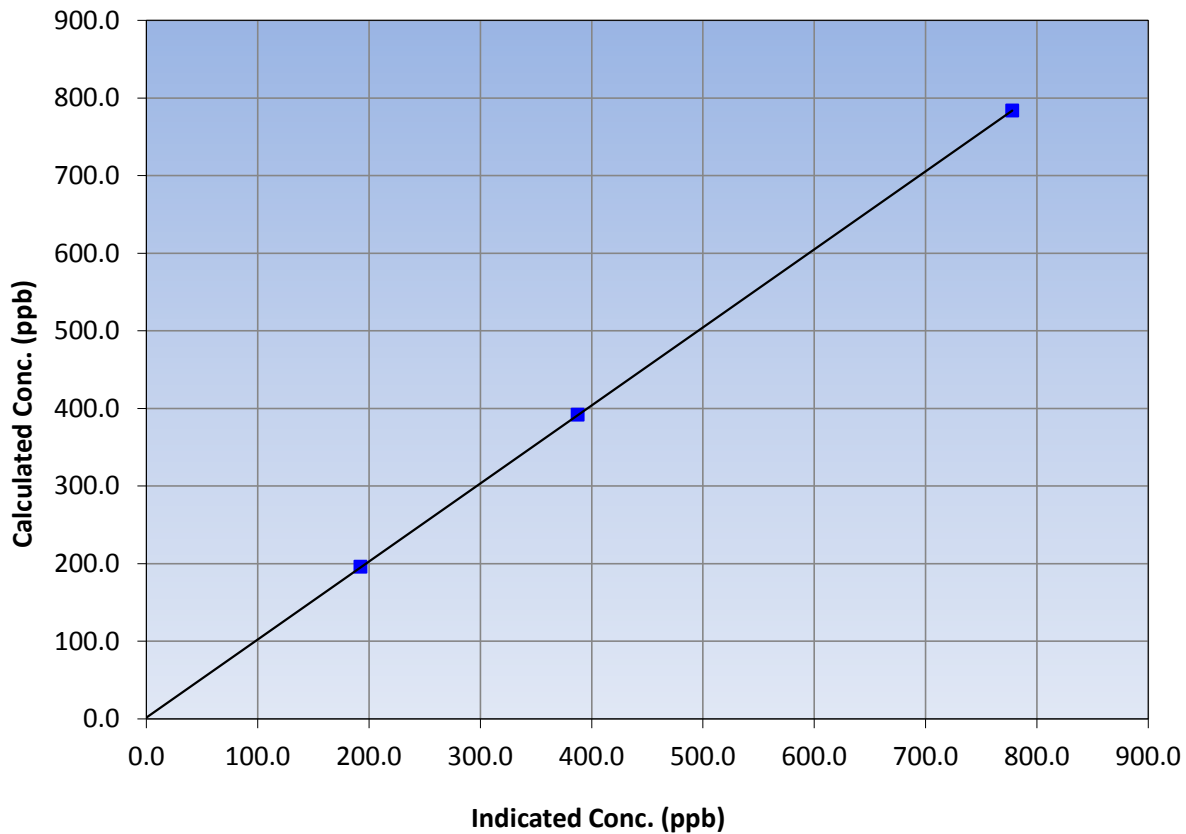
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 7:07 | End Time (MST) | 12:11 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.8 | ---- | Correlation Coefficient | ≥0.995 | |
| 783.5 | 777.9 | 1.0072 | | | |
| 391.8 | 387.6 | 1.0109 | | | |
| 195.9 | 192.5 | 1.0177 | | | |
| | | | Slope | 1.005663 | 0.90 - 1.10 |
| | | | Intercept | 1.580905 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

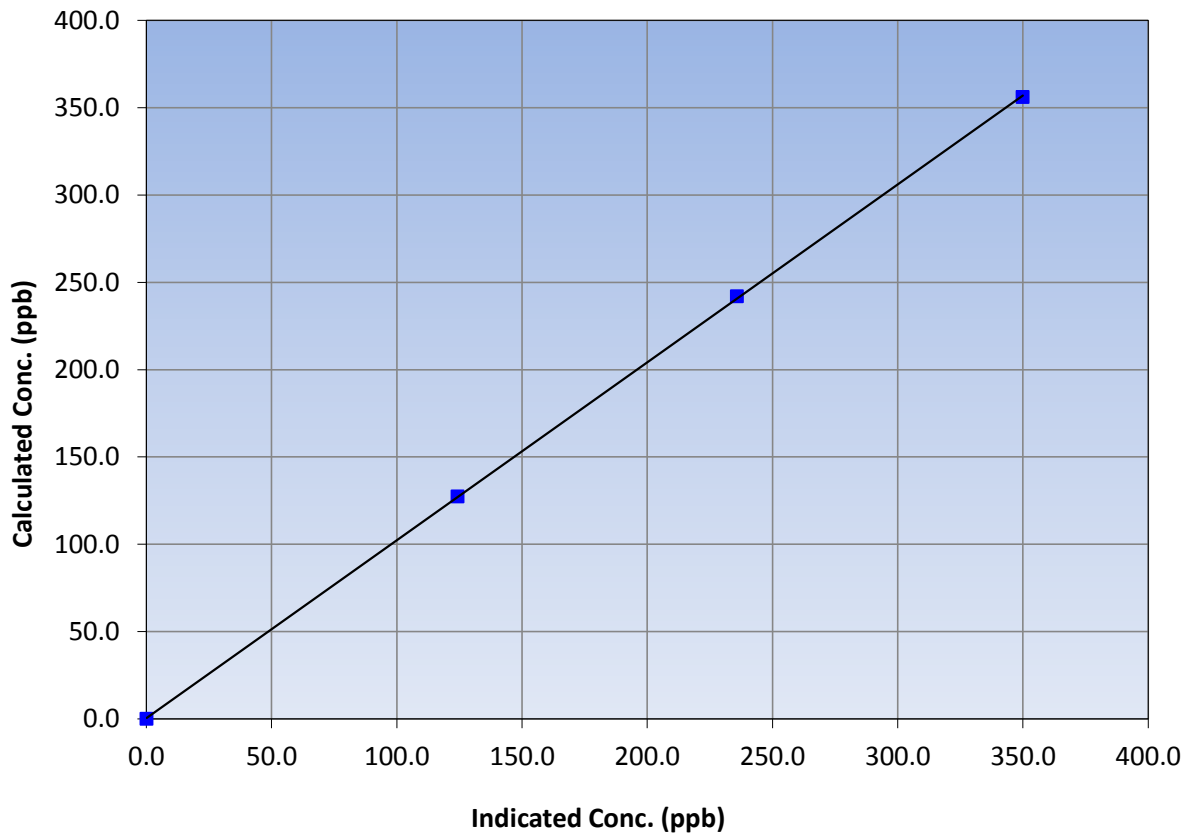
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 7:07 | End Time (MST) | 12:11 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 356.1 | 349.9 | 1.0177 | | | |
| 242.0 | 235.8 | 1.0263 | | | |
| 127.3 | 124.3 | 1.0241 | | | |
| | | | Slope | 1.019105 | 0.90 - 1.10 |
| | | | Intercept | 0.433367 | +/-20 |

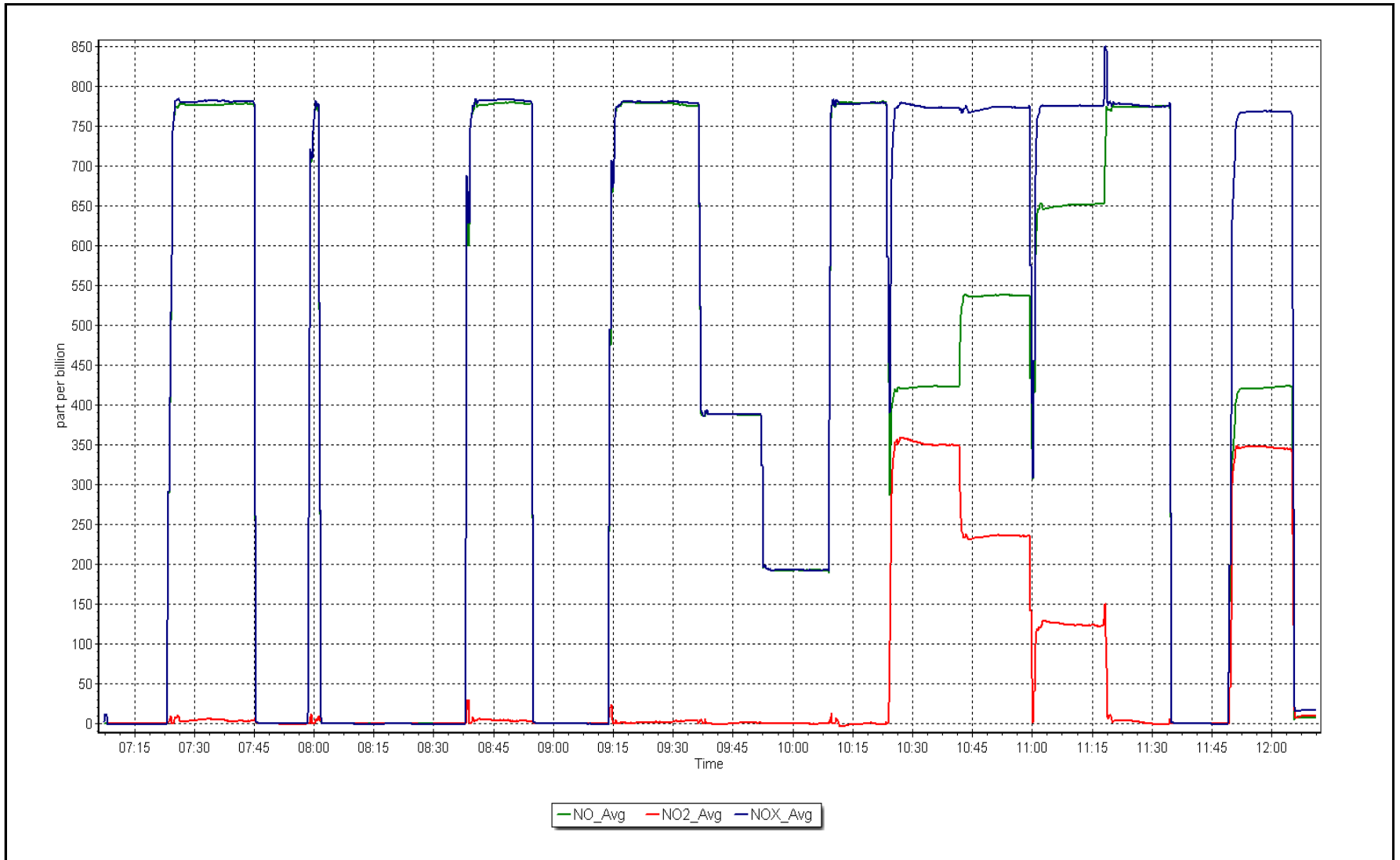
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 27, 2017

Location: Wapasu





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|-----------------|
| Station Name: | Wapasu | Station number: | AMS 17 |
| Calibration Date: | September 29, 2017 | Last Cal Date: | August 24, 2017 |
| Start time (MST): | 7:11 | End time (MST): | 7:41 |
| Sharp Model: | 5030 | S/N: | CM-2390 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 10391 |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1451 |
| Temp/RH standard: | Delta Cal | S/N: | 1451 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 13 | 12.2 | 13 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 947 | 953 | 947 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1021 | 1000 | <input checked="" type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.4 | ----- | 0.4 | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: July 12, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: _____

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-----------------------------------|--------------------------|---------------------------------|-----------------|
| <input type="checkbox"/> | Foil S/N: _____ | Foil S/N: 2519 | |
| Foil Calibration | Foil Mass: _____ | Foil Mass: 1326 | |
| | Calibration Date: _____ | Calibration Date: July 12, 2017 | |
| (Limit) +/- 5% of previous | Correction Factor: _____ | Correction Factor: 7090 | --- |

Annual Calibration Test

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

Notes: Cyclone Head Cleaned; Flow adjusted

Calibration by: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 18
STONY MOUNTAIN
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 684 | 35 | 36 | 99.86 | 5 | 0 | 1 | 0 |
| TRS(ppb) Average | 687 | 33 | 33 | 100 | 1 | 0 | 0 | 0 |
| THC(ppm) Average | 683 | 35 | 37 | 99.72 | 2.3 | - | 2.1 | - |
| NMHC(ppm) Average | 683 | 35 | 37 | 99.72 | 0.199 | - | 0.087 | - |
| CH4(ppm) Average | 683 | 35 | 37 | 99.72 | 2.3 | - | 2.1 | - |
| O3 (ppb) Average | 686 | 33 | 34 | 99.86 | 77 | 0 | 59 | - |
| NO2 (ppb) Average | 682 | 35 | 38 | 99.58 | 4 | 0 | 2 | - |
| NO (ppb) Average | 682 | 35 | 38 | 99.58 | 1 | - | 0 | - |
| NOX (ppb) Average | 682 | 35 | 38 | 99.58 | 4 | - | 2 | - |
| PM2.5 (ug/m3) Average | 718 | 2 | 2 | 100 | 56 | - | 21.6 | 0 |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 18 | - | 13 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | 0 | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 28 | - | 20.6 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 100 | - | 99.0 | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100 | 30.2 | - | 59.9 | - |
| Leaf Wetness (% of range) Average | 720 | 0 | 0 | 100 | 36 | - | 29.0 | - |
| Global Solar Radiation (W/m2) Average | 720 | 0 | 0 | 100 | 754 | - | 235.0 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|---------------------------------------|--------|-------|--------|--------|------------|-----|-----|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 684 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| TRS (ppb) Average | 687 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 683 | 1.95 | 0.1 | - | 1.9 | 1.9 | 1.9 | 1.9 | 2 | 2 | 2.3 |
| NMHC(ppm) Average | 683 | 0.018 | 0.031 | - | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.199 |
| CH4(ppm) Average | 683 | 1.93 | 0.1 | - | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2 | 2.3 |
| O3 (ppb) Average | 686 | 31.1 | 10 | - | 12 | 21 | 25 | 30 | 36 | 41 | 77 |
| NO2 (ppb) Average | 682 | 0.9 | 1 | - | 0 | 0 | 0 | 1 | 1 | 2 | 4 |
| NO (ppb) Average | 682 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| NOX (ppb) Average | 682 | 0.9 | 1 | - | 0 | 0 | 0 | 1 | 1 | 2 | 4 |
| PM2.5 (ug/m3) Average | 718 | 5.06 | 6.1 | - | 0.8 | 1.3 | 1.9 | 3.2 | 5.7 | 10.8 | 56 |
| Wind Speed 10 m (km/h) Average | 720 | 7.3 | 3 | - | 0 | 3 | 5 | 7 | 10 | 12 | 18 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 11.14 | 6 | - | 0.5 | 3.1 | 5.9 | 11.2 | 15.4 | 18.9 | 28 |
| Relative Humidity (%) Average | 720 | 70.1 | 20 | - | 27 | 42 | 54 | 69 | 87 | 99 | 100 |
| Precipitation (mm) Total | 720 | - | - | 187.42 | - | - | - | - | - | - | - |
| Surface Wetness (% of range) Average | 720 | 5.7 | 8 | - | 0 | 1 | 1 | 2 | 5 | 21 | 36 |
| Global Solar Radiation (W/m2) Average | 720 | 146.3 | 214 | - | 0 | 0 | 0 | 11 | 248 | 534 | 754 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------------------|-------------------|-------------------|------------------|--|
| NO2, NO, NOX | 27 Sep 2017 11:00 | 27 Sep 2017 12:00 | 2 | Maintenance - confirmed calibration points for Ozone |
| NO2, NO, NOX ,O3, SO2 | 27 Sep 2017 17:00 | 27 Sep 2017 17:00 | 1 | Maintenance - manifold cleaning |
| NMHC, CH4, THC | 27 Sep 2017 17:00 | 27 Sep 2017 18:00 | 2 | Maintenance - manifold cleaning |



| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 5 ppb on Sep 6 12:00 | Maximum Daily Average: 1.0 ppb on Sep 6 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 20 14:00 | Minimum Daily Average: 0.0 ppb on Sep 21 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 0.5 ppb at hour 12 | Minimum Diurnal Average: 0.3 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 O 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-Sep | 0 | 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-Sep | 0 | 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-Sep | Z | 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 |
| 4-Sep | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.5 | 2 |
| 6-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1.0 | 5 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 |
| 8-Sep | 1 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 |
| 9-Sep | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 10-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 12-Sep | 0 | 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-Sep | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 17-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.4 | 1 |
| 18-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 1 |
| 19-Sep | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0.4 | 1 |
| 25-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.3 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.6 | 1 |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.5 | 1 |
| 30-Sep | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |

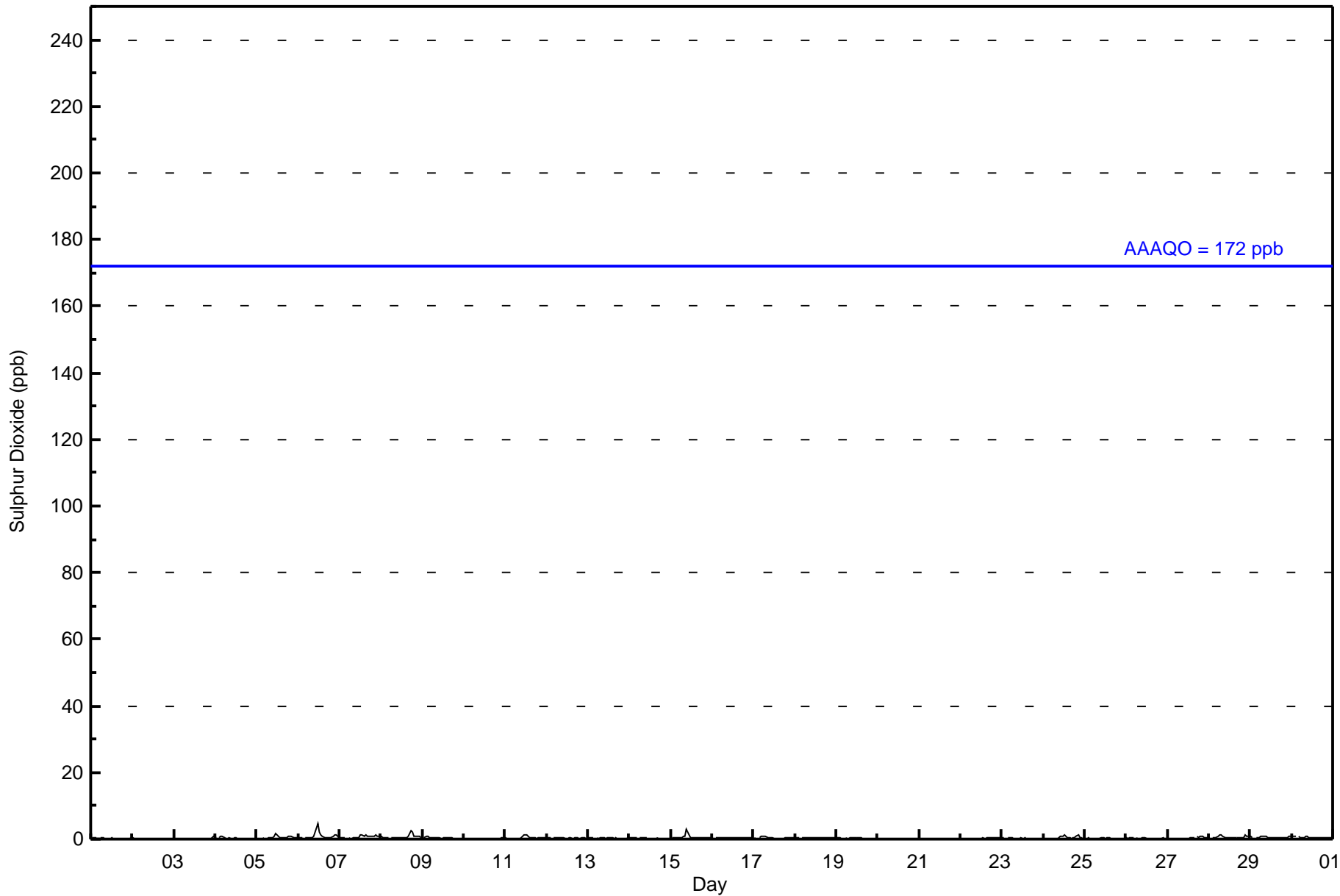
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.5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

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 684 | 100.00 | 100.00 |
| 11 - 20 | 0 | 0.00 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Stony Mountain - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 76 | 17 | 14 | 684 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 76 | 17 | 14 | 684 |

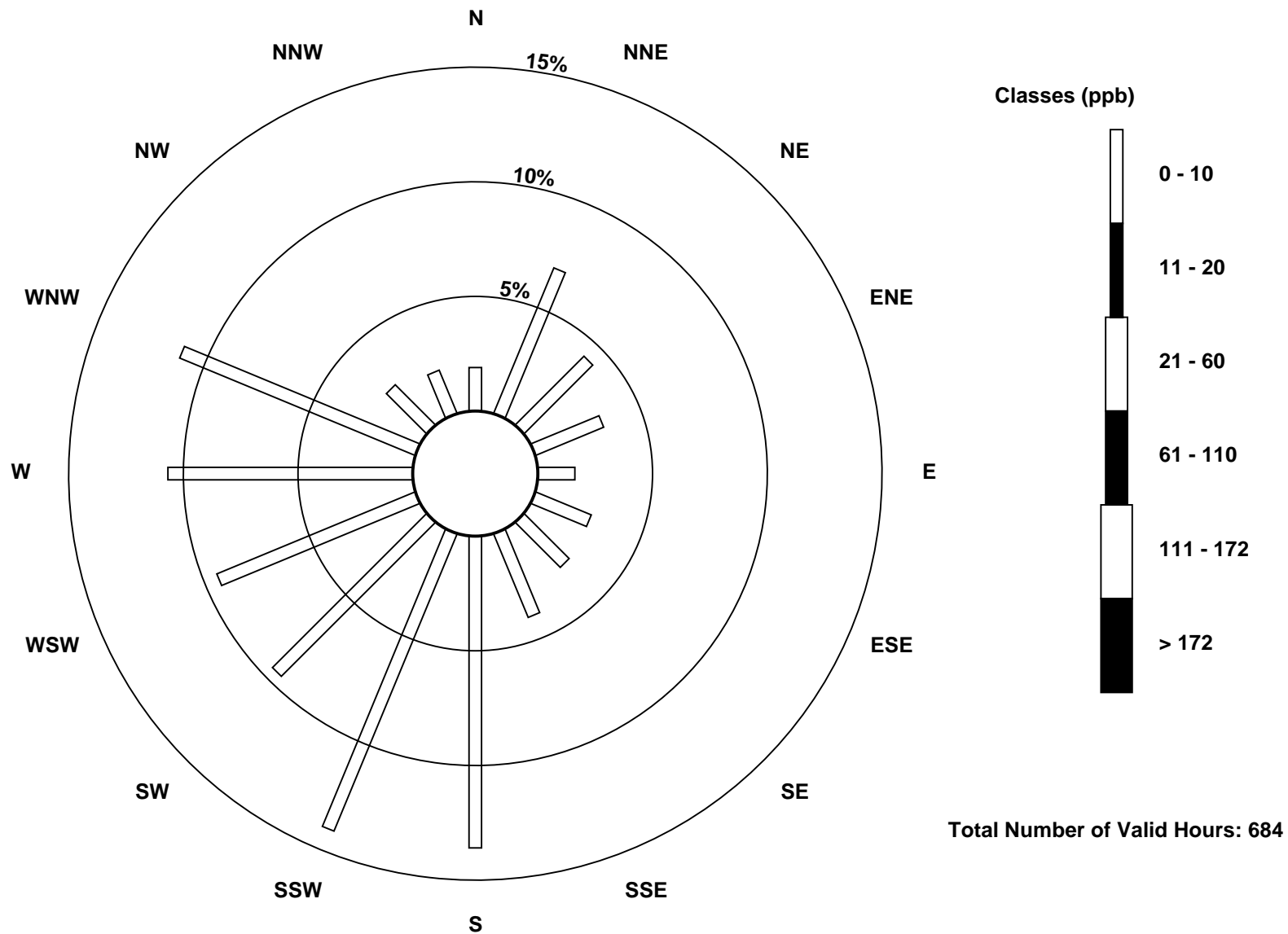
Total Number of Valid Hours: 684

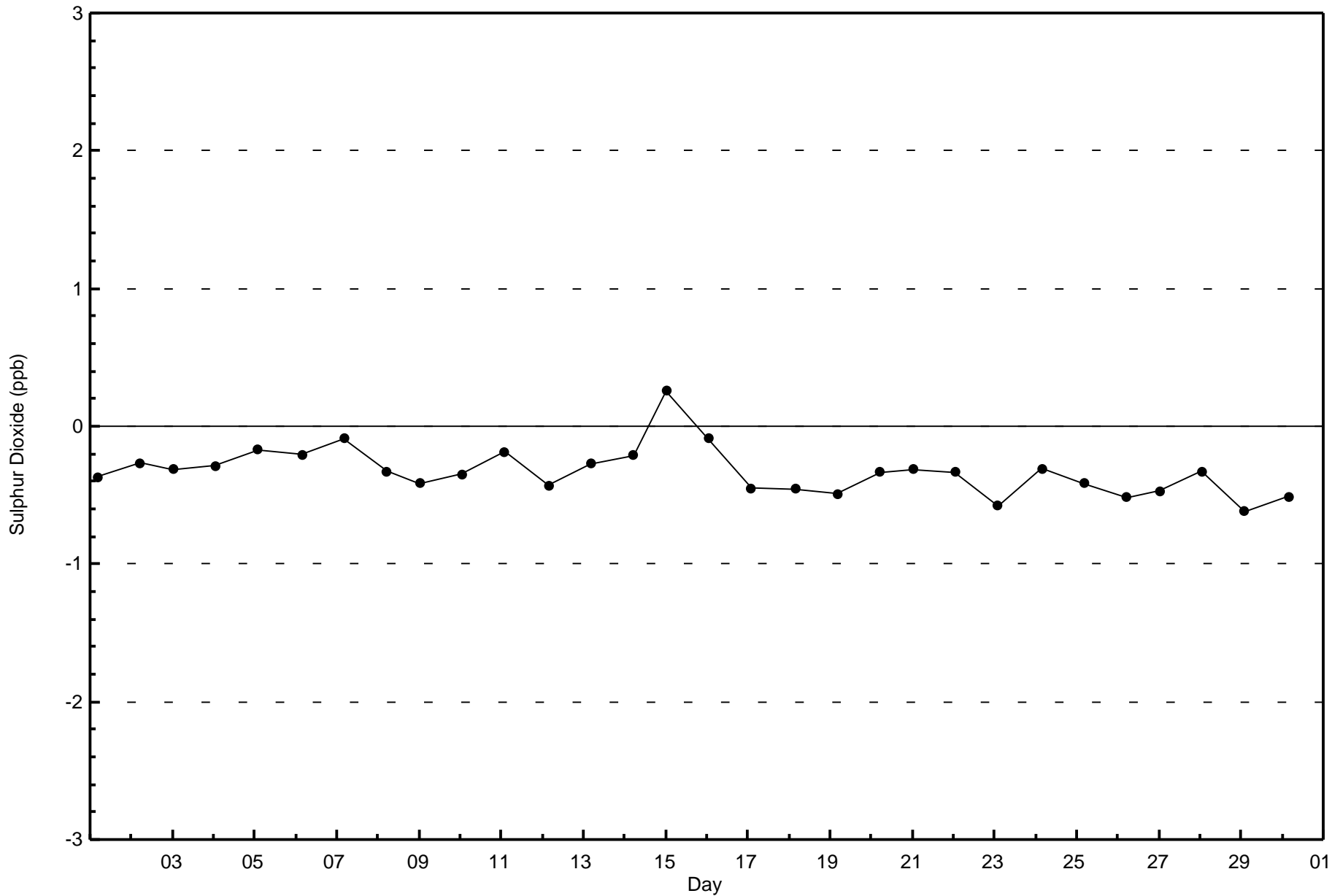
Total Number of Hours: 720

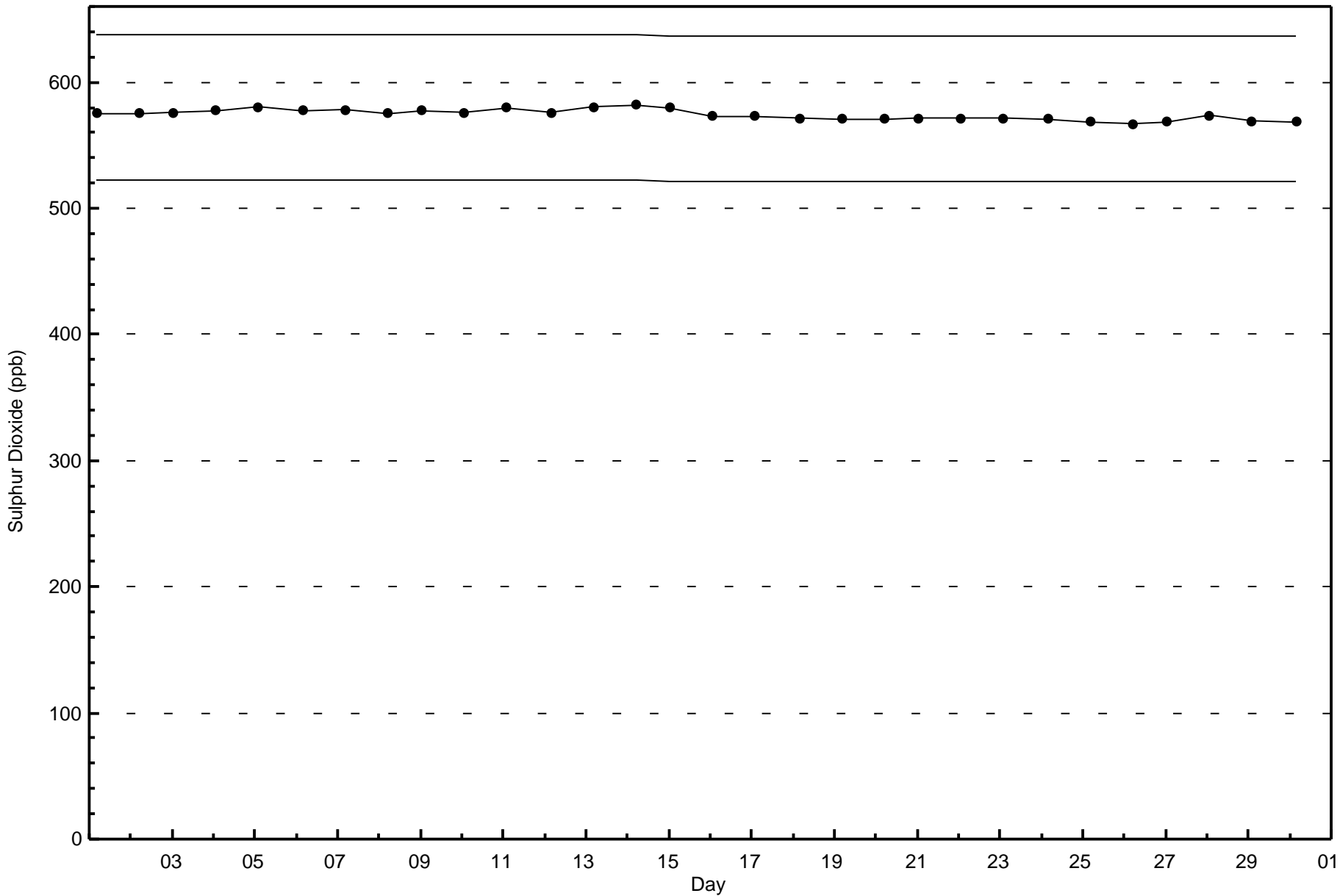


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Stony Mountain (AMS 18)



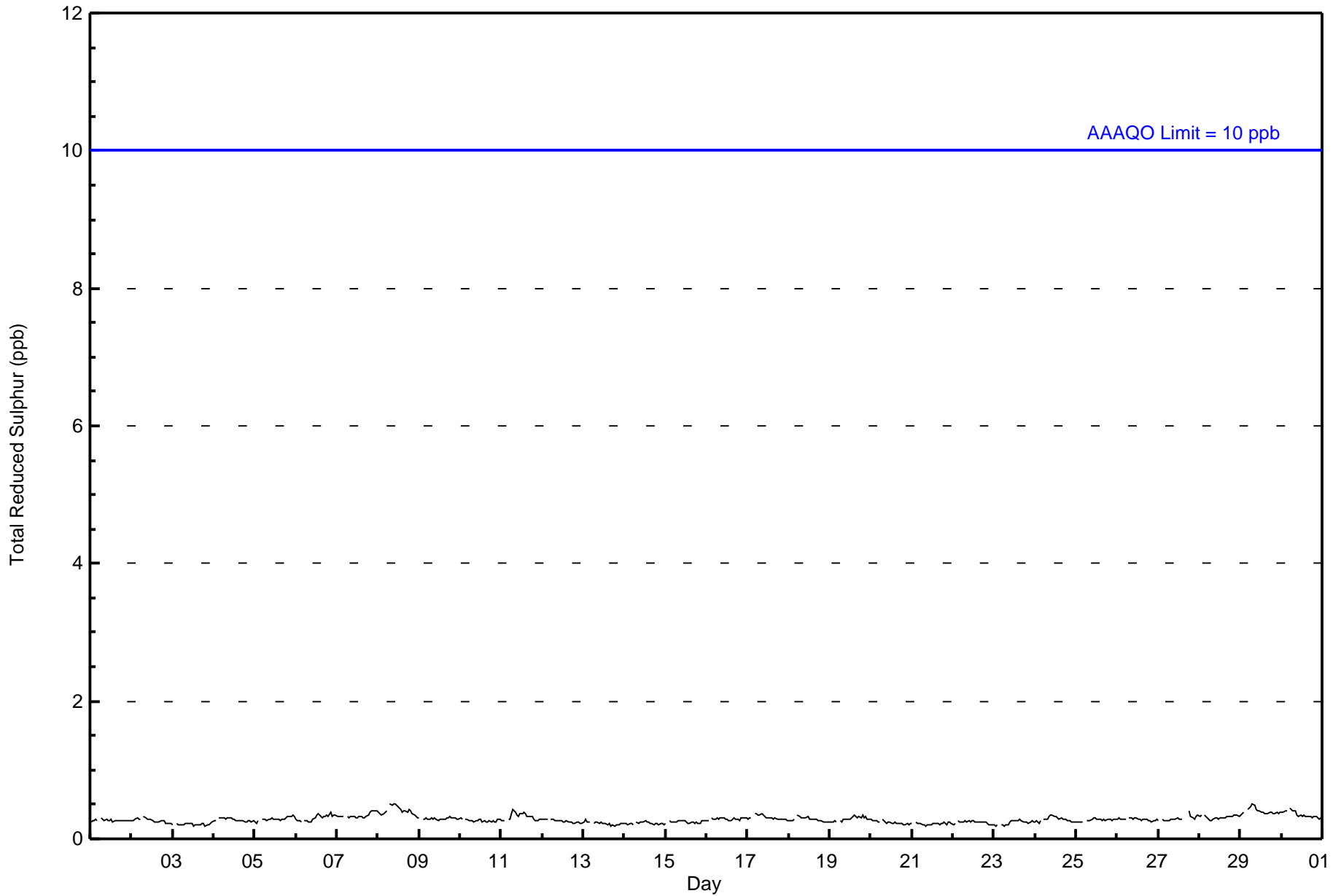






Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - September 2017**

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

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 14 | 48 | 27 | 21 | 11 | 18 | 19 | 30 | 92 | 96 | 64 | 69 | 73 | 75 | 17 | 13 | 687 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 14 | 48 | 27 | 21 | 11 | 18 | 19 | 30 | 92 | 96 | 64 | 69 | 73 | 75 | 17 | 13 | 687 |

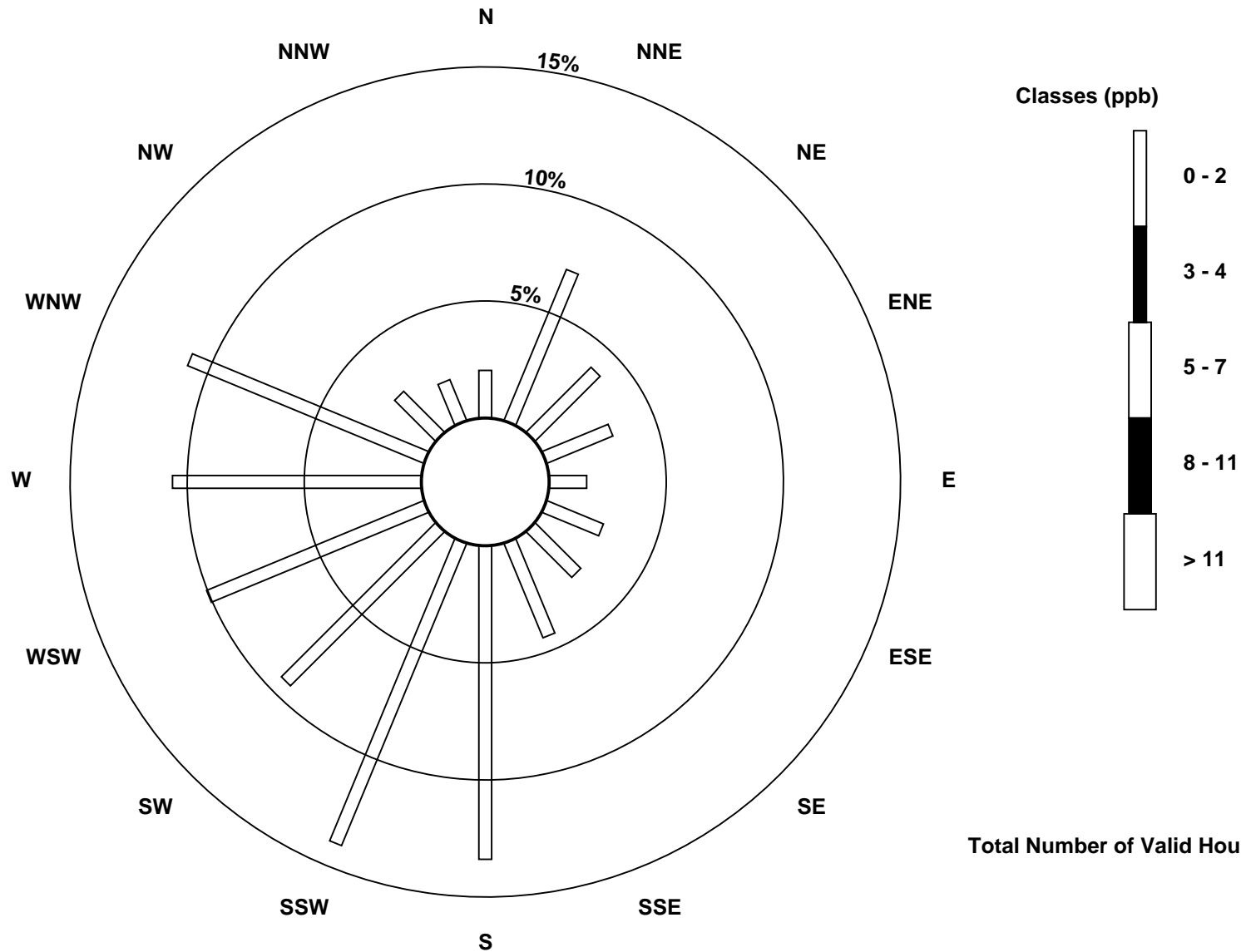
Total Number of Valid Hours: 687

Total Number of Hours: 720

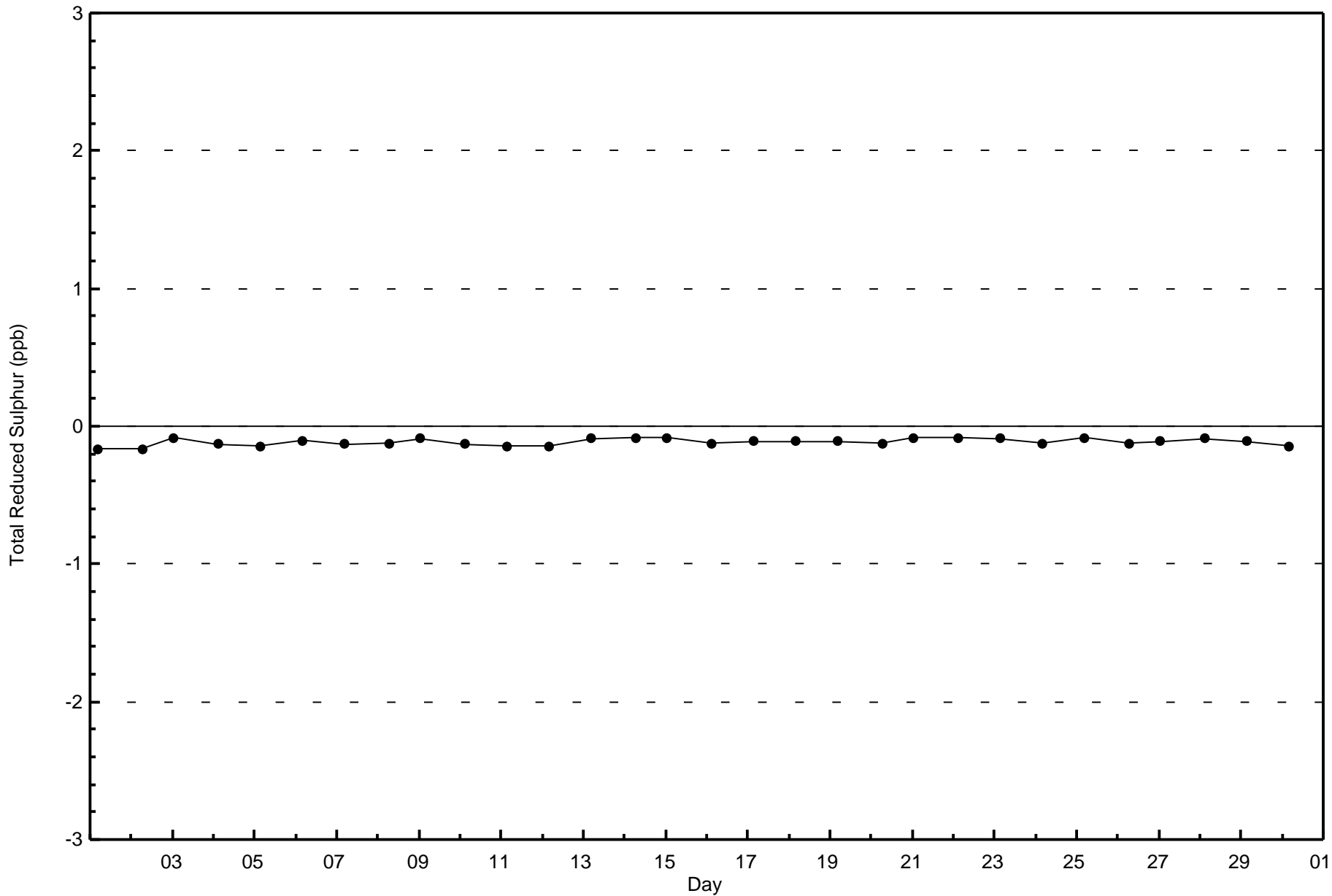


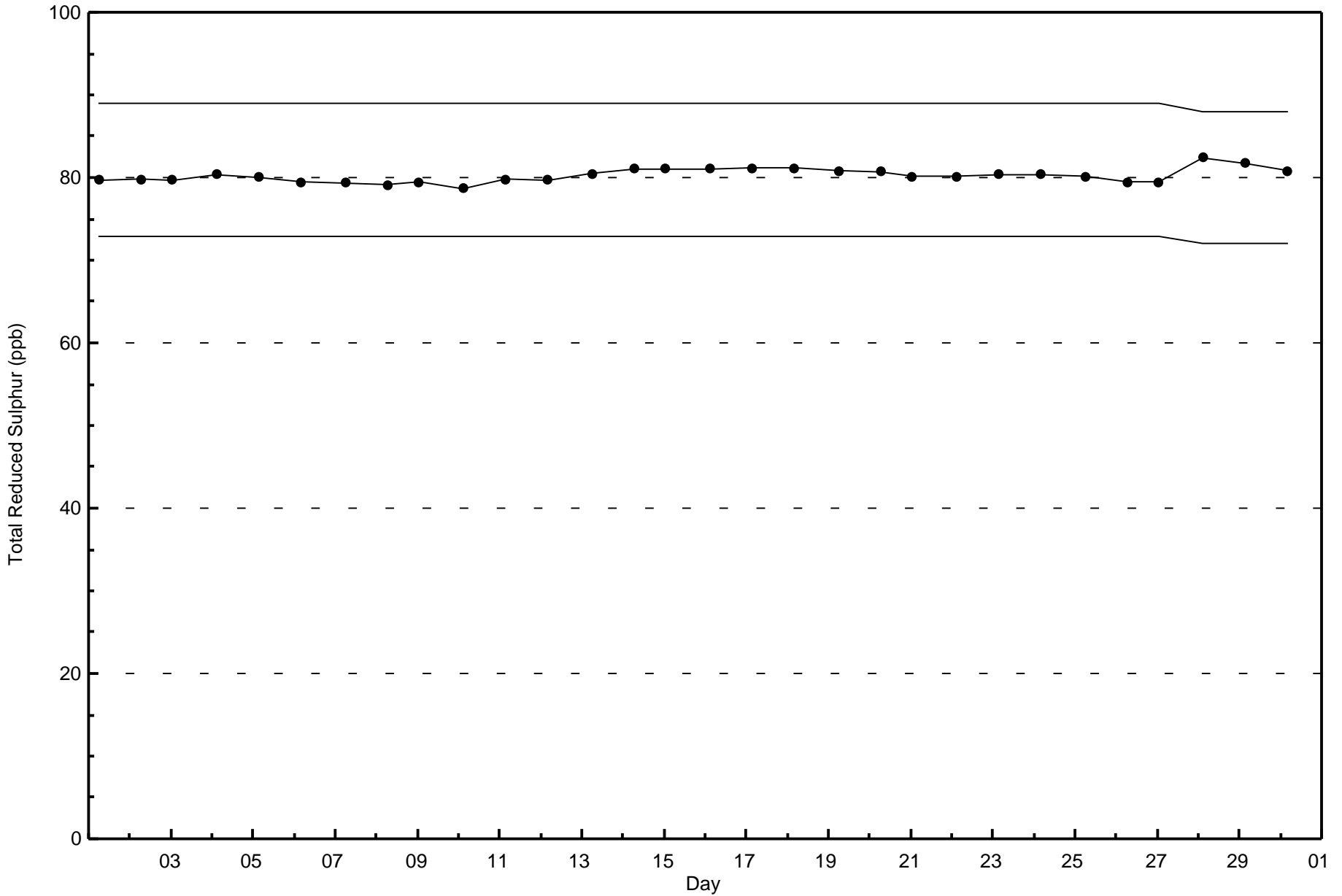
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Reduced Sulphur (TRS) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 687

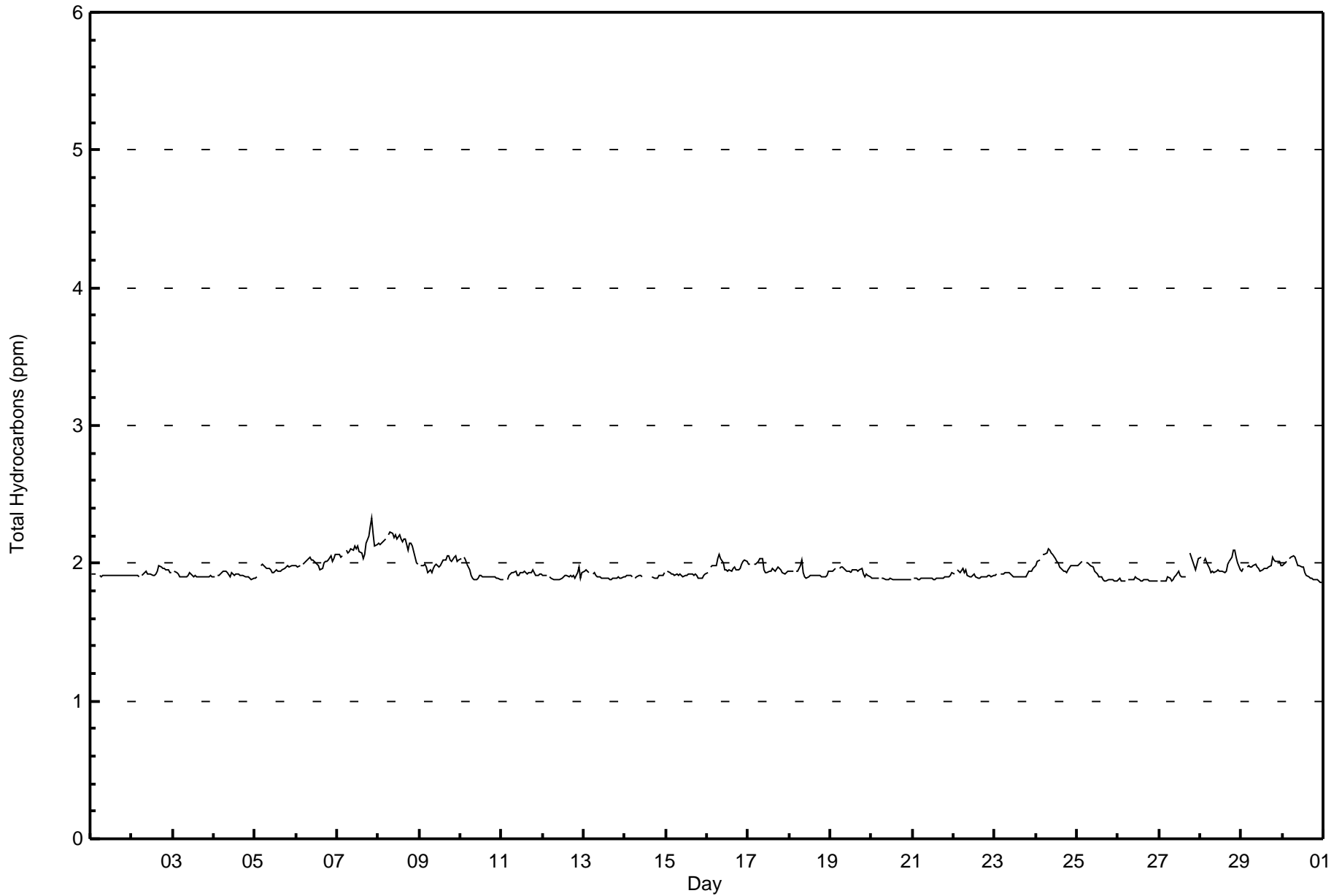






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 626 | 91.65 | 91.65 |
| 2.1 - 3.0 | 57 | 8.35 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 12 | 46 | 27 | 21 | 11 | 17 | 19 | 22 | 77 | 75 | 64 | 62 | 72 | 74 | 13 | 14 | 626 |
| 2.1 - 3.0 | 1 | 1 | 2 | 0 | 0 | 1 | 0 | 5 | 16 | 21 | 1 | 2 | 1 | 2 | 4 | 0 | 57 |
| 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 | 13 | 47 | 29 | 21 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 76 | 17 | 14 | 683 |

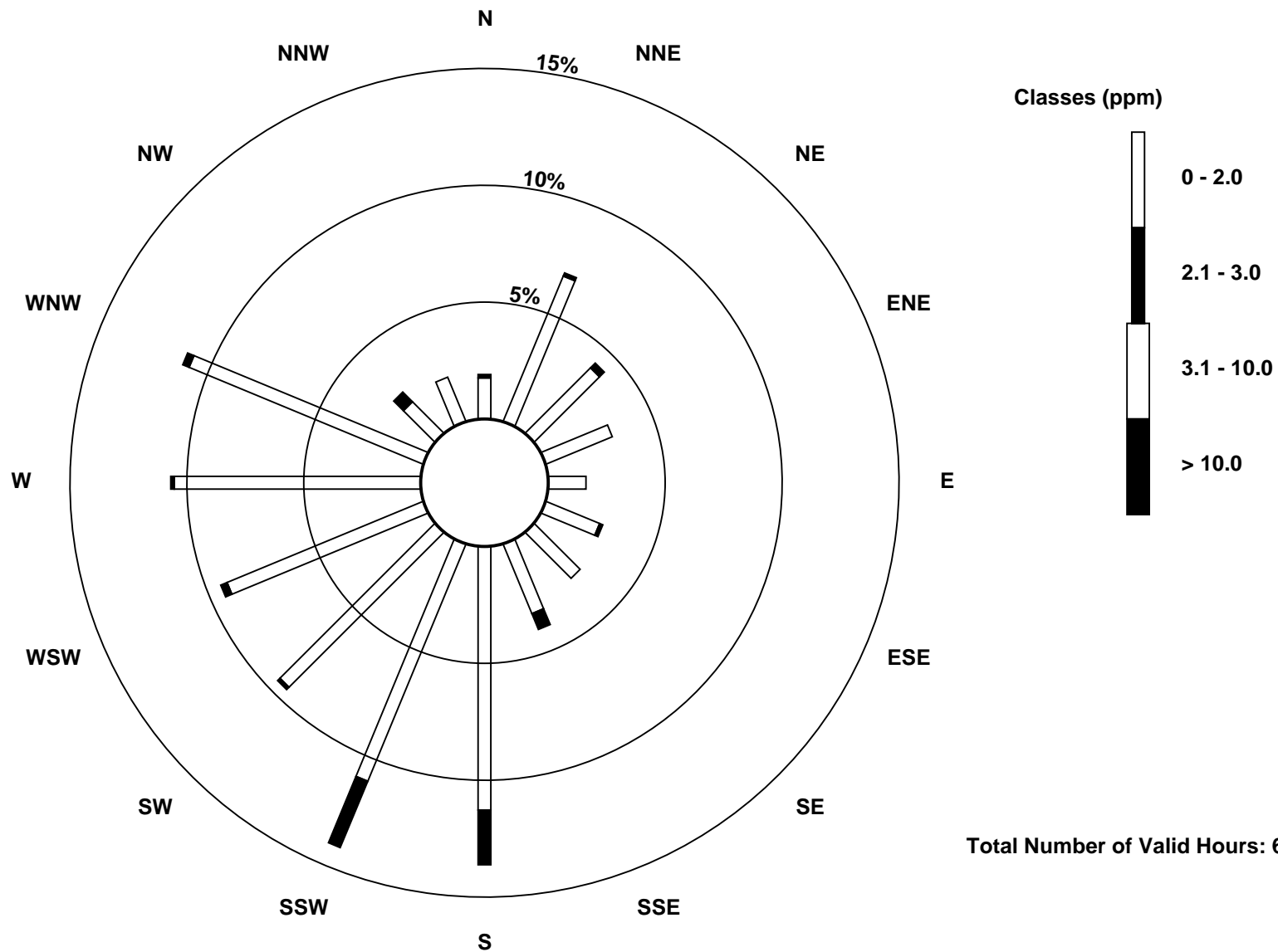
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Stony Mountain (AMS 18)



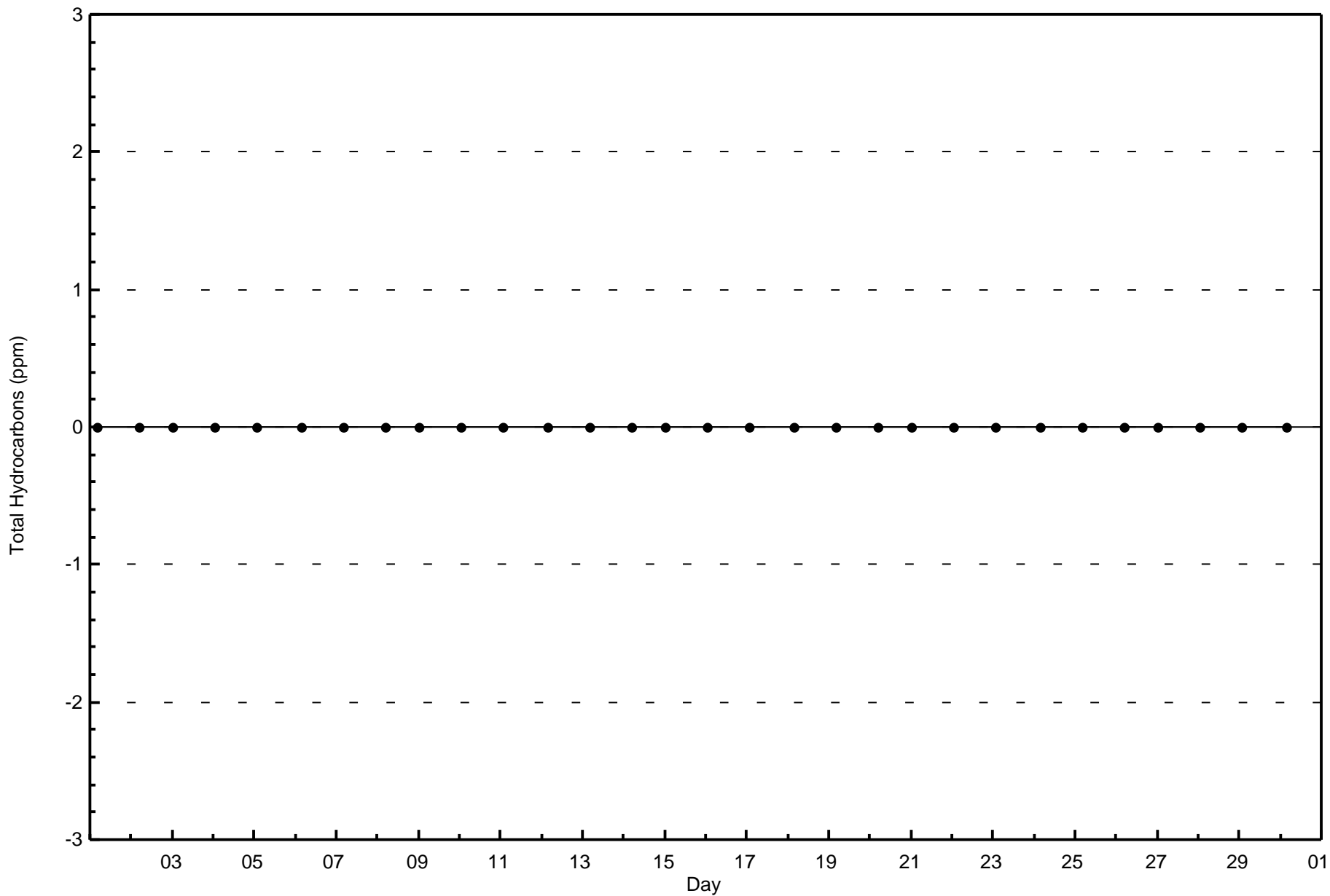


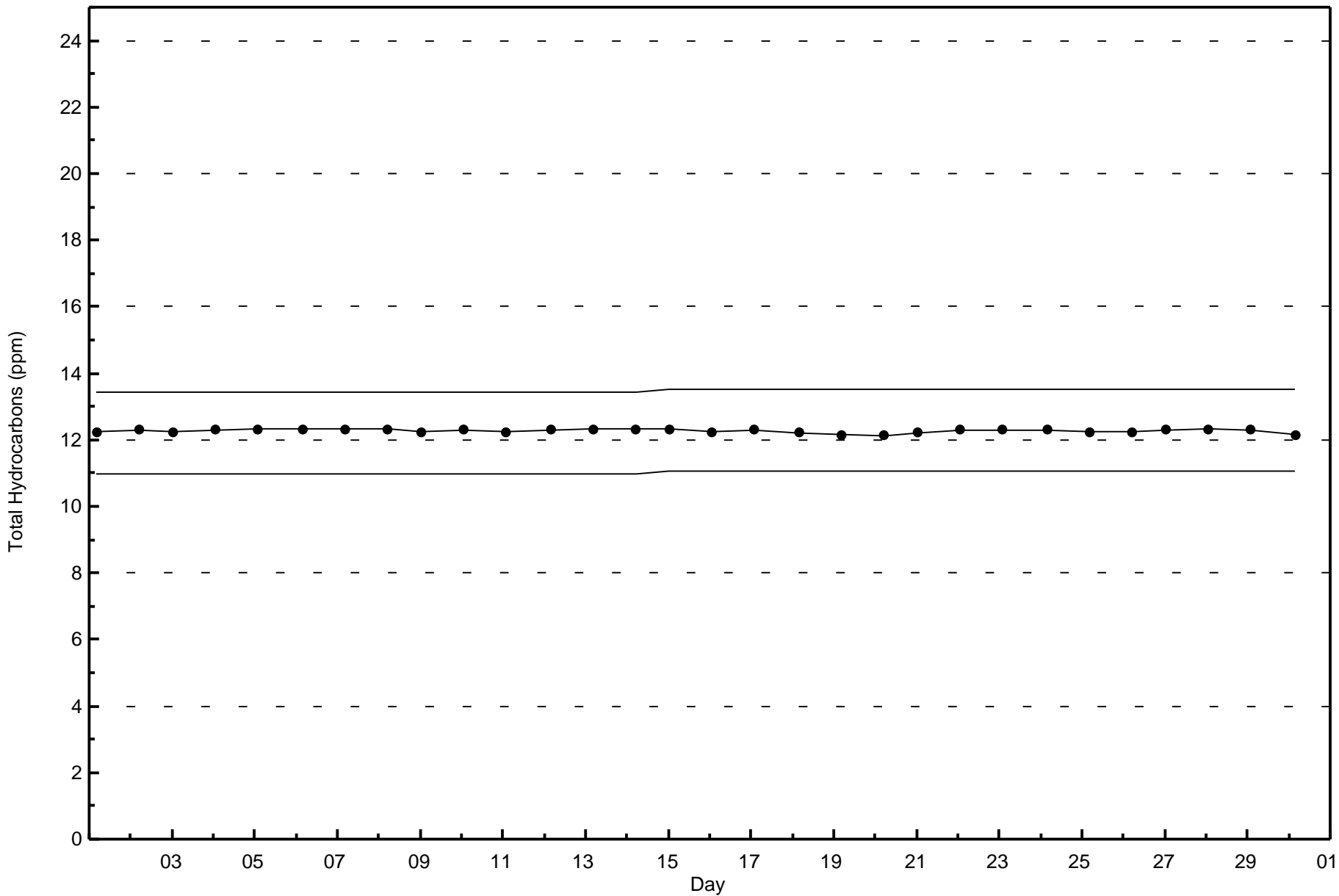
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Stony Mountain - September 2017

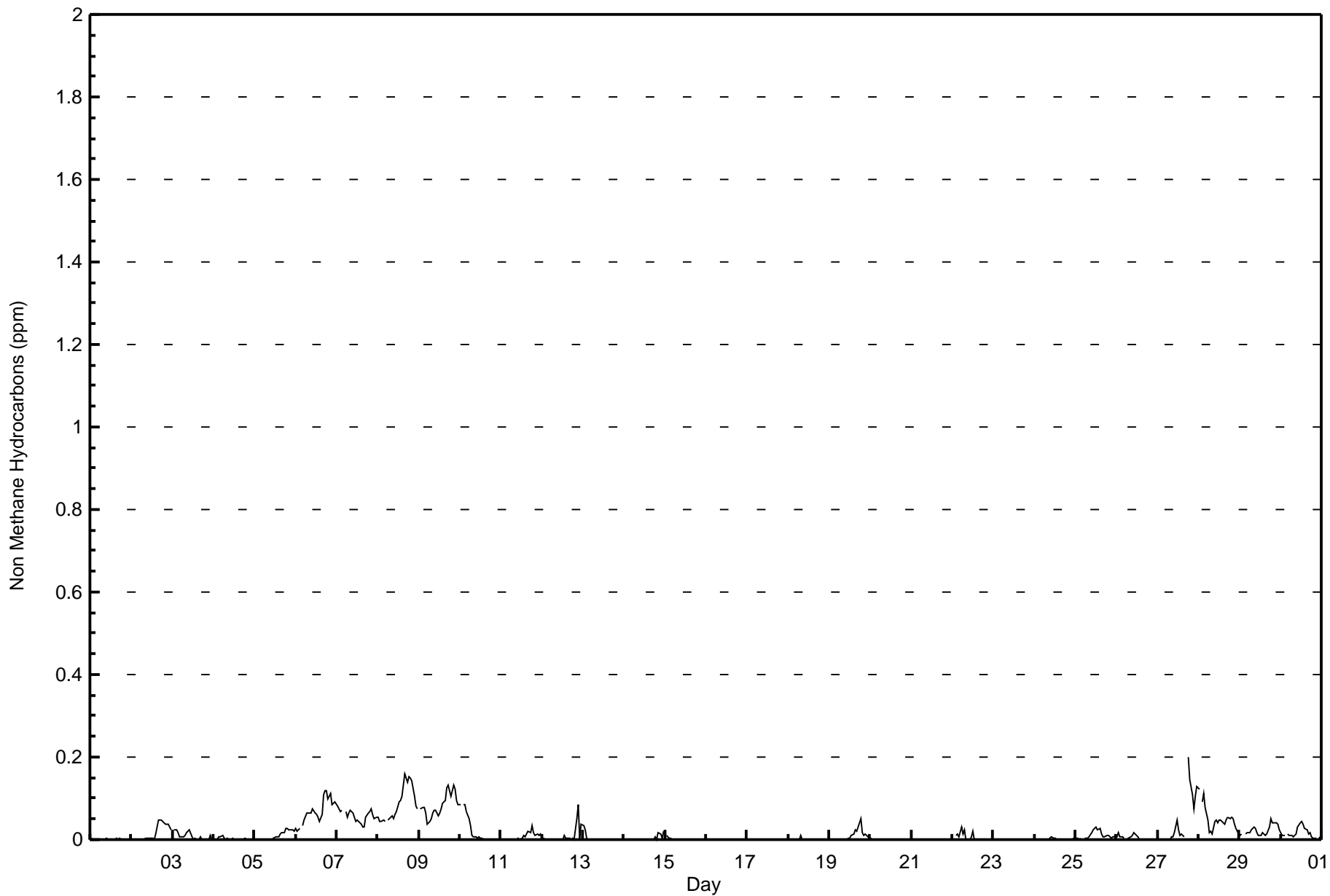






Wood Buffalo Environmental Association
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 406 | 59.44 | 59.44 |
| 0.006 - 0.05 | 197 | 28.84 | 88.29 |
| 0.06 - 0.1 | 77 | 11.27 | 99.56 |
| > 0.1 | 3 | 0.44 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



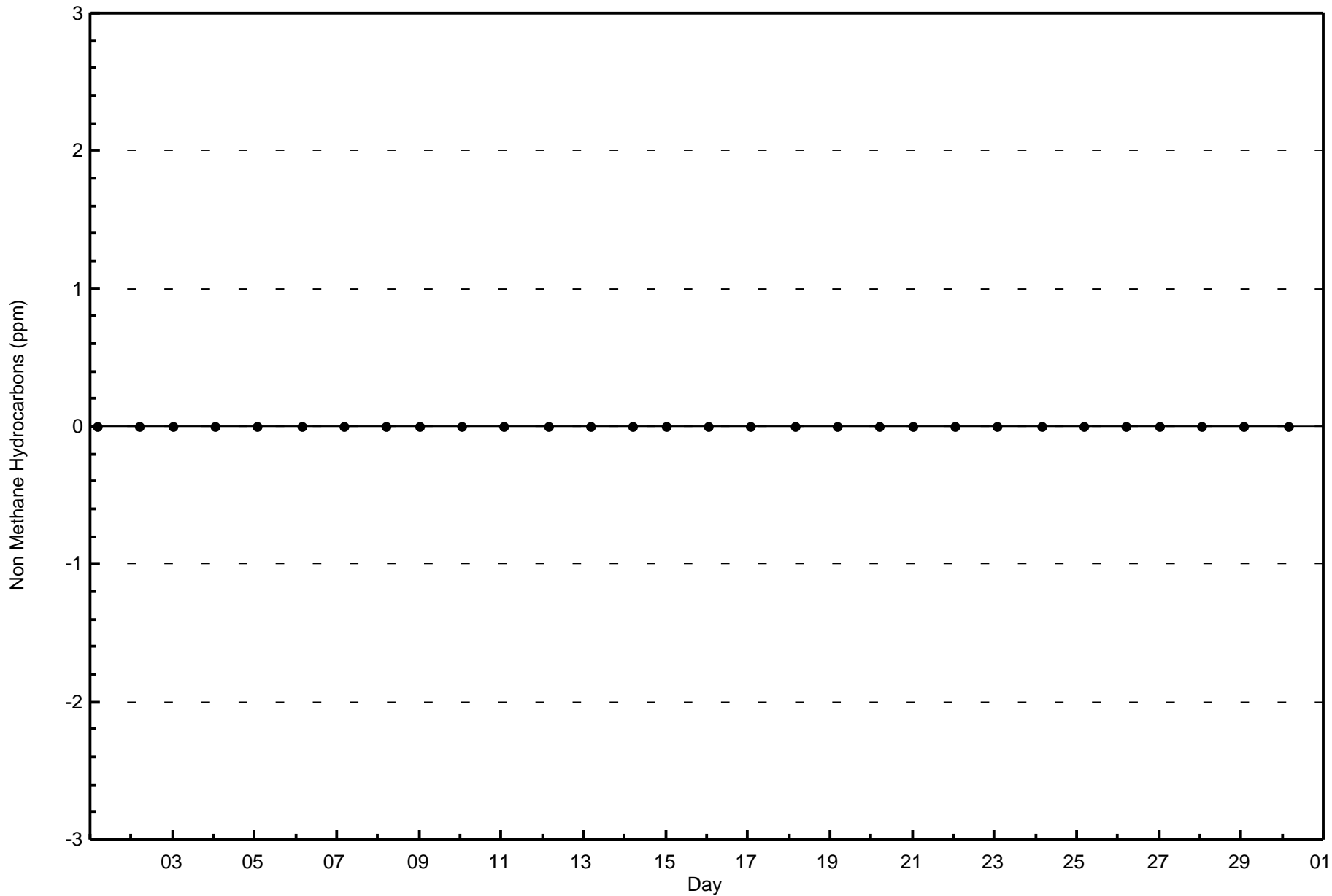
**Wood Buffalo Environmental Association
Frequency Distribution**

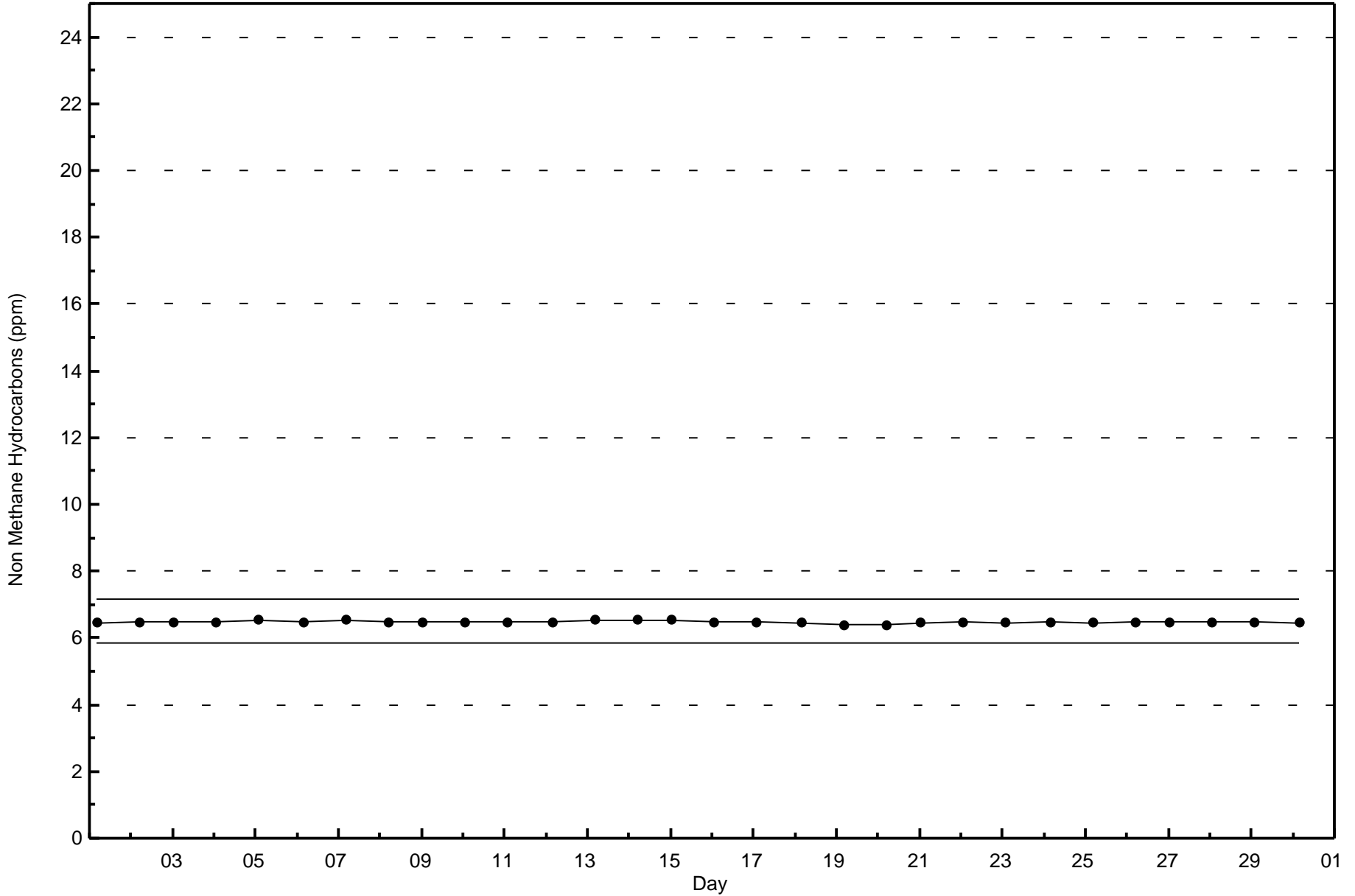
**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - September 2017**

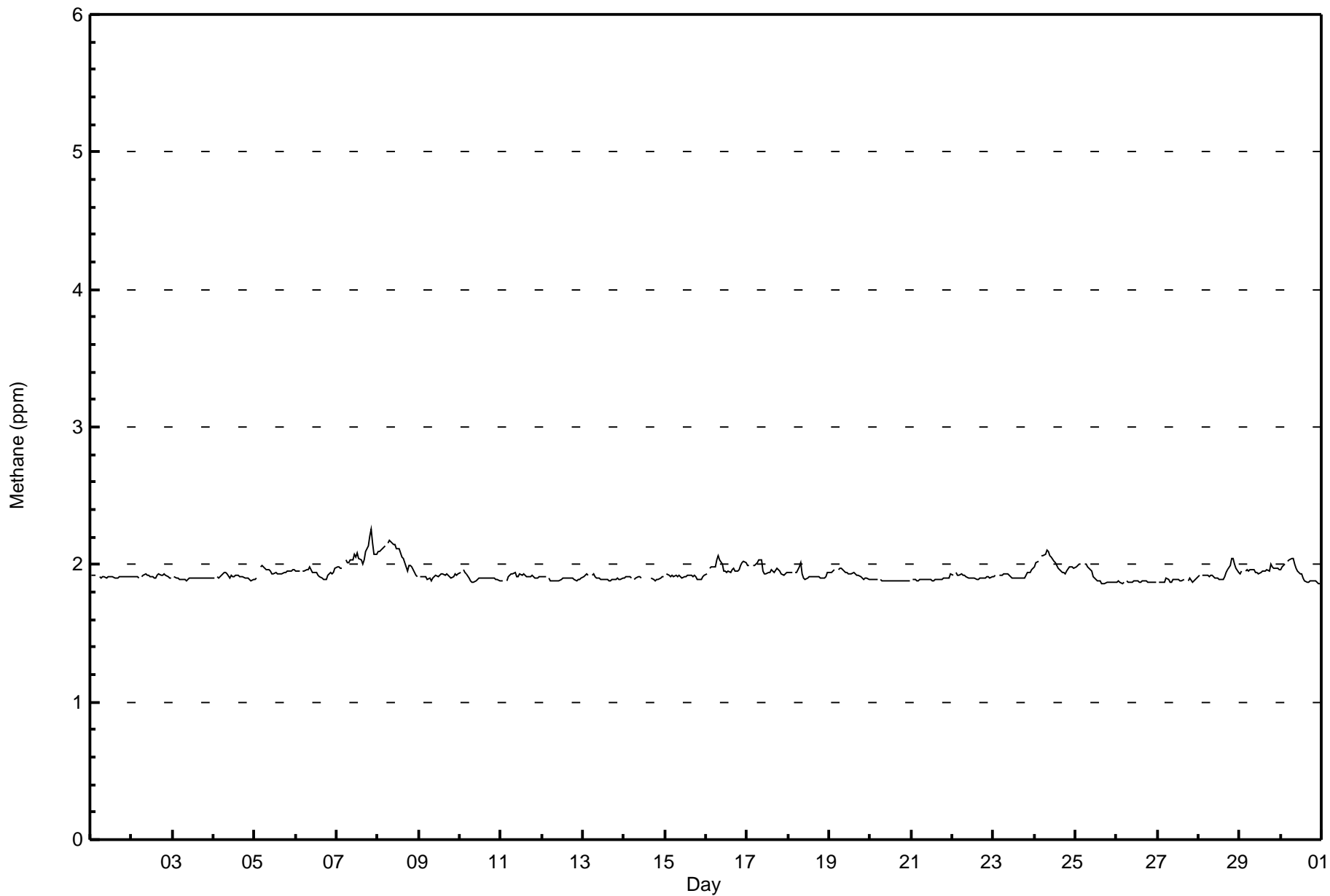
| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 9 | 37 | 19 | 11 | 5 | 14 | 17 | 12 | 53 | 59 | 33 | 38 | 49 | 41 | 3 | 6 | 406 |
| 0.006 - 0.05 | 1 | 4 | 1 | 5 | 4 | 2 | 0 | 11 | 31 | 28 | 30 | 22 | 20 | 27 | 7 | 4 | 197 |
| 0.06 - 0.1 | 3 | 5 | 8 | 5 | 2 | 2 | 2 | 4 | 9 | 9 | 2 | 4 | 4 | 8 | 6 | 4 | 77 |
| > 0.1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| Totals | 13 | 47 | 29 | 21 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 76 | 17 | 14 | 683 |

Total Number of Valid Hours: 683

Total Number of Hours: 720









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 651 | 95.31 | 95.31 |
| 2.1 - 3.0 | 32 | 4.69 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 13 | 47 | 29 | 21 | 11 | 17 | 19 | 25 | 81 | 84 | 64 | 62 | 72 | 76 | 16 | 14 | 651 |
| 2.1 - 3.0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 12 | 12 | 1 | 2 | 1 | 0 | 1 | 0 | 32 |
| 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 | 13 | 47 | 29 | 21 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 76 | 17 | 14 | 683 |

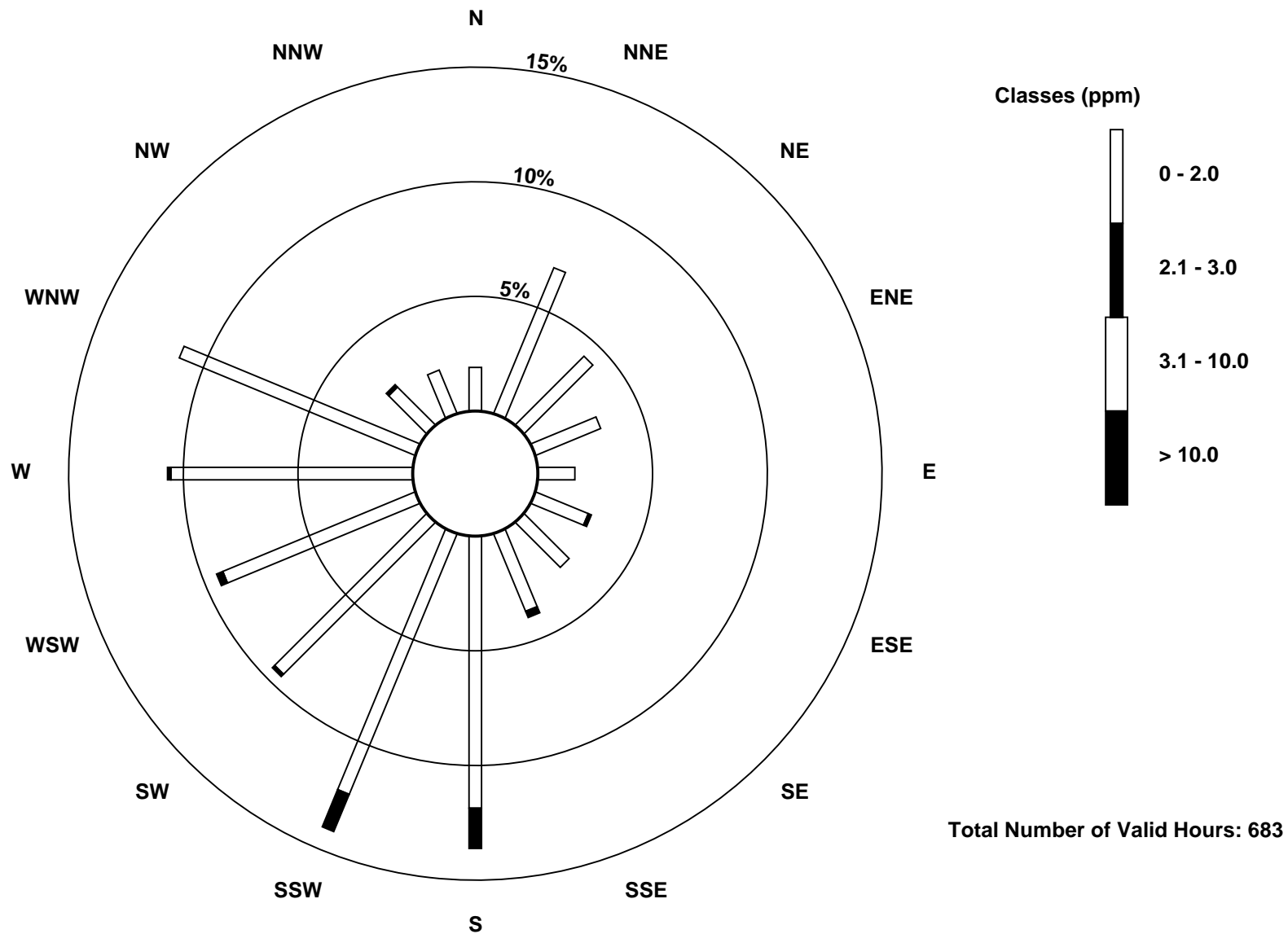
Total Number of Valid Hours: 683

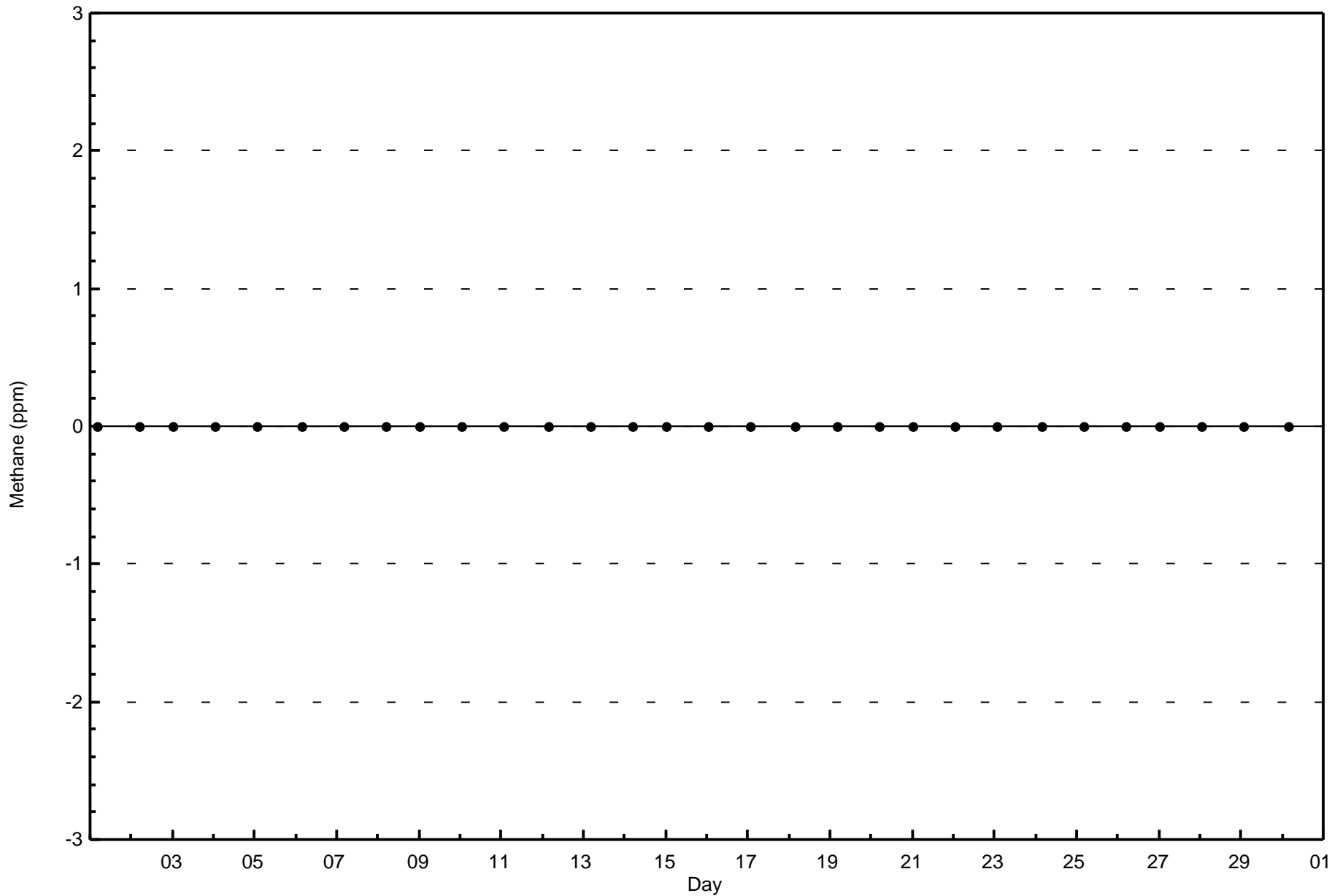
Total Number of Hours: 720

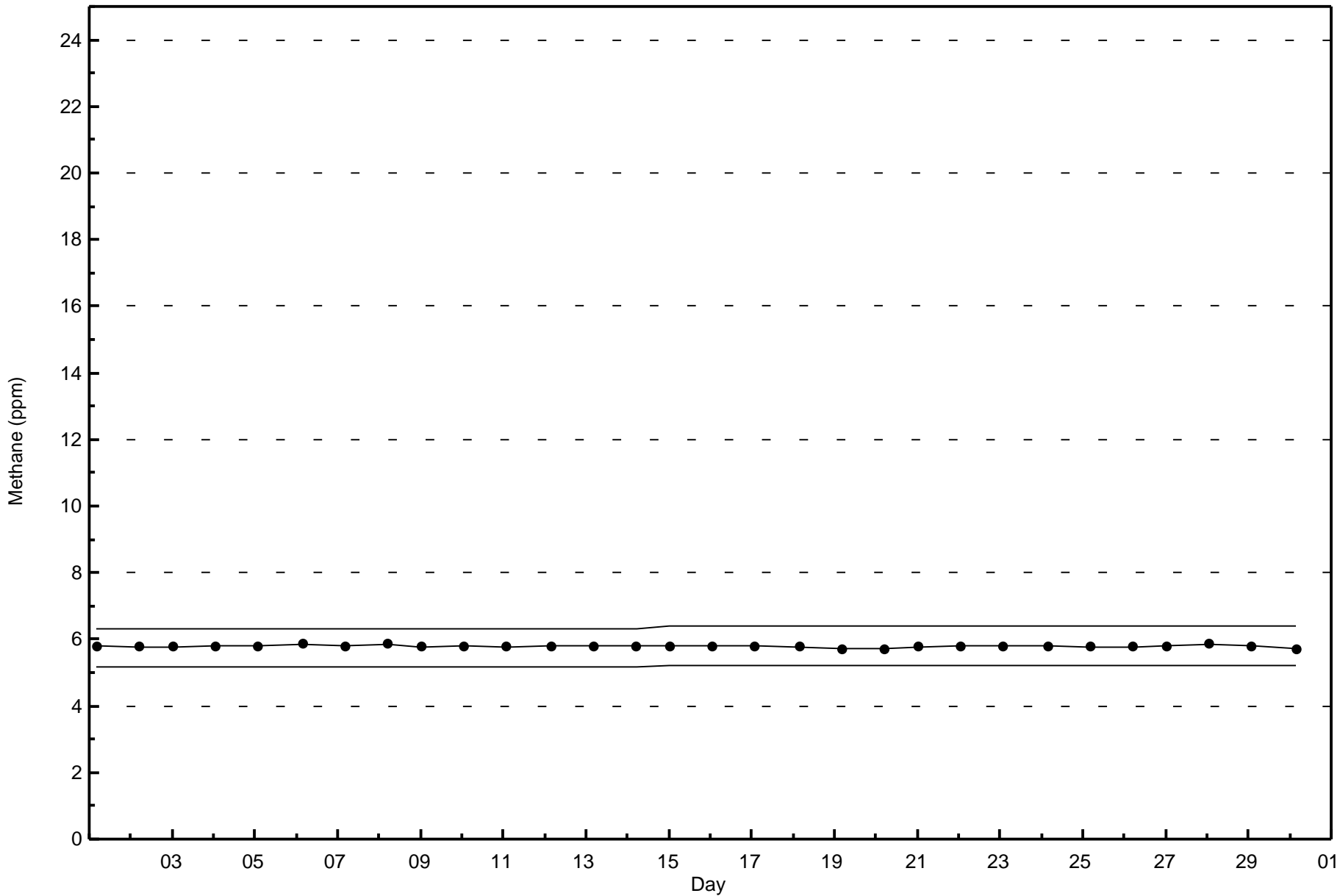


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Methane (CH₄) - ppm
Stony Mountain (AMS 18)







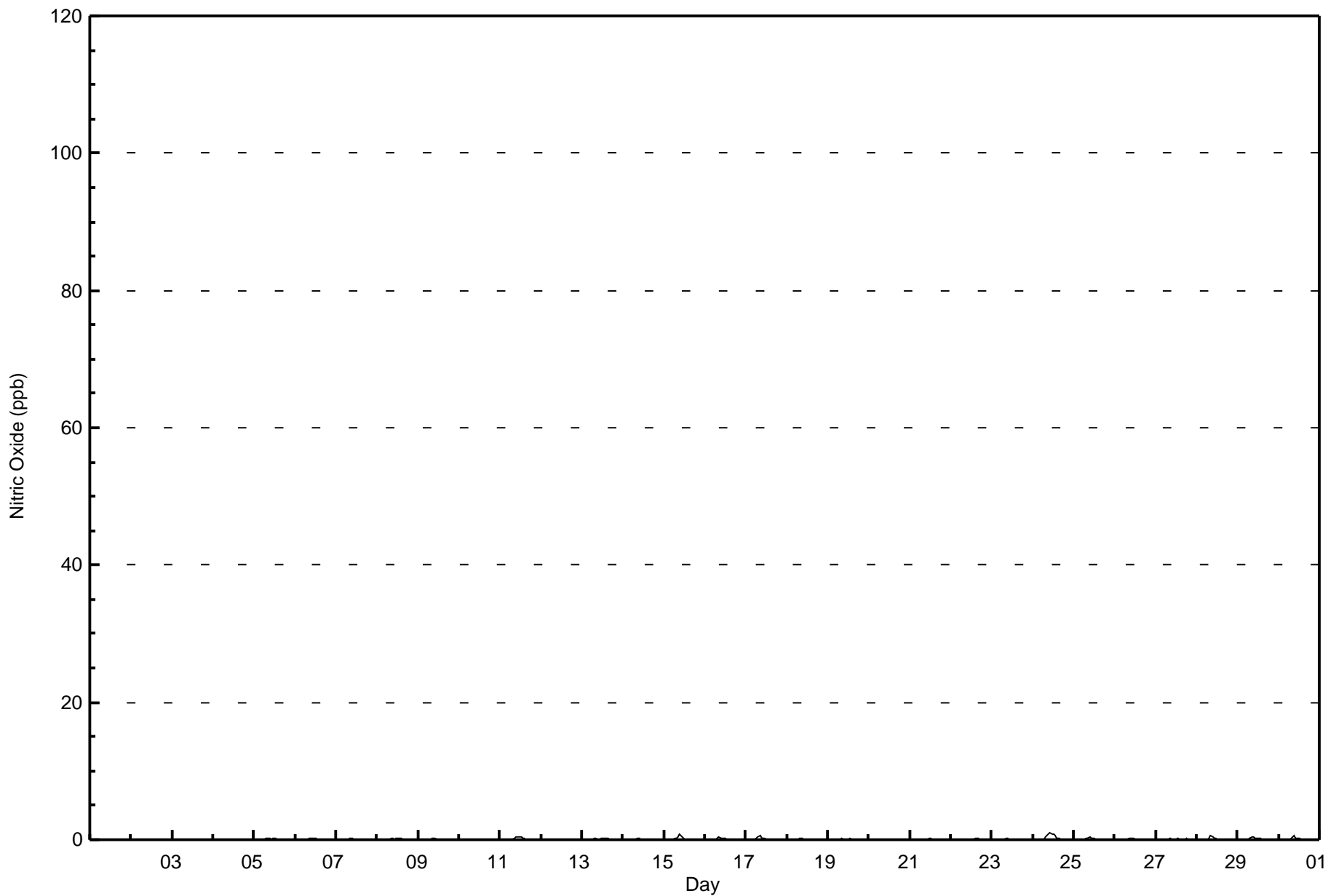


| Maximum Value: 1 ppb on Sep 24 11:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 0.3 ppb on Sep 24 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|----|----|----|----|----|----|-----------------|---------------|---------------|---|--|--|--|--|--|--|--------------------------------|--|
| Minimum Value: 0 ppb on Sep 17 22:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 20 | | | | | | | | | | | | | | | | | Hours of Data: 682 | |
| Maximum Diurnal Average: 0.2 ppb at hour 10 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.0 ppb at hour 24 | | | | | | | | | | | | | | | | | Hours of Missing Data: 38 | |
| Monthly Average: 0.1 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | | | | | | | | | | | | | | | | Hours of Calibration: 35 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | |
| 8-Sep | 0 | 0 | 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-Sep | Z | 0 | 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-Sep | 0 | Z | 0 | 0 | 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-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | |
| 14-Sep | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | |
| 17-Sep | 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 | | | | | | | | |
| 18-Sep | 0 | 0 | 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-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 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-Sep | 0 | Z | 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-Sep | 0 | 0 | Z | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | |
| 25-Sep | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | |
| 29-Sep | 0 | 0 | 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 | | | | | | | | |
| 30-Sep | 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 | 0.1 | 1 | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Stony Mountain - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Stony Mountain - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 682 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



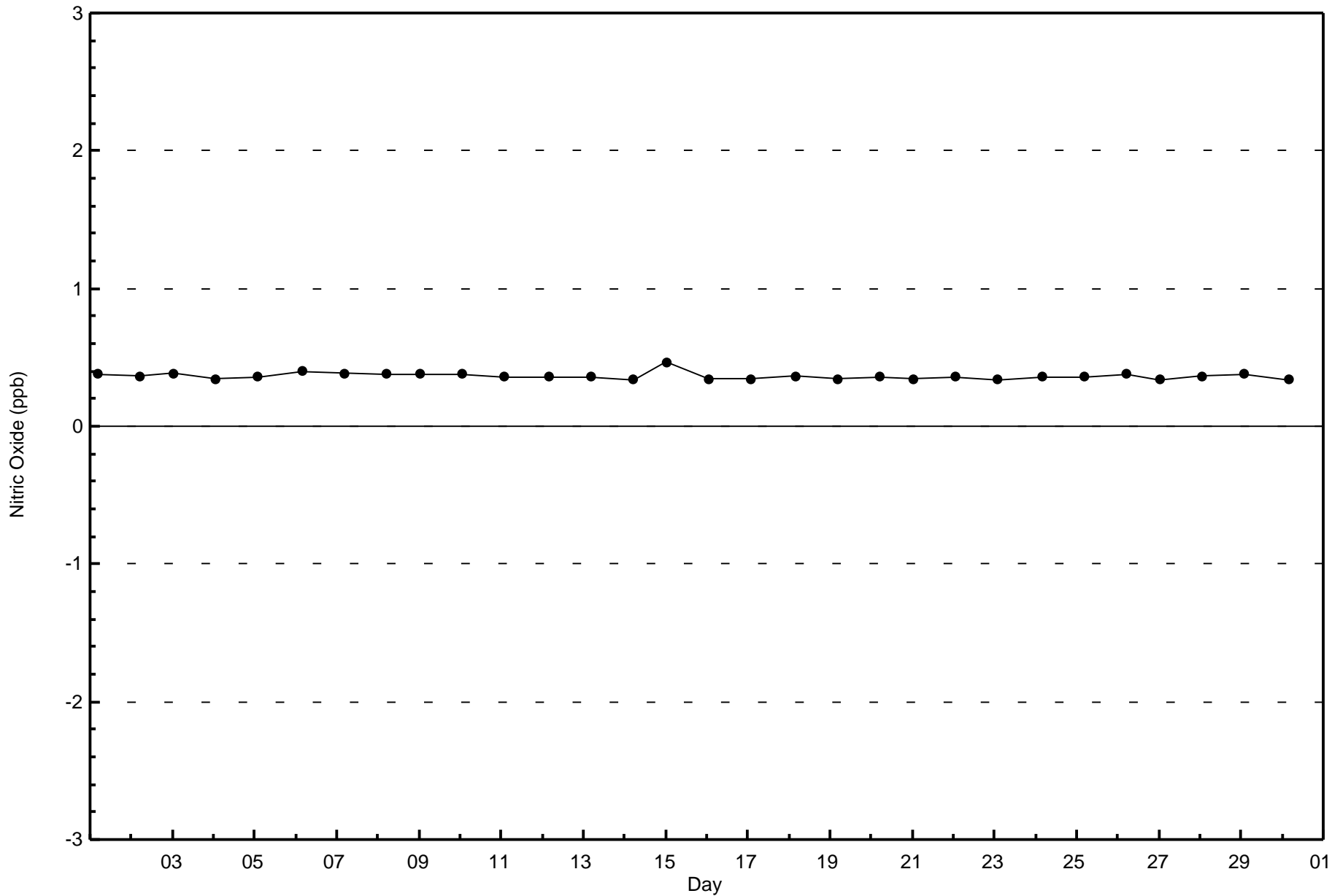
**Wood Buffalo Environmental Association
Frequency Distribution**

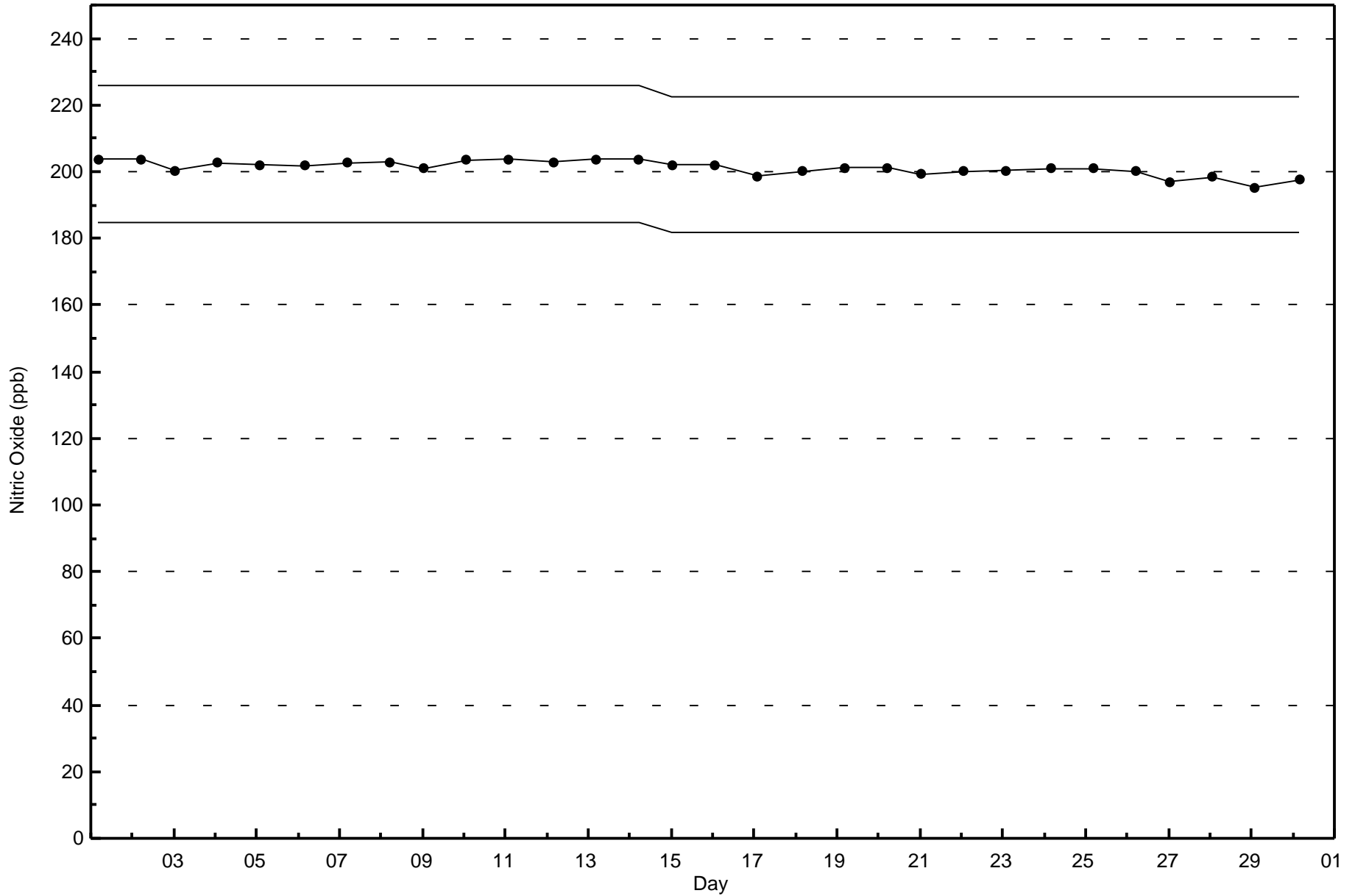
**Nitric Oxide (NO) - ppb
Stony Mountain - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 75 | 16 | 14 | 682 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 75 | 16 | 14 | 682 |

Total Number of Valid Hours: 682

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Stony Mountain - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 4 ppb on Sep 8 20:00 | Maximum Daily Average: 2.0 ppb on Sep 8 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 3 13:00 | Minimum Daily Average: 0.3 ppb on Sep 20 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 1.1 ppb at hour 5 | Minimum Diurnal Average: 0.5 ppb at hour 16 | | Hours of Calibration: | 35 |
| Monthly Average: 0.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 3 | | Percent Operational Time: | 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 2-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 3-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 |
| 4-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 5-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 |
| 6-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1.1 | 2 |
| 7-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1.2 | 2 |
| 8-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 2.0 | 4 |
| 9-Sep | Z | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 3 |
| 10-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 12-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.3 | 1 |
| 13-Sep | 1 | 2 | 1 | 1 | Z | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 3 |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0.7 | 2 |
| 16-Sep | 1 | Z | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 |
| 17-Sep | 1 | 2 | Z | 3 | 3 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 4 | 4 | 1.8 | 4 |
| 18-Sep | 3 | 1 | 1 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1.0 | 3 |
| 19-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.8 | 1 |
| 20-Sep | 1 | 1 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 21-Sep | Z | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 22-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0.7 | 2 |
| 23-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 0.6 | 2 |
| 24-Sep | 1 | 1 | 1 | Z | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1.4 | 2 |
| 25-Sep | 1 | 1 | 2 | 1 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.8 | 2 |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 27-Sep | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | M | M | 1 | 1 | 1 | 1 | M | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 1.0 | 3 |
| 28-Sep | 3 | Z | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1.7 | 3 |
| 29-Sep | 1 | 1 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1.4 | 2 |
| 30-Sep | 2 | 2 | 3 | Z | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.4 | 3 |

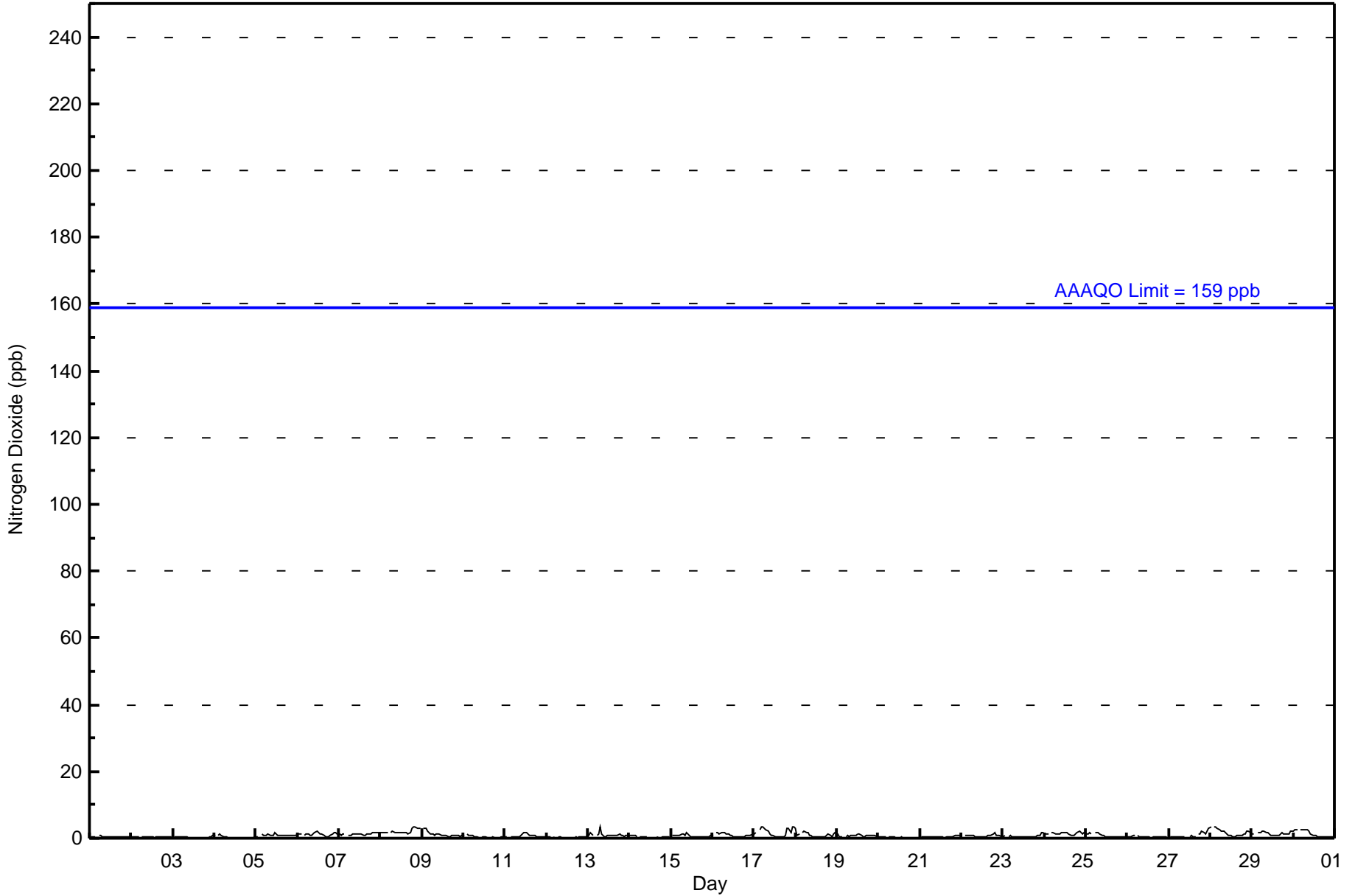
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.1 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 0.9 | 0.8 | 0.8 | 0.7 | 0.7 | 0.6 | 0.5 | 0.6 | 0.7 | 0.7 | 0.9 | 0.9 | 0.9 | 1.0 | 1.1 | Diurnal Average | |
| 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 4 | 3 | 3 | 4 | 4 | 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
Stony Mountain - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 682 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 75 | 16 | 14 | 682 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 75 | 16 | 14 | 682 |

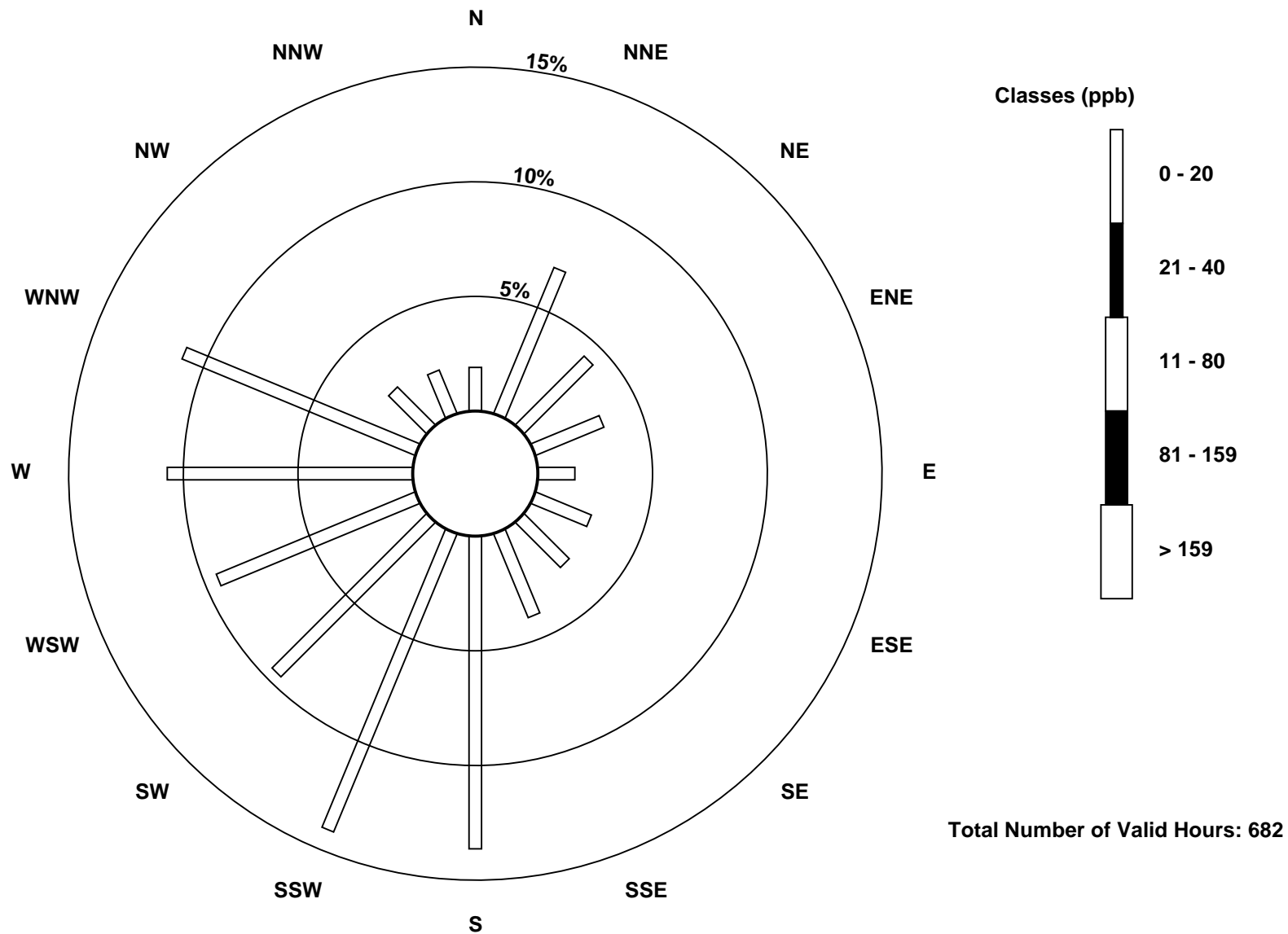
Total Number of Valid Hours: 682

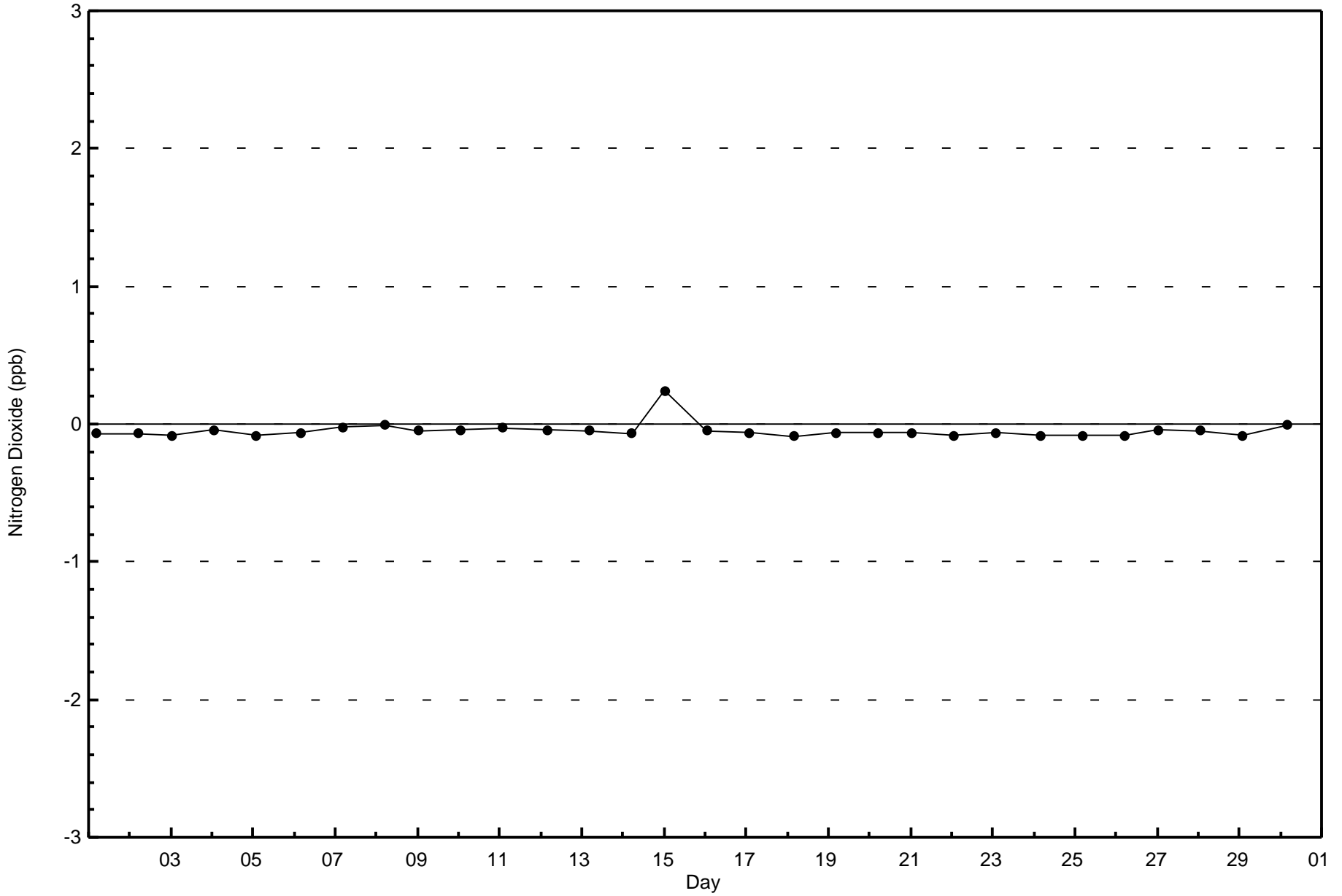
Total Number of Hours: 720

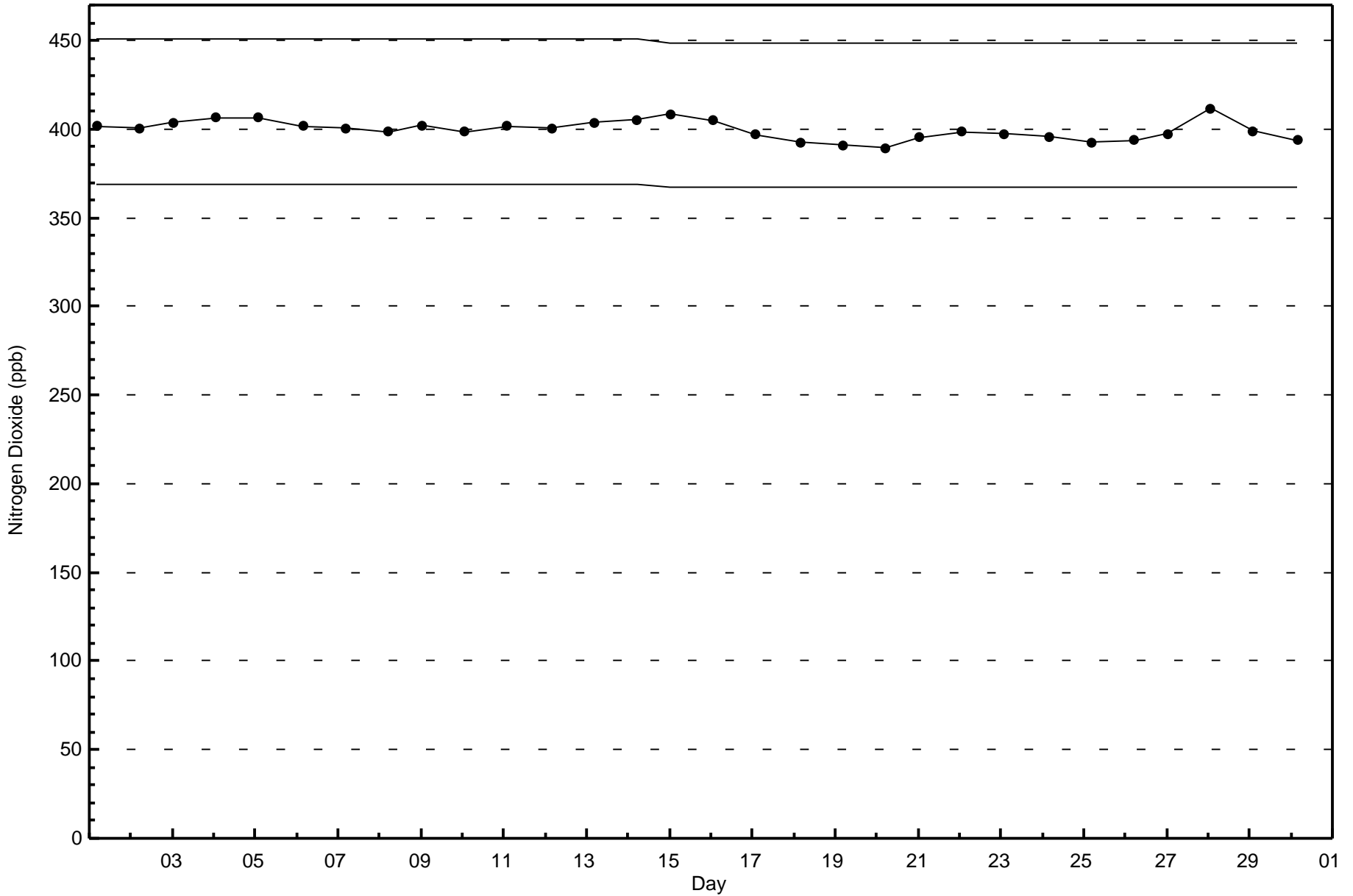


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association
Summary of Hour Averages

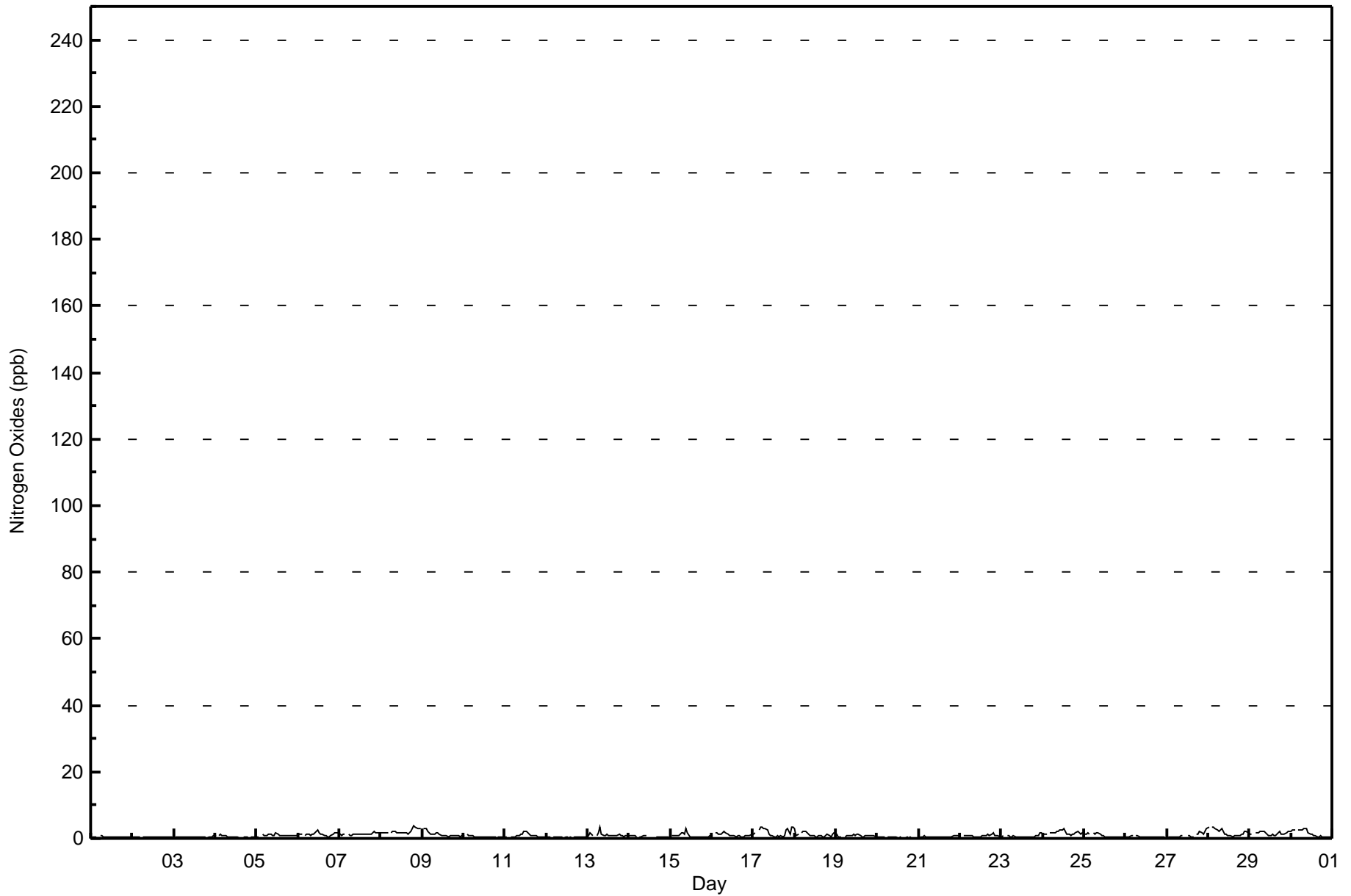
Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2017

| Maximum Value: 4 ppb on Sep 8 20:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.1 ppb on Sep 8 | | | | | | | Hours in Service: 720 | | |
|--|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|----|----|----|----|----|----|---------------------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 20 22:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.3 ppb on Sep 20 | | | | | | | Hours of Data: 682 | | |
| Maximum Diurnal Average: 1.2 ppb at hour 8 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.6 ppb at hour 16 | | | | | | | Hours of Missing Data: 38 | | |
| Monthly Average: 0.9 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 3 | | | | | | | Hours of Calibration: 35 | | |
| | | | | | | | | | | | | | | | | | Percent Operational Time: 99.6 | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 1 | 1 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 2-Sep | 0 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 |
| 4-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 5-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 |
| 6-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1.2 | 2 |
| 7-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1.3 | 2 |
| 8-Sep | 2 | 1 | 1 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 2.1 | 4 |
| 9-Sep | Z | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.2 | 3 |
| 10-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0.8 | 2 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | 1 |
| 13-Sep | 1 | 2 | 1 | 1 | Z | 1 | 2 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 4 |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | Z | 0 | 1 | 1 | 1 | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.9 | 3 | |
| 16-Sep | 1 | Z | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 |
| 17-Sep | 1 | 2 | Z | 3 | 3 | 4 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 4 | 4 | 1.9 | 4 |
| 18-Sep | 3 | 1 | 1 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1.1 | 3 | |
| 19-Sep | 1 | 1 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.8 | 1 |
| 20-Sep | 0 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 21-Sep | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.5 | 1 |
| 22-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 |
| 23-Sep | 1 | 1 | Z | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 0.6 | 2 |
| 24-Sep | 1 | 1 | 1 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1.7 | 3 |
| 25-Sep | 1 | 1 | 2 | 1 | Z | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.8 | 2 | |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 27-Sep | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | M | M | 1 | 1 | 1 | 1 | M | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 1.0 | 3 |
| 28-Sep | 3 | Z | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1.7 | 3 |
| 29-Sep | 1 | 1 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1.5 | 2 |
| 30-Sep | 2 | 3 | 3 | Z | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.5 | 3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 682 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 75 | 16 | 14 | 682 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 47 | 29 | 22 | 11 | 18 | 19 | 27 | 93 | 96 | 65 | 64 | 73 | 75 | 16 | 14 | 682 |

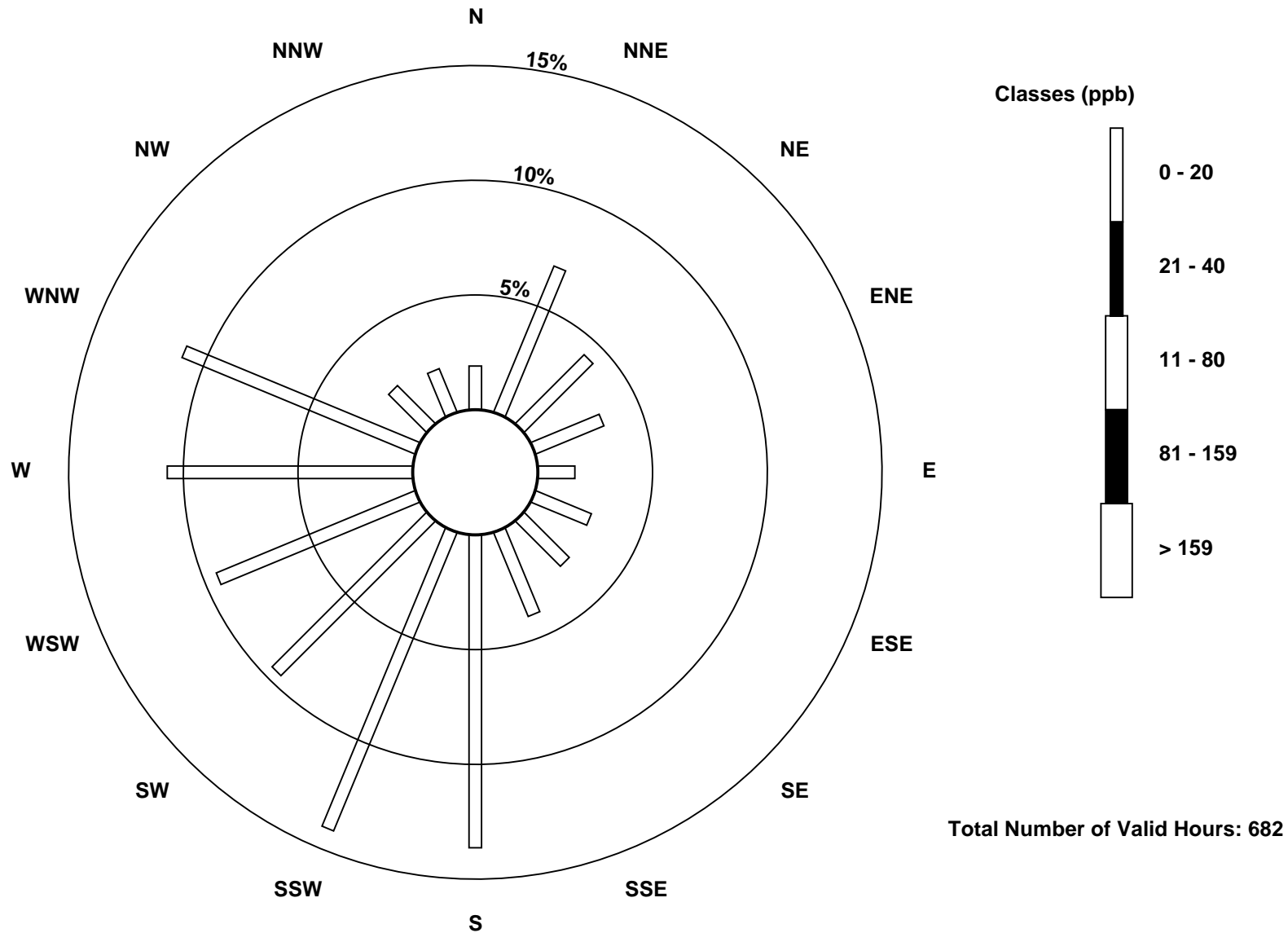
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

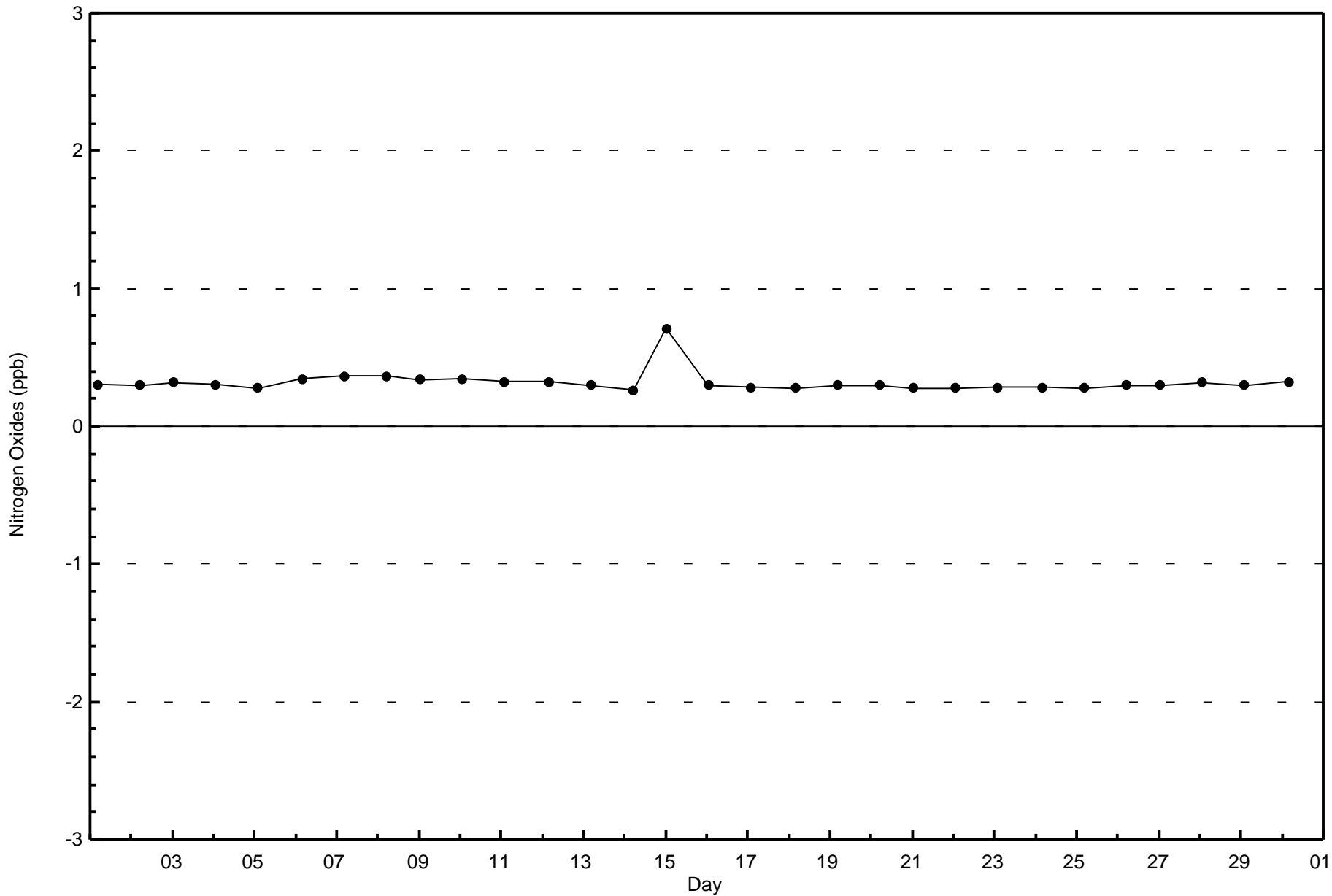
Nitrogen Oxides (NO_x) - ppb
Stony Mountain (AMS 18)

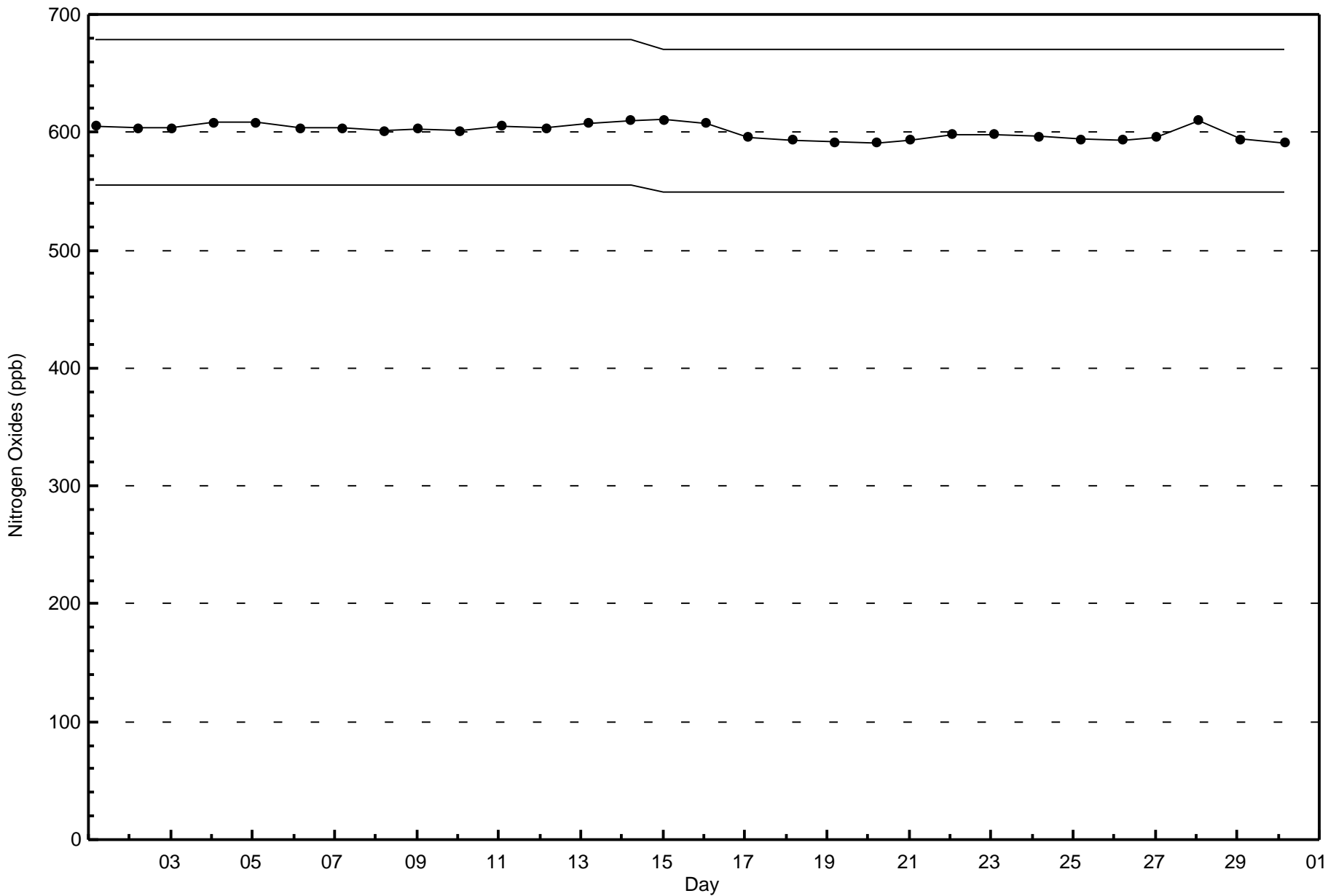




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

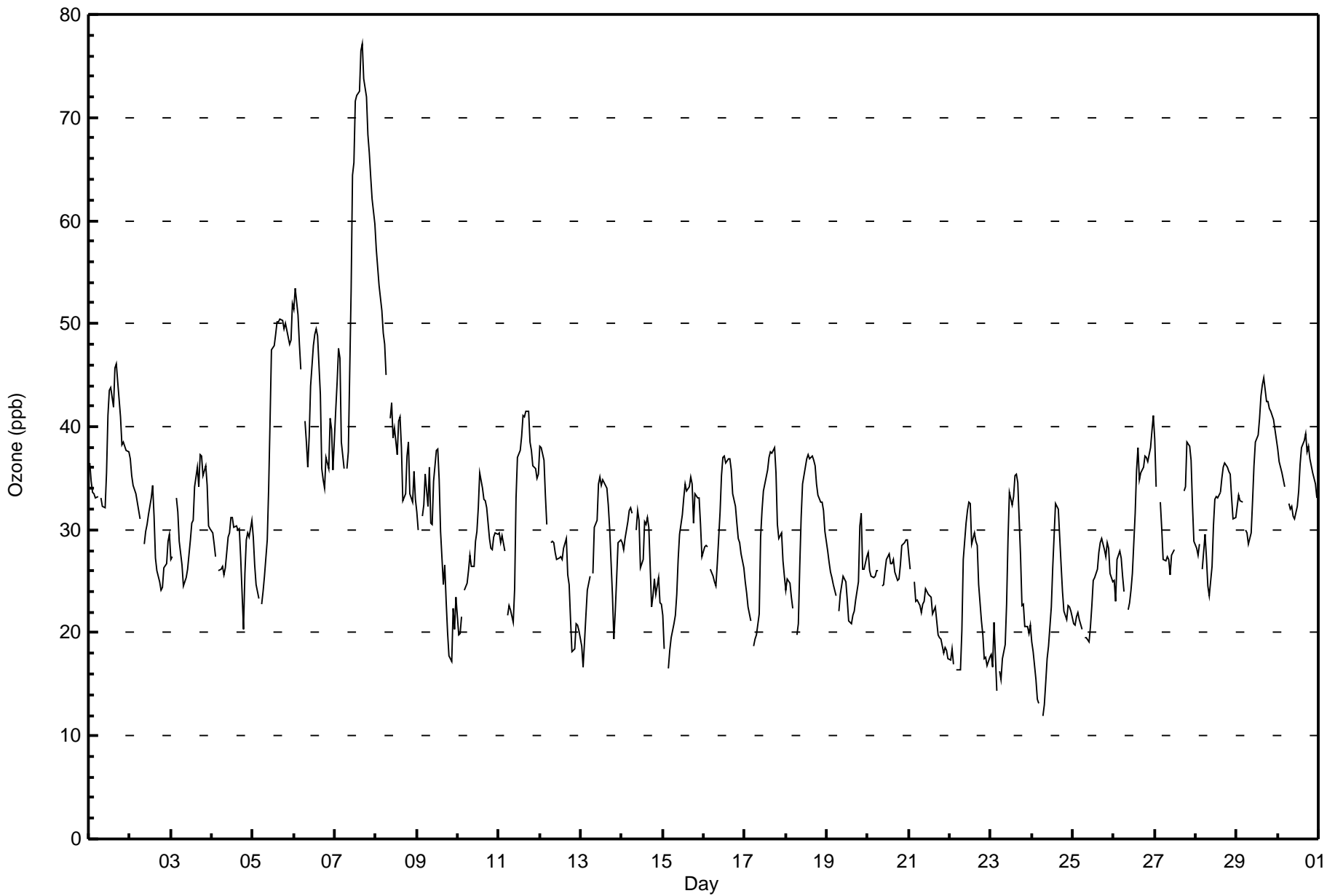
Stony Mountain - September 2017

| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 77 ppb on Sep 7 17:00 | Maximum Daily Average: 58.6 ppb on Sep 7 | | Hours of Data: | 686 |
| Minimum Value: 12 ppb on Sep 24 07:00 | Minimum Daily Average: 21.3 ppb on Sep 24 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 35.8 ppb at hour 15 | Minimum Diurnal Average: 25.5 ppb at hour 8 | | Hours of Calibration: | 33 |
| Monthly Average: 31.1 ppb | Percentiles: P ₁ = 15 P ₁₀ = 21 Q ₁ = 25 Median = 30 Q ₃ = 36 P ₉₀ = 41 P ₉₉ = 71 | | 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-Sep | 36 | 35 | 34 | 34 | 33 | 33 | Z | 33 | 32 | 32 | 36 | 41 | 43 | 44 | 42 | 46 | 46 | 44 | 41 | 38 | 39 | 38 | 38 | 38 | 38.1 | 46 |
| 2-Sep | 37 | 35 | 34 | 33 | 33 | 32 | 31 | Z | 29 | 30 | 30 | 31 | 33 | 34 | 31 | 27 | 26 | 25 | 24 | 24 | 26 | 27 | 29 | 30 | 30.1 | 37 |
| 3-Sep | 27 | 27 | Z | 33 | 32 | 29 | 27 | 25 | 25 | 25 | 26 | 29 | 31 | 31 | 34 | 36 | 34 | 37 | 37 | 35 | 36 | 34 | 30 | 30 | 30.9 | 37 |
| 4-Sep | 30 | 29 | 27 | Z | 26 | 26 | 26 | 26 | 26 | 29 | 30 | 31 | 31 | 30 | 30 | 30 | 30 | 27 | 20 | 26 | 29 | 30 | 29 | 31 | 28.3 | 31 |
| 5-Sep | 29 | 27 | 25 | 23 | Z | 23 | 24 | 25 | 29 | 34 | 41 | 47 | 48 | 49 | 50 | 50 | 50 | 50 | 50 | 50 | 49 | 48 | 48 | 52 | 40.1 | 52 |
| 6-Sep | 51 | 53 | 51 | 48 | 46 | Z | 41 | 39 | 36 | 39 | 44 | 48 | 49 | 49 | 49 | 43 | 36 | 35 | 34 | 37 | 36 | 41 | 40 | 36 | 42.6 | 53 |
| 7-Sep | 42 | 44 | 48 | 47 | 38 | 36 | Z | 36 | 38 | 53 | 64 | 66 | 72 | 72 | 73 | 77 | 77 | 74 | 72 | 68 | 67 | 64 | 62 | 60 | 58.6 | 77 |
| 8-Sep | 57 | 55 | 54 | 51 | 49 | 48 | 45 | Z | 41 | 42 | 39 | 40 | 37 | 41 | 41 | 38 | 33 | 33 | 37 | 39 | 33 | 33 | 36 | 33 | 41.5 | 57 |
| 9-Sep | 32 | 30 | Z | 31 | 32 | 35 | 32 | 36 | 31 | 31 | 35 | 38 | 38 | 35 | 30 | 25 | 27 | 23 | 20 | 18 | 17 | 22 | 20 | 23 | 28.7 | 38 |
| 10-Sep | 20 | 20 | 22 | Z | 24 | 25 | 26 | 28 | 26 | 26 | 29 | 30 | 32 | 36 | 34 | 33 | 33 | 32 | 29 | 28 | 28 | 29 | 30 | 30 | 28.2 | 36 |
| 11-Sep | 30 | 29 | 29 | 28 | Z | 22 | 23 | 22 | 21 | 24 | 33 | 37 | 38 | 39 | 41 | 41 | 41 | 41 | 39 | 38 | 36 | 36 | 35 | 35 | 33.0 | 41 |
| 12-Sep | 38 | 38 | 37 | 33 | 30 | Z | 29 | 29 | 29 | 28 | 27 | 27 | 27 | 27 | 28 | 29 | 26 | 25 | 21 | 18 | 18 | 21 | 21 | 20 | 27.3 | 38 |
| 13-Sep | 19 | 17 | 19 | 22 | 24 | 25 | Z | 26 | 30 | 31 | 34 | 35 | 34 | 35 | 34 | 34 | 32 | 30 | 24 | 19 | 22 | 25 | 29 | 29 | 27.4 | 35 |
| 14-Sep | 29 | 28 | 29 | 31 | 32 | 32 | Z | 30 | 32 | 31 | 26 | 27 | 31 | 30 | 31 | 30 | 22 | 24 | 25 | 24 | 25 | 23 | 23 | 23 | 28.1 | 32 |
| 15-Sep | 22 | 18 | Z | 17 | 18 | 20 | 21 | 22 | 24 | 27 | 30 | 31 | 33 | 34 | 34 | 34 | 35 | 34 | 31 | 33 | 33 | 33 | 30 | 27 | 27.9 | 35 |
| 16-Sep | 28 | 28 | 28 | Z | 26 | 26 | 25 | 25 | 27 | 32 | 35 | 37 | 37 | 36 | 37 | 37 | 36 | 34 | 32 | 31 | 29 | 29 | 28 | 26 | 30.8 | 37 |
| 17-Sep | 25 | 24 | 23 | 21 | Z | 19 | 19 | 20 | 22 | 29 | 32 | 34 | 35 | 36 | 37 | 38 | 37 | 38 | 35 | 30 | 29 | 30 | 27 | 26 | 28.9 | 38 |
| 18-Sep | 24 | 25 | 25 | 24 | 22 | Z | 20 | 21 | 26 | 31 | 34 | 36 | 37 | 37 | 37 | 37 | 37 | 36 | 34 | 33 | 33 | 33 | 32 | 30 | 30.6 | 37 |
| 19-Sep | 28 | 27 | 26 | 25 | 25 | 24 | Z | 22 | 24 | 25 | 25 | 25 | 23 | 21 | 21 | 22 | 22 | 23 | 25 | 30 | 32 | 26 | 26 | 27 | 25.0 | 32 |
| 20-Sep | 28 | 26 | 25 | 25 | 26 | 26 | 26 | Z | 25 | 25 | 26 | 27 | 28 | 27 | 27 | 27 | 26 | 25 | 25 | 27 | 29 | 29 | 29 | 29 | 26.6 | 29 |
| 21-Sep | 28 | 26 | Z | 25 | 23 | 23 | 23 | 22 | 23 | 23 | 24 | 24 | 24 | 23 | 22 | 22 | 21 | 20 | 20 | 19 | 18 | 19 | 18 | 18 | 22.0 | 28 |
| 22-Sep | 17 | 18 | 17 | Z | 16 | 16 | 16 | 20 | 27 | 31 | 32 | 33 | 32 | 29 | 30 | 29 | 28 | 25 | 21 | 20 | 17 | 18 | 17 | 18 | 22.9 | 33 |
| 23-Sep | 18 | 17 | 21 | 14 | Z | 16 | 15 | 18 | 19 | 23 | 29 | 34 | 32 | 33 | 35 | 35 | 35 | 27 | 23 | 23 | 21 | 21 | 20 | 21 | 23.9 | 35 |
| 24-Sep | 19 | 18 | 15 | 13 | 13 | Z | 12 | 13 | 15 | 18 | 19 | 23 | 26 | 29 | 33 | 32 | 29 | 27 | 24 | 22 | 21 | 23 | 23 | 22 | 21.3 | 33 |
| 25-Sep | 21 | 21 | 22 | 22 | 21 | 20 | Z | 20 | 19 | 19 | 21 | 23 | 25 | 25 | 26 | 28 | 29 | 29 | 28 | 27 | 29 | 28 | 26 | 25 | 24.1 | 29 |
| 26-Sep | 25 | 23 | 27 | 28 | 27 | 26 | 24 | Z | 22 | 23 | 24 | 26 | 32 | 36 | 38 | 35 | 36 | 36 | 37 | 37 | 37 | 38 | 40 | 41 | 31.1 | 41 |
| 27-Sep | 39 | 34 | Z | 33 | 30 | 27 | 27 | 27 | 26 | 28 | 28 | C | C | C | 33 | M | 34 | 34 | 38 | 38 | 37 | 32 | 29 | 31.6 | 39 | |
| 28-Sep | 28 | 27 | 29 | Z | 26 | 30 | 27 | 25 | 24 | 26 | 30 | 33 | 33 | 33 | 34 | 35 | 36 | 37 | 36 | 36 | 35 | 33 | 31 | 31 | 31.1 | 37 |
| 29-Sep | 32 | 33 | 33 | 33 | Z | 30 | 30 | 29 | 30 | 33 | 36 | 38 | 39 | 41 | 43 | 44 | 45 | 42 | 42 | 42 | 41 | 41 | 40 | 39 | 37.2 | 45 |
| 30-Sep | 38 | 37 | 35 | 35 | 34 | Z | 33 | 32 | 32 | 31 | 31 | 32 | 34 | 36 | 38 | 39 | 39 | 38 | 38 | 37 | 35 | 35 | 34 | 33 | 35.1 | 39 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 29.9 | 29.0 | 29.4 | 29.2 | 28.3 | 26.7 | 26.1 | 25.5 | 26.9 | 29.3 | 31.8 | 33.7 | 34.9 | 35.5 | 35.8 | 35.5 | 34.9 | 33.5 | 31.9 | 31.7 | 31.3 | 31.5 | 30.7 | 30.3 | Diurnal Average | |
| 57 | 55 | 54 | 51 | 49 | 48 | 45 | 39 | 41 | 53 | 64 | 66 | 72 | 72 | 73 | 77 | 77 | 74 | 72 | 68 | 67 | 64 | 62 | 60 | Diurnal Maximum | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 63 | 9.18 | 9.18 |
| 21 - 50 | 600 | 87.46 | 96.65 |
| 51 - 82 | 23 | 3.35 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 4 | 2 | 1 | 1 | 0 | 2 | 1 | 3 | 16 | 12 | 2 | 2 | 3 | 4 | 6 | 4 | 63 |
| 21 - 50 | 10 | 45 | 28 | 21 | 11 | 16 | 18 | 24 | 70 | 73 | 61 | 65 | 70 | 72 | 10 | 6 | 600 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 9 | 8 | 2 | 1 | 1 | 0 | 0 | 0 | 23 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 14 | 47 | 29 | 22 | 11 | 18 | 19 | 29 | 95 | 93 | 65 | 68 | 74 | 76 | 16 | 10 | 686 |

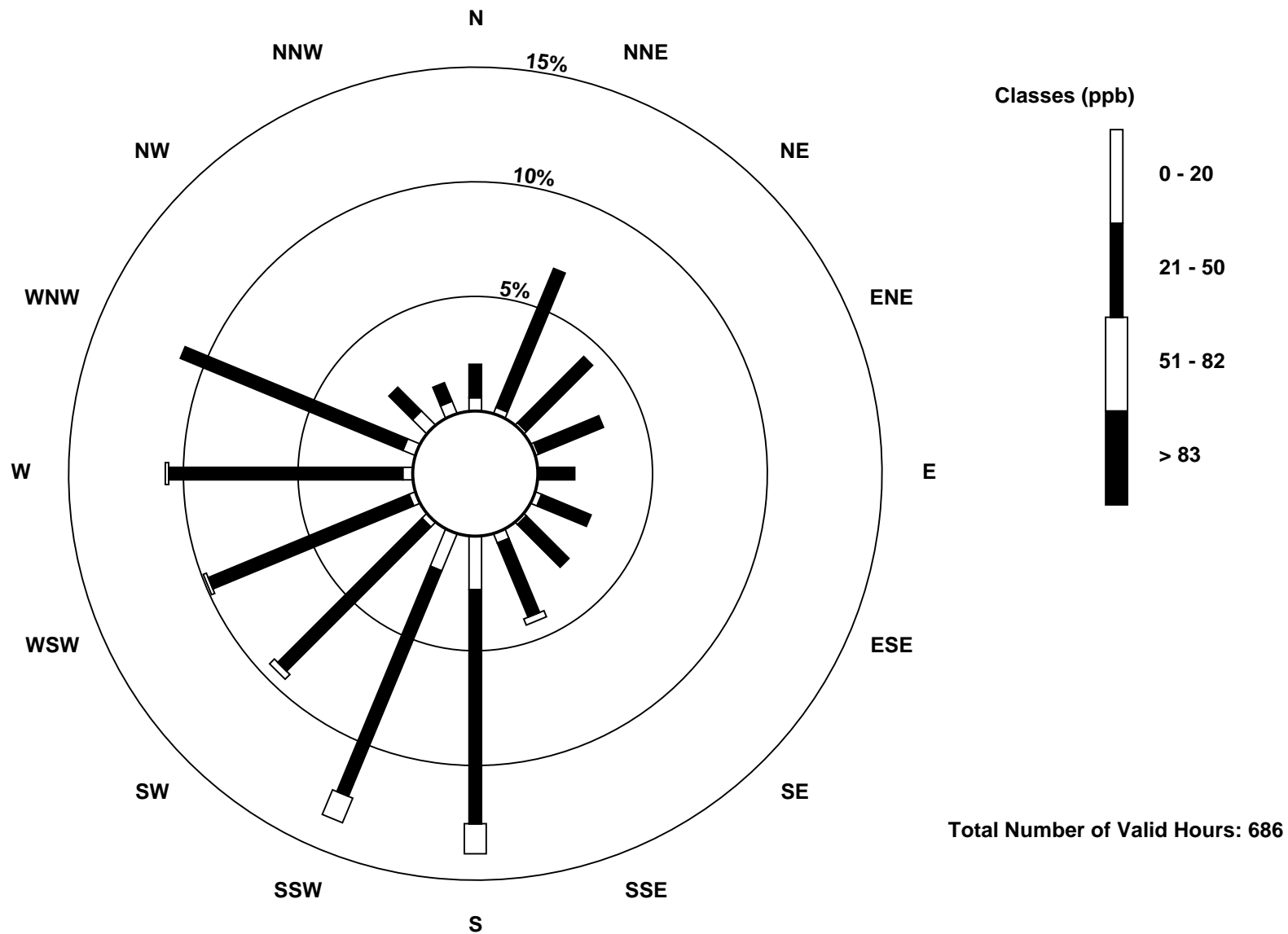
Total Number of Valid Hours: 686

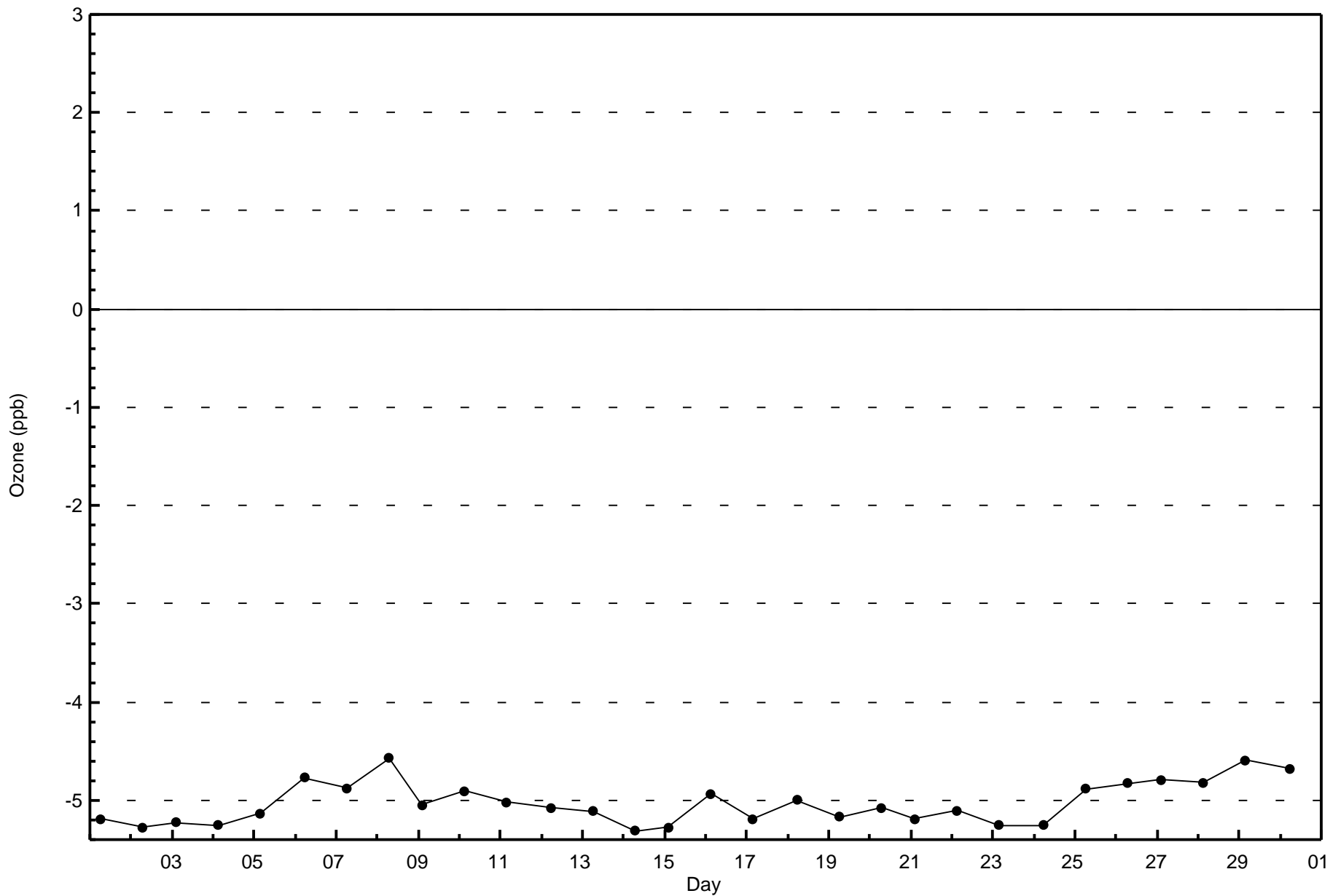
Total Number of Hours: 720

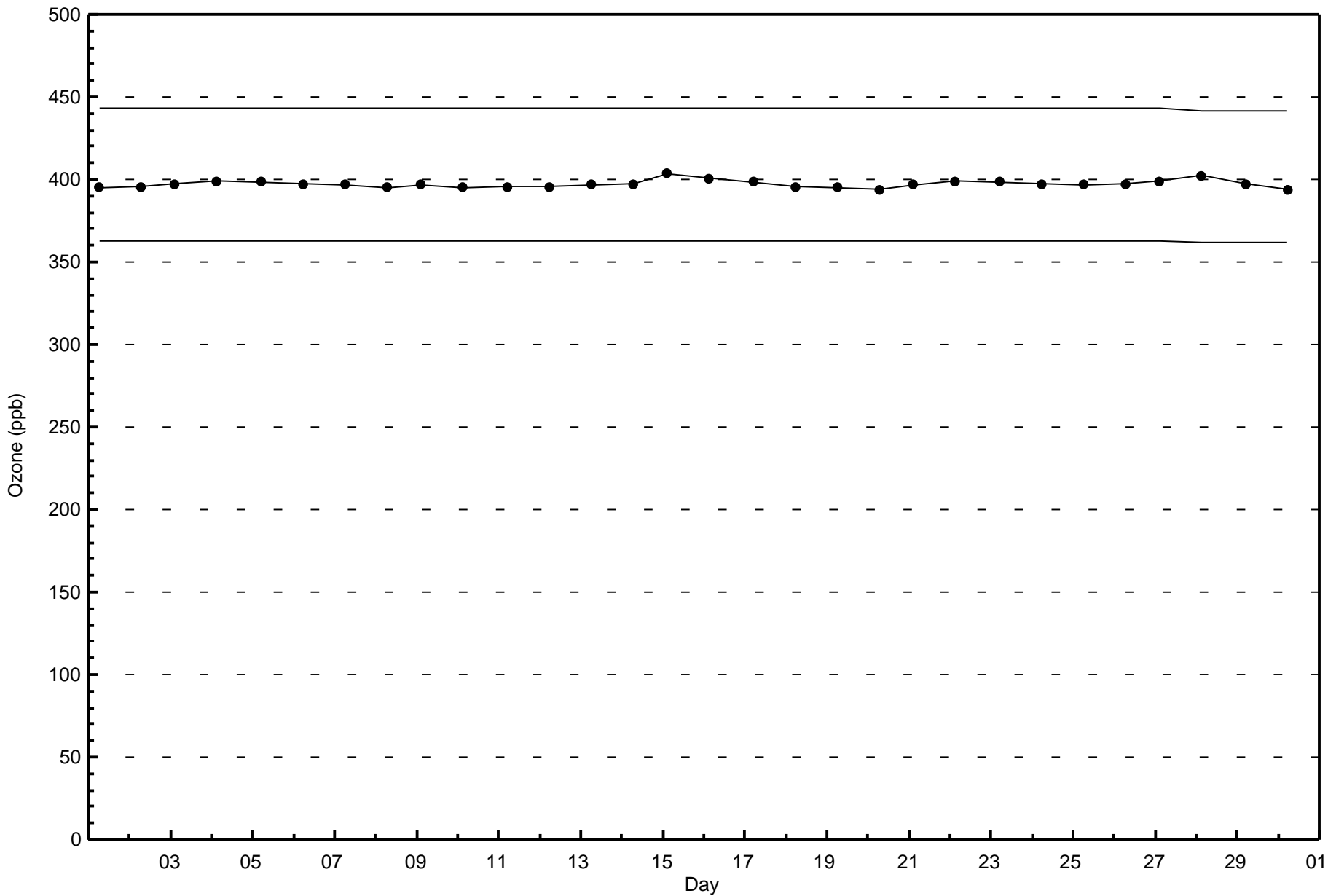


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Ozone (O₃) - ppb
Stony Mountain (AMS 18)









| | | | |
|--|--|---------------------------|-------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 56.0 µg/m ³ on Sep 8 18:00 | Maximum Daily Average: 21.6 µg/m ³ on Sep 8 | Hours of Data: | 718 |
| Minimum Value: 0.8 µg/m ³ on Sep 10 18:00 | Minimum Daily Average: 1.3 µg/m ³ on Sep 21 | Hours of Missing Data: | 2 |
| Maximum Diurnal Average: 5.8 µg/m ³ at hour 5 | Minimum Diurnal Average: 3.5 µg/m ³ at hour 11 | Hours of Calibration: | 2 |
| Monthly Average: 5.06 µg/m ³ | Percentiles: P ₁ = 0.8 P ₁₀ = 1.3 Q ₁ = 1.9 Median = 3.2 Q ₃ = 5.7 P ₉₀ = 10.8 P ₉₉ = 33.0 | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1.4 | 1.4 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.3 | 1.0 | 1.2 | 1.6 | 1.8 | 2.1 | 2.0 | 1.7 | 1.8 | 2.5 | 2.8 | 2.6 | 2.4 | 2.2 | 1.8 | 2.8 |
| 2-Sep | 2.2 | 2.4 | 2.5 | 2.6 | 2.6 | 2.6 | 2.8 | 2.9 | 2.7 | 2.1 | 1.8 | 1.3 | 0.8 | 1.1 | 1.4 | 1.9 | 2.5 | 2.8 | 3.3 | 3.7 | 3.3 | 3.2 | 2.8 | 2.6 | 2.4 | 3.7 |
| 3-Sep | 3.2 | 3.3 | 3.3 | 3.2 | 3.2 | 3.0 | 3.0 | 3.1 | 2.9 | 2.5 | 2.2 | 1.4 | 1.3 | 1.8 | 1.9 | 2.1 | 1.6 | 1.8 | 1.7 | 1.9 | 2.3 | 2.4 | 4.6 | 6.1 | 2.7 | 6.1 |
| 4-Sep | 5.1 | 5.2 | 6.3 | 9.8 | 24.3 | 26.4 | 25.8 | 11.7 | 6.0 | 2.7 | 1.4 | 0.9 | 0.8 | 1.0 | 0.9 | 0.9 | 1.0 | 0.9 | 0.8 | 0.9 | 1.0 | 1.2 | 1.2 | 1.2 | 5.7 | 26.4 |
| 5-Sep | 1.6 | 1.9 | 2.5 | 2.8 | 2.8 | 2.8 | 2.9 | 3.2 | 3.4 | 2.6 | 2.1 | 2.0 | 2.7 | 3.0 | 3.4 | 3.7 | 4.2 | 4.6 | 5.6 | 6.3 | 6.9 | 7.2 | 7.7 | 8.4 | 3.9 | 8.4 |
| 6-Sep | 7.9 | 7.6 | 7.6 | 7.8 | 7.4 | 7.3 | 7.6 | 7.5 | 7.3 | 5.7 | 8.1 | 22.2 | 39.1 | 40.9 | 35.5 | 16.4 | 13.8 | 14.7 | 17.2 | 21.2 | 20.7 | 16.9 | 19.8 | 16.1 | 15.7 | 40.9 |
| 7-Sep | 8.0 | 7.5 | 7.8 | 8.3 | 8.9 | 9.9 | 9.1 | 9.1 | 8.2 | 5.7 | 5.7 | 5.5 | 6.1 | 6.8 | 8.3 | 9.7 | 11.2 | 9.9 | 10.7 | 12.0 | 11.9 | 11.8 | 11.4 | 10.8 | 8.9 | 12.0 |
| 8-Sep | 11.3 | 11.1 | 11.0 | 11.0 | 11.1 | 10.9 | 11.2 | 10.9 | 10.2 | 9.0 | 9.0 | 13.8 | 16.4 | 24.9 | 30.3 | 33.2 | 52.1 | 56.0 | 55.9 | 41.9 | 32.8 | 18.8 | 12.9 | 12.2 | 21.6 | 56.0 |
| 9-Sep | 11.8 | 10.6 | 8.5 | 6.8 | 5.8 | 4.8 | 4.8 | 4.7 | 5.4 | 6.5 | 5.6 | 6.4 | 9.4 | 15.4 | 15.6 | 11.3 | 13.1 | 13.7 | 13.3 | 13.2 | 13.1 | 13.5 | 13.7 | 13.9 | 10.0 | 15.6 |
| 10-Sep | 21.6 | 25.8 | 25.2 | 20.2 | 11.3 | 5.3 | 3.2 | 1.8 | 1.4 | 1.3 | 1.2 | 1.4 | 1.3 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 1.0 | 1.0 | 5.4 | 25.8 |
| 11-Sep | 1.0 | 1.0 | 1.1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.4 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 1.3 | 1.3 | 1.4 | 1.8 | 2.0 | 2.3 | 2.0 | 1.7 | 1.8 | 2.0 | 2.1 | 1.5 | 2.3 |
| 12-Sep | 1.9 | 1.7 | 1.7 | 1.4 | 1.5 | 1.5 | 1.7 | 1.8 | 1.8 | 2.2 | 2.1 | 1.7 | 1.6 | 1.4 | 1.2 | 1.2 | 1.9 | 2.3 | 2.5 | 3.6 | 3.5 | 4.3 | 4.1 | 3.3 | 2.2 | 4.3 |
| 13-Sep | 5.0 | 6.3 | 5.3 | 4.0 | 3.3 | 3.1 | 3.5 | 3.6 | 3.7 | 6.4 | 3.7 | 3.2 | 2.8 | 3.1 | 2.4 | 1.8 | 1.9 | 1.9 | 2.2 | 2.4 | 2.7 | 2.5 | 2.4 | 2.4 | 3.3 | 6.4 |
| 14-Sep | 3.6 | 4.8 | 5.6 | 5.3 | 4.5 | 3.9 | 3.5 | 4.9 | 5.3 | 3.7 | 3.0 | 3.9 | 3.2 | 2.0 | 1.4 | 1.1 | 1.1 | 1.3 | 1.9 | 2.2 | 2.5 | 2.3 | 2.3 | 2.1 | 3.1 | 5.6 |
| 15-Sep | 3.0 | 4.1 | 5.1 | 5.0 | 4.4 | 4.4 | 4.0 | 4.0 | 5.5 | 2.8 | 1.7 | 1.4 | 1.2 | 1.1 | 1.2 | 1.2 | 1.2 | 1.3 | 1.4 | 1.8 | 2.2 | 2.4 | 2.6 | 2.7 | 2.7 | 5.5 |
| 16-Sep | 2.7 | 3.0 | 3.4 | 3.7 | 3.9 | 4.2 | 4.8 | 4.2 | 3.3 | 2.1 | 1.8 | 1.6 | 1.3 | 1.3 | 1.1 | 1.1 | 1.2 | 1.2 | 1.3 | 1.7 | 2.2 | 2.5 | 2.7 | 2.6 | 2.5 | 4.8 |
| 17-Sep | 2.9 | 3.2 | 3.5 | 3.7 | 4.2 | 5.8 | 6.9 | 8.0 | 9.8 | 10.0 | 6.0 | 5.2 | 4.7 | 3.7 | 3.6 | 4.4 | 4.1 | 3.6 | 5.1 | 7.0 | 7.4 | 6.4 | 5.7 | 6.0 | 5.4 | 10.0 |
| 18-Sep | 7.5 | 9.0 | 8.6 | 8.5 | 8.9 | 9.4 | 9.5 | 9.3 | 6.6 | 4.2 | 3.1 | 2.9 | 3.6 | 4.6 | 5.5 | 4.7 | 4.6 | 5.7 | 6.4 | 6.0 | 5.3 | 4.5 | 4.1 | 4.1 | 6.1 | 9.5 |
| 19-Sep | 5.3 | 7.8 | 11.7 | 13.2 | 13.8 | 14.9 | 17.0 | 18.4 | 18.2 | 15.6 | 15.9 | 14.3 | 12.0 | 9.8 | 8.0 | 7.2 | 3.5 | 2.5 | 2.4 | 2.3 | 3.6 | 3.5 | 3.5 | 2.9 | 9.5 | 18.4 |
| 20-Sep | 2.7 | 2.5 | 2.8 | 3.0 | 2.9 | 2.7 | 2.4 | 2.3 | 2.2 | 1.9 | 1.6 | 1.4 | 1.3 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.8 | 3.0 |
| 21-Sep | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.5 | 1.4 | 1.5 | 1.4 | 1.4 | 1.4 | 1.3 | 1.5 |
| 22-Sep | 1.7 | 2.7 | 3.3 | 3.5 | 4.2 | 4.7 | 5.2 | 4.0 | 2.8 | 2.1 | 1.9 | 1.9 | 1.8 | 1.9 | 2.1 | 2.7 | 3.3 | 3.6 | 3.7 | 4.1 | 3.7 | 3.4 | 2.9 | 2.8 | 3.1 | 5.2 |
| 23-Sep | 3.4 | 3.8 | 3.5 | 3.5 | 3.2 | 2.9 | 2.9 | 2.7 | 2.6 | 2.5 | 2.3 | 2.1 | 2.1 | 3.2 | 4.4 | 4.2 | 4.4 | 3.5 | 3.6 | 3.2 | 3.1 | 3.5 | 4.1 | 5.0 | 3.3 | 5.0 |
| 24-Sep | 4.5 | 4.6 | 4.8 | 4.7 | 4.4 | 4.1 | 3.4 | 3.3 | 3.0 | 2.4 | 2.3 | 2.0 | 1.9 | 1.9 | 2.3 | 2.4 | 2.5 | 2.5 | 2.6 | 2.9 | 3.0 | 2.9 | 2.9 | 2.8 | 3.1 | 4.8 |
| 25-Sep | 3.1 | 3.4 | 3.6 | 3.8 | 3.7 | 3.7 | 3.8 | 3.7 | 3.6 | 3.5 | 2.8 | 2.2 | 1.7 | 1.4 | 1.6 | 1.6 | 1.3 | 1.4 | 1.5 | 1.8 | 1.9 | 1.9 | 2.2 | 2.3 | 2.6 | 3.8 |
| 26-Sep | 3.2 | 3.9 | 3.9 | 3.8 | 3.6 | 3.6 | 3.4 | 3.1 | 2.8 | 2.4 | 2.5 | 2.3 | 2.2 | 2.3 | 2.1 | 2.6 | 3.3 | 3.1 | 3.3 | 2.9 | 2.6 | 2.1 | 1.9 | 1.9 | 2.9 | 3.9 |
| 27-Sep | 1.9 | 2.2 | 2.4 | 2.5 | 2.7 | 2.9 | 3.2 | 3.3 | 3.2 | 3.1 | 2.9 | 2.6 | 2.2 | 2.3 | 2.5 | C | C | 1.4 | 1.7 | 2.2 | 2.3 | 2.5 | 3.5 | 4.6 | 2.6 | 4.6 |
| 28-Sep | 7.8 | 10.0 | 9.1 | 8.5 | 7.7 | 5.9 | 4.5 | 4.2 | 3.7 | 2.9 | 2.1 | 1.6 | 1.6 | 2.6 | 2.9 | 3.4 | 3.7 | 4.0 | 4.7 | 5.6 | 5.9 | 5.4 | 5.3 | 5.4 | 4.9 | 10.0 |
| 29-Sep | 7.9 | 9.7 | 9.8 | 9.4 | 9.0 | 8.5 | 8.0 | 7.2 | 5.8 | 4.3 | 3.4 | 3.0 | 4.5 | 4.6 | 4.6 | 4.8 | 5.0 | 5.6 | 5.4 | 5.6 | 5.6 | 5.8 | 6.2 | 6.1 | 6.2 | 9.8 |
| 30-Sep | 6.7 | 7.1 | 7.1 | 7.1 | 7.1 | 7.5 | 7.7 | 8.1 | 8.6 | 7.5 | 5.9 | 5.4 | 5.7 | 5.8 | 5.0 | 4.3 | 3.5 | 3.4 | 2.8 | 2.7 | 2.8 | 3.0 | 2.9 | 3.0 | 5.4 | 8.6 |

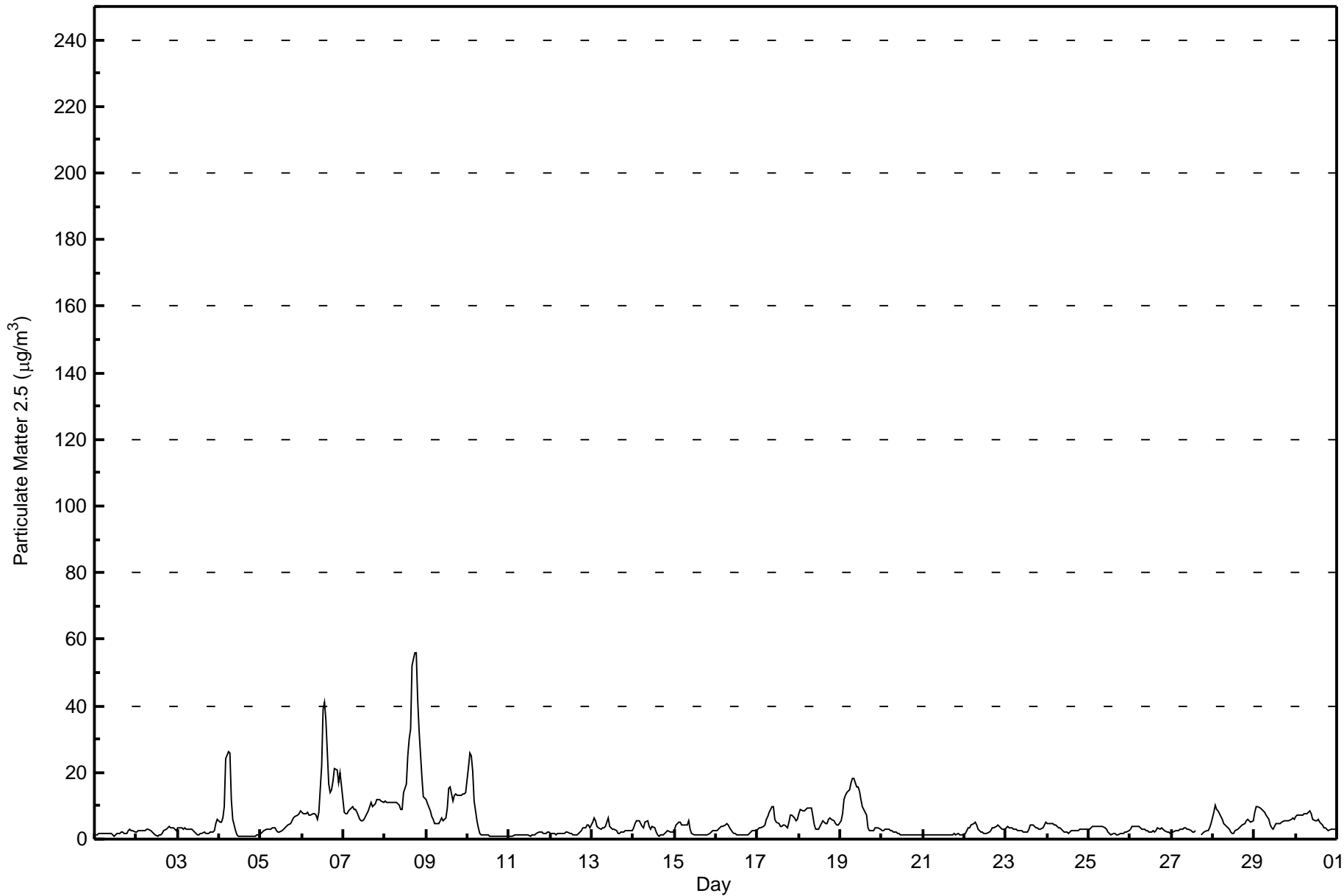
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 5.0 | 5.6 | 5.8 | 5.7 | 5.8 | 5.7 | 5.7 | 5.2 | 4.8 | 4.1 | 3.5 | 3.9 | 4.5 | 5.2 | 5.2 | 4.6 | 5.3 | 5.3 | 5.6 | 5.6 | 5.3 | 4.7 | 4.7 | 4.6 | Diurnal Average | |
| 21.6 | 25.8 | 25.2 | 20.2 | 24.3 | 26.4 | 25.8 | 18.4 | 18.2 | 15.6 | 15.9 | 22.2 | 39.1 | 40.9 | 35.5 | 33.2 | 52.1 | 56.0 | 55.9 | 41.9 | 32.8 | 18.8 | 19.8 | 16.1 | Diurnal Maximum | |

C - Calibration
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 506 | 70.47 | 70.47 |
| 6 - 15 | 154 | 21.45 | 91.92 |
| 16 - 25 | 21 | 2.92 | 94.85 |
| 26 - 80 | 13 | 1.81 | 96.66 |
| > 81.0 | 0 | 0.00 | 96.66 |

Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 11 | 41 | 19 | 11 | 6 | 13 | 7 | 16 | 68 | 68 | 55 | 53 | 59 | 58 | 11 | 10 | 506 |
| 6 - 15 | 2 | 6 | 7 | 7 | 4 | 3 | 13 | 13 | 25 | 32 | 9 | 6 | 7 | 14 | 3 | 3 | 154 |
| 16 - 25 | 0 | 1 | 3 | 4 | 1 | 1 | 0 | 1 | 3 | 1 | 0 | 1 | 3 | 0 | 1 | 1 | 21 |
| 26 - 80 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 2 | 3 | 0 | 13 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 14 | 49 | 30 | 22 | 11 | 18 | 20 | 30 | 97 | 101 | 65 | 60 | 71 | 74 | 18 | 14 | 694 |

Total Number of Valid Hours: 718

Total Number of Hours: 720

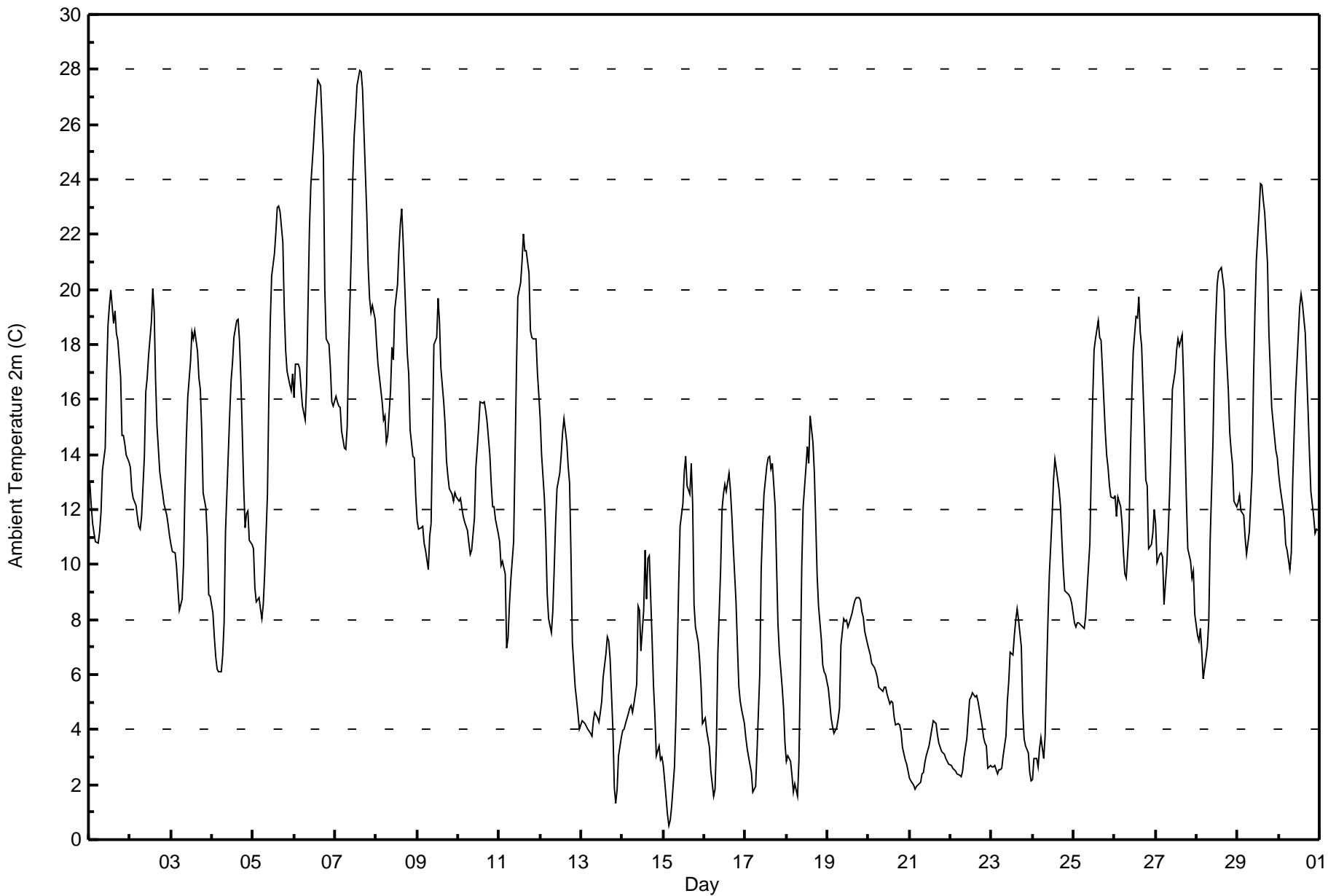


| Maximum Value: 28.0 C on Sep 7 15:00 | | Maximum Daily Average: 20.6 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: 0.5 C on Sep 15 04:00 | | Minimum Daily Average: 2.9 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.1 C at hour 15 | | Minimum Diurnal Average: 7.2 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.14 C | | Percentiles: P ₁ = 1.7 P ₁₀ = 3.1 Q ₁ = 5.9 Median = 11.2 Q ₃ = 15.4 P ₉₀ = 18.9 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-Sep | 13.0 | 12.2 | 11.5 | 11.2 | 10.8 | 10.8 | 11.2 | 11.9 | 13.4 | 14.2 | 16.9 | 18.7 | 19.4 | 20.0 | 18.7 | 19.2 | 18.4 | 18.1 | 16.8 | 14.7 | 14.7 | 14.4 | 14.0 | 13.7 | 14.9 | 20.0 | |
| 2-Sep | 13.5 | 12.7 | 12.4 | 12.2 | 11.7 | 11.4 | 11.3 | 11.7 | 13.9 | 16.3 | 16.8 | 17.6 | 18.8 | 20.0 | 19.2 | 16.8 | 15.0 | 13.4 | 12.9 | 12.6 | 12.2 | 11.8 | 11.4 | 11.0 | 14.0 | 20.0 | |
| 3-Sep | 10.7 | 10.5 | 10.4 | 9.9 | 9.1 | 8.4 | 8.7 | 10.0 | 12.6 | 14.6 | 16.1 | 17.4 | 18.5 | 18.2 | 18.5 | 17.7 | 16.8 | 16.4 | 14.9 | 12.6 | 12.0 | 11.0 | 8.9 | 8.9 | 13.0 | 18.5 | |
| 4-Sep | 8.2 | 7.4 | 6.7 | 6.2 | 6.1 | 6.1 | 6.7 | 7.9 | 11.2 | 14.0 | 15.4 | 16.7 | 17.3 | 18.3 | 18.9 | 18.9 | 18.2 | 16.7 | 12.9 | 11.3 | 11.9 | 12.0 | 10.9 | 10.7 | 12.1 | 18.9 | |
| 5-Sep | 10.6 | 9.1 | 8.6 | 8.8 | 8.4 | 8.0 | 8.6 | 9.7 | 12.6 | 16.2 | 18.8 | 20.5 | 21.3 | 22.1 | 23.0 | 23.0 | 22.8 | 21.7 | 19.3 | 17.8 | 17.0 | 16.5 | 16.3 | 17.0 | 15.7 | 23.0 | |
| 6-Sep | 16.1 | 17.3 | 17.3 | 17.1 | 16.4 | 15.7 | 15.2 | 16.6 | 19.4 | 22.2 | 23.8 | 25.3 | 26.3 | 26.9 | 27.6 | 27.4 | 26.2 | 24.8 | 20.0 | 18.2 | 18.0 | 17.1 | 15.9 | 15.8 | 20.3 | 27.6 | |
| 7-Sep | 16.1 | 15.9 | 15.8 | 15.7 | 14.9 | 14.2 | 14.2 | 15.0 | 17.6 | 21.5 | 24.0 | 25.6 | 26.4 | 27.4 | 28.0 | 27.9 | 27.2 | 25.7 | 22.8 | 20.8 | 19.7 | 19.2 | 19.4 | 18.9 | 20.6 | 28.0 | |
| 8-Sep | 18.0 | 17.3 | 16.8 | 15.9 | 15.3 | 15.4 | 14.4 | 14.7 | 16.3 | 17.9 | 17.4 | 19.3 | 20.2 | 21.5 | 22.4 | 22.9 | 21.8 | 19.0 | 17.6 | 16.9 | 14.9 | 13.9 | 13.9 | 12.5 | 17.3 | 22.9 | |
| 9-Sep | 11.6 | 11.3 | 11.3 | 11.4 | 10.8 | 10.5 | 9.8 | 11.0 | 11.5 | 14.7 | 18.0 | 18.2 | 19.7 | 18.8 | 17.2 | 15.9 | 15.1 | 13.8 | 13.2 | 12.8 | 12.6 | 12.3 | 12.6 | 12.5 | 13.6 | 19.7 | |
| 10-Sep | 12.3 | 12.4 | 12.1 | 11.7 | 11.6 | 11.2 | 10.8 | 10.4 | 10.5 | 11.7 | 13.5 | 14.2 | 15.0 | 15.9 | 15.9 | 15.6 | 15.2 | 14.0 | 12.9 | 12.1 | 12.1 | 11.6 | 11.1 | 12.9 | 15.9 | 19.7 | |
| 11-Sep | 10.8 | 10.0 | 10.1 | 9.7 | 7.0 | 7.3 | 8.6 | 9.5 | 10.8 | 13.9 | 17.0 | 19.7 | 20.2 | 21.0 | 22.0 | 21.4 | 21.4 | 20.6 | 18.5 | 18.2 | 18.2 | 18.2 | 17.0 | 16.2 | 15.3 | 22.0 | |
| 12-Sep | 15.3 | 14.0 | 12.4 | 11.0 | 9.0 | 8.0 | 7.5 | 8.3 | 9.8 | 11.5 | 12.8 | 13.3 | 14.0 | 14.8 | 15.3 | 14.4 | 13.6 | 13.0 | 10.4 | 7.2 | 5.5 | 5.1 | 4.6 | 4.0 | 10.6 | 15.3 | |
| 13-Sep | 4.3 | 4.3 | 4.2 | 4.1 | 4.0 | 3.8 | 3.8 | 4.3 | 4.6 | 4.4 | 4.3 | 4.6 | 5.0 | 5.9 | 6.8 | 7.4 | 7.2 | 6.6 | 4.0 | 1.9 | 1.3 | 1.8 | 3.0 | 3.7 | 4.4 | 7.4 | |
| 14-Sep | 4.0 | 4.0 | 4.2 | 4.6 | 4.8 | 4.9 | 4.7 | 4.9 | 5.7 | 8.5 | 8.3 | 6.8 | 8.4 | 10.5 | 8.8 | 10.2 | 10.3 | 7.3 | 5.6 | 4.5 | 3.0 | 3.4 | 2.9 | 3.0 | 6.0 | 10.5 | |
| 15-Sep | 2.7 | 2.1 | 0.9 | 0.5 | 0.7 | 1.2 | 2.6 | 4.4 | 6.7 | 9.2 | 11.4 | 12.2 | 13.4 | 13.9 | 12.8 | 12.5 | 13.7 | 12.2 | 8.5 | 7.7 | 7.2 | 6.5 | 5.6 | 4.2 | 7.2 | 13.9 | |
| 16-Sep | 4.4 | 4.0 | 3.7 | 3.4 | 2.5 | 1.6 | 1.8 | 3.5 | 6.8 | 9.8 | 12.0 | 12.5 | 12.9 | 12.7 | 13.3 | 12.7 | 11.8 | 10.7 | 8.6 | 7.1 | 5.6 | 5.0 | 4.7 | 4.2 | 7.3 | 13.3 | |
| 17-Sep | 3.7 | 3.3 | 3.0 | 2.5 | 1.7 | 1.8 | 1.9 | 3.2 | 6.0 | 9.8 | 11.4 | 12.6 | 13.6 | 13.9 | 14.0 | 13.5 | 13.7 | 12.1 | 10.0 | 7.8 | 6.8 | 5.6 | 4.8 | 3.5 | 7.5 | 14.0 | |
| 18-Sep | 2.8 | 3.1 | 2.8 | 2.4 | 1.7 | 2.0 | 1.6 | 2.9 | 6.3 | 9.9 | 12.1 | 13.5 | 14.3 | 13.7 | 15.4 | 14.4 | 13.4 | 11.6 | 9.6 | 8.5 | 7.3 | 6.4 | 6.1 | 6.0 | 7.8 | 15.4 | |
| 19-Sep | 5.5 | 5.0 | 4.4 | 4.1 | 3.8 | 4.1 | 4.4 | 4.8 | 7.1 | 8.1 | 8.0 | 8.0 | 7.7 | 7.9 | 8.3 | 8.5 | 8.7 | 8.8 | 8.8 | 8.7 | 8.3 | 8.1 | 7.6 | 7.1 | 6.9 | 8.8 | |
| 20-Sep | 6.9 | 6.7 | 6.4 | 6.2 | 6.1 | 5.9 | 5.5 | 5.5 | 5.4 | 5.5 | 5.6 | 5.3 | 4.9 | 5.0 | 5.0 | 4.5 | 4.2 | 4.2 | 4.2 | 3.9 | 3.3 | 2.9 | 2.7 | 2.5 | 4.9 | 6.9 | |
| 21-Sep | 2.3 | 2.1 | 2.0 | 1.8 | 1.9 | 2.0 | 2.1 | 2.4 | 2.4 | 2.8 | 3.0 | 3.4 | 3.7 | 4.0 | 4.3 | 4.2 | 3.8 | 3.5 | 3.3 | 3.2 | 3.1 | 2.9 | 2.8 | 2.8 | 2.9 | 4.3 | |
| 22-Sep | 2.7 | 2.6 | 2.6 | 2.5 | 2.4 | 2.3 | 2.3 | 2.5 | 3.0 | 3.7 | 4.4 | 5.1 | 5.2 | 5.3 | 5.2 | 5.2 | 5.0 | 4.7 | 4.1 | 3.7 | 3.5 | 3.4 | 2.6 | 2.7 | 3.6 | 5.3 | |
| 23-Sep | 2.7 | 2.6 | 2.7 | 2.4 | 2.5 | 2.5 | 2.6 | 3.1 | 3.7 | 5.0 | 5.8 | 6.8 | 6.7 | 7.4 | 8.0 | 8.4 | 8.0 | 7.0 | 4.7 | 3.7 | 3.4 | 3.1 | 2.4 | 2.2 | 4.5 | 8.4 | |
| 24-Sep | 2.2 | 2.9 | 2.9 | 2.7 | 3.3 | 3.7 | 2.9 | 3.8 | 5.9 | 7.9 | 9.6 | 11.7 | 13.1 | 13.8 | 13.5 | 12.7 | 12.1 | 10.9 | 9.8 | 9.1 | 8.9 | 8.9 | 8.8 | 8.6 | 7.9 | 13.8 | |
| 25-Sep | 7.9 | 7.7 | 7.9 | 7.9 | 7.8 | 7.7 | 7.7 | 8.1 | 9.0 | 10.8 | 13.5 | 16.0 | 17.8 | 18.2 | 18.9 | 18.2 | 18.2 | 17.1 | 14.9 | 14.0 | 13.5 | 12.9 | 12.5 | 12.4 | 12.5 | 18.9 | |
| 26-Sep | 12.5 | 11.7 | 12.5 | 12.1 | 11.5 | 10.4 | 9.7 | 9.5 | 11.3 | 14.1 | 16.2 | 17.8 | 19.0 | 19.0 | 19.7 | 18.5 | 17.9 | 14.9 | 13.0 | 12.8 | 10.6 | 10.7 | 11.1 | 12.0 | 13.7 | 19.7 | |
| 27-Sep | 11.5 | 10.1 | 10.4 | 10.4 | 10.3 | 8.6 | 10.0 | 11.1 | 12.6 | 14.5 | 16.4 | 17.0 | 17.8 | 18.2 | 17.9 | 18.3 | 16.7 | 14.5 | 12.3 | 10.6 | 10.1 | 9.5 | 9.7 | 8.2 | 12.8 | 18.3 | |
| 28-Sep | 7.4 | 7.2 | 7.7 | 6.9 | 5.8 | 6.6 | 7.0 | 7.9 | 10.9 | 14.5 | 17.3 | 18.9 | 20.2 | 20.6 | 20.8 | 20.4 | 20.0 | 18.3 | 16.3 | 14.8 | 14.1 | 13.6 | 12.3 | 12.1 | 13.4 | 20.8 | |
| 29-Sep | 12.3 | 12.5 | 11.9 | 11.8 | 11.0 | 10.4 | 10.8 | 11.2 | 13.4 | 16.7 | 19.2 | 21.1 | 22.8 | 23.9 | 23.8 | 23.2 | 22.8 | 21.0 | 18.4 | 17.1 | 15.7 | 14.7 | 14.1 | 13.9 | 16.4 | 23.9 | |
| 30-Sep | 13.3 | 12.8 | 12.1 | 11.7 | 10.7 | 10.5 | 9.8 | 10.4 | 13.0 | 14.7 | 16.2 | 18.3 | 19.4 | 19.8 | 19.5 | 18.4 | 17.0 | 15.6 | 14.0 | 12.7 | 11.8 | 11.2 | 11.3 | 11.2 | 14.0 | 19.8 | |
| | | 8.8 | 8.5 | 8.3 | 8.0 | 7.5 | 7.2 | 7.3 | 8.0 | 9.8 | 12.0 | 13.5 | 14.6 | 15.4 | 16.0 | 16.1 | 15.8 | 15.2 | 14.0 | 12.1 | 10.9 | 10.2 | 9.8 | 9.4 | 9.1 | Diurnal Average | |
| | | 18.0 | 17.3 | 17.3 | 17.1 | 16.4 | 15.7 | 15.2 | 16.6 | 19.4 | 22.2 | 24.0 | 25.6 | 26.4 | 27.4 | 28.0 | 27.9 | 27.2 | 25.7 | 22.8 | 20.8 | 19.7 | 19.2 | 19.4 | 18.9 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Stony Mountain - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 308 | 42.78 | 42.78 |
| 10 - 20 | 362 | 50.28 | 93.06 |
| > 20 | 50 | 6.94 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



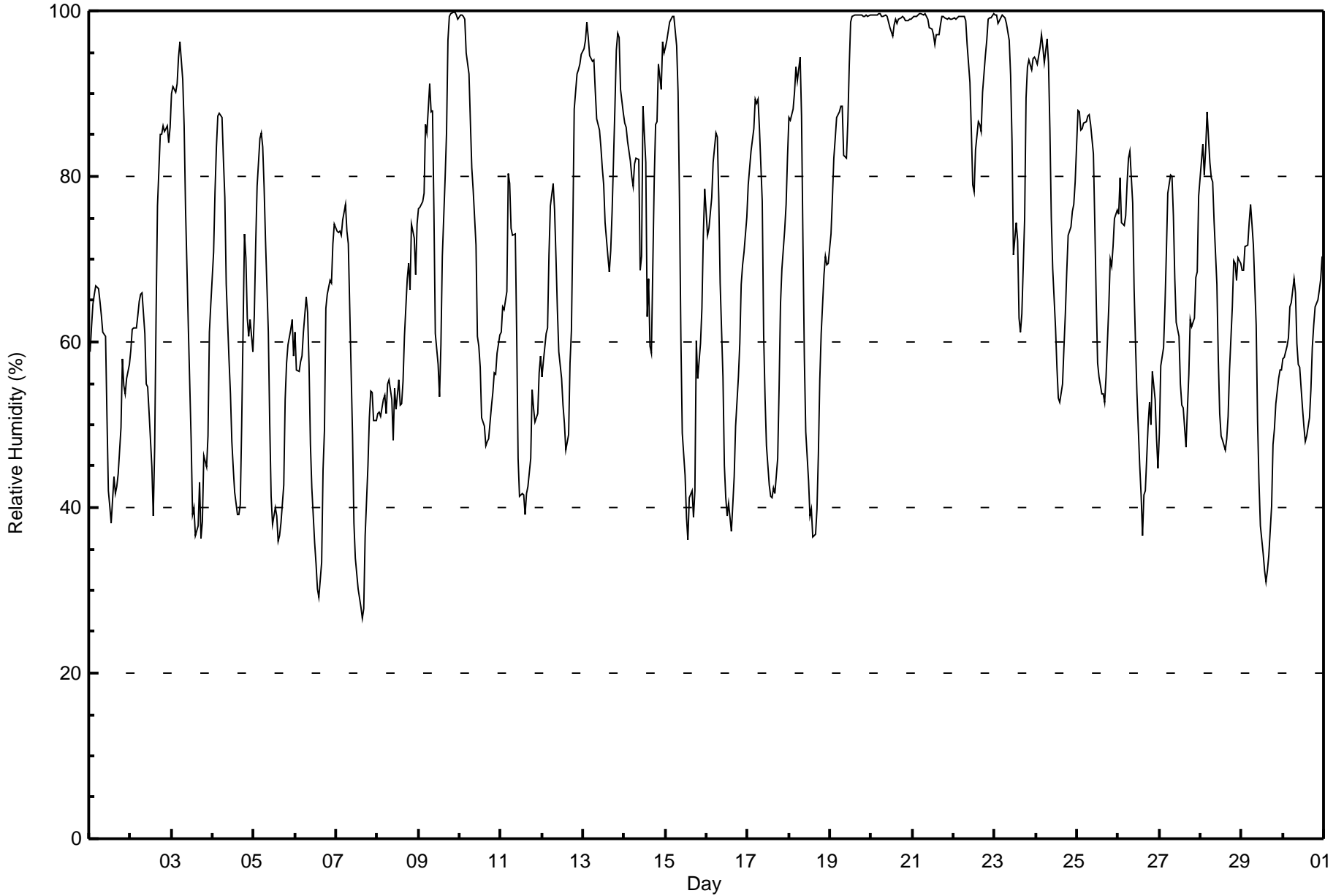
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Stony Mountain - September 2017

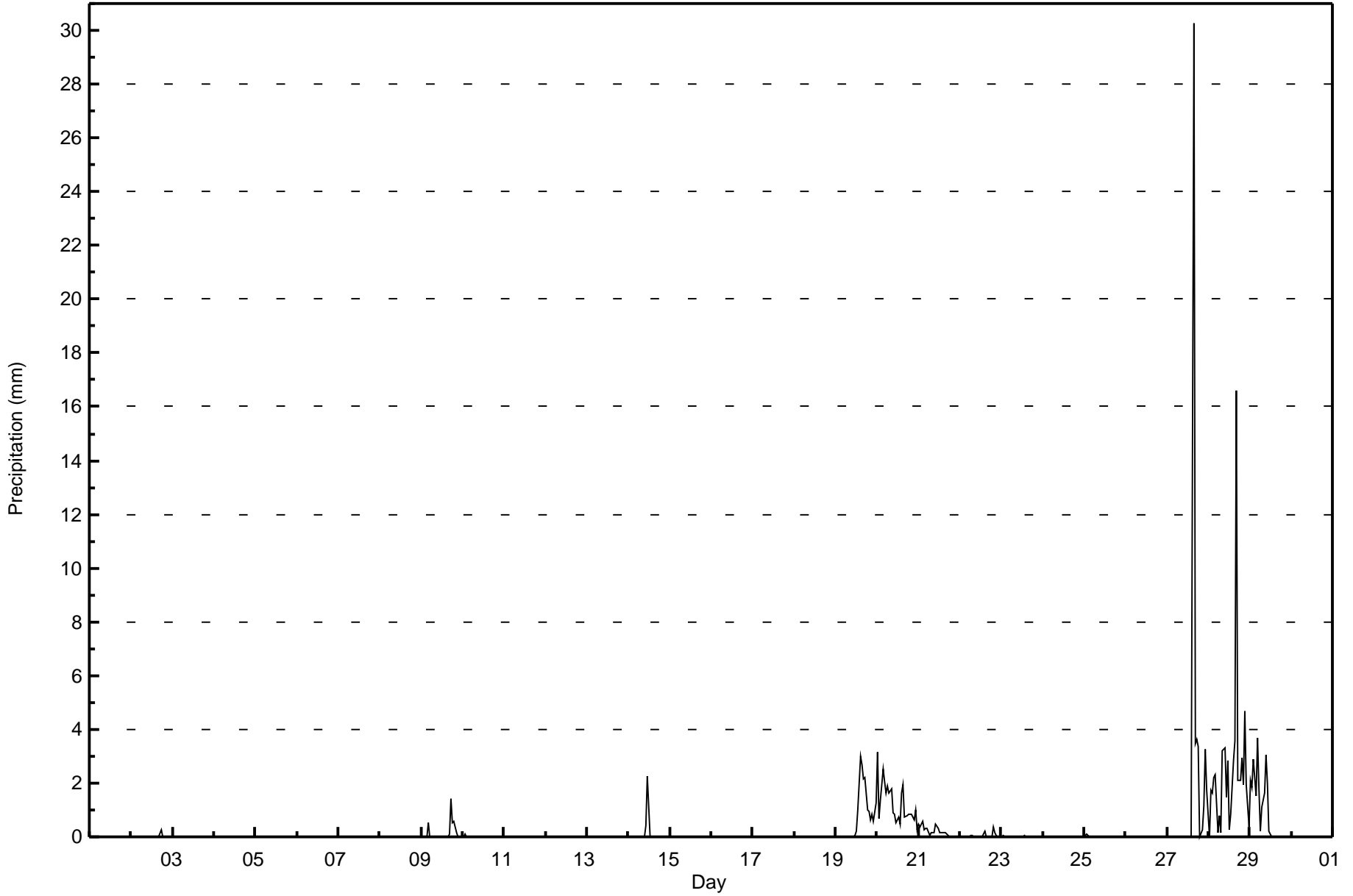
| Maximum Value: 100 % on Sep 9 21:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 99.0 % on Sep 20 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | |
|---|-------------------------------|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|--|-----|-----|-----|-----|-----|----|------|---------------|---------------|------|------|------|------|------|------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 27 % on Sep 7 16:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 52.5 % on Sep 7 | | | | | | | | | | | | | | | | | Hours of Data: 720 | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 83.5 % at hour 6 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 52.7 % at hour 15 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | |
| Monthly Average: 70.1 % | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 32 P ₁₀ = 42 Q ₁ = 54 Median = 69 O ₃ = 87 P ₉₀ = 99 P ₉₉ = 100 | | | | | | | | | | | | | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 59 | 62 | 64 | 66 | 67 | 66 | 65 | 63 | 61 | 61 | 51 | 42 | 40 | 38 | 44 | 42 | 43 | 44 | 50 | 58 | 55 | 54 | 56 | 57 | 54.4 | 67 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 59 | 61 | 62 | 62 | 63 | 65 | 66 | 66 | 61 | 55 | 55 | 52 | 45 | 39 | 47 | 63 | 77 | 85 | 85 | 86 | 85 | 86 | 84 | 86 | 66.4 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 90 | 91 | 90 | 91 | 94 | 96 | 92 | 86 | 76 | 69 | 62 | 48 | 39 | 40 | 37 | 38 | 43 | 36 | 38 | 46 | 45 | 49 | 61 | 65 | 63.5 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 71 | 78 | 84 | 87 | 88 | 87 | 82 | 77 | 67 | 58 | 54 | 48 | 45 | 42 | 39 | 39 | 40 | 50 | 73 | 70 | 63 | 61 | 63 | 59 | 63.5 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 63 | 72 | 79 | 85 | 85 | 84 | 79 | 72 | 61 | 50 | 41 | 38 | 40 | 39 | 36 | 37 | 38 | 43 | 53 | 57 | 60 | 62 | 63 | 58 | 58.1 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 61 | 57 | 56 | 58 | 58 | 61 | 65 | 64 | 57 | 48 | 42 | 36 | 33 | 30 | 29 | 33 | 45 | 49 | 64 | 66 | 67 | 67 | 72 | 74 | 53.9 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 73 | 73 | 73 | 73 | 75 | 77 | 73 | 72 | 64 | 49 | 38 | 34 | 32 | 30 | 28 | 27 | 28 | 37 | 45 | 51 | 54 | 54 | 51 | 51 | 52.5 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 51 | 51 | 51 | 53 | 54 | 51 | 55 | 55 | 53 | 48 | 54 | 52 | 55 | 52 | 53 | 55 | 61 | 68 | 69 | 66 | 74 | 73 | 68 | 74 | 58.3 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 76 | 76 | 77 | 78 | 86 | 85 | 91 | 88 | 88 | 76 | 61 | 57 | 53 | 60 | 70 | 80 | 85 | 96 | 99 | 100 | 100 | 100 | 99 | 99 | 82.6 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 100 | 100 | 99 | 99 | 95 | 92 | 87 | 81 | 78 | 72 | 61 | 59 | 57 | 51 | 50 | 47 | 48 | 48 | 52 | 54 | 56 | 56 | 59 | 61 | 69.2 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 61 | 64 | 64 | 66 | 80 | 79 | 74 | 73 | 73 | 61 | 46 | 41 | 42 | 41 | 39 | 42 | 43 | 46 | 54 | 52 | 50 | 51 | 56 | 58 | 56.6 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 56 | 58 | 61 | 62 | 71 | 76 | 79 | 76 | 70 | 64 | 59 | 56 | 52 | 50 | 47 | 49 | 58 | 61 | 74 | 88 | 92 | 93 | 94 | 95 | 68.3 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 95 | 96 | 99 | 97 | 95 | 94 | 94 | 90 | 87 | 86 | 84 | 81 | 79 | 74 | 70 | 68 | 71 | 76 | 88 | 95 | 97 | 97 | 91 | 88 | 87.2 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 86 | 86 | 84 | 82 | 80 | 79 | 82 | 82 | 69 | 70 | 88 | 82 | 63 | 68 | 60 | 59 | 80 | 86 | 87 | 94 | 90 | 96 | 95 | 95 | 80.4 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 96 | 96 | 99 | 99 | 99 | 99 | 96 | 90 | 77 | 61 | 49 | 44 | 39 | 36 | 41 | 42 | 39 | 42 | 60 | 56 | 60 | 64 | 73 | 79 | 68.1 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 73 | 74 | 76 | 77 | 82 | 85 | 85 | 77 | 67 | 56 | 45 | 41 | 39 | 40 | 37 | 40 | 44 | 50 | 56 | 60 | 67 | 69 | 71 | 75 | 61.9 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 79 | 81 | 83 | 86 | 89 | 89 | 89 | 86 | 77 | 61 | 53 | 48 | 43 | 41 | 41 | 42 | 42 | 46 | 54 | 65 | 69 | 74 | 77 | 82 | 66.5 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 87 | 87 | 88 | 90 | 93 | 92 | 94 | 87 | 72 | 58 | 49 | 43 | 39 | 40 | 36 | 37 | 40 | 47 | 55 | 61 | 68 | 70 | 69 | 70 | 65.6 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 73 | 77 | 82 | 85 | 87 | 88 | 88 | 89 | 83 | 82 | 87 | 93 | 99 | 99 | 99 | 99 | 99 | 100 | 100 | 99 | 99 | 99 | 99 | 99 | 91.9 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 99 | 99 | 99 | 99 | 98 | 97 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99.0 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 99 | 99 | 99 | 100 | 100 | 100 | 100 | 100 | 99 | 99 | 98 | 98 | 97 | 96 | 97 | 97 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98.7 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 96 | 91 | 86 | 79 | 78 | 83 | 87 | 86 | 85 | 90 | 95 | 96 | 99 | 99 | 99 | 100 | 93.4 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 100 | 100 | 98 | 99 | 99 | 99 | 99 | 99 | 96 | 92 | 84 | 70 | 74 | 72 | 63 | 61 | 63 | 75 | 89 | 93 | 94 | 93 | 94 | 94 | 87.7 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 94 | 93 | 96 | 97 | 96 | 94 | 97 | 94 | 86 | 75 | 69 | 62 | 57 | 53 | 53 | 55 | 59 | 63 | 68 | 73 | 74 | 76 | 77 | 79 | 76.6 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 88 | 88 | 86 | 86 | 87 | 87 | 87 | 87 | 86 | 83 | 74 | 65 | 57 | 56 | 54 | 54 | 53 | 56 | 64 | 70 | 69 | 72 | 75 | 76 | 73.3 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 75 | 80 | 74 | 74 | 75 | 79 | 82 | 83 | 77 | 66 | 60 | 54 | 45 | 42 | 37 | 42 | 42 | 50 | 53 | 50 | 56 | 53 | 48 | 45 | 60.1 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 49 | 57 | 59 | 64 | 71 | 78 | 80 | 80 | 75 | 68 | 62 | 61 | 55 | 52 | 52 | 47 | 52 | 56 | 63 | 62 | 63 | 68 | 68 | 78 | 63.4 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 82 | 84 | 80 | 83 | 88 | 82 | 80 | 79 | 75 | 67 | 58 | 51 | 49 | 48 | 47 | 48 | 51 | 57 | 64 | 70 | 69 | 67 | 70 | 69 | 67.5 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 69 | 69 | 72 | 72 | 74 | 77 | 74 | 72 | 62 | 50 | 43 | 38 | 34 | 32 | 31 | 32 | 34 | 40 | 48 | 50 | 53 | 56 | 57 | 57 | 53.9 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 58 | 58 | 59 | 61 | 64 | 65 | 68 | 66 | 60 | 57 | 57 | 52 | 50 | 48 | 49 | 51 | 54 | 59 | 62 | 64 | 65 | 66 | 68 | 70 | 59.6 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 77.4 | 78.9 | 79.8 | 81.0 | 83.1 | 83.5 | 83.4 | 81.1 | 75.6 | 67.7 | 61.7 | 57.6 | 54.9 | 52.9 | 52.7 | 53.8 | 56.4 | 61.6 | 68.7 | 71.4 | 73.2 | 73.9 | 75.2 | 76.4 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 99 | 99 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 100 | 100 | 100 | 100 | 99 | 100 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Stony Mountain - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Stony Mountain - September 2017

| Concentration Ranges (mm) | Number of Hours | % | Cumulative % |
|----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 639 | 88.75 | 88.75 |
| 0.4 - 0.5 | 9 | 1.25 | 90.00 |
| 0.6 - 0.7 | 7 | 0.97 | 90.97 |
| 0.8 - 1.4 | 19 | 2.64 | 93.61 |
| 1.5 - 10 | 43 | 5.97 | 99.58 |
| > 10 | 2 | 0.28 | 99.86 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



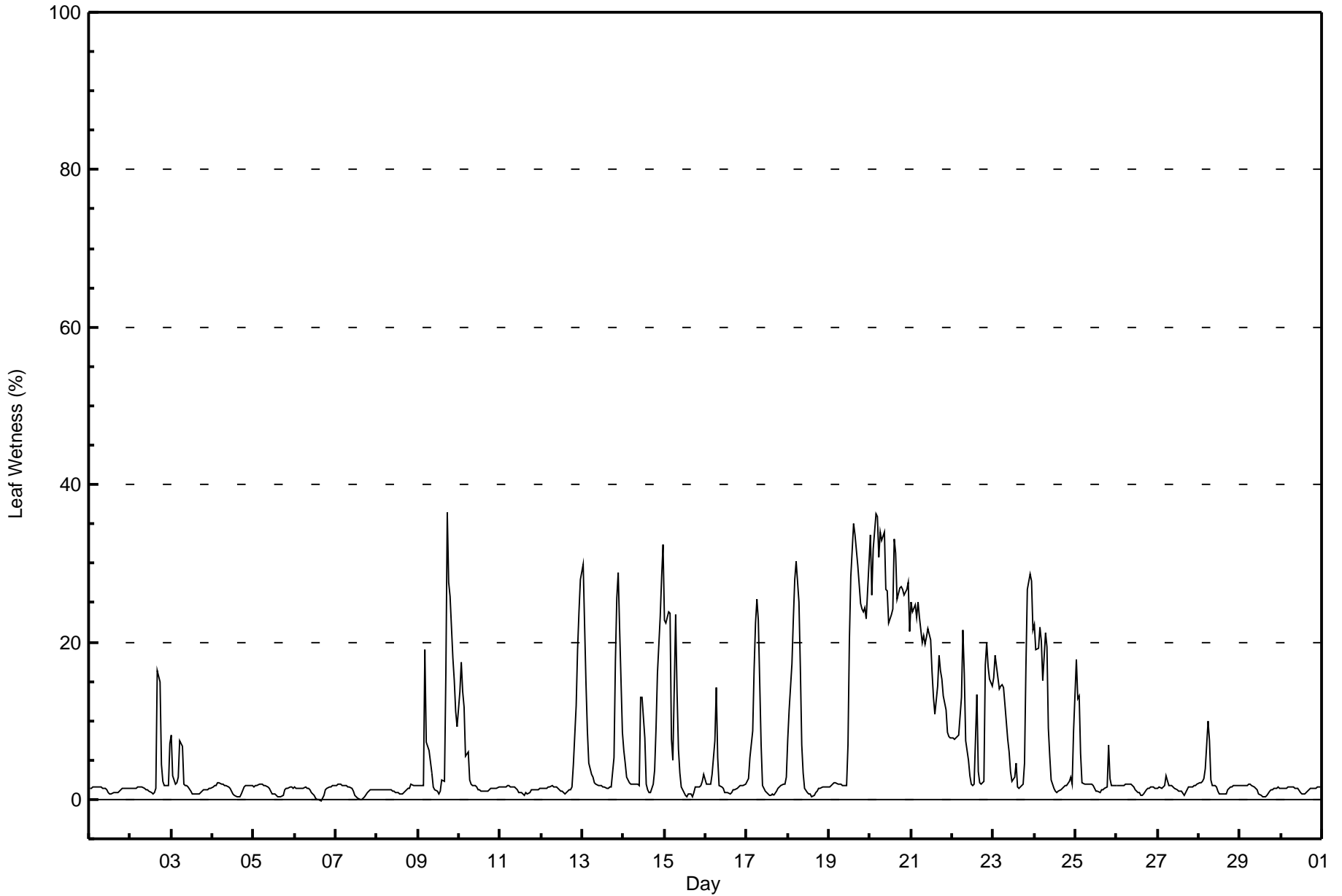
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

Stony Mountain - September 2017

| Maximum Value: 36 % on Sep 9 18:00 | | | | | | | | | | | | | | Maximum Daily Average: 28.8 % on Sep 20 | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|--|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|-----|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Minimum Value: 0 % on Sep 6 16:00 | | | | | | | | | | | | | | Minimum Daily Average: 1.1 % on Sep 6 | | | | | | | | | | | | | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 8.4 % at hour 7 | | | | | | | | | | | | | | Minimum Diurnal Average: 3.0 % at hour 12 | | | | | | | | | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 5.7 % | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 21 P ₉₉ = 33 | | | | | | | | | | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 16 | 15 | 4 | 2 | 2 | 2 | 2 | 7 | 3.0 | 16 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 8 | 3 | 2 | 2 | 3 | 7 | 7 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2.2 | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 2 | 1.4 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1.3 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 1.1 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1.2 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 2 | 2 | 2 | 2 | 19 | 7 | 6 | 5 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 16 | 36 | 28 | 26 | 18 | 15 | 11 | 9 | 9.1 | 36 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 14 | 17 | 14 | 12 | 6 | 6 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3.9 | 17 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 12 | 19 | 24 | 28 | 4.7 | 28 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 30 | 22 | 15 | 9 | 5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 5 | 18 | 26 | 29 | 22 | 9 | 8.9 | 30 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 6 | 5 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 13 | 13 | 8 | 2 | 1 | 1 | 1 | 2 | 4 | 9 | 16 | 23 | 28 | 32 | 7.5 | 32 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 23 | 22 | 24 | 24 | 8 | 5 | 23 | 14 | 6 | 3 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 2 | 2 | 2 | 3 | 7.1 | 24 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2 | 2 | 2 | 2 | 3 | 7 | 14 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2.5 | 14 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 2 | 3 | 5 | 9 | 17 | 22 | 26 | 23 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 5.5 | 26 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 8 | 11 | 17 | 23 | 28 | 30 | 25 | 17 | 7 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 7.7 | 30 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 7 | 20 | 28 | 35 | 34 | 32 | 30 | 25 | 24 | 24 | 24 | 23 | 30 | 14.9 | 35 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 34 | 26 | 32 | 36 | 36 | 31 | 34 | 33 | 34 | 27 | 26 | 22 | 24 | 24 | 33 | 31 | 25 | 27 | 27 | 27 | 26 | 27 | 28 | 21 | 28.8 | 36 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 25 | 24 | 25 | 23 | 25 | 23 | 20 | 21 | 20 | 21 | 22 | 20 | 16 | 13 | 11 | 14 | 18 | 16 | 15 | 13 | 11 | 8 | 8 | 8 | 17.5 | 25 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 8 | 8 | 8 | 8 | 8 | 13 | 21 | 16 | 8 | 5 | 3 | 2 | 2 | 2 | 13 | 3 | 2 | 2 | 2 | 17 | 20 | 17 | 15 | 14 | 9.1 | 21 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 15 | 18 | 17 | 14 | 14 | 15 | 14 | 12 | 8 | 6 | 4 | 2 | 3 | 5 | 2 | 1 | 2 | 2 | 5 | 17 | 27 | 29 | 28 | 21 | 11.6 | 29 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 22 | 19 | 19 | 22 | 20 | 15 | 21 | 19 | 9 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 9 | 8.5 | 22 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 18 | 13 | 13 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 7 | 3 | 2 | 2 | 2 | 3.6 | 18 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1.4 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 1 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1.5 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 2 | 2 | 2 | 3 | 4 | 10 | 7 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 10 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1.3 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.0 | 7.3 | 7.4 | 7.3 | 7.4 | 7.5 | 8.4 | 6.7 | 4.5 | 3.6 | 3.4 | 3.0 | 3.1 | 3.0 | 3.8 | 3.5 | 4.3 | 5.1 | 4.8 | 6.4 | 7.1 | 7.5 | 7.4 | 7.4 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 34 | 26 | 32 | 36 | 36 | 31 | 34 | 33 | 34 | 27 | 26 | 22 | 24 | 28 | 35 | 34 | 32 | 36 | 28 | 27 | 27 | 29 | 28 | 32 | Diurnal Maximum |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Stony Mountain - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 15 | 2.09 | 2.09 |
| 0.4 - 0.5 | 16 | 2.23 | 4.32 |
| 0.6 - 0.7 | 31 | 4.32 | 8.65 |
| 0.8 - 1.4 | 180 | 25.10 | 33.75 |
| 1.5 - 10 | 301 | 41.98 | 75.73 |
| > 10 | 139 | 19.39 | 95.12 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



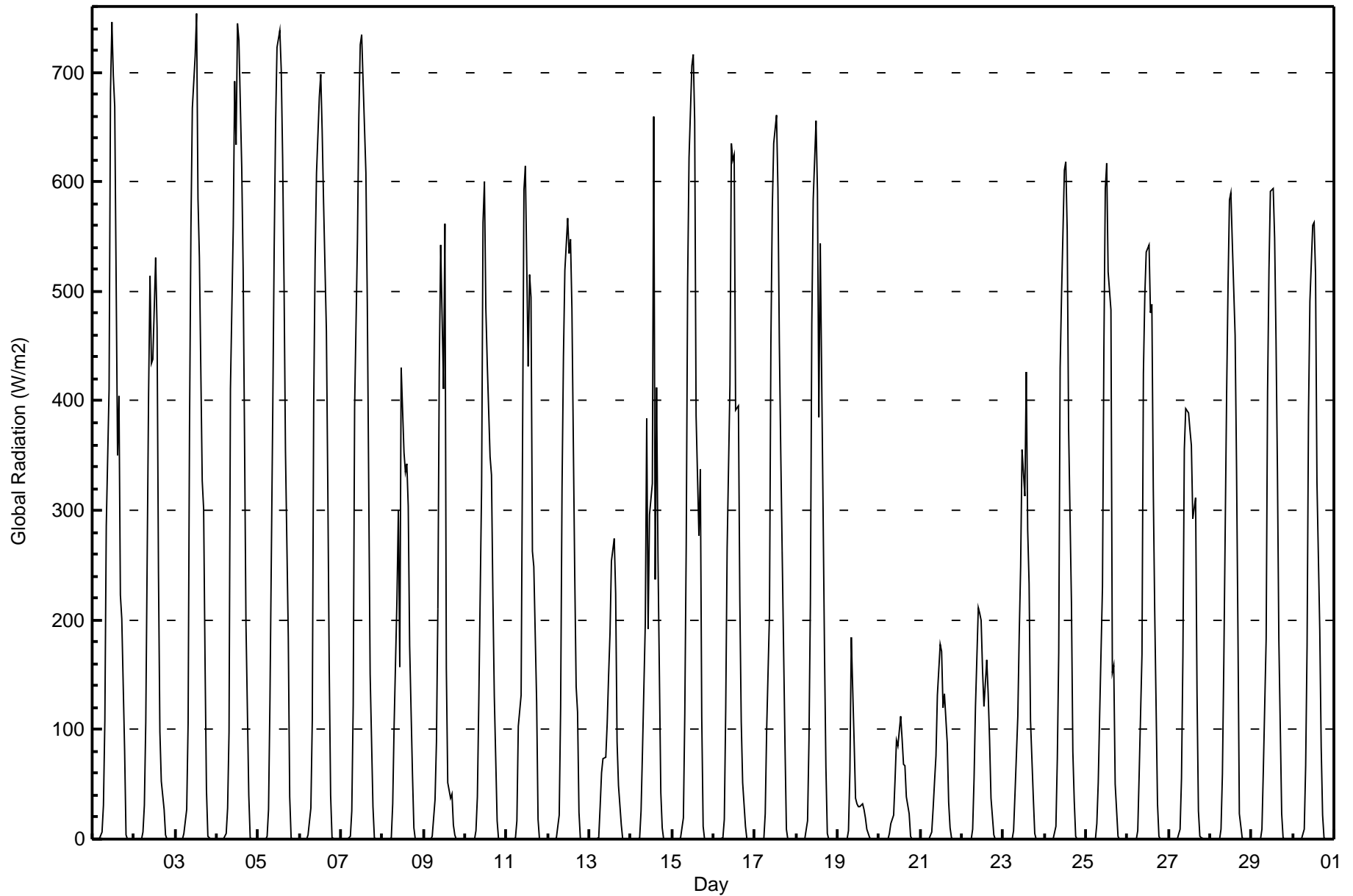
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Stony Mountain - September 2017

| Maximum Value: 754 W/m2 on Sep 3 13:00 | | Maximum Daily Average: 234.9 W/m2 on Sep 4 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|-----|---------------------------------|-----|-----|-----|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|-----|-----|-----|---------------|-----------------|--|
| Minimum Value: 0 W/m2 on Sep 2 21:00 | | Minimum Daily Average: 23.3 W/m2 on Sep 19 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 501.9 W/m2 at hour 12 | | Minimum Diurnal Average: 0.0 W/m2 at hour 23 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 146.3 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 11 Q ₃ = 248 P ₉₀ = 534 P ₉₉ = 723 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 0 | 0 | 0 | 0 | 0 | 6 | 31 | 108 | 285 | 411 | 683 | 746 | 697 | 669 | 351 | 404 | 223 | 200 | 81 | 3 | 0 | 0 | 0 | 0 | 204.1 | 746 | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 31 | 106 | 407 | 515 | 434 | 438 | 531 | 467 | 244 | 98 | 52 | 27 | 4 | 0 | 0 | 0 | 0 | 0 | 140.0 | 531 | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 5 | 27 | 105 | 376 | 558 | 667 | 715 | 754 | 584 | 531 | 327 | 302 | 162 | 45 | 3 | 0 | 0 | 0 | 0 | 215.1 | 754 | |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 5 | 28 | 99 | 410 | 559 | 691 | 634 | 744 | 729 | 613 | 521 | 365 | 197 | 40 | 2 | 0 | 0 | 0 | 0 | 234.9 | 744 | |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 28 | 126 | 393 | 540 | 653 | 722 | 738 | 702 | 621 | 504 | 355 | 184 | 39 | 2 | 0 | 0 | 0 | 0 | 233.7 | 738 | |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 29 | 108 | 396 | 528 | 608 | 678 | 699 | 646 | 581 | 464 | 322 | 157 | 40 | 2 | 0 | 0 | 0 | 0 | 219.2 | 699 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 26 | 122 | 394 | 547 | 659 | 726 | 734 | 692 | 608 | 489 | 322 | 150 | 29 | 1 | 0 | 0 | 0 | 0 | 229.2 | 734 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 32 | 105 | 218 | 300 | 158 | 430 | 353 | 335 | 343 | 303 | 176 | 59 | 11 | 0 | 0 | 0 | 0 | 0 | 117.8 | 430 | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 35 | 89 | 210 | 429 | 542 | 411 | 562 | 156 | 52 | 38 | 41 | 12 | 4 | 0 | 0 | 0 | 0 | 0 | 107.6 | 562 | |
| 10-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 38 | 125 | 322 | 563 | 600 | 484 | 435 | 349 | 332 | 222 | 131 | 17 | 0 | 0 | 0 | 0 | 0 | 151.1 | 600 | |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 17 | 103 | 131 | 360 | 592 | 614 | 432 | 516 | 495 | 263 | 249 | 125 | 18 | 0 | 0 | 0 | 0 | 0 | 163.2 | 614 | |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 22 | 119 | 321 | 441 | 519 | 567 | 535 | 547 | 484 | 240 | 139 | 116 | 24 | 1 | 0 | 0 | 0 | 0 | 170.0 | 567 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 29 | 61 | 73 | 75 | 105 | 150 | 189 | 254 | 274 | 225 | 89 | 49 | 13 | 0 | 0 | 0 | 0 | 0 | 66.2 | 274 | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 25 | 80 | 197 | 384 | 192 | 297 | 324 | 659 | 238 | 413 | 256 | 43 | 10 | 0 | 1 | 1 | 0 | 1 | 130.1 | 659 | |
| 15-Sep | 0 | 1 | 0 | 0 | 0 | 1 | 19 | 114 | 268 | 506 | 622 | 706 | 716 | 656 | 386 | 277 | 338 | 112 | 11 | 0 | 0 | 0 | 0 | 0 | 197.3 | 716 | |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 19 | 118 | 265 | 414 | 635 | 620 | 625 | 391 | 395 | 218 | 107 | 52 | 12 | 0 | 0 | 0 | 0 | 0 | 161.3 | 635 | |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 23 | 99 | 205 | 451 | 575 | 635 | 661 | 594 | 453 | 353 | 262 | 86 | 10 | 0 | 0 | 0 | 0 | 0 | 183.6 | 661 | |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 90 | 216 | 470 | 584 | 655 | 592 | 385 | 544 | 300 | 171 | 65 | 6 | 0 | 0 | 0 | 0 | 0 | 170.6 | 655 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 61 | 185 | 89 | 37 | 32 | 29 | 30 | 32 | 27 | 20 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 23.3 | 185 | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 14 | 22 | 54 | 90 | 85 | 112 | 92 | 69 | 67 | 39 | 23 | 3 | 0 | 0 | 0 | 0 | 0 | 28.1 | 112 | |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 29 | 53 | 75 | 131 | 178 | 171 | 120 | 133 | 87 | 34 | 10 | 2 | 0 | 0 | 0 | 0 | 0 | 42.8 | 178 | |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 56 | 121 | 211 | 207 | 199 | 154 | 121 | 164 | 133 | 90 | 37 | 4 | 0 | 0 | 0 | 0 | 0 | 62.7 | 211 | |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 42 | 112 | 187 | 248 | 355 | 313 | 426 | 282 | 233 | 108 | 37 | 5 | 0 | 0 | 0 | 0 | 0 | 98.1 | 426 | |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 73 | 171 | 431 | 498 | 611 | 618 | 555 | 375 | 217 | 80 | 35 | 2 | 0 | 0 | 0 | 0 | 0 | 153.2 | 618 | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 51 | 114 | 230 | 447 | 594 | 617 | 518 | 483 | 152 | 159 | 50 | 2 | 0 | 0 | 0 | 0 | 0 | 143.0 | 617 | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 59 | 169 | 425 | 496 | 536 | 542 | 481 | 489 | 320 | 210 | 32 | 2 | 0 | 1 | 0 | 0 | 0 | 157.1 | 542 | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 55 | 168 | 355 | 392 | 390 | 374 | 359 | 292 | 312 | 135 | 26 | 3 | 1 | 0 | 0 | 0 | 0 | 119.7 | 392 | |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 59 | 162 | 408 | 506 | 583 | 590 | 545 | 460 | 340 | 190 | 24 | 2 | 0 | 0 | 0 | 0 | 0 | 161.6 | 590 | |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 64 | 183 | 408 | 521 | 592 | 594 | 549 | 455 | 335 | 182 | 23 | 1 | 0 | 0 | 0 | 0 | 0 | 163.1 | 594 | |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 67 | 176 | 386 | 491 | 561 | 562 | 515 | 326 | 190 | 84 | 22 | 1 | 0 | 0 | 0 | 0 | 0 | 141.3 | 562 | |
| | | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 1.5 | 18.3 | 80.7 | 217.5 | 369.0 | 451.6 | 501.9 | 501.5 | 457.6 | 370.6 | 272.7 | 177.3 | 75.2 | 14.7 | 0.6 | 0.1 | 0.1 | 0.0 | 0.1 | Diurnal Average | |
| | | 0 | 1 | 0 | 0 | 0 | 7 | 35 | 126 | 410 | 559 | 691 | 746 | 754 | 729 | 621 | 521 | 365 | 200 | 81 | 3 | 1 | 1 | 0 | 1 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Stony Mountain - September 2017

| Concentration Ranges (W/m2) | Number of Hours | % | Cumulative % |
|------------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 375 | 52.08 | 52.08 |
| 21 - 100 | 85 | 11.81 | 63.89 |
| 101 - 300 | 96 | 13.33 | 77.22 |
| 301 - 600 | 123 | 17.08 | 94.31 |
| 601 - 900 | 41 | 5.69 | 100.00 |
| > 900 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

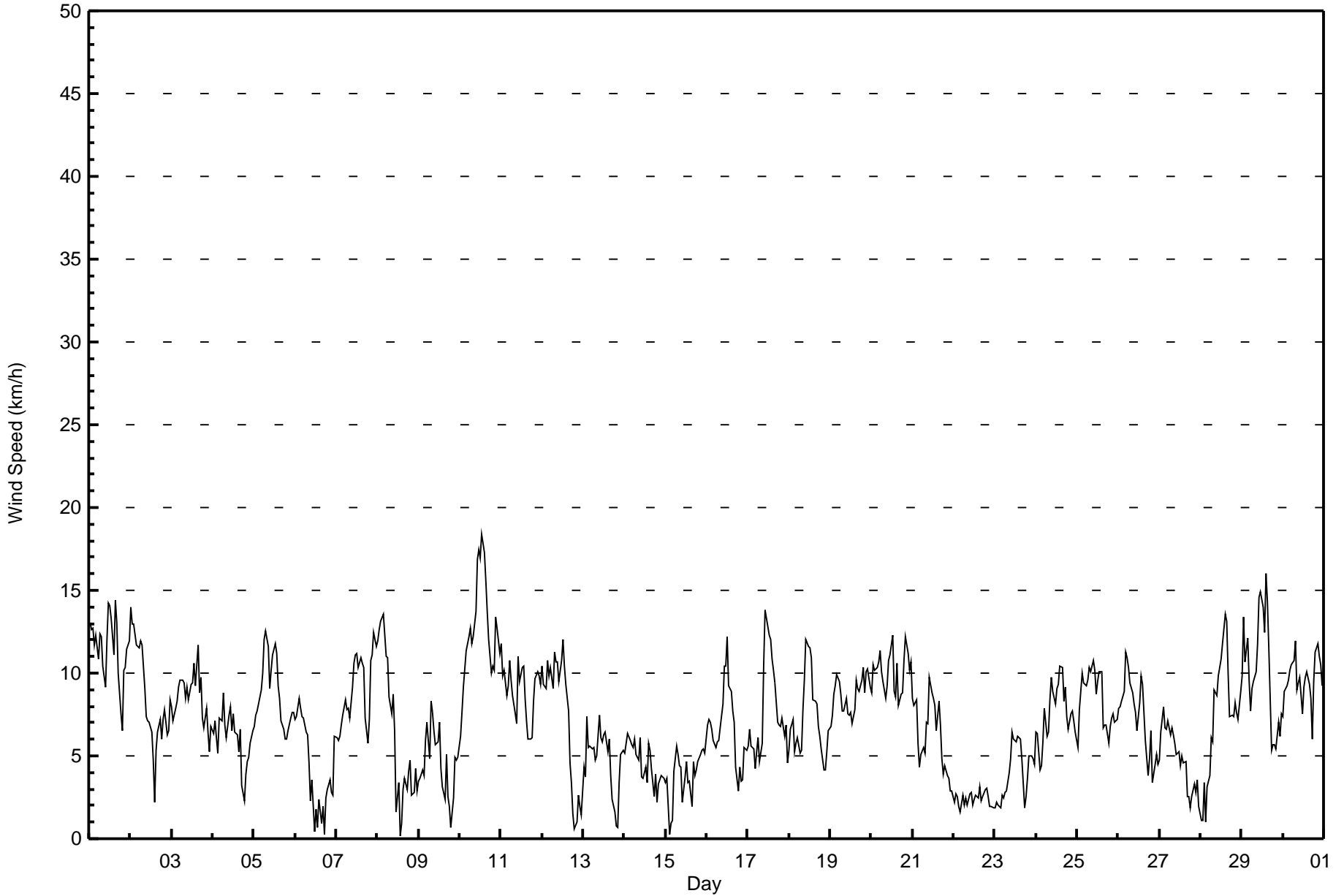
Stony Mountain - September 2017

| | | |
|---|---|---------------------------------|
| Maximum Speed: 18 km/h on Sep 10 14:00 | Maximum Daily Speed Average: 12.4 km/h on Sep 10 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 8 14:00 | Minimum Daily Speed Average: 0.4 km/h on Sep 22 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 4.2 km/h at hour 7 | Minimum Diurnal Speed Average: 1.6 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 3.2 km/h 231.5 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 12 P ₉₉ = 15 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | W13 | W13 | W13 | W12 | W12 | W11 | W12 | WSW12 | WSW10 | WSW9 | WSW12 | W14 | W14 | W13 | WSW11 | WSW14 | W13 | W10 | W8 | WSW6 | WSW10 | WSW10 | WSW11 | WSW12 | W11.5 | WSW14 |
| 2-Sep | W14 | W13 | W13 | W12 | WSW12 | WSW12 | W12 | W12 | WNW9 | W7 | WSW7 | WSW7 | W6 | WNW5 | WNW2 | SW5 | WSW6 | WSW7 | WSW6 | WSW7 | W8 | WNW6 | W7 | W8 | W8.3 | W14 |
| 3-Sep | W8 | W7 | W8 | W8 | W9 | W10 | W10 | W9 | WNW8 | W9 | WNW8 | WNW9 | WNW9 | WNW11 | WNW9 | WNW12 | WNW9 | WNW10 | WNW7 | WNW7 | WNW8 | WNW6 | WNW5 | WNW7 | WNW8.5 | WNW12 |
| 4-Sep | WNW6 | WNW7 | WNW6 | WNW5 | W7 | WNW7 | WNW9 | WNW7 | WNW6 | W7 | WNW8 | WNW7 | WNW8 | WNW6 | WNW6 | WNW5 | W7 | W3 | W2 | WSW4 | WSW5 | WSW5 | SW6 | SW7 | W5.7 | WNW9 |
| 5-Sep | SW7 | SW7 | SW8 | SSW9 | SSW10 | SSW12 | SSW13 | SSW12 | SSW9 | SW10 | SW11 | SW12 | SW11 | SW9 | SW8 | SW7 | SW7 | SW6 | SW6 | SW7 | SW7 | SW8 | SW8 | SW8.7 | SSW13 | |
| 6-Sep | SW7 | WSW7 | W8 | W8 | WNW7 | WNW7 | WNW6 | WNW6 | WNW5 | NW2 | NE4 | ENE0 | ESE2 | S1 | SW2 | NE1 | SE2 | SE0 | S2 | E3 | SSE4 | S3 | S3 | SSW6 | WSW2.3 | W8 |
| 7-Sep | SSW6 | SSW6 | SSW6 | SSW7 | SSW7 | SSW8 | SSW8 | SSW8 | S7 | S9 | S11 | S11 | S10 | S11 | SSW11 | SSW10 | SSE7 | SSE6 | S7 | S11 | S11 | SSW12 | SSW12 | SSW8.8 | SSW12 | |
| 8-Sep | SSW12 | SSW13 | SSW13 | SSW14 | SSW12 | SSW11 | SSW11 | SSW9 | WSW8 | SW9 | SW7 | WSW2 | ESE3 | NW0 | W1 | NE3 | NW4 | NW3 | NNE4 | N5 | NW3 | NNW3 | NNE4 | N3 | SSW3.9 | SSW14 |
| 9-Sep | N3 | NNW4 | NNW4 | NW4 | NNE6 | NNE7 | N5 | NNE8 | NE8 | NE7 | E6 | ENE6 | NE7 | ENE4 | NNE3 | NNW2 | WNW5 | WNW3 | WNW2 | ENE1 | NW2 | WNW5 | WSW5 | SW5 | N2.8 | NNE8 |
| 10-Sep | WSW6 | W8 | W9 | W10 | W11 | WSW12 | W13 | WSW12 | WSW12 | WSW14 | W17 | W17 | W17 | W18 | W17 | W16 | W14 | WSW12 | WSW10 | WSW10 | SW10 | WSW13 | WSW13 | WSW11 | W12.4 | W18 |
| 11-Sep | WSW12 | SW10 | WSW10 | SW9 | SSW9 | SSW11 | SSW10 | SSW9 | SSW8 | S7 | SSW11 | SSW10 | SW10 | SW10 | WSW9 | WSW7 | WSW6 | SW6 | SW6 | SW8 | WSW10 | WSW10 | WSW10 | WSW9 | SW8.4 | WSW12 |
| 12-Sep | W10 | W9 | W9 | W11 | W10 | W10 | WSW9 | W11 | W11 | WNW11 | WNW10 | W11 | WNW12 | WNW10 | WNW9 | WNW8 | NW5 | NNW3 | N2 | SW1 | W1 | WNW3 | WNW2 | NNW1 | W7.1 | WNW12 |
| 13-Sep | NNE4 | NNE4 | NE7 | NNE6 | NNE6 | NE5 | NNE5 | NNE5 | NNE5 | NNE7 | NNE6 | NNE6 | NE6 | NE6 | NNE5 | NE6 | ENE4 | ENE2 | ESE2 | ESE1 | SSW1 | SSW3 | SW5 | SSW5 | NE3.4 | NNE7 |
| 14-Sep | SW5 | WSW6 | WSW6 | WSW6 | WSW6 | WSW5 | W6 | WSW5 | WSW5 | SW6 | SW4 | SSE4 | SSE4 | S3 | WSW6 | W5 | W4 | W3 | W4 | WNW2 | WNW3 | WNW4 | WNW4 | WNW4 | WSW3.7 | WSW6 |
| 15-Sep | WNW3 | WNW4 | NNW0 | SSW1 | SSW1 | SW4 | SW6 | SSW5 | SSW4 | S4 | SSW2 | SSW4 | SE5 | SSW3 | SSW3 | S2 | SE5 | SW4 | SW4 | SW4 | SW5 | SW5 | SSW5 | SSW5 | SSW3.0 | SW6 |
| 16-Sep | SSW7 | SSW7 | SSW7 | SSW7 | SSW6 | SSW5 | SSW6 | S6 | S7 | S8 | S10 | S10 | S12 | S9 | S9 | S8 | S7 | SSE4 | SSE3 | SSW4 | S3 | S4 | S6 | S5 | S6.6 | S12 |
| 17-Sep | SSW6 | SSW7 | S6 | S5 | S4 | S5 | S6 | S5 | SSE6 | S10 | S14 | S13 | S12 | SSE12 | SSE11 | SSE10 | SSE9 | SSE7 | SE7 | SE7 | SE7 | SE6 | SE7 | SE5 | SSE7.4 | S14 |
| 18-Sep | SSE5 | SE7 | SE7 | SE5 | SE6 | SE6 | ESE5 | ESE5 | SE8 | SE10 | SE12 | SE12 | ESE11 | ESE11 | ESE8 | ESE8 | ESE8 | E7 | E6 | ESE5 | E4 | E4 | ENE5 | NE7 | ESE6.7 | SE12 |
| 19-Sep | NE7 | NNE7 | NE9 | NE9 | NE10 | NE9 | NE9 | NE8 | ENE8 | ENE8 | ENE8 | E7 | ENE8 | ENE7 | ENE8 | ENE10 | ENE9 | E9 | E10 | ESE10 | E9 | ENE10 | E10 | ENE9 | ENE8.1 | ESE10 |
| 20-Sep | ENE9 | ENE11 | NE10 | NE10 | NE11 | NE11 | NE10 | NE10 | NE9 | NNE9 | NNE11 | NNE11 | NNE12 | NNE9 | NNE9 | NNE11 | NNE8 | NNE9 | NNE9 | NNE11 | NNE12 | NNE11 | NNE10 | NNE11 | NNE9.7 | NNE12 |
| 21-Sep | NNE8 | NNE8 | NNE8 | NNE6 | N4 | N5 | N5 | N5 | NNE7 | NNE7 | NNE10 | NNE9 | NNE8 | NNE8 | NNE7 | NNE8 | NNE7 | N5 | NNW4 | N4 | N4 | N4 | NNW3 | NW3 | N6.0 | NNE10 |
| 22-Sep | NW2 | NW3 | NW3 | NW2 | NW2 | WNW3 | WNW2 | NW2 | NNW2 | NE3 | NNE3 | NNW2 | NW2 | ENE3 | ESE2 | ESE3 | ESE2 | ESE3 | ESE3 | SE3 | SSE3 | SSE2 | S2 | S2 | NNE0.4 | ESE3 |
| 23-Sep | S2 | SSW2 | WSW2 | S2 | SSW3 | SSW2 | S3 | SSE3 | S4 | S5 | S6 | SSW6 | SSW6 | SW6 | SSW6 | SSW6 | SSW5 | SSW2 | SSW3 | SSW4 | SSW5 | SSW5 | SSW5 | S5 | SSW3.9 | S6 |
| 24-Sep | SSW6 | SSW6 | S4 | S4 | S6 | SSW8 | S6 | S6 | S8 | S10 | SSW9 | S8 | S9 | S9 | SSW10 | SSW10 | S8 | S9 | S7 | S7 | S8 | S8 | S7 | S6 | S7.5 | SSW10 |
| 25-Sep | S6 | S8 | SSW9 | SSW10 | SSW9 | SSW9 | SSW10 | SSW10 | SSW10 | SSW11 | SW10 | SW9 | SW9 | SW10 | SW10 | WSW7 | WSW7 | WSW7 | WSW7 | WSW6 | WSW7 | WSW7 | WSW7 | WSW7 | SW8.1 | SSW11 |
| 26-Sep | SW8 | SW8 | WSW8 | WSW9 | W11 | W11 | W10 | W9 | WNW9 | WNW8 | W8 | W7 | WNW8 | WNW10 | WNW9 | WNW8 | WNW6 | W4 | WSW5 | W7 | W3 | WSW5 | WSW5 | WSW4 | W7.0 | W11 |
| 27-Sep | SW5 | SW6 | SW8 | SW7 | SW7 | SW6 | WSW7 | W6 | WNW6 | WNW5 | NW5 | NNW4 | NW5 | NNW5 | NE5 | ENE3 | ENE3 | NE2 | NE3 | NE3 | N3 | NNE4 | ENE2 | W2.1 | SW8 | |
| 28-Sep | NNE1 | SSE1 | S3 | SSE1 | SSE3 | S4 | S6 | S6 | S9 | SSE9 | S10 | S10 | S11 | S12 | SSW14 | SSW13 | S10 | SSE7 | SSE7 | SSE7 | SSE8 | S8 | S7 | S9 | S7.0 | SSW14 |
| 29-Sep | S10 | S13 | S11 | S12 | S10 | SSE8 | SSE9 | SSE9 | SSE10 | S12 | S15 | S15 | S14 | S12 | SSW16 | SSW14 | SSW12 | S5 | SSE6 | S6 | S5 | SSW7 | S6 | SSW8 | S10.0 | SSW16 |
| 30-Sep | SSW7 | SSW9 | SSW9 | SSW10 | SSW10 | SSW10 | SSW11 | SSW12 | WSW9 | W9 | W10 | W8 | W9 | W10 | WNW10 | WNW9 | WNW9 | WNW6 | WNW9 | WNW11 | WNW12 | WNW11 | WNW10 | NW9 | WSW7.5 | SSW12 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|
| SW3.6 | SW3.9 | WSW3.8 | WSW3.8 | WSW3.8 | SW3.9 | SW4.2 | SW3.8 | SW3.3 | SW3.1 | SW3.6 | SW3.4 | SW3.1 | SW3.4 | WSW3.8 | WSW2.9 | SW2.6 | SW1.8 | SW1.6 | SW1.9 | SW2.4 | SW2.9 | SW3.0 | SW3.2 | Diurnal Average |
| W14 | S13 | SSW13 | SSW14 | SSW12 | WSW12 | WSW13 | SSW13 | WSW12 | WSW14 | W17 | W17 | W17 | W18 | W17 | W16 | W14 | WSW12 | WSW10 | WNW11 | NNE12 | WSW13 | WSW13 | WSW12 | 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
Stony Mountain - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 222 | 30.83 | 30.83 |
| 6 - 11 | 423 | 58.75 | 89.58 |
| 12 - 19 | 75 | 10.42 | 100.00 |
| 20 - 28 | 0 | 0.00 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Stony Mountain - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 14 | 12 | 9 | 10 | 3 | 12 | 7 | 12 | 28 | 25 | 14 | 13 | 10 | 22 | 17 | 14 | 222 |
| 6 - 11 | 0 | 35 | 22 | 13 | 8 | 6 | 11 | 17 | 57 | 60 | 52 | 41 | 47 | 53 | 1 | 0 | 423 |
| 12 - 19 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 12 | 16 | 1 | 15 | 23 | 3 | 0 | 0 | 75 |
| 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 | 14 | 49 | 31 | 23 | 11 | 18 | 20 | 30 | 97 | 101 | 67 | 69 | 80 | 78 | 18 | 14 | 720 |

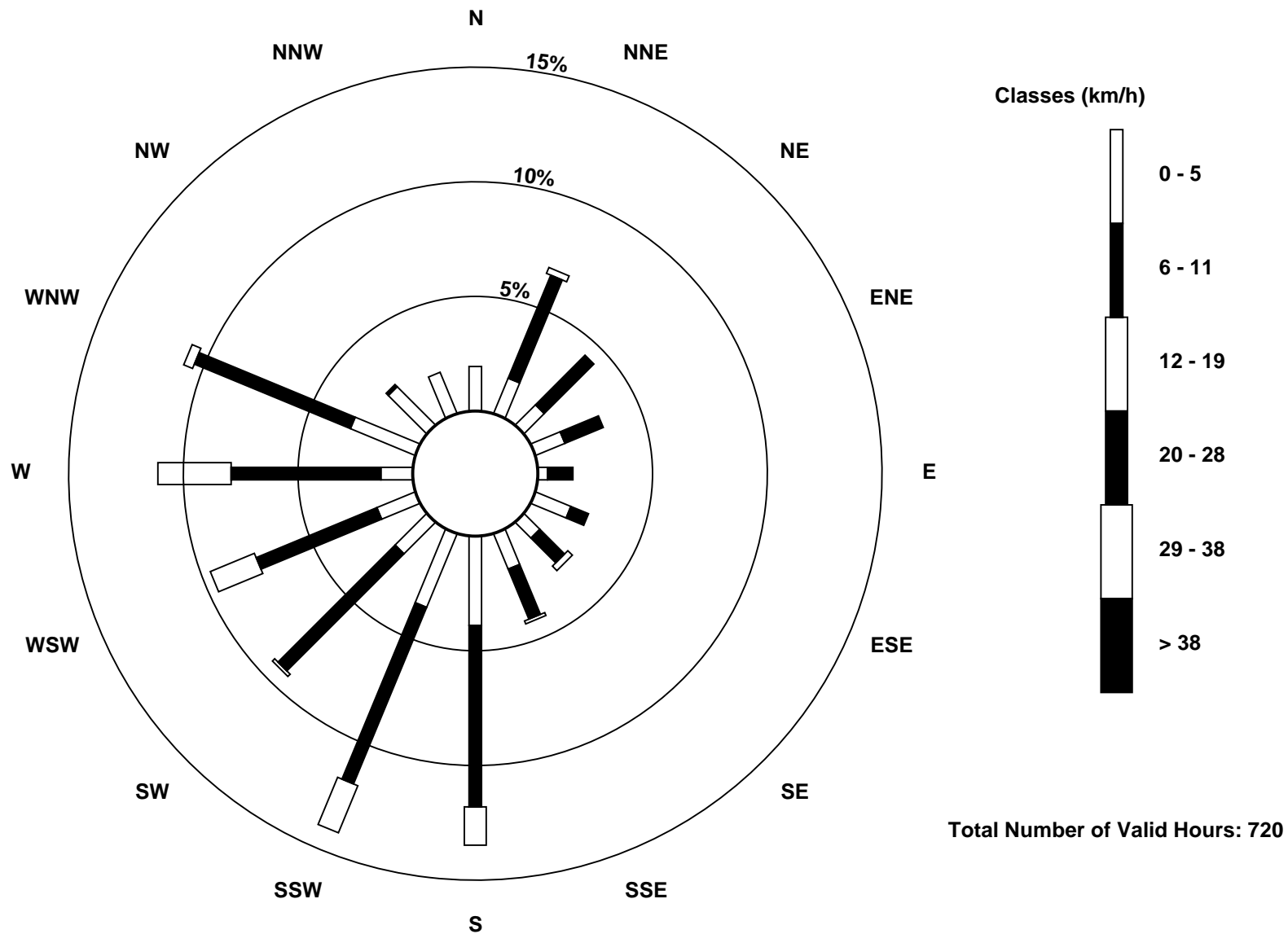
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Stony Mountain - September 2017

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



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Stony Mountain - September 2017

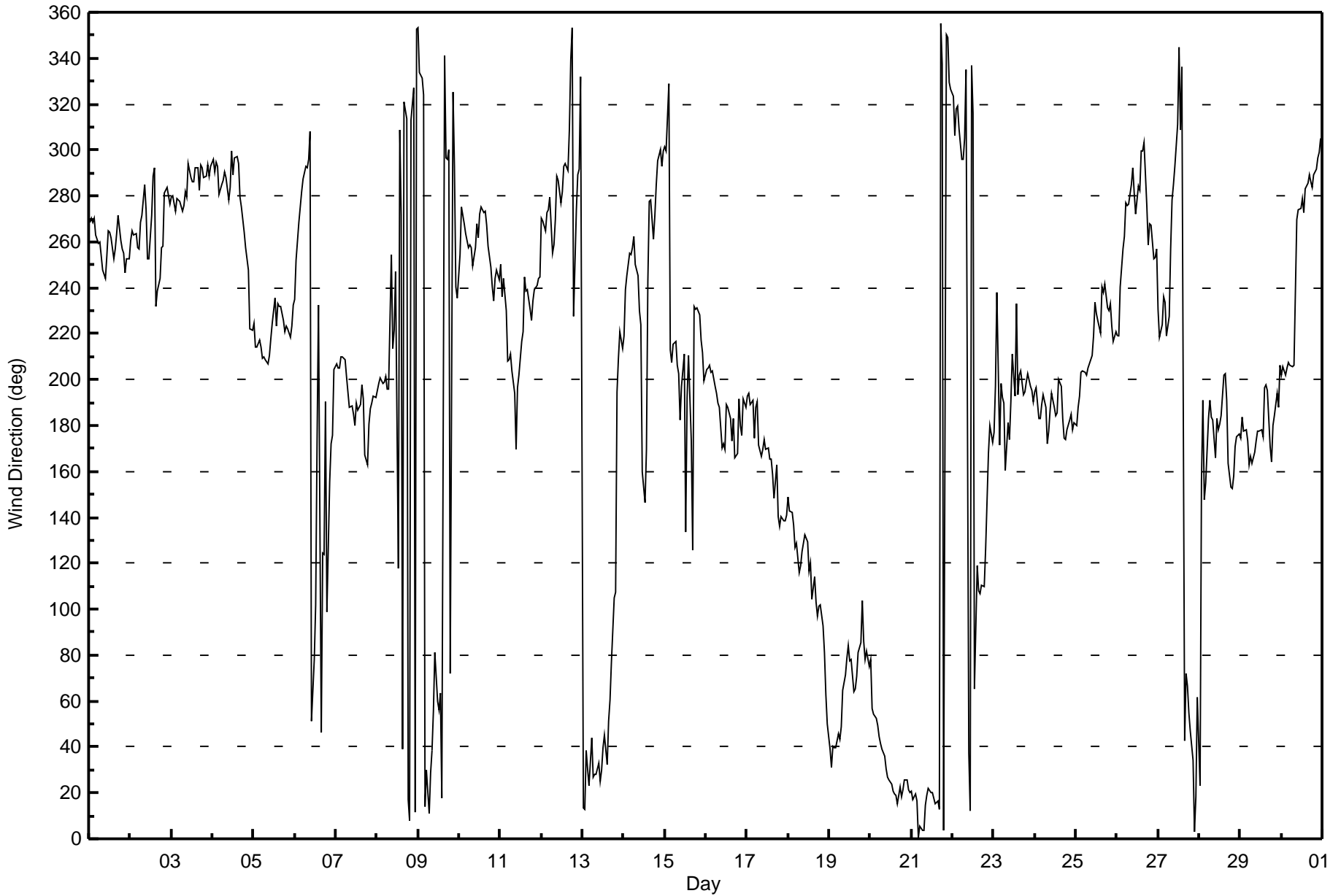
| | |
|---|---------------------------------|
| Direction of Maximum Speed: 275 deg on Sep 10 14:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 260.4 deg on Sep 10 | Hours of Data: 720 |
| Direction of Minimum Speed: 309 deg on Sep 8 14:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 0.4 deg on Sep 22 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 242.8 deg | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 269 | 270 | 268 | 270 | 263 | 259 | 260 | 254 | 248 | 244 | 254 | 265 | 264 | 262 | 253 | 257 | 264 | 272 | 261 | 257 | 255 | 246 | 253 | 253 | 259.5 |
| 2-Sep | 260 | 265 | 263 | 263 | 257 | 257 | 269 | 272 | 285 | 274 | 253 | 252 | 272 | 289 | 292 | 232 | 238 | 244 | 258 | 258 | 281 | 284 | 280 | 276 | 264.9 |
| 3-Sep | 279 | 280 | 273 | 279 | 278 | 278 | 274 | 276 | 282 | 279 | 294 | 288 | 286 | 286 | 292 | 292 | 283 | 293 | 292 | 288 | 289 | 293 | 288 | 293 | 284.6 |
| 4-Sep | 296 | 290 | 295 | 293 | 281 | 285 | 287 | 290 | 288 | 278 | 283 | 299 | 289 | 297 | 297 | 294 | 280 | 275 | 264 | 257 | 253 | 248 | 222 | 221 | 280.2 |
| 5-Sep | 224 | 214 | 214 | 217 | 214 | 209 | 210 | 209 | 207 | 210 | 218 | 224 | 235 | 223 | 233 | 232 | 232 | 226 | 221 | 223 | 222 | 219 | 224 | 232 | 220.1 |
| 6-Sep | 235 | 252 | 268 | 275 | 282 | 288 | 293 | 293 | 296 | 308 | 52 | 78 | 102 | 174 | 233 | 47 | 124 | 124 | 190 | 99 | 156 | 172 | 176 | 205 | 257.4 |
| 7-Sep | 207 | 205 | 205 | 210 | 210 | 209 | 202 | 195 | 188 | 188 | 185 | 180 | 190 | 187 | 189 | 198 | 192 | 167 | 163 | 181 | 188 | 190 | 193 | 192 | 191.7 |
| 8-Sep | 195 | 198 | 201 | 198 | 199 | 202 | 196 | 196 | 255 | 214 | 222 | 247 | 118 | 309 | 271 | 39 | 321 | 314 | 17 | 8 | 313 | 327 | 12 | 352 | 212.0 |
| 9-Sep | 353 | 333 | 331 | 324 | 14 | 30 | 11 | 29 | 39 | 55 | 81 | 60 | 56 | 64 | 18 | 341 | 297 | 296 | 300 | 72 | 325 | 293 | 240 | 235 | 10.7 |
| 10-Sep | 254 | 275 | 272 | 268 | 263 | 257 | 259 | 258 | 250 | 258 | 268 | 262 | 272 | 275 | 273 | 273 | 268 | 258 | 249 | 241 | 234 | 244 | 248 | 243 | 260.4 |
| 11-Sep | 250 | 236 | 244 | 230 | 208 | 208 | 211 | 204 | 194 | 170 | 197 | 202 | 216 | 221 | 245 | 238 | 239 | 231 | 226 | 234 | 239 | 241 | 244 | 245 | 224.5 |
| 12-Sep | 270 | 269 | 265 | 273 | 274 | 280 | 255 | 259 | 270 | 289 | 287 | 277 | 282 | 293 | 294 | 291 | 309 | 339 | 353 | 227 | 274 | 289 | 292 | 332 | 279.5 |
| 13-Sep | 13 | 13 | 38 | 30 | 23 | 44 | 27 | 28 | 28 | 33 | 25 | 30 | 40 | 45 | 32 | 51 | 60 | 77 | 105 | 107 | 195 | 209 | 221 | 213 | 36.3 |
| 14-Sep | 219 | 239 | 245 | 255 | 254 | 257 | 263 | 250 | 245 | 230 | 224 | 160 | 147 | 170 | 243 | 278 | 278 | 261 | 271 | 285 | 295 | 300 | 293 | 299 | 250.6 |
| 15-Sep | 302 | 300 | 329 | 213 | 207 | 216 | 216 | 206 | 202 | 183 | 197 | 211 | 134 | 192 | 211 | 173 | 126 | 232 | 230 | 231 | 228 | 217 | 211 | 200 | 209.7 |
| 16-Sep | 204 | 205 | 206 | 203 | 204 | 197 | 194 | 190 | 188 | 170 | 172 | 170 | 189 | 188 | 183 | 173 | 183 | 166 | 167 | 192 | 180 | 176 | 191 | 188 | 186.6 |
| 17-Sep | 193 | 194 | 189 | 191 | 175 | 188 | 190 | 171 | 166 | 169 | 174 | 169 | 171 | 165 | 166 | 159 | 148 | 163 | 140 | 136 | 140 | 138 | 138 | 141 | 165.2 |
| 18-Sep | 149 | 143 | 142 | 137 | 127 | 129 | 116 | 119 | 125 | 129 | 132 | 129 | 116 | 120 | 104 | 114 | 103 | 97 | 101 | 102 | 93 | 81 | 63 | 50 | 116.3 |
| 19-Sep | 39 | 31 | 40 | 40 | 40 | 46 | 43 | 49 | 65 | 71 | 78 | 84 | 78 | 78 | 64 | 65 | 71 | 81 | 85 | 104 | 86 | 78 | 82 | 75 | 66.1 |
| 20-Sep | 78 | 57 | 54 | 53 | 49 | 45 | 41 | 39 | 36 | 30 | 27 | 26 | 24 | 21 | 19 | 19 | 15 | 22 | 18 | 22 | 26 | 26 | 21 | 20 | 32.7 |
| 21-Sep | 21 | 17 | 20 | 16 | 1 | 5 | 4 | 4 | 15 | 19 | 22 | 20 | 20 | 18 | 15 | 17 | 13 | 355 | 338 | 4 | 350 | 349 | 329 | 326 | 10.7 |
| 22-Sep | 323 | 306 | 318 | 319 | 310 | 296 | 296 | 305 | 335 | 38 | 12 | 337 | 316 | 65 | 119 | 108 | 107 | 111 | 110 | 126 | 147 | 168 | 180 | 173 | 28.1 |
| 23-Sep | 177 | 197 | 238 | 172 | 199 | 192 | 190 | 161 | 182 | 174 | 190 | 211 | 193 | 233 | 194 | 202 | 204 | 194 | 195 | 199 | 202 | 197 | 196 | 191 | 196.5 |
| 24-Sep | 195 | 197 | 183 | 183 | 189 | 194 | 188 | 172 | 178 | 187 | 194 | 188 | 184 | 185 | 200 | 197 | 183 | 175 | 174 | 178 | 183 | 185 | 178 | 181 | 185.9 |
| 25-Sep | 180 | 188 | 193 | 203 | 204 | 203 | 202 | 205 | 207 | 211 | 219 | 234 | 229 | 226 | 220 | 241 | 238 | 242 | 231 | 230 | 233 | 223 | 217 | 221 | 215.9 |
| 26-Sep | 219 | 219 | 240 | 257 | 263 | 277 | 276 | 276 | 285 | 292 | 281 | 272 | 284 | 283 | 299 | 300 | 303 | 276 | 258 | 268 | 268 | 252 | 253 | 257 | 270.5 |
| 27-Sep | 231 | 219 | 224 | 236 | 234 | 219 | 227 | 257 | 278 | 285 | 293 | 311 | 345 | 309 | 336 | 43 | 72 | 67 | 55 | 47 | 34 | 3 | 19 | 61 | 275.2 |
| 28-Sep | 23 | 156 | 191 | 148 | 155 | 183 | 191 | 184 | 182 | 166 | 183 | 178 | 180 | 184 | 202 | 203 | 191 | 164 | 153 | 153 | 158 | 171 | 175 | 177 | 178.9 |
| 29-Sep | 175 | 184 | 178 | 178 | 173 | 163 | 166 | 164 | 168 | 173 | 178 | 178 | 178 | 175 | 197 | 198 | 195 | 171 | 164 | 180 | 185 | 194 | 188 | 206 | 180.1 |
| 30-Sep | 202 | 206 | 202 | 205 | 207 | 206 | 206 | 206 | 238 | 270 | 274 | 274 | 279 | 272 | 283 | 285 | 289 | 286 | 283 | 289 | 292 | 297 | 299 | 305 | 257.9 |

234.6 234.3 236.5 238.1 236.9 234.6 234.5 231.8 231.3 219.6 221.0 222.8 225.6 231.9 238.7 240.5 235.1 230.9 220.4 220.3 229.8 232.9 228.7 230.8

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
Stony Mountain - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 112 deg on Sep 6 16:00 Minimum Value: 11 deg on Sep 27 20:00 Percentiles: P ₁ = 14 P ₁₀ = 19 Q ₁ = 25 Median = 33 Q ₃ = 37 P ₉₀ = 46 P ₉₉ = 79 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|----|----|----|----|----|----|----|---------------|--|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 31 | 31 | 32 | 33 | 33 | 33 | 35 | 35 | 36 | 38 | 37 | 36 | 38 | 37 | 37 | 36 | 37 | 35 | 34 | 32 | 35 | 33 | 36 | 34 | 38 | |
| 2-Sep | 33 | 33 | 34 | 37 | 35 | 33 | 33 | 32 | 30 | 40 | 38 | 39 | 38 | 50 | 79 | 27 | 30 | 34 | 32 | 35 | 28 | 29 | 27 | 29 | 79 | |
| 3-Sep | 27 | 30 | 30 | 30 | 31 | 29 | 35 | 34 | 30 | 32 | 40 | 37 | 42 | 37 | 52 | 36 | 35 | 41 | 43 | 31 | 33 | 39 | 34 | 33 | 52 | |
| 4-Sep | 33 | 32 | 28 | 29 | 27 | 27 | 29 | 30 | 34 | 38 | 41 | 57 | 59 | 63 | 53 | 58 | 42 | 46 | 31 | 24 | 20 | 18 | 22 | 16 | 63 | |
| 5-Sep | 18 | 16 | 17 | 20 | 20 | 21 | 21 | 23 | 22 | 27 | 31 | 32 | 34 | 33 | 36 | 35 | 30 | 24 | 17 | 16 | 16 | 17 | 19 | 26 | 36 | |
| 6-Sep | 28 | 33 | 30 | 28 | 22 | 22 | 17 | 20 | 29 | 72 | 47 | 99 | 79 | 101 | 64 | 112 | 36 | 51 | 15 | 33 | 38 | 34 | 21 | 13 | 112 | |
| 7-Sep | 13 | 12 | 14 | 16 | 19 | 21 | 19 | 19 | 32 | 33 | 36 | 38 | 41 | 41 | 39 | 31 | 34 | 45 | 41 | 38 | 26 | 22 | 22 | 22 | 45 | |
| 8-Sep | 20 | 20 | 21 | 21 | 21 | 22 | 20 | 31 | 42 | 23 | 30 | 82 | 47 | 105 | 96 | 57 | 64 | 56 | 50 | 45 | 23 | 25 | 27 | 30 | 105 | |
| 9-Sep | 25 | 27 | 43 | 31 | 37 | 31 | 29 | 22 | 26 | 35 | 37 | 34 | 34 | 30 | 28 | 40 | 22 | 52 | 46 | 82 | 43 | 22 | 45 | 32 | 82 | |
| 10-Sep | 36 | 33 | 32 | 34 | 33 | 34 | 36 | 35 | 35 | 38 | 36 | 35 | 35 | 33 | 36 | 35 | 37 | 40 | 38 | 33 | 33 | 32 | 34 | 33 | 40 | |
| 11-Sep | 35 | 33 | 35 | 34 | 18 | 21 | 22 | 22 | 23 | 35 | 30 | 41 | 28 | 33 | 39 | 37 | 34 | 26 | 21 | 25 | 34 | 35 | 35 | 36 | 41 | |
| 12-Sep | 36 | 33 | 34 | 32 | 31 | 35 | 34 | 36 | 35 | 38 | 43 | 36 | 36 | 41 | 41 | 46 | 49 | 64 | 47 | 41 | 15 | 15 | 25 | 42 | 64 | |
| 13-Sep | 24 | 31 | 24 | 27 | 24 | 35 | 22 | 21 | 34 | 27 | 36 | 37 | 33 | 37 | 41 | 34 | 36 | 34 | 16 | 41 | 63 | 19 | 15 | 16 | 63 | |
| 14-Sep | 23 | 31 | 35 | 33 | 35 | 31 | 28 | 35 | 44 | 39 | 66 | 40 | 47 | 71 | 42 | 36 | 43 | 30 | 22 | 68 | 19 | 15 | 15 | 17 | 71 | |
| 15-Sep | 22 | 13 | 82 | 69 | 57 | 16 | 14 | 17 | 21 | 44 | 80 | 75 | 56 | 86 | 68 | 69 | 37 | 32 | 15 | 17 | 17 | 14 | 13 | 17 | 86 | |
| 16-Sep | 16 | 18 | 17 | 17 | 15 | 14 | 16 | 23 | 32 | 41 | 43 | 45 | 34 | 39 | 42 | 39 | 40 | 42 | 48 | 36 | 32 | 46 | 24 | 27 | 48 | |
| 17-Sep | 23 | 20 | 28 | 24 | 33 | 30 | 21 | 36 | 41 | 41 | 41 | 40 | 41 | 39 | 40 | 43 | 42 | 45 | 31 | 28 | 29 | 27 | 27 | 32 | 45 | |
| 18-Sep | 32 | 27 | 27 | 22 | 17 | 18 | 23 | 23 | 32 | 35 | 38 | 36 | 33 | 33 | 38 | 36 | 33 | 34 | 28 | 27 | 28 | 27 | 22 | 19 | 38 | |
| 19-Sep | 21 | 20 | 19 | 21 | 21 | 21 | 21 | 21 | 34 | 32 | 34 | 34 | 33 | 34 | 29 | 32 | 34 | 35 | 36 | 33 | 37 | 34 | 36 | 33 | 37 | |
| 20-Sep | 34 | 27 | 26 | 25 | 26 | 24 | 26 | 28 | 29 | 29 | 30 | 29 | 28 | 34 | 31 | 33 | 37 | 32 | 35 | 31 | 27 | 28 | 34 | 32 | 37 | |
| 21-Sep | 33 | 33 | 33 | 40 | 53 | 53 | 52 | 52 | 36 | 41 | 30 | 35 | 41 | 39 | 41 | 39 | 50 | 59 | 57 | 57 | 58 | 54 | 44 | 44 | 59 | |
| 22-Sep | 35 | 30 | 31 | 39 | 44 | 26 | 35 | 37 | 69 | 45 | 65 | 68 | 51 | 46 | 48 | 36 | 31 | 24 | 23 | 19 | 32 | 30 | 24 | 25 | 69 | |
| 23-Sep | 26 | 36 | 62 | 26 | 18 | 28 | 26 | 33 | 35 | 38 | 32 | 43 | 45 | 41 | 36 | 38 | 32 | 34 | 16 | 15 | 14 | 18 | 18 | 20 | 62 | |
| 24-Sep | 17 | 19 | 31 | 29 | 23 | 19 | 22 | 39 | 36 | 34 | 38 | 36 | 42 | 41 | 33 | 28 | 33 | 38 | 36 | 35 | 29 | 31 | 35 | 34 | 42 | |
| 25-Sep | 29 | 22 | 20 | 22 | 20 | 21 | 20 | 21 | 24 | 23 | 31 | 39 | 34 | 34 | 35 | 33 | 35 | 32 | 24 | 25 | 28 | 23 | 21 | 21 | 39 | |
| 26-Sep | 23 | 19 | 31 | 34 | 33 | 30 | 31 | 29 | 29 | 31 | 33 | 49 | 42 | 37 | 38 | 39 | 50 | 33 | 24 | 30 | 29 | 23 | 22 | 21 | 50 | |
| 27-Sep | 26 | 19 | 22 | 28 | 33 | 23 | 25 | 34 | 36 | 39 | 51 | 49 | 61 | 65 | 61 | 58 | 24 | 21 | 14 | 11 | 18 | 27 | 28 | 32 | 65 | |
| 28-Sep | 36 | 78 | 11 | 70 | 30 | 20 | 21 | 28 | 29 | 37 | 37 | 39 | 40 | 37 | 30 | 29 | 35 | 38 | 32 | 35 | 36 | 36 | 32 | 33 | 78 | |
| 29-Sep | 34 | 26 | 33 | 30 | 32 | 35 | 37 | 32 | 33 | 37 | 32 | 33 | 37 | 38 | 28 | 27 | 26 | 35 | 35 | 32 | 24 | 18 | 20 | 18 | 38 | |
| 30-Sep | 18 | 18 | 18 | 18 | 18 | 19 | 18 | 18 | 38 | 32 | 32 | 38 | 36 | 38 | 32 | 32 | 27 | 23 | 27 | 25 | 23 | 23 | 23 | 24 | 38 | |
| | | 36 | 78 | 82 | 70 | 57 | 53 | 52 | 52 | 69 | 72 | 80 | 99 | 79 | 105 | 96 | 112 | 64 | 64 | 57 | 82 | 63 | 54 | 45 | 44 | |
| | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | September 14, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 11:20 | End time (MST): | 15:34 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|-----------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>49.4</u> | ppm | Cal Gas Exp Date | February 16, 2019 |
| Cal Gas Cylinder # | <u>LL110090</u> | | | |
| Calibrator Make/Model | API T700 | | Serial Number | 1222 |
| ZAG Make/Model | API 701 | | Serial Number | 5610 |

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: JC1501301453

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -602 | -602 |
| Calculated slope | 1.004243 | 0.997811 | Lamp voltage | 888 | 890 |
| Calculated intercept | 0.671068 | 0.628013 | Pressure | 675.3 | 667.8 |
| Analyzer Background | 20.7 | 20.4 | Flow | 0.301 | 0.297 |
| Analyzer Coefficient | 0.878 | 0.866 | Intensity | 86 | 86 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5009 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4955 | 59.1 | 582.3 | 588.0 | 0.990 |
| calibrator zero | 4984 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4955 | 59.1 | 582.3 | 583.1 | 0.999 |
| second point | 4988 | 29.6 | 291.4 | 291.4 | 1.000 |
| third point | 5000 | 14.8 | 145.8 | 144.8 | 1.007 |
| as left zero | 5010 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 4833 | 59.0 | 595.8 | 583.3 | 1.021 |

| Average Correction Factor | | | | 1.002 |
|---------------------------|--------|-------------------|--------|-----------------|
| Corrected As found | 588.10 | Previous response | 579.13 | *% change -1.5% |

* = > +/-5% change initiates investigation

Notes:

Span adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

SO₂ Calibration Summary

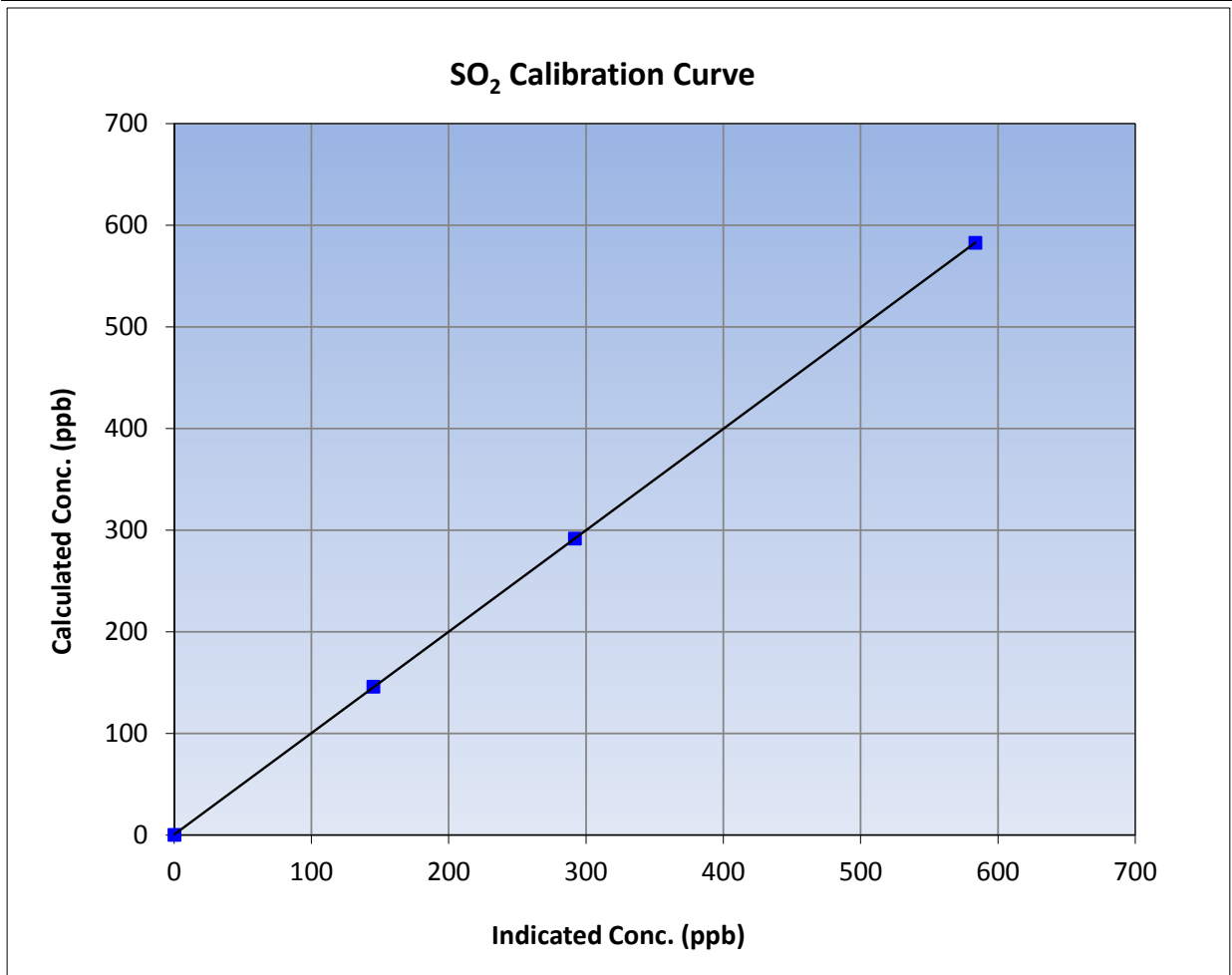
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:20 | End Time (MST) | 15:34 |
| Analyzer make | Thermo 43i | Analyzer serial # | JC1501301453 |

Calibration Data

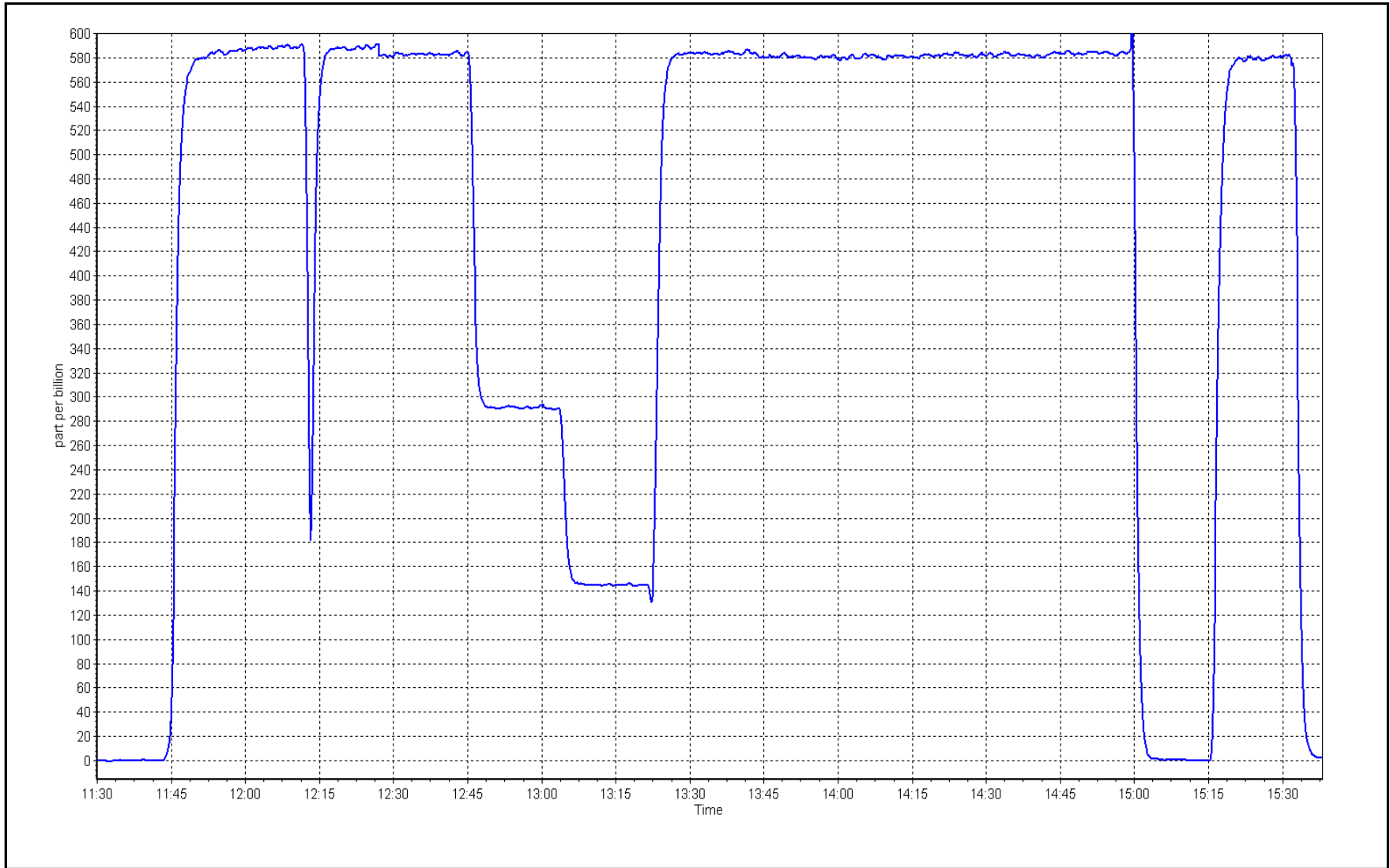
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 |
| 582.3 | 583.1 | 0.9986 | | |
| 291.4 | 291.4 | 1.0001 | Slope | 0.90 - 1.10 |
| 145.8 | 144.8 | 1.0069 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: 14-Sep

Location: Stony Mountain





Wood Buffalo Environmental Association

TRS Calibration Summary

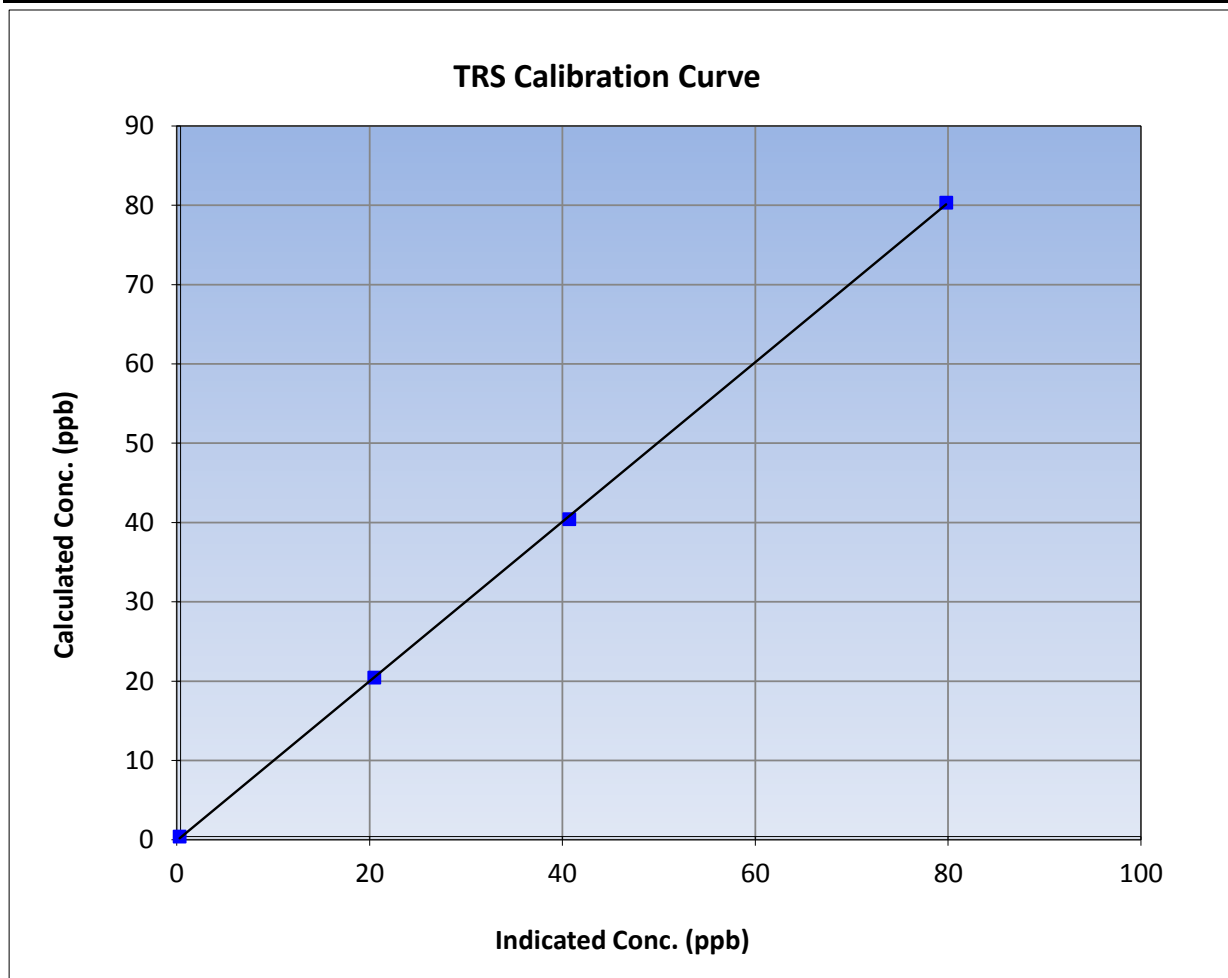
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 15:15 | End Time (MST) | 17:23 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1336160090 |

Calibration Data

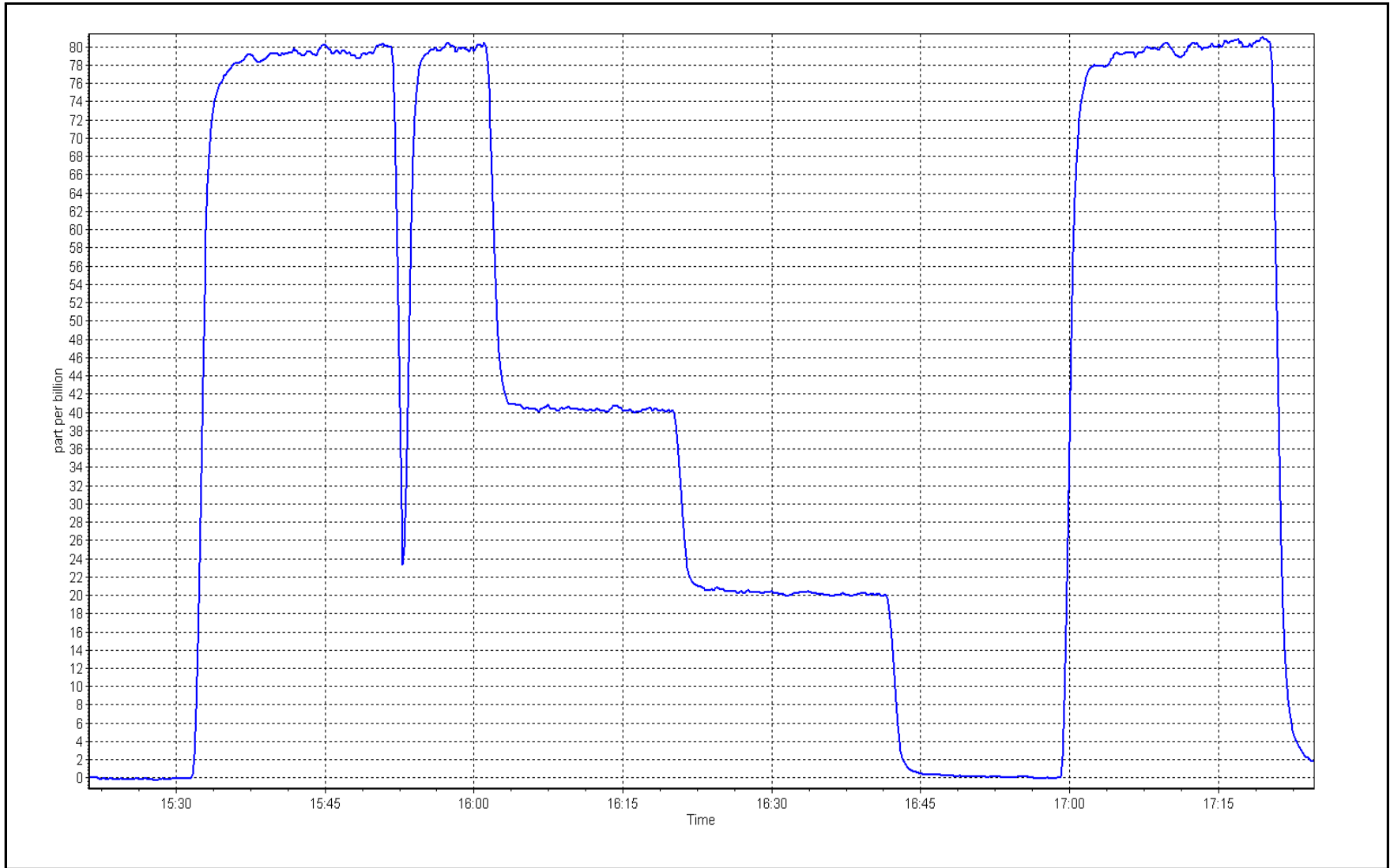
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999933 | ≥0.995 |
| 79.9 | 79.4 | 1.0066 | | | |
| 40.0 | 40.3 | 0.9931 | Slope | 1.005490 | 0.90 - 1.10 |
| 20.1 | 20.1 | 0.9979 | | | |
| | | | Intercept | -0.115343 | +/-3 |



TRS Calibration Plot

Date: 27-Sep

Location: Stony Mountain





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------------|-----------------|-----------------|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | September 14, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 11:20 | End time (MST): | 15:34 |
| Reason: | Cylinder Change Nitrogen | | |

Calibration Standards

| | | | |
|--------------------|------------------|---------------------|-------------------|
| Gas Cert Reference | LL110090 | Cal Gas Expiry Date | February 16, 2019 |
| CH4 Cal Gas Conc. | <u>491.0</u> ppm | CH4 Equiv Conc. | 1041.0 ppm |
| C3H8 Cal Gas Conc. | <u>200.0</u> ppm | Station temp. | 23 Deg C |
| Calibrator Model | API 700 | Serial Number | 1222 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5610 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1505164831

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 0.000198 | 0.000197 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 12.0 | 12.0 | Carrier Pressure | 31.5 | 31.5 |
| NMHC SP Ratio | 4.52E-05 | 4.49E-05 | Fuel Pressure | 44.3 | 44.3 |
| NMHC Peak Area | 143430 | 144367 | Air Pressure | 34.5 | 34.5 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 1.002993 | 1.001586 |
| THC Cal Offset | 0.001326 | 0.013365 |
| CH4 Cal Slope | 1.002826 | 1.003697 |
| CH4 Cal Offset | 0.006103 | 0.008927 |
| NMHC Cal Slope | 1.003152 | 0.999707 |
| NMHC Cal Offset | -0.004558 | 0.004454 |

Notes: Nitrogen cylinder changed after as founds. Span adjusted.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4955 | 59.1 | 12.27 | 12.34 | 0.995 |
| calibrator zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4955 | 59.1 | 12.27 | 12.25 | 1.002 |
| second point | 4988 | 29.6 | 6.14 | 6.11 | 1.006 |
| third point | 5000 | 14.8 | 3.07 | 3.05 | 1.009 |
| as left zero | 5010 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4833 | 59.0 | 12.55 | 12.25 | 1.025 |
| Average Correction Factor | | | | | 1.006 |
| Corrected As found | 12.34 | Prev response | 12.23 | *% change | -0.8% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4955 | 59.1 | 6.48 | 6.53 | 0.993 |
| calibrator zero | 5009 | 0 | 0.00 | 0.00 | ---- |
| high point | 4955 | 59.1 | 6.48 | 6.48 | 1.000 |
| second point | 4988 | 29.6 | 3.24 | 3.24 | 1.002 |
| third point | 5000 | 14.8 | 1.62 | 1.62 | 1.004 |
| as left zero | 5010 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4833 | 59 | 6.63 | 6.47 | 1.025 |
| Average Correction Factor | | | | | 1.002 |
| Corrected As found | 6.53 | Prev response | 6.47 | *% change | -1.0% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4955 | 59.1 | 5.79 | 5.81 | 0.997 |
| calibrator zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4955 | 59.1 | 5.79 | 5.76 | 1.004 |
| second point | 4988 | 29.6 | 2.90 | 2.87 | 1.010 |
| third point | 5000 | 14.8 | 1.45 | 1.43 | 1.014 |
| as left zero | 5010 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4833 | 59.0 | 5.92 | 5.78 | 1.024 |
| Average Correction Factor | | | | | 1.009 |
| Corrected As found | 5.81 | Prev response | 5.76 | *% change | -0.7% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

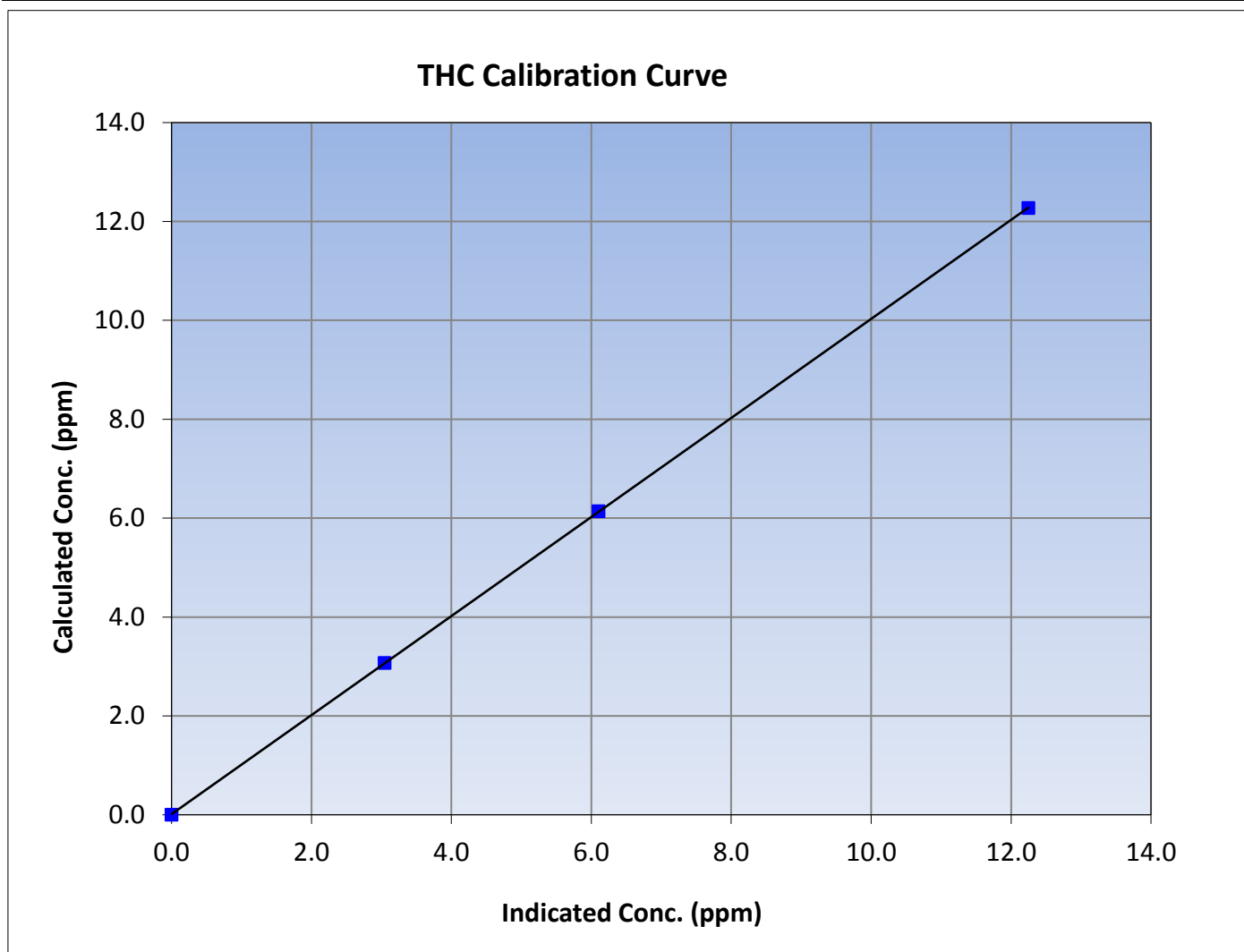
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:20 | End Time (MST) | 15:34 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1505164831 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999994 | ≥ 0.995 | | | |
| 12.27 | 12.25 | 1.0020 | | | | | | |
| 6.14 | 6.11 | 1.0059 | | | | Slope | 1.001586 | 0.90 - 1.10 |
| 3.07 | 3.05 | 1.0090 | | | | | | |
| | | | Intercept | 0.013365 | ± 0.5 | | | |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

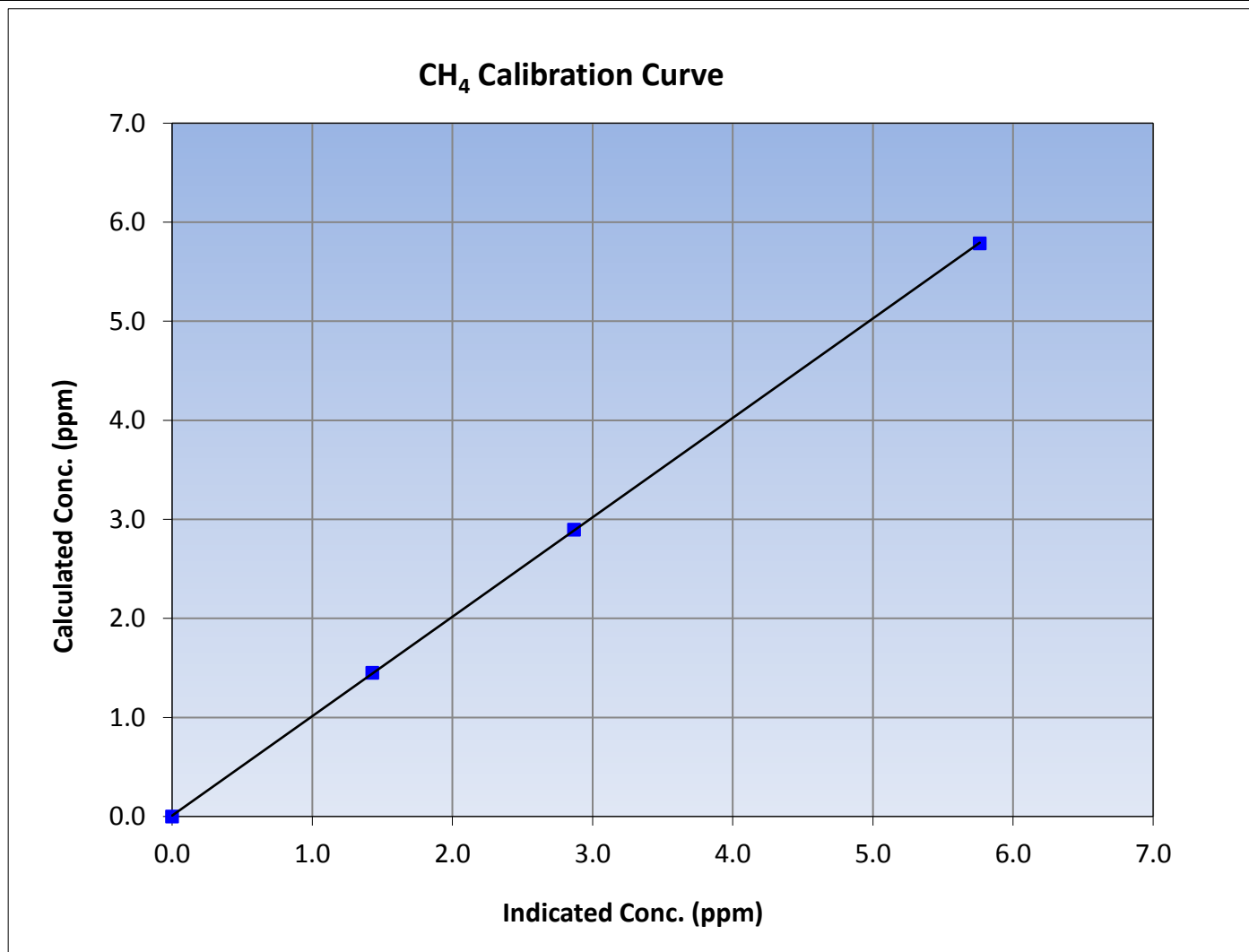
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:20 | End Time (MST) | 15:34 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1505164831 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999987 | ≥ 0.995 | | | |
| 5.79 | 5.76 | 1.0042 | | | | | | |
| 2.90 | 2.87 | 1.0099 | | | | Slope | 1.003697 | 0.90 - 1.10 |
| 1.45 | 1.43 | 1.0140 | | | | | | |
| | | | Intercept | 0.008927 | ± 0.5 | | | |





Wood Buffalo Environmental Association

NMHC Calibration Summary

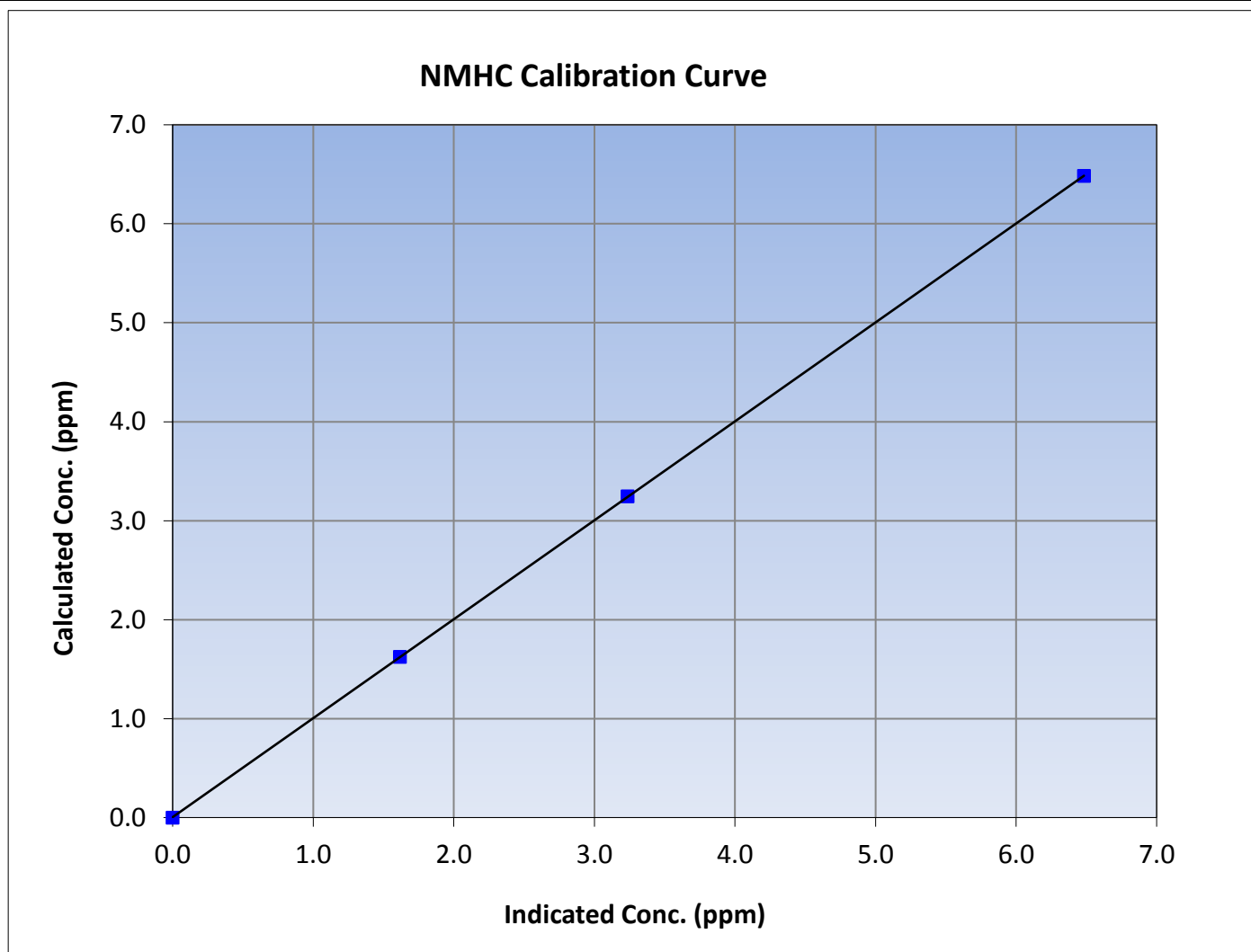
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:20 | End Time (MST) | 15:34 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1505164831 |

Calibration Data

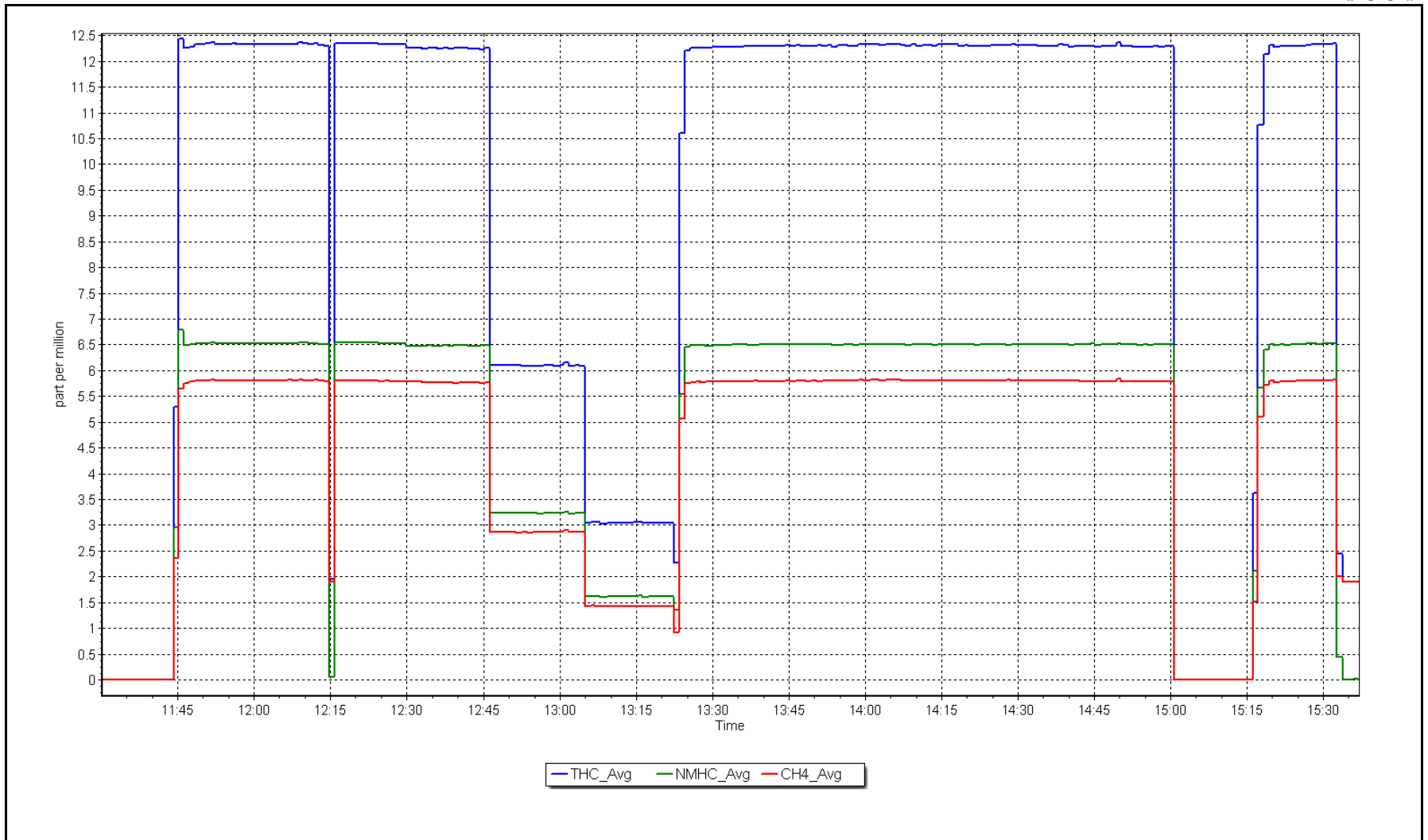
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999998 | ≥ 0.995 | | | |
| 6.48 | 6.48 | 1.0000 | | | | | | |
| 3.24 | 3.24 | 1.0023 | | | | Slope | 0.999707 | 0.90 - 1.10 |
| 1.62 | 1.62 | 1.0045 | | | | | | |
| | | | Intercept | 0.004454 | ± 0.5 | | | |



NMHC Calibration Plot

Date: Sep-17

Location: Stony Mountain





Wood Buffalo Environmental Association

O₃ Calibration Summary

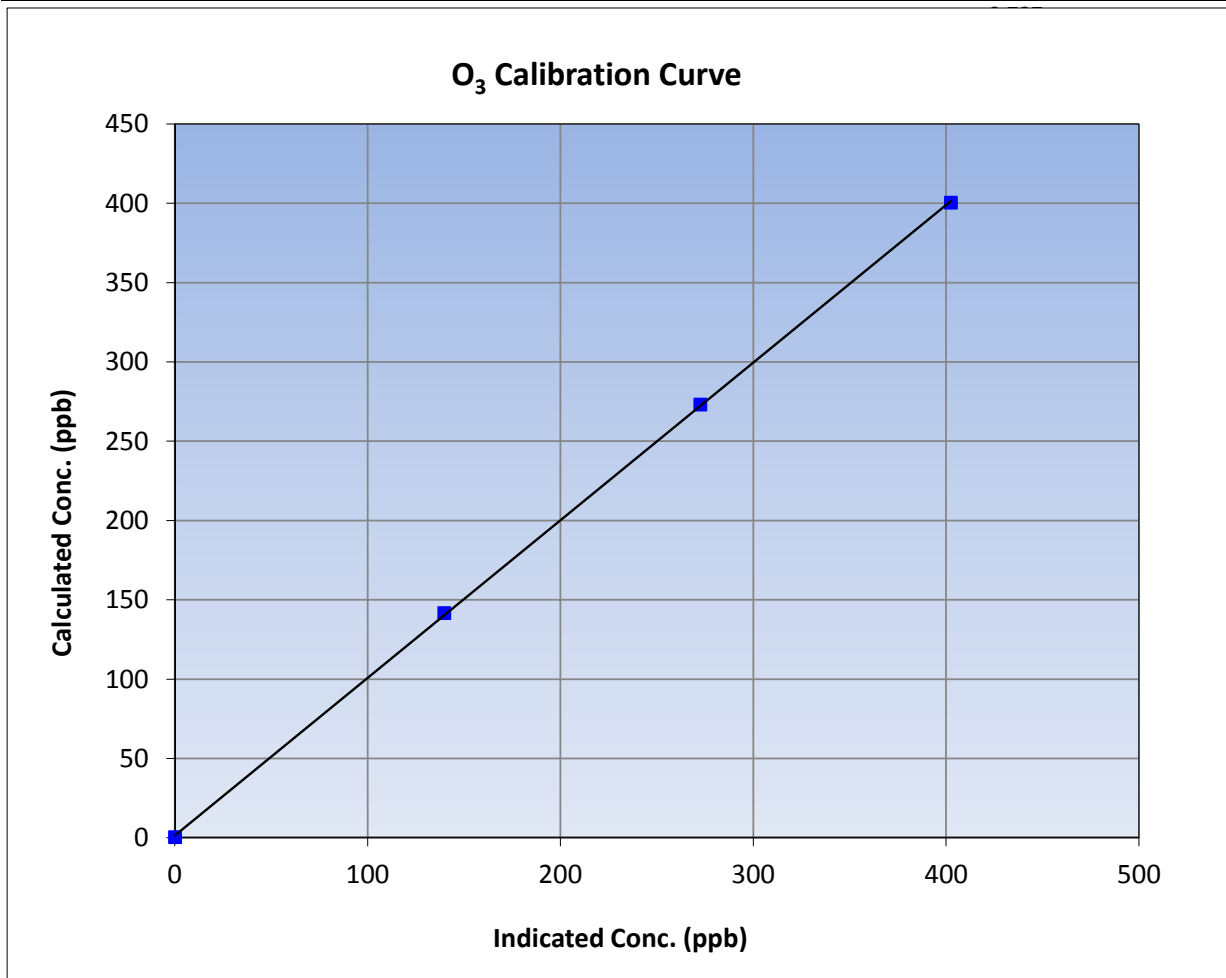
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2017 | Previous Calibration | August 18, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 12:08 | End Time (MST) | 15:09 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1501663733 |

Calibration Data

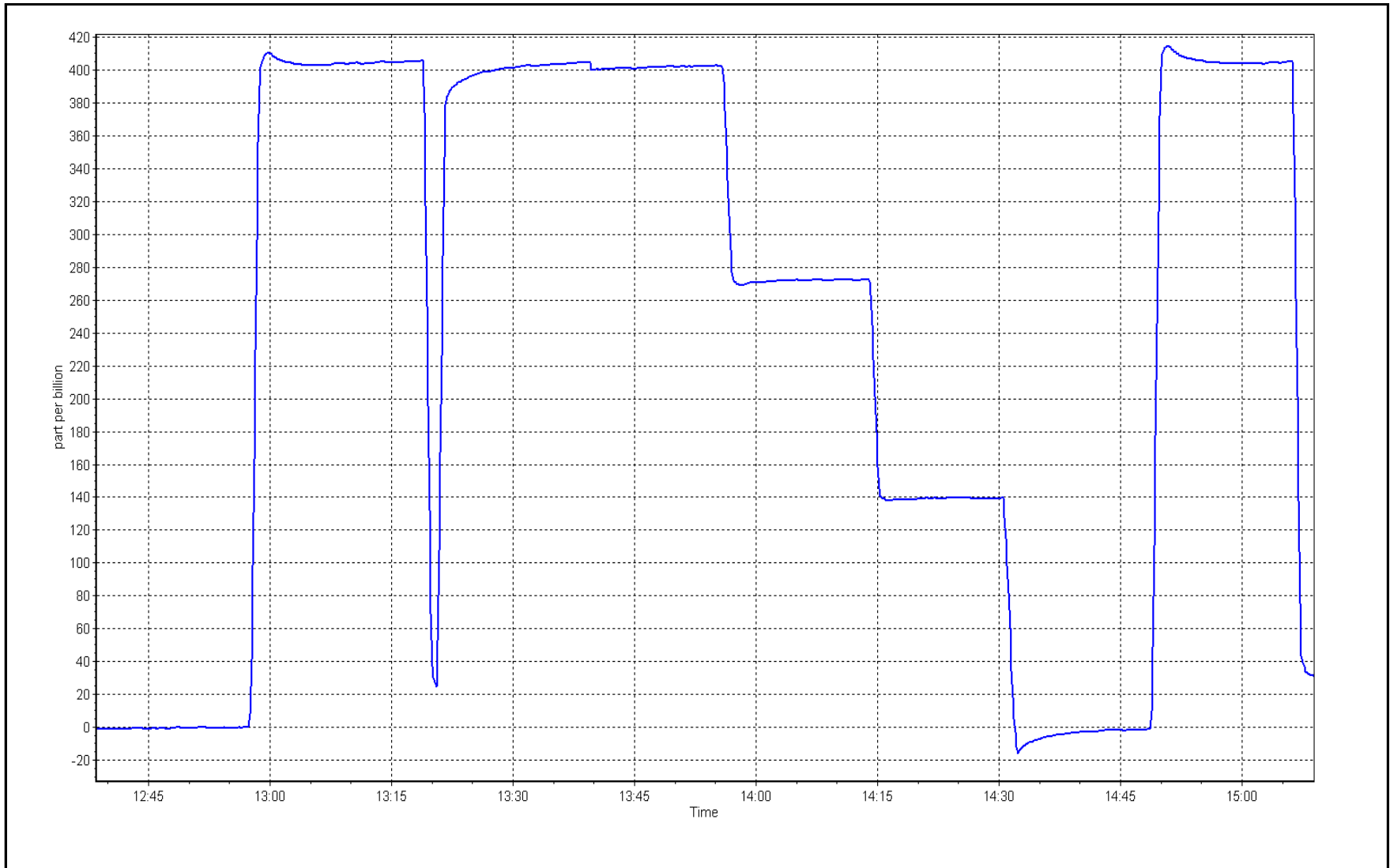
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999945 | ≥0.995 |
| 400.0 | 402.1 | 0.9948 | | | |
| 272.8 | 272.2 | 1.0022 | Slope | 0.994074 | 0.90 - 1.10 |
| 141.2 | 139.4 | 1.0129 | | | |
| | | | Intercept | 1.330099 | +/- 10 |



O₃ Calibration Plot

Date: 27-Sep

Location: Stony Mountain





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | September 14, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 11:20 | End time (MST): | 15:34 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-------------------|
| NO Gas Cylinder # | LL110090 | Cal Gas Expiry Date | February 16, 2019 |
| NOX Cal Gas Conc. | <u>50.9</u> ppb | NO Cal Gas Conc. | <u>50.9</u> ppb |
| Calibrator Model | API T700 | Serial Number | 1222 |
| ZAG make/model | Teledyne API T701 | Serial Number | 5610 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1336160088 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 0.973 | 0.950 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.998 | 0.999 | PMT Temperature | -3.0 | -3.1 |
| NO ₂ coefficient | 0.999 | 0.999 | Reaction cell Press | 199.0 | 198.7 |
| NO bkgrnd | 1.7 | 1.7 | Sample Flow | 0.725 | 0.721 |
| NOX bkgrnd | 1.8 | 1.8 | PMT Voltage | -850.6 | -850.6 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.005444 | 1.000396 |
| NO _x Cal Offset | -0.973316 | 0.450148 |
| NO Cal Slope | 1.004499 | 0.999274 |
| NO Cal Offset | -1.152606 | 0.369681 |
| NO ₂ Cal Slope | 0.999799 | 0.996899 |
| NO ₂ Cal Offset | -0.209032 | 0.381812 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5010 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | -0.1 | ---- | ---- |
| as found span | 4955 | 59.1 | 599.9 | 599.9 | 0.0 | 611.1 | 610.8 | 0.3 | 0.9817 | 0.9822 |
| calibrator zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | -0.1 | ---- | ---- |
| high point | 4955 | 59.1 | 599.9 | 599.9 | 0.0 | 599.7 | 600.3 | -0.6 | 1.0004 | 0.9994 |
| second point | 4985 | 29.6 | 300.5 | 300.5 | 0.0 | 299.3 | 300.1 | -0.8 | 1.0038 | 1.0012 |
| third point | 5000 | 14.8 | 150.2 | 150.2 | 0.0 | 149.1 | 149.2 | -0.1 | 1.0075 | 1.0068 |
| as left zero | 5010 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | 0.0 | ---- | ---- |
| as left span | 4846 | 59.1 | 613.3 | 199.2 | 414.1 | 607.0 | 199.7 | 407.4 | 1.0103 | 0.9975 |
| Average Correction Factor | | | | | | | | | 1.0039 | 1.0025 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 610.8 ppb | NO = 610.5 ppb | | *Percent Change | NO _x = -2.1% |
| Previous Response | NO _x = 597.7 ppb | NO = 598.4 ppb | | *Percent Change | NO = -2.0% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 600.3 | 599.2 | 1.0 | 0.9994 | 1.0012 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 199.2 | 400.0 | 600.4 | 199.2 | 401.2 | 0.9992 | ---- | 0.9970 | 100.3% |
| 2nd NO2 (200 ppb O3) | 326.4 | 272.8 | 599.2 | 326.4 | 272.9 | 1.0012 | ---- | 0.9996 | 100.0% |
| 3rd NO2 (100 ppb O3) | 458.0 | 141.2 | 599.0 | 458.0 | 141.0 | 1.0016 | ---- | 1.0014 | 99.9% |
| 2nd NO ref point | ---- | 0.0 | 598.4 | 598.6 | -0.2 | 1.0026 | 1.0022 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0012 | 1.0017 | 0.9994 | 100.1% |

Notes:

Span adjusted.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

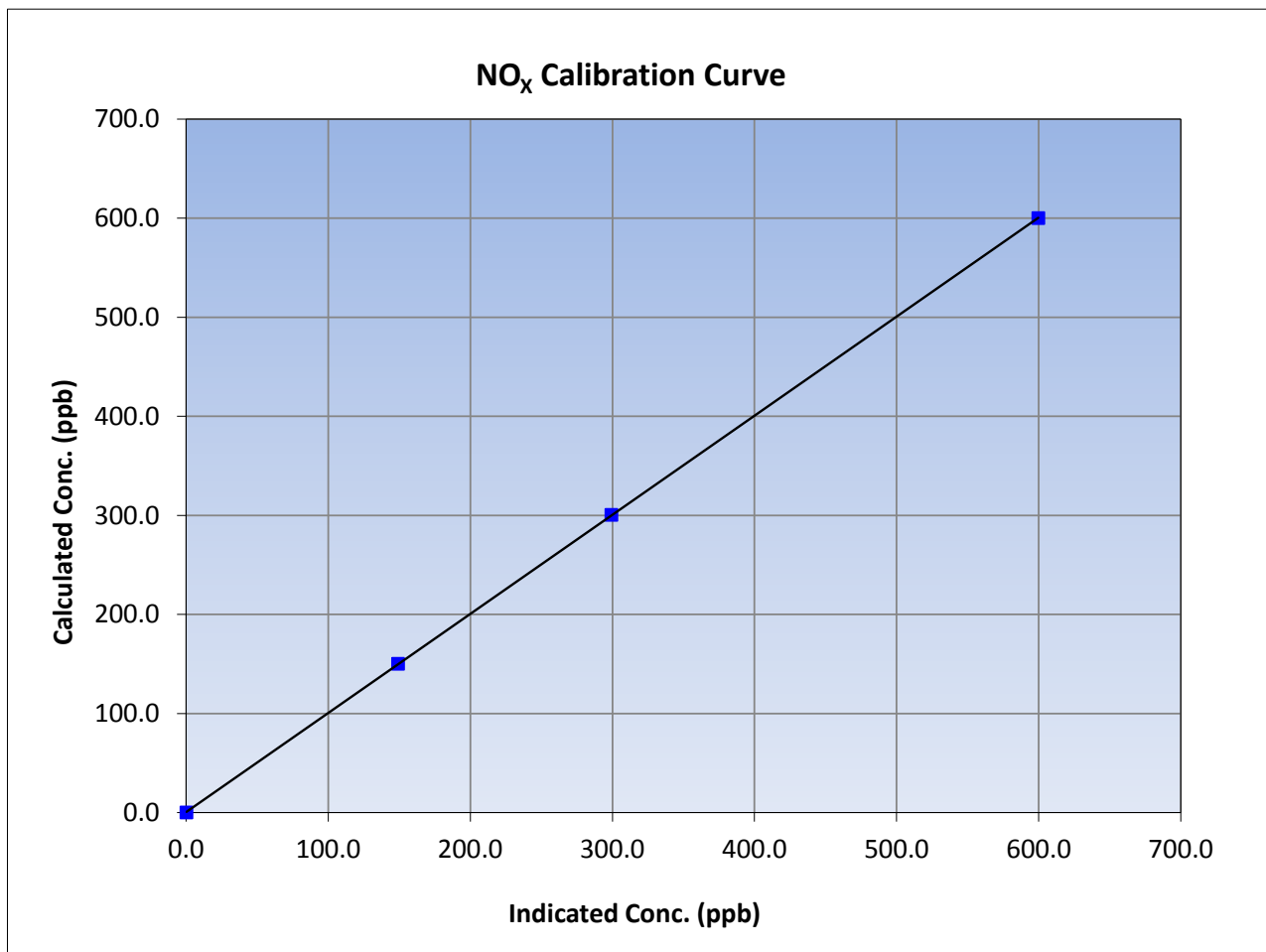
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:20 | End Time (MST) | 15:34 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | ≥0.995 | |
| 599.9 | 599.7 | 1.0004 | | | |
| 300.5 | 299.3 | 1.0038 | | | |
| 150.2 | 149.1 | 1.0075 | | | |
| | | | Slope | 1.000396 | 0.90 - 1.10 |
| | | | Intercept | 0.450148 | +/-20 |





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

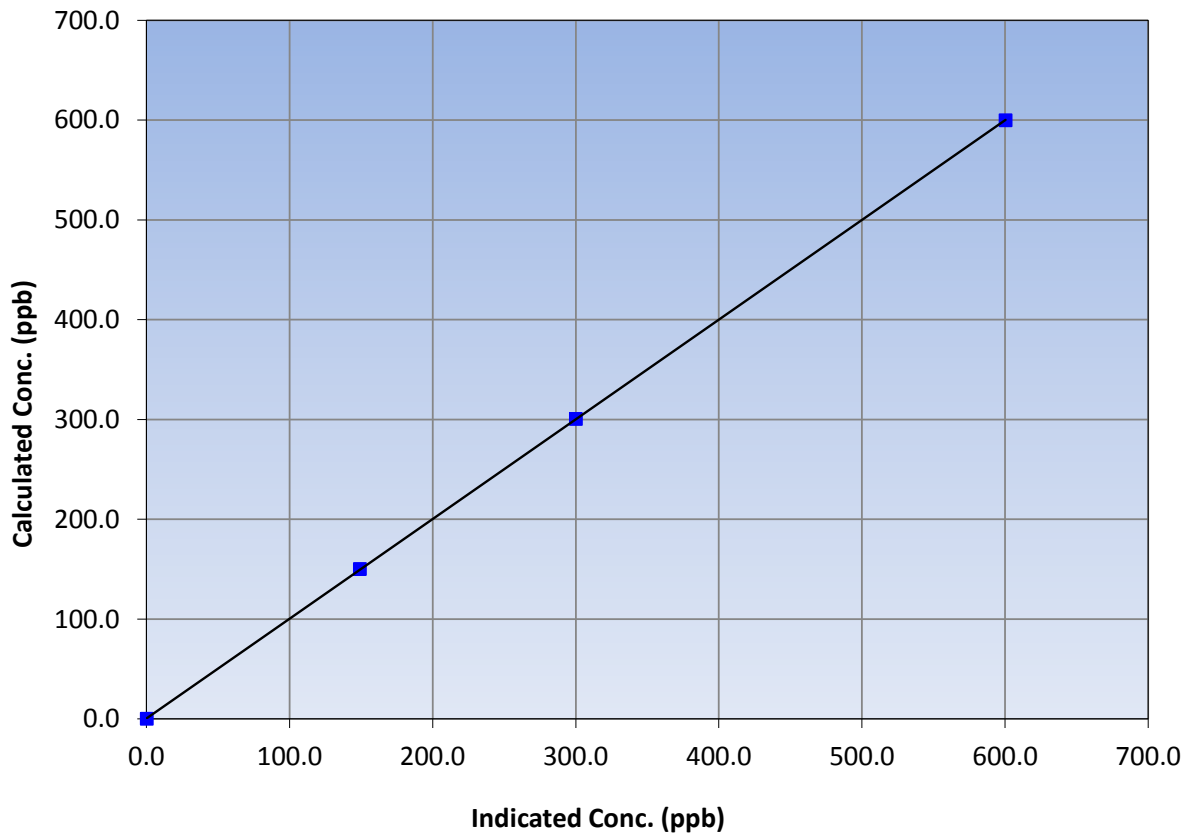
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:20 | End Time (MST) | 15:34 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | ≥0.995 |
| 599.9 | 600.3 | 0.9994 | | |
| 300.5 | 300.1 | 1.0012 | Slope | 0.90 - 1.10 |
| 150.2 | 149.2 | 1.0068 | | |
| | | | Intercept | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

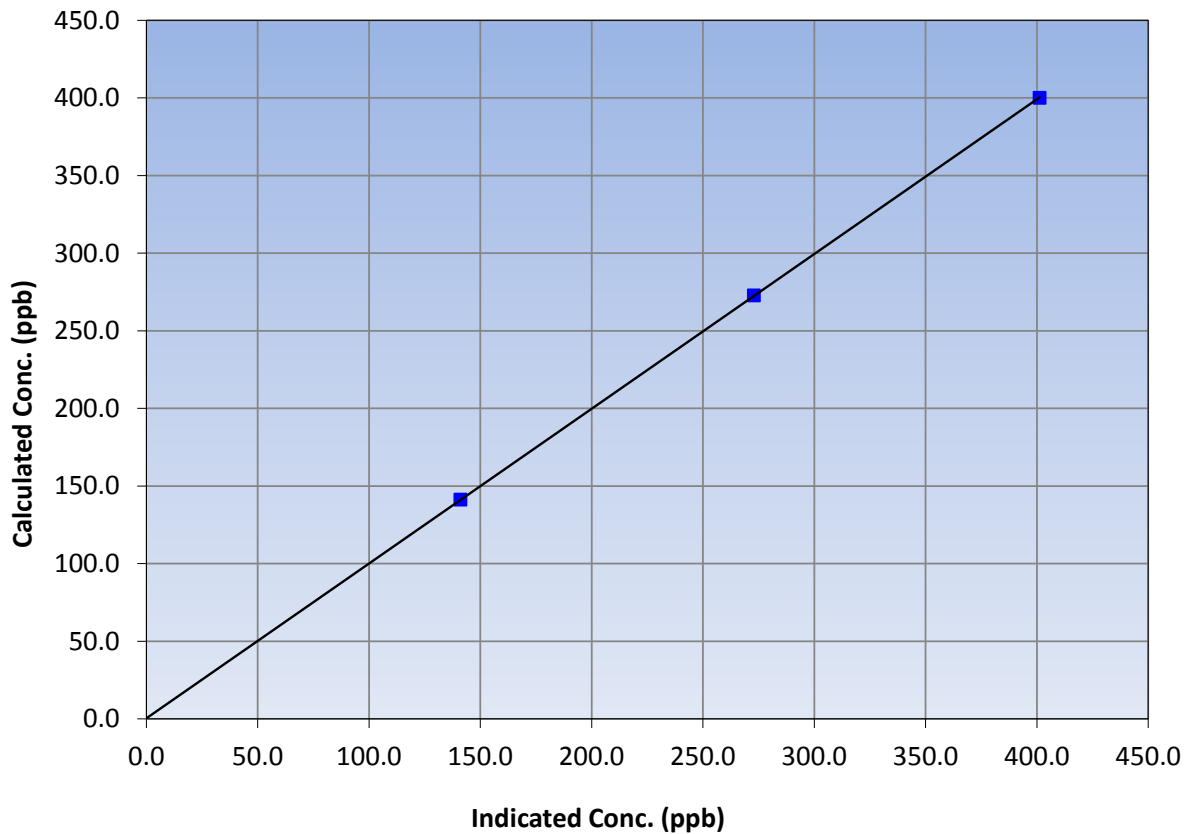
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:20 | End Time (MST) | 15:34 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 400.0 | 401.2 | 0.9970 | | | |
| 272.8 | 272.9 | 0.9996 | | | |
| 141.2 | 141.0 | 1.0014 | | | |
| | | | Slope | 0.996899 | 0.90 - 1.10 |
| | | | Intercept | 0.381812 | +/-20 |

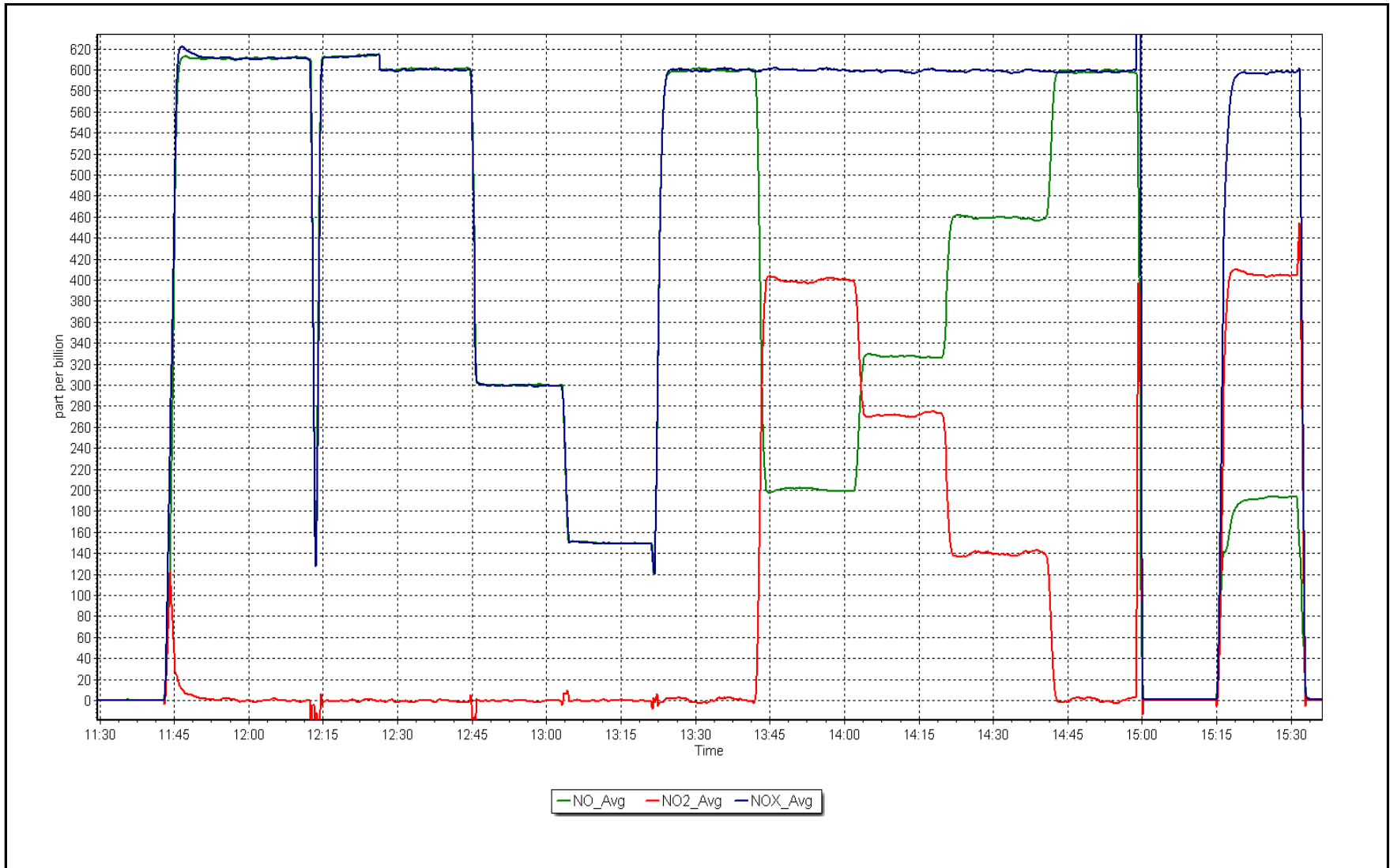
NO₂ Calibration Curve



NO_x Calibration Plot

Date: 14-Sep

Location: Stony Mountain





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|--------------------|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | September 27, 2017 | Last Cal Date: | September 14, 2017 |
| Start time (MST): | 10:35 | End time (MST): | 12:01 |
| Reason: | GPT Check | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-------------------|
| NO Gas Cylinder # | LL110090 | Cal Gas Expiry Date | February 16, 2019 |
| NOX Cal Gas Conc. | <u>50.9</u> ppb | NO Cal Gas Conc. | <u>50.9</u> ppb |
| Calibrator Model | API T700 | Serial Number | 1222 |
| ZAG make/model | Teledyne API T701 | Serial Number | 5610 |

Analyzer Information

| | | | | | |
|---------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1336160088 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 0.950 | 0.950 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.999 | 0.999 | PMT Temperature | -2.9 | -3.1 |
| NO2 coefficient | 0.999 | 0.999 | Reaction cell Press | 198.7 | 198.7 |
| NO bkgrnd | 1.7 | 1.7 | Sample Flow | 0.720 | 0.721 |
| NOX bkgrnd | 1.8 | 1.8 | PMT Voltage | -850.6 | -850.6 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.000396 | 1.013423 |
| NO _x Cal Offset | 0.450148 | -0.304027 |
| NO Cal Slope | 0.999274 | 1.014451 |
| NO Cal Offset | 0.369681 | -0.304335 |
| NO ₂ Cal Slope | 0.996899 | 0.994007 |
| NO ₂ Cal Offset | 0.381812 | -1.233258 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5010 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | -0.1 | ---- | ---- |
| as found span | 4955 | 59.1 | 599.9 | 599.9 | 0.0 | 592.3 | 591.7 | 0.6 | 1.0129 | 1.0139 |
| calibrator zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | -0.1 | ---- | ---- |
| high point | 4955 | 59.1 | 599.9 | 599.9 | 0.0 | 592.3 | 591.7 | 0.6 | 1.0129 | 1.0139 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 1.0129 | 1.0139 |

| | | | | | |
|--------------------|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 592.0 ppb | NO = 591.4 ppb | | *Percent Change | NO _x = 1.2% |
| Previous Response | NO _x = 599.3 ppb | NO = 600.0 ppb | | *Percent Change | NO = 1.5% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 592.3 | 591.7 | 0.6 | 1.0129 | 1.0139 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 193.7 | 398.0 | 594.3 | 193.7 | 400.6 | 1.0095 | ---- | 0.9935 | 100.7% |
| 2nd NO2 (200 ppb O3) | 322.9 | 268.8 | 595.2 | 322.9 | 272.3 | 1.0080 | ---- | 0.9871 | 101.3% |
| 3rd NO2 (100 ppb O3) | 456.2 | 135.5 | 595.5 | 456.2 | 139.3 | 1.0075 | ---- | 0.9727 | 102.8% |
| 2nd NO ref point | | 0.0 | | | | | | | |
| Average Correction Factor | | | | | | 1.0083 | 1.0139 | 0.9845 | 101.6% |

Notes:

GPT check for O3 calibration.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

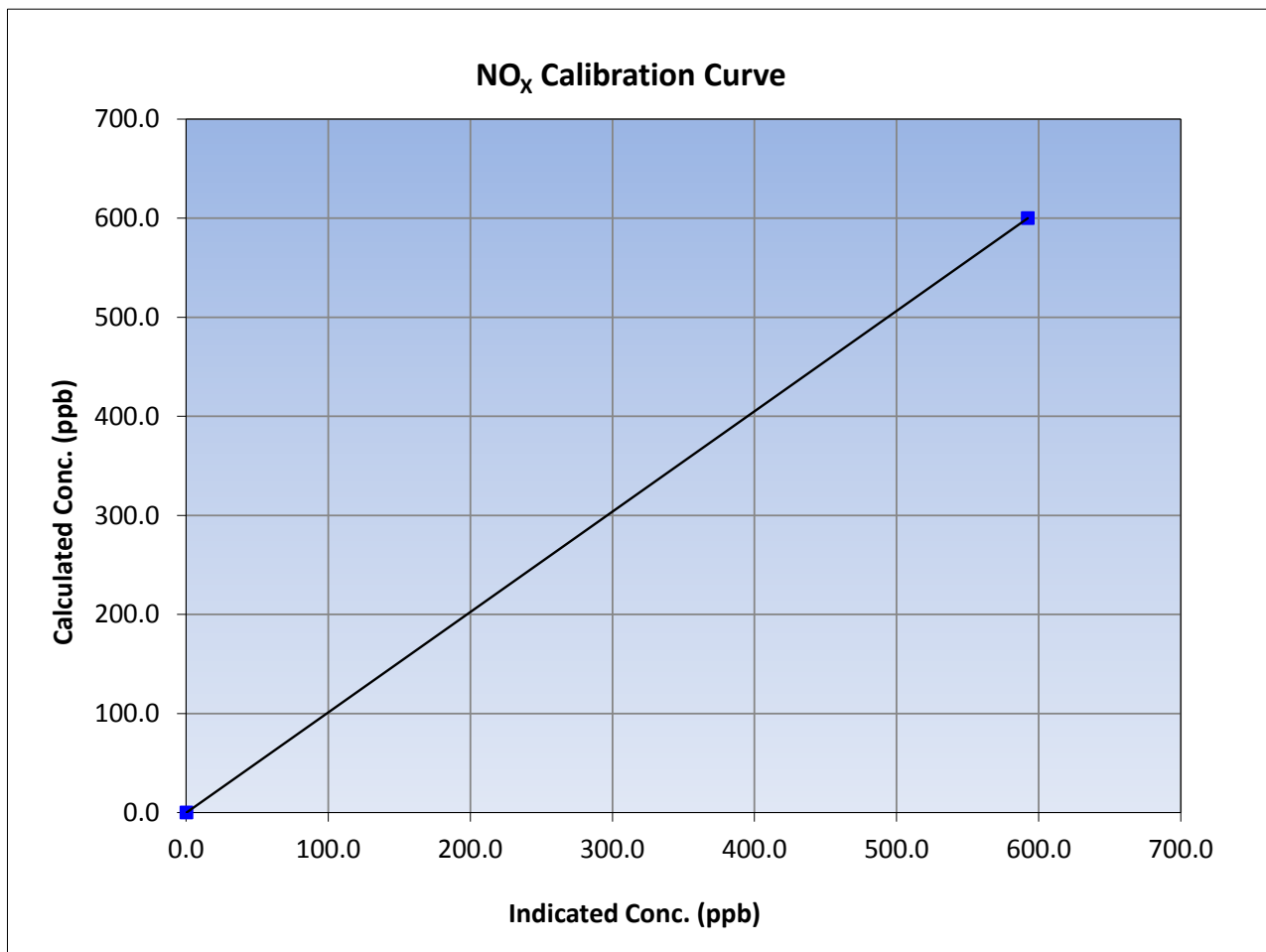
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 27, 2017 | Previous Calibration | September 14, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:35 | End Time (MST) | 12:01 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 599.9 | 592.3 | 1.0129 | | | |
| | | | Slope | 1.013423 | 0.90 - 1.10 |
| | | | Intercept | -0.304027 | +/-20 |





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

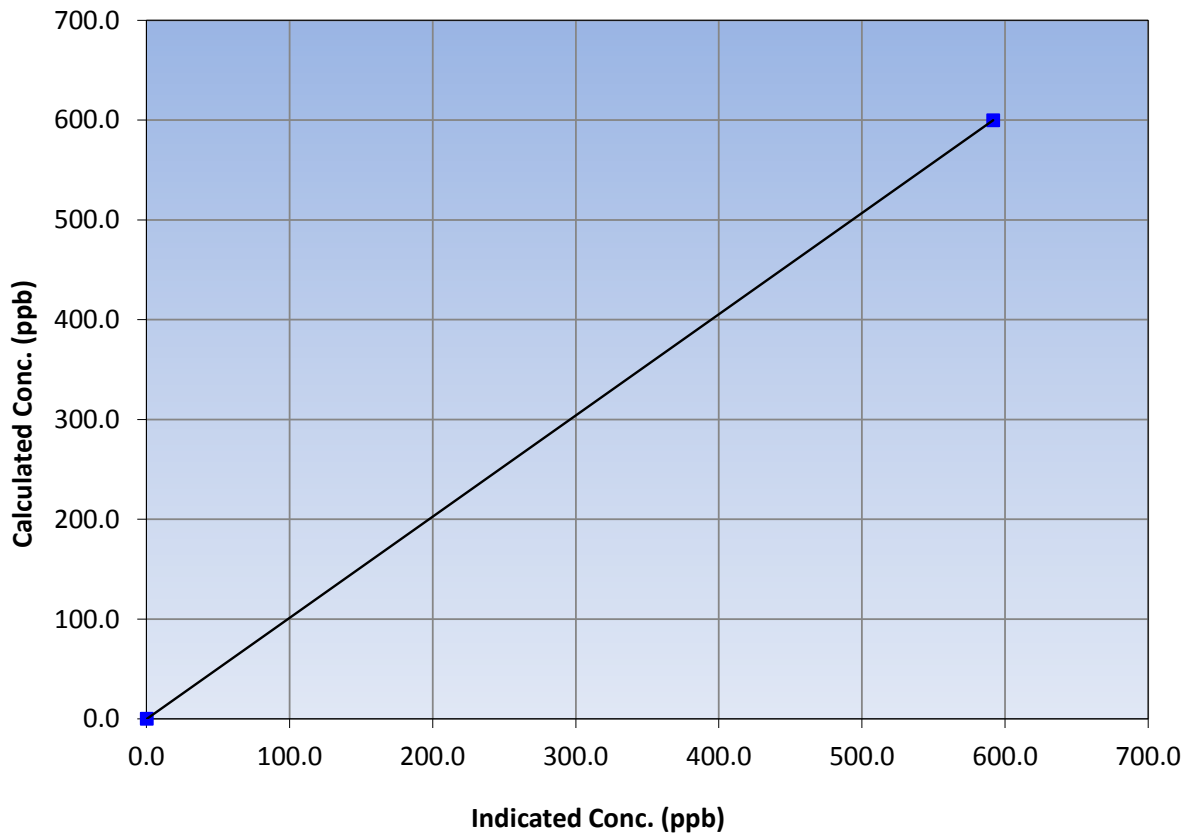
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 27, 2017 | Previous Calibration | September 14, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:35 | End Time (MST) | 12:01 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 599.9 | 591.7 | 1.0139 | | | |
| | | | Slope | 1.014451 | 0.90 - 1.10 |
| | | | Intercept | -0.304335 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

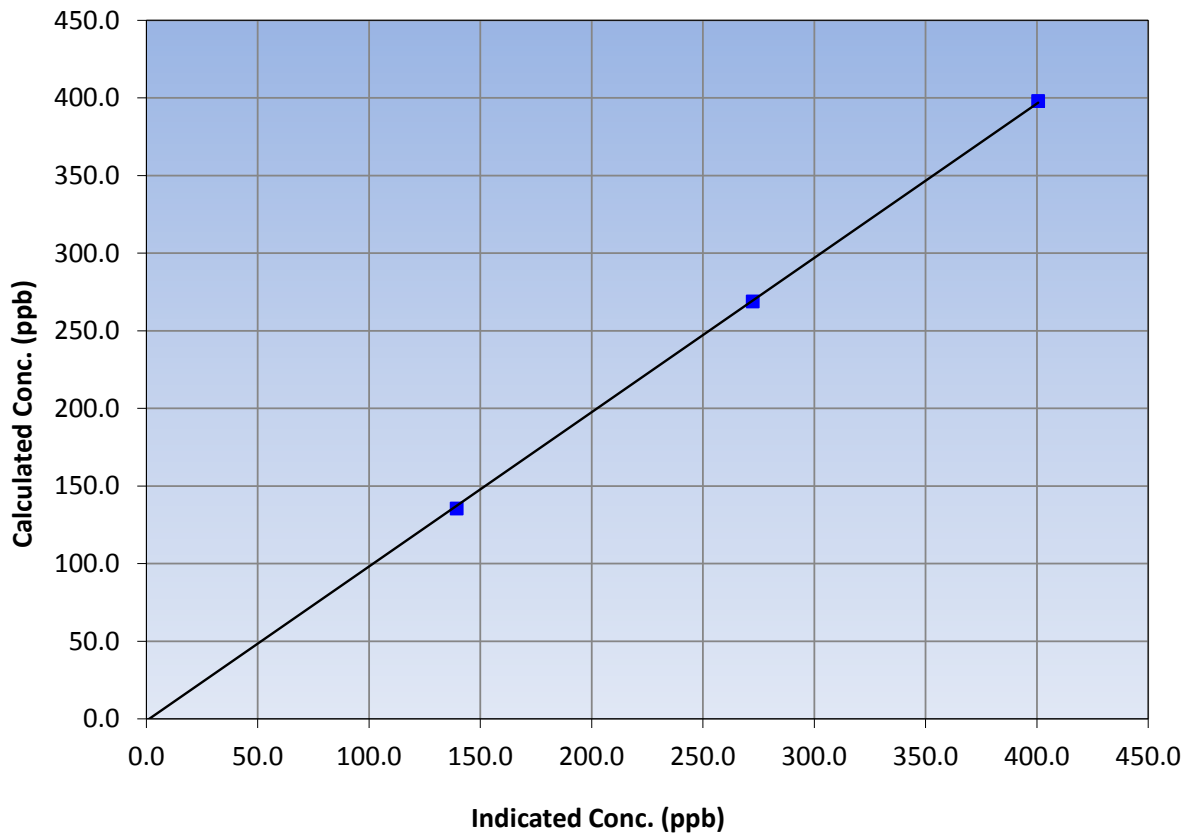
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 27, 2017 | Previous Calibration | September 14, 2017 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:35 | End Time (MST) | 12:01 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> |
|-------------------------------------|------------------------------------|---------------------------|---|--------------------------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient Slope Intercept | ≥0.995 0.90 - 1.10 +/-20 |
| 398.0 | 400.6 | 0.9935 | | |
| 268.8 | 272.3 | 0.9871 | | |
| 135.5 | 139.3 | 0.9727 | | |
| | | | | |

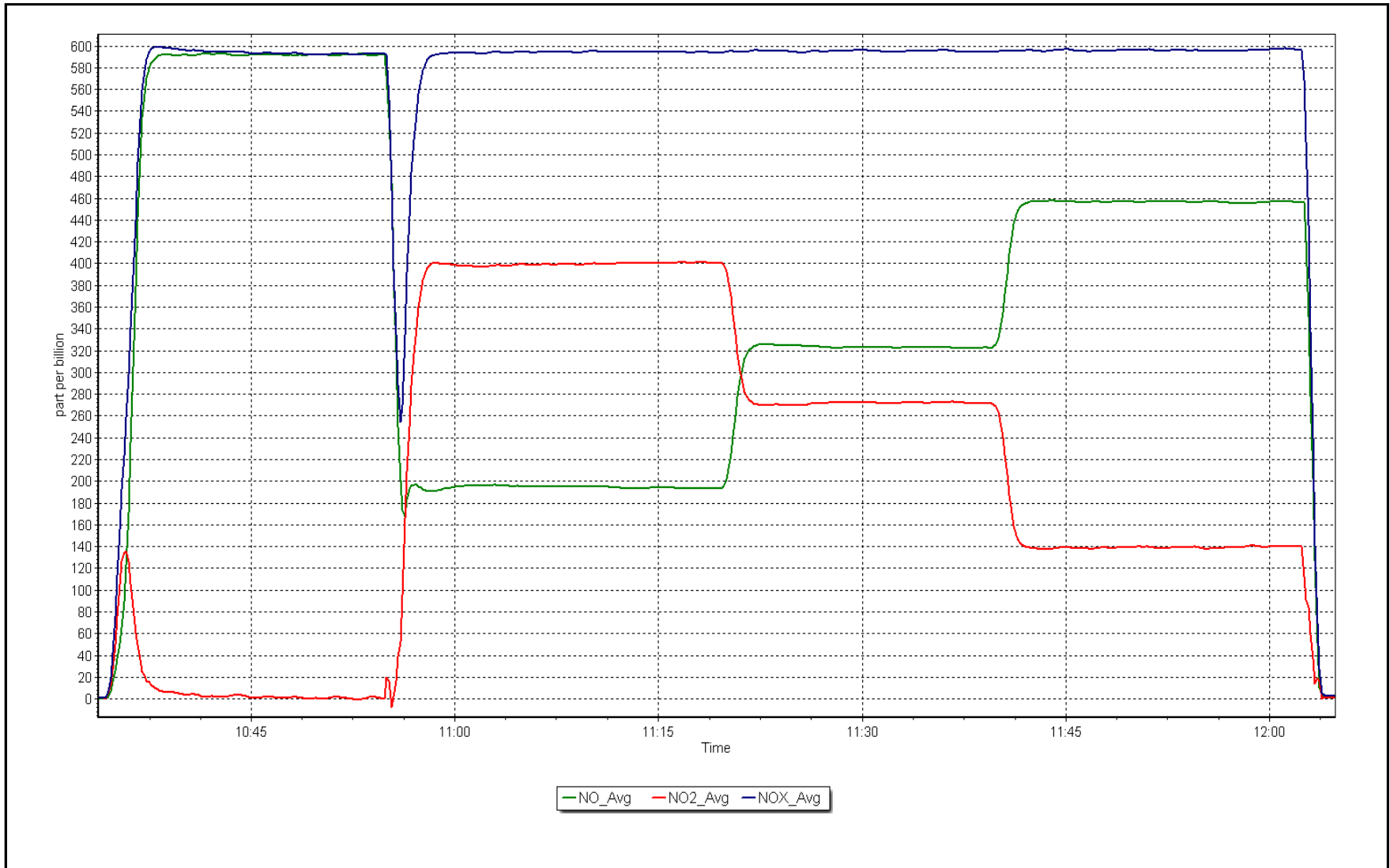
NO₂ Calibration Curve



NO_x Calibration Plot

Date: 27-Sep

Location: Stony Mountain





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|-----------------|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | September 27, 2017 | Last Cal Date: | August 18, 2017 |
| Start time (MST): | 15:17 | End time (MST): | 17:04 |
| Sharp Model: | Thermo 5030 SHARP | S/N: | E-1107 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 4965 |
| Flow Meter Make/Model: | Delta-Cal | S/N: | 954 |
| Temp/RH standard: | Delta-Cal | S/N: | 954 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 16 | 17.4 | 16 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 939 | 939.9 | 939 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 999 | 996 | 999 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.8 | 0.8 | -0.4 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input checked="" type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: June 27, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: 16.63

(Limit) 0.4 LPM

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

Annual Calibration Test

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

Notes: Nephelometer zero adjusted.

Calibration by: Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 19
FIREBAG
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 685 | 34 | 35 | 99.86 | 16 | 0 | 3 | 0 |
| H2S (ppb) Average | 686 | 33 | 34 | 99.86 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 685 | 34 | 35 | 99.86 | 3.1 | - | 2.3 | - |
| NO2 (ppb) Average | 685 | 34 | 35 | 99.86 | 15 | 0 | 5 | - |
| NO (ppb) Average | 685 | 34 | 35 | 99.86 | 8 | - | 1 | - |
| NOX (ppb) Average | 685 | 34 | 35 | 99.86 | 22 | - | 5 | - |
| Temperature 2 m (C) Average | 719 | 0 | 1 | 99.86 | 28.6 | - | 21.9 | - |
| Relative Humidity (%) Average | 719 | 0 | 1 | 99.86 | 100 | - | 99 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 34 | - | 25 | - |
| Wind Direction 10 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|--------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 685 | 0.7 | 1 | - | 0 | 0 | 0 | 0 | 0 | 2 | 16 |
| H2S (ppb) Average | 686 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 685 | 2.2 | 0.1 | - | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 3.1 |
| NO2 (ppb) Average | 685 | 2.2 | 2 | - | 0 | 0 | 1 | 1 | 3 | 6 | 15 |
| NO (ppb) Average | 685 | 0.4 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 8 |
| NOX (ppb) Average | 685 | 2.6 | 3 | - | 0 | 0 | 1 | 2 | 4 | 6 | 22 |
| Temperature 2 m (C) Average | 719 | 10.63 | 5.7 | - | -0.1 | 3.1 | 6 | 10.3 | 14.3 | 18.5 | 28.6 |
| Relative Humidity (%) Average | 719 | 69.5 | 20 | - | 25 | 41 | 53 | 71 | 86 | 95 | 100 |
| Wind Speed 10 m (km/h) Average | 719 | 14.2 | 7 | - | 1 | 6 | 9 | 13 | 19 | 24 | 34 |
| | 6 | 719 | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------|-------------------|-------------------|------------------|--|
| ALL PARAMETERS | 17 Sep 2017 07:00 | 17 Sep 2017 07:00 | | 1 DAS collection error - data not recorded |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Firebag - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 16 ppb on Sep 19 02:00 | Maximum Daily Average: 2.7 ppb on Sep 19 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 4 03:00 | Minimum Daily Average: 0.0 ppb on Sep 14 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 1.2 ppb at hour 8 | Minimum Diurnal Average: 0.3 ppb at hour 22 | | Hours of Calibration: | 34 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 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-Sep | 1 | 1 | 1 | 2 | Z | 5 | 4 | 2 | 2 | 1 | 2 | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 5 |
| 2-Sep | 1 | 0 | 0 | 0 | 0 | Z | 1 | 2 | 1 | 1 | 4 | 3 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1.0 | 4 |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 4-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 6 | 6 | 5 | 5 | 5 | 2 | 0 | 1 | 1 | 1.8 | 6 |
| 6-Sep | 2 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 2 | 4 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 6 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 5 | 6 | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 6 |
| 10-Sep | 0 | Z | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 11-Sep | 0 | 0 | Z | 1 | 0 | 1 | 4 | 5 | 6 | 5 | 7 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 7 |
| 12-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 3 | 1 | 1 | 11 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 11 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 17-Sep | 0 | 0 | Z | 1 | 1 | 1 | M | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 18-Sep | 0 | 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-Sep | 6 | 16 | 4 | 3 | Z | 2 | 3 | 9 | 6 | 3 | 3 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.7 | 16 |
| 20-Sep | 0 | 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-Sep | Z | 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-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 25-Sep | 1 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 0.9 | 4 |
| 26-Sep | 2 | 2 | 2 | 1 | 1 | Z | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0.5 | 3 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 1 | 4 | 7 | 8 | 3 | 3 | 1 | 1 | 0 | 0 | 1.5 | 8 |

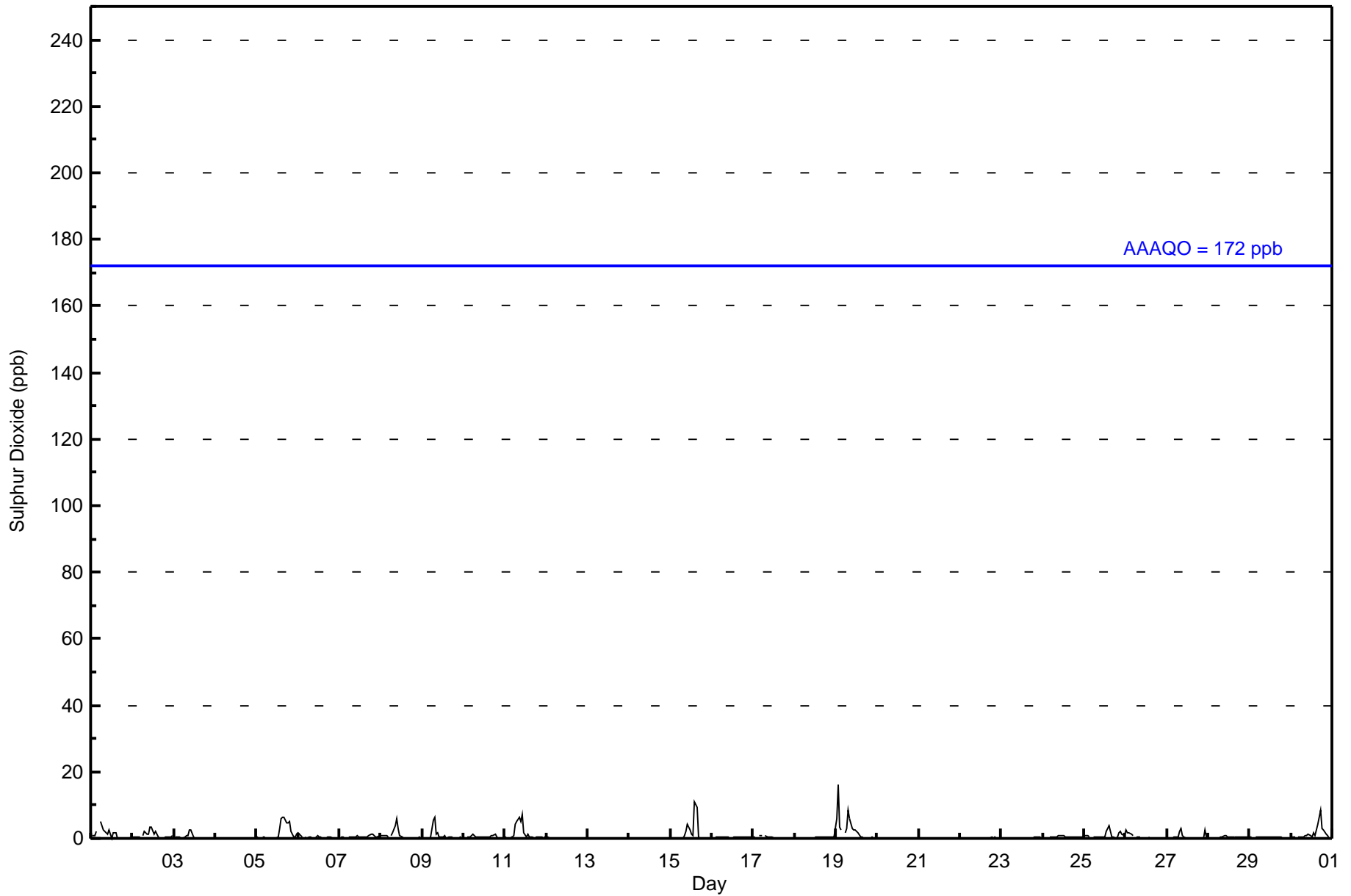
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.7 | 1.0 | 0.4 | 0.5 | 0.3 | 0.6 | 0.8 | 1.2 | 1.0 | 1.0 | 1.1 | 0.6 | 0.4 | 0.7 | 1.0 | 0.9 | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 | 0.3 | 0.3 | 0.3 | Diurnal Average | |
| 6 | 16 | 4 | 3 | 1 | 5 | 5 | 9 | 6 | 6 | 7 | 3 | 2 | 3 | 11 | 9 | 7 | 8 | 5 | 5 | 2 | 2 | 3 | 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
Firebag - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 683 | 99.71 | 99.71 |
| 11 - 20 | 2 | 0.29 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Firebag - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 42 | 71 | 16 | 9 | 20 | 28 | 31 | 68 | 103 | 67 | 41 | 73 | 45 | 11 | 24 | 34 | 683 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 685 |

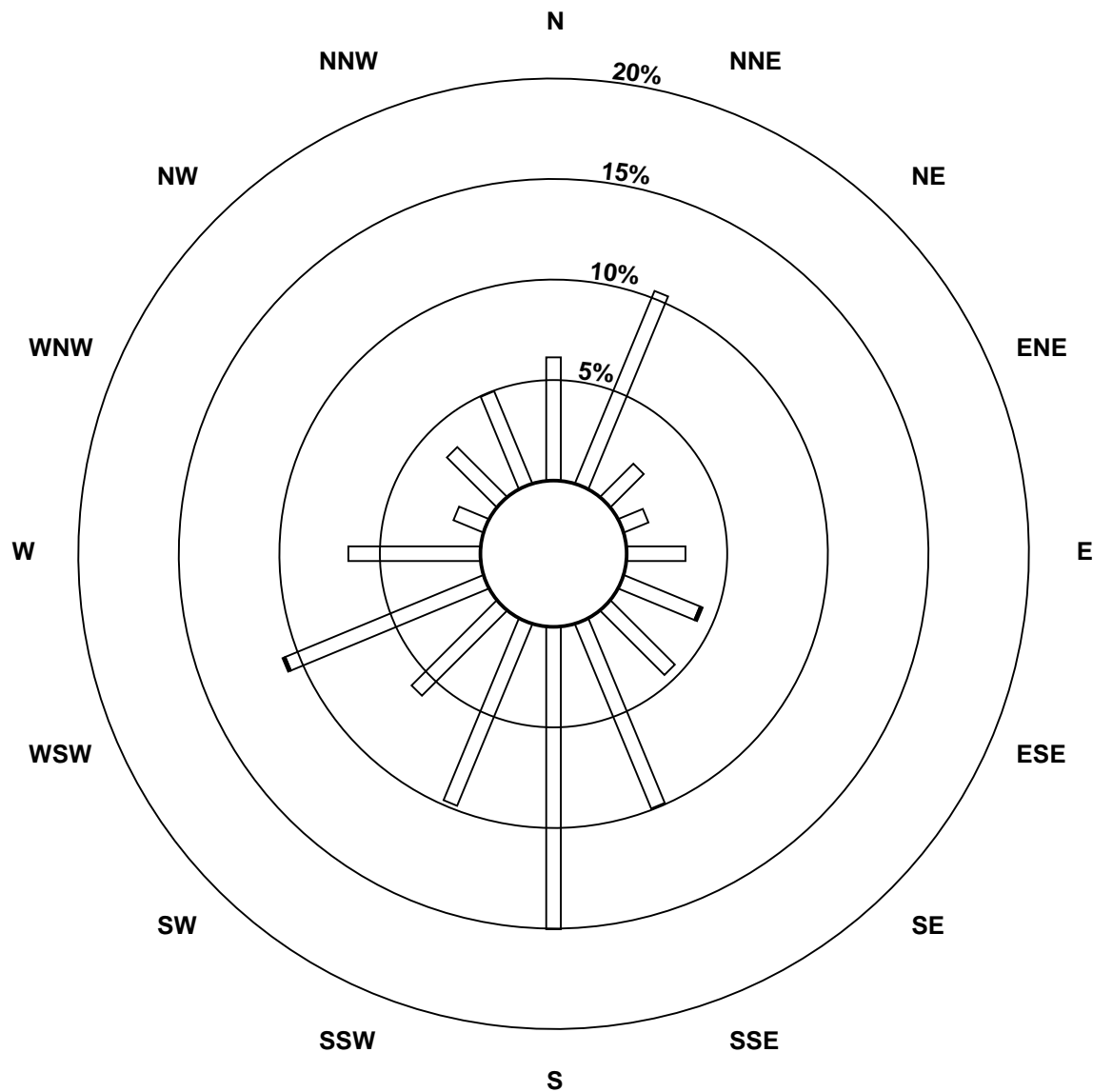
Total Number of Valid Hours: 685

Total Number of Hours: 720

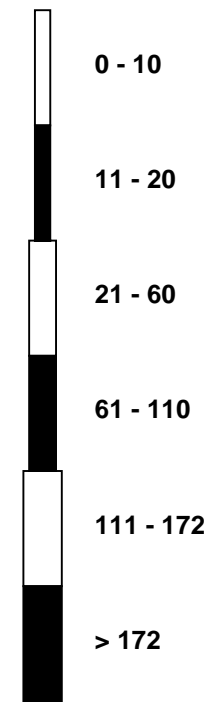


Wood Buffalo Environmental Association
Wind Rose Sep 2017

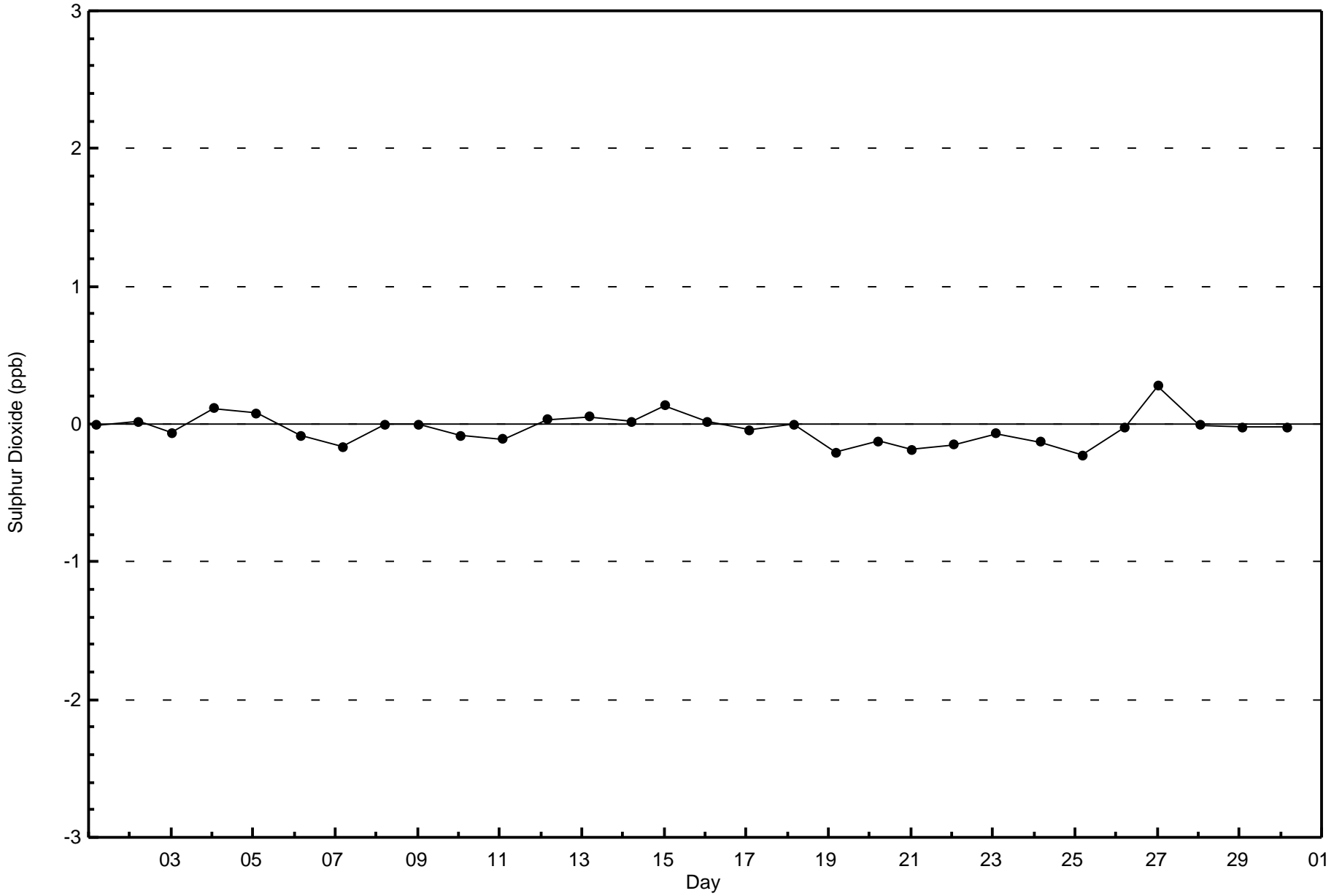
Sulphur Dioxide (SO₂) - ppb
Firebag (AMS 19)

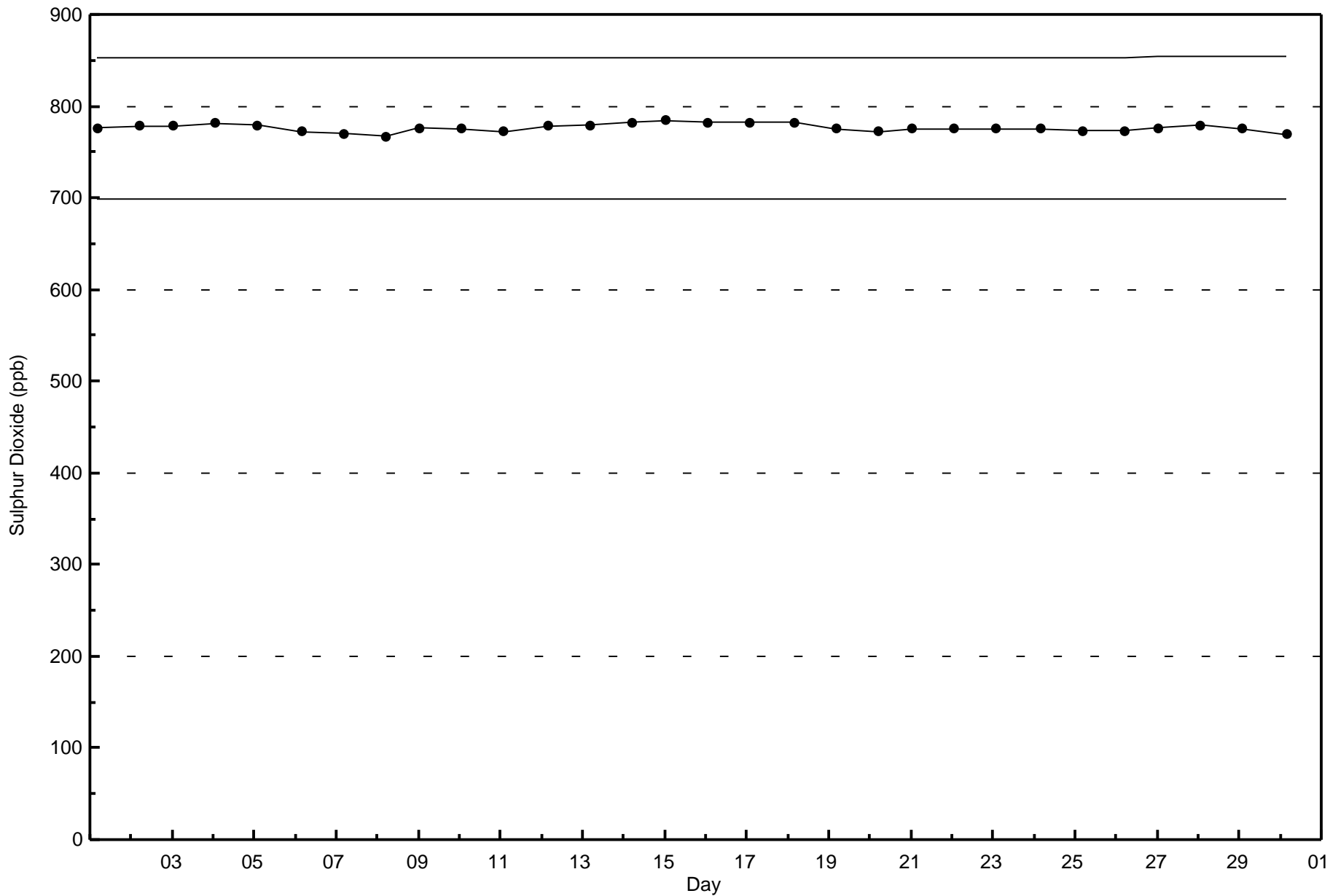


Classes (ppb)



Total Number of Valid Hours: 685







| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 25 22:00 | Maximum Daily Average: 0.4 ppb on Sep 19 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 5 08:00 | Minimum Daily Average: 0.1 ppb on Sep 5 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 0.3 ppb at hour 3 | Minimum Diurnal Average: 0.1 ppb at hour 15 | | Hours of Calibration: | 33 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | Percent Operational Time: | 99.9 |

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

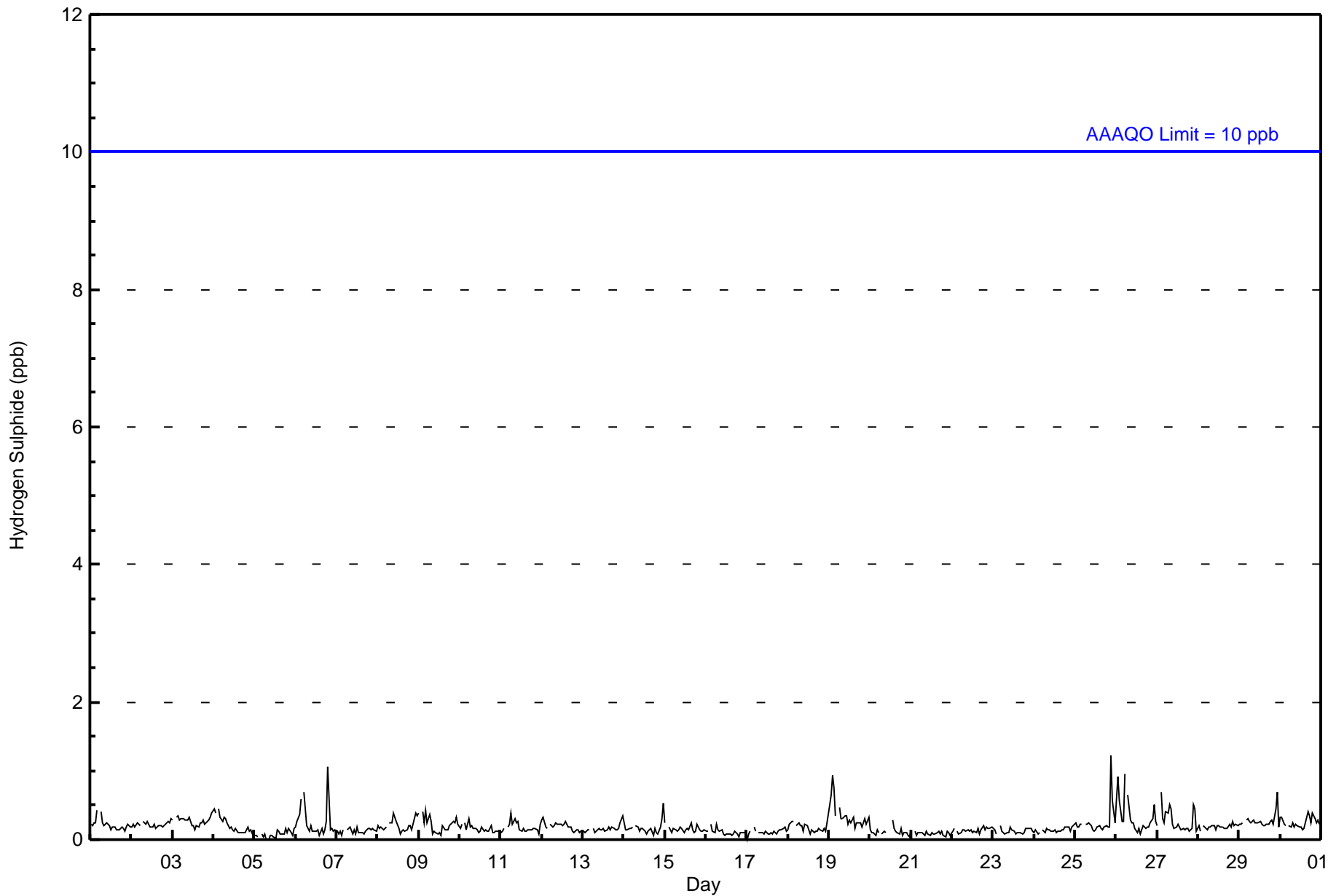
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average |
| 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Firebag - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Firebag - September 2017

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 42 | 68 | 16 | 9 | 19 | 30 | 32 | 68 | 103 | 67 | 40 | 73 | 46 | 13 | 26 | 34 | 686 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 68 | 16 | 9 | 19 | 30 | 32 | 68 | 103 | 67 | 40 | 73 | 46 | 13 | 26 | 34 | 686 |

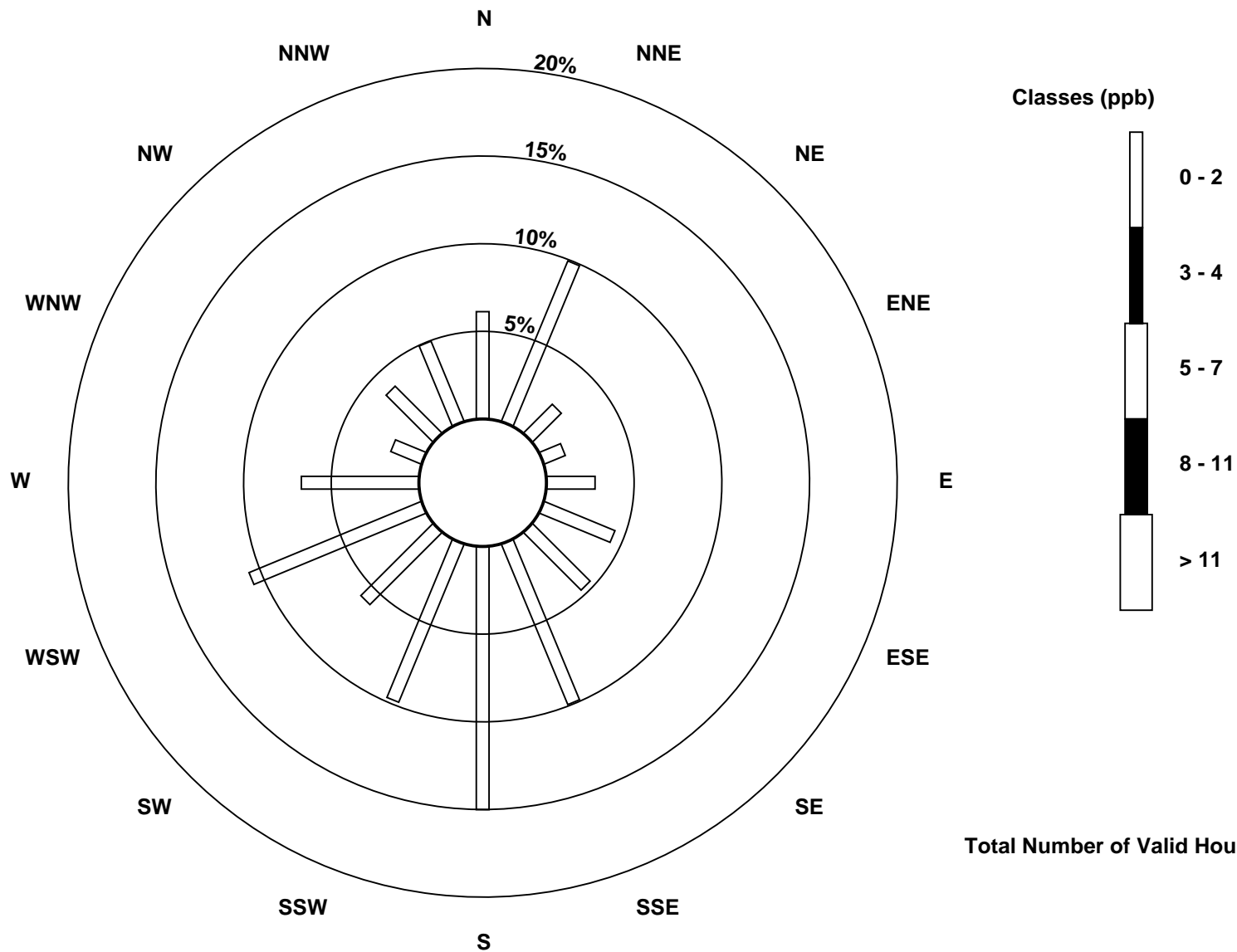
Total Number of Valid Hours: 686

Total Number of Hours: 720

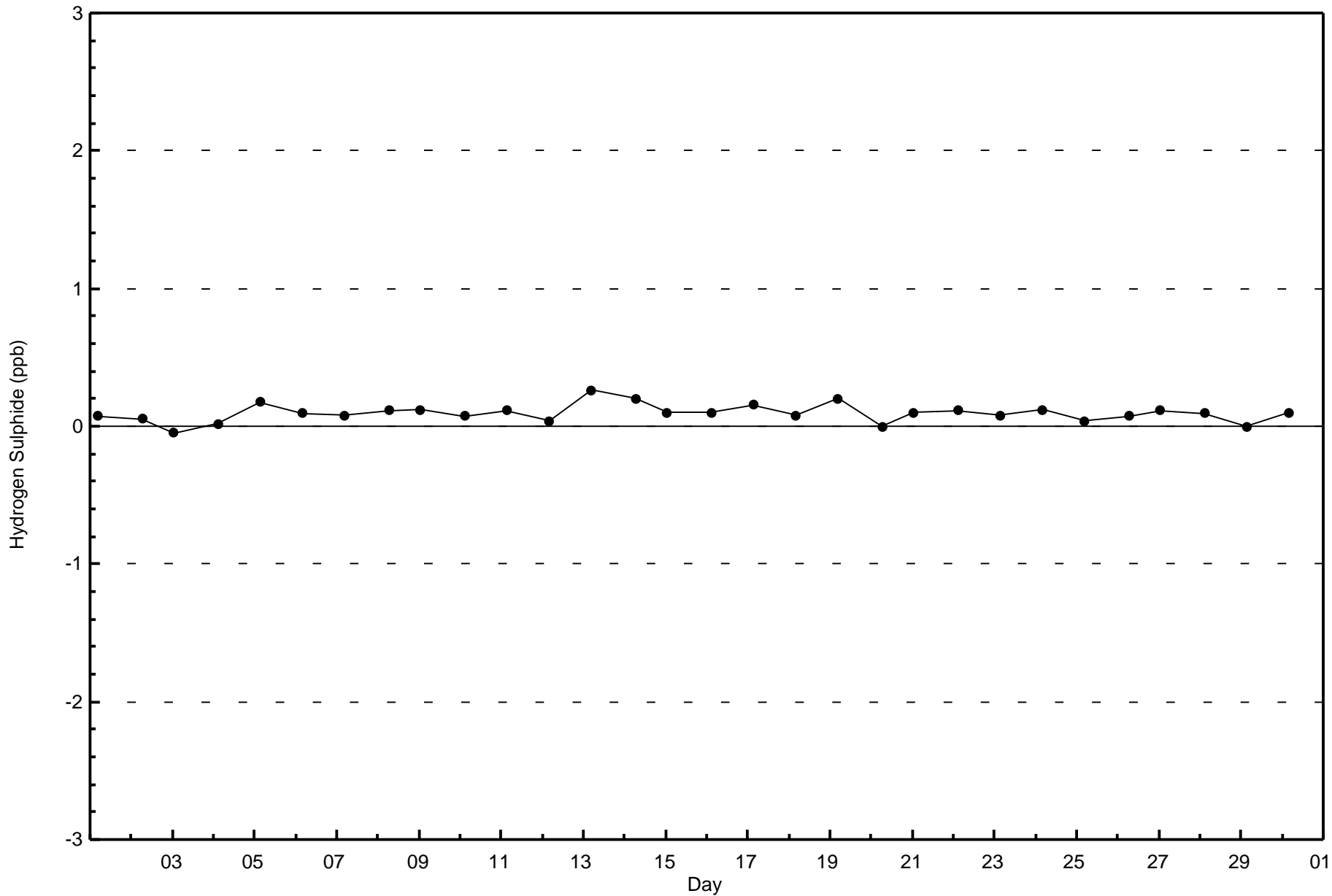


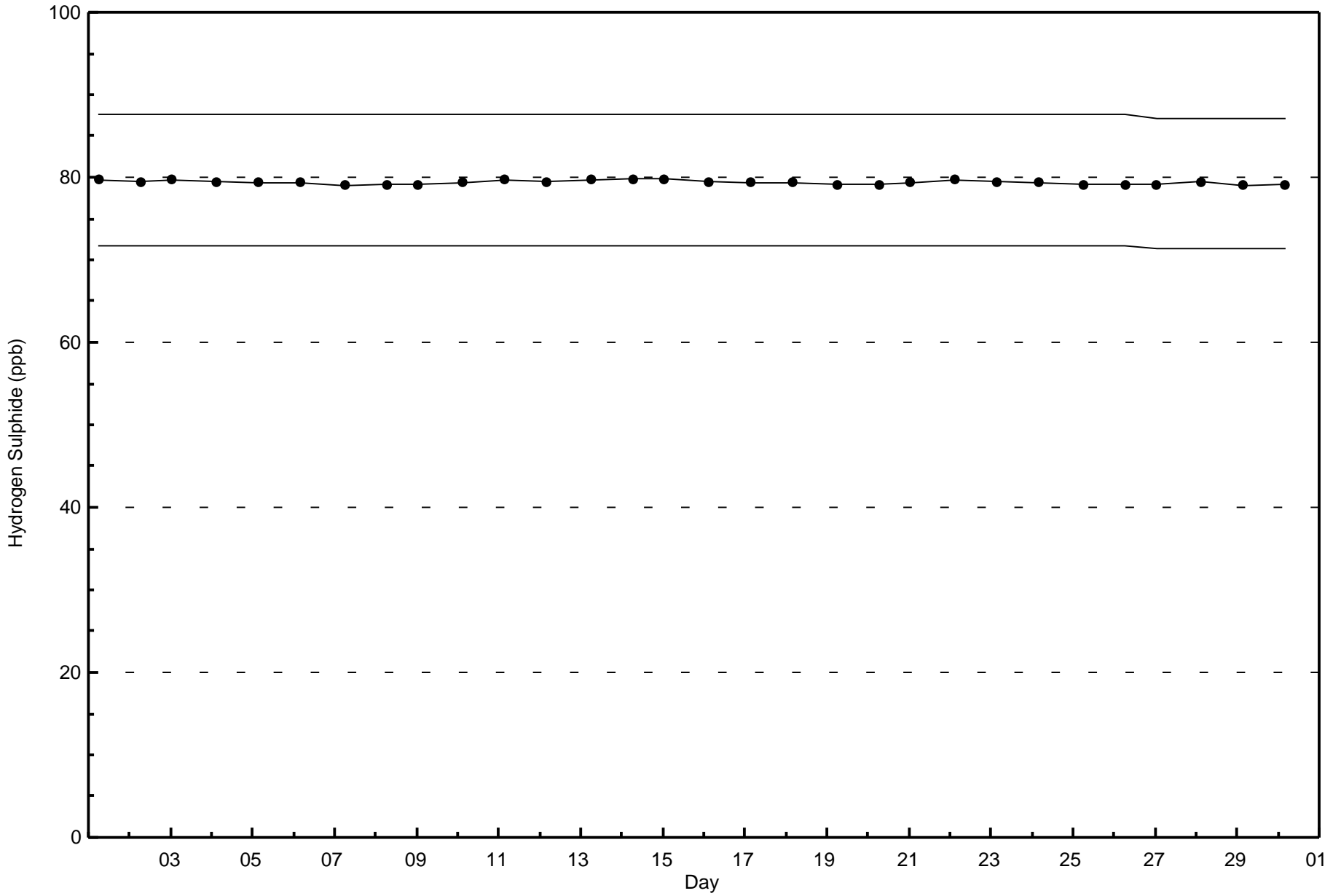
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Hydrogen Sulphide (H₂S) - ppb
Firebag (AMS 19)



Total Number of Valid Hours: 686

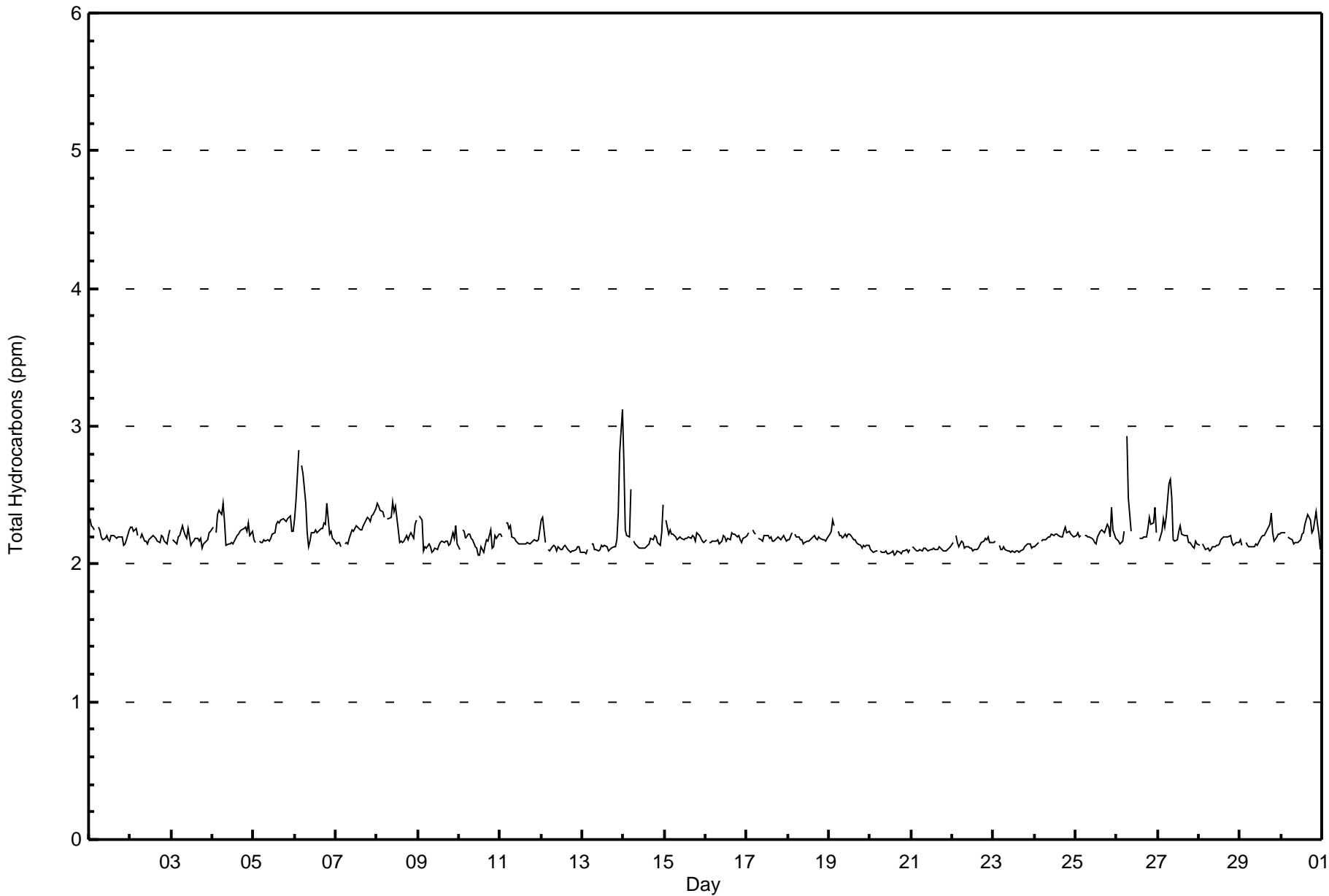






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Firebag - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 0 | 0.00 | 0.00 |
| 2.1 - 3.0 | 684 | 99.85 | 99.85 |
| 3.1 - 10.0 | 1 | 0.15 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Firebag - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.1 - 3.0 | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 66 | 41 | 74 | 45 | 11 | 24 | 34 | 684 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 685 |

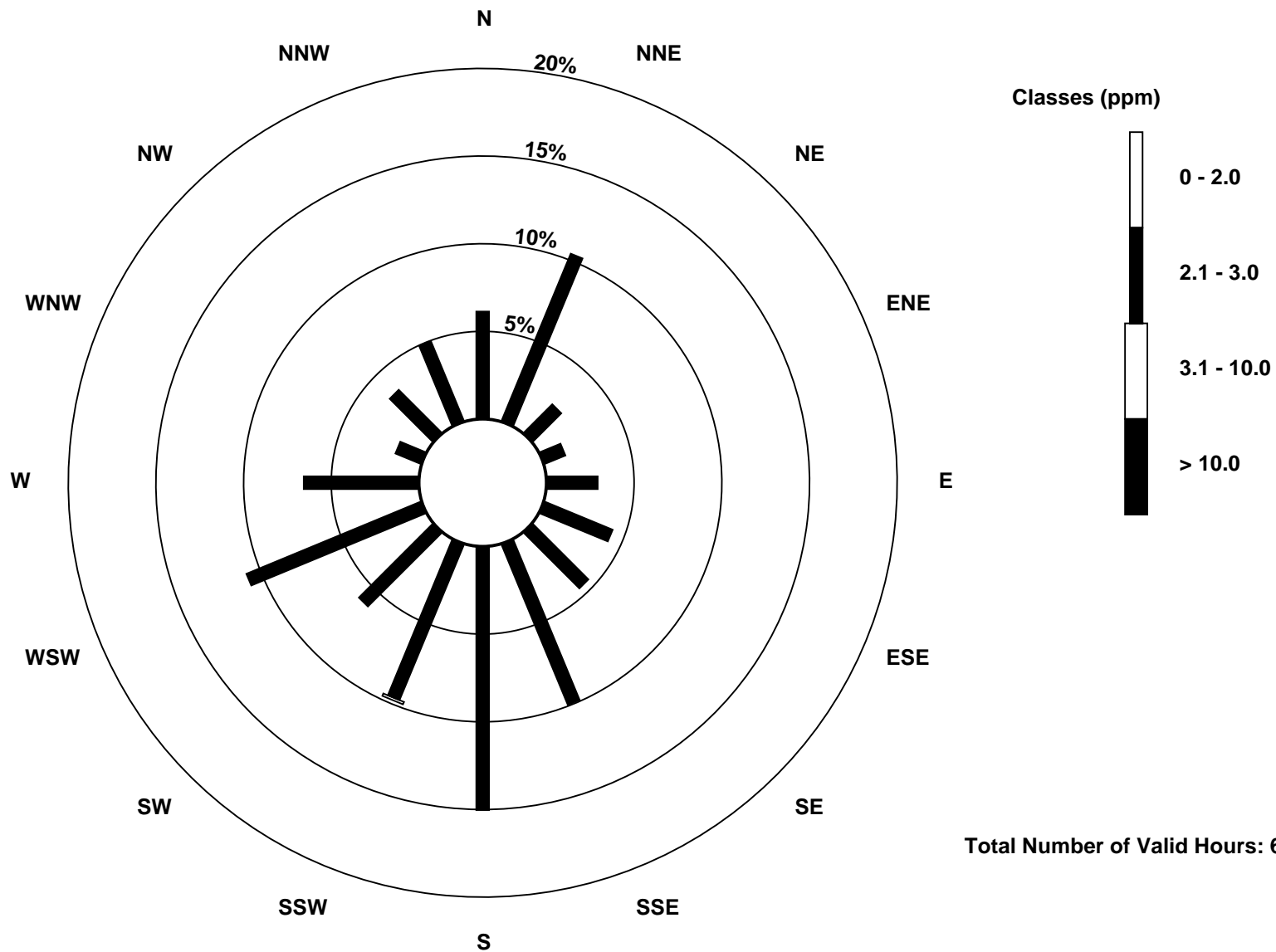
Total Number of Valid Hours: 685

Total Number of Hours: 720

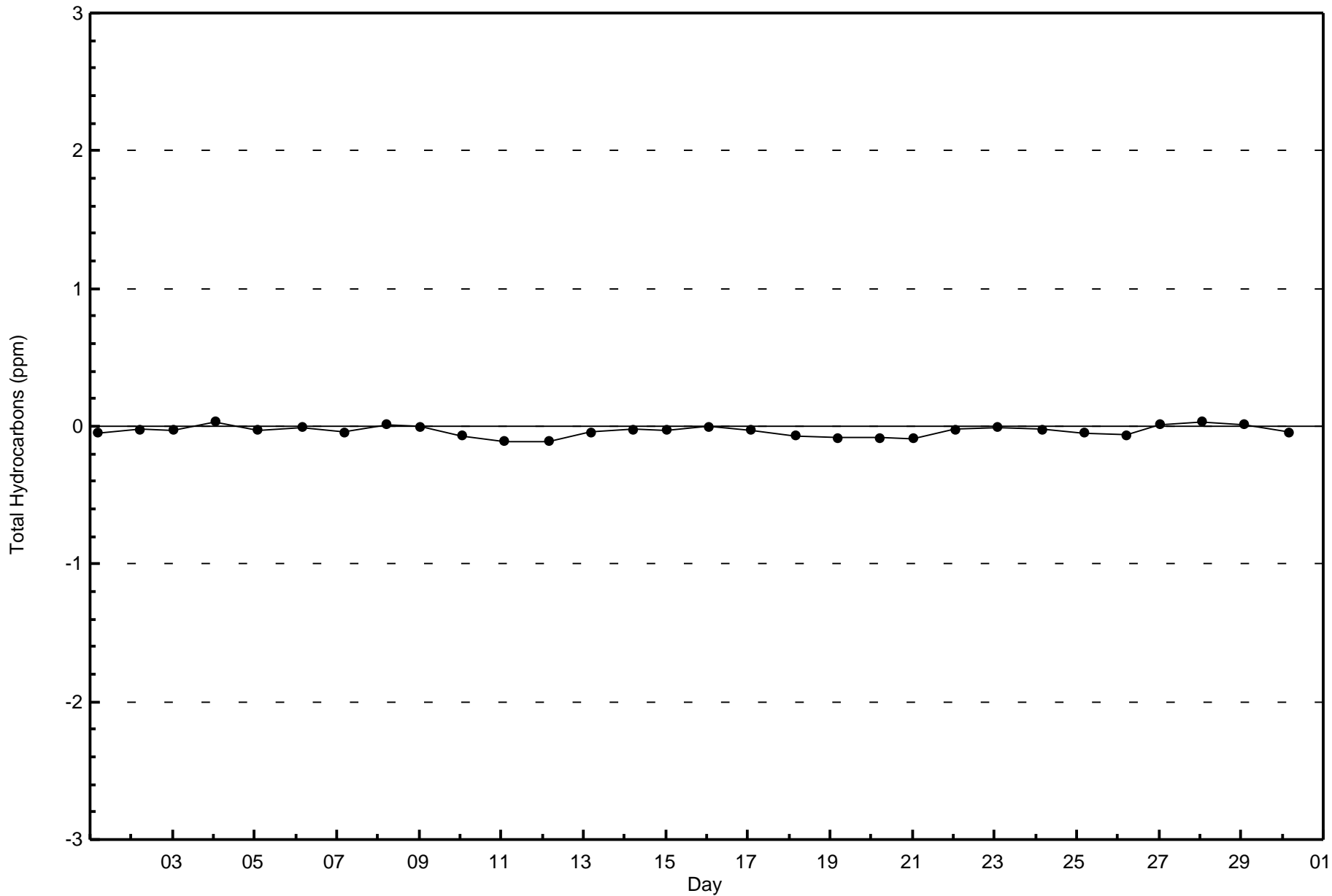


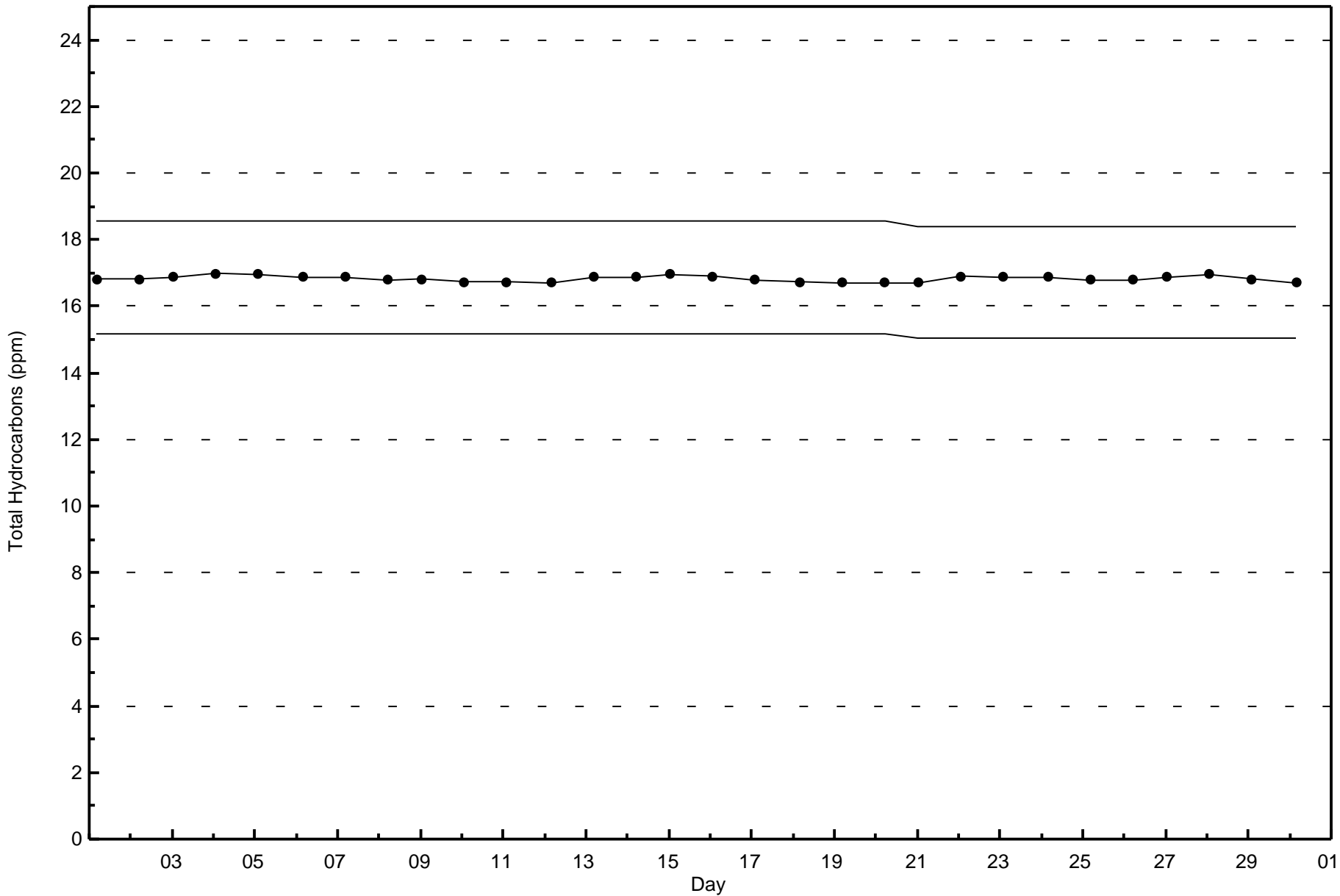
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association
Summary of Hour Averages

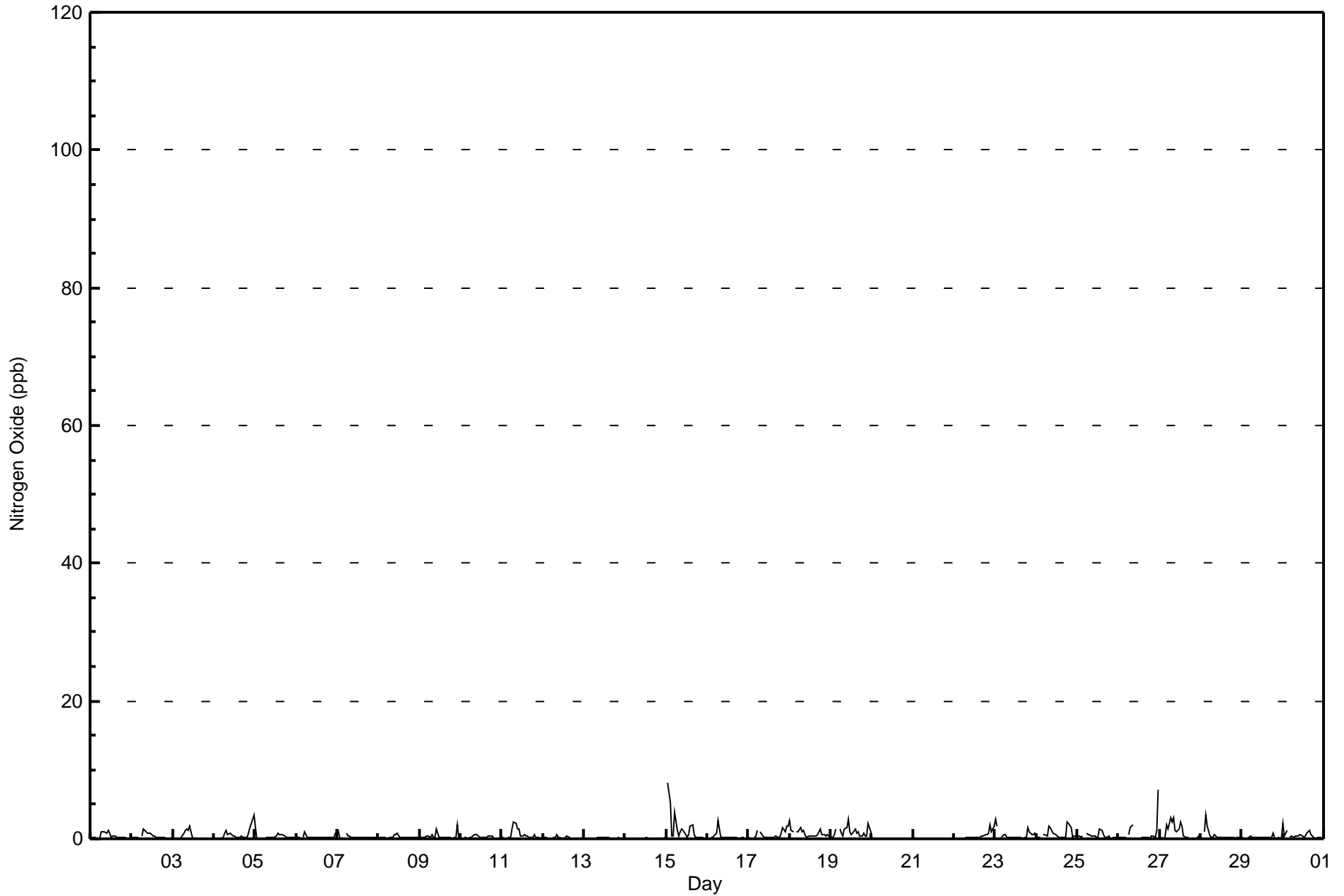
Nitrogen Oxide (NO) - ppb
Firebag - September 2017

| Maximum Value: 8 ppb on Sep 15 02:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 1.3 ppb on Sep 15 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--|-------------------------------|-----------------|---|---|---|---|-----------------|---|---|----|----|----|----|----|----|----|--|----|----|----|----|----|----|-----|---------------|---------------|--|--|--|--|--|--|--|--------------------------------|--|
| Minimum Value: 0 ppb on Sep 14 22:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 20 | | | | | | | | | | | | | | | | | Hours of Data: 685 | |
| Maximum Diurnal Average: 0.7 ppb at hour 9 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.2 ppb at hour 18 | | | | | | | | | | | | | | | | | Hours of Missing Data: 35 | |
| Monthly Average: 0.4 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 3 | | | | | | | | | | | | | | | | | Hours of Calibration: 34 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.9 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | | | | | | | | | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | | | | | | | | | | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 0.7 | 3 | | | | | | | | | |
| 5-Sep | 2 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | | | | | | | | | | |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | |
| 7-Sep | 1 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.3 | 2 | | | | | | | | | | |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.6 | 2 | | | | | | | | | | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | |
| 15-Sep | Z | 8 | 5 | 0 | 0 | 4 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 8 | | | | | | | | | | |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 | | | | | | | | | | |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 1 | M | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 0.6 | 2 | | | | | | | | | | |
| 18-Sep | 3 | 1 | 1 | Z | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.8 | 3 | | | | | | | | | | |
| 19-Sep | 0 | 0 | 1 | 1 | Z | 1 | 1 | 0 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 1.0 | 3 | | | | | | | | | | |
| 20-Sep | 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 | | | | | | | | | | |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 0.4 | 2 | | | | | | | | | | |
| 23-Sep | 3 | 2 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0.6 | 3 | | | | | | | | | | |
| 24-Sep | 0 | 0 | 0 | Z | 1 | 1 | 0 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | 0.8 | 2 | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 2 | 2 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0.8 | 7 | | | | | | | | | | |
| 27-Sep | Z | 0 | 0 | 0 | 2 | 1 | 3 | 2 | 3 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 3 | | | | | | | | | | |
| 28-Sep | 0 | Z | 1 | 3 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | | | | | | | | | | |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | |
| 30-Sep | 2 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.5 0.6 0.5 0.3 0.4 0.7 0.6 0.7 0.7 0.5 0.6 0.3 0.3 0.4 0.4 0.3 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.5 0.7 | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | 3 8 5 3 2 4 3 2 3 2 3 1 2 2 2 2 1 1 1 2 2 2 2 2 7 | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| Z - zerspan | | C - Calibration | | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Firebag - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 685 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 685 |

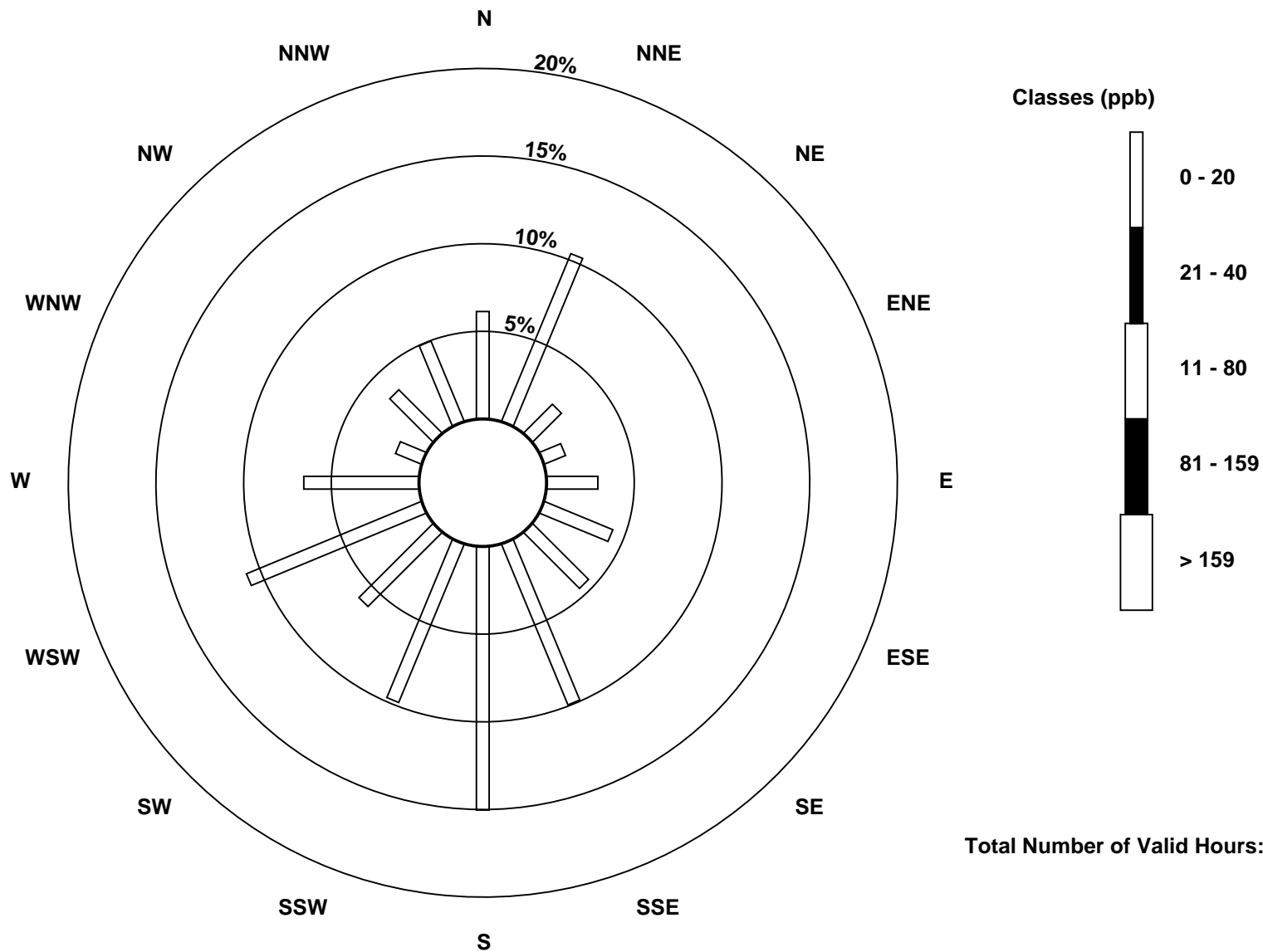
Total Number of Valid Hours: 685

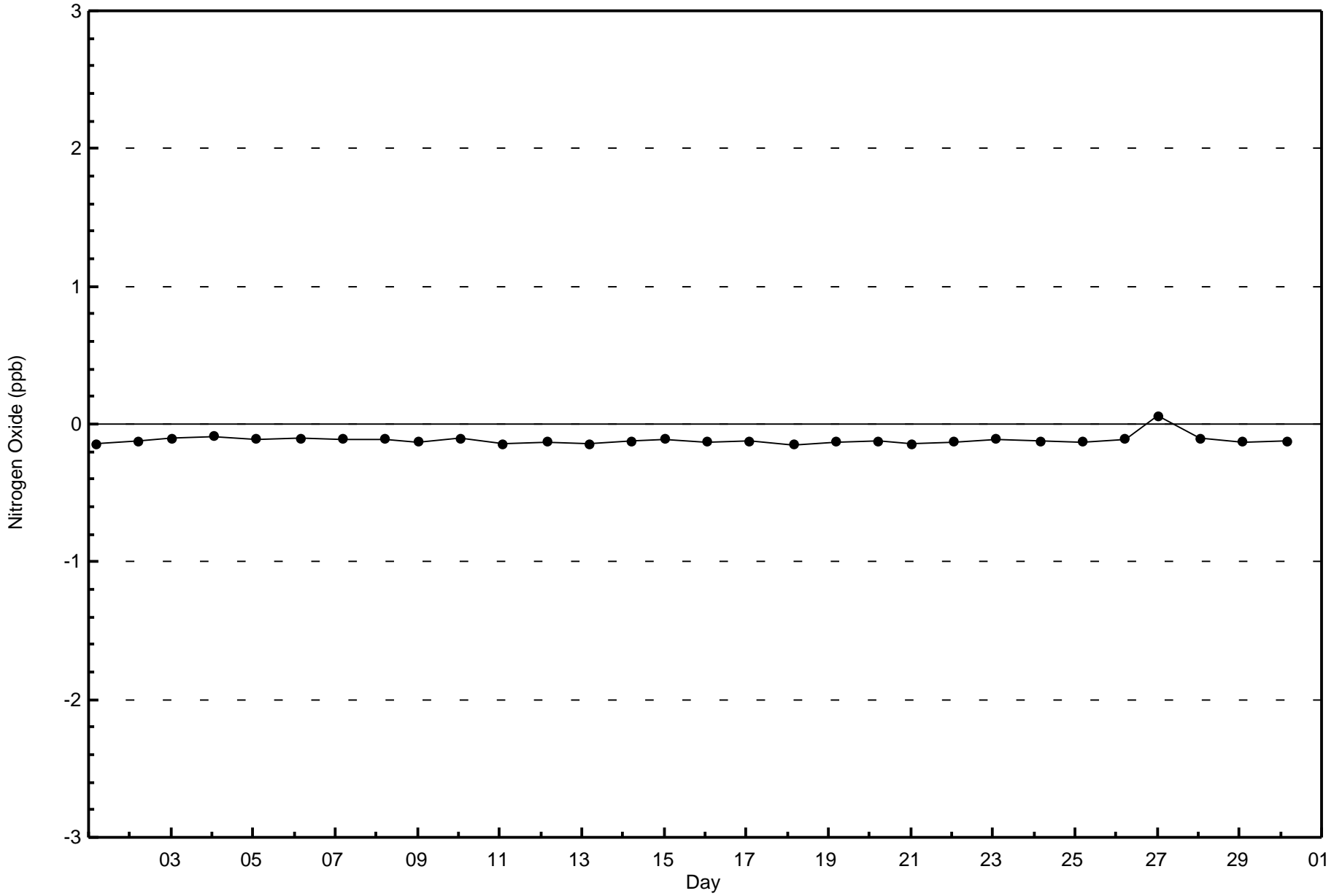
Total Number of Hours: 720

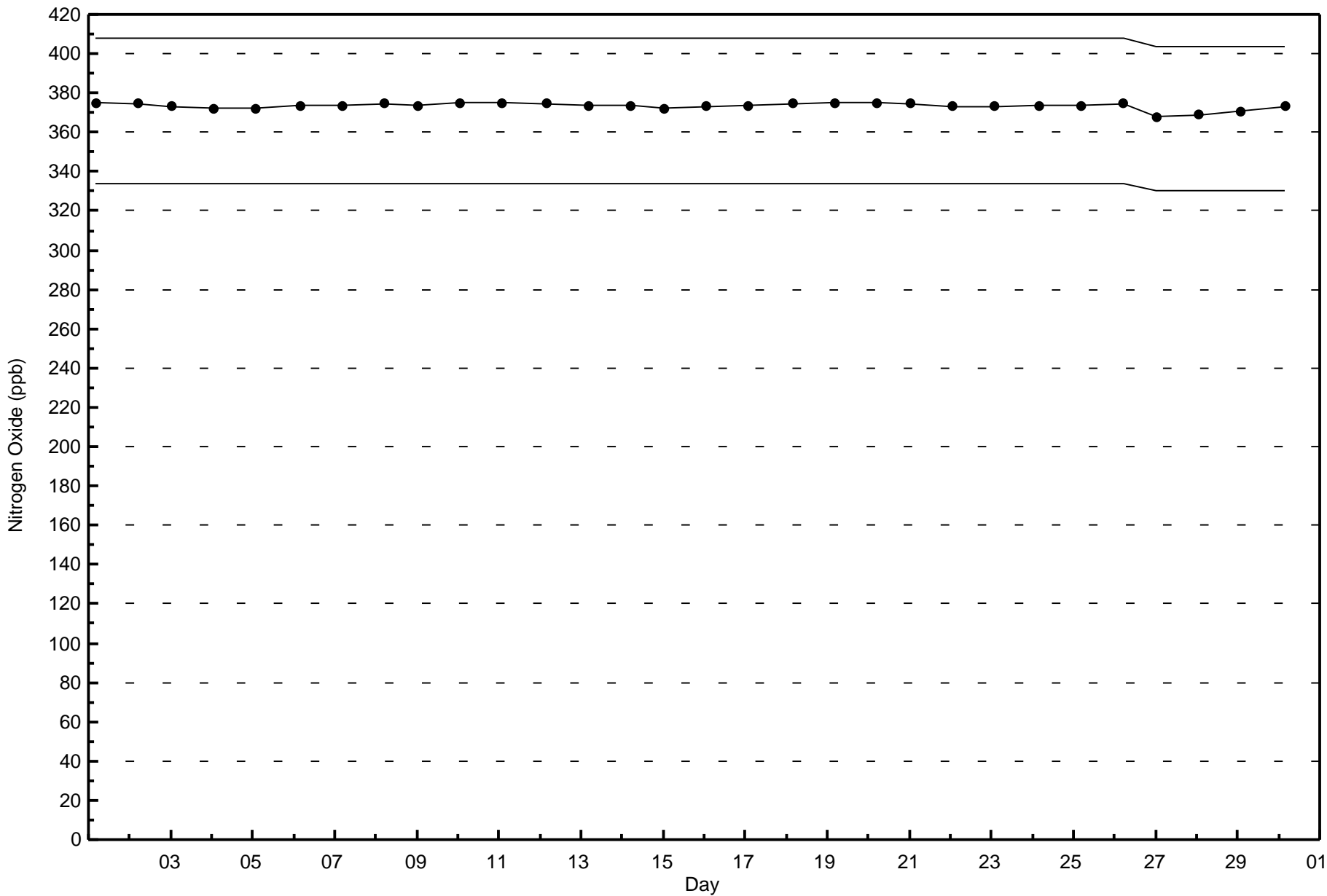


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)









| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 15 ppb on Sep 27 00:00 | Maximum Daily Average: 4.7 ppb on Sep 26 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 12 19:00 | Minimum Daily Average: 0.0 ppb on Sep 21 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 3.8 ppb at hour 6 | Minimum Diurnal Average: 0.9 ppb at hour 13 | | Hours of Calibration: | 34 |
| Monthly Average: 2.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 6 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-Sep | 5 | 4 | 4 | 5 | Z | 7 | 7 | 3 | 2 | 2 | 3 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 4 | 2.4 | 7 |
| 2-Sep | 4 | 4 | 4 | 4 | 3 | Z | 2 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 3 | 2 | 1 | 3 | 4 | 2.2 | 4 |
| 3-Sep | Z | 1 | 1 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 6 | 4 | 1.9 | 6 | |
| 4-Sep | 5 | Z | 2 | 8 | 8 | 7 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 4 | 7 | 8 | 10 | 3.1 | 10 | |
| 5-Sep | 8 | 0 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 2 | 6 | 2 | 3 | 2.2 | 8 |
| 6-Sep | 6 | 7 | 6 | Z | 6 | 10 | 3 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 4 | 2.2 | 10 | |
| 7-Sep | 6 | 6 | 2 | 1 | Z | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.6 | 6 | |
| 8-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 4 | 8 | 5 | 6 | 2 | 1 | 1 | 1 | 0 | 5 | 5 | 1 | 1 | 1 | 1 | 2.4 | 8 | |
| 9-Sep | Z | 1 | 0 | 0 | 4 | 3 | 3 | 4 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 6 | 2 | 1.6 | 6 |
| 10-Sep | 1 | Z | 4 | 3 | 3 | 5 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 5 | 1 | 1 | 2 | 2 | 3 | 2.3 | 5 | |
| 11-Sep | 3 | 2 | Z | 5 | 4 | 4 | 7 | 6 | 5 | 5 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 1 | 3 | 2.9 | 7 | |
| 12-Sep | 4 | 5 | 2 | Z | 0 | 0 | 1 | 2 | 3 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 | |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 | |
| 14-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0.2 | 2 | |
| 15-Sep | Z | 12 | 10 | 5 | 1 | 7 | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 4 | 4 | 2 | 1 | 1 | 2 | 2 | 4 | 0 | 1 | 3.0 | 12 |
| 16-Sep | 1 | Z | 1 | 1 | 2 | 3 | 6 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1.4 | 6 | |
| 17-Sep | 1 | 2 | Z | 5 | 5 | 6 | M | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 5 | 3 | 4 | 2.5 | 6 | |
| 18-Sep | 5 | 3 | 2 | Z | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 8 | 4 | 2 | 2 | 3 | 2 | 2.3 | 8 | |
| 19-Sep | 3 | 3 | 8 | 9 | Z | 7 | 5 | 2 | 5 | 5 | 6 | 2 | 3 | 4 | 7 | 4 | 4 | 2 | 1 | 3 | 1 | 2 | 8 | 4 | 4.2 | 9 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | |
| 21-Sep | Z | 0 | 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-Sep | 2 | Z | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 7 | 6 | 5 | 6 | 4 | 8 | 2.2 | 8 |
| 23-Sep | 7 | 5 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 10 | 6 | 8 | 8 | 7 | 2.6 | 10 | |
| 24-Sep | 1 | 0 | 1 | Z | 4 | 4 | 3 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 12 | 8 | 7 | 6 | 5 | 5 | 3.1 | 12 | |
| 25-Sep | 5 | 5 | 2 | 3 | Z | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 5 | 2 | 3 | 6 | 9 | 10 | 2.9 | 10 |
| 26-Sep | 8 | 6 | 5 | 6 | 6 | Z | 6 | 4 | 4 | C | C | C | C | 0 | 0 | 1 | 1 | 0 | 1 | 7 | 6 | 4 | 8 | 15 | 4.7 | 15 |
| 27-Sep | Z | 5 | 6 | 10 | 12 | 14 | 11 | 7 | 6 | 3 | 2 | 3 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 4.0 | 14 | |
| 28-Sep | 1 | Z | 2 | 6 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1.3 | 6 | |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 13 | 2 | 1 | 2 | 2 | 3 | 1.9 | 13 |
| 30-Sep | 10 | 6 | 6 | Z | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 4 | 7 | 6 | 7 | 3 | 4 | 4 | 3 | 2 | 1 | 3.6 | 10 | |

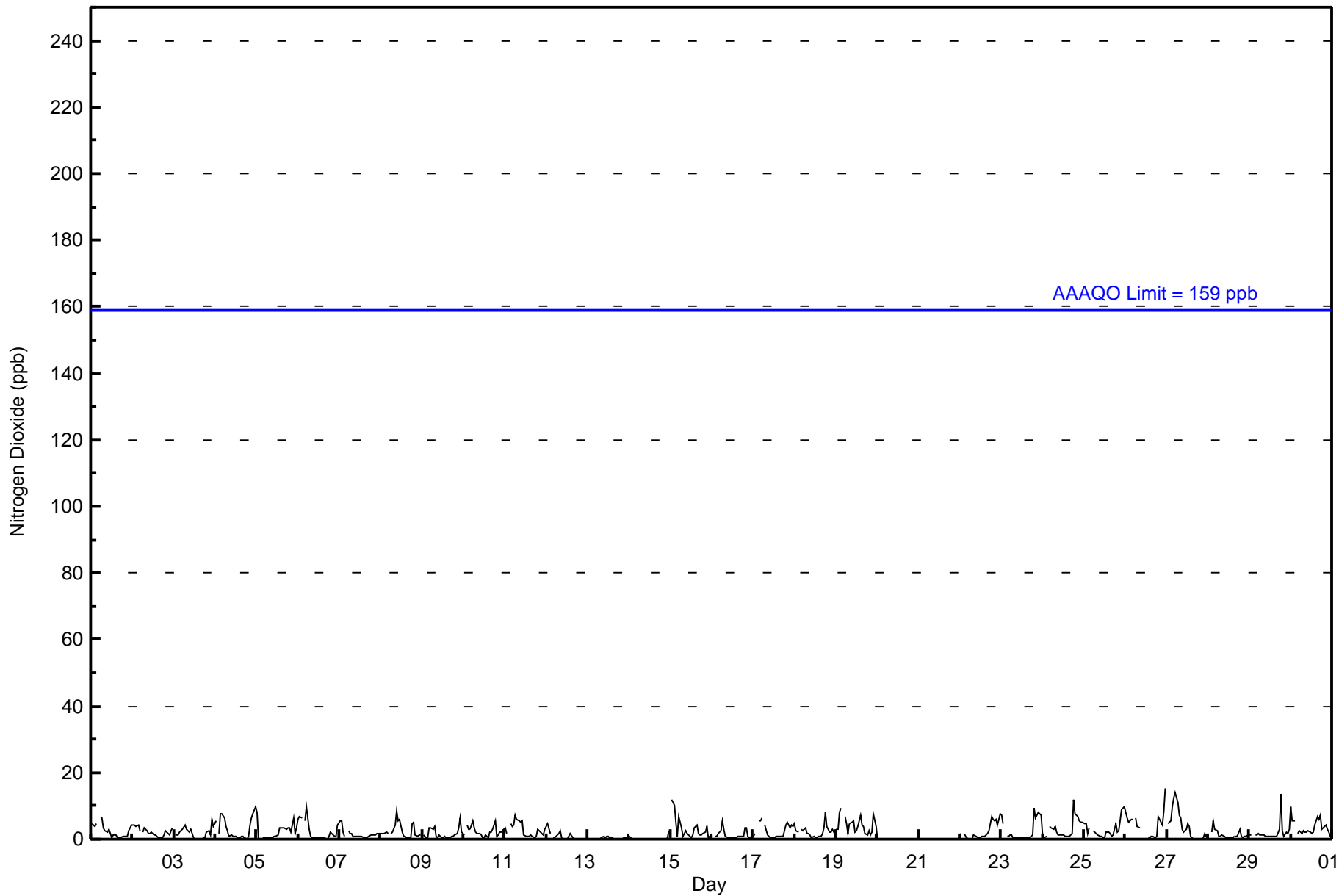
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 3.5 | 3.1 | 2.8 | 3.2 | 2.9 | 3.8 | 2.8 | 2.1 | 1.8 | 1.6 | 1.5 | 1.0 | 0.9 | 1.1 | 1.1 | 1.2 | 1.1 | 1.2 | 2.6 | 2.6 | 2.3 | 2.5 | 3.0 | 3.5 | Diurnal Average | |
| 10 | 12 | 10 | 10 | 12 | 14 | 11 | 7 | 6 | 8 | 6 | 6 | 5 | 4 | 7 | 7 | 6 | 7 | 13 | 10 | 7 | 8 | 9 | 15 | 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
Firebag - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 685 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 685 |

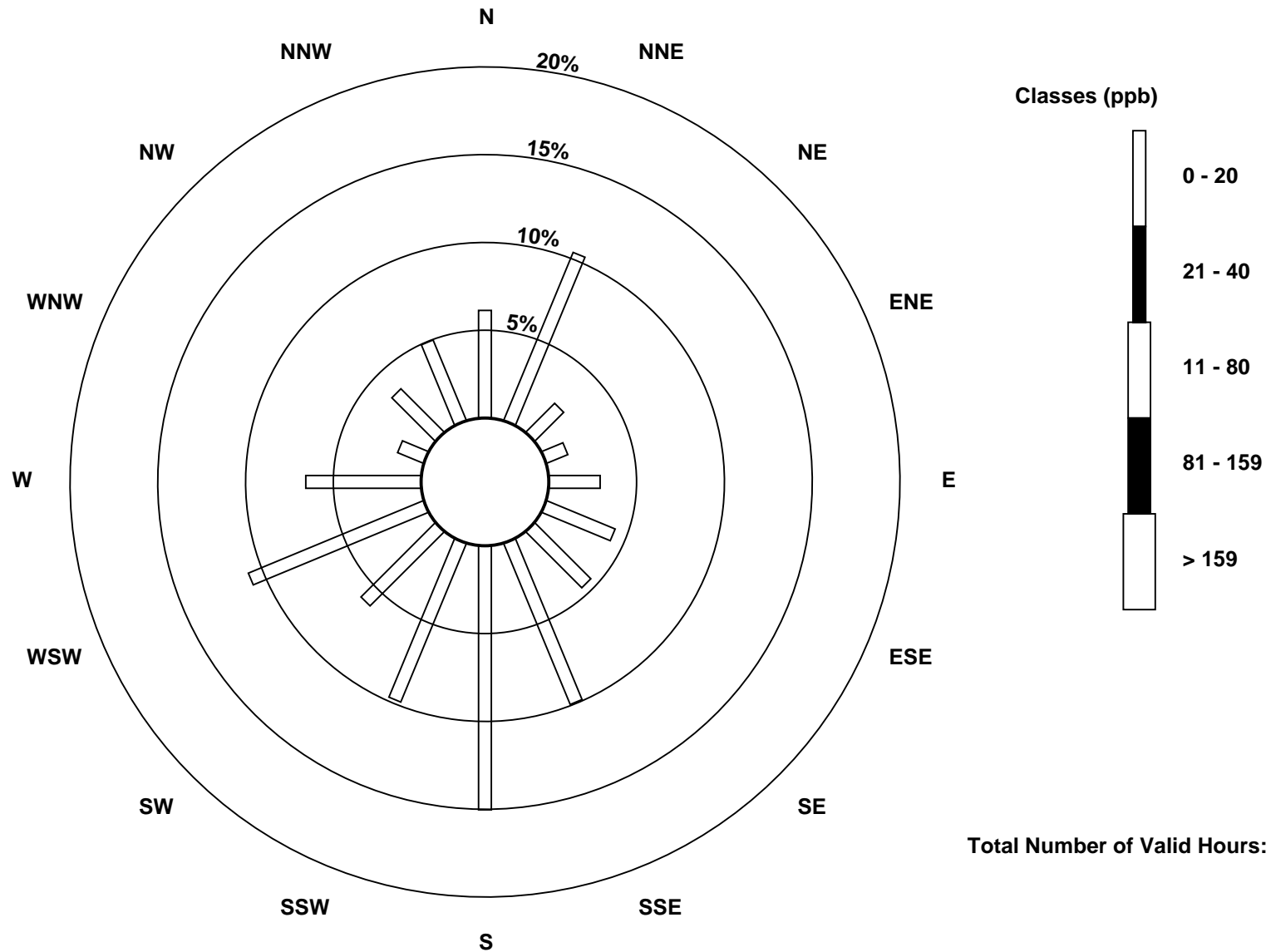
Total Number of Valid Hours: 685

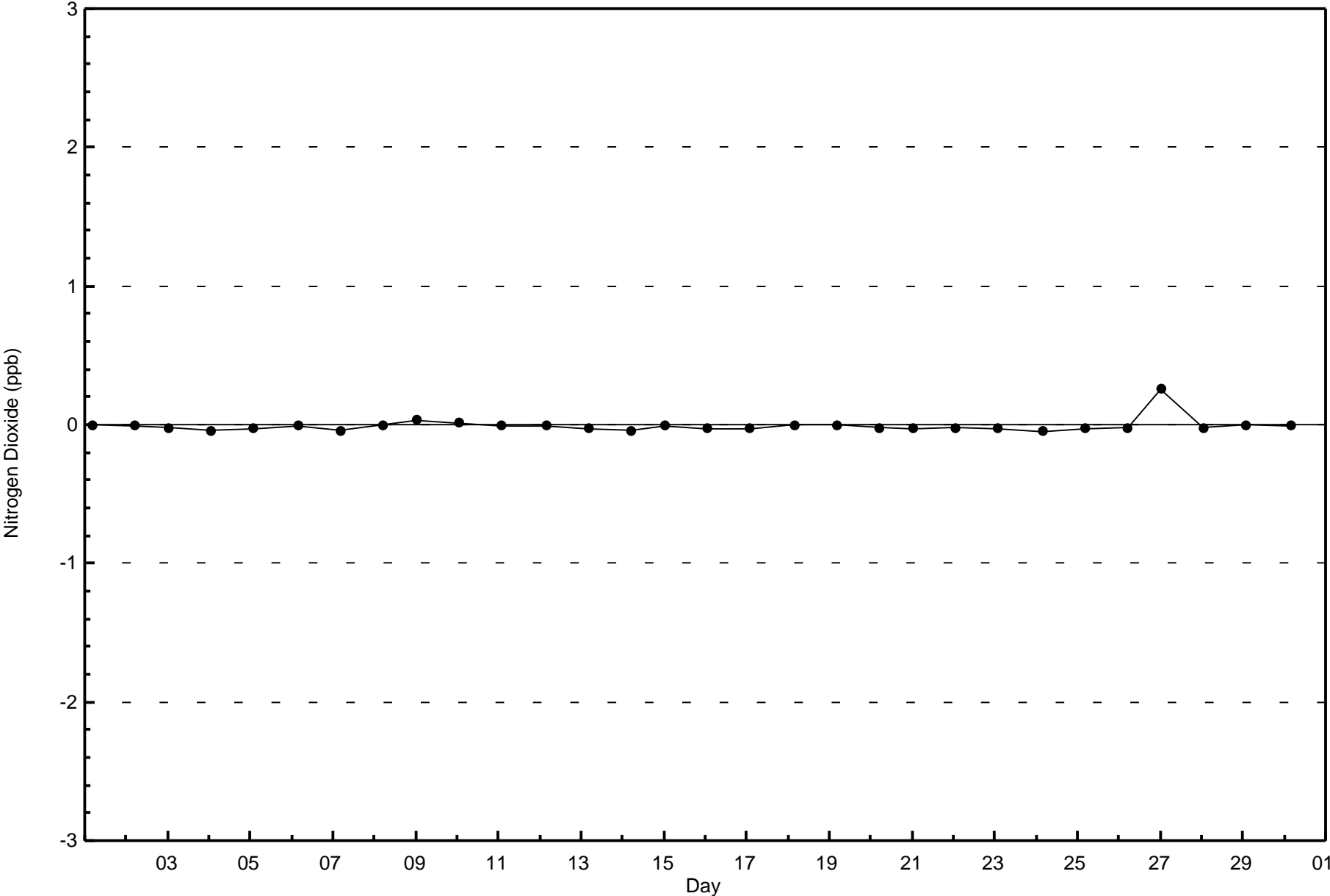
Total Number of Hours: 720

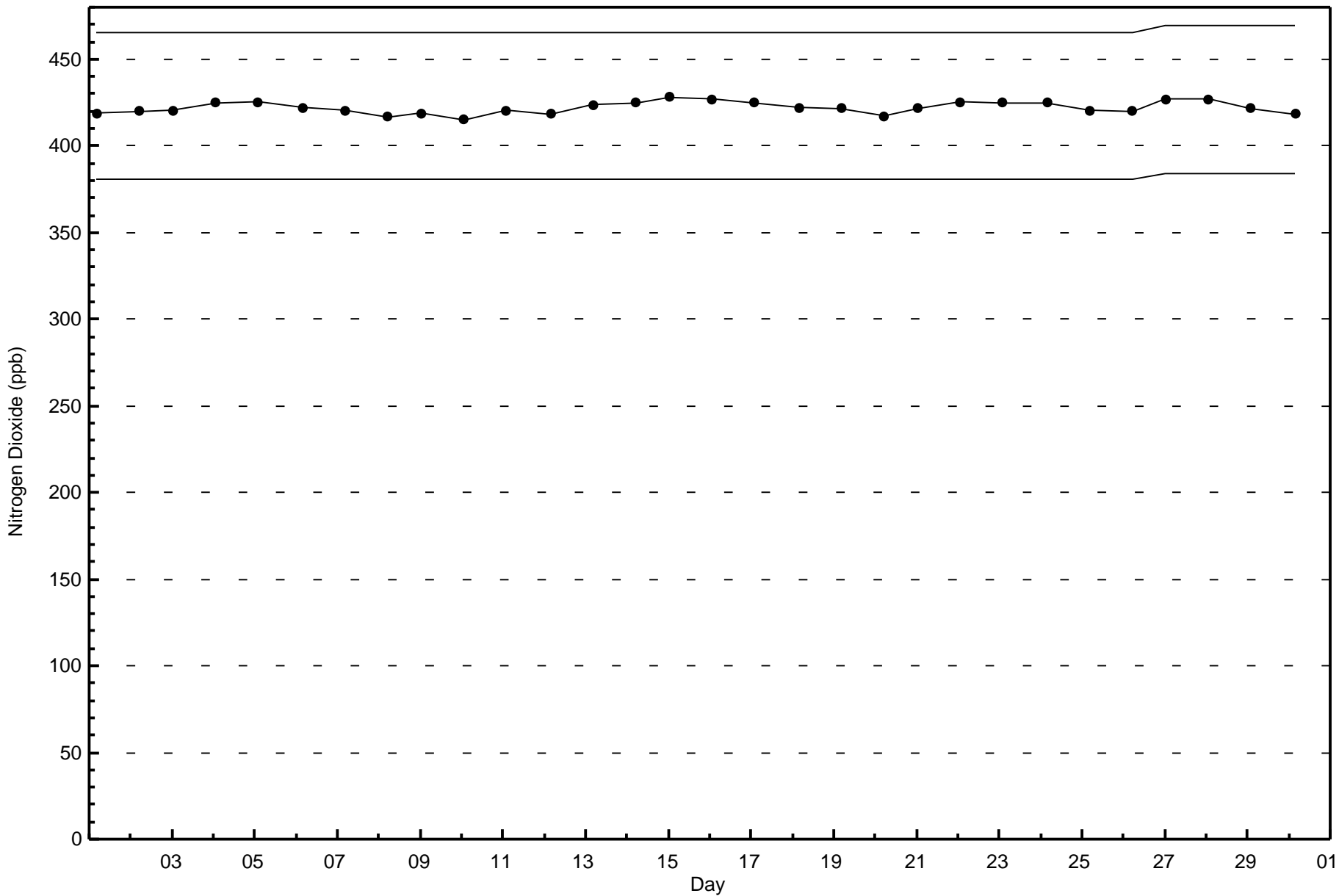


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)









| | | |
|--|---|--------------------------------|
| Maximum Value: 22 ppb on Sep 27 00:00 | Maximum Daily Average: 5.4 ppb on Sep 26 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 14 22:00 | Minimum Daily Average: 0.1 ppb on Sep 21 | Hours of Data: 685 |
| Maximum Diurnal Average: 4.5 ppb at hour 6 | Minimum Diurnal Average: 1.2 ppb at hour 13 | Hours of Missing Data: 35 |
| Monthly Average: 2.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 14 | Hours of Calibration: 34 |
| | | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 5 | 4 | 4 | 5 | Z | 7 | 8 | 4 | 3 | 3 | 4 | 3 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 2.8 | 8 |
| 2-Sep | 4 | 4 | 4 | 4 | 3 | Z | 3 | 5 | 4 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 3 | 2 | 1 | 3 | 4 | 2.5 | 5 |
| 3-Sep | Z | 1 | 1 | 2 | 3 | 3 | 5 | 4 | 4 | 3 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 6 | 4 | 2.2 | 6 |
| 4-Sep | 6 | Z | 2 | 8 | 8 | 7 | 5 | 4 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 5 | 8 | 10 | 13 | 3.8 | 13 |
| 5-Sep | 10 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 2 | 6 | 2 | 3 | 2.5 | 10 |
| 6-Sep | 6 | 7 | 6 | Z | 6 | 11 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 5 | 2.5 | 11 | |
| 7-Sep | 7 | 6 | 2 | 1 | Z | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1.9 | 7 |
| 8-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 4 | 9 | 6 | 6 | 3 | 1 | 1 | 1 | 1 | 1 | 5 | 5 | 1 | 1 | 1 | 1 | 2.6 | 9 |
| 9-Sep | Z | 1 | 1 | 0 | 4 | 4 | 3 | 4 | 1 | 1 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 4 | 8 | 2 | 1.9 | 8 |
| 10-Sep | 1 | Z | 4 | 3 | 3 | 5 | 3 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 6 | 1 | 1 | 2 | 2 | 3 | 2.5 | 6 |
| 11-Sep | 3 | 2 | Z | 5 | 4 | 4 | 9 | 8 | 8 | 6 | 7 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 4 | 3 | 2 | 2 | 3 | 3.4 | 9 |
| 12-Sep | 4 | 5 | 2 | Z | 0 | 1 | 1 | 2 | 3 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 5 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.4 | 1 |
| 14-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0.3 | 3 | |
| 15-Sep | Z | 20 | 16 | 6 | 1 | 11 | 5 | 1 | 3 | 4 | 3 | 2 | 1 | 2 | 5 | 6 | 2 | 2 | 1 | 2 | 2 | 4 | 1 | 1 | 4.3 | 20 |
| 16-Sep | 1 | Z | 1 | 1 | 2 | 3 | 8 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1.7 | 8 |
| 17-Sep | 1 | 2 | Z | 5 | 6 | 8 | M | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 5 | 7 | 4 | 6 | 5 | 3.1 | 8 |
| 18-Sep | 7 | 4 | 3 | Z | 4 | 4 | 5 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 10 | 4 | 3 | 3 | 3 | 2 | 2 | 3.1 | 10 |
| 19-Sep | 3 | 3 | 9 | 11 | Z | 8 | 6 | 2 | 6 | 7 | 8 | 3 | 3 | 5 | 8 | 5 | 5 | 2 | 2 | 3 | 2 | 3 | 10 | 5 | 5.2 | 11 |
| 20-Sep | 0 | 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-Sep | Z | 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-Sep | 2 | Z | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 7 | 6 | 6 | 8 | 5 | 9 | 2.7 | 9 |
| 23-Sep | 10 | 6 | Z | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 11 | 7 | 9 | 8 | 8 | 8 | 3.2 | 11 |
| 24-Sep | 1 | 1 | 1 | Z | 5 | 4 | 3 | 6 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 14 | 10 | 8 | 6 | 5 | 6 | 6 | 3.9 | 14 |
| 25-Sep | 5 | 5 | 2 | 4 | Z | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 4 | 3 | 2 | 1 | 1 | 5 | 2 | 3 | 6 | 9 | 10 | 3.3 | 10 |
| 26-Sep | 8 | 6 | 5 | 6 | 6 | Z | 7 | 5 | 5 | C | C | C | C | 0 | 1 | 1 | 1 | 1 | 1 | 7 | 6 | 4 | 9 | 22 | 5.4 | 22 |
| 27-Sep | Z | 5 | 6 | 10 | 14 | 15 | 14 | 10 | 9 | 4 | 3 | 4 | 7 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 4.9 | 15 |
| 28-Sep | 1 | Z | 3 | 9 | 5 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1.8 | 9 |
| 29-Sep | 1 | 1 | Z | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 14 | 3 | 1 | 2 | 2 | 3 | 2.1 | 14 |
| 30-Sep | 12 | 6 | 7 | Z | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 5 | 8 | 6 | 8 | 3 | 4 | 5 | 3 | 2 | 1 | 4.1 | 12 |

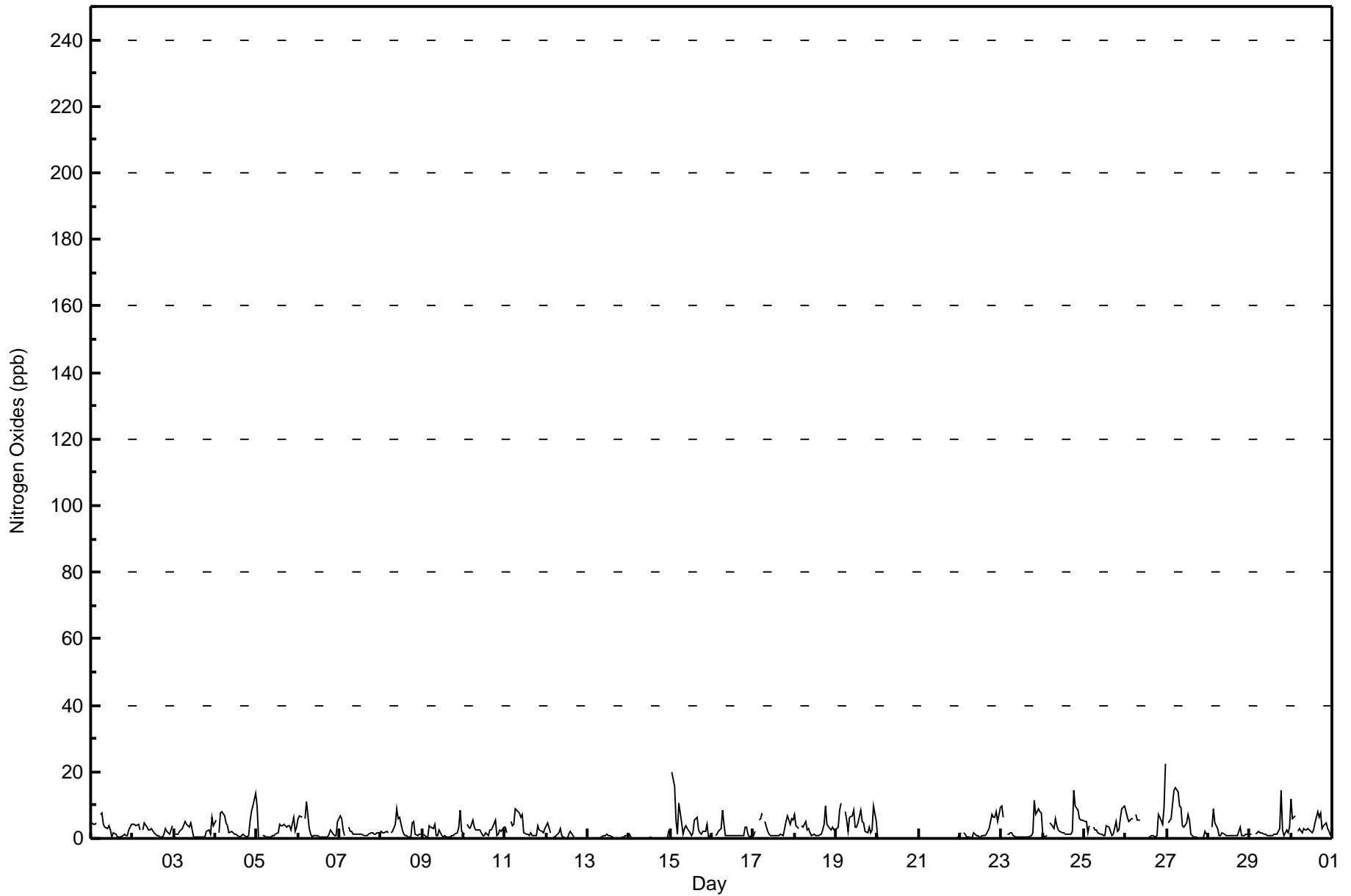
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 4.0 | 3.7 | 3.3 | 3.5 | 3.3 | 4.5 | 3.5 | 2.9 | 2.6 | 2.1 | 2.1 | 1.4 | 1.2 | 1.4 | 1.5 | 1.5 | 1.3 | 1.4 | 2.9 | 2.9 | 2.6 | 2.8 | 3.5 | 4.2 | Diurnal Average | |
| 12 | 20 | 16 | 11 | 14 | 15 | 14 | 10 | 9 | 9 | 8 | 6 | 7 | 5 | 8 | 8 | 6 | 8 | 14 | 11 | 8 | 9 | 10 | 22 | Diurnal Maximum | |

Z - zerospan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Firebag - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 684 | 99.85 | 99.85 |
| 21 - 40 | 1 | 0.15 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 67 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 684 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 42 | 71 | 16 | 9 | 20 | 29 | 31 | 68 | 103 | 67 | 41 | 74 | 45 | 11 | 24 | 34 | 685 |

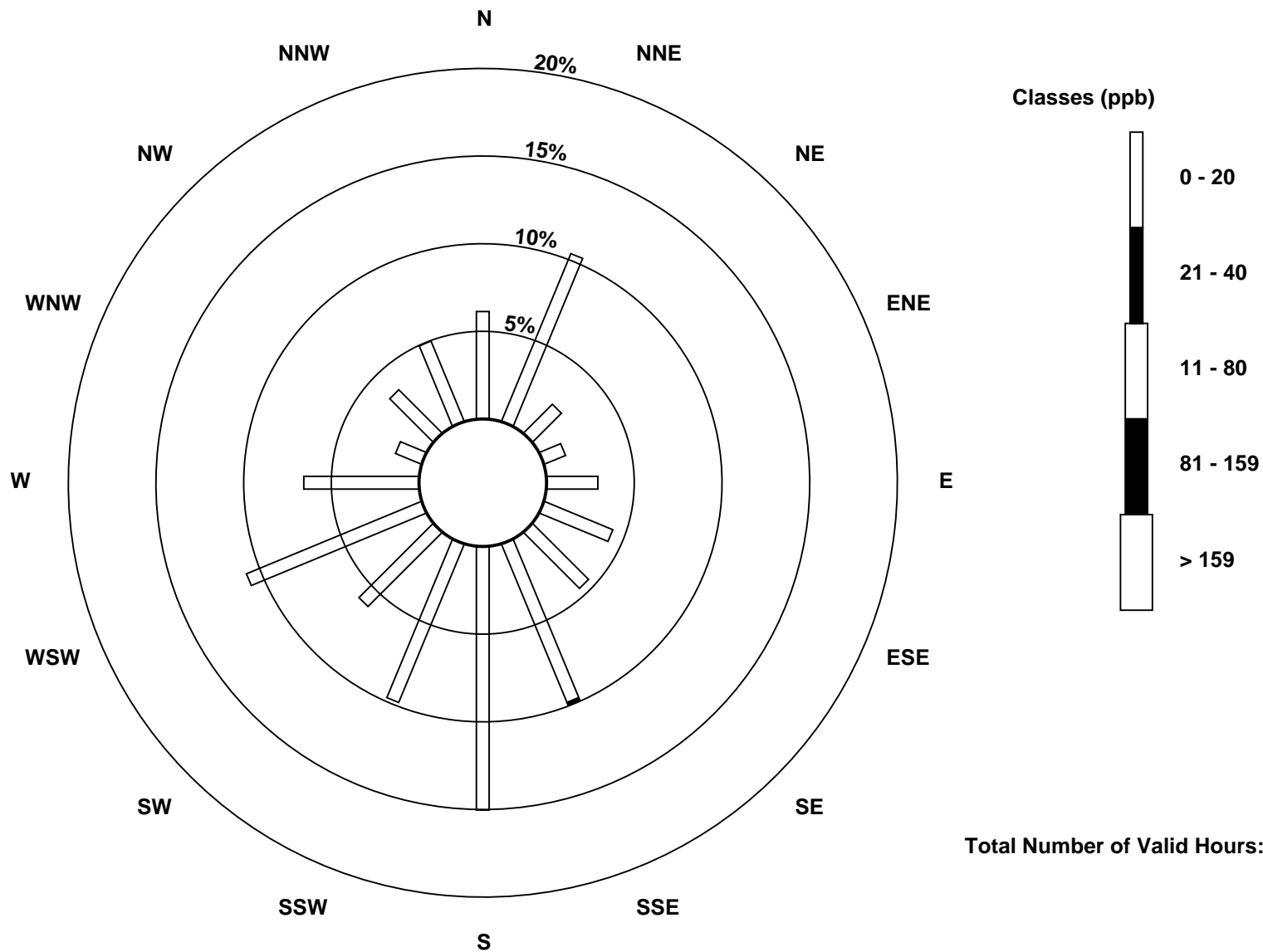
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

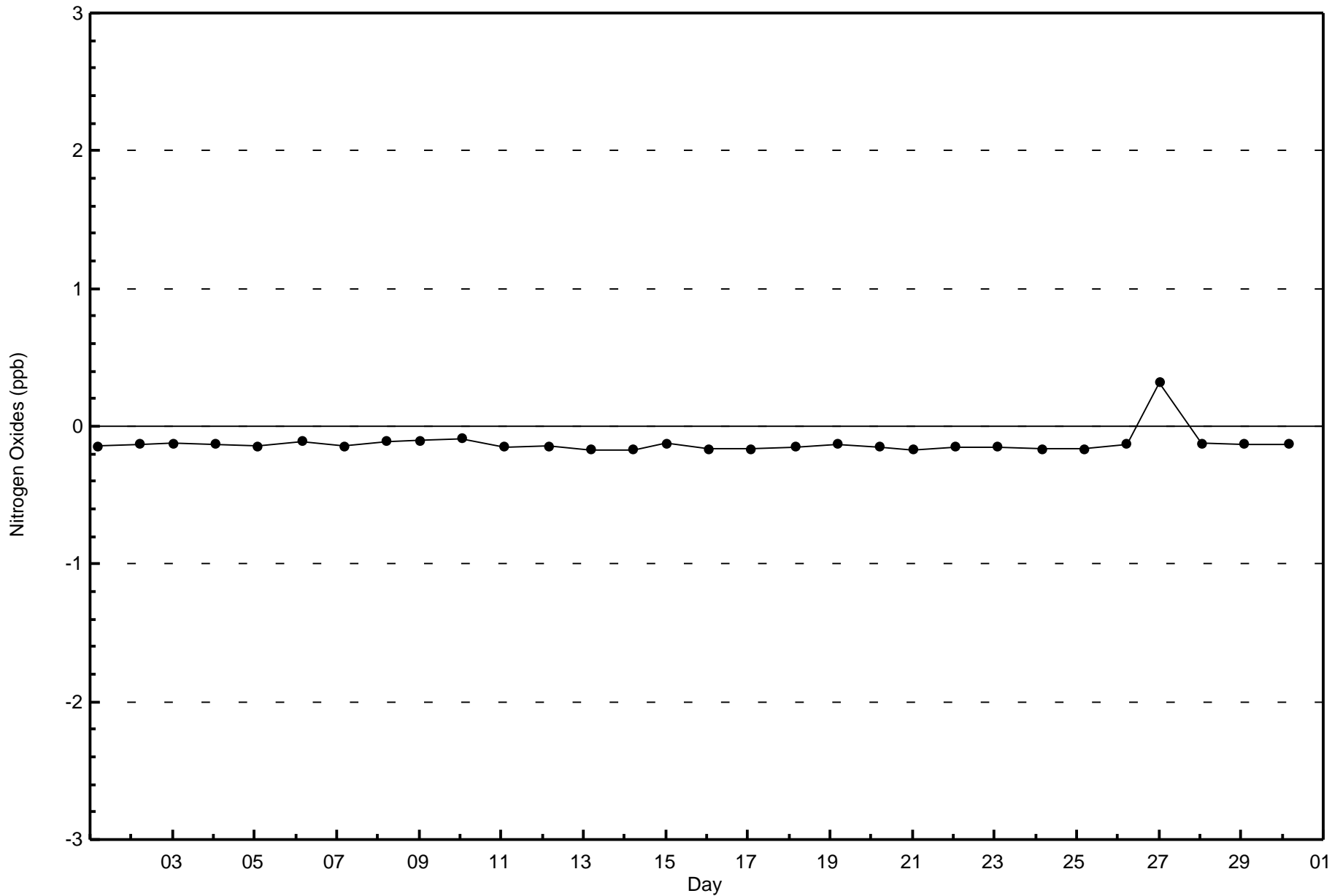
Nitrogen Oxides (NO_x) - ppb
Firebag (AMS 19)

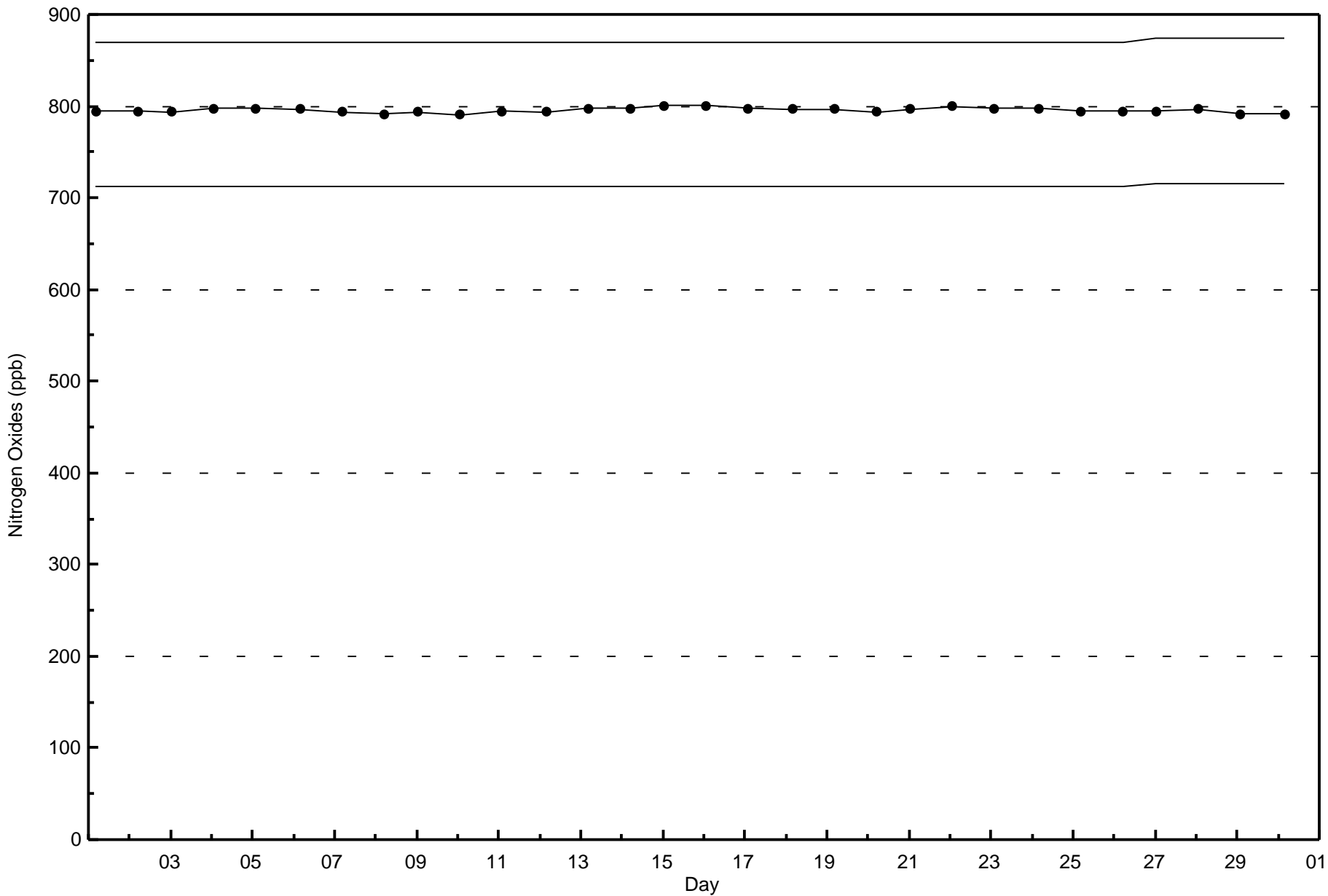




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Firebag - September 2017







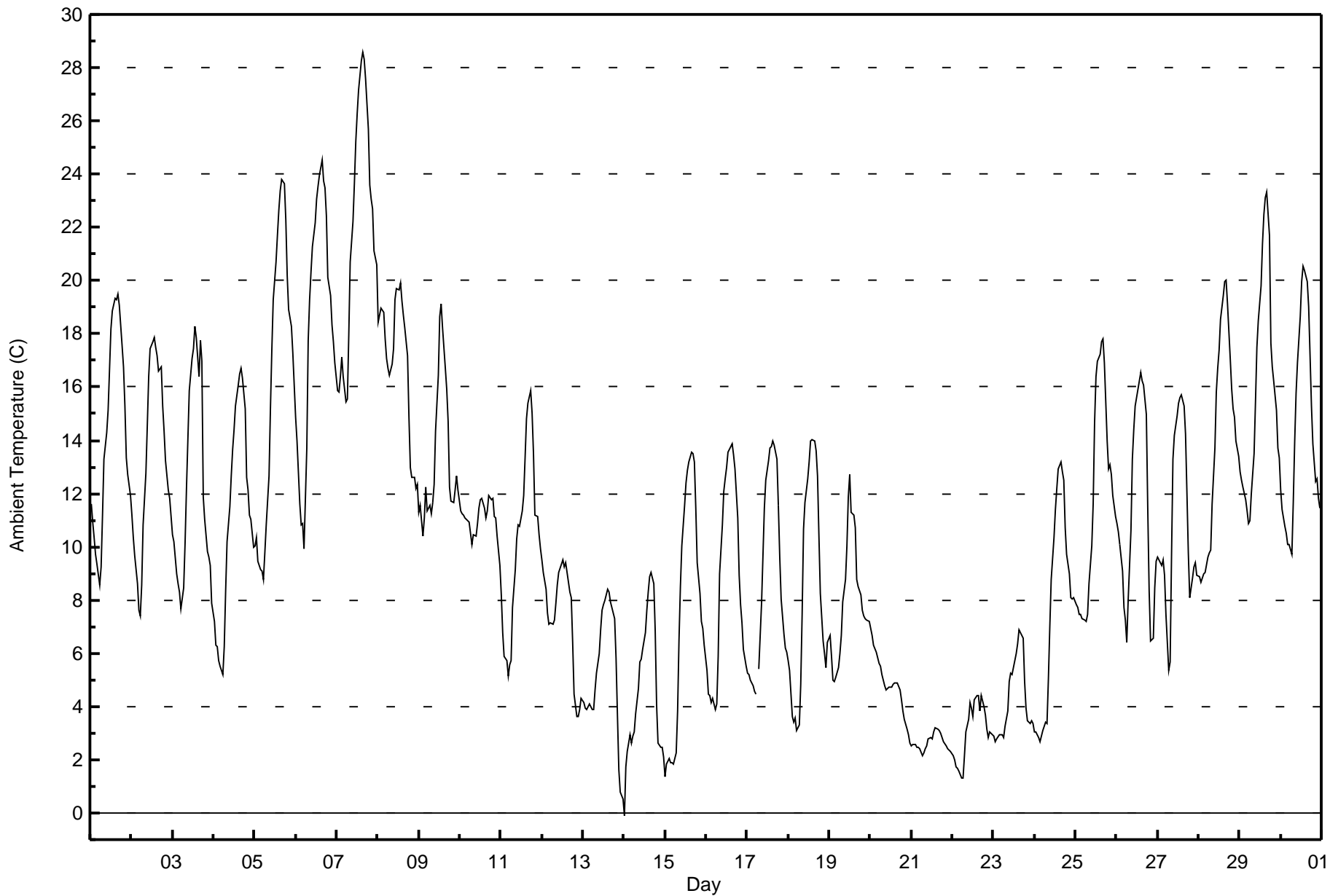
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Firebag - September 2017

| Maximum Value: 28.6 C on Sep 7 16:00 | | Maximum Daily Average: 21.9 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -0.1 C on Sep 14 01:00 | | Minimum Daily Average: 2.6 C on Sep 21 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 14.8 C at hour 16 | | Minimum Diurnal Average: 7.0 C at hour 6 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.63 C | | Percentiles: P ₁ = 1.6 P ₁₀ = 3.1 Q ₁ = 6.0 Median = 10.3 Q ₃ = 14.3 P ₉₀ = 18.5 P ₉₉ = 25.3 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.9 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 11.6 | 11.0 | 10.4 | 9.7 | 9.3 | 8.6 | 9.2 | 11.2 | 13.3 | 14.3 | 15.1 | 16.6 | 18.2 | 18.8 | 19.3 | 19.3 | 19.5 | 19.1 | 17.5 | 16.8 | 15.3 | 13.4 | 12.7 | 11.9 | 14.3 | 19.5 |
| 2-Sep | 11.2 | 10.4 | 9.7 | 8.6 | 7.6 | 7.4 | 8.5 | 10.8 | 12.8 | 14.6 | 16.4 | 17.4 | 17.7 | 17.9 | 17.5 | 17.2 | 16.6 | 16.8 | 15.3 | 14.4 | 13.2 | 12.1 | 11.8 | 11.1 | 13.2 | 17.9 |
| 3-Sep | 10.5 | 10.2 | 9.0 | 8.6 | 8.3 | 7.7 | 8.5 | 10.1 | 12.2 | 14.0 | 15.9 | 17.1 | 17.4 | 18.3 | 17.9 | 16.4 | 17.7 | 17.0 | 11.9 | 11.0 | 9.8 | 9.6 | 9.3 | 7.9 | 12.3 | 18.3 |
| 4-Sep | 7.2 | 6.3 | 6.2 | 5.7 | 5.5 | 5.2 | 6.3 | 8.4 | 10.2 | 11.5 | 12.7 | 13.7 | 14.4 | 15.3 | 16.1 | 16.5 | 16.7 | 16.4 | 15.2 | 12.6 | 12.1 | 11.2 | 11.0 | 10.0 | 11.1 | 16.7 |
| 5-Sep | 10.0 | 10.3 | 9.4 | 9.1 | 9.1 | 8.8 | 9.8 | 10.8 | 12.7 | 15.2 | 17.4 | 19.3 | 20.7 | 21.7 | 22.6 | 23.4 | 23.8 | 23.6 | 22.3 | 20.2 | 18.9 | 18.3 | 17.3 | 16.1 | 16.3 | 23.8 |
| 6-Sep | 14.8 | 14.0 | 11.6 | 10.8 | 10.9 | 9.9 | 13.7 | 17.8 | 19.3 | 20.4 | 21.3 | 22.2 | 23.1 | 23.6 | 24.0 | 24.5 | 23.7 | 23.5 | 22.4 | 20.1 | 19.5 | 18.3 | 17.7 | 16.9 | 18.5 | 24.5 |
| 7-Sep | 15.9 | 15.8 | 16.4 | 17.1 | 16.4 | 15.4 | 15.6 | 18.0 | 20.7 | 22.2 | 23.6 | 25.2 | 26.3 | 27.2 | 28.3 | 28.6 | 28.3 | 27.6 | 25.7 | 23.6 | 23.0 | 22.7 | 21.1 | 20.6 | 21.9 | 28.6 |
| 8-Sep | 18.4 | 18.7 | 19.0 | 18.8 | 17.8 | 17.1 | 16.7 | 16.4 | 16.9 | 17.4 | 19.3 | 19.7 | 19.7 | 19.9 | 19.2 | 18.7 | 18.2 | 17.2 | 14.9 | 13.0 | 12.6 | 12.6 | 12.2 | 12.3 | 16.9 | 19.9 |
| 9-Sep | 11.3 | 11.6 | 10.4 | 11.1 | 12.3 | 11.4 | 11.6 | 11.2 | 11.6 | 12.3 | 14.3 | 16.5 | 18.7 | 19.1 | 18.2 | 16.7 | 15.9 | 14.7 | 12.2 | 11.7 | 11.7 | 12.1 | 12.7 | 12.1 | 13.4 | 19.1 |
| 10-Sep | 11.4 | 11.2 | 11.2 | 11.1 | 11.0 | 10.9 | 10.5 | 10.1 | 10.5 | 10.4 | 10.9 | 11.5 | 11.8 | 11.8 | 11.5 | 11.1 | 11.3 | 11.9 | 11.8 | 11.8 | 11.2 | 11.1 | 10.4 | 9.3 | 11.1 | 11.9 |
| 11-Sep | 8.2 | 6.8 | 5.9 | 5.8 | 5.1 | 5.6 | 5.7 | 7.7 | 9.2 | 10.3 | 10.8 | 10.8 | 11.3 | 11.9 | 13.4 | 14.8 | 15.4 | 15.9 | 15.0 | 13.5 | 11.2 | 11.1 | 10.5 | 9.9 | 10.2 | 15.9 |
| 12-Sep | 9.5 | 9.0 | 8.4 | 7.5 | 7.1 | 7.1 | 7.1 | 7.2 | 7.9 | 8.6 | 9.0 | 9.4 | 9.5 | 9.2 | 9.4 | 8.7 | 8.3 | 8.1 | 6.4 | 4.5 | 3.6 | 3.6 | 3.9 | 4.3 | 7.4 | 9.5 |
| 13-Sep | 4.1 | 3.9 | 3.9 | 4.0 | 4.1 | 3.9 | 3.9 | 4.6 | 5.3 | 6.0 | 6.9 | 7.6 | 7.8 | 8.0 | 8.4 | 8.3 | 8.0 | 7.7 | 7.3 | 5.8 | 3.7 | 1.6 | 0.8 | 0.5 | 5.3 | 8.4 |
| 14-Sep | -0.1 | 1.7 | 2.3 | 2.9 | 2.6 | 2.9 | 3.1 | 3.8 | 4.7 | 5.7 | 5.8 | 6.2 | 6.8 | 7.6 | 8.3 | 8.9 | 9.0 | 8.6 | 6.8 | 4.0 | 2.6 | 2.5 | 2.4 | 2.1 | 4.6 | 9.0 |
| 15-Sep | 1.3 | 1.8 | 2.0 | 1.9 | 1.9 | 1.8 | 2.3 | 3.8 | 6.5 | 8.5 | 10.0 | 11.5 | 12.4 | 12.8 | 13.2 | 13.6 | 13.5 | 13.2 | 11.5 | 9.4 | 8.2 | 7.2 | 6.9 | 6.3 | 7.6 | 13.6 |
| 16-Sep | 5.4 | 4.5 | 4.4 | 4.1 | 4.3 | 3.9 | 4.1 | 5.9 | 9.0 | 10.8 | 12.1 | 12.6 | 13.0 | 13.5 | 13.8 | 13.9 | 13.4 | 12.9 | 11.1 | 8.9 | 7.8 | 7.2 | 6.2 | 5.5 | 8.7 | 13.9 |
| 17-Sep | 5.3 | 5.2 | 5.0 | 4.8 | 4.6 | 4.5 | M | 5.4 | 7.9 | 9.7 | 11.5 | 12.5 | 13.3 | 13.7 | 13.7 | 14.0 | 13.8 | 13.3 | 11.5 | 9.6 | 8.0 | 6.7 | 6.2 | 6.0 | 9.0 | 14.0 |
| 18-Sep | 5.7 | 5.3 | 3.6 | 3.4 | 3.6 | 3.1 | 3.3 | 4.8 | 7.4 | 10.7 | 11.7 | 12.6 | 13.2 | 14.0 | 14.0 | 14.0 | 13.6 | 12.7 | 10.4 | 8.2 | 6.5 | 6.0 | 5.5 | 6.4 | 8.3 | 14.0 |
| 19-Sep | 6.7 | 5.9 | 5.0 | 4.9 | 5.1 | 5.5 | 6.0 | 6.7 | 7.9 | 8.8 | 10.0 | 11.9 | 12.7 | 11.3 | 11.2 | 10.7 | 8.8 | 8.5 | 8.2 | 7.6 | 7.4 | 7.3 | 7.2 | 7.2 | 8.0 | 12.7 |
| 20-Sep | 7.0 | 6.7 | 6.3 | 6.0 | 5.8 | 5.6 | 5.5 | 5.2 | 4.8 | 4.6 | 4.7 | 4.7 | 4.7 | 4.8 | 4.9 | 4.9 | 4.9 | 4.6 | 4.2 | 3.9 | 3.5 | 3.1 | 2.9 | 2.6 | 4.8 | 7.0 |
| 21-Sep | 2.5 | 2.6 | 2.6 | 2.4 | 2.4 | 2.4 | 2.2 | 2.3 | 2.4 | 2.5 | 2.8 | 2.8 | 2.8 | 3.0 | 3.2 | 3.2 | 3.1 | 3.0 | 2.8 | 2.7 | 2.5 | 2.4 | 2.3 | 2.3 | 2.6 | 3.2 |
| 22-Sep | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.3 | 1.3 | 2.2 | 3.1 | 3.5 | 4.1 | 4.0 | 3.6 | 4.3 | 4.4 | 4.4 | 3.8 | 4.4 | 4.0 | 3.7 | 3.1 | 2.8 | 3.1 | 2.9 | 3.0 | 4.4 |
| 23-Sep | 2.9 | 2.7 | 2.8 | 2.9 | 2.9 | 2.9 | 2.9 | 3.2 | 3.8 | 4.9 | 5.2 | 5.2 | 5.7 | 6.0 | 6.4 | 6.9 | 6.8 | 6.6 | 4.9 | 3.9 | 3.5 | 3.4 | 3.4 | 3.4 | 4.3 | 6.9 |
| 24-Sep | 3.1 | 3.0 | 2.8 | 2.7 | 2.9 | 3.1 | 3.4 | 3.4 | 5.0 | 7.0 | 8.8 | 10.3 | 11.4 | 12.2 | 12.9 | 13.2 | 12.8 | 12.5 | 10.7 | 9.7 | 9.0 | 8.1 | 8.0 | 8.1 | 7.7 | 13.2 |
| 25-Sep | 7.8 | 7.7 | 7.5 | 7.5 | 7.3 | 7.3 | 7.2 | 7.5 | 8.6 | 10.0 | 11.6 | 14.6 | 16.4 | 17.0 | 17.2 | 17.7 | 17.8 | 16.9 | 14.0 | 12.9 | 13.1 | 12.7 | 11.9 | 11.1 | 11.8 | 17.8 |
| 26-Sep | 10.9 | 10.6 | 10.1 | 9.1 | 7.7 | 7.2 | 6.4 | 8.0 | 10.6 | 13.3 | 14.4 | 15.3 | 15.9 | 16.2 | 16.5 | 16.2 | 16.1 | 15.0 | 11.4 | 8.4 | 6.5 | 6.6 | 8.5 | 9.5 | 11.3 | 16.5 |
| 27-Sep | 9.6 | 9.5 | 9.3 | 9.5 | 9.0 | 7.5 | 5.4 | 5.7 | 9.7 | 13.3 | 14.2 | 14.9 | 15.4 | 15.6 | 15.7 | 15.3 | 14.2 | 12.0 | 9.8 | 8.1 | 8.8 | 9.3 | 9.4 | 8.9 | 10.8 | 15.7 |
| 28-Sep | 8.9 | 8.7 | 8.8 | 9.0 | 9.1 | 9.6 | 9.8 | 9.9 | 11.6 | 13.7 | 15.8 | 16.7 | 17.4 | 18.5 | 19.5 | 20.0 | 20.0 | 19.1 | 17.0 | 15.9 | 15.2 | 14.9 | 14.0 | 13.4 | 14.0 | 20.0 |
| 29-Sep | 12.8 | 12.5 | 12.2 | 11.8 | 11.3 | 10.9 | 11.0 | 12.0 | 13.5 | 15.4 | 17.5 | 18.5 | 19.8 | 21.4 | 22.5 | 23.1 | 23.3 | 21.7 | 17.7 | 16.8 | 16.3 | 15.1 | 13.7 | 13.3 | 16.0 | 23.3 |
| 30-Sep | 12.1 | 11.4 | 10.8 | 10.5 | 10.1 | 10.1 | 9.7 | 11.6 | 13.9 | 15.8 | 16.9 | 18.7 | 20.0 | 20.5 | 20.4 | 20.0 | 19.0 | 17.2 | 15.3 | 13.9 | 12.4 | 12.5 | 11.8 | 11.5 | 14.4 | 20.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | M - Maintenance | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Firebag - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 1 | 0.14 | 0.14 |
| 0 - 10 | 345 | 47.98 | 48.12 |
| 10 - 20 | 330 | 45.90 | 94.02 |
| > 20 | 43 | 5.98 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

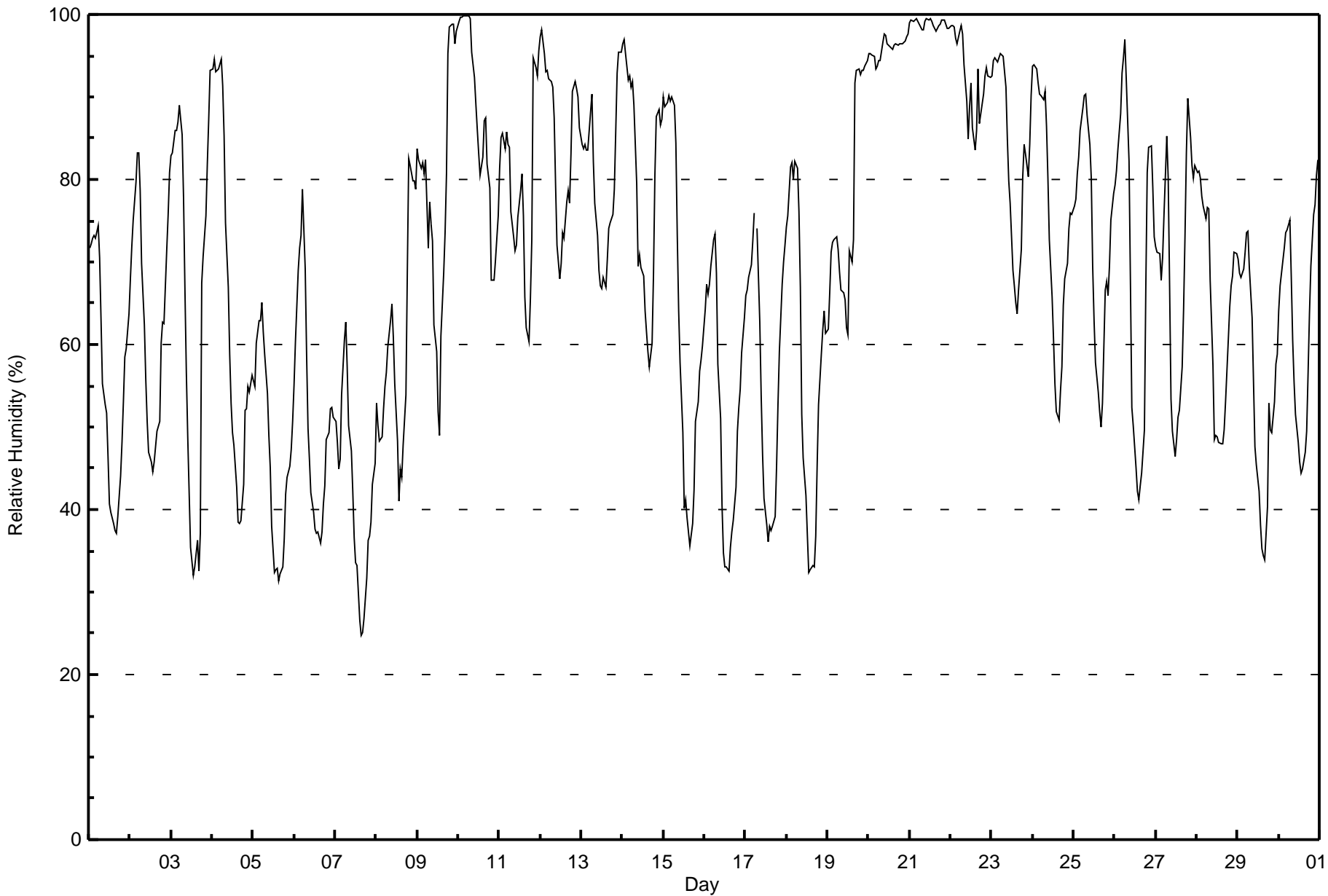
Firebag - September 2017

| Maximum Value: 100 % on Sep 10 06:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 98.9 % on Sep 21 | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|-----|-----|-----|-----|-----|-----|----|----|----|-----|----|-----|----|----|----|----|----|--|----|----|----|----|------|--------------------------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 25 % on Sep 7 16:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 41.8 % on Sep 7 | | | | | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 83.0 % at hour 6 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 53.5 % at hour 15 | | | | | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 69.5 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 32 P ₁₀ = 41 Q ₁ = 53 Median = 71 Q ₃ = 86 P ₉₀ = 95 P ₉₉ = 100 | | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.9 | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 72 | 72 | 73 | 73 | 73 | 74 | 70 | 63 | 55 | 53 | 52 | 46 | 41 | 40 | 38 | 38 | 37 | 39 | 44 | 48 | 53 | 58 | 60 | 64 | 55.7 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 68 | 72 | 75 | 80 | 83 | 83 | 79 | 70 | 62 | 56 | 51 | 47 | 46 | 45 | 46 | 48 | 50 | 51 | 60 | 63 | 63 | 72 | 76 | 81 | 63.4 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 83 | 83 | 86 | 86 | 87 | 89 | 85 | 78 | 67 | 57 | 49 | 35 | 34 | 32 | 33 | 36 | 32 | 37 | 67 | 71 | 76 | 82 | 87 | 93 | 65.2 | 93 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 93 | 95 | 93 | 93 | 93 | 95 | 91 | 85 | 75 | 67 | 59 | 53 | 49 | 48 | 43 | 39 | 38 | 39 | 43 | 52 | 52 | 55 | 54 | 56 | 65.0 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 56 | 55 | 60 | 63 | 63 | 65 | 62 | 59 | 54 | 49 | 45 | 38 | 32 | 33 | 33 | 31 | 32 | 33 | 36 | 42 | 44 | 45 | 47 | 51 | 47.0 | 65 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 55 | 60 | 69 | 72 | 73 | 79 | 69 | 59 | 50 | 46 | 42 | 40 | 38 | 37 | 37 | 36 | 37 | 41 | 43 | 48 | 49 | 52 | 52 | 51 | 51.5 | 79 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 51 | 48 | 45 | 46 | 54 | 60 | 63 | 57 | 50 | 47 | 42 | 37 | 34 | 33 | 27 | 25 | 25 | 27 | 32 | 36 | 37 | 38 | 43 | 46 | 41.8 | 63 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 53 | 50 | 48 | 49 | 52 | 55 | 57 | 60 | 63 | 65 | 61 | 55 | 48 | 41 | 45 | 44 | 48 | 54 | 69 | 83 | 82 | 80 | 80 | 79 | 59.1 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 84 | 82 | 81 | 82 | 81 | 82 | 72 | 77 | 75 | 73 | 62 | 59 | 52 | 49 | 61 | 69 | 74 | 81 | 95 | 98 | 99 | 99 | 96 | 98 | 78.4 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 99 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 96 | 92 | 89 | 86 | 83 | 80 | 83 | 87 | 87 | 82 | 79 | 68 | 68 | 68 | 70 | 76 | 87.1 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 81 | 85 | 86 | 84 | 86 | 84 | 84 | 76 | 73 | 71 | 72 | 75 | 79 | 81 | 76 | 66 | 62 | 60 | 66 | 73 | 95 | 94 | 93 | 96 | 79.0 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 97 | 98 | 95 | 93 | 93 | 92 | 92 | 91 | 87 | 79 | 72 | 68 | 70 | 73 | 73 | 77 | 79 | 77 | 83 | 91 | 92 | 91 | 90 | 86 | 85.1 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 84 | 84 | 84 | 84 | 84 | 88 | 90 | 82 | 77 | 73 | 69 | 67 | 67 | 68 | 67 | 70 | 74 | 75 | 76 | 79 | 86 | 93 | 95 | 95 | 79.6 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 96 | 97 | 95 | 92 | 92 | 91 | 92 | 89 | 80 | 70 | 71 | 69 | 68 | 64 | 62 | 59 | 57 | 60 | 68 | 81 | 88 | 89 | 87 | 87 | 79.3 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 90 | 89 | 89 | 90 | 89 | 90 | 89 | 84 | 73 | 64 | 58 | 49 | 40 | 41 | 39 | 36 | 37 | 38 | 42 | 51 | 53 | 57 | 58 | 60 | 62.8 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 64 | 67 | 66 | 67 | 70 | 73 | 73 | 69 | 58 | 51 | 40 | 35 | 33 | 33 | 33 | 35 | 37 | 39 | 43 | 49 | 52 | 55 | 59 | 63 | 52.7 | 73 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 66 | 67 | 68 | 70 | 73 | 76 | M | 74 | 63 | 54 | 47 | 41 | 38 | 36 | 38 | 37 | 38 | 39 | 45 | 53 | 59 | 67 | 70 | 72 | 56.1 | 76 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 74 | 76 | 82 | 82 | 80 | 82 | 81 | 76 | 67 | 51 | 46 | 42 | 37 | 32 | 33 | 33 | 33 | 37 | 45 | 53 | 59 | 62 | 64 | 61 | 57.9 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 62 | 66 | 71 | 72 | 73 | 73 | 72 | 69 | 67 | 66 | 65 | 62 | 61 | 71 | 70 | 73 | 92 | 93 | 93 | 93 | 93 | 93 | 94 | 94 | 76.6 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 95 | 95 | 95 | 95 | 93 | 94 | 94 | 94 | 97 | 98 | 97 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 97 | 97 | 98 | 95.9 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 99 | 99 | 99 | 99 | 100 | 99 | 98 | 98 | 98 | 99 | 100 | 99 | 100 | 99 | 99 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 98 | 98 | 98.9 | 100 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 99 | 99 | 98 | 97 | 97 | 98 | 99 | 98 | 94 | 89 | 85 | 89 | 92 | 86 | 84 | 86 | 93 | 87 | 89 | 90 | 93 | 94 | 93 | 92 | 92.5 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 93 | 94 | 95 | 94 | 95 | 95 | 95 | 95 | 91 | 85 | 80 | 77 | 69 | 67 | 65 | 64 | 67 | 72 | 80 | 84 | 83 | 80 | 84 | 90 | 83.1 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 94 | 94 | 93 | 92 | 90 | 90 | 90 | 91 | 86 | 80 | 73 | 66 | 61 | 55 | 52 | 51 | 54 | 57 | 65 | 68 | 70 | 74 | 76 | 76 | 74.9 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 77 | 78 | 81 | 83 | 86 | 89 | 90 | 90 | 88 | 84 | 80 | 69 | 63 | 58 | 54 | 52 | 50 | 53 | 67 | 68 | 66 | 69 | 75 | 78 | 72.8 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 79 | 81 | 84 | 88 | 93 | 95 | 97 | 92 | 82 | 68 | 52 | 50 | 45 | 42 | 41 | 43 | 44 | 50 | 67 | 81 | 84 | 84 | 79 | 73 | 70.6 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 72 | 71 | 71 | 68 | 71 | 76 | 85 | 80 | 67 | 53 | 49 | 46 | 49 | 51 | 52 | 57 | 64 | 73 | 83 | 90 | 85 | 82 | 80 | 82 | 69.1 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 81 | 81 | 80 | 78 | 77 | 75 | 77 | 76 | 68 | 57 | 48 | 49 | 49 | 48 | 48 | 48 | 50 | 53 | 61 | 65 | 67 | 68 | 71 | 71 | 64.4 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 70 | 69 | 68 | 69 | 71 | 73 | 74 | 69 | 63 | 56 | 48 | 45 | 42 | 38 | 35 | 34 | 34 | 40 | 53 | 50 | 49 | 53 | 58 | 59 | 55.1 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 64 | 67 | 70 | 72 | 74 | 74 | 75 | 68 | 61 | 55 | 52 | 48 | 46 | 44 | 45 | 47 | 50 | 56 | 64 | 69 | 76 | 77 | 80 | 82 | 63.2 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 78.4 | 79.1 | 80.1 | 80.4 | 81.5 | 83.0 | 82.6 | 79.0 | 72.8 | 67.0 | 61.9 | 58.1 | 55.3 | 54.1 | 53.5 | 53.8 | 55.7 | 57.9 | 65.1 | 69.7 | 72.2 | 74.2 | 75.6 | 77.0 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 99 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 98 | 99 | 100 | 99 | 100 | 99 | 99 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 98 | 98 | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Firebag - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Firebag - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 67 | 9.32 | 9.32 |
| 40 - 60 | 170 | 23.64 | 32.96 |
| 60 - 80 | 224 | 31.15 | 64.12 |
| 80 - 100 | 258 | 35.88 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720

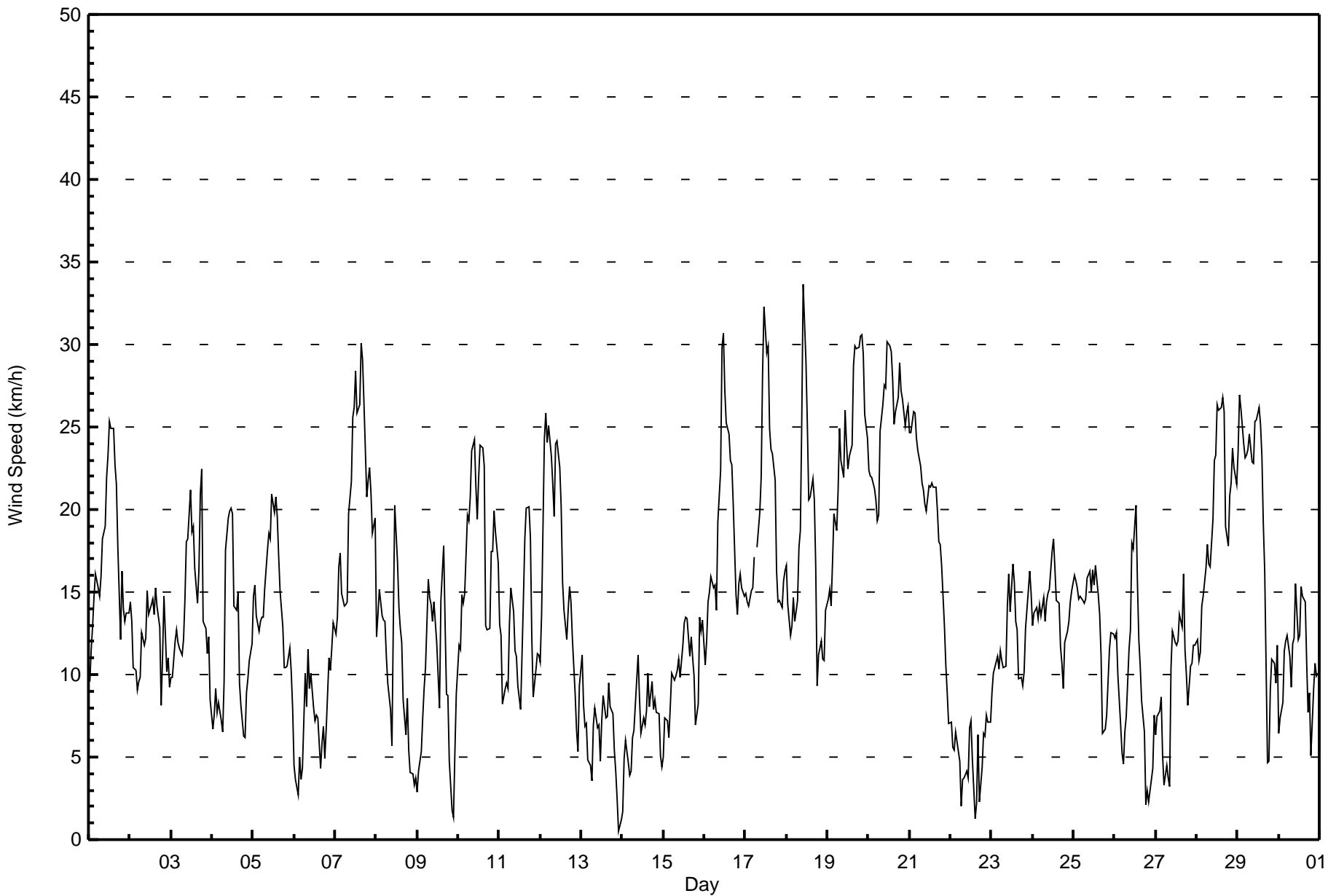


| | | |
|---|--|--------------------------------|
| Maximum Speed: 34 km/h on Sep 18 11:00 | Maximum Daily Speed Average: 25.0 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 13 23:00 | Minimum Daily Speed Average: 0.7 km/h on Sep 22 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 6.0 km/h at hour 6 | Minimum Diurnal Speed Average: 1.5 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 3.9 km/h 198.9 deg | Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 13 Q ₃ = 19 P ₉₀ = 24 P ₉₉ = 30 | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | WSW10 | WSW12 | SW13 | SW15 | SW16 | SW15 | WSW16 | WSW18 | WSW19 | WSW22 | WSW23 | W25 | WSW25 | WSW25 | W23 | W21 | W18 | W12 | W16 | W14 | WSW13 | WSW14 | WSW14 | WSW16.7 | W25 | |
| 2-Sep | WSW14 | WSW13 | WSW10 | WSW10 | WSW9 | WSW10 | WSW10 | WSW13 | W12 | WNW12 | WNW15 | WNW14 | W14 | W15 | W14 | WSW15 | WSW14 | W13 | W8 | W11 | W15 | WSW10 | WSW11 | WSW9 | W11.8 | WSW15 |
| 3-Sep | W10 | W10 | W12 | WSW13 | WSW12 | WSW12 | WSW11 | WSW12 | W15 | W18 | WNW18 | NW21 | NW19 | NW19 | NW16 | NW14 | NW16 | NNW21 | NNW22 | NNW13 | NNW13 | NNW11 | NNW12 | NNW8 | NNW12.2 | NNW20 |
| 4-Sep | NNW7 | W8 | W9 | W8 | W8 | WNW7 | W7 | WNW10 | NW18 | NW19 | NW20 | NNW20 | NNW20 | NNW14 | NW14 | NNW15 | NNW9 | NNE8 | NE6 | E6 | SE9 | SE10 | SE11 | SSE12 | NW6.5 | NNW20 |
| 5-Sep | S15 | S15 | S14 | SSW13 | SSW13 | SSW13 | SSW13 | SSW15 | SW18 | SW19 | SW18 | SW21 | WSW20 | WSW21 | WSW20 | WSW17 | WSW15 | WSW13 | SW10 | SSW10 | SSW10 | SSW12 | SW10 | SW8 | SW13.5 | SW21 |
| 6-Sep | SW5 | WSW4 | W3 | N5 | N4 | N4 | NNE10 | NE8 | NE11 | NNE9 | NNE10 | NNE8 | NNW7 | N8 | N7 | NNE4 | NE6 | NNE7 | E5 | ESE7 | ESE11 | SE10 | SE12 | SE13 | NE3.9 | SE13 |
| 7-Sep | SSE12 | SSE14 | SSE17 | S17 | S15 | S14 | S14 | S14 | SSW20 | SSW22 | SSW26 | SSW26 | SSW28 | SSW26 | SSW30 | SSW29 | SSW26 | S21 | S22 | SSW23 | SSW21 | SSW19 | SSW20 | S20.3 | SSW30 | |
| 8-Sep | S12 | SSW14 | SSW15 | SSW14 | SSW13 | SSW13 | SSW11 | SW9 | WSW8 | W6 | NNW13 | N20 | NNE17 | NNE14 | N13 | N12 | N8 | NNW6 | N9 | NNE5 | NE4 | E4 | ESE3 | SE4 | WNW1.8 | N20 |
| 9-Sep | SE3 | E4 | ENE5 | ENE7 | SE9 | ESE10 | ESE16 | ESE15 | ESE14 | ESE13 | ESE14 | ESE12 | ESE10 | ESE8 | NNE14 | NNE18 | NNE13 | NW9 | NW9 | NW5 | NNW2 | SE1 | S5 | WSW9 | E5.2 | NNE18 |
| 10-Sep | WSW12 | W12 | WSW15 | WSW14 | WSW15 | WSW20 | WSW19 | W21 | WSW24 | WSW24 | WSW21 | WSW19 | WSW22 | W24 | W24 | WNW23 | W13 | W13 | W13 | W17 | W17 | W20 | W19 | W17 | W17.9 | WSW24 |
| 11-Sep | W13 | WSW12 | WSW8 | WSW9 | SW9 | SW9 | SW13 | SW15 | WSW14 | WSW11 | SSW11 | S9 | SSE8 | ESE11 | SE15 | SSE18 | S20 | S20 | S18 | S12 | WNW9 | SW10 | WSW11 | WSW11 | SSW9.2 | S20 |
| 12-Sep | SW11 | WSW14 | W24 | W26 | W24 | WSW25 | W23 | W22 | WNW20 | NW24 | NW24 | NW23 | NW20 | NW16 | NNW14 | N12 | N14 | N15 | NNE14 | NNE12 | NNE9 | NNE7 | NNE5 | N9 | WNW12.4 | W26 |
| 13-Sep | NNE11 | NNE8 | NNE7 | N7 | N5 | N5 | N4 | N7 | NW8 | N7 | NNE7 | N5 | N7 | N9 | NNW7 | NNE7 | N9 | NNE8 | N8 | NNE5 | ENE4 | E2 | W1 | SSW1 | N5.7 | NNE11 |
| 14-Sep | N2 | NE5 | NE6 | NE5 | N4 | N4 | N6 | NNE7 | NNE10 | NE11 | NNE9 | NNE6 | NNE7 | N7 | NNE8 | NNE10 | NNE8 | NNE10 | NNE8 | NNE8 | NE8 | NE8 | E5 | ESE4 | NNE6.4 | NE11 |
| 15-Sep | ESE5 | SSE7 | SSE7 | S6 | S8 | S10 | SSE10 | S10 | SSW10 | SSW11 | SSW10 | SSW12 | W13 | WSW13 | WSW13 | WSW11 | SW12 | SW11 | SSW10 | S7 | S8 | SSE13 | S13 | SSW13 | SSW8.3 | WSW13 |
| 16-Sep | S11 | S12 | S14 | S15 | S16 | S15 | S15 | S14 | SSW19 | SSW22 | SSW30 | SSW31 | S27 | SSW25 | SSW25 | S23 | S23 | S20 | S15 | SSE14 | SSE15 | S16 | S15 | S15 | S18.3 | SSW31 |
| 17-Sep | S15 | S14 | SSE14 | SSE15 | SSE15 | SSE17 | M | SSE18 | S20 | S22 | S28 | S32 | S29 | S30 | S25 | S24 | SSE23 | S22 | SSE16 | SSE14 | SE15 | SE14 | SSE16 | SSE16 | S19.3 | S32 |
| 18-Sep | SSE17 | SSE14 | SE12 | SE13 | SE15 | SE13 | SE15 | SE18 | SSE19 | SSE25 | S34 | SSE29 | SSE25 | SE21 | SE21 | SE22 | SE21 | SSE17 | SE9 | ESE11 | SE12 | ESE11 | ESE11 | ESE14 | SE16.7 | S34 |
| 19-Sep | ESE15 | ESE15 | E14 | E17 | E20 | E19 | ESE21 | ESE25 | ESE23 | ESE22 | E26 | ESE24 | ESE22 | E23 | E24 | E29 | E30 | E30 | E30 | E31 | E31 | E29 | E26 | ENE24 | E23.5 | E31 |
| 20-Sep | ENE22 | ENE22 | NE22 | NE21 | NNE21 | NNE19 | NNE20 | NNE25 | NNE26 | NNE28 | NNE27 | NNE30 | NE30 | NNE30 | NE28 | NNE25 | NNE26 | NNE27 | NNE29 | NNE27 | NNE27 | NNE25 | NNE26 | NNE26 | NNE25.0 | NNE30 |
| 21-Sep | NNE25 | NNE25 | NNE26 | NNE26 | NNE24 | NNE24 | NNE23 | NNE22 | NNE21 | NNE20 | NNE20 | N21 | N21 | N22 | N21 | N21 | N20 | N18 | N18 | N17 | N13 | NNW11 | NNW9 | NNW7 | N19.4 | NNE26 |
| 22-Sep | NNW7 | NNW6 | NNW5 | N7 | NNE6 | NE5 | NNW2 | WSW4 | WSW4 | WSW4 | SW4 | NNW7 | NW7 | NW5 | N1 | SSE2 | WSW6 | SW2 | SSE4 | SE6 | SSE6 | SE8 | SE7 | SSE7 | WNW0.7 | SE8 |
| 23-Sep | SSE9 | SSE10 | SSE10 | SSE11 | S10 | S11 | S11 | S10 | S11 | S14 | SSW16 | SSW14 | SSW17 | SW16 | SSW13 | SSW13 | SW10 | S10 | S9 | SSE10 | SSE13 | SSE15 | SSE16 | SSE15 | S11.5 | SSW17 |
| 24-Sep | S13 | S14 | S14 | SSE13 | SSE14 | SSE14 | SSE15 | SSE13 | SSE14 | SSE15 | S15 | S17 | S18 | SSW16 | SSW15 | SSW14 | SSW12 | S11 | SE9 | SE12 | SSE13 | SSE13 | SSE14 | SSE15 | S13.4 | S18 |
| 25-Sep | SSE16 | SSE16 | S15 | SSE15 | S15 | S15 | S14 | S15 | S16 | SSW16 | SSW15 | SSW16 | SW15 | WSW17 | W15 | W14 | W11 | SW6 | S7 | S8 | SSW10 | SSW12 | SW13 | SW12 | SSW11.2 | WSW17 |
| 26-Sep | SW12 | SSW13 | SW10 | WSW7 | WSW5 | SSW5 | SW7 | SW7 | WSW12 | WNW13 | NW18 | WNW18 | NW20 | NNW16 | NW12 | NNW10 | NNW8 | N6 | ENE2 | SSE3 | SSE2 | ESE4 | SSE4 | SSE8 | W4.8 | NW20 |
| 27-Sep | SSE6 | S7 | SSW8 | SSW9 | S5 | S3 | SW4 | WNW4 | NNW3 | NNE10 | NNE13 | N12 | N12 | N12 | N14 | NNE13 | NNE16 | NNE12 | NNE10 | NE8 | ENE10 | ENE11 | ESE12 | ESE12 | NNE4.4 | NNE16 |
| 28-Sep | SE12 | SE11 | SE11 | SE14 | SSE15 | SSE16 | S18 | S17 | SSE17 | S19 | S23 | S23 | S26 | S26 | S26 | S27 | S26 | S19 | SSE18 | S21 | S22 | S24 | S23 | S21 | S19.1 | S27 |
| 29-Sep | S24 | S27 | S26 | S24 | S23 | S23 | S24 | S25 | S23 | S23 | SSW25 | SSW25 | SSW26 | SSW25 | SSW23 | SSW19 | SSW16 | SW5 | SSE5 | S9 | SSW11 | S11 | S9 | SSE12 | S18.9 | S27 |
| 30-Sep | SSE6 | SSE7 | SSE8 | S11 | S12 | S12 | S11 | SSW9 | SW12 | SSW12 | SW15 | SW12 | SW12 | WSW15 | WSW15 | WSW14 | WSW11 | SW8 | SW9 | WSW5 | NNW9 | NNW11 | NW10 | NW10 | SW7.4 | SW15 |
| S4.8 S5.2 S4.9 S4.8 S5.5 S6.0 S5.5 SSW5.4 SSW5.3 SWS5.4 SWS5.8 SWS5.5 SWS5.4 SWS4.9 SWS4.3 SWS3.0 SW2.6 SSW1.5 SE1.5 SE2.8 SSE2.9 SSE4.3 S4.7 S4.7 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| NNE25 S27 S26 NNE26 NNE24 WSW25 S24 ESE25 NNE26 NNE28 S34 S32 NNE30 S30 NE28 SSW30 E30 E30 E30 E31 E31 E29 NNE26 NNE26 | | | | | | | | | | | | | | | | | | | | | | | | 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
Firebag - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 65 | 9.04 | 9.04 |
| 6 - 11 | 205 | 28.51 | 37.55 |
| 12 - 19 | 279 | 38.80 | 76.36 |
| 20 - 28 | 150 | 20.86 | 97.22 |
| 29 - 38 | 20 | 2.78 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 10 | 4 | 4 | 3 | 5 | 4 | 3 | 6 | 3 | 2 | 5 | 6 | 2 | 1 | 2 | 5 | 65 |
| 6 - 11 | 15 | 28 | 9 | 3 | 1 | 9 | 12 | 17 | 23 | 12 | 17 | 21 | 11 | 3 | 6 | 18 | 205 |
| 12 - 19 | 13 | 12 | 0 | 0 | 3 | 11 | 15 | 45 | 43 | 32 | 19 | 36 | 24 | 7 | 11 | 8 | 279 |
| 20 - 28 | 7 | 25 | 3 | 3 | 5 | 6 | 4 | 3 | 36 | 19 | 1 | 13 | 12 | 2 | 7 | 4 | 150 |
| 29 - 38 | 0 | 4 | 0 | 0 | 7 | 0 | 0 | 1 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 45 | 73 | 16 | 9 | 21 | 30 | 34 | 72 | 109 | 69 | 42 | 76 | 49 | 13 | 26 | 35 | 719 |

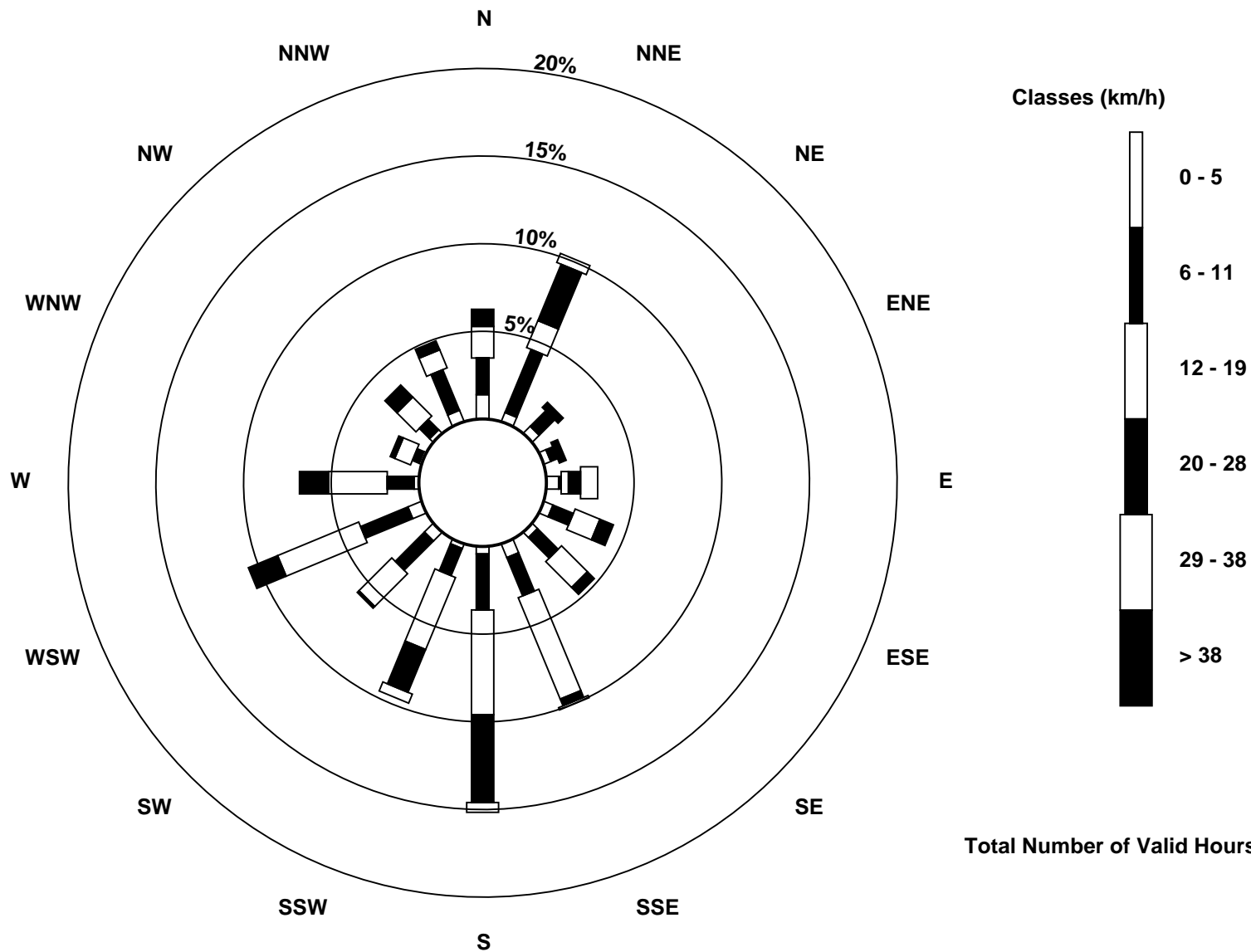
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Firebag (AMS 19)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - September 2017

| | |
|--|--|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Sep 11 21:00 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9 |
| Minimum Value: 0 km/h on Sep 14 21:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 4 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-Sep | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 4 | 5 | 6 | 6 | 5 | 6 | 6 | 4 | 3 | 4 | 2 | 2 | 2 | 2 | 6 |
| 2-Sep | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 1 | 2 | 4 | 1 | 2 | 1 | 4 |
| 3-Sep | 1 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | 5 | 7 | 7 | 3 | 3 | 2 | 3 | 2 | 7 |
| 4-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 5 |
| 5-Sep | 3 | 2 | 2 | 2 | 1 | 1 | 3 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 6-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 3 |
| 7-Sep | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 2 | 5 |
| 8-Sep | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 4 | 5 | 4 | 4 | 5 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 5 |
| 9-Sep | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 4 |
| 10-Sep | 2 | 2 | 4 | 3 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 5 | 6 | 5 | 7 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 7 |
| 11-Sep | 2 | 2 | 1 | 3 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 7 | 8 | 2 | 1 | 2 | 8 |
| 12-Sep | 2 | 5 | 6 | 6 | 4 | 5 | 5 | 5 | 5 | 6 | 6 | 5 | 5 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 1 | 1 | 2 | 6 |
| 13-Sep | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 4 |
| 14-Sep | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 1 | 1 | 0 | 1 | 1 | 2 | 4 |
| 15-Sep | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 4 |
| 16-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 5 |
| 17-Sep | 2 | 2 | 2 | 2 | 2 | 2 | M | 2 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 2 | 3 | 2 | 2 | 2 | 5 |
| 18-Sep | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 6 | 6 | 5 | 6 | 5 | 5 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 6 |
| 19-Sep | 3 | 3 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 6 | 6 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 7 |
| 20-Sep | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 5 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 |
| 21-Sep | 5 | 5 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 6 |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 23-Sep | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 3 |
| 24-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 5 | 4 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 5 |
| 25-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 2 | 1 | 0 | 1 | 2 | 2 | 2 | 4 |
| 26-Sep | 1 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 5 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 5 |
| 27-Sep | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 1 | 1 | 1 | 2 | 2 | 2 | 4 |
| 28-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 5 |
| 29-Sep | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 5 |
| 30-Sep | 3 | 4 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 4 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| 5 | 5 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 8 | 6 | 6 | 6 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Firebag - September 2017

| | |
|---|---|
| Direction of Maximum Speed: 172 deg on Sep 18 11:00 Direction of Maximum Daily Speed Average: 32.9 deg on Sep 20 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 |
| Direction of Minimum Speed: 268 deg on Sep 13 23:00 Direction of Minimum Daily Speed Average: 0.7 deg on Sep 22 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 231.2 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-Sep | 244 | 240 | 229 | 219 | 225 | 225 | 227 | 240 | 245 | 252 | 249 | 257 | 268 | 256 | 256 | 266 | 265 | 266 | 271 | 261 | 264 | 252 | 257 | 251 | 251.1 |
| 2-Sep | 252 | 255 | 257 | 253 | 248 | 239 | 244 | 258 | 274 | 282 | 284 | 297 | 261 | 265 | 261 | 253 | 255 | 264 | 261 | 261 | 271 | 242 | 247 | 254 | 261.0 |
| 3-Sep | 260 | 272 | 259 | 258 | 249 | 242 | 244 | 256 | 268 | 273 | 292 | 309 | 320 | 311 | 318 | 323 | 314 | 343 | 348 | 329 | 334 | 331 | 330 | 329 | 301.2 |
| 4-Sep | 329 | 279 | 272 | 281 | 279 | 284 | 276 | 293 | 325 | 326 | 324 | 328 | 334 | 328 | 322 | 338 | 331 | 25 | 49 | 92 | 131 | 141 | 146 | 149 | 321.3 |
| 5-Sep | 169 | 178 | 178 | 196 | 200 | 198 | 206 | 204 | 219 | 214 | 220 | 233 | 242 | 242 | 249 | 256 | 248 | 238 | 221 | 212 | 213 | 211 | 221 | 225 | 218.6 |
| 6-Sep | 229 | 240 | 279 | 351 | 353 | 2 | 18 | 35 | 36 | 30 | 20 | 15 | 342 | 5 | 7 | 18 | 42 | 32 | 82 | 103 | 122 | 131 | 131 | 142 | 46.9 |
| 7-Sep | 150 | 158 | 168 | 174 | 173 | 176 | 174 | 183 | 195 | 207 | 200 | 205 | 198 | 203 | 207 | 200 | 194 | 192 | 185 | 187 | 194 | 198 | 192 | 195 | 191.0 |
| 8-Sep | 181 | 212 | 212 | 211 | 199 | 205 | 197 | 216 | 250 | 274 | 344 | 357 | 12 | 15 | 357 | 11 | 6 | 333 | 349 | 27 | 41 | 91 | 122 | 126 | 297.5 |
| 9-Sep | 125 | 80 | 69 | 78 | 125 | 112 | 112 | 113 | 114 | 118 | 113 | 123 | 118 | 107 | 25 | 23 | 24 | 318 | 325 | 321 | 329 | 143 | 179 | 242 | 89.9 |
| 10-Sep | 258 | 259 | 257 | 252 | 253 | 240 | 253 | 261 | 251 | 250 | 257 | 256 | 258 | 272 | 271 | 286 | 281 | 263 | 266 | 263 | 261 | 269 | 272 | 274 | 261.8 |
| 11-Sep | 265 | 252 | 246 | 240 | 232 | 214 | 222 | 231 | 240 | 239 | 212 | 183 | 150 | 111 | 133 | 167 | 170 | 180 | 172 | 172 | 292 | 229 | 244 | 256 | 207.3 |
| 12-Sep | 232 | 241 | 264 | 269 | 259 | 257 | 266 | 277 | 293 | 310 | 315 | 318 | 311 | 324 | 330 | 355 | 358 | 1 | 12 | 21 | 25 | 25 | 12 | 11 | 303.7 |
| 13-Sep | 18 | 12 | 14 | 10 | 4 | 356 | 353 | 354 | 325 | 350 | 28 | 5 | 352 | 356 | 344 | 25 | 9 | 16 | 4 | 28 | 69 | 93 | 268 | 212 | 6.9 |
| 14-Sep | 349 | 36 | 42 | 46 | 10 | 8 | 9 | 21 | 21 | 37 | 25 | 30 | 27 | 358 | 33 | 27 | 23 | 32 | 22 | 30 | 41 | 52 | 95 | 119 | 30.8 |
| 15-Sep | 122 | 150 | 155 | 177 | 177 | 173 | 167 | 179 | 203 | 213 | 228 | 244 | 260 | 257 | 258 | 241 | 232 | 218 | 196 | 182 | 173 | 168 | 181 | 193 | 203.7 |
| 16-Sep | 181 | 178 | 175 | 171 | 172 | 169 | 175 | 177 | 196 | 200 | 193 | 192 | 188 | 199 | 195 | 187 | 181 | 174 | 170 | 165 | 166 | 174 | 173 | 171 | 182.4 |
| 17-Sep | 172 | 169 | 166 | 164 | 166 | 165 | M | 164 | 169 | 181 | 182 | 190 | 186 | 190 | 172 | 169 | 165 | 170 | 162 | 156 | 145 | 144 | 148 | 154 | 170.3 |
| 18-Sep | 151 | 148 | 128 | 132 | 138 | 135 | 138 | 141 | 149 | 163 | 172 | 167 | 166 | 144 | 141 | 137 | 144 | 151 | 134 | 123 | 124 | 123 | 119 | 113 | 145.5 |
| 19-Sep | 110 | 105 | 95 | 95 | 94 | 96 | 103 | 113 | 109 | 102 | 101 | 110 | 108 | 99 | 86 | 94 | 94 | 94 | 95 | 95 | 96 | 95 | 91 | 76 | 97.8 |
| 20-Sep | 67 | 57 | 41 | 38 | 30 | 27 | 25 | 23 | 25 | 29 | 32 | 33 | 34 | 32 | 35 | 33 | 32 | 31 | 31 | 31 | 31 | 27 | 28 | 25 | 32.9 |
| 21-Sep | 19 | 18 | 17 | 18 | 17 | 16 | 17 | 16 | 13 | 13 | 13 | 6 | 3 | 6 | 3 | 4 | 359 | 356 | 354 | 358 | 358 | 345 | 344 | 328 | 8.2 |
| 22-Sep | 332 | 338 | 345 | 350 | 19 | 35 | 335 | 242 | 255 | 249 | 232 | 333 | 323 | 308 | 358 | 155 | 252 | 223 | 149 | 137 | 148 | 145 | 143 | 155 | 294.4 |
| 23-Sep | 154 | 158 | 166 | 168 | 174 | 174 | 170 | 177 | 174 | 177 | 197 | 203 | 205 | 214 | 211 | 209 | 220 | 183 | 169 | 157 | 161 | 163 | 164 | 165 | 180.9 |
| 24-Sep | 170 | 172 | 173 | 164 | 165 | 168 | 165 | 161 | 166 | 167 | 173 | 183 | 187 | 197 | 203 | 202 | 198 | 181 | 144 | 145 | 155 | 163 | 167 | 164 | 173.0 |
| 25-Sep | 162 | 166 | 171 | 168 | 171 | 171 | 171 | 177 | 190 | 195 | 193 | 208 | 230 | 247 | 263 | 274 | 264 | 229 | 187 | 186 | 195 | 210 | 214 | 217 | 199.8 |
| 26-Sep | 214 | 209 | 217 | 246 | 239 | 205 | 228 | 232 | 249 | 282 | 307 | 302 | 319 | 338 | 317 | 346 | 346 | 9 | 61 | 150 | 151 | 117 | 159 | 150 | 279.4 |
| 27-Sep | 163 | 177 | 207 | 204 | 184 | 174 | 226 | 284 | 338 | 17 | 14 | 6 | 3 | 5 | 360 | 12 | 21 | 24 | 22 | 39 | 59 | 70 | 107 | 123 | 33.5 |
| 28-Sep | 131 | 133 | 139 | 145 | 156 | 165 | 170 | 169 | 167 | 179 | 190 | 183 | 184 | 182 | 186 | 189 | 184 | 171 | 165 | 173 | 178 | 185 | 179 | 177 | 174.1 |
| 29-Sep | 178 | 178 | 177 | 172 | 172 | 172 | 176 | 177 | 183 | 188 | 199 | 192 | 193 | 197 | 205 | 200 | 193 | 232 | 163 | 181 | 204 | 185 | 182 | 166 | 185.1 |
| 30-Sep | 168 | 167 | 166 | 176 | 173 | 174 | 176 | 202 | 216 | 207 | 219 | 221 | 225 | 247 | 251 | 238 | 243 | 223 | 227 | 242 | 330 | 340 | 320 | 324 | 222.5 |

174.7 181.5 188.9 187.7 185.4 184.4 188.2 195.7 212.8 219.4 222.4 231.6 237.0 244.1 250.8 238.7 223.6 202.0 130.2 145.5 153.8 163.5 171.2 173.9

Diurnal Average

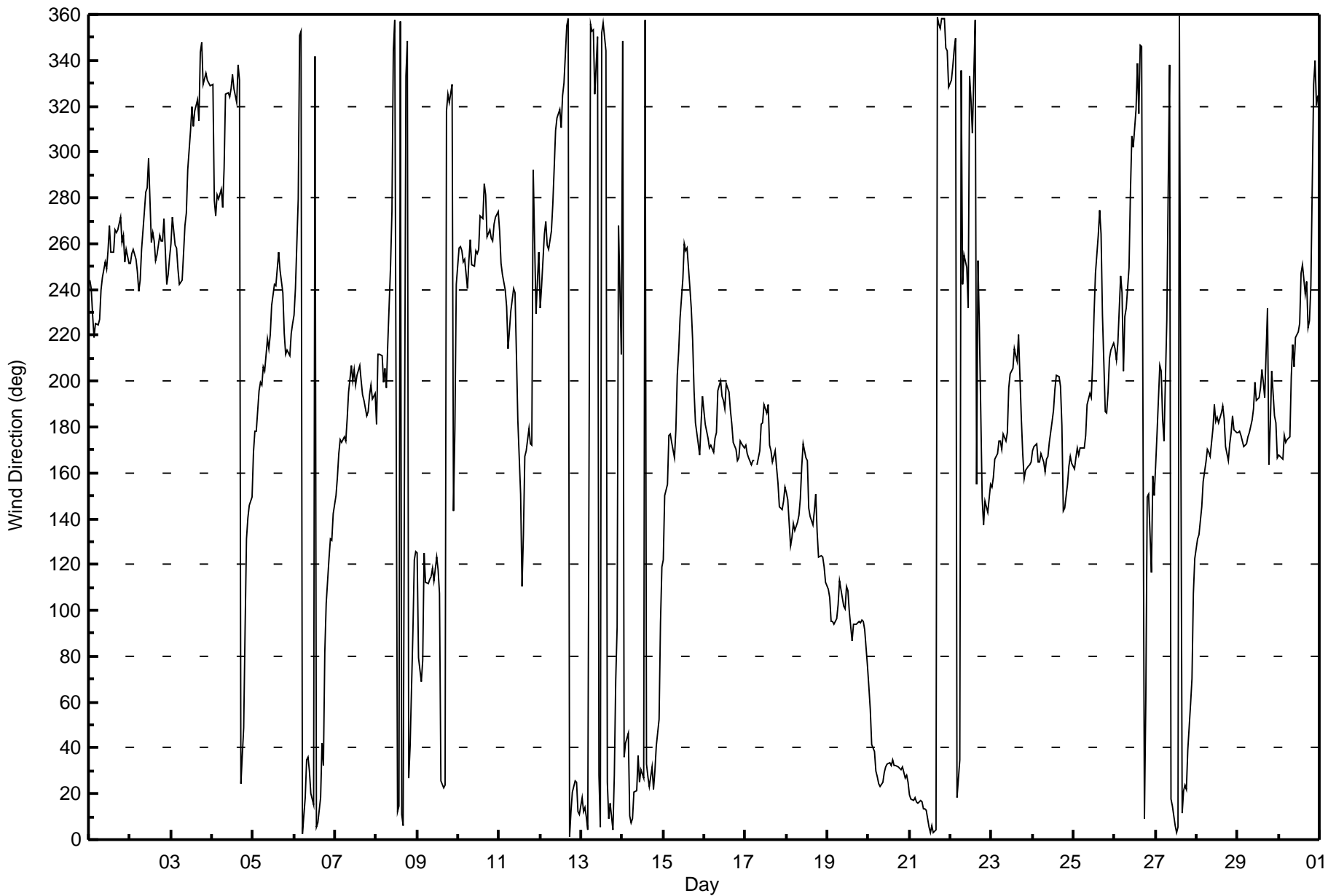
M - Maintenance

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Firebag - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - September 2017

| | |
|---|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 71 deg on Sep 14 00:00 | Hours of Data: 719 |
| Minimum Value: 4 deg on Sep 25 20:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 6 P ₁₀ = 8 Q ₁ = 10 Median = 12 Q ₃ = 16 P ₉₀ = 24 P ₉₉ = 58 | 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-Sep | 9 | 8 | 8 | 8 | 9 | 9 | 11 | 10 | 12 | 11 | 12 | 16 | 14 | 17 | 15 | 16 | 14 | 13 | 12 | 11 | 10 | 8 | 9 | 8 | 17 |
| 2-Sep | 9 | 14 | 12 | 9 | 8 | 7 | 9 | 12 | 16 | 20 | 19 | 21 | 21 | 21 | 16 | 13 | 11 | 11 | 9 | 9 | 12 | 10 | 9 | 8 | 21 |
| 3-Sep | 9 | 18 | 9 | 9 | 8 | 9 | 11 | 14 | 15 | 16 | 17 | 19 | 22 | 24 | 24 | 13 | 16 | 15 | 15 | 12 | 10 | 11 | 11 | 12 | 24 |
| 4-Sep | 14 | 11 | 10 | 12 | 9 | 8 | 15 | 16 | 15 | 17 | 17 | 19 | 19 | 28 | 22 | 23 | 26 | 19 | 11 | 18 | 13 | 10 | 9 | 9 | 28 |
| 5-Sep | 10 | 9 | 10 | 8 | 5 | 6 | 9 | 10 | 11 | 12 | 13 | 14 | 14 | 16 | 15 | 15 | 16 | 11 | 9 | 8 | 8 | 9 | 6 | 6 | 16 |
| 6-Sep | 13 | 7 | 44 | 10 | 10 | 18 | 6 | 11 | 11 | 25 | 22 | 29 | 25 | 31 | 31 | 46 | 29 | 11 | 26 | 10 | 11 | 11 | 11 | 10 | 46 |
| 7-Sep | 11 | 9 | 9 | 8 | 9 | 8 | 8 | 8 | 10 | 11 | 11 | 11 | 11 | 15 | 12 | 12 | 10 | 8 | 8 | 8 | 8 | 8 | 7 | 9 | 15 |
| 8-Sep | 10 | 11 | 9 | 9 | 8 | 9 | 10 | 15 | 14 | 26 | 14 | 16 | 16 | 13 | 19 | 24 | 15 | 14 | 26 | 20 | 29 | 32 | 22 | 22 | 32 |
| 9-Sep | 46 | 29 | 20 | 13 | 29 | 23 | 11 | 12 | 11 | 12 | 13 | 19 | 28 | 34 | 25 | 12 | 12 | 35 | 16 | 28 | 63 | 60 | 21 | 12 | 63 |
| 10-Sep | 12 | 12 | 11 | 11 | 16 | 11 | 12 | 12 | 11 | 11 | 11 | 13 | 11 | 14 | 12 | 13 | 13 | 11 | 10 | 11 | 10 | 11 | 11 | 11 | 16 |
| 11-Sep | 12 | 8 | 11 | 10 | 6 | 10 | 9 | 10 | 11 | 14 | 11 | 17 | 23 | 14 | 16 | 12 | 10 | 9 | 10 | 43 | 57 | 15 | 12 | 12 | 57 |
| 12-Sep | 13 | 13 | 12 | 12 | 11 | 10 | 13 | 11 | 14 | 15 | 15 | 14 | 15 | 15 | 17 | 27 | 16 | 15 | 14 | 9 | 14 | 11 | 16 | 12 | 27 |
| 13-Sep | 16 | 12 | 15 | 15 | 33 | 22 | 16 | 18 | 23 | 43 | 40 | 64 | 29 | 18 | 35 | 33 | 17 | 13 | 12 | 15 | 14 | 18 | 71 | 71 | 71 |
| 14-Sep | 54 | 9 | 16 | 16 | 19 | 26 | 12 | 12 | 15 | 24 | 36 | 46 | 43 | 45 | 40 | 27 | 24 | 15 | 7 | 8 | 8 | 8 | 18 | 33 | 54 |
| 15-Sep | 12 | 10 | 10 | 10 | 8 | 8 | 9 | 10 | 10 | 14 | 23 | 23 | 23 | 28 | 21 | 27 | 23 | 14 | 6 | 7 | 8 | 7 | 9 | 7 | 28 |
| 16-Sep | 9 | 8 | 8 | 8 | 8 | 7 | 8 | 9 | 11 | 10 | 12 | 12 | 15 | 14 | 14 | 15 | 12 | 10 | 8 | 7 | 8 | 8 | 8 | 8 | 15 |
| 17-Sep | 8 | 8 | 9 | 9 | 9 | 9 | M | 9 | 11 | 11 | 12 | 12 | 14 | 15 | 13 | 16 | 14 | 15 | 9 | 9 | 10 | 10 | 10 | 10 | 16 |
| 18-Sep | 10 | 13 | 11 | 12 | 11 | 12 | 12 | 11 | 12 | 12 | 11 | 13 | 14 | 24 | 22 | 20 | 14 | 12 | 14 | 12 | 11 | 11 | 11 | 9 | 24 |
| 19-Sep | 10 | 11 | 9 | 9 | 10 | 10 | 12 | 11 | 12 | 13 | 12 | 13 | 15 | 15 | 13 | 12 | 11 | 11 | 11 | 11 | 11 | 11 | 12 | 12 | 15 |
| 20-Sep | 11 | 10 | 11 | 10 | 10 | 10 | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 12 | 11 | 11 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 |
| 21-Sep | 13 | 12 | 12 | 12 | 12 | 13 | 12 | 11 | 13 | 13 | 14 | 15 | 15 | 15 | 16 | 15 | 15 | 14 | 13 | 13 | 15 | 11 | 12 | 13 | 16 |
| 22-Sep | 11 | 9 | 11 | 14 | 11 | 13 | 53 | 15 | 22 | 31 | 39 | 31 | 16 | 32 | 70 | 67 | 25 | 45 | 25 | 18 | 27 | 10 | 14 | 13 | 70 |
| 23-Sep | 11 | 13 | 10 | 10 | 9 | 9 | 9 | 11 | 10 | 12 | 11 | 18 | 15 | 16 | 15 | 17 | 12 | 18 | 8 | 8 | 10 | 8 | 8 | 9 | 18 |
| 24-Sep | 8 | 9 | 8 | 8 | 7 | 8 | 8 | 9 | 9 | 11 | 15 | 14 | 16 | 17 | 19 | 16 | 11 | 14 | 8 | 11 | 10 | 8 | 10 | 10 | 19 |
| 25-Sep | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 11 | 8 | 8 | 10 | 15 | 17 | 17 | 22 | 18 | 16 | 18 | 6 | 4 | 6 | 8 | 8 | 8 | 22 |
| 26-Sep | 9 | 8 | 16 | 12 | 29 | 24 | 11 | 10 | 11 | 25 | 16 | 18 | 22 | 22 | 31 | 20 | 17 | 13 | 39 | 16 | 32 | 20 | 13 | 13 | 39 |
| 27-Sep | 11 | 12 | 12 | 10 | 9 | 16 | 13 | 20 | 38 | 17 | 17 | 22 | 23 | 20 | 20 | 18 | 14 | 8 | 9 | 9 | 9 | 13 | 14 | 12 | 38 |
| 28-Sep | 12 | 12 | 12 | 11 | 10 | 9 | 9 | 9 | 10 | 11 | 11 | 12 | 11 | 12 | 13 | 11 | 11 | 9 | 9 | 9 | 9 | 8 | 10 | 9 | 13 |
| 29-Sep | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 11 | 11 | 9 | 10 | 12 | 11 | 12 | 10 | 50 | 27 | 17 | 8 | 13 | 9 | 9 | 50 |
| 30-Sep | 42 | 21 | 10 | 7 | 7 | 8 | 7 | 21 | 12 | 12 | 13 | 17 | 19 | 20 | 16 | 15 | 11 | 10 | 7 | 28 | 14 | 12 | 10 | 10 | 42 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 54 | 29 | 44 | 16 | 33 | 26 | 53 | 21 | 38 | 43 | 40 | 64 | 43 | 45 | 70 | 67 | 29 | 50 | 39 | 43 | 63 | 60 | 71 | 71 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | September 26, 2017 | Last Cal Date: | August 16, 2017 |
| Start time (MST): | 9:00 | End time (MST): | 13:02 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|------------------|-----|------------------|------------------|
| Cal Gas Concentration | <u>49</u> | ppm | Cal Gas Exp Date | November 4, 2019 |
| Cal Gas Cylinder # | <u>EY0000652</u> | | | |
| Calibrator Make/Model | API T700 | | Serial Number | 996 |
| ZAG Make/Model | API 701 | | Serial Number | 201 |

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 1410661308

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -605.7 | -605.7 |
| Calculated slope | 1.003625 | 0.993907 | Lamp voltage | 798 | 797 |
| Calculated intercept | -2.469306 | -2.068720 | Pressure | 685.0 | 683.1 |
| Analyzer Background | 8.4 | 8.4 | Flow | 0.447 | 0.448 |
| Analyzer Coefficient | 0.982 | 0.979 | Intensity | 90 | 90 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 4999 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 4930 | 79.8 | 780.5 | 783.1 | 0.997 |
| calibrator zero | 4999 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4932 | 79.8 | 780.2 | 785.7 | 0.993 |
| second point | 4972 | 39.9 | 390.1 | 396.5 | 0.984 |
| third point | 4992 | 20.1 | 196.5 | 201.3 | 0.976 |
| as left zero | 4999 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4930 | 79.8 | 780.5 | 774.1 | 1.008 |
| Average Correction Factor | | | | | 0.984 |
| Corrected As found | 783.10 | Previous response | 780.16 | *% change | -0.4% |

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter after asfound. Adjusted the span.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association

SO₂ Calibration Summary

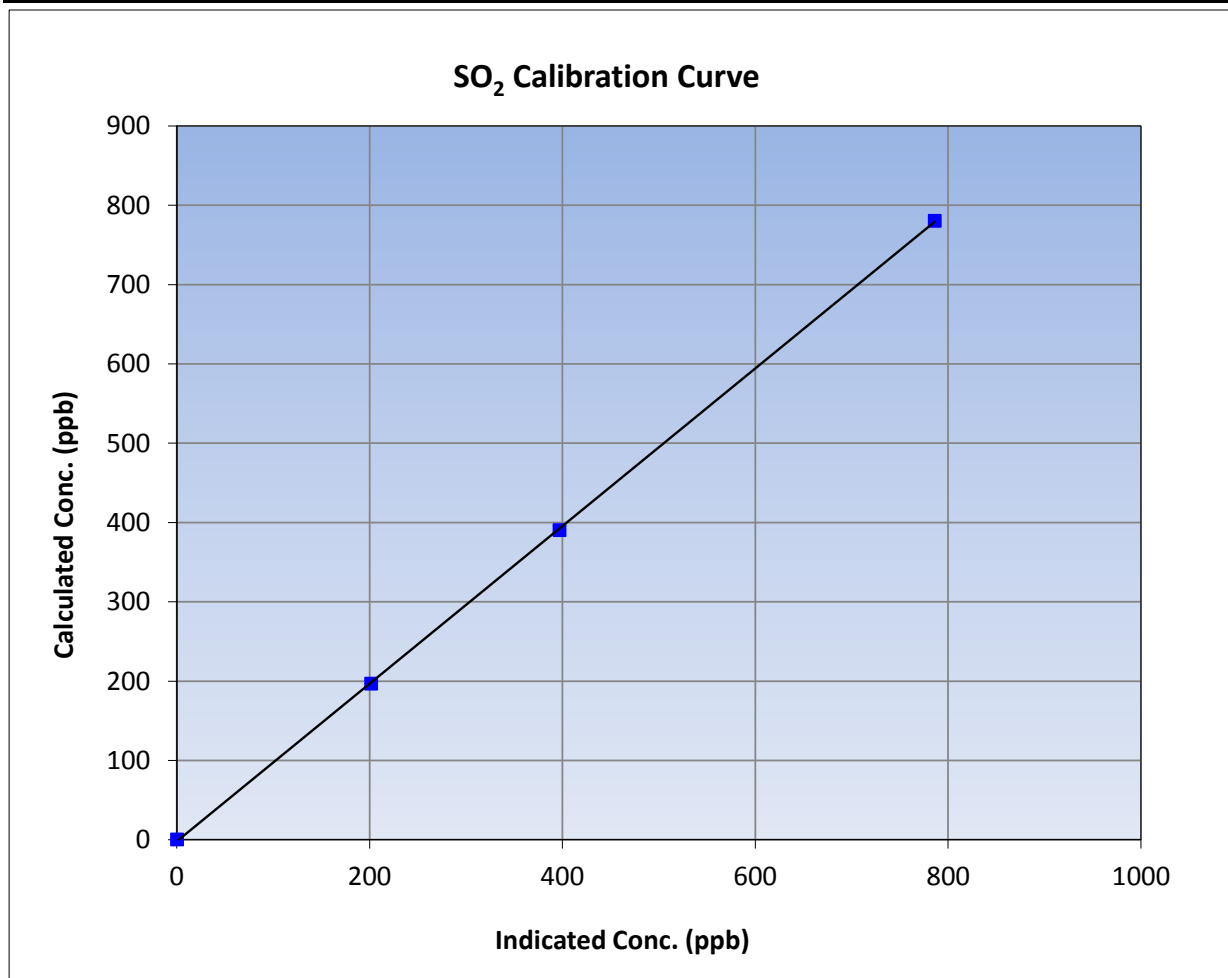
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 9:00 | End Time (MST) | 13:02 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1410661308 |

Calibration Data

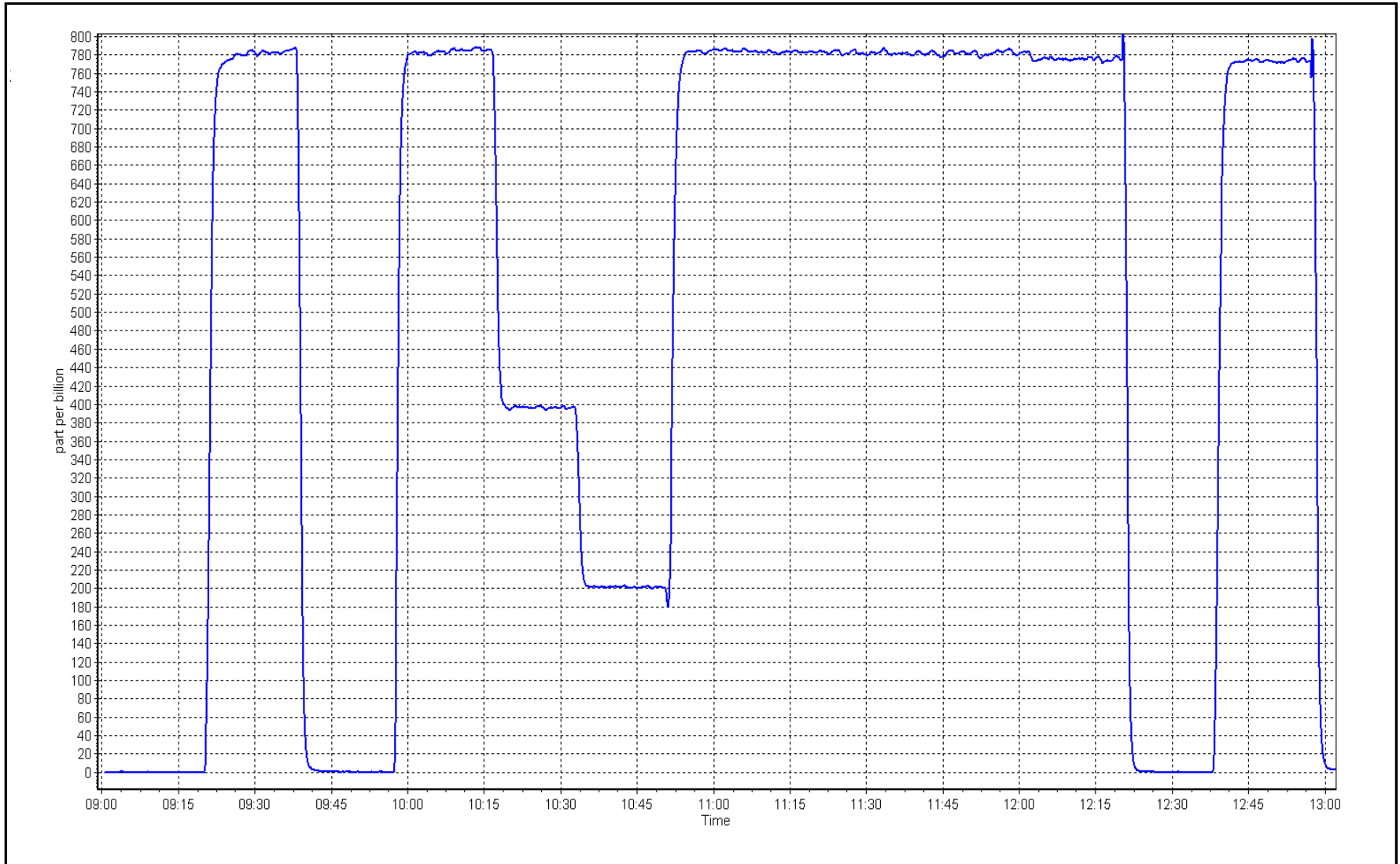
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 |
| 780.2 | 785.7 | 0.9930 | | |
| 390.1 | 396.5 | 0.9838 | Slope | 0.90 - 1.10 |
| 196.5 | 201.3 | 0.9762 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 26, 2017

Location: Firebag





Wood Buffalo Environmental Association

H₂S Calibration Summary

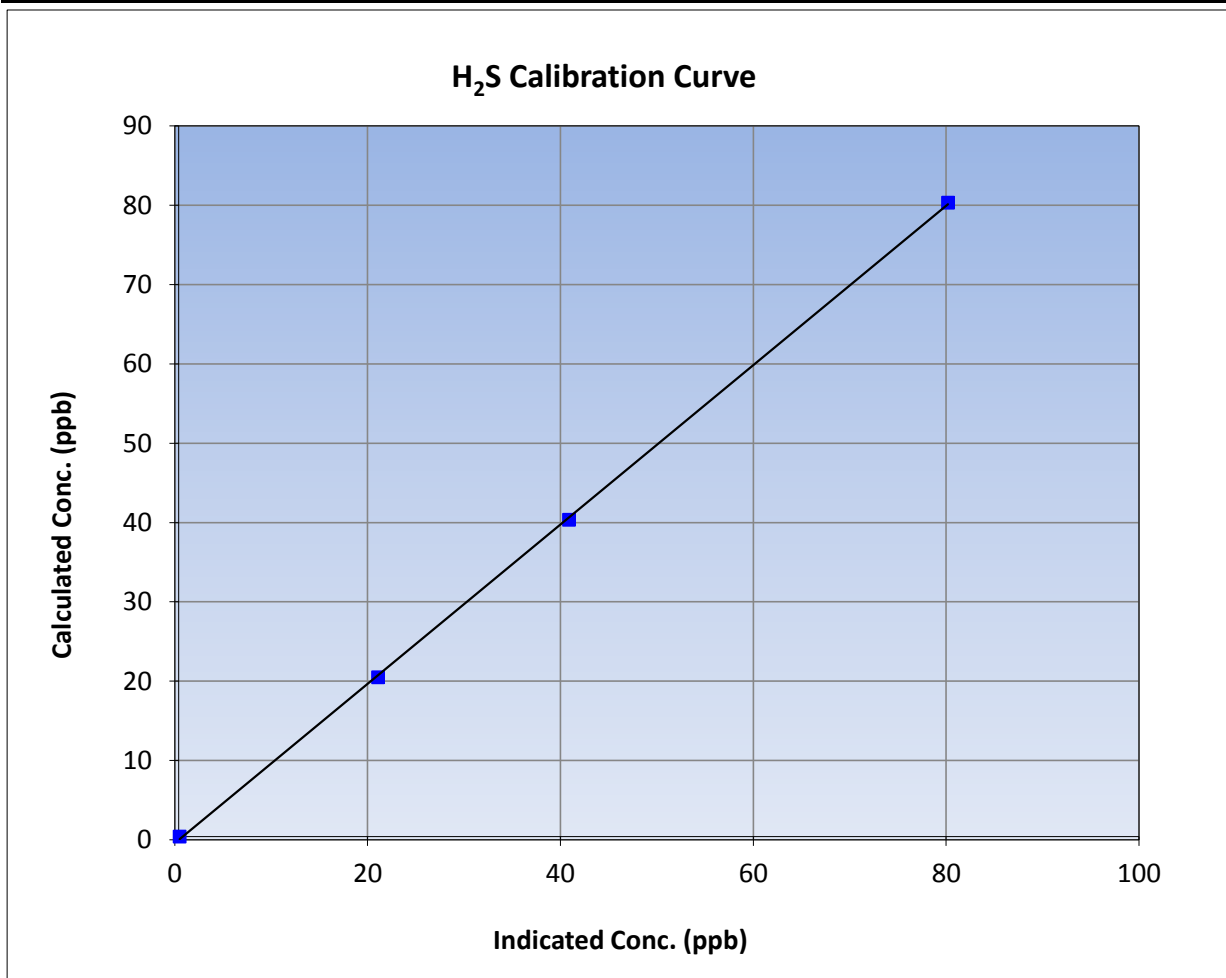
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2017 | Previous Calibration | August 18, 2017 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 10:17 | End Time (MST) | 13:07 |
| Analyzer make | Thermo 450i | Analyzer serial # | 815129098 |

Calibration Data

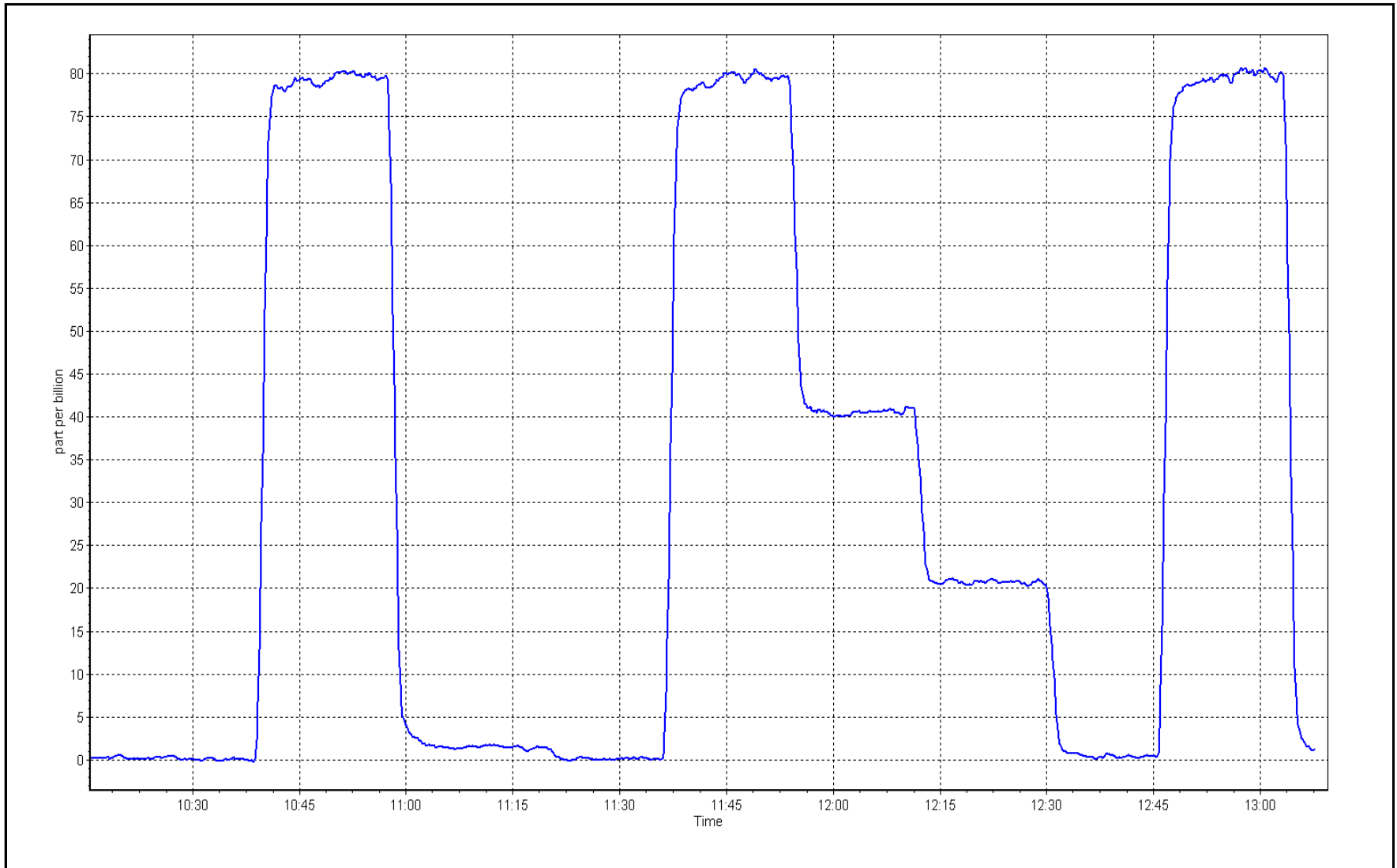
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999910 | |
| 80.0 | 79.8 | 1.0019 | | | ≥0.995 |
| 40.0 | 40.5 | 0.9868 | Slope | 1.004726 | |
| 20.1 | 20.7 | 0.9704 | | | 0.90 - 1.10 |
| | | | Intercept | -0.440727 | +/-3 |



H₂S Calibration Plot

Date: September 20, 2017

Location: Firebag





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | September 26, 2017 | Last Cal Date: | August 16, 2017 |
| Start time (MST): | 9:00 | End time (MST): | 12:59 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|------------------|
| Gas Cert Reference | EY0000652 | Cal Gas Expiry Date | November 4, 2019 |
| CH4 Cal Gas Conc. | <u>513.0</u> ppm | CH4 Equiv Conc. | 1057.5 ppm |
| C3H8 Cal Gas Conc. | <u>198.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 996 |
| ZAG Make/Model | API 701 | Serial Number | 201 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|---------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1336160089 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -305 |
| Calculated slope | 1.001882 | Sample pressure | 8.6 |
| Calculated intercept | -0.076100 | Fuel pressure | 23.0 |
| Analyzer Background | 1.64 | Air pressure | 34.9 |
| Analyzer Coefficient | 3.636 | Flame temperature | 156.1 |
| | | | <u>Finish</u> |
| | | | -306 |
| | | | 8.6 |
| | | | 23.0 |
| | | | 34.9 |
| | | | 156.7 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 4999 | 0.0 | 0.00 | -0.01 | ---- |
| as found span | 4930 | 79.8 | 16.84 | 16.82 | 1.001 |
| calibrator zero | 4999 | 0.0 | 0.00 | 0.04 | ---- |
| high point | 4929 | 79.8 | 16.85 | 16.82 | 1.002 |
| second point | 4972 | 39.9 | 8.42 | 8.48 | 0.993 |
| third point | 4991 | 20.1 | 4.24 | 4.35 | 0.976 |
| as left zero | 4999 | 0.0 | 0.00 | 0.11 | ---- |
| as left span | 4930 | 79.8 | 16.84 | 16.90 | 0.997 |
| Average Correction Factor | | | | | 0.990 |
| Corrected As found | 16.84 | Previous response | 16.89 | *% change | 0.3% |

* = > +/-5% change initiates investigation

Notes:

Changed inlet filter. Adjusted the zero.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

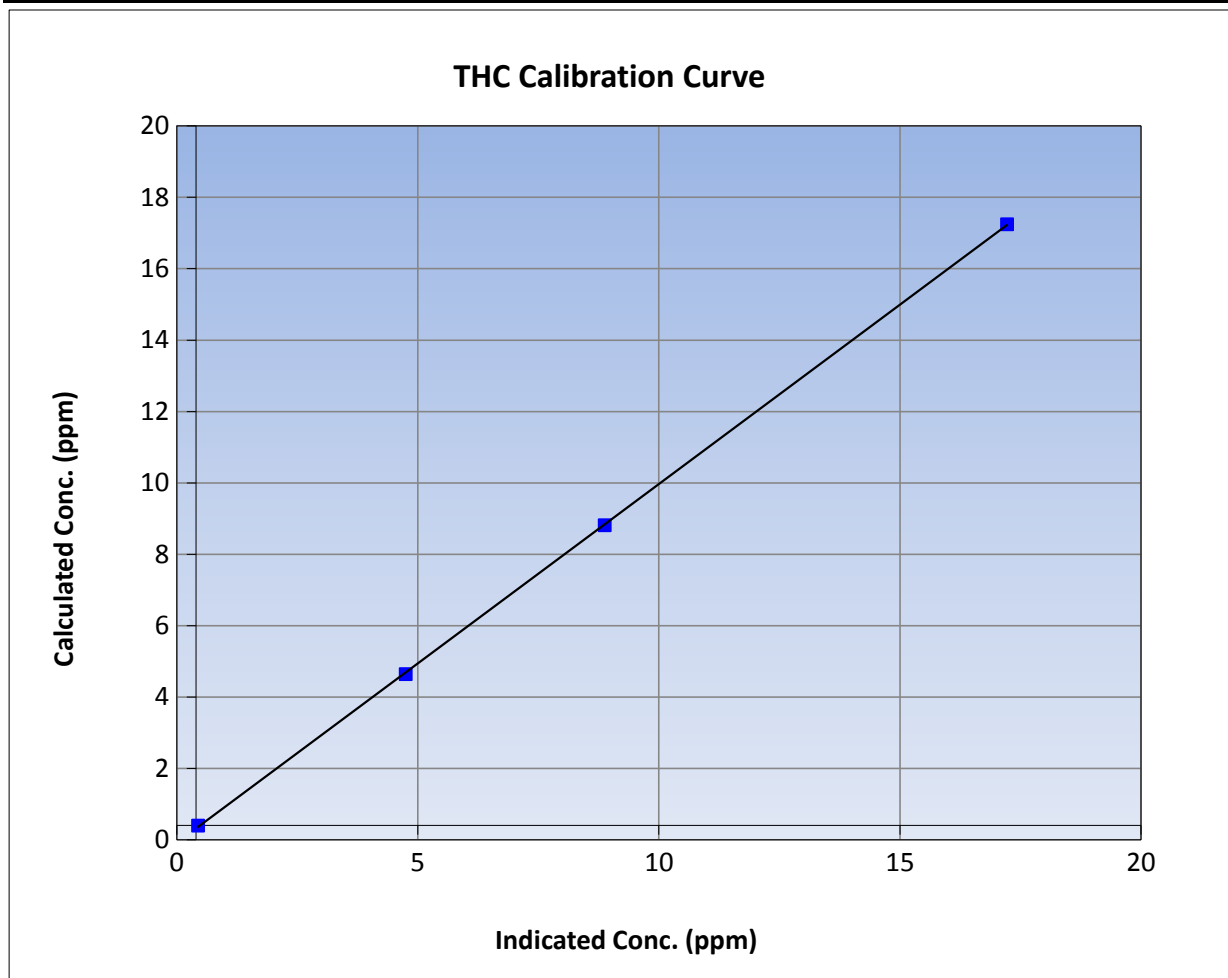
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 9:00 | End Time (MST) | 12:59 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1336160089 |

Calibration Data

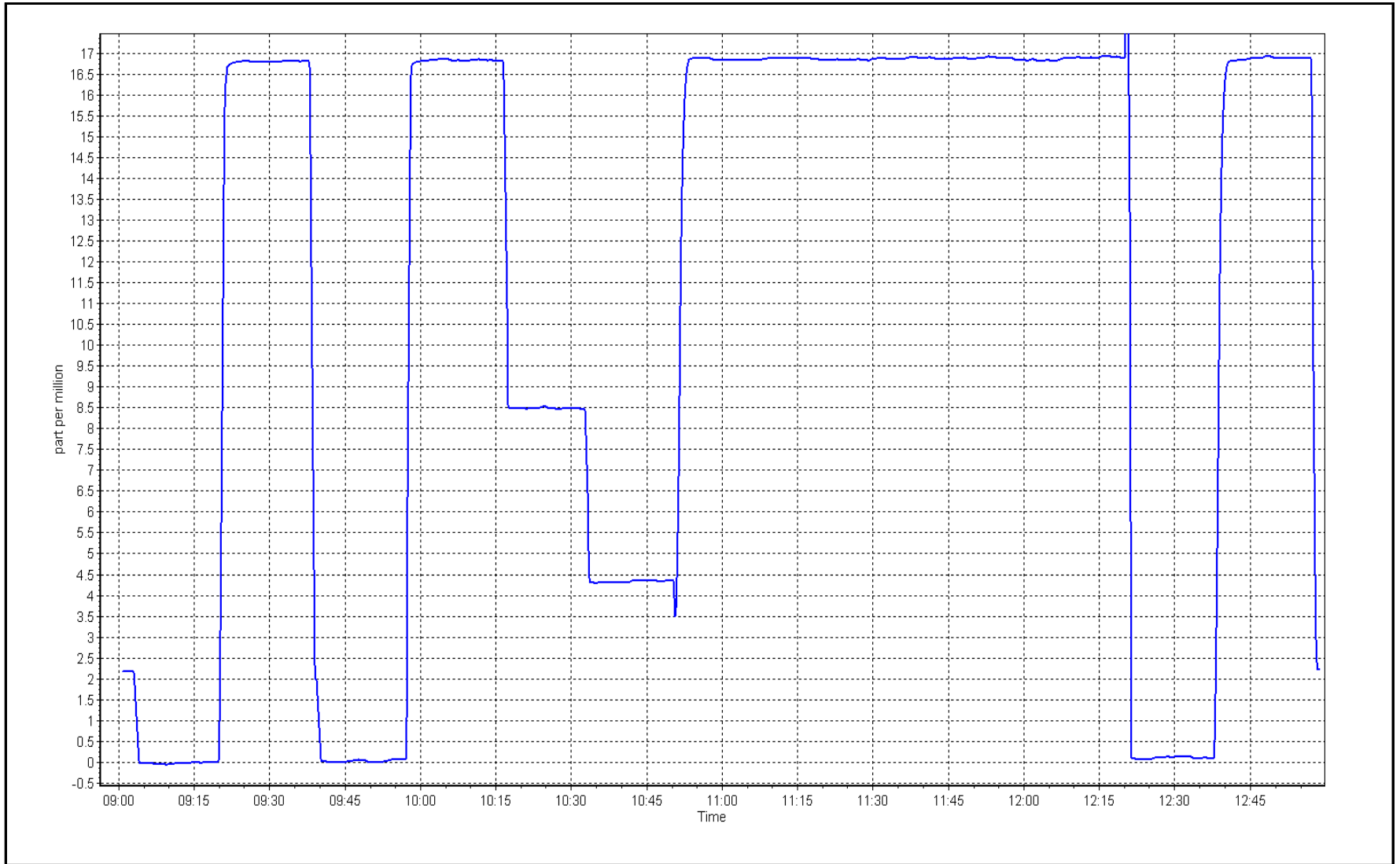
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999969 | ≥0.995 |
| 16.8 | 16.8 | 1.0016 | | | |
| 8.4 | 8.5 | 0.9929 | Slope | 1.005277 | 0.90 - 1.10 |
| 4.2 | 4.3 | 0.9758 | | | |
| | | | Intercept | -0.083766 | +/-1.5 |



THC Calibration Plot

Date: September 26, 2017

Location: Firebag





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Firebag | Station number: | AMS 19 |
| Calibration Date: | September 26, 2017 | Last Cal Date: | August 16, 2017 |
| Start time (MST): | 9:00 | End time (MST): | 12:59 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|------------------|
| NO Gas Cylinder # | EY0000652 | Cal Gas Expiry Date | November 4, 2019 |
| NOX Cal Gas Conc. | <u>50.2</u> ppb | NO Cal Gas Conc. | <u>50.2</u> ppb |
| Calibrator Model | API T700 | Serial Number | 996 |
| ZAG make/model | API T701H | Serial Number | 201 |

Analyzer Information

| | | | | |
|-----------------|--------------|--------------------|---------------------|---------------|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1410661309 | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 0.934 | 0.954 | NOX Range (ppb) | 0 - 1000 ppb |
| NOX coefficient | 1.000 | 1.000 | PMT Temperature | -3.1 -2.7 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 163.3 163.0 |
| NO bkgrnd | 4.2 | 4.1 | Sample Flow | 0.626 0.617 |
| NOX bkgrnd | 4.2 | 4.2 | PMT Voltage | -780.7 -780.7 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 1.001409 | 1.000225 |
| NO _x Cal Offset | -1.979128 | -2.487909 |
| NO Cal Slope | 1.002005 | 0.999693 |
| NO Cal Offset | -2.038481 | -2.525292 |
| NO ₂ Cal Slope | 0.998299 | 0.978869 |
| NO ₂ Cal Offset | -0.135941 | 2.417109 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 4999 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| as found span | 4930 | 79.8 | 799.6 | 799.6 | 0.0 | 802.2 | 801.5 | 0.7 | 0.9968 | 0.9977 |
| calibrator zero | 4999 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high point | 4929 | 79.8 | 799.8 | 799.8 | 0.0 | 800.3 | 800.7 | -0.5 | 0.9994 | 0.9989 |
| second point | 4971 | 39.9 | 399.7 | 399.7 | 0.0 | 404.8 | 405.2 | -0.4 | 0.9875 | 0.9865 |
| third point | 4991 | 20.1 | 201.4 | 201.4 | 0.0 | 205.5 | 205.6 | -0.1 | 0.9798 | 0.9794 |
| as left zero | 4999 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | ---- | ---- |
| as left span | 4929 | 79.8 | 799.8 | 374.9 | 424.9 | 790.1 | 367.1 | 422.9 | 1.0123 | 1.0212 |
| Average Correction Factor | | | | | | | | | 0.9889 | 0.9882 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 802.3 ppb | NO = 801.6 ppb | | *Percent Change | NO _x = -0.2% |
| Previous Response | NO _x = 800.5 ppb | NO = 800.1 ppb | | *Percent Change | NO = -0.2% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 798.9 | 798.4 | 0.5 | 1.0011 | 1.0017 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 374.9 | 423.5 | 798.0 | 374.9 | 432.2 | 1.0022 | ---- | 0.9799 | 102.1% |
| 2nd NO2 (200 ppb O3) | 583.1 | 215.3 | 797.0 | 583.1 | 213.8 | 1.0035 | ---- | 1.0070 | 99.3% |
| 3rd NO2 (100 ppb O3) | 687.8 | 110.6 | 797.5 | 687.8 | 109.7 | 1.0029 | ---- | 1.0082 | 99.2% |
| 2nd NO ref point | ---- | 0.0 | 797.3 | 796.7 | 0.6 | 1.0031 | 1.0039 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0029 | 1.0028 | 0.9984 | 100.2% |

Notes: Changed inlet filter after asfinds. Adjusted the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

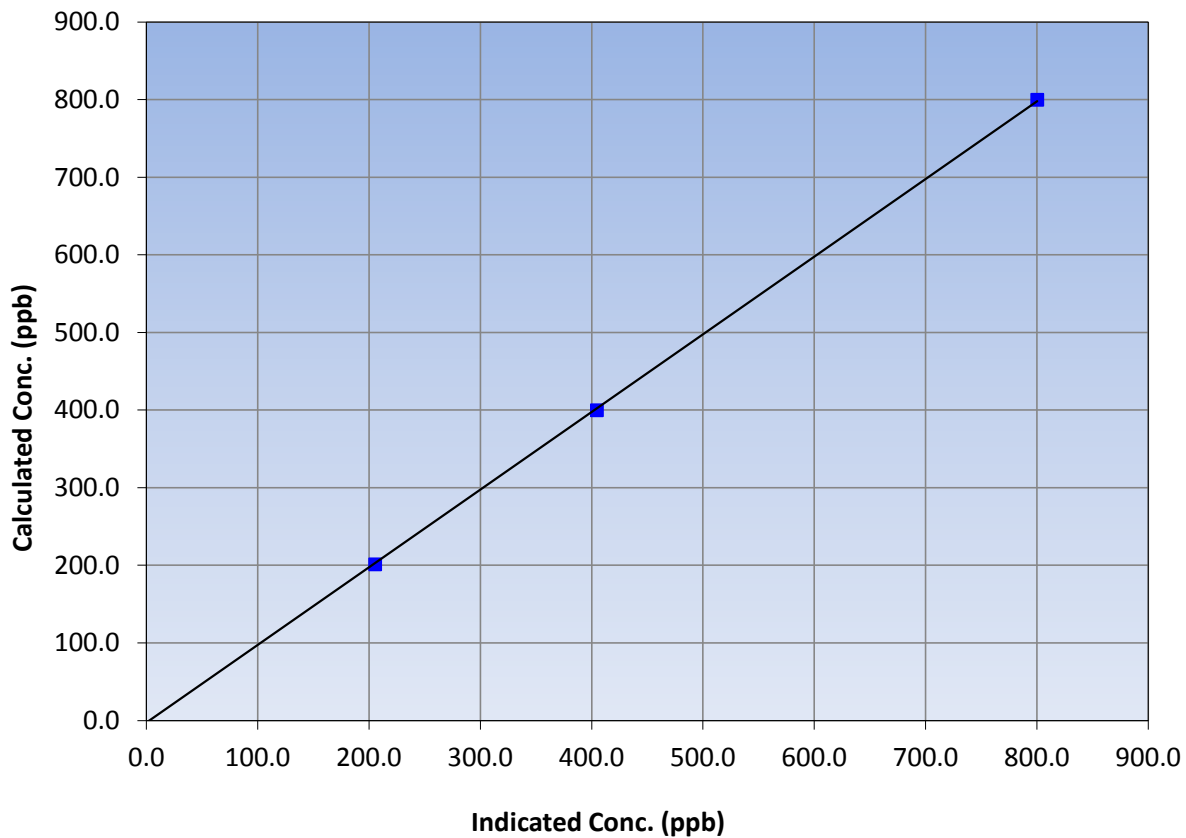
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 9:00 | End Time (MST) | 12:59 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661309 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.8 | 800.3 | 0.9994 | | | |
| 399.7 | 404.8 | 0.9875 | | | |
| 201.4 | 205.5 | 0.9798 | | | |
| | | | Slope | 1.000225 | 0.90 - 1.10 |
| | | | Intercept | -2.487909 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

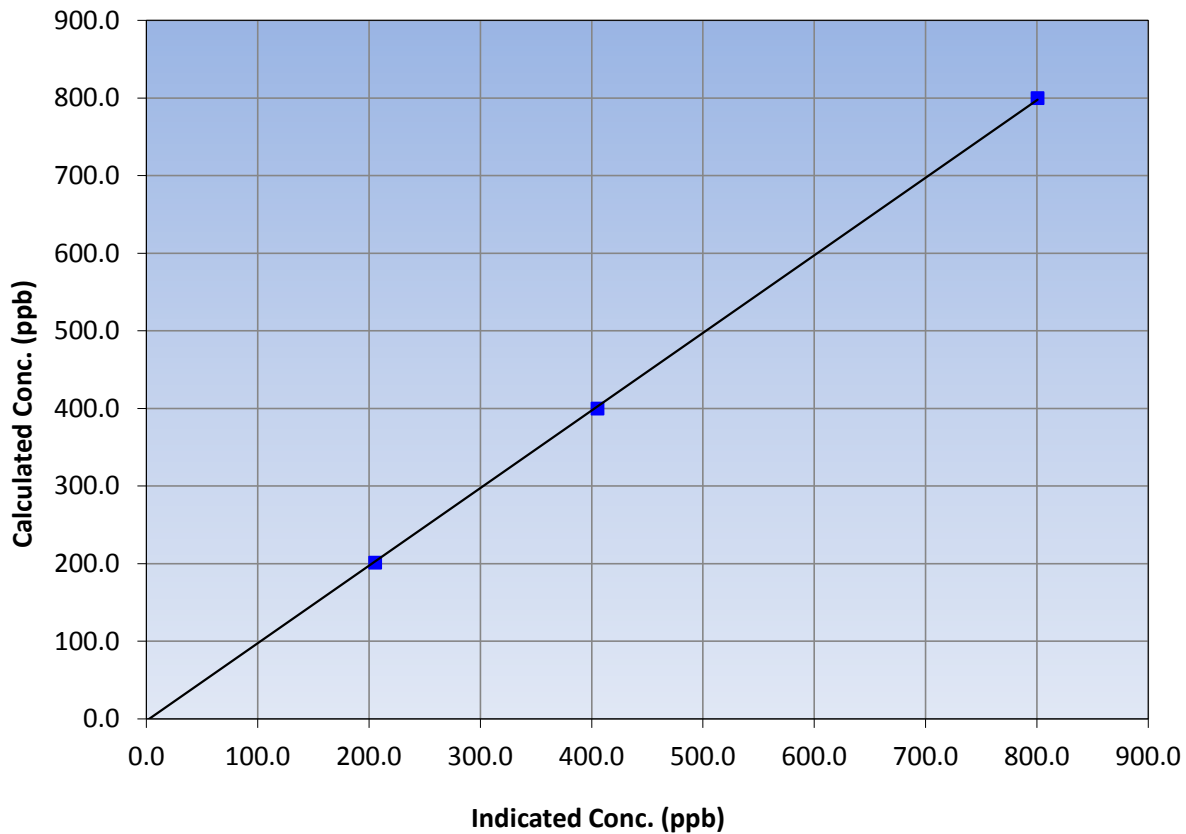
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 9:00 | End Time (MST) | 12:59 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661309 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999940 | ≥0.995 |
| 799.8 | 800.7 | 0.9989 | | | |
| 399.7 | 405.2 | 0.9865 | Slope | 0.999693 | 0.90 - 1.10 |
| 201.4 | 205.6 | 0.9794 | | | |
| | | | Intercept | -2.525292 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

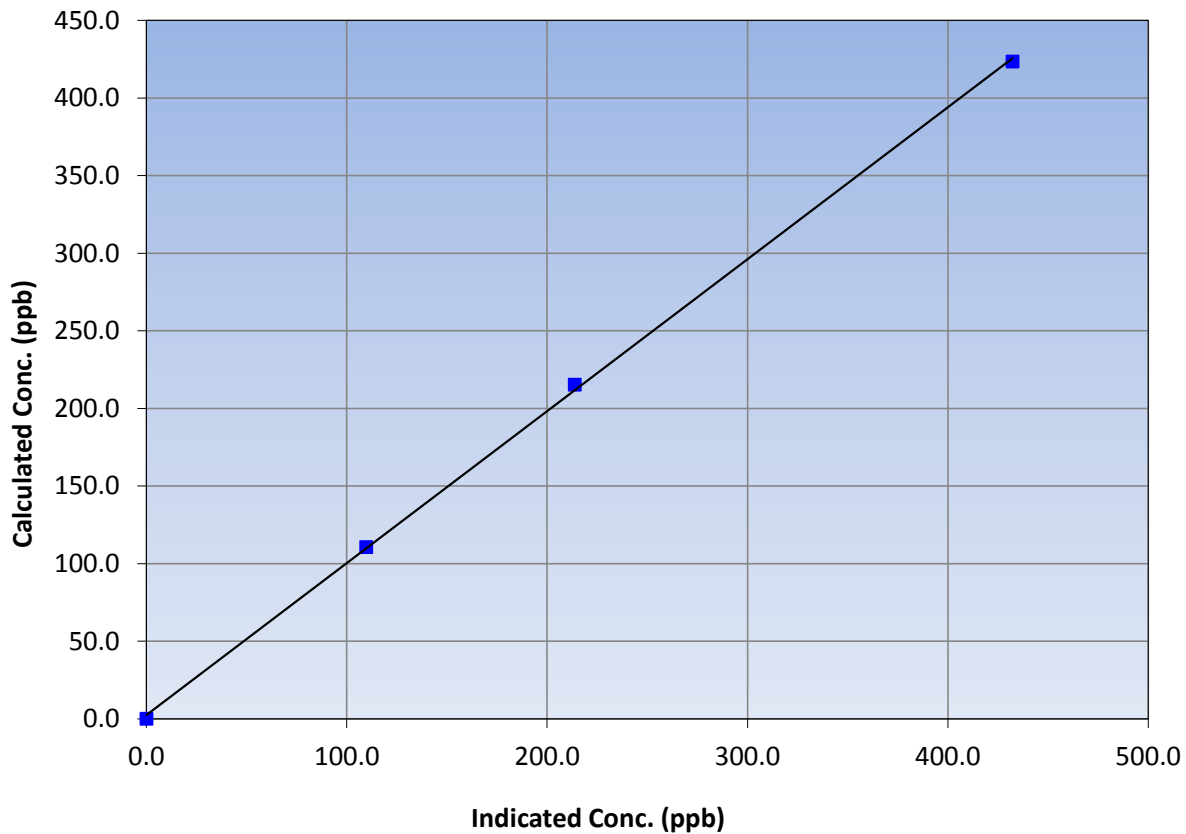
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 9:00 | End Time (MST) | 12:59 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661309 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 423.5 | 432.2 | 0.9799 | | | |
| 215.3 | 213.8 | 1.0070 | | | |
| 110.6 | 109.7 | 1.0082 | | | |
| | | | Slope | 0.978869 | 0.90 - 1.10 |
| | | | Intercept | 2.417109 | +/-20 |

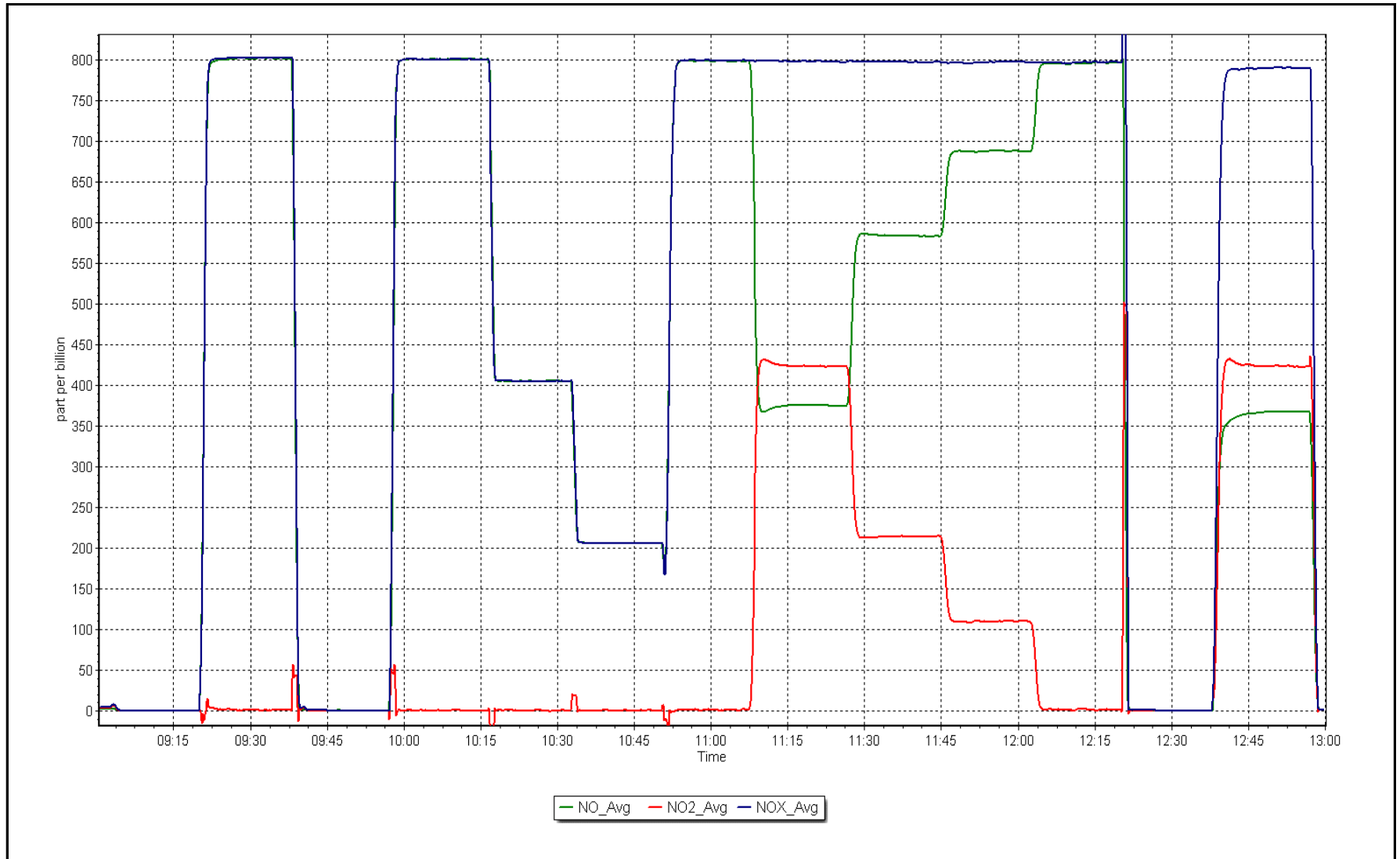
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 26, 2017

Location: Firebag





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 20
MACKAY RIVER
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)
SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|------------------|-------------------------|-----------------------|---------------------|-------------------------|-----------------------|--------------------------|------------------------|
| SO2 (ppb) Average | 685 | 35 | 35 | 100 | 14 | 0 | 2 | 0 |
| H2S (ppb) Average | 680 | 33 | 40 | 99.03 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 685 | 35 | 35 | 100 | 2.6 | - | 2.3 | - |
| NO2 (ppb) Average | 685 | 35 | 35 | 100 | 11 | 0 | 4 | - |
| NO (ppb) Average | 685 | 35 | 35 | 100 | 6 | - | 1 | - |
| NOX (ppb) Average | 685 | 35 | 35 | 100 | 17 | - | 5 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 30.2 | - | 21.3 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 99 | - | 96 | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100 | 5.9 | - | 37 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 20 | - | 17 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS 20)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|-----|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 685 | 0.5 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 14 |
| H2S (ppb) Average | 680 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 685 | 2.17 | 0.1 | - | 1.8 | 2 | 2.1 | 2.2 | 2.3 | 2.4 | 2.6 |
| NO2 (ppb) Average | 685 | 1 | 2 | - | 0 | 0 | 0 | 1 | 1 | 2 | 11 |
| NO (ppb) Average | 685 | 0.2 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| NOX (ppb) Average | 685 | 1.2 | 2 | - | 0 | 0 | 0 | 1 | 1 | 2 | 17 |
| Temperature 2 m (C) Average | 720 | 10.58 | 6.6 | - | -4.2 | 2.2 | 5.4 | 10.3 | 15 | 19.3 | 30.2 |
| Relative Humidity (%) Average | 720 | 70.1 | 21 | - | 21 | 38 | 55 | 72 | 89 | 96 | 99 |
| Precipitation (mm) Total | 720 | - | - | 64.22 | - | - | - | - | - | - | - |
| Wind Speed 10 m (km/h) Average | 720 | 7.1 | 4 | - | 0 | 2 | 4 | 6 | 9 | 13 | 20 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MACKAY RIVER (AMS 20)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|---------------------|---|
| H2S | 02 Sep 2017 23:00 | 02 Sep 2017 23:00 | 1 | Unstable operation - excessive baseline drift |
| H2S | 09 Sep 2017 06:00 | 09 Sep 2017 06:00 | 1 | Unstable operation - excessive baseline drift |
| H2S | 11 Sep 2017 20:00 | 11 Sep 2017 20:00 | 1 | Unstable operation - excessive baseline drift |
| H2S | 14 Sep 2017 23:00 | 15 Sep 2017 00:00 | 2 | Unstable operation - excessive baseline drift |
| H2S | 19 Sep 2017 21:00 | 19 Sep 2017 22:00 | 2 | Unstable operation - excessive baseline drift |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Mackay River - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 14 ppb on Sep 27 14:00 | Maximum Daily Average: 2.2 ppb on Sep 27 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 5 04:00 | Minimum Daily Average: 0.0 ppb on Sep 15 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 1.0 ppb at hour 14 | Minimum Diurnal Average: 0.1 ppb at hour 5 | | Hours of Calibration: | 35 |
| Monthly Average: 0.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 3 | 2 | 0 | 2 | 4 | 2 | 1 | 0.9 | 4 | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 5 | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 4 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1.3 | 9 | |
| 7-Sep | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 8-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 8 | 10 | 6 | 3 | 3 | 2 | 1 | 1 | 1.7 | 10 | |
| 10-Sep | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0.3 | 2 |
| 13-Sep | 1 | 2 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 5 | 8 | 6 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 8 | |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 17-Sep | 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-Sep | 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-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 4 | |
| 20-Sep | 0 | 1 | 2 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | |
| 21-Sep | 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 | |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 23-Sep | 0 | Z | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 25-Sep | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 7 | 1 | 6 | 8 | 14 | 4 | 0 | 0 | 3 | 1 | 1 | 1 | 1 | 3 | 2 | 2.2 | 14 |
| 28-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0.3 | 2 |

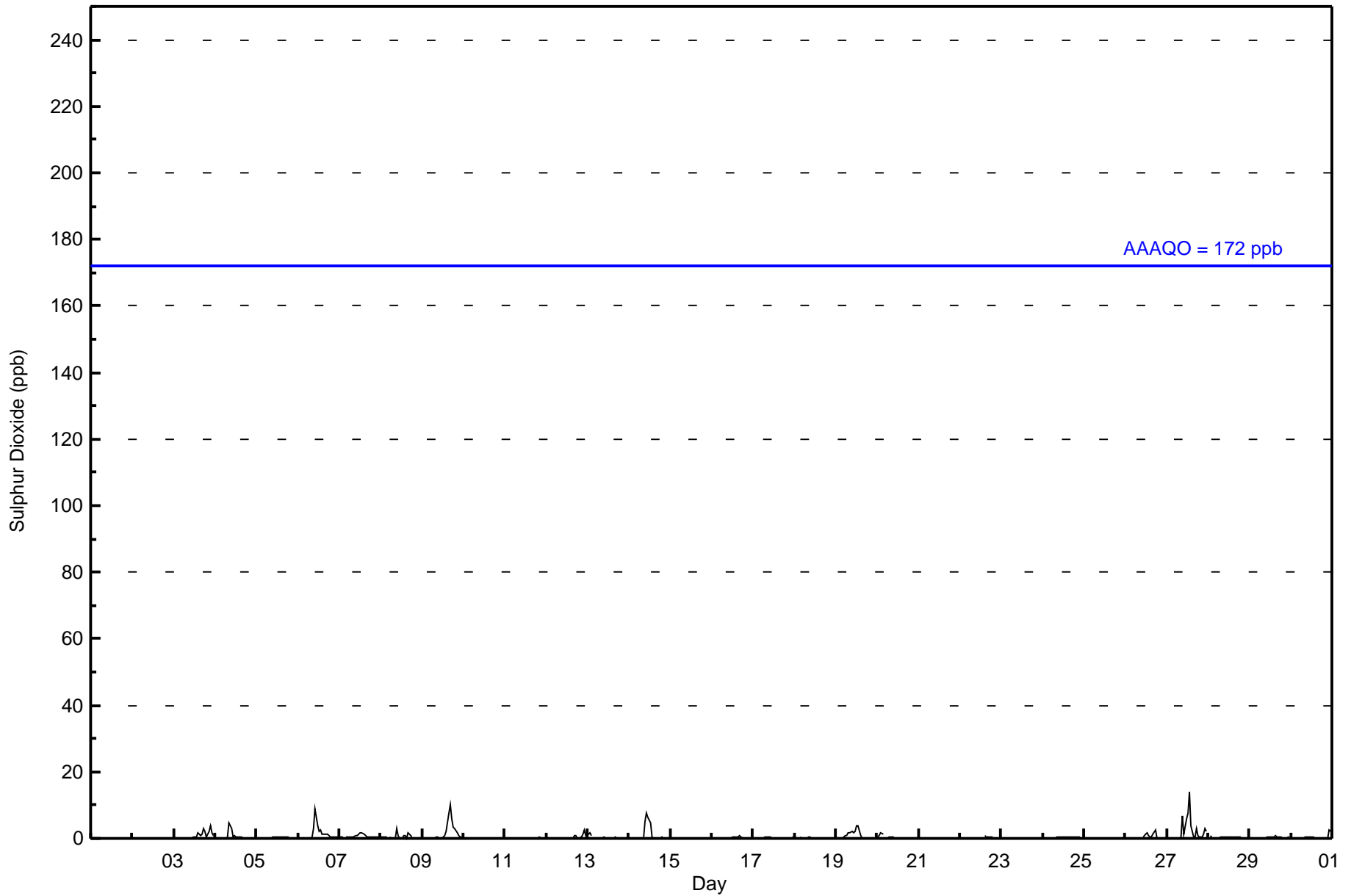
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.4 | 1.0 | 0.9 | 0.9 | 0.9 | 1.0 | 0.6 | 0.5 | 0.7 | 0.7 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 | 0.3 | Diurnal Average |
| 1 | 2 | 2 | 1 | 0 | 1 | 1 | 2 | 5 | 7 | 9 | 6 | 8 | 14 | 4 | 8 | 10 | 6 | 3 | 3 | 2 | 4 | 3 | 2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mackay River - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mackay River - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 684 | 99.85 | 99.85 |
| 11 - 20 | 1 | 0.15 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 23 | 37 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 684 |
| 11 - 20 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |

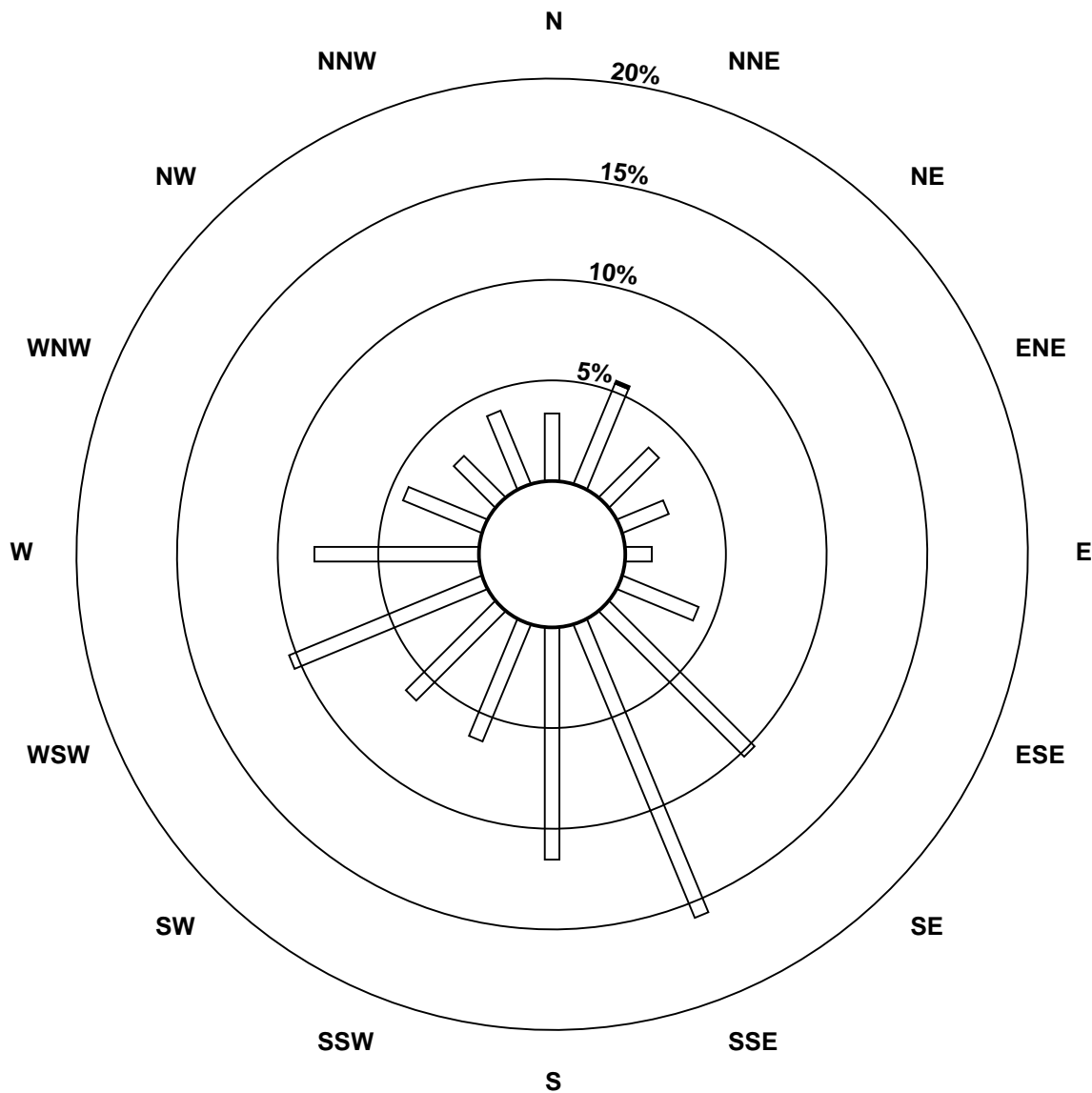
Total Number of Valid Hours: 685

Total Number of Hours: 720

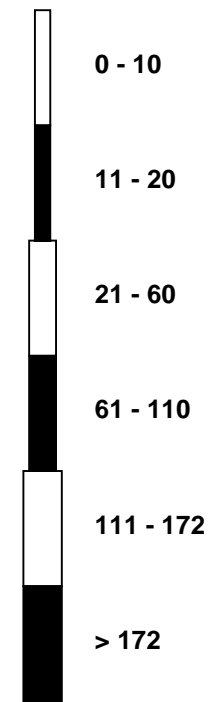


Wood Buffalo Environmental Association
Wind Rose Sep 2017

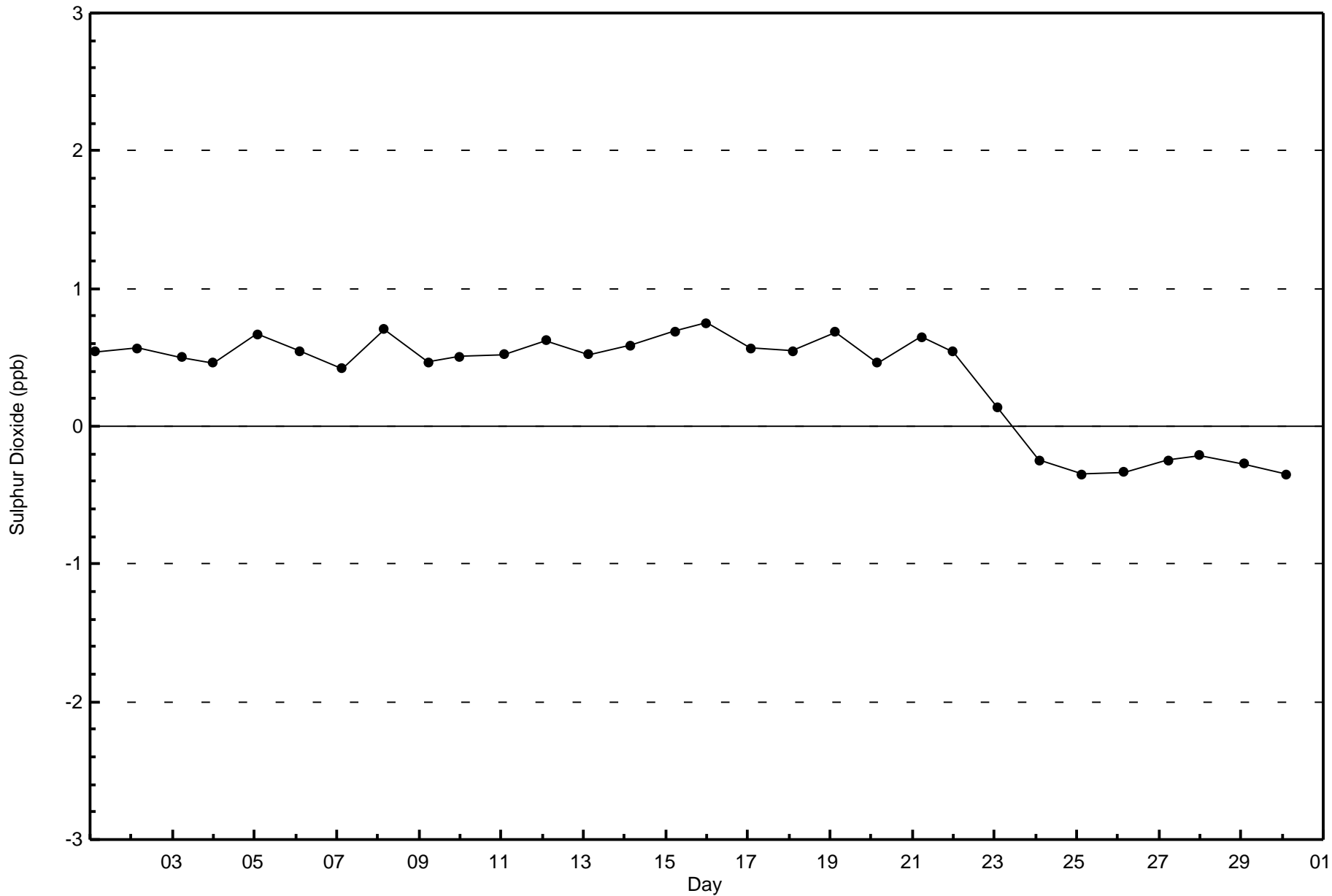
Sulphur Dioxide (SO₂) - ppb
Mackay River (AMS 20)

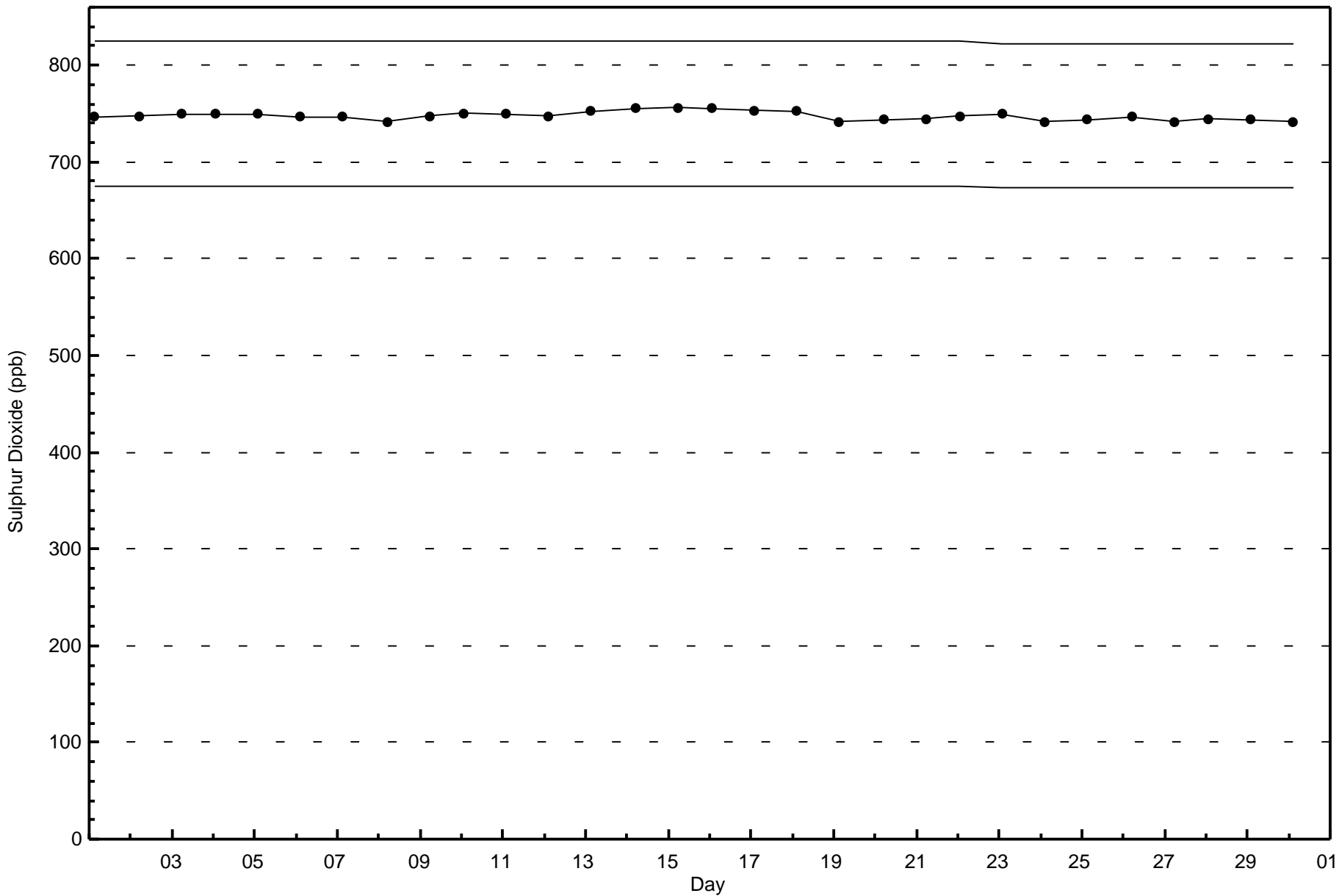


Classes (ppb)



Total Number of Valid Hours: 685

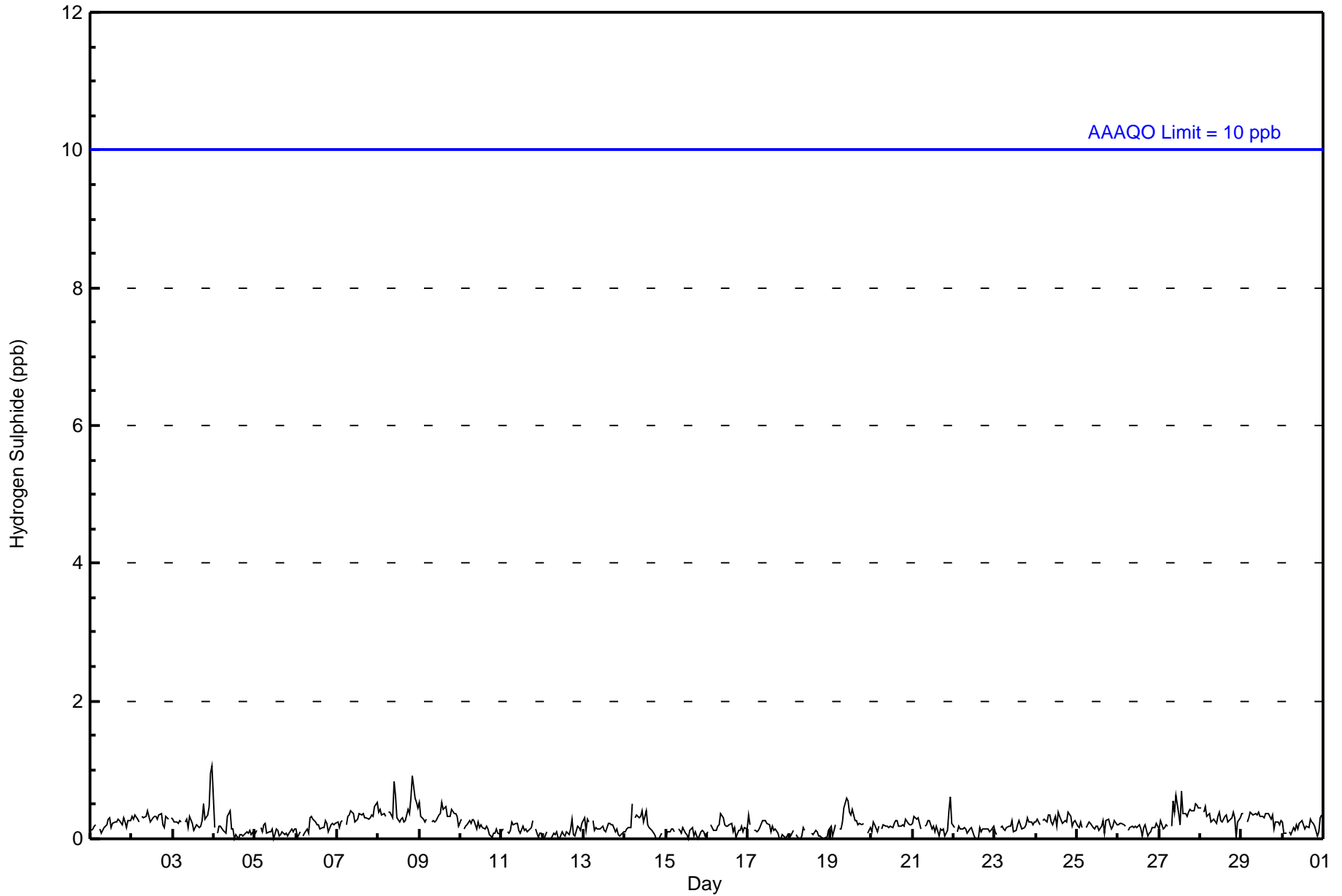






Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Mackay River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 23 | 37 | 24 | 15 | 9 | 26 | 67 | 110 | 77 | 44 | 44 | 70 | 57 | 29 | 20 | 28 | 680 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 37 | 24 | 15 | 9 | 26 | 67 | 110 | 77 | 44 | 44 | 70 | 57 | 29 | 20 | 28 | 680 |

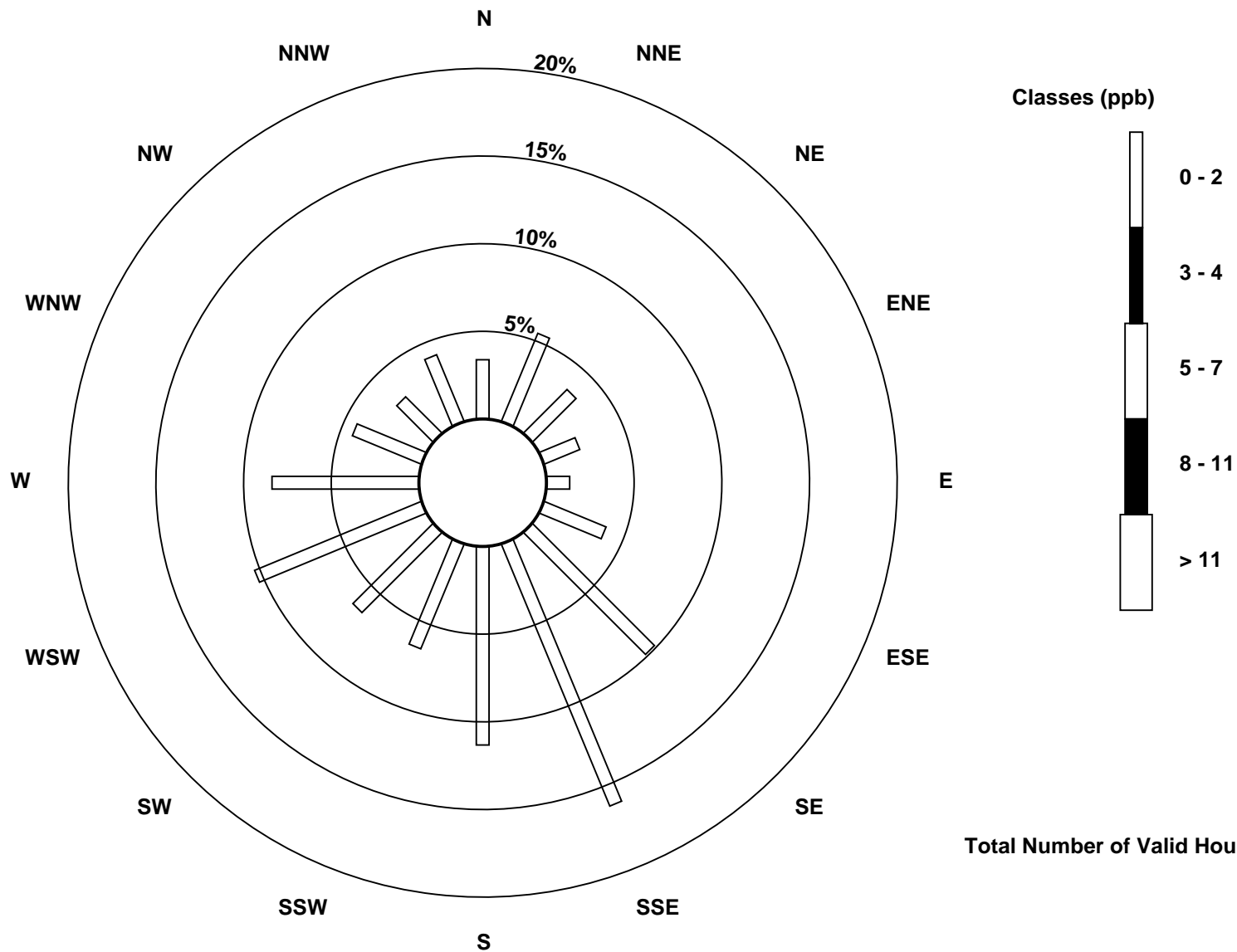
Total Number of Valid Hours: 680

Total Number of Hours: 720

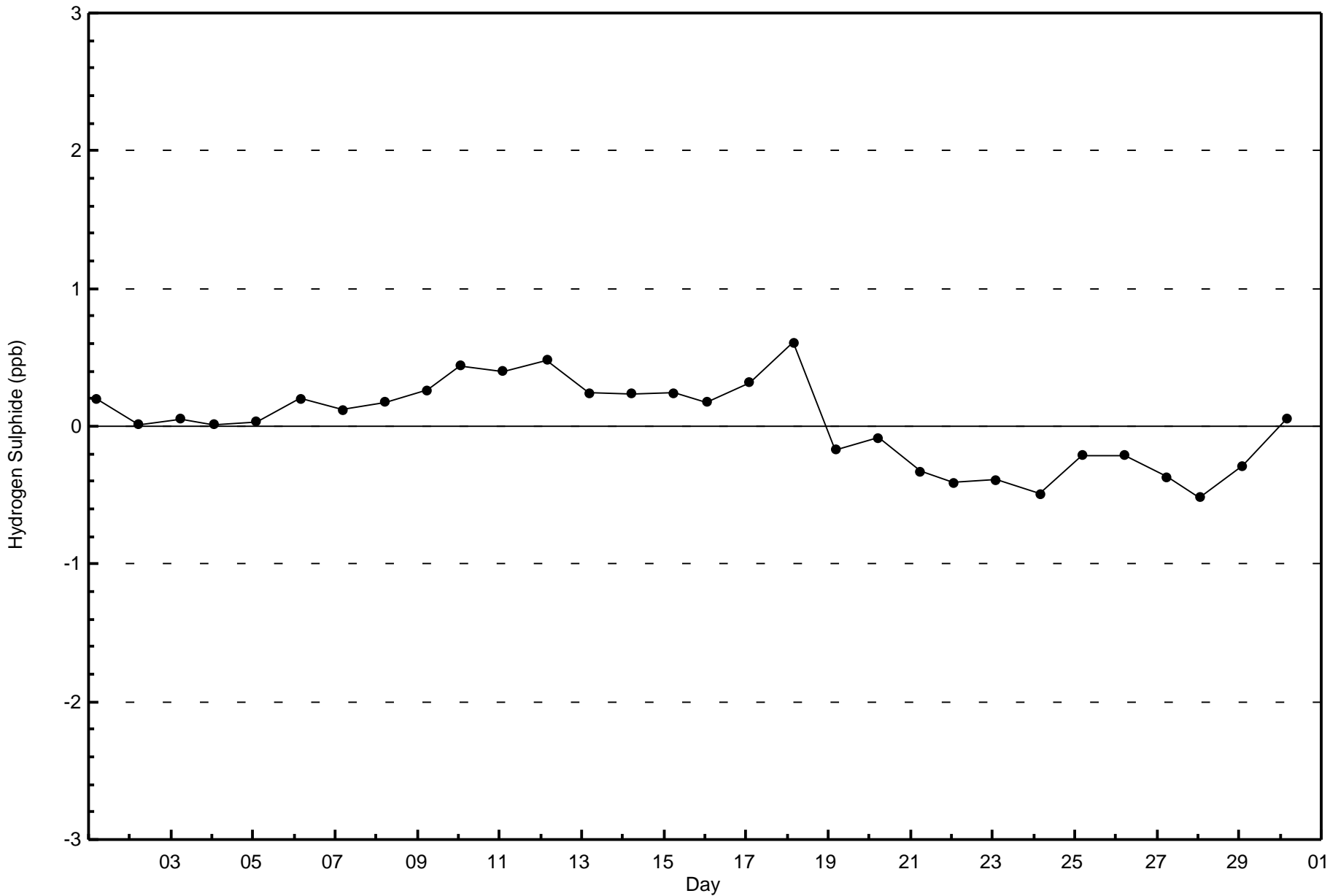


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Hydrogen Sulphide (H₂S) - ppb
Mackay River (AMS 20)



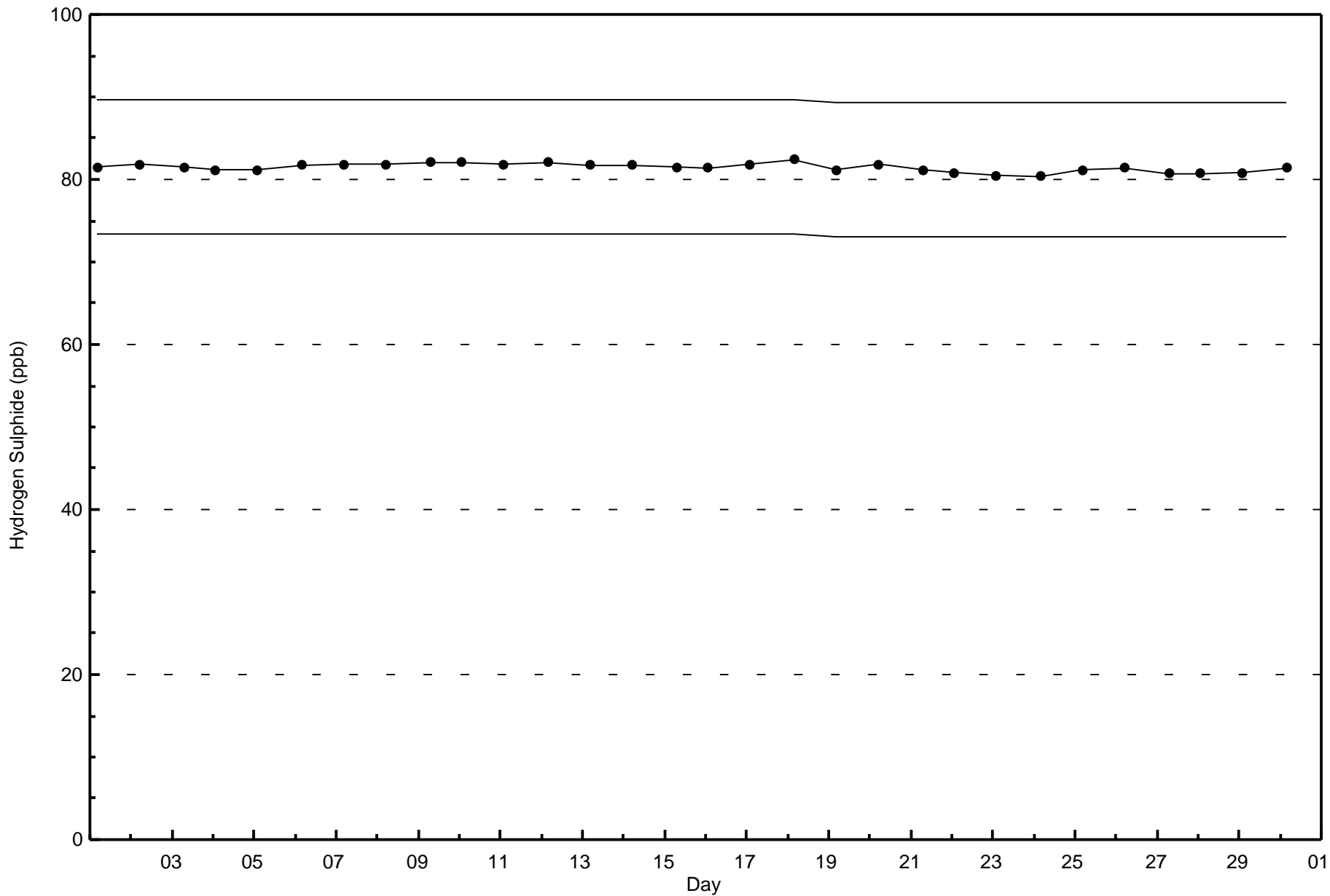
Total Number of Valid Hours: 680





Wood Buffalo Environmental Association
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Mackay River - September 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

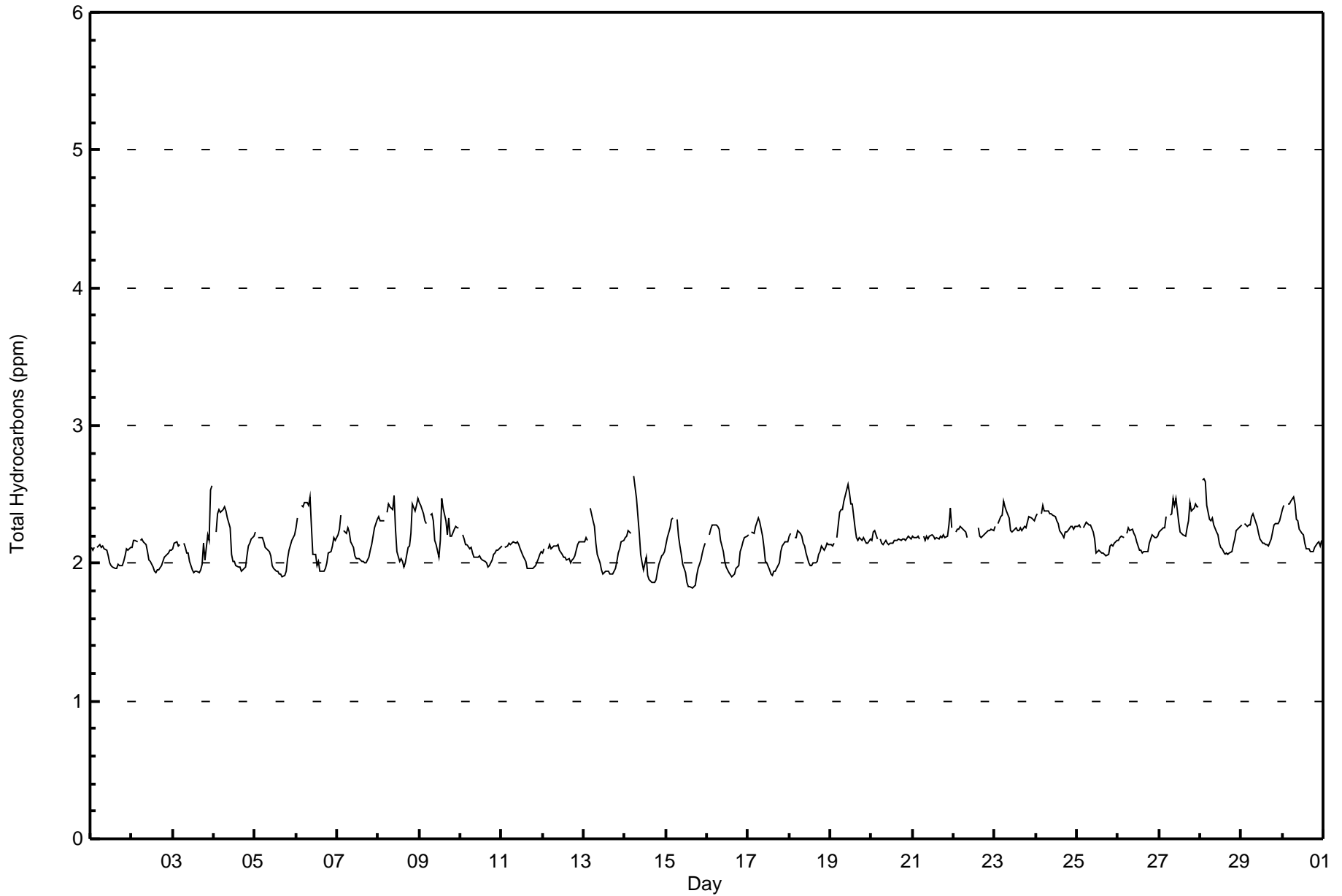
Total Hydrocarbons (THC) - ppm
Mackay River - September 2017

| Maximum Value: 2.6 ppm on Sep 14 06:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.3 ppm on Sep 27 | | | | | Hours in Service: 720 | | | | |
|--|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|-----|-----------------|---------------------------|---------------|-----|-----|-----|
| Minimum Value: 1.8 ppm on Sep 15 16:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.0 ppm on Sep 15 | | | | | Hours of Data: 685 | | | | |
| Maximum Diurnal Average: 2.3 ppm at hour 7 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.0 ppm at hour 17 | | | | | Hours of Missing Data: 35 | | | | |
| Monthly Average: 2.17 ppm | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 2.6 | | | | | Hours of Calibration: 35 | | | | |
| | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 1-Sep | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | |
| 2-Sep | 2.1 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 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 | 2.2 |
| 3-Sep | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.2 | 2.2 | 2.5 | 2.6 | 2.1 | 2.1 | 2.6 | 2.6 | |
| 4-Sep | Z | 2.2 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 | |
| 5-Sep | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | |
| 6-Sep | 2.3 | 2.3 | Z | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.3 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.5 | |
| 7-Sep | 2.2 | 2.2 | 2.3 | Z | 2.2 | 2.2 | 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 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.1 | 2.1 | 2.3 | 2.3 | |
| 8-Sep | 2.3 | 2.3 | 2.3 | 2.3 | Z | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.4 | 2.4 | 2.4 | 2.5 | 2.3 | 2.3 | 2.5 | 2.5 | |
| 9-Sep | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | Z | 2.4 | 2.4 | 2.3 | 2.2 | 2.1 | 2.0 | 2.2 | 2.5 | 2.4 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.5 | 2.5 | |
| 10-Sep | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | |
| 11-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | |
| 12-Sep | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | |
| 13-Sep | 2.2 | 2.2 | 2.2 | Z | 2.4 | 2.3 | 2.3 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.4 | 2.4 | | |
| 14-Sep | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.6 | 2.6 | 2.5 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.6 | 2.6 | |
| 15-Sep | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | Z | 2.3 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.3 | 2.3 | |
| 16-Sep | Z | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.3 | 2.3 | |
| 17-Sep | 2.2 | Z | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.3 | 2.3 | |
| 18-Sep | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | |
| 19-Sep | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.6 | 2.5 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.6 | 2.6 | |
| 20-Sep | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | |
| 21-Sep | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 | 2.3 | 2.2 | 2.2 | 2.4 | 2.4 | |
| 22-Sep | Z | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | C | C | C | C | C | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | |
| 23-Sep | 2.3 | Z | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | |
| 24-Sep | 2.3 | 2.4 | Z | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | |
| 25-Sep | 2.3 | 2.3 | 2.3 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | |
| 26-Sep | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | |
| 27-Sep | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | Z | 2.4 | 2.4 | 2.5 | 2.4 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | |
| 28-Sep | Z | 2.6 | 2.6 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.6 | 2.6 | |
| 29-Sep | 2.3 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | |
| 30-Sep | 2.4 | 2.4 | Z | 2.4 | 2.4 | 2.4 | 2.5 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.4 | 2.4 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Mackay River - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mackay River - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 151 | 22.04 | 22.04 |
| 2.1 - 3.0 | 534 | 77.96 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mackay River - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 2 | 4 | 1 | 1 | 2 | 6 | 8 | 13 | 24 | 10 | 12 | 14 | 22 | 14 | 5 | 13 | 151 |
| 2.1 - 3.0 | 21 | 34 | 23 | 16 | 7 | 22 | 62 | 95 | 55 | 33 | 31 | 57 | 34 | 15 | 15 | 14 | 534 |
| 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 | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |

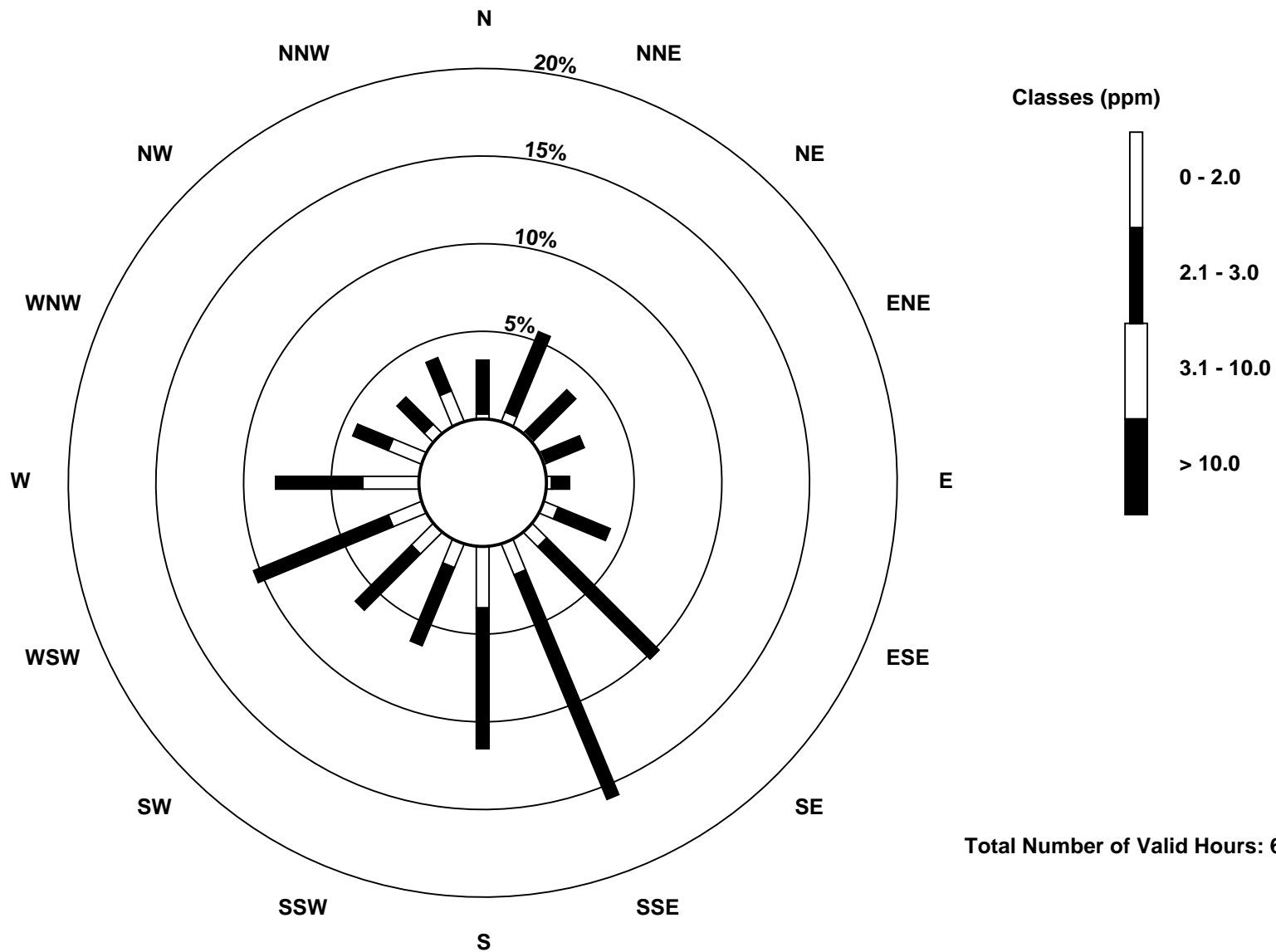
Total Number of Valid Hours: 685

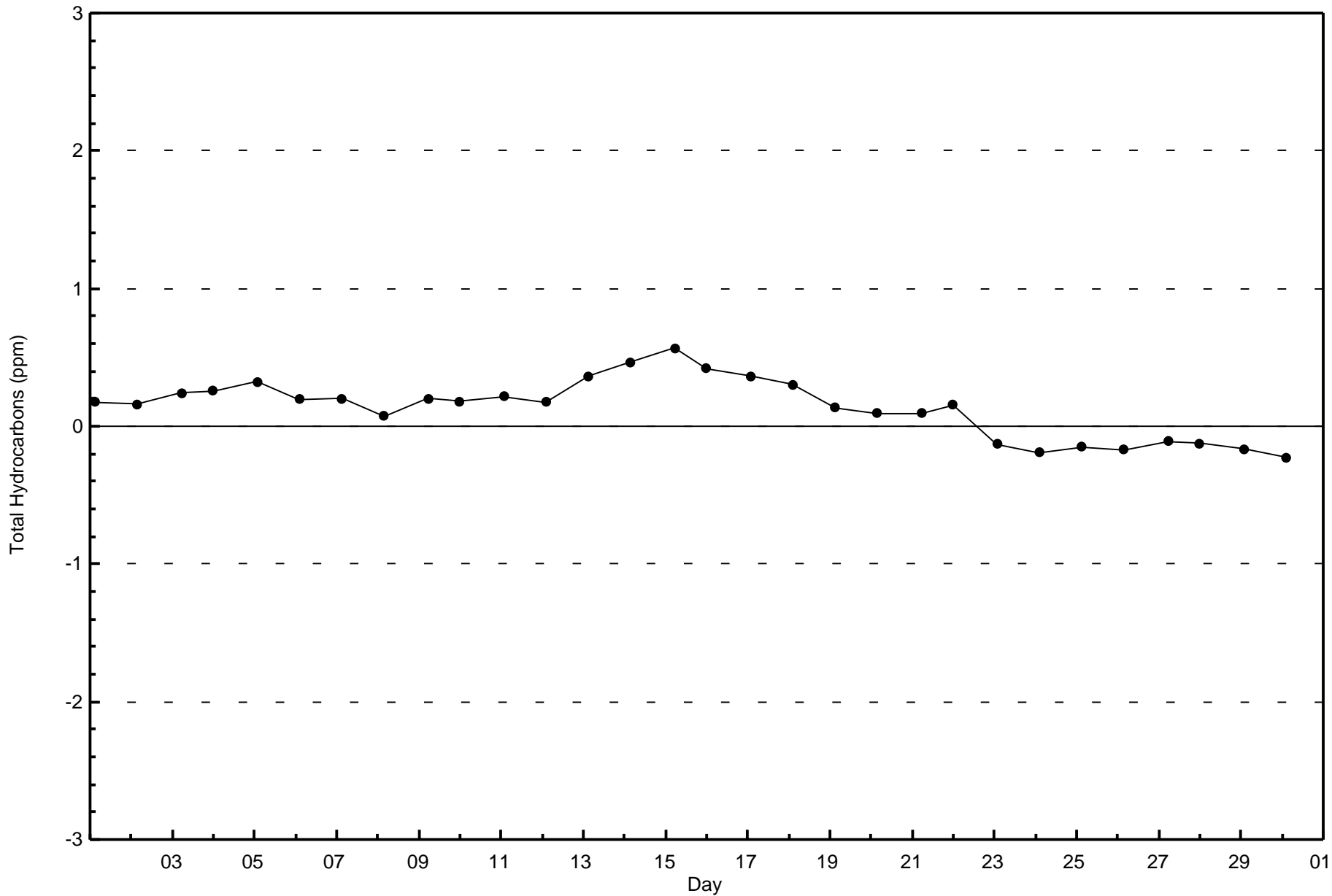
Total Number of Hours: 720

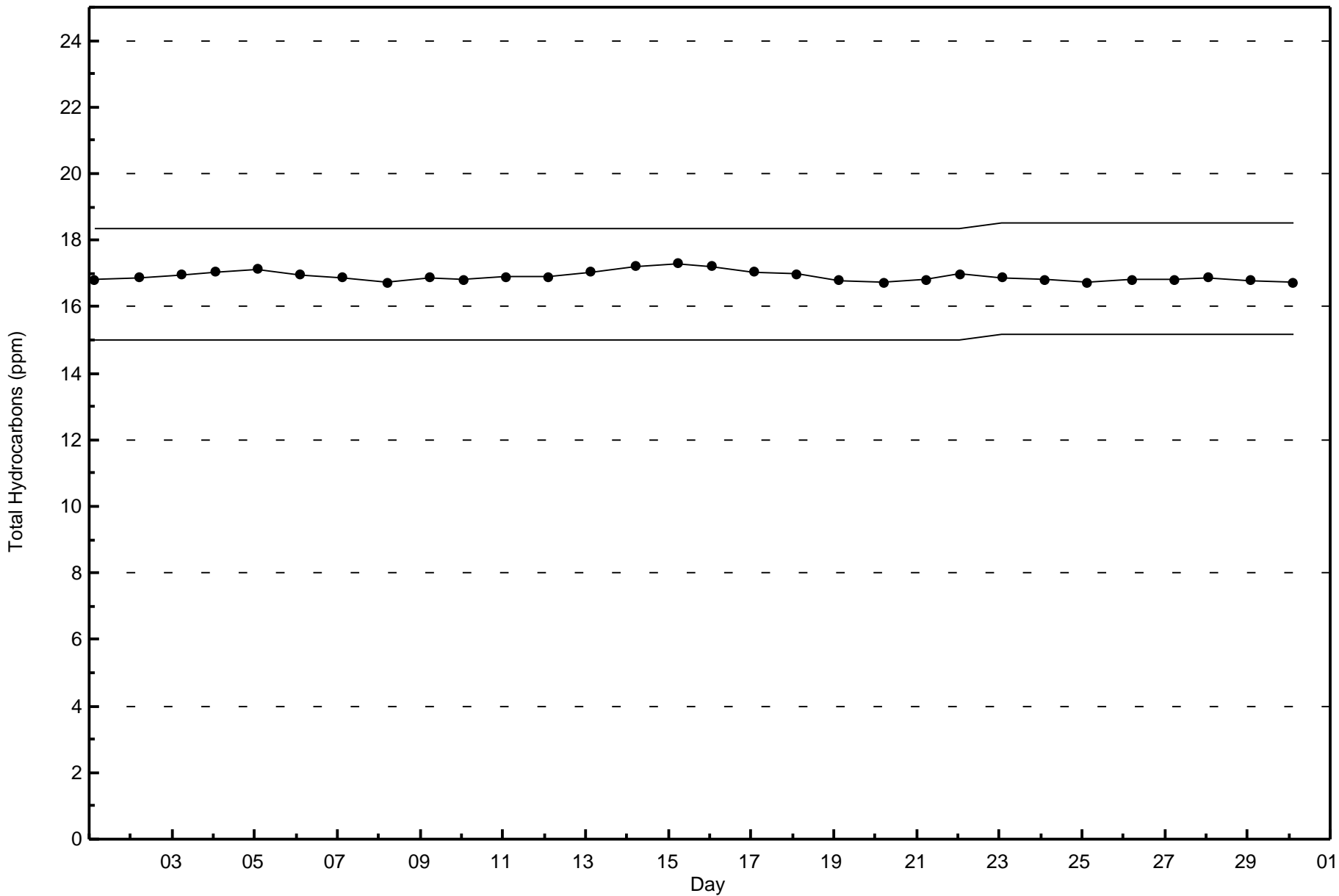


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Mackay River (AMS 20)







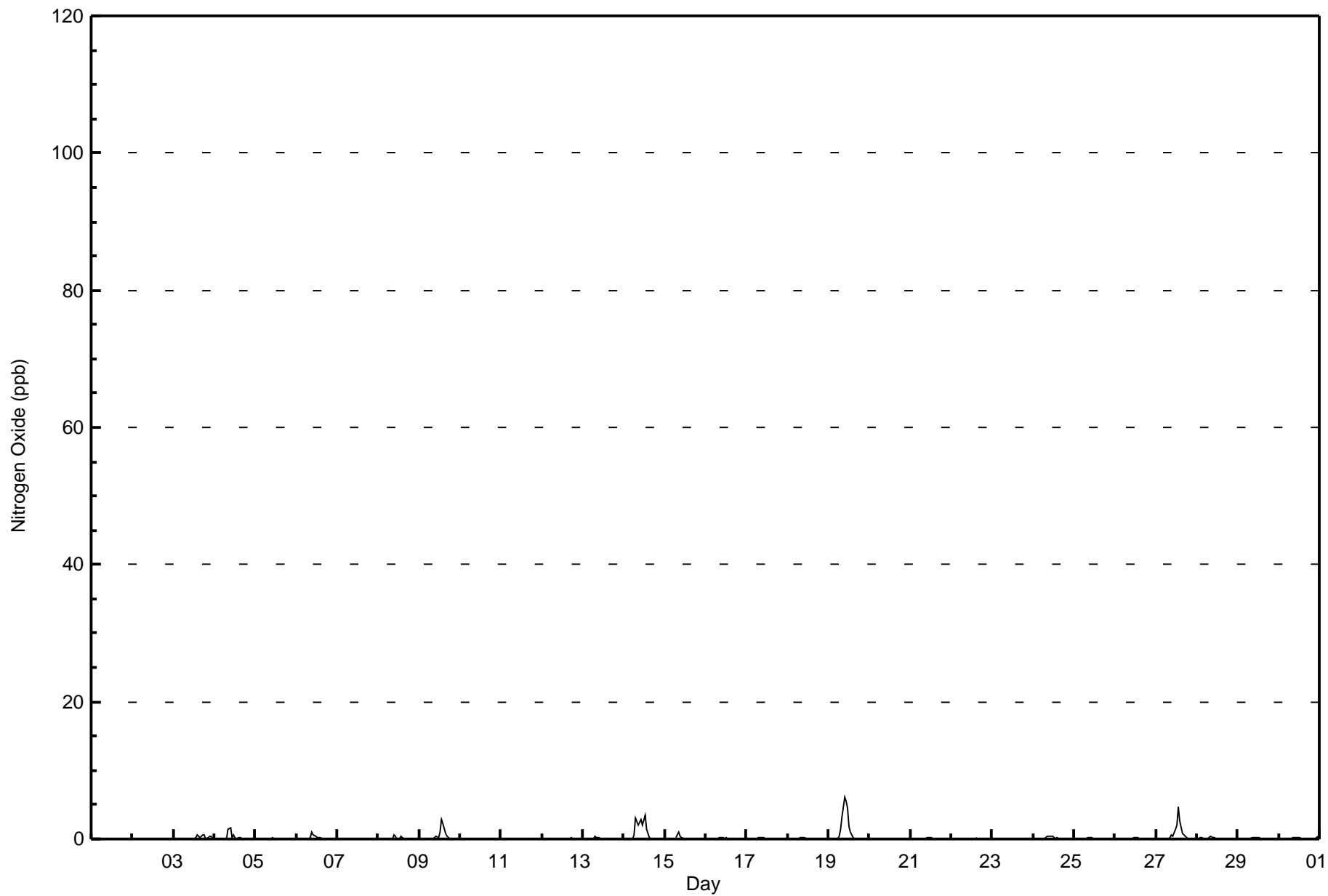


| Maximum Value: 6 ppb on Sep 19 10:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 1.1 ppb on Sep 19 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|---|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|----|----|----|----|----|----|-----------------|---------------|---------------|---|--|--|--|--|--|--|---------------------------|--|--|--|
| Minimum Value: 0 ppb on Sep 1 01:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 20 | | | | | | | | | | | | | | | | | Hours of Data: 685 | | | |
| Maximum Diurnal Average: 0.5 ppb at hour 10 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.0 ppb at hour 1 | | | | | | | | | | | | | | | | | Hours of Missing Data: 35 | | | |
| Monthly Average: 0.2 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 3 | | | | | | | | | | | | | | | | | Hours of Calibration: 35 | | | |
| | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 | | | | | | | | | | | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | | | | | | | | | | | |
| 10-Sep | Z | 0 | 0 | 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-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 3 | 2 | 2 | 3 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 3 | | | | | | | | | | | |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | | |
| 17-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 6 | 6 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 | | | | | | | | | | | |
| 20-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | | | |
| 22-Sep | 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 | | | | | | | | | | | |
| 23-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 5 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 | | | | | | | | | | | |
| 28-Sep | Z | 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-Sep | 0 | 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 | | | | | | | | | | | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Mackay River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |

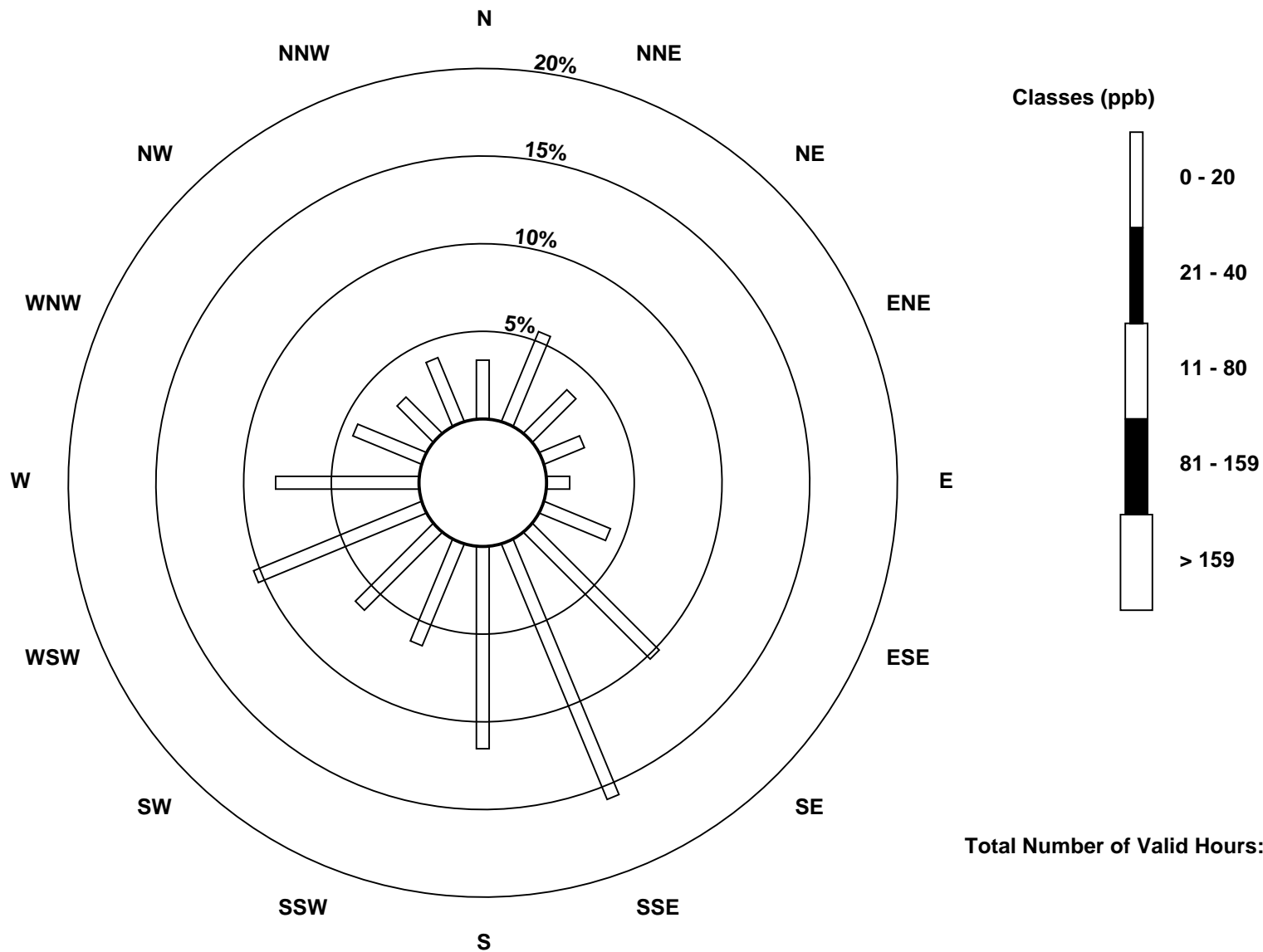
Total Number of Valid Hours: 685

Total Number of Hours: 720

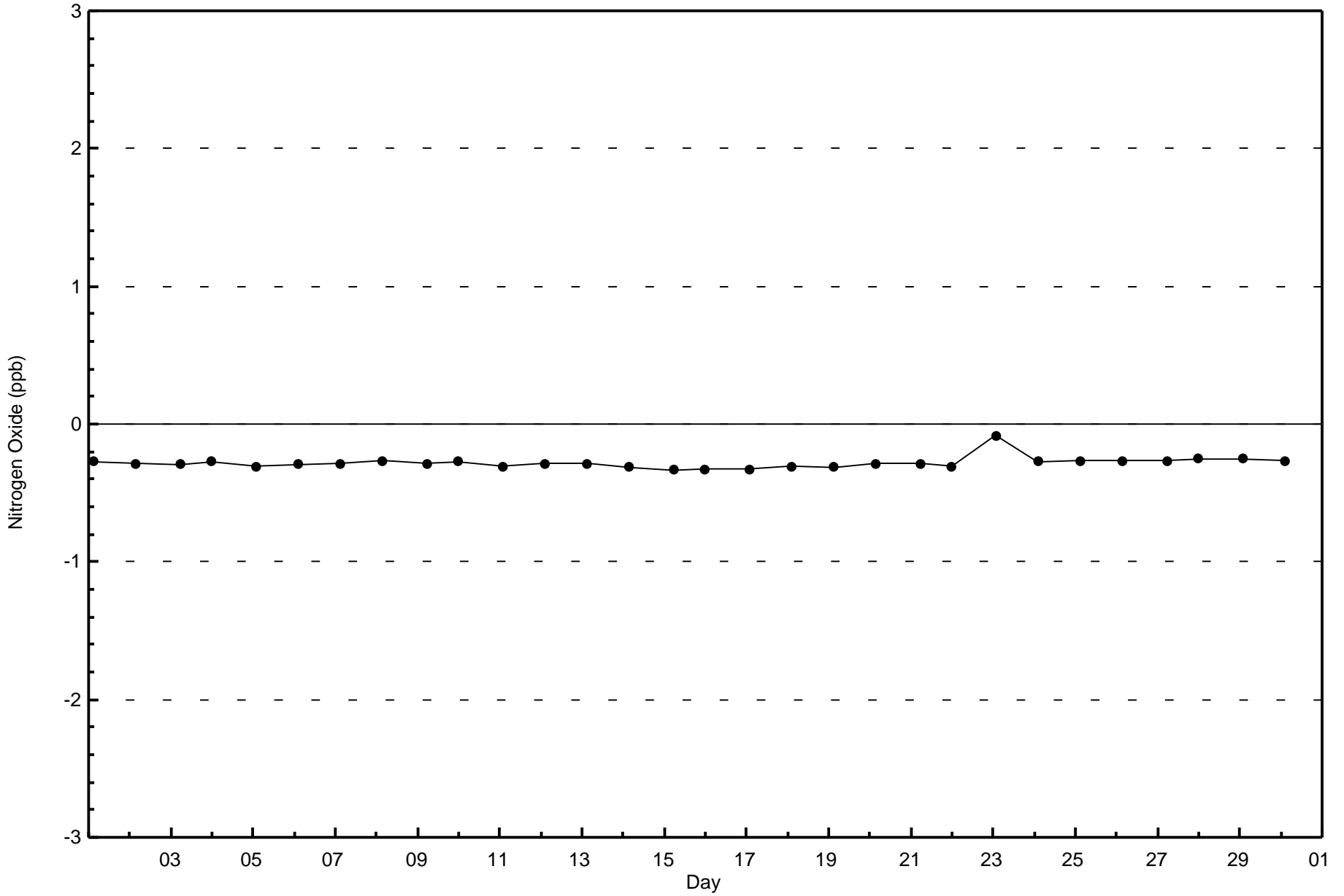


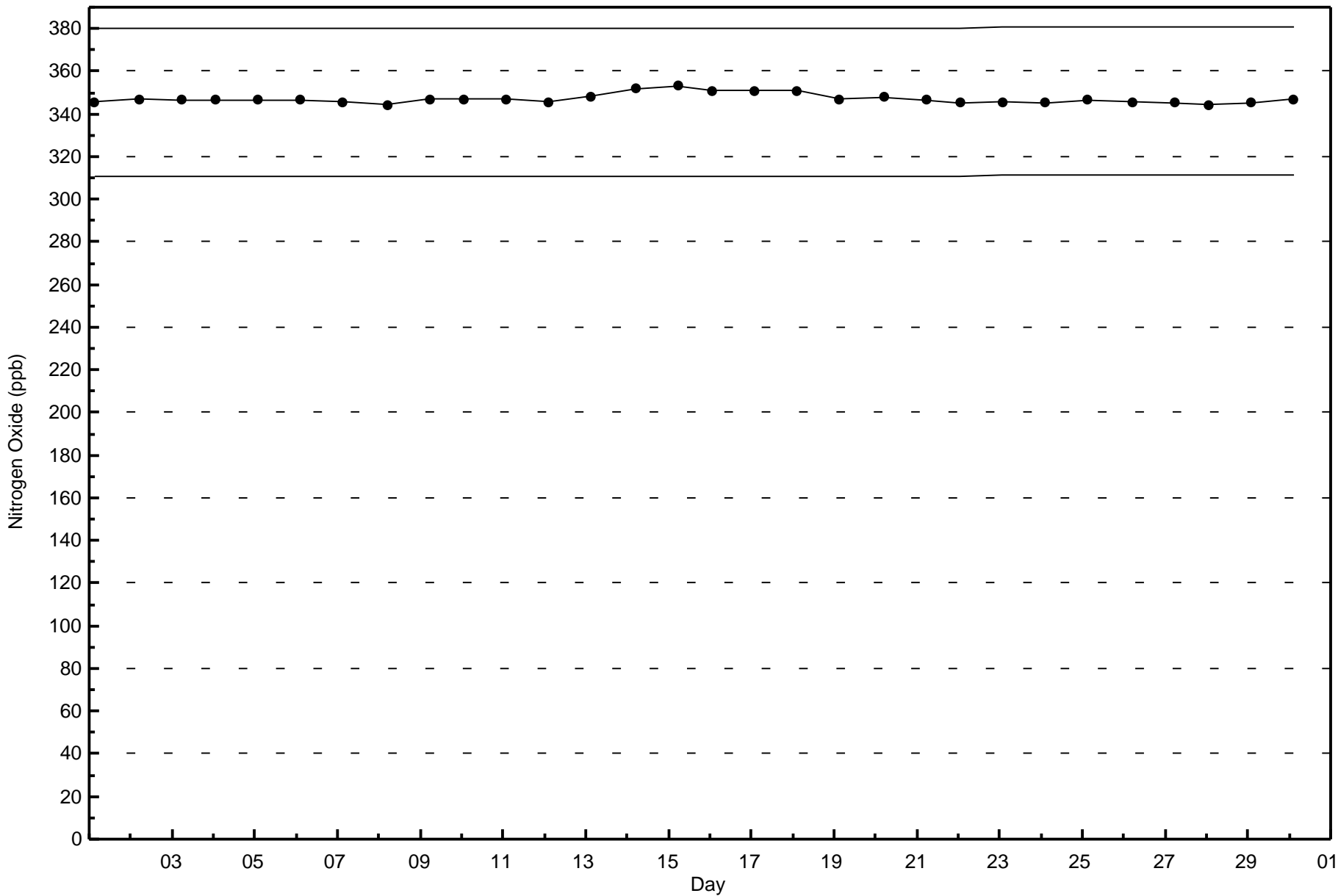
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxide (NO) - ppb
Mackay River (AMS 20)



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Mackay River - September 2017

| | | | | |
|---|--|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 11 ppb on Sep 28 02:00 | Maximum Daily Average: 3.9 ppb on Sep 19 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 4 21:00 | Minimum Daily Average: 0.3 ppb on Sep 22 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 1.5 ppb at hour 14 | Minimum Diurnal Average: 0.6 ppb at hour 1 | | Hours of Calibration: | 35 |
| Monthly Average: 1.0 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 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-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 2-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 6 | 1 | 4 | 6 | 6 | 2 | 1.5 | 6 | |
| 4-Sep | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0.4 | 1 | |
| 6-Sep | 0 | 1 | Z | 1 | 0 | 0 | 0 | 1 | 2 | 5 | 4 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1.5 | 5 | |
| 7-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 | |
| 8-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 5 | 3 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.2 | 5 | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 2 | 2 | 3 | 7 | 9 | 9 | 7 | 6 | 4 | 3 | 3 | 2 | 2 | 2.7 | 9 | |
| 10-Sep | Z | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 2 | |
| 11-Sep | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 3 | 3 | 2 | 0.6 | 3 | |
| 13-Sep | 2 | 3 | 2 | Z | 4 | 3 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 1 | 2 | 4 | 3 | 4 | 5 | 4 | 6 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1.8 | 6 | |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0.5 | 1 | |
| 17-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 | |
| 18-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.7 | 1 | |
| 19-Sep | 0 | 0 | 0 | Z | 1 | 9 | 9 | 9 | 8 | 11 | 10 | 8 | 8 | 8 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 3.9 | 11 | |
| 20-Sep | 2 | 4 | 4 | 2 | Z | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 | |
| 21-Sep | 0 | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 1 | |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0.3 | 1 | |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | 1 | |
| 24-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 | |
| 25-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 26-Sep | 0 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 1 | 3 | 5 | 11 | 6 | 4 | 5 | 7 | 10 | 6 | 6 | 7 | 7 | 3.8 | 11 | |
| 28-Sep | Z | 11 | 7 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.6 | 11 | |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.9 | 2 | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0.6 | 1 | |

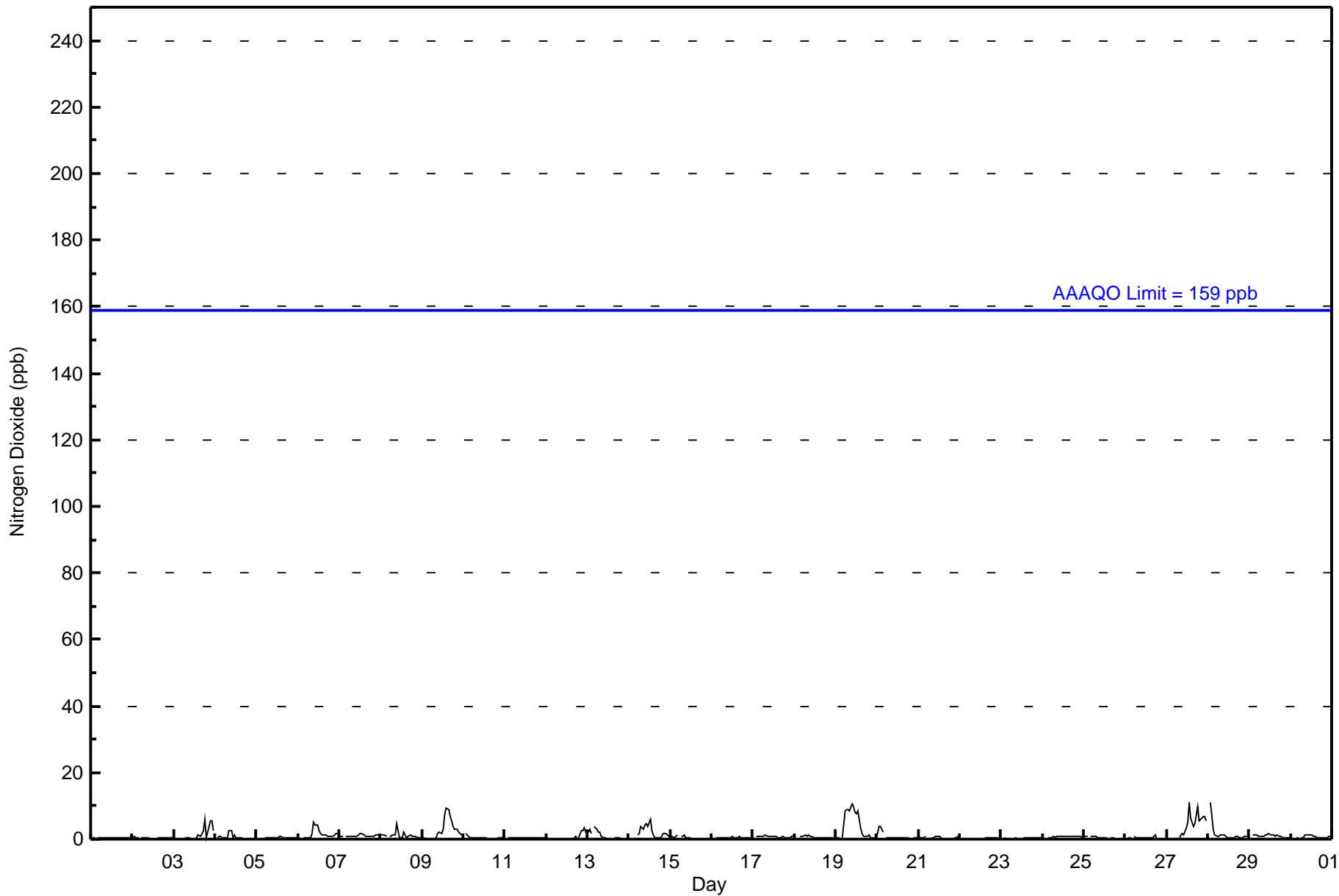
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.6 | 1.1 | 1.0 | 0.6 | 0.7 | 1.0 | 0.9 | 1.0 | 1.1 | 1.5 | 1.3 | 1.2 | 1.3 | 1.5 | 1.2 | 0.9 | 0.9 | 1.0 | 1.1 | 0.7 | 1.0 | 1.0 | 1.0 | 0.8 | Diurnal Average |
| 2 | 11 | 7 | 3 | 4 | 9 | 9 | 9 | 8 | 11 | 10 | 8 | 8 | 11 | 9 | 9 | 7 | 7 | 10 | 6 | 6 | 7 | 7 | 6 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Mackay River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



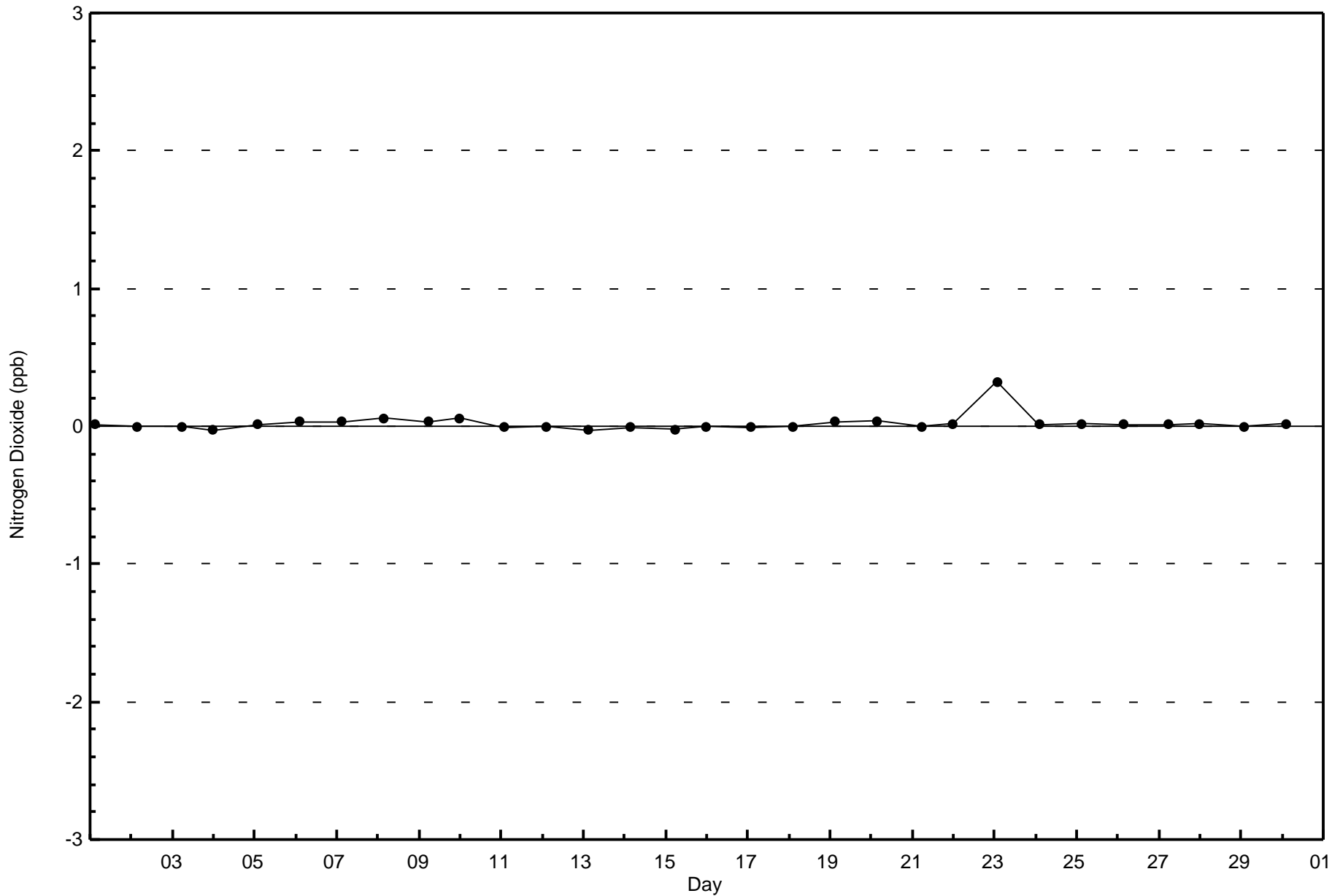
**Wood Buffalo Environmental Association
Frequency Distribution**

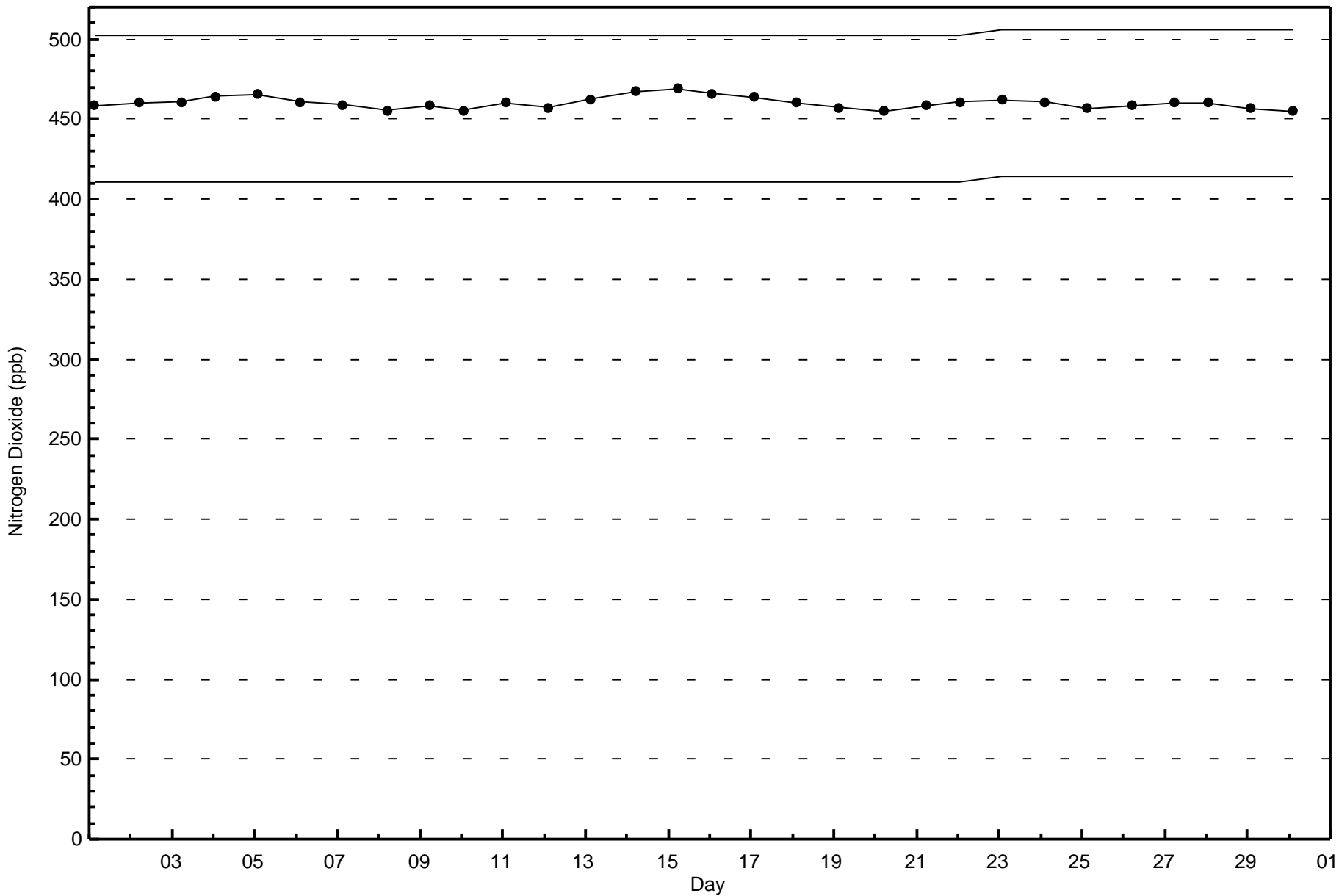
**Nitrogen Dioxide (NO₂) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |

Total Number of Valid Hours: 685

Total Number of Hours: 720







Wood Buffalo Environmental Association
Summary of Hour Averages

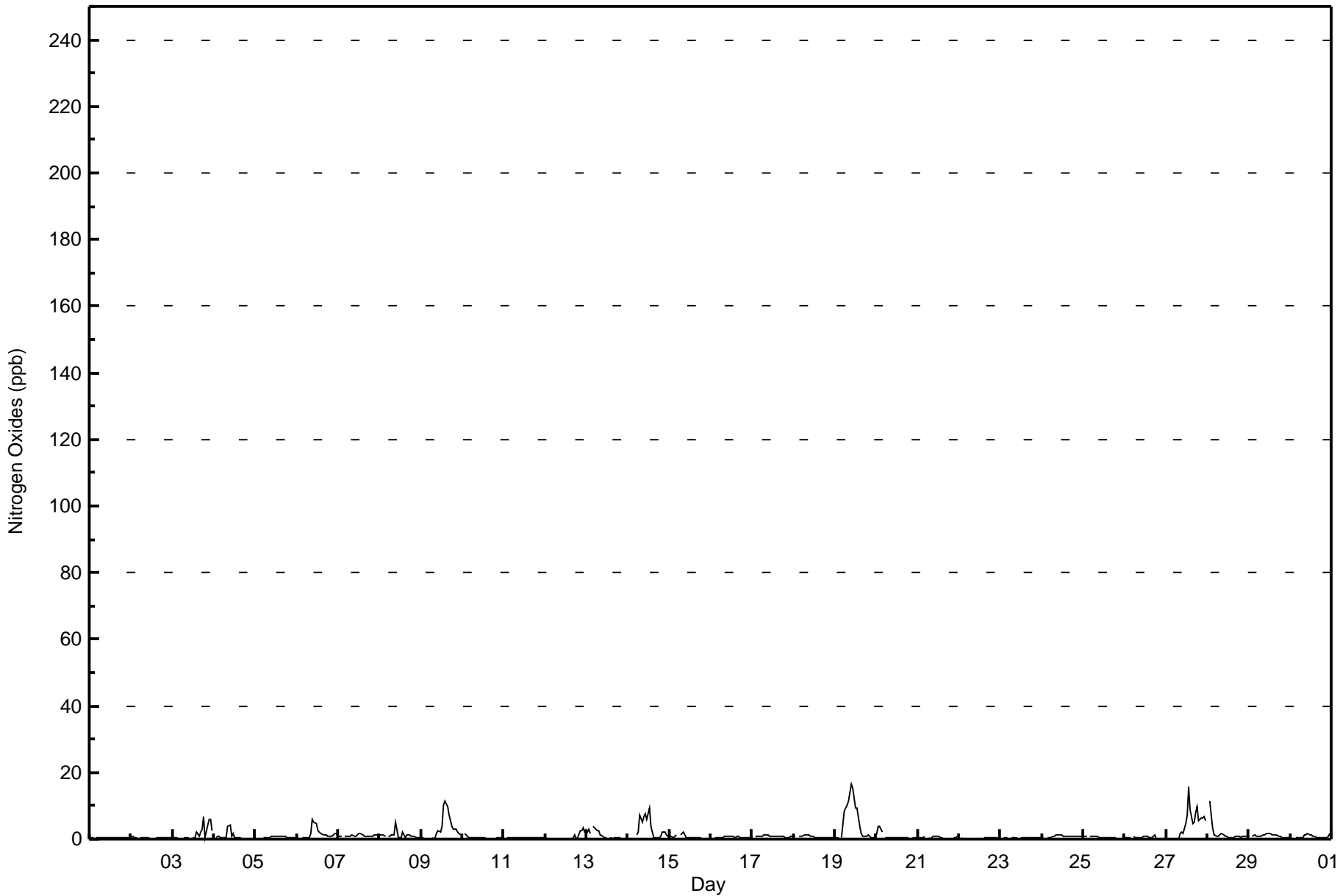
Nitrogen Oxides (NO_x) - ppb
Mackay River - September 2017

| Maximum Value: 17 ppb on Sep 19 10:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 5.0 ppb on Sep 19 | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|----|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|---------------------------|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Minimum Value: 0 ppb on Sep 27 04:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.3 ppb on Sep 22 | | | | | | Hours of Data: 685 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.0 ppb at hour 10 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.6 ppb at hour 1 | | | | | | Hours of Missing Data: 35 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.2 ppb | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 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-Sep | 1 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 1 | 1 | 1 | 1 | Z | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 3 | 7 | 1 | 4 | 6 | 6 | 2 | 1.6 | 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 4 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 5 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.7 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 5 | 3 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.2 | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 3 | 2 | 4 | 10 | 11 | 10 | 7 | 6 | 4 | 3 | 3 | 2 | 2 | 1 | 3.1 | 11 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | Z | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 3 | 3 | 2 | 0.7 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 2 | 3 | 2 | Z | 4 | 3 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 1 | 2 | 7 | 5 | 7 | 8 | 6 | 10 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2.7 | 10 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | Z | 1 | 9 | 9 | 10 | 12 | 17 | 15 | 12 | 9 | 9 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 5.0 | 17 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 2 | 4 | 4 | 2 | Z | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0 | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 2 | 2 | 2 | 5 | 7 | 16 | 9 | 5 | 5 | 8 | 10 | 6 | 6 | 7 | 7 | 6 | 4.4 | 16 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | Z | 11 | 7 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.7 | 11 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1.0 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0.7 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.6 | 1.1 | 1.0 | 0.6 | 0.7 | 1.0 | 0.9 | 1.2 | 1.5 | 2.0 | 1.7 | 1.6 | 1.6 | 1.9 | 1.4 | 1.0 | 1.0 | 1.1 | 1.1 | 0.7 | 1.0 | 1.0 | 1.0 | 0.9 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 2 | 11 | 7 | 3 | 4 | 9 | 9 | 10 | 12 | 17 | 15 | 12 | 10 | 16 | 11 | 10 | 7 | 8 | 10 | 6 | 6 | 7 | 7 | 6 | Diurnal Maximum |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Mackay River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 38 | 24 | 17 | 9 | 28 | 70 | 108 | 79 | 43 | 43 | 71 | 56 | 29 | 20 | 27 | 685 |

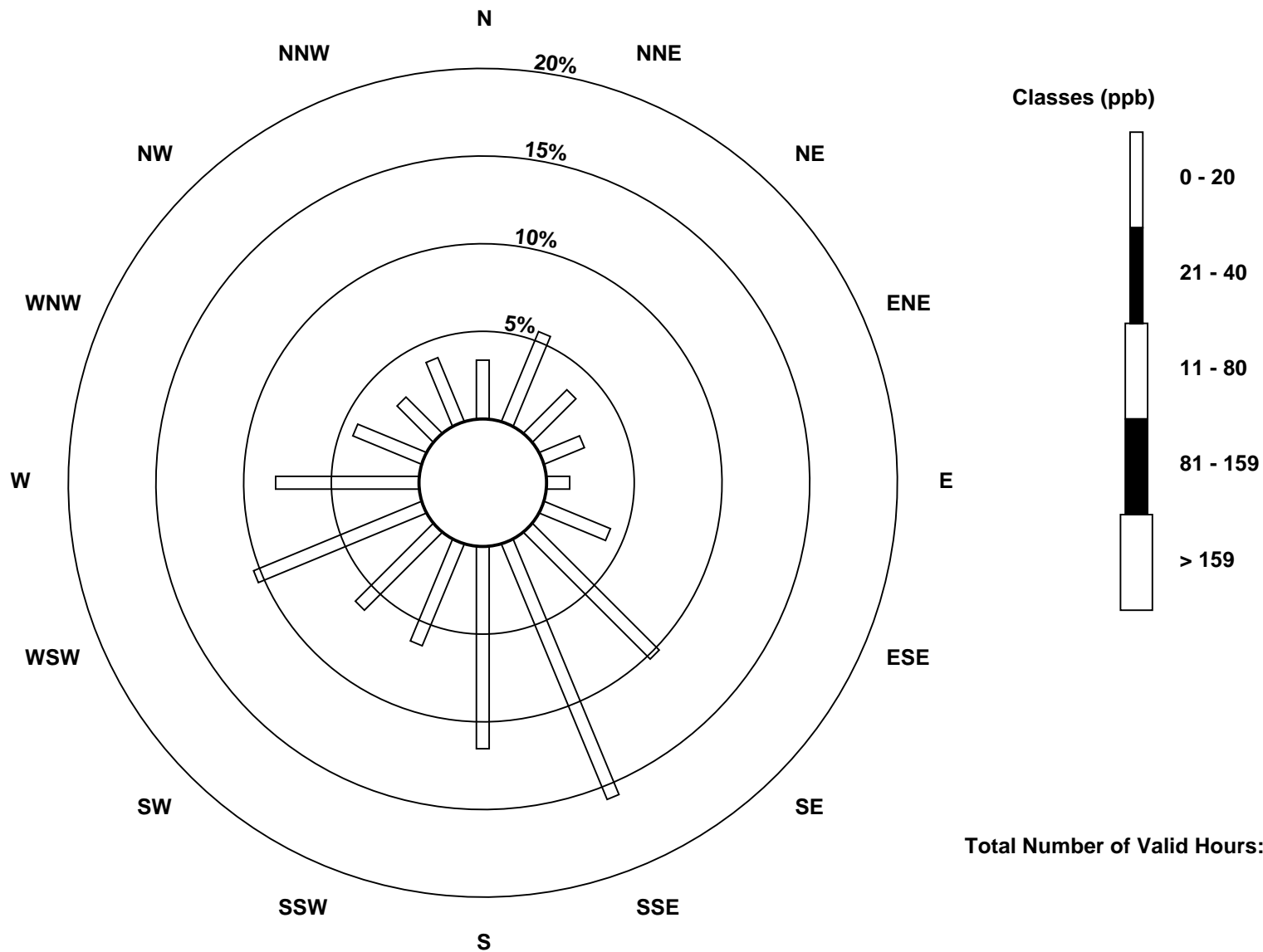
Total Number of Valid Hours: 685

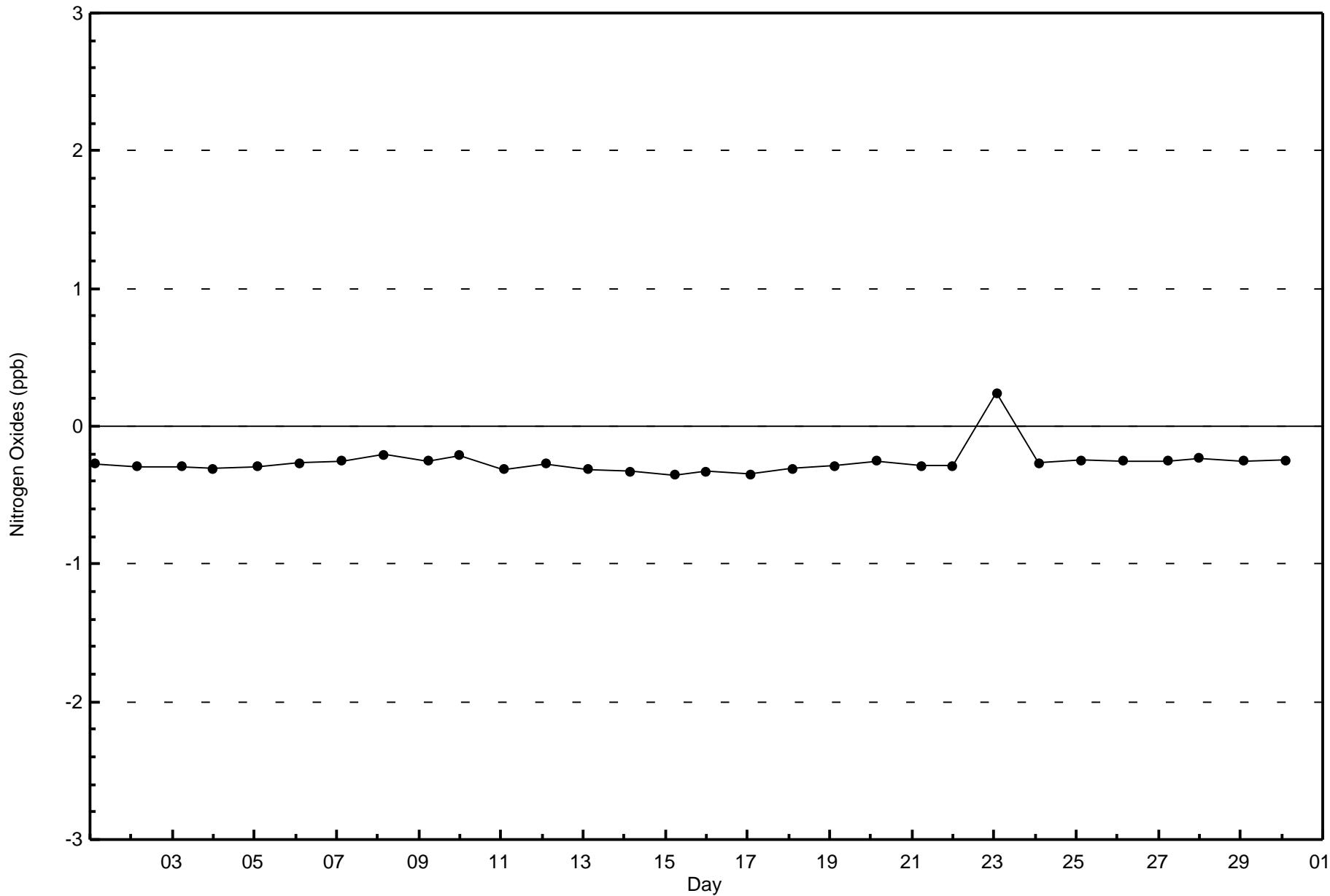
Total Number of Hours: 720

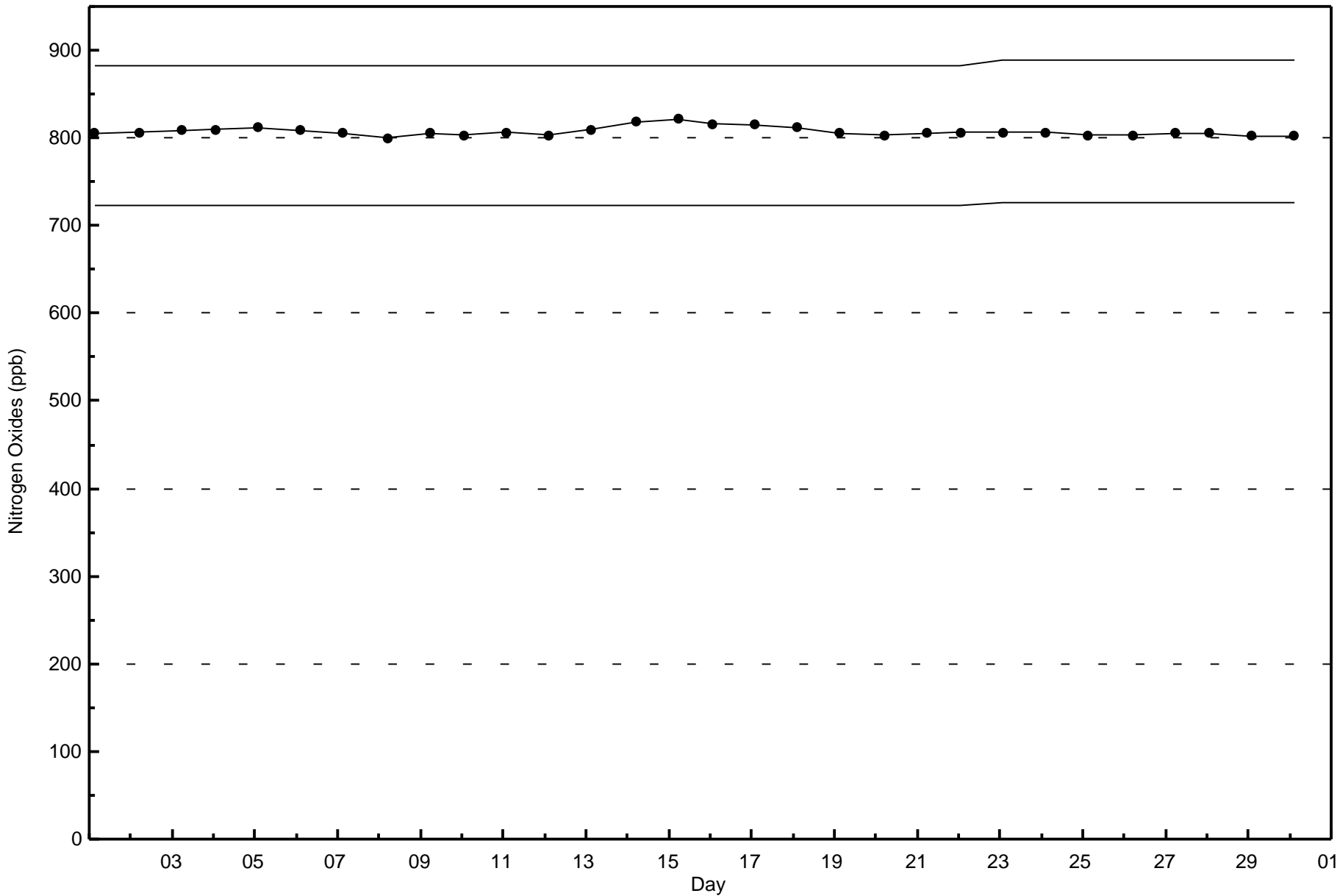


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxides (NO_x) - ppb
Mackay River (AMS 20)









Wood Buffalo Environmental Association
Summary of Hour Averages

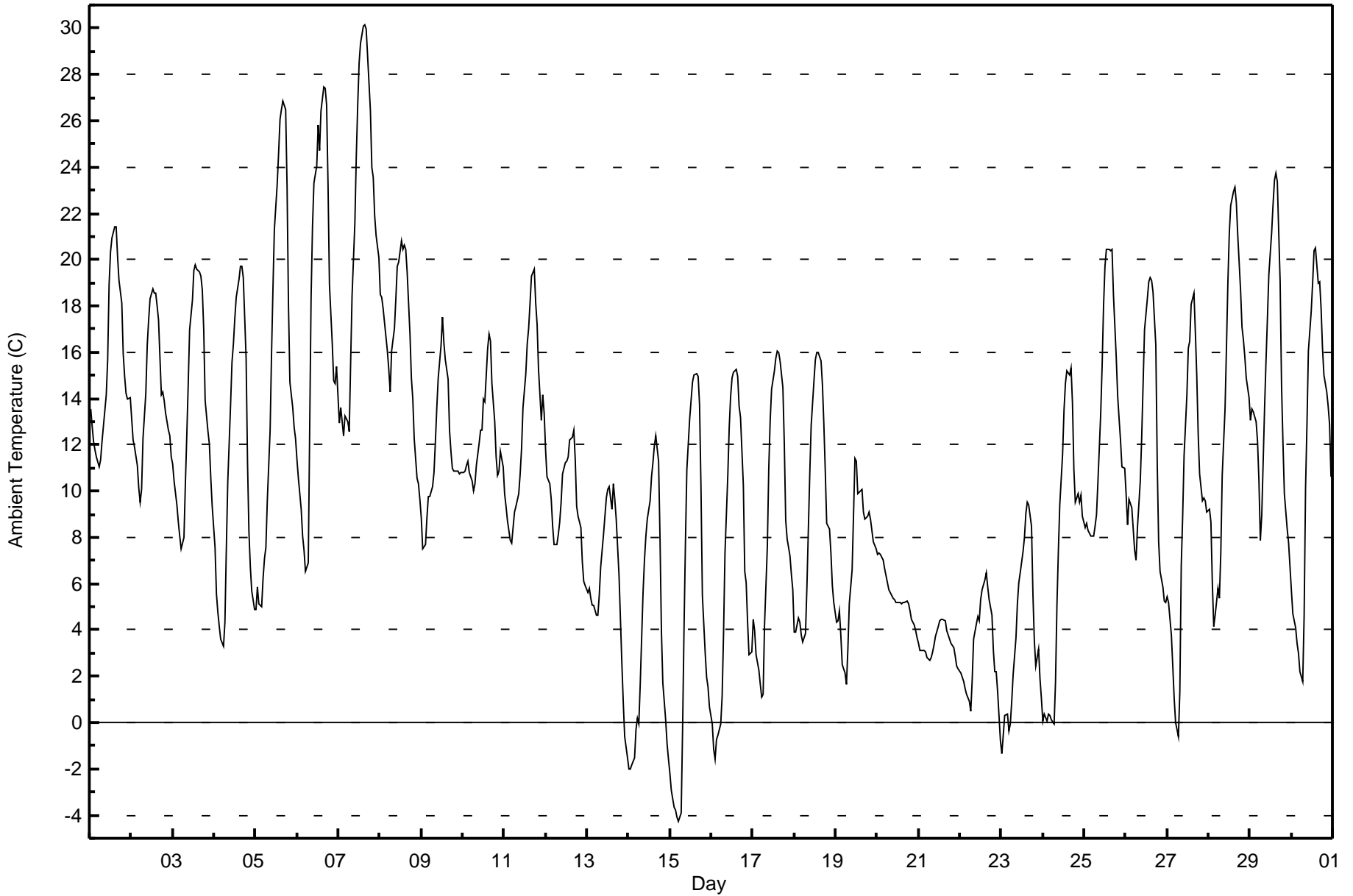
Ambient Temperature (AT) - C
Mackay River - September 2017

| Maximum Value: 30.2 C on Sep 7 16:00 Minimum Value: -4.2 C on Sep 15 06:00 Maximum Diurnal Average: 16.8 C at hour 16 Monthly Average: 10.58 C | | Maximum Daily Average: 21.3 C on Sep 7 Minimum Daily Average: 3.2 C on Sep 22 Minimum Diurnal Average: 5.4 C at hour 7 Percentiles: P ₁ = -2.0 P ₁₀ = 2.2 Q ₁ = 5.4 Median = 10.3 Q ₃ = 15.0 P ₉₀ = 19.3 P ₉₉ = 26.7 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 13.6 | 12.8 | 12.2 | 11.8 | 11.5 | 11.0 | 11.4 | 12.2 | 12.8 | 14.2 | 15.7 | 18.9 | 20.3 | 20.9 | 21.4 | 21.4 | 20.1 | 19.1 | 18.1 | 15.9 | 14.9 | 14.2 | 14.0 | 14.0 | 15.5 | 21.4 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 13.1 | 12.2 | 11.9 | 11.1 | 10.1 | 9.5 | 10.1 | 12.3 | 14.2 | 16.3 | 17.4 | 18.3 | 18.7 | 18.6 | 18.6 | 18.0 | 17.4 | 14.2 | 14.3 | 13.9 | 13.4 | 12.6 | 12.4 | 11.5 | 14.2 | 18.7 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 11.2 | 10.4 | 9.4 | 8.7 | 8.1 | 7.5 | 8.0 | 10.3 | 12.4 | 14.6 | 17.0 | 18.3 | 19.5 | 19.8 | 19.6 | 19.5 | 19.3 | 18.6 | 17.0 | 13.9 | 12.6 | 12.0 | 10.6 | 9.3 | 13.6 | 19.8 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 7.5 | 5.5 | 4.8 | 4.2 | 3.6 | 3.3 | 4.3 | 7.5 | 10.4 | 13.7 | 15.6 | 16.4 | 17.5 | 18.4 | 19.2 | 19.7 | 19.7 | 19.2 | 15.7 | 11.2 | 8.3 | 6.7 | 5.7 | 4.9 | 11.0 | 19.7 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 4.9 | 5.9 | 5.2 | 5.0 | 6.2 | 7.1 | 7.6 | 9.6 | 12.6 | 15.9 | 18.7 | 21.3 | 23.2 | 24.6 | 26.1 | 26.5 | 26.8 | 26.5 | 23.2 | 18.0 | 14.7 | 13.6 | 12.8 | 12.3 | 15.3 | 26.8 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 11.4 | 10.5 | 9.2 | 8.1 | 7.4 | 6.5 | 6.9 | 12.6 | 18.4 | 21.4 | 23.3 | 24.0 | 25.8 | 24.7 | 26.4 | 27.4 | 27.4 | 26.7 | 23.2 | 18.9 | 16.4 | 14.8 | 14.7 | 15.4 | 17.6 | 27.4 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 13.0 | 13.6 | 13.0 | 12.4 | 13.2 | 13.0 | 12.6 | 15.5 | 18.4 | 21.6 | 24.5 | 26.7 | 28.5 | 29.4 | 30.1 | 30.2 | 29.9 | 28.8 | 26.4 | 24.0 | 23.6 | 21.9 | 21.1 | 20.1 | 21.3 | 30.2 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 18.5 | 18.3 | 17.9 | 16.7 | 16.0 | 15.2 | 14.3 | 16.1 | 17.0 | 18.3 | 19.7 | 19.9 | 20.8 | 20.5 | 20.6 | 20.4 | 19.5 | 16.8 | 14.9 | 14.0 | 12.2 | 10.5 | 10.3 | 9.6 | 16.6 | 20.8 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 8.9 | 7.5 | 7.7 | 8.9 | 9.8 | 9.7 | 10.2 | 10.8 | 12.2 | 13.6 | 14.9 | 16.3 | 17.5 | 16.4 | 15.7 | 14.8 | 12.6 | 11.7 | 11.0 | 10.9 | 10.9 | 10.9 | 10.8 | 10.8 | 11.9 | 17.5 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 10.8 | 10.9 | 11.1 | 11.3 | 10.8 | 10.4 | 10.0 | 10.3 | 11.1 | 12.1 | 12.6 | 12.6 | 14.0 | 13.9 | 16.1 | 16.8 | 16.5 | 14.7 | 13.0 | 11.5 | 10.7 | 10.9 | 11.7 | 11.1 | 12.3 | 16.8 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 9.9 | 9.4 | 8.7 | 7.9 | 7.8 | 8.4 | 9.1 | 9.3 | 9.9 | 10.7 | 11.8 | 13.6 | 15.1 | 16.3 | 17.0 | 18.1 | 19.3 | 19.6 | 18.1 | 17.2 | 15.3 | 13.1 | 14.2 | 13.4 | 13.0 | 19.6 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 11.8 | 10.6 | 10.3 | 9.6 | 8.5 | 7.7 | 7.7 | 8.1 | 8.7 | 9.5 | 10.7 | 11.2 | 11.3 | 11.5 | 12.2 | 12.3 | 12.7 | 11.3 | 9.3 | 8.9 | 8.4 | 7.0 | 6.1 | 5.9 | 9.6 | 12.7 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 5.6 | 5.8 | 5.4 | 5.1 | 5.1 | 4.7 | 4.7 | 5.5 | 6.7 | 8.1 | 8.9 | 9.7 | 10.1 | 10.2 | 9.2 | 10.3 | 9.7 | 8.8 | 6.4 | 4.4 | 2.6 | 0.8 | -0.6 | -1.5 | 6.1 | 10.3 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | -2.0 | -2.0 | -1.8 | -1.5 | -0.3 | 0.2 | 0.0 | 1.6 | 5.6 | 7.0 | 8.0 | 8.8 | 9.6 | 10.6 | 11.2 | 11.9 | 12.4 | 11.3 | 8.0 | 4.0 | 1.7 | 0.1 | -0.9 | -1.6 | 4.3 | 12.4 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | -2.2 | -2.9 | -3.6 | -3.8 | -4.1 | -4.2 | -3.9 | -0.2 | 4.0 | 7.8 | 10.9 | 13.1 | 13.9 | 14.7 | 15.0 | 15.1 | 14.9 | 13.7 | 10.2 | 5.5 | 3.0 | 2.0 | 1.5 | 0.7 | 5.0 | 15.1 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | -0.1 | -1.1 | -1.6 | -0.7 | -0.5 | -0.1 | 1.2 | 3.9 | 7.3 | 10.7 | 12.8 | 14.1 | 14.9 | 15.1 | 15.2 | 15.0 | 13.7 | 13.2 | 10.3 | 6.5 | 6.1 | 4.3 | 2.9 | 3.1 | 6.9 | 15.2 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 4.4 | 4.0 | 2.9 | 2.2 | 1.7 | 1.1 | 1.2 | 4.2 | 7.7 | 11.0 | 13.1 | 14.4 | 15.2 | 15.7 | 16.1 | 16.0 | 15.6 | 14.5 | 12.1 | 8.7 | 8.0 | 7.2 | 6.4 | 5.7 | 8.7 | 16.1 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 3.9 | 3.9 | 4.5 | 4.3 | 3.8 | 3.5 | 3.9 | 5.8 | 8.3 | 10.7 | 12.8 | 14.8 | 15.7 | 16.0 | 16.0 | 15.6 | 14.6 | 12.9 | 10.9 | 8.6 | 8.3 | 7.3 | 5.9 | 5.2 | 9.1 | 16.0 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 4.3 | 4.4 | 4.9 | 3.8 | 2.5 | 2.1 | 1.7 | 3.2 | 5.1 | 6.6 | 9.0 | 11.4 | 11.3 | 9.9 | 10.0 | 10.1 | 9.1 | 8.8 | 8.9 | 9.1 | 8.8 | 8.3 | 7.8 | 7.5 | 7.0 | 11.4 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 7.3 | 7.3 | 7.3 | 7.0 | 6.7 | 6.3 | 6.0 | 5.8 | 5.5 | 5.4 | 5.3 | 5.2 | 5.2 | 5.2 | 5.1 | 5.2 | 5.2 | 5.3 | 5.1 | 4.8 | 4.5 | 4.2 | 4.0 | 3.7 | 5.5 | 7.3 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 3.4 | 3.1 | 3.1 | 3.1 | 3.0 | 2.8 | 2.7 | 2.8 | 3.1 | 3.4 | 3.7 | 4.1 | 4.4 | 4.5 | 4.4 | 4.4 | 4.0 | 3.8 | 3.6 | 3.4 | 3.2 | 2.8 | 2.4 | 2.3 | 3.4 | 4.5 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 2.1 | 1.9 | 1.8 | 1.5 | 1.2 | 0.9 | 0.5 | 1.9 | 3.6 | 4.3 | 4.6 | 4.4 | 5.3 | 5.7 | 6.2 | 6.5 | 5.9 | 5.3 | 4.6 | 3.1 | 2.2 | 2.2 | 1.3 | -0.8 | 3.2 | 6.5 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | -1.4 | -0.6 | 0.3 | 0.4 | -0.4 | 0.0 | 0.9 | 2.1 | 3.7 | 5.1 | 6.0 | 6.5 | 7.4 | 8.0 | 9.1 | 9.5 | 9.4 | 8.5 | 5.5 | 3.6 | 2.4 | 3.2 | 1.9 | 1.0 | 3.8 | 9.5 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0.1 | 0.4 | 0.0 | 0.4 | 0.3 | 0.1 | -0.1 | 1.8 | 5.1 | 7.4 | 9.4 | 11.6 | 13.5 | 14.7 | 15.2 | 15.0 | 15.3 | 13.8 | 10.9 | 9.5 | 9.9 | 9.5 | 9.8 | 8.9 | 7.6 | 15.3 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 8.4 | 8.6 | 8.3 | 8.2 | 8.1 | 8.1 | 8.5 | 9.0 | 10.4 | 13.4 | 15.4 | 18.0 | 19.7 | 20.4 | 20.4 | 20.4 | 20.4 | 18.5 | 15.7 | 14.1 | 13.1 | 12.2 | 11.0 | 11.0 | 13.4 | 20.4 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 9.8 | 8.5 | 9.6 | 9.3 | 8.3 | 7.5 | 7.0 | 8.4 | 10.4 | 12.3 | 14.7 | 16.9 | 18.3 | 19.0 | 19.2 | 19.1 | 18.6 | 16.3 | 11.2 | 7.8 | 6.5 | 5.8 | 5.2 | 5.2 | 11.5 | 19.2 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 5.4 | 5.2 | 3.8 | 2.4 | 1.1 | 0.0 | -0.6 | 1.3 | 6.8 | 8.9 | 11.6 | 14.1 | 16.2 | 16.5 | 18.1 | 18.5 | 16.9 | 15.0 | 12.4 | 10.7 | 9.6 | 9.7 | 9.6 | 9.1 | 9.3 | 18.5 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 9.2 | 8.6 | 6.0 | 4.2 | 4.6 | 5.8 | 5.4 | 7.3 | 10.7 | 13.6 | 16.2 | 19.0 | 21.1 | 22.4 | 22.9 | 23.1 | 22.4 | 21.0 | 18.7 | 17.1 | 16.5 | 15.8 | 14.9 | 14.1 | 14.2 | 23.1 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 13.0 | 13.5 | 13.4 | 13.0 | 12.2 | 10.4 | 7.9 | 9.0 | 13.6 | 15.6 | 17.5 | 19.4 | 21.1 | 22.4 | 23.4 | 23.7 | 23.4 | 19.0 | 14.6 | 12.1 | 9.9 | 8.4 | 7.8 | 6.7 | 14.6 | 23.7 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 5.7 | 4.7 | 4.1 | 3.4 | 3.0 | 2.2 | 1.8 | 4.7 | 10.1 | 12.9 | 16.0 | 17.8 | 19.0 | 20.4 | 20.5 | 19.0 | 19.1 | 17.9 | 16.2 | 15.0 | 14.3 | 13.7 | 12.9 | 10.6 | 11.9 | 20.5 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 7.1 | 6.7 | 6.3 | 5.9 | 5.6 | 5.4 | 5.4 | 7.1 | 9.5 | 11.5 | 13.3 | 14.7 | 15.8 | 16.2 | 16.7 | 16.8 | 16.4 | 15.2 | 13.0 | 10.9 | 9.7 | 8.9 | 8.3 | 7.6 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 18.5 | 18.3 | 17.9 | 16.7 | 16.0 | 15.2 | 14.3 | 16.1 | 18.4 | 21.6 | 24.5 | 26.7 | 28.5 | 29.4 | 30.1 | 30.2 | 29.9 | 28.8 | 26.4 | 24.0 | 23.6 | 21.9 | 21.1 | 20.1 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Mackay River - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Mackay River - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 31 | 4.31 | 4.31 |
| 0 - 10 | 316 | 43.89 | 48.19 |
| 10 - 20 | 314 | 43.61 | 91.81 |
| > 20 | 59 | 8.19 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

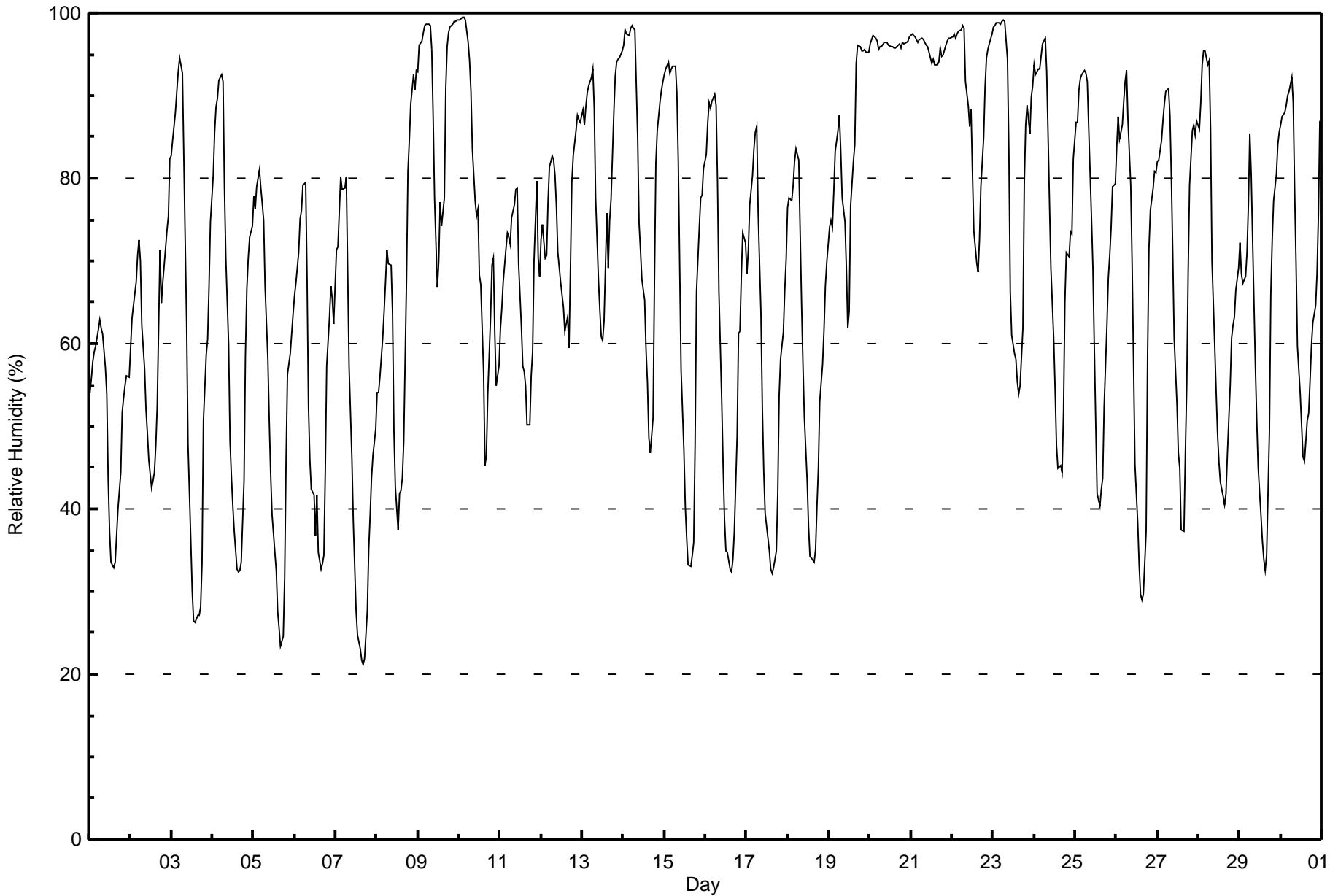
**Relative Humidity (RH) - %
Mackay River - September 2017**

| Maximum Value: 99 % on Sep 10 04:00 Maximum Daily Average: 96.3 % on Sep 20 Minimum Value: 21 % on Sep 7 17:00 Minimum Daily Average: 48.4 % on Sep 7 Maximum Diurnal Average: 87.9 % at hour 7 Minimum Diurnal Average: 47.6 % at hour 16 Monthly Average: 70.1 % Percentiles: P ₁ = 26 P ₁₀ = 38 Q ₁ = 55 Median = 72 O ₃ = 89 P ₉₀ = 96 P ₉₉ = 99 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|-----------------|---------------|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 54 | 56 | 58 | 59 | 60 | 62 | 63 | 62 | 61 | 57 | 54 | 44 | 37 | 34 | 33 | 34 | 37 | 40 | 44 | 52 | 53 | 55 | 56 | 56 | 50.8 | 63 |
| 2-Sep | 59 | 63 | 65 | 67 | 71 | 73 | 70 | 62 | 57 | 52 | 49 | 46 | 43 | 43 | 44 | 48 | 52 | 71 | 65 | 68 | 69 | 74 | 75 | 82 | 61.2 | 82 |
| 3-Sep | 83 | 85 | 88 | 91 | 93 | 95 | 93 | 82 | 72 | 62 | 48 | 36 | 30 | 26 | 26 | 27 | 27 | 28 | 33 | 51 | 59 | 61 | 67 | 75 | 59.9 | 95 |
| 4-Sep | 80 | 86 | 89 | 90 | 92 | 93 | 92 | 79 | 70 | 60 | 48 | 44 | 40 | 37 | 33 | 32 | 33 | 34 | 43 | 59 | 67 | 70 | 73 | 74 | 63.2 | 93 |
| 5-Sep | 78 | 76 | 79 | 81 | 79 | 77 | 75 | 67 | 58 | 51 | 44 | 39 | 35 | 33 | 28 | 26 | 23 | 25 | 32 | 46 | 56 | 59 | 61 | 63 | 53.7 | 81 |
| 6-Sep | 66 | 67 | 71 | 75 | 76 | 79 | 79 | 68 | 52 | 46 | 42 | 42 | 37 | 42 | 35 | 33 | 33 | 34 | 45 | 57 | 63 | 67 | 65 | 62 | 55.7 | 79 |
| 7-Sep | 71 | 72 | 76 | 80 | 79 | 79 | 80 | 69 | 57 | 46 | 38 | 33 | 28 | 25 | 23 | 22 | 21 | 22 | 28 | 35 | 39 | 44 | 46 | 50 | 48.4 | 80 |
| 8-Sep | 54 | 54 | 56 | 61 | 64 | 67 | 71 | 70 | 70 | 64 | 49 | 43 | 37 | 42 | 42 | 44 | 48 | 68 | 81 | 85 | 89 | 93 | 91 | 93 | 63.9 | 93 |
| 9-Sep | 93 | 96 | 97 | 98 | 98 | 99 | 99 | 98 | 96 | 88 | 78 | 67 | 70 | 77 | 74 | 78 | 91 | 96 | 98 | 98 | 99 | 99 | 99 | 99 | 90.9 | 99 |
| 10-Sep | 99 | 99 | 99 | 99 | 99 | 96 | 94 | 90 | 83 | 77 | 75 | 76 | 68 | 67 | 57 | 45 | 46 | 54 | 63 | 70 | 70 | 61 | 55 | 57 | 75.2 | 99 |
| 11-Sep | 62 | 64 | 68 | 72 | 73 | 73 | 72 | 75 | 77 | 79 | 79 | 70 | 62 | 57 | 57 | 55 | 50 | 50 | 56 | 59 | 70 | 80 | 70 | 68 | 66.5 | 80 |
| 12-Sep | 72 | 74 | 70 | 71 | 77 | 81 | 83 | 82 | 80 | 77 | 71 | 67 | 66 | 64 | 61 | 63 | 59 | 69 | 79 | 83 | 86 | 88 | 87 | 87 | 75.0 | 88 |
| 13-Sep | 88 | 86 | 89 | 90 | 91 | 92 | 93 | 89 | 78 | 68 | 64 | 61 | 60 | 63 | 76 | 69 | 75 | 77 | 88 | 92 | 94 | 94 | 95 | 95 | 82.0 | 95 |
| 14-Sep | 96 | 98 | 98 | 97 | 98 | 98 | 98 | 98 | 85 | 75 | 71 | 68 | 65 | 59 | 55 | 49 | 47 | 51 | 68 | 82 | 86 | 89 | 91 | 92 | 79.7 | 98 |
| 15-Sep | 93 | 93 | 94 | 93 | 93 | 94 | 93 | 90 | 82 | 69 | 57 | 47 | 40 | 36 | 33 | 33 | 34 | 36 | 48 | 66 | 74 | 78 | 78 | 81 | 68.2 | 94 |
| 16-Sep | 83 | 87 | 89 | 88 | 89 | 90 | 89 | 79 | 66 | 53 | 45 | 39 | 35 | 35 | 33 | 32 | 34 | 37 | 49 | 61 | 61 | 68 | 73 | 72 | 62.1 | 90 |
| 17-Sep | 68 | 71 | 77 | 80 | 84 | 86 | 86 | 76 | 64 | 52 | 45 | 40 | 36 | 35 | 33 | 32 | 33 | 35 | 42 | 54 | 58 | 61 | 66 | 70 | 57.7 | 86 |
| 18-Sep | 76 | 78 | 77 | 79 | 82 | 84 | 82 | 74 | 65 | 58 | 51 | 43 | 38 | 34 | 34 | 34 | 35 | 40 | 45 | 53 | 57 | 61 | 67 | 70 | 59.1 | 84 |
| 19-Sep | 74 | 75 | 74 | 78 | 83 | 86 | 88 | 83 | 78 | 75 | 69 | 62 | 64 | 77 | 82 | 84 | 94 | 96 | 96 | 95 | 95 | 96 | 95 | 95 | 83.1 | 96 |
| 20-Sep | 96 | 97 | 97 | 97 | 97 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 97 | 97 | 97 | 96.3 | 97 |
| 21-Sep | 97 | 97 | 97 | 97 | 96 | 97 | 97 | 97 | 96 | 96 | 96 | 95 | 94 | 94 | 94 | 94 | 94 | 96 | 95 | 95 | 96 | 97 | 97 | 97 | 95.8 | 97 |
| 22-Sep | 97 | 97 | 97 | 97 | 98 | 98 | 98 | 98 | 92 | 89 | 86 | 88 | 81 | 74 | 70 | 69 | 72 | 79 | 85 | 91 | 95 | 96 | 96 | 97 | 89.2 | 98 |
| 23-Sep | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 94 | 83 | 66 | 61 | 59 | 58 | 55 | 54 | 55 | 62 | 79 | 86 | 89 | 85 | 90 | 91 | 81.6 | 99 |
| 24-Sep | 94 | 92 | 93 | 93 | 95 | 96 | 97 | 93 | 85 | 77 | 69 | 61 | 55 | 48 | 45 | 45 | 44 | 52 | 65 | 71 | 71 | 74 | 73 | 82 | 73.7 | 97 |
| 25-Sep | 87 | 87 | 91 | 92 | 93 | 93 | 93 | 92 | 86 | 75 | 69 | 60 | 50 | 42 | 40 | 42 | 44 | 52 | 62 | 68 | 71 | 74 | 79 | 79 | 71.7 | 93 |
| 26-Sep | 84 | 87 | 85 | 86 | 89 | 92 | 93 | 87 | 79 | 69 | 58 | 45 | 38 | 33 | 30 | 29 | 30 | 37 | 58 | 72 | 76 | 79 | 81 | 81 | 66.6 | 93 |
| 27-Sep | 82 | 82 | 85 | 87 | 89 | 90 | 91 | 88 | 80 | 71 | 61 | 53 | 47 | 45 | 38 | 37 | 47 | 55 | 69 | 79 | 86 | 86 | 85 | 87 | 71.6 | 91 |
| 28-Sep | 86 | 89 | 94 | 96 | 96 | 94 | 94 | 86 | 70 | 59 | 54 | 49 | 46 | 43 | 42 | 40 | 42 | 47 | 55 | 61 | 62 | 63 | 66 | 69 | 66.8 | 96 |
| 29-Sep | 72 | 68 | 67 | 68 | 71 | 77 | 86 | 81 | 65 | 57 | 50 | 45 | 39 | 36 | 34 | 33 | 34 | 49 | 66 | 73 | 77 | 80 | 84 | 86 | 62.4 | 86 |
| 30-Sep | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 89 | 79 | 70 | 60 | 54 | 50 | 46 | 46 | 51 | 51 | 55 | 60 | 63 | 65 | 68 | 76 | 87 | 70.5 | 92 |
| 81.0 82.1 83.5 85.0 86.4 87.5 87.9 83.3 75.8 68.4 61.5 55.7 51.5 50.0 48.2 47.6 49.5 54.8 63.1 70.6 74.3 76.5 77.9 79.9 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 99 99 99 99 99 99 99 99 96 96 96 96 96 96 96 96 96 96 98 98 99 99 99 99 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mackay River - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mackay River - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 81 | 11.25 | 11.25 |
| 40 - 60 | 147 | 20.42 | 31.67 |
| 60 - 80 | 219 | 30.42 | 62.08 |
| 80 - 100 | 273 | 37.92 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

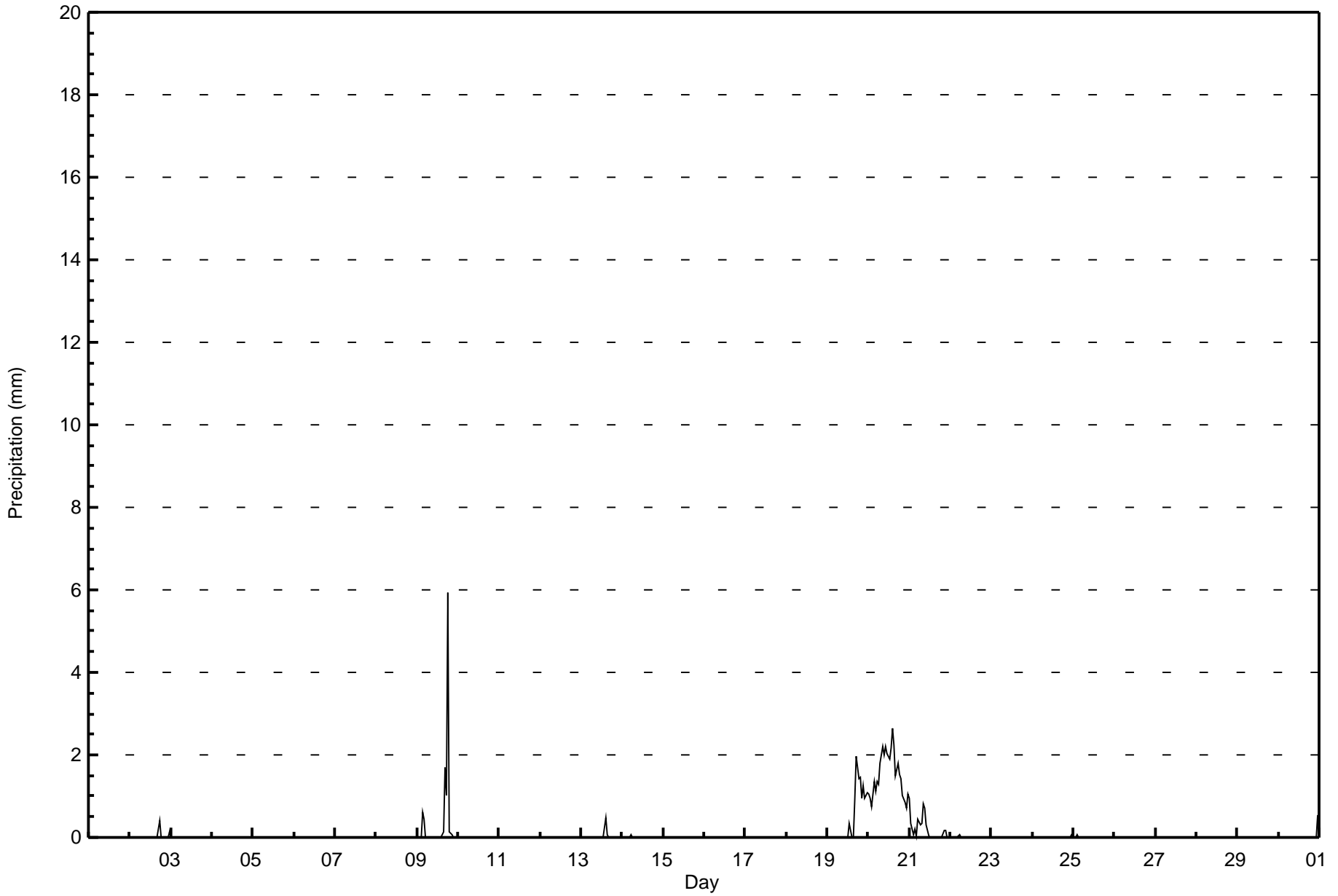
Mackay River - September 2017

| Maximum Value: 5.9 mm on Sep 9 19:00 | | Maximum Daily Total: 37.0 mm on Sep 20 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|-----|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|---------------|-----------------|-----|
| Minimum Value: 0.0 mm on Sep 1 01:00 | | Minimum Daily Total: 0.0 mm on Sep 1 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Total: 8.9 mm at hour 19 | | Minimum Diurnal Total: 0.9 mm at hour 3 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Total: 64.22 mm | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 1.9 | | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.4 |
| 3-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.6 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.7 | 1.0 | 5.9 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 5.9 | |
| 10-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.5 | |
| 14-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | |
| 15-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 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 | 0.9 | 2.0 | 1.4 | 1.5 | 1.0 | 1.3 | 1.0 | 1.1 | 10.4 | 2.0 | | |
| 20-Sep | 1.0 | 1.0 | 0.7 | 1.4 | 1.1 | 1.4 | 1.3 | 1.8 | 2.2 | 2.0 | 2.2 | 2.0 | 1.9 | 2.2 | 2.7 | 2.3 | 1.5 | 1.8 | 1.5 | 1.4 | 1.0 | 0.9 | 0.7 | 1.1 | 37.0 | 2.7 | |
| 21-Sep | 1.0 | 0.3 | 0.1 | 0.2 | 0.1 | 0.5 | 0.3 | 0.4 | 0.8 | 0.7 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | 0.0 | 4.9 | 1.0 | |
| 22-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | |
| 23-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 | |
| 25-Sep | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | |
| 26-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 28-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | 0.5 | |
| | | 2.0 | 1.3 | 0.9 | 2.2 | 1.6 | 2.0 | 1.6 | 2.2 | 3.0 | 2.7 | 2.5 | 2.1 | 1.9 | 2.5 | 3.1 | 2.5 | 4.1 | 5.2 | 8.9 | 3.0 | 2.2 | 2.3 | 1.7 | 2.9 | Diurnal Average | |
| | | 1.0 | 1.0 | 0.7 | 1.4 | 1.1 | 1.4 | 1.3 | 1.8 | 2.2 | 2.0 | 2.2 | 2.0 | 1.9 | 2.2 | 2.7 | 2.3 | 1.7 | 2.0 | 5.9 | 1.5 | 1.0 | 1.3 | 1.0 | 1.1 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Mackay River - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Mackay River - September 2017

| Concentration Ranges (mm) | Number of Hours | % | Cumulative % |
|----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 675 | 93.75 | 93.75 |
| 0.4 - 0.5 | 6 | 0.83 | 94.58 |
| 0.6 - 0.7 | 4 | 0.56 | 95.14 |
| 0.8 - 1.4 | 19 | 2.64 | 97.78 |
| 1.5 - 10 | 14 | 1.94 | 99.72 |
| > 10 | 0 | 0.00 | 99.72 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

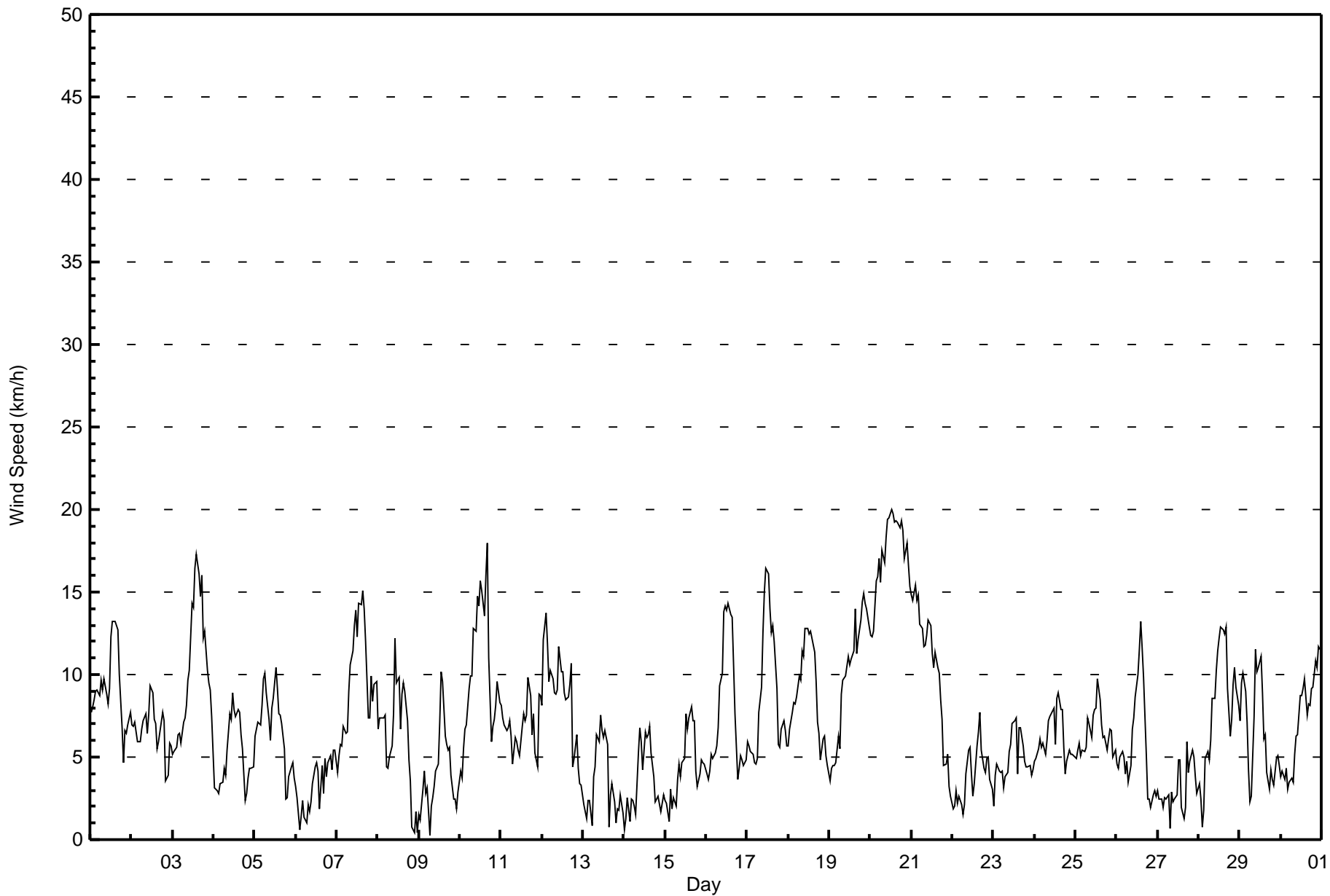


| | | |
|--|--|---------------------------------|
| Maximum Speed: 20 km/h on Sep 20 13:00 | Maximum Daily Speed Average: 17.2 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 9 07:00 | Minimum Daily Speed Average: 1.7 km/h on Sep 27 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 3.2 km/h at hour 14 | Minimum Diurnal Speed Average: 0.6 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 1.6 km/h 213.9 deg | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 9 P ₉₀ = 13 P ₉₉ = 19 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|---------------|---------------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | WSW8 | SW8 | SW9 | WSW9 | WSW9 | WSW9 | WSW10 | WSW9 | WSW10 | WSW9 | WSW8 | WSW9 | WSW12 | W13 | W13 | W13 | WSW13 | W10 | W7 | WSW5 | SW7 | SW6 | SW7 | WSW8 | WSW8.9 | W13 | |
| 2-Sep | W7 | WSW7 | WSW7 | WSW6 | WSW6 | WSW6 | WSW7 | WSW7 | W8 | W6 | W8 | WSW9 | WSW9 | W7 | WSW7 | WSW6 | SW6 | SW7 | SW8 | WSW7 | W4 | WSW4 | WSW6 | WSW6 | WSW6.4 | WSW9 | |
| 3-Sep | W5 | WSW5 | WSW6 | WSW6 | WSW6 | WSW6 | WSW7 | WSW7 | W8 | W10 | W10 | NNW14 | NNW14 | NNW16 | NNW17 | NNW16 | NNW15 | NW16 | NW12 | NNW13 | NW10 | NW10 | NW9 | NW7 | NNW9.4 | NNW17 | |
| 4-Sep | WSW3 | SW3 | WSW3 | WSW3 | W3 | WSW3 | W4 | W4 | NW5 | NNW8 | NNW7 | NNW9 | NNW8 | NNW7 | NNW8 | NNW8 | W6 | W5 | SSW2 | SSE3 | SSE4 | SSE4 | SSE4 | SSE4 | W3.2 | NW9 | |
| 5-Sep | S6 | S7 | S7 | S7 | S8 | S10 | SSW10 | S9 | SSW7 | SSW6 | SW8 | SW9 | SW10 | SW9 | SW8 | W8 | W7 | W5 | WSW2 | SSE3 | S4 | SSW4 | SW5 | SW4 | SSW5.8 | SW10 | |
| 6-Sep | WSW3 | SW3 | SSE1 | SSW1 | SW2 | ESE1 | SW1 | WSW2 | NNE2 | NE2 | ESE3 | S4 | SSE5 | SW4 | SSE2 | E4 | SE3 | ESE5 | SE4 | SE5 | SE5 | SE4 | SE5 | SSE5 | SSE2.2 | SE5 | |
| 7-Sep | SE4 | SSE5 | SSE6 | SSE6 | S7 | SSE6 | SSE7 | S9 | S11 | S11 | S13 | SSW14 | SSW12 | S14 | SSW14 | S15 | S14 | S12 | S7 | S7 | S10 | S8 | S9 | SSW10 | S9.5 | S15 | |
| 8-Sep | SSW7 | SSW7 | S7 | S7 | S8 | S4 | S4 | WSW5 | NNW6 | NW8 | NNW12 | NNW10 | NNW10 | NW7 | NNW9 | NNW10 | NW9 | NW7 | NNW5 | NNW4 | SW1 | SW0 | SE2 | E0 | NNW2.9 | NW12 | |
| 9-Sep | SSE1 | W1 | SSE3 | S4 | ESE3 | ESE3 | NNE0 | NNE2 | ENE3 | ENE3 | ENE4 | E5 | N7 | N10 | NNE10 | NNE6 | N6 | N5 | NE6 | NNW4 | NW2 | W2 | SW2 | SW3 | NNE2.1 | N10 | |
| 10-Sep | SW4 | SSW4 | SSW6 | SW7 | WSW7 | WSW9 | WSW10 | WSW10 | WSW13 | W13 | W15 | W14 | W16 | NNW15 | W14 | NNW16 | W18 | WSW11 | WSW6 | SW7 | SW7 | SW8 | WSW10 | WSW9.4 | W18 | | |
| 11-Sep | SW8 | SW7 | SW7 | SW7 | SSW7 | SSW7 | SSW6 | SSE5 | SSE6 | SSE6 | SSE5 | SSE5 | SSE7 | S8 | S7 | S8 | S10 | SSW9 | SSW6 | SW8 | W5 | SW4 | W9 | W9 | SSW5.6 | S10 | |
| 12-Sep | W8 | W12 | W14 | W12 | W10 | WSW10 | WSW10 | WSW9 | W9 | W9 | W12 | W10 | NNW10 | NNW9 | W8 | W9 | NNW9 | NNW11 | NNW4 | N5 | NE6 | NE4 | ENE3 | E3 | NNW6.7 | W14 | |
| 13-Sep | E2 | E2 | NW1 | NW2 | NW2 | SE1 | N4 | NNW4 | NNW6 | NNW6 | NNW8 | N7 | NNW6 | NNE7 | NNW6 | NNW1 | W3 | SSE3 | S2 | ESE1 | SSE2 | SE2 | SSE3 | SE2 | NNW1.8 | NNW8 | |
| 14-Sep | ESE1 | SSE1 | SSE3 | E1 | NNW2 | ESE2 | NW2 | NE2 | ENE5 | ENE7 | NE6 | NNE4 | NNE7 | N6 | N6 | N7 | NNE5 | ENE4 | ESE2 | SE2 | SE3 | SE2 | SE2 | SSE3 | NE2.2 | N7 | |
| 15-Sep | SSE2 | SE2 | SE1 | E3 | SSE2 | SSE3 | S2 | SSW4 | SW5 | SW4 | WSW5 | SW5 | SSW8 | SSW7 | SSW7 | SSW8 | S7 | S7 | S4 | SE3 | S4 | S5 | SE5 | S5 | SSW3.9 | SSW8 | |
| 16-Sep | SSE4 | SSE4 | SE4 | SSE5 | SSE5 | SSE5 | SSE6 | SSE7 | S9 | S10 | S14 | S14 | S14 | S14 | SSE14 | S13 | S11 | S8 | SSE4 | SE4 | SE5 | SE5 | SE4 | SSE5 | S7.5 | S14 | |
| 17-Sep | SSE6 | SE6 | SE5 | SSE5 | SSE5 | SE5 | SE5 | SE8 | SE9 | SSE13 | SSE15 | S16 | SSE16 | S14 | SSE13 | SSE13 | SSE12 | SSE9 | SE6 | SE6 | SE7 | SE7 | SE7 | SE6 | SSE8.6 | S16 | |
| 18-Sep | ESE6 | ESE7 | SE8 | ESE8 | ESE8 | ESE9 | ESE10 | ESE10 | SE11 | SE11 | SE13 | SE13 | SE12 | SE13 | ESE12 | ESE11 | ESE10 | ESE7 | ESE6 | ESE5 | ESE6 | ESE6 | ESE5 | ESE5 | ESE8.7 | SE13 | |
| 19-Sep | ESE4 | E4 | E5 | NE4 | NNE5 | NNE6 | NNE5 | NNE9 | NE10 | NE10 | NE11 | NE11 | NE11 | NE11 | NE11 | ENE14 | ENE11 | NE12 | NE13 | ENE14 | ENE15 | ENE14 | ENE14 | ENE13 | NE9.5 | ENE15 | |
| 20-Sep | NE12 | NE12 | NNE13 | NNE16 | NNE16 | NNE17 | NNE16 | NNE18 | NNE17 | NNE18 | NNE19 | NNE19 | NNE20 | NNE20 | NNE19 | NNE19 | NNE19 | NNE19 | NNE19 | NNE19 | NNE19 | NNE17 | NNE18 | NNE17 | N15 | NNE17.2 | NNE20 |
| 21-Sep | N15 | N14 | N15 | N15 | N15 | N13 | N13 | N12 | N12 | N12 | N13 | N13 | N11 | N10 | N11 | NNW10 | NNW10 | NNW9 | NNW7 | NNW4 | NW5 | NW5 | NW3 | NNW3 | N10.1 | N15 | |
| 22-Sep | W2 | W2 | NNW3 | WSW2 | WSW3 | SSW2 | SE2 | SSW2 | SSW4 | SSW5 | SSW6 | SSW4 | SW3 | SW3 | ESE6 | SE7 | SE8 | SE5 | SSE4 | SE4 | SE5 | SE5 | SSE4 | SSE3 | S2.6 | SE8 | |
| 23-Sep | SSE2 | SSE4 | SSE5 | SSE4 | SSE4 | SE4 | SSE3 | SE4 | SSE4 | SSE5 | S6 | SSW7 | S7 | S7 | S4 | SSE7 | S7 | SE6 | SE5 | SE4 | SE4 | SE4 | SE4 | SSE4 | SSE4.5 | S7 | |
| 24-Sep | SE5 | SSE5 | SSE6 | SSE6 | SSE6 | SSE6 | SSE5 | SSE6 | SSE7 | S7 | SSE8 | S8 | S6 | S9 | S9 | SSE8 | S8 | S6 | S4 | SSE5 | SSE5 | SSE5 | SSE5 | SE5 | SSE6.0 | S9 | |
| 25-Sep | SE5 | SSE5 | SE6 | SSE5 | SSE5 | SSE5 | SSE6 | S7 | SSW7 | SW6 | SSW8 | WSW8 | WSW8 | W10 | W8 | W7 | WSW6 | SW6 | SW5 | SSW6 | SSW7 | SSW5 | SSW5 | SSW5 | SSW5.0 | W10 | |
| 26-Sep | SSW5 | SW4 | WSW5 | WSW5 | W5 | WSW4 | W5 | WSW4 | W4 | W7 | W7 | NNW9 | NNW10 | NNW12 | NNW13 | NNW12 | NNW10 | NNW5 | SSW2 | SSE2 | SSW2 | SSE3 | SSE3 | SSE3 | W4.6 | NNW13 | |
| 27-Sep | SSE3 | SE2 | SE2 | SSE2 | SSE3 | SSE2 | SSE3 | SSW1 | NNW3 | WSW2 | N2 | NE3 | N5 | NNE5 | NNE2 | E1 | ENE2 | NE6 | NE4 | NE5 | NE5 | NE5 | NE4 | ENE3 | ENE1.7 | NE6 | |
| 28-Sep | NNE3 | NE2 | ESE1 | SE2 | SE5 | SE5 | SE5 | SE6 | SSE9 | SSE9 | S10 | SSE11 | S12 | S13 | S13 | S12 | S13 | S9 | SSE6 | SSE7 | SSE9 | SSE10 | SSE9 | SSE8 | SSE7.3 | S13 | |
| 29-Sep | SSE7 | SSE9 | SSE10 | SSE9 | SSE7 | SE4 | SE2 | S3 | S7 | S12 | S10 | S10 | S11 | SSW9 | SSW6 | SSW6 | SW4 | SW3 | SSW4 | S4 | SSE3 | SSE5 | SSE5 | SSE5 | S6.2 | S12 | |
| 30-Sep | SSE4 | SE4 | SE4 | SE4 | SE3 | SE3 | SSE4 | S3 | WSW5 | WSW6 | WSW6 | WSW9 | WSW9 | WSW9 | WSW10 | WSW8 | W8 | W8 | W9 | W9 | NNW11 | NNW10 | NNW12 | NNW12 | WSW5.0 | NNW12 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|------|-------|--------|-------|--------|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|-------|-------|-------|--------|-------|-------|-----------------|-----|-----------------|
| S1.7 | S1.8 | S1.9 | S1.9 | SSW1.8 | S1.9 | SSW1.7 | SSW1.7 | SW1.9 | SW2.0 | SW2.3 | SW2.5 | WSW2.7 | WSW3.2 | WSW2.4 | WSW2.1 | WSW1.4 | S0.6 | SE0.7 | SE1.1 | SSE1.5 | S1.5 | S1.4 | Diurnal Average | | |
| NNE15 | NNE14 | N15 | NNE16 | NNE16 | NNE17 | NNE16 | NNE18 | NNE17 | NNE18 | NNE19 | NNE19 | NNE20 | NNE20 | NNE19 | NNE19 | NNE19 | NNE19 | NNE19 | NNE19 | NNE19 | NNE17 | NNE18 | NNE17 | N15 | Diurnal Maximum |

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Mackay River - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 297 | 41.25 | 41.25 |
| 6 - 11 | 313 | 43.47 | 84.72 |
| 12 - 19 | 108 | 15.00 | 99.72 |
| 20 - 28 | 2 | 0.28 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Mackay River - September 2017

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 5 | 10 | 11 | 9 | 9 | 14 | 52 | 75 | 16 | 17 | 22 | 20 | 16 | 4 | 8 | 9 | 297 |
| 6 - 11 | 8 | 7 | 10 | 2 | 0 | 14 | 17 | 35 | 47 | 26 | 25 | 52 | 30 | 12 | 10 | 18 | 313 |
| 12 - 19 | 11 | 21 | 4 | 6 | 0 | 1 | 4 | 7 | 18 | 3 | 0 | 3 | 13 | 13 | 3 | 1 | 108 |
| 20 - 28 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 24 | 40 | 25 | 17 | 9 | 29 | 73 | 117 | 81 | 46 | 47 | 75 | 59 | 29 | 21 | 28 | 720 |

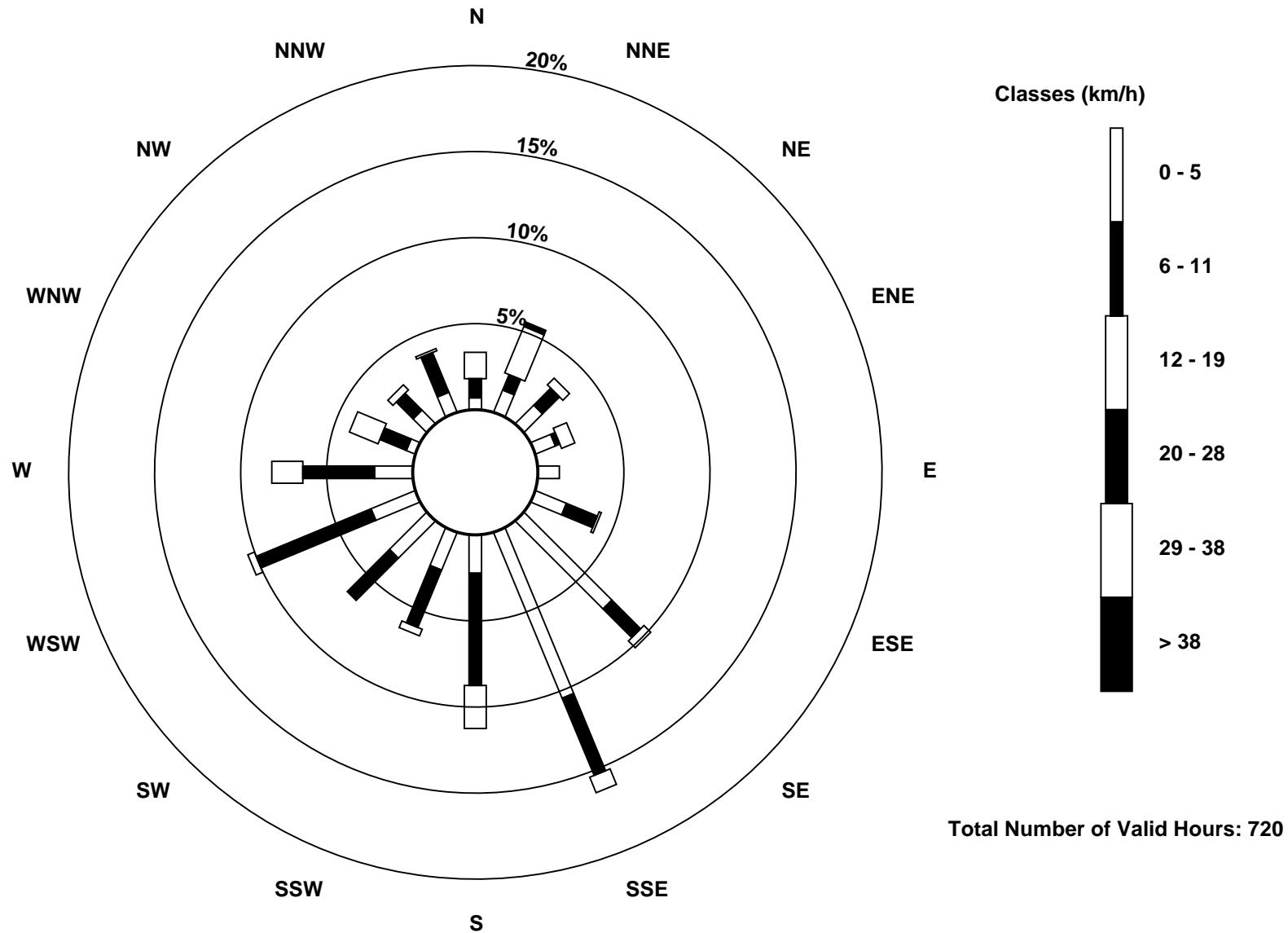
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Mackay River (AMS 20)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Mackay River - September 2017

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

Diurnal Maximum



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Mackay River - September 2017

| | |
|--|---|
| Direction of Maximum Speed: 22 deg on Sep 20 13:00 Direction of Maximum Daily Speed Average: 20.2 deg on Sep 20 | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 |
| Direction of Minimum Speed: 23 deg on Sep 9 07:00 Direction of Minimum Daily Speed Average: 1.7 deg on Sep 27 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 224.9 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-Sep | 243 | 236 | 232 | 237 | 241 | 245 | 245 | 252 | 258 | 247 | 247 | 253 | 257 | 266 | 270 | 266 | 254 | 260 | 260 | 242 | 228 | 228 | 235 | 251 | 250.2 |
| 2-Sep | 261 | 246 | 248 | 256 | 248 | 245 | 244 | 258 | 272 | 270 | 264 | 251 | 248 | 259 | 255 | 251 | 233 | 216 | 218 | 245 | 260 | 241 | 242 | 257 | 249.6 |
| 3-Sep | 264 | 252 | 251 | 251 | 251 | 250 | 250 | 256 | 268 | 269 | 278 | 297 | 286 | 297 | 301 | 298 | 302 | 309 | 314 | 336 | 317 | 307 | 317 | 315 | 291.8 |
| 4-Sep | 252 | 233 | 241 | 253 | 264 | 255 | 271 | 266 | 304 | 327 | 328 | 316 | 301 | 297 | 310 | 284 | 262 | 262 | 201 | 150 | 148 | 159 | 166 | 158 | 276.1 |
| 5-Sep | 181 | 182 | 179 | 174 | 179 | 186 | 194 | 188 | 205 | 194 | 218 | 228 | 232 | 232 | 236 | 281 | 277 | 263 | 240 | 148 | 187 | 205 | 223 | 224 | 210.4 |
| 6-Sep | 243 | 236 | 153 | 200 | 217 | 114 | 214 | 245 | 33 | 52 | 122 | 179 | 149 | 230 | 149 | 82 | 138 | 112 | 124 | 131 | 134 | 137 | 139 | 153 | 147.7 |
| 7-Sep | 142 | 149 | 150 | 164 | 178 | 167 | 162 | 170 | 183 | 182 | 189 | 195 | 194 | 185 | 194 | 187 | 190 | 183 | 188 | 179 | 185 | 181 | 184 | 192 | 182.3 |
| 8-Sep | 196 | 193 | 182 | 183 | 190 | 176 | 188 | 250 | 283 | 309 | 319 | 342 | 333 | 318 | 331 | 335 | 314 | 317 | 331 | 329 | 236 | 229 | 141 | 88 | 291.1 |
| 9-Sep | 163 | 262 | 156 | 181 | 119 | 123 | 23 | 31 | 58 | 60 | 70 | 84 | 11 | 2 | 13 | 16 | 360 | 350 | 34 | 342 | 317 | 261 | 234 | 236 | 22.0 |
| 10-Sep | 229 | 210 | 198 | 231 | 242 | 244 | 245 | 240 | 247 | 262 | 266 | 281 | 277 | 283 | 276 | 287 | 279 | 256 | 237 | 215 | 214 | 230 | 238 | 232 | 255.7 |
| 11-Sep | 224 | 234 | 232 | 219 | 211 | 212 | 205 | 158 | 158 | 166 | 156 | 159 | 157 | 181 | 184 | 170 | 177 | 196 | 193 | 224 | 281 | 221 | 266 | 265 | 202.8 |
| 12-Sep | 259 | 274 | 279 | 275 | 259 | 251 | 248 | 257 | 260 | 279 | 278 | 280 | 286 | 287 | 266 | 276 | 293 | 336 | 345 | 359 | 35 | 47 | 68 | 79 | 282.0 |
| 13-Sep | 84 | 89 | 325 | 305 | 325 | 143 | 355 | 338 | 341 | 341 | 328 | 349 | 344 | 17 | 329 | 336 | 270 | 151 | 169 | 102 | 155 | 141 | 149 | 130 | 347.9 |
| 14-Sep | 117 | 149 | 147 | 99 | 348 | 122 | 323 | 48 | 70 | 65 | 49 | 23 | 25 | 349 | 3 | 2 | 33 | 62 | 109 | 130 | 125 | 144 | 146 | 151 | 49.4 |
| 15-Sep | 159 | 138 | 124 | 146 | 148 | 167 | 182 | 211 | 234 | 233 | 250 | 233 | 193 | 213 | 199 | 205 | 188 | 187 | 180 | 168 | 175 | 180 | 168 | 173 | 192.9 |
| 16-Sep | 167 | 155 | 145 | 153 | 155 | 153 | 154 | 159 | 184 | 179 | 176 | 185 | 180 | 181 | 167 | 178 | 187 | 183 | 157 | 138 | 146 | 141 | 138 | 156 | 169.7 |
| 17-Sep | 156 | 145 | 146 | 148 | 154 | 146 | 140 | 142 | 143 | 167 | 168 | 169 | 168 | 175 | 164 | 164 | 162 | 163 | 143 | 129 | 131 | 134 | 132 | 128 | 155.7 |
| 18-Sep | 118 | 121 | 126 | 121 | 121 | 120 | 117 | 121 | 125 | 127 | 129 | 127 | 134 | 128 | 110 | 105 | 109 | 105 | 109 | 105 | 103 | 108 | 113 | 111 | 118.8 |
| 19-Sep | 109 | 88 | 90 | 34 | 27 | 30 | 27 | 29 | 37 | 39 | 45 | 44 | 36 | 38 | 47 | 63 | 58 | 52 | 55 | 60 | 58 | 62 | 61 | 58 | 51.3 |
| 20-Sep | 41 | 34 | 31 | 22 | 19 | 17 | 15 | 12 | 13 | 20 | 21 | 24 | 22 | 22 | 23 | 23 | 20 | 20 | 22 | 17 | 17 | 13 | 13 | 10 | 20.2 |
| 21-Sep | 11 | 11 | 11 | 9 | 5 | 4 | 358 | 355 | 1 | 5 | 6 | 4 | 1 | 360 | 354 | 340 | 334 | 336 | 338 | 343 | 326 | 324 | 308 | 294 | 357.2 |
| 22-Sep | 267 | 268 | 297 | 248 | 241 | 212 | 140 | 197 | 195 | 196 | 211 | 210 | 234 | 214 | 109 | 126 | 137 | 136 | 154 | 127 | 138 | 135 | 149 | 150 | 169.0 |
| 23-Sep | 149 | 150 | 149 | 152 | 154 | 142 | 147 | 141 | 149 | 156 | 181 | 192 | 187 | 189 | 181 | 162 | 169 | 126 | 129 | 131 | 129 | 137 | 143 | 149 | 156.9 |
| 24-Sep | 145 | 148 | 149 | 149 | 149 | 150 | 150 | 148 | 167 | 180 | 166 | 179 | 170 | 174 | 176 | 155 | 177 | 184 | 173 | 158 | 150 | 153 | 162 | 138 | 162.0 |
| 25-Sep | 144 | 147 | 143 | 156 | 155 | 156 | 165 | 185 | 199 | 218 | 207 | 238 | 252 | 268 | 264 | 260 | 244 | 225 | 215 | 207 | 203 | 206 | 199 | 205 | 208.3 |
| 26-Sep | 201 | 220 | 253 | 258 | 267 | 256 | 259 | 238 | 264 | 264 | 275 | 291 | 300 | 300 | 299 | 294 | 296 | 289 | 197 | 157 | 192 | 167 | 167 | 154 | 271.0 |
| 27-Sep | 159 | 137 | 144 | 149 | 152 | 152 | 154 | 211 | 299 | 246 | 355 | 48 | 10 | 19 | 12 | 94 | 74 | 51 | 52 | 41 | 36 | 53 | 56 | 64 | 59.0 |
| 28-Sep | 26 | 34 | 111 | 141 | 144 | 145 | 140 | 144 | 155 | 167 | 173 | 167 | 176 | 186 | 185 | 189 | 188 | 181 | 165 | 155 | 155 | 160 | 154 | 147 | 166.0 |
| 29-Sep | 147 | 161 | 166 | 162 | 151 | 140 | 142 | 179 | 174 | 181 | 188 | 174 | 180 | 194 | 195 | 204 | 217 | 220 | 196 | 172 | 147 | 153 | 155 | 158 | 173.5 |
| 30-Sep | 148 | 145 | 145 | 145 | 145 | 140 | 156 | 190 | 254 | 248 | 238 | 244 | 241 | 249 | 247 | 252 | 265 | 271 | 276 | 280 | 291 | 293 | 301 | 302 | 256.5 |

183.0 183.5 182.5 191.1 195.5 182.9 202.8 207.3 221.0 222.3 229.5 235.6 243.8 254.1 258.3 249.0 243.1 242.0 186.4 134.2 146.1 161.0 175.4 184.0

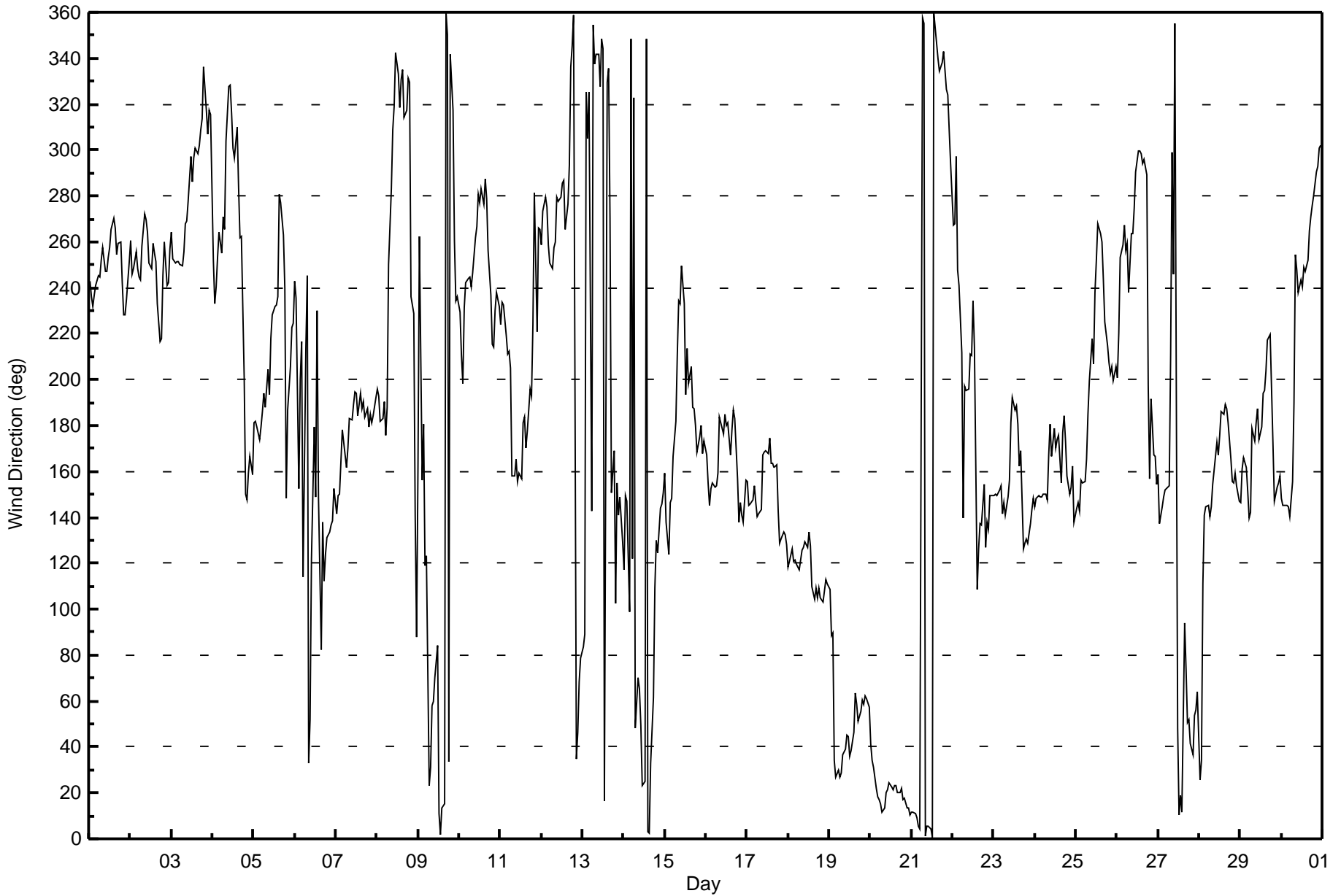
Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Mackay River - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Mackay River - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on Sep 13 16:00 Minimum Value: 7 deg on Sep 29 22:00 Percentiles: P ₁ = 10 P ₁₀ = 17 Q ₁ = 23 Median = 29 Q ₃ = 43 P ₉₀ = 50 P ₉₉ = 82 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|---------------|--|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 47 | 38 | 32 | 41 | 46 | 44 | 41 | 48 | 44 | 51 | 41 | 50 | 48 | 46 | 47 | 46 | 46 | 47 | 50 | 39 | 31 | 28 | 38 | 51 | 51 | |
| 2-Sep | 49 | 47 | 46 | 48 | 46 | 48 | 43 | 48 | 46 | 48 | 42 | 41 | 45 | 48 | 49 | 49 | 34 | 40 | 35 | 42 | 49 | 36 | 39 | 47 | 49 | |
| 3-Sep | 44 | 48 | 55 | 50 | 50 | 47 | 46 | 46 | 47 | 45 | 46 | 30 | 39 | 32 | 29 | 30 | 30 | 24 | 22 | 23 | 20 | 21 | 17 | 18 | 55 | |
| 4-Sep | 37 | 39 | 44 | 56 | 49 | 38 | 50 | 55 | 36 | 33 | 47 | 41 | 45 | 57 | 53 | 56 | 52 | 47 | 40 | 10 | 8 | 12 | 14 | 19 | 57 | |
| 5-Sep | 16 | 13 | 12 | 12 | 14 | 17 | 20 | 23 | 28 | 39 | 38 | 45 | 38 | 43 | 49 | 45 | 46 | 44 | 46 | 11 | 20 | 21 | 16 | 17 | 49 | |
| 6-Sep | 20 | 22 | 73 | 46 | 32 | 44 | 49 | 31 | 72 | 69 | 67 | 60 | 60 | 46 | 93 | 57 | 79 | 23 | 14 | 11 | 10 | 10 | 13 | 23 | 93 | |
| 7-Sep | 21 | 17 | 12 | 17 | 18 | 21 | 23 | 25 | 24 | 25 | 27 | 28 | 31 | 27 | 30 | 26 | 27 | 23 | 21 | 22 | 22 | 23 | 24 | 26 | 31 | |
| 8-Sep | 21 | 20 | 17 | 17 | 20 | 32 | 29 | 49 | 42 | 25 | 21 | 26 | 24 | 51 | 28 | 25 | 24 | 30 | 25 | 24 | 82 | 67 | 50 | 81 | 82 | |
| 9-Sep | 42 | 48 | 20 | 27 | 37 | 36 | 89 | 31 | 26 | 33 | 38 | 36 | 38 | 26 | 26 | 29 | 25 | 33 | 40 | 29 | 43 | 55 | 45 | 43 | 89 | |
| 10-Sep | 40 | 25 | 26 | 35 | 49 | 46 | 44 | 43 | 45 | 47 | 46 | 41 | 42 | 37 | 44 | 36 | 39 | 46 | 43 | 25 | 24 | 35 | 43 | 39 | 49 | |
| 11-Sep | 32 | 36 | 29 | 25 | 23 | 24 | 25 | 21 | 20 | 25 | 29 | 31 | 30 | 33 | 29 | 32 | 27 | 23 | 21 | 45 | 43 | 23 | 43 | 46 | 46 | |
| 12-Sep | 54 | 46 | 40 | 41 | 50 | 43 | 48 | 50 | 44 | 44 | 39 | 42 | 38 | 34 | 45 | 45 | 33 | 28 | 23 | 28 | 24 | 29 | 34 | 39 | 54 | |
| 13-Sep | 27 | 51 | 55 | 39 | 37 | 84 | 23 | 27 | 29 | 45 | 36 | 45 | 47 | 47 | 37 | 106 | 77 | 51 | 30 | 49 | 44 | 30 | 13 | 16 | 106 | |
| 14-Sep | 72 | 28 | 16 | 81 | 63 | 54 | 65 | 76 | 37 | 39 | 40 | 62 | 40 | 62 | 63 | 40 | 52 | 41 | 18 | 13 | 14 | 33 | 12 | 11 | 81 | |
| 15-Sep | 18 | 17 | 35 | 12 | 43 | 31 | 44 | 31 | 37 | 54 | 54 | 67 | 49 | 56 | 50 | 45 | 42 | 24 | 14 | 11 | 14 | 11 | 14 | 15 | 67 | |
| 16-Sep | 17 | 14 | 12 | 16 | 16 | 18 | 20 | 24 | 28 | 29 | 30 | 30 | 30 | 29 | 33 | 31 | 28 | 26 | 27 | 20 | 20 | 18 | 19 | 23 | 33 | |
| 17-Sep | 25 | 21 | 20 | 19 | 22 | 23 | 20 | 22 | 23 | 30 | 30 | 30 | 31 | 28 | 32 | 28 | 30 | 30 | 25 | 16 | 17 | 17 | 18 | 16 | 32 | |
| 18-Sep | 13 | 15 | 17 | 17 | 18 | 16 | 17 | 18 | 22 | 24 | 26 | 28 | 33 | 28 | 27 | 28 | 21 | 21 | 18 | 21 | 23 | 18 | 17 | 21 | 33 | |
| 19-Sep | 29 | 35 | 38 | 23 | 21 | 23 | 24 | 26 | 26 | 24 | 28 | 32 | 27 | 25 | 29 | 30 | 30 | 27 | 29 | 30 | 28 | 31 | 28 | 29 | 38 | |
| 20-Sep | 26 | 27 | 25 | 26 | 25 | 24 | 24 | 24 | 24 | 25 | 25 | 24 | 25 | 26 | 26 | 26 | 24 | 25 | 25 | 26 | 26 | 25 | 24 | 26 | 27 | |
| 21-Sep | 26 | 25 | 26 | 25 | 25 | 25 | 25 | 25 | 26 | 25 | 26 | 25 | 25 | 25 | 24 | 21 | 21 | 21 | 22 | 21 | 20 | 18 | 21 | 36 | 36 | |
| 22-Sep | 40 | 46 | 23 | 34 | 38 | 55 | 60 | 32 | 28 | 28 | 34 | 36 | 67 | 49 | 26 | 25 | 22 | 26 | 33 | 32 | 21 | 19 | 23 | 25 | 67 | |
| 23-Sep | 17 | 11 | 12 | 11 | 13 | 15 | 27 | 27 | 26 | 29 | 52 | 33 | 46 | 41 | 81 | 39 | 27 | 21 | 12 | 14 | 20 | 37 | 21 | 16 | 81 | |
| 24-Sep | 16 | 14 | 14 | 15 | 16 | 18 | 20 | 20 | 26 | 33 | 33 | 41 | 66 | 34 | 34 | 30 | 32 | 29 | 23 | 24 | 23 | 24 | 28 | 21 | 66 | |
| 25-Sep | 22 | 25 | 24 | 26 | 23 | 21 | 22 | 21 | 24 | 38 | 39 | 51 | 52 | 48 | 48 | 42 | 49 | 31 | 17 | 18 | 18 | 20 | 18 | 17 | 52 | |
| 26-Sep | 19 | 29 | 39 | 48 | 49 | 59 | 56 | 56 | 56 | 50 | 42 | 40 | 36 | 30 | 29 | 29 | 28 | 37 | 34 | 21 | 51 | 19 | 20 | 26 | 59 | |
| 27-Sep | 33 | 21 | 31 | 67 | 16 | 19 | 18 | 76 | 42 | 46 | 65 | 63 | 35 | 46 | 92 | 83 | 41 | 24 | 27 | 22 | 22 | 26 | 34 | 36 | 92 | |
| 28-Sep | 55 | 54 | 59 | 40 | 16 | 19 | 19 | 24 | 29 | 25 | 26 | 28 | 30 | 29 | 29 | 25 | 22 | 24 | 27 | 25 | 25 | 27 | 26 | 25 | 59 | |
| 29-Sep | 22 | 27 | 27 | 27 | 27 | 33 | 48 | 30 | 27 | 26 | 29 | 28 | 32 | 36 | 54 | 32 | 33 | 23 | 20 | 24 | 10 | 7 | 9 | 11 | 54 | |
| 30-Sep | 15 | 15 | 14 | 9 | 21 | 13 | 14 | 35 | 54 | 49 | 46 | 42 | 43 | 46 | 44 | 48 | 44 | 46 | 39 | 37 | 29 | 27 | 23 | 23 | 54 | |
| | | 72 | 54 | 73 | 81 | 63 | 84 | 89 | 76 | 72 | 69 | 67 | 67 | 67 | 62 | 93 | 106 | 79 | 51 | 50 | 49 | 82 | 67 | 50 | 81 | |
| | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association

SO₂ Calibration Summary

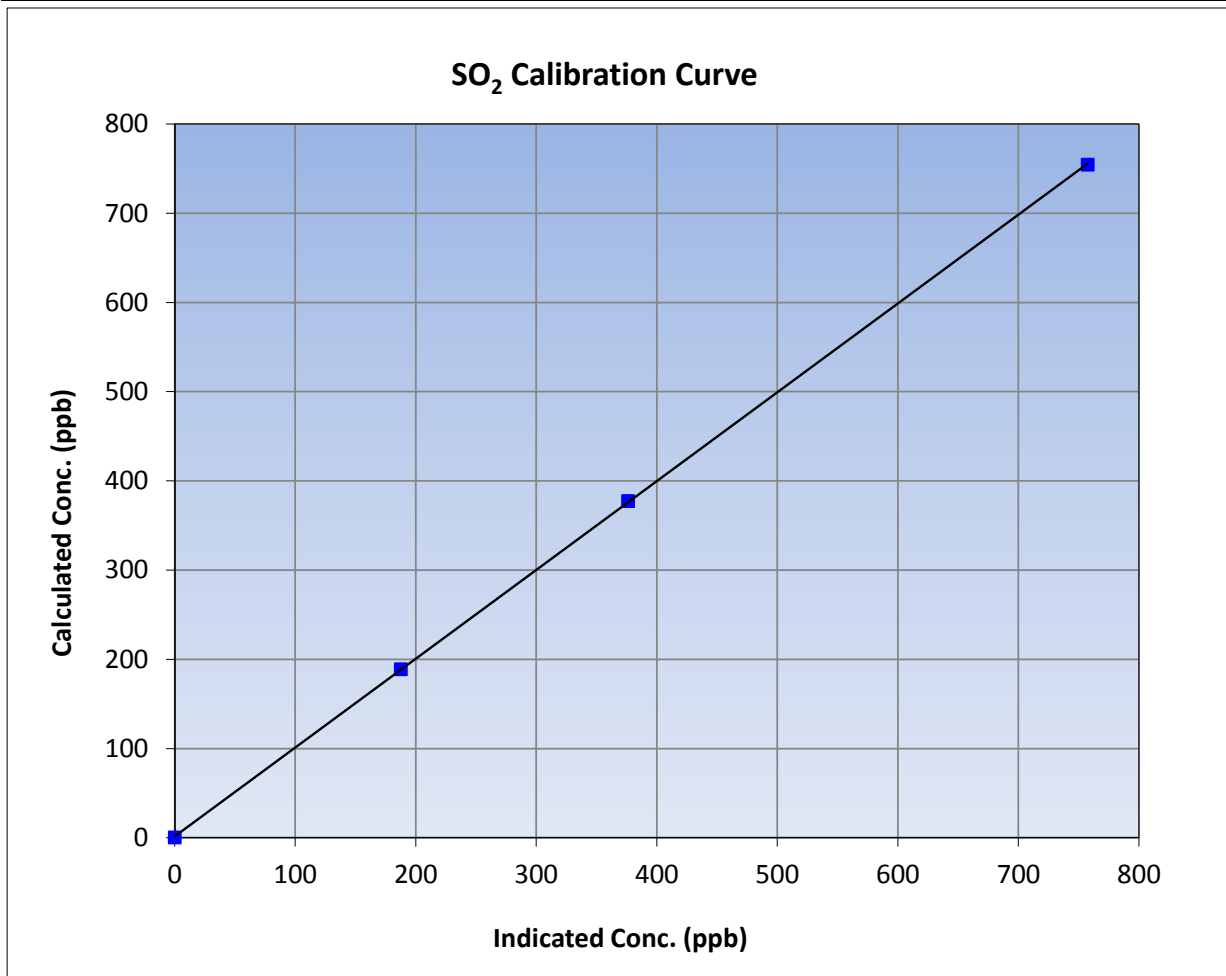
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | MacKay River | Station Number | AMS 20 |
| Start Time (MST) | 9:30 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1501301450 |

Calibration Data

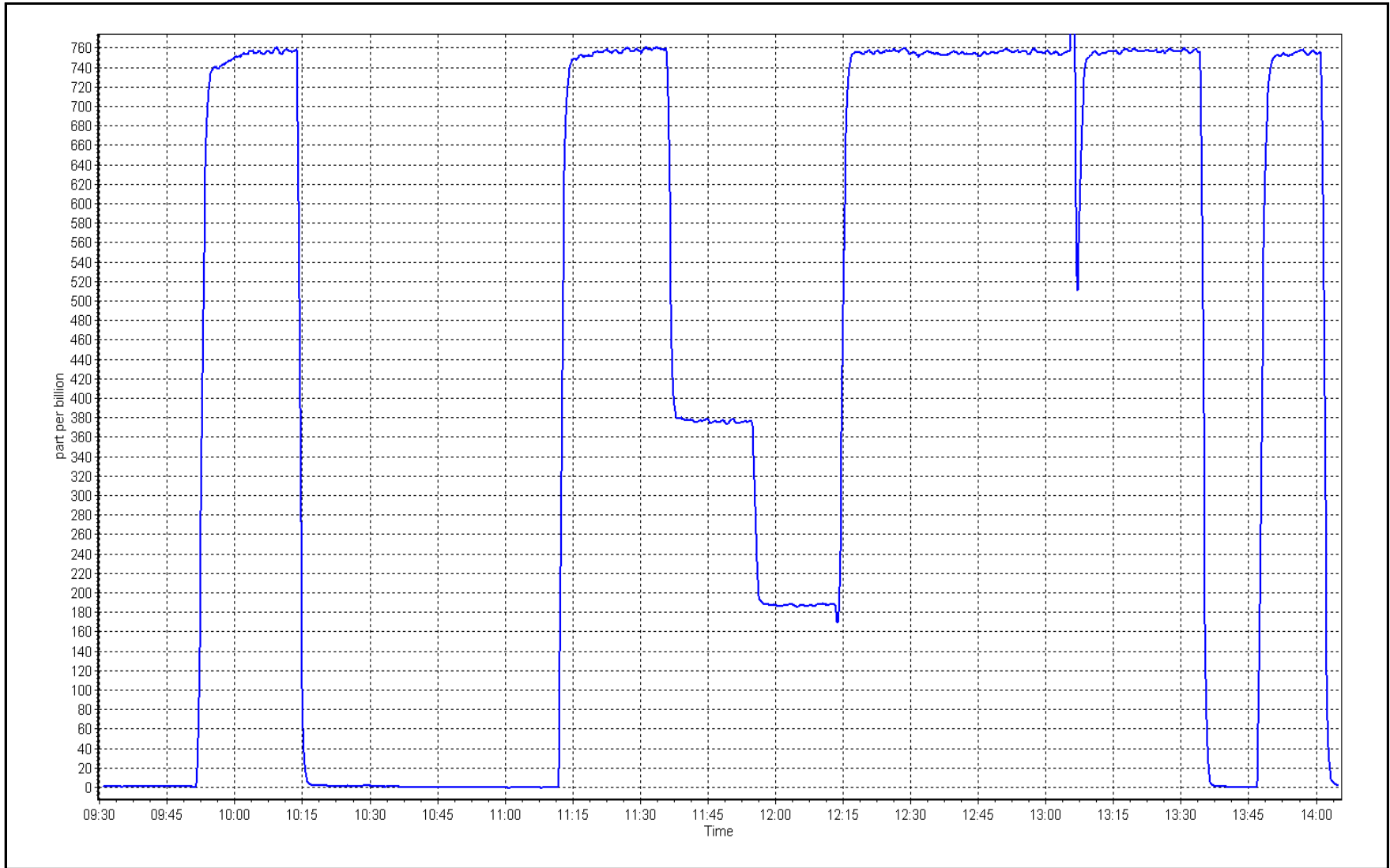
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | 0.999983 | ≥0.995 |
| 754.2 | 757.0 | 0.9963 | | | |
| 377.2 | 375.7 | 1.0039 | Slope | 0.995522 | 0.90 - 1.10 |
| 188.6 | 187.3 | 1.0068 | | | |
| | | | Intercept | 1.534188 | +/-30 |



SO2 Calibration Plot

Date: September 22, 2017

Location: MacKay River





Wood Buffalo Environmental Association

H₂S Calibration Report

Version-06-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | MacKay River | Station number: | AMS 20 |
| Calibration Date: | September 18, 2017 | Last Cal Date: | August 14, 2017 |
| Start time (MST): | 10:05 | End time (MST): | 13:05 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|-------------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>5.35</u> | ppm | Cal Gas Exp Date | February 13, 2018 |
| Cal Gas Cylinder # | <u>LL119508</u> | | | |
| Calibrator Make/Model | Teledyne API T700 | | Serial Number | 1220 |
| ZAG Make/Model | Teledyne API 701 | | Serial Number | 4766 |

Analyzer Information

Analyzer make: Teledyne API T101

Analyzer serial #: 196

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 100 ppb | | PMT voltage | 505 | 505 |
| Calculated slope | 0.994652 | 0.998729 | Lamp voltage | 2303 | 2301 |
| Calculated intercept | 0.174856 | 0.155489 | Pressure | 19.1 | 19.1 |
| Analyzer Background | 28.9 | 30.5 | Flow | 0.488 | 0.488 |
| Analyzer Coefficient | 0.963 | 0.959 | Intensity | 57 | 57 |

H₂S Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5005 | 0.0 | 0.0 | 0.5 | ---- |
| as found span | 4935 | 75.6 | 80.7 | 82.7 | 0.976 |
| calibrator zero | 5005 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 4935 | 75.6 | 80.7 | 80.8 | 0.999 |
| second point | 4975 | 37.9 | 40.4 | 40.1 | 1.009 |
| third point | 4995 | 19.0 | 20.3 | 20.1 | 1.009 |
| as left zero | 5005 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 4935 | 75.6 | 80.7 | 80.2 | 1.006 |

SO2 Scrubber Check

| | | | | Average Correction Factor | 1.005 |
|--------------------|-------|-------------------|-------|---------------------------|-------|
| Corrected As found | 82.20 | Previous response | 80.98 | *% change | -1.5% |

* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. Adjusted zero and span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

H₂S Calibration Summary

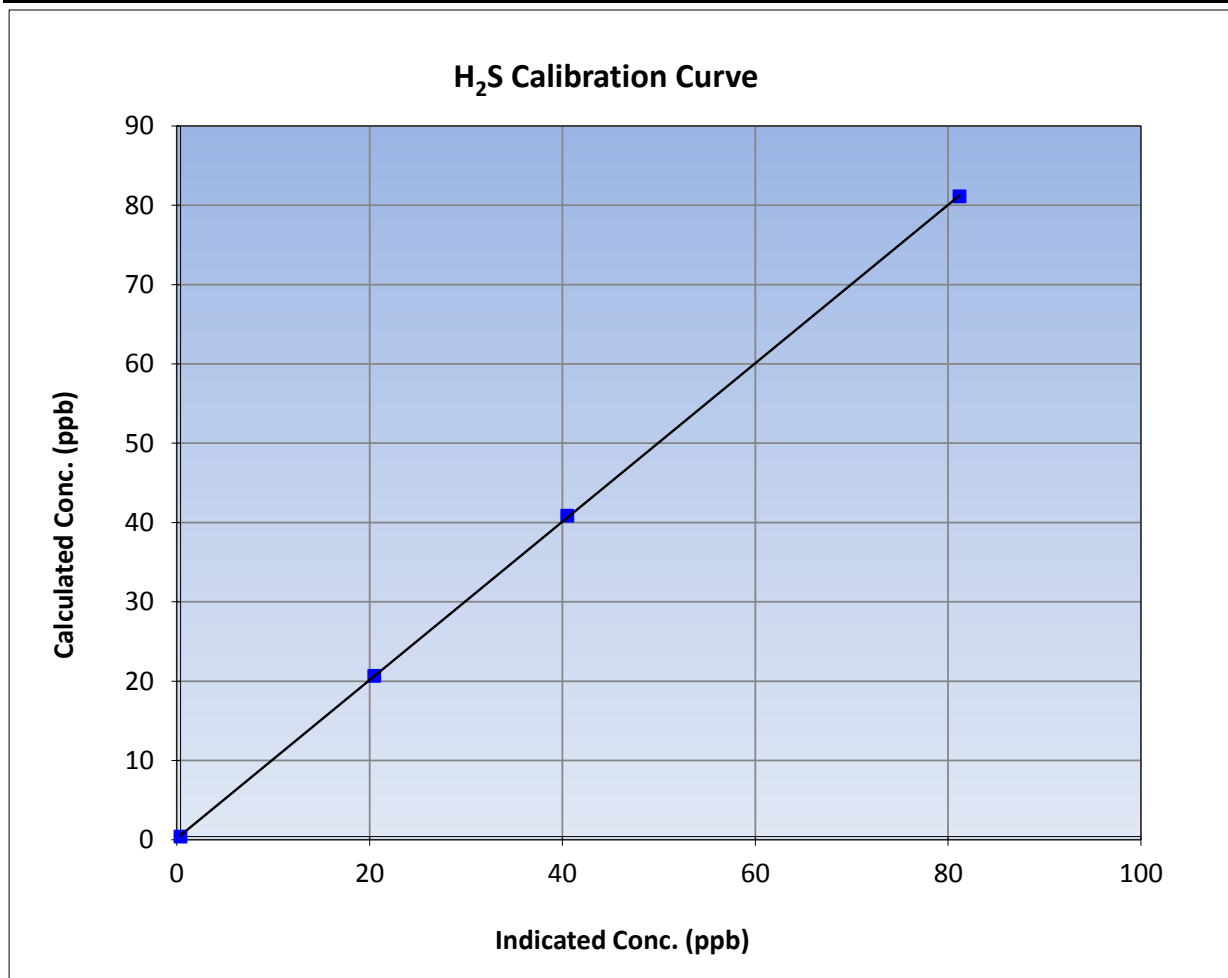
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 18, 2017 | Previous Calibration | August 14, 2017 |
| Station Name | MacKay River | Station Number | AMS 20 |
| Start Time (MST) | 10:05 | End Time (MST) | 13:05 |
| Analyzer make | Teledyne API T101 | Analyzer serial # | 196 |

Calibration Data

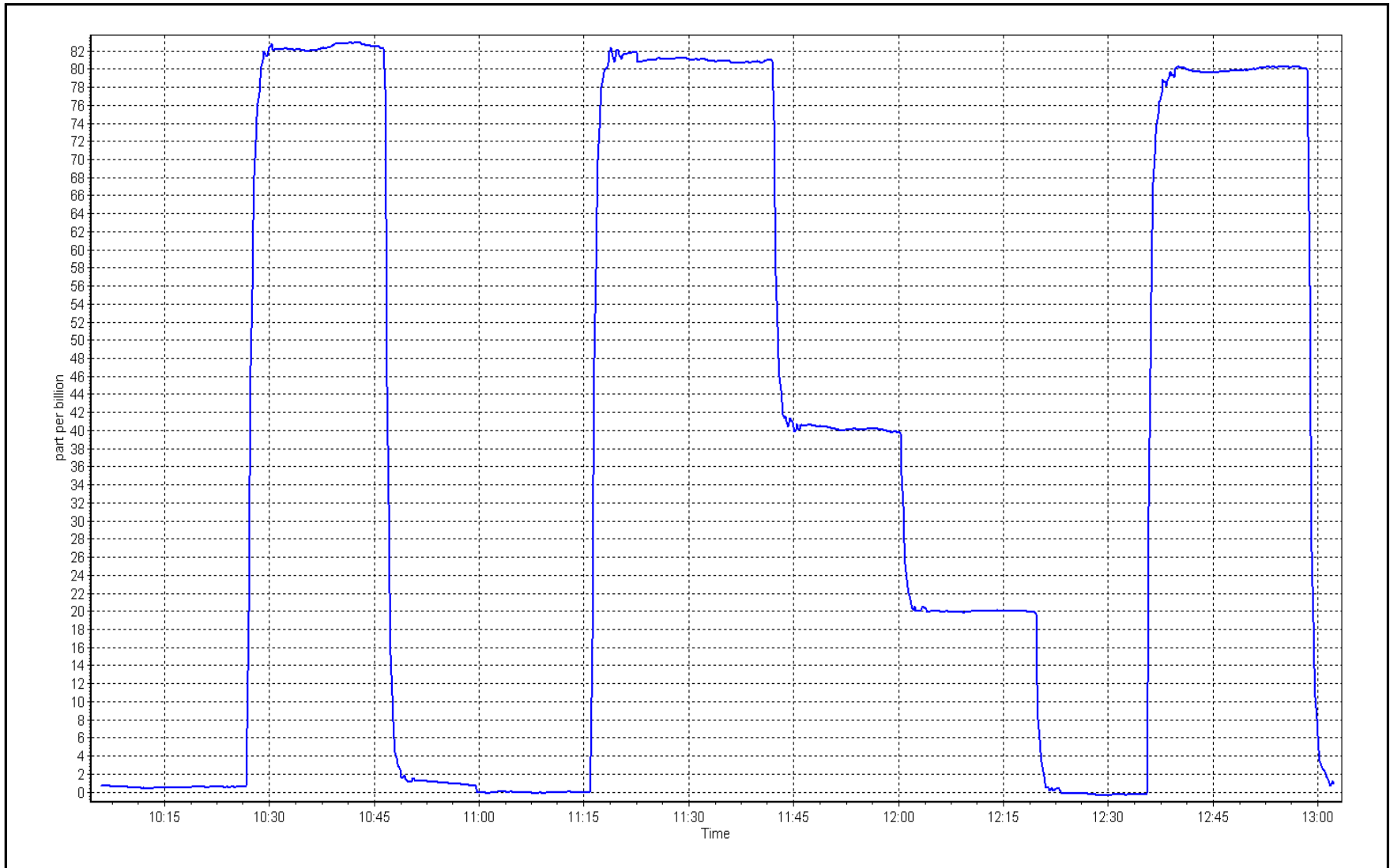
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999971 | |
| 80.7 | 80.8 | 0.9990 | | | ≥0.995 |
| 40.4 | 40.1 | 1.0087 | Slope | 0.998729 | |
| 20.3 | 20.1 | 1.0086 | | | 0.90 - 1.10 |
| | | | Intercept | 0.155489 | +/-3 |



H₂S Calibration Plot

Date: September 18, 2017

Location: MacKay River





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | MacKay River | Station number: | AMS 20 |
| Calibration Date: | September 22, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 9:30 | End time (MST): | 14:05 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|-------------------|---------------------|------------------|
| Gas Cert Reference | EY0000657 | Cal Gas Expiry Date | November 4, 2019 |
| CH4 Cal Gas Conc. | <u>513.0</u> ppm | CH4 Equiv Conc. | 1060.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 1220 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 4766 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|--------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1501663727 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -299 |
| Calculated slope | 1.005517 | Sample pressure | 8.6 |
| Calculated intercept | -0.026569 | Fuel pressure | 23.9 |
| Analyzer Background | 2.220 | Air pressure | 34.3 |
| Analyzer Coefficient | 4.324 | Flame temperature | 148.8 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5005 | 0.0 | 0.00 | 0.18 | ---- |
| as found span | 4930 | 78.7 | 16.66 | 16.91 | 0.985 |
| calibrator zero | 5005 | 0.0 | 0.00 | -0.04 | ---- |
| high point | 4930 | 78.7 | 16.66 | 16.68 | 0.999 |
| second point | 4975 | 39.4 | 8.33 | 8.24 | 1.011 |
| third point | 4995 | 19.7 | 4.17 | 4.12 | 1.011 |
| as left zero | 5005 | 0.0 | 0.00 | -0.05 | ---- |
| as left span | 4930 | 78.7 | 16.66 | 16.74 | 0.995 |
| Average Correction Factor | | | | | 1.007 |
| Corrected As found | 16.73 | Previous response | 16.59 | *% change | -0.8% |

* = > +/-5% change initiates investigation

Notes: Sample inlet filter replaced after as founds. Sample pump replaced after as founds for preventative maintenance. Adjusted zero and span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

THC Calibration Summary

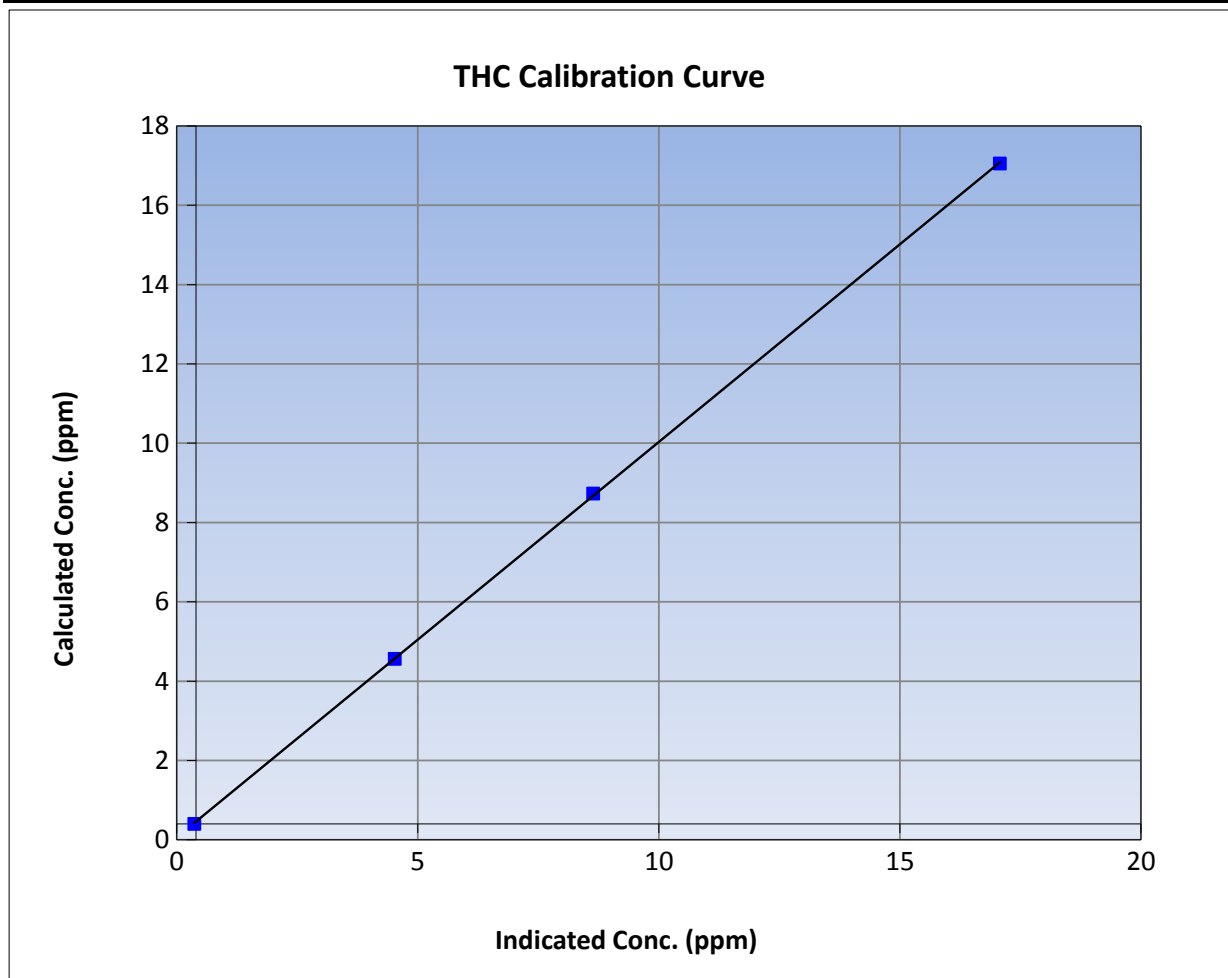
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | MacKay River | Station Number | AMS 20 |
| Start Time (MST) | 9:30 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1501663727 |

Calibration Data

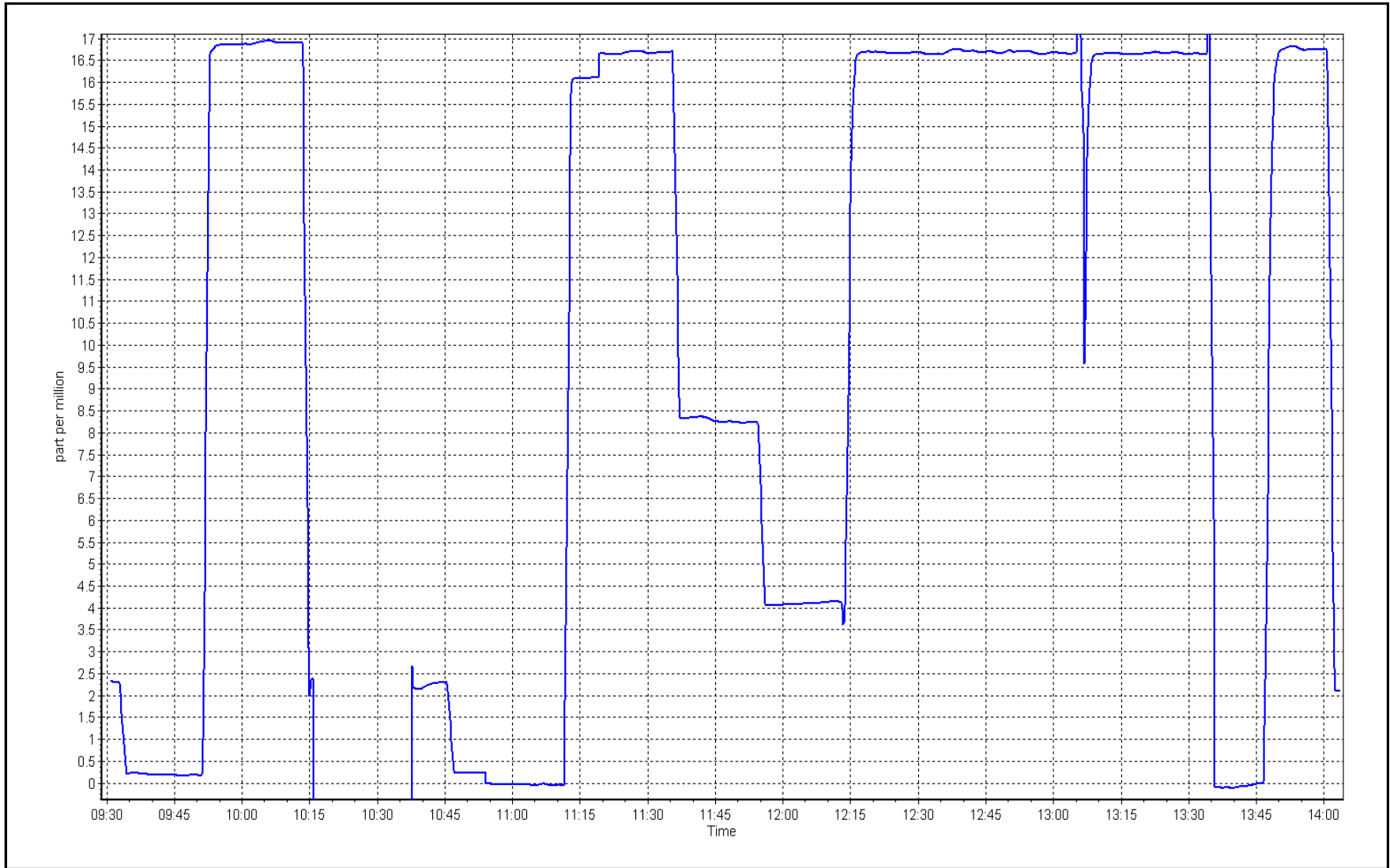
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999971 | ≥0.995 |
| 16.7 | 16.7 | 0.9991 | | | |
| 8.3 | 8.2 | 1.0110 | Slope | 0.997027 | 0.90 - 1.10 |
| 4.2 | 4.1 | 1.0110 | | | |
| | | | Intercept | 0.060370 | +/-1.5 |



THC Calibration Plot

Date: September 22, 2017

Location: MacKay River





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | MacKay River | Station number: | AMS 20 |
| Calibration Date: | September 22, 2017 | Last Cal Date: | August 23, 2017 |
| Start time (MST): | 9:30 | End time (MST): | 14:05 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|------------------|
| NO Gas Cylinder # | EY0000657 | Cal Gas Expiry Date | November 4, 2019 |
| NOX Cal Gas Conc. | <u>50.9</u> ppb | NO Cal Gas Conc. | <u>50.9</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 1220 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4766 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1505164379 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.078 | 1.078 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.997 | 0.997 | PMT Temperature | -3.1 | -2.9 |
| NO ₂ coefficient | 0.995 | 0.995 | Reaction cell Press | 167.8 | 168.1 |
| NO bkgrnd | 3.1 | 3.1 | Sample Flow | 0.828 | 0.830 |
| NOX bkgrnd | 3.1 | 3.2 | PMT Voltage | -767.4 | -767.4 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.999116 | 0.990558 |
| NO _x Cal Offset | 0.777124 | 0.870236 |
| NO Cal Slope | 0.998501 | 0.988618 |
| NO Cal Offset | 1.216759 | 1.504421 |
| NO ₂ Cal Slope | 0.994927 | 0.993230 |
| NO ₂ Cal Offset | -0.001353 | 0.375588 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | 0.0 | ---- | ---- |
| as found span | 4930 | 78.7 | 799.8 | 799.8 | 0.0 | 806.5 | 806.5 | 0.0 | 0.9917 | 0.9917 |
| calibrator zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | 0.0 | ---- | ---- |
| high point | 4930 | 78.7 | 799.8 | 799.8 | 0.0 | 807.1 | 808.4 | -1.3 | 0.9909 | 0.9893 |
| second point | 4975 | 39.4 | 399.9 | 399.9 | 0.0 | 401.7 | 401.4 | 0.3 | 0.9956 | 0.9964 |
| third point | 4995 | 19.7 | 200.0 | 200.0 | 0.0 | 201.0 | 200.2 | 0.7 | 0.9948 | 0.9988 |
| as left zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | ---- | ---- |
| as left span | 4930 | 78.7 | 799.8 | 349.3 | 450.5 | 806.7 | 348.0 | 458.6 | 0.9914 | 1.0037 |
| Average Correction Factor | | | | | | | | | 0.9938 | 0.9948 |

Corrected As found NO_x = 806.8 ppb
 Previous Response NO_x = 799.7 ppb

NO = 806.8 ppb
 NO = 799.8 ppb

*Percent Change NO_x = -0.9%
 *Percent Change NO = -0.9%
 * = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|---------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 804.7 | 804.3 | 0.4 | 0.9939 | 0.9944 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 349.3 | 455.0 | 807.4 | 349.3 | 458.1 | 0.9906 | ---- | 0.9932 | 100.7% |
| 2nd NO2 (200 ppb O3) | 570.4 | 233.9 | 804.8 | 570.4 | 234.4 | 0.9938 | ---- | 0.9979 | 100.2% |
| 3rd NO2 (100 ppb O3) | 684.5 | 119.8 | 804.7 | 684.5 | 120.2 | 0.9939 | ---- | 0.9967 | 100.3% |
| 2nd NO ref point | ---- | 0.0 | 803.6 | 802.6 | 1.0 | 0.9952 | 0.9965 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9934 | 0.9954 | 0.9959 | 100.4% |

Notes:

Sample inlet filter replaced after as founds. No adjustment made.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

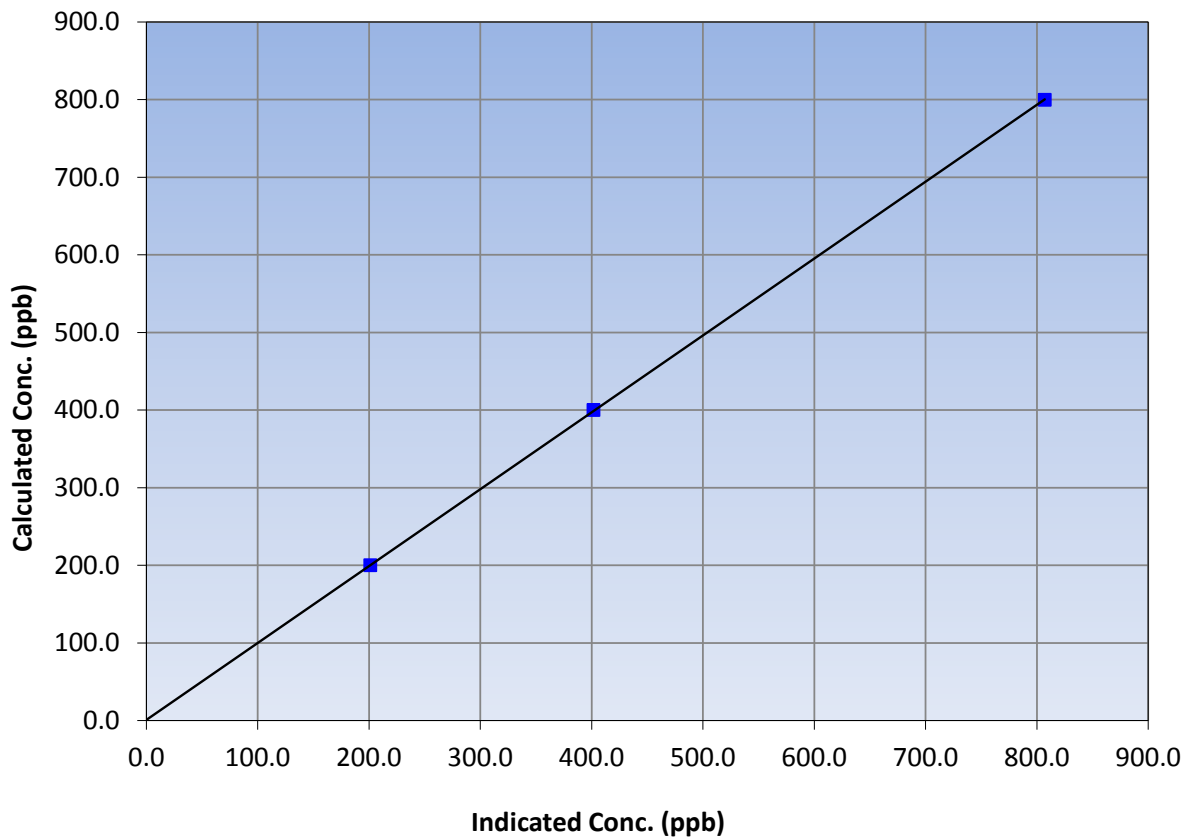
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | MackKay River | Station Number | AMS 20 |
| Start Time (MST) | 9:30 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1505164379 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.8 | 807.1 | 0.9909 | | | |
| 399.9 | 401.7 | 0.9956 | | | |
| 200.0 | 201.0 | 0.9948 | | | |
| | | | Slope | 0.990558 | 0.90 - 1.10 |
| | | | Intercept | 0.870236 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

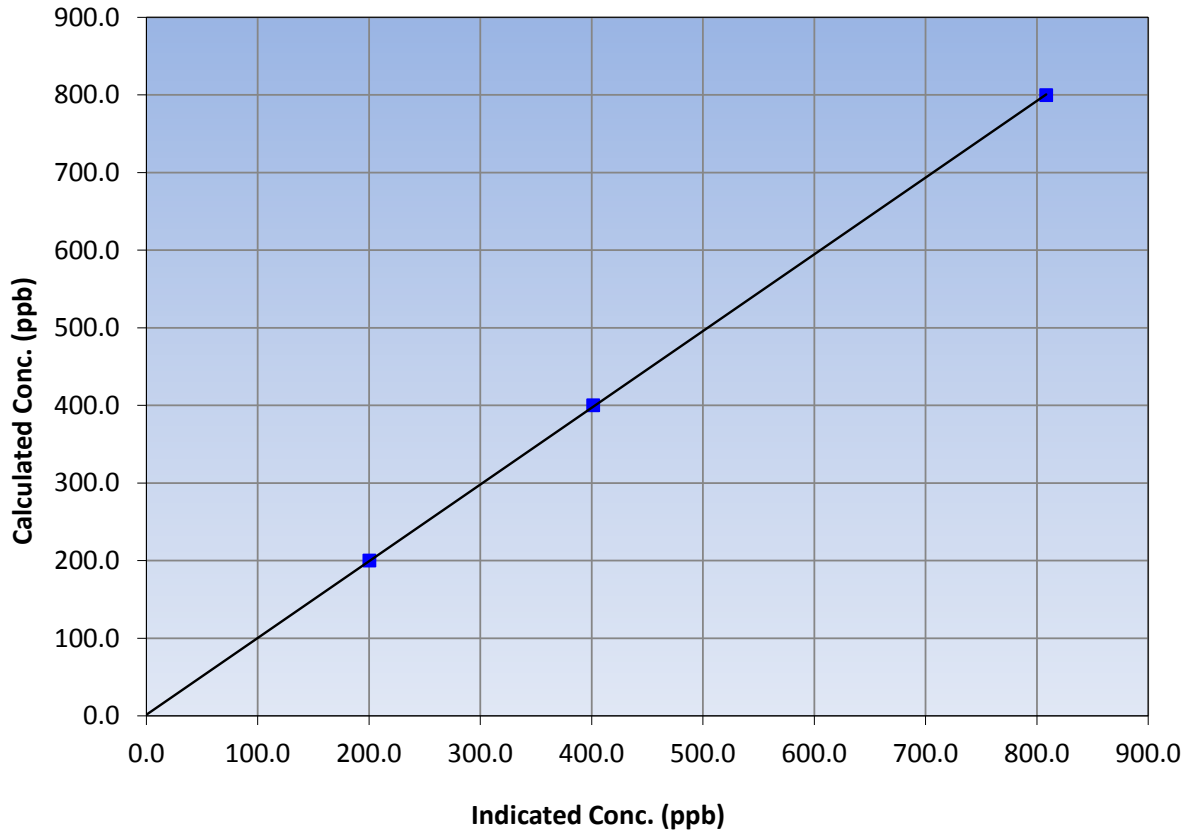
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 9:30 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1505164379 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.8 | 808.4 | 0.9893 | | | |
| 399.9 | 401.4 | 0.9964 | | | |
| 200.0 | 200.2 | 0.9988 | | | |
| | | | Slope | 0.988618 | 0.90 - 1.10 |
| | | | Intercept | 1.504421 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

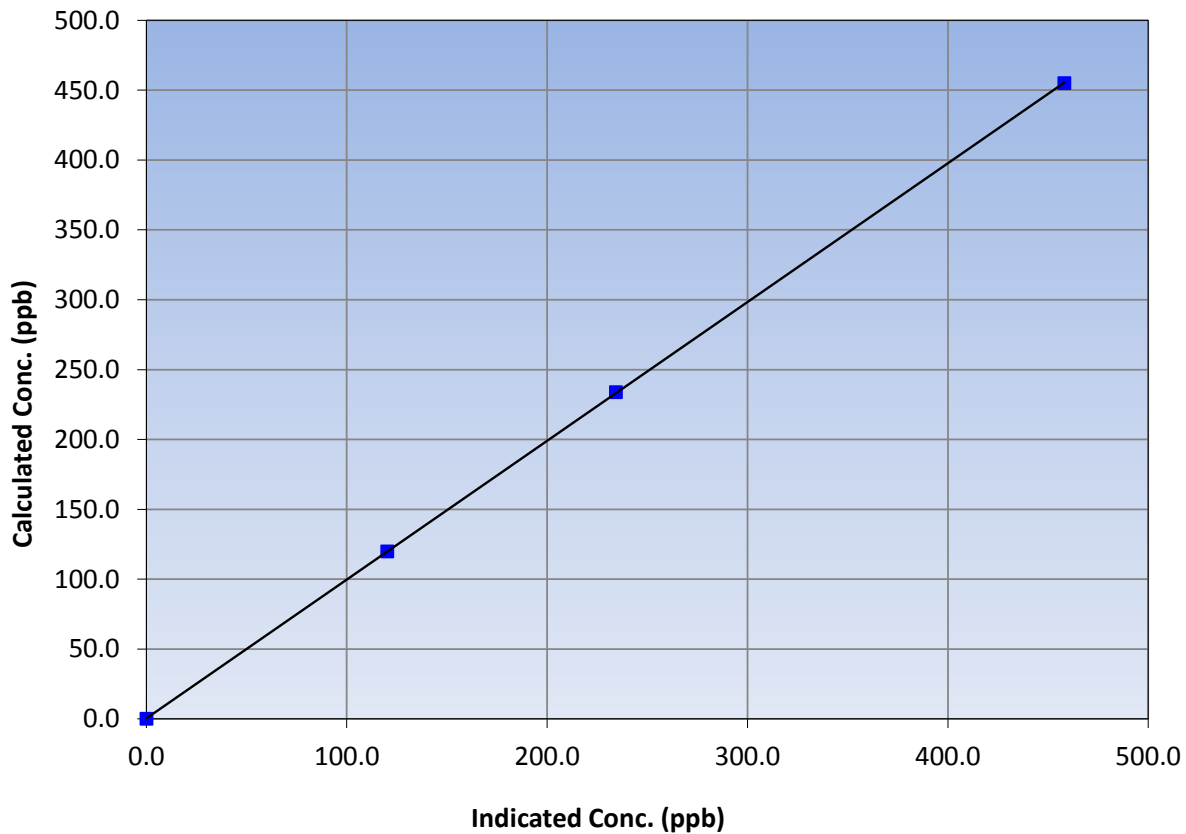
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 9:30 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1505164379 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 455.0 | 458.1 | 0.9932 | | | |
| 233.9 | 234.4 | 0.9979 | | | |
| 119.8 | 120.2 | 0.9967 | | | |
| | | | Slope | 0.993230 | 0.90 - 1.10 |
| | | | Intercept | 0.375588 | +/-20 |

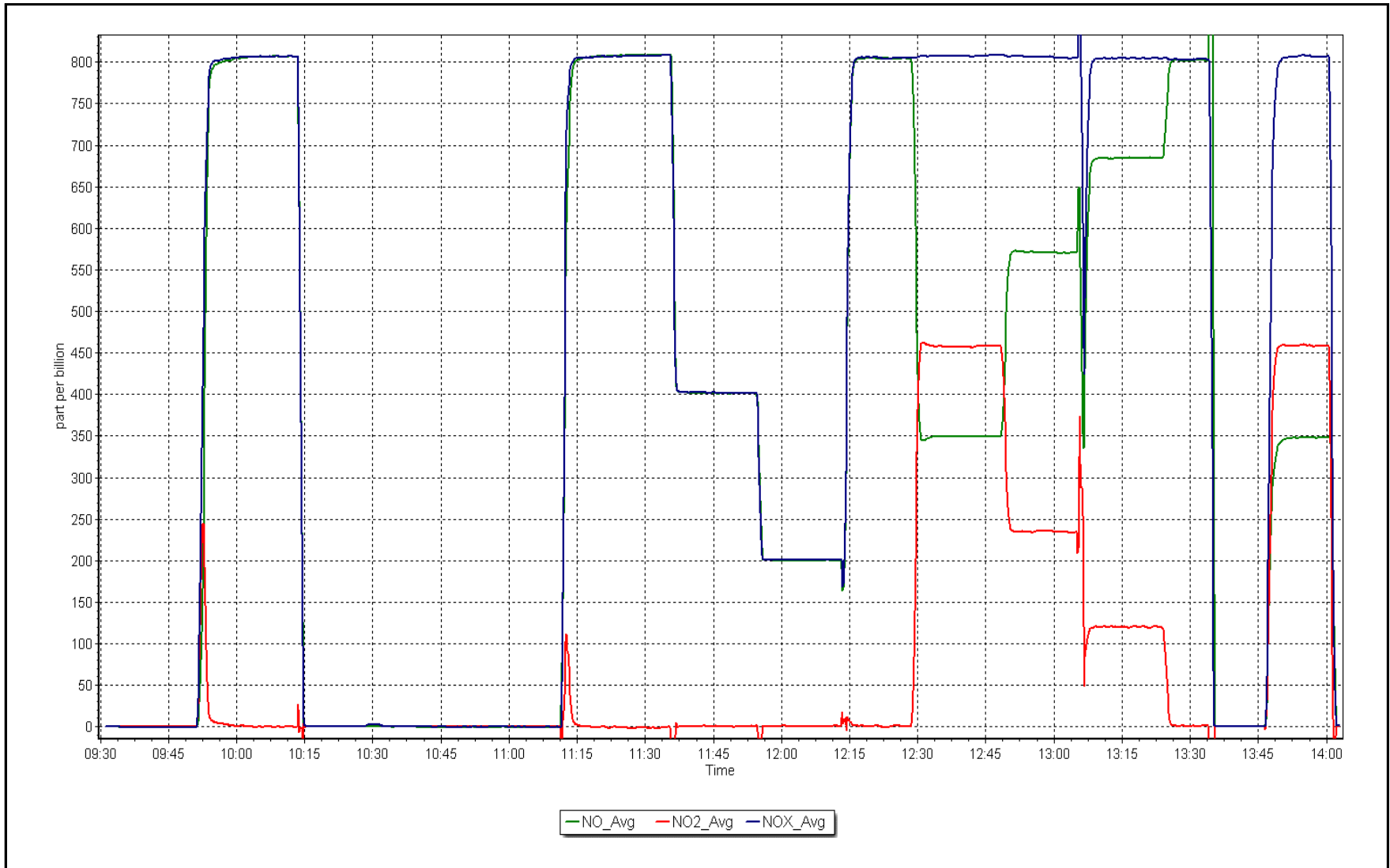
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 22, 2017

Location: MacKay River





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 21
CONKLIN COMMUNITY
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 683 | 34 | 37 | 99.58 | 5 | 0 | 1 | 0 |
| TRS(ppb) Average | 686 | 33 | 34 | 99.86 | 1 | 0 | 0 | 0 |
| THC(ppm) Average | 682 | 34 | 38 | 99.44 | 2.9 | - | 2.3 | - |
| NMHC(ppm) Average | 682 | 38 | 38 | 100 | 0.356 | - | 0.048 | - |
| CH4(ppm) Average | 682 | 38 | 38 | 100 | 2.8 | - | 2.3 | - |
| O3 (ppb) Average | 685 | 34 | 35 | 99.86 | 77 | 0 | 43 | - |
| NO2 (ppb) Average | 683 | 34 | 37 | 99.58 | 18 | 0 | 8 | - |
| NO (ppb) Average | 683 | 34 | 37 | 99.58 | 22 | - | 5 | - |
| NOX (ppb) Average | 683 | 34 | 37 | 99.58 | 34 | - | 13 | - |
| PM2.5 (ug/m3) Average | 699 | 1 | 21 | 97.22 | 67 | - | 24 | 0 |
| Wind Speed 10 m (km/h) Average | 715 | 0 | 5 | 99.31 | 18 | - | 12 | - |
| Wind Direction 10 m (deg) Average | 715 | 0 | 5 | 99.31 | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 28.8 | - | 17.7 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 98 | - | 96.0 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|-----|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max | |
| SO2 (ppb) Average | 683 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| TRS (ppb) Average | 686 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 682 | 2 | 0.2 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2.1 | 2.3 | 2.3 | 2.9 |
| NMHC(ppm) Average | 682 | 0.005 | 0.027 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.356 |
| CH4(ppm) Average | 682 | 2 | 0.2 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.3 | 2.3 | 2.8 |
| O3 (ppb) Average | 685 | 24.7 | 13 | - | 3 | 6 | 16 | 26 | 33 | 38 | 38 | 77 |
| NO2 (ppb) Average | 683 | 2.5 | 2 | - | 0 | 0 | 1 | 2 | 3 | 6 | 6 | 18 |
| NO (ppb) Average | 683 | 1.3 | 2 | - | 0 | 0 | 0 | 0 | 2 | 4 | 4 | 22 |
| NOX (ppb) Average | 683 | 3.8 | 4 | - | 0 | 0 | 1 | 2 | 5 | 10 | 10 | 34 |
| PM2.5 (ug/m3) Average | 699 | 6.26 | 7.8 | - | 0.8 | 1.2 | 2.3 | 3.7 | 6.5 | 13.2 | 13.2 | 67 |
| Wind Speed 10 m (km/h) Average | 715 | 6.6 | 4 | - | 0 | 2 | 3 | 6 | 10 | 12 | 12 | 18 |
| Wind Direction 10 m (deg) Average | 715 | - | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 10.46 | 6.9 | - | -3.8 | 1.7 | 5.1 | 10.4 | 15 | 19.3 | 19.3 | 28.8 |
| Relative Humidity (%) Average | 720 | 71.8 | 21 | - | 26 | 40 | 53 | 76 | 93 | 96 | 96 | 98 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
 SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|---------------------|--|
| NOx, SO2, THC | 19 Sep 2017 11:00 | 19 Sep 2017 13:00 | 3 | Maintenance - calibration cylinder replacement |
| O3, TRS | 15 Sep 2017 13:00 | 15 Sep 2017 13:00 | 1 | Maintenance - manifold cleaning |
| PM2.5 | 19 Sep 2017 18:00 | 20 Sep 2017 13:00 | 20 | Analyzer Failure - pump stalled |
| THC | 29 Sep 2017 11:00 | 29 Sep 2017 11:00 | 1 | Maintenance - carrier gas replacement |
| Wind Speed, Wind Direction | 04 Sep 2017 19:00 | 04 Sep 2017 19:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 13 Sep 2017 20:00 | 13 Sep 2017 20:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 17 Sep 2017 01:00 | 17 Sep 2017 01:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 23 Sep 2017 19:00 | 23 Sep 2017 19:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 27 Sep 2017 19:00 | 27 Sep 2017 19:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Conklin - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 5 ppb on Sep 6 12:00 | Maximum Daily Average: 0.8 ppb on Sep 6 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 4 23:00 | Minimum Daily Average: 0.0 ppb on Sep 13 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 0.4 ppb at hour 12 | Minimum Diurnal Average: 0.1 ppb at hour 7 | | Hours of Calibration: | 34 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 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 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 5 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 5 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0.6 | 1 |
| 8-Sep | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 12-Sep | 0 | 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-Sep | 0 | 0 | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 16-Sep | 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 |
| 17-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0.4 | 1 |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | M | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 20-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 24-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 0.6 | 2 |
| 25-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.2 | 1 |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |

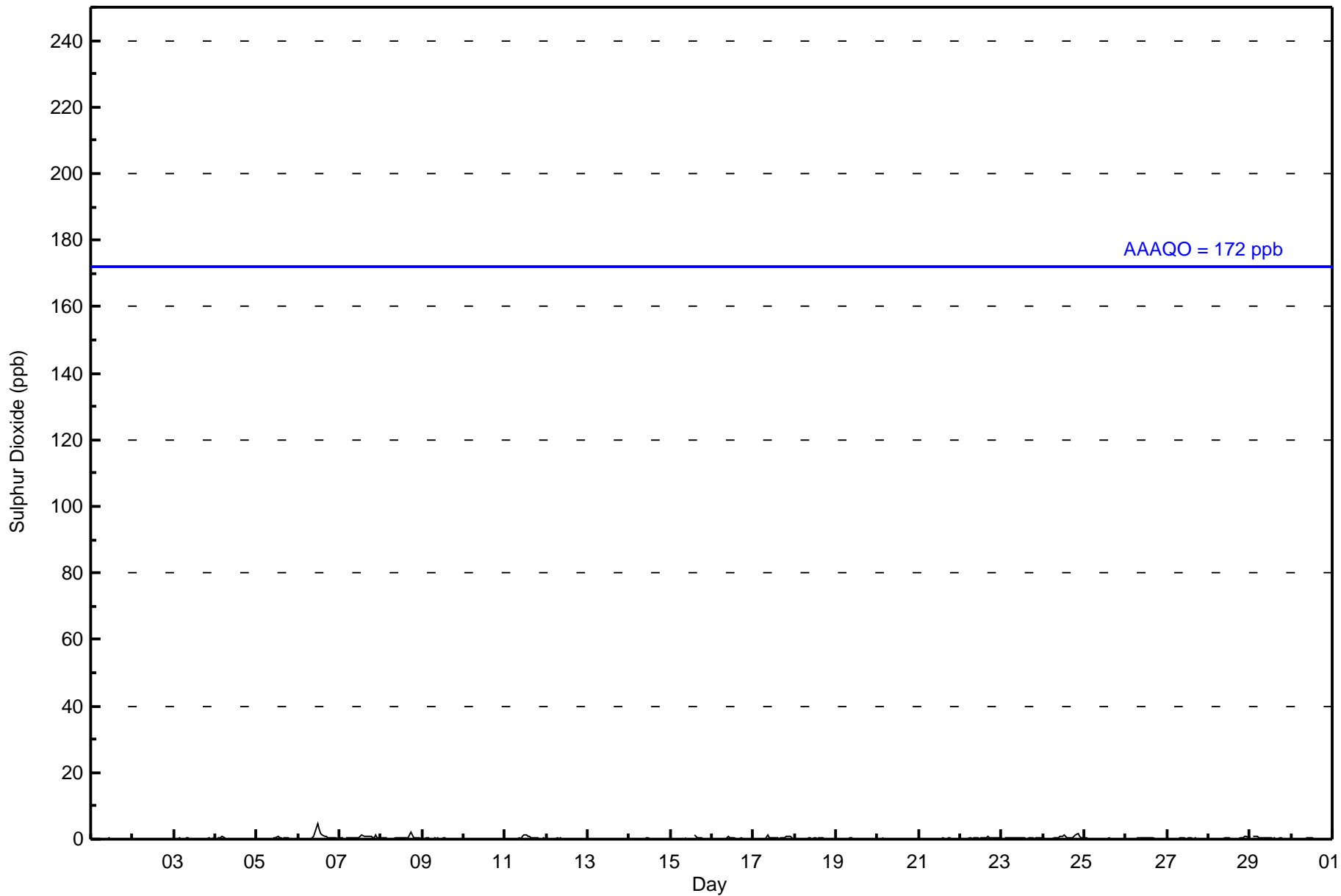
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | Diurnal Average | |
| 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 5 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Conklin - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Conklin - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 683 | 100.00 | 100.00 |
| 11 - 20 | 0 | 0.00 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 122 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 678 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 122 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 678 |

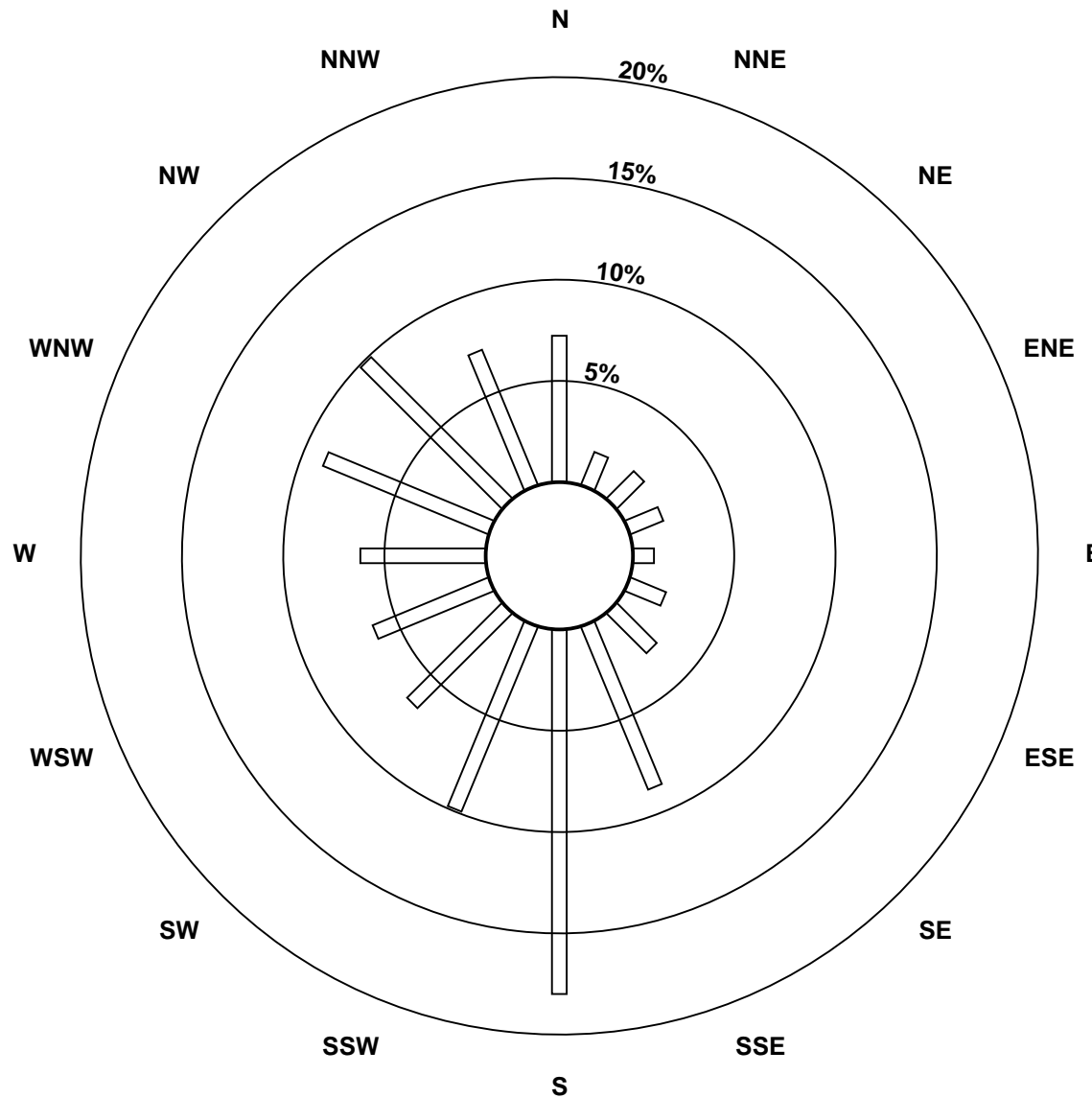
Total Number of Valid Hours: 678

Total Number of Hours: 720

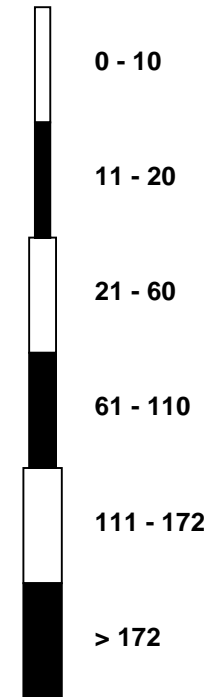


Wood Buffalo Environmental Association
Wind Rose Sep 2017

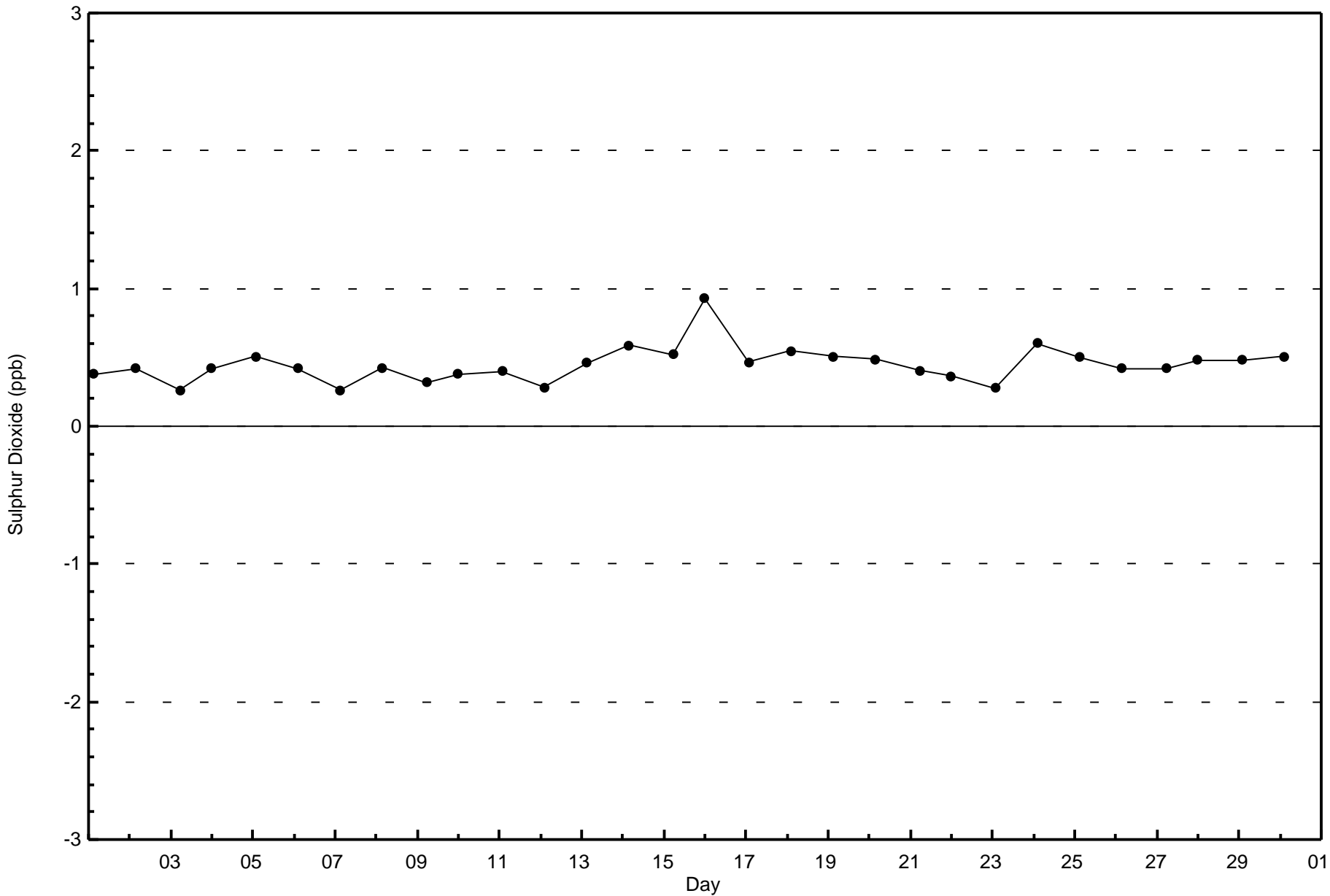
Sulphur Dioxide (SO₂) - ppb
Conklin (AMS 21)

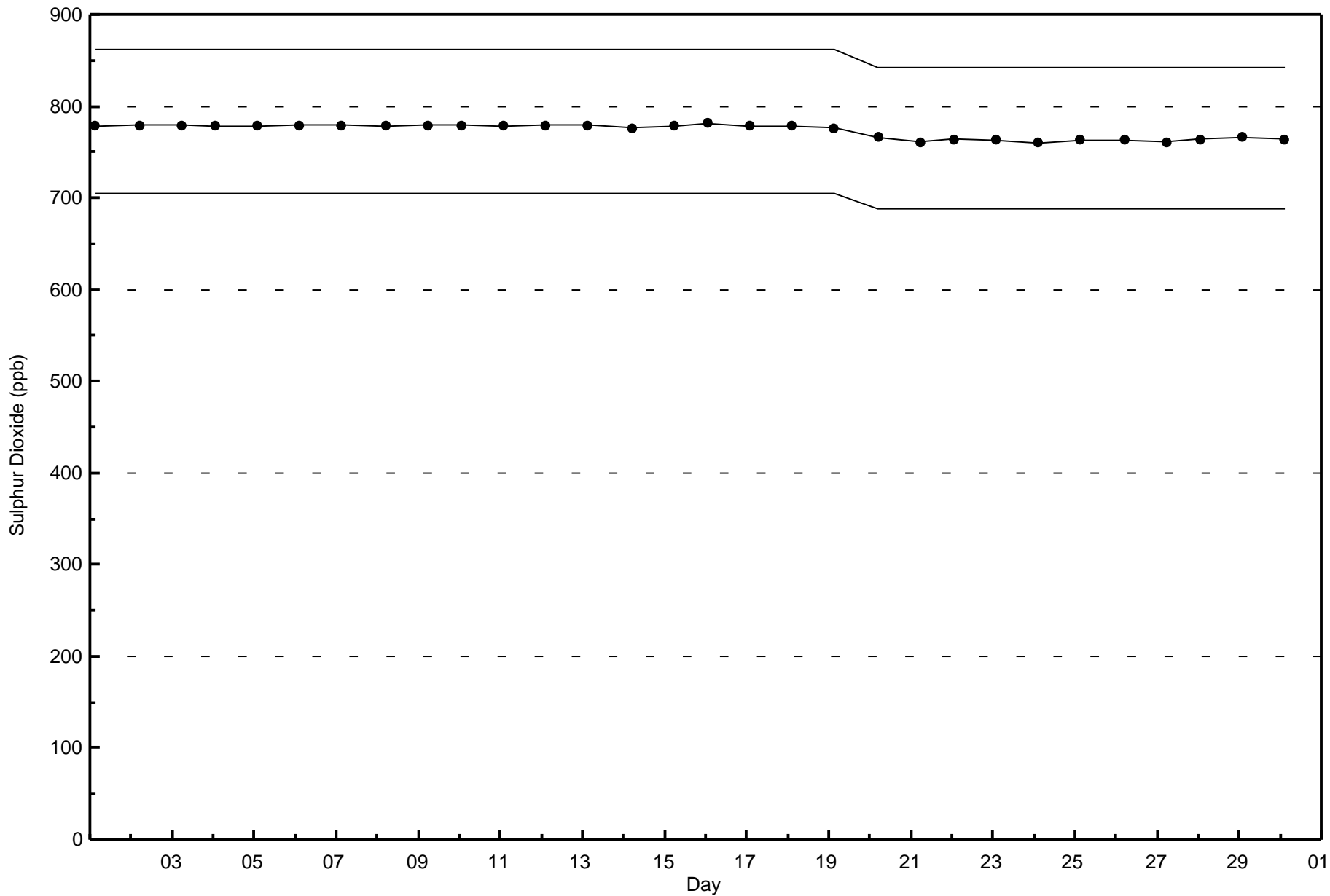


Classes (ppb)



Total Number of Valid Hours: 678

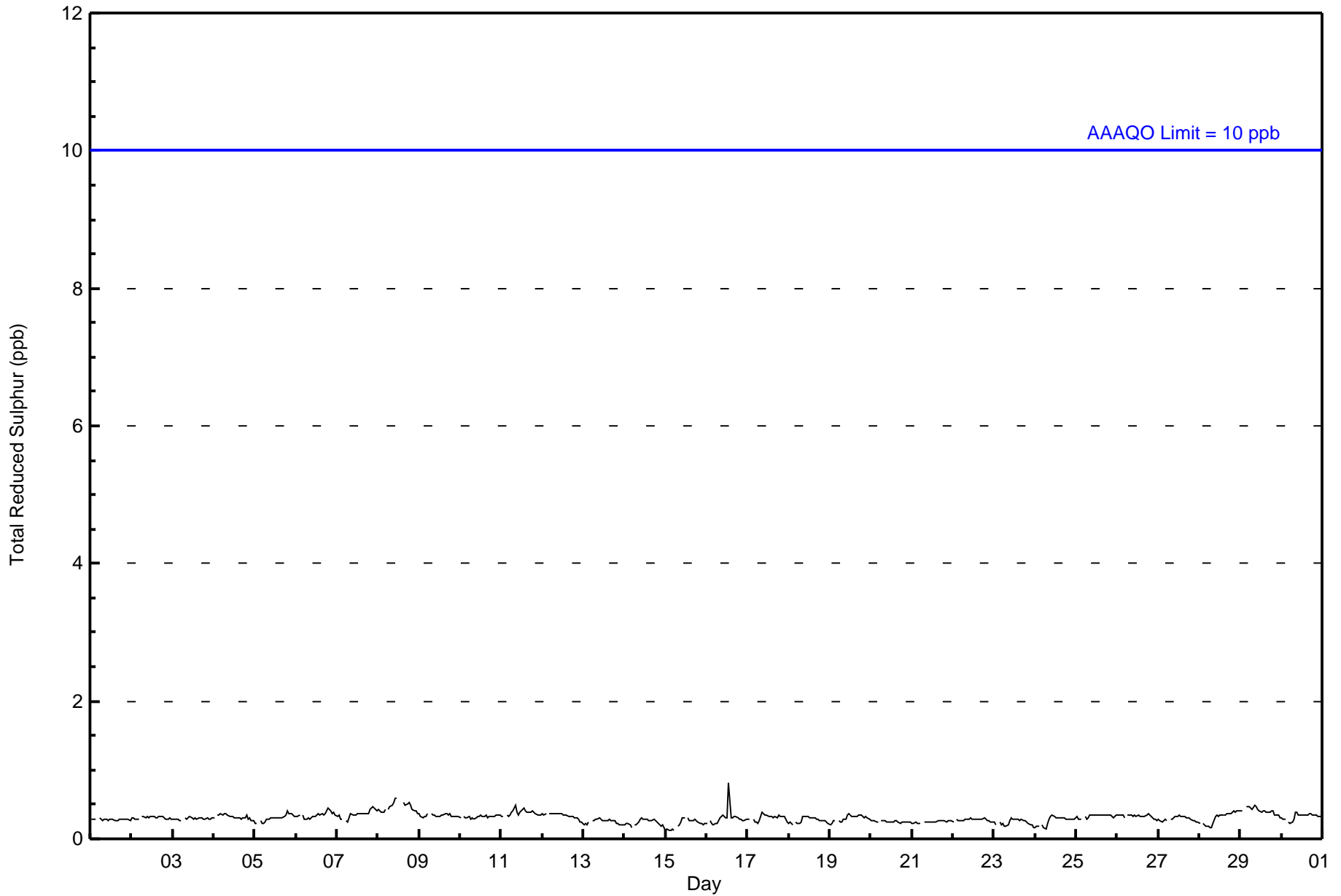






Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Conklin - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Conklin - September 2017**

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



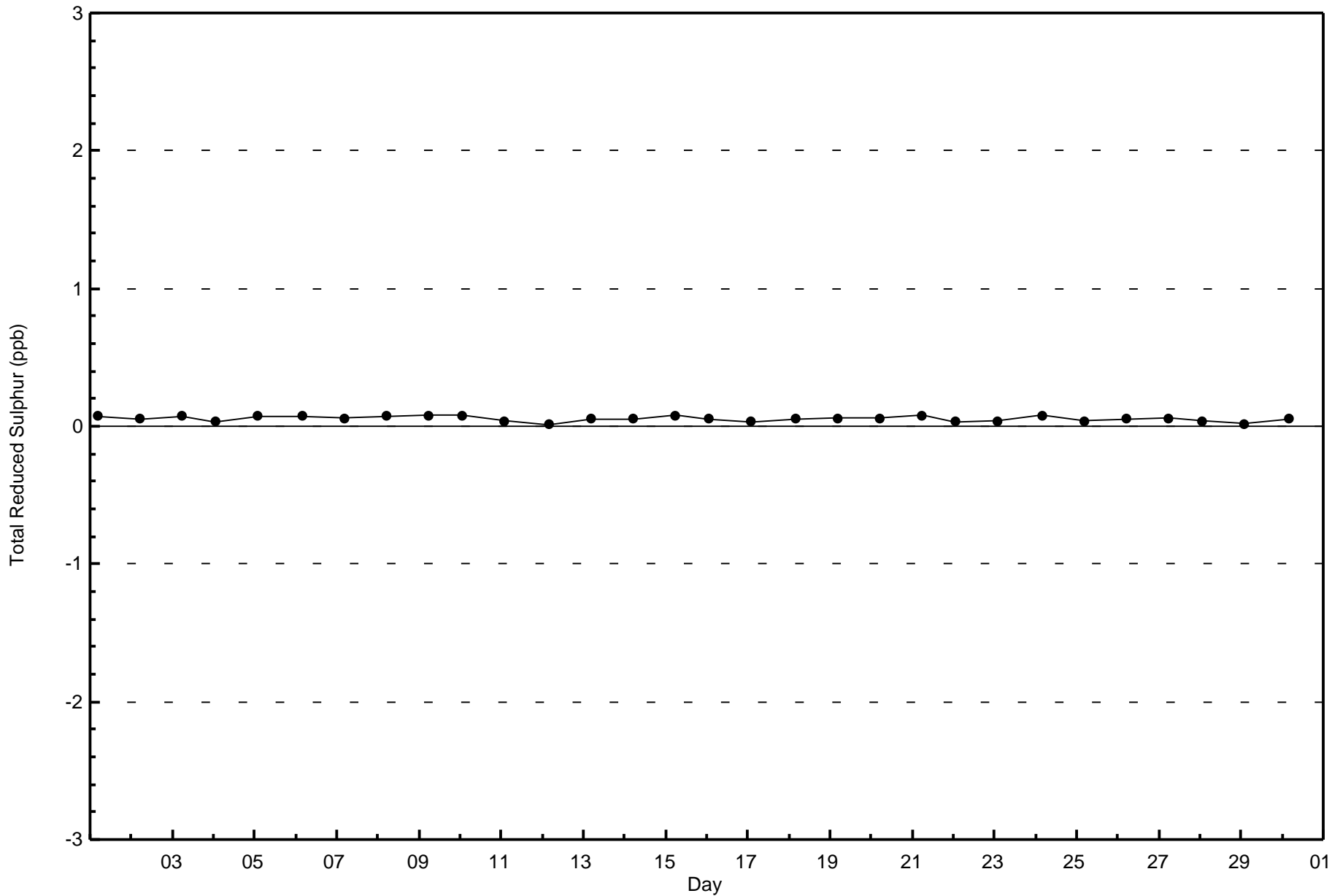
Wood Buffalo Environmental Association
Frequency Distribution

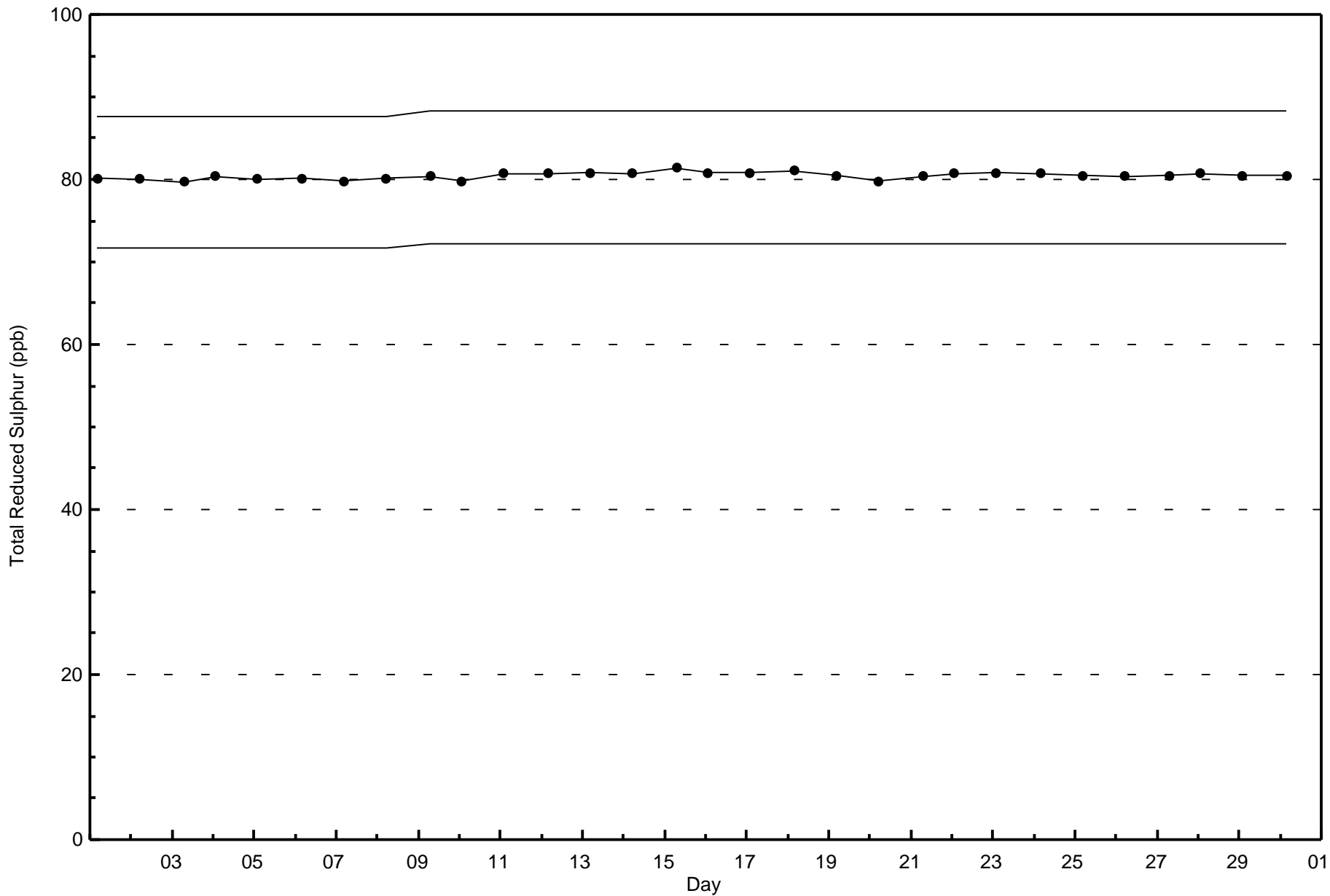
Total Reduced Sulphur (TRS) - ppb
Conklin - September 2017

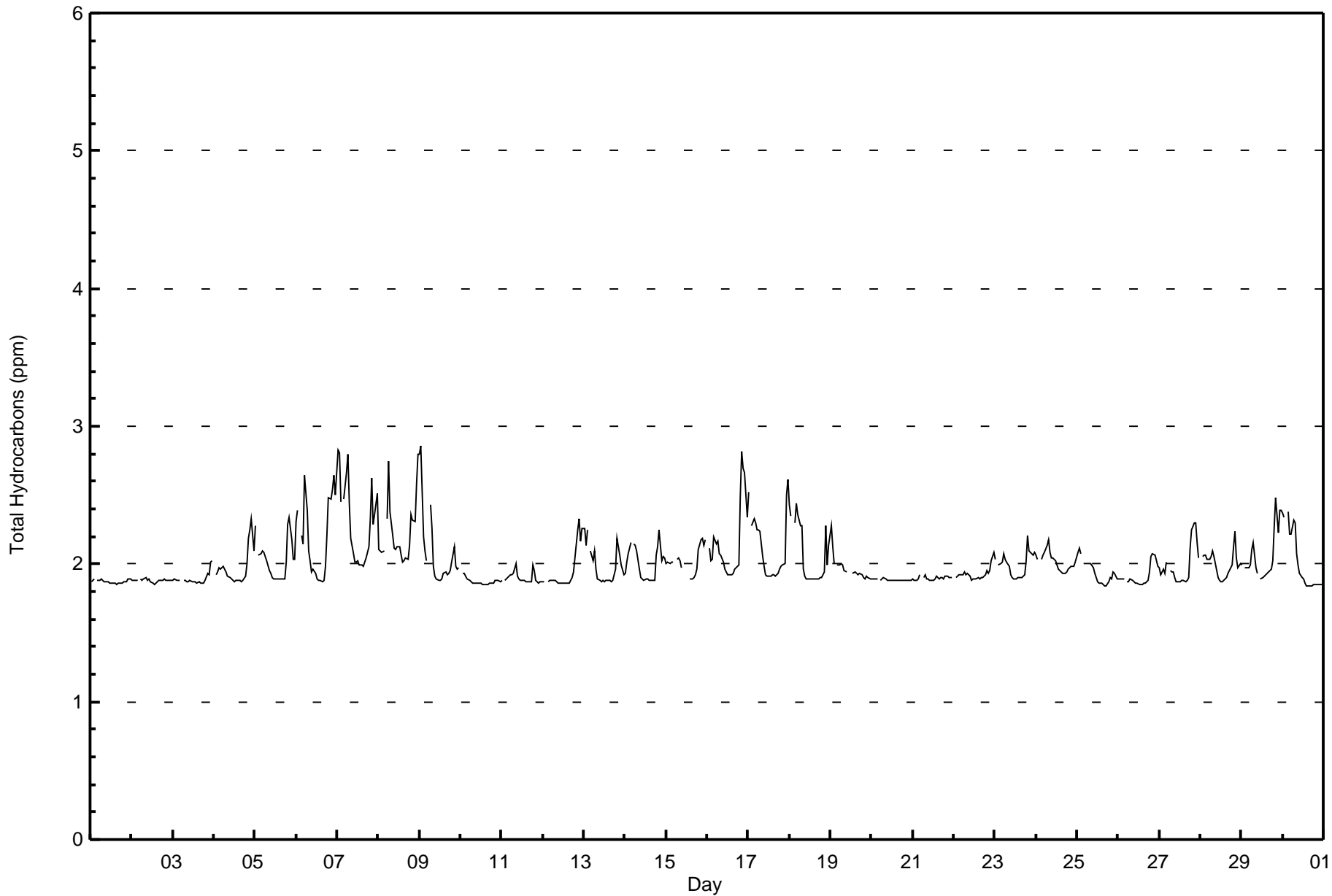
| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 48 | 12 | 13 | 13 | 9 | 14 | 18 | 60 | 121 | 67 | 45 | 43 | 42 | 59 | 68 | 49 | 681 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 12 | 13 | 13 | 9 | 14 | 18 | 60 | 121 | 67 | 45 | 43 | 42 | 59 | 68 | 49 | 681 |

Total Number of Valid Hours: 681

Total Number of Hours: 720









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 510 | 74.78 | 74.78 |
| 2.1 - 3.0 | 172 | 25.22 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 45 | 12 | 13 | 12 | 7 | 13 | 11 | 30 | 71 | 37 | 39 | 37 | 39 | 54 | 55 | 33 | 508 |
| 2.1 - 3.0 | 4 | 0 | 0 | 0 | 0 | 0 | 8 | 29 | 50 | 30 | 6 | 5 | 3 | 6 | 12 | 16 | 169 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 121 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 677 |

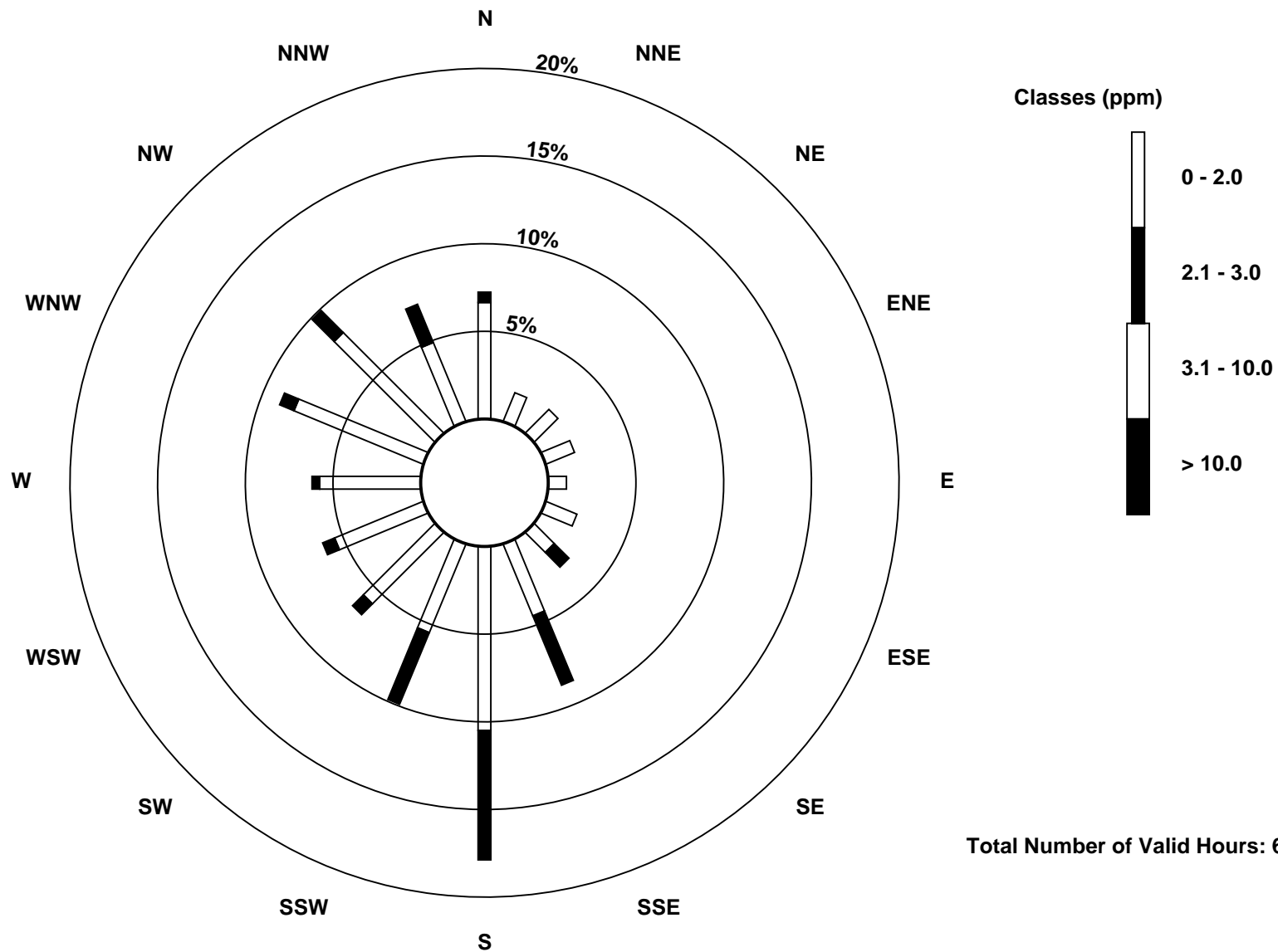
Total Number of Valid Hours: 677

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Conklin (AMS 21)



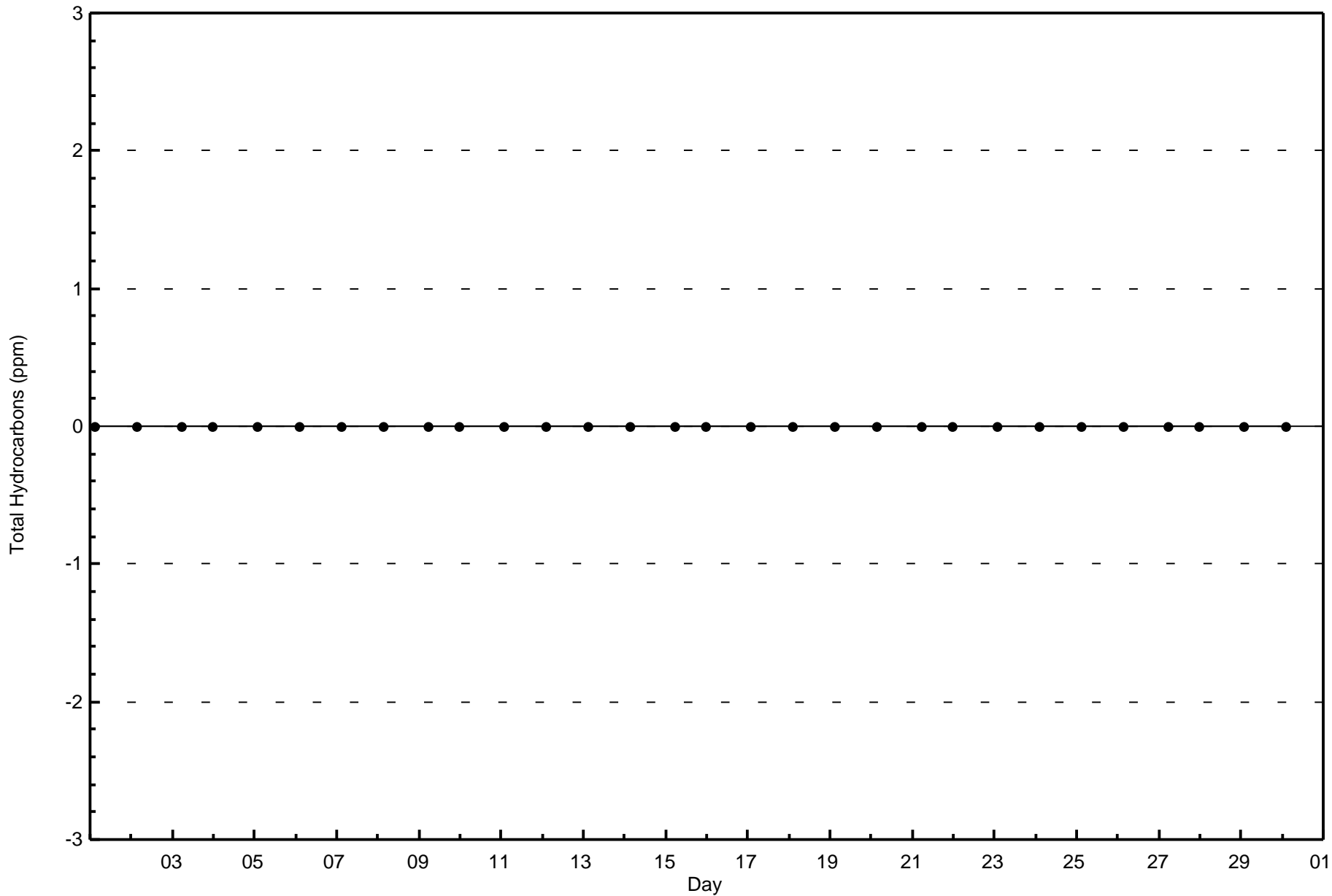


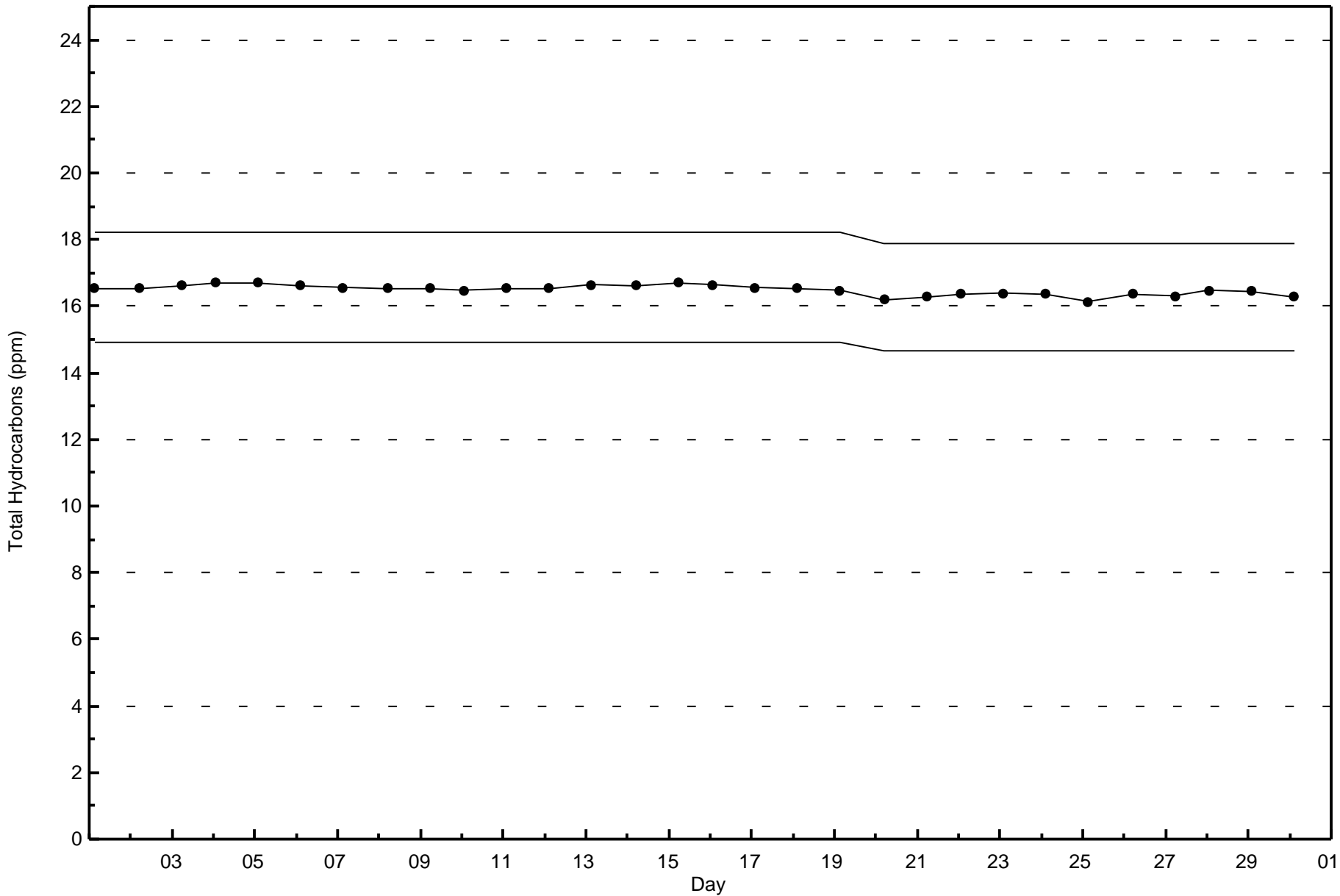
Wood Buffalo Environmental Association

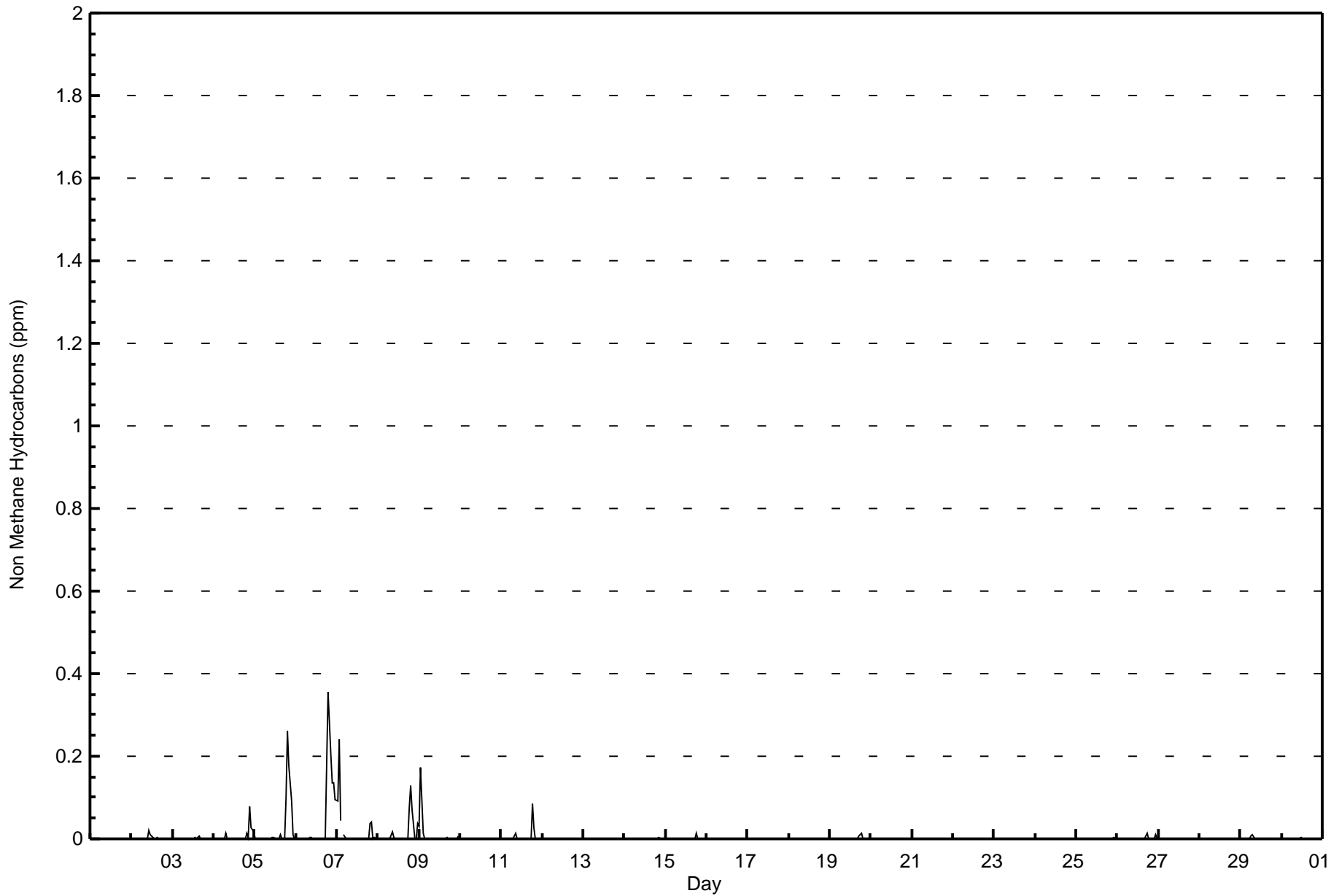
Zero Responses

Total Hydrocarbons (THC) - ppm

Conklin - September 2017









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 637 | 93.40 | 93.40 |
| 0.006 - 0.05 | 27 | 3.96 | 97.36 |
| 0.06 - 0.1 | 11 | 1.61 | 98.97 |
| > 0.1 | 7 | 1.03 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 47 | 12 | 13 | 11 | 6 | 13 | 18 | 53 | 110 | 62 | 39 | 39 | 42 | 59 | 62 | 46 | 632 |
| 0.006 - 0.05 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 6 | 2 | 3 | 3 | 0 | 1 | 4 | 1 | 27 |
| 0.06 - 0.1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 11 |
| > 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 7 |
| Totals | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 121 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 677 |

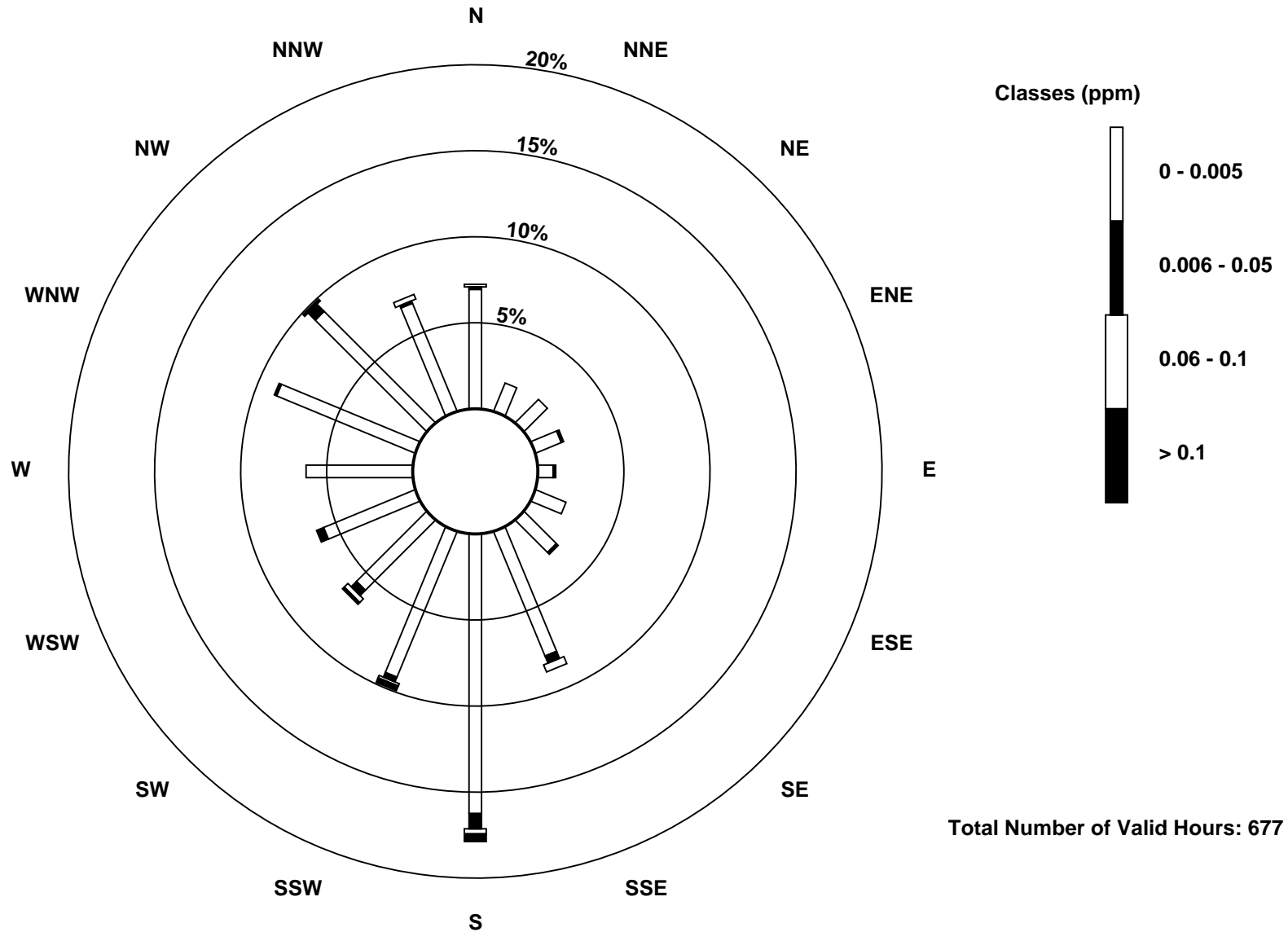
Total Number of Valid Hours: 677

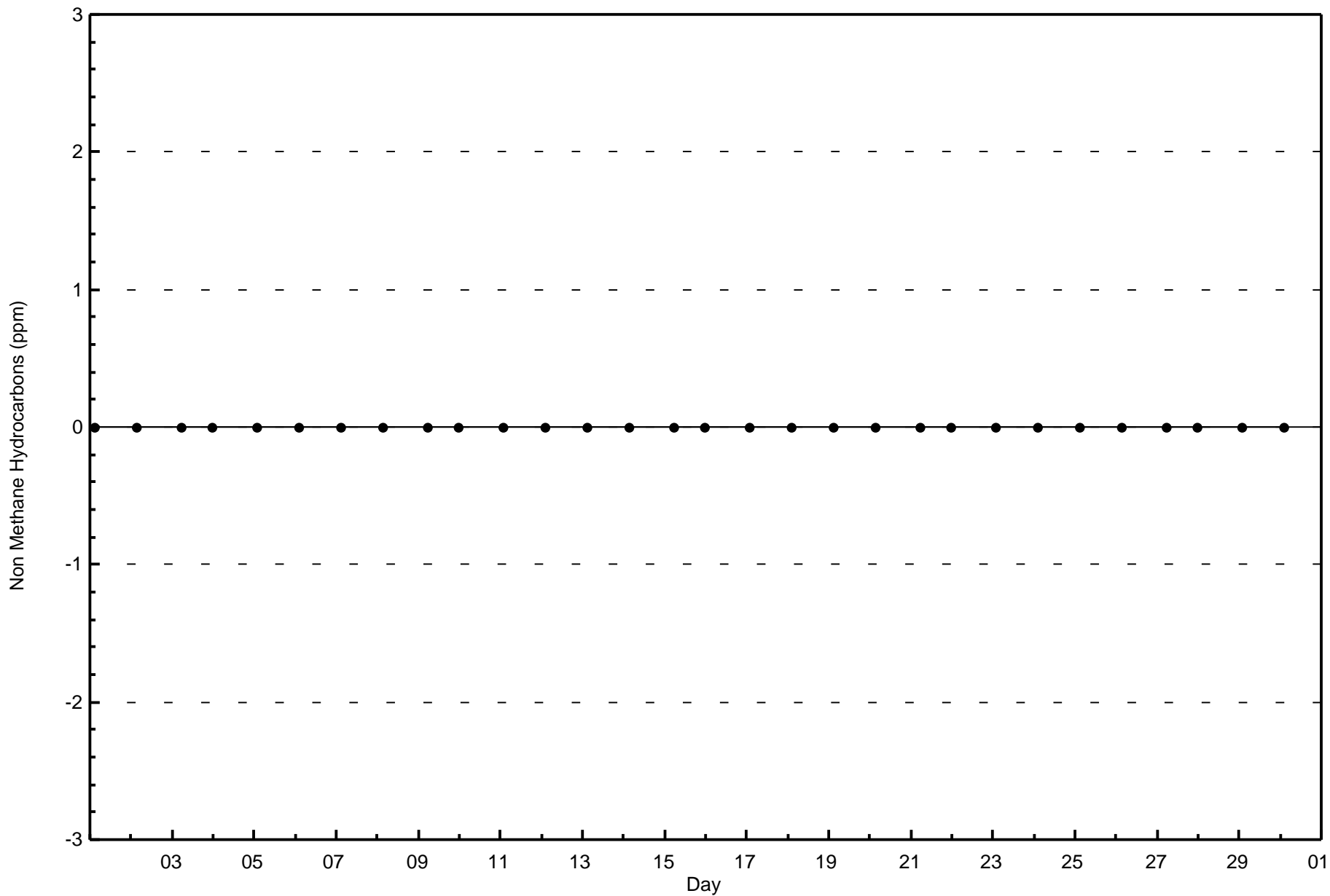
Total Number of Hours: 720

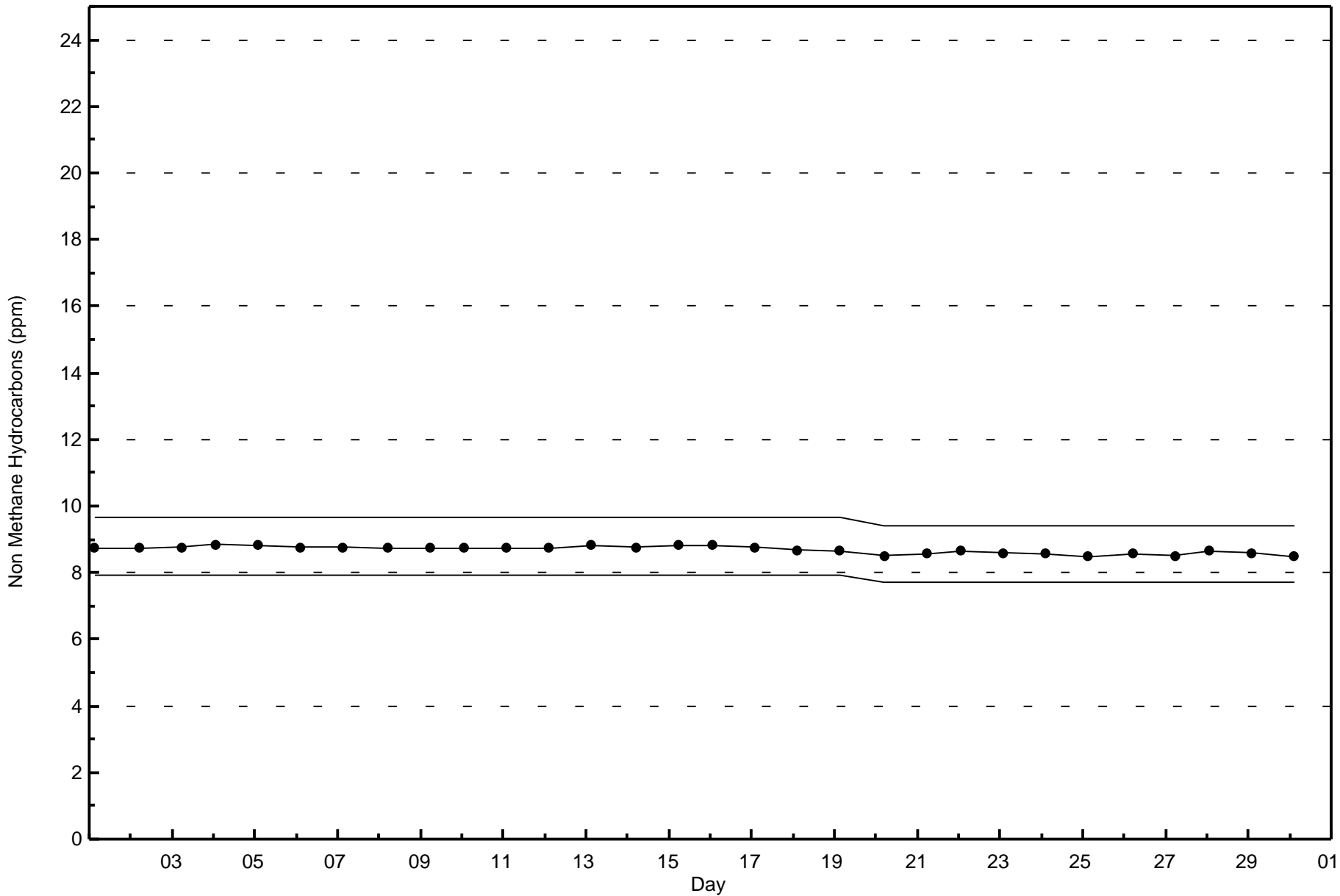


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Non Methane Hydrocarbons (NMHC) - ppm
Conklin (AMS 21)



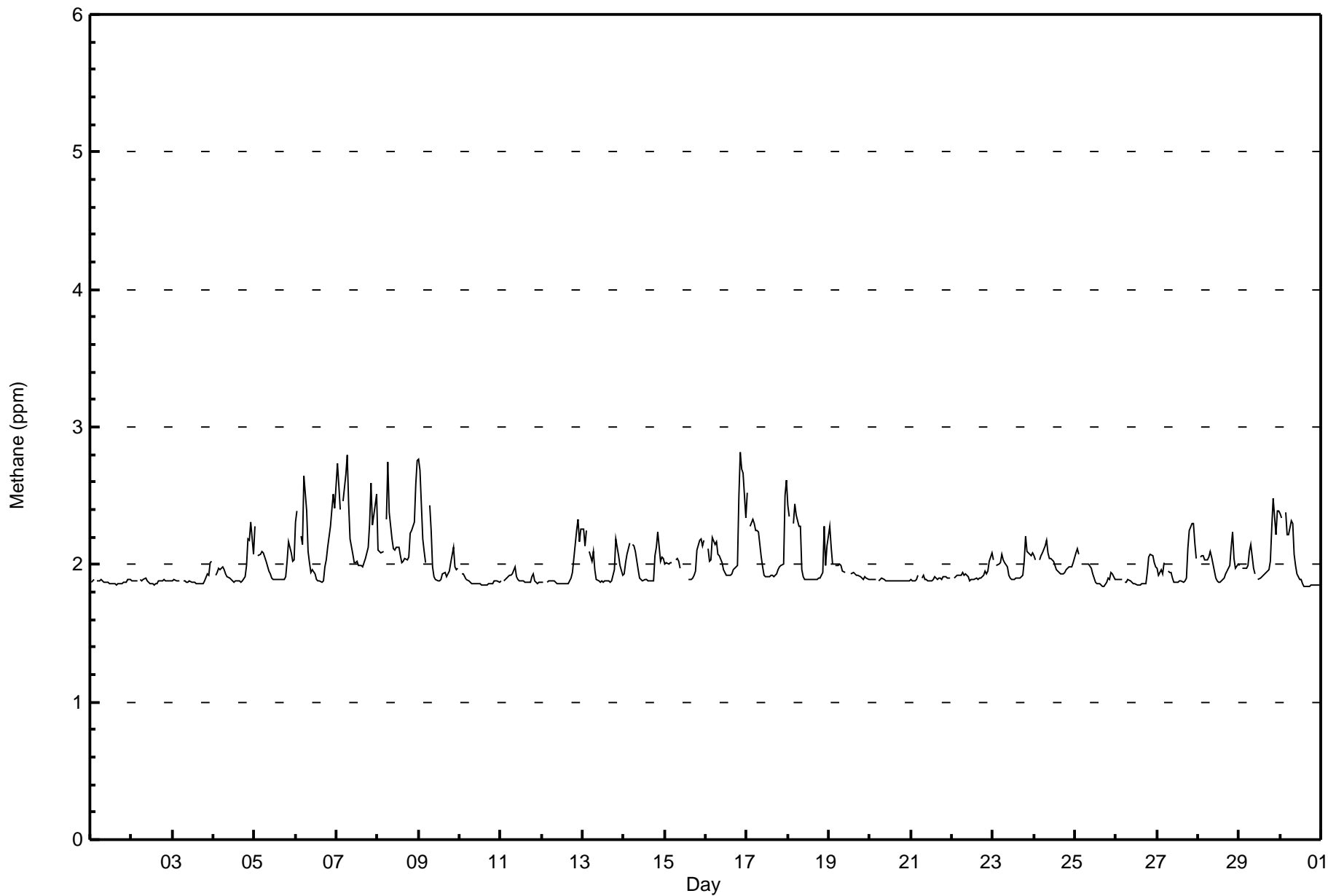






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Conklin - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Conklin - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 512 | 75.07 | 75.07 |
| 2.1 - 3.0 | 170 | 24.93 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Conklin - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 45 | 12 | 13 | 12 | 7 | 13 | 11 | 30 | 72 | 38 | 39 | 37 | 39 | 54 | 55 | 33 | 510 |
| 2.1 - 3.0 | 4 | 0 | 0 | 0 | 0 | 0 | 8 | 29 | 49 | 29 | 6 | 5 | 3 | 6 | 12 | 16 | 167 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 121 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 677 |

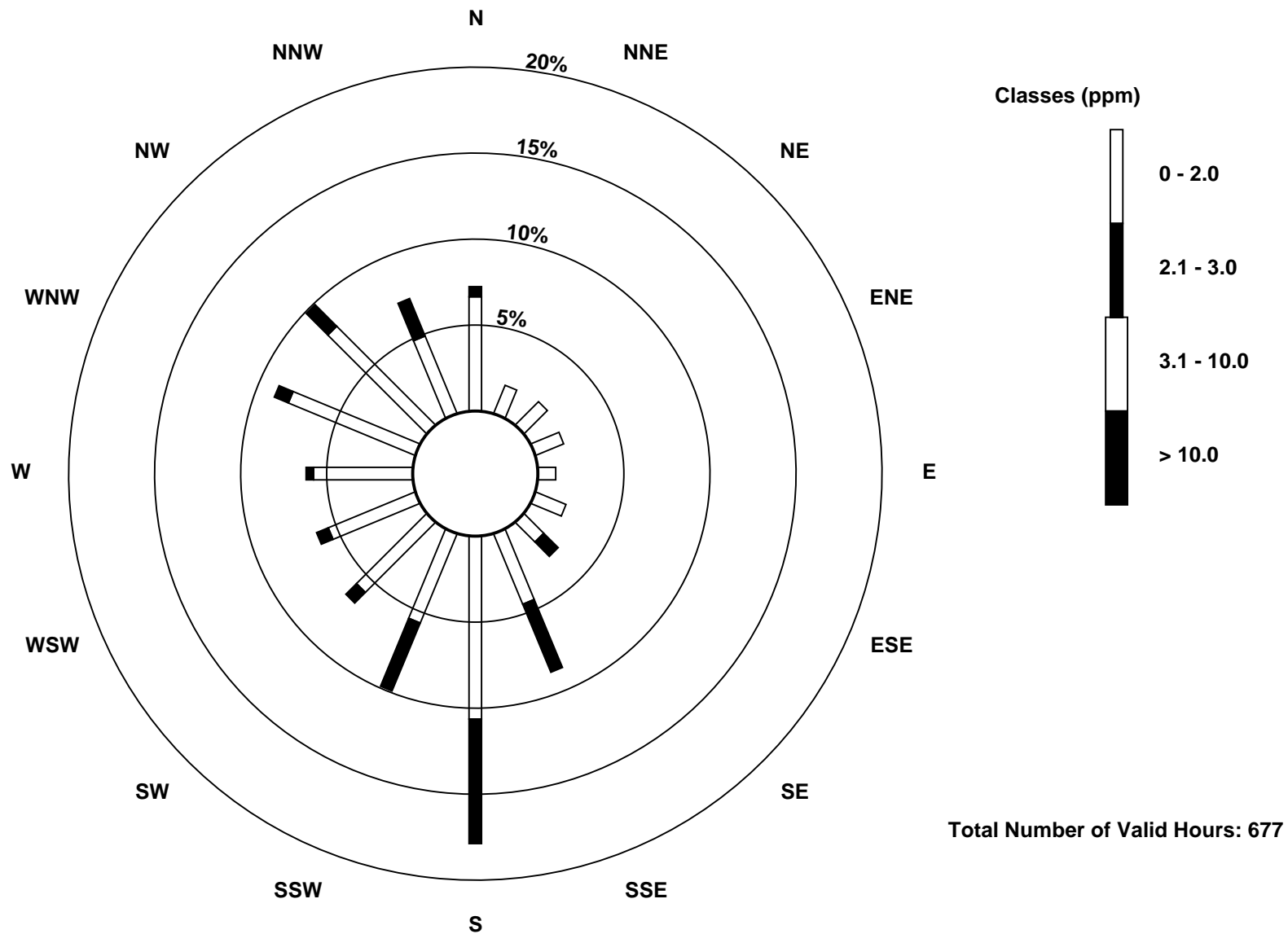
Total Number of Valid Hours: 677

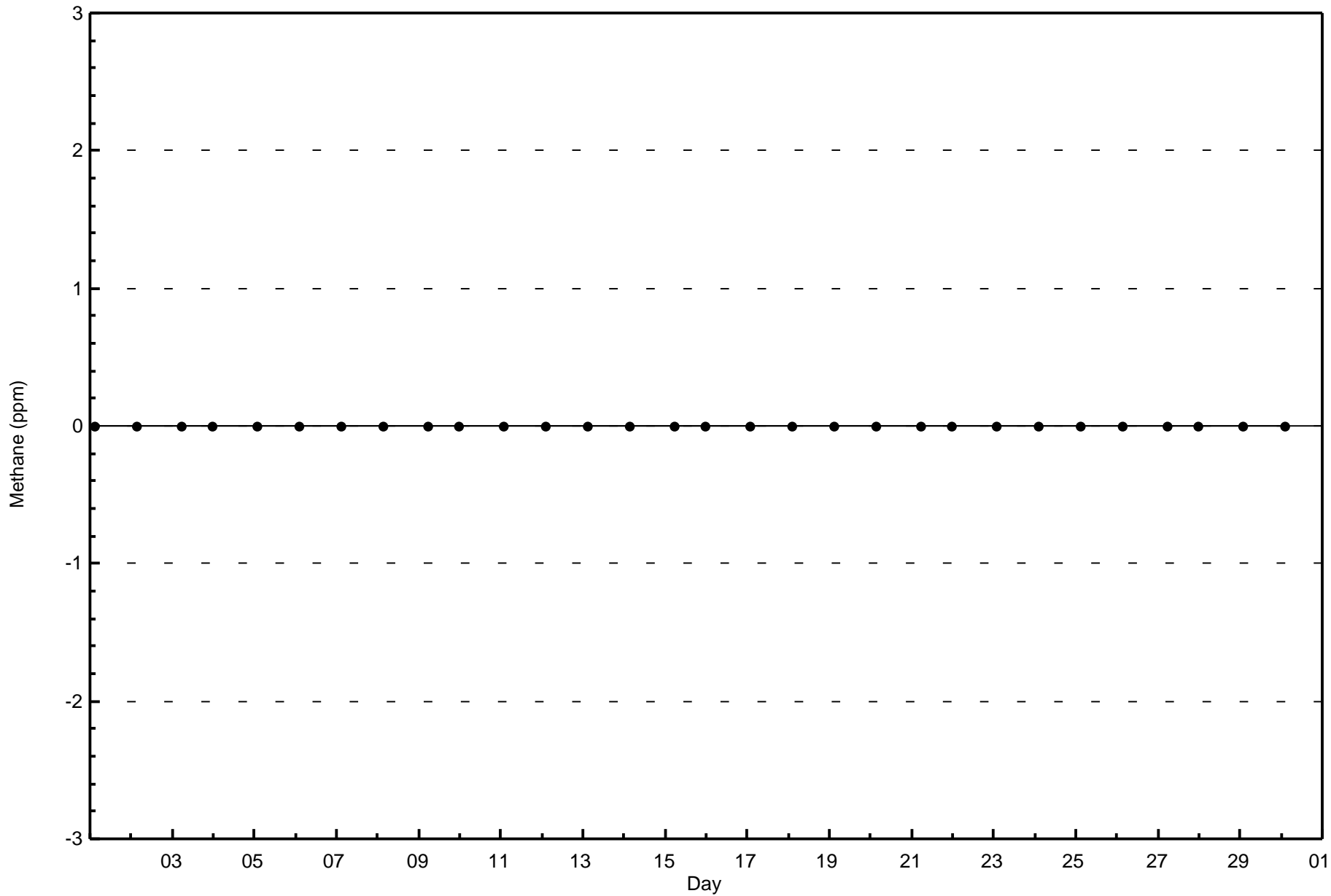
Total Number of Hours: 720

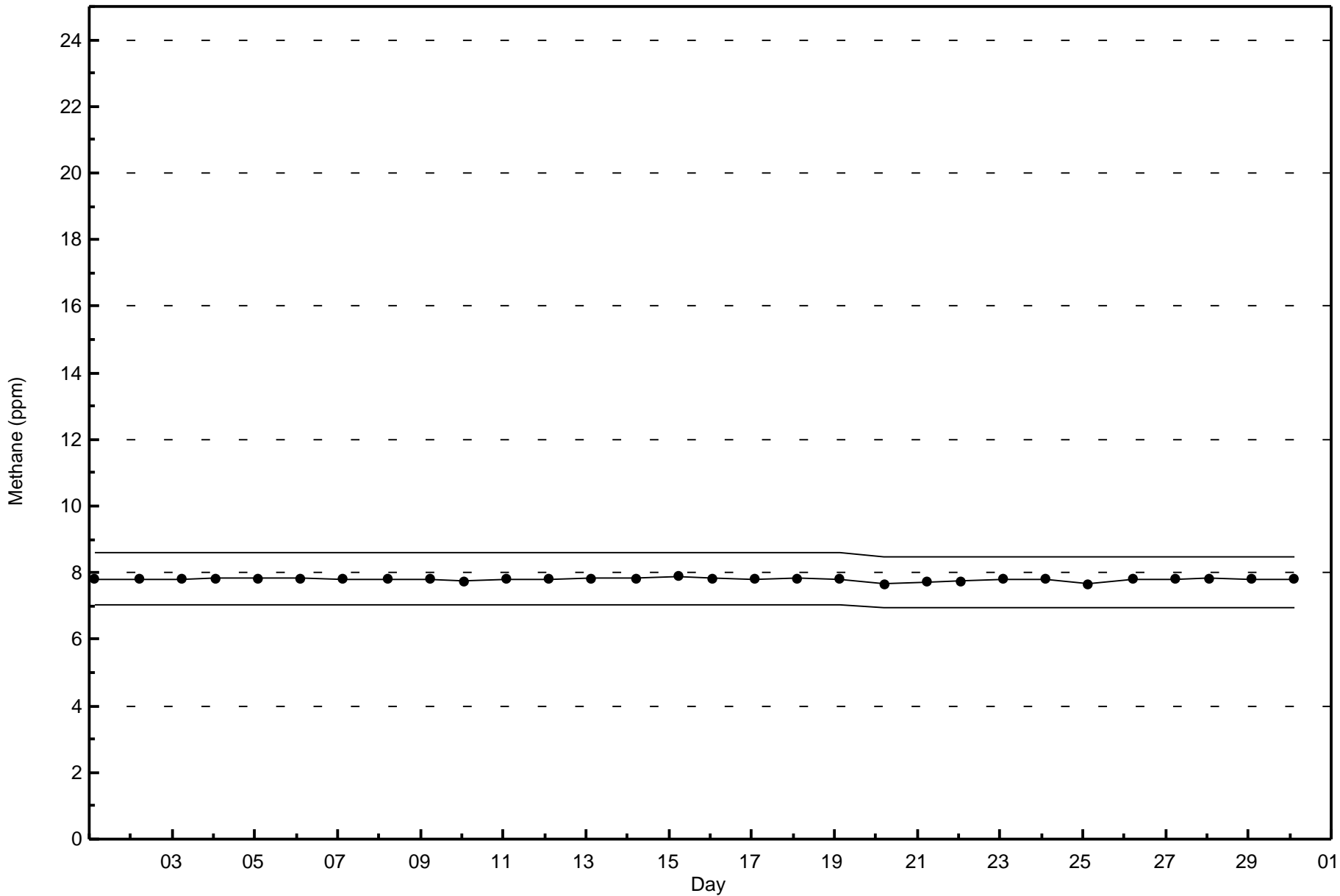


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Methane (CH₄) - ppm
Conklin (AMS 21)









Wood Buffalo Environmental Association

Summary of Hour Averages

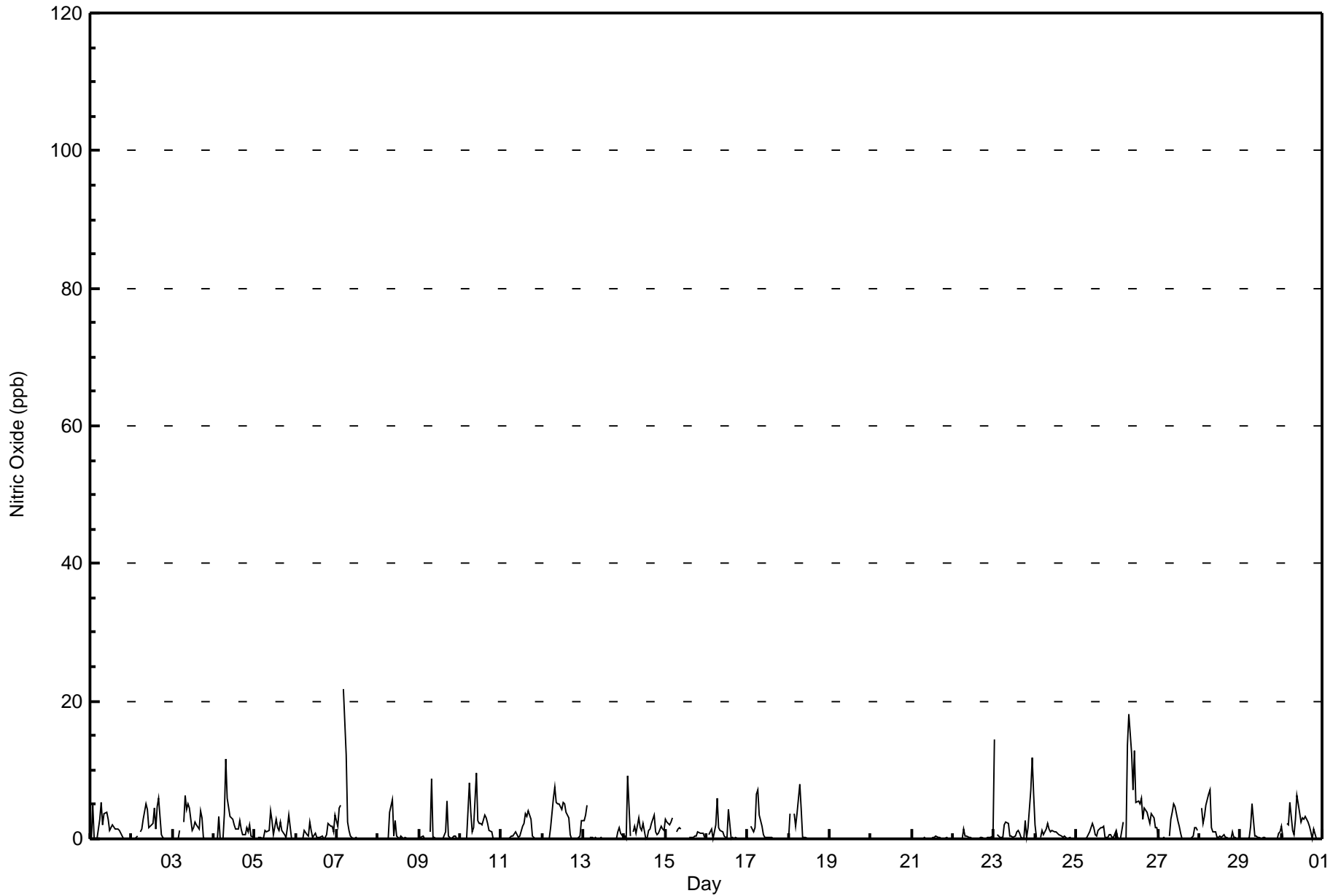
**Nitric Oxide (NO) - ppb
Conklin - September 2017**

| Maximum Value: 22 ppb on Sep 7 05:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 5.0 ppb on Sep 26 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--|-------------------------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|---|----|-----------------|----|----|----|----|----|---------------|---------------|---|--|--|--|--|--|--|---------------------------|--|
| Minimum Value: 0 ppb on Sep 2 21:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 20 | | | | | | | | | | | | | | | | | Hours of Data: 683 | |
| Maximum Diurnal Average: 3.1 ppb at hour 8 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.4 ppb at hour 19 | | | | | | | | | | | | | | | | | Hours of Missing Data: 37 | |
| Monthly Average: 1.3 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 2 P ₉₀ = 4 P ₉₉ = 12 | | | | | | | | | | | | | | | | | Hours of Calibration: 34 | |
| | | | | | | | | | | | | | | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 0 | 5 | 0 | Z | 0 | 3 | 5 | 2 | 4 | 4 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 5 | | | | | | | | | |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 3 | 5 | 4 | 2 | 2 | 2 | 5 | 1 | 5 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 | 6 | | | | | | | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 1 | Z | 2 | 6 | 4 | 5 | 4 | 1 | 2 | 3 | 2 | 1 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 | 6 | | | | | | | | | |
| 4-Sep | Z | 0 | 0 | 3 | 0 | 0 | 4 | 12 | 6 | 3 | 3 | 3 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 2 | 0 | 0 | 2.1 | 12 | | | | | | | | | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 4 | 3 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 0 | 2 | 3 | 0 | 0 | 0 | 1.2 | 4 | | | | | | | | | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 3 | 0.8 | 3 | | | | | | | | | |
| 7-Sep | 2 | 4 | 5 | Z | 22 | 12 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 22 | | | | | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 4 | 6 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 6 | | | | | | | | | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 9 | | | | | | | | | |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 8 | 4 | 1 | 2 | 10 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1.9 | 10 | | | | | | | | | |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | 2 | 4 | 3 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 | | | | | | | | | |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 2 | 6 | 7 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2.4 | 7 | | | | | | | | | |
| 13-Sep | 3 | 3 | 5 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0.7 | 5 | | | | | | | | | |
| 14-Sep | 0 | 0 | 9 | 0 | Z | 1 | 2 | 1 | 3 | 2 | 1 | 2 | 0 | 0 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1.6 | 9 | | | | | | | | | |
| 15-Sep | 3 | 2 | 2 | 3 | 3 | Z | 1 | 1 | 2 | 1 | C | C | C | C | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1.2 | 3 | | | | | | | | | |
| 16-Sep | Z | 1 | 1 | 1 | 0 | 2 | 6 | 2 | 1 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 6 | | | | | | | | | |
| 17-Sep | 0 | Z | 2 | 1 | 2 | 7 | 7 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 7 | | | | | | | | | |
| 18-Sep | 0 | 4 | Z | 4 | 2 | 4 | 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 8 | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | M | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | |
| 20-Sep | 0 | 0 | 0 | 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-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 23-Sep | 14 | Z | 1 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0 | 2 | 7 | 12 | 7 | 2.5 | 14 | | | | | | | | | |
| 24-Sep | 2 | 0 | Z | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 0 | 1 | 2 | 2 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0.7 | 2 | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 3 | Z | 0 | 14 | 18 | 12 | 7 | 13 | 5 | 6 | 5 | 6 | 3 | 4 | 4 | 3 | 2 | 4 | 3 | 2 | 2 | 5.0 | 18 | | | | | | | | | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 3 | 4 | 5 | 5 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1.2 | 5 | | | | | | | | |
| 28-Sep | Z | 5 | 2 | 3 | 5 | 6 | 7 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1.6 | 7 | | | | | | | | | |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 5 | | | | | | | | | |
| 30-Sep | 2 | 0 | Z | 2 | 2 | 5 | 1 | 1 | 3 | 6 | 5 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2.0 | 6 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | Diurnal Average | | Diurnal Maximum | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.1 | | 14 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.0 | | 5 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.1 | | 9 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.9 | | 4 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.5 | | 22 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.2 | | 12 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.7 | | 14 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 3.1 | | 18 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.4 | | 12 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.2 | | 10 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.9 | | 13 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.1 | | 5 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.2 | | 6 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.4 | | 5 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.1 | | 6 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.1 | | 5 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.3 | | 6 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.7 | | 4 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.4 | | 3 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.4 | | 2 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.6 | | 4 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.7 | | 7 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.7 | | 12 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.7 | | 7 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | Z - zerospan | | C - Calibration | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | M - Maintenance | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Conklin - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 682 | 99.85 | 99.85 |
| 21 - 40 | 1 | 0.15 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 121 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 677 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 122 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 678 |

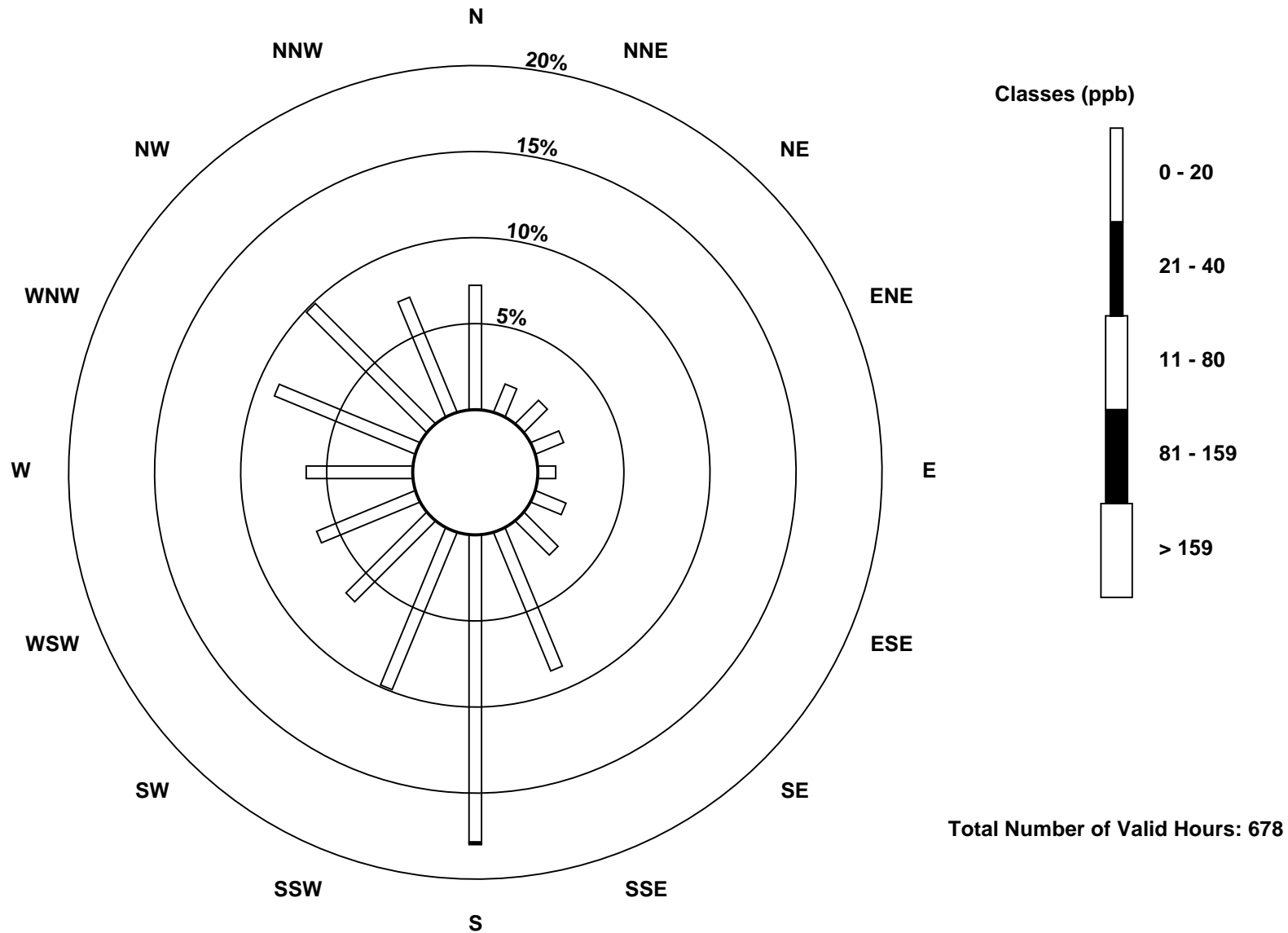
Total Number of Valid Hours: 678

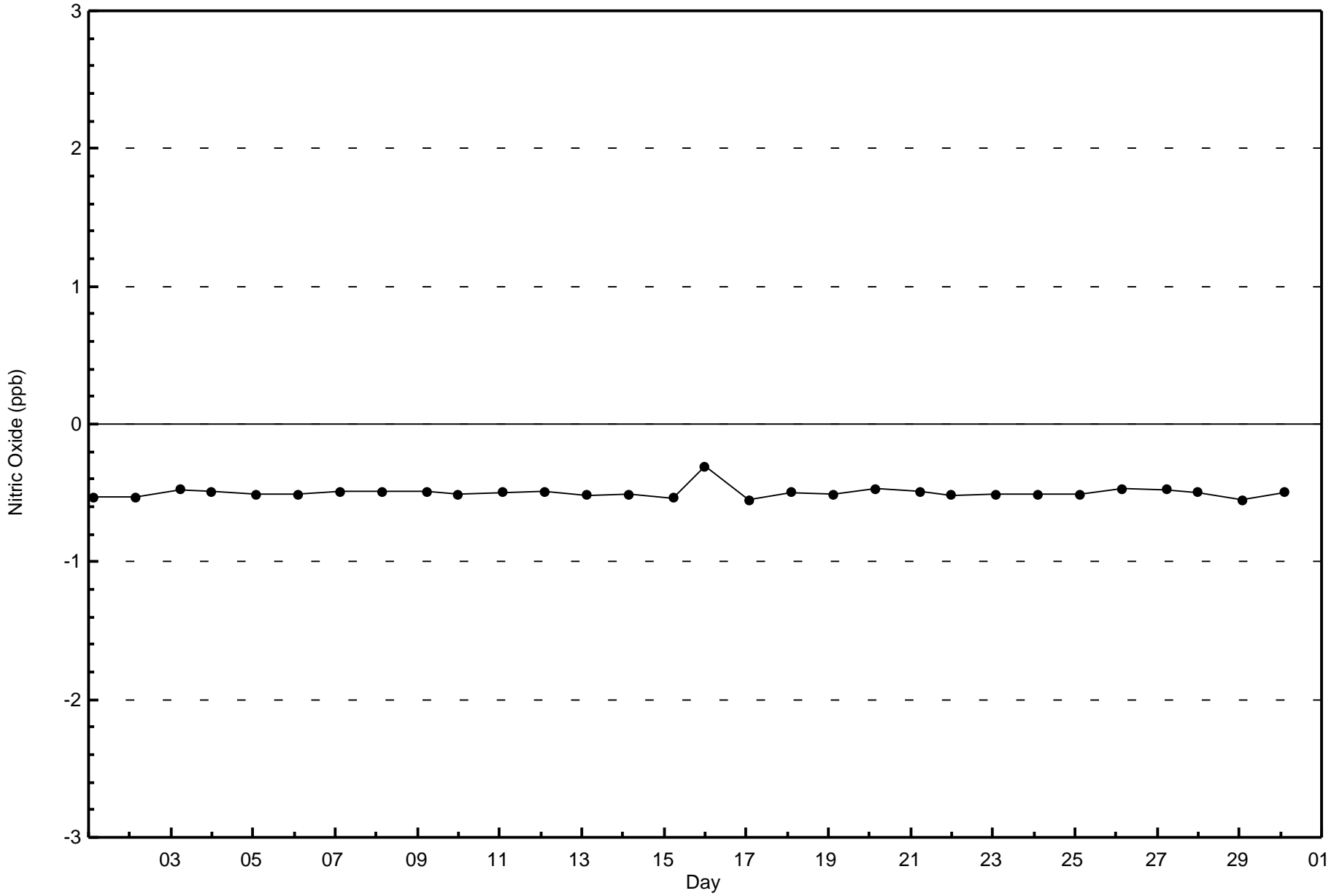
Total Number of Hours: 720

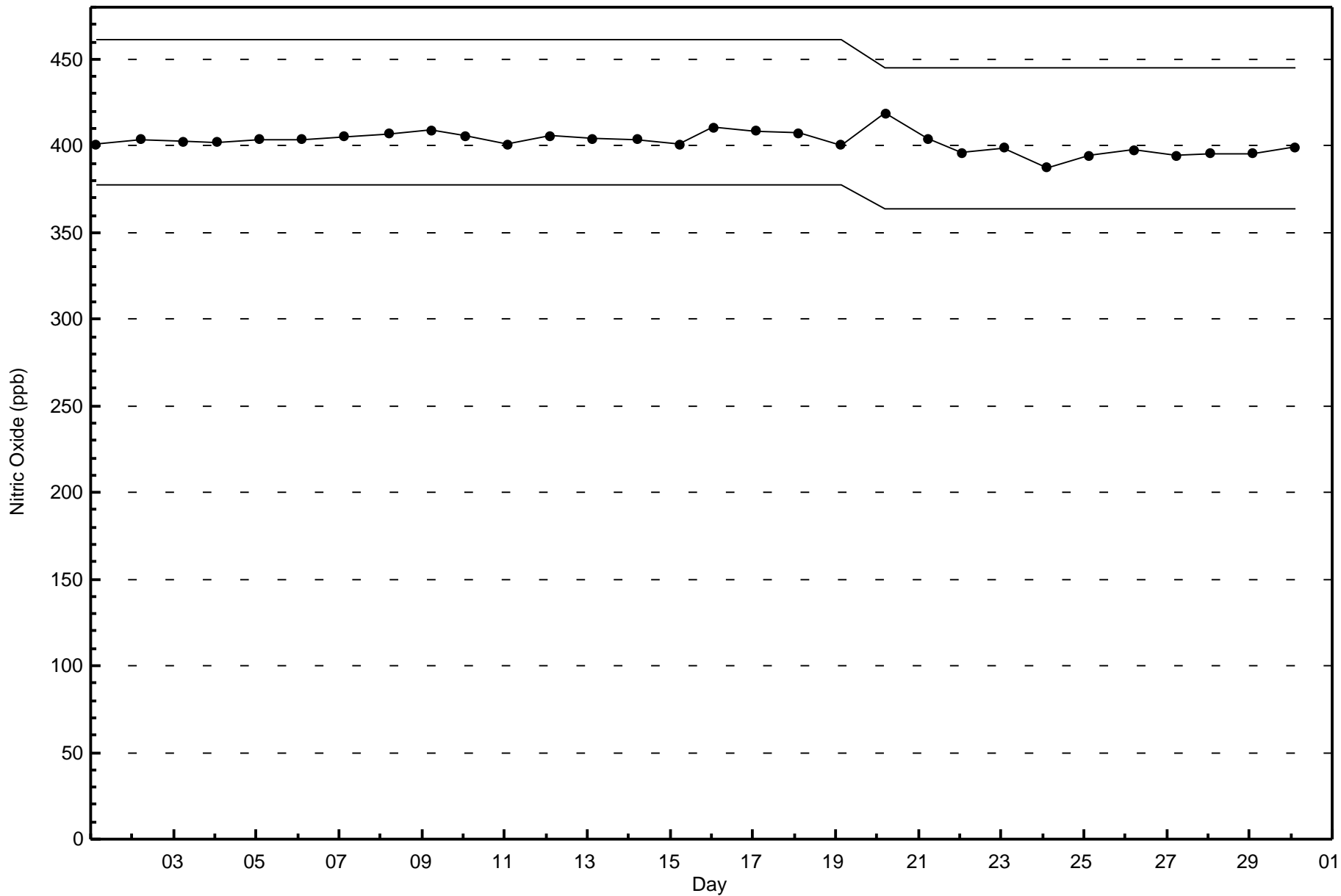


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Conklin (AMS 21)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Conklin - September 2017

| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 18 ppb on Sep 26 18:00 | Maximum Daily Average: 7.6 ppb on Sep 26 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 20 23:00 | Minimum Daily Average: 0.1 ppb on Sep 20 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 3.4 ppb at hour 8 | Minimum Diurnal Average: 1.8 ppb at hour 2 | | Hours of Calibration: | 34 |
| Monthly Average: 2.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 6 P ₉₉ = 10 | | Percent Operational Time: | 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 2 | 1 | Z | 1 | 5 | 6 | 3 | 4 | 5 | 3 | 2 | 3 | 4 | 3 | 3 | 4 | 4 | 2 | 1 | 1 | 1 | 2 | 2 | 2.6 | 6 |
| 2-Sep | 1 | 0 | 0 | 1 | Z | 4 | 3 | 4 | 6 | 4 | 3 | 3 | 4 | 5 | 3 | 5 | 6 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 2.5 | 6 |
| 3-Sep | 0 | 0 | 0 | 0 | 1 | Z | 4 | 6 | 4 | 4 | 4 | 2 | 2 | 3 | 3 | 3 | 7 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 2.4 | 7 |
| 4-Sep | Z | 1 | 1 | 4 | 2 | 1 | 4 | 9 | 6 | 4 | 4 | 3 | 2 | 2 | 2 | 4 | 2 | 2 | 3 | 7 | 4 | 5 | 2 | 1 | 3.3 | 9 |
| 5-Sep | 0 | Z | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 6 | 5 | 2 | 6 | 4 | 3 | 6 | 4 | 3 | 4 | 17 | 10 | 2 | 1 | 1 | 3.7 | 17 |
| 6-Sep | 1 | 2 | Z | 2 | 2 | 4 | 2 | 1 | 6 | 4 | 2 | 4 | 2 | 2 | 2 | 3 | 1 | 2 | 5 | 9 | 7 | 6 | 2 | 4 | 3.2 | 9 |
| 7-Sep | 5 | 5 | 6 | Z | 6 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 3 | 2 | 1 | 2.7 | 6 |
| 8-Sep | 3 | 2 | 1 | 2 | Z | 4 | 2 | 4 | 15 | 3 | 7 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 3.3 | 15 |
| 9-Sep | 2 | 2 | 4 | 3 | 2 | Z | 2 | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 9 | 3 | 3 | 1 | 1 | 3 | 2 | 1 | 2.4 | 9 |
| 10-Sep | Z | 1 | 1 | 1 | 1 | 6 | 5 | 2 | 2 | 1 | 3 | 3 | 3 | 3 | 4 | 5 | 3 | 2 | 2 | 0 | 1 | 1 | 0 | 0 | 2.1 | 6 |
| 11-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 4 | 4 | 7 | 7 | 9 | 7 | 8 | 5 | 3 | 1 | 1 | 1 | 3.0 | 9 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 3 | 7 | 6 | 5 | 5 | 5 | 4 | 5 | 5 | 3 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2.8 | 7 |
| 13-Sep | 3 | 3 | 2 | Z | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 4 | 3 | 2 | 2 | 1.5 | 4 |
| 14-Sep | 2 | 1 | 4 | 2 | Z | 4 | 3 | 1 | 4 | 2 | 2 | 4 | 0 | 0 | 2 | 2 | 3 | 8 | 6 | 3 | 2 | 5 | 3 | 2 | 2.8 | 8 |
| 15-Sep | 3 | 3 | 3 | 3 | 4 | Z | 1 | 1 | 2 | 2 | C | C | C | C | 1 | 1 | 1 | 2 | 6 | 4 | 2 | 2 | 3 | 1 | 2.2 | 6 |
| 16-Sep | Z | 3 | 4 | 5 | 1 | 5 | 6 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1.9 | 6 |
| 17-Sep | 1 | Z | 5 | 2 | 3 | 6 | 5 | 3 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 2.1 | 6 |
| 18-Sep | 1 | 7 | Z | 6 | 3 | 4 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1.7 | 7 |
| 19-Sep | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | M | M | M | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.6 | 1 |
| 20-Sep | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 21-Sep | 0 | 0 | 0 | 1 | 2 | Z | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 1 | 0.8 | 2 |
| 22-Sep | Z | 0 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1.0 | 4 |
| 23-Sep | 5 | Z | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 2 | 1 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 2 | 3 | 5 | 4 | 3 | 2.1 | 5 |
| 24-Sep | 2 | 1 | Z | 2 | 3 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 3 | 4 | 3 | 3 | 2 | 1.9 | 4 |
| 25-Sep | 2 | 2 | 1 | Z | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 4 | 3 | 1 | 3 | 6 | 3 | 1 | 1 | 2 | 2.2 | 6 |
| 26-Sep | 2 | 1 | 1 | 3 | Z | 1 | 13 | 16 | 10 | 6 | 9 | 5 | 6 | 7 | 10 | 5 | 8 | 18 | 12 | 9 | 9 | 8 | 9 | 9 | 7.6 | 18 |
| 27-Sep | 5 | 1 | 1 | 2 | 1 | Z | 2 | 6 | 5 | 6 | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 4 | 2.8 | 6 |
| 28-Sep | Z | 5 | 3 | 3 | 3 | 4 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 1.9 | 5 |
| 29-Sep | 2 | Z | 2 | 2 | 2 | 3 | 7 | 7 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 6 | 5 | 2.3 | 7 |
| 30-Sep | 6 | 2 | Z | 4 | 3 | 7 | 2 | 1 | 4 | 9 | 8 | 5 | 5 | 6 | 7 | 7 | 10 | 8 | 2 | 2 | 1 | 1 | 1 | 1 | 4.3 | 10 |

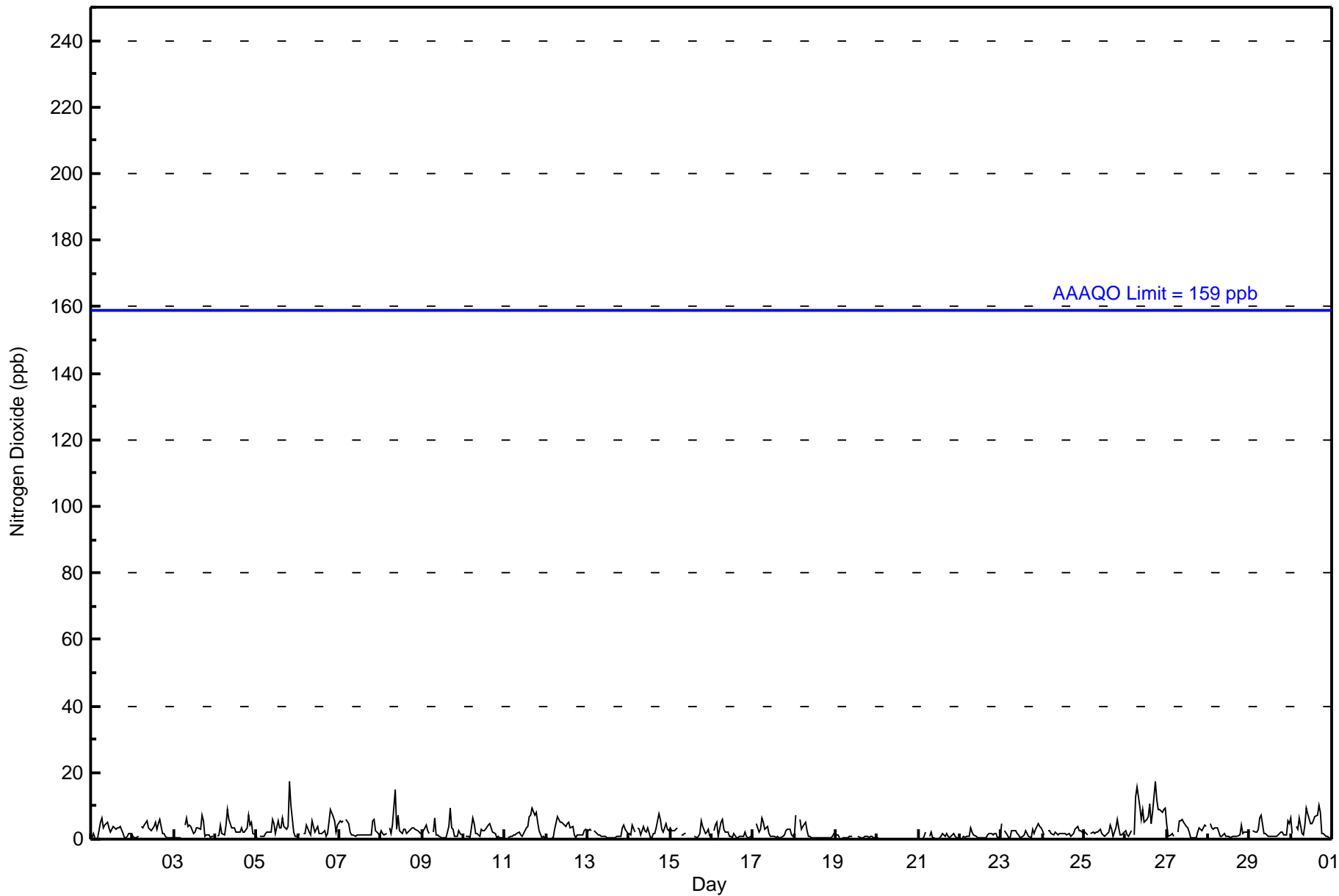
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 2.0 | 1.8 | 1.9 | 2.1 | 1.8 | 3.0 | 3.3 | 3.4 | 3.3 | 2.7 | 2.6 | 1.9 | 1.9 | 2.2 | 2.3 | 2.4 | 2.9 | 2.8 | 2.7 | 3.3 | 2.6 | 2.2 | 2.0 | 1.9 | Diurnal Average |
| 6 | 7 | 6 | 6 | 6 | 7 | 13 | 16 | 15 | 9 | 9 | 5 | 6 | 7 | 10 | 7 | 10 | 18 | 12 | 17 | 10 | 8 | 9 | 9 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Conklin - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 683 | 100.00 | 100.00 |
| 21 - 40 | 0 | 0.00 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 122 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 678 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 122 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 678 |

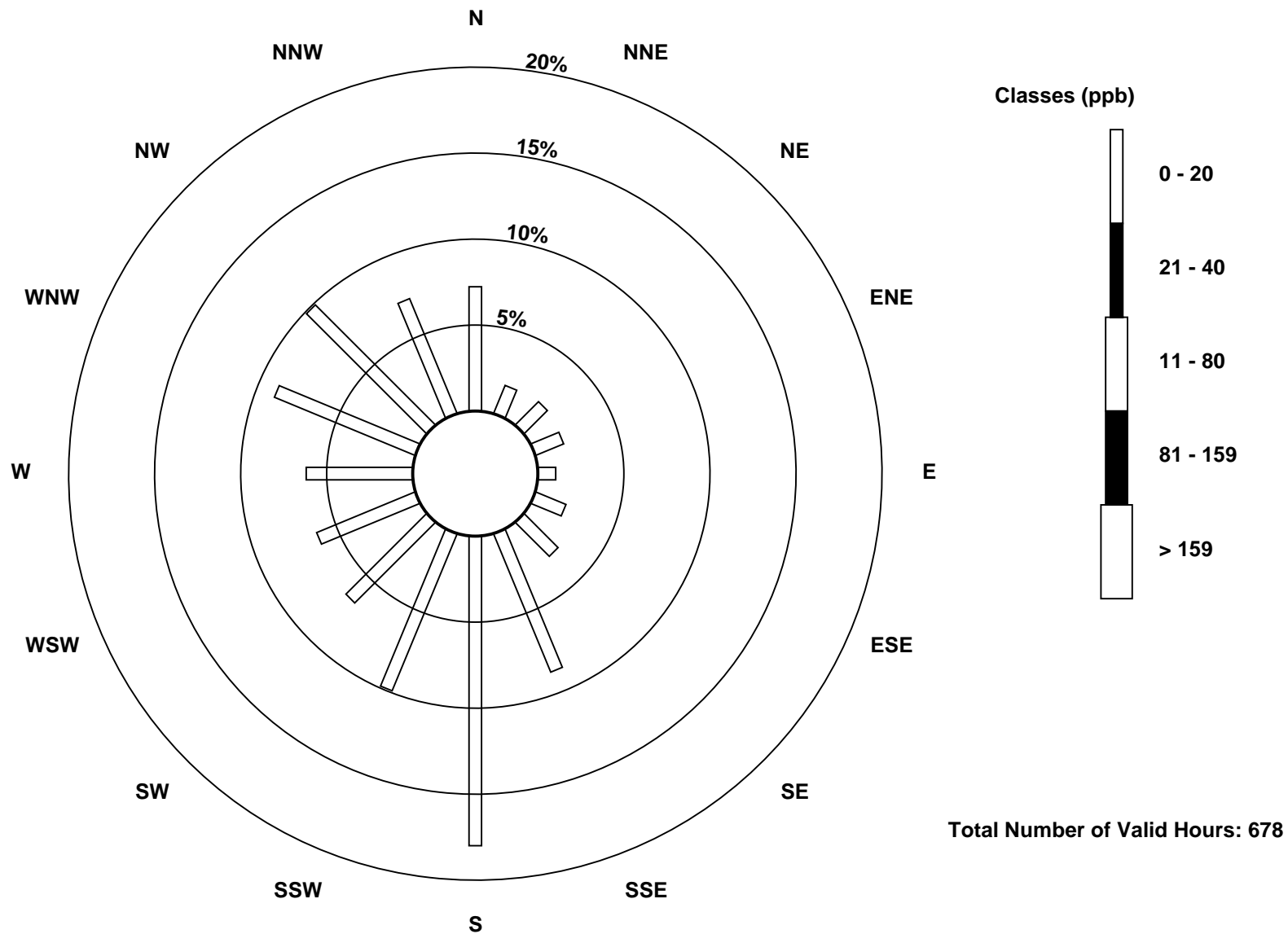
Total Number of Valid Hours: 678

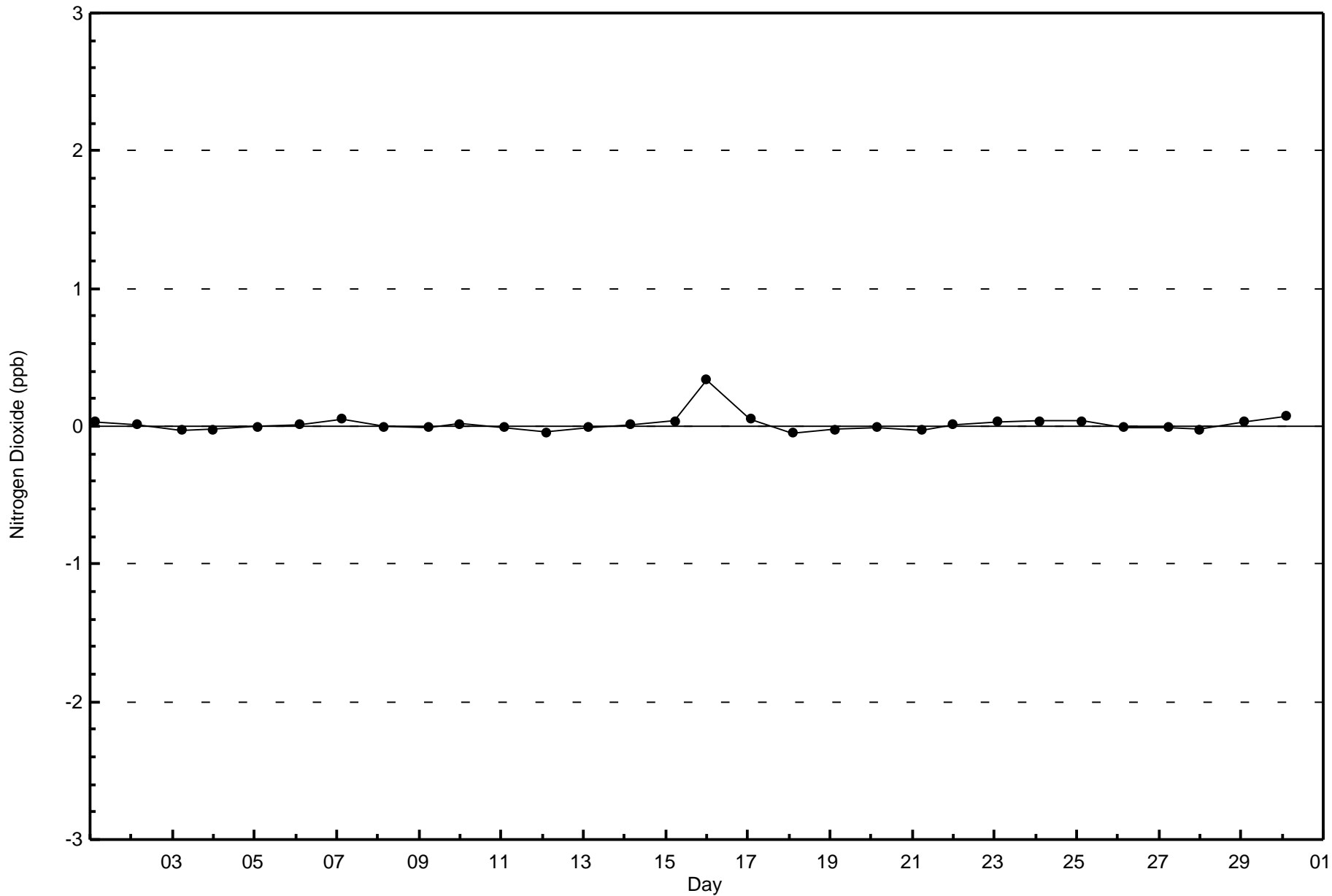
Total Number of Hours: 720

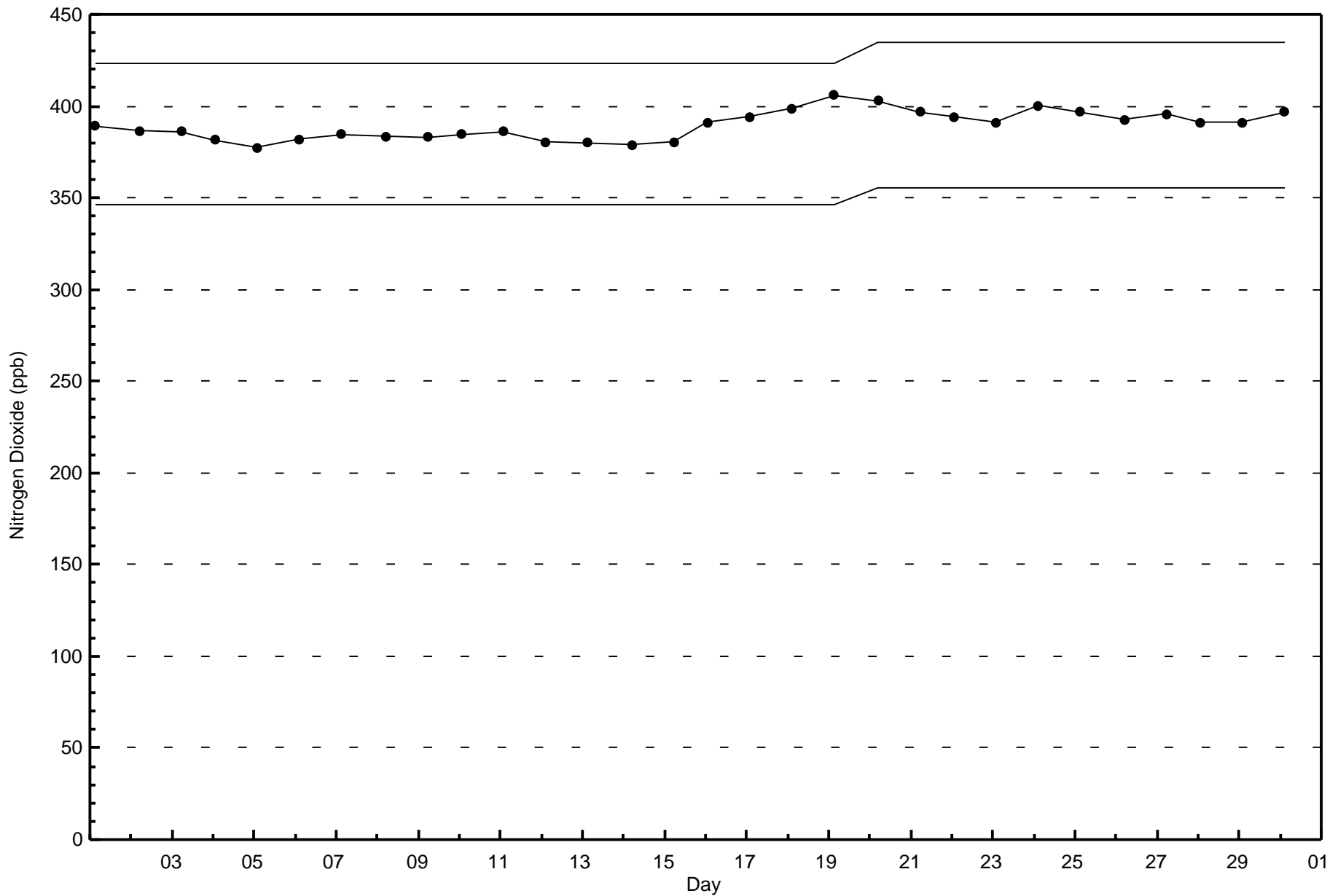


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Conklin (AMS 21)









Wood Buffalo Environmental Association
Summary of Hour Averages

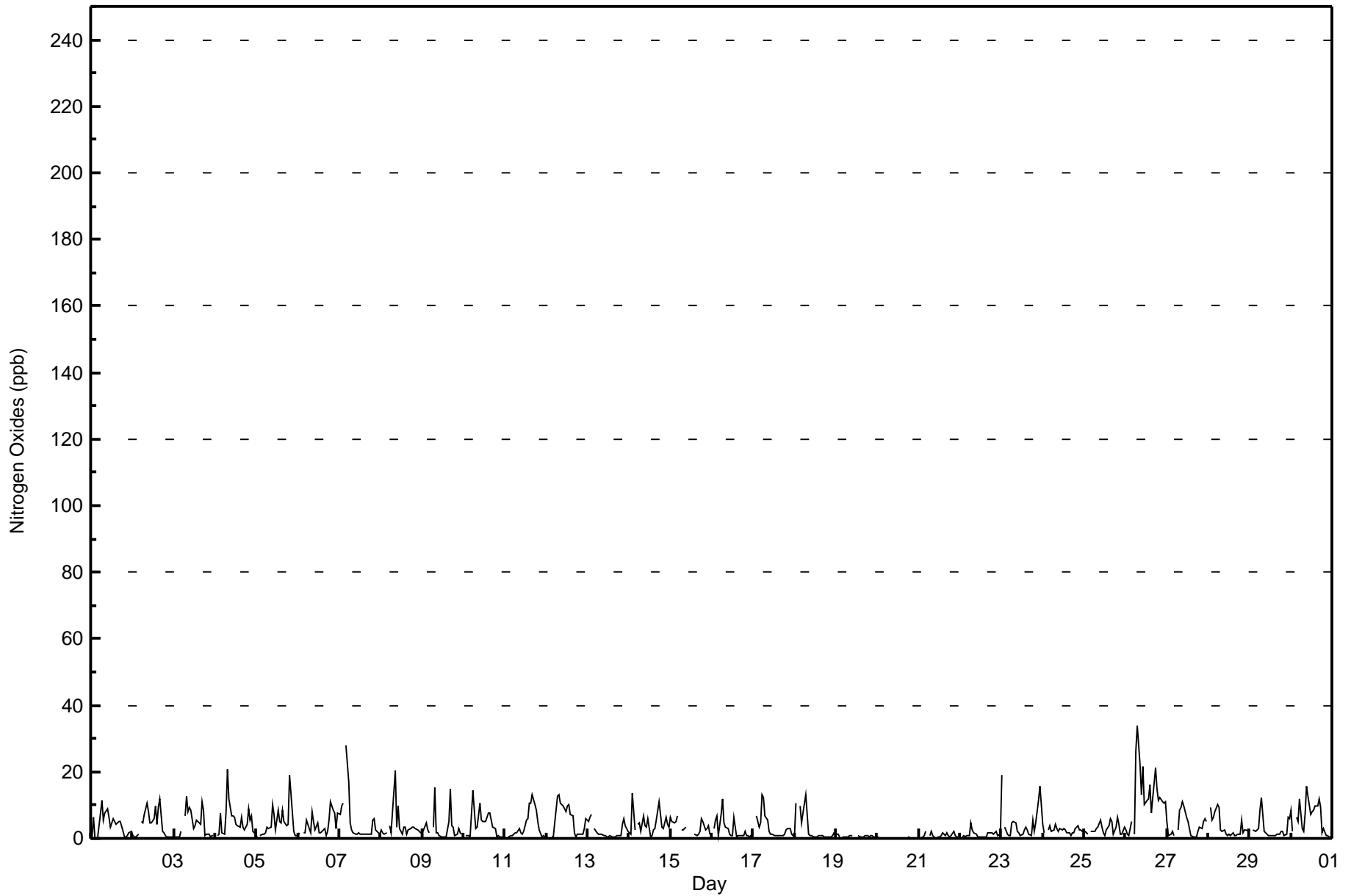
Nitrogen Oxides (NO_x) - ppb
Conklin - September 2017

| Maximum Value: 34 ppb on Sep 26 08:00 | | Maximum Daily Average: 12.6 ppb on Sep 26 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|-----|--------------------------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|-----------------|--|--|--|--|--|
| Minimum Value: 0 ppb on Sep 20 23:00 | | Minimum Daily Average: 0.1 ppb on Sep 20 | | Hours of Data: 683 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 6.5 ppb at hour 8 | | Minimum Diurnal Average: 2.6 ppb at hour 24 | | Hours of Missing Data: 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 3.8 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 5 P ₉₀ = 10 P ₉₉ = 20 | | Hours of Calibration: 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | |
| 1-Sep | 1 | 7 | 1 | Z | 1 | 8 | 12 | 5 | 8 | 9 | 6 | 4 | 5 | 6 | 4 | 5 | 5 | 5 | 2 | 1 | 1 | 1 | 2 | 2 | 4.2 | 12 | | | | | |
| 2-Sep | 1 | 0 | 0 | 1 | Z | 5 | 5 | 7 | 11 | 8 | 4 | 5 | 6 | 10 | 4 | 9 | 12 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 4.1 | 12 | | | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 2 | Z | 7 | 13 | 8 | 10 | 8 | 3 | 4 | 6 | 5 | 4 | 11 | 9 | 1 | 1 | 1 | 1 | 1 | 1 | 4.2 | 13 | | | | | |
| 4-Sep | Z | 1 | 1 | 8 | 2 | 1 | 8 | 21 | 12 | 7 | 7 | 6 | 4 | 4 | 3 | 6 | 4 | 3 | 4 | 9 | 5 | 7 | 2 | 1 | 5.4 | 21 | | | | | |
| 5-Sep | 0 | Z | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 10 | 7 | 2 | 8 | 5 | 5 | 9 | 5 | 4 | 4 | 19 | 14 | 2 | 1 | 1 | 4.8 | 19 | | | | | |
| 6-Sep | 1 | 2 | Z | 2 | 2 | 6 | 3 | 2 | 8 | 5 | 2 | 5 | 2 | 2 | 2 | 3 | 1 | 2 | 6 | 11 | 9 | 8 | 3 | 8 | 4.0 | 11 | | | | | |
| 7-Sep | 7 | 10 | 11 | Z | 28 | 17 | 4 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 3 | 2 | 1 | 4.9 | 28 | | | | | |
| 8-Sep | 3 | 2 | 1 | 1 | Z | 4 | 2 | 8 | 20 | 3 | 10 | 3 | 1 | 3 | 3 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3.8 | 20 | | | | | |
| 9-Sep | 2 | 3 | 5 | 3 | 2 | Z | 3 | 15 | 2 | 2 | 1 | 0 | 0 | 1 | 1 | 5 | 15 | 4 | 3 | 1 | 1 | 3 | 2 | 1 | 3.2 | 15 | | | | | |
| 10-Sep | Z | 1 | 1 | 1 | 1 | 14 | 8 | 3 | 3 | 11 | 5 | 5 | 5 | 5 | 8 | 8 | 6 | 4 | 3 | 0 | 1 | 0 | 0 | 0 | 4.0 | 14 | | | | | |
| 11-Sep | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 2 | 6 | 6 | 10 | 10 | 13 | 10 | 9 | 5 | 3 | 0 | 1 | 1 | 3.9 | 13 | | | | | |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 5 | 13 | 13 | 10 | 10 | 10 | 8 | 10 | 10 | 7 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 6 | 5.2 | 13 | | | | | |
| 13-Sep | 5 | 6 | 7 | Z | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 4 | 6 | 4 | 2 | 2.2 | 7 | | | | | |
| 14-Sep | 2 | 1 | 14 | 3 | Z | 4 | 5 | 2 | 7 | 4 | 3 | 6 | 0 | 1 | 3 | 3 | 5 | 11 | 7 | 3 | 3 | 7 | 4 | 4 | 4.4 | 14 | | | | | |
| 15-Sep | 6 | 5 | 5 | 5 | 7 | Z | 2 | 3 | 3 | 3 | C | C | C | C | 1 | 1 | 1 | 2 | 6 | 5 | 3 | 3 | 4 | 1 | 3.5 | 7 | | | | | |
| 16-Sep | Z | 3 | 5 | 7 | 1 | 7 | 12 | 5 | 3 | 3 | 1 | 1 | 1 | 6 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2.8 | 12 | | | | | |
| 17-Sep | 1 | Z | 7 | 3 | 4 | 13 | 12 | 7 | 6 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 3.2 | 13 | | | | | |
| 18-Sep | 1 | 11 | Z | 10 | 5 | 8 | 13 | 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2.8 | 13 | | | | | |
| 19-Sep | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | M | M | M | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0.6 | 1 | | | | | |
| 20-Sep | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | |
| 21-Sep | 0 | 0 | 0 | 1 | 2 | Z | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 1 | 0.9 | 2 | | | | | |
| 22-Sep | Z | 0 | 1 | 1 | 1 | 1 | 5 | 3 | 2 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1.2 | 5 | | | | | |
| 23-Sep | 19 | Z | 3 | 1 | 1 | 1 | 5 | 5 | 5 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 6 | 2 | 5 | 12 | 16 | 10 | 4.6 | 19 | | | | | |
| 24-Sep | 4 | 2 | Z | 3 | 4 | 2 | 3 | 4 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 4 | 3 | 3 | 2 | 2.6 | 4 | | | | | |
| 25-Sep | 2 | 2 | 1 | Z | 2 | 2 | 2 | 3 | 3 | 5 | 4 | 2 | 1 | 3 | 4 | 6 | 5 | 1 | 3 | 7 | 4 | 1 | 1 | 4 | 3.0 | 7 | | | | | |
| 26-Sep | 3 | 1 | 1 | 5 | Z | 1 | 26 | 34 | 22 | 13 | 22 | 10 | 12 | 12 | 16 | 7 | 12 | 21 | 15 | 11 | 12 | 11 | 11 | 11 | 12.6 | 34 | | | | | |
| 27-Sep | 5 | 1 | 1 | 2 | 1 | Z | 2 | 8 | 9 | 11 | 10 | 6 | 5 | 3 | 1 | 0 | 1 | 0 | 2 | 4 | 3 | 5 | 6 | 5 | 4.0 | 11 | | | | | |
| 28-Sep | Z | 9 | 5 | 6 | 8 | 10 | 9 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 5 | 2 | 2 | 2 | 2 | 3.4 | 10 | | | | | |
| 29-Sep | 2 | Z | 3 | 2 | 2 | 3 | 8 | 12 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 6 | 6 | 2.8 | 12 | | | | | |
| 30-Sep | 8 | 2 | Z | 6 | 5 | 12 | 3 | 2 | 7 | 16 | 13 | 7 | 8 | 8 | 10 | 10 | 12 | 9 | 2 | 3 | 1 | 1 | 1 | 1 | 6.3 | 16 | | | | | |
| | | 3.1 | 2.8 | 3.0 | 2.9 | 3.4 | 5.1 | 6.0 | 6.5 | 5.6 | 4.9 | 4.5 | 3.0 | 3.1 | 3.5 | 3.4 | 3.5 | 4.1 | 3.5 | 3.1 | 3.7 | 3.2 | 2.9 | 2.7 | 2.6 | Diurnal Average | | | | | |
| | | 19 | 11 | 14 | 10 | 28 | 17 | 26 | 34 | 22 | 16 | 22 | 10 | 12 | 12 | 16 | 10 | 15 | 21 | 15 | 19 | 14 | 12 | 16 | 11 | Diurnal Maximum | | | | | |
| Z - zerospan | | C - Calibration | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Conklin - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 676 | 98.98 | 98.98 |
| 21 - 40 | 7 | 1.02 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 121 | 67 | 45 | 42 | 42 | 57 | 64 | 49 | 671 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 7 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 49 | 12 | 13 | 12 | 7 | 13 | 19 | 59 | 122 | 67 | 45 | 42 | 42 | 60 | 67 | 49 | 678 |

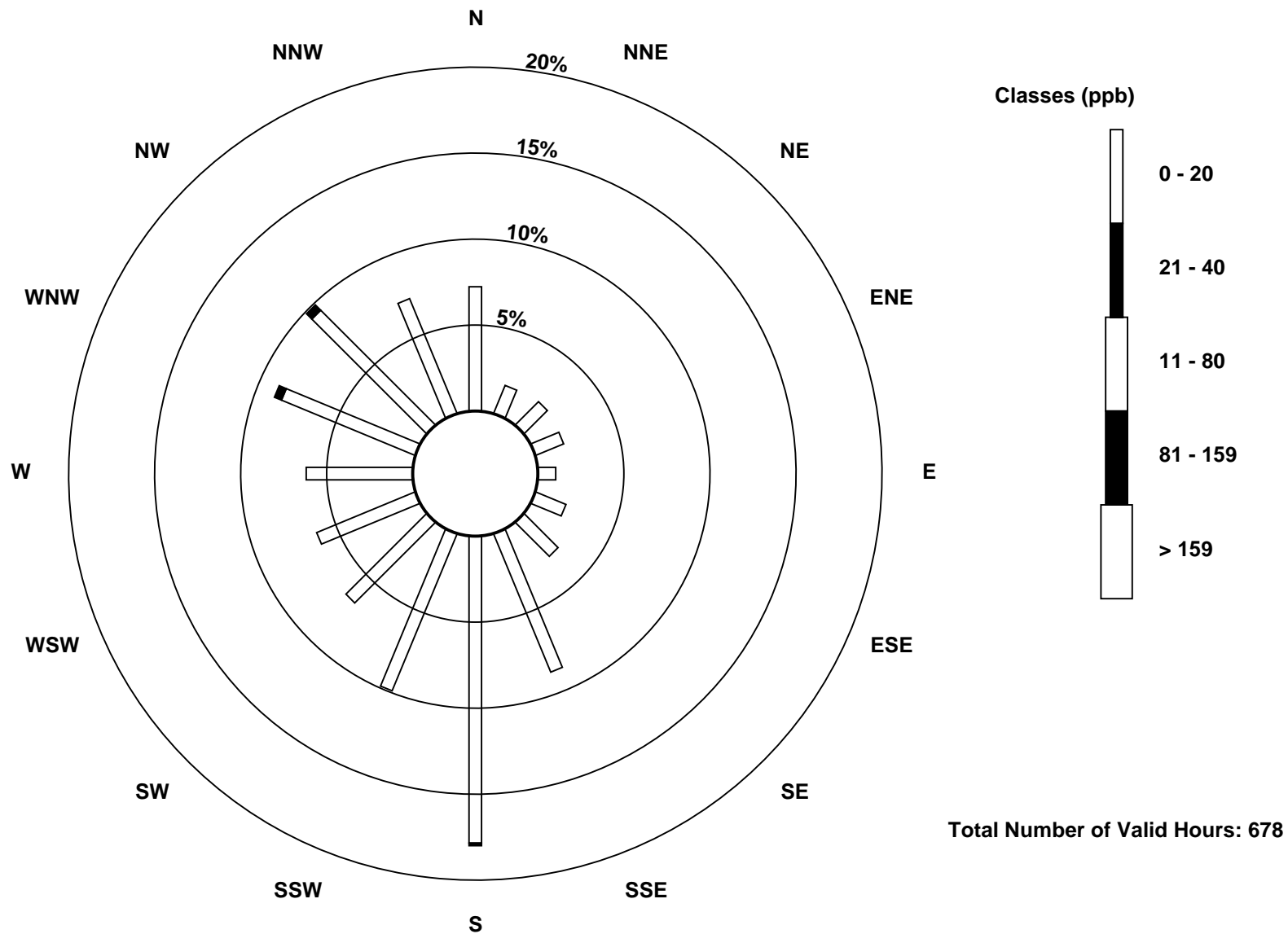
Total Number of Valid Hours: 678

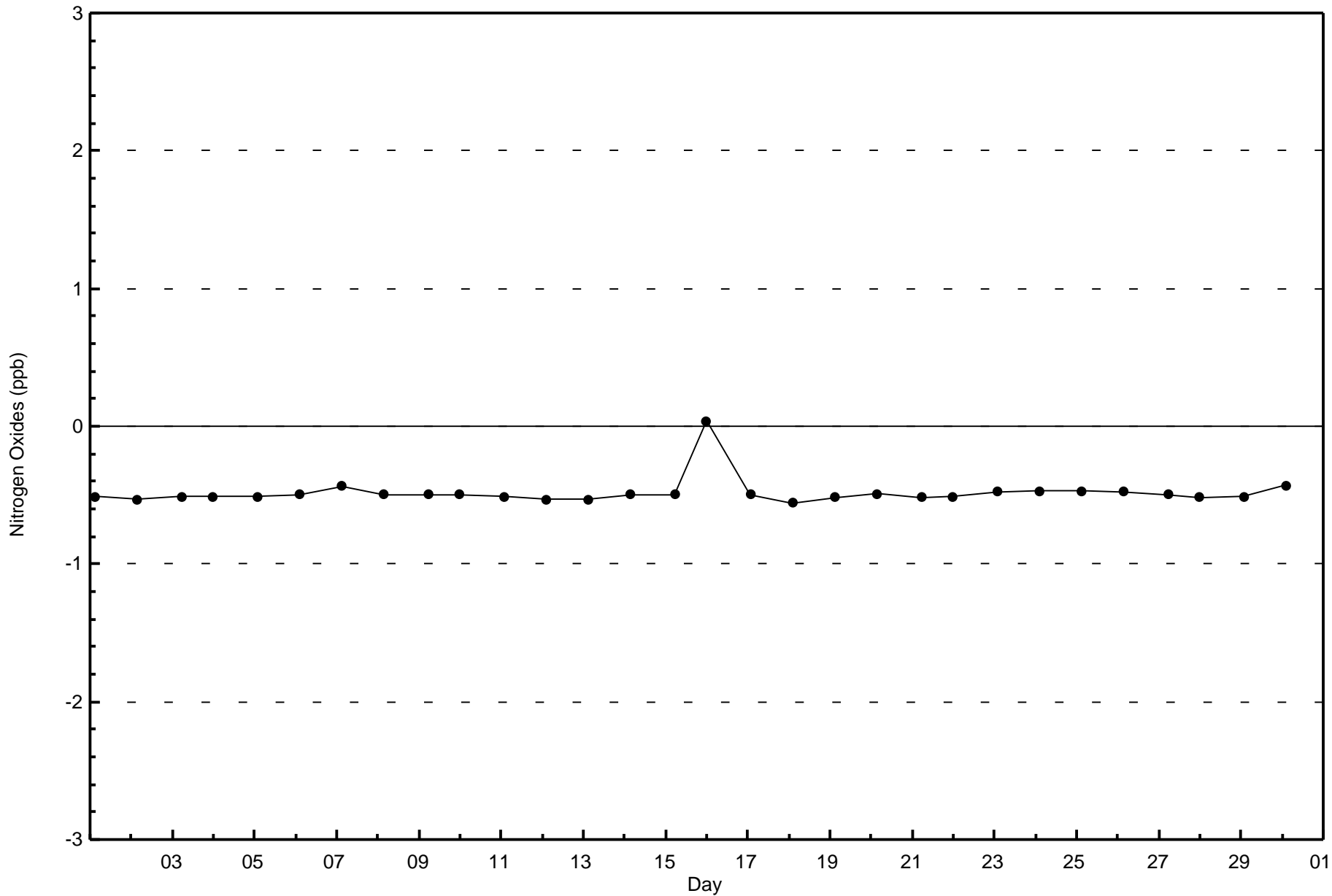
Total Number of Hours: 720

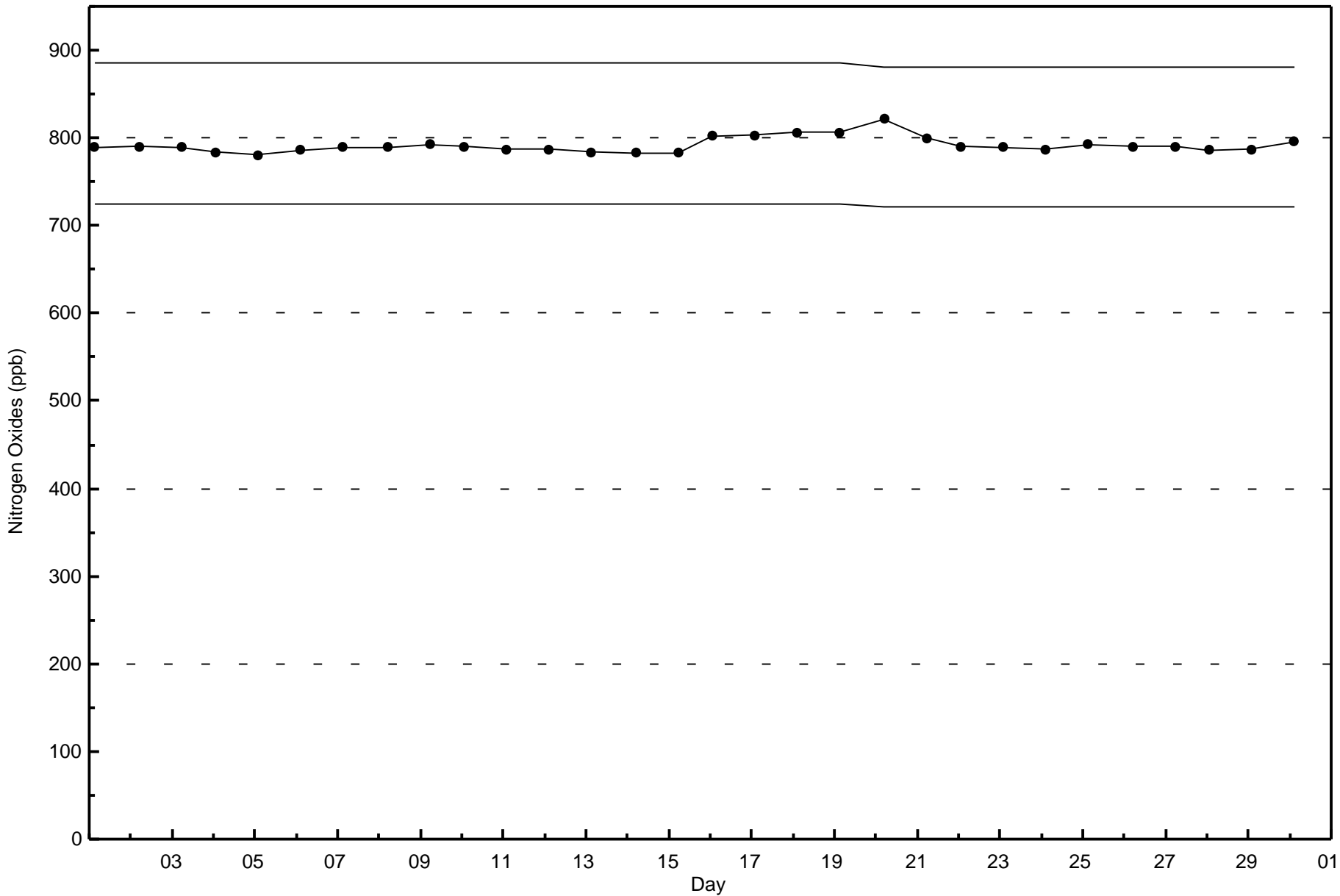


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxides (NO_x) - ppb
Conklin (AMS 21)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Conklin - September 2017

| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 77 ppb on Sep 7 17:00 | Maximum Daily Average: 42.9 ppb on Sep 7 | | Hours of Data: | 685 |
| Minimum Value: 3 ppb on Sep 23 23:00 | Minimum Daily Average: 15.7 ppb on Sep 23 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 35.2 ppb at hour 14 | Minimum Diurnal Average: 14.1 ppb at hour 7 | | Hours of Calibration: | 34 |
| Monthly Average: 24.7 ppb | Percentiles: P ₁ = 4 P ₁₀ = 6 Q ₁ = 16 Median = 26 Q ₃ = 33 P ₉₀ = 38 P ₉₉ = 70 | | 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-Sep | 37 | 35 | 34 | 34 | 34 | Z | 29 | 32 | 32 | 30 | 34 | 39 | 41 | 41 | 40 | 43 | 43 | 42 | 41 | 40 | 39 | 38 | 34 | 34 | 36.8 | 43 |
| 2-Sep | 36 | 36 | 35 | 34 | 30 | 27 | Z | 27 | 25 | 29 | 30 | 31 | 31 | 31 | 32 | 27 | 24 | 24 | 21 | 21 | 26 | 27 | 28 | 30 | 28.7 | 36 |
| 3-Sep | 28 | 27 | 31 | 32 | 32 | 29 | 23 | Z | 23 | 23 | 24 | 28 | 30 | 29 | 33 | 35 | 29 | 33 | 37 | 33 | 32 | 33 | 28 | 26 | 29.5 | 37 |
| 4-Sep | 28 | 27 | Z | 21 | 23 | 21 | 20 | 17 | 22 | 26 | 28 | 29 | 31 | 30 | 30 | 29 | 30 | 29 | 21 | 9 | 7 | 7 | 9 | 15 | 22.2 | 31 |
| 5-Sep | 10 | 15 | 16 | Z | 15 | 14 | 16 | 19 | 26 | 31 | 39 | 47 | 47 | 48 | 49 | 47 | 49 | 50 | 43 | 18 | 20 | 29 | 32 | 29 | 30.9 | 50 |
| 6-Sep | 23 | 23 | 21 | 23 | Z | 13 | 17 | 24 | 28 | 39 | 44 | 49 | 52 | 53 | 51 | 45 | 47 | 37 | 24 | 12 | 8 | 6 | 6 | 6 | 28.3 | 53 |
| 7-Sep | 5 | 4 | 4 | 4 | 4 | Z | 6 | 13 | 22 | 43 | 64 | 65 | 71 | 75 | 73 | 76 | 77 | 76 | 74 | 50 | 39 | 58 | 46 | 38 | 42.9 | 77 |
| 8-Sep | 52 | 53 | 50 | 49 | 48 | 35 | Z | 31 | 25 | C | C | C | C | 40 | 44 | 42 | 37 | 38 | 37 | 29 | 29 | 27 | 20 | 13 | 36.8 | 53 |
| 9-Sep | 10 | 9 | 17 | 23 | 25 | 12 | 8 | Z | 25 | 30 | 38 | 40 | 39 | 38 | 31 | 23 | 19 | 20 | 15 | 14 | 13 | 16 | 15 | 14 | 21.5 | 40 |
| 10-Sep | 18 | 19 | Z | 23 | 25 | 23 | 25 | 28 | 27 | 26 | 28 | 29 | 32 | 34 | 32 | 31 | 31 | 32 | 29 | 29 | 27 | 28 | 30 | 30 | 27.5 | 34 |
| 11-Sep | 28 | 27 | 26 | Z | 24 | 23 | 23 | 21 | 21 | 25 | 33 | 38 | 38 | 39 | 37 | 37 | 35 | 38 | 26 | 29 | 33 | 36 | 35 | 34 | 30.7 | 39 |
| 12-Sep | 38 | 38 | 37 | 34 | Z | 27 | 24 | 25 | 25 | 24 | 24 | 24 | 24 | 23 | 25 | 26 | 25 | 25 | 24 | 16 | 9 | 5 | 5 | 4 | 23.2 | 38 |
| 13-Sep | 4 | 4 | 4 | 7 | 9 | Z | 16 | 23 | 29 | 33 | 35 | 35 | 36 | 35 | 34 | 35 | 34 | 32 | 25 | 12 | 6 | 6 | 9 | 14 | 20.7 | 36 |
| 14-Sep | 15 | 11 | 8 | 6 | 5 | 5 | Z | 12 | 16 | 28 | 31 | 29 | 30 | 32 | 31 | 29 | 29 | 22 | 11 | 10 | 6 | 5 | 6 | 5 | 16.7 | 32 |
| 15-Sep | 4 | 4 | 4 | 4 | 5 | 6 | 8 | Z | 14 | 19 | 28 | 31 | M | 35 | 36 | 36 | 34 | 31 | 18 | 9 | 9 | 8 | 8 | 8 | 16.4 | 36 |
| 16-Sep | 8 | 10 | Z | 10 | 10 | 7 | 7 | 17 | 21 | 30 | 35 | 37 | 38 | 36 | 37 | 38 | 36 | 34 | 30 | 14 | 8 | 7 | 6 | 11 | 21.1 | 38 |
| 17-Sep | 8 | 4 | 4 | Z | 5 | 3 | 4 | 8 | 19 | 27 | 32 | 34 | 35 | 36 | 37 | 38 | 37 | 36 | 32 | 29 | 28 | 26 | 13 | 8 | 21.8 | 38 |
| 18-Sep | 8 | 5 | 6 | 4 | Z | 4 | 4 | 10 | 27 | 32 | 35 | 37 | 37 | 38 | 37 | 38 | 38 | 37 | 36 | 34 | 32 | 19 | 28 | 17 | 24.4 | 38 |
| 19-Sep | 14 | 18 | 23 | 23 | 22 | Z | 20 | 21 | 26 | 26 | 26 | 27 | 25 | 22 | 21 | 22 | 23 | 24 | 26 | 33 | 32 | 27 | 27 | 29 | 24.2 | 33 |
| 20-Sep | 29 | 26 | 26 | 26 | 26 | 26 | Z | 25 | 24 | 25 | 26 | 27 | 28 | 27 | 26 | 27 | 26 | 25 | 25 | 27 | 28 | 29 | 29 | 29 | 26.6 | 29 |
| 21-Sep | 28 | 28 | 27 | 26 | 23 | 22 | 22 | Z | 24 | 24 | 25 | 24 | 24 | 23 | 22 | 22 | 21 | 20 | 20 | 20 | 18 | 18 | 17 | 17 | 22.4 | 28 |
| 22-Sep | 13 | 16 | Z | 15 | 14 | 14 | 11 | 21 | 21 | 30 | 35 | 33 | 32 | 34 | 32 | 32 | 32 | 27 | 24 | 17 | 16 | 12 | 7 | 6 | 21.4 | 35 |
| 23-Sep | 4 | 7 | 6 | Z | 7 | 5 | 5 | 7 | 10 | 22 | 29 | 34 | 33 | 32 | 33 | 34 | 34 | 28 | 10 | 6 | 4 | 5 | 3 | 4 | 15.7 | 34 |
| 24-Sep | 4 | 10 | 11 | 9 | Z | 6 | 4 | 7 | 13 | 18 | 18 | 22 | 26 | 30 | 31 | 29 | 27 | 24 | 21 | 20 | 21 | 20 | 17 | 17 | 18.2 | 31 |
| 25-Sep | 17 | 15 | 18 | 18 | 17 | Z | 18 | 18 | 18 | 18 | 19 | 22 | 25 | 25 | 25 | 23 | 25 | 29 | 23 | 17 | 17 | 14 | 14 | 20 | 19.8 | 29 |
| 26-Sep | 20 | 20 | 20 | 19 | 25 | 25 | Z | 12 | 16 | 19 | 18 | 22 | 26 | 31 | 30 | 32 | 29 | 21 | 12 | 7 | 5 | 6 | 8 | 10 | 18.9 | 32 |
| 27-Sep | 15 | 23 | 22 | 26 | 20 | 21 | 20 | Z | 18 | 21 | 24 | 26 | 28 | 29 | 31 | 37 | 35 | 25 | 12 | 6 | 4 | 3 | 4 | 5 | 19.7 | 37 |
| 28-Sep | 3 | 4 | Z | 3 | 4 | 3 | 3 | 4 | 10 | 22 | 31 | 34 | 34 | 34 | 33 | 36 | 38 | 37 | 35 | 25 | 28 | 31 | 32 | 25 | 22.1 | 38 |
| 29-Sep | 30 | 33 | 33 | Z | 32 | 27 | 14 | 14 | 29 | 34 | 37 | 40 | 41 | 43 | 44 | 45 | 46 | 45 | 37 | 22 | 17 | 16 | 7 | 8 | 30.1 | 46 |
| 30-Sep | 6 | 7 | 5 | 4 | Z | 4 | 5 | 12 | 23 | 24 | 27 | 31 | 32 | 33 | 33 | 33 | 31 | 31 | 36 | 35 | 35 | 34 | 34 | 33 | 23.8 | 36 |

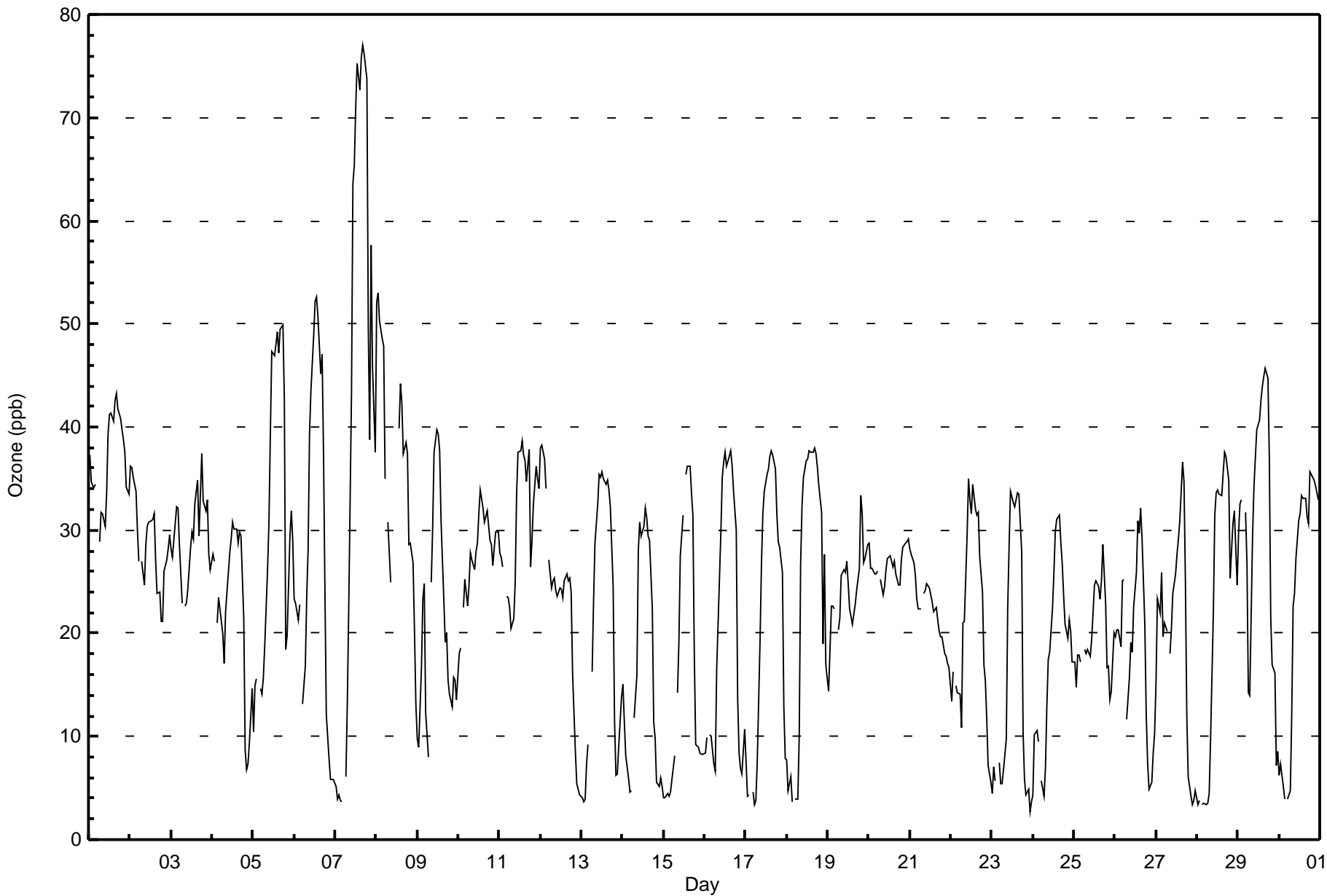
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 18.2 | 18.6 | 19.6 | 19.0 | 19.3 | 16.2 | 14.1 | 17.8 | 21.9 | 26.8 | 30.9 | 33.3 | 34.4 | 35.2 | 35.1 | 34.9 | 34.1 | 32.6 | 27.6 | 21.4 | 19.7 | 19.9 | 18.7 | 17.9 | Diurnal Average | |
| 52 | 53 | 50 | 49 | 48 | 35 | 29 | 32 | 32 | 43 | 64 | 65 | 71 | 75 | 73 | 76 | 77 | 76 | 74 | 50 | 39 | 58 | 46 | 38 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Conklin - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Conklin - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 231 | 33.72 | 33.72 |
| 21 - 50 | 439 | 64.09 | 97.81 |
| 51 - 82 | 15 | 2.19 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Conklin - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 4 | 0 | 1 | 0 | 0 | 0 | 7 | 26 | 63 | 45 | 20 | 6 | 4 | 10 | 19 | 22 | 227 |
| 21 - 50 | 44 | 11 | 12 | 13 | 9 | 13 | 12 | 30 | 52 | 16 | 27 | 37 | 38 | 50 | 48 | 26 | 438 |
| 51 - 82 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 8 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 15 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 48 | 12 | 13 | 13 | 9 | 14 | 19 | 57 | 123 | 64 | 47 | 43 | 42 | 60 | 68 | 48 | 680 |

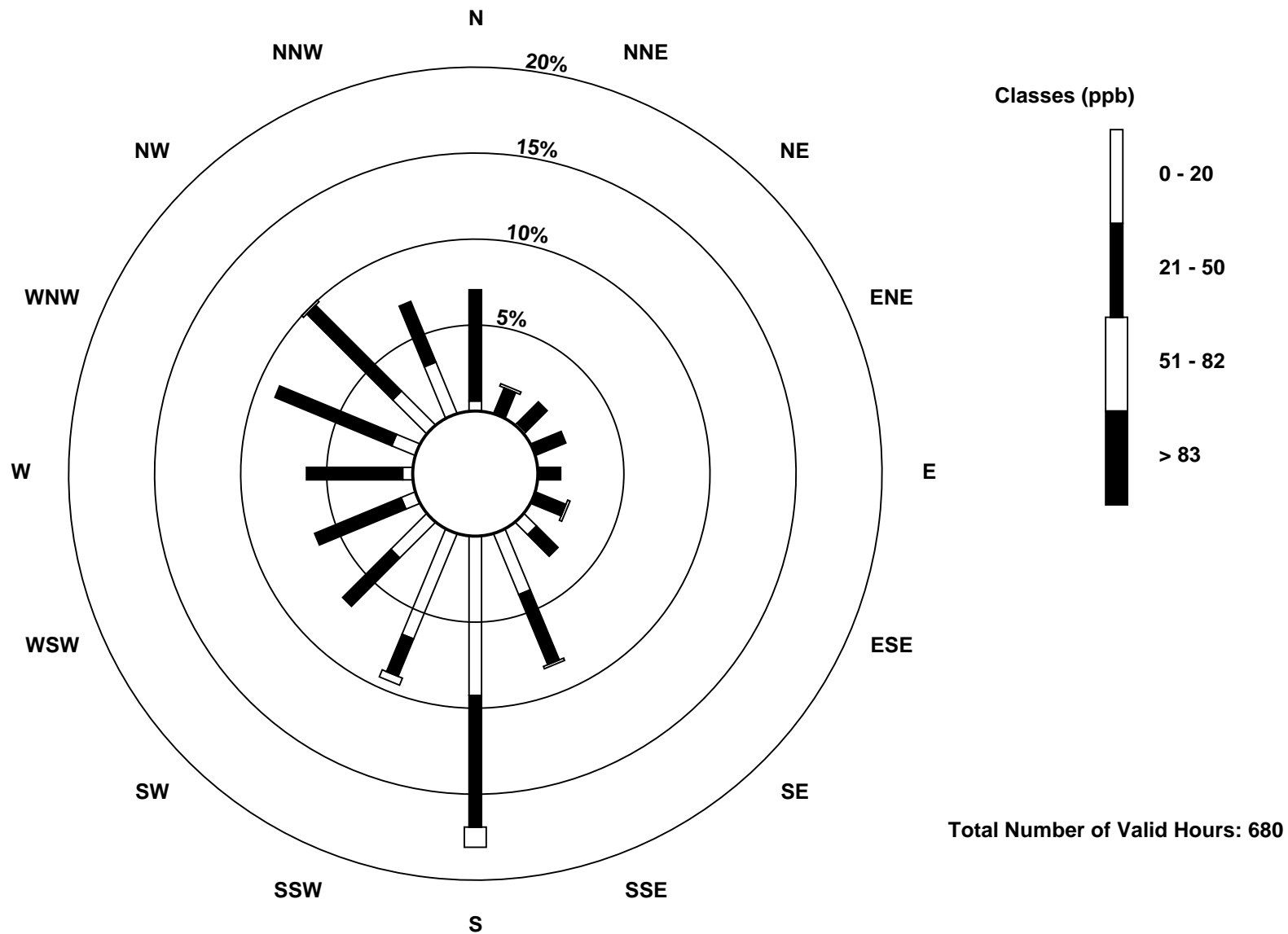
Total Number of Valid Hours: 680

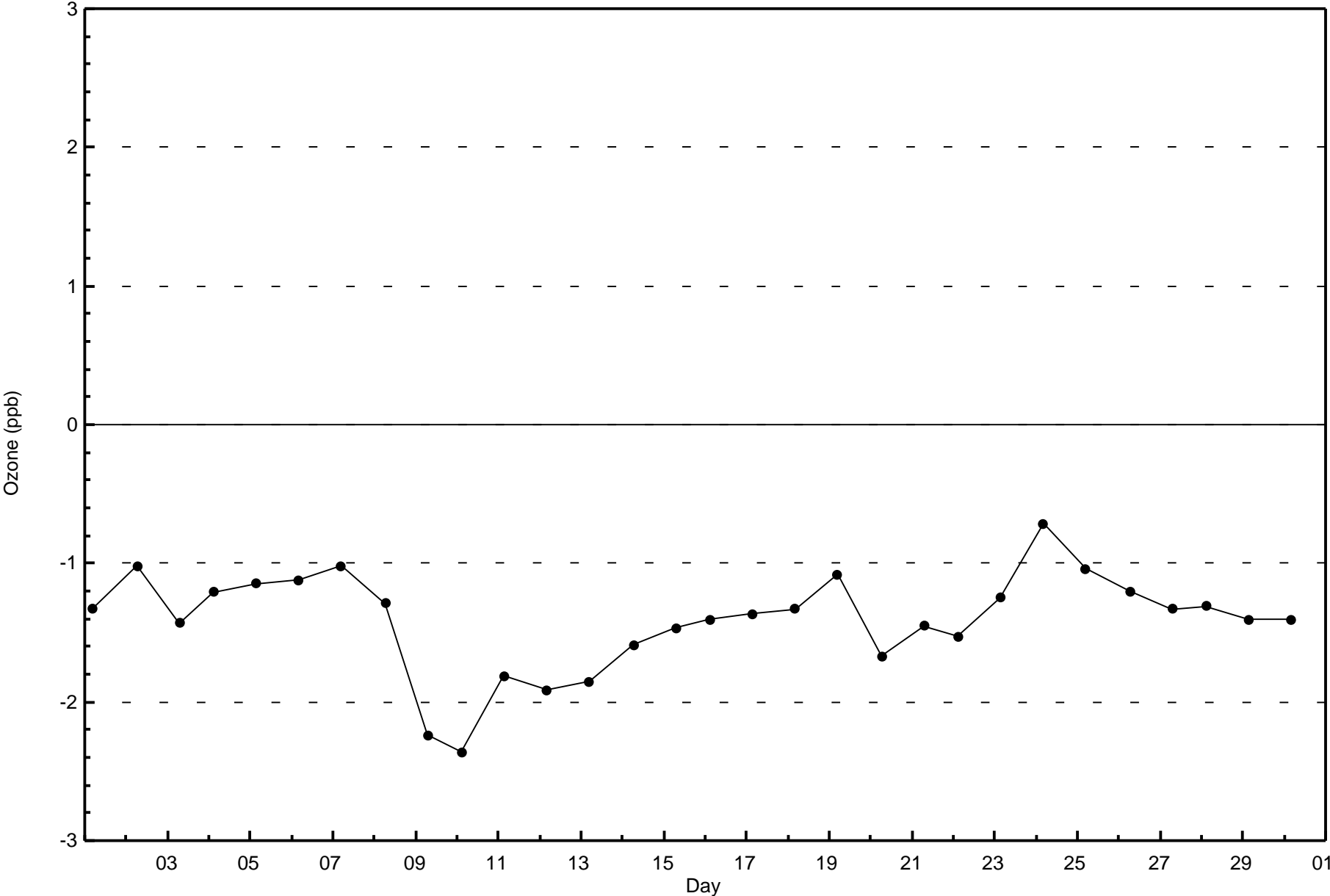
Total Number of Hours: 720

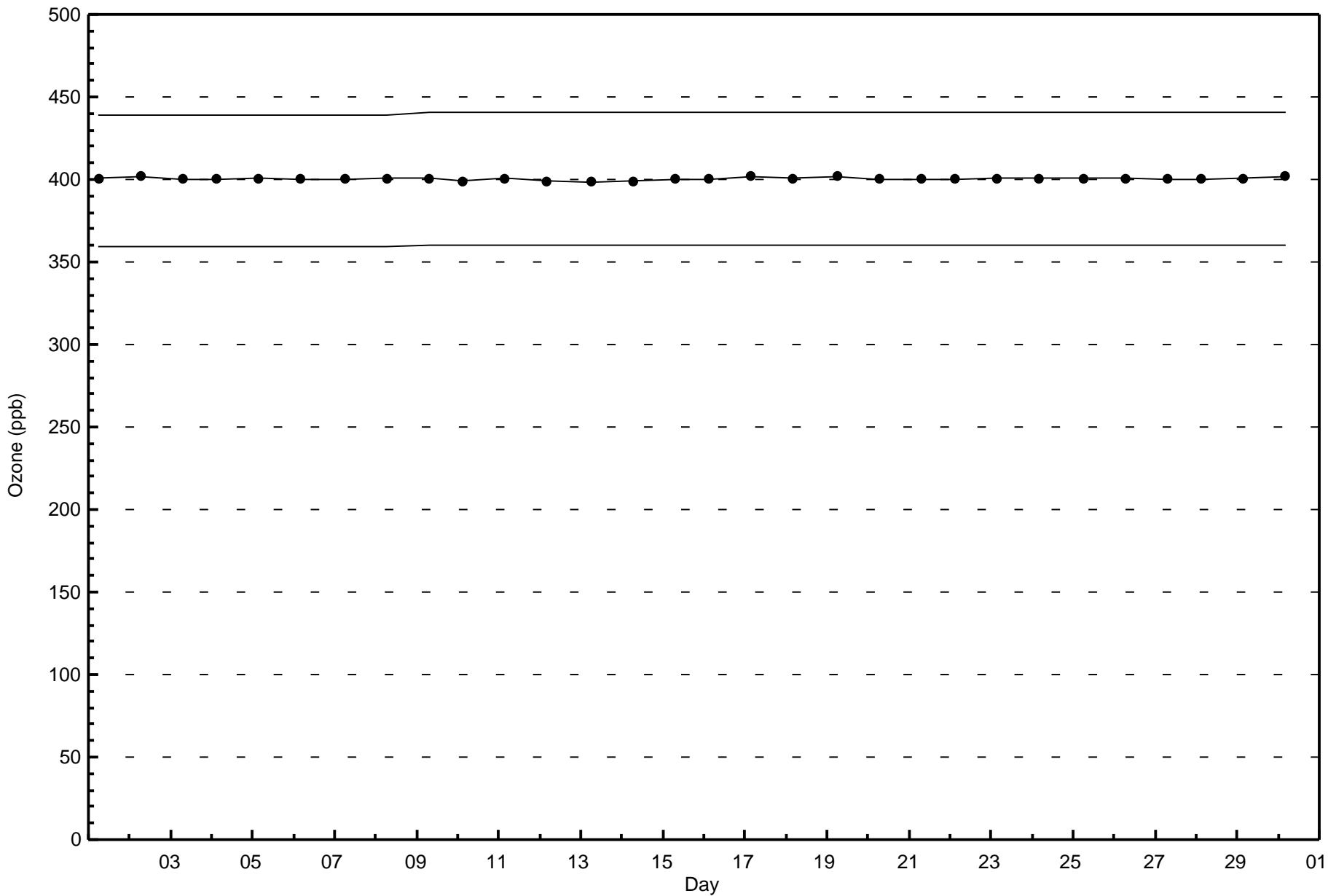


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Ozone (O₃) - ppb
Conklin (AMS 21)









Summary of Hour Averages

Conklin - September 2017

| | | | |
|--|--|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 67.0 µg/m ³ on Sep 6 20:00 | Maximum Daily Average: 24.0 µg/m ³ on Sep 8 | Hours of Data: | 699 |
| Minimum Value: 0.8 µg/m ³ on Sep 20 21:00 | Minimum Daily Average: 0.9 µg/m ³ on Sep 21 | Hours of Missing Data: | 21 |
| Maximum Diurnal Average: 14.0 µg/m ³ at hour 20 | Minimum Diurnal Average: 3.8 µg/m ³ at hour 12 | Hours of Calibration: | 1 |
| Monthly Average: 6.26 µg/m ³ | Percentiles: P ₁ = 0.8 P ₁₀ = 1.2 Q ₁ = 2.3 Median = 3.7 Q ₃ = 6.5 P ₉₀ = 13.2 P ₉₉ = 40.7 | Percent Operational Time: | 97.2 |

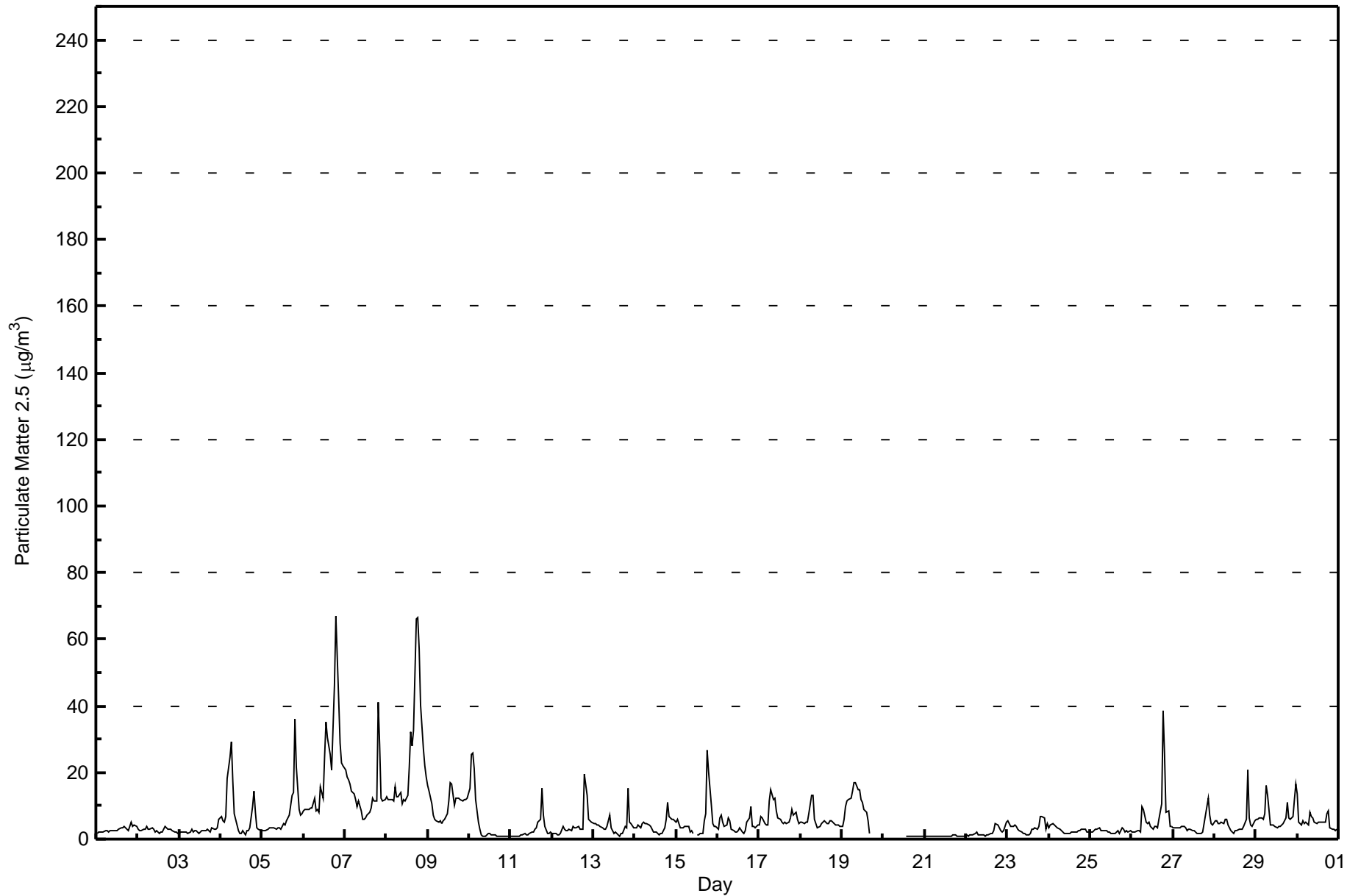
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1.8 | 2.3 | 2.1 | 1.9 | 2.0 | 2.4 | 2.5 | 2.3 | 2.6 | 2.7 | 2.4 | 2.6 | 2.6 | 2.9 | 3.2 | 3.5 | 3.7 | 3.3 | 2.6 | 3.8 | 4.9 | 3.8 | 4.3 | 3.7 | 2.9 | 4.9 |
| 2-Sep | 2.8 | 2.6 | 2.5 | 2.9 | 2.9 | 3.9 | 2.9 | 3.0 | 3.3 | 3.0 | 1.9 | 2.4 | 1.8 | 2.3 | 2.2 | 2.9 | 3.7 | 2.9 | 2.9 | 3.0 | 2.7 | 2.2 | 1.9 | 1.9 | 2.7 | 3.9 |
| 3-Sep | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.7 | 2.1 | 2.9 | 1.9 | 2.5 | 2.5 | 1.8 | 2.0 | 2.5 | 2.5 | 2.6 | 2.8 | 2.7 | 1.9 | 3.3 | 3.1 | 2.9 | 3.5 | 5.8 | 2.5 | 5.8 |
| 4-Sep | 6.7 | 5.4 | 5.2 | 6.9 | 18.1 | 24.4 | 29.2 | 17.2 | 7.5 | 4.2 | 2.4 | 1.6 | 1.9 | 2.3 | 1.4 | 2.7 | 2.6 | 3.4 | 9.7 | 14.4 | 8.3 | 3.4 | 2.8 | 2.7 | 7.7 | 29.2 |
| 5-Sep | 2.4 | 2.5 | 2.7 | 2.9 | 3.4 | 3.3 | 3.5 | 3.3 | 3.0 | 3.6 | 3.2 | 2.8 | 4.5 | 4.1 | 5.7 | 6.5 | 7.0 | 13.0 | 14.0 | 36.1 | 21.8 | 8.9 | 7.1 | 7.7 | 7.2 | 36.1 |
| 6-Sep | 8.6 | 8.8 | 9.0 | 8.9 | 9.4 | 9.2 | 12.1 | 8.4 | 8.7 | 7.9 | 15.7 | 12.3 | 24.7 | 35.3 | 30.4 | 25.4 | 20.7 | 33.4 | 46.2 | 67.0 | 42.1 | 28.8 | 23.0 | 22.2 | 21.6 | 67.0 |
| 7-Sep | 20.7 | 18.8 | 17.6 | 16.3 | 14.6 | 13.6 | 11.9 | 9.9 | 11.5 | 8.6 | 5.9 | 6.1 | 6.2 | 7.1 | 8.1 | 9.4 | 12.2 | 11.3 | 11.4 | 41.1 | 28.4 | 12.3 | 11.3 | 12.0 | 13.6 | 41.1 |
| 8-Sep | 12.6 | 12.0 | 11.8 | 11.9 | 11.3 | 15.5 | 12.9 | 12.9 | 14.1 | 10.7 | 11.9 | 11.5 | 13.3 | 21.7 | 32.3 | 28.0 | 32.6 | 66.0 | 66.6 | 57.3 | 40.4 | 27.1 | 21.8 | 18.8 | 24.0 | 66.6 |
| 9-Sep | 16.0 | 14.6 | 10.5 | 7.4 | 6.1 | 5.4 | 5.1 | 5.5 | 4.7 | 5.5 | 5.8 | 7.6 | 11.5 | 17.1 | 16.5 | 10.1 | 12.3 | 12.4 | 12.2 | 12.0 | 11.5 | 12.0 | 11.9 | 12.5 | 10.3 | 17.1 |
| 10-Sep | 15.1 | 25.2 | 26.0 | 21.2 | 11.8 | 5.2 | 2.8 | 1.3 | 0.9 | 1.0 | 1.1 | 1.5 | 1.9 | 1.2 | 1.5 | 1.3 | 1.0 | 1.0 | 0.9 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 5.3 | 26.0 |
| 11-Sep | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.1 | 1.2 | 1.8 | 1.4 | 1.3 | 1.5 | 2.3 | 2.2 | 2.9 | 3.4 | 5.1 | 6.0 | 15.3 | 7.3 | 3.8 | 1.8 | 1.8 | 2.0 | 2.8 | 15.3 |
| 12-Sep | 1.7 | 1.5 | 1.7 | 1.2 | 1.1 | 1.6 | 3.8 | 3.1 | 2.4 | 2.6 | 2.8 | 2.6 | 3.8 | 3.3 | 3.4 | 3.7 | 3.0 | 3.0 | 2.8 | 19.4 | 13.3 | 6.1 | 5.6 | 5.2 | 4.1 | 19.4 |
| 13-Sep | 4.7 | 4.6 | 4.3 | 4.3 | 3.7 | 3.4 | 2.8 | 3.1 | 4.0 | 7.3 | 3.4 | 2.6 | 1.8 | 2.1 | 1.2 | 1.0 | 1.7 | 1.7 | 3.6 | 3.3 | 15.1 | 5.0 | 4.6 | 3.2 | 3.9 | 15.1 |
| 14-Sep | 3.3 | 3.2 | 4.4 | 3.5 | 4.5 | 5.0 | 4.9 | 4.9 | 4.2 | 4.0 | 2.9 | 2.3 | 2.3 | 1.6 | 1.5 | 1.5 | 1.6 | 3.4 | 5.9 | 10.9 | 6.8 | 5.9 | 6.0 | 5.6 | 4.2 | 10.9 |
| 15-Sep | 5.1 | 6.0 | 3.4 | 3.4 | 3.5 | 3.8 | 4.0 | 3.9 | 2.1 | 2.6 | 1.6 | C | 1.4 | 1.5 | 1.5 | 1.8 | 5.5 | 7.4 | 26.9 | 20.4 | 10.1 | 4.5 | 3.8 | 3.9 | 5.6 | 26.9 |
| 16-Sep | 3.2 | 6.3 | 7.0 | 5.3 | 3.9 | 4.2 | 6.1 | 5.6 | 3.2 | 2.4 | 1.9 | 1.9 | 2.3 | 3.3 | 2.0 | 1.9 | 2.6 | 5.3 | 6.2 | 9.8 | 3.9 | 3.9 | 3.2 | 4.2 | 4.1 | 9.8 |
| 17-Sep | 4.3 | 6.6 | 6.4 | 4.7 | 4.3 | 4.3 | 11.4 | 14.7 | 12.0 | 12.4 | 8.4 | 6.6 | 6.1 | 5.0 | 4.7 | 4.9 | 4.5 | 4.9 | 6.4 | 8.9 | 7.1 | 8.1 | 5.9 | 4.6 | 7.0 | 14.7 |
| 18-Sep | 5.1 | 5.2 | 4.8 | 4.9 | 5.2 | 7.7 | 13.1 | 13.0 | 6.1 | 4.6 | 3.6 | 3.7 | 4.7 | 5.0 | 5.3 | 4.7 | 4.6 | 5.5 | 5.3 | 5.1 | 4.4 | 4.4 | 4.1 | 3.9 | 5.6 | 13.1 |
| 19-Sep | 3.8 | 5.8 | 9.6 | 11.5 | 11.8 | 12.3 | 14.4 | 16.9 | 17.1 | 14.6 | 14.9 | 11.8 | 11.0 | 8.9 | 7.9 | 5.4 | 1.8 | AF | AF | AF | AF | AF | AF | AF | -- | 17.1 |
| 20-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | -- | 0.9 |
| 21-Sep | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 0.8 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 1.0 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 1.2 |
| 22-Sep | 1.1 | 1.0 | 1.1 | 1.2 | 1.4 | 1.6 | 2.0 | 1.4 | 1.3 | 1.2 | 1.1 | 0.9 | 1.3 | 1.4 | 1.7 | 1.7 | 2.6 | 4.8 | 4.2 | 3.3 | 2.5 | 2.3 | 2.5 | 5.1 | 2.0 | 5.1 |
| 23-Sep | 5.6 | 4.6 | 3.8 | 3.7 | 4.1 | 3.6 | 2.8 | 2.6 | 2.1 | 1.7 | 1.6 | 1.2 | 1.3 | 1.8 | 2.8 | 3.1 | 3.2 | 3.0 | 3.7 | 6.7 | 6.9 | 6.5 | 2.9 | 4.7 | 3.5 | 6.9 |
| 24-Sep | 3.3 | 4.2 | 4.6 | 4.4 | 3.8 | 3.4 | 3.2 | 2.6 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.6 | 2.4 | 3.1 | 3.1 | 2.9 | 2.3 | 2.1 | 2.7 | 4.6 |
| 25-Sep | 2.2 | 2.3 | 2.5 | 2.8 | 3.2 | 3.2 | 2.5 | 2.5 | 2.4 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.6 | 1.9 | 2.4 | 1.7 | 3.2 | 2.9 | 2.2 | 2.5 | 2.0 | 2.4 | 2.3 | 3.2 |
| 26-Sep | 2.2 | 2.3 | 2.3 | 2.5 | 2.4 | 2.3 | 9.8 | 9.1 | 5.1 | 4.5 | 5.2 | 3.8 | 3.1 | 3.8 | 3.7 | 3.4 | 5.9 | 10.7 | 38.6 | 25.3 | 8.2 | 8.3 | 3.6 | 3.7 | 7.1 | 38.6 |
| 27-Sep | 3.5 | 3.3 | 3.3 | 3.3 | 3.5 | 3.8 | 4.0 | 3.5 | 2.7 | 2.9 | 2.9 | 2.4 | 2.7 | 2.0 | 1.6 | 1.7 | 1.8 | 2.2 | 4.7 | 7.4 | 12.2 | 7.2 | 4.8 | 4.4 | 3.8 | 12.2 |
| 28-Sep | 5.7 | 5.4 | 4.6 | 4.8 | 5.0 | 4.7 | 6.1 | 6.0 | 4.3 | 2.7 | 2.2 | 1.9 | 2.4 | 2.4 | 2.8 | 2.8 | 3.2 | 3.7 | 6.1 | 20.7 | 6.4 | 4.1 | 3.9 | 5.5 | 4.9 | 20.7 |
| 29-Sep | 6.1 | 6.0 | 6.4 | 6.3 | 6.1 | 7.6 | 15.9 | 13.2 | 4.4 | 4.0 | 4.2 | 3.9 | 3.6 | 3.8 | 3.9 | 4.2 | 4.7 | 6.2 | 11.1 | 6.5 | 5.8 | 6.7 | 11.9 | 16.5 | 7.0 | 16.5 |
| 30-Sep | 13.4 | 5.0 | 4.2 | 5.6 | 4.7 | 5.2 | 4.1 | 7.9 | 6.7 | 6.2 | 5.3 | 4.5 | 5.0 | 5.0 | 5.1 | 5.1 | 4.9 | 7.4 | 8.3 | 3.5 | 3.0 | 2.9 | 2.7 | 3.1 | 5.4 | 13.4 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |

C - Calibration AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m³



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 433 | 61.95 | 61.95 |
| 6 - 15 | 169 | 24.18 | 86.12 |
| 16 - 25 | 30 | 4.29 | 90.41 |
| 26 - 80 | 22 | 3.15 | 93.56 |
| > 81.0 | 0 | 0.00 | 93.56 |

Total Number of Valid Hours: 699

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Conklin - September 2017

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 9 | 4 | 8 | 2 | 4 | 9 | 10 | 31 | 86 | 42 | 28 | 29 | 37 | 53 | 49 | 28 | 429 |
| 6 - 15 | 5 | 2 | 3 | 4 | 3 | 2 | 8 | 24 | 37 | 23 | 11 | 10 | 4 | 7 | 15 | 10 | 168 |
| 16 - 25 | 2 | 2 | 0 | 2 | 0 | 1 | 0 | 6 | 4 | 2 | 0 | 0 | 1 | 2 | 5 | 3 | 30 |
| 26 - 80 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 2 | 0 | 1 | 0 | 1 | 6 | 22 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 18 | 9 | 11 | 8 | 7 | 13 | 19 | 63 | 129 | 70 | 41 | 39 | 43 | 62 | 70 | 47 | 649 |

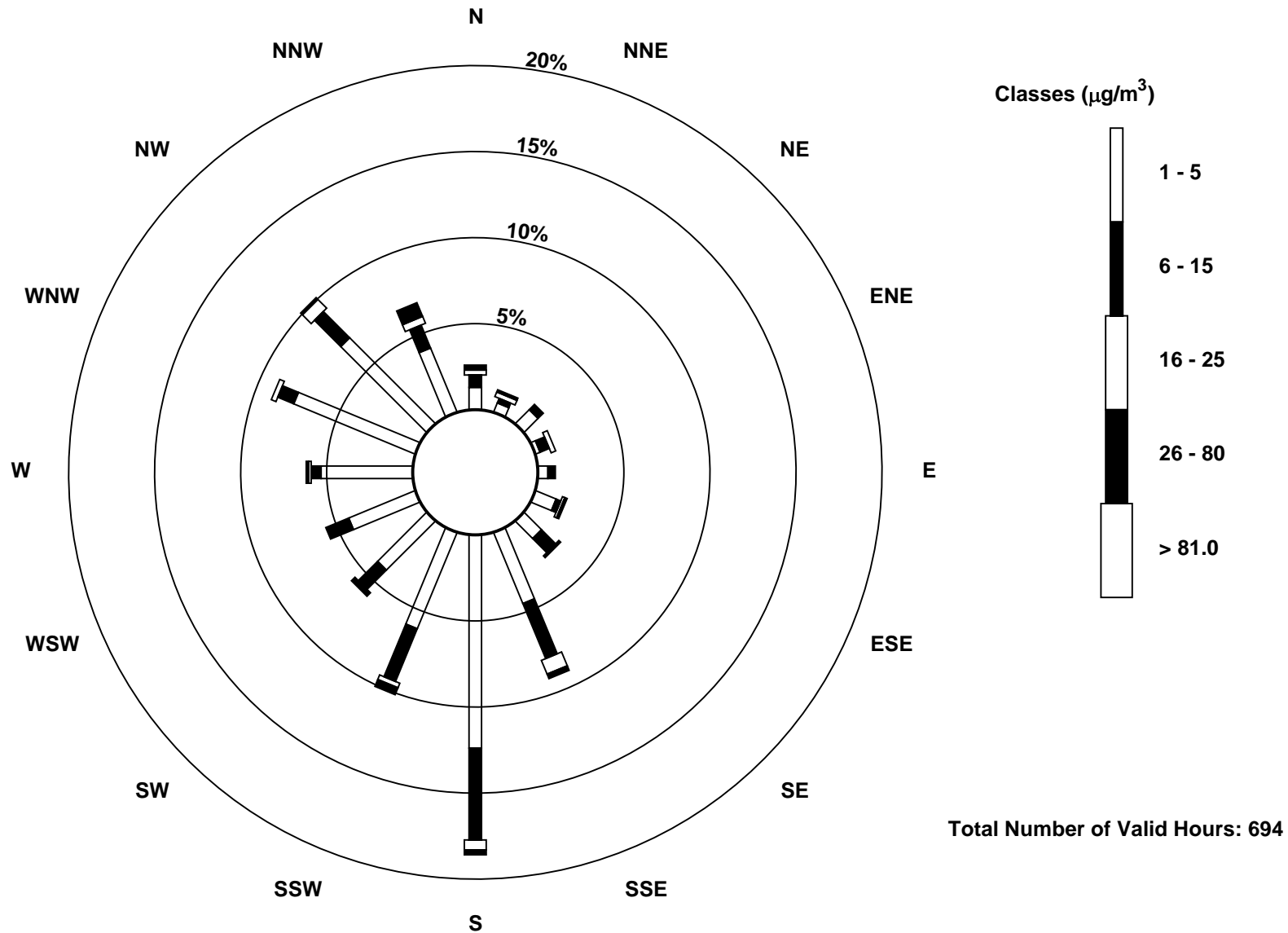
Total Number of Valid Hours: 694

Total Number of Hours: 720



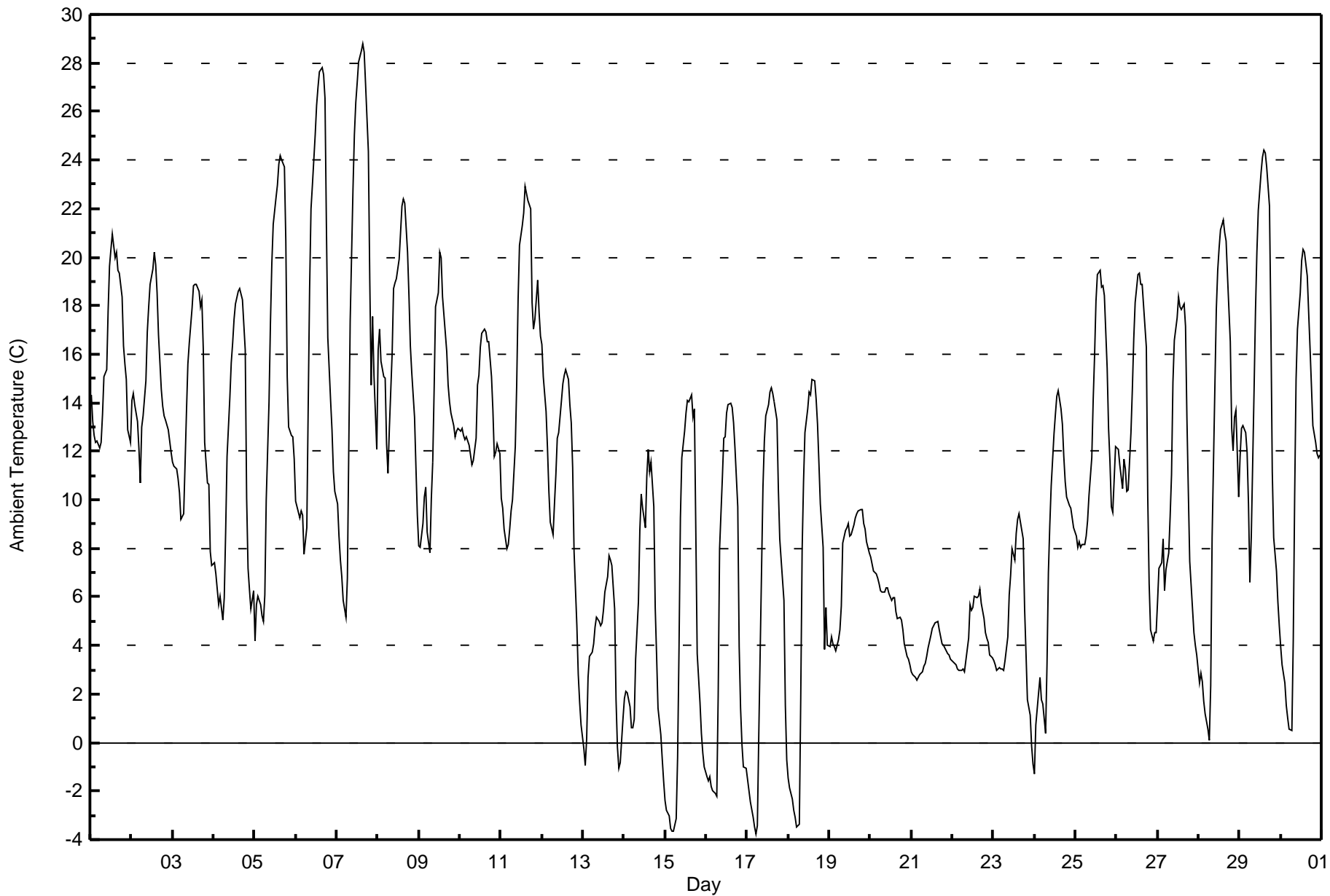
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin (AMS 21)





| Maximum Value: 28.8 C on Sep 7 16:00 Maximum Daily Average: 17.7 C on Sep 7 | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | |
|--|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|-----------------|---------------|---------------|
| Minimum Value: -3.8 C on Sep 17 06:00 Minimum Daily Average: 3.5 C on Sep 13 Maximum Diurnal Average: 16.7 C at hour 15 Minimum Diurnal Average: 5.2 C at hour 6 Monthly Average: 10.46 C Percentiles: P ₁ = -3.4 P ₁₀ = 1.7 Q ₁ = 5.1 Median = 10.4 Q ₃ = 15.0 P ₉₀ = 19.3 P ₉₉ = 27.4 | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 14.3 | 13.3 | 12.6 | 12.4 | 12.4 | 12.2 | 12.4 | 13.5 | 15.0 | 15.4 | 17.8 | 19.7 | 20.3 | 21.0 | 20.0 | 20.2 | 19.5 | 19.4 | 18.4 | 16.4 | 15.6 | 15.0 | 12.9 | 12.4 | 15.9 | 21.0 |
| 2-Sep | 14.1 | 14.4 | 13.9 | 13.3 | 12.1 | 10.7 | 13.0 | 13.5 | 14.9 | 16.9 | 18.0 | 18.9 | 19.5 | 20.2 | 19.7 | 18.5 | 16.8 | 14.6 | 13.9 | 13.4 | 13.3 | 12.9 | 12.4 | 12.0 | 15.0 | 20.2 |
| 3-Sep | 11.6 | 11.4 | 11.3 | 10.9 | 10.3 | 9.2 | 9.4 | 11.5 | 13.6 | 15.6 | 16.4 | 17.9 | 18.8 | 18.9 | 18.9 | 18.6 | 17.9 | 18.3 | 16.2 | 12.4 | 10.7 | 10.6 | 7.9 | 7.3 | 13.6 | 18.9 |
| 4-Sep | 7.4 | 6.9 | 6.3 | 5.7 | 6.0 | 5.1 | 6.0 | 8.7 | 11.8 | 14.2 | 15.7 | 16.5 | 17.4 | 18.1 | 18.6 | 18.7 | 18.5 | 18.2 | 16.2 | 10.1 | 7.2 | 6.3 | 5.5 | 6.3 | 11.3 | 18.7 |
| 5-Sep | 4.2 | 5.7 | 6.0 | 5.7 | 5.2 | 5.0 | 6.1 | 10.0 | 14.1 | 17.3 | 19.7 | 21.4 | 22.5 | 23.0 | 23.8 | 24.2 | 24.0 | 23.7 | 20.7 | 15.1 | 13.0 | 12.7 | 12.6 | 11.7 | 14.5 | 24.2 |
| 6-Sep | 10.0 | 9.7 | 9.2 | 9.5 | 9.4 | 7.8 | 8.9 | 13.9 | 18.7 | 22.0 | 23.0 | 25.0 | 26.2 | 27.0 | 27.7 | 27.8 | 27.5 | 26.5 | 21.3 | 16.7 | 14.1 | 12.9 | 11.2 | 10.3 | 17.3 | 27.8 |
| 7-Sep | 9.8 | 8.5 | 7.6 | 6.8 | 5.9 | 5.2 | 6.8 | 12.1 | 17.4 | 22.8 | 25.0 | 26.4 | 27.2 | 28.1 | 28.5 | 28.8 | 28.4 | 27.1 | 24.4 | 19.0 | 14.7 | 17.5 | 15.2 | 12.1 | 17.7 | 28.8 |
| 8-Sep | 16.1 | 17.0 | 15.7 | 15.1 | 15.0 | 12.3 | 11.1 | 12.9 | 16.0 | 18.7 | 19.0 | 19.1 | 19.9 | 21.0 | 22.1 | 22.4 | 22.2 | 20.2 | 18.4 | 16.3 | 15.2 | 13.4 | 11.3 | 9.4 | 16.7 | 22.4 |
| 9-Sep | 8.1 | 8.1 | 9.0 | 10.1 | 10.5 | 8.7 | 7.8 | 10.0 | 11.6 | 14.5 | 17.9 | 18.5 | 20.2 | 20.0 | 18.3 | 16.8 | 16.1 | 14.7 | 14.0 | 13.6 | 13.1 | 12.6 | 12.8 | 13.0 | 13.3 | 20.2 |
| 10-Sep | 12.8 | 13.0 | 12.7 | 12.5 | 12.6 | 12.2 | 11.9 | 11.5 | 11.6 | 12.5 | 14.7 | 15.2 | 16.3 | 16.9 | 17.1 | 16.9 | 16.5 | 16.5 | 15.1 | 13.7 | 11.8 | 12.0 | 12.3 | 11.9 | 13.8 | 17.1 |
| 11-Sep | 10.1 | 9.7 | 8.8 | 8.0 | 8.2 | 8.8 | 9.5 | 10.0 | 12.2 | 14.7 | 18.2 | 20.5 | 21.3 | 21.8 | 22.9 | 22.6 | 22.4 | 22.0 | 18.1 | 17.1 | 17.5 | 19.0 | 17.8 | 16.7 | 15.7 | 22.9 |
| 12-Sep | 16.4 | 15.1 | 13.6 | 12.1 | 10.4 | 9.1 | 8.6 | 9.8 | 11.0 | 12.5 | 12.8 | 14.1 | 14.8 | 15.1 | 15.3 | 15.0 | 13.9 | 13.2 | 11.3 | 7.9 | 4.8 | 2.8 | 1.6 | 0.7 | 10.9 | 16.4 |
| 13-Sep | -0.2 | -1.0 | 0.1 | 2.7 | 3.6 | 3.7 | 4.1 | 4.8 | 5.2 | 5.0 | 4.8 | 5.0 | 5.5 | 6.2 | 6.8 | 7.7 | 7.5 | 7.3 | 5.5 | 1.8 | -0.2 | -1.1 | -0.9 | 1.0 | 3.5 | 7.7 |
| 14-Sep | 1.8 | 2.1 | 2.1 | 1.5 | 0.6 | 0.6 | 1.0 | 3.5 | 5.8 | 8.7 | 10.2 | 9.7 | 8.8 | 11.0 | 12.1 | 11.2 | 11.5 | 9.7 | 5.6 | 3.6 | 1.4 | 0.3 | -0.7 | -1.6 | 5.0 | 12.1 |
| 15-Sep | -2.4 | -2.8 | -3.0 | -3.6 | -3.6 | -3.7 | -3.1 | -0.6 | 3.8 | 9.2 | 11.7 | 12.8 | 13.5 | 14.1 | 14.1 | 14.3 | 13.4 | 13.8 | 8.8 | 3.7 | 1.7 | 0.4 | -0.4 | -1.0 | 4.6 | 14.3 |
| 16-Sep | -1.4 | -1.6 | -1.4 | -1.8 | -2.0 | -2.1 | -2.2 | 2.0 | 8.0 | 10.9 | 12.5 | 12.6 | 13.6 | 13.9 | 14.0 | 13.8 | 13.1 | 12.1 | 9.7 | 3.9 | 1.4 | -0.1 | -1.0 | -1.1 | 5.3 | 14.0 |
| 17-Sep | -1.5 | -2.0 | -2.5 | -3.1 | -3.5 | -3.8 | -3.4 | 0.3 | 7.1 | 10.5 | 12.4 | 13.4 | 13.9 | 14.4 | 14.6 | 14.4 | 14.0 | 13.3 | 10.5 | 8.4 | 7.6 | 5.9 | 1.5 | -0.7 | 5.9 | 14.6 |
| 18-Sep | -1.5 | -1.9 | -2.3 | -2.8 | -3.1 | -3.5 | -3.4 | 1.8 | 7.9 | 10.8 | 12.8 | 13.7 | 14.4 | 14.3 | 15.0 | 14.9 | 14.2 | 13.1 | 11.5 | 9.8 | 8.0 | 3.8 | 5.5 | 4.0 | 6.6 | 15.0 |
| 19-Sep | 4.0 | 4.4 | 4.1 | 3.9 | 3.8 | 4.2 | 4.6 | 5.6 | 8.2 | 8.8 | 8.9 | 9.0 | 8.5 | 8.6 | 9.0 | 9.2 | 9.4 | 9.5 | 9.6 | 9.6 | 9.0 | 8.8 | 8.3 | 7.8 | 7.4 | 9.6 |
| 20-Sep | 7.6 | 7.4 | 7.1 | 6.9 | 6.8 | 6.6 | 6.2 | 6.2 | 6.2 | 6.4 | 6.4 | 6.2 | 5.9 | 5.9 | 6.0 | 5.4 | 5.1 | 5.1 | 5.0 | 4.7 | 4.1 | 3.6 | 3.4 | 3.2 | 5.7 | 7.6 |
| 21-Sep | 2.9 | 2.8 | 2.7 | 2.5 | 2.7 | 2.8 | 2.9 | 3.1 | 3.3 | 3.5 | 3.9 | 4.4 | 4.7 | 4.8 | 4.9 | 5.0 | 4.6 | 4.3 | 4.1 | 4.0 | 3.8 | 3.6 | 3.6 | 3.4 | 3.7 | 5.0 |
| 22-Sep | 3.3 | 3.3 | 3.2 | 3.1 | 3.0 | 3.0 | 3.0 | 2.9 | 3.4 | 4.3 | 5.7 | 5.4 | 5.6 | 6.1 | 5.9 | 6.0 | 6.3 | 5.7 | 5.1 | 4.5 | 4.3 | 4.1 | 3.6 | 3.5 | 4.3 | 6.3 |
| 23-Sep | 3.4 | 3.2 | 3.0 | 3.1 | 3.1 | 3.0 | 3.0 | 3.4 | 4.4 | 6.1 | 6.9 | 8.0 | 7.5 | 8.6 | 9.2 | 9.4 | 9.1 | 8.4 | 5.5 | 3.7 | 1.8 | 1.1 | -0.1 | -0.9 | 4.7 | 9.4 |
| 24-Sep | -1.3 | 0.7 | 2.0 | 2.7 | 1.7 | 1.6 | 0.4 | 3.2 | 7.0 | 9.0 | 10.6 | 12.7 | 13.5 | 14.3 | 14.5 | 13.7 | 13.1 | 11.8 | 10.8 | 10.1 | 9.8 | 9.7 | 9.3 | 8.8 | 7.9 | 14.5 |
| 25-Sep | 8.5 | 8.1 | 8.3 | 8.1 | 8.2 | 8.2 | 8.5 | 9.1 | 10.2 | 11.8 | 14.1 | 16.0 | 18.2 | 19.3 | 19.5 | 18.8 | 18.8 | 18.4 | 15.4 | 12.9 | 11.6 | 9.7 | 9.5 | 12.2 | 12.6 | 19.5 |
| 26-Sep | 12.1 | 12.1 | 11.4 | 10.5 | 11.7 | 11.3 | 10.4 | 10.4 | 12.8 | 14.6 | 16.6 | 18.1 | 19.3 | 19.3 | 18.9 | 18.9 | 18.0 | 16.3 | 10.1 | 6.5 | 4.7 | 4.2 | 4.6 | 4.6 | 12.4 | 19.3 |
| 27-Sep | 5.8 | 7.2 | 7.4 | 8.4 | 6.2 | 7.1 | 7.8 | 9.3 | 11.1 | 14.8 | 16.6 | 17.5 | 18.4 | 18.0 | 17.9 | 18.1 | 17.2 | 13.3 | 10.3 | 7.5 | 5.5 | 4.5 | 4.0 | 3.6 | 10.7 | 18.4 |
| 28-Sep | 2.5 | 2.8 | 2.5 | 1.7 | 1.2 | 0.6 | 0.1 | 2.3 | 8.4 | 14.7 | 17.8 | 19.5 | 20.4 | 21.1 | 21.5 | 21.0 | 20.7 | 19.3 | 16.5 | 13.0 | 12.0 | 13.4 | 13.7 | 10.1 | 11.5 | 21.5 |
| 29-Sep | 11.8 | 12.9 | 13.1 | 12.8 | 11.9 | 9.8 | 6.6 | 8.5 | 14.6 | 17.8 | 20.2 | 21.9 | 23.5 | 24.1 | 24.4 | 24.3 | 23.7 | 22.1 | 17.2 | 11.1 | 8.4 | 7.1 | 5.8 | 4.8 | 14.9 | 24.4 |
| 30-Sep | 4.0 | 3.2 | 2.4 | 1.5 | 1.0 | 0.6 | 0.5 | 4.2 | 10.2 | 15.0 | 17.1 | 18.5 | 19.9 | 20.3 | 20.2 | 19.3 | 17.7 | 16.2 | 14.7 | 13.1 | 12.4 | 11.9 | 11.8 | 11.9 | 11.1 | 20.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Conklin - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 45 | 6.25 | 6.25 |
| 0 - 10 | 301 | 41.81 | 48.06 |
| 10 - 20 | 314 | 43.61 | 91.67 |
| > 20 | 60 | 8.33 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

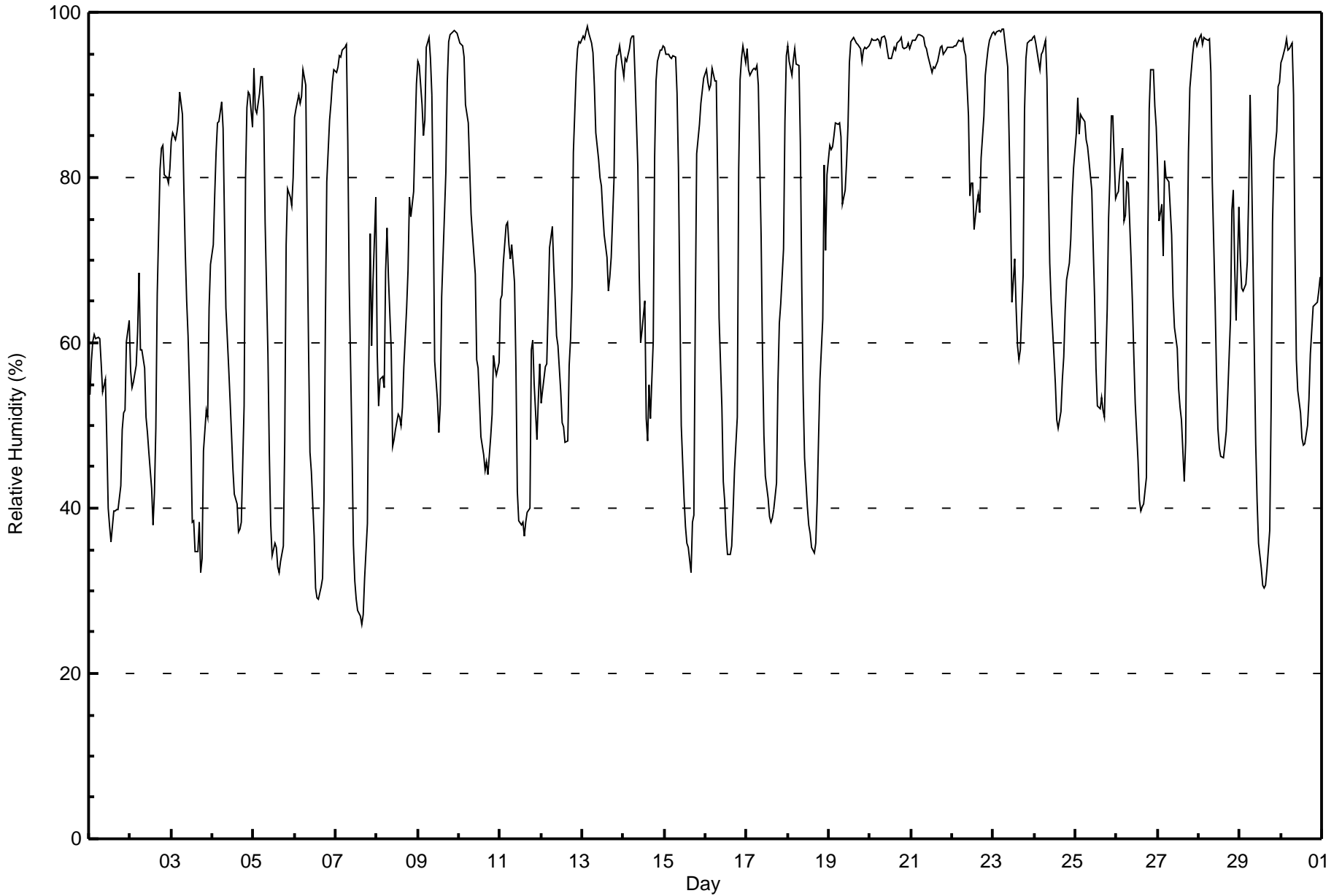
Conklin - September 2017

| Maximum Value: 98 % on Sep 13 04:00 Maximum Daily Average: 96.1 % on Sep 20 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|------|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 26 % on Sep 7 16:00 Minimum Daily Average: 50.9 % on Sep 1 Maximum Diurnal Average: 87.8 % at hour 6 Minimum Diurnal Average: 49.8 % at hour 15 Monthly Average: 71.8 % Percentiles: P ₁ = 30 P ₁₀ = 40 Q ₁ = 53 Median = 76 O ₃ = 93 P ₉₀ = 96 P ₉₉ = 98 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 54 | 58 | 60 | 61 | 61 | 61 | 60 | 57 | 54 | 56 | 48 | 40 | 38 | 36 | 40 | 40 | 40 | 40 | 43 | 50 | 52 | 52 | 60 | 63 | 50.9 | 63 |
| 2-Sep | 57 | 55 | 55 | 57 | 61 | 68 | 59 | 59 | 57 | 51 | 49 | 47 | 42 | 38 | 42 | 50 | 66 | 81 | 84 | 84 | 80 | 80 | 79 | 81 | 61.8 | 84 |
| 3-Sep | 84 | 85 | 85 | 85 | 87 | 90 | 88 | 79 | 71 | 65 | 61 | 48 | 38 | 38 | 35 | 35 | 38 | 32 | 34 | 47 | 52 | 51 | 64 | 70 | 60.9 | 90 |
| 4-Sep | 72 | 78 | 83 | 87 | 87 | 89 | 86 | 75 | 64 | 57 | 53 | 49 | 45 | 42 | 40 | 37 | 38 | 52 | 80 | 88 | 90 | 90 | 86 | 86 | 66.9 | 90 |
| 5-Sep | 93 | 88 | 88 | 90 | 92 | 92 | 88 | 75 | 59 | 47 | 38 | 34 | 36 | 35 | 33 | 32 | 34 | 35 | 48 | 72 | 79 | 78 | 77 | 80 | 63.4 | 93 |
| 6-Sep | 87 | 88 | 90 | 89 | 90 | 93 | 91 | 74 | 59 | 47 | 44 | 37 | 30 | 29 | 29 | 30 | 32 | 41 | 62 | 79 | 87 | 89 | 92 | 93 | 66.0 | 93 |
| 7-Sep | 93 | 93 | 95 | 95 | 95 | 96 | 96 | 84 | 67 | 47 | 36 | 31 | 29 | 28 | 27 | 26 | 27 | 31 | 38 | 57 | 73 | 60 | 67 | 78 | 61.3 | 96 |
| 8-Sep | 59 | 52 | 56 | 56 | 55 | 69 | 74 | 68 | 59 | 47 | 48 | 50 | 51 | 51 | 50 | 52 | 57 | 64 | 69 | 78 | 75 | 78 | 85 | 91 | 62.3 | 91 |
| 9-Sep | 94 | 94 | 89 | 85 | 87 | 96 | 97 | 94 | 90 | 76 | 58 | 53 | 49 | 52 | 66 | 76 | 81 | 92 | 96 | 97 | 98 | 98 | 98 | 97 | 83.8 | 98 |
| 10-Sep | 96 | 96 | 96 | 95 | 89 | 87 | 81 | 76 | 73 | 68 | 58 | 57 | 53 | 49 | 46 | 45 | 46 | 44 | 49 | 51 | 58 | 57 | 56 | 58 | 66.0 | 96 |
| 11-Sep | 65 | 66 | 70 | 74 | 75 | 72 | 70 | 72 | 67 | 57 | 42 | 38 | 38 | 38 | 37 | 38 | 39 | 40 | 59 | 60 | 55 | 48 | 53 | 57 | 55.5 | 75 |
| 12-Sep | 53 | 54 | 57 | 57 | 64 | 72 | 74 | 69 | 65 | 61 | 60 | 54 | 50 | 50 | 48 | 48 | 57 | 60 | 67 | 83 | 93 | 96 | 96 | 96 | 66.1 | 96 |
| 13-Sep | 97 | 97 | 98 | 98 | 97 | 96 | 95 | 91 | 85 | 82 | 80 | 79 | 76 | 73 | 70 | 66 | 68 | 70 | 80 | 93 | 95 | 95 | 96 | 93 | 86.3 | 98 |
| 14-Sep | 92 | 94 | 94 | 96 | 97 | 97 | 97 | 92 | 81 | 68 | 60 | 62 | 65 | 51 | 48 | 55 | 51 | 60 | 83 | 92 | 94 | 95 | 95 | 96 | 79.8 | 97 |
| 15-Sep | 96 | 95 | 95 | 95 | 94 | 95 | 95 | 90 | 81 | 65 | 50 | 41 | 38 | 36 | 35 | 32 | 38 | 39 | 63 | 83 | 86 | 89 | 91 | 92 | 71.4 | 96 |
| 16-Sep | 93 | 92 | 91 | 91 | 93 | 92 | 92 | 80 | 63 | 52 | 43 | 41 | 37 | 34 | 34 | 35 | 40 | 45 | 51 | 81 | 92 | 94 | 96 | 94 | 69.0 | 96 |
| 17-Sep | 96 | 93 | 92 | 93 | 93 | 93 | 93 | 91 | 73 | 59 | 49 | 44 | 41 | 39 | 38 | 39 | 40 | 43 | 55 | 62 | 65 | 71 | 87 | 95 | 68.5 | 96 |
| 18-Sep | 96 | 94 | 92 | 94 | 96 | 94 | 94 | 84 | 67 | 54 | 46 | 40 | 38 | 37 | 35 | 35 | 36 | 41 | 49 | 56 | 63 | 82 | 71 | 80 | 65.5 | 96 |
| 19-Sep | 84 | 83 | 84 | 85 | 87 | 86 | 87 | 85 | 77 | 78 | 82 | 86 | 94 | 96 | 97 | 97 | 96 | 96 | 96 | 94 | 95 | 96 | 96 | 96 | 89.7 | 97 |
| 20-Sep | 96 | 97 | 97 | 97 | 97 | 97 | 96 | 97 | 97 | 97 | 95 | 94 | 94 | 95 | 96 | 95 | 96 | 97 | 97 | 96 | 96 | 96 | 96 | 96 | 96.1 | 97 |
| 21-Sep | 96 | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 96 | 96 | 95 | 93 | 93 | 93 | 93 | 94 | 95 | 96 | 96 | 95 | 95 | 96 | 96 | 96 | 95.5 | 97 |
| 22-Sep | 96 | 96 | 96 | 96 | 97 | 96 | 97 | 95 | 95 | 87 | 78 | 79 | 79 | 74 | 77 | 78 | 76 | 82 | 87 | 92 | 94 | 96 | 97 | 98 | 89.1 | 98 |
| 23-Sep | 98 | 97 | 98 | 98 | 98 | 98 | 98 | 96 | 93 | 85 | 76 | 65 | 70 | 64 | 60 | 58 | 59 | 68 | 88 | 94 | 96 | 97 | 97 | 97 | 85.3 | 98 |
| 24-Sep | 97 | 96 | 94 | 93 | 95 | 95 | 97 | 92 | 80 | 70 | 65 | 58 | 55 | 51 | 50 | 52 | 56 | 58 | 64 | 68 | 70 | 72 | 78 | 81 | 74.4 | 97 |
| 25-Sep | 86 | 90 | 85 | 88 | 87 | 87 | 85 | 84 | 82 | 79 | 72 | 65 | 57 | 52 | 52 | 53 | 52 | 51 | 64 | 75 | 80 | 87 | 88 | 78 | 74.1 | 90 |
| 26-Sep | 78 | 78 | 81 | 84 | 75 | 75 | 79 | 79 | 70 | 65 | 59 | 53 | 46 | 41 | 40 | 40 | 41 | 44 | 73 | 88 | 93 | 93 | 89 | 86 | 68.7 | 93 |
| 27-Sep | 81 | 75 | 77 | 71 | 82 | 80 | 80 | 76 | 73 | 66 | 62 | 59 | 54 | 52 | 51 | 43 | 48 | 68 | 83 | 91 | 95 | 96 | 97 | 96 | 73.1 | 97 |
| 28-Sep | 97 | 97 | 96 | 97 | 97 | 97 | 97 | 93 | 79 | 65 | 56 | 50 | 47 | 46 | 46 | 48 | 49 | 54 | 63 | 76 | 79 | 69 | 63 | 76 | 72.4 | 97 |
| 29-Sep | 70 | 67 | 66 | 67 | 70 | 78 | 90 | 82 | 59 | 48 | 41 | 36 | 33 | 31 | 30 | 31 | 32 | 37 | 52 | 75 | 82 | 86 | 91 | 92 | 60.2 | 92 |
| 30-Sep | 94 | 94 | 96 | 97 | 95 | 96 | 96 | 90 | 72 | 58 | 54 | 51 | 48 | 48 | 48 | 50 | 53 | 59 | 62 | 64 | 65 | 65 | 66 | 68 | 70.4 | 97 |
| | 85.0 | 84.7 | 85.0 | 85.5 | 86.3 | 87.8 | 87.6 | 82.6 | 73.7 | 65.1 | 58.6 | 54.5 | 52.2 | 50.0 | 49.8 | 50.3 | 52.7 | 56.9 | 66.8 | 77.1 | 80.8 | 81.7 | 83.5 | 85.3 | Diurnal Average | |
| | 98 | 97 | 98 | 98 | 98 | 98 | 98 | 97 | 97 | 97 | 95 | 94 | 94 | 96 | 97 | 97 | 96 | 97 | 97 | 97 | 98 | 98 | 98 | 98 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Conklin - September 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Conklin - September 2017

| | | |
|--|---|--------------------------------|
| Maximum Speed: 18 km/h on Sep 29 14:00 | Maximum Daily Speed Average: 11.5 km/h on Sep 10 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 9 07:00 | Minimum Daily Speed Average: 1.1 km/h on Sep 27 | Hours of Data: 715 |
| Maximum Diurnal Speed Average: 3.3 km/h at hour 11 | Minimum Diurnal Speed Average: 0.8 km/h at hour 19 | Hours of Missing Data: 5 |
| Monthly Average Velocity: 2.0 km/h 241.2 deg | Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 3 Median = 6 Q ₃ = 10 P ₉₀ = 12 P ₉₉ = 17 | 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-Sep | WNW9 | WNW9 | WNW8 | WNW8 | W10 | W9WSW10 | WSW12 | W14WSW13 | W14WNW13 | WNW13 | WNW12 | W14 | W12 | W12 | WNW9 | W8 | W8WSW11 | WSW10 | SW9 | SW9 | | | | | | | W10.2 | W14 |
| 2-Sep | WSW12 | WNW12 | W12 | W9 | WSW8 | SW8 | W10 | W8 | WNW6 | W8 | WSW8 | WSW9 | WNW6 | NW6 | NW6 | W5WSW10 | WSW8 | WSW5 | WSW5 | WNW6 | WNW5 | NW3 | WNW4 | | | W6.8 | WNW12 | |
| 3-Sep | WNW6 | WNW5 | WNW6 | WNW5 | WNW6 | NW5 | WNW4 | NW6 | NW6 | WNW7 | NW9 | NW9 | NW10 | NW10 | NW12 | WNW8 | NW11 | NW7 | W2 | WNW3 | NNW5 | NW2 | NW3 | | | NW6.5 | NW12 | |
| 4-Sep | NW4 | NW4 | NNW4 | NNW5 | NW3 | NNW3 | NNW5 | NW7 | NW6 | NW7 | NW7 | NNW9 | NNW11 | NW9 | NW9 | NW9 | NW9 | NW5 | AF | S2 | SSW3 | S4 | S3 | S4 | | NW4.4 | NNW11 | |
| 5-Sep | S3 | S6 | S7 | S6 | S5 | S5 | S4 | S3 | WSW5 | W7WSW10 | SW12 | WSW12 | WSW12 | WSW12 | WSW10 | WSW9 | WSW7 | SW4 | SSW4 | SSW6 | SSW6 | S6 | S4 | | | SW6.1 | WSW12 | |
| 6-Sep | S4 | S4 | S4 | SSW5 | SSW3 | SSW2 | S3 | S4 | SW1 | NNW3 | NNW4 | W2 | NNE2 | NW1 | ESE1 | WNW1 | ESE3 | SE3 | S0 | SW1 | S3 | SSE3 | SSE4 | S4 | | S1.6 | SSW5 | |
| 7-Sep | SSE4 | S3 | SSE3 | S3 | S2 | SSE3 | SE4 | SSE4 | SE3 | S6 | S12 | S14 | S14 | SSW13 | S13 | S13 | S12 | S11 | SSE8 | SSE4 | SSW3 | S6 | NW2 | NNW2 | | S6.3 | S14 | |
| 8-Sep | SSW5 | SSW8 | S7 | S9 | SSW7 | SE1 | SSE6 | SSE2 | NW5 | SSW7 | WSW7 | S4 | SE4 | NW1 | N3 | NNE5 | NNW6 | NNW7 | N4 | NNW3 | NNW4 | NNW4 | N2 | NW1 | | SW1.2 | S9 | |
| 9-Sep | NNW2 | NW1 | N4 | NNW5 | NNW4 | WNW1 | WSW0 | NW3 | N5 | NNE5 | E6 | ENE6 | NE7 | ENE4 | N5 | NW4 | NW5 | NNW3 | NW1 | NE0 | NNW3 | NW2 | SSW2 | SW2 | | N2.1 | NE7 | |
| 10-Sep | WSW5 | WNW4 | W5 | W7 | W10 | W13 | W13 | W13 | WSW14 | W14 | W16 | W16 | WNW17 | WNW16 | WNW15 | WNW15 | W14 | W14 | W11 | WSW10 | SW8 | WSW12 | WSW13 | WSW12 | | W11.5 | WNW17 | |
| 11-Sep | SW9 | SW10 | SW10 | SW8 | SW10 | SW10 | SW9 | SSW7 | SSW7 | S6 | S10 | SSW11 | SW12 | SW13 | WSW9 | WSW8 | W7 | WSW8 | SW3 | SW6 | SW8 | WSW11 | WSW10 | WSW10 | | SW8.3 | SW13 | |
| 12-Sep | W10 | W9 | W10 | W11 | WNW9 | WNW8 | W10 | W13 | WNW10 | NW9 | NW10 | NW10 | WNW11 | NW10 | NNW12 | NNW10 | NNW9 | NNW8 | NNW8 | NW1 | SW0 | W0 | WSW1 | W0 | | WNW7.0 | W13 | |
| 13-Sep | SSW1 | W1 | NNW3 | NW1 | NNW3 | NNW2 | NNW5 | N3 | NNE6 | NNE9 | NNE8 | NNE7 | N8 | N7 | N7 | NNE5 | NE5 | NE3 | E1 | AF | S2 | S3 | S3 | SSW3 | | N2.7 | NNE9 | |
| 14-Sep | SSW3 | WNW1 | SSW1 | WNW1 | NW0 | SW0 | S1 | SSE2 | S4 | SW6 | SSW6 | WSW4 | ESE6 | E1 | WNW3 | NW4 | WNW3 | WNW4 | WNW1 | WSW0 | SSW1 | SSW2 | S3 | SSW2 | | SW1.3 | SW6 | |
| 15-Sep | SSW2 | SSW2 | SSW2 | S2 | S3 | S3 | S4 | S5 | SSE5 | SSE4 | S4 | SE7 | SSE7 | ESE6 | ESE6 | SSE5 | SSW4 | ESE2 | SW1 | SSE4 | S4 | SSE5 | S5 | SSE4 | | SSE3.7 | SE7 | |
| 16-Sep | SSE5 | S5 | SSW6 | S5 | SSE5 | SSE6 | S5 | S5 | SSE3 | S11 | S15 | S14 | S12 | S12 | S11 | S11 | S11 | S7 | SSE6 | S1 | NW1 | NW1 | NW2 | NNW1 | | S6.2 | S15 | |
| 17-Sep | AF | SSW2 | S2 | S2 | S2 | SSW1 | SE1 | SSW2 | SSE5 | SSE12 | S18 | S17 | SSE17 | SSE16 | S15 | S15 | SSE13 | SSE12 | SSE7 | SSE7 | SSE8 | SSE5 | WSW1 | NNW3 | | SSE7.4 | S18 | |
| 18-Sep | NW2 | SSW2 | S2 | WNW1 | WNW1 | SSW2 | SW1 | S3 | SE7 | SE13 | SE17 | SE18 | SE16 | SE16 | ESE13 | ESE12 | ESE11 | ESE10 | ESE7 | E5 | NE4 | N4 | N5 | NNW4 | | ESE5.6 | SE18 | |
| 19-Sep | NNW5 | NNW5 | NNW6 | N7 | N8 | N7 | N6 | NNE6 | ENE9 | ENE10 | E9 | E10 | ENE8 | ENE7 | NE6 | NE9 | ENE9 | ENE10 | E12 | ESE13 | E9 | ENE10 | ENE10 | ENE10 | | ENE6.6 | ESE13 | |
| 20-Sep | ENE8 | NE9 | NE10 | NNE8 | NNE8 | NNE9 | NNE10 | N9 | N8 | N10 | N12 | N13 | N14 | N12 | N11 | N13 | N12 | N10 | N11 | N14 | N14 | N12 | N13 | N14 | | N10.6 | N14 | |
| 21-Sep | N13 | N12 | N11 | N10 | N9 | NNW9 | NNW10 | N11 | N12 | N12 | N12 | N14 | N14 | N11 | N12 | N13 | N11 | NNW11 | NNW8 | NNW10 | NNW8 | NNW7 | NW4 | NNW6 | | N10.3 | N14 | |
| 22-Sep | NNW4 | NW4 | NNW4 | NNW5 | NW4 | NNW3 | WNW1 | NNW3 | NNW4 | NW3 | NW3 | N4 | NE4 | NE1 | SE6 | ENE5 | ESE2 | E4 | ESE3 | SSW1 | SW2 | SE2 | S1 | SSW1 | | N1.2 | SE6 | |
| 23-Sep | SW3 | SW2 | S0 | SSE3 | S2 | S2 | WSW2 | S2 | SSW3 | SSE6 | S8 | S8 | SW8 | WSW7 | SW7 | WSW7 | SSW6 | S4 | AF | SW1 | SSW2 | SSW4 | S3 | S3 | | SSW3.6 | SW8 | |
| 24-Sep | SSW4 | SSW5 | SSW4 | S5 | SSW5 | S4 | S5 | SSW3 | S6 | S12 | S9 | S8 | S10 | S13 | SSW11 | SSW11 | S11 | S11 | S8 | S6 | SSW5 | SSW4 | SSE3 | SE3 | | S6.7 | S13 | |
| 25-Sep | SE5 | SSE5 | SSE6 | SSE5 | SSE4 | SSE6 | S7 | SSW8 | SSW10 | SW10 | SW9 | SW10 | SW11 | SW11 | SW11 | SW6 | WSW6 | WSW10 | SW4 | SSW6 | SSW6 | SSW6 | SSW6 | SW8 | | SSW6.5 | SW11 | |
| 26-Sep | SW7 | SW8 | SW9 | SW6 | W8 | W6 | NW6 | WNW5 | WNW6 | NW8 | NW7 | WNW7 | WNW7 | WNW9 | WNW8 | NW11 | NW9 | WNW3 | SSW1 | SSW2 | S3 | S2 | S3 | S3 | | W4.3 | NW11 | |
| 27-Sep | S4 | SSW4 | SSW4 | SSW6 | S5 | S3 | SSW5 | SSW4 | SW4 | WNW4 | NW5 | NW6 | NW6 | NNW8 | N10 | NE6 | NE4 | NNW0 | AF | WNW1 | SSW0 | SW1 | SSW1 | S1 | | W1.1 | N10 | |
| 28-Sep | SW1 | SSW2 | SSW1 | S2 | SSW3 | SSW2 | S3 | SSE3 | SE4 | SSE8 | S13 | S13 | S14 | S14 | S13 | S15 | S12 | SSE10 | SSE7 | SSE5 | SSE6 | SSE9 | SSE9 | SSE2 | | S6.7 | S15 | |
| 29-Sep | SSE8 | SSE9 | SSE10 | S10 | SSE7 | SE5 | SE3 | SE6 | SSE8 | S14 | S15 | S17 | S16 | S18 | S16 | S14 | S13 | SSE9 | SSE4 | NW1 | NNW4 | NW1 | SSE1 | S3 | | S8.1 | S18 | |
| 30-Sep | S2 | SSE4 | W1 | S2 | SSE3 | S3 | SSE3 | SSE5 | WNW2 | WNW5 | WNW6 | WNW7 | W8 | WNW8 | WNW8 | WNW8 | WNW5 | W4 | WNW7 | NW6 | WNW6 | NW6 | NW7 | NW8 | | WNW3.6 | WNW8 | |

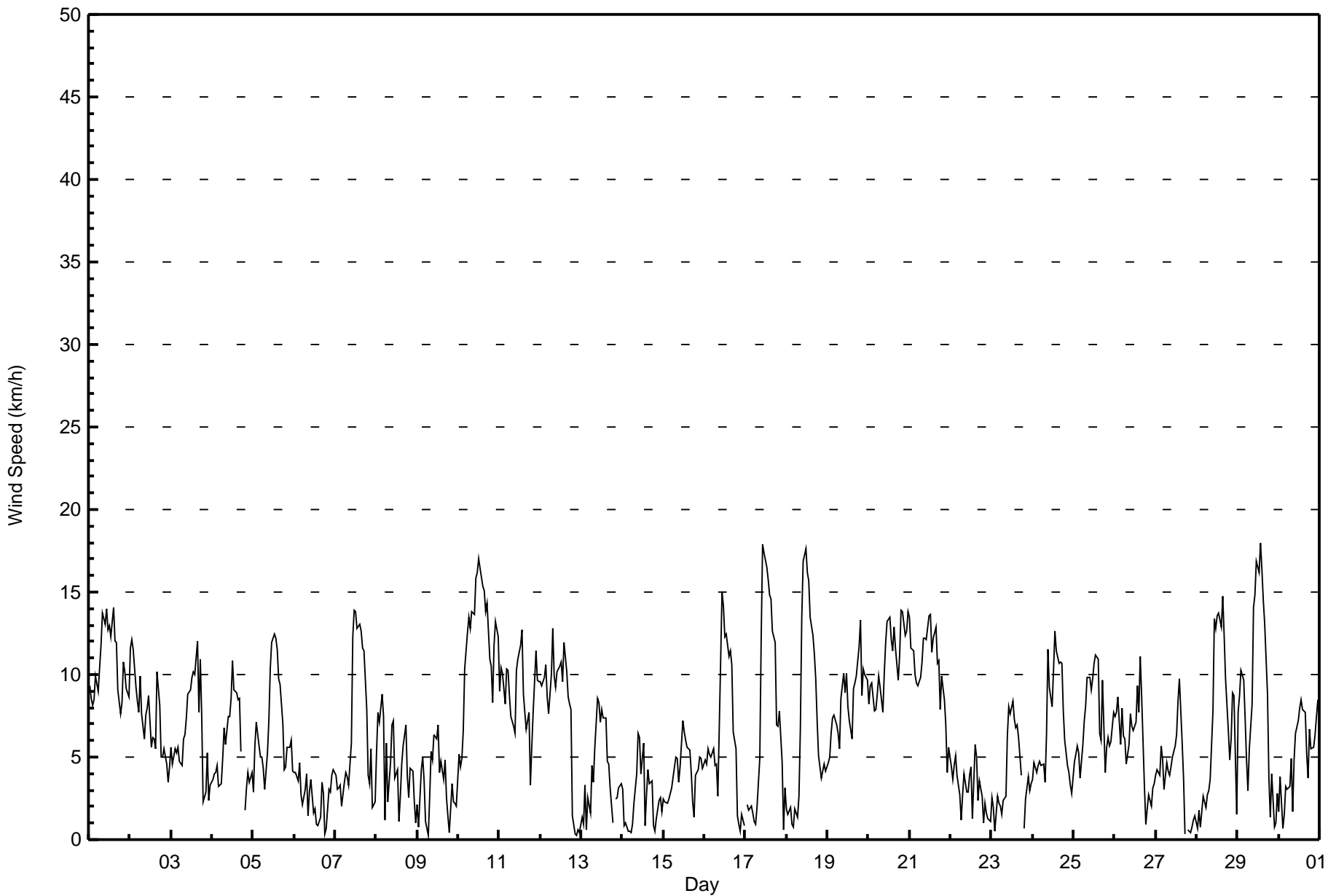
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------|-------|-------|-------------------|------------------|-------|-------------|-------|-------------|------|-------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-------|-----|--|-----------------|--|--|--|--|--|--|--|--|--|--|--|--|-----------------|
| WSW2.1WSW2.1WSW2.1WSW2.2WSW2.1WSW1.8WSW2.1WSW2.2WSW1.9 | SW2.4 | SW3.3 | SW2.9 | SW2.6WSW3.1WSW2.9 | W2.5WSW2.1WSW1.4 | SW0.8 | SW1.1WSW1.4 | SW1.6 | SW1.5WSW1.4 | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | |
| N13WNW12 | W12 | W11 | SW10 | W13 | W13 | W13 | WSW14 | S14 | S18 | SE18 | WNW17 | S18 | S16 | WNW15 | W14 | W14 | E12 | N14 | N14 | N12 | WSW13 | N14 | | | | | | | | | | | | | | | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Conklin - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 326 | 45.59 | 45.59 |
| 6 - 11 | 285 | 39.86 | 85.45 |
| 12 - 19 | 104 | 14.55 | 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: 715

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 10 | 4 | 7 | 2 | 4 | 5 | 11 | 35 | 70 | 49 | 17 | 10 | 9 | 25 | 35 | 33 | 326 |
| 6 - 11 | 20 | 9 | 6 | 11 | 4 | 6 | 4 | 23 | 28 | 20 | 28 | 24 | 21 | 29 | 35 | 17 | 285 |
| 12 - 19 | 20 | 0 | 0 | 0 | 1 | 3 | 5 | 5 | 31 | 1 | 3 | 10 | 15 | 8 | 1 | 1 | 104 |
| 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 | 50 | 13 | 13 | 13 | 9 | 14 | 20 | 63 | 129 | 70 | 48 | 44 | 45 | 62 | 71 | 51 | 715 |

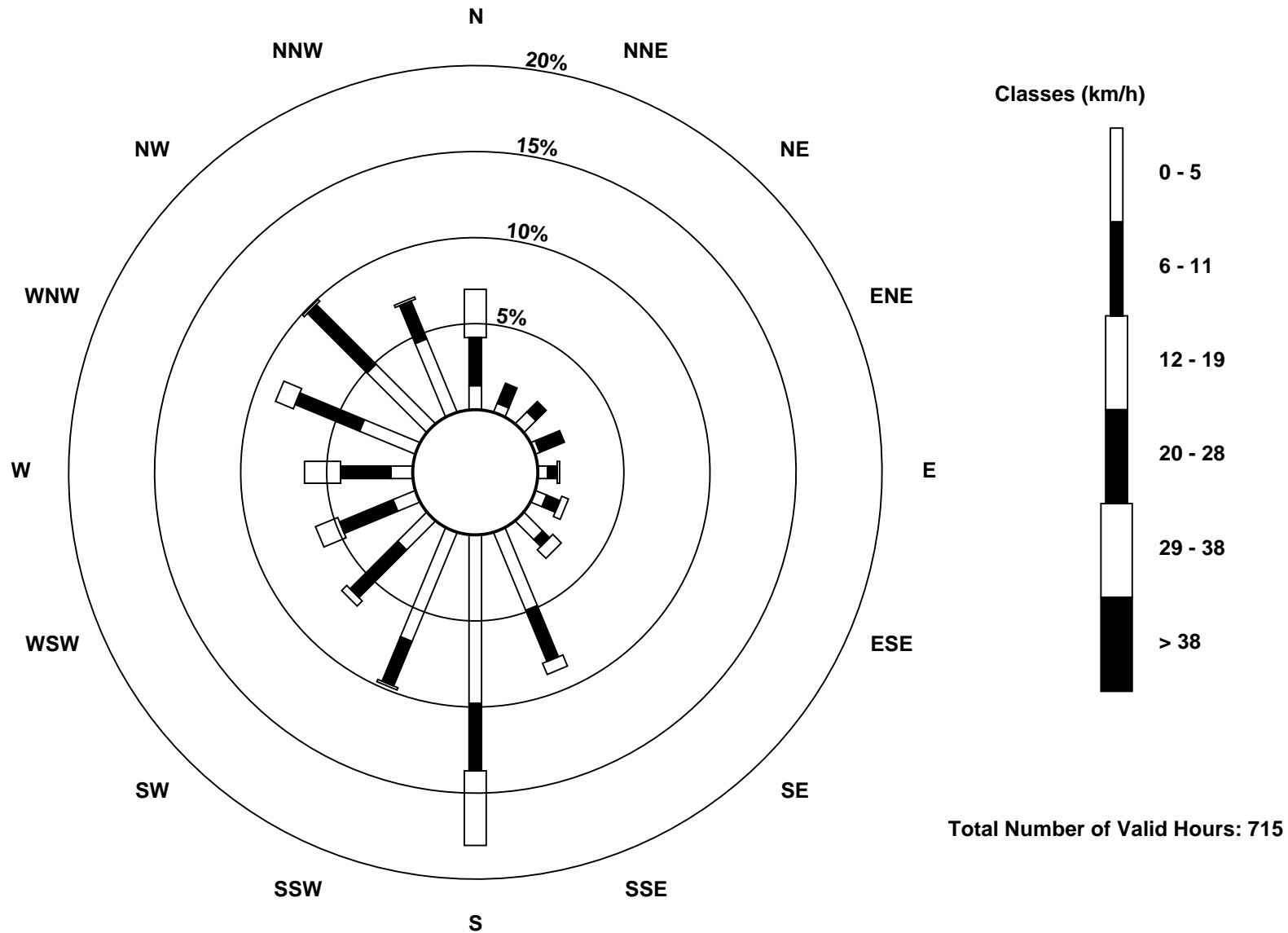
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Conklin (AMS 21)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Conklin - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 7 km/h on Sep 10 13:00 | Hours of Data: 715 |
| Minimum Value: 0 km/h on Sep 28 08:00 | Hours of Missing Data: 5 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6 | 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-Sep | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 6 | 6 | 6 | 6 | 6 | 5 | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 6 |
| 2-Sep | 5 | 5 | 4 | 4 | 3 | 3 | 4 | 4 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 5 |
| 3-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 5 | 6 | 3 | 5 | 4 | 1 | 1 | 3 | 1 | 1 | 6 |
| 4-Sep | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | AF | 1 | 1 | 1 | 1 | 4 |
| 5-Sep | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 6-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 7-Sep | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 5 |
| 8-Sep | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 3 |
| 9-Sep | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 10-Sep | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 4 | 4 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 3 | 3 | 2 | 4 | 3 | 3 | 7 |
| 11-Sep | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 1 | 2 | 2 | 4 | 3 | 3 | 4 |
| 12-Sep | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 5 |
| 13-Sep | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | AF | 1 | 1 | 1 | 1 | 3 |
| 14-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 16-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 4 |
| 17-Sep | AF | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 1 | 1 | 2 | 1 | 1 | 1 | 5 |
| 18-Sep | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 5 |
| 19-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 4 | 4 | 4 | 5 | 5 | 3 | 4 | 4 | 4 | 5 |
| 20-Sep | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 5 | 4 | 4 | 4 | 4 | 5 |
| 21-Sep | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 2 | 3 | 3 | 2 | 2 | 1 | 4 |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 23-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | AF | 1 | 2 | 1 | 1 | 1 | 3 |
| 24-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 2 | 2 | 1 | 2 | 2 | 2 | 4 |
| 25-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 4 |
| 26-Sep | 2 | 2 | 3 | 2 | 4 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 4 | 4 | 5 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 5 |
| 27-Sep | 2 | 2 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 1 | 1 | AF | 1 | 1 | 1 | 1 | 1 | 3 |
| 28-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 1 | 1 | 1 | 3 | 3 | 2 | 4 |
| 29-Sep | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 5 |
| 30-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 3 | 3 |

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Conklin - September 2017

| | |
|---|--------------------------------|
| Direction of Maximum Speed: 185 deg on Sep 29 14:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 267.8 deg on Sep 10 | Hours of Data: 715 |
| Direction of Minimum Speed: 250 deg on Sep 9 07:00 | Hours of Missing Data: 5 |
| Direction of Minimum Daily Speed Average: 1.1 deg on Sep 27 | Percent Operational Time: 99.3 |
| Monthly Average Direction: 262.6 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-Sep | 288 | 292 | 293 | 294 | 281 | 271 | 255 | 257 | 261 | 254 | 260 | 286 | 285 | 286 | 261 | 269 | 274 | 283 | 274 | 267 | 254 | 243 | 227 | 226 | 268.1 |
| 2-Sep | 257 | 282 | 278 | 274 | 243 | 235 | 272 | 274 | 291 | 265 | 257 | 250 | 299 | 305 | 322 | 270 | 245 | 239 | 237 | 242 | 299 | 291 | 310 | 300 | 269.3 |
| 3-Sep | 282 | 295 | 297 | 294 | 298 | 312 | 296 | 307 | 306 | 299 | 310 | 312 | 305 | 305 | 309 | 310 | 296 | 317 | 317 | 280 | 298 | 330 | 314 | 320 | 305.8 |
| 4-Sep | 322 | 324 | 328 | 340 | 325 | 340 | 327 | 319 | 308 | 315 | 312 | 325 | 328 | 322 | 324 | 309 | 320 | 326 | AF | 189 | 192 | 174 | 174 | 187 | 315.8 |
| 5-Sep | 179 | 187 | 190 | 189 | 182 | 179 | 177 | 188 | 238 | 266 | 240 | 225 | 239 | 239 | 245 | 257 | 240 | 238 | 224 | 200 | 199 | 196 | 190 | 186 | 220.9 |
| 6-Sep | 173 | 169 | 170 | 192 | 194 | 199 | 184 | 190 | 224 | 327 | 329 | 278 | 24 | 316 | 113 | 283 | 120 | 137 | 190 | 219 | 187 | 167 | 166 | 175 | 182.6 |
| 7-Sep | 165 | 169 | 161 | 190 | 177 | 152 | 145 | 148 | 136 | 174 | 179 | 184 | 188 | 193 | 191 | 186 | 177 | 174 | 161 | 161 | 202 | 181 | 310 | 332 | 178.6 |
| 8-Sep | 198 | 196 | 189 | 190 | 192 | 144 | 160 | 153 | 314 | 212 | 242 | 177 | 130 | 316 | 8 | 17 | 338 | 348 | 353 | 346 | 342 | 348 | 353 | 320 | 227.8 |
| 9-Sep | 335 | 305 | 350 | 337 | 340 | 294 | 250 | 324 | 351 | 26 | 95 | 64 | 53 | 72 | 350 | 324 | 324 | 334 | 316 | 45 | 336 | 312 | 211 | 221 | 1.3 |
| 10-Sep | 238 | 297 | 280 | 278 | 273 | 266 | 267 | 268 | 258 | 268 | 277 | 278 | 282 | 283 | 290 | 290 | 277 | 266 | 259 | 246 | 224 | 239 | 245 | 243 | 267.8 |
| 11-Sep | 234 | 232 | 232 | 214 | 225 | 218 | 214 | 201 | 195 | 173 | 187 | 200 | 226 | 226 | 258 | 240 | 260 | 241 | 217 | 229 | 231 | 246 | 246 | 240 | 225.2 |
| 12-Sep | 270 | 271 | 272 | 273 | 285 | 282 | 263 | 268 | 285 | 307 | 312 | 307 | 294 | 308 | 327 | 329 | 341 | 347 | 347 | 306 | 224 | 267 | 251 | 273 | 297.5 |
| 13-Sep | 203 | 260 | 335 | 304 | 337 | 335 | 346 | 355 | 18 | 16 | 24 | 18 | 8 | 349 | 354 | 23 | 40 | 55 | 87 | AF | 187 | 184 | 187 | 194 | 8.1 |
| 14-Sep | 197 | 282 | 206 | 282 | 309 | 221 | 182 | 155 | 187 | 223 | 207 | 254 | 114 | 97 | 302 | 324 | 303 | 291 | 290 | 249 | 198 | 207 | 177 | 210 | 223.3 |
| 15-Sep | 202 | 192 | 202 | 190 | 184 | 173 | 182 | 183 | 167 | 156 | 169 | 134 | 148 | 109 | 116 | 159 | 197 | 123 | 235 | 166 | 172 | 165 | 171 | 154 | 162.4 |
| 16-Sep | 158 | 186 | 193 | 188 | 156 | 157 | 169 | 186 | 151 | 178 | 173 | 173 | 182 | 187 | 181 | 181 | 174 | 172 | 166 | 173 | 315 | 309 | 305 | 327 | 177.2 |
| 17-Sep | AF | 201 | 170 | 170 | 185 | 196 | 143 | 199 | 167 | 159 | 170 | 169 | 165 | 166 | 179 | 169 | 165 | 147 | 151 | 159 | 156 | 161 | 241 | 329 | 166.4 |
| 18-Sep | 323 | 202 | 181 | 283 | 286 | 192 | 215 | 180 | 134 | 138 | 137 | 137 | 126 | 129 | 118 | 117 | 117 | 108 | 105 | 88 | 39 | 351 | 0 | 340 | 122.9 |
| 19-Sep | 334 | 328 | 347 | 352 | 357 | 356 | 357 | 12 | 61 | 71 | 82 | 86 | 77 | 68 | 35 | 49 | 59 | 78 | 80 | 113 | 80 | 70 | 73 | 71 | 56.4 |
| 20-Sep | 73 | 37 | 35 | 29 | 23 | 16 | 12 | 6 | 358 | 5 | 6 | 6 | 4 | 1 | 359 | 359 | 360 | 2 | 360 | 4 | 6 | 5 | 360 | 5 | 9.2 |
| 21-Sep | 358 | 359 | 359 | 355 | 350 | 348 | 346 | 350 | 356 | 358 | 5 | 359 | 359 | 355 | 352 | 357 | 354 | 346 | 333 | 343 | 340 | 337 | 324 | 336 | 352.2 |
| 22-Sep | 327 | 323 | 329 | 328 | 323 | 329 | 301 | 338 | 342 | 322 | 322 | 354 | 39 | 50 | 140 | 74 | 118 | 89 | 122 | 209 | 224 | 140 | 180 | 210 | 356.0 |
| 23-Sep | 216 | 218 | 182 | 152 | 172 | 186 | 238 | 182 | 194 | 167 | 182 | 171 | 223 | 244 | 225 | 243 | 198 | 170 | AF | 223 | 202 | 197 | 178 | 178 | 199.6 |
| 24-Sep | 198 | 197 | 197 | 189 | 198 | 190 | 187 | 203 | 187 | 188 | 188 | 181 | 185 | 175 | 198 | 200 | 176 | 178 | 175 | 180 | 198 | 201 | 159 | 135 | 186.1 |
| 25-Sep | 145 | 154 | 165 | 164 | 158 | 162 | 189 | 202 | 205 | 217 | 233 | 224 | 220 | 224 | 228 | 231 | 244 | 250 | 228 | 208 | 205 | 201 | 200 | 226 | 209.7 |
| 26-Sep | 216 | 225 | 232 | 226 | 259 | 278 | 313 | 296 | 300 | 312 | 306 | 302 | 300 | 303 | 290 | 322 | 321 | 291 | 212 | 196 | 180 | 182 | 183 | 180 | 277.9 |
| 27-Sep | 187 | 193 | 192 | 211 | 172 | 181 | 196 | 209 | 226 | 293 | 310 | 315 | 317 | 338 | 355 | 41 | 49 | 335 | AF | 301 | 208 | 232 | 204 | 188 | 269.7 |
| 28-Sep | 221 | 204 | 203 | 188 | 196 | 201 | 177 | 162 | 138 | 162 | 177 | 188 | 184 | 186 | 185 | 179 | 174 | 164 | 157 | 148 | 154 | 160 | 160 | 152 | 174.1 |
| 29-Sep | 158 | 158 | 167 | 176 | 158 | 144 | 146 | 141 | 163 | 177 | 178 | 182 | 175 | 185 | 181 | 191 | 179 | 163 | 152 | 315 | 332 | 308 | 168 | 173 | 173.7 |
| 30-Sep | 191 | 151 | 268 | 189 | 166 | 174 | 151 | 150 | 302 | 287 | 285 | 284 | 281 | 284 | 303 | 300 | 301 | 276 | 283 | 304 | 302 | 309 | 316 | 320 | 286.3 |

238.4 241.4 251.1 246.2 249.1 245.9 248.0 250.1 258.1 232.3 220.9 221.4 233.5 243.5 257.8 262.9 244.5 236.4 231.0 219.6 238.9 232.9 226.3 247.1

Diurnal Average

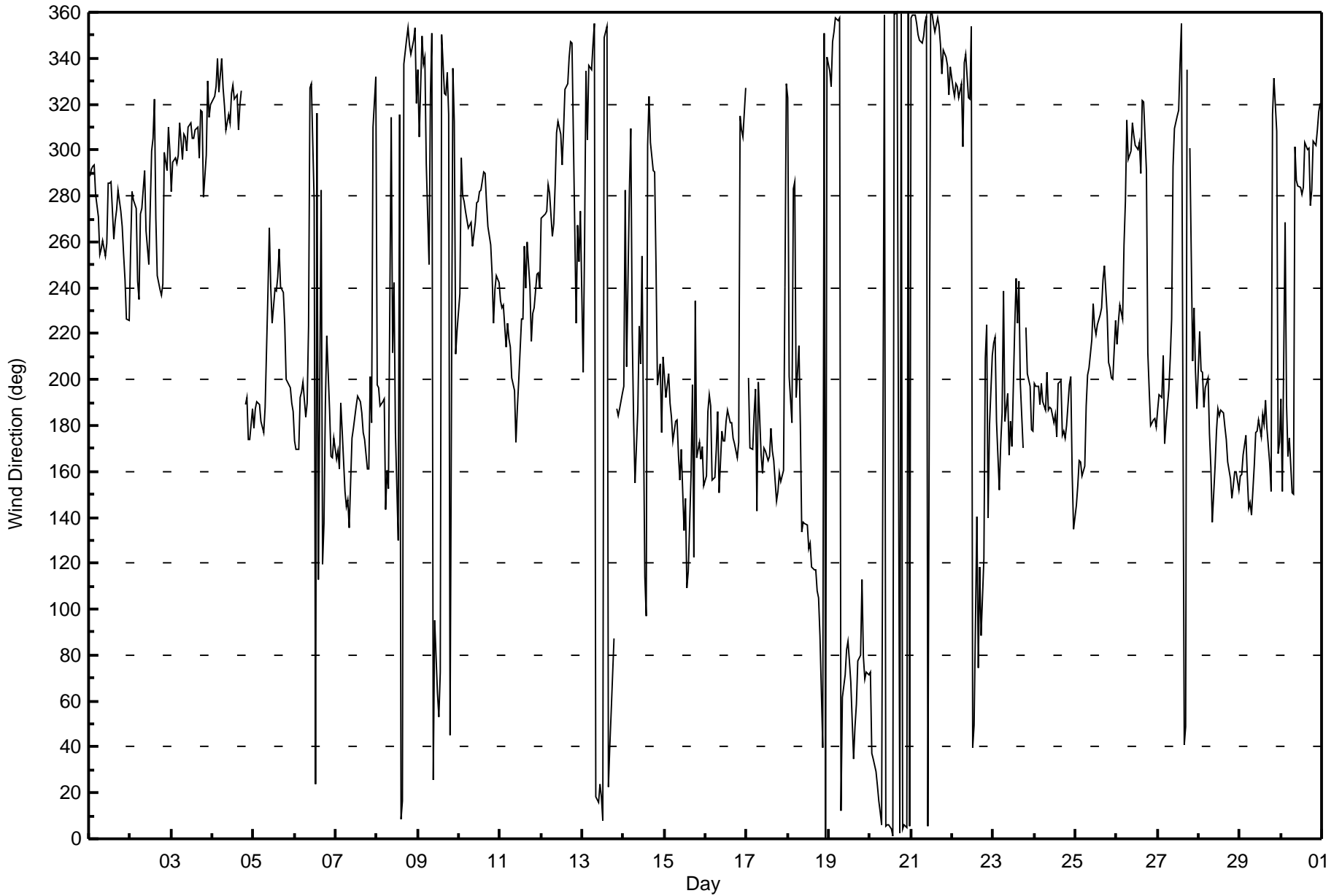
AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Conklin - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Conklin - September 2017

| | |
|---|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 103 deg on Sep 6 14:00 | Hours of Data: 715 |
| Minimum Value: 8 deg on Sep 29 21:00 | Hours of Missing Data: 5 |
| Percentiles: P ₁ = 11 P ₁₀ = 18 Q ₁ = 22 Median = 30 Q ₃ = 44 P ₉₀ = 59 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-Sep | 46 | 47 | 52 | 47 | 46 | 38 | 31 | 30 | 25 | 24 | 31 | 45 | 41 | 43 | 30 | 38 | 40 | 42 | 38 | 28 | 20 | 20 | 25 | 22 | 52 |
| 2-Sep | 35 | 40 | 39 | 38 | 37 | 34 | 36 | 53 | 54 | 41 | 30 | 29 | 47 | 44 | 36 | 48 | 15 | 23 | 23 | 24 | 47 | 55 | 42 | 54 | 55 |
| 3-Sep | 41 | 46 | 47 | 46 | 54 | 49 | 56 | 47 | 44 | 44 | 44 | 43 | 46 | 45 | 43 | 42 | 45 | 37 | 44 | 57 | 47 | 38 | 38 | 39 | 57 |
| 4-Sep | 31 | 37 | 49 | 27 | 47 | 27 | 29 | 28 | 44 | 38 | 47 | 41 | 33 | 43 | 39 | 43 | 34 | 31 | AF | 64 | 15 | 20 | 27 | 27 | 64 |
| 5-Sep | 28 | 16 | 16 | 18 | 21 | 22 | 26 | 51 | 39 | 30 | 26 | 27 | 34 | 34 | 30 | 35 | 27 | 20 | 25 | 10 | 12 | 14 | 15 | 18 | 51 |
| 6-Sep | 19 | 19 | 19 | 14 | 49 | 49 | 33 | 22 | 69 | 55 | 41 | 83 | 97 | 103 | 102 | 85 | 51 | 36 | 83 | 59 | 19 | 17 | 9 | 19 | 103 |
| 7-Sep | 16 | 16 | 19 | 26 | 24 | 12 | 17 | 20 | 25 | 54 | 23 | 24 | 25 | 26 | 26 | 22 | 19 | 17 | 23 | 24 | 29 | 69 | 53 | 69 | |
| 8-Sep | 21 | 20 | 18 | 18 | 51 | 87 | 26 | 82 | 55 | 30 | 30 | 48 | 30 | 92 | 59 | 47 | 27 | 20 | 42 | 59 | 23 | 15 | 57 | 70 | 92 |
| 9-Sep | 40 | 76 | 27 | 26 | 51 | 79 | 84 | 50 | 25 | 51 | 47 | 41 | 49 | 49 | 24 | 16 | 26 | 87 | 51 | 99 | 19 | 38 | 68 | 52 | 99 |
| 10-Sep | 25 | 41 | 49 | 38 | 34 | 28 | 29 | 30 | 24 | 35 | 41 | 36 | 41 | 40 | 43 | 42 | 40 | 31 | 24 | 19 | 20 | 21 | 19 | 19 | 49 |
| 11-Sep | 21 | 21 | 18 | 20 | 23 | 21 | 22 | 21 | 19 | 26 | 28 | 28 | 26 | 27 | 39 | 38 | 38 | 20 | 34 | 20 | 20 | 21 | 22 | 18 | 39 |
| 12-Sep | 40 | 33 | 30 | 38 | 49 | 40 | 24 | 33 | 45 | 45 | 39 | 41 | 43 | 43 | 31 | 31 | 23 | 21 | 16 | 51 | 70 | 62 | 76 | 78 | 78 |
| 13-Sep | 55 | 70 | 46 | 87 | 65 | 63 | 17 | 28 | 30 | 27 | 30 | 34 | 31 | 34 | 40 | 66 | 44 | 56 | 89 | AF | 19 | 34 | 27 | 32 | 89 |
| 14-Sep | 68 | 78 | 70 | 59 | 57 | 75 | 82 | 44 | 26 | 36 | 44 | 88 | 44 | 102 | 85 | 73 | 60 | 46 | 52 | 92 | 72 | 19 | 29 | 66 | 102 |
| 15-Sep | 25 | 27 | 42 | 28 | 25 | 24 | 16 | 15 | 15 | 52 | 68 | 37 | 47 | 54 | 57 | 39 | 32 | 66 | 41 | 16 | 14 | 12 | 16 | 17 | 68 |
| 16-Sep | 17 | 15 | 11 | 13 | 16 | 16 | 16 | 22 | 53 | 23 | 23 | 23 | 31 | 28 | 30 | 25 | 22 | 19 | 13 | 66 | 23 | 36 | 28 | 54 | 66 |
| 17-Sep | AF | 38 | 28 | 27 | 38 | 40 | 43 | 38 | 71 | 23 | 23 | 21 | 24 | 26 | 26 | 26 | 21 | 18 | 15 | 13 | 13 | 14 | 55 | 15 | 71 |
| 18-Sep | 55 | 40 | 35 | 76 | 61 | 34 | 37 | 42 | 25 | 20 | 21 | 23 | 23 | 24 | 26 | 26 | 23 | 31 | 33 | 46 | 47 | 17 | 25 | 17 | 76 |
| 19-Sep | 18 | 13 | 17 | 17 | 20 | 20 | 19 | 37 | 43 | 41 | 45 | 37 | 44 | 44 | 45 | 43 | 43 | 43 | 43 | 25 | 44 | 39 | 44 | 42 | 45 |
| 20-Sep | 46 | 33 | 36 | 35 | 31 | 28 | 26 | 23 | 22 | 24 | 24 | 24 | 23 | 23 | 23 | 22 | 22 | 22 | 20 | 23 | 22 | 23 | 21 | 22 | 46 |
| 21-Sep | 21 | 21 | 20 | 20 | 19 | 19 | 18 | 19 | 20 | 21 | 23 | 22 | 22 | 23 | 20 | 21 | 20 | 20 | 20 | 20 | 20 | 18 | 21 | 17 | 23 |
| 22-Sep | 18 | 22 | 22 | 16 | 31 | 21 | 50 | 36 | 32 | 48 | 81 | 48 | 34 | 82 | 23 | 53 | 64 | 36 | 61 | 65 | 27 | 52 | 63 | 27 | 82 |
| 23-Sep | 18 | 51 | 95 | 41 | 34 | 38 | 62 | 40 | 29 | 26 | 25 | 41 | 36 | 51 | 50 | 32 | 26 | 22 | AF | 51 | 46 | 18 | 20 | 21 | 95 |
| 24-Sep | 12 | 17 | 19 | 16 | 19 | 12 | 15 | 27 | 25 | 25 | 33 | 38 | 31 | 26 | 28 | 27 | 21 | 20 | 21 | 23 | 28 | 38 | 50 | 78 | 78 |
| 25-Sep | 14 | 10 | 12 | 18 | 57 | 21 | 24 | 22 | 21 | 25 | 28 | 29 | 29 | 28 | 31 | 27 | 28 | 20 | 20 | 13 | 14 | 12 | 16 | 21 | 57 |
| 26-Sep | 20 | 21 | 20 | 22 | 37 | 49 | 39 | 57 | 51 | 40 | 45 | 42 | 44 | 42 | 49 | 34 | 30 | 38 | 57 | 32 | 16 | 35 | 22 | 18 | 57 |
| 27-Sep | 25 | 25 | 46 | 28 | 23 | 71 | 22 | 29 | 26 | 45 | 42 | 45 | 48 | 29 | 27 | 43 | 36 | 31 | AF | 30 | 68 | 60 | 53 | 19 | 71 |
| 28-Sep | 80 | 47 | 63 | 42 | 18 | 48 | 24 | 18 | 22 | 32 | 23 | 24 | 24 | 26 | 26 | 22 | 20 | 16 | 11 | 9 | 10 | 16 | 18 | 92 | 92 |
| 29-Sep | 18 | 21 | 19 | 22 | 21 | 19 | 50 | 18 | 24 | 21 | 24 | 23 | 24 | 23 | 24 | 23 | 20 | 17 | 75 | 14 | 8 | 46 | 73 | 66 | 75 |
| 30-Sep | 38 | 19 | 71 | 61 | 24 | 16 | 30 | 31 | 86 | 49 | 41 | 39 | 38 | 39 | 38 | 38 | 37 | 25 | 34 | 35 | 42 | 36 | 28 | 26 | 86 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|----|----|--|
| 80 | 78 | 95 | 87 | 65 | 87 | 84 | 82 | 86 | 55 | 81 | 88 | 97 | 103 | 102 | 85 | 64 | 87 | 89 | 99 | 72 | 62 | 76 | 92 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Summary

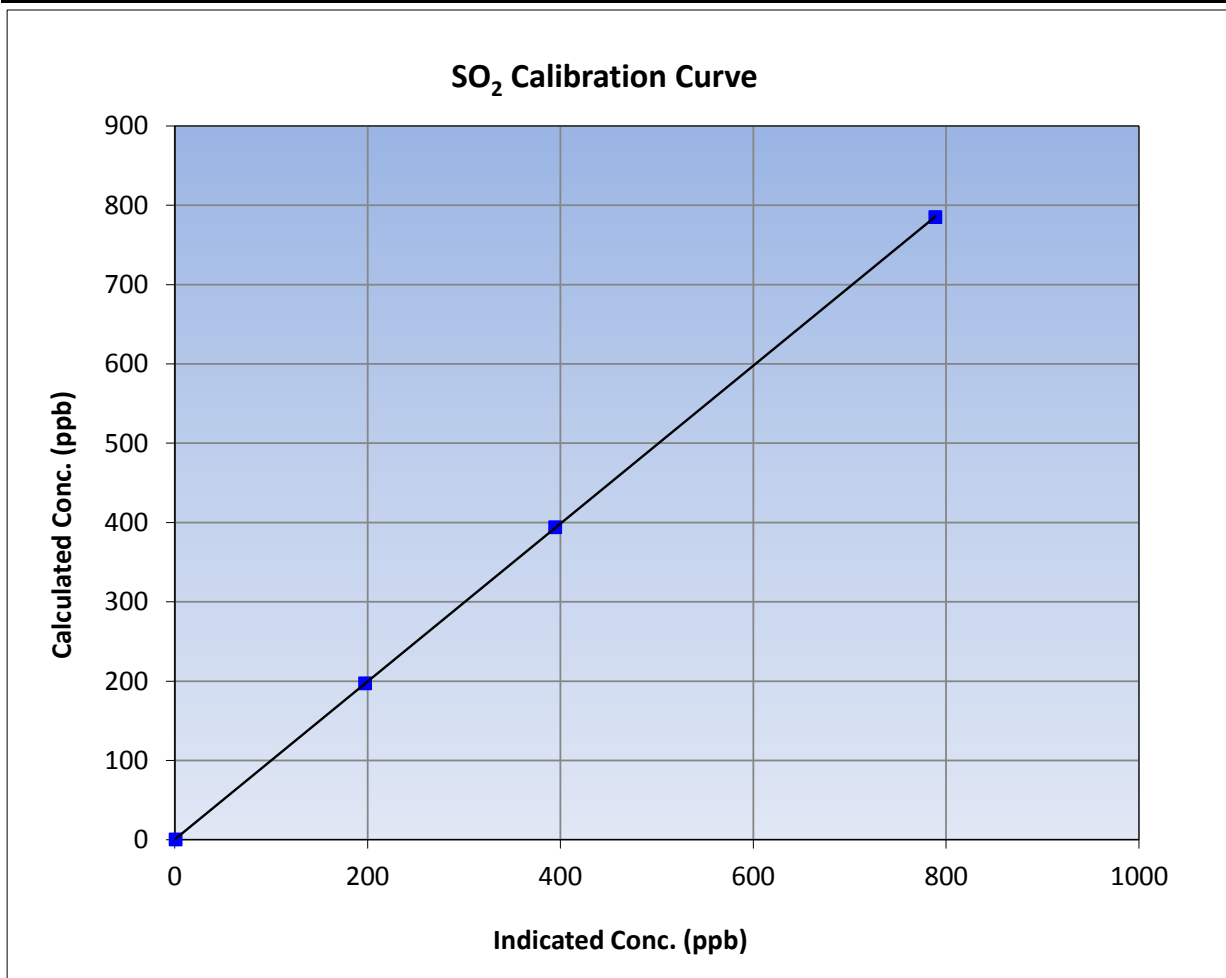
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 14:10 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1428701363 |

Calibration Data

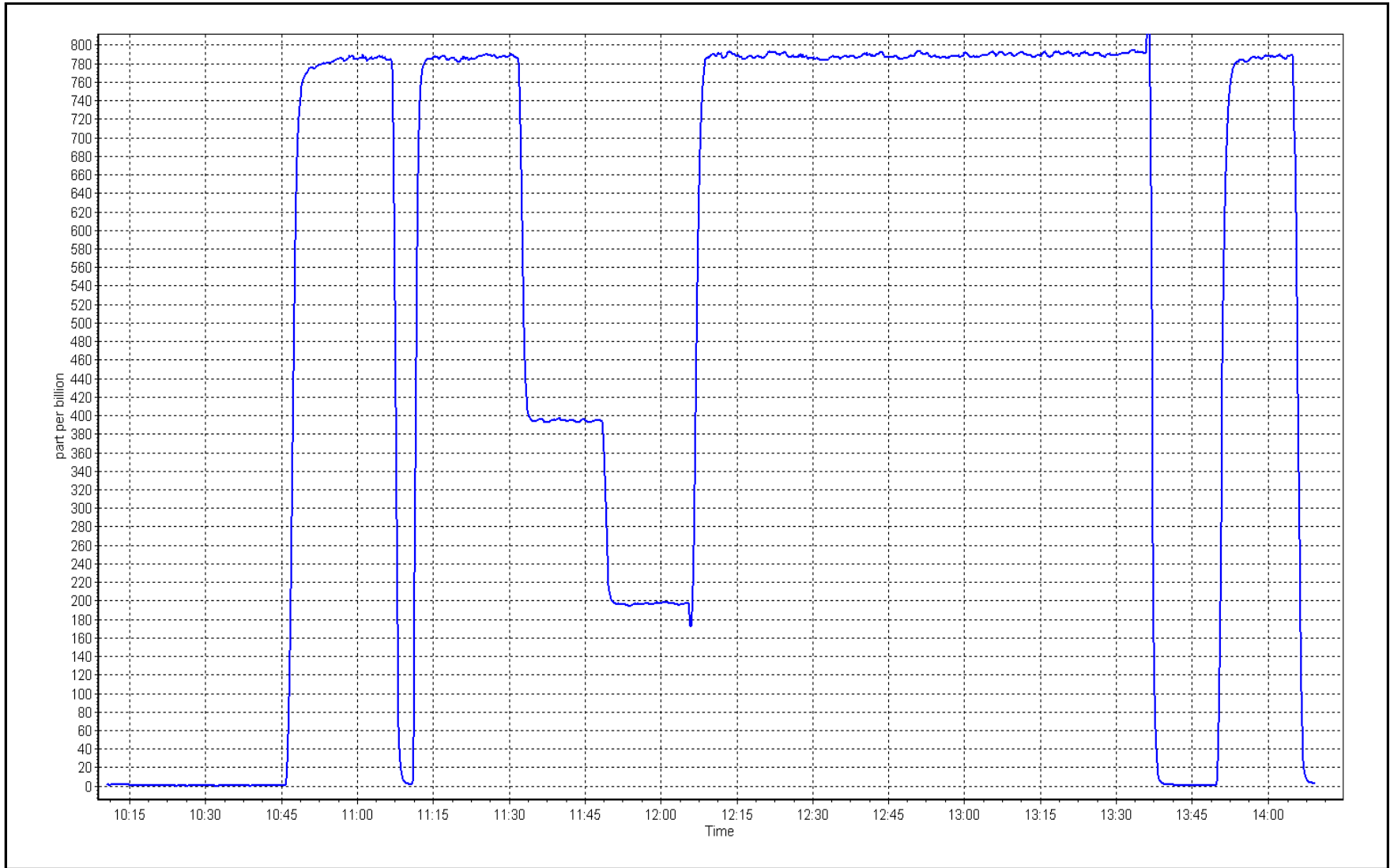
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999994 | ≥0.995 |
| 784.8 | 788.5 | 0.9953 | | | |
| 393.7 | 394.1 | 0.9990 | Slope | 0.995519 | 0.90 - 1.10 |
| 197.0 | 197.1 | 0.9996 | | | |
| | | | Intercept | 0.391756 | +/-30 |



SO2 Calibration Plot

Date: September 15, 2017

Location: Conklin





Wood Buffalo Environmental Association

SO₂ Calibration Summary

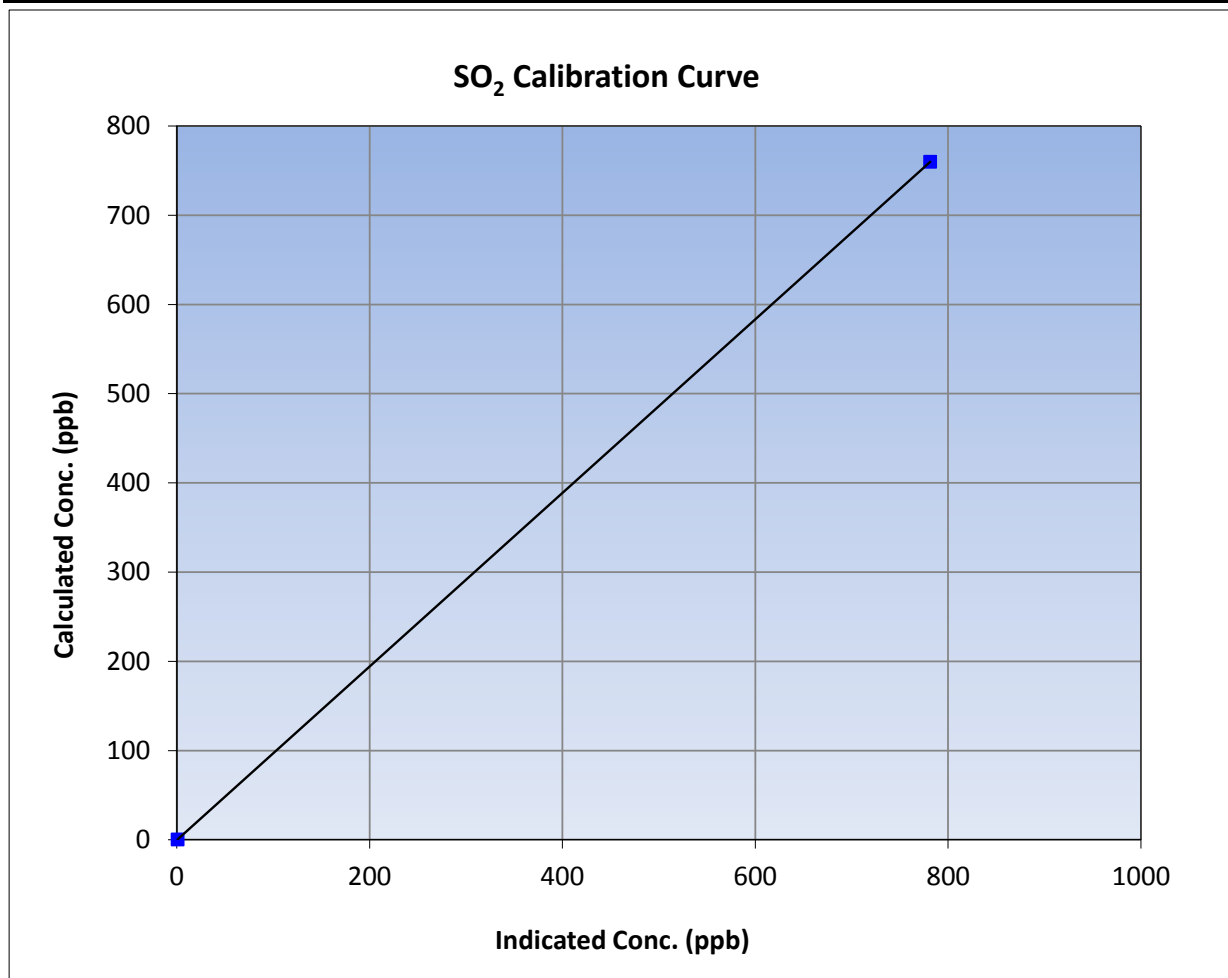
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 19, 2017 | Previous Calibration | September 15, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 12:25 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1428701363 |

Calibration Data

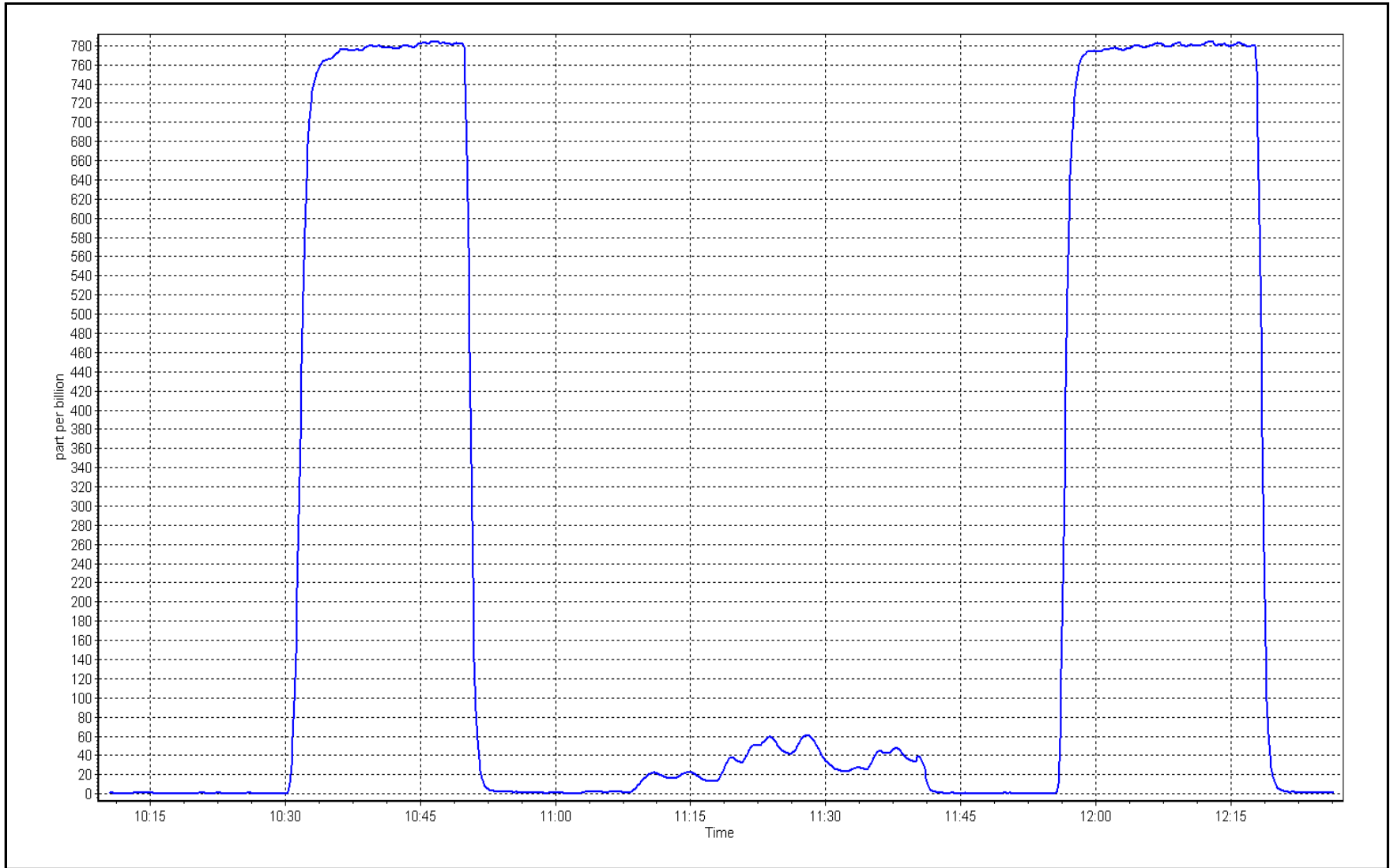
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|--------------|
| 0.0 | 0.5 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 759.5 | 781.1 | 0.9723 | Slope | 0.972912 | 0.90 - 1.10 |
| | | | Intercept | -0.486456 | +/-30 |



SO2 Calibration Plot

Date: September 19, 2017

Location: Conklin





Wood Buffalo Environmental Association

TRS Calibration Summary

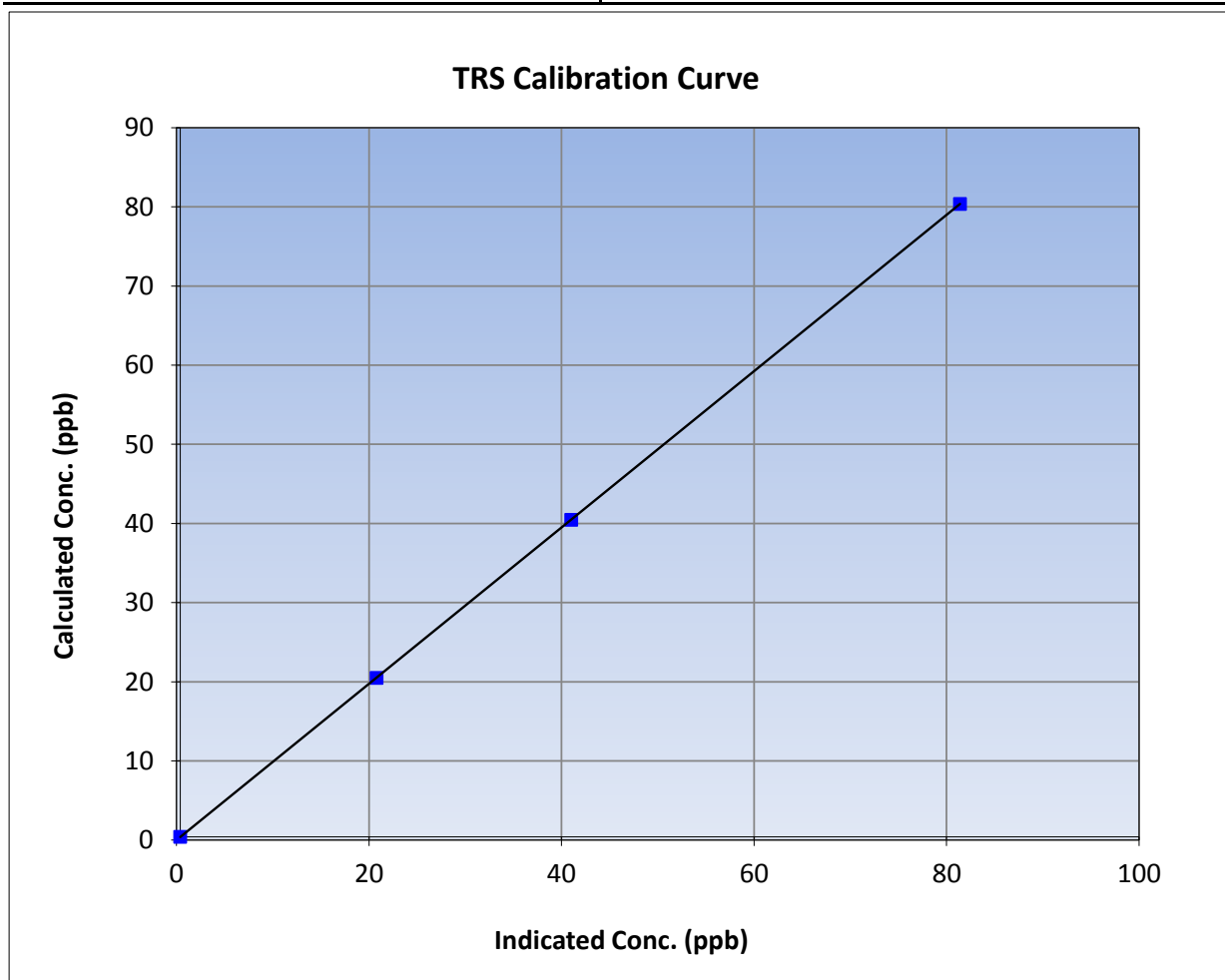
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 8, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 12:35 | End Time (MST) | 14:46 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1236656116 |

Calibration Data

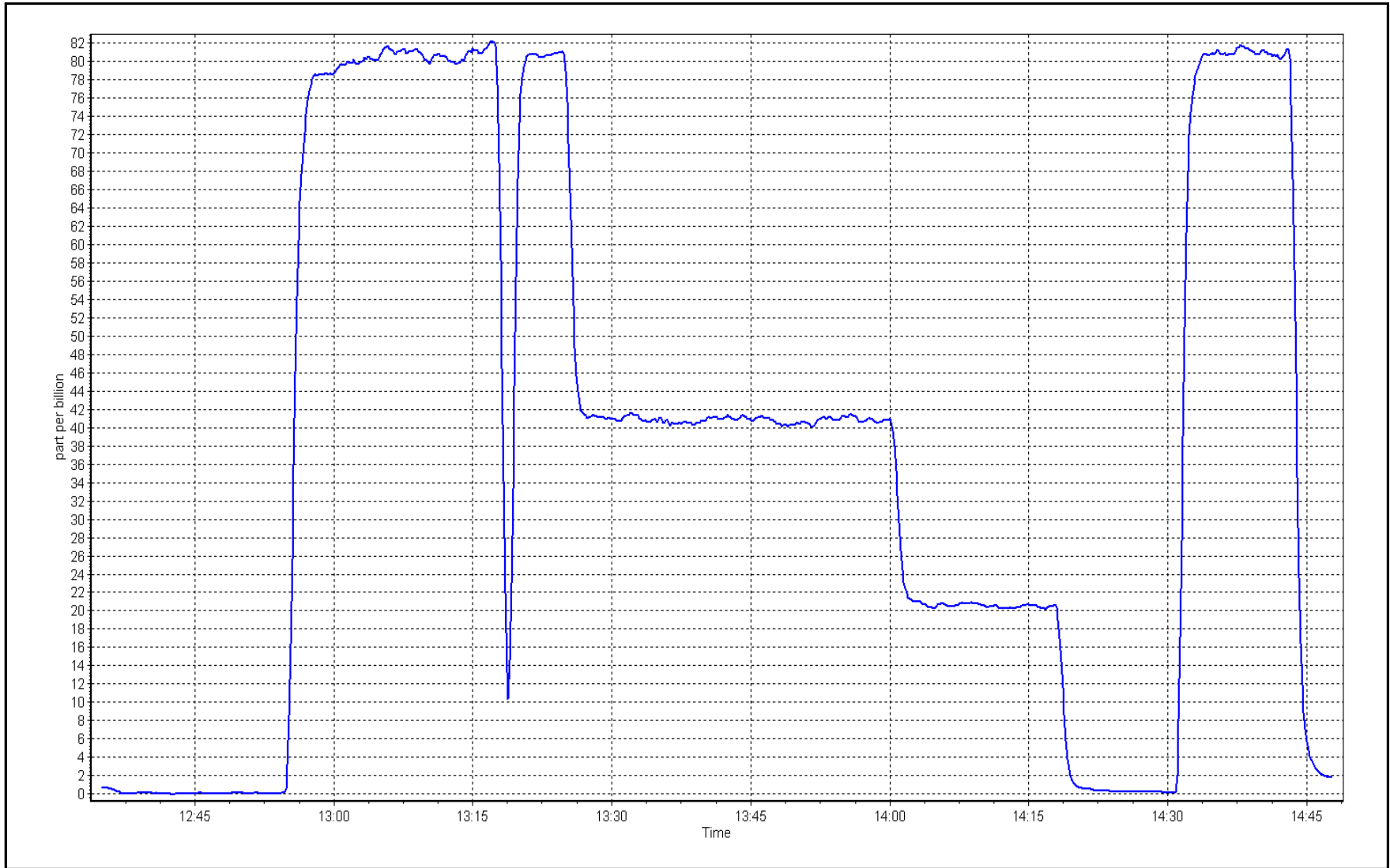
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 1.000000 | |
| 80.0 | 81.0 | 0.9874 | | | ≥0.995 |
| 40.1 | 40.6 | 0.9872 | Slope | 0.987486 | |
| 20.1 | 20.4 | 0.9858 | | | 0.90 - 1.10 |
| | | | Intercept | -0.013755 | +/-3 |



TRS Calibration Plot

Date: September 8, 2017

Location: Conklin





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | September 15, 2017 | Last Cal Date: | August 10, 2017 |
| Start time (MST): | 10:10 | End time (MST): | 14:10 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|--------------------|-------------------|---------------------|------------------|
| Gas Cert Reference | EY0000359 | Cal Gas Expiry Date | February 9, 2018 |
| CH4 Cal Gas Conc. | <u>512.0</u> ppm | CH4 Equiv Conc. | 1084.0 ppm |
| C3H8 Cal Gas Conc. | <u>208.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Model | Teledyne API T700 | Serial Number | 2658 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5611 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1152430011

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 1.70E-04 | 1.70E-04 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 12.0 | 12.0 | Carrier Pressure | 37.0 | 37.0 |
| NMHC SP Ratio | 4.10E-05 | 4.10E-05 | Fuel Pressure | 49.7 | 49.7 |
| NMHC Peak Area | 213276 | 213276 | Air Pressure | 34.3 | 34.3 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.995687 | 0.991448 |
| THC Cal Offset | 0.046264 | 0.059366 |
| CH4 Cal Slope | 0.997446 | 0.990397 |
| CH4 Cal Offset | 0.033615 | 0.041507 |
| NMHC Cal Slope | 0.994020 | 0.992474 |
| NMHC Cal Offset | 0.012565 | 0.019743 |

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

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4934 | 76.5 | 16.55 | 16.67 | 0.993 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4934 | 76.5 | 16.55 | 16.67 | 0.993 |
| second point | 4975 | 38.4 | 8.30 | 8.27 | 1.004 |
| third point | 4992 | 19.3 | 4.17 | 4.10 | 1.018 |
| as left zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4934 | 76.5 | 16.55 | 16.61 | 0.996 |
| Average Correction Factor | | | | | 1.005 |
| Corrected As found | 16.67 | Prev response | 16.58 | *% change | -0.6% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4934 | 76.5 | 8.73 | 8.79 | 0.993 |
| calibrator zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| high point | 4934 | 76.5 | 8.73 | 8.79 | 0.993 |
| second point | 4975 | 38.4 | 4.38 | 4.38 | 1.000 |
| third point | 4992 | 19.3 | 2.20 | 2.18 | 1.009 |
| as left zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4934 | 76.5 | 8.73 | 8.77 | 0.996 |
| Average Correction Factor | | | | | 1.001 |
| Corrected As found | 8.79 | Prev response | 8.77 | *% change | -0.2% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4934 | 76.5 | 7.82 | 7.88 | 0.992 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4934 | 76.5 | 7.82 | 7.88 | 0.992 |
| second point | 4975 | 38.4 | 3.92 | 3.88 | 1.011 |
| third point | 4992 | 19.3 | 1.97 | 1.92 | 1.028 |
| as left zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4934 | 76.5 | 7.82 | 7.84 | 0.997 |
| Average Correction Factor | | | | | 1.010 |
| Corrected As found | 7.88 | Prev response | 7.80 | *% change | -0.9% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

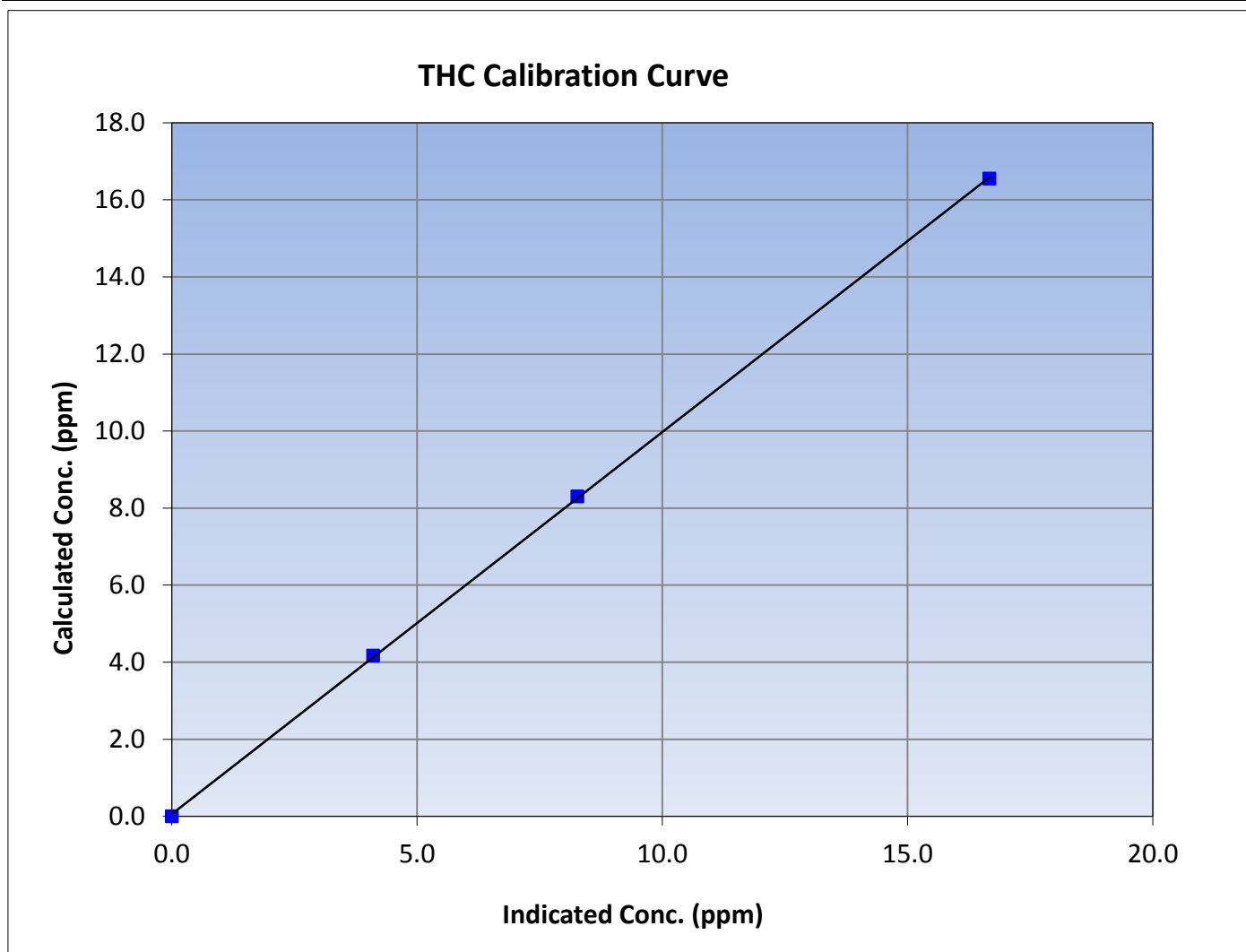
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 14:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | ≥ 0.995 | |
| 16.55 | 16.67 | 0.9929 | | | |
| 8.30 | 8.27 | 1.0041 | | | |
| 4.17 | 4.10 | 1.0177 | | | |
| | | | Slope | 0.991448 | 0.90 - 1.10 |
| | | | Intercept | 0.059366 | +/-0.5 |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

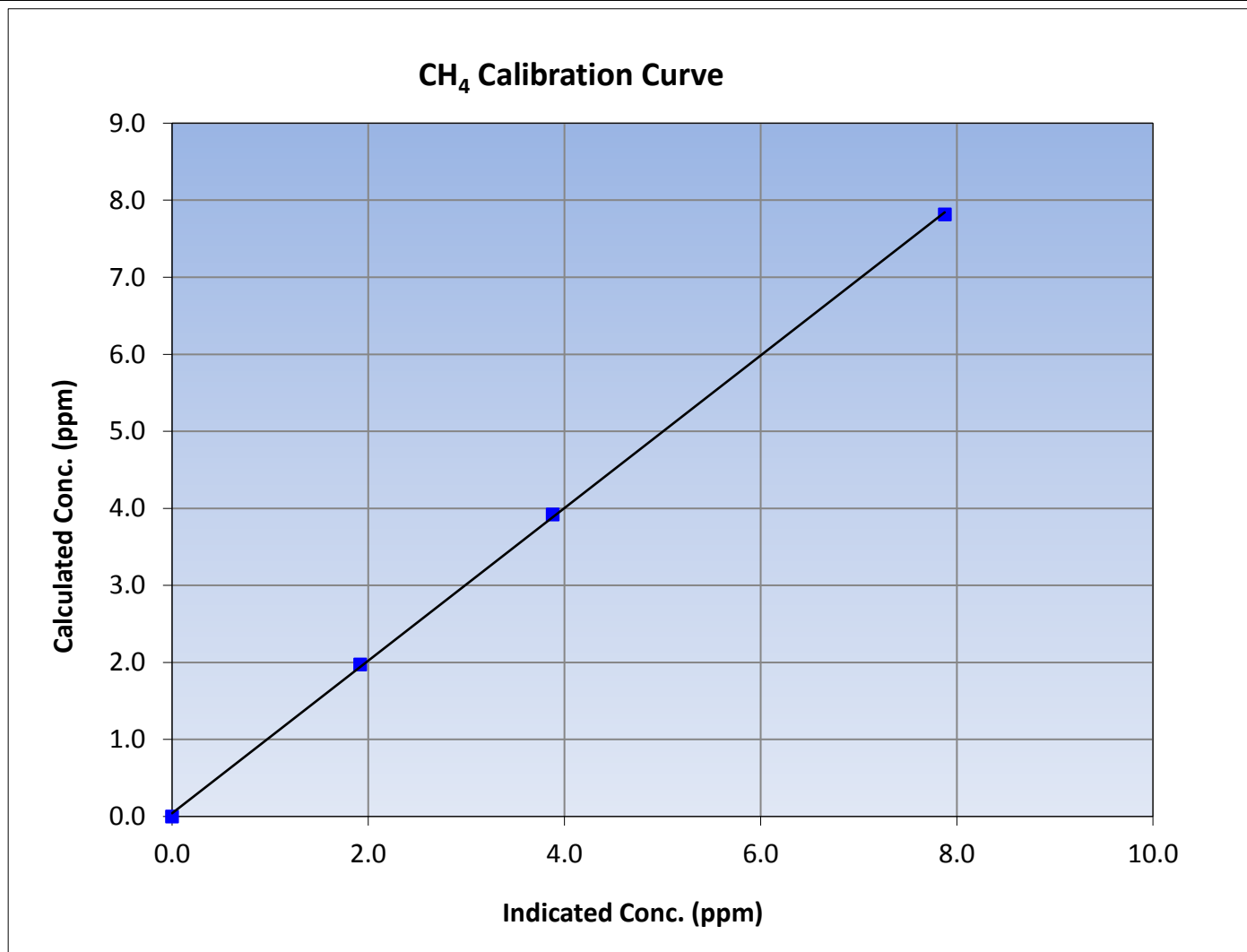
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 14:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999860 | ≥ 0.995 | | | |
| 7.82 | 7.88 | 0.9924 | | | | | | |
| 3.92 | 3.88 | 1.0107 | | | | Slope | 0.990397 | 0.90 - 1.10 |
| 1.97 | 1.92 | 1.0275 | | | | | | |
| | | | Intercept | 0.041507 | ± 0.5 | | | |





Wood Buffalo Environmental Association

NMHC Calibration Summary

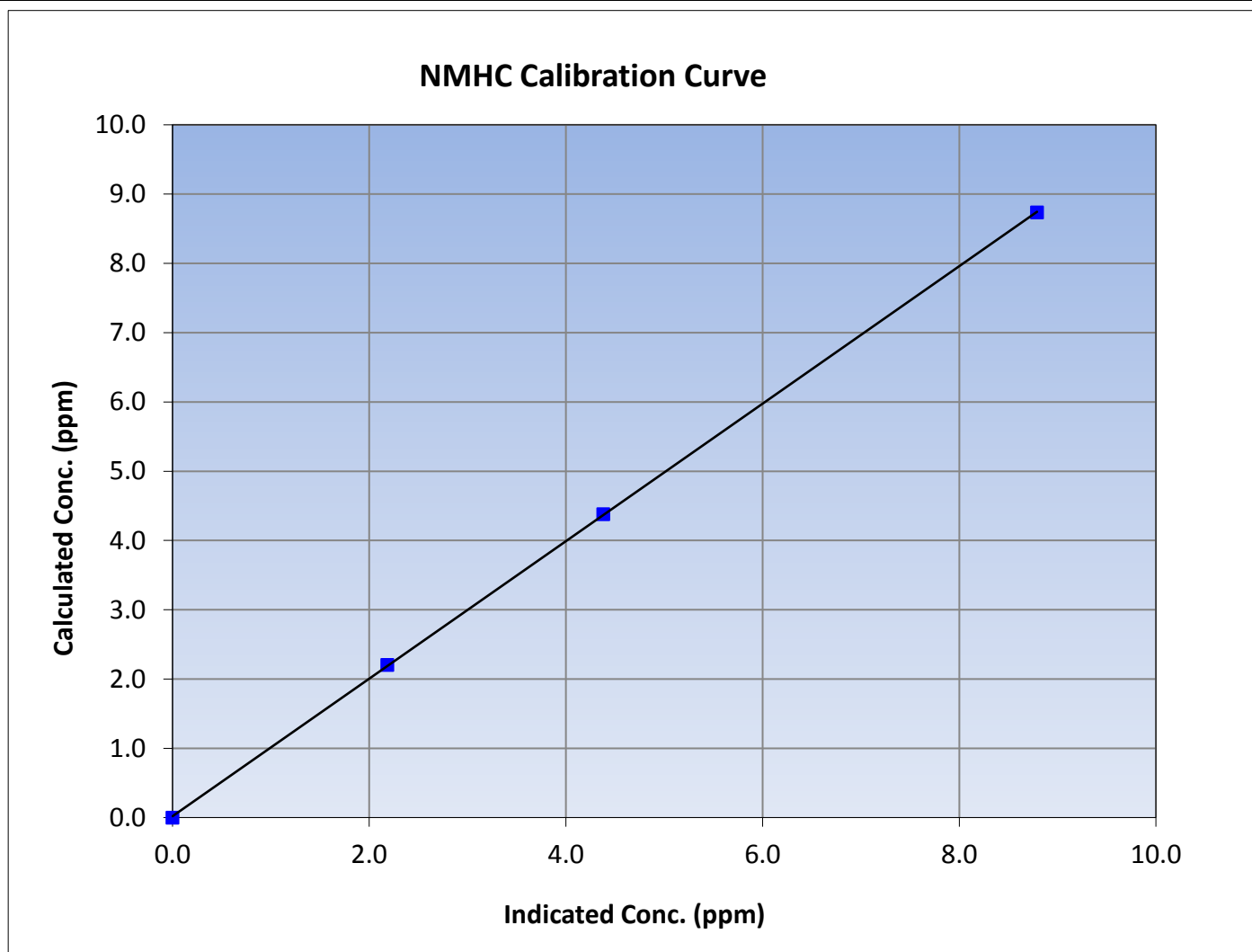
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 14:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

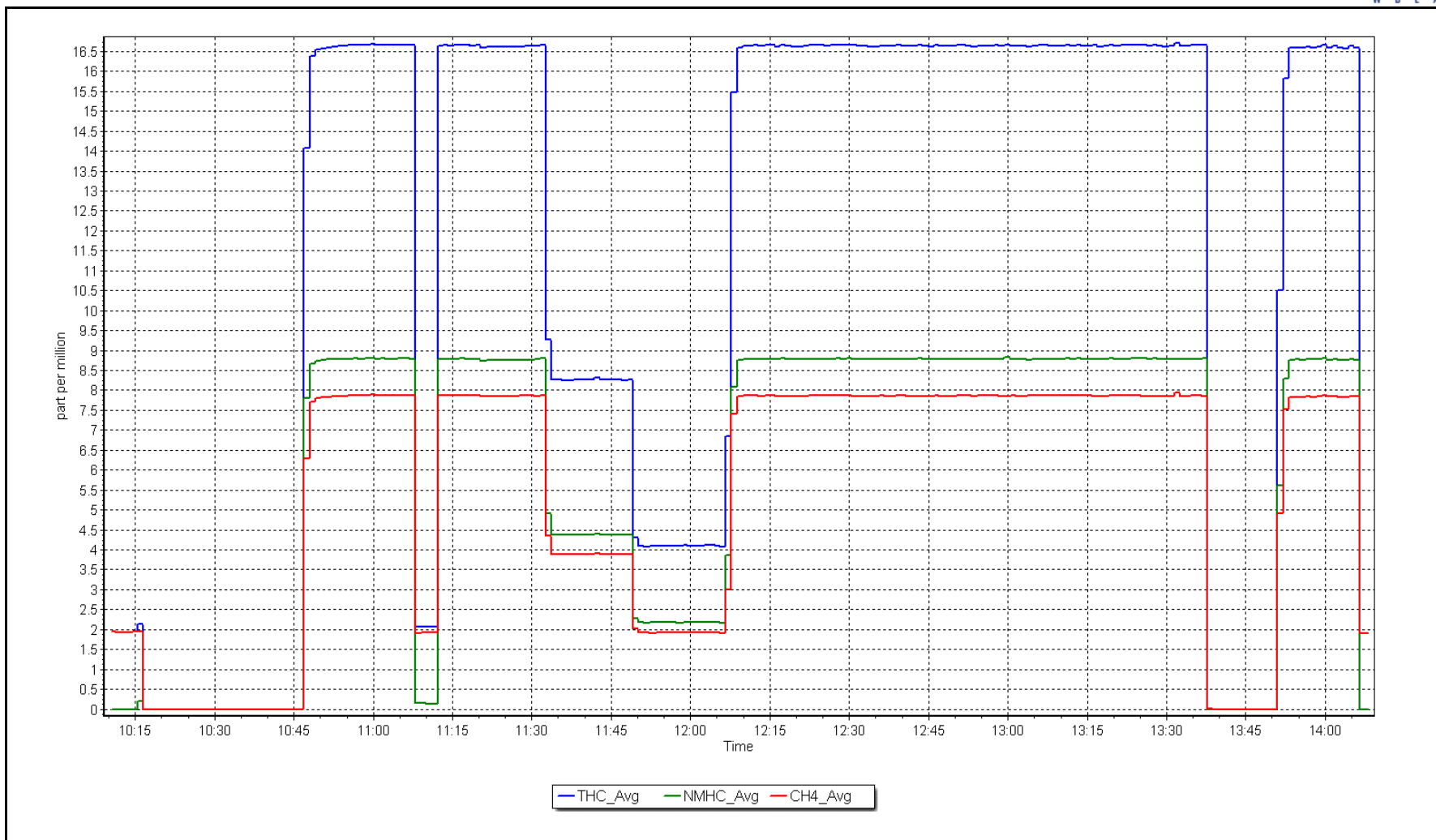
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999976 | ≥ 0.995 | | | |
| 8.73 | 8.79 | 0.9934 | | | | | | |
| 4.38 | 4.38 | 1.0003 | | | | Slope | 0.992474 | 0.90 - 1.10 |
| 2.20 | 2.18 | 1.0091 | | | | | | |
| | | | Intercept | 0.019743 | ± 0.5 | | | |



NMHC Calibration Plot

Date: September 15, 2017

Location: Conklin





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|---------------------------|-----------------|--------------------|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | September 29, 2017 | Last Cal Date: | September 15, 2017 |
| Start time (MST): | 10:06 | End time (MST): | 11:02 |
| Reason: | Cylinder Change N2 Change | | |

Calibration Standards

| | | | |
|--------------------|-------------------|---------------------|------------------|
| Gas Cert Reference | EY0000359 | Cal Gas Expiry Date | February 9, 2018 |
| CH4 Cal Gas Conc. | <u>512.0</u> ppm | CH4 Equiv Conc. | 1084.0 ppm |
| C3H8 Cal Gas Conc. | <u>208.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Model | Teledyne API T700 | Serial Number | 2658 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5611 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1152430011

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| CH4 SP Ratio | 1.70E-04 | 1.70E-04 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 12.0 | 12.0 | Carrier Pressure | 37.0 | 37.0 |
| NMHC SP Ratio | 4.10E-05 | 4.10E-05 | Fuel Pressure | 49.7 | 49.7 |
| NMHC Peak Area | 213276 | 213276 | Air Pressure | 34.3 | 34.3 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.991448 | 1.017237 |
| THC Cal Offset | 0.059366 | 0.000000 |
| CH4 Cal Slope | 0.990397 | 1.010756 |
| CH4 Cal Offset | 0.041507 | 0.000000 |
| NMHC Cal Slope | 0.992474 | 1.023469 |
| NMHC Cal Offset | 0.019743 | 0.000000 |

Notes: No adjustments made. Replaced N2 cylinder after as founds.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4934 | 76.5 | 16.55 | 16.27 | 1.017 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4934 | 76.5 | 16.55 | 16.27 | 1.017 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.017 |
| Corrected As found | 16.27 | Prev response | 16.63 | *% change | 2.2% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4934 | 76.5 | 8.73 | 8.53 | 1.023 |
| calibrator zero | 5005 | 0 | 0.00 | 0.00 | ---- |
| high point | 4934 | 76.5 | 8.73 | 8.53 | 1.023 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.023 |
| Corrected As found | 8.53 | Prev response | 8.78 | *% change | 2.9% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|----------------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4934 | 76.5 | 7.82 | 7.73 | 1.011 |
| calibrator zero | 5005 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4934 | 76.5 | 7.82 | 7.73 | 1.011 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.011 |
| Corrected As found | 7.73 | Prev response | 7.85 | *% change | 1.5% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

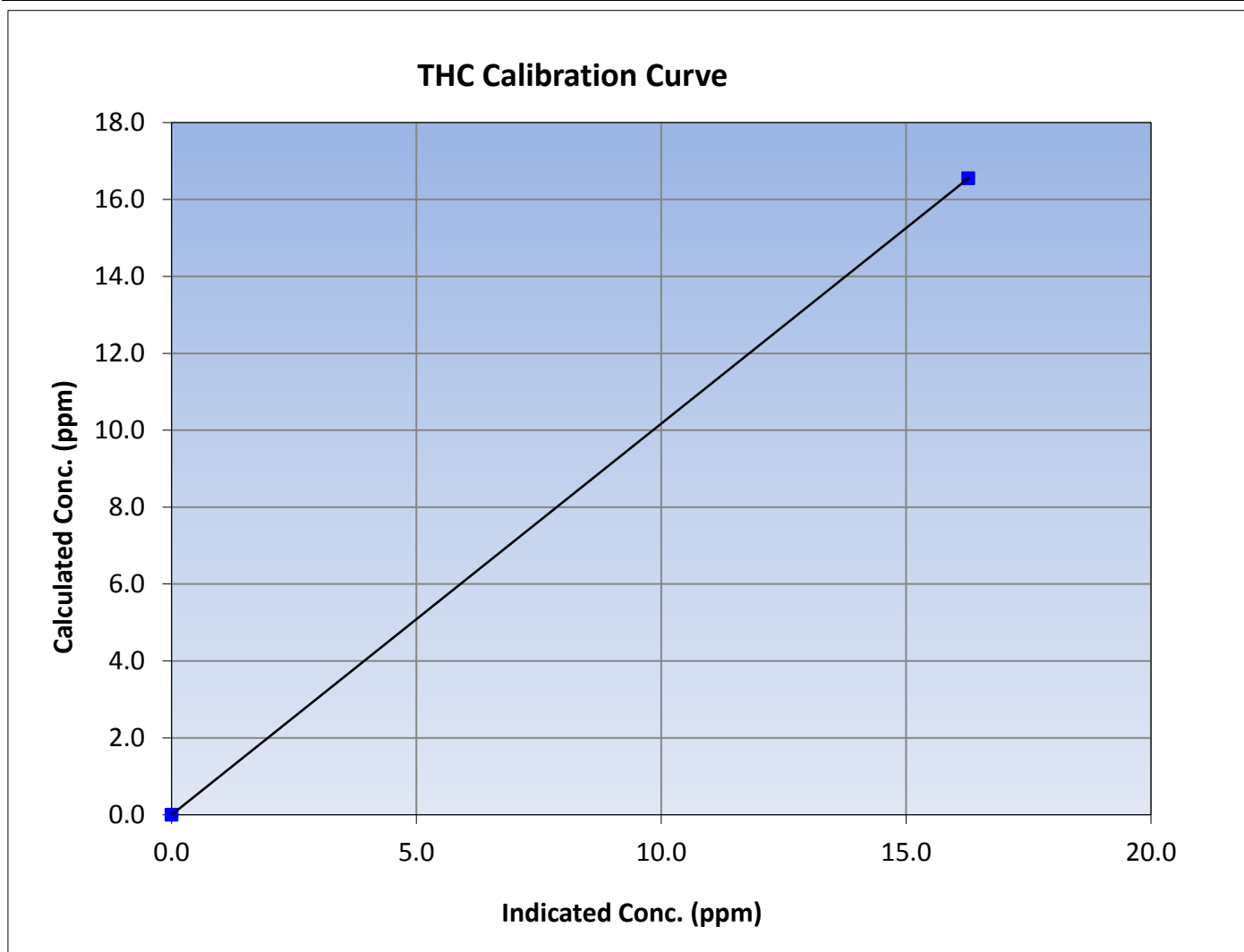
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 15, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:06 | End Time (MST) | 11:02 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 16.55 | 16.27 | 1.0172 | | | |
| | | | Slope | 1.017237 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-0.5 |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

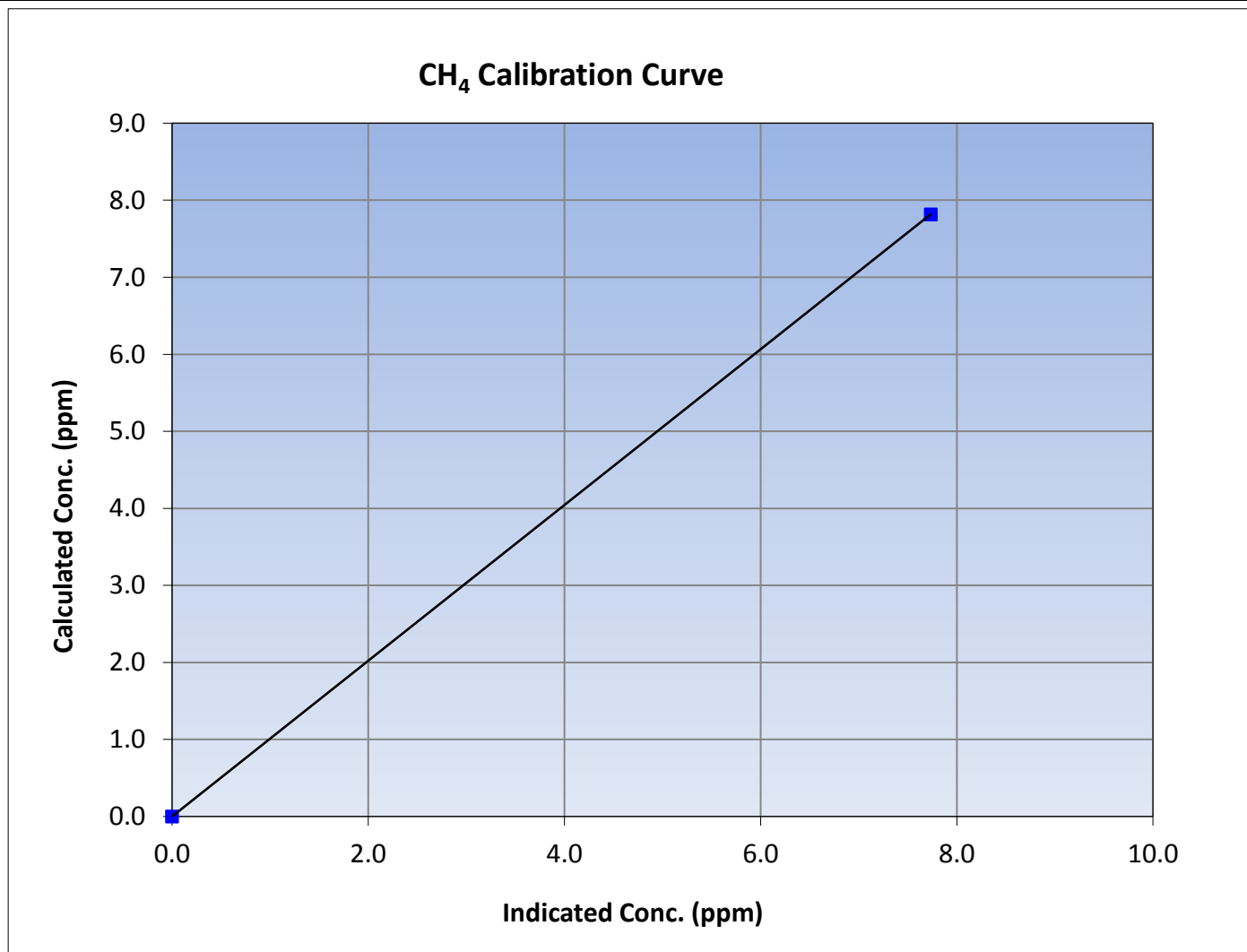
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 15, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:06 | End Time (MST) | 11:02 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 7.82 | 7.73 | 1.0108 | | | |
| | | | | | |
| | | | Intercept | 0.000000 | +/-0.5 |





Wood Buffalo Environmental Association

NMHC Calibration Summary

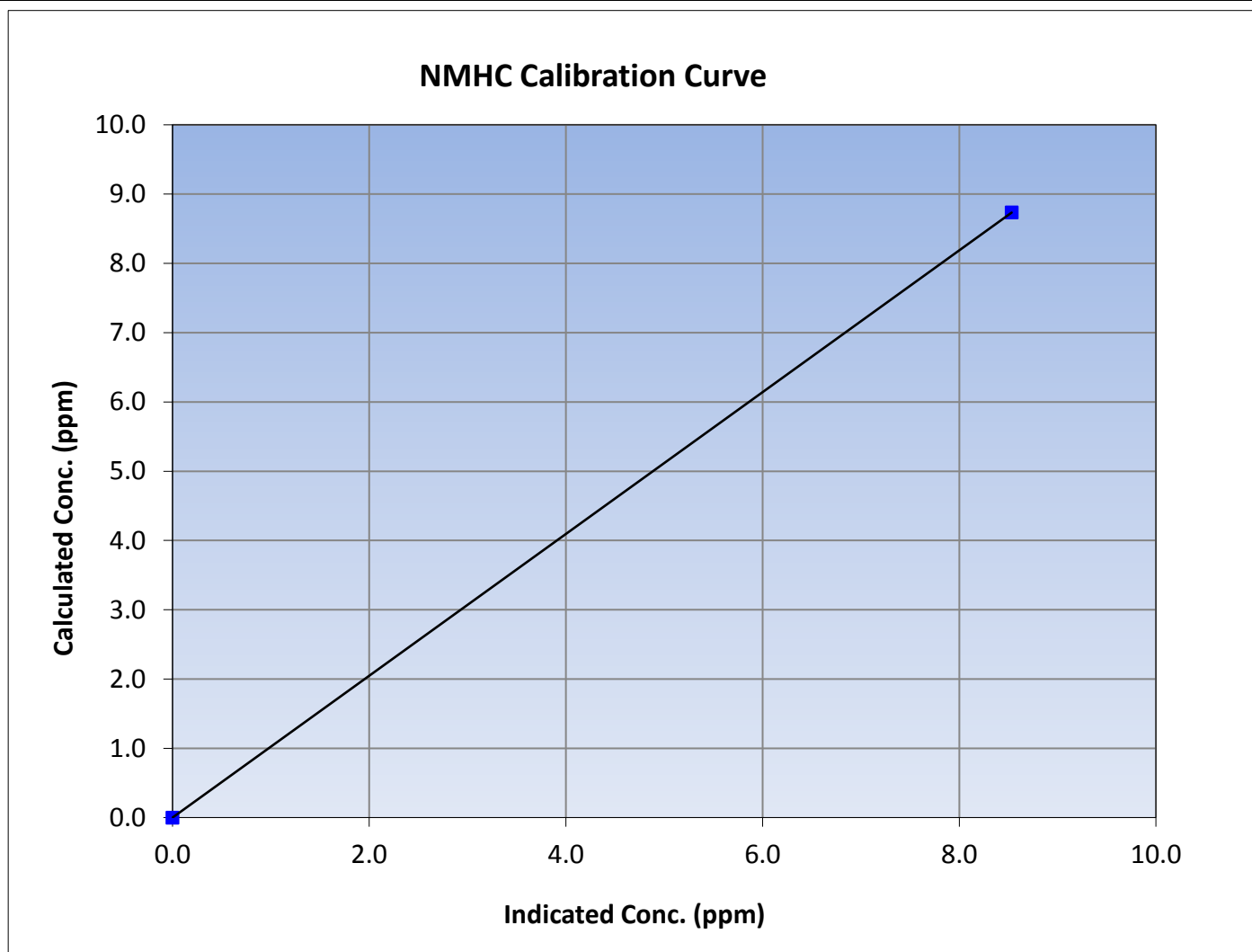
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 15, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:06 | End Time (MST) | 11:02 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

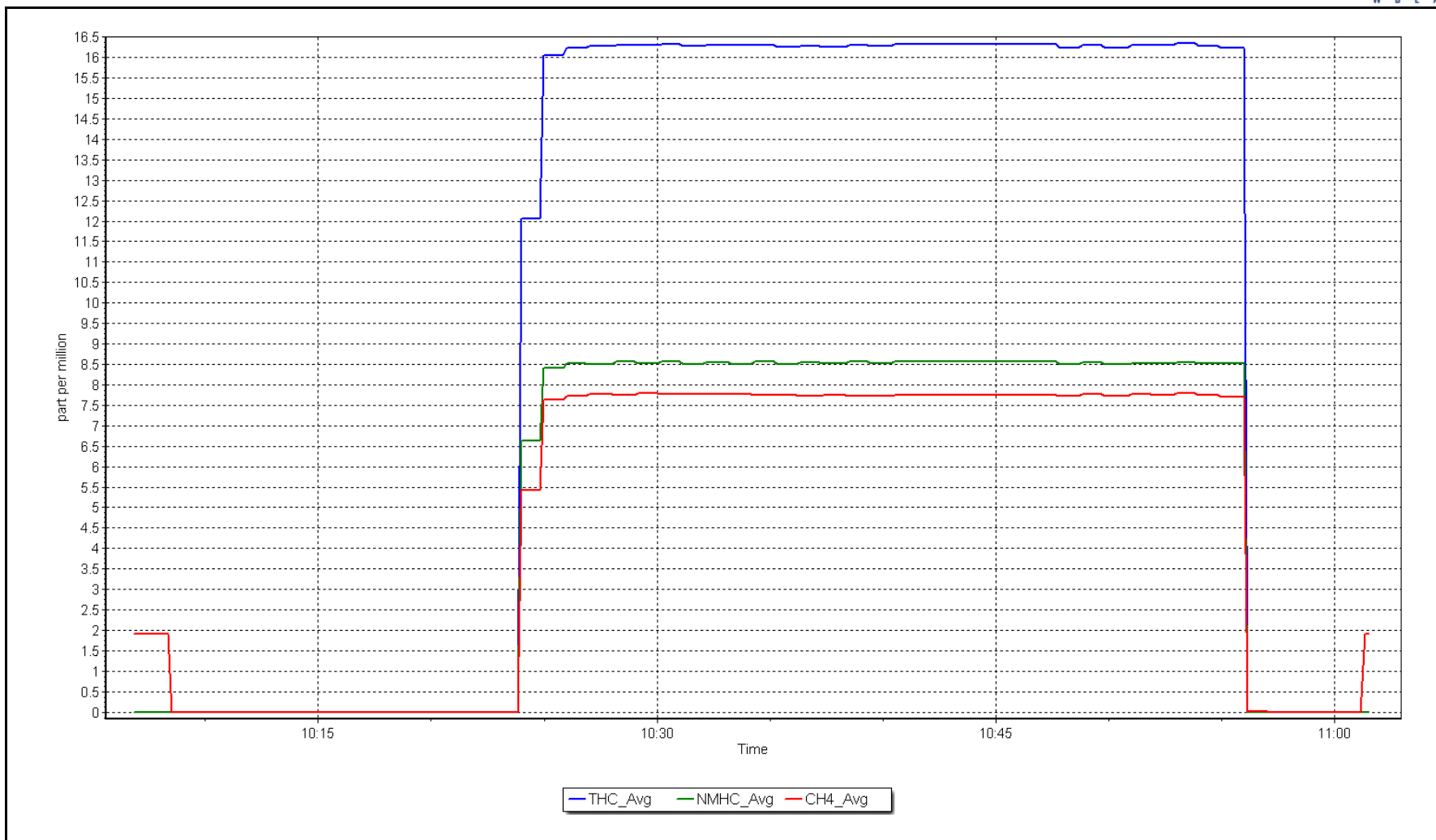
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|---------------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 | |
| 8.73 | 8.53 | 1.0235 | | Slope | 1.023469 | 0.90 - 1.10 |
| | | | | Intercept | 0.000000 | +/-0.5 |



NMHC Calibration Plot

Date: September 29, 2017

Location: Conklin





Wood Buffalo Environmental Association

O₃ Calibration Summary

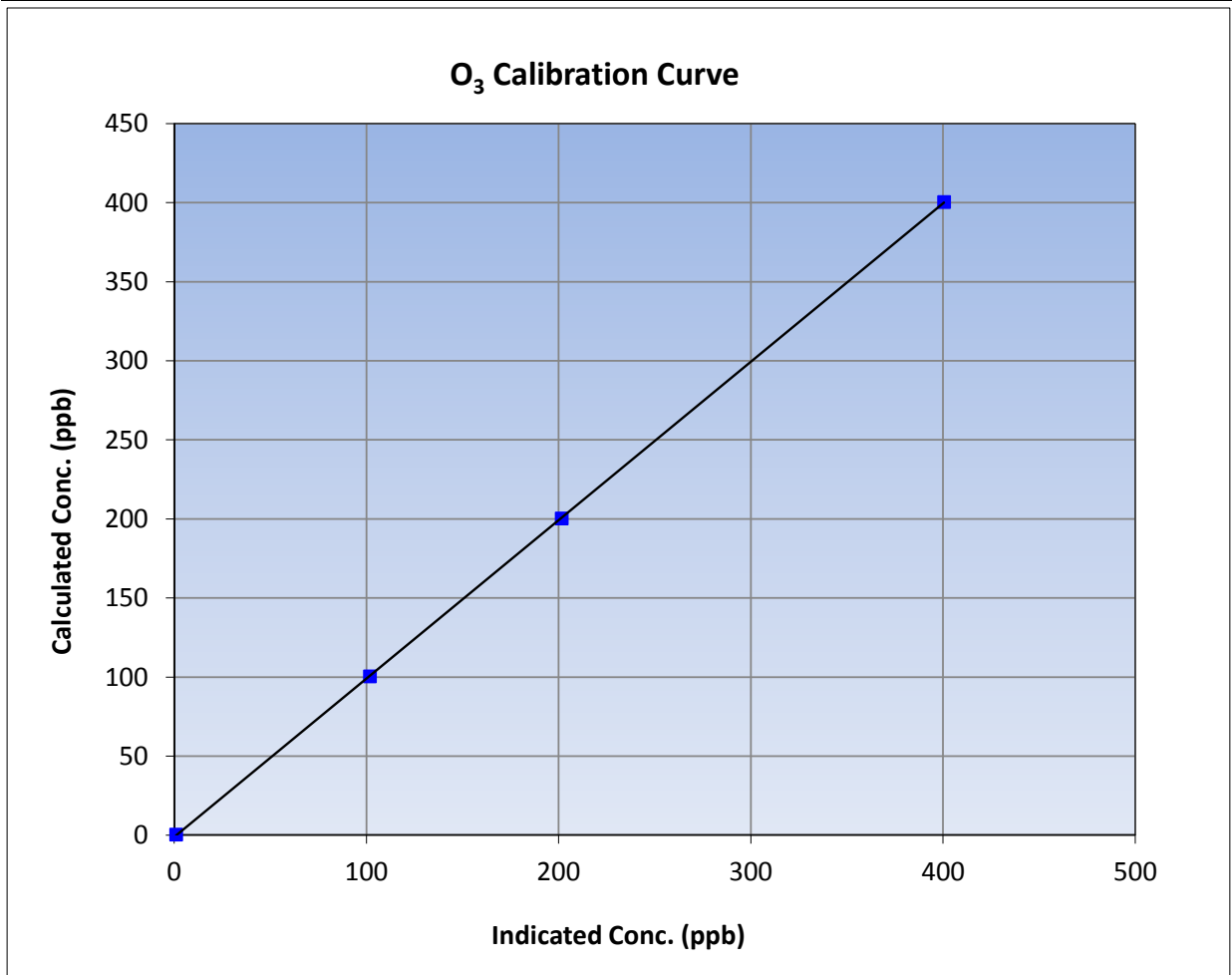
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 8, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 9:40 | End Time (MST) | 12:36 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1501663734 |

Calibration Data

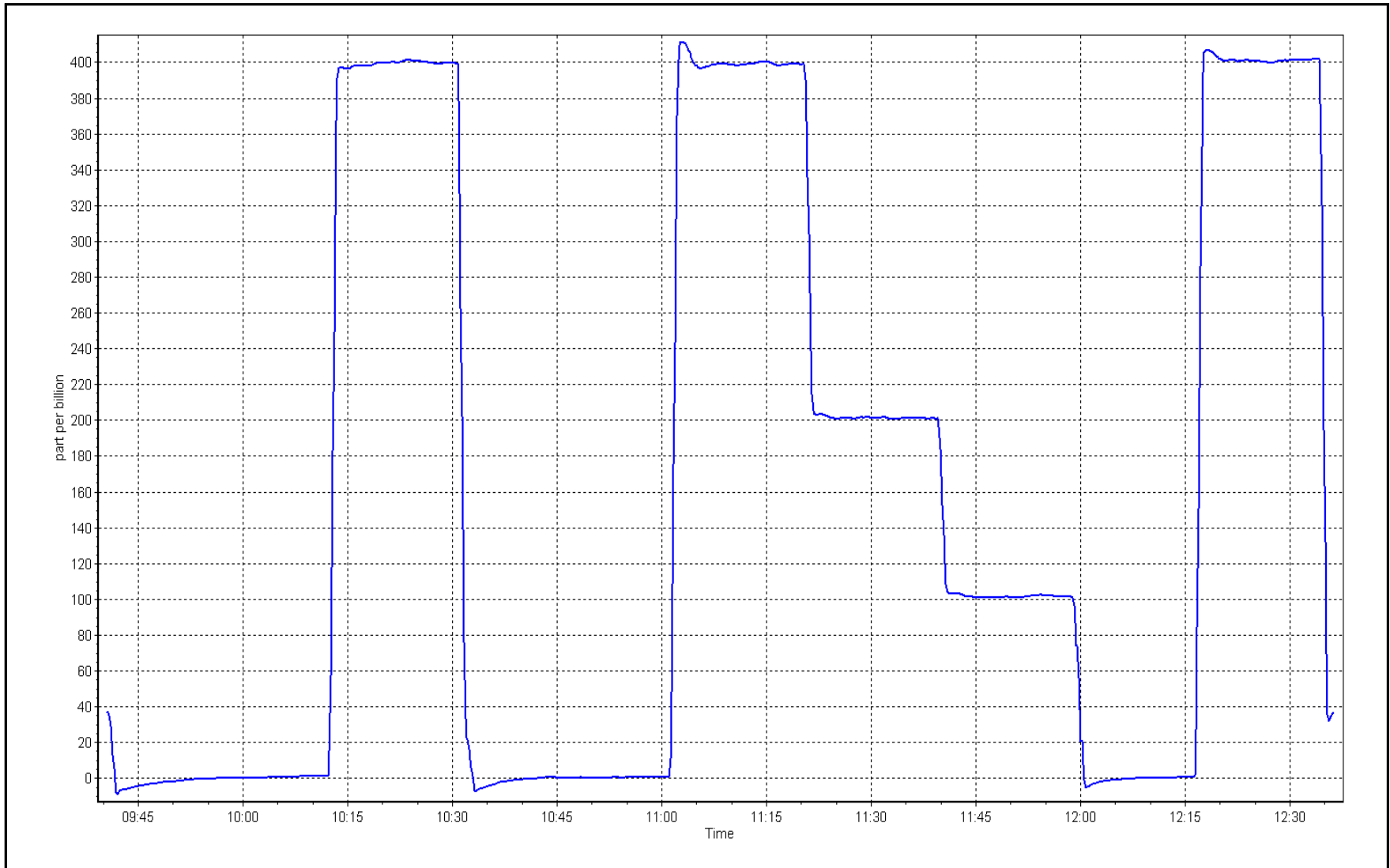
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.6 | ---- | Correlation Coefficient | 0.999990 | ≥0.995 |
| 400.0 | 400.1 | 0.9998 | | | |
| 200.0 | 201.2 | 0.9940 | Slope | 1.001879 | 0.90 - 1.10 |
| 100.0 | 101.5 | 0.9852 | | | |
| | | | Intercept | -1.180494 | +/- 10 |



O₃ Calibration Plot

Date: September 8, 2017

Location: Conklin





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | September 15, 2017 | Last Cal Date: | August 21, 2017 |
| Start time (MST): | 10:10 | End time (MST): | 14:08 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|------------------|
| NO Gas Cylinder # | EY0000359 | Cal Gas Expiry Date | February 9, 2018 |
| NOX Cal Gas Conc. | <u>52.4</u> ppb | NO Cal Gas Conc. | <u>52.4</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 2658 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5611 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1501663731 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 0.944 | 0.948 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.996 | 0.668 | PMT Temperature | -3.0 | -2.7 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 162.6 | 161.7 |
| NO bkgrnd | 9.7 | 9.6 | Sample Flow | 0.602 | 0.603 |
| NOX bkgrnd | 9.7 | 9.6 | PMT Voltage | -892.4 | -892.4 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.998053 | 0.997249 |
| NO _x Cal Offset | -0.439233 | 0.715736 |
| NO Cal Slope | 0.995897 | 0.996338 |
| NO Cal Offset | -0.279317 | 1.134626 |
| NO ₂ Cal Slope | 0.998780 | 0.999733 |
| NO ₂ Cal Offset | -1.132708 | -0.677898 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.5 | 0.0 | ---- | ---- |
| as found span | 4934 | 76.5 | 800.0 | 800.0 | 0.0 | 782.7 | 784.2 | -1.5 | 1.0222 | 1.0202 |
| calibrator zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.5 | 0.0 | ---- | ---- |
| high point | 4934 | 76.5 | 800.0 | 800.0 | 0.0 | 801.2 | 801.7 | -0.5 | 0.9986 | 0.9979 |
| second point | 4975 | 38.3 | 400.3 | 400.3 | 0.0 | 401.9 | 401.7 | 0.2 | 0.9961 | 0.9966 |
| third point | 4990 | 19.2 | 200.8 | 200.8 | 0.0 | 199.6 | 198.9 | 0.8 | 1.0062 | 1.0098 |
| as left zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.4 | 0.0 | ---- | ---- |
| as left span | 4934 | 76.5 | 800.0 | 398.7 | 401.3 | 803.6 | 396.5 | 407.1 | 0.9956 | 1.0055 |
| Average Correction Factor | | | | | | | | | 1.0003 | 1.0014 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 783.2 ppb | NO = 784.7 ppb | | *Percent Change | NO _x = 2.4% |
| Previous Response | NO _x = 802.0 ppb | NO = 803.6 ppb | | *Percent Change | NO = 2.4% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 799.3 | 799.6 | -0.3 | 1.0009 | 1.0006 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 398.7 | 400.9 | 800.5 | 398.7 | 401.8 | 0.9994 | ---- | 0.9978 | 100.2% |
| 2nd NO2 (200 ppb O3) | 597.4 | 202.2 | 799.3 | 597.4 | 201.9 | 1.0009 | ---- | 1.0015 | 99.9% |
| 3rd NO2 (100 ppb O3) | 700.2 | 99.4 | 802.1 | 700.2 | 101.7 | 0.9974 | ---- | 0.9774 | 102.3% |
| 2nd NO ref point | ---- | 0.0 | 801.7 | 801.6 | 0.0 | 0.9979 | 0.9981 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9989 | 0.9993 | 0.9922 | 100.8% |

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

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

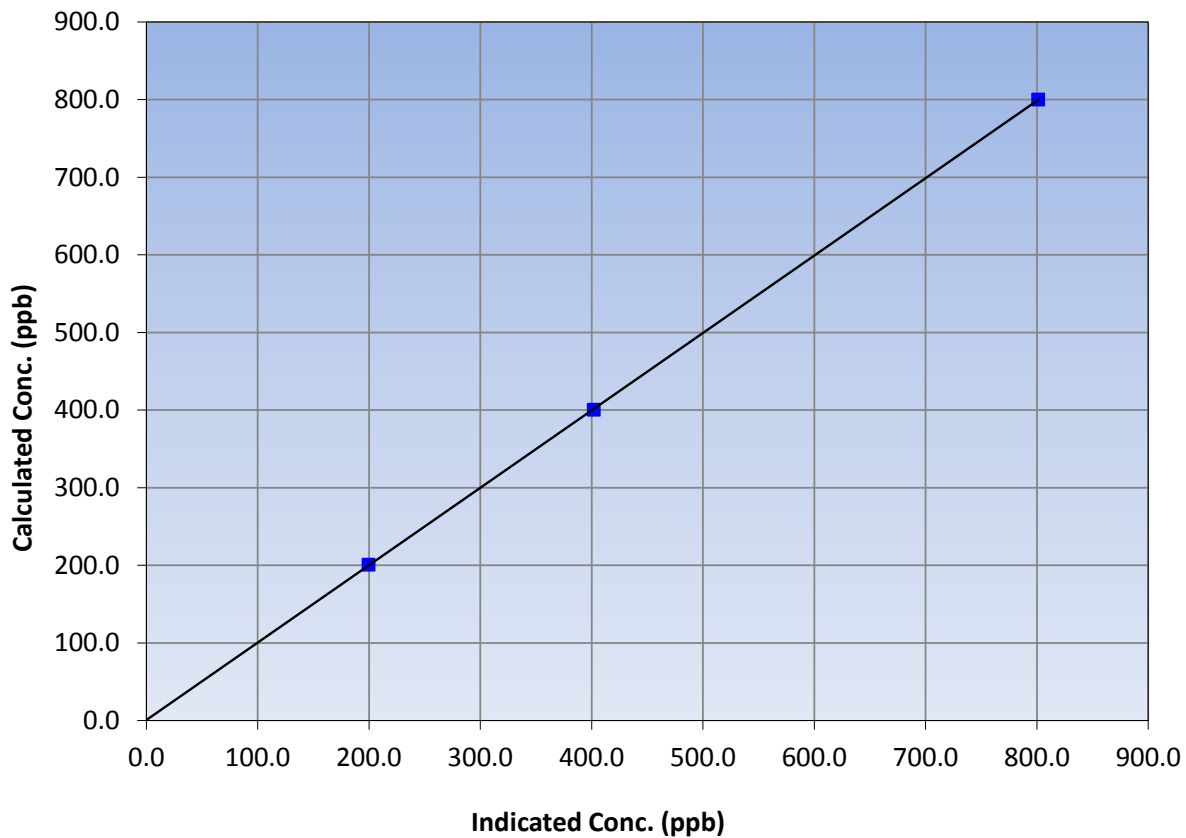
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 21, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 14:08 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.5 | ---- | Correlation Coefficient | ≥0.995 | |
| 800.0 | 801.2 | 0.9986 | | | |
| 400.3 | 401.9 | 0.9961 | | | |
| 200.8 | 199.6 | 1.0062 | | | |
| | | | Slope | 0.997249 | 0.90 - 1.10 |
| | | | Intercept | 0.715736 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

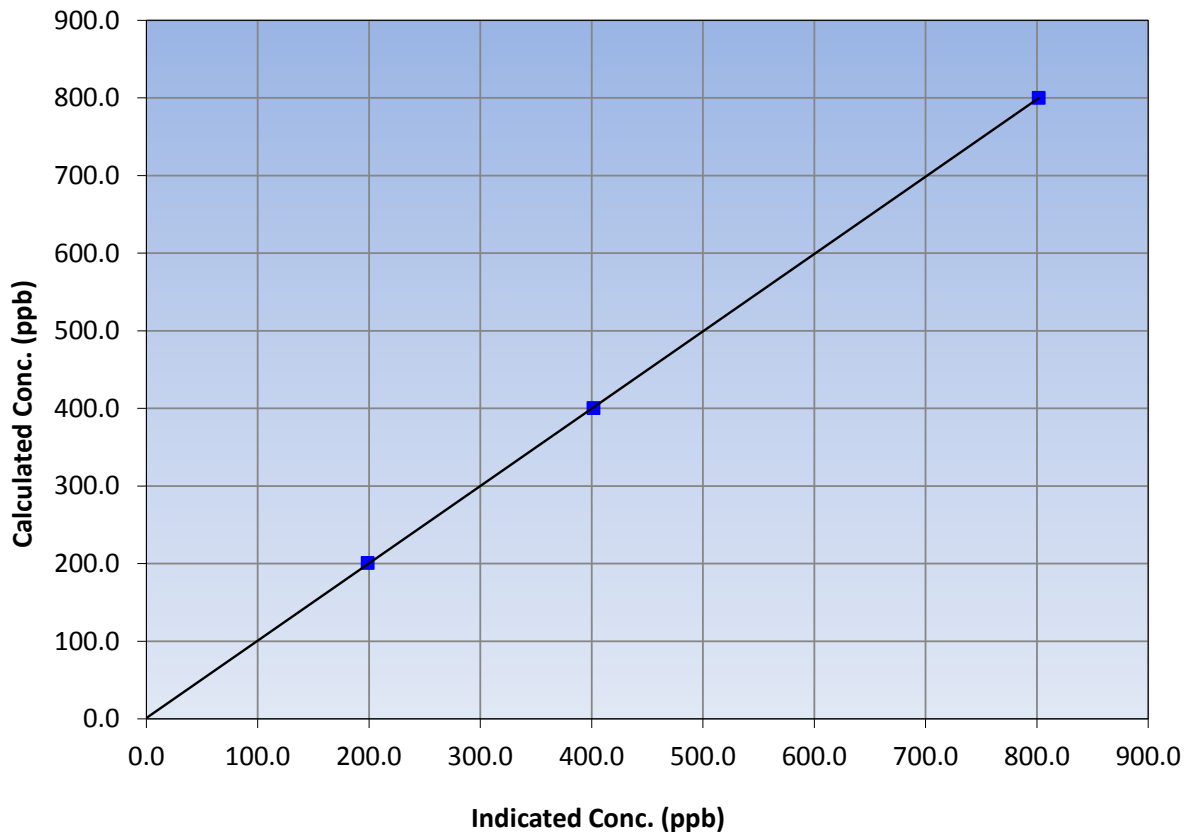
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 21, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 14:08 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.5 | ---- | Correlation Coefficient | 0.999989 | ≥0.995 |
| 800.0 | 801.7 | 0.9979 | | | |
| 400.3 | 401.7 | 0.9966 | Slope | 0.996338 | 0.90 - 1.10 |
| 200.8 | 198.9 | 1.0098 | | | |
| | | | Intercept | 1.134626 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

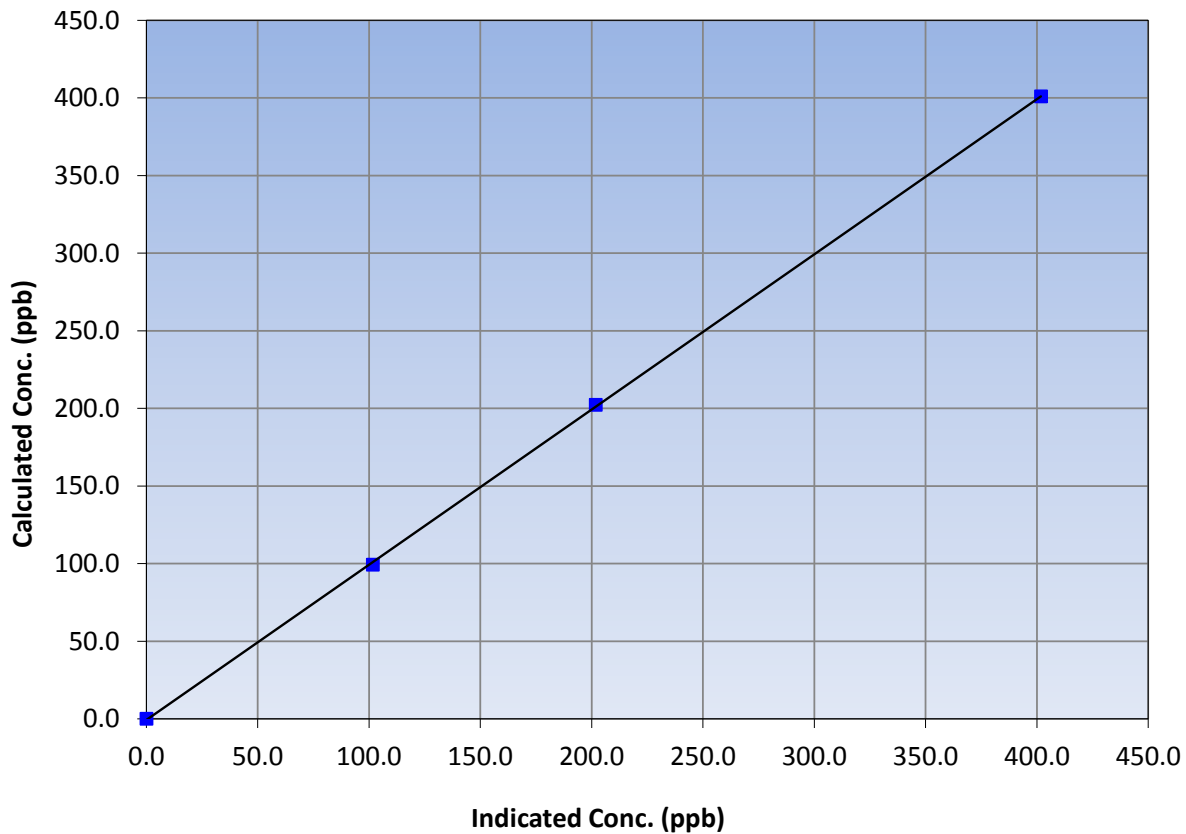
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 21, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 14:08 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 400.9 | 401.8 | 0.9978 | | | |
| 202.2 | 201.9 | 1.0015 | | | |
| 99.4 | 101.7 | 0.9774 | | | |
| | | | Slope | 0.999733 | 0.90 - 1.10 |
| | | | Intercept | -0.677898 | +/-20 |

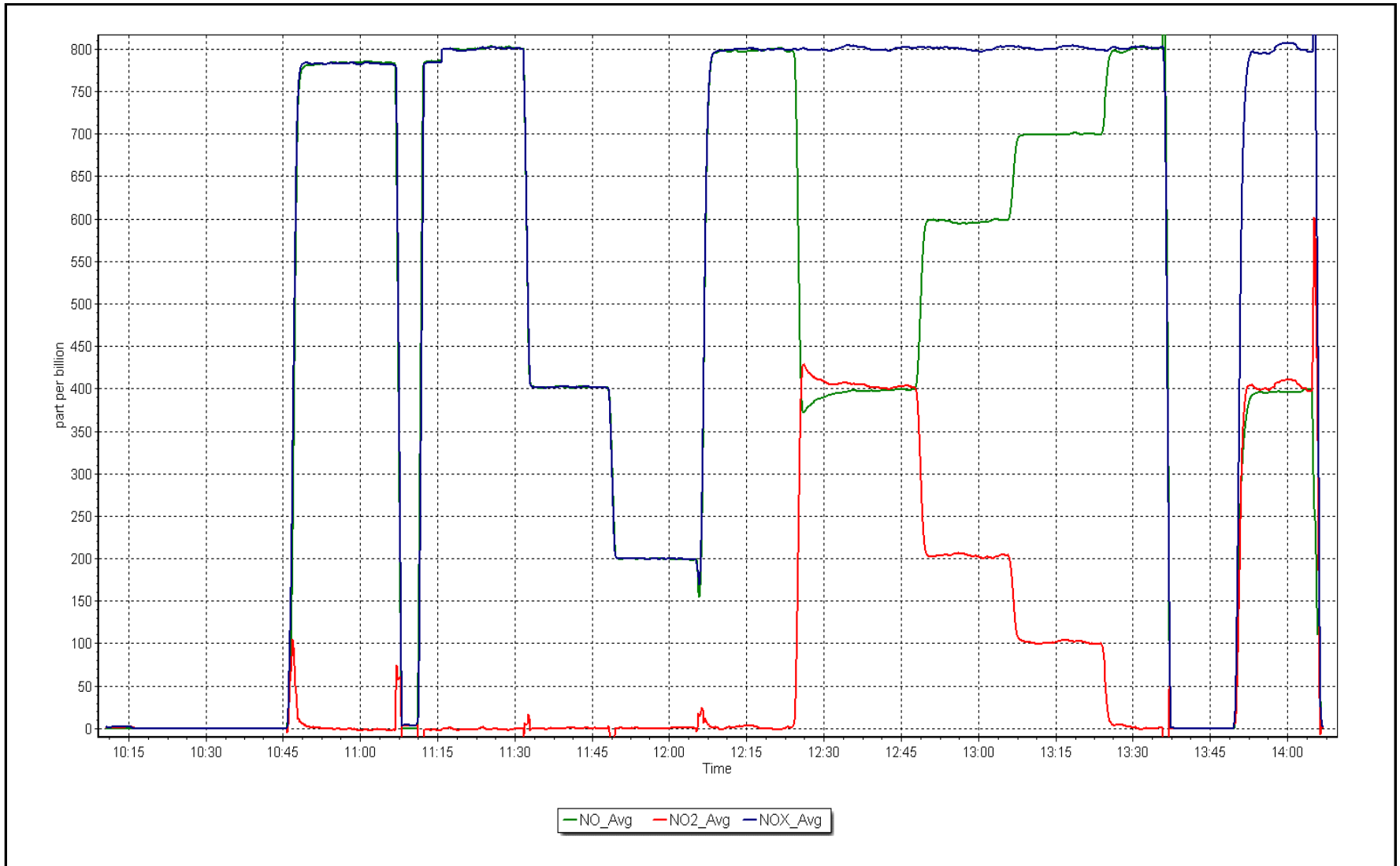
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 15, 2017

Location: Conklin





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|---------------------------------------|-----------------|--------------------|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | September 15, 2017 |
| Start time (MST): | 10:10 | End time (MST): | 12:25 |
| Reason: | Cylinder Change Installed new cal gas | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-----------------|
| NO Gas Cylinder # | LL84669 | Cal Gas Expiry Date | August 18, 2020 |
| NOX Cal Gas Conc. | <u>51.7</u> ppb | NO Cal Gas Conc. | <u>51.7</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 2658 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5611 |

Analyzer Information

| | | | | | |
|---------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1501663731 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 0.948 | 0.948 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.998 | 0.998 | PMT Temperature | -2.7 | -3.0 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 161.7 | 157.8 |
| NO bkgrnd | 9.6 | 9.6 | Sample Flow | 0.603 | 0.585 |
| NOX bkgrnd | 9.6 | 9.6 | PMT Voltage | -892.4 | -892.4 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.988436 | 0.986517 |
| NO _x Cal Offset | 0.494218 | 0.493259 |
| NO Cal Slope | 0.988802 | 0.986274 |
| NO Cal Offset | 0.494401 | 0.493137 |
| NO ₂ Cal Slope | NA | NA |
| NO ₂ Cal Offset | NA | NA |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.5 | 0.0 | ---- | ---- |
| as found span | 4933 | 77.5 | 799.7 | 799.7 | 0.0 | 810.1 | 810.3 | -0.2 | 0.9871 | 0.9869 |
| calibrator zero | 5005 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.5 | 0.0 | ---- | ---- |
| high point | 4933 | 77.5 | 799.7 | 799.7 | 0.0 | 810.1 | 810.3 | -0.2 | 0.9871 | 0.9869 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 0.9871 | 0.9869 |

| | | | | | |
|--------------------|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 810.6 ppb | NO = 810.8 ppb | | *Percent Change | NO _x = -0.3% |
| Previous Response | NO _x = 808.5 ppb | NO = 808.2 ppb | | *Percent Change | NO = -0.3% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | | | | | | | | |
| 1st NO2 (400 ppb O3) | | | | | | | | | |
| 2nd NO2 (200 ppb O3) | | | | | | | | | |
| 3rd NO2 (100 ppb O3) | | | | | | | | | |
| 2nd NO ref point | | | | | | | | | |
| Average Correction Factor | | | | | | | | | |

Notes: New cal gas cylinder installed. No adjustments. Analyzer pulling room air, hence high readings due to regulator being purged.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

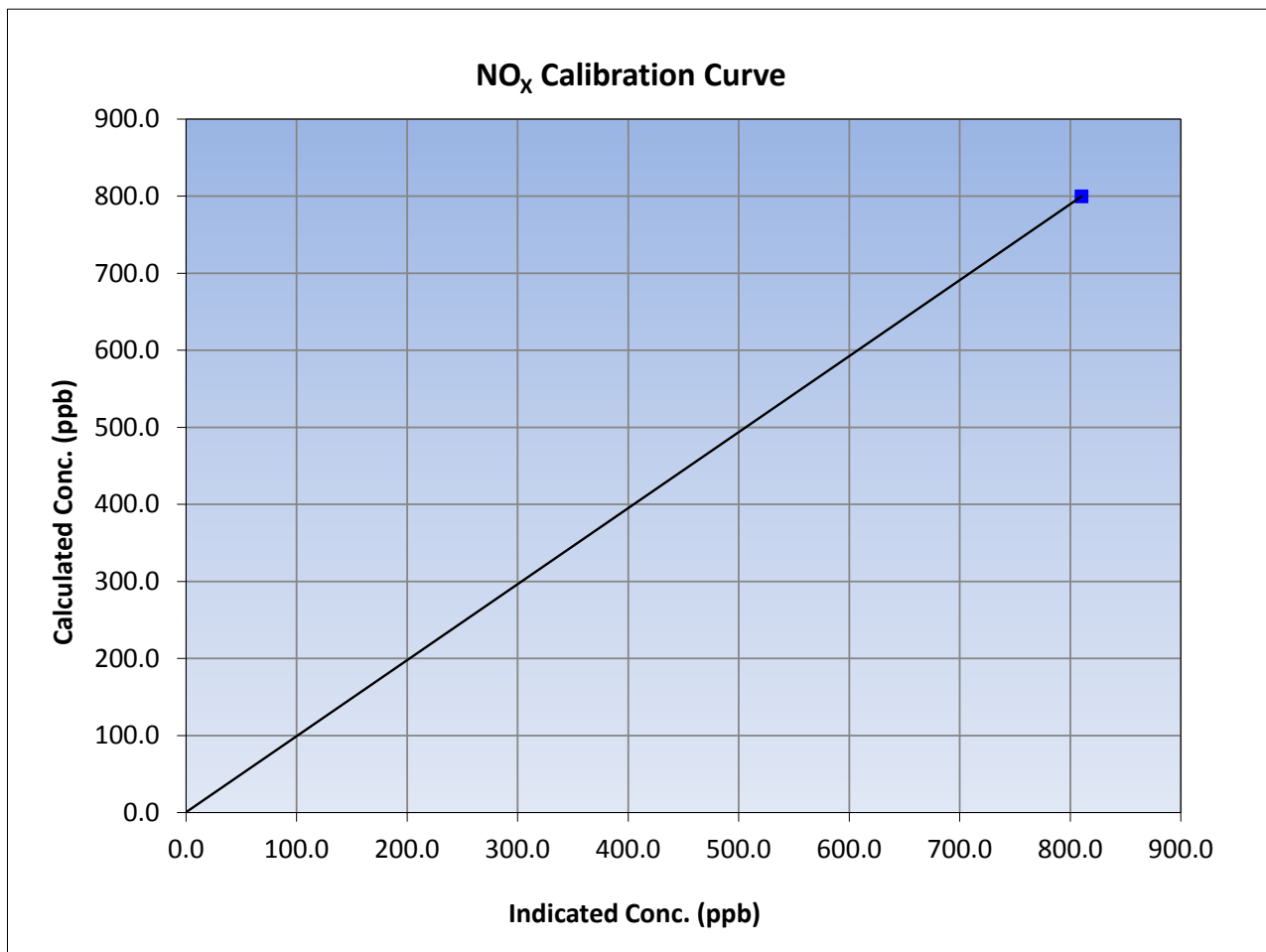
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 19, 2017 | Previous Calibration | September 15, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 12:25 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.5 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.7 | 810.1 | 0.9871 | | | |
| | | | | | |
| | | | Slope | 0.986517 | 0.90 - 1.10 |
| | | | Intercept | 0.493259 | +/-20 |





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

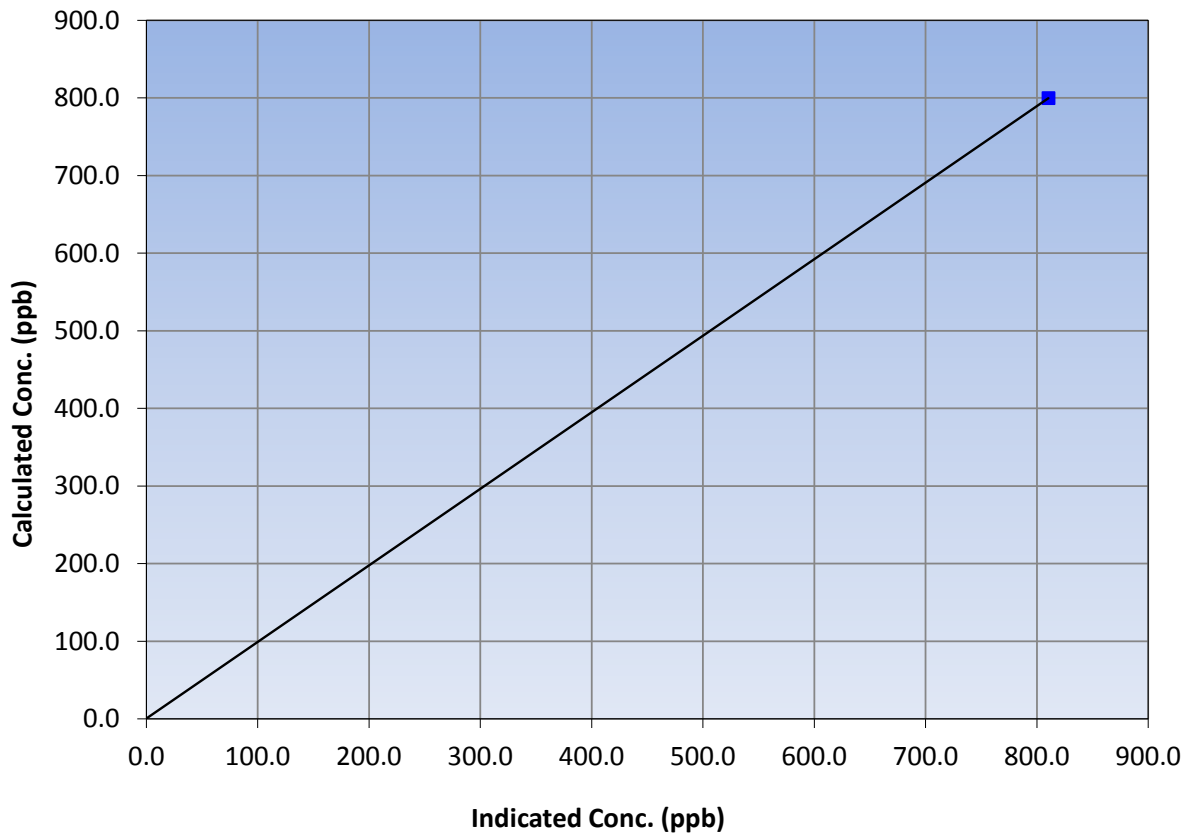
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 19, 2017 | Previous Calibration | September 15, 2017 |
| Station Name | Conklin | Station Number | AMS 21 |
| Start Time (MST) | 10:10 | End Time (MST) | 12:25 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.5 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 799.7 | 810.3 | 0.9869 | | | |
| | | | Slope | 0.986274 | 0.90 - 1.10 |
| | | | Intercept | 0.493137 | +/-20 |

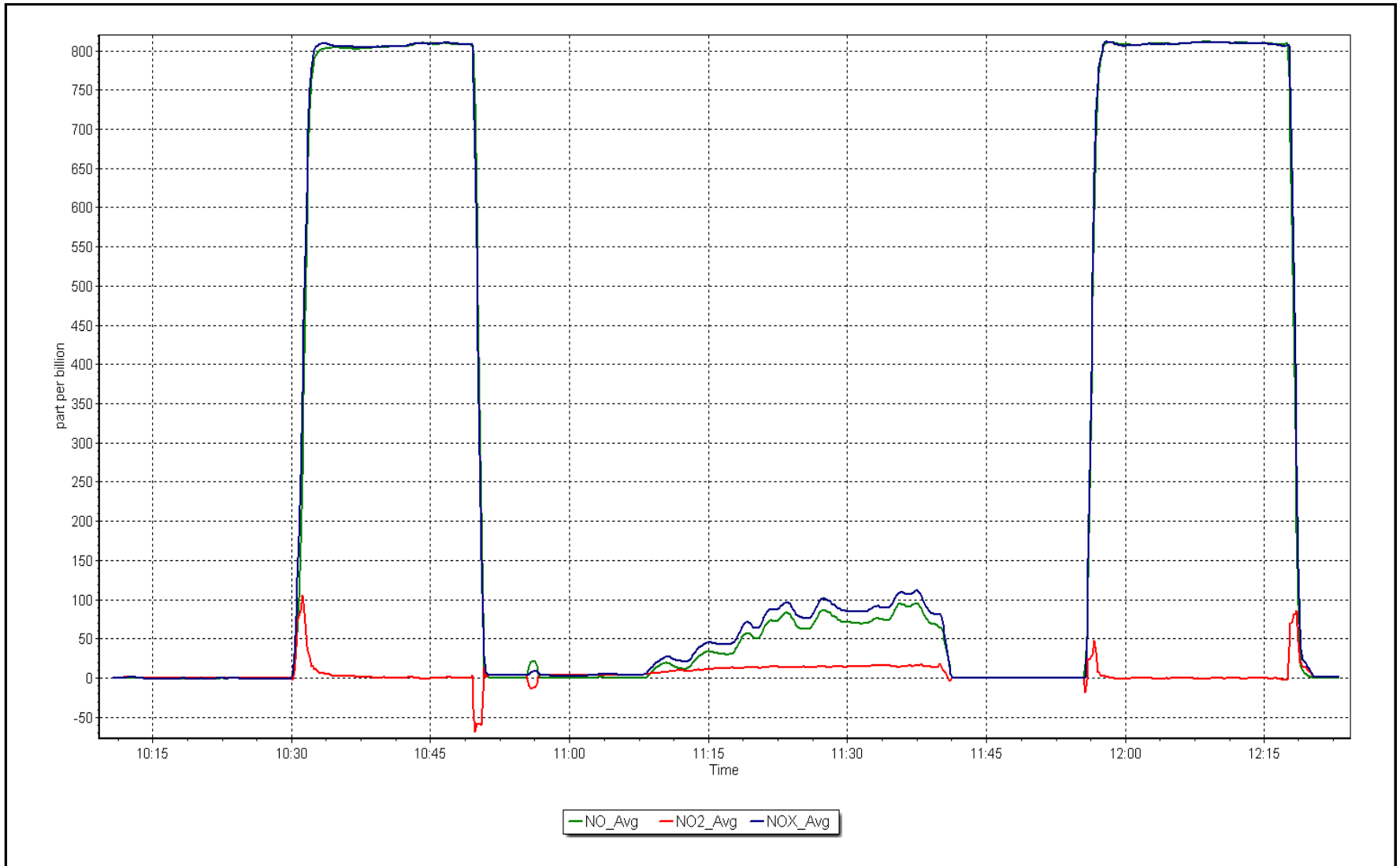
NO Calibration Curve



NO_x Calibration Plot

Date: September 19, 2017

Location: Conklin





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|-----------------|
| Station Name: | Conklin | Station number: | AMS 21 |
| Calibration Date: | September 15, 2017 | Last Cal Date: | August 10, 2017 |
| Start time (MST): | 10:45 | End time (MST): | 11:33 |
| Sharp Model: | 5030 | S/N: | 7494 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | CM-0404 |
| Flow Meter Make/Model: | Delta Cal | S/N: | 1019 |
| Temp/RH standard: | NA | S/N: | NA |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 13 | 14 | 13 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 959 | 959 | 959 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1008 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.2 | ----- | 0.2 | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input checked="" type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: July 27, 2017
 Flow w/o adaptor: _____ Flow w/ adaptor: _____

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-----------------------------------|--------------------------|---------------------------------|-----------------|
| <input type="checkbox"/> | Foil S/N: _____ | Foil S/N: _____ | |
| Foil Calibration | Foil Mass: _____ | Foil Mass: _____ | |
| | Calibration Date: _____ | Calibration Date: July 27, 2017 | |
| (Limit) +/- 5% of previous | Correction Factor: _____ | Correction Factor: _____ | --- |

Annual Calibration Test

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

Notes: Cyclone head cleaned. No adjustments made.

Calibration by: Asad Hidayat



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 22
JANVIER
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 675 | 35 | 45 | 98.61 | 3 | 0 | 1 | 0 |
| TRS(ppb) Average | 674 | 33 | 46 | 98.19 | 0 | 0 | 0 | 0 |
| THC(ppm) Average | 649 | 34 | 71 | 94.86 | 2.2 | - | 2.1 | - |
| NMHC(ppm) Average | 649 | 34 | 71 | 94.86 | 0.113 | - | 0.013 | - |
| CH4(ppm) Average | 649 | 34 | 71 | 94.86 | 2.2 | - | 2 | - |
| O3 (ppb) Average | 676 | 34 | 44 | 98.61 | 78 | 0 | 41 | - |
| NO2 (ppb) Average | 673 | 35 | 47 | 98.33 | 6 | 0 | 2 | - |
| NO (ppb) Average | 673 | 35 | 47 | 98.33 | 3 | - | 1 | - |
| NOX (ppb) Average | 673 | 35 | 47 | 98.33 | 8 | - | 2 | - |
| PM2.5 (ug/m3) Average | 709 | 2 | 11 | 98.75 | 70.3 | - | 21.7 | 0 |
| Wind Speed 10 m (km/h) Average | 717 | 3 | 3 | 100 | 19 | - | 11 | - |
| Wind Direction 10 m (deg) Average | 717 | 3 | 3 | 100 | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 28.8 | - | 18.4 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 98 | - | 96.0 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 675 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| TRS (ppb) Average | 674 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| THC (ppm) Average | 649 | 1.92 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2 | 2.2 |
| NMHC(ppm) Average | 649 | 0.001 | 0.007 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0.113 |
| CH4(ppm) Average | 649 | 1.92 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2 | 2.2 |
| O3 (ppb) Average | 676 | 28.8 | 10 | - | 7 | 15 | 22 | 29 | 35 | 41 | 78 |
| NO2 (ppb) Average | 673 | 0.7 | 1 | - | 0 | 0 | 0 | 1 | 1 | 2 | 6 |
| NO (ppb) Average | 673 | 0.5 | 0 | - | 0 | 0 | 0 | 0 | 1 | 1 | 3 |
| NOX (ppb) Average | 673 | 1.2 | 1 | - | 0 | 1 | 1 | 1 | 2 | 2 | 8 |
| PM2.5 (ug/m3) Average | 709 | 5.44 | 6.6 | - | 0.4 | 1.6 | 2.1 | 3.3 | 5.8 | 12 | 70.3 |
| Wind Speed 10 m (km/h) Average | 717 | 5.8 | 4 | - | 0 | 1 | 3 | 5 | 8 | 11 | 19 |
| Wind Direction 10 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 11.03 | 6.2 | - | -2.1 | 3.7 | 6.1 | 10.8 | 15.1 | 19.7 | 28.8 |
| Relative Humidity (%) Average | 720 | 72.3 | 20 | - | 26 | 41 | 58 | 75 | 92 | 96 | 98 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS 22)
 SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|--------------------------|-------------------|-------------------|---------------------|---|
| NOX, O3, SO2, THC | 01 Sep 2017 14:00 | 01 Sep 2017 14:00 | 1 | Maintenance - manifold maintenance |
| O3, PM2.5, SO2, THC, TRS | 10 Sep 2017 15:00 | 10 Sep 2017 23:00 | 9 | Station power failure |
| NO2, NO, NOX | 10 Sep 2017 15:00 | 11 Sep 2017 01:00 | 11 | Station power failure |
| NMHC, CH4, THC | 29 Sep 2017 11:00 | 29 Sep 2017 11:00 | 1 | Maintenance - carrier gas replacement |
| TRS | 01 Sep 2017 11:00 | 01 Sep 2017 14:00 | 4 | Maintenance - WBEA internal audit |
| NMHC, CH4, THC | 04 Sep 2017 09:00 | 05 Sep 2017 10:00 | 26 | Analyzer Failure - depleted fuel cylinder |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Janvier - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 3 ppb on Sep 8 17:00 | Maximum Daily Average: 0.6 ppb on Sep 29 | | Hours of Data: | 675 |
| Minimum Value: 0 ppb on Sep 5 01:00 | Minimum Daily Average: 0.0 ppb on Sep 20 | | Hours of Missing Data: | 45 |
| Maximum Diurnal Average: 0.4 ppb at hour 16 | Minimum Diurnal Average: 0.1 ppb at hour 2 | | Hours of Calibration: | 35 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 2 | | Percent Operational Time: | 98.6 |

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

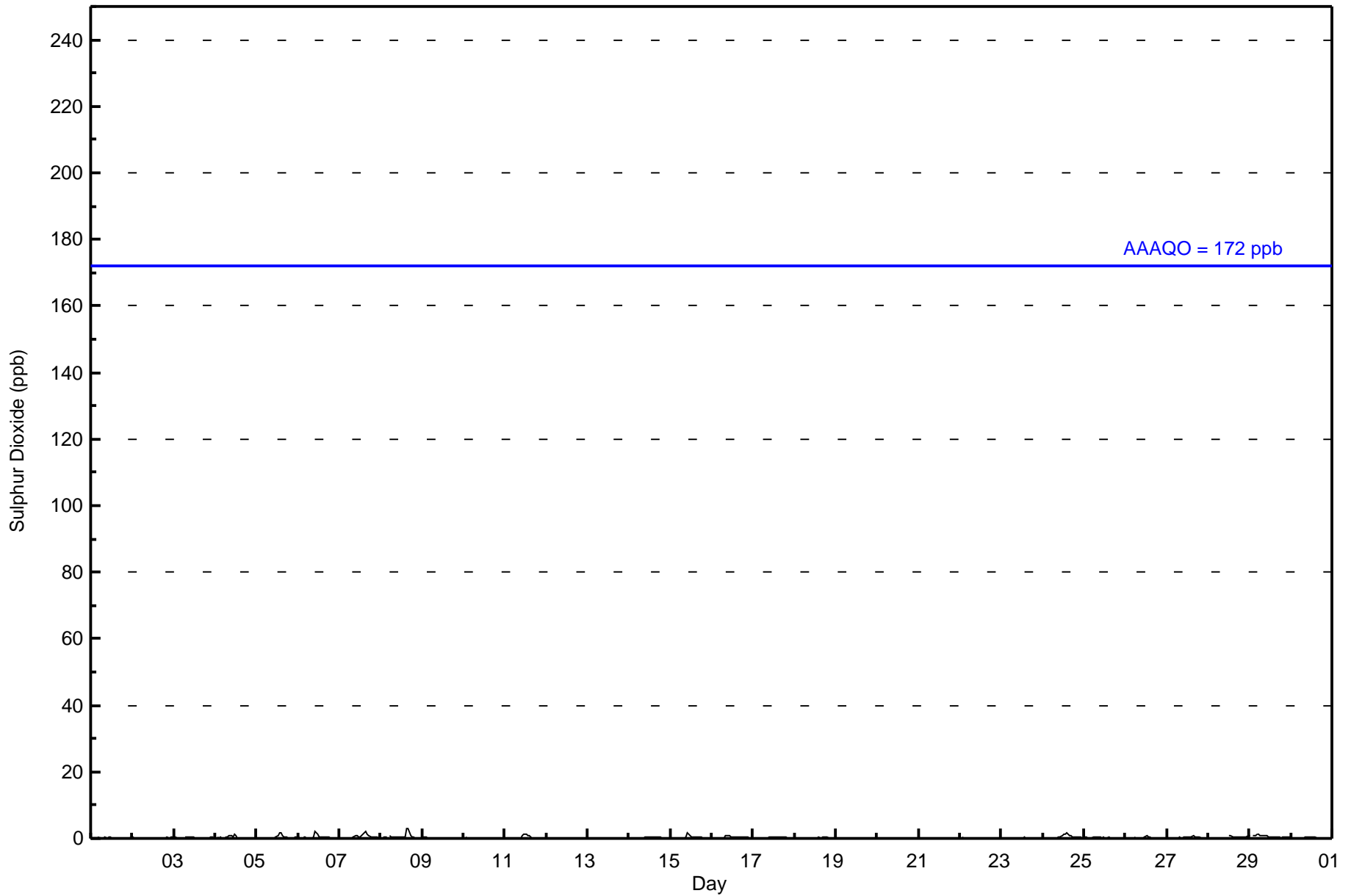
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | Diurnal Average | | |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Janvier - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Janvier - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 675 | 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: 675

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Janvier - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 93 | 40 | 35 | 34 | 16 | 9 | 12 | 672 |
| 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 | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 93 | 40 | 35 | 34 | 16 | 9 | 12 | 672 |

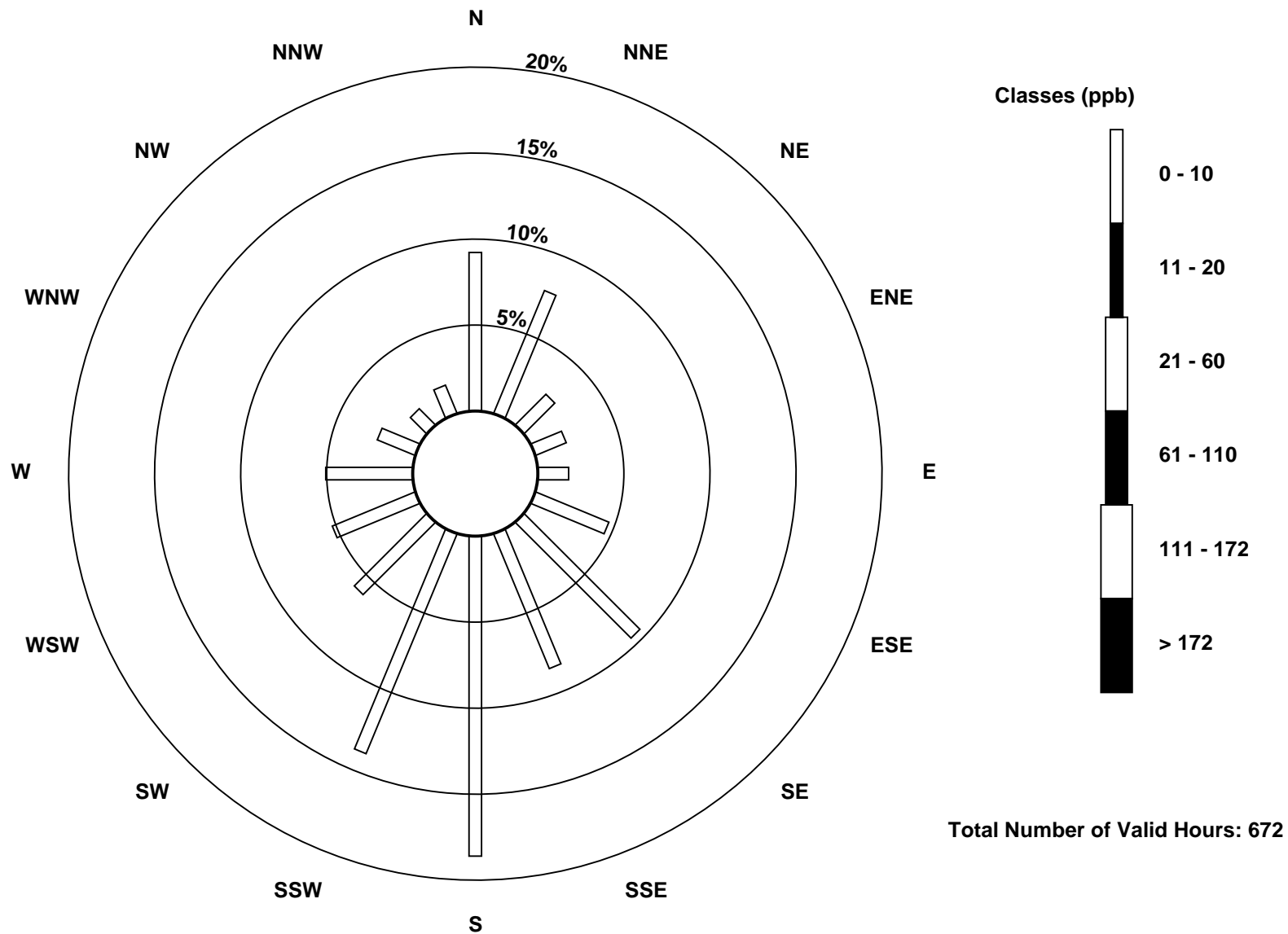
Total Number of Valid Hours: 672

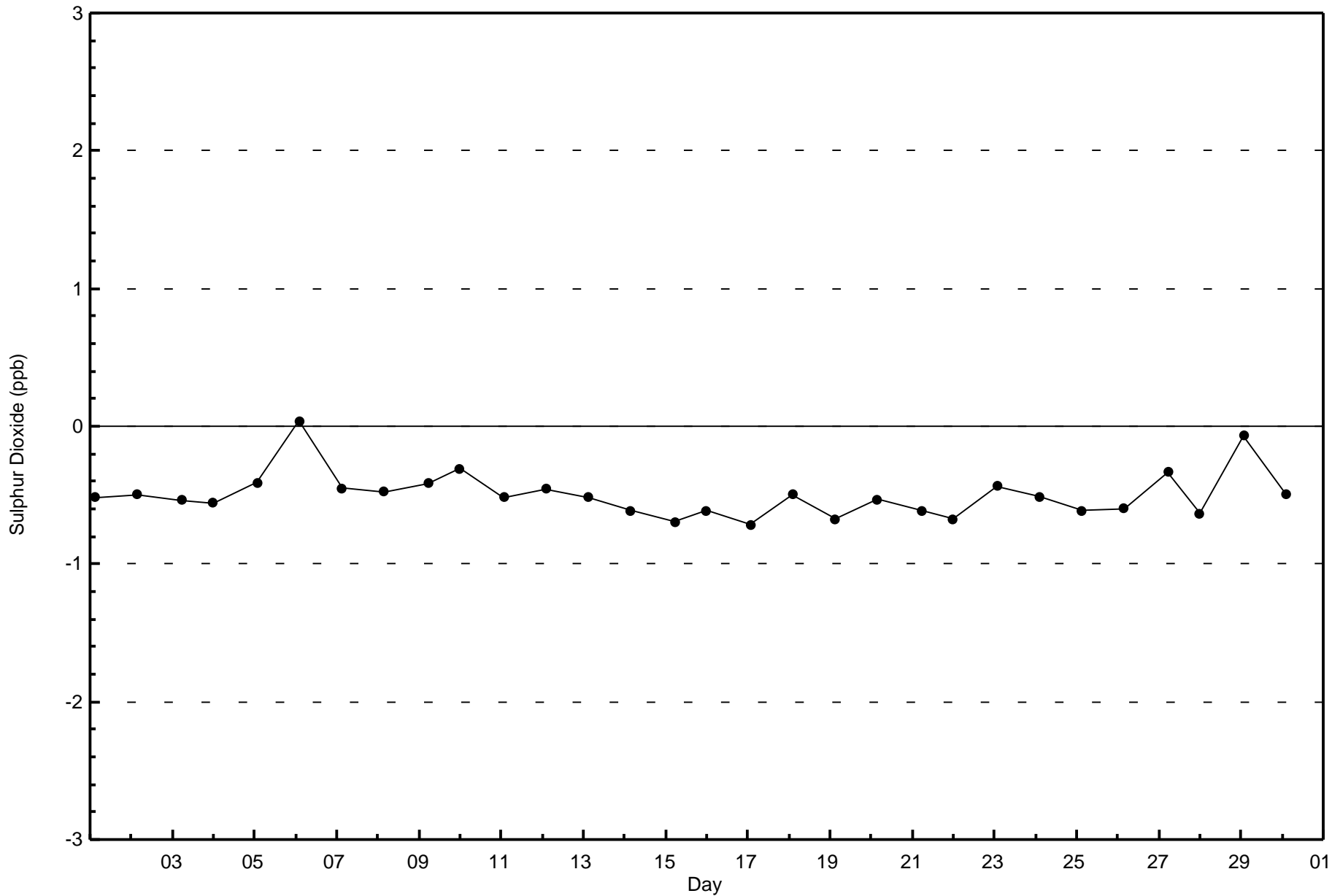
Total Number of Hours: 720

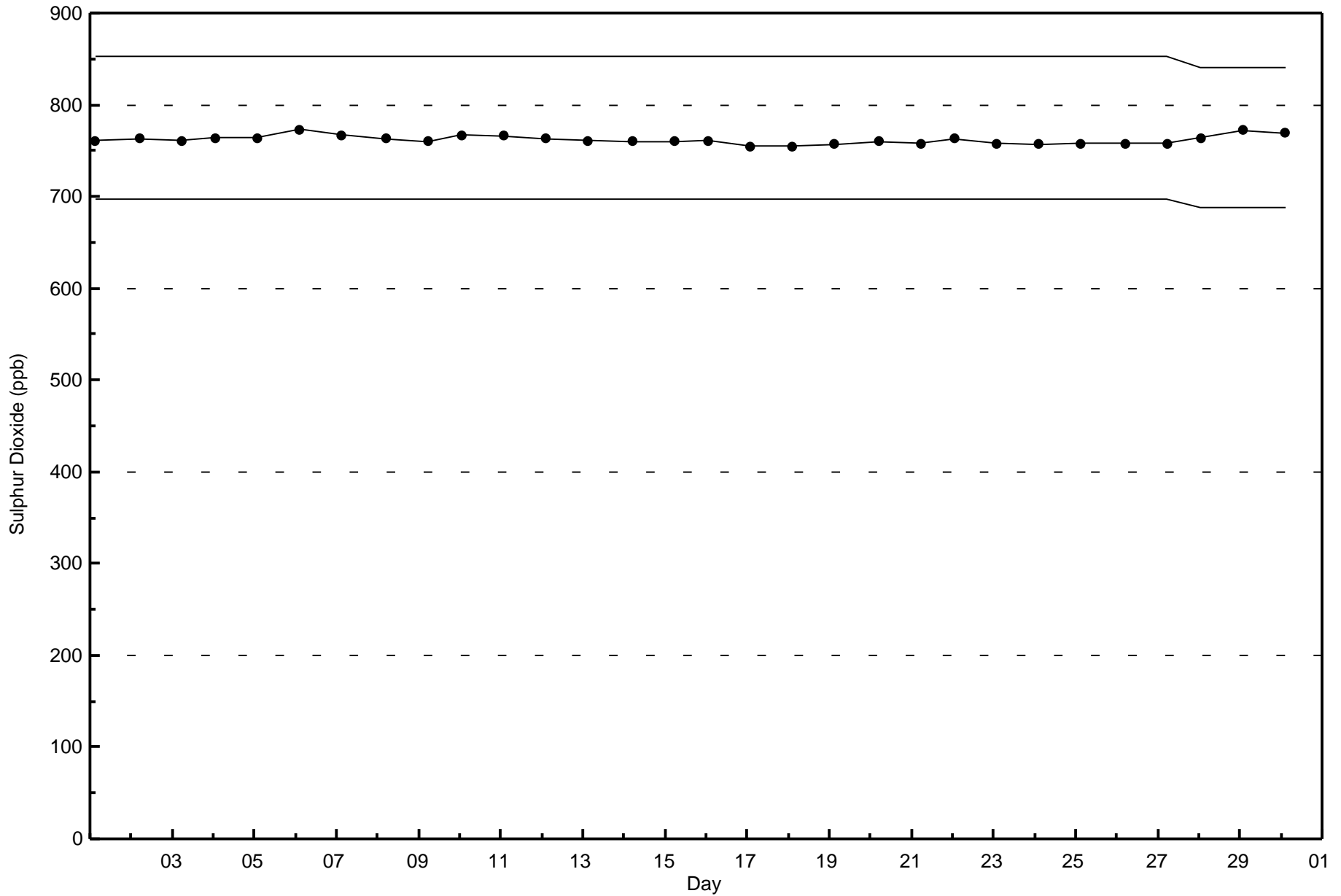


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Janvier (AMS 22)









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Janvier - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 0 ppb on Sep 8 17:00 | Maximum Daily Average: 0.2 ppb on Sep 8 | | Hours of Data: | 674 |
| Minimum Value: 0 ppb on Sep 23 07:00 | Minimum Daily Average: 0.1 ppb on Sep 23 | | Hours of Missing Data: | 46 |
| Maximum Diurnal Average: 0.2 ppb at hour 19 | Minimum Diurnal Average: 0.1 ppb at hour 6 | | Hours of Calibration: | 33 |
| 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 = 0 | | Percent Operational Time: | 98.2 |

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

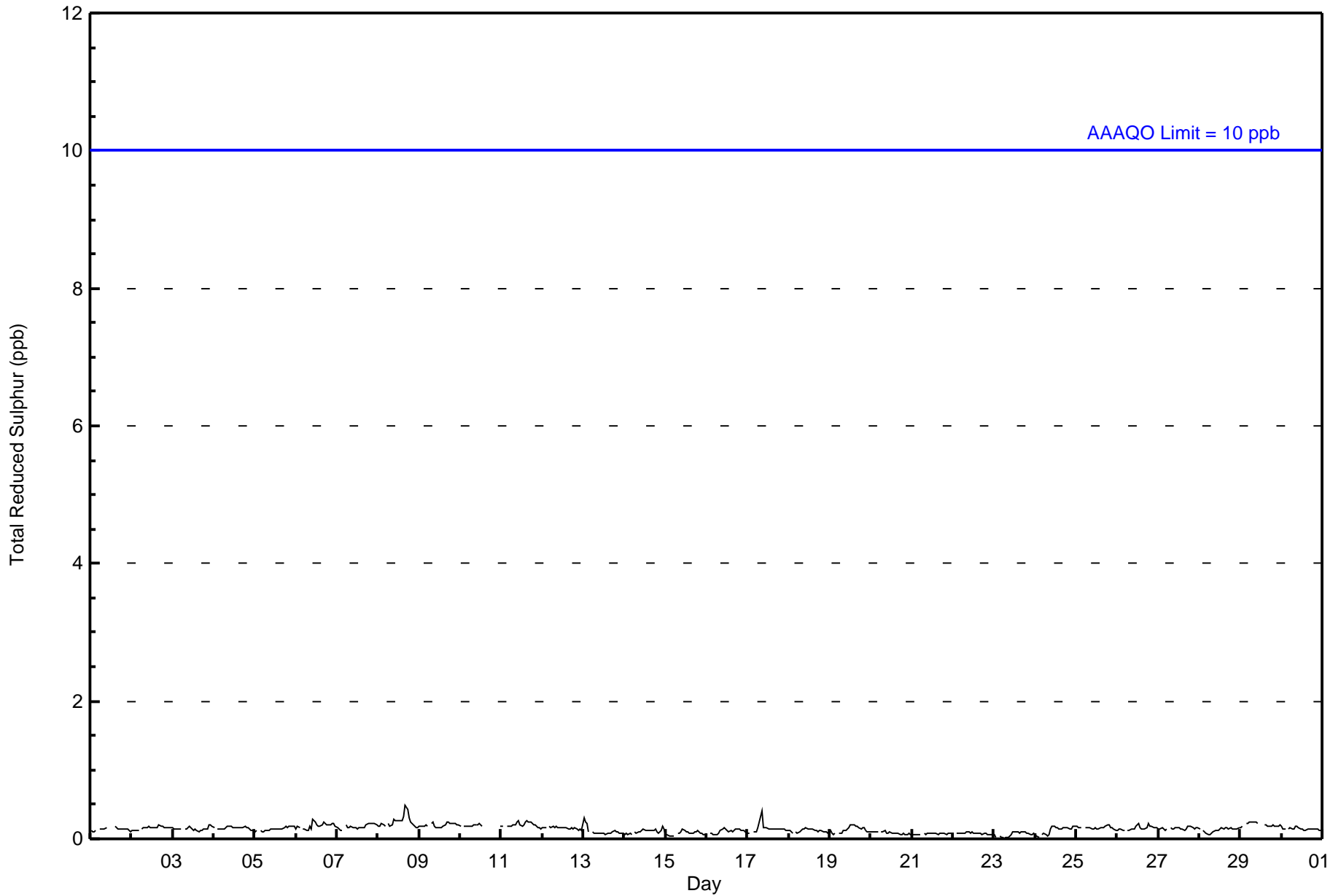
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | Diurnal Average |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Janvier - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Janvier - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 674 | 100.00 | 100.00 |
| 3 - 4 | 0 | 0.00 | 100.00 |
| 5 - 7 | 0 | 0.00 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 674

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Janvier - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 62 | 54 | 18 | 12 | 12 | 30 | 64 | 57 | 123 | 93 | 39 | 35 | 34 | 17 | 9 | 12 | 671 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 62 | 54 | 18 | 12 | 12 | 30 | 64 | 57 | 123 | 93 | 39 | 35 | 34 | 17 | 9 | 12 | 671 |

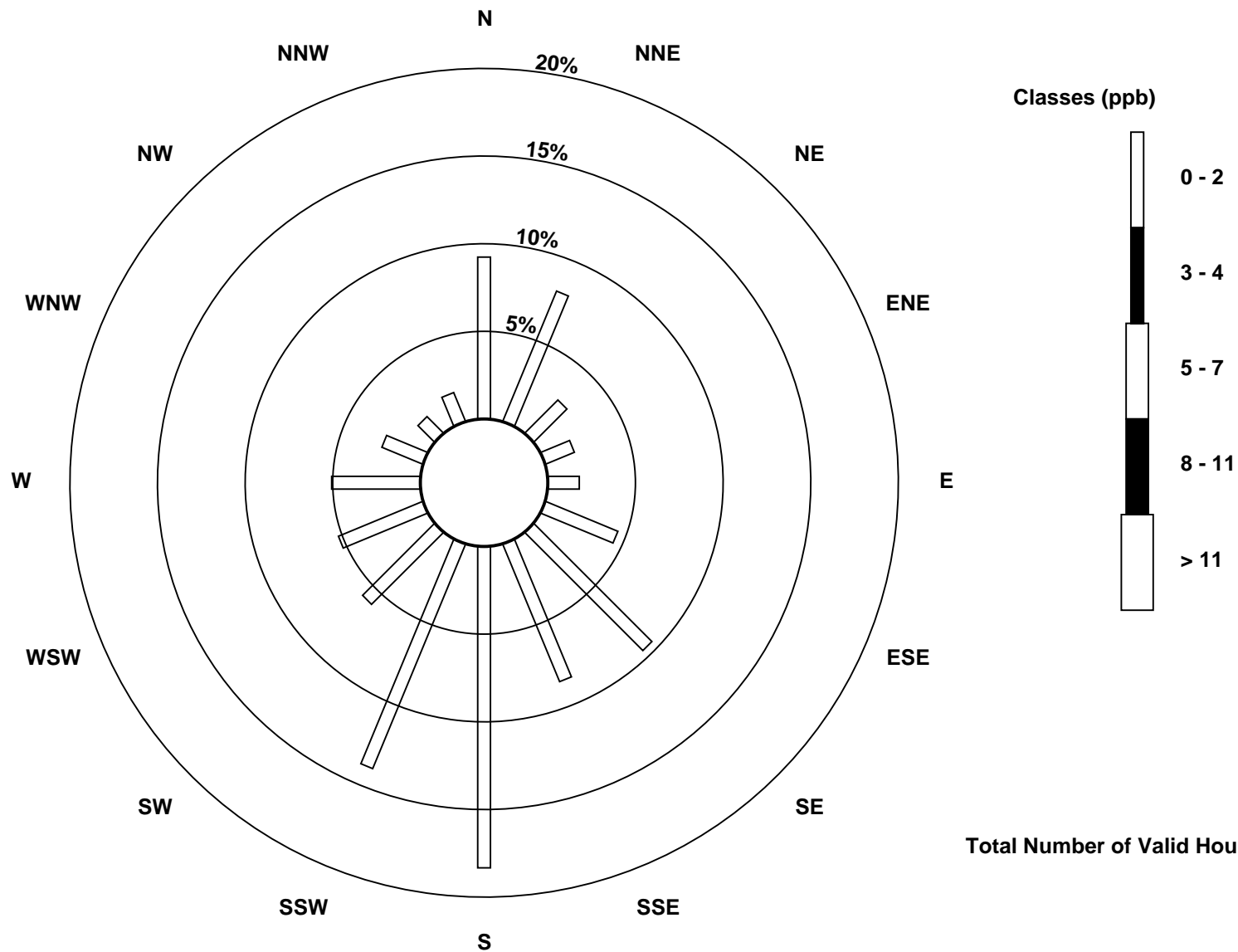
Total Number of Valid Hours: 671

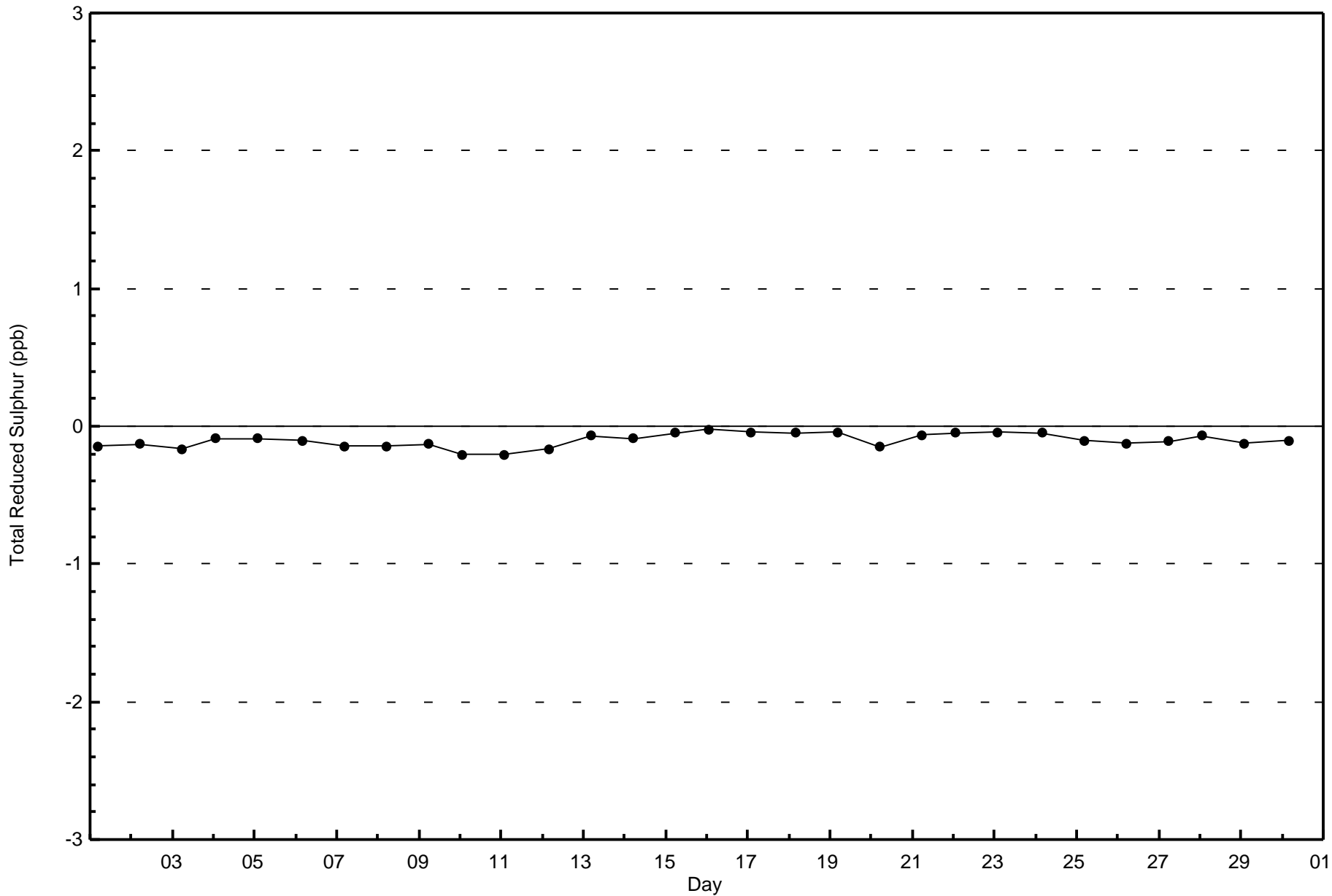
Total Number of Hours: 720

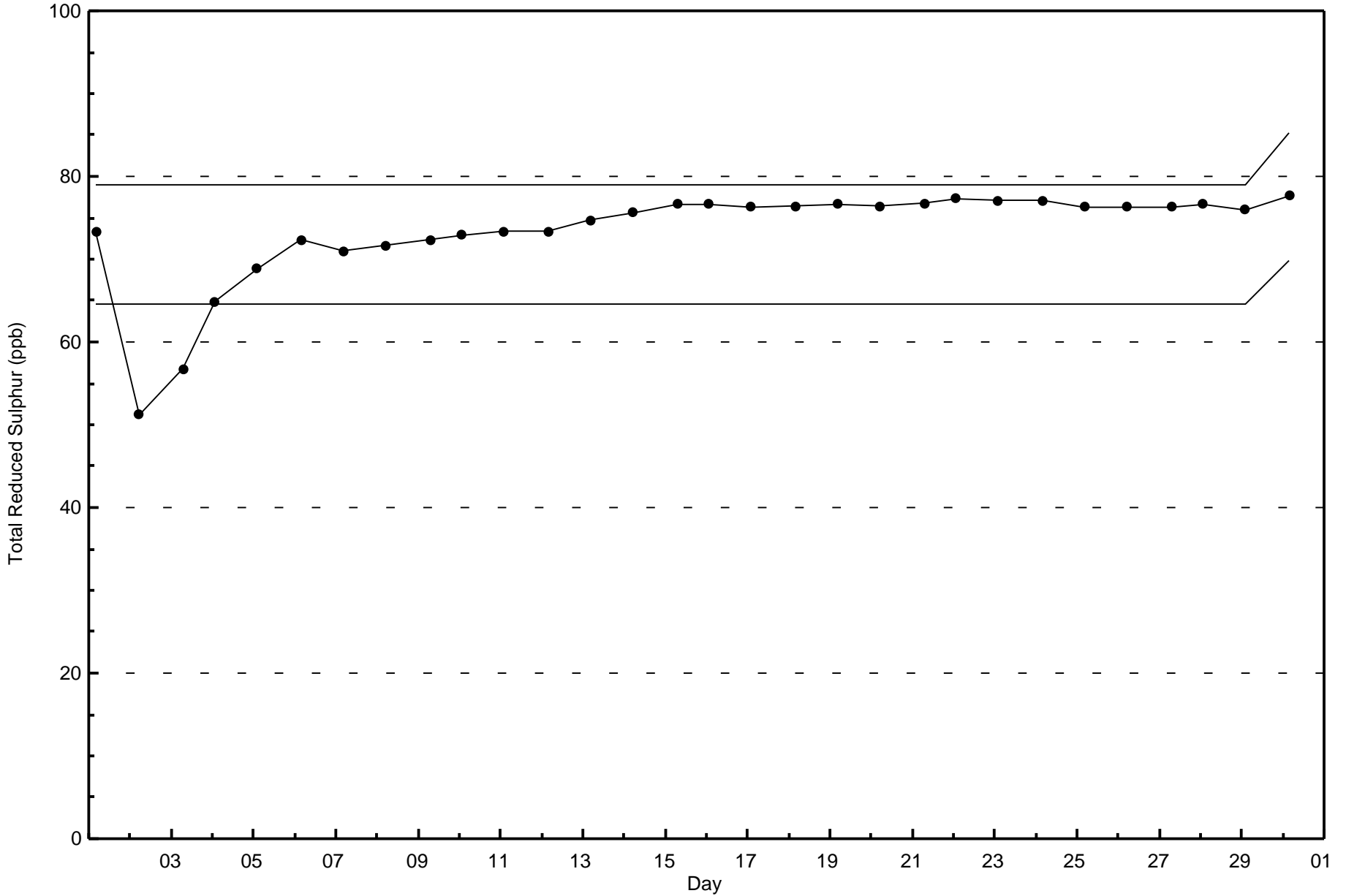


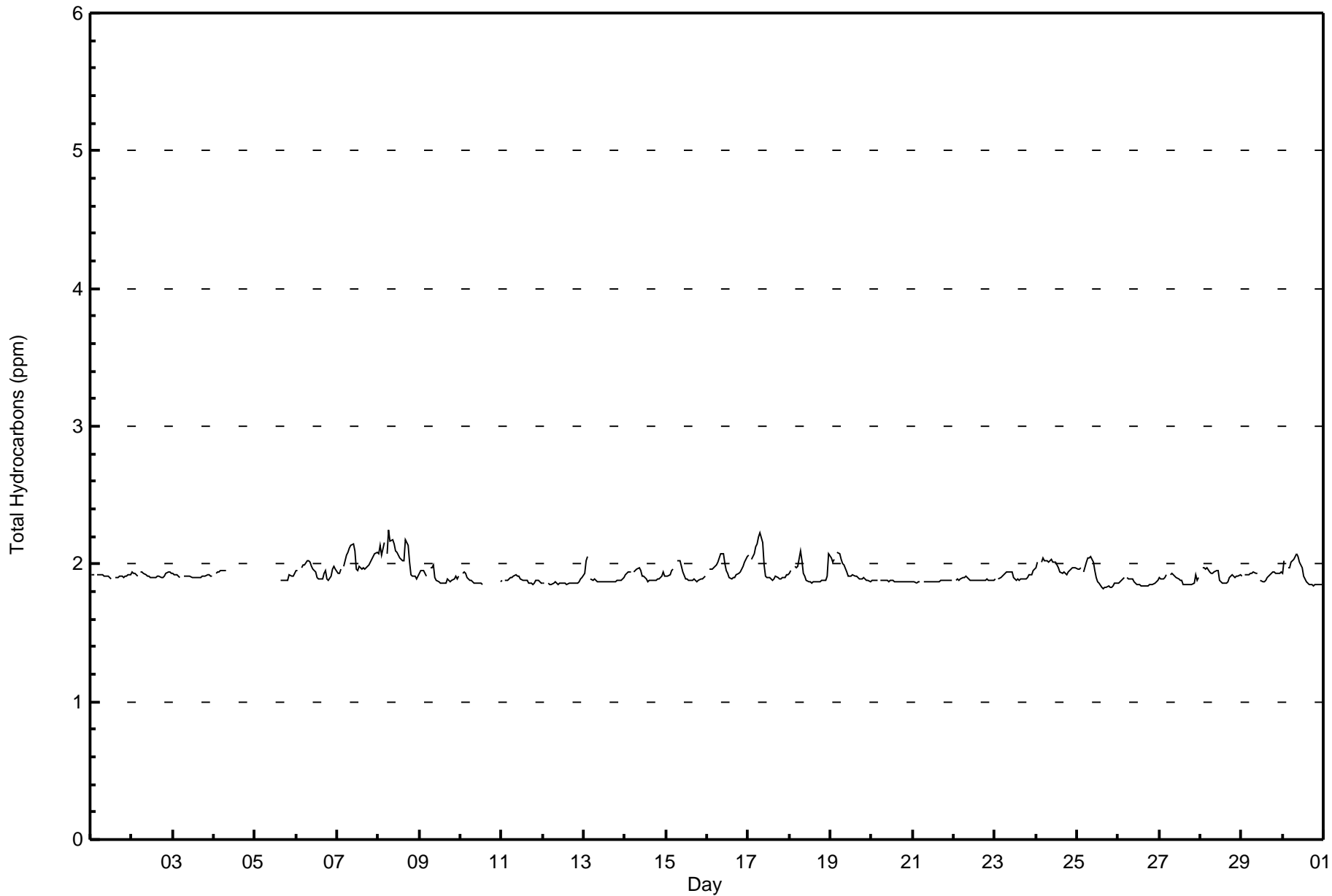
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Reduced Sulphur (TRS) - ppb
Janvier (AMS 22)











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Janvier - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 610 | 93.99 | 93.99 |
| 2.1 - 3.0 | 39 | 6.01 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 649

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Janvier - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 57 | 50 | 15 | 13 | 12 | 29 | 60 | 47 | 117 | 82 | 32 | 36 | 30 | 13 | 6 | 8 | 607 |
| 2.1 - 3.0 | 5 | 2 | 2 | 0 | 0 | 1 | 3 | 6 | 5 | 5 | 4 | 0 | 2 | 1 | 3 | 0 | 39 |
| 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 | 62 | 52 | 17 | 13 | 12 | 30 | 63 | 53 | 122 | 87 | 36 | 36 | 32 | 14 | 9 | 8 | 646 |

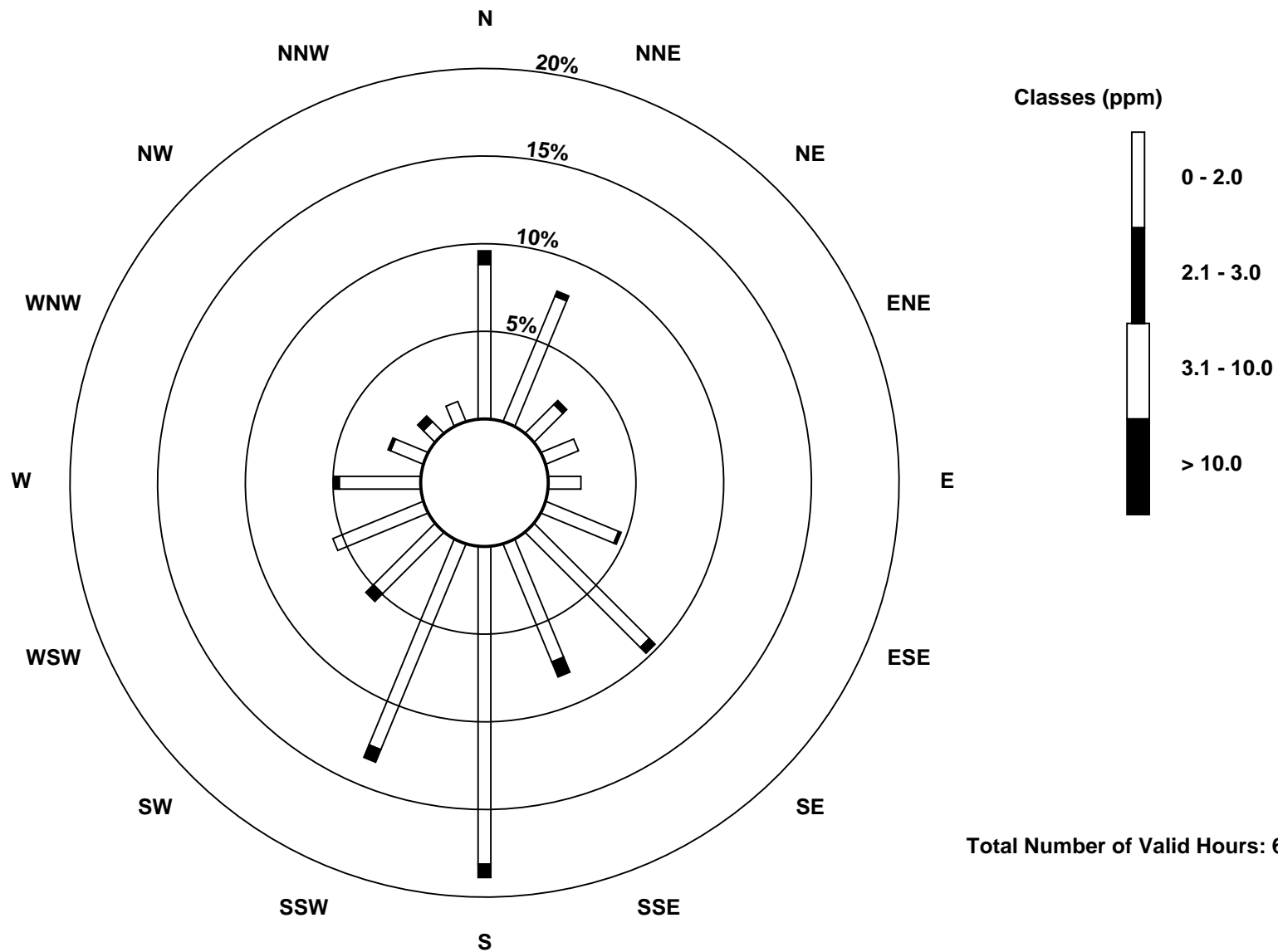
Total Number of Valid Hours: 646

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Janvier (AMS 22)



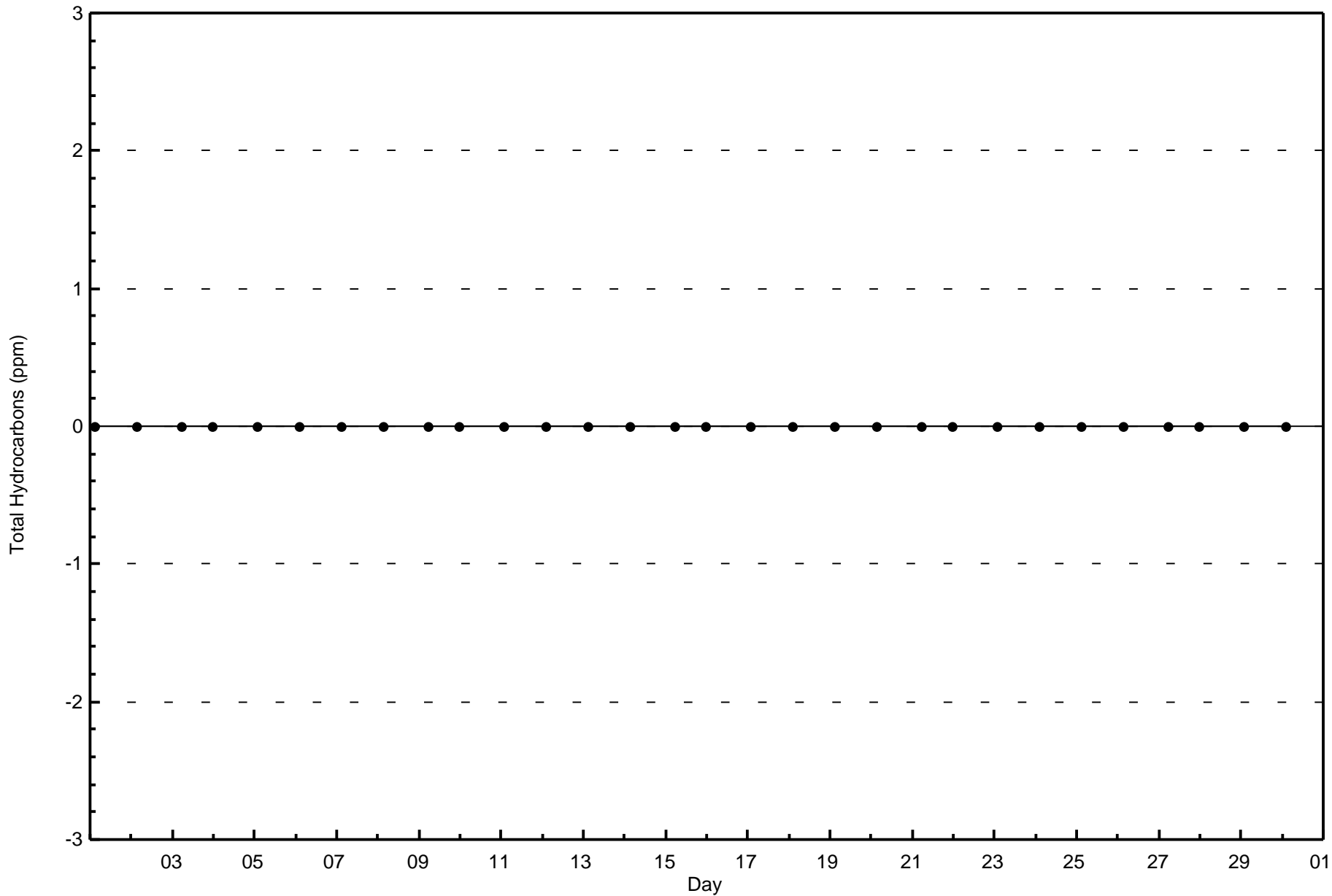


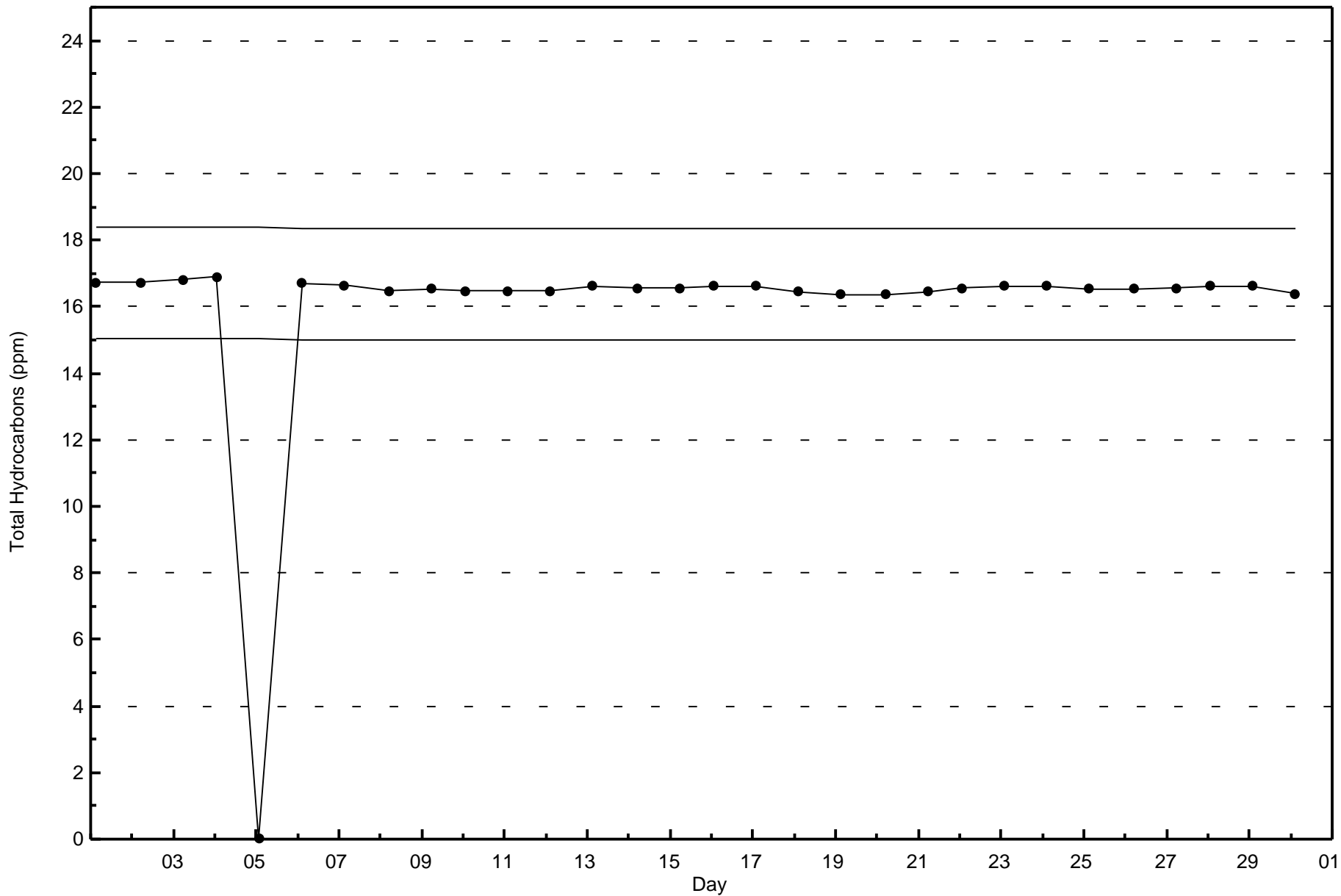
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Janvier - September 2017



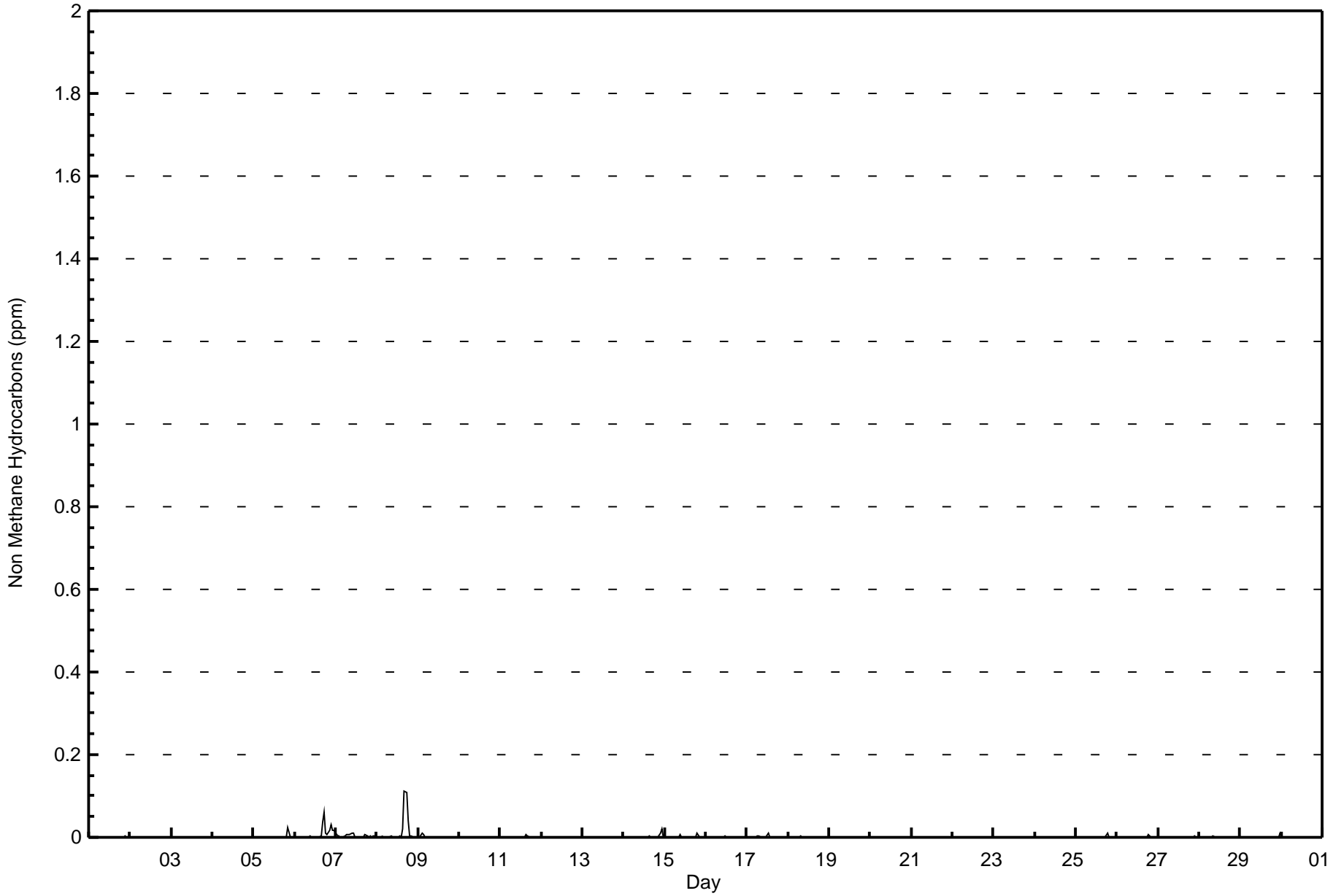




| | | |
|---|--|--------------------------------|
| Maximum Value: 0.113 ppm on Sep 8 17:00 | Maximum Daily Average: 0.013 ppm on Sep 8 | Hours in Service: 720 |
| Minimum Value: 0.000 ppm on Sep 1 01:00 | Minimum Daily Average: 0.000 ppm on Sep 3 | Hours of Data: 649 |
| Maximum Diurnal Average: 0.006 ppm at hour 18 | Minimum Diurnal Average: 0.000 ppm at hour 5 | Hours of Missing Data: 71 |
| 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: 34 |
| | | Percent Operational Time: 94.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|-----------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 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 | M | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 0.000 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | C | C | C | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.023 | 0.001 | 0.000 | 0.001 | -- | 0.023 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.002 | 0.001 | 0.000 | 0.001 | 0.001 | 0.003 | 0.036 | 0.061 | 0.011 | 0.006 | 0.018 | 0.029 | 0.017 | 0.018 | 0.009 | 0.061 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 0.008 | 0.003 | 0.002 | Z | 0.001 | 0.004 | 0.008 | 0.007 | 0.005 | 0.010 | 0.011 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.006 | 0.002 | 0.001 | 0.002 | 0.001 | 0.002 | 0.002 | 0.003 | 0.011 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 0.000 | 0.000 | 0.000 | 0.002 | Z | 0.001 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.001 | 0.000 | 0.004 | 0.001 | 0.019 | 0.113 | 0.107 | 0.042 | 0.003 | 0.003 | 0.000 | 0.000 | 0.000 | 0.013 | 0.113 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 0.000 | 0.001 | 0.009 | 0.006 | 0.000 | Z | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 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 | PF | PF | PF | PF | PF | PF | PF | PF | PF | PF | 0.000 | -- | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0.001 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.008 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.008 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0.000 | 0.001 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.022 | 0.000 | 0.001 | 0.022 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0.000 | 0.000 | 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 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 0.000 | 0.001 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 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 | 0.001 | 0.000 | 0.001 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 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 | 0.009 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 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 | 0.005 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.002 | 0.000 | 0.000 | 0.000 | 0.003 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 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 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.000 | 0.001 | 0.010 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 0.005 | 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 | 0.005 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.005 | 0.006 | 0.003 | 0.001 | 0.002 | 0.002 | 0.002 | 0.001 | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.008 | 0.003 | 0.009 | 0.006 | 0.001 | 0.004 | 0.008 | 0.007 | 0.005 | 0.010 | 0.011 | 0.003 | 0.009 | 0.004 | 0.001 | 0.019 | 0.113 | 0.107 | 0.042 | 0.009 | 0.023 | 0.029 | 0.022 | 0.018 | Diurnal Maximum | |

| | | | | |
|--------------|-----------------|-----------------|-----------------------|--------------------|
| Z - zerospan | C - Calibration | M - Maintenance | AF - Analyzer Failure | PF - Power Failure |
|--------------|-----------------|-----------------|-----------------------|--------------------|





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Janvier - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 621 | 95.69 | 95.69 |
| 0.006 - 0.05 | 25 | 3.85 | 99.54 |
| 0.06 - 0.1 | 3 | 0.46 | 100.00 |
| > 0.1 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 649

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Janvier - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 61 | 49 | 17 | 13 | 12 | 25 | 57 | 48 | 117 | 87 | 35 | 36 | 31 | 14 | 8 | 8 | 618 |
| 0.006 - 0.05 | 0 | 3 | 0 | 0 | 0 | 4 | 6 | 5 | 5 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 25 |
| 0.06 - 0.1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| > 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 62 | 52 | 17 | 13 | 12 | 30 | 63 | 53 | 122 | 87 | 36 | 36 | 32 | 14 | 9 | 8 | 646 |

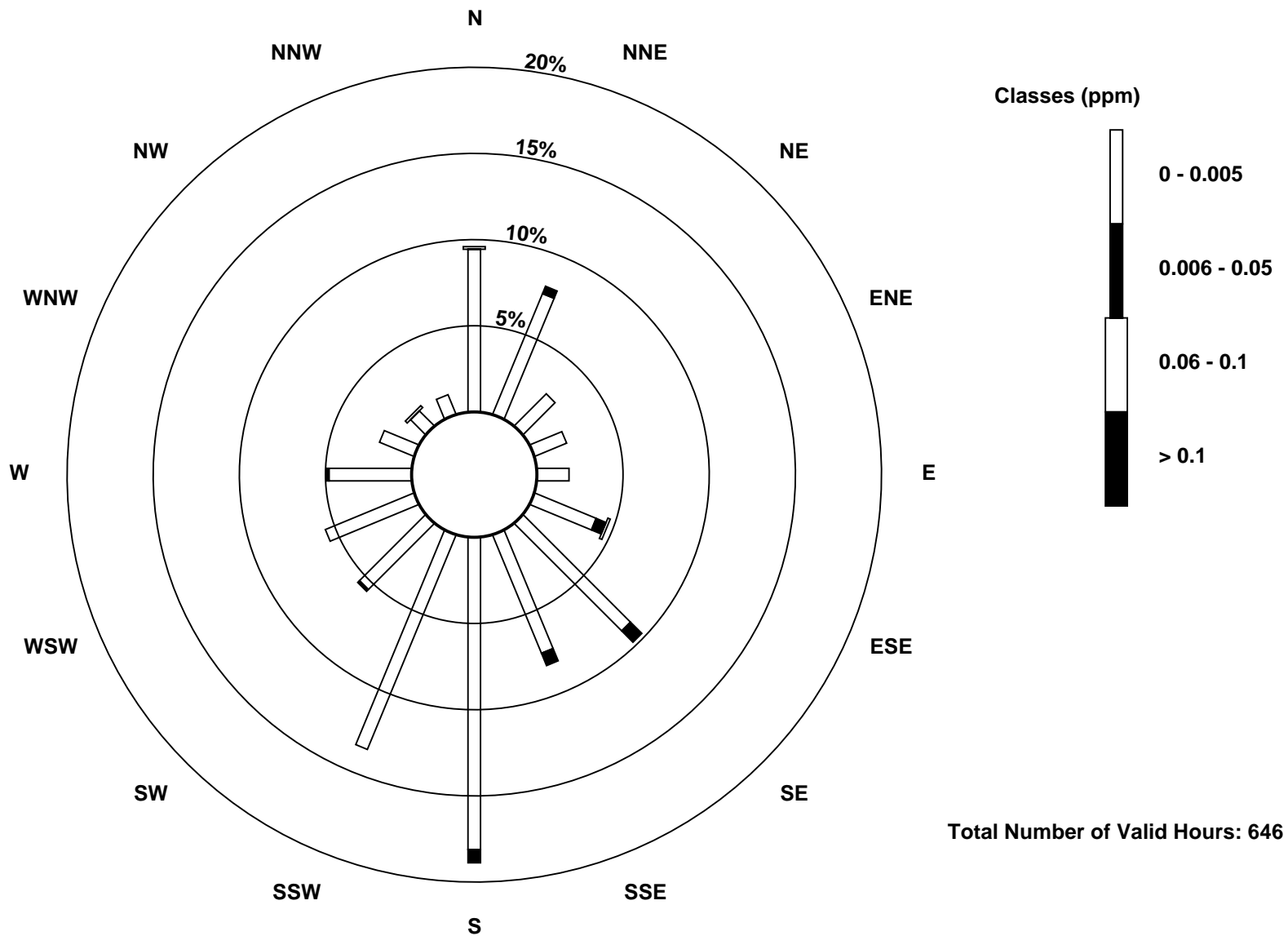
Total Number of Valid Hours: 646

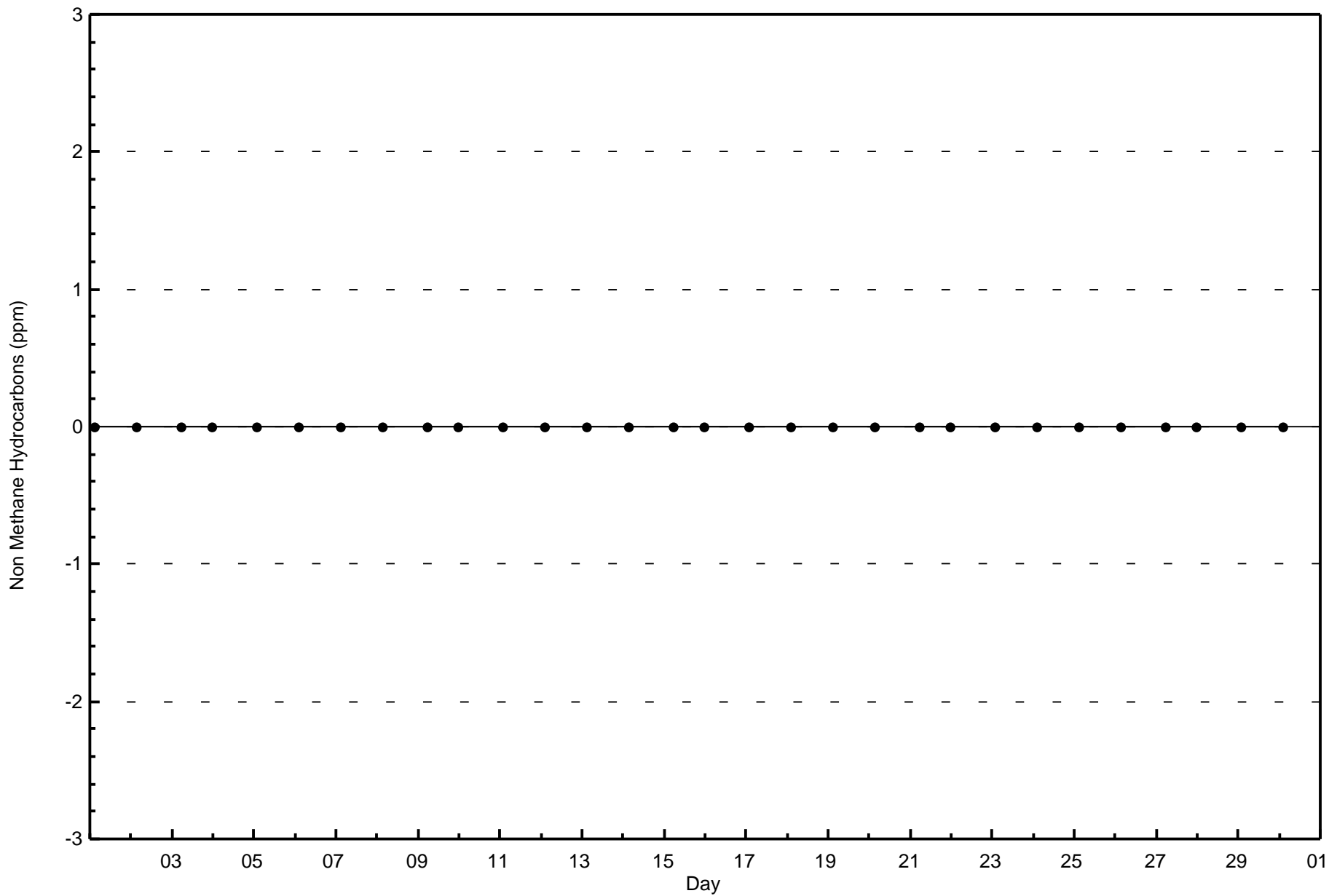
Total Number of Hours: 720

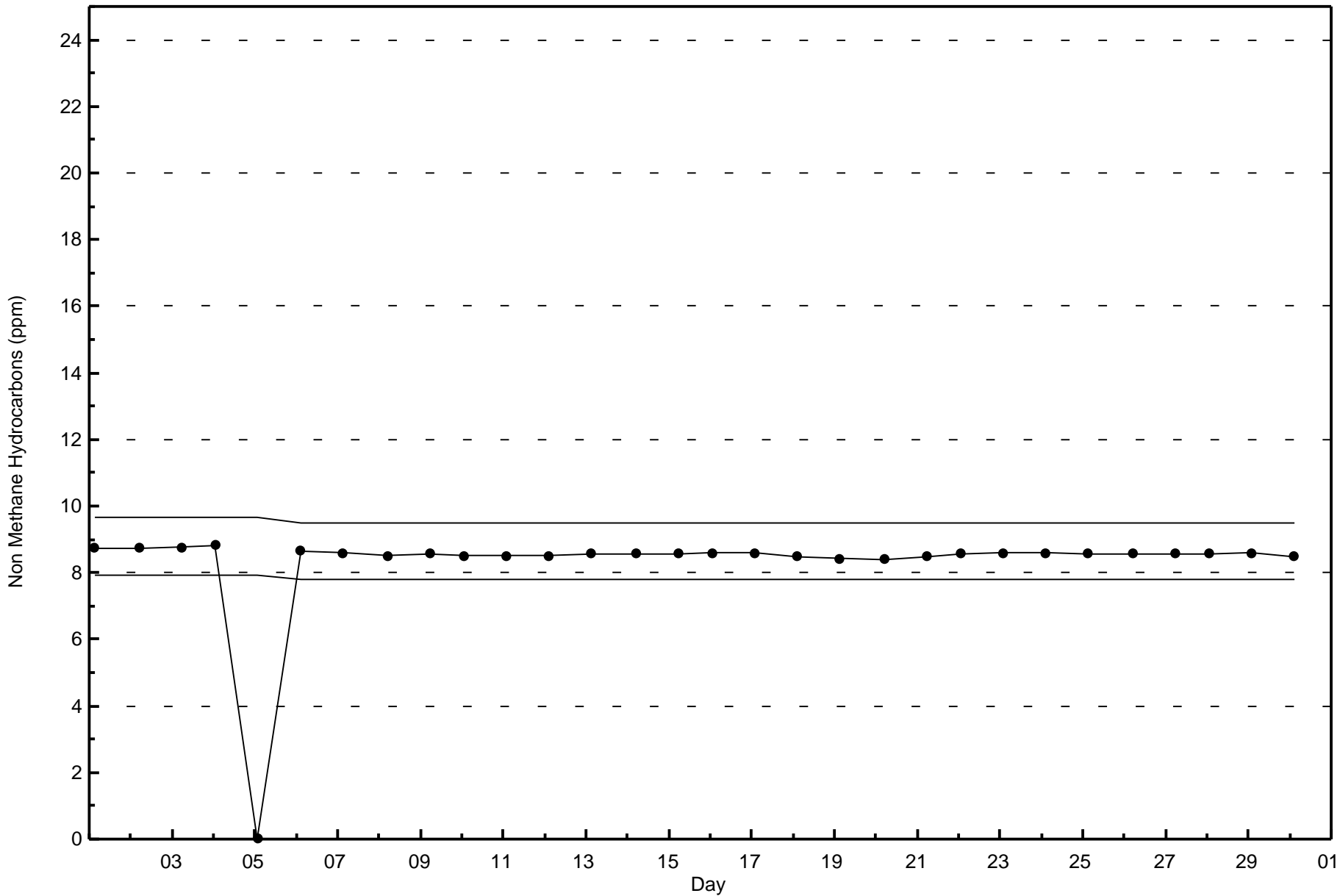


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Non Methane Hydrocarbons (NMHC) - ppm
Janvier (AMS 22)



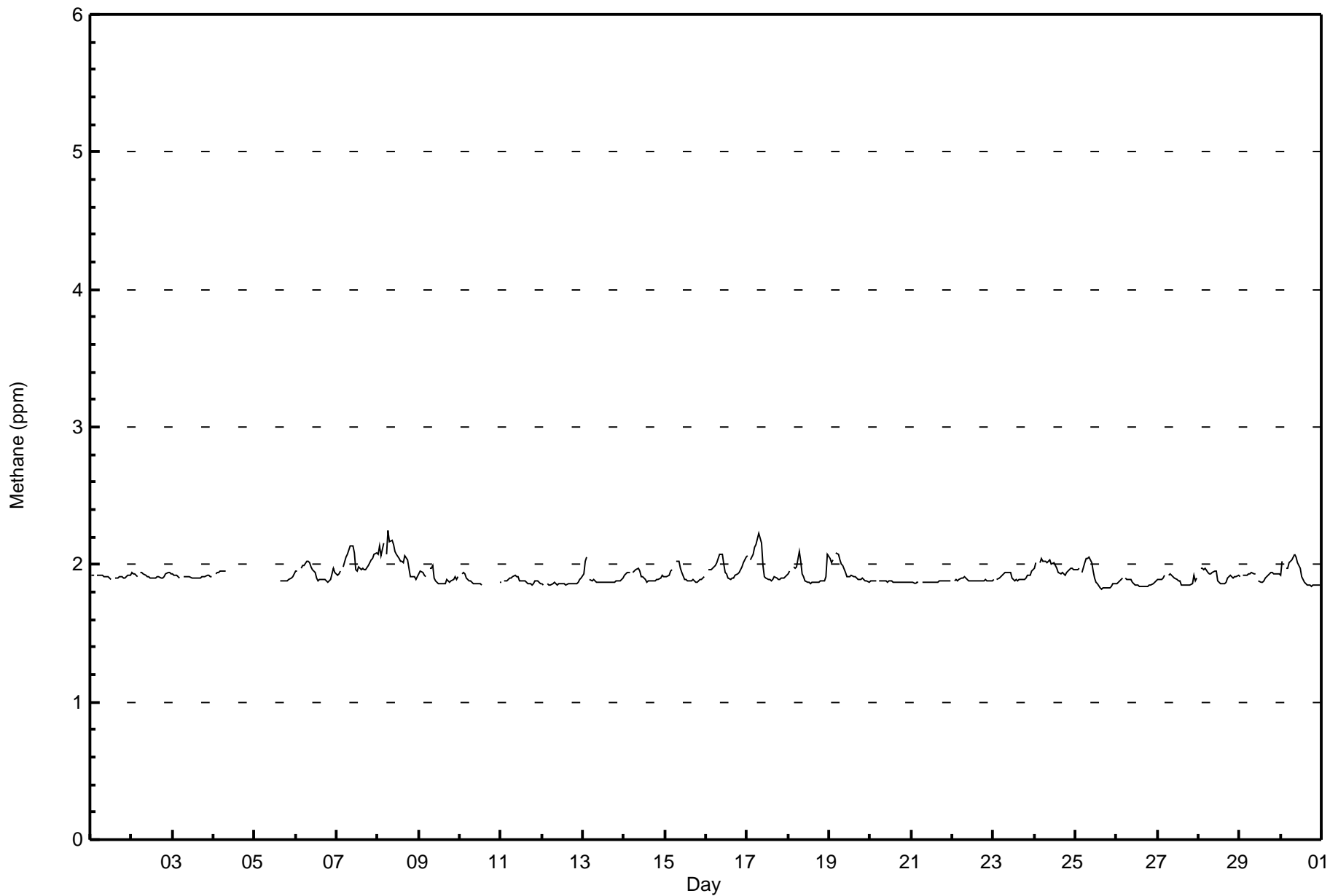






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Janvier - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Janvier - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 611 | 94.14 | 94.14 |
| 2.1 - 3.0 | 38 | 5.86 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 649

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Janvier - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 57 | 50 | 15 | 13 | 12 | 29 | 60 | 47 | 117 | 82 | 32 | 36 | 30 | 13 | 7 | 8 | 608 |
| 2.1 - 3.0 | 5 | 2 | 2 | 0 | 0 | 1 | 3 | 6 | 5 | 5 | 4 | 0 | 2 | 1 | 2 | 0 | 38 |
| 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 | 62 | 52 | 17 | 13 | 12 | 30 | 63 | 53 | 122 | 87 | 36 | 36 | 32 | 14 | 9 | 8 | 646 |

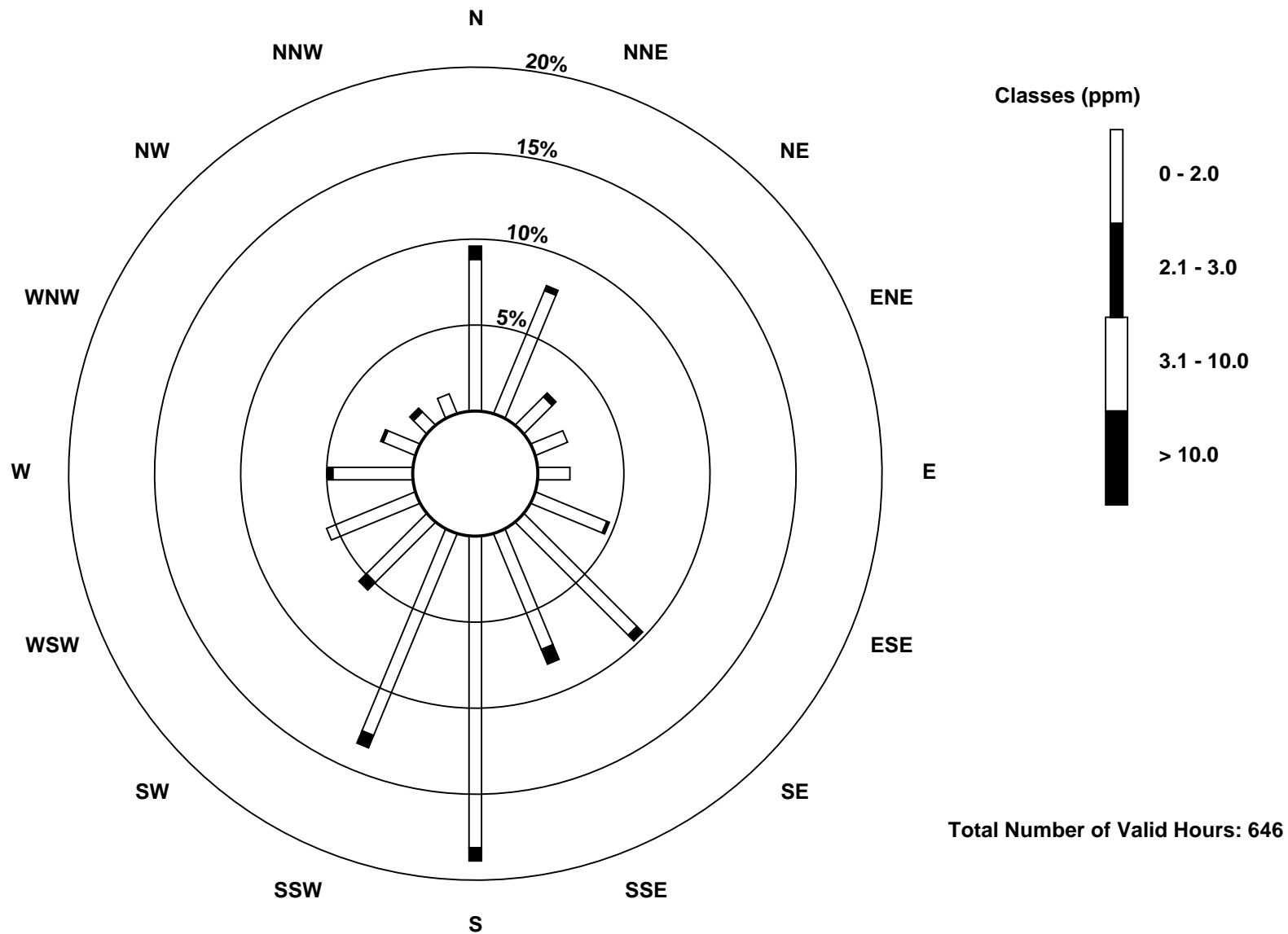
Total Number of Valid Hours: 646

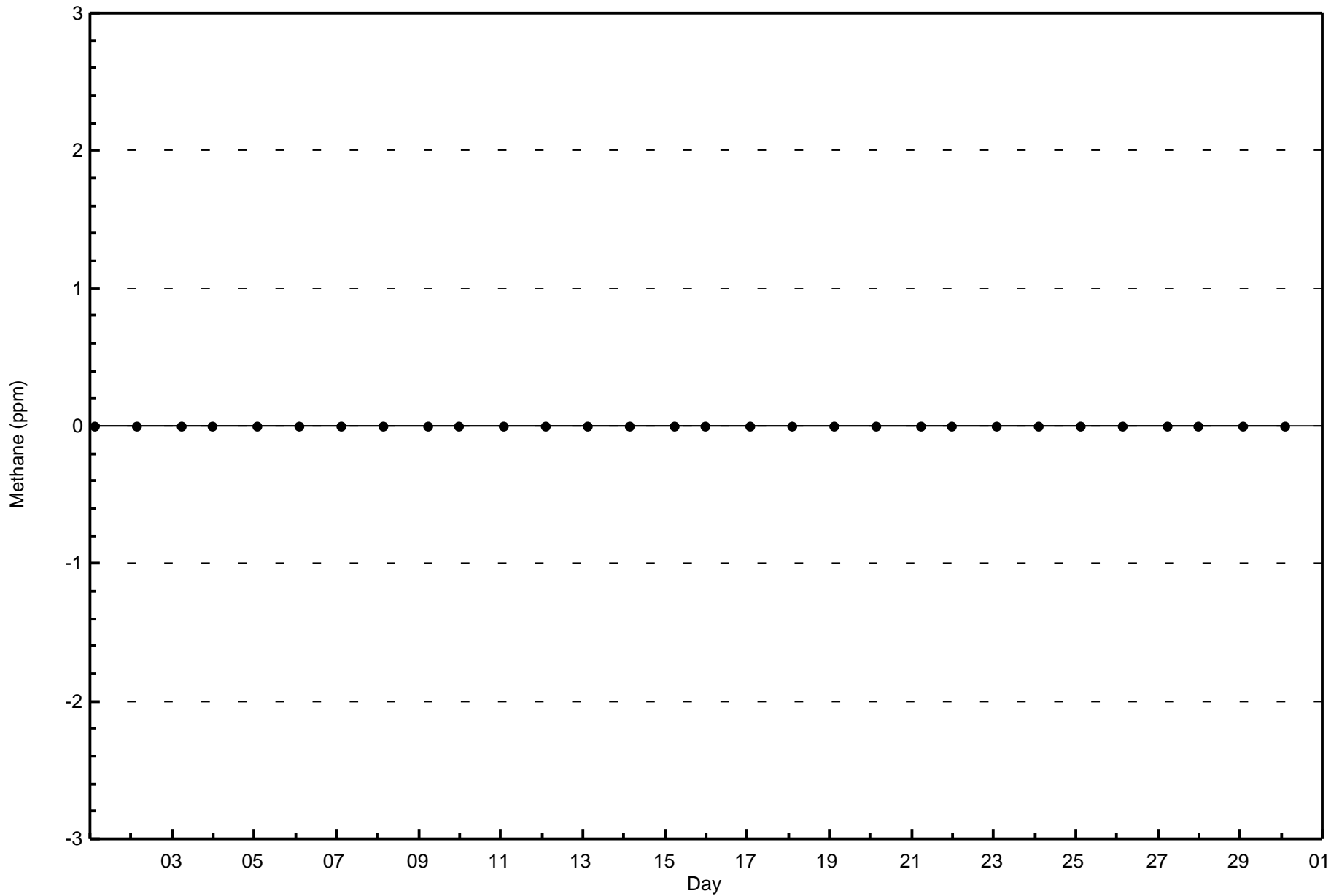
Total Number of Hours: 720

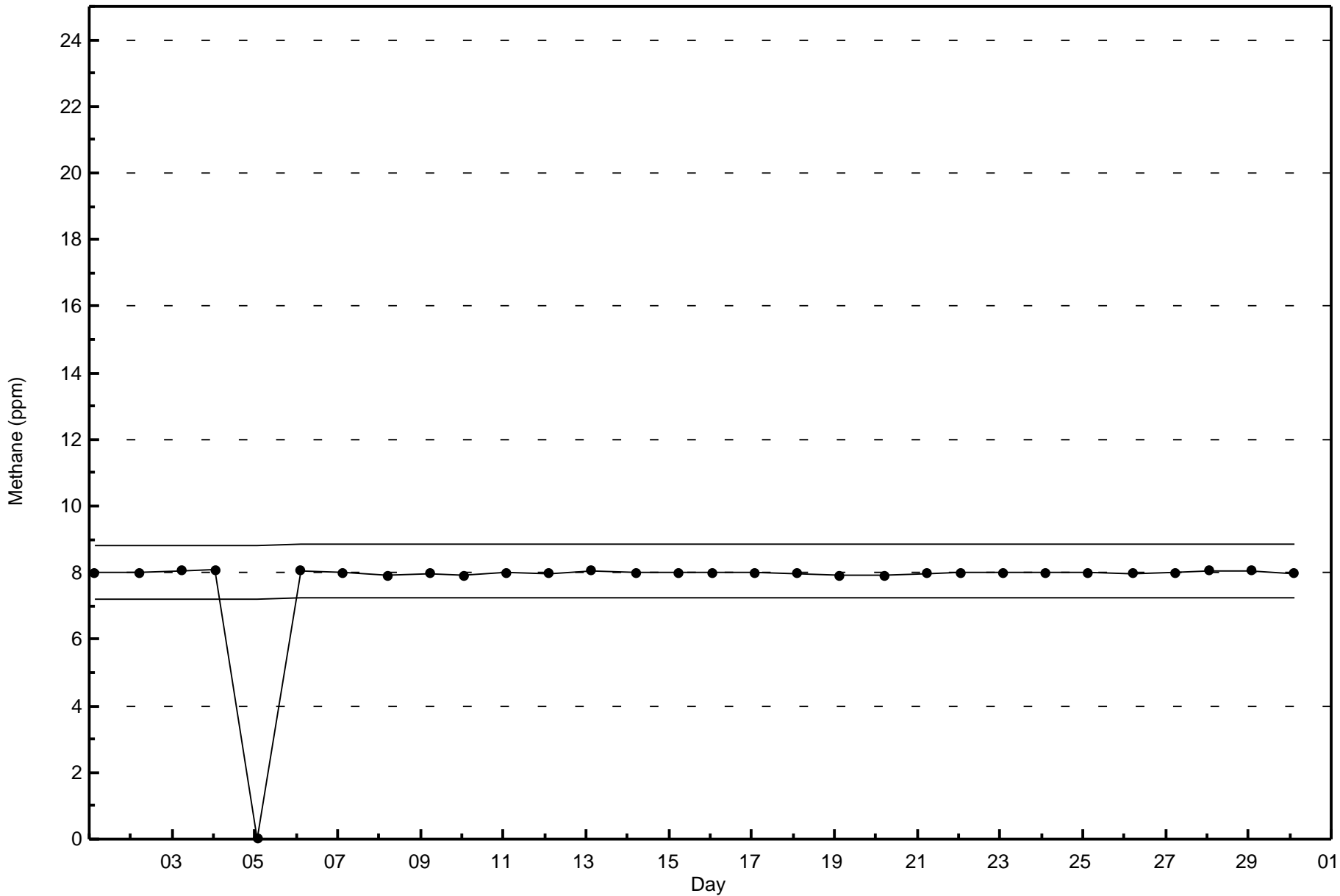


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Methane (CH₄) - ppm
Janvier (AMS 22)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

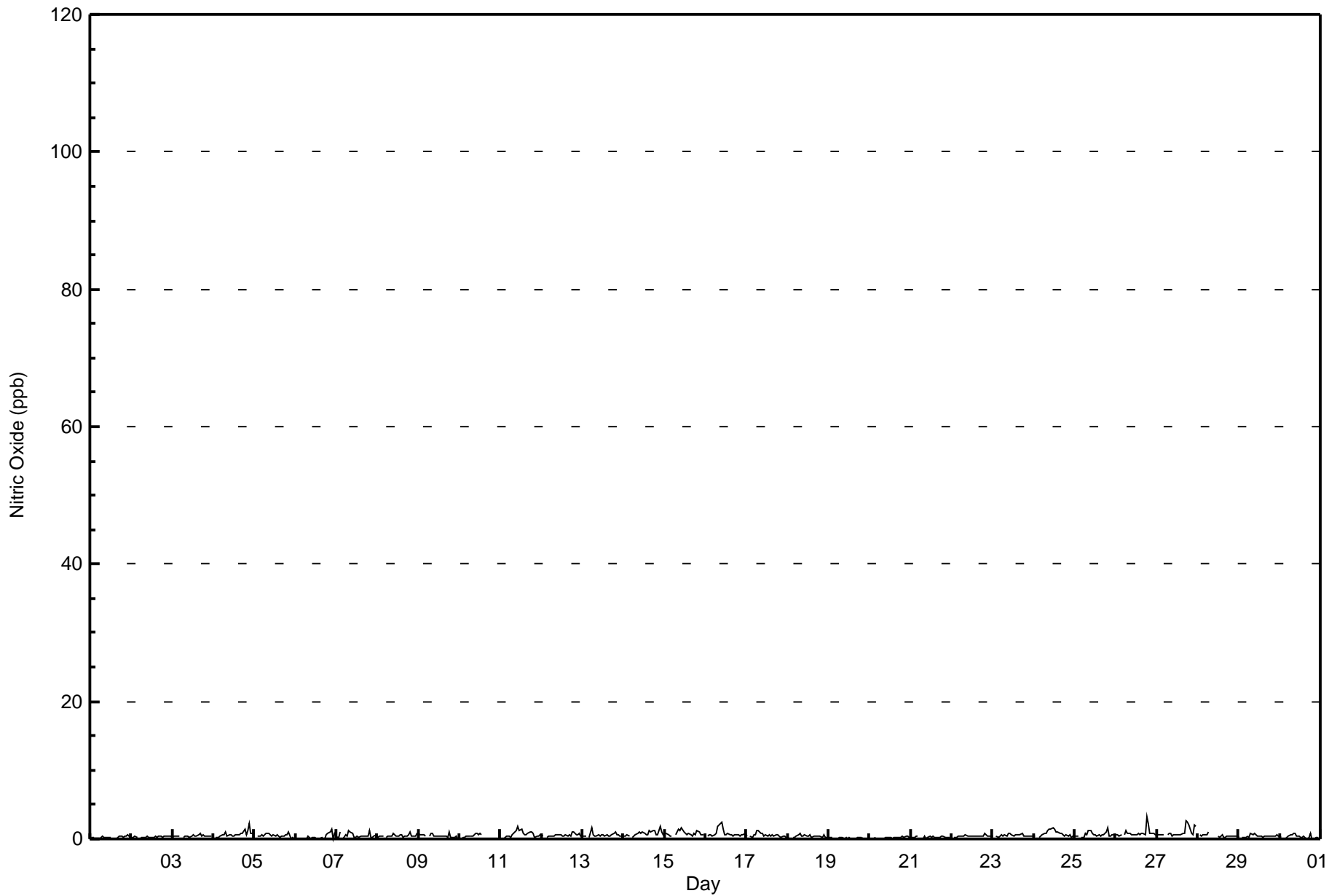
Janvier - September 2017

| Maximum Value: 3 ppb on Sep 26 19:00 | | | | | | | | | | | | | | Maximum Daily Average: 1.0 ppb on Sep 27 | | | | | | | | | | | | | | Hours in Service: 720 | |
|---|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|--|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|--------------------------------|--|
| Minimum Value: 0 ppb on Sep 6 01:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 19 | | | | | | | | | | | | | | Hours of Data: 673 | |
| Maximum Diurnal Average: 0.8 ppb at hour 19 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.3 ppb at hour 2 | | | | | | | | | | | | | | Hours of Missing Data: 47 | |
| Monthly Average: 0.5 ppb | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 2 | | | | | | | | | | | | | | Hours of Calibration: 35 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 98.3 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 1-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.2 | 1 | | | |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | | | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0.4 | 1 | | | |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0.7 | 2 | | | |
| 5-Sep | 1 | Z | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0.5 | 1 | | | |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0.3 | 1 | | | |
| 7-Sep | 0 | 0 | 1 | Z | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.5 | 1 | | | |
| 8-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0.5 | 1 | | | |
| 9-Sep | 1 | 1 | 1 | 1 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | PF | PF | PF | PF | PF | PF | PF | PF | PF | PF | -- | 1 | | | |
| 11-Sep | PF | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0.7 | 2 | | | |
| 12-Sep | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | | | |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.6 | 2 | | | |
| 14-Sep | 1 | 0 | 1 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0.8 | 2 | | | |
| 15-Sep | 1 | 1 | 1 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 | | | |
| 16-Sep | Z | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0.8 | 2 | | | |
| 17-Sep | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.4 | 1 | | | |
| 19-Sep | 0 | 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-Sep | 0 | 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-Sep | 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 | | | |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.4 | 1 | | | |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | |
| 24-Sep | 0 | 1 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0.8 | 2 | | | |
| 25-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 0.7 | 2 | | |
| 26-Sep | 1 | 1 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 0.9 | 3 | | | |
| 27-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 1.0 | 3 | | | |
| 28-Sep | Z | 1 | 0 | 1 | 1 | 1 | 1 | C | C | C | C | C | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | | | |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.4 | 1 | | | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | M - Maintenance | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | PF - Power Failure | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Janvier - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Janvier - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 673 | 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: 673

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Janvier - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 92 | 39 | 35 | 34 | 16 | 9 | 12 | 670 |
| 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 | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 92 | 39 | 35 | 34 | 16 | 9 | 12 | 670 |

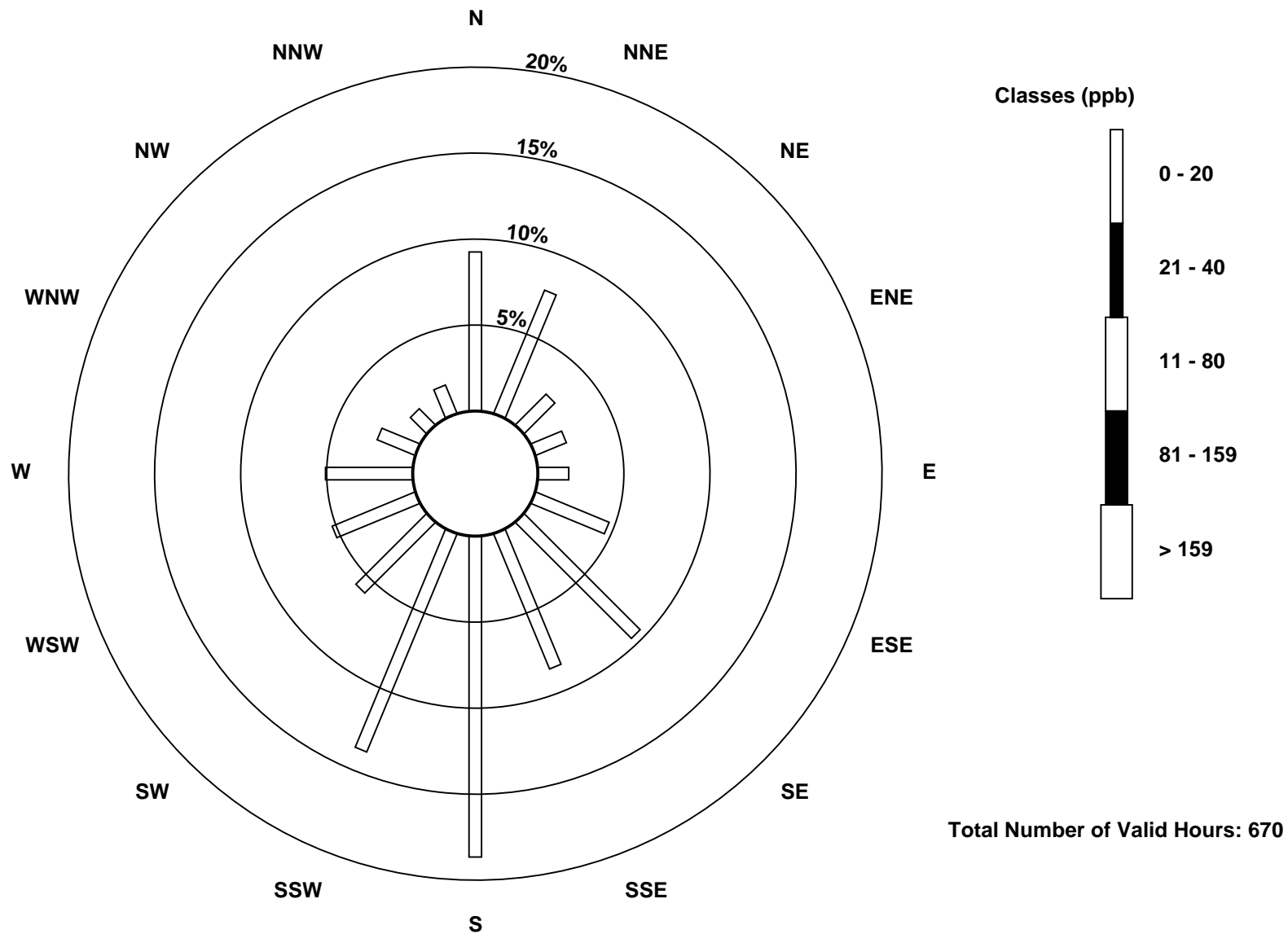
Total Number of Valid Hours: 670

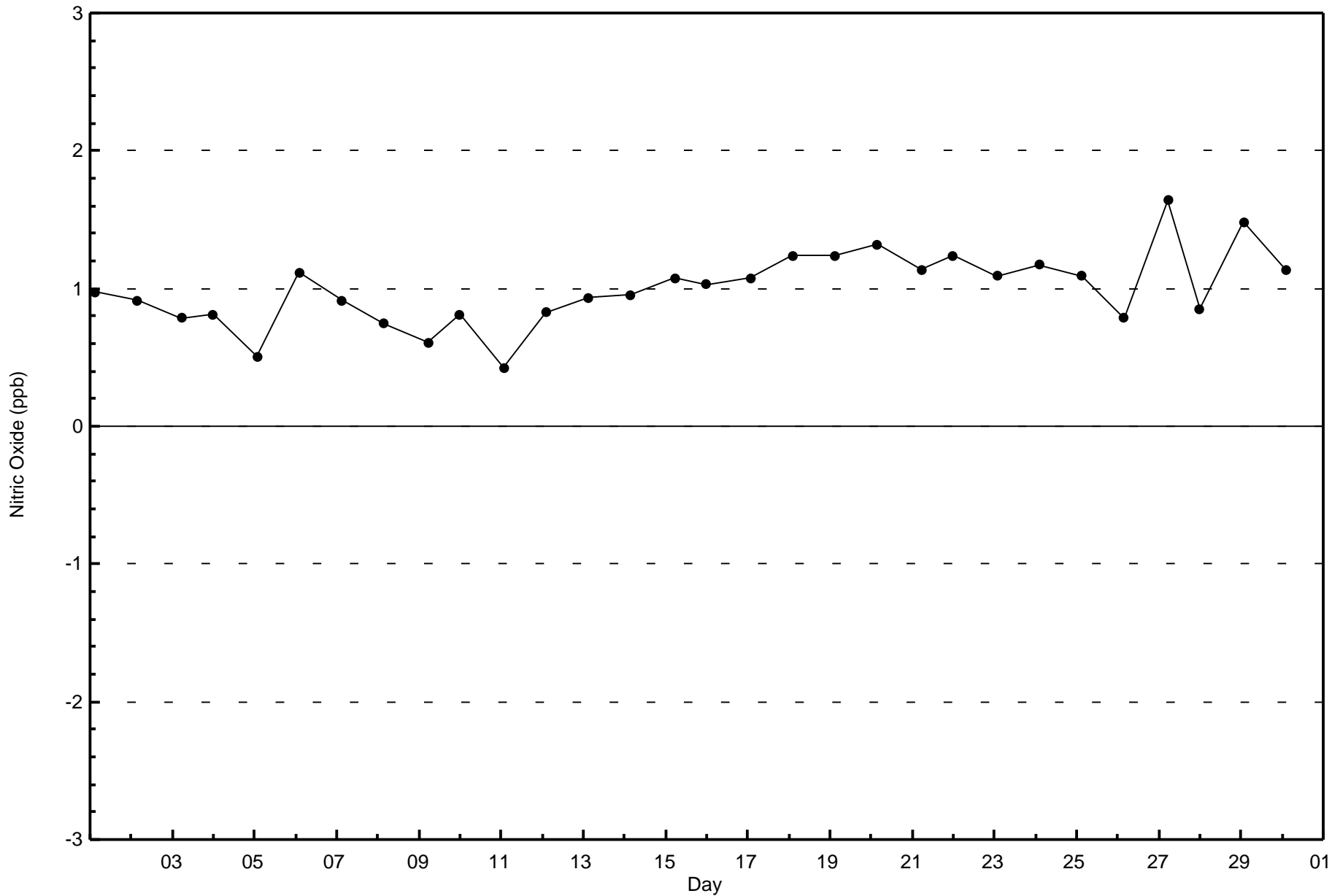
Total Number of Hours: 720

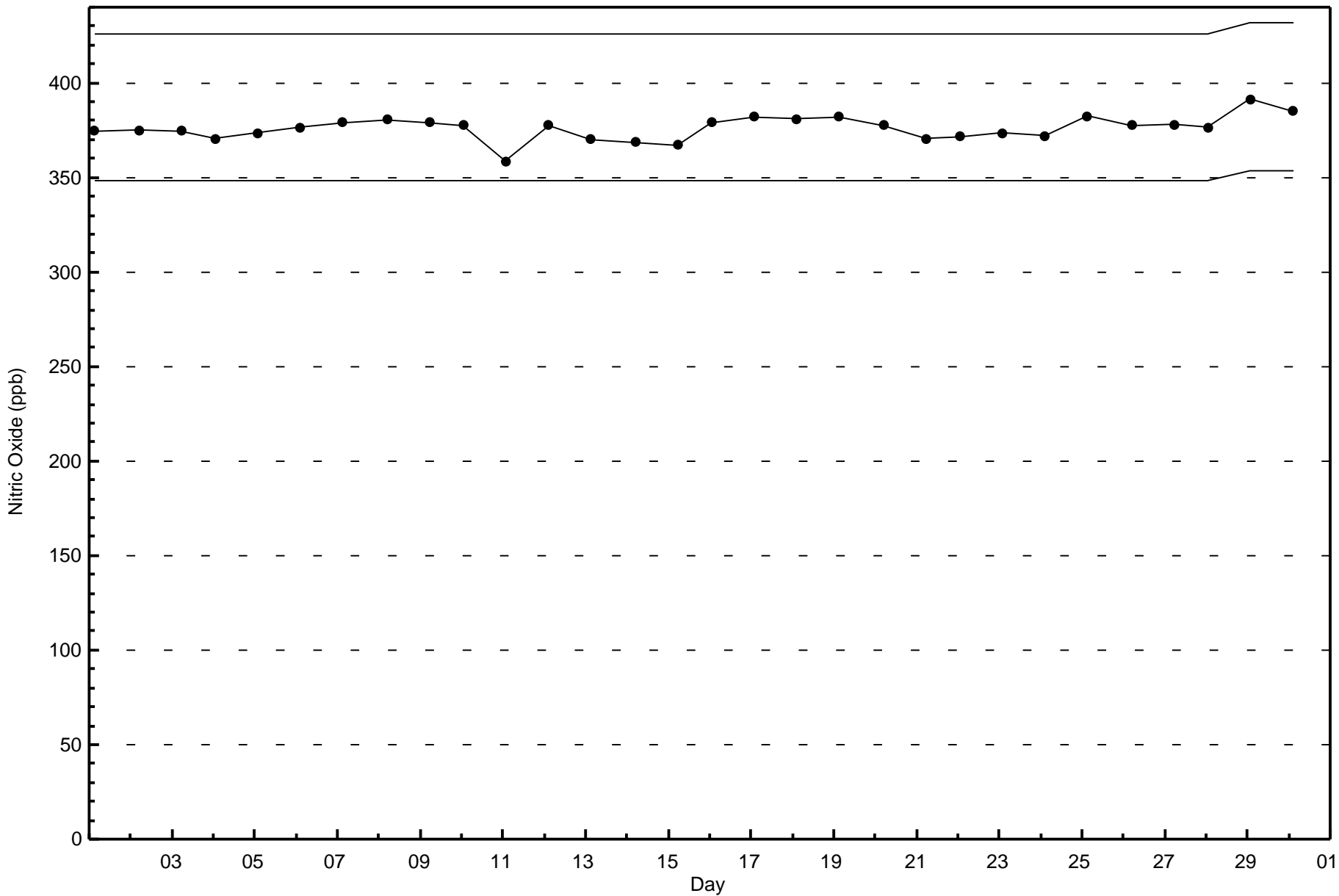


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Janvier (AMS 22)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Janvier - September 2017

| | | | | |
|---|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 6 ppb on Sep 8 17:00 | Maximum Daily Average: 1.6 ppb on Sep 8 | | Hours of Data: | 673 |
| Minimum Value: 0 ppb on Sep 3 12:00 | Minimum Daily Average: 0.2 ppb on Sep 3 | | Hours of Missing Data: | 47 |
| Maximum Diurnal Average: 1.0 ppb at hour 20 | Minimum Diurnal Average: 0.4 ppb at hour 15 | | Hours of Calibration: | 35 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 4 | | Percent Operational Time: | 98.3 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | M | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 |
| 2-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0.5 | 1 |
| 3-Sep | 0 | 1 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0.2 | 1 |
| 4-Sep | Z | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0.3 | 1 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 |
| 6-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1.0 | 2 |
| 7-Sep | 0 | 0 | 0 | Z | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1.2 | 2 |
| 8-Sep | 1 | 0 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 5 | 4 | 4 | 2 | 2 | 0 | 1 | 1.6 | 6 |
| 9-Sep | 1 | 2 | 2 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0.6 | 2 |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | PF | PF | PF | PF | PF | PF | PF | PF | PF | PF | -- | 1 |
| 11-Sep | PF | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.9 | 2 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.2 | 1 |
| 13-Sep | 1 | 1 | 1 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0.5 | 1 |
| 14-Sep | 1 | 1 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 0.8 | 2 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 0 | 0 | 0.6 | 2 |
| 16-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 |
| 17-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0.7 | 1 |
| 18-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 0.8 | 3 |
| 19-Sep | 0 | 0 | 0 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.6 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.4 | 1 |
| 22-Sep | Z | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 |
| 24-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1.2 | 2 |
| 25-Sep | 1 | 2 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 26-Sep | 0 | 2 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 0 | 0 | 0 | 0 | 0.7 | 5 |
| 27-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 2 | 1 | 1 | 4 | 2 | 1.0 | 4 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0.3 | 2 |
| 29-Sep | 1 | Z | 2 | 2 | 3 | 3 | 4 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1.3 | 4 |
| 30-Sep | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1.0 | 2 |

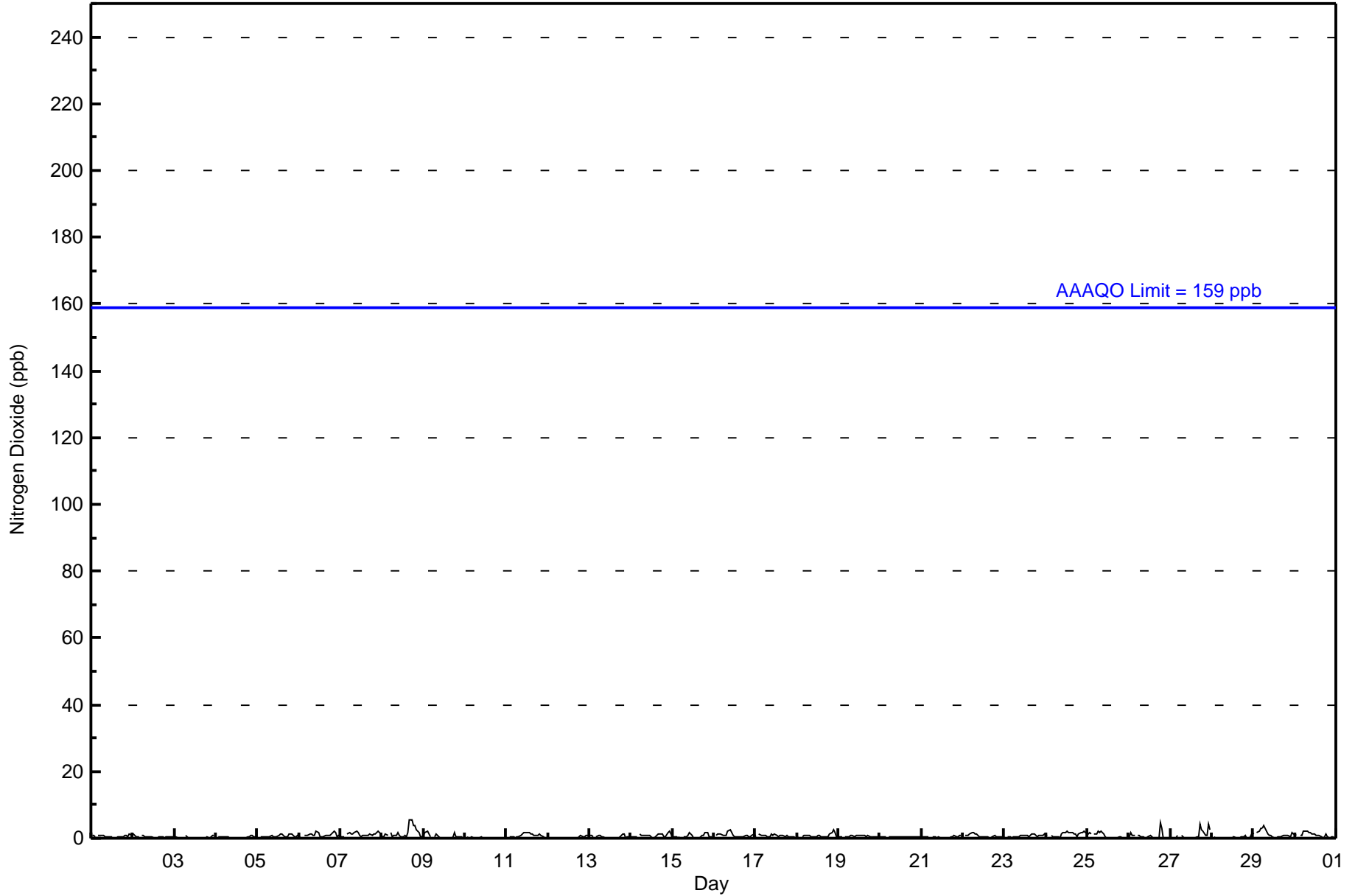
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.9 | 0.9 | 0.8 | 0.7 | 0.8 | 0.7 | 0.6 | 0.5 | 0.5 | 0.4 | 0.5 | 0.6 | 0.8 | 1.0 | 1.0 | 0.8 | 0.7 | 0.9 | 0.7 | Diurnal Average | |
| 1 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 6 | 5 | 5 | 4 | 2 | 3 | 4 | 2 | Diurnal Maximum | |

Z - zerspan 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
Janvier - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Janvier - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 673 | 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: 673

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Janvier - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 92 | 39 | 35 | 34 | 16 | 9 | 12 | 670 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 92 | 39 | 35 | 34 | 16 | 9 | 12 | 670 |

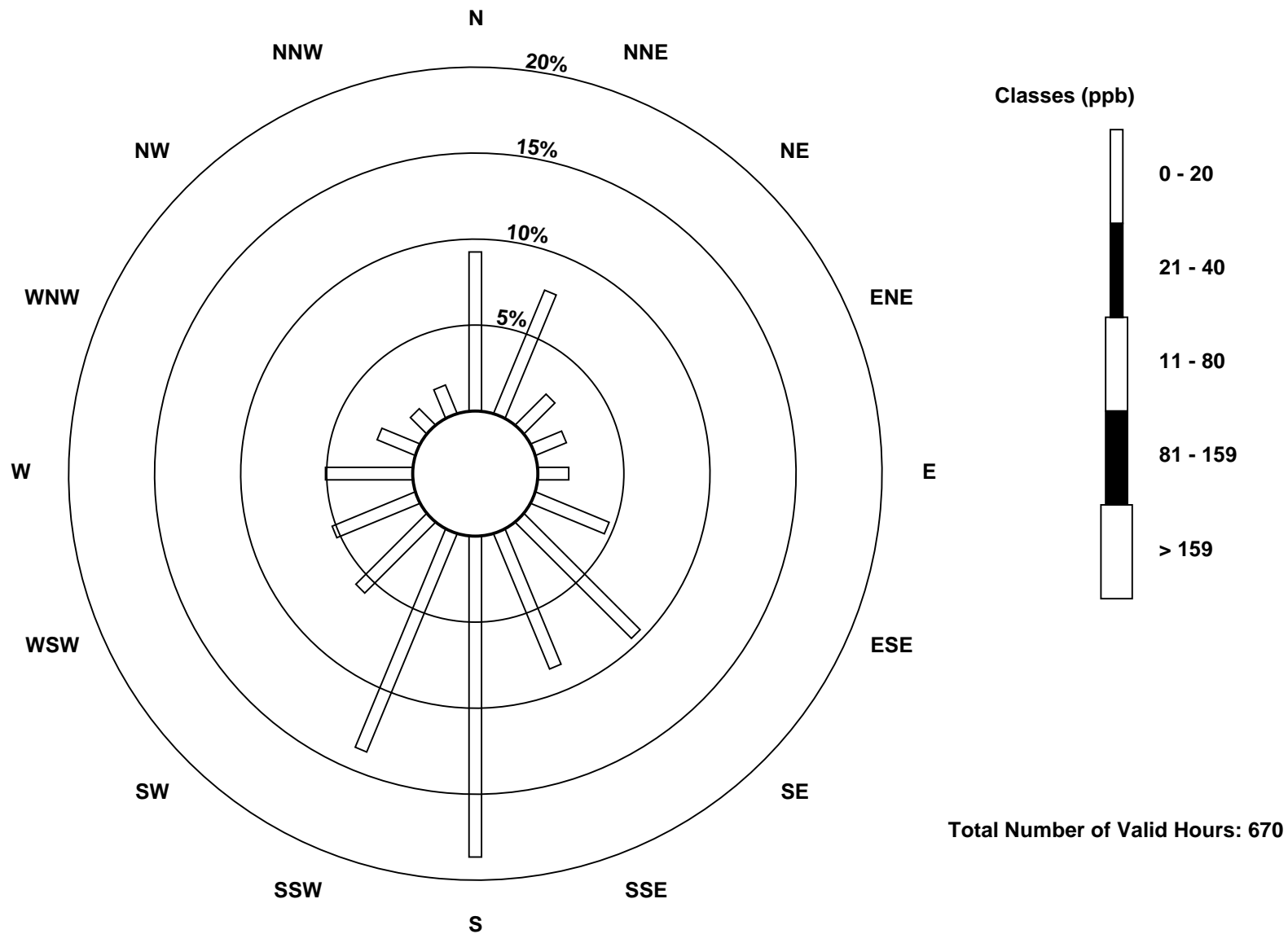
Total Number of Valid Hours: 670

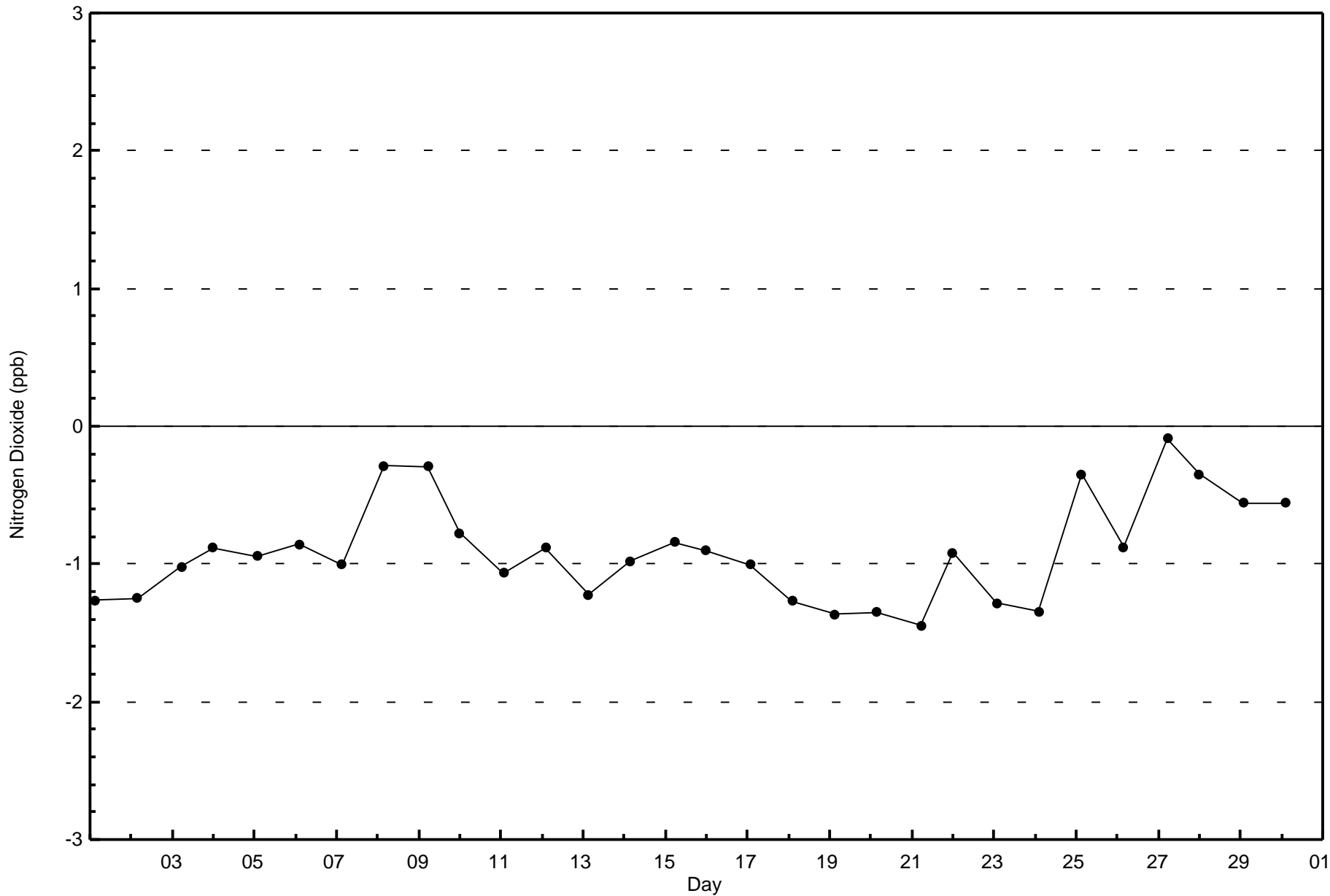
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Janvier (AMS 22)

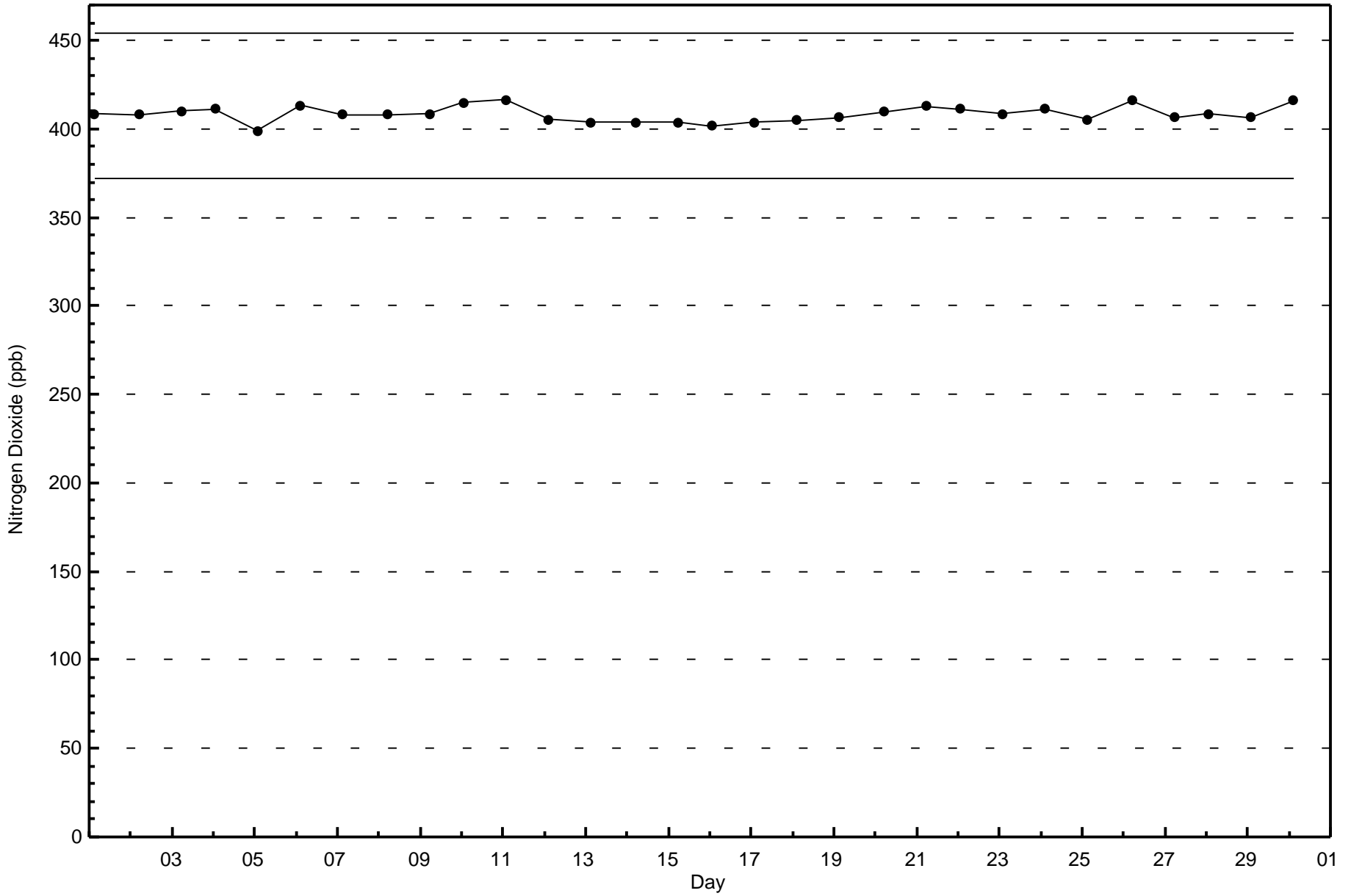






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Janvier - September 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

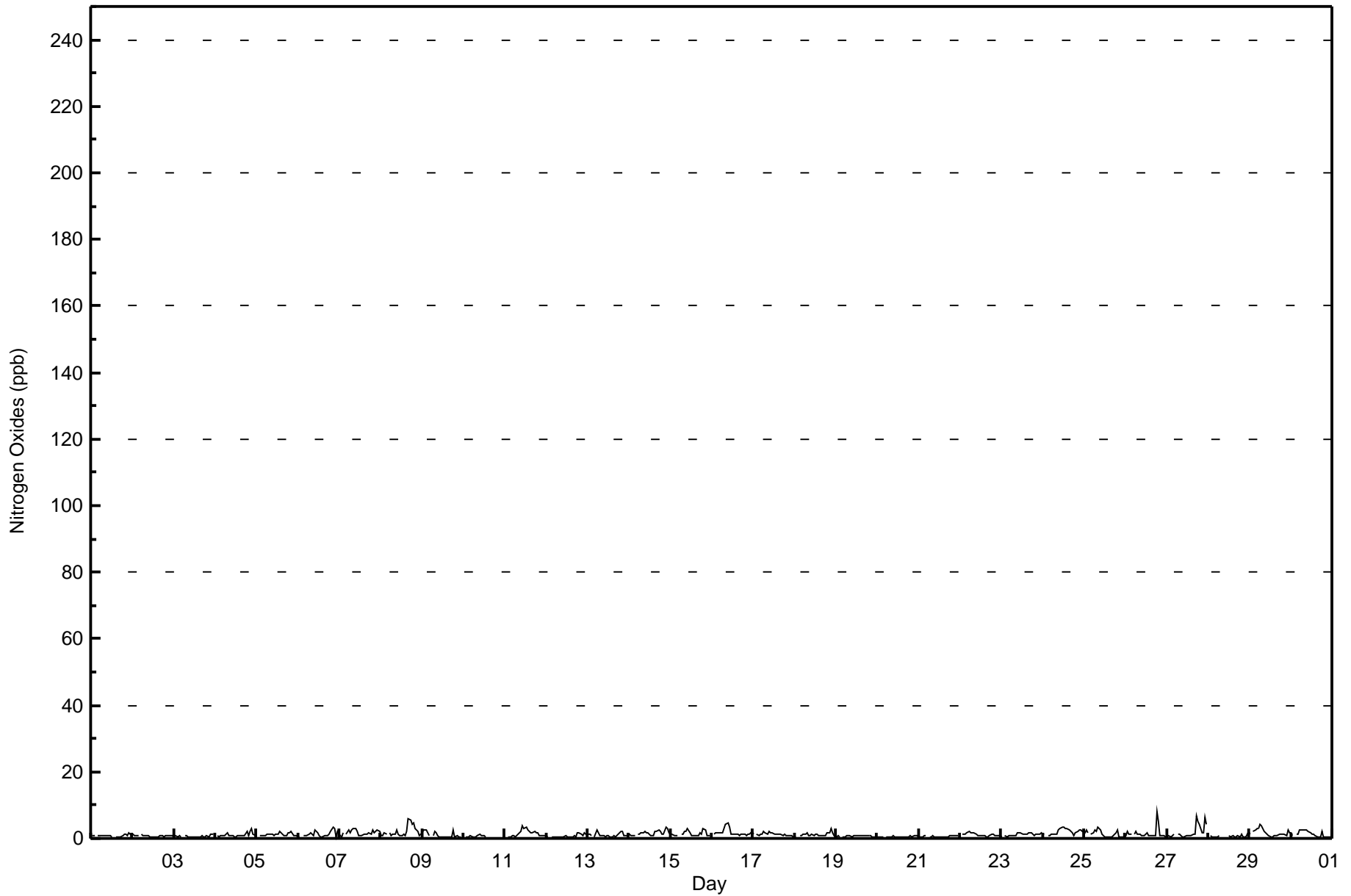
Nitrogen Oxides (NO_x) - ppb
Janvier - September 2017

| Maximum Value: 8 ppb on Sep 26 19:00 | | | | | | | | | | | | | | Maximum Daily Average: 2.1 ppb on Sep 8 | | | | | | | | | | | | | | Hours in Service: 720 | |
|---|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|--|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|--|--------------------------------|--|
| Minimum Value: 0 ppb on Sep 10 00:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.5 ppb on Sep 20 | | | | | | | | | | | | | | Hours of Data: 673 | |
| Maximum Diurnal Average: 1.8 ppb at hour 19 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.9 ppb at hour 15 | | | | | | | | | | | | | | Hours of Missing Data: 47 | |
| Monthly Average: 1.2 ppb | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 2 P ₉₉ = 5 | | | | | | | | | | | | | | Hours of Calibration: 35 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 98.3 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 1-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | M | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0.8 | 2 | | | |
| 2-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 | | | |
| 3-Sep | 1 | 1 | 1 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 | | | | |
| 4-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 1.0 | 3 | | | | |
| 5-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1.2 | 2 | | | | |
| 6-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 1.3 | 3 | | | | |
| 7-Sep | 1 | 1 | 2 | Z | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1.7 | 3 | | | | |
| 8-Sep | 1 | 1 | 2 | 1 | Z | 2 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 6 | 4 | 5 | 3 | 2 | 1 | 2.1 | 6 | | | | |
| 9-Sep | 2 | 3 | 2 | 2 | 1 | Z | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 0 | 1 | 1 | 1 | 1.1 | 3 | | | | |
| 10-Sep | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | PF | PF | PF | PF | PF | PF | PF | PF | PF | -- | 1 | | | | |
| 11-Sep | PF | Z | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1.6 | 4 | | | | |
| 12-Sep | 1 | 1 | Z | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 0.8 | 2 | | | | |
| 13-Sep | 1 | 1 | 1 | Z | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1.1 | 3 | | | | |
| 14-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 3 | 2 | 1.6 | 3 | | | | |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 1 | 1.4 | 3 | | | | |
| 16-Sep | Z | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1.8 | 5 | | | | |
| 17-Sep | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1.2 | 2 | | | | |
| 18-Sep | 1 | 0 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1.2 | 3 | | | | |
| 19-Sep | 1 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.7 | 1 | | | | |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0.5 | 1 | | | | |
| 21-Sep | 1 | 1 | 1 | 1 | 1 | Z | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 | | | | |
| 22-Sep | Z | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 | | | | |
| 23-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1.2 | 2 | | | | |
| 24-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 2.0 | 3 | | | | |
| 25-Sep | 2 | 2 | 2 | Z | 1 | 2 | 3 | 2 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 1.3 | 3 | | | | |
| 26-Sep | 1 | 2 | 1 | 1 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 8 | 5 | 1 | 1 | 1 | 1.5 | 8 | | | | |
| 27-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 | 5 | 4 | 2 | 2 | 6 | 2.0 | 7 | | | | |
| 28-Sep | Z | 1 | 0 | 1 | 1 | 1 | 1 | C | C | C | C | C | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 0.7 | 2 | | | | |
| 29-Sep | 1 | Z | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.7 | 4 | | | | |
| 30-Sep | 2 | 1 | Z | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1.3 | 3 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | M - Maintenance | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | PF - Power Failure | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Janvier - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Janvier - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 673 | 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: 673

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Janvier - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 92 | 39 | 35 | 34 | 16 | 9 | 12 | 670 |
| 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 | 62 | 52 | 17 | 13 | 12 | 31 | 64 | 57 | 125 | 92 | 39 | 35 | 34 | 16 | 9 | 12 | 670 |

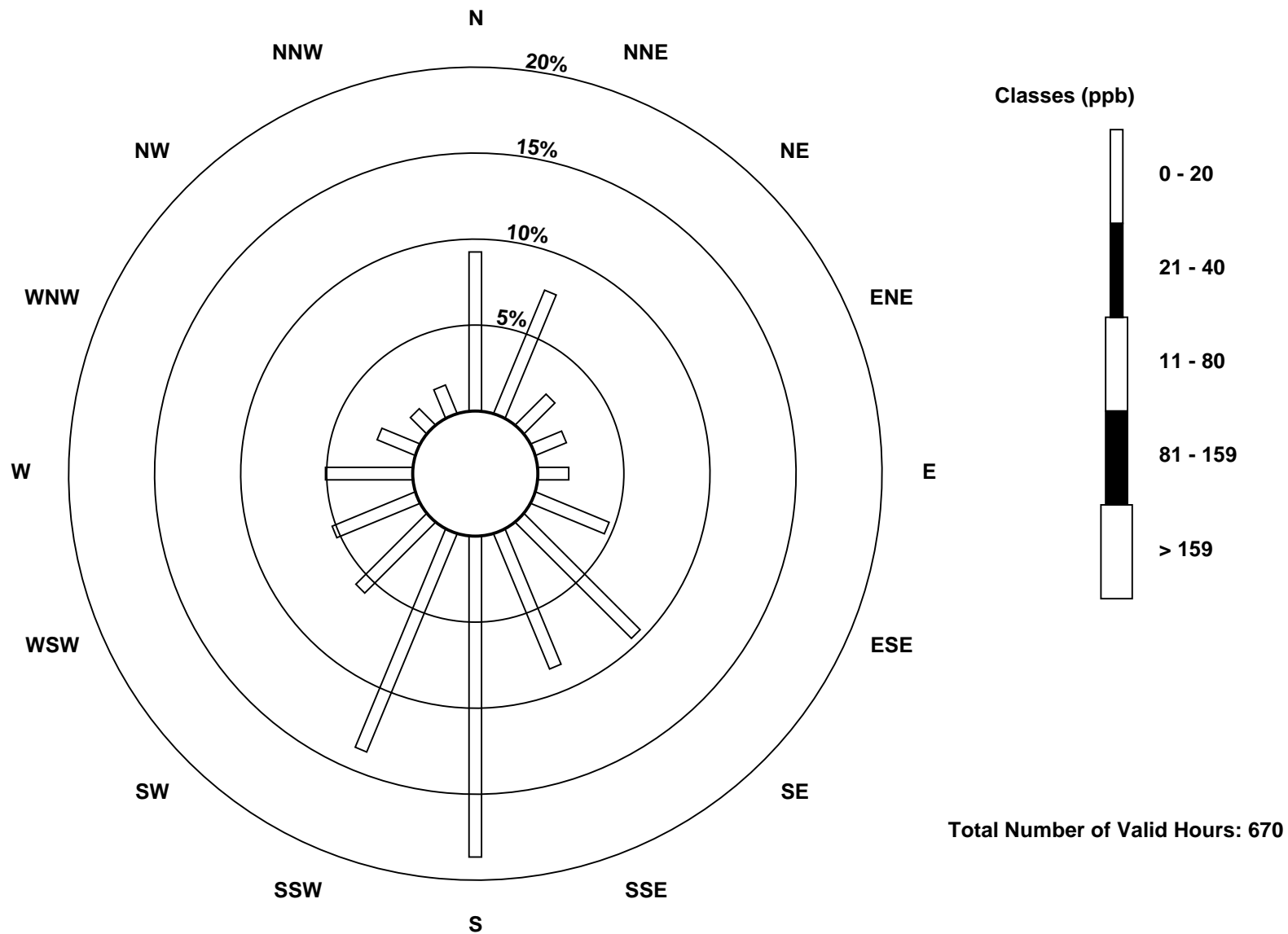
Total Number of Valid Hours: 670

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

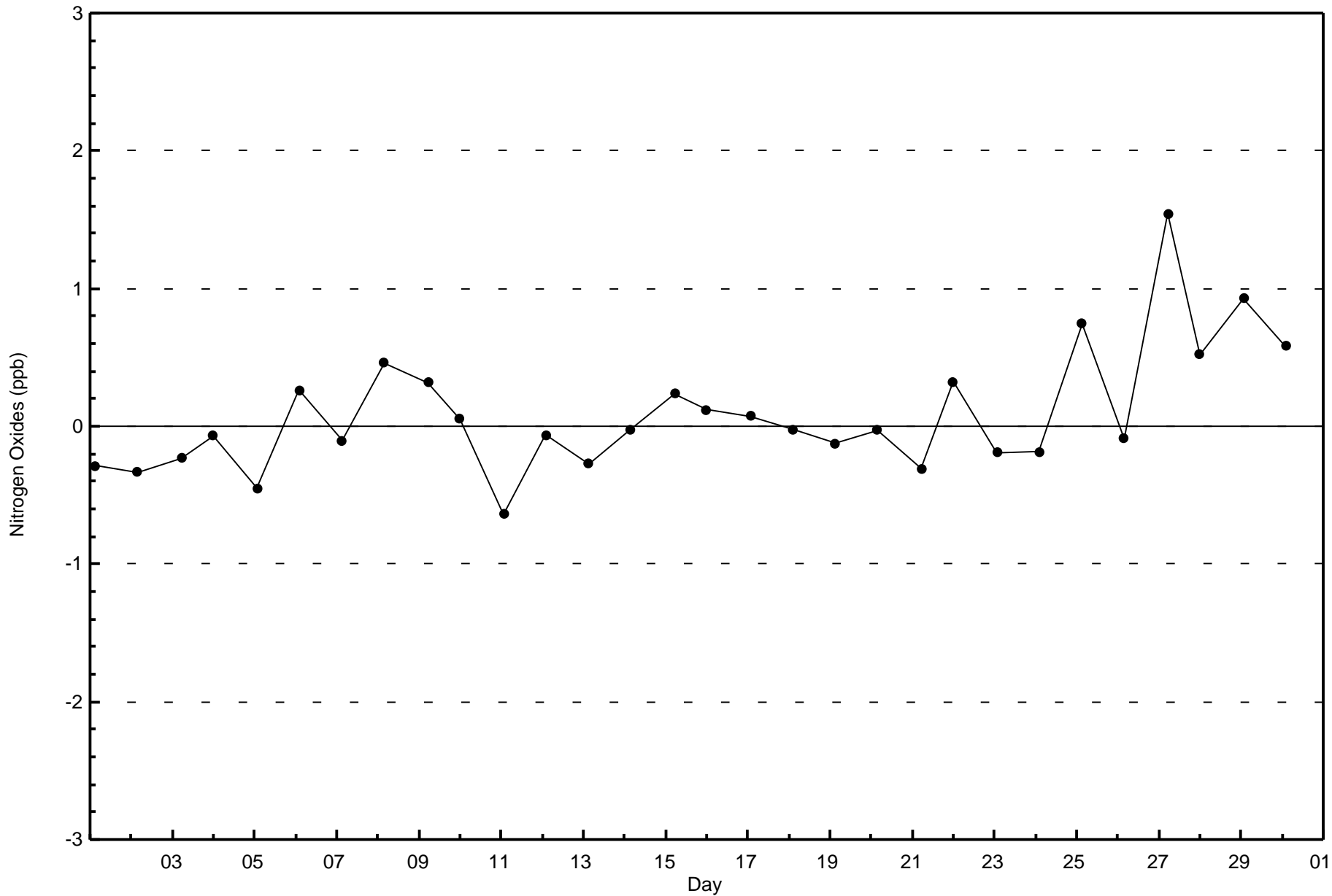
Nitrogen Oxides (NO_x) - ppb
Janvier (AMS 22)

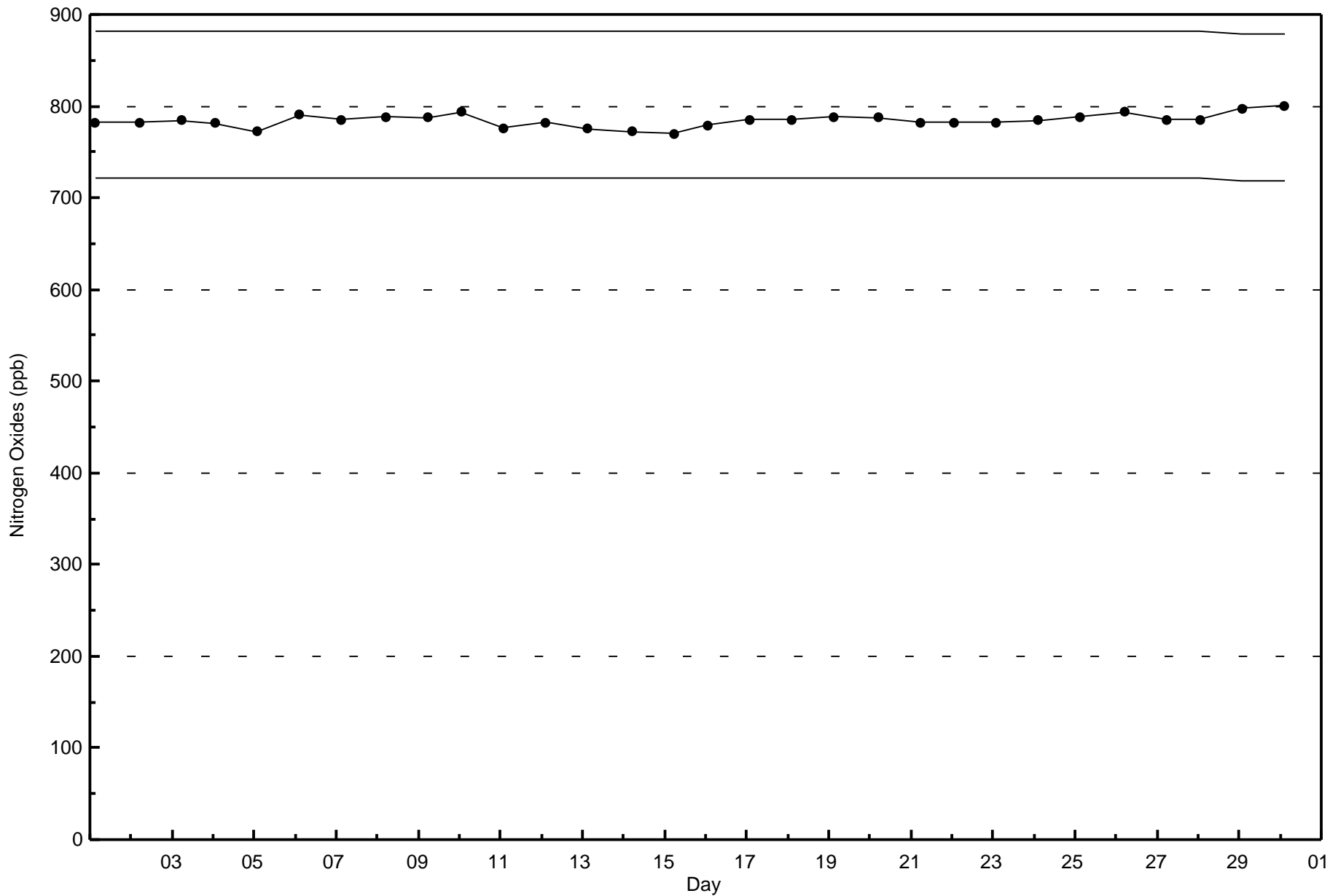




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Janvier - September 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Janvier - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 78 ppb on Sep 7 16:00 | Maximum Daily Average: 40.5 ppb on Sep 7 | | Hours of Data: | 676 |
| Minimum Value: 7 ppb on Sep 28 07:00 | Minimum Daily Average: 20.5 ppb on Sep 24 | | Hours of Missing Data: | 44 |
| Maximum Diurnal Average: 39.1 ppb at hour 15 | Minimum Diurnal Average: 19.3 ppb at hour 7 | | Hours of Calibration: | 34 |
| Monthly Average: 28.8 ppb | Percentiles: P ₁ = 7 P ₁₀ = 15 O ₁ = 22 Median = 29 O ₃ = 35 P ₉₀ = 41 P ₉₉ = 60 | | Percent Operational Time: | 98.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 32 | 32 | 32 | 32 | 32 | Z | 32 | 31 | 34 | 34 | 35 | 39 | 43 | M | 46 | 46 | 45 | 42 | 42 | 37 | 31 | 30 | 28 | 31 | 35.7 | 46 |
| 2-Sep | 32 | 31 | 30 | 31 | 28 | 26 | Z | 26 | 28 | 30 | 31 | 34 | 35 | 35 | 34 | 29 | 23 | 30 | 27 | 26 | 27 | 27 | 26 | 26 | 29.3 | 35 |
| 3-Sep | 25 | 23 | 28 | 32 | 32 | 30 | 28 | Z | 26 | 27 | 29 | 32 | 33 | 33 | 41 | 42 | 41 | 40 | 40 | 36 | 35 | 33 | 26 | 22 | 32.0 | 42 |
| 4-Sep | 20 | 20 | Z | 20 | 18 | 17 | 19 | 20 | 28 | 31 | 33 | 34 | 33 | 31 | 32 | 32 | 32 | 31 | 23 | 21 | 19 | 17 | 16 | 16 | 24.5 | 34 |
| 5-Sep | 16 | 18 | 17 | Z | 21 | 21 | 19 | 20 | 23 | 31 | 35 | 41 | 51 | 55 | 59 | 58 | 54 | 47 | 38 | 30 | 28 | 36 | 40 | 40 | 34.7 | 59 |
| 6-Sep | 39 | 38 | 38 | 38 | Z | 33 | 30 | 28 | 28 | 32 | 43 | 42 | 40 | 42 | 43 | 43 | 33 | 31 | 31 | 25 | 18 | 13 | 11 | 9 | 31.7 | 43 |
| 7-Sep | 11 | 9 | 7 | 7 | 9 | Z | 12 | 14 | 21 | 26 | 39 | 60 | 61 | 67 | 72 | 78 | 72 | 68 | 64 | 61 | 53 | 53 | 42 | 27 | 40.5 | 78 |
| 8-Sep | 29 | 25 | 35 | 28 | 32 | 40 | Z | 24 | 28 | 35 | 39 | 37 | 41 | 41 | 42 | 43 | 49 | 43 | 39 | 32 | 28 | 31 | 34 | 31 | 35.1 | 49 |
| 9-Sep | 27 | 25 | 24 | 24 | 28 | 22 | 20 | Z | 25 | 31 | 33 | 36 | 39 | 40 | 33 | 23 | 21 | 26 | 21 | 21 | 18 | 16 | 17 | 15 | 25.5 | 40 |
| 10-Sep | 15 | 17 | Z | 18 | 22 | 24 | 24 | 27 | 28 | 28 | 30 | 32 | 34 | 36 | PF | PF | PF | PF | PF | PF | PF | PF | PF | PF | -- | 36 |
| 11-Sep | 28 | 26 | 25 | Z | 24 | 24 | 23 | 22 | 21 | 21 | 26 | 34 | 38 | 38 | 38 | 33 | 28 | 31 | 26 | 24 | 29 | 31 | 31 | 33 | 28.4 | 38 |
| 12-Sep | 36 | 37 | 36 | 34 | Z | 30 | 30 | 29 | 30 | 30 | 30 | 29 | 30 | 30 | 29 | 29 | 29 | 29 | 23 | 17 | 17 | 14 | 15 | 12 | 27.2 | 37 |
| 13-Sep | 12 | 12 | 15 | 24 | 29 | Z | 23 | 36 | 37 | 37 | 37 | 36 | 36 | 35 | 35 | 35 | 35 | 33 | 29 | 20 | 19 | 20 | 21 | 22 | 27.7 | 37 |
| 14-Sep | 21 | 22 | 20 | 20 | 19 | 19 | Z | 20 | 21 | 23 | 29 | 30 | 31 | 33 | 33 | 32 | 30 | 23 | 20 | 18 | 17 | 15 | 13 | 11 | 22.6 | 33 |
| 15-Sep | 10 | 9 | 9 | 10 | 10 | 9 | 12 | Z | 14 | 20 | C | C | C | C | 41 | 41 | 41 | 37 | 33 | 27 | 24 | 24 | 23 | 21 | 21.9 | 41 |
| 16-Sep | 19 | 17 | Z | 14 | 13 | 12 | 12 | 12 | 20 | 21 | 34 | 38 | 40 | 41 | 41 | 40 | 39 | 36 | 32 | 32 | 33 | 29 | 23 | 15 | 26.6 | 41 |
| 17-Sep | 12 | 12 | 12 | Z | 9 | 10 | 8 | 9 | 14 | 28 | 35 | 37 | 39 | 39 | 40 | 41 | 40 | 39 | 36 | 34 | 33 | 32 | 31 | 29 | 26.8 | 41 |
| 18-Sep | 29 | 26 | 16 | 15 | Z | 13 | 10 | 23 | 30 | 33 | 38 | 40 | 41 | 42 | 40 | 42 | 42 | 42 | 40 | 37 | 29 | 25 | 23 | 26 | 30.5 | 42 |
| 19-Sep | 25 | 24 | 22 | 22 | 21 | Z | 20 | 21 | 24 | 29 | 31 | 33 | 31 | 29 | 27 | 26 | 28 | 32 | 31 | 30 | 31 | 33 | 33 | 33 | 27.7 | 33 |
| 20-Sep | 31 | 31 | 31 | 31 | 30 | 30 | Z | 27 | 28 | 29 | 30 | 30 | 30 | 30 | 30 | 30 | 29 | 28 | 29 | 31 | 32 | 32 | 33 | 32 | 30.2 | 33 |
| 21-Sep | 32 | 31 | 31 | 30 | 29 | 29 | 28 | Z | 28 | 28 | 28 | 28 | 28 | 27 | 27 | 26 | 25 | 24 | 24 | 23 | 24 | 24 | 23 | 24 | 27.0 | 32 |
| 22-Sep | 22 | 22 | Z | 21 | 20 | 19 | 17 | 22 | 26 | 32 | 36 | 37 | 37 | 35 | 34 | 34 | 33 | 30 | 24 | 29 | 26 | 21 | 20 | 21 | 26.8 | 37 |
| 23-Sep | 19 | 14 | 11 | Z | 12 | 12 | 9 | 10 | 11 | 15 | 23 | 35 | 39 | 39 | 37 | 36 | 35 | 28 | 25 | 23 | 20 | 16 | 13 | 13 | 21.5 | 39 |
| 24-Sep | 11 | 8 | 7 | 7 | Z | 8 | 7 | 7 | 9 | 18 | 23 | 24 | 28 | 33 | 36 | 36 | 35 | 32 | 30 | 27 | 24 | 22 | 21 | 18 | 20.5 | 36 |
| 25-Sep | 23 | 23 | 19 | 16 | 15 | Z | 18 | 15 | 17 | 18 | 21 | 24 | 27 | 29 | 29 | 30 | 29 | 25 | 23 | 24 | 23 | 22 | 23 | 24 | 22.5 | 30 |
| 26-Sep | 24 | 22 | 22 | 22 | 22 | 21 | Z | 21 | 22 | 25 | 27 | 36 | 43 | 43 | 43 | 43 | 44 | 43 | 28 | 28 | 29 | 29 | 28 | 30 | 30.2 | 44 |
| 27-Sep | 31 | 30 | 31 | 30 | 28 | 27 | 26 | Z | 26 | 26 | 27 | 29 | 32 | 35 | 41 | 44 | 43 | 33 | 31 | 29 | 27 | 24 | 18 | 18 | 29.9 | 44 |
| 28-Sep | 18 | 16 | Z | 10 | 8 | 8 | 7 | 8 | 11 | 18 | 23 | 35 | 38 | 38 | 38 | 37 | 38 | 38 | 37 | 35 | 35 | 35 | 35 | 32 | 25.9 | 38 |
| 29-Sep | 32 | 36 | 35 | Z | 32 | 32 | 28 | 28 | 32 | 35 | 38 | 43 | 45 | 46 | 48 | 48 | 49 | 48 | 46 | 45 | 44 | 42 | 38 | 37 | 39.5 | 49 |
| 30-Sep | 29 | 21 | 20 | 19 | Z | 26 | 22 | 24 | 27 | 31 | 33 | 36 | 41 | 43 | 43 | 41 | 38 | 37 | 37 | 39 | 39 | 38 | 37 | 35 | 32.9 | 43 |

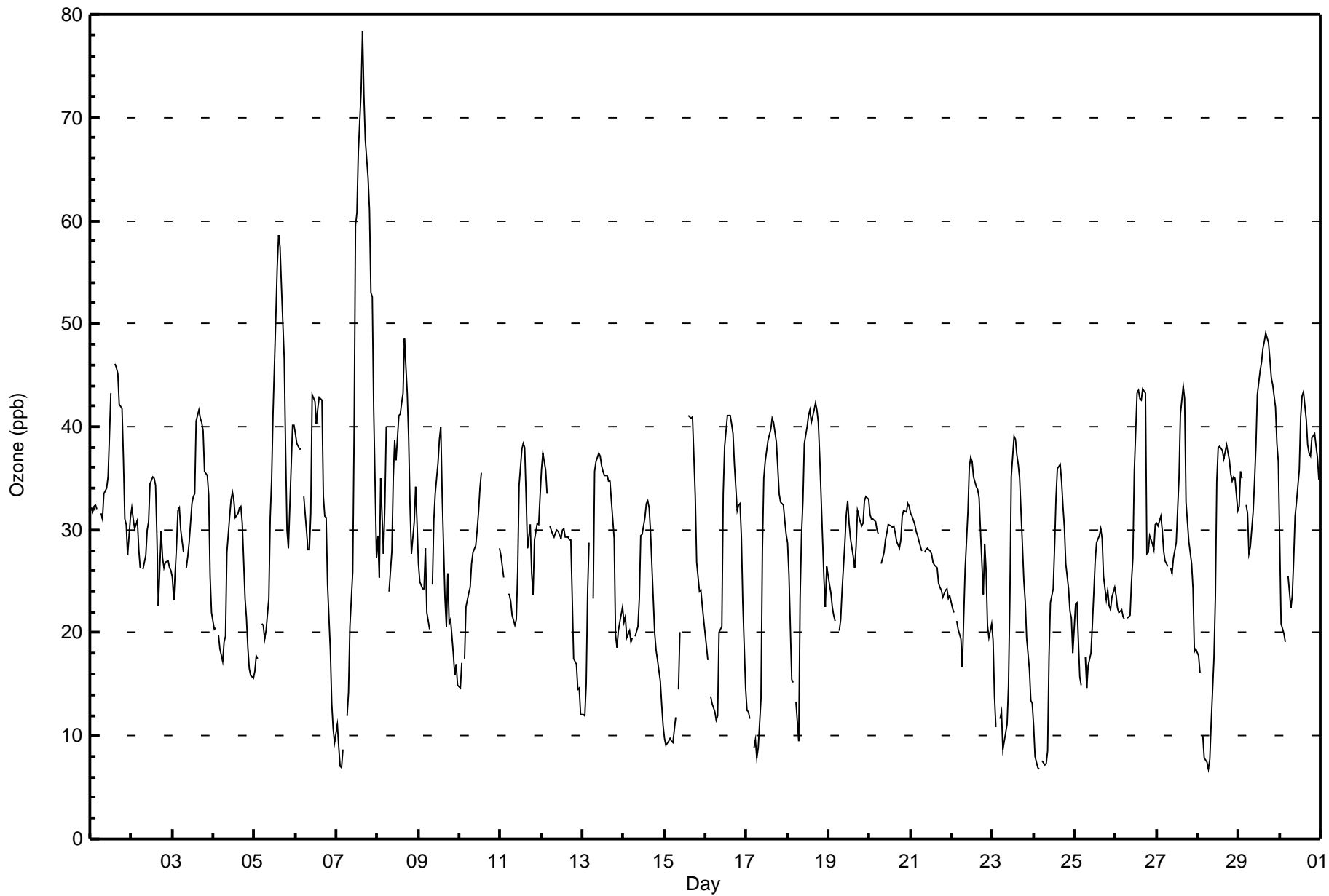
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 23.7 | 22.6 | 23.0 | 22.1 | 21.7 | 21.7 | 19.3 | 20.9 | 23.8 | 27.4 | 31.6 | 35.2 | 37.3 | 38.1 | 39.1 | 38.6 | 37.2 | 35.4 | 32.1 | 29.7 | 28.0 | 27.1 | 25.5 | 24.5 | Diurnal Average | |
| 39 | 38 | 38 | 38 | 32 | 40 | 32 | 36 | 37 | 37 | 43 | 60 | 61 | 67 | 72 | 78 | 72 | 68 | 64 | 61 | 53 | 53 | 42 | 40 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Janvier - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Janvier - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 135 | 19.97 | 19.97 |
| 21 - 50 | 525 | 77.66 | 97.63 |
| 51 - 82 | 16 | 2.37 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 676

Total Number of Hours: 720



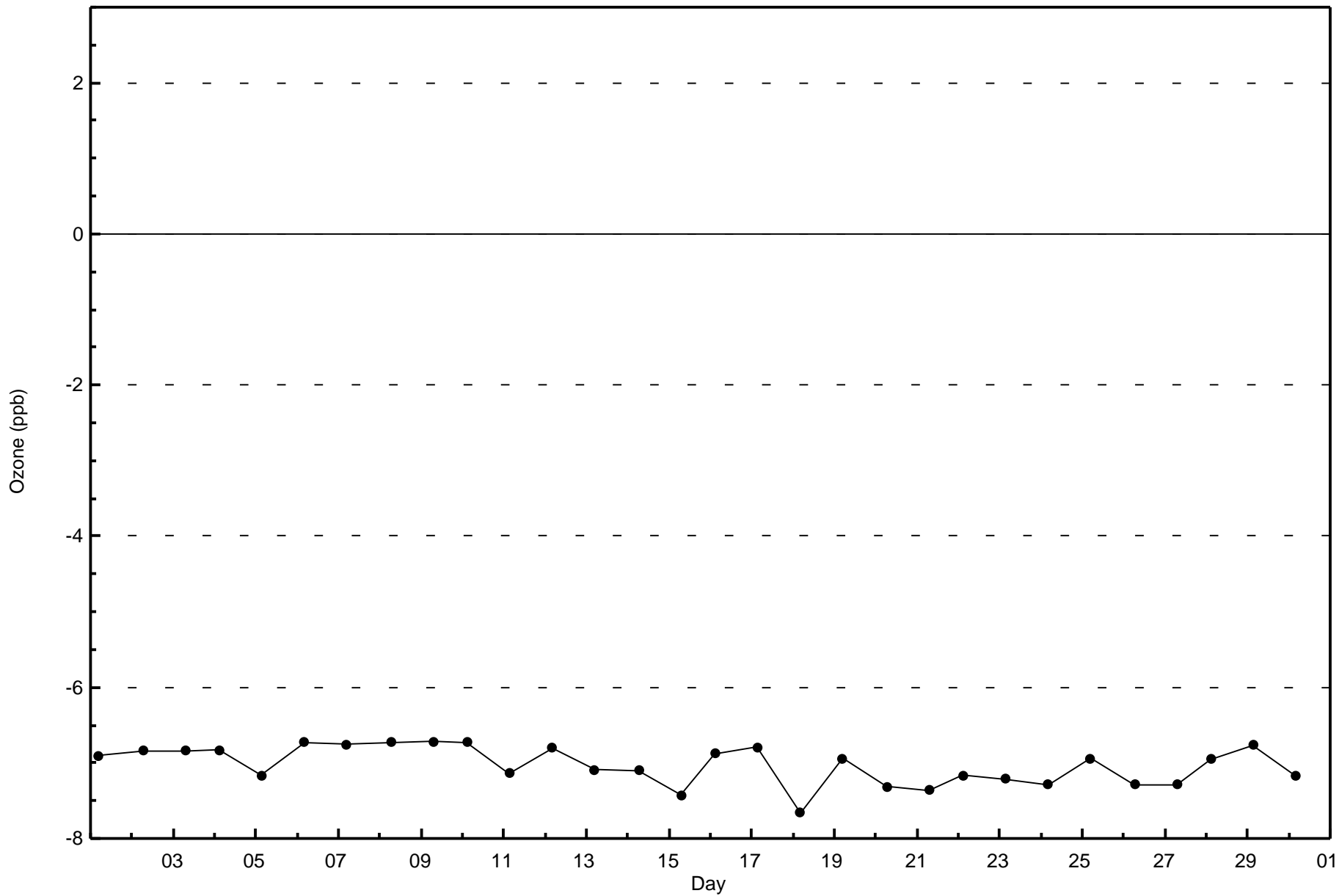
**Wood Buffalo Environmental Association
Frequency Distribution**

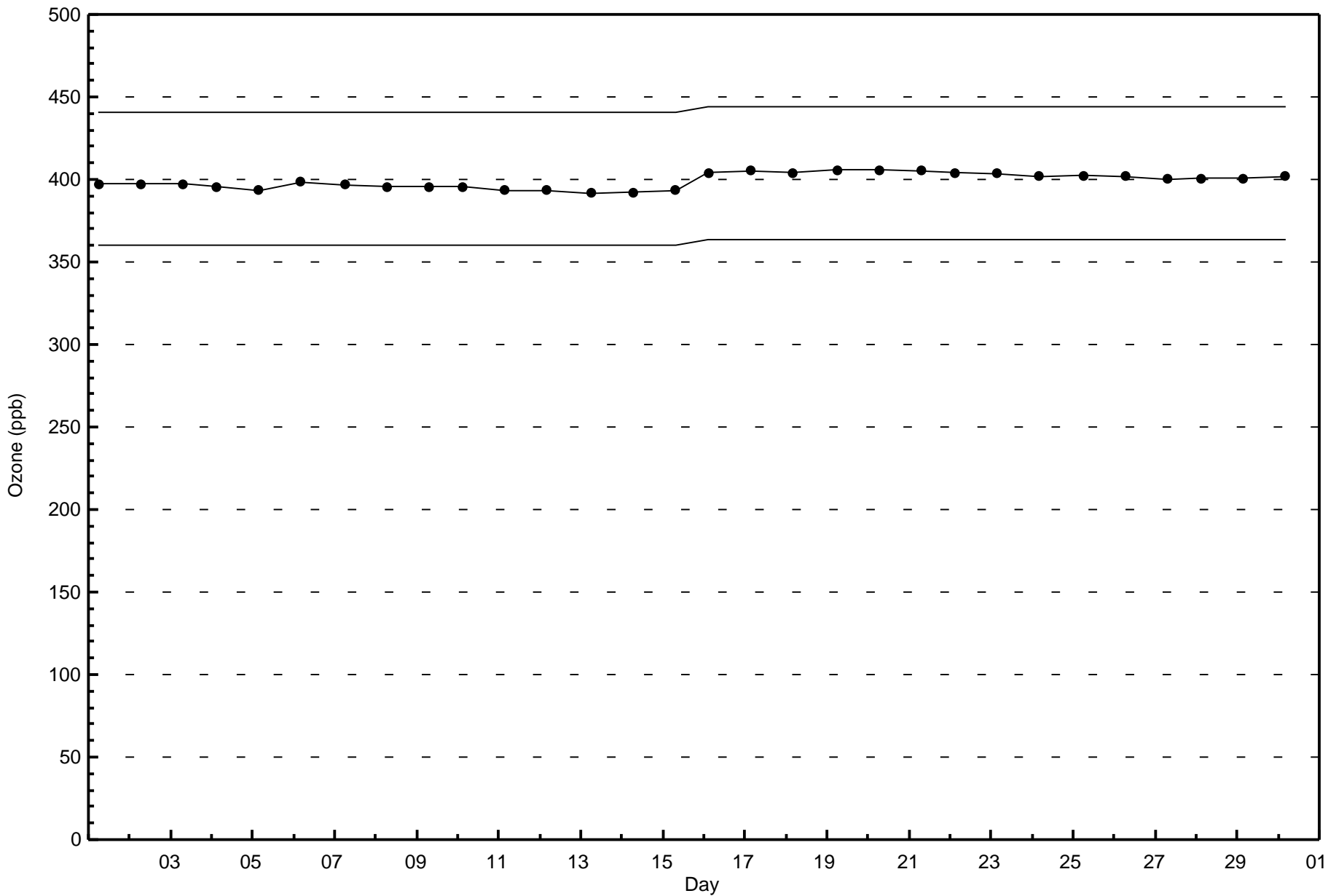
**Ozone (O₃) - ppb
Janvier - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 6 | 3 | 4 | 2 | 1 | 8 | 21 | 21 | 34 | 15 | 5 | 2 | 3 | 2 | 3 | 5 | 135 |
| 21 - 50 | 57 | 50 | 14 | 10 | 10 | 22 | 43 | 33 | 87 | 71 | 35 | 34 | 31 | 15 | 6 | 7 | 525 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 6 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 16 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 63 | 53 | 18 | 12 | 11 | 31 | 66 | 56 | 127 | 90 | 41 | 36 | 34 | 17 | 9 | 12 | 676 |

Total Number of Valid Hours: 676

Total Number of Hours: 720







Wood Buffalo Environmental Association

Summary of Hour Averages

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

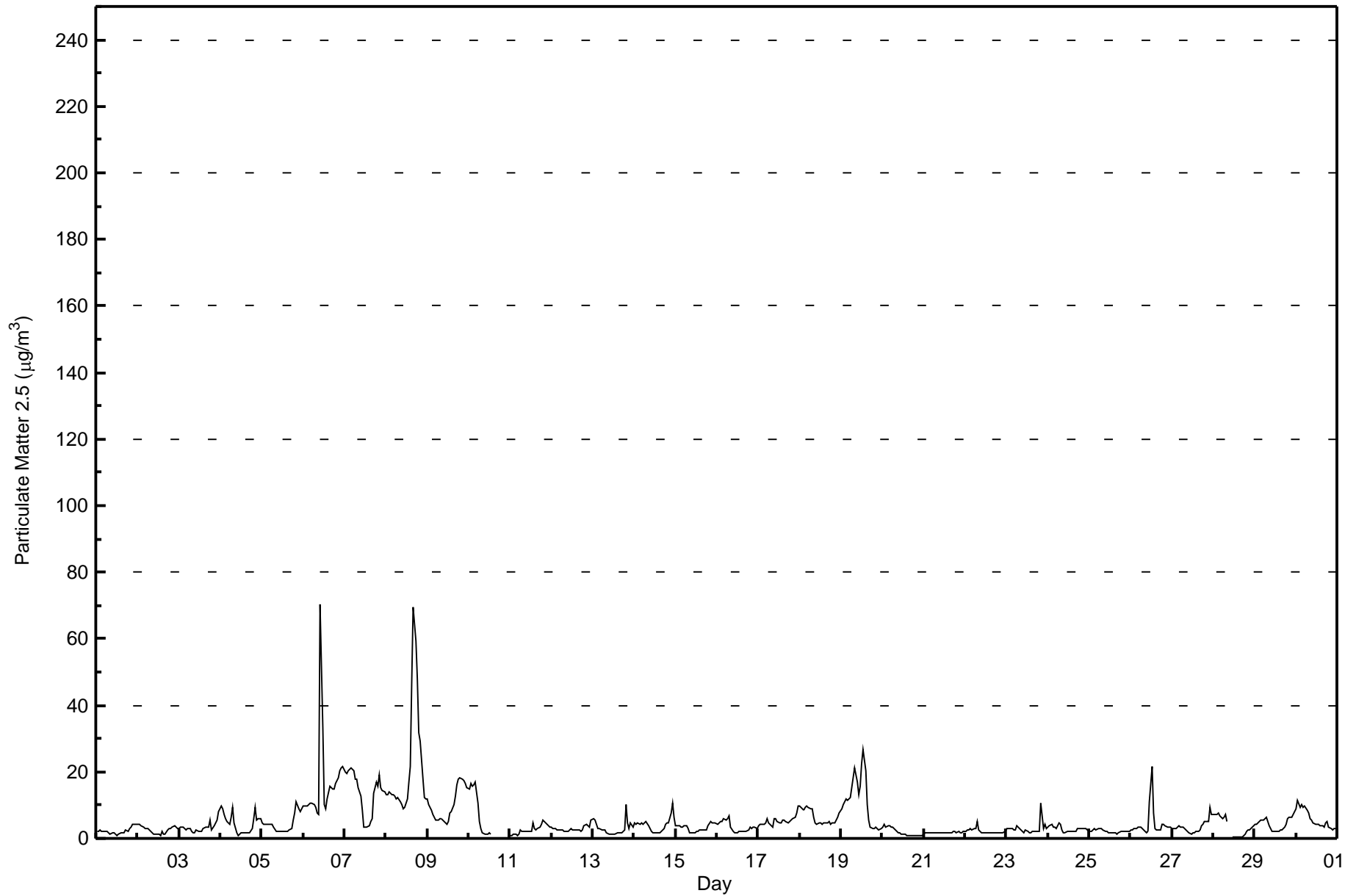
Janvier - September 2017

| Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 70.3 µg/m ³ on Sep 6 11:00 Minimum Value: 0.4 µg/m ³ on Sep 28 12:00 Maximum Diurnal Average: 6.8 µg/m ³ at hour 21 Monthly Average: 5.44 µg/m ³ | | Maximum Daily Average: 21.7 µg/m ³ on Sep 8 Minimum Daily Average: 1.7 µg/m ³ on Sep 21 Minimum Diurnal Average: 3.8 µg/m ³ at hour 10 Percentiles: P ₁ = 0.9 P ₁₀ = 1.6 Q ₁ = 2.1 Median = 3.3 Q ₃ = 5.8 P ₉₀ = 12.0 P ₉₉ = 31.2 | | Hours in Service: 720 Hours of Data: 709 Hours of Missing Data: 11 Hours of Calibration: 2 Percent Operational Time: 98.8 | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 2.0 | 2.2 | 2.5 | 2.2 | 2.2 | 2.2 | 2.2 | 1.8 | 1.4 | 1.7 | 1.7 | 1.2 | 1.0 | 1.3 | 1.7 | 1.5 | 1.6 | 2.5 | 2.2 | 3.1 | 3.6 | 4.2 | 4.4 | 4.4 | 2.3 | 4.4 |
| 2-Sep | 4.4 | 4.3 | 4.0 | 3.5 | 3.2 | 3.2 | 3.1 | 2.5 | 1.6 | 1.4 | 1.3 | 1.2 | 1.4 | 1.0 | 2.1 | 1.2 | 1.1 | 2.5 | 2.8 | 2.9 | 3.4 | 3.6 | 3.4 | 3.0 | 2.6 | 4.4 |
| 3-Sep | 3.1 | 3.4 | 3.4 | 3.2 | 2.7 | 2.9 | 3.1 | 2.3 | 1.7 | 1.8 | 2.4 | 2.1 | 2.2 | 2.3 | 3.0 | 3.4 | 3.6 | 3.6 | 5.4 | 2.8 | 4.0 | 4.6 | 5.6 | 8.0 | 3.4 | 8.0 |
| 4-Sep | 9.9 | 9.0 | 7.1 | 6.0 | 4.9 | 4.3 | 6.2 | 9.5 | 4.7 | 1.7 | 1.1 | 1.4 | 1.5 | 1.5 | 1.8 | 1.7 | 1.5 | 1.8 | 3.0 | 5.8 | 9.3 | 5.6 | 5.9 | 5.9 | 4.6 | 9.9 |
| 5-Sep | 4.7 | 4.2 | 4.2 | 4.1 | 4.2 | 4.2 | 4.2 | 3.6 | 2.1 | 2.0 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.4 | 3.1 | 5.4 | 7.7 | 11.2 | 8.7 | 8.1 | 9.0 | 4.4 | 11.2 |
| 6-Sep | 9.6 | 9.8 | 9.9 | 10.1 | 10.5 | 10.4 | 10.2 | 9.2 | 7.6 | 7.4 | 70.3 | 32.8 | 10.3 | 8.9 | 11.9 | 15.7 | 15.2 | 14.8 | 15.0 | 16.3 | 18.1 | 20.2 | 21.1 | 21.7 | 16.1 | 70.3 |
| 7-Sep | 20.1 | 19.6 | 20.2 | 20.9 | 21.4 | 20.5 | 17.9 | 17.7 | 15.3 | 12.6 | 8.3 | 3.6 | 3.2 | 3.3 | 3.7 | 5.0 | 6.0 | 13.5 | 17.0 | 15.5 | 19.2 | 15.2 | 14.2 | 14.1 | 13.7 | 21.4 |
| 8-Sep | 13.1 | 13.3 | 14.0 | 13.2 | 13.1 | 12.6 | 11.8 | 12.4 | 11.2 | 10.1 | 8.9 | 9.3 | 12.0 | 16.7 | 21.4 | 46.8 | 69.6 | 59.5 | 47.8 | 31.8 | 29.1 | 18.0 | 12.2 | 12.0 | 21.7 | 69.6 |
| 9-Sep | 12.0 | 10.3 | 8.6 | 7.4 | 6.2 | 5.7 | 5.7 | 5.8 | 5.7 | 5.4 | 4.9 | 4.3 | 5.2 | 7.5 | 7.9 | 10.0 | 12.8 | 16.1 | 17.7 | 18.2 | 18.0 | 17.5 | 16.5 | 15.2 | 10.2 | 18.2 |
| 10-Sep | 15.0 | 16.6 | 15.8 | 16.2 | 16.9 | 10.5 | 5.0 | 2.8 | 1.7 | 1.3 | 1.1 | 1.3 | 1.7 | 1.2 | PF | PF | PF | PF | PF | PF | PF | PF | PF | 1.0 | -- | 16.9 |
| 11-Sep | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 4.5 | 2.8 | 2.6 | 3.0 | 3.4 | 4.2 | 5.5 | 5.3 | 4.2 | 3.7 | 3.3 | 2.7 | 5.5 |
| 12-Sep | 3.2 | 2.9 | 3.0 | 2.6 | 2.7 | 2.6 | 2.5 | 2.0 | 2.0 | 2.0 | 2.3 | 2.9 | 2.6 | 2.5 | 2.7 | 2.5 | 2.3 | 2.3 | 2.6 | 3.7 | 4.4 | 3.7 | 3.6 | 5.3 | 2.9 | 5.3 |
| 13-Sep | 5.9 | 5.7 | 4.4 | 3.1 | 2.8 | 2.6 | 2.6 | 2.5 | 1.8 | 1.4 | 1.3 | 1.4 | 1.4 | 1.5 | 1.5 | 1.7 | 1.9 | 1.9 | 2.4 | 10.0 | 4.6 | 3.1 | 4.7 | 3.2 | 3.1 | 10.0 |
| 14-Sep | 4.6 | 4.4 | 4.5 | 4.2 | 4.8 | 4.2 | 4.5 | 4.9 | 3.8 | 3.1 | 2.1 | 1.8 | 1.7 | 1.5 | 1.9 | 1.8 | 2.3 | 2.9 | 4.1 | 4.5 | 4.6 | 7.5 | 10.8 | 6.4 | 4.0 | 10.8 |
| 15-Sep | 3.8 | 3.8 | 3.6 | 3.3 | 3.4 | 4.0 | 3.9 | 3.2 | 1.8 | 1.7 | 1.9 | 1.9 | 1.9 | 2.1 | 2.4 | 2.4 | 2.4 | 2.4 | 2.6 | 3.9 | 4.9 | 4.5 | 4.8 | 4.5 | 3.1 | 4.9 |
| 16-Sep | 4.4 | 4.6 | 5.0 | 5.2 | 5.9 | 5.7 | 6.1 | 6.8 | 3.2 | 2.1 | 1.7 | 1.7 | 1.9 | 2.0 | 2.0 | 2.3 | 2.0 | 2.1 | 2.5 | 3.2 | 3.0 | 3.4 | 3.4 | 3.1 | 3.5 | 6.8 |
| 17-Sep | 3.7 | 4.2 | 4.4 | 4.3 | 4.9 | 5.9 | 4.8 | 4.1 | 3.3 | 6.1 | 5.9 | 4.9 | 4.6 | 4.6 | 5.3 | 5.4 | 5.0 | 4.7 | 5.2 | 5.7 | 6.0 | 6.2 | 7.7 | 9.7 | 5.3 | 9.7 |
| 18-Sep | 9.6 | 9.2 | 8.3 | 9.1 | 9.6 | 9.4 | 9.1 | 8.8 | 6.4 | 4.8 | 4.4 | 4.5 | 4.5 | 4.4 | 4.8 | 4.5 | 4.5 | 4.9 | 4.2 | 4.5 | 4.8 | 5.5 | 6.5 | 7.6 | 6.4 | 9.6 |
| 19-Sep | 8.7 | 10.1 | 10.9 | 11.7 | 11.6 | 12.1 | 15.2 | 18.4 | 21.1 | 16.9 | 13.0 | 15.9 | 22.3 | 26.5 | 20.2 | 10.4 | 5.3 | 3.4 | 3.0 | 3.1 | 3.6 | 3.0 | 2.5 | 3.0 | 11.3 | 26.5 |
| 20-Sep | 3.5 | 4.1 | 3.5 | 3.7 | 3.7 | 3.4 | 3.2 | 2.9 | 2.2 | 1.9 | 1.7 | 1.3 | 1.3 | 1.2 | 1.1 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 4.1 |
| 21-Sep | 1.3 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.7 | 2.0 |
| 22-Sep | 2.0 | 2.4 | 2.5 | 2.9 | 2.7 | 2.9 | 2.9 | 5.3 | 2.7 | 1.8 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 | 1.6 | 1.7 | 1.8 | 1.8 | 1.7 | 1.6 | 1.6 | 1.8 | 2.2 | 2.2 | 5.3 |
| 23-Sep | 2.9 | 3.0 | 3.1 | 2.8 | 2.6 | 2.5 | 3.7 | 3.5 | 2.6 | 2.2 | 1.8 | 2.5 | 2.2 | 1.8 | 1.9 | 2.0 | 2.2 | 2.2 | 2.2 | 2.2 | 10.5 | 2.9 | 4.3 | 3.0 | 2.9 | 10.5 |
| 24-Sep | 3.3 | 4.0 | 4.2 | 3.3 | 3.2 | 3.1 | 4.6 | 4.1 | 2.5 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.3 | 2.3 | 2.8 | 3.0 | 2.9 | 3.1 | 3.0 | 2.8 | 2.4 | 2.9 | 4.6 |
| 25-Sep | 2.1 | 2.3 | 2.6 | 2.8 | 2.6 | 2.8 | 2.9 | 3.0 | 2.7 | 2.3 | 2.0 | 1.7 | 1.6 | 1.6 | 1.6 | 1.5 | 1.4 | 1.6 | 1.9 | 2.3 | 2.3 | 2.0 | 2.2 | 2.3 | 2.2 | 3.0 |
| 26-Sep | 2.5 | 2.5 | 2.8 | 3.0 | 3.4 | 3.6 | 3.4 | 3.0 | 2.0 | 1.8 | 2.1 | 11.0 | 21.8 | 7.7 | 3.1 | 2.7 | 2.6 | 2.7 | 4.4 | 4.4 | 3.9 | 3.5 | 3.3 | 3.2 | 4.3 | 21.8 |
| 27-Sep | 3.0 | 3.1 | 3.2 | 3.4 | 3.6 | 3.6 | 3.3 | 2.9 | 2.4 | 1.9 | 1.8 | 1.4 | 1.5 | 1.7 | 1.9 | 2.1 | 2.4 | 3.6 | 4.2 | 5.1 | 5.2 | 5.2 | 9.2 | 7.2 | 3.5 | 9.2 |
| 28-Sep | 7.1 | 7.0 | 7.1 | 7.4 | 6.6 | 6.1 | 6.4 | 7.4 | 5.1 | C | C | 0.4 | 0.6 | 0.5 | 0.5 | 0.4 | 0.5 | 0.5 | 1.2 | 2.2 | 2.5 | 2.7 | 3.2 | 3.8 | 3.6 | 7.4 |
| 29-Sep | 4.1 | 4.4 | 4.8 | 5.4 | 5.7 | 5.5 | 5.9 | 6.5 | 3.8 | 2.8 | 2.2 | 2.0 | 2.0 | 1.9 | 2.1 | 2.5 | 2.5 | 3.5 | 4.2 | 6.0 | 6.4 | 6.4 | 7.1 | 8.2 | 4.4 | 8.2 |
| 30-Sep | 9.0 | 11.4 | 9.4 | 10.0 | 9.5 | 9.5 | 8.3 | 7.6 | 6.1 | 5.4 | 4.8 | 4.2 | 4.1 | 4.4 | 3.9 | 3.7 | 3.6 | 4.7 | 5.2 | 3.2 | 2.8 | 2.7 | 2.9 | 3.1 | 5.8 | 11.4 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 6.0 6.1 6.0 5.9 5.9 5.6 5.6 5.6 4.4 3.8 5.5 4.2 4.1 4.1 4.2 4.9 5.7 5.9 6.1 6.2 6.8 5.9 6.2 6.0 20.1 19.6 20.2 20.9 21.4 20.5 17.9 18.4 21.1 16.9 70.3 32.8 22.3 26.5 21.4 46.8 69.6 59.5 47.8 31.8 29.1 20.2 21.1 21.7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³ | | PF - Power Failure | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 508 | 71.65 | 71.65 |
| 6 - 15 | 143 | 20.17 | 91.82 |
| 16 - 25 | 37 | 5.22 | 97.04 |
| 26 - 80 | 9 | 1.27 | 98.31 |
| > 81.0 | 0 | 0.00 | 98.31 |

Total Number of Valid Hours: 709

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 52 | 33 | 11 | 8 | 6 | 18 | 41 | 28 | 91 | 81 | 33 | 37 | 32 | 15 | 8 | 11 | 505 |
| 6 - 15 | 8 | 13 | 3 | 3 | 4 | 12 | 20 | 24 | 30 | 13 | 8 | 0 | 3 | 0 | 0 | 2 | 143 |
| 16 - 25 | 1 | 4 | 2 | 2 | 2 | 0 | 6 | 7 | 7 | 4 | 0 | 1 | 0 | 1 | 0 | 0 | 37 |
| 26 - 80 | 1 | 4 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 9 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 62 | 54 | 18 | 13 | 12 | 31 | 67 | 59 | 128 | 98 | 41 | 38 | 35 | 16 | 9 | 13 | 694 |

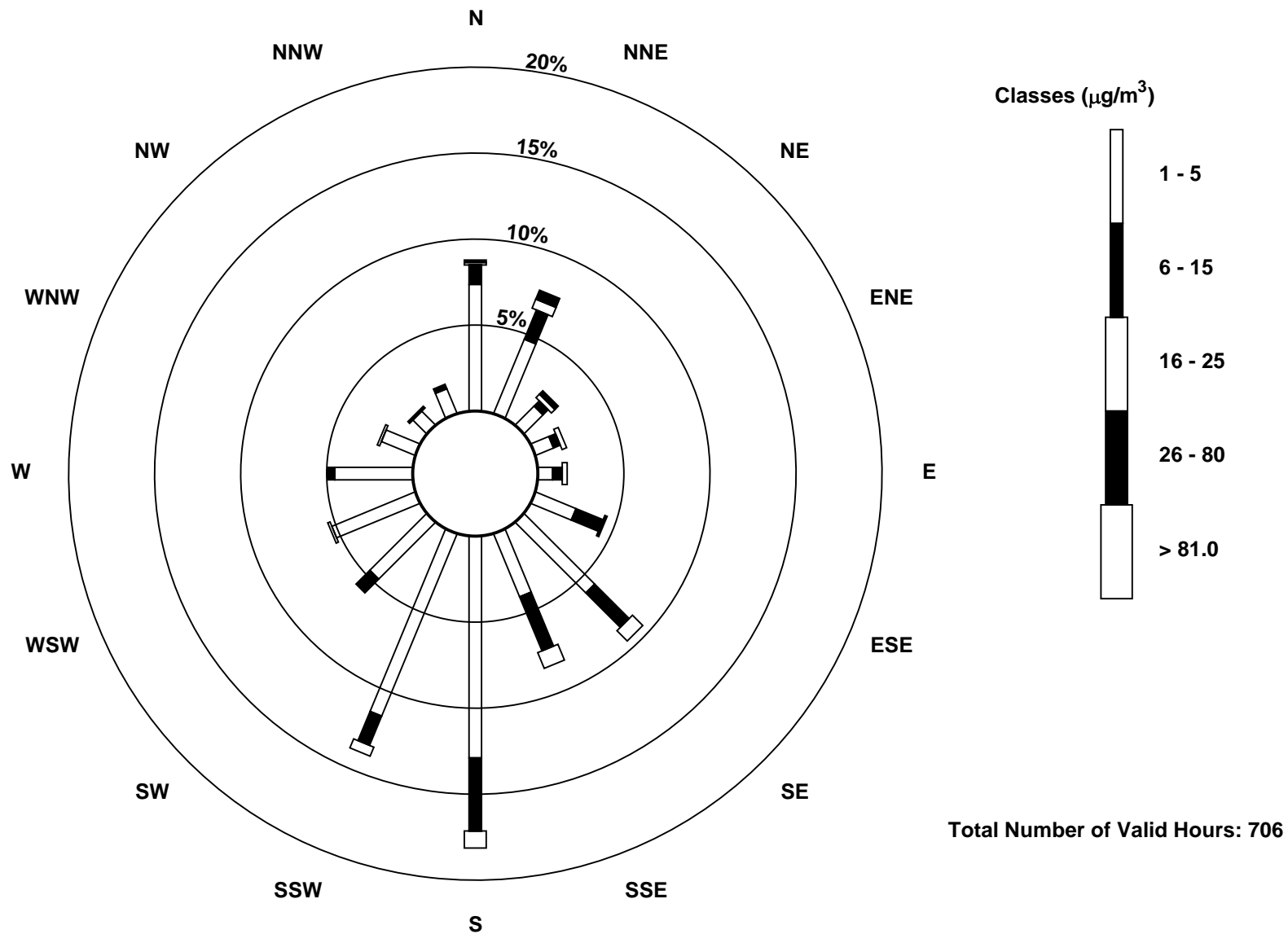
Total Number of Valid Hours: 706

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier (AMS 22)





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

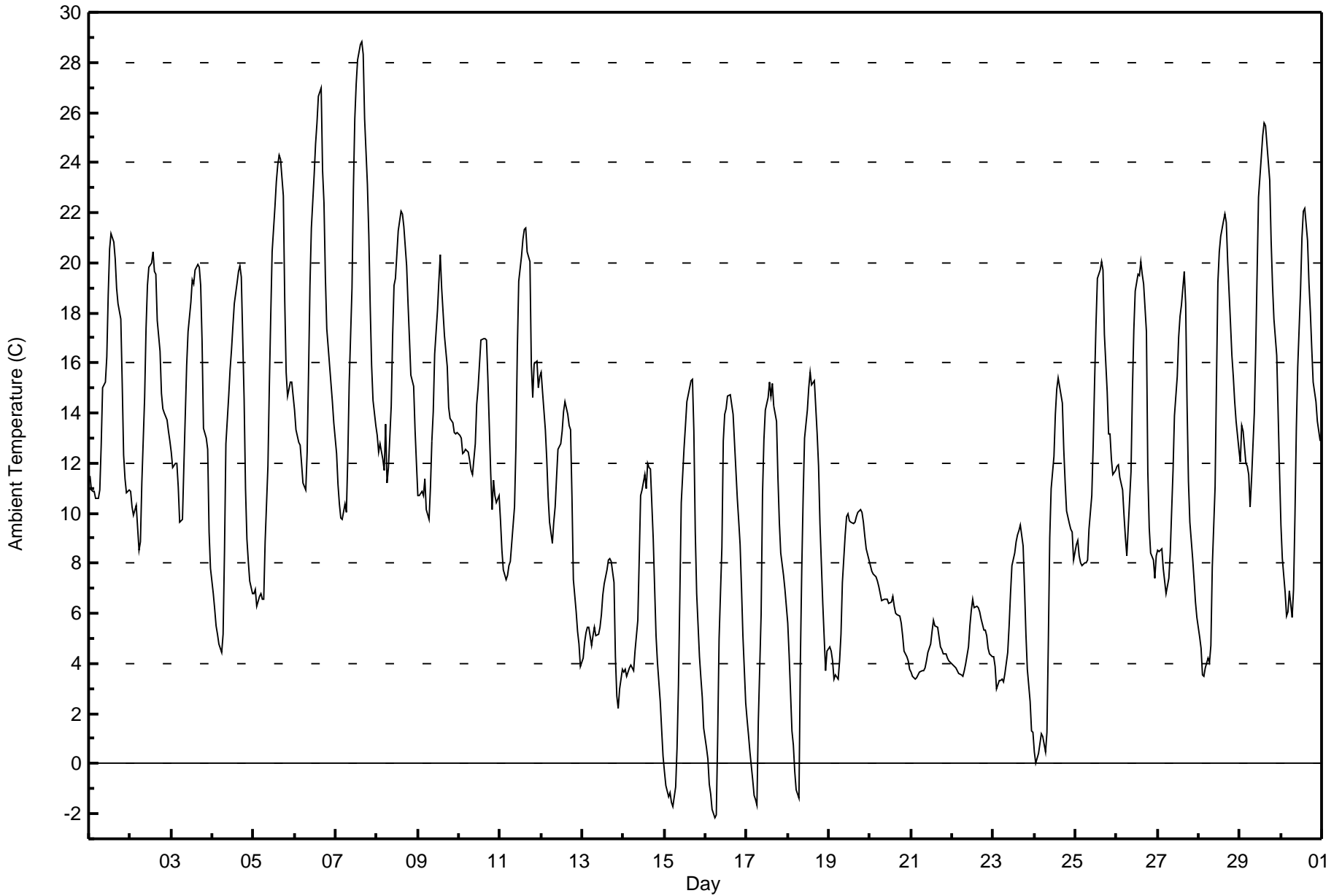
Janvier - September 2017

| Maximum Value: 28.8 C on Sep 7 16:00 | | Maximum Daily Average: 18.4 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -2.1 C on Sep 16 06:00 | | Minimum Daily Average: 4.3 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.0 C at hour 15 | | Minimum Diurnal Average: 6.0 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.03 C | | Percentiles: P₁ = -1.4 P₁₀ = 3.7 Q₁ = 6.1 Median = 10.8 Q₃ = 15.1 P₉₀ = 19.7 P₉₉ = 26.4 | | 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-Sep | 11.5 | 10.9 | 10.9 | 10.9 | 10.6 | 10.6 | 10.9 | 12.7 | 15.0 | 15.2 | 16.2 | 18.7 | 20.6 | 21.2 | 20.8 | 20.1 | 19.0 | 18.3 | 17.8 | 15.2 | 12.3 | 11.4 | 10.8 | 10.9 | 14.7 | 21.2 | |
| 2-Sep | 10.9 | 10.2 | 9.9 | 10.3 | 9.4 | 8.5 | 8.9 | 11.2 | 14.6 | 17.4 | 19.1 | 19.8 | 20.0 | 20.5 | 19.7 | 19.5 | 17.7 | 16.5 | 14.8 | 14.2 | 14.0 | 13.7 | 13.3 | 12.9 | 14.5 | 20.5 | |
| 3-Sep | 12.4 | 11.8 | 12.0 | 12.0 | 11.1 | 9.6 | 9.8 | 11.9 | 13.9 | 15.9 | 17.3 | 18.4 | 19.3 | 19.1 | 19.7 | 19.9 | 19.8 | 19.1 | 16.9 | 13.4 | 13.0 | 12.5 | 9.3 | 7.8 | 14.4 | 19.9 | |
| 4-Sep | 6.8 | 6.2 | 5.5 | 5.1 | 4.8 | 4.5 | 5.2 | 8.5 | 12.8 | 14.7 | 15.7 | 16.5 | 17.5 | 18.4 | 19.2 | 19.6 | 19.8 | 19.4 | 14.5 | 11.0 | 9.0 | 8.0 | 7.3 | 6.8 | 11.5 | 19.8 | |
| 5-Sep | 6.8 | 7.0 | 6.3 | 6.7 | 6.8 | 6.6 | 6.6 | 8.8 | 11.9 | 15.1 | 17.9 | 20.4 | 22.3 | 23.2 | 23.9 | 24.3 | 24.1 | 22.7 | 18.5 | 15.6 | 14.7 | 15.3 | 15.2 | 14.7 | 14.8 | 24.3 | |
| 6-Sep | 14.1 | 13.3 | 12.8 | 12.7 | 12.0 | 11.2 | 10.9 | 12.5 | 15.6 | 19.1 | 21.4 | 23.5 | 24.7 | 25.6 | 26.7 | 27.0 | 23.7 | 22.4 | 19.5 | 17.3 | 15.9 | 15.2 | 14.5 | 13.6 | 17.7 | 27.0 | |
| 7-Sep | 12.4 | 11.2 | 10.4 | 9.8 | 9.7 | 10.3 | 10.1 | 12.2 | 15.2 | 19.0 | 22.9 | 25.7 | 27.1 | 28.1 | 28.7 | 28.8 | 28.3 | 25.8 | 23.1 | 21.1 | 18.2 | 15.9 | 14.5 | 13.5 | 18.4 | 28.8 | |
| 8-Sep | 13.1 | 12.4 | 12.7 | 12.1 | 11.7 | 13.6 | 11.2 | 11.8 | 14.3 | 17.1 | 19.1 | 19.4 | 21.3 | 21.7 | 22.1 | 22.0 | 21.5 | 19.9 | 18.4 | 17.0 | 15.5 | 15.1 | 13.3 | 12.0 | 16.2 | 22.1 | |
| 9-Sep | 10.7 | 10.7 | 10.9 | 10.7 | 11.4 | 10.2 | 9.8 | 11.0 | 12.9 | 14.0 | 16.4 | 18.1 | 19.3 | 20.3 | 19.0 | 17.1 | 16.5 | 15.8 | 14.3 | 13.8 | 13.6 | 13.2 | 13.2 | 13.2 | 14.0 | 20.3 | |
| 10-Sep | 13.1 | 13.0 | 12.4 | 12.4 | 12.6 | 12.4 | 12.1 | 11.7 | 11.6 | 12.8 | 14.3 | 15.0 | 16.0 | 16.9 | 17.0 | 17.0 | 16.9 | 15.3 | 11.6 | 10.2 | 11.3 | 10.7 | 10.4 | 10.7 | 13.2 | 17.0 | |
| 11-Sep | 9.7 | 8.5 | 7.8 | 7.3 | 7.5 | 7.9 | 8.1 | 8.8 | 10.3 | 12.7 | 16.5 | 19.2 | 20.3 | 20.9 | 21.3 | 21.4 | 20.4 | 20.0 | 15.9 | 14.6 | 15.9 | 16.1 | 15.0 | 15.4 | 14.2 | 21.4 | |
| 12-Sep | 15.6 | 14.8 | 13.3 | 12.1 | 10.6 | 9.6 | 8.8 | 9.7 | 10.3 | 11.4 | 12.5 | 12.8 | 13.3 | 14.1 | 14.5 | 13.9 | 13.5 | 13.3 | 10.7 | 7.3 | 6.1 | 5.3 | 4.8 | 3.9 | 10.9 | 15.6 | |
| 13-Sep | 4.2 | 4.8 | 5.2 | 5.5 | 5.4 | 4.7 | 5.1 | 5.4 | 5.1 | 5.2 | 5.5 | 6.0 | 6.7 | 7.2 | 7.7 | 8.1 | 8.2 | 8.0 | 7.2 | 4.3 | 2.7 | 2.2 | 3.0 | 3.7 | 5.5 | 8.2 | |
| 14-Sep | 3.7 | 3.8 | 3.5 | 3.8 | 3.9 | 3.8 | 3.7 | 4.5 | 5.7 | 8.2 | 10.7 | 10.9 | 11.5 | 11.0 | 12.0 | 11.8 | 11.8 | 9.0 | 7.0 | 5.1 | 4.0 | 2.5 | 1.4 | 0.3 | 6.4 | 12.0 | |
| 15-Sep | -0.3 | -0.9 | -1.3 | -1.2 | -1.5 | -1.7 | -0.9 | 0.7 | 3.1 | 6.7 | 10.4 | 12.6 | 13.5 | 14.5 | 14.7 | 15.3 | 15.4 | 13.3 | 9.3 | 6.8 | 4.3 | 3.4 | 2.7 | 1.4 | 5.8 | 15.4 | |
| 16-Sep | 0.6 | 0.2 | -0.8 | -1.2 | -1.8 | -2.1 | -2.0 | 1.1 | 5.0 | 8.6 | 12.9 | 14.0 | 14.2 | 14.7 | 14.8 | 14.4 | 13.9 | 12.8 | 10.6 | 9.7 | 8.7 | 7.0 | 5.1 | 2.4 | 6.8 | 14.8 | |
| 17-Sep | 1.7 | 1.1 | 0.4 | -0.6 | -1.2 | -1.4 | -1.7 | 1.7 | 6.0 | 10.8 | 12.9 | 14.1 | 14.6 | 15.2 | 14.7 | 15.2 | 14.3 | 13.7 | 11.4 | 9.7 | 8.4 | 7.5 | 6.9 | 6.3 | 7.6 | 15.2 | |
| 18-Sep | 5.6 | 4.3 | 1.3 | 0.7 | -0.3 | -1.0 | -1.4 | 4.0 | 7.8 | 10.6 | 13.0 | 14.1 | 15.0 | 15.6 | 15.1 | 15.3 | 14.3 | 13.2 | 11.9 | 9.6 | 6.4 | 5.0 | 3.7 | 4.5 | 7.9 | 15.6 | |
| 19-Sep | 4.7 | 4.5 | 4.1 | 3.4 | 3.5 | 3.4 | 4.1 | 5.2 | 7.2 | 9.2 | 9.9 | 10.0 | 9.7 | 9.6 | 9.6 | 9.6 | 9.9 | 10.0 | 10.2 | 10.0 | 9.6 | 9.1 | 8.6 | 8.1 | 7.6 | 10.2 | |
| 20-Sep | 7.9 | 7.7 | 7.6 | 7.5 | 7.3 | 7.1 | 6.8 | 6.5 | 6.6 | 6.6 | 6.5 | 6.4 | 6.5 | 6.7 | 6.3 | 6.0 | 5.9 | 5.9 | 5.6 | 5.1 | 4.5 | 4.3 | 4.1 | 3.8 | 6.2 | 7.9 | |
| 21-Sep | 3.7 | 3.5 | 3.4 | 3.4 | 3.5 | 3.6 | 3.7 | 3.7 | 3.8 | 4.1 | 4.5 | 4.8 | 5.3 | 5.7 | 5.5 | 5.4 | 5.0 | 4.7 | 4.6 | 4.4 | 4.4 | 4.2 | 4.1 | 4.1 | 4.3 | 5.7 | |
| 22-Sep | 3.9 | 3.9 | 3.8 | 3.7 | 3.6 | 3.6 | 3.5 | 3.7 | 4.0 | 4.7 | 5.5 | 6.1 | 6.5 | 6.2 | 6.3 | 6.2 | 6.1 | 5.8 | 5.3 | 5.3 | 5.1 | 4.6 | 4.4 | 4.3 | 4.8 | 6.5 | |
| 23-Sep | 4.3 | 3.9 | 3.0 | 3.3 | 3.3 | 3.4 | 3.3 | 3.6 | 4.4 | 5.5 | 6.8 | 7.9 | 8.4 | 8.9 | 9.1 | 9.3 | 9.5 | 8.7 | 7.0 | 5.2 | 3.7 | 2.5 | 1.3 | 1.2 | 5.3 | 9.5 | |
| 24-Sep | 0.5 | 0.0 | 0.4 | 0.8 | 1.2 | 1.1 | 0.5 | 1.3 | 4.9 | 9.0 | 11.0 | 12.3 | 14.0 | 14.9 | 15.4 | 14.7 | 14.4 | 12.5 | 11.2 | 10.1 | 9.6 | 9.3 | 9.3 | 8.1 | 7.8 | 15.4 | |
| 25-Sep | 8.8 | 8.9 | 8.3 | 8.0 | 7.9 | 8.0 | 8.0 | 8.1 | 9.4 | 10.7 | 12.7 | 15.2 | 17.5 | 19.4 | 19.7 | 20.0 | 19.7 | 17.1 | 14.8 | 13.2 | 13.2 | 12.2 | 11.5 | 11.7 | 12.7 | 20.0 | |
| 26-Sep | 11.9 | 11.9 | 11.4 | 10.9 | 9.9 | 9.1 | 8.3 | 9.4 | 11.7 | 14.9 | 17.3 | 18.9 | 19.6 | 19.5 | 20.0 | 19.6 | 19.1 | 17.3 | 11.7 | 9.4 | 8.4 | 8.2 | 7.4 | 8.3 | 13.1 | 20.0 | |
| 27-Sep | 8.5 | 8.4 | 8.6 | 7.8 | 7.3 | 6.8 | 7.4 | 8.4 | 10.1 | 11.7 | 13.9 | 15.4 | 17.1 | 17.9 | 18.3 | 19.7 | 18.4 | 14.3 | 11.2 | 9.7 | 8.2 | 7.4 | 6.4 | 5.9 | 11.2 | 19.7 | |
| 28-Sep | 5.1 | 4.6 | 3.6 | 3.5 | 3.8 | 4.2 | 4.0 | 4.7 | 7.9 | 11.0 | 15.3 | 19.2 | 20.4 | 21.1 | 21.6 | 21.9 | 21.6 | 20.1 | 17.6 | 16.3 | 15.5 | 14.5 | 13.7 | 12.6 | 12.7 | 21.9 | |
| 29-Sep | 12.0 | 13.5 | 13.3 | 12.0 | 11.9 | 11.5 | 10.3 | 11.3 | 14.0 | 16.5 | 19.6 | 22.6 | 24.3 | 25.1 | 25.6 | 25.5 | 24.7 | 23.3 | 20.9 | 19.1 | 17.8 | 16.3 | 14.0 | 11.7 | 17.4 | 25.6 | |
| 30-Sep | 9.5 | 8.2 | 6.8 | 5.9 | 6.1 | 6.9 | 5.9 | 6.9 | 9.9 | 13.4 | 15.8 | 18.9 | 21.0 | 22.1 | 22.1 | 20.9 | 19.2 | 18.0 | 16.6 | 15.2 | 14.5 | 13.7 | 13.3 | 12.9 | 13.5 | 22.1 | |
| | | 7.8 | 7.4 | 6.9 | 6.6 | 6.4 | 6.2 | 6.0 | 7.4 | 9.5 | 11.7 | 13.8 | 15.2 | 16.2 | 16.8 | 17.0 | 17.0 | 16.4 | 15.2 | 13.0 | 11.3 | 10.3 | 9.5 | 8.8 | 8.2 | Diurnal Average | |
| | | 15.6 | 14.8 | 13.3 | 12.7 | 12.6 | 13.6 | 12.1 | 12.7 | 15.6 | 19.1 | 22.9 | 25.7 | 27.1 | 28.1 | 28.7 | 28.8 | 28.3 | 25.8 | 23.1 | 21.1 | 18.2 | 16.3 | 15.2 | 15.4 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Janvier - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Janvier - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 19 | 2.64 | 2.64 |
| 0 - 10 | 308 | 42.78 | 45.42 |
| 10 - 20 | 331 | 45.97 | 91.39 |
| > 20 | 62 | 8.61 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



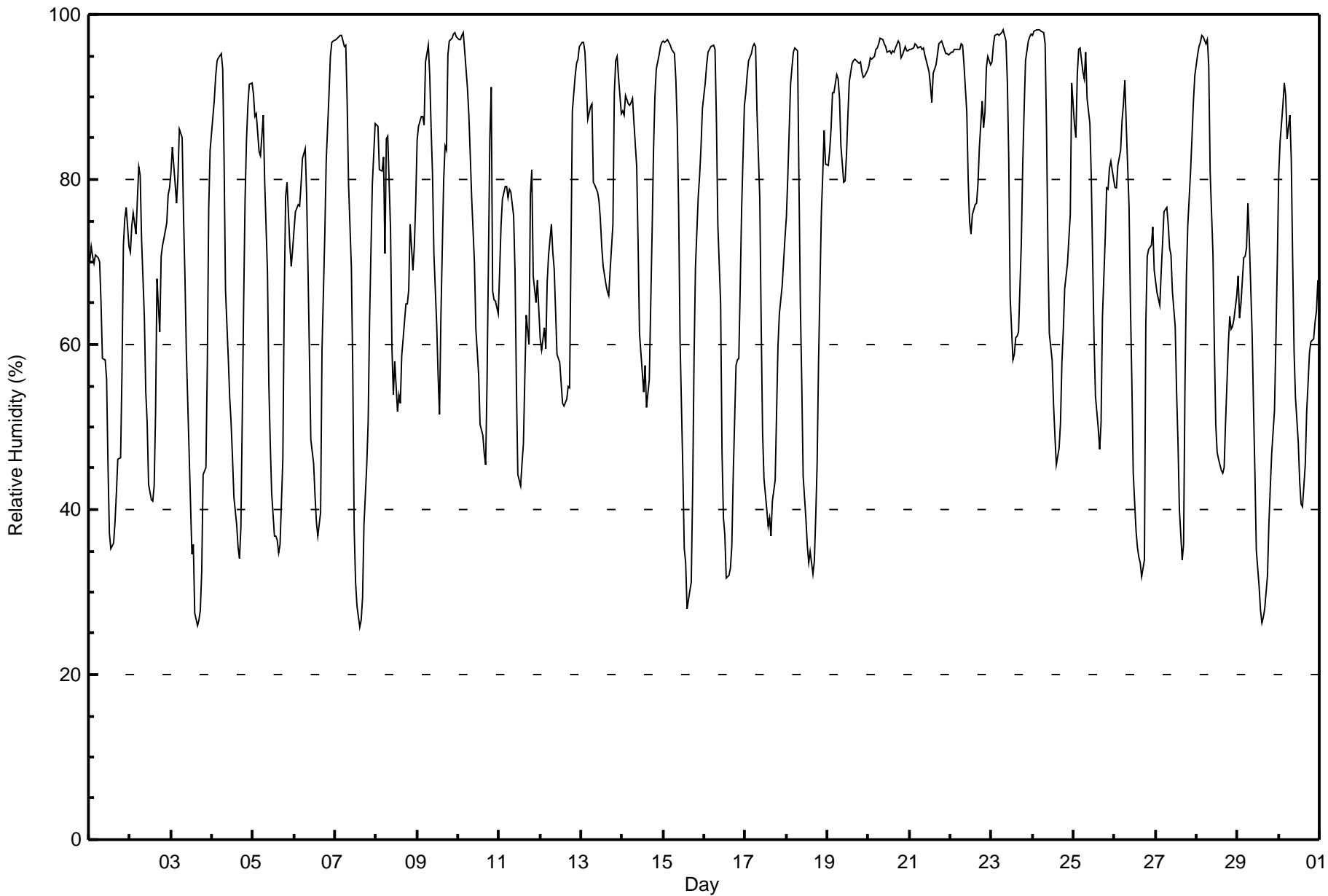
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Janvier - September 2017

| Maximum Value: 98 % on Sep 24 05:00 Maximum Daily Average: 95.7 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 26 % on Sep 7 15:00 Minimum Daily Average: 51.4 % on Sep 29 Maximum Diurnal Average: 89.3 % at hour 7 Minimum Diurnal Average: 48.8 % at hour 15 Monthly Average: 72.3 % Percentiles: P ₁ = 28 P ₁₀ = 41 Q ₁ = 58 Median = 75 O ₃ = 92 P ₉₀ = 96 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-Sep | 70 | 72 | 71 | 70 | 71 | 71 | 70 | 65 | 58 | 58 | 56 | 45 | 37 | 35 | 36 | 38 | 42 | 46 | 46 | 57 | 72 | 75 | 77 | 72 | 58.8 | 77 |
| 2-Sep | 71 | 74 | 76 | 73 | 78 | 82 | 80 | 73 | 63 | 54 | 51 | 43 | 41 | 41 | 43 | 52 | 68 | 62 | 71 | 72 | 73 | 75 | 78 | 79 | 65.5 | 82 |
| 3-Sep | 81 | 84 | 79 | 77 | 80 | 86 | 85 | 75 | 68 | 59 | 53 | 41 | 35 | 36 | 27 | 26 | 27 | 28 | 33 | 44 | 45 | 58 | 77 | 84 | 57.8 | 86 |
| 4-Sep | 88 | 90 | 92 | 94 | 95 | 95 | 93 | 82 | 67 | 58 | 53 | 51 | 46 | 42 | 38 | 35 | 34 | 38 | 65 | 78 | 85 | 89 | 92 | 92 | 70.5 | 95 |
| 5-Sep | 90 | 88 | 88 | 83 | 83 | 85 | 88 | 80 | 69 | 55 | 48 | 42 | 37 | 37 | 36 | 35 | 36 | 46 | 66 | 78 | 80 | 72 | 69 | 71 | 65.1 | 90 |
| 6-Sep | 74 | 76 | 77 | 77 | 79 | 83 | 84 | 78 | 69 | 59 | 49 | 46 | 42 | 39 | 37 | 40 | 59 | 66 | 73 | 82 | 90 | 95 | 97 | 97 | 69.4 | 97 |
| 7-Sep | 97 | 97 | 97 | 97 | 97 | 96 | 96 | 89 | 79 | 69 | 57 | 38 | 31 | 28 | 26 | 27 | 29 | 38 | 45 | 51 | 63 | 71 | 79 | 87 | 66.1 | 97 |
| 8-Sep | 87 | 86 | 81 | 81 | 83 | 71 | 85 | 85 | 74 | 60 | 54 | 58 | 52 | 54 | 53 | 59 | 61 | 65 | 65 | 67 | 74 | 69 | 72 | 77 | 69.6 | 87 |
| 9-Sep | 85 | 86 | 88 | 88 | 87 | 94 | 96 | 93 | 86 | 81 | 71 | 62 | 56 | 52 | 63 | 80 | 84 | 84 | 95 | 97 | 97 | 98 | 98 | 97 | 84.0 | 98 |
| 10-Sep | 97 | 97 | 97 | 98 | 96 | 91 | 88 | 83 | 78 | 70 | 62 | 59 | 56 | 50 | 49 | 47 | 45 | 56 | 85 | 91 | 67 | 65 | 65 | 64 | 73.1 | 98 |
| 11-Sep | 69 | 74 | 78 | 79 | 79 | 78 | 79 | 78 | 76 | 69 | 55 | 44 | 43 | 46 | 48 | 56 | 64 | 60 | 78 | 81 | 68 | 65 | 68 | 64 | 66.6 | 81 |
| 12-Sep | 61 | 59 | 62 | 59 | 68 | 71 | 74 | 71 | 69 | 64 | 59 | 58 | 55 | 53 | 53 | 53 | 55 | 55 | 71 | 88 | 93 | 94 | 95 | 96 | 68.2 | 96 |
| 13-Sep | 97 | 97 | 95 | 91 | 87 | 89 | 89 | 80 | 79 | 78 | 77 | 75 | 72 | 70 | 67 | 67 | 66 | 69 | 75 | 91 | 94 | 95 | 92 | 88 | 82.5 | 97 |
| 14-Sep | 88 | 88 | 90 | 89 | 89 | 90 | 90 | 87 | 81 | 72 | 61 | 59 | 54 | 57 | 52 | 54 | 56 | 74 | 83 | 90 | 93 | 95 | 96 | 97 | 78.6 | 97 |
| 15-Sep | 97 | 97 | 97 | 97 | 96 | 96 | 95 | 92 | 87 | 76 | 61 | 45 | 35 | 34 | 28 | 30 | 31 | 42 | 58 | 69 | 78 | 81 | 84 | 89 | 70.6 | 97 |
| 16-Sep | 92 | 94 | 95 | 96 | 96 | 96 | 96 | 87 | 75 | 65 | 47 | 39 | 37 | 32 | 32 | 33 | 36 | 44 | 58 | 58 | 58 | 67 | 76 | 89 | 66.5 | 96 |
| 17-Sep | 90 | 93 | 94 | 95 | 96 | 96 | 96 | 88 | 78 | 62 | 49 | 44 | 40 | 38 | 39 | 37 | 41 | 44 | 52 | 60 | 64 | 67 | 70 | 73 | 66.9 | 96 |
| 18-Sep | 75 | 80 | 92 | 94 | 95 | 96 | 96 | 80 | 65 | 55 | 44 | 39 | 36 | 33 | 35 | 32 | 34 | 39 | 46 | 58 | 76 | 81 | 86 | 82 | 64.5 | 96 |
| 19-Sep | 82 | 84 | 86 | 91 | 90 | 93 | 92 | 90 | 84 | 80 | 80 | 83 | 88 | 92 | 94 | 94 | 95 | 94 | 94 | 94 | 93 | 92 | 93 | 93 | 89.6 | 95 |
| 20-Sep | 94 | 95 | 95 | 95 | 96 | 96 | 96 | 97 | 97 | 96 | 96 | 95 | 96 | 95 | 96 | 95 | 96 | 97 | 96 | 95 | 95 | 96 | 96 | 96 | 95.7 | 97 |
| 21-Sep | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 95 | 94 | 93 | 91 | 89 | 93 | 94 | 95 | 96 | 97 | 97 | 96 | 95 | 95 | 95 | 95.0 | 97 |
| 22-Sep | 95 | 95 | 96 | 96 | 96 | 96 | 97 | 96 | 94 | 88 | 80 | 75 | 73 | 76 | 77 | 77 | 79 | 84 | 89 | 86 | 88 | 93 | 95 | 94 | 88.2 | 97 |
| 23-Sep | 94 | 96 | 97 | 98 | 97 | 98 | 98 | 98 | 97 | 92 | 83 | 66 | 58 | 59 | 61 | 61 | 62 | 72 | 82 | 89 | 94 | 97 | 97 | 98 | 85.1 | 98 |
| 24-Sep | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 96 | 86 | 72 | 61 | 58 | 53 | 49 | 46 | 47 | 51 | 58 | 62 | 67 | 70 | 73 | 76 | 92 | 75.1 | 98 |
| 25-Sep | 87 | 85 | 93 | 96 | 96 | 93 | 92 | 95 | 90 | 87 | 80 | 70 | 60 | 54 | 50 | 47 | 51 | 63 | 73 | 79 | 79 | 81 | 82 | 80 | 77.6 | 96 |
| 26-Sep | 79 | 79 | 82 | 84 | 87 | 89 | 92 | 87 | 77 | 65 | 56 | 44 | 37 | 35 | 34 | 34 | 32 | 34 | 63 | 71 | 72 | 72 | 74 | 69 | 64.4 | 92 |
| 27-Sep | 68 | 66 | 65 | 69 | 72 | 76 | 77 | 75 | 72 | 71 | 66 | 62 | 54 | 48 | 40 | 34 | 36 | 55 | 68 | 74 | 81 | 85 | 89 | 92 | 66.5 | 92 |
| 28-Sep | 95 | 96 | 97 | 98 | 97 | 96 | 97 | 94 | 81 | 71 | 60 | 50 | 47 | 46 | 45 | 44 | 45 | 51 | 60 | 63 | 62 | 62 | 63 | 66 | 70.3 | 98 |
| 29-Sep | 68 | 63 | 65 | 71 | 71 | 72 | 77 | 73 | 61 | 52 | 44 | 35 | 31 | 28 | 26 | 27 | 28 | 32 | 38 | 43 | 47 | 52 | 61 | 70 | 51.4 | 77 |
| 30-Sep | 80 | 85 | 89 | 92 | 90 | 85 | 88 | 82 | 70 | 59 | 54 | 48 | 43 | 41 | 40 | 45 | 52 | 55 | 59 | 60 | 61 | 63 | 64 | 68 | 65.6 | 92 |
| | | | | | | | | | | | | | | | | | | 84.8 85.7 87.0 87.4 88.1 88.4 89.3 84.9 77.5 69.8 62.0 55.6 51.3 49.6 48.8 50.0 52.9 58.2 68.2 74.3 76.9 79.1 81.8 83.6 | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | 98 98 98 98 98 98 98 98 97 96 96 95 96 95 96 95 96 97 97 97 97 98 98 98 | | | | | | Diurnal Maximum | | |





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Janvier - September 2017

| | | |
|--|--|---------------------------------|
| Maximum Speed: 19 km/h on Sep 29 14:00 | Maximum Daily Speed Average: 10.5 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 28 03:00 | Minimum Daily Speed Average: 1.0 km/h on Sep 8 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 3.2 km/h at hour 12 | Minimum Diurnal Speed Average: 1.1 km/h at hour 18 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 1.9 km/h 198.2 deg | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 5 Q ₃ = 8 P ₉₀ = 11 P ₉₉ = 17 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-------|-------|------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | SSW7 | SSW7 | SSW7 | SSW7 | SSW8 | SSW7 | SW7 | SW8 | SW9 | SW12 | SW10 | WSW12 | W14 | WSW16 | WSW13 | WSW14 | W9 | W7 | WSW7 | SW5 | SSE4 | S5 | S6 | S6 | SW7.7 | WSW16 |
| 2-Sep | SSW7 | SSW8 | S7 | SSW7 | S7 | S6 | SSW6 | SSW6 | SW5 | S7 | SW7 | WSW8 | WSW8 | WSW7 | WSW5 | WNW1 | SSW2 | SW4 | SSW5 | SSW5 | SW5 | SW6 | SW5 | SW6 | SW5.3 | WSW8 |
| 3-Sep | W2 | S3 | SW5 | WSW5 | WSW5 | SW6 | SW6 | WSW8 | SW7 | WSW7 | W9 | W10 | WNW10 | W11 | W11 | WNW11 | WNW12 | W9 | WNW6 | WSW5 | WNW4 | N4 | S3 | S3 | W5.7 | WNW12 |
| 4-Sep | SSE3 | S3 | SSE3 | S4 | S3 | S3 | S5 | SSW4 | W5 | WNW7 | NNW6 | NNW5 | WNW6 | NNW5 | NNW4 | W5 | NW4 | WNW2 | ESE4 | SE3 | SSE2 | SSE3 | S3 | SSE3 | WSW1.2 | WNW7 |
| 5-Sep | S5 | S7 | S7 | SSW8 | SSW9 | S8 | S7 | SSW7 | SW6 | SSW9 | SW7 | SW9 | SSW10 | SSW11 | SW10 | SSW10 | SSW9 | S5 | SE3 | SE3 | S5 | S7 | S8 | S9 | SSW7.1 | SSW11 |
| 6-Sep | S9 | S9 | S9 | SSW9 | S8 | S8 | S6 | S6 | SSE3 | S2 | NE3 | ESE3 | SE4 | ENE2 | SE2 | E3 | ESE4 | ESE4 | ESE5 | SE2 | SE2 | SE1 | S3 | SE1 | SSE3.6 | S9 |
| 7-Sep | SSE1 | SSE1 | S1 | S2 | SSE3 | SSE3 | SSE3 | S3 | SSW4 | W2 | SW2 | S12 | S13 | S12 | S12 | S10 | S8 | SSE5 | SSE6 | SE6 | SE3 | ESE3 | ESE2 | SE2 | S4.7 | S13 |
| 8-Sep | SSE2 | SSE1 | SSE4 | SSE2 | SSE3 | SE5 | S0 | SE3 | SW3 | S6 | SSW6 | S5 | SE4 | E2 | ENE1 | NNE5 | N4 | NW1 | NNE4 | NNE2 | NNE1 | NNE3 | NNE3 | NNE1 | SE1.0 | S6 |
| 9-Sep | E1 | E1 | NNE2 | ESE1 | ENE2 | N2 | NNE2 | NNE2 | NNE5 | NNE7 | NNE7 | NNE8 | NNE7 | NNE8 | N2 | ESE1 | SW2 | WSW2 | SSE1 | S2 | N2 | SSW2 | S4 | SW4 | NNE1.6 | NNE8 |
| 10-Sep | SSW3 | SSW3 | S3 | SSW5 | SSW5 | SW7 | WSW10 | WSW12 | WSW11 | WSW12 | WSW14 | WSW17 | W17 | W19 | W18 | WSW17 | W16 | W9 | SSW3 | SSE2 | SSW8 | SSW7 | SW9 | SW10 | WSW9.1 | W19 |
| 11-Sep | SSW8 | SSW8 | SSW9 | SSW9 | SSW9 | SSW9 | SSW7 | SSW5 | SW5 | SSW4 | SE5 | S5 | SSW5 | SW3 | SSW4 | S3 | S4 | S4 | SE4 | SSE4 | SSW6 | SSW7 | SSW6 | SW7 | SSW5.4 | SSW9 |
| 12-Sep | WSW8 | WSW8 | WSW8 | WSW11 | W8 | WSW7 | WSW7 | WSW10 | W10 | W11 | W14 | W12 | W11 | WNW8 | NNW8 | N8 | N7 | N6 | E1 | SE2 | SE2 | SE2 | ESE2 | SE1 | W5.0 | W14 |
| 13-Sep | NE2 | N2 | NW2 | N2 | NW2 | ENE2 | N2 | N7 | NNE8 | N6 | N6 | NNE7 | NNE5 | NNE6 | NNE5 | NNE6 | NNW3 | WNW2 | SW2 | SSE2 | SSE2 | S3 | SSW4 | S5 | NNE2.2 | NNE8 |
| 14-Sep | SSW5 | SSW5 | S4 | S5 | SSW5 | SSW4 | SSW4 | SSW5 | SSW6 | S5 | NNE4 | NNW3 | W2 | NE5 | N1 | NE5 | E2 | SE2 | SE3 | SE3 | SE2 | SE1 | SSE1 | SSE2 | S1.7 | SSW6 |
| 15-Sep | S2 | SE0 | S3 | S3 | S3 | S3 | S7 | S6 | SSW5 | S7 | C | C | C | S3 | SW5 | SE2 | SSW4 | SE4 | SE4 | SE4 | SSE2 | SE3 | SE3 | SSE2 | S3.2 | S7 |
| 16-Sep | SSE2 | S2 | SSE2 | SE1 | S1 | S1 | SE2 | SSE1 | SW2 | NNW3 | S10 | S12 | S11 | SSW11 | S11 | S9 | SSE8 | SE5 | SE5 | SE6 | SE6 | SSE4 | SSE3 | W1 | S4.5 | S12 |
| 17-Sep | SSW0 | NE1 | ENE1 | N1 | NE1 | NNE1 | NW0 | N1 | SW1 | SSE7 | S13 | S13 | SSE13 | S13 | SSE12 | SSE11 | SE10 | SE8 | ESE6 | SE6 | SE5 | SE7 | SE7 | SE8 | SSE5.4 | SSE13 |
| 18-Sep | SE5 | ESE4 | NNW0 | SSE1 | SSW1 | NNW1 | NE2 | ESE5 | ESE5 | ESE6 | SE11 | SE12 | ESE11 | E11 | E10 | ENE10 | E9 | E7 | ENE5 | NE4 | NNE3 | NNE2 | N2 | NNE4 | E4.4 | SE12 |
| 19-Sep | N4 | N4 | N3 | NNE3 | N2 | N2 | NNE5 | NNE7 | NNE8 | NE10 | NE10 | ENE11 | NE12 | NE11 | NNE11 | NE12 | NE13 | NE12 | NE12 | ENE11 | NE14 | NE14 | NNE15 | NNE15 | NE8.9 | NNE15 |
| 20-Sep | NNE15 | NNE13 | NNE14 | NNE13 | NNE12 | NNE12 | NNE10 | N8 | NNE10 | N10 | N10 | N10 | N9 | N9 | N10 | N10 | NNE9 | N9 | N10 | NNE12 | NNE11 | N10 | N10 | N9 | NNE10.5 | NNE15 |
| 21-Sep | N9 | N9 | N8 | N8 | N9 | N9 | N7 | NNE8 | N9 | N10 | N10 | N10 | N9 | N8 | N10 | N9 | N8 | N7 | N6 | N7 | N6 | N5 | N5 | NNE4 | N7.9 | N10 |
| 22-Sep | NNE4 | N3 | NNW2 | N4 | N3 | NNW1 | NW1 | WNW2 | NW3 | N2 | NW3 | NNE4 | ENE5 | E3 | ENE3 | ENE3 | N3 | NE1 | E3 | ESE5 | ESE4 | SSE1 | SE1 | ESE2 | NE1.6 | ESE5 |
| 23-Sep | ESE2 | N0 | SE2 | SE2 | ESE1 | ESE2 | W1 | N1 | WNW1 | S1 | S6 | SSW7 | SSW7 | SW7 | W1 | S4 | SE4 | SE3 | SE4 | SE3 | SSW1 | S2 | S1 | ESE2 | S2.0 | SSW7 |
| 24-Sep | ESE1 | N0 | W1 | NNW1 | NW1 | ESE0 | S0 | SSE1 | WSW1 | S6 | S10 | S10 | SSW8 | S9 | SSW9 | S9 | S8 | SSE7 | SSE7 | SSE5 | SSE4 | SSE4 | S3 | SSE2 | S4.1 | S10 |
| 25-Sep | SSE5 | SSW4 | SE1 | SE3 | SE3 | SSE4 | SSE3 | S4 | SSW6 | SSW7 | SW7 | SSW9 | SSW9 | SSW9 | SSW9 | SW8 | SSW7 | SSW4 | S4 | S4 | SSW5 | S6 | S6 | SSW6 | SSW4.9 | SSW9 |
| 26-Sep | SSW7 | SSW8 | SSW7 | SSW8 | SSW6 | S6 | S7 | S8 | SSW5 | WSW6 | SW6 | W7 | WNW7 | W10 | W12 | W11 | W9 | W5 | SSE3 | S4 | S4 | S5 | S5 | S8 | SW5.1 | W12 |
| 27-Sep | SSW8 | S8 | S8 | SSW8 | S7 | S8 | S9 | SSW8 | SSW6 | SSW5 | WSW3 | NNE3 | NNE7 | NNE4 | N2 | N4 | NNE6 | ESE2 | SE3 | SE2 | SE2 | ESE1 | E0 | ENE1 | S2.4 | S9 |
| 28-Sep | SE2 | ESE2 | E0 | SW0 | SW1 | SSW0 | SSW1 | S2 | WSW2 | WNW3 | NW3 | S9 | S12 | S13 | S12 | S12 | S11 | SSE8 | SE7 | SE8 | SSE8 | S9 | S8 | SSW5 | S5.1 | S13 |
| 29-Sep | SSW6 | S11 | S9 | SSW5 | SSW6 | SSW6 | SW2 | SSW3 | S9 | S12 | S13 | S16 | S16 | S19 | S19 | SSW14 | S14 | S10 | SSE6 | SSE7 | SSE8 | S8 | SSE2 | ESE3 | S9.0 | S19 |
| 30-Sep | SE3 | SE1 | SE1 | SSE2 | S4 | S6 | S5 | S4 | SSW7 | SSW8 | SSW9 | SSW8 | SW7 | WSW8 | WSW10 | W11 | W7 | WSW7 | WSW6 | WSW8 | WSW6 | W6 | W7 | WNW5 | SW4.9 | W11 |

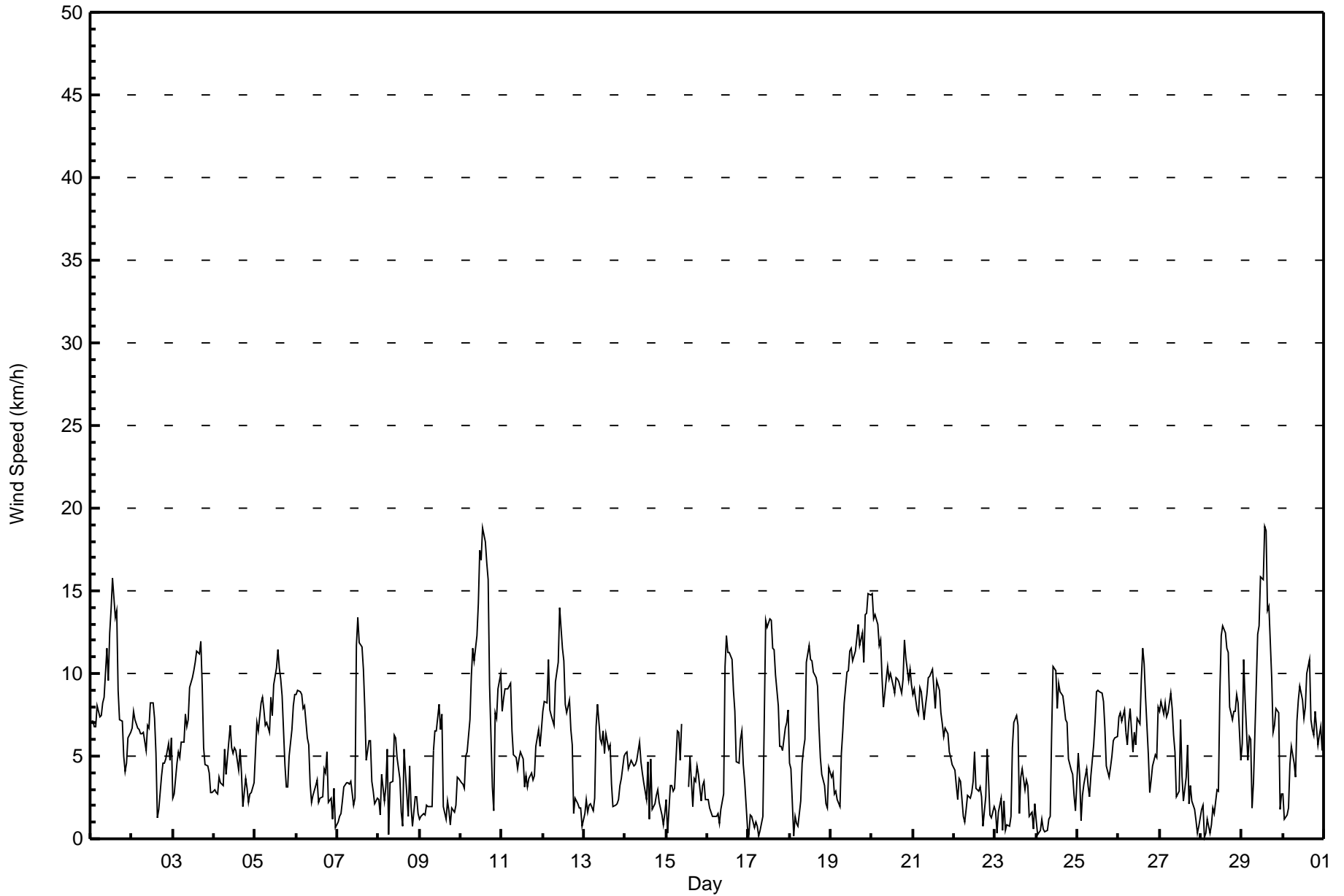
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|-------|--------|--------|--------|--------|--------|-------|-------|-------|--------|--------|-------|-------|-------|-------|------|-------|-------|--------|--------|-------|-------|-----------------|
| S1.9 | S2.0 | S2.1 | SSW2.2 | SSW2.2 | SSW2.4 | SSW2.2 | SSW2.3 | SW2.3 | SW2.6 | SW2.7 | SSW3.2 | SSW3.0 | SW2.9 | SW2.7 | SW1.8 | SW1.6 | S1.1 | SE1.9 | SE2.2 | SSE1.8 | SSE1.8 | S1.6 | S1.5 | Diurnal Average |
| NNE15 | NNE13 | NNE14 | NNE13 | NNE12 | NNE12 | WSW10 | WSW12 | WSW11 | S12 | WSW14 | WSW17 | W17 | S19 | S19 | WSW17 | W16 | NE12 | NE12 | NNE12 | NE14 | NE14 | NNE15 | NNE15 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Janvier - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Janvier - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 371 | 51.74 | 51.74 |
| 6 - 11 | 288 | 40.17 | 91.91 |
| 12 - 19 | 58 | 8.09 | 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: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Janvier - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 27 | 26 | 9 | 10 | 9 | 27 | 55 | 47 | 57 | 38 | 18 | 8 | 10 | 9 | 10 | 11 | 371 |
| 6 - 11 | 38 | 20 | 3 | 3 | 3 | 4 | 11 | 12 | 58 | 62 | 23 | 22 | 20 | 7 | 0 | 2 | 288 |
| 12 - 19 | 0 | 10 | 6 | 0 | 0 | 0 | 1 | 2 | 19 | 1 | 1 | 9 | 8 | 1 | 0 | 0 | 58 |
| 20 - 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 65 | 56 | 18 | 13 | 12 | 31 | 67 | 61 | 134 | 101 | 42 | 39 | 38 | 17 | 10 | 13 | 717 |

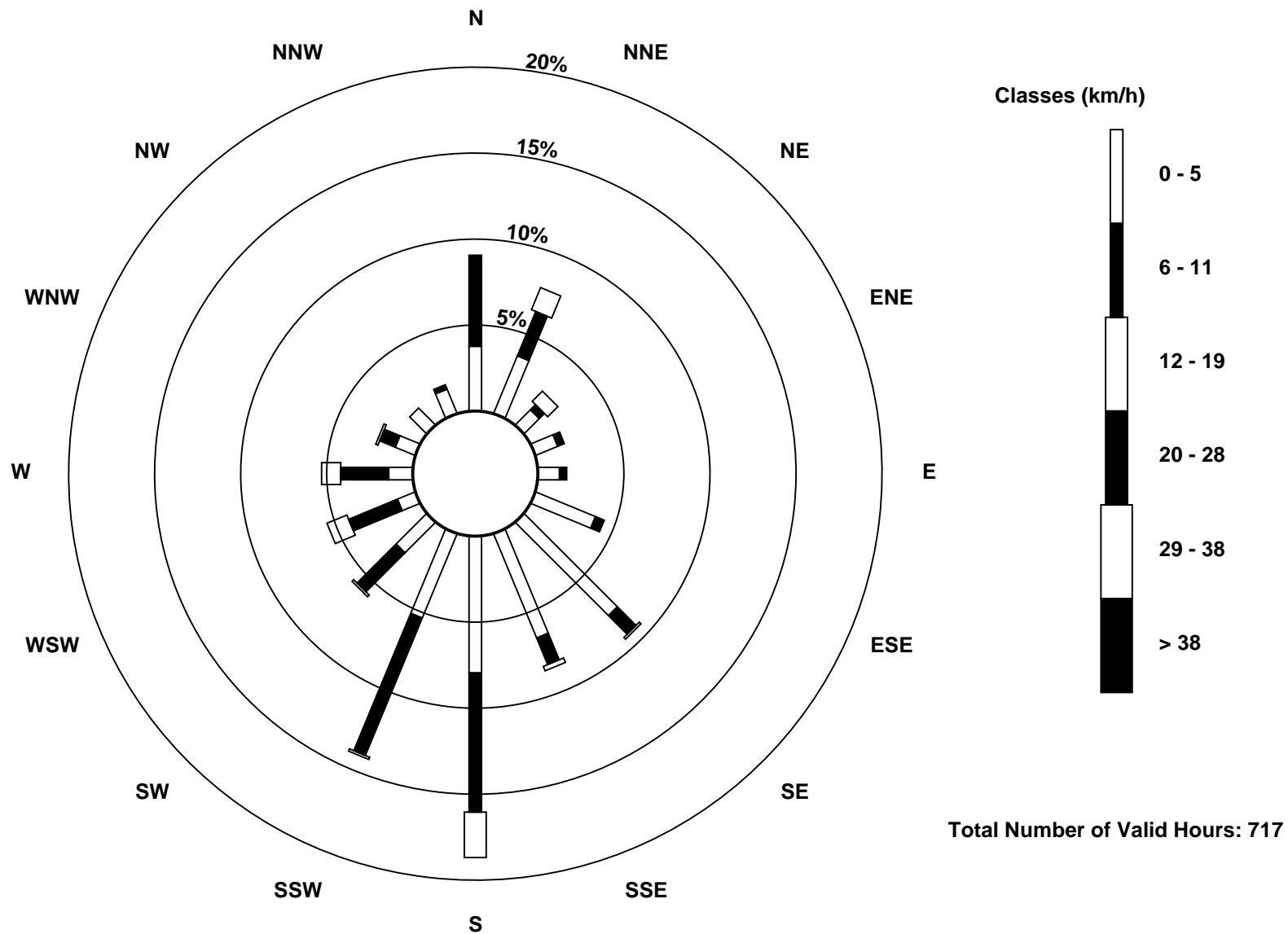
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Janvier (AMS 22)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Janvier - September 2017

| | |
|--|---------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 8 km/h on Sep 10 14:00 | Hours of Data: 717 |
| Minimum Value: 0 km/h on Sep 13 20:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6 | Hours of Calibration: 3 |
| | 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-Sep | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 5 | 6 | 6 | 5 | 6 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 6 |
| 2-Sep | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 3 |
| 3-Sep | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 3 | 1 | 2 | 3 | 1 | 1 | 5 |
| 4-Sep | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 5-Sep | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 0 | 1 | 2 | 1 | 1 | 1 | 4 |
| 6-Sep | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 7-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 4 |
| 8-Sep | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 3 |
| 9-Sep | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 |
| 10-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 7 | 7 | 8 | 7 | 6 | 6 | 6 | 1 | 2 | 2 | 2 | 3 | 3 | 8 |
| 11-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 3 |
| 12-Sep | 4 | 3 | 2 | 4 | 4 | 3 | 2 | 3 | 4 | 5 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 5 |
| 13-Sep | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 3 |
| 14-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | C | C | C | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 16-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 4 |
| 17-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 5 |
| 18-Sep | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 5 |
| 19-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 5 | 4 | 4 | 4 | 5 |
| 20-Sep | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 5 | 5 | 4 | 4 | 3 | 5 |
| 21-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 |
| 23-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 3 |
| 24-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 5 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 5 |
| 25-Sep | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 4 |
| 26-Sep | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 4 | 3 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 5 |
| 27-Sep | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 28-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 4 |
| 29-Sep | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 5 | 5 | 6 | 5 | 4 | 5 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 6 |
| 30-Sep | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 2 | 2 | 1 | 3 | 2 | 3 | 3 | 2 | 4 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 5 | 5 | 7 | 7 | 8 | 7 | 6 | 6 | 6 | 6 | 4 | 5 | 5 | 4 | 4 | 4 | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | |

C - Calibration



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Janvier - September 2017

| | |
|--|--|
| Direction of Maximum Speed: 182 deg on Sep 29 14:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 14.7 deg on Sep 20 | Hours of Data: 717 |
| Direction of Minimum Speed: 97 deg on Sep 28 03:00 | Direction of Minimum Daily Speed Average: 1.0 deg on Sep 8 |
| Direction of Minimum Speed: 97 deg on Sep 28 03:00 | Hours of Missing Data: 3 |
| Monthly Average Direction: 205.0 deg | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 195 | 192 | 198 | 205 | 193 | 203 | 224 | 217 | 230 | 232 | 229 | 241 | 259 | 249 | 244 | 247 | 260 | 261 | 245 | 214 | 153 | 169 | 181 | 191 | 226.3 |
| 2-Sep | 204 | 192 | 186 | 202 | 190 | 188 | 194 | 211 | 218 | 189 | 217 | 255 | 252 | 244 | 258 | 292 | 202 | 217 | 203 | 205 | 220 | 233 | 235 | 236 | 216.0 |
| 3-Sep | 259 | 191 | 219 | 243 | 238 | 214 | 229 | 251 | 235 | 254 | 265 | 277 | 282 | 277 | 280 | 285 | 285 | 275 | 283 | 244 | 299 | 6 | 184 | 173 | 263.1 |
| 4-Sep | 166 | 181 | 150 | 178 | 173 | 170 | 183 | 208 | 277 | 286 | 327 | 342 | 293 | 327 | 342 | 275 | 322 | 286 | 118 | 140 | 150 | 159 | 169 | 150 | 239.3 |
| 5-Sep | 178 | 191 | 190 | 193 | 192 | 190 | 187 | 200 | 216 | 206 | 222 | 226 | 212 | 206 | 215 | 212 | 206 | 185 | 146 | 146 | 178 | 185 | 189 | 188 | 198.6 |
| 6-Sep | 191 | 189 | 191 | 193 | 189 | 190 | 187 | 186 | 167 | 191 | 39 | 113 | 140 | 69 | 134 | 93 | 108 | 114 | 118 | 126 | 129 | 146 | 173 | 129 | 166.2 |
| 7-Sep | 164 | 155 | 170 | 173 | 161 | 166 | 162 | 182 | 202 | 261 | 220 | 186 | 178 | 184 | 181 | 186 | 172 | 149 | 152 | 142 | 129 | 118 | 122 | 136 | 172.3 |
| 8-Sep | 150 | 158 | 147 | 155 | 155 | 145 | 170 | 144 | 222 | 184 | 203 | 179 | 134 | 84 | 76 | 20 | 3 | 324 | 18 | 30 | 30 | 22 | 21 | 20 | 135.5 |
| 9-Sep | 99 | 80 | 29 | 109 | 64 | 11 | 25 | 16 | 19 | 21 | 28 | 29 | 29 | 25 | 11 | 117 | 219 | 247 | 154 | 172 | 357 | 199 | 188 | 221 | 32.1 |
| 10-Sep | 205 | 210 | 174 | 200 | 201 | 226 | 237 | 241 | 241 | 247 | 245 | 256 | 260 | 261 | 259 | 258 | 260 | 268 | 208 | 158 | 198 | 203 | 219 | 228 | 242.1 |
| 11-Sep | 208 | 198 | 197 | 198 | 198 | 201 | 212 | 203 | 223 | 203 | 140 | 174 | 201 | 217 | 207 | 174 | 172 | 183 | 135 | 164 | 208 | 196 | 202 | 217 | 196.2 |
| 12-Sep | 243 | 253 | 244 | 258 | 262 | 257 | 237 | 239 | 264 | 268 | 263 | 273 | 281 | 298 | 339 | 358 | 360 | 8 | 101 | 132 | 132 | 128 | 106 | 126 | 271.3 |
| 13-Sep | 49 | 352 | 322 | 350 | 325 | 66 | 8 | 7 | 13 | 10 | 4 | 23 | 12 | 18 | 21 | 20 | 344 | 298 | 223 | 148 | 149 | 176 | 194 | 188 | 11.4 |
| 14-Sep | 192 | 195 | 183 | 185 | 193 | 194 | 192 | 202 | 213 | 181 | 24 | 341 | 267 | 41 | 9 | 42 | 84 | 137 | 140 | 131 | 129 | 135 | 167 | 154 | 174.1 |
| 15-Sep | 177 | 134 | 177 | 174 | 175 | 174 | 188 | 188 | 209 | 189 | C | C | C | 188 | 218 | 133 | 208 | 142 | 127 | 137 | 168 | 142 | 130 | 162 | 174.5 |
| 16-Sep | 151 | 174 | 148 | 142 | 169 | 182 | 143 | 156 | 231 | 300 | 185 | 172 | 181 | 195 | 181 | 185 | 163 | 145 | 133 | 138 | 140 | 151 | 147 | 277 | 170.6 |
| 17-Sep | 194 | 44 | 72 | 2 | 49 | 32 | 306 | 3 | 236 | 163 | 173 | 170 | 166 | 173 | 164 | 155 | 146 | 138 | 123 | 127 | 133 | 125 | 128 | 127 | 151.4 |
| 18-Sep | 129 | 116 | 332 | 161 | 194 | 331 | 38 | 104 | 108 | 118 | 128 | 143 | 117 | 92 | 91 | 74 | 101 | 93 | 69 | 37 | 32 | 31 | 6 | 14 | 98.2 |
| 19-Sep | 10 | 11 | 5 | 14 | 349 | 351 | 20 | 15 | 15 | 35 | 42 | 58 | 52 | 42 | 33 | 34 | 36 | 43 | 46 | 59 | 47 | 41 | 33 | 32 | 36.7 |
| 20-Sep | 28 | 30 | 26 | 22 | 18 | 18 | 14 | 8 | 12 | 10 | 10 | 11 | 10 | 9 | 9 | 10 | 12 | 10 | 10 | 12 | 12 | 10 | 10 | 10 | 14.7 |
| 21-Sep | 11 | 9 | 9 | 9 | 9 | 8 | 6 | 16 | 10 | 10 | 11 | 9 | 8 | 4 | 9 | 6 | 8 | 3 | 10 | 10 | 8 | 4 | 8 | 12 | 8.7 |
| 22-Sep | 12 | 10 | 342 | 3 | 5 | 344 | 316 | 301 | 307 | 360 | 320 | 21 | 76 | 96 | 69 | 58 | 352 | 36 | 88 | 104 | 119 | 166 | 127 | 110 | 38.4 |
| 23-Sep | 107 | 356 | 136 | 134 | 111 | 113 | 260 | 349 | 303 | 180 | 169 | 193 | 197 | 230 | 261 | 175 | 144 | 126 | 131 | 137 | 201 | 180 | 169 | 119 | 170.1 |
| 24-Sep | 112 | 358 | 263 | 333 | 320 | 112 | 181 | 147 | 243 | 190 | 184 | 180 | 192 | 177 | 202 | 178 | 172 | 163 | 166 | 153 | 150 | 159 | 172 | 150 | 177.0 |
| 25-Sep | 161 | 200 | 125 | 129 | 132 | 156 | 155 | 165 | 182 | 198 | 213 | 216 | 204 | 199 | 203 | 226 | 206 | 194 | 180 | 173 | 200 | 190 | 190 | 196 | 192.9 |
| 26-Sep | 192 | 193 | 193 | 196 | 195 | 190 | 185 | 189 | 207 | 239 | 236 | 278 | 288 | 275 | 281 | 272 | 265 | 264 | 152 | 169 | 179 | 180 | 178 | 189 | 222.5 |
| 27-Sep | 193 | 189 | 187 | 192 | 189 | 189 | 190 | 192 | 192 | 202 | 252 | 31 | 29 | 28 | 350 | 7 | 21 | 123 | 125 | 137 | 133 | 120 | 91 | 59 | 178.7 |
| 28-Sep | 131 | 121 | 97 | 233 | 229 | 213 | 194 | 187 | 244 | 290 | 306 | 180 | 169 | 170 | 170 | 174 | 178 | 167 | 146 | 146 | 159 | 178 | 182 | 207 | 173.4 |
| 29-Sep | 192 | 185 | 187 | 192 | 198 | 201 | 229 | 201 | 188 | 181 | 177 | 189 | 180 | 182 | 186 | 192 | 191 | 180 | 153 | 148 | 154 | 180 | 161 | 113 | 182.5 |
| 30-Sep | 140 | 144 | 135 | 167 | 180 | 182 | 188 | 179 | 194 | 203 | 202 | 201 | 229 | 245 | 250 | 261 | 262 | 254 | 249 | 252 | 250 | 276 | 279 | 284 | 230.6 |

179.1 185.7 186.6 197.8 195.3 192.7 203.8 210.3 233.6 223.5 217.4 213.2 213.2 220.8 226.6 231.9 216.0 186.3 131.0 135.0 147.3 162.6 172.5 180.9

Diurnal Average

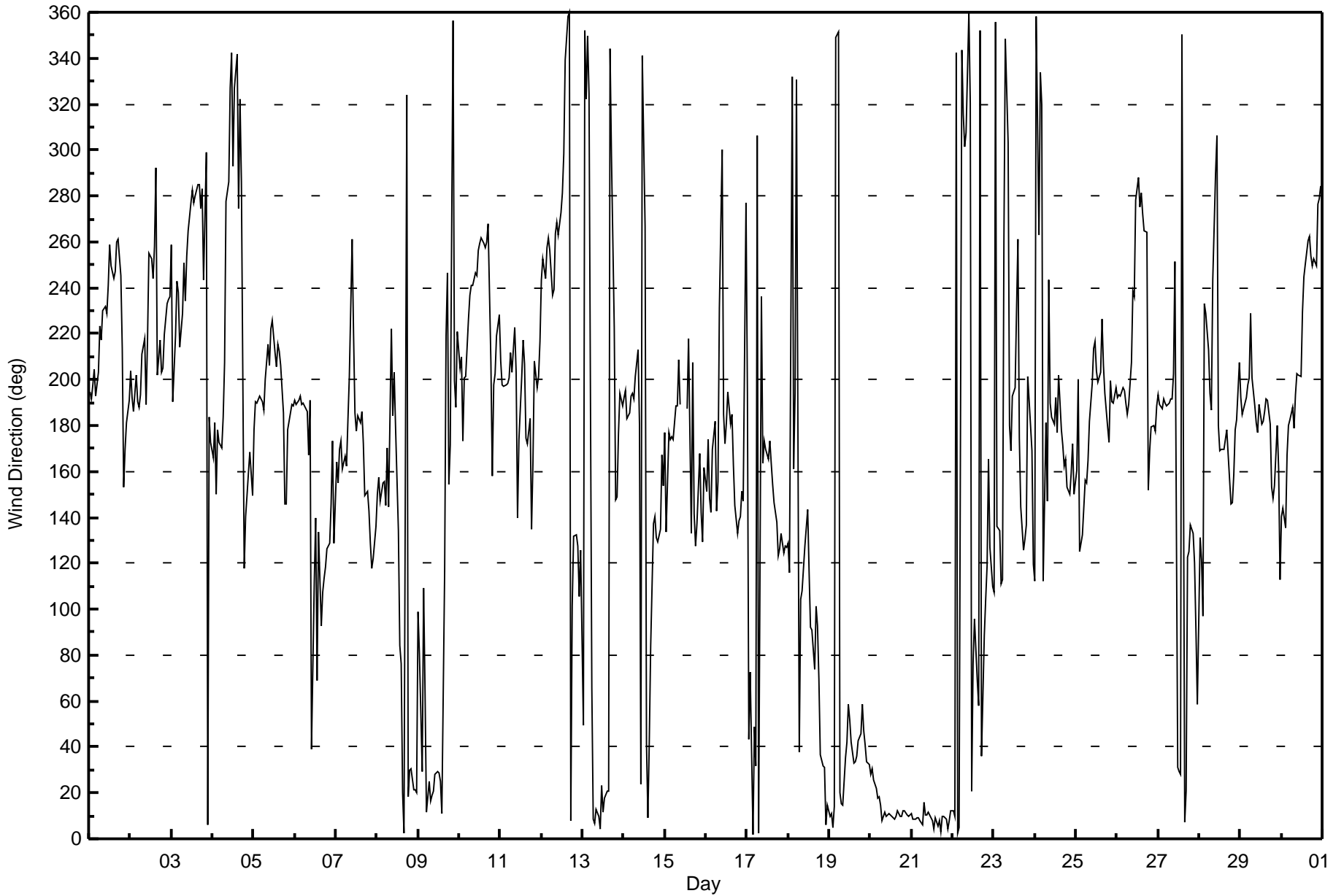
C - Calibration

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Janvier - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Janvier - September 2017

| | |
|---|---------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 105 deg on Sep 14 15:00 | Hours of Data: 717 |
| Minimum Value: 8 deg on Sep 6 19:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 11 P ₁₀ = 16 Q ₁ = 22 Median = 30 Q ₃ = 45 P ₉₀ = 68 P ₉₉ = 94 | Hours of Calibration: 3 |
| | 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-Sep | 15 | 13 | 16 | 20 | 18 | 22 | 26 | 27 | 28 | 28 | 27 | 32 | 34 | 29 | 32 | 32 | 32 | 30 | 28 | 25 | 26 | 17 | 12 | 14 | 34 |
| 2-Sep | 21 | 15 | 14 | 19 | 20 | 20 | 21 | 23 | 38 | 28 | 32 | 30 | 34 | 31 | 36 | 75 | 59 | 40 | 24 | 19 | 23 | 23 | 21 | 19 | 75 |
| 3-Sep | 79 | 52 | 32 | 28 | 29 | 20 | 22 | 21 | 28 | 39 | 38 | 42 | 47 | 50 | 50 | 51 | 48 | 45 | 64 | 36 | 71 | 70 | 29 | 32 | 79 |
| 4-Sep | 22 | 29 | 14 | 16 | 12 | 14 | 9 | 34 | 57 | 48 | 69 | 63 | 67 | 73 | 75 | 60 | 81 | 87 | 14 | 27 | 21 | 16 | 20 | 16 | 87 |
| 5-Sep | 17 | 12 | 13 | 13 | 12 | 12 | 13 | 23 | 26 | 27 | 34 | 34 | 29 | 29 | 29 | 27 | 23 | 31 | 14 | 20 | 16 | 9 | 11 | 12 | 34 |
| 6-Sep | 12 | 11 | 13 | 13 | 11 | 9 | 13 | 12 | 15 | 53 | 77 | 47 | 55 | 73 | 65 | 67 | 12 | 14 | 8 | 38 | 22 | 56 | 29 | 64 | 77 |
| 7-Sep | 76 | 54 | 52 | 14 | 19 | 19 | 22 | 32 | 36 | 68 | 69 | 22 | 21 | 24 | 23 | 25 | 25 | 24 | 25 | 20 | 33 | 33 | 27 | 13 | 76 |
| 8-Sep | 17 | 78 | 19 | 85 | 25 | 20 | 103 | 45 | 52 | 27 | 33 | 38 | 27 | 75 | 92 | 43 | 61 | 96 | 63 | 67 | 96 | 27 | 25 | 64 | 103 |
| 9-Sep | 70 | 55 | 90 | 64 | 75 | 46 | 48 | 73 | 39 | 21 | 30 | 20 | 24 | 27 | 37 | 45 | 37 | 62 | 71 | 75 | 74 | 56 | 28 | 33 | 90 |
| 10-Sep | 25 | 40 | 26 | 26 | 24 | 32 | 25 | 25 | 29 | 31 | 32 | 31 | 31 | 32 | 30 | 29 | 28 | 62 | 47 | 80 | 16 | 19 | 24 | 23 | 80 |
| 11-Sep | 23 | 17 | 17 | 16 | 18 | 19 | 24 | 23 | 27 | 36 | 43 | 60 | 48 | 53 | 43 | 30 | 26 | 36 | 12 | 44 | 29 | 17 | 18 | 25 | 60 |
| 12-Sep | 34 | 25 | 23 | 28 | 37 | 31 | 23 | 27 | 35 | 38 | 31 | 38 | 47 | 64 | 62 | 54 | 51 | 39 | 62 | 13 | 53 | 48 | 43 | 68 | 68 |
| 13-Sep | 75 | 40 | 38 | 70 | 55 | 55 | 76 | 38 | 28 | 43 | 39 | 39 | 48 | 37 | 30 | 36 | 44 | 66 | 43 | 13 | 12 | 22 | 26 | 20 | 76 |
| 14-Sep | 30 | 19 | 21 | 13 | 19 | 20 | 21 | 45 | 25 | 48 | 75 | 70 | 79 | 57 | 105 | 46 | 72 | 41 | 20 | 15 | 31 | 39 | 73 | 45 | 105 |
| 15-Sep | 21 | 80 | 11 | 17 | 26 | 19 | 13 | 16 | 31 | 28 | C | C | C | 74 | 56 | 93 | 52 | 28 | 12 | 19 | 41 | 30 | 21 | 41 | 93 |
| 16-Sep | 46 | 47 | 46 | 50 | 53 | 29 | 16 | 65 | 57 | 50 | 41 | 29 | 31 | 29 | 32 | 29 | 25 | 21 | 15 | 18 | 22 | 21 | 31 | 67 | 67 |
| 17-Sep | 94 | 41 | 46 | 64 | 59 | 41 | 75 | 88 | 70 | 30 | 27 | 31 | 30 | 29 | 31 | 34 | 30 | 28 | 23 | 26 | 24 | 22 | 24 | 22 | 94 |
| 18-Sep | 37 | 44 | 95 | 52 | 57 | 66 | 40 | 28 | 33 | 42 | 34 | 36 | 34 | 35 | 36 | 34 | 29 | 25 | 29 | 16 | 17 | 23 | 13 | 17 | 95 |
| 19-Sep | 18 | 20 | 31 | 37 | 33 | 34 | 18 | 22 | 19 | 22 | 25 | 30 | 31 | 27 | 20 | 21 | 23 | 26 | 27 | 32 | 27 | 23 | 22 | 20 | 37 |
| 20-Sep | 20 | 21 | 18 | 19 | 19 | 21 | 26 | 28 | 26 | 24 | 27 | 26 | 31 | 28 | 28 | 28 | 25 | 28 | 26 | 24 | 26 | 24 | 29 | 28 | 31 |
| 21-Sep | 29 | 31 | 32 | 30 | 29 | 32 | 38 | 31 | 27 | 27 | 28 | 30 | 31 | 35 | 31 | 32 | 39 | 41 | 45 | 37 | 37 | 45 | 40 | 45 | 45 |
| 22-Sep | 43 | 56 | 66 | 41 | 37 | 55 | 31 | 37 | 34 | 59 | 65 | 45 | 44 | 38 | 48 | 35 | 49 | 96 | 28 | 22 | 24 | 52 | 40 | 37 | 96 |
| 23-Sep | 42 | 80 | 19 | 24 | 94 | 30 | 86 | 73 | 89 | 86 | 29 | 37 | 33 | 36 | 89 | 56 | 29 | 17 | 15 | 40 | 59 | 40 | 60 | 27 | 94 |
| 24-Sep | 71 | 92 | 50 | 24 | 34 | 89 | 89 | 22 | 48 | 80 | 26 | 29 | 38 | 31 | 34 | 28 | 24 | 23 | 24 | 24 | 31 | 68 | 61 | 92 | 92 |
| 25-Sep | 34 | 41 | 85 | 15 | 19 | 20 | 21 | 28 | 24 | 23 | 33 | 30 | 35 | 35 | 26 | 43 | 29 | 21 | 25 | 16 | 32 | 16 | 17 | 16 | 85 |
| 26-Sep | 14 | 13 | 15 | 16 | 18 | 20 | 12 | 15 | 32 | 33 | 49 | 45 | 57 | 40 | 44 | 41 | 31 | 30 | 17 | 25 | 16 | 14 | 21 | 11 | 57 |
| 27-Sep | 14 | 12 | 13 | 14 | 15 | 10 | 14 | 16 | 18 | 29 | 59 | 80 | 32 | 69 | 71 | 72 | 21 | 35 | 10 | 26 | 38 | 64 | 62 | 70 | 80 |
| 28-Sep | 48 | 43 | 90 | 89 | 69 | 80 | 97 | 52 | 56 | 37 | 59 | 42 | 28 | 26 | 27 | 28 | 24 | 25 | 24 | 23 | 23 | 19 | 20 | 53 | 97 |
| 29-Sep | 63 | 18 | 21 | 25 | 29 | 32 | 78 | 54 | 24 | 21 | 22 | 24 | 26 | 21 | 21 | 24 | 18 | 18 | 23 | 22 | 23 | 17 | 77 | 35 | 78 |
| 30-Sep | 26 | 46 | 62 | 46 | 13 | 22 | 22 | 28 | 24 | 29 | 28 | 33 | 37 | 31 | 26 | 22 | 21 | 17 | 17 | 22 | 29 | 28 | 32 | 35 | 62 |
| | 94 | 92 | 95 | 89 | 94 | 89 | 103 | 88 | 89 | 86 | 77 | 80 | 79 | 75 | 105 | 93 | 81 | 96 | 71 | 80 | 96 | 70 | 77 | 70 | |

Diurnal Maximum

C - Calibration



Wood Buffalo Environmental Association

SO₂ Calibration Summary

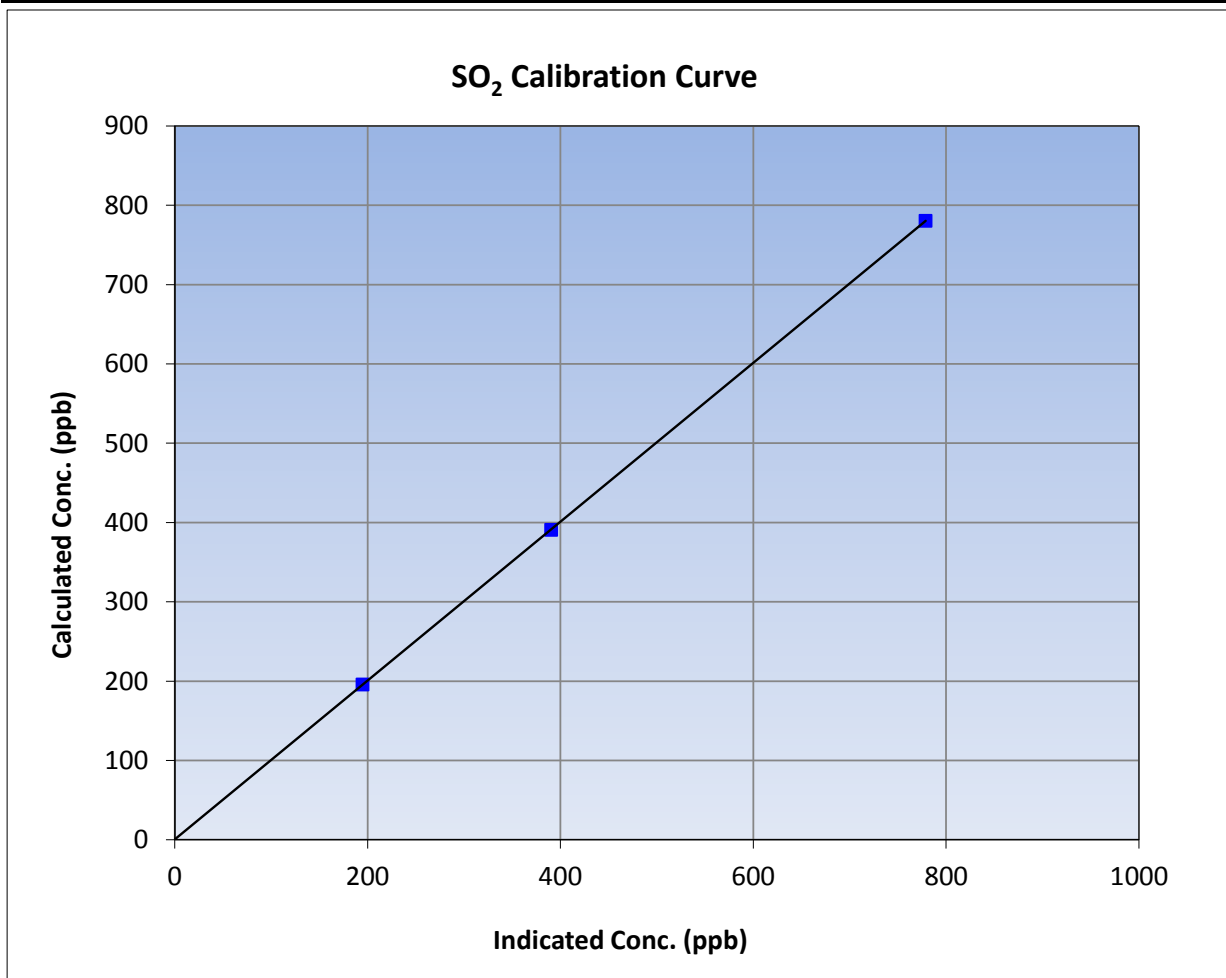
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 28, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 7:39 | End Time (MST) | 11:57 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1152430006 |

Calibration Data

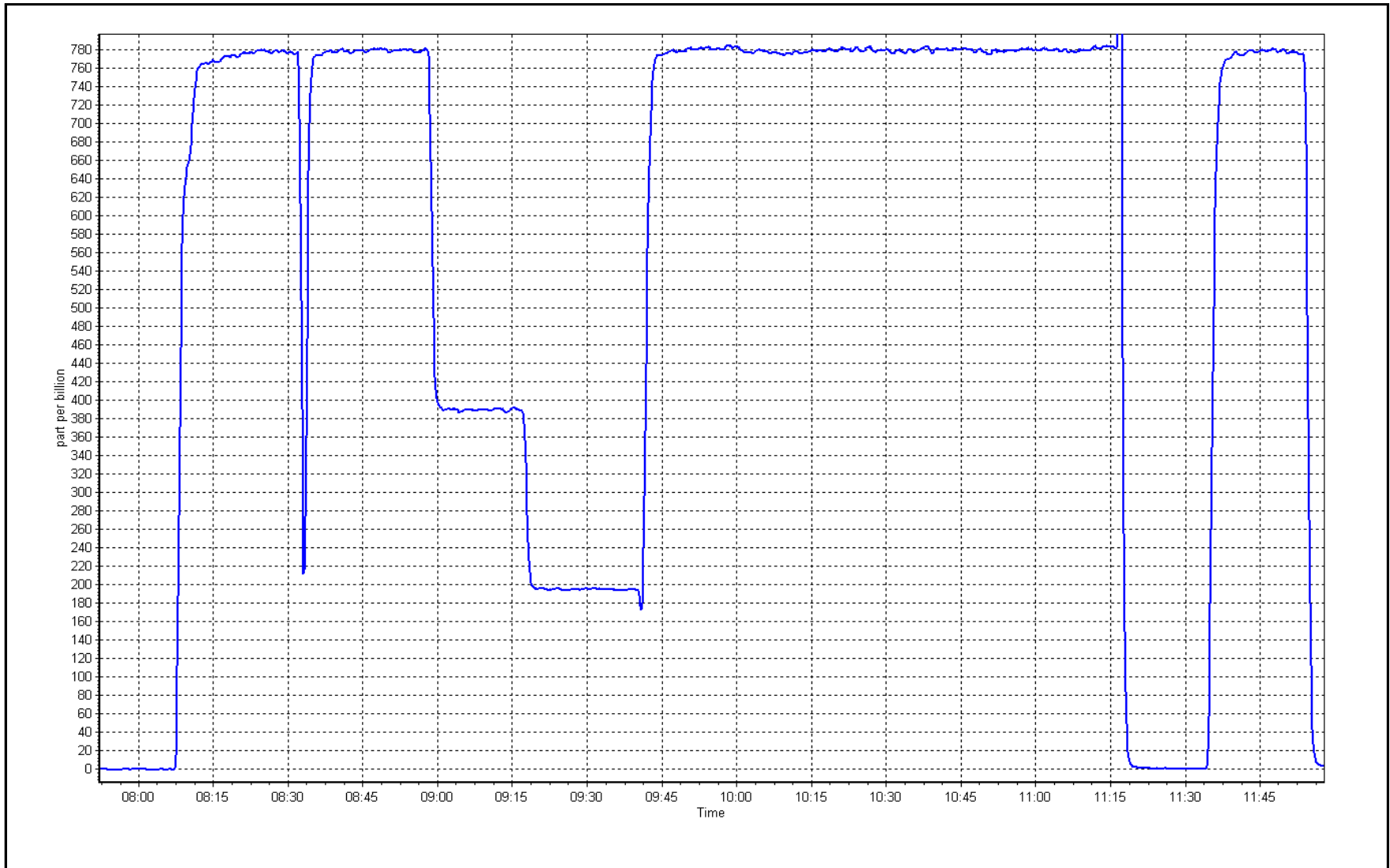
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.6 | ---- | Correlation Coefficient | ≥0.995 |
| 780.3 | 778.4 | 1.0024 | | |
| 390.4 | 390.1 | 1.0007 | Slope | 0.90 - 1.10 |
| 195.3 | 194.4 | 1.0047 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: 28-Sep

Location: Janvier





Wood Buffalo Environmental Association

TRS Calibration Summary

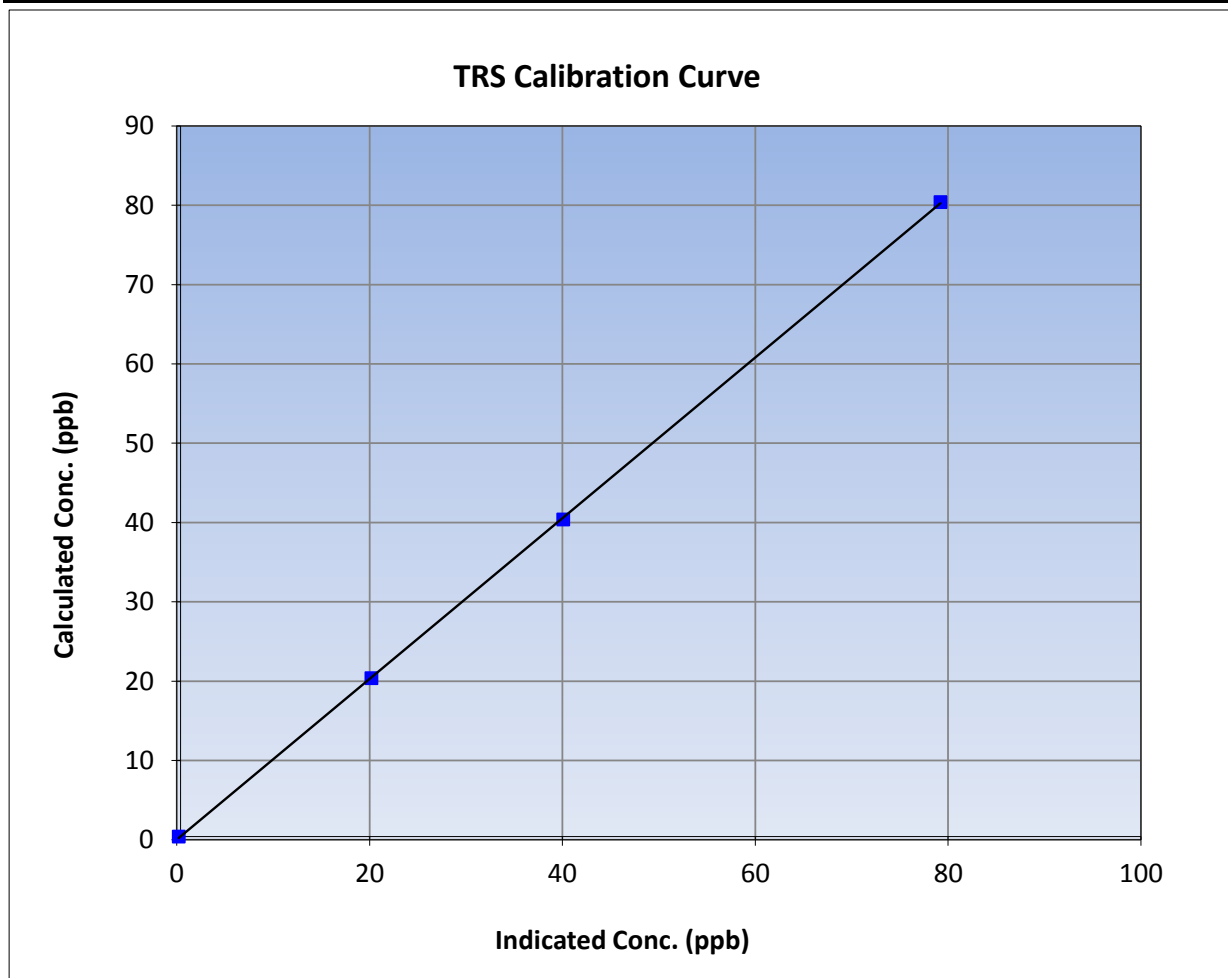
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 29, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 11:30 | End Time (MST) | 13:45 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1151680031 |

Calibration Data

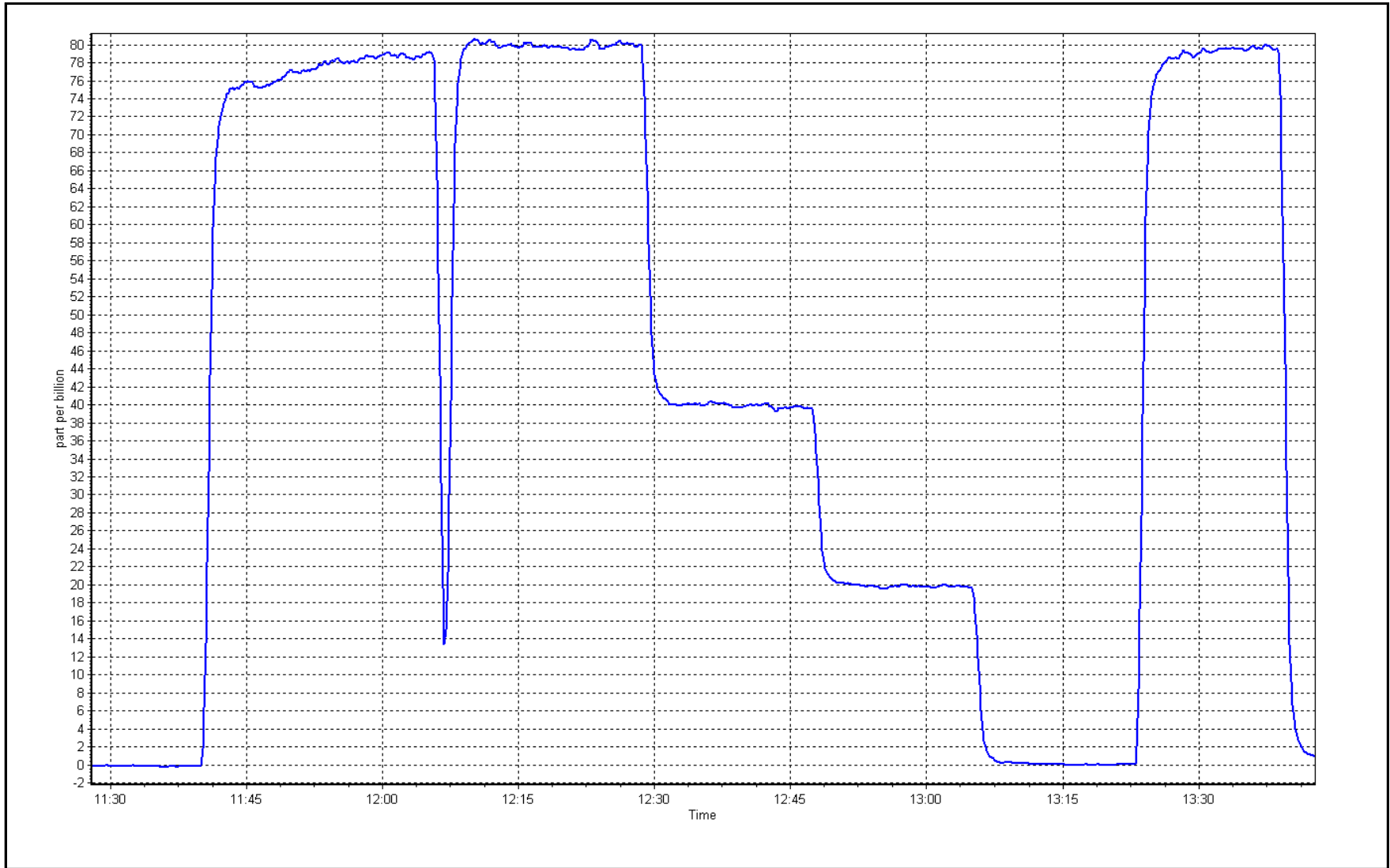
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999964 | ≥0.995 |
| 80.0 | 78.8 | 1.0153 | | | |
| 40.0 | 39.7 | 1.0072 | Slope | 1.013185 | 0.90 - 1.10 |
| 20.0 | 19.8 | 1.0100 | | | |
| | | | Intercept | 0.017540 | +/-3 |



TRS Calibration Plot

Date: 29-Sep

Location: Janvier





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|-----------------|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | September 5, 2017 | Last Cal Date: | August 10, 2017 |
| Start time (MST): | 10:01 | End time (MST): | 15:02 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|--------------------|------------------|---------------------|-------------------|
| Gas Cert Reference | LL107937 | Cal Gas Expiry Date | September 8, 2018 |
| CH4 Cal Gas Conc. | <u>509.0</u> ppm | CH4 Equiv Conc. | 1056.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 21 Deg C |
| Calibrator Model | Teledyne API 700 | Serial Number | 2447 |
| ZAG make/model | Teledyne API 701 | Serial Number | 135 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1501663728

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.0 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.2 | 174.9 |
| CH4 SP Ratio | 0.000189 | 0.000188 | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | 12.4 | 12.4 | Carrier Pressure | 36.8 | 36.8 |
| NMHC SP Ratio | 4.33E-05 | 4.40E-05 | Fuel Pressure | 44.9 | 45.0 |
| NMHC Peak Area | 198789 | 195354 | Air Pressure | 33.8 | 33.8 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.997713 | 0.994743 |
| THC Cal Offset | 0.017682 | 0.083254 |
| CH4 Cal Slope | 0.997519 | 0.995759 |
| CH4 Cal Offset | 0.031108 | 0.042951 |
| NMHC Cal Slope | 0.997737 | 0.993680 |
| NMHC Cal Offset | -0.013342 | 0.040511 |

Notes: No asfound because Hydrogen cylinder was empty. Changed out Hydrogen and Nitrogen cylinder. Adjusted the span.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4933 | 78.7 | 16.59 | 16.64 | 0.997 |
| calibrator zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4933 | 78.7 | 16.59 | 16.64 | 0.997 |
| second point | 4976 | 39.4 | 8.30 | 8.20 | 1.012 |
| third point | 4993 | 19.7 | 4.15 | 4.02 | 1.033 |
| as left zero | 5011 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4828 | 78.7 | 16.94 | 16.63 | 1.019 |
| Average Correction Factor | | | | | 1.014 |
| Corrected As found | 16.64 | Prev response | 16.61 | *% change | -0.2% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4933 | 78.8 | 8.60 | 8.63 | 0.997 |
| calibrator zero | 5009 | 0 | 0.00 | 0.00 | ---- |
| high point | 4933 | 78.7 | 8.59 | 8.63 | 0.996 |
| second point | 4976 | 39.4 | 4.30 | 4.25 | 1.011 |
| third point | 4993 | 19.7 | 2.15 | 2.09 | 1.029 |
| as left zero | 5011 | 0 | 0.00 | 0.00 | ---- |
| as left span | 4828 | 78.7 | 8.78 | 8.65 | 1.015 |
| Average Correction Factor | | | | | 1.012 |
| Corrected As found | 8.63 | Prev response | 8.64 | *% change | 0.1% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4933 | 78.7 | 7.99 | 8.01 | 0.998 |
| calibrator zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4933 | 78.7 | 7.99 | 8.01 | 0.998 |
| second point | 4976 | 39.4 | 4.00 | 3.94 | 1.014 |
| third point | 4993 | 19.7 | 2.00 | 1.93 | 1.038 |
| as left zero | 5011 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 4828 | 78.7 | 8.16 | 7.99 | 1.022 |
| Average Correction Factor | | | | | 1.017 |
| Corrected As found | 8.01 | Prev response | 7.98 | *% change | -0.4% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

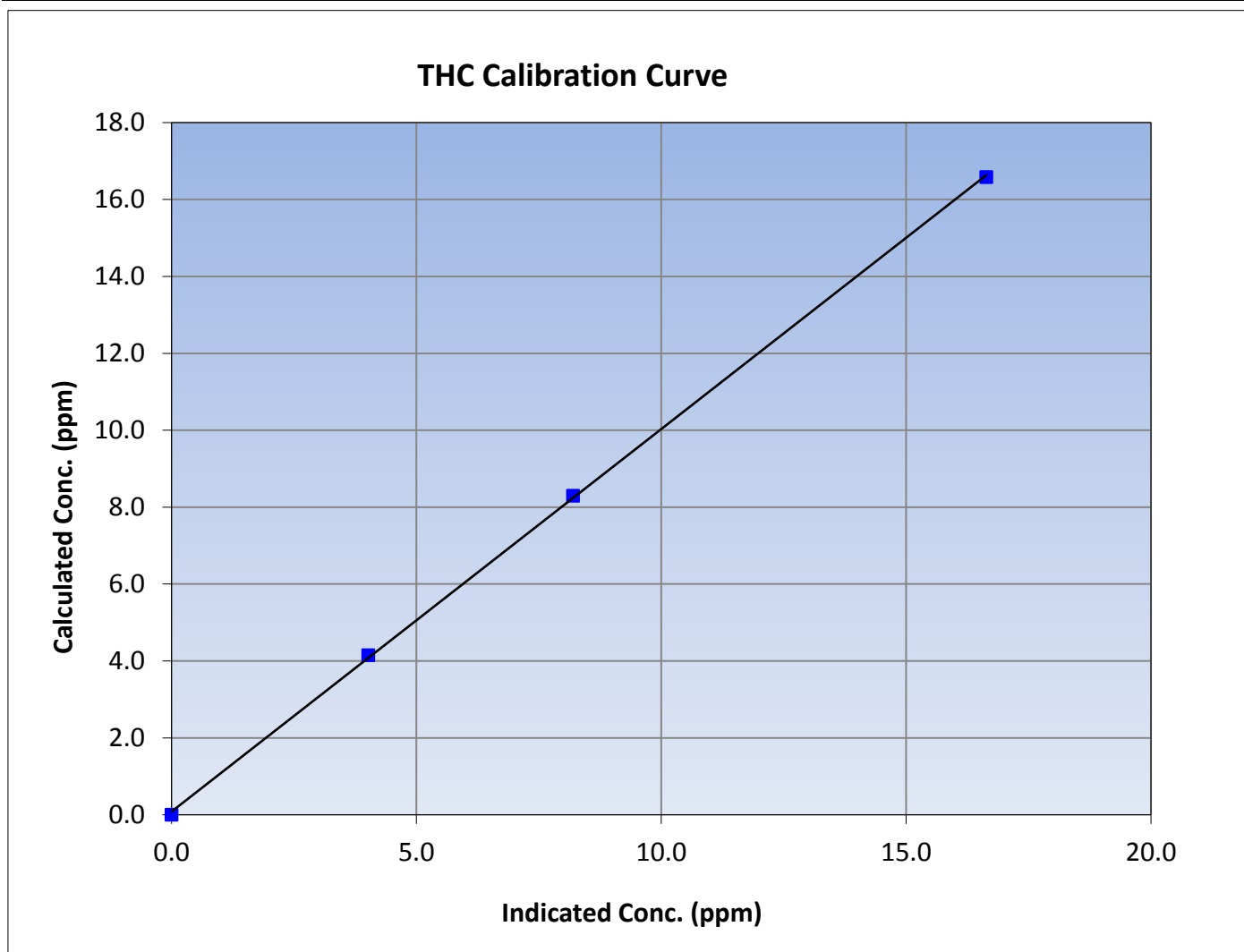
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 5, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 14:18 | End Time (MST) | 16:50 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1501663728 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999884 | ≥ 0.995 | | | |
| 16.59 | 16.64 | 0.9970 | | | | | | |
| 8.30 | 8.20 | 1.0122 | | | | Slope | 0.994743 | 0.90 - 1.10 |
| 4.15 | 4.02 | 1.0329 | | | | | | |
| | | | Intercept | 0.083254 | ± 0.5 | | | |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

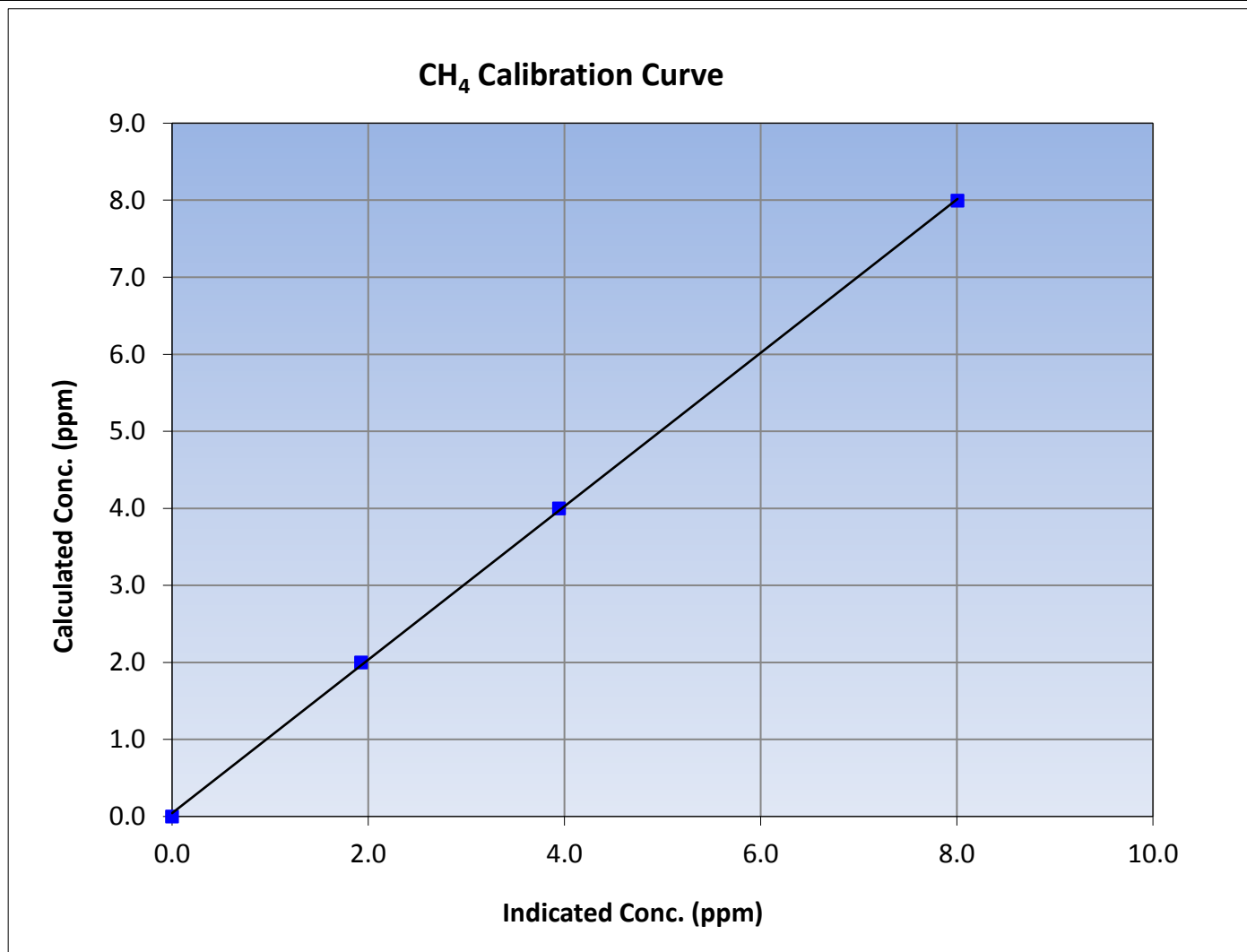
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 5, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 14:18 | End Time (MST) | 16:50 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1501663728 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999868 | ≥ 0.995 |
| 7.99 | 8.01 | 0.9982 | | | |
| 4.00 | 3.94 | 1.0138 | | | |
| 2.00 | 1.93 | 1.0375 | | | |
| | | | Slope | 0.995759 | 0.90 - 1.10 |
| | | | Intercept | 0.042951 | +/-0.5 |





Wood Buffalo Environmental Association

NMHC Calibration Summary

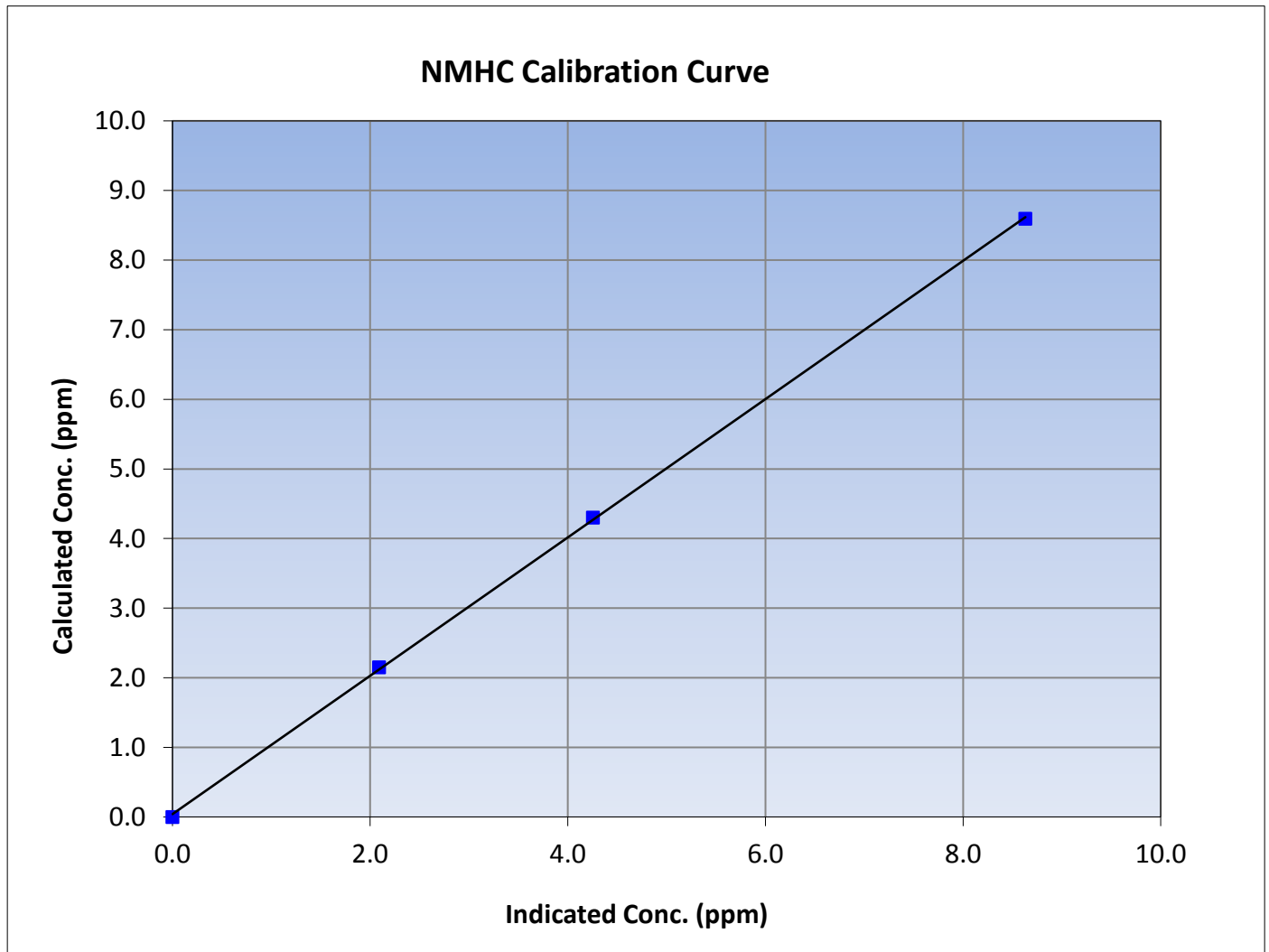
Version-02-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 5, 2017 | Previous Calibration | August 10, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 14:18 | End Time (MST) | 16:50 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1501663728 |

Calibration Data

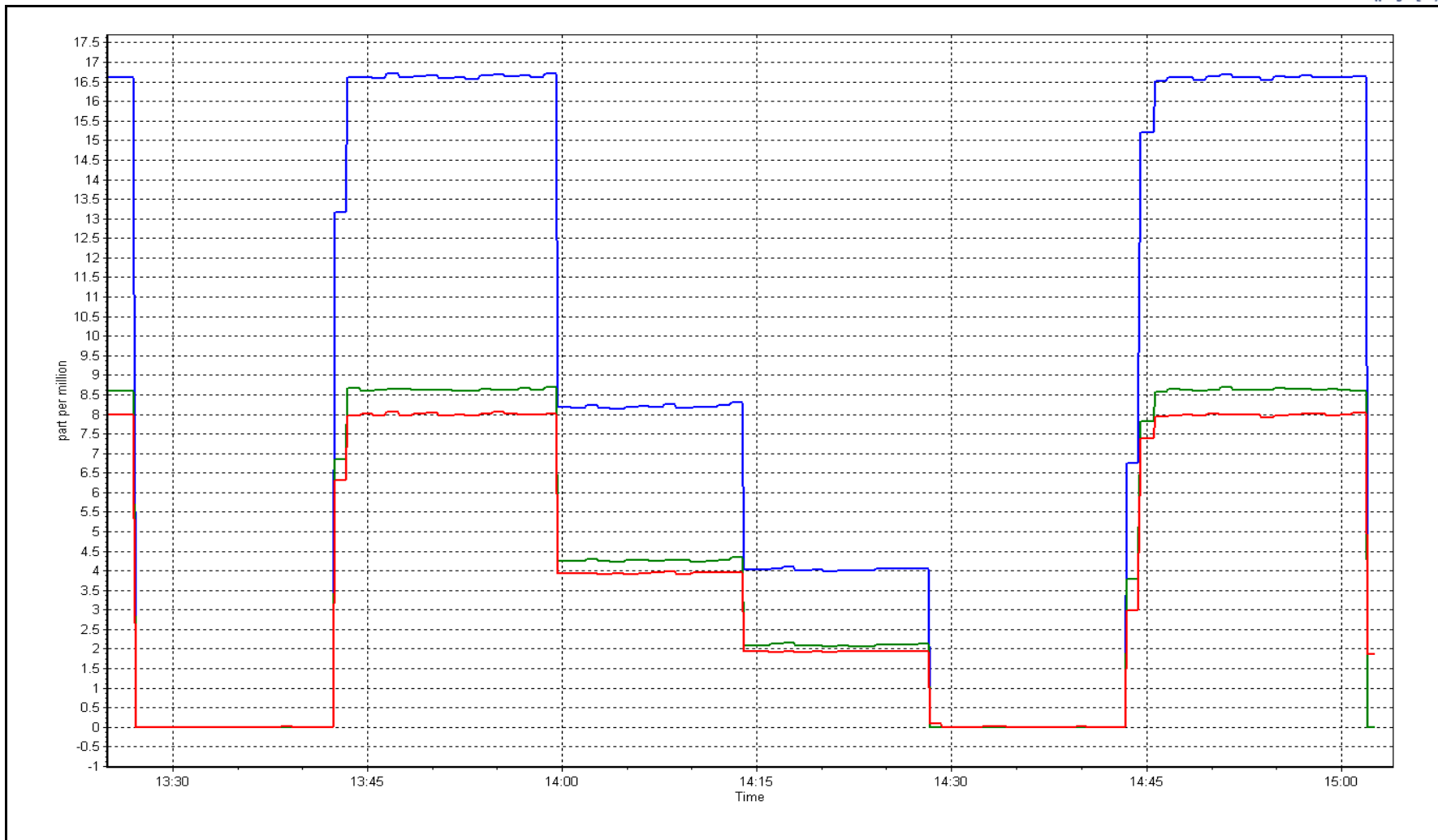
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> | | | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|-------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999895 | ≥ 0.995 | | | |
| 8.59 | 8.63 | 0.9957 | | | | | | |
| 4.30 | 4.25 | 1.0106 | | | | Slope | 0.993680 | 0.90 - 1.10 |
| 2.15 | 2.09 | 1.0286 | | | | | | |
| | | | Intercept | 0.040511 | ± 0.5 | | | |



NMHC Calibration Plot

Date: September 5, 2017

Location: Janvier





Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|---|-----------------|-------------------|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | September 29, 2017 | Last Cal Date: | September 5, 2017 |
| Start time (MST): | 9:51 | End time (MST): | 10:53 |
| Reason: | Cylinder Change Nitrogen cylinder change. | | |

Calibration Standards

| | | | |
|--------------------|------------------|---------------------|-------------------|
| Gas Cert Reference | LL107937 | Cal Gas Expiry Date | September 8, 2018 |
| CH4 Cal Gas Conc. | <u>509.0</u> ppm | CH4 Equiv Conc. | 1056.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 21 Deg C |
| Calibrator Model | Teledyne API 700 | Serial Number | 2447 |
| ZAG make/model | Teledyne API 701 | Serial Number | 135 |

Analyzer Information

Analyzer make: Thermo 55i

Analyzer serial #: 1501663728

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|--------------------|--------------|---------------|------------------|--------------|---------------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.0 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 174.9 | 174.9 |
| CH4 SP Ratio | NA | NA | Flame Temp | 405.0 | 405.0 |
| CH4 Retention time | NA | NA | Carrier Pressure | 36.8 | 36.8 |
| NMHC SP Ratio | NA | NA | Fuel Pressure | 45.0 | 45.0 |
| NMHC Peak Area | NA | NA | Air Pressure | 33.8 | 33.8 |

Calibration Statistics

| | <u>Start</u> | <u>Finish</u> |
|-----------------|--------------|---------------|
| THC Cal Slope | 0.994743 | 1.006466 |
| THC Cal Offset | 0.083254 | 0.000000 |
| CH4 Cal Slope | 0.995759 | 1.004140 |
| CH4 Cal Offset | 0.042951 | 0.000000 |
| NMHC Cal Slope | 0.993680 | 1.007457 |
| NMHC Cal Offset | 0.040511 | 0.000000 |

Notes: Nitrogen cylinder being changed. Since the instrument was reset, there was no calibration history.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

Version-02-2017

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4933 | 78.7 | 16.59 | 16.48 | 1.006 |
| calibrator zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4933 | 78.7 | 16.59 | 16.48 | 1.006 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.006 |
| Corrected As found | 16.48 | Prev response | 16.59 | *% change | 0.7% |

NMHC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0 | 0.00 | 0.00 | ---- |
| as found span | 4933 | 78.8 | 8.60 | 8.53 | 1.009 |
| calibrator zero | 5009 | 0 | 0.00 | 0.00 | ---- |
| high point | 4933 | 78.7 | 8.59 | 8.53 | 1.007 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.007 |
| Corrected As found | 8.53 | Prev response | 8.62 | *% change | 1.1% |

CH4 Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit= 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|--|
| as found zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 4933 | 78.7 | 7.99 | 7.96 | 1.005 |
| calibrator zero | 5009 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4933 | 78.7 | 7.99 | 7.96 | 1.004 |
| second point | | | | | |
| third point | | | | | |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.004 |
| Corrected As found | 7.96 | Prev response | 7.98 | *% change | 0.4% |

* = > +/-5% change initiates investigation



Wood Buffalo Environmental Association

THC Calibration Summary

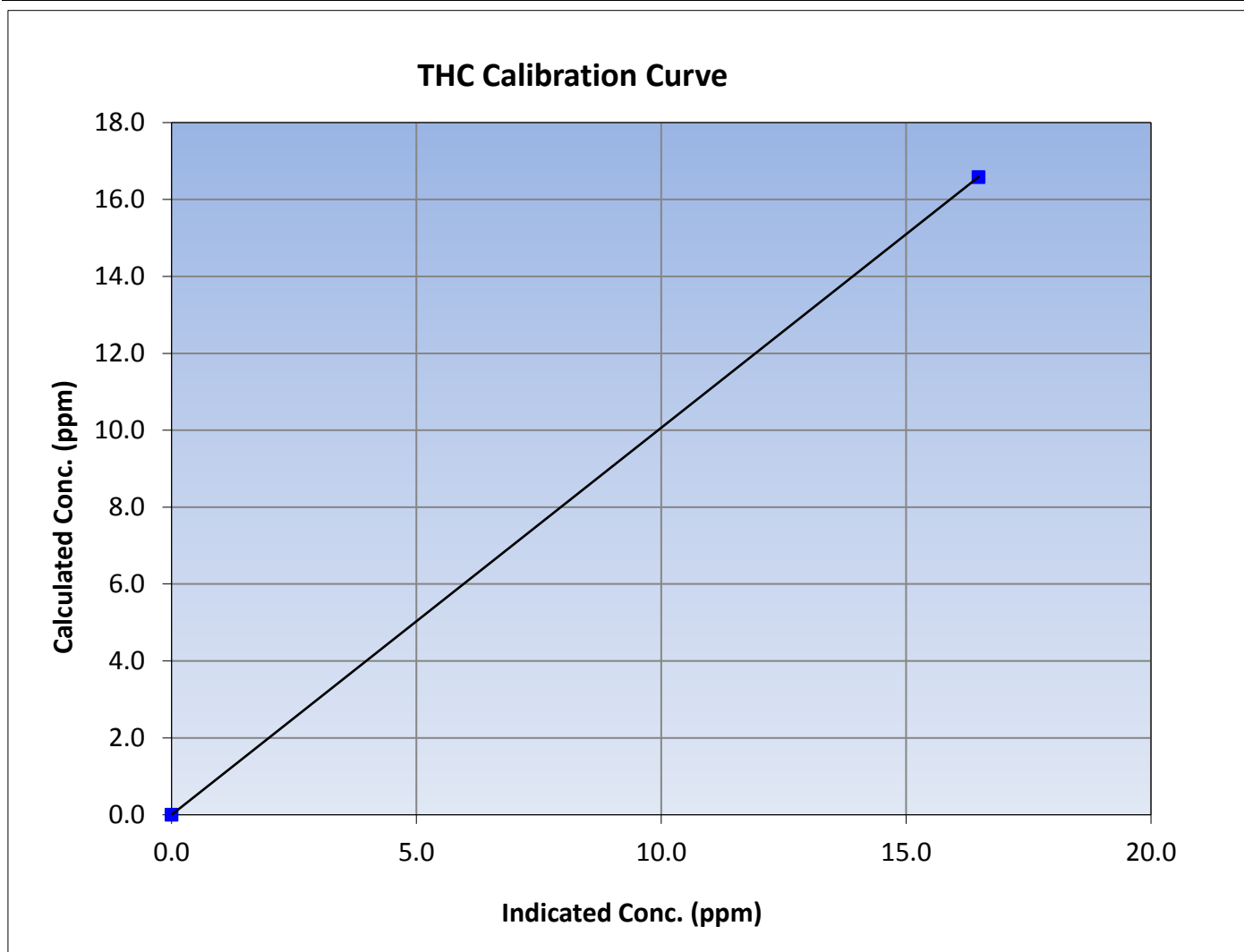
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 5, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 9:51 | End Time (MST) | 10:53 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1501663728 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥ 0.995 |
| 16.59 | 16.48 | 1.0065 | | | |
| | | | Slope | 1.006466 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-0.5 |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

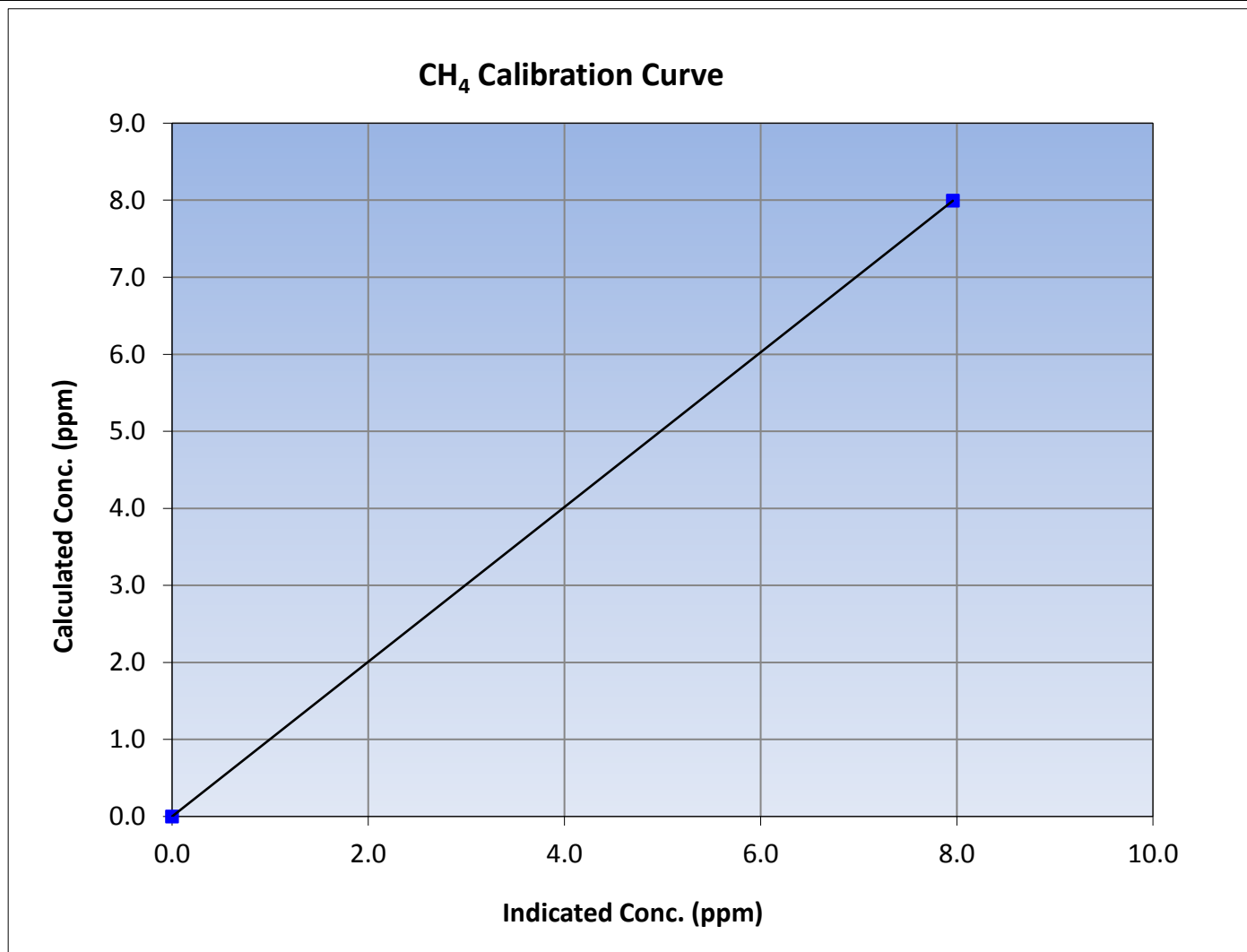
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 5, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 9:51 | End Time (MST) | 10:53 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1501663728 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|---------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 7.99 | 7.96 | 1.0041 | | | |
| | | | Slope | 1.004140 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-0.5 |





Wood Buffalo Environmental Association

NMHC Calibration Summary

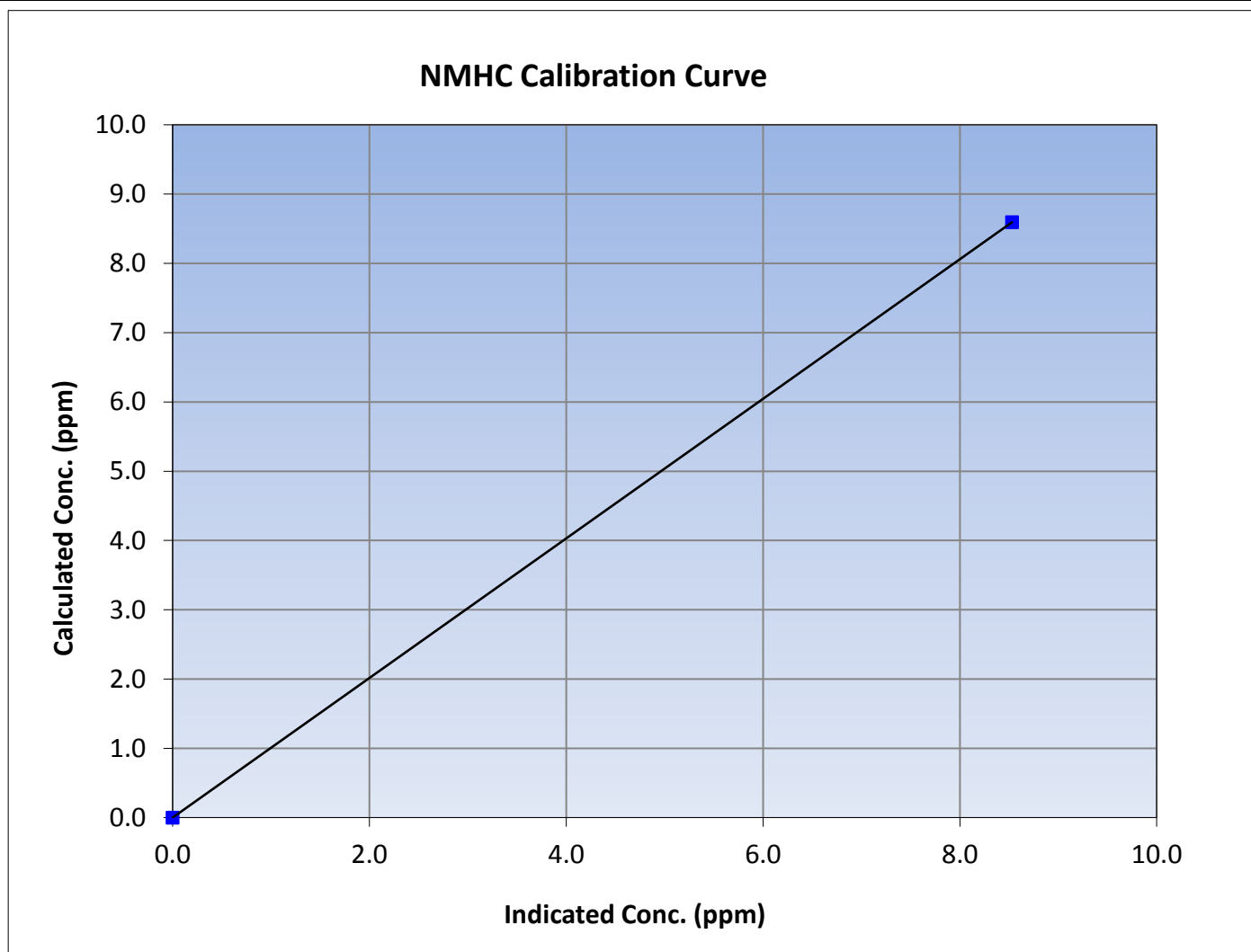
Version-02-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 29, 2017 | Previous Calibration | September 5, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 9:51 | End Time (MST) | 10:53 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1501663728 |

Calibration Data

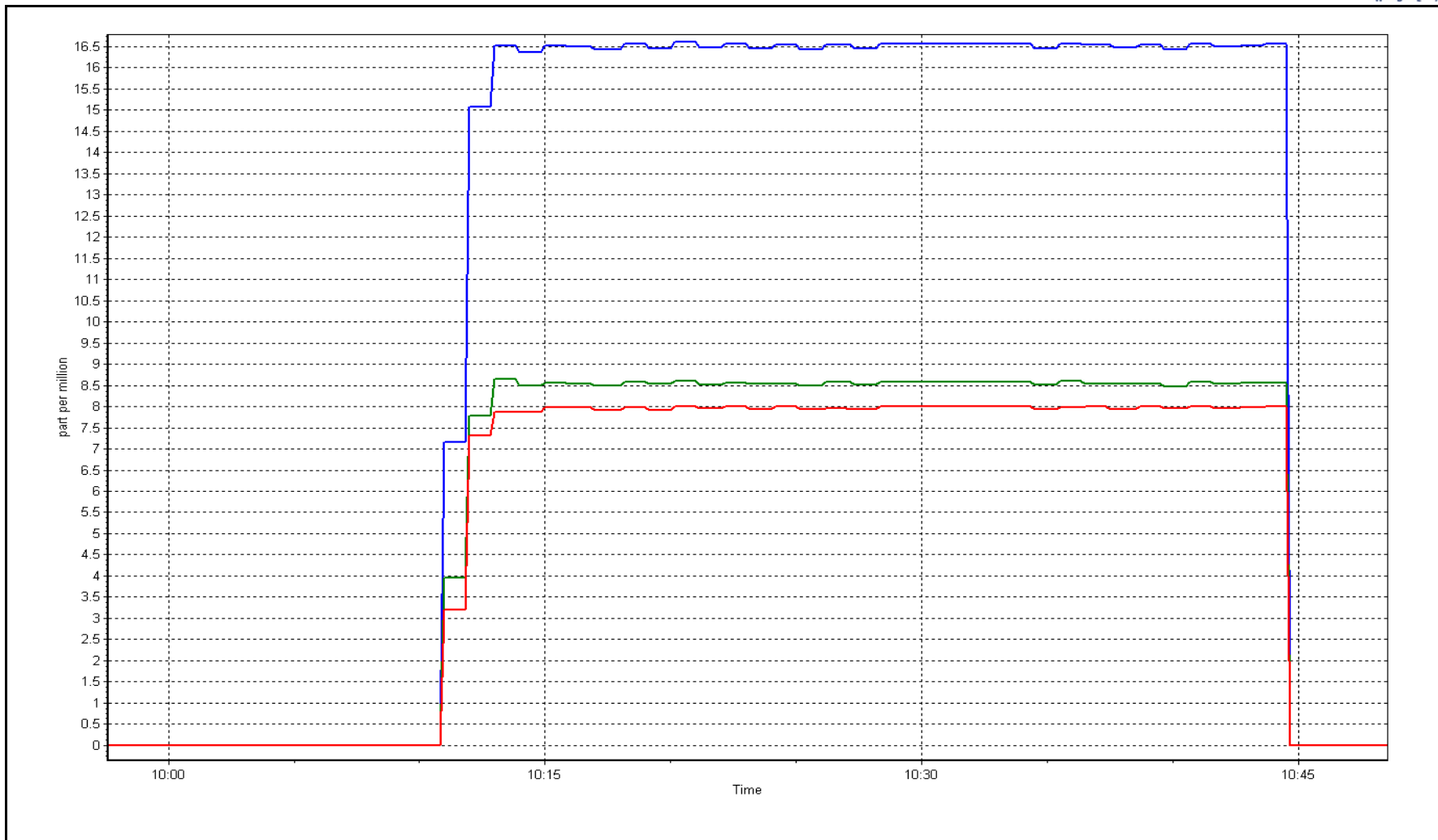
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 1.000000 | ≥0.995 |
| 8.59 | 8.53 | 1.0075 | | | |
| | | | Slope | 1.007457 | 0.90 - 1.10 |
| | | | Intercept | 0.000000 | +/-0.5 |



NMHC Calibration Plot

Date: 29-Sep

Location: Janvier





Wood Buffalo Environmental Association

O₃ Calibration Summary

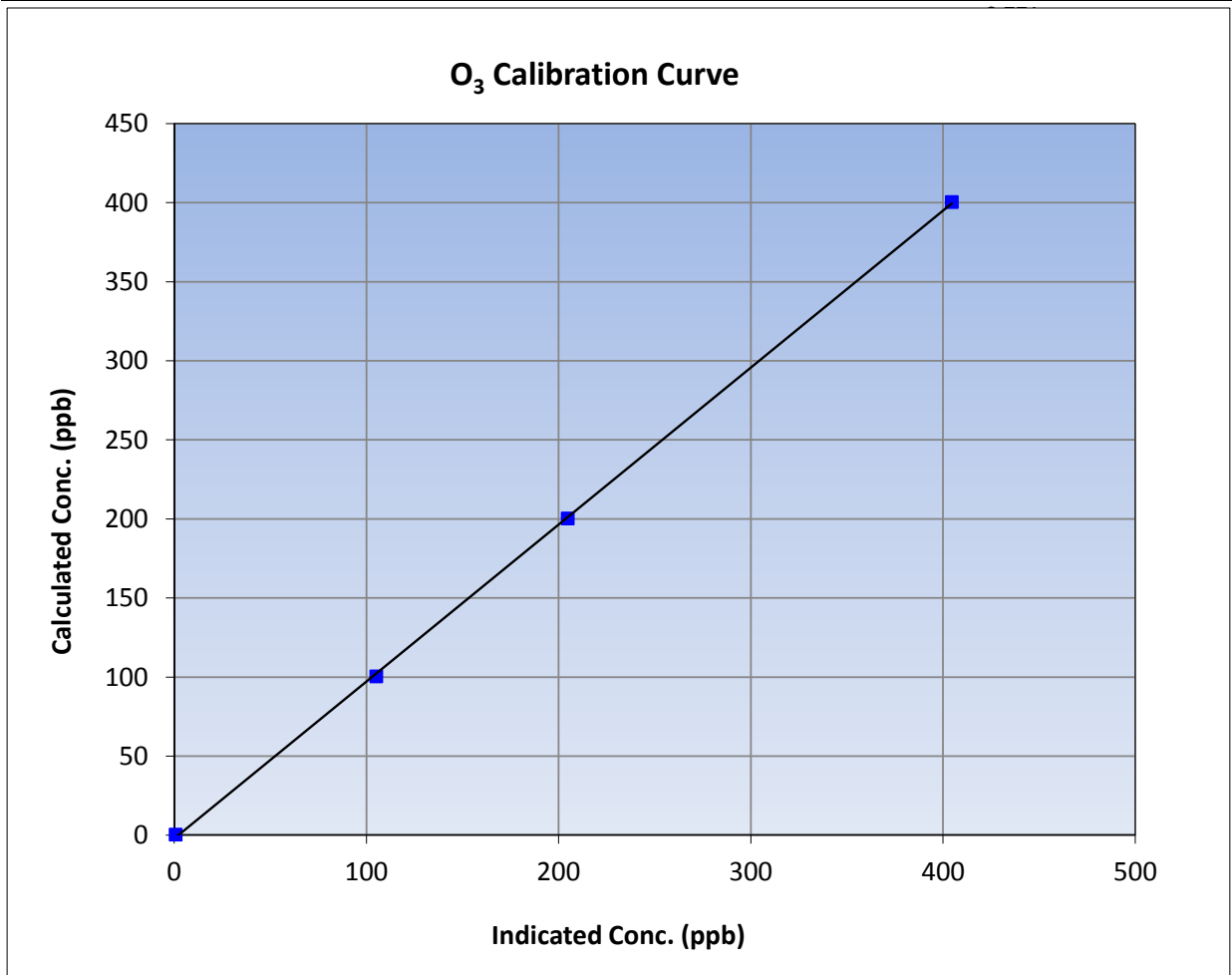
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 10:03 | End Time (MST) | 14:11 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1227254861 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|--------------------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999910 | ≥0.995 |
| 400.0 | 404.2 | 0.9896 | Slope | 0.992847 | 0.90 - 1.10 |
| 200.0 | 204.3 | 0.9790 | Intercept | -2.148674 | +/- 10 |
| 100.0 | 104.8 | 0.9542 | | | |



O₃ Calibration Plot

Date: 15-Sep

Location: Janvier





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | September 28, 2017 | Last Cal Date: | August 12, 2017 |
| Start time (MST): | 7:39 | End time (MST): | 11:57 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|------------------------------|
| NO Gas Cylinder # | LL107937 | Cal Gas Expiry Date | Saturday, September 08, 2018 |
| NOX Cal Gas Conc. | <u>50.9</u> ppb | NO Cal Gas Conc. | <u>50.9</u> ppb |
| Calibrator Model | API T700 | Serial Number | 2447 |
| ZAG make/model | Teledyne API T701 | Serial Number | 135 |

Analyzer Information

| | | | |
|-------------------------|--------------|------------------------|---------------------|
| Analyzer make: API T200 | | Analyzer serial #: 722 | |
| | <u>Start</u> | <u>Finish</u> | |
| NO coefficient | 0.946 | 0.948 | NOX Range (ppb) |
| NOX coefficient | 0.935 | 0.938 | PMT Temperature |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press |
| NO bkgrnd | -3.8 | -3.8 | Sample Flow |
| NOX bkgrnd | -0.3 | -0.3 | PMT Voltage |
| | | | 0 - 1000 ppb |
| | | | 6.8 |
| | | | 3.3 |
| | | | 468.000 |
| | | | 798.0 |
| | | | 463.000 |
| | | | 798.0 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.992568 | 0.999876 |
| NO _x Cal Offset | 3.486085 | 0.711965 |
| NO Cal Slope | 0.990309 | 1.000814 |
| NO Cal Offset | 4.992127 | 0.059561 |
| NO ₂ Cal Slope | 1.001167 | 1.009223 |
| NO ₂ Cal Offset | -1.917211 | 0.844914 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | 0.9 | -1.3 | ---- | ---- |
| as found span | 4935 | 78.7 | 799.0 | 799.0 | 0.0 | 791.8 | 792.7 | -0.9 | 1.0091 | 1.0079 |
| calibrator zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | 0.9 | -1.3 | ---- | ---- |
| high point | 4935 | 78.7 | 799.0 | 799.0 | 0.0 | 798.6 | 798.1 | 0.5 | 1.0005 | 1.0011 |
| second point | 4976 | 39.4 | 399.9 | 399.9 | 0.0 | 398.8 | 400.9 | -2.2 | 1.0027 | 0.9974 |
| third point | 4993 | 19.7 | 200.0 | 200.0 | 0.0 | 199.2 | 197.6 | 1.7 | 1.0042 | 1.0123 |
| as left zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 1.4 | -1.6 | ---- | ---- |
| as left span | 4935 | 78.7 | 799.0 | 396.8 | 402.2 | 795.4 | 392.3 | 403.2 | 1.0045 | 1.0115 |
| Average Correction Factor | | | | | | | | | 1.0024 | 1.0036 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 792.2 ppb | NO = 791.8 ppb | | *Percent Change | NO _x = 1.2% |
| Previous Response | NO _x = 801.5 ppb | NO = 801.8 ppb | | *Percent Change | NO = 1.3% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 799.5 | 799.0 | 0.5 | 0.9993 | 1.0000 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 396.8 | 402.2 | 794.2 | 396.8 | 397.3 | 1.0060 | ---- | 1.0123 | 98.8% |
| 2nd NO2 (200 ppb O3) | 597.1 | 201.9 | 797.0 | 597.1 | 199.9 | 1.0025 | ---- | 1.0100 | 99.0% |
| 3rd NO2 (100 ppb O3) | 697.2 | 101.8 | 797.4 | 697.2 | 100.2 | 1.0020 | ---- | 1.0160 | 98.4% |
| 2nd NO ref point | ---- | 0.0 | 798.3 | 797.1 | 1.2 | 1.0008 | 1.0024 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0028 | 1.0012 | 1.0128 | 98.7% |

Notes:

Span adjusted slightly after as founds.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

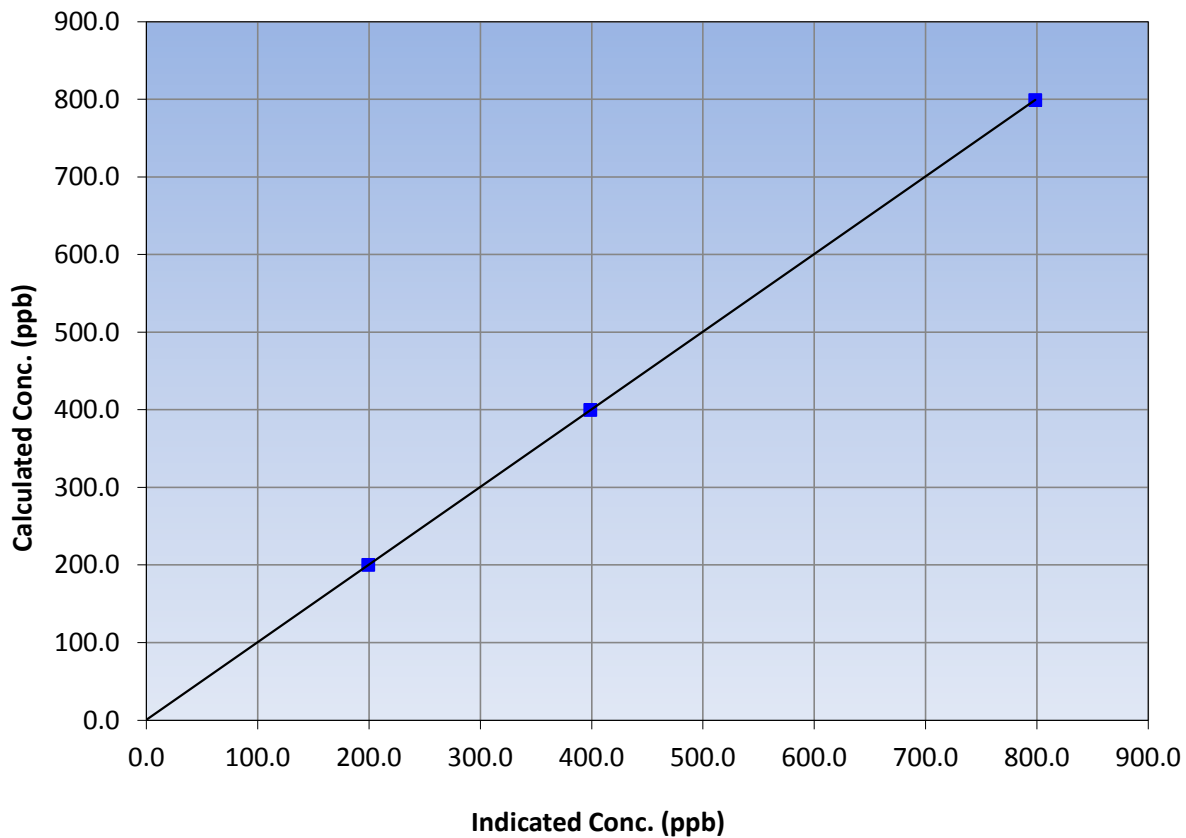
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 28, 2017 | Previous Calibration | August 12, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 7:39 | End Time (MST) | 11:57 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.4 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.0 | 798.6 | 1.0005 | | | |
| 399.9 | 398.8 | 1.0027 | | | |
| 200.0 | 199.2 | 1.0042 | | | |
| | | | Slope | 0.999876 | 0.90 - 1.10 |
| | | | Intercept | 0.711965 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

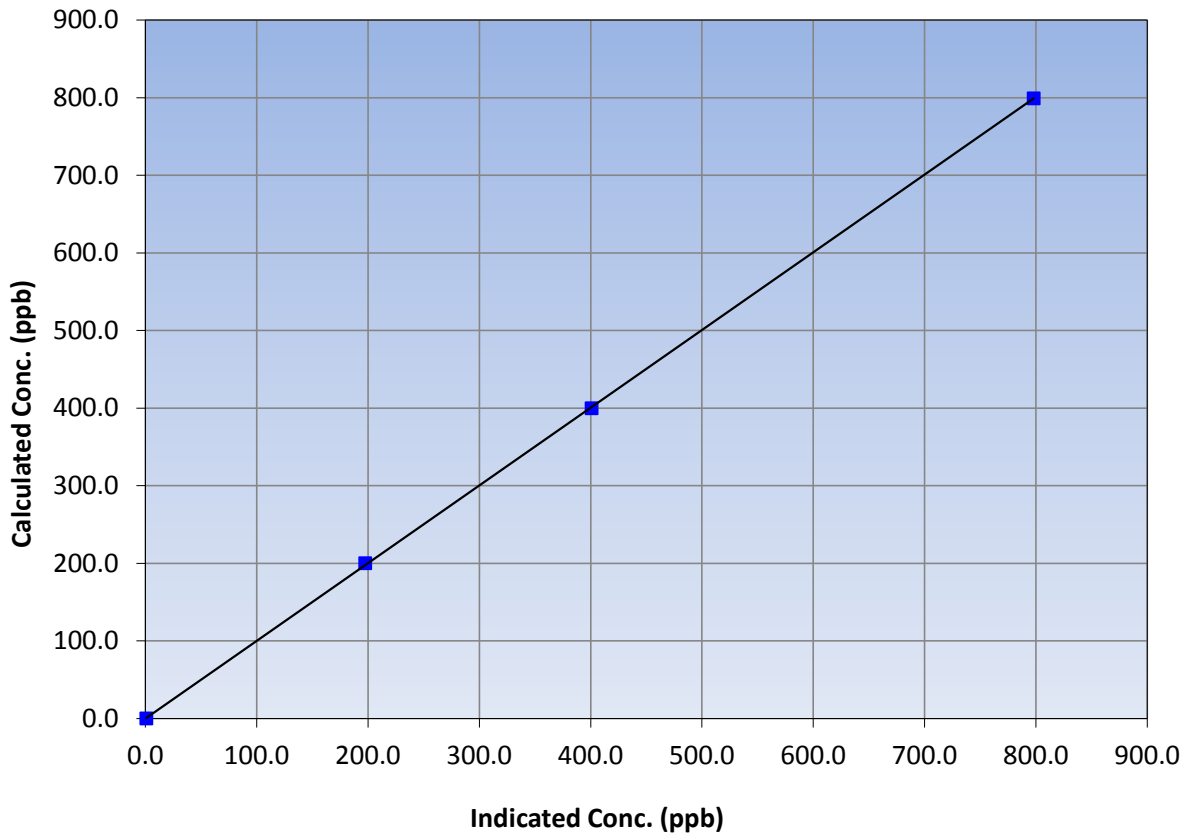
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 28, 2017 | Previous Calibration | August 12, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 7:39 | End Time (MST) | 11:57 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.9 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.0 | 798.1 | 1.0011 | | | |
| 399.9 | 400.9 | 0.9974 | | | |
| 200.0 | 197.6 | 1.0123 | | | |
| | | | Slope | 1.000814 | 0.90 - 1.10 |
| | | | Intercept | 0.059561 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

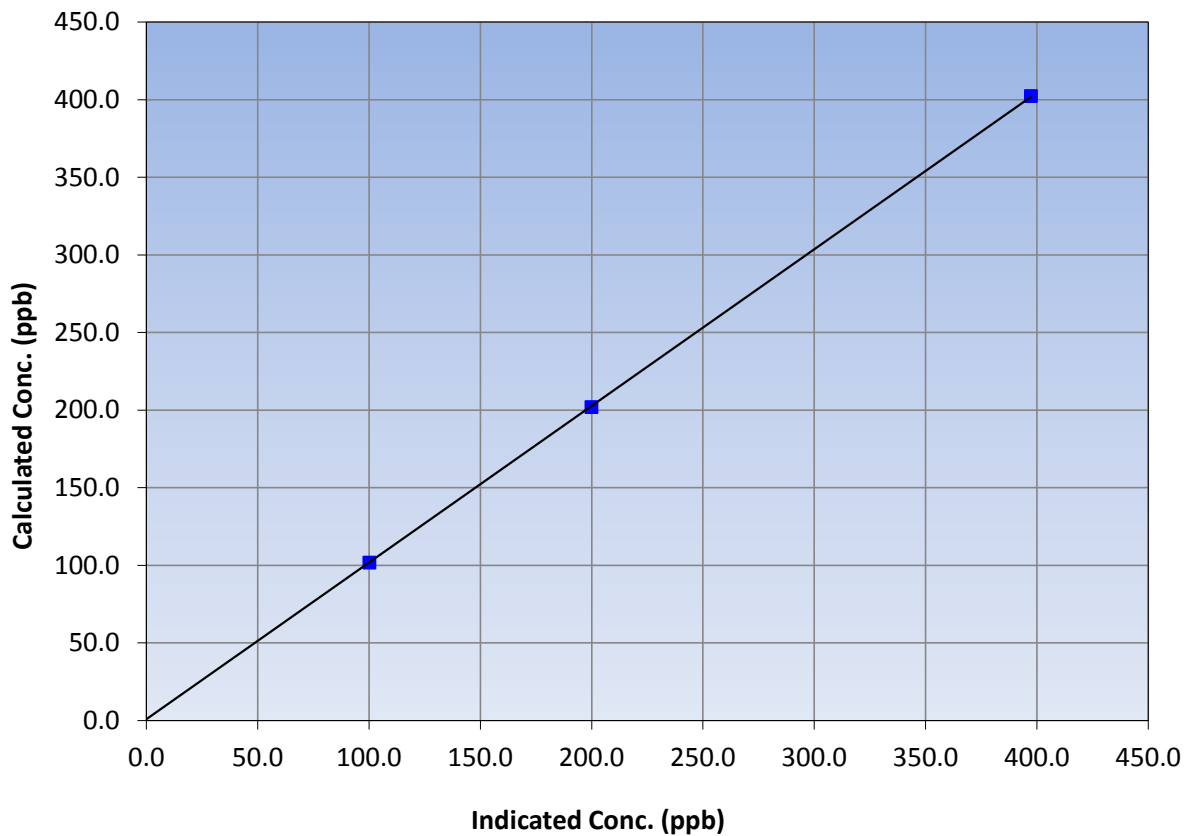
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 28, 2017 | Previous Calibration | August 12, 2017 |
| Station Name | Janvier | Station Number | AMS 22 |
| Start Time (MST) | 7:39 | End Time (MST) | 11:57 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|
| 0.0 | -1.3 | ---- | Correlation Coefficient | ≥0.995 |
| 402.2 | 397.3 | 1.0123 | | |
| 201.9 | 199.9 | 1.0100 | | |
| 101.8 | 100.2 | 1.0160 | | |
| | | | Slope | 0.90 - 1.10 |
| | | | Intercept | +/-20 |

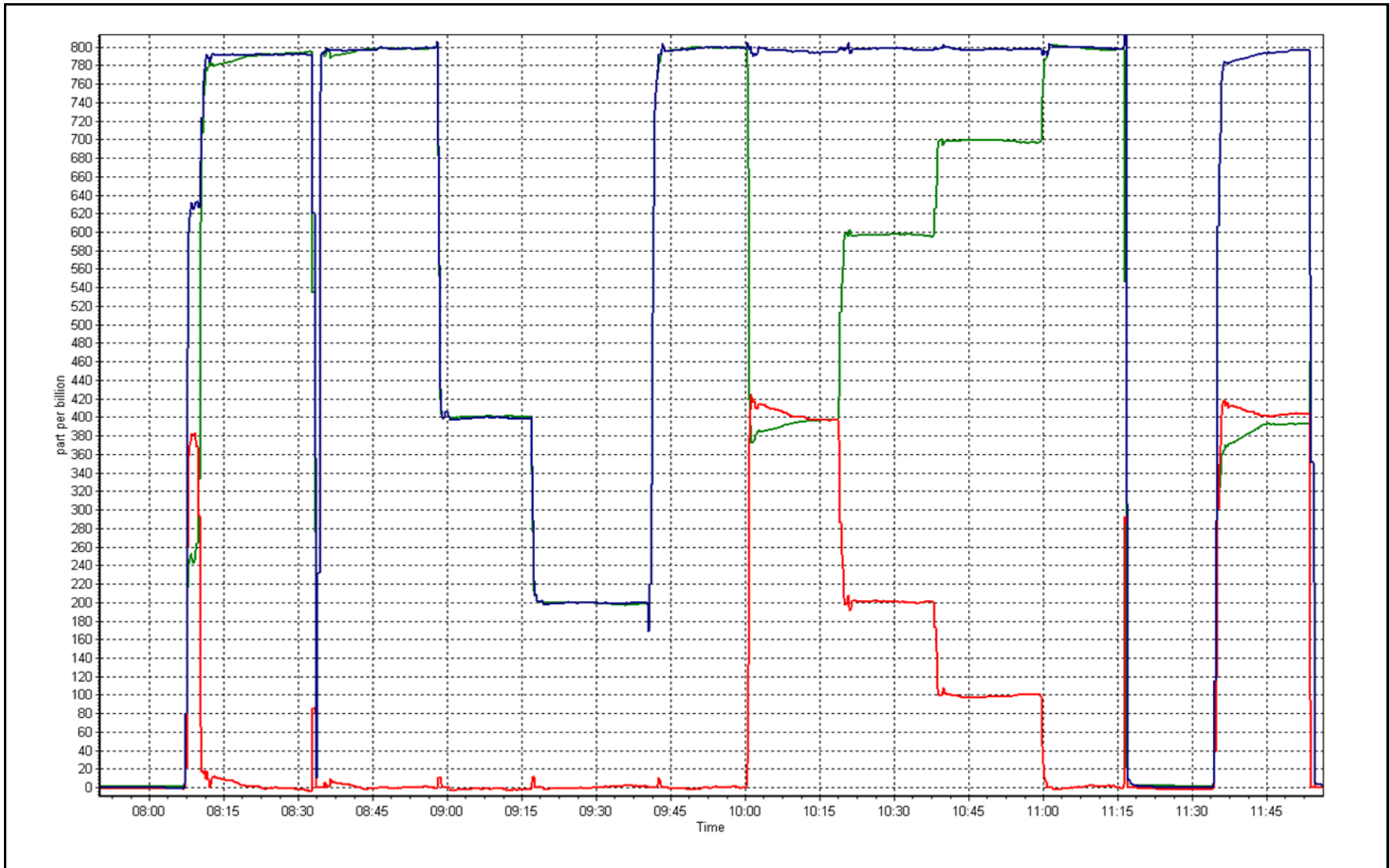
NO₂ Calibration Curve



NO_x Calibration Plot

Date: 28-Sep

Location: Janvier





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|-----------------|
| Station Name: | Janvier | Station number: | AMS 22 |
| Calibration Date: | September 28, 2017 | Last Cal Date: | August 16, 2017 |
| Start time (MST): | 9:29 | End time (MST): | 11:11 |
| Sharp Model: | Thermo 5030 SHARP | S/N: | E-1333 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 5341 |
| Flow Standard Model: | Delta-Cal | S/N: | 954 |
| Temp/RH standard: | Delta-Cal | S/N: | 954 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | <u>Tolerance</u> |
|------------------------|--|-----------------|---|-------------------------------------|------------------|
| T1 (°C) | 12 | 15 | 15 | <input checked="" type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 949 | 963.9 | 963 | <input checked="" type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1027 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.7 | 0.7 | -0.1 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning : | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | <u>Tolerance</u> |
|------------|---------------------------------------|-------------------------------|------------|------------------|
| Leak Test: | Date of check: <u>August 16, 2017</u> | Last Cal Date: | <u>N/A</u> | |
| | Flow w/o adaptor: <u>17.08</u> | Flow w/ adaptor: <u>17.07</u> | | 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|------------------------------|----------------------|
| Foil Calibration | Foil Mass: _____ | S/N: _____ |
| | Date of check: _____ | Last Cal Date: _____ |
| | New Correction Factor: _____ | 7036 _____ |

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

Notes: T1, P3, Nephelometer zero adjusted.

Calibration by: Aswin Sasi Kumar



Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-------------------|
| Station Name: | Janvier | Station Number: | AMS 22 |
| Calibration Date: | September 15, 2017 | Prev Cal Date: | November 17, 2016 |
| Start Time (MST): | 10:20 | End Time (MST): | 13:00 |
| Barometric Press: | n/a | Station Temp: | 22 Deg C |
| Reason: | Routine | | |

Wind Speed Information

| | | | |
|--------------------|----------------|----------------|--------|
| Sensor make/model: | Met One 010C-1 | Serial Number: | U11126 |
| WS Calibrator: | MetOne 053 | Serial Number: | K13090 |

| Shaft RPM | Actual Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i> |
|----------------------------------|--------------------------|-----------------------------|---|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.1 | 1.0031 |
| 400 | 39.4 | 39.4 | 0.9990 |
| 600 | 58.6 | 58.6 | 0.9992 |
| 800 | 77.8 | 77.8 | 0.9994 |
| Average Correction Factor | | | 1.0002 |

| | <i>Start</i> | <i>Finish</i> | <i>Limits</i> |
|--------------------------------|--------------|---------------|---------------|
| Correl Coeff (r ²) | 0.999973 | 0.999999 | ≥0.995 |
| Calculated slope | 0.994833 | 0.998960 | 0.90 - 1.10 |
| Calculated intercept | 0.128345 | 0.026359 | +/- 2 |

Wind Direction Information

| | | | |
|--|----------------|---|-----------|
| Sensor make/model: | Met One 020C-1 | Serial Number: | U11346 |
| As Found Declination (deg east of North) | <u>13</u> | As Left Declination (deg east of North) | <u>13</u> |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i> |
|-----------------------------------|------------------------------------|---|
| 0 | 0.0 | n/a |
| 90 | 89.3 | 1.0078 |
| 180 | 179.0 | 1.0056 |
| 270 | 270.1 | 0.9996 |
| 357 | 356.8 | 1.0006 |
| Average Correction Factor | | 1.0034 |

| | <i>Start</i> | <i>Finish</i> | <i>Limits</i> |
|--------------------------------|--------------|---------------|---------------|
| Correl Coeff (r ²) | 0.999901 | 0.999995 | ≥0.995 |
| Calculated slope | 1.006805 | 0.999545 | 0.90 - 1.10 |
| Calculated intercept | -2.892201 | 0.441491 | +/- 7 |

Notes: Calibration went well. No issues.

Calibration Performed By: Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 23
FORT HILLS
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 683 | 34 | 37 | 99.58 | 18 | 0 | 4 | 0 |
| TRS(ppb) Average | 683 | 33 | 37 | 99.44 | 3 | 0 | 1 | 0 |
| THC(ppm) Average | 683 | 32 | 37 | 99.31 | 6 | - | 3 | - |
| NO2 (ppb) Average | 683 | 34 | 37 | 99.58 | 32 | 0 | 13 | - |
| NO (ppb) Average | 683 | 34 | 37 | 99.58 | 123 | - | 19 | - |
| NOX (ppb) Average | 683 | 34 | 37 | 99.58 | 146 | - | 28 | - |
| PM2.5 (ug/m3) Average | 698 | 1 | 22 | 97.08 | 68 | - | 26 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 31 | - | 21 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 98 | - | 90 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 34 | - | 28 | - |
| Wind Direction 10 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|----|--------|----|-----|-----|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 683 | 0.8 | 2 | - | 0 | 0 | 0 | 0 | 0 | 2 | 18 |
| TRS (ppb) Average | 683 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| THC (ppm) Average | 683 | 2.2 | 0 | - | 2 | 2 | 2 | 2 | 2 | 3 | 6 |
| NO2 (ppb) Average | 683 | 5.7 | 6 | - | 0 | 1 | 1 | 3 | 8 | 14 | 32 |
| NO (ppb) Average | 683 | 3.1 | 8 | - | 0 | 0 | 0 | 1 | 2 | 8 | 123 |
| NOX (ppb) Average | 683 | 8.7 | 13 | - | 0 | 1 | 2 | 4 | 11 | 21 | 146 |
| PM2.5 (ug/m3) Average | 698 | 8.5 | 10 | - | 0 | 1 | 2 | 5 | 11 | 18 | 68 |
| Temperature 2 m (C) Average | 720 | 12.2 | 6 | - | 0 | 5 | 8 | 12 | 16 | 21 | 31 |
| Relative Humidity (%) Average | 720 | 68.2 | 20 | - | 23 | 36 | 54 | 71 | 85 | 92 | 98 |
| Wind Speed 10 m (km/h) Average | 719 | 11.1 | 7 | - | 1 | 3 | 6 | 10 | 15 | 21 | 34 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS 23)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-------------------------------|-------------------|-------------------|------------------|---|
| NO2, NO, NOX, PM2.5, SO2, TRS | 07 Sep 2017 16:00 | 07 Sep 2017 18:00 | 3 | Station power failure |
| THC, TRS | 12 Sep 2017 11:00 | 12 Sep 2017 11:00 | 1 | Maintenance - manifold cleaning |
| THC | 07 Sep 2017 16:00 | 07 Sep 2017 19:00 | 4 | Station power failure |
| PM2.5 | 04 Sep 2017 17:00 | 04 Sep 2017 17:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 12 Sep 2017 20:00 | 12 Sep 2017 21:00 | 2 | Unstable operation - excessive baseline drift |
| PM2.5 | 13 Sep 2017 12:00 | 13 Sep 2017 12:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 13 Sep 2017 15:00 | 13 Sep 2017 15:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 13 Sep 2017 19:00 | 13 Sep 2017 19:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 14 Sep 2017 09:00 | 14 Sep 2017 13:00 | 5 | Unstable operation - excessive baseline drift |
| PM2.5 | 15 Sep 2017 02:00 | 15 Sep 2017 05:00 | 4 | Unstable operation - excessive baseline drift |
| PM2.5 | 15 Sep 2017 15:00 | 15 Sep 2017 17:00 | 3 | Unstable operation - excessive baseline drift |
| Wind Speed, Wind Direction | 04 Sep 2017 23:00 | 04 Sep 2017 23:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort Hills - September 2017

| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 18 ppb on Sep 17 11:00 | Maximum Daily Average: 3.6 ppb on Sep 24 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.1 ppb on Sep 14 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 1.8 ppb at hour 11 | Minimum Diurnal Average: 0.3 ppb at hour 7 | | Hours of Calibration: | 34 |
| Monthly Average: 0.8 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 P ₉₉ = 10 | | Percent Operational Time: | 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 3 | 4 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 3 | 0.9 | 6 |
| 2-Sep | 11 | 3 | 1 | 1 | Z | 1 | 0 | 4 | 8 | 12 | 7 | 0 | 3 | 8 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2.6 | 12 |
| 3-Sep | 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 |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | PF | PF | PF | 0 | 1 | 0 | 0 | 1 | 0 | 0.7 | 2 |
| 8-Sep | 0 | 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-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 4 | 4 | 5 | 1 | 1 | 0 | 0 | 0 | 1.0 | 5 |
| 12-Sep | 0 | 0 | Z | 4 | 2 | 1 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 4 |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 14-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 3 | 0 | 1 | 1 | 3 | 2 | 1 | 0 | 0 | 1 | 2 | 2 | 2 | 1.2 | 3 |
| 17-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 7 | 18 | 9 | 5 | 3 | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.7 | 18 |
| 18-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 21-Sep | 0 | 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-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 2 | 2 | 4 | 3 | 4 | 4 | 2 | 1 | 1 | 1.4 | 4 |
| 23-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |
| 24-Sep | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 6 | 8 | 13 | 14 | 10 | 9 | 5 | 2 | 1 | 1 | 1 | 1 | 2 | 3.6 | 14 |
| 25-Sep | 2 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 | 10 | 13 | 9 | 5 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 3 | 2.6 | 13 |
| 29-Sep | 3 | Z | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 8 | 7 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1.7 | 8 |
| 30-Sep | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |

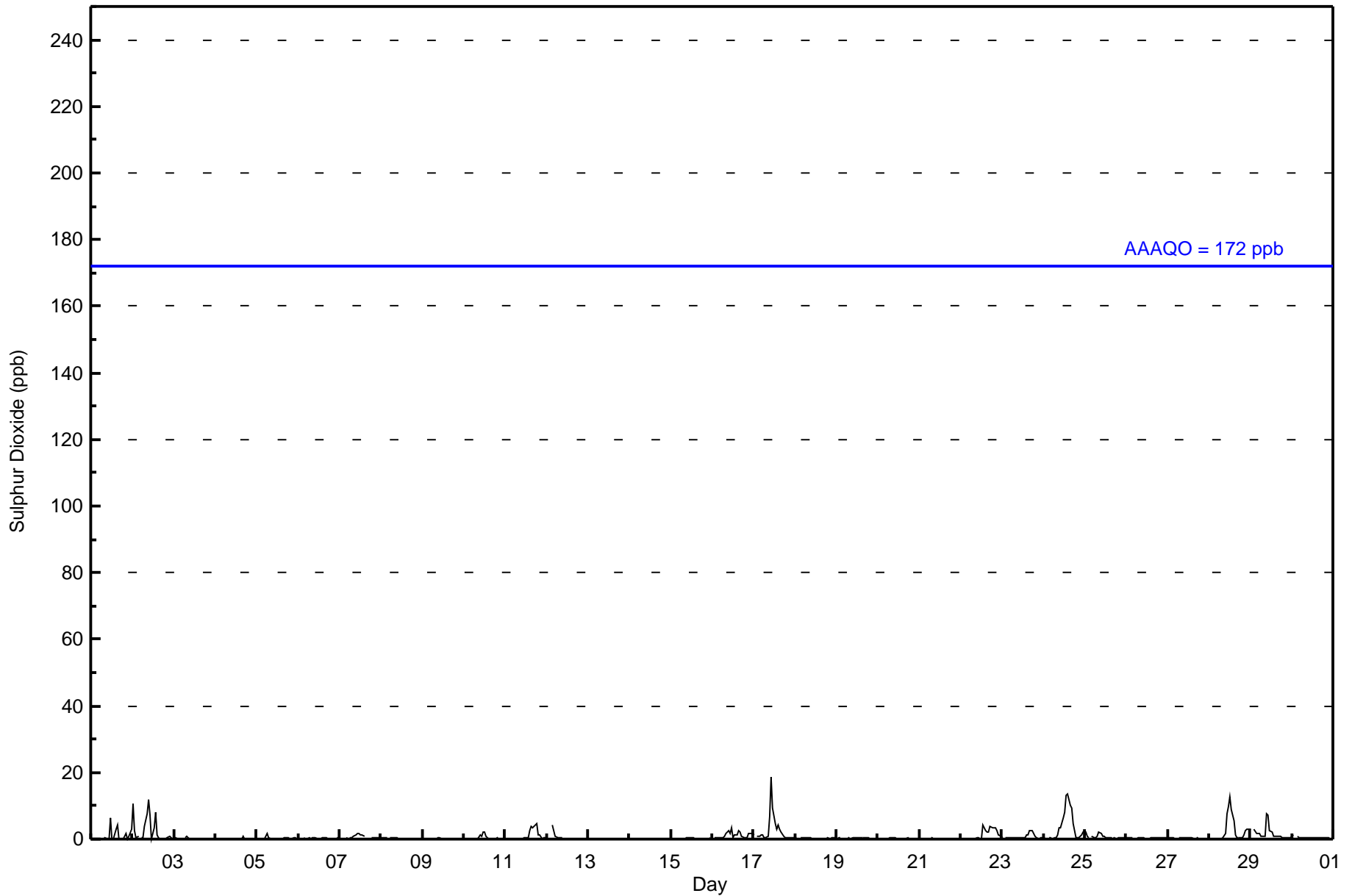
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.9 | 0.3 | 0.3 | 0.5 | 0.4 | 0.4 | 0.3 | 0.4 | 0.7 | 1.4 | 1.8 | 1.6 | 1.3 | 1.5 | 1.3 | 1.1 | 0.9 | 0.7 | 0.6 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | Diurnal Average | | |
| 11 | 3 | 3 | 4 | 2 | 2 | 2 | 4 | 8 | 12 | 18 | 10 | 13 | 13 | 14 | 10 | 9 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | Diurnal Maximum | |

Z - zeronspan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Hills - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Hills - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 677 | 99.12 | 99.12 |
| 11 - 20 | 6 | 0.88 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Hills - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 41 | 85 | 16 | 12 | 5 | 9 | 18 | 80 | 103 | 82 | 57 | 37 | 17 | 33 | 42 | 39 | 676 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 6 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 41 | 85 | 16 | 12 | 5 | 9 | 18 | 80 | 107 | 82 | 57 | 39 | 17 | 33 | 42 | 39 | 682 |

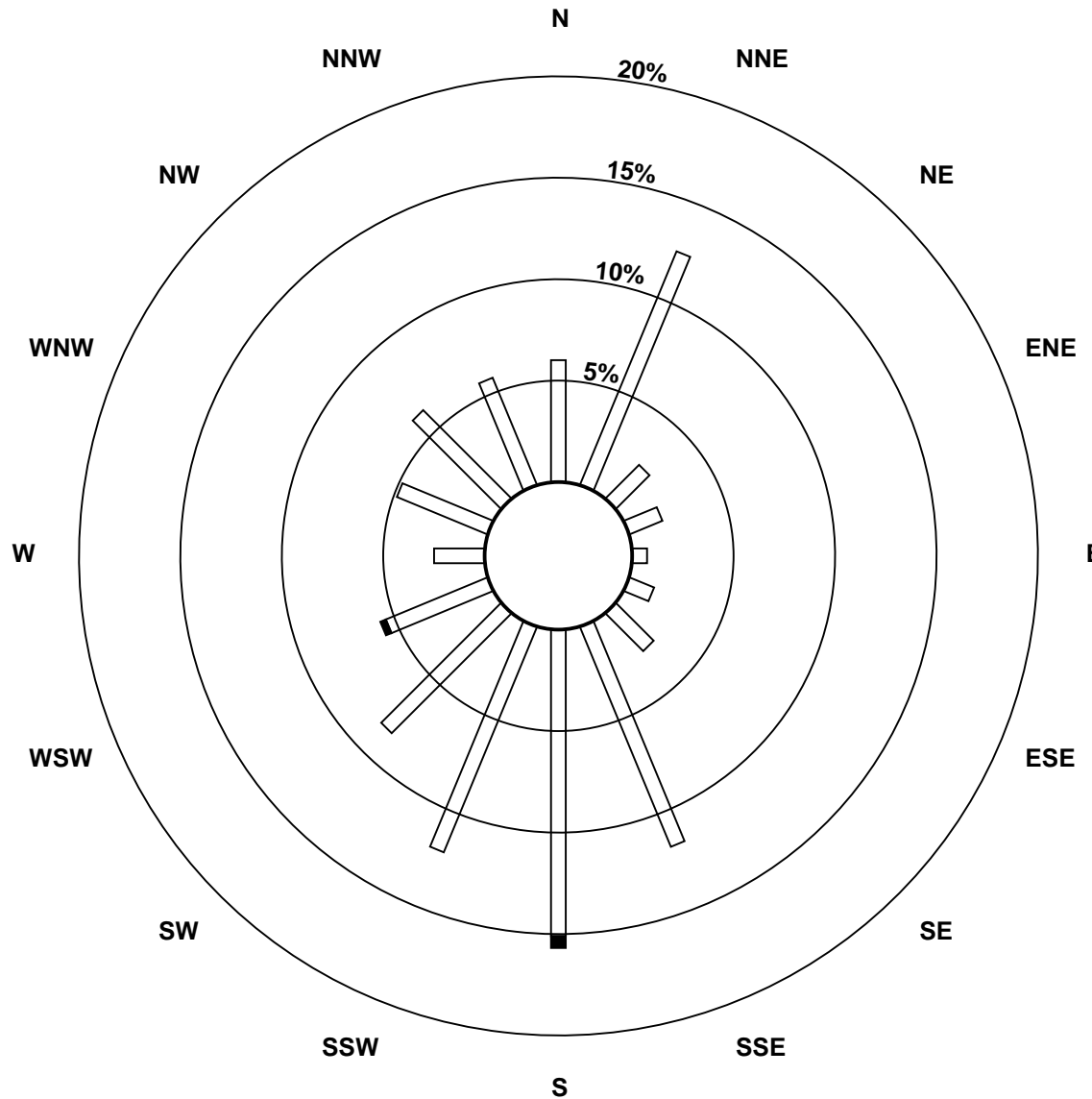
Total Number of Valid Hours: 682

Total Number of Hours: 720

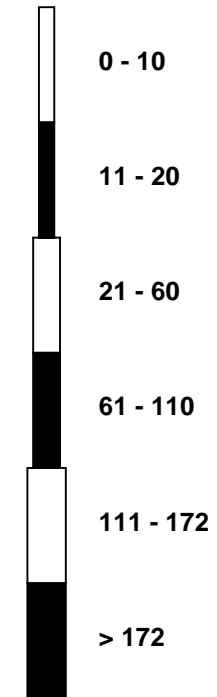


Wood Buffalo Environmental Association
Wind Rose Sep 2017

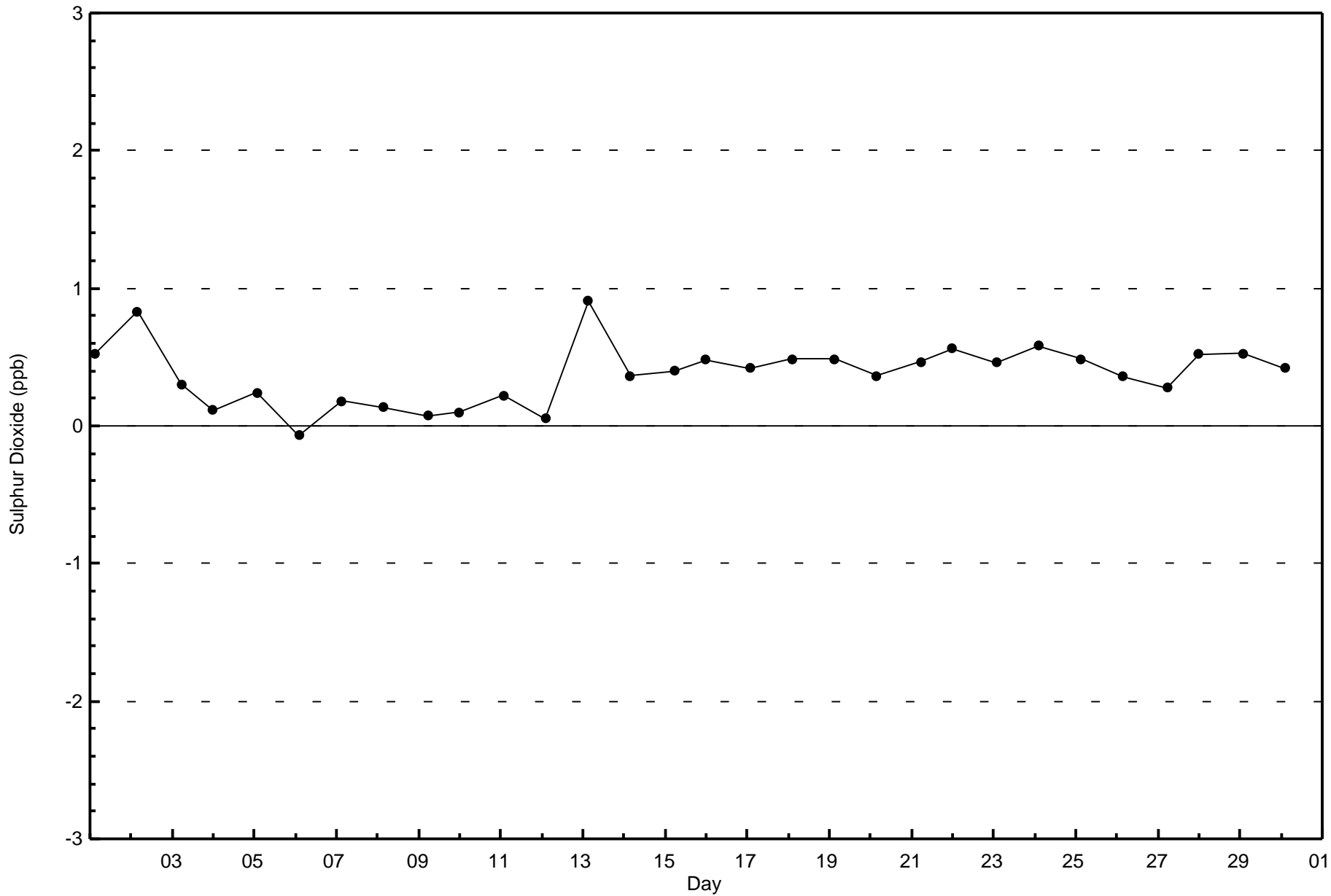
Sulphur Dioxide (SO₂) - ppb
Fort Hills (AMS 23)

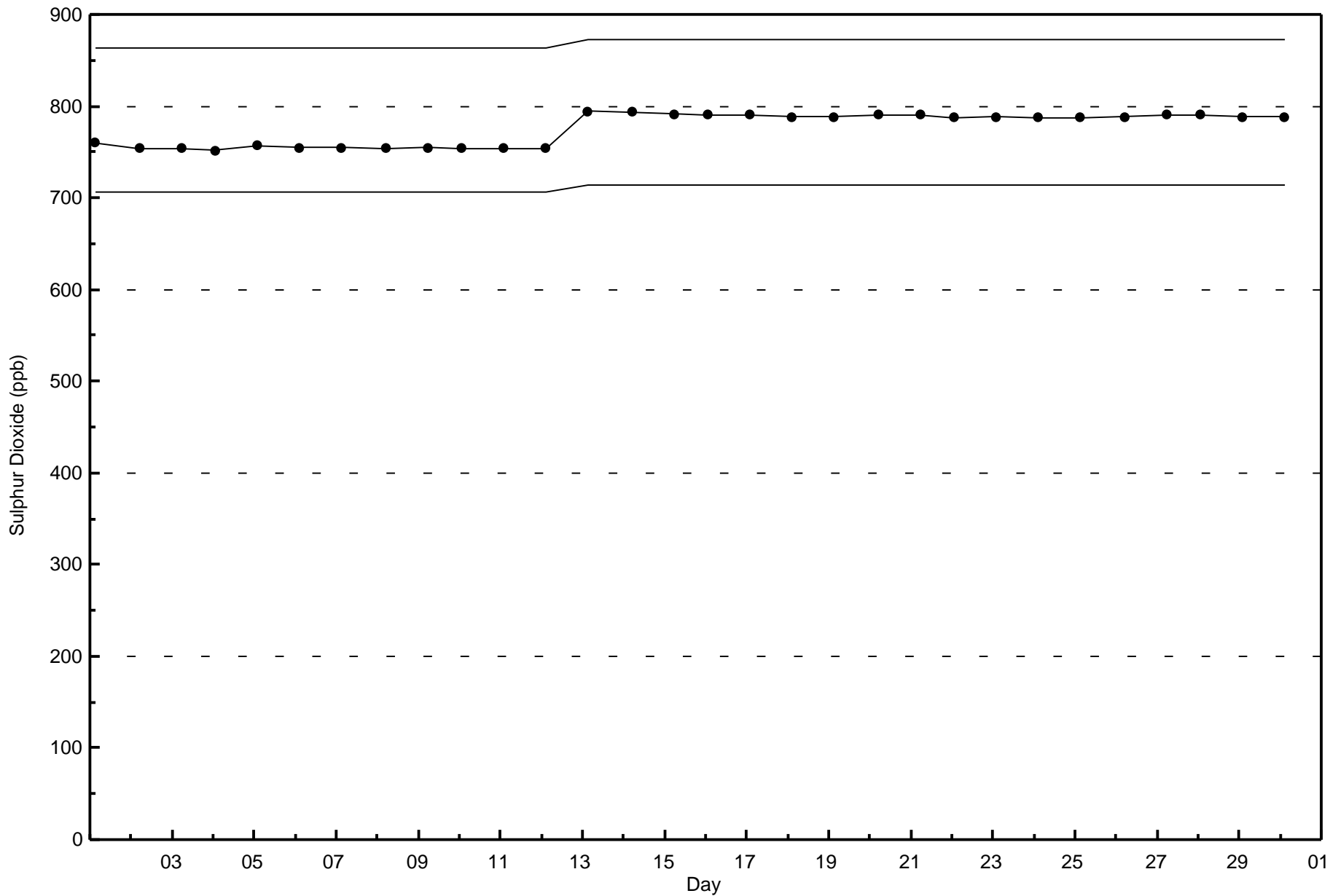


Classes (ppb)



Total Number of Valid Hours: 682





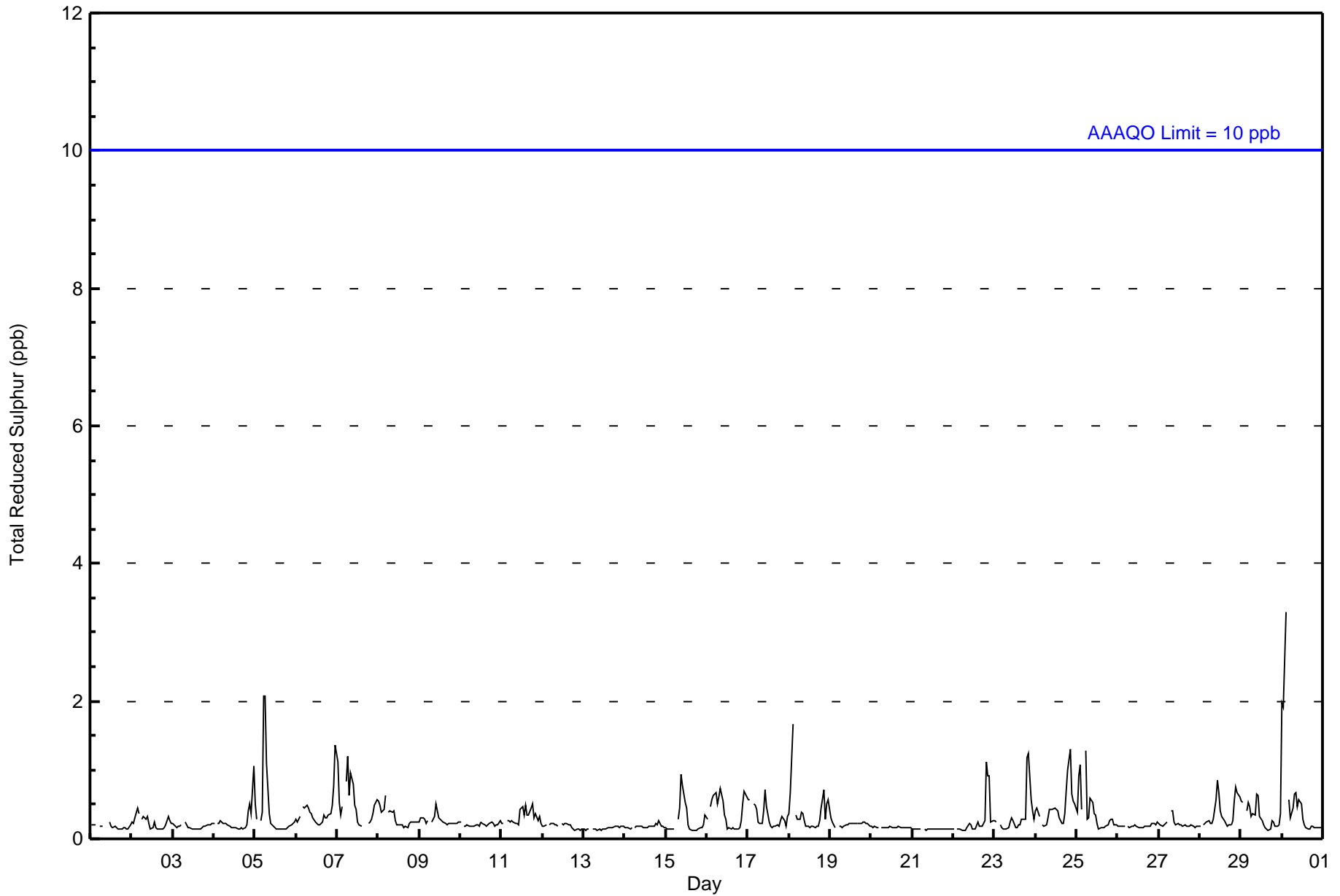


| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 3 ppb on Sep 30 03:00 | Maximum Daily Average: 0.6 ppb on Sep 30 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 12 23:00 | Minimum Daily Average: 0.1 ppb on Sep 21 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 0.4 ppb at hour 3 | Minimum Diurnal Average: 0.2 ppb at hour 16 | | Hours of Calibration: | 33 |
| Monthly Average: 0.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 1 | | Percent Operational Time: | 99.4 |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 | 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 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | Diurnal Average |
| 2 | 2 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | Diurnal Maximum |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort Hills - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 682 | 99.85 | 99.85 |
| 3 - 4 | 1 | 0.15 | 100.00 |
| 5 - 7 | 0 | 0.00 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort Hills - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 43 | 82 | 16 | 12 | 6 | 9 | 18 | 81 | 104 | 83 | 56 | 37 | 19 | 31 | 44 | 40 | 681 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 43 | 82 | 16 | 12 | 6 | 9 | 18 | 82 | 104 | 83 | 56 | 37 | 19 | 31 | 44 | 40 | 682 |

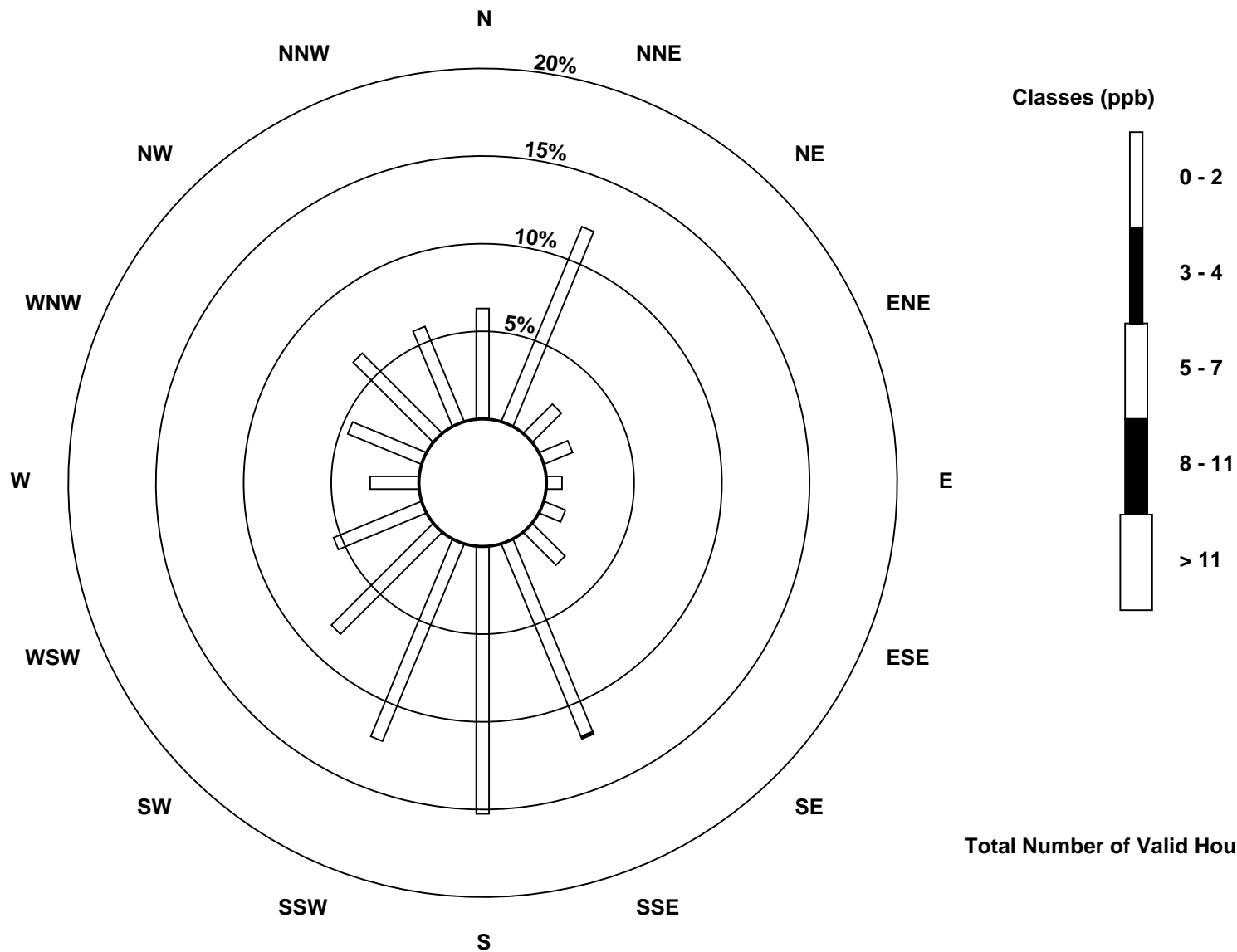
Total Number of Valid Hours: 682

Total Number of Hours: 720

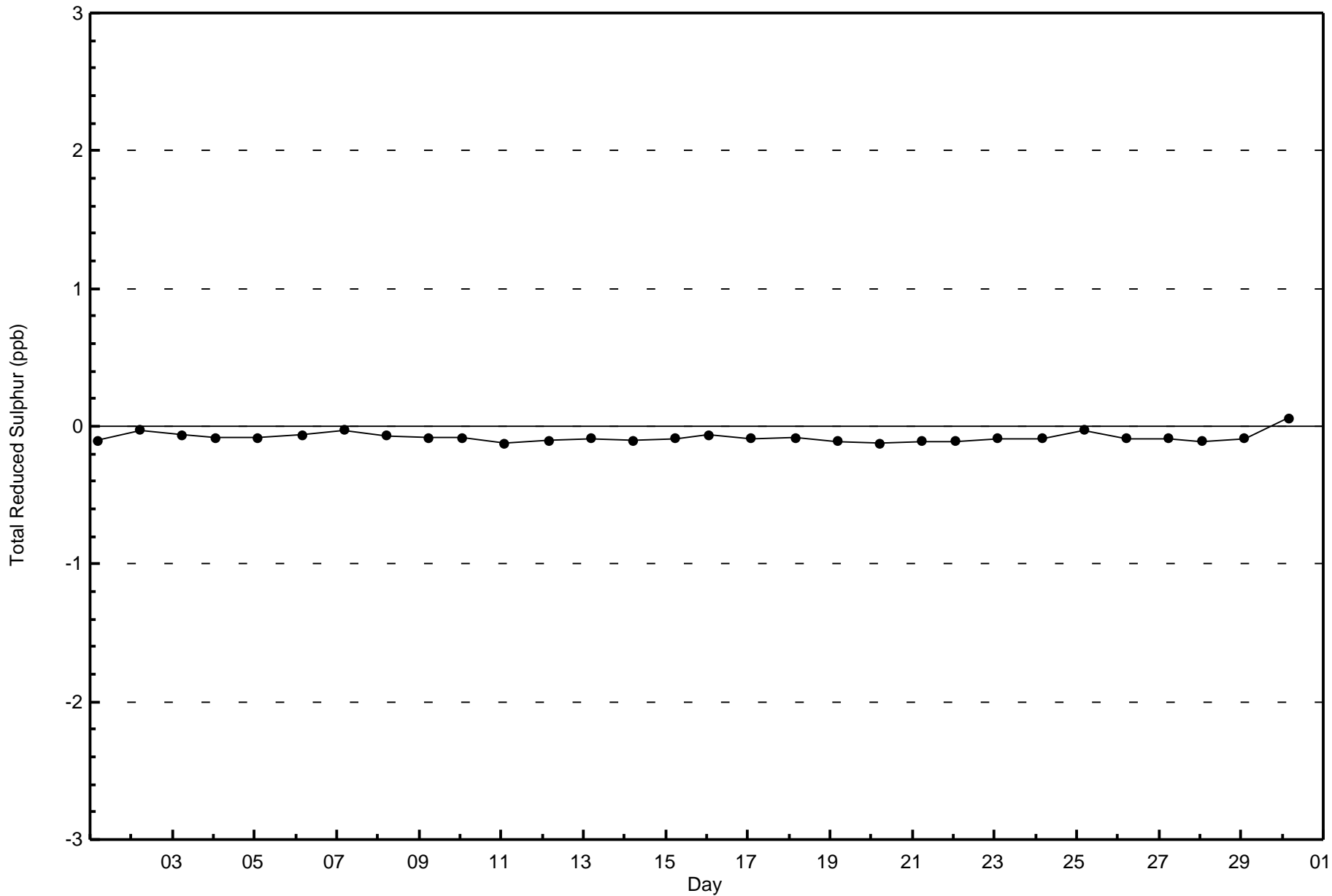


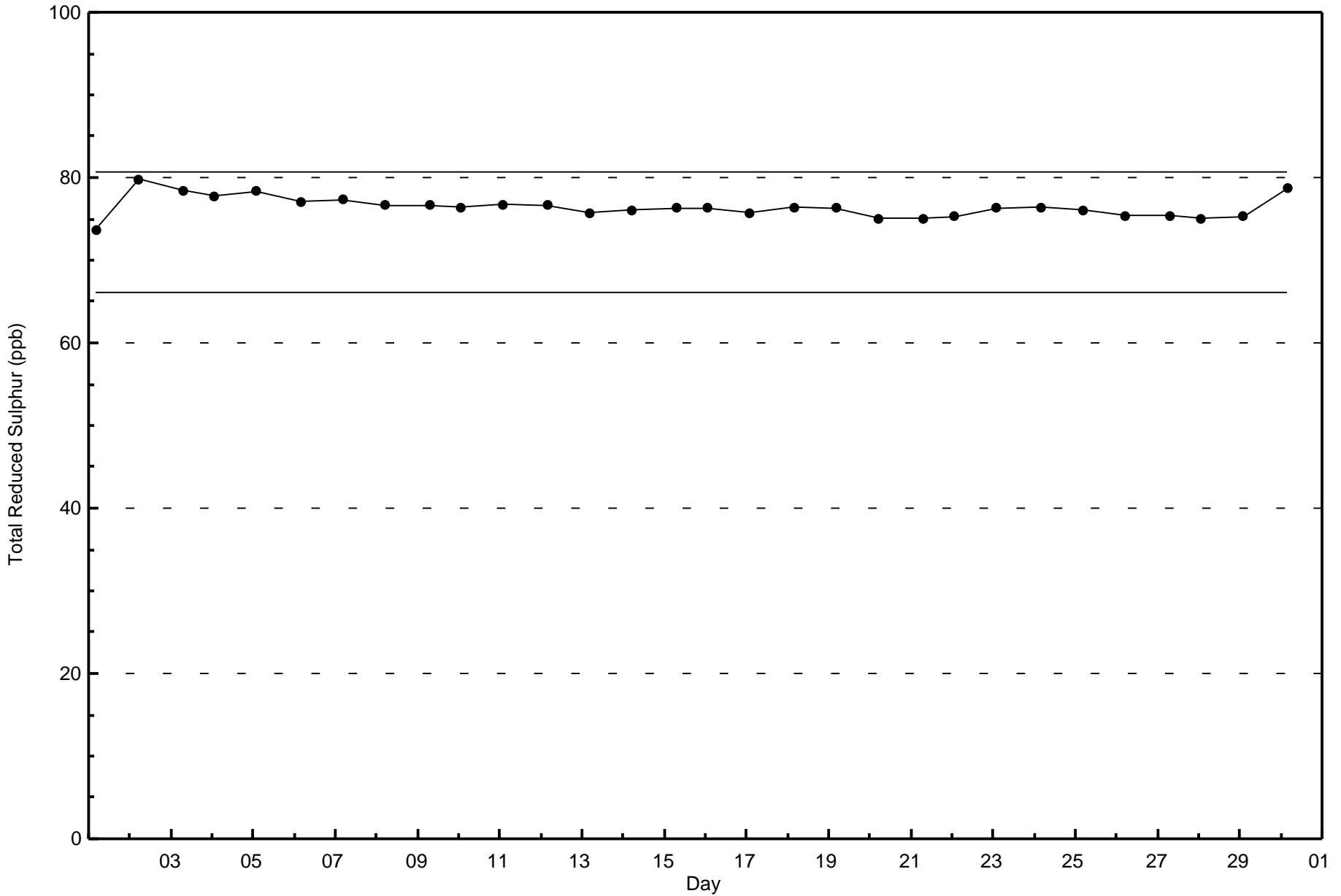
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Reduced Sulphur (TRS) - ppb
Fort Hills (AMS 23)



Total Number of Valid Hours: 682







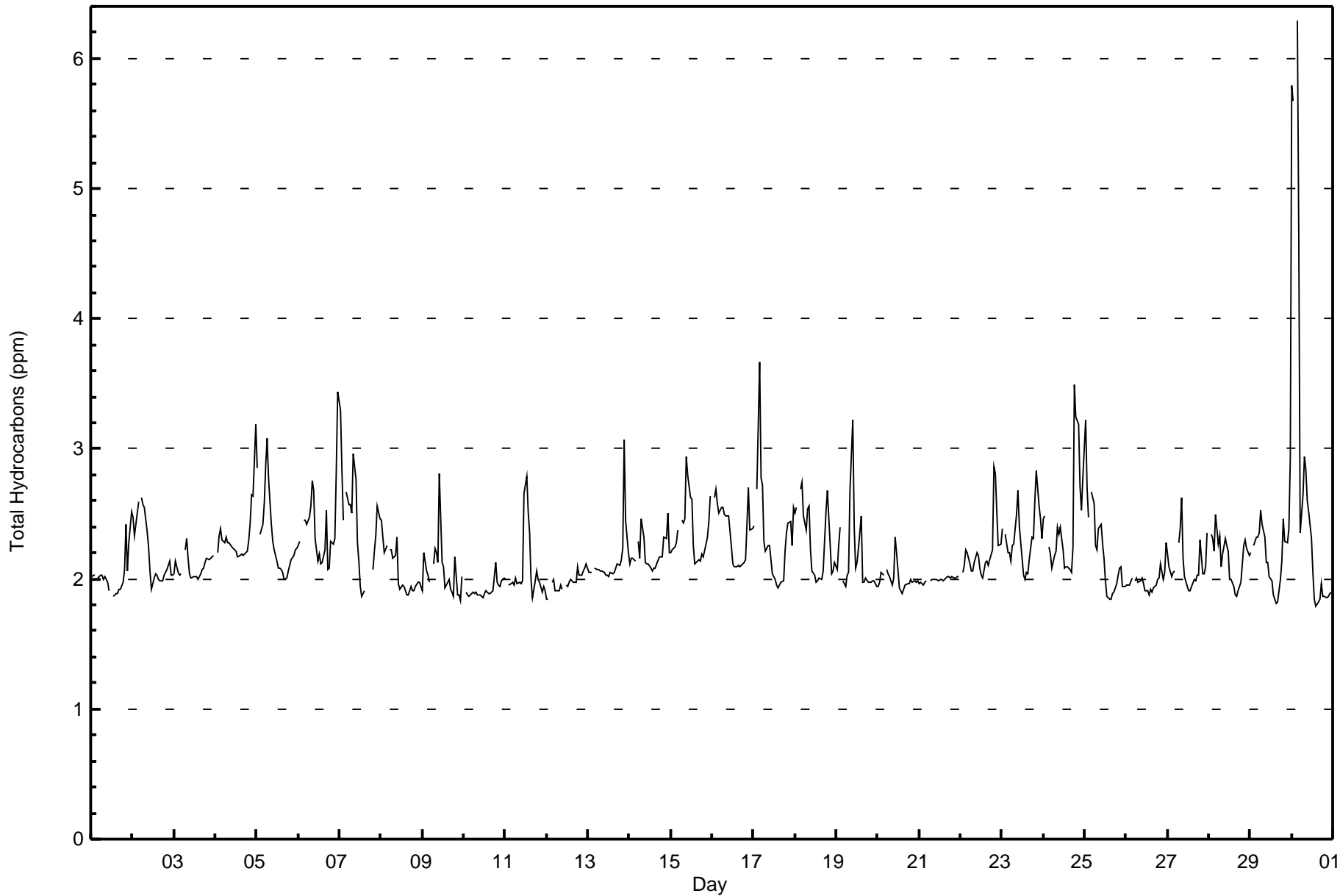
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Fort Hills - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|---|---|---|---|---|---|---|--|----|----|----|----|----|----|----|----|----|--------------------------------|----|----|----|-----------------|---------------|---------------|
| Maximum Value: 6 ppm on Sep 30 04:00 | | | | | | | | | | Maximum Daily Average: 2.7 ppm on Sep 30 | | | | | | | | | | Hours of Data: 683 | | | | | | |
| Minimum Value: 2 ppm on Sep 30 15:00 | | | | | | | | | | Minimum Daily Average: 1.9 ppm on Sep 10 | | | | | | | | | | Hours of Missing Data: 37 | | | | | | |
| Maximum Diurnal Average: 2.4 ppm at hour 4 | | | | | | | | | | Minimum Diurnal Average: 2.0 ppm at hour 16 | | | | | | | | | | Hours of Calibration: 32 | | | | | | |
| Monthly Average: 2.2 ppm | | | | | | | | | | Percentiles: P ₁ = 2 P ₁₀ = 2 Q ₁ = 2 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 3 | | | | | | | | | | Percent Operational Time: 99.3 | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | C | C | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2.0 | 3 |
| 2-Sep | 2 | 2 | 2 | 3 | Z | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 3 |
| 3-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 2 | |
| 4-Sep | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2.3 | 3 | |
| 5-Sep | 3 | Z | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.3 | 3 | |
| 6-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2.4 | 3 | |
| 7-Sep | 3 | 3 | 2 | Z | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | PF | PF | PF | PF | 2 | 2 | 2 | 3 | 2.4 | 3 | |
| 8-Sep | 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 | |
| 9-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 3 | |
| 10-Sep | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.9 | 2 | |
| 11-Sep | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 3 | |
| 12-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | M | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 | |
| 13-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2.1 | 3 | |
| 14-Sep | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2.2 | 3 | |
| 15-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2.4 | 3 | |
| 16-Sep | Z | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2.4 | 3 | |
| 17-Sep | 2 | Z | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2.3 | 4 | |
| 18-Sep | 3 | 3 | Z | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2.3 | 3 | |
| 19-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 3 | |
| 20-Sep | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 | |
| 21-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 | |
| 22-Sep | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2.2 | 3 | |
| 23-Sep | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2.3 | 3 | |
| 24-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2.4 | 3 | |
| 25-Sep | 3 | 3 | 2 | Z | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 3 | |
| 26-Sep | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 | |
| 27-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 3 | |
| 28-Sep | 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 | |
| 29-Sep | 2 | Z | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2.2 | 3 | |
| 30-Sep | 6 | 6 | Z | 6 | 5 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.7 | 6 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance PF - Power Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort Hills - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 277 | 40.56 | 40.56 |
| 2.1 - 3.0 | 391 | 57.25 | 97.80 |
| 3.1 - 10.0 | 15 | 2.20 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort Hills - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 16 | 50 | 9 | 7 | 1 | 0 | 3 | 9 | 23 | 34 | 35 | 21 | 9 | 22 | 26 | 12 | 277 |
| 2.1 - 3.0 | 25 | 33 | 7 | 5 | 4 | 8 | 13 | 66 | 80 | 46 | 22 | 16 | 8 | 11 | 18 | 28 | 390 |
| 3.1 - 10.0 | 0 | 2 | 0 | 0 | 0 | 1 | 2 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 41 | 85 | 16 | 12 | 5 | 9 | 18 | 80 | 107 | 81 | 57 | 37 | 17 | 33 | 44 | 40 | 682 |

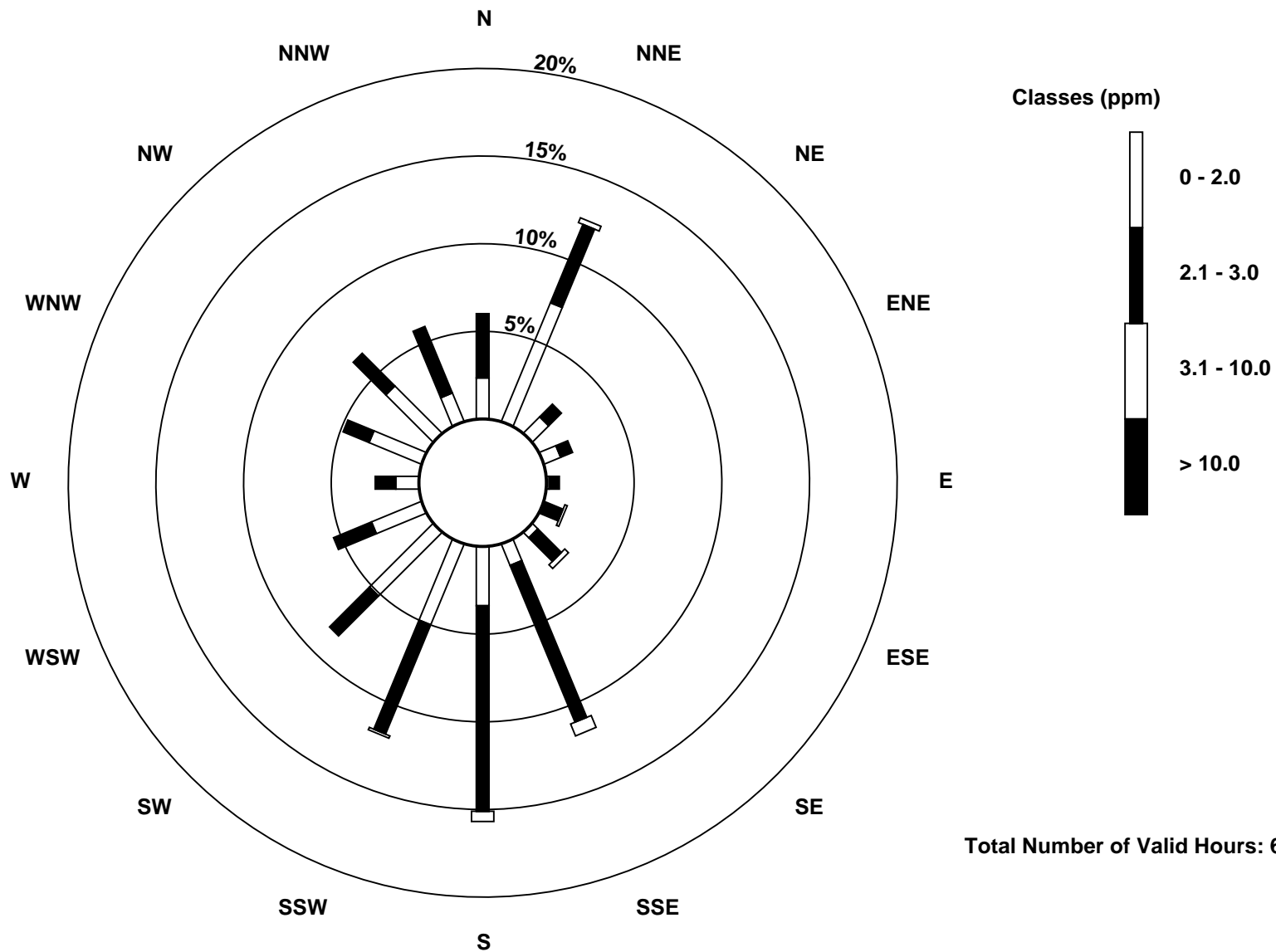
Total Number of Valid Hours: 682

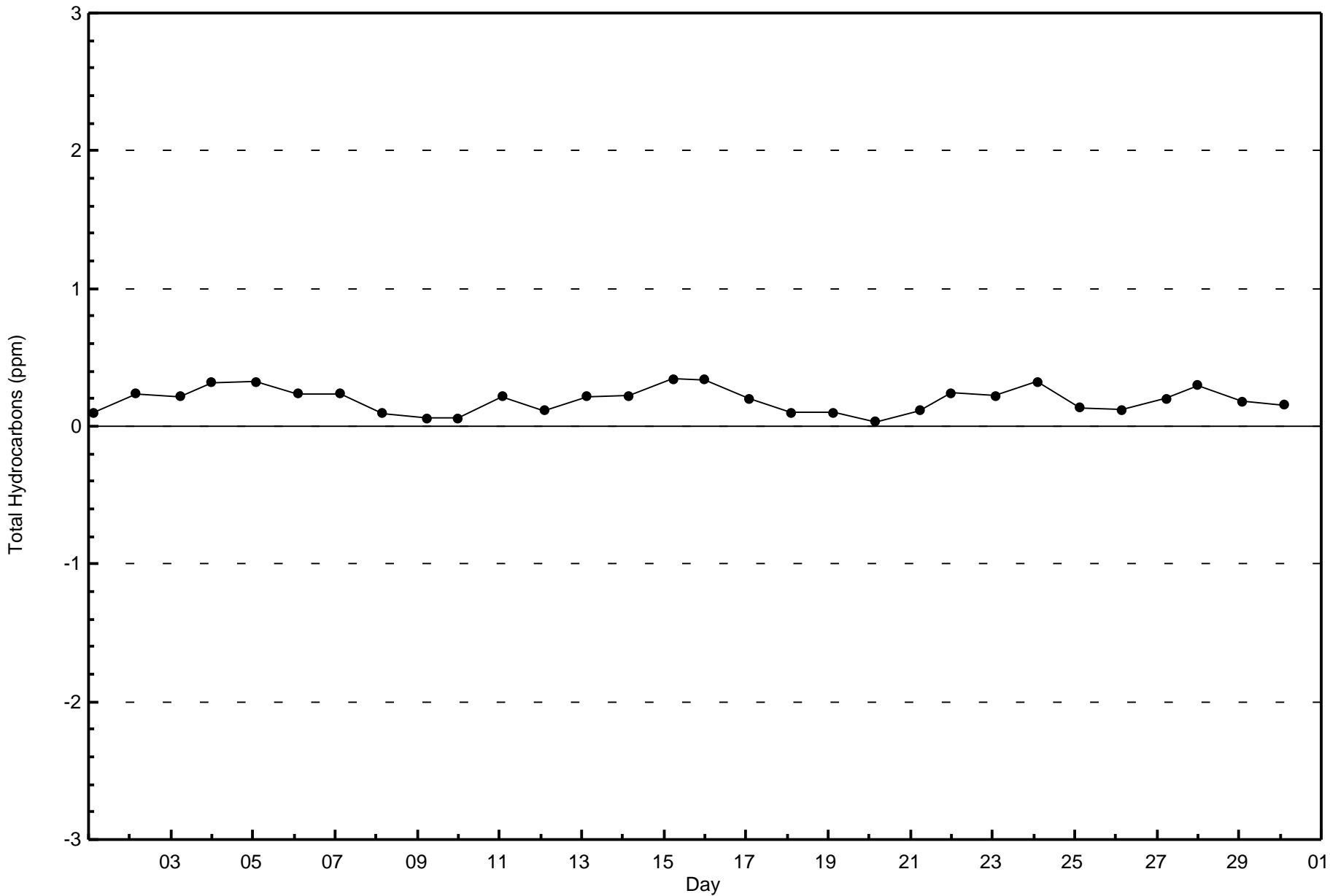
Total Number of Hours: 720

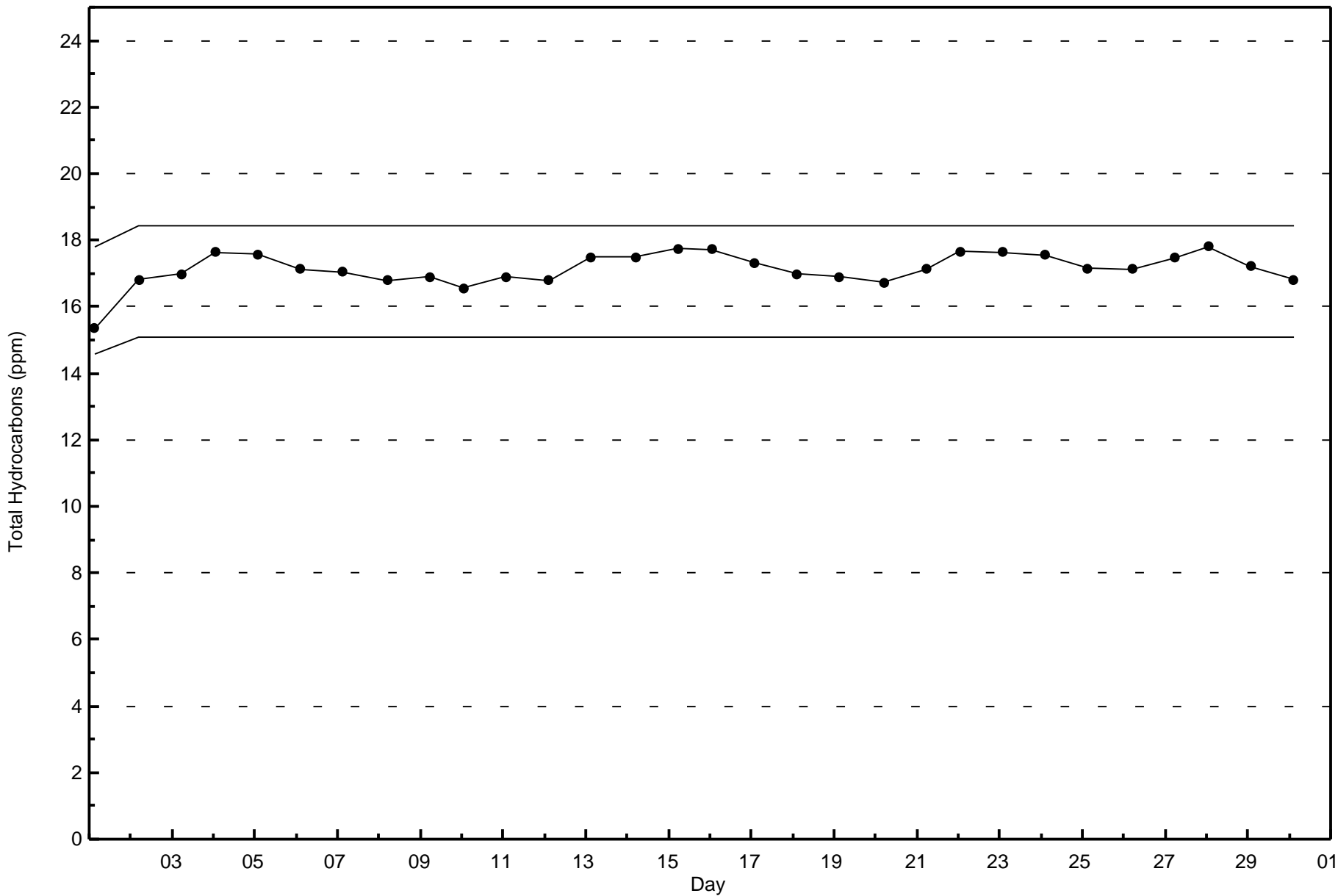


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Fort Hills (AMS 23)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb
Fort Hills - September 2017

| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 123 ppb on Sep 30 02:00 | Maximum Daily Average: 19.2 ppb on Sep 30 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.2 ppb on Sep 8 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 7.7 ppb at hour 2 | Minimum Diurnal Average: 0.6 ppb at hour 18 | | Hours of Calibration: | 34 |
| Monthly Average: 3.1 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 8 P ₉₉ = 33 | | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 3 | 0.5 | 3 |
| 2-Sep | 3 | 4 | 0 | 3 | Z | 4 | 1 | 5 | 5 | 4 | 2 | 0 | 1 | 1 | 0 | 2 | 2 | 2 | 4 | 2 | 1 | 0 | 0 | 0 | 2.1 | 5 |
| 3-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 4-Sep | Z | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 | 3 | 29 | 1.9 | 29 |
| 5-Sep | 9 | Z | 0 | 0 | 1 | 3 | 6 | 4 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 9 |
| 6-Sep | 0 | 0 | Z | 1 | 6 | 3 | 23 | 11 | 23 | 10 | 4 | 2 | 3 | 2 | 1 | 2 | 4 | 0 | 0 | 1 | 2 | 0 | 5 | 10 | 4.9 | 23 |
| 7-Sep | 16 | 6 | 1 | Z | 2 | 4 | 7 | 5 | 7 | 6 | 2 | 1 | 0 | 0 | 0 | PF | PF | PF | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 16 |
| 8-Sep | 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 |
| 9-Sep | 0 | 0 | 0 | 5 | 1 | Z | 5 | 5 | 6 | 4 | 14 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2.2 | 14 |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 15 | 7 | 10 | 5 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 2.5 | 15 |
| 12-Sep | 0 | 0 | Z | 0 | 0 | 1 | 2 | 1 | 2 | 0 | C | C | C | C | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 13-Sep | 0 | 0 | 0 | Z | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0.4 | 2 |
| 14-Sep | 0 | 0 | 0 | 2 | Z | 6 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 4 | 0 | 1 | 1 | 1.2 | 6 |
| 15-Sep | 1 | 1 | 0 | 3 | 3 | Z | 3 | 7 | 12 | 34 | 20 | 9 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.5 | 34 |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 5 | 5 | 3 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 5 |
| 17-Sep | 0 | Z | 5 | 18 | 9 | 10 | 1 | 2 | 7 | 11 | 7 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 8 | 8 | 3 | 2 | 35 | 5.8 | 35 |
| 18-Sep | 14 | 34 | Z | 14 | 17 | 12 | 10 | 18 | 15 | 4 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 9 | 8 | 4 | 0 | 0 | 2 | 7.3 | 34 |
| 19-Sep | 0 | 1 | 1 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 20-Sep | 0 | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.2 | 1 |
| 22-Sep | Z | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 4 | 2 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 20 | 27 | 9 | 0 | 0 | 3.2 | 27 |
| 23-Sep | 4 | Z | 2 | 2 | 3 | 0 | 13 | 7 | 19 | 34 | 17 | 9 | 2 | 0 | 1 | 1 | 2 | 2 | 3 | 29 | 33 | 8 | 3 | 1 | 8.6 | 34 |
| 24-Sep | 18 | 5 | Z | 2 | 1 | 0 | 3 | 9 | 15 | 12 | 9 | 7 | 6 | 5 | 4 | 2 | 1 | 1 | 7 | 11 | 17 | 3 | 1 | 1 | 6.1 | 18 |
| 25-Sep | 14 | 15 | 4 | Z | 16 | 16 | 1 | 4 | 7 | 5 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 4.1 | 16 |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0.6 | 3 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | Z | 6 | 15 | 33 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.7 | 33 |
| 28-Sep | Z | 0 | 0 | 4 | 5 | 7 | 3 | 6 | 6 | 8 | 11 | 7 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 11 |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 7 | 9 | 7 | 7 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 9 | 2.2 | 9 |
| 30-Sep | 101 | 123 | Z | 71 | 13 | 1 | 18 | 32 | 30 | 17 | 14 | 7 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 4 | 1 | 19.2 | 123 |

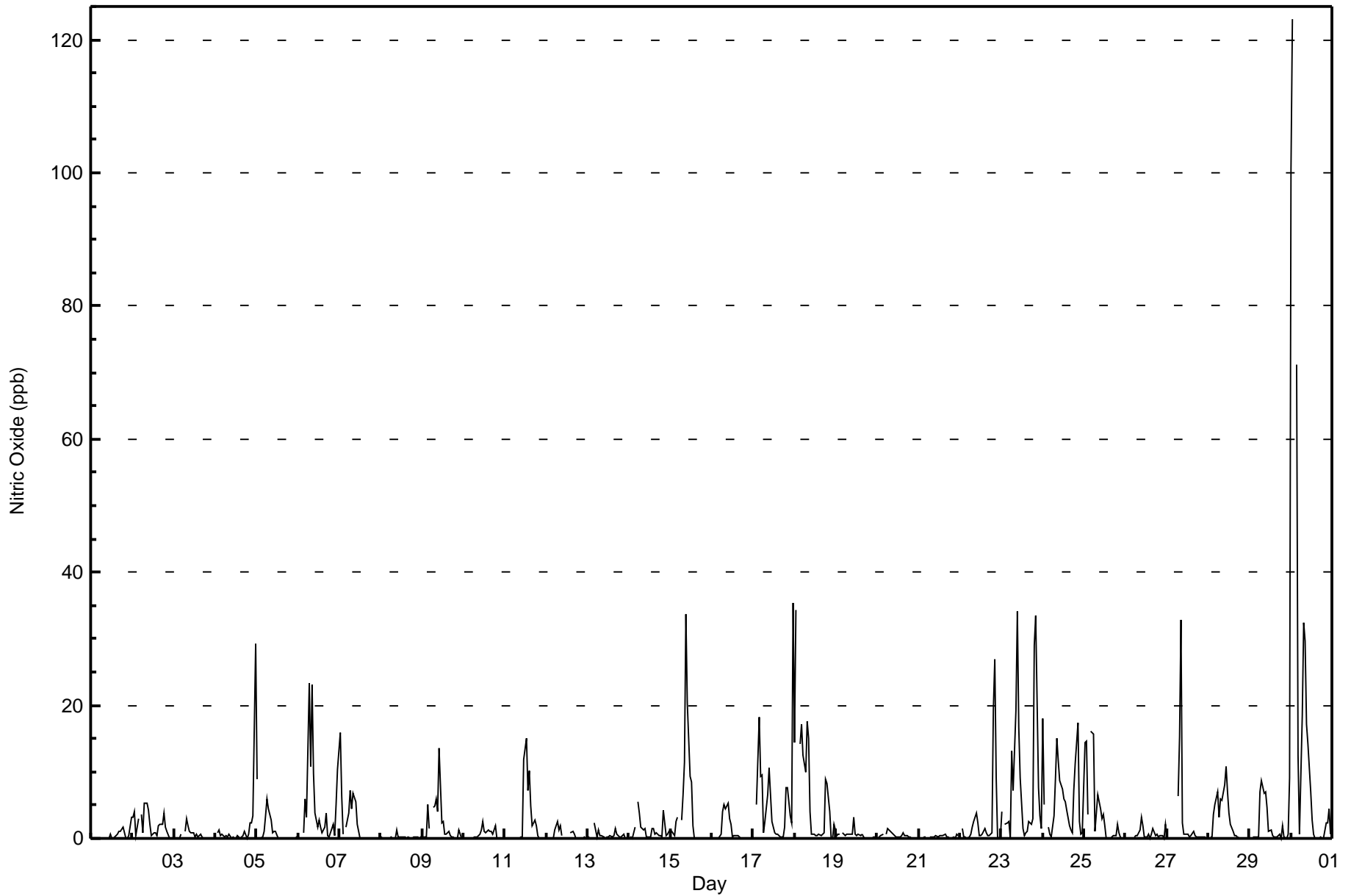
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 7.3 | 7.7 | 0.6 | 5.1 | 3.3 | 2.8 | 4.2 | 5.2 | 7.0 | 5.9 | 4.2 | 2.6 | 1.8 | 1.0 | 0.9 | 0.8 | 0.8 | 0.6 | 1.1 | 2.9 | 3.5 | 1.1 | 0.8 | 3.2 | Diurnal Average | |
| 101 | 123 | 5 | 71 | 17 | 16 | 23 | 32 | 33 | 34 | 20 | 12 | 15 | 7 | 10 | 5 | 4 | 3 | 9 | 29 | 33 | 9 | 5 | 35 | Diurnal Maximum | |

Z - zerospan C - Calibration PF - Power Failure



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Hills - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Hills - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 667 | 97.66 | 97.66 |
| 21 - 40 | 13 | 1.90 | 99.56 |
| 41 - 80 | 1 | 0.15 | 99.71 |
| 81 - 159 | 2 | 0.29 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Hills - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 41 | 84 | 16 | 12 | 5 | 9 | 17 | 73 | 103 | 80 | 57 | 39 | 17 | 32 | 42 | 39 | 666 |
| 21 - 40 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 7 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 13 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 41 | 85 | 16 | 12 | 5 | 9 | 18 | 80 | 107 | 82 | 57 | 39 | 17 | 33 | 42 | 39 | 682 |

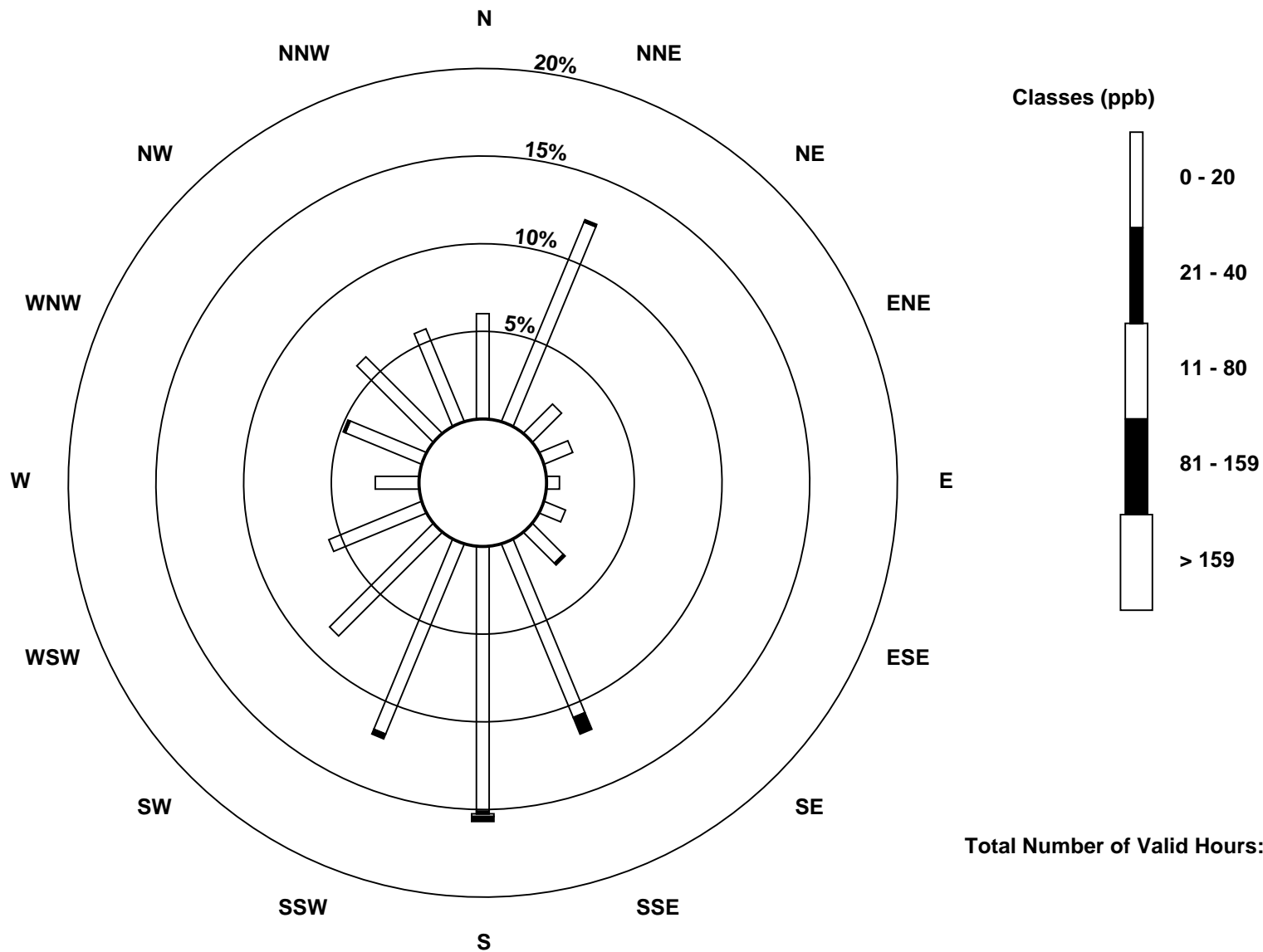
Total Number of Valid Hours: 682

Total Number of Hours: 720

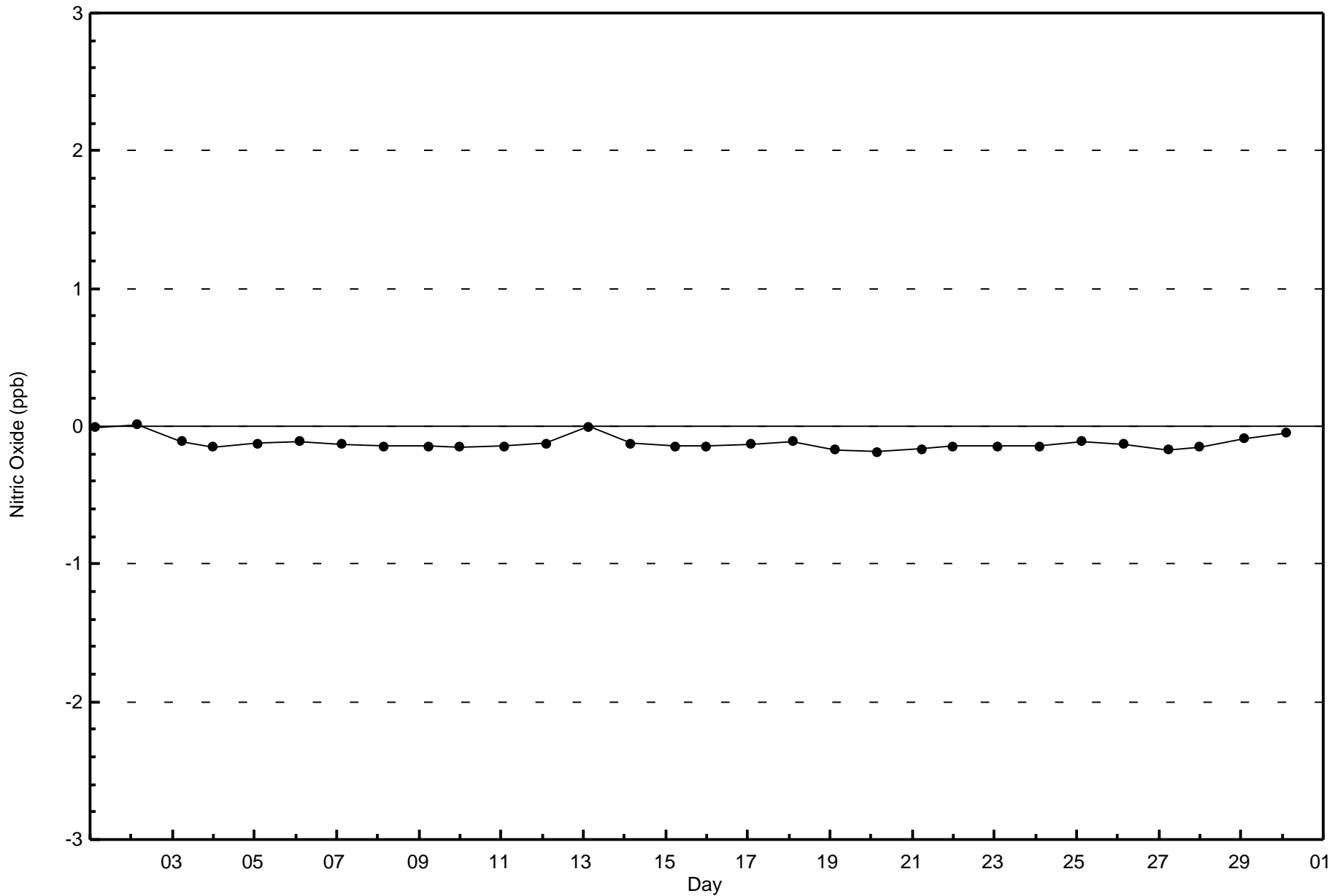


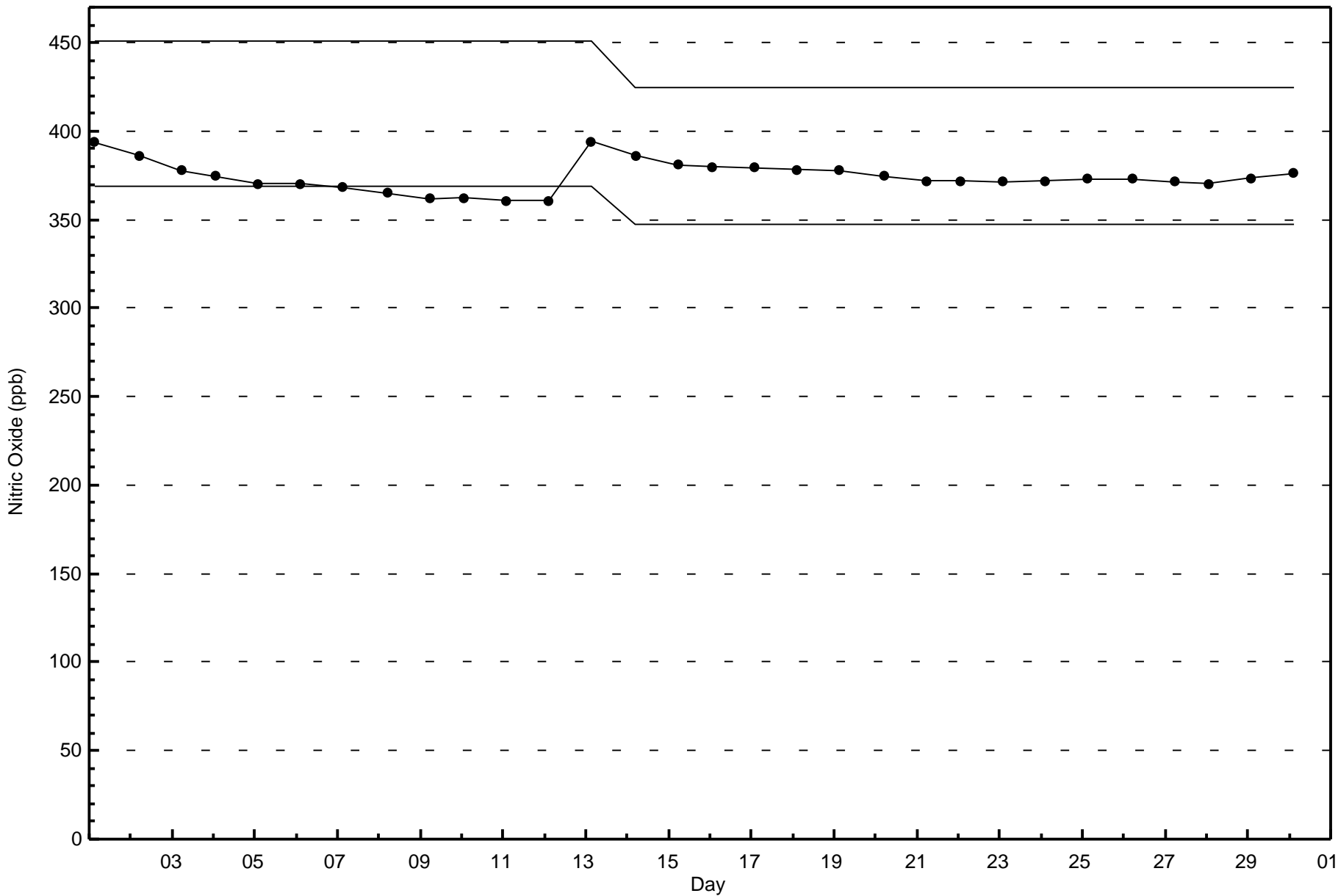
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Fort Hills (AMS 23)



Total Number of Valid Hours: 682







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort Hills - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 32 ppb on Sep 17 20:00 | Maximum Daily Average: 12.8 ppb on Sep 24 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 1 14:00 | Minimum Daily Average: 1.1 ppb on Sep 21 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 8.7 ppb at hour 1 | Minimum Diurnal Average: 2.2 ppb at hour 14 | | Hours of Calibration: | 34 |
| Monthly Average: 5.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 3 Q ₃ = 8 P ₉₀ = 14 P ₉₉ = 27 | | 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-Sep | 0 | 0 | 1 | Z | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 2 | 1 | 3 | 4 | 10 | 3 | 7 | 15 | 2.4 | 15 |
| 2-Sep | 19 | 12 | 13 | 6 | Z | 10 | 4 | 9 | 8 | 7 | 4 | 0 | 1 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 1 | 1 | 1 | 1 | 4.9 | 19 |
| 3-Sep | 0 | 3 | 1 | 1 | 2 | Z | 6 | 6 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 6 |
| 4-Sep | Z | 1 | 5 | 6 | 4 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 6 | 15 | 14 | 17 | 21 | 4.4 | 21 |
| 5-Sep | 15 | Z | 3 | 7 | 12 | 14 | 12 | 8 | 5 | 2 | 2 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 4 | 6 | 8 | 7 | 5.0 | 15 |
| 6-Sep | 7 | 11 | Z | 7 | 6 | 9 | 14 | 11 | 15 | 15 | 9 | 6 | 8 | 6 | 5 | 7 | 15 | 4 | 5 | 15 | 19 | 13 | 19 | 16 | 10.5 | 19 |
| 7-Sep | 17 | 12 | 10 | Z | 15 | 13 | 13 | 10 | 12 | 12 | 8 | 7 | 2 | 2 | 2 | PF | PF | PF | 4 | 8 | 4 | 4 | 6 | 10 | 8.5 | 17 |
| 8-Sep | 11 | 6 | 3 | 3 | Z | 3 | 5 | 2 | 3 | 8 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 2.9 | 11 |
| 9-Sep | 1 | 5 | 5 | 8 | 3 | Z | 5 | 6 | 8 | 8 | 20 | 7 | 6 | 3 | 2 | 4 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 5 | 4.7 | 20 |
| 10-Sep | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 4 | 5 | 1.3 | 5 |
| 11-Sep | 2 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 | 14 | 8 | 13 | 8 | 5 | 10 | 12 | 6 | 3 | 2 | 3 | 2 | 4.6 | 14 |
| 12-Sep | 0 | 0 | Z | 6 | 5 | 3 | 2 | 1 | 2 | 1 | C | C | C | C | 1 | 3 | 6 | 1 | 1 | 1 | 3 | 4 | 5 | 2 | 2.4 | 6 |
| 13-Sep | 1 | 1 | 1 | Z | 5 | 4 | 5 | 2 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 3 | 4 | 2 | 7 | 8 | 7 | 3 | 4 | 2.8 | 8 |
| 14-Sep | 2 | 1 | 2 | 3 | Z | 8 | 7 | 8 | 4 | 2 | 1 | 0 | 0 | 2 | 2 | 1 | 2 | 2 | 4 | 6 | 14 | 9 | 6 | 3 | 3.8 | 14 |
| 15-Sep | 2 | 1 | 1 | 4 | 6 | Z | 5 | 4 | 5 | 10 | 8 | 8 | 3 | 0 | 0 | 0 | 1 | 1 | 2 | 7 | 8 | 11 | 12 | 12 | 4.6 | 12 |
| 16-Sep | Z | 8 | 8 | 10 | 13 | 14 | 13 | 8 | 6 | 6 | 5 | 4 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 4 | 4 | 7 | 7 | 9 | 5.9 | 14 |
| 17-Sep | 7 | Z | 16 | 17 | 18 | 18 | 9 | 7 | 8 | 11 | 10 | 5 | 3 | 2 | 3 | 2 | 2 | 3 | 13 | 32 | 29 | 20 | 10 | 28 | 11.8 | 32 |
| 18-Sep | 26 | 26 | Z | 18 | 15 | 15 | 12 | 13 | 12 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 8 | 26 | 31 | 17 | 5 | 11 | 14 | 11.6 | 31 |
| 19-Sep | 9 | 10 | 8 | Z | 7 | 5 | 5 | 4 | 3 | 2 | 3 | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3.5 | 10 |
| 20-Sep | 1 | 1 | 3 | 3 | Z | 4 | 4 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1.7 | 4 |
| 21-Sep | 1 | 1 | 1 | 1 | 2 | Z | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 |
| 22-Sep | Z | 2 | 3 | 9 | 9 | 7 | 5 | 4 | 5 | 7 | 5 | 2 | 2 | 3 | 7 | 6 | 5 | 6 | 13 | 26 | 27 | 18 | 8 | 8 | 8.1 | 27 |
| 23-Sep | 15 | Z | 9 | 5 | 4 | 3 | 8 | 7 | 8 | 12 | 13 | 9 | 3 | 2 | 4 | 4 | 8 | 14 | 17 | 30 | 27 | 18 | 14 | 11 | 10.7 | 30 |
| 24-Sep | 19 | 18 | Z | 18 | 15 | 11 | 12 | 10 | 10 | 7 | 6 | 6 | 7 | 7 | 6 | 5 | 9 | 25 | 25 | 23 | 19 | 13 | 14 | 14 | 12.8 | 25 |
| 25-Sep | 19 | 20 | 16 | Z | 17 | 16 | 9 | 10 | 10 | 5 | 3 | 4 | 2 | 1 | 0 | 1 | 1 | 2 | 5 | 8 | 8 | 6 | 1 | 1 | 7.1 | 20 |
| 26-Sep | 1 | 1 | 1 | 2 | Z | 5 | 4 | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 2 | 4 | 6 | 4 | 5 | 16 | 2.9 | 16 |
| 27-Sep | 10 | 6 | 2 | 2 | 5 | Z | 10 | 11 | 14 | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 4 | 2 | 2 | 1 | 3 | 3.7 | 14 |
| 28-Sep | Z | 4 | 3 | 12 | 13 | 12 | 9 | 7 | 6 | 9 | 11 | 10 | 7 | 5 | 4 | 2 | 2 | 5 | 6 | 3 | 2 | 4 | 5 | 9 | 6.5 | 13 |
| 29-Sep | 10 | Z | 13 | 16 | 15 | 18 | 20 | 15 | 10 | 11 | 9 | 3 | 4 | 2 | 2 | 2 | 3 | 9 | 11 | 12 | 12 | 9 | 9 | 12 | 9.7 | 20 |
| 30-Sep | 23 | 23 | Z | 20 | 17 | 12 | 15 | 16 | 16 | 14 | 14 | 11 | 6 | 3 | 1 | 1 | 2 | 4 | 1 | 1 | 3 | 2 | 3 | 1 | 9.1 | 23 |

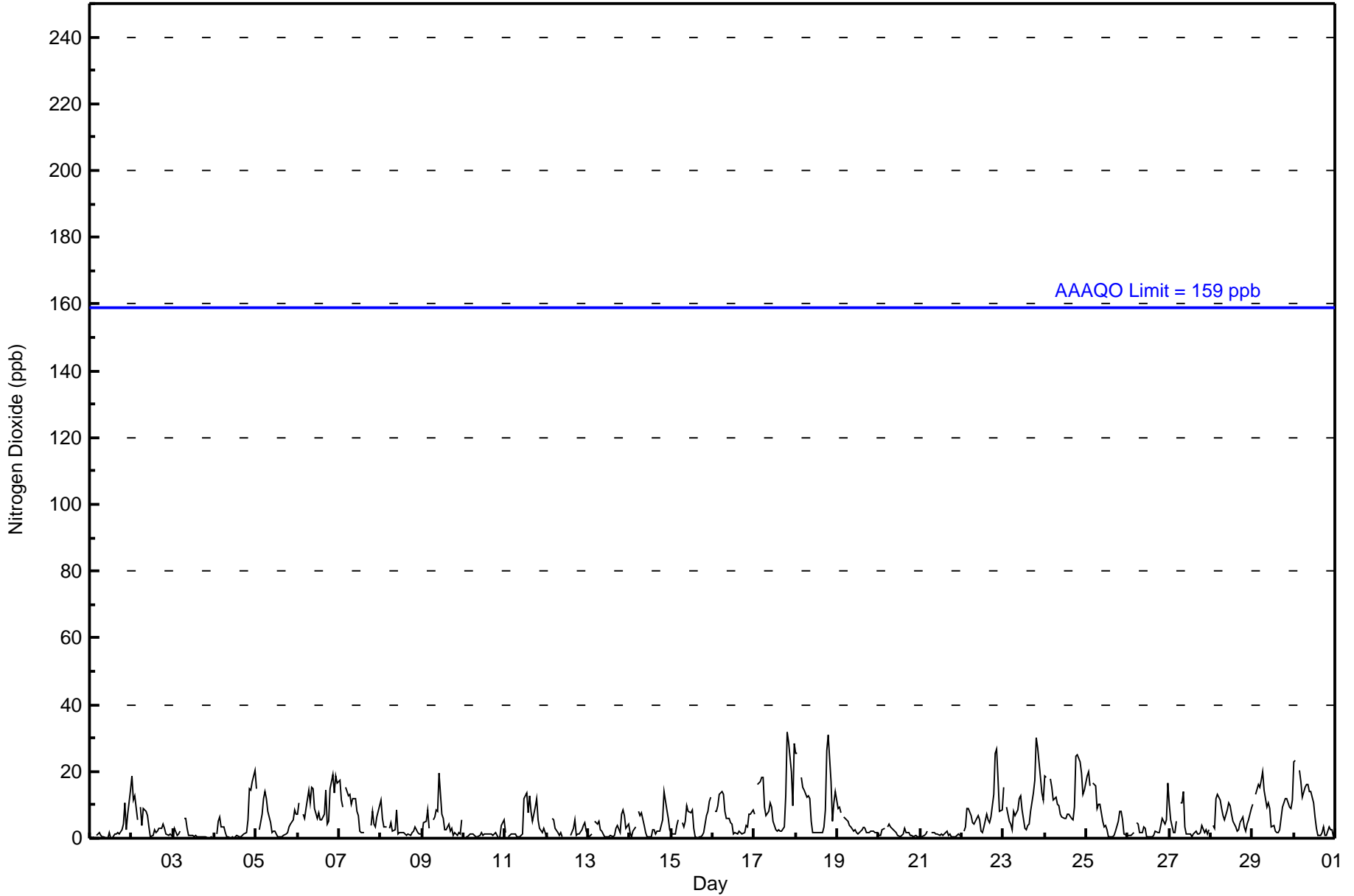
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 8.7 | 6.8 | 5.1 | 7.5 | 8.5 | 8.4 | 7.3 | 6.2 | 6.1 | 5.5 | 4.9 | 3.7 | 2.9 | 2.2 | 2.3 | 2.4 | 2.9 | 3.6 | 5.7 | 8.3 | 8.5 | 6.4 | 6.1 | 7.8 | Diurnal Average | |
| 26 | 26 | 16 | 20 | 18 | 18 | 20 | 16 | 16 | 15 | 20 | 12 | 14 | 8 | 13 | 8 | 15 | 14 | 26 | 32 | 29 | 20 | 19 | 28 | Diurnal Maximum | |

Z - zeronpan C - Calibration PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Hills - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Hills - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 666 | 97.51 | 97.51 |
| 21 - 40 | 17 | 2.49 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Hills - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 41 | 85 | 16 | 12 | 5 | 8 | 15 | 69 | 105 | 82 | 57 | 39 | 17 | 33 | 42 | 39 | 665 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 11 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 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 | 41 | 85 | 16 | 12 | 5 | 9 | 18 | 80 | 107 | 82 | 57 | 39 | 17 | 33 | 42 | 39 | 682 |

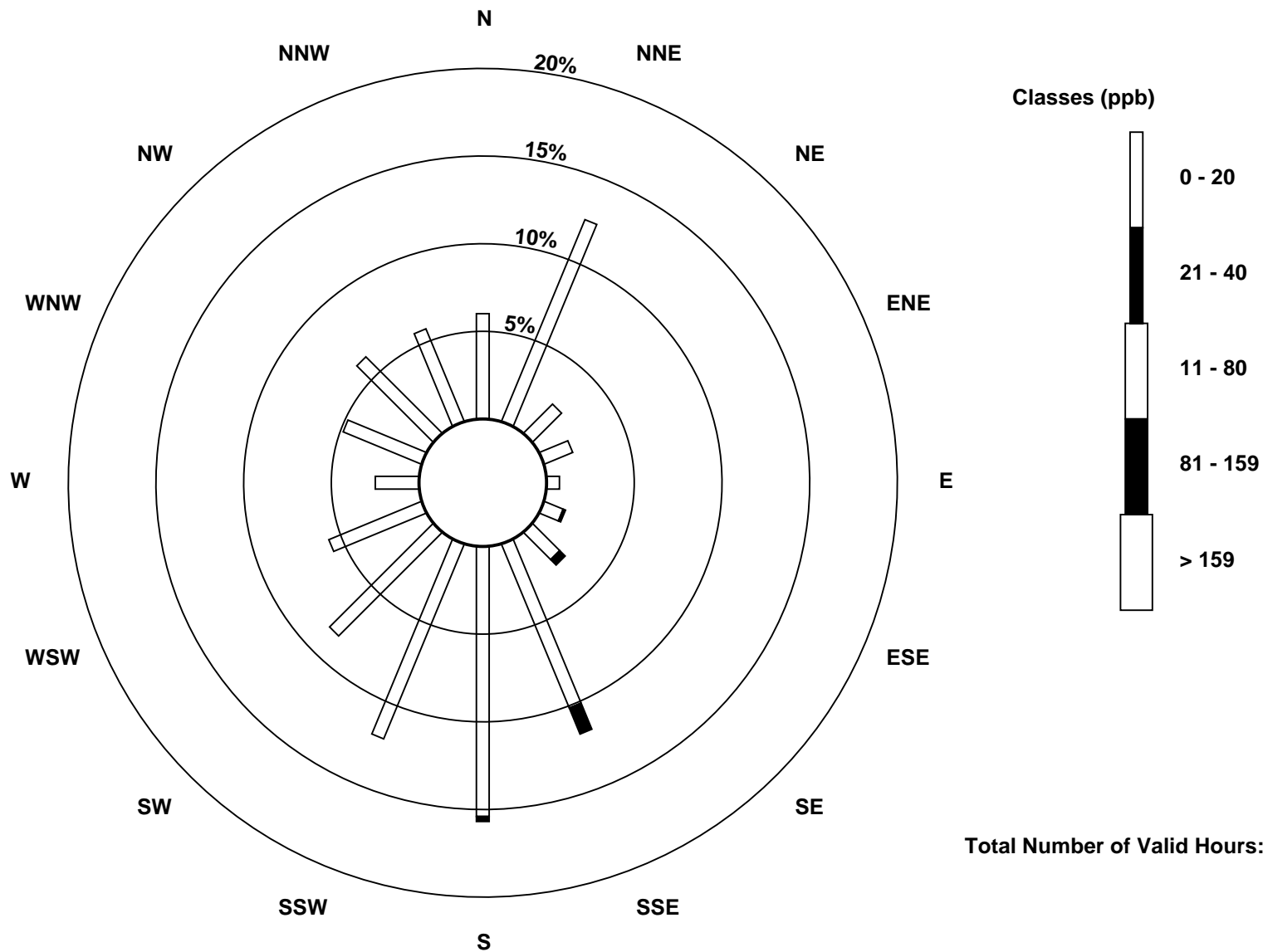
Total Number of Valid Hours: 682

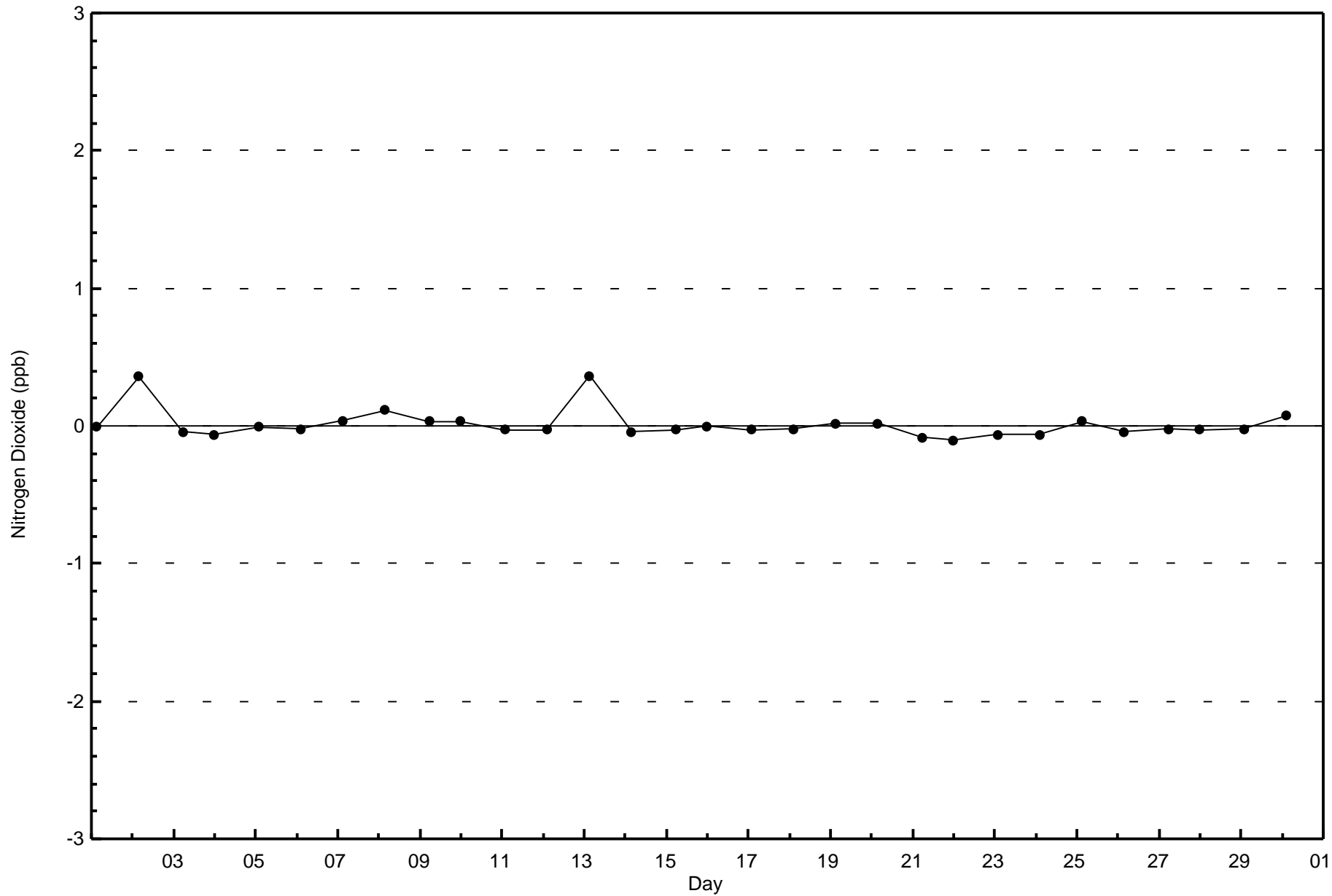
Total Number of Hours: 720

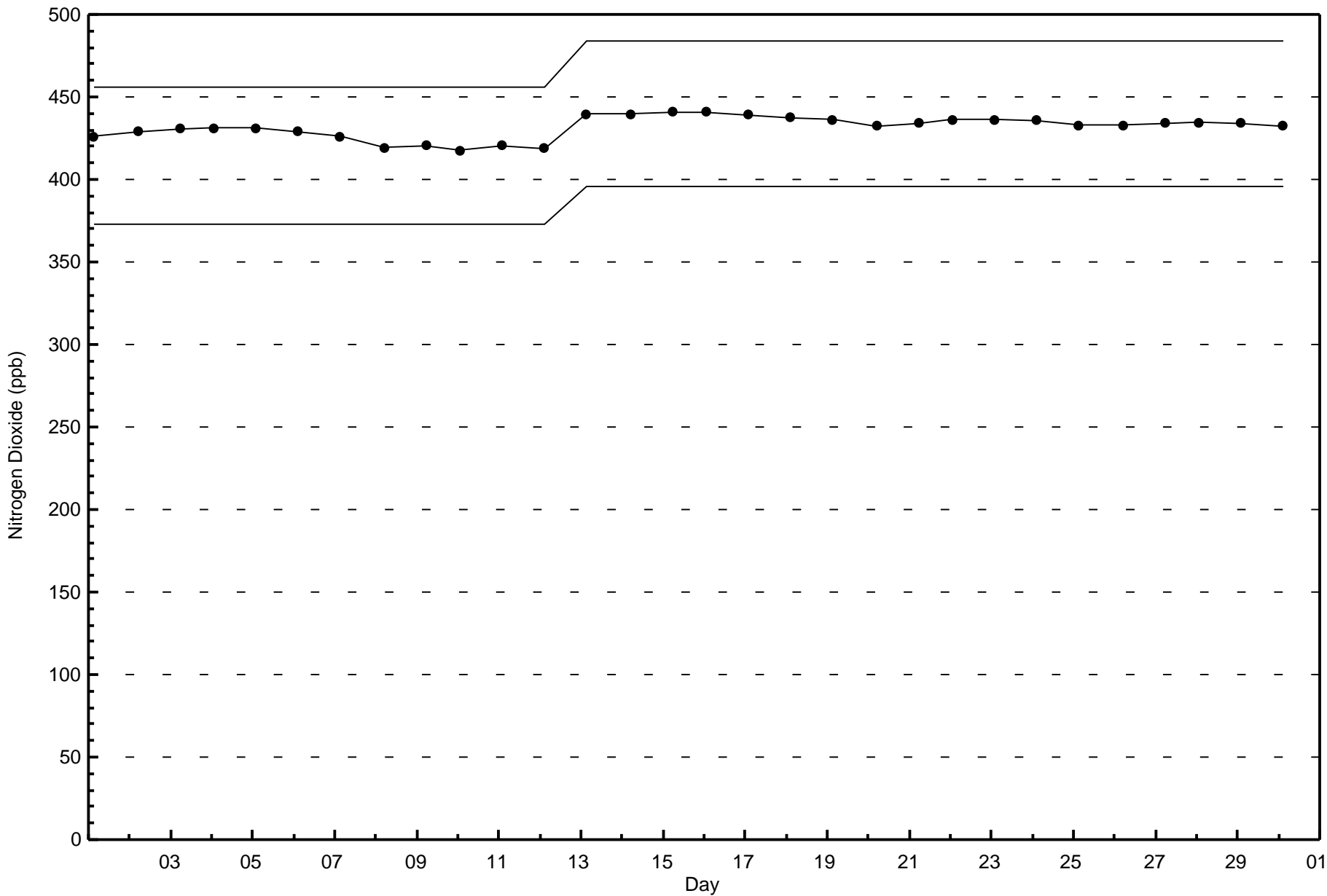


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Fort Hills (AMS 23)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Fort Hills - September 2017

| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 146 ppb on Sep 30 02:00 | Maximum Daily Average: 28.2 ppb on Sep 30 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 1 14:00 | Minimum Daily Average: 1.3 ppb on Sep 21 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 15.9 ppb at hour 1 | Minimum Diurnal Average: 3.2 ppb at hour 14 | | Hours of Calibration: | 34 |
| Monthly Average: 8.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 11 P ₉₀ = 21 P ₉₉ = 59 | | 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-Sep | 0 | 0 | 1 | Z | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 2 | 3 | 3 | 5 | 5 | 11 | 3 | 8 | 18 | 2.8 | 18 | |
| 2-Sep | 22 | 16 | 13 | 9 | Z | 13 | 5 | 14 | 13 | 11 | 6 | 1 | 2 | 3 | 2 | 4 | 5 | 5 | 8 | 4 | 3 | 1 | 1 | 1 | 7.0 | 22 | |
| 3-Sep | 0 | 3 | 1 | 1 | 3 | Z | 7 | 9 | 5 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 9 | |
| 4-Sep | Z | 2 | 6 | 7 | 4 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 2 | 6 | 17 | 17 | 20 | 50 | 6.3 | 50 | |
| 5-Sep | 24 | Z | 3 | 7 | 13 | 17 | 18 | 12 | 7 | 3 | 3 | 3 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 4 | 6 | 8 | 7 | 6.3 | 24 | |
| 6-Sep | 7 | 11 | Z | 8 | 12 | 12 | 37 | 22 | 38 | 24 | 13 | 8 | 10 | 7 | 6 | 9 | 18 | 5 | 5 | 16 | 21 | 14 | 24 | 27 | 15.4 | 38 | |
| 7-Sep | 33 | 18 | 10 | Z | 17 | 17 | 20 | 15 | 19 | 17 | 10 | 8 | 2 | 2 | 2 | PF | PF | PF | 4 | 8 | 4 | 4 | 6 | 10 | 11.3 | 33 | |
| 8-Sep | 11 | 6 | 3 | 3 | Z | 3 | 5 | 2 | 3 | 10 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 2 | 1 | 2 | 3.0 | 11 | |
| 9-Sep | 1 | 5 | 5 | 14 | 5 | Z | 10 | 11 | 14 | 12 | 33 | 10 | 8 | 3 | 3 | 5 | 2 | 3 | 1 | 2 | 1 | 3 | 2 | 5 | 6.9 | 33 | |
| 10-Sep | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 2 | 2 | 3 | 2 | 2 | 2 | 4 | 1 | 0 | 0 | 4 | 5 | 1.9 | 5 |
| 11-Sep | 2 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 24 | 29 | 15 | 23 | 13 | 7 | 12 | 14 | 6 | 3 | 2 | 3 | 2 | 7.1 | 29 | |
| 12-Sep | 0 | 0 | Z | 6 | 5 | 4 | 4 | 2 | 3 | 1 | C | C | C | C | 2 | 4 | 6 | 1 | 1 | 1 | 3 | 4 | 5 | 2 | 3.0 | 6 | |
| 13-Sep | 1 | 1 | 1 | Z | 8 | 5 | 6 | 3 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 4 | 5 | 2 | 7 | 9 | 7 | 3 | 4 | 3.2 | 9 | |
| 14-Sep | 2 | 1 | 2 | 5 | Z | 14 | 10 | 9 | 5 | 3 | 1 | 1 | 0 | 4 | 4 | 2 | 3 | 3 | 4 | 6 | 18 | 9 | 7 | 3 | 5.0 | 18 | |
| 15-Sep | 2 | 2 | 2 | 6 | 9 | Z | 7 | 10 | 16 | 43 | 29 | 17 | 17 | 5 | 0 | 0 | 0 | 1 | 1 | 2 | 7 | 8 | 11 | 12 | 9.0 | 43 | |
| 16-Sep | Z | 8 | 8 | 10 | 13 | 14 | 17 | 13 | 10 | 11 | 8 | 6 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 4 | 4 | 7 | 7 | 9 | 7.1 | 17 | |
| 17-Sep | 8 | Z | 21 | 35 | 28 | 28 | 10 | 9 | 15 | 21 | 16 | 8 | 4 | 3 | 3 | 3 | 2 | 4 | 14 | 39 | 36 | 23 | 12 | 64 | 17.6 | 64 | |
| 18-Sep | 40 | 60 | Z | 32 | 32 | 27 | 22 | 30 | 27 | 9 | 2 | 3 | 2 | 2 | 2 | 2 | 4 | 9 | 35 | 39 | 21 | 5 | 11 | 16 | 18.9 | 60 | |
| 19-Sep | 9 | 10 | 8 | Z | 7 | 6 | 6 | 5 | 4 | 3 | 6 | 2 | 2 | 2 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4.1 | 10 | |
| 20-Sep | 1 | 1 | 3 | 4 | Z | 4 | 6 | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 2 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 2.2 | 6 | |
| 21-Sep | 1 | 1 | 1 | 2 | 2 | Z | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1.3 | 3 | |
| 22-Sep | Z | 3 | 4 | 9 | 9 | 7 | 5 | 6 | 7 | 10 | 8 | 3 | 2 | 4 | 9 | 6 | 5 | 7 | 14 | 45 | 54 | 27 | 8 | 9 | 11.3 | 54 | |
| 23-Sep | 19 | Z | 11 | 7 | 7 | 3 | 21 | 14 | 28 | 46 | 29 | 18 | 5 | 3 | 5 | 5 | 11 | 16 | 20 | 59 | 60 | 26 | 17 | 13 | 19.2 | 60 | |
| 24-Sep | 37 | 23 | Z | 20 | 16 | 12 | 16 | 19 | 25 | 19 | 15 | 14 | 12 | 12 | 11 | 8 | 7 | 10 | 32 | 36 | 40 | 22 | 14 | 15 | 18.9 | 40 | |
| 25-Sep | 33 | 35 | 19 | Z | 33 | 31 | 10 | 14 | 17 | 10 | 6 | 8 | 4 | 1 | 1 | 0 | 1 | 3 | 6 | 10 | 9 | 6 | 1 | 1 | 11.2 | 35 | |
| 26-Sep | 1 | 1 | 1 | 2 | Z | 5 | 4 | 2 | 3 | 7 | 5 | 1 | 1 | 1 | 0 | 2 | 4 | 2 | 3 | 4 | 6 | 5 | 5 | 18 | 3.5 | 18 | |
| 27-Sep | 10 | 6 | 2 | 2 | 5 | Z | 17 | 26 | 47 | 6 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 4 | 2 | 3 | 2 | 3 | 6.5 | 47 | |
| 28-Sep | Z | 4 | 3 | 16 | 18 | 18 | 12 | 13 | 12 | 17 | 21 | 17 | 11 | 7 | 5 | 2 | 3 | 5 | 6 | 3 | 2 | 4 | 6 | 9 | 9.3 | 21 | |
| 29-Sep | 10 | Z | 13 | 16 | 16 | 18 | 27 | 23 | 16 | 18 | 14 | 5 | 5 | 3 | 2 | 2 | 3 | 10 | 11 | 14 | 12 | 9 | 9 | 21 | 11.9 | 27 | |
| 30-Sep | 124 | 146 | Z | 92 | 29 | 13 | 34 | 48 | 46 | 31 | 28 | 18 | 9 | 4 | 1 | 1 | 2 | 4 | 1 | 1 | 6 | 5 | 7 | 1 | 28.2 | 146 | |

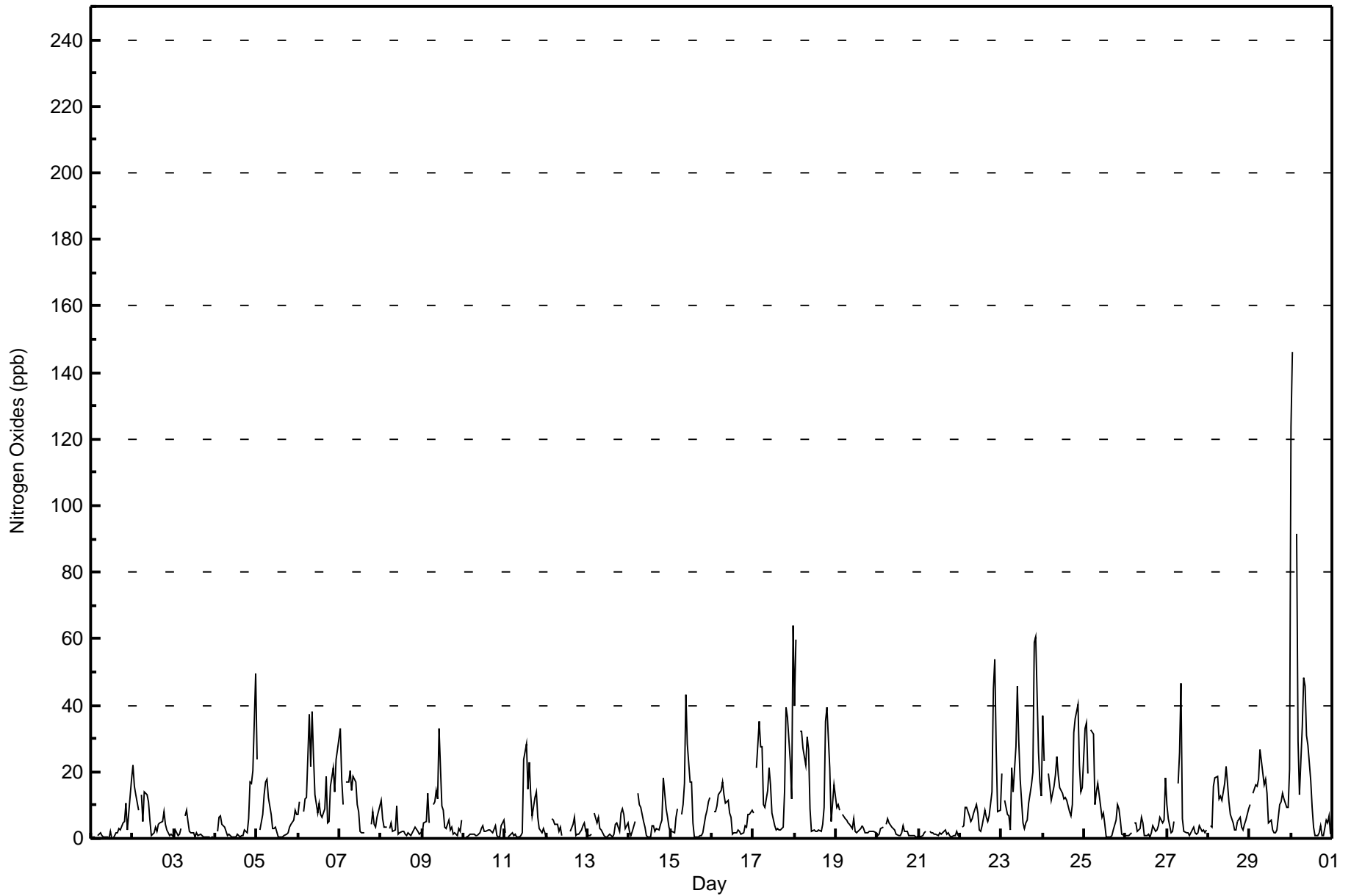
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|-----|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------|-----------------|--|
| 15.9 | 14.5 | 5.7 | 12.6 | 11.8 | 11.1 | 11.5 | 11.3 | 13.0 | 11.4 | 9.2 | 6.3 | 4.8 | 3.2 | 3.2 | 3.2 | 3.7 | 4.2 | 6.8 | 11.1 | 12.0 | 7.5 | 6.9 | 11.0 | Diurnal Average | |
| 124 | 146 | 21 | 92 | 33 | 31 | 37 | 48 | 47 | 46 | 33 | 24 | 29 | 15 | 23 | 13 | 18 | 16 | 35 | 59 | 60 | 27 | 24 | 64 | Diurnal Maximum | |

Z - zerospan C - Calibration PF - Power Failure



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Hills - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort Hills - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 610 | 89.31 | 89.31 |
| 21 - 40 | 58 | 8.49 | 97.80 |
| 41 - 80 | 12 | 1.76 | 99.56 |
| 81 - 159 | 3 | 0.44 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Hills - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 36 | 80 | 16 | 12 | 5 | 7 | 11 | 54 | 97 | 75 | 55 | 35 | 17 | 30 | 42 | 37 | 609 |
| 21 - 40 | 5 | 4 | 0 | 0 | 0 | 2 | 7 | 18 | 6 | 5 | 2 | 4 | 0 | 3 | 0 | 2 | 58 |
| 11 - 80 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 8 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 41 | 85 | 16 | 12 | 5 | 9 | 18 | 80 | 107 | 82 | 57 | 39 | 17 | 33 | 42 | 39 | 682 |

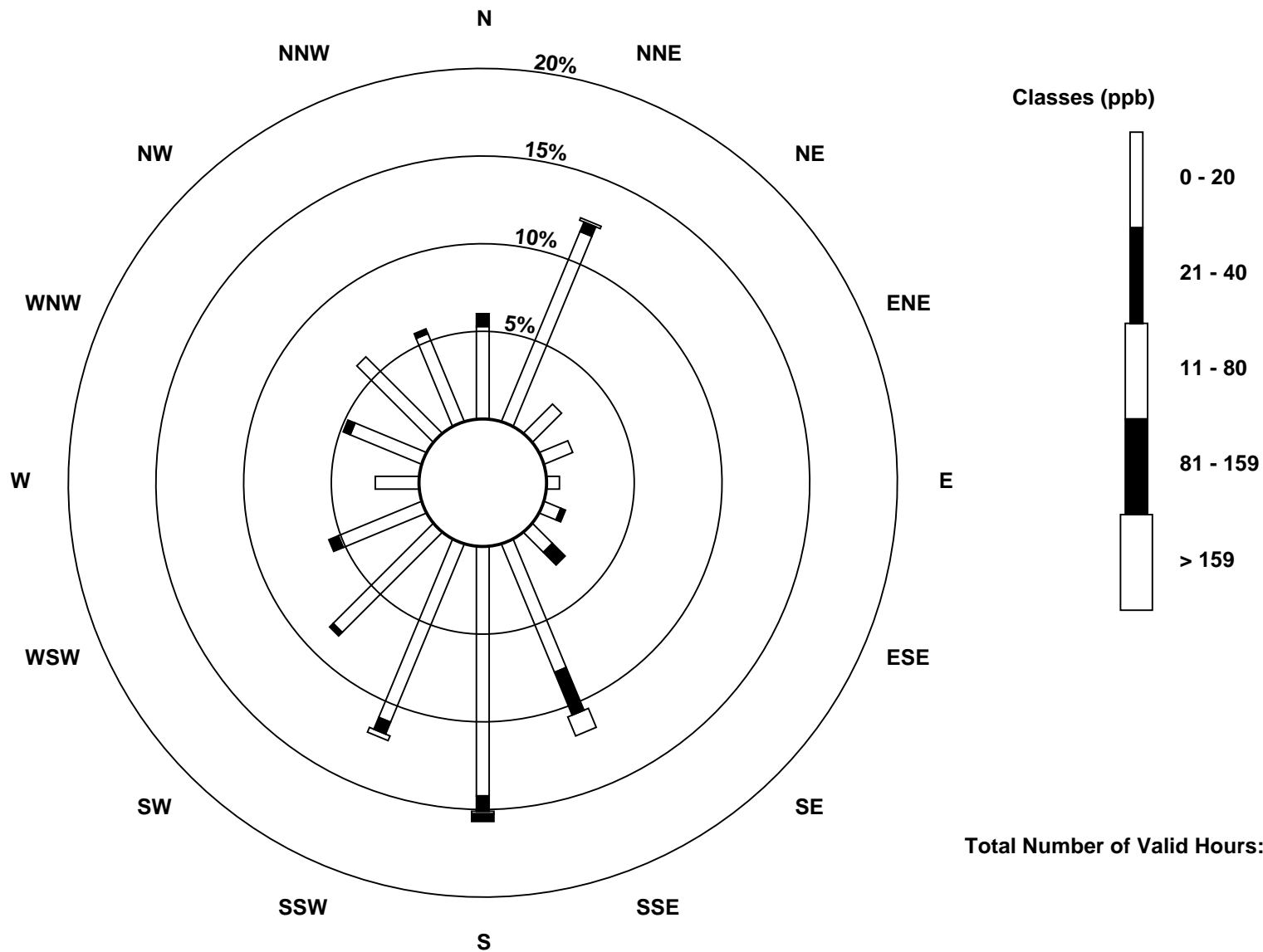
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

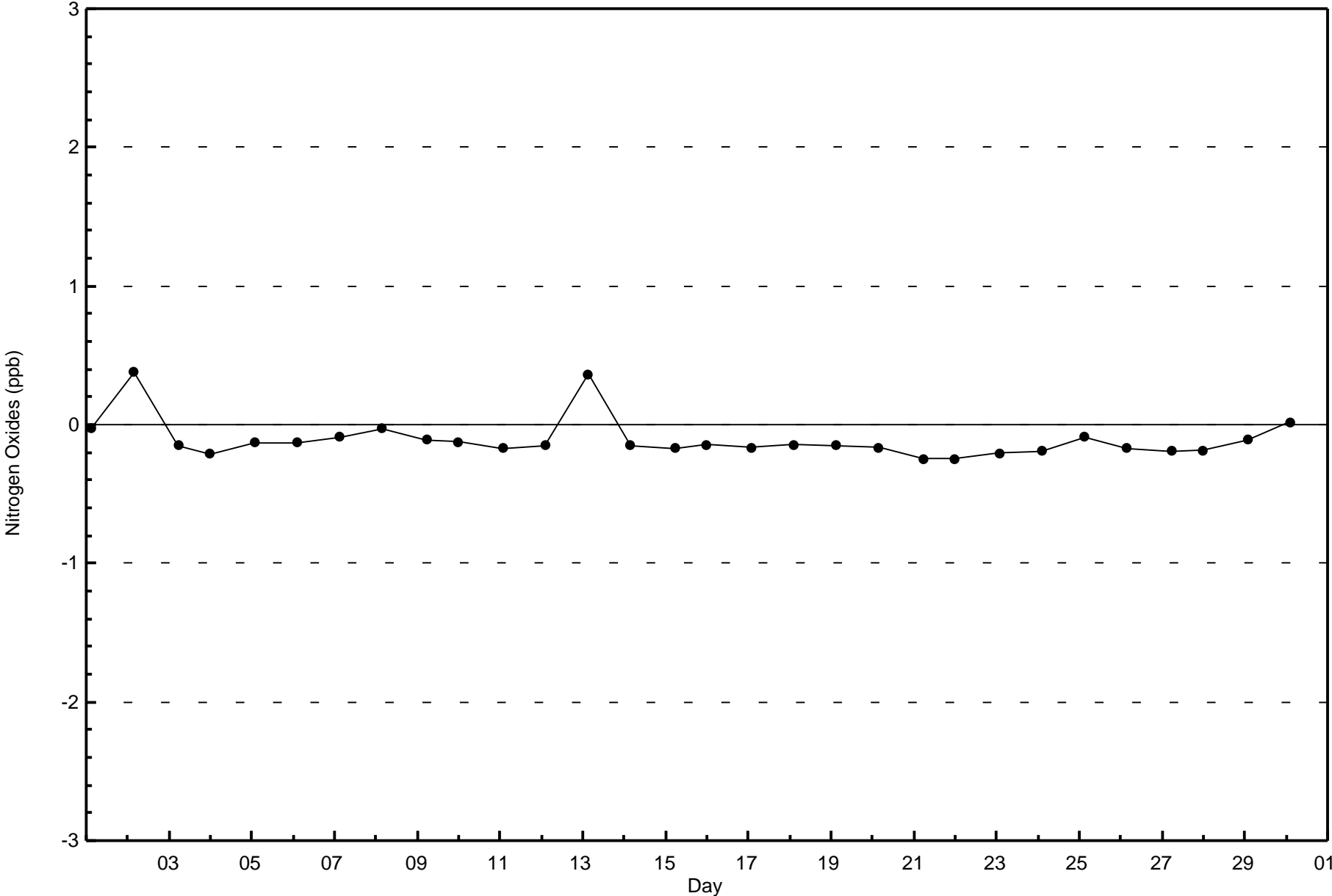
Nitrogen Oxides (NO_x) - ppb
Fort Hills (AMS 23)

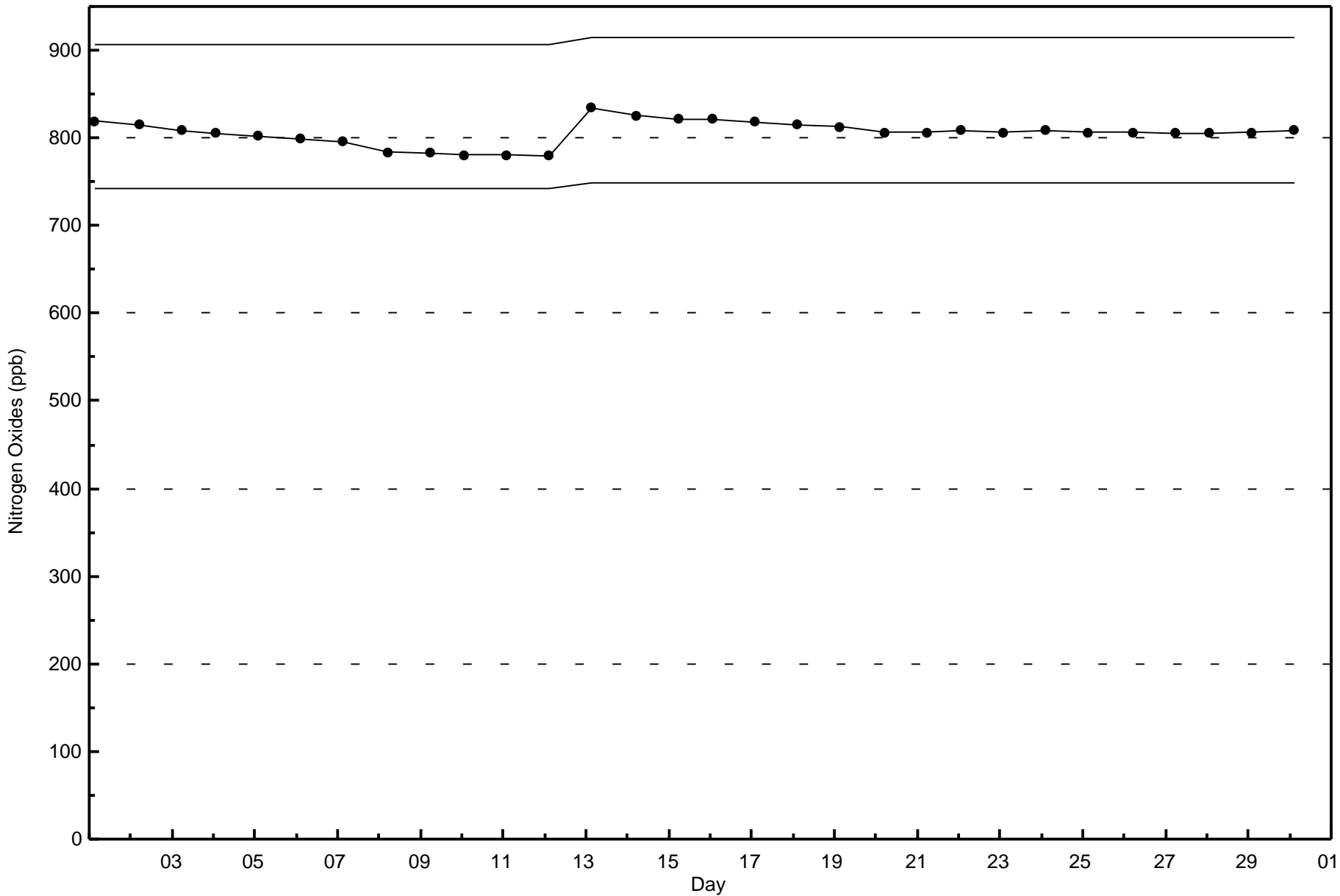




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Fort Hills - September 2017







Summary of Hour Averages

Fort Hills - September 2017

| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 68 µg/m ³ on Sep 29 18:00 | Maximum Daily Average: 26.4 µg/m ³ on Sep 6 | | Hours of Data: | 698 |
| Minimum Value: 0 µg/m ³ on Sep 21 08:00 | Minimum Daily Average: 0.5 µg/m ³ on Sep 21 | | Hours of Missing Data: | 22 |
| Maximum Diurnal Average: 11.9 µg/m ³ at hour 7 | Minimum Diurnal Average: 5.1 µg/m ³ at hour 17 | | Hours of Calibration: | 1 |
| Monthly Average: 8.5 µg/m ³ | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 Q ₃ = 11 P ₉₀ = 18 P ₉₉ = 54 | | Percent Operational Time: | 97.1 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 2 | 3 | 2 | 5 | 8 | 13 | 12 | 4 | 10 | 8 | 6 | 7 | 5.3 | 13 |
| 2-Sep | 6 | 6 | 7 | 14 | 9 | 9 | 6 | 6 | 4 | 4 | 6 | 3 | 9 | 2 | 3 | 8 | 4 | 7 | 10 | 4 | 2 | 3 | 4 | 2 | 5.8 | 14 |
| 3-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 7 | 10 | 12 | 12 | 10 | 8 | 15 | 10 | 8 | 7 | 50 | 16 | 12 | 6 | 5 | 3 | 2 | 8.9 | 50 |
| 4-Sep | 5 | 2 | 9 | 7 | 8 | 3 | 3 | 5 | 2 | 2 | 1 | 1 | 2 | 1 | 4 | 2 | UO | 13 | 44 | 4 | 21 | 22 | 10 | 9 | 7.9 | 44 |
| 5-Sep | 8 | 10 | 13 | 10 | 9 | 17 | 25 | 14 | 7 | 6 | 7 | 6 | 3 | 3 | 3 | 3 | 3 | 6 | 5 | 5 | 5 | 13 | 55 | 27 | 10.9 | 55 |
| 6-Sep | 56 | 33 | 54 | 61 | 47 | 51 | 41 | 37 | 29 | 16 | 15 | 12 | 10 | 9 | 15 | 14 | 11 | 9 | 14 | 18 | 23 | 28 | 18 | 14 | 26.4 | 61 |
| 7-Sep | 12 | 13 | 10 | 13 | 17 | 64 | 49 | 18 | 23 | 18 | 21 | 16 | 9 | 9 | 9 | PF | PF | PF | 18 | 19 | 20 | 20 | 21 | 23 | 20.1 | 64 |
| 8-Sep | 36 | 19 | 15 | 17 | 22 | 19 | 63 | 30 | 45 | 44 | 31 | 15 | 13 | 11 | 9 | 9 | 9 | 4 | 6 | 3 | 4 | 4 | 4 | 4 | 18.1 | 63 |
| 9-Sep | 5 | 4 | 5 | 5 | 3 | 6 | 7 | 5 | 7 | 3 | 6 | 6 | 4 | 3 | 7 | 10 | 7 | 6 | 10 | 7 | 7 | 7 | 8 | 8 | 6.0 | 10 |
| 10-Sep | 11 | 12 | 14 | 14 | 13 | 11 | 10 | 9 | 7 | 6 | 3 | 2 | 4 | 5 | 8 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5.8 | 14 |
| 11-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 3 | 1 | 2 | 2 | 2 | 4 | 8 | 5 | 3 | 3 | 4 | 3 | 2.1 | 8 |
| 12-Sep | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | C | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 0 | UO | UO | 0 | 1 | 1 | 1.8 | 3 |
| 13-Sep | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 2 | 0 | 0 | 1 | UO | 0 | 1 | UO | 1 | 2 | 2 | UO | 1 | 4 | 3 | 1 | 1 | 1.6 | 4 |
| 14-Sep | 2 | 1 | 1 | 2 | 3 | 8 | 3 | 1 | UO | UO | UO | UO | UO | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 4 | 3 | 1 | 1 | 2.0 | 8 |
| 15-Sep | 1 | UO | UO | UO | UO | 0 | 1 | 9 | 22 | 32 | 20 | 11 | 7 | 2 | UO | UO | UO | 0 | 1 | 1 | 1 | 1 | 2 | 3 | -- | 32 |
| 16-Sep | 2 | 3 | 5 | 5 | 6 | 21 | 12 | 5 | 8 | 11 | 8 | 7 | 2 | 3 | 2 | 3 | 2 | 2 | 1 | 4 | 16 | 5 | 4 | 4 | 5.9 | 21 |
| 17-Sep | 5 | 6 | 6 | 7 | 8 | 10 | 5 | 4 | 6 | 15 | 32 | 30 | 23 | 17 | 14 | 11 | 9 | 10 | 15 | 20 | 17 | 14 | 13 | 13 | 13.0 | 32 |
| 18-Sep | 13 | 18 | 22 | 20 | 28 | 14 | 16 | 15 | 19 | 18 | 8 | 8 | 8 | 7 | 5 | 5 | 5 | 10 | 13 | 9 | 8 | 9 | 11 | 17 | 12.7 | 28 |
| 19-Sep | 13 | 12 | 12 | 13 | 13 | 14 | 16 | 18 | 29 | 42 | 49 | 45 | 38 | 34 | 30 | 26 | 11 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 18.3 | 49 |
| 20-Sep | 4 | 5 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 2.1 | 5 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 22-Sep | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 4 | 3 | 5 | 9 | 13 | 15 | 15 | 16 | 14 | 13 | 13 | 5.8 | 16 |
| 23-Sep | 12 | 10 | 5 | 6 | 9 | 7 | 8 | 8 | 8 | 10 | 9 | 5 | 1 | 1 | 1 | 1 | 2 | 3 | 5 | 7 | 6 | 6 | 7 | 8 | 6.0 | 12 |
| 24-Sep | 10 | 7 | 6 | 6 | 6 | 6 | 6 | 7 | 7 | 15 | 13 | 11 | 12 | 15 | 13 | 9 | 11 | 7 | 9 | 8 | 7 | 9 | 9 | 7 | 9.0 | 15 |
| 25-Sep | 6 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 6 | 8 | 4 | 2 | 1 | 1 | 1 | 2 | 2 | 4 | 4 | 3 | 3 | 4 | 2 | 2 | 3.4 | 8 |
| 26-Sep | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 4 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 5 | 3 | 8 | 5 | 5 | 5 | 8 | 3.4 | 8 |
| 27-Sep | 5 | 5 | 3 | 3 | 5 | 10 | 17 | 10 | 9 | 4 | 4 | 4 | 4 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 5 | 6 | 4 | 4 | 5.5 | 17 |
| 28-Sep | 5 | 6 | 6 | 8 | 19 | 13 | 7 | 9 | 7 | 7 | 13 | 22 | 19 | 8 | 5 | 2 | 2 | 4 | 7 | 6 | 5 | 8 | 9 | 7 | 8.5 | 22 |
| 29-Sep | 7 | 8 | 5 | 7 | 17 | 11 | 23 | 31 | 10 | 10 | 15 | 7 | 6 | 4 | 5 | 5 | 10 | 68 | 37 | 12 | 12 | 13 | 15 | 16 | 14.8 | 68 |
| 30-Sep | 27 | 27 | 32 | 23 | 15 | 11 | 14 | 14 | 16 | 11 | 23 | 18 | 8 | 6 | 5 | 5 | 6 | 24 | 7 | 8 | 7 | 6 | 5 | 4 | 13.4 | 32 |

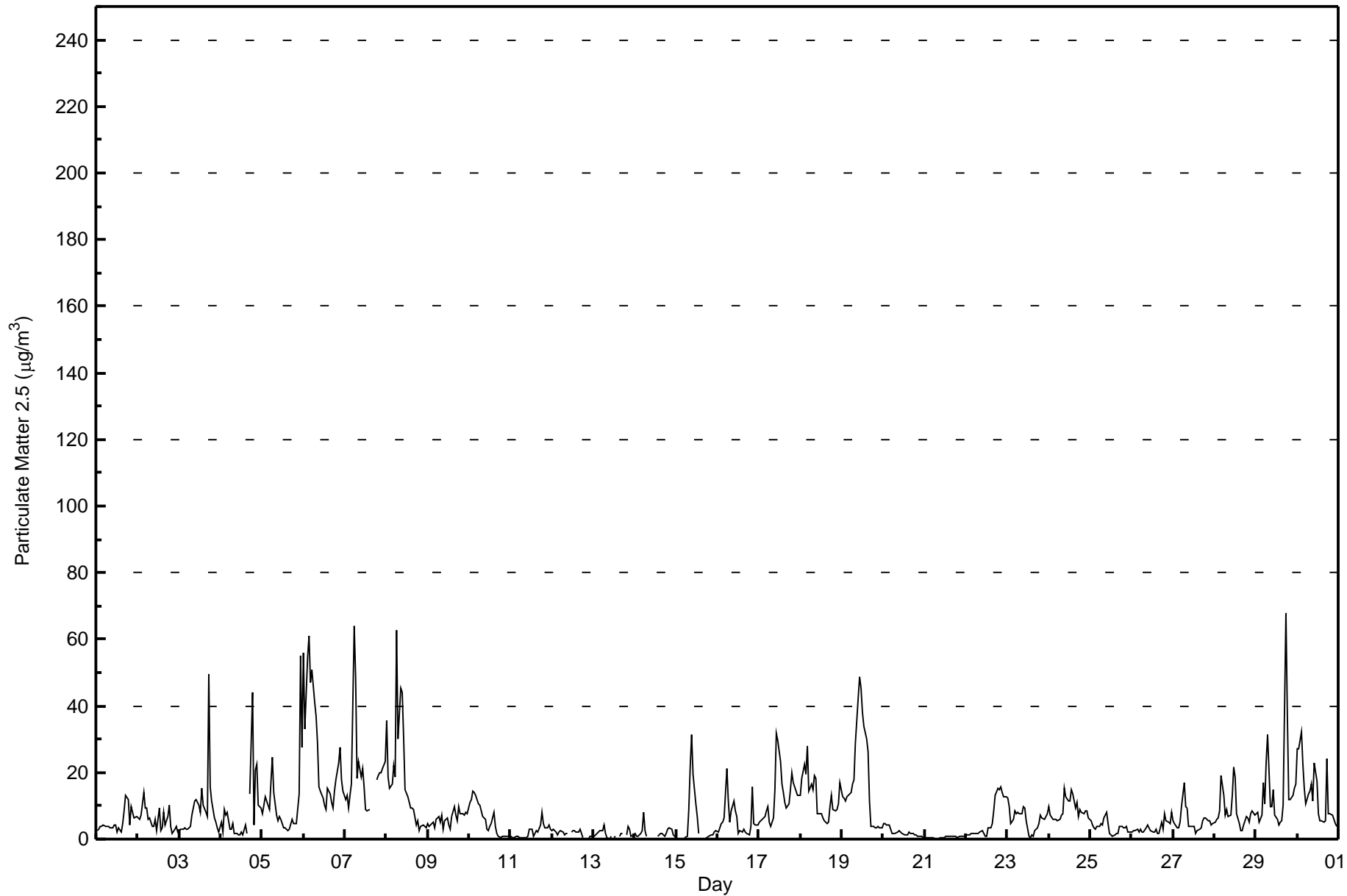
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|------|------|-----|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 8.8 | 7.8 | 8.7 | 9.1 | 9.7 | 10.9 | 11.9 | 9.3 | 10.1 | 10.6 | 11.1 | 9.1 | 7.0 | 5.7 | 6.1 | 5.4 | 5.1 | 9.6 | 9.4 | 6.8 | 7.8 | 7.5 | 8.0 | 7.1 | Diurnal Average | |
| 56 | 33 | 54 | 61 | 47 | 64 | 63 | 37 | 45 | 44 | 49 | 45 | 38 | 34 | 30 | 26 | 11 | 68 | 44 | 20 | 23 | 28 | 55 | 27 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 285 | 40.83 | 40.83 |
| 6 - 15 | 245 | 35.10 | 75.93 |
| 16 - 25 | 55 | 7.88 | 83.81 |
| 26 - 80 | 40 | 5.73 | 89.54 |
| > 81.0 | 0 | 0.00 | 89.54 |

Total Number of Valid Hours: 698

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills - September 2017

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 11 | 35 | 9 | 10 | 3 | 2 | 3 | 21 | 36 | 32 | 34 | 20 | 11 | 16 | 23 | 19 | 285 |
| 6 - 15 | 10 | 19 | 1 | 1 | 2 | 3 | 12 | 37 | 48 | 35 | 16 | 14 | 7 | 12 | 14 | 13 | 244 |
| 16 - 25 | 2 | 3 | 1 | 0 | 0 | 3 | 1 | 15 | 15 | 8 | 1 | 1 | 0 | 1 | 1 | 3 | 55 |
| 26 - 80 | 6 | 9 | 0 | 0 | 0 | 0 | 2 | 8 | 10 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 40 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 29 | 66 | 11 | 11 | 5 | 8 | 18 | 81 | 109 | 76 | 52 | 35 | 18 | 31 | 39 | 35 | 624 |

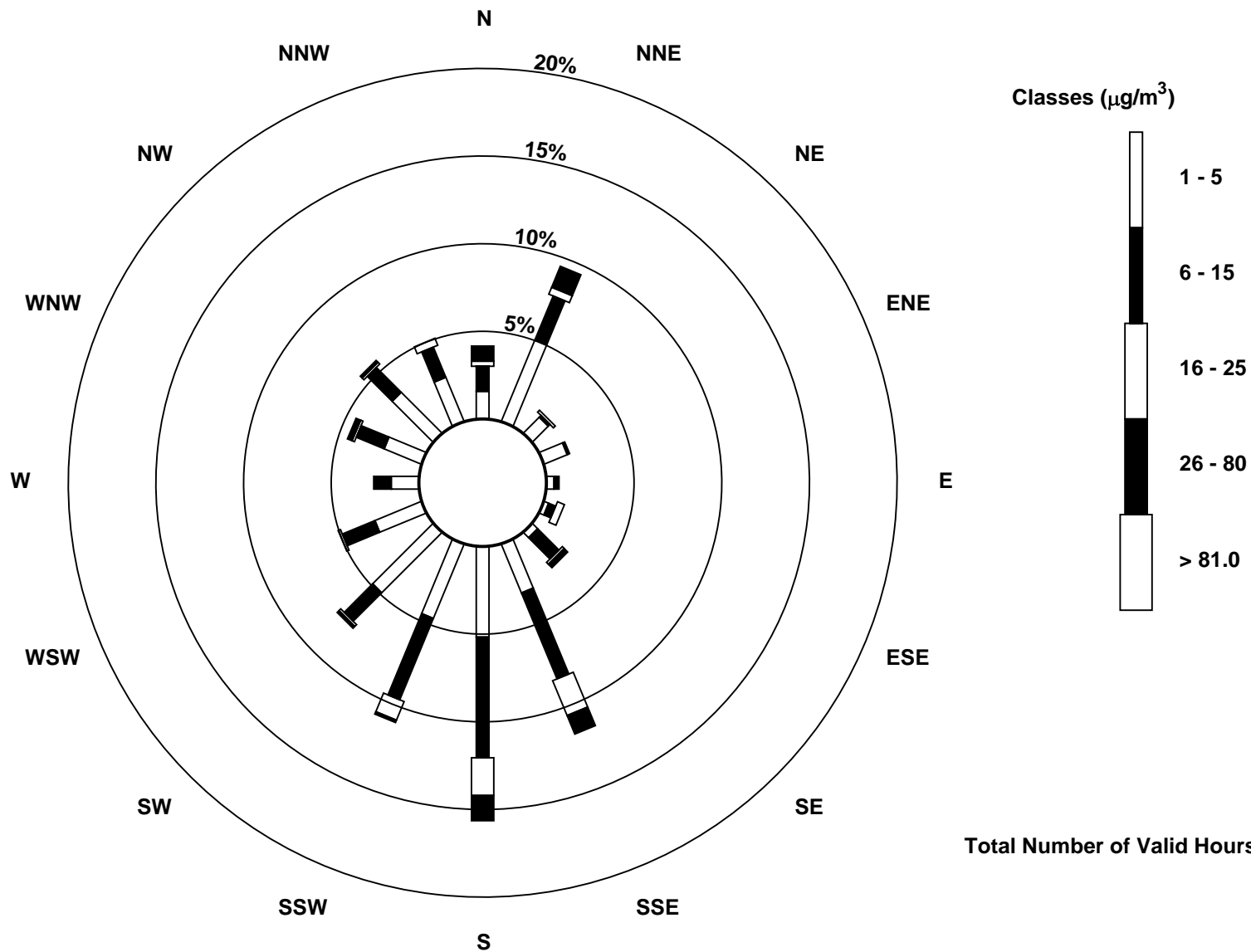
Total Number of Valid Hours: 697

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills (AMS 23)



Total Number of Valid Hours: 697



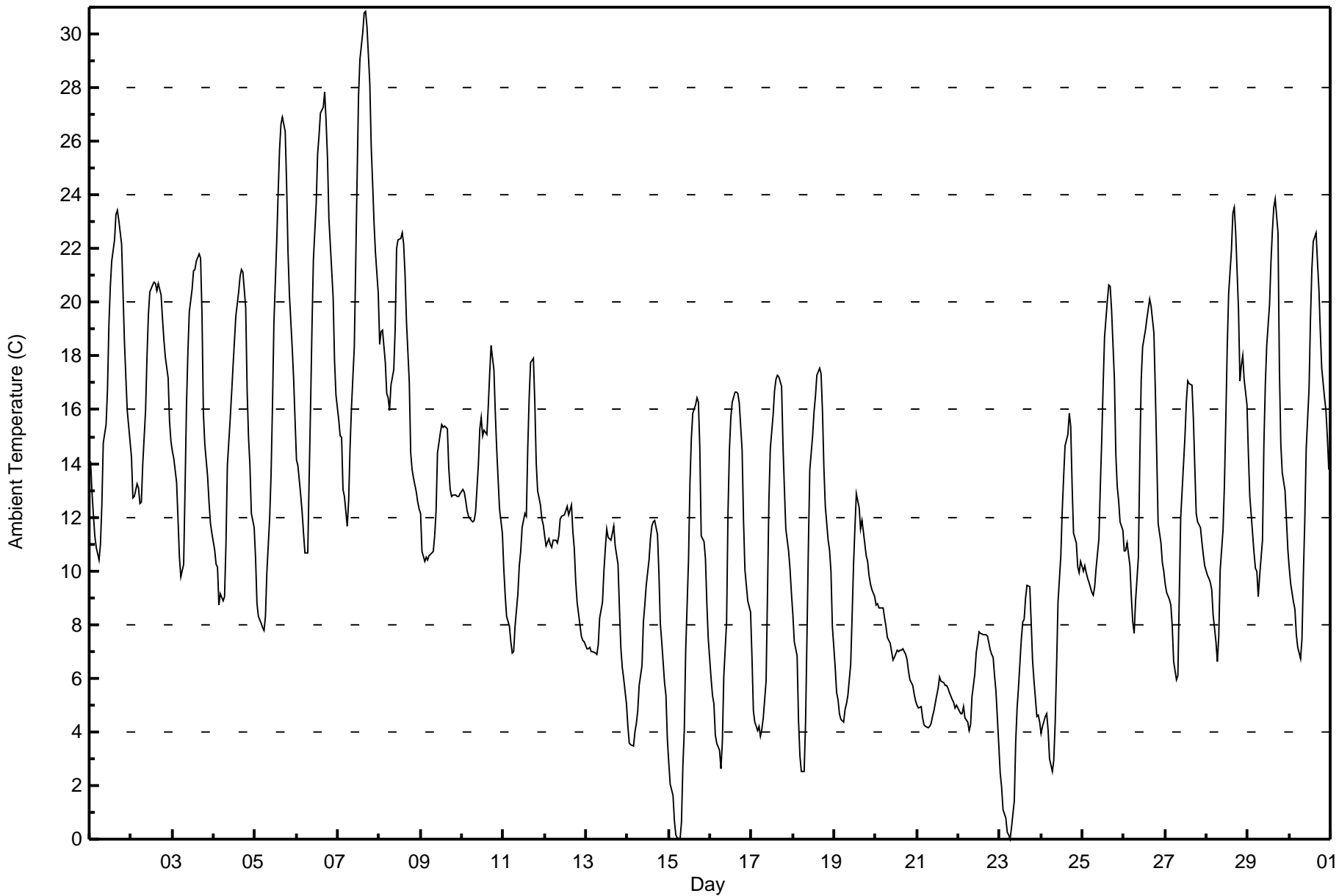
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Fort Hills - September 2017

| Maximum Value: 31 C on Sep 7 17:00 | | | | | | | | | | Maximum Daily Average: 21.4 C on Sep 7 | | | | | | | | | | Hours in Service: 720 | | | | | | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|--|----|----|----|----|----|----|----|----|----|---------------------------------|----|----|----|----|---------------|---------------|----|
| Minimum Value: 0 C on Sep 15 07:00 | | | | | | | | | | Minimum Daily Average: 4.5 C on Sep 23 | | | | | | | | | | Hours of Data: 720 | | | | | | | |
| Maximum Diurnal Average: 17.6 C at hour 16 | | | | | | | | | | Minimum Diurnal Average: 7.3 C at hour 7 | | | | | | | | | | Hours of Missing Data: 0 | | | | | | | |
| Monthly Average: 12.2 C | | | | | | | | | | Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 8 Median = 12 O ₃ = 16 P ₉₀ = 21 P ₉₉ = 28 | | | | | | | | | | Hours of Calibration: 0 | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 14 | 13 | 12 | 11 | 11 | 10 | 11 | 12 | 15 | 15 | 17 | 19 | 21 | 22 | 22 | 23 | 23 | 23 | 22 | 20 | 19 | 17 | 16 | 15 | 16.9 | 23 | |
| 2-Sep | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 14 | 16 | 18 | 20 | 20 | 21 | 21 | 21 | 20 | 21 | 20 | 19 | 19 | 18 | 17 | 16 | 15 | 16.9 | 21 | |
| 3-Sep | 14 | 14 | 13 | 12 | 11 | 10 | 10 | 13 | 16 | 18 | 20 | 20 | 21 | 21 | 22 | 22 | 22 | 20 | 16 | 15 | 14 | 13 | 12 | 11 | 15.8 | 22 | |
| 4-Sep | 11 | 10 | 10 | 9 | 9 | 9 | 9 | 11 | 14 | 16 | 17 | 18 | 19 | 20 | 20 | 21 | 21 | 21 | 20 | 17 | 15 | 14 | 12 | 12 | 14.7 | 21 | |
| 5-Sep | 10 | 9 | 8 | 8 | 8 | 8 | 8 | 10 | 12 | 14 | 16 | 19 | 22 | 24 | 26 | 27 | 27 | 26 | 24 | 22 | 20 | 18 | 17 | 16 | 16.7 | 27 | |
| 6-Sep | 14 | 14 | 13 | 12 | 11 | 11 | 11 | 13 | 16 | 19 | 22 | 24 | 26 | 26 | 27 | 27 | 28 | 27 | 25 | 23 | 21 | 20 | 18 | 17 | 19.4 | 28 | |
| 7-Sep | 16 | 15 | 15 | 13 | 13 | 12 | 13 | 15 | 16 | 18 | 21 | 25 | 28 | 29 | 30 | 31 | 31 | 30 | 28 | 26 | 24 | 23 | 22 | 20 | 21.4 | 31 | |
| 8-Sep | 18 | 19 | 19 | 18 | 17 | 16 | 16 | 17 | 17 | 19 | 22 | 22 | 22 | 23 | 22 | 21 | 19 | 17 | 14 | 14 | 13 | 13 | 13 | 12 | 17.7 | 23 | |
| 9-Sep | 12 | 11 | 10 | 11 | 10 | 11 | 11 | 11 | 11 | 12 | 14 | 15 | 15 | 15 | 15 | 15 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 12.7 | 15 | |
| 10-Sep | 13 | 13 | 13 | 12 | 12 | 12 | 12 | 12 | 12 | 14 | 15 | 16 | 15 | 15 | 15 | 16 | 17 | 18 | 18 | 16 | 15 | 13 | 12 | 11 | 14.1 | 18 | |
| 11-Sep | 10 | 9 | 8 | 8 | 7 | 7 | 7 | 8 | 9 | 10 | 11 | 12 | 12 | 12 | 15 | 16 | 18 | 18 | 16 | 14 | 13 | 12 | 12 | 12 | 11.5 | 18 | |
| 12-Sep | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 11 | 11 | 10 | 9 | 8 | 8 | 7 | 7 | 10.7 | 12 | |
| 13-Sep | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 9 | 10 | 11 | 12 | 11 | 11 | 11 | 12 | 11 | 10 | 9 | 7 | 6 | 6 | 5 | 8.6 | 12 | |
| 14-Sep | 4 | 4 | 4 | 3 | 4 | 4 | 5 | 6 | 6 | 8 | 9 | 9 | 10 | 11 | 12 | 12 | 12 | 11 | 10 | 8 | 7 | 6 | 5 | 4 | 7.3 | 12 | |
| 15-Sep | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 3 | 4 | 7 | 10 | 13 | 15 | 16 | 16 | 16 | 16 | 16 | 15 | 11 | 11 | 10 | 9 | 7 | 7.9 | 16 |
| 16-Sep | 6 | 5 | 5 | 4 | 4 | 3 | 3 | 4 | 6 | 8 | 12 | 14 | 16 | 16 | 17 | 17 | 17 | 16 | 15 | 12 | 10 | 9 | 9 | 8 | 9.8 | 17 | |
| 17-Sep | 7 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 6 | 9 | 13 | 15 | 16 | 17 | 17 | 17 | 17 | 17 | 15 | 13 | 12 | 11 | 10 | 9 | 10.4 | 17 | |
| 18-Sep | 8 | 7 | 7 | 4 | 3 | 3 | 3 | 4 | 8 | 11 | 14 | 15 | 16 | 17 | 17 | 18 | 17 | 16 | 14 | 12 | 11 | 11 | 10 | 8 | 10.6 | 18 | |
| 19-Sep | 6 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 7 | 8 | 10 | 12 | 13 | 12 | 12 | 12 | 11 | 11 | 10 | 10 | 10 | 9 | 9 | 8.4 | 13 | |
| 20-Sep | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 5 | 5 | 7.2 | 9 | |
| 21-Sep | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5.1 | 6 | |
| 22-Sep | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 6 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 6 | 6 | 4 | 6.0 | 8 | |
| 23-Sep | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 6 | 7 | 8 | 8 | 9 | 9 | 9 | 8 | 7 | 6 | 5 | 5 | 4 | 4.5 | 9 | |
| 24-Sep | 4 | 4 | 5 | 5 | 4 | 3 | 3 | 3 | 4 | 6 | 9 | 11 | 12 | 14 | 15 | 15 | 16 | 15 | 13 | 11 | 11 | 10 | 10 | 10 | 8.9 | 16 | |
| 25-Sep | 10 | 10 | 10 | 10 | 10 | 9 | 9 | 9 | 10 | 11 | 13 | 15 | 17 | 19 | 20 | 21 | 21 | 20 | 17 | 14 | 13 | 13 | 12 | 12 | 13.5 | 21 | |
| 26-Sep | 11 | 11 | 11 | 10 | 9 | 8 | 8 | 9 | 11 | 14 | 17 | 18 | 19 | 19 | 20 | 20 | 20 | 19 | 17 | 14 | 12 | 11 | 10 | 10 | 13.7 | 20 | |
| 27-Sep | 10 | 9 | 9 | 9 | 8 | 7 | 6 | 6 | 9 | 12 | 13 | 15 | 16 | 17 | 17 | 17 | 16 | 14 | 12 | 12 | 12 | 11 | 11 | 10 | 11.5 | 17 | |
| 28-Sep | 10 | 10 | 10 | 9 | 8 | 7 | 7 | 8 | 10 | 11 | 13 | 16 | 18 | 20 | 22 | 23 | 24 | 23 | 20 | 17 | 18 | 18 | 17 | 16 | 14.8 | 24 | |
| 29-Sep | 14 | 13 | 12 | 11 | 10 | 10 | 9 | 10 | 11 | 15 | 17 | 18 | 20 | 22 | 23 | 24 | 24 | 23 | 18 | 15 | 14 | 13 | 12 | 11 | 15.2 | 24 | |
| 30-Sep | 10 | 9 | 9 | 9 | 8 | 7 | 7 | 7 | 10 | 12 | 15 | 17 | 19 | 21 | 22 | 23 | 21 | 21 | 19 | 18 | 16 | 16 | 15 | 14 | 14.3 | 23 | |
| | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort Hills - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 270 | 37.50 | 37.50 |
| 10 - 20 | 365 | 50.69 | 88.19 |
| > 20 | 85 | 11.81 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

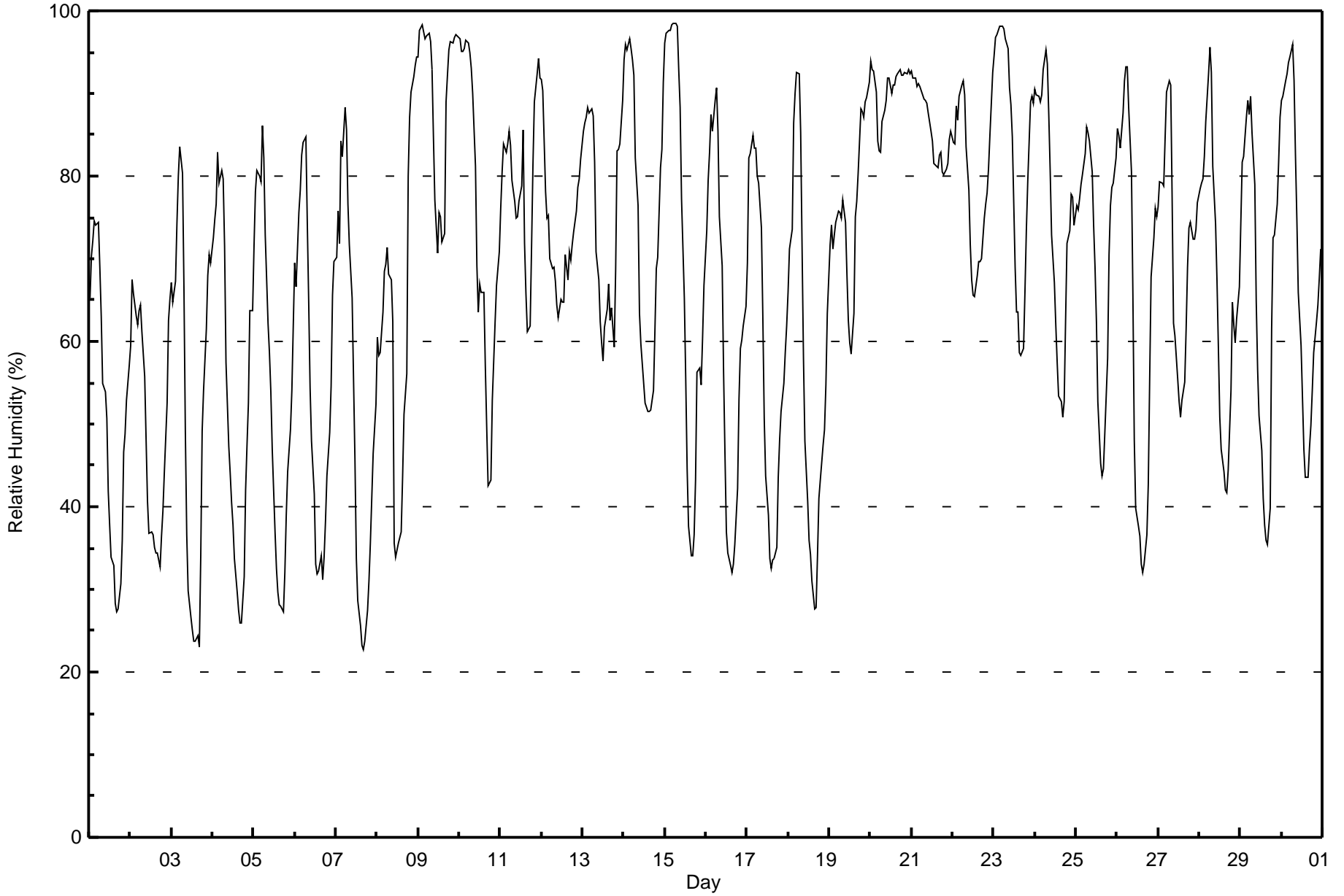
Fort Hills - September 2017

| Maximum Value: 98 % on Sep 15 07:00 Maximum Daily Average: 90.5 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 23 % on Sep 7 17:00 Minimum Daily Average: 49.9 % on Sep 2 Maximum Diurnal Average: 86.5 % at hour 6 Minimum Diurnal Average: 47.8 % at hour 16 Monthly Average: 68.2 % Percentiles: P ₁ = 25 P ₁₀ = 36 Q ₁ = 54 Median = 71 O ₃ = 85 P ₉₀ = 92 P ₉₉ = 98 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 65 | 70 | 72 | 75 | 74 | 74 | 69 | 63 | 55 | 54 | 51 | 42 | 38 | 34 | 33 | 28 | 27 | 28 | 31 | 36 | 47 | 49 | 53 | 57 | 51.0 | 75 |
| 2-Sep | 59 | 67 | 66 | 63 | 62 | 64 | 64 | 61 | 56 | 48 | 41 | 37 | 37 | 37 | 35 | 34 | 34 | 33 | 36 | 39 | 44 | 53 | 63 | 65 | 49.9 | 67 |
| 3-Sep | 67 | 65 | 67 | 74 | 80 | 84 | 80 | 67 | 49 | 37 | 30 | 27 | 25 | 24 | 24 | 24 | 23 | 34 | 49 | 54 | 62 | 68 | 71 | 70 | 52.2 | 84 |
| 4-Sep | 73 | 75 | 77 | 83 | 79 | 81 | 80 | 72 | 57 | 47 | 44 | 40 | 38 | 34 | 30 | 27 | 26 | 26 | 32 | 42 | 47 | 53 | 64 | 64 | 53.7 | 83 |
| 5-Sep | 72 | 78 | 81 | 80 | 79 | 86 | 82 | 73 | 62 | 59 | 54 | 47 | 37 | 33 | 30 | 28 | 28 | 27 | 32 | 39 | 44 | 49 | 54 | 62 | 54.8 | 86 |
| 6-Sep | 70 | 67 | 76 | 78 | 83 | 84 | 85 | 74 | 65 | 54 | 48 | 42 | 33 | 32 | 32 | 34 | 31 | 34 | 38 | 44 | 49 | 55 | 66 | 70 | 55.9 | 85 |
| 7-Sep | 70 | 76 | 72 | 84 | 82 | 88 | 86 | 77 | 72 | 65 | 55 | 46 | 34 | 29 | 26 | 23 | 23 | 24 | 27 | 31 | 36 | 41 | 46 | 52 | 52.7 | 88 |
| 8-Sep | 60 | 58 | 59 | 64 | 68 | 69 | 71 | 68 | 67 | 62 | 36 | 34 | 36 | 36 | 37 | 44 | 51 | 56 | 80 | 87 | 90 | 92 | 93 | 94 | 63.1 | 94 |
| 9-Sep | 94 | 98 | 98 | 97 | 97 | 97 | 97 | 96 | 93 | 85 | 77 | 71 | 76 | 75 | 72 | 73 | 89 | 92 | 95 | 96 | 96 | 97 | 97 | 97 | 89.8 | 98 |
| 10-Sep | 97 | 95 | 95 | 95 | 96 | 96 | 95 | 93 | 90 | 81 | 69 | 64 | 67 | 66 | 66 | 57 | 50 | 43 | 43 | 53 | 58 | 62 | 67 | 71 | 73.7 | 97 |
| 11-Sep | 76 | 81 | 84 | 83 | 84 | 85 | 84 | 79 | 77 | 75 | 75 | 77 | 79 | 86 | 72 | 66 | 61 | 62 | 71 | 81 | 89 | 92 | 94 | 92 | 79.4 | 94 |
| 12-Sep | 92 | 90 | 78 | 75 | 75 | 70 | 69 | 69 | 67 | 64 | 63 | 65 | 65 | 65 | 70 | 67 | 71 | 70 | 72 | 73 | 76 | 79 | 80 | 82 | 72.8 | 92 |
| 13-Sep | 85 | 86 | 87 | 88 | 88 | 88 | 87 | 82 | 71 | 67 | 62 | 60 | 58 | 62 | 64 | 67 | 63 | 64 | 59 | 69 | 83 | 83 | 84 | 89 | 74.8 | 89 |
| 14-Sep | 94 | 96 | 95 | 97 | 95 | 94 | 92 | 82 | 76 | 63 | 60 | 57 | 53 | 52 | 52 | 51 | 52 | 54 | 61 | 69 | 70 | 81 | 83 | 91 | 73.8 | 97 |
| 15-Sep | 96 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 93 | 88 | 77 | 65 | 56 | 45 | 38 | 34 | 34 | 37 | 43 | 56 | 57 | 55 | 60 | 67 | 70.3 | 98 |
| 16-Sep | 73 | 79 | 83 | 87 | 85 | 89 | 91 | 85 | 75 | 69 | 56 | 46 | 37 | 34 | 33 | 32 | 33 | 35 | 42 | 53 | 59 | 60 | 62 | 64 | 61.1 | 91 |
| 17-Sep | 70 | 82 | 83 | 85 | 83 | 83 | 80 | 79 | 74 | 63 | 51 | 44 | 39 | 34 | 33 | 34 | 34 | 35 | 44 | 48 | 52 | 55 | 59 | 62 | 58.4 | 85 |
| 18-Sep | 66 | 71 | 74 | 86 | 90 | 93 | 92 | 85 | 71 | 58 | 48 | 41 | 36 | 34 | 31 | 28 | 28 | 34 | 41 | 43 | 47 | 49 | 55 | 63 | 56.9 | 93 |
| 19-Sep | 72 | 74 | 71 | 73 | 74 | 76 | 76 | 75 | 77 | 74 | 68 | 63 | 60 | 58 | 63 | 75 | 77 | 80 | 88 | 88 | 87 | 89 | 89 | 91 | 75.8 | 91 |
| 20-Sep | 94 | 93 | 93 | 90 | 84 | 83 | 83 | 87 | 88 | 89 | 92 | 92 | 90 | 91 | 91 | 92 | 92 | 93 | 92 | 92 | 93 | 92 | 93 | 92 | 90.5 | 94 |
| 21-Sep | 93 | 92 | 92 | 91 | 91 | 91 | 90 | 89 | 89 | 89 | 88 | 85 | 84 | 82 | 81 | 81 | 83 | 83 | 80 | 80 | 81 | 82 | 84 | 85 | 86.1 | 93 |
| 22-Sep | 84 | 84 | 88 | 87 | 90 | 91 | 92 | 90 | 84 | 78 | 72 | 67 | 66 | 65 | 68 | 70 | 70 | 70 | 75 | 77 | 78 | 81 | 85 | 93 | 79.3 | 93 |
| 23-Sep | 95 | 97 | 97 | 98 | 98 | 98 | 98 | 97 | 95 | 91 | 89 | 85 | 69 | 64 | 64 | 59 | 58 | 59 | 66 | 73 | 79 | 89 | 90 | 89 | 83.1 | 98 |
| 24-Sep | 90 | 90 | 90 | 89 | 90 | 93 | 95 | 94 | 88 | 81 | 73 | 67 | 62 | 57 | 53 | 53 | 51 | 53 | 62 | 72 | 73 | 78 | 77 | 74 | 75.2 | 95 |
| 25-Sep | 76 | 76 | 77 | 79 | 80 | 83 | 86 | 85 | 84 | 81 | 74 | 69 | 62 | 53 | 45 | 44 | 45 | 49 | 58 | 71 | 76 | 79 | 79 | 82 | 70.5 | 86 |
| 26-Sep | 86 | 85 | 83 | 88 | 92 | 93 | 93 | 88 | 81 | 66 | 48 | 40 | 38 | 36 | 33 | 32 | 33 | 37 | 43 | 56 | 68 | 73 | 76 | 75 | 64.2 | 93 |
| 27-Sep | 76 | 79 | 79 | 79 | 85 | 90 | 92 | 91 | 77 | 62 | 61 | 55 | 53 | 51 | 53 | 55 | 61 | 69 | 74 | 74 | 72 | 72 | 74 | 77 | 71.3 | 92 |
| 28-Sep | 79 | 79 | 80 | 82 | 87 | 92 | 96 | 92 | 81 | 74 | 68 | 59 | 51 | 47 | 44 | 42 | 42 | 44 | 54 | 65 | 62 | 60 | 63 | 67 | 67.0 | 96 |
| 29-Sep | 74 | 82 | 82 | 87 | 89 | 87 | 90 | 85 | 79 | 65 | 57 | 51 | 47 | 41 | 38 | 36 | 35 | 40 | 61 | 73 | 73 | 77 | 82 | 87 | 67.4 | 90 |
| 30-Sep | 89 | 90 | 92 | 92 | 94 | 94 | 96 | 92 | 82 | 75 | 66 | 59 | 53 | 47 | 44 | 44 | 47 | 50 | 54 | 59 | 62 | 64 | 68 | 71 | 70.2 | 96 |
| 79.6 81.7 82.2 84.3 85.1 86.5 86.3 82.3 75.9 68.9 61.7 56.5 52.5 50.1 48.4 47.8 48.4 50.5 56.9 63.1 67.0 70.2 73.6 76.5 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 97 98 98 98 98 98 98 98 95 91 92 92 90 91 91 92 92 93 95 96 96 97 97 97 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort Hills - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Hills - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 95 | 13.19 | 13.19 |
| 40 - 60 | 135 | 18.75 | 31.94 |
| 60 - 80 | 241 | 33.47 | 65.42 |
| 80 - 100 | 249 | 34.58 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

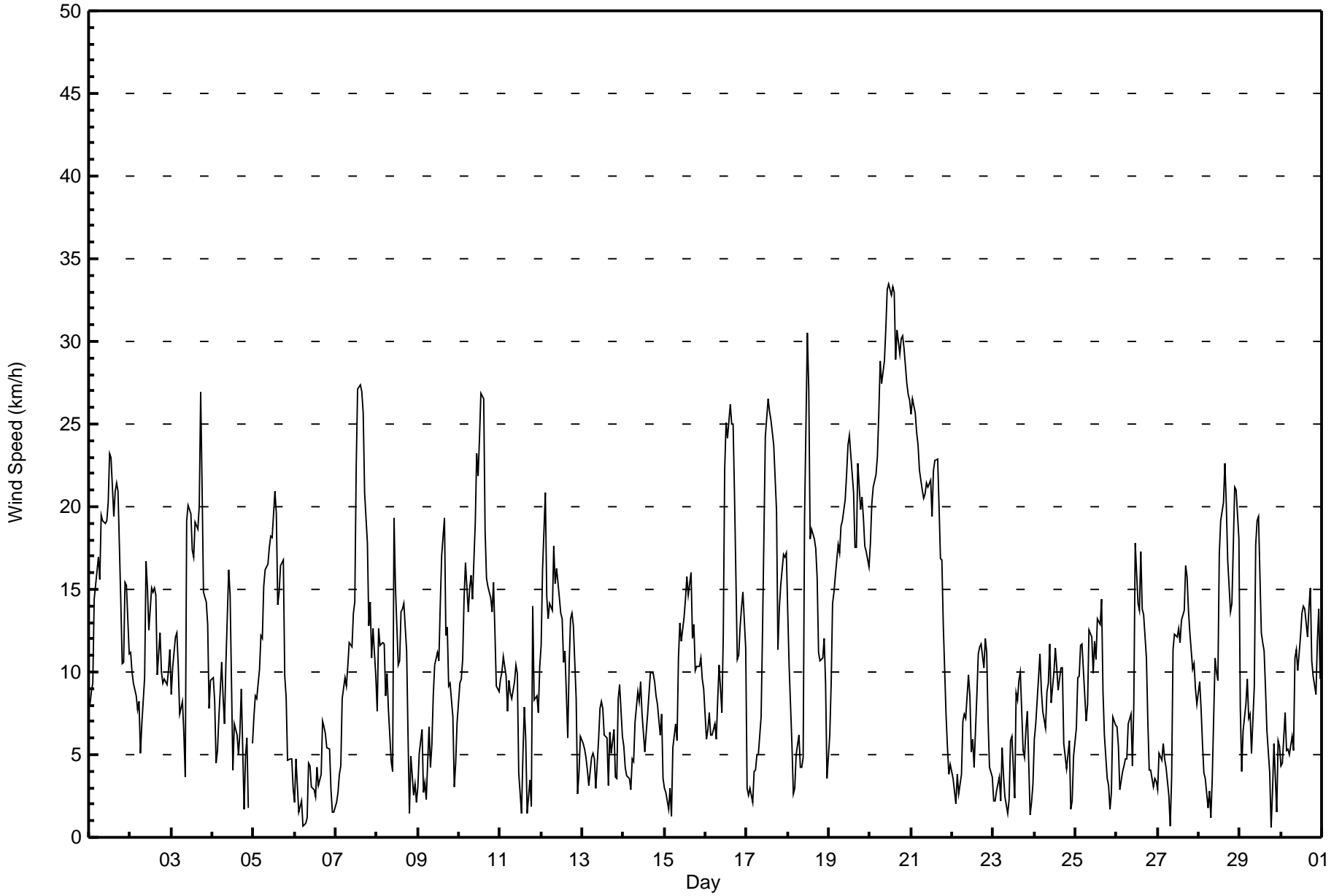
Wind Speed (WS) - km/h
Fort Hills - September 2017

| | | |
|--|--|--------------------------------|
| Maximum Speed: 34 km/h on Sep 20 12:00 | Maximum Daily Speed Average: 27.9 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 29 19:00 | Minimum Daily Speed Average: 0.9 km/h on Sep 8 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 3.8 km/h at hour 14 | Minimum Diurnal Speed Average: 1.1 km/h at hour 22 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 1.7 km/h 231.2 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 10 Q ₃ = 15 P ₉₀ = 21 P ₉₉ = 31 | 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-Sep | SW8 | SSW9 | SW9 | SW14 | SW15 | SW17 | SW16 | SW19 | SW19 | SW19 | WSW19 | WSW20 | WSW23 | WSW23 | W19 | W21 | WNW21 | WNW21 | WNW14 | WNW10 | WSW11 | WSW15 | WSW15 | WSW11 | WSW15.1 | WSW23 |
| 2-Sep | WSW11 | SW10 | WSW9 | W9 | W8 | WNW8 | WSW5 | SW7 | SSW10 | WSW17 | W15 | W13 | W15 | WSW15 | W15 | W15 | WNW10 | WNW12 | WNW10 | WNW9 | W10 | W9 | SSW10 | SW11 | W9.8 | WSW17 |
| 3-Sep | SSW9 | WSW10 | WSW12 | SW12 | WSW10 | SW7 | S8 | SE6 | W4 | WNW19 | NW20 | NW20 | NW17 | WNW17 | NW19 | NW19 | NW20 | N27 | NNW21 | NW15 | NW14 | NNW13 | NNW8 | NNW9 | NW10.6 | N27 |
| 4-Sep | WNW10 | WNW8 | W4 | NW5 | NNW7 | NNW11 | NNW9 | NW7 | NN11 | N16 | NNW15 | NNW9 | NNW4 | NW7 | NW6 | NNE5 | NW6 | NW9 | N2 | ESE5 | ESE6 | NE2 | AF | SSE6 | NNW5.5 | N16 |
| 5-Sep | SSW7 | S9 | S8 | SSE10 | S12 | S12 | S15 | S16 | SSW16 | SSW18 | S18 | SSW18 | SW21 | SW20 | WSW14 | SW15 | SW16 | SW17 | SW10 | SW8 | SW5 | SSE5 | SSE5 | S3 | SSW11.4 | SW21 |
| 6-Sep | SSE2 | SSE5 | S2 | SSE2 | S2 | N1 | SE1 | WNW1 | WNW4 | N4 | NW3 | SSW3 | SSE2 | SW4 | SSE3 | SSW4 | SE7 | ESE7 | ESE6 | ESE5 | ESE5 | SE3 | WSW2 | SSE2 | SSE1.8 | SE7 |
| 7-Sep | SE2 | SSE3 | SSE4 | S4 | SSE8 | SSE10 | S9 | S10 | SSW12 | SSW12 | SW14 | SSW14 | SSW22 | SSW27 | SSW27 | SSW27 | SSW26 | SSW21 | SSW18 | SSW13 | S14 | S11 | SSW13 | S10 | SSW13.4 | SSW27 |
| 8-Sep | S8 | S13 | S12 | SSE12 | SSE12 | S9 | SSE10 | S8 | SSW5 | NNE4 | N19 | N15 | NNE10 | NNE11 | N14 | N14 | NNW14 | NNW11 | NNW6 | WSW1 | SW5 | WSW3 | SSW3 | SSW2 | NNW0.9 | N19 |
| 9-Sep | SSW3 | N5 | N7 | NW3 | WSW3 | E2 | NNW7 | NNW4 | N6 | N9 | NNE10 | N11 | N11 | N14 | NNE17 | NNE19 | NNW12 | N13 | N9 | NNE9 | N7 | NNW3 | WSW5 | SW7 | N6.6 | NNE19 |
| 10-Sep | SW9 | SSW10 | SSW11 | SSW14 | SW17 | SW14 | SW15 | SW16 | SW14 | WSW19 | W23 | WNW22 | W24 | W27 | WNW27 | WNW19 | NW16 | WNW15 | WNW15 | SW14 | WSW15 | WSW12 | WSW9 | WSW9 | WSW13.5 | WNW27 |
| 11-Sep | SW10 | SW10 | SW11 | SW10 | SSW8 | S9 | S9 | SSW8 | SSW9 | SSW10 | SSW10 | SE4 | NNE1 | N5 | SSE8 | SSE6 | SSW1 | SSE3 | N2 | NW14 | S8 | SW9 | SW8 | SW10 | SSW5.5 | NW14 |
| 12-Sep | SW12 | WSW16 | W21 | WSW15 | WSW13 | W14 | WNW14 | WNW18 | WNW15 | NW16 | NNW15 | NW14 | NW13 | NNW11 | NW11 | NNE6 | ENE10 | NE13 | NE14 | NE13 | ENE8 | NE3 | N4 | N6 | NW7.1 | W21 |
| 13-Sep | NNW6 | NNW5 | NNW5 | NNW4 | WNW3 | NNW5 | NNW5 | NNW5 | SSW3 | NW6 | NNE8 | NNE8 | NNE8 | N6 | NW6 | W3 | NE6 | ENE5 | NE7 | NE4 | NNE4 | NNE8 | NNE9 | N6 | N4.6 | NNE9 |
| 14-Sep | NNW5 | NNW4 | NNW4 | NW4 | NW3 | NW5 | N5 | NNE7 | NNE9 | NNE8 | N9 | N7 | NE5 | ESE6 | E7 | E9 | ENE10 | E10 | ENE9 | ENE9 | ENE8 | NNE6 | N7 | NNW4 | NNE5.1 | ENE10 |
| 15-Sep | WNW3 | NW3 | NNW2 | NW3 | SSE1 | SSW5 | S7 | S6 | SSE11 | SSE13 | SSE12 | SSE13 | S14 | SSW16 | SW15 | SW16 | SW12 | SSW13 | S10 | SSE10 | S10 | S11 | SSW10 | SSW9 | SSW8.1 | SW16 |
| 16-Sep | S6 | S7 | SSW8 | S6 | SSE6 | SSE7 | S6 | SSW8 | SSW10 | SW8 | S12 | S22 | SSW25 | SSW24 | S26 | SSW25 | SSW25 | SSW21 | S11 | S11 | SSE13 | S14 | S15 | S11 | S13.2 | S26 |
| 17-Sep | SW3 | N3 | NNE3 | SSE2 | SSE4 | S4 | SSW5 | SW5 | SW7 | SSW12 | S18 | S24 | S27 | S26 | S25 | S25 | S24 | SSE20 | SSE11 | SSE14 | SSE15 | SSE17 | SSE17 | SSE17 | S12.7 | S27 |
| 18-Sep | SSE14 | SSE10 | SSE6 | NNE3 | N3 | N5 | N6 | N4 | NNW4 | S5 | S19 | S30 | S27 | SSE18 | SE19 | SSE18 | SSE17 | SE16 | SE11 | SE11 | SE11 | SE12 | SE9 | WNW4 | SSE9.0 | S30 |
| 19-Sep | NNW6 | N9 | NNE14 | NNE15 | NNE16 | NNE18 | NNE17 | NNE19 | NNE19 | NNE20 | NNE22 | NNE24 | NNE24 | NNE23 | NNE21 | NNE18 | ENE18 | E23 | ENE20 | ENE21 | ENE19 | ENE18 | NE17 | NE16 | NE16.8 | NNE24 |
| 20-Sep | NNE18 | NNE20 | NNE21 | NNE22 | NNE23 | NNE26 | NNE29 | NNE27 | NNE29 | NNE31 | NNE33 | NNE34 | NNE33 | NNE33 | NNE33 | NNE29 | NNE31 | NNE29 | NNE30 | NNE30 | NNE30 | NNE27 | NNE27 | NNE26 | NNE27.9 | NNE34 |
| 21-Sep | NNE26 | NNE27 | NNE26 | NNE25 | NNE24 | N22 | NNE21 | NNE21 | N21 | N21 | N21 | NNE22 | NNE19 | NNE22 | NNE23 | N23 | N20 | N17 | N17 | N13 | NNW7 | NNW5 | NW4 | WNW4 | N18.4 | NNE27 |
| 22-Sep | WNW4 | WNW3 | SSE2 | SSW4 | SE3 | SSE4 | S7 | S7 | SSE7 | S10 | SSE9 | SSE5 | SE6 | SW4 | SSE9 | S11 | S11 | SSE12 | SSE10 | SSE12 | SSE11 | S7 | S4 | NW4 | S5.9 | SSE12 |
| 23-Sep | NNW2 | SE2 | SW3 | SW4 | SSW2 | SSW5 | WSW4 | WSW2 | SSE1 | SSW2 | SW6 | WSW6 | WSW2 | SSE9 | S8 | SSE10 | SSE10 | ESE5 | SE5 | SSE7 | SSE8 | WNW1 | S2 | S3 | S3.5 | SSE10 |
| 24-Sep | SSE6 | S7 | S10 | S11 | S9 | SSE8 | SSE7 | SSW9 | SSW9 | SSW12 | S8 | SSW10 | S11 | S10 | S9 | S10 | S10 | SE6 | ESE5 | SE4 | SSE6 | WSW2 | E2 | SSE5 | S7.2 | SSW12 |
| 25-Sep | SSE7 | SSE10 | SSE10 | SSE12 | SSE12 | SSE9 | S7 | S8 | S13 | S12 | S10 | S12 | SSW11 | SW13 | WSW13 | SW14 | SW9 | SSW6 | SSW4 | WSW3 | W2 | SW3 | SW7 | SSW7 | S7.8 | SW14 |
| 26-Sep | S7 | S6 | SSW3 | SSE4 | S4 | S5 | SSW5 | SSW7 | SSW7 | S4 | NW8 | NW18 | NW14 | NW14 | N17 | NW14 | WNW14 | NW11 | NW7 | NW4 | NNW4 | NW3 | S4 | SSW3 | WNW4.1 | NW18 |
| 27-Sep | SSE3 | S5 | S5 | SSE6 | S5 | SSE4 | SE3 | NNW1 | NNE4 | NNE11 | NNE12 | NNE12 | NE13 | NE12 | NE13 | NNE14 | NNE16 | NNE16 | NNE14 | NNE12 | NE10 | NE11 | NNE9 | NNE8 | NE6.9 | NNE16 |
| 28-Sep | NNE9 | NNE8 | NNE6 | NNE4 | NNW4 | NNW2 | S3 | WSW1 | SSW4 | SW11 | SW10 | SSW10 | S17 | S19 | S20 | S23 | SSW20 | S17 | S14 | SSE14 | S18 | S21 | S21 | S18 | S9.3 | S23 |
| 29-Sep | S8 | SSW4 | S6 | SSE8 | S10 | S7 | SSE7 | SW5 | SSW9 | SSW18 | SSW19 | SSW19 | SSW12 | SW12 | SW11 | SW9 | WSW6 | NW4 | N1 | SSE3 | SSW6 | S1 | SSE6 | S6 | SSW7.4 | SSW19 |
| 30-Sep | S4 | S5 | SSE8 | S5 | SSW5 | SSW5 | S6 | SSW5 | S11 | S11 | SSE10 | SSE12 | S14 | SSW14 | SSW14 | SSW12 | SSW14 | NW15 | NW11 | NNW10 | WNW9 | NW12 | WNW14 | NW10 | SW4.9 | NW15 |

| | |
|---|-----------------|
| SW1.7 SW1.6 SW1.6 SW2.0SSW2.2 SW1.6SSW1.4WSW2.2 SW3.0WSW2.9 W2.7WSW2.2 SW3.1WSW3.8WSW2.9WSW2.9WSW2.1NNW1.1 NNE1.7 ENE1.2 SSE1.7SSW1.1SSW1.9SSW1.8 | Diurnal Average |
| NNE26 NNE27 NNE26 NNE25 NNE24 NNE26 NNE29 NNE27 NNE29 NNE31 NNE33 NNE34 NNE33 NNE33 NNE33 NNE33 NNE29 NNE31 NNE29 NNE30 NNE30 NNE30 NNE27 NNE27 NNE26 | 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
Fort Hills - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|-------------------------------------|----------------------------|----------|---------------------|
| 0 - 5 | 178 | 24.76 | 24.76 |
| 6 - 11 | 257 | 35.74 | 60.50 |
| 12 - 19 | 190 | 26.43 | 86.93 |
| 20 - 28 | 79 | 10.99 | 97.91 |
| 29 - 38 | 15 | 2.09 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Hills - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 12 | 9 | 4 | 1 | 2 | 5 | 8 | 24 | 21 | 23 | 10 | 12 | 4 | 9 | 13 | 21 | 178 |
| 6 - 11 | 14 | 21 | 4 | 6 | 3 | 4 | 8 | 39 | 54 | 30 | 24 | 10 | 4 | 8 | 15 | 13 | 257 |
| 12 - 19 | 10 | 19 | 8 | 3 | 0 | 0 | 3 | 21 | 24 | 22 | 25 | 14 | 7 | 12 | 15 | 7 | 190 |
| 20 - 28 | 7 | 25 | 0 | 2 | 1 | 0 | 0 | 1 | 13 | 12 | 2 | 3 | 4 | 6 | 2 | 1 | 79 |
| 29 - 38 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 43 | 88 | 16 | 12 | 6 | 9 | 19 | 85 | 113 | 87 | 61 | 39 | 19 | 35 | 45 | 42 | 719 |

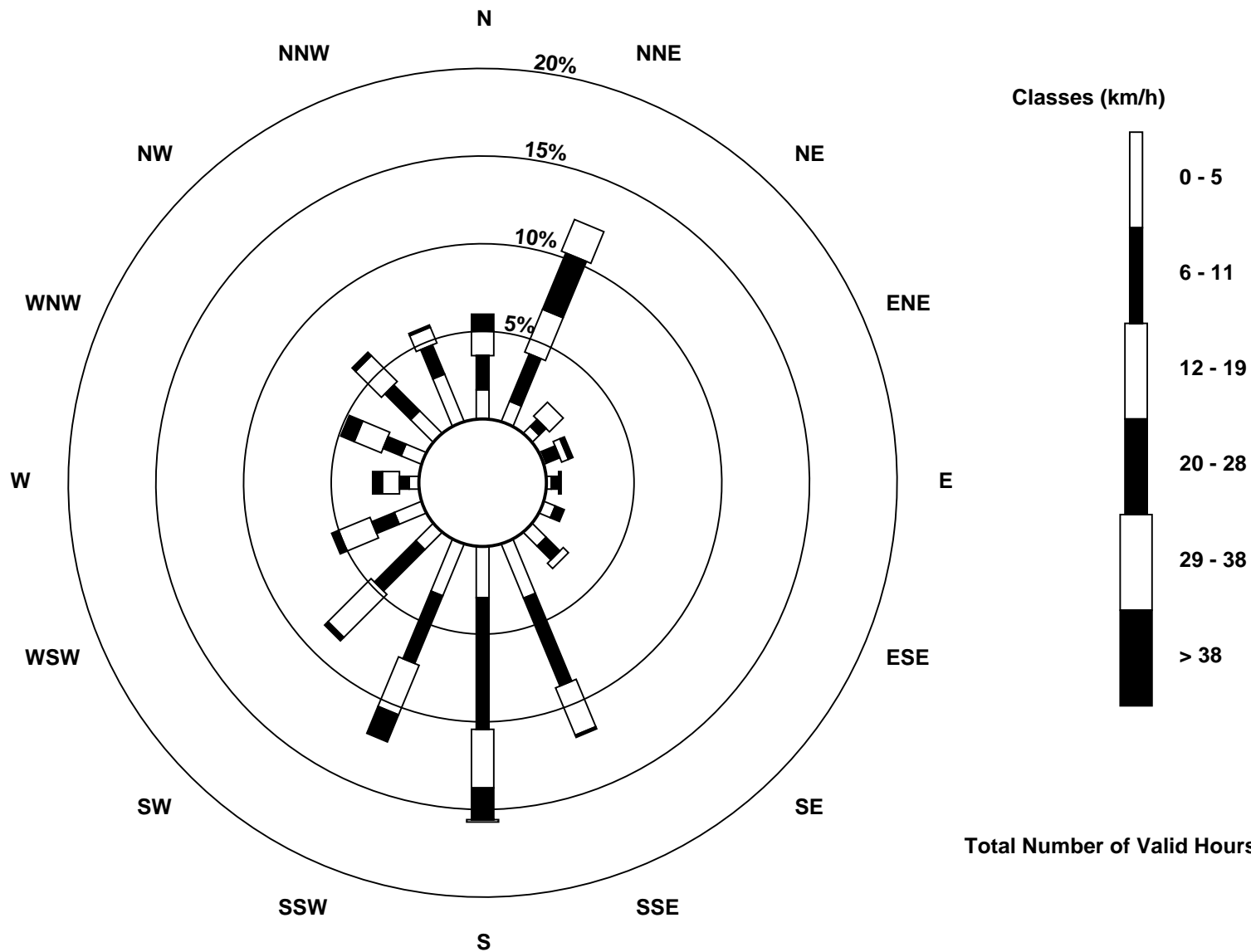
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Fort Hills (AMS 23)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Hills - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 10 km/h on Sep 11 20:00 | Hours of Data: 719 |
| Minimum Value: 0 km/h on Sep 29 05:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 7 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.9 |

| 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-Sep | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 6 | 6 | 5 | 5 | 5 | 4 | 3 | 2 | 3 | 3 | 2 | 6 |
| 2-Sep | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 1 | 2 | 4 |
| 3-Sep | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 5 | 9 | 6 | 3 | 3 | 3 | 1 | 2 | 9 | |
| 4-Sep | 2 | 3 | 1 | 2 | 4 | 2 | 2 | 2 | 3 | 7 | 5 | 3 | 3 | 3 | 4 | 4 | 4 | 2 | 3 | 1 | 2 | 1 | AF | 2 | 7 |
| 5-Sep | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 2 | 1 | 2 | 4 |
| 6-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| 7-Sep | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 5 |
| 8-Sep | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 5 | 4 | 4 | 3 | 3 | 4 | 5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 5 |
| 9-Sep | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 3 |
| 10-Sep | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 5 | 5 | 7 | 7 | 7 | 5 | 5 | 4 | 4 | 3 | 2 | 4 | 2 | 1 | 7 |
| 11-Sep | 1 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 2 | 3 | 2 | 2 | 4 | 3 | 10 | 2 | 2 | 2 | 1 | 10 |
| 12-Sep | 1 | 3 | 6 | 3 | 3 | 6 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 4 | 2 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 6 |
| 13-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 5 | 3 | 1 | 4 | 2 | 3 | 1 | 1 | 2 | 1 | 2 | 5 |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 3 |
| 15-Sep | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 4 | 4 | 3 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 16-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 5 | 5 | 5 | 5 | 6 | 5 | 4 | 5 | 2 | 1 | 1 | 1 | 1 | 2 | 6 |
| 17-Sep | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 5 | 4 | 5 | 5 | 4 | 4 | 5 | 2 | 2 | 1 | 2 | 2 | 2 | 5 |
| 18-Sep | 3 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 5 | 4 | 5 | 5 | 6 | 4 | 4 | 4 | 2 | 2 | 2 | 3 | 3 | 1 | 6 |
| 19-Sep | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 5 |
| 20-Sep | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 6 | 6 | 6 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 7 |
| 21-Sep | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 5 | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 5 |
| 22-Sep | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 |
| 23-Sep | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 3 |
| 24-Sep | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 3 |
| 25-Sep | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 2 | 2 | 1 | 3 | 2 | 3 |
| 26-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 | 5 | 4 | 4 | 4 | 3 | 3 | 2 | 1 | 3 | 1 | 2 | 1 | 1 | 7 |
| 27-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 3 |
| 28-Sep | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 1 | 1 | 2 | 3 | 3 | 2 | 4 |
| 29-Sep | 3 | 1 | 1 | 2 | 0 | 1 | 2 | 2 | 1 | 3 | 3 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 2 | 3 | 1 | 2 | 2 | 1 | 4 |
| 30-Sep | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 4 | 3 | 2 | 2 | 2 | 3 | 3 | 4 |
| | 5 | 5 | 6 | 5 | 4 | 6 | 5 | 4 | 5 | 7 | 7 | 6 | 7 | 7 | 7 | 6 | 6 | 9 | 6 | 10 | 5 | 5 | 5 | 5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Hills - September 2017

| | |
|--|--------------------------------|
| Direction of Maximum Speed: 25 deg on Sep 20 12:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 23.5 deg on Sep 20 | Hours of Data: 719 |
| Direction of Minimum Speed: 360 deg on Sep 29 19:00 | Hours of Missing Data: 1 |
| Direction of Minimum Daily Speed Average: 0.9 deg on Sep 8 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 236.7 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-Sep | 229 | 205 | 222 | 223 | 221 | 228 | 231 | 229 | 236 | 235 | 240 | 246 | 240 | 242 | 259 | 276 | 286 | 287 | 290 | 282 | 242 | 248 | 254 | 249 | 247.4 |
| 2-Sep | 251 | 218 | 245 | 264 | 261 | 284 | 251 | 219 | 203 | 242 | 265 | 271 | 266 | 258 | 270 | 280 | 298 | 291 | 288 | 300 | 276 | 263 | 210 | 216 | 259.4 |
| 3-Sep | 212 | 246 | 249 | 233 | 242 | 220 | 189 | 143 | 273 | 303 | 304 | 309 | 322 | 300 | 326 | 307 | 313 | 350 | 338 | 316 | 322 | 330 | 331 | 331 | 304.6 |
| 4-Sep | 297 | 302 | 276 | 318 | 333 | 320 | 327 | 321 | 306 | 350 | 342 | 348 | 329 | 322 | 323 | 26 | 307 | 308 | 355 | 106 | 122 | 37 | AF | 162 | 327.4 |
| 5-Sep | 193 | 176 | 189 | 168 | 185 | 169 | 169 | 182 | 195 | 194 | 183 | 199 | 220 | 224 | 237 | 229 | 226 | 230 | 215 | 220 | 226 | 163 | 147 | 176 | 200.8 |
| 6-Sep | 167 | 149 | 177 | 164 | 172 | 10 | 129 | 303 | 297 | 354 | 319 | 211 | 154 | 219 | 168 | 201 | 132 | 122 | 120 | 110 | 119 | 139 | 238 | 155 | 150.6 |
| 7-Sep | 139 | 164 | 158 | 177 | 152 | 159 | 174 | 191 | 211 | 209 | 214 | 208 | 198 | 194 | 198 | 195 | 198 | 198 | 192 | 200 | 186 | 189 | 193 | 187 | 193.3 |
| 8-Sep | 188 | 181 | 173 | 163 | 162 | 171 | 167 | 184 | 192 | 17 | 351 | 11 | 18 | 21 | 354 | 349 | 346 | 332 | 347 | 251 | 226 | 241 | 197 | 197 | 344.2 |
| 9-Sep | 206 | 353 | 358 | 313 | 237 | 87 | 346 | 345 | 358 | 360 | 21 | 4 | 6 | 8 | 19 | 20 | 343 | 7 | 353 | 21 | 2 | 341 | 258 | 218 | 1.2 |
| 10-Sep | 218 | 211 | 192 | 209 | 216 | 214 | 226 | 230 | 228 | 239 | 273 | 287 | 279 | 281 | 288 | 296 | 304 | 301 | 282 | 234 | 239 | 249 | 249 | 238 | 255.8 |
| 11-Sep | 226 | 226 | 233 | 221 | 209 | 181 | 178 | 207 | 198 | 202 | 192 | 127 | 17 | 11 | 152 | 168 | 209 | 156 | 11 | 321 | 186 | 214 | 228 | 222 | 208.0 |
| 12-Sep | 228 | 242 | 263 | 258 | 246 | 274 | 301 | 303 | 296 | 321 | 329 | 322 | 306 | 332 | 307 | 32 | 66 | 42 | 35 | 44 | 57 | 48 | 10 | 10 | 312.1 |
| 13-Sep | 341 | 347 | 347 | 337 | 301 | 338 | 336 | 343 | 198 | 322 | 12 | 14 | 24 | 4 | 323 | 265 | 44 | 66 | 48 | 40 | 15 | 18 | 22 | 4 | 3.0 |
| 14-Sep | 348 | 329 | 347 | 318 | 322 | 326 | 353 | 21 | 12 | 16 | 5 | 4 | 35 | 107 | 94 | 79 | 69 | 79 | 63 | 65 | 57 | 16 | 10 | 334 | 32.1 |
| 15-Sep | 298 | 318 | 342 | 309 | 152 | 196 | 183 | 181 | 158 | 159 | 163 | 166 | 179 | 201 | 214 | 224 | 220 | 207 | 184 | 168 | 182 | 190 | 202 | 193 | 191.3 |
| 16-Sep | 177 | 187 | 194 | 175 | 155 | 167 | 180 | 206 | 205 | 235 | 189 | 180 | 198 | 194 | 188 | 193 | 193 | 193 | 190 | 173 | 164 | 169 | 170 | 178 | 186.9 |
| 17-Sep | 228 | 357 | 29 | 165 | 168 | 172 | 202 | 214 | 222 | 192 | 186 | 179 | 180 | 188 | 181 | 179 | 176 | 165 | 167 | 162 | 154 | 154 | 155 | 153 | 174.9 |
| 18-Sep | 157 | 155 | 158 | 25 | 6 | 6 | 7 | 2 | 336 | 172 | 175 | 177 | 171 | 165 | 144 | 148 | 149 | 135 | 129 | 125 | 126 | 125 | 136 | 299 | 150.8 |
| 19-Sep | 345 | 11 | 17 | 20 | 17 | 16 | 24 | 18 | 18 | 17 | 29 | 24 | 26 | 26 | 25 | 33 | 62 | 80 | 72 | 72 | 70 | 69 | 54 | 37 | 36.2 |
| 20-Sep | 26 | 29 | 21 | 21 | 24 | 20 | 21 | 20 | 18 | 23 | 22 | 25 | 29 | 30 | 28 | 27 | 23 | 24 | 23 | 21 | 23 | 21 | 21 | 22 | 23.5 |
| 21-Sep | 21 | 18 | 16 | 14 | 15 | 11 | 13 | 12 | 11 | 11 | 10 | 13 | 16 | 14 | 12 | 11 | 2 | 6 | 2 | 353 | 347 | 344 | 309 | 303 | 10.1 |
| 22-Sep | 299 | 302 | 153 | 213 | 146 | 165 | 189 | 187 | 158 | 178 | 168 | 165 | 137 | 224 | 162 | 171 | 178 | 165 | 151 | 149 | 154 | 170 | 173 | 314 | 170.1 |
| 23-Sep | 327 | 134 | 235 | 222 | 198 | 213 | 238 | 240 | 157 | 195 | 214 | 237 | 251 | 166 | 179 | 155 | 149 | 119 | 142 | 152 | 147 | 289 | 169 | 169 | 178.6 |
| 24-Sep | 155 | 177 | 177 | 172 | 169 | 166 | 168 | 194 | 207 | 201 | 187 | 162 | 169 | 185 | 185 | 181 | 174 | 139 | 107 | 134 | 163 | 249 | 100 | 151 | 173.7 |
| 25-Sep | 152 | 157 | 152 | 157 | 160 | 162 | 174 | 182 | 189 | 187 | 190 | 177 | 194 | 219 | 237 | 232 | 216 | 202 | 198 | 238 | 268 | 216 | 220 | 192 | 190.9 |
| 26-Sep | 173 | 187 | 198 | 166 | 185 | 181 | 200 | 199 | 210 | 173 | 306 | 319 | 317 | 313 | 349 | 318 | 301 | 307 | 308 | 325 | 327 | 304 | 191 | 202 | 291.1 |
| 27-Sep | 162 | 174 | 175 | 164 | 170 | 159 | 145 | 344 | 12 | 27 | 23 | 22 | 34 | 46 | 35 | 28 | 30 | 32 | 29 | 24 | 35 | 40 | 32 | 21 | 37.1 |
| 28-Sep | 13 | 20 | 31 | 13 | 348 | 340 | 172 | 250 | 203 | 216 | 216 | 198 | 185 | 180 | 179 | 188 | 194 | 191 | 172 | 165 | 176 | 183 | 187 | 190 | 185.8 |
| 29-Sep | 191 | 204 | 187 | 168 | 173 | 177 | 167 | 217 | 207 | 192 | 199 | 203 | 212 | 220 | 221 | 229 | 254 | 316 | 360 | 149 | 203 | 171 | 152 | 173 | 199.1 |
| 30-Sep | 177 | 180 | 164 | 184 | 197 | 198 | 182 | 199 | 189 | 179 | 164 | 164 | 180 | 198 | 209 | 204 | 203 | 324 | 324 | 342 | 302 | 306 | 294 | 325 | 218.0 |

223.8 215.2 227.3 215.0 203.7 216.5 211.4 238.3 235.8 251.2 267.5 250.1 230.0 237.5 248.9 237.4 238.0 335.6 21.1 62.9 150.7 192.8 196.5 211.0

Diurnal Average

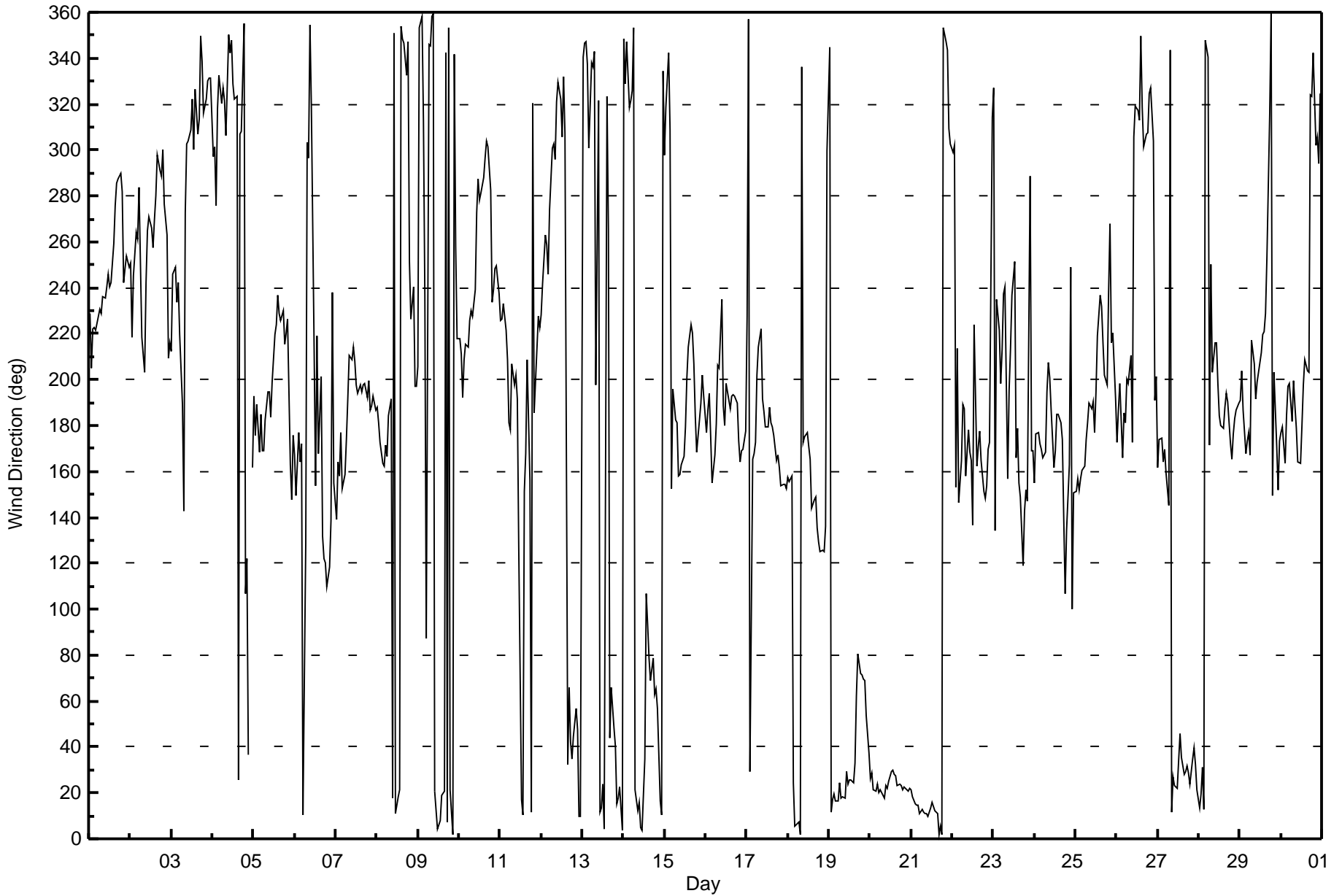
AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort Hills - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Hills - September 2017

| | |
|---|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 90 deg on Sep 11 13:00 | Hours of Data: 719 |
| Minimum Value: 4 deg on Sep 28 20:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 11 Median = 15 Q ₃ = 24 P ₉₀ = 44 P ₉₉ = 83 | 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-Sep | 17 | 13 | 10 | 7 | 8 | 6 | 7 | 8 | 9 | 11 | 8 | 19 | 15 | 18 | 23 | 17 | 16 | 14 | 14 | 26 | 9 | 8 | 10 | 14 | 26 |
| 2-Sep | 9 | 15 | 20 | 12 | 17 | 13 | 43 | 34 | 31 | 19 | 23 | 25 | 19 | 17 | 12 | 12 | 15 | 12 | 11 | 13 | 20 | 12 | 18 | 10 | 43 |
| 3-Sep | 14 | 15 | 9 | 9 | 12 | 24 | 13 | 27 | 87 | 15 | 15 | 21 | 21 | 26 | 23 | 22 | 13 | 27 | 21 | 11 | 12 | 11 | 14 | 12 | 87 |
| 4-Sep | 14 | 26 | 16 | 19 | 34 | 9 | 15 | 25 | 15 | 26 | 21 | 32 | 76 | 54 | 64 | 60 | 62 | 25 | 76 | 26 | 24 | 65 | AF | 15 | 76 |
| 5-Sep | 11 | 11 | 18 | 12 | 9 | 9 | 12 | 14 | 10 | 10 | 14 | 15 | 12 | 12 | 17 | 15 | 10 | 8 | 5 | 8 | 28 | 22 | 22 | 75 | 75 |
| 6-Sep | 61 | 18 | 47 | 28 | 48 | 76 | 88 | 74 | 35 | 29 | 55 | 55 | 75 | 44 | 54 | 37 | 28 | 21 | 21 | 23 | 23 | 74 | 39 | 37 | 88 |
| 7-Sep | 39 | 25 | 42 | 30 | 11 | 7 | 23 | 13 | 12 | 13 | 11 | 18 | 15 | 10 | 11 | 11 | 10 | 8 | 7 | 9 | 6 | 8 | 10 | 12 | 42 |
| 8-Sep | 44 | 11 | 12 | 6 | 7 | 15 | 9 | 18 | 16 | 75 | 16 | 14 | 18 | 18 | 18 | 17 | 18 | 13 | 30 | 70 | 32 | 61 | 65 | 71 | 75 |
| 9-Sep | 44 | 20 | 16 | 62 | 59 | 60 | 19 | 21 | 16 | 17 | 13 | 17 | 15 | 15 | 14 | 10 | 24 | 14 | 14 | 17 | 15 | 53 | 22 | 11 | 62 |
| 10-Sep | 13 | 12 | 11 | 8 | 6 | 7 | 9 | 6 | 9 | 8 | 15 | 18 | 14 | 13 | 13 | 16 | 14 | 15 | 12 | 11 | 7 | 13 | 9 | 16 | 18 |
| 11-Sep | 8 | 8 | 7 | 32 | 25 | 20 | 14 | 13 | 13 | 14 | 18 | 30 | 90 | 45 | 31 | 31 | 83 | 74 | 87 | 46 | 25 | 16 | 32 | 12 | 90 |
| 12-Sep | 9 | 10 | 15 | 15 | 15 | 17 | 14 | 12 | 12 | 16 | 15 | 19 | 20 | 22 | 16 | 66 | 13 | 12 | 15 | 12 | 13 | 23 | 20 | 21 | 66 |
| 13-Sep | 13 | 15 | 23 | 21 | 21 | 14 | 10 | 26 | 49 | 36 | 34 | 34 | 72 | 64 | 34 | 47 | 49 | 42 | 11 | 34 | 43 | 10 | 8 | 13 | 72 |
| 14-Sep | 17 | 14 | 29 | 10 | 17 | 11 | 29 | 12 | 12 | 26 | 30 | 39 | 60 | 53 | 45 | 30 | 24 | 14 | 10 | 7 | 7 | 21 | 8 | 27 | 60 |
| 15-Sep | 18 | 30 | 71 | 47 | 85 | 28 | 15 | 22 | 9 | 9 | 10 | 11 | 23 | 26 | 22 | 17 | 19 | 12 | 8 | 6 | 7 | 8 | 11 | 10 | 85 |
| 16-Sep | 15 | 16 | 19 | 13 | 9 | 15 | 25 | 10 | 16 | 16 | 25 | 13 | 17 | 15 | 15 | 16 | 12 | 9 | 10 | 7 | 6 | 5 | 5 | 14 | 25 |
| 17-Sep | 43 | 13 | 34 | 65 | 20 | 20 | 20 | 21 | 14 | 15 | 14 | 12 | 12 | 15 | 12 | 15 | 11 | 8 | 6 | 6 | 6 | 7 | 6 | 6 | 65 |
| 18-Sep | 8 | 7 | 46 | 31 | 55 | 12 | 12 | 19 | 38 | 75 | 13 | 10 | 16 | 23 | 24 | 22 | 17 | 15 | 13 | 14 | 19 | 22 | 18 | 37 | 75 |
| 19-Sep | 21 | 12 | 8 | 8 | 10 | 9 | 12 | 12 | 12 | 10 | 11 | 11 | 11 | 12 | 9 | 11 | 22 | 14 | 11 | 11 | 11 | 11 | 11 | 12 | 22 |
| 20-Sep | 8 | 10 | 10 | 11 | 11 | 10 | 10 | 9 | 11 | 11 | 10 | 11 | 11 | 11 | 10 | 10 | 10 | 10 | 11 | 11 | 9 | 11 | 10 | 11 | 11 |
| 21-Sep | 10 | 10 | 12 | 12 | 13 | 14 | 14 | 14 | 15 | 15 | 15 | 14 | 12 | 12 | 14 | 14 | 15 | 14 | 13 | 13 | 13 | 9 | 15 | 11 | 15 |
| 22-Sep | 19 | 15 | 61 | 30 | 25 | 35 | 9 | 15 | 11 | 15 | 25 | 43 | 31 | 43 | 34 | 14 | 10 | 10 | 9 | 9 | 9 | 42 | 32 | 36 | 61 |
| 23-Sep | 28 | 45 | 56 | 26 | 55 | 15 | 23 | 44 | 85 | 62 | 26 | 21 | 67 | 19 | 21 | 16 | 17 | 25 | 13 | 9 | 10 | 76 | 43 | 43 | 85 |
| 24-Sep | 10 | 12 | 7 | 9 | 9 | 9 | 12 | 11 | 10 | 12 | 25 | 16 | 17 | 22 | 27 | 13 | 10 | 19 | 24 | 36 | 27 | 84 | 51 | 9 | 84 |
| 25-Sep | 10 | 8 | 8 | 7 | 6 | 9 | 9 | 10 | 8 | 9 | 19 | 17 | 23 | 17 | 18 | 11 | 9 | 34 | 29 | 33 | 77 | 67 | 27 | 19 | 77 |
| 26-Sep | 13 | 32 | 53 | 33 | 22 | 22 | 33 | 17 | 10 | 18 | 73 | 16 | 18 | 28 | 17 | 20 | 13 | 10 | 11 | 50 | 42 | 47 | 25 | 58 | 73 |
| 27-Sep | 36 | 20 | 18 | 17 | 23 | 10 | 34 | 59 | 28 | 23 | 14 | 17 | 18 | 17 | 17 | 14 | 11 | 10 | 10 | 9 | 11 | 10 | 11 | 9 | 59 |
| 28-Sep | 11 | 9 | 22 | 14 | 17 | 32 | 32 | 36 | 15 | 16 | 19 | 21 | 13 | 12 | 10 | 12 | 9 | 7 | 9 | 4 | 7 | 7 | 7 | 7 | 36 |
| 29-Sep | 8 | 15 | 7 | 10 | 6 | 10 | 15 | 29 | 14 | 8 | 12 | 14 | 20 | 21 | 16 | 20 | 18 | 28 | 73 | 32 | 13 | 64 | 16 | 14 | 73 |
| 30-Sep | 11 | 18 | 15 | 29 | 19 | 20 | 15 | 17 | 17 | 12 | 12 | 11 | 14 | 14 | 14 | 12 | 22 | 15 | 12 | 17 | 15 | 15 | 11 | 20 | 29 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 61 | 45 | 71 | 65 | 85 | 76 | 88 | 74 | 87 | 75 | 73 | 55 | 90 | 64 | 64 | 66 | 83 | 74 | 87 | 70 | 77 | 84 | 65 | 75 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Summary

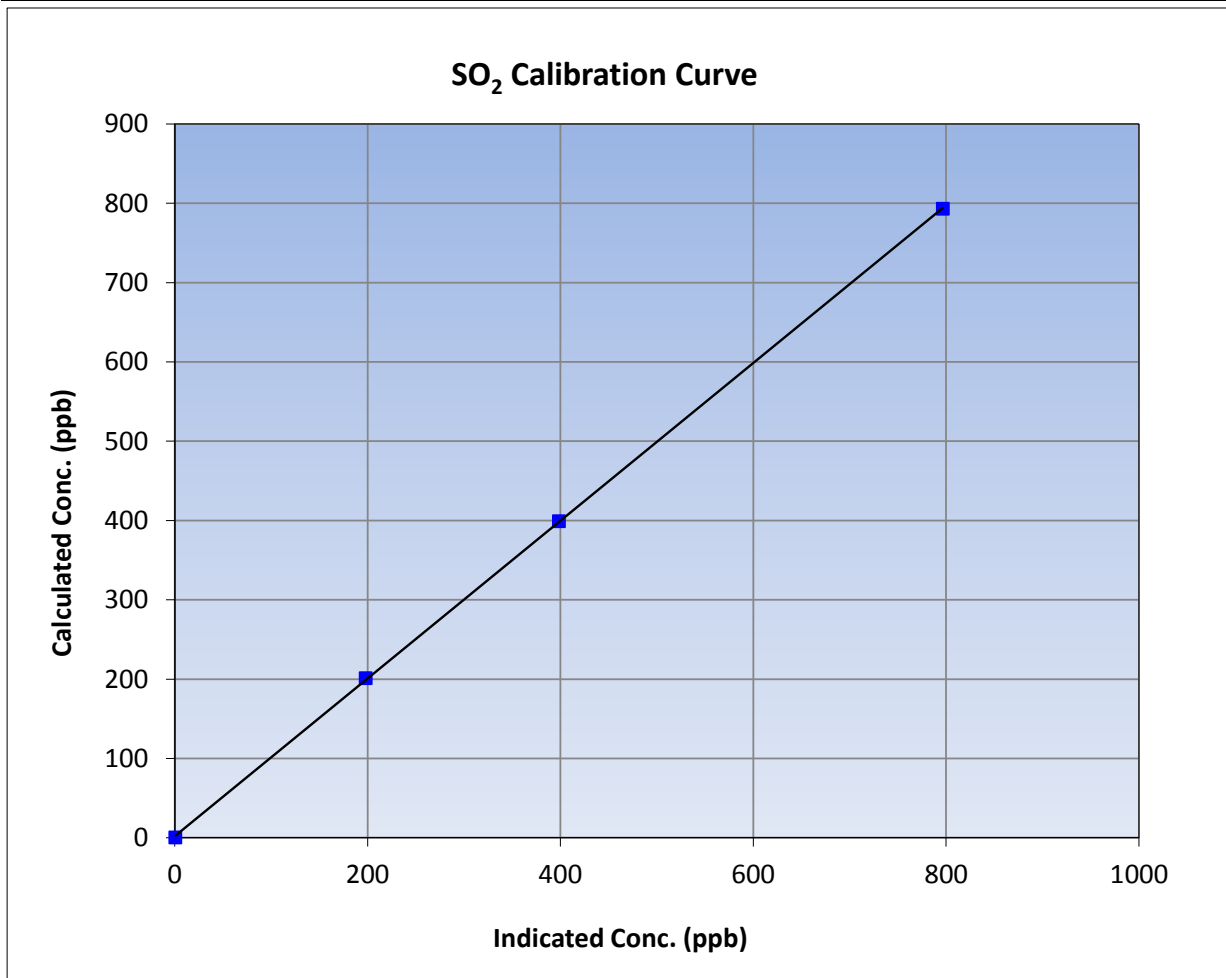
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Fort Hills | Station Number | AMS 23 |
| Start Time (MST) | 10:22 | End Time (MST) | 13:44 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1160290012 |

Calibration Data

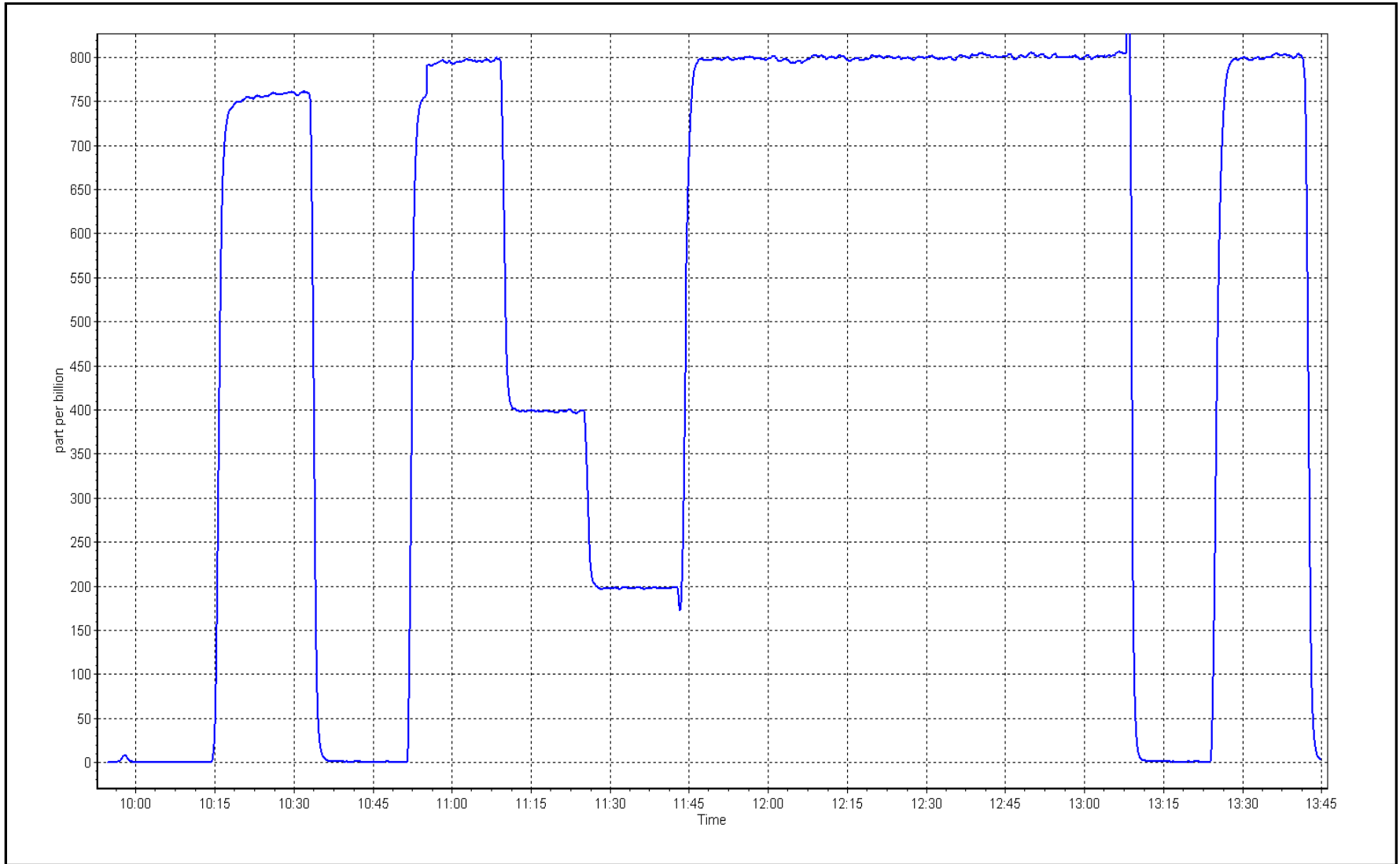
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | ≥0.995 |
| 792.7 | 796.2 | 0.9956 | | |
| 398.8 | 398.2 | 1.0016 | Slope | 0.90 - 1.10 |
| 200.9 | 197.7 | 1.0159 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 12, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

TRS Calibration Summary

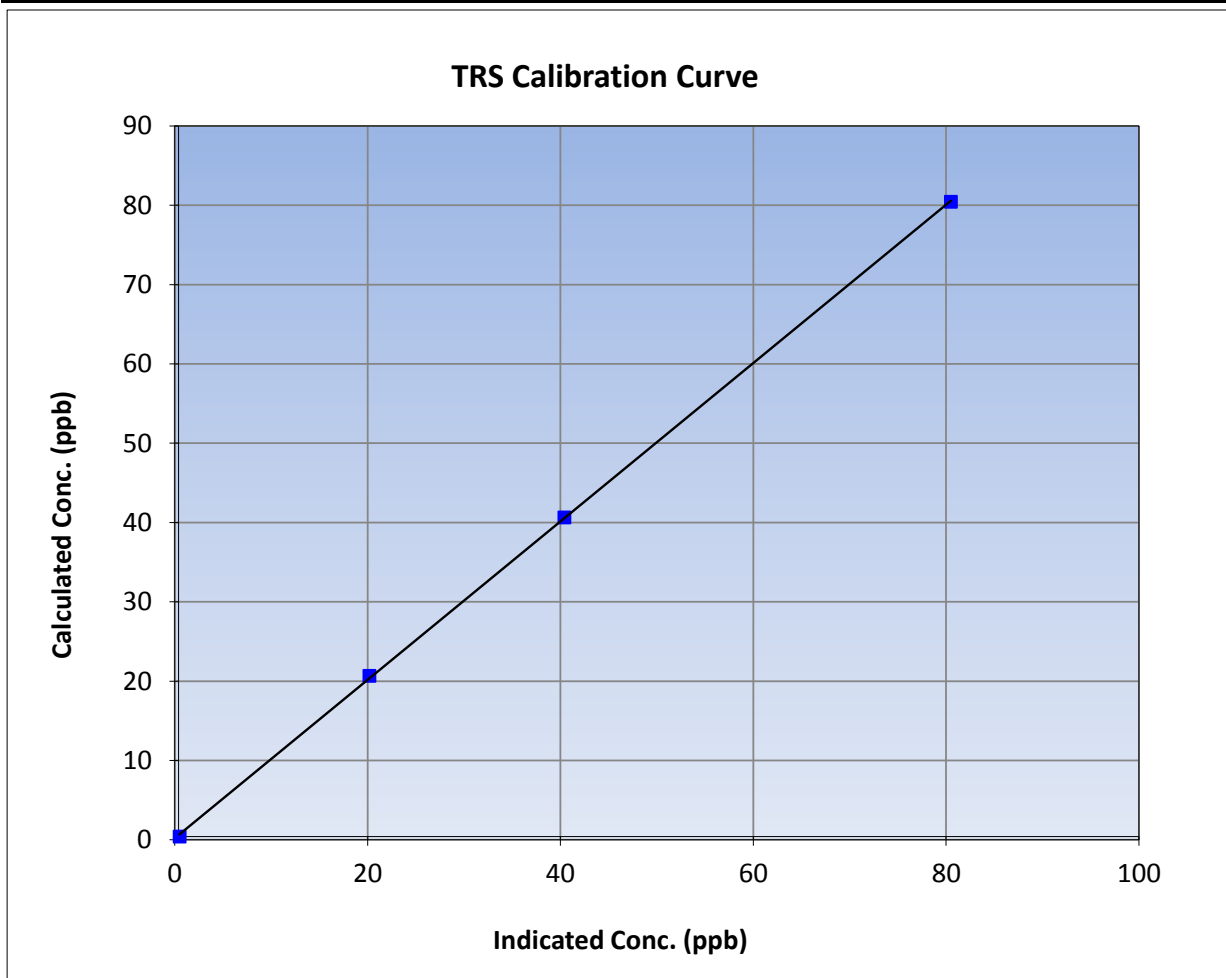
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 1, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Fort Hills | Station Number | AMS 23 |
| Start Time (MST) | 8:25 | End Time (MST) | 11:03 |
| Analyzer make | Thermo 43iTLE | Analyzer serial # | 1150840012 |

Calibration Data

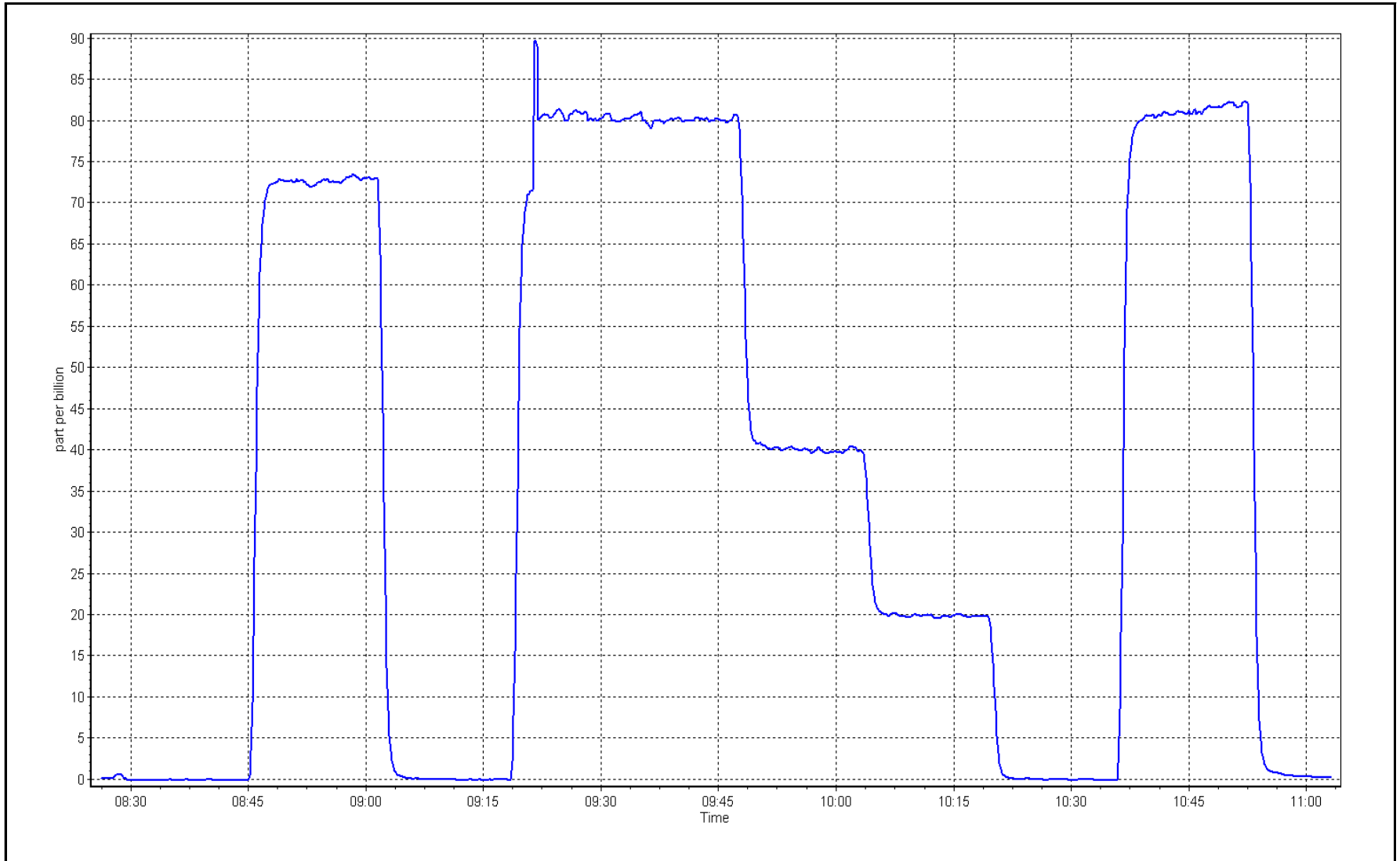
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999941 | ≥0.995 |
| 80.0 | 80.1 | 0.9993 | | | |
| 40.2 | 40.0 | 1.0061 | Slope | 0.998634 | 0.90 - 1.10 |
| 20.3 | 19.8 | 1.0237 | | | |
| | | | Intercept | 0.188059 | +/-3 |



TRS Calibration Plot

Date: September 1, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|-----------------|
| Station Name: | Fort Hills | Station number: | AMS 23 |
| Calibration Date: | September 1, 2017 | Last Cal Date: | August 22, 2017 |
| Start time (MST): | 10:52 | End time (MST): | 13:07 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|-------------------|---------------------|------------------|
| Gas Cert Reference | EY0000688 | Cal Gas Expiry Date | November 4, 2019 |
| CH4 Cal Gas Conc. | <u>514.0</u> ppm | CH4 Equiv Conc. | 1061.3 ppm |
| C3H8 Cal Gas Conc. | <u>199.0</u> ppm | Station temp. | 24 Deg C |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 451 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 4522 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|---------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 1218153580 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -299 |
| Calculated slope | 1.000546 | Sample pressure | 8.2 |
| Calculated intercept | -0.012950 | Fuel pressure | 24.2 |
| Analyzer Background | 2.30 | Air pressure | 37.8 |
| Analyzer Coefficient | 4.767 | Flame temperature | 158.6 |
| | | | <u>Finish</u> |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5007 | 0.0 | 0.00 | -0.08 | ---- |
| as found span | 4936 | 80.5 | 17.03 | 15.74 | 1.082 |
| calibrator zero | 5011 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 4937 | 80.5 | 17.03 | 17.02 | 1.001 |
| second point | 4977 | 40.5 | 8.57 | 8.56 | 1.000 |
| third point | 4997 | 20.4 | 4.31 | 4.22 | 1.022 |
| as left zero | 5009 | 0.0 | 0.00 | 0.04 | ---- |
| as left span | 4937 | 80.5 | 17.03 | 17.52 | 0.972 |
| Average Correction Factor | | | | | 1.008 |
| Corrected As found | 15.82 | Previous response | 17.03 | *% change | 7.7% |

* = > +/-5% change initiates investigation

Notes: % change is high due to MFC calibration the day before. Changed inlet filter after asfounds. Adjusted the zero and the span.

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

THC Calibration Summary

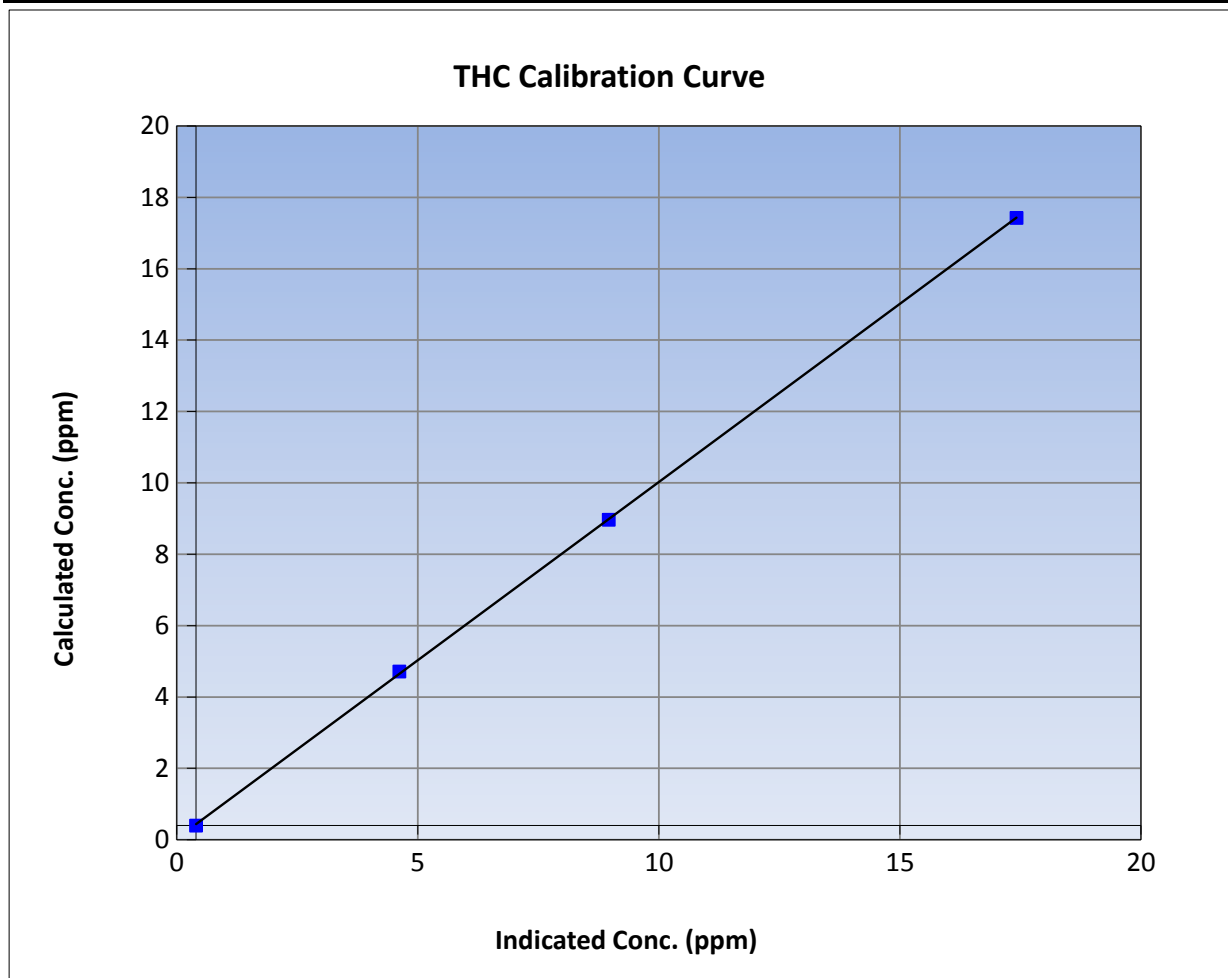
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 1, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Fort Hills | Station Number | AMS 23 |
| Start Time (MST) | 10:52 | End Time (MST) | 13:07 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1218153580 |

Calibration Data

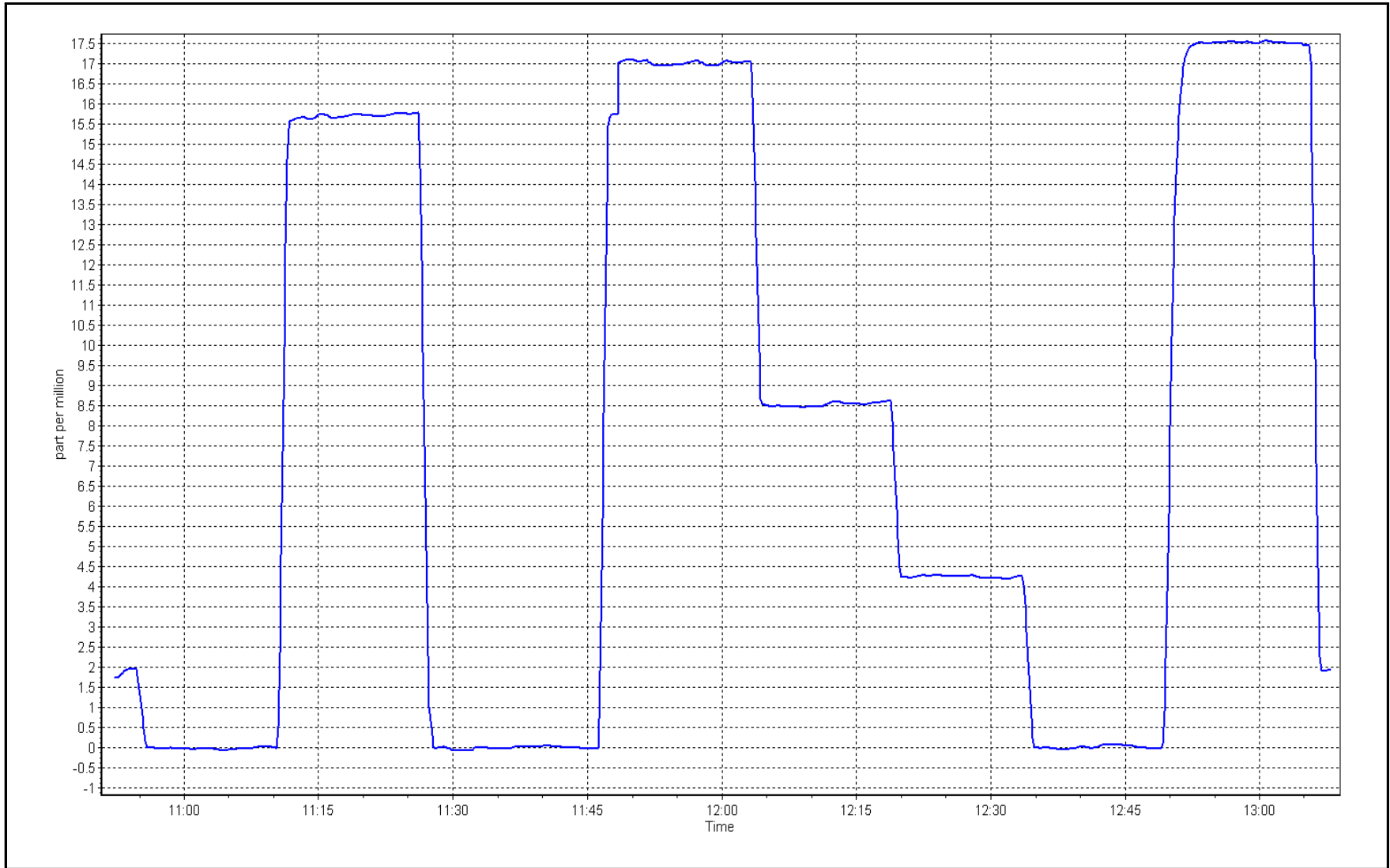
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999962 | ≥0.995 |
| 17.03 | 17.02 | 1.0005 | | | |
| 8.57 | 8.56 | 1.0004 | Slope | 0.998699 | 0.90 - 1.10 |
| 4.31 | 4.22 | 1.0225 | | | |
| | | | Intercept | 0.035837 | +/-1.5 |



THC Calibration Plot

Date: September 1, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|----------------|
| Station Name: | Fort Hills | Station number: | AMS 23 |
| Calibration Date: | September 12, 2017 | Last Cal Date: | August 2, 2017 |
| Start time (MST): | 9:55 | End time (MST): | 13:43 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|------------------|
| NO Gas Cylinder # | EY0000688 | Cal Gas Expiry Date | November 4, 2019 |
| NOX Cal Gas Conc. | <u>49.9</u> ppb | NO Cal Gas Conc. | <u>49.9</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 451 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4522 |

Analyzer Information

| | | | | |
|-----------------|--------------|--------------------|---------------------|---------------|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 115243007 | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.013 | 1.052 | NOX Range (ppb) | 0 - 1000 ppb |
| NOX coefficient | 1.000 | 1.000 | PMT Temperature | -2.8 -3.1 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 162.9 162.0 |
| NO bkgrnd | 1.6 | 1.7 | Sample Flow | 0.773 0.777 |
| NOX bkgrnd | 1.7 | 1.8 | PMT Voltage | -802.9 -803.5 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.995585 | 0.995838 |
| NO _x Cal Offset | -1.242502 | 0.185520 |
| NO Cal Slope | 0.995831 | 0.996492 |
| NO Cal Offset | -1.281029 | 0.225913 |
| NO ₂ Cal Slope | 1.006775 | 1.008574 |
| NO ₂ Cal Offset | -1.675270 | -2.099705 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Total flow rate (sccm) | Total flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|------------------------|------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5008 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| as found span | 4937 | 80.5 | 813.6 | 813.6 | 0.0 | 784.5 | 783.5 | 1.0 | 1.0371 | 1.0385 |
| calibrator zero | 5008 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high point | 4937 | 80.5 | 813.6 | 813.6 | 0.0 | 816.5 | 815.9 | 0.6 | 0.9965 | 0.9972 |
| second point | 4976 | 40.5 | 406.1 | 406.1 | 0.0 | 408.8 | 408.6 | 0.2 | 0.9935 | 0.9940 |
| third point | 4997 | 20.4 | 203.7 | 203.7 | 0.0 | 203.5 | 203.2 | 0.3 | 1.0011 | 1.0025 |
| as left zero | 5008 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | ---- | ---- |
| as left span | 4936 | 80.4 | 812.8 | 395.9 | 416.9 | 841.6 | 402.3 | 439.3 | 0.9658 | 0.9841 |
| Average Correction Factor | | | | | | | | | 0.9970 | 0.9979 |

| | | | | |
|--------------------|-----------------------------|----------------|-----------------|------------------------|
| Corrected As found | NO _x = 784.6 ppb | NO = 783.6 ppb | *Percent Change | NO _x = 4.3% |
| Previous Response | NO _x = 818.5 ppb | NO = 818.3 ppb | *Percent Change | NO = 4.4% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 838.1 | 835.3 | 2.8 | 0.9708 | 0.9741 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 395.9 | 439.4 | 832.5 | 395.9 | 436.5 | 0.9773 | ---- | 1.0066 | 99.3% |
| 2nd NO2 (200 ppb O3) | 617.9 | 217.4 | 837.1 | 617.9 | 219.2 | 0.9720 | ---- | 0.9918 | 100.8% |
| 3rd NO2 (100 ppb O3) | 724.3 | 111.0 | 838.1 | 724.3 | 113.9 | 0.9708 | ---- | 0.9745 | 102.6% |
| 2nd NO ref point | ---- | 0.0 | 838.1 | 835.3 | 2.8 | 0.9708 | 0.9741 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9727 | 0.9741 | 0.9910 | 100.9% |

Notes: Changed inlet filter after asfound. Adjusted the span. Used second NO ref point due to drift

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

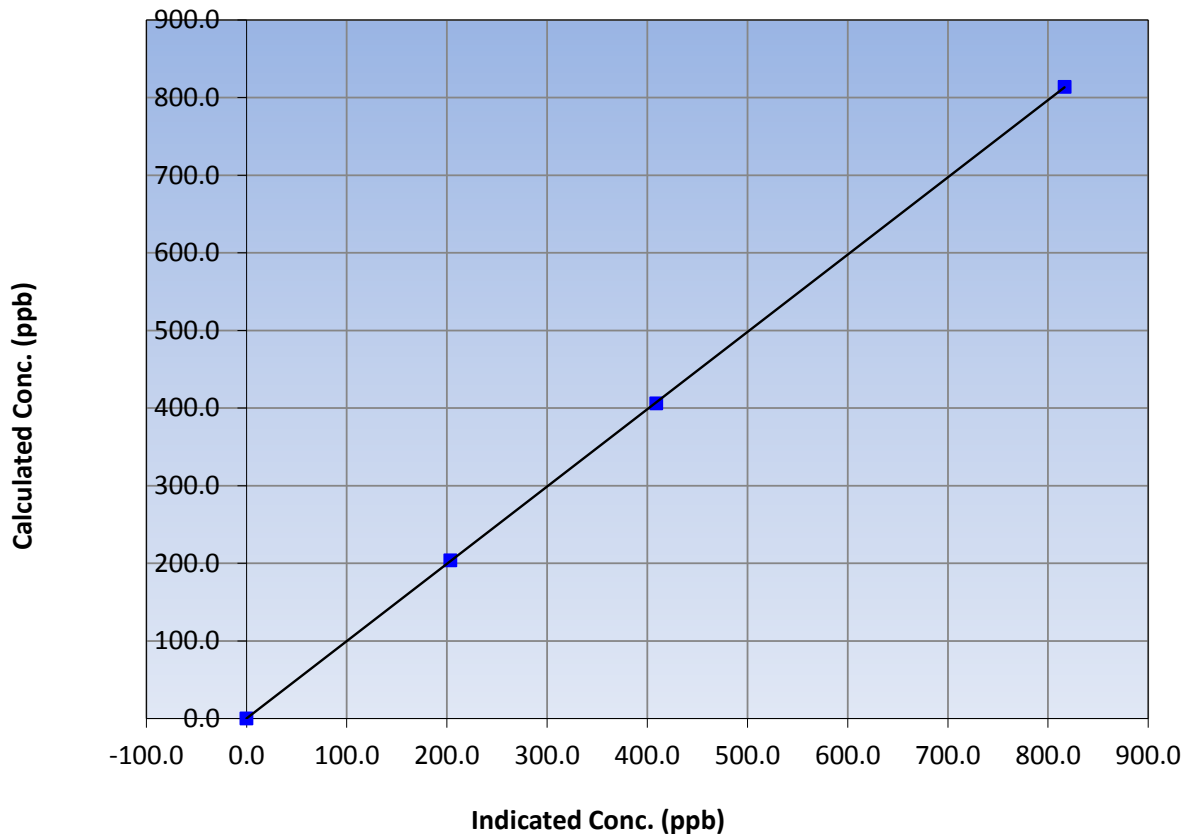
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Fort Hills | Station Number | AMS 23 |
| Start Time (MST) | 9:55 | End Time (MST) | 13:43 |
| Analyzer make | Thermo 42i | Analyzer serial # | 115243007 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 813.6 | 816.5 | 0.9965 | | | |
| 406.1 | 408.8 | 0.9935 | | | |
| 203.7 | 203.5 | 1.0011 | | | |
| | | | Slope | 0.995838 | 0.90 - 1.10 |
| | | | Intercept | 0.185520 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

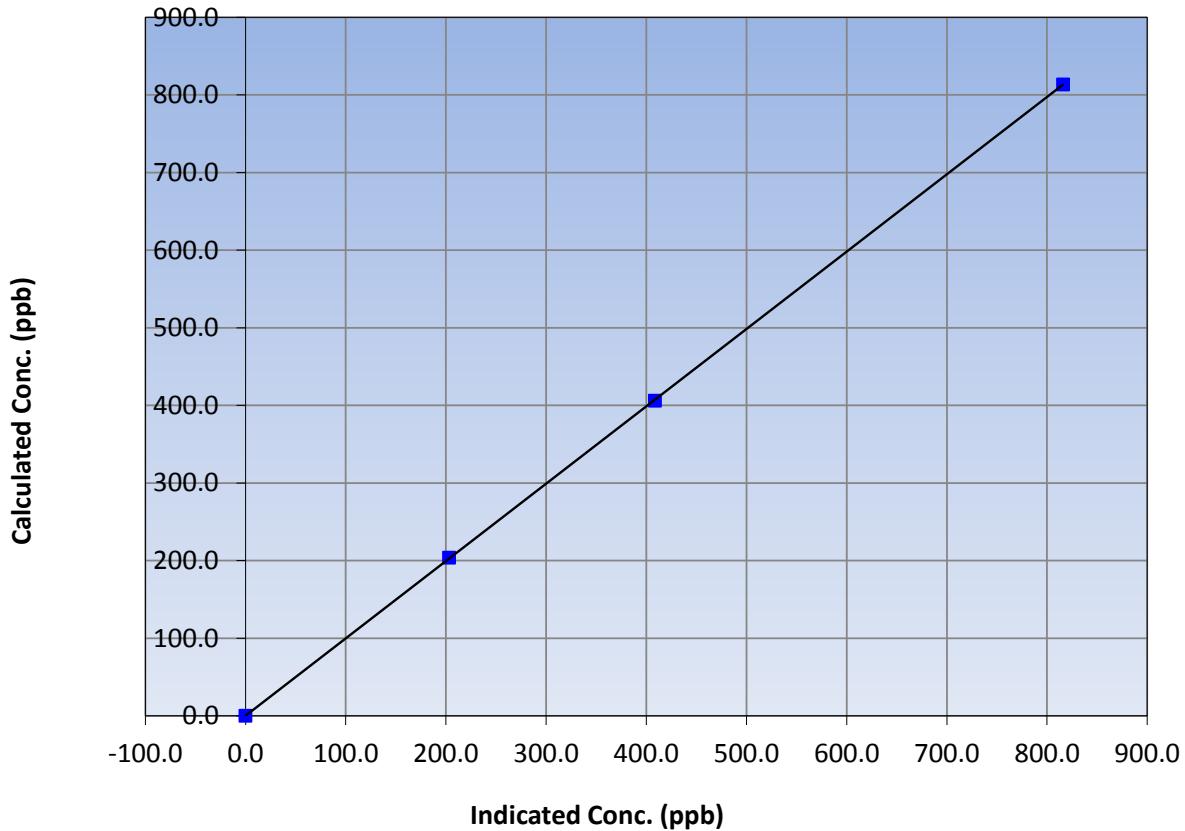
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Fort Hills | Station Number | AMS 23 |
| Start Time (MST) | 9:55 | End Time (MST) | 13:43 |
| Analyzer make | Thermo 42i | Analyzer serial # | 115243007 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 813.6 | 815.9 | 0.9972 | | | |
| 406.1 | 408.6 | 0.9940 | | | |
| 203.7 | 203.2 | 1.0025 | | | |
| | | | Slope | 0.996492 | 0.90 - 1.10 |
| | | | Intercept | 0.225913 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

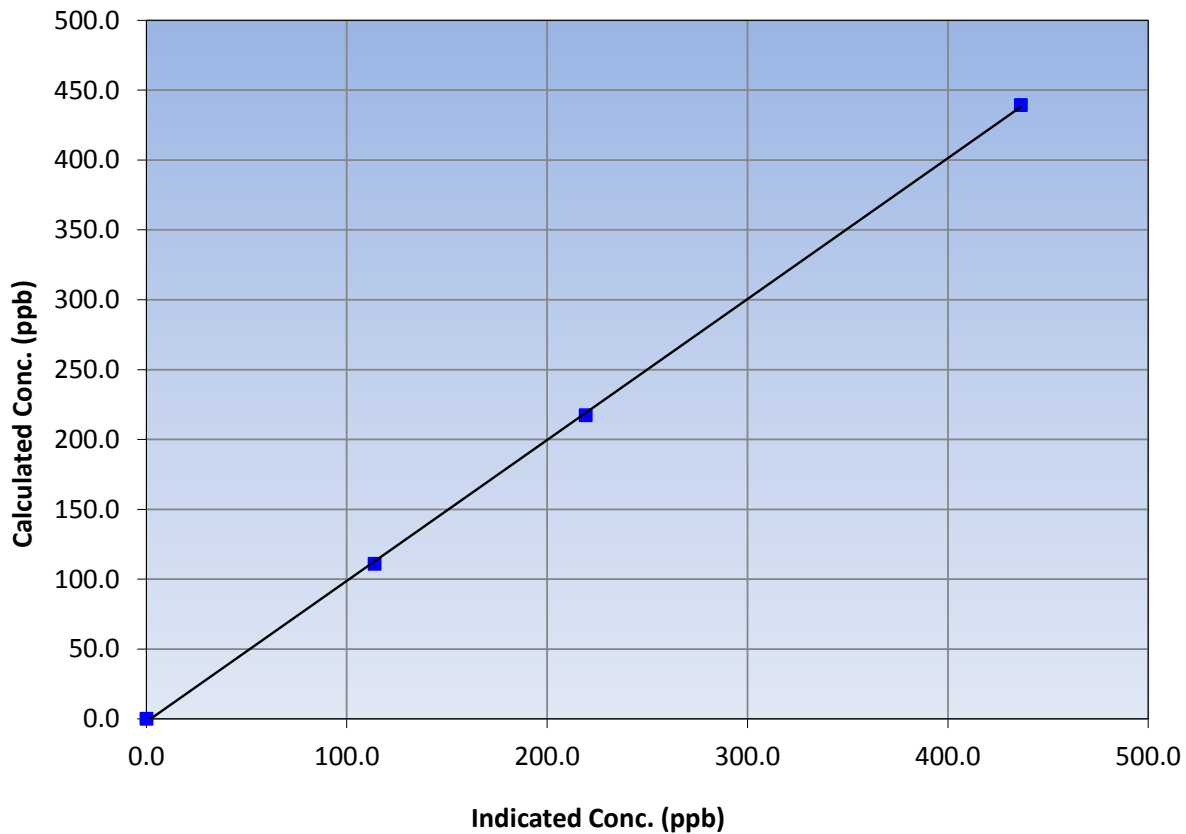
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2017 | Previous Calibration | August 2, 2017 |
| Station Name | Fort Hills | Station Number | AMS 23 |
| Start Time (MST) | 9:55 | End Time (MST) | 13:43 |
| Analyzer make | Thermo 42i | Analyzer serial # | 115243007 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 439.4 | 436.5 | 1.0066 | | | |
| 217.4 | 219.2 | 0.9918 | | | |
| 111.0 | 113.9 | 0.9745 | | | |
| | | | Slope | 1.008574 | 0.90 - 1.10 |
| | | | Intercept | -2.099705 | +/-20 |

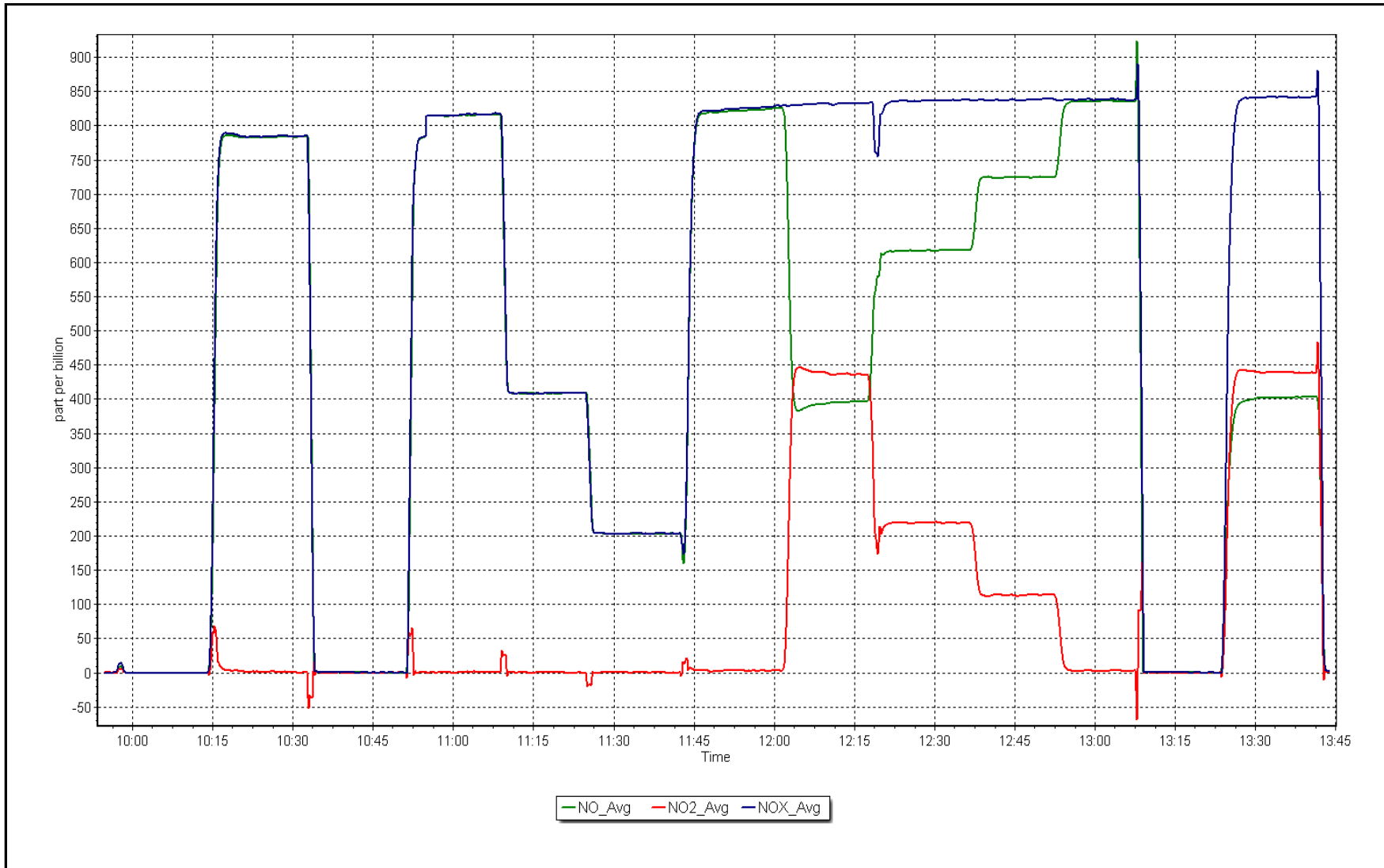
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 12, 2017

Location: Fort Hills





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-02-2017

Station Information

| | | | |
|------------------------|--------------------|-----------------|----------------|
| Station Name: | Fort Hills | Station number: | AMS 23 |
| Calibration Date: | September 12, 2017 | Last Cal Date: | August 4, 2017 |
| Start time (MST): | 10:02 | End time (MST): | 11:04 |
| Sharp Model: | 5030 | S/N: | E-802 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 4153 |
| Flow Meter Make/Model: | DeltaCAL | S/N: | 628 |
| Temp/RH standard: | | S/N: | |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | (Limits) |
|-----------------------------|-----------------|-------------------------------------|----------------|-------------------------------------|-----------------|
| T1 (°C) | 11.3 | 12.1 | 12.1 | <input checked="" type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 977 | 975 | 977 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1003 | 100 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.2 | ----- | 0.2 | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified | <input type="checkbox"/> | | | |
| Cyclone cleaning : | PM10 Cyclone | <input checked="" type="checkbox"/> | PM2.5 Cyclone | <input checked="" type="checkbox"/> | |
| Date Filter Tape Installed: | | | | | |

Quarterly Calibration Test

Leak Test: Date of check: _____ Last Cal Date: July 10, 2017
 Flow w/o adaptor: 17.8 Flow w/ adaptor: 17.66

(Limit) 0.4 LPM

| <u>Adjusted</u> | <u>Current Test</u> | <u>Previous Test</u> | <u>% Change</u> |
|-----------------------------------|--------------------------|--------------------------------------|-----------------|
| <input type="checkbox"/> | Foil S/N: _____ | Foil S/N: <u>2198</u> | |
| Foil Calibration | Foil Mass: _____ | Foil Mass: <u>1463</u> | |
| | Calibration Date: _____ | Calibration Date: <u>May 5, 2017</u> | |
| (Limit) +/- 5% of previous | Correction Factor: _____ | Correction Factor: <u>6969</u> | --- |

Annual Calibration Test

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

Notes: Cleaned cyclone head. Adjusted T1.

Calibration by: Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

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

**AMS 24
SURMONT
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 24)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 273 | 12 | 12 | 100 | 2 | 0 | 1 | 0 |
| H2S (ppb) Average | 272 | 12 | 12 | 100 | 1 | 0 | 0 | 0 |
| THC(ppm) Average | 268 | 15 | 17 | 99.3 | 3 | - | 2 | - |
| NO2 (ppb) Average | 273 | 12 | 12 | 100 | 9 | 0 | 2 | - |
| NO (ppb) Average | 273 | 12 | 12 | 100 | 7 | - | 2 | - |
| NOX (ppb) Average | 273 | 12 | 12 | 100 | 13 | - | 3 | - |
| Temperature 2 m (C) Average | 288 | 0 | 0 | 100 | 24 | - | 16 | - |
| Relative Humidity (%) Average | 288 | 0 | 0 | 100 | 99 | - | 97 | - |
| Wind Speed 10 m (km/h) Average | 288 | 0 | 0 | 100 | 26 | - | 22 | - |
| Wind Direction 10 m (deg) Average | 288 | 0 | 0 | 100 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 24)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|----|--------|----|-----|-----|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 273 | 0.4 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| H2S (ppb) Average | 272 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 268 | 2 | 0 | - | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| NO2 (ppb) Average | 273 | 1.1 | 1 | - | 0 | 0 | 0 | 1 | 2 | 2 | 9 |
| NO (ppb) Average | 273 | 0.4 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 7 |
| NOX (ppb) Average | 273 | 1.4 | 2 | - | 0 | 0 | 0 | 1 | 2 | 3 | 13 |
| Temperature 2 m (C) Average | 288 | 9.6 | 6 | - | 2 | 3 | 4 | 9 | 13 | 17 | 24 |
| Relative Humidity (%) Average | 288 | 75 | 20 | - | 29 | 47 | 58 | 78 | 96 | 97 | 99 |
| Wind Speed 10 m (km/h) Average | 288 | 12.3 | 7 | - | 2 | 5 | 7 | 11 | 17 | 23 | 26 |
| Wind Direction 10 m (deg) Average | 288 | 0 | 0 | - | 0 | | | | | | 0 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 24)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|--|
| THC | 22 Sep 2017 14:00 | 22 Sep 2017 15:00 | 2 | Maintenance - reinitiated daily QA check |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

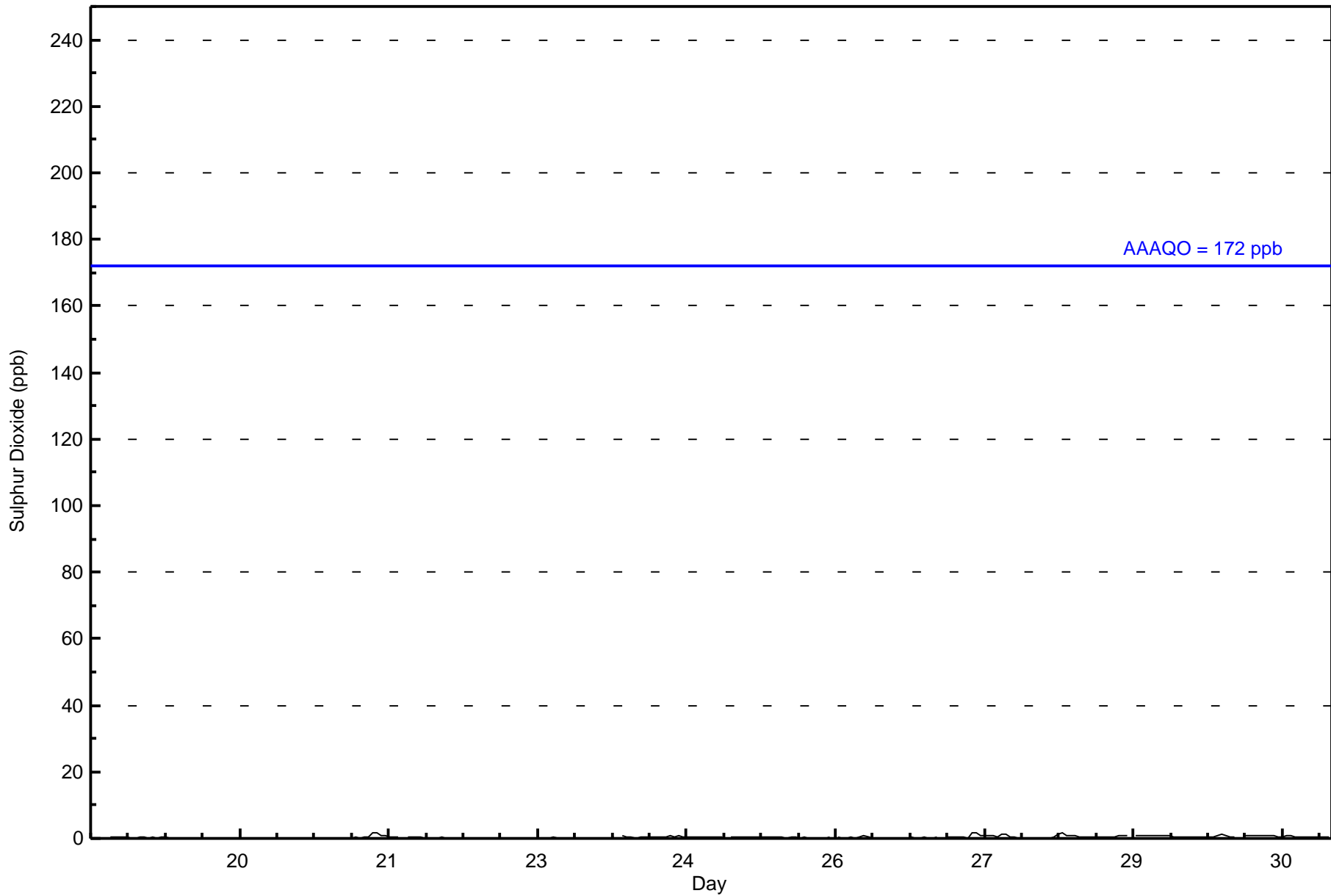
Surmont - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 2 ppb on Sep 27 14:00 Maximum Daily Average: 0.7 ppb on Sep 29 | | | | | | | | | | | | | | Hours in Service: 285 Hours of Data: 273 Hours of Missing Data: 12 Hours of Calibration: 12 Percent Operational Time: 100.0 | | | | | | | | | | | | |
|---|-------------------------------|----|----|---|---|---|---|---|---|----|----|----|----|---|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 21 11:00 Minimum Daily Average: 0.1 ppb on Sep 23 Maximum Diurnal Average: 0.4 ppb at hour 13 Minimum Diurnal Average: 0.3 ppb at hour 2 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 | | |
| 19-Sep | NS | NS | NS | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 20-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0.4 | 2 |
| 22-Sep | Z | 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-Sep | 0 | 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-Sep | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0.4 | 1 |
| 25-Sep | 1 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 27-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0.6 | 2 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.5 | 2 |
| 29-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.7 | 1 |
| 30-Sep | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerspan NS - Not in Service Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Surmont - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Surmont - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 273 | 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: 273

Total Number of Hours: 288



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |
| 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 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |

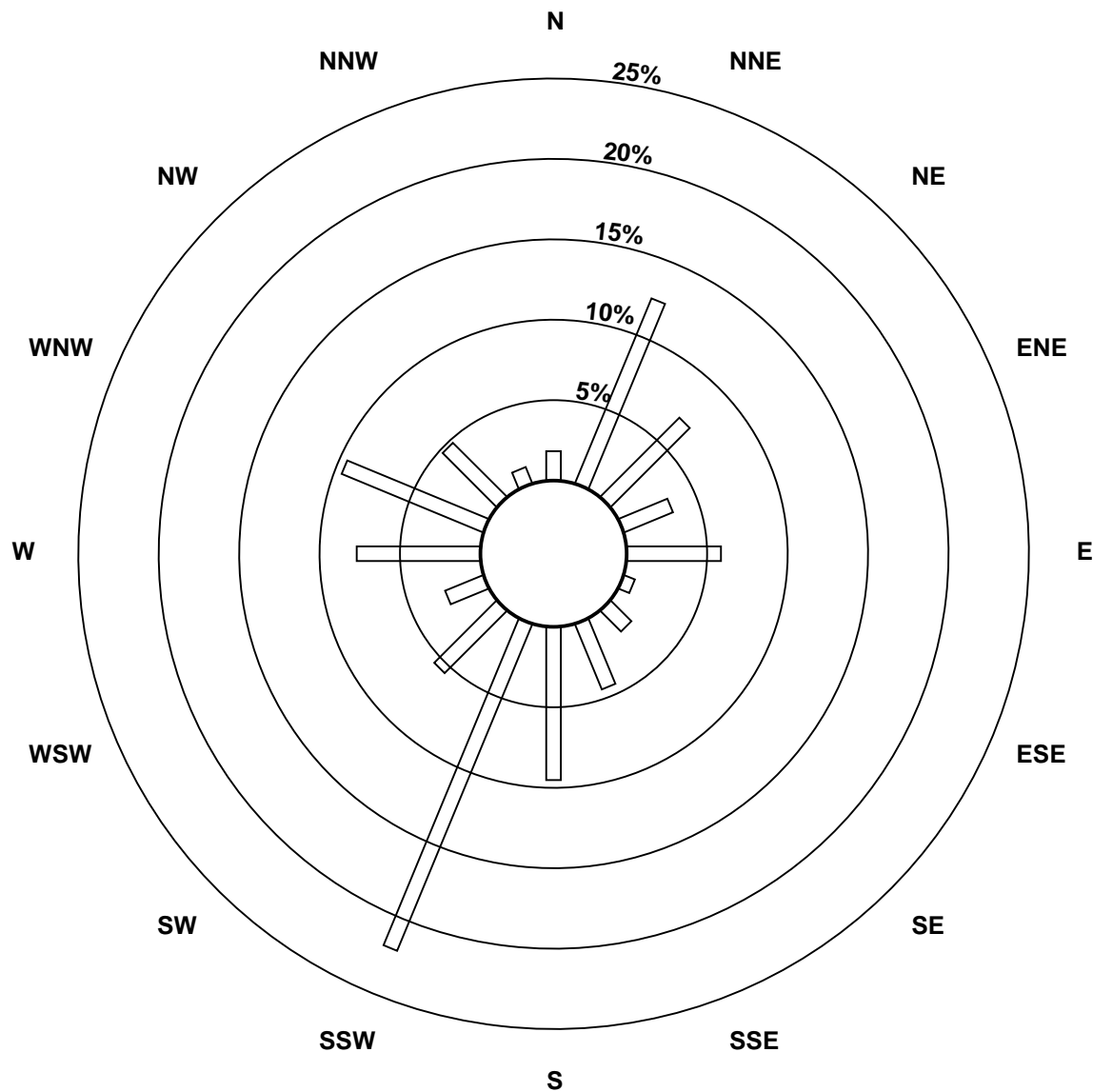
Total Number of Valid Hours: 273

Total Number of Hours: 288

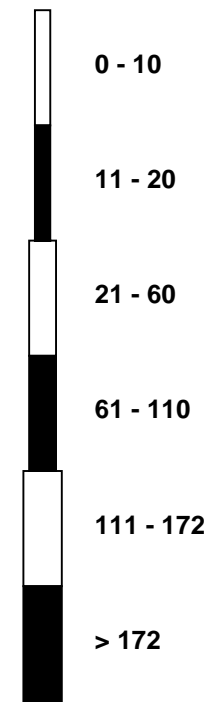


Wood Buffalo Environmental Association
Wind Rose Sep 2017

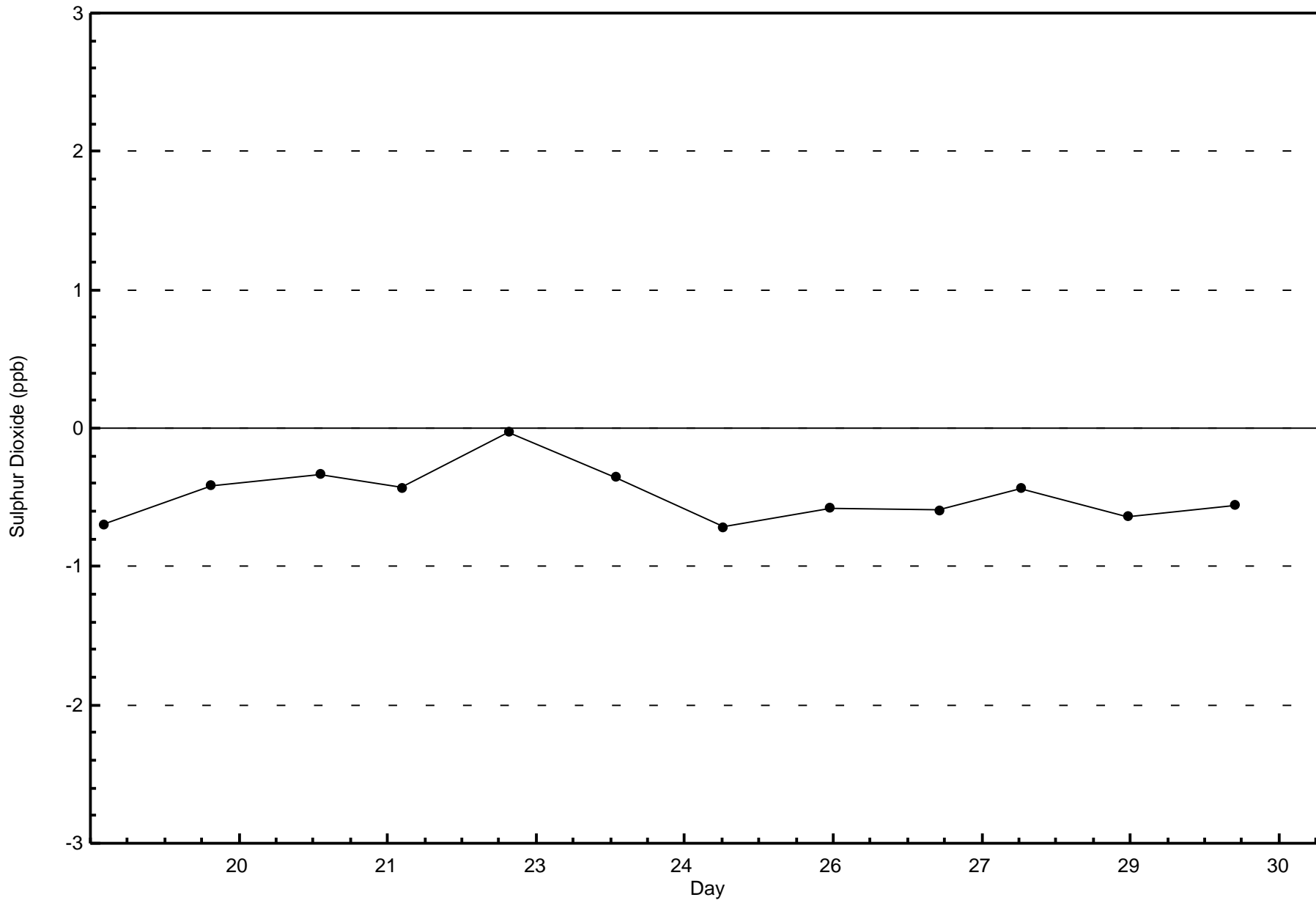
Sulphur Dioxide (SO₂) - ppb
Surmont (AMS 24)

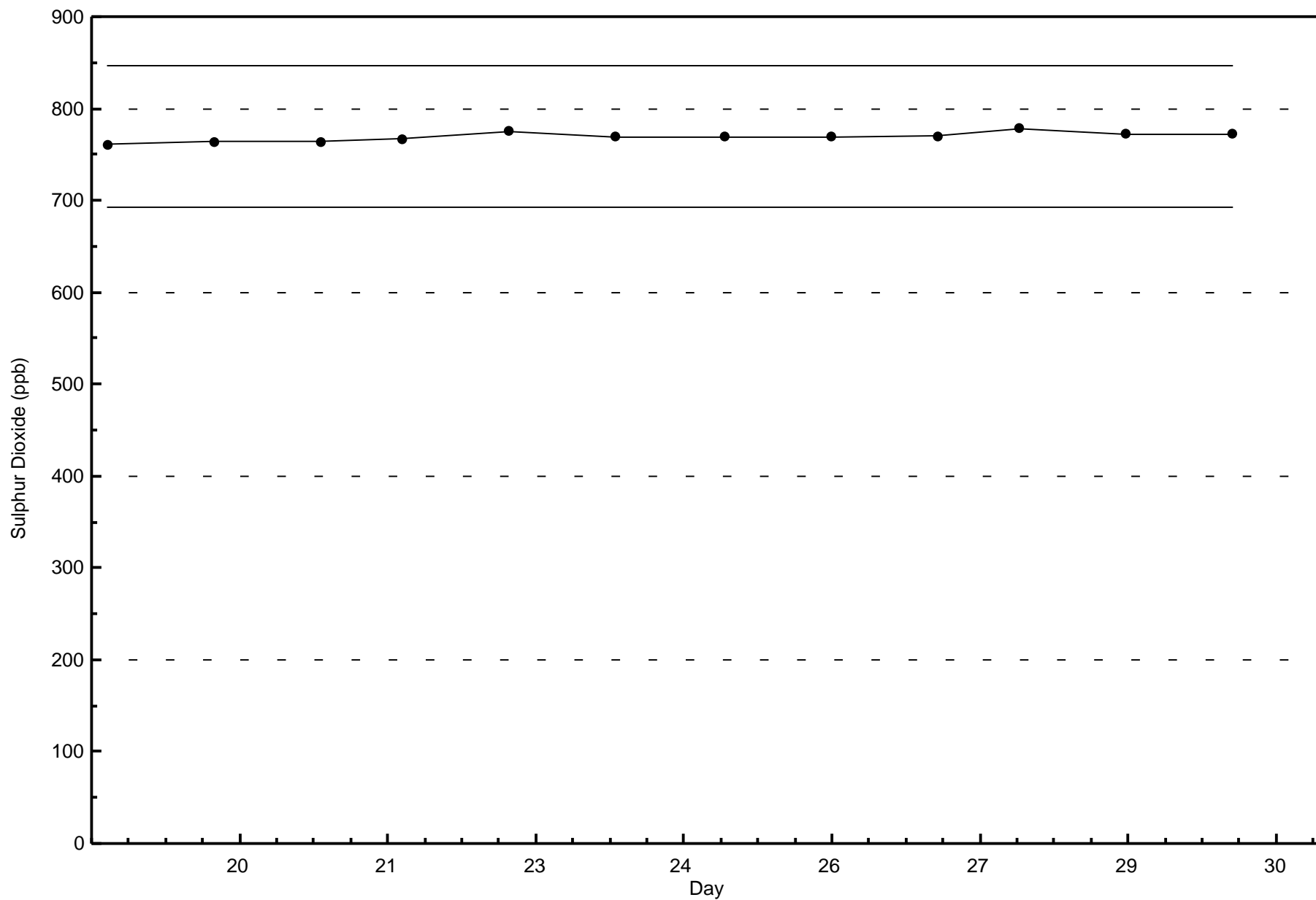


Classes (ppb)



Total Number of Valid Hours: 273





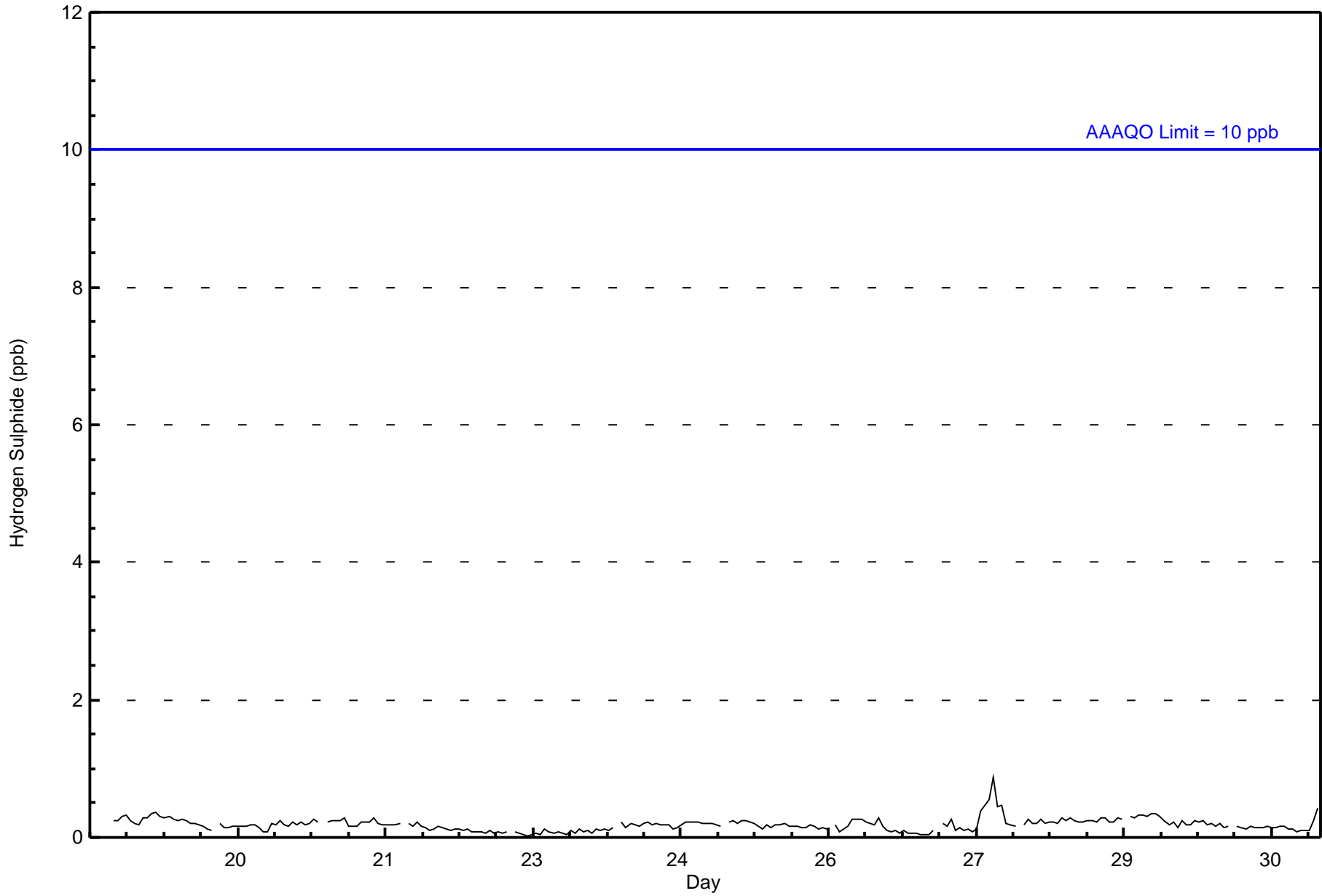


| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 1 ppb on Sep 27 20:00 Maximum Daily Average: 0.3 ppb on Sep 19 | | Hours in Service: 284 Hours of Data: 272 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|----|----|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 23 07:00 Minimum Daily Average: 0.1 ppb on Sep 23 Maximum Diurnal Average: 0.2 ppb at hour 20 Minimum Diurnal Average: 0.2 ppb at hour 3 | | Hours of Missing Data: 12 Hours of Calibration: 12 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.2 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0 | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 19-Sep | NS | NS | NS | NS | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 20-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 25-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 28-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan NS - Not in Service Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Surmont - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 272 | 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: 272

Total Number of Hours: 288



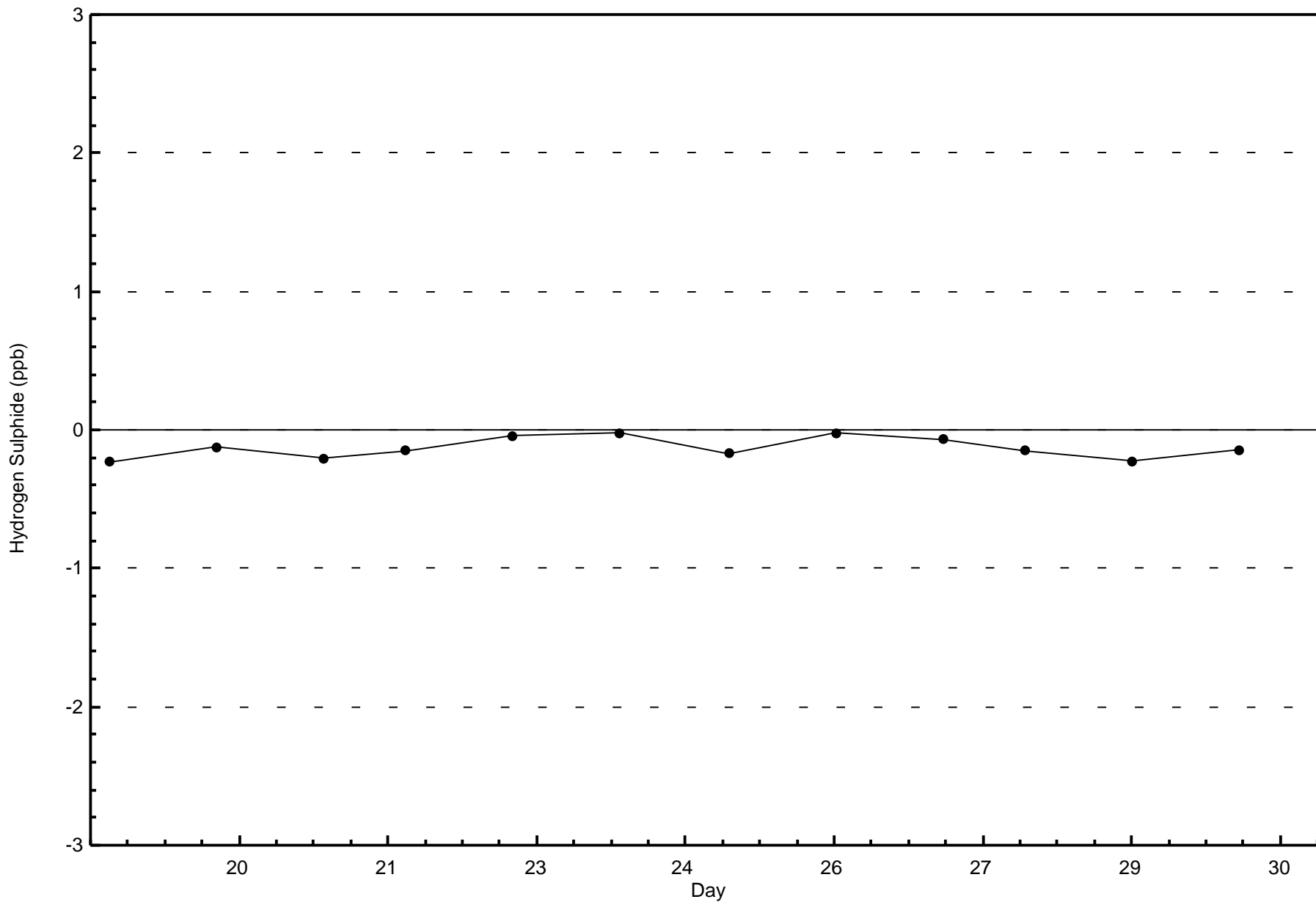
**Wood Buffalo Environmental Association
Frequency Distribution**

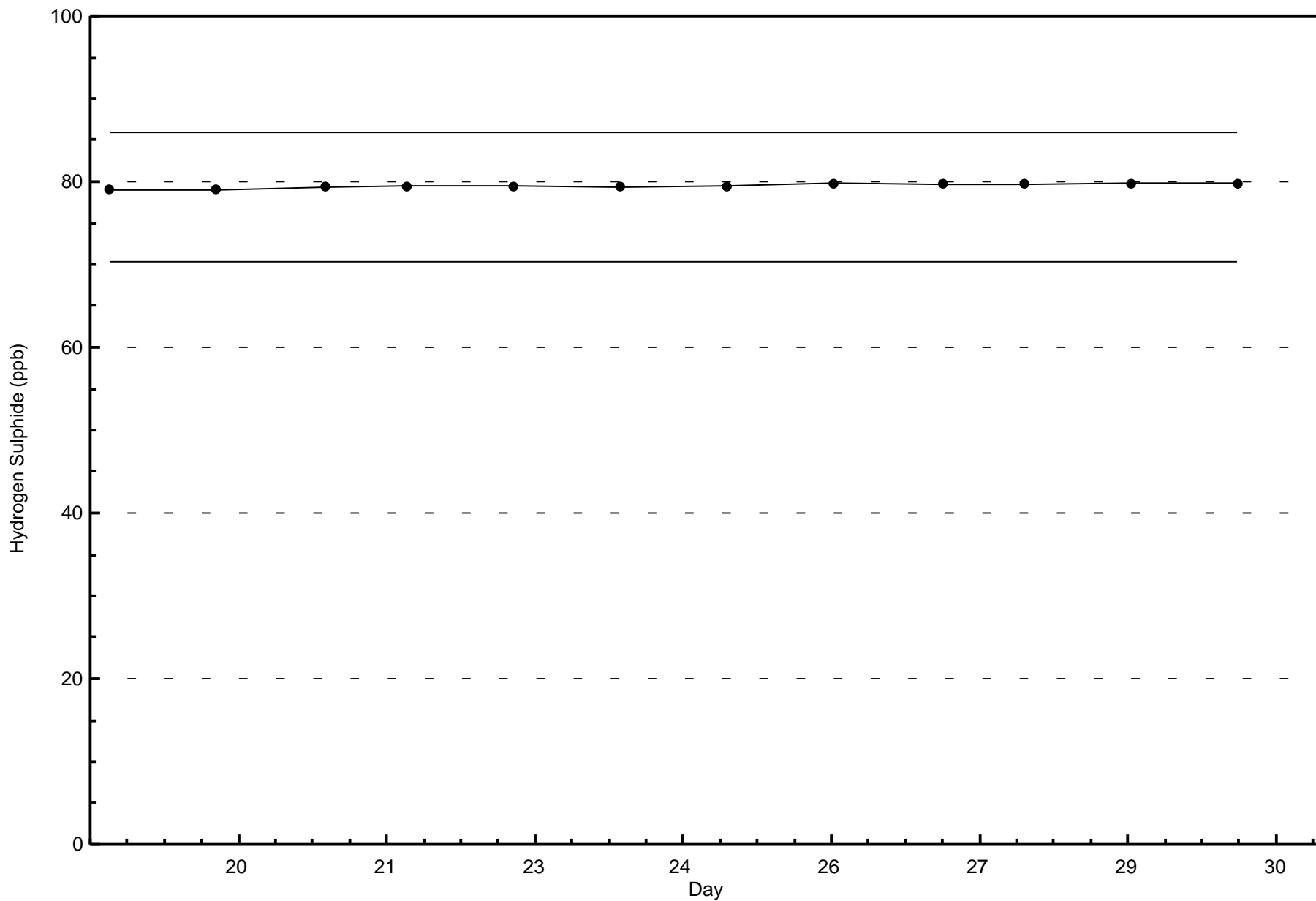
**Hydrogen Sulphide (H₂S) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 6 | 33 | 19 | 8 | 16 | 2 | 5 | 12 | 26 | 60 | 14 | 8 | 22 | 25 | 13 | 3 | 272 |
| 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 | 6 | 33 | 19 | 8 | 16 | 2 | 5 | 12 | 26 | 60 | 14 | 8 | 22 | 25 | 13 | 3 | 272 |

Total Number of Valid Hours: 272

Total Number of Hours: 288







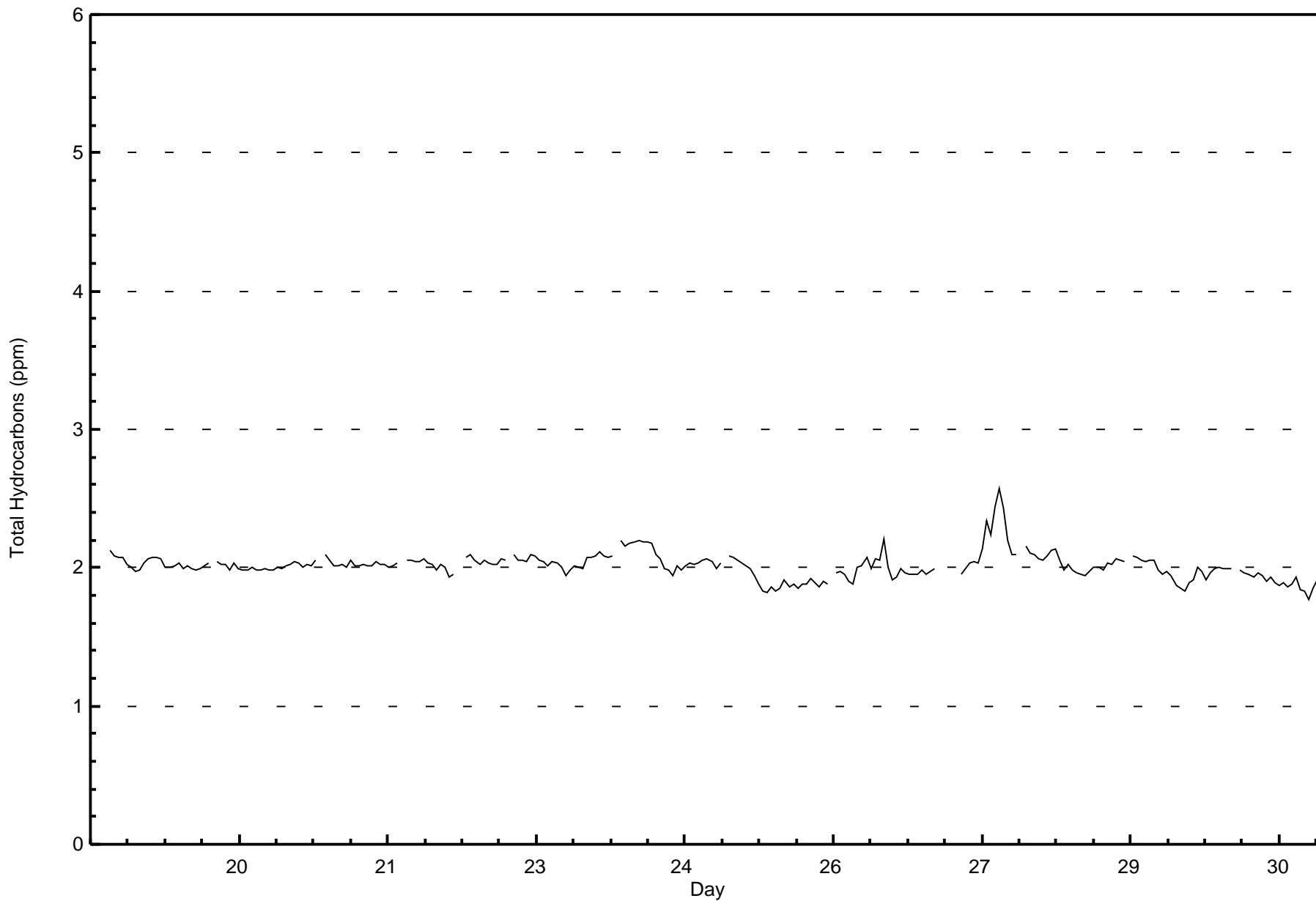
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Surmont - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | | | | | | | | | | Hours in Service: 285 | | | | | | | | | | Daily Average | | Daily Maximum | | | | | |
|---|-------------------------------|----|-----------------|---|---|-----------------|---|---|---------------------|--|----|----|----|----|----|----|----|----|----|--------------------------------|----|---------------|----|-----------------|---------------|-----------------|---|
| Maximum Value: 3 ppm on Sep 27 20:00 | | | | | | | | | | Maximum Daily Average: 2.1 ppm on Sep 27 | | | | | | | | | | Hours of Data: 268 | | | | | | | |
| Minimum Value: 2 ppm on Sep 30 20:00 | | | | | | | | | | Minimum Daily Average: 1.9 ppm on Sep 30 | | | | | | | | | | Hours of Missing Data: 17 | | | | | | | |
| Maximum Diurnal Average: 2.1 ppm at hour 5 | | | | | | | | | | Minimum Diurnal Average: 2.0 ppm at hour 15 | | | | | | | | | | Hours of Calibration: 15 | | | | | | | |
| Monthly Average: 2.0 ppm | | | | | | | | | | Percentiles: P ₁ = 2 P ₁₀ = 2 Q ₁ = 2 Median = 2 Q ₃ = 2 P ₉₀ = 2 P ₉₉ = 2 | | | | | | | | | | 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 | | | |
| 19-Sep | NS | NS | NS | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 |
| 20-Sep | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 |
| 21-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 |
| 22-Sep | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | M | M | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 |
| 23-Sep | 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 | 2.0 | 2 |
| 24-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 2 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.9 | 2 |
| 26-Sep | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.0 | 2 |
| 27-Sep | 2 | 2 | 2 | 2 | 2 | Z | 2 | C | C | C | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2.1 | 3 |
| 28-Sep | 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 | 2.0 | 2 |
| 29-Sep | 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 | 2.0 | 2 |
| 30-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.9 | 2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | Diurnal Maximum | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.0 | | 2 | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2 | | 2 | |
| Z - zerospan | | | C - Calibration | | | M - Maintenance | | | NS - Not in Service | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Surmont - September 2017

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 191 | 71.27 | 71.27 |
| 2.1 - 3.0 | 77 | 28.73 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 268

Total Number of Hours: 288



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Surmont - September 2017

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 2 | 26 | 19 | 4 | 12 | 1 | 1 | 11 | 17 | 29 | 10 | 7 | 21 | 23 | 6 | 2 | 191 |
| 2.1 - 3.0 | 3 | 8 | 0 | 4 | 4 | 1 | 3 | 1 | 9 | 31 | 5 | 0 | 0 | 1 | 6 | 1 | 77 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 5 | 34 | 19 | 8 | 16 | 2 | 4 | 12 | 26 | 60 | 15 | 7 | 21 | 24 | 12 | 3 | 268 |

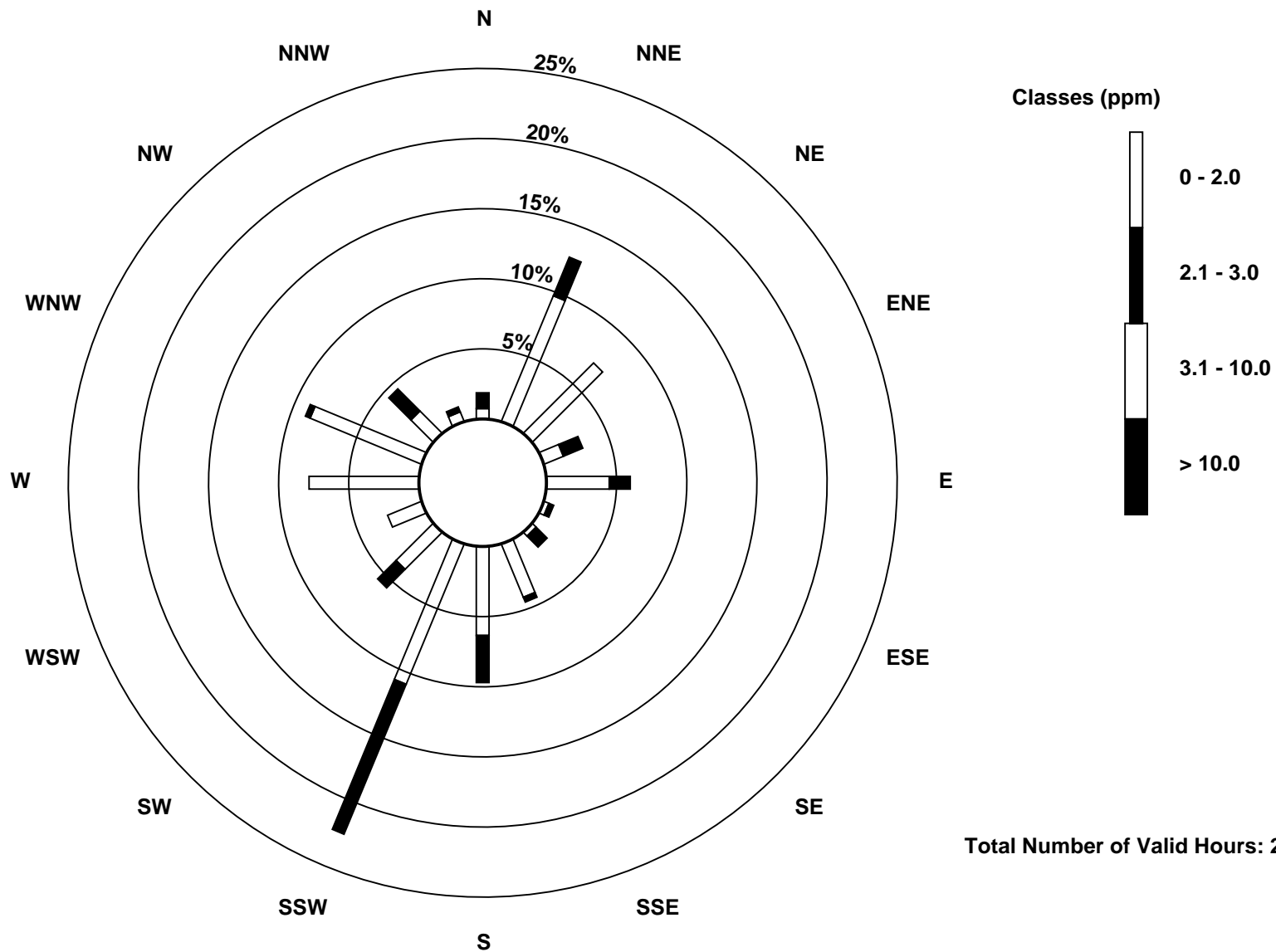
Total Number of Valid Hours: 268

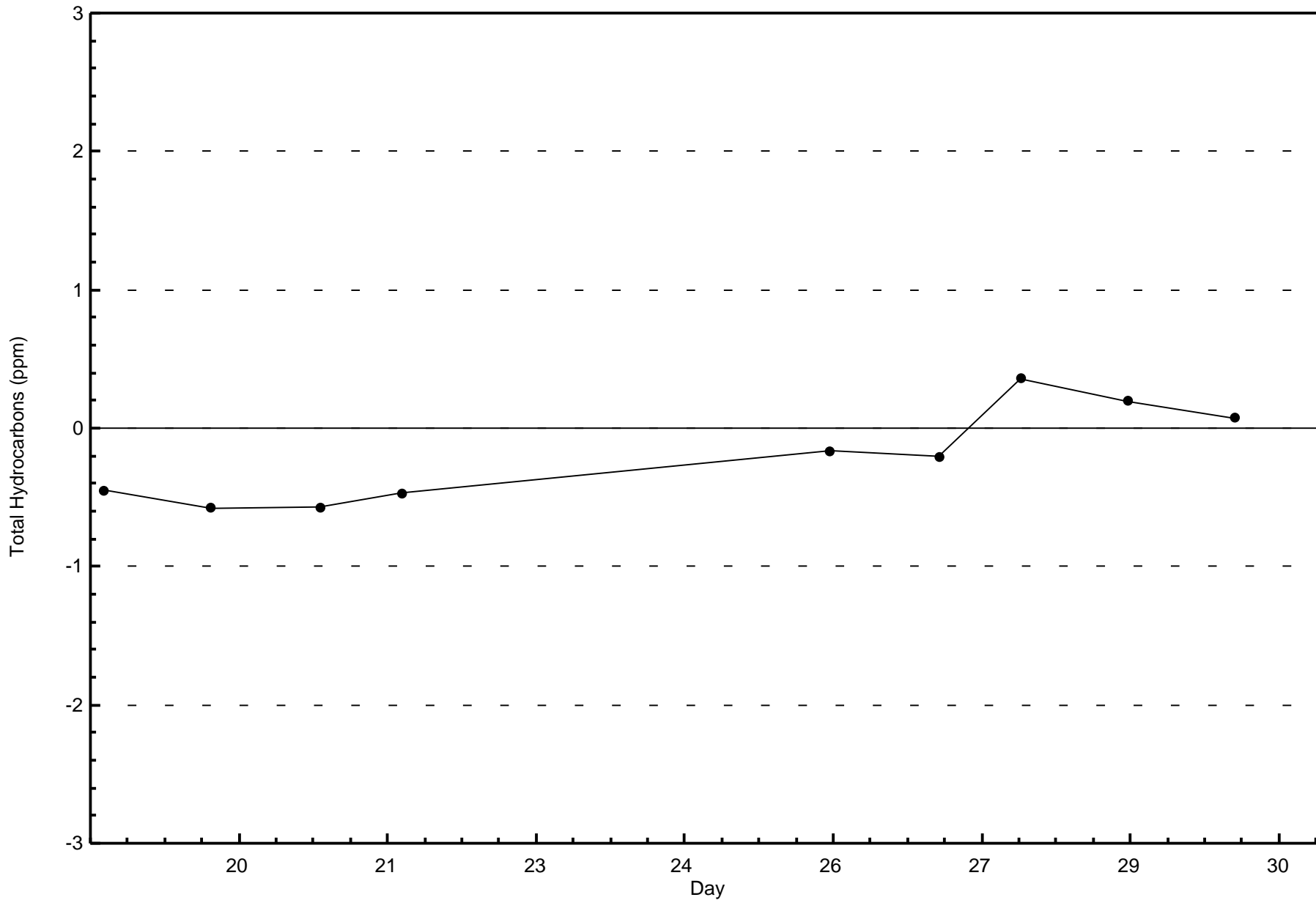
Total Number of Hours: 288

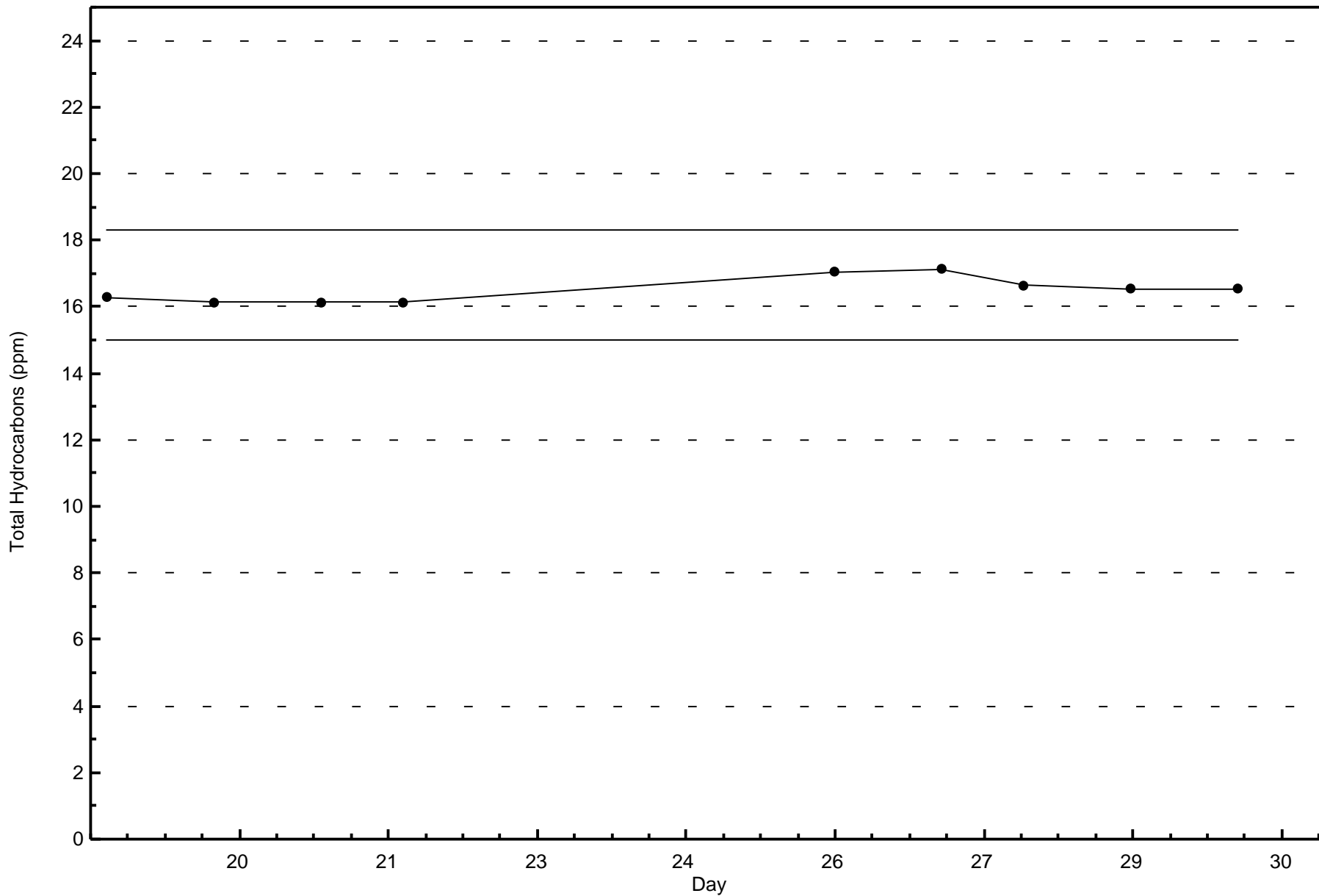


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Surmont (AMS 24)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

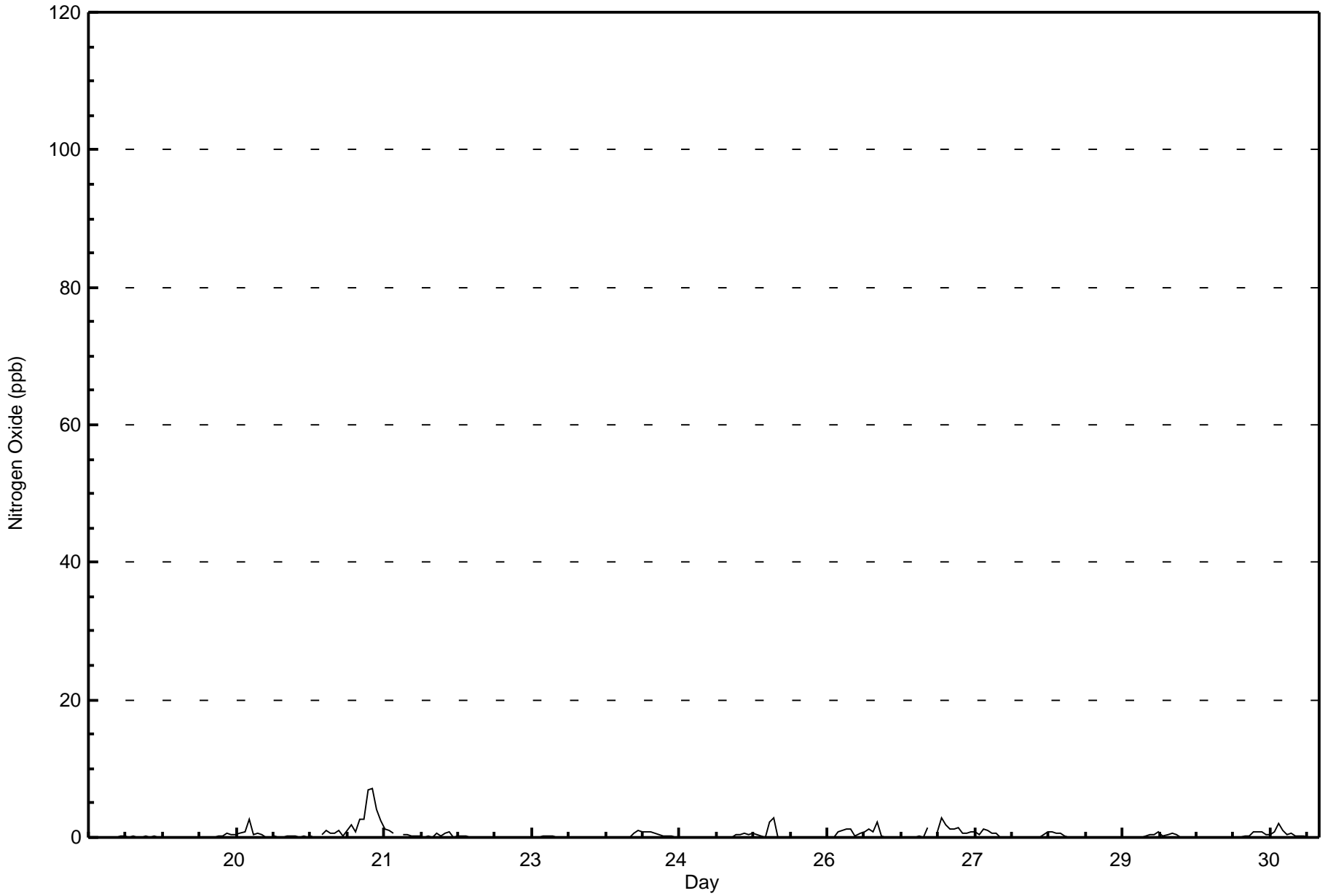
Surmont - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 ppb on Sep 21 19:00 Maximum Daily Average: 1.6 ppb on Sep 21 | | | | | | | | | | | | | | Hours in Service: 285 Hours of Data: 273 Hours of Missing Data: 12 Hours of Calibration: 12 Percent Operational Time: 100.0 | | | | | | | | | | | | | |
|---|-------------------------------|----|----|---|---|---|---|---|---|----|----|----|----|---|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|--|
| Minimum Value: 0 ppb on Sep 19 22:00 Minimum Daily Average: 0.0 ppb on Sep 23 Maximum Diurnal Average: 0.8 ppb at hour 17 Minimum Diurnal Average: 0.0 ppb at hour 1 Monthly Average: 0.4 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 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 | | | |
| 19-Sep | NS | NS | NS | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 | |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 3 | 3 | 7 | 7 | 4 | 3 | 1 | 1 | 1 | 1.6 | 7 | |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 23-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 25-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 27-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.8 | 3 | |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 29-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 30-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan NS - Not in Service | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Surmont - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 273 | 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: 273

Total Number of Hours: 288



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |
| 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 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |

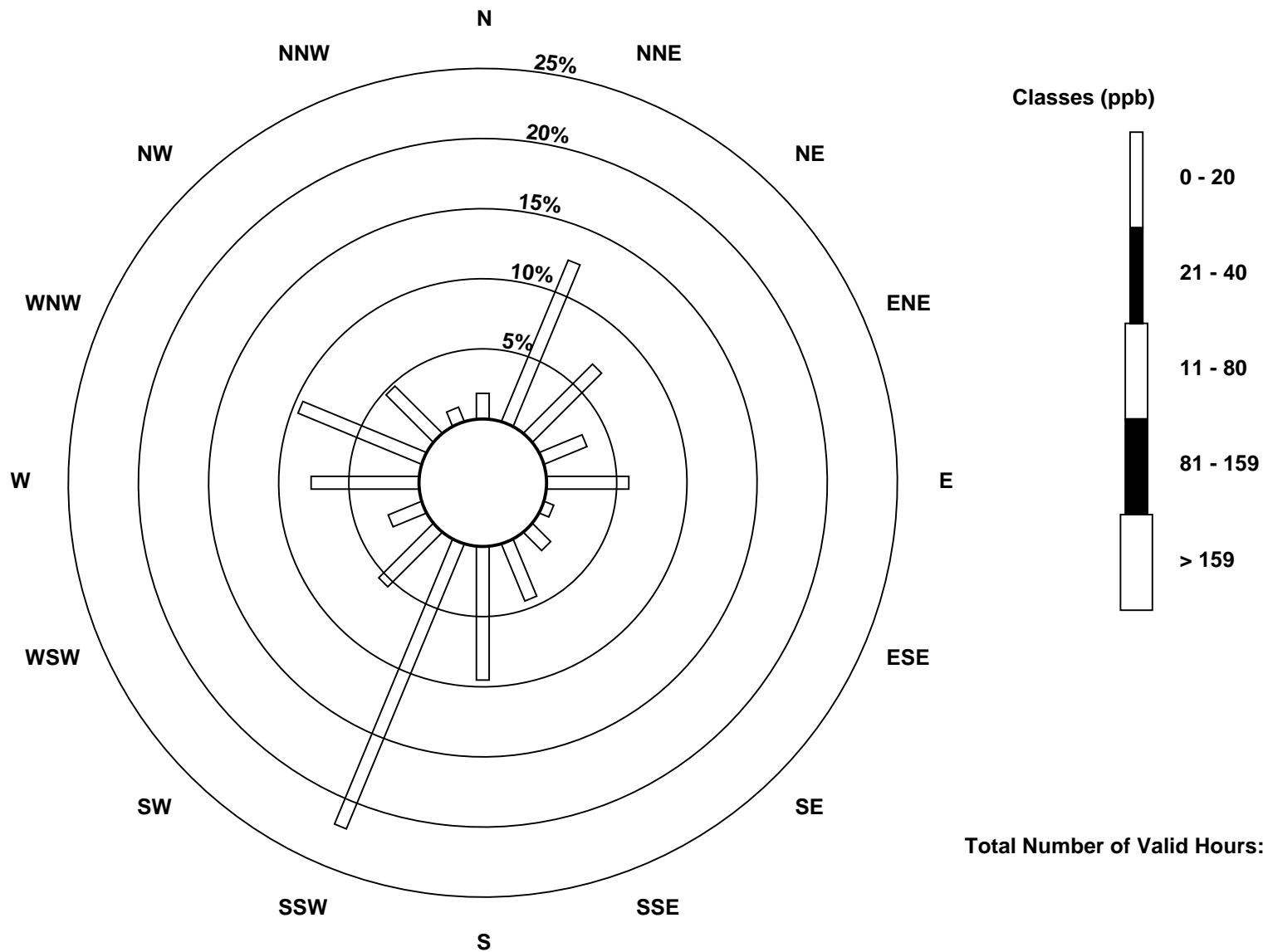
Total Number of Valid Hours: 273

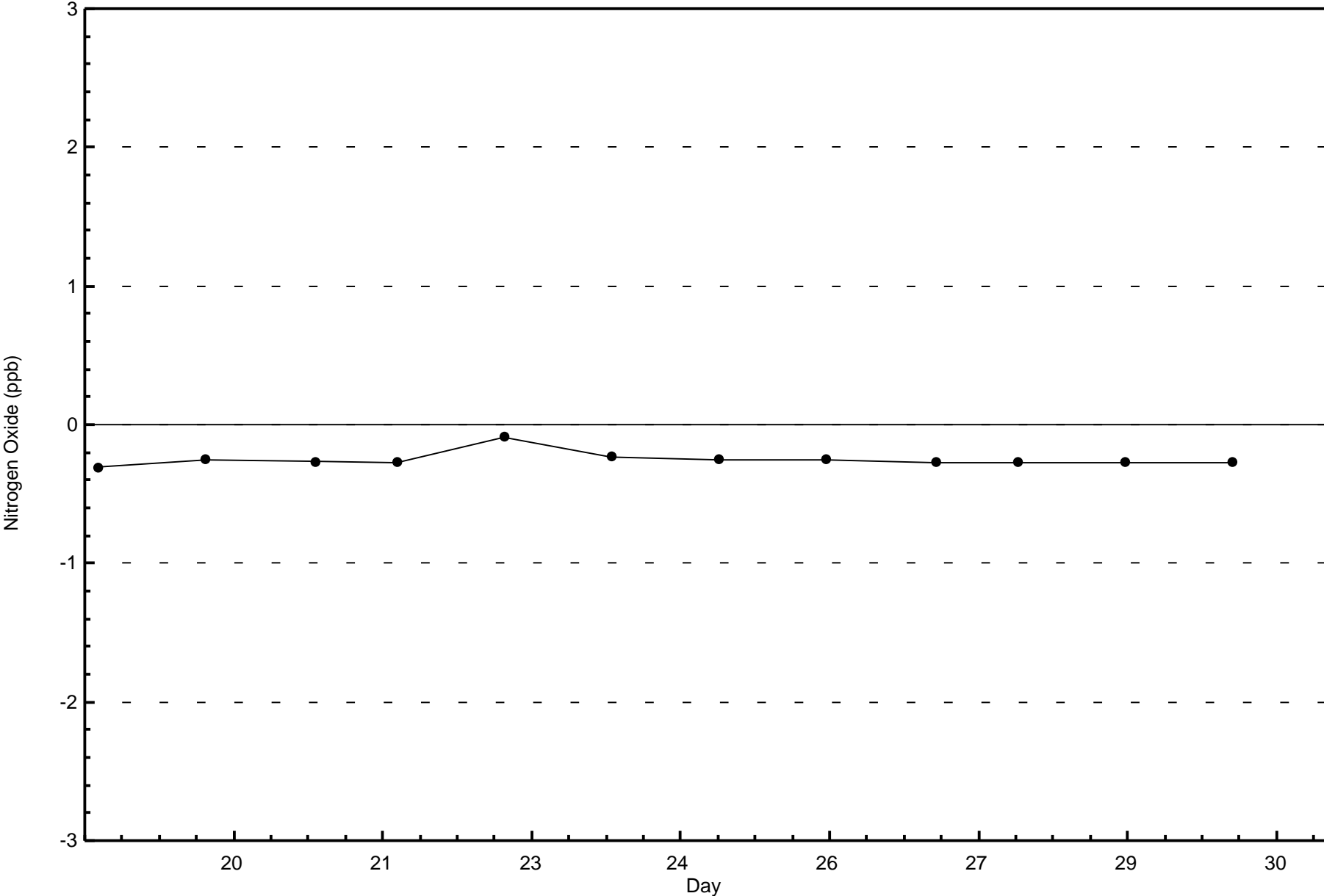
Total Number of Hours: 288



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxide (NO) - ppb
Surmont (AMS 24)

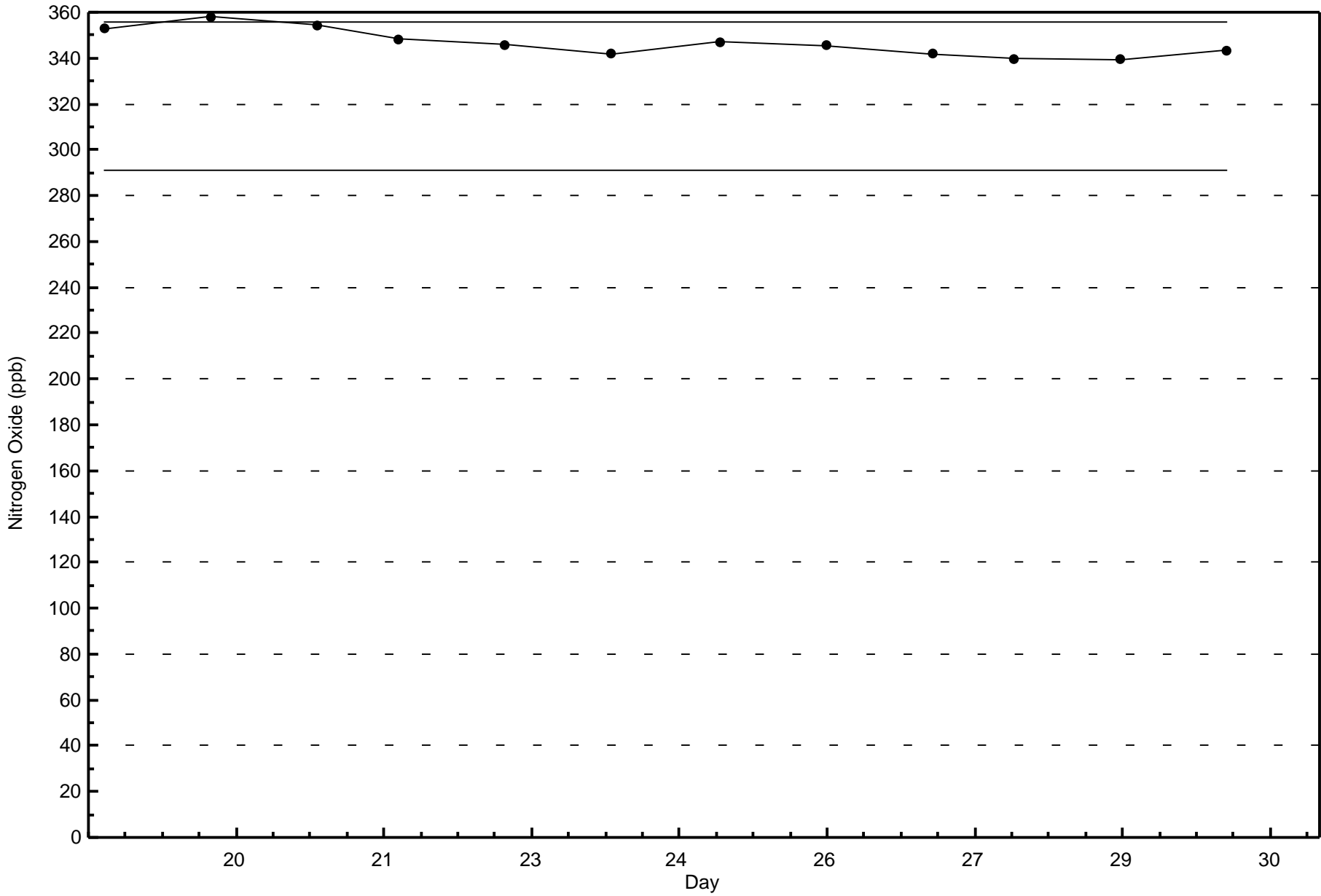






Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxide (NO) - ppb
Surrmont - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

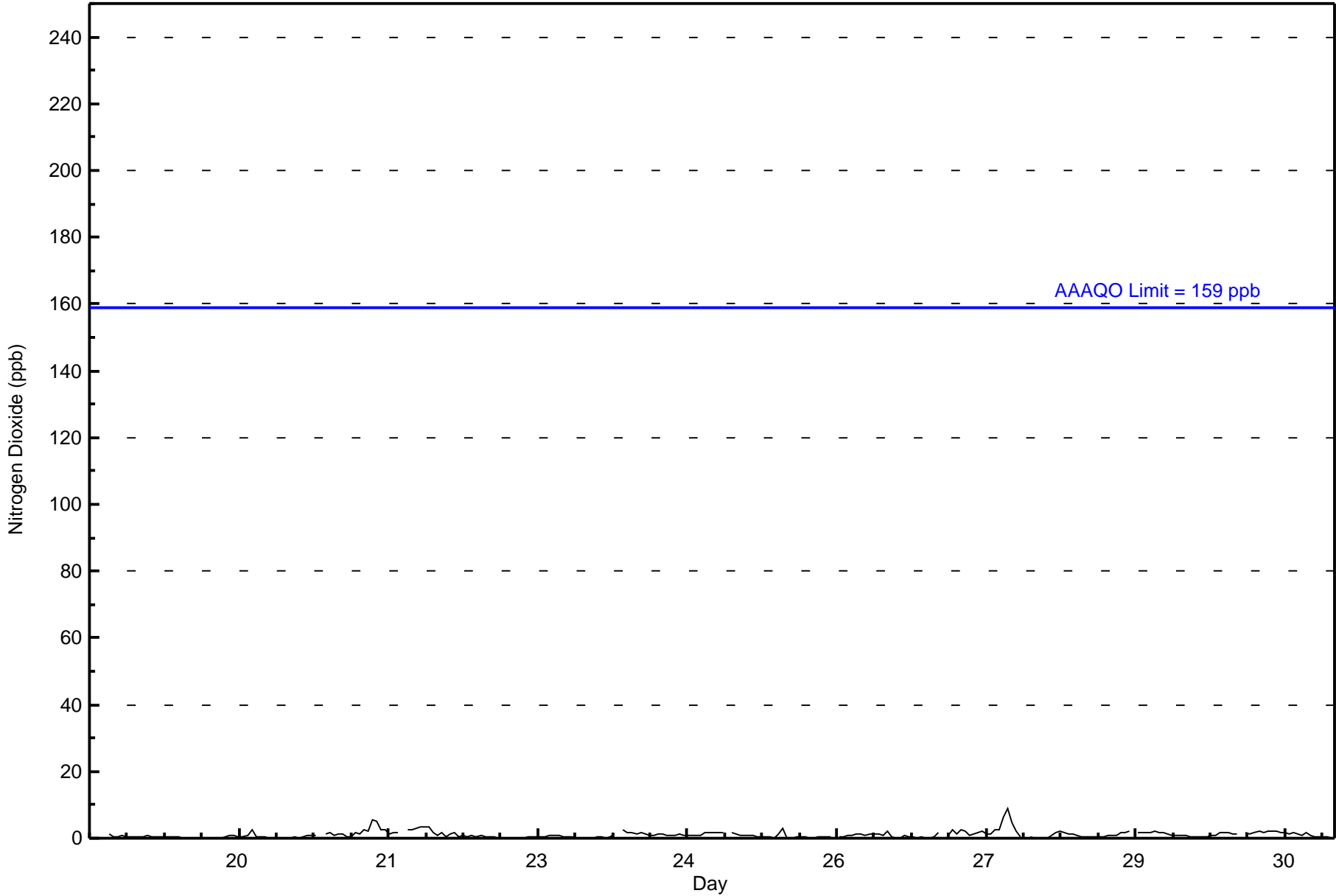
Surmont - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 ppb on Sep 27 21:00 Maximum Daily Average: 2.1 ppb on Sep 27 | | | | | | | | | | Hours in Service: 285 Hours of Data: 273 Hours of Missing Data: 12 Hours of Calibration: 12 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | |
|---|-------------------------------|----|----|---|---|---|---|---|---|--|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 20 01:00 Maximum Diurnal Average: 1.4 ppb at hour 5 Monthly Average: 1.1 ppb | | | | | | | | | | Minimum Daily Average: 0.3 ppb on Sep 23 Minimum Diurnal Average: 0.7 ppb at hour 1 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 2 P 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 | | |
| 19-Sep | NS | NS | NS | Z | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 21-Sep | 0 | 0 | 1 | 1 | 1 | Z | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 3 | 2 | 6 | 5 | 3 | 3 | 1 | 2 | 2 | 1.7 | 6 |
| 22-Sep | Z | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1.4 | 3 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 24-Sep | 0 | 1 | Z | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.2 | 3 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 3 |
| 26-Sep | 0 | 0 | 0 | 1 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 27-Sep | 1 | 0 | 0 | 0 | 2 | Z | 1 | 3 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 3 | 6 | 9 | 5 | 2 | 0 | 2.1 | 9 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 0.8 | 2 |
| 29-Sep | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1.2 | 2 |
| 30-Sep | 1 | 1 | Z | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1.3 | 2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan NS - Not in Service Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Surmont - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Surmont - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 273 | 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: 273

Total Number of Hours: 288



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |
| 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 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |

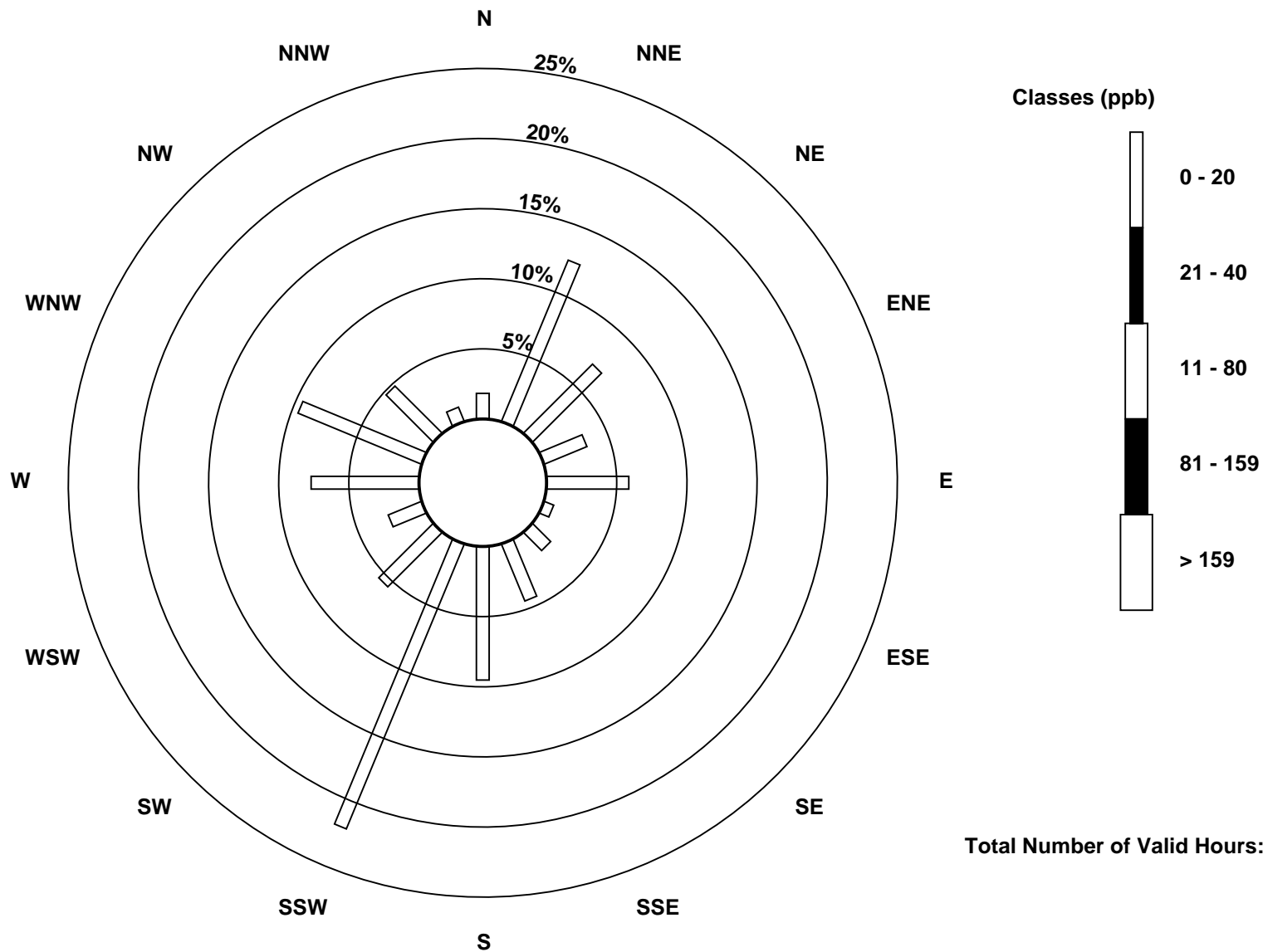
Total Number of Valid Hours: 273

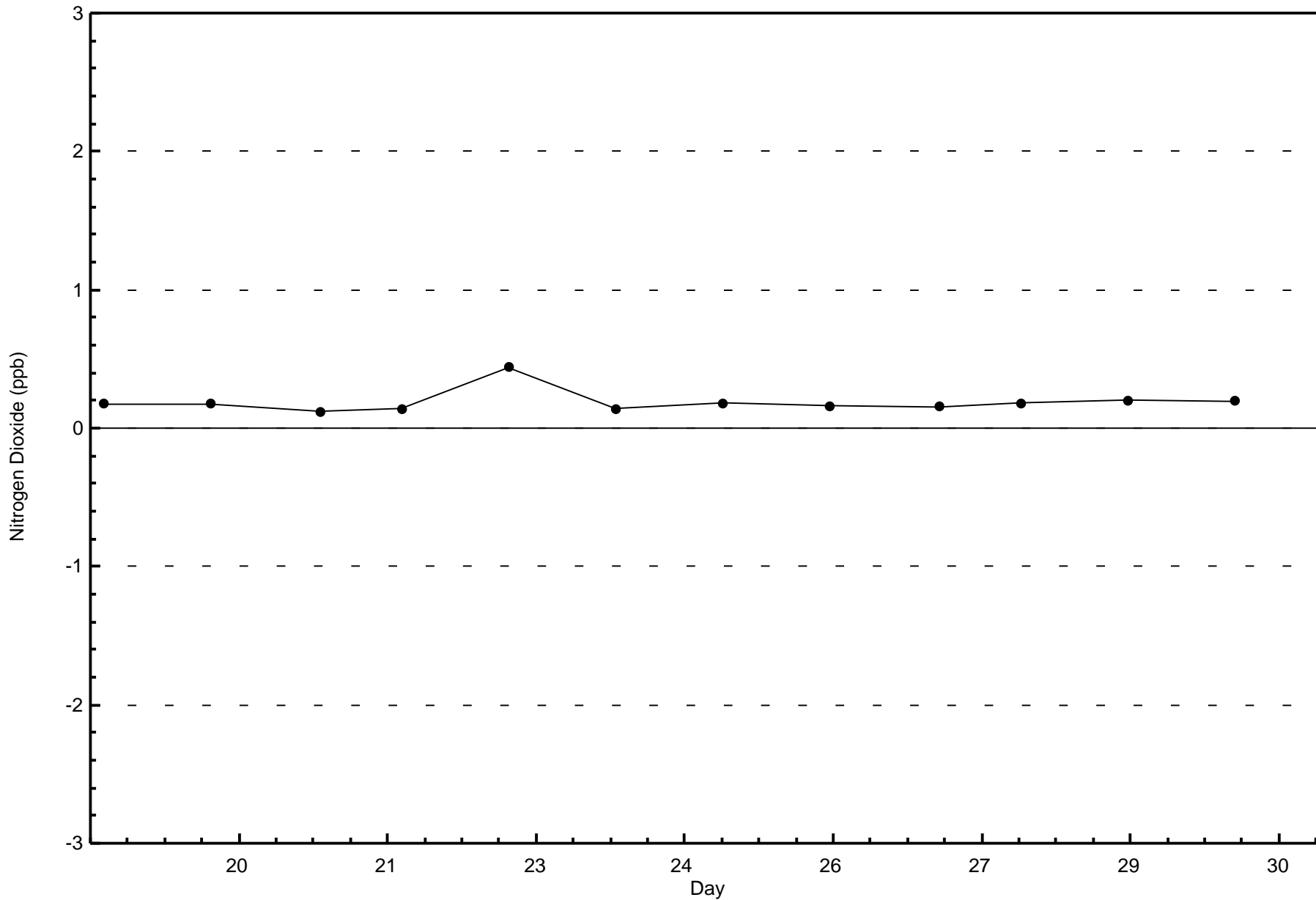
Total Number of Hours: 288



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Surmont (AMS 24)

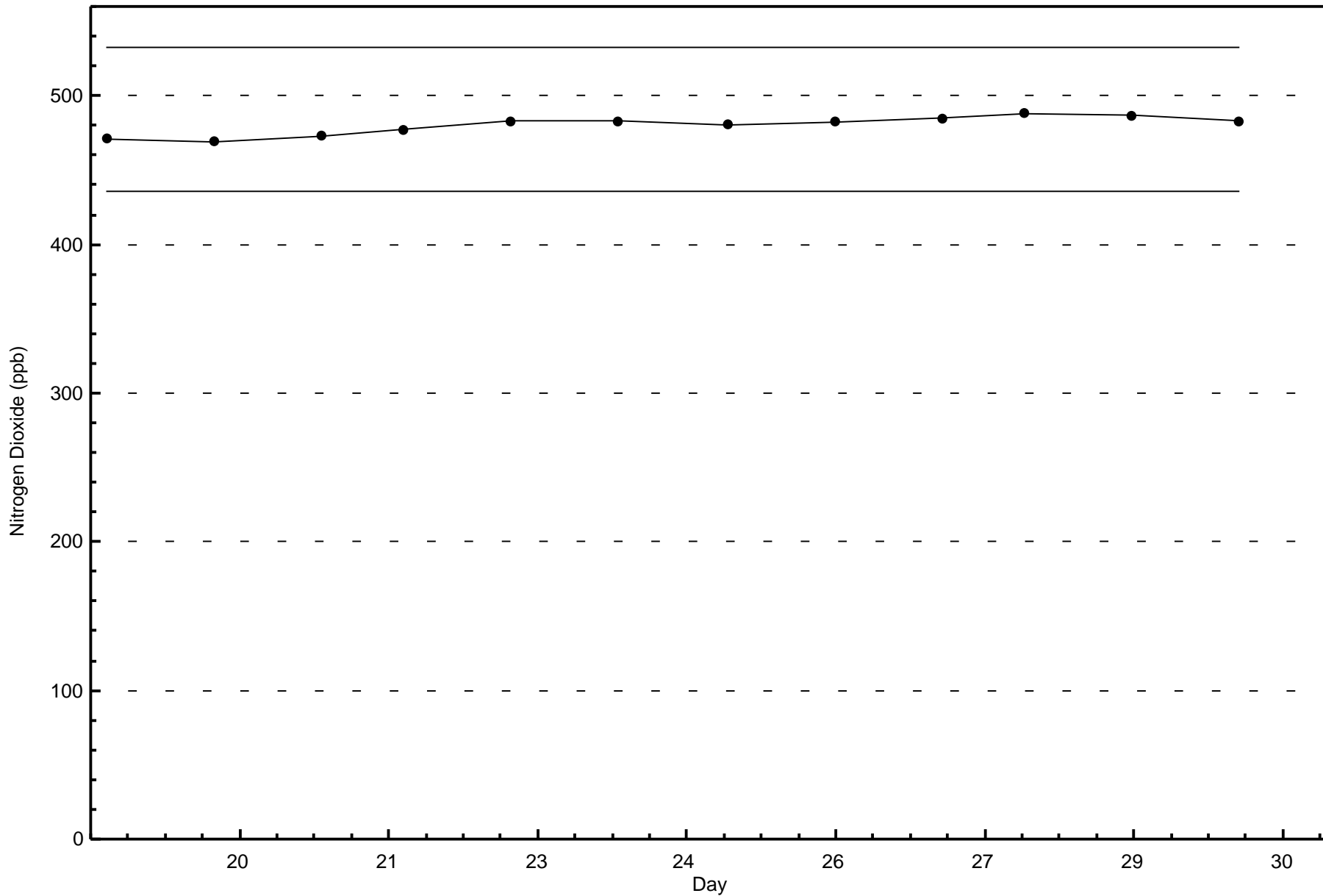






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Surmont - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

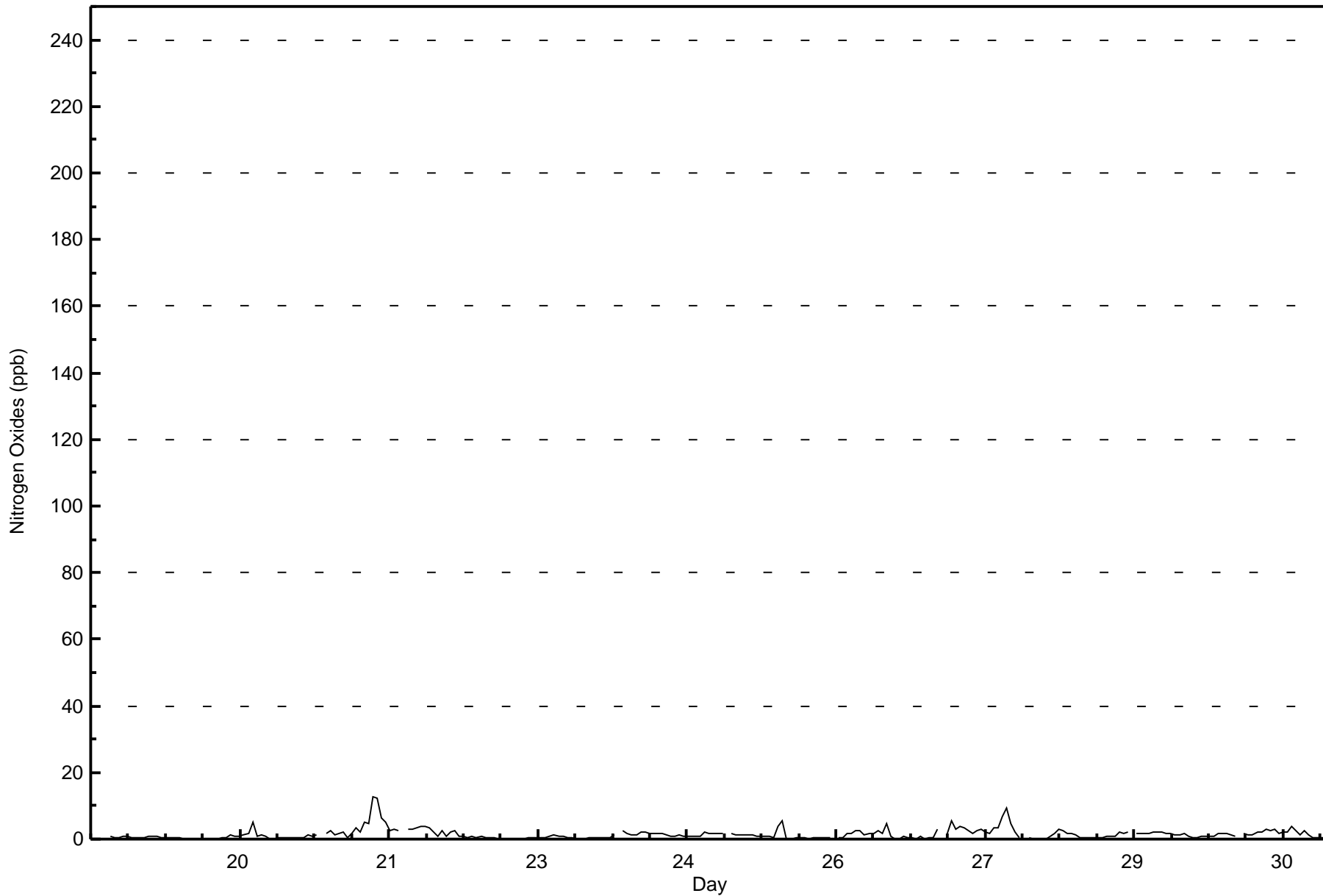
Surmont - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | | | | | | | | | | Hours in Service: 285 | | | | | | | | | | | | | | | | |
|---|-------------------------------|----|----|---|---|---|---|---|---|--|----|----|----|----|----|----|----|----|----|---------------------------------|----|----|----|-----------------|---------------|---------------|
| Maximum Value: 13 ppb on Sep 21 18:00 | | | | | | | | | | Maximum Daily Average: 3.3 ppb on Sep 21 | | | | | | | | | | Hours of Data: 273 | | | | | | |
| Minimum Value: 0 ppb on Sep 26 19:00 | | | | | | | | | | Minimum Daily Average: 0.4 ppb on Sep 23 | | | | | | | | | | Hours of Missing Data: 12 | | | | | | |
| Maximum Diurnal Average: 1.9 ppb at hour 18 | | | | | | | | | | Minimum Diurnal Average: 0.7 ppb at hour 1 | | | | | | | | | | Hours of Calibration: 12 | | | | | | |
| Monthly Average: 1.4 ppb | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 9 | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 19-Sep | NS | NS | NS | Z | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 5 |
| 21-Sep | 0 | 0 | 1 | 1 | 1 | Z | 2 | 3 | 1 | 2 | 2 | 1 | 1 | 3 | 2 | 5 | 4 | 13 | 12 | 6 | 5 | 2 | 3 | 2 | 3.3 | 13 |
| 22-Sep | Z | 3 | 3 | 3 | 4 | 4 | 4 | 2 | 1 | 3 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1.6 | 4 |
| 23-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 24-Sep | 0 | 1 | Z | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.4 | 3 |
| 25-Sep | 2 | 2 | 2 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 4 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 6 |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1.1 | 4 |
| 27-Sep | 1 | 0 | 0 | 0 | 3 | Z | 2 | 5 | 3 | 4 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 4 | 4 | 7 | 9 | 5 | 2 | 0 | 2.9 | 9 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1.0 | 3 |
| 29-Sep | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1.4 | 2 |
| 30-Sep | 1 | 1 | Z | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 4 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1.7 | 4 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 0.7 0.9 1.0 1.1 1.6 1.1 1.3 1.9 1.8 1.8 1.7 1.4 1.5 1.8 1.4 1.7 1.9 1.9 1.7 1.5 1.7 1.1 1.1 0.8 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 3 3 3 4 4 4 5 3 4 3 2 3 5 4 5 6 13 12 7 9 5 3 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan NS - Not in Service | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Surmont - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 273 | 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: 273

Total Number of Hours: 288



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |
| 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 | 5 | 34 | 19 | 9 | 16 | 2 | 5 | 12 | 26 | 60 | 15 | 7 | 21 | 26 | 13 | 3 | 273 |

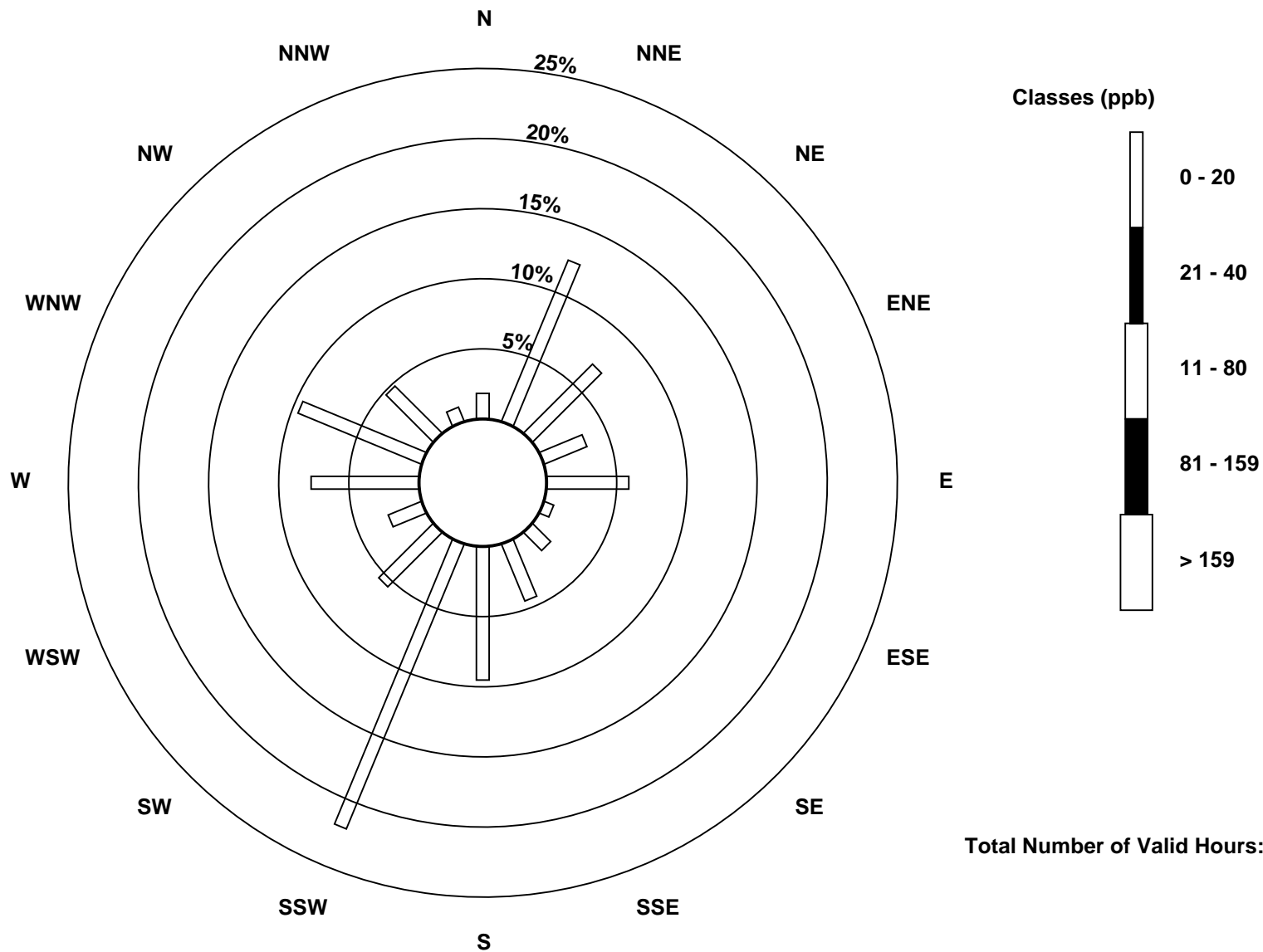
Total Number of Valid Hours: 273

Total Number of Hours: 288



Wood Buffalo Environmental Association
Wind Rose Sep 2017

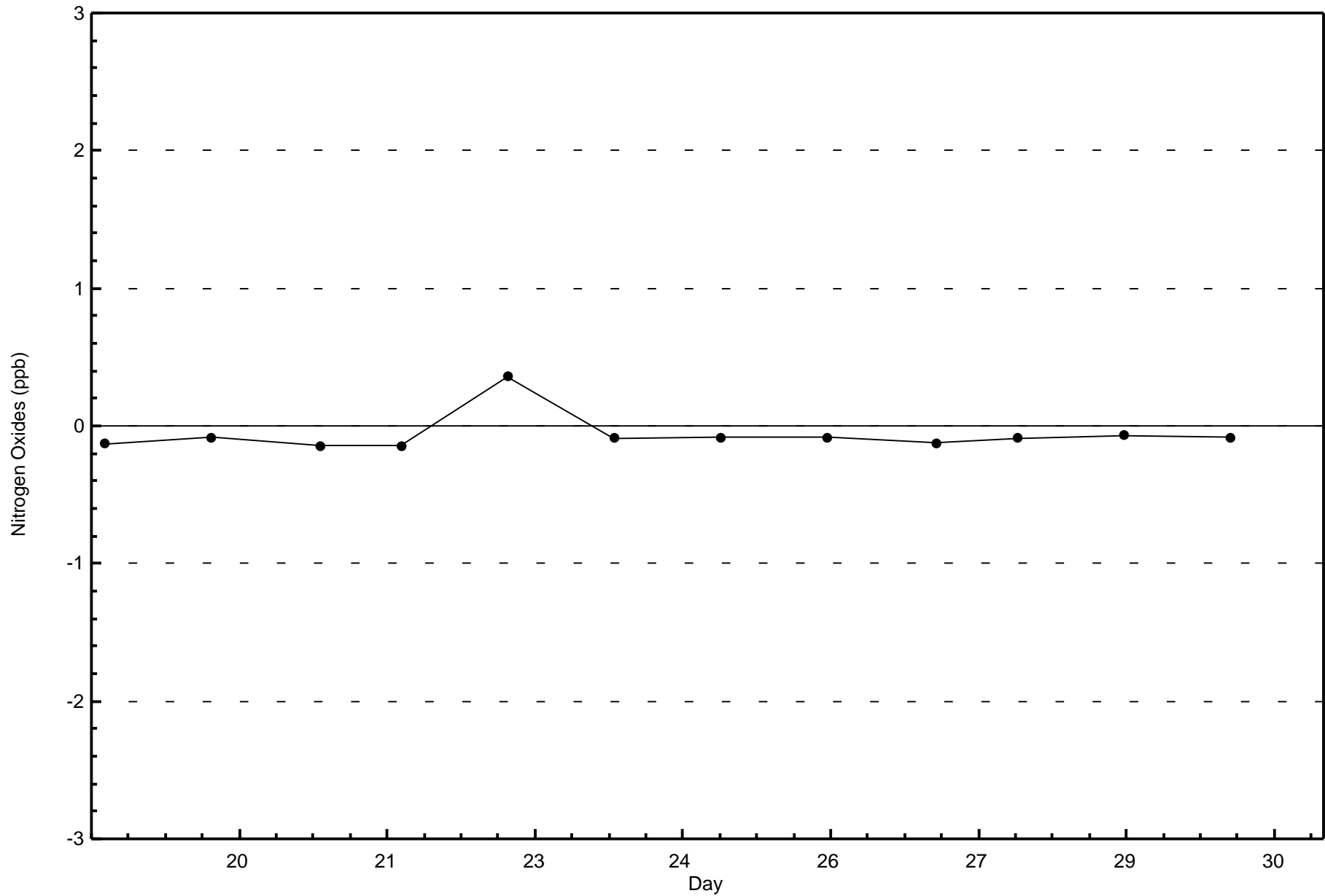
Nitrogen Oxides (NO_x) - ppb
Surmont (AMS 24)





Wood Buffalo Environmental Association
Zero Responses

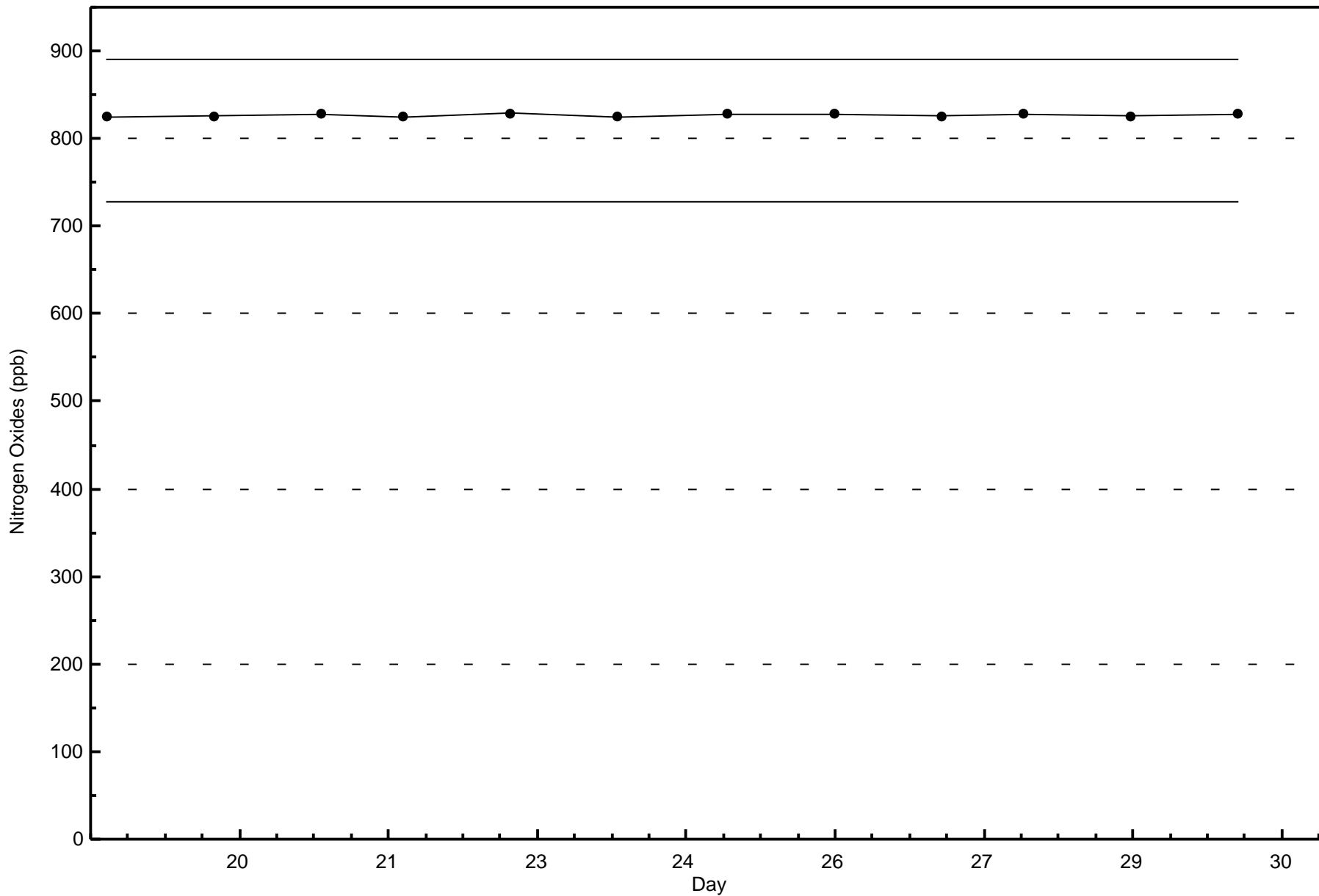
Nitrogen Oxides (NO_x) - ppb
Surmont - September 2017





Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Surmont - September 2017





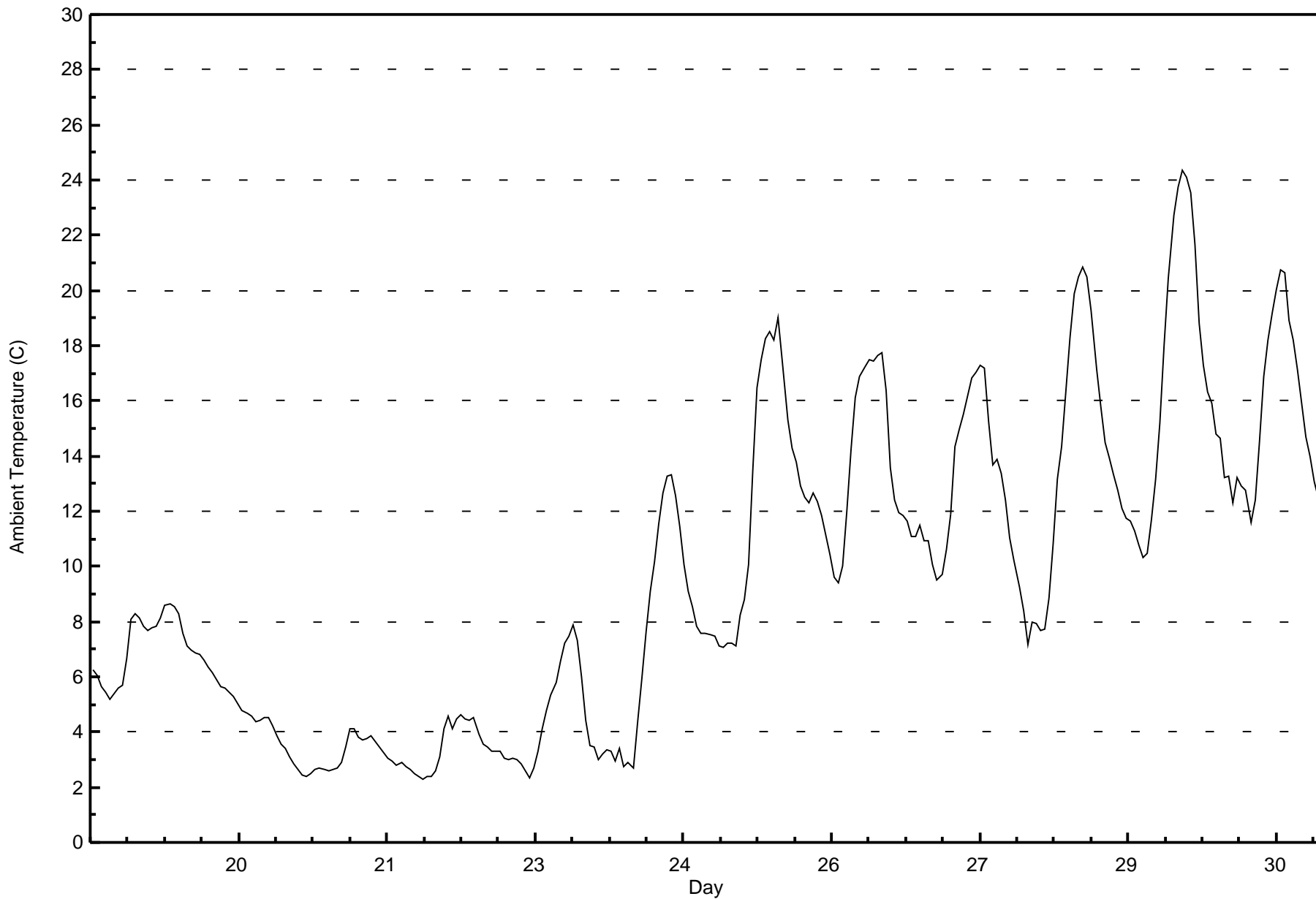
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Surmont - September 2017

| Maximum Value: 24 C on Sep 29 15:00 | | | | | | | | | | | | | | Maximum Daily Average: 16.4 C on Sep 29 | | | | | | | | | | | | | | Hours in Service: 288 | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|--|---------------------------------|--|
| Minimum Value: 2 C on Sep 22 06:00 | | | | | | | | | | | | | | Minimum Daily Average: 3.1 C on Sep 21 | | | | | | | | | | | | | | Hours of Data: 288 | |
| Maximum Diurnal Average: 13.3 C at hour 15 | | | | | | | | | | | | | | Minimum Diurnal Average: 6.4 C at hour 7 | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 9.6 C | | | | | | | | | | | | | | Percentiles: P ₁ = 2 P ₁₀ = 3 Q ₁ = 4 Median = 9 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 24 | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 19-Sep | 6 | 6 | 6 | 5 | 5 | 5 | 6 | 6 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 8 | 8 | 7 | 7 | 7.1 | 9 | | | |
| 20-Sep | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 4.9 | 7 | | | | |
| 21-Sep | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3.1 | 4 | | | | |
| 22-Sep | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 3 | 3 | 3 | 3.4 | 5 | | | | |
| 23-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 7 | 8 | 7 | 6 | 4 | 3 | 3 | 3 | 3 | 4.4 | 8 | | | | |
| 24-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 6 | 8 | 9 | 10 | 12 | 13 | 13 | 13 | 13 | 11 | 10 | 9 | 9 | 8 | 8 | 7.7 | 13 | | | | |
| 25-Sep | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 9 | 10 | 13 | 16 | 17 | 18 | 19 | 18 | 19 | 17 | 15 | 14 | 14 | 13 | 13 | 12.4 | 19 | | | | |
| 26-Sep | 13 | 12 | 12 | 11 | 10 | 10 | 9 | 10 | 12 | 14 | 16 | 17 | 17 | 18 | 17 | 18 | 18 | 16 | 14 | 12 | 12 | 12 | 12 | 13.5 | 18 | | | | |
| 27-Sep | 11 | 12 | 11 | 11 | 10 | 10 | 10 | 11 | 12 | 14 | 15 | 15 | 16 | 17 | 17 | 17 | 17 | 15 | 14 | 14 | 13 | 12 | 11 | 13.1 | 17 | | | | |
| 28-Sep | 9 | 8 | 7 | 8 | 8 | 8 | 8 | 9 | 11 | 13 | 14 | 16 | 18 | 20 | 20 | 21 | 21 | 19 | 17 | 16 | 15 | 14 | 13 | 13.6 | 21 | | | | |
| 29-Sep | 12 | 12 | 12 | 11 | 11 | 10 | 10 | 12 | 13 | 15 | 18 | 20 | 23 | 24 | 24 | 24 | 24 | 22 | 19 | 17 | 16 | 16 | 15 | 16.4 | 24 | | | | |
| 30-Sep | 13 | 13 | 12 | 13 | 13 | 13 | 12 | 12 | 15 | 17 | 18 | 19 | 20 | 21 | 21 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 15.4 | 21 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Surmont - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 157 | 54.51 | 54.51 |
| 10 - 20 | 118 | 40.97 | 95.49 |
| > 20 | 13 | 4.51 | 100.00 |

Total Number of Valid Hours: 288

Total Number of Hours: 288



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

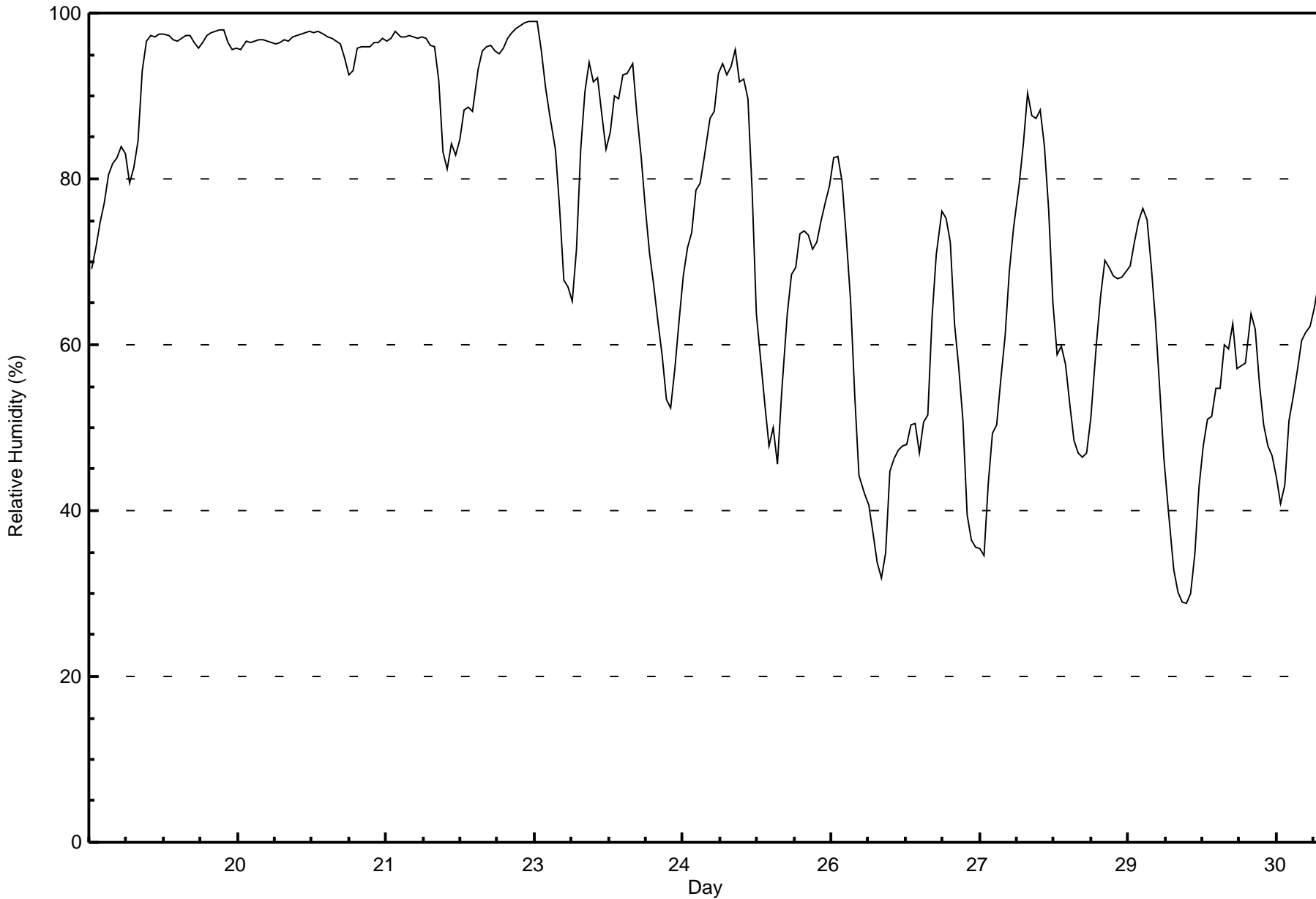
Surmont - September 2017

| Maximum Value: 99 % on Sep 23 08:00 | | | | | | | | | | | | | | Maximum Daily Average: 96.7 % on Sep 20 | | | | | | | | | | | | | | Hours in Service: 288 | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|---------------|---------------|--|---------------------------------|--|
| Minimum Value: 29 % on Sep 29 16:00 | | | | | | | | | | | | | | Minimum Daily Average: 52.8 % on Sep 29 | | | | | | | | | | | | | | Hours of Data: 288 | |
| Maximum Diurnal Average: 87.1 % at hour 7 | | | | | | | | | | | | | | Minimum Diurnal Average: 61.3 % at hour 15 | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 75.0 % | | | | | | | | | | | | | | Percentiles: P ₁ = 29 P ₁₀ = 47 Q ₁ = 58 Median = 78 O ₃ = 96 P ₉₀ = 97 P ₉₉ = 99 | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 19-Sep | 69 | 72 | 75 | 77 | 81 | 82 | 83 | 84 | 83 | 79 | 81 | 85 | 93 | 97 | 97 | 97 | 98 | 98 | 97 | 97 | 97 | 97 | 97 | 97 | 88.0 | 98 | | | |
| 20-Sep | 96 | 96 | 96 | 97 | 98 | 98 | 98 | 98 | 96 | 96 | 96 | 96 | 97 | 96 | 97 | 97 | 97 | 97 | 97 | 97 | 96 | 96 | 97 | 97 | 96.7 | 98 | | | |
| 21-Sep | 97 | 97 | 98 | 98 | 98 | 98 | 98 | 97 | 97 | 97 | 96 | 95 | 93 | 93 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 97 | 97 | 97 | 96.4 | 98 | | | |
| 22-Sep | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 96 | 96 | 92 | 83 | 81 | 84 | 83 | 85 | 88 | 89 | 88 | 93 | 95 | 96 | 96 | 95 | 95 | 92.3 | 97 | | | |
| 23-Sep | 96 | 97 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 95 | 91 | 88 | 84 | 76 | 68 | 67 | 65 | 72 | 84 | 91 | 94 | 92 | 92 | 88 | 88.7 | 99 | | | |
| 24-Sep | 84 | 86 | 90 | 90 | 93 | 93 | 94 | 88 | 83 | 76 | 71 | 67 | 63 | 59 | 53 | 52 | 57 | 63 | 68 | 72 | 74 | 79 | 80 | 83 | 75.6 | 94 | | | |
| 25-Sep | 87 | 88 | 93 | 94 | 93 | 94 | 96 | 92 | 92 | 90 | 78 | 64 | 58 | 53 | 48 | 50 | 46 | 54 | 64 | 68 | 69 | 73 | 74 | 73 | 74.6 | 96 | | | |
| 26-Sep | 72 | 72 | 75 | 77 | 79 | 83 | 83 | 80 | 73 | 65 | 54 | 44 | 42 | 41 | 37 | 34 | 32 | 35 | 45 | 46 | 47 | 48 | 48 | 50 | 56.7 | 83 | | | |
| 27-Sep | 51 | 47 | 51 | 52 | 63 | 71 | 76 | 75 | 72 | 62 | 57 | 51 | 39 | 36 | 36 | 35 | 35 | 43 | 49 | 50 | 56 | 61 | 69 | 74 | 54.7 | 76 | | | |
| 28-Sep | 79 | 84 | 90 | 88 | 87 | 88 | 84 | 76 | 65 | 59 | 60 | 58 | 53 | 48 | 47 | 46 | 47 | 51 | 60 | 66 | 70 | 69 | 68 | 68 | 67.2 | 90 | | | |
| 29-Sep | 68 | 69 | 70 | 72 | 75 | 76 | 75 | 69 | 63 | 55 | 46 | 40 | 33 | 30 | 29 | 29 | 30 | 35 | 43 | 48 | 51 | 51 | 55 | 55 | 52.8 | 76 | | | |
| 30-Sep | 60 | 59 | 63 | 57 | 57 | 58 | 64 | 62 | 55 | 50 | 48 | 47 | 44 | 41 | 43 | 51 | 54 | 57 | 60 | 62 | 62 | 64 | 68 | 70 | 56.5 | 70 | | | |
| | | | | | | | | | | | | | | 79.7 80.4 82.9 83.1 84.9 86.3 87.1 84.7 81.2 76.4 71.9 67.8 65.2 62.8 61.3 61.9 62.0 65.6 71.4 73.9 75.8 77.0 78.3 79.0 | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | 97 97 98 98 99 99 99 99 99 97 96 96 97 97 97 97 98 98 97 97 97 97 97 98 | | | | | | | | | | | | | | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Surmont - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Surmont - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 15 | 5.21 | 5.21 |
| 40 - 60 | 63 | 21.88 | 27.08 |
| 60 - 80 | 72 | 25.00 | 52.08 |
| 80 - 100 | 138 | 47.92 | 100.00 |

Total Number of Valid Hours: 288

Total Number of Hours: 288



Wood Buffalo Environmental Association
Summary of Hour Averages

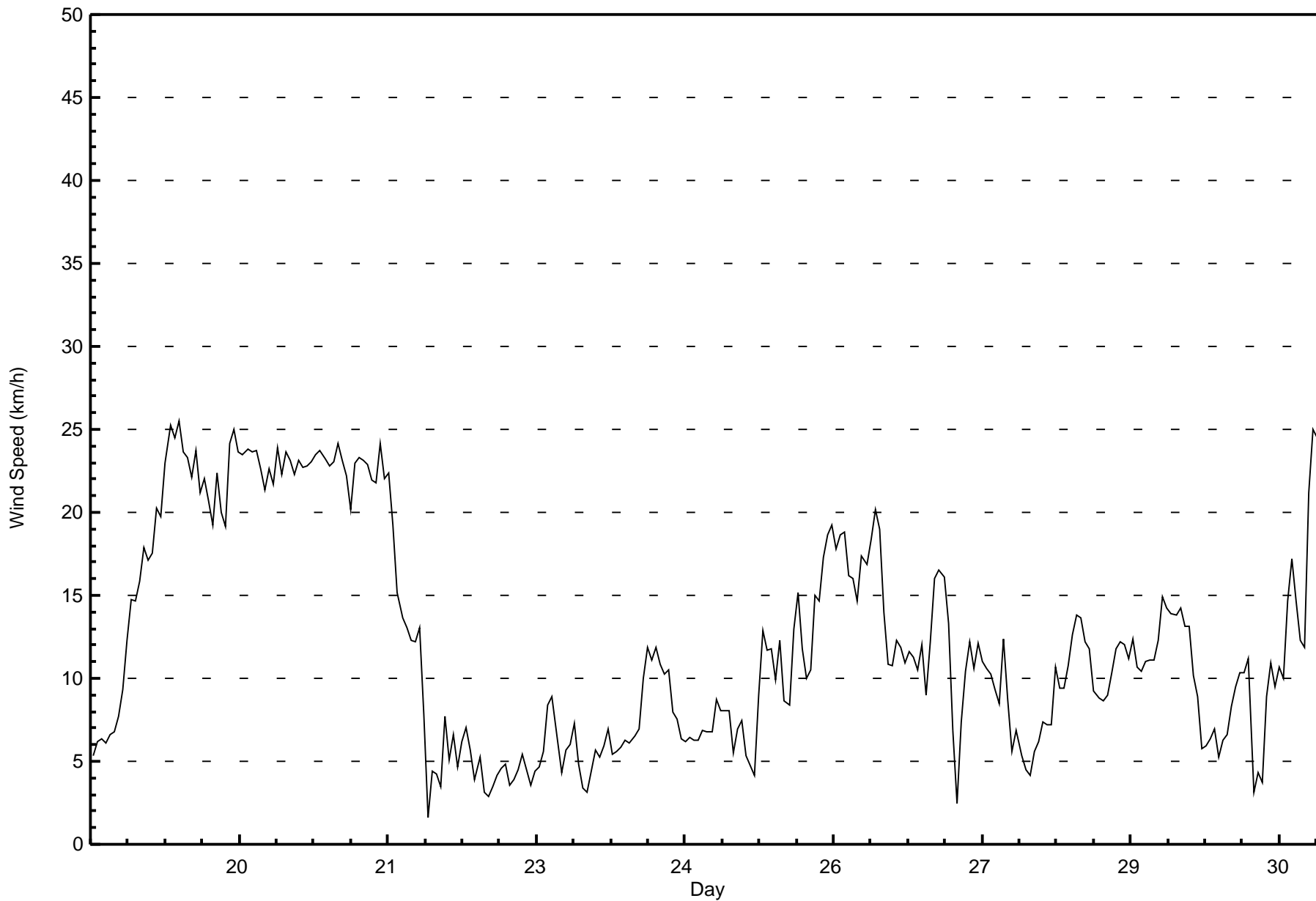
Wind Speed (WS) - km/h
Surmont - September 2017

| Maximum Speed: 26 km/h on Sep 19 21:00 Maximum Daily Speed Average: 22.3 km/h on Sep 21 | | Hours in Service: 288 Hours of Data: 288 Hours of Missing Data: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|---------------|---------------|
| Minimum Speed Value: 2 km/h on Sep 22 07:00 Maximum Diurnal Speed Average: 3.2 km/h at hour 21 Monthly Average Velocity: 1.5 km/h 356.3 deg | | Minimum Daily Speed Average: 2.1 km/h on Sep 22 Minimum Diurnal Speed Average: 0.2 km/h at hour 9 Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 7 Median = 11 Q ₃ = 17 P ₉₀ = 23 P ₉₉ = 25 | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 19-Sep | ENE5 | NE6 | NE6 | ENE6 | ENE7 | ENE7 | ENE8 | ENE9 | E12 | E15 | E15 | E16 | E18 | E17 | E18 | E20 | E20 | E23 | E25 | E25 | E26 | E24 | E23 | E22 | E15.2 | ESE26 |
| 20-Sep | E24 | ENE21 | ENE22 | ENE21 | ENE19 | ENE22 | NE20 | NE19 | NE24 | NNE25 | NE24 | NE23 | NE24 | NE24 | NE24 | NE23 | NE21 | NE23 | NE22 | NE24 | NE22 | NE24 | NNE23 | NNE22 | NE22.0 | NNE25 |
| 21-Sep | NNE23 | NNE23 | NNE23 | NNE23 | NNE23 | NNE24 | NNE23 | NNE23 | NNE23 | NNE24 | NNE23 | NNE22 | NNE20 | NNE23 | NNE23 | NNE23 | NNE23 | N22 | NNE22 | NNE24 | NNE22 | NNE22 | NNE19 | NNE15 | NNE22.3 | NNE24 |
| 22-Sep | N14 | NNE13 | NNE12 | NNE12 | NNE13 | NNE8 | NE2 | WSW4 | SW4 | NW3 | WNW8 | N5 | NE7 | ENE5 | SE6 | SE7 | SE6 | SSE4 | SSE5 | S3 | SSW3 | SW4 | SW4 | SSW5 | NNE2.1 | N14 |
| 23-Sep | S5 | S4 | S4 | S4 | SSW5 | SW5 | SSW4 | SSW4 | SSW5 | SSE6 | SSE8 | SSE9 | S6 | S4 | S6 | SSE6 | SE7 | SSE5 | SSE3 | SSW3 | SW4 | SW6 | SW5 | SW6 | S4.7 | SSE9 |
| 24-Sep | SW7 | SSW5 | SSW6 | SSW6 | SSW6 | SSW6 | SSW6 | SSW7 | SSW10 | SSW12 | SSW11 | S12 | S11 | SSE10 | S11 | S8 | S8 | S6 | S6 | SSW6 | S6 | SSE6 | S7 | S7 | S7.5 | SSW12 |
| 25-Sep | S7 | SSW9 | SSW8 | SSW8 | SSW8 | SSW6 | SW7 | SW7 | S5 | SSE5 | S4 | WSW9 | W13 | WNW12 | W12 | W10 | W12 | W9 | WSW8 | W13 | W15 | W12 | W10 | W11 | WSW7.4 | W15 |
| 26-Sep | W15 | W15 | W17 | W19 | W19 | WNW18 | WNW19 | WNW19 | WNW16 | WNW16 | NW15 | NNW17 | NW17 | NW18 | NW20 | NW19 | NW14 | WNW11 | WNW11 | WNW12 | WNW12 | WNW11 | WNW12 | W11 | WNW14.8 | NW20 |
| 27-Sep | W10 | W12 | W9 | W12 | WNW16 | WNW16 | WNW16 | WNW13 | WNW7 | NW2 | NE7 | NE10 | NNE12 | NE11 | NNE12 | N11 | NNW11 | NW10 | NW9 | N8 | N12 | NNE9 | ESE6 | SE7 | NW6.3 | WNW16 |
| 28-Sep | S5 | S5 | SSW4 | SSW6 | SSW6 | SSW7 | SSW7 | SSW7 | SSW11 | SSW9 | SSE9 | S11 | S13 | SSW14 | SSW14 | SSW12 | SSW12 | SSW9 | S9 | S9 | SSW9 | SSW10 | SSW12 | SSW12 | SSW9.1 | SSW14 |
| 29-Sep | SSW12 | SSW11 | SSW12 | SSW11 | SSW10 | SSW11 | SSW11 | S11 | SSW12 | SSW15 | SSW14 | SSW14 | SSW14 | SSW14 | SSW13 | SSW13 | SSW10 | SW9 | SSW6 | SSW6 | SSW6 | SSW7 | SSW5 | WSW6 | SSW10.5 | SSW15 |
| 30-Sep | SW7 | SW8 | WSW9 | SW10 | WSW10 | WSW11 | SSW3 | S4 | WSW4 | W9 | WNW11 | WNW9 | WNW11 | W10 | WNW15 | WNW17 | NW15 | WNW12 | WNW12 | WNW21 | WNW25 | NW24 | NW21 | NNW22 | WNW10.8 | WNW25 |
| NNE0.2NNW0.7NNW1.0WNW1.1 NW2.0 NW2.1 NW1.4WNW1.3 NO.2NNE0.8 NE1.7 NE2.7 NE2.4NNE2.0 N1.9 N2.1 N2.4 N1.7NNE1.7 N2.5NNW3.2 N2.7 N2.0NNW1.7 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| E24 NNE23 NNE23 NNE23 NNE23 NNE24 NNE23 NNE23 NE24 NNE25 NE24 NE23 NE24 NE24 NE24 NNE23 NNE23 E23 E25 E25 ESE26 NW24 E23NNW22 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| All monthly, daily, and diurnal averages have been calculated using vector methods | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Surmont - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 41 | 14.24 | 14.24 |
| 6 - 11 | 113 | 39.24 | 53.47 |
| 12 - 19 | 75 | 26.04 | 79.51 |
| 20 - 28 | 59 | 20.49 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 288

Total Number of Hours: 288



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 5 | 11 | 11 | 6 | 2 | 0 | 0 | 2 | 0 | 41 |
| 6 - 11 | 2 | 2 | 6 | 5 | 0 | 1 | 5 | 7 | 15 | 35 | 9 | 6 | 9 | 8 | 2 | 1 | 113 |
| 12 - 19 | 2 | 8 | 1 | 1 | 7 | 0 | 0 | 0 | 2 | 17 | 0 | 0 | 13 | 17 | 6 | 1 | 75 |
| 20 - 28 | 1 | 25 | 13 | 4 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 59 |
| 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 | 6 | 35 | 21 | 12 | 16 | 2 | 5 | 12 | 28 | 63 | 15 | 8 | 22 | 27 | 13 | 3 | 288 |

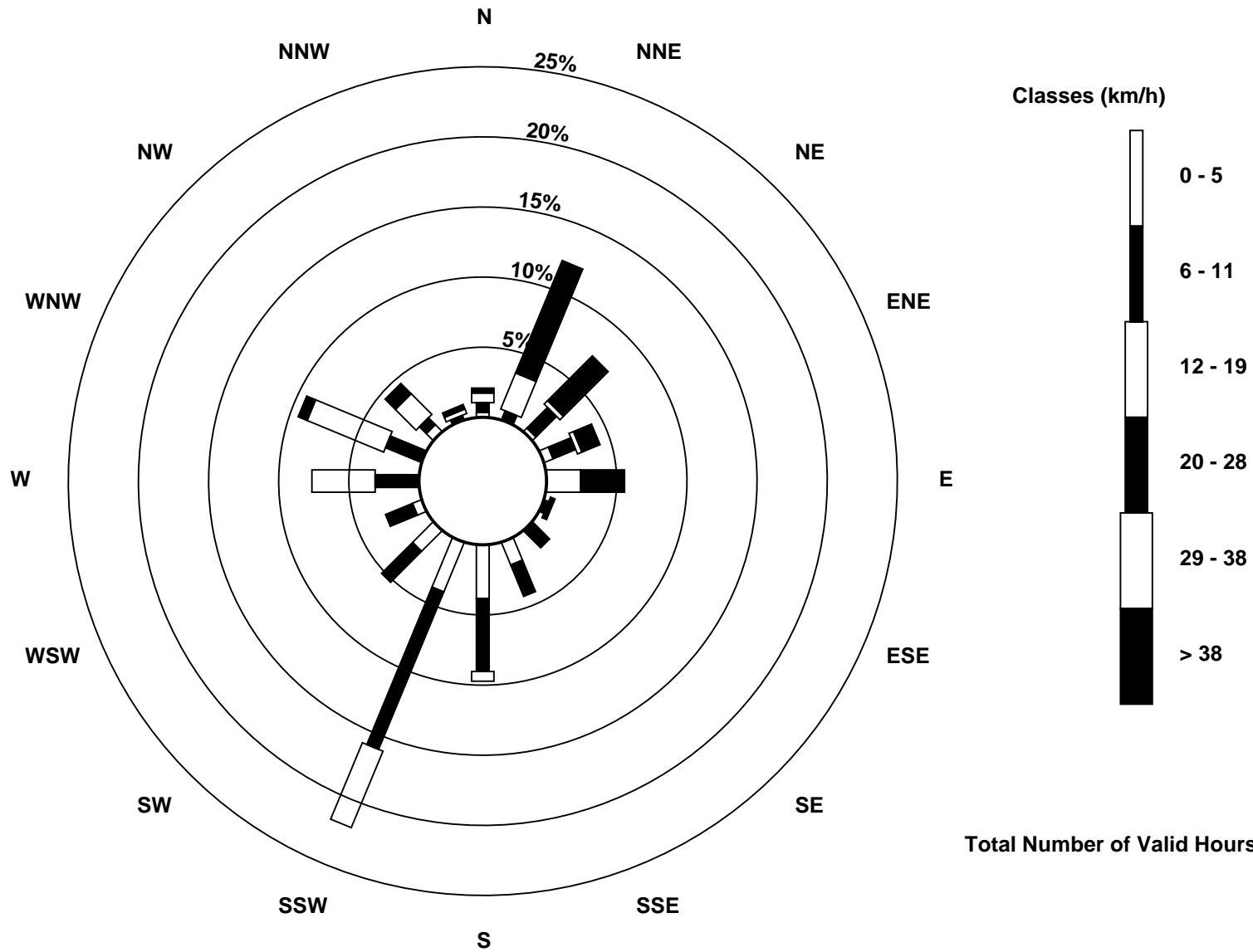
Total Number of Valid Hours: 288

Total Number of Hours: 288



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Surmont (AMS 24)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Surmont - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Sep 19 21:00 Minimum Value: 1 km/h on Sep 23 21:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6 | | | | | | | | | | | | | | Hours in Service: 288 Hours of Data: 288 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 | |
| 19-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | 3 | 4 | 4 | 5 | 5 | 5 | 6 | 6 | 6 | 7 | 6 | 6 | 6 | 7 |
| 20-Sep | 6 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 5 | 6 | 5 | 4 | 5 | 5 | 6 | 5 | 5 | 4 | 4 | 6 |
| 21-Sep | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 5 | 5 | 6 | 5 | 5 | 4 | 4 | 4 | 6 |
| 22-Sep | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 23-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 24-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 4 |
| 25-Sep | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 3 | 3 | 2 | 4 | 2 | 2 | 4 | 3 | 2 | 4 | 2 | 4 |
| 26-Sep | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 3 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 5 |
| 27-Sep | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 5 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 4 | 3 | 1 | 2 | 5 |
| 28-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 4 | 5 | 4 | 4 | 4 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 5 |
| 29-Sep | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 5 |
| 30-Sep | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 4 | 5 | 5 | 4 | 4 | 5 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Summary of Hour Averages

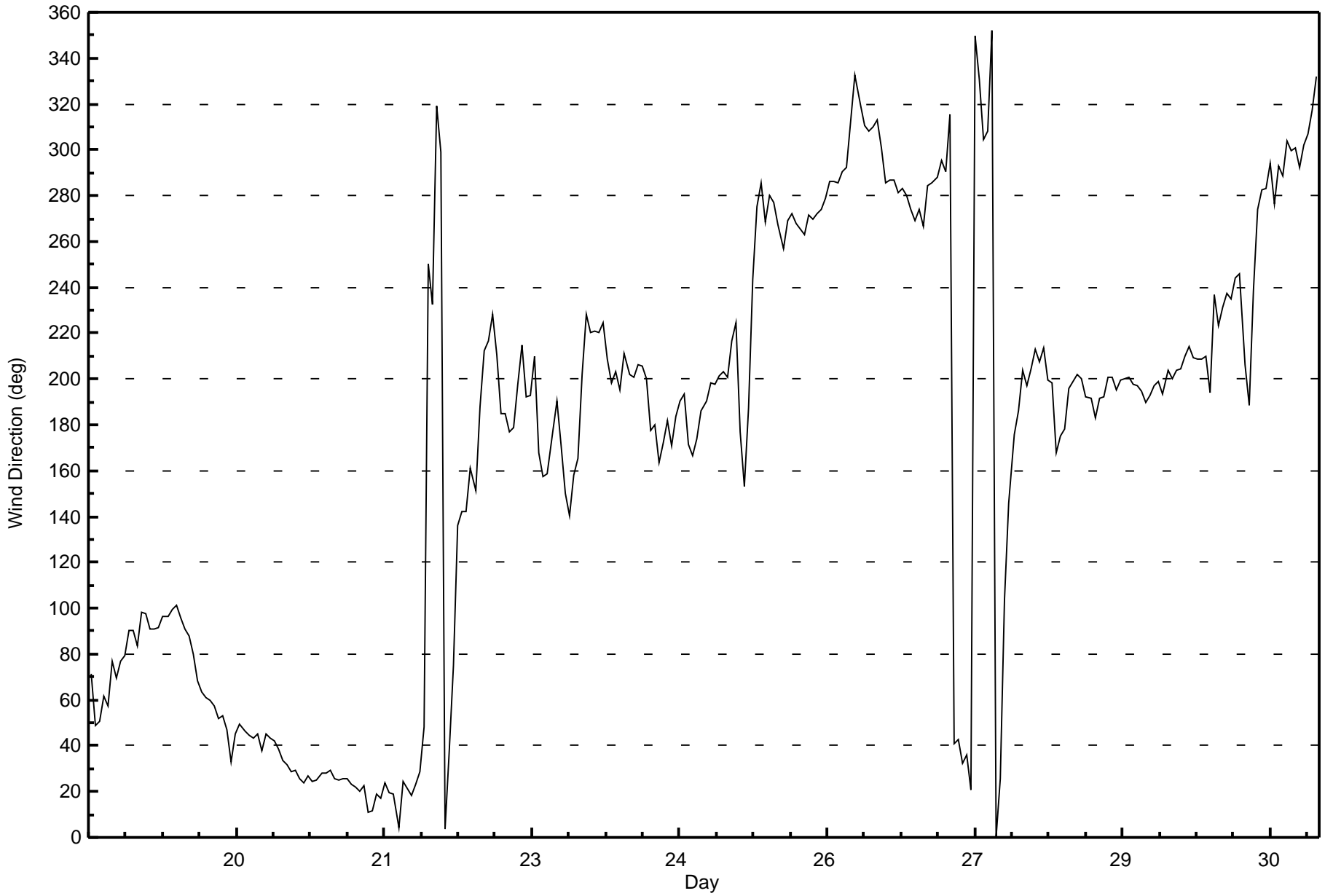
Wind Direction (WD) - deg
Surmont - September 2017

| Direction of Maximum Speed: 101 deg on Sep 19 21:00 Direction of Maximum Daily Speed Average: 23.1 deg on Sep 21 | | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 288 | | |
|---|-------------------------------|-------|-------|-------|-------|-------|-------|-----|------|------|---|------|------|-----|-------|-----|-----|------|-------|-------|-------|-----|---------------------------------|-----|---------------|
| Direction of Minimum Speed: 48 deg on Sep 22 07:00 | | | | | | | | | | | Direction of Minimum Daily Speed Average: 2.1 deg on Sep 22 | | | | | | | | | | | | Hours of Data: 288 | | |
| Monthly Average Direction: 237.3 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 | |
| 19-Sep | 72 | 49 | 51 | 62 | 57 | 77 | 70 | 77 | 79 | 90 | 90 | 84 | 98 | 98 | 91 | 91 | 91 | 97 | 96 | 100 | 101 | 96 | 91 | 88 | 89.4 |
| 20-Sep | 80 | 68 | 64 | 61 | 60 | 57 | 52 | 53 | 47 | 33 | 45 | 49 | 46 | 45 | 43 | 45 | 38 | 45 | 43 | 42 | 38 | 34 | 32 | 29 | 47.6 |
| 21-Sep | 29 | 26 | 24 | 27 | 24 | 25 | 28 | 28 | 29 | 26 | 25 | 26 | 26 | 23 | 22 | 20 | 22 | 11 | 12 | 19 | 17 | 24 | 20 | 19 | 23.1 |
| 22-Sep | 4 | 25 | 21 | 18 | 23 | 28 | 48 | 250 | 232 | 319 | 299 | 4 | 38 | 75 | 136 | 142 | 142 | 161 | 151 | 188 | 212 | 217 | 228 | 211 | 27.7 |
| 23-Sep | 185 | 185 | 177 | 178 | 198 | 215 | 192 | 193 | 210 | 168 | 157 | 158 | 177 | 191 | 171 | 150 | 140 | 158 | 165 | 202 | 228 | 220 | 221 | 220 | 182.9 |
| 24-Sep | 225 | 208 | 198 | 203 | 195 | 211 | 202 | 201 | 207 | 205 | 200 | 178 | 180 | 163 | 172 | 182 | 171 | 184 | 190 | 193 | 172 | 166 | 174 | 186 | 189.5 |
| 25-Sep | 191 | 198 | 198 | 201 | 203 | 201 | 217 | 224 | 177 | 153 | 187 | 244 | 275 | 286 | 269 | 280 | 277 | 267 | 257 | 269 | 272 | 268 | 265 | 263 | 247.4 |
| 26-Sep | 271 | 269 | 272 | 274 | 279 | 286 | 286 | 286 | 291 | 292 | 312 | 333 | 320 | 310 | 308 | 310 | 313 | 301 | 285 | 287 | 287 | 282 | 283 | 280 | 292.9 |
| 27-Sep | 274 | 269 | 274 | 267 | 284 | 285 | 288 | 295 | 290 | 316 | 41 | 43 | 32 | 36 | 21 | 349 | 331 | 304 | 308 | 352 | 0 | 25 | 104 | 146 | 322.3 |
| 28-Sep | 176 | 186 | 204 | 197 | 205 | 213 | 207 | 213 | 200 | 198 | 168 | 175 | 178 | 196 | 199 | 202 | 200 | 192 | 191 | 183 | 192 | 192 | 201 | 201 | 194.4 |
| 29-Sep | 195 | 199 | 200 | 201 | 197 | 197 | 195 | 190 | 193 | 197 | 199 | 193 | 204 | 200 | 204 | 204 | 210 | 214 | 209 | 209 | 209 | 210 | 194 | 237 | 201.1 |
| 30-Sep | 223 | 231 | 237 | 235 | 244 | 246 | 206 | 188 | 239 | 274 | 282 | 283 | 294 | 276 | 293 | 288 | 304 | 300 | 301 | 293 | 302 | 307 | 317 | 332 | 286.6 |
| 32.4 | 336.0 | 329.1 | 300.1 | 308.0 | 310.0 | 311.6 | 291.6 | 1.5 | 12.2 | 45.4 | 54.8 | 33.9 | 28.8 | 6.1 | 357.4 | 3.7 | 4.4 | 17.1 | 353.1 | 343.3 | 355.8 | 1.2 | 340.0 | | |
| Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | | | |
| All monthly, daily, and diurnal averages have been calculated using vector methods | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Surmont - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Surmont - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 92 deg on Sep 27 10:00 Minimum Value: 4 deg on Sep 26 20:00 Percentiles: P ₁ = 6 P ₁₀ = 11 Q ₁ = 13 Median = 16 Q ₃ = 21 P ₉₀ = 27 P ₉₉ = 51 | | | | | | | | | | | | | | | | | Hours in Service: 288 Hours of Data: 288 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 | | |
| 19-Sep | 10 | 14 | 13 | 12 | 10 | 11 | 12 | 11 | 13 | 17 | 16 | 15 | 15 | 15 | 16 | 15 | 15 | 15 | 16 | 16 | 15 | 15 | 16 | 16 | 17 | |
| 20-Sep | 15 | 15 | 13 | 13 | 13 | 13 | 13 | 16 | 13 | 13 | 13 | 13 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 14 | 14 | 16 | |
| 21-Sep | 13 | 13 | 14 | 13 | 14 | 14 | 14 | 14 | 13 | 13 | 14 | 13 | 15 | 15 | 14 | 16 | 14 | 21 | 19 | 14 | 17 | 13 | 18 | 21 | 21 | |
| 22-Sep | 23 | 15 | 16 | 17 | 14 | 17 | 85 | 41 | 30 | 48 | 16 | 49 | 22 | 21 | 34 | 18 | 20 | 27 | 16 | 21 | 16 | 20 | 15 | 16 | 85 | |
| 23-Sep | 17 | 19 | 23 | 19 | 23 | 25 | 29 | 29 | 28 | 23 | 20 | 20 | 23 | 31 | 30 | 25 | 21 | 15 | 16 | 21 | 16 | 17 | 19 | 14 | 31 | |
| 24-Sep | 14 | 19 | 15 | 17 | 15 | 17 | 15 | 17 | 19 | 21 | 31 | 26 | 29 | 27 | 25 | 27 | 19 | 21 | 20 | 19 | 20 | 18 | 19 | 19 | 31 | |
| 25-Sep | 18 | 16 | 18 | 16 | 16 | 13 | 13 | 17 | 17 | 25 | 54 | 32 | 22 | 20 | 18 | 15 | 18 | 14 | 18 | 17 | 12 | 12 | 21 | 12 | 54 | |
| 26-Sep | 11 | 11 | 10 | 10 | 9 | 8 | 9 | 9 | 10 | 13 | 17 | 17 | 18 | 20 | 15 | 16 | 15 | 14 | 5 | 4 | 6 | 6 | 5 | 9 | 20 | |
| 27-Sep | 11 | 11 | 10 | 13 | 8 | 8 | 7 | 12 | 60 | 92 | 27 | 19 | 14 | 23 | 26 | 26 | 21 | 9 | 18 | 24 | 21 | 16 | 29 | 18 | 92 | |
| 28-Sep | 19 | 14 | 12 | 12 | 13 | 12 | 14 | 14 | 19 | 21 | 24 | 24 | 27 | 27 | 26 | 27 | 24 | 22 | 19 | 20 | 20 | 21 | 20 | 20 | 27 | |
| 29-Sep | 21 | 22 | 22 | 19 | 18 | 18 | 21 | 20 | 21 | 22 | 23 | 25 | 29 | 25 | 29 | 25 | 23 | 21 | 16 | 15 | 15 | 19 | 15 | 21 | 29 | |
| 30-Sep | 13 | 17 | 12 | 12 | 11 | 12 | 60 | 28 | 38 | 19 | 18 | 22 | 24 | 25 | 16 | 12 | 12 | 10 | 9 | 9 | 11 | 11 | 12 | 12 | 60 | |
| | | | | | | | | | | | | | | | | | 23 22 23 19 23 25 85 41 60 92 54 49 29 31 34 27 24 27 20 24 21 21 29 21 | | | | | | | | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association

SO₂ Calibration Summary

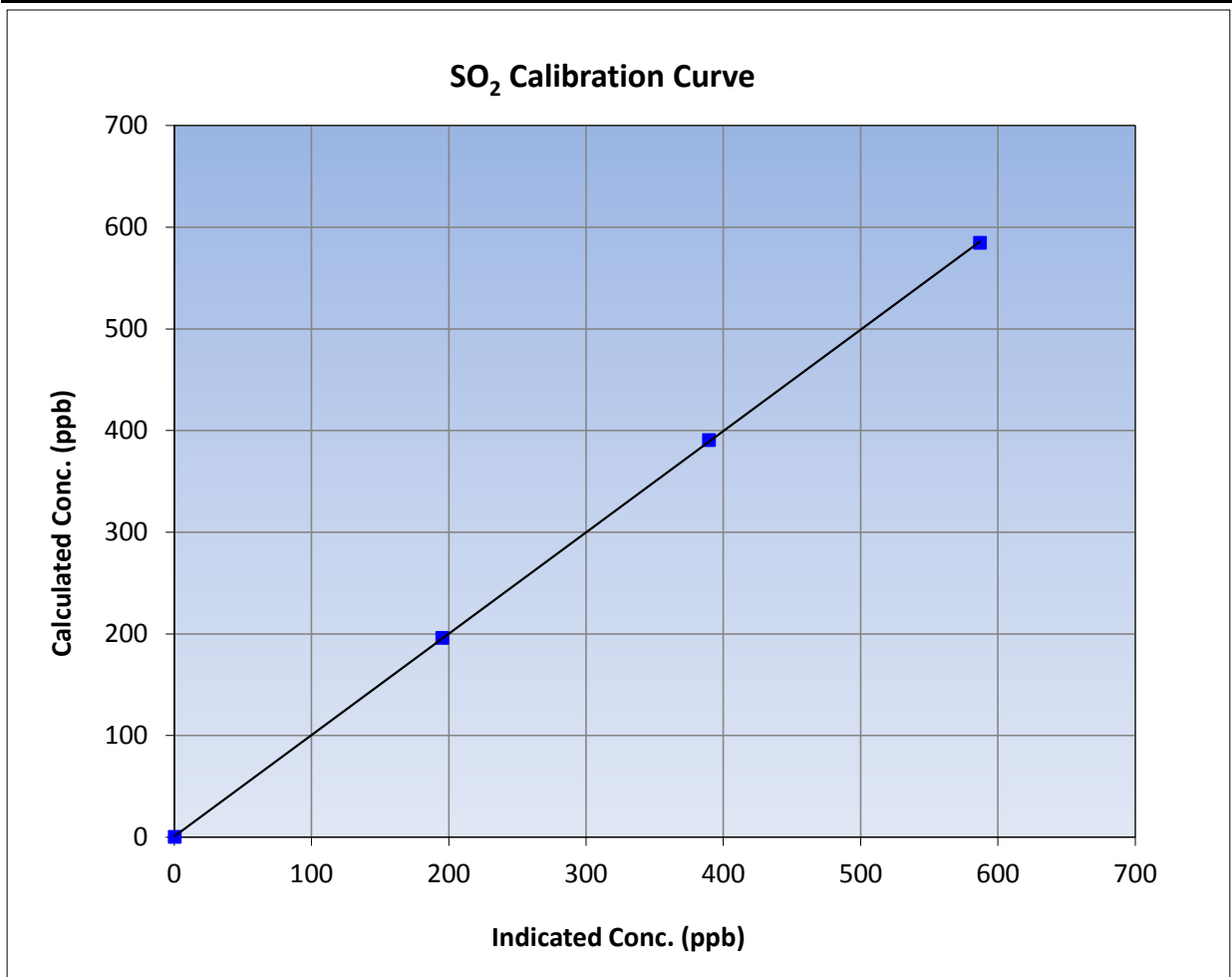
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 29, 2017 |
| Station Name | Surmont | Station Number | AMS 24 |
| Start Time (MST) | 10:13 | End Time (MST) | 16:04 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1170050150 |

Calibration Data

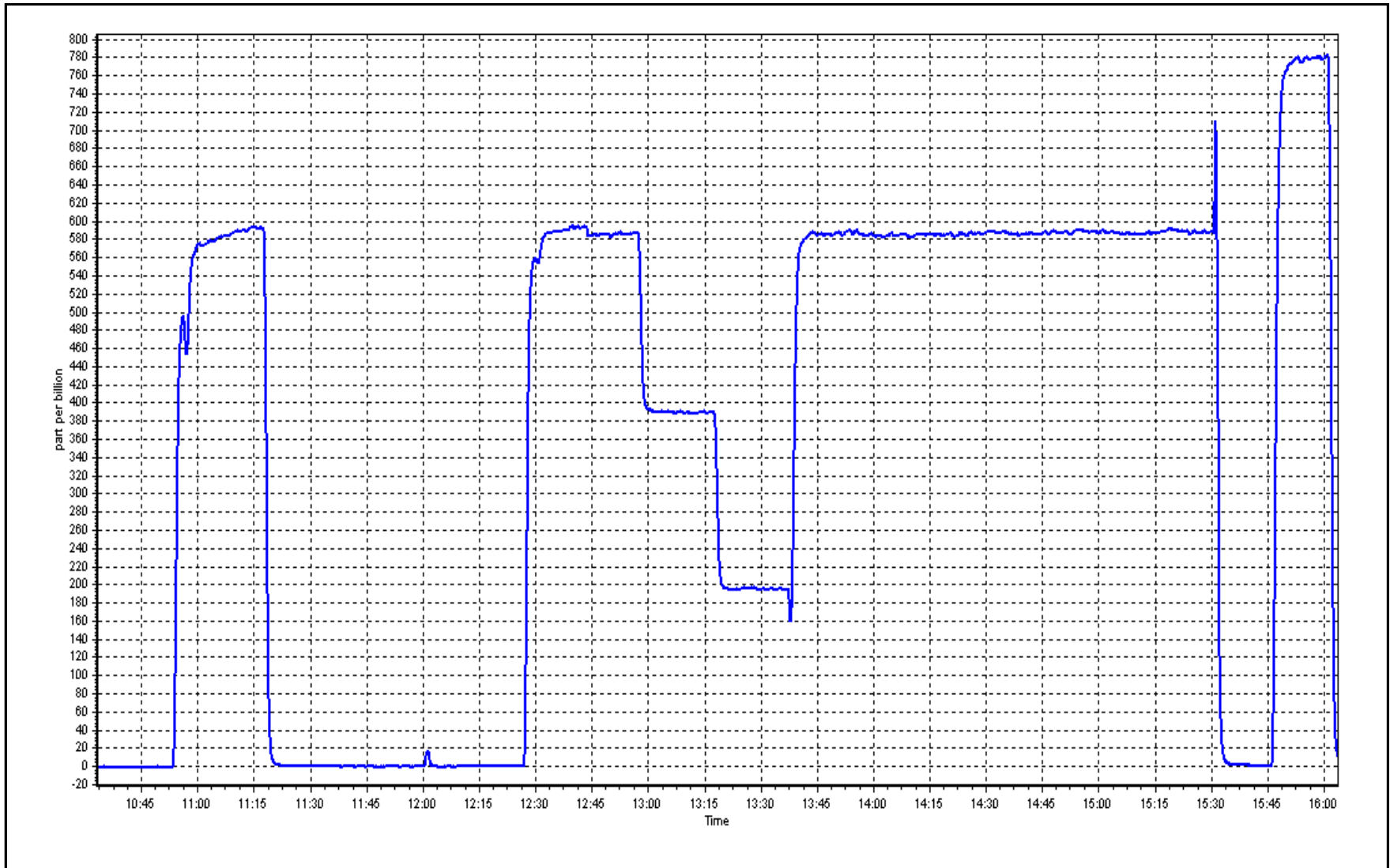
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999972 | ≥0.995 |
| 584.3 | 586.5 | 0.9962 | Slope | 0.996882 | 0.90 - 1.10 |
| 390.4 | 389.2 | 1.0031 | | | |
| 195.8 | 194.9 | 1.0044 | Intercept | 0.840646 | +/-30 |



SO2 Calibration Plot

Date: September 7, 2017

Location: Surmont





Wood Buffalo Environmental Association

H₂S Calibration Summary

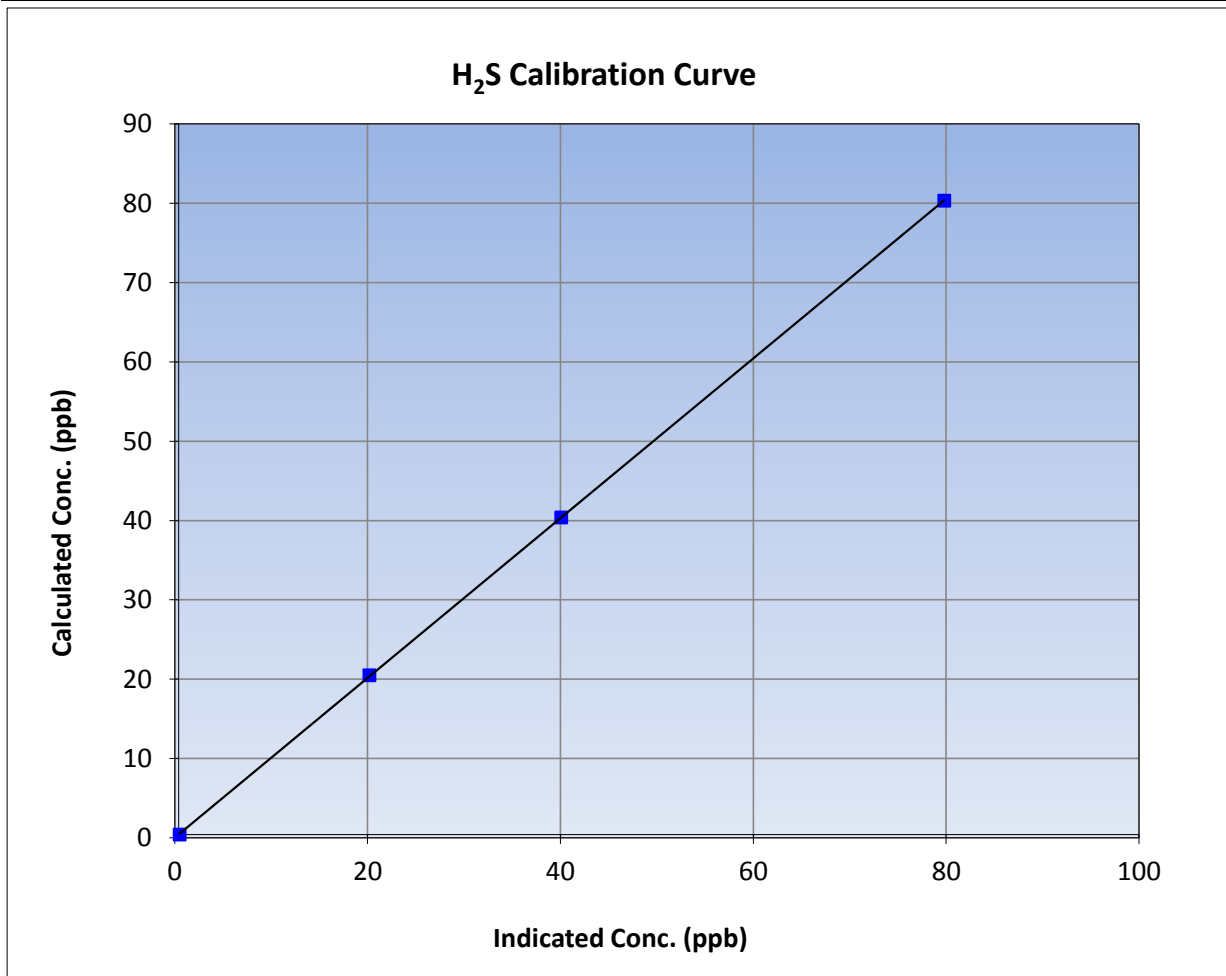
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 8, 2017 | Previous Calibration | August 31, 2017 |
| Station Name | Surmont | Station Number | AMS 24 |
| Start Time (MST) | 9:30 | End Time (MST) | 12:01 |
| Analyzer make | Thermo 450i | Analyzer serial # | 1170050142 |

Calibration Data

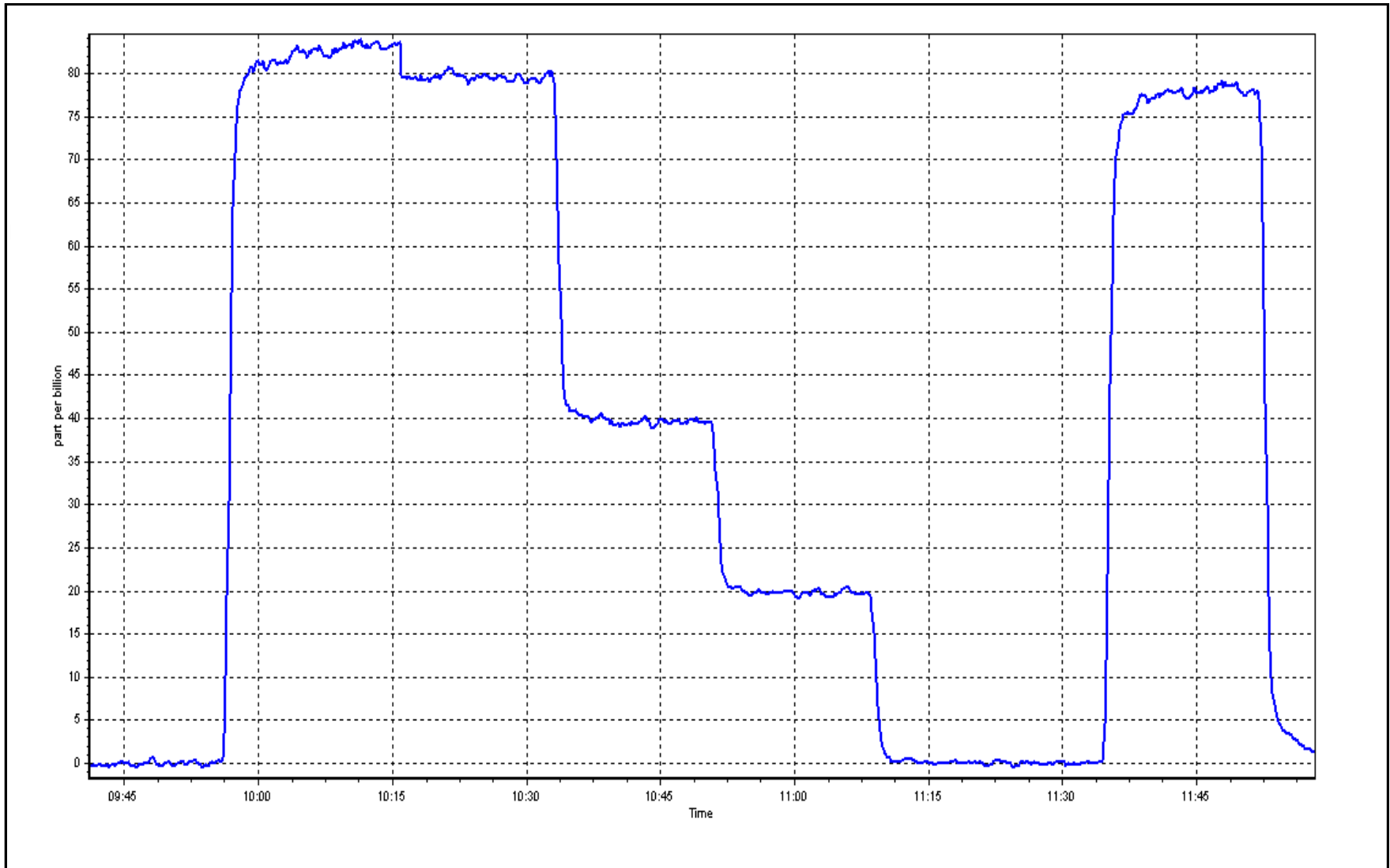
| Calculated concentration (ppb) (Cc) | LL65044 | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|---------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999989 | |
| 79.9 | 79.4 | 1.0067 | | | ≥0.995 |
| 40.0 | 39.7 | 1.0074 | Slope | 1.006974 | |
| 20.1 | 19.8 | 1.0154 | | | 0.90 - 1.10 |
| | | | Intercept | 0.014777 | +/-3 |



H₂S Calibration Plot

Date: September 8, 2017

Location: Surmont





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|-----------------|
| Station Name: | Surmont | Station number: | AMS 24 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 29, 2017 |
| Start time (MST): | 10:13 | End time (MST): | 16:04 |
| Reason: | Install | | |

Calibration Standards

| | | | |
|-----------------------|------------------|---------------------|----------------|
| Gas Cert Reference | EY0000833 | Cal Gas Expiry Date | February-22-20 |
| CH4 Cal Gas Conc. | <u>506.0</u> ppm | CH4 Equiv Conc. | 1056.0 ppm |
| C3H8 Cal Gas Conc. | <u>200.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 1845 |
| ZAG Make/Model | API T701H | Serial Number | 268 |

Analyzer Information

| | | | |
|----------------------|---------------|---------------------|---------------|
| Analyzer make: | Thermo 51i-LT | Analyzer serial #: | 913935796 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -293 |
| Calculated slope | 0.994290 | Sample pressure | 9.6 |
| Calculated intercept | 0.032540 | Fuel pressure | 18.8 |
| Analyzer Background | 3.950 | Air pressure | 35.7 |
| Analyzer Coefficient | 4.719 | Flame temperature | 157.5 |
| | | | <u>Finish</u> |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 4900 | 0.0 | 0.00 | -0.76 | ---- |
| as found span | 4953 | 58.8 | 12.39 | 10.05 | 1.233 |
| calibrator zero | 4900 | 0.0 | 0.00 | -0.01 | ---- |
| high point | 4953 | 58.8 | 12.39 | 12.44 | 0.996 |
| second point | 4974 | 39.3 | 8.28 | 8.26 | 1.002 |
| third point | 4992 | 19.7 | 4.15 | 4.30 | 0.965 |
| as left zero | 4900 | 0.0 | 0.00 | 0.13 | ---- |
| as left span | 3840 | 62.7 | 16.97 | 16.40 | 1.034 |
| Average Correction Factor | | | | | 0.988 |
| Corrected As found | 10.81 | Previous response | 12.43 | *% change | 15.0% |

* = > +/-5% change initiates investigation

Notes: zero adjusted.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

THC Calibration Summary

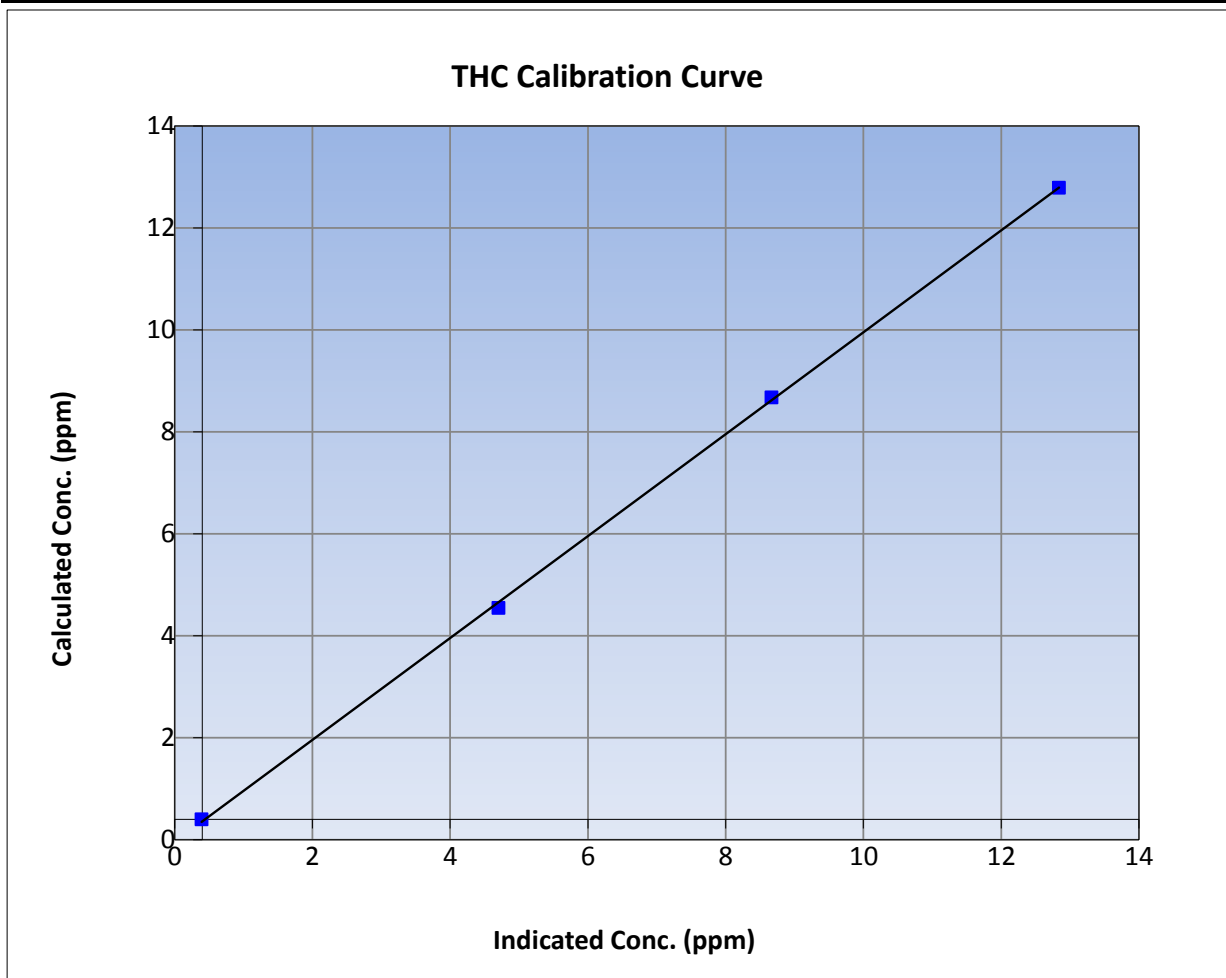
Version-03-2017

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 29, 2017 |
| Station Name | Surmont | Station Number | AMS 24 |
| Start Time (MST) | 10:13 | End Time (MST) | 16:04 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 913935796 |

Calibration Data

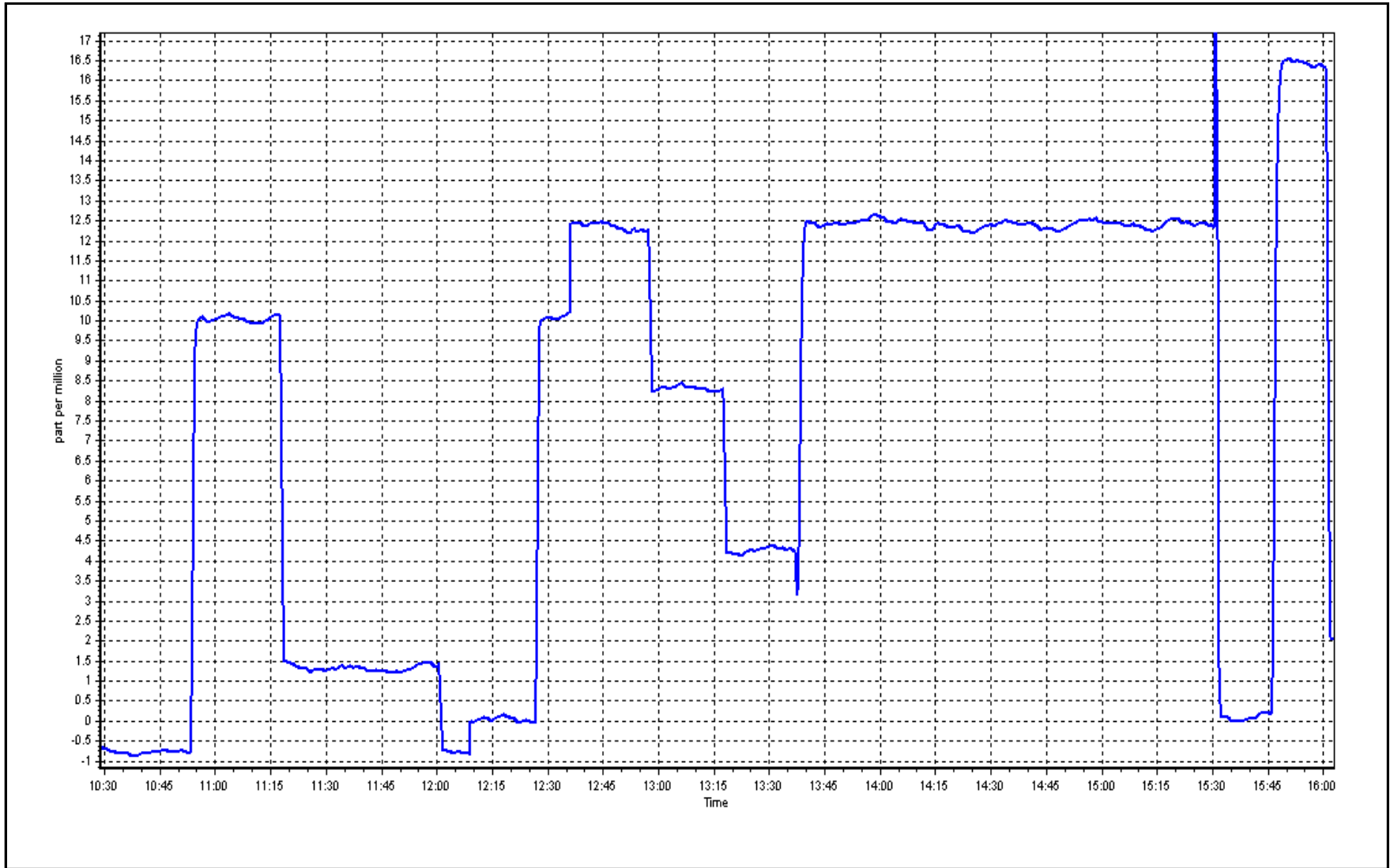
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999797 | ≥0.995 |
| 12.4 | 12.4 | 0.9959 | | | |
| 8.3 | 8.3 | 1.0017 | Slope | 0.999328 | 0.90 - 1.10 |
| 4.2 | 4.3 | 0.9653 | | | |
| | | | Intercept | -0.039702 | +/-1.5 |



THC Calibration Plot

Date: September 7, 2017

Location: Surmont





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

Station Name: Surmont Station number: AMS 24
 Calibration Date: September 27, 2017 Last Cal Date: September 22, 2017
 Start time (MST): 7:33 End time (MST): 9:53
 Reason: Other: Adjusted zero remotely

Calibration Standards

Gas Cert Reference EY0000833 Cal Gas Expiry Date February-22-20
 CH4 Cal Gas Conc. 506.0 ppm CH4 Equiv Conc. 1056.0 ppm
 C3H8 Cal Gas Conc. 200.0 ppm Station temp. 22 Deg C
 Calibrator Make/Model API T700 Serial Number 1845
 ZAG Make/Model API T701H Serial Number 268

Analyzer Information

Analyzer make: Thermo 51i-LT Analyzer serial #: 913935796

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|---------------------|--------------|---------------|
| Analyzer Range | 0 - 25 ppm | | Bias voltage supply | -294 | -293 |
| Calculated slope | 0.996212 | 1.008902 | Sample pressure | 9.6 | 9.6 |
| Calculated intercept | 0.049811 | 0.010650 | Fuel pressure | 18.8 | 18.8 |
| Analyzer Background | 3.200 | 2.840 | Air pressure | 37.7 | 37.7 |
| Analyzer Coefficient | 5.518 | 5.232 | Flame temperature | 157.4 | 157.6 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|-----------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5000 | 0.0 | 0.00 | -0.21 | ---- |
| as found span | 4933 | 78.4 | 16.52 | 17.16 | 0.963 |
| calibrator zero | 4900 | 0.0 | 0.00 | 0.04 | ---- |
| high point | 4933 | 78.4 | 16.52 | 16.40 | 1.007 |
| second point | 4975 | 39.2 | 8.26 | 8.12 | 1.017 |
| third point | 4995 | 19.7 | 4.15 | 4.07 | 1.020 |
| as left zero | | | | | |
| as left span | | | | | |

| Average Correction Factor | | | | 1.015 |
|---------------------------|-------|-------------------|-------|-----------------|
| Corrected As found | 17.37 | Previous response | 16.53 | *% change -4.8% |

* = > +/-5% change initiates investigation

Notes: Remote calibration to adjust baseline since it has drifted for the past few days. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

THC Calibration Summary

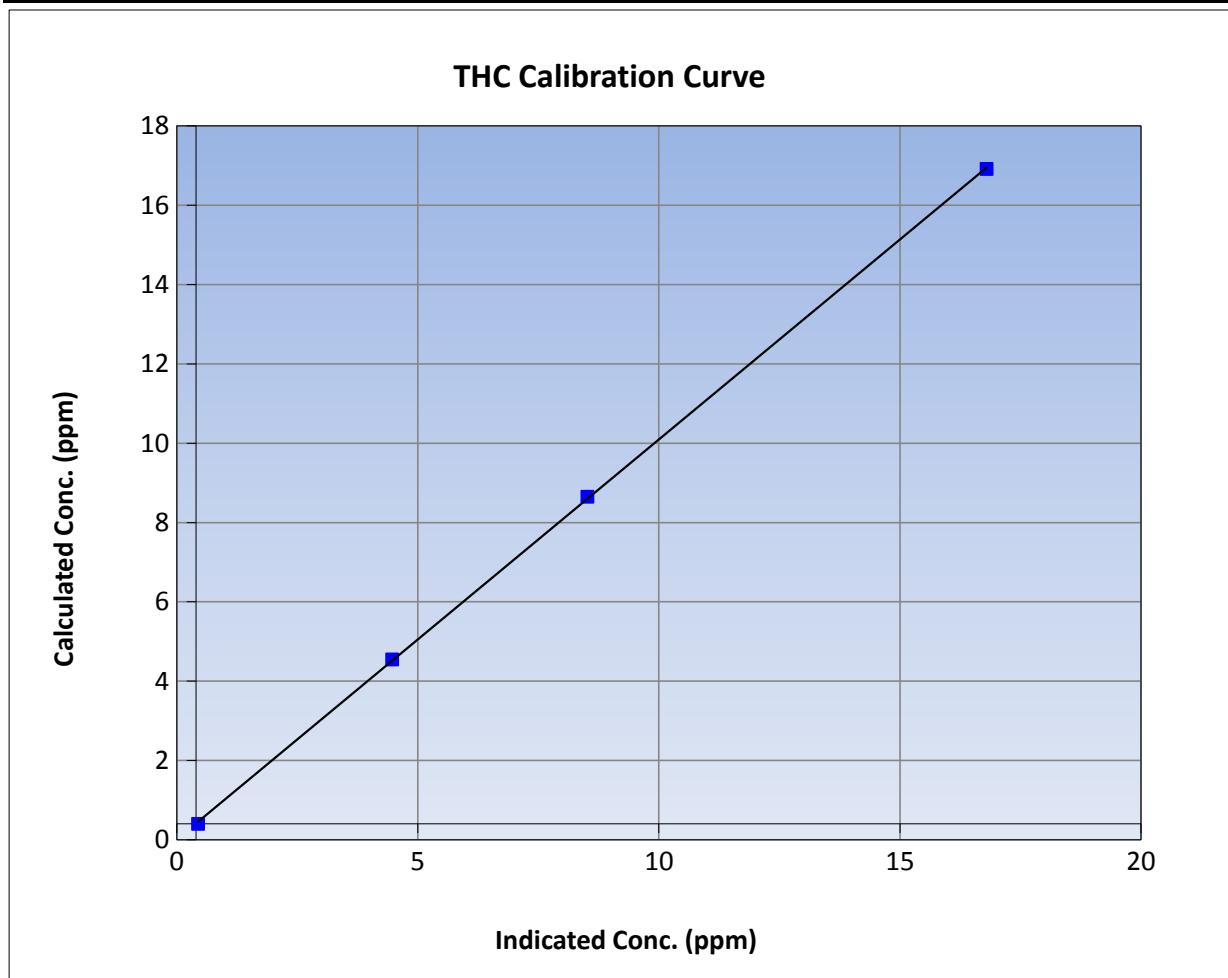
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 27, 2017 | Previous Calibration | September 22, 2017 |
| Station Name | Surmont | Station Number | AMS 24 |
| Start Time (MST) | 7:33 | End Time (MST) | 9:53 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 913935796 |

Calibration Data

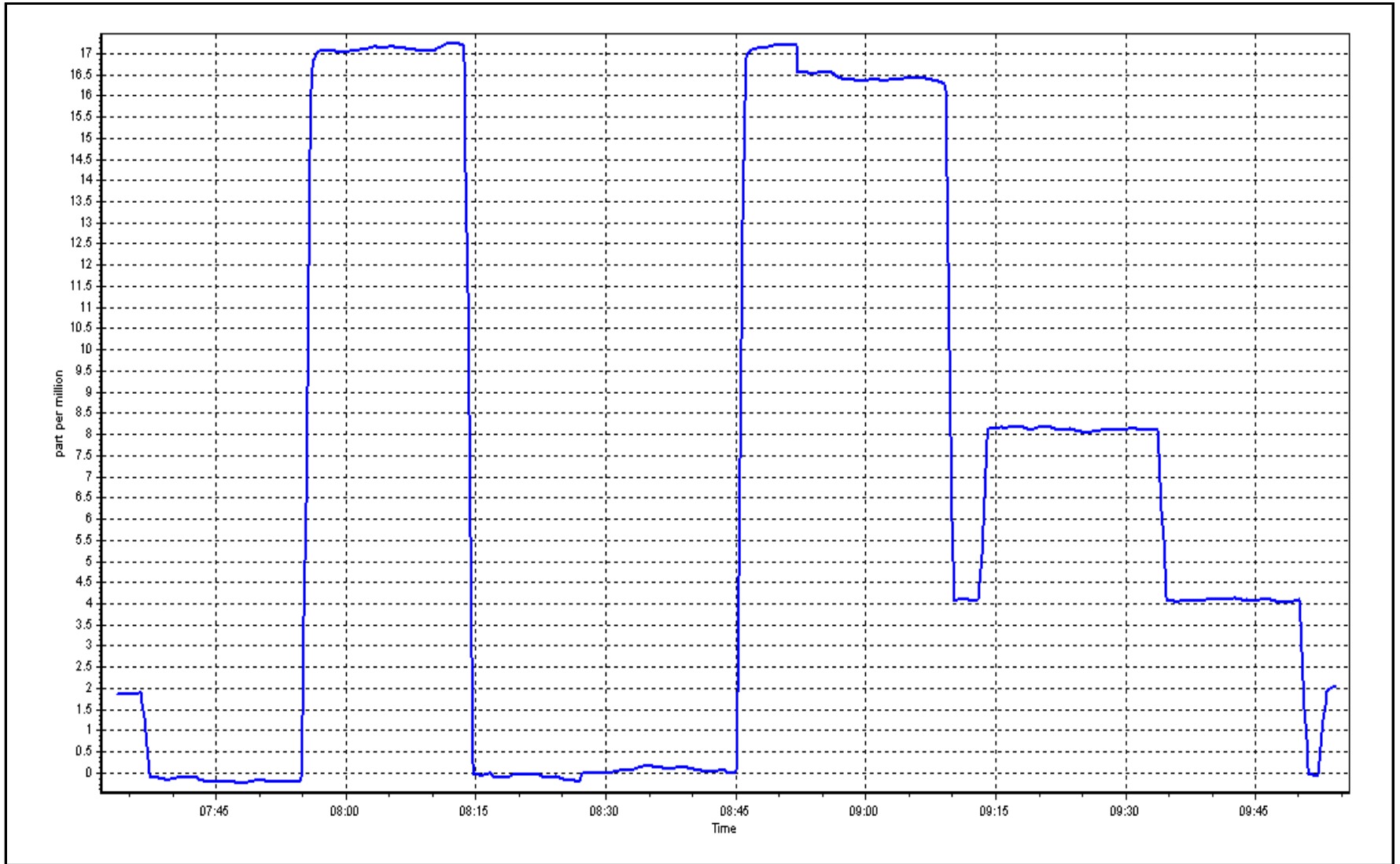
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999942 | ≥0.995 |
| 16.5 | 16.4 | 1.0073 | | | |
| 8.3 | 8.1 | 1.0171 | Slope | 1.008902 | 0.90 - 1.10 |
| 4.1 | 4.1 | 1.0203 | | | |
| | | | Intercept | 0.010650 | +/-1.5 |



THC Calibration Plot

Date: September 27, 2017

Location: Surmont





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------|-----------------|-----------------|
| Station Name: | Surmont | Station number: | AMS 24 |
| Calibration Date: | September 7, 2017 | Last Cal Date: | August 30, 2017 |
| Start time (MST): | 10:13 | End time (MST): | 16:04 |
| Reason: | Install | | |

Calibration Standards

| | | | |
|-------------------|-----------------|---------------------|-----------------|
| NO Gas Cylinder # | EY0000833 | Cal Gas Expiry Date | February-22-20 |
| NOX Cal Gas Conc. | <u>51.1</u> ppb | NO Cal Gas Conc. | <u>51.1</u> ppb |
| Calibrator Model | API T700 | Serial Number | 1845 |
| ZAG make/model | API T701H | Serial Number | 268 |

Analyzer Information

| | | | | | |
|---------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1170050148 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 0.994 | 1.101 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.995 | 0.995 | PMT Temperature | -2.8 | -2.9 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 482.7 | 157.5 |
| NO bkgrnd | 1.3 | 1.5 | Sample Flow | 0.238 | 0.893 |
| NOX bkgrnd | 1.4 | 1.4 | PMT Voltage | -794.4 | -794.4 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.997550 | 0.994560 |
| NO _x Cal Offset | 0.627235 | 0.448694 |
| NO Cal Slope | 0.995999 | 0.992485 |
| NO Cal Offset | 1.008450 | 1.156187 |
| NO ₂ Cal Slope | 0.999017 | 0.998914 |
| NO ₂ Cal Offset | -0.442685 | -0.808524 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 4900 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.3 | 0.1 | ---- | ---- |
| as found span | 4953 | 58.8 | 599.5 | 599.5 | 0.0 | 129.7 | 128.9 | 0.8 | 4.6224 | 4.6511 |
| calibrator zero | 4900 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.3 | 0.1 | ---- | ---- |
| high point | 4953 | 58.8 | 599.5 | 599.5 | 0.0 | 602.8 | 603.7 | -0.8 | 0.9946 | 0.9931 |
| second point | 4974 | 39.3 | 400.6 | 400.6 | 0.0 | 401.7 | 401.7 | 0.0 | 0.9972 | 0.9972 |
| third point | 4992 | 19.7 | 200.9 | 200.9 | 0.0 | 201.4 | 200.3 | 1.2 | 0.9973 | 1.0028 |
| as left zero | 4900 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | -0.3 | 1.1 | ---- | ---- |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 0.9964 | 0.9977 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 129.9 ppb | NO = 129.2 ppb | | *Percent Change | NO _x = 362% |
| Previous Response | NO _x = 600.4 ppb | NO = 600.9 ppb | | *Percent Change | NO = 365% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 604.3 | 603.3 | 1.1 | 0.9921 | 0.9937 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 101.6 | 501.7 | 604.1 | 101.6 | 502.6 | 0.9924 | ---- | 0.9982 | 100.2% |
| 2nd NO2 (200 ppb O3) | 343.7 | 259.6 | 604.8 | 343.7 | 261.2 | 0.9913 | ---- | 0.9939 | 100.6% |
| 3rd NO2 (100 ppb O3) | 451.7 | 151.6 | 605.0 | 451.7 | 153.2 | 0.9909 | ---- | 0.9896 | 101.1% |
| 2nd NO ref point | ---- | 0.0 | 605.0 | 605.0 | 0.1 | 0.9909 | 0.9909 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9914 | 0.9923 | 0.9939 | 100.6% |

Notes:

Flow is low. Replacing pump after as founds.

Calibration Performed By:

Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

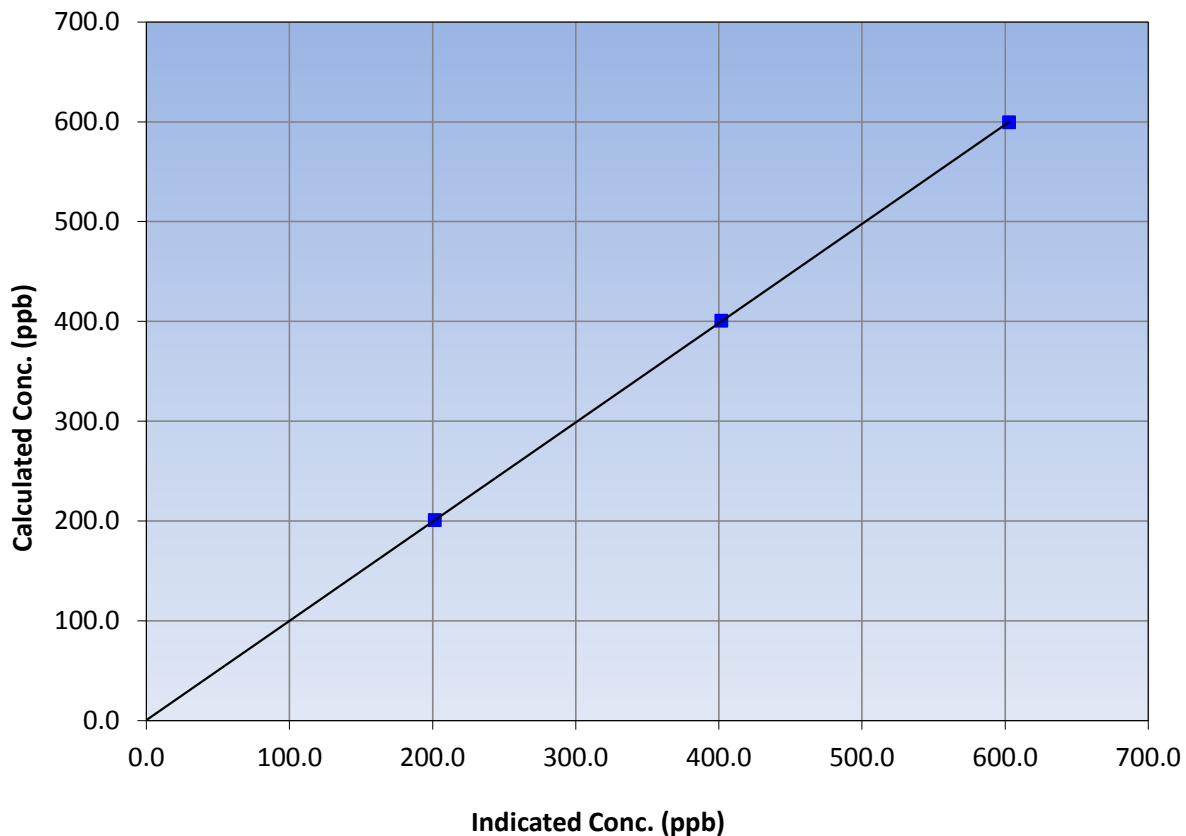
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 30, 2017 |
| Station Name | Surmont | Station Number | AMS 24 |
| Start Time (MST) | 10:13 | End Time (MST) | 16:04 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1170050148 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 |
| 599.5 | 602.8 | 0.9946 | | |
| 400.6 | 401.7 | 0.9972 | Slope | 0.90 - 1.10 |
| 200.9 | 201.4 | 0.9973 | | |
| | | | Intercept | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

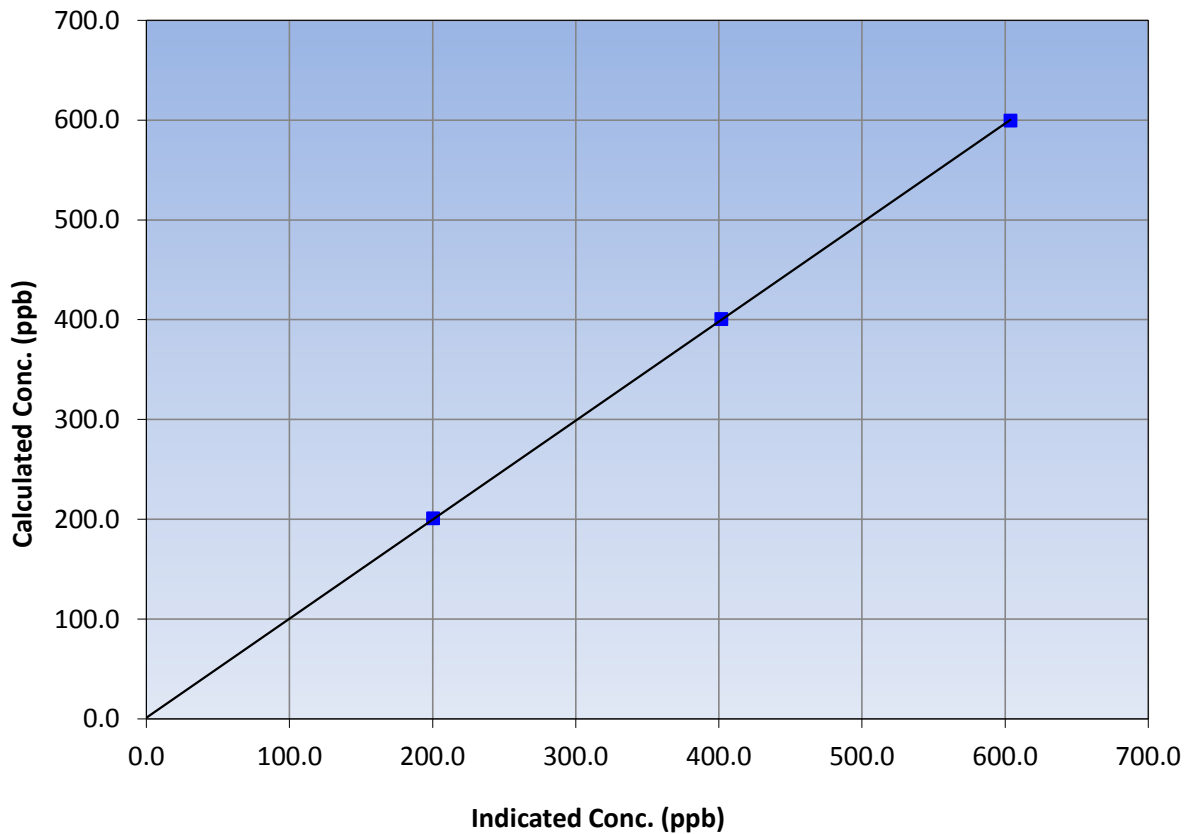
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 30, 2017 |
| Station Name | Surmont | Station Number | AMS 24 |
| Start Time (MST) | 10:13 | End Time (MST) | 16:04 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1170050148 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 | |
| 599.5 | 603.7 | 0.9931 | | | |
| 400.6 | 401.7 | 0.9972 | | | |
| 200.9 | 200.3 | 1.0028 | | | |
| | | | Slope | 0.992485 | 0.90 - 1.10 |
| | | | Intercept | 1.156187 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

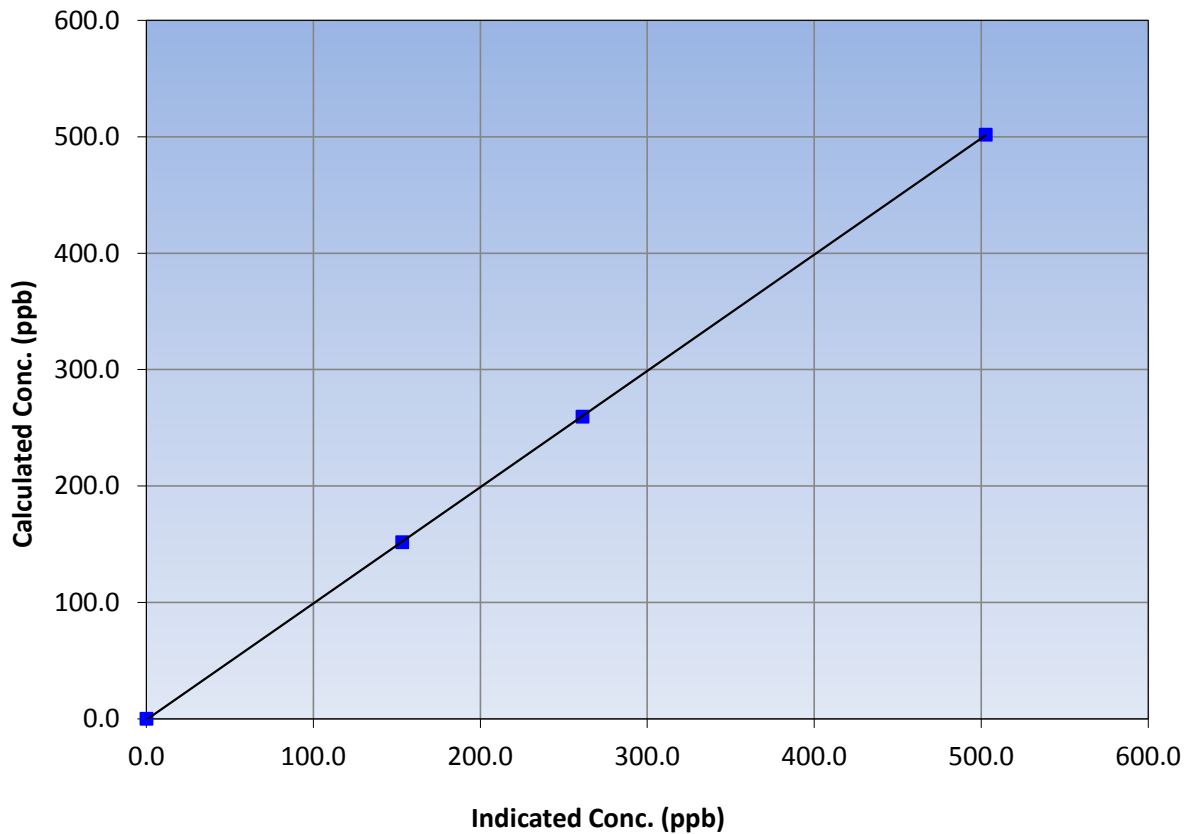
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 7, 2017 | Previous Calibration | August 30, 2017 |
| Station Name | Surmont | Station Number | AMS 24 |
| Start Time (MST) | 10:13 | End Time (MST) | 16:04 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1170050148 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 501.7 | 502.6 | 0.9982 | | | |
| 259.6 | 261.2 | 0.9939 | | | |
| 151.6 | 153.2 | 0.9896 | | | |
| | | | Slope | 0.998914 | 0.90 - 1.10 |
| | | | Intercept | -0.808524 | +/-20 |

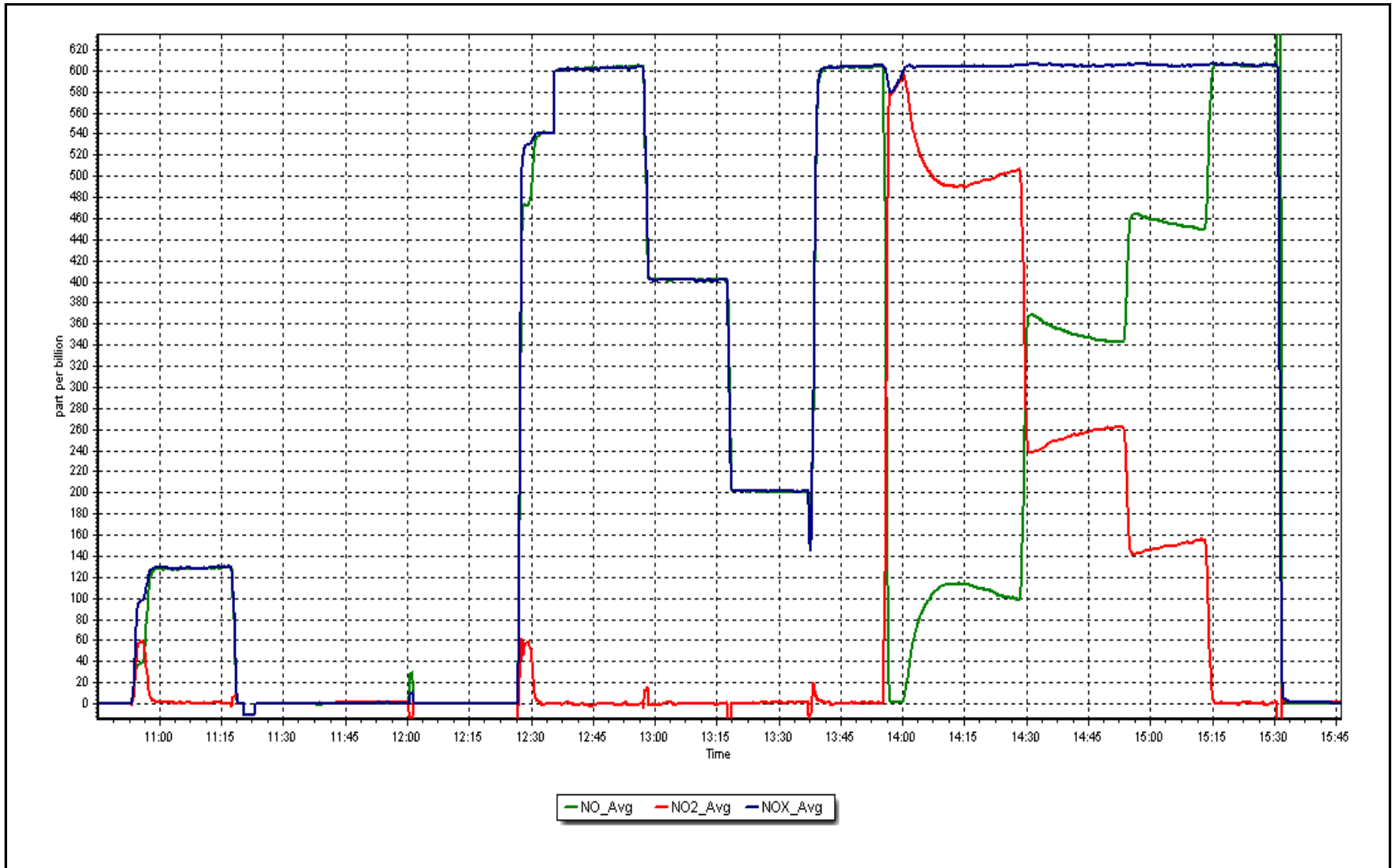
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 7, 2017

Location: Surmont





Wood Buffalo Environmental Association

Wind Speed/Direction Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-----------------|-----------------|--------------|
| Station Name: | Surmont | Station Number: | AMS 24 |
| Calibration Date: | September-07-17 | Prev Cal Date: | August-30-17 |
| Start Time (MST): | 13:00 | End Time (MST): | 14:15 |
| Barometric Press: | NA | Station Temp: | 22 Deg C |
| Reason: | Routine | | |

Wind Speed Information

| | | | |
|--------------------|----------------|----------------|--------|
| Sensor make/model: | Met One 010C-1 | Serial Number: | W15275 |
| WS Calibrator: | MetOne 053 | Serial Number: | K13090 |

| Shaft RPM | Actual Speed (K/hr) (Cv) | Indicated Speed (K/hr) (Iv) | Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i> |
|----------------------------------|--------------------------|-----------------------------|---|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.1 | 1.0031 |
| 400 | 39.4 | 39.5 | 0.9964 |
| 600 | 58.6 | 58.5 | 1.0009 |
| 800 | 77.8 | 77.7 | 1.0007 |
| Average Correction Factor | | | 1.0003 |

| | <i>Start</i> | <i>Finish</i> | <i>Limits</i> |
|--------------------------------|--------------|---------------|---------------|
| Correl Coeff (r ²) | 0.999999 | 0.999996 | ≥0.995 |
| Calculated slope | 0.998843 | 1.000489 | 0.90 - 1.10 |
| Calculated intercept | -0.025014 | -0.013563 | +/- 2 |

Wind Direction Information

| | | | |
|--|----------------|---|-----------|
| Sensor make/model: | Met One 020C-1 | Serial Number: | W16101 |
| As Found Declination (deg west of North) | <u>16</u> | As Left Declination (deg west of North) | <u>16</u> |

| Physical Direction (Degrees) (Cv) | Indicated Direction (Degrees) (Iv) | Correction factor (Cv/Iv) <i>Limit = 0.95-1.05</i> |
|-----------------------------------|------------------------------------|---|
| 0 | 0.0 | n/a |
| 90 | 90.2 | 0.9978 |
| 180 | 180.8 | 0.9956 |
| 270 | 271.2 | 0.9956 |
| 357 | 358.1 | 0.9969 |
| Average Correction Factor | | 0.9965 |

| | <i>Start</i> | <i>Finish</i> | <i>Limits</i> |
|--------------------------------|--------------|---------------|---------------|
| Correl Coeff (r ²) | 0.999987 | 0.999999 | ≥0.995 |
| Calculated slope | 0.998321 | 0.996503 | 0.90 - 1.10 |
| Calculated intercept | 0.447962 | -0.037222 | +/- 7 |

Notes: No issues. All points within specified limits.

Calibration Performed By: Aswin Sasi Kumar



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 25
WASKŌW OHCI PIMÂTISIWIN
SEPTEMBER 2017

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OCHI PIMATISIWIN (AMS 25)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 684 | 33 | 36 | 99.58 | 23 | 0 | 4 | 0 |
| H2S(ppb) Average | 681 | 33 | 39 | 99.17 | 2 | 0 | 1 | 0 |
| Temperature 2 m (C) Average | 717 | 0 | 3 | 99.58 | 17 | - | 14 | - |
| Relative Humidity (%) Average | 717 | 0 | 3 | 99.58 | 0 | - | 0 | - |
| Wind Speed 10 m (km/h) Average | 718 | 0 | 2 | 99.72 | 32.1 | - | 20.9 | - |
| Wind Direction 10 m (deg) Average | 718 | 0 | 2 | 99.72 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OHCI PIMATISIWIN (AMS 25)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 684 | 0.9 | 2 | - | 0 | 0 | 0 | 0 | 1 | 2 | 23 |
| H2S (ppb) Average | 681 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Wind Speed 10 m (km/h) Average | 717 | 5.3 | 4 | - | 0 | 1 | 2 | 4 | 7 | 11 | 17 |
| Wind Direction 10 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 718 | 11.8 | 6.5 | - | -2.4 | 3.9 | 7 | 11.3 | 16.1 | 20.7 | 32.1 |
| Relative Humidity (%) Average | 718 | 69.9 | 21 | - | 0 | 36 | 54 | 75 | 89 | 95 | 98 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKOW OHCI PIMATISIWIN (AMS 25)
 SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|---------------------|-----------------------------------|
| SO2 | 08 Sep 2017 11:00 | 08 Sep 2017 11:00 | 1 | Maintenance - station relocation |
| H2S | 08 Sep 2017 11:00 | 08 Sep 2017 13:00 | 3 | Maintenance - station relocation |
| AT, RH, WS, WD | 08 Sep 2017 10:00 | 08 Sep 2017 11:00 | 2 | Maintenance - station relocation |
| SO2 | 14 Sep 2017 10:00 | 14 Sep 2017 11:00 | 2 | Maintenance - WBEA internal audit |
| H2S | 14 Sep 2017 12:00 | 14 Sep 2017 14:00 | 3 | Maintenance - WBEA internal audit |
| Wind Speed, Wind Direction | 24 Sep 2017 02:00 | 24 Sep 2017 02:00 | 1 | Flat line in sensor output signal |



| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 23 ppb on Sep 24 13:00 | Maximum Daily Average: 4.4 ppb on Sep 24 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.1 ppb on Sep 1 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 2.5 ppb at hour 12 | Minimum Diurnal Average: 0.3 ppb at hour 7 | | Hours of Calibration: | 33 |
| 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 = 10 | | Percent Operational Time: | 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 0.3 | 4 |
| 4-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 6-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.4 | 1 |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 3 | 4 | 3 | 1 | 1 | 2 | 1 | 3 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1.1 | 4 |
| 8-Sep | 1 | 1 | 1 | 0 | Z | 1 | 0 | 0 | 0 | C | M | C | C | 1 | 1 | 1 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 1.0 | 10 | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 2 |
| 10-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 6 | 6 | 3 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 1.4 | 6 |
| 12-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | M | M | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 15-Sep | 0 | 0 | 0 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0.6 | 2 |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 7 | 5 | 3 | 3 | 1 | 3 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1.6 | 7 |
| 17-Sep | 1 | Z | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 3 | 4 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.5 | 4 |
| 18-Sep | 1 | 1 | Z | 0 | 1 | 0 | 1 | 0 | 1 | 7 | 7 | 5 | 4 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1.4 | 7 |
| 19-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 22-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.4 | 1 |
| 23-Sep | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0.7 | 3 | |
| 24-Sep | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 18 | 23 | 19 | 14 | 7 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4.4 | 23 |
| 25-Sep | 1 | 1 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 27-Sep | 1 | 1 | 0 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 28-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 10 | 12 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2.1 | 12 |
| 29-Sep | 2 | Z | 3 | 3 | 2 | 2 | 1 | 1 | 4 | 10 | 10 | 12 | 8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2.9 | 12 |
| 30-Sep | 1 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |

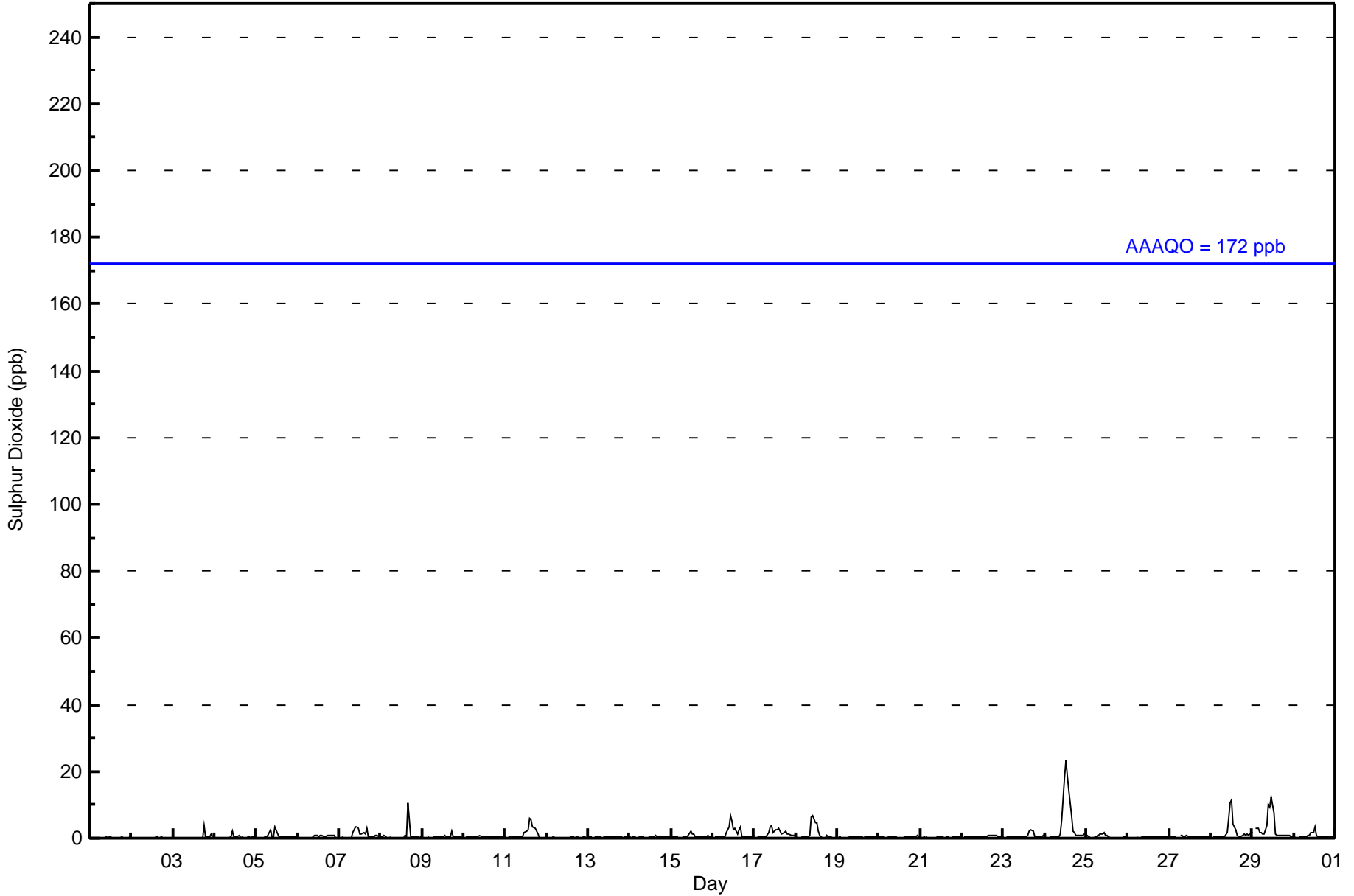
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.7 | 1.4 | 1.9 | 2.5 | 2.4 | 1.5 | 1.3 | 1.0 | 1.1 | 0.7 | 0.7 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | Diurnal Average |
| 2 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 4 | 10 | 10 | 18 | 23 | 19 | 14 | 7 | 10 | 3 | 4 | 1 | 1 | 1 | 1 | 1 | 2 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 678 | 99.12 | 99.12 |
| 11 - 20 | 5 | 0.73 | 99.85 |
| 21 - 60 | 1 | 0.15 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 55 | 17 | 17 | 11 | 7 | 12 | 62 | 98 | 50 | 40 | 41 | 58 | 69 | 49 | 51 | 40 | 677 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 55 | 17 | 17 | 11 | 7 | 12 | 67 | 99 | 50 | 40 | 41 | 58 | 69 | 49 | 51 | 40 | 683 |

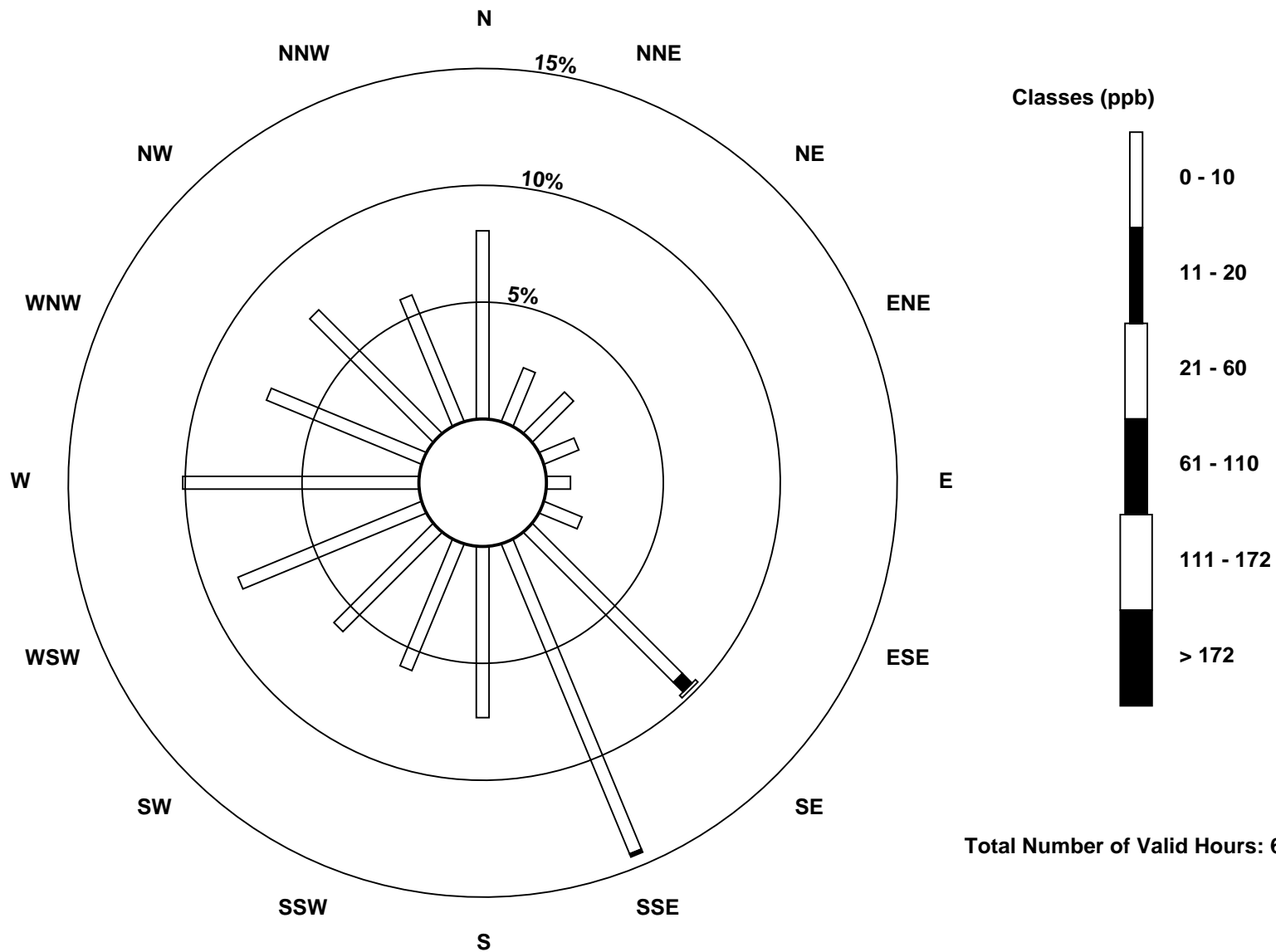
Total Number of Valid Hours: 683

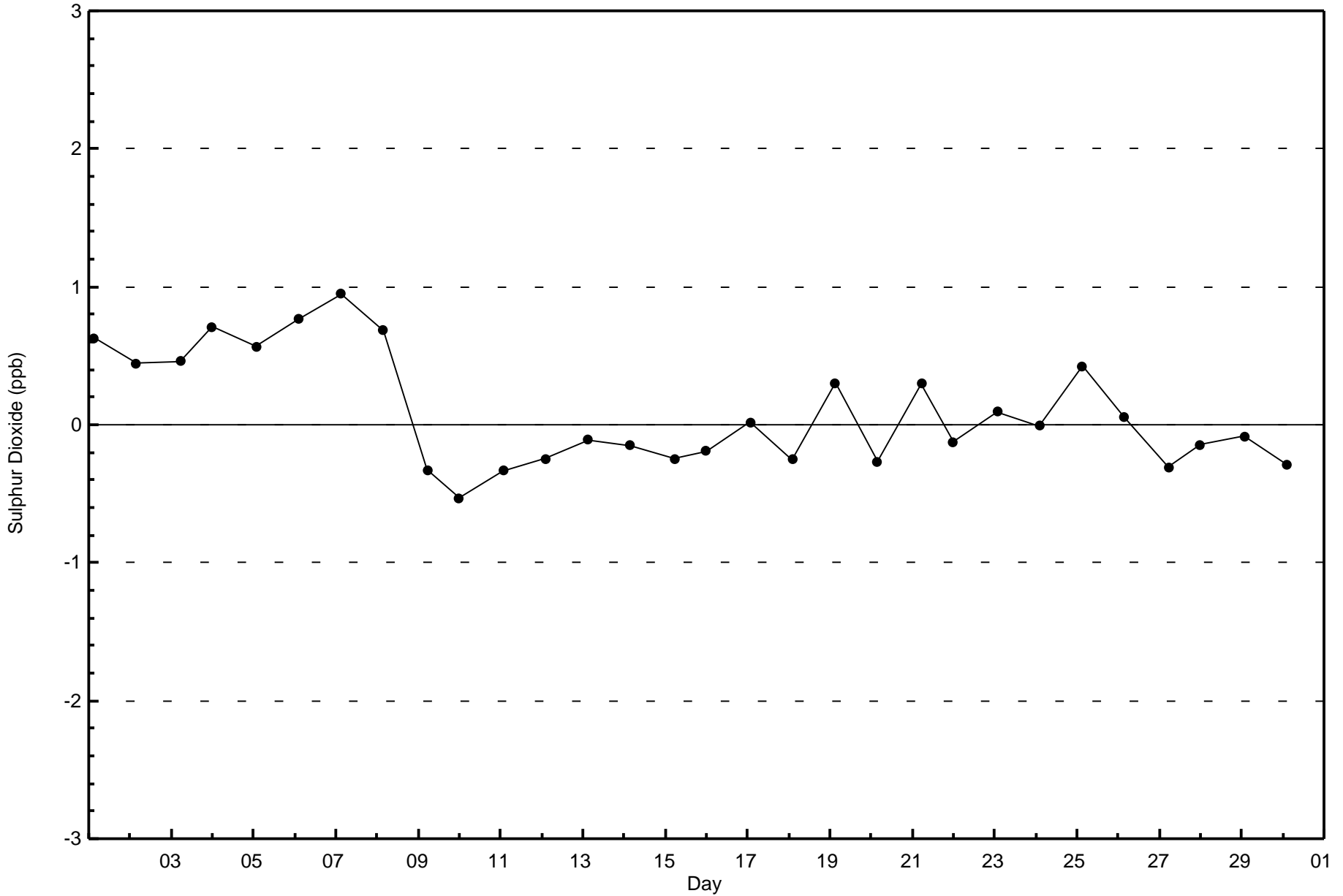
Total Number of Hours: 720

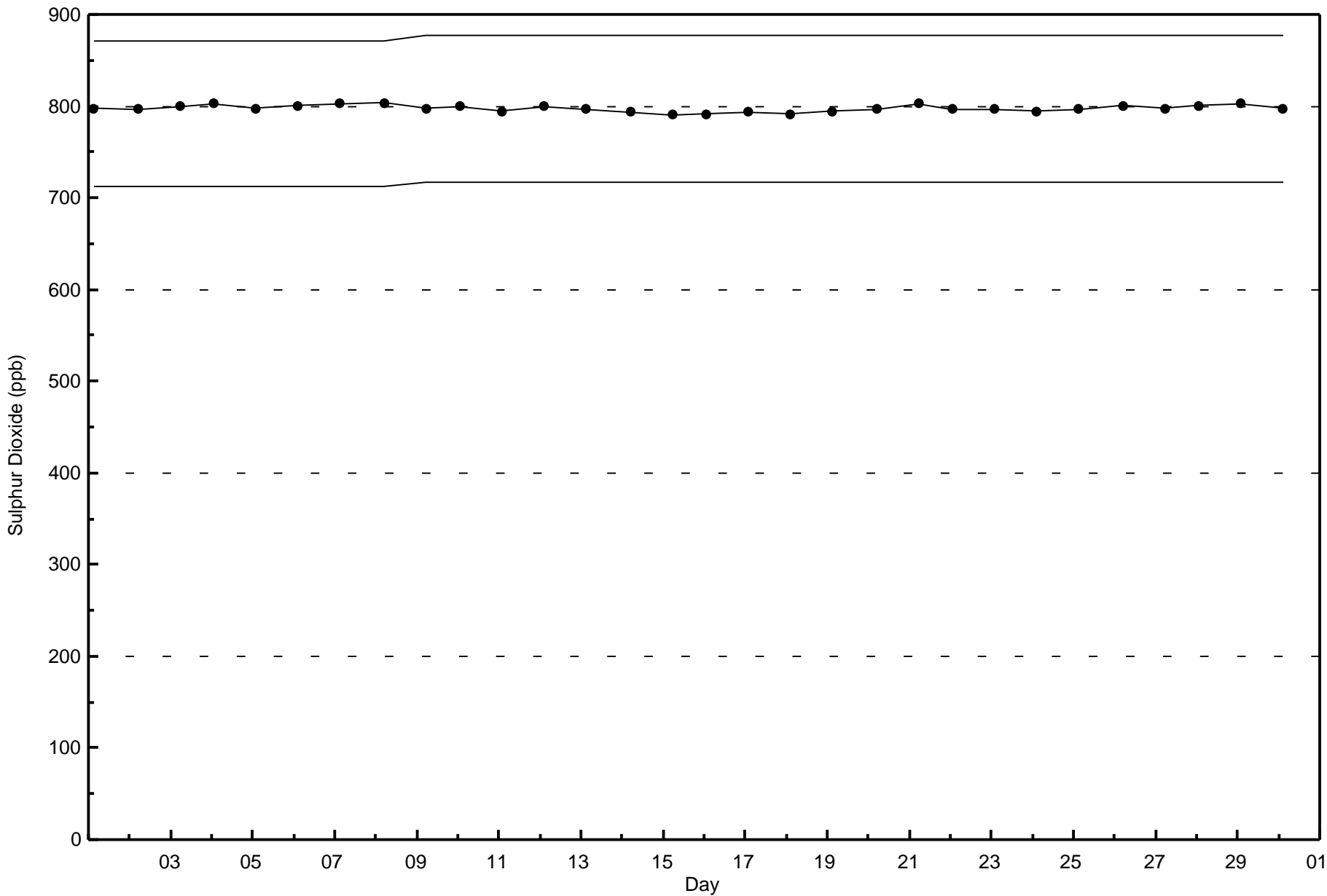


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin (AMS 25)







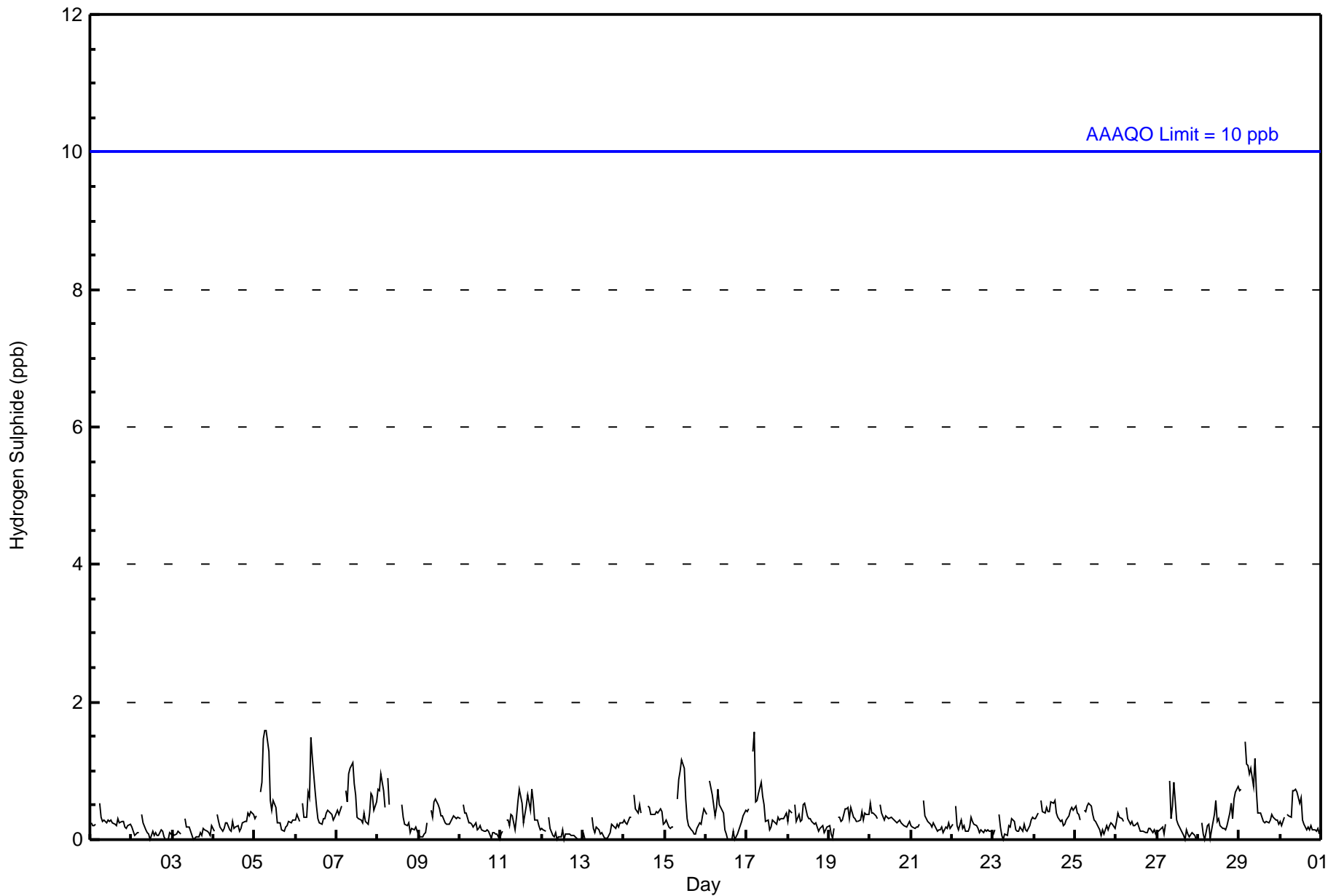


| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 5 08:00 | Maximum Daily Average: 0.6 ppb on Sep 29 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 2 21:00 | Minimum Daily Average: 0.1 ppb on Sep 12 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 0.5 ppb at hour 8 | Minimum Diurnal Average: 0.2 ppb at hour 18 | | Hours of Calibration: | 33 |
| Monthly Average: 0.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 1 P ₉₉ = 1 | | Percent Operational Time: | 99.2 |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | Diurnal Average | |
| 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Diurnal Maximum | |

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 681 | 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: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 54 | 18 | 15 | 10 | 7 | 13 | 65 | 101 | 51 | 41 | 38 | 57 | 67 | 50 | 53 | 40 | 680 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 54 | 18 | 15 | 10 | 7 | 13 | 65 | 101 | 51 | 41 | 38 | 57 | 67 | 50 | 53 | 40 | 680 |

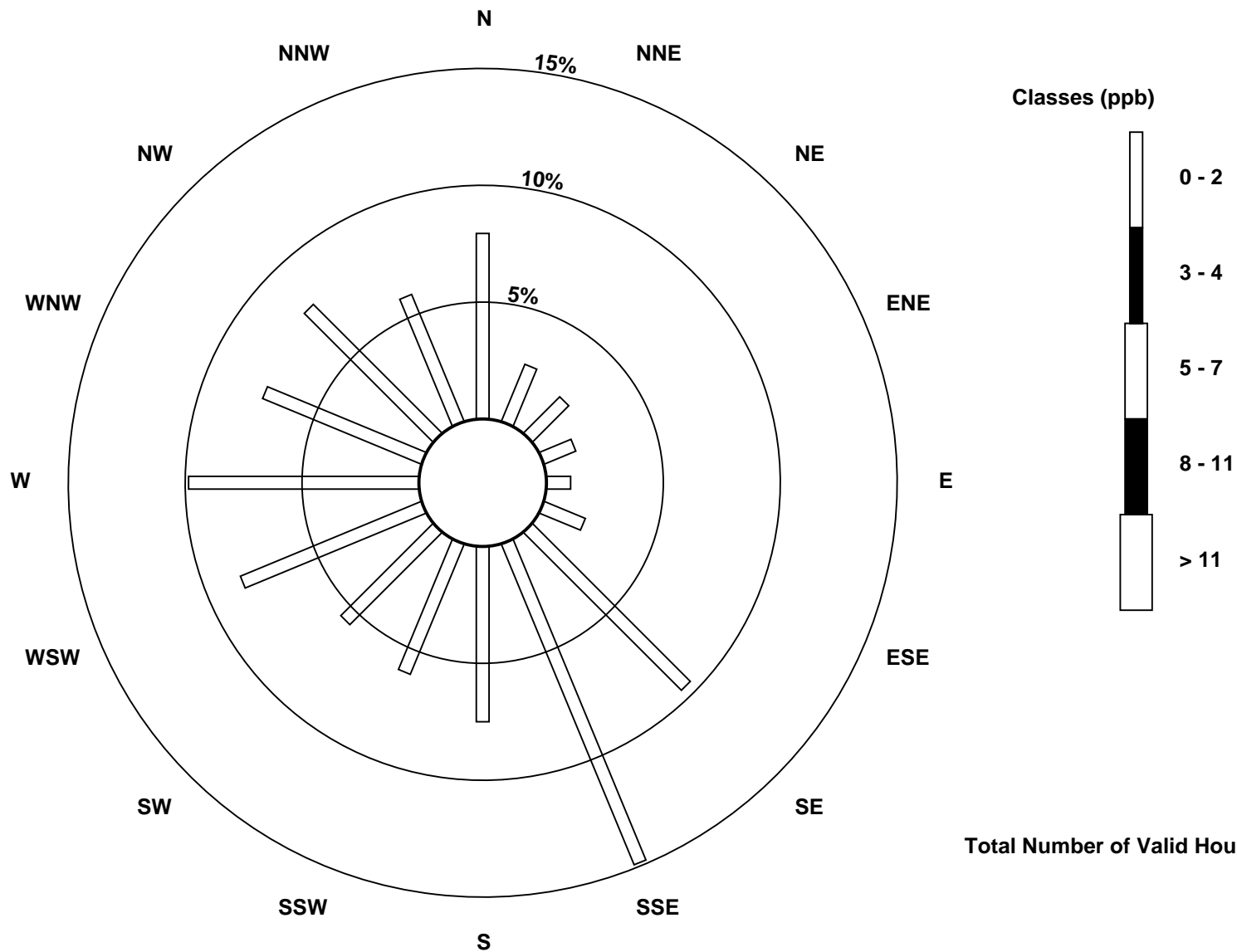
Total Number of Valid Hours: 680

Total Number of Hours: 720

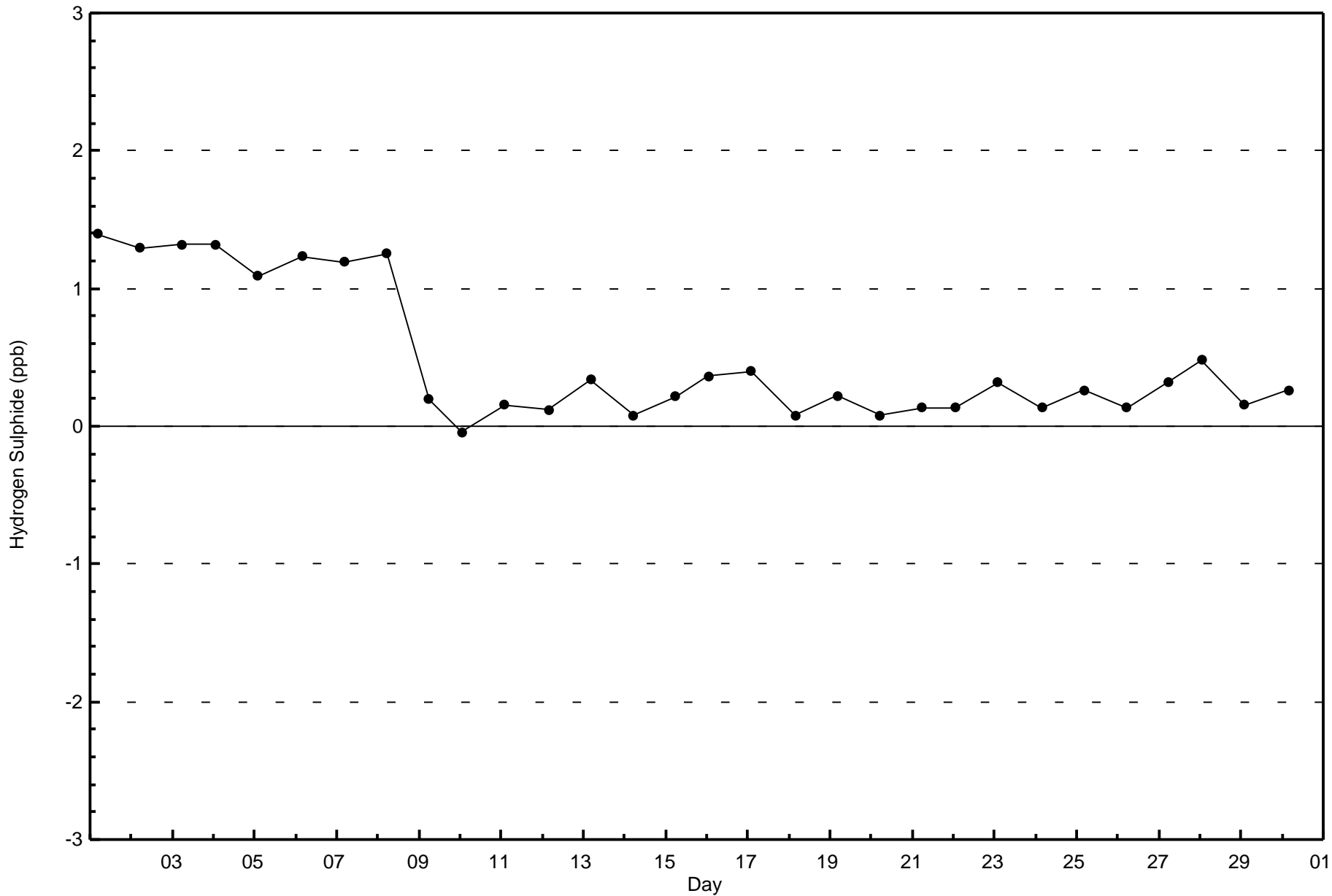


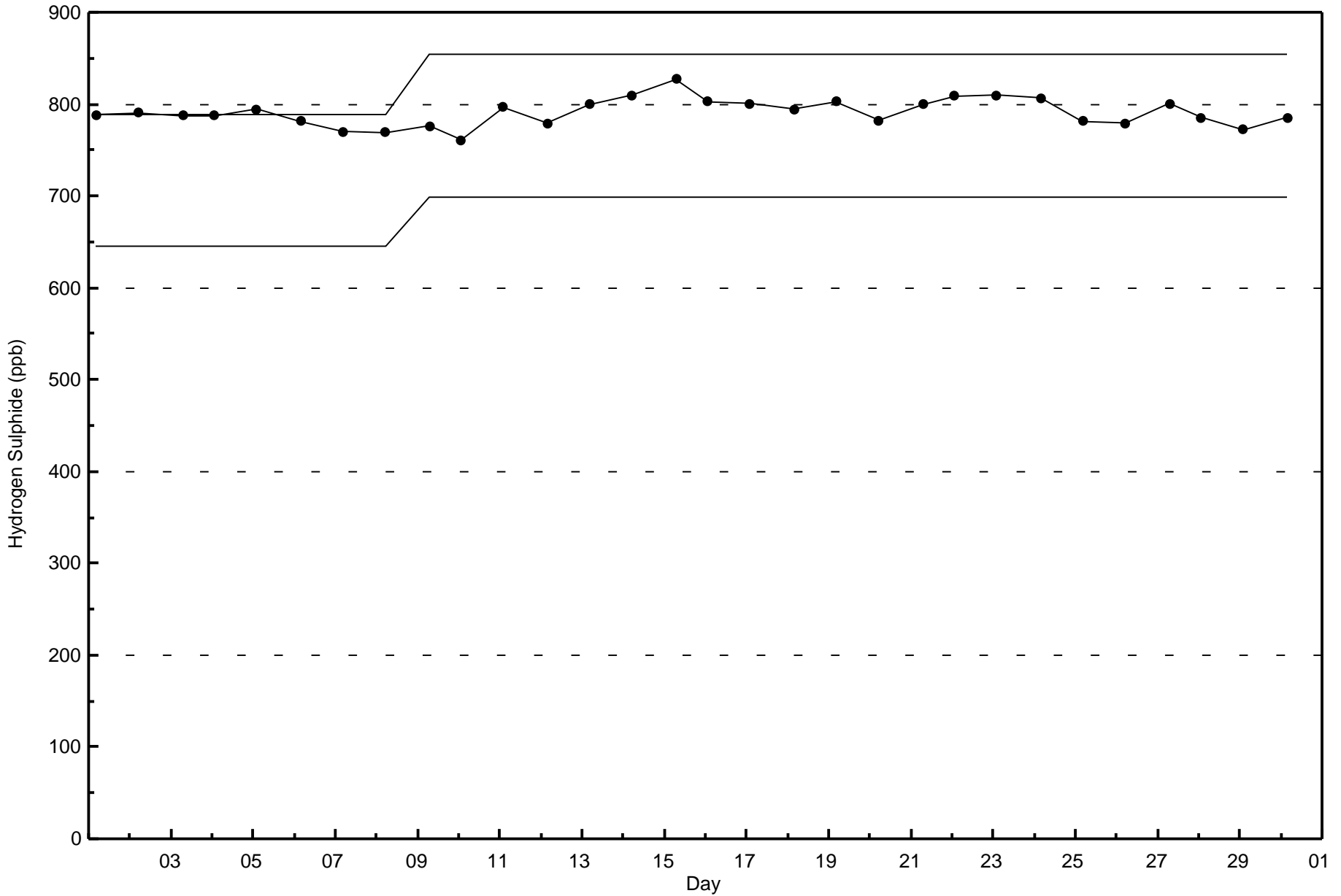
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin (AMS 25)



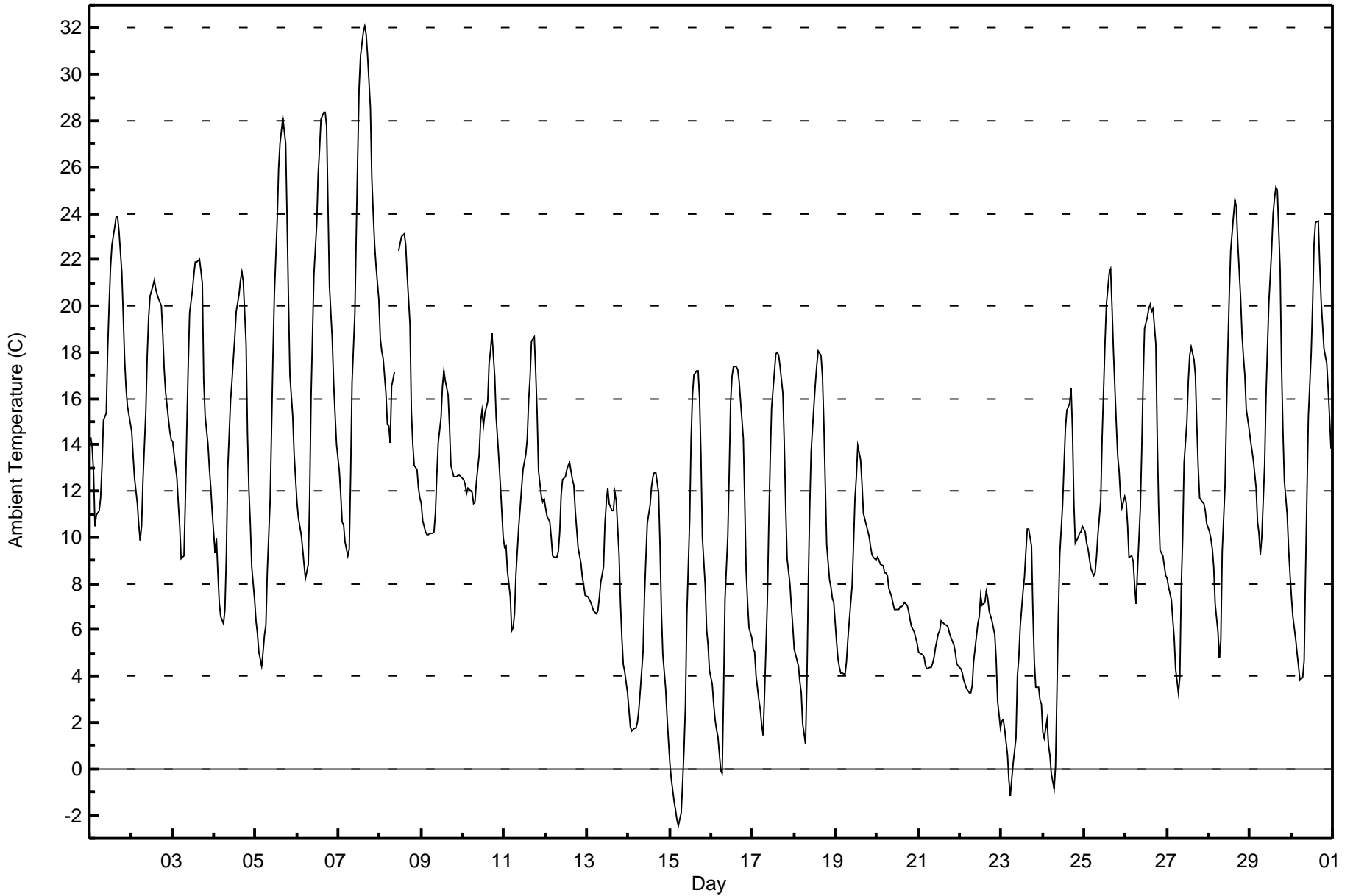
Total Number of Valid Hours: 680







| Maximum Value: 32.1 C on Sep 7 16:00 | | Maximum Daily Average: 20.9 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -2.4 C on Sep 15 06:00 | | Minimum Daily Average: 4.2 C on Sep 23 | | Hours of Data: 718 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 18.2 C at hour 16 | | Minimum Diurnal Average: 6.0 C at hour 7 | | Hours of Missing Data: 2 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.76 C | | Percentiles: P ₁ = -0.6 P ₁₀ = 3.9 Q ₁ = 7.0 Median = 11.3 Q ₃ = 16.1 P ₉₀ = 20.7 P ₉₉ = 27.9 | | 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-Sep | 14.3 | 13.9 | 12.8 | 10.5 | 11.0 | 11.1 | 11.7 | 13.1 | 15.0 | 15.4 | 18.1 | 20.0 | 21.7 | 22.6 | 23.4 | 23.9 | 23.8 | 23.3 | 21.5 | 19.6 | 17.7 | 16.5 | 15.6 | 15.0 | 17.1 | 23.9 |
| 2-Sep | 14.6 | 13.5 | 12.6 | 11.5 | 10.5 | 9.9 | 10.5 | 12.5 | 15.4 | 17.9 | 19.5 | 20.4 | 20.8 | 21.1 | 20.7 | 20.5 | 20.3 | 20.0 | 18.8 | 17.3 | 16.3 | 15.1 | 14.6 | 14.2 | 16.2 | 21.1 |
| 3-Sep | 14.1 | 13.6 | 12.5 | 11.5 | 10.5 | 9.1 | 9.2 | 11.6 | 14.7 | 17.4 | 19.7 | 20.7 | 21.3 | 21.9 | 21.9 | 22.0 | 21.5 | 21.0 | 16.8 | 15.2 | 14.0 | 13.0 | 12.2 | 11.1 | 15.7 | 22.0 |
| 4-Sep | 9.3 | 9.9 | 8.4 | 7.2 | 6.6 | 6.3 | 6.9 | 9.2 | 12.9 | 15.9 | 16.8 | 17.7 | 18.6 | 19.7 | 20.5 | 21.1 | 21.5 | 21.0 | 18.4 | 14.4 | 12.0 | 10.6 | 8.7 | 7.3 | 13.4 | 21.5 |
| 5-Sep | 6.4 | 5.9 | 5.1 | 4.4 | 5.1 | 5.8 | 6.2 | 8.5 | 11.6 | 14.6 | 17.8 | 20.5 | 23.7 | 25.9 | 27.0 | 27.6 | 28.1 | 27.0 | 23.8 | 20.2 | 17.0 | 15.2 | 13.6 | 12.5 | 15.6 | 28.1 |
| 6-Sep | 11.5 | 10.8 | 10.1 | 9.5 | 8.8 | 8.2 | 8.8 | 11.8 | 16.1 | 18.7 | 21.4 | 23.5 | 25.7 | 26.8 | 28.1 | 28.4 | 28.4 | 27.8 | 24.3 | 20.8 | 18.6 | 16.7 | 15.3 | 14.0 | 18.1 | 28.4 |
| 7-Sep | 12.8 | 11.8 | 10.7 | 10.5 | 9.8 | 9.2 | 9.5 | 12.7 | 16.7 | 19.7 | 23.1 | 26.5 | 29.4 | 30.8 | 31.8 | 32.1 | 31.7 | 30.8 | 28.5 | 25.5 | 24.0 | 22.6 | 21.7 | 20.3 | 20.9 | 32.1 |
| 8-Sep | 18.6 | 18.0 | 17.8 | 16.2 | 14.9 | 14.8 | 14.1 | 16.6 | 17.1 | M | M | 22.4 | 23.0 | 23.1 | 23.1 | 22.6 | 21.4 | 19.2 | 15.4 | 14.0 | 13.1 | 12.9 | 12.1 | 11.7 | 17.4 | 23.1 |
| 9-Sep | 11.5 | 10.7 | 10.2 | 10.1 | 10.1 | 10.2 | 10.2 | 10.2 | 11.0 | 12.7 | 14.1 | 15.2 | 16.5 | 17.2 | 16.8 | 16.1 | 14.7 | 13.1 | 12.8 | 12.6 | 12.6 | 12.7 | 12.7 | 12.6 | 12.8 | 17.2 |
| 10-Sep | 12.5 | 12.3 | 11.9 | 12.1 | 12.1 | 11.9 | 11.4 | 11.5 | 12.3 | 13.6 | 15.0 | 15.5 | 14.8 | 15.4 | 15.8 | 17.5 | 18.1 | 18.8 | 16.9 | 15.2 | 14.3 | 13.3 | 12.3 | 10.0 | 13.9 | 18.8 |
| 11-Sep | 9.6 | 9.6 | 8.5 | 7.5 | 6.0 | 6.1 | 6.7 | 8.4 | 10.5 | 11.3 | 12.1 | 13.0 | 13.6 | 14.3 | 15.9 | 16.9 | 18.5 | 18.7 | 17.1 | 15.4 | 12.9 | 11.8 | 11.5 | 11.7 | 12.0 | 18.7 |
| 12-Sep | 11.3 | 10.9 | 10.7 | 10.0 | 9.2 | 9.1 | 9.1 | 9.4 | 10.2 | 11.8 | 12.5 | 12.6 | 12.9 | 13.1 | 13.2 | 12.5 | 12.2 | 11.1 | 10.3 | 9.6 | 8.9 | 8.3 | 7.9 | 7.5 | 10.6 | 13.2 |
| 13-Sep | 7.4 | 7.3 | 7.2 | 7.0 | 6.8 | 6.7 | 6.8 | 7.4 | 8.0 | 8.7 | 10.6 | 11.5 | 12.1 | 11.4 | 11.1 | 11.2 | 11.9 | 11.6 | 9.3 | 7.2 | 5.7 | 4.5 | 4.2 | 3.3 | 8.3 | 12.1 |
| 14-Sep | 2.5 | 1.8 | 1.6 | 1.8 | 1.8 | 2.0 | 2.6 | 3.3 | 5.1 | 7.4 | 9.1 | 10.6 | 11.4 | 12.2 | 12.6 | 12.8 | 12.8 | 11.9 | 9.7 | 6.8 | 4.9 | 3.4 | 2.2 | 1.2 | 6.3 | 12.8 |
| 15-Sep | 0.3 | -0.4 | -1.4 | -1.8 | -2.2 | -2.4 | -1.9 | -0.6 | 0.8 | 2.8 | 6.7 | 10.8 | 14.2 | 16.1 | 17.0 | 17.2 | 17.2 | 16.1 | 13.5 | 10.0 | 7.9 | 6.1 | 5.3 | 4.3 | 6.5 | 17.2 |
| 16-Sep | 3.7 | 2.8 | 2.1 | 1.7 | 1.4 | -0.1 | -0.2 | 3.2 | 7.3 | 10.1 | 12.8 | 15.9 | 17.0 | 17.4 | 17.4 | 17.2 | 16.8 | 15.9 | 14.3 | 11.5 | 8.6 | 7.2 | 6.1 | 5.7 | 9.0 | 17.4 |
| 17-Sep | 5.2 | 5.0 | 4.0 | 3.0 | 2.5 | 1.9 | 1.5 | 3.2 | 7.3 | 10.5 | 13.3 | 15.6 | 17.1 | 17.9 | 18.0 | 17.8 | 17.4 | 16.2 | 14.0 | 11.3 | 9.1 | 8.0 | 7.0 | 6.2 | 9.7 | 18.0 |
| 18-Sep | 5.2 | 4.9 | 4.5 | 3.8 | 3.3 | 1.9 | 1.1 | 3.8 | 8.0 | 11.3 | 13.7 | 15.8 | 16.7 | 17.4 | 18.1 | 17.8 | 17.0 | 14.9 | 12.3 | 9.7 | 8.2 | 7.9 | 7.4 | 7.2 | 9.7 | 18.1 |
| 19-Sep | 5.5 | 4.7 | 4.4 | 4.2 | 4.1 | 4.1 | 4.6 | 5.6 | 6.4 | 7.9 | 9.7 | 11.6 | 12.6 | 14.0 | 13.4 | 12.3 | 11.0 | 10.8 | 10.3 | 10.0 | 9.6 | 9.3 | 9.1 | 9.0 | 8.5 | 14.0 |
| 20-Sep | 9.1 | 9.0 | 8.8 | 8.7 | 8.5 | 8.5 | 8.3 | 7.8 | 7.4 | 7.1 | 6.9 | 6.9 | 6.9 | 7.0 | 7.0 | 7.0 | 7.2 | 7.1 | 6.8 | 6.4 | 6.1 | 5.9 | 5.6 | 5.4 | 7.3 | 9.1 |
| 21-Sep | 5.1 | 5.0 | 5.0 | 4.8 | 4.4 | 4.3 | 4.4 | 4.4 | 4.6 | 4.8 | 5.3 | 5.9 | 6.0 | 6.4 | 6.3 | 6.2 | 6.2 | 6.1 | 5.8 | 5.7 | 5.3 | 5.0 | 4.6 | 4.5 | 5.2 | 6.4 |
| 22-Sep | 4.3 | 4.1 | 3.9 | 3.7 | 3.5 | 3.3 | 3.3 | 3.6 | 4.6 | 5.7 | 6.3 | 6.6 | 7.5 | 7.1 | 7.2 | 7.7 | 7.4 | 6.8 | 6.4 | 6.1 | 5.8 | 4.7 | 2.9 | 1.8 | 5.2 | 7.7 |
| 23-Sep | 2.1 | 2.1 | 1.7 | 0.6 | -0.5 | -1.1 | -0.4 | 0.2 | 1.3 | 4.0 | 4.8 | 6.1 | 7.7 | 8.3 | 9.4 | 10.4 | 10.4 | 9.6 | 6.8 | 4.6 | 3.5 | 3.5 | 3.0 | 2.8 | 4.2 | 10.4 |
| 24-Sep | 1.6 | 1.3 | 2.1 | 1.0 | 0.6 | -0.2 | -0.9 | 0.1 | 3.4 | 6.7 | 9.3 | 11.4 | 13.1 | 14.7 | 15.5 | 15.8 | 16.5 | 14.6 | 11.5 | 9.7 | 10.0 | 10.2 | 10.2 | 10.5 | 7.9 | 16.5 |
| 25-Sep | 10.2 | 9.7 | 9.5 | 9.1 | 8.6 | 8.4 | 8.5 | 9.1 | 10.1 | 11.6 | 14.3 | 16.3 | 18.3 | 20.0 | 21.4 | 21.6 | 20.0 | 18.1 | 14.9 | 13.5 | 12.9 | 11.7 | 11.3 | 11.8 | 13.4 | 21.6 |
| 26-Sep | 11.5 | 10.6 | 9.2 | 9.2 | 9.0 | 7.9 | 7.1 | 8.5 | 11.2 | 13.7 | 16.8 | 19.1 | 19.5 | 19.9 | 20.1 | 19.8 | 19.9 | 18.4 | 14.3 | 11.3 | 9.4 | 9.2 | 8.8 | 8.3 | 13.0 | 20.1 |
| 27-Sep | 8.2 | 7.9 | 7.3 | 6.5 | 5.7 | 4.3 | 3.3 | 4.0 | 7.8 | 10.0 | 13.2 | 15.0 | 16.8 | 17.9 | 18.2 | 17.7 | 17.0 | 14.9 | 13.1 | 11.7 | 11.6 | 11.5 | 11.1 | 10.6 | 11.0 | 18.2 |
| 28-Sep | 10.3 | 9.9 | 9.5 | 8.7 | 7.1 | 5.9 | 4.8 | 5.5 | 9.4 | 12.2 | 15.4 | 18.2 | 20.5 | 22.4 | 23.9 | 24.6 | 24.2 | 22.8 | 20.3 | 18.8 | 17.8 | 17.0 | 15.6 | 14.7 | 15.0 | 24.6 |
| 29-Sep | 14.2 | 13.8 | 13.3 | 12.1 | 10.7 | 10.2 | 9.3 | 10.0 | 13.1 | 16.1 | 18.2 | 20.1 | 22.4 | 24.0 | 24.6 | 25.1 | 25.0 | 21.6 | 17.4 | 14.6 | 12.5 | 11.0 | 9.5 | 8.4 | 15.7 | 25.1 |
| 30-Sep | 7.4 | 6.6 | 5.6 | 5.0 | 4.4 | 3.9 | 3.9 | 4.7 | 8.4 | 11.9 | 15.2 | 18.0 | 20.1 | 22.7 | 23.6 | 23.7 | 21.8 | 20.2 | 19.2 | 18.2 | 17.5 | 16.4 | 15.2 | 13.8 | 13.6 | 23.7 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Waskow ohci Pimatisiwin - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 14 | 1.95 | 1.95 |
| 0 - 10 | 292 | 40.67 | 42.62 |
| 10 - 20 | 323 | 44.99 | 87.60 |
| > 20 | 89 | 12.40 | 100.00 |

Total Number of Valid Hours: 718

Total Number of Hours: 720



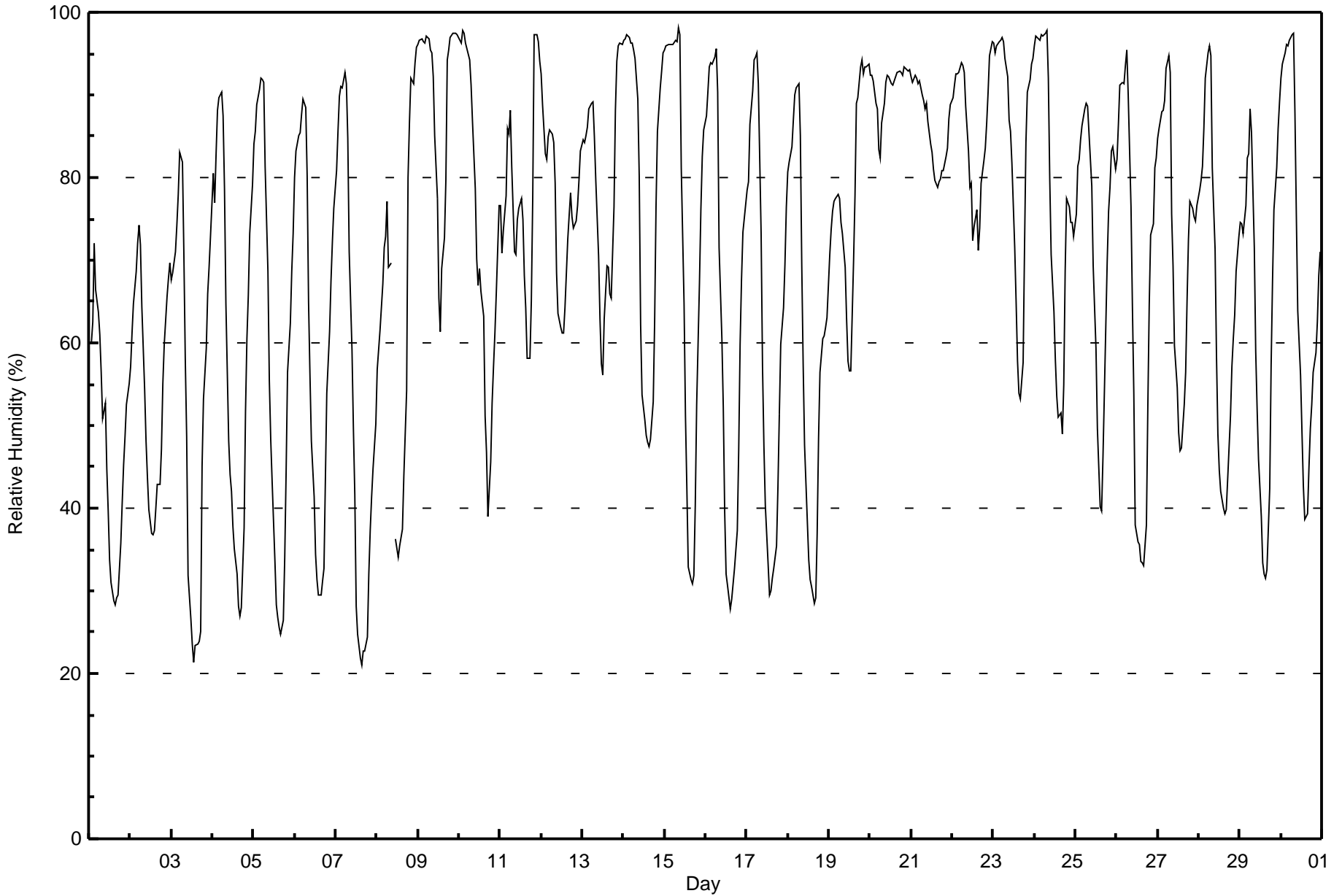
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Waskow ohci Pimatisiwin - September 2017

| Maximum Value: 98 % on Sep 15 09:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 90.9 % on Sep 20 | | | | | | Hours in Service: 720 | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|--------------------------------|---------------|
| Minimum Value: 21 % on Sep 7 16:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 47.9 % on Sep 1 | | | | | | Hours of Data: 718 | |
| Maximum Diurnal Average: 89.2 % at hour 7 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 46.4 % at hour 16 | | | | | | Hours of Missing Data: 2 | |
| Monthly Average: 69.9 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 24 P ₁₀ = 36 Q ₁ = 54 Median = 75 O ₃ = 89 P ₉₀ = 95 P ₉₉ = 97 | | | | | | 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-Sep | 60 | 60 | 63 | 72 | 66 | 64 | 61 | 56 | 51 | 53 | 45 | 40 | 34 | 31 | 29 | 28 | 29 | 29 | 36 | 41 | 45 | 49 | 53 | 55 | 47.9 | 72 |
| 2-Sep | 57 | 61 | 65 | 69 | 72 | 74 | 72 | 64 | 54 | 48 | 44 | 40 | 37 | 37 | 37 | 40 | 43 | 43 | 47 | 55 | 60 | 66 | 68 | 70 | 55.1 | 74 |
| 3-Sep | 68 | 68 | 71 | 74 | 78 | 83 | 82 | 71 | 58 | 49 | 32 | 27 | 24 | 21 | 23 | 24 | 24 | 25 | 45 | 53 | 59 | 66 | 69 | 73 | 52.8 | 83 |
| 4-Sep | 81 | 77 | 83 | 88 | 90 | 90 | 88 | 79 | 65 | 48 | 44 | 42 | 38 | 35 | 32 | 28 | 27 | 28 | 38 | 52 | 61 | 66 | 73 | 79 | 59.6 | 90 |
| 5-Sep | 84 | 86 | 89 | 91 | 92 | 92 | 91 | 81 | 69 | 55 | 48 | 43 | 34 | 28 | 27 | 26 | 25 | 26 | 34 | 45 | 57 | 62 | 69 | 73 | 59.4 | 92 |
| 6-Sep | 80 | 83 | 85 | 85 | 88 | 90 | 88 | 80 | 65 | 56 | 48 | 41 | 34 | 31 | 30 | 30 | 31 | 33 | 43 | 54 | 61 | 67 | 72 | 76 | 60.5 | 90 |
| 7-Sep | 81 | 86 | 90 | 91 | 91 | 93 | 91 | 85 | 71 | 59 | 50 | 42 | 28 | 25 | 22 | 21 | 23 | 23 | 24 | 32 | 37 | 41 | 45 | 50 | 54.1 | 93 |
| 8-Sep | 57 | 59 | 61 | 67 | 72 | 73 | 77 | 69 | 70 | M | M | 36 | 34 | 35 | 36 | 37 | 44 | 54 | 80 | 87 | 92 | 91 | 94 | 96 | 64.7 | 96 |
| 9-Sep | 96 | 97 | 97 | 96 | 96 | 97 | 97 | 95 | 95 | 92 | 85 | 77 | 65 | 61 | 69 | 73 | 80 | 94 | 95 | 97 | 98 | 98 | 97 | 97 | 89.4 | 98 |
| 10-Sep | 97 | 96 | 98 | 97 | 96 | 95 | 94 | 91 | 87 | 79 | 70 | 67 | 69 | 66 | 63 | 51 | 47 | 39 | 46 | 53 | 57 | 61 | 66 | 77 | 73.4 | 98 |
| 11-Sep | 77 | 71 | 74 | 78 | 86 | 85 | 88 | 81 | 71 | 71 | 75 | 76 | 77 | 75 | 68 | 64 | 58 | 58 | 65 | 78 | 97 | 97 | 96 | 94 | 77.6 | 97 |
| 12-Sep | 93 | 89 | 83 | 82 | 85 | 86 | 85 | 84 | 79 | 68 | 64 | 62 | 61 | 61 | 64 | 73 | 75 | 78 | 75 | 74 | 75 | 77 | 80 | 83 | 76.5 | 93 |
| 13-Sep | 85 | 84 | 85 | 86 | 88 | 89 | 89 | 85 | 80 | 71 | 63 | 57 | 56 | 63 | 69 | 69 | 66 | 65 | 76 | 88 | 94 | 96 | 96 | 96 | 79.1 | 96 |
| 14-Sep | 97 | 97 | 97 | 97 | 96 | 96 | 95 | 94 | 89 | 80 | 62 | 54 | 51 | 49 | 48 | 48 | 48 | 53 | 63 | 77 | 86 | 91 | 93 | 95 | 77.3 | 97 |
| 15-Sep | 95 | 96 | 96 | 96 | 96 | 96 | 97 | 96 | 98 | 97 | 81 | 65 | 51 | 42 | 33 | 31 | 31 | 32 | 40 | 53 | 67 | 76 | 83 | 86 | 72.3 | 98 |
| 16-Sep | 87 | 90 | 93 | 94 | 94 | 95 | 96 | 90 | 71 | 61 | 52 | 39 | 32 | 31 | 28 | 29 | 31 | 33 | 37 | 47 | 60 | 68 | 73 | 77 | 62.8 | 96 |
| 17-Sep | 78 | 79 | 87 | 90 | 94 | 95 | 95 | 91 | 73 | 57 | 47 | 40 | 33 | 30 | 30 | 31 | 33 | 35 | 43 | 51 | 60 | 64 | 70 | 76 | 61.9 | 95 |
| 18-Sep | 81 | 82 | 84 | 87 | 90 | 91 | 91 | 85 | 70 | 57 | 48 | 38 | 34 | 31 | 31 | 28 | 29 | 37 | 48 | 56 | 61 | 61 | 62 | 63 | 60.2 | 91 |
| 19-Sep | 71 | 74 | 76 | 77 | 78 | 78 | 77 | 75 | 73 | 69 | 63 | 58 | 57 | 57 | 70 | 78 | 89 | 90 | 93 | 94 | 93 | 93 | 93 | 94 | 77.8 | 94 |
| 20-Sep | 92 | 92 | 92 | 89 | 88 | 83 | 82 | 87 | 89 | 92 | 92 | 92 | 91 | 91 | 92 | 92 | 93 | 93 | 93 | 92 | 93 | 93 | 93 | 93 | 90.9 | 93 |
| 21-Sep | 92 | 92 | 92 | 92 | 91 | 92 | 90 | 89 | 88 | 89 | 87 | 84 | 83 | 81 | 80 | 79 | 80 | 80 | 81 | 81 | 83 | 84 | 87 | 89 | 86.0 | 92 |
| 22-Sep | 90 | 91 | 92 | 93 | 93 | 94 | 94 | 93 | 89 | 83 | 79 | 79 | 72 | 74 | 76 | 71 | 74 | 79 | 82 | 84 | 87 | 90 | 95 | 96 | 85.4 | 96 |
| 23-Sep | 96 | 95 | 96 | 96 | 97 | 97 | 96 | 94 | 92 | 87 | 86 | 82 | 72 | 65 | 58 | 54 | 53 | 58 | 72 | 84 | 90 | 92 | 94 | 94 | 83.3 | 97 |
| 24-Sep | 96 | 97 | 97 | 97 | 97 | 97 | 98 | 98 | 92 | 80 | 71 | 64 | 58 | 54 | 51 | 52 | 49 | 55 | 69 | 77 | 76 | 75 | 75 | 73 | 76.9 | 98 |
| 25-Sep | 76 | 81 | 82 | 84 | 86 | 88 | 89 | 89 | 85 | 79 | 69 | 64 | 59 | 50 | 40 | 40 | 46 | 54 | 70 | 76 | 79 | 83 | 84 | 81 | 72.3 | 89 |
| 26-Sep | 82 | 86 | 91 | 92 | 91 | 94 | 95 | 90 | 76 | 64 | 54 | 38 | 36 | 36 | 34 | 33 | 33 | 38 | 52 | 65 | 73 | 74 | 81 | 82 | 66.3 | 95 |
| 27-Sep | 85 | 86 | 88 | 88 | 89 | 93 | 95 | 93 | 76 | 69 | 60 | 54 | 49 | 47 | 47 | 53 | 56 | 65 | 73 | 77 | 76 | 75 | 75 | 77 | 72.7 | 95 |
| 28-Sep | 79 | 80 | 81 | 86 | 92 | 95 | 96 | 95 | 81 | 71 | 59 | 49 | 45 | 42 | 40 | 39 | 40 | 44 | 51 | 57 | 60 | 63 | 69 | 73 | 66.1 | 96 |
| 29-Sep | 75 | 74 | 73 | 77 | 82 | 83 | 88 | 85 | 71 | 59 | 52 | 46 | 39 | 33 | 32 | 31 | 32 | 42 | 57 | 67 | 76 | 81 | 86 | 89 | 63.9 | 89 |
| 30-Sep | 92 | 94 | 95 | 96 | 96 | 97 | 97 | 97 | 88 | 75 | 64 | 56 | 49 | 43 | 39 | 39 | 45 | 50 | 53 | 56 | 59 | 63 | 68 | 71 | 70.1 | 97 |
| | | | | | | | | | | | | | | | | | | | 82.6 83.5 85.2 86.9 88.4 89.1 89.2 85.5 77.2 69.6 61.8 55.1 50.1 47.5 46.6 46.4 47.8 51.1 59.4 66.7 72.4 75.5 78.6 81.0 | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | 97 97 98 97 97 97 98 98 98 97 92 92 91 91 92 92 93 94 95 97 98 98 97 97 | | | | | | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Waskow ohci Pimatisiwin - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 99 | 13.79 | 13.79 |
| 40 - 60 | 127 | 17.69 | 31.48 |
| 60 - 80 | 203 | 28.27 | 59.75 |
| 80 - 100 | 289 | 40.25 | 100.00 |

Total Number of Valid Hours: 718

Total Number of Hours: 720

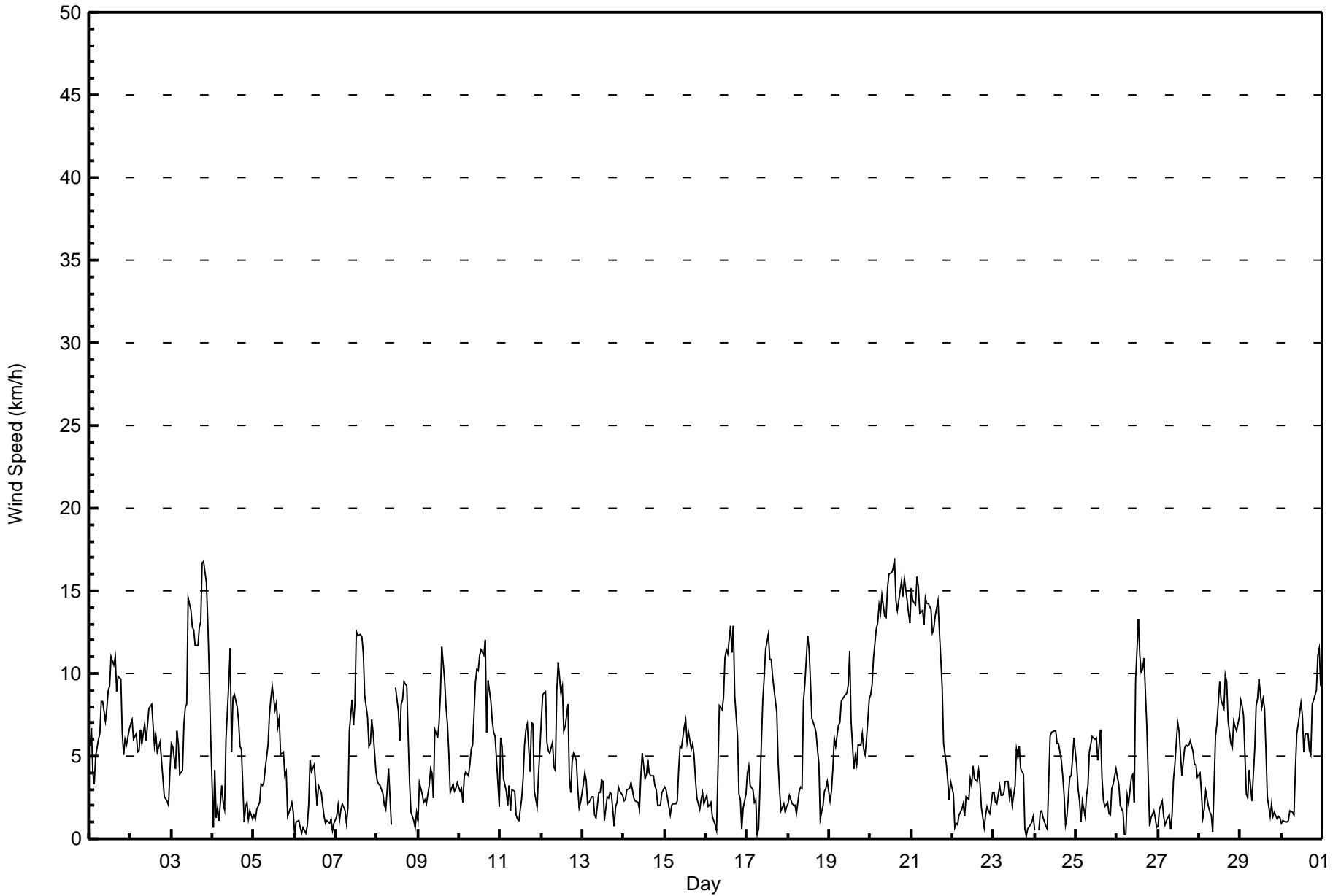


| | | |
|---|--|--------------------------------|
| Maximum Speed: 17 km/h on Sep 20 15:00 | Maximum Daily Speed Average: 13.9 km/h on Sep 20 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 23 20:00 | Minimum Daily Speed Average: 0.6 km/h on Sep 23 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 1.6 km/h at hour 2 | Minimum Diurnal Speed Average: 0.2 km/h at hour 11 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 1.0 km/h 275.5 deg | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 7 P ₉₀ = 11 P ₉₉ = 16 | 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-Sep | W6 | W7 | SSW4 | SSE3 | SW5 | WSW6 | WSW6 | W8 | WSW8 | SW7 | WSW8 | SW9 | WSW9 | SW11 | WSW11 | WSW11 | W9 | W10 | WSW10 | WSW6 | SW5 | WSW6 | WSW6 | W7 | WSW7.0 | SW11 |
| 2-Sep | W7 | W7 | WNW6 | WNW6 | WNW5 | W5 | W7 | W6 | W7 | W6 | W7 | W8 | W8 | WSW7 | WSW6 | SW6 | SW5 | WSW6 | W5 | SSW4 | SSE3 | SSW2 | WSW2 | WSW4 | W5.1 | W8 |
| 3-Sep | WSW6 | WSW6 | W4 | W7 | WSW6 | SSW4 | WSW4 | W7 | WNW8 | WNW8 | WNW15 | WNW14 | WNW13 | WNW13 | WNW12 | NW12 | WNW13 | NW13 | NNW17 | NW17 | NW16 | NW13 | NW10 | NW6 | WNW9.1 | NW17 |
| 4-Sep | W1 | NW4 | NNE1 | NW2 | NW1 | W3 | S2 | WNW2 | WNW6 | NW9 | NNW12 | WNW5 | NW9 | WNW9 | NW8 | NW7 | WNW6 | NW5 | WNW1 | WNW2 | W2 | WSW1 | WSW2 | SSW1 | NW3.8 | NNW12 |
| 5-Sep | SW1 | SW1 | SSW2 | SSW2 | SSE3 | SSE3 | SSE3 | SSE4 | SSE6 | SSE7 | SSE8 | SSE9 | SSW8 | SW8 | SW7 | SW7 | WSW5 | SW5 | S4 | SSW4 | WSW1 | WSW2 | SSE2 | WSW2 | S3.7 | SSE9 |
| 6-Sep | NE0 | S1 | SW1 | SW1 | SE0 | W1 | NNE0 | ENE1 | NE2 | N5 | N4 | N4 | NE3 | NE2 | E3 | N3 | ENE2 | N1 | NW1 | WSW1 | WSW1 | W1 | SSW0 | W1 | NNE0.9 | N5 |
| 7-Sep | WNW1 | WNW2 | SSW1 | SSW2 | W2 | SW2 | WSW1 | SE2 | SSE7 | SSE8 | SSE7 | SSE8 | S13 | S12 | S12 | SSE12 | S11 | S9 | S7 | S6 | SSE6 | S7 | S6 | SSW4 | S5.7 | S13 |
| 8-Sep | SSE3 | S3 | S3 | S3 | S2 | SW2 | SSW3 | S4 | SSW1 | M | M | N9 | NNW8 | NNW6 | NNW8 | NNW8 | NNW9 | NNW9 | NW6 | NW3 | SW2 | WNW1 | ENE1 | WNW2 | NW2.3 | NNW9 |
| 9-Sep | WNW1 | NW3 | WNW3 | W2 | SSW2 | NW2 | WNW3 | NW4 | NNW4 | N2 | N7 | NNW6 | NNW7 | NNW9 | NNW12 | NNW10 | NW8 | NNW7 | NW5 | NNW3 | WNW3 | W3 | W3 | WSW3 | NW4.0 | NNW12 |
| 10-Sep | SSW3 | S3 | SSW2 | S4 | SSW4 | SSW4 | SW5 | SW5 | SW6 | WSW9 | W10 | W10 | W11 | W11 | W11 | WNW12 | W6 | W10 | SW8 | SW7 | SW6 | WSW6 | WSW5 | W2 | WSW5.9 | WNW12 |
| 11-Sep | WSW6 | WSW6 | SW4 | S3 | SSE2 | S3 | SSW2 | S3 | S3 | SSW1 | E1 | E1 | NNE2 | NNE4 | SE6 | SSE7 | SSE7 | SE4 | SSE7 | NW7 | S3 | SSW2 | W4 | W5 | S1.9 | SSE7 |
| 12-Sep | WSW7 | WSW9 | W9 | SW6 | SSW5 | SSW5 | SSW6 | SW4 | W4 | WNW9 | NW11 | WNW9 | NW9 | WNW7 | NNW7 | NNW8 | NNW4 | NE3 | NNE5 | N5 | NE5 | NE3 | NNE2 | NNW2 | WNW3.6 | NW11 |
| 13-Sep | NW3 | NW4 | NW4 | NW2 | W2 | WNW3 | W3 | WNW1 | W1 | WNW3 | E3 | ENE4 | E3 | NNE1 | SSE3 | WNW2 | ESE3 | NE3 | NW1 | WSW2 | WNW2 | WNW3 | WNW3 | WNW3 | NW1.1 | NW4 |
| 14-Sep | W2 | W2 | W3 | W3 | W3 | W3 | WNW2 | W2 | NW2 | NNE2 | NNW4 | NE5 | NE4 | ENE4 | E5 | NE4 | NE4 | NNE4 | N3 | NW3 | W2 | W2 | W3 | W3 | NNW1.4 | NE5 |
| 15-Sep | W3 | W3 | W2 | WSW1 | WSW2 | SW2 | SW2 | SSW2 | S4 | SSE6 | SE5 | SE7 | SE7 | SE6 | SSW6 | SSW5 | SSW6 | S5 | S4 | SSE2 | SSE2 | S2 | S3 | S2 | S2.9 | SE7 |
| 16-Sep | S3 | SE2 | SSE2 | SSE2 | ESE1 | SW1 | SSE1 | SSE4 | SSE8 | SSE8 | SE9 | SSE11 | SSE11 | SSE11 | SSE13 | SSE11 | SSE13 | S9 | S6 | SSE3 | SE2 | SE1 | S2 | SSE3 | SSE5.5 | SSE13 |
| 17-Sep | SSE4 | SE4 | SE3 | SE3 | ESE2 | SE2 | ESE0 | SE1 | SE6 | SSE8 | SSE10 | SE11 | SSE12 | SSE11 | SSE11 | SE10 | SE9 | SSE8 | SSE5 | SE3 | SSE2 | SE2 | ESE2 | ESE2 | SE5.4 | SSE12 |
| 18-Sep | ESE2 | SE3 | ESE2 | SE2 | SE2 | NW2 | NW3 | NNW3 | SSE3 | SSE8 | SE9 | SE12 | SE12 | SSE10 | SE7 | ESE7 | ESE6 | ESE5 | E5 | S1 | SSW2 | SSW3 | S3 | S4 | SE3.9 | SE12 |
| 19-Sep | W2 | NW3 | NNW4 | NNW6 | NNW6 | NNW7 | NNW7 | N8 | N8 | N9 | NNE9 | N9 | N11 | NNE7 | ENE4 | NE5 | ENE5 | ENE6 | NE6 | NE6 | ENE5 | NE5 | NNE6 | NNE9 | NNE5.4 | N11 |
| 20-Sep | N9 | N9 | N11 | N13 | N13 | N14 | N14 | N15 | N13 | N13 | N15 | N16 | NNE16 | N16 | N17 | N14 | N14 | N15 | N16 | N15 | N16 | N14 | N14 | N13 | N13.9 | N17 |
| 21-Sep | N15 | N14 | N14 | NNW16 | NNW15 | NNW14 | NNW14 | NNW13 | NNW15 | NNW14 | N14 | N14 | NNW12 | N13 | N13 | N14 | NNW13 | NNW11 | N9 | NNW6 | NW5 | NW3 | WNW2 | W3 | NNW11.4 | NNW16 |
| 22-Sep | WNW3 | W1 | WSW1 | WSW1 | SSW1 | SSW2 | SSW2 | SW1 | SSE3 | S2 | S4 | SSE3 | SE4 | SSW4 | S3 | SSE4 | SE3 | SE2 | ENE1 | SE1 | SSE2 | SW2 | WNW2 | W3 | S1.5 | SE4 |
| 23-Sep | W3 | W2 | WSW2 | W3 | WNW3 | WNW3 | WNW3 | NW3 | NW3 | N2 | W3 | NNW2 | SE3 | SE5 | SE5 | SSE6 | SSE4 | SE4 | SE1 | WSW0 | SSE1 | SSE1 | SSE1 | NNW1 | SW0.6 | SSE6 |
| 24-Sep | SSW1 | AF | NW1 | WSW2 | W2 | WSW1 | SW1 | SSE1 | SE3 | SE6 | SE6 | SSE7 | SE7 | SE6 | SE6 | SSE5 | SE4 | SSE3 | SSE1 | S1 | SSE4 | S4 | SSE5 | SSE6 | SSE3.1 | SSE7 |
| 25-Sep | SSE4 | SE3 | SE2 | SE1 | SE2 | SE1 | SSE3 | SE3 | SSE5 | SE6 | SE6 | SSE6 | SE6 | WSW5 | W7 | WSW4 | SSE2 | S2 | WSW2 | SW1 | S1 | SSE3 | SSE3 | S4 | SSE2.6 | W7 |
| 26-Sep | S4 | S3 | SE2 | ESE2 | SSE0 | N0 | SSE3 | SSE2 | SW4 | WSW4 | SE2 | NW10 | NW13 | NNW11 | NW10 | NW10 | NW11 | NW7 | WNW4 | WSW1 | SW1 | WSW2 | SE1 | SW1 | NW2.6 | NW13 |
| 27-Sep | SE1 | SSE2 | S2 | SW1 | WSW1 | WSW1 | W1 | WSW1 | NNE1 | N4 | N5 | N7 | NNW7 | NNE5 | NE4 | N6 | NNE6 | NNE6 | N6 | N6 | N5 | N4 | N4 | N4 | N2.9 | N7 |
| 28-Sep | NNW4 | NNW3 | NW1 | NW2 | W3 | W2 | SW2 | NW1 | ENE0 | SSE6 | SE7 | SE8 | SE9 | SE8 | SSE8 | SSE10 | S9 | S7 | SSE6 | SSE6 | SSE7 | SSE7 | SSE7 | SSE7 | SSE4.1 | SSE10 |
| 29-Sep | SSE8 | SSE8 | SSE7 | SSE3 | SE2 | SSE4 | ESE3 | SSE2 | SE5 | SSE8 | SE8 | SE10 | SSE8 | SSW8 | SSW8 | SSW5 | W3 | WNW1 | WSW2 | SW1 | WSW2 | SW1 | SW1 | W1 | SSE3.9 | SE10 |
| 30-Sep | WSW1 | WSW1 | SW1 | SW1 | S1 | SSW2 | SSE2 | SSE1 | SSE4 | SSE6 | SE7 | SE8 | SE7 | S5 | SSW6 | SW6 | SSW5 | WNW5 | WNW8 | NW8 | NW9 | WNW11 | WNW12 | NW9 | WSW2.0 | WNW12 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|--------|-------|------|-------|--------|--------|-------|--------|-------|-------|--------|--------|------|--------|--------|-------|-------|--------|------|------|------|-----------------|
| W1.4 | W1.6 | W1.2 | NNW1.2 | W1.1 | W1.4 | W1.4 | NNW1.3 | WSW0.8 | SW0.8 | NNE0.2 | NE0.3 | W0.4 | WSW1.2 | WSW1.1 | W1.2 | WSW0.9 | NNW1.2 | NW1.3 | NW1.6 | NNW1.0 | W1.2 | W1.1 | W1.4 | Diurnal Average |
| N15 | N14 | N14 | NNW16 | NNW15 | N14 | NNW14 | N15 | NNW15 | NNW14 | N15 | N16 | NNE16 | N16 | N17 | N14 | N14 | N15 | NNW17 | NW17 | N16 | N14 | N14 | N13 | Diurnal Maximum |

M - Maintenance 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
Waskow ohci Pimatisiwin - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 423 | 59.00 | 59.00 |
| 6 - 11 | 230 | 32.08 | 91.07 |
| 12 - 19 | 64 | 8.93 | 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: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Waskow ohci Pimatisiwin - September 2017

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 16 | 11 | 15 | 10 | 7 | 11 | 40 | 52 | 39 | 36 | 32 | 37 | 47 | 31 | 28 | 11 | 423 |
| 6 - 11 | 14 | 6 | 2 | 1 | 0 | 2 | 27 | 46 | 10 | 7 | 13 | 23 | 26 | 12 | 20 | 21 | 230 |
| 12 - 19 | 27 | 1 | 0 | 0 | 0 | 0 | 2 | 4 | 3 | 0 | 0 | 0 | 0 | 8 | 6 | 13 | 64 |
| 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 | 18 | 17 | 11 | 7 | 13 | 69 | 102 | 52 | 43 | 45 | 60 | 73 | 51 | 54 | 45 | 717 |

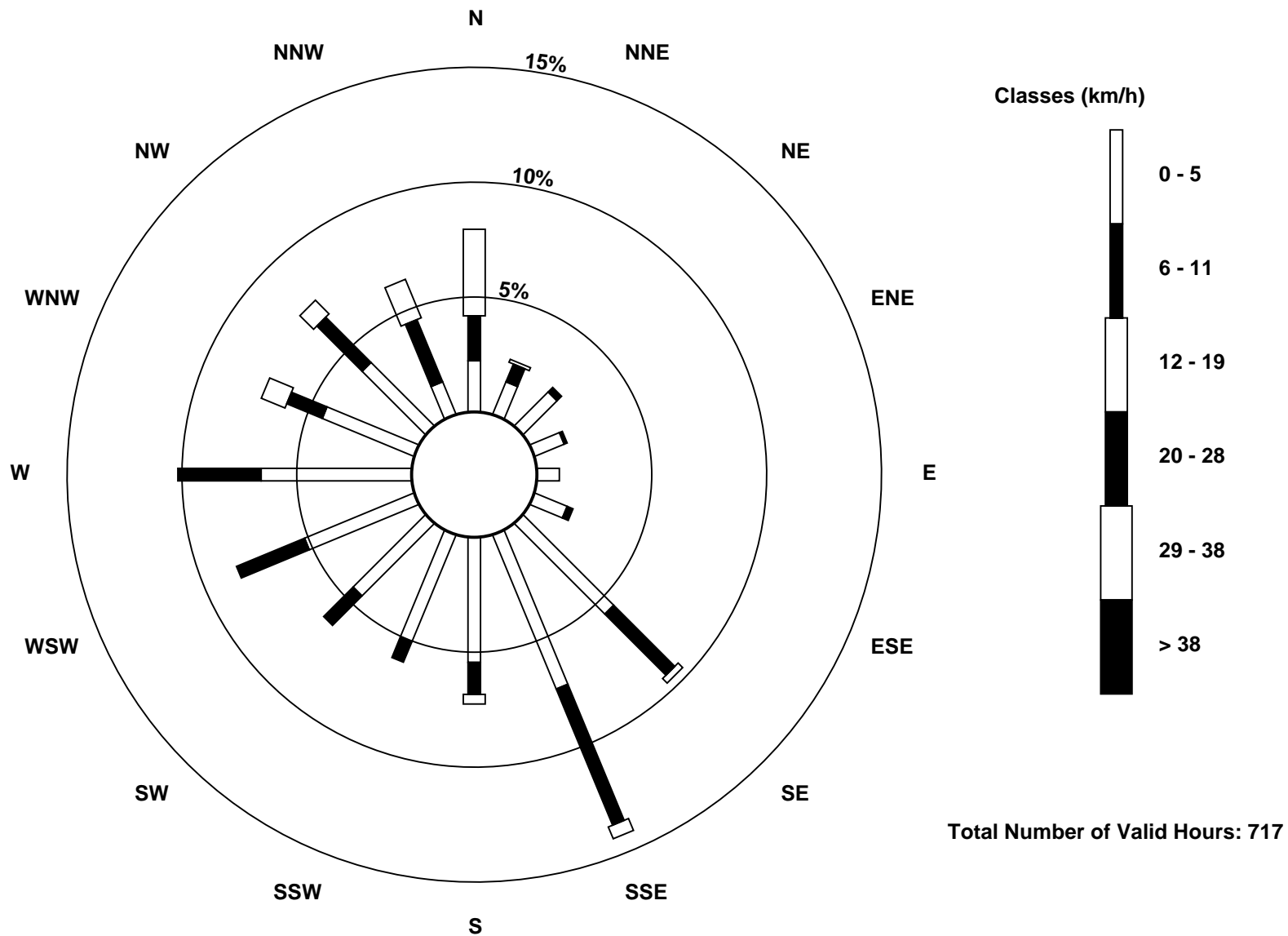
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Waskow ohci Pimatisiwin (AMS 25)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Waskow ohci Pimatisiwin - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 9 km/h on Sep 11 20:00 | Hours of Data: 717 |
| Minimum Value: 0 km/h on Sep 14 23:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6 | 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-Sep | 2 | 3 | 2 | 1 | 2 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 3 | 5 |
| 2-Sep | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 4 |
| 3-Sep | 2 | 2 | 2 | 3 | 3 | 1 | 2 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 6 | 6 | 5 | 4 | 3 | 3 | 3 | 6 |
| 4-Sep | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 4 |
| 5-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 6-Sep | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 7-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 5 | 5 | 5 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 5 |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | M | M | 4 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 4 |
| 9-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 10-Sep | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 4 | 5 | 4 | 5 | 5 | 5 | 6 | 3 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 6 |
| 11-Sep | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 9 | 1 | 1 | 2 | 2 | 9 |
| 12-Sep | 3 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 2 | 3 | 4 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 4 |
| 13-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 |
| 14-Sep | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 2 |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 3 |
| 16-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 5 |
| 17-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 5 |
| 18-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 5 | 5 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 5 |
| 19-Sep | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 |
| 20-Sep | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 6 |
| 21-Sep | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 5 |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 23-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| 24-Sep | 1 | AF | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 25-Sep | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 3 |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 4 | 4 | 3 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 27-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 3 |
| 28-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 |
| 29-Sep | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 30-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 4 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 9 | 5 | 5 | 5 | 4 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Waskow ohci Pimatisiwin - September 2017

| | |
|---|--------------------------------|
| Direction of Maximum Speed: 9 deg on Sep 20 15:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 2.3 deg on Sep 20 | Hours of Data: 717 |
| Direction of Minimum Speed: 246 deg on Sep 23 20:00 | Hours of Missing Data: 3 |
| Direction of Minimum Daily Speed Average: 0.6 deg on Sep 23 | Percent Operational Time: 99.6 |
| Monthly Average Direction: 263.5 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-Sep | 280 | 261 | 205 | 157 | 220 | 248 | 251 | 261 | 255 | 232 | 255 | 235 | 240 | 230 | 256 | 255 | 264 | 264 | 247 | 249 | 227 | 240 | 258 | 269 | 248.1 |
| 2-Sep | 274 | 278 | 292 | 282 | 292 | 276 | 278 | 273 | 275 | 276 | 263 | 264 | 262 | 252 | 237 | 224 | 226 | 242 | 262 | 211 | 164 | 203 | 247 | 237 | 260.5 |
| 3-Sep | 251 | 253 | 268 | 260 | 251 | 196 | 258 | 277 | 282 | 282 | 301 | 302 | 303 | 288 | 290 | 308 | 300 | 316 | 345 | 318 | 315 | 317 | 315 | 309 | 299.0 |
| 4-Sep | 264 | 318 | 13 | 315 | 309 | 279 | 188 | 293 | 302 | 318 | 333 | 300 | 319 | 300 | 319 | 307 | 286 | 320 | 291 | 283 | 268 | 254 | 258 | 212 | 306.7 |
| 5-Sep | 227 | 219 | 200 | 213 | 168 | 156 | 149 | 151 | 148 | 168 | 163 | 149 | 193 | 218 | 234 | 216 | 242 | 225 | 184 | 202 | 247 | 243 | 160 | 257 | 190.4 |
| 6-Sep | 38 | 173 | 234 | 231 | 128 | 263 | 25 | 72 | 50 | 5 | 4 | 10 | 39 | 47 | 96 | 358 | 59 | 10 | 308 | 258 | 242 | 272 | 210 | 275 | 15.6 |
| 7-Sep | 288 | 282 | 210 | 197 | 271 | 236 | 243 | 139 | 156 | 154 | 151 | 155 | 185 | 173 | 171 | 168 | 173 | 176 | 171 | 172 | 166 | 171 | 174 | 192 | 173.0 |
| 8-Sep | 162 | 188 | 178 | 175 | 176 | 229 | 199 | 186 | 195 | M | M | 349 | 342 | 334 | 332 | 338 | 327 | 322 | 324 | 309 | 221 | 283 | 76 | 295 | 314.8 |
| 9-Sep | 286 | 304 | 293 | 269 | 203 | 326 | 292 | 322 | 330 | 357 | 354 | 345 | 348 | 343 | 345 | 345 | 319 | 337 | 321 | 340 | 292 | 276 | 259 | 252 | 326.0 |
| 10-Sep | 202 | 185 | 203 | 181 | 209 | 205 | 218 | 223 | 223 | 256 | 264 | 274 | 277 | 280 | 277 | 289 | 273 | 265 | 233 | 225 | 233 | 239 | 247 | 276 | 252.2 |
| 11-Sep | 249 | 247 | 229 | 190 | 151 | 182 | 210 | 181 | 182 | 194 | 87 | 95 | 29 | 26 | 140 | 150 | 149 | 141 | 155 | 312 | 174 | 208 | 270 | 265 | 190.9 |
| 12-Sep | 254 | 257 | 267 | 229 | 199 | 194 | 212 | 231 | 277 | 294 | 304 | 303 | 308 | 301 | 332 | 340 | 342 | 38 | 12 | 7 | 35 | 38 | 22 | 335 | 295.1 |
| 13-Sep | 306 | 325 | 315 | 310 | 260 | 283 | 275 | 300 | 261 | 298 | 87 | 78 | 86 | 31 | 156 | 294 | 118 | 39 | 316 | 246 | 282 | 293 | 289 | 286 | 307.9 |
| 14-Sep | 266 | 268 | 268 | 272 | 268 | 274 | 284 | 271 | 310 | 15 | 347 | 36 | 38 | 65 | 79 | 49 | 55 | 27 | 358 | 318 | 266 | 267 | 267 | 269 | 334.4 |
| 15-Sep | 271 | 266 | 261 | 258 | 256 | 229 | 220 | 200 | 173 | 155 | 132 | 134 | 135 | 154 | 193 | 206 | 212 | 183 | 182 | 160 | 159 | 178 | 183 | 175 | 181.1 |
| 16-Sep | 177 | 140 | 168 | 151 | 114 | 227 | 160 | 148 | 147 | 148 | 143 | 152 | 160 | 162 | 158 | 162 | 166 | 175 | 179 | 152 | 136 | 133 | 189 | 157 | 158.6 |
| 17-Sep | 158 | 140 | 125 | 126 | 123 | 129 | 114 | 124 | 141 | 151 | 147 | 143 | 158 | 161 | 152 | 141 | 140 | 153 | 154 | 142 | 153 | 133 | 108 | 112 | 145.8 |
| 18-Sep | 123 | 128 | 116 | 134 | 132 | 322 | 317 | 327 | 147 | 154 | 144 | 135 | 144 | 147 | 134 | 113 | 123 | 113 | 98 | 175 | 204 | 205 | 188 | 174 | 139.4 |
| 19-Sep | 268 | 310 | 330 | 348 | 342 | 342 | 343 | 351 | 349 | 0 | 15 | 9 | 358 | 16 | 57 | 53 | 58 | 71 | 45 | 47 | 66 | 54 | 31 | 29 | 13.4 |
| 20-Sep | 11 | 356 | 359 | 353 | 352 | 354 | 356 | 354 | 1 | 5 | 5 | 9 | 12 | 11 | 9 | 10 | 6 | 5 | 0 | 1 | 359 | 2 | 0 | 358 | 2.3 |
| 21-Sep | 354 | 351 | 353 | 348 | 348 | 345 | 344 | 345 | 346 | 346 | 350 | 352 | 348 | 349 | 349 | 349 | 342 | 346 | 349 | 335 | 322 | 311 | 293 | 279 | 345.9 |
| 22-Sep | 299 | 275 | 253 | 239 | 208 | 206 | 213 | 223 | 165 | 170 | 169 | 151 | 142 | 211 | 173 | 150 | 126 | 134 | 68 | 130 | 151 | 218 | 282 | 275 | 180.1 |
| 23-Sep | 272 | 281 | 258 | 274 | 282 | 286 | 291 | 310 | 309 | 359 | 274 | 335 | 128 | 138 | 139 | 149 | 147 | 144 | 129 | 246 | 147 | 154 | 161 | 329 | 220.9 |
| 24-Sep | 198 | AF | 314 | 253 | 264 | 257 | 227 | 149 | 139 | 145 | 139 | 156 | 141 | 143 | 140 | 147 | 133 | 157 | 148 | 170 | 164 | 172 | 155 | 154 | 153.1 |
| 25-Sep | 148 | 128 | 134 | 131 | 134 | 139 | 147 | 144 | 155 | 144 | 132 | 152 | 145 | 239 | 273 | 243 | 163 | 183 | 247 | 230 | 185 | 163 | 159 | 173 | 165.5 |
| 26-Sep | 172 | 172 | 144 | 103 | 154 | 3 | 163 | 164 | 216 | 250 | 145 | 319 | 316 | 330 | 319 | 320 | 325 | 319 | 290 | 255 | 228 | 254 | 140 | 220 | 303.9 |
| 27-Sep | 129 | 164 | 181 | 228 | 242 | 255 | 268 | 258 | 13 | 351 | 11 | 353 | 348 | 18 | 46 | 8 | 25 | 24 | 4 | 353 | 352 | 354 | 359 | 355 | 2.1 |
| 28-Sep | 329 | 328 | 322 | 322 | 278 | 277 | 231 | 320 | 65 | 157 | 138 | 141 | 140 | 141 | 153 | 166 | 176 | 169 | 156 | 147 | 150 | 156 | 152 | 155 | 157.4 |
| 29-Sep | 156 | 158 | 163 | 150 | 142 | 150 | 118 | 148 | 144 | 151 | 141 | 144 | 156 | 202 | 205 | 204 | 261 | 299 | 251 | 227 | 248 | 233 | 215 | 259 | 168.0 |
| 30-Sep | 246 | 238 | 224 | 231 | 174 | 196 | 162 | 153 | 151 | 147 | 137 | 135 | 136 | 178 | 206 | 220 | 197 | 286 | 299 | 306 | 305 | 303 | 298 | 304 | 242.8 |

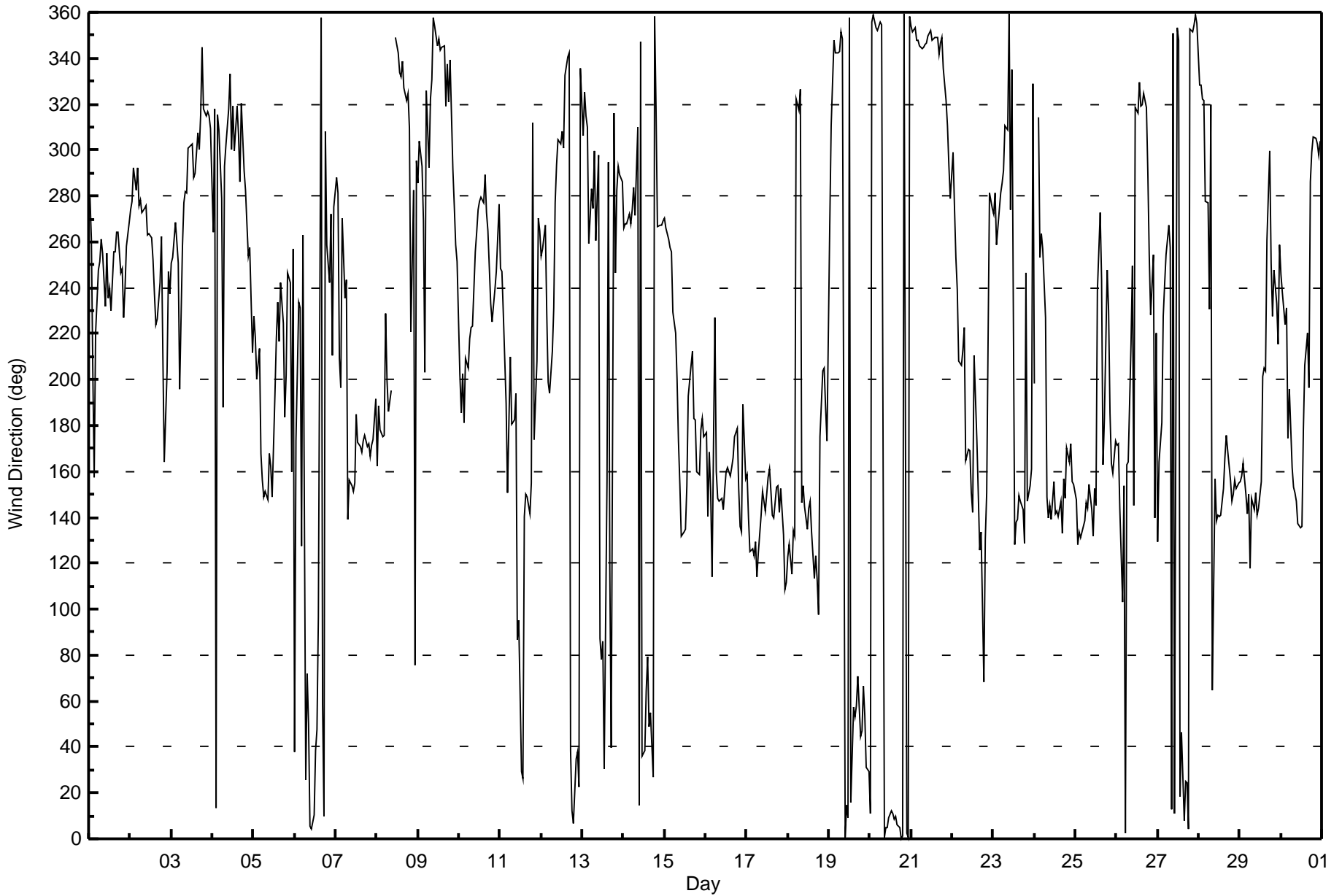
264.1 271.2 274.5 281.9 273.8 277.0 277.4 286.8 250.3 221.9 17.7 48.3 268.6 252.0 246.4 271.9 253.4 300.3 309.0 303.9 282.7 273.6 273.0 275.6

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

Waskow ohci Pimatisiwin - September 2017

| | |
|---|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 108 deg on Sep 26 06:00 | Hours of Data: 717 |
| Minimum Value: 11 deg on Sep 23 00:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 16 P ₁₀ = 22 Q ₁ = 28 Median = 37 Q ₃ = 52 P ₉₀ = 67 P ₉₉ = 93 | 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-Sep | 58 | 55 | 49 | 35 | 42 | 65 | 53 | 57 | 55 | 52 | 54 | 53 | 59 | 45 | 56 | 53 | 58 | 49 | 45 | 50 | 40 | 47 | 51 | 54 | 65 |
| 2-Sep | 57 | 53 | 50 | 44 | 46 | 44 | 46 | 56 | 48 | 53 | 53 | 57 | 53 | 53 | 52 | 42 | 45 | 43 | 49 | 72 | 56 | 63 | 50 | 36 | 72 |
| 3-Sep | 46 | 49 | 64 | 48 | 48 | 35 | 50 | 47 | 42 | 46 | 34 | 32 | 33 | 41 | 45 | 38 | 33 | 33 | 26 | 17 | 16 | 16 | 16 | 32 | 64 |
| 4-Sep | 86 | 54 | 77 | 71 | 77 | 63 | 60 | 98 | 36 | 36 | 28 | 71 | 45 | 42 | 45 | 47 | 57 | 36 | 62 | 50 | 29 | 63 | 29 | 54 | 98 |
| 5-Sep | 60 | 58 | 52 | 25 | 31 | 30 | 29 | 38 | 31 | 33 | 36 | 31 | 51 | 48 | 64 | 45 | 64 | 37 | 12 | 17 | 73 | 51 | 24 | 65 | 73 |
| 6-Sep | 93 | 71 | 66 | 53 | 72 | 74 | 82 | 66 | 54 | 38 | 59 | 57 | 79 | 78 | 66 | 85 | 74 | 64 | 39 | 52 | 41 | 35 | 79 | 55 | 93 |
| 7-Sep | 25 | 44 | 60 | 52 | 47 | 32 | 70 | 44 | 27 | 31 | 35 | 33 | 34 | 33 | 30 | 29 | 29 | 27 | 23 | 21 | 21 | 19 | 21 | 35 | 70 |
| 8-Sep | 30 | 24 | 23 | 31 | 31 | 75 | 62 | 39 | 89 | M | M | 24 | 28 | 37 | 25 | 32 | 22 | 18 | 21 | 50 | 76 | 92 | 80 | 52 | 92 |
| 9-Sep | 60 | 23 | 42 | 43 | 60 | 49 | 29 | 30 | 30 | 45 | 23 | 27 | 29 | 22 | 20 | 22 | 30 | 21 | 23 | 45 | 31 | 46 | 41 | 42 | 60 |
| 10-Sep | 36 | 41 | 44 | 33 | 48 | 45 | 38 | 43 | 50 | 49 | 52 | 51 | 43 | 49 | 45 | 43 | 54 | 46 | 45 | 40 | 43 | 37 | 48 | 50 | 54 |
| 11-Sep | 36 | 39 | 54 | 46 | 37 | 19 | 66 | 23 | 45 | 46 | 56 | 73 | 50 | 50 | 39 | 32 | 36 | 35 | 25 | 82 | 51 | 56 | 45 | 43 | 82 |
| 12-Sep | 40 | 48 | 49 | 47 | 33 | 35 | 36 | 48 | 51 | 37 | 30 | 32 | 30 | 34 | 29 | 30 | 55 | 53 | 41 | 34 | 45 | 50 | 45 | 34 | 55 |
| 13-Sep | 24 | 22 | 22 | 49 | 70 | 26 | 24 | 70 | 84 | 69 | 62 | 61 | 66 | 95 | 61 | 67 | 56 | 54 | 80 | 33 | 18 | 18 | 17 | 25 | 95 |
| 14-Sep | 24 | 22 | 25 | 26 | 18 | 18 | 20 | 23 | 41 | 72 | 69 | 54 | 81 | 63 | 47 | 57 | 62 | 40 | 27 | 15 | 35 | 51 | 19 | 26 | 81 |
| 15-Sep | 24 | 21 | 34 | 48 | 26 | 32 | 48 | 35 | 35 | 29 | 38 | 36 | 34 | 53 | 50 | 53 | 45 | 27 | 26 | 29 | 39 | 31 | 29 | 35 | 53 |
| 16-Sep | 31 | 32 | 33 | 38 | 68 | 47 | 68 | 25 | 32 | 31 | 31 | 35 | 36 | 38 | 35 | 35 | 32 | 34 | 33 | 31 | 31 | 56 | 33 | 25 | 68 |
| 17-Sep | 21 | 25 | 24 | 23 | 25 | 22 | 89 | 93 | 27 | 30 | 31 | 34 | 35 | 43 | 38 | 39 | 37 | 33 | 27 | 25 | 34 | 23 | 21 | 25 | 93 |
| 18-Sep | 24 | 23 | 35 | 28 | 29 | 65 | 30 | 13 | 75 | 32 | 34 | 36 | 37 | 36 | 38 | 39 | 41 | 39 | 25 | 63 | 47 | 54 | 38 | 34 | 75 |
| 19-Sep | 39 | 70 | 29 | 18 | 20 | 16 | 17 | 18 | 19 | 25 | 36 | 32 | 25 | 67 | 54 | 49 | 47 | 43 | 40 | 40 | 49 | 46 | 40 | 36 | 70 |
| 20-Sep | 30 | 22 | 25 | 23 | 22 | 22 | 25 | 22 | 28 | 29 | 29 | 30 | 32 | 31 | 30 | 31 | 28 | 29 | 26 | 27 | 24 | 25 | 25 | 24 | 32 |
| 21-Sep | 23 | 23 | 22 | 20 | 21 | 20 | 21 | 21 | 22 | 22 | 20 | 23 | 23 | 22 | 23 | 23 | 21 | 21 | 23 | 21 | 21 | 31 | 40 | 25 | 40 |
| 22-Sep | 41 | 84 | 69 | 72 | 54 | 61 | 41 | 61 | 54 | 60 | 33 | 32 | 33 | 52 | 45 | 32 | 35 | 33 | 73 | 59 | 61 | 39 | 65 | 11 | 84 |
| 23-Sep | 27 | 45 | 36 | 19 | 18 | 13 | 22 | 31 | 33 | 62 | 52 | 77 | 46 | 33 | 43 | 40 | 44 | 37 | 94 | 80 | 85 | 58 | 48 | 57 | 94 |
| 24-Sep | 87 | AF | 50 | 18 | 29 | 27 | 50 | 57 | 37 | 25 | 32 | 36 | 39 | 39 | 36 | 43 | 29 | 34 | 46 | 21 | 22 | 26 | 23 | 87 | |
| 25-Sep | 27 | 32 | 28 | 66 | 29 | 71 | 30 | 29 | 28 | 32 | 35 | 47 | 42 | 73 | 56 | 72 | 25 | 33 | 22 | 53 | 68 | 19 | 21 | 16 | 73 |
| 26-Sep | 22 | 22 | 54 | 71 | 102 | 108 | 40 | 75 | 61 | 61 | 83 | 38 | 24 | 25 | 28 | 22 | 20 | 17 | 14 | 75 | 65 | 65 | 64 | 101 | 108 |
| 27-Sep | 59 | 34 | 24 | 36 | 68 | 68 | 40 | 72 | 49 | 38 | 45 | 33 | 37 | 51 | 51 | 35 | 36 | 35 | 28 | 19 | 20 | 23 | 27 | 33 | 72 |
| 28-Sep | 30 | 39 | 67 | 32 | 18 | 22 | 59 | 32 | 83 | 31 | 34 | 32 | 35 | 39 | 38 | 34 | 30 | 28 | 27 | 32 | 27 | 26 | 26 | 24 | 83 |
| 29-Sep | 26 | 25 | 24 | 67 | 39 | 33 | 34 | 29 | 29 | 29 | 33 | 34 | 45 | 41 | 45 | 42 | 61 | 73 | 22 | 60 | 35 | 53 | 50 | 77 | 77 |
| 30-Sep | 65 | 76 | 65 | 60 | 60 | 40 | 65 | 68 | 31 | 33 | 30 | 34 | 31 | 57 | 49 | 44 | 36 | 44 | 22 | 19 | 24 | 25 | 27 | 24 | 76 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|--|
| 93 | 84 | 77 | 72 | 102 | 108 | 89 | 98 | 89 | 72 | 83 | 77 | 81 | 95 | 66 | 85 | 74 | 73 | 94 | 82 | 85 | 92 | 80 | 101 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|-------------------------|-----------------|-----------------|
| Station Name: | Waskow Ohci Pimatisiwin | Station number: | AMS 25 |
| Calibration Date: | September 8, 2017 | Last Cal Date: | August 11, 2017 |
| Start time (MST): | 10:40 | End time (MST): | 12:18 |
| Reason: | Install | | |

Calibration Standards

| | | | | |
|-----------------------|------------------|-----|------------------|----------------|
| Cal Gas Concentration | <u>50.2</u> | ppm | Cal Gas Exp Date | April 19, 2021 |
| Cal Gas Cylinder # | <u>EY0000817</u> | | | |
| Calibrator Make/Model | API T700 | | Serial Number | 747 |
| ZAG Make/Model | API 701 | | Serial Number | 261 |

Analyzer Information

| | | | | | |
|----------------------|--------------|--------------------|--------------|---------------|-------|
| Analyzer make: | Thermo 43i | Analyzer serial #: | 1160290014 | | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> | |
| Analyzer Range | 0 - 1000 ppb | PMT voltage | -609 | -611 | |
| Calculated slope | 0.994683 | 0.992126 | Lamp voltage | 852 | 843 |
| Calculated intercept | -1.365040 | 0.901447 | Pressure | 721.5 | 716.8 |
| Analyzer Background | 14.2 | 15.2 | Flow | 0.452 | 0.449 |
| Analyzer Coefficient | 0.710 | 0.704 | Intensity | 92 | 90 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | | | | | |
| as found span | | | | | |
| calibrator zero | 4999 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 4931 | 79.8 | 799.5 | 804.9 | 0.993 |
| second point | 4972 | 39.8 | 398.7 | 401.9 | 0.992 |
| third point | 4992 | 20.0 | 200.3 | 199.0 | 1.007 |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 0.997 |
| Corrected As found | NA | Previous response | NA | *% change | NA |

* = > +/-5% change initiates investigation

Notes: Install cal. Inlet filter changed out. Adjusted the zero and the span. As lefts will be taken from Nightly zero and span

Calibration Performed By: Jayme Marcoux



Wood Buffalo Environmental Association

SO₂ Calibration Summary

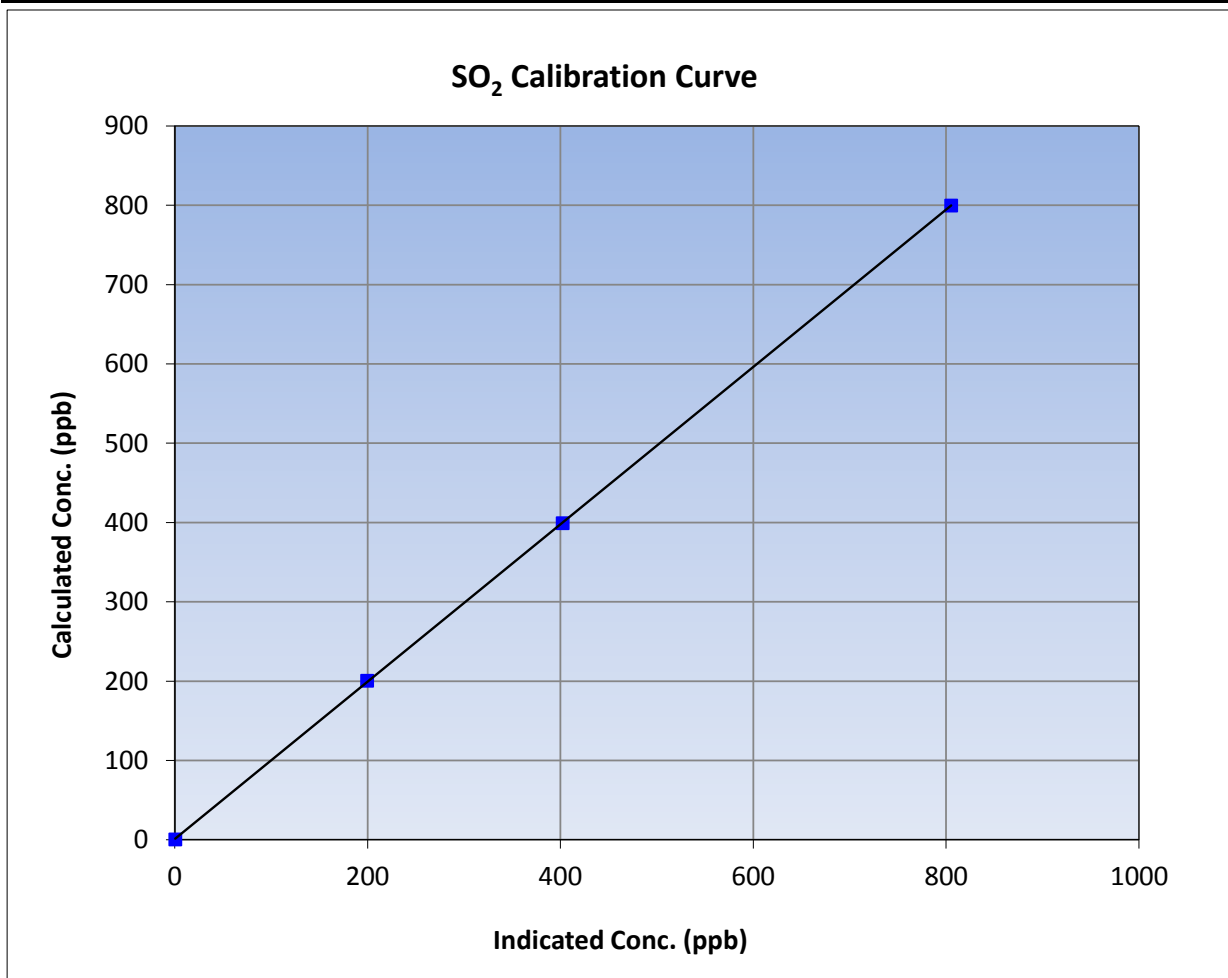
Version-03-2017

Station Information

| | | | |
|------------------|-------------------------|----------------------|-----------------|
| Calibration Date | September 8, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Waskow Ohci Pimatisiwin | Station Number | AMS 25 |
| Start Time (MST) | 10:40 | End Time (MST) | 12:18 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1160290014 |

Calibration Data

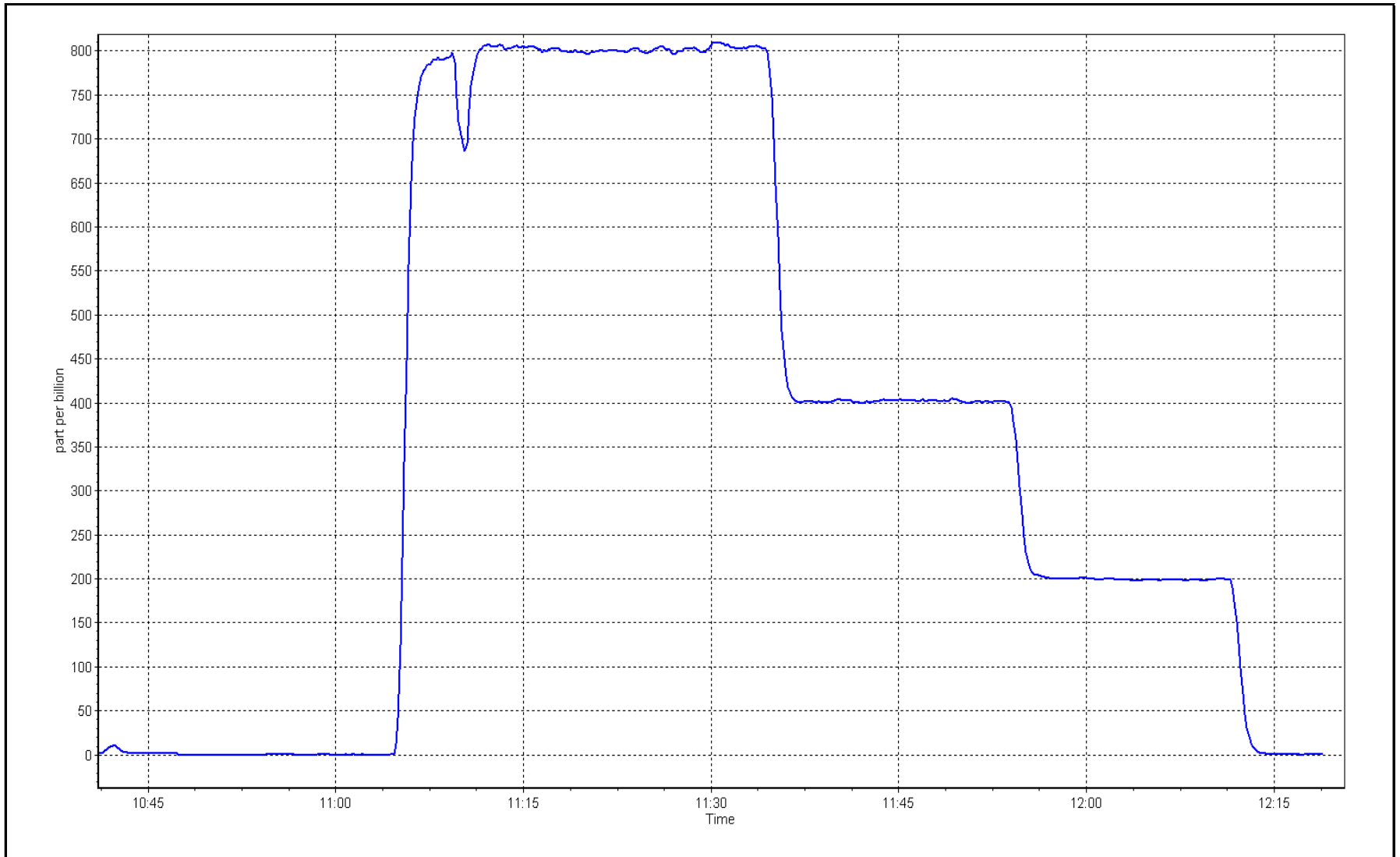
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 |
| 799.5 | 804.9 | 0.9932 | | |
| 398.7 | 401.9 | 0.9919 | Slope | 0.90 - 1.10 |
| 200.3 | 199.0 | 1.0066 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 8, 2017

Location: Waskow Ohci Pimatisiwin





Wood Buffalo Environmental Association

SO₂ Calibration Summary

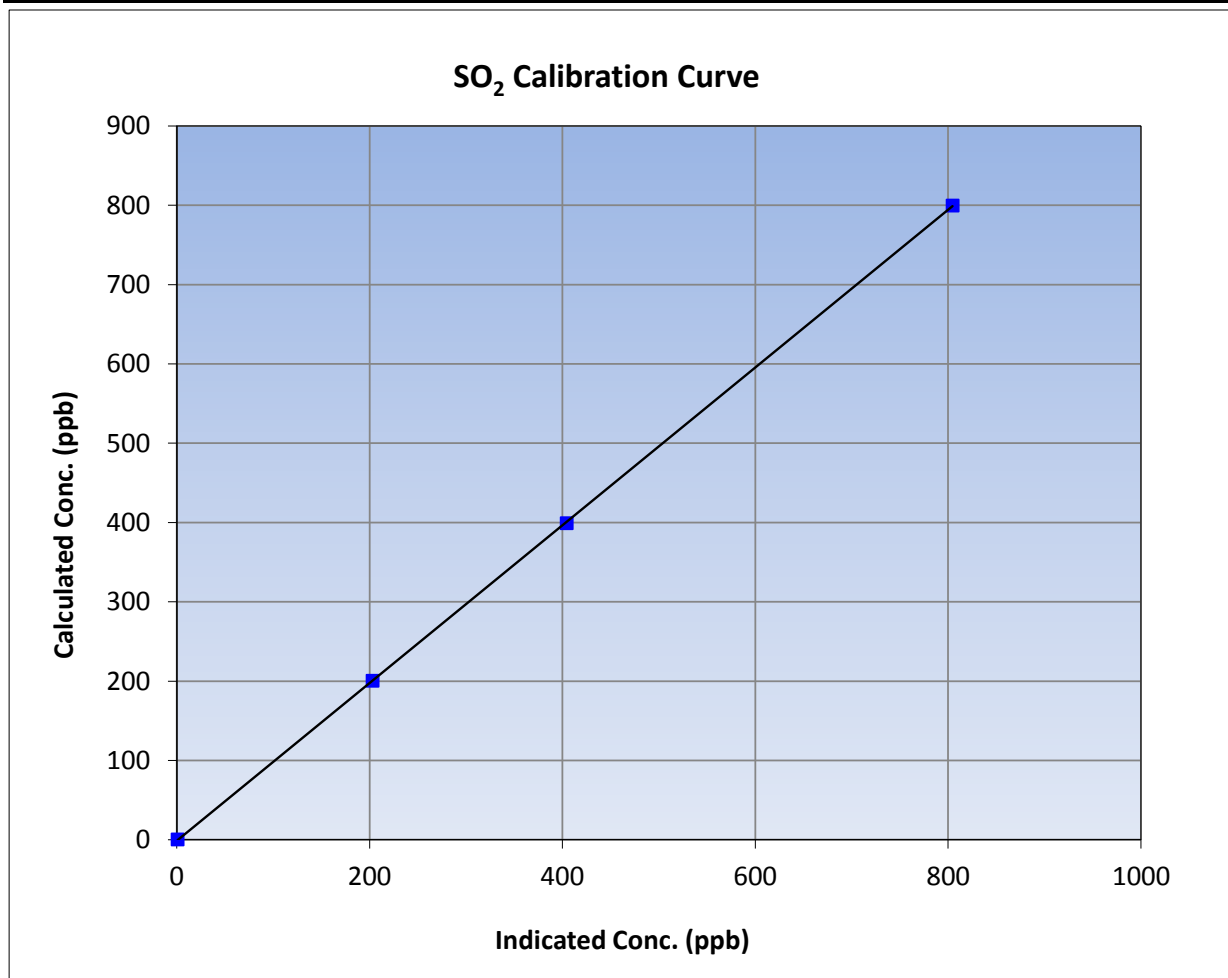
Version-03-2017

Station Information

| | | | |
|------------------|-------------------------|----------------------|-----------------|
| Calibration Date | September 8, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Waskow Ohci Pimatisiwin | Station Number | AMS 25 |
| Start Time (MST) | 9:00 | End Time (MST) | 10:03 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1160290014 |

Calibration Data

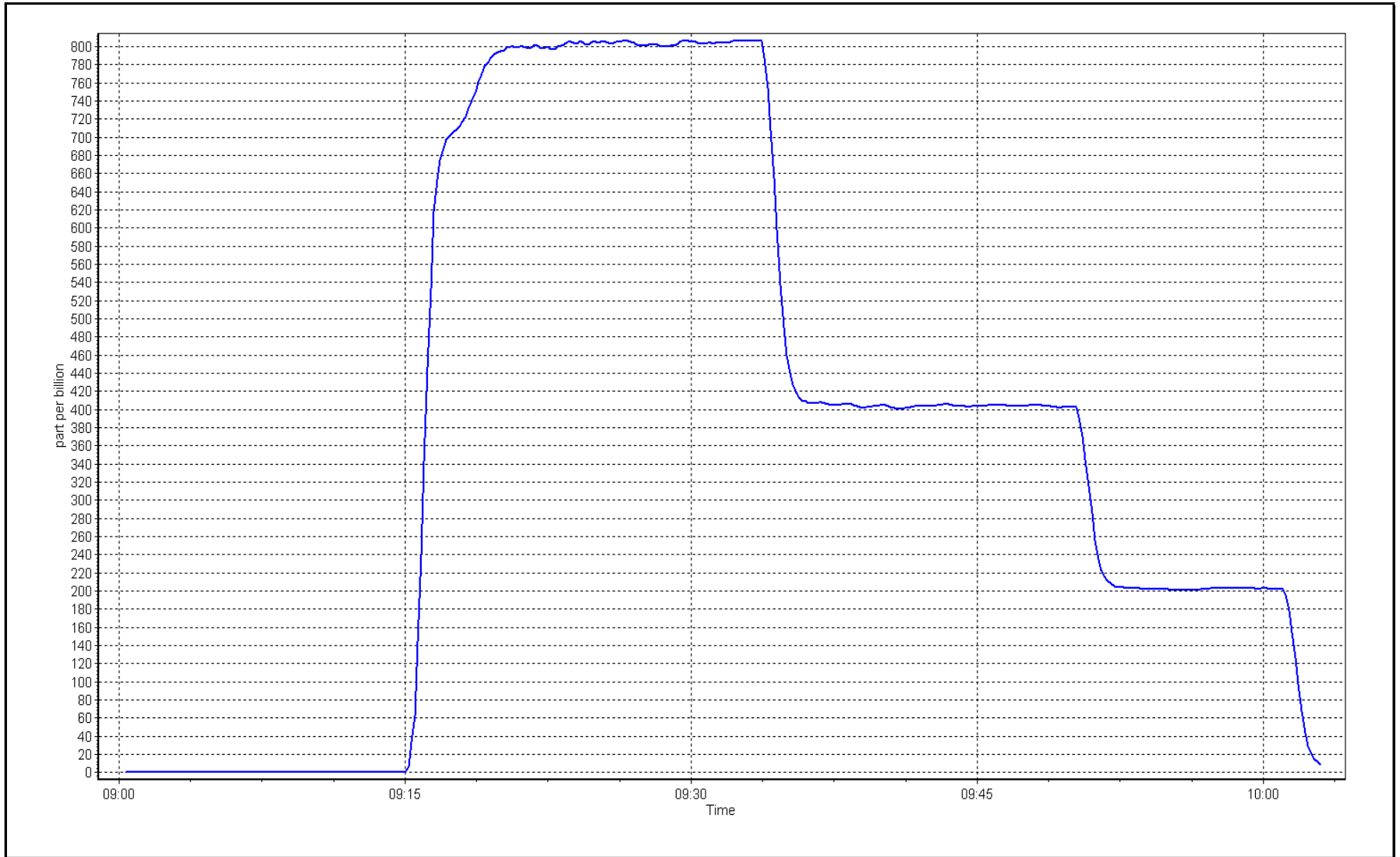
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | 0.5 | ---- | Correlation Coefficient | ≥0.995 |
| 799.5 | 804.2 | 0.9941 | | |
| 398.7 | 404.0 | 0.9868 | Slope | 0.90 - 1.10 |
| 200.3 | 202.7 | 0.9883 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 8, 2017

Location: Waskow Ohci Pimatisiwin





Wood Buffalo Environmental Association

H₂S Calibration Summary

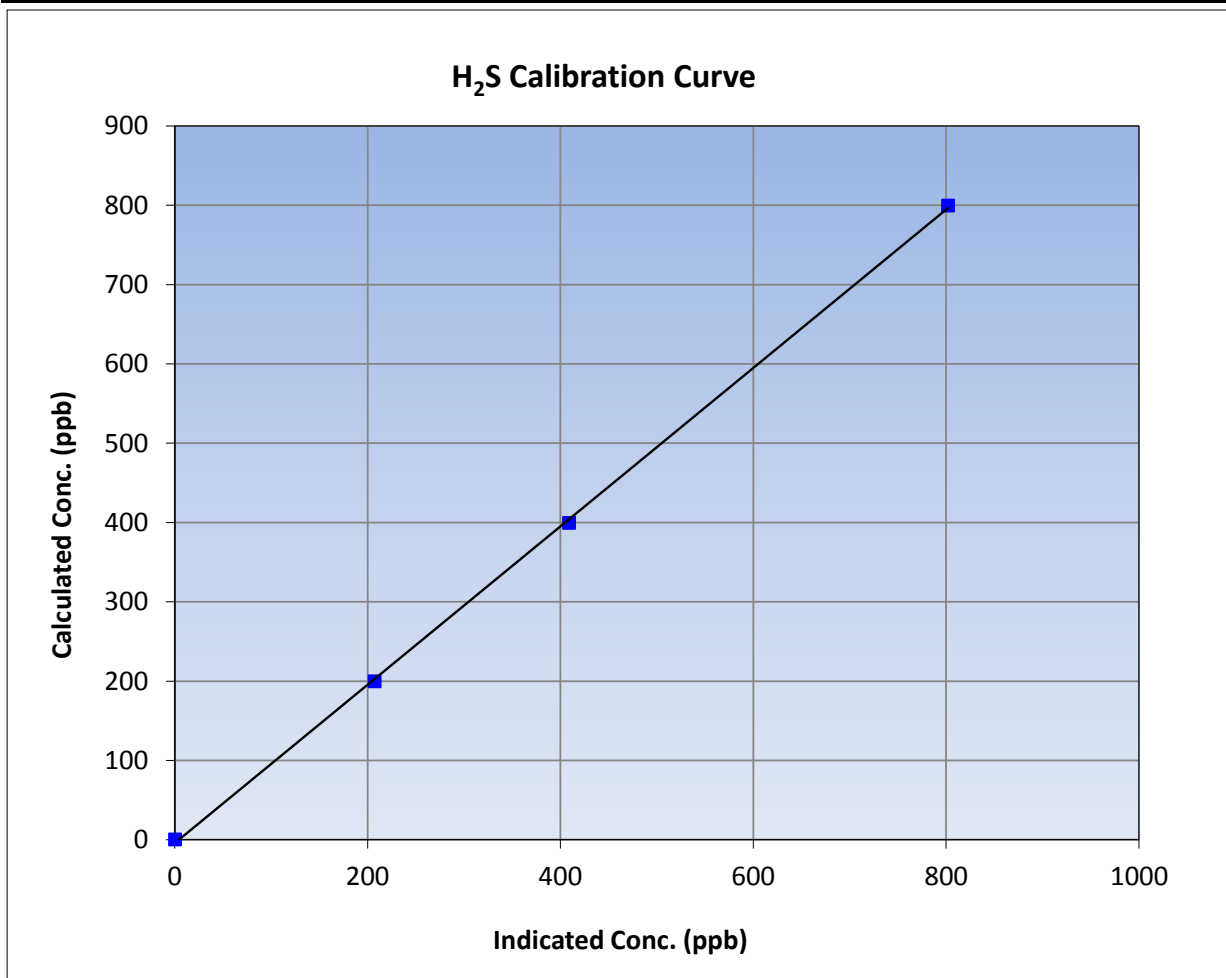
Version-03-2017

Station Information

| | | | |
|------------------|-------------------------|----------------------|----------------|
| Calibration Date | September 8, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Waskow Ohci Pimatisiwin | Station Number | AMS 25 |
| Start Time (MST) | 12:10 | End Time (MST) | 13:51 |
| Analyzer make | Thermo 450i | Analyzer serial # | 822436967 |

Calibration Data

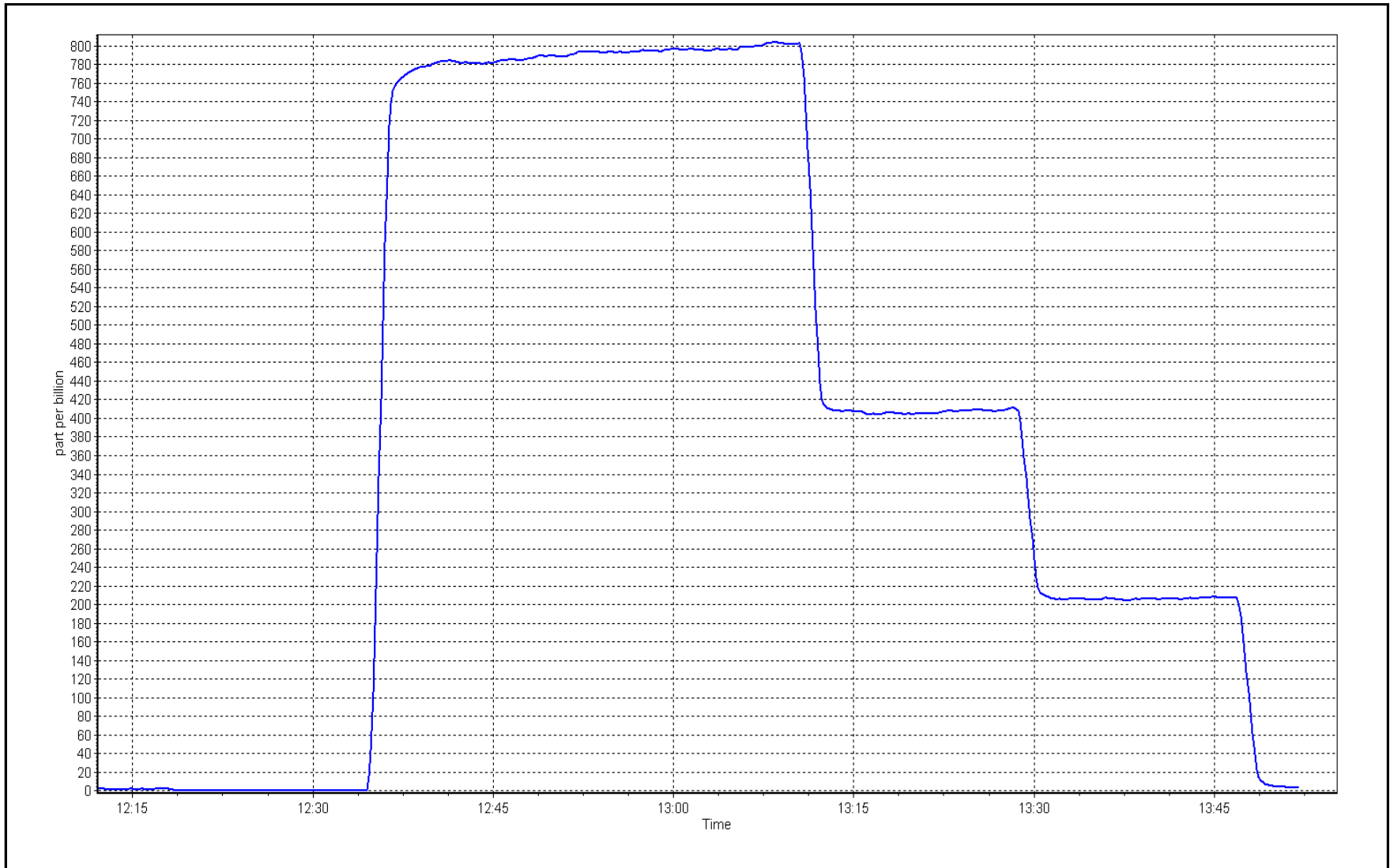
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|--------------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999843 | ≥0.995 |
| 799.3 | 801.7 | 0.9970 | Slope | 0.998587 | 0.90 - 1.10 |
| 399.1 | 408.4 | 0.9773 | Intercept | -4.272782 | +/-10 |
| 199.5 | 206.9 | 0.9643 | | | |



H₂S Calibration Plot

Date: September 8, 2017

Location: Waskow Ohci Pimatisiwin





Wood Buffalo Environmental Association

H₂S Calibration Summary

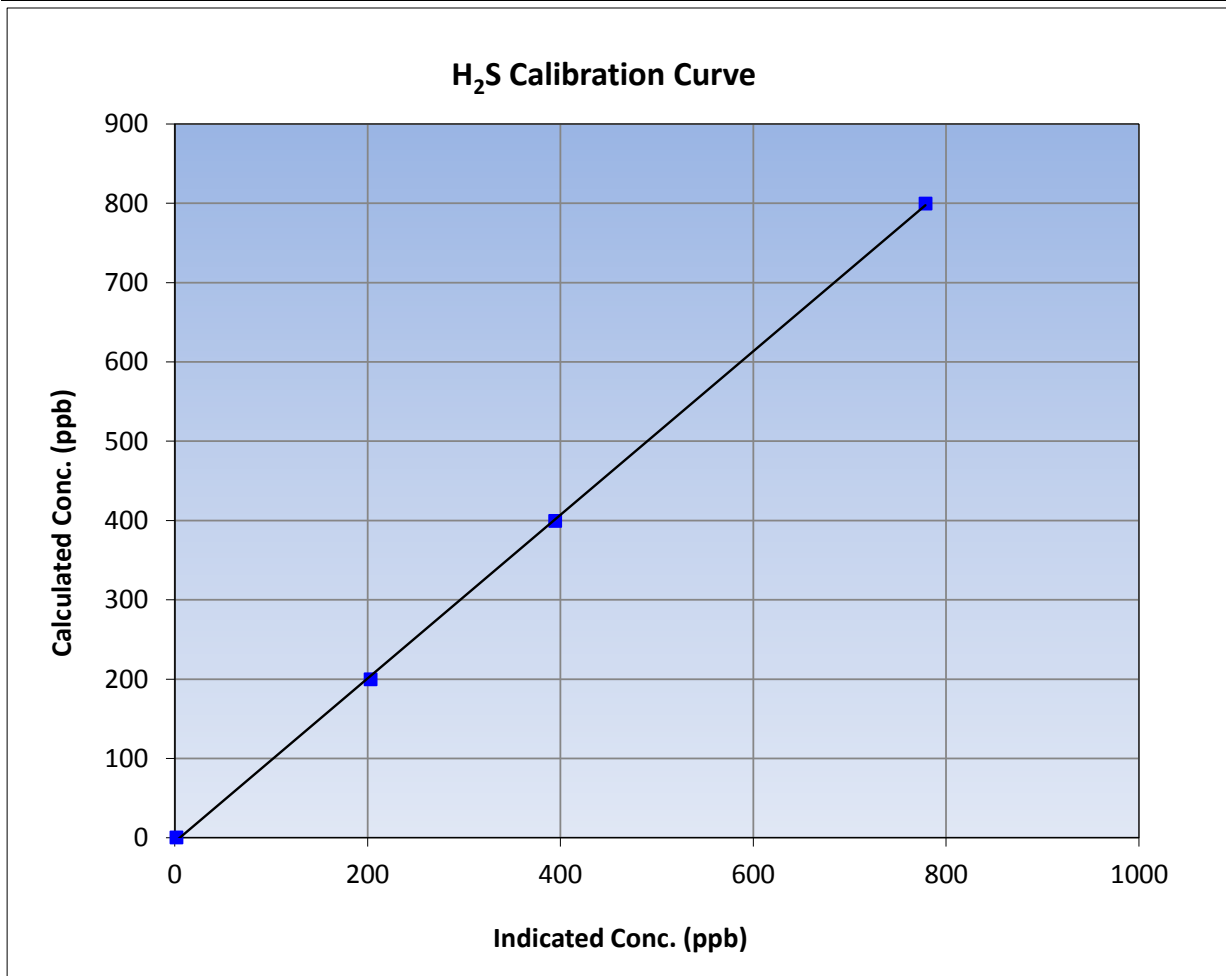
Version-03-2017

Station Information

| | | | |
|------------------|-------------------------|----------------------|----------------|
| Calibration Date | September 8, 2017 | Previous Calibration | August 3, 2017 |
| Station Name | Waskow Ohci Pimatisiwin | Station Number | AMS 25 |
| Start Time (MST) | 7:49 | End Time (MST) | 9:06 |
| Analyzer make | Thermo 450i | Analyzer serial # | 822436967 |

Calibration Data

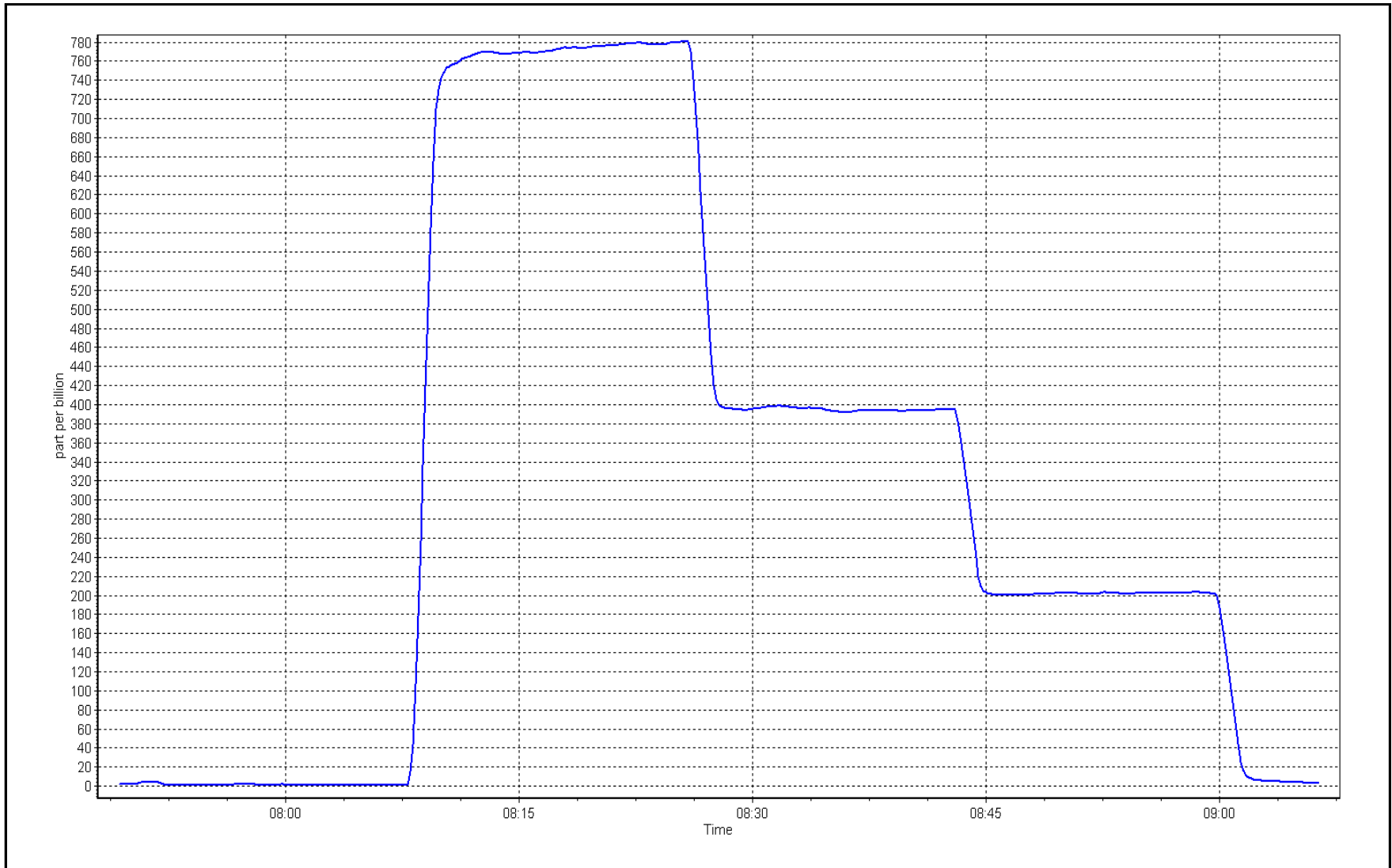
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|-------------|
| 0.0 | 1.3 | ---- | Correlation Coefficient | 0.999879 | ≥0.995 |
| 799.3 | 778.2 | 1.0271 | | | |
| 399.1 | 394.2 | 1.0125 | Slope | 1.031344 | 0.90 - 1.10 |
| 199.5 | 202.7 | 0.9843 | | | |
| | | | Intercept | -5.408989 | +/-10 |



H₂S Calibration Plot

Date: September 8, 2017

Location: Waskow Ohci Pimatisiwin





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 500
CENOVUS
CHRISTINA LAKE
SEPTEMBER 2017**

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 684 | 34 | 36 | 99.72 | 53 | 0 | 9 | 0 |
| H2S (ppb) Average | 685 | 33 | 35 | 99.72 | 2 | 0 | 0 | 0 |
| NO2 (ppb) Average | 682 | 34 | 38 | 99.44 | 24 | 0 | 7 | - |
| NO (ppb) Average | 682 | 34 | 38 | 99.44 | 26 | - | 5 | - |
| NOX (ppb) Average | 682 | 34 | 38 | 99.44 | 50 | - | 10 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 28.4 | - | 19.5 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 97 | - | 94 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100 | 26 | - | 16 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 684 | 1.4 | 4 | - | 0 | 0 | 0 | 0 | 1 | 3 | 53 |
| H2S (ppb) Average | 685 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| NO2 (ppb) Average | 682 | 2.5 | 3 | - | 0 | 0 | 1 | 2 | 3 | 6 | 24 |
| NO (ppb) Average | 682 | 1.2 | 2 | - | 0 | 0 | 0 | 0 | 1 | 3 | 26 |
| NOX (ppb) Average | 682 | 3.7 | 5 | - | 0 | 0 | 1 | 2 | 4 | 9 | 50 |
| Temperature 2 m (C) Average | 720 | 11.42 | 6.1 | - | -3.4 | 3.7 | 6.4 | 11.3 | 15.6 | 19.7 | 28.4 |
| Relative Humidity (%) Average | 720 | 68.1 | 19 | - | 27 | 40 | 52 | 69 | 84 | 94 | 97 |
| Wind Speed 10 m (km/h) Average | 720 | 10.1 | 5 | - | 0 | 3 | 6 | 10 | 14 | 17 | 26 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS 500)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|--------------|-------------------|-------------------|------------------|-----------------------------------|
| SO2 | 07 Sep 2017 11:00 | 07 Sep 2017 12:00 | 2 | Maintenance - WBEA internal audit |
| H2S | 07 Sep 2017 12:00 | 07 Sep 2017 13:00 | 2 | Maintenance - WBEA internal audit |
| NO2, NO, NOX | 07 Sep 2017 13:00 | 07 Sep 2017 16:00 | 4 | Maintenance - WBEA internal audit |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Christina Lake - September 2017

| | | | | |
|---|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 53 ppb on Sep 3 23:00 | Maximum Daily Average: 8.9 ppb on Sep 3 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 1 02:00 | Minimum Daily Average: 0.0 ppb on Sep 18 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 2.6 ppb at hour 23 | Minimum Diurnal Average: 0.6 ppb at hour 21 | | Hours of Calibration: | 34 |
| Monthly Average: 1.4 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 16 | | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 5 | 0.8 | 5 |
| 3-Sep | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 2 | 6 | 7 | 9 | 4 | 13 | 9 | 6 | 11 | 5 | 13 | 18 | 5 | 4 | 53 | 36 | 8.9 | 53 |
| 4-Sep | 42 | 34 | Z | 36 | 25 | 1 | 1 | 3 | 7 | 3 | 3 | 4 | 5 | 5 | 3 | 8 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 8.2 | 42 |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0.6 | 2 |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 5 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1.3 | 5 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 3 | 2 | M | M | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 5 | 3 | 1 | 1.3 | 5 |
| 8-Sep | Z | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 6 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 1.1 | 6 |
| 9-Sep | 0 | Z | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 4 |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 11-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.8 | 3 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 2 | 6 | 5 | 7 | 8 | 12 | 10 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.4 | 12 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.7 | 4 |
| 16-Sep | 2 | 0 | Z | 0 | 1 | 9 | 5 | 12 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1.8 | 12 |
| 17-Sep | 1 | 1 | 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 |
| 18-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 22-Sep | 0 | 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 |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.4 | 1 |
| 24-Sep | 0 | 4 | 8 | 3 | Z | 7 | 5 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 3 | 3 | 6 | 7 | 1 | 1 | 2.7 | 8 |
| 25-Sep | 2 | 4 | 5 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 6 | 5 | 4 | 2 | 4 | 8 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.8 | 8 |
| 27-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0.7 | 5 |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 1 | 1 | 1 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 3 | 8 | 1.4 | 8 |
| 30-Sep | 3 | 4 | 1 | 1 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 7 | 2 | 1 | 0 | 1 | 0 | 1 | 12 | 9 | 2.2 | 12 |

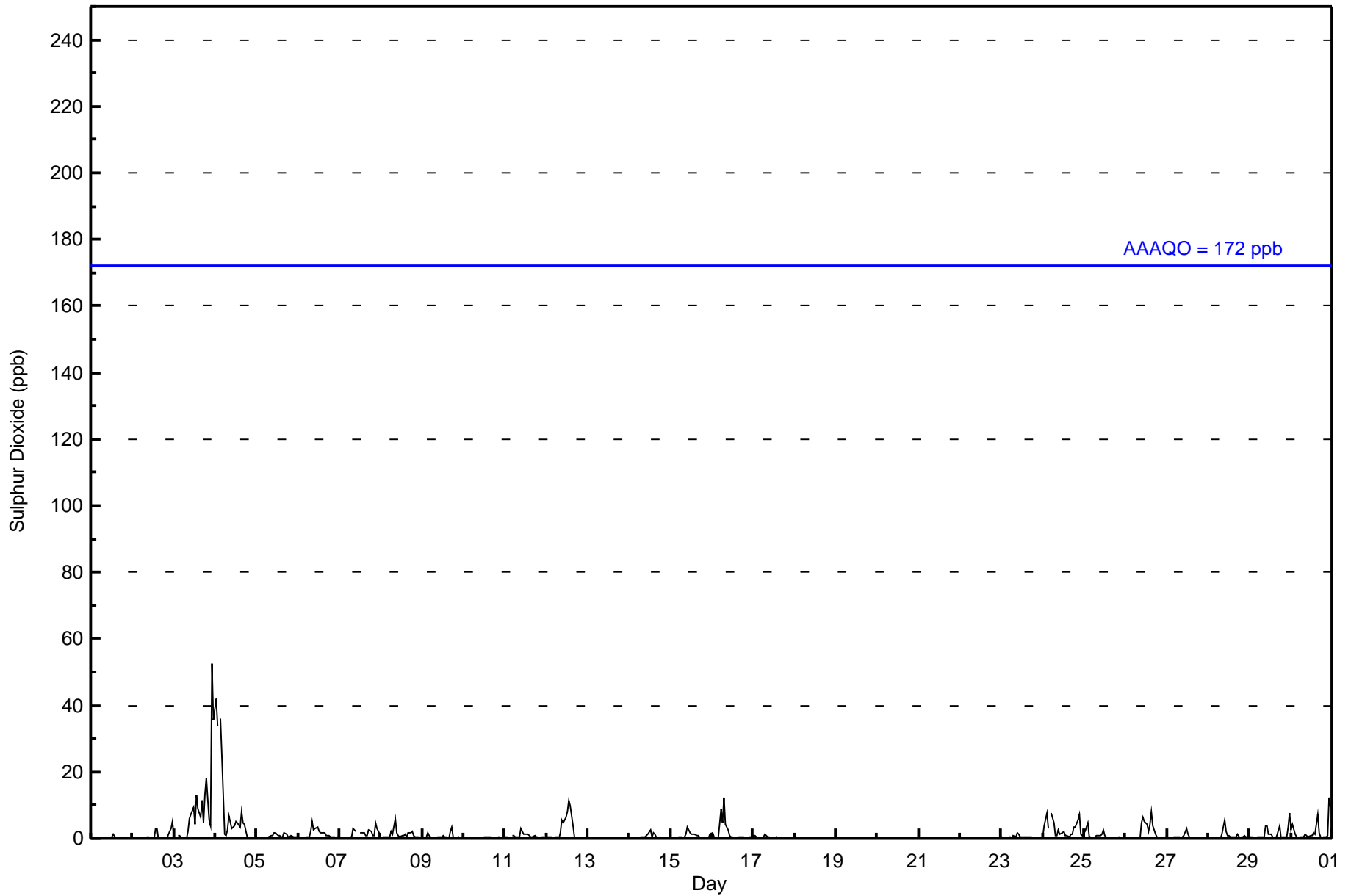
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 2.1 | 2.0 | 0.7 | 1.8 | 1.2 | 0.9 | 0.6 | 0.9 | 1.3 | 1.7 | 1.6 | 1.6 | 1.4 | 1.6 | 1.4 | 1.5 | 1.2 | 1.0 | 0.9 | 0.9 | 0.6 | 0.8 | 2.6 | 2.2 | Diurnal Average | |
| 42 | 34 | 8 | 36 | 25 | 9 | 5 | 12 | 7 | 6 | 7 | 9 | 8 | 13 | 10 | 8 | 11 | 5 | 13 | 18 | 6 | 7 | 53 | 36 | 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
Christina Lake - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Christina Lake - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 671 | 98.10 | 98.10 |
| 11 - 20 | 7 | 1.02 | 99.12 |
| 21 - 60 | 6 | 0.88 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Christina Lake - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 89 | 115 | 51 | 40 | 82 | 42 | 22 | 20 | 14 | 671 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 7 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 6 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 90 | 115 | 51 | 40 | 82 | 43 | 31 | 22 | 14 | 684 |

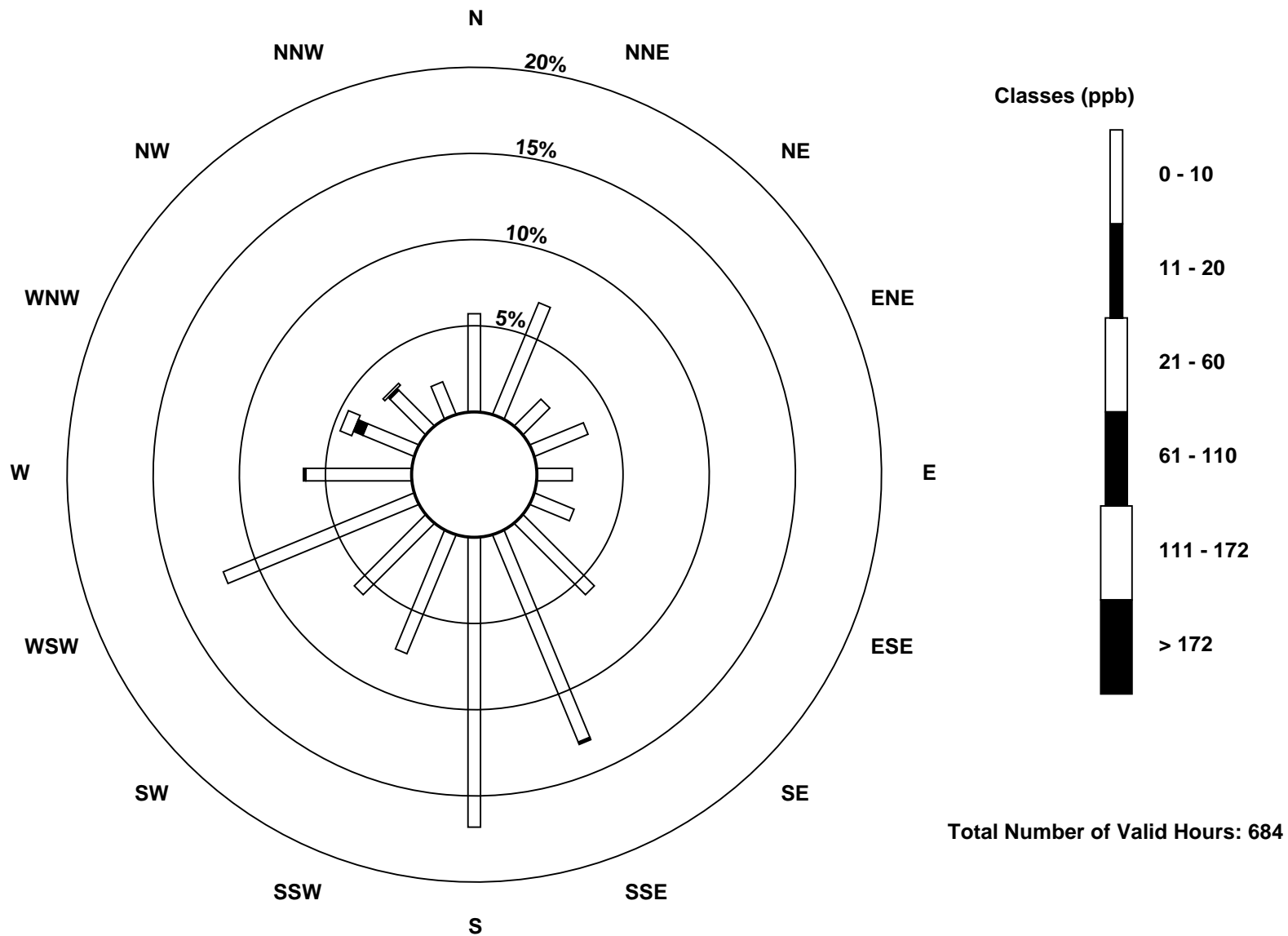
Total Number of Valid Hours: 684

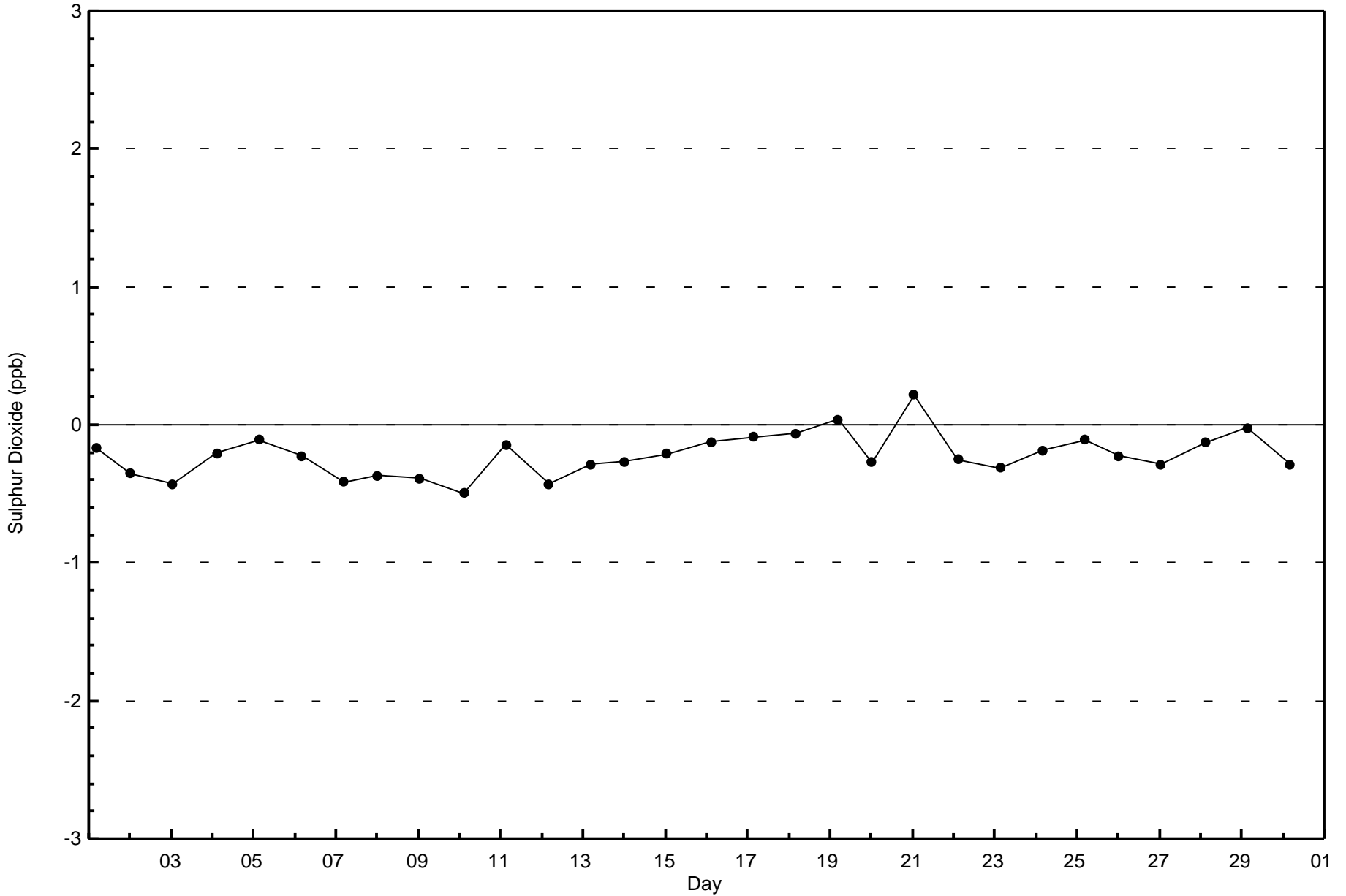
Total Number of Hours: 720

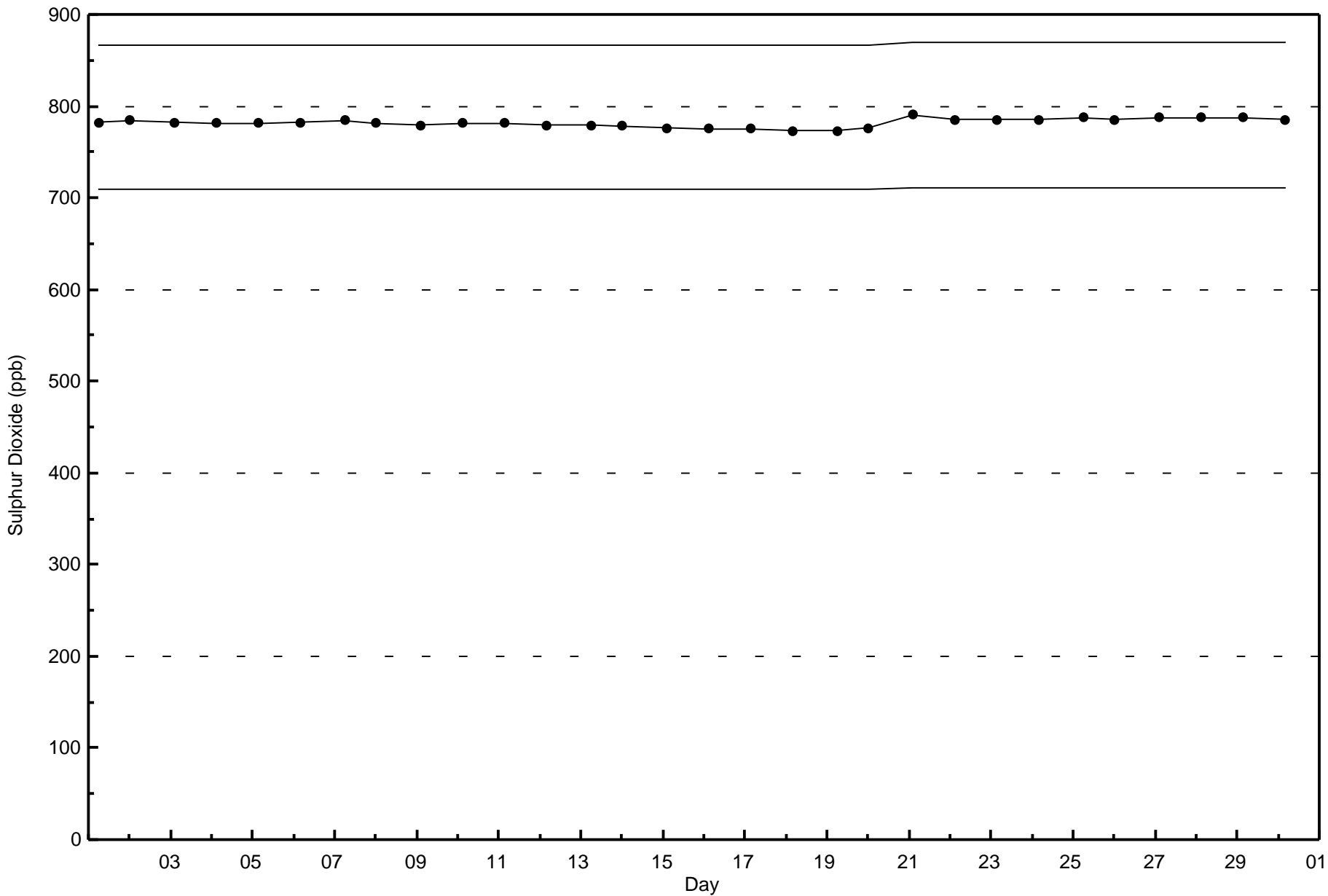


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Christina Lake (AMS 500)









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Christina Lake - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 30 01:00 | Maximum Daily Average: 0.4 ppb on Sep 30 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 2 20:00 | Minimum Daily Average: 0.0 ppb on Sep 23 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 0.2 ppb at hour 1 | Minimum Diurnal Average: 0.1 ppb at hour 15 | | Hours of Calibration: | 33 |
| Monthly Average: 0.1 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | Percent Operational Time: | 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 2-Sep | 0 | Z | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0.2 | 1 | |
| 4-Sep | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 5-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 8-Sep | 0 | 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 | |
| 9-Sep | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 10-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.2 | 1 | |
| 13-Sep | 0 | 0 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 14-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 15-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.1 | 1 | |
| 19-Sep | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 21-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 22-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | |
| 24-Sep | 0 | 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-Sep | 0 | 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 | |
| 26-Sep | 0 | 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 | |
| 27-Sep | 0 | 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-Sep | 0 | 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-Sep | 0 | 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-Sep | 2 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0.4 | 2 | |

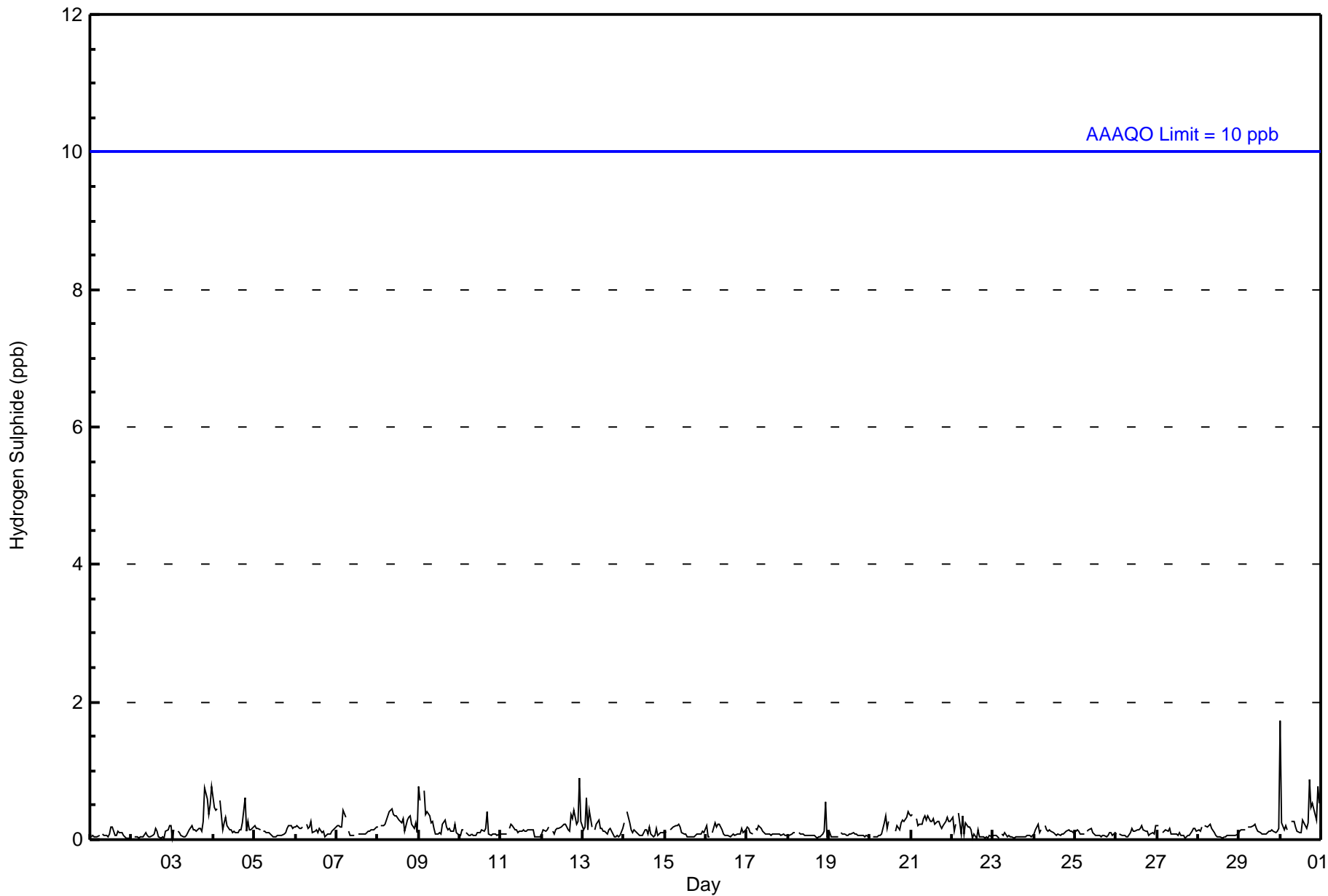
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.2 | Diurnal Average | |
| 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Christina Lake - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 685 | 100.00 | 100.00 |
| 3 - 4 | 0 | 0.00 | 100.00 |
| 5 - 7 | 0 | 0.00 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 37 | 51 | 14 | 24 | 14 | 18 | 37 | 92 | 115 | 51 | 41 | 80 | 44 | 31 | 21 | 15 | 685 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 37 | 51 | 14 | 24 | 14 | 18 | 37 | 92 | 115 | 51 | 41 | 80 | 44 | 31 | 21 | 15 | 685 |

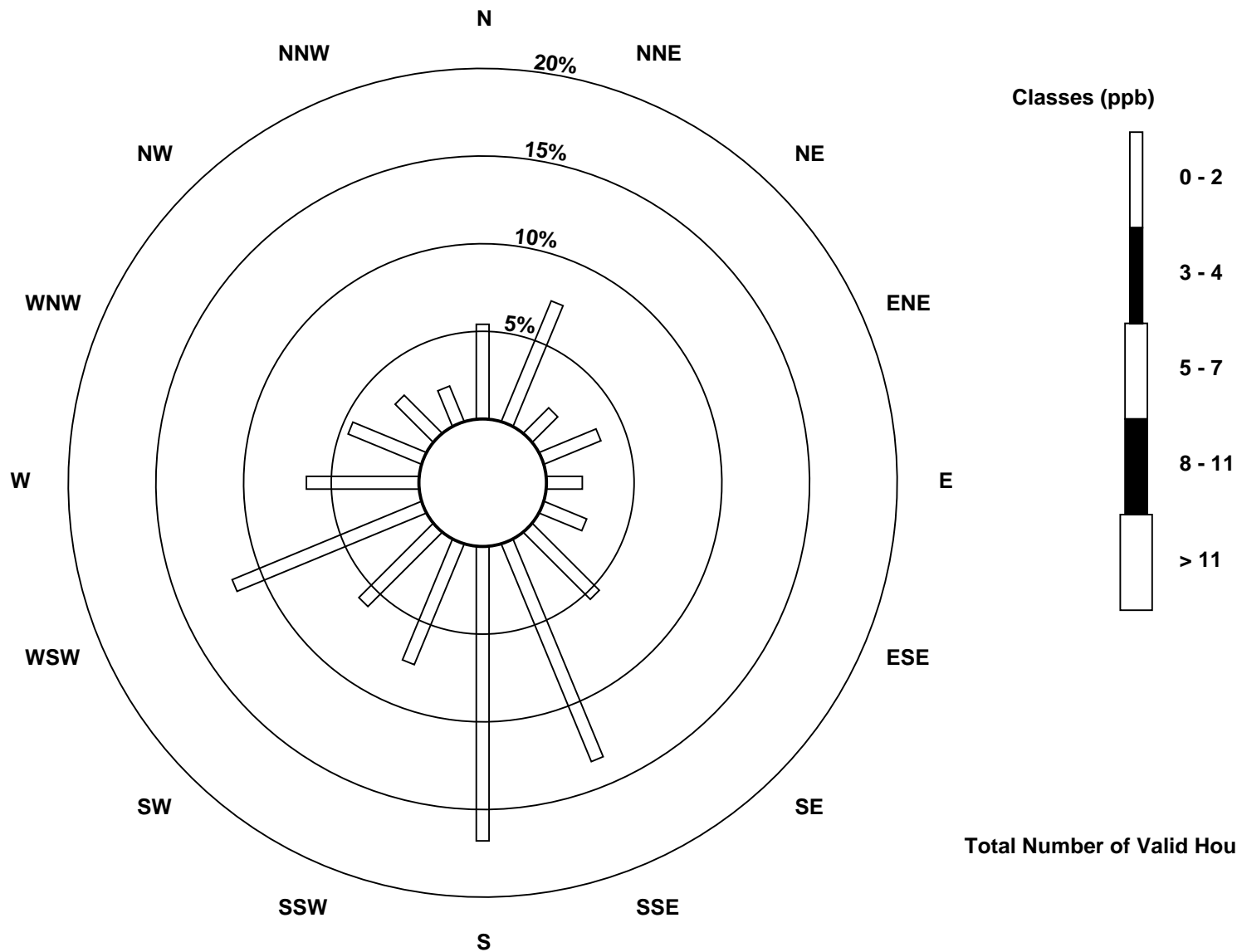
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Hydrogen Sulphide (H₂S) - ppb
Christina Lake (AMS 500)

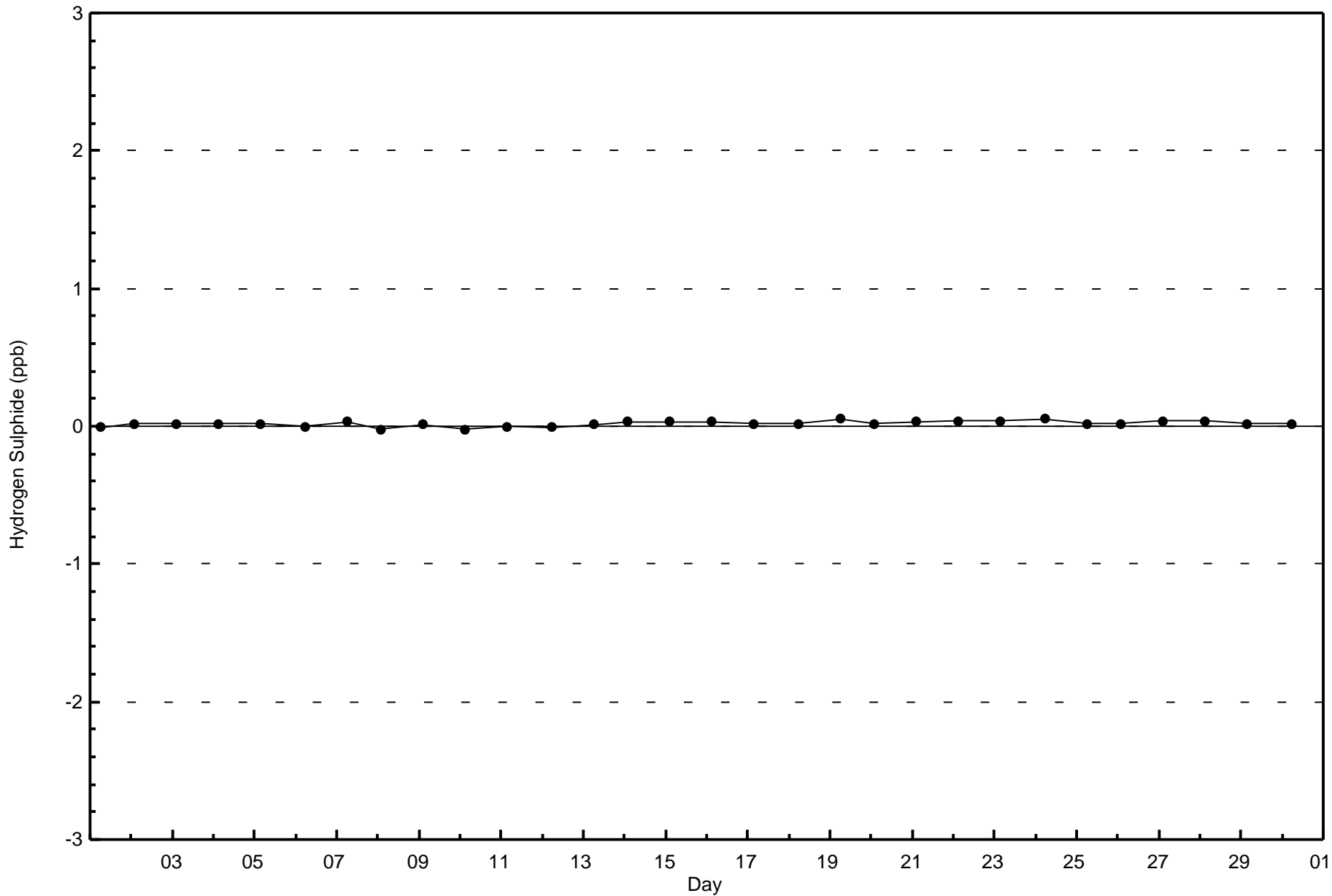


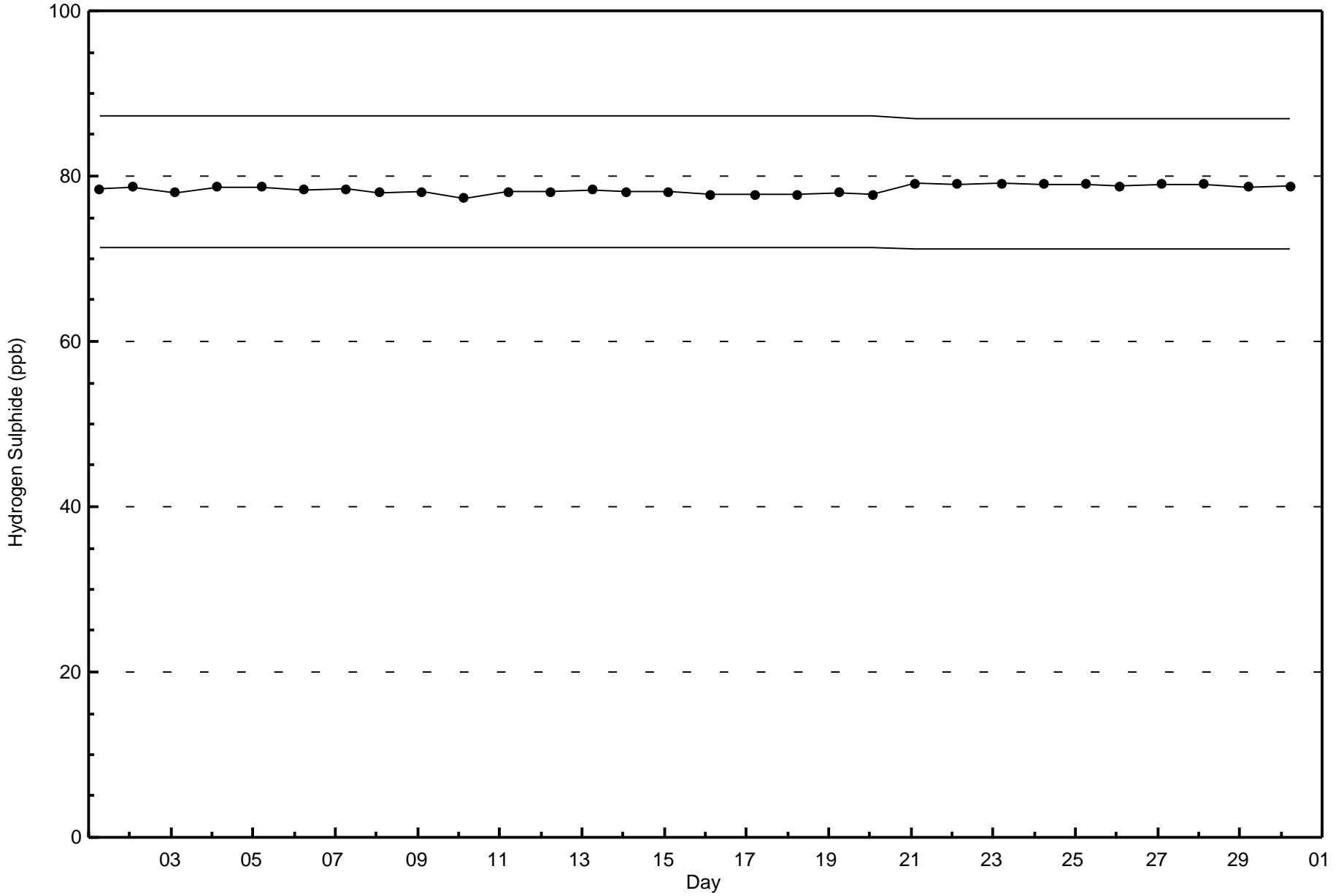
Total Number of Valid Hours: 685



Wood Buffalo Environmental Association
Zero Responses

Hydrogen Sulphide (H₂S) - ppb
Christina Lake - September 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

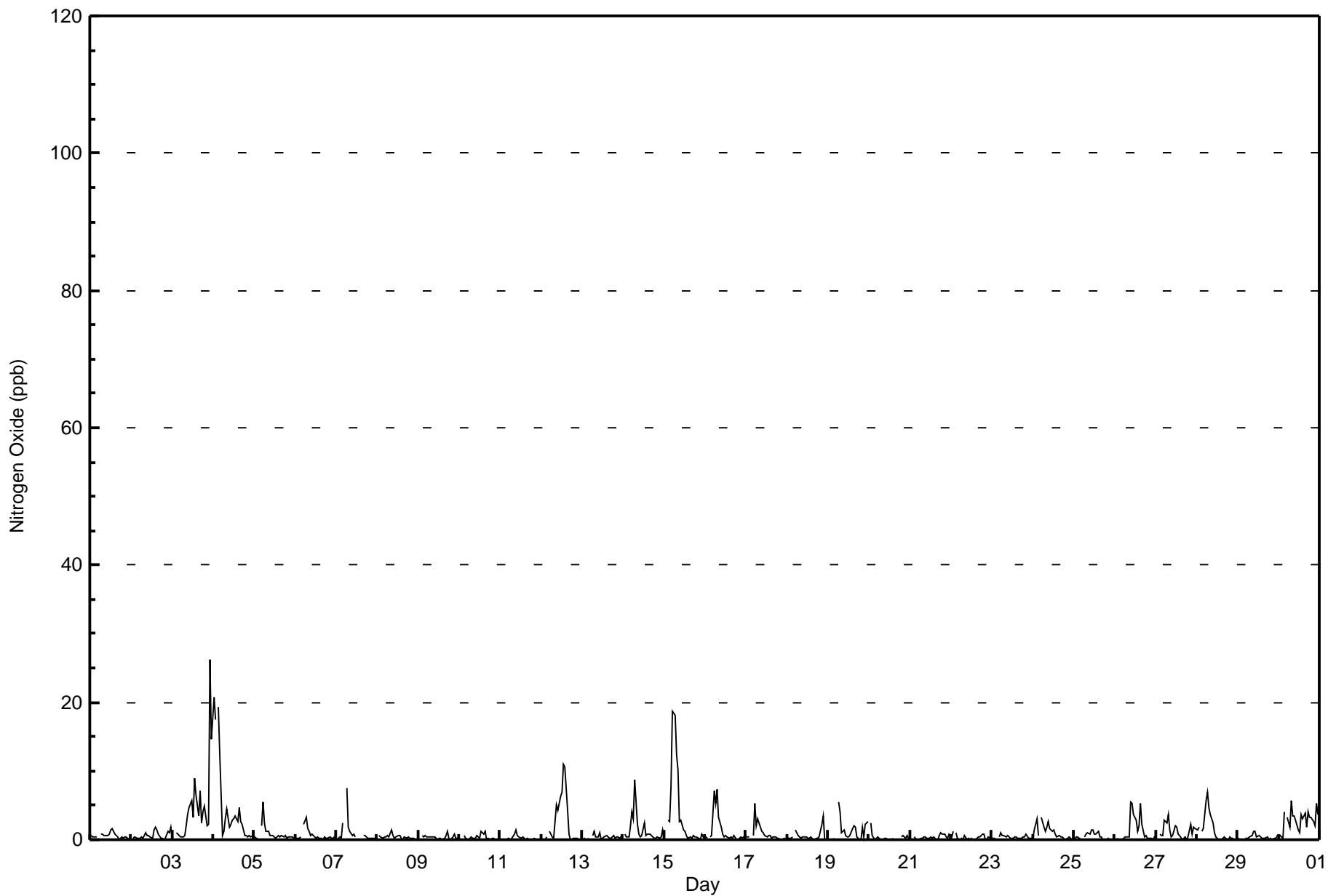
Nitrogen Oxide (NO) - ppb
Christina Lake - September 2017

| Maximum Value: 26 ppb on Sep 3 23:00 | | | | | | | | | | | | | | Maximum Daily Average: 4.7 ppb on Sep 4 | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|---|-------------------------------|----|---|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|--|--------------------------------|--|--|--|
| Minimum Value: 0 ppb on Sep 2 00:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.2 ppb on Sep 11 | | | | | | | | | | | | | | Hours of Data: 682 | | | |
| Maximum Diurnal Average: 2.6 ppb at hour 6 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.5 ppb at hour 20 | | | | | | | | | | | | | | Hours of Missing Data: 38 | | | |
| Monthly Average: 1.2 ppb | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 3 P ₉₉ = 14 | | | | | | | | | | | | | | Hours of Calibration: 34 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.4 | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | |
| 1-Sep | 1 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | | | | | |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0.6 | 2 | | | | | |
| 3-Sep | 0 | Z | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 4 | 5 | 6 | 3 | 9 | 6 | 3 | 7 | 2 | 4 | 5 | 2 | 2 | 26 | 15 | 4.6 | 26 | | | | | |
| 4-Sep | 21 | 17 | Z | 19 | 13 | 1 | 1 | 3 | 5 | 2 | 2 | 3 | 3 | 3 | 5 | 3 | 2 | 1 | 1 | 0 | 1 | 0 | 1 | 4.7 | 21 | | | | | | |
| 5-Sep | 0 | 0 | 0 | Z | 2 | 6 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0.9 | 6 | | | | | | |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 2 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 | | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | 3 | Z | 7 | 2 | 1 | 1 | 1 | 0 | M | M | M | M | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.9 | 7 | | | | | | |
| 8-Sep | Z | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | | | | | | |
| 9-Sep | 0 | Z | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0.4 | 1 | | | | | | |
| 10-Sep | 0 | 0 | Z | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | |
| 11-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 3 | 5 | 4 | 6 | 7 | 11 | 11 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.4 | 11 | | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.4 | 1 | | | | | | |
| 14-Sep | Z | 1 | 1 | 0 | 2 | 4 | 3 | 9 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1.4 | 9 | | | | | | |
| 15-Sep | 0 | Z | 3 | 3 | 8 | 19 | 18 | 12 | 10 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 3.7 | 19 | | | | | | |
| 16-Sep | 0 | 0 | Z | 0 | 1 | 7 | 5 | 7 | 3 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1.4 | 7 | | | | | | |
| 17-Sep | 0 | 0 | 0 | Z | 1 | 5 | 2 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 | | | | | | |
| 18-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 0.5 | 3 | | | | | | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 5 | 4 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 2 | 0 | 2 | 1.2 | 5 | | | | | | |
| 20-Sep | Z | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 1 | 0 | 1 | 0.4 | 3 | | | | | | |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.4 | 1 | | | | | | |
| 22-Sep | 0 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.3 | 1 | | | | | | |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.4 | 1 | | | | | | |
| 24-Sep | 0 | 1 | 3 | 1 | Z | 3 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 3 | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | | | | |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 4 | 3 | 1 | 2 | 5 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1.4 | 5 | | | | | | |
| 27-Sep | 0 | Z | 1 | 1 | 1 | 3 | 2 | 4 | 1 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 1.2 | 4 | | | | | | |
| 28-Sep | 1 | 2 | Z | 1 | 2 | 6 | 7 | 5 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 7 | | | | | | |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 | | | | | | |
| 30-Sep | 0 | 1 | 0 | 4 | Z | 3 | 2 | 6 | 3 | 4 | 3 | 1 | 1 | 4 | 3 | 4 | 2 | 4 | 3 | 3 | 3 | 2 | 5 | 2.8 | 6 | | | | | | |
| 1.1 1.2 0.5 1.4 1.4 2.6 2.3 2.2 1.7 1.4 1.3 1.1 1.1 1.4 1.3 1.2 0.8 0.6 0.5 0.5 0.6 0.5 1.4 1.1 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | |
| 21 17 3 19 13 19 18 12 10 5 5 6 7 11 11 5 7 4 4 5 3 3 26 15 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | |
| Z - zerspan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Christina Lake - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Christina Lake - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 99.71 | 99.71 |
| 21 - 40 | 2 | 0.29 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Christina Lake - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 91 | 112 | 51 | 40 | 82 | 43 | 30 | 21 | 14 | 680 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 91 | 112 | 51 | 40 | 82 | 43 | 31 | 22 | 14 | 682 |

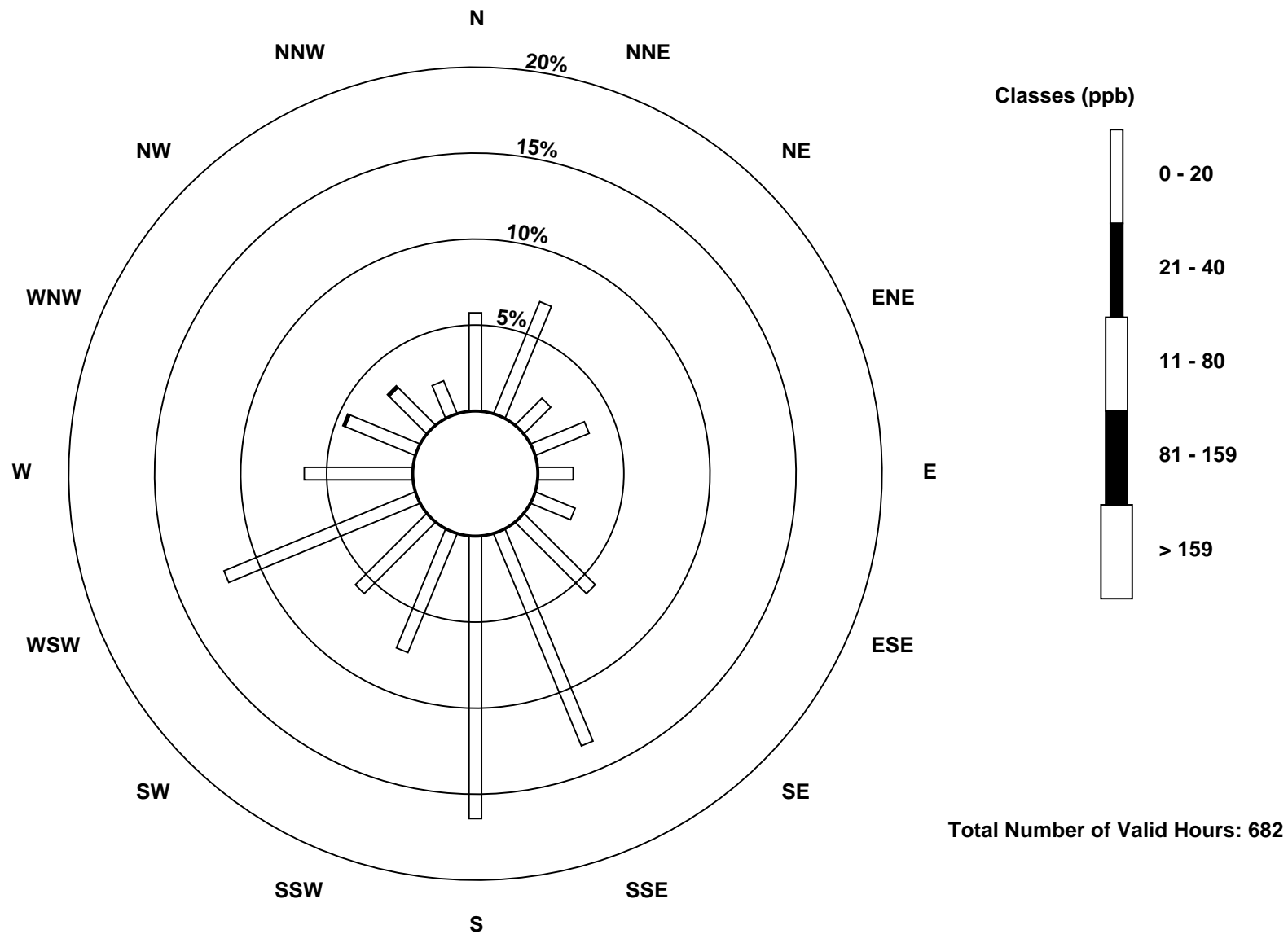
Total Number of Valid Hours: 682

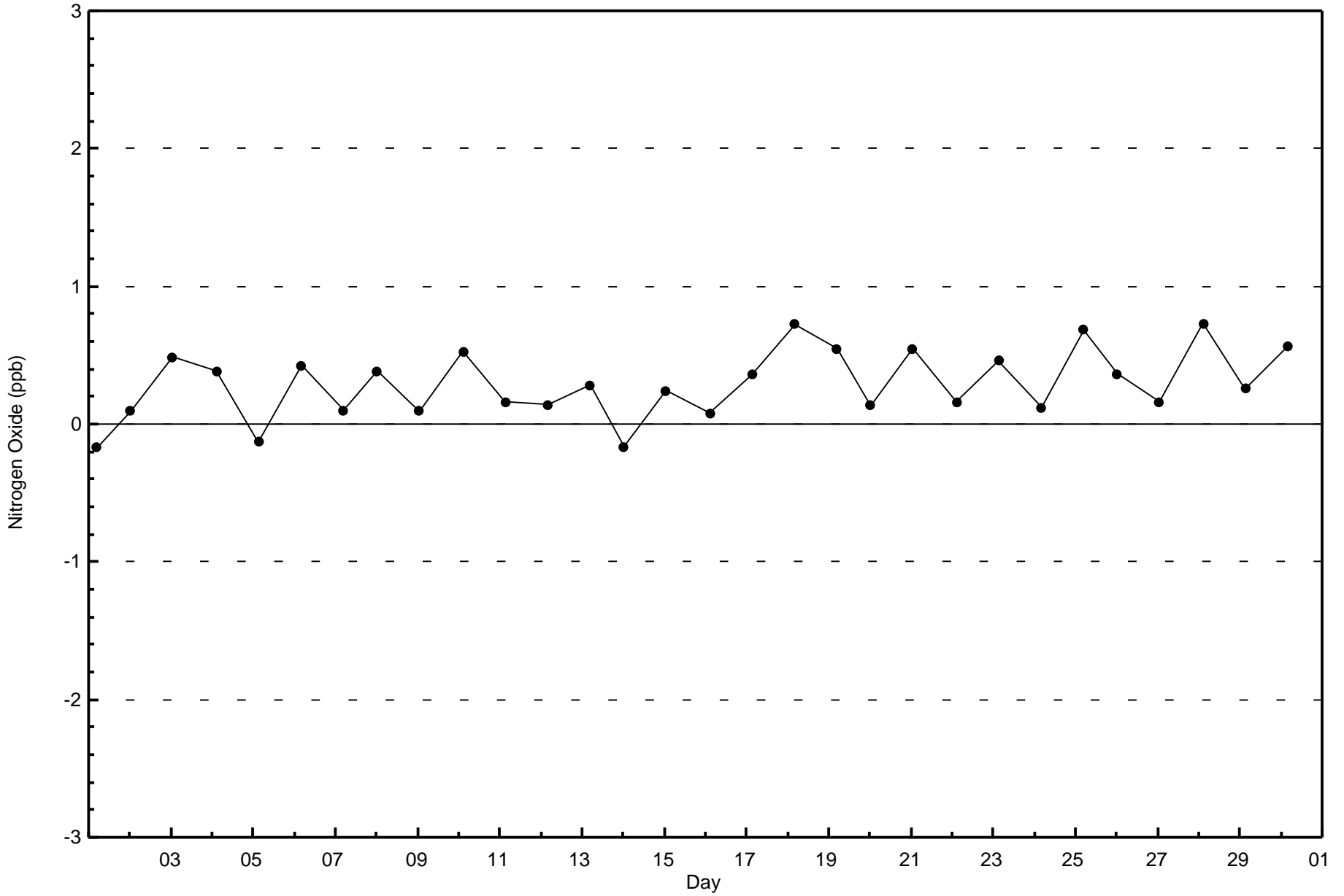
Total Number of Hours: 720

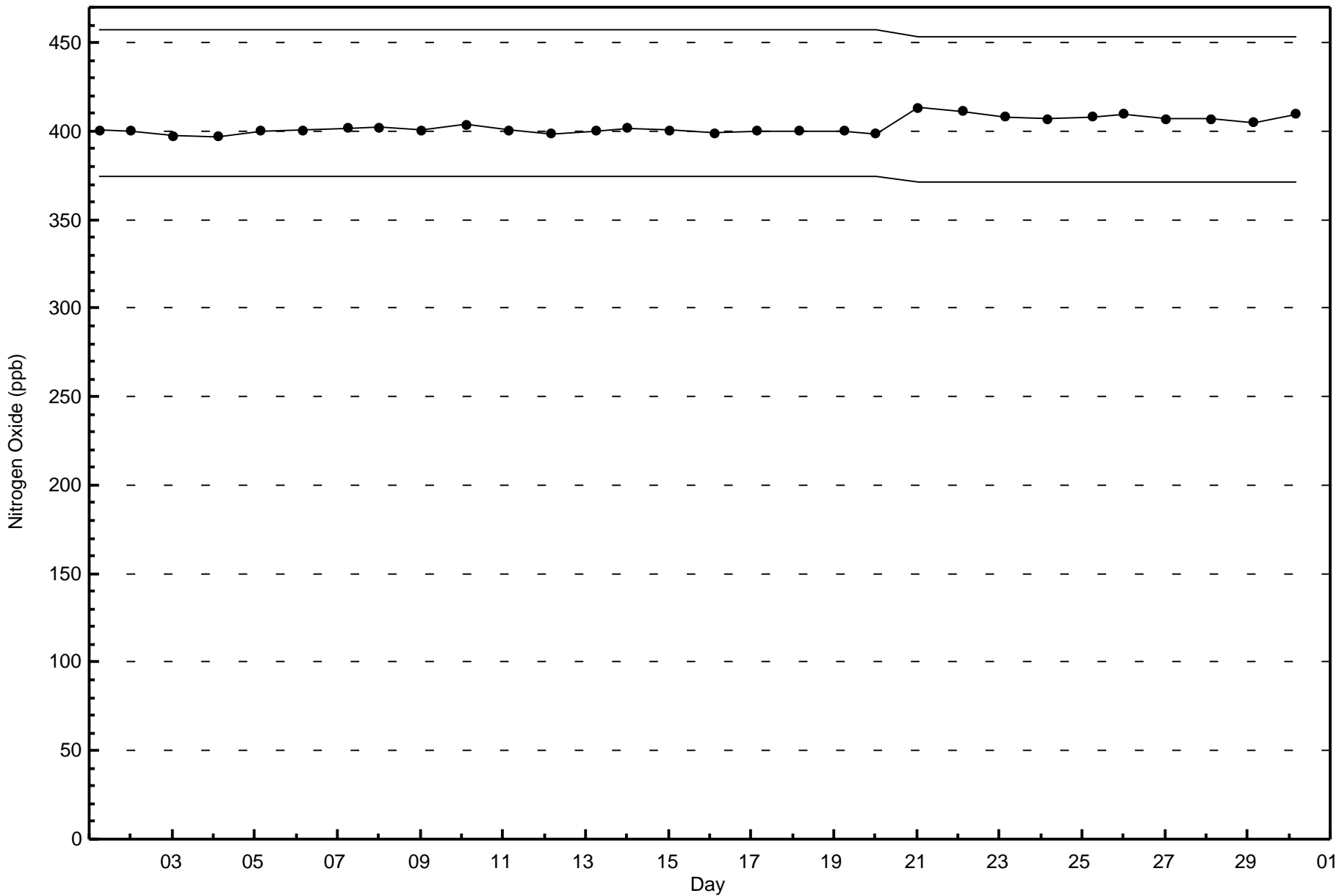


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxide (NO) - ppb
Christina Lake (AMS 500)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Christina Lake - September 2017

| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 24 ppb on Sep 3 23:00 | Maximum Daily Average: 6.5 ppb on Sep 30 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 1 22:00 | Minimum Daily Average: 0.5 ppb on Sep 20 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 4.2 ppb at hour 6 | Minimum Diurnal Average: 1.7 ppb at hour 12 | | Hours of Calibration: | 34 |
| Monthly Average: 2.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 3 P ₉₀ = 6 P ₉₉ = 12 | | Percent Operational Time: | 99.4 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 1 | 1 | 1 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0.9 | 4 | |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 2 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 4 | 1.1 | 4 | |
| 3-Sep | 0 | Z | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 3 | 4 | 5 | 3 | 8 | 7 | 5 | 10 | 4 | 8 | 13 | 7 | 4 | 24 | 19 | 5.7 | 24 | |
| 4-Sep | 18 | 16 | Z | 19 | 12 | 3 | 4 | 5 | 5 | 2 | 3 | 4 | 4 | 4 | 3 | 5 | 4 | 4 | 1 | 1 | 1 | 2 | 2 | 2 | 5.5 | 19 | |
| 5-Sep | 2 | 1 | 2 | Z | 3 | 7 | 4 | 2 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2.0 | 7 | |
| 6-Sep | 1 | 1 | 2 | 0 | Z | 5 | 4 | 5 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1.6 | 5 | |
| 7-Sep | 2 | 1 | 1 | 1 | 2 | Z | 7 | 3 | 3 | 2 | 3 | 2 | M | M | M | M | 2 | 3 | 3 | 1 | 2 | 5 | 3 | 2 | 2.5 | 7 | |
| 8-Sep | Z | 2 | 1 | 1 | 2 | 3 | 5 | 3 | 7 | 4 | 2 | 3 | 3 | 4 | 3 | 1 | 3 | 2 | 4 | 4 | 4 | 4 | 2 | 1 | 3.0 | 7 | |
| 9-Sep | 1 | Z | 3 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 2 | 1 | 1.8 | 5 | |
| 10-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.8 | 2 | |
| 11-Sep | 0 | 0 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 4 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.4 | 4 | |
| 12-Sep | 1 | 1 | 1 | 2 | Z | 3 | 2 | 1 | 3 | 5 | 4 | 5 | 6 | 9 | 8 | 6 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2.9 | 9 | |
| 13-Sep | 1 | 1 | 1 | 1 | 1 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1.1 | 2 | |
| 14-Sep | Z | 3 | 3 | 2 | 4 | 6 | 6 | 9 | 4 | 2 | 2 | 2 | 4 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | 4 | 5 | 3.2 | 9 | |
| 15-Sep | 3 | Z | 4 | 4 | 4 | 5 | 6 | 5 | 6 | 4 | 5 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 5 | 5 | 3.8 | 6 | |
| 16-Sep | 8 | 2 | Z | 3 | 5 | 20 | 12 | 11 | 6 | 4 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 5 | 2 | 9 | 4.7 | 20 | |
| 17-Sep | 5 | 9 | 6 | Z | 3 | 9 | 6 | 7 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2.9 | 9 | |
| 18-Sep | 0 | 1 | 1 | 1 | Z | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 10 | 0 | 0 | 0.9 | 10 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 9 | 8 | 1 | 3 | 1 | 0 | 1 | 1 | 4 | 4 | 3 | 1 | 0 | 0 | 3 | 1 | 3 | 4 | 1.9 | 9 | |
| 20-Sep | Z | 4 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 1 | 0 | 0.5 | 4 | |
| 21-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0.7 | 2 |
| 22-Sep | 2 | 3 | Z | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 2 | 0 | 1 | 2 | 0 | 1.1 | 3 | |
| 23-Sep | 0 | 0 | 1 | Z | 0 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1.0 | 2 | |
| 24-Sep | 2 | 8 | 11 | 5 | Z | 8 | 6 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 4 | 4 | 7 | 9 | 3 | 3 | 4.1 | 11 | |
| 25-Sep | 4 | 5 | 6 | 2 | 2 | Z | 2 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 1 | 2 | 2.0 | 6 | |
| 26-Sep | Z | 1 | 0 | 0 | 0 | 2 | 3 | 2 | 1 | 4 | 4 | 3 | 4 | 2 | 4 | 7 | 4 | 1 | 4 | 2 | 2 | 2 | 2 | 6 | 2.6 | 7 | |
| 27-Sep | 3 | Z | 5 | 3 | 5 | 10 | 8 | 7 | 3 | 1 | 1 | 3 | 3 | 2 | 1 | 1 | 1 | 5 | 4 | 3 | 6 | 4 | 3 | 5 | 3.8 | 10 | |
| 28-Sep | 6 | 4 | Z | 2 | 2 | 3 | 4 | 3 | 5 | 5 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 5 | 2 | 1 | 1 | 0 | 2.1 | 6 | |
| 29-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | 4 | 4 | 8 | 3 | 2 | 4 | 10 | 2.4 | 10 | |
| 30-Sep | 7 | 10 | 5 | 11 | Z | 10 | 7 | 8 | 6 | 6 | 4 | 3 | 2 | 5 | 5 | 7 | 5 | 9 | 7 | 7 | 6 | 5 | 10 | 8 | 6.5 | 11 | |

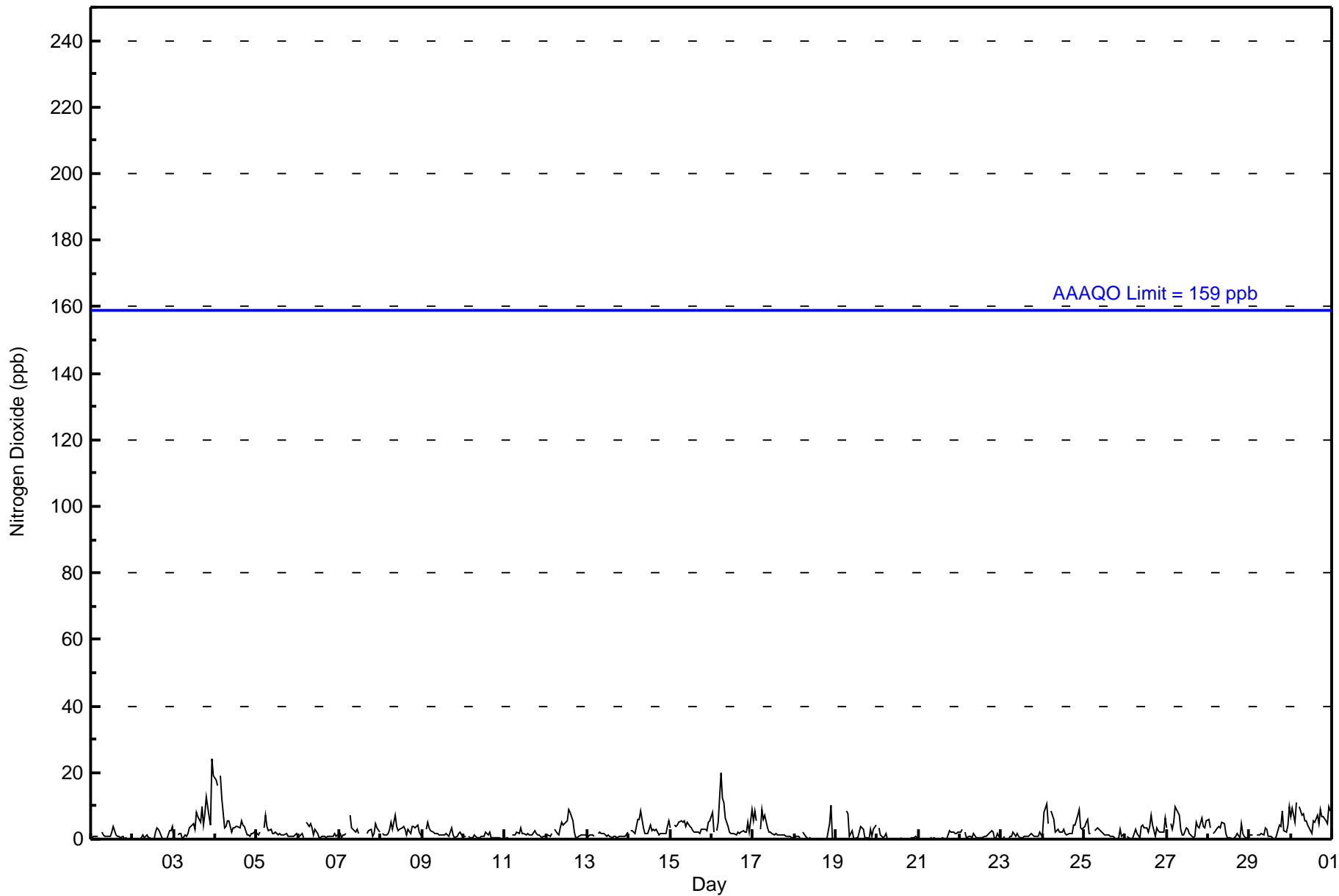
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 2.8 | 3.0 | 2.3 | 2.7 | 2.3 | 4.2 | 3.7 | 3.3 | 2.6 | 2.3 | 2.0 | 1.7 | 1.7 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.3 | 2.1 | 2.5 | 2.9 | 3.3 | Diurnal Average | |
| 18 | 16 | 11 | 19 | 12 | 20 | 12 | 11 | 7 | 6 | 5 | 5 | 6 | 9 | 8 | 7 | 10 | 9 | 8 | 13 | 7 | 10 | 24 | 19 | Diurnal Maximum | | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Christina Lake - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Christina Lake - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 681 | 99.85 | 99.85 |
| 21 - 40 | 1 | 0.15 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Christina Lake - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 91 | 112 | 51 | 40 | 82 | 43 | 30 | 22 | 14 | 681 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 91 | 112 | 51 | 40 | 82 | 43 | 31 | 22 | 14 | 682 |

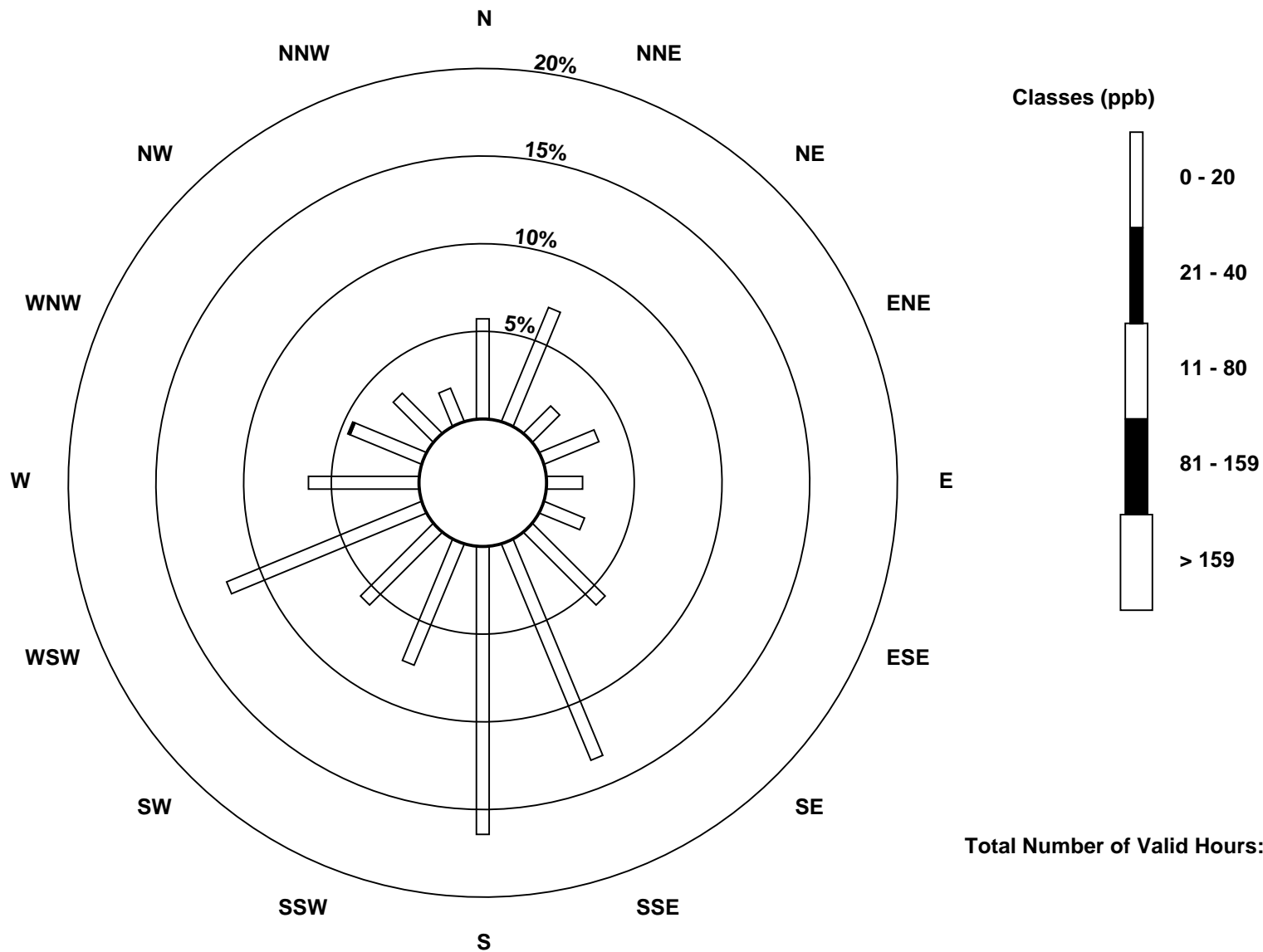
Total Number of Valid Hours: 682

Total Number of Hours: 720

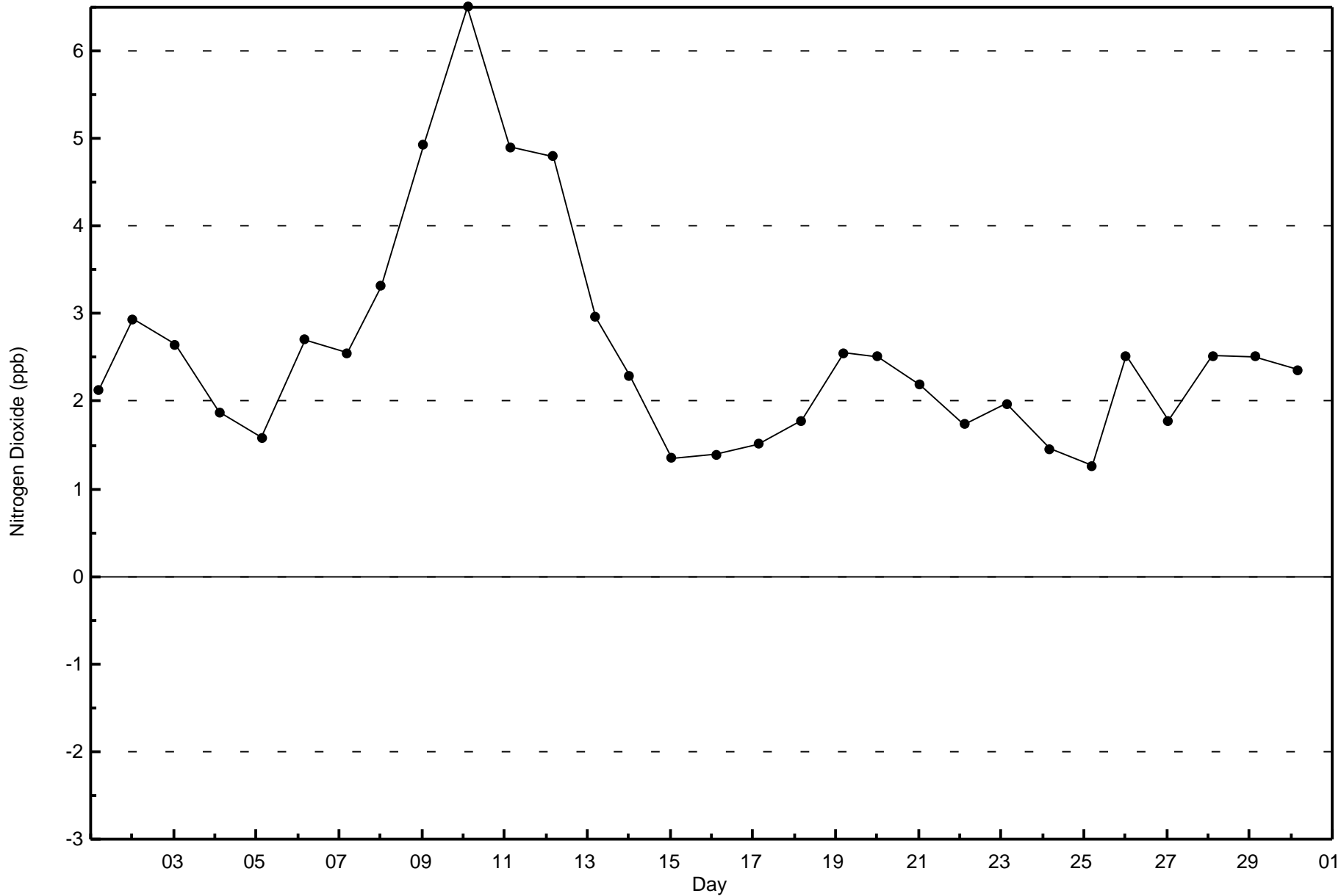


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Christina Lake (AMS 500)



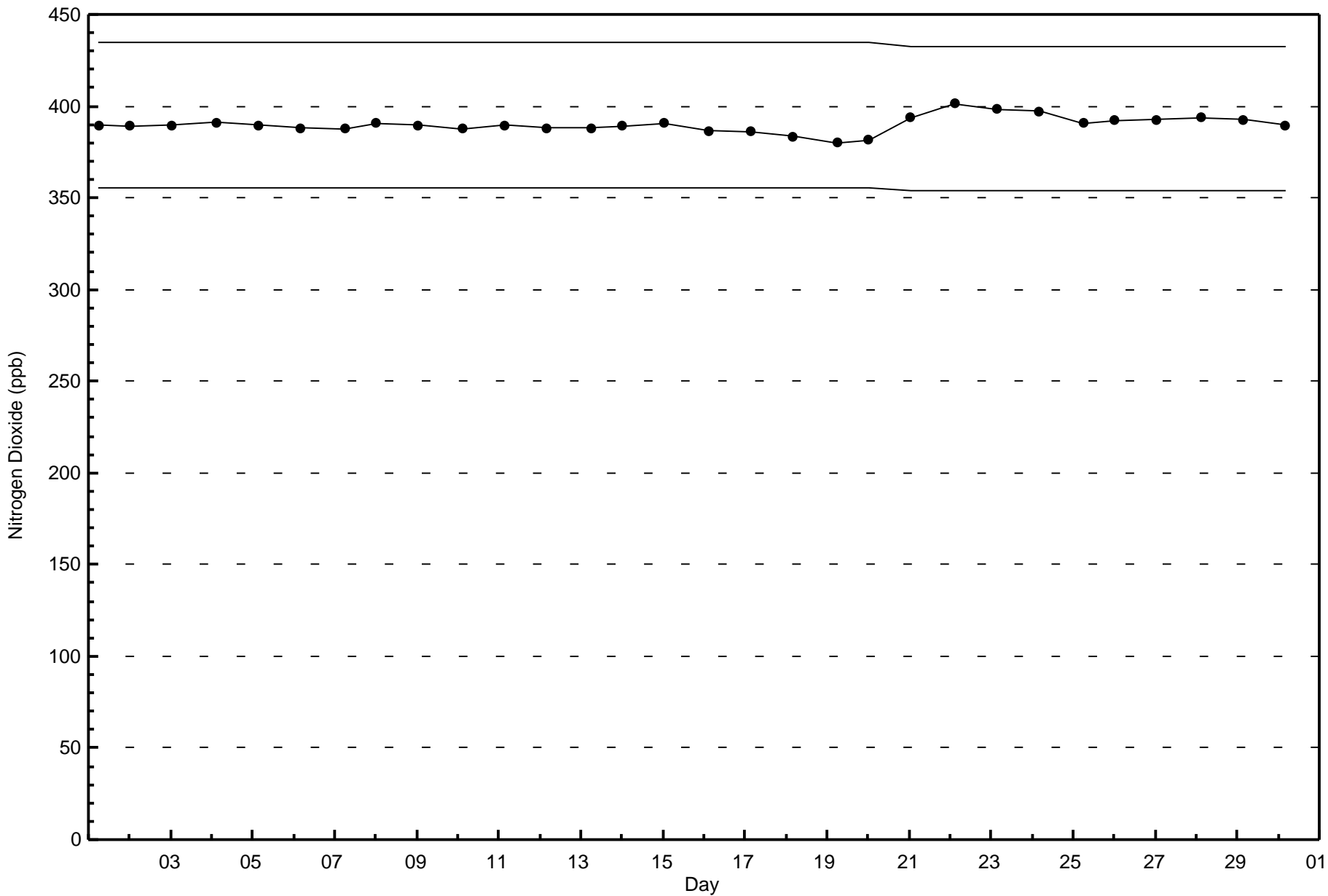
Total Number of Valid Hours: 682





Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Christina Lake - September 2017





Wood Buffalo Environmental Association
Summary of Hour Averages

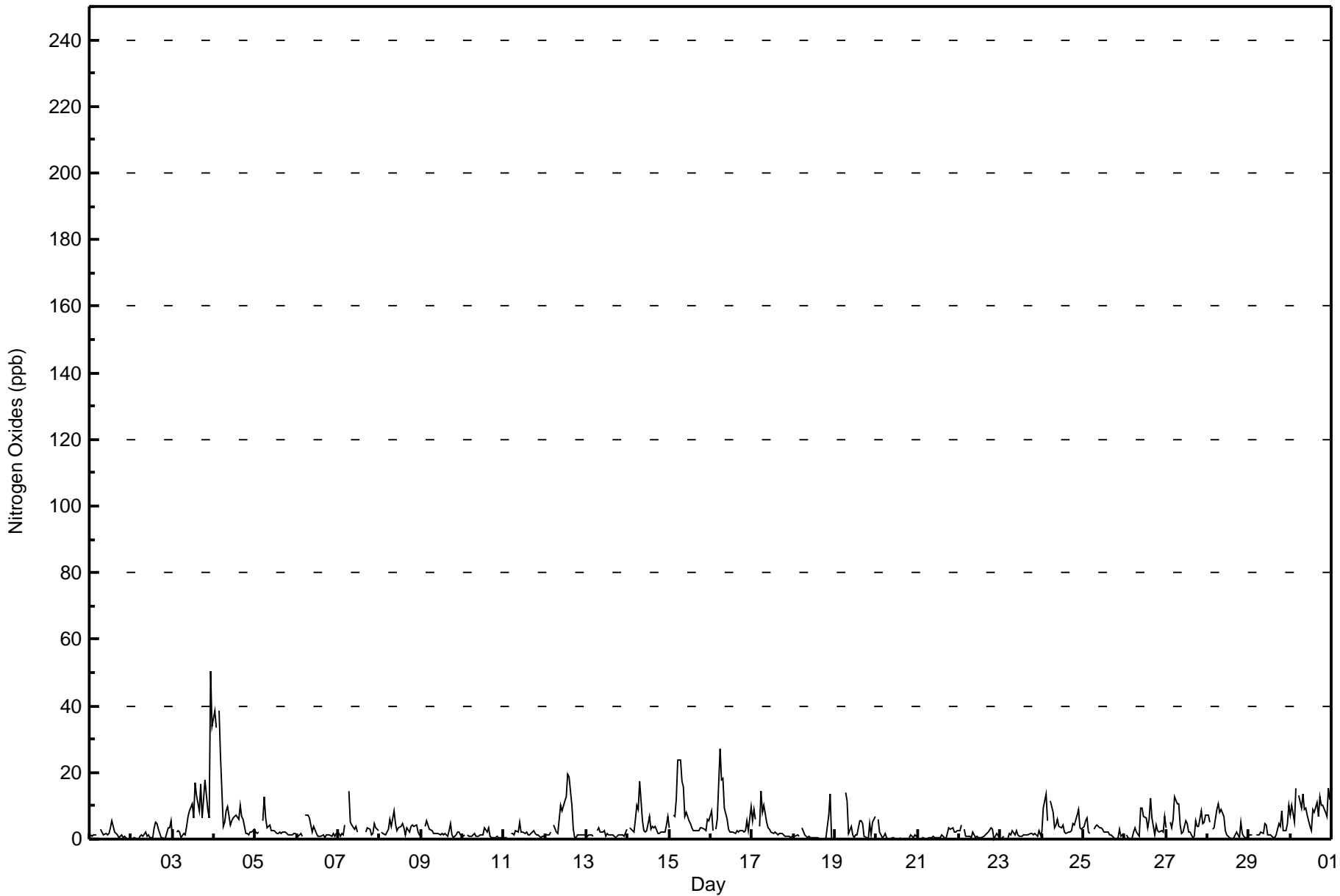
Nitrogen Oxides (NO_x) - ppb
Christina Lake - September 2017

| Maximum Value: 50 ppb on Sep 3 23:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 10.3 ppb on Sep 3 | | | | | | Hours in Service: 720 | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|---------------------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 2 00:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.9 ppb on Sep 20 | | | | | | Hours of Data: 682 | | |
| Maximum Diurnal Average: 6.8 ppb at hour 6 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.6 ppb at hour 18 | | | | | | Hours of Missing Data: 38 | | |
| Monthly Average: 3.7 ppb | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 4 P ₉₀ = 9 P ₉₉ = 25 | | | | | | Hours of Calibration: 34 | | |
| | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.4 | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 1 | 1 | 1 | 1 | Z | 3 | 2 | 1 | 2 | 1 | 2 | 3 | 6 | 2 | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1.5 | 6 |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 3 | 5 | 5 | 3 | 0 | 0 | 0 | 0 | 4 | 4 | 6 | 1.7 | 6 |
| 3-Sep | 0 | Z | 2 | 3 | 2 | 1 | 2 | 1 | 4 | 7 | 9 | 10 | 6 | 17 | 13 | 8 | 17 | 7 | 12 | 18 | 9 | 7 | 50 | 34 | 10.3 | 50 |
| 4-Sep | 39 | 34 | Z | 38 | 25 | 4 | 5 | 8 | 10 | 4 | 5 | 6 | 7 | 7 | 6 | 10 | 7 | 6 | 2 | 2 | 1 | 2 | 2 | 3 | 10.2 | 39 |
| 5-Sep | 2 | 2 | 2 | Z | 5 | 13 | 6 | 3 | 4 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2.8 | 13 |
| 6-Sep | 1 | 1 | 2 | 1 | Z | 7 | 7 | 7 | 4 | 2 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2.2 | 7 |
| 7-Sep | 2 | 1 | 2 | 1 | 4 | Z | 15 | 5 | 4 | 3 | 4 | 2 | M | M | M | M | 2 | 3 | 3 | 1 | 2 | 5 | 3 | 2 | 3.4 | 15 |
| 8-Sep | Z | 2 | 2 | 1 | 2 | 3 | 6 | 4 | 9 | 4 | 3 | 3 | 4 | 5 | 3 | 1 | 3 | 2 | 4 | 4 | 4 | 4 | 2 | 1 | 3.3 | 9 |
| 9-Sep | 1 | Z | 4 | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 3 | 5 | 1 | 1 | 1 | 2 | 2 | 1 | 2.2 | 6 |
| 10-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1.1 | 3 |
| 11-Sep | 0 | 0 | 1 | Z | 2 | 2 | 1 | 2 | 2 | 5 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1.6 | 5 |
| 12-Sep | 1 | 1 | 1 | 2 | Z | 4 | 2 | 2 | 6 | 10 | 9 | 11 | 13 | 20 | 19 | 10 | 3 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 5.3 | 20 |
| 13-Sep | 1 | 1 | 1 | 1 | 1 | Z | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1.5 | 3 |
| 14-Sep | Z | 3 | 3 | 2 | 6 | 10 | 9 | 17 | 6 | 2 | 2 | 2 | 2 | 7 | 3 | 4 | 3 | 4 | 2 | 2 | 2 | 2 | 4 | 7 | 4.6 | 17 |
| 15-Sep | 3 | Z | 7 | 7 | 12 | 24 | 24 | 17 | 16 | 7 | 8 | 5 | 5 | 3 | 2 | 2 | 3 | 2 | 3 | 4 | 3 | 3 | 6 | 6 | 7.5 | 24 |
| 16-Sep | 8 | 2 | Z | 3 | 6 | 27 | 18 | 18 | 9 | 6 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 5 | 2 | 10 | 6.1 | 27 |
| 17-Sep | 6 | 9 | 6 | Z | 4 | 14 | 8 | 10 | 5 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3.7 | 14 |
| 18-Sep | 1 | 1 | 1 | 1 | Z | 4 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 14 | 0 | 0 | 1.5 | 14 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 14 | 12 | 2 | 4 | 1 | 0 | 1 | 1 | 5 | 6 | 5 | 1 | 0 | 0 | 5 | 1 | 5 | 7 | 3.1 | 14 |
| 20-Sep | Z | 6 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | C | C | C | C | 0 | 1 | 0 | 1 | 1 | 0.9 | 6 |
| 21-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 1.1 | 3 |
| 22-Sep | 3 | 4 | Z | 3 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 3 | 3 | 0 | 1 | 2 | 0 | 1.4 | 4 |
| 23-Sep | 0 | 0 | 1 | Z | 1 | 2 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 1.3 | 3 |
| 24-Sep | 2 | 9 | 14 | 5 | Z | 12 | 8 | 3 | 4 | 6 | 4 | 3 | 4 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 7 | 9 | 4 | 3 | 5.1 | 14 |
| 25-Sep | 4 | 5 | 6 | 2 | 2 | Z | 3 | 4 | 4 | 3 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 1 | 2 | 2.5 | 6 |
| 26-Sep | Z | 1 | 0 | 0 | 0 | 2 | 3 | 2 | 1 | 9 | 9 | 7 | 6 | 3 | 6 | 12 | 6 | 1 | 4 | 3 | 2 | 2 | 2 | 7 | 4.0 | 12 |
| 27-Sep | 3 | Z | 5 | 3 | 6 | 13 | 11 | 11 | 4 | 2 | 2 | 5 | 5 | 2 | 2 | 1 | 1 | 6 | 4 | 4 | 9 | 5 | 5 | 7 | 5.0 | 13 |
| 28-Sep | 7 | 5 | Z | 3 | 3 | 9 | 10 | 8 | 9 | 7 | 3 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 5 | 2 | 1 | 1 | 1 | 3.5 | 10 |
| 29-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 4 | 4 | 1 | 1 | 1 | 0 | 1 | 1 | 5 | 4 | 9 | 3 | 3 | 5 | 10 | 2.7 | 10 |
| 30-Sep | 7 | 10 | 5 | 15 | Z | 13 | 9 | 14 | 9 | 9 | 7 | 4 | 3 | 9 | 8 | 11 | 7 | 13 | 10 | 10 | 8 | 7 | 15 | 12 | 9.4 | 15 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Christina Lake - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Christina Lake - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 673 | 98.68 | 98.68 |
| 21 - 40 | 8 | 1.17 | 99.85 |
| 41 - 80 | 1 | 0.15 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



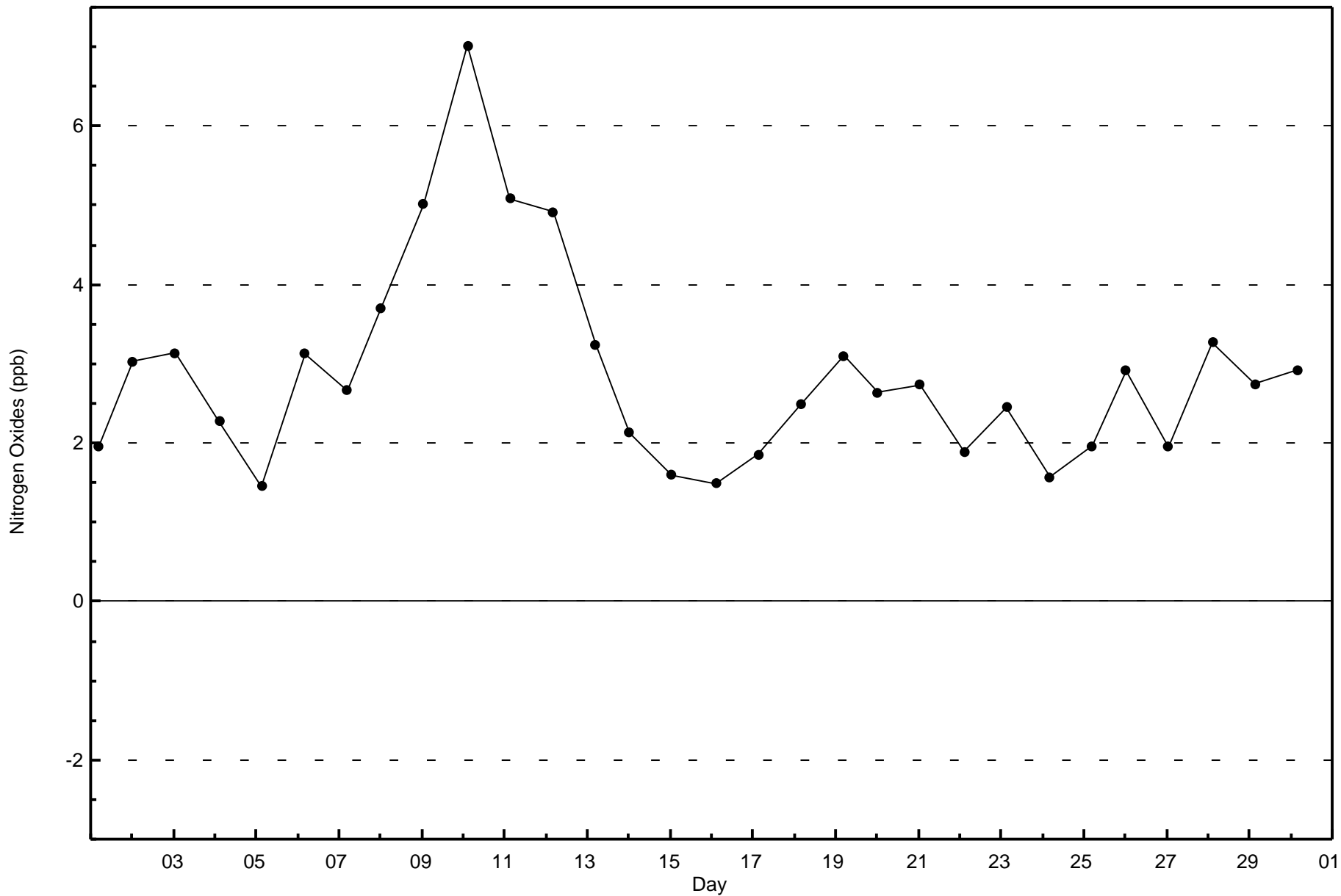
**Wood Buffalo Environmental Association
Frequency Distribution**

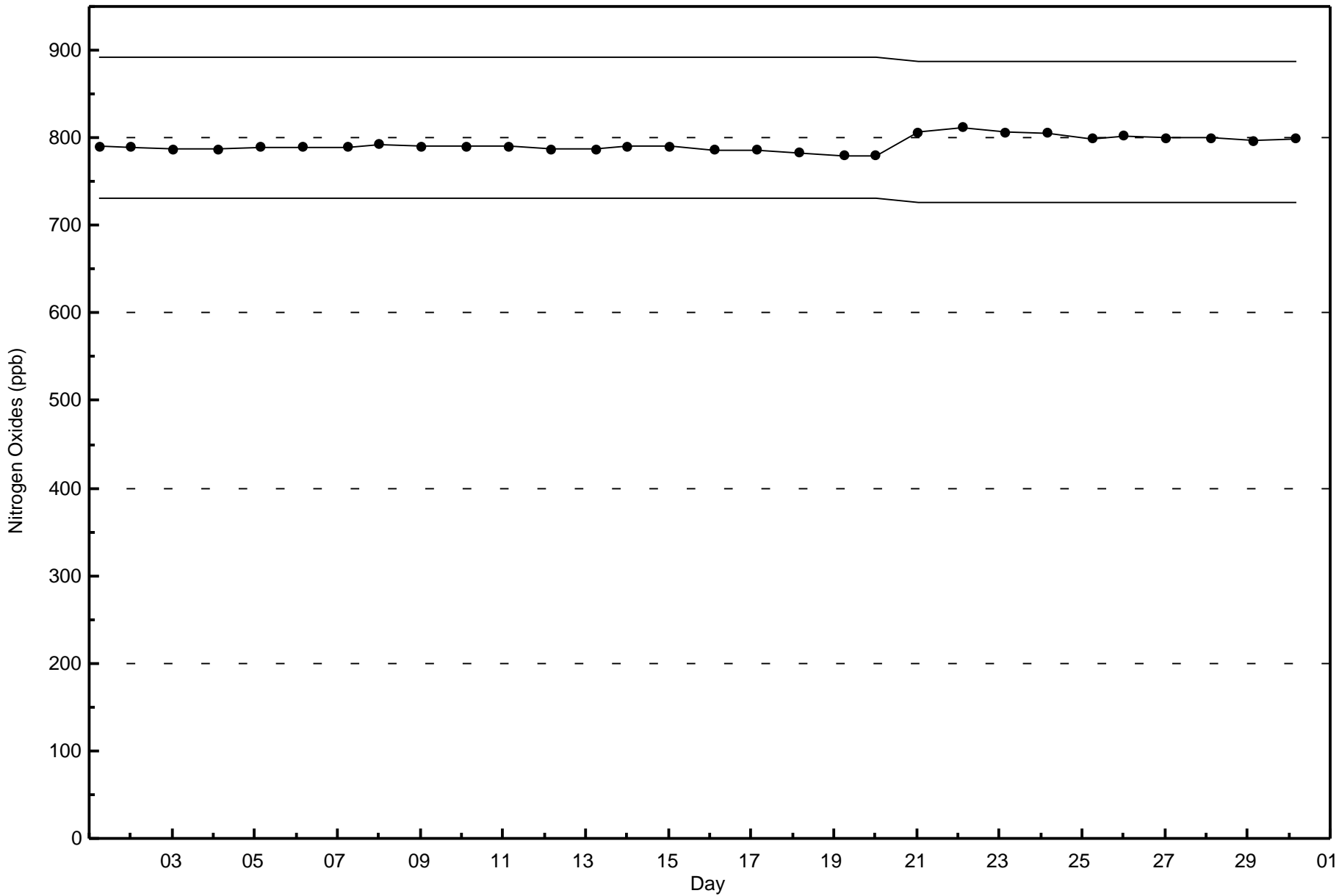
**Nitrogen Oxides (NO_x) - ppb
Christina Lake - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 90 | 110 | 51 | 40 | 82 | 43 | 26 | 21 | 14 | 673 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 8 |
| 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 | 39 | 48 | 15 | 23 | 14 | 17 | 40 | 91 | 112 | 51 | 40 | 82 | 43 | 31 | 22 | 14 | 682 |

Total Number of Valid Hours: 682

Total Number of Hours: 720







Wood Buffalo Environmental Association
Summary of Hour Averages

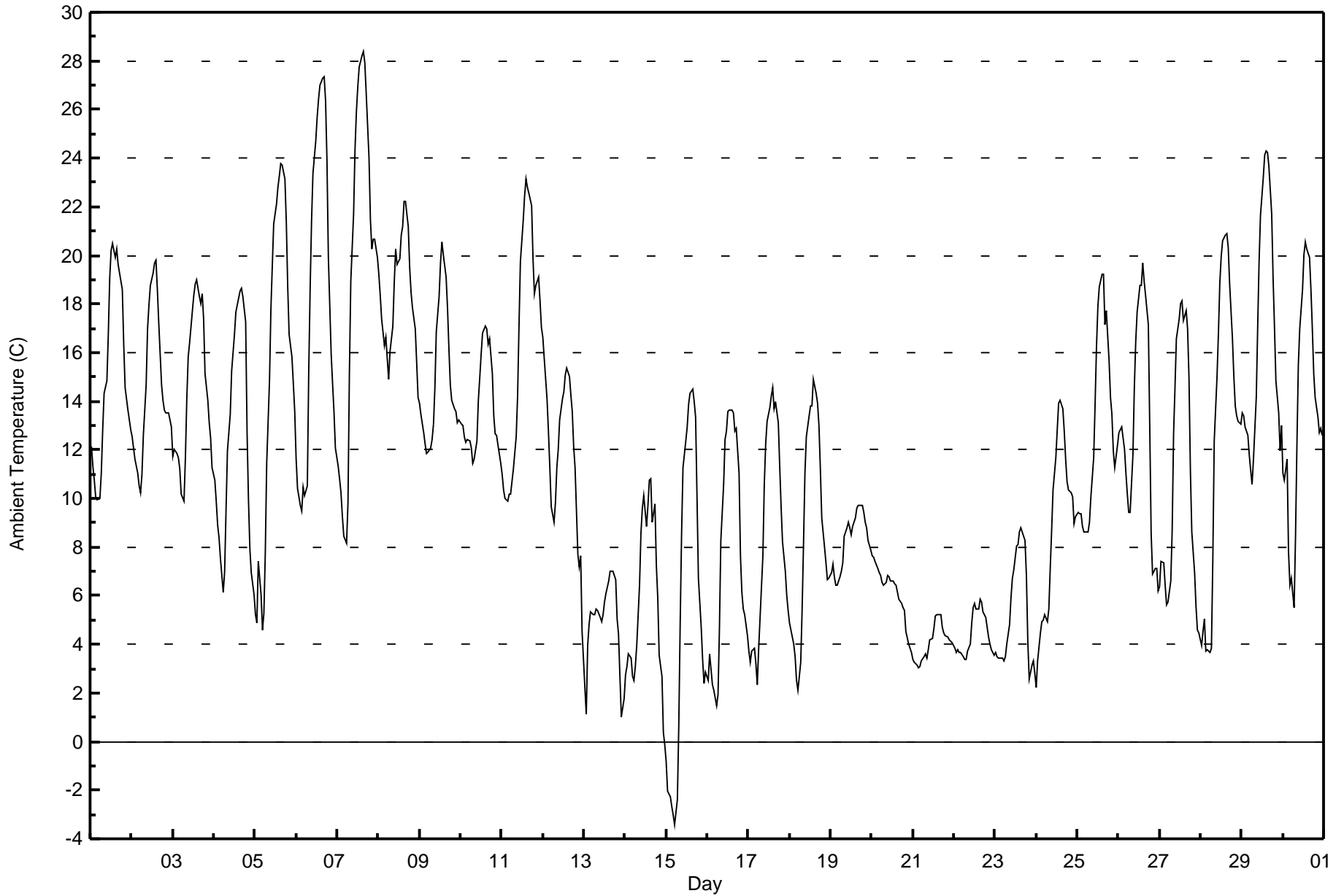
Ambient Temperature (AT) - C
Christina Lake - September 2017

| Maximum Value: 28.4 C on Sep 7 16:00 Minimum Value: -3.4 C on Sep 15 06:00 Maximum Diurnal Average: 16.6 C at hour 15 Monthly Average: 11.42 C | | Maximum Daily Average: 19.5 C on Sep 7 Minimum Daily Average: 4.1 C on Sep 21 Minimum Diurnal Average: 6.8 C at hour 6 Percentiles: P ₁ = -0.3 P ₁₀ = 3.7 Q ₁ = 6.4 Median = 11.3 Q ₃ = 15.6 P ₉₀ = 19.7 P ₉₉ = 26.8 | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|---|------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 12.1 | 11.3 | 10.7 | 10.1 | 10.0 | 10.0 | 11.0 | 12.8 | 14.3 | 14.8 | 16.8 | 19.1 | 20.2 | 20.5 | 19.9 | 20.2 | 19.6 | 19.3 | 18.6 | 16.3 | 14.5 | 14.1 | 13.6 | 12.8 | 15.1 | 20.5 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 12.6 | 12.1 | 11.6 | 11.0 | 10.5 | 10.2 | 11.0 | 12.6 | 14.7 | 17.0 | 17.9 | 18.7 | 19.3 | 19.7 | 19.8 | 18.6 | 17.2 | 14.7 | 14.0 | 13.7 | 13.5 | 13.5 | 13.2 | 12.9 | 14.6 | 19.8 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 11.8 | 12.0 | 11.9 | 11.7 | 11.2 | 10.2 | 9.9 | 11.7 | 14.1 | 15.8 | 16.4 | 17.7 | 18.3 | 18.8 | 19.0 | 18.3 | 18.0 | 18.4 | 17.4 | 15.2 | 14.1 | 13.1 | 12.5 | 11.3 | 14.5 | 19.0 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 10.7 | 9.9 | 8.9 | 8.4 | 7.5 | 6.1 | 7.0 | 9.6 | 11.9 | 13.5 | 15.2 | 16.0 | 16.7 | 17.6 | 18.2 | 18.5 | 18.6 | 18.3 | 17.3 | 12.7 | 10.0 | 7.9 | 6.9 | 6.0 | 12.2 | 18.6 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 5.2 | 4.9 | 7.4 | 6.0 | 4.6 | 5.3 | 7.7 | 11.4 | 14.9 | 17.8 | 19.6 | 21.3 | 22.1 | 22.8 | 23.3 | 23.8 | 23.7 | 23.1 | 21.4 | 18.7 | 16.8 | 15.8 | 14.7 | 13.6 | 15.2 | 23.8 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 11.6 | 10.4 | 9.7 | 9.5 | 10.5 | 10.1 | 10.5 | 15.2 | 18.6 | 21.4 | 23.4 | 24.7 | 25.7 | 26.4 | 27.0 | 27.3 | 27.4 | 26.4 | 23.9 | 19.9 | 16.0 | 14.8 | 13.6 | 12.1 | 18.2 | 27.4 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 11.3 | 10.8 | 10.2 | 9.2 | 8.4 | 8.2 | 9.8 | 15.1 | 19.0 | 21.7 | 24.4 | 25.9 | 26.9 | 27.7 | 28.2 | 28.4 | 27.9 | 26.7 | 24.0 | 21.5 | 20.3 | 20.6 | 20.7 | 19.9 | 19.5 | 28.4 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 19.2 | 18.4 | 17.4 | 16.3 | 16.6 | 15.8 | 14.9 | 16.1 | 17.1 | 18.9 | 20.3 | 19.6 | 19.9 | 20.9 | 21.2 | 22.2 | 22.2 | 21.2 | 19.5 | 18.5 | 17.8 | 17.0 | 15.6 | 14.1 | 18.4 | 22.2 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 13.9 | 13.5 | 12.7 | 12.2 | 11.8 | 11.9 | 12.1 | 12.4 | 13.1 | 14.6 | 16.8 | 18.3 | 19.7 | 20.5 | 20.0 | 19.1 | 17.8 | 16.2 | 14.7 | 14.0 | 13.7 | 13.6 | 13.1 | 13.2 | 15.0 | 20.5 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 13.1 | 13.0 | 12.5 | 12.3 | 12.4 | 12.4 | 12.1 | 11.5 | 11.6 | 12.4 | 14.0 | 15.0 | 15.9 | 16.8 | 17.1 | 17.0 | 16.3 | 16.6 | 15.1 | 13.4 | 12.7 | 12.6 | 12.2 | 11.5 | 13.7 | 17.1 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 11.0 | 10.3 | 10.0 | 9.9 | 10.2 | 10.2 | 10.7 | 11.2 | 12.5 | 14.2 | 17.1 | 19.8 | 21.4 | 22.5 | 23.1 | 22.8 | 22.5 | 22.1 | 19.9 | 18.4 | 18.8 | 19.1 | 18.1 | 17.1 | 16.4 | 23.1 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 16.6 | 15.7 | 14.1 | 12.8 | 11.3 | 9.6 | 9.0 | 9.8 | 11.3 | 12.0 | 13.2 | 14.1 | 14.4 | 15.1 | 15.4 | 15.0 | 14.3 | 13.6 | 12.2 | 11.3 | 7.7 | 7.2 | 7.7 | 4.5 | 12.0 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 2.2 | 1.1 | 3.9 | 4.8 | 5.4 | 5.2 | 5.2 | 5.5 | 5.4 | 5.1 | 4.9 | 5.2 | 5.7 | 6.1 | 6.6 | 7.0 | 7.0 | 7.0 | 6.7 | 5.1 | 4.4 | 2.7 | 1.0 | 1.8 | 4.8 | 7.0 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 2.8 | 3.1 | 3.6 | 3.4 | 2.7 | 2.5 | 3.1 | 3.9 | 6.4 | 8.6 | 9.6 | 10.1 | 8.8 | 9.7 | 10.8 | 10.8 | 9.0 | 9.7 | 7.3 | 5.9 | 3.5 | 2.7 | 0.4 | -0.2 | 5.8 | 10.8 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | -0.8 | -2.0 | -2.3 | -2.7 | -3.0 | -3.4 | -2.4 | 0.7 | 4.9 | 8.6 | 11.3 | 12.4 | 13.0 | 13.8 | 14.3 | 14.5 | 14.0 | 13.4 | 10.1 | 6.7 | 4.7 | 3.4 | 2.4 | 2.9 | 5.6 | 14.5 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2.5 | 3.6 | 3.0 | 2.3 | 2.1 | 1.5 | 1.9 | 4.7 | 8.3 | 10.6 | 12.4 | 12.7 | 13.6 | 13.7 | 13.7 | 13.5 | 12.7 | 12.9 | 11.0 | 7.6 | 6.1 | 5.5 | 5.2 | 4.4 | 7.7 | 13.7 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 3.7 | 3.3 | 3.7 | 3.9 | 3.2 | 2.3 | 3.9 | 5.1 | 7.6 | 10.6 | 12.2 | 13.2 | 13.7 | 14.2 | 14.6 | 13.7 | 14.0 | 13.1 | 11.3 | 9.6 | 8.2 | 7.0 | 6.0 | 5.4 | 8.5 | 14.6 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 4.9 | 4.6 | 4.0 | 3.5 | 2.5 | 2.1 | 3.3 | 5.5 | 8.2 | 11.0 | 12.6 | 13.4 | 13.8 | 13.8 | 14.9 | 14.3 | 13.9 | 13.0 | 11.2 | 9.2 | 8.0 | 7.3 | 6.7 | 6.7 | 8.7 | 14.9 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 7.0 | 7.3 | 6.8 | 6.4 | 6.4 | 6.8 | 7.0 | 7.4 | 8.5 | 8.8 | 9.0 | 8.8 | 8.5 | 8.8 | 9.2 | 9.6 | 9.7 | 9.7 | 9.7 | 9.5 | 9.0 | 8.8 | 8.3 | 7.9 | 8.3 | 9.7 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 7.6 | 7.6 | 7.4 | 7.1 | 7.0 | 6.8 | 6.5 | 6.4 | 6.5 | 6.8 | 6.8 | 6.6 | 6.6 | 6.5 | 6.4 | 6.1 | 5.9 | 5.7 | 5.5 | 5.4 | 4.6 | 4.0 | 3.9 | 3.7 | 6.1 | 7.6 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 3.4 | 3.3 | 3.2 | 3.0 | 3.1 | 3.3 | 3.5 | 3.6 | 3.4 | 3.8 | 4.2 | 4.2 | 4.7 | 5.2 | 5.2 | 5.2 | 5.2 | 4.7 | 4.4 | 4.4 | 4.3 | 4.2 | 4.1 | 4.1 | 4.1 | 5.2 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 3.8 | 3.7 | 3.8 | 3.7 | 3.6 | 3.5 | 3.4 | 3.4 | 3.7 | 4.0 | 4.9 | 5.5 | 5.7 | 5.5 | 5.4 | 5.9 | 5.7 | 5.3 | 5.1 | 4.7 | 4.3 | 4.0 | 3.8 | 3.5 | 4.4 | 5.9 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 3.7 | 3.5 | 3.5 | 3.4 | 3.5 | 3.3 | 3.5 | 4.0 | 4.8 | 5.9 | 6.7 | 7.0 | 8.0 | 8.1 | 8.6 | 8.8 | 8.6 | 8.3 | 6.9 | 4.2 | 2.6 | 3.1 | 3.3 | 2.8 | 5.3 | 8.8 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 2.2 | 3.3 | 4.5 | 4.9 | 5.0 | 5.2 | 4.9 | 5.5 | 7.1 | 8.7 | 10.3 | 11.7 | 12.8 | 13.9 | 14.0 | 13.7 | 12.8 | 11.6 | 10.7 | 10.4 | 10.3 | 10.0 | 9.0 | 9.3 | 8.8 | 14.0 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 9.4 | 9.4 | 9.4 | 8.8 | 8.6 | 8.6 | 8.6 | 9.0 | 10.1 | 11.7 | 13.8 | 16.2 | 17.9 | 18.7 | 19.2 | 19.2 | 17.1 | 17.7 | 15.6 | 14.1 | 13.5 | 12.0 | 11.3 | 12.2 | 13.0 | 19.2 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 12.7 | 12.8 | 13.0 | 12.0 | 11.1 | 10.2 | 9.4 | 9.5 | 11.8 | 14.6 | 16.4 | 17.7 | 18.8 | 18.8 | 19.7 | 18.9 | 18.4 | 17.2 | 12.9 | 8.6 | 6.9 | 7.1 | 7.1 | 6.2 | 13.0 | 19.7 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 6.4 | 7.4 | 7.4 | 6.4 | 5.6 | 5.7 | 6.6 | 8.7 | 12.7 | 14.6 | 16.6 | 17.4 | 18.0 | 18.1 | 17.3 | 17.7 | 17.0 | 14.9 | 11.2 | 8.6 | 7.0 | 5.6 | 4.6 | 4.5 | 10.8 | 18.1 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 3.9 | 4.5 | 5.0 | 3.7 | 3.8 | 3.7 | 3.8 | 7.5 | 12.4 | 15.0 | 16.8 | 18.9 | 20.0 | 20.6 | 20.8 | 20.9 | 20.3 | 18.8 | 16.6 | 15.0 | 13.8 | 13.4 | 13.2 | 13.0 | 12.7 | 20.9 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 13.5 | 13.4 | 12.9 | 12.6 | 11.8 | 11.2 | 10.6 | 11.6 | 14.2 | 17.0 | 19.8 | 21.7 | 23.2 | 24.1 | 24.3 | 24.2 | 23.6 | 21.7 | 19.0 | 17.0 | 14.8 | 13.5 | 12.0 | 13.0 | 16.7 | 24.3 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 11.0 | 10.7 | 11.6 | 7.8 | 6.4 | 6.7 | 5.5 | 8.4 | 12.2 | 15.5 | 17.0 | 18.6 | 20.1 | 20.6 | 20.2 | 19.9 | 18.6 | 17.0 | 15.1 | 14.2 | 13.4 | 12.7 | 12.9 | 12.6 | 13.7 | 20.6 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.3 | 8.1 | 8.1 | 7.5 | 7.1 | 6.8 | 7.1 | 8.7 | 10.7 | 12.5 | 14.0 | 15.1 | 15.8 | 16.3 | 16.6 | 16.5 | 16.0 | 15.3 | 13.6 | 11.8 | 10.5 | 9.9 | 9.2 | 8.8 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 19.2 | 18.4 | 17.4 | 16.3 | 16.6 | 15.8 | 14.9 | 16.1 | 19.0 | 21.7 | 24.4 | 25.9 | 26.9 | 27.7 | 28.2 | 28.4 | 27.9 | 26.7 | 24.0 | 21.5 | 20.3 | 20.6 | 20.7 | 19.9 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Christina Lake - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Christina Lake - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 8 | 1.11 | 1.11 |
| 0 - 10 | 301 | 41.81 | 42.92 |
| 10 - 20 | 348 | 48.33 | 91.25 |
| > 20 | 63 | 8.75 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



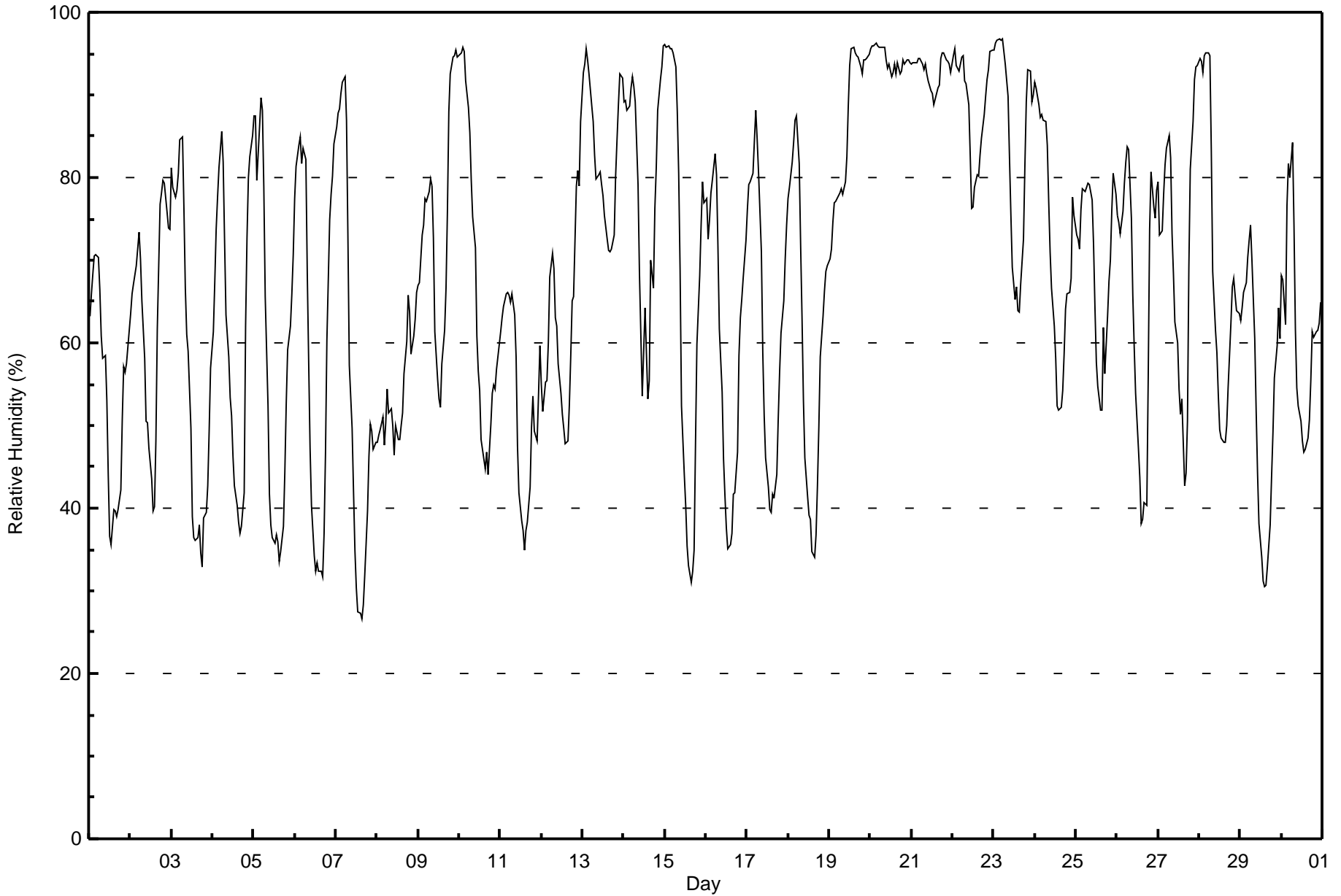
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Christina Lake - September 2017

| Maximum Value: 97 % on Sep 23 06:00 Maximum Daily Average: 94.4 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 27 % on Sep 7 16:00 Minimum Daily Average: 53.0 % on Sep 11 Maximum Diurnal Average: 83.3 % at hour 6 Minimum Diurnal Average: 50.0 % at hour 15 Monthly Average: 68.1 % Percentiles: P ₁ = 31 P ₁₀ = 40 Q ₁ = 52 Median = 69 O ₃ = 84 P ₉₀ = 94 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-Sep | 63 | 66 | 68 | 71 | 71 | 70 | 66 | 61 | 58 | 58 | 53 | 44 | 37 | 36 | 40 | 40 | 39 | 40 | 42 | 51 | 57 | 56 | 57 | 61 | 54.4 | 71 |
| 2-Sep | 64 | 66 | 67 | 69 | 71 | 73 | 70 | 65 | 58 | 51 | 50 | 47 | 44 | 40 | 40 | 48 | 62 | 77 | 78 | 80 | 79 | 76 | 74 | 74 | 63.5 | 80 |
| 3-Sep | 81 | 79 | 78 | 78 | 80 | 85 | 85 | 76 | 67 | 61 | 59 | 50 | 39 | 36 | 36 | 36 | 38 | 35 | 33 | 39 | 39 | 43 | 49 | 57 | 56.6 | 85 |
| 4-Sep | 61 | 67 | 74 | 78 | 81 | 86 | 82 | 72 | 63 | 58 | 53 | 51 | 46 | 43 | 40 | 38 | 37 | 38 | 42 | 62 | 73 | 80 | 83 | 85 | 62.2 | 86 |
| 5-Sep | 87 | 87 | 80 | 86 | 90 | 88 | 79 | 66 | 52 | 42 | 38 | 36 | 36 | 37 | 36 | 33 | 35 | 38 | 44 | 53 | 59 | 62 | 66 | 71 | 58.4 | 90 |
| 6-Sep | 77 | 81 | 84 | 85 | 82 | 84 | 82 | 68 | 58 | 47 | 40 | 34 | 32 | 33 | 32 | 32 | 32 | 37 | 47 | 60 | 75 | 78 | 80 | 84 | 60.3 | 85 |
| 7-Sep | 86 | 88 | 88 | 90 | 91 | 92 | 87 | 73 | 57 | 50 | 42 | 35 | 30 | 28 | 27 | 27 | 28 | 32 | 40 | 46 | 50 | 49 | 47 | 48 | 55.5 | 92 |
| 8-Sep | 48 | 49 | 50 | 51 | 48 | 50 | 54 | 52 | 52 | 50 | 46 | 50 | 48 | 48 | 50 | 52 | 56 | 60 | 66 | 64 | 59 | 61 | 63 | 66 | 53.8 | 66 |
| 9-Sep | 67 | 67 | 73 | 74 | 78 | 77 | 78 | 80 | 79 | 73 | 61 | 56 | 53 | 52 | 57 | 62 | 67 | 76 | 88 | 93 | 95 | 95 | 95 | 95 | 74.6 | 95 |
| 10-Sep | 95 | 95 | 96 | 95 | 92 | 89 | 86 | 80 | 75 | 72 | 61 | 57 | 54 | 48 | 46 | 45 | 47 | 44 | 50 | 54 | 55 | 54 | 57 | 60 | 66.9 | 96 |
| 11-Sep | 61 | 63 | 64 | 66 | 66 | 66 | 65 | 66 | 63 | 58 | 48 | 42 | 38 | 37 | 35 | 37 | 38 | 43 | 50 | 54 | 49 | 48 | 54 | 60 | 53.0 | 66 |
| 12-Sep | 55 | 52 | 55 | 55 | 60 | 68 | 71 | 69 | 63 | 62 | 57 | 54 | 51 | 50 | 48 | 48 | 53 | 59 | 65 | 66 | 79 | 81 | 79 | 87 | 61.9 | 87 |
| 13-Sep | 93 | 94 | 96 | 94 | 93 | 89 | 87 | 83 | 80 | 80 | 81 | 79 | 78 | 75 | 73 | 71 | 71 | 73 | 80 | 85 | 89 | 93 | 92 | 92 | 83.2 | 96 |
| 14-Sep | 89 | 89 | 88 | 89 | 91 | 92 | 91 | 89 | 79 | 68 | 61 | 54 | 64 | 59 | 53 | 55 | 70 | 67 | 76 | 81 | 88 | 92 | 93 | 96 | 78.2 | 96 |
| 15-Sep | 96 | 96 | 96 | 96 | 96 | 95 | 93 | 88 | 80 | 69 | 52 | 44 | 40 | 35 | 33 | 31 | 32 | 35 | 48 | 60 | 68 | 74 | 80 | 77 | 67.3 | 96 |
| 16-Sep | 78 | 73 | 75 | 78 | 80 | 83 | 80 | 72 | 62 | 54 | 46 | 42 | 38 | 35 | 36 | 37 | 42 | 42 | 47 | 59 | 63 | 65 | 68 | 72 | 59.3 | 83 |
| 17-Sep | 76 | 79 | 79 | 81 | 84 | 88 | 85 | 81 | 71 | 59 | 51 | 46 | 42 | 40 | 39 | 42 | 41 | 44 | 51 | 57 | 61 | 65 | 70 | 74 | 62.8 | 88 |
| 18-Sep | 77 | 79 | 82 | 84 | 87 | 87 | 82 | 72 | 63 | 53 | 46 | 41 | 39 | 39 | 35 | 34 | 37 | 43 | 50 | 58 | 63 | 66 | 69 | 69 | 60.6 | 87 |
| 19-Sep | 70 | 71 | 75 | 77 | 77 | 78 | 78 | 79 | 78 | 79 | 83 | 89 | 94 | 96 | 96 | 95 | 95 | 95 | 93 | 93 | 94 | 94 | 94 | 95 | 86.1 | 96 |
| 20-Sep | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 94 | 93 | 94 | 92 | 93 | 94 | 93 | 94 | 93 | 93 | 94 | 94 | 94 | 94 | 94 | 94.4 | 96 |
| 21-Sep | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 93 | 94 | 93 | 92 | 91 | 90 | 89 | 89 | 91 | 91 | 94 | 95 | 95 | 94 | 94 | 94 | 93 | 92.9 | 95 |
| 22-Sep | 95 | 96 | 94 | 93 | 93 | 95 | 95 | 92 | 91 | 89 | 83 | 76 | 76 | 79 | 80 | 80 | 83 | 85 | 88 | 90 | 92 | 93 | 95 | 95 | 88.6 | 96 |
| 23-Sep | 95 | 96 | 97 | 97 | 97 | 95 | 94 | 90 | 83 | 76 | 69 | 65 | 67 | 64 | 64 | 67 | 73 | 81 | 89 | 93 | 93 | 89 | 90 | 90 | 84.1 | 97 |
| 24-Sep | 92 | 91 | 89 | 87 | 88 | 87 | 87 | 84 | 77 | 71 | 67 | 62 | 58 | 52 | 52 | 54 | 59 | 64 | 66 | 66 | 66 | 68 | 78 | 75 | 71.9 | 92 |
| 25-Sep | 73 | 72 | 71 | 76 | 79 | 78 | 79 | 79 | 79 | 77 | 72 | 64 | 58 | 55 | 52 | 52 | 62 | 56 | 63 | 67 | 70 | 76 | 81 | 78 | 69.6 | 81 |
| 26-Sep | 75 | 75 | 73 | 76 | 79 | 82 | 84 | 83 | 75 | 66 | 59 | 54 | 47 | 44 | 38 | 39 | 41 | 40 | 56 | 74 | 81 | 76 | 75 | 78 | 65.4 | 84 |
| 27-Sep | 80 | 73 | 74 | 78 | 81 | 84 | 85 | 82 | 73 | 68 | 62 | 60 | 54 | 51 | 53 | 43 | 44 | 50 | 69 | 81 | 87 | 92 | 93 | 94 | 71.4 | 94 |
| 28-Sep | 94 | 94 | 93 | 95 | 95 | 95 | 95 | 83 | 69 | 62 | 59 | 54 | 50 | 49 | 48 | 48 | 50 | 55 | 62 | 67 | 68 | 66 | 64 | 64 | 69.8 | 95 |
| 29-Sep | 63 | 64 | 66 | 67 | 70 | 72 | 74 | 70 | 60 | 52 | 44 | 38 | 34 | 31 | 31 | 31 | 33 | 38 | 44 | 49 | 56 | 60 | 64 | 60 | 53.0 | 74 |
| 30-Sep | 68 | 68 | 62 | 77 | 82 | 80 | 84 | 74 | 62 | 55 | 52 | 51 | 48 | 47 | 47 | 49 | 51 | 55 | 61 | 61 | 61 | 62 | 62 | 65 | 61.8 | 84 |
| | | | | | | | | | | | | | | | | | | 78.3 78.7 79.2 81.1 82.3 83.3 82.3 77.4 70.9 65.1 59.6 55.4 52.6 50.8 50.0 50.1 52.9 55.7 62.0 68.0 71.8 73.4 75.3 77.0 | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | 96 96 97 97 97 97 96 96 96 94 93 94 94 96 96 95 95 95 95 95 95 95 95 95 96 | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Christina Lake - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 72 | 10.00 | 10.00 |
| 40 - 60 | 182 | 25.28 | 35.28 |
| 60 - 80 | 240 | 33.33 | 68.61 |
| 80 - 100 | 226 | 31.39 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Christina Lake - September 2017

| | | |
|--|--|---------------------------------|
| Maximum Speed: 26 km/h on Sep 10 14:00 | Maximum Daily Speed Average: 15.8 km/h on Sep 21 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 28 08:00 | Minimum Daily Speed Average: 0.2 km/h on Sep 27 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 4.2 km/h at hour 14 | Minimum Diurnal Speed Average: 1.4 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 2.6 km/h 221.7 deg | Percentiles: P ₁ = 2 P ₁₀ = 3 Q ₁ = 6 Median = 10 Q ₃ = 14 P ₉₀ = 17 P ₉₉ = 22 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | WSW10 | WSW10 | WSW10 | WSW9 | WSW9 | WSW10 | WSW10 | WSW14 | WSW13 | WSW12 | WSW14 | WSW17 | W23 | W22 | WSW17 | WSW18 | W19 | W16 | WSW13 | WSW10 | SW10 | WSW11 | WSW13 | WSW12 | WSW13.3 | W23 | |
| 2-Sep | WSW11 | WSW11 | WSW11 | WSW10 | WSW10 | WSW10 | WSW10 | WSW11 | WSW12 | WSW11 | WSW10 | WSW11 | WSW10 | WNW10 | WNW8 | W9 | SW11 | SW10 | WSW11 | WSW10 | WSW11 | W10 | W9 | W10 | WSW9.9 | WSW12 | |
| 3-Sep | WSW10 | W10 | WSW12 | W12 | WSW13 | WSW11 | WSW10 | WSW10 | W10 | WNW11 | WNW18 | WNW16 | WNW19 | WNW21 | W19 | WNW18 | W16 | WNW17 | NW20 | WNW11 | W12 | WNW16 | WNW16 | WNW14 | WNW13.4 | WNW21 | |
| 4-Sep | NW21 | WNW21 | WNW18 | WNW12 | WNW8 | SW5 | WSW5 | W7 | NW13 | NW16 | WNW14 | WNW14 | NW15 | NW14 | NW13 | NW16 | WNW14 | WNW11 | W5 | SSE5 | SSE3 | SE3 | SSE3 | ESE3 | WNW9.2 | WNW21 | |
| 5-Sep | SSE3 | S5 | S7 | S4 | SE4 | SSE6 | SSE3 | S6 | SSW9 | SSW11 | SSW12 | SW11 | SW14 | SSW12 | SSW13 | SW12 | SW11 | SW9 | SSW7 | SSW8 | SSW7 | S8 | S6 | S5 | SSW7.4 | SW14 | |
| 6-Sep | S3 | SE4 | SSE4 | S4 | SSW6 | SSW5 | S3 | SW6 | W4 | NNE3 | NE2 | NNE5 | NNE7 | NNE6 | NNE6 | NE4 | NE4 | E4 | E6 | SE3 | SSW4 | S3 | SE4 | ESE3 | ESE1.3 | NNE7 | |
| 7-Sep | SSE2 | SSE3 | SE4 | SE3 | ENE2 | ESE3 | SE3 | S5 | S10 | S13 | S14 | SSE16 | S16 | S14 | S15 | S14 | S13 | S12 | SSE9 | SE9 | SSE11 | S14 | S17 | S16 | S9.5 | S17 | |
| 8-Sep | S18 | S17 | S12 | SSW9 | S13 | SSW8 | SSE6 | S9 | SSW7 | SSW4 | SSW7 | SW5 | SSE3 | S3 | NW10 | N10 | NW9 | NNW10 | NNE7 | N9 | NNW11 | NW11 | N5 | NE4 | SW2.4 | S18 | |
| 9-Sep | N7 | NNW7 | NW10 | WNW11 | NNW6 | NNE4 | NNW9 | NNE8 | N8 | N8 | NE9 | NNE10 | N9 | NNE5 | NNE7 | N9 | NW14 | NW11 | NW5 | ENE3 | SW1 | W8 | SW7 | SW6 | NNW5.5 | NW14 | |
| 10-Sep | SW7 | WSW9 | WSW9 | WSW10 | WSW12 | WSW13 | WSW14 | WSW14 | WSW15 | WSW18 | W22 | W26 | WSW24 | W26 | W26 | W25 | W18 | WSW19 | WSW12 | SW10 | SW13 | SW14 | WSW15 | WSW13 | WSW15.7 | W26 | |
| 11-Sep | WSW12 | WSW11 | WSW10 | SW9 | SSW11 | SSW11 | SSW9 | SSW7 | S6 | SSE10 | S13 | SSW11 | SW13 | SW12 | WSW12 | WSW10 | WSW9 | SSW7 | SSW7 | SSW7 | SSW7 | SW10 | WSW11 | SW10 | SW11 | SW9.1 | S13 |
| 12-Sep | WSW15 | W15 | WSW13 | W15 | W15 | W14 | WSW10 | WSW11 | W17 | W18 | W18 | W17 | W18 | WNW19 | WNW20 | WNW16 | NW14 | N12 | NNE9 | NNW7 | SSE2 | W3 | WNW6 | S2 | W10.7 | WNW20 | |
| 13-Sep | SSW3 | SSE3 | NNE4 | E3 | NNE6 | NNE12 | NNE9 | NNE10 | N14 | NNE12 | N12 | NNE10 | N10 | N11 | NNE11 | NNE10 | NNE10 | NNE8 | ENE6 | ESE3 | SSW4 | SW4 | SSW4 | SSW4 | NNE5.5 | N14 | |
| 14-Sep | SSW5 | WSW5 | WSW5 | SW5 | S6 | S6 | ESE5 | S5 | SSW5 | SSW5 | WSW5 | WSW3 | NW16 | NW2 | SSW3 | N5 | SW8 | SW9 | SW6 | WSW3 | S5 | SSW6 | SE4 | SSW5 | SW3.7 | NW16 | |
| 15-Sep | S4 | S4 | S3 | S3 | S5 | S3 | S3 | S2 | S3 | SW3 | SSW4 | E2 | ENE3 | SSW2 | SSE3 | SE6 | S4 | SE7 | SSE7 | S7 | SSW6 | SSE5 | S6 | S3.7 | SE7 | | |
| 16-Sep | SSE7 | S9 | S8 | S7 | S6 | SSE3 | SSE5 | SSE8 | S12 | S14 | SSE16 | S16 | S13 | S14 | S13 | S12 | S9 | SSE11 | SSE8 | SSE7 | SSE8 | SSE8 | SSE8 | S7 | S9.4 | SSE16 | |
| 17-Sep | S7 | SSE7 | SSE8 | SE9 | SE6 | SSE6 | SSE10 | S7 | SSE13 | SSE18 | SSE21 | SSE21 | SSE20 | SSE19 | SSE20 | SSE17 | SSE17 | SE15 | SE12 | SE10 | SE9 | ESE9 | ESE10 | SE11 | SSE12.3 | SSE21 | |
| 18-Sep | SE10 | SE9 | ESE8 | E6 | E6 | E7 | ESE7 | SE12 | ESE12 | SE18 | SE20 | ESE21 | ESE21 | E19 | ESE20 | ESE19 | E17 | E16 | E12 | ENE8 | ENE8 | NE7 | NNE8 | NNE6 | ESE11.1 | ESE21 | |
| 19-Sep | NNE8 | NNE9 | NNE10 | NNE10 | NNE10 | NE10 | NE9 | ENE10 | ENE15 | NE14 | ENE17 | ENE18 | ENE15 | ENE13 | NE12 | ENE16 | ENE18 | ENE20 | E20 | E18 | ENE15 | ENE19 | ENE19 | ENE17 | ENE13.7 | E20 | |
| 20-Sep | ENE14 | NE13 | NE14 | NE15 | NE15 | NNE15 | NNE16 | NNE16 | NNE15 | N16 | NNE17 | NNE16 | N17 | N15 | NNE16 | NNE17 | NNE14 | NNE18 | NNE16 | NNE17 | NNE21 | N19 | N16 | N18 | NNE15.6 | NNE21 | |
| 21-Sep | N18 | N17 | N17 | N16 | N17 | N18 | N18 | N15 | N16 | N16 | N17 | N19 | N18 | N18 | N17 | N18 | N18 | NNW15 | NNW14 | NNW15 | NNW14 | N12 | N12 | NNW10 | N15.8 | N19 | |
| 22-Sep | NNW10 | NNW11 | NNW10 | NNW10 | N9 | NNE8 | NNE7 | ENE4 | N6 | NNE6 | NNE7 | NNE6 | S1 | ENE3 | ESE7 | NNE7 | NNE9 | NE6 | ENE6 | E6 | SE5 | SE4 | ESE3 | SE3 | NNE4.4 | NNW11 | |
| 23-Sep | SE4 | SE3 | SSE3 | SSE3 | ESE3 | SE4 | SSE4 | S5 | S8 | SSE7 | S8 | SW8 | S7 | SSW5 | SSW6 | S6 | SSE5 | SE5 | SSE5 | SSE6 | SSE7 | S7 | S6 | SSE7 | S5.1 | S8 | |
| 24-Sep | S6 | SSE9 | S10 | S12 | S9 | S11 | S10 | SSE11 | SSE12 | S15 | S12 | S14 | S11 | S15 | S15 | S14 | S14 | S14 | S11 | SSE13 | S13 | S13 | SSE14 | SSE11 | S12.0 | S15 | |
| 25-Sep | SSE10 | SSE10 | S11 | S9 | S7 | S7 | S9 | S10 | SSW8 | SSW8 | SSW8 | SW10 | SW12 | WSW12 | SW13 | SW11 | SSW7 | SSW8 | SSW8 | SSW8 | SSW8 | S8 | S7 | SSW7 | SSW8.3 | SW13 | |
| 26-Sep | SSW8 | SSW8 | SW9 | SW6 | WSW7 | WSW7 | WSW9 | SW8 | WSW9 | NNW11 | NNW12 | W13 | W14 | W13 | W15 | WNW18 | NW18 | NW13 | ESE2 | SSE4 | SSW4 | S5 | SSW5 | S4 | W7.4 | NW18 | |
| 27-Sep | S3 | S4 | S4 | SSE4 | SSE5 | SE4 | SSE4 | SE3 | SW6 | WSW7 | WSW5 | WNW8 | NW10 | NW12 | NNE13 | NNE12 | NNE8 | NE5 | SSE2 | S3 | SSE2 | SSW3 | S4 | S3 | WNW0.2 | NNE13 | |
| 28-Sep | S3 | SSE3 | ESE2 | SE2 | SSE3 | SSE2 | S3 | SW0 | SSE4 | S13 | S15 | S15 | S17 | S17 | S16 | S17 | S15 | SSE10 | SE9 | SE9 | SE10 | SSE13 | SSE14 | SSE15 | SSE9.2 | S17 | |
| 29-Sep | SSE20 | SSE21 | SSE19 | SSE18 | SSE16 | SSE14 | SSE13 | SSE9 | SSE13 | S12 | S16 | SSE22 | SSE20 | S20 | S21 | S17 | S16 | SSE11 | SE9 | SE10 | SSE9 | SSE8 | SSE8 | SSE8 | SSE14.3 | SSE22 | |
| 30-Sep | E3 | SE2 | SSW6 | ENE3 | SSE2 | S3 | SE1 | S4 | SSW7 | SW7 | WSW8 | SW9 | SW9 | W12 | W12 | W14 | W13 | WSW10 | WSW11 | W14 | W12 | W12 | WNW13 | WNW12 | WSW6.7 | W14 | |

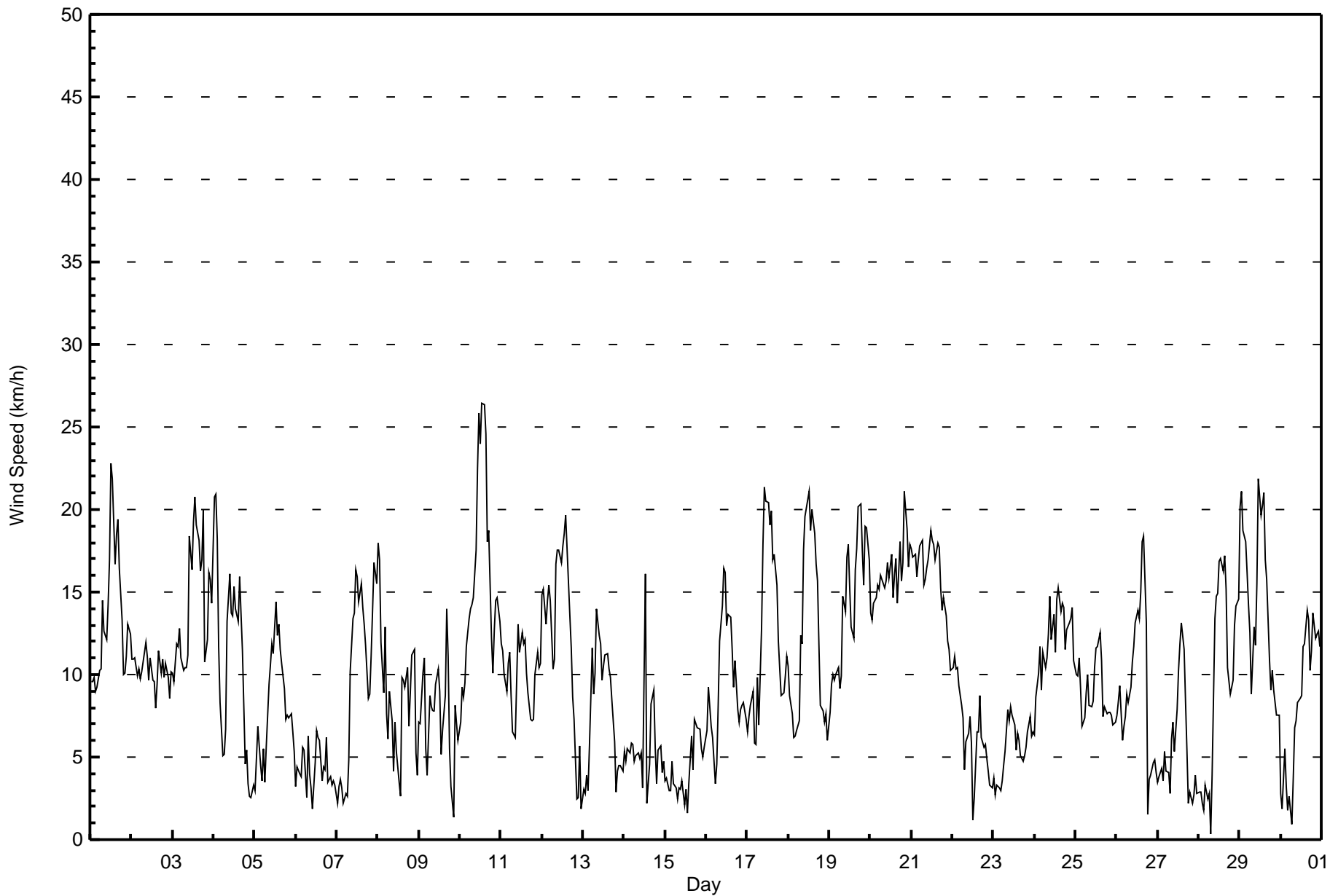
| | |
|---|-----------------|
| SSW2.8 SW3.0 SW3.1 SW2.4 SW2.1 SSW2.0 SSW1.9 SSW2.6 SW3.1 SW3.2 SW3.7 SW3.8 WSW4.0 WSW4.2 WSW3.8 W3.0 W3.1 WSW1.6 S1.4 S2.1 SSW2.8 SSW2.9 SSW2.6 SSW2.5 | Diurnal Average |
| NW21 SSE21 SSE19 SSE18 N17 N18 N18 NNE16 W17 SSE18 W22 W26 WSW24 W26 W26 W25 W19 ENE20 E20 E18 NNE21 ENE19 ENE19 N18 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Christina Lake - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Christina Lake - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 156 | 21.67 | 21.67 |
| 6 - 11 | 295 | 40.97 | 62.64 |
| 12 - 19 | 239 | 33.19 | 95.83 |
| 20 - 28 | 30 | 4.17 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Christina Lake - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 2 | 5 | 5 | 6 | 4 | 9 | 21 | 32 | 35 | 19 | 6 | 7 | 3 | 0 | 2 | 0 | 156 |
| 6 - 11 | 11 | 31 | 5 | 5 | 5 | 5 | 15 | 34 | 41 | 34 | 25 | 49 | 8 | 10 | 6 | 11 | 295 |
| 12 - 19 | 27 | 16 | 6 | 12 | 5 | 2 | 4 | 20 | 45 | 1 | 10 | 28 | 27 | 19 | 12 | 5 | 239 |
| 20 - 28 | 0 | 1 | 0 | 1 | 1 | 3 | 1 | 8 | 2 | 0 | 0 | 1 | 7 | 3 | 2 | 0 | 30 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 40 | 53 | 16 | 24 | 15 | 19 | 41 | 94 | 123 | 54 | 41 | 85 | 45 | 32 | 22 | 16 | 720 |

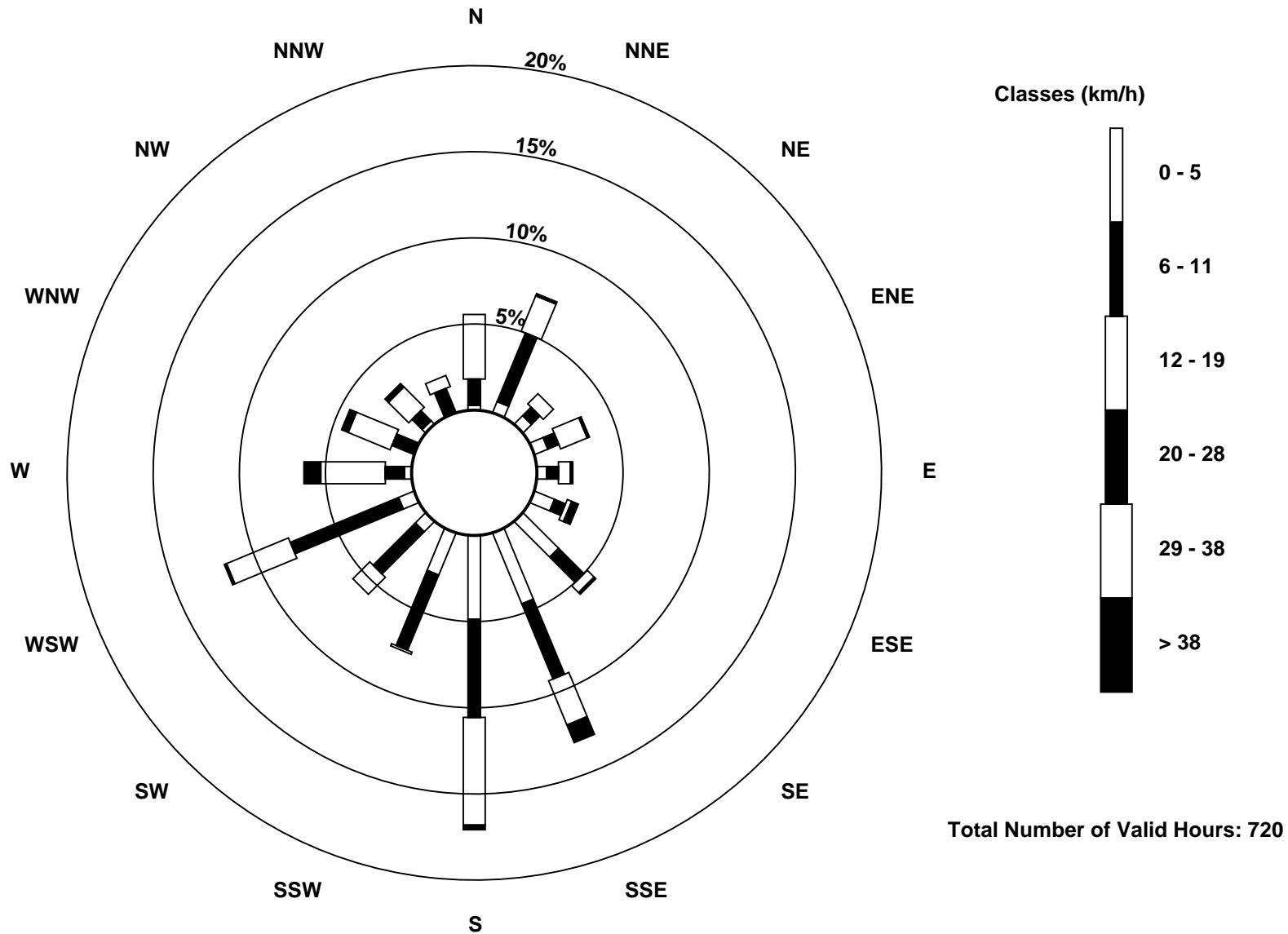
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Christina Lake (AMS 500)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Christina Lake - September 2017

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



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Christina Lake - September 2017

| | |
|---|---------------------------------|
| Direction of Maximum Speed: 268 deg on Sep 10 14:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 354.3 deg on Sep 21 | Hours of Data: 720 |
| Direction of Minimum Speed: 220 deg on Sep 28 08:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 0.2 deg on Sep 27 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 224.0 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-Sep | 242 | 242 | 243 | 239 | 248 | 250 | 248 | 243 | 241 | 244 | 245 | 254 | 265 | 269 | 255 | 256 | 260 | 260 | 255 | 238 | 234 | 240 | 244 | 250 | 250.9 |
| 2-Sep | 248 | 246 | 248 | 246 | 244 | 246 | 241 | 244 | 254 | 254 | 242 | 240 | 254 | 290 | 287 | 267 | 236 | 233 | 243 | 238 | 248 | 266 | 272 | 273 | 251.6 |
| 3-Sep | 238 | 263 | 253 | 260 | 255 | 244 | 244 | 246 | 265 | 294 | 303 | 285 | 294 | 286 | 279 | 300 | 279 | 290 | 309 | 296 | 277 | 300 | 294 | 300 | 281.3 |
| 4-Sep | 304 | 302 | 303 | 300 | 286 | 232 | 252 | 277 | 304 | 313 | 284 | 294 | 307 | 307 | 304 | 307 | 301 | 298 | 272 | 168 | 148 | 129 | 156 | 109 | 296.5 |
| 5-Sep | 157 | 169 | 191 | 172 | 130 | 152 | 161 | 184 | 197 | 211 | 208 | 227 | 230 | 227 | 220 | 220 | 222 | 217 | 202 | 194 | 193 | 191 | 186 | 190 | 203.9 |
| 6-Sep | 176 | 144 | 167 | 183 | 197 | 213 | 175 | 227 | 262 | 27 | 43 | 23 | 31 | 24 | 24 | 53 | 35 | 88 | 101 | 144 | 196 | 176 | 138 | 110 | 120.4 |
| 7-Sep | 159 | 155 | 143 | 138 | 73 | 107 | 137 | 176 | 173 | 173 | 169 | 167 | 175 | 183 | 182 | 190 | 180 | 176 | 165 | 145 | 156 | 177 | 177 | 179 | 171.3 |
| 8-Sep | 181 | 180 | 190 | 192 | 185 | 203 | 165 | 175 | 203 | 205 | 206 | 225 | 164 | 181 | 314 | 358 | 316 | 346 | 33 | 7 | 328 | 321 | 4 | 43 | 222.4 |
| 9-Sep | 1 | 345 | 309 | 299 | 331 | 19 | 346 | 17 | 4 | 2 | 39 | 17 | 10 | 21 | 12 | 360 | 304 | 305 | 308 | 66 | 224 | 275 | 232 | 234 | 338.9 |
| 10-Sep | 225 | 245 | 238 | 249 | 248 | 252 | 251 | 251 | 246 | 250 | 261 | 263 | 256 | 268 | 264 | 266 | 259 | 257 | 245 | 235 | 225 | 236 | 241 | 237 | 252.3 |
| 11-Sep | 239 | 239 | 238 | 226 | 213 | 212 | 206 | 194 | 176 | 162 | 170 | 195 | 214 | 222 | 251 | 246 | 249 | 211 | 197 | 213 | 234 | 240 | 236 | 231 | 219.2 |
| 12-Sep | 256 | 259 | 255 | 259 | 261 | 260 | 246 | 245 | 269 | 277 | 280 | 278 | 279 | 290 | 302 | 303 | 316 | 2 | 20 | 336 | 158 | 264 | 295 | 174 | 279.6 |
| 13-Sep | 194 | 155 | 26 | 90 | 20 | 21 | 29 | 21 | 7 | 13 | 11 | 16 | 0 | 9 | 20 | 12 | 16 | 25 | 64 | 103 | 197 | 214 | 196 | 198 | 19.8 |
| 14-Sep | 195 | 250 | 240 | 228 | 183 | 178 | 117 | 172 | 202 | 206 | 244 | 254 | 307 | 307 | 211 | 350 | 227 | 236 | 220 | 237 | 186 | 199 | 130 | 206 | 222.2 |
| 15-Sep | 181 | 183 | 172 | 181 | 187 | 173 | 188 | 175 | 180 | 222 | 202 | 99 | 67 | 213 | 157 | 127 | 182 | 142 | 159 | 188 | 191 | 192 | 168 | 173 | 172.3 |
| 16-Sep | 168 | 175 | 179 | 176 | 175 | 164 | 153 | 165 | 170 | 172 | 168 | 185 | 182 | 179 | 172 | 169 | 184 | 147 | 162 | 152 | 154 | 155 | 157 | 170 | 169.6 |
| 17-Sep | 177 | 168 | 158 | 143 | 138 | 164 | 165 | 174 | 157 | 158 | 156 | 160 | 154 | 157 | 157 | 163 | 153 | 145 | 139 | 137 | 126 | 121 | 122 | 128 | 151.7 |
| 18-Sep | 124 | 126 | 120 | 97 | 84 | 89 | 116 | 124 | 120 | 129 | 133 | 121 | 111 | 101 | 102 | 103 | 91 | 86 | 87 | 77 | 70 | 46 | 26 | 27 | 103.6 |
| 19-Sep | 24 | 28 | 29 | 29 | 28 | 36 | 47 | 57 | 65 | 54 | 73 | 73 | 66 | 66 | 52 | 57 | 61 | 67 | 80 | 91 | 66 | 69 | 64 | 63 | 60.3 |
| 20-Sep | 60 | 46 | 47 | 42 | 37 | 32 | 22 | 22 | 13 | 8 | 19 | 13 | 6 | 10 | 12 | 19 | 19 | 17 | 15 | 12 | 13 | 8 | 7 | 2 | 19.8 |
| 21-Sep | 360 | 359 | 357 | 359 | 355 | 356 | 355 | 2 | 2 | 357 | 5 | 10 | 2 | 358 | 351 | 359 | 356 | 337 | 329 | 334 | 337 | 349 | 349 | 342 | 354.3 |
| 22-Sep | 348 | 328 | 339 | 340 | 11 | 32 | 21 | 57 | 349 | 24 | 14 | 15 | 182 | 64 | 116 | 19 | 33 | 36 | 73 | 86 | 129 | 136 | 118 | 142 | 24.1 |
| 23-Sep | 138 | 125 | 153 | 161 | 104 | 127 | 168 | 170 | 179 | 166 | 173 | 223 | 182 | 212 | 197 | 177 | 147 | 146 | 165 | 168 | 164 | 173 | 173 | 162 | 169.9 |
| 24-Sep | 178 | 168 | 169 | 173 | 173 | 173 | 171 | 161 | 166 | 178 | 174 | 173 | 186 | 183 | 181 | 176 | 174 | 175 | 170 | 166 | 170 | 176 | 158 | 158 | 172.4 |
| 25-Sep | 155 | 164 | 174 | 180 | 184 | 182 | 185 | 183 | 192 | 201 | 212 | 216 | 231 | 238 | 227 | 226 | 203 | 212 | 202 | 205 | 209 | 191 | 189 | 197 | 199.4 |
| 26-Sep | 202 | 213 | 228 | 234 | 239 | 244 | 241 | 235 | 244 | 283 | 283 | 277 | 275 | 263 | 276 | 288 | 308 | 305 | 119 | 147 | 193 | 186 | 208 | 178 | 259.7 |
| 27-Sep | 176 | 181 | 170 | 147 | 153 | 144 | 160 | 131 | 222 | 252 | 248 | 302 | 321 | 324 | 29 | 25 | 29 | 44 | 158 | 176 | 157 | 193 | 173 | 169 | 297.2 |
| 28-Sep | 189 | 165 | 120 | 131 | 148 | 147 | 180 | 220 | 164 | 175 | 179 | 175 | 170 | 174 | 180 | 174 | 179 | 168 | 141 | 142 | 144 | 158 | 160 | 154 | 166.3 |
| 29-Sep | 163 | 167 | 168 | 166 | 161 | 158 | 156 | 156 | 166 | 179 | 172 | 162 | 163 | 177 | 183 | 189 | 178 | 167 | 144 | 146 | 155 | 160 | 164 | 164 | 166.7 |
| 30-Sep | 82 | 137 | 197 | 73 | 162 | 191 | 134 | 173 | 196 | 226 | 246 | 229 | 235 | 263 | 263 | 281 | 271 | 255 | 249 | 260 | 259 | 261 | 285 | 290 | 253.5 |

207.2 215.6 221.7 220.3 214.8 208.5 203.8 200.1 217.4 222.0 214.8 224.1 245.6 250.5 246.9 270.1 260.7 250.4 175.6 173.3 193.7 211.7 201.1 197.8

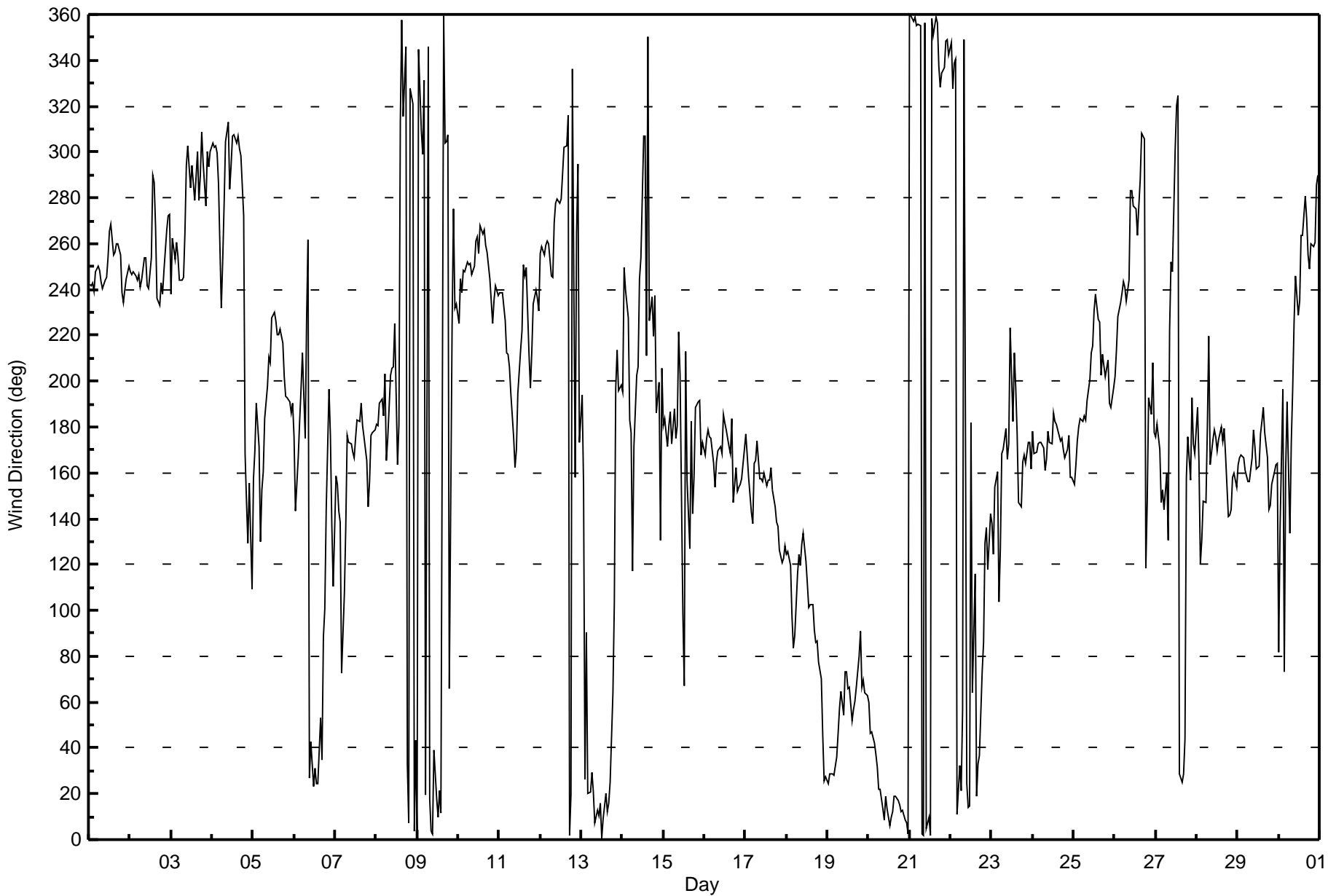
Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Christina Lake - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Christina Lake - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Sep 15 14:00 Minimum Value: 4 deg on Sep 16 21:00 Percentiles: P ₁ = 7 P ₁₀ = 11 Q ₁ = 15 Median = 19 Q ₃ = 26 P ₉₀ = 38 P ₉₉ = 77 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|---|----|----|----|----|----|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 18 | 18 | 17 | 16 | 18 | 18 | 20 | 22 | 22 | 23 | 23 | 23 | 20 | 18 | 22 | 23 | 19 | 19 | 19 | 20 | 20 | 20 | 21 | 19 | 23 |
| 2-Sep | 21 | 20 | 20 | 20 | 18 | 19 | 20 | 23 | 20 | 23 | 24 | 26 | 29 | 37 | 34 | 36 | 22 | 21 | 20 | 19 | 20 | 28 | 28 | 28 | 37 |
| 3-Sep | 17 | 27 | 21 | 21 | 19 | 19 | 17 | 22 | 27 | 23 | 18 | 25 | 24 | 21 | 20 | 21 | 21 | 27 | 11 | 16 | 19 | 18 | 11 | 12 | 27 |
| 4-Sep | 10 | 10 | 10 | 15 | 40 | 33 | 73 | 30 | 20 | 16 | 28 | 28 | 22 | 25 | 31 | 23 | 26 | 24 | 46 | 24 | 30 | 22 | 34 | 18 | 73 |
| 5-Sep | 40 | 25 | 7 | 18 | 12 | 9 | 37 | 27 | 22 | 22 | 23 | 27 | 23 | 26 | 23 | 23 | 22 | 18 | 13 | 10 | 7 | 9 | 8 | 10 | 40 |
| 6-Sep | 30 | 10 | 27 | 13 | 9 | 17 | 54 | 24 | 58 | 55 | 82 | 32 | 27 | 46 | 37 | 63 | 43 | 27 | 26 | 29 | 8 | 27 | 17 | 25 | 82 |
| 7-Sep | 56 | 42 | 17 | 17 | 45 | 15 | 26 | 23 | 13 | 14 | 18 | 17 | 21 | 23 | 23 | 20 | 17 | 15 | 14 | 8 | 12 | 14 | 13 | 13 | 56 |
| 8-Sep | 14 | 13 | 16 | 19 | 17 | 42 | 51 | 25 | 51 | 54 | 30 | 32 | 46 | 66 | 33 | 21 | 19 | 26 | 23 | 25 | 20 | 14 | 43 | 31 | 66 |
| 9-Sep | 17 | 26 | 16 | 11 | 51 | 46 | 19 | 19 | 21 | 20 | 26 | 26 | 28 | 52 | 22 | 18 | 20 | 27 | 31 | 38 | 69 | 23 | 18 | 21 | 69 |
| 10-Sep | 20 | 19 | 18 | 19 | 21 | 20 | 21 | 21 | 21 | 23 | 19 | 19 | 20 | 19 | 19 | 18 | 19 | 21 | 20 | 20 | 19 | 21 | 21 | 19 | 23 |
| 11-Sep | 23 | 23 | 23 | 22 | 17 | 18 | 17 | 19 | 19 | 16 | 18 | 24 | 23 | 25 | 26 | 25 | 24 | 17 | 12 | 15 | 20 | 23 | 22 | 20 | 26 |
| 12-Sep | 21 | 19 | 18 | 19 | 20 | 20 | 22 | 22 | 22 | 21 | 24 | 22 | 21 | 22 | 19 | 21 | 18 | 20 | 17 | 27 | 34 | 62 | 60 | 79 | 79 |
| 13-Sep | 41 | 36 | 35 | 34 | 43 | 15 | 14 | 18 | 19 | 18 | 21 | 20 | 29 | 28 | 24 | 22 | 21 | 18 | 20 | 33 | 30 | 29 | 26 | 35 | 43 |
| 14-Sep | 24 | 35 | 23 | 26 | 17 | 13 | 30 | 28 | 36 | 50 | 43 | 65 | 23 | 78 | 73 | 81 | 25 | 17 | 60 | 71 | 18 | 12 | 36 | 15 | 81 |
| 15-Sep | 34 | 12 | 26 | 28 | 12 | 40 | 19 | 50 | 36 | 54 | 69 | 90 | 71 | 102 | 76 | 45 | 56 | 20 | 10 | 12 | 9 | 17 | 29 | 7 | 102 |
| 16-Sep | 8 | 11 | 11 | 10 | 12 | 14 | 26 | 13 | 14 | 17 | 22 | 22 | 29 | 26 | 22 | 27 | 17 | 18 | 16 | 10 | 4 | 4 | 9 | 8 | 29 |
| 17-Sep | 8 | 7 | 10 | 10 | 17 | 10 | 12 | 17 | 13 | 14 | 16 | 16 | 17 | 17 | 19 | 18 | 17 | 16 | 11 | 10 | 12 | 11 | 11 | 11 | 19 |
| 18-Sep | 10 | 11 | 11 | 18 | 18 | 11 | 13 | 13 | 17 | 16 | 18 | 19 | 18 | 17 | 19 | 16 | 17 | 13 | 12 | 8 | 10 | 14 | 10 | 9 | 19 |
| 19-Sep | 10 | 10 | 8 | 10 | 11 | 12 | 17 | 14 | 12 | 15 | 13 | 13 | 11 | 12 | 13 | 13 | 12 | 11 | 16 | 14 | 11 | 11 | 11 | 12 | 17 |
| 20-Sep | 13 | 12 | 13 | 12 | 13 | 14 | 14 | 14 | 16 | 18 | 15 | 17 | 17 | 17 | 18 | 15 | 17 | 16 | 14 | 20 | 17 | 18 | 18 | 18 | 20 |
| 21-Sep | 18 | 18 | 18 | 18 | 17 | 17 | 16 | 20 | 17 | 18 | 19 | 17 | 18 | 19 | 21 | 18 | 18 | 22 | 19 | 20 | 21 | 22 | 23 | 26 | 26 |
| 22-Sep | 24 | 20 | 24 | 24 | 18 | 10 | 15 | 51 | 37 | 26 | 28 | 28 | 83 | 69 | 17 | 60 | 17 | 19 | 14 | 18 | 13 | 13 | 25 | 19 | 83 |
| 23-Sep | 17 | 28 | 18 | 22 | 40 | 18 | 26 | 20 | 17 | 17 | 21 | 27 | 42 | 38 | 26 | 30 | 23 | 21 | 11 | 15 | 8 | 8 | 9 | 6 | 42 |
| 24-Sep | 9 | 11 | 12 | 12 | 11 | 12 | 13 | 12 | 16 | 18 | 23 | 18 | 20 | 25 | 19 | 16 | 13 | 15 | 15 | 13 | 12 | 14 | 12 | 14 | 25 |
| 25-Sep | 13 | 14 | 16 | 18 | 23 | 18 | 16 | 13 | 17 | 21 | 27 | 26 | 30 | 26 | 27 | 25 | 22 | 20 | 14 | 13 | 14 | 7 | 11 | 13 | 30 |
| 26-Sep | 14 | 17 | 22 | 18 | 19 | 17 | 16 | 17 | 23 | 26 | 25 | 25 | 24 | 23 | 19 | 20 | 12 | 15 | 86 | 33 | 46 | 33 | 15 | 10 | 86 |
| 27-Sep | 21 | 28 | 17 | 31 | 22 | 12 | 32 | 24 | 32 | 33 | 52 | 38 | 30 | 26 | 14 | 17 | 13 | 13 | 58 | 26 | 49 | 32 | 20 | 22 | 58 |
| 28-Sep | 20 | 14 | 29 | 55 | 20 | 33 | 25 | 69 | 66 | 17 | 17 | 20 | 19 | 20 | 17 | 16 | 16 | 13 | 11 | 11 | 11 | 10 | 11 | 12 | 69 |
| 29-Sep | 13 | 13 | 13 | 13 | 11 | 11 | 12 | 14 | 15 | 17 | 17 | 15 | 17 | 18 | 17 | 18 | 15 | 12 | 10 | 7 | 5 | 5 | 8 | 19 | 19 |
| 30-Sep | 49 | 73 | 27 | 39 | 68 | 34 | 53 | 46 | 41 | 31 | 27 | 29 | 33 | 26 | 27 | 20 | 19 | 21 | 17 | 18 | 19 | 20 | 21 | 22 | 73 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association

SO₂ Calibration Summary

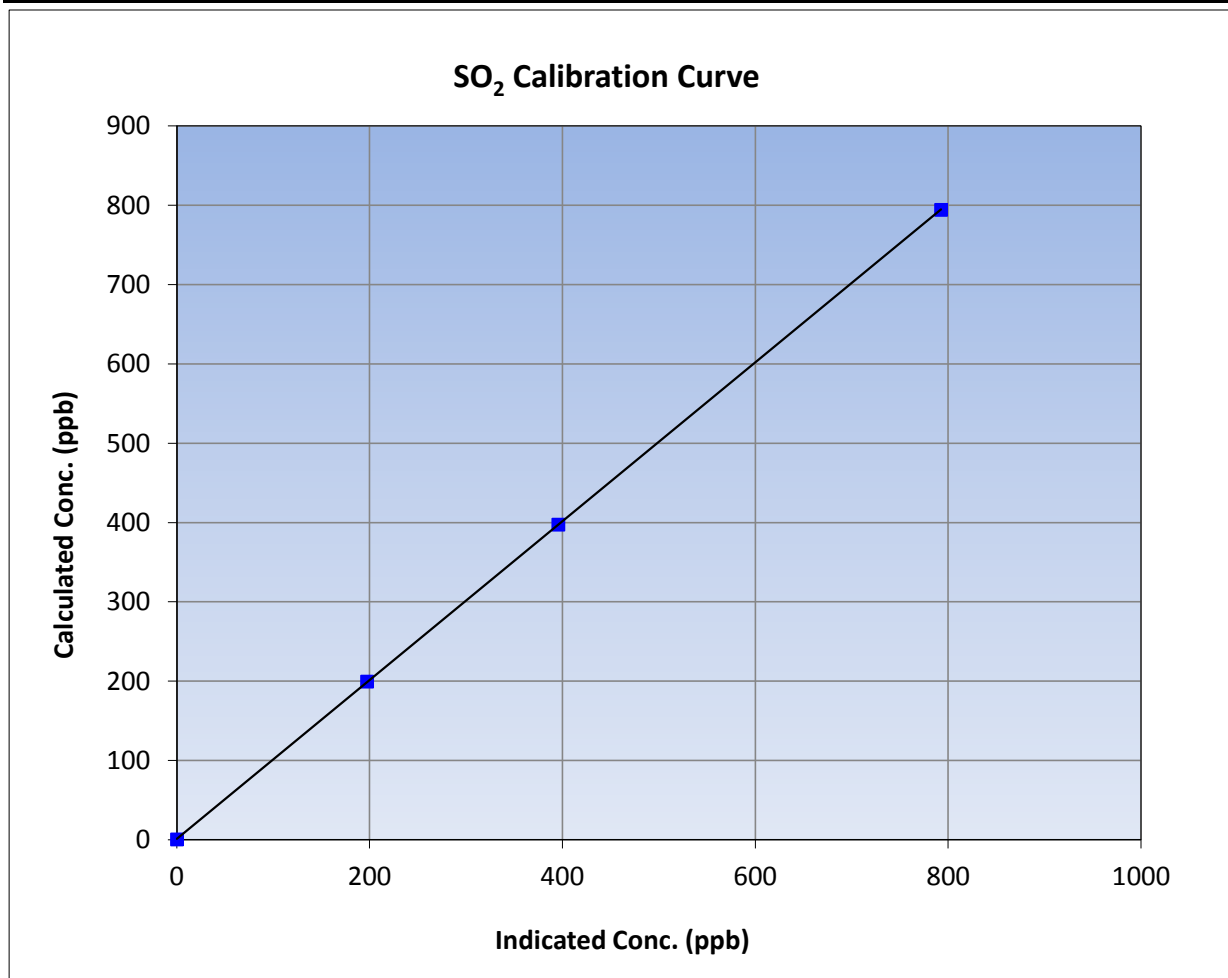
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Christina Lake | Station Number | AMS 500 |
| Start Time (MST) | 14:53 | End Time (MST) | 18:25 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1118148497 |

Calibration Data

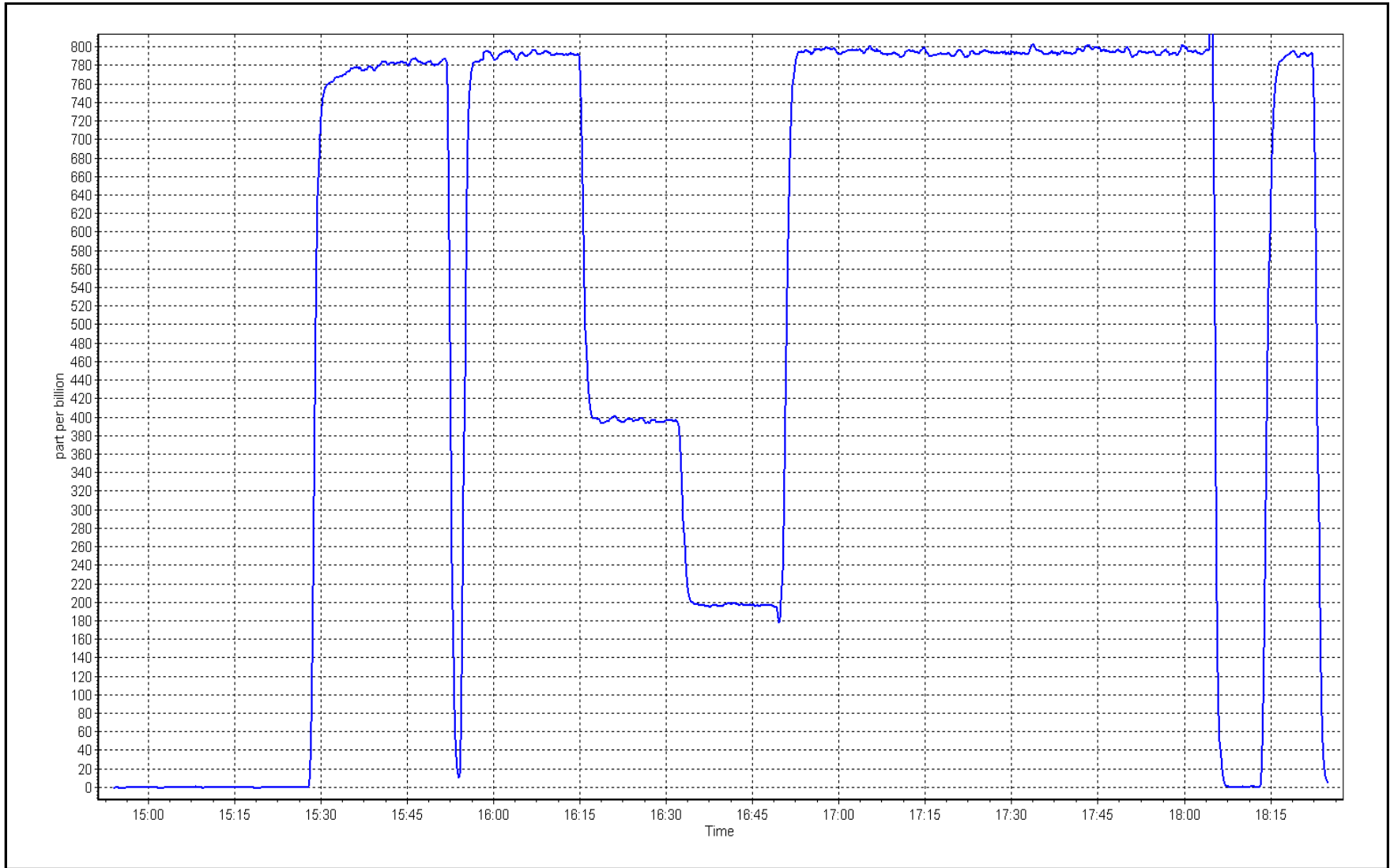
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999997 | ≥0.995 |
| 794.1 | 792.4 | 1.0021 | | | |
| 397.0 | 395.5 | 1.0039 | Slope | 1.001392 | 0.90 - 1.10 |
| 199.0 | 197.1 | 1.0097 | | | |
| | | | Intercept | 0.848962 | +/-30 |



SO2 Calibration Plot

Date: September 20, 2017

Location: Christina Lake





Wood Buffalo Environmental Association

H₂S Calibration Summary

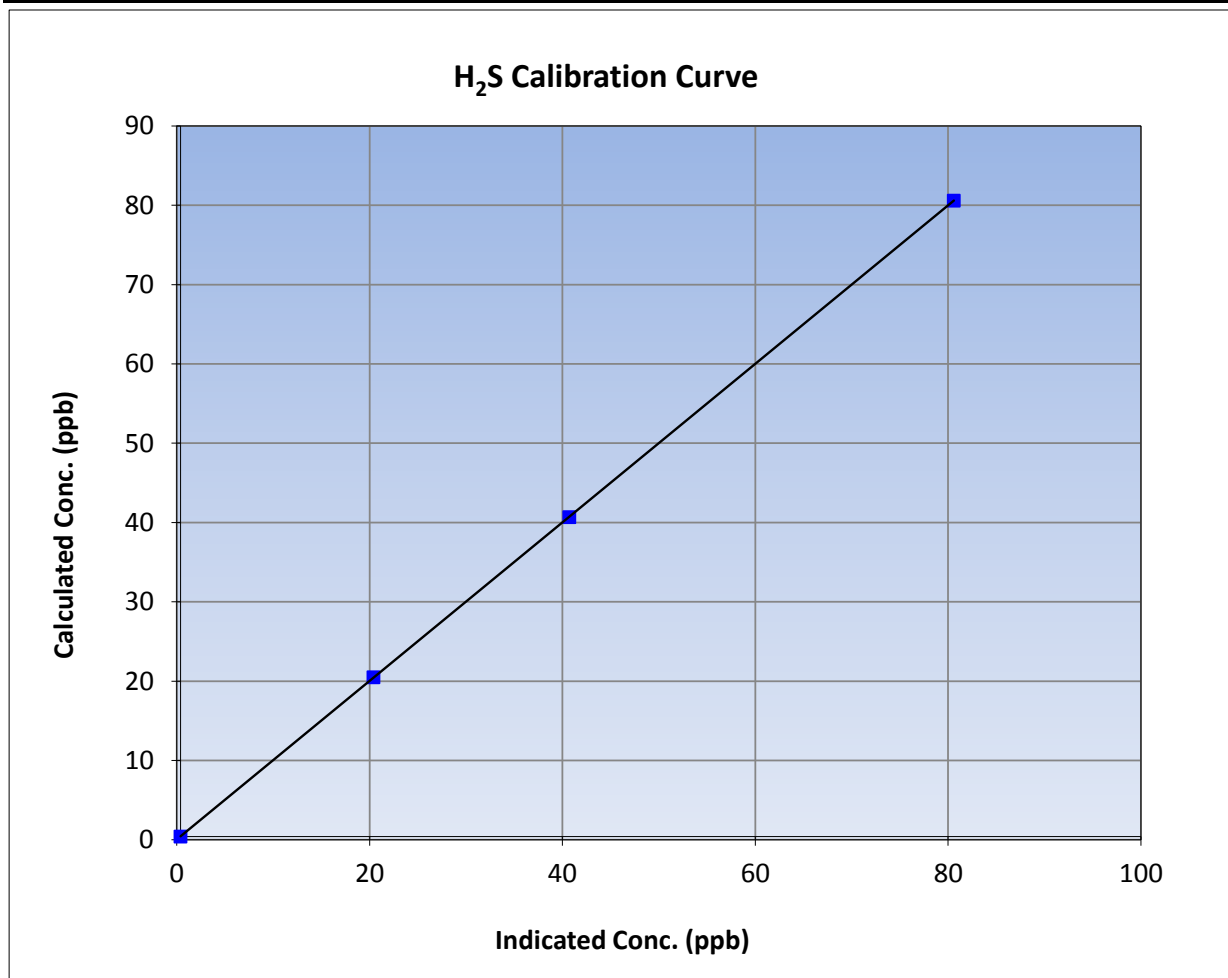
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2017 | Previous Calibration | August 16, 2017 |
| Station Name | Christina Lake | Station Number | AMS 500 |
| Start Time (MST) | 12:31 | End Time (MST) | 14:55 |
| Analyzer make | Thermo 43i- TLE | Analyzer serial # | 1008841400 |

Calibration Data

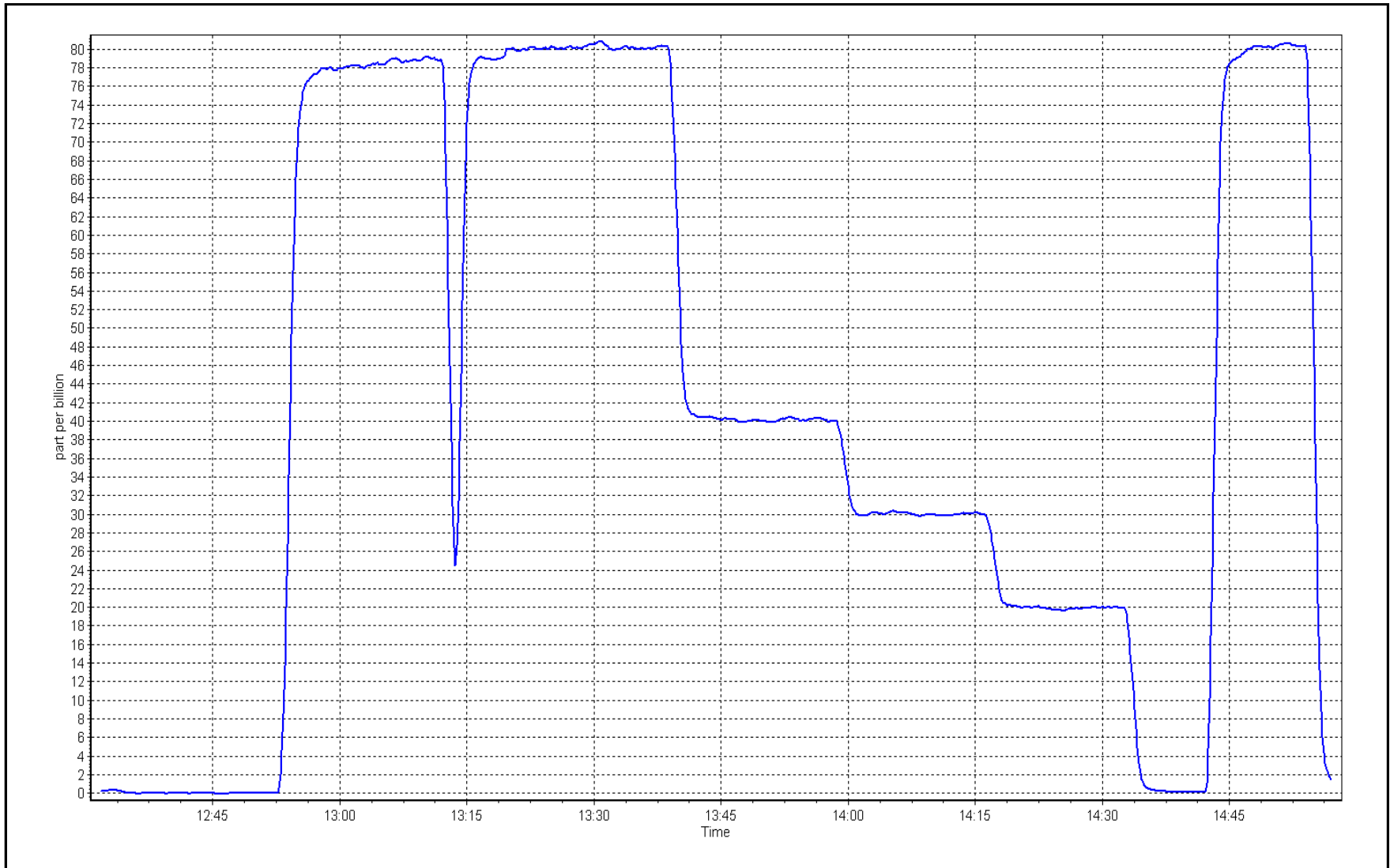
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999998 | ≥0.995 |
| 80.2 | 80.2 | 0.9999 | | | |
| 40.3 | 40.3 | 0.9999 | Slope | 0.999511 | 0.90 - 1.10 |
| 20.1 | 20.0 | 1.0048 | | | |
| | | | Intercept | 0.038089 | +/-3 |



H₂S Calibration Plot

Date: September 20, 2017

Location: Christina Lake





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Christina Lake | Station number: | AMS 500 |
| Calibration Date: | September 20, 2017 | Last Cal Date: | August 15, 2017 |
| Start time (MST): | 14:53 | End time (MST): | 18:25 |
| Reason: | Maintenance | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-------------------|
| NO Gas Cylinder # | LL107928 | Cal Gas Expiry Date | September 8, 2018 |
| NOX Cal Gas Conc. | <u>50.8</u> ppb | NO Cal Gas Conc. | <u>50.5</u> ppb |
| Calibrator Model | Teledyne API T700 | Serial Number | 1221 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4604 |

Analyzer Information

| | | | | | |
|----------------------------------|--------------|---------------|------------------------|--------------|---------------|
| Analyzer make: Teledyne API T200 | | | Analyzer serial #: 723 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.272 | 1.322 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 1.277 | 1.314 | Moly Temperature | 314.6 | 314.9 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 4.1 | 4.1 |
| NO bkgrnd | -0.4 | -0.4 | Sample Flow | 0.481 | 0.484 |
| NOX bkgrnd | 0.9 | 0.9 | PMT Voltage | 826.0 | 827.0 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.997935 | 1.000153 |
| NO _x Cal Offset | 1.066259 | 1.337325 |
| NO Cal Slope | 0.996778 | 1.000168 |
| NO Cal Offset | 0.586306 | 0.972210 |
| NO ₂ Cal Slope | 1.004267 | 1.008807 |
| NO ₂ Cal Offset | 1.122650 | -0.272177 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | ---- | ---- |
| as found span | 4920 | 79.4 | 806.8 | 802.0 | 4.8 | 778.0 | 775.4 | 2.6 | 1.0370 | 1.0344 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.1 | ---- | ---- |
| high point | 4920 | 79.4 | 806.8 | 802.0 | 4.8 | 805.7 | 801.1 | 4.6 | 1.0014 | 1.0012 |
| second point | 4960 | 39.7 | 403.4 | 401.0 | 2.4 | 402.4 | 400.4 | 2.1 | 1.0024 | 1.0015 |
| third point | 4980 | 19.9 | 202.2 | 201.0 | 1.2 | 198.5 | 198.4 | 0.1 | 1.0186 | 1.0131 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 1.6 | -0.9 | ---- | ---- |
| as left span | 4920 | 79.4 | 806.8 | 418.7 | 388.1 | 800.2 | 413.9 | 386.3 | 1.0082 | 1.0116 |
| Average Correction Factor | | | | | | | | | 1.0075 | 1.0052 |

| | | | | |
|--------------------|-----------------------------|----------------|-----------------|------------------------|
| Corrected As found | NO _x = 777.8 ppb | NO = 775.4 ppb | *Percent Change | NO _x = 3.8% |
| Previous Response | NO _x = 807.4 ppb | NO = 804.0 ppb | *Percent Change | NO = 3.7% |

* = > +/-5% change initiates investigation

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 4.8 | 805.1 | 801.2 | 3.9 | 1.0021 | 1.0010 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 418.7 | 387.3 | 802.9 | 418.7 | 384.2 | 1.0049 | ---- | 1.0080 | 99.2% |
| 2nd NO2 (200 ppb O3) | 610.6 | 195.4 | 804.2 | 610.6 | 193.6 | 1.0032 | ---- | 1.0091 | 99.1% |
| 3rd NO2 (100 ppb O3) | 704.4 | 101.6 | 806.3 | 704.4 | 101.4 | 1.0006 | ---- | 1.0016 | 99.8% |
| 2nd NO ref point | ---- | 4.8 | 807.0 | 805.0 | 5.0 | 0.9998 | 0.9963 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0021 | 0.9987 | 1.0062 | 99.4% |

Notes:

Sample inlet filter replaced after as founds. Adjusted span.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

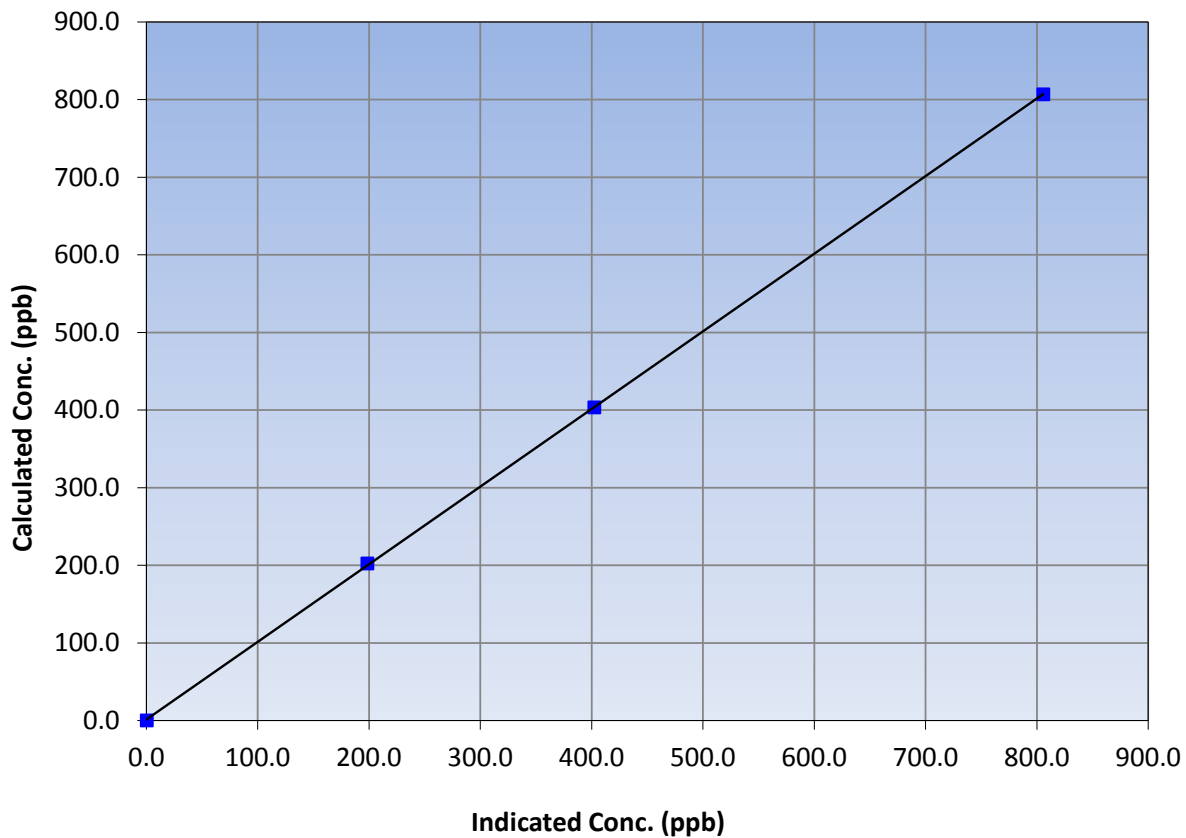
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Christina Lake | Station Number | AMS 500 |
| Start Time (MST) | 14:53 | End Time (MST) | 18:25 |
| Analyzer make | Teledyne API T200 | Analyzer serial # | 723 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 806.8 | 805.7 | 1.0014 | | | |
| 403.4 | 402.4 | 1.0024 | | | |
| 202.2 | 198.5 | 1.0186 | | | |
| | | | Slope | 1.000153 | 0.90 - 1.10 |
| | | | Intercept | 1.337325 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

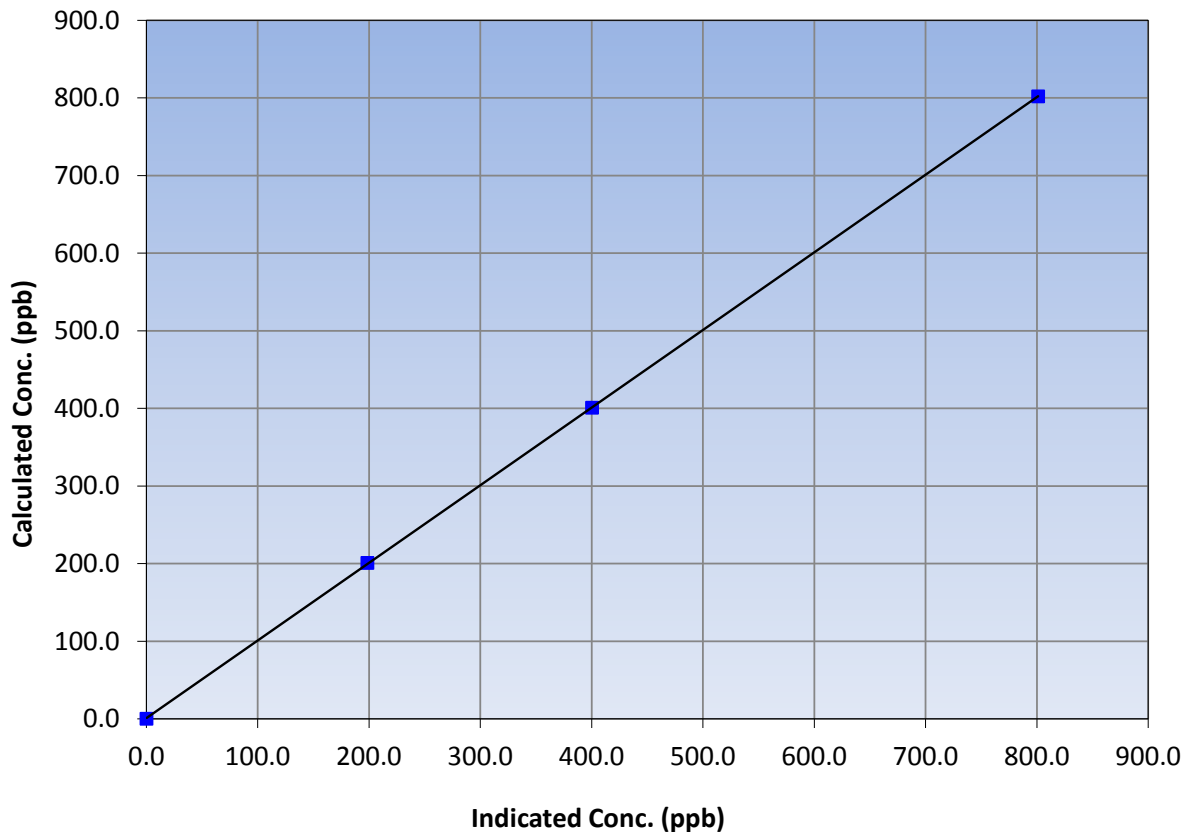
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Christina Lake | Station Number | AMS 500 |
| Start Time (MST) | 14:53 | End Time (MST) | 18:25 |
| Analyzer make | Teledyne API T200 | Analyzer serial # | 723 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 802.0 | 801.1 | 1.0012 | | | |
| 401.0 | 400.4 | 1.0015 | | | |
| 201.0 | 198.4 | 1.0131 | | | |
| | | | Slope | 1.000168 | 0.90 - 1.10 |
| | | | Intercept | 0.972210 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

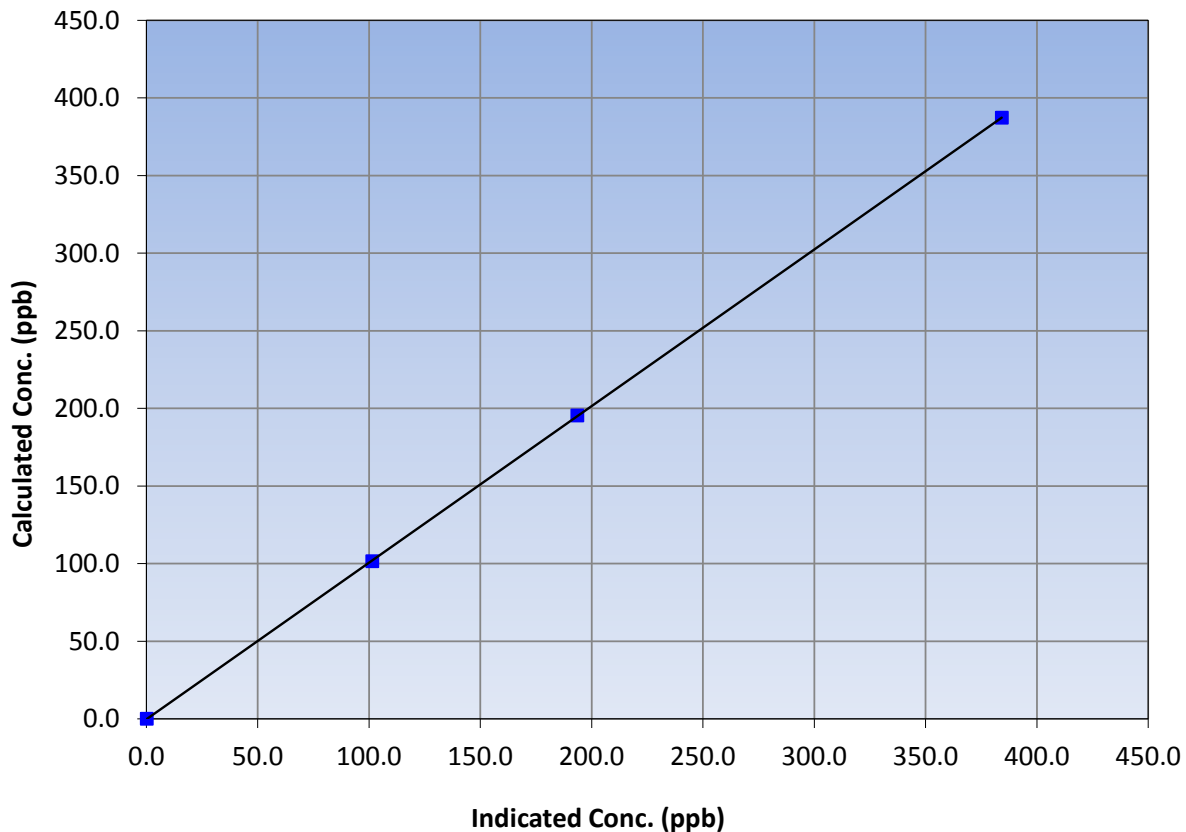
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2017 | Previous Calibration | August 15, 2017 |
| Station Name | Christina Lake | Station Number | AMS 500 |
| Start Time (MST) | 14:53 | End Time (MST) | 18:25 |
| Analyzer make | Teledyne API T200 | Analyzer serial # | 723 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 387.3 | 384.2 | 1.0080 | | | |
| 195.4 | 193.6 | 1.0091 | | | |
| 101.6 | 101.4 | 1.0016 | | | |
| | | | Slope | 1.008807 | 0.90 - 1.10 |
| | | | Intercept | -0.272177 | +/-20 |

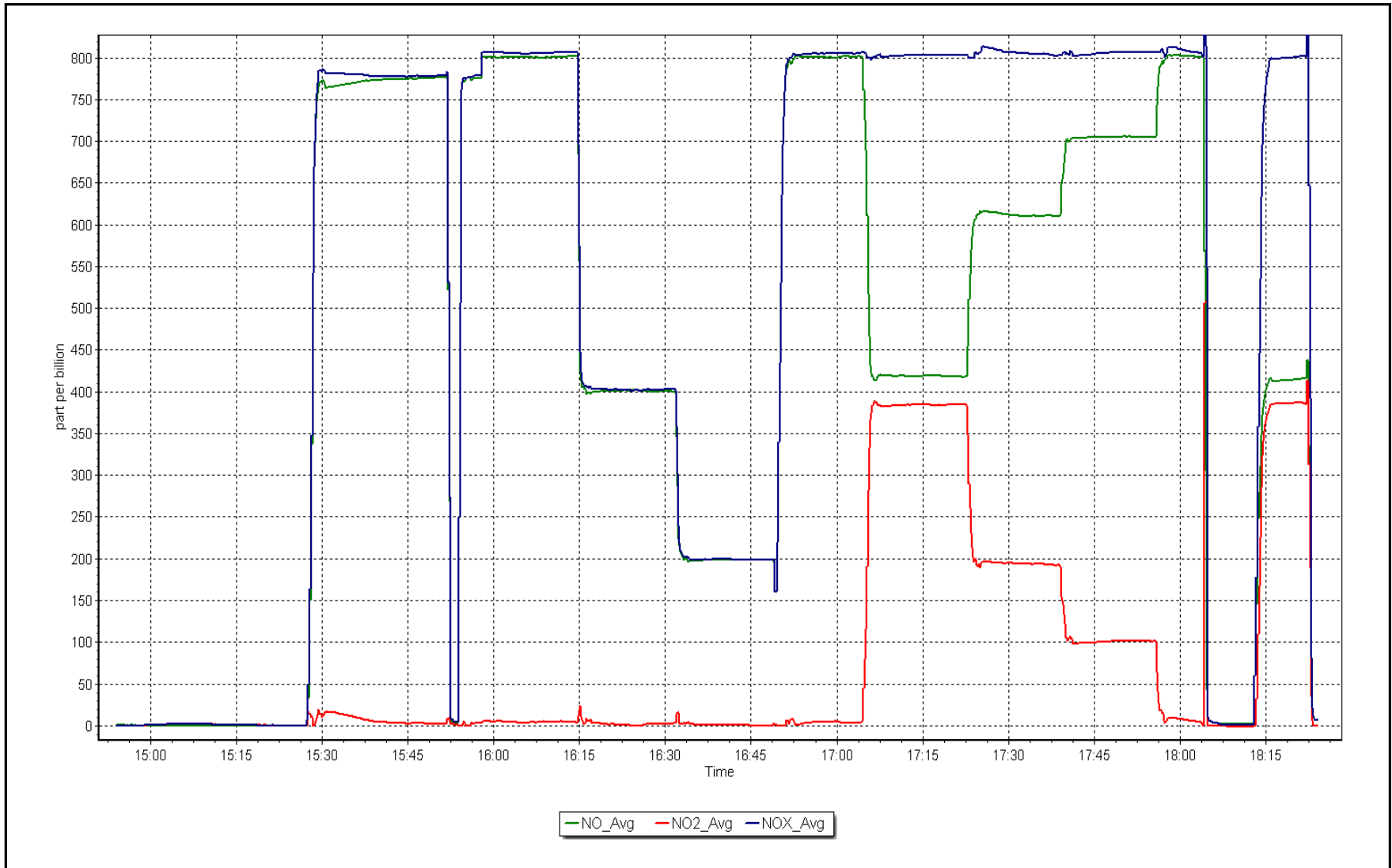
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 20, 2017

Location: Christina Lake





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 502 SURMONT SEPTEMBER 2017

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 423 | 25 | 25 | 100 | 13 | 0 | 4 | 0 |
| H2S (ppb) Average | 424 | 21 | 24 | 99.33 | 3 | 0 | 1 | 0 |
| NO2 (ppb) Average | 423 | 25 | 25 | 100 | 11 | 0 | 4 | - |
| NO (ppb) Average | 423 | 25 | 25 | 100 | 21 | - | 5 | - |
| NOX (ppb) Average | 423 | 25 | 25 | 100 | 31 | - | 8 | - |
| Temperature 2 m (C) Average | 448 | 0 | 0 | 100 | 27.9 | - | 22.3 | - |
| Relative Humidity (%) Average | 448 | 0 | 0 | 100 | 99 | - | 79 | - |
| Wind Speed 10 m (km/h) Average | 447 | 0 | 0 | 100 | 35 | - | 24 | - |
| Wind Direction 10 m (deg) Average | 447 | 0 | 0 | 100 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 423 | 0.9 | 2 | - | 0 | 0 | 0 | 0 | 1 | 2 | 13 |
| H2S (ppb) Average | 424 | 0.4 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| NO2 (ppb) Average | 423 | 1.8 | 2 | - | 0 | 0 | 1 | 1 | 2 | 4 | 11 |
| NO (ppb) Average | 423 | 1.1 | 2 | - | 0 | 0 | 0 | 0 | 1 | 3 | 21 |
| NOX (ppb) Average | 423 | 2.9 | 4 | - | 0 | 0 | 1 | 2 | 4 | 6 | 31 |
| Temperature 2 m (C) Average | 448 | 12.74 | 5.6 | - | 2.8 | 5.3 | 8.3 | 12.3 | 17.2 | 20.5 | 27.9 |
| Relative Humidity (%) Average | 448 | 61.1 | 17 | - | 26 | 38 | 48 | 61 | 74 | 83 | 99 |
| Wind Speed 10 m (km/h) Average | 447 | 13.7 | 6 | - | 1 | 6 | 8 | 13 | 18 | 23 | 35 |
| Wind Direction 10 m (deg) Average | 447 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT (AMS 502)
SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|---|
| H2S | 11 Sep 2017 12:00 | 11 Sep 2017 12:00 | 1 | Unstable operation - excessive baseline drift |
| H2S | 13 Sep 2017 21:00 | 13 Sep 2017 22:00 | 2 | Unstable operation - excessive baseline drift |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

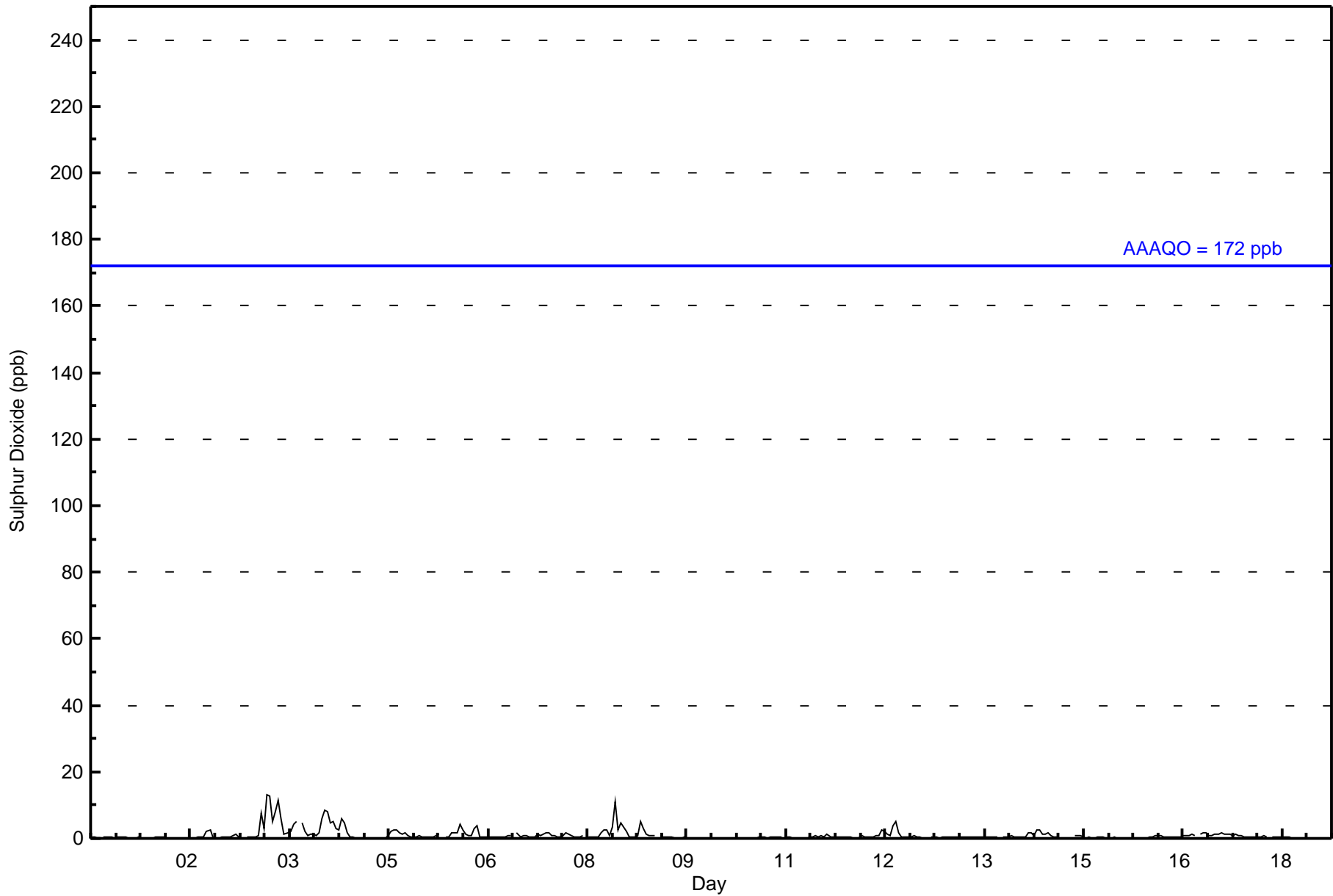
Surmont PAMS - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 ppb on Sep 3 14:00 Maximum Daily Average: 3.8 ppb on Sep 3 | | | | | | | | | | Hours in Service: 432 Hours of Data: 414 Hours of Missing Data: 18 Hours of Calibration: 18 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|---|---|---|---|---|---|---|--|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|---|
| Minimum Value: 0 ppb on Sep 2 11:00 Maximum Diurnal Average: 2.2 ppb at hour 15 Monthly Average: 1.0 ppb | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 10 Minimum Diurnal Average: 0.4 ppb at hour 20 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 2 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 | |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 3 | |
| 3-Sep | 0 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 8 | 3 | 13 | 13 | 5 | 8 | 11 | 6 | 1 | 2 | 2 | 4 | 5 | 3.8 | 13 | | |
| 4-Sep | Z | 5 | 2 | 1 | 1 | 1 | 1 | 2 | 6 | 8 | 8 | 5 | 5 | 3 | 2 | 6 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 2.7 | 8 | | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.8 | 2 | | |
| 6-Sep | 1 | 1 | Z | 1 | 0 | 2 | 2 | 2 | 4 | 2 | 1 | 1 | 1 | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1.2 | 4 | |
| 7-Sep | 1 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0.9 | 2 | |
| 8-Sep | 1 | 1 | 0 | 1 | Z | 1 | 0 | 1 | 0 | 2 | 3 | 2 | 1 | 4 | 11 | 3 | 5 | 3 | 2 | 1 | 0 | 0 | 1 | 5 | 2.0 | 11 | |
| 9-Sep | 3 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 12-Sep | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 4 | 5 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 1.1 | 5 | |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 0.9 | 2 | |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | |
| 17-Sep | 1 | Z | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.9 | 2 |
| 18-Sep | 1 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 0.7 0.7 0.5 0.5 0.6 0.5 0.4 0.6 1.0 1.1 1.1 1.4 1.0 1.7 2.2 1.4 1.7 1.5 0.8 0.4 0.5 0.6 0.7 1.0 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| 3 5 2 1 2 2 2 2 6 8 8 8 8 5 13 13 6 8 11 6 1 2 2 4 5 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Surmont PAMS - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Surmont PAMS - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 410 | 99.03 | 99.03 |
| 11 - 20 | 4 | 0.97 | 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: 414

Total Number of Hours: 432



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Surmont PAMS - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 26 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 42 | 20 | 35 | 58 | 68 | 52 | 16 | 25 | 410 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 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 | 26 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 42 | 20 | 35 | 58 | 68 | 53 | 18 | 26 | 414 |

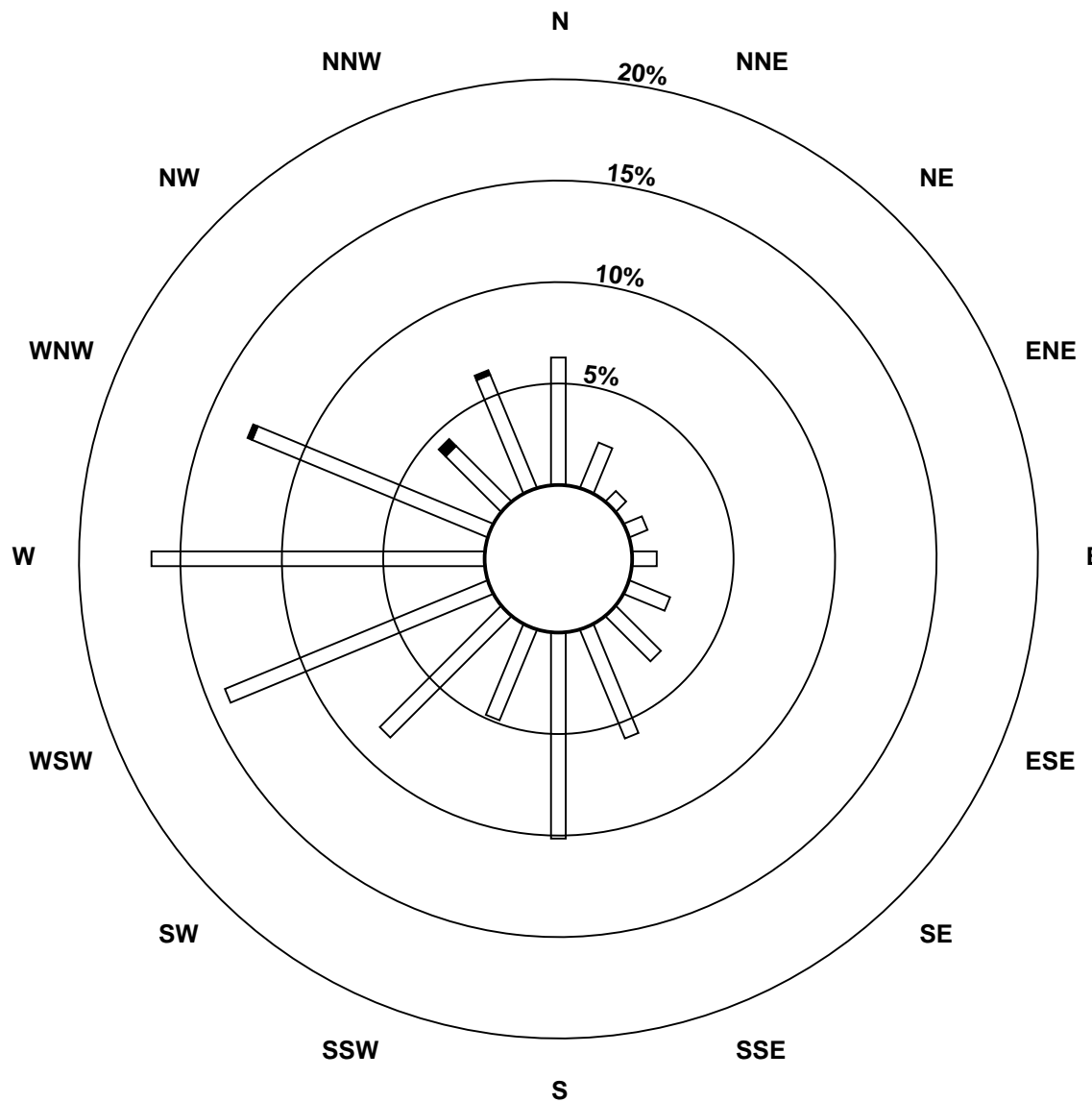
Total Number of Valid Hours: 414

Total Number of Hours: 432

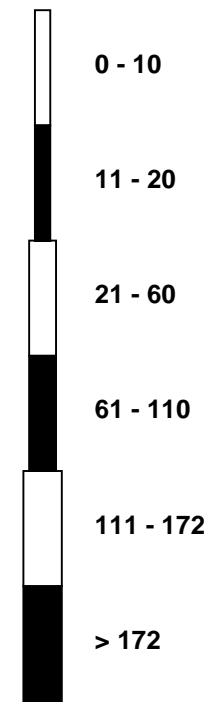


Wood Buffalo Environmental Association
Wind Rose Sep 2017

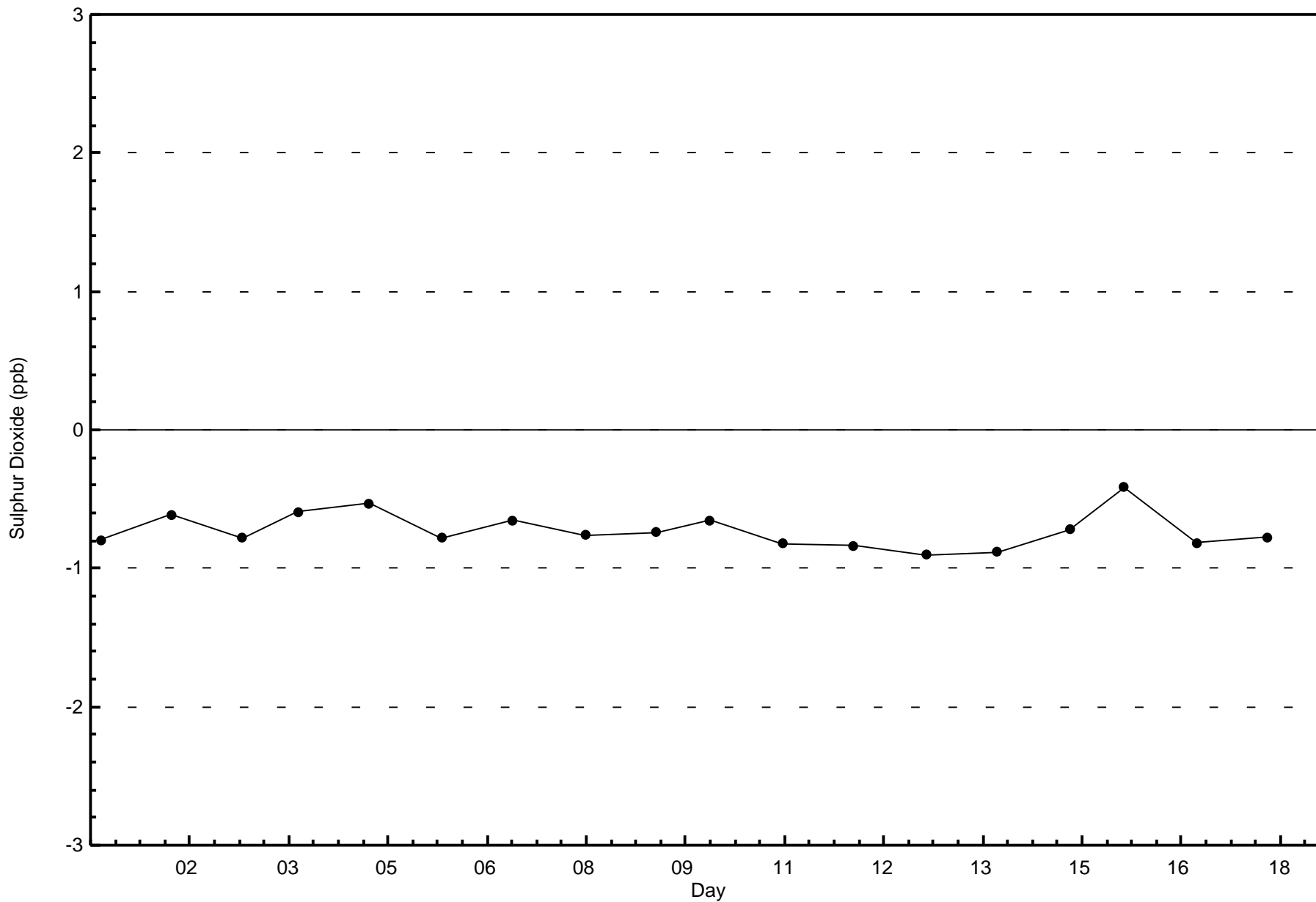
Sulphur Dioxide (SO₂) - ppb
Surmont PAMS (AMS 502)



Classes (ppb)



Total Number of Valid Hours: 414



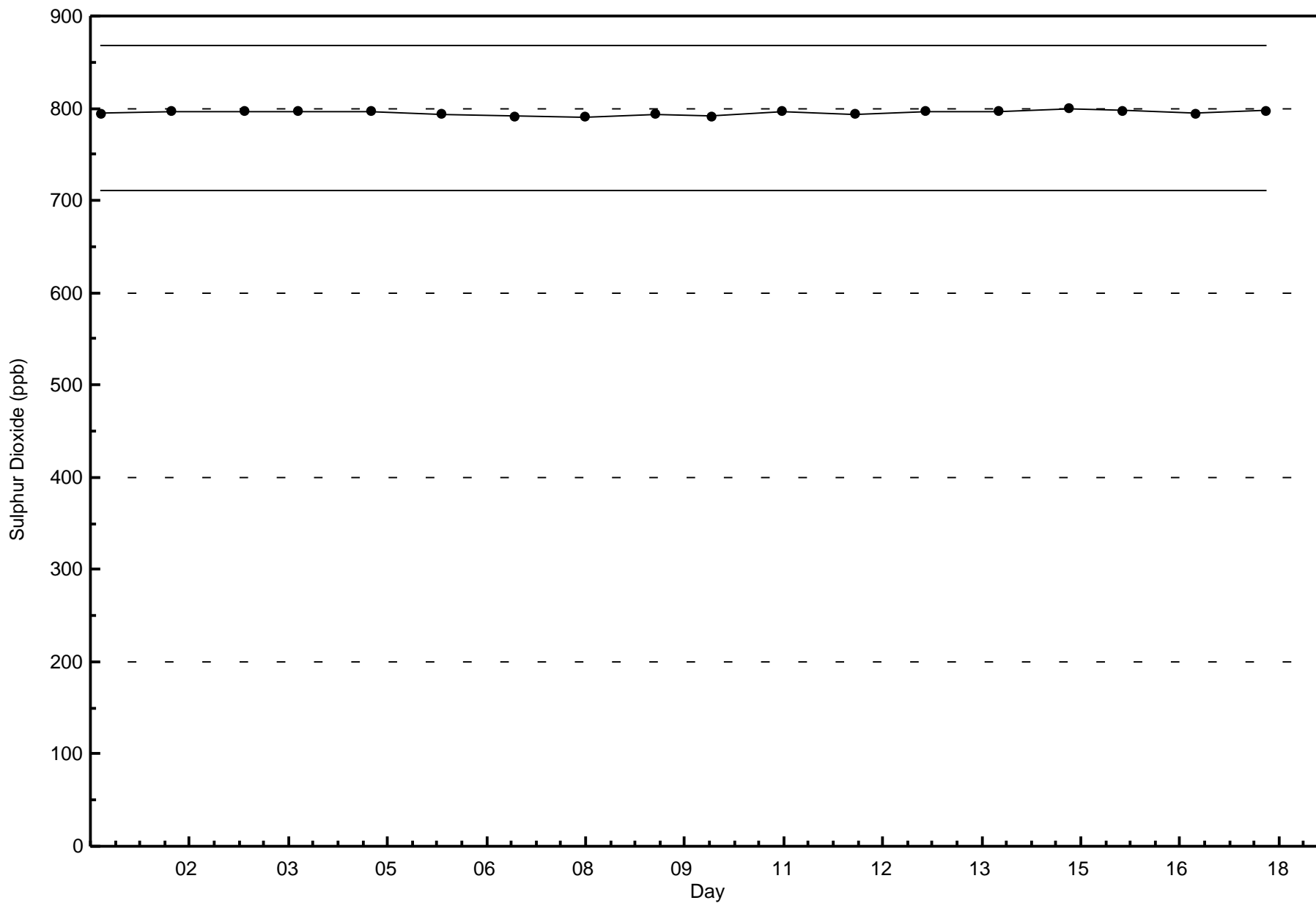


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO₂) - ppb

Surmont PAMS - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

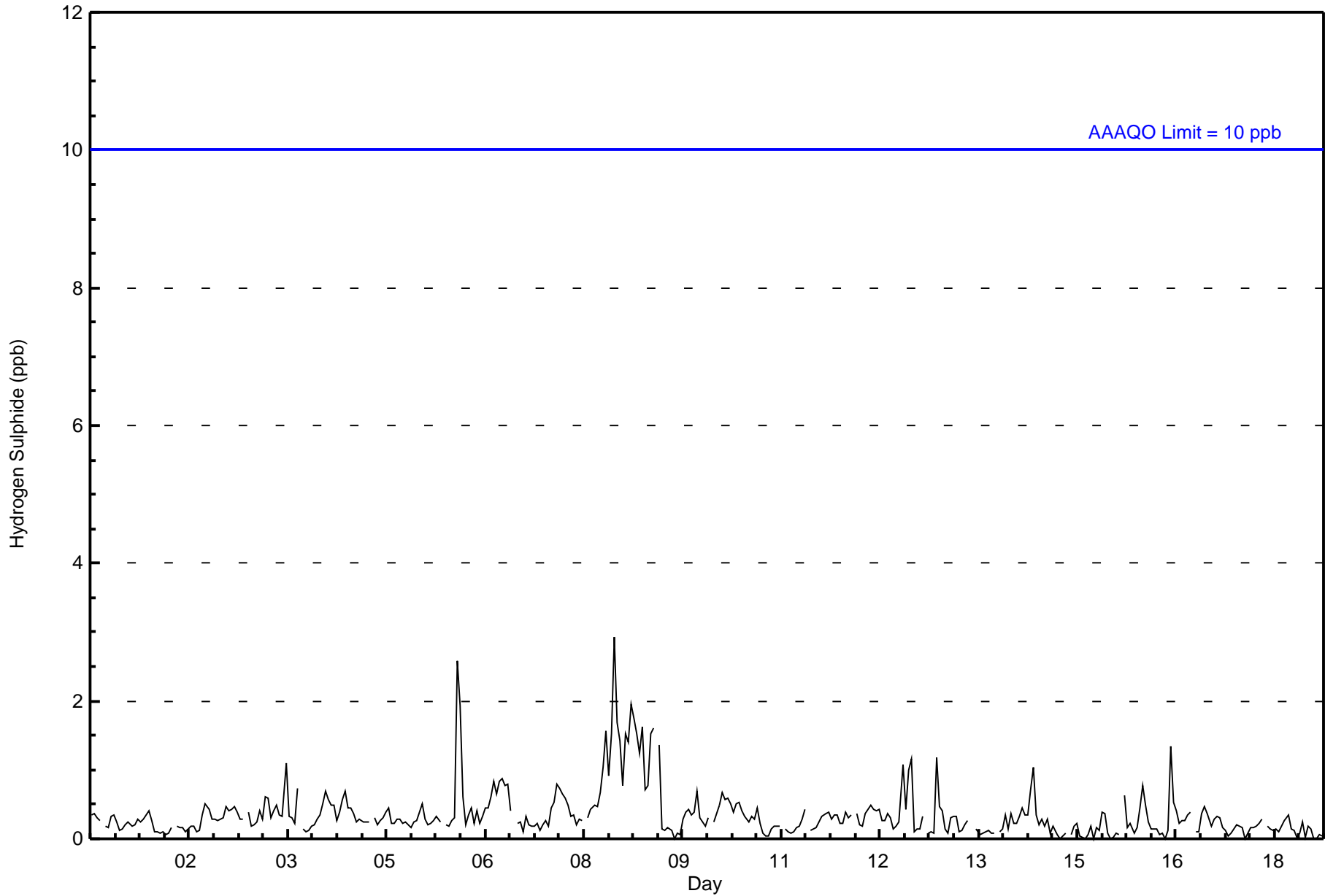
Hydrogen Sulphide (H₂S) - ppb
Surmont PAMS - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3 ppb on Sep 8 16:00 Maximum Daily Average: 1.0 ppb on Sep 8 | | | | | | | | | | Hours in Service: 432 Hours of Data: 411 Hours of Missing Data: 21 Hours of Calibration: 18 Percent Operational Time: 99.3 | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|---|---|---|---|---|---|---|--|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 9 13:00 Maximum Diurnal Average: 0.5 ppb at hour 9 Monthly Average: 0.4 ppb | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 15 Minimum Diurnal Average: 0.2 ppb at hour 7 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-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 1 |
| 4-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.3 | 1 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.6 | 3 |
| 7-Sep | 1 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0.4 | 1 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1.0 | 3 |
| 9-Sep | 1 | 2 | 1 | 1 | 2 | 2 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.6 | 2 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | UO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0.4 | 1 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | UO | UO | 0 | 0 | 0.2 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 15-Sep | 0 | 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-Sep | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 17-Sep | 0 | 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-Sep | 0 | 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 |
| 0.3 0.4 0.3 0.3 0.3 0.3 0.2 0.3 0.5 0.4 0.3 0.3 0.3 0.3 0.3 0.4 0.4 0.4 0.4 0.4 0.5 0.4 0.4 0.4 1 2 1 1 2 2 1 1 3 2 1 1 2 1 2 3 2 1 1 2 1 2 2 2 2 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| Z - zerospan UO - Unstable Operation Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Surmont PAMS - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Surmont PAMS - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 409 | 99.51 | 99.51 |
| 3 - 4 | 2 | 0.49 | 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: 411

Total Number of Hours: 432



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Surmont PAMS - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 26 | 10 | 3 | 4 | 5 | 9 | 12 | 24 | 41 | 21 | 34 | 56 | 69 | 53 | 18 | 24 | 409 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 10 | 3 | 4 | 5 | 9 | 12 | 24 | 41 | 21 | 34 | 56 | 69 | 53 | 18 | 26 | 411 |

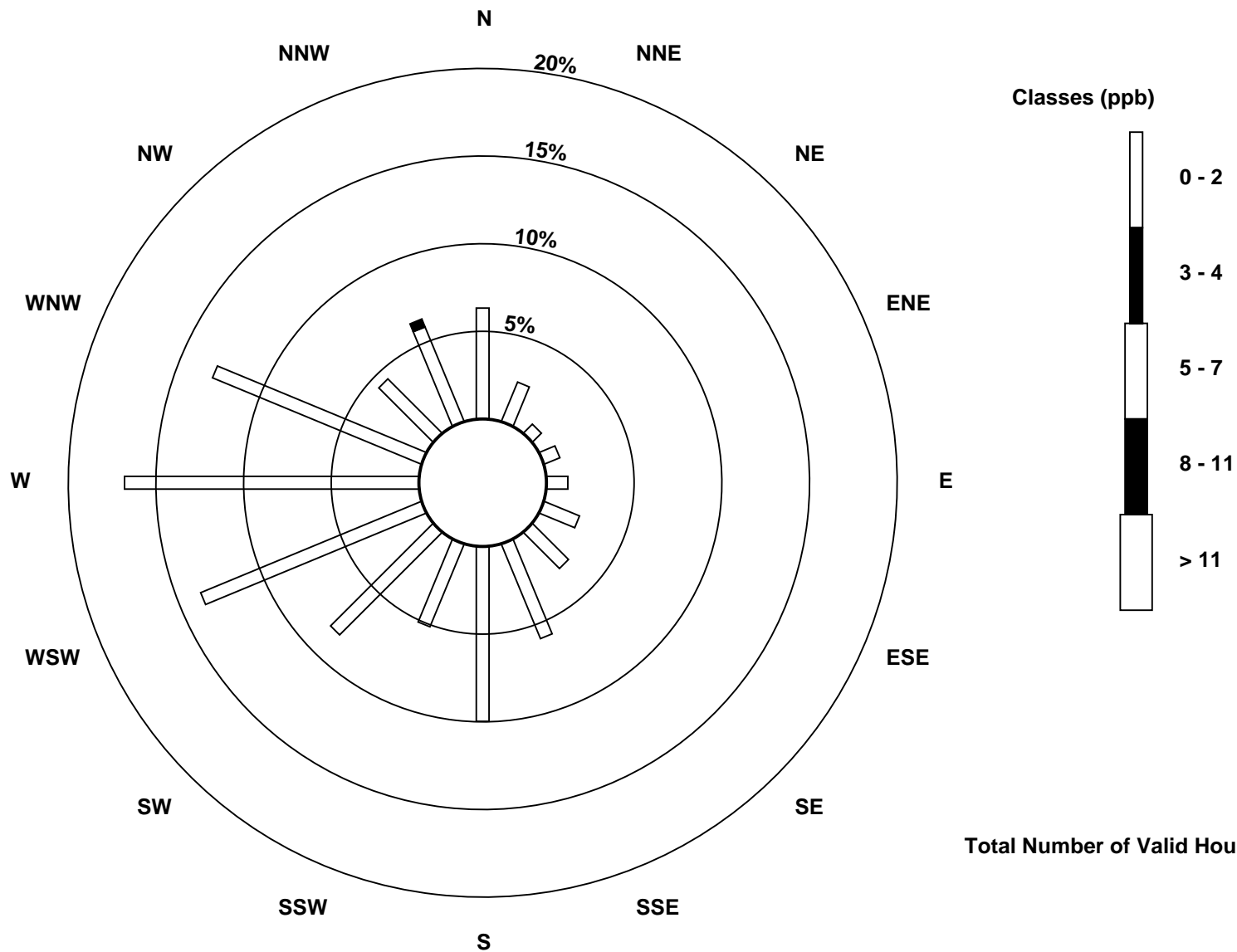
Total Number of Valid Hours: 411

Total Number of Hours: 432

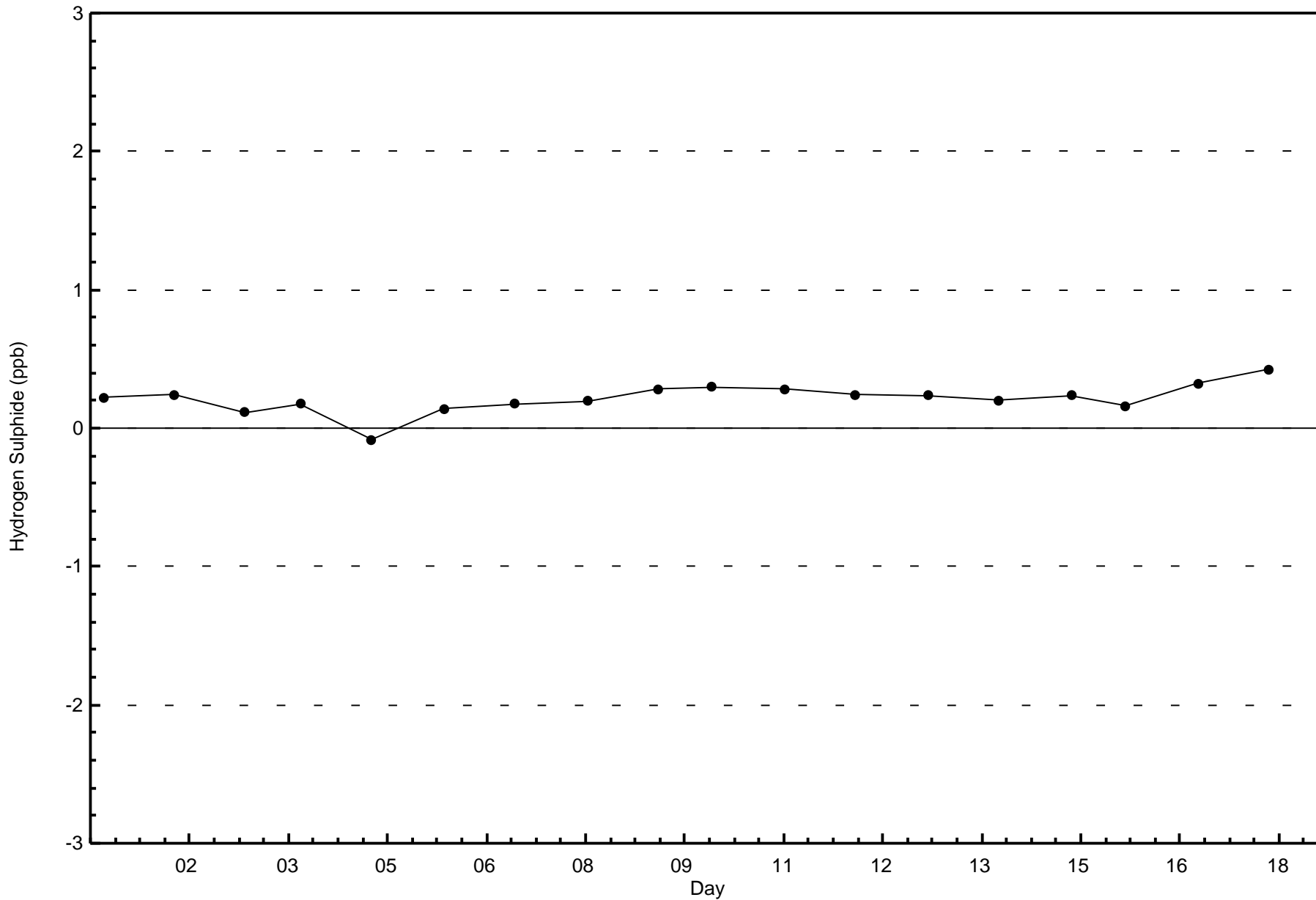


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Hydrogen Sulphide (H₂S) - ppb
Surmont PAMS (AMS 502)



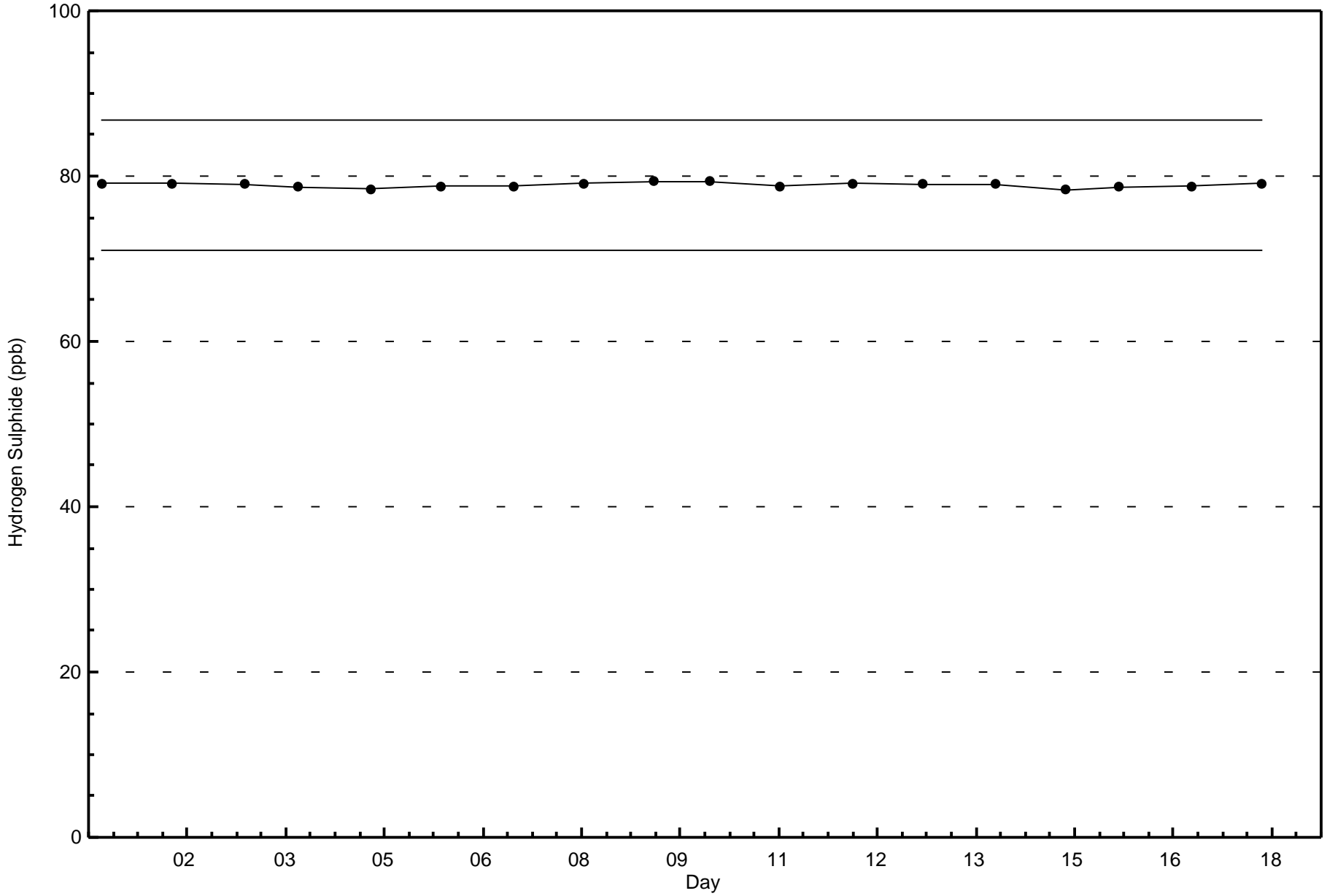
Total Number of Valid Hours: 411





Wood Buffalo Environmental Association
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Surmont PAMS - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxide (NO) - ppb

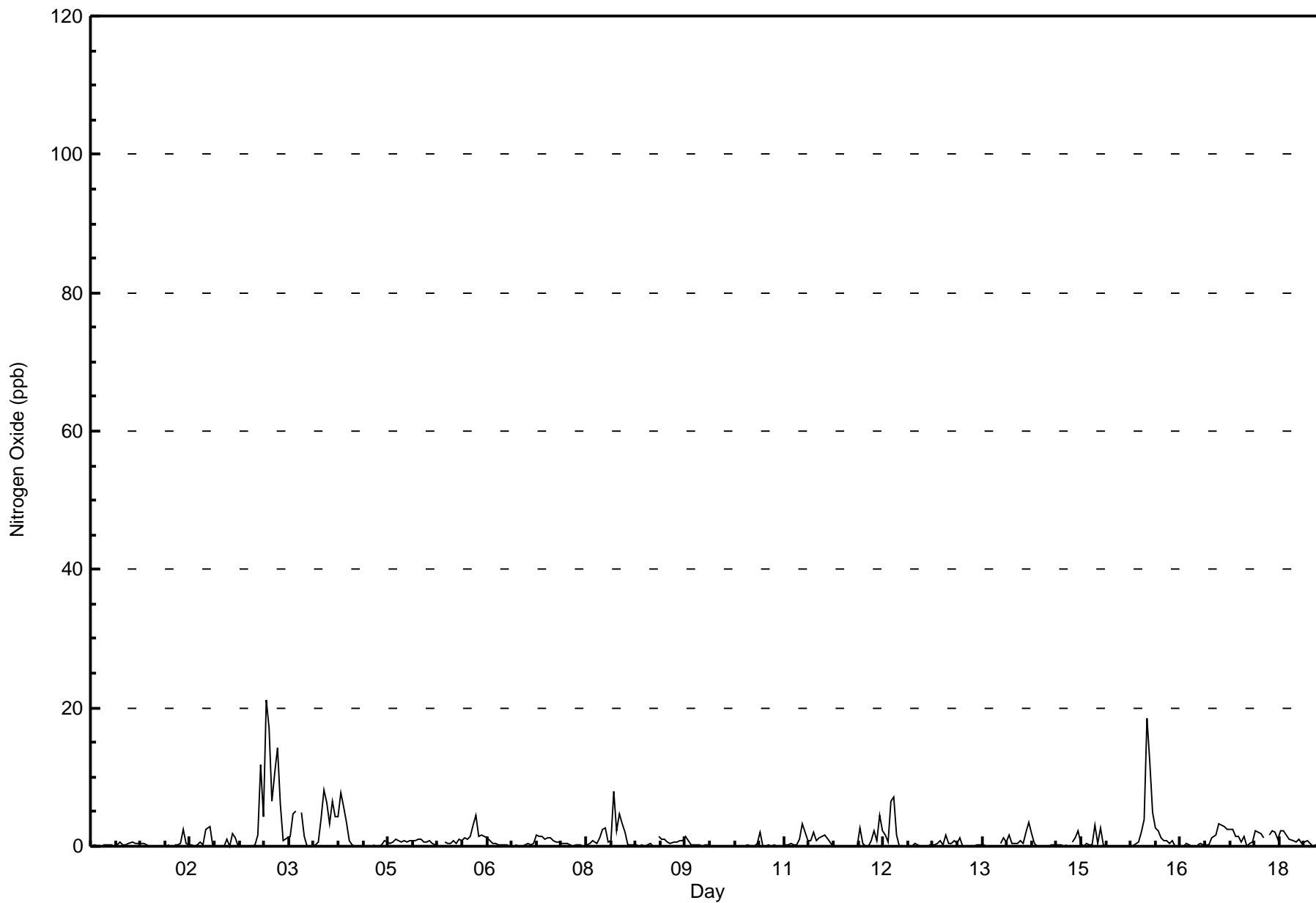
Surmont PAMS - September 2017

| Maximum Value: 21 ppb on Sep 3 14:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 4.8 ppb on Sep 3 | | | | | | | | | | | | | | | | | Hours in Service: 432 | | | |
|---|-------------------------------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|-----|---------------|---------------|--|--|--|--|--|--|--|---------------------------------|--|--|--|
| Minimum Value: 0 ppb on Sep 1 22:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 10 | | | | | | | | | | | | | | | | | Hours of Data: 414 | | | |
| Maximum Diurnal Average: 2.7 ppb at hour 15 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.2 ppb at hour 21 | | | | | | | | | | | | | | | | | Hours of Missing Data: 18 | | | |
| Monthly Average: 1.1 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 12 | | | | | | | | | | | | | | | | | Hours of Calibration: 18 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | | |
| 2-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 3 | | | | | | | | | | | |
| 3-Sep | 0 | 2 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 12 | 4 | 21 | 17 | 7 | 11 | 14 | 6 | 1 | 1 | 1 | 5 | 5 | 4.8 | 21 | | | | | | | | | | | |
| 4-Sep | Z | 5 | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 8 | 6 | 3 | 6 | 4 | 4 | 8 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 2.7 | 8 | | | | | | | | | | | | |
| 5-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 | | | | | | | | | | | | |
| 6-Sep | 0 | 0 | Z | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1.0 | 4 | | | | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.6 | 2 | | | | | | | | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 1 | 2 | 3 | 1 | 1 | 8 | 2 | 5 | 3 | 2 | 0 | 0 | 0 | 0 | 1.4 | 8 | | | | | | | | | | | | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | | | | | | | | | | |
| 10-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0.1 | 2 | | | | | | | | | | | | |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 | | | | | | | | | | | | |
| 12-Sep | 0 | 0 | Z | 0 | 3 | 0 | 0 | 0 | 1 | 2 | 1 | 4 | 2 | 2 | 1 | 7 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 1.4 | 7 | | | | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 2 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 4 | | | | | | | | | | | | |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | | | | | | | | | | | | |
| 16-Sep | Z | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 18 | 12 | 5 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2.3 | 18 | | | | | | | | | | | | |
| 17-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1.3 | 3 | | | | | | | | | | | | |
| 18-Sep | 2 | 1 | Z | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 2 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0.2 0.6 0.3 0.2 0.5 0.3 0.5 0.8 2.3 1.9 1.5 2.0 1.5 2.3 2.7 2.1 2.5 1.9 0.8 0.2 0.2 0.2 0.5 0.6 | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | 2 5 1 2 3 2 2 4 18 12 6 12 6 21 17 8 11 14 6 1 1 1 5 5 | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerspan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Surmont PAMS - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Surmont PAMS - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 413 | 99.76 | 99.76 |
| 21 - 40 | 1 | 0.24 | 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: 414

Total Number of Hours: 432



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Surmont PAMS - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 26 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 42 | 20 | 35 | 58 | 68 | 53 | 17 | 26 | 413 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 42 | 20 | 35 | 58 | 68 | 53 | 18 | 26 | 414 |

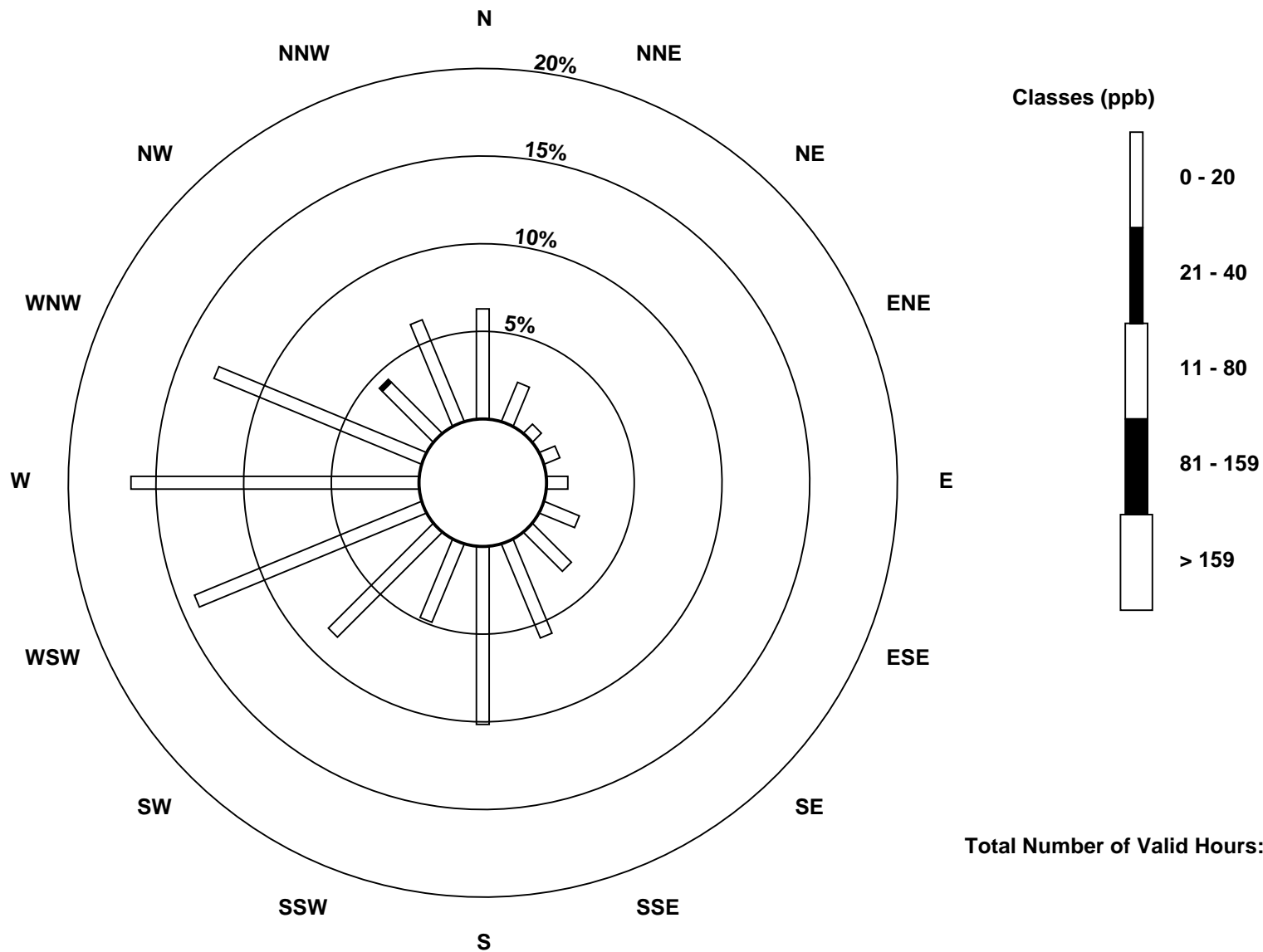
Total Number of Valid Hours: 414

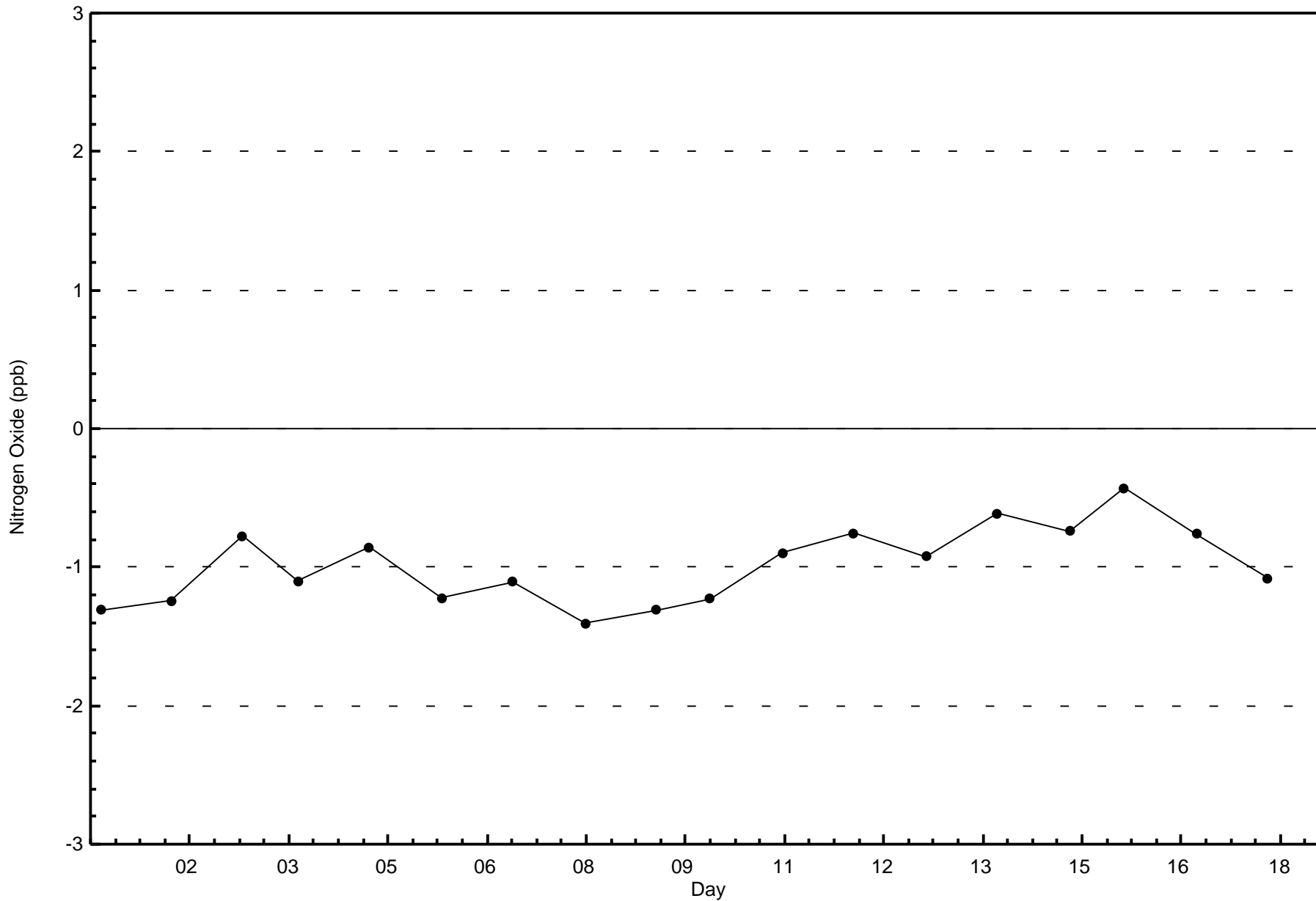
Total Number of Hours: 432



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxide (NO) - ppb
Surmont PAMS (AMS 502)

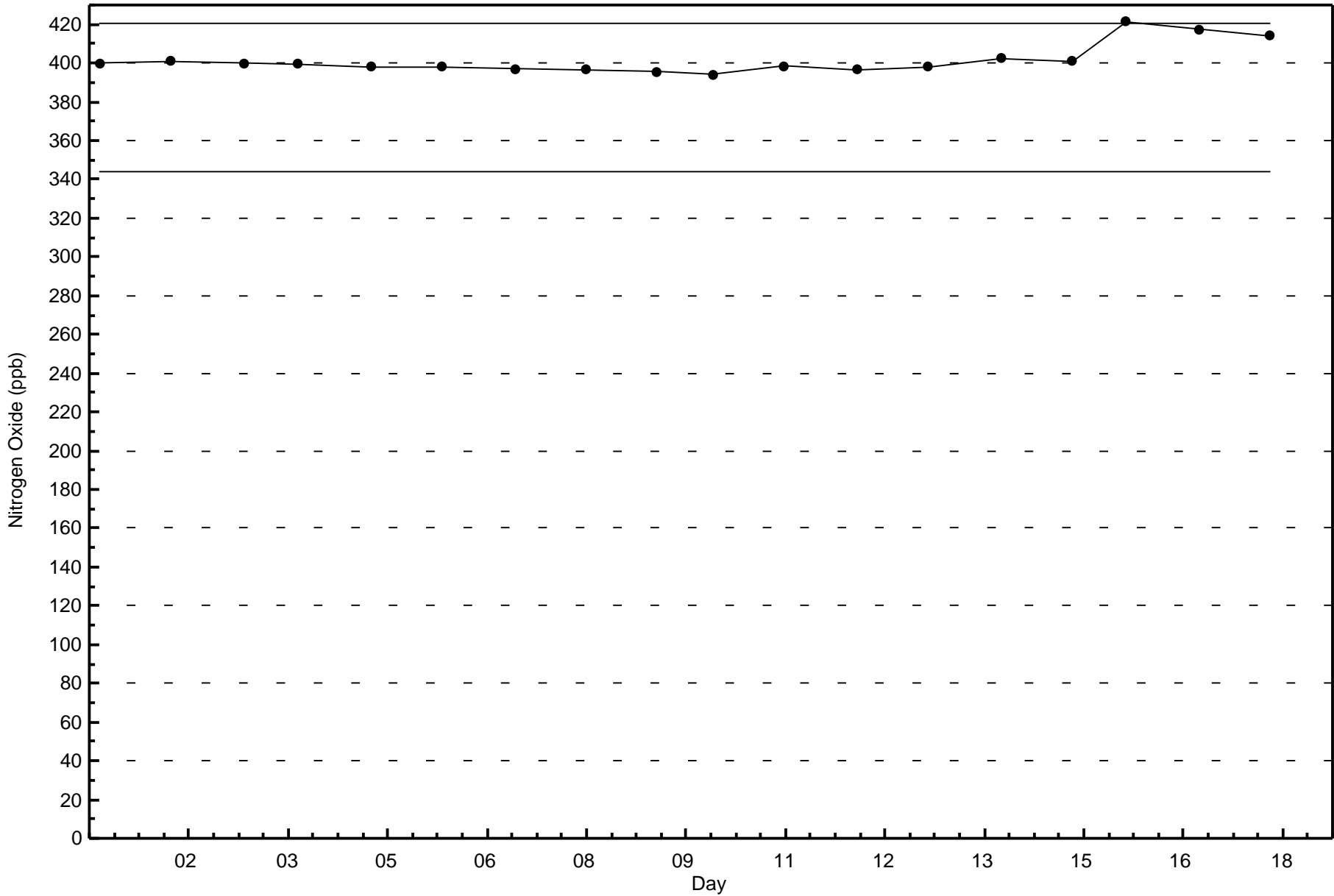






Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxide (NO) - ppb
Surmont PAMS - September 2017





Wood Buffalo Environmental Association

Summary of Hour Averages

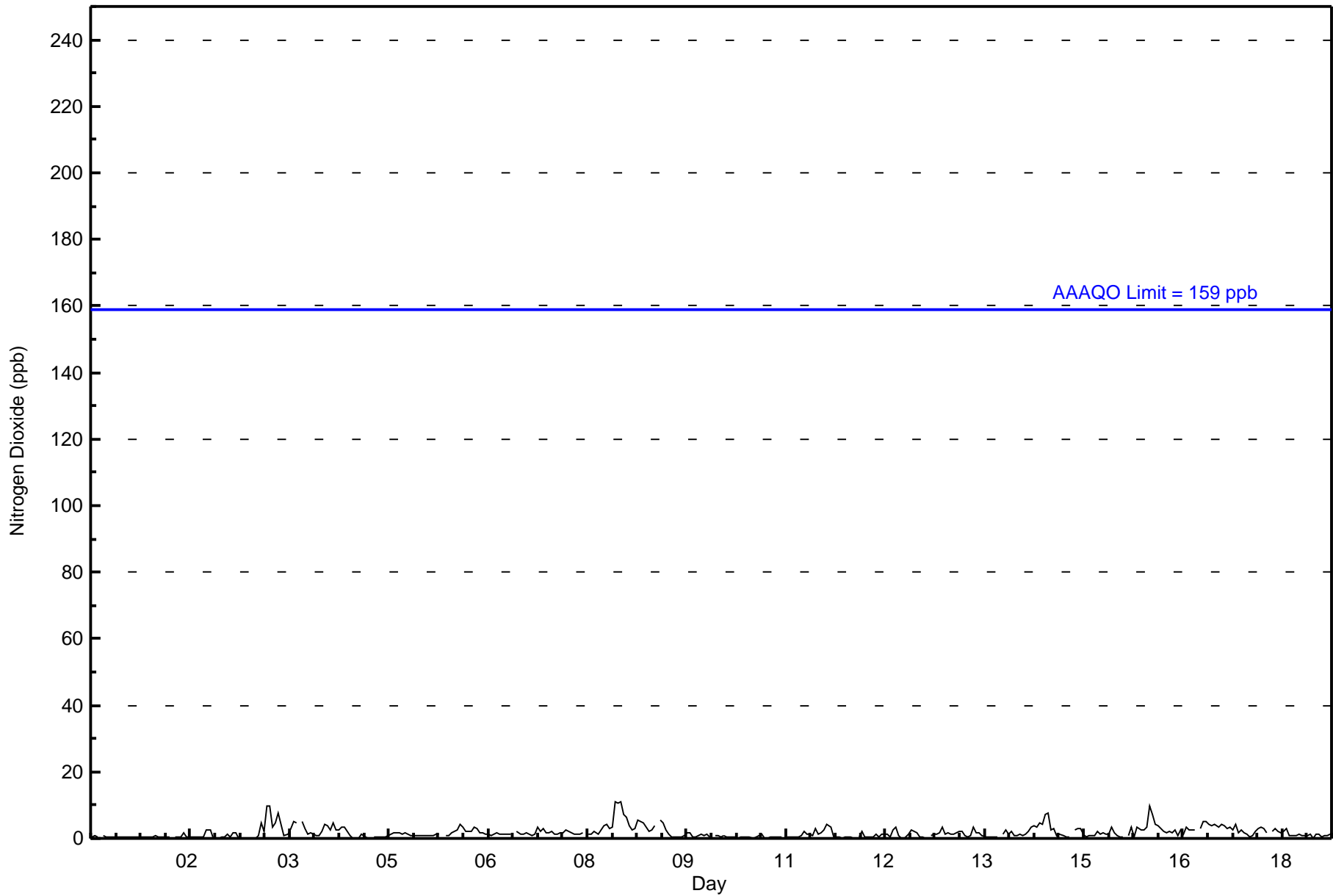
**Nitrogen Dioxide (NO₂) - ppb
Surmont PAMS - September 2017**

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 ppb on Sep 8 15:00 Maximum Daily Average: 4.1 ppb on Sep 8 | | | | | | | | | | Hours in Service: 432 Hours of Data: 414 Hours of Missing Data: 18 Hours of Calibration: 18 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | |
|--|-------------------------------|---|---|---|---|---|---|---|----|--|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|--|
| Minimum Value: 0 ppb on Sep 2 19:00 Maximum Diurnal Average: 2.7 ppb at hour 17 Monthly Average: 1.8 ppb | | | | | | | | | | Minimum Daily Average: 0.4 ppb on Sep 10 Minimum Diurnal Average: 1.2 ppb at hour 4 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 4 P ₉₉ = 9 | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 1 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0.5 | 1 | |
| 2-Sep | 1 | 1 | 0 | 0 | Z | 0 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0.7 | 3 | |
| 3-Sep | 0 | 2 | 2 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 5 | 2 | 10 | 10 | 3 | 5 | 8 | 4 | 1 | 1 | 3 | 5 | 5 | 2.9 | 10 | |
| 4-Sep | Z | 5 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 4 | 4 | 2 | 5 | 2 | 2 | 4 | 4 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 2.1 | 5 | |
| 5-Sep | 0 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 | |
| 6-Sep | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 4 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1.9 | 4 | |
| 7-Sep | 1 | 1 | 1 | Z | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 1.7 | 3 | |
| 8-Sep | 1 | 1 | 1 | 2 | Z | 1 | 1 | 2 | 1 | 3 | 4 | 4 | 3 | 4 | 11 | 11 | 11 | 7 | 6 | 4 | 3 | 3 | 5 | 5 | 4.1 | 11 | |
| 9-Sep | 5 | 3 | 2 | 2 | 4 | Z | 6 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.8 | 6 | |
| 10-Sep | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0.4 | 1 | |
| 11-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 3 | 1 | 2 | 3 | 4 | 4 | 1 | 1 | 0 | 0 | 0 | 1 | 1.2 | 4 | |
| 12-Sep | 1 | 0 | Z | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 0 | 0 | 1 | 3 | 2 | 2 | 1.1 | 3 | |
| 13-Sep | 1 | 0 | 0 | Z | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 0 | 1 | 4 | 2 | 2 | 1 | 1 | 1.4 | 4 | |
| 14-Sep | 1 | 1 | 0 | 0 | Z | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 4 | 4 | 5 | 4 | 7 | 8 | 3 | 3 | 2.4 | 8 | |
| 15-Sep | 1 | 1 | 1 | 0 | 1 | Z | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 4 | 2 | 1 | 0 | 0 | 1.3 | 4 | |
| 16-Sep | Z | 1 | 3 | 1 | 3 | 2 | 3 | 3 | 10 | 7 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 2.9 | 10 | |
| 17-Sep | 3 | Z | 3 | 5 | 5 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 4 | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 3.0 | 5 | |
| 18-Sep | 3 | 2 | Z | 2 | 3 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1.4 | 3 | |
| 1.2 1.4 1.2 1.7 1.3 1.6 1.8 2.3 1.8 1.6 1.8 1.7 2.1 2.6 2.3 2.7 2.2 1.5 1.4 1.3 1.8 1.8 1.7 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| 5 5 3 5 5 4 6 5 10 7 4 5 5 10 11 11 11 8 6 4 7 8 5 5 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Surmont PAMS - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont PAMS - September 2017**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 414 | 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: 414

Total Number of Hours: 432



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont PAMS - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 26 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 42 | 20 | 35 | 58 | 68 | 53 | 18 | 26 | 414 |
| 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 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 42 | 20 | 35 | 58 | 68 | 53 | 18 | 26 | 414 |

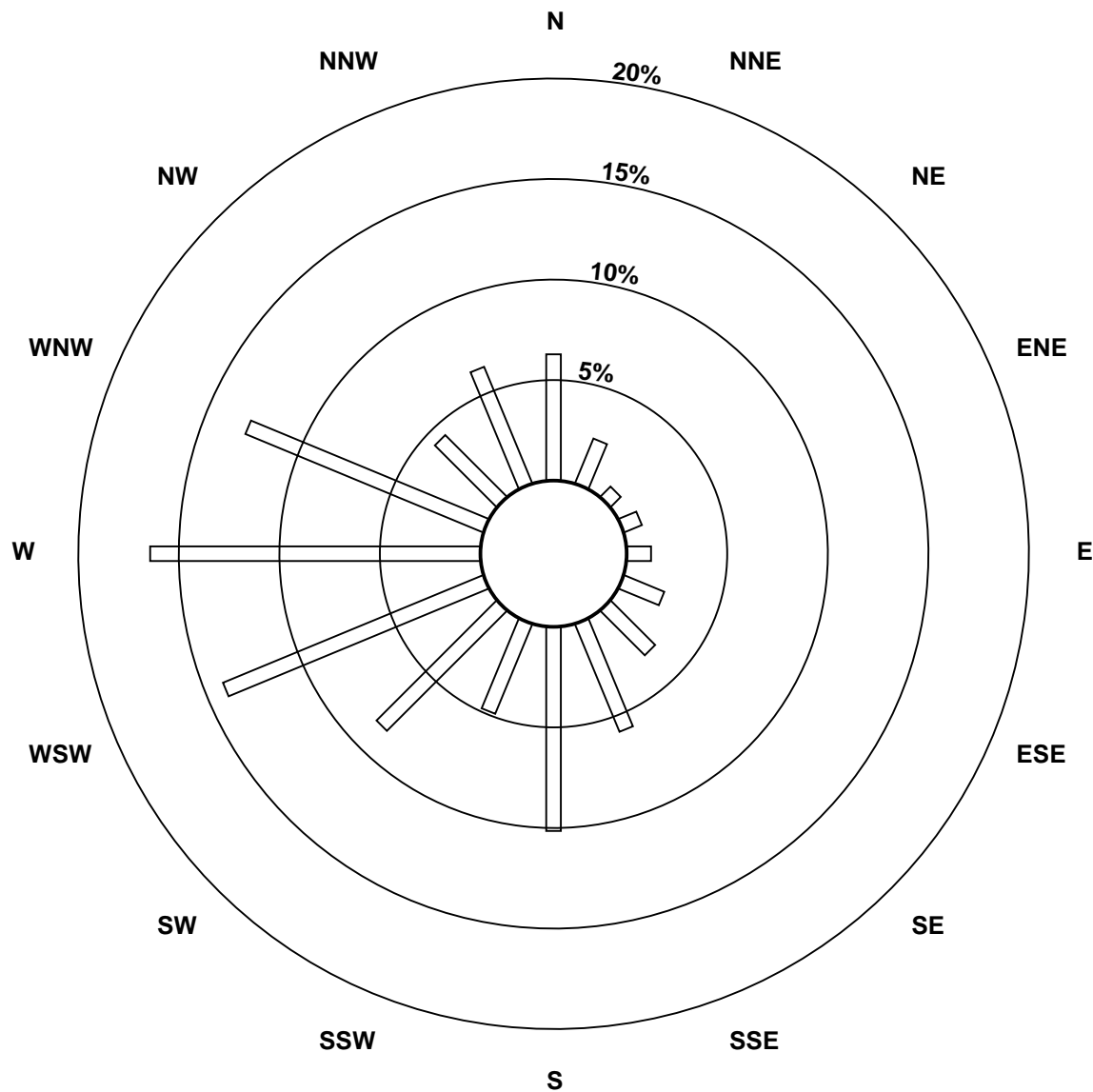
Total Number of Valid Hours: 414

Total Number of Hours: 432

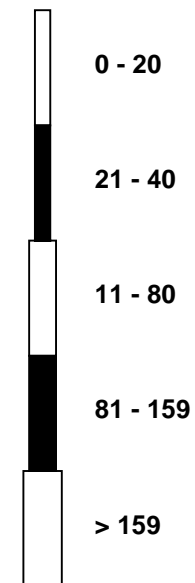


Wood Buffalo Environmental Association
Wind Rose Sep 2017

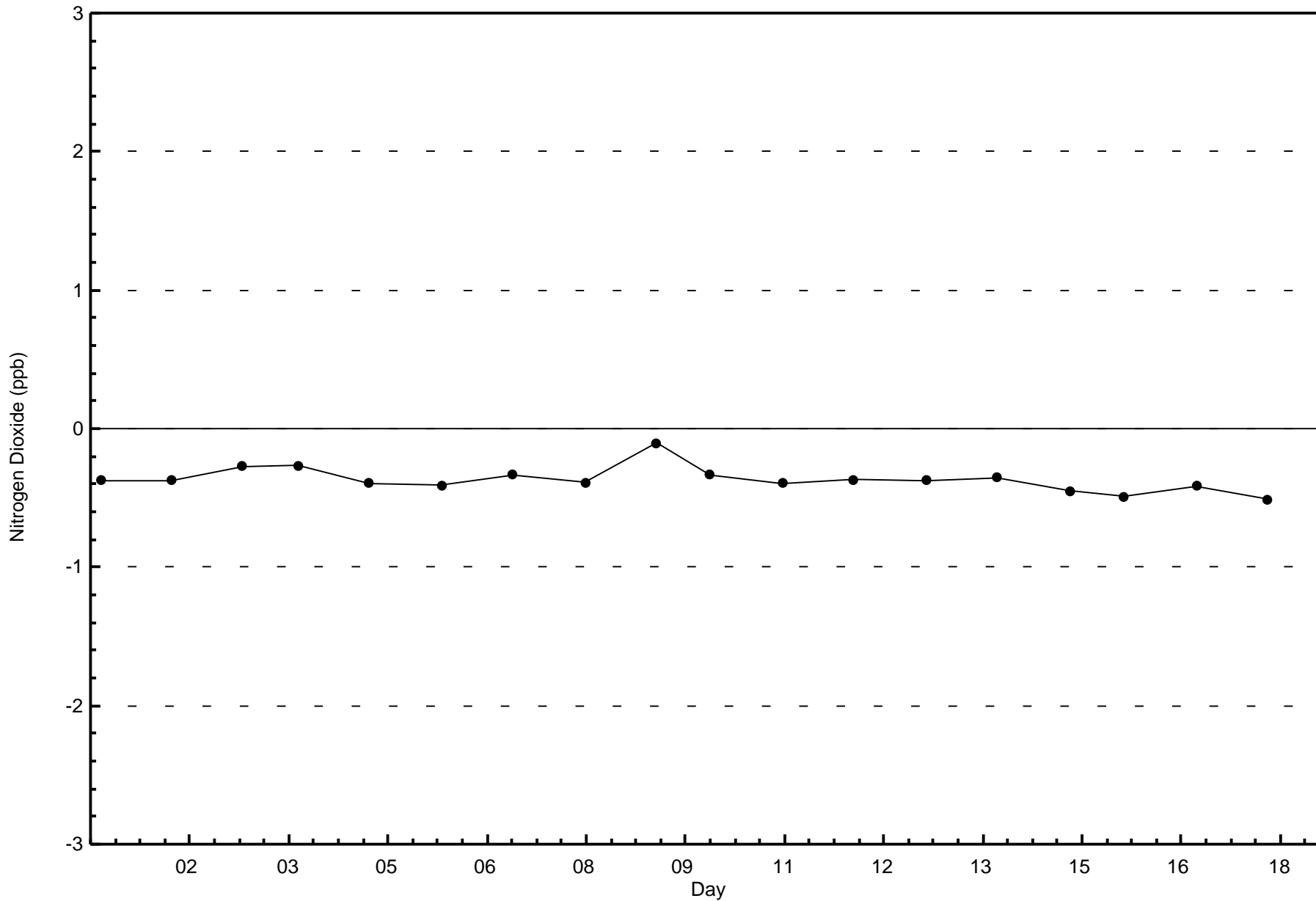
Nitrogen Dioxide (NO₂) - ppb
Surmont PAMS (AMS 502)



Classes (ppb)



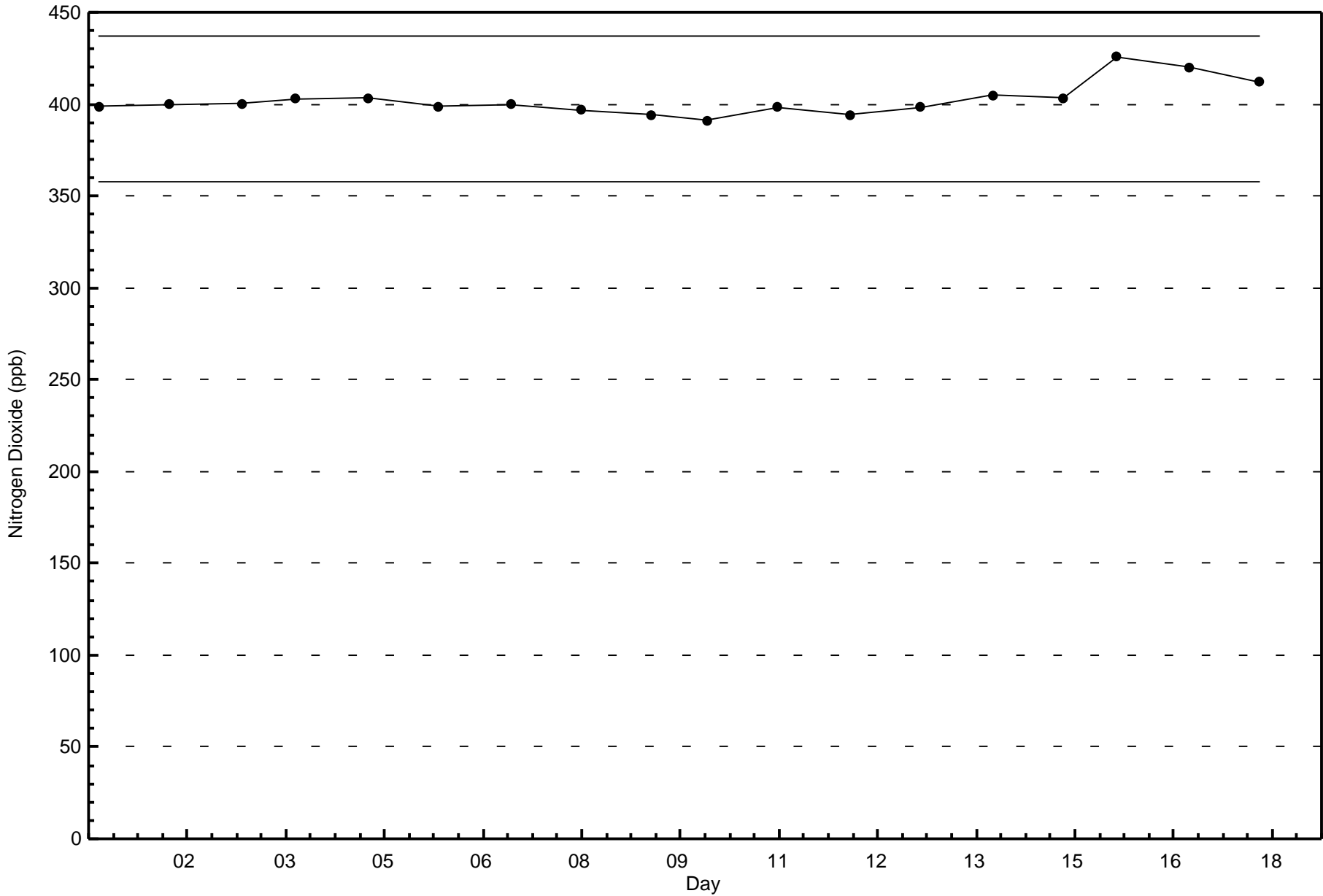
Total Number of Valid Hours: 414





Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Surmont PAMS - September 2017



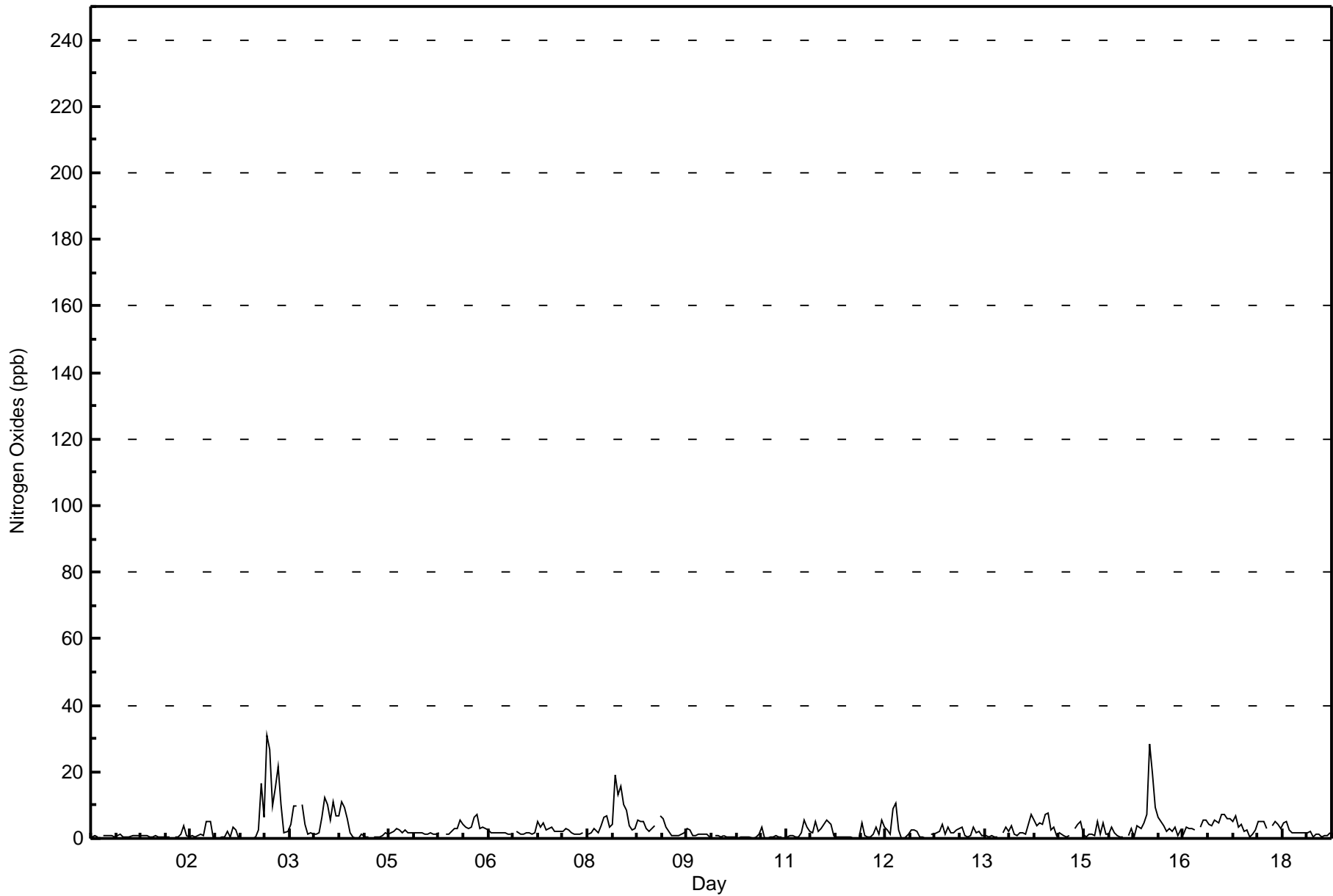


| Maximum Value: 31 ppb on Sep 3 14:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 7.6 ppb on Sep 3 | | | | | | | | | | | | | | | | | Hours in Service: 432 | |
|---|-------------------------------|----|---|---|---|---|---|---|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|-----|---------------|---------------|--|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: 0 ppb on Sep 2 19:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.6 ppb on Sep 10 | | | | | | | | | | | | | | | | | Hours of Data: 414 | |
| Maximum Diurnal Average: 5.3 ppb at hour 15 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 1.4 ppb at hour 4 | | | | | | | | | | | | | | | | | Hours of Missing Data: 18 | |
| Monthly Average: 2.9 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 6 P ₉₉ = 19 | | | | | | | | | | | | | | | | | Hours of Calibration: 18 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 1 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0.7 | 1 | | | | | | | | | | |
| 2-Sep | 1 | 1 | 0 | 1 | Z | 1 | 1 | 1 | 4 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 5 | 5 | 0 | 0 | 0 | 0 | 2 | 1.1 | 5 | | | | | | | | | | |
| 3-Sep | 0 | 4 | 3 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 3 | 17 | 6 | 31 | 27 | 10 | 15 | 22 | 10 | 2 | 2 | 4 | 10 | 7.6 | 31 | | | | | | | | | | |
| 4-Sep | Z | 10 | 4 | 1 | 1 | 1 | 1 | 2 | 6 | 12 | 10 | 6 | 11 | 7 | 7 | 11 | 9 | 6 | 2 | 0 | 0 | 1 | 0 | 4.8 | 12 | | | | | | | | | | |
| 5-Sep | 0 | Z | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1.5 | 3 | | | | | | | | | | |
| 6-Sep | 1 | 2 | Z | 1 | 1 | 2 | 3 | 3 | 5 | 4 | 3 | 3 | 3 | 6 | 7 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2.9 | 7 | | | | | | | | | | |
| 7-Sep | 2 | 1 | 1 | Z | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 5 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2.3 | 5 | | | | | | | | | | |
| 8-Sep | 1 | 1 | 1 | 2 | Z | 1 | 2 | 3 | 2 | 4 | 6 | 7 | 3 | 4 | 19 | 13 | 16 | 10 | 8 | 4 | 3 | 3 | 5 | 5.4 | 19 | | | | | | | | | | |
| 9-Sep | 5 | 3 | 2 | 3 | 4 | Z | 7 | 6 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2.3 | 7 | | | | | | | | | | |
| 10-Sep | Z | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 0 | 0 | 1 | 0 | 1 | 0.6 | 3 | | | | | | | | | | |
| 11-Sep | 0 | Z | 1 | 1 | 1 | 1 | 0 | 2 | 5 | 3 | 2 | 2 | 5 | 2 | 3 | 4 | 6 | 4 | 1 | 1 | 0 | 0 | 0 | 1.9 | 6 | | | | | | | | | | |
| 12-Sep | 1 | 0 | Z | 0 | 5 | 1 | 0 | 0 | 1 | 3 | 1 | 6 | 4 | 3 | 1 | 9 | 10 | 3 | 0 | 0 | 1 | 3 | 2 | 2.5 | 10 | | | | | | | | | | |
| 13-Sep | 1 | 0 | 0 | Z | 1 | 1 | 2 | 2 | 4 | 1 | 4 | 2 | 2 | 3 | 3 | 4 | 1 | 0 | 1 | 3 | 2 | 2 | 1 | 1.7 | 4 | | | | | | | | | | |
| 14-Sep | 1 | 1 | 0 | 0 | Z | 2 | 4 | 2 | 4 | 1 | 1 | 2 | 2 | 1 | 4 | 7 | 6 | 4 | 5 | 4 | 7 | 8 | 3 | 3.1 | 8 | | | | | | | | | | |
| 15-Sep | 1 | 2 | 1 | 0 | 1 | Z | 3 | 4 | 5 | 1 | 0 | 1 | 1 | 1 | 5 | 1 | 5 | 1 | 1 | 4 | 2 | 1 | 0 | 1.9 | 5 | | | | | | | | | | |
| 16-Sep | Z | 1 | 3 | 0 | 4 | 3 | 5 | 7 | 28 | 20 | 9 | 6 | 5 | 4 | 2 | 3 | 2 | 3 | 1 | 2 | 1 | 3 | 3 | 5.2 | 28 | | | | | | | | | | |
| 17-Sep | 3 | Z | 3 | 5 | 5 | 4 | 4 | 5 | 5 | 7 | 7 | 6 | 6 | 5 | 7 | 3 | 4 | 2 | 3 | 1 | 1 | 3 | 5 | 4.4 | 7 | | | | | | | | | | |
| 18-Sep | 5 | 3 | Z | 4 | 5 | 4 | 3 | 5 | 5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 2.4 | 5 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.4 2.0 1.5 1.4 2.1 1.6 2.1 2.6 4.6 3.8 3.1 3.8 3.2 4.4 5.3 4.4 5.2 4.1 2.2 1.6 1.5 2.0 2.3 2.2 | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | 5 10 4 5 5 4 7 7 28 20 10 17 11 31 27 13 16 22 10 4 7 8 10 10 | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Surmont PAMS - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Surmont PAMS - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 410 | 99.03 | 99.03 |
| 21 - 40 | 4 | 0.97 | 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: 414

Total Number of Hours: 432



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont PAMS - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 26 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 41 | 20 | 35 | 58 | 68 | 52 | 16 | 26 | 410 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 4 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 10 | 3 | 4 | 5 | 9 | 13 | 24 | 42 | 20 | 35 | 58 | 68 | 53 | 18 | 26 | 414 |

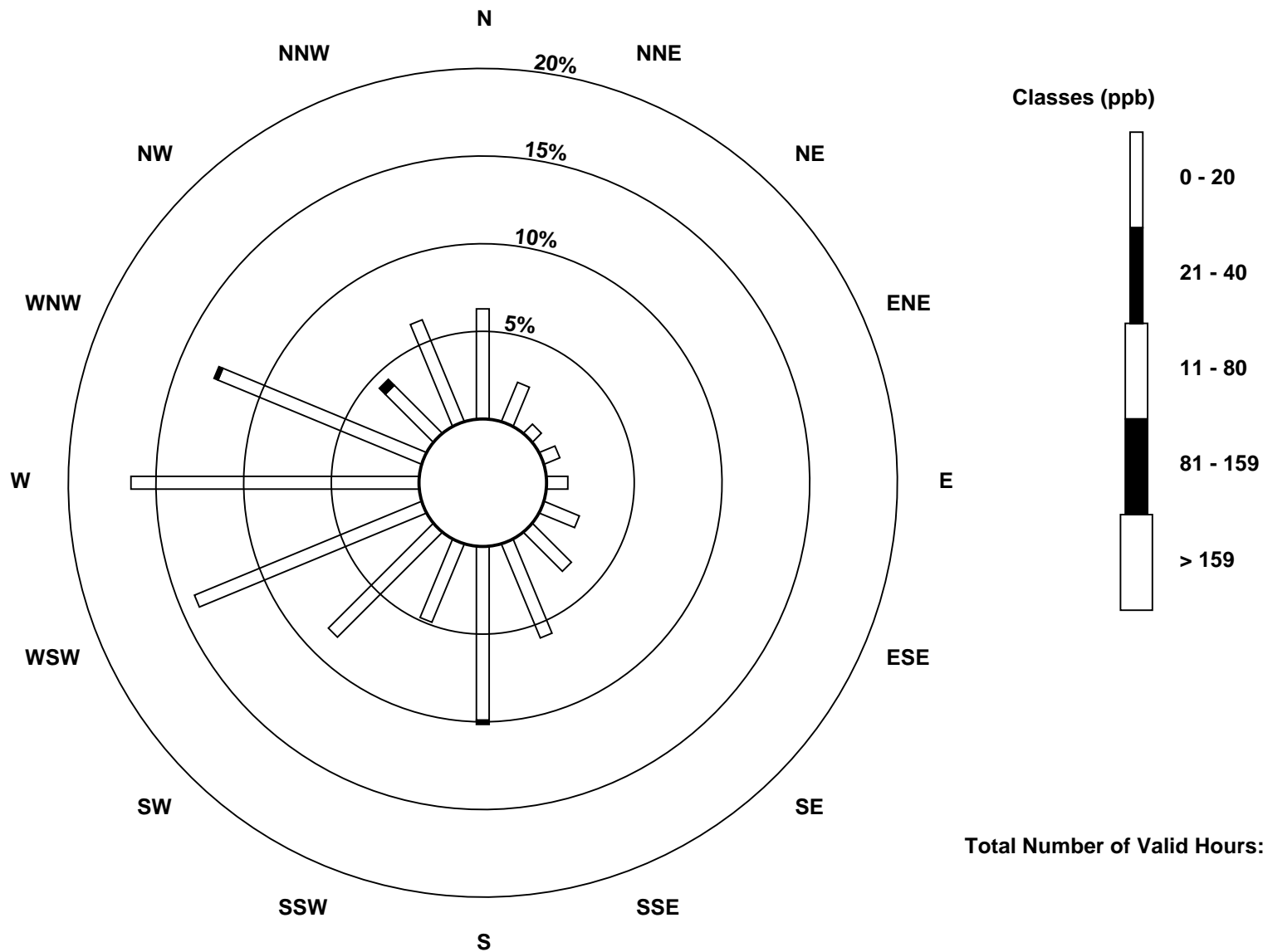
Total Number of Valid Hours: 414

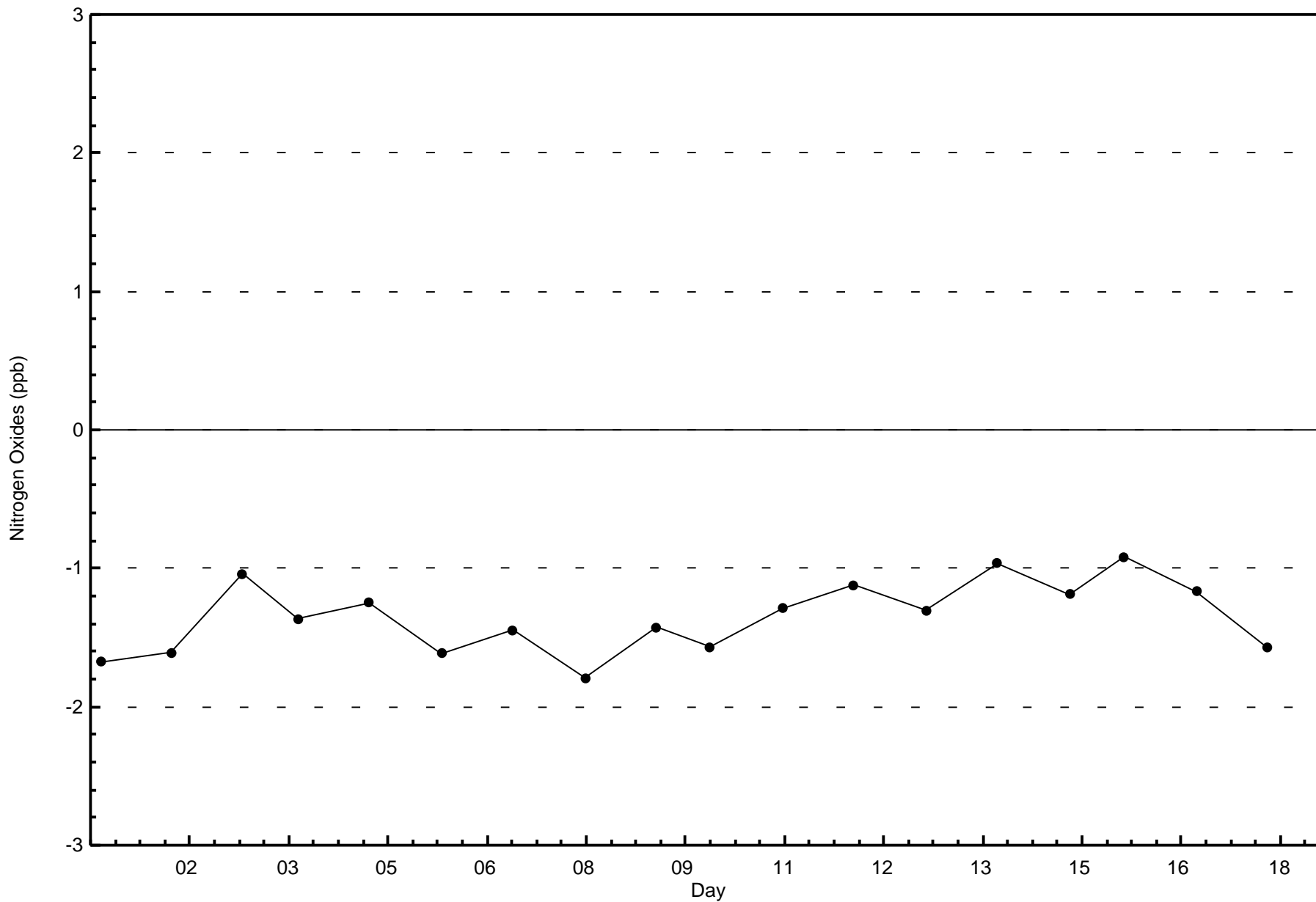
Total Number of Hours: 432

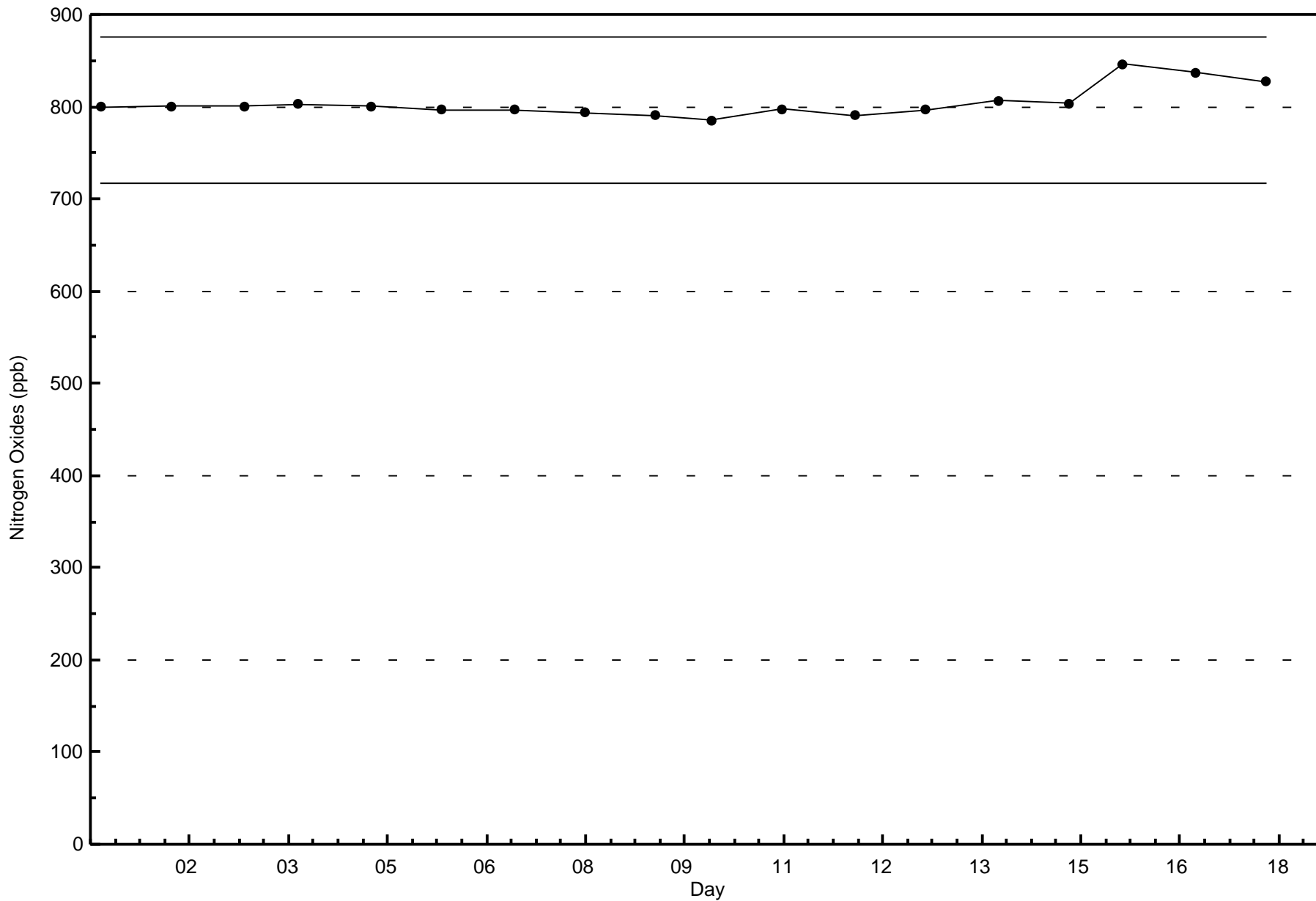


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Oxides (NO_x) - ppb
Surmont PAMS (AMS 502)









Wood Buffalo Environmental Association
Summary of Hour Averages

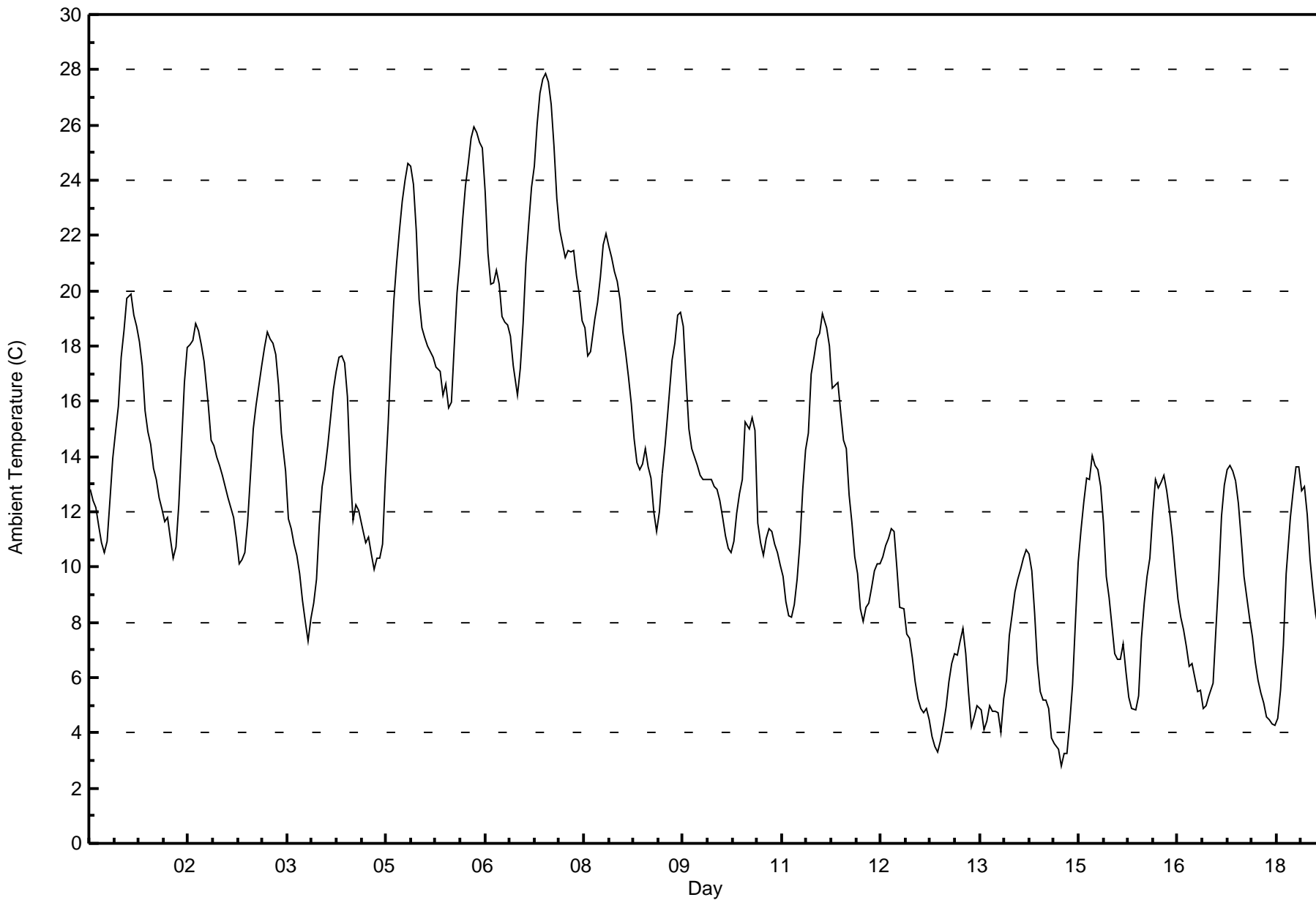
Ambient Temperature (AT) - C
Surmont PAMS - September 2017

| Maximum Value: 27.9 C on Sep 7 16:00 | | Maximum Daily Average: 22.3 C on Sep 7 | | Hours in Service: 432 | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: 2.8 C on Sep 15 04:00 | | Minimum Daily Average: 5.2 C on Sep 13 | | Hours of Data: 432 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.1 C at hour 15 | | Minimum Diurnal Average: 9.3 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.96 C | | Percentiles: P ₁ = 3.4 P ₁₀ = 5.3 O ₁ = 8.7 Median = 12.5 O ₃ = 17.2 P ₉₀ = 20.6 P ₉₉ = 26.8 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 12.8 | 12.4 | 12.1 | 11.5 | 10.9 | 10.5 | 10.9 | 12.4 | 13.9 | 14.9 | 15.8 | 17.6 | 18.5 | 19.7 | 19.9 | 19.1 | 18.7 | 18.1 | 17.3 | 15.6 | 14.9 | 14.5 | 13.6 | 13.2 | 15.0 | 19.9 | |
| 2-Sep | 12.5 | 12.1 | 11.6 | 11.8 | 11.0 | 10.3 | 10.7 | 12.3 | 14.5 | 16.7 | 17.9 | 18.1 | 18.2 | 18.8 | 18.5 | 18.1 | 17.4 | 15.9 | 14.6 | 14.4 | 14.0 | 13.7 | 13.3 | 12.9 | 14.6 | 18.8 | |
| 3-Sep | 12.5 | 12.2 | 11.8 | 11.0 | 10.1 | 10.3 | 10.5 | 11.6 | 13.3 | 15.0 | 15.9 | 16.6 | 17.3 | 17.9 | 18.5 | 18.2 | 18.1 | 17.7 | 16.6 | 14.8 | 13.5 | 11.7 | 11.4 | 10.9 | 14.1 | 18.5 | |
| 4-Sep | 10.4 | 9.7 | 8.8 | 8.0 | 7.3 | 8.1 | 8.7 | 9.5 | 11.5 | 12.9 | 13.5 | 14.4 | 15.4 | 16.4 | 17.1 | 17.6 | 17.4 | 16.2 | 13.5 | 11.7 | 12.3 | 12.0 | 11.3 | 12.6 | 17.6 | | |
| 5-Sep | 10.9 | 11.1 | 10.5 | 9.9 | 10.3 | 10.3 | 10.8 | 13.2 | 15.2 | 17.7 | 19.6 | 21.0 | 22.2 | 23.2 | 24.0 | 24.6 | 24.5 | 23.9 | 22.2 | 19.7 | 18.7 | 18.3 | 18.0 | 17.8 | 17.4 | 24.6 | |
| 6-Sep | 17.6 | 17.2 | 17.1 | 16.2 | 16.6 | 15.8 | 15.9 | 18.0 | 19.9 | 21.1 | 22.6 | 23.8 | 24.6 | 25.5 | 25.9 | 25.7 | 25.4 | 25.2 | 23.6 | 21.4 | 20.2 | 20.3 | 20.8 | 20.2 | 20.9 | 25.9 | |
| 7-Sep | 19.1 | 18.9 | 18.7 | 18.4 | 17.3 | 16.2 | 17.2 | 18.8 | 21.0 | 22.4 | 23.7 | 24.5 | 26.0 | 27.2 | 27.7 | 27.9 | 27.6 | 26.7 | 25.2 | 23.4 | 22.2 | 21.7 | 21.2 | 21.5 | 22.3 | 27.9 | |
| 8-Sep | 21.4 | 21.4 | 20.5 | 19.9 | 18.9 | 18.7 | 17.6 | 17.8 | 19.0 | 19.6 | 20.5 | 21.7 | 22.1 | 21.6 | 21.2 | 20.7 | 20.3 | 19.7 | 18.5 | 17.7 | 16.9 | 15.9 | 14.7 | 13.8 | 19.2 | 22.1 | |
| 9-Sep | 13.5 | 13.7 | 14.3 | 13.6 | 13.2 | 12.0 | 11.3 | 12.0 | 13.4 | 14.4 | 15.6 | 17.5 | 18.1 | 19.1 | 19.2 | 18.7 | 16.8 | 15.0 | 14.3 | 14.0 | 13.7 | 13.3 | 13.2 | 13.2 | 14.7 | 19.2 | |
| 10-Sep | 13.2 | 13.2 | 12.9 | 12.8 | 12.4 | 11.8 | 11.1 | 10.7 | 10.5 | 10.9 | 11.9 | 12.7 | 13.2 | 15.2 | 15.0 | 15.4 | 14.9 | 11.6 | 10.9 | 10.4 | 11.1 | 11.4 | 11.3 | 10.8 | 12.3 | 15.4 | |
| 11-Sep | 10.5 | 10.1 | 9.7 | 8.8 | 8.3 | 8.2 | 8.7 | 9.6 | 10.9 | 12.8 | 14.2 | 14.9 | 17.0 | 17.6 | 18.3 | 18.5 | 19.2 | 18.7 | 18.0 | 16.5 | 16.6 | 16.7 | 15.6 | 14.6 | 13.9 | 19.2 | |
| 12-Sep | 14.3 | 12.6 | 11.6 | 10.4 | 9.8 | 8.5 | 8.0 | 8.5 | 8.7 | 9.3 | 9.9 | 10.1 | 10.1 | 10.3 | 10.8 | 11.0 | 11.4 | 11.3 | 10.0 | 8.6 | 8.5 | 7.6 | 7.4 | 6.7 | 9.8 | 14.3 | |
| 13-Sep | 5.9 | 5.2 | 4.9 | 4.7 | 4.9 | 4.5 | 3.9 | 3.5 | 3.3 | 3.7 | 4.3 | 5.0 | 5.8 | 6.5 | 6.9 | 6.8 | 7.3 | 7.8 | 6.9 | 5.4 | 4.2 | 4.6 | 5.0 | 4.9 | 5.2 | 7.8 | |
| 14-Sep | 4.1 | 4.4 | 5.0 | 4.8 | 4.8 | 4.7 | 4.0 | 5.2 | 5.9 | 7.5 | 8.3 | 9.1 | 9.5 | 9.9 | 10.3 | 10.6 | 10.5 | 9.9 | 8.3 | 6.5 | 5.5 | 5.2 | 5.2 | 4.9 | 6.8 | 10.6 | |
| 15-Sep | 3.8 | 3.6 | 3.4 | 2.8 | 3.3 | 3.3 | 4.4 | 5.7 | 8.0 | 10.2 | 11.3 | 12.3 | 13.2 | 13.2 | 14.1 | 13.7 | 13.5 | 12.9 | 11.6 | 9.7 | 8.9 | 7.9 | 6.8 | 6.7 | 8.5 | 14.1 | |
| 16-Sep | 6.7 | 7.2 | 6.2 | 5.3 | 4.9 | 4.8 | 5.4 | 7.4 | 8.7 | 9.7 | 10.3 | 11.9 | 13.1 | 12.8 | 13.1 | 13.3 | 12.8 | 12.0 | 11.1 | 9.9 | 8.9 | 8.2 | 7.8 | 7.1 | 9.1 | 13.3 | |
| 17-Sep | 6.4 | 6.5 | 6.0 | 5.5 | 5.6 | 4.9 | 5.0 | 5.3 | 5.8 | 7.7 | 9.6 | 11.9 | 13.0 | 13.5 | 13.7 | 13.5 | 13.1 | 12.3 | 11.1 | 9.7 | 8.9 | 8.1 | 7.5 | 6.6 | 8.8 | 13.7 | |
| 18-Sep | 5.9 | 5.4 | 5.1 | 4.6 | 4.5 | 4.3 | 4.3 | 4.5 | 5.5 | 7.1 | 9.8 | 11.8 | 12.8 | 13.7 | 13.6 | 12.8 | 12.9 | 11.9 | 10.3 | 9.2 | 8.3 | 7.7 | 7.1 | 6.7 | 8.3 | 13.7 | |
| | | 11.2 | 10.9 | 10.6 | 10.0 | 9.7 | 9.3 | 9.4 | 10.3 | 11.6 | 13.0 | 14.2 | 15.3 | 16.1 | 16.8 | 17.1 | 17.0 | 16.8 | 16.0 | 14.8 | 13.4 | 12.6 | 12.2 | 11.8 | 11.3 | Diurnal Average | |
| | | 21.4 | 21.4 | 20.5 | 19.9 | 18.9 | 18.7 | 17.6 | 18.8 | 21.0 | 22.4 | 23.7 | 24.5 | 26.0 | 27.2 | 27.7 | 27.9 | 27.6 | 26.7 | 25.2 | 23.4 | 22.2 | 21.7 | 21.2 | 21.5 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Surmont PAMS - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Surmont PAMS - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 133 | 30.79 | 30.79 |
| 10 - 20 | 250 | 57.87 | 88.66 |
| > 20 | 49 | 11.34 | 100.00 |

Total Number of Valid Hours: 432

Total Number of Hours: 432



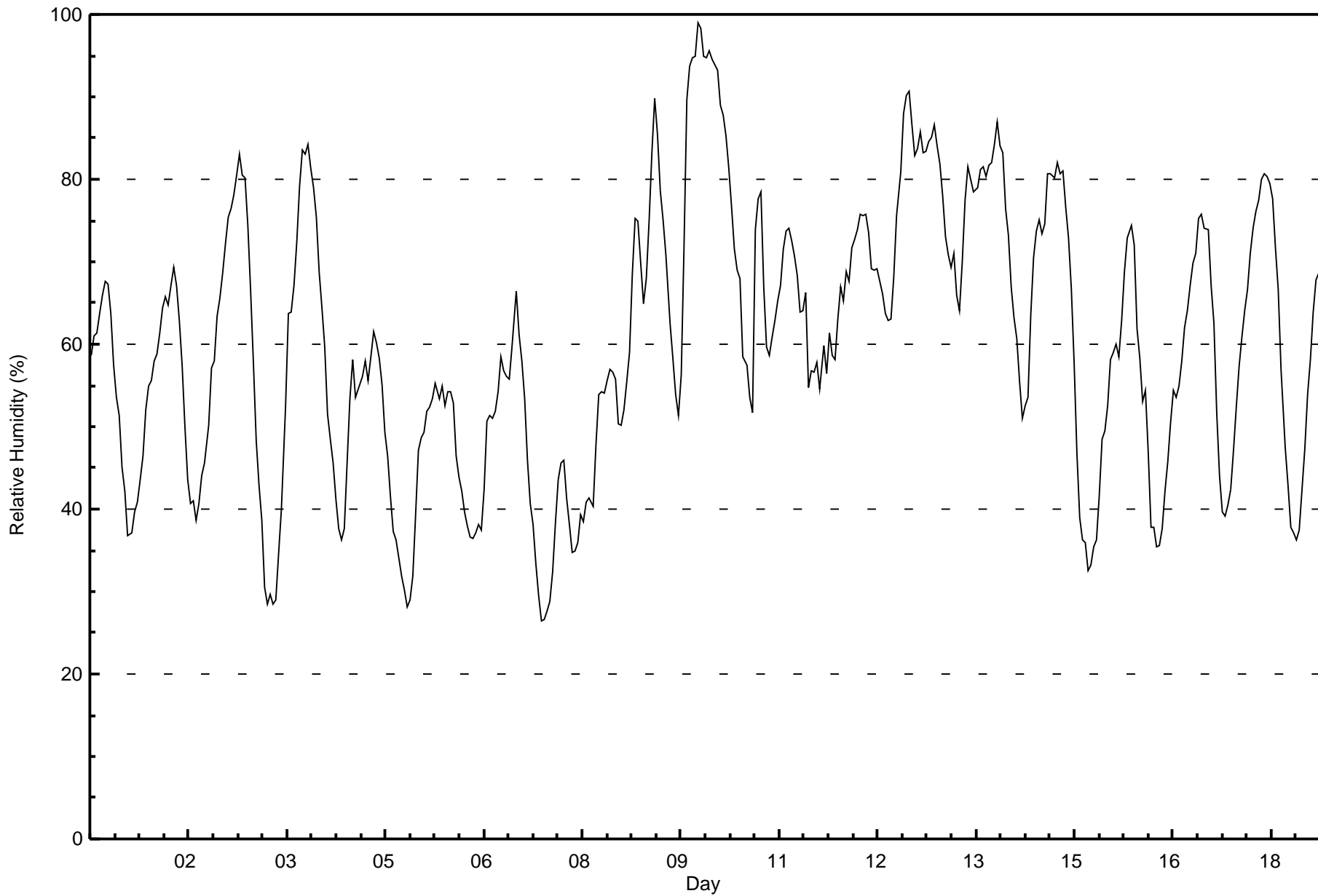
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Surmont PAMS - September 2017

| Maximum Value: 99 % on Sep 9 22:00 | | | | | | | | | | | | | | Maximum Daily Average: 78.6 % on Sep 13 | | | | | | | | | | | | | | Hours in Service: 432 | |
|---|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|---------------|---------------|--|---------------------------------|--|
| Minimum Value: 26 % on Sep 7 15:00 | | | | | | | | | | | | | | Minimum Daily Average: 44.6 % on Sep 7 | | | | | | | | | | | | | | Hours of Data: 432 | |
| Maximum Diurnal Average: 73.1 % at hour 6 | | | | | | | | | | | | | | Minimum Diurnal Average: 44.3 % at hour 15 | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 60.2 % | | | | | | | | | | | | | | Percentiles: P ₁ = 29 P ₁₀ = 38 Q ₁ = 48 Median = 60 Q ₃ = 73 P ₉₀ = 81 P ₉₉ = 94 | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 1-Sep | 59 | 61 | 61 | 64 | 66 | 68 | 67 | 64 | 57 | 54 | 51 | 45 | 42 | 37 | 37 | 40 | 41 | 44 | 46 | 52 | 55 | 56 | 58 | 59 | 53.4 | 68 | | | |
| 2-Sep | 61 | 64 | 66 | 65 | 67 | 69 | 67 | 63 | 58 | 50 | 44 | 41 | 41 | 39 | 41 | 44 | 46 | 50 | 57 | 58 | 63 | 66 | 69 | 72 | 56.6 | 72 | | | |
| 3-Sep | 75 | 76 | 78 | 80 | 83 | 81 | 80 | 74 | 66 | 58 | 48 | 43 | 39 | 31 | 29 | 30 | 29 | 29 | 35 | 40 | 53 | 64 | 64 | 67 | 56.3 | 83 | | | |
| 4-Sep | 72 | 79 | 84 | 83 | 84 | 81 | 79 | 75 | 69 | 64 | 60 | 52 | 49 | 46 | 41 | 38 | 36 | 38 | 46 | 53 | 58 | 54 | 55 | 56 | 60.5 | 84 | | | |
| 5-Sep | 58 | 56 | 59 | 62 | 60 | 58 | 55 | 49 | 46 | 42 | 37 | 36 | 34 | 32 | 30 | 28 | 29 | 32 | 39 | 47 | 49 | 49 | 52 | 52 | 45.5 | 62 | | | |
| 6-Sep | 53 | 55 | 53 | 55 | 53 | 54 | 54 | 53 | 46 | 44 | 42 | 40 | 38 | 37 | 36 | 37 | 38 | 37 | 42 | 51 | 51 | 51 | 52 | 54 | 47.0 | 55 | | | |
| 7-Sep | 58 | 57 | 56 | 56 | 60 | 67 | 61 | 58 | 53 | 46 | 41 | 38 | 33 | 30 | 26 | 27 | 28 | 29 | 32 | 38 | 44 | 46 | 46 | 41 | 44.6 | 67 | | | |
| 8-Sep | 38 | 35 | 35 | 36 | 39 | 38 | 41 | 41 | 40 | 48 | 54 | 54 | 54 | 56 | 57 | 57 | 56 | 50 | 50 | 52 | 55 | 59 | 69 | 75 | 49.6 | 75 | | | |
| 9-Sep | 75 | 70 | 65 | 68 | 75 | 83 | 90 | 85 | 79 | 75 | 71 | 62 | 58 | 54 | 51 | 56 | 72 | 90 | 94 | 95 | 95 | 99 | 98 | 95 | 77.3 | 99 | | | |
| 10-Sep | 95 | 96 | 95 | 94 | 93 | 89 | 88 | 85 | 81 | 77 | 72 | 69 | 68 | 58 | 58 | 54 | 52 | 74 | 78 | 78 | 67 | 60 | 59 | 61 | 74.9 | 96 | | | |
| 11-Sep | 63 | 65 | 67 | 71 | 74 | 74 | 73 | 71 | 68 | 64 | 64 | 66 | 55 | 57 | 57 | 58 | 55 | 60 | 56 | 61 | 59 | 58 | 63 | 67 | 63.6 | 74 | | | |
| 12-Sep | 65 | 69 | 68 | 72 | 73 | 74 | 76 | 76 | 76 | 73 | 69 | 69 | 69 | 68 | 66 | 64 | 63 | 63 | 68 | 76 | 81 | 88 | 90 | 91 | 72.7 | 91 | | | |
| 13-Sep | 87 | 83 | 84 | 86 | 83 | 83 | 85 | 85 | 87 | 84 | 82 | 78 | 73 | 71 | 69 | 71 | 66 | 64 | 70 | 77 | 81 | 80 | 78 | 79 | 78.6 | 87 | | | |
| 14-Sep | 81 | 82 | 80 | 82 | 82 | 84 | 87 | 84 | 83 | 76 | 73 | 67 | 63 | 61 | 55 | 51 | 53 | 53 | 64 | 70 | 74 | 75 | 73 | 75 | 72.0 | 87 | | | |
| 15-Sep | 81 | 81 | 80 | 82 | 81 | 81 | 77 | 73 | 67 | 58 | 47 | 39 | 36 | 36 | 32 | 33 | 35 | 36 | 42 | 48 | 50 | 53 | 58 | 59 | 56.8 | 82 | | | |
| 16-Sep | 60 | 58 | 63 | 69 | 73 | 74 | 72 | 62 | 58 | 53 | 54 | 47 | 38 | 38 | 35 | 36 | 38 | 42 | 46 | 51 | 54 | 54 | 55 | 58 | 53.6 | 74 | | | |
| 17-Sep | 62 | 64 | 67 | 70 | 71 | 75 | 76 | 74 | 74 | 67 | 62 | 52 | 44 | 40 | 39 | 40 | 42 | 47 | 52 | 57 | 61 | 64 | 67 | 71 | 60.0 | 76 | | | |
| 18-Sep | 74 | 76 | 78 | 80 | 81 | 80 | 80 | 78 | 72 | 67 | 57 | 48 | 43 | 38 | 37 | 36 | 37 | 42 | 47 | 54 | 58 | 64 | 68 | 69 | 60.9 | 81 | | | |
| | | | | | | | | | | | | | | 67.7 68.1 68.8 70.8 72.1 73.1 72.6 69.5 65.7 61.1 57.1 52.5 48.8 45.8 44.3 44.4 45.2 48.9 53.6 58.9 61.5 63.2 65.1 66.7 | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | 95 96 95 94 93 89 90 85 87 84 82 78 73 71 69 71 72 90 94 95 95 99 98 95 | | | | | | | | | | | | | | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Surmont PAMS - September 2017**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 63 | 14.58 | 14.58 |
| 40 - 60 | 157 | 36.34 | 50.93 |
| 60 - 80 | 150 | 34.72 | 85.65 |
| 80 - 100 | 62 | 14.35 | 100.00 |

Total Number of Valid Hours: 432

Total Number of Hours: 432



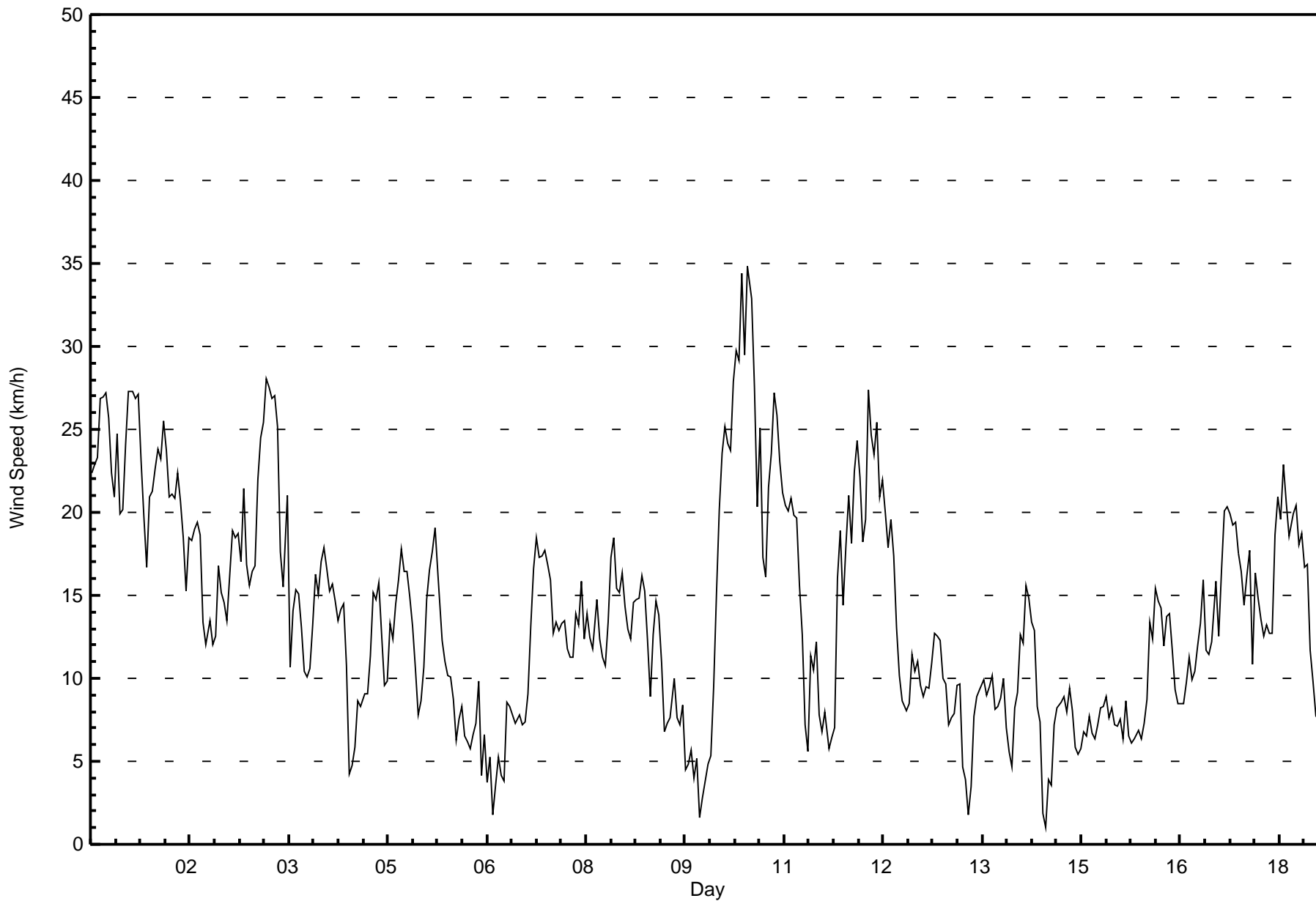
Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Surmont PAMS - September 2017

| Maximum Speed: 35 km/h on Sep 10 14:00 | | Maximum Daily Speed Average: 23.5 km/h on Sep 10 | | Hours in Service: 432 | | | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------|--|-------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|---------------|---------------|
| Minimum Speed Value: 1 km/h on Sep 14 22:00 | | Minimum Daily Speed Average: 3.9 km/h on Sep 6 | | Hours of Data: 432 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Speed Average: 11.3 km/h at hour 4 | | Minimum Diurnal Speed Average: 4.9 km/h at hour 12 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average Velocity: 7.7 km/h 261.5 deg | | Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 9 Median = 13 Q ₃ = 18 P ₉₀ = 23 P ₉₉ = 27 | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | WSW22 | W23 | W23 | W27 | WSW27 | WSW27 | W26 | W22 | W21 | W25 | WSW20 | W20 | W24 | W27 | W27 | W27 | W27 | W23 | W20 | W17 | W21 | W21 | W23 | WSW24 | W23.4 | W27 |
| 2-Sep | WSW23 | W25 | W24 | W21 | W21 | W21 | WSW22 | W21 | W18 | WNW15 | W18 | WNW18 | W19 | WNW19 | WNW19 | WNW13 | WNW12 | WNW13 | W12 | W13 | W17 | WNW15 | WNW15 | WNW13 | W17.4 | W25 |
| 3-Sep | WNW16 | WNW19 | WNW18 | WNW19 | W17 | WNW21 | W17 | W16 | WNW16 | WNW17 | WNW22 | WNW24 | WNW25 | NW28 | NW28 | WNW27 | WNW27 | NW25 | WNW18 | WNW15 | NNW21 | NW11 | NW14 | NW15 | WNW19.4 | NW28 |
| 4-Sep | NW15 | NW13 | WNW10 | WNW10 | W11 | WNW13 | WNW16 | WNW15 | WNW17 | NW18 | NNW17 | NNW15 | NW16 | NW15 | NW13 | NW14 | NNW11 | WNW4 | W5 | SW6 | SW9 | SW8 | SW9 | WNW10.4 | NW18 | |
| 5-Sep | SW9 | WSW11 | WSW15 | WSW16 | WSW13 | WSW10 | SW10 | WSW13 | SW12 | WSW14 | WSW16 | WSW16 | WSW16 | WSW16 | WSW15 | W13 | W11 | WSW8 | SW9 | WSW11 | WSW15 | WSW17 | WSW18 | WSW13.1 | WSW18 | |
| 6-Sep | WSW19 | W16 | W12 | W11 | WNW10 | WSW10 | WSW9 | W6 | NNW8 | N8 | NNE7 | NE6 | NNE6 | N7 | N7 | N10 | E4 | NNE7 | N4 | WSW5 | WSW2 | SSW4 | SSW5 | S4 | WNW3.9 | WSW19 |
| 7-Sep | S4 | SSW9 | SSW8 | SSW8 | SW7 | SW8 | SW7 | SSW7 | SSW9 | S13 | S17 | S18 | S17 | S17 | S18 | S17 | S16 | S13 | S13 | S13 | S13 | S14 | SSW12 | SSW11 | S11.8 | S18 |
| 8-Sep | SSW11 | SW14 | SW13 | WSW16 | SW12 | SW14 | SW12 | WSW12 | WSW15 | W12 | NW11 | N11 | N13 | N17 | NNW19 | NNW15 | NNW15 | NNW16 | N14 | NNW13 | NNW12 | NNW15 | NNW15 | NNW15 | NNW9.0 | NNW19 |
| 9-Sep | NNW16 | NNW15 | NNW12 | NW9 | NNW13 | NNW15 | NNW14 | NNW11 | NE7 | ENE7 | ENE8 | E10 | E8 | E7 | ENE8 | ESE4 | SSW5 | WSW6 | WSW4 | WNW5 | NNW2 | W3 | WSW4 | WSW5 | N4.3 | NNW16 |
| 10-Sep | WNW5 | WNW9 | W15 | W20 | W24 | W25 | W24 | W24 | W28 | W30 | W29 | W34 | W29 | W35 | W33 | WNW28 | WNW20 | W25 | W17 | WSW16 | WSW22 | W24 | W27 | W26 | W23.5 | W35 |
| 11-Sep | W23 | WSW21 | W20 | WSW20 | WSW21 | WSW20 | WSW20 | WSW16 | WSW13 | SW7 | SSE6 | SE11 | SSE10 | SE12 | ESE8 | SE7 | S8 | SSW6 | SW6 | SW7 | WSW16 | WSW19 | W14 | W18 | WSW10.4 | W23 |
| 12-Sep | W21 | W18 | W22 | WNW24 | WNW22 | WNW18 | W20 | WNW27 | WNW25 | WNW23 | WNW25 | WNW21 | WNW22 | WNW20 | WNW18 | WNW20 | WNW17 | WNW13 | W10 | WNW9 | NNW8 | NW8 | NNW11 | N10 | WNW17.4 | WNW27 |
| 13-Sep | NNE11 | NNE10 | NNE9 | N10 | N9 | N11 | N13 | N13 | N12 | N10 | N10 | NNE7 | NNE8 | NNE8 | N10 | NNW10 | NNE5 | NE4 | W2 | SSW3 | SW8 | SW9 | WSW9 | WSW10 | N5.8 | N13 |
| 14-Sep | WSW9 | W10 | WSW10 | WSW8 | WSW8 | WSW9 | WSW10 | W7 | NW6 | N5 | N8 | N9 | N13 | N12 | N16 | NNW15 | N13 | N13 | NW8 | WNW7 | NNW2 | NW1 | SSE4 | SSW4 | NW5.5 | N16 |
| 15-Sep | SW7 | SW8 | SW9 | SW9 | SW8 | SW9 | SW8 | SW6 | SSW5 | SW6 | WSW7 | W7 | SSW8 | S7 | S6 | SSW7 | S8 | S8 | SSW9 | SW8 | SW8 | SW7 | SW7 | SW8 | SW7.0 | SW9 |
| 16-Sep | SW6 | S9 | SSW6 | SW6 | SW6 | SW7 | SW6 | S7 | S9 | S13 | SSE12 | SSE15 | S15 | S14 | S12 | S14 | SSE14 | SSE12 | S9 | SSW8 | SSW9 | S8 | S10 | S11 | S9.5 | SSE15 |
| 17-Sep | S10 | S10 | S12 | S13 | S16 | S12 | S11 | S12 | S16 | S13 | SSE17 | SSE20 | SSE20 | SSE20 | SSE19 | SSE19 | SSE18 | SE16 | SE14 | SE16 | SE18 | SSE11 | SSE16 | SSE15 | SSE14.6 | SSE20 |
| 18-Sep | S14 | SSE13 | SSE13 | SSE13 | SSE13 | SSE19 | SSE21 | SE20 | SSE23 | SE21 | SE19 | SE20 | SE20 | SE18 | ESE19 | SE17 | ESE17 | ESE12 | ESE10 | ESE8 | ESE8 | ESE9 | E7 | ENE4 | SE13.9 | SSE23 |
| W9.6 W10.1 W10.0 W11.0 W11.0 W11.0 W10.6 W9.5 W8.7 W7.2 W6.2 W4.9 W6.2 W6.0 W6.6 W6.2 W5.2 WNW5.2 W5.1 WSW5.9 WSW5.9 WSW7.2 WSW7.4 WSW7.8 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| WSW23 W25 W24 W27 WSW27 WSW27 W26 WNW27 W28 W30 W29 W34 W29 W35 W33 WNW28 W27 WNW25 W20 W17 WSW22 W24 W27 W26 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| All monthly, daily, and diurnal averages have been calculated using vector methods | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Surmont PAMS - September 2017

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 30 | 6.94 | 6.94 |
| 6 - 11 | 147 | 34.03 | 40.97 |
| 12 - 19 | 166 | 38.43 | 79.40 |
| 20 - 28 | 83 | 19.21 | 98.61 |
| 29 - 38 | 6 | 1.39 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 432

Total Number of Hours: 432



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont PAMS - September 2017**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 6 | 0 | 6 | 2 | 3 | 1 | 2 | 30 |
| 6 - 11 | 14 | 9 | 2 | 3 | 4 | 5 | 2 | 3 | 15 | 14 | 32 | 19 | 7 | 6 | 6 | 6 | 147 |
| 12 - 19 | 11 | 0 | 0 | 0 | 0 | 3 | 8 | 15 | 26 | 1 | 6 | 23 | 18 | 27 | 10 | 18 | 166 |
| 20 - 28 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 0 | 0 | 0 | 13 | 39 | 19 | 2 | 1 | 83 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 6 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 27 | 10 | 3 | 4 | 5 | 9 | 13 | 25 | 43 | 21 | 38 | 61 | 72 | 55 | 19 | 27 | 432 |

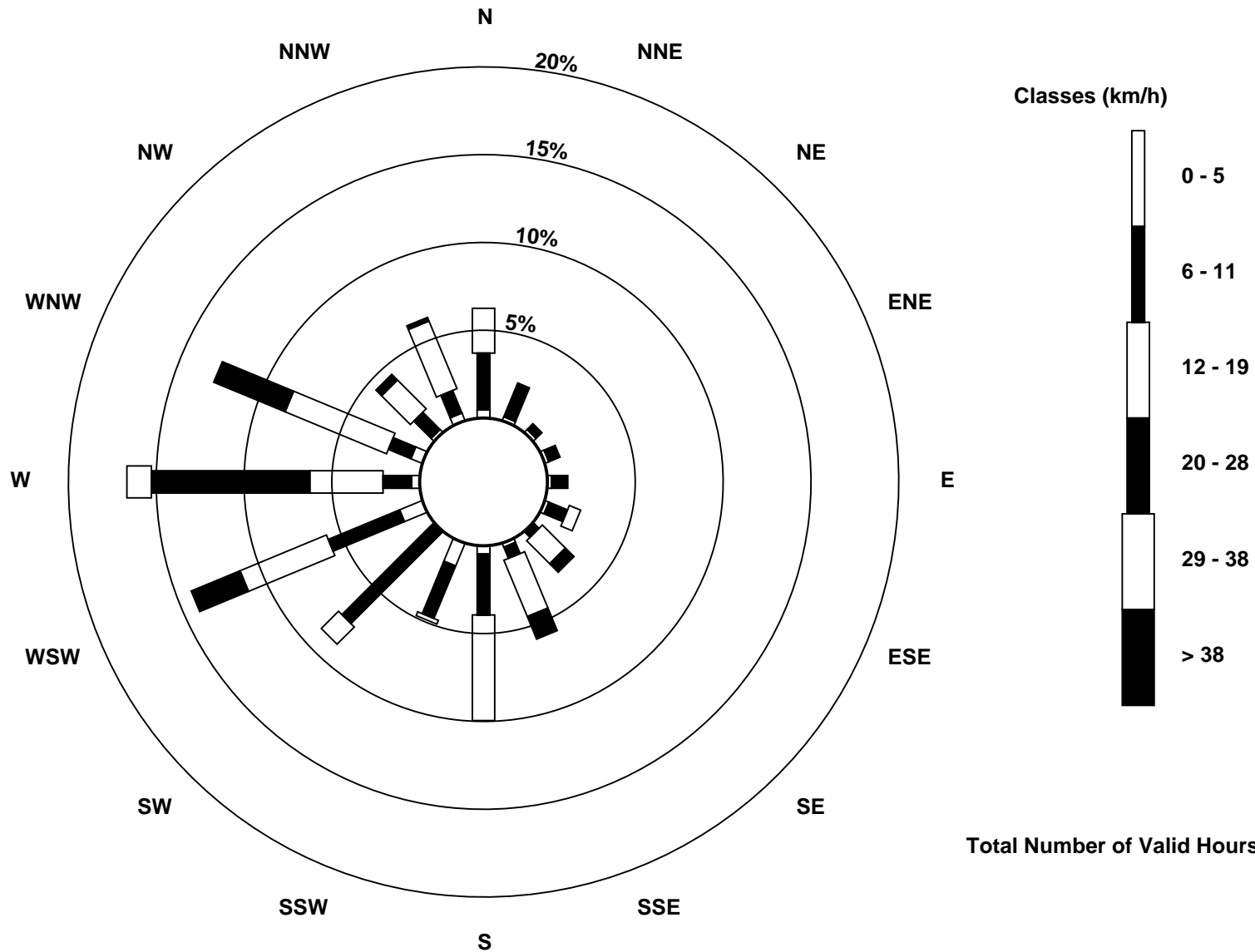
Total Number of Valid Hours: 432

Total Number of Hours: 432



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Surmont PAMS (AMS 502)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Surmont PAMS - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Sep 10 18:00 Minimum Value: 1 km/h on Sep 6 06:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8 | | | | | | | | | | | | | | | | | Hours in Service: 432 Hours of Data: 432 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-Sep | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 6 | 7 | 6 | 5 | 6 | 5 | 4 | 4 | 3 | 4 | 4 | 3 | 7 |
| 2-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 |
| 3-Sep | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 5 | 6 | 6 | 6 | 7 | 6 | 7 | 6 | 4 | 4 | 6 | 2 | 2 | 2 | 7 |
| 4-Sep | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 5 |
| 5-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 3 | 3 | 1 | 1 | 2 | 2 | 2 | 3 | 5 |
| 6-Sep | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 7-Sep | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 5 |
| 8-Sep | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 6 | 3 | 2 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 6 |
| 9-Sep | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 4 |
| 10-Sep | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 8 | 8 | 8 | 7 | 7 | 5 | 10 | 3 | 2 | 4 | 4 | 5 | 4 | 10 |
| 11-Sep | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 4 | 3 | 3 | 4 | 4 |
| 12-Sep | 4 | 3 | 4 | 5 | 6 | 4 | 4 | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 1 | 2 | 3 | 3 | 3 | 2 | 6 |
| 13-Sep | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 3 |
| 14-Sep | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 4 |
| 15-Sep | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 4 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 4 |
| 16-Sep | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 5 |
| 17-Sep | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 6 | 5 | 5 | 5 | 4 | 4 | 3 | 2 | 3 | 3 | 4 | 4 | 4 | 6 |
| 18-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 4 |
| | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |



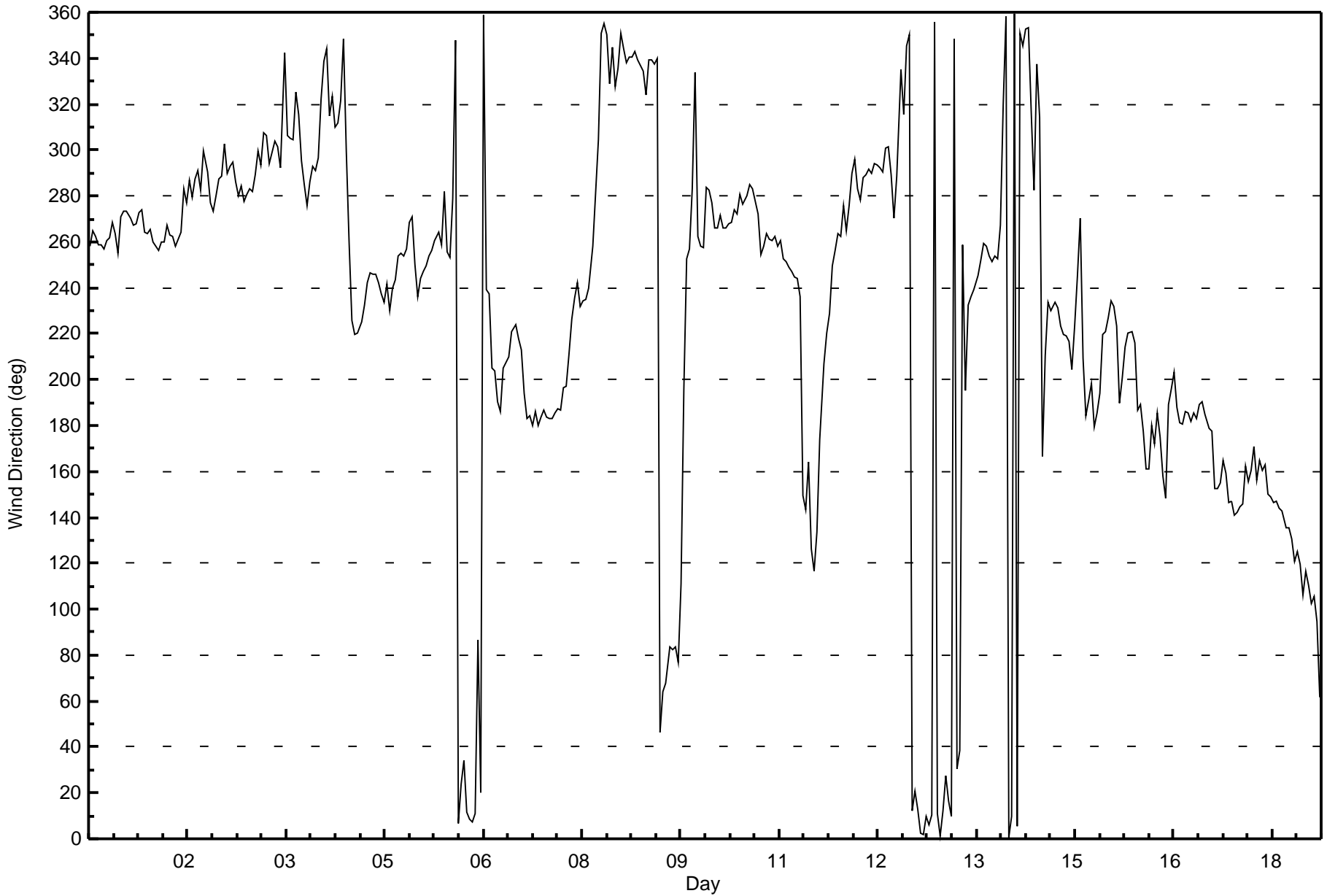
Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Surmont PAMS - September 2017

| | |
|--|---|
| Direction of Maximum Speed: 277 deg on Sep 10 14:00 Direction of Maximum Daily Speed Average: 271.2 deg on Sep 10 | Hours in Service: 432 Hours of Data: 432 Hours of Missing Data: 0 |
| Direction of Minimum Speed: 314 deg on Sep 14 22:00 Direction of Minimum Daily Speed Average: 3.9 deg on Sep 6 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 264.9 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-Sep | 258 | 265 | 263 | 259 | 258 | 257 | 260 | 262 | 269 | 264 | 255 | 271 | 273 | 274 | 270 | 268 | 268 | 273 | 274 | 264 | 264 | 266 | 260 | 258 | 264.6 |
| 2-Sep | 256 | 260 | 260 | 267 | 263 | 262 | 258 | 261 | 264 | 283 | 277 | 287 | 279 | 287 | 291 | 282 | 299 | 291 | 277 | 274 | 280 | 287 | 289 | 303 | 274.3 |
| 3-Sep | 290 | 293 | 295 | 286 | 280 | 284 | 278 | 281 | 283 | 282 | 289 | 300 | 293 | 308 | 306 | 294 | 299 | 304 | 301 | 292 | 342 | 306 | 305 | 304 | 296.2 |
| 4-Sep | 325 | 315 | 295 | 285 | 276 | 286 | 293 | 291 | 297 | 322 | 339 | 344 | 315 | 323 | 310 | 312 | 322 | 348 | 299 | 260 | 226 | 220 | 221 | 225 | 303.6 |
| 5-Sep | 233 | 242 | 246 | 246 | 246 | 242 | 237 | 234 | 242 | 230 | 239 | 243 | 254 | 255 | 254 | 257 | 268 | 271 | 250 | 236 | 244 | 247 | 249 | 254 | 247.4 |
| 6-Sep | 256 | 261 | 264 | 259 | 282 | 256 | 253 | 279 | 348 | 7 | 24 | 34 | 12 | 9 | 7 | 11 | 86 | 20 | 359 | 239 | 237 | 205 | 204 | 191 | 293.8 |
| 7-Sep | 186 | 205 | 208 | 210 | 221 | 224 | 218 | 213 | 194 | 183 | 184 | 180 | 186 | 180 | 184 | 187 | 184 | 183 | 183 | 186 | 187 | 187 | 196 | 197 | 190.8 |
| 8-Sep | 211 | 227 | 235 | 242 | 232 | 234 | 235 | 240 | 258 | 281 | 305 | 351 | 355 | 350 | 329 | 345 | 328 | 336 | 351 | 344 | 338 | 340 | 340 | 343 | 304.6 |
| 9-Sep | 339 | 337 | 334 | 324 | 339 | 339 | 338 | 340 | 46 | 64 | 68 | 84 | 82 | 84 | 77 | 111 | 196 | 253 | 257 | 283 | 334 | 262 | 258 | 257 | 352.8 |
| 10-Sep | 284 | 283 | 277 | 266 | 266 | 271 | 266 | 266 | 268 | 269 | 274 | 272 | 280 | 277 | 280 | 285 | 283 | 278 | 272 | 254 | 258 | 264 | 261 | 261 | 271.2 |
| 11-Sep | 263 | 258 | 260 | 253 | 252 | 249 | 247 | 245 | 244 | 236 | 150 | 143 | 164 | 126 | 117 | 133 | 174 | 207 | 220 | 229 | 249 | 256 | 264 | 262 | 238.6 |
| 12-Sep | 276 | 265 | 276 | 290 | 296 | 283 | 278 | 288 | 289 | 292 | 290 | 294 | 294 | 292 | 290 | 301 | 301 | 289 | 271 | 289 | 335 | 315 | 345 | 350 | 291.6 |
| 13-Sep | 12 | 21 | 13 | 2 | 2 | 10 | 6 | 11 | 356 | 11 | 1 | 12 | 27 | 16 | 10 | 348 | 30 | 38 | 259 | 195 | 232 | 236 | 239 | 245 | 357.4 |
| 14-Sep | 252 | 259 | 258 | 254 | 251 | 254 | 253 | 267 | 320 | 358 | 1 | 10 | 359 | 5 | 351 | 345 | 353 | 353 | 317 | 283 | 338 | 314 | 166 | 210 | 314.4 |
| 15-Sep | 234 | 230 | 234 | 232 | 223 | 220 | 219 | 217 | 204 | 224 | 245 | 270 | 209 | 184 | 191 | 198 | 179 | 185 | 194 | 220 | 221 | 227 | 234 | 232 | 217.6 |
| 16-Sep | 224 | 190 | 201 | 214 | 220 | 221 | 216 | 187 | 189 | 177 | 161 | 161 | 180 | 172 | 185 | 175 | 158 | 148 | 189 | 196 | 203 | 188 | 181 | 181 | 183.0 |
| 17-Sep | 186 | 186 | 182 | 186 | 183 | 189 | 190 | 185 | 179 | 178 | 153 | 153 | 155 | 165 | 159 | 147 | 147 | 141 | 142 | 145 | 146 | 162 | 156 | 160 | 162.9 |
| 18-Sep | 171 | 156 | 165 | 161 | 163 | 150 | 149 | 146 | 147 | 144 | 143 | 136 | 136 | 131 | 121 | 125 | 120 | 106 | 116 | 110 | 103 | 105 | 94 | 62 | 137.1 |
| | 261.8 | 259.3 | 259.7 | 258.3 | 258.4 | 257.6 | 256.2 | 258.8 | 259.8 | 262.3 | 265.1 | 265.9 | 266.2 | 276.1 | 280.7 | 277.8 | 270.2 | 283.1 | 259.2 | 247.6 | 256.2 | 253.0 | 252.9 | 256.3 | |
| | Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | | |

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Surmont PAMS - September 2017

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Sep 9 21:00 Minimum Value: 6 deg on Sep 6 04:00 Percentiles: P ₁ = 8 P ₁₀ = 9 Q ₁ = 11 Median = 16 Q ₃ = 22 P ₉₀ = 32 P ₉₉ = 74 | | | | | | | | | | | | | | | | | Hours in Service: 432 Hours of Data: 432 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-Sep | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 10 | 11 | 14 | 18 | 15 | 15 | 16 | 13 | 13 | 11 | 10 | 9 | 9 | 9 | 8 | 8 | 18 |
| 2-Sep | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 10 | 10 | 13 | 15 | 12 | 13 | 14 | 12 | 13 | 21 | 17 | 9 | 8 | 10 | 11 | 18 | 31 | 31 |
| 3-Sep | 11 | 14 | 12 | 11 | 10 | 10 | 11 | 12 | 12 | 14 | 15 | 16 | 15 | 15 | 16 | 15 | 14 | 14 | 12 | 12 | 13 | 18 | 12 | 10 | 18 |
| 4-Sep | 16 | 16 | 9 | 11 | 9 | 11 | 10 | 11 | 12 | 21 | 21 | 23 | 25 | 32 | 30 | 24 | 26 | 20 | 44 | 19 | 16 | 9 | 15 | 10 | 44 |
| 5-Sep | 15 | 12 | 9 | 9 | 10 | 13 | 15 | 20 | 16 | 22 | 19 | 23 | 19 | 19 | 16 | 15 | 13 | 9 | 13 | 11 | 10 | 9 | 9 | 8 | 23 |
| 6-Sep | 8 | 8 | 8 | 6 | 11 | 7 | 9 | 12 | 28 | 22 | 33 | 36 | 56 | 50 | 41 | 23 | 29 | 26 | 59 | 18 | 73 | 25 | 23 | 24 | 73 |
| 7-Sep | 33 | 25 | 22 | 22 | 20 | 15 | 18 | 23 | 28 | 23 | 21 | 18 | 23 | 21 | 22 | 22 | 20 | 18 | 17 | 17 | 19 | 20 | 24 | 26 | 33 |
| 8-Sep | 27 | 20 | 18 | 15 | 19 | 17 | 16 | 22 | 20 | 19 | 19 | 31 | 18 | 16 | 16 | 18 | 18 | 16 | 22 | 15 | 15 | 11 | 13 | 14 | 31 |
| 9-Sep | 11 | 8 | 14 | 26 | 15 | 11 | 13 | 22 | 20 | 22 | 23 | 27 | 31 | 38 | 16 | 22 | 45 | 18 | 60 | 58 | 91 | 75 | 49 | 21 | 91 |
| 10-Sep | 20 | 11 | 10 | 10 | 10 | 10 | 11 | 11 | 10 | 11 | 13 | 12 | 12 | 12 | 12 | 14 | 12 | 19 | 15 | 9 | 9 | 9 | 9 | 8 | 20 |
| 11-Sep | 8 | 8 | 8 | 8 | 8 | 9 | 10 | 12 | 14 | 24 | 42 | 18 | 27 | 14 | 30 | 33 | 34 | 30 | 19 | 18 | 13 | 10 | 8 | 10 | 42 |
| 12-Sep | 10 | 9 | 12 | 12 | 13 | 13 | 11 | 13 | 13 | 14 | 13 | 15 | 13 | 14 | 13 | 13 | 17 | 13 | 8 | 24 | 24 | 20 | 15 | 19 | 24 |
| 13-Sep | 13 | 14 | 14 | 16 | 22 | 15 | 16 | 20 | 22 | 24 | 26 | 28 | 37 | 32 | 21 | 29 | 40 | 42 | 76 | 34 | 15 | 10 | 10 | 10 | 76 |
| 14-Sep | 12 | 8 | 8 | 9 | 10 | 9 | 11 | 29 | 58 | 53 | 35 | 33 | 22 | 21 | 18 | 20 | 21 | 14 | 33 | 8 | 79 | 75 | 35 | 46 | 79 |
| 15-Sep | 15 | 11 | 12 | 12 | 15 | 12 | 17 | 25 | 32 | 43 | 49 | 51 | 46 | 44 | 63 | 38 | 43 | 26 | 22 | 18 | 16 | 16 | 12 | 14 | 63 |
| 16-Sep | 15 | 20 | 22 | 21 | 16 | 15 | 18 | 23 | 23 | 18 | 22 | 21 | 27 | 28 | 27 | 23 | 28 | 21 | 22 | 23 | 23 | 21 | 17 | 15 | 28 |
| 17-Sep | 20 | 19 | 16 | 17 | 16 | 19 | 21 | 20 | 16 | 21 | 14 | 18 | 20 | 23 | 21 | 14 | 16 | 11 | 9 | 9 | 11 | 18 | 16 | 17 | 23 |
| 18-Sep | 20 | 14 | 18 | 18 | 20 | 11 | 10 | 10 | 10 | 11 | 15 | 15 | 17 | 17 | 18 | 16 | 17 | 12 | 11 | 11 | 10 | 12 | 15 | 21 | 21 |
| | | | | | | | | | | | | | | | | | 33 25 22 26 22 19 21 29 58 53 49 51 56 50 63 38 45 42 76 58 91 75 49 46 Diurnal Maximum | | | | | | | | |



Wood Buffalo Environmental Association

SO₂ Calibration Summary

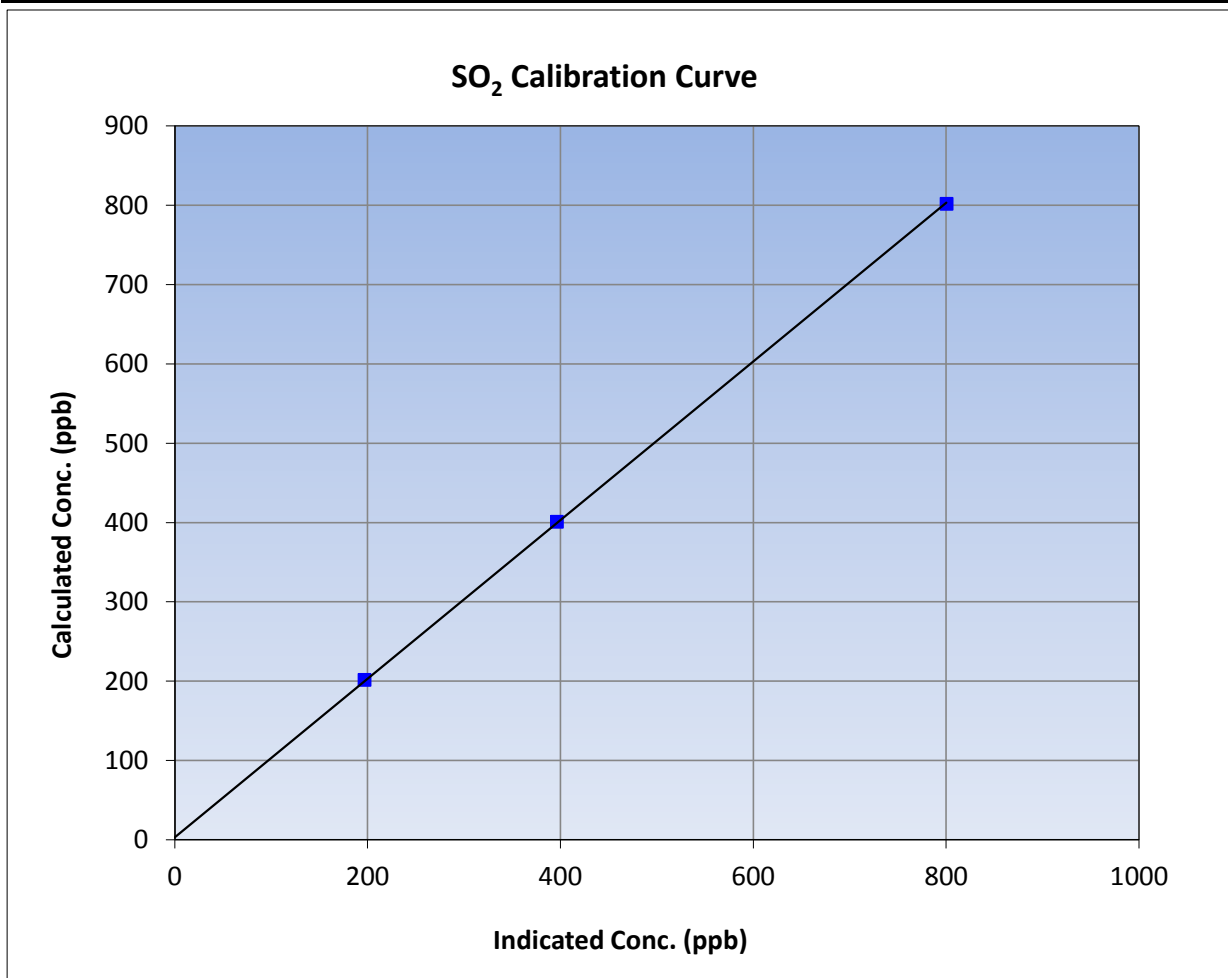
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Surmont | Station Number | AMS 502 |
| Start Time (MST) | 10:44 | End Time (MST) | 14:07 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1160290011 |

Calibration Data

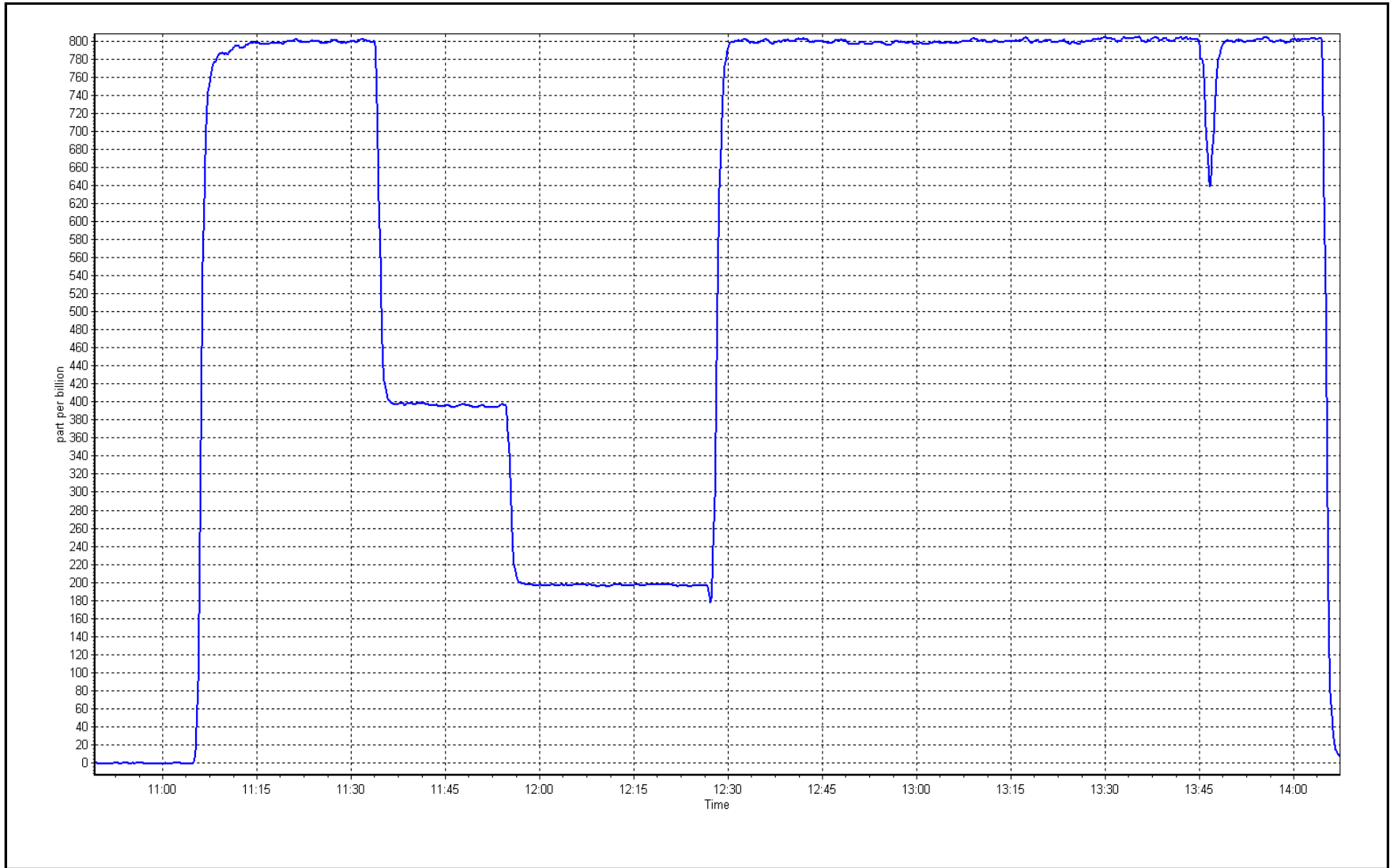
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.6 | ---- | Correlation Coefficient | 0.999958 | ≥0.995 |
| 801.6 | 800.0 | 1.0020 | Slope | 0.999936 | 0.90 - 1.10 |
| 400.7 | 396.0 | 1.0118 | Intercept | 2.996461 | +/-30 |
| 201.4 | 196.4 | 1.0255 | | | |



SO2 Calibration Plot

Date: 19-Sep

Location: Surmont





Wood Buffalo Environmental Association

H₂S Calibration Summary

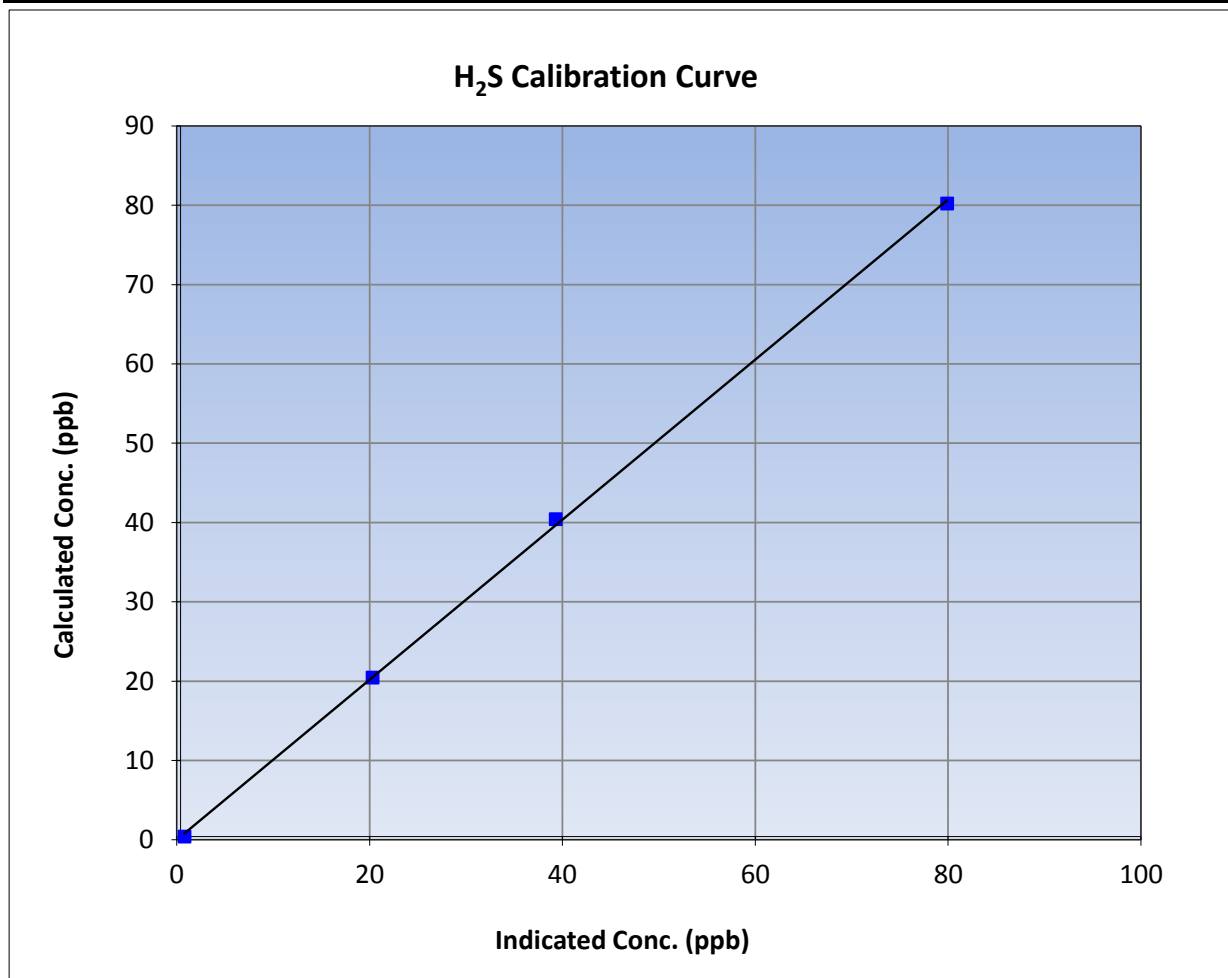
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 23, 2017 |
| Station Name | Surmont | Station Number | AMS 502 |
| Start Time (MST) | 14:13 | End Time (MST) | 15:47 |
| Analyzer make | API T101 | Analyzer serial # | 197 |

Calibration Data

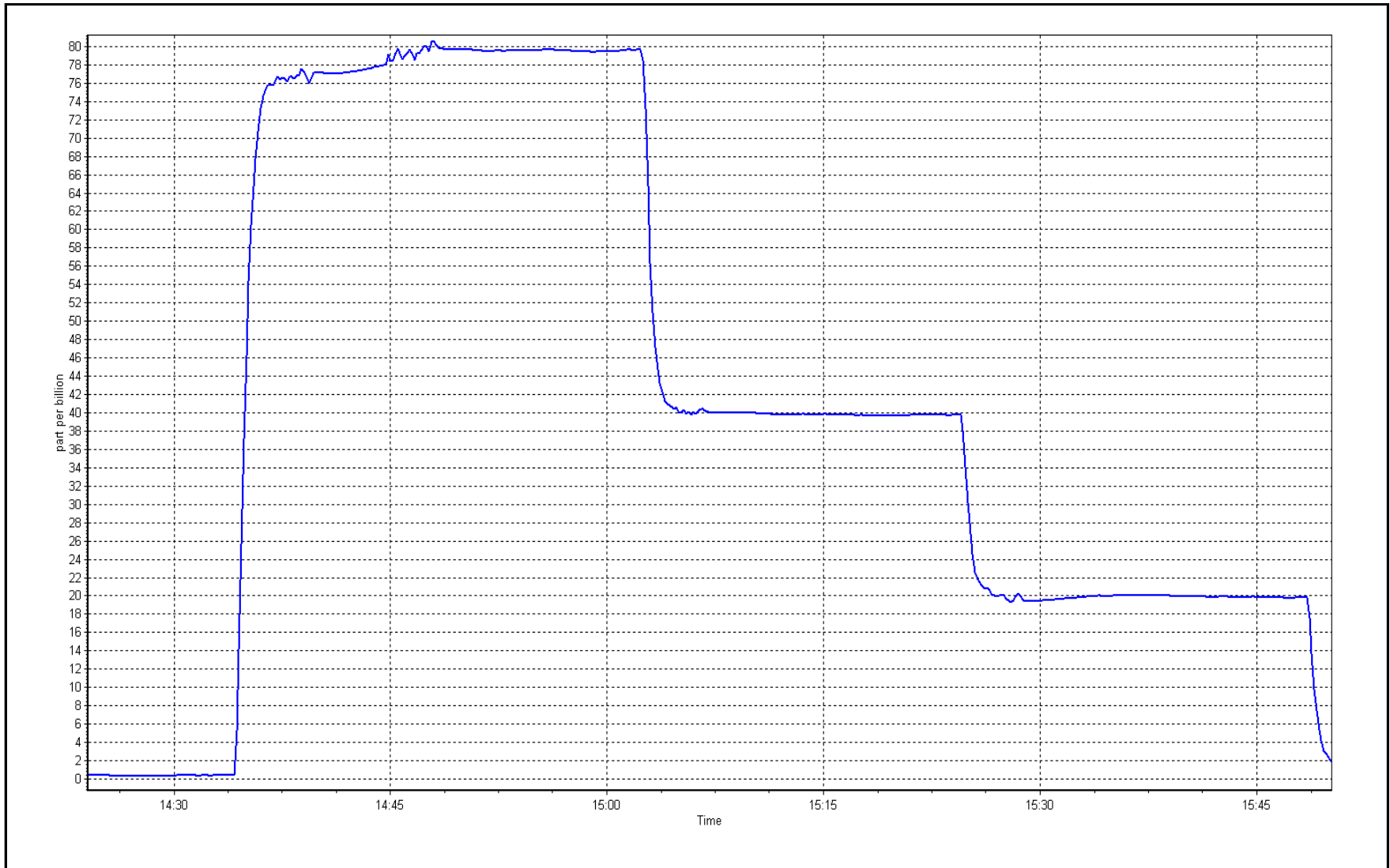
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <u>Limits</u> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999734 | |
| 79.8 | 79.5 | 1.0043 | | | ≥0.995 |
| 40.0 | 38.9 | 1.0293 | Slope | 1.009164 | |
| 20.1 | 19.9 | 1.0083 | | | 0.90 - 1.10 |
| | | | Intercept | -0.006309 | +/-3 |



H₂S Calibration Plot

Date: 19-Sep

Location: Surmont





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Surmont | Station number: | AMS 502 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 22, 2017 |
| Start time (MST): | 10:44 | End time (MST): | 14:07 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-------------------|
| NO Gas Cylinder # | LL104215 | Cal Gas Expiry Date | February 12, 2018 |
| NOX Cal Gas Conc. | <u>48.1</u> ppb | NO Cal Gas Conc. | <u>48.1</u> ppb |
| Calibrator Model | API T700 | Serial Number | 622 |
| ZAG make/model | Teledyne API T701 | Serial Number | 196 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1218153356 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 1.045 | NA | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 1.001 | NA | PMT Temperature | -3.0 | NA |
| NO ₂ coefficient | 1.000 | NA | Reaction cell Press | 158.5 | NA |
| NO bkgrnd | 5.8 | NA | Sample Flow | 0.666 | NA |
| NOX bkgrnd | 6.4 | NA | PMT Voltage | -866.9 | NA |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.994643 | 0.980032 |
| NO _x Cal Offset | 2.116792 | 3.397063 |
| NO Cal Slope | 0.994189 | 0.981886 |
| NO Cal Offset | 2.175914 | 2.889709 |
| NO ₂ Cal Slope | 0.994477 | 0.993169 |
| NO ₂ Cal Offset | -1.000749 | -1.118125 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5007 | 0.0 | 0.0 | 0.0 | 0.0 | -0.7 | -0.4 | -0.2 | ---- | ---- |
| as found span | 4930 | 83.2 | 798.3 | 798.3 | 0.0 | 812.5 | 811.4 | 1.1 | 0.9825 | 0.9838 |
| calibrator zero | 5008 | 0.0 | 0.0 | 0.0 | 0.0 | -0.7 | -0.4 | -0.2 | ---- | ---- |
| high point | 4930 | 83.2 | 798.3 | 798.3 | 0.0 | 812.5 | 811.4 | 1.1 | 0.9825 | 0.9838 |
| second point | 4973 | 41.6 | 399.0 | 399.0 | 0.0 | 402.1 | 401.9 | 0.2 | 0.9924 | 0.9929 |
| third point | 4991 | 20.9 | 200.6 | 200.6 | 0.0 | 198.6 | 199.0 | -0.4 | 1.0100 | 1.0079 |
| as left zero | 5009 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.2 | -0.3 | ---- | ---- |
| as left span | 4816 | 83.2 | 816.9 | 409.7 | 407.2 | 807.4 | 404.7 | 402.7 | 1.0117 | 1.0124 |
| Average Correction Factor | | | | | | | | | 0.9949 | 0.9949 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 813.2 ppb | NO = 811.8 ppb | | *Percent Change | NO _x = -1.6% |
| Previous Response | NO _x = 800.5 ppb | NO = 800.8 ppb | | *Percent Change | NO = -1.4% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 807.5 | 806.4 | 1.1 | 0.9886 | 0.9899 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 409.7 | 396.7 | 809.9 | 409.7 | 400.3 | 0.9856 | ---- | 0.9910 | 100.9% |
| 2nd NO2 (200 ppb O3) | 598.4 | 208.0 | 808.2 | 598.4 | 209.8 | 0.9877 | ---- | 0.9914 | 100.9% |
| 3rd NO2 (100 ppb O3) | 699.2 | 107.2 | 810.5 | 699.2 | 111.4 | 0.9849 | ---- | 0.9623 | 103.9% |
| 2nd NO ref point | ---- | 0.0 | 808.1 | 806.8 | 1.3 | 0.9878 | 0.9894 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9865 | 0.9897 | 0.9816 | 101.9% |

Notes: No adjustment. Instrument shutdown for transport.

Calibration Performed By: Aswin Sasi Kumar



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

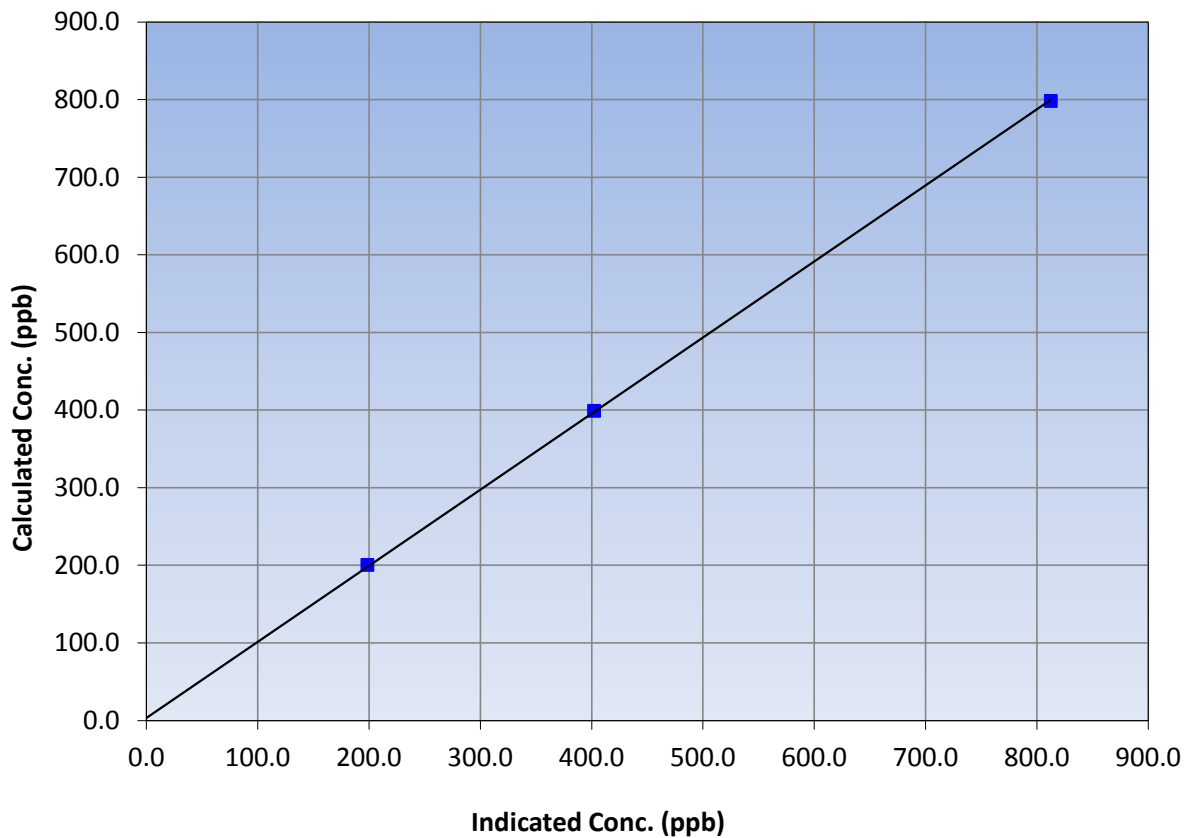
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Surmont | Station Number | AMS 502 |
| Start Time (MST) | 10:44 | End Time (MST) | 14:07 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153356 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.7 | ---- | Correlation Coefficient | ≥0.995 | |
| 798.3 | 812.5 | 0.9825 | | | |
| 399.0 | 402.1 | 0.9924 | | | |
| 200.6 | 198.6 | 1.0100 | | | |
| | | | Slope | 0.980032 | 0.90 - 1.10 |
| | | | Intercept | 3.397063 | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

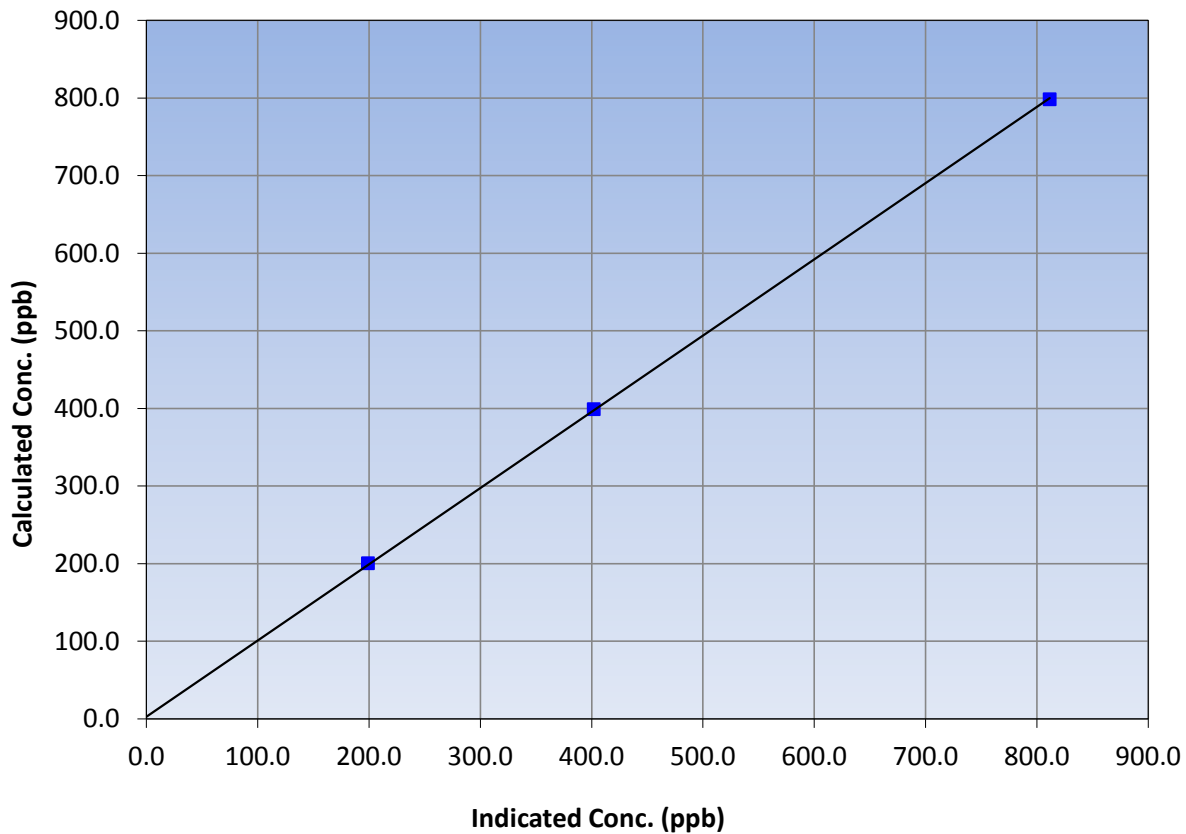
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Surmont | Station Number | AMS 502 |
| Start Time (MST) | 10:44 | End Time (MST) | 14:07 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153356 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999955 | ≥0.995 |
| 798.3 | 811.4 | 0.9838 | | | |
| 399.0 | 401.9 | 0.9929 | Slope | 0.981886 | 0.90 - 1.10 |
| 200.6 | 199.0 | 1.0079 | | | |
| | | | Intercept | 2.889709 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

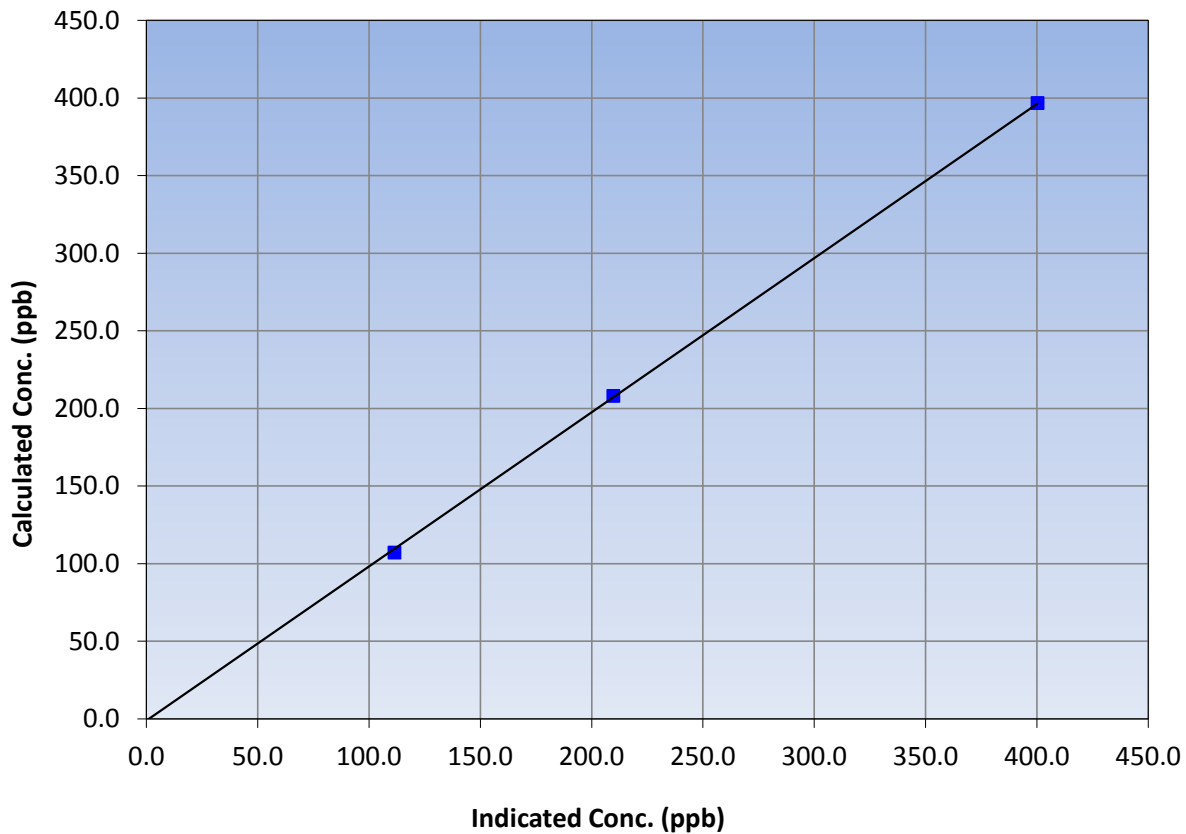
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 22, 2017 |
| Station Name | Surmont | Station Number | AMS 502 |
| Start Time (MST) | 10:44 | End Time (MST) | 14:07 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153356 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 396.7 | 400.3 | 0.9910 | | | |
| 208.0 | 209.8 | 0.9914 | | | |
| 107.2 | 111.4 | 0.9623 | | | |
| | | | Slope | 0.993169 | 0.90 - 1.10 |
| | | | Intercept | -1.118125 | +/-20 |

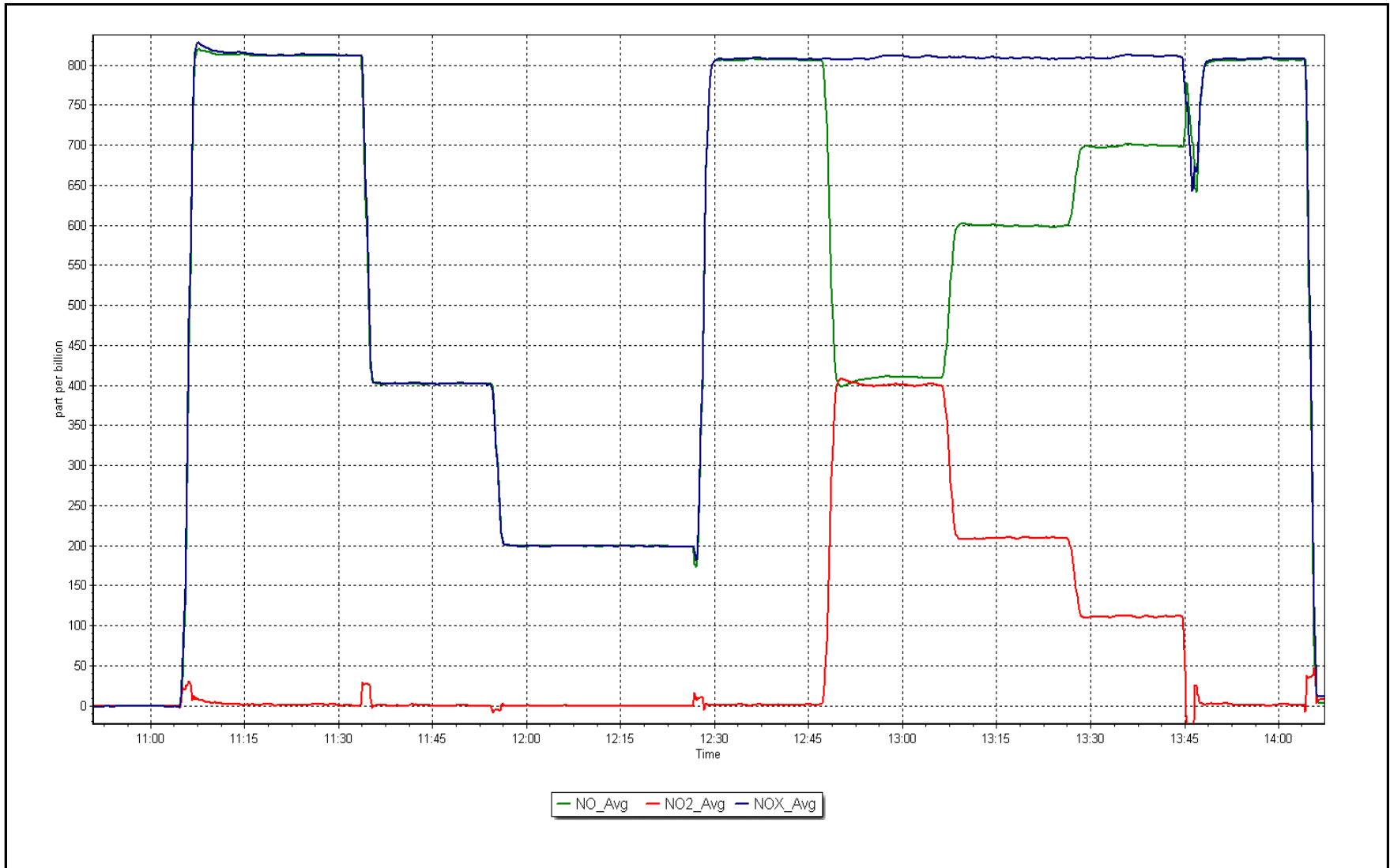
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 19, 2017

Location: Surmont





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 505 SAWBONES BAY SEPTEMBER 2017

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

October 27, 2017

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS 505)
 SEPTEMBER 2017

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 684 | 34 | 36 | 99.72 | 27 | 0 | 11 | 0 |
| H2S (ppb) Average | 686 | 32 | 34 | 99.72 | 2 | 0 | 0 | 0 |
| THC(ppm) Average | 684 | 34 | 36 | 99.72 | 3.7 | - | 2.5 | - |
| NO2 (ppb) Average | 648 | 36 | 72 | 95 | 18 | 0 | 8 | - |
| NO (ppb) Average | 648 | 36 | 72 | 95 | 18 | - | 5 | - |
| NOX (ppb) Average | 648 | 36 | 72 | 95 | 29 | - | 12 | - |
| PM2.5(ug/m3) Average | 720 | 0 | 0 | 100 | 58 | - | 23 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 29 | - | 20 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 97 | - | 94 | - |
| Wind Speed 10 m (km/h) Average | 716 | 0 | 4 | 99.44 | 35 | - | 23 | - |
| Wind Direction 10 m (deg) Average | 716 | 0 | 4 | 99.44 | - | - | 0 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS 505)
 SEPTEMBER 2017

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|-----|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 684 | 1.6 | 4 | - | 0 | 0 | 0 | 0 | 1 | 4 | 27 |
| H2S (ppb) Average | 686 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| THC(ppm) Average | 684 | 2.25 | 0.2 | - | 2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.4 | 3.7 |
| NO2 (ppb) Average | 648 | 2.5 | 3 | - | 0 | 0 | 1 | 1 | 3 | 6 | 18 |
| NO (ppb) Average | 648 | 1 | 2 | - | 0 | 0 | 0 | 0 | 1 | 3 | 18 |
| NOX (ppb) Average | 648 | 3.4 | 5 | - | 0 | 0 | 1 | 2 | 4 | 9 | 29 |
| PM2.5(ug/m3) Average | 720 | 7 | 8 | - | 0 | 0 | 1 | 5 | 11 | 16 | 58 |
| Temperature 2 m (C) Average | 720 | 11.45 | 6.1 | - | -2.7 | 3.5 | 6.3 | 11.5 | 15.3 | 19.7 | 29 |
| Relative Humidity (%) Average | 720 | 66.8 | 20 | - | 25 | 38 | 52 | 67 | 84 | 94 | 97 |
| Wind Speed 10 m (km/h) Average | 716 | 11.2 | 6 | - | 0 | 4 | 7 | 10 | 15 | 18 | 35 |
| Wind Direction 10 m (deg) Average | 716 | 0 | 0 | - | 0 | - | - | - | - | - | 0 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS 505)
 SEPTEMBER 2017

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|---------------------|--|
| SO2 | 06 Sep 2017 13:00 | 06 Sep 2017 14:00 | 2 | Maintenance - WBEA internal audit |
| THC | 06 Sep 2017 14:00 | 06 Sep 2017 15:00 | 2 | Maintenance - WBEA internal audit |
| NO2, NO, NOX | 06 Sep 2017 15:00 | 06 Sep 2017 19:00 | 5 | Maintenance - WBEA internal audit |
| H2S | 06 Sep 2017 18:00 | 06 Sep 2017 19:00 | 2 | Maintenance - WBEA internal audit |
| NO2, NO, NOX | 25 Sep 2017 06:00 | 26 Sep 2017 12:00 | 31 | Analyzer failure - sample pump failure |
| Wind Speed, Wind Direction | 15 Sep 2017 04:00 | 15 Sep 2017 07:00 | 4 | Flat line in sensor output signal |



| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 27 ppb on Sep 1 04:00 | Maximum Daily Average: 11.2 ppb on Sep 10 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 1 19:00 | Minimum Daily Average: 0.0 ppb on Sep 20 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 3.9 ppb at hour 7 | Minimum Diurnal Average: 0.5 ppb at hour 16 | | Hours of Calibration: | 34 |
| Monthly Average: 1.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 22 | | 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-Sep | 18 | 4 | 22 | 27 | Z | 20 | 22 | 18 | 12 | 4 | 7 | 3 | 5 | 2 | 6 | 1 | 4 | 3 | 0 | 3 | 17 | 19 | 1 | 10 | 10.0 | 27 |
| 2-Sep | 9 | 21 | 18 | 23 | 21 | Z | 21 | 14 | 2 | 6 | 5 | 4 | 2 | 3 | 6 | 0 | 2 | 10 | 18 | 8 | 0 | 0 | 1 | 0 | 8.5 | 23 |
| 3-Sep | Z | 1 | 0 | 0 | 0 | 0 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 6 |
| 4-Sep | 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 |
| 5-Sep | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 3 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1.2 | 3 |
| 6-Sep | 1 | 1 | 1 | Z | 4 | 7 | 5 | 4 | 1 | 2 | 6 | 4 | M | M | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1.8 | 7 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0.4 | 1 |
| 8-Sep | 1 | 1 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 6 | 1 | 4 | 1 | 1 | 1 | 1 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1.3 | 6 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0.3 | 2 |
| 10-Sep | 10 | Z | 3 | 11 | 14 | 21 | 21 | 21 | 22 | 17 | 10 | 5 | 9 | 2 | 3 | 1 | 3 | 10 | 20 | 13 | 1 | 1 | 15 | 26 | 11.2 | 26 |
| 11-Sep | 4 | 4 | Z | 1 | 0 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 4 | 7 | 1 | 0 | 1 | 1 | 10 | 5 | 3 | 2.5 | 10 |
| 12-Sep | 7 | 1 | 5 | Z | 0 | 0 | 23 | 12 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.3 | 23 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.1 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 4 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 17-Sep | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 18-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 20-Sep | 0 | 0 | 0 | 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-Sep | Z | 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-Sep | 0 | Z | 0 | 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-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0.5 | 1 |
| 25-Sep | 0 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.6 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | 3 | Z | 12 | 11 | 12 | 0 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 10 | 0 | 2.5 | 12 |
| 27-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 30-Sep | 0 | 0 | 0 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 5 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 |

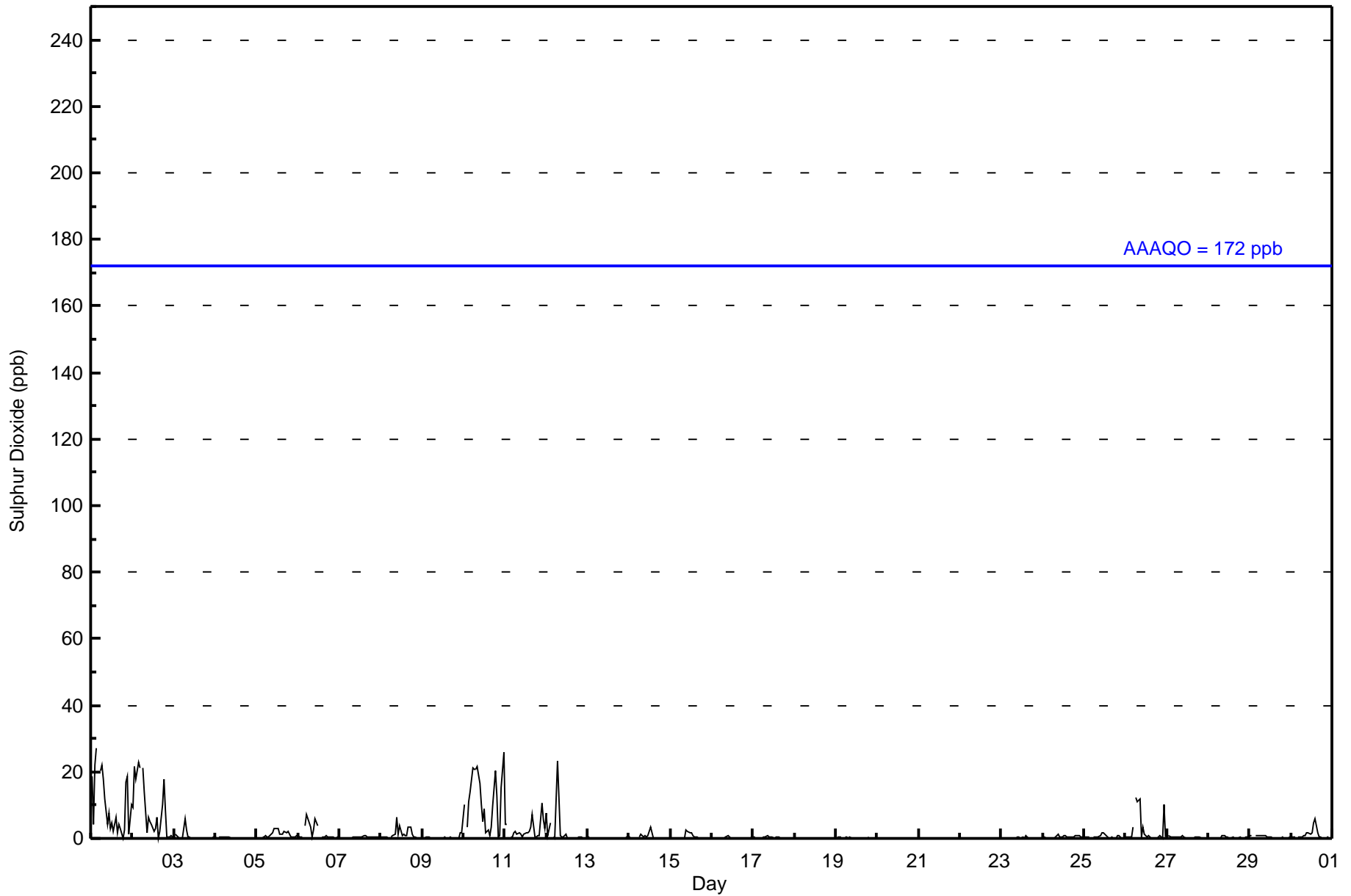
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 2.2 | 1.5 | 2.1 | 2.6 | 1.9 | 2.2 | 3.9 | 3.0 | 2.0 | 1.8 | 1.6 | 1.2 | 1.1 | 0.8 | 1.1 | 0.5 | 0.9 | 1.1 | 1.5 | 1.0 | 0.8 | 1.2 | 1.3 | 1.6 | Diurnal Average | |
| 18 | 21 | 22 | 27 | 21 | 21 | 23 | 21 | 22 | 17 | 10 | 5 | 9 | 5 | 6 | 4 | 7 | 10 | 20 | 13 | 17 | 19 | 15 | 26 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 652 | 95.32 | 95.32 |
| 11 - 20 | 19 | 2.78 | 98.10 |
| 21 - 60 | 13 | 1.90 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - September 2017

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 50 | 55 | 13 | 3 | 23 | 21 | 34 | 71 | 106 | 49 | 37 | 27 | 31 | 71 | 37 | 20 | 648 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 17 | 1 | 0 | 0 | 19 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 13 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 50 | 55 | 13 | 3 | 23 | 21 | 34 | 71 | 106 | 49 | 37 | 28 | 61 | 72 | 37 | 20 | 680 |

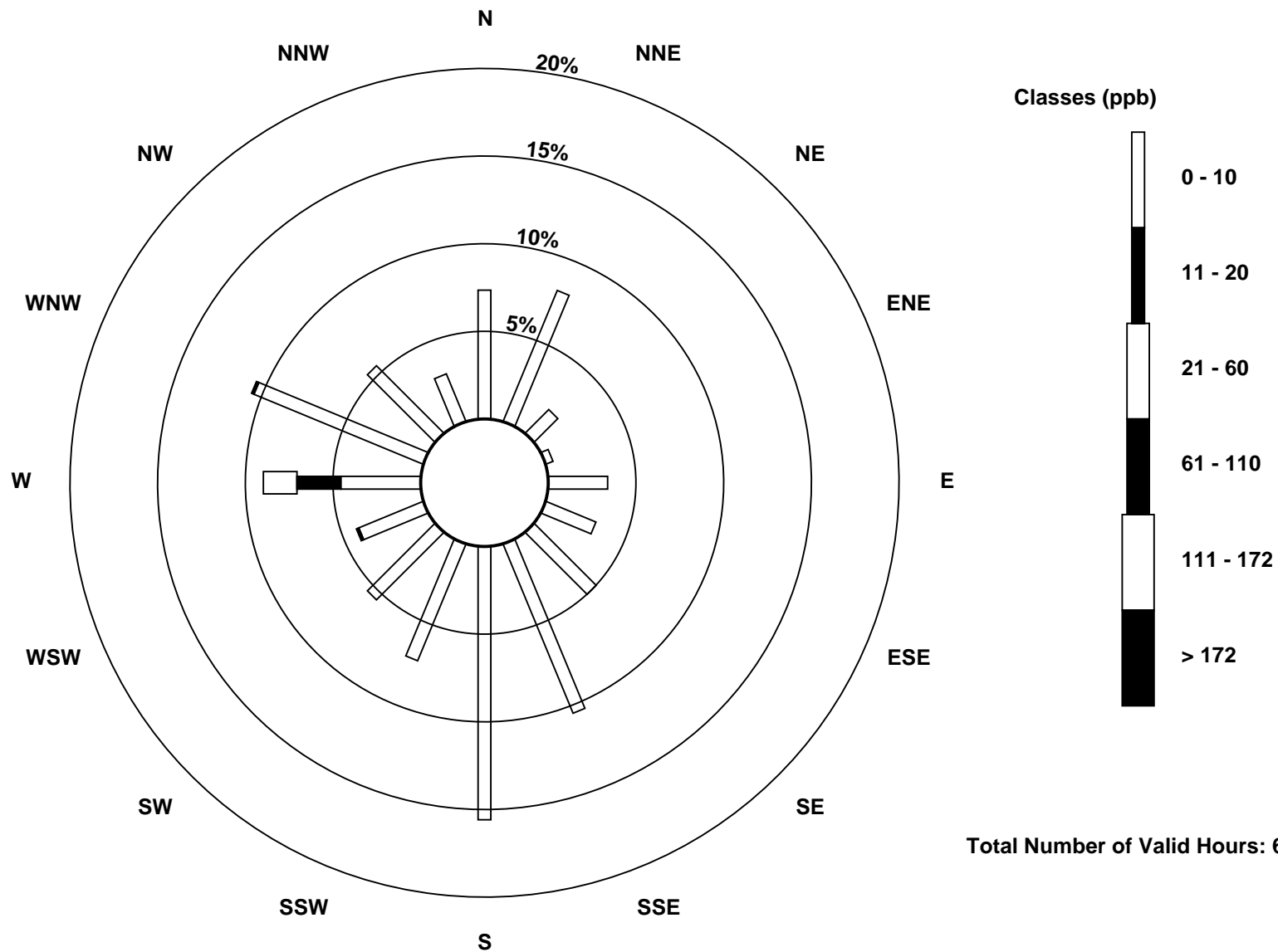
Total Number of Valid Hours: 680

Total Number of Hours: 720

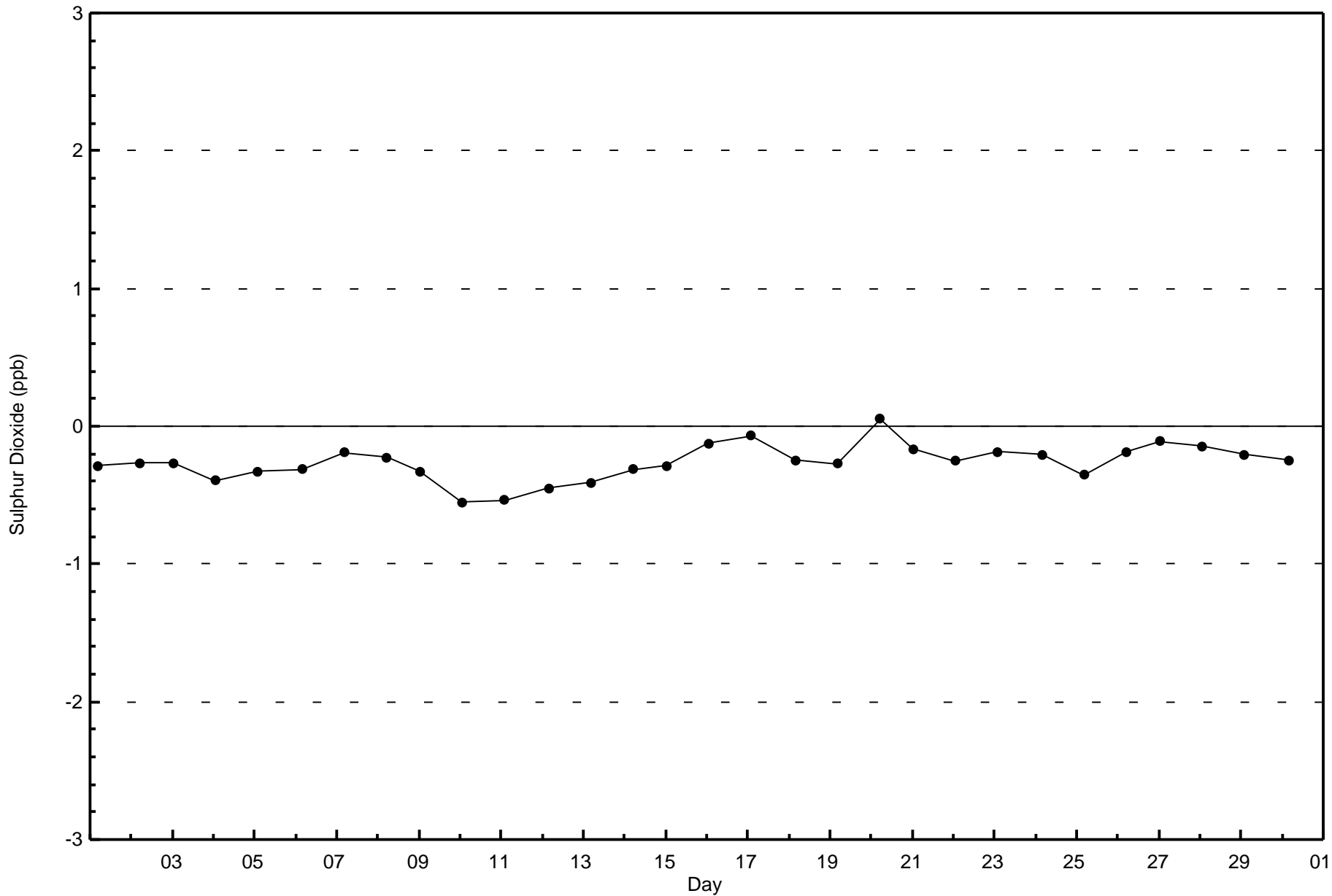


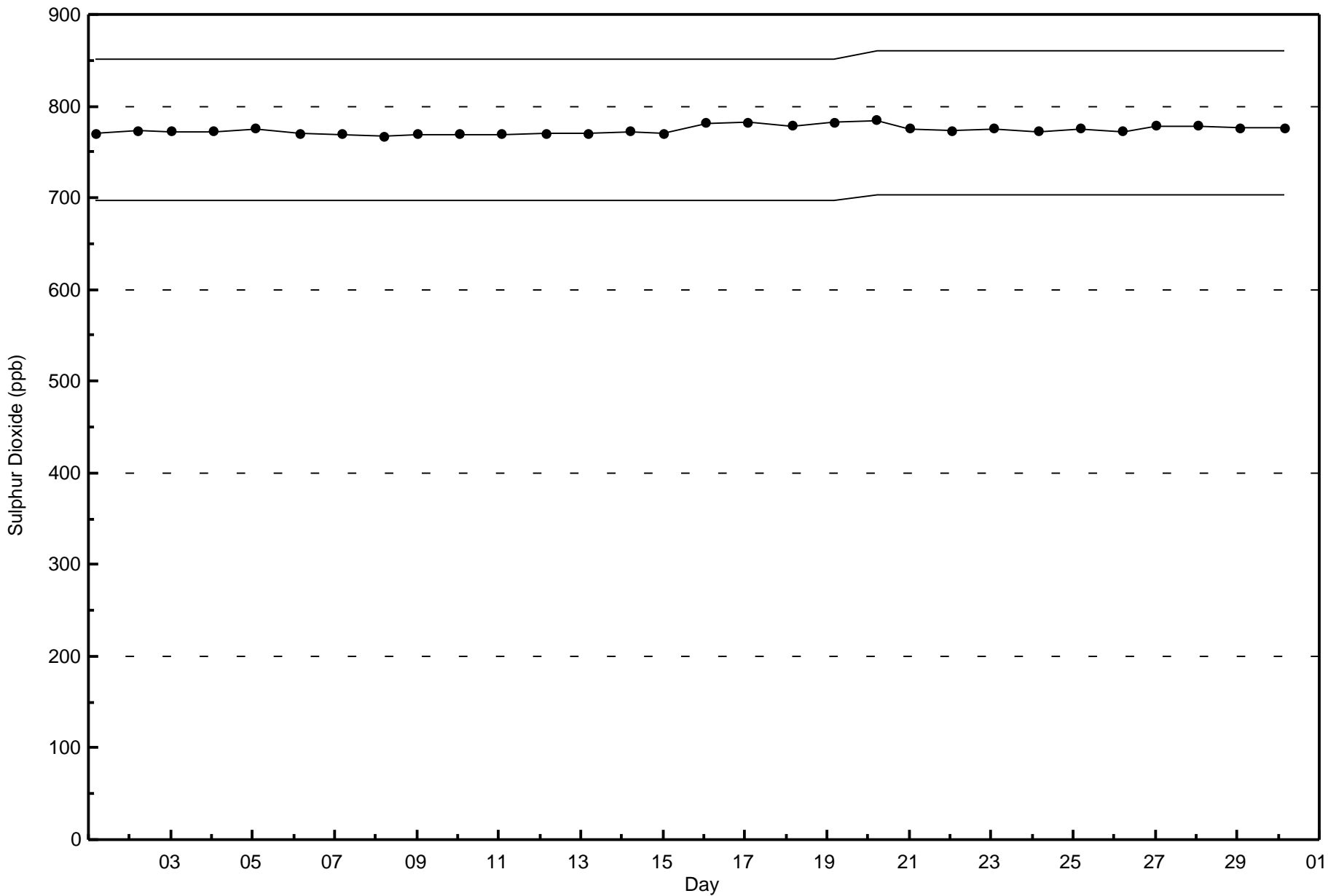
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay (AMS 505)



Total Number of Valid Hours: 680







Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H2S) - ppb

Sawbones Bay - September 2017

| | | | | |
|--|--|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 26 23:00 | Maximum Daily Average: 0.5 ppb on Sep 10 | | Hours of Data: | 686 |
| Minimum Value: 0 ppb on Sep 1 19:00 | Minimum Daily Average: 0.0 ppb on Sep 28 | | Hours of Missing Data: | 34 |
| Maximum Diurnal Average: 0.3 ppb at hour 8 | Minimum Diurnal Average: 0.1 ppb at hour 17 | | Hours of Calibration: | 32 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | Percent Operational Time: | 99.7 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.3 | 1 | |
| 2-Sep | 1 | 1 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 4-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 10-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0.5 | 1 |
| 11-Sep | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 12-Sep | 1 | 0 | 1 | 1 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.1 | 1 | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 15-Sep | 0 | Z | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 16-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 18-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 22-Sep | 0 | 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 | |
| 23-Sep | 0 | 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-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0.2 | 2 | |
| 27-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 28-Sep | 0 | 0 | Z | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | |
| 30-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |

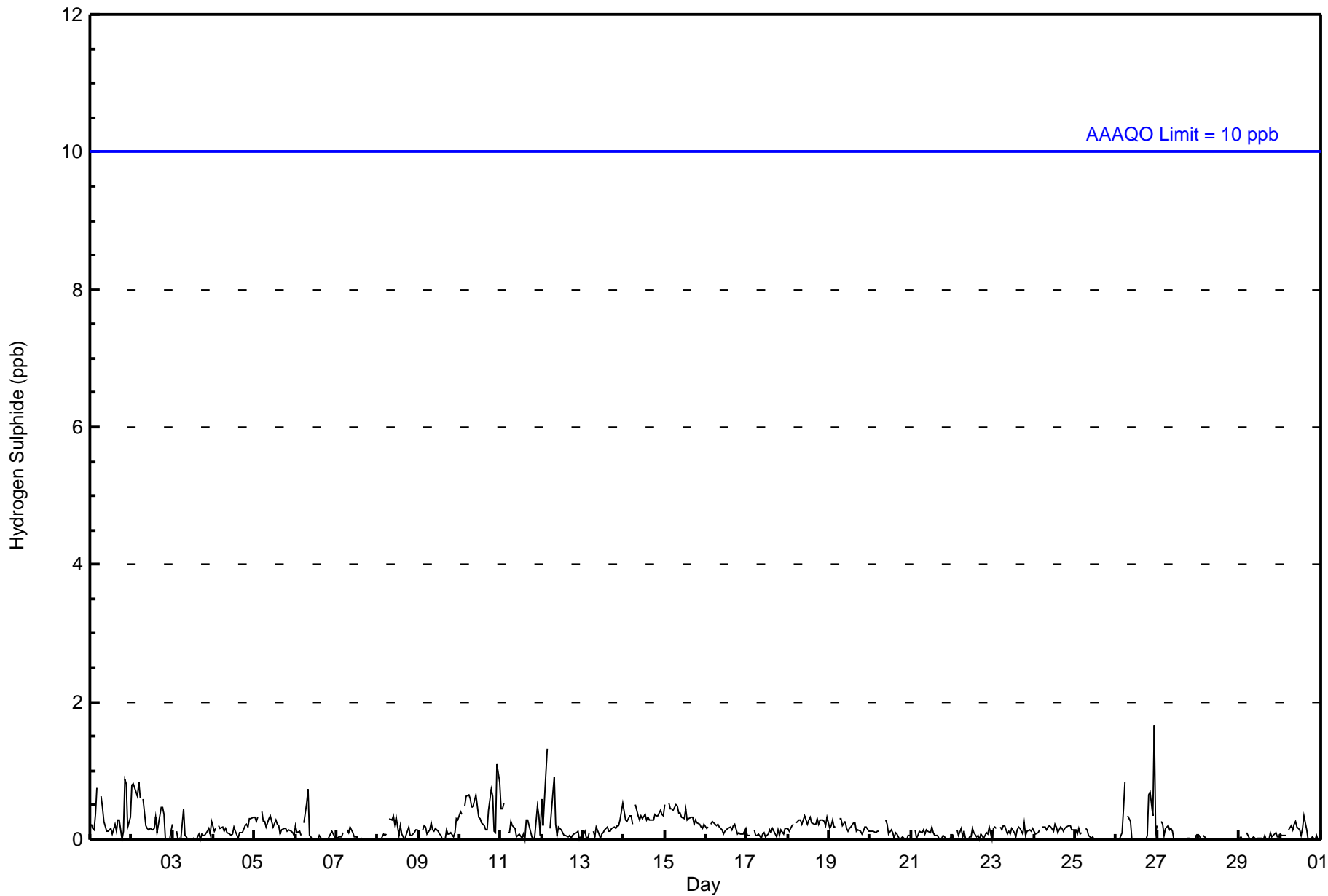
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 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 | Diurnal Average | | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 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
Sawbones Bay - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay - September 2017

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 51 | 51 | 14 | 5 | 23 | 22 | 32 | 70 | 110 | 47 | 36 | 31 | 60 | 71 | 37 | 22 | 682 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 51 | 51 | 14 | 5 | 23 | 22 | 32 | 70 | 110 | 47 | 36 | 31 | 60 | 71 | 37 | 22 | 682 |

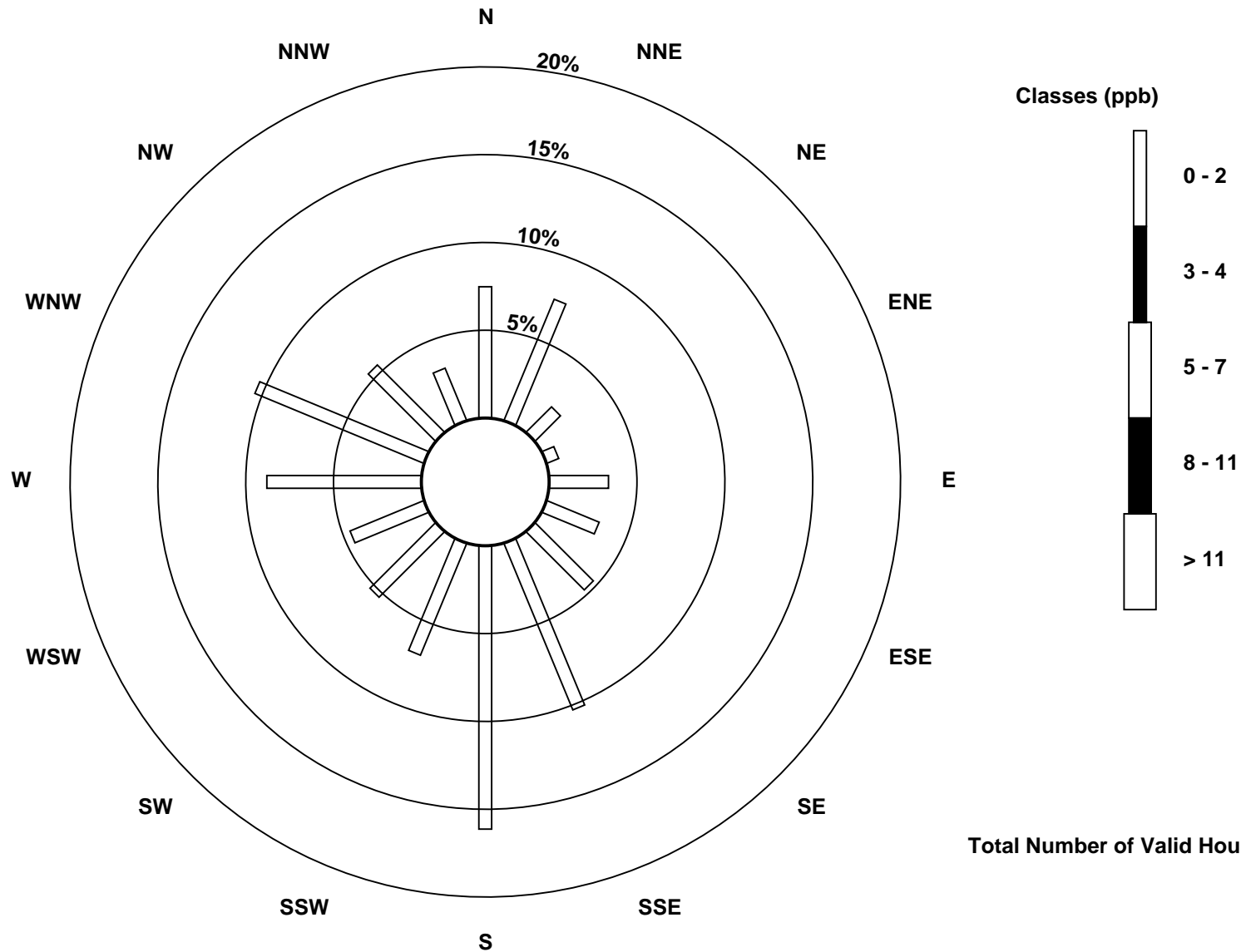
Total Number of Valid Hours: 682

Total Number of Hours: 720

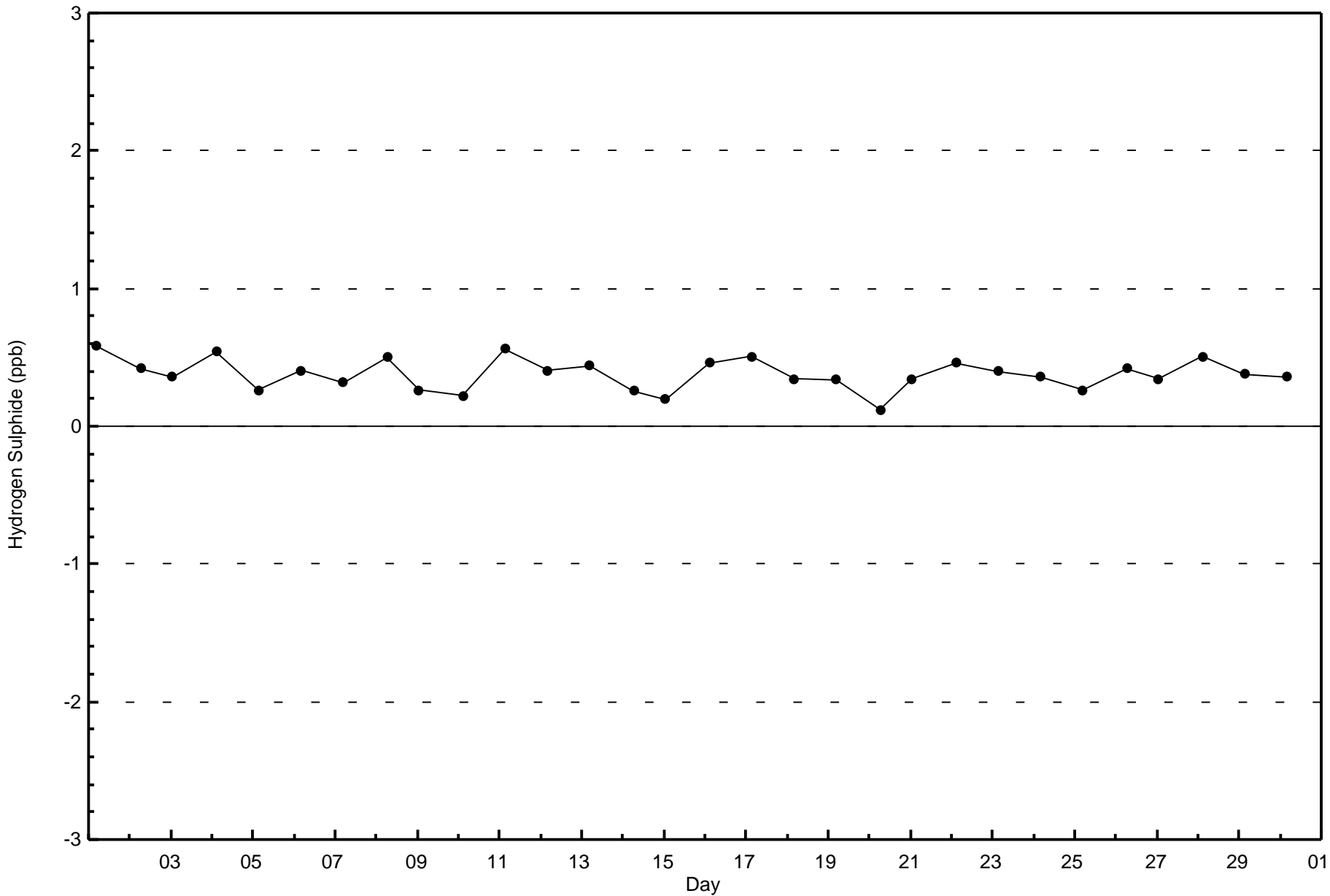


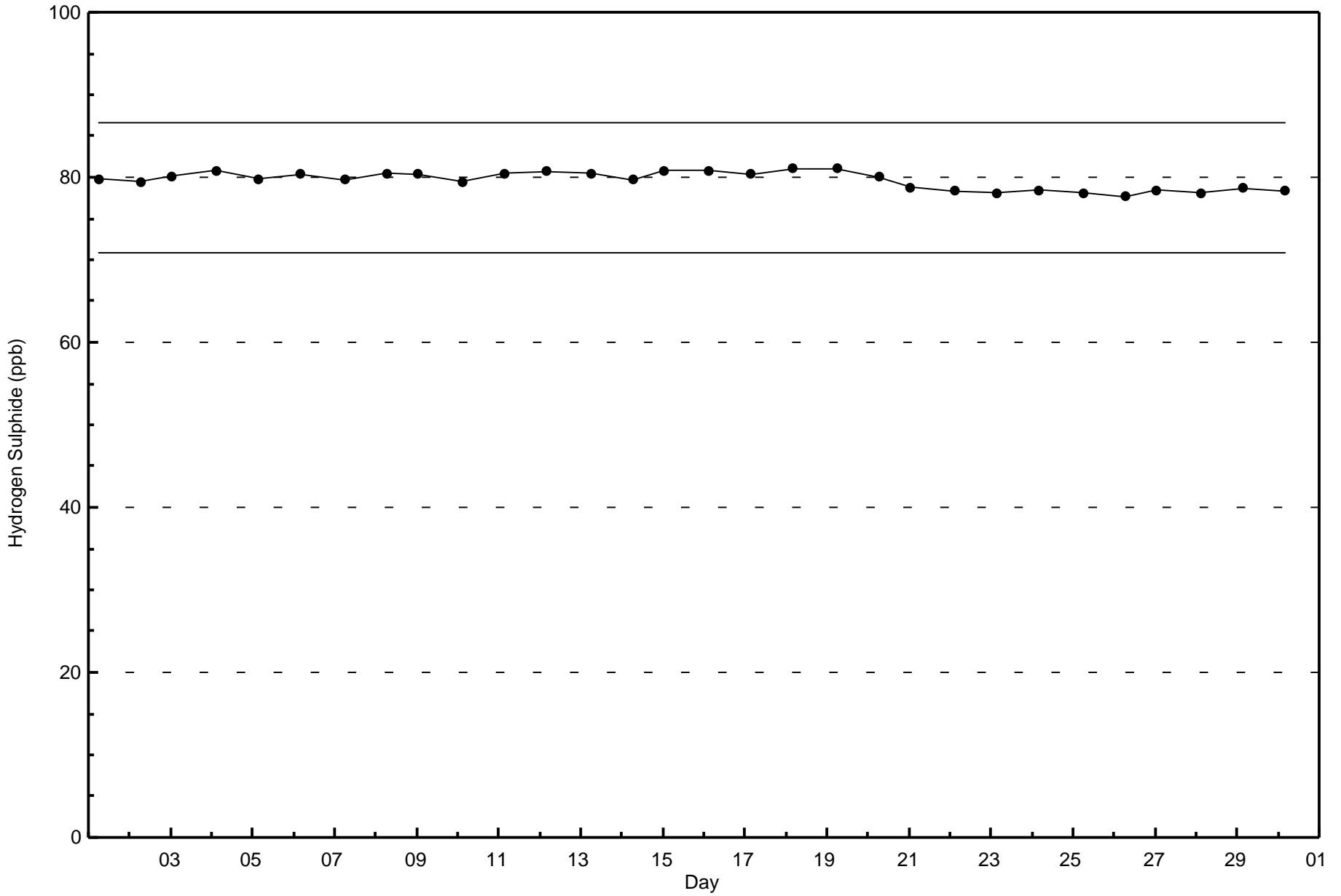
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay (AMS 505)



Total Number of Valid Hours: 682







Wood Buffalo Environmental Association
Summary of Hour Averages

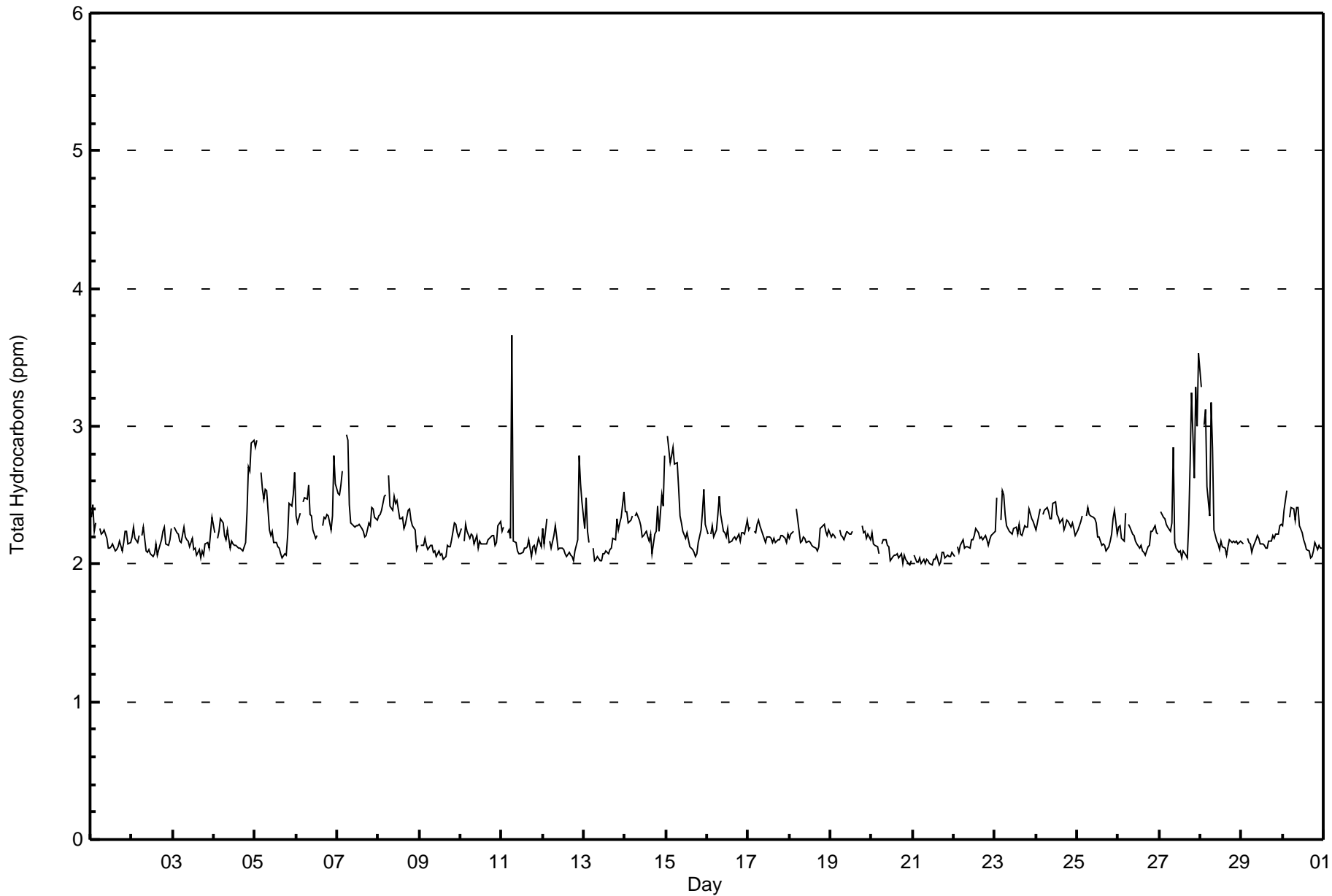
Total Hydrocarbons (THC) - ppm
Sawbones Bay - September 2017

| Maximum Value: 3.7 ppm on Sep 11 07:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.5 ppm on Sep 27 | | | | | | Hours in Service: 720 | | |
|--|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|-----|-----|--|--------------------------------|---------------|-----|
| Minimum Value: 2.0 ppm on Sep 21 16:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.0 ppm on Sep 21 | | | | | | Hours of Data: 684 | | |
| Maximum Diurnal Average: 2.4 ppm at hour 7 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.1 ppm at hour 17 | | | | | | Hours of Missing Data: 36 | | |
| Monthly Average: 2.25 ppm | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 3.1 | | | | | | Hours of Calibration: 34 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.7 | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 2.3 | 2.4 | 2.2 | 2.3 | Z | 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 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.4 |
| 2-Sep | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.1 | 2.1 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 |
| 3-Sep | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 |
| 4-Sep | 2.2 | Z | 2.2 | 2.2 | 2.3 | 2.3 | 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 | 2.2 | 2.4 | 2.7 | 2.7 | 2.9 | 2.9 | 2.3 | 2.9 |
| 5-Sep | 2.8 | 2.9 | Z | 2.7 | 2.5 | 2.5 | 2.5 | 2.5 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.4 | 2.4 | 2.4 | 2.5 | 2.7 | 2.4 | 2.9 |
| 6-Sep | 2.3 | 2.3 | 2.4 | Z | 2.4 | 2.5 | 2.5 | 2.6 | 2.4 | 2.4 | 2.2 | 2.2 | 2.2 | M | M | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.2 | 2.3 | 2.8 | 2.6 | 2.4 | 2.8 | |
| 7-Sep | 2.5 | 2.5 | 2.6 | 2.7 | Z | 2.9 | 2.9 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.4 | 2.9 | |
| 8-Sep | 2.3 | 2.4 | 2.4 | 2.5 | 2.5 | Z | 2.6 | 2.4 | 2.4 | 2.5 | 2.4 | 2.5 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.4 | 2.6 | |
| 9-Sep | Z | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.3 | |
| 10-Sep | 2.3 | Z | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | |
| 11-Sep | 2.2 | 2.3 | Z | 2.2 | 2.2 | 2.2 | 3.7 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 3.7 | |
| 12-Sep | 2.3 | 2.1 | 2.3 | Z | 2.2 | 2.1 | 2.2 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.8 | 2.6 | 2.4 | 2.2 | 2.8 | |
| 13-Sep | 2.3 | 2.5 | 2.2 | 2.2 | Z | 2.1 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.5 | 2.2 | 2.5 | |
| 14-Sep | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | Z | 2.3 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.4 | 2.2 | 2.5 | 2.4 | 2.8 | 2.3 | 2.8 |
| 15-Sep | Z | 2.9 | 2.7 | 2.8 | 2.8 | 2.7 | 2.7 | 2.6 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.4 | 2.5 | 2.3 | 2.4 | 2.9 | |
| 16-Sep | 2.2 | Z | 2.2 | 2.3 | 2.2 | 2.3 | 2.4 | 2.5 | 2.4 | 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 | 2.3 | 2.2 | 2.5 | |
| 17-Sep | 2.2 | 2.3 | Z | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | |
| 18-Sep | 2.2 | 2.2 | 2.2 | Z | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.2 | 2.4 | |
| 19-Sep | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | C | C | C | C | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | |
| 20-Sep | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | |
| 21-Sep | Z | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | |
| 22-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | |
| 23-Sep | 2.2 | 2.5 | Z | 2.3 | 2.5 | 2.5 | 2.4 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.5 | |
| 24-Sep | 2.2 | 2.3 | 2.4 | Z | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.4 | |
| 25-Sep | 2.2 | 2.3 | 2.3 | 2.4 | Z | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.4 | 2.2 | 2.3 | 2.4 | |
| 26-Sep | 2.3 | 2.3 | 2.2 | 2.2 | 2.4 | Z | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.4 | |
| 27-Sep | Z | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.8 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.0 | 2.3 | 2.7 | 3.2 | 2.6 | 3.3 | 3.0 | 3.5 | 2.5 | 3.5 | |
| 28-Sep | 3.3 | Z | 3.0 | 3.1 | 2.6 | 2.3 | 3.2 | 2.8 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.4 | 3.3 | |
| 29-Sep | 2.2 | 2.1 | Z | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | |
| 30-Sep | 2.3 | 2.4 | 2.5 | Z | 2.3 | 2.4 | 2.4 | 2.3 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 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
Sawbones Bay - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Sawbones Bay - September 2017**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 34 | 4.97 | 4.97 |
| 2.1 - 3.0 | 643 | 94.01 | 98.98 |
| 3.1 - 10.0 | 7 | 1.02 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Sawbones Bay - September 2017**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals | |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|-----|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | | |
| 0 - 2.0 | 10 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 34 |
| 2.1 - 3.0 | 39 | 33 | 13 | 3 | 23 | 19 | 34 | 70 | 106 | 48 | 34 | 28 | 61 | 70 | 37 | 21 | | 639 |
| 3.1 - 10.0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 50 | 54 | 13 | 3 | 23 | 21 | 34 | 71 | 106 | 49 | 37 | 28 | 61 | 72 | 37 | 21 | | 680 |

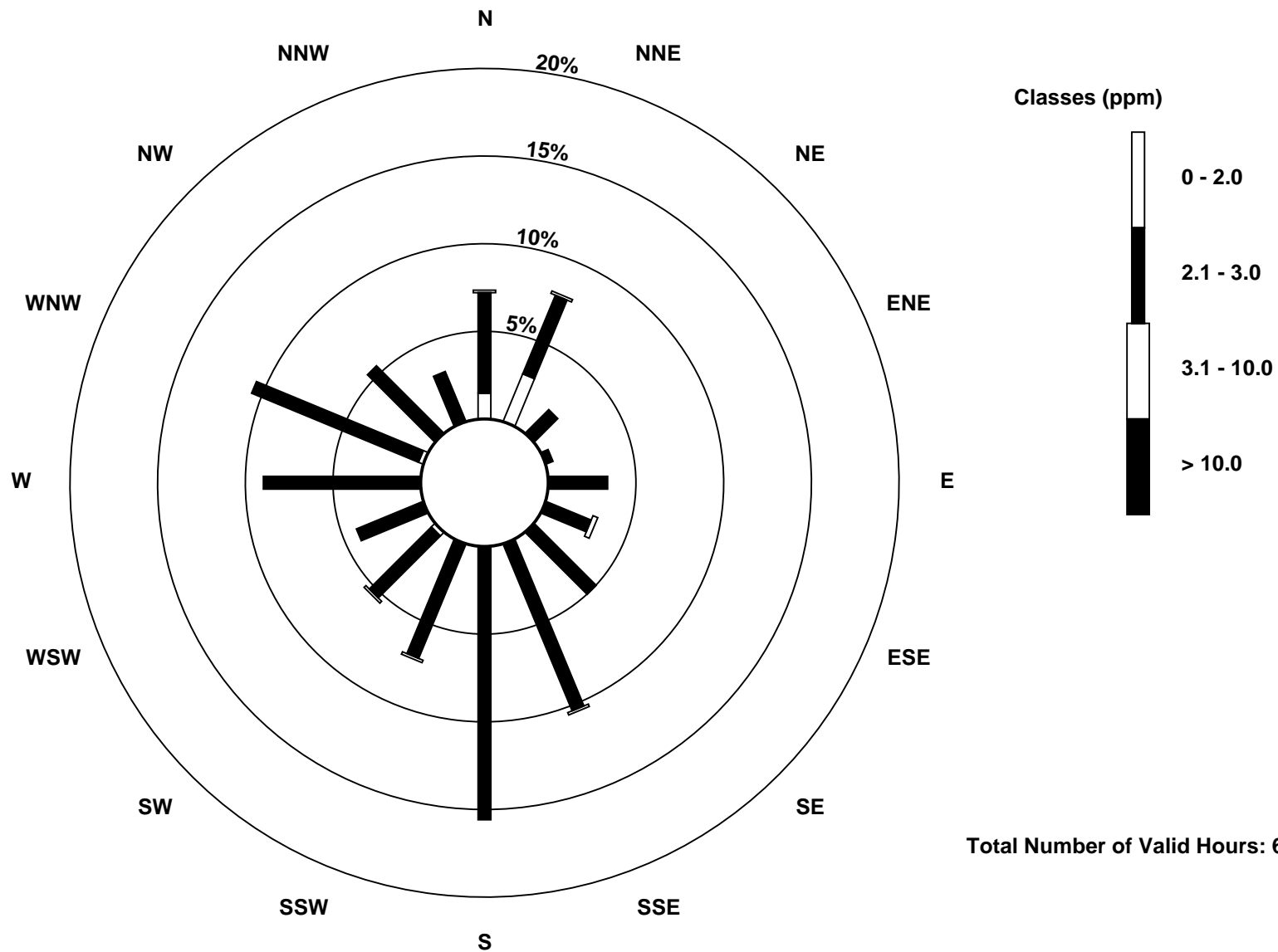
Total Number of Valid Hours: 680

Total Number of Hours: 720

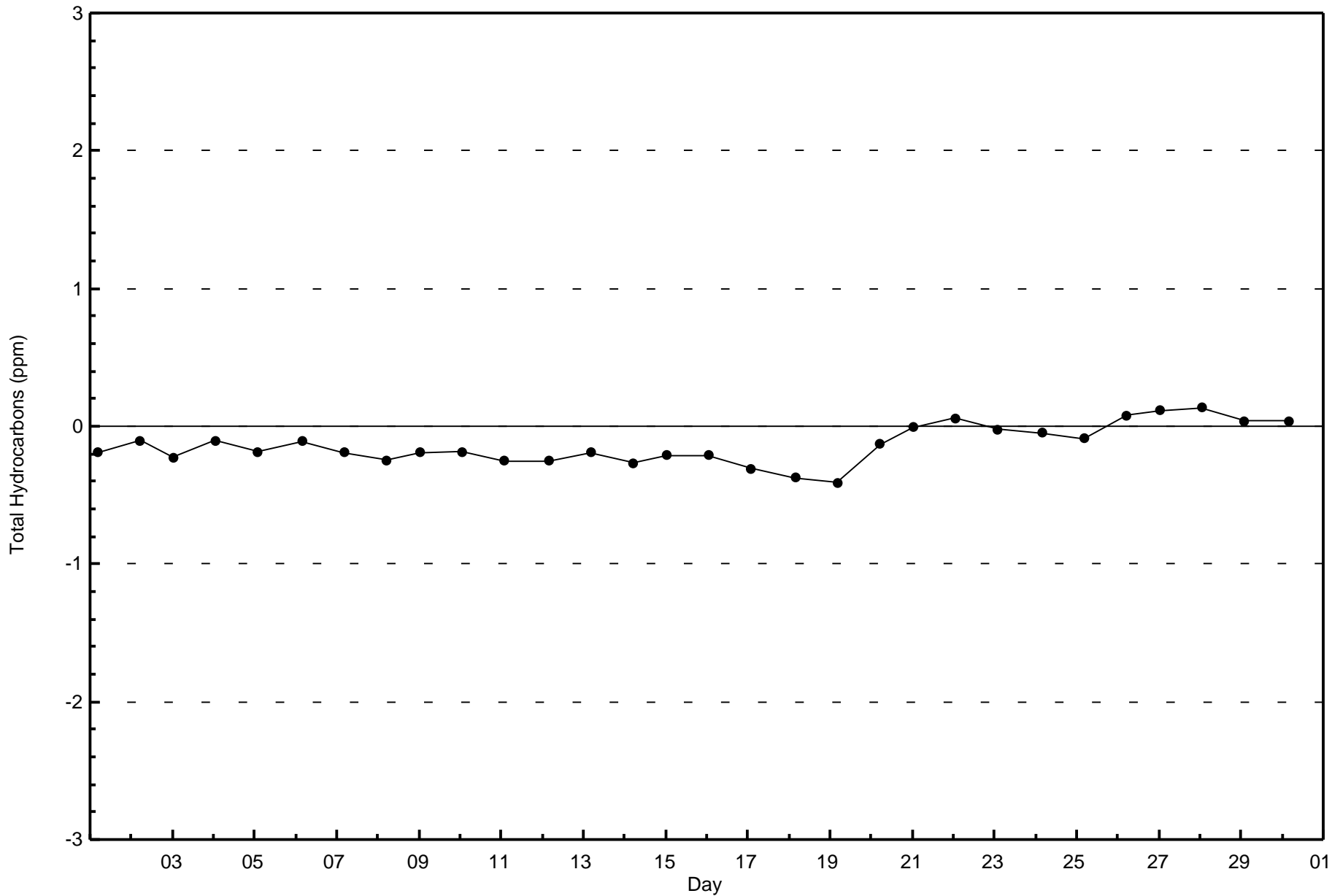


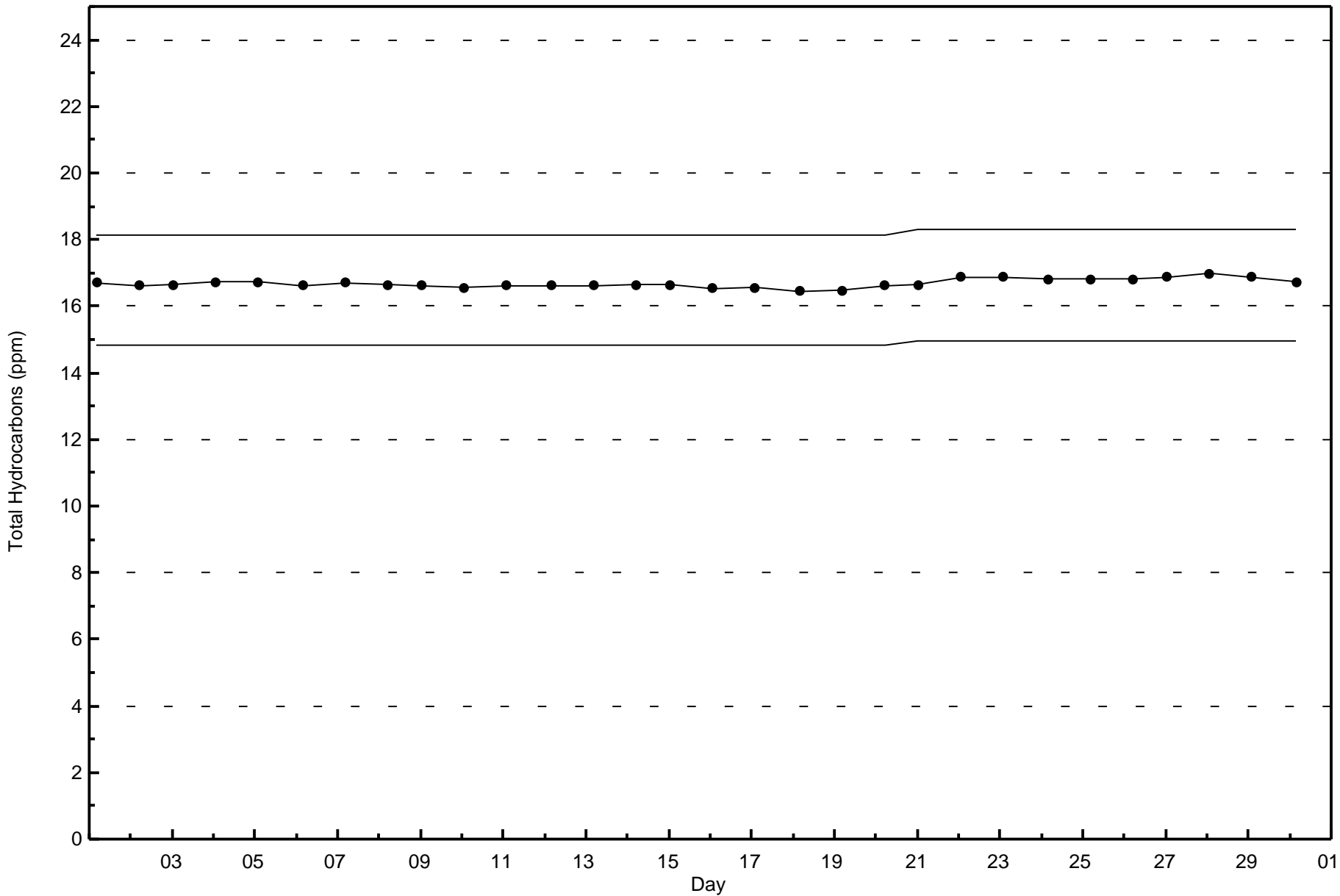
Wood Buffalo Environmental Association
Wind Rose Sep 2017

Total Hydrocarbons (THC) - ppm
Sawbones Bay (AMS 505)



Total Number of Valid Hours: 680







| Maximum Value: 18 ppb on Sep 5 10:00 | | | | | | | | | | | | | | Maximum Daily Average: 5.1 ppb on Sep 10 | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|---------------|---------------|--|--------------------------------|--|-----------------------|--|
| Minimum Value: 0 ppb on Sep 1 19:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 18 | | | | | | | | | | | | | | Hours of Data: 648 | | | |
| Maximum Diurnal Average: 2.5 ppb at hour 9 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.3 ppb at hour 21 | | | | | | | | | | | | | | Hours of Missing Data: 72 | | | |
| 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 = 10 | | | | | | | | | | | | | | Hours of Calibration: 36 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 95.0 | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | |
| 1-Sep | 6 | 1 | 9 | 11 | Z | 9 | 11 | 11 | 5 | 2 | 5 | 2 | 2 | 1 | 5 | 1 | 1 | 1 | 0 | 1 | 5 | 5 | 0 | 3 | 4.2 | 11 | | | | | |
| 2-Sep | 4 | 7 | 6 | 9 | 9 | Z | 10 | 6 | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 0 | 2 | 6 | 8 | 3 | 0 | 0 | 0 | 0 | 3.6 | 10 | | | | | |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 3 | | | | | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.1 | 1 | | | | | |
| 5-Sep | 1 | 3 | Z | 0 | 0 | 0 | 8 | 1 | 14 | 18 | 4 | 1 | 3 | 2 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.6 | 18 | | | | | |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | M | M | M | M | M | 0 | 0 | 0 | 3 | 0 | 0.6 | 3 | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 10 | 9 | 9 | 2 | 4 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 10 | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | | | | | |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.3 | 4 | | | | | |
| 10-Sep | 4 | Z | 2 | 6 | 9 | 10 | 8 | 8 | 11 | 10 | 5 | 2 | 4 | 1 | 1 | 0 | 1 | 4 | 8 | 7 | 0 | 1 | 8 | 7 | 5.1 | 11 | | | | | |
| 11-Sep | 4 | 3 | Z | 0 | 0 | 0 | 1 | 13 | 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 4 | 3 | 1 | 1.9 | 13 | | | | | |
| 12-Sep | 2 | 0 | 1 | Z | 0 | 0 | 10 | 5 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 10 | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.1 | 1 | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 2 | 2 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | |
| 15-Sep | Z | 1 | 3 | 1 | 4 | 4 | 3 | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 4 | | | | | |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 8 | 6 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 8 | | | | | |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | |
| 18-Sep | 0 | 0 | 0 | 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-Sep | 0 | 1 | 3 | 0 | Z | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | | | | | |
| 20-Sep | 2 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 2 | | | | | |
| 21-Sep | Z | 0 | 0 | 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-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 4 | | | | | |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | |
| 25-Sep | 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 | | | | | |
| 26-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | -- | 3 | | | | | |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 6 | 0.5 | 6 | | | | | |
| 28-Sep | 5 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 5 | | | | | |
| 29-Sep | 0 | 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-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | M - Maintenance | | AF - Analyzer Failure | |

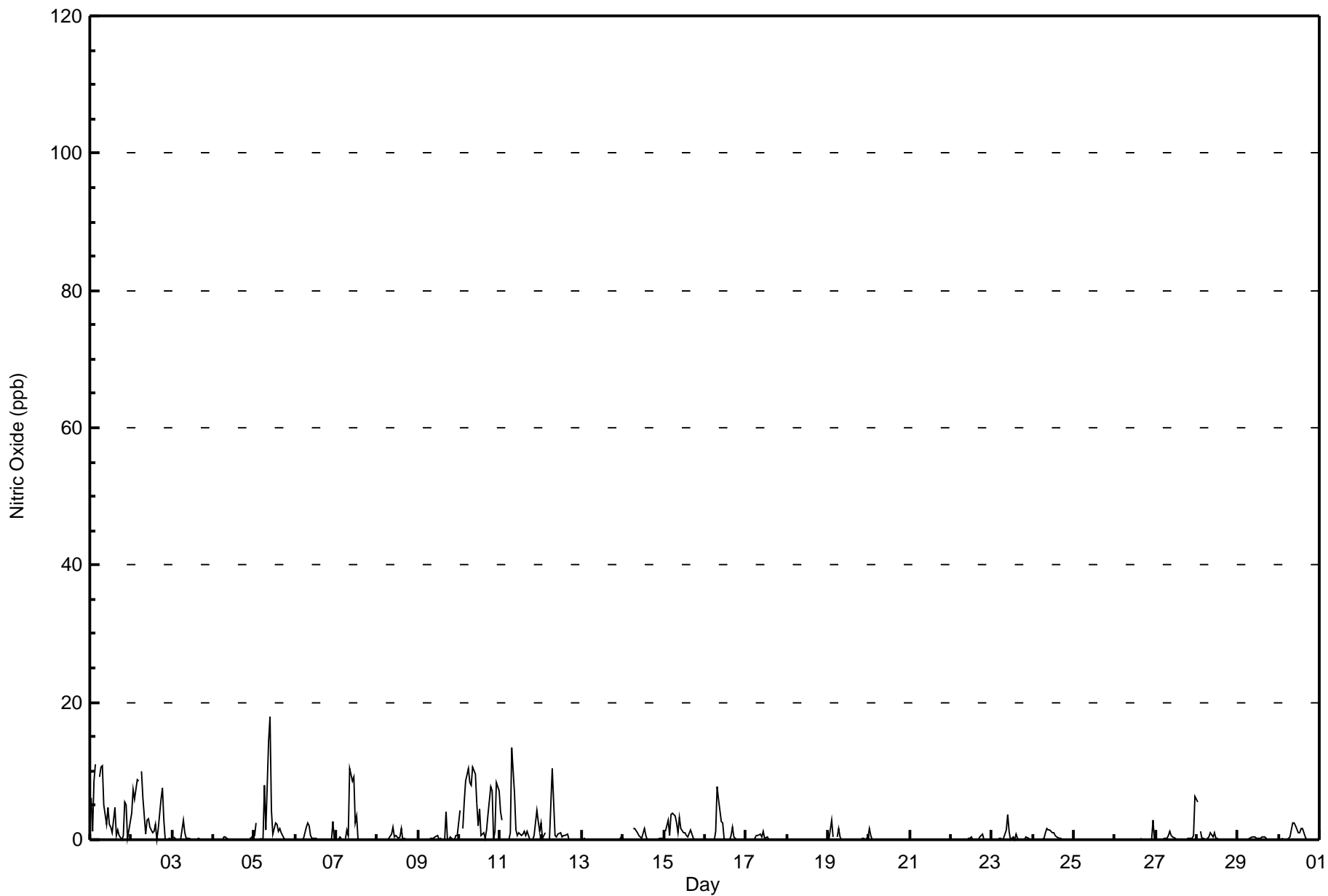


Wood Buffalo Environmental Association

Hourly Averages

Nitric Oxide (NO) - ppb

Sawbones Bay - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Sawbones Bay - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 648 | 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: 648

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Sawbones Bay - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 48 | 54 | 12 | 3 | 22 | 21 | 34 | 69 | 103 | 40 | 31 | 24 | 59 | 65 | 37 | 22 | 644 |
| 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 | 48 | 54 | 12 | 3 | 22 | 21 | 34 | 69 | 103 | 40 | 31 | 24 | 59 | 65 | 37 | 22 | 644 |

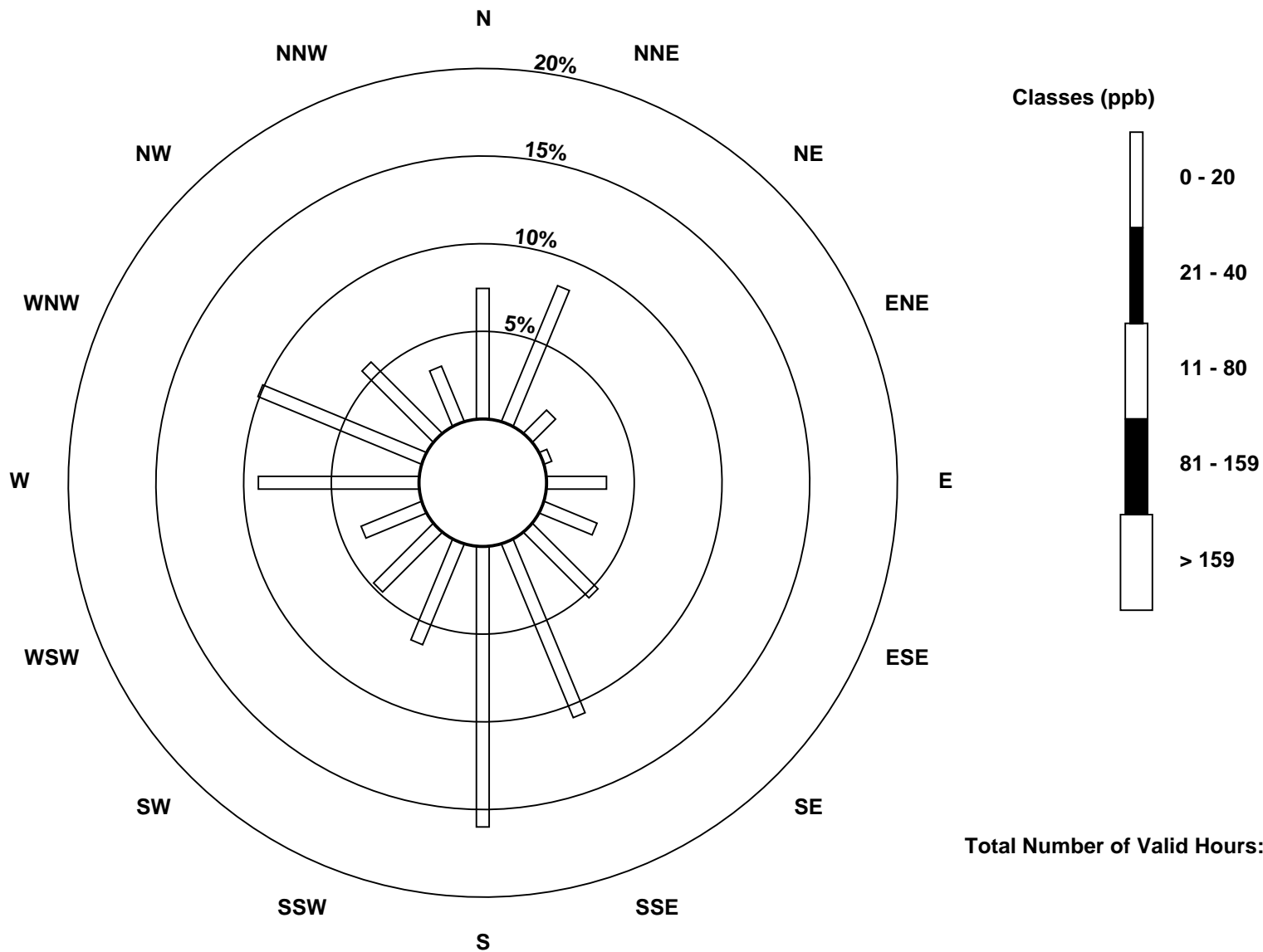
Total Number of Valid Hours: 644

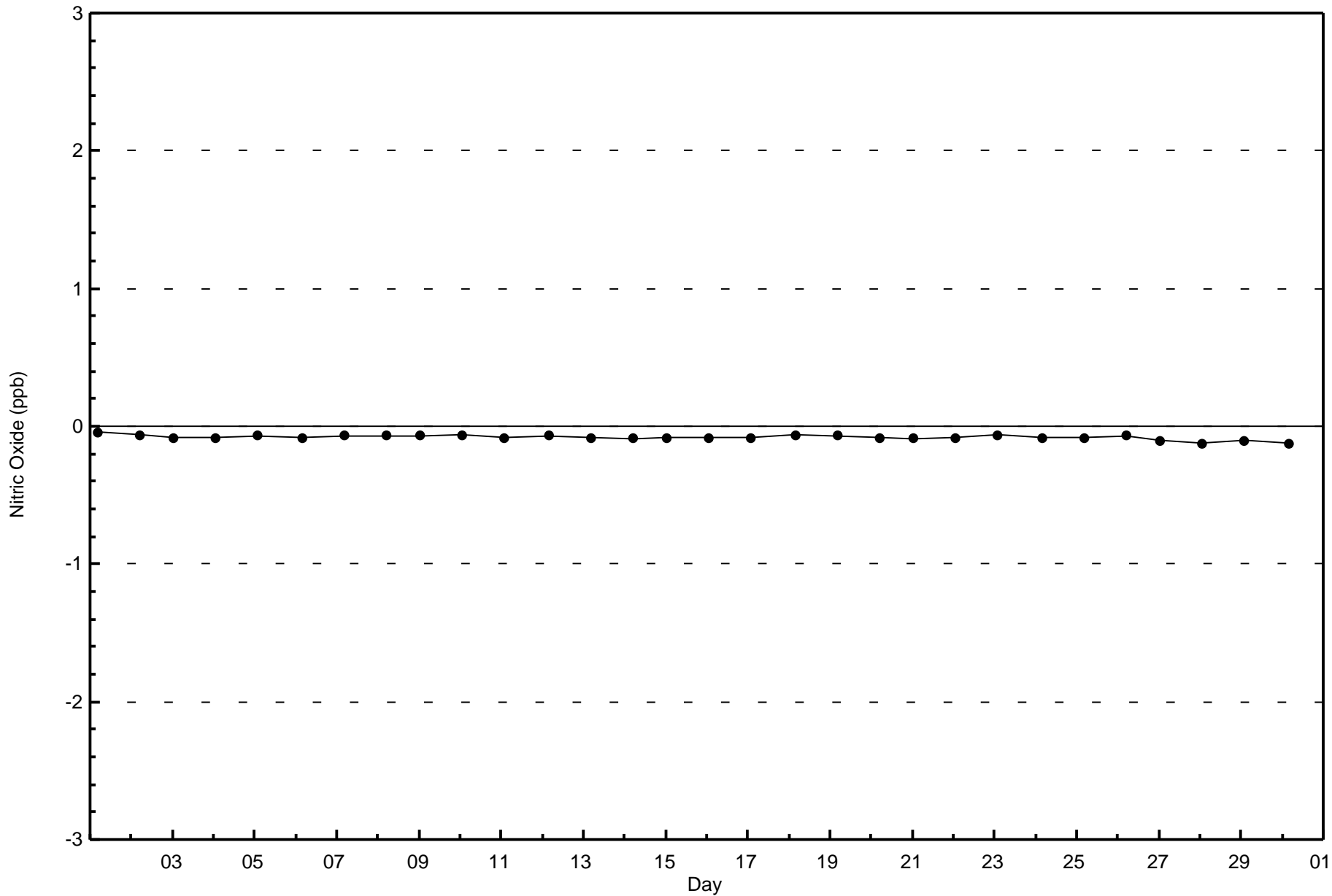
Total Number of Hours: 720

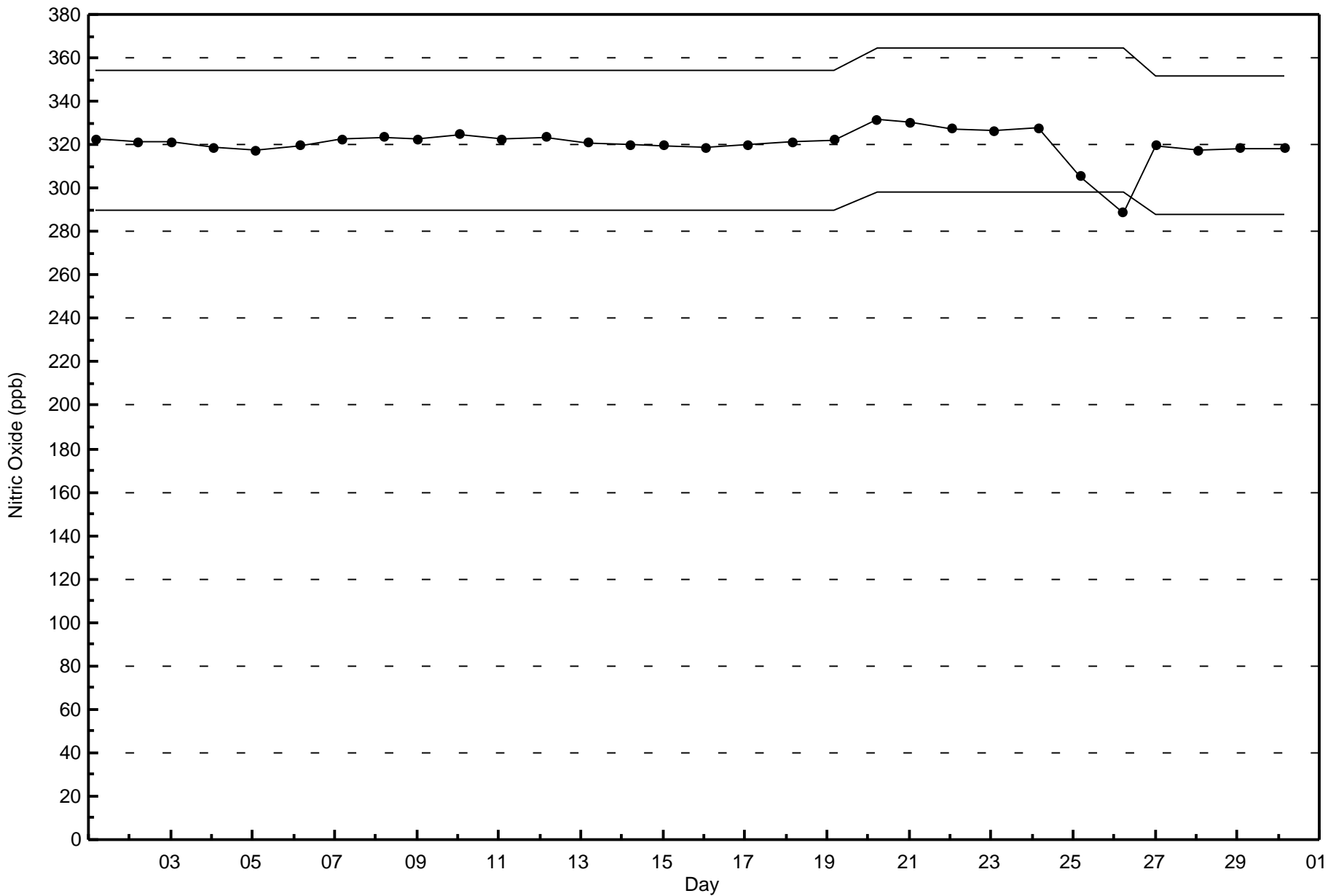


Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitric Oxide (NO) - ppb
Sawbones Bay (AMS 505)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Sawbones Bay - September 2017

| | | | | |
|--|---|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 18 ppb on Sep 1 04:00 | Maximum Daily Average: 7.6 ppb on Sep 1 | | Hours of Data: | 648 |
| Minimum Value: 0 ppb on Sep 20 19:00 | Minimum Daily Average: 0.3 ppb on Sep 21 | | Hours of Missing Data: | 72 |
| Maximum Diurnal Average: 4.6 ppb at hour 7 | Minimum Diurnal Average: 1.1 ppb at hour 16 | | Hours of Calibration: | 36 |
| Monthly Average: 2.5 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 6 P ₉₉ = 14 | | Percent Operational Time: | 95.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 12 | 4 | 13 | 18 | Z | 15 | 16 | 14 | 8 | 4 | 6 | 3 | 3 | 2 | 7 | 2 | 4 | 3 | 0 | 3 | 15 | 14 | 2 | 8 | 7.6 | 18 |
| 2-Sep | 9 | 14 | 11 | 16 | 16 | Z | 14 | 8 | 2 | 4 | 4 | 3 | 2 | 2 | 5 | 0 | 3 | 10 | 12 | 5 | 1 | 1 | 1 | 1 | 6.2 | 16 |
| 3-Sep | Z | 1 | 1 | 1 | 0 | 1 | 5 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 5 |
| 4-Sep | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 3 | 5 | 1.0 | 5 |
| 5-Sep | 8 | 8 | Z | 3 | 5 | 4 | 7 | 3 | 6 | 7 | 5 | 3 | 6 | 4 | 3 | 5 | 5 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 4.1 | 8 |
| 6-Sep | 3 | 2 | 2 | Z | 3 | 5 | 8 | 7 | 5 | 3 | 2 | 1 | 2 | 1 | M | M | M | M | M | 1 | 1 | 1 | 6 | 4 | 3.1 | 8 |
| 7-Sep | 2 | 1 | 5 | 6 | Z | 8 | 7 | 3 | 8 | 8 | 13 | 6 | 8 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 4.1 | 13 |
| 8-Sep | 2 | 3 | 3 | 3 | 3 | Z | 5 | 4 | 5 | 7 | 4 | 5 | 3 | 4 | 4 | 2 | 3 | 6 | 6 | 4 | 3 | 2 | 2 | 1 | 3.6 | 7 |
| 9-Sep | Z | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 4 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 1.6 | 4 |
| 10-Sep | 6 | Z | 3 | 7 | 10 | 12 | 10 | 11 | 13 | 10 | 5 | 2 | 5 | 1 | 2 | 1 | 2 | 5 | 13 | 11 | 0 | 2 | 13 | 13 | 6.7 | 13 |
| 11-Sep | 7 | 6 | Z | 1 | 1 | 3 | 4 | 8 | 3 | 4 | 1 | 3 | 3 | 2 | 3 | 3 | 5 | 1 | 1 | 2 | 2 | 11 | 7 | 4 | 3.7 | 11 |
| 12-Sep | 6 | 1 | 4 | Z | 1 | 0 | 13 | 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 1.9 | 13 |
| 13-Sep | 1 | 2 | 1 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 0.8 | 3 |
| 14-Sep | 2 | 1 | 1 | 1 | 2 | Z | 5 | 4 | 2 | 2 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 6 | 3 | 3 | 3 | 1.7 | 6 |
| 15-Sep | Z | 3 | 5 | 3 | 4 | 6 | 4 | 2 | 1 | 4 | 3 | 2 | 3 | 1 | 1 | 2 | 3 | 1 | 0 | 0 | 2 | 3 | 2 | 1 | 2.4 | 6 |
| 16-Sep | 1 | Z | 2 | 2 | 2 | 2 | 4 | 6 | 7 | 4 | 3 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2.2 | 7 |
| 17-Sep | 4 | 3 | Z | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1.3 | 4 |
| 18-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0.4 | 1 |
| 19-Sep | 1 | 6 | 9 | 1 | Z | 2 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 2 | 1.9 | 9 |
| 20-Sep | 4 | 2 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 4 |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.3 | 1 |
| 22-Sep | 1 | Z | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 4 | 1 | 0 | 0 | 0 | 0 | 0.9 | 4 |
| 23-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 1 | 1 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 5 | 5 | 2 | 2 | 1.4 | 5 |
| 24-Sep | 1 | 1 | 3 | Z | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 1.9 | 3 |
| 25-Sep | 2 | 2 | 2 | 2 | Z | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 2 |
| 26-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | C | C | 1 | 0 | 0 | 0 | 2 | 3 | 1 | 8 | 2 | -- | 8 |
| 27-Sep | Z | 4 | 3 | 4 | 4 | 5 | 4 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 3 | 4 | 11 | 2.6 | 11 |
| 28-Sep | 9 | Z | 6 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.5 | 9 |
| 29-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 1.6 | 3 |
| 30-Sep | 1 | 6 | 9 | Z | 5 | 5 | 8 | 8 | 7 | 5 | 4 | 3 | 3 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3.5 | 9 |

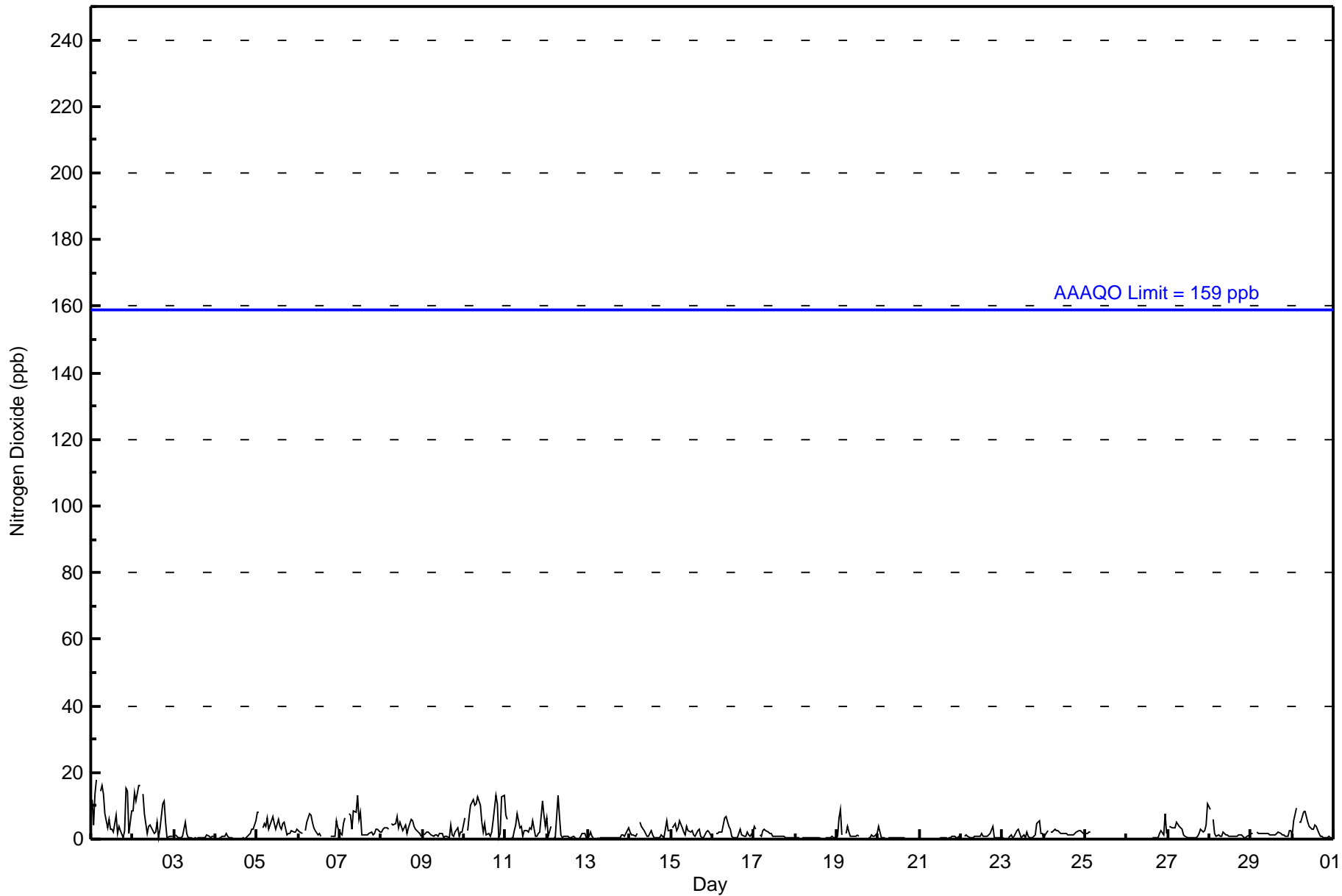
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 3.5 | 3.1 | 3.6 | 3.2 | 2.7 | 3.3 | 4.6 | 3.7 | 3.1 | 2.7 | 2.3 | 1.6 | 1.8 | 1.2 | 1.6 | 1.1 | 1.7 | 1.6 | 1.9 | 1.7 | 2.0 | 2.4 | 2.5 | 2.7 | Diurnal Average | |
| 12 | 14 | 13 | 18 | 16 | 15 | 16 | 14 | 13 | 10 | 13 | 6 | 8 | 4 | 7 | 5 | 5 | 10 | 13 | 11 | 15 | 14 | 13 | 13 | 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
Sawbones Bay - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 648 | 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: 648

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 48 | 54 | 12 | 3 | 22 | 21 | 34 | 69 | 103 | 40 | 31 | 24 | 59 | 65 | 37 | 22 | 644 |
| 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 | 48 | 54 | 12 | 3 | 22 | 21 | 34 | 69 | 103 | 40 | 31 | 24 | 59 | 65 | 37 | 22 | 644 |

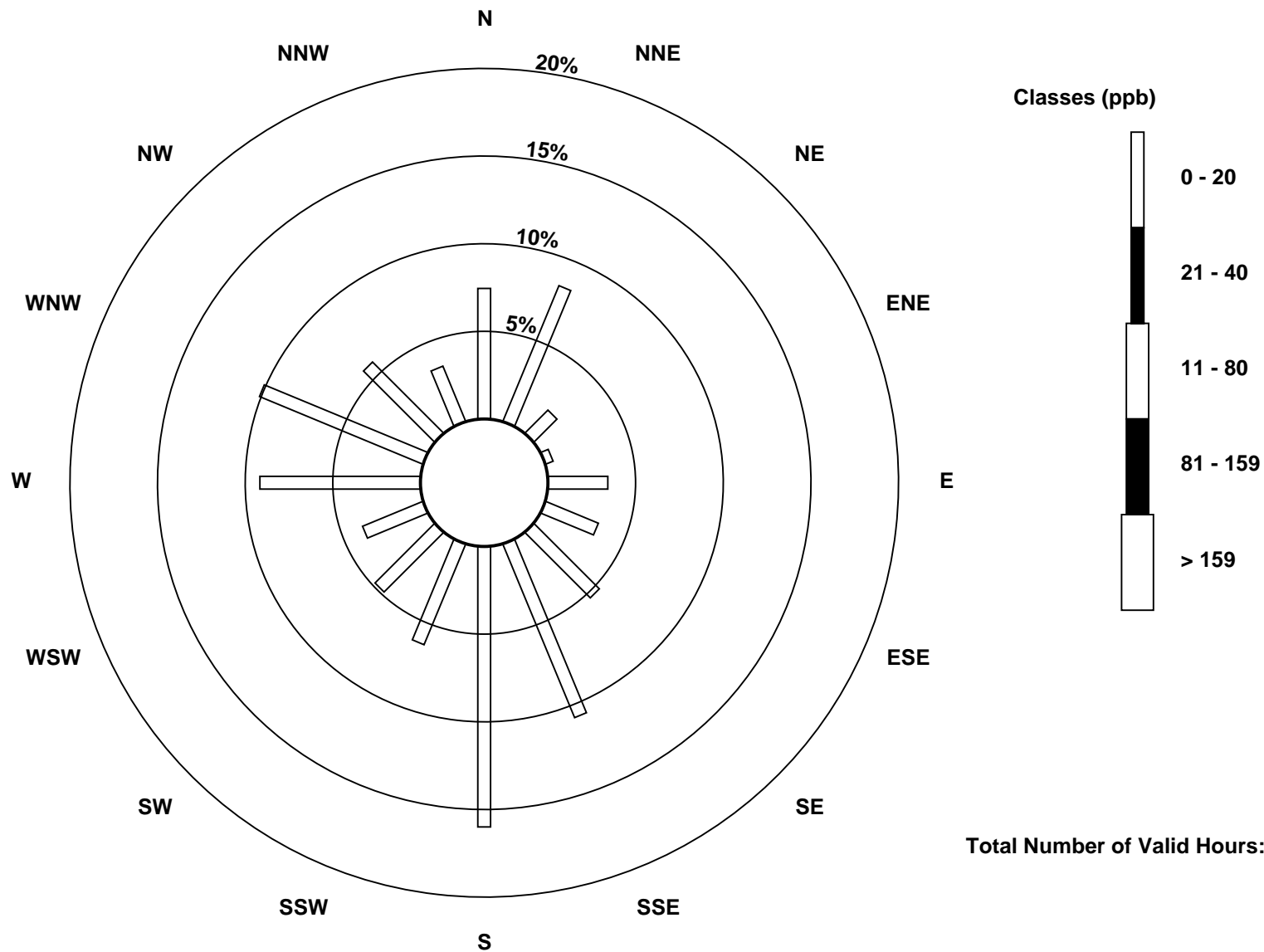
Total Number of Valid Hours: 644

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay (AMS 505)

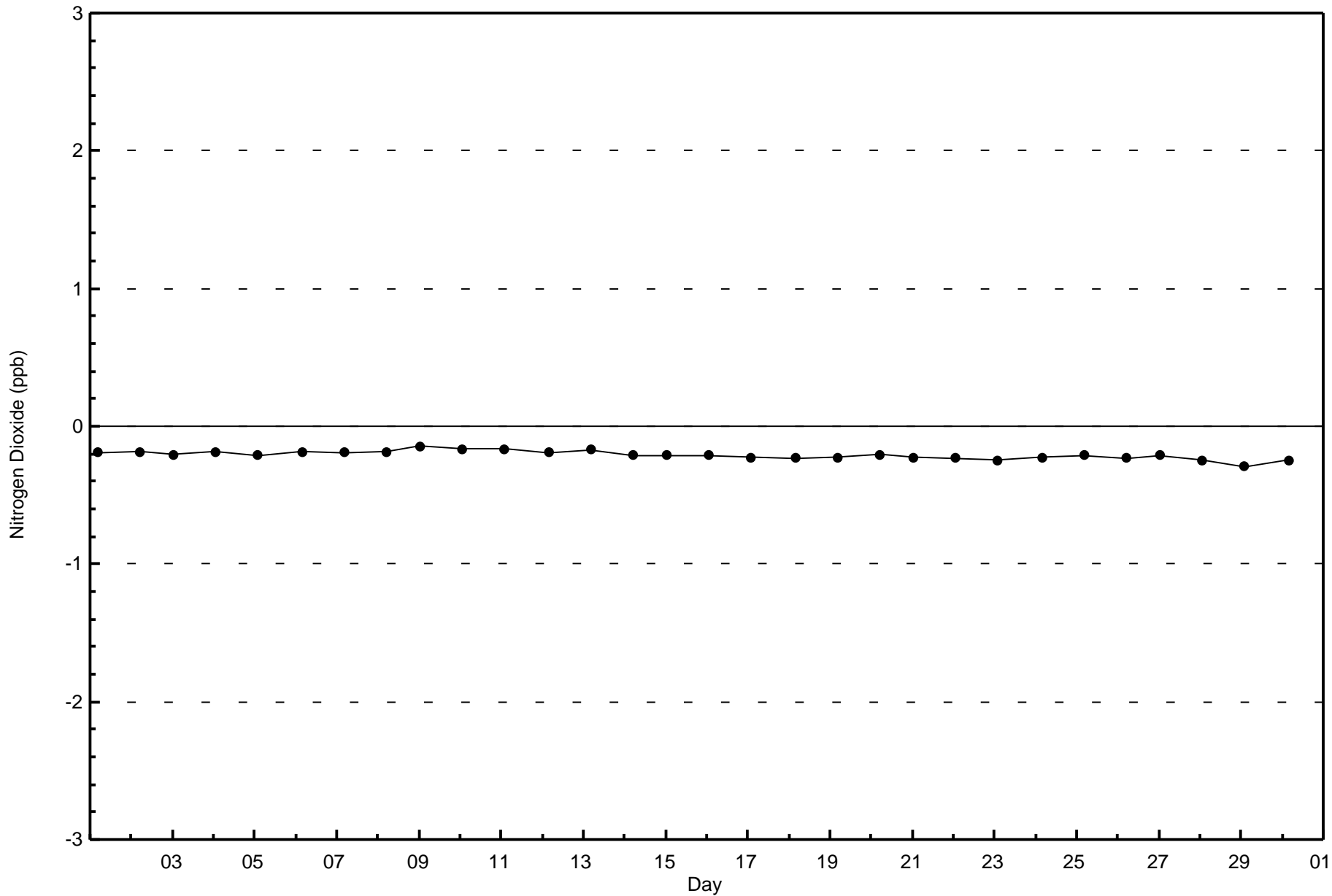


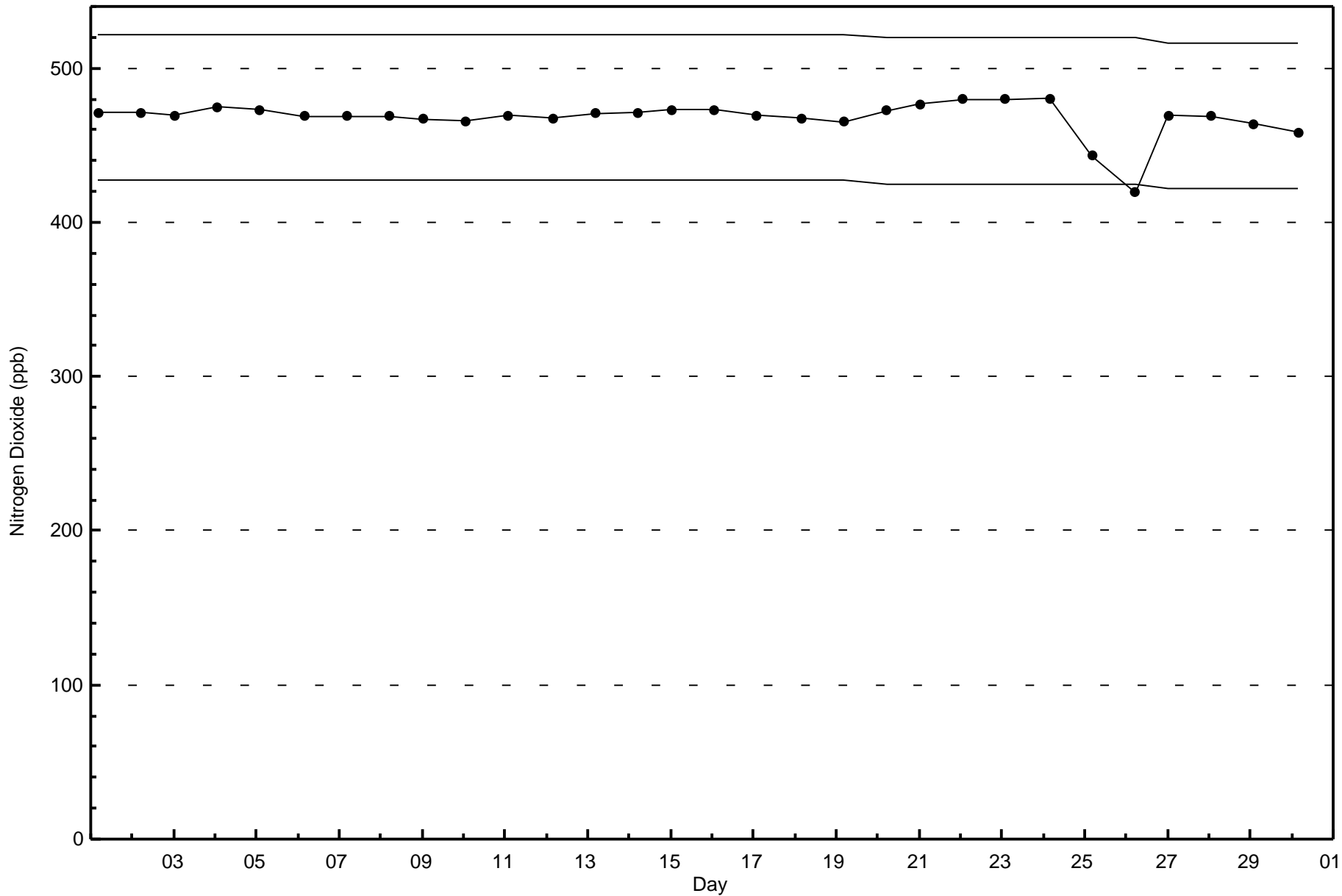
Total Number of Valid Hours: 644



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - September 2017







Wood Buffalo Environmental Association
Summary of Hour Averages

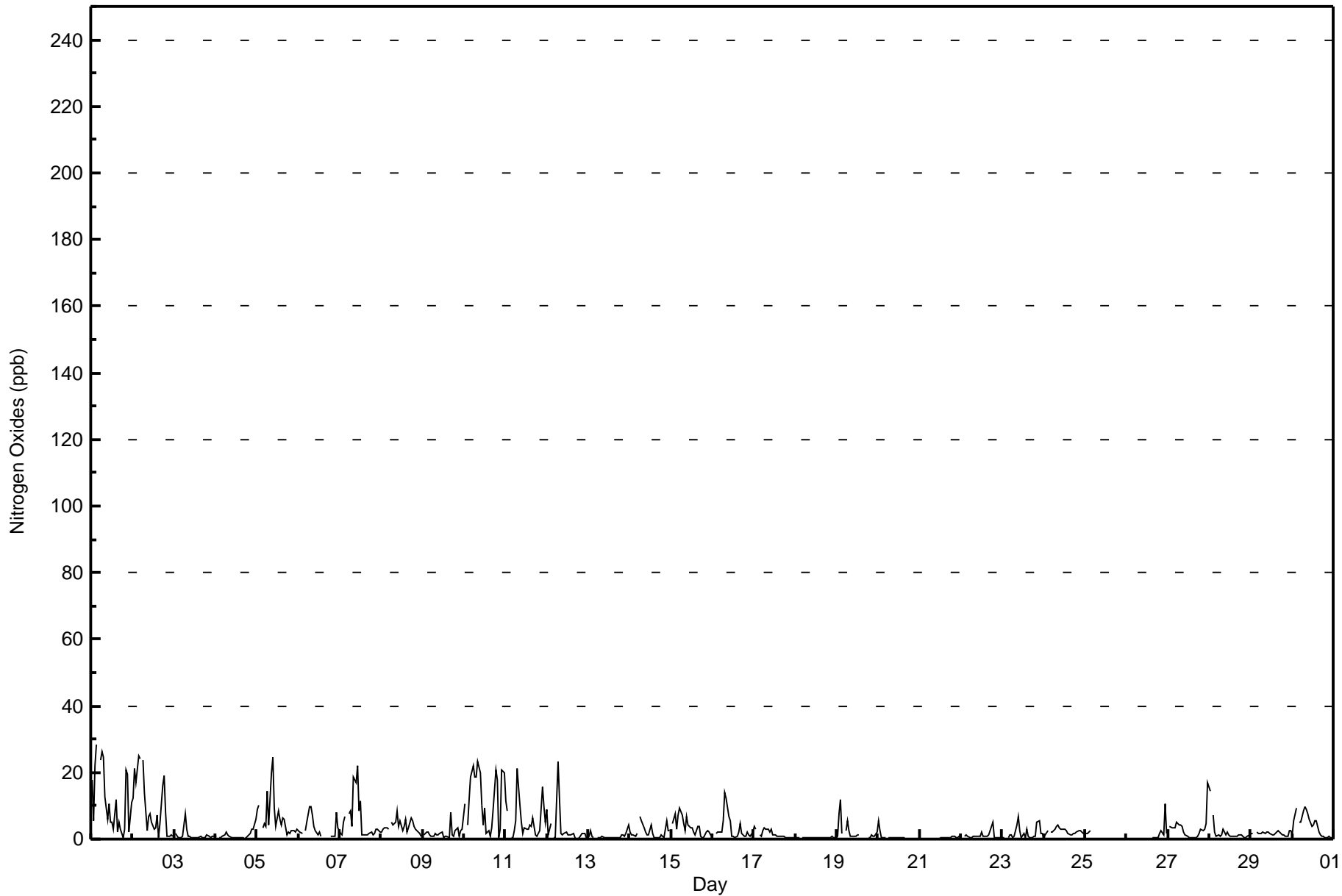
Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - September 2017

| Maximum Value: 29 ppb on Sep 1 04:00 | | | | | | | | | | | | | | Maximum Daily Average: 11.8 ppb on Sep 10 | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|--|--------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Minimum Value: 0 ppb on Sep 21 04:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.3 ppb on Sep 21 | | | | | | | | | | | | | | Hours of Data: 648 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 6.9 ppb at hour 7 | | | | | | | | | | | | | | Minimum Diurnal Average: 1.4 ppb at hour 16 | | | | | | | | | | | | | | Hours of Missing Data: 72 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 3.4 ppb | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 O ₃ = 4 P ₉₀ = 9 P ₉₉ = 24 | | | | | | | | | | | | | | Hours of Calibration: 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 95.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 18 | 5 | 22 | 29 | Z | 24 | 26 | 25 | 13 | 6 | 10 | 5 | 5 | 3 | 12 | 2 | 5 | 3 | 0 | 3 | 21 | 20 | 2 | 11 | 11.8 | 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 12 | 21 | 17 | 25 | 24 | Z | 24 | 14 | 2 | 7 | 8 | 5 | 3 | 3 | 7 | 0 | 5 | 16 | 19 | 8 | 1 | 1 | 1 | 1 | 9.8 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | Z | 2 | 1 | 1 | 0 | 1 | 8 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1.1 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 3 | 6 | 1.1 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 9 | 10 | Z | 3 | 5 | 4 | 15 | 4 | 20 | 25 | 9 | 4 | 8 | 6 | 4 | 6 | 6 | 1 | 2 | 2 | 2 | 2 | 3 | 6.7 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 3 | 2 | 2 | Z | 3 | 5 | 10 | 10 | 7 | 4 | 3 | 1 | 2 | 1 | M | M | M | M | M | 1 | 1 | 1 | 8 | 4 | 3.7 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 2 | 1 | 5 | 7 | Z | 8 | 8 | 4 | 19 | 17 | 22 | 8 | 12 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 5.8 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 2 | 3 | 3 | 3 | 3 | Z | 5 | 4 | 5 | 8 | 4 | 6 | 3 | 4 | 6 | 2 | 4 | 6 | 6 | 4 | 3 | 2 | 1 | 1 | 3.8 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 8 | 1 | 1 | 3 | 3 | 1 | 3 | 3 | 1.8 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 11 | Z | 4 | 12 | 19 | 22 | 19 | 18 | 23 | 20 | 10 | 4 | 9 | 2 | 3 | 1 | 3 | 9 | 21 | 18 | 0 | 3 | 21 | 20 | 11.8 | 23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 11 | 8 | Z | 1 | 1 | 3 | 5 | 21 | 10 | 5 | 2 | 4 | 3 | 3 | 4 | 4 | 6 | 1 | 1 | 2 | 3 | 16 | 10 | 5 | 5.6 | 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 9 | 1 | 5 | Z | 0 | 0 | 23 | 12 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 3.0 | 23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 1 | 2 | 1 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 4 | 0.8 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 2 | 1 | 1 | 1 | 2 | Z | 7 | 5 | 3 | 2 | 1 | 4 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 3 | 3 | 3 | 2.1 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 5 | 8 | 3 | 7 | 9 | 7 | 5 | 2 | 7 | 4 | 3 | 4 | 2 | 1 | 4 | 4 | 1 | 0 | 0 | 2 | 2 | 2 | 1 | 3.7 | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 1 | Z | 1 | 2 | 2 | 2 | 5 | 14 | 12 | 7 | 5 | 1 | 1 | 1 | 2 | 5 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 3.2 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 4 | 3 | Z | 1 | 1 | 3 | 3 | 3 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 1 | 8 | 12 | 2 | Z | 2 | 6 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 2 | 2.4 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 5 | 3 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 1 | Z | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 5 | 1 | 0 | 0 | 0 | 0 | 1.0 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 4 | 7 | 3 | 1 | 2 | 1 | 3 | 1 | 0 | 1 | 1 | 1 | 5 | 6 | 2 | 2 | 1.8 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 1 | 1 | 3 | Z | 2 | 2 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2.3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 2 | 2 | 2 | 2 | Z | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | C | C | 1 | 0 | 0 | 0 | 2 | 3 | 1 | 10 | 2 | -- | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 4 | 3 | 4 | 4 | 5 | 4 | 4 | 4 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 3 | 3 | 3 | 5 | 17 | 3.1 | 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 14 | Z | 7 | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2.0 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 1.7 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 1 | 6 | 9 | Z | 5 | 5 | 9 | 10 | 9 | 7 | 6 | 4 | 4 | 6 | 6 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4.1 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | M - Maintenance | | | | | | | | | | | | | | AF - Analyzer Failure | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - September 2017





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - September 2017

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 630 | 97.22 | 97.22 |
| 21 - 40 | 18 | 2.78 | 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: 648

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - September 2017**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 48 | 54 | 12 | 3 | 22 | 21 | 34 | 69 | 103 | 38 | 30 | 23 | 45 | 65 | 37 | 22 | 626 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 14 | 0 | 0 | 0 | 18 |
| 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 | 48 | 54 | 12 | 3 | 22 | 21 | 34 | 69 | 103 | 40 | 31 | 24 | 59 | 65 | 37 | 22 | 644 |

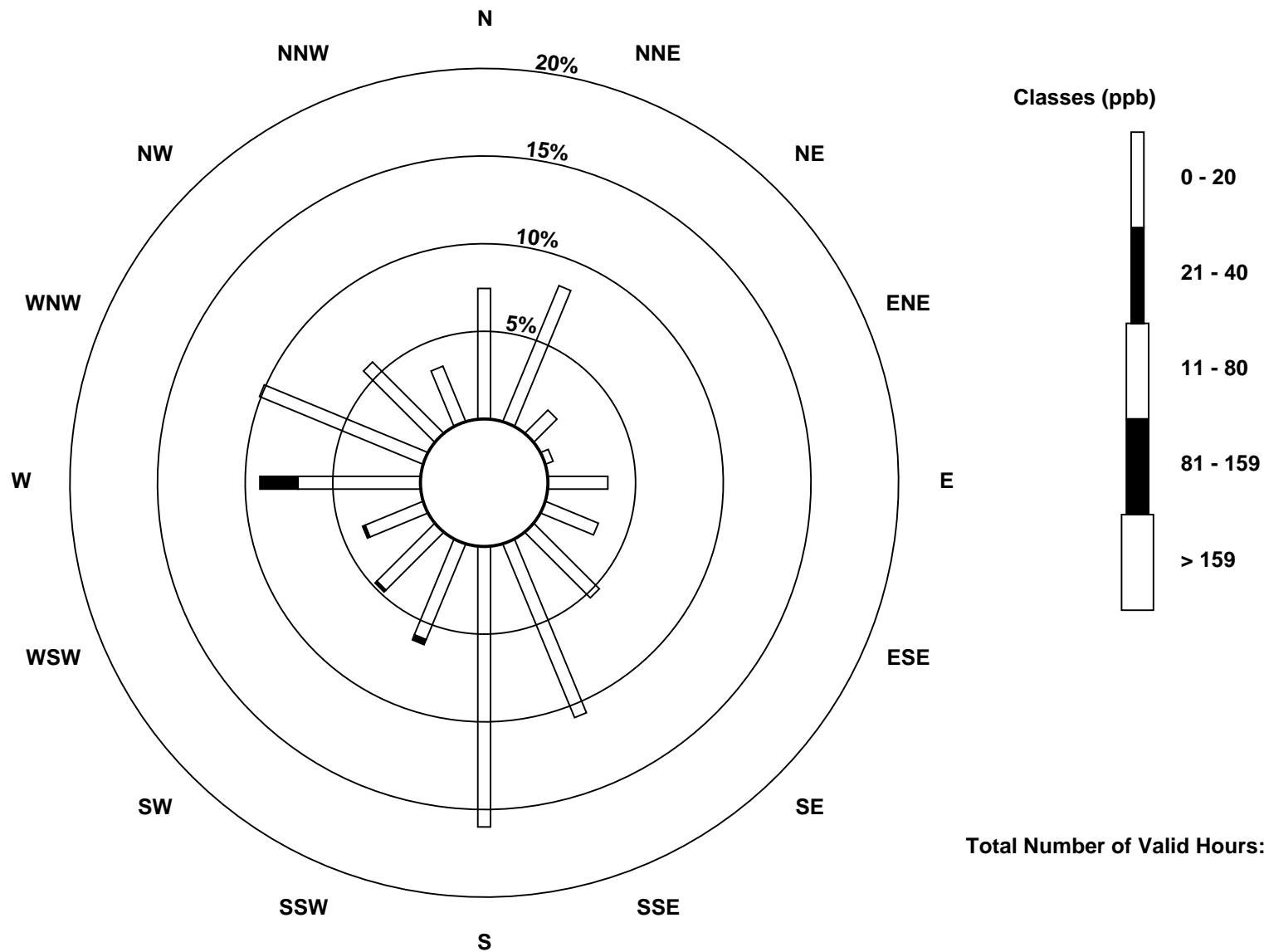
Total Number of Valid Hours: 644

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

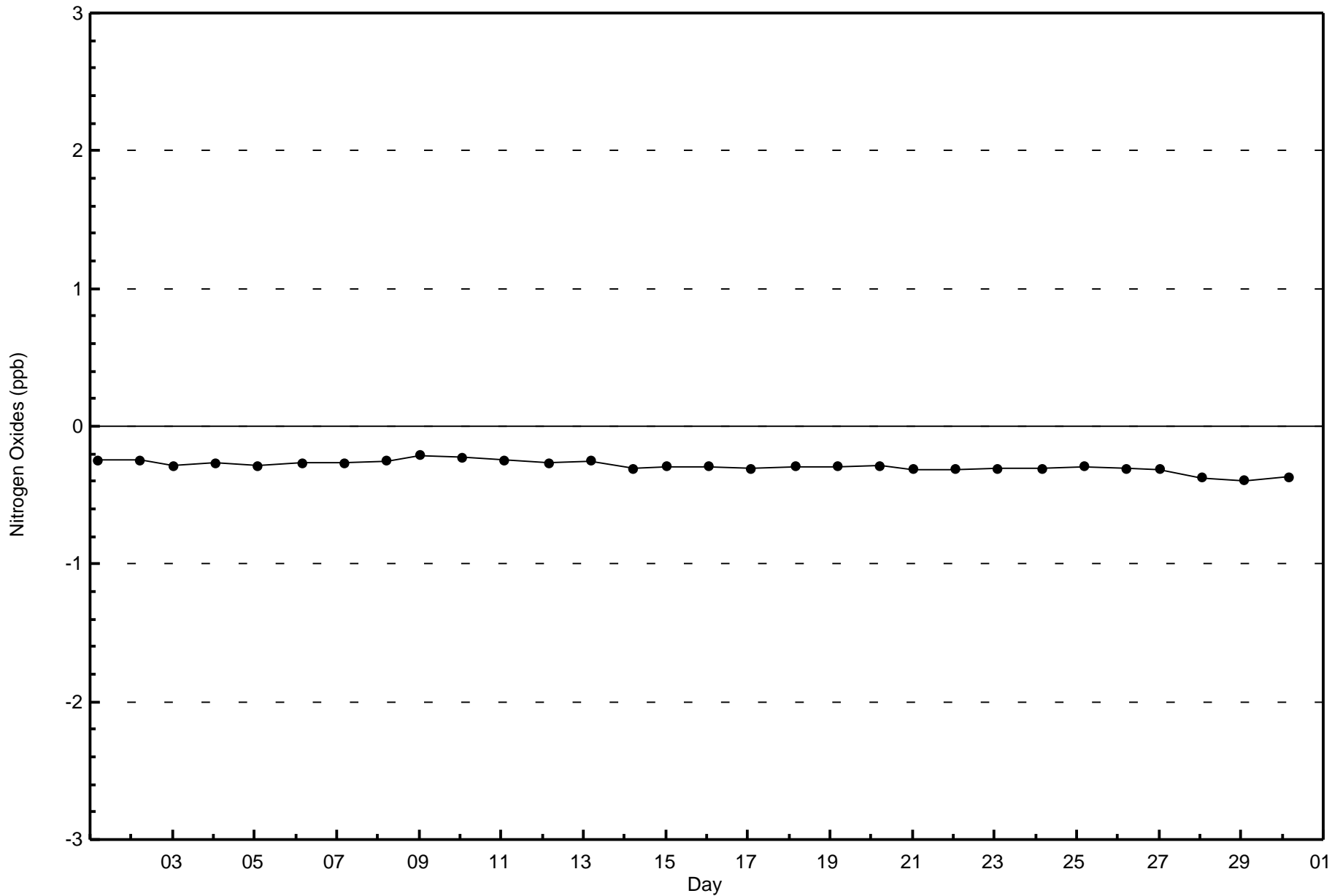
Nitrogen Oxides (NO_x) - ppb
Sawbones Bay (AMS 505)

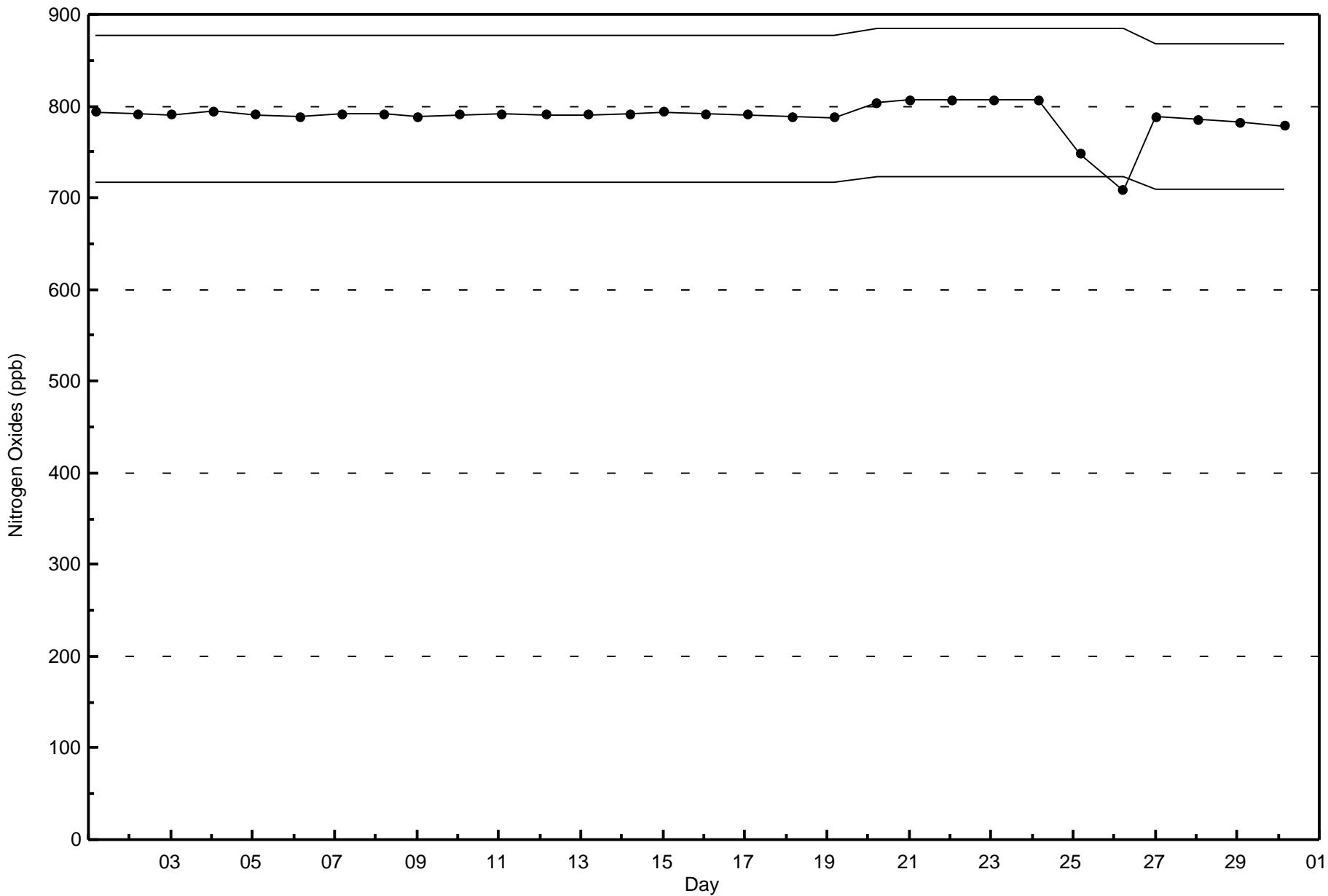




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - September 2017







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Sawbones Bay - September 2017

| | | | | |
|---|---|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 58 µg/m ³ on Sep 8 19:00 | Maximum Daily Average: 23.0 µg/m ³ on Sep 8 | | Hours of Data: | 720 |
| Minimum Value: 0 µg/m ³ on Sep 1 11:00 | Minimum Daily Average: 2.0 µg/m ³ on Sep 20 | | Hours of Missing Data: | 0 |
| Maximum Diurnal Average: 16.7 µg/m ³ at hour 9 | Minimum Diurnal Average: 4.5 µg/m ³ at hour 23 | | Hours of Calibration: | 0 |
| Monthly Average: 7.0 µg/m ³ | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 5 Q ₃ = 11 P ₉₀ = 16 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-Sep | 8 | 3 | 15 | 2 | 7 | 6 | 7 | 8 | 8 | 9 | 0 | 0 | 5 | 12 | 5 | 5 | 0 | 4 | 0 | 7 | 5 | 12 | 0 | 16 | 6.0 | 16 |
| 2-Sep | 0 | 15 | 11 | 4 | 4 | 17 | 0 | 6 | 5 | 2 | 5 | 7 | 3 | 3 | 3 | 3 | 4 | 7 | 4 | 13 | 0 | 12 | 0 | 5 | 5.5 | 17 |
| 3-Sep | 5 | 0 | 8 | 5 | 0 | 9 | 3 | 0 | 26 | 0 | 5 | 2 | 2 | 2 | 0 | 12 | 0 | 5 | 7 | 5 | 1 | 3 | 6 | 12 | 4.9 | 26 |
| 4-Sep | 0 | 12 | 2 | 4 | 10 | 2 | 3 | 11 | 44 | 2 | 0 | 7 | 0 | 3 | 2 | 0 | 1 | 5 | 5 | 11 | 0 | 0 | 0 | 7 | 5.6 | 44 |
| 5-Sep | 3 | 3 | 12 | 10 | 0 | 4 | 10 | 3 | 30 | 5 | 3 | 8 | 7 | 9 | 10 | 5 | 12 | 12 | 9 | 13 | 12 | 8 | 6 | 24 | 9.1 | 30 |
| 6-Sep | 2 | 10 | 17 | 16 | 0 | 8 | 12 | 39 | 8 | 15 | 14 | 17 | 16 | 16 | 12 | 7 | 21 | 25 | 24 | 26 | 19 | 17 | 9 | 9 | 15.0 | 39 |
| 7-Sep | 13 | 26 | 5 | 11 | 15 | 22 | 6 | 11 | 44 | 13 | 12 | 25 | 11 | 14 | 11 | 3 | 12 | 13 | 12 | 17 | 12 | 12 | 21 | 13 | 14.8 | 44 |
| 8-Sep | 10 | 16 | 13 | 11 | 8 | 15 | 17 | 9 | 9 | 12 | 6 | 23 | 12 | 13 | 16 | 18 | 46 | 45 | 58 | 53 | 50 | 43 | 25 | 25 | 23.0 | 58 |
| 9-Sep | 4 | 20 | 1 | 13 | 20 | 5 | 2 | 7 | 27 | 8 | 21 | 5 | 21 | 14 | 30 | 16 | 16 | 16 | 0 | 16 | 18 | 23 | 14 | 16 | 13.9 | 30 |
| 10-Sep | 12 | 23 | 14 | 19 | 22 | 21 | 18 | 20 | 10 | 12 | 11 | 0 | 6 | 9 | 0 | 3 | 0 | 2 | 4 | 8 | 10 | 4 | 0 | 10 | 9.9 | 23 |
| 11-Sep | 2 | 2 | 5 | 0 | 5 | 0 | 7 | 11 | 8 | 0 | 0 | 0 | 0 | 9 | 0 | 13 | 1 | 1 | 10 | 5 | 1 | 5 | 4 | 4 | 3.9 | 13 |
| 12-Sep | 6 | 10 | 0 | 10 | 6 | 0 | 0 | 1 | 22 | 6 | 0 | 0 | 11 | 6 | 2 | 0 | 8 | 4 | 4 | 11 | 0 | 9 | 0 | 2 | 4.9 | 22 |
| 13-Sep | 0 | 2 | 2 | 5 | 3 | 2 | 0 | 15 | 0 | 2 | 12 | 0 | 4 | 9 | 0 | 4 | 5 | 6 | 0 | 0 | 1 | 0 | 2 | 12 | 3.6 | 15 |
| 14-Sep | 0 | 0 | 0 | 6 | 3 | 8 | 2 | 5 | 29 | 13 | 0 | 0 | 14 | 0 | 6 | 9 | 0 | 12 | 0 | 0 | 12 | 0 | 5 | 9 | 5.5 | 29 |
| 15-Sep | 0 | 0 | 2 | 11 | 0 | 7 | 1 | 4 | 0 | 22 | 1 | 2 | 11 | 0 | 7 | 0 | 3 | 4 | 14 | 2 | 7 | 1 | 0 | 0 | 4.1 | 22 |
| 16-Sep | 0 | 1 | 14 | 2 | 0 | 14 | 4 | 0 | 27 | 0 | 3 | 4 | 8 | 1 | 3 | 5 | 0 | 7 | 0 | 10 | 8 | 1 | 0 | 0 | 4.7 | 27 |
| 17-Sep | 3 | 4 | 0 | 0 | 4 | 7 | 4 | 0 | 25 | 18 | 13 | 11 | 10 | 10 | 0 | 12 | 13 | 7 | 10 | 8 | 3 | 0 | 0 | 0 | 6.8 | 25 |
| 18-Sep | 9 | 10 | 5 | 10 | 11 | 14 | 7 | 1 | 32 | 6 | 0 | 8 | 10 | 2 | 14 | 0 | 8 | 6 | 9 | 3 | 6 | 0 | 7 | 12 | 7.9 | 32 |
| 19-Sep | 5 | 6 | 10 | 0 | 4 | 13 | 26 | 15 | 17 | 17 | 17 | 6 | 14 | 13 | 8 | 6 | 8 | 0 | 6 | 3 | 0 | 11 | 4 | 0 | 8.7 | 26 |
| 20-Sep | 6 | 0 | 7 | 0 | 1 | 0 | 7 | 6 | 1 | 0 | 2 | 0 | 1 | 0 | 4 | 0 | 4 | 0 | 3 | 1 | 3 | 0 | 1 | 2 | 2.0 | 7 |
| 21-Sep | 3 | 1 | 0 | 4 | 2 | 0 | 3 | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 6 | 0 | 0 | 8 | 0 | 6 | 0 | 2 | 6 | 2.5 | 8 |
| 22-Sep | 0 | 0 | 6 | 3 | 0 | 2 | 3 | 1 | 4 | 6 | 13 | 4 | 11 | 1 | 0 | 0 | 0 | 11 | 0 | 7 | 0 | 4 | 5 | 0 | 3.4 | 13 |
| 23-Sep | 2 | 1 | 6 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 22 | 3 | 1 | 0 | 11 | 0 | 6 | 4 | 0 | 0 | 3 | 2 | 0 | 1 | 2.8 | 22 |
| 24-Sep | 7 | 8 | 4 | 0 | 8 | 2 | 6 | 1 | 22 | 15 | 0 | 4 | 3 | 1 | 1 | 7 | 3 | 7 | 1 | 0 | 7 | 0 | 0 | 4 | 4.6 | 22 |
| 25-Sep | 0 | 1 | 13 | 0 | 0 | 11 | 2 | 1 | 2 | 12 | 13 | 6 | 0 | 5 | 7 | 1 | 5 | 5 | 8 | 0 | 1 | 0 | 1 | 3 | 4.0 | 13 |
| 26-Sep | 14 | 0 | 11 | 5 | 1 | 3 | 6 | 0 | 12 | 22 | 0 | 7 | 3 | 12 | 5 | 4 | 0 | 6 | 11 | 1 | 14 | 0 | 16 | 0 | 6.4 | 22 |
| 27-Sep | 19 | 0 | 24 | 0 | 8 | 5 | 0 | 4 | 17 | 21 | 10 | 0 | 0 | 8 | 0 | 8 | 0 | 0 | 23 | 0 | 7 | 3 | 6 | 5 | 7.0 | 24 |
| 28-Sep | 1 | 7 | 2 | 2 | 5 | 5 | 8 | 2 | 21 | 8 | 0 | 9 | 3 | 9 | 2 | 6 | 0 | 3 | 14 | 0 | 8 | 5 | 0 | 18 | 5.8 | 21 |
| 29-Sep | 0 | 6 | 6 | 7 | 0 | 6 | 10 | 12 | 18 | 8 | 0 | 8 | 3 | 8 | 5 | 4 | 6 | 6 | 8 | 4 | 6 | 11 | 0 | 0 | 5.9 | 18 |
| 30-Sep | 6 | 9 | 3 | 0 | 11 | 20 | 0 | 12 | 32 | 5 | 3 | 16 | 9 | 10 | 13 | 7 | 12 | 3 | 10 | 5 | 5 | 5 | 2 | 1 | 8.3 | 32 |

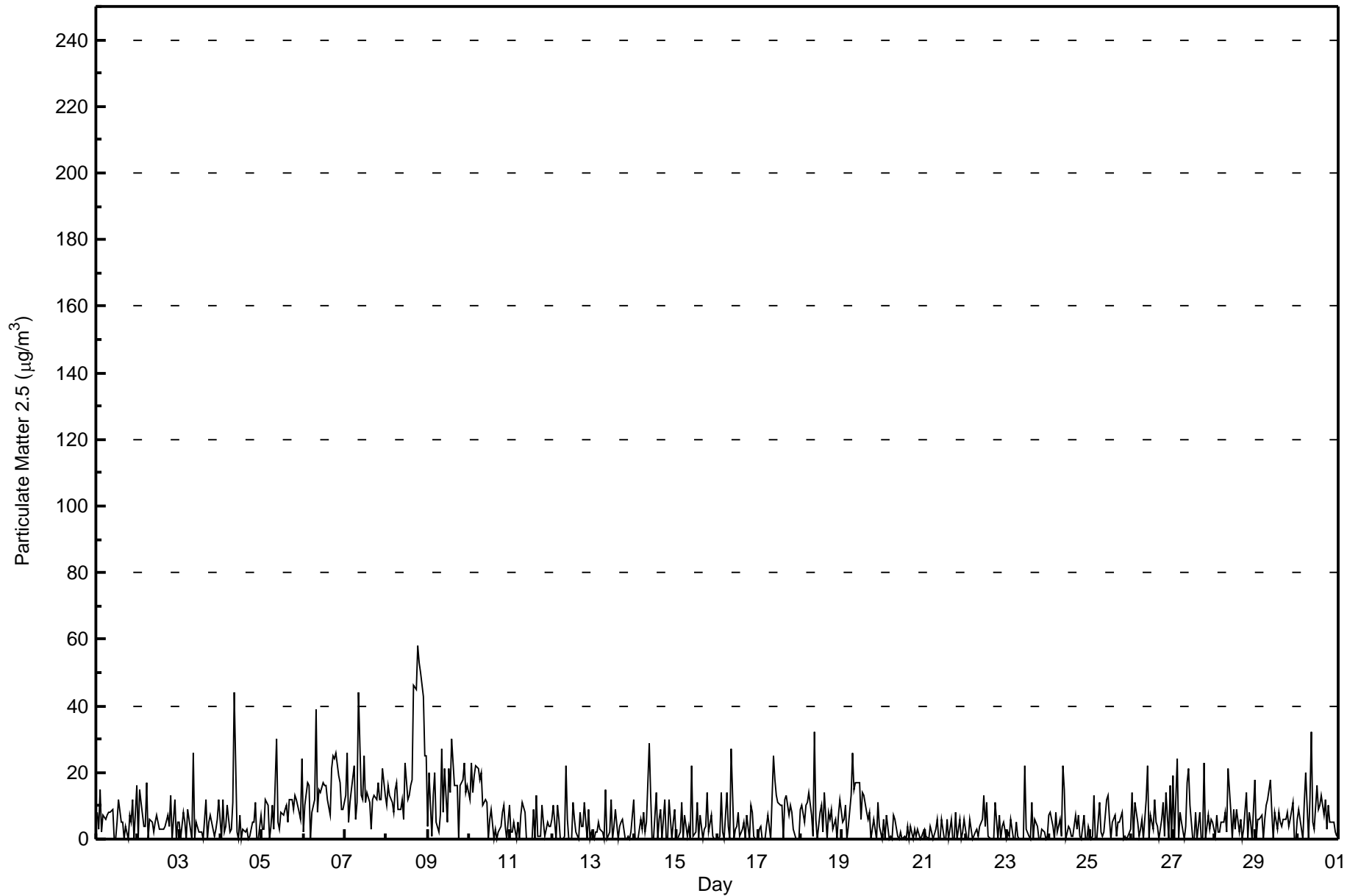
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 4.7 | 6.5 | 7.3 | 5.3 | 5.3 | 7.8 | 5.8 | 7.0 | 16.7 | 8.6 | 6.4 | 6.1 | 6.6 | 6.8 | 5.9 | 5.6 | 6.4 | 7.4 | 8.7 | 7.4 | 7.9 | 6.4 | 4.5 | 7.2 | Diurnal Average | |
| 19 | 26 | 24 | 19 | 22 | 22 | 26 | 39 | 44 | 22 | 22 | 25 | 21 | 16 | 30 | 18 | 46 | 45 | 58 | 53 | 50 | 43 | 25 | 25 | Diurnal Maximum | |

| | | |
|---|-------|----------------------|
| 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}) - $\mu\text{g}/\text{m}^3$
Sawbones Bay - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Sawbones Bay - September 2017**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|---|------------------------|----------|---------------------|
| 1 - 5 | 213 | 29.58 | 29.58 |
| 6 - 15 | 258 | 35.83 | 65.42 |
| 16 - 25 | 62 | 8.61 | 74.03 |
| 26 - 80 | 20 | 2.78 | 76.81 |
| > 81.0 | 0 | 0.00 | 76.81 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Sawbones Bay - September 2017

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|--|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 18 | 20 | 4 | 0 | 2 | 9 | 10 | 20 | 25 | 18 | 12 | 15 | 17 | 26 | 12 | 4 | 212 |
| 6 - 15 | 14 | 13 | 3 | 5 | 12 | 11 | 11 | 35 | 44 | 17 | 15 | 6 | 30 | 24 | 11 | 5 | 256 |
| 16 - 25 | 4 | 5 | 3 | 0 | 4 | 0 | 1 | 5 | 13 | 2 | 3 | 3 | 6 | 6 | 3 | 4 | 62 |
| 26 - 80 | 4 | 3 | 0 | 0 | 1 | 1 | 2 | 0 | 2 | 2 | 0 | 0 | 1 | 2 | 1 | 1 | 20 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 40 | 41 | 10 | 5 | 19 | 21 | 24 | 60 | 84 | 39 | 30 | 24 | 54 | 58 | 27 | 14 | 550 |

Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

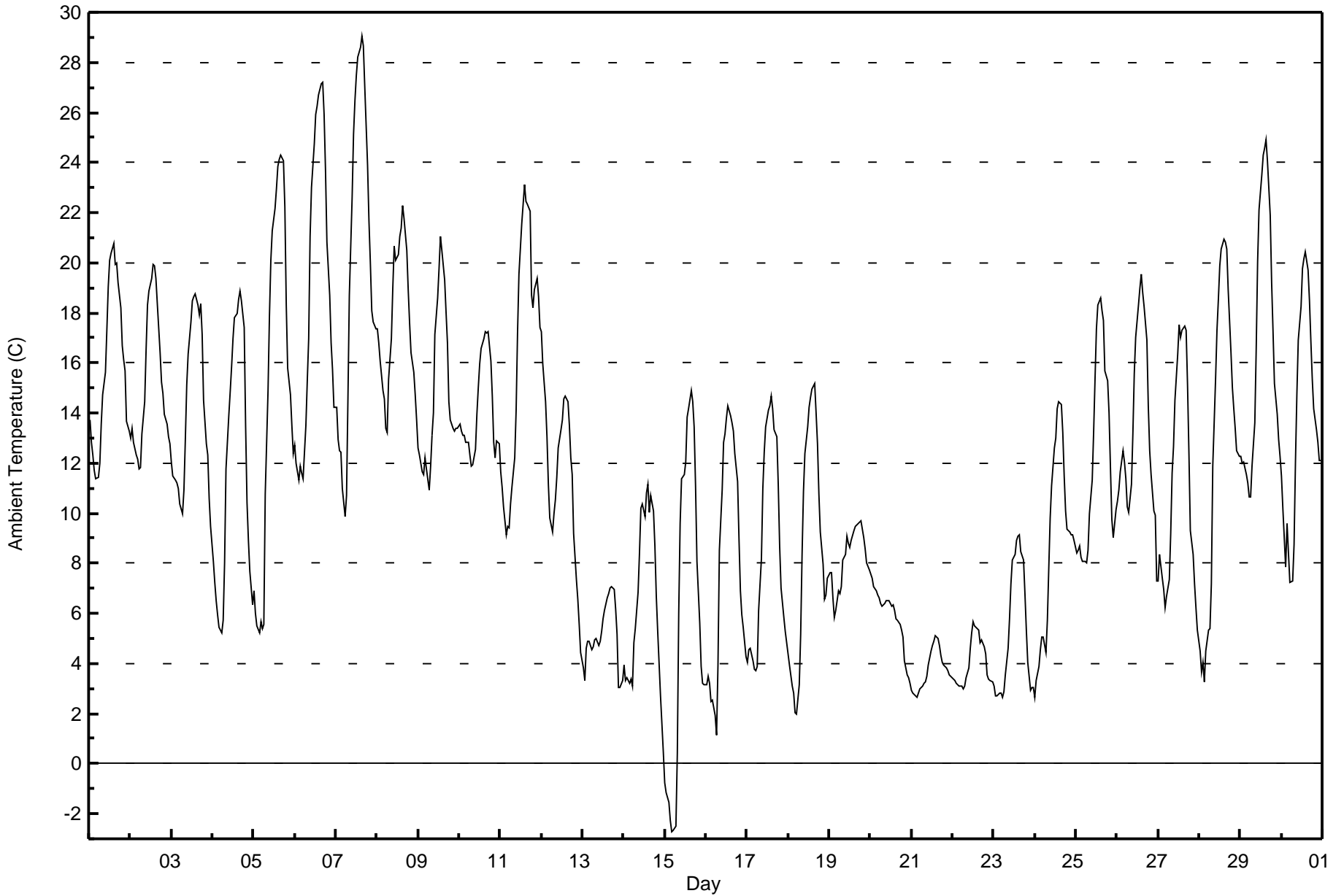
Ambient Temperature (AT) - C
Sawbones Bay - September 2017

| Maximum Value: 29.0 C on Sep 7 16:00 | | Maximum Daily Average: 20.0 C on Sep 7 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------------------|--|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -2.7 C on Sep 15 05:00 | | Minimum Daily Average: 3.7 C on Sep 21 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.7 C at hour 15 | | Minimum Diurnal Average: 7.1 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.45 C | | Percentiles: P ₁ = 0.4 P ₁₀ = 3.5 Q ₁ = 6.3 Median = 11.5 Q ₃ = 15.3 P ₉₀ = 19.7 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-Sep | 13.7 | 12.8 | 12.3 | 11.7 | 11.4 | 11.4 | 12.0 | 13.6 | 14.7 | 15.6 | 17.3 | 19.1 | 20.1 | 20.4 | 20.8 | 20.0 | 20.0 | 19.2 | 18.2 | 16.7 | 16.1 | 15.7 | 13.7 | 13.3 | 15.8 | 20.8 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 13.0 | 13.4 | 12.8 | 12.3 | 12.1 | 11.7 | 11.8 | 13.2 | 14.5 | 16.5 | 18.3 | 18.9 | 19.4 | 19.9 | 19.9 | 19.4 | 18.4 | 16.4 | 15.3 | 14.8 | 14.0 | 13.5 | 13.1 | 12.8 | 15.2 | 19.9 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 12.0 | 11.5 | 11.3 | 11.2 | 11.0 | 10.4 | 10.0 | 10.9 | 12.9 | 15.1 | 16.4 | 17.6 | 18.5 | 18.7 | 18.8 | 18.3 | 17.9 | 18.3 | 17.1 | 14.5 | 12.8 | 12.3 | 10.6 | 9.5 | 14.1 | 18.8 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 8.1 | 7.2 | 6.5 | 6.0 | 5.5 | 5.2 | 5.7 | 8.0 | 11.8 | 13.9 | 14.9 | 15.9 | 17.0 | 17.8 | 18.0 | 18.5 | 18.9 | 18.5 | 17.4 | 13.5 | 10.4 | 8.9 | 7.7 | 6.3 | 11.7 | 18.9 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 6.9 | 6.0 | 5.5 | 5.2 | 5.6 | 5.4 | 5.6 | 10.8 | 14.9 | 17.8 | 20.1 | 21.3 | 22.2 | 23.0 | 23.8 | 24.1 | 24.3 | 24.0 | 22.2 | 18.3 | 15.8 | 14.7 | 13.5 | 12.4 | 15.1 | 24.3 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 12.7 | 12.0 | 11.3 | 11.9 | 11.6 | 11.4 | 13.5 | 15.3 | 17.0 | 21.0 | 23.0 | 24.7 | 25.9 | 26.2 | 26.7 | 27.1 | 27.2 | 25.9 | 23.7 | 20.8 | 18.7 | 16.8 | 15.7 | 14.2 | 18.9 | 27.2 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 14.2 | 12.9 | 12.5 | 12.4 | 11.0 | 9.9 | 10.7 | 14.6 | 18.7 | 22.6 | 25.1 | 26.5 | 27.5 | 28.2 | 28.6 | 29.0 | 28.6 | 27.0 | 23.9 | 21.7 | 20.0 | 18.1 | 17.6 | 17.4 | 20.0 | 29.0 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 17.3 | 16.8 | 16.1 | 14.9 | 14.6 | 13.4 | 13.2 | 15.3 | 17.0 | 19.0 | 20.7 | 20.1 | 20.3 | 21.0 | 21.4 | 22.3 | 21.8 | 20.5 | 18.9 | 17.6 | 16.4 | 15.6 | 14.7 | 13.7 | 17.6 | 22.3 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 12.6 | 12.3 | 11.6 | 11.5 | 12.2 | 11.8 | 11.0 | 11.9 | 13.1 | 14.0 | 17.1 | 18.6 | 19.7 | 21.0 | 20.5 | 19.3 | 18.0 | 16.8 | 14.5 | 13.7 | 13.4 | 13.3 | 13.4 | 13.4 | 14.8 | 21.0 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 13.6 | 13.3 | 13.1 | 13.1 | 12.8 | 12.9 | 12.4 | 11.9 | 12.0 | 12.5 | 14.0 | 15.0 | 16.0 | 16.6 | 17.0 | 17.2 | 17.2 | 17.3 | 16.1 | 14.7 | 12.8 | 12.2 | 12.9 | 12.8 | 14.1 | 17.3 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 11.7 | 11.1 | 10.3 | 9.2 | 9.5 | 9.4 | 10.4 | 11.1 | 12.2 | 14.1 | 17.2 | 19.6 | 21.6 | 22.4 | 23.1 | 22.5 | 22.4 | 22.1 | 18.7 | 18.2 | 18.9 | 19.4 | 18.6 | 17.4 | 16.3 | 23.1 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 17.2 | 16.0 | 14.5 | 13.1 | 11.2 | 9.8 | 9.2 | 10.0 | 10.5 | 11.4 | 12.6 | 13.3 | 13.7 | 14.6 | 14.7 | 14.4 | 13.5 | 12.2 | 11.5 | 9.2 | 7.4 | 6.6 | 5.5 | 4.4 | 11.5 | 17.2 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 3.8 | 3.3 | 4.6 | 4.9 | 4.9 | 4.6 | 4.6 | 5.0 | 5.0 | 4.7 | 4.9 | 5.3 | 5.8 | 6.1 | 6.6 | 6.8 | 7.0 | 7.1 | 7.0 | 6.2 | 5.2 | 3.1 | 3.0 | 3.3 | 5.1 | 7.1 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 3.9 | 3.3 | 3.5 | 3.2 | 3.4 | 3.1 | 4.8 | 5.4 | 6.8 | 8.4 | 10.2 | 10.3 | 9.9 | 10.8 | 11.1 | 10.1 | 10.7 | 10.1 | 8.7 | 6.7 | 5.3 | 2.7 | 1.6 | 0.5 | 6.4 | 11.1 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | -0.7 | -1.2 | -1.6 | -2.3 | -2.7 | -2.6 | -2.5 | 0.4 | 6.0 | 9.6 | 11.4 | 11.6 | 12.1 | 13.8 | 14.2 | 14.9 | 14.5 | 13.5 | 11.1 | 8.1 | 5.6 | 3.9 | 3.2 | 3.1 | 6.0 | 14.9 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 3.1 | 3.5 | 3.2 | 2.5 | 2.5 | 1.9 | 1.2 | 3.9 | 8.5 | 10.9 | 12.8 | 13.1 | 13.8 | 14.3 | 13.9 | 13.6 | 13.3 | 12.4 | 11.3 | 9.0 | 6.9 | 5.9 | 5.4 | 4.2 | 8.0 | 14.3 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 4.0 | 4.5 | 4.6 | 4.1 | 3.8 | 3.7 | 3.9 | 6.1 | 8.2 | 11.0 | 12.4 | 13.4 | 14.1 | 14.3 | 14.7 | 14.2 | 13.3 | 13.1 | 11.1 | 8.7 | 7.0 | 5.8 | 5.3 | 4.8 | 8.6 | 14.7 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 4.4 | 3.9 | 3.1 | 2.8 | 2.0 | 2.0 | 3.1 | 5.2 | 8.3 | 10.9 | 12.4 | 13.5 | 14.3 | 14.6 | 15.0 | 15.2 | 14.0 | 12.8 | 10.7 | 9.3 | 8.0 | 6.6 | 6.8 | 7.4 | 8.6 | 15.2 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 7.6 | 7.6 | 6.6 | 5.9 | 6.1 | 6.9 | 6.8 | 7.1 | 8.1 | 8.4 | 9.1 | 8.8 | 8.6 | 8.9 | 9.3 | 9.5 | 9.5 | 9.6 | 9.7 | 9.3 | 9.0 | 8.6 | 8.0 | 7.7 | 8.2 | 9.7 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 7.6 | 7.4 | 7.1 | 6.9 | 6.7 | 6.6 | 6.4 | 6.3 | 6.4 | 6.5 | 6.5 | 6.5 | 6.3 | 6.3 | 6.1 | 5.8 | 5.7 | 5.5 | 5.4 | 5.1 | 4.1 | 3.5 | 3.4 | 3.2 | 5.9 | 7.6 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 2.9 | 2.8 | 2.7 | 2.6 | 2.8 | 3.0 | 3.1 | 3.2 | 3.3 | 3.5 | 3.9 | 4.5 | 4.7 | 4.9 | 5.1 | 5.0 | 4.7 | 4.4 | 4.1 | 3.9 | 3.8 | 3.7 | 3.5 | 3.5 | 3.7 | 5.1 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 3.4 | 3.3 | 3.2 | 3.1 | 3.1 | 3.1 | 3.0 | 3.1 | 3.4 | 3.8 | 4.6 | 5.2 | 5.7 | 5.5 | 5.4 | 5.3 | 4.8 | 4.9 | 4.7 | 4.4 | 3.5 | 3.4 | 3.3 | 3.2 | 4.0 | 5.7 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 3.1 | 2.7 | 2.7 | 2.8 | 2.8 | 2.7 | 2.9 | 3.6 | 4.6 | 5.8 | 7.2 | 8.1 | 8.4 | 8.9 | 9.1 | 9.1 | 8.5 | 8.1 | 6.8 | 5.4 | 4.0 | 2.9 | 3.0 | 3.0 | 5.3 | 9.1 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 2.7 | 3.3 | 3.9 | 4.6 | 5.1 | 5.1 | 4.4 | 5.7 | 7.8 | 9.8 | 11.1 | 12.6 | 13.0 | 14.2 | 14.4 | 14.4 | 13.2 | 11.5 | 10.1 | 9.4 | 9.2 | 9.1 | 9.1 | 8.9 | 8.9 | 14.4 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 8.4 | 8.5 | 8.7 | 8.3 | 8.0 | 8.1 | 8.0 | 8.5 | 10.0 | 11.3 | 13.2 | 15.4 | 17.4 | 18.3 | 18.6 | 18.1 | 17.7 | 15.7 | 15.3 | 14.0 | 11.8 | 9.8 | 9.0 | 10.1 | 12.2 | 18.6 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 10.5 | 10.9 | 11.6 | 12.5 | 12.0 | 11.4 | 10.2 | 10.0 | 11.2 | 13.1 | 15.6 | 17.0 | 18.3 | 19.0 | 19.6 | 18.8 | 18.2 | 16.9 | 14.3 | 12.5 | 11.6 | 10.1 | 9.9 | 7.3 | 13.4 | 19.6 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 7.3 | 8.3 | 7.4 | 7.0 | 6.2 | 6.7 | 7.3 | 9.2 | 11.6 | 12.7 | 14.5 | 16.4 | 17.5 | 17.0 | 17.3 | 17.5 | 17.3 | 15.1 | 12.4 | 9.3 | 8.4 | 7.2 | 6.3 | 5.3 | 11.0 | 17.5 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 4.5 | 3.7 | 4.0 | 3.3 | 4.5 | 5.4 | 5.4 | 7.2 | 11.9 | 15.3 | 17.3 | 18.6 | 19.9 | 20.6 | 20.9 | 20.8 | 20.6 | 19.0 | 16.4 | 15.0 | 14.2 | 13.4 | 12.5 | 12.3 | 12.8 | 20.9 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 12.3 | 12.0 | 12.1 | 11.5 | 11.2 | 10.6 | 10.6 | 11.9 | 13.6 | 16.6 | 20.0 | 22.1 | 23.5 | 24.3 | 24.6 | 24.9 | 24.0 | 21.9 | 19.2 | 17.3 | 15.2 | 13.9 | 13.0 | 12.3 | 16.6 | 24.9 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 11.5 | 10.2 | 7.9 | 9.6 | 8.4 | 7.2 | 7.3 | 8.8 | 12.0 | 14.7 | 16.9 | 18.3 | 19.8 | 20.2 | 20.4 | 19.7 | 18.5 | 16.9 | 15.4 | 14.1 | 13.3 | 12.8 | 12.1 | 12.1 | 13.7 | 20.4 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.4 | 8.1 | 7.8 | 7.5 | 7.3 | 7.1 | 7.2 | 8.6 | 10.5 | 12.4 | 14.0 | 15.0 | 15.8 | 16.4 | 16.7 | 16.5 | 16.1 | 15.2 | 13.7 | 12.0 | 10.8 | 9.8 | 9.2 | 8.7 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 17.3 | 16.8 | 16.1 | 14.9 | 14.6 | 13.4 | 13.5 | 15.3 | 18.7 | 22.6 | 25.1 | 26.5 | 27.5 | 28.2 | 28.6 | 29.0 | 28.6 | 27.0 | 23.9 | 21.7 | 20.0 | 19.4 | 18.6 | 17.4 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Sawbones Bay - September 2017





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Sawbones Bay - September 2017**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 7 | 0.97 | 0.97 |
| 0 - 10 | 298 | 41.39 | 42.36 |
| 10 - 20 | 350 | 48.61 | 90.97 |
| > 20 | 65 | 9.03 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



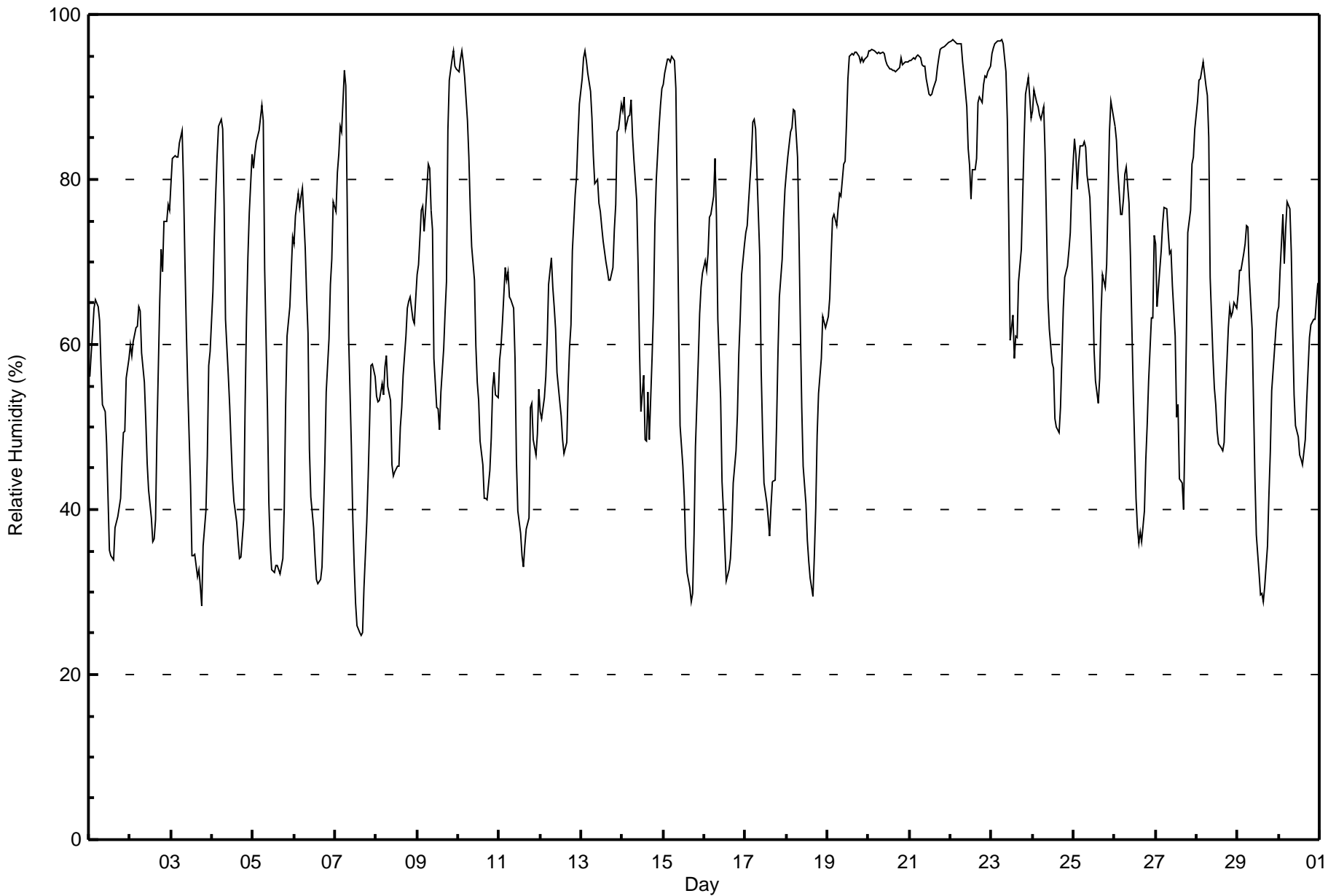
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Sawbones Bay - September 2017

| Maximum Value: 97 % on Sep 22 02:00 Maximum Daily Average: 94.5 % on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|---|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 25 % on Sep 7 16:00 Minimum Daily Average: 50.2 % on Sep 1 Maximum Diurnal Average: 82.5 % at hour 6 Minimum Diurnal Average: 48.0 % at hour 15 Monthly Average: 66.8 % Percentiles: P ₁ = 29 P ₁₀ = 38 Q ₁ = 52 Median = 67 O ₃ = 84 P ₉₀ = 94 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-Sep | 56 | 59 | 62 | 64 | 65 | 65 | 63 | 57 | 53 | 52 | 48 | 42 | 35 | 34 | 34 | 38 | 38 | 39 | 41 | 46 | 49 | 50 | 56 | 58 | 50.2 | 65 |
| 2-Sep | 60 | 59 | 60 | 62 | 62 | 65 | 64 | 59 | 55 | 51 | 46 | 42 | 39 | 36 | 37 | 39 | 49 | 65 | 72 | 69 | 75 | 75 | 77 | 76 | 58.1 | 77 |
| 3-Sep | 80 | 83 | 83 | 83 | 83 | 84 | 86 | 79 | 70 | 62 | 55 | 43 | 34 | 34 | 35 | 32 | 33 | 31 | 28 | 36 | 40 | 46 | 57 | 59 | 56.5 | 86 |
| 4-Sep | 67 | 73 | 78 | 83 | 86 | 87 | 86 | 77 | 63 | 56 | 53 | 48 | 44 | 41 | 38 | 36 | 34 | 34 | 39 | 52 | 63 | 71 | 76 | 83 | 61.2 | 87 |
| 5-Sep | 81 | 83 | 85 | 86 | 87 | 89 | 87 | 69 | 52 | 41 | 36 | 33 | 32 | 33 | 33 | 33 | 32 | 34 | 40 | 53 | 61 | 65 | 69 | 73 | 57.8 | 89 |
| 6-Sep | 72 | 76 | 78 | 77 | 78 | 79 | 72 | 66 | 61 | 47 | 41 | 38 | 34 | 32 | 31 | 32 | 33 | 39 | 46 | 54 | 61 | 67 | 70 | 77 | 56.7 | 79 |
| 7-Sep | 76 | 81 | 83 | 86 | 86 | 93 | 91 | 77 | 61 | 48 | 39 | 33 | 29 | 26 | 25 | 25 | 25 | 30 | 38 | 44 | 50 | 57 | 58 | 56 | 55.0 | 93 |
| 8-Sep | 54 | 53 | 53 | 55 | 54 | 57 | 59 | 55 | 53 | 45 | 44 | 45 | 45 | 45 | 50 | 52 | 56 | 61 | 64 | 65 | 66 | 63 | 63 | 66 | 55.2 | 66 |
| 9-Sep | 68 | 70 | 76 | 77 | 74 | 76 | 82 | 81 | 76 | 74 | 58 | 52 | 52 | 50 | 54 | 60 | 64 | 68 | 86 | 92 | 95 | 96 | 94 | 93 | 73.6 | 96 |
| 10-Sep | 93 | 95 | 96 | 94 | 92 | 87 | 83 | 76 | 72 | 68 | 60 | 55 | 53 | 48 | 45 | 41 | 41 | 41 | 45 | 49 | 55 | 57 | 54 | 54 | 64.8 | 96 |
| 11-Sep | 58 | 60 | 63 | 69 | 68 | 69 | 66 | 65 | 64 | 58 | 46 | 40 | 37 | 34 | 33 | 36 | 38 | 39 | 52 | 53 | 48 | 47 | 49 | 55 | 52.0 | 69 |
| 12-Sep | 52 | 51 | 54 | 56 | 61 | 67 | 71 | 67 | 65 | 62 | 57 | 53 | 51 | 48 | 47 | 48 | 55 | 60 | 62 | 71 | 78 | 80 | 85 | 89 | 62.1 | 89 |
| 13-Sep | 92 | 95 | 96 | 94 | 93 | 91 | 87 | 83 | 80 | 80 | 77 | 76 | 74 | 73 | 70 | 69 | 68 | 68 | 69 | 74 | 77 | 86 | 86 | 89 | 81.1 | 96 |
| 14-Sep | 88 | 90 | 86 | 88 | 88 | 90 | 85 | 82 | 78 | 70 | 59 | 52 | 56 | 49 | 48 | 54 | 49 | 58 | 64 | 75 | 80 | 86 | 89 | 91 | 73.1 | 91 |
| 15-Sep | 92 | 93 | 95 | 95 | 94 | 95 | 94 | 91 | 77 | 63 | 50 | 45 | 42 | 35 | 32 | 30 | 29 | 30 | 37 | 48 | 58 | 64 | 67 | 69 | 63.5 | 95 |
| 16-Sep | 70 | 69 | 71 | 75 | 76 | 78 | 83 | 76 | 63 | 53 | 43 | 40 | 36 | 31 | 33 | 34 | 38 | 43 | 47 | 51 | 59 | 63 | 68 | 72 | 57.2 | 83 |
| 17-Sep | 73 | 74 | 77 | 83 | 87 | 87 | 86 | 81 | 71 | 57 | 49 | 43 | 41 | 39 | 37 | 40 | 43 | 43 | 50 | 59 | 66 | 70 | 75 | 79 | 63.0 | 87 |
| 18-Sep | 81 | 83 | 86 | 86 | 88 | 88 | 83 | 74 | 62 | 52 | 45 | 41 | 36 | 34 | 32 | 30 | 34 | 40 | 49 | 54 | 58 | 63 | 63 | 62 | 59.3 | 88 |
| 19-Sep | 63 | 66 | 71 | 75 | 76 | 74 | 76 | 78 | 78 | 82 | 82 | 87 | 92 | 95 | 95 | 95 | 95 | 95 | 95 | 94 | 95 | 94 | 95 | 95 | 85.2 | 95 |
| 20-Sep | 96 | 96 | 96 | 96 | 95 | 95 | 95 | 95 | 95 | 95 | 94 | 94 | 93 | 93 | 93 | 93 | 93 | 93 | 94 | 95 | 94 | 94 | 94 | 94 | 94.5 | 96 |
| 21-Sep | 94 | 94 | 95 | 95 | 95 | 95 | 95 | 94 | 94 | 94 | 92 | 90 | 90 | 90 | 91 | 92 | 94 | 95 | 96 | 96 | 96 | 96 | 96 | 97 | 94.0 | 97 |
| 22-Sep | 97 | 97 | 97 | 97 | 96 | 96 | 96 | 94 | 93 | 89 | 84 | 82 | 78 | 81 | 81 | 83 | 89 | 90 | 89 | 91 | 92 | 92 | 93 | 94 | 90.5 | 97 |
| 23-Sep | 95 | 96 | 96 | 97 | 97 | 97 | 97 | 96 | 93 | 87 | 75 | 61 | 64 | 58 | 61 | 61 | 68 | 72 | 78 | 85 | 90 | 92 | 90 | 87 | 83.0 | 97 |
| 24-Sep | 88 | 91 | 89 | 89 | 88 | 87 | 89 | 83 | 74 | 66 | 62 | 58 | 57 | 51 | 50 | 49 | 52 | 59 | 64 | 68 | 69 | 71 | 73 | 79 | 71.2 | 91 |
| 25-Sep | 85 | 83 | 79 | 82 | 84 | 84 | 85 | 84 | 81 | 78 | 73 | 67 | 59 | 56 | 53 | 56 | 64 | 68 | 67 | 70 | 78 | 86 | 89 | 87 | 74.9 | 89 |
| 26-Sep | 87 | 85 | 81 | 76 | 76 | 78 | 81 | 82 | 77 | 71 | 62 | 54 | 41 | 38 | 36 | 37 | 36 | 40 | 46 | 50 | 56 | 63 | 63 | 73 | 62.0 | 87 |
| 27-Sep | 72 | 65 | 69 | 71 | 74 | 77 | 76 | 74 | 71 | 71 | 67 | 61 | 51 | 53 | 44 | 43 | 40 | 50 | 61 | 74 | 76 | 82 | 83 | 86 | 66.3 | 86 |
| 28-Sep | 89 | 92 | 92 | 93 | 94 | 91 | 90 | 85 | 68 | 58 | 55 | 53 | 50 | 48 | 48 | 47 | 48 | 54 | 62 | 65 | 63 | 64 | 65 | 64 | 68.3 | 94 |
| 29-Sep | 66 | 69 | 69 | 71 | 72 | 74 | 74 | 68 | 62 | 53 | 44 | 37 | 32 | 30 | 30 | 29 | 31 | 36 | 42 | 47 | 54 | 59 | 62 | 64 | 53.1 | 74 |
| 30-Sep | 65 | 69 | 76 | 70 | 74 | 77 | 76 | 71 | 62 | 54 | 50 | 49 | 47 | 46 | 45 | 48 | 53 | 57 | 61 | 62 | 63 | 63 | 65 | 67 | 61.3 | 77 |
| | 77.0 | 78.2 | 79.7 | 80.8 | 81.5 | 82.5 | 81.9 | 77.4 | 70.8 | 64.5 | 58.2 | 53.8 | 50.9 | 48.7 | 48.0 | 48.7 | 50.8 | 54.4 | 59.5 | 64.7 | 68.9 | 72.1 | 74.2 | 76.3 | Diurnal Average | |
| | 97 | 97 | 97 | 97 | 97 | 97 | 97 | 96 | 95 | 95 | 94 | 94 | 93 | 95 | 95 | 95 | 95 | 95 | 96 | 96 | 96 | 96 | 96 | 97 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Sawbones Bay - September 2017

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 87 | 12.08 | 12.08 |
| 40 - 60 | 185 | 25.69 | 37.78 |
| 60 - 80 | 227 | 31.53 | 69.31 |
| 80 - 100 | 221 | 30.69 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

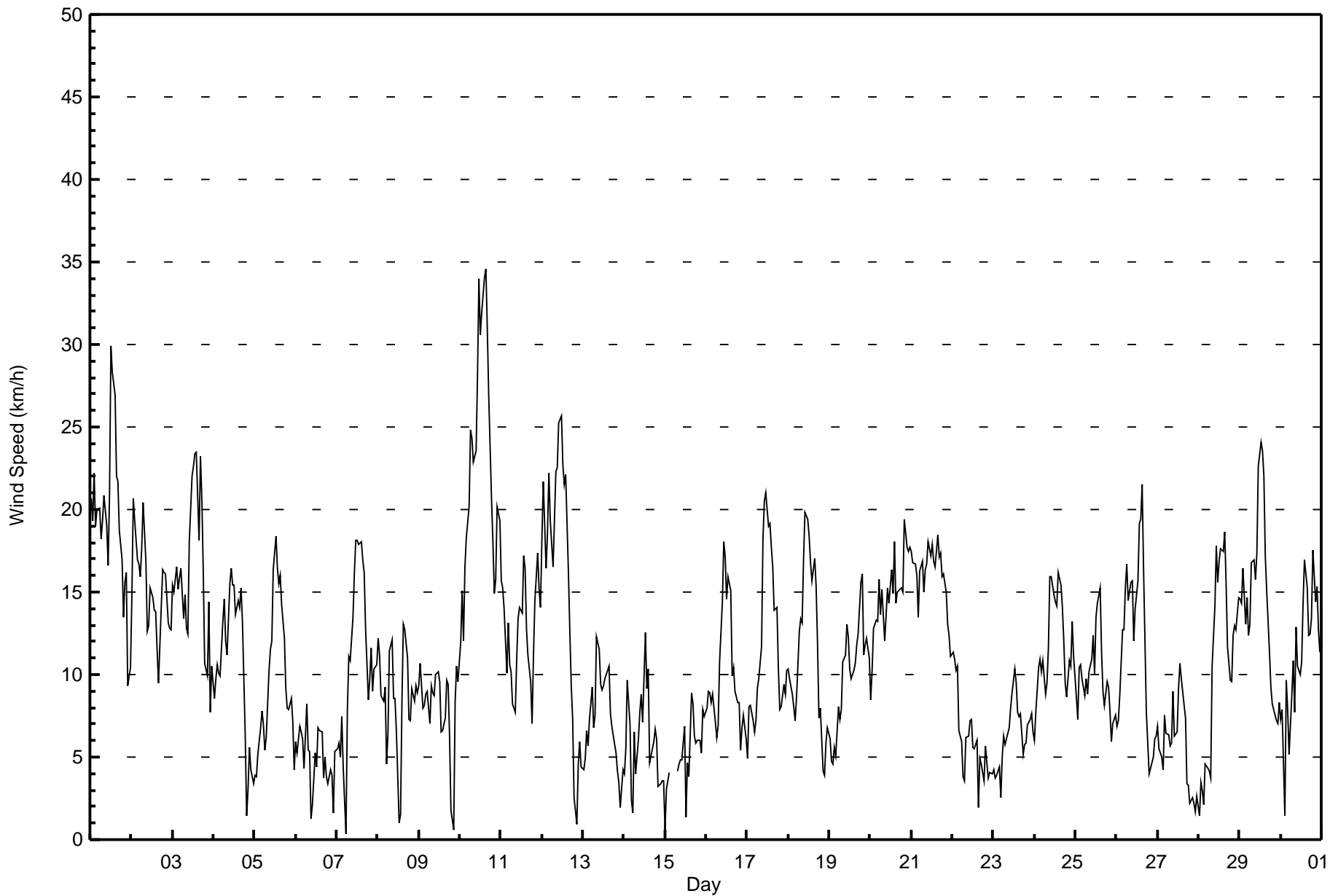
Wind Speed (WS) - km/h
Sawbones Bay - September 2017

| | | |
|--|--|--------------------------------|
| Maximum Speed: 35 km/h on Sep 10 16:00 | Maximum Daily Speed Average: 22.4 km/h on Sep 10 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 7 06:00 | Minimum Daily Speed Average: 0.4 km/h on Sep 8 | Hours of Data: 716 |
| Maximum Diurnal Speed Average: 6.2 km/h at hour 13 | Minimum Diurnal Speed Average: 1.2 km/h at hour 20 | Hours of Missing Data: 4 |
| Monthly Average Velocity: 3.3 km/h 249.7 deg | Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 10 Q ₃ = 15 P ₉₀ = 18 P ₉₉ = 29 | Percent Operational Time: 99.4 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|---|-----------|-----------------|-------|-----------------------------------|---|-----------------------------|----------|-----------------|----------------|-----------|----------------|---|-----------------------------|----------------------|--------------------------|-----------|-------|-------|-------|-------|-------------------|-------|----------|---------------|---------------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | W21 | W19 | W22 | W19 | W20 | W20 | W18 | W19 | W21 | W19WSW17 | W21WNNW30 | W28 | W27WNNW22 | W22 | W19WNNW17WNNW13WSW16 | W16 | WSW9WSW10 | | | | | | | | | W19.0 | WNNW30 |
| 2-Sep | WSW15 | W21 | W19 | W17 | W17WSW16 | W18 | W20WNNW17 | W13WSW13 | W15WNNW15WNNW14 | W14WNNW12 | W10 | W14 | W16 | W16WNNW16WNNW13WNNW13WNNW13 | | | | | | | | | | | W14.8 | W21 | |
| 3-Sep | WNNW15WNNW15WNNW16WNNW15WNNW16WNNW16 | | | | | | W13WNNW15WNNW13WNNW12WNNW18 | | | | | | | | | | | | | | | | | | WNNW15.8 | WNNW23 | |
| 4-Sep | WNNW9WNNW10WNNW11WNNW10WNNW10WNNW13WNNW15WNNW12 | | | | | | W11 | W16 | W16 | W16 | W15 | W15 | W14 | W15 | W14 | W15 | W13 | NNW6 | NNE1 | SE3 | S6 | S4 | S3 | | NW9.4 | NW16 | |
| 5-Sep | S4 | S4 | S5 | S7 | S8 | S7 | S5 | SSW6 | SSW10 | SW12 | SW12 | SW16 | WSW18 | SW16 | SW15 | SW16 | SW14 | SW12 | SW9 | SSW8 | SSW8 | S9 | S7 | S4 | SW8.9 | WSW18 | |
| 6-Sep | S6 | SSE5 | S7 | S7 | SSW6 | SW4 | W8 | W5 | WNNW5 | NW1 | NW2 | NW5 | NNW4 | NNW7 | NNE7 | N7 | N4 | NE5 | E4 | ESE3 | SE4 | SSE4 | S2 | SSE5 | WSW0.6 | W8 | |
| 7-Sep | SE5 | SE6 | SSE5 | S7 | SSE4 | SSE0 | SSE8 | S11 | S11 | S13 | SSW16 | SSW18 | SSW18 | SSW18 | S18 | SSW17 | SSW16 | S13 | S8 | SSE10 | SSE12 | S9 | S10 | S11 | S10.7 | SSW18 | |
| 8-Sep | S12 | S11 | SSE9 | SSE8 | S9 | S5 | SSE6 | S11 | S12 | WSW9 | SSW9 | W7 | SSW1 | W2 | NNW8 | N13 | N13 | N11 | NNE7 | N7 | NNW9 | N8 | NNE9 | NNE9 | WSW0.4 | N13 | |
| 9-Sep | NNE9 | N11 | N8 | NNW8 | NNE9 | NNE9 | N7 | NNE9 | NNE9 | NNE9 | NE10 | NE10 | NNE10 | NE6 | NNE7 | N7 | NW10 | NW9 | NNW6 | NE2 | NNE1 | WNNW8WNNW11WNNW10 | | N6.6 | N11 | | |
| 10-Sep | W12WNNW15WNNW12 | | | W17 | W18 | W20 | W25 | W24 | W23 | W24 | W28 | W34 | W31WNNW32WNNW34WNNW35 | W31 | W27 | W21 | W18 | SW15 | SW16 | W20 | W19 | | | W22.4 | WNNW35 | | |
| 11-Sep | WSW16WSW15WSW14 | | | SW10 | SW13 | SW11 | SW10 | SSW8 | S8 | S11 | S13 | SSW14 | SW14WSW17WSW16WSW13WSW11 | SW10 | S7 | SW11WSW14WSW17WSW15WSW14 | | | | | | | | SW11.6 | WSW17 | | |
| 12-Sep | W18WNNW22 | W16 | W19WNNW22WNNW19 | W17 | W19WNNW22WNNW23WNNW25WNNW26WNNW23 | NW22 | NW22 | NNW16 | N13 | NNE9 | N7 | NNE3 | SW1 | NW5 | NNW6 | N4 | | | | | | | | WNNW14.1 | WNNW26 | | |
| 13-Sep | NNE4 | NE5 | NNE7 | N6 | N7 | NNE9 | NNE7 | N8 | N12 | NNE12 | NNE9 | NNE9 | N9 | NNE10 | N10 | N11 | N8 | N7 | NW6 | NW5 | NW4 | NW3 | W2 | W4 | N6.6 | N12 | |
| 14-Sep | W4 | NW5WNNW10 | NW7 | WSW2 | S2 | W6 | SW4 | WNNW6 | WSW8 | SW9 | NW7 | W13 | WNNW9 | WNNW10 | N5 | NNW5 | NNW6 | NNW7 | NNW6 | N3 | SE3 | S4 | S4 | WNNW4.2 | WNNW13 | | |
| 15-Sep | WSW1 | S3 | S4 | AF | AF | AF | AF | S4 | S5 | SW5 | SW5 | NNW7 | NNW1 | SSW5 | SSE4 | SSW9 | S8 | SSE6 | SE6 | SSE6 | S5 | SSE8 | SSE7 | S4.0 | SSW9 | | |
| 16-Sep | SSE8 | SSE9 | SSE9 | SSE8 | SSE9 | SSE7 | SSE6 | S7 | S11 | S14 | S18 | S17 | SSW15 | SSW16 | S15 | SSW10 | SSW10 | S9 | SSE8 | SSE8 | S5 | SE7 | SSE8 | S6 | S9.6 | S18 | |
| 17-Sep | SSE5 | SSE8 | SSE8 | SE7 | SE7 | SE7 | SSE9 | S10 | SSE12 | S18 | S20 | S21 | S19 | S19 | S18 | SSE17 | S14 | SSE14 | SSE10 | SE8 | SE8 | SE9 | SE9 | SE10 | SSE11.4 | S21 | |
| 18-Sep | SE10 | SE10 | ESE9 | ESE8 | ESE7 | ESE9 | ESE13 | SE13 | SE13 | SE17 | SE20 | SSE19 | SE18 | SE17 | SE16 | SE17 | ESE15 | ESE12 | ESE7 | ESE8 | E4 | E4 | E6 | E7 | SE11.2 | SE20 | |
| 19-Sep | E6 | ENE5 | NE5 | NE6 | NE5 | E8 | E7 | E8 | E11 | E11 | E13 | E12 | E10 | E10 | ENE10 | ENE11 | E12 | E12 | ESE16 | ESE16 | E11 | E12 | E12 | E11 | E9.7 | ESE16 | |
| 20-Sep | E8 | NE10 | NE13 | NE13 | NE13 | NE16 | NNE14 | NNE15 | NNE12 | NNE14 | NNE15 | NNE14 | NNE16 | NNE15 | NNE18 | NE14 | NNE15 | NNE15 | NNE15 | NNE15 | NNE15 | NNE19 | NNE18 | NNE17 | NNE18 | NNE14.4 | NNE19 |
| 21-Sep | N17 | NNE17 | NNE17 | NNE16 | N13 | N16 | N17 | NNE15 | NNE16 | NNE17 | NNE18 | NNE17 | N18 | N17 | N16 | N18 | N17 | N16 | N16 | N15 | N13 | N12 | N11 | | N15.9 | N18 | |
| 22-Sep | N11 | N11 | N10 | N11 | N7 | N6 | N4 | NNW4 | N6 | N6 | N7 | NNE7 | NE6 | ESE5 | ESE6 | SW2 | NNW5 | ENE5 | E4 | ESE6 | ESE5 | SSE4 | SE4 | SE4 | NNE3.6 | N11 | |
| 23-Sep | ESE4 | ESE4 | ESE4 | SE4 | E3 | ESE5 | SE6 | SE6 | S6 | S7 | SSW8 | SSW9 | SW10 | S10 | SW8 | S7 | SSE8 | SSE5 | SE6 | SSE6 | S7 | S7 | SSE8 | SSE6 | SSE5.2 | SW10 | |
| 24-Sep | SE6 | SSE8 | SSE10 | S11 | S10 | SSE11 | SSE9 | S9 | S12 | S16 | S16 | SSW15 | SSW14 | SSW14 | SSW16 | SSW15 | S14 | S12 | SSE9 | SSE9 | SSE11 | S11 | S13 | S11 | S11.4 | SSW16 | |
| 25-Sep | SSE9 | SSE7 | SSE10 | S11 | SSE10 | SSE9 | SSE10 | S9 | SSW10 | SSW11 | SW12 | SW10WSW14WSW14 | SW15 | SW15 | SW11 | SSW9 | SSW8 | SSW10 | SW9 | SSW8 | SW8 | S6 | S7 | SSW8 | SSW8.7 | SW15 | |
| 26-Sep | SSW7 | SSW7 | SW9WSW13WSW13 | W15 | W17 | W14WNNW16WNNW16WNNW12WNNW14WNNW16WNNW19WNNW19 | NW22 | NW16 | NNW8 | NW6 | W4 | WSW4 | WSW5 | SW6 | SSW6 | | | | | | | | | | W10.0 | NW22 | |
| 27-Sep | S7 | SSW6 | S5 | S4 | S8 | SSW6 | SSW6 | SSW6 | SW6 | WNNW9 | NW6 | NW7 | N9 | NNE11 | NNE10 | NNE8 | NNW3 | NNW3 | NNE2 | NNE3 | N2 | E2 | SSE3 | | NW1.1 | NNE11 | |
| 28-Sep | SSW1 | SSE3 | SSE3 | ESE2 | SE5 | SE4 | ESE4 | SE4 | S11 | S14 | S18 | S16 | S17 | SSW18 | S17 | S19 | SSW16 | S12 | SSE10 | SSE10 | SSE12 | SSE13 | S13 | S15 | S10.1 | S19 | |
| 29-Sep | S15 | S14 | S16 | SSE13 | S15 | S12 | SSE13 | S17 | S17 | S16 | S17 | S23 | S24 | SSW24 | S22 | SSW17 | S15 | S11 | SSE9 | SSE8 | SE8 | SSE7 | SSE7 | SSE8 | S14.2 | S24 | |
| 30-Sep | SSE7 | SSE8 | S1 | SSE10 | S8 | S5 | S9 | S11 | SSW8 | SW13WSW11WSW10 | SW11 | W14 | W17WNNW15WNNW12WNNW12WNNW13WNNW18WNNW14WNNW15WNNW13 | NW11 | | | | | | | | | | W7.2 | WNNW18 | | |

| | | | | | | | | | | | | | | | | |
|---|-------------------|-------------|------|------|------|------|------|------|------|-----------------------|-------------|-------|-------|-----------------|-----------------|--|
| SW2.4WSW2.3WSW2.7WSW2.8WSW3.2WSW2.7WSW3.3 | SW3.6WSW3.8WSW4.4 | SW5.3WSW5.5 | W6.2 | W6.2 | W5.9 | W4.6 | W4.2 | W2.7 | W1.4 | SW1.2 | SW1.7WSW1.9 | SW2.1 | SW2.2 | Diurnal Average | | |
| W21WNNW22 | W22 | W19WNNW22 | W20 | W25 | W24 | W23 | W24 | W28 | W34 | W31WNNW32WNNW34WNNW35 | W31 | W27 | W21 | W18 | 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
Sawbones Bay - September 2017**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 114 | 15.92 | 15.92 |
| 6 - 11 | 293 | 40.92 | 56.84 |
| 12 - 19 | 258 | 36.03 | 92.88 |
| 20 - 28 | 44 | 6.15 | 99.02 |
| 29 - 38 | 7 | 0.98 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Sawbones Bay - September 2017

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 6 | 6 | 5 | 2 | 6 | 9 | 10 | 13 | 22 | 3 | 6 | 4 | 6 | 1 | 8 | 7 | 114 |
| 6 - 11 | 28 | 24 | 5 | 3 | 13 | 8 | 17 | 54 | 47 | 28 | 16 | 7 | 4 | 14 | 12 | 13 | 293 |
| 12 - 19 | 19 | 26 | 5 | 0 | 6 | 6 | 6 | 10 | 39 | 17 | 15 | 20 | 32 | 43 | 12 | 2 | 258 |
| 20 - 28 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 1 | 0 | 0 | 19 | 13 | 5 | 0 | 44 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 7 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 53 | 56 | 15 | 5 | 25 | 23 | 34 | 77 | 113 | 49 | 37 | 31 | 64 | 75 | 37 | 22 | 716 |

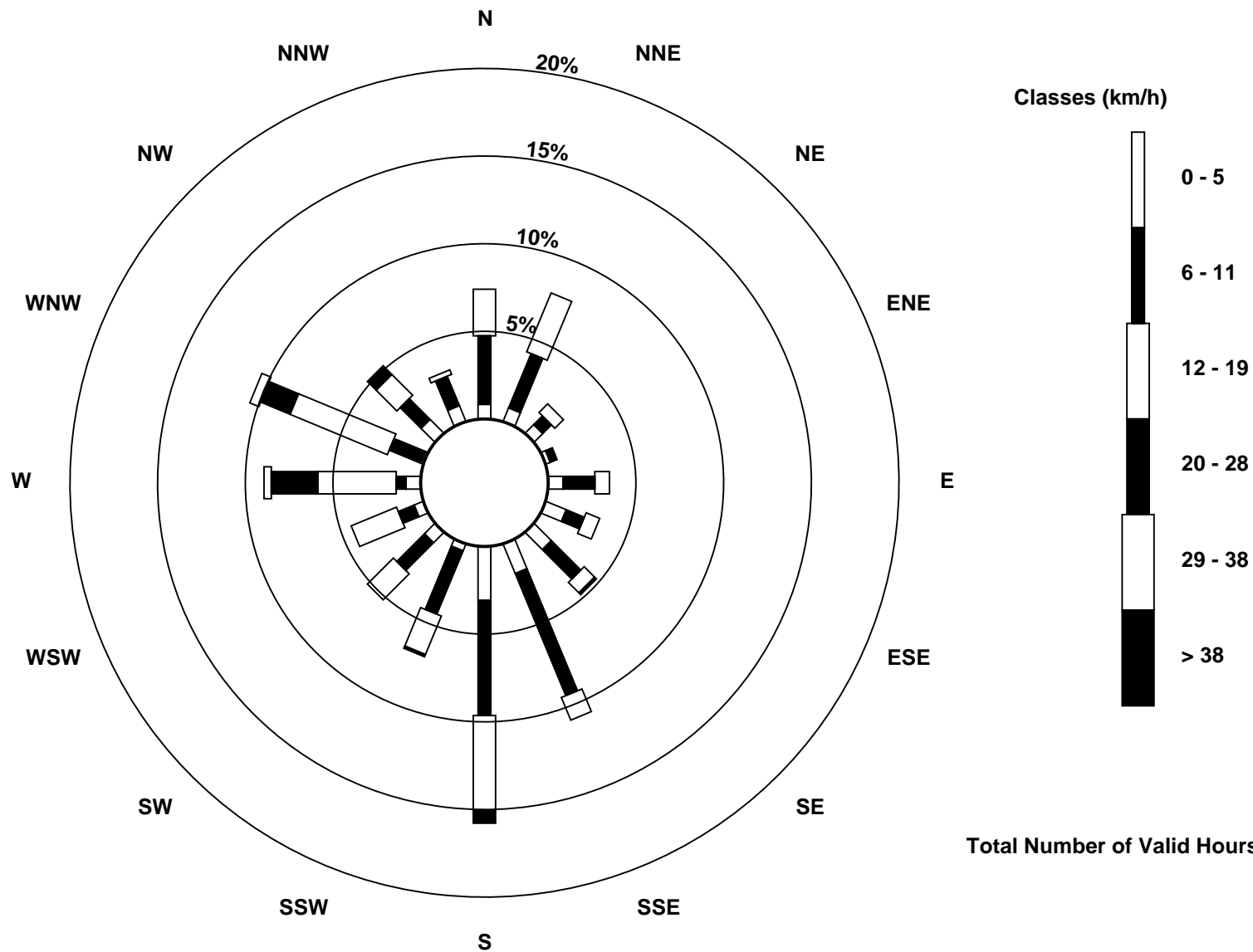
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2017

Wind Speed (WS) - km/h
Sawbones Bay (AMS 505)



Total Number of Valid Hours: 716



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Sawbones Bay - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 8 km/h on Sep 10 12:00 | Hours of Data: 716 |
| Minimum Value: 1 km/h on Sep 27 19:00 | Hours of Missing Data: 4 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 4 P ₉₉ = 6 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.4 |

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

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Sawbones Bay - September 2017

| | | |
|---|--|--------------------------------|
| Direction of Maximum Speed: 285 deg on Sep 10 16:00 | | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 272.6 deg on Sep 10 | | Hours of Data: 716 |
| Direction of Minimum Speed: 156 deg on Sep 7 06:00 | Direction of Minimum Daily Speed Average: 0.4 deg on Sep 8 | Hours of Missing Data: 4 |
| Monthly Average Direction: 250.0 deg | | Percent Operational Time: 99.4 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 270 | 269 | 267 | 267 | 262 | 262 | 264 | 266 | 272 | 276 | 257 | 262 | 282 | 281 | 278 | 288 | 280 | 281 | 296 | 282 | 258 | 267 | 237 | 250 | 271.5 |
| 2-Sep | 254 | 269 | 269 | 265 | 264 | 256 | 266 | 275 | 285 | 275 | 258 | 268 | 289 | 290 | 276 | 303 | 269 | 262 | 267 | 276 | 297 | 297 | 295 | 291 | 274.9 |
| 3-Sep | 285 | 292 | 293 | 295 | 294 | 291 | 281 | 292 | 296 | 297 | 300 | 310 | 303 | 301 | 301 | 312 | 295 | 307 | 314 | 310 | 299 | 347 | 317 | 296 | 300.9 |
| 4-Sep | 297 | 299 | 301 | 297 | 298 | 296 | 294 | 292 | 310 | 319 | 312 | 316 | 305 | 316 | 318 | 316 | 313 | 315 | 327 | 17 | 128 | 170 | 178 | 180 | 305.9 |
| 5-Sep | 183 | 183 | 174 | 177 | 183 | 177 | 173 | 199 | 209 | 220 | 227 | 232 | 245 | 235 | 236 | 236 | 230 | 223 | 214 | 202 | 192 | 188 | 183 | 172 | 214.4 |
| 6-Sep | 176 | 161 | 176 | 190 | 211 | 230 | 268 | 271 | 301 | 317 | 320 | 320 | 330 | 345 | 19 | 2 | 11 | 49 | 94 | 110 | 129 | 159 | 181 | 152 | 240.7 |
| 7-Sep | 133 | 138 | 167 | 171 | 168 | 156 | 166 | 172 | 175 | 183 | 193 | 193 | 200 | 192 | 189 | 199 | 197 | 183 | 175 | 158 | 168 | 179 | 173 | 171 | 181.5 |
| 8-Sep | 173 | 170 | 168 | 168 | 170 | 182 | 148 | 169 | 184 | 245 | 203 | 269 | 201 | 260 | 328 | 9 | 349 | 350 | 17 | 10 | 345 | 351 | 16 | 19 | 247.5 |
| 9-Sep | 13 | 9 | 358 | 347 | 21 | 21 | 0 | 28 | 24 | 14 | 50 | 40 | 22 | 35 | 18 | 5 | 324 | 320 | 341 | 52 | 30 | 301 | 288 | 284 | 1.6 |
| 10-Sep | 277 | 284 | 293 | 270 | 266 | 268 | 271 | 270 | 270 | 268 | 274 | 279 | 276 | 284 | 284 | 285 | 280 | 274 | 268 | 260 | 229 | 236 | 265 | 268 | 272.6 |
| 11-Sep | 255 | 257 | 250 | 227 | 229 | 216 | 220 | 203 | 191 | 179 | 179 | 199 | 215 | 237 | 240 | 253 | 242 | 224 | 189 | 219 | 237 | 257 | 249 | 246 | 229.6 |
| 12-Sep | 275 | 288 | 277 | 270 | 292 | 294 | 268 | 270 | 291 | 301 | 294 | 292 | 297 | 314 | 310 | 332 | 356 | 27 | 7 | 30 | 235 | 318 | 327 | 2 | 298.6 |
| 13-Sep | 24 | 36 | 22 | 10 | 359 | 17 | 24 | 10 | 2 | 23 | 21 | 19 | 360 | 18 | 5 | 4 | 7 | 360 | 324 | 326 | 307 | 305 | 268 | 268 | 4.8 |
| 14-Sep | 260 | 307 | 297 | 311 | 247 | 188 | 276 | 218 | 284 | 253 | 232 | 313 | 281 | 298 | 341 | 353 | 336 | 338 | 328 | 333 | 358 | 124 | 171 | 182 | 294.8 |
| 15-Sep | 244 | 180 | 179 | AF | AF | AF | AF | 174 | 187 | 214 | 223 | 348 | 342 | 210 | 159 | 211 | 173 | 159 | 135 | 144 | 158 | 170 | 166 | 165 | 177.2 |
| 16-Sep | 156 | 152 | 160 | 147 | 152 | 156 | 163 | 173 | 176 | 172 | 184 | 175 | 197 | 194 | 185 | 197 | 192 | 172 | 161 | 163 | 170 | 138 | 149 | 173 | 172.6 |
| 17-Sep | 162 | 152 | 152 | 140 | 145 | 162 | 164 | 171 | 164 | 170 | 176 | 177 | 175 | 179 | 183 | 168 | 170 | 161 | 159 | 133 | 129 | 129 | 128 | 126 | 162.5 |
| 18-Sep | 127 | 127 | 119 | 116 | 111 | 113 | 123 | 124 | 139 | 145 | 145 | 149 | 136 | 137 | 129 | 129 | 115 | 112 | 105 | 107 | 84 | 81 | 94 | 99 | 126.2 |
| 19-Sep | 92 | 63 | 45 | 38 | 47 | 93 | 80 | 89 | 94 | 89 | 99 | 95 | 92 | 92 | 72 | 77 | 93 | 99 | 104 | 107 | 89 | 89 | 87 | 83 | 88.4 |
| 20-Sep | 82 | 47 | 41 | 44 | 42 | 35 | 28 | 30 | 24 | 22 | 20 | 21 | 18 | 16 | 23 | 34 | 26 | 26 | 29 | 24 | 19 | 15 | 16 | 15 | 27.1 |
| 21-Sep | 11 | 15 | 16 | 13 | 10 | 9 | 10 | 16 | 13 | 15 | 19 | 15 | 9 | 6 | 2 | 11 | 1 | 355 | 353 | 352 | 353 | 358 | 356 | 358 | 7.0 |
| 22-Sep | 3 | 353 | 353 | 358 | 351 | 359 | 2 | 348 | 358 | 7 | 352 | 14 | 56 | 111 | 112 | 229 | 336 | 59 | 97 | 113 | 123 | 153 | 131 | 139 | 22.5 |
| 23-Sep | 114 | 103 | 115 | 125 | 83 | 117 | 127 | 146 | 174 | 184 | 198 | 199 | 233 | 187 | 233 | 173 | 151 | 148 | 143 | 161 | 169 | 175 | 162 | 148 | 166.3 |
| 24-Sep | 134 | 154 | 168 | 169 | 169 | 167 | 166 | 169 | 171 | 185 | 189 | 200 | 192 | 196 | 200 | 195 | 189 | 180 | 167 | 158 | 165 | 173 | 174 | 179 | 178.8 |
| 25-Sep | 155 | 148 | 166 | 172 | 168 | 168 | 168 | 173 | 194 | 198 | 218 | 219 | 240 | 240 | 235 | 227 | 212 | 207 | 209 | 216 | 200 | 184 | 191 | 198 | 200.0 |
| 26-Sep | 195 | 201 | 224 | 241 | 253 | 263 | 279 | 278 | 285 | 296 | 287 | 297 | 303 | 292 | 303 | 317 | 317 | 328 | 308 | 259 | 241 | 257 | 233 | 204 | 280.8 |
| 27-Sep | 188 | 210 | 179 | 183 | 191 | 201 | 197 | 199 | 236 | 302 | 309 | 305 | 360 | 14 | 29 | 25 | 18 | 344 | 346 | 28 | 13 | 352 | 86 | 166 | 310.8 |
| 28-Sep | 201 | 147 | 150 | 108 | 132 | 130 | 121 | 144 | 173 | 180 | 179 | 180 | 189 | 193 | 186 | 180 | 192 | 177 | 155 | 153 | 161 | 166 | 169 | 176 | 173.6 |
| 29-Sep | 178 | 170 | 174 | 165 | 174 | 169 | 167 | 179 | 172 | 176 | 179 | 183 | 184 | 192 | 190 | 198 | 190 | 181 | 160 | 148 | 136 | 149 | 165 | 154 | 176.4 |
| 30-Sep | 157 | 166 | 181 | 168 | 176 | 171 | 170 | 174 | 194 | 233 | 239 | 241 | 229 | 274 | 276 | 289 | 299 | 297 | 296 | 293 | 295 | 292 | 299 | 309 | 259.0 |

227.6 246.2 246.0 238.8 240.9 250.1 242.7 232.5 241.4 241.9 232.9 250.8 259.7 260.8 268.8 279.1 275.0 274.5 275.2 229.3 221.2 239.6 220.0 215.9

Diurnal Average

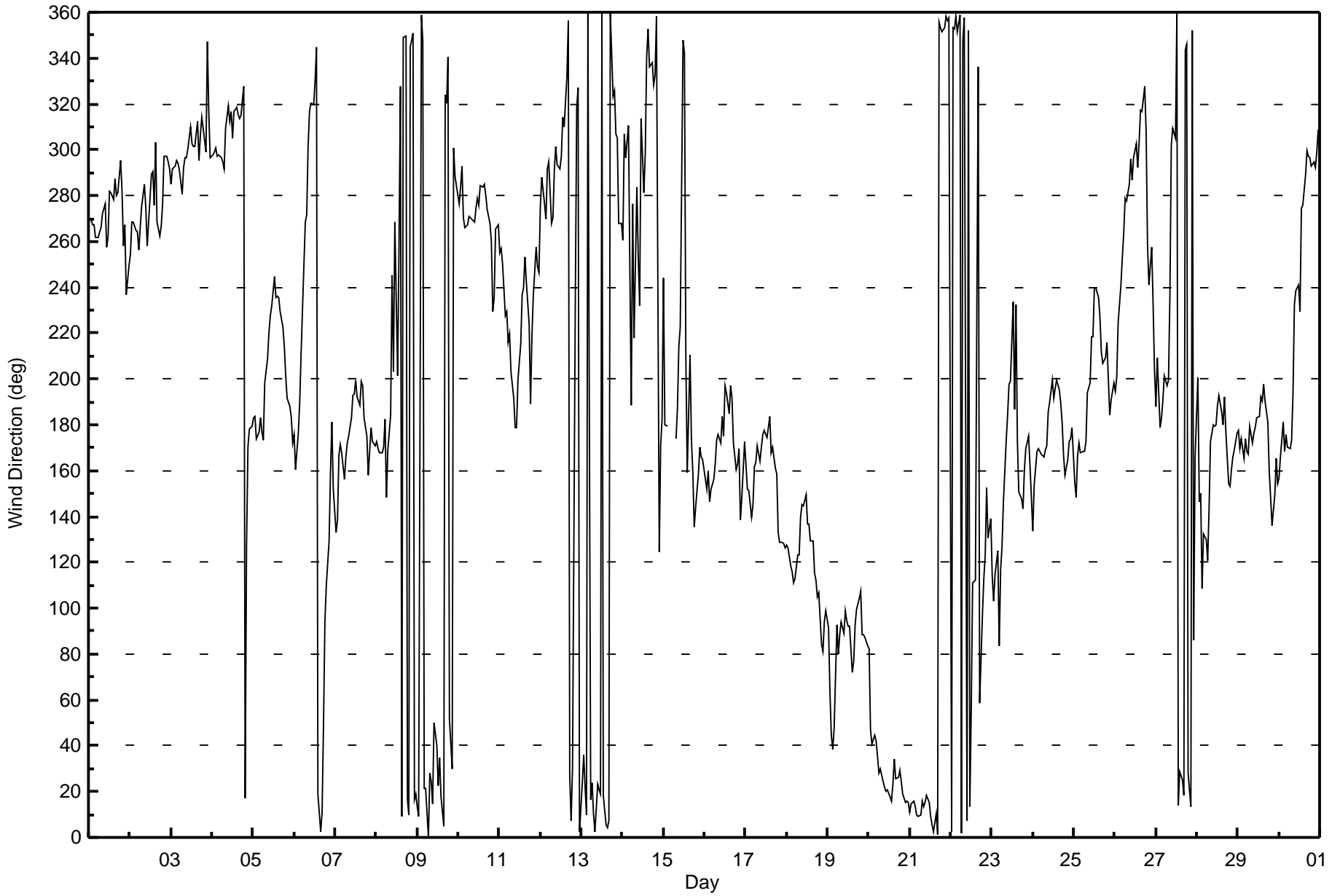
AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Sawbones Bay - September 2017





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Sawbones Bay - September 2017

| | |
|--|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 100 deg on Sep 8 13:00 | Hours of Data: 716 |
| Minimum Value: 5 deg on Sep 7 04:00 | Hours of Missing Data: 4 |
| Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 12 Median = 15 Q ₃ = 22 P ₉₀ = 35 P ₉₉ = 85 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.4 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 9 | 10 | 9 | 10 | 10 | 9 | 11 | 12 | 12 | 14 | 22 | 25 | 15 | 15 | 19 | 13 | 15 | 14 | 10 | 24 | 13 | 13 | 13 | 26 | 26 |
| 2-Sep | 16 | 9 | 10 | 11 | 11 | 15 | 12 | 13 | 15 | 19 | 22 | 21 | 19 | 20 | 16 | 12 | 37 | 14 | 11 | 14 | 10 | 11 | 10 | 10 | 37 |
| 3-Sep | 14 | 12 | 9 | 11 | 10 | 8 | 15 | 14 | 15 | 18 | 14 | 16 | 17 | 16 | 17 | 15 | 12 | 16 | 13 | 11 | 9 | 18 | 19 | 9 | 19 |
| 4-Sep | 8 | 10 | 7 | 9 | 9 | 9 | 9 | 8 | 18 | 20 | 21 | 26 | 20 | 25 | 20 | 23 | 19 | 19 | 10 | 82 | 49 | 18 | 20 | 22 | 82 |
| 5-Sep | 28 | 31 | 15 | 11 | 7 | 8 | 10 | 20 | 18 | 15 | 20 | 17 | 19 | 19 | 18 | 17 | 16 | 13 | 10 | 9 | 10 | 11 | 11 | 17 | 31 |
| 6-Sep | 22 | 20 | 15 | 14 | 31 | 28 | 24 | 28 | 18 | 78 | 71 | 49 | 70 | 46 | 49 | 45 | 66 | 34 | 24 | 24 | 11 | 40 | 63 | 12 | 78 |
| 7-Sep | 12 | 24 | 13 | 5 | 24 | 94 | 10 | 9 | 12 | 16 | 16 | 16 | 19 | 18 | 16 | 16 | 16 | 12 | 12 | 10 | 11 | 9 | 8 | 8 | 94 |
| 8-Sep | 8 | 8 | 9 | 7 | 11 | 57 | 63 | 13 | 35 | 41 | 22 | 55 | 100 | 93 | 23 | 17 | 18 | 15 | 29 | 18 | 20 | 17 | 15 | 13 | 100 |
| 9-Sep | 13 | 14 | 16 | 19 | 27 | 22 | 20 | 15 | 15 | 24 | 29 | 28 | 23 | 52 | 18 | 16 | 23 | 11 | 16 | 62 | 89 | 11 | 13 | 28 | 89 |
| 10-Sep | 15 | 16 | 17 | 14 | 11 | 12 | 11 | 10 | 11 | 13 | 14 | 13 | 14 | 13 | 13 | 12 | 14 | 13 | 12 | 16 | 11 | 12 | 12 | 11 | 17 |
| 11-Sep | 14 | 14 | 16 | 13 | 13 | 12 | 11 | 13 | 13 | 12 | 17 | 21 | 21 | 15 | 18 | 28 | 26 | 14 | 9 | 17 | 14 | 15 | 17 | 14 | 28 |
| 12-Sep | 16 | 13 | 14 | 11 | 11 | 10 | 12 | 12 | 15 | 13 | 13 | 14 | 15 | 20 | 18 | 20 | 21 | 13 | 15 | 51 | 73 | 17 | 18 | 10 | 73 |
| 13-Sep | 29 | 26 | 16 | 13 | 15 | 15 | 14 | 17 | 16 | 19 | 23 | 23 | 25 | 26 | 24 | 20 | 24 | 22 | 14 | 8 | 26 | 26 | 56 | 50 | 56 |
| 14-Sep | 40 | 63 | 12 | 15 | 68 | 85 | 45 | 31 | 41 | 36 | 26 | 47 | 31 | 34 | 38 | 38 | 30 | 23 | 15 | 17 | 32 | 34 | 15 | 14 | 85 |
| 15-Sep | 68 | 52 | 8 | AF | AF | AF | AF | 11 | 26 | 42 | 51 | 38 | 87 | 55 | 76 | 34 | 27 | 26 | 9 | 10 | 22 | 32 | 9 | 12 | 87 |
| 16-Sep | 11 | 10 | 9 | 11 | 9 | 7 | 6 | 12 | 12 | 16 | 17 | 22 | 24 | 23 | 23 | 19 | 18 | 14 | 11 | 10 | 8 | 13 | 14 | 7 | 24 |
| 17-Sep | 14 | 10 | 12 | 13 | 14 | 14 | 11 | 11 | 12 | 14 | 18 | 17 | 18 | 15 | 21 | 18 | 18 | 15 | 11 | 12 | 10 | 10 | 11 | 9 | 21 |
| 18-Sep | 9 | 10 | 8 | 11 | 15 | 17 | 10 | 11 | 17 | 18 | 19 | 20 | 20 | 19 | 22 | 19 | 16 | 16 | 22 | 23 | 36 | 50 | 38 | 27 | 50 |
| 19-Sep | 34 | 37 | 31 | 20 | 30 | 34 | 36 | 36 | 30 | 31 | 28 | 30 | 33 | 31 | 33 | 35 | 32 | 26 | 23 | 22 | 32 | 35 | 36 | 37 | 37 |
| 20-Sep | 38 | 23 | 18 | 20 | 19 | 15 | 13 | 12 | 14 | 16 | 15 | 15 | 15 | 16 | 15 | 16 | 16 | 14 | 15 | 15 | 14 | 14 | 15 | 15 | 38 |
| 21-Sep | 15 | 15 | 15 | 16 | 15 | 17 | 16 | 15 | 16 | 16 | 15 | 18 | 16 | 17 | 16 | 17 | 16 | 16 | 15 | 16 | 14 | 16 | 16 | 15 | 18 |
| 22-Sep | 13 | 14 | 14 | 14 | 16 | 19 | 33 | 19 | 16 | 19 | 25 | 32 | 32 | 24 | 20 | 70 | 20 | 33 | 34 | 17 | 16 | 16 | 11 | 13 | 70 |
| 23-Sep | 15 | 15 | 46 | 64 | 41 | 11 | 10 | 15 | 17 | 22 | 24 | 25 | 21 | 34 | 28 | 35 | 18 | 16 | 12 | 13 | 6 | 7 | 9 | 17 | 64 |
| 24-Sep | 9 | 14 | 8 | 8 | 9 | 12 | 13 | 12 | 12 | 18 | 18 | 19 | 19 | 24 | 17 | 18 | 13 | 12 | 15 | 10 | 9 | 9 | 11 | 14 | 24 |
| 25-Sep | 12 | 12 | 10 | 8 | 9 | 10 | 9 | 10 | 13 | 14 | 15 | 23 | 16 | 18 | 13 | 13 | 33 | 19 | 10 | 9 | 13 | 10 | 7 | 9 | 33 |
| 26-Sep | 12 | 11 | 19 | 12 | 14 | 13 | 14 | 13 | 15 | 10 | 18 | 16 | 14 | 18 | 23 | 15 | 15 | 12 | 10 | 32 | 39 | 40 | 42 | 18 | 42 |
| 27-Sep | 10 | 29 | 16 | 41 | 16 | 32 | 22 | 27 | 23 | 13 | 25 | 28 | 59 | 17 | 17 | 20 | 18 | 13 | 14 | 27 | 24 | 53 | 55 | 30 | 59 |
| 28-Sep | 83 | 42 | 38 | 63 | 15 | 15 | 17 | 26 | 10 | 14 | 14 | 19 | 19 | 18 | 15 | 14 | 15 | 15 | 11 | 12 | 11 | 10 | 10 | 10 | 83 |
| 29-Sep | 10 | 9 | 9 | 10 | 10 | 11 | 11 | 12 | 11 | 13 | 15 | 14 | 14 | 15 | 14 | 15 | 13 | 13 | 10 | 11 | 11 | 11 | 7 | 11 | 15 |
| 30-Sep | 9 | 8 | 92 | 7 | 10 | 37 | 9 | 9 | 30 | 13 | 15 | 28 | 19 | 22 | 16 | 15 | 9 | 9 | 9 | 9 | 9 | 8 | 11 | 11 | 92 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|--|
| 83 | 63 | 92 | 64 | 68 | 94 | 63 | 36 | 41 | 78 | 71 | 55 | 100 | 93 | 76 | 70 | 66 | 34 | 34 | 82 | 89 | 53 | 63 | 50 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association

SO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Sawbones Bay | Station number: | AMS 505 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 11, 2017 |
| Start time (MST): | 13:53 | End time (MST): | 17:45 |
| Reason: | Routine | | |

Calibration Standards

| | | | | |
|-----------------------|-------------------|-----|------------------|-------------------|
| Cal Gas Concentration | <u>49.6</u> | ppm | Cal Gas Exp Date | February 22, 2020 |
| Cal Gas Cylinder # | <u>EY0000793</u> | | | |
| Calibrator Make/Model | Teledyne API T700 | | Serial Number | 621 |
| ZAG Make/Model | Teledyne API 701 | | Serial Number | 4428 |

Analyzer Information

Analyzer make: Thermo 43i

Analyzer serial #: 710321323

| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
|----------------------|--------------|---------------|--------------|--------------|---------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -628 | -628 |
| Calculated slope | 0.998254 | 0.992849 | Lamp voltage | 787 | 783 |
| Calculated intercept | 0.715842 | 0.877953 | Pressure | 662.6 | 664.4 |
| Analyzer Background | 16.0 | 16.1 | Flow | 0.402 | 0.402 |
| Analyzer Coefficient | 1.020 | 1.015 | Intensity | 92 | 91 |

SO₂ Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 4930 | 78.8 | 780.3 | 785.2 | 0.994 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 4930 | 78.8 | 780.3 | 786.1 | 0.993 |
| second point | 4967 | 39.5 | 391.3 | 390.9 | 1.001 |
| third point | 4990 | 19.8 | 196.0 | 197.1 | 0.995 |
| as left zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as left span | 4930 | 78.8 | 780.3 | 780.3 | 1.000 |
| Average Correction Factor | | | | | 0.996 |
| Corrected As found | 785.30 | Previous response | 780.97 | *% change | -0.6% |

* = > +/-5% change initiates investigation

Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span.

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

SO₂ Calibration Summary

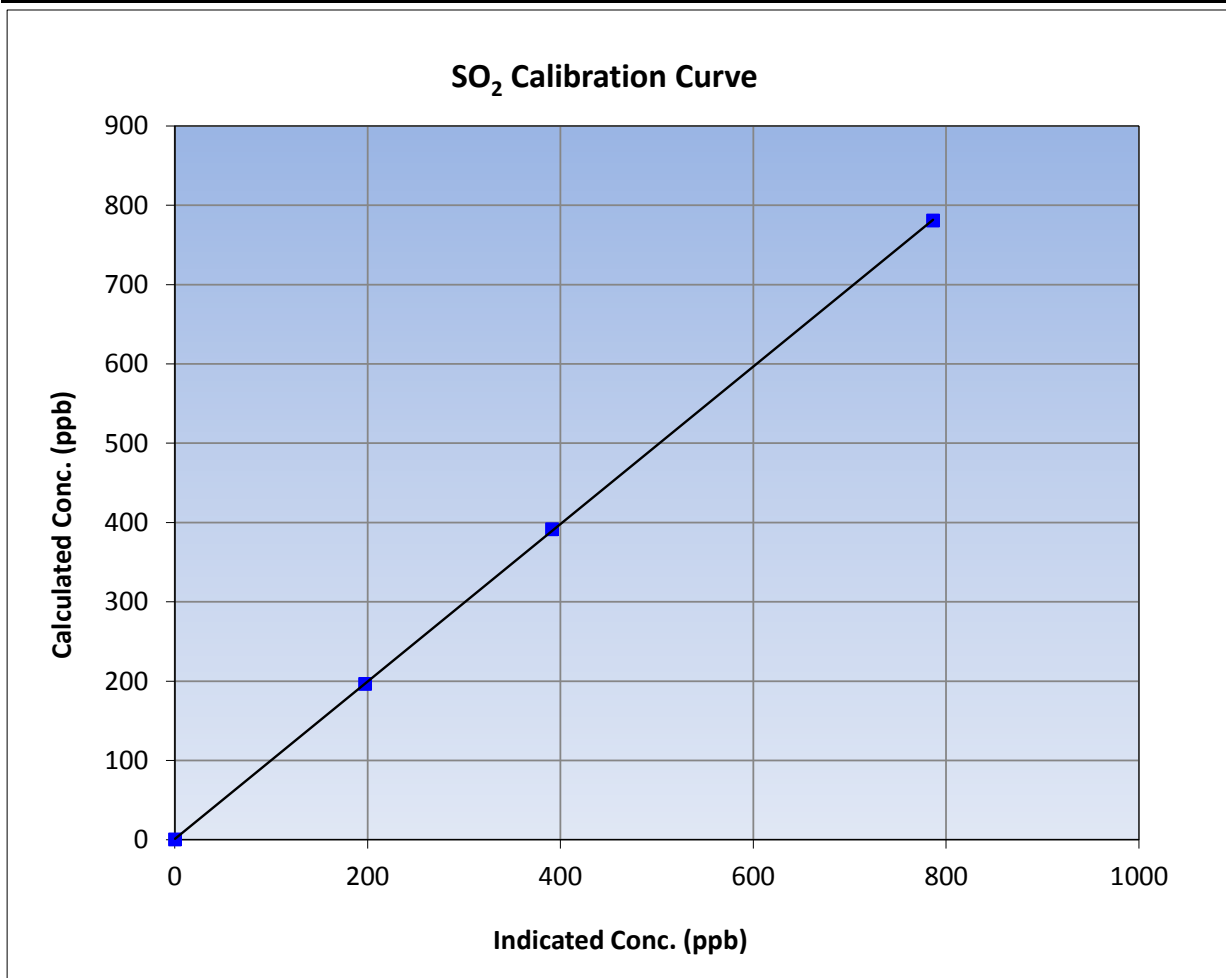
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 13:53 | End Time (MST) | 17:45 |
| Analyzer make | Thermo 43i | Analyzer serial # | 710321323 |

Calibration Data

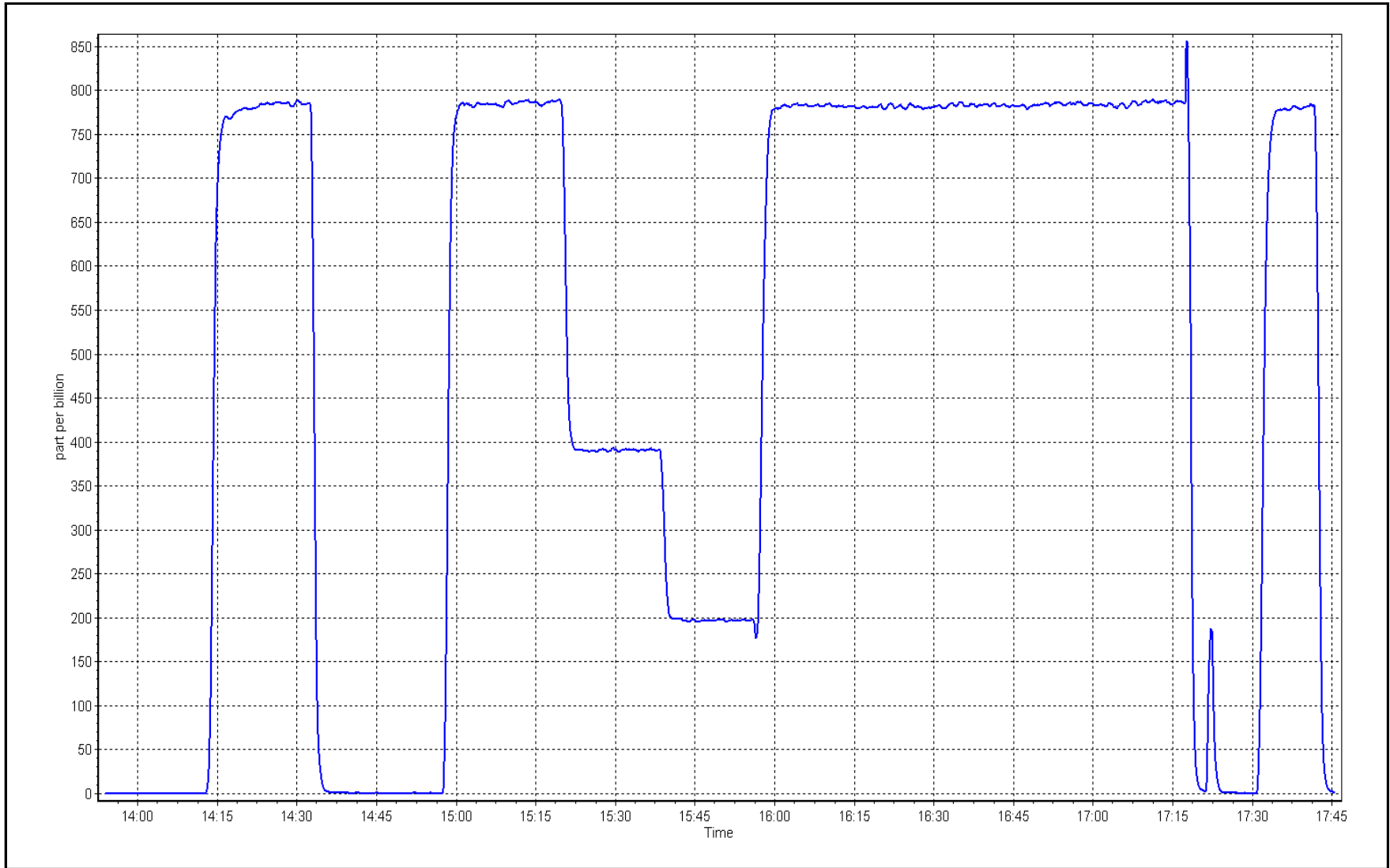
| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 |
| 780.3 | 786.1 | 0.9927 | | |
| 391.3 | 390.9 | 1.0011 | Slope | 0.90 - 1.10 |
| 196.0 | 197.1 | 0.9946 | | |
| | | | Intercept | +/-30 |



SO2 Calibration Plot

Date: September 19, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

THC Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Sawbones Bay | Station number: | AMS 505 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 11, 2017 |
| Start time (MST): | 13:53 | End time (MST): | 17:45 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-----------------------|-------------------|---------------------|-------------------|
| Gas Cert Reference | EY0000793 | Cal Gas Expiry Date | February 22, 2020 |
| CH4 Cal Gas Conc. | <u>504.0</u> ppm | CH4 Equiv Conc. | 1054.0 ppm |
| C3H8 Cal Gas Conc. | <u>200.0</u> ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 621 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 4428 |

Analyzer Information

| | | | |
|----------------------|--------------|---------------------|---------------|
| Analyzer make: | Thermo 51i | Analyzer serial #: | 1327059297 |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> |
| Analyzer Range | 0 - 25 ppm | Bias voltage supply | -288 |
| Calculated slope | 0.997756 | Sample pressure | 8.0 |
| Calculated intercept | 0.049061 | Fuel pressure | 23.3 |
| Analyzer Background | 2.990 | Air pressure | 34.5 |
| Analyzer Coefficient | 5.051 | Flame temperature | 152.2 |
| | | | <u>Finish</u> |
| | | | -288 |
| | | | 8.0 |
| | | | 23.3 |
| | | | 34.5 |
| | | | 154.0 |

THC Calibration Data

| Set Point | Dilution air flow rate (sccm) | Source gas flow rate (sccm) | Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (Ic) | Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|---------------------------|-------------------------------|-----------------------------|-------------------------------------|------------------------------------|---|
| as found zero | 5000 | 0.0 | 0.00 | -0.33 | ---- |
| as found span | 4930 | 78.8 | 16.58 | 16.30 | 1.017 |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.03 | ---- |
| high point | 4930 | 78.8 | 16.58 | 16.60 | 0.999 |
| second point | 4967 | 39.5 | 8.32 | 8.32 | 1.000 |
| third point | 4990 | 19.8 | 4.17 | 4.07 | 1.024 |
| as left zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| as left span | 4930 | 78.8 | 16.58 | 16.64 | 0.997 |
| Average Correction Factor | | | | | 1.008 |
| Corrected As found | 16.63 | Previous response | 16.57 | *% change | -0.3% |

* = > +/-5% change initiates investigation

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

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

THC Calibration Summary

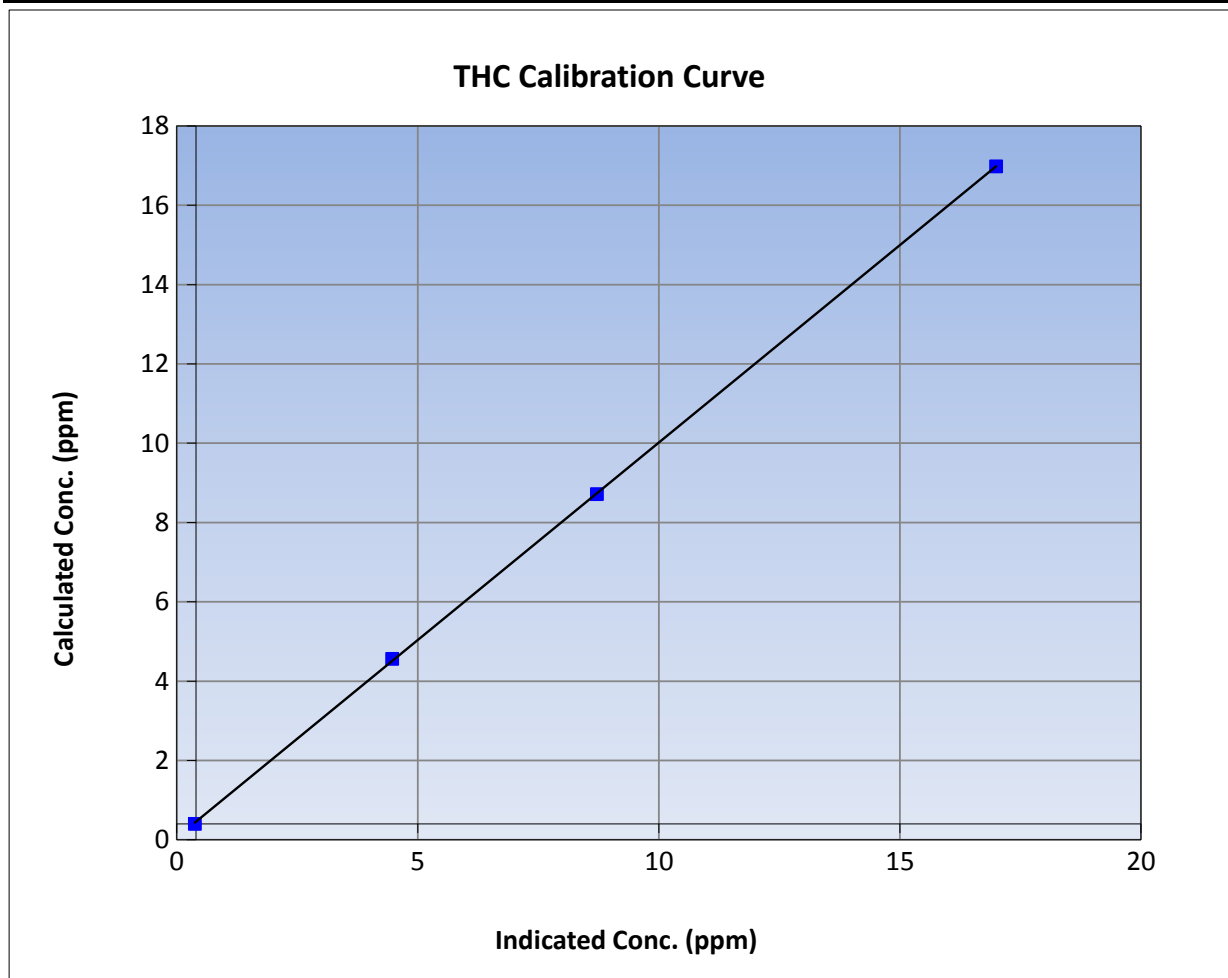
Version-03-2017

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 13:53 | End Time (MST) | 17:45 |
| Analyzer make | Thermo 51i | Analyzer serial # | 1327059297 |

Calibration Data

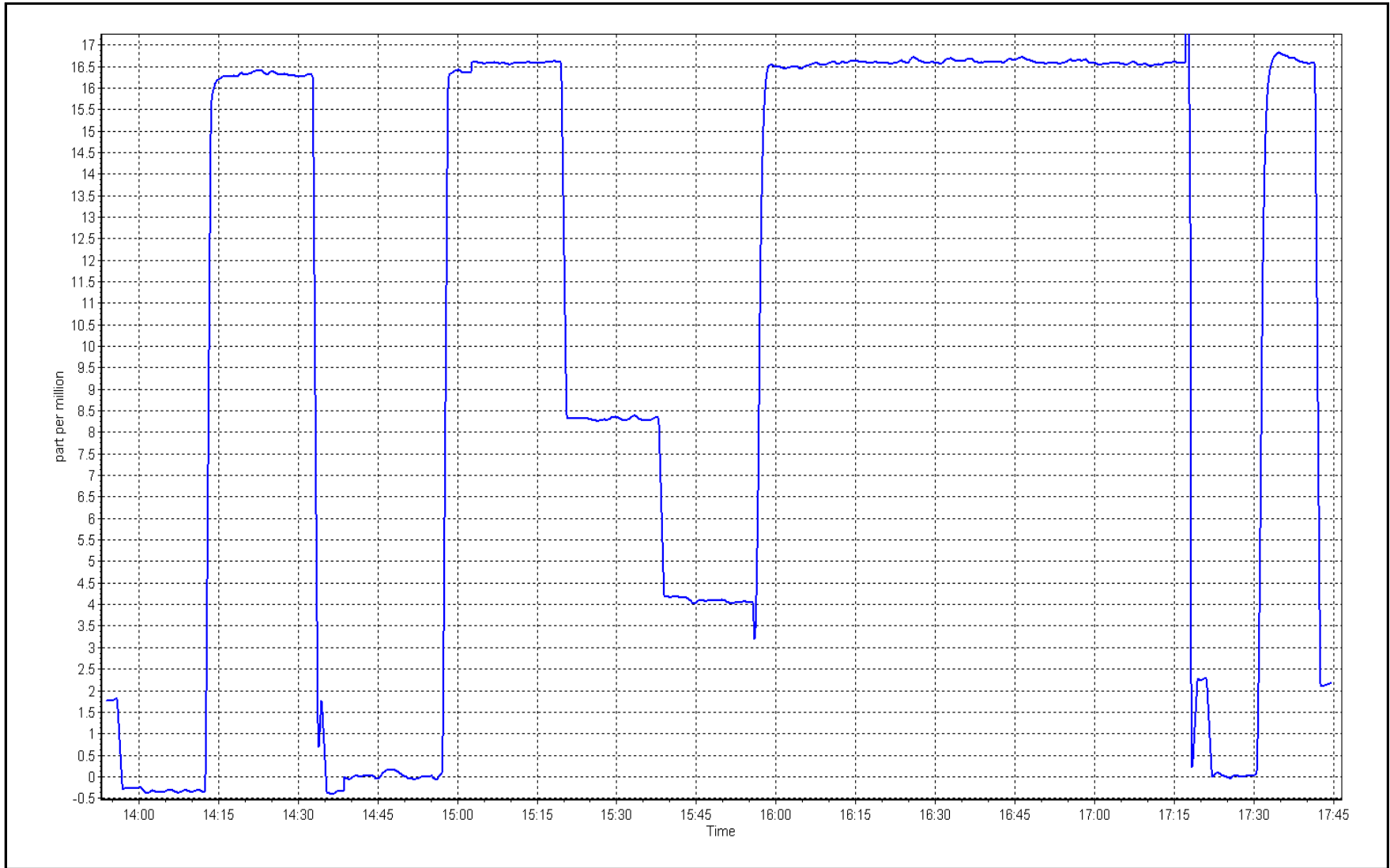
| Calculated Concentration (ppm) (Cc) | Indicated Concentration (ppm) (lc) | Correction factor (Cc/lc) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999966 | ≥0.995 |
| 16.6 | 16.6 | 0.9991 | | | |
| 8.3 | 8.3 | 0.9996 | Slope | 0.995840 | 0.90 - 1.10 |
| 4.2 | 4.1 | 1.0243 | | | |
| | | | Intercept | 0.056696 | +/-1.5 |



THC Calibration Plot

Date: September 19, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|-----------------|-----------------|
| Station Name: | Sawbones Bay | Station number: | AMS 505 |
| Calibration Date: | September 19, 2017 | Last Cal Date: | August 11, 2017 |
| Start time (MST): | 13:53 | End time (MST): | 17:45 |
| Reason: | Routine | | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-------------------|
| NO Gas Cylinder # | EY0000793 | Cal Gas Expiry Date | February 22, 2020 |
| NOX Cal Gas Conc. | <u>50.8</u> ppm | NO Cal Gas Conc. | <u>50.8</u> ppm |
| Calibrator Model | Teledyne API T700 | Serial Number | 621 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4428 |

Analyzer Information

| | | | | | |
|-----------------------------|--------------|--------------------|---------------------|---------------|--------|
| Analyzer make: | Thermo 42i | Analyzer serial #: | 1152430008 | | |
| | <u>Start</u> | <u>Finish</u> | <u>Start</u> | <u>Finish</u> | |
| NO coefficient | 0.897 | 0.919 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.998 | 0.998 | PMT Temperature | -3.1 | -2.9 |
| NO ₂ coefficient | 1.000 | 1.000 | Reaction cell Press | 148.2 | 147.9 |
| NO bkgrnd | 2.4 | 2.4 | Sample Flow | 0.639 | 0.644 |
| NOX bkgrnd | 2.6 | 2.7 | PMT Voltage | -760.7 | -760.7 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.997021 | 0.995072 |
| NO _x Cal Offset | 1.809685 | 2.167433 |
| NO Cal Slope | 0.995944 | 0.995012 |
| NO Cal Offset | 2.210884 | 2.088717 |
| NO ₂ Cal Slope | 0.996242 | 0.997073 |
| NO ₂ Cal Offset | 0.086653 | 0.205376 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.1 | -0.2 | ---- | ---- |
| as found span | 4930 | 78.8 | 799.2 | 799.2 | 0.0 | 780.8 | 780.8 | 0.0 | 1.0236 | 1.0236 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.1 | -0.2 | ---- | ---- |
| high point | 4930 | 78.8 | 799.2 | 799.2 | 0.0 | 802.0 | 802.2 | -0.1 | 0.9965 | 0.9963 |
| second point | 4967 | 39.5 | 400.8 | 400.8 | 0.0 | 399.4 | 399.4 | -0.1 | 1.0035 | 1.0035 |
| third point | 4990 | 19.8 | 200.8 | 200.8 | 0.0 | 197.9 | 197.9 | 0.1 | 1.0145 | 1.0145 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.1 | -0.2 | ---- | ---- |
| as left span | 4930 | 78.8 | 799.2 | 331.3 | 467.9 | 800.7 | 330.4 | 470.3 | 0.9981 | 1.0027 |
| Average Correction Factor | | | | | | | | | 1.0048 | 1.0048 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|------------------------|
| Corrected As found | NO _x = 781.1 ppb | NO = 780.9 ppb | | *Percent Change | NO _x = 2.4% |
| Previous Response | NO _x = 799.8 ppb | NO = 800.2 ppb | | *Percent Change | NO = 2.5% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|
| 1st NO ref point | | 0.0 | 800.8 | 799.6 | 1.1 | 0.9980 | 0.9995 | ---- | ---- |
| 1st NO2 (400 ppb O3) | 331.3 | 468.3 | 800.7 | 331.3 | 469.4 | 0.9981 | ---- | 0.9977 | 100.2% |
| 2nd NO2 (200 ppb O3) | 562.4 | 237.2 | 800.3 | 562.4 | 237.9 | 0.9986 | ---- | 0.9971 | 100.3% |
| 3rd NO2 (100 ppb O3) | 679.3 | 120.3 | 799.7 | 679.3 | 120.3 | 0.9994 | ---- | 1.0000 | 100.0% |
| 2nd NO ref point | ---- | 0.0 | 799.3 | 798.6 | 0.7 | 0.9999 | 1.0008 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9990 | 1.0001 | 0.9982 | 100.2% |

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

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

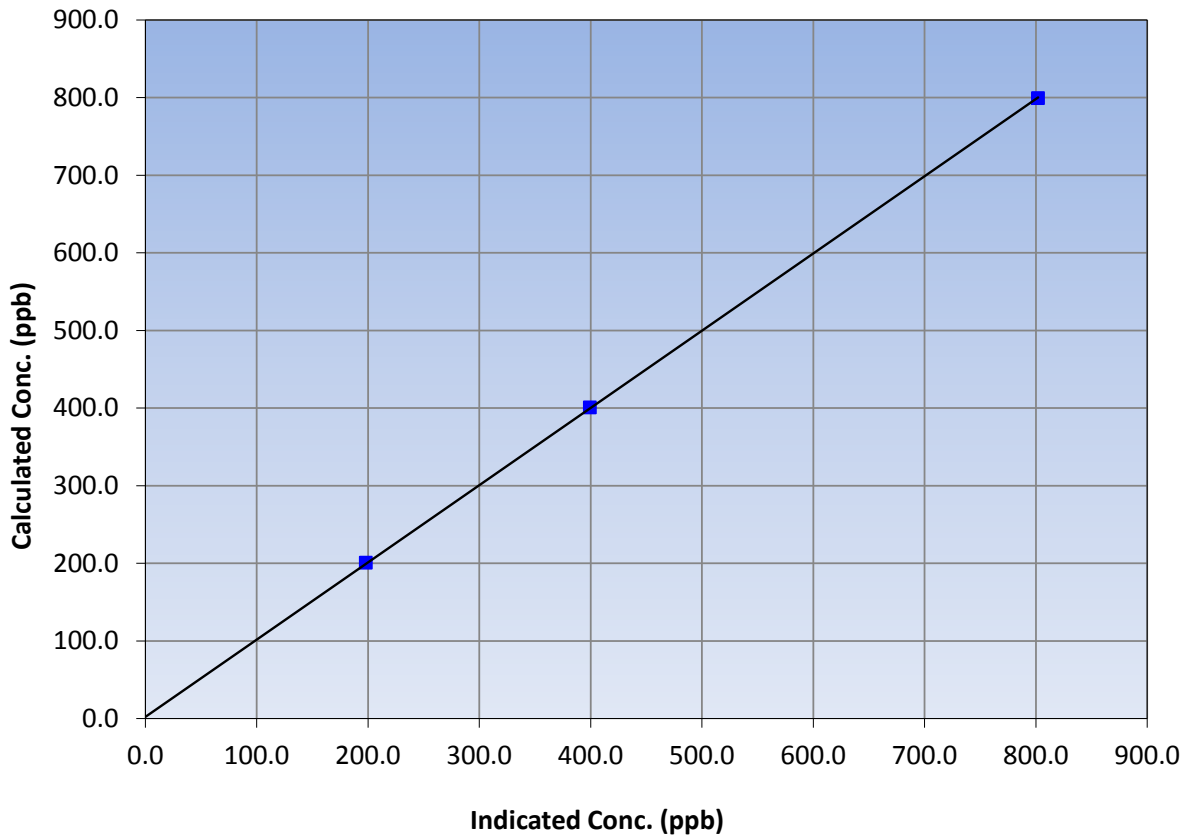
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 13:53 | End Time (MST) | 17:45 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1152430008 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | ≥0.995 |
| 799.2 | 802.0 | 0.9965 | | |
| 400.8 | 399.4 | 1.0035 | Slope | 0.90 - 1.10 |
| 200.8 | 197.9 | 1.0145 | | |
| | | | Intercept | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

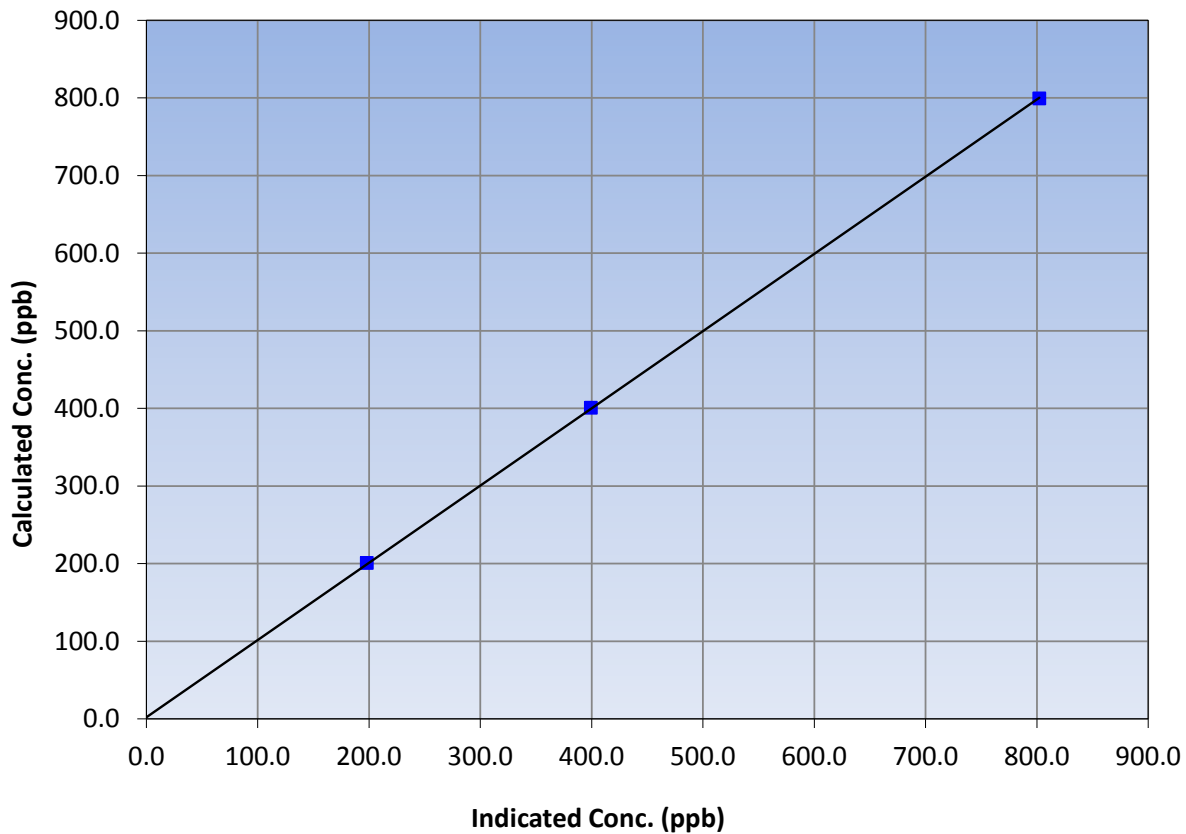
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 13:53 | End Time (MST) | 17:45 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1152430008 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.2 | 802.2 | 0.9963 | | | |
| 400.8 | 399.4 | 1.0035 | | | |
| 200.8 | 197.9 | 1.0145 | | | |
| | | | Slope | 0.995012 | 0.90 - 1.10 |
| | | | Intercept | 2.088717 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

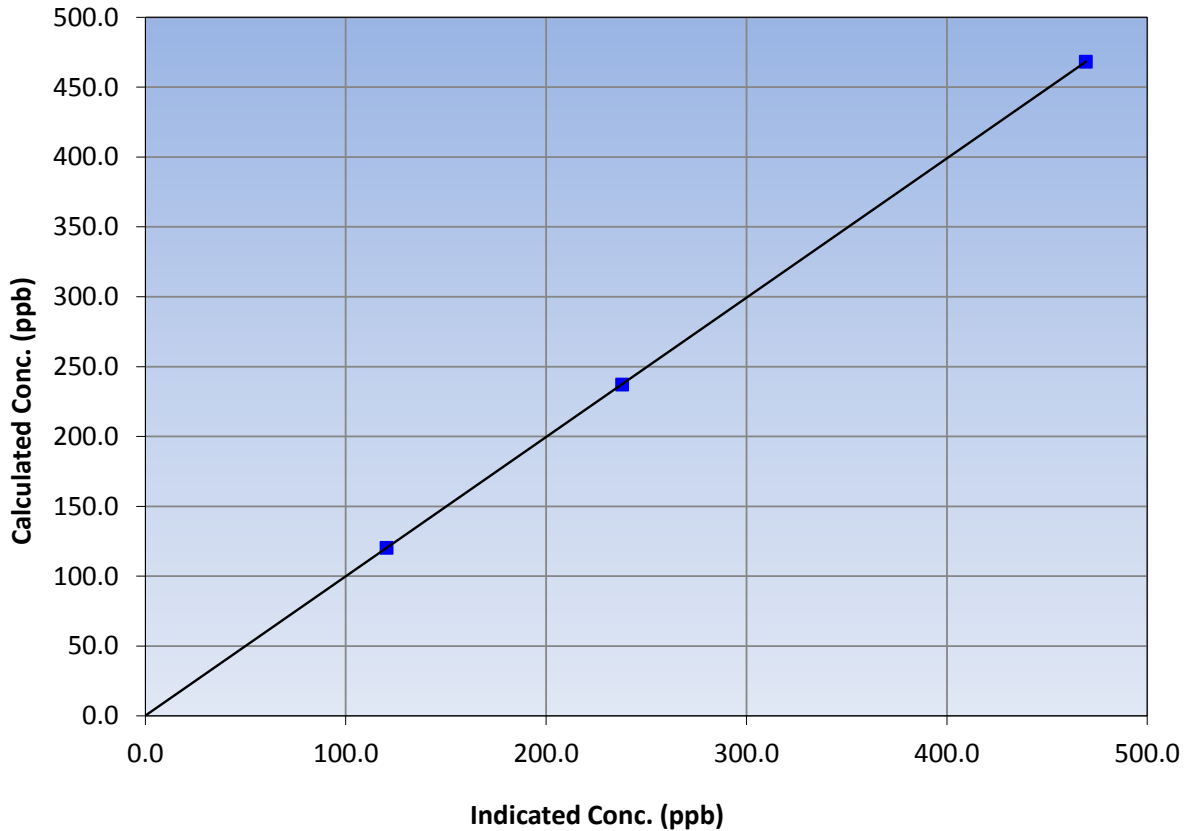
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2017 | Previous Calibration | August 11, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 13:53 | End Time (MST) | 17:45 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1152430008 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 | |
| 468.3 | 469.4 | 0.9977 | | | |
| 237.2 | 237.9 | 0.9971 | | | |
| 120.3 | 120.3 | 1.0000 | | | |
| | | | Slope | 0.997073 | 0.90 - 1.10 |
| | | | Intercept | 0.205376 | +/-20 |

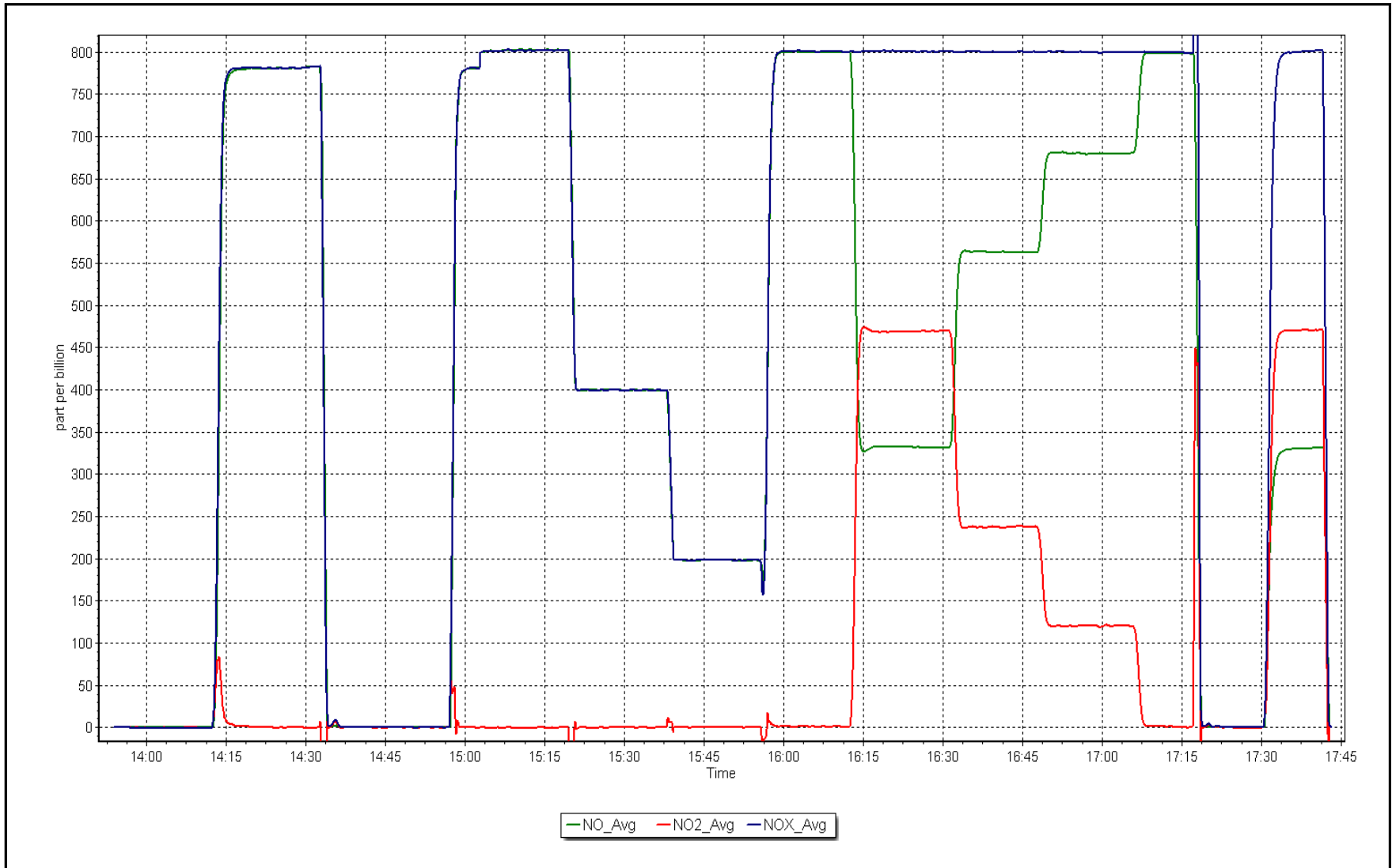
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 19, 2017

Location: Sawbones Bay





Wood Buffalo Environmental Association

NO_x - NO - NO₂ Calibration Report

Version-03-2017

Station Information

| | | | |
|-------------------|--------------------|--------------------|--------------------|
| Station Name: | Sawbones Bay | Station number: | AMS 505 |
| Calibration Date: | September 26, 2017 | Last Cal Date: | September 19, 2017 |
| Start time (MST): | 11:10 | End time (MST): | 15:13 |
| Reason: | Maintenance | Pump deteriorating | |

Calibration Standards

| | | | |
|-------------------|-------------------|---------------------|-------------------|
| NO Gas Cylinder # | EY0000793 | Cal Gas Expiry Date | February 22, 2020 |
| NOX Cal Gas Conc. | <u>50.8</u> ppm | NO Cal Gas Conc. | <u>50.8</u> ppm |
| Calibrator Model | Teledyne API T700 | Serial Number | 621 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4428 |

Analyzer Information

| | | | | | |
|---------------------------|--------------|---------------|-------------------------------|--------------|---------------|
| Analyzer make: Thermo 42i | | | Analyzer serial #: 1152430008 | | |
| | <u>Start</u> | <u>Finish</u> | | <u>Start</u> | <u>Finish</u> |
| NO coefficient | 0.919 | 1.148 | NOX Range (ppb) | 0 - 1000 ppb | |
| NOX coefficient | 0.998 | 0.998 | PMT Temperature | -3.1 | -2.9 |
| NO2 coefficient | 1.000 | 1.000 | Reaction cell Press | 166.9 | 179.0 |
| NO bkgrnd | 2.4 | 3.0 | Sample Flow | 0.551 | 0.510 |
| NOX bkgrnd | 2.7 | 3.3 | PMT Voltage | -760.7 | -760.4 |

Calibration Statistics

| | | |
|----------------------------|--------------|---------------|
| | <u>Start</u> | <u>Finish</u> |
| NO _x Cal Slope | 0.995072 | 1.001219 |
| NO _x Cal Offset | 2.167433 | 2.420201 |
| NO Cal Slope | 0.995012 | 1.000153 |
| NO Cal Offset | 2.088717 | 2.440480 |
| NO ₂ Cal Slope | 0.997073 | 0.997395 |
| NO ₂ Cal Offset | 0.205376 | 0.560845 |



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Version-03-2017

Dilution Calibration Data

| Set Point | Dilution flow rate (sccm) | Source gas flow rate (sccm) | Calculated NOx concentration (ppb) (Cc) | Calculated NO concentration (ppb) (Cc) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> |
|----------------------------------|---------------------------|-----------------------------|---|--|---|--|---------------------------------------|--|---|--|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.1 | -0.2 | ---- | ---- |
| as found span | 4930 | 78.8 | 799.2 | 799.2 | 0.0 | 701.3 | 701.3 | 0.0 | 1.1396 | 1.1396 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 0.0 | -0.2 | ---- | ---- |
| high point | 4930 | 78.8 | 799.2 | 799.2 | 0.0 | 797.0 | 797.9 | -0.9 | 1.0028 | 1.0016 |
| second point | 4967 | 39.5 | 400.8 | 400.8 | 0.0 | 396.5 | 396.9 | -0.4 | 1.0108 | 1.0098 |
| third point | 4990 | 19.8 | 200.8 | 200.8 | 0.0 | 196.1 | 196.0 | 0.0 | 1.0238 | 1.0244 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | 0.0 | -0.2 | ---- | ---- |
| as left span | 4930 | 78.8 | 799.2 | 324.4 | 474.8 | 795.4 | 324.1 | 471.3 | 1.0048 | 1.0009 |
| Average Correction Factor | | | | | | | | | 1.0125 | 1.0119 |

| | | | | | |
|--|-----------------------------|----------------|--|-----------------|-------------------------|
| Corrected As found | NO _x = 701.6 ppb | NO = 701.4 ppb | | *Percent Change | NO _x = 14.2% |
| Previous Response | NO _x = 801.0 ppb | NO = 801.1 ppb | | *Percent Change | NO = 14.2% |
| <i>* = > +/-5% change initiates investigation</i> | | | | | |

GPT Calibration Data

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 concentration (ppb) (Cc) | Indicated NOx concentration (ppb) (Ic) | Indicated NO concentration (ppb) (Ic) | Indicated NO2 concentration (ppb) (Ic) | NOx Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | NO2 Correction factor (Cc/Ic) <i>Limit = 0.95-1.05</i> | Converter Efficiency <i>Limit = 96-104%</i> | |
|----------------------------------|------------------------------|---|--|---------------------------------------|--|---|--|---|--|--------------|
| 1st NO ref point | | 0.0 | 792.1 | 790.8 | 1.3 | 1.0090 | 1.0106 | ---- | ---- | |
| 1st NO2 (400 ppb O3) | 324.4 | 466.4 | 791.7 | 324.4 | 467.3 | 1.0095 | ---- | 0.9981 | 100.2% | |
| 2nd NO2 (200 ppb O3) | 554.1 | 236.7 | 790.5 | 554.1 | 236.4 | 1.0110 | ---- | 1.0013 | 99.9% | |
| 3rd NO2 (100 ppb O3) | 671.0 | 119.8 | 790.3 | 671.0 | 119.3 | 1.0113 | ---- | 1.0042 | 99.6% | |
| 2nd NO ref point | ---- | 0.0 | 790.4 | 788.8 | 1.6 | 1.0111 | 1.0132 | ---- | ---- | |
| Average Correction Factor | | | | | | | 1.0107 | 1.0119 | 1.0012 | 99.9% |

Notes: Daily span last night was more than 10% low. Suspected bad pump. Sample pump replaced after as founds. Adjusted span.

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

Version-03-2017

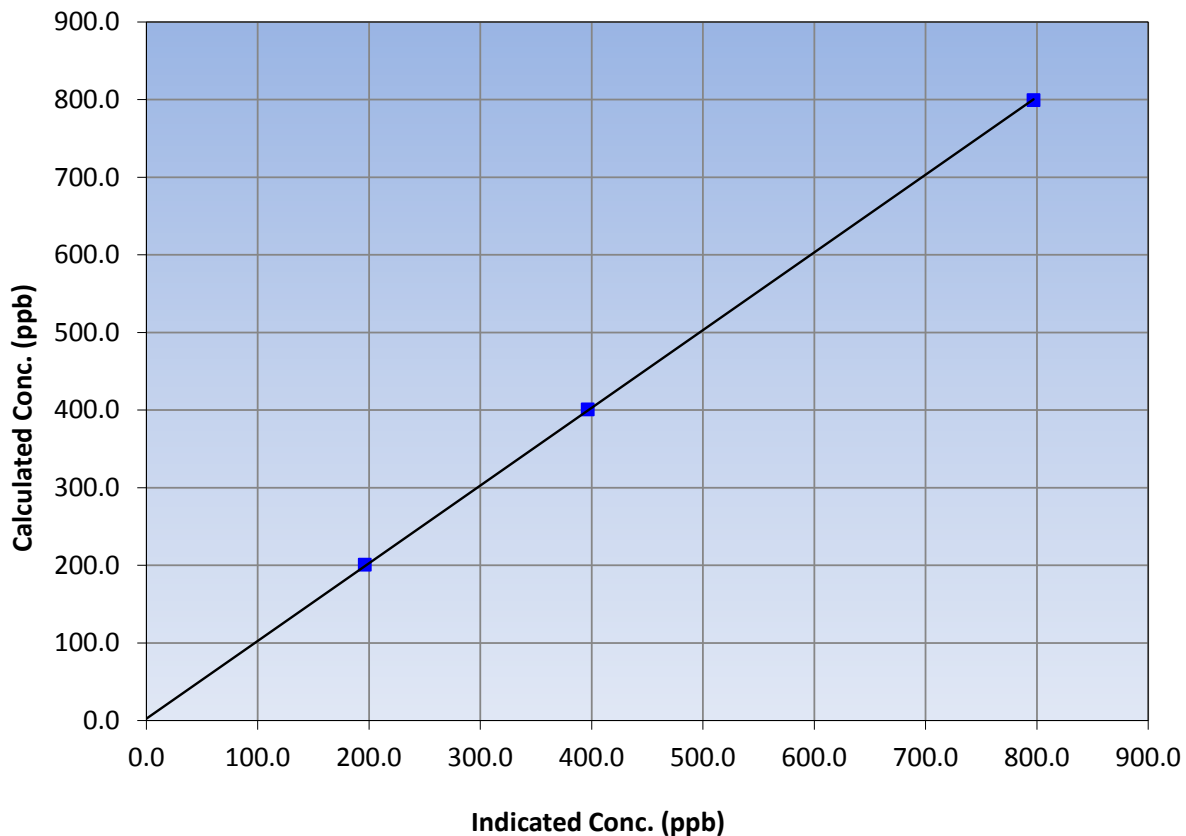
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2017 | Previous Calibration | September 19, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 11:10 | End Time (MST) | 15:13 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1152430008 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | ≥0.995 |
| 799.2 | 797.0 | 1.0028 | | |
| 400.8 | 396.5 | 1.0108 | Slope | 0.90 - 1.10 |
| 200.8 | 196.1 | 1.0238 | | |
| | | | Intercept | +/-20 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

Version-03-2017

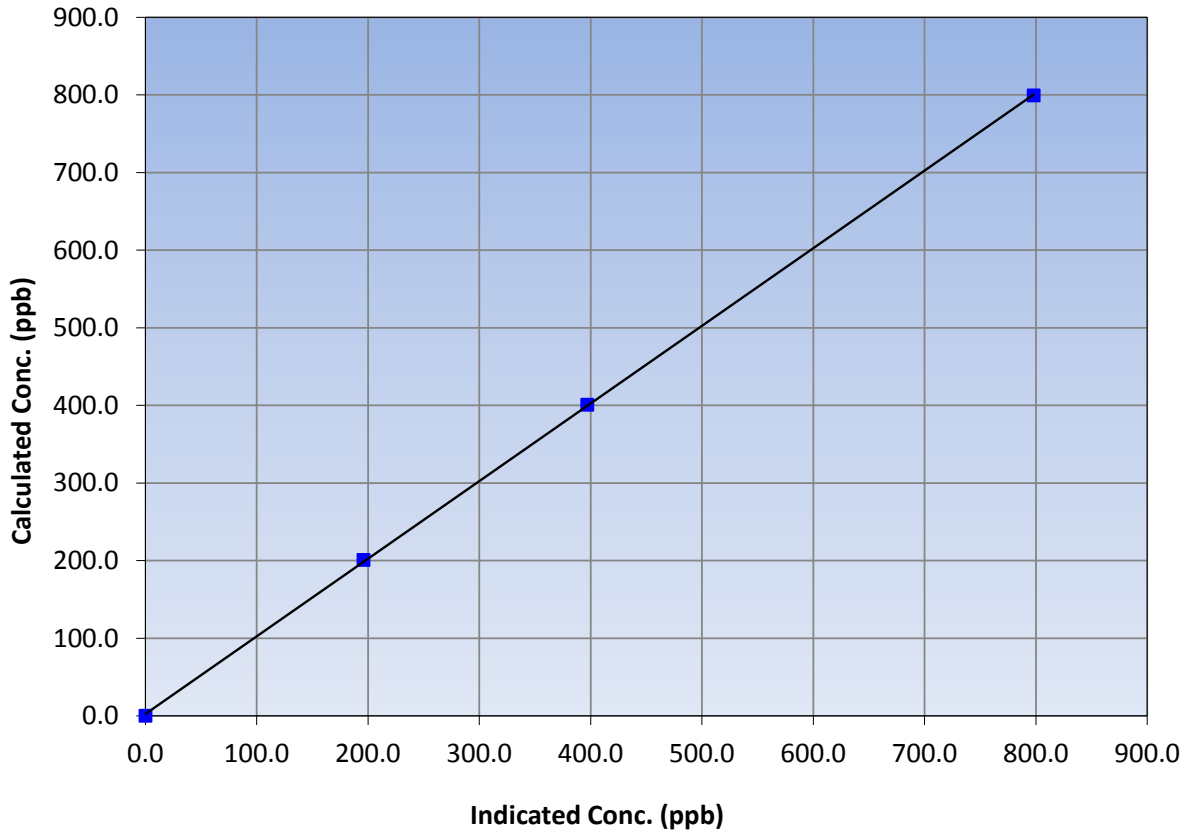
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2017 | Previous Calibration | September 19, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 11:10 | End Time (MST) | 15:13 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1152430008 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | Limits | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|-------------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | ≥0.995 | |
| 799.2 | 797.9 | 1.0016 | | | |
| 400.8 | 396.9 | 1.0098 | | | |
| 200.8 | 196.0 | 1.0244 | | | |
| | | | Slope | 1.000153 | 0.90 - 1.10 |
| | | | Intercept | 2.440480 | +/-20 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

Version-03-2017

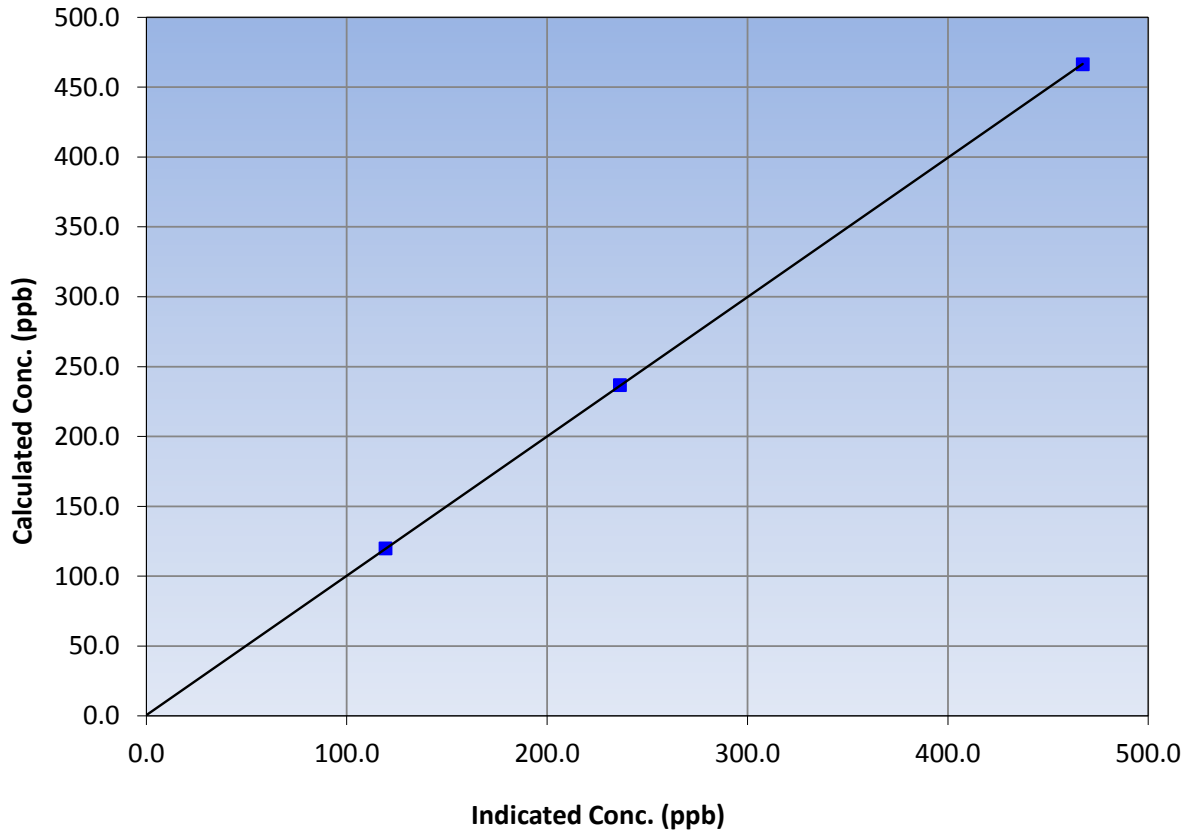
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2017 | Previous Calibration | September 19, 2017 |
| Station Name | Sawbones Bay | Station Number | AMS 505 |
| Start Time (MST) | 11:10 | End Time (MST) | 15:13 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1152430008 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | <i>Limits</i> | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|---------------|-------------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999997 | ≥0.995 |
| 466.4 | 467.3 | 0.9981 | | | |
| 236.7 | 236.4 | 1.0013 | Slope | 0.997395 | 0.90 - 1.10 |
| 119.8 | 119.3 | 1.0042 | | | |
| | | | Intercept | 0.560845 | +/-20 |

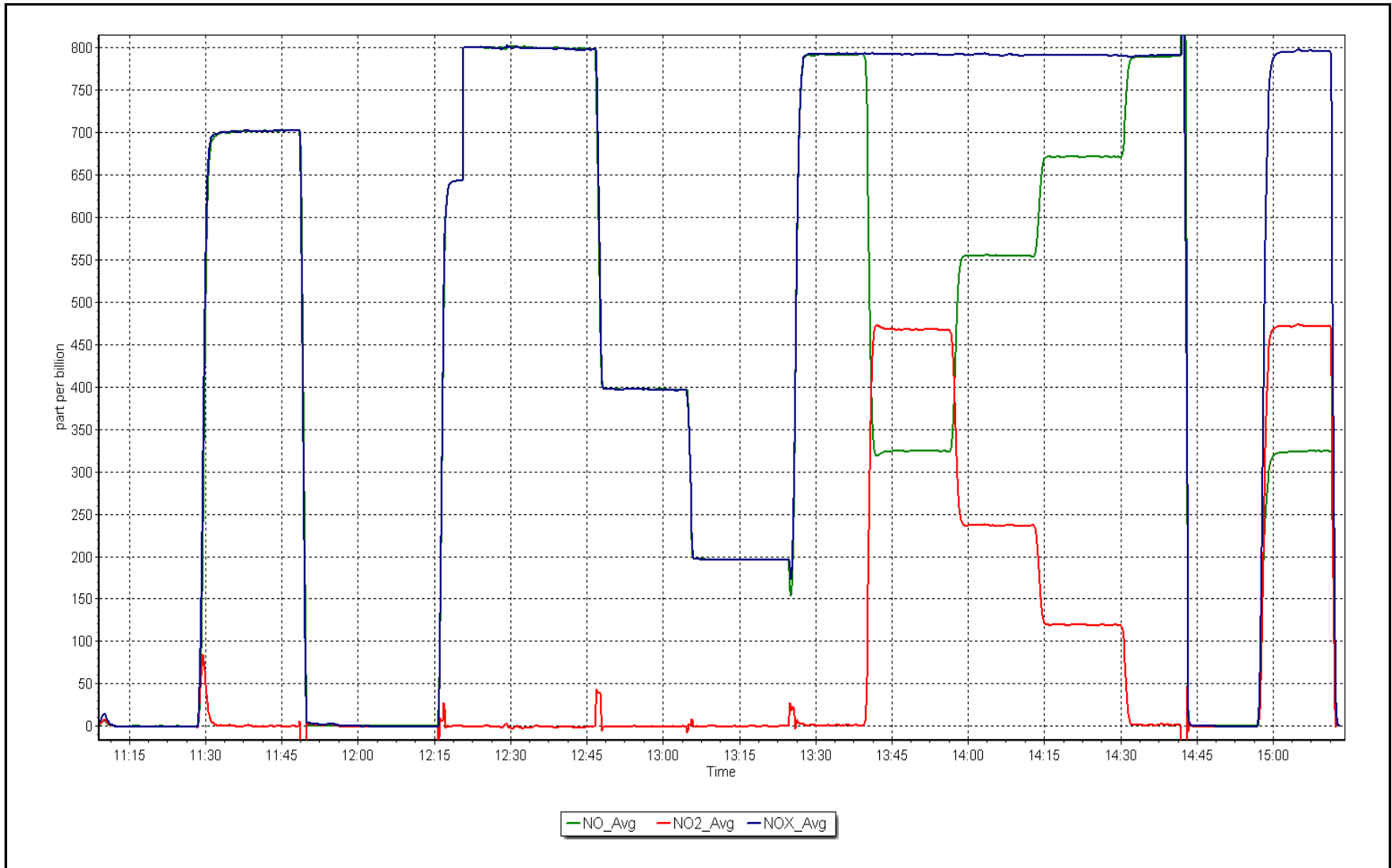
NO₂ Calibration Curve



NO_x Calibration Plot

Date: September 26, 2017

Location: Sawbones Bay





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

DATA SUMMARY AUGUST 2017

Prepared October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

VOCs: InnoTech Alberta, Inc.
Vegreville, Alberta

Particulate Matter: Atmospheric Research & Analysis, Inc.
Morrisville, NC

PAHs: Airzone One Ltd
Mississauga, Ontario

Precipitation: InnoTech Alberta, Inc.
Vegreville, Alberta



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

VOLATILE ORGANIC COMPOUNDS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

VOCs: InnoTech Alberta, Inc.
Vegreville, Alberta



| | |
|---------------------------|--|
| FILE CONTENTS DESCRIPTION | VOC - Speciated Volatile Organic Compounds |
|---------------------------|--|

| | |
|---|---|
| SAMPLING INTERVAL | 24 hour |
| SAMPLING FREQUENCY OF DATA | Once every 6 days |
| EXPLANATION OF ZERO VALUES | Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation |
| UNITS | ppbv (parts per billion volume) |
| OBSERVATION TYPE | Gas |
| FIELD SAMPLING OR MEASUREMENT PRINCIPLE | Evacuated canister |
| ANALYTICAL METHODS | GC/MS - Gas chromatography/mass spectrometer |
| ANALYTICAL LABORATORY | InnoTech Alberta Inc |
| USER NOTE 1 | Data are not blank corrected |
| SAMPLING INSTRUMENT TYPE | Tisch TE123 |
| FLOW RATE | 10.0 cc/min (cubic centimeters per minute) |

| | |
|------------|---|
| FLAGS USED | |
| V0 | Valid value |
| V1 | Valid value but comprised wholly or partially of below detection limit data |
| V4 | Valid value despite failing to meet some QC or statistical criteria |
| V5 | Valid value but qualified because of possible contamination |
| V6 | Valid value but qualified due to non-standard sampling conditions |
| M1 | Missing value because no value is available |
| M2 | Missing value because invalidated by Data Originator |



| Station Name Station # Sample Date | Bertha Ganter - | | | Patricia McInnes | |
|--|-----------------|----------------|------|------------------|------|
| | Fort McKay | | | AMS 6 | |
| | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0.03 | V0 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0.14 | V0 | 0.09 | V0 |
| 1-Pentene | 0.01 | 0.03 | V0 | 0.02 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0.14 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.05 | V0 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0.07 | V0 | 0.04 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.17 | V0 | 0.01 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.09 | V0 | 0.06 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.09 | V0 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.16 | V0 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0.07 | V0 | 0.04 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 16 | V0 | 26 | V0 |
| Acetone | 0.4 | 4.9 | V0 | 6.6 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.08 | V0 | 0.08 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0.1 | V0 | 0 | V1 |
| Cyclopentane | 0.01 | 0.02 | V0 | 0.01 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 7.1 | V0 | 10.1 | V0 |
| Ethylbenzene | 0.01 | 0.04 | V0 | 0.05 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.94 | V0 | 1.34 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.46 | V0 | 0.6 | V0 |
| Isoprene | 0.01 | 0.95 | V0 | 0.33 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.1 | V0 | 0.07 | V0 |
| Methanol | 3 | 23 | V0 | 27 | V0 |
| Methylcyclohexane | 0.01 | 0.18 | V0 | 0.01 | V0 |
| Methylcyclopentane | 0.02 | 0.13 | V0 | 0.04 | V0 |
| Methylethylketone | 0.3 | 0.5 | V0 | 0.7 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.51 | V0 | 0.71 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.34 | V0 | 0.07 | V0 |
| n-Hexane | 0.01 | 0.2 | V0 | 0.08 | V0 |
| n-Nonane | 0.01 | 0.06 | V0 | 0 | V1 |
| n-Octane | 0.02 | 0.26 | V0 | 0.02 | V0 |
| n-Pentane | 0.1 | 0.2 | V0 | 0.3 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.04 | V0 | 0.02 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.2 | V0 | 0.32 | V0 |
| trans-2-Butene | 0.01 | 0.01 | V0 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Athabasca Valley AMS 7 05-Aug | | | Anzac AMS 14 05-Aug | |
|--|-------------------------------------|----------------|------|---------------------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0.05 | V0 | 0.09 | V0 |
| 1-Pentene | 0.01 | 0.02 | V0 | 0.01 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0.03 | V0 | 0.79 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.01 | V0 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0.02 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0.03 | V0 | 0.08 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | V0 | 0.02 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 | 0.02 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.06 | V0 | 0.05 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0.04 | V0 | 0.04 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 12 | V0 | 10 | V0 |
| Acetone | 0.4 | 4.6 | V0 | 4.8 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.07 | V0 | 0.07 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0 | V1 |
| Cyclopentane | 0.01 | 0.01 | V0 | 0.02 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 6.5 | V0 | 6.8 | V0 |
| Ethylbenzene | 0.01 | 0.03 | V0 | 0.02 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.72 | V0 | 0.62 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.47 | V0 | 0.44 | V0 |
| Isoprene | 0.01 | 0.23 | V0 | 0.38 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.05 | V0 | 0 | V1 |
| Methanol | 3 | 16 | V0 | 24 | V0 |
| Methylcyclohexane | 0.01 | 0 | V1 | 0.01 | V0 |
| Methylcyclopentane | 0.02 | 0.03 | V0 | 0.03 | V0 |
| Methylethylketone | 0.3 | 0.5 | V0 | 0.5 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.56 | V0 | 0.47 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.05 | V0 | 0.12 | V0 |
| n-Hexane | 0.01 | 0.07 | V0 | 0.08 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 | 0.02 | V0 |
| n-Pentane | 0.1 | 0.2 | V0 | 0.4 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.02 | V0 | 0 | V1 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.12 | V0 | 0.35 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0.02 | V0 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Barge Landing AMS 9 05-Aug | Fort McKay South AMS 13 05-Aug | | | |
|--|----------------------------------|--------------------------------------|------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0.04 | V0 | 0.03 | V0 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0.11 | V0 | 0.13 | V0 |
| 1-Pentene | 0.01 | 0.02 | V0 | 0.03 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0.09 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.05 | V0 | 0.05 | V0 |
| 2,3,4-Trimethylpentane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0.11 | V0 | 0.12 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0.07 | V0 | 0.08 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.19 | V0 | 0.24 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.12 | V0 | 0.09 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.08 | V0 | 0.11 | V0 |
| 3-Methylhexane | 0.02 | 0.16 | V0 | 0.17 | V0 |
| 3-Methylpentane | 0.01 | 0.09 | V0 | 0.09 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 17 | V0 | 13 | V0 |
| Acetone | 0.4 | 4.5 | V0 | 5.1 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0.4 | V0 |
| Benzene | 0.01 | 0.08 | V0 | 0.07 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0.1 | V0 | 0.11 | V0 |
| Cyclopentane | 0.01 | 0.03 | V0 | 0.02 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 5 | V0 | 10.5 | V0 |
| Ethylbenzene | 0.01 | 0.05 | V0 | 0.09 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 8.17 | V4 | 0.78 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.42 | V0 | 0.44 | V0 |
| Isoprene | 0.01 | 1.17 | V0 | 1.18 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.1 | V0 | 0.13 | V0 |
| Methanol | 3 | 18 | V0 | 18 | V0 |
| Methylcyclohexane | 0.01 | 0.2 | V0 | 0.21 | V0 |
| Methylcyclopentane | 0.02 | 0.13 | V0 | 0.14 | V0 |
| Methylethylketone | 0.3 | 0.4 | V0 | 0.6 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.43 | V0 | 0.37 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.37 | V0 | 0.41 | V0 |
| n-Hexane | 0.01 | 0.22 | V0 | 0.21 | V0 |
| n-Nonane | 0.01 | 0.06 | V0 | 0.08 | V0 |
| n-Octane | 0.02 | 0.28 | V0 | 0.35 | V0 |
| n-Pentane | 0.1 | 0.2 | V0 | 0.2 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.04 | V0 | 0.05 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.22 | V0 | 0.45 | V0 |
| trans-2-Butene | 0.01 | 0.01 | V0 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Horizon AMS 15 05-Aug | | |
|--|-----------------------------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 |
| 1-Butene | 0.02 | 0.08 | V0 |
| 1-Pentene | 0.01 | 0.02 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0.12 | V0 |
| 2,3,4-Trimethylpentane | 0.01 | 0.03 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0.28 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0.1 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.03 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.08 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.06 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.03 | V0 |
| 3-Methylhexane | 0.02 | 0.09 | V0 |
| 3-Methylpentane | 0.01 | 0.35 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 |
| Acetaldehyde | 3 | 12 | V0 |
| Acetone | 0.4 | 5.4 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 |
| Benzene | 0.01 | 0.05 | V0 |
| beta-Pinene | 0.3 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 |
| Cyclohexane | 0.02 | 0.43 | V0 |
| Cyclopentane | 0.01 | 0.09 | V0 |
| Cyclopentene | 0.3 | 0 | V1 |
| Ethanol | 0.3 | 4.4 | V0 |
| Ethylbenzene | 0.01 | 0.02 | V0 |
| Formaldehyde | 3 | 0 | V1 |
| Isobutane | 0.02 | 2.41 | V0 |
| Isobutylene | 0.3 | 0 | V1 |
| Isopentane | 0.03 | 2.33 | V0 |
| Isoprene | 0.01 | 1.04 | V0 |
| Isopropylalcohol | 0.4 | 0.9 | V0 |
| Isopropylbenzene | 0.01 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.03 | V0 |
| Methanol | 3 | 18 | V0 |
| Methylcyclohexane | 0.01 | 0.17 | V0 |
| Methylcyclopentane | 0.02 | 0.28 | V0 |
| Methylethylketone | 0.3 | 0.4 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 |
| n-Butane | 0.03 | 0.47 | V0 |
| n-Decane | 0.06 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 |
| n-Heptane | 0.01 | 0.16 | V0 |
| n-Hexane | 0.01 | 0.09 | V0 |
| n-Nonane | 0.01 | 0.03 | V0 |
| n-Octane | 0.02 | 0.11 | V0 |
| n-Pentane | 0.1 | 0.2 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 |
| o-Xylene | 0.01 | 0.02 | V0 |
| Styrene | 0.04 | 0 | V1 |
| Toluene | 0.01 | 0.17 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 |



| Station Name Station # Sample Date | Bertha Ganter - | | | Patricia McInnes | |
|--|-----------------|----------------|------|------------------|------|
| | Fort McKay | | | AMS 6 | |
| | AMS 1 | | | AMS 6 | |
| | 11-Aug | | | 11-Aug | |
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0.06 | V0 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0.03 | V0 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0.19 | V0 |
| 1-Pentene | 0.01 | 0 | V1 | 0.01 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0.21 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.04 | V0 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | V0 | 0.01 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0.09 | V0 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0.08 | V0 | 0.03 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | V0 | 0.01 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.21 | V0 | 0.01 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0.06 | V0 |
| 2-Methylpentane | 0.01 | 0.12 | V0 | 0.05 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.07 | V0 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.13 | V0 | 0.06 | V0 |
| 3-Methylpentane | 0.01 | 0.07 | V0 | 0.03 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 16 | V0 | 4 | V0 |
| Acetone | 0.4 | 5.3 | V0 | 3.9 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.09 | V0 | 0.06 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0.07 | V0 | 0 | V1 |
| Cyclopentane | 0.01 | 0.01 | V0 | 0.01 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 4.9 | V0 | 2 | V0 |
| Ethylbenzene | 0.01 | 0.07 | V0 | 0.03 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.68 | V0 | 0.43 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.39 | V0 | 0.33 | V0 |
| Isoprene | 0.01 | 1.58 | V0 | 1.14 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.16 | V0 | 0.06 | V0 |
| Methanol | 3 | 14 | V0 | 11 | V0 |
| Methylcyclohexane | 0.01 | 0.25 | V0 | 0.01 | V0 |
| Methylcyclopentane | 0.02 | 0.13 | V0 | 0.03 | V0 |
| Methylethylketone | 0.3 | 0.6 | V0 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.21 | V0 | 0.42 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.28 | V0 | 0.08 | V0 |
| n-Hexane | 0.01 | 0.22 | V0 | 0.06 | V0 |
| n-Nonane | 0.01 | 0.07 | V0 | 0 | V1 |
| n-Octane | 0.02 | 0.22 | V0 | 0 | V1 |
| n-Pentane | 0.1 | 0 | V1 | 0.2 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.07 | V0 | 0.02 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.33 | V0 | 0.2 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name | Athabasca Valley | | | Anzac | |
|------------------------|------------------|----------------|------|----------------|------|
| Station # | AMS 7 | | | AMS 14 | |
| Sample Date | 11-Aug | | | 11-Aug | |
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0.04 | V0 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0.07 | V0 | 0.05 | V0 |
| 1-Pentene | 0.01 | 0.02 | V0 | 0.01 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0.2 | V0 | 0.05 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.01 | V0 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0.02 | V0 | 0.01 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 | 0.03 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0.05 | V0 | 0.04 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.02 | V0 | 0.01 | V0 |
| 2-Methylhexane | 0.01 | 0.06 | V0 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.1 | V0 | 0.07 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.06 | V0 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0.06 | V0 | 0.05 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 4 | V0 | 15 | V0 |
| Acetone | 0.4 | 3.6 | V0 | 4.2 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.08 | V0 | 0.07 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0.02 | V0 |
| Cyclopentane | 0.01 | 0.02 | V0 | 0.01 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 3.7 | V0 | 3.2 | V0 |
| Ethylbenzene | 0.01 | 0.06 | V0 | 0.04 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.34 | V0 | 0.23 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.63 | V0 | 0.45 | V0 |
| Isoprene | 0.01 | 0.93 | V0 | 0.97 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.1 | V0 | 0.07 | V0 |
| Methanol | 3 | 17 | V0 | 18 | V0 |
| Methylcyclohexane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| Methylcyclopentane | 0.02 | 0.05 | V0 | 0.05 | V0 |
| Methylethylketone | 0.3 | 0.4 | V0 | 0.6 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.74 | V0 | 0.46 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.08 | V0 | 0.06 | V0 |
| n-Hexane | 0.01 | 0.11 | V0 | 0.1 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0.02 | V0 | 0 | V1 |
| n-Pentane | 0.1 | 0.5 | V0 | 0.4 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.03 | V0 | 0.03 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.45 | V0 | 0.32 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Barge Landing AMS 9 11-Aug | Fort McKay South AMS 13 11-Aug | | | |
|--|----------------------------------|--------------------------------------|------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0.06 | V0 | 0.04 | V0 |
| 1,3,5-Trimethylbenzene | 0.02 | 0.02 | V0 | 0.02 | V0 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0.05 | V0 | 0.05 | V0 |
| 2,3,4-Trimethylpentane | 0.01 | 0.02 | V0 | 0.01 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0.07 | V0 | 0.07 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0.09 | V0 | 0.09 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | V0 | 0.01 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.27 | V0 | 0.21 | V0 |
| 2-Methylhexane | 0.01 | 0.11 | V0 | 0.09 | V0 |
| 2-Methylpentane | 0.01 | 0.11 | V0 | 0.1 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.08 | V0 | 0.08 | V0 |
| 3-Methylhexane | 0.02 | 0.13 | V0 | 0.12 | V0 |
| 3-Methylpentane | 0.01 | 0.07 | V0 | 0.08 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 9 | V0 | 19 | V0 |
| Acetone | 0.4 | 4.3 | V0 | 4.6 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0.3 | V0 |
| Benzene | 0.01 | 0.08 | V0 | 0.08 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0.4 | V0 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0.07 | V0 | 0.08 | V0 |
| Cyclopentane | 0.01 | 0 | V1 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 3.2 | V0 | 1.8 | V0 |
| Ethylbenzene | 0.01 | 0.07 | V0 | 0.09 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 1.11 | V0 | 0.7 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.28 | V0 | 0.34 | V0 |
| Isoprene | 0.01 | 1.96 | V0 | 1.36 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.17 | V0 | 0.19 | V0 |
| Methanol | 3 | 13 | V0 | 8 | V0 |
| Methylcyclohexane | 0.01 | 0.3 | V0 | 0.29 | V0 |
| Methylcyclopentane | 0.02 | 0.14 | V0 | 0.13 | V0 |
| Methylethylketone | 0.3 | 0.4 | V0 | 0.4 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.17 | V0 | 0.26 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.36 | V0 | 0.32 | V0 |
| n-Hexane | 0.01 | 0.24 | V0 | 0.2 | V0 |
| n-Nonane | 0.01 | 0.09 | V0 | 0.07 | V0 |
| n-Octane | 0.02 | 0.26 | V0 | 0.24 | V0 |
| n-Pentane | 0.1 | 0 | V1 | 0 | V1 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.07 | V0 | 0.06 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.36 | V0 | 0.51 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Horizon AMS 15 11-Aug | | |
|--|-----------------------------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0.01 | V0 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.02 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.03 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.03 | V0 |
| 3-Methylpentane | 0.01 | 0.02 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 |
| Acetaldehyde | 3 | 12 | V0 |
| Acetone | 0.4 | 6.9 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 |
| Benzene | 0.01 | 0.04 | V0 |
| beta-Pinene | 0.3 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 |
| Cyclohexane | 0.02 | 0.02 | V0 |
| Cyclopentane | 0.01 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 |
| Ethanol | 0.3 | 3.4 | V0 |
| Ethylbenzene | 0.01 | 0.04 | V0 |
| Formaldehyde | 3 | 0 | V1 |
| Isobutane | 0.02 | 0.38 | V0 |
| Isobutylene | 0.3 | 0 | V1 |
| Isopentane | 0.03 | 0.25 | V0 |
| Isoprene | 0.01 | 1.83 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.04 | V0 |
| Methanol | 3 | 11 | V0 |
| Methylcyclohexane | 0.01 | 0.04 | V0 |
| Methylcyclopentane | 0.02 | 0.03 | V0 |
| Methylethylketone | 0.3 | 0.6 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 |
| n-Butane | 0.03 | 0 | V1 |
| n-Decane | 0.06 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 |
| n-Heptane | 0.01 | 0.04 | V0 |
| n-Hexane | 0.01 | 0.03 | V0 |
| n-Nonane | 0.01 | 0.01 | V0 |
| n-Octane | 0.02 | 0.02 | V0 |
| n-Pentane | 0.1 | 0 | V1 |
| n-Propylbenzene | 0.05 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 |
| o-Xylene | 0.01 | 0.02 | V0 |
| Styrene | 0.04 | 0 | V1 |
| Toluene | 0.01 | 0.21 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 |



| Station Name Station # Sample Date | Bertha Ganter - Fort McKay AMS 1 17-Aug | | | Patricia McInnes AMS 6 17-Aug | |
|--|--|----------------|------|-------------------------------------|------|
| | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0.13 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0.02 | V0 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0 | V1 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.02 | V0 | 0.03 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0.01 | V0 | 0.02 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 10 | V0 | 9 | V0 |
| Acetone | 0.4 | 4 | V0 | 3.1 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.08 | V0 | 0.06 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0 | V1 |
| Cyclopentane | 0.01 | 0 | V1 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 2.5 | V0 | 3 | V0 |
| Ethylbenzene | 0.01 | 0.02 | V0 | 0.02 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.31 | V0 | 0.3 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.2 | V0 | 0.17 | V0 |
| Isoprene | 0.01 | 2.42 | V0 | 1.03 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.03 | V0 | 0.03 | V0 |
| Methanol | 3 | 10 | V0 | 13 | V0 |
| Methylcyclohexane | 0.01 | 0 | V1 | 0 | V1 |
| Methylcyclopentane | 0.02 | 0 | V1 | 0 | V1 |
| Methylethylketone | 0.3 | 0.3 | V0 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0 | V1 | 0.06 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0 | V1 | 0.01 | V0 |
| n-Hexane | 0.01 | 0.02 | V0 | 0.04 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 | 0 | V1 |
| n-Pentane | 0.1 | 0 | V1 | 0 | V1 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.02 | V0 | 0.02 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.08 | V0 | 0.18 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Athabasca Valley AMS 7 17-Aug | | | Anzac AMS 14 17-Aug | |
|--|-------------------------------------|----------------|------|---------------------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0.03 | V0 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0.03 | V0 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0.02 | V0 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.04 | V0 | 0.03 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 8 | V0 | 7 | V0 |
| Acetone | 0.4 | 5.4 | V0 | 6.2 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.08 | V0 | 0.06 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0 | V1 |
| Cyclopentane | 0.01 | 0 | V1 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 3 | V0 | 1.3 | V0 |
| Ethylbenzene | 0.01 | 0.02 | V0 | 0.01 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.38 | V0 | 0.26 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.26 | V0 | 0.24 | V0 |
| Isoprene | 0.01 | 0.96 | V0 | 1 | V0 |
| Isopropylalcohol | 0.4 | 0.5 | V0 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.04 | V0 | 0 | V1 |
| Methanol | 3 | 8 | V0 | 7 | V0 |
| Methylcyclohexane | 0.01 | 0.01 | V0 | 0 | V1 |
| Methylcyclopentane | 0.02 | 0 | V1 | 0 | V1 |
| Methylethylketone | 0.3 | 0.3 | V0 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.15 | V0 | 0.13 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0 | V1 | 0 | V1 |
| n-Hexane | 0.01 | 0.04 | V0 | 0.03 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 | 0 | V1 |
| n-Pentane | 0.1 | 0 | V1 | 0 | V1 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.02 | V0 | 0.01 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.13 | V0 | 0.14 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Barge Landing AMS 9 17-Aug | Fort McKay South AMS 13 17-Aug | | | |
|--|----------------------------------|--------------------------------------|------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0.03 | V0 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0 | V1 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0 | V1 | 0.01 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0 | V1 | 0.01 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 5 | V0 | 4 | V0 |
| Acetone | 0.4 | 5.3 | V0 | 4.6 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.07 | V0 | 0.07 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0.4 | V0 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0 | V1 |
| Cyclopentane | 0.01 | 0 | V1 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 1.6 | V0 | 1.5 | V0 |
| Ethylbenzene | 0.01 | 0 | V1 | 0.01 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.08 | V0 | 0.13 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.13 | V0 | 0.13 | V0 |
| Isoprene | 0.01 | 2.42 | V0 | 3.09 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0 | V1 | 0 | V1 |
| Methanol | 3 | 8 | V0 | 9 | V0 |
| Methylcyclohexane | 0.01 | 0.01 | V0 | 0 | V1 |
| Methylcyclopentane | 0.02 | 0 | V1 | 0 | V1 |
| Methylethylketone | 0.3 | 0 | V1 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0 | V1 | 0 | V1 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0 | V1 | 0 | V1 |
| n-Hexane | 0.01 | 0.02 | V0 | 0.02 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 | 0 | V1 |
| n-Pentane | 0.1 | 0 | V1 | 0 | V1 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.01 | V0 | 0.01 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.05 | V0 | 0.08 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Horizon AMS 15 17-Aug | | |
|--|-----------------------------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0.02 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 |
| 2-Methylhexane | 0.01 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0 | V1 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0.03 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 |
| Acetaldehyde | 3 | 4 | V0 |
| Acetone | 0.4 | 2.7 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 |
| Benzene | 0.01 | 0.06 | V0 |
| beta-Pinene | 0.3 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 |
| Cyclohexane | 0.02 | 0.04 | V0 |
| Cyclopentane | 0.01 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 |
| Ethanol | 0.3 | 0.9 | V0 |
| Ethylbenzene | 0.01 | 0 | V1 |
| Formaldehyde | 3 | 0 | V1 |
| Isobutane | 0.02 | 0.17 | V0 |
| Isobutylene | 0.3 | 0 | V1 |
| Isopentane | 0.03 | 0.3 | V0 |
| Isoprene | 0.01 | 2.2 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 |
| m,p-Xylene | 0.03 | 0 | V1 |
| Methanol | 3 | 5 | V0 |
| Methylcyclohexane | 0.01 | 0.02 | V0 |
| Methylcyclopentane | 0.02 | 0.02 | V0 |
| Methylethylketone | 0.3 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 |
| n-Butane | 0.03 | 0 | V1 |
| n-Decane | 0.06 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 |
| n-Heptane | 0.01 | 0 | V1 |
| n-Hexane | 0.01 | 0.02 | V0 |
| n-Nonane | 0.01 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 |
| n-Pentane | 0.1 | 0 | V1 |
| n-Propylbenzene | 0.05 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 |
| o-Xylene | 0.01 | 0 | V1 |
| Styrene | 0.04 | 0 | V1 |
| Toluene | 0.01 | 0.09 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 |



| Station Name Station # Sample Date | Bertha Ganter - | | | Patricia McInnes | |
|--|-----------------|----------------|------|------------------|------|
| | Fort McKay | | | AMS 6 | |
| | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0.12 | V0 | 0.05 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.06 | V0 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0.09 | V0 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0.03 | V0 | 0.02 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.05 | V0 | 0 | V1 |
| 2-Methylhexane | 0.01 | 0.05 | V0 | 0.02 | V0 |
| 2-Methylpentane | 0.01 | 0.32 | V0 | 0.07 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.03 | V0 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.08 | V0 | 0.03 | V0 |
| 3-Methylpentane | 0.01 | 0.18 | V0 | 0.03 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 4 | V0 | 0 | V1 |
| Acetone | 0.4 | 3.7 | V0 | 3.3 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.13 | V0 | 0.09 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0.04 | V0 | 0 | V1 |
| Cyclopentane | 0.01 | 0.05 | V0 | 0.01 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 2.1 | V0 | 1.8 | V0 |
| Ethylbenzene | 0.01 | 0.05 | V0 | 0.02 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.1 | V0 | 0.14 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.81 | V0 | 0.57 | V0 |
| Isoprene | 0.01 | 0.95 | V0 | 0.61 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.08 | V0 | 0.05 | V0 |
| Methanol | 3 | 13 | V0 | 7 | V0 |
| Methylcyclohexane | 0.01 | 0.06 | V0 | 0.02 | V0 |
| Methylcyclopentane | 0.02 | 0.09 | V0 | 0.03 | V0 |
| Methylethylketone | 0.3 | 0.3 | V0 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.39 | V0 | 0.48 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.14 | V0 | 0.05 | V0 |
| n-Hexane | 0.01 | 0.24 | V0 | 0.07 | V0 |
| n-Nonane | 0.01 | 0.03 | V0 | 0 | V1 |
| n-Octane | 0.02 | 0.07 | V0 | 0 | V1 |
| n-Pentane | 0.1 | 0.6 | V0 | 0.2 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.03 | V0 | 0.03 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.36 | V0 | 0.15 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Athabasca Valley AMS 7 23-Aug | | | Anzac AMS 14 23-Aug | |
|--|-------------------------------------|----------------|------|---------------------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0.03 | V0 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0 | V1 | 0.01 | V0 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0.03 | V0 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 | 0.01 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.07 | V0 | 0.11 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.03 | V0 | 0.04 | V0 |
| 3-Methylpentane | 0.01 | 0.03 | V0 | 0.07 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 16 | V0 | 15 | V0 |
| Acetone | 0.4 | 5.5 | V0 | 5 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.11 | V0 | 0.1 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0.03 | V0 |
| Cyclopentane | 0.01 | 0 | V1 | 0.02 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 7 | V0 | 2.2 | V0 |
| Ethylbenzene | 0.01 | 0.02 | V0 | 0.04 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.76 | V0 | 0.67 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.76 | V0 | 1.24 | V0 |
| Isoprene | 0.01 | 0.39 | V0 | 0.77 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.05 | V0 | 0.05 | V0 |
| Methanol | 3 | 14 | V0 | 9 | V0 |
| Methylcyclohexane | 0.01 | 0.01 | V0 | 0.02 | V0 |
| Methylcyclopentane | 0.02 | 0.02 | V0 | 0.03 | V0 |
| Methylethylketone | 0.3 | 0.6 | V0 | 0.4 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.57 | V0 | 0.52 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.04 | V0 | 0.05 | V0 |
| n-Hexane | 0.01 | 0.08 | V0 | 0.12 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 | 0 | V1 |
| n-Pentane | 0.1 | 0.2 | V0 | 0.6 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.02 | V0 | 0.02 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.1 | V0 | 0.24 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Barge Landing AMS 9 23-Aug | Fort McKay South AMS 13 23-Aug | | | |
|--|----------------------------------|--------------------------------------|------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0.02 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0.07 | V0 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0.07 | V0 | 0.04 | V0 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0.07 | V0 | 0.03 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0.02 | V0 | 0.03 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.03 | V0 | 0.08 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0.08 | V0 |
| 2-Methylpentane | 0.01 | 0.34 | V0 | 0.19 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0.04 | V0 |
| 3-Methylhexane | 0.02 | 0.06 | V0 | 0.11 | V0 |
| 3-Methylpentane | 0.01 | 0.18 | V0 | 0.11 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 20 | V0 | 9 | V0 |
| Acetone | 0.4 | 5.9 | V0 | 4.4 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.13 | V0 | 0.13 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0.03 | V0 | 0.04 | V0 |
| Cyclopentane | 0.01 | 0.05 | V0 | 0.05 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 5.2 | V0 | 4.2 | V0 |
| Ethylbenzene | 0.01 | 0.02 | V0 | 0.03 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.95 | V0 | 0.41 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.91 | V0 | 0.65 | V0 |
| Isoprene | 0.01 | 0.91 | V0 | 0.73 | V0 |
| Isopropylalcohol | 0.4 | 0.4 | V0 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.04 | V0 | 0.08 | V0 |
| Methanol | 3 | 14 | V0 | 9 | V0 |
| Methylcyclohexane | 0.01 | 0.03 | V0 | 0.1 | V0 |
| Methylcyclopentane | 0.02 | 0.06 | V0 | 0.1 | V0 |
| Methylethylketone | 0.3 | 0.7 | V0 | 0.5 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.22 | V0 | 0.28 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.11 | V0 | 0.23 | V0 |
| n-Hexane | 0.01 | 0.21 | V0 | 0.23 | V0 |
| n-Nonane | 0.01 | 0.02 | V0 | 0.03 | V0 |
| n-Octane | 0.02 | 0.04 | V0 | 0.1 | V0 |
| n-Pentane | 0.1 | 0.6 | V0 | 0.4 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.02 | V0 | 0.04 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.15 | V0 | 0.19 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Horizon AMS 15 23-Aug | | |
|--|-----------------------------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 |
| 1-Pentene | 0.01 | 0.03 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0.22 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.05 | V0 |
| 2,3,4-Trimethylpentane | 0.01 | 0.02 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0.08 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0.05 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.08 | V0 |
| 2-Methylhexane | 0.01 | 0.08 | V0 |
| 2-Methylpentane | 0.01 | 0.13 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.05 | V0 |
| 3-Methylhexane | 0.02 | 0.11 | V0 |
| 3-Methylpentane | 0.01 | 0.18 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 |
| Acetaldehyde | 3 | 7 | V0 |
| Acetone | 0.4 | 4.4 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 |
| Benzene | 0.01 | 0.1 | V0 |
| beta-Pinene | 0.3 | 0 | V1 |
| cis-2-Butene | 0.02 | 0.02 | V0 |
| cis-2-Hexene | 0.3 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 |
| Cyclohexane | 0.02 | 0.17 | V0 |
| Cyclopentane | 0.01 | 0.04 | V0 |
| Cyclopentene | 0.3 | 0 | V1 |
| Ethanol | 0.3 | 2.7 | V0 |
| Ethylbenzene | 0.01 | 0.09 | V0 |
| Formaldehyde | 3 | 0 | V1 |
| Isobutane | 0.02 | 1.06 | V0 |
| Isobutylene | 0.3 | 0 | V1 |
| Isopentane | 0.03 | 1.39 | V0 |
| Isoprene | 0.01 | 0.86 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.12 | V0 |
| Methanol | 3 | 8 | V0 |
| Methylcyclohexane | 0.01 | 0.14 | V0 |
| Methylcyclopentane | 0.02 | 0.15 | V0 |
| Methylethylketone | 0.3 | 0.3 | V0 |
| Methylisobutylketone | 0.4 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 |
| n-Butane | 0.03 | 1.22 | V0 |
| n-Decane | 0.06 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 |
| n-Heptane | 0.01 | 0.21 | V0 |
| n-Hexane | 0.01 | 0.21 | V0 |
| n-Nonane | 0.01 | 0.03 | V0 |
| n-Octane | 0.02 | 0.1 | V0 |
| n-Pentane | 0.1 | 0.4 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 |
| o-Xylene | 0.01 | 0.05 | V0 |
| Styrene | 0.04 | 0.04 | V0 |
| Toluene | 0.01 | 0.58 | V0 |
| trans-2-Butene | 0.01 | 0.03 | V0 |
| trans-2-Hexene | 0.3 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 |



| Station Name Station # Sample Date | Bertha Ganter - Fort McKay AMS 1 29-Aug | | | Patricia McInnes AMS 6 29-Aug | |
|--|--|----------------|------|-------------------------------------|------|
| | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0.06 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0.01 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 | 0.04 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0 | V1 | 0.06 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0.02 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.01 | V0 | 0.02 | V0 |
| 2-Methylhexane | 0.01 | 0.01 | V0 | 0.05 | V0 |
| 2-Methylpentane | 0.01 | 0.02 | V0 | 0.09 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.02 | V0 | 0.05 | V0 |
| 3-Methylpentane | 0.01 | 0.01 | V0 | 0.07 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 0 | V1 | 0 | V1 |
| Acetone | 0.4 | 2.7 | V0 | 3.4 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.04 | V0 | 0.09 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0.02 | V0 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0.02 | V0 |
| Cyclopentane | 0.01 | 0 | V1 | 0.02 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 1 | V0 | 3.3 | V0 |
| Ethylbenzene | 0.01 | 0.01 | V0 | 0.04 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0 | V1 | 0.24 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.22 | V0 | 0.8 | V0 |
| Isoprene | 0.01 | 0.79 | V0 | 0.29 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0 | V1 | 0.1 | V0 |
| Methanol | 3 | 6 | V0 | 15 | V0 |
| Methylcyclohexane | 0.01 | 0.01 | V0 | 0.04 | V0 |
| Methylcyclopentane | 0.02 | 0 | V1 | 0.07 | V0 |
| Methylethylketone | 0.3 | 0 | V1 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.07 | V0 | 1.01 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.05 | V0 | 0.1 | V0 |
| n-Hexane | 0.01 | 0.04 | V0 | 0.16 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0.02 | V0 |
| n-Octane | 0.02 | 0.02 | V0 | 0.04 | V0 |
| n-Pentane | 0.1 | 0 | V1 | 0.3 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0 | V1 | 0.04 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.07 | V0 | 0.27 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Athabasca Valley AMS 7 29-Aug | | | Anzac AMS 14 29-Aug | |
|--|-------------------------------------|----------------|------|---------------------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0.04 | V0 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0.02 | V0 |
| 1-Pentene | 0.01 | 0 | V1 | 0.03 | V0 |
| 2,2,4-Trimethylpentane | 0.01 | 0.05 | V0 | 0.28 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | V0 | 0.06 | V0 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 | 0.05 | V0 |
| 2,3-Dimethylpentane | 0.02 | 0.04 | V0 | 0.26 | V0 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0.08 | V0 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 | 0.03 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.06 | V0 | 0 | V1 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0.04 | V0 |
| 3-Methylhexane | 0.02 | 0.03 | V0 | 0.11 | V0 |
| 3-Methylpentane | 0.01 | 0.04 | V0 | 0.13 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 0 | V1 | 0 | V1 |
| Acetone | 0.4 | 2.9 | V0 | 7.9 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.07 | V0 | 0.19 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0.04 | V0 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0.03 | V0 |
| Cyclopentane | 0.01 | 0 | V1 | 0.02 | V0 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 2.5 | V0 | 1.7 | V0 |
| Ethylbenzene | 0.01 | 0.03 | V0 | 0.06 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.11 | V0 | 0.1 | V0 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.43 | V0 | 1.18 | V0 |
| Isoprene | 0.01 | 0.34 | V0 | 0.34 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.08 | V0 | 0.18 | V0 |
| Methanol | 3 | 7 | V0 | 5 | V0 |
| Methylcyclohexane | 0.01 | 0.02 | V0 | 0.05 | V0 |
| Methylcyclopentane | 0.02 | 0.03 | V0 | 0.14 | V0 |
| Methylethylketone | 0.3 | 0 | V1 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.41 | V0 | 0.95 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.05 | V0 | 0.11 | V0 |
| n-Hexane | 0.01 | 0.08 | V0 | 0.16 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 | 0.03 | V0 |
| n-Pentane | 0.1 | 0.2 | V0 | 0.3 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.03 | V0 | 0.07 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.11 | V0 | 0.43 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0.04 | V0 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0.04 | V0 |



| Station Name Station # Sample Date | Barge Landing AMS 9 29-Aug | Fort McKay South AMS 13 29-Aug | | | |
|--|----------------------------------|--------------------------------------|------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0.13 | V0 |
| 2,2-Dimethylbutane | 0.01 | 0.03 | V0 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0 | V1 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0 | V1 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0.02 | V0 |
| 2-Methylpentane | 0.01 | 0.17 | V0 | 0.03 | V0 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0 | V1 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0 | V1 | 0.03 | V0 |
| 3-Methylpentane | 0.01 | 0.09 | V0 | 0.02 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 5 | V0 | 0 | V1 |
| Acetone | 0.4 | 2.9 | V0 | 2.7 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.05 | V0 | 0.05 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0 | V1 | 0 | V1 |
| Cyclopentane | 0.01 | 0.03 | V0 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 1.6 | V0 | 1.2 | V0 |
| Ethylbenzene | 0.01 | 0.02 | V0 | 0.02 | V0 |
| Formaldehyde | 3 | 0 | V1 | 0 | V1 |
| Isobutane | 0.02 | 0.06 | V0 | 0 | V1 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 0.4 | V0 | 0.3 | V0 |
| Isoprene | 0.01 | 0.66 | V0 | 0.73 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0 | V1 | 0.03 | V0 |
| Methanol | 3 | 6 | V0 | 6 | V0 |
| Methylcyclohexane | 0.01 | 0.01 | V0 | 0 | V1 |
| Methylcyclopentane | 0.02 | 0.02 | V0 | 0 | V1 |
| Methylethylketone | 0.3 | 0 | V1 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.07 | V0 | 0.13 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.04 | V0 | 0.05 | V0 |
| n-Hexane | 0.01 | 0.08 | V0 | 0.05 | V0 |
| n-Nonane | 0.01 | 0 | V1 | 0 | V1 |
| n-Octane | 0.02 | 0 | V1 | 0 | V1 |
| n-Pentane | 0.1 | 0.3 | V0 | 0.2 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.01 | V0 | 0.01 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.06 | V0 | 0.12 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



| Station Name Station # Sample Date | Horizon AMS 15 29-Aug | Janvier AMS 22 29-Aug | | | |
|--|-----------------------------|-----------------------------|------|----------------|------|
| Compound Name | MDL (ppbv) | Results (ppbv) | Flag | Results (ppbv) | Flag |
| 1,2,4-Trimethylbenzene | 0.03 | 0 | V1 | 0 | V1 |
| 1,3,5-Trimethylbenzene | 0.02 | 0 | V1 | 0 | V1 |
| 1,3-Butadiene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Butene | 0.02 | 0 | V1 | 0 | V1 |
| 1-Pentene | 0.01 | 0 | V1 | 0 | V1 |
| 2,2,4-Trimethylpentane | 0.01 | 0 | V1 | 0 | V1 |
| 2,2-Dimethylbutane | 0.01 | 0.09 | V0 | 0 | V1 |
| 2,3,4-Trimethylpentane | 0.01 | 0.02 | V0 | 0 | V1 |
| 2,3-Dimethylbutane | 0.02 | 0.14 | V0 | 0 | V1 |
| 2,3-Dimethylpentane | 0.02 | 0.1 | V0 | 0 | V1 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | V0 | 0 | V1 |
| 2-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methyl-2-butene | 0.3 | 0 | V1 | 0 | V1 |
| 2-Methylheptane | 0.01 | 0.2 | V0 | 0.02 | V0 |
| 2-Methylhexane | 0.01 | 0 | V1 | 0 | V1 |
| 2-Methylpentane | 0.01 | 0.42 | V0 | 0 | V1 |
| 3-Methyl-1-butene | 0.3 | 0 | V1 | 0 | V1 |
| 3-Methylheptane | 0.02 | 0.08 | V0 | 0 | V1 |
| 3-Methylhexane | 0.02 | 0.22 | V0 | 0 | V1 |
| 3-Methylpentane | 0.01 | 0.35 | V0 | 0.01 | V0 |
| 4-Methyl-1-pentene | 0.3 | 0 | V1 | 0 | V1 |
| Acetaldehyde | 3 | 3 | V0 | 6 | V0 |
| Acetone | 0.4 | 3.9 | V0 | 2.9 | V0 |
| alpha-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| Benzene | 0.01 | 0.1 | V0 | 0.04 | V0 |
| beta-Pinene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Butene | 0.02 | 0 | V1 | 0 | V1 |
| cis-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| cis-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |
| Cyclohexane | 0.02 | 0.19 | V0 | 0 | V1 |
| Cyclopentane | 0.01 | 0.1 | V0 | 0 | V1 |
| Cyclopentene | 0.3 | 0 | V1 | 0 | V1 |
| Ethanol | 0.3 | 0.9 | V0 | 2.6 | V0 |
| Ethylbenzene | 0.01 | 0.04 | V0 | 0.04 | V0 |
| Formaldehyde | 3 | 0 | V1 | 5 | V4 |
| Isobutane | 0.02 | 0.34 | V0 | 0 | V1 |
| Isobutylene | 0.3 | 0 | V1 | 0 | V1 |
| Isopentane | 0.03 | 1.2 | V0 | 0.22 | V0 |
| Isoprene | 0.01 | 0.74 | V0 | 1.19 | V0 |
| Isopropylalcohol | 0.4 | 0 | V1 | 0 | V1 |
| Isopropylbenzene | 0.01 | 0 | V1 | 0 | V1 |
| m,p-Xylene | 0.03 | 0.1 | V0 | 0.1 | V0 |
| Methanol | 3 | 6 | V0 | 26 | V0 |
| Methylcyclohexane | 0.01 | 0.25 | V0 | 0.02 | V0 |
| Methylcyclopentane | 0.02 | 0.12 | V0 | 0 | V1 |
| Methylethylketone | 0.3 | 0 | V1 | 0 | V1 |
| Methylisobutylketone | 0.4 | 0 | V1 | 0 | V1 |
| Methylvinylketone | 0.3 | 0 | V1 | 0 | V1 |
| n-Butane | 0.03 | 0.12 | V0 | 0.06 | V0 |
| n-Decane | 0.06 | 0 | V1 | 0 | V1 |
| n-Dodecane | 0.4 | 0 | V1 | 0 | V1 |
| n-Heptane | 0.01 | 0.59 | V0 | 0.06 | V0 |
| n-Hexane | 0.01 | 0.19 | V0 | 0.06 | V0 |
| n-Nonane | 0.01 | 0.1 | V0 | 0 | V1 |
| n-Octane | 0.02 | 0.29 | V0 | 0.03 | V0 |
| n-Pentane | 0.1 | 0.7 | V0 | 0.1 | V0 |
| n-Propylbenzene | 0.05 | 0 | V1 | 0 | V1 |
| n-Undecane | 0.5 | 0 | V1 | 0 | V1 |
| Naphthalene | 0.5 | 0 | V1 | 0 | V1 |
| o-Xylene | 0.01 | 0.03 | V0 | 0.03 | V0 |
| Styrene | 0.04 | 0 | V1 | 0 | V1 |
| Toluene | 0.01 | 0.28 | V0 | 0.2 | V0 |
| trans-2-Butene | 0.01 | 0 | V1 | 0 | V1 |
| trans-2-Hexene | 0.3 | 0 | V1 | 0 | V1 |
| trans-2-Pentene | 0.02 | 0 | V1 | 0 | V1 |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
 Volatile Organic Compounds (VOCs) - Summary

2017
 Indicated Sites and Dates

| Station Name Station # Sample Date | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 Average | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 Std Dev | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 Total Samples (#) | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|--|--|--|--|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.02 | 0.03 | 5 | 2 |
| 1,3,5-Trimethylbenzene | 0.01 | 0.01 | 5 | 1 |
| 1,3-Butadiene | 0.00 | 0.00 | 5 | 0 |
| 1-Butene | 0.03 | 0.06 | 5 | 1 |
| 1-Pentene | 0.01 | 0.01 | 5 | 1 |
| 2,2,4-Trimethylpentane | 0.02 | 0.05 | 5 | 1 |
| 2,2-Dimethylbutane | 0.03 | 0.03 | 5 | 3 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2,3-Dimethylbutane | 0.04 | 0.05 | 5 | 3 |
| 2,3-Dimethylpentane | 0.04 | 0.04 | 5 | 3 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| 2-Methyl-2-butene | 0.00 | 0.00 | 5 | 0 |
| 2-Methylheptane | 0.09 | 0.10 | 5 | 4 |
| 2-Methylhexane | 0.01 | 0.02 | 5 | 2 |
| 2-Methylpentane | 0.11 | 0.12 | 5 | 5 |
| 3-Methyl-1-butene | 0.00 | 0.00 | 5 | 0 |
| 3-Methylheptane | 0.04 | 0.04 | 5 | 3 |
| 3-Methylhexane | 0.08 | 0.07 | 5 | 4 |
| 3-Methylpentane | 0.07 | 0.07 | 5 | 5 |
| 4-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| Acetaldehyde | 9.20 | 7.16 | 5 | 4 |
| Acetone | 4.12 | 1.03 | 5 | 5 |
| alpha-Pinene | 0.00 | 0.00 | 5 | 0 |
| Benzene | 0.08 | 0.03 | 5 | 5 |
| beta-Pinene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Butene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Pentene | 0.00 | 0.00 | 5 | 0 |
| Cyclohexane | 0.04 | 0.04 | 5 | 3 |
| Cyclopentane | 0.02 | 0.02 | 5 | 3 |
| Cyclopentene | 0.00 | 0.00 | 5 | 0 |
| Ethanol | 3.52 | 2.46 | 5 | 5 |
| Ethylbenzene | 0.04 | 0.02 | 5 | 5 |
| Formaldehyde | 0.00 | 0.00 | 5 | 0 |
| Isobutane | 0.41 | 0.40 | 5 | 4 |
| Isobutylene | 0.00 | 0.00 | 5 | 0 |
| Isopentane | 0.42 | 0.25 | 5 | 5 |
| Isoprene | 1.34 | 0.68 | 5 | 5 |
| Isopropylalcohol | 0.00 | 0.00 | 5 | 0 |
| Isopropylbenzene | 0.00 | 0.00 | 5 | 0 |
| m,p-Xylene | 0.07 | 0.06 | 5 | 4 |
| Methanol | 13.20 | 6.30 | 5 | 5 |
| Methylcyclohexane | 0.10 | 0.11 | 5 | 4 |
| Methylcyclopentane | 0.07 | 0.07 | 5 | 3 |
| Methylethylketone | 0.34 | 0.23 | 5 | 4 |
| Methylisobutylketone | 0.00 | 0.00 | 5 | 0 |
| Methylvinylketone | 0.00 | 0.00 | 5 | 0 |
| n-Butane | 0.24 | 0.21 | 5 | 4 |
| n-Decane | 0.00 | 0.00 | 5 | 0 |
| n-Dodecane | 0.00 | 0.00 | 5 | 0 |
| n-Heptane | 0.16 | 0.15 | 5 | 4 |
| n-Hexane | 0.14 | 0.11 | 5 | 5 |
| n-Nonane | 0.03 | 0.03 | 5 | 3 |
| n-Octane | 0.11 | 0.12 | 5 | 4 |
| n-Pentane | 0.16 | 0.26 | 5 | 2 |
| n-Propylbenzene | 0.00 | 0.00 | 5 | 0 |
| n-Undecane | 0.00 | 0.00 | 5 | 0 |
| Naphthalene | 0.00 | 0.00 | 5 | 0 |
| o-Xylene | 0.03 | 0.03 | 5 | 4 |
| Styrene | 0.00 | 0.00 | 5 | 0 |
| Toluene | 0.21 | 0.14 | 5 | 5 |
| trans-2-Butene | 0.00 | 0.00 | 5 | 1 |
| trans-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Pentene | 0.00 | 0.00 | 5 | 0 |



| Station Name Station # Sample Date | Patricia McInnes AMS 6 Aug 05 - Aug 29 Average | Patricia McInnes AMS 6 Aug 05 - Aug 29 Std Dev | Patricia McInnes AMS 6 Aug 05 - Aug 29 Total Samples (#) | Patricia McInnes AMS 6 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|---|---|---|---|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.00 | 0.00 | 5 | 0 |
| 1,3,5-Trimethylbenzene | 0.00 | 0.00 | 5 | 0 |
| 1,3-Butadiene | 0.00 | 0.00 | 5 | 0 |
| 1-Butene | 0.06 | 0.08 | 5 | 2 |
| 1-Pentene | 0.01 | 0.01 | 5 | 2 |
| 2,2,4-Trimethylpentane | 0.12 | 0.07 | 5 | 5 |
| 2,2-Dimethylbutane | 0.00 | 0.00 | 5 | 0 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | 5 | 3 |
| 2,3-Dimethylbutane | 0.01 | 0.02 | 5 | 1 |
| 2,3-Dimethylpentane | 0.03 | 0.02 | 5 | 4 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | 5 | 3 |
| 2-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| 2-Methyl-2-butene | 0.00 | 0.00 | 5 | 0 |
| 2-Methylheptane | 0.01 | 0.01 | 5 | 3 |
| 2-Methylhexane | 0.03 | 0.03 | 5 | 3 |
| 2-Methylpentane | 0.06 | 0.02 | 5 | 5 |
| 3-Methyl-1-butene | 0.00 | 0.00 | 5 | 0 |
| 3-Methylheptane | 0.00 | 0.00 | 5 | 0 |
| 3-Methylhexane | 0.03 | 0.03 | 5 | 3 |
| 3-Methylpentane | 0.04 | 0.02 | 5 | 5 |
| 4-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| Acetaldehyde | 7.80 | 10.83 | 5 | 3 |
| Acetone | 4.06 | 1.45 | 5 | 5 |
| alpha-Pinene | 0.00 | 0.00 | 5 | 0 |
| Benzene | 0.08 | 0.02 | 5 | 5 |
| beta-Pinene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Butene | 0.00 | 0.01 | 5 | 1 |
| cis-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Pentene | 0.00 | 0.00 | 5 | 0 |
| Cyclohexane | 0.00 | 0.01 | 5 | 1 |
| Cyclopentane | 0.01 | 0.01 | 5 | 4 |
| Cyclopentene | 0.00 | 0.00 | 5 | 0 |
| Ethanol | 4.04 | 3.45 | 5 | 5 |
| Ethylbenzene | 0.03 | 0.01 | 5 | 5 |
| Formaldehyde | 0.00 | 0.00 | 5 | 0 |
| Isobutane | 0.49 | 0.49 | 5 | 5 |
| Isobutylene | 0.00 | 0.00 | 5 | 0 |
| Isopentane | 0.49 | 0.25 | 5 | 5 |
| Isoprene | 0.68 | 0.39 | 5 | 5 |
| Isopropylalcohol | 0.00 | 0.00 | 5 | 0 |
| Isopropylbenzene | 0.00 | 0.00 | 5 | 0 |
| m,p-Xylene | 0.06 | 0.03 | 5 | 5 |
| Methanol | 14.60 | 7.54 | 5 | 5 |
| Methylcyclohexane | 0.02 | 0.02 | 5 | 4 |
| Methylcyclopentane | 0.03 | 0.03 | 5 | 4 |
| Methylethylketone | 0.14 | 0.31 | 5 | 1 |
| Methylisobutylketone | 0.00 | 0.00 | 5 | 0 |
| Methylvinylketone | 0.00 | 0.00 | 5 | 0 |
| n-Butane | 0.54 | 0.35 | 5 | 5 |
| n-Decane | 0.00 | 0.00 | 5 | 0 |
| n-Dodecane | 0.00 | 0.00 | 5 | 0 |
| n-Heptane | 0.06 | 0.03 | 5 | 5 |
| n-Hexane | 0.08 | 0.05 | 5 | 5 |
| n-Nonane | 0.00 | 0.01 | 5 | 1 |
| n-Octane | 0.01 | 0.02 | 5 | 2 |
| n-Pentane | 0.20 | 0.12 | 5 | 4 |
| n-Propylbenzene | 0.00 | 0.00 | 5 | 0 |
| n-Undecane | 0.00 | 0.00 | 5 | 0 |
| Naphthalene | 0.00 | 0.00 | 5 | 0 |
| o-Xylene | 0.03 | 0.01 | 5 | 5 |
| Styrene | 0.00 | 0.00 | 5 | 0 |
| Toluene | 0.22 | 0.07 | 5 | 5 |
| trans-2-Butene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Pentene | 0.00 | 0.00 | 5 | 0 |



| Station Name Station # Sample Date | Athabasca Valley AMS 7 Aug 05 - Aug 29 Average | Athabasca Valley AMS 7 Aug 05 - Aug 29 Std Dev | Athabasca Valley AMS 7 Aug 05 - Aug 29 Total Samples (#) | Athabasca Valley AMS 7 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|---|---|---|---|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.01 | 0.02 | 5 | 2 |
| 1,3,5-Trimethylbenzene | 0.00 | 0.00 | 5 | 0 |
| 1,3-Butadiene | 0.00 | 0.00 | 5 | 0 |
| 1-Butene | 0.02 | 0.03 | 5 | 2 |
| 1-Pentene | 0.01 | 0.01 | 5 | 2 |
| 2,2,4-Trimethylpentane | 0.07 | 0.08 | 5 | 5 |
| 2,2-Dimethylbutane | 0.00 | 0.01 | 5 | 2 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2,3-Dimethylbutane | 0.01 | 0.01 | 5 | 1 |
| 2,3-Dimethylpentane | 0.03 | 0.01 | 5 | 5 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| 2-Methyl-2-butene | 0.00 | 0.00 | 5 | 0 |
| 2-Methylheptane | 0.00 | 0.01 | 5 | 1 |
| 2-Methylhexane | 0.01 | 0.03 | 5 | 1 |
| 2-Methylpentane | 0.07 | 0.02 | 5 | 5 |
| 3-Methyl-1-butene | 0.00 | 0.00 | 5 | 0 |
| 3-Methylheptane | 0.00 | 0.00 | 5 | 0 |
| 3-Methylhexane | 0.02 | 0.03 | 5 | 3 |
| 3-Methylpentane | 0.04 | 0.01 | 5 | 5 |
| 4-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| Acetaldehyde | 8.00 | 6.32 | 5 | 4 |
| Acetone | 4.40 | 1.13 | 5 | 5 |
| alpha-Pinene | 0.00 | 0.00 | 5 | 0 |
| Benzene | 0.08 | 0.02 | 5 | 5 |
| beta-Pinene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Butene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Pentene | 0.00 | 0.00 | 5 | 0 |
| Cyclohexane | 0.00 | 0.00 | 5 | 0 |
| Cyclopentane | 0.01 | 0.01 | 5 | 2 |
| Cyclopentene | 0.00 | 0.00 | 5 | 0 |
| Ethanol | 4.54 | 2.07 | 5 | 5 |
| Ethylbenzene | 0.03 | 0.02 | 5 | 5 |
| Formaldehyde | 0.00 | 0.00 | 5 | 0 |
| Isobutane | 0.46 | 0.27 | 5 | 5 |
| Isobutylene | 0.00 | 0.00 | 5 | 0 |
| Isopentane | 0.51 | 0.19 | 5 | 5 |
| Isoprene | 0.57 | 0.35 | 5 | 5 |
| Isopropylalcohol | 0.10 | 0.22 | 5 | 1 |
| Isopropylbenzene | 0.00 | 0.00 | 5 | 0 |
| m,p-Xylene | 0.06 | 0.03 | 5 | 5 |
| Methanol | 12.40 | 4.62 | 5 | 5 |
| Methylcyclohexane | 0.01 | 0.01 | 5 | 4 |
| Methylcyclopentane | 0.03 | 0.02 | 5 | 4 |
| Methylethylketone | 0.36 | 0.23 | 5 | 4 |
| Methylisobutylketone | 0.00 | 0.00 | 5 | 0 |
| Methylvinylketone | 0.00 | 0.00 | 5 | 0 |
| n-Butane | 0.49 | 0.22 | 5 | 5 |
| n-Decane | 0.00 | 0.00 | 5 | 0 |
| n-Dodecane | 0.00 | 0.00 | 5 | 0 |
| n-Heptane | 0.04 | 0.03 | 5 | 4 |
| n-Hexane | 0.08 | 0.03 | 5 | 5 |
| n-Nonane | 0.00 | 0.00 | 5 | 0 |
| n-Octane | 0.00 | 0.01 | 5 | 1 |
| n-Pentane | 0.22 | 0.18 | 5 | 4 |
| n-Propylbenzene | 0.00 | 0.00 | 5 | 0 |
| n-Undecane | 0.00 | 0.00 | 5 | 0 |
| Naphthalene | 0.00 | 0.00 | 5 | 0 |
| o-Xylene | 0.02 | 0.01 | 5 | 5 |
| Styrene | 0.00 | 0.00 | 5 | 0 |
| Toluene | 0.18 | 0.15 | 5 | 5 |
| trans-2-Butene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Pentene | 0.00 | 0.00 | 5 | 0 |



| Station Name Station # Sample Date | Anzac AMS 14 Aug 05 - Aug 29 Average | Anzac AMS 14 Aug 05 - Aug 29 Std Dev | Anzac AMS 14 Aug 05 - Aug 29 Total Samples (#) | Anzac AMS 14 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|---|---|---|---|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.01 | 0.02 | 5 | 1 |
| 1,3,5-Trimethylbenzene | 0.00 | 0.00 | 5 | 0 |
| 1,3-Butadiene | 0.00 | 0.00 | 5 | 0 |
| 1-Butene | 0.03 | 0.04 | 5 | 3 |
| 1-Pentene | 0.01 | 0.01 | 5 | 3 |
| 2,2,4-Trimethylpentane | 0.23 | 0.33 | 5 | 4 |
| 2,2-Dimethylbutane | 0.00 | 0.00 | 5 | 1 |
| 2,3,4-Trimethylpentane | 0.02 | 0.02 | 5 | 3 |
| 2,3-Dimethylbutane | 0.02 | 0.02 | 5 | 2 |
| 2,3-Dimethylpentane | 0.08 | 0.11 | 5 | 3 |
| 2,4-Dimethylpentane | 0.02 | 0.03 | 5 | 3 |
| 2-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| 2-Methyl-2-butene | 0.00 | 0.00 | 5 | 0 |
| 2-Methylheptane | 0.01 | 0.01 | 5 | 4 |
| 2-Methylhexane | 0.00 | 0.00 | 5 | 0 |
| 2-Methylpentane | 0.05 | 0.04 | 5 | 4 |
| 3-Methyl-1-butene | 0.00 | 0.00 | 5 | 0 |
| 3-Methylheptane | 0.01 | 0.02 | 5 | 1 |
| 3-Methylhexane | 0.03 | 0.05 | 5 | 2 |
| 3-Methylpentane | 0.06 | 0.04 | 5 | 5 |
| 4-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| Acetaldehyde | 9.40 | 6.27 | 5 | 4 |
| Acetone | 5.62 | 1.47 | 5 | 5 |
| alpha-Pinene | 0.00 | 0.00 | 5 | 0 |
| Benzene | 0.10 | 0.05 | 5 | 5 |
| beta-Pinene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Butene | 0.01 | 0.02 | 5 | 1 |
| cis-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Pentene | 0.00 | 0.00 | 5 | 0 |
| Cyclohexane | 0.02 | 0.02 | 5 | 3 |
| Cyclopentane | 0.01 | 0.01 | 5 | 4 |
| Cyclopentene | 0.00 | 0.00 | 5 | 0 |
| Ethanol | 3.04 | 2.22 | 5 | 5 |
| Ethylbenzene | 0.03 | 0.02 | 5 | 5 |
| Formaldehyde | 0.00 | 0.00 | 5 | 0 |
| Isobutane | 0.38 | 0.25 | 5 | 5 |
| Isobutylene | 0.00 | 0.00 | 5 | 0 |
| Isopentane | 0.71 | 0.46 | 5 | 5 |
| Isoprene | 0.69 | 0.32 | 5 | 5 |
| Isopropylalcohol | 0.00 | 0.00 | 5 | 0 |
| Isopropylbenzene | 0.00 | 0.00 | 5 | 0 |
| m,p-Xylene | 0.06 | 0.07 | 5 | 3 |
| Methanol | 12.60 | 8.08 | 5 | 5 |
| Methylcyclohexane | 0.02 | 0.02 | 5 | 4 |
| Methylcyclopentane | 0.05 | 0.05 | 5 | 4 |
| Methylethylketone | 0.30 | 0.28 | 5 | 3 |
| Methylisobutylketone | 0.00 | 0.00 | 5 | 0 |
| Methylvinylketone | 0.00 | 0.00 | 5 | 0 |
| n-Butane | 0.51 | 0.29 | 5 | 5 |
| n-Decane | 0.00 | 0.00 | 5 | 0 |
| n-Dodecane | 0.00 | 0.00 | 5 | 0 |
| n-Heptane | 0.07 | 0.05 | 5 | 4 |
| n-Hexane | 0.10 | 0.05 | 5 | 5 |
| n-Nonane | 0.00 | 0.00 | 5 | 0 |
| n-Octane | 0.01 | 0.01 | 5 | 2 |
| n-Pentane | 0.34 | 0.22 | 5 | 4 |
| n-Propylbenzene | 0.00 | 0.00 | 5 | 0 |
| n-Undecane | 0.00 | 0.00 | 5 | 0 |
| Naphthalene | 0.00 | 0.00 | 5 | 0 |
| o-Xylene | 0.03 | 0.03 | 5 | 4 |
| Styrene | 0.00 | 0.00 | 5 | 0 |
| Toluene | 0.30 | 0.11 | 5 | 5 |
| trans-2-Butene | 0.01 | 0.02 | 5 | 2 |
| trans-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Pentene | 0.01 | 0.02 | 5 | 1 |



| Station Name Station # Sample Date | Barge Landing AMS 9 Aug 05 - Aug 29 Average | Barge Landing AMS 9 Aug 05 - Aug 29 Std Dev | Barge Landing AMS 9 Aug 05 - Aug 29 Total Samples (#) | Barge Landing AMS 9 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|--|--|--|--|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.02 | 0.03 | 5 | 2 |
| 1,3,5-Trimethylbenzene | 0.00 | 0.01 | 5 | 1 |
| 1,3-Butadiene | 0.00 | 0.00 | 5 | 0 |
| 1-Butene | 0.02 | 0.05 | 5 | 1 |
| 1-Pentene | 0.00 | 0.01 | 5 | 1 |
| 2,2,4-Trimethylpentane | 0.01 | 0.03 | 5 | 1 |
| 2,2-Dimethylbutane | 0.04 | 0.03 | 5 | 4 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2,3-Dimethylbutane | 0.06 | 0.04 | 5 | 4 |
| 2,3-Dimethylpentane | 0.04 | 0.04 | 5 | 3 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| 2-Methyl-2-butene | 0.00 | 0.00 | 5 | 0 |
| 2-Methylheptane | 0.10 | 0.12 | 5 | 3 |
| 2-Methylhexane | 0.02 | 0.05 | 5 | 1 |
| 2-Methylpentane | 0.15 | 0.12 | 5 | 4 |
| 3-Methyl-1-butene | 0.00 | 0.00 | 5 | 0 |
| 3-Methylheptane | 0.03 | 0.04 | 5 | 2 |
| 3-Methylhexane | 0.07 | 0.07 | 5 | 3 |
| 3-Methylpentane | 0.09 | 0.06 | 5 | 4 |
| 4-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| Acetaldehyde | 11.20 | 6.94 | 5 | 5 |
| Acetone | 4.58 | 1.14 | 5 | 5 |
| alpha-Pinene | 0.00 | 0.00 | 5 | 0 |
| Benzene | 0.08 | 0.03 | 5 | 5 |
| beta-Pinene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Butene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Pentene | 0.00 | 0.00 | 5 | 0 |
| Cyclohexane | 0.04 | 0.04 | 5 | 3 |
| Cyclopentane | 0.02 | 0.02 | 5 | 3 |
| Cyclopentene | 0.00 | 0.00 | 5 | 0 |
| Ethanol | 3.32 | 1.75 | 5 | 5 |
| Ethylbenzene | 0.03 | 0.03 | 5 | 4 |
| Formaldehyde | 0.00 | 0.00 | 5 | 0 |
| Isobutane | 2.07 | 3.44 | 5 | 5 |
| Isobutylene | 0.00 | 0.00 | 5 | 0 |
| Isopentane | 0.43 | 0.29 | 5 | 5 |
| Isoprene | 1.42 | 0.74 | 5 | 5 |
| Isopropylalcohol | 0.08 | 0.18 | 5 | 1 |
| Isopropylbenzene | 0.00 | 0.00 | 5 | 0 |
| m,p-Xylene | 0.06 | 0.07 | 5 | 3 |
| Methanol | 11.80 | 4.82 | 5 | 5 |
| Methylcyclohexane | 0.11 | 0.13 | 5 | 5 |
| Methylcyclopentane | 0.07 | 0.06 | 5 | 4 |
| Methylethylketone | 0.30 | 0.30 | 5 | 3 |
| Methylisobutylketone | 0.00 | 0.00 | 5 | 0 |
| Methylvinylketone | 0.00 | 0.00 | 5 | 0 |
| n-Butane | 0.18 | 0.16 | 5 | 4 |
| n-Decane | 0.00 | 0.00 | 5 | 0 |
| n-Dodecane | 0.00 | 0.00 | 5 | 0 |
| n-Heptane | 0.18 | 0.18 | 5 | 4 |
| n-Hexane | 0.15 | 0.10 | 5 | 5 |
| n-Nonane | 0.03 | 0.04 | 5 | 3 |
| n-Octane | 0.12 | 0.14 | 5 | 3 |
| n-Pentane | 0.22 | 0.25 | 5 | 3 |
| n-Propylbenzene | 0.00 | 0.00 | 5 | 0 |
| n-Undecane | 0.00 | 0.00 | 5 | 0 |
| Naphthalene | 0.00 | 0.00 | 5 | 0 |
| o-Xylene | 0.03 | 0.03 | 5 | 5 |
| Styrene | 0.00 | 0.00 | 5 | 0 |
| Toluene | 0.17 | 0.13 | 5 | 5 |
| trans-2-Butene | 0.00 | 0.00 | 5 | 1 |
| trans-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Pentene | 0.00 | 0.00 | 5 | 0 |



| Station Name Station # Sample Date | Fort McKay South AMS 13 Aug 05 - Aug 29 Average | Fort McKay South AMS 13 Aug 05 - Aug 29 Std Dev | Fort McKay South AMS 13 Aug 05 - Aug 29 Total Samples (#) | Fort McKay South AMS 13 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|--|--|--|--|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.01 | 0.02 | 5 | 2 |
| 1,3,5-Trimethylbenzene | 0.00 | 0.01 | 5 | 1 |
| 1,3-Butadiene | 0.00 | 0.00 | 5 | 0 |
| 1-Butene | 0.03 | 0.06 | 5 | 1 |
| 1-Pentene | 0.01 | 0.01 | 5 | 2 |
| 2,2,4-Trimethylpentane | 0.04 | 0.06 | 5 | 2 |
| 2,2-Dimethylbutane | 0.03 | 0.03 | 5 | 3 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2,3-Dimethylbutane | 0.04 | 0.05 | 5 | 3 |
| 2,3-Dimethylpentane | 0.04 | 0.04 | 5 | 3 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | 5 | 2 |
| 2-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| 2-Methyl-2-butene | 0.00 | 0.00 | 5 | 0 |
| 2-Methylheptane | 0.11 | 0.11 | 5 | 3 |
| 2-Methylhexane | 0.04 | 0.04 | 5 | 3 |
| 2-Methylpentane | 0.08 | 0.07 | 5 | 5 |
| 3-Methyl-1-butene | 0.00 | 0.00 | 5 | 0 |
| 3-Methylheptane | 0.05 | 0.05 | 5 | 3 |
| 3-Methylhexane | 0.09 | 0.07 | 5 | 4 |
| 3-Methylpentane | 0.06 | 0.04 | 5 | 5 |
| 4-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| Acetaldehyde | 9.00 | 7.45 | 5 | 4 |
| Acetone | 4.28 | 0.92 | 5 | 5 |
| alpha-Pinene | 0.14 | 0.19 | 5 | 2 |
| Benzene | 0.08 | 0.03 | 5 | 5 |
| beta-Pinene | 0.16 | 0.22 | 5 | 2 |
| cis-2-Butene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Pentene | 0.00 | 0.00 | 5 | 0 |
| Cyclohexane | 0.05 | 0.05 | 5 | 3 |
| Cyclopentane | 0.01 | 0.02 | 5 | 2 |
| Cyclopentene | 0.00 | 0.00 | 5 | 0 |
| Ethanol | 3.84 | 3.91 | 5 | 5 |
| Ethylbenzene | 0.05 | 0.04 | 5 | 5 |
| Formaldehyde | 0.00 | 0.00 | 5 | 0 |
| Isobutane | 0.40 | 0.34 | 5 | 4 |
| Isobutylene | 0.00 | 0.00 | 5 | 0 |
| Isopentane | 0.37 | 0.19 | 5 | 5 |
| Isoprene | 1.42 | 0.97 | 5 | 5 |
| Isopropylalcohol | 0.00 | 0.00 | 5 | 0 |
| Isopropylbenzene | 0.00 | 0.00 | 5 | 0 |
| m,p-Xylene | 0.09 | 0.08 | 5 | 4 |
| Methanol | 10.00 | 4.64 | 5 | 5 |
| Methylcyclohexane | 0.12 | 0.13 | 5 | 3 |
| Methylcyclopentane | 0.07 | 0.07 | 5 | 3 |
| Methylethylketone | 0.30 | 0.28 | 5 | 3 |
| Methylisobutylketone | 0.00 | 0.00 | 5 | 0 |
| Methylvinylketone | 0.00 | 0.00 | 5 | 0 |
| n-Butane | 0.21 | 0.14 | 5 | 4 |
| n-Decane | 0.00 | 0.00 | 5 | 0 |
| n-Dodecane | 0.00 | 0.00 | 5 | 0 |
| n-Heptane | 0.20 | 0.17 | 5 | 4 |
| n-Hexane | 0.14 | 0.10 | 5 | 5 |
| n-Nonane | 0.04 | 0.04 | 5 | 3 |
| n-Octane | 0.14 | 0.15 | 5 | 3 |
| n-Pentane | 0.16 | 0.17 | 5 | 3 |
| n-Propylbenzene | 0.00 | 0.00 | 5 | 0 |
| n-Undecane | 0.00 | 0.00 | 5 | 0 |
| Naphthalene | 0.00 | 0.00 | 5 | 0 |
| o-Xylene | 0.03 | 0.02 | 5 | 5 |
| Styrene | 0.00 | 0.00 | 5 | 0 |
| Toluene | 0.27 | 0.20 | 5 | 5 |
| trans-2-Butene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Pentene | 0.00 | 0.00 | 5 | 0 |



| Station Name Station # Sample Date | Horizon AMS 15 Aug 05 - Aug 29 Average | Horizon AMS 15 Aug 05 - Aug 29 Std Dev | Horizon AMS 15 Aug 05 - Aug 29 Total Samples (#) | Horizon AMS 15 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|---|---|---|---|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.00 | 0.00 | 5 | 0 |
| 1,3,5-Trimethylbenzene | 0.00 | 0.00 | 5 | 0 |
| 1,3-Butadiene | 0.00 | 0.00 | 5 | 0 |
| 1-Butene | 0.02 | 0.04 | 5 | 1 |
| 1-Pentene | 0.01 | 0.01 | 5 | 2 |
| 2,2,4-Trimethylpentane | 0.04 | 0.10 | 5 | 1 |
| 2,2-Dimethylbutane | 0.05 | 0.05 | 5 | 4 |
| 2,3,4-Trimethylpentane | 0.01 | 0.01 | 5 | 3 |
| 2,3-Dimethylbutane | 0.10 | 0.11 | 5 | 4 |
| 2,3-Dimethylpentane | 0.05 | 0.05 | 5 | 3 |
| 2,4-Dimethylpentane | 0.01 | 0.01 | 5 | 3 |
| 2-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| 2-Methyl-2-butene | 0.00 | 0.00 | 5 | 0 |
| 2-Methylheptane | 0.08 | 0.08 | 5 | 4 |
| 2-Methylhexane | 0.02 | 0.04 | 5 | 1 |
| 2-Methylpentane | 0.13 | 0.17 | 5 | 4 |
| 3-Methyl-1-butene | 0.00 | 0.00 | 5 | 0 |
| 3-Methylheptane | 0.03 | 0.03 | 5 | 3 |
| 3-Methylhexane | 0.09 | 0.09 | 5 | 4 |
| 3-Methylpentane | 0.19 | 0.16 | 5 | 5 |
| 4-Methyl-1-pentene | 0.00 | 0.00 | 5 | 0 |
| Acetaldehyde | 7.60 | 4.28 | 5 | 5 |
| Acetone | 4.66 | 1.59 | 5 | 5 |
| alpha-Pinene | 0.00 | 0.00 | 5 | 0 |
| Benzene | 0.07 | 0.03 | 5 | 5 |
| beta-Pinene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Butene | 0.00 | 0.01 | 5 | 1 |
| cis-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| cis-2-Pentene | 0.00 | 0.00 | 5 | 0 |
| Cyclohexane | 0.17 | 0.16 | 5 | 5 |
| Cyclopentane | 0.05 | 0.05 | 5 | 3 |
| Cyclopentene | 0.00 | 0.00 | 5 | 0 |
| Ethanol | 2.46 | 1.55 | 5 | 5 |
| Ethylbenzene | 0.04 | 0.03 | 5 | 4 |
| Formaldehyde | 0.00 | 0.00 | 5 | 0 |
| Isobutane | 0.87 | 0.92 | 5 | 5 |
| Isobutylene | 0.00 | 0.00 | 5 | 0 |
| Isopentane | 1.09 | 0.86 | 5 | 5 |
| Isoprene | 1.33 | 0.64 | 5 | 5 |
| Isopropylalcohol | 0.18 | 0.40 | 5 | 1 |
| Isopropylbenzene | 0.00 | 0.00 | 5 | 0 |
| m,p-Xylene | 0.06 | 0.05 | 5 | 4 |
| Methanol | 9.60 | 5.22 | 5 | 5 |
| Methylcyclohexane | 0.12 | 0.10 | 5 | 5 |
| Methylcyclopentane | 0.12 | 0.11 | 5 | 5 |
| Methylethylketone | 0.26 | 0.26 | 5 | 3 |
| Methylisobutylketone | 0.00 | 0.00 | 5 | 0 |
| Methylvinylketone | 0.00 | 0.00 | 5 | 0 |
| n-Butane | 0.36 | 0.52 | 5 | 3 |
| n-Decane | 0.00 | 0.00 | 5 | 0 |
| n-Dodecane | 0.00 | 0.00 | 5 | 0 |
| n-Heptane | 0.20 | 0.23 | 5 | 4 |
| n-Hexane | 0.11 | 0.09 | 5 | 5 |
| n-Nonane | 0.03 | 0.04 | 5 | 4 |
| n-Octane | 0.10 | 0.11 | 5 | 4 |
| n-Pentane | 0.26 | 0.30 | 5 | 3 |
| n-Propylbenzene | 0.00 | 0.00 | 5 | 0 |
| n-Undecane | 0.00 | 0.00 | 5 | 0 |
| Naphthalene | 0.00 | 0.00 | 5 | 0 |
| o-Xylene | 0.02 | 0.02 | 5 | 4 |
| Styrene | 0.01 | 0.02 | 5 | 1 |
| Toluene | 0.27 | 0.19 | 5 | 5 |
| trans-2-Butene | 0.01 | 0.01 | 5 | 1 |
| trans-2-Hexene | 0.00 | 0.00 | 5 | 0 |
| trans-2-Pentene | 0.00 | 0.00 | 5 | 0 |



| Station Name Station # Sample Date | Janvier AMS 22 Aug 05 - Aug 29 Average | Janvier AMS 22 Aug 05 - Aug 29 Std Dev | Janvier AMS 22 Aug 05 - Aug 29 Total Samples (#) | Janvier AMS 22 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|---|---|---|---|
| Compound Name | ppbv | ppbv | | |
| 1,2,4-Trimethylbenzene | 0.00 | -9999 | 1 | 0 |
| 1,3,5-Trimethylbenzene | 0.00 | -9999 | 1 | 0 |
| 1,3-Butadiene | 0.00 | -9999 | 1 | 0 |
| 1-Butene | 0.00 | -9999 | 1 | 0 |
| 1-Pentene | 0.00 | -9999 | 1 | 0 |
| 2,2,4-Trimethylpentane | 0.00 | -9999 | 1 | 0 |
| 2,2-Dimethylbutane | 0.00 | -9999 | 1 | 0 |
| 2,3,4-Trimethylpentane | 0.00 | -9999 | 1 | 0 |
| 2,3-Dimethylbutane | 0.00 | -9999 | 1 | 0 |
| 2,3-Dimethylpentane | 0.00 | -9999 | 1 | 0 |
| 2,4-Dimethylpentane | 0.00 | -9999 | 1 | 0 |
| 2-Methyl-1-pentene | 0.00 | -9999 | 1 | 0 |
| 2-Methyl-2-butene | 0.00 | -9999 | 1 | 0 |
| 2-Methylheptane | 0.02 | -9999 | 1 | 1 |
| 2-Methylhexane | 0.00 | -9999 | 1 | 0 |
| 2-Methylpentane | 0.00 | -9999 | 1 | 0 |
| 3-Methyl-1-butene | 0.00 | -9999 | 1 | 0 |
| 3-Methylheptane | 0.00 | -9999 | 1 | 0 |
| 3-Methylhexane | 0.00 | -9999 | 1 | 0 |
| 3-Methylpentane | 0.01 | -9999 | 1 | 1 |
| 4-Methyl-1-pentene | 0.00 | -9999 | 1 | 0 |
| Acetaldehyde | 6.00 | -9999 | 1 | 1 |
| Acetone | 2.90 | -9999 | 1 | 1 |
| alpha-Pinene | 0.00 | -9999 | 1 | 0 |
| Benzene | 0.04 | -9999 | 1 | 1 |
| beta-Pinene | 0.00 | -9999 | 1 | 0 |
| cis-2-Butene | 0.00 | -9999 | 1 | 0 |
| cis-2-Hexene | 0.00 | -9999 | 1 | 0 |
| cis-2-Pentene | 0.00 | -9999 | 1 | 0 |
| Cyclohexane | 0.00 | -9999 | 1 | 0 |
| Cyclopentane | 0.00 | -9999 | 1 | 0 |
| Cyclopentene | 0.00 | -9999 | 1 | 0 |
| Ethanol | 2.60 | -9999 | 1 | 1 |
| Ethylbenzene | 0.04 | -9999 | 1 | 1 |
| Formaldehyde | 5.00 | -9999 | 1 | 1 |
| Isobutane | 0.00 | -9999 | 1 | 0 |
| Isobutylene | 0.00 | -9999 | 1 | 0 |
| Isopentane | 0.22 | -9999 | 1 | 1 |
| Isoprene | 1.19 | -9999 | 1 | 1 |
| Isopropylalcohol | 0.00 | -9999 | 1 | 0 |
| Isopropylbenzene | 0.00 | -9999 | 1 | 0 |
| m,p-Xylene | 0.10 | -9999 | 1 | 1 |
| Methanol | 26.00 | -9999 | 1 | 1 |
| Methylcyclohexane | 0.02 | -9999 | 1 | 1 |
| Methylcyclopentane | 0.00 | -9999 | 1 | 0 |
| Methylethylketone | 0.00 | -9999 | 1 | 0 |
| Methylisobutylketone | 0.00 | -9999 | 1 | 0 |
| Methylvinylketone | 0.00 | -9999 | 1 | 0 |
| n-Butane | 0.06 | -9999 | 1 | 1 |
| n-Decane | 0.00 | -9999 | 1 | 0 |
| n-Dodecane | 0.00 | -9999 | 1 | 0 |
| n-Heptane | 0.06 | -9999 | 1 | 1 |
| n-Hexane | 0.06 | -9999 | 1 | 1 |
| n-Nonane | 0.00 | -9999 | 1 | 0 |
| n-Octane | 0.03 | -9999 | 1 | 1 |
| n-Pentane | 0.10 | -9999 | 1 | 1 |
| n-Propylbenzene | 0.00 | -9999 | 1 | 0 |
| n-Undecane | 0.00 | -9999 | 1 | 0 |
| Naphthalene | 0.00 | -9999 | 1 | 0 |
| o-Xylene | 0.03 | -9999 | 1 | 1 |
| Styrene | 0.00 | -9999 | 1 | 0 |
| Toluene | 0.20 | -9999 | 1 | 1 |
| trans-2-Butene | 0.00 | -9999 | 1 | 0 |
| trans-2-Hexene | 0.00 | -9999 | 1 | 0 |
| trans-2-Pentene | 0.00 | -9999 | 1 | 0 |



Wood Buffalo Environmental Association

VOC (ppb) summary

2017 August

| Compound | % Det | N | N < Det. | Min. | 10% | 25% | 50% | 60% | 75% | 80% | 90% | 95% | 99% | Max. | Mean | Std. Dev. | Median | Outlier | Test |
|------------------------|--------|----|----------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|--------|---------|------|
| 1,2,4-Trimethylbenzene | 25.0% | 36 | 27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.04 | 0.06 | 0.06 | 0.06 | 0.01 | 0.02 | 0.00 | 0.10 | |
| 1,3,5-Trimethylbenzene | 8.3% | 36 | 33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.03 | 0.03 | 0.00 | 0.01 | 0.00 | 0.04 | |
| 1,3-Butadiene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1-Butene | 30.6% | 36 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.07 | 0.11 | 0.14 | 0.19 | 0.19 | 0.03 | 0.05 | 0.00 | 0.28 | |
| 1-Pentene | 36.1% | 36 | 23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.01 | 0.01 | 0.00 | 0.06 | |
| 2,2,4-Trimethylpentane | 52.8% | 36 | 17 | 0.00 | 0.00 | 0.02 | 0.05 | 0.12 | 0.13 | 0.21 | 0.28 | 0.28 | 0.79 | 0.79 | 0.07 | 0.14 | 0.02 | 0.80 | |
| 2,2-Dimethylbutane | 47.2% | 36 | 19 | 0.00 | 0.00 | 0.00 | 0.01 | 0.05 | 0.05 | 0.06 | 0.09 | 0.12 | 0.12 | 0.12 | 0.02 | 0.03 | 0.00 | 0.18 | |
| 2,3,4-Trimethylpentane | 47.2% | 36 | 19 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 | 0.06 | 0.06 | 0.01 | 0.01 | 0.00 | 0.07 | | |
| 2,3-Dimethylbutane | 50.0% | 36 | 18 | 0.00 | 0.00 | 0.02 | 0.03 | 0.07 | 0.07 | 0.11 | 0.14 | 0.28 | 0.28 | 0.04 | 0.06 | 0.02 | 0.33 | | |
| 2,3-Dimethylpentane | 66.7% | 36 | 12 | 0.00 | 0.00 | 0.03 | 0.04 | 0.07 | 0.08 | 0.09 | 0.10 | 0.26 | 0.26 | 0.04 | 0.05 | 0.03 | 0.29 | | |
| 2,4-Dimethylpentane | 47.2% | 36 | 19 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 | 0.08 | 0.08 | 0.01 | 0.02 | 0.00 | 0.08 | | |
| 2-Methyl-1-pentene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| 2-Methyl-2-butene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| 2-Methylheptane | 63.9% | 36 | 13 | 0.00 | 0.00 | 0.02 | 0.02 | 0.08 | 0.08 | 0.21 | 0.24 | 0.27 | 0.27 | 0.06 | 0.08 | 0.02 | 0.47 | | |
| 2-Methylhexane | 30.6% | 36 | 25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.05 | 0.08 | 0.09 | 0.11 | 0.11 | 0.02 | 0.03 | 0.00 | 0.18 | | |
| 2-Methylpentane | 88.9% | 36 | 4 | 0.00 | 0.00 | 0.03 | 0.07 | 0.09 | 0.11 | 0.12 | 0.19 | 0.34 | 0.42 | 0.42 | 0.09 | 0.10 | 0.07 | 0.57 | |
| 3-Methyl-1-butene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| 3-Methylheptane | 33.3% | 36 | 24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.05 | 0.08 | 0.09 | 0.11 | 0.11 | 0.02 | 0.03 | 0.00 | 0.19 | | |
| 3-Methylhexane | 63.9% | 36 | 13 | 0.00 | 0.00 | 0.03 | 0.06 | 0.11 | 0.11 | 0.16 | 0.17 | 0.22 | 0.22 | 0.06 | 0.06 | 0.03 | 0.36 | | |
| 3-Methylpentane | 97.2% | 36 | 1 | 0.00 | 0.01 | 0.02 | 0.05 | 0.07 | 0.09 | 0.09 | 0.18 | 0.35 | 0.35 | 0.35 | 0.08 | 0.08 | 0.05 | 0.49 | |
| 4-Methyl-1-pentene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Acetaldehyde | 83.3% | 36 | 6 | 0.00 | 0.00 | 4.00 | 9.00 | 10.00 | 15.00 | 15.00 | 17.00 | 20.00 | 26.00 | 26.00 | 8.81 | 6.62 | 9.00 | 41.90 | |
| Acetone | 100.0% | 36 | 0 | 2.70 | 2.90 | 3.60 | 4.50 | 4.60 | 5.30 | 5.40 | 6.20 | 6.90 | 7.90 | 7.90 | 4.49 | 1.26 | 4.50 | 10.81 | |
| alpha-Pinene | 5.6% | 36 | 34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.40 | 0.40 | 0.02 | 0.08 | 0.00 | 0.43 | |
| Benzene | 100.0% | 36 | 0 | 0.04 | 0.05 | 0.06 | 0.08 | 0.08 | 0.09 | 0.10 | 0.13 | 0.13 | 0.19 | 0.19 | 0.08 | 0.03 | 0.08 | 0.23 | |
| beta-Pinene | 5.6% | 36 | 34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.40 | 0.40 | 0.02 | 0.09 | 0.00 | 0.49 | |
| cis-2-Butene | 8.3% | 36 | 33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.04 | 0.04 | 0.00 | 0.01 | 0.00 | 0.04 | |
| cis-2-Hexene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| cis-2-Pentene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Cyclohexane | 50.0% | 36 | 18 | 0.00 | 0.00 | 0.02 | 0.03 | 0.07 | 0.07 | 0.11 | 0.19 | 0.43 | 0.43 | 0.04 | 0.08 | 0.02 | 0.46 | | |
| Cyclopentane | 58.3% | 36 | 15 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.03 | 0.05 | 0.09 | 0.10 | 0.10 | 0.02 | 0.02 | 0.01 | 0.14 | | |
| Cyclopentene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Ethanol | 100.0% | 36 | 0 | 0.90 | 1.20 | 1.80 | 3.00 | 3.20 | 4.90 | 5.00 | 7.00 | 10.10 | 10.50 | 10.50 | 3.51 | 2.43 | 3.00 | 15.65 | |
| Ethylbenzene | 94.4% | 36 | 2 | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.05 | 0.07 | 0.09 | 0.09 | 0.09 | 0.04 | 0.02 | 0.03 | 0.16 | |
| Formaldehyde | 2.8% | 36 | 35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.00 | 5.00 | 0.14 | 0.83 | 0.00 | 4.31 | |
| Isobutane | 91.7% | 36 | 3 | 0.00 | 0.06 | 0.14 | 0.38 | 0.43 | 0.76 | 0.78 | 1.11 | 2.41 | 8.17 | 8.17 | 0.71 | 1.37 | 0.38 | 7.54 | |
| Isobutylene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Isopentane | 100.0% | 36 | 0 | 0.13 | 0.20 | 0.28 | 0.44 | 0.46 | 0.76 | 0.80 | 1.20 | 1.39 | 2.33 | 2.33 | 0.56 | 0.45 | 0.44 | 2.80 | |
| Isoprene | 100.0% | 36 | 0 | 0.23 | 0.34 | 0.73 | 0.95 | 1.00 | 1.19 | 1.36 | 2.20 | 2.42 | 3.09 | 3.09 | 1.07 | 0.67 | 0.95 | 4.41 | |
| Isopropylalcohol | 8.3% | 36 | 33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.90 | 0.90 | 0.05 | 0.18 | 0.00 | 0.95 | |
| Isopropylbenzene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| m,p-Xylene | 80.6% | 36 | 7 | 0.00 | 0.00 | 0.03 | 0.06 | 0.08 | 0.10 | 0.10 | 0.16 | 0.18 | 0.19 | 0.19 | 0.07 | 0.05 | 0.06 | 0.34 | |
| Methanol | 100.0% | 36 | 0 | 5.00 | 6.00 | 8.00 | 11.00 | 13.00 | 17.00 | 18.00 | 23.00 | 26.00 | 27.00 | 27.00 | 12.42 | 6.10 | 11.00 | 42.92 | |
| Methylcyclohexane | 83.3% | 36 | 6 | 0.00 | 0.00 | 0.01 | 0.02 | 0.03 | 0.14 | 0.17 | 0.25 | 0.29 | 0.30 | 0.30 | 0.07 | 0.09 | 0.02 | 0.54 | |
| Methylcyclopentane | 75.0% | 36 | 9 | 0.00 | 0.00 | 0.02 | 0.03 | 0.05 | 0.13 | 0.13 | 0.14 | 0.15 | 0.28 | 0.28 | 0.06 | 0.06 | 0.03 | 0.38 | |
| Methylethylketone | 58.3% | 36 | 15 | 0.00 | 0.00 | 0.30 | 0.40 | 0.50 | 0.50 | 0.60 | 0.70 | 0.70 | 0.70 | 0.28 | 0.26 | 0.30 | 1.57 | | |
| Methylisobutylketone | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Methylvinylketone | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| n-Butane | 86.1% | 36 | 5 | 0.00 | 0.12 | 0.37 | 0.42 | 0.51 | 0.52 | 0.74 | 1.01 | 1.22 | 1.22 | 0.35 | 0.31 | 0.37 | 1.88 | | |
| n-Decane | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| n-Dodecane | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| n-Heptane | 83.3% | 36 | 6 | 0.00 | 0.00 | 0.04 | 0.07 | 0.10 | 0.21 | 0.23 | 0.36 | 0.41 | 0.59 | 0.59 | 0.13 | 0.14 | 0.07 | 0.85 | |
| n-Hexane | 100.0% | 36 | 0 | 0.02 | 0.02 | 0.05 | 0.08 | 0.11 | 0.20 | 0.21 | 0.22 | 0.24 | 0.24 | 0.24 | 0.11 | 0.08 | 0.08 | 0.50 | |
| n-Nonane | 38.9% | 36 | 22 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.07 | 0.09 | 0.10 | 0.10 | 0.02 | 0.03 | 0.00 | 0.17 | | |
| n-Octane | 55.6% | 36 | 16 | 0.00 | 0.00 | 0.02 | 0.03 | 0.10 | 0.11 | 0.26 | 0.29 | 0.35 | 0.35 | 0.07 | 0.11 | 0.02 | 0.60 | | |
| n-Pentane | 66.7% | 36 | 12 | 0.00 | 0.00 | 0.20 | 0.20 | 0.40 | 0.40 | 0.60 | 0.60 | 0.70 | 0.70 | 0.22 | 0.21 | 0.20 | 1.25 | | |
| n-Propylbenzene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| n-Undecane | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Naphthalene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| o-Xylene | 91.7% | 36 | 3 | 0.00 | 0.01 | 0.02 | 0.02 | 0.03 | 0.04 | 0.04 | 0.06 | 0.07 | 0.07 | 0.03 | 0.02 | 0.02 | 0.12 | | |
| Styrene | 2.8% | 36 | 35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.00 | 0.01 | 0.00 | 0.03 | | |
| Toluene | 100.0% | 36 | 0 | 0.05 | 0.08 | 0.12 | 0.20 | 0.22 | 0.33 | 0.35 | 0.45 | 0.51 | 0.58 | 0.58 | 0.23 | 0.14 | 0.20 | 0.92 | |
| trans-2-Butene | 13.9% | 36 | 31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.04 | 0.04 | 0.00 | 0.01 | 0.00 | 0.05 | | |
| trans-2-Hexene | 0.0% | 36 | 36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| trans-2-Pentene | 2.8% | 36 | 35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.00 | 0.01 | 0.00 | 0.03 | | |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER - IONS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM_{2.5}) - IONS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



| | |
|---|---|
| FILE CONTENTS DESCRIPTION | Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS |
| SAMPLING INTERVAL | 24 hour |
| SAMPLING FREQUENCY OF DATA | Once every 6 days |
| EXPLANATION OF ZERO VALUES | Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation |
| UNITS | $\mu\text{g}/\text{m}^3$ (microgram per cubic meter) |
| OBSERVATION TYPE | Particles |
| FIELD SAMPLING OR MEASUREMENT PRINCIPLE | Filtration with PM_{10} Inlet for PM_{10} and with PM_{10} Inlet/Very Sharp Cut Cyclone for $\text{PM}_{2.5}$ |
| PARTICLE DIAMETER | $< 2.5 \mu\text{m}$ or $< 10 \mu\text{m}$ |
| MEDIUM | 47 mm Teflon Filter |
| ANALYTICAL METHODS | MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC) |
| SAMPLE PREPARATION | DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis |
| ANALYTICAL LABORATORY | Atmospheric Research & Analysis Inc |
| USER NOTE 1 | Data are not blank corrected |
| USER NOTE 2 | Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler |
| USER NOTE 3 | Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler |
| VOLUME STANDARDIZATION | Actual Volume at Ambient Conditions (since 01-Jan-2011) |
| SAMPLING INSTRUMENT TYPE | For PM_{10} FRM Partisol PM_{10} sampler For $\text{PM}_{2.5}$ FRM Partisol $\text{PM}_{2.5}$ sampler |
| FLAGS USED | |
| V0 | Valid value |
| V1 | Valid value but comprised wholly or partially of below detection limit data |
| V4 | Valid value despite failing to meet some QC or statistical criteria |
| V5 | Valid value but qualified because of possible contamination |
| V6 | Valid value but qualified due to non-standard sampling conditions |
| M1 | Missing value because no value is available |
| M2 | Missing value because invalidated by Data Originator |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 05-Aug | | | 05-Aug | | 05-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 11.28 | V0 | 5.64 | V0 | 0.14 | V0 |
| Calcium | 0.16 | 0.13 | V0 | 0.06 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.01 | V0 | 0.00 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.03 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.02 | V0 | 0.01 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.00 | V1 | 0.01 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.03 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 1.92 | V0 | 0.45 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.59 | V0 | 0.14 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 05-Aug | |
| Sample Date | 05-Aug | | | 05-Aug | | 05-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | PM2.5 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 5.83 | V0 | 4.70 | V0 | 0.14 | V0 |
| Calcium | 0.16 | 0.05 | V0 | 0.01 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.01 | V0 | 0.00 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | -9999 | M2 | 0.00 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.01 | V0 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.01 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.45 | V0 | 0.44 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.14 | V0 | 0.13 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 11-Aug | | | 11-Aug | | 11-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 12.09 | V0 | 6.66 | V0 | 0.01 | V1 |
| Calcium | 0.16 | 0.29 | V0 | 0.06 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.02 | V0 | 0.01 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.04 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.02 | V0 | 0.00 | V0 | 0.00 | V0 |
| Chloride | 0.12 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.03 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 1.12 | V0 | 0.48 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.33 | V0 | 0.17 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 11-Aug | |
| Sample Date | 11-Aug | | | 11-Aug | | 11-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | PM2.5 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 7.15 | V0 | 5.49 | V0 | 0.01 | V1 |
| Calcium | 0.16 | 0.09 | V0 | 0.03 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.01 | V0 | 0.00 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | 0.01 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.01 | V0 | 0.00 | V0 | 0.00 | V0 |
| Chloride | 0.12 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.03 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.48 | V0 | 0.49 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.16 | V0 | 0.16 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 17-Aug | | | 17-Aug | | 17-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 9.69 | V0 | 9.02 | V0 | 0.04 | V1 |
| Calcium | 0.16 | 0.07 | V0 | 0.05 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.00 | V0 | 0.01 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.04 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.01 | V0 | 0.01 | V0 | 0.01 | V0 |
| Chloride | 0.12 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.01 | V0 | 0.01 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.29 | V0 | 0.27 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.09 | V0 | 0.10 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 17-Aug | |
| Sample Date | 17-Aug | | | 17-Aug | | 17-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | PM2.5 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 8.67 | V0 | 5.65 | V0 | 0.04 | V1 |
| Calcium | 0.16 | 0.07 | V0 | 0.02 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.01 | V0 | 0.00 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.01 | V0 | 0.01 | V0 | 0.01 | V0 |
| Chloride | 0.12 | 0.01 | V0 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.02 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.28 | V0 | 0.24 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.10 | V0 | 0.06 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 23-Aug | | | 23-Aug | | 23-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 8.41 | V0 | 8.13 | V0 | 0.11 | V0 |
| Calcium | 0.16 | 0.34 | V0 | 0.19 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.01 | V0 | 0.02 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.01 | V0 | 0.01 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.02 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.71 | V0 | 0.46 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.21 | V0 | 0.13 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | | |
| Sample Date | 23-Aug | | | 23-Aug | | 23-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 6.86 | V0 | 5.34 | V0 | 0.11 | V0 |
| Calcium | 0.16 | 0.08 | V0 | 0.05 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.01 | V0 | 0.01 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | 0.01 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.01 | V0 | 0.01 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.02 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.37 | V0 | 0.32 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.10 | V0 | 0.09 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 29-Aug | | | 29-Aug | | 29-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 6.34 | V0 | 5.74 | V0 | 0.14 | V0 |
| Calcium | 0.16 | 0.39 | V0 | 0.14 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.01 | V0 | 0.02 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.01 | V0 | 0.01 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.02 | V0 | 0.02 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.03 | V0 | 0.02 | V0 | 0.02 | V0 |
| Sulphate | 0.25 | 0.86 | V0 | 0.58 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.25 | V0 | 0.18 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | | |
| Sample Date | 29-Aug | | | 29-Aug | | 29-Aug | |
| Particulate Size | PM2.5 | | | PM2.5 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 5.18 | V0 | 4.17 | V0 | 0.14 | V0 |
| Calcium | 0.16 | 0.09 | V0 | 0.03 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.01 | V0 | 0.00 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.01 | V0 | 0.01 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.02 | V0 | 0.01 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.00 | V1 | 0.01 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.02 | V0 | 0.02 | V0 | 0.02 | V0 |
| Sulphate | 0.25 | 0.52 | V0 | 0.21 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.15 | V0 | 0.07 | V0 | 0.00 | V1 |



| Station Name | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay |
|--------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Station # | AMS 1 | AMS 1 | AMS 1 | AMS 1 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 9.56 | 2.29 | 5 | 5 |
| Calcium | 0.24 | 0.14 | 5 | 5 |
| Magnesium | 0.01 | 0.01 | 5 | 5 |
| Potassium | 0.02 | 0.01 | 5 | 5 |
| Sodium | 0.01 | 0.00 | 5 | 5 |
| Chloride | 0.00 | 0.00 | 5 | 0 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.02 | 0.01 | 5 | 5 |
| Sulphate | 0.98 | 0.61 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.29 | 0.19 | 5 | 5 |



| Station Name | Patricia McInnes | Patricia McInnes | Patricia McInnes | Patricia McInnes |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 6 | AMS 6 | AMS 6 | AMS 6 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 7.04 | 1.49 | 5 | 5 |
| Calcium | 0.10 | 0.06 | 5 | 5 |
| Magnesium | 0.01 | 0.01 | 5 | 5 |
| Potassium | 0.02 | 0.00 | 5 | 5 |
| Sodium | 0.01 | 0.00 | 5 | 5 |
| Chloride | 0.00 | 0.00 | 5 | 1 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.02 | 0.01 | 5 | 5 |
| Sulphate | 0.45 | 0.11 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.15 | 0.03 | 5 | 5 |



| Station Name | Athabasca Valley | Athabasca Valley | Athabasca Valley | Athabasca Valley |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 7 | AMS 7 | AMS 7 | AMS 7 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 6.74 | 1.34 | 5 | 5 |
| Calcium | 0.07 | 0.01 | 5 | 5 |
| Magnesium | 0.01 | 0.00 | 5 | 5 |
| Potassium | 0.02 | 0.00 | 5 | 5 |
| Sodium | 0.01 | 0.00 | 4 | 4 |
| Chloride | 0.00 | 0.00 | 5 | 2 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.02 | 0.01 | 5 | 5 |
| Sulphate | 0.42 | 0.10 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.13 | 0.03 | 5 | 5 |



| Station Name | Anzac | Anzac | Anzac | Anzac |
|--------------------|------------------------------|------------------------------|-------------------|-----------------|
| Station # | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 5.07 | 0.62 | 5 | 5 |
| Calcium | 0.03 | 0.01 | 5 | 5 |
| Magnesium | 0.00 | 0.00 | 5 | 5 |
| Potassium | 0.01 | 0.00 | 5 | 5 |
| Sodium | 0.01 | 0.00 | 5 | 5 |
| Chloride | 0.00 | 0.00 | 5 | 1 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.02 | 0.00 | 5 | 5 |
| Sulphate | 0.34 | 0.12 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.10 | 0.04 | 5 | 5 |



Wood Buffalo Environmental Association

PM2.5 Ion (µg/sample) Summary

2017 August

| Compound | % Det | N | N < Det. | Min. | 10% | 25% | 50% | 60% | 75% | 80% | 90% | 95% | 99% | Max. | Mean | Std. Dev. | Median | Outlier Test |
|--------------------|--------|----|----------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|--------|--------------|
| Particulate Matter | 100.0% | 20 | 0 | 100 | 124 | 135 | 160 | 172 | 208 | 216 | 271 | 290 | 290 | 290 | 170 | 52 | 160 | 432 |
| Calcium | 100.0% | 20 | 0 | 0.30 | 0.69 | 1.23 | 1.71 | 2.04 | 3.30 | 4.47 | 8.16 | 9.36 | 9.36 | 9.36 | 2.67 | 2.59 | 1.71 | 15.64 |
| Magnesium | 100.0% | 20 | 0 | 0.06 | 0.09 | 0.09 | 0.15 | 0.21 | 0.21 | 0.33 | 0.36 | 0.42 | 0.42 | 0.42 | 0.19 | 0.11 | 0.15 | 0.71 |
| Potassium | 100.0% | 20 | 0 | 0.12 | 0.27 | 0.33 | 0.39 | 0.45 | 0.57 | 0.57 | 0.84 | 0.84 | 0.84 | 0.84 | 0.44 | 0.19 | 0.39 | 1.40 |
| Sodium | 100.0% | 20 | 0 | 0.06 | 0.09 | 0.15 | 0.24 | 0.27 | 0.36 | 0.36 | 0.39 | 0.99 | 0.99 | 0.99 | 0.27 | 0.20 | 0.24 | 1.27 |
| Chloride | 20.0% | 20 | 16 | 0.03 | 0.03 | 0.06 | 0.06 | 0.06 | 0.09 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.07 | 0.03 | 0.06 | 0.23 |
| Fluoride | 0.0% | 20 | 20 | 0.00 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.06 | 0.09 | 0.09 | 0.09 | 0.03 | 0.02 | 0.03 | |
| Nitrate | 100.0% | 20 | 0 | 0.24 | 0.30 | 0.42 | 0.48 | 0.51 | 0.60 | 0.60 | 0.69 | 0.75 | 0.75 | 0.75 | 0.48 | 0.14 | 0.48 | 1.18 |
| Sulphate | 100.0% | 20 | 0 | 4.92 | 6.57 | 7.68 | 10.92 | 11.58 | 13.98 | 16.98 | 26.91 | 46.17 | 46.17 | 46.17 | 13.12 | 9.40 | 10.92 | 60.11 |
| Phosphate | 0.0% | 20 | 20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| Ammonium (as N) | 100.0% | 20 | 0 | 1.51 | 2.14 | 2.42 | 3.31 | 3.80 | 4.40 | 5.05 | 7.92 | 14.09 | 14.09 | 14.09 | 4.01 | 2.82 | 3.31 | 18.12 |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM₁₀) - IONS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



| | |
|---|---|
| FILE CONTENTS DESCRIPTION | Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS |
| SAMPLING INTERVAL | 24 hour |
| SAMPLING FREQUENCY OF DATA | Once every 6 days |
| EXPLANATION OF ZERO VALUES | Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation |
| UNITS | $\mu\text{g}/\text{m}^3$ (microgram per cubic meter) |
| OBSERVATION TYPE | Particles |
| FIELD SAMPLING OR MEASUREMENT PRINCIPLE | Filtration with PM_{10} Inlet for PM_{10} and with PM_{10} Inlet/Very Sharp Cut Cyclone for $\text{PM}_{2.5}$ |
| PARTICLE DIAMETER MEDIUM | < 2.5 μm or < 10 μm 47 mm Teflon Filter |
| ANALYTICAL METHODS | MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC) |
| SAMPLE PREPARATION | DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis |
| ANALYTICAL LABORATORY | Atmospheric Research & Analysis Inc |
| USER NOTE 1 | Data are not blank corrected |
| USER NOTE 2 | Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler |
| USER NOTE 3 | Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler |
| VOLUME STANDARDIZATION | Actual Volume at Ambient Conditions (since 01-Jan-2011) |
| SAMPLING INSTRUMENT TYPE | For PM_{10} FRM Partisol PM_{10} sampler For $\text{PM}_{2.5}$ FRM Partisol $\text{PM}_{2.5}$ sampler |
| FLAGS USED | |
| V0 | Valid value |
| V1 | Valid value but comprised wholly or partially of below detection limit data |
| V4 | Valid value despite failing to meet some QC or statistical criteria |
| V5 | Valid value but qualified because of possible contamination |
| V6 | Valid value but qualified due to non-standard sampling conditions |
| M1 | Missing value because no value is available |
| M2 | Missing value because invalidated by Data Originator |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 05-Aug | | | 05-Aug | | 05-Aug | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 34.32 | V0 | 10.08 | V0 | 0.02 | V1 |
| Calcium | 0.16 | 1.62 | V0 | 0.33 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.07 | V0 | 0.04 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.06 | V0 | 0.04 | V0 | 0.00 | V0 |
| Sodium | 0.05 | 0.13 | V0 | 0.02 | V0 | 0.00 | V0 |
| Chloride | 0.12 | 0.07 | V0 | 0.02 | V0 | 0.01 | V0 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.19 | V0 | 0.04 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 2.13 | V0 | 0.49 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.56 | V0 | 0.14 | V0 | 0.00 | V1 |



| Compound Name | MDL (µg/sample) | Athabasca Valley | | Anzac | | Travel Blank | |
|--------------------|-----------------|------------------|---------|-----------------|---------|-----------------|---------|
| | | Results (µg/m³) | QC Flag | Results (µg/m³) | QC Flag | Results (µg/m³) | QC Flag |
| Particulate Matter | 1.00 | 12.64 | V0 | 8.40 | V0 | 0.02 | V1 |
| Calcium | 0.16 | 0.48 | V0 | 0.09 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.04 | V0 | 0.02 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.05 | V0 | 0.05 | V0 | 0.00 | V0 |
| Sodium | 0.05 | 0.02 | V0 | 0.01 | V0 | 0.00 | V0 |
| Chloride | 0.12 | 0.02 | V0 | 0.01 | V0 | 0.01 | V0 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.05 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.50 | V0 | 0.48 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.13 | V0 | 0.14 | V0 | 0.00 | V1 |



| Station Name | Fort McKay South | | | Horizon | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 13 | | | AMS 15 | | 05-Aug | |
| Sample Date | 05-Aug | | | 05-Aug | | 05-Aug | |
| Particulate Size | PM10 | | | PM10 | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 32.92 | V0 | 21.25 | V0 | 0.02 | V1 |
| Calcium | 0.16 | 1.16 | V0 | 0.27 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.08 | V0 | 0.04 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.05 | V0 | 0.03 | V0 | 0.00 | V0 |
| Sodium | 0.05 | 0.15 | V0 | 0.05 | V0 | 0.00 | V0 |
| Chloride | 0.12 | 0.08 | V0 | 0.01 | V0 | 0.01 | V0 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.15 | V0 | 0.08 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 1.75 | V0 | 2.90 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.42 | V0 | 0.78 | V0 | 0.00 | V1 |



| Station Name | Muskeg River | Travel Blank | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | | |
| Sample Date | 05-Aug | 05-Aug | | | |
| Particulate Size | PM10 | | | | |
| Total Air Volume (m ³) | 24 | 24 | | | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 50.27 | V0 | 0.02 | V1 |
| Calcium | 0.16 | 2.37 | V0 | 0.01 | V0 |
| Magnesium | 0.03 | 0.10 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.05 | V0 | 0.00 | V0 |
| Sodium | 0.05 | 0.09 | V0 | 0.00 | V0 |
| Chloride | 0.12 | 0.03 | V0 | 0.01 | V0 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.28 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 2.04 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.42 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 11-Aug | | | 11-Aug | | 11-Aug | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 43.43 | V0 | 13.84 | V0 | 0.07 | V0 |
| Calcium | 0.16 | 2.56 | V0 | 0.46 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.11 | V0 | 0.06 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.07 | V0 | 0.05 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.15 | V0 | 0.02 | V0 | 0.01 | V0 |
| Chloride | 0.12 | 0.09 | V0 | 0.02 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.18 | V0 | 0.06 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 1.38 | V0 | 0.50 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.33 | V0 | 0.16 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 11-Aug | |
| Sample Date | 11-Aug | | | 11-Aug | | 11-Aug | |
| Particulate Size | PM10 | | | PM10 | | PM10 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 21.76 | V0 | 10.87 | V0 | 0.07 | V0 |
| Calcium | 0.16 | 0.94 | V0 | 0.19 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.10 | V0 | 0.03 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.06 | V0 | 0.05 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.03 | V0 | 0.01 | V0 | 0.01 | V0 |
| Chloride | 0.12 | 0.03 | V0 | 0.01 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.09 | V0 | 0.04 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.54 | V0 | 0.50 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.15 | V0 | 0.16 | V0 | 0.00 | V1 |



| Station Name | Fort McKay South | | | Horizon | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 13 | | | AMS 15 | | 11-Aug | |
| Sample Date | 11-Aug | | | 11-Aug | | 11-Aug | |
| Particulate Size | PM10 | | | PM10 | | PM10 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 35.16 | V0 | 16.64 | V0 | 0.07 | V0 |
| Calcium | 0.16 | 1.37 | V0 | 0.31 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.10 | V0 | 0.04 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.05 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.14 | V0 | 0.05 | V0 | 0.01 | V0 |
| Chloride | 0.12 | 0.08 | V0 | 0.02 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.11 | V0 | 0.06 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 1.22 | V0 | 0.61 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.26 | V0 | 0.18 | V0 | 0.00 | V1 |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 11-Aug | |
| Sample Date | 11-Aug | | | 11-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 50.04 | V0 | 0.07 | V0 |
| Calcium | 0.16 | 2.04 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.11 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.07 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.15 | V0 | 0.01 | V0 |
| Chloride | 0.12 | 0.05 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.23 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 2.31 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.52 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 17-Aug | | | 17-Aug | | 17-Aug | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 16.11 | V0 | 17.96 | V0 | 0.05 | V0 |
| Calcium | 0.16 | 0.97 | V0 | 0.75 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.02 | V0 | 0.11 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.05 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.03 | V0 | 0.05 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.01 | V0 | 0.05 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.03 | V0 | 0.04 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.33 | V0 | 0.32 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.09 | V0 | 0.10 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 17-Aug | |
| Sample Date | 17-Aug | | | 17-Aug | | 17-Aug | |
| Particulate Size | PM10 | | | PM10 | | PM10 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 18.12 | V0 | 9.48 | V0 | 0.05 | V0 |
| Calcium | 0.16 | 0.55 | V0 | 0.13 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.07 | V0 | 0.02 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.04 | V0 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.03 | V0 | 0.02 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.02 | V0 | 0.01 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.04 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.33 | V0 | 0.26 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.10 | V0 | 0.06 | V0 | 0.00 | V1 |



| Station Name | Fort McKay South | | | Horizon | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 13 | | | AMS 15 | | 17-Aug | |
| Sample Date | 17-Aug | | | 17-Aug | | 17-Aug | |
| Particulate Size | PM10 | | | PM10 | | PM10 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 12.25 | V0 | 16.34 | V0 | 0.05 | V0 |
| Calcium | 0.16 | 0.15 | V0 | 0.11 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.02 | V0 | 0.02 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.05 | V0 | 0.04 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.02 | V0 | 0.05 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.01 | V0 | 0.01 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.02 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.30 | V0 | 0.30 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.09 | V0 | 0.07 | V0 | 0.00 | V1 |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 17-Aug | |
| Sample Date | 17-Aug | | | 17-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 36.28 | V0 | 0.05 | V0 |
| Calcium | 0.16 | 2.13 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.10 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.04 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.16 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.09 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.11 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.47 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.07 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 23-Aug | | | 23-Aug | | 23-Aug | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 43.03 | V0 | 16.85 | V0 | 0.18 | V0 |
| Calcium | 0.16 | 3.87 | V0 | 0.70 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.08 | V0 | 0.09 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.04 | V0 | 0.04 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.13 | V0 | 0.02 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.10 | V0 | 0.03 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.17 | V0 | 0.09 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 1.05 | V0 | 0.46 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.20 | V0 | 0.13 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 23-Aug | |
| Sample Date | 23-Aug | | | 23-Aug | | 23-Aug | |
| Particulate Size | PM10 | | | PM10 | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 20.55 | V0 | 11.53 | V0 | 0.18 | V0 |
| Calcium | 0.16 | 0.87 | V0 | 0.39 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.10 | V0 | 0.06 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.05 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.03 | V0 | 0.01 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.03 | V0 | 0.01 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.11 | V0 | 0.06 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.46 | V0 | 0.37 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.12 | V0 | 0.09 | V0 | 0.00 | V1 |



| Station Name | Fort McKay South | | | Horizon | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 13 | | | AMS 15 | | | |
| Sample Date | 23-Aug | | | 23-Aug | | 23-Aug | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 23.45 | V0 | 34.39 | V0 | 0.18 | V0 |
| Calcium | 0.16 | 1.31 | V0 | 1.68 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.07 | V0 | 0.14 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.03 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.07 | V0 | 0.09 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.02 | V0 | 0.05 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.09 | V0 | 0.15 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 1.07 | V0 | 1.21 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.25 | V0 | 0.23 | V0 | 0.00 | V1 |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 23-Aug | |
| Sample Date | 23-Aug | | | 23-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 25.94 | V0 | 0.18 | V0 |
| Calcium | 0.16 | 1.61 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.08 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.03 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.07 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.04 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.11 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.81 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.17 | V0 | 0.00 | V1 |



| Bertha Ganter - Fort | | | | | | | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station Name | McKay | | | Patricia McInnes | | Travel Blank | |
| Station # | AMS 1 | | | AMS 6 | | | |
| Sample Date | 29-Aug | | | 29-Aug | | 29-Aug | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 25.14 | V0 | 43.54 | V0 | 0.10 | V0 |
| Calcium | 0.16 | 3.85 | V0 | 2.23 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.05 | V0 | 0.11 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.06 | V0 | 0.17 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.04 | V0 | 0.23 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.10 | V0 | 0.13 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.94 | V0 | 0.72 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.25 | V0 | 0.16 | V0 | 0.00 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 29-Aug | |
| Sample Date | 29-Aug | | | 29-Aug | | 29-Aug | |
| Particulate Size | PM10 | | | PM10 | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 19.71 | V0 | 9.45 | V0 | 0.10 | V0 |
| Calcium | 0.16 | 0.94 | V0 | 0.29 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.08 | V0 | 0.04 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.03 | V0 | 0.03 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.05 | V0 | 0.02 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.04 | V0 | 0.03 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.11 | V0 | 0.04 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.59 | V0 | 0.23 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.14 | V0 | 0.07 | V0 | 0.00 | V1 |



| Station Name | Fort McKay South | | | Horizon | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 13 | | | AMS 15 | | | |
| Sample Date | 29-Aug | | | 29-Aug | | 29-Aug | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 11.77 | V0 | -9999 | M2 | 0.10 | V0 |
| Calcium | 0.16 | 0.72 | V0 | -9999 | M2 | 0.00 | V1 |
| Magnesium | 0.03 | 0.03 | V0 | -9999 | M2 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | -9999 | M2 | 0.00 | V1 |
| Sodium | 0.05 | 0.04 | V0 | -9999 | M2 | 0.00 | V1 |
| Chloride | 0.12 | 0.02 | V0 | -9999 | M2 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | -9999 | M2 | 0.00 | V1 |
| Nitrate | 0.20 | 0.07 | V0 | -9999 | M2 | 0.00 | V1 |
| Sulphate | 0.25 | 1.10 | V0 | -9999 | M2 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | -9999 | M2 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.30 | V0 | -9999 | M2 | 0.00 | V1 |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 29-Aug | |
| Sample Date | 29-Aug | | | 29-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 25.93 | V0 | 0.10 | V0 |
| Calcium | 0.16 | 1.40 | V0 | 0.00 | V1 |
| Magnesium | 0.03 | 0.08 | V0 | 0.00 | V1 |
| Potassium | 0.09 | 0.02 | V0 | 0.00 | V1 |
| Sodium | 0.05 | 0.07 | V0 | 0.00 | V1 |
| Chloride | 0.12 | 0.03 | V0 | 0.00 | V1 |
| Fluoride | 0.15 | 0.00 | V1 | 0.00 | V1 |
| Nitrate | 0.20 | 0.17 | V0 | 0.00 | V1 |
| Sulphate | 0.25 | 0.47 | V0 | 0.00 | V1 |
| Phosphate | 0.26 | 0.00 | V1 | 0.00 | V1 |
| Ammonium (as N) | 0.02 | 0.08 | V0 | 0.00 | V1 |



| Station Name | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay |
|--------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Station # | AMS 1 | AMS 1 | AMS 1 | AMS 1 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 32.41 | 11.80 | 5 | 5 |
| Calcium | 2.57 | 1.30 | 5 | 5 |
| Magnesium | 0.07 | 0.03 | 5 | 5 |
| Potassium | 0.04 | 0.02 | 5 | 5 |
| Sodium | 0.10 | 0.05 | 5 | 5 |
| Chloride | 0.06 | 0.04 | 5 | 5 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.13 | 0.07 | 5 | 5 |
| Sulphate | 1.16 | 0.66 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.28 | 0.17 | 5 | 5 |



| Station Name | Patricia McInnes | Patricia McInnes | Patricia McInnes | Patricia McInnes |
|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|
| Station # | AMS 6 | AMS 6 | AMS 6 | AMS 6 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average | Std Dev | Total Samples (#) | Total ≥ MDL (#) |
| | µg/m³ | µg/m³ | | |
| Particulate Matter | 20.45 | 13.26 | 5 | 5 |
| Calcium | 0.89 | 0.77 | 5 | 5 |
| Magnesium | 0.08 | 0.03 | 5 | 5 |
| Potassium | 0.04 | 0.01 | 5 | 5 |
| Sodium | 0.05 | 0.06 | 5 | 5 |
| Chloride | 0.07 | 0.09 | 5 | 5 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.07 | 0.04 | 5 | 5 |
| Sulphate | 0.50 | 0.14 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.14 | 0.03 | 5 | 5 |



| Station Name | Athabasca Valley | Athabasca Valley | Athabasca Valley | Athabasca Valley |
|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|
| Station # | AMS 7 | AMS 7 | AMS 7 | AMS 7 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average | Std Dev | Total Samples (#) | Total ≥ MDL (#) |
| | µg/m³ | µg/m³ | | |
| Particulate Matter | 18.56 | 3.56 | 5 | 5 |
| Calcium | 0.76 | 0.22 | 5 | 5 |
| Magnesium | 0.08 | 0.02 | 5 | 5 |
| Potassium | 0.05 | 0.01 | 5 | 5 |
| Sodium | 0.03 | 0.01 | 5 | 5 |
| Chloride | 0.03 | 0.01 | 5 | 5 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.08 | 0.03 | 5 | 5 |
| Sulphate | 0.48 | 0.10 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.13 | 0.02 | 5 | 5 |



| Station Name | Anzac | Anzac | Anzac | Anzac |
|--------------------|------------------------------|------------------------------|-------------------|-----------------|
| Station # | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 9.95 | 1.25 | 5 | 5 |
| Calcium | 0.22 | 0.12 | 5 | 5 |
| Magnesium | 0.03 | 0.02 | 5 | 5 |
| Potassium | 0.04 | 0.01 | 5 | 5 |
| Sodium | 0.01 | 0.01 | 5 | 5 |
| Chloride | 0.01 | 0.01 | 5 | 5 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.04 | 0.01 | 5 | 5 |
| Sulphate | 0.36 | 0.12 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.10 | 0.04 | 5 | 5 |



| Station Name | Fort McKay South | Fort McKay South | Fort McKay South | Fort McKay South |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 13 | AMS 13 | AMS 13 | AMS 13 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 23.11 | 11.05 | 5 | 5 |
| Calcium | 0.94 | 0.51 | 5 | 5 |
| Magnesium | 0.06 | 0.04 | 5 | 5 |
| Potassium | 0.04 | 0.01 | 5 | 5 |
| Sodium | 0.08 | 0.06 | 5 | 5 |
| Chloride | 0.04 | 0.03 | 5 | 5 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.09 | 0.05 | 5 | 5 |
| Sulphate | 1.09 | 0.52 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.26 | 0.12 | 5 | 5 |



| Station Name | Horizon | Horizon | Horizon | Horizon |
|--------------------|------------------------------|------------------------------|-------------------|-----------------|
| Station # | AMS 15 | AMS 15 | AMS 15 | AMS 15 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 22.16 | 8.46 | 4 | 4 |
| Calcium | 0.59 | 0.73 | 4 | 4 |
| Magnesium | 0.06 | 0.05 | 4 | 4 |
| Potassium | 0.03 | 0.01 | 4 | 4 |
| Sodium | 0.06 | 0.02 | 4 | 4 |
| Chloride | 0.02 | 0.02 | 4 | 4 |
| Fluoride | 0.00 | 0.00 | 4 | 0 |
| Nitrate | 0.08 | 0.05 | 4 | 4 |
| Sulphate | 1.26 | 1.16 | 4 | 4 |
| Phosphate | 0.00 | 0.00 | 4 | 0 |
| Ammonium (as N) | 0.32 | 0.32 | 4 | 4 |



| Station Name | Muskeg River | Muskeg River | Muskeg River | Muskeg River |
|--------------------|------------------------------|------------------------------|-------------------|-----------------|
| Station # | AMS 16 | AMS 16 | AMS 16 | AMS 16 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 37.69 | 12.14 | 5 | 5 |
| Calcium | 1.91 | 0.40 | 5 | 5 |
| Magnesium | 0.09 | 0.01 | 5 | 5 |
| Potassium | 0.04 | 0.02 | 5 | 5 |
| Sodium | 0.11 | 0.04 | 5 | 5 |
| Chloride | 0.05 | 0.02 | 5 | 5 |
| Fluoride | 0.00 | 0.00 | 5 | 0 |
| Nitrate | 0.18 | 0.08 | 5 | 5 |
| Sulphate | 1.22 | 0.89 | 5 | 5 |
| Phosphate | 0.00 | 0.00 | 5 | 0 |
| Ammonium (as N) | 0.25 | 0.20 | 5 | 5 |



Wood Buffalo Environmental Association

PM10 Ion (µg/sample) Summary

2017 August

| Compound | % Det | N | N < Det. | Min. | 10% | 25% | 50% | 60% | 75% | 80% | 90% | 95% | 99% Max. | Mean | Std. Dev. | Median | Outlier Test | |
|--------------------|--------|----|----------|------|------|------|-------|-------|-------|-------|-------|-------|----------|-------|-----------|--------|--------------|--------|
| Particulate Matter | 100.0% | 35 | 0 | 14 | 227 | 294 | 473 | 563 | 824 | 844 | 1042 | 1201 | 1206 | 1206 | 549 | 309 | 473 | 2091 |
| Calcium | 100.0% | 35 | 0 | 0.45 | 3.12 | 7.35 | 20.91 | 27.75 | 38.97 | 48.90 | 56.82 | 92.40 | 92.76 | 92.76 | 26.63 | 23.92 | 20.91 | 146.22 |
| Magnesium | 100.0% | 35 | 0 | 0.03 | 0.39 | 0.84 | 1.65 | 1.98 | 2.34 | 2.40 | 2.52 | 2.70 | 3.27 | 3.27 | 1.55 | 0.84 | 1.65 | 5.75 |
| Potassium | 97.1% | 35 | 1 | 0.03 | 0.42 | 0.66 | 0.90 | 1.08 | 1.17 | 1.20 | 1.38 | 1.59 | 1.68 | 1.68 | 0.92 | 0.36 | 0.90 | 2.71 |
| Sodium | 100.0% | 35 | 0 | 0.06 | 0.18 | 0.54 | 1.20 | 1.32 | 2.25 | 3.09 | 3.51 | 3.81 | 3.99 | 3.99 | 1.48 | 1.23 | 1.20 | 7.64 |
| Chloride | 97.1% | 35 | 1 | 0.06 | 0.15 | 0.27 | 0.66 | 0.81 | 1.17 | 1.65 | 2.10 | 2.46 | 5.52 | 5.52 | 0.94 | 1.03 | 0.66 | 6.09 |
| Fluoride | 0.0% | 35 | 35 | 0.03 | 0.03 | 0.03 | 0.06 | 0.06 | 0.06 | 0.06 | 0.09 | 0.09 | 0.09 | 0.09 | 0.05 | 0.02 | 0.06 | |
| Nitrate | 97.1% | 35 | 1 | 0.12 | 0.75 | 0.93 | 2.16 | 2.55 | 3.03 | 3.54 | 4.20 | 5.52 | 6.72 | 6.72 | 2.24 | 1.53 | 2.16 | 9.91 |
| Sulphate | 97.1% | 35 | 1 | 0.09 | 7.11 | 8.76 | 12.00 | 17.34 | 26.31 | 29.34 | 49.02 | 55.44 | 69.69 | 69.69 | 19.96 | 16.20 | 12.00 | 100.98 |
| Phosphate | 0.0% | 35 | 35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | 0.00 | |
| Ammonium (as N) | 100.0% | 35 | 0 | 0.02 | 1.61 | 2.24 | 3.66 | 4.05 | 5.96 | 7.22 | 10.04 | 13.39 | 18.73 | 18.73 | 4.88 | 3.93 | 3.66 | 24.51 |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER - METALS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM ions: Atmospheric Research & Analysis, Inc.
Morrisville, NC



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM_{2.5}) - METALS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM metals: Atmospheric Research & Analysis, Inc.
Morrisville, NC



| | |
|---|---|
| FILE CONTENTS DESCRIPTION | Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS |
| SAMPLING INTERVAL | 24 hour |
| SAMPLING FREQUENCY OF DATA | Once every 6 days |
| EXPLANATION OF ZERO VALUES | Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation |
| UNITS | $\mu\text{g}/\text{m}^3$ (microgram per cubic meter) |
| OBSERVATION TYPE | Particles |
| FIELD SAMPLING OR MEASUREMENT PRINCIPLE | Filtration with PM ₁₀ Inlet for PM ₁₀ and with PM ₁₀ Inlet/Very Sharp Cut Cyclone for PM _{2.5} |
| PARTICLE DIAMETER | < 2.5 μm or < 10 μm |
| MEDIUM | 47 mm Teflon Filter |
| ANALYTICAL METHODS | MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC) |
| SAMPLE PREPARATION | DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis |
| ANALYTICAL LABORATORY | Atmospheric Research & Analysis Inc |
| USER NOTE 1 | Data are not blank corrected |
| USER NOTE 2 | Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler |
| USER NOTE 3 | Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler |
| VOLUME STANDARDIZATION | Actual Volume at Ambient Conditions (since 01-Jan-2011) |
| SAMPLING INSTRUMENT TYPE | For PM ₁₀ FRM Partisol PM ₁₀ sampler For PM _{2.5} FRM Partisol PM _{2.5} sampler |
| FLAGS USED | |
| V0 | Valid value |
| V1 | Valid value but comprised wholly or partially of below detection limit data |
| V4 | Valid value despite failing to meet some QC or statistical criteria |
| V5 | Valid value but qualified because of possible contamination |
| V6 | Valid value but qualified due to non-standard sampling conditions |
| M1 | Missing value because no value is available |
| M2 | Missing value because invalidated by Data Originator |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|----------------------|-----------|-----------|------------------|-----------|--------------|-----------|
| | Station Name | McKay | | Patricia McInnes | | Travel Blank | |
| | Station # | AMS 1 | AMS 6 | AMS 6 | AMS 6 | AMS 6 | AMS 6 |
| | Sample Date | 05-Aug | 05-Aug | 05-Aug | 05-Aug | 05-Aug | 05-Aug |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Total Air Volume (m ³) | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| MDL (µg/sample) | 1.00 | 11.94 | 5.85 | 0.07 | | | |
| Results (µg/m ³) | 0.1380326 | 0.1300944 | 0.0176489 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| QC Flag | V0 | V0 | V0 | V0 | V0 | V0 | V0 |
| Aluminum | 0.0001784 | 0.0000292 | 0.0000984 | 0.0000000 | V0 | V0 | V1 |
| Antimony | 0.0001060 | 0.0000983 | 0.0000904 | 0.0000000 | V0 | V0 | V1 |
| Arsenic | 0.0092847 | 0.0013064 | 0.0006678 | 0.0000000 | V0 | V0 | V1 |
| Barium | 0.0000946 | 0.0000048 | 0.0000000 | 0.0000000 | V1 | V0 | V1 |
| Beryllium | 0.0000093 | 0.0000044 | 0.0000038 | 0.0000010 | V0 | V0 | V0 |
| Bismuth | 0.0000174 | 0.0000120 | 0.0000106 | 0.0000000 | V0 | V0 | V1 |
| Cadmium | 0.4112124 | 0.1452817 | 0.0482630 | 0.0000000 | V0 | V0 | V1 |
| Calcium | 0.0000174 | 0.0001339 | 0.0000306 | 0.0000000 | V0 | V0 | V1 |
| Cerium | 0.0000100 | 0.0000112 | 0.0000019 | 0.0000000 | V0 | V0 | V1 |
| Cesium | 0.0022262 | 0.0003383 | 0.0003823 | 0.0000000 | V0 | V0 | V1 |
| Chromium | 0.0000273 | 0.0000414 | 0.0000100 | 0.0000015 | V0 | V0 | V0 |
| Cobalt | 0.0017171 | 0.0010724 | 0.0005576 | 0.0007157 | V0 | V0 | V0 |
| Copper | 0.0393063 | 0.1100824 | 0.0284862 | 0.0000000 | V0 | V0 | V1 |
| Iron | 0.0000130 | 0.0000686 | 0.0000170 | 0.0000000 | V0 | V0 | V1 |
| Lanthanum | 0.0008577 | 0.0001398 | 0.0000815 | 0.0000000 | V0 | V0 | V1 |
| Lead | 0.0000374 | 0.0001214 | 0.0000140 | 0.0000000 | V0 | V0 | V1 |
| Lithium | 0.0091409 | 0.0242403 | 0.0058841 | 0.0004116 | V0 | V0 | V0 |
| Magnesium | 0.0006949 | 0.0018188 | 0.0004578 | 0.0000000 | V0 | V0 | V1 |
| Manganese | 0.0007116 | 0.0001571 | 0.0000450 | 0.0000603 | V0 | V0 | V0 |
| Molybdenum | 0.0000140 | 0.0000558 | 0.0000073 | 0.0000000 | V0 | V0 | V1 |
| Neodymium | 0.0005429 | 0.0004852 | 0.0001486 | 0.0000511 | V0 | V0 | V0 |
| Nickel | 0.0000202 | 0.0000183 | 0.0000026 | 0.0000000 | V0 | V0 | V1 |
| Niobium | 0.0000632 | 0.0000076 | 0.0000121 | 0.0000035 | V0 | V0 | V0 |
| Palladium | 0.0459574 | 0.0110414 | 0.0082551 | 0.0065527 | V0 | V0 | V0 |
| Phosphorus | 0.0000088 | 0.0000020 | 0.0000020 | 0.0000016 | V0 | V0 | V0 |
| Platinum | 0.0061261 | 0.0676935 | 0.0249437 | 0.0010941 | V0 | V0 | V0 |
| Potassium | 0.0000070 | 0.0000147 | 0.0000019 | 0.0000000 | V0 | V0 | V1 |
| Praseodymium | 0.0000184 | 0.0002207 | 0.0000677 | 0.0000010 | V0 | V0 | V0 |
| Rubidium | 0.0000133 | 0.0000114 | 0.0000012 | 0.0000000 | V0 | V0 | V1 |
| Samarium | 0.0003366 | 0.0002014 | 0.0000926 | 0.0000168 | V0 | V0 | V0 |
| Selenium | 0.7676322 | 0.4287140 | 0.1151417 | 0.0669031 | V0 | V0 | V0 |
| Silicon | 0.0000100 | 0.0000026 | 0.0000029 | 0.0000000 | V0 | V0 | V1 |
| Silver | 0.0169447 | 0.0242354 | 0.0124217 | 0.0016907 | V0 | V0 | V0 |
| Sodium | 0.0003375 | 0.0005295 | 0.0001555 | 0.0000000 | V0 | V0 | V1 |
| Strontium | 0.0000394 | 0.0000000 | 0.0000000 | 0.0000000 | V1 | V0 | V1 |
| Tantalum | 0.0000090 | 0.0000021 | 0.0000008 | 0.0000000 | V0 | V0 | V1 |
| Thallium | 0.0000059 | 0.0000163 | 0.0000025 | 0.0000000 | V0 | V0 | V1 |
| Thorium | 0.0004414 | 0.0001302 | 0.0002148 | 0.0000316 | V0 | V0 | V0 |
| Tin | 0.0015201 | 0.0059822 | 0.0013239 | 0.0014332 | V0 | V0 | V0 |
| Titanium | 0.0000938 | 0.0000142 | 0.0000068 | 0.0000000 | V0 | V0 | V1 |
| Tungsten | 0.0000048 | 0.0000054 | 0.0000009 | 0.0000000 | V0 | V0 | V1 |
| Uranium | 0.0007697 | 0.0008479 | 0.0000331 | 0.0000000 | V0 | V0 | V1 |
| Vanadium | 0.0055897 | 0.0027833 | 0.0016255 | 0.0005234 | V0 | V0 | V0 |
| Zinc | | | | | | | |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|--------------------------------|---------------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|--------------------------------|
| | AMS 7 05-Aug PM2.5 24 | AMS 14 05-Aug PM2.5 24 | AMS 7 05-Aug PM2.5 24 | AMS 14 05-Aug PM2.5 24 | AMS 7 05-Aug PM2.5 24 | AMS 14 05-Aug PM2.5 24 | AMS 7 05-Aug PM2.5 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 5.67 | V0 | 4.49 | V0 | 0.07 | V0 |
| Aluminum | 0.1380326 | 0.0195447 | V0 | 0.0067360 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0001240 | V0 | 0.0000174 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000713 | V0 | 0.0000406 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0015265 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000054 | V0 | 0.0000006 | V0 | 0.0000010 | V0 |
| Cadmium | 0.0000174 | 0.0000069 | V0 | 0.0000046 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.0452563 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0000299 | V0 | 0.0000090 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000020 | V0 | 0.0000008 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0001942 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0000153 | V0 | 0.0000084 | V0 | 0.0000015 | V0 |
| Copper | 0.0017171 | 0.0009004 | V0 | 0.0003763 | V0 | 0.0007157 | V0 |
| Iron | 0.0393063 | 0.0326461 | V0 | 0.0209161 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0000160 | V0 | 0.0000051 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0000754 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000137 | V0 | 0.0000073 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.0066293 | V0 | 0.0025437 | V0 | 0.0004116 | V0 |
| Manganese | 0.0006949 | 0.0007389 | V0 | 0.0002698 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001262 | V0 | 0.0000000 | V1 | 0.0000603 | V0 |
| Neodymium | 0.0000140 | 0.0000087 | V0 | 0.0000035 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0001212 | V0 | 0.0000798 | V0 | 0.0000511 | V0 |
| Niobium | 0.0000202 | 0.0000028 | V0 | 0.0000009 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000105 | V0 | 0.0000040 | V0 | 0.0000035 | V0 |
| Phosphorus | 0.0459574 | 0.0107883 | V0 | 0.0125101 | V0 | 0.0065527 | V0 |
| Platinum | 0.0000088 | 0.0000017 | V0 | 0.0000018 | V0 | 0.0000016 | V0 |
| Potassium | 0.0061261 | 0.0220256 | V0 | 0.0147181 | V0 | 0.0010941 | V0 |
| Praseodymium | 0.0000070 | 0.0000025 | V0 | 0.0000008 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0000621 | V0 | 0.0000333 | V0 | 0.0000010 | V0 |
| Samarium | 0.0000133 | 0.0000013 | V0 | 0.0000011 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0001062 | V0 | 0.0000760 | V0 | 0.0000168 | V0 |
| Silicon | 0.7676322 | 0.2033621 | V0 | 0.1269332 | V0 | 0.0669031 | V0 |
| Silver | 0.0000100 | 0.0000020 | V0 | 0.0067724 | V1 | 0.0000000 | V1 |
| Sodium | 0.0169447 | -9999 | M2 | 0.0033858 | V0 | 0.0016907 | V0 |
| Strontium | 0.0003375 | 0.0001468 | V0 | 0.0000351 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000007 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000027 | V0 | 0.0000010 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0002052 | V0 | 0.0000824 | V0 | 0.0000316 | V0 |
| Titanium | 0.0015201 | 0.0032520 | V0 | 0.0006569 | V0 | 0.0014332 | V0 |
| Tungsten | 0.0000938 | 0.0000090 | V0 | 0.0000040 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000008 | V0 | 0.0000003 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0000624 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0018661 | V0 | 0.0006235 | V0 | 0.0005234 | V0 |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|-----------|------------------------------|-----------|--------------|
| | Station Name | McKay | | | Patricia McInnes | | Travel Blank |
| | Station # | AMS 1 | | AMS 6 | | | |
| | Sample Date | 11-Aug | | 11-Aug | | 11-Aug | |
| Particulate Size | PM2.5 | | PM2.5 | | | | |
| Total Air Volume (m ³) | 24 | | 24 | | | 24 | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | |
| Particulate Matter | 1.00 | 13.74 | V0 | 6.76 | V0 | 0.04 | V0 |
| Aluminum | 0.1380326 | 0.1962416 | V0 | 0.0315196 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000578 | V0 | 0.0000547 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0001034 | V0 | 0.0000531 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0018789 | V0 | 0.0007439 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000075 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000036 | V0 | 0.0000076 | V0 | 0.0000004 | V0 |
| Cadmium | 0.0000174 | 0.0000108 | V0 | 0.0000077 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.2780185 | V0 | 0.0472213 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0002060 | V0 | 0.0000373 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000149 | V0 | 0.0000021 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0003881 | V0 | 0.0001862 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0000580 | V0 | 0.0000111 | V0 | 0.0000000 | V1 |
| Copper | 0.0017171 | 0.0012004 | V0 | 0.0004575 | V0 | 0.0001078 | V0 |
| Iron | 0.0393063 | 0.1939178 | V0 | 0.0379181 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0001045 | V0 | 0.0000256 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0001379 | V0 | 0.0001109 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0002001 | V0 | 0.0000213 | V0 | 0.0000017 | V0 |
| Magnesium | 0.0091409 | 0.0426004 | V0 | 0.0084047 | V0 | 0.0004261 | V0 |
| Manganese | 0.0006949 | 0.0032317 | V0 | 0.0006252 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0000764 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0000887 | V0 | 0.0000137 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0003286 | V0 | 0.0000959 | V0 | 0.0000233 | V0 |
| Niobium | 0.0000202 | 0.0000250 | V0 | 0.0000032 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000063 | V0 | 0.0000097 | V0 | 0.0000000 | V1 |
| Phosphorus | 0.0459574 | 0.0112694 | V0 | 0.0099086 | V0 | 0.0050017 | V0 |
| Platinum | 0.0000088 | 0.0000047 | V0 | -9999 | M2 | 0.0000012 | V0 |
| Potassium | 0.0061261 | 0.0879709 | V0 | 0.0237092 | V0 | 0.0009974 | V0 |
| Praseodymium | 0.0000070 | 0.0000242 | V0 | 0.0000037 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0003130 | V0 | 0.0000596 | V0 | 0.0000008 | V0 |
| Samarium | 0.0000133 | 0.0000168 | V0 | 0.0000026 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0001642 | V0 | 0.0000523 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.6978581 | V0 | 0.2483435 | V0 | 0.1001404 | V0 |
| Silver | 0.0000100 | 0.0000029 | V0 | 0.0000013 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0261616 | V0 | 0.0079276 | V0 | 0.0010298 | V0 |
| Strontium | 0.0003375 | 0.0008062 | V0 | 0.0001594 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000018 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000028 | V0 | 0.0000005 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000263 | V0 | 0.0000042 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0000977 | V0 | 0.0001090 | V0 | 0.0000249 | V0 |
| Titanium | 0.0015201 | 0.0078510 | V0 | 0.0013870 | V0 | 0.0004040 | V0 |
| Tungsten | 0.0000938 | 0.0000252 | V0 | 0.0000092 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000078 | V0 | 0.0000012 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0005243 | V0 | 0.0000723 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0034955 | V0 | 0.0013738 | V0 | 0.0000000 | V1 |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| | AMS 7 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| | 11-Aug | 11-Aug | 11-Aug | 11-Aug | 11-Aug | 11-Aug | 11-Aug |
| | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 7.27 | V0 | 5.39 | V0 | 0.04 | V0 |
| Aluminum | 0.1380326 | 0.0353656 | V0 | 0.0225993 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0001254 | V0 | 0.0000128 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0001242 | V0 | 0.0000836 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0017006 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000083 | V0 | 0.0000017 | V0 | 0.0000004 | V0 |
| Cadmium | 0.0000174 | 0.0000073 | V0 | 0.0000051 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.0574642 | V0 | 0.0294789 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0000576 | V0 | 0.0000223 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000027 | V0 | 0.0000010 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0001947 | V0 | 0.0005814 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0000151 | V0 | 0.0000111 | V0 | 0.0000000 | V1 |
| Copper | 0.0017171 | 0.0010173 | V0 | 0.0002761 | V0 | 0.0001078 | V0 |
| Iron | 0.0393063 | 0.0586085 | V0 | 0.0239323 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0000339 | V0 | 0.0000235 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0001292 | V0 | 0.0000548 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000297 | V0 | 0.0000118 | V0 | 0.0000017 | V0 |
| Magnesium | 0.0091409 | 0.0118169 | V0 | 0.0048901 | V0 | 0.0004261 | V0 |
| Manganese | 0.0006949 | 0.0010836 | V0 | 0.0004885 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0000660 | V0 | 0.0000521 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0000204 | V0 | 0.0000101 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0001548 | V0 | 0.0002883 | V0 | 0.0000233 | V0 |
| Niobium | 0.0000202 | 0.0000049 | V0 | 0.0000020 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000071 | V0 | 0.0000154 | V0 | 0.0000000 | V1 |
| Phosphorus | 0.0459574 | 0.0101754 | V0 | 0.0112422 | V0 | 0.0050017 | V0 |
| Platinum | 0.0000088 | 0.0000022 | V0 | 0.0000025 | V0 | 0.0000012 | V0 |
| Potassium | 0.0061261 | 0.0274893 | V0 | 0.0173488 | V0 | 0.0009974 | V0 |
| Praseodymium | 0.0000070 | 0.0000054 | V0 | 0.0000023 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0000683 | V0 | 0.0000381 | V0 | 0.0000008 | V0 |
| Samarium | 0.0000133 | 0.0000031 | V0 | 0.0000014 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0000630 | V0 | 0.0000460 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.1663520 | V0 | 0.1840955 | V0 | 0.1001404 | V0 |
| Silver | 0.0000100 | 0.0000009 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0148693 | V0 | 0.0045602 | V0 | 0.0010298 | V0 |
| Strontium | 0.0003375 | 0.0002146 | V0 | 0.0000817 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000006 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000056 | V0 | 0.0000029 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001455 | V0 | 0.0001496 | V0 | 0.0000249 | V0 |
| Titanium | 0.0015201 | 0.0022147 | V0 | 0.0014900 | V0 | 0.0004040 | V0 |
| Tungsten | 0.0000938 | 0.0000143 | V0 | 0.0000072 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000016 | V0 | 0.0000008 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0000937 | V0 | 0.0000550 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0018582 | V0 | 0.0013121 | V0 | 0.0000000 | V1 |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|------------------|------------------------------|--------------|----|
| | Station Name | McKay | | Patricia McInnes | | Travel Blank | |
| | Station # | AMS 1 | | AMS 6 | | | |
| | Sample Date | 17-Aug | | 17-Aug | | | |
| Particulate Size | PM2.5 | | PM2.5 | | | | |
| Total Air Volume (m ³) | 24 | | 24 | | | | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | |
| Particulate Matter | 1.00 | 9.86 | V0 | 7.64 | V0 | 0.04 | V1 |
| Aluminum | 0.1380326 | 0.0269920 | V0 | 0.0357116 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000101 | V0 | 0.0000212 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000487 | V0 | 0.0000297 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0003879 | V0 | 0.0005503 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000013 | V0 | 0.0000022 | V0 | 0.0000008 | V0 |
| Cadmium | 0.0000174 | 0.0000136 | V0 | 0.0000136 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.0637929 | V0 | 0.0411100 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0000345 | V0 | 0.0000398 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000042 | V0 | 0.0000026 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0001814 | V0 | 0.0003685 | V0 | 0.0001205 | V0 |
| Cobalt | 0.0000273 | 0.0000093 | V0 | 0.0000142 | V0 | 0.0000021 | V0 |
| Copper | 0.0017171 | 0.0007030 | V0 | 0.0005499 | V0 | 0.0000830 | V0 |
| Iron | 0.0393063 | 0.0327923 | V0 | 0.0377563 | V0 | 0.0036964 | V0 |
| Lanthanum | 0.0000130 | 0.0000171 | V0 | 0.0000196 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0000669 | V0 | 0.0000401 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000223 | V0 | 0.0000216 | V0 | 0.0000027 | V0 |
| Magnesium | 0.0091409 | 0.0070295 | V0 | 0.0103066 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0006136 | V0 | 0.0006562 | V0 | 0.0000300 | V0 |
| Molybdenum | 0.0007116 | 0.0000457 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0000124 | V0 | 0.0000150 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0001116 | V0 | 0.0001968 | V0 | 0.0000506 | V0 |
| Niobium | 0.0000202 | 0.0000030 | V0 | 0.0000041 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000095 | V0 | 0.0000068 | V0 | 0.0000064 | V0 |
| Phosphorus | 0.0459574 | 0.0143425 | V0 | 0.0117845 | V0 | 0.0104047 | V0 |
| Platinum | 0.0000088 | -9999 | M2 | 0.0000027 | V0 | 0.0000021 | V0 |
| Potassium | 0.0061261 | 0.0505191 | V0 | 0.0288554 | V0 | 0.0014096 | V0 |
| Praseodymium | 0.0000070 | 0.0000037 | V0 | 0.0000041 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0001048 | V0 | 0.0000613 | V0 | 0.0000011 | V0 |
| Samarium | 0.0000133 | 0.0000021 | V0 | 0.0000027 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0000471 | V0 | 0.0000434 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.1395400 | V0 | 0.0945536 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000020 | V0 | 0.0000011 | V0 | 0.0000006 | V0 |
| Sodium | 0.0169447 | 0.0137915 | V0 | 0.0161330 | V0 | 0.0035467 | V0 |
| Strontium | 0.0003375 | 0.0001440 | V0 | 0.0001423 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000016 | V0 | 0.0000008 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000042 | V0 | 0.0000050 | V0 | 0.0000004 | V0 |
| Tin | 0.0004414 | 0.0001187 | V0 | 0.0001097 | V0 | 0.0000226 | V0 |
| Titanium | 0.0015201 | 0.0014822 | V0 | 0.0016454 | V0 | 0.0005788 | V0 |
| Tungsten | 0.0000938 | 0.0000078 | V0 | 0.0000067 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000010 | V0 | 0.0000014 | V0 | 0.0000003 | V0 |
| Vanadium | 0.0007697 | 0.0000665 | V0 | 0.0000845 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0022487 | V0 | 0.0014278 | V0 | 0.0000000 | V1 |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|--------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| | AMS 7 17-Aug PM2.5 24 | AMS 14 17-Aug PM2.5 24 | AMS 14 17-Aug PM2.5 24 | AMS 14 17-Aug PM2.5 24 | AMS 14 17-Aug PM2.5 24 | AMS 14 17-Aug PM2.5 24 | AMS 14 17-Aug PM2.5 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 9.43 | V0 | 5.65 | V0 | 0.04 | V1 |
| Aluminum | 0.1380326 | 0.0351684 | V0 | 0.0241086 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0001257 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000330 | V0 | 0.0000244 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0017245 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000089 | V0 | 0.0000054 | V0 | 0.0000008 | V0 |
| Cadmium | 0.0000174 | 0.0000102 | V0 | 0.0000092 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.0417205 | V0 | 0.0199802 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0000440 | V0 | 0.0000278 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000024 | V0 | 0.0000021 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0002001 | V0 | 0.0002223 | V0 | 0.0001205 | V0 |
| Cobalt | 0.0000273 | 0.0000145 | V0 | 0.0000091 | V0 | 0.0000021 | V0 |
| Copper | 0.0017171 | 0.0007584 | V0 | 0.0002014 | V0 | 0.0000830 | V0 |
| Iron | 0.0393063 | 0.0510480 | V0 | 0.0233916 | V0 | 0.0036964 | V0 |
| Lanthanum | 0.0000130 | 0.0000193 | V0 | 0.0000169 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0000495 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000234 | V0 | 0.0000200 | V0 | 0.0000027 | V0 |
| Magnesium | 0.0091409 | 0.0100832 | V0 | 0.0058490 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0007464 | V0 | 0.0004134 | V0 | 0.0000300 | V0 |
| Molybdenum | 0.0007116 | 0.0000489 | V0 | 0.0000340 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0000171 | V0 | 0.0000111 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0000968 | V0 | 0.0000991 | V0 | 0.0000506 | V0 |
| Niobium | 0.0000202 | 0.0000040 | V0 | 0.0000032 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000053 | V0 | 0.0000077 | V0 | 0.0000064 | V0 |
| Phosphorus | 0.0459574 | 0.0061509 | V0 | 0.0133547 | V0 | 0.0104047 | V0 |
| Platinum | 0.0000088 | 0.0000012 | V0 | 0.0000015 | V0 | 0.0000021 | V0 |
| Potassium | 0.0061261 | 0.0244727 | V0 | 0.0210616 | V0 | 0.0014096 | V0 |
| Praseodymium | 0.0000070 | 0.0000048 | V0 | 0.0000028 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0000540 | V0 | 0.0000463 | V0 | 0.0000011 | V0 |
| Samarium | 0.0000133 | 0.0000026 | V0 | 0.0000023 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0000417 | V0 | 0.0000353 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.1253645 | V0 | 0.1263778 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000007 | V0 | 0.0000022 | V0 | 0.0000006 | V0 |
| Sodium | 0.0169447 | 0.0124656 | V0 | 0.0143904 | V0 | 0.0035467 | V0 |
| Strontium | 0.0003375 | 0.0001859 | V0 | 0.0000996 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000005 | V0 | 0.0000007 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000047 | V0 | 0.0000037 | V0 | 0.0000004 | V0 |
| Tin | 0.0004414 | 0.0001134 | V0 | 0.0000851 | V0 | 0.0000226 | V0 |
| Titanium | 0.0015201 | 0.0020492 | V0 | 0.0015039 | V0 | 0.0005788 | V0 |
| Tungsten | 0.0000938 | 0.0000158 | V0 | 0.0000055 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000014 | V0 | 0.0000010 | V0 | 0.0000003 | V0 |
| Vanadium | 0.0007697 | 0.0000819 | V0 | 0.0000634 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0014183 | V0 | 0.0007866 | V0 | 0.0000000 | V1 |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|----------------------|-----------|-----------|------------------|-----------|--------------|-----------|
| | Station Name | McKay | | Patricia McInnes | | Travel Blank | |
| | Station # | AMS 1 | AMS 6 | AMS 6 | AMS 6 | AMS 6 | AMS 6 |
| | Sample Date | 23-Aug | 23-Aug | 23-Aug | 23-Aug | 23-Aug | 23-Aug |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Total Air Volume (m ³) | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| MDL (µg/sample) | 1.00 | 8.42 | 6.45 | 0.25 | | | |
| Results (µg/m ³) | 0.0891252 | 0.0000227 | 0.0436924 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| QC Flag | V0 | V0 | V0 | V0 | V0 | V0 | V0 |
| Aluminum | 0.1380326 | 0.0891252 | V0 | 0.0436924 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000227 | V0 | 0.0000682 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000475 | V0 | 0.0001282 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0008142 | V0 | 0.0011187 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000042 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000025 | V0 | 0.0000062 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000051 | V0 | 0.0000107 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.1810822 | V0 | 0.0585513 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0001029 | V0 | 0.0000645 | V0 | 0.0000013 | V0 |
| Cesium | 0.0000100 | 0.0000096 | V0 | 0.0000031 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0003219 | V0 | 0.0002524 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0000303 | V0 | 0.0000156 | V0 | 0.0000014 | V0 |
| Copper | 0.0017171 | 0.0009753 | V0 | 0.0005644 | V0 | 0.0001861 | V0 |
| Iron | 0.0393063 | 0.0999582 | V0 | 0.0538714 | V0 | 0.0026234 | V0 |
| Lanthanum | 0.0000130 | 0.0000547 | V0 | 0.0000333 | V0 | 0.0000007 | V0 |
| Lead | 0.0008577 | 0.0000825 | V0 | 0.0001314 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000921 | V0 | 0.0000355 | V0 | 0.0000027 | V0 |
| Magnesium | 0.0091409 | 0.0188461 | V0 | 0.0133822 | V0 | 0.0008818 | V0 |
| Manganese | 0.0006949 | 0.0017297 | V0 | 0.0010203 | V0 | 0.0000418 | V0 |
| Molybdenum | 0.0007116 | 0.0000939 | V0 | 0.0000648 | V0 | 0.0000399 | V0 |
| Neodymium | 0.0000140 | 0.0000426 | V0 | 0.0000239 | V0 | 0.0000006 | V0 |
| Nickel | 0.0005429 | 0.0002326 | V0 | 0.0001278 | V0 | 0.0000441 | V0 |
| Niobium | 0.0000202 | 0.0000115 | V0 | 0.0000052 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000075 | V0 | 0.0000054 | V0 | 0.0000000 | V1 |
| Phosphorus | 0.0459574 | 0.0114149 | V0 | 0.0143806 | V0 | 0.0095044 | V0 |
| Platinum | 0.0000088 | 0.0000024 | V0 | 0.0000020 | V0 | 0.0000010 | V0 |
| Potassium | 0.0061261 | 0.0355513 | V0 | 0.0287342 | V0 | 0.0015876 | V0 |
| Praseodymium | 0.0000070 | 0.0000113 | V0 | 0.0000064 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0001247 | V0 | 0.0000774 | V0 | 0.0000026 | V0 |
| Samarium | 0.0000133 | 0.0000075 | V0 | 0.0000040 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0000777 | V0 | 0.0000594 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.3193562 | V0 | 0.2837710 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000015 | V0 | 0.0000015 | V0 | 0.0000007 | V0 |
| Sodium | 0.0169447 | 0.0131823 | V0 | 0.0094686 | V0 | 0.0035374 | V0 |
| Strontium | 0.0003375 | 0.0004072 | V0 | 0.0002026 | V0 | 0.0000164 | V0 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000014 | V0 | 0.0000008 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000123 | V0 | 0.0000074 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0000931 | V0 | 0.0001089 | V0 | 0.0000272 | V0 |
| Titanium | 0.0015201 | 0.0038398 | V0 | 0.0021817 | V0 | 0.0009181 | V0 |
| Tungsten | 0.0000938 | 0.0000103 | V0 | 0.0000109 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000039 | V0 | 0.0000020 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0003640 | V0 | 0.0001127 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0040736 | V0 | 0.0016442 | V0 | 0.0008493 | V0 |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| | AMS 7 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| | 23-Aug | 23-Aug | 23-Aug | 23-Aug | 23-Aug | 23-Aug | 23-Aug |
| | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 7.02 | V0 | 5.56 | V0 | 0.25 | V0 |
| Aluminum | 0.1380326 | 0.0443290 | V0 | 0.0267909 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000918 | V0 | 0.0000081 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000757 | V0 | 0.0000340 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0015019 | V0 | 0.0003889 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000041 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000058 | V0 | 0.0000025 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000108 | V0 | 0.0000052 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.0652179 | V0 | 0.0385610 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0000615 | V0 | 0.0000415 | V0 | 0.0000013 | V0 |
| Cesium | 0.0000100 | 0.0000032 | V0 | 0.0000019 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0002264 | V0 | 0.0002691 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0000163 | V0 | 0.0000110 | V0 | 0.0000014 | V0 |
| Copper | 0.0017171 | 0.0009147 | V0 | 0.0002925 | V0 | 0.0001861 | V0 |
| Iron | 0.0393063 | 0.0637479 | V0 | 0.0310092 | V0 | 0.0026234 | V0 |
| Lanthanum | 0.0000130 | 0.0000301 | V0 | 0.0000223 | V0 | 0.0000007 | V0 |
| Lead | 0.0008577 | 0.0001422 | V0 | 0.0000611 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000376 | V0 | 0.0000221 | V0 | 0.0000027 | V0 |
| Magnesium | 0.0091409 | 0.0142620 | V0 | 0.0089046 | V0 | 0.0008818 | V0 |
| Manganese | 0.0006949 | 0.0011435 | V0 | 0.0007542 | V0 | 0.0000418 | V0 |
| Molybdenum | 0.0007116 | 0.0000534 | V0 | 0.0000000 | V1 | 0.0000399 | V0 |
| Neodymium | 0.0000140 | 0.0000222 | V0 | 0.0000175 | V0 | 0.0000006 | V0 |
| Nickel | 0.0005429 | 0.0001254 | V0 | 0.0001272 | V0 | 0.0000441 | V0 |
| Niobium | 0.0000202 | 0.0000062 | V0 | 0.0000047 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000070 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Phosphorus | 0.0459574 | 0.0151175 | V0 | 0.0117382 | V0 | 0.0095044 | V0 |
| Platinum | 0.0000088 | 0.0000018 | V0 | 0.0000016 | V0 | 0.0000010 | V0 |
| Potassium | 0.0061261 | 0.0283054 | V0 | 0.0187557 | V0 | 0.0015876 | V0 |
| Praseodymium | 0.0000070 | 0.0000074 | V0 | 0.0000046 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0000744 | V0 | 0.0000507 | V0 | 0.0000026 | V0 |
| Samarium | 0.0000133 | 0.0000048 | V0 | 0.0000035 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0000545 | V0 | 0.0000328 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.2954671 | V0 | 0.1197587 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000011 | V0 | 0.0000084 | V0 | 0.0000007 | V0 |
| Sodium | 0.0169447 | 0.0108321 | V0 | 0.0068568 | V0 | 0.0035374 | V0 |
| Strontium | 0.0003375 | 0.0002515 | V0 | 0.0001227 | V0 | 0.0000164 | V0 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000008 | V0 | 0.0000006 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000068 | V0 | 0.0000060 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001201 | V0 | 0.0000562 | V0 | 0.0000272 | V0 |
| Titanium | 0.0015201 | 0.0025643 | V0 | 0.0015113 | V0 | 0.0009181 | V0 |
| Tungsten | 0.0000938 | 0.0000131 | V0 | 0.0000082 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000020 | V0 | 0.0000015 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0001041 | V0 | 0.0000609 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0019876 | V0 | 0.0007012 | V0 | 0.0008493 | V0 |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|-----------|------------------------------|-----------|--------------|
| | Station Name | McKay | | | Patricia McInnes | | Travel Blank |
| | Station # | AMS 1 | | AMS 6 | | | |
| | Sample Date | 29-Aug | | 29-Aug | | 29-Aug | |
| Particulate Size | PM2.5 | | PM2.5 | | | | |
| Total Air Volume (m ³) | 24 | | 24 | | | 24 | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | |
| Particulate Matter | 1.00 | 6.69 | V0 | 5.69 | V0 | 0.12 | V0 |
| Aluminum | 0.1380326 | 0.0789722 | V0 | 0.0583986 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000345 | V0 | 0.0001137 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000231 | V0 | 0.0002710 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0009211 | V0 | 0.0015128 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000049 | V0 | 0.0000052 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000015 | V0 | 0.0000051 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000065 | V0 | 0.0000057 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.3406495 | V0 | 0.0936034 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0000862 | V0 | 0.0000843 | V0 | 0.0000008 | V0 |
| Cesium | 0.0000100 | 0.0000068 | V0 | 0.0000044 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0002041 | V0 | 0.0002580 | V0 | 0.0002997 | V0 |
| Cobalt | 0.0000273 | 0.0000252 | V0 | 0.0000214 | V0 | 0.0000027 | V0 |
| Copper | 0.0017171 | 0.0004957 | V0 | 0.0008830 | V0 | 0.0000000 | V1 |
| Iron | 0.0393063 | 0.0868628 | V0 | 0.0881299 | V0 | 0.0030224 | V0 |
| Lanthanum | 0.0000130 | 0.0000428 | V0 | 0.0000401 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0000619 | V0 | 0.0000895 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000788 | V0 | 0.0000545 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.0211448 | V0 | 0.0208933 | V0 | 0.0004359 | V0 |
| Manganese | 0.0006949 | 0.0014629 | V0 | 0.0013690 | V0 | 0.0000417 | V0 |
| Molybdenum | 0.0007116 | 0.0000361 | V0 | 0.0000796 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0000357 | V0 | 0.0000323 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0001678 | V0 | 0.0001487 | V0 | 0.0006087 | V0 |
| Niobium | 0.0000202 | 0.0000086 | V0 | 0.0000097 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000049 | V0 | 0.0000077 | V0 | 0.0000033 | V0 |
| Phosphorus | 0.0459574 | 0.0111965 | V0 | 0.0122684 | V0 | 0.0094987 | V0 |
| Platinum | 0.0000088 | 0.0000027 | V0 | 0.0000023 | V0 | 0.0000005 | V0 |
| Potassium | 0.0061261 | 0.0324989 | V0 | 0.0282700 | V0 | 0.0007565 | V0 |
| Praseodymium | 0.0000070 | 0.0000097 | V0 | 0.0000083 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0001261 | V0 | 0.0000901 | V0 | 0.0000000 | V1 |
| Samarium | 0.0000133 | 0.0000071 | V0 | 0.0000062 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0000572 | V0 | 0.0000600 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.2609922 | V0 | 0.3254274 | V0 | 0.0557555 | V0 |
| Silver | 0.0000100 | 0.0000014 | V0 | 0.0000050 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0186849 | V0 | 0.0201838 | V0 | 0.0007552 | V0 |
| Strontium | 0.0003375 | 0.0005393 | V0 | 0.0003287 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000012 | V0 | 0.0000012 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000107 | V0 | 0.0000090 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001372 | V0 | 0.0001612 | V0 | 0.0173422 | V0 |
| Titanium | 0.0015201 | 0.0033393 | V0 | 0.0029645 | V0 | 0.0006376 | V0 |
| Tungsten | 0.0000938 | -9999 | M2 | 0.0000147 | V0 | 0.0000079 | V0 |
| Uranium | 0.0000048 | 0.0000030 | V0 | 0.0000027 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0001534 | V0 | 0.0001737 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0008555 | V0 | 0.0017522 | V0 | 0.0000000 | V1 |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| | AMS 7 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug |
| | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 5.46 | V0 | 4.38 | V0 | 0.12 | V0 |
| Aluminum | 0.1380326 | 0.0433466 | V0 | 0.0126023 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0001286 | V0 | 0.0014730 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0004159 | V0 | 0.0001056 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0016838 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000052 | V0 | 0.0000058 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000080 | V0 | 0.0000276 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.0722437 | V0 | 0.0217886 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0000601 | V0 | 0.0000190 | V0 | 0.0000008 | V0 |
| Cesium | 0.0000100 | 0.0000034 | V0 | 0.0000011 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0002024 | V0 | 0.0001961 | V0 | 0.0002997 | V0 |
| Cobalt | 0.0000273 | 0.0000186 | V0 | 0.0000074 | V0 | 0.0000027 | V0 |
| Copper | 0.0017171 | 0.0009203 | V0 | 0.0006611 | V0 | 0.0000000 | V1 |
| Iron | 0.0393063 | 0.0673685 | V0 | 0.0299264 | V0 | 0.0030224 | V0 |
| Lanthanum | 0.0000130 | 0.0000279 | V0 | 0.0000092 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0001941 | V0 | 0.0004523 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0000462 | V0 | 0.0000136 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.0153639 | V0 | 0.0050006 | V0 | 0.0004359 | V0 |
| Manganese | 0.0006949 | 0.0011335 | V0 | 0.0004518 | V0 | 0.0000417 | V0 |
| Molybdenum | 0.0007116 | 0.0000638 | V0 | 0.0000341 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0000235 | V0 | 0.0000070 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0001756 | V0 | 0.0001219 | V0 | 0.0006087 | V0 |
| Niobium | 0.0000202 | 0.0000075 | V0 | 0.0000021 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000064 | V0 | 0.0000032 | V0 | 0.0000033 | V0 |
| Phosphorus | 0.0459574 | 0.0133079 | V0 | 0.0132004 | V0 | 0.0094987 | V0 |
| Platinum | 0.0000088 | 0.0000019 | V0 | 0.0000019 | V0 | 0.0000005 | V0 |
| Potassium | 0.0061261 | 0.0269248 | V0 | 0.0152235 | V0 | 0.0007565 | V0 |
| Praseodymium | 0.0000070 | 0.0000063 | V0 | 0.0000019 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0000693 | V0 | 0.0000303 | V0 | 0.0000000 | V1 |
| Samarium | 0.0000133 | 0.0000042 | V0 | 0.0000013 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0000517 | V0 | 0.0000267 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.1720115 | V0 | 0.0900182 | V0 | 0.0557555 | V0 |
| Silver | 0.0000100 | 0.0000013 | V0 | 0.0000019 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0166866 | V0 | 0.0117666 | V0 | 0.0007552 | V0 |
| Strontium | 0.0003375 | 0.0002450 | V0 | 0.0000709 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000009 | V0 | 0.0000006 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000063 | V0 | 0.0000021 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001349 | V0 | 0.0008438 | V0 | 0.0173422 | V0 |
| Titanium | 0.0015201 | 0.0024185 | V0 | 0.0010261 | V0 | 0.0006376 | V0 |
| Tungsten | 0.0000938 | 0.0000107 | V0 | 0.0000054 | V0 | 0.0000079 | V0 |
| Uranium | 0.0000048 | 0.0000021 | V0 | 0.0000006 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0001141 | V0 | 0.0000401 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0026297 | V0 | 0.0015405 | V0 | 0.0000000 | V1 |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

Particulate Matter (PM2.5) - METALS - Summary

2017

Indicated Sites and Dates

| Station Name | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay |
|--------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Station # | AMS 1 | AMS 1 | AMS 1 | AMS 1 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 10.13 | 2.79 | 5 | 5 |
| Aluminum | 0.1042851 | 0.0631801 | 5 | 5 |
| Antimony | 0.0000309 | 0.0000176 | 5 | 5 |
| Arsenic | 0.0000642 | 0.0000350 | 5 | 5 |
| Barium | 0.0010617 | 0.0005619 | 5 | 5 |
| Beryllium | 0.0000034 | 0.0000033 | 5 | 3 |
| Bismuth | 0.0000027 | 0.0000013 | 5 | 5 |
| Cadmium | 0.0000096 | 0.0000037 | 5 | 5 |
| Calcium | 0.2017650 | 0.1092679 | 5 | 5 |
| Cerium | 0.0001127 | 0.0000634 | 5 | 5 |
| Cesium | 0.0000093 | 0.0000041 | 5 | 5 |
| Chromium | 0.0002867 | 0.0000896 | 5 | 5 |
| Cobalt | 0.0000328 | 0.0000182 | 5 | 5 |
| Copper | 0.0008894 | 0.0002860 | 5 | 5 |
| Iron | 0.1047227 | 0.0580951 | 5 | 5 |
| Lanthanum | 0.0000575 | 0.0000324 | 5 | 5 |
| Lead | 0.0000978 | 0.0000382 | 5 | 5 |
| Lithium | 0.0001029 | 0.0000652 | 5 | 5 |
| Magnesium | 0.0227722 | 0.0128570 | 5 | 5 |
| Manganese | 0.0017713 | 0.0009450 | 5 | 5 |
| Molybdenum | 0.0000818 | 0.0000481 | 5 | 5 |
| Neodymium | 0.0000470 | 0.0000281 | 5 | 5 |
| Nickel | 0.0002651 | 0.0001471 | 5 | 5 |
| Niobium | 0.0000133 | 0.0000086 | 5 | 5 |
| Palladium | 0.0000072 | 0.0000017 | 5 | 5 |
| Phosphorus | 0.0118529 | 0.0013982 | 5 | 5 |
| Platinum | 0.0000030 | 0.0000012 | 4 | 4 |
| Potassium | 0.0548467 | 0.0231987 | 5 | 5 |
| Praseodymium | 0.0000127 | 0.0000076 | 5 | 5 |
| Rubidium | 0.0001778 | 0.0000879 | 5 | 5 |
| Samarium | 0.0000090 | 0.0000055 | 5 | 5 |
| Selenium | 0.0001095 | 0.0000691 | 5 | 5 |
| Silicon | 0.3692921 | 0.2112434 | 5 | 5 |
| Silver | 0.0000021 | 0.0000007 | 5 | 5 |
| Sodium | 0.0192112 | 0.0059065 | 5 | 5 |
| Strontium | 0.0004853 | 0.0002400 | 5 | 5 |
| Tantalum | 0.0000004 | 0.0000008 | 5 | 1 |
| Thallium | 0.0000018 | 0.0000007 | 5 | 5 |
| Thorium | 0.0000139 | 0.0000081 | 5 | 5 |
| Tin | 0.0001154 | 0.0000194 | 5 | 5 |
| Titanium | 0.0044989 | 0.0024656 | 5 | 5 |
| Tungsten | 0.0000144 | 0.0000077 | 4 | 4 |
| Uranium | 0.0000042 | 0.0000025 | 5 | 5 |
| Vanadium | 0.0003912 | 0.0003119 | 5 | 5 |
| Zinc | 0.0026913 | 0.0012382 | 5 | 5 |



| Station Name | Patricia McInnes | Patricia McInnes | Patricia McInnes | Patricia McInnes |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 6 | AMS 6 | AMS 6 | AMS 6 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 6.48 | 0.78 | 5 | 5 |
| Aluminum | 0.0373942 | 0.0150671 | 5 | 5 |
| Antimony | 0.0000712 | 0.0000365 | 5 | 5 |
| Arsenic | 0.0001145 | 0.0000952 | 5 | 5 |
| Barium | 0.0009187 | 0.0003944 | 5 | 5 |
| Beryllium | 0.0000019 | 0.0000026 | 5 | 2 |
| Bismuth | 0.0000050 | 0.0000021 | 5 | 5 |
| Cadmium | 0.0000097 | 0.0000030 | 5 | 5 |
| Calcium | 0.0577498 | 0.0209991 | 5 | 5 |
| Cerium | 0.0000513 | 0.0000225 | 5 | 5 |
| Cesium | 0.0000028 | 0.0000010 | 5 | 5 |
| Chromium | 0.0002895 | 0.0000835 | 5 | 5 |
| Cobalt | 0.0000145 | 0.0000045 | 5 | 5 |
| Copper | 0.0006025 | 0.0001627 | 5 | 5 |
| Iron | 0.0492324 | 0.0235831 | 5 | 5 |
| Lanthanum | 0.0000271 | 0.0000096 | 5 | 5 |
| Lead | 0.0000907 | 0.0000343 | 5 | 5 |
| Lithium | 0.0000294 | 0.0000161 | 5 | 5 |
| Magnesium | 0.0117742 | 0.0057867 | 5 | 5 |
| Manganese | 0.0008257 | 0.0003665 | 5 | 5 |
| Molybdenum | 0.0000379 | 0.0000367 | 5 | 3 |
| Neodymium | 0.0000184 | 0.0000097 | 5 | 5 |
| Nickel | 0.0001436 | 0.0000368 | 5 | 5 |
| Niobium | 0.0000049 | 0.0000028 | 5 | 5 |
| Palladium | 0.0000083 | 0.0000026 | 5 | 5 |
| Phosphorus | 0.0113194 | 0.0023382 | 5 | 5 |
| Platinum | 0.0000023 | 0.0000003 | 4 | 4 |
| Potassium | 0.0269025 | 0.0024017 | 5 | 5 |
| Praseodymium | 0.0000049 | 0.0000025 | 5 | 5 |
| Rubidium | 0.0000712 | 0.0000127 | 5 | 5 |
| Samarium | 0.0000033 | 0.0000019 | 5 | 5 |
| Selenium | 0.0000615 | 0.0000186 | 5 | 5 |
| Silicon | 0.2134475 | 0.1030806 | 5 | 5 |
| Silver | 0.0000023 | 0.0000016 | 5 | 5 |
| Sodium | 0.0132269 | 0.0049925 | 5 | 5 |
| Strontium | 0.0001977 | 0.0000766 | 5 | 5 |
| Tantalum | 0.0000000 | 0.0000000 | 5 | 0 |
| Thallium | 0.0000008 | 0.0000002 | 5 | 5 |
| Thorium | 0.0000056 | 0.0000026 | 5 | 5 |
| Tin | 0.0001407 | 0.0000471 | 5 | 5 |
| Titanium | 0.0019005 | 0.0006842 | 5 | 5 |
| Tungsten | 0.0000097 | 0.0000033 | 5 | 5 |
| Uranium | 0.0000016 | 0.0000007 | 5 | 5 |
| Vanadium | 0.0000953 | 0.0000524 | 5 | 5 |
| Zinc | 0.0015647 | 0.0001584 | 5 | 5 |



| Station Name | Athabasca Valley | Athabasca Valley | Athabasca Valley | Athabasca Valley |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 7 | AMS 7 | AMS 7 | AMS 7 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 6.97 | 1.59 | 5 | 5 |
| Aluminum | 0.0355509 | 0.0099273 | 5 | 5 |
| Antimony | 0.0001191 | 0.0000153 | 5 | 5 |
| Arsenic | 0.0001440 | 0.0001554 | 5 | 5 |
| Barium | 0.0016274 | 0.0001048 | 5 | 5 |
| Beryllium | 0.0000000 | 0.0000000 | 5 | 0 |
| Bismuth | 0.0000067 | 0.0000017 | 5 | 5 |
| Cadmium | 0.0000086 | 0.0000018 | 5 | 5 |
| Calcium | 0.0563805 | 0.0129381 | 5 | 5 |
| Cerium | 0.0000506 | 0.0000135 | 5 | 5 |
| Cesium | 0.0000027 | 0.0000006 | 5 | 5 |
| Chromium | 0.0002036 | 0.0000132 | 5 | 5 |
| Cobalt | 0.0000160 | 0.0000016 | 5 | 5 |
| Copper | 0.0009022 | 0.0000928 | 5 | 5 |
| Iron | 0.0546838 | 0.0137599 | 5 | 5 |
| Lanthanum | 0.0000254 | 0.0000075 | 5 | 5 |
| Lead | 0.0001181 | 0.0000571 | 5 | 5 |
| Lithium | 0.0000301 | 0.0000126 | 5 | 5 |
| Magnesium | 0.0116310 | 0.0034751 | 5 | 5 |
| Manganese | 0.0009692 | 0.0002081 | 5 | 5 |
| Molybdenum | 0.0000717 | 0.0000313 | 5 | 5 |
| Neodymium | 0.0000184 | 0.0000059 | 5 | 5 |
| Nickel | 0.0001347 | 0.0000307 | 5 | 5 |
| Niobium | 0.0000051 | 0.0000018 | 5 | 5 |
| Palladium | 0.0000073 | 0.0000020 | 5 | 5 |
| Phosphorus | 0.0111080 | 0.0034081 | 5 | 5 |
| Platinum | 0.0000018 | 0.0000004 | 5 | 5 |
| Potassium | 0.0258436 | 0.0025688 | 5 | 5 |
| Praseodymium | 0.0000053 | 0.0000018 | 5 | 5 |
| Rubidium | 0.0000656 | 0.0000078 | 5 | 5 |
| Samarium | 0.0000032 | 0.0000014 | 5 | 5 |
| Selenium | 0.0000634 | 0.0000251 | 5 | 5 |
| Silicon | 0.1925114 | 0.0638962 | 5 | 5 |
| Silver | 0.0000012 | 0.0000005 | 5 | 5 |
| Sodium | 0.0137134 | 0.0025842 | 4 | 4 |
| Strontium | 0.0002088 | 0.0000434 | 5 | 5 |
| Tantalum | 0.0000000 | 0.0000000 | 5 | 0 |
| Thallium | 0.0000007 | 0.0000002 | 5 | 5 |
| Thorium | 0.0000052 | 0.0000016 | 5 | 5 |
| Tin | 0.0001438 | 0.0000365 | 5 | 5 |
| Titanium | 0.0024997 | 0.0004639 | 5 | 5 |
| Tungsten | 0.0000126 | 0.0000027 | 5 | 5 |
| Uranium | 0.0000016 | 0.0000005 | 5 | 5 |
| Vanadium | 0.0000912 | 0.0000201 | 5 | 5 |
| Zinc | 0.0019520 | 0.0004363 | 5 | 5 |



| Station Name | Anzac | Anzac | Anzac | Anzac |
|--------------------|------------------------------|------------------------------|-------------------|-----------------|
| Station # | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM2.5 | PM2.5 | PM2.5 | PM2.5 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 5.09 | 0.61 | 5 | 5 |
| Aluminum | 0.0185674 | 0.0085169 | 5 | 5 |
| Antimony | 0.0003023 | 0.0006545 | 5 | 4 |
| Arsenic | 0.0000576 | 0.0000351 | 5 | 5 |
| Barium | 0.0000778 | 0.0001739 | 5 | 1 |
| Beryllium | 0.0000008 | 0.0000018 | 5 | 1 |
| Bismuth | 0.0000032 | 0.0000023 | 5 | 5 |
| Cadmium | 0.0000104 | 0.0000098 | 5 | 5 |
| Calcium | 0.0219617 | 0.0143031 | 5 | 4 |
| Cerium | 0.0000239 | 0.0000120 | 5 | 5 |
| Cesium | 0.0000014 | 0.0000006 | 5 | 5 |
| Chromium | 0.0002538 | 0.0002099 | 5 | 4 |
| Cobalt | 0.0000094 | 0.0000016 | 5 | 5 |
| Copper | 0.0003615 | 0.0001787 | 5 | 5 |
| Iron | 0.0258351 | 0.0043959 | 5 | 5 |
| Lanthanum | 0.0000154 | 0.0000081 | 5 | 5 |
| Lead | 0.0001136 | 0.0001916 | 5 | 3 |
| Lithium | 0.0000150 | 0.0000061 | 5 | 5 |
| Magnesium | 0.0054376 | 0.0022943 | 5 | 5 |
| Manganese | 0.0004756 | 0.0001765 | 5 | 5 |
| Molybdenum | 0.0000240 | 0.0000231 | 5 | 3 |
| Neodymium | 0.0000098 | 0.0000052 | 5 | 5 |
| Nickel | 0.0001433 | 0.0000833 | 5 | 5 |
| Niobium | 0.0000026 | 0.0000014 | 5 | 5 |
| Palladium | 0.0000061 | 0.0000059 | 5 | 4 |
| Phosphorus | 0.0124091 | 0.0009141 | 5 | 5 |
| Platinum | 0.0000018 | 0.0000004 | 5 | 5 |
| Potassium | 0.0174216 | 0.0026065 | 5 | 5 |
| Praseodymium | 0.0000025 | 0.0000014 | 5 | 5 |
| Rubidium | 0.0000397 | 0.0000086 | 5 | 5 |
| Samarium | 0.0000019 | 0.0000010 | 5 | 5 |
| Selenium | 0.0000434 | 0.0000196 | 5 | 5 |
| Silicon | 0.1294367 | 0.0340980 | 5 | 5 |
| Silver | 0.0013570 | 0.0030273 | 5 | 4 |
| Sodium | 0.0081919 | 0.0047241 | 5 | 5 |
| Strontium | 0.0000820 | 0.0000327 | 5 | 5 |
| Tantalum | 0.0000000 | 0.0000000 | 5 | 0 |
| Thallium | 0.0000004 | 0.0000003 | 5 | 3 |
| Thorium | 0.0000031 | 0.0000019 | 5 | 5 |
| Tin | 0.0002434 | 0.0003374 | 5 | 5 |
| Titanium | 0.0012377 | 0.0003845 | 5 | 5 |
| Tungsten | 0.0000061 | 0.0000016 | 5 | 5 |
| Uranium | 0.0000008 | 0.0000004 | 5 | 5 |
| Vanadium | 0.0000439 | 0.0000261 | 5 | 4 |
| Zinc | 0.0009928 | 0.0004080 | 5 | 5 |



Wood Buffalo Environmental Association

PM2.5 Metal (µg/sample) Summary

2017 August

| Compound | % Det | N | N < Det. | Min. | 10% | 25% | 50% | 60% | 75% | 80% | 90% | 95% | 99% Max. | Mean | Std. Dev. | Median | Outlier Test | |
|--------------------|--------|----|----------|--------|--------|--------|--------|--------|--------|--------|---------|---------|----------|---------|-----------|--------|--------------|---------|
| Particulate Matter | 100.0% | 20 | 0 | 105 | 129 | 136 | 160 | 168 | 202 | 226 | 287 | 330 | 330 | 330 | 172 | 59 | 160 | 465 |
| Aluminium | 100.0% | 20 | 0 | 0.1617 | 0.4236 | 0.5786 | 0.8488 | 1.0403 | 1.4016 | 1.8953 | 3.1223 | 4.7098 | 4.7098 | 4.7098 | 1.1748 | 1.0880 | 0.8488 | 6.6150 |
| Antimony | 95.0% | 20 | 1 | 0.0002 | 0.0002 | 0.0005 | 0.0014 | 0.0022 | 0.0030 | 0.0030 | 0.0031 | 0.0354 | 0.0354 | 0.0354 | 0.0031 | 0.0077 | 0.0014 | 0.0414 |
| Arsenic | 100.0% | 20 | 0 | 0.0006 | 0.0007 | 0.0010 | 0.0018 | 0.0022 | 0.0025 | 0.0030 | 0.0065 | 0.0100 | 0.0100 | 0.0100 | 0.0023 | 0.0023 | 0.0018 | 0.0136 |
| Barium | 80.0% | 20 | 4 | 0.0041 | 0.0071 | 0.0093 | 0.0221 | 0.0314 | 0.0366 | 0.0404 | 0.0414 | 0.0451 | 0.0451 | 0.0451 | 0.0234 | 0.0140 | 0.0221 | 0.0933 |
| Beryllium | 30.0% | 20 | 14 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0000 | 0.0003 |
| Bismuth | 100.0% | 20 | 0 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0001 | 0.0001 | 0.0004 |
| Cadmium | 100.0% | 20 | 0 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0007 | 0.0007 | 0.0007 | 0.0002 | 0.0001 | 0.0002 | 0.0008 |
| Calcium | 95.0% | 20 | 1 | 0.3979 | 0.5229 | 0.9866 | 1.3791 | 1.5310 | 2.2465 | 3.4868 | 6.6724 | 8.1756 | 8.1756 | 8.1756 | 2.0470 | 2.0916 | 1.3791 | 12.5052 |
| Cerium | 100.0% | 20 | 0 | 0.0002 | 0.0005 | 0.0007 | 0.0011 | 0.0014 | 0.0020 | 0.0021 | 0.0032 | 0.0049 | 0.0049 | 0.0049 | 0.0014 | 0.0011 | 0.0011 | 0.0070 |
| Cesium | 100.0% | 20 | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0003 | 0.0004 | 0.0004 | 0.0004 | 0.0001 | 0.0001 | 0.0001 | 0.0005 |
| Chromium | 95.0% | 20 | 1 | 0.0021 | 0.0045 | 0.0047 | 0.0054 | 0.0062 | 0.0081 | 0.0088 | 0.0093 | 0.0140 | 0.0140 | 0.0140 | 0.0063 | 0.0026 | 0.0054 | 0.0193 |
| Cobalt | 100.0% | 20 | 0 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0004 | 0.0005 | 0.0006 | 0.0010 | 0.0014 | 0.0014 | 0.0014 | 0.0004 | 0.0003 | 0.0004 | 0.0019 |
| Copper | 100.0% | 20 | 0 | 0.0048 | 0.0070 | 0.0119 | 0.0169 | 0.0212 | 0.0221 | 0.0234 | 0.0257 | 0.0288 | 0.0288 | 0.0288 | 0.0165 | 0.0070 | 0.0169 | 0.0513 |
| Iron | 100.0% | 20 | 0 | 0.5020 | 0.5744 | 0.7442 | 1.2252 | 1.4066 | 2.0847 | 2.1151 | 2.6420 | 4.6540 | 4.6540 | 4.6540 | 1.4068 | 1.0014 | 1.2252 | 6.4139 |
| Lanthanum | 100.0% | 20 | 0 | 0.0001 | 0.0004 | 0.0004 | 0.0006 | 0.0007 | 0.0010 | 0.0010 | 0.0016 | 0.0025 | 0.0025 | 0.0025 | 0.0008 | 0.0006 | 0.0006 | 0.0035 |
| Lead | 90.0% | 20 | 2 | 0.0008 | 0.0010 | 0.0015 | 0.0020 | 0.0027 | 0.0033 | 0.0034 | 0.0047 | 0.0109 | 0.0109 | 0.0109 | 0.0026 | 0.0022 | 0.0020 | 0.0137 |
| Lithium | 100.0% | 20 | 0 | 0.0002 | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0013 | 0.0019 | 0.0029 | 0.0048 | 0.0048 | 0.0048 | 0.0011 | 0.0011 | 0.0006 | 0.0067 |
| Magnesium | 100.0% | 20 | 0 | 0.0610 | 0.1200 | 0.1591 | 0.2474 | 0.3212 | 0.4523 | 0.5014 | 0.5818 | 1.0224 | 1.0224 | 1.0224 | 0.3097 | 0.2233 | 0.2474 | 1.4261 |
| Manganese | 100.0% | 20 | 0 | 0.0065 | 0.0108 | 0.0147 | 0.0181 | 0.0260 | 0.0329 | 0.0351 | 0.0437 | 0.0776 | 0.0776 | 0.0776 | 0.0243 | 0.0164 | 0.0181 | 0.1064 |
| Molybdenum | 80.0% | 20 | 4 | 0.0004 | 0.0006 | 0.0008 | 0.0012 | 0.0015 | 0.0018 | 0.0019 | 0.0030 | 0.0038 | 0.0038 | 0.0038 | 0.0014 | 0.0008 | 0.0012 | 0.0056 |
| Neodymium | 100.0% | 20 | 0 | 0.0001 | 0.0002 | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0009 | 0.0013 | 0.0021 | 0.0021 | 0.0021 | 0.0006 | 0.0005 | 0.0004 | 0.0030 |
| Nickel | 100.0% | 20 | 0 | 0.0019 | 0.0023 | 0.0029 | 0.0036 | 0.0037 | 0.0047 | 0.0056 | 0.0079 | 0.0116 | 0.0116 | 0.0116 | 0.0041 | 0.0023 | 0.0036 | 0.0159 |
| Niobium | 100.0% | 20 | 0 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0004 | 0.0006 | 0.0006 | 0.0006 | 0.0002 | 0.0001 | 0.0001 | 0.0009 |
| Palladium | 95.0% | 20 | 1 | 0.0000 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0004 | 0.0004 | 0.0002 | 0.0001 | 0.0002 | 0.0005 |
| Phosphorus | 100.0% | 20 | 0 | 0.1476 | 0.2378 | 0.2650 | 0.2817 | 0.2944 | 0.3194 | 0.3205 | 0.3451 | 0.3628 | 0.3628 | 0.3628 | 0.2801 | 0.0506 | 0.2817 | 0.5333 |
| Platinum | 100.0% | 20 | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0002 |
| Potassium | 100.0% | 20 | 0 | 0.3532 | 0.4164 | 0.5286 | 0.6597 | 0.6793 | 0.7800 | 0.8532 | 1.6246 | 2.1113 | 2.1113 | 2.1113 | 0.7501 | 0.4339 | 0.6597 | 2.9196 |
| Praseodymium | 100.0% | 20 | 0 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0004 | 0.0006 | 0.0006 | 0.0006 | 0.0002 | 0.0001 | 0.0001 | 0.0008 |
| Rubidium | 100.0% | 20 | 0 | 0.0007 | 0.0009 | 0.0013 | 0.0016 | 0.0018 | 0.0025 | 0.0030 | 0.0053 | 0.0075 | 0.0075 | 0.0075 | 0.0021 | 0.0016 | 0.0016 | 0.0103 |
| Samarium | 100.0% | 20 | 0 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0003 | 0.0004 | 0.0004 | 0.0004 | 0.0001 | 0.0001 | 0.0001 | 0.0006 |
| Selenium | 100.0% | 20 | 0 | 0.0006 | 0.0008 | 0.0011 | 0.0014 | 0.0014 | 0.0019 | 0.0022 | 0.0039 | 0.0048 | 0.0048 | 0.0048 | 0.0017 | 0.0011 | 0.0014 | 0.0069 |
| Silicon | 100.0% | 20 | 0 | 2.1604 | 2.7634 | 3.0331 | 4.4183 | 5.9602 | 7.0912 | 7.6645 | 10.2891 | 16.7486 | 16.7486 | 16.7486 | 5.4281 | 3.4721 | 4.4183 | 22.7885 |
| Silver | 95.0% | 20 | 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0002 | 0.1625 | 0.1625 | 0.1625 | 0.0082 | 0.0363 | 0.0000 | 0.1898 |
| Sodium | 100.0% | 20 | 0 | 0.0813 | 0.1602 | 0.2272 | 0.3164 | 0.3454 | 0.4005 | 0.4484 | 0.5816 | 0.6279 | 0.6279 | 0.6279 | 0.3176 | 0.1455 | 0.3164 | 1.0451 |
| Strontium | 100.0% | 20 | 0 | 0.0008 | 0.0020 | 0.0034 | 0.0045 | 0.0052 | 0.0079 | 0.0098 | 0.0129 | 0.0193 | 0.0193 | 0.0193 | 0.0058 | 0.0046 | 0.0045 | 0.0290 |
| Tantalum | 5.0% | 20 | 19 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| Thallium | 90.0% | 20 | 2 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0001 |
| Thorium | 100.0% | 20 | 0 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0006 | 0.0006 | 0.0006 | 0.0002 | 0.0001 | 0.0001 | 0.0009 |
| Tin | 100.0% | 20 | 0 | 0.0013 | 0.0020 | 0.0026 | 0.0029 | 0.0032 | 0.0036 | 0.0039 | 0.0052 | 0.0203 | 0.0203 | 0.0203 | 0.0039 | 0.0040 | 0.0029 | 0.0237 |
| Titanium | 100.0% | 20 | 0 | 0.0158 | 0.0318 | 0.0358 | 0.0524 | 0.0580 | 0.0780 | 0.0801 | 0.1436 | 0.1884 | 0.1884 | 0.1884 | 0.0608 | 0.0417 | 0.0524 | 0.2693 |
| Tungsten | 100.0% | 20 | 0 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0004 | 0.0006 | 0.0022 | 0.0022 | 0.0022 | 0.0003 | 0.0004 | 0.0002 | 0.0026 |
| Uranium | 100.0% | 20 | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0003 |
| Vanadium | 95.0% | 20 | 1 | 0.0004 | 0.0010 | 0.0015 | 0.0020 | 0.0025 | 0.0037 | 0.0042 | 0.0126 | 0.0203 | 0.0203 | 0.0203 | 0.0038 | 0.0049 | 0.0020 | 0.0280 |
| Zinc | 100.0% | 20 | 0 | 0.0150 | 0.0189 | 0.0330 | 0.0395 | 0.0446 | 0.0540 | 0.0631 | 0.0839 | 0.0978 | 0.0978 | 0.0978 | 0.0432 | 0.0215 | 0.0395 | 0.1508 |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PARTICULATE MATTER (PM₁₀) - METALS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PM metals: Atmospheric Research & Analysis, Inc.
Morrisville, NC



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|---|---|
| FILE CONTENTS DESCRIPTION | Partisol Sampler Measurements of Mass, Ions by IC and Metals by ICP-MS |
| SAMPLING INTERVAL | 24 hour |
| SAMPLING FREQUENCY OF DATA | Once every 6 days |
| EXPLANATION OF ZERO VALUES | Zero values are contained in this file and should be treated as values below detection - Method Detection Limits (MDL) are provided with each observation |
| UNITS | $\mu\text{g}/\text{m}^3$ (microgram per cubic meter) |
| OBSERVATION TYPE | Particles |
| FIELD SAMPLING OR MEASUREMENT PRINCIPLE | Filtration with PM_{10} Inlet for PM_{10} and with PM_{10} Inlet/Very Sharp Cut Cyclone for $\text{PM}_{2.5}$ |
| PARTICLE DIAMETER | $< 2.5 \mu\text{m}$ or $< 10 \mu\text{m}$ |
| MEDIUM | 47 mm Teflon Filter |
| ANALYTICAL METHODS | MASS by Microbalance ELEMENTS by Inductively Coupled Plasma Mass Spectrometry (ICP/MS) IONS by Ion Chromatography (IC) |
| SAMPLE PREPARATION | DI Water extraction for IC analysis and Acid Digestion for ICP/MS Analysis |
| ANALYTICAL LABORATORY | Atmospheric Research & Analysis Inc |
| USER NOTE 1 | Data are not blank corrected |
| USER NOTE 2 | Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler |
| USER NOTE 3 | Blank sample concentration ($\mu\text{g}/\text{m}^3$) is calculated using expected actual volume of sampler |
| VOLUME STANDARDIZATION | Actual Volume at Ambient Conditions (since 01-Jan-2011) |
| SAMPLING INSTRUMENT TYPE | For PM_{10} FRM Partisol PM_{10} sampler For $\text{PM}_{2.5}$ FRM Partisol $\text{PM}_{2.5}$ sampler |
| FLAGS USED | |
| V0 | Valid value |
| V1 | Valid value but comprised wholly or partially of below detection limit data |
| V4 | Valid value despite failing to meet some QC or statistical criteria |
| V5 | Valid value but qualified because of possible contamination |
| V6 | Valid value but qualified due to non-standard sampling conditions |
| M1 | Missing value because no value is available |
| M2 | Missing value because invalidated by Data Originator |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|-----------|------------------------------|-----------|--------------|
| | Station Name | McKay | | | Patricia McInnes | | Travel Blank |
| | Station # | AMS 1 | AMS 6 | AMS 6 | AMS 6 | 05-Aug | |
| | Sample Date | 05-Aug | 05-Aug | 05-Aug | 05-Aug | 05-Aug | |
| Particulate Size | PM10 | PM10 | PM10 | PM10 | PM10 | PM10 | |
| Total Air Volume (m ³) | 24 | 24 | 24 | 24 | 24 | 24 | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | |
| Particulate Matter | 1.00 | 35.79 | V0 | 9.86 | V0 | 0.07 | V0 |
| Aluminum | 0.1380326 | 1.2729075 | V0 | 0.1147643 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000844 | V0 | 0.0002191 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0003125 | V0 | 0.0001359 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0114715 | V0 | 0.0028319 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000366 | V0 | 0.0000082 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000097 | V0 | 0.0000076 | V0 | 0.0000005 | V0 |
| Cadmium | 0.0000174 | 0.0000161 | V0 | 0.0000124 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 1.5546234 | V0 | 0.2936041 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0013088 | V0 | 0.0001588 | V0 | 0.0000008 | V0 |
| Cesium | 0.0000100 | 0.0001073 | V0 | 0.0000082 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0016202 | V0 | 0.0003264 | V0 | 0.0002701 | V0 |
| Cobalt | 0.0000273 | 0.0003514 | V0 | 0.0000445 | V0 | 0.0000035 | V0 |
| Copper | 0.0017171 | 0.0023783 | V0 | 0.0012610 | V0 | 0.0001434 | V0 |
| Iron | 0.0393063 | 1.0023631 | V0 | 0.1637056 | V0 | 0.0052658 | V0 |
| Lanthanum | 0.0000130 | 0.0006488 | V0 | 0.0000787 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0004567 | V0 | 0.0001345 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0011704 | V0 | 0.0000916 | V0 | 0.0000021 | V0 |
| Magnesium | 0.0091409 | 0.2561834 | V0 | 0.0555898 | V0 | 0.0005352 | V0 |
| Manganese | 0.0006949 | 0.0143238 | V0 | 0.0028060 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0002827 | V0 | 0.0000569 | V0 | 0.0000579 | V0 |
| Neodymium | 0.0000140 | 0.0005837 | V0 | 0.0000634 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0017452 | V0 | 0.0001774 | V0 | 0.0000545 | V0 |
| Niobium | 0.0000202 | 0.0001645 | V0 | 0.0000147 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000249 | V0 | 0.0000106 | V0 | 0.0000087 | V0 |
| Phosphorus | 0.0459574 | 0.0289807 | V0 | 0.0222125 | V0 | 0.0082094 | V0 |
| Platinum | 0.0000088 | 0.0000018 | V0 | 0.0000015 | V0 | 0.0000022 | V0 |
| Potassium | 0.0061261 | 0.4139644 | V0 | 0.0748786 | V0 | 0.0009348 | V0 |
| Praseodymium | 0.0000070 | 0.0001518 | V0 | 0.0000162 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0017504 | V0 | 0.0002066 | V0 | 0.0000011 | V0 |
| Samarium | 0.0000133 | 0.0001071 | V0 | 0.0000107 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0008589 | V0 | 0.0001753 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 3.7734388 | V0 | 0.6487435 | V0 | 0.0983498 | V0 |
| Silver | 0.0000100 | 0.0000080 | V0 | 0.0000028 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.1955623 | V0 | 0.0246879 | V0 | 0.0010467 | V0 |
| Strontium | 0.0003375 | 0.0049299 | V0 | 0.0008071 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000125 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000131 | V0 | 0.0000020 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0001720 | V0 | 0.0000182 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001674 | V0 | 0.0002215 | V0 | 0.0000361 | V0 |
| Titanium | 0.0015201 | 0.0533240 | V0 | 0.0056000 | V0 | 0.0005767 | V0 |
| Tungsten | 0.0000938 | 0.0001081 | V0 | 0.0000771 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000523 | V0 | 0.0000063 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0041316 | V0 | 0.0002411 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0052012 | V0 | 0.0042428 | V0 | 0.0000000 | V1 |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|-------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|
| | AMS 7 05-Aug PM10 24 | AMS 14 05-Aug PM10 24 | AMS 7 05-Aug PM10 24 | AMS 14 05-Aug PM10 24 | AMS 14 05-Aug PM10 24 | AMS 7 05-Aug PM10 24 | AMS 14 05-Aug PM10 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 12.38 | V0 | 7.95 | V0 | 0.07 | V0 |
| Aluminum | 0.1380326 | 0.1343874 | V0 | 0.0591646 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0002732 | V0 | 0.0000706 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000972 | V0 | 0.0000686 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0040500 | V0 | 0.0011262 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000047 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000122 | V0 | 0.0000000 | V1 | 0.0000005 | V0 |
| Cadmium | 0.0000174 | 0.0000063 | V0 | 0.0000081 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.2869051 | V0 | 0.0738362 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0003948 | V0 | 0.0000651 | V0 | 0.0000008 | V0 |
| Cesium | 0.0000100 | 0.0000099 | V0 | 0.0000030 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0004083 | V0 | 0.0002953 | V0 | 0.0002701 | V0 |
| Cobalt | 0.0000273 | 0.0000460 | V0 | 0.0000265 | V0 | 0.0000035 | V0 |
| Copper | 0.0017171 | 0.0024776 | V0 | 0.0005837 | V0 | 0.0001434 | V0 |
| Iron | 0.0393063 | 0.1943978 | V0 | 0.1743699 | V0 | 0.0052658 | V0 |
| Lanthanum | 0.0000130 | 0.0000945 | V0 | 0.0000326 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0001463 | V0 | 0.0000639 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0001015 | V0 | 0.0000347 | V0 | 0.0000021 | V0 |
| Magnesium | 0.0091409 | 0.0534105 | V0 | 0.0236731 | V0 | 0.0005352 | V0 |
| Manganese | 0.0006949 | 0.0030612 | V0 | 0.0023901 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001034 | V0 | 0.0000751 | V0 | 0.0000579 | V0 |
| Neodymium | 0.0000140 | 0.0000699 | V0 | 0.0000257 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0002400 | V0 | 0.0002155 | V0 | 0.0000545 | V0 |
| Niobium | 0.0000202 | 0.0000198 | V0 | 0.0000057 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000129 | V0 | 0.0000000 | V1 | 0.0000087 | V0 |
| Phosphorus | 0.0459574 | 0.0210628 | V0 | 0.0292018 | V0 | 0.0082094 | V0 |
| Platinum | 0.0000088 | 0.0000033 | V0 | 0.0000020 | V0 | 0.0000022 | V0 |
| Potassium | 0.0061261 | 0.0735514 | V0 | 0.0599701 | V0 | 0.0009348 | V0 |
| Praseodymium | 0.0000070 | 0.0000192 | V0 | 0.0000069 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0002134 | V0 | 0.0001266 | V0 | 0.0000011 | V0 |
| Samarium | 0.0000133 | 0.0000125 | V0 | 0.0000052 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0001414 | V0 | 0.0001450 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.7925958 | V0 | 0.1841858 | V0 | 0.0983498 | V0 |
| Silver | 0.0000100 | -9999 | M2 | 0.0000006 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0358425 | V0 | 0.0124975 | V0 | 0.0010467 | V0 |
| Strontium | 0.0003375 | 0.0007843 | V0 | 0.0002287 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000017 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000018 | V0 | 0.0000007 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000196 | V0 | 0.0000074 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0003008 | V0 | 0.0000635 | V0 | 0.0000361 | V0 |
| Titanium | 0.0015201 | 0.0076602 | V0 | 0.0027204 | V0 | 0.0005767 | V0 |
| Tungsten | 0.0000938 | 0.0000836 | V0 | 0.0000284 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000060 | V0 | 0.0000020 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0002993 | V0 | 0.0001171 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0052282 | V0 | 0.0011556 | V0 | 0.0000000 | V1 |



| Compound Name | Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Fort McKay South | | | Horizon | | Travel Blank | |
|--------------------|--|--------------------------------|------------------------------|-----------|--------------------------------|------------------------------|--------------|--------------|
| | | AMS 13 05-Aug PM10 24 | Results (µg/m ³) | QC Flag | AMS 15 05-Aug PM10 24 | Results (µg/m ³) | QC Flag | 05-Aug 24 |
| Particulate Matter | 1.00 | 32.43 | V0 | 21.33 | V0 | 0.07 | V0 | |
| Aluminum | 0.1380326 | 1.2797466 | V0 | 0.5752176 | V0 | 0.0000000 | V1 | |
| Antimony | 0.0001784 | 0.0000604 | V0 | 0.0000346 | V0 | 0.0000000 | V1 | |
| Arsenic | 0.0001060 | 0.0002954 | V0 | 0.0001437 | V0 | 0.0000000 | V1 | |
| Barium | 0.0092847 | 0.0116496 | V0 | 0.0043659 | V0 | 0.0000000 | V1 | |
| Beryllium | 0.0000946 | 0.0000383 | V0 | 0.0000182 | V0 | 0.0000000 | V1 | |
| Bismuth | 0.0000093 | 0.0000085 | V0 | 0.0000000 | V1 | 0.0000005 | V0 | |
| Cadmium | 0.0000174 | 0.0000114 | V0 | 0.0000088 | V0 | 0.0000000 | V1 | |
| Calcium | 0.4112124 | 1.0605029 | V0 | 0.2562724 | V0 | 0.0000000 | V1 | |
| Cerium | 0.0000174 | 0.0012724 | V0 | 0.0005236 | V0 | 0.0000008 | V0 | |
| Cesium | 0.0000100 | 0.0001086 | V0 | 0.0000409 | V0 | 0.0000000 | V1 | |
| Chromium | 0.0022262 | 0.0016909 | V0 | 0.0007092 | V0 | 0.0002701 | V0 | |
| Cobalt | 0.0000273 | 0.0003486 | V0 | 0.0001388 | V0 | 0.0000035 | V0 | |
| Copper | 0.0017171 | 0.0014090 | V0 | 0.0006863 | V0 | 0.0001434 | V0 | |
| Iron | 0.0393063 | 0.9959821 | V0 | 0.3657995 | V0 | 0.0052658 | V0 | |
| Lanthanum | 0.0000130 | 0.0006219 | V0 | 0.0002533 | V0 | 0.0000000 | V1 | |
| Lead | 0.0008577 | 0.0004286 | V0 | 0.0001942 | V0 | 0.0000000 | V1 | |
| Lithium | 0.0000374 | 0.0012220 | V0 | 0.0005625 | V0 | 0.0000021 | V0 | |
| Magnesium | 0.0091409 | 0.2476737 | V0 | 0.1044851 | V0 | 0.0005352 | V0 | |
| Manganese | 0.0006949 | 0.0137096 | V0 | 0.0058388 | V0 | 0.0000000 | V1 | |
| Molybdenum | 0.0007116 | 0.0003401 | V0 | 0.0001658 | V0 | 0.0000579 | V0 | |
| Neodymium | 0.0000140 | 0.0005718 | V0 | 0.0002360 | V0 | 0.0000000 | V1 | |
| Nickel | 0.0005429 | 0.0016272 | V0 | 0.0005982 | V0 | 0.0000545 | V0 | |
| Niobium | 0.0000202 | 0.0001663 | V0 | 0.0000633 | V0 | 0.0000000 | V1 | |
| Palladium | 0.0000632 | 0.0000255 | V0 | 0.0000000 | V1 | 0.0000087 | V0 | |
| Phosphorus | 0.0459574 | 0.0285718 | V0 | 0.0211068 | V0 | 0.0082094 | V0 | |
| Platinum | 0.0000088 | 0.0000030 | V0 | 0.0000015 | V0 | 0.0000022 | V0 | |
| Potassium | 0.0061261 | 0.3953264 | V0 | 0.1601663 | V0 | 0.0009348 | V0 | |
| Praseodymium | 0.0000070 | 0.0001488 | V0 | 0.0000598 | V0 | 0.0000000 | V1 | |
| Rubidium | 0.0000184 | 0.0017185 | V0 | 0.0007426 | V0 | 0.0000011 | V0 | |
| Samarium | 0.0000133 | 0.0001088 | V0 | 0.0000452 | V0 | 0.0000000 | V1 | |
| Selenium | 0.0003366 | 0.0007049 | V0 | 0.0004304 | V0 | 0.0000000 | V1 | |
| Silicon | 0.7676322 | 3.7506133 | V0 | 1.5253829 | V0 | 0.0983498 | V0 | |
| Silver | 0.0000100 | 0.0000066 | V0 | 0.0000027 | V0 | 0.0000000 | V1 | |
| Sodium | 0.0169447 | 0.2055068 | V0 | 0.0811935 | V0 | 0.0010467 | V0 | |
| Strontium | 0.0003375 | 0.0046976 | V0 | 0.0016221 | V0 | 0.0000000 | V1 | |
| Tantalum | 0.0000394 | 0.0000117 | V0 | 0.0000034 | V0 | 0.0000000 | V1 | |
| Thallium | 0.0000090 | 0.0000129 | V0 | 0.0000056 | V0 | 0.0000000 | V1 | |
| Thorium | 0.0000059 | 0.0001678 | V0 | 0.0000730 | V0 | 0.0000000 | V1 | |
| Tin | 0.0004414 | 0.0001394 | V0 | 0.0000952 | V0 | 0.0000361 | V0 | |
| Titanium | 0.0015201 | 0.0618101 | V0 | 0.0205024 | V0 | 0.0005767 | V0 | |
| Tungsten | 0.0000938 | 0.0001012 | V0 | 0.0000323 | V0 | 0.0000000 | V1 | |
| Uranium | 0.0000048 | 0.0000520 | V0 | 0.0000203 | V0 | 0.0000000 | V1 | |
| Vanadium | 0.0007697 | 0.0039953 | V0 | 0.0016128 | V0 | 0.0000000 | V1 | |
| Zinc | 0.0055897 | 0.0047343 | V0 | 0.0025736 | V0 | 0.0000000 | V1 | |



| Compound Name | MDL (µg/sample) | Muskeg River | | Travel Blank | | |
|--------------------|-----------------|--------------|------------------|------------------------------------|------------------------------|---------|
| | | AMS 16 | QC Flag | 05-Aug | QC Flag | |
| Station Name | Station # | Sample Date | Particulate Size | Total Air Volume (m ³) | 24 | 24 |
| AMS 16 | 05-Aug | PM10 | 24 | 24 | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 49.01 | V0 | 0.07 | V0 | |
| Aluminum | 0.1380326 | 2.3099389 | V0 | 0.0000000 | V1 | |
| Antimony | 0.0001784 | 0.0000486 | V0 | 0.0000000 | V1 | |
| Arsenic | 0.0001060 | 0.0003342 | V0 | 0.0000000 | V1 | |
| Barium | 0.0092847 | 0.0144120 | V0 | 0.0000000 | V1 | |
| Beryllium | 0.0000946 | 0.0000665 | V0 | 0.0000000 | V1 | |
| Bismuth | 0.0000093 | 0.0000061 | V0 | 0.0000005 | V0 | |
| Cadmium | 0.0000174 | 0.0000175 | V0 | 0.0000000 | V1 | |
| Calcium | 0.4112124 | 2.1961490 | V0 | 0.0000000 | V1 | |
| Cerium | 0.0000174 | 0.0023316 | V0 | 0.0000008 | V0 | |
| Cesium | 0.0000100 | 0.0001376 | V0 | 0.0000000 | V1 | |
| Chromium | 0.0022262 | 0.0024064 | V0 | 0.0002701 | V0 | |
| Cobalt | 0.0000273 | 0.0005456 | V0 | 0.0000035 | V0 | |
| Copper | 0.0017171 | 0.0012930 | V0 | 0.0001434 | V0 | |
| Iron | 0.0393063 | 1.8819762 | V0 | 0.0052658 | V0 | |
| Lanthanum | 0.0000130 | 0.0010930 | V0 | 0.0000000 | V1 | |
| Lead | 0.0008577 | 0.0006517 | V0 | 0.0000000 | V1 | |
| Lithium | 0.0000374 | 0.0027277 | V0 | 0.0000021 | V0 | |
| Magnesium | 0.0091409 | 0.3999562 | V0 | 0.0005352 | V0 | |
| Manganese | 0.0006949 | 0.0305086 | V0 | 0.0000000 | V1 | |
| Molybdenum | 0.0007116 | 0.0004361 | V0 | 0.0000579 | V0 | |
| Neodymium | 0.0000140 | 0.0009824 | V0 | 0.0000000 | V1 | |
| Nickel | 0.0005429 | 0.0021332 | V0 | 0.0000545 | V0 | |
| Niobium | 0.0000202 | 0.0002591 | V0 | 0.0000000 | V1 | |
| Palladium | 0.0000632 | 0.0000245 | V0 | 0.0000087 | V0 | |
| Phosphorus | 0.0459574 | 0.0369852 | V0 | 0.0082094 | V0 | |
| Platinum | 0.0000088 | 0.0000025 | V0 | 0.0000022 | V0 | |
| Potassium | 0.0061261 | 0.5100808 | V0 | 0.0009348 | V0 | |
| Praseodymium | 0.0000070 | 0.0002610 | V0 | 0.0000000 | V1 | |
| Rubidium | 0.0000184 | 0.0025640 | V0 | 0.0000011 | V0 | |
| Samarium | 0.0000133 | 0.0001821 | V0 | 0.0000000 | V1 | |
| Selenium | 0.0003366 | 0.0014699 | V0 | 0.0000000 | V1 | |
| Silicon | 0.7676322 | 4.9340121 | V0 | 0.0983498 | V0 | |
| Silver | 0.0000100 | 0.0000082 | V0 | 0.0000000 | V1 | |
| Sodium | 0.0169447 | 0.1706446 | V0 | 0.0010467 | V0 | |
| Strontium | 0.0003375 | 0.0061273 | V0 | 0.0000000 | V1 | |
| Tantalum | 0.0000394 | 0.0000166 | V0 | 0.0000000 | V1 | |
| Thallium | 0.0000090 | 0.0000222 | V0 | 0.0000000 | V1 | |
| Thorium | 0.0000059 | 0.0003154 | V0 | 0.0000000 | V1 | |
| Tin | 0.0004414 | 0.0001829 | V0 | 0.0000361 | V0 | |
| Titanium | 0.0015201 | 0.0813374 | V0 | 0.0005767 | V0 | |
| Tungsten | 0.0000938 | 0.0001160 | V0 | 0.0000000 | V1 | |
| Uranium | 0.0000048 | 0.0000841 | V0 | 0.0000000 | V1 | |
| Vanadium | 0.0007697 | 0.0049590 | V0 | 0.0000000 | V1 | |
| Zinc | 0.0055897 | 0.0053501 | V0 | 0.0000000 | V1 | |



| Compound Name | Bertha Ganter - Fort | | | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|-----------|------------------------------|-----------|------------------------------|--------------|--|
| | Station Name | McKay | | | Patricia McInnes | | | Travel Blank | |
| | Station # | AMS 1 | AMS 6 | AMS 6 | AMS 6 | AMS 6 | 11-Aug | | |
| | Sample Date | 11-Aug | 11-Aug | 11-Aug | 11-Aug | 11-Aug | 11-Aug | | |
| Particulate Size | PM10 | PM10 | PM10 | PM10 | PM10 | PM10 | PM10 | | |
| Total Air Volume (m ³) | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | |
| Particulate Matter | 1.00 | 41.92 | V0 | 14.19 | V0 | -0.02 | V1 | | |
| Aluminum | 0.1380326 | 1.5862574 | V0 | 0.2495647 | V0 | 0.0000000 | V1 | | |
| Antimony | 0.0001784 | 0.0000805 | V0 | 0.0001950 | V0 | 0.0000000 | V1 | | |
| Arsenic | 0.0001060 | 0.0003113 | V0 | 0.0000990 | V0 | 0.0000045 | V0 | | |
| Barium | 0.0092847 | 0.0144812 | V0 | 0.0042528 | V0 | 0.0000000 | V1 | | |
| Beryllium | 0.0000946 | 0.0000425 | V0 | 0.0000088 | V0 | 0.0000000 | V1 | | |
| Bismuth | 0.0000093 | 0.0000104 | V0 | 0.0000075 | V0 | 0.0000024 | V0 | | |
| Cadmium | 0.0000174 | 0.0000145 | V0 | 0.0000104 | V0 | 0.0000000 | V1 | | |
| Calcium | 0.4112124 | 2.5052266 | V0 | 0.4234467 | V0 | 0.0000000 | V1 | | |
| Cerium | 0.0000174 | 0.0018770 | V0 | 0.0003346 | V0 | 0.0000008 | V0 | | |
| Cesium | 0.0000100 | 0.0001275 | V0 | 0.0000169 | V0 | 0.0000006 | V0 | | |
| Chromium | 0.0022262 | 0.0018944 | V0 | 0.0005127 | V0 | 0.0000000 | V1 | | |
| Cobalt | 0.0000273 | 0.0004134 | V0 | 0.0000779 | V0 | 0.0000018 | V0 | | |
| Copper | 0.0017171 | 0.0025715 | V0 | 0.0017183 | V0 | 0.0000767 | V0 | | |
| Iron | 0.0393063 | 1.4810301 | V0 | 0.3250161 | V0 | 0.0000000 | V1 | | |
| Lanthanum | 0.0000130 | 0.0009283 | V0 | 0.0001730 | V0 | 0.0000000 | V1 | | |
| Lead | 0.0008577 | 0.0005416 | V0 | 0.0002624 | V0 | 0.0000000 | V1 | | |
| Lithium | 0.0000374 | 0.0015331 | V0 | 0.0002145 | V0 | 0.0000056 | V0 | | |
| Magnesium | 0.0091409 | 0.3498062 | V0 | 0.0980141 | V0 | 0.0005297 | V0 | | |
| Manganese | 0.0006949 | 0.0219086 | V0 | 0.0054129 | V0 | 0.0000000 | V1 | | |
| Molybdenum | 0.0007116 | 0.0002314 | V0 | 0.0000740 | V0 | 0.0000000 | V1 | | |
| Neodymium | 0.0000140 | 0.0007875 | V0 | 0.0001404 | V0 | 0.0000000 | V1 | | |
| Nickel | 0.0005429 | 0.0017341 | V0 | 0.0003740 | V0 | 0.0001535 | V0 | | |
| Niobium | 0.0000202 | 0.0001961 | V0 | 0.0000300 | V0 | 0.0000000 | V1 | | |
| Palladium | 0.0000632 | 0.0000335 | V0 | 0.0000148 | V0 | 0.0000221 | V0 | | |
| Phosphorus | 0.0459574 | 0.0333433 | V0 | 0.0203614 | V0 | 0.0104520 | V0 | | |
| Platinum | 0.0000088 | 0.0000037 | V0 | 0.0000027 | V0 | 0.0000016 | V0 | | |
| Potassium | 0.0061261 | 0.4810207 | V0 | 0.1132732 | V0 | 0.0009936 | V0 | | |
| Praseodymium | 0.0000070 | 0.0002078 | V0 | 0.0000365 | V0 | 0.0000003 | V0 | | |
| Rubidium | 0.0000184 | 0.0021480 | V0 | 0.0003695 | V0 | 0.0000015 | V0 | | |
| Samarium | 0.0000133 | 0.0001458 | V0 | 0.0000237 | V0 | 0.0000006 | V0 | | |
| Selenium | 0.0003366 | 0.0008418 | V0 | 0.0001860 | V0 | 0.0000000 | V1 | | |
| Silicon | 0.7676322 | 4.0356888 | V0 | 1.0603252 | V0 | 0.0000000 | V1 | | |
| Silver | 0.0000100 | 0.0000096 | V0 | 0.0000022 | V0 | 0.0000015 | V0 | | |
| Sodium | 0.0169447 | 0.2179122 | V0 | 0.0441234 | V0 | 0.0011346 | V0 | | |
| Strontium | 0.0003375 | 0.0064670 | V0 | 0.0012443 | V0 | 0.0000000 | V1 | | |
| Tantalum | 0.0000394 | 0.0000129 | V0 | 0.0000022 | V0 | 0.0000000 | V1 | | |
| Thallium | 0.0000090 | 0.0000157 | V0 | 0.0000031 | V0 | 0.0000000 | V1 | | |
| Thorium | 0.0000059 | 0.0002390 | V0 | 0.0000378 | V0 | 0.0000004 | V0 | | |
| Tin | 0.0004414 | 0.0001986 | V0 | 0.0003249 | V0 | 0.0000264 | V0 | | |
| Titanium | 0.0015201 | 0.0744225 | V0 | 0.0101398 | V0 | 0.0005955 | V0 | | |
| Tungsten | 0.0000938 | 0.0001329 | V0 | 0.0000765 | V0 | 0.0000000 | V1 | | |
| Uranium | 0.0000048 | 0.0000636 | V0 | 0.0000113 | V0 | 0.0000000 | V1 | | |
| Vanadium | 0.0007697 | 0.0042371 | V0 | 0.0005290 | V0 | 0.0000000 | V1 | | |
| Zinc | 0.0055897 | 0.0063569 | V0 | 0.0050570 | V0 | 0.0000000 | V1 | | |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|-------------------------------|--------------------------------|---------|-------------------------------|--------------------------------|------------------------------|---------|
| | AMS 7 11-Aug PM10 24 | AMS 14 11-Aug PM10 24 | QC Flag | AMS 7 11-Aug PM10 24 | AMS 14 11-Aug PM10 24 | QC Flag | QC Flag |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 21.79 | V0 | 10.65 | V0 | -0.02 | V1 |
| Aluminum | 0.1380326 | 0.4033419 | V0 | 0.1302029 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0004199 | V0 | 0.0000302 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0002016 | V0 | 0.0001253 | V0 | 0.0000045 | V0 |
| Barium | 0.0092847 | 0.0090878 | V0 | 0.0019406 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000129 | V0 | 0.0000071 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000238 | V0 | 0.0000044 | V0 | 0.0000024 | V0 |
| Cadmium | 0.0000174 | 0.0000110 | V0 | 0.0000092 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.7790308 | V0 | 0.1951133 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0005219 | V0 | 0.0001730 | V0 | 0.0000008 | V0 |
| Cesium | 0.0000100 | 0.0000291 | V0 | 0.0000084 | V0 | 0.0000006 | V0 |
| Chromium | 0.0022262 | 0.0007465 | V0 | 0.0003985 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0001420 | V0 | 0.0000454 | V0 | 0.0000018 | V0 |
| Copper | 0.0017171 | 0.0031054 | V0 | 0.0004252 | V0 | 0.0000767 | V0 |
| Iron | 0.0393063 | 0.6053990 | V0 | 0.1595345 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0002667 | V0 | 0.0001050 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0003780 | V0 | 0.0001085 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0003371 | V0 | 0.0000891 | V0 | 0.0000056 | V0 |
| Magnesium | 0.0091409 | 0.1745580 | V0 | 0.0510022 | V0 | 0.0005297 | V0 |
| Manganese | 0.0006949 | 0.0095991 | V0 | 0.0034510 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001509 | V0 | 0.0000395 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0002174 | V0 | 0.0000734 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0005553 | V0 | 0.0003628 | V0 | 0.0001535 | V0 |
| Niobium | 0.0000202 | 0.0000480 | V0 | 0.0000164 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000201 | V0 | 0.0000129 | V0 | 0.0000221 | V0 |
| Phosphorus | 0.0459574 | 0.0267651 | V0 | 0.0327128 | V0 | 0.0104520 | V0 |
| Platinum | 0.0000088 | 0.0000024 | V0 | 0.0000015 | V0 | 0.0000016 | V0 |
| Potassium | 0.0061261 | 0.1749198 | V0 | 0.0944671 | V0 | 0.0009936 | V0 |
| Praseodymium | 0.0000070 | 0.0000584 | V0 | 0.0000198 | V0 | 0.0000003 | V0 |
| Rubidium | 0.0000184 | 0.0005946 | V0 | 0.0002334 | V0 | 0.0000015 | V0 |
| Samarium | 0.0000133 | 0.0000392 | V0 | 0.0000135 | V0 | 0.0000006 | V0 |
| Selenium | 0.0003366 | 0.0002830 | V0 | 0.0001182 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 1.7834954 | V0 | 0.5110600 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000043 | V0 | 0.0000017 | V0 | 0.0000015 | V0 |
| Sodium | 0.0169447 | 0.0694186 | V0 | 0.0222637 | V0 | 0.0011346 | V0 |
| Strontium | 0.0003375 | 0.0022111 | V0 | 0.0005544 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000037 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000052 | V0 | 0.0000017 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000648 | V0 | 0.0000217 | V0 | 0.0000004 | V0 |
| Tin | 0.0004414 | 0.0003768 | V0 | 0.0001459 | V0 | 0.0000264 | V0 |
| Titanium | 0.0015201 | 0.0172908 | V0 | 0.0055195 | V0 | 0.0005955 | V0 |
| Tungsten | 0.0000938 | 0.0001205 | V0 | 0.0000669 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000180 | V0 | 0.0000061 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0009508 | V0 | 0.0002798 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0102813 | V0 | 0.0019075 | V0 | 0.0000000 | V1 |



| Compound Name | Station Name | Fort McKay South | | Horizon | | Travel Blank | |
|--------------------|------------------------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| | Station # | AMS 13 | | AMS 15 | | 11-Aug | |
| | Sample Date | 11-Aug | | 11-Aug | | | |
| | Particulate Size | PM10 | | PM10 | | | |
| | Total Air Volume (m ³) | 24 | | 24 | | 24 | |
| | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 32.56 | V0 | 17.96 | V0 | -0.02 | V1 |
| Aluminum | 0.1380326 | 1.0160966 | V0 | 0.5569885 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000641 | V0 | 0.0000381 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0002645 | V0 | 0.0001215 | V0 | 0.0000045 | V0 |
| Barium | 0.0092847 | 0.0091214 | V0 | 0.0046354 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000284 | V0 | 0.0000151 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000066 | V0 | 0.0000037 | V0 | 0.0000024 | V0 |
| Cadmium | 0.0000174 | 0.0000092 | V0 | 0.0000079 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.9757068 | V0 | 0.3007310 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0010007 | V0 | 0.0005444 | V0 | 0.0000008 | V0 |
| Cesium | 0.0000100 | 0.0000821 | V0 | 0.0000431 | V0 | 0.0000006 | V0 |
| Chromium | 0.0022262 | 0.0013541 | V0 | 0.0008278 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0002889 | V0 | 0.0001396 | V0 | 0.0000018 | V0 |
| Copper | 0.0017171 | 0.0010551 | V0 | 0.0009935 | V0 | 0.0000767 | V0 |
| Iron | 0.0393063 | 0.8785227 | V0 | 0.3669621 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0004861 | V0 | 0.0002700 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0003800 | V0 | 0.0001944 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0009698 | V0 | 0.0004820 | V0 | 0.0000056 | V0 |
| Magnesium | 0.0091409 | 0.2154771 | V0 | 0.0995995 | V0 | 0.0005297 | V0 |
| Manganese | 0.0006949 | 0.0131324 | V0 | 0.0055747 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001729 | V0 | 0.0000720 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0004565 | V0 | 0.0002508 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0011228 | V0 | 0.0007790 | V0 | 0.0001535 | V0 |
| Niobium | 0.0000202 | 0.0001124 | V0 | 0.0000592 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000185 | V0 | 0.0000107 | V0 | 0.0000221 | V0 |
| Phosphorus | 0.0459574 | 0.0257658 | V0 | 0.0193341 | V0 | 0.0104520 | V0 |
| Platinum | 0.0000088 | 0.0000028 | V0 | 0.0000026 | V0 | 0.0000016 | V0 |
| Potassium | 0.0061261 | 0.3230254 | V0 | 0.1724121 | V0 | 0.0009936 | V0 |
| Praseodymium | 0.0000070 | 0.0001168 | V0 | 0.0000638 | V0 | 0.0000003 | V0 |
| Rubidium | 0.0000184 | 0.0013578 | V0 | 0.0007211 | V0 | 0.0000015 | V0 |
| Samarium | 0.0000133 | 0.0000879 | V0 | 0.0000470 | V0 | 0.0000006 | V0 |
| Selenium | 0.0003366 | 0.0005635 | V0 | 0.0003082 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 3.6541084 | V0 | 1.6047275 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000051 | V0 | 0.0000060 | V0 | 0.0000015 | V0 |
| Sodium | 0.0169447 | 0.1540101 | V0 | 0.0839512 | V0 | 0.0011346 | V0 |
| Strontium | 0.0003375 | 0.0038044 | V0 | 0.0017823 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000075 | V0 | 0.0000040 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000103 | V0 | 0.0000052 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0001404 | V0 | 0.0000724 | V0 | 0.0000004 | V0 |
| Tin | 0.0004414 | 0.0001895 | V0 | 0.0001301 | V0 | 0.0000264 | V0 |
| Titanium | 0.0015201 | 0.0366994 | V0 | 0.0194197 | V0 | 0.0005955 | V0 |
| Tungsten | 0.0000938 | 0.0000686 | V0 | 0.0000393 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000401 | V0 | 0.0000207 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0026275 | V0 | 0.0013198 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0037159 | V0 | 0.0028311 | V0 | 0.0000000 | V1 |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 11-Aug | |
| Sample Date | 11-Aug | | | 11-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 47.25 | V0 | -0.02 | V1 |
| Aluminum | 0.1380326 | 2.0848963 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000597 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0003541 | V0 | 0.0000045 | V0 |
| Barium | 0.0092847 | 0.0156042 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000579 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000104 | V0 | 0.0000024 | V0 |
| Cadmium | 0.0000174 | 0.0000121 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 1.9425180 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0023145 | V0 | 0.0000008 | V0 |
| Cesium | 0.0000100 | 0.0001577 | V0 | 0.0000006 | V0 |
| Chromium | 0.0022262 | 0.0024018 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0005186 | V0 | 0.0000018 | V0 |
| Copper | 0.0017171 | 0.0014653 | V0 | 0.0000767 | V0 |
| Iron | 0.0393063 | 1.5140209 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0010410 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0006250 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0019493 | V0 | 0.0000056 | V0 |
| Magnesium | 0.0091409 | 0.3672379 | V0 | 0.0005297 | V0 |
| Manganese | 0.0006949 | 0.0225816 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0003015 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0009507 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0020100 | V0 | 0.0001535 | V0 |
| Niobium | 0.0000202 | 0.0002319 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000342 | V0 | 0.0000221 | V0 |
| Phosphorus | 0.0459574 | 0.0331563 | V0 | 0.0104520 | V0 |
| Platinum | 0.0000088 | 0.0000034 | V0 | 0.0000016 | V0 |
| Potassium | 0.0061261 | 0.5947759 | V0 | 0.0009936 | V0 |
| Praseodymium | 0.0000070 | 0.0002502 | V0 | 0.0000003 | V0 |
| Rubidium | 0.0000184 | 0.0026919 | V0 | 0.0000015 | V0 |
| Samarium | 0.0000133 | 0.0001826 | V0 | 0.0000006 | V0 |
| Selenium | 0.0003366 | 0.0011083 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 5.2957562 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000075 | V0 | 0.0000015 | V0 |
| Sodium | 0.0169447 | 0.2171976 | V0 | 0.0011346 | V0 |
| Strontium | 0.0003375 | 0.0062877 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000159 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000189 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0002812 | V0 | 0.0000004 | V0 |
| Tin | 0.0004414 | 0.0001894 | V0 | 0.0000264 | V0 |
| Titanium | 0.0015201 | 0.0726905 | V0 | 0.0005955 | V0 |
| Tungsten | 0.0000938 | 0.0001385 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000739 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0049637 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0068376 | V0 | 0.0000000 | V1 |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|------------------|------------------------------|--------------|---------|
| | Station Name | McKay | | Patricia McInnes | | Travel Blank | |
| | Station # | AMS 1 | | AMS 6 | | | |
| | Sample Date | 17-Aug | | 17-Aug | | | |
| Particulate Size | PM10 | | PM10 | | | | |
| Total Air Volume (m ³) | 24 | | 24 | | | | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | QC Flag |
| Particulate Matter | 1.00 | 16.09 | V0 | 18.96 | V0 | -0.04 | V1 |
| Aluminum | 0.1380326 | 0.1522850 | V0 | 0.3713341 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000124 | V0 | 0.0000762 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000711 | V0 | 0.0001113 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0017462 | V0 | 0.0054209 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000000 | V1 | 0.0000137 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000014 | V0 | 0.0000051 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000116 | V0 | 0.0000147 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.7228813 | V0 | 0.7603611 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0001568 | V0 | 0.0004768 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000129 | V0 | 0.0000248 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0003623 | V0 | 0.0005592 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0000470 | V0 | 0.0001094 | V0 | 0.0000024 | V0 |
| Copper | 0.0017171 | 0.0008262 | V0 | 0.0007761 | V0 | 0.0002003 | V0 |
| Iron | 0.0393063 | 0.1748828 | V0 | 0.5185129 | V0 | 0.0022586 | V0 |
| Lanthanum | 0.0000130 | 0.0000777 | V0 | 0.0002384 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0000979 | V0 | 0.0001719 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0001329 | V0 | 0.0002708 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.0442776 | V0 | 0.1817644 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0036110 | V0 | 0.0085314 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0000384 | V0 | 0.0000604 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0000675 | V0 | 0.0002090 | V0 | 0.0000006 | V0 |
| Nickel | 0.0005429 | 0.0002206 | V0 | 0.0004547 | V0 | 0.0000504 | V0 |
| Niobium | 0.0000202 | 0.0000137 | V0 | 0.0000455 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000060 | V0 | 0.0000121 | V0 | 0.0000076 | V0 |
| Phosphorus | 0.0459574 | 0.0142009 | V0 | 0.0173353 | V0 | 0.0111727 | V0 |
| Platinum | 0.0000088 | 0.0000015 | V0 | 0.0000028 | V0 | 0.0000017 | V0 |
| Potassium | 0.0061261 | 0.0912792 | V0 | 0.1521888 | V0 | 0.0014902 | V0 |
| Praseodymium | 0.0000070 | 0.0000178 | V0 | 0.0000553 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0002798 | V0 | 0.0005364 | V0 | 0.0000010 | V0 |
| Samarium | 0.0000133 | 0.0000133 | V0 | 0.0000391 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0001075 | V0 | 0.0002736 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.6484775 | V0 | 1.4757710 | V0 | 0.0446564 | V0 |
| Silver | 0.0000100 | 0.0000016 | V0 | 0.0000063 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0323814 | V0 | 0.0964910 | V0 | 0.0046735 | V0 |
| Strontium | 0.0003375 | 0.0010494 | V0 | 0.0020123 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000000 | V1 | 0.0000034 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000026 | V0 | 0.0000049 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000206 | V0 | 0.0000681 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001301 | V0 | 0.0001633 | V0 | 0.0000307 | V0 |
| Titanium | 0.0015201 | 0.0045276 | V0 | 0.0158519 | V0 | 0.0002596 | V0 |
| Tungsten | 0.0000938 | 0.0000159 | V0 | 0.0000900 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000059 | V0 | 0.0000188 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0003185 | V0 | 0.0008916 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0023908 | V0 | 0.0034544 | V0 | 0.0000000 | V1 |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|-------------------------------|------------------------------|---------|--------------------------------|------------------------------|------------------------------|------------------------------------|
| | AMS 7 17-Aug PM10 24 | Results (µg/m ³) | QC Flag | AMS 14 17-Aug PM10 24 | Results (µg/m ³) | QC Flag | Results (µg/m ³) 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 19.68 | V0 | 10.10 | V0 | -0.04 | V1 |
| Aluminum | 0.1380326 | 0.4208575 | V0 | 0.1729872 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0005047 | V0 | 0.0000146 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0001460 | V0 | 0.0000606 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0106088 | V0 | 0.0024950 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000144 | V0 | 0.0000066 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000237 | V0 | 0.0000121 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000177 | V0 | 0.0000130 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.6220590 | V0 | 0.1339318 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0005548 | V0 | 0.0002188 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000308 | V0 | 0.0000131 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0007640 | V0 | 0.0003197 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0001331 | V0 | 0.0000503 | V0 | 0.0000024 | V0 |
| Copper | 0.0017171 | 0.0031920 | V0 | 0.0004318 | V0 | 0.0002003 | V0 |
| Iron | 0.0393063 | 0.5564438 | V0 | 0.1508409 | V0 | 0.0022586 | V0 |
| Lanthanum | 0.0000130 | 0.0002661 | V0 | 0.0001010 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0002657 | V0 | 0.0000854 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0003238 | V0 | 0.0001216 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.1426443 | V0 | 0.0398194 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0081282 | V0 | 0.0029695 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001975 | V0 | 0.0000513 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0002324 | V0 | 0.0000871 | V0 | 0.0000006 | V0 |
| Nickel | 0.0005429 | 0.0010735 | V0 | 0.0002151 | V0 | 0.0000504 | V0 |
| Niobium | 0.0000202 | 0.0000493 | V0 | 0.0000193 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000205 | V0 | 0.0000105 | V0 | 0.0000076 | V0 |
| Phosphorus | 0.0459574 | 0.0225703 | V0 | 0.0184707 | V0 | 0.0111727 | V0 |
| Platinum | 0.0000088 | 0.0000030 | V0 | 0.0000025 | V0 | 0.0000017 | V0 |
| Potassium | 0.0061261 | 0.1676030 | V0 | 0.0781157 | V0 | 0.0014902 | V0 |
| Praseodymium | 0.0000070 | 0.0000621 | V0 | 0.0000237 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0006008 | V0 | 0.0002622 | V0 | 0.0000010 | V0 |
| Samarium | 0.0000133 | 0.0000434 | V0 | 0.0000160 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0003092 | V0 | 0.0001236 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 1.4831262 | V0 | 0.7505023 | V0 | 0.0446564 | V0 |
| Silver | 0.0000100 | 0.0000039 | V0 | 0.0000021 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0715990 | V0 | 0.0353456 | V0 | 0.0046735 | V0 |
| Strontium | 0.0003375 | 0.0019936 | V0 | 0.0005783 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000037 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000051 | V0 | 0.0000024 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000688 | V0 | 0.0000276 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0004155 | V0 | 0.0001242 | V0 | 0.0000307 | V0 |
| Titanium | 0.0015201 | 0.0182916 | V0 | 0.0069805 | V0 | 0.0002596 | V0 |
| Tungsten | 0.0000938 | 0.0001389 | V0 | 0.0000539 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000197 | V0 | 0.0000076 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0009872 | V0 | 0.0004037 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0116394 | V0 | 0.0015548 | V0 | 0.0000000 | V1 |



| Compound Name | Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Fort McKay South | | | Horizon | | Travel Blank | |
|--------------------|--|------------------|--------------------------------|------------------------------|-----------|--------------------------------|------------------------------|---------|
| | | MDL (µg/sample) | AMS 13 17-Aug PM10 24 | Results (µg/m ³) | QC Flag | AMS 15 17-Aug PM10 24 | Results (µg/m ³) | QC Flag |
| Particulate Matter | | 1.00 | 12.78 | V0 | 16.44 | V0 | -0.04 | V1 |
| Aluminum | | 0.1380326 | 0.1535027 | V0 | 0.4963862 | V0 | 0.0000000 | V1 |
| Antimony | | 0.0001784 | 0.0000322 | V0 | 0.0000166 | V0 | 0.0000000 | V1 |
| Arsenic | | 0.0001060 | 0.0001055 | V0 | 0.0000923 | V0 | 0.0000000 | V1 |
| Barium | | 0.0092847 | 0.0017211 | V0 | 0.0039594 | V0 | 0.0000000 | V1 |
| Beryllium | | 0.0000946 | 0.0000050 | V0 | 0.0000140 | V0 | 0.0000000 | V1 |
| Bismuth | | 0.0000093 | 0.0000029 | V0 | 0.0000034 | V0 | 0.0000000 | V1 |
| Cadmium | | 0.0000174 | 0.0000137 | V0 | 0.0000104 | V0 | 0.0000000 | V1 |
| Calcium | | 0.4112124 | 0.1511415 | V0 | 0.1007556 | V0 | 0.0000000 | V1 |
| Cerium | | 0.0000174 | 0.0001510 | V0 | 0.0004519 | V0 | 0.0000000 | V1 |
| Cesium | | 0.0000100 | 0.0000141 | V0 | 0.0000421 | V0 | 0.0000000 | V1 |
| Chromium | | 0.0022262 | 0.0004515 | V0 | 0.0007643 | V0 | 0.0000000 | V1 |
| Cobalt | | 0.0000273 | 0.0000436 | V0 | 0.0001128 | V0 | 0.0000024 | V0 |
| Copper | | 0.0017171 | 0.0013249 | V0 | 0.0006879 | V0 | 0.0002003 | V0 |
| Iron | | 0.0393063 | 0.1333335 | V0 | 0.2381229 | V0 | 0.0022586 | V0 |
| Lanthanum | | 0.0000130 | 0.0000767 | V0 | 0.0002223 | V0 | 0.0000000 | V1 |
| Lead | | 0.0008577 | 0.0001053 | V0 | 0.0001647 | V0 | 0.0000000 | V1 |
| Lithium | | 0.0000374 | 0.0001229 | V0 | 0.0004975 | V0 | 0.0000000 | V1 |
| Magnesium | | 0.0091409 | 0.0381937 | V0 | 0.0681468 | V0 | 0.0000000 | V1 |
| Manganese | | 0.0006949 | 0.0024609 | V0 | 0.0045631 | V0 | 0.0000000 | V1 |
| Molybdenum | | 0.0007116 | 0.0001109 | V0 | 0.0000567 | V0 | 0.0000000 | V1 |
| Neodymium | | 0.0000140 | 0.0000676 | V0 | 0.0002028 | V0 | 0.0000006 | V0 |
| Nickel | | 0.0005429 | 0.0003399 | V0 | 0.0006488 | V0 | 0.0000504 | V0 |
| Niobium | | 0.0000202 | 0.0000161 | V0 | 0.0000530 | V0 | 0.0000000 | V1 |
| Palladium | | 0.0000632 | 0.0000108 | V0 | 0.0000097 | V0 | 0.0000076 | V0 |
| Phosphorus | | 0.0459574 | 0.0232077 | V0 | 0.0123957 | V0 | 0.0111727 | V0 |
| Platinum | | 0.0000088 | 0.0000021 | V0 | 0.0000018 | V0 | 0.0000017 | V0 |
| Potassium | | 0.0061261 | 0.1278356 | V0 | 0.1686564 | V0 | 0.0014902 | V0 |
| Praseodymium | | 0.0000070 | 0.0000177 | V0 | 0.0000531 | V0 | 0.0000000 | V1 |
| Rubidium | | 0.0000184 | 0.0003001 | V0 | 0.0006903 | V0 | 0.0000010 | V0 |
| Samarium | | 0.0000133 | 0.0000128 | V0 | 0.0000382 | V0 | 0.0000000 | V1 |
| Selenium | | 0.0003366 | 0.0001053 | V0 | 0.0002518 | V0 | 0.0000000 | V1 |
| Silicon | | 0.7676322 | 0.5564039 | V0 | 1.2784464 | V0 | 0.0446564 | V0 |
| Silver | | 0.0000100 | 0.0000028 | V0 | 0.0000025 | V0 | 0.0000000 | V1 |
| Sodium | | 0.0169447 | 0.0521040 | V0 | 0.0627688 | V0 | 0.0046735 | V0 |
| Strontium | | 0.0003375 | 0.0006103 | V0 | 0.0012920 | V0 | 0.0000000 | V1 |
| Tantalum | | 0.0000394 | 0.0000000 | V1 | 0.0000036 | V0 | 0.0000000 | V1 |
| Thallium | | 0.0000090 | 0.0000027 | V0 | 0.0000051 | V0 | 0.0000000 | V1 |
| Thorium | | 0.0000059 | 0.0000206 | V0 | 0.0000601 | V0 | 0.0000000 | V1 |
| Tin | | 0.0004414 | 0.0002613 | V0 | 0.0000918 | V0 | 0.0000307 | V0 |
| Titanium | | 0.0015201 | 0.0059349 | V0 | 0.0176156 | V0 | 0.0002596 | V0 |
| Tungsten | | 0.0000938 | 0.0000109 | V0 | 0.0000112 | V0 | 0.0000000 | V1 |
| Uranium | | 0.0000048 | 0.0000061 | V0 | 0.0000177 | V0 | 0.0000000 | V1 |
| Vanadium | | 0.0007697 | 0.0003403 | V0 | 0.0009957 | V0 | 0.0000000 | V1 |
| Zinc | | 0.0055897 | 0.0054702 | V0 | 0.0029339 | V0 | 0.0000000 | V1 |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 17-Aug | |
| Sample Date | 17-Aug | | | 17-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 38.94 | V0 | -0.04 | V1 |
| Aluminum | 0.1380326 | 1.3213150 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000435 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0003684 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0121109 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000393 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000066 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000122 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 2.2168251 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0016748 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000946 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0017892 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0003795 | V0 | 0.0000024 | V0 |
| Copper | 0.0017171 | 0.0013634 | V0 | 0.0002003 | V0 |
| Iron | 0.0393063 | 1.7529631 | V0 | 0.0022586 | V0 |
| Lanthanum | 0.0000130 | 0.0008075 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0004771 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0014370 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.3022787 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0274854 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0003681 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0007138 | V0 | 0.0000006 | V0 |
| Nickel | 0.0005429 | 0.0015515 | V0 | 0.0000504 | V0 |
| Niobium | 0.0000202 | 0.0001666 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000275 | V0 | 0.0000076 | V0 |
| Phosphorus | 0.0459574 | 0.0224565 | V0 | 0.0111727 | V0 |
| Platinum | 0.0000088 | 0.0000029 | V0 | 0.0000017 | V0 |
| Potassium | 0.0061261 | 0.4047936 | V0 | 0.0014902 | V0 |
| Praseodymium | 0.0000070 | 0.0001865 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0017690 | V0 | 0.0000010 | V0 |
| Samarium | 0.0000133 | 0.0001303 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0008301 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 3.4756294 | V0 | 0.0446564 | V0 |
| Silver | 0.0000100 | 0.0000067 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.2008961 | V0 | 0.0046735 | V0 |
| Strontium | 0.0003375 | 0.0053776 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000116 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000148 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0002152 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001406 | V0 | 0.0000307 | V0 |
| Titanium | 0.0015201 | 0.0528405 | V0 | 0.0002596 | V0 |
| Tungsten | 0.0000938 | 0.0001096 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000526 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0024424 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0043990 | V0 | 0.0000000 | V1 |



| Compound Name | Bertha Ganter - Fort | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|------------------|------------------------------|--------------|----|
| | Station Name | McKay | | Patricia McInnes | | Travel Blank | |
| | Station # | AMS 1 | QC Flag | AMS 6 | QC Flag | 23-Aug | |
| | Sample Date | 23-Aug | | 23-Aug | | | |
| Particulate Size | PM10 | | PM10 | | | | |
| Total Air Volume (m ³) | 24 | | 24 | | | | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | |
| Particulate Matter | 1.00 | 38.83 | V0 | 16.75 | V0 | 0.11 | V0 |
| Aluminum | 0.1380326 | 1.4938576 | V0 | 0.3943903 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000548 | V0 | 0.0002434 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0002561 | V0 | 0.0001932 | V0 | 0.0000057 | V0 |
| Barium | 0.0092847 | 0.0122395 | V0 | 0.0065892 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000442 | V0 | 0.0000127 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000082 | V0 | 0.0000113 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000118 | V0 | 0.0000149 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 3.3632263 | V0 | 0.5988873 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0016518 | V0 | 0.0005090 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0001223 | V0 | 0.0000268 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0017313 | V0 | 0.0008170 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0003827 | V0 | 0.0001170 | V0 | 0.0000000 | V1 |
| Copper | 0.0017171 | 0.0016202 | V0 | 0.0017705 | V0 | 0.0000000 | V1 |
| Iron | 0.0393063 | 1.2259202 | V0 | 0.4788021 | V0 | 0.0024202 | V0 |
| Lanthanum | 0.0000130 | 0.0008227 | V0 | 0.0004335 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0005232 | V0 | 0.0003029 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0014107 | V0 | 0.0003093 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.3189726 | V0 | 0.1504472 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0196780 | V0 | 0.0082659 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0002487 | V0 | 0.0001283 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0007372 | V0 | 0.0002152 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0017443 | V0 | 0.0004715 | V0 | 0.0000667 | V0 |
| Niobium | 0.0000202 | 0.0001793 | V0 | 0.0000507 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000270 | V0 | 0.0000159 | V0 | 0.0000149 | V0 |
| Phosphorus | 0.0459574 | 0.0326253 | V0 | 0.0261817 | V0 | 0.0091428 | V0 |
| Platinum | 0.0000088 | 0.0000028 | V0 | 0.0000024 | V0 | 0.0000011 | V0 |
| Potassium | 0.0061261 | 0.4360652 | V0 | 0.1503097 | V0 | 0.0004256 | V0 |
| Praseodymium | 0.0000070 | 0.0001900 | V0 | 0.0000573 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0019997 | V0 | 0.0005742 | V0 | 0.0000000 | V1 |
| Samarium | 0.0000133 | 0.0001321 | V0 | 0.0000383 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0008138 | V0 | 0.0002618 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 3.3568285 | V0 | 1.2569671 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000070 | V0 | 0.0000039 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.1806814 | V0 | 0.0593125 | V0 | 0.0000000 | V1 |
| Strontium | 0.0003375 | 0.0064509 | V0 | 0.0018256 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000124 | V0 | 0.0000036 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000147 | V0 | 0.0000048 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0002140 | V0 | 0.0000737 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001397 | V0 | 0.0002518 | V0 | 0.0000262 | V0 |
| Titanium | 0.0015201 | 0.0564999 | V0 | 0.0167476 | V0 | 0.0003177 | V0 |
| Tungsten | 0.0000938 | 0.0001100 | V0 | 0.0001397 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000581 | V0 | 0.0000183 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0040182 | V0 | 0.0008591 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0045630 | V0 | 0.0067491 | V0 | 0.0000000 | V1 |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| | AMS 7 | AMS 14 | | AMS 14 | | 23-Aug | |
| | 23-Aug | 23-Aug | | 23-Aug | | 23-Aug | |
| | PM10 | PM10 | | PM10 | | PM10 | |
| | 24 | 24 | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 20.02 | V0 | 11.98 | V0 | 0.11 | V0 |
| Aluminum | 0.1380326 | 0.4521336 | V0 | 0.2162970 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0003369 | V0 | 0.0000198 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0001698 | V0 | 0.0000872 | V0 | 0.0000057 | V0 |
| Barium | 0.0092847 | 0.0088990 | V0 | 0.0029032 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000154 | V0 | 0.0000088 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000145 | V0 | 0.0000057 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000174 | V0 | 0.0000091 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.7303289 | V0 | 0.3330332 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0005669 | V0 | 0.0003432 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000323 | V0 | 0.0000143 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0007457 | V0 | 0.0004224 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0001415 | V0 | 0.0000651 | V0 | 0.0000000 | V1 |
| Copper | 0.0017171 | 0.0025128 | V0 | 0.0004662 | V0 | 0.0000000 | V1 |
| Iron | 0.0393063 | 0.6008348 | V0 | 0.2362215 | V0 | 0.0024202 | V0 |
| Lanthanum | 0.0000130 | 0.0002822 | V0 | 0.0001695 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0003858 | V0 | 0.0001475 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0003497 | V0 | 0.0001715 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.1763297 | V0 | 0.0827016 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0097153 | V0 | 0.0056918 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001636 | V0 | 0.0000457 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0002445 | V0 | 0.0001474 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0005580 | V0 | 0.0003134 | V0 | 0.0000667 | V0 |
| Niobium | 0.0000202 | 0.0000566 | V0 | 0.0000303 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000178 | V0 | 0.0000063 | V0 | 0.0000149 | V0 |
| Phosphorus | 0.0459574 | 0.0305958 | V0 | 0.0227440 | V0 | 0.0091428 | V0 |
| Platinum | 0.0000088 | 0.0000017 | V0 | 0.0000022 | V0 | 0.0000011 | V0 |
| Potassium | 0.0061261 | 0.1766257 | V0 | 0.0932448 | V0 | 0.0004256 | V0 |
| Praseodymium | 0.0000070 | 0.0000635 | V0 | 0.0000383 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0006474 | V0 | 0.0003408 | V0 | 0.0000000 | V1 |
| Samarium | 0.0000133 | 0.0000451 | V0 | 0.0000262 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0002956 | V0 | 0.0001736 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 1.3725685 | V0 | 0.7951905 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000051 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0724616 | V0 | 0.0347301 | V0 | 0.0000000 | V1 |
| Strontium | 0.0003375 | 0.0022102 | V0 | 0.0008971 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000044 | V0 | 0.0000021 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000056 | V0 | 0.0000032 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000731 | V0 | 0.0000470 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0003039 | V0 | 0.0000864 | V0 | 0.0000262 | V0 |
| Titanium | 0.0015201 | 0.0197612 | V0 | 0.0093298 | V0 | 0.0003177 | V0 |
| Tungsten | 0.0000938 | 0.0001577 | V0 | 0.0000589 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000200 | V0 | 0.0000112 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0010223 | V0 | 0.0005235 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0099100 | V0 | 0.0014016 | V0 | 0.0000000 | V1 |



| Compound Name | Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Fort McKay South | | | Horizon | | Travel Blank | |
|--------------------|--|------------------|--------------------------------|-----------|--------------------------------|-----------|------------------------------|---------|
| | | MDL (µg/sample) | AMS 13 23-Aug PM10 24 | QC Flag | AMS 15 23-Aug PM10 24 | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 21.30 | V0 | 29.89 | V0 | 0.11 | V0 | |
| Aluminum | 0.1380326 | 0.6831560 | V0 | 0.9032854 | V0 | 0.0000000 | V1 | |
| Antimony | 0.0001784 | 0.0000599 | V0 | 0.0000792 | V0 | 0.0000000 | V1 | |
| Arsenic | 0.0001060 | 0.0001775 | V0 | 0.0002059 | V0 | 0.0000057 | V0 | |
| Barium | 0.0092847 | 0.0062018 | V0 | 0.0100572 | V0 | 0.0000000 | V1 | |
| Beryllium | 0.0000946 | 0.0000215 | V0 | 0.0000321 | V0 | 0.0000000 | V1 | |
| Bismuth | 0.0000093 | 0.0000071 | V0 | 0.0000060 | V0 | 0.0000000 | V1 | |
| Cadmium | 0.0000174 | 0.0000099 | V0 | 0.0000102 | V0 | 0.0000000 | V1 | |
| Calcium | 0.4112124 | 1.0002666 | V0 | 1.1862282 | V0 | 0.0000000 | V1 | |
| Cerium | 0.0000174 | 0.0007619 | V0 | 0.0011959 | V0 | 0.0000000 | V1 | |
| Cesium | 0.0000100 | 0.0000539 | V0 | 0.0000686 | V0 | 0.0000000 | V1 | |
| Chromium | 0.0022262 | 0.0008848 | V0 | 0.0011858 | V0 | 0.0000000 | V1 | |
| Cobalt | 0.0000273 | 0.0002086 | V0 | 0.0002811 | V0 | 0.0000000 | V1 | |
| Copper | 0.0017171 | 0.0008875 | V0 | 0.0008159 | V0 | 0.0000000 | V1 | |
| Iron | 0.0393063 | 0.6392075 | V0 | 1.3423300 | V0 | 0.0024202 | V0 | |
| Lanthanum | 0.0000130 | 0.0003653 | V0 | 0.0004823 | V0 | 0.0000000 | V1 | |
| Lead | 0.0008577 | 0.0002969 | V0 | 0.0003467 | V0 | 0.0000000 | V1 | |
| Lithium | 0.0000374 | 0.0006548 | V0 | 0.0009230 | V0 | 0.0000000 | V1 | |
| Magnesium | 0.0091409 | 0.1393369 | V0 | 0.2521664 | V0 | 0.0000000 | V1 | |
| Manganese | 0.0006949 | 0.0108389 | V0 | 0.0202854 | V0 | 0.0000000 | V1 | |
| Molybdenum | 0.0007116 | 0.0001945 | V0 | 0.0001637 | V0 | 0.0000000 | V1 | |
| Neodymium | 0.0000140 | 0.0003297 | V0 | 0.0004436 | V0 | 0.0000000 | V1 | |
| Nickel | 0.0005429 | 0.0011860 | V0 | 0.0011799 | V0 | 0.0000667 | V0 | |
| Niobium | 0.0000202 | 0.0000851 | V0 | 0.0001091 | V0 | 0.0000000 | V1 | |
| Palladium | 0.0000632 | 0.0000164 | V0 | 0.0000201 | V0 | 0.0000149 | V0 | |
| Phosphorus | 0.0459574 | 0.0276448 | V0 | 0.0259036 | V0 | 0.0091428 | V0 | |
| Platinum | 0.0000088 | 0.0000029 | V0 | 0.0000020 | V0 | 0.0000011 | V0 | |
| Potassium | 0.0061261 | 0.2113133 | V0 | 0.2679801 | V0 | 0.0004256 | V0 | |
| Praseodymium | 0.0000070 | 0.0000884 | V0 | 0.0001141 | V0 | 0.0000000 | V1 | |
| Rubidium | 0.0000184 | 0.0009195 | V0 | 0.0011646 | V0 | 0.0000000 | V1 | |
| Samarium | 0.0000133 | 0.0000627 | V0 | 0.0000821 | V0 | 0.0000000 | V1 | |
| Selenium | 0.0003366 | 0.0004233 | V0 | 0.0005049 | V0 | 0.0000000 | V1 | |
| Silicon | 0.7676322 | 1.8258666 | V0 | 2.5118803 | V0 | 0.0000000 | V1 | |
| Silver | 0.0000100 | 0.0000045 | V0 | 0.0000122 | V0 | 0.0000000 | V1 | |
| Sodium | 0.0169447 | 0.0875028 | V0 | 0.1177297 | V0 | 0.0000000 | V1 | |
| Strontium | 0.0003375 | 0.0026069 | V0 | 0.0036362 | V0 | 0.0000000 | V1 | |
| Tantalum | 0.0000394 | 0.0000059 | V0 | 0.0000073 | V0 | 0.0000000 | V1 | |
| Thallium | 0.0000090 | 0.0000077 | V0 | 0.0000109 | V0 | 0.0000000 | V1 | |
| Thorium | 0.0000059 | 0.0001044 | V0 | 0.0001297 | V0 | 0.0000000 | V1 | |
| Tin | 0.0004414 | 0.0001233 | V0 | 0.0001171 | V0 | 0.0000262 | V0 | |
| Titanium | 0.0015201 | 0.0256024 | V0 | 0.0387810 | V0 | 0.0003177 | V0 | |
| Tungsten | 0.0000938 | 0.0000618 | V0 | 0.0000619 | V0 | 0.0000000 | V1 | |
| Uranium | 0.0000048 | 0.0000293 | V0 | 0.0000408 | V0 | 0.0000000 | V1 | |
| Vanadium | 0.0007697 | 0.0023213 | V0 | 0.0027493 | V0 | 0.0000000 | V1 | |
| Zinc | 0.0055897 | 0.0032802 | V0 | 0.0032623 | V0 | 0.0000000 | V1 | |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 23-Aug | |
| Sample Date | 23-Aug | | | 23-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 24.00 | V0 | 0.11 | V0 |
| Aluminum | 0.1380326 | 0.8040515 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000320 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0001704 | V0 | 0.0000057 | V0 |
| Barium | 0.0092847 | 0.0066919 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000246 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000054 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000079 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 1.1357355 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0009438 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000637 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0010594 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0002328 | V0 | 0.0000000 | V1 |
| Copper | 0.0017171 | 0.0007192 | V0 | 0.0000000 | V1 |
| Iron | 0.0393063 | 0.9491481 | V0 | 0.0024202 | V0 |
| Lanthanum | 0.0000130 | 0.0004575 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0003336 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0008195 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.1706464 | V0 | 0.0000000 | V1 |
| Manganese | 0.0006949 | 0.0160146 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001796 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0004099 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0009768 | V0 | 0.0000667 | V0 |
| Niobium | 0.0000202 | 0.0001011 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000177 | V0 | 0.0000149 | V0 |
| Phosphorus | 0.0459574 | 0.0235793 | V0 | 0.0091428 | V0 |
| Platinum | 0.0000088 | 0.0000028 | V0 | 0.0000011 | V0 |
| Potassium | 0.0061261 | 0.2325405 | V0 | 0.0004256 | V0 |
| Praseodymium | 0.0000070 | 0.0001057 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0010566 | V0 | 0.0000000 | V1 |
| Samarium | 0.0000133 | 0.0000760 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0004827 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 2.1752938 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000044 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0834828 | V0 | 0.0000000 | V1 |
| Strontium | 0.0003375 | 0.0029507 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000066 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000091 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0001229 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001311 | V0 | 0.0000262 | V0 |
| Titanium | 0.0015201 | 0.0304831 | V0 | 0.0003177 | V0 |
| Tungsten | 0.0000938 | 0.0000684 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000344 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0020782 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0028345 | V0 | 0.0000000 | V1 |



| Compound Name | Bertha Ganter - Fort | | | | | | | | |
|------------------------------------|------------------------------|-----------|------------------------------|-----------|------------------------------|-----------|------------------------------|--------------|--|
| | Station Name | McKay | | | Patricia McInnes | | | Travel Blank | |
| | Station # | AMS 1 | AMS 6 | AMS 6 | AMS 6 | AMS 6 | 29-Aug | | |
| | Sample Date | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug | | |
| Particulate Size | PM10 | PM10 | PM10 | PM10 | PM10 | PM10 | PM10 | | |
| Total Air Volume (m ³) | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | |
| MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | |
| Particulate Matter | 1.00 | 26.65 | V0 | 42.08 | V0 | 0.15 | V0 | | |
| Aluminum | 0.1380326 | 0.6182273 | V0 | 1.2696512 | V0 | 0.0000000 | V1 | | |
| Antimony | 0.0001784 | 0.0000741 | V0 | 0.0005058 | V0 | 0.0000000 | V1 | | |
| Arsenic | 0.0001060 | 0.0001354 | V0 | 0.0007530 | V0 | 0.0000000 | V1 | | |
| Barium | 0.0092847 | 0.0059247 | V0 | 0.0178415 | V0 | 0.0000000 | V1 | | |
| Beryllium | 0.0000946 | 0.0000189 | V0 | 0.0001713 | V0 | 0.0000000 | V1 | | |
| Bismuth | 0.0000093 | 0.0000031 | V0 | 0.0000219 | V0 | 0.0000000 | V1 | | |
| Cadmium | 0.0000174 | 0.0000097 | V0 | 0.0000140 | V0 | 0.0000000 | V1 | | |
| Calcium | 0.4112124 | 3.4968742 | V0 | 2.9265990 | V0 | 0.0000000 | V1 | | |
| Cerium | 0.0000174 | 0.0006612 | V0 | 0.0017435 | V0 | 0.0000000 | V1 | | |
| Cesium | 0.0000100 | 0.0000552 | V0 | 0.0000824 | V0 | 0.0000000 | V1 | | |
| Chromium | 0.0022262 | 0.0008566 | V0 | 0.0015583 | V0 | 0.0000000 | V1 | | |
| Cobalt | 0.0000273 | 0.0001969 | V0 | 0.0003863 | V0 | 0.0000015 | V0 | | |
| Copper | 0.0017171 | 0.0009128 | V0 | 0.0053661 | V0 | 0.0008045 | V0 | | |
| Iron | 0.0393063 | 0.6747899 | V0 | 1.9062815 | V0 | 0.0000000 | V1 | | |
| Lanthanum | 0.0000130 | 0.0003275 | V0 | 0.0008711 | V0 | 0.0000000 | V1 | | |
| Lead | 0.0008577 | 0.0002831 | V0 | 0.0006321 | V0 | 0.0000000 | V1 | | |
| Lithium | 0.0000374 | 0.0006582 | V0 | 0.0010145 | V0 | 0.0000000 | V1 | | |
| Magnesium | 0.0091409 | 0.1779427 | V0 | 0.6806098 | V0 | 0.0004476 | V0 | | |
| Manganese | 0.0006949 | 0.0111885 | V0 | 0.0299762 | V0 | 0.0000000 | V1 | | |
| Molybdenum | 0.0007116 | 0.0000816 | V0 | 0.0002612 | V0 | 0.0000000 | V1 | | |
| Neodymium | 0.0000140 | 0.0002930 | V0 | 0.0007362 | V0 | 0.0000000 | V1 | | |
| Nickel | 0.0005429 | 0.0006662 | V0 | 0.0014875 | V0 | 0.0000411 | V0 | | |
| Niobium | 0.0000202 | 0.0000695 | V0 | 0.0001370 | V0 | 0.0000000 | V1 | | |
| Palladium | 0.0000632 | 0.0000116 | V0 | 0.0000338 | V0 | 0.0000000 | V1 | | |
| Phosphorus | 0.0459574 | 0.0230004 | V0 | 0.0369295 | V0 | 0.0086883 | V0 | | |
| Platinum | 0.0000088 | 0.0000022 | V0 | 0.0000027 | V0 | 0.0000010 | V0 | | |
| Potassium | 0.0061261 | 0.2264286 | V0 | 0.4301626 | V0 | 0.0008372 | V0 | | |
| Praseodymium | 0.0000070 | 0.0000761 | V0 | 0.0001974 | V0 | 0.0000000 | V1 | | |
| Rubidium | 0.0000184 | 0.0010080 | V0 | 0.0017098 | V0 | 0.0000009 | V0 | | |
| Samarium | 0.0000133 | 0.0000550 | V0 | 0.0001300 | V0 | 0.0000000 | V1 | | |
| Selenium | 0.0003366 | 0.0003643 | V0 | 0.0007837 | V0 | 0.0000000 | V1 | | |
| Silicon | 0.7676322 | 1.7366779 | V0 | 3.8503773 | V0 | 0.0000000 | V1 | | |
| Silver | 0.0000100 | 0.0000032 | V0 | 0.0000071 | V0 | 0.0000000 | V1 | | |
| Sodium | 0.0169447 | 0.0842662 | V0 | 0.2899081 | V0 | 0.0008656 | V0 | | |
| Strontium | 0.0003375 | 0.0047132 | V0 | 0.0069829 | V0 | 0.0000000 | V1 | | |
| Tantalum | 0.0000394 | 0.0000044 | V0 | 0.0000100 | V0 | 0.0000000 | V1 | | |
| Thallium | 0.0000090 | 0.0000074 | V0 | 0.0000164 | V0 | 0.0000000 | V1 | | |
| Thorium | 0.0000059 | 0.0000918 | V0 | 0.0002220 | V0 | 0.0000000 | V1 | | |
| Tin | 0.0004414 | 0.0001129 | V0 | 0.0004845 | V0 | 0.0000289 | V0 | | |
| Titanium | 0.0015201 | 0.0220941 | V0 | 0.0445813 | V0 | 0.0006668 | V0 | | |
| Tungsten | 0.0000938 | 0.0000463 | V0 | 0.0003588 | V0 | 0.0000000 | V1 | | |
| Uranium | 0.0000048 | 0.0000271 | V0 | 0.0000593 | V0 | 0.0000000 | V1 | | |
| Vanadium | 0.0007697 | 0.0013248 | V0 | 0.0030866 | V0 | 0.0000000 | V1 | | |
| Zinc | 0.0055897 | 0.0021906 | V0 | 0.0108565 | V0 | 0.0006571 | V0 | | |



| Station Name Station # Sample Date Particulate Size Total Air Volume (m ³) | Athabasca Valley | | | Anzac | | Travel Blank | |
|--|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| | AMS 7 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug | 29-Aug |
| | PM10 | PM10 | PM10 | PM10 | PM10 | PM10 | PM10 |
| | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 18.52 | V0 | 9.98 | V0 | 0.15 | V0 |
| Aluminum | 0.1380326 | 0.5051612 | V0 | 0.1411893 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0004528 | V0 | 0.0023206 | V4 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0006638 | V0 | 0.0001436 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0097141 | V0 | 0.0022050 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000200 | V0 | 0.0000062 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000155 | V0 | 0.0000065 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000125 | V0 | 0.0000337 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.8590946 | V0 | 0.2511213 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0006349 | V0 | 0.0001875 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000362 | V0 | 0.0000098 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0008361 | V0 | 0.0003400 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0001576 | V0 | 0.0000541 | V0 | 0.0000015 | V0 |
| Copper | 0.0017171 | 0.0029013 | V0 | 0.0009535 | V0 | 0.0008045 | V0 |
| Iron | 0.0393063 | 0.6985485 | V0 | 0.2331423 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0003083 | V0 | 0.0000949 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0005186 | V0 | 0.0005709 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0004181 | V0 | 0.0001097 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.1890665 | V0 | 0.0616022 | V0 | 0.0004476 | V0 |
| Manganese | 0.0006949 | 0.0103948 | V0 | 0.0047071 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0002027 | V0 | 0.0000670 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0002735 | V0 | 0.0000852 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0005813 | V0 | 0.0002508 | V0 | 0.0000411 | V0 |
| Niobium | 0.0000202 | 0.0000592 | V0 | 0.0000182 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000217 | V0 | 0.0000069 | V0 | 0.0000000 | V1 |
| Phosphorus | 0.0459574 | 0.0278469 | V0 | 0.0239408 | V0 | 0.0086883 | V0 |
| Platinum | 0.0000088 | 0.0000025 | V0 | 0.0000023 | V0 | 0.0000010 | V0 |
| Potassium | 0.0061261 | 0.1799626 | V0 | 0.0759193 | V0 | 0.0008372 | V0 |
| Praseodymium | 0.0000070 | 0.0000706 | V0 | 0.0000215 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0007012 | V0 | 0.0002268 | V0 | 0.0000009 | V0 |
| Samarium | 0.0000133 | 0.0000474 | V0 | 0.0000150 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0003359 | V0 | 0.0000988 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 1.5047646 | V0 | 0.4593145 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000062 | V0 | 0.0000021 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0887054 | V0 | 0.0388345 | V0 | 0.0008656 | V0 |
| Strontium | 0.0003375 | 0.0024293 | V0 | 0.0006741 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000046 | V0 | 0.0000000 | V1 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000064 | V0 | 0.0000025 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000809 | V0 | 0.0000238 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0003363 | V0 | 0.0009842 | V0 | 0.0000289 | V0 |
| Titanium | 0.0015201 | 0.0219654 | V0 | 0.0056726 | V0 | 0.0006668 | V0 |
| Tungsten | 0.0000938 | 0.0000990 | V0 | 0.0000889 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000217 | V0 | 0.0000085 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0011071 | V0 | 0.0003311 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0119723 | V0 | 0.0029874 | V0 | 0.0006571 | V0 |



| Station Name | Fort McKay South | | | Horizon | | Travel Blank | |
|------------------------------------|------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 13 | | | AMS 15 | | | |
| Sample Date | 29-Aug | | | 29-Aug | | | |
| Particulate Size | PM10 | | | PM10 | | | |
| Total Air Volume (m ³) | 24 | | | 24 | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 11.92 | V0 | -9999 | M2 | 0.15 | V0 |
| Aluminum | 0.1380326 | 0.2679453 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000233 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0000614 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0024804 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000077 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000031 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000041 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 0.5045025 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0002661 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000215 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0010084 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0000764 | V0 | -9999 | M2 | 0.0000015 | V0 |
| Copper | 0.0017171 | 0.0004676 | V0 | -9999 | M2 | 0.0008045 | V0 |
| Iron | 0.0393063 | 0.2491375 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0001302 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0001036 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0002499 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.0640159 | V0 | -9999 | M2 | 0.0004476 | V0 |
| Manganese | 0.0006949 | 0.0037463 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0000769 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0001181 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0006422 | V0 | -9999 | M2 | 0.0000411 | V0 |
| Niobium | 0.0000202 | 0.0000274 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000078 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Phosphorus | 0.0459574 | 0.0191204 | V0 | -9999 | M2 | 0.0086883 | V0 |
| Platinum | 0.0000088 | 0.0000025 | V0 | -9999 | M2 | 0.0000010 | V0 |
| Potassium | 0.0061261 | 0.0946013 | V0 | -9999 | M2 | 0.0008372 | V0 |
| Praseodymium | 0.0000070 | 0.0000304 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0003877 | V0 | -9999 | M2 | 0.0000009 | V0 |
| Samarium | 0.0000133 | 0.0000241 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0001542 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 0.7446917 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000021 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.0501010 | V0 | -9999 | M2 | 0.0008656 | V0 |
| Strontium | 0.0003375 | 0.0013016 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000020 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000031 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0000362 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0000840 | V0 | -9999 | M2 | 0.0000289 | V0 |
| Titanium | 0.0015201 | 0.0089858 | V0 | -9999 | M2 | 0.0006668 | V0 |
| Tungsten | 0.0000938 | 0.0000202 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000109 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0006465 | V0 | -9999 | M2 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0012758 | V0 | -9999 | M2 | 0.0006571 | V0 |



| Station Name | Muskeg River | | | Travel Blank | |
|------------------------------------|-----------------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 16 | | | 29-Aug | |
| Sample Date | 29-Aug | | | 29-Aug | |
| Particulate Size | PM10 | | | 24 | |
| Total Air Volume (m ³) | 24 | | | 24 | |
| Compound Name | MDL (µg/sample) | Results (µg/m ³) | QC Flag | Results (µg/m ³) | QC Flag |
| Particulate Matter | 1.00 | 29.22 | V0 | 0.15 | V0 |
| Aluminum | 0.1380326 | 1.1857945 | V0 | 0.0000000 | V1 |
| Antimony | 0.0001784 | 0.0000301 | V0 | 0.0000000 | V1 |
| Arsenic | 0.0001060 | 0.0001979 | V0 | 0.0000000 | V1 |
| Barium | 0.0092847 | 0.0098984 | V0 | 0.0000000 | V1 |
| Beryllium | 0.0000946 | 0.0000413 | V0 | 0.0000000 | V1 |
| Bismuth | 0.0000093 | 0.0000057 | V0 | 0.0000000 | V1 |
| Cadmium | 0.0000174 | 0.0000050 | V0 | 0.0000000 | V1 |
| Calcium | 0.4112124 | 1.6271724 | V0 | 0.0000000 | V1 |
| Cerium | 0.0000174 | 0.0014030 | V0 | 0.0000000 | V1 |
| Cesium | 0.0000100 | 0.0000849 | V0 | 0.0000000 | V1 |
| Chromium | 0.0022262 | 0.0014151 | V0 | 0.0000000 | V1 |
| Cobalt | 0.0000273 | 0.0003416 | V0 | 0.0000015 | V0 |
| Copper | 0.0017171 | 0.0007695 | V0 | 0.0008045 | V0 |
| Iron | 0.0393063 | 1.5219242 | V0 | 0.0000000 | V1 |
| Lanthanum | 0.0000130 | 0.0006739 | V0 | 0.0000000 | V1 |
| Lead | 0.0008577 | 0.0003817 | V0 | 0.0000000 | V1 |
| Lithium | 0.0000374 | 0.0013853 | V0 | 0.0000000 | V1 |
| Magnesium | 0.0091409 | 0.2632536 | V0 | 0.0004476 | V0 |
| Manganese | 0.0006949 | 0.0257355 | V0 | 0.0000000 | V1 |
| Molybdenum | 0.0007116 | 0.0001914 | V0 | 0.0000000 | V1 |
| Neodymium | 0.0000140 | 0.0006007 | V0 | 0.0000000 | V1 |
| Nickel | 0.0005429 | 0.0011579 | V0 | 0.0000411 | V0 |
| Niobium | 0.0000202 | 0.0001455 | V0 | 0.0000000 | V1 |
| Palladium | 0.0000632 | 0.0000230 | V0 | 0.0000000 | V1 |
| Phosphorus | 0.0459574 | 0.0259873 | V0 | 0.0086883 | V0 |
| Platinum | 0.0000088 | 0.0000024 | V0 | 0.0000010 | V0 |
| Potassium | 0.0061261 | 0.3231250 | V0 | 0.0008372 | V0 |
| Praseodymium | 0.0000070 | 0.0001593 | V0 | 0.0000000 | V1 |
| Rubidium | 0.0000184 | 0.0015121 | V0 | 0.0000009 | V0 |
| Samarium | 0.0000133 | 0.0001095 | V0 | 0.0000000 | V1 |
| Selenium | 0.0003366 | 0.0006705 | V0 | 0.0000000 | V1 |
| Silicon | 0.7676322 | 2.7278601 | V0 | 0.0000000 | V1 |
| Silver | 0.0000100 | 0.0000051 | V0 | 0.0000000 | V1 |
| Sodium | 0.0169447 | 0.1233679 | V0 | 0.0008656 | V0 |
| Strontium | 0.0003375 | 0.0045134 | V0 | 0.0000000 | V1 |
| Tantalum | 0.0000394 | 0.0000092 | V0 | 0.0000000 | V1 |
| Thallium | 0.0000090 | 0.0000133 | V0 | 0.0000000 | V1 |
| Thorium | 0.0000059 | 0.0001818 | V0 | 0.0000000 | V1 |
| Tin | 0.0004414 | 0.0001330 | V0 | 0.0000289 | V0 |
| Titanium | 0.0015201 | 0.0445656 | V0 | 0.0006668 | V0 |
| Tungsten | 0.0000938 | 0.0000688 | V0 | 0.0000000 | V1 |
| Uranium | 0.0000048 | 0.0000477 | V0 | 0.0000000 | V1 |
| Vanadium | 0.0007697 | 0.0022877 | V0 | 0.0000000 | V1 |
| Zinc | 0.0055897 | 0.0031240 | V0 | 0.0006571 | V0 |



| Station Name | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay | Bertha Ganter - Fort McKay |
|--------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Station # | AMS 1 | AMS 1 | AMS 1 | AMS 1 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 31.86 | 10.50 | 5 | 5 |
| Aluminum | 1.0247070 | 0.6171285 | 5 | 5 |
| Antimony | 0.0000612 | 0.0000296 | 5 | 5 |
| Arsenic | 0.0002173 | 0.0001089 | 5 | 5 |
| Barium | 0.0091726 | 0.0052099 | 5 | 5 |
| Beryllium | 0.0000285 | 0.0000188 | 5 | 4 |
| Bismuth | 0.0000066 | 0.0000040 | 5 | 5 |
| Cadmium | 0.0000128 | 0.0000025 | 5 | 5 |
| Calcium | 2.3285664 | 1.1878432 | 5 | 5 |
| Cerium | 0.0011311 | 0.0007122 | 5 | 5 |
| Cesium | 0.0000850 | 0.0000494 | 5 | 5 |
| Chromium | 0.0012930 | 0.0006553 | 5 | 5 |
| Cobalt | 0.0002783 | 0.0001538 | 5 | 5 |
| Copper | 0.0016618 | 0.0008065 | 5 | 5 |
| Iron | 0.9117972 | 0.5074734 | 5 | 5 |
| Lanthanum | 0.0005610 | 0.0003533 | 5 | 5 |
| Lead | 0.0003805 | 0.0001881 | 5 | 5 |
| Lithium | 0.0009810 | 0.0005807 | 5 | 5 |
| Magnesium | 0.2294365 | 0.1226340 | 5 | 5 |
| Manganese | 0.0141420 | 0.0072565 | 5 | 5 |
| Molybdenum | 0.0001765 | 0.0001091 | 5 | 5 |
| Neodymium | 0.0004938 | 0.0003065 | 5 | 5 |
| Nickel | 0.0012221 | 0.0007281 | 5 | 5 |
| Niobium | 0.0001246 | 0.0000791 | 5 | 5 |
| Palladium | 0.0000206 | 0.0000114 | 5 | 5 |
| Phosphorus | 0.0264301 | 0.0079686 | 5 | 5 |
| Platinum | 0.0000024 | 0.0000009 | 5 | 5 |
| Potassium | 0.3297516 | 0.1649405 | 5 | 5 |
| Praseodymium | 0.0001287 | 0.0000800 | 5 | 5 |
| Rubidium | 0.0014372 | 0.0007816 | 5 | 5 |
| Samarium | 0.0000906 | 0.0000554 | 5 | 5 |
| Selenium | 0.0005973 | 0.0003425 | 5 | 5 |
| Silicon | 2.7102223 | 1.4580784 | 5 | 5 |
| Silver | 0.0000059 | 0.0000034 | 5 | 5 |
| Sodium | 0.1421607 | 0.0798078 | 5 | 5 |
| Strontium | 0.0047221 | 0.0022117 | 5 | 5 |
| Tantalum | 0.0000084 | 0.0000059 | 5 | 4 |
| Thallium | 0.0000107 | 0.0000056 | 5 | 5 |
| Thorium | 0.0001475 | 0.0000903 | 5 | 5 |
| Tin | 0.0001497 | 0.0000337 | 5 | 5 |
| Titanium | 0.0421736 | 0.0282399 | 5 | 5 |
| Tungsten | 0.0000826 | 0.0000492 | 5 | 5 |
| Uranium | 0.0000414 | 0.0000243 | 5 | 5 |
| Vanadium | 0.0028060 | 0.0018477 | 5 | 5 |
| Zinc | 0.0041405 | 0.0018083 | 5 | 5 |



| Station Name | Patricia McInnes | Patricia McInnes | Patricia McInnes | Patricia McInnes |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 6 | AMS 6 | AMS 6 | AMS 6 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 20.37 | 12.60 | 5 | 5 |
| Aluminum | 0.4799409 | 0.4552977 | 5 | 5 |
| Antimony | 0.0002479 | 0.0001578 | 5 | 5 |
| Arsenic | 0.0002585 | 0.0002788 | 5 | 5 |
| Barium | 0.0073873 | 0.0060077 | 5 | 5 |
| Beryllium | 0.0000429 | 0.0000718 | 5 | 5 |
| Bismuth | 0.0000107 | 0.0000067 | 5 | 5 |
| Cadmium | 0.0000133 | 0.0000019 | 5 | 5 |
| Calcium | 1.0005796 | 1.0910441 | 5 | 5 |
| Cerium | 0.0006445 | 0.0006297 | 5 | 5 |
| Cesium | 0.0000318 | 0.0000292 | 5 | 5 |
| Chromium | 0.0007547 | 0.0004821 | 5 | 5 |
| Cobalt | 0.0001470 | 0.0001368 | 5 | 5 |
| Copper | 0.0021784 | 0.0018267 | 5 | 5 |
| Iron | 0.6784636 | 0.7005153 | 5 | 5 |
| Lanthanum | 0.0003589 | 0.0003144 | 5 | 5 |
| Lead | 0.0003008 | 0.0001972 | 5 | 5 |
| Lithium | 0.0003801 | 0.0003640 | 5 | 5 |
| Magnesium | 0.2332851 | 0.2547007 | 5 | 5 |
| Manganese | 0.0109985 | 0.0108630 | 5 | 5 |
| Molybdenum | 0.0001162 | 0.0000860 | 5 | 5 |
| Neodymium | 0.0002729 | 0.0002662 | 5 | 5 |
| Nickel | 0.0005930 | 0.0005135 | 5 | 5 |
| Niobium | 0.0000556 | 0.0000476 | 5 | 5 |
| Palladium | 0.0000174 | 0.0000094 | 5 | 5 |
| Phosphorus | 0.0246041 | 0.0075987 | 5 | 5 |
| Platinum | 0.0000024 | 0.0000005 | 5 | 5 |
| Potassium | 0.1841626 | 0.1411140 | 5 | 5 |
| Praseodymium | 0.0000725 | 0.0000717 | 5 | 5 |
| Rubidium | 0.0006793 | 0.0005943 | 5 | 5 |
| Samarium | 0.0000484 | 0.0000471 | 5 | 5 |
| Selenium | 0.0003361 | 0.0002540 | 5 | 5 |
| Silicon | 1.6584368 | 1.2625733 | 5 | 5 |
| Silver | 0.0000044 | 0.0000022 | 5 | 5 |
| Sodium | 0.1029046 | 0.1078017 | 5 | 5 |
| Strontium | 0.0025744 | 0.0025102 | 5 | 5 |
| Tantalum | 0.0000038 | 0.0000037 | 5 | 4 |
| Thallium | 0.0000062 | 0.0000058 | 5 | 5 |
| Thorium | 0.0000840 | 0.0000804 | 5 | 5 |
| Tin | 0.0002892 | 0.0001237 | 5 | 5 |
| Titanium | 0.0185841 | 0.0152199 | 5 | 5 |
| Tungsten | 0.0001484 | 0.0001204 | 5 | 5 |
| Uranium | 0.0000228 | 0.0000210 | 5 | 5 |
| Vanadium | 0.0011215 | 0.0011302 | 5 | 5 |
| Zinc | 0.0060720 | 0.0029402 | 5 | 5 |



| Station Name | Athabasca Valley | Athabasca Valley | Athabasca Valley | Athabasca Valley |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 7 | AMS 7 | AMS 7 | AMS 7 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 18.48 | 3.60 | 5 | 5 |
| Aluminum | 0.3831763 | 0.1443588 | 5 | 5 |
| Antimony | 0.0003975 | 0.0000924 | 5 | 5 |
| Arsenic | 0.0002556 | 0.0002313 | 5 | 5 |
| Barium | 0.0084719 | 0.0025605 | 5 | 5 |
| Beryllium | 0.0000135 | 0.0000056 | 5 | 5 |
| Bismuth | 0.0000179 | 0.0000054 | 5 | 5 |
| Cadmium | 0.0000130 | 0.0000048 | 5 | 5 |
| Calcium | 0.6554837 | 0.2232098 | 5 | 5 |
| Cerium | 0.0005346 | 0.0000883 | 5 | 5 |
| Cesium | 0.0000277 | 0.0000103 | 5 | 5 |
| Chromium | 0.0007001 | 0.0001673 | 5 | 5 |
| Cobalt | 0.0001240 | 0.0000445 | 5 | 5 |
| Copper | 0.0028378 | 0.0003303 | 5 | 5 |
| Iron | 0.5311248 | 0.1952133 | 5 | 5 |
| Lanthanum | 0.0002436 | 0.0000851 | 5 | 5 |
| Lead | 0.0003389 | 0.0001401 | 5 | 5 |
| Lithium | 0.0003060 | 0.0001200 | 5 | 5 |
| Magnesium | 0.1472018 | 0.0551521 | 5 | 5 |
| Manganese | 0.0081797 | 0.0029783 | 5 | 5 |
| Molybdenum | 0.0001636 | 0.0000402 | 5 | 5 |
| Neodymium | 0.0002075 | 0.0000796 | 5 | 5 |
| Nickel | 0.0006016 | 0.0002991 | 5 | 5 |
| Niobium | 0.0000466 | 0.0000157 | 5 | 5 |
| Palladium | 0.0000186 | 0.0000035 | 5 | 5 |
| Phosphorus | 0.0257682 | 0.0039047 | 5 | 5 |
| Platinum | 0.0000026 | 0.0000006 | 5 | 5 |
| Potassium | 0.1545325 | 0.0454951 | 5 | 5 |
| Praseodymium | 0.0000547 | 0.0000204 | 5 | 5 |
| Rubidium | 0.0005515 | 0.0001938 | 5 | 5 |
| Samarium | 0.0000375 | 0.0000143 | 5 | 5 |
| Selenium | 0.0002730 | 0.0000761 | 5 | 5 |
| Silicon | 1.3873101 | 0.3653223 | 5 | 5 |
| Silver | 0.0000049 | 0.0000010 | 4 | 4 |
| Sodium | 0.0676054 | 0.0193449 | 5 | 5 |
| Strontium | 0.0019257 | 0.0006564 | 5 | 5 |
| Tantalum | 0.0000036 | 0.0000012 | 5 | 5 |
| Thallium | 0.0000048 | 0.0000018 | 5 | 5 |
| Thorium | 0.0000614 | 0.0000241 | 5 | 5 |
| Tin | 0.0003466 | 0.0000492 | 5 | 5 |
| Titanium | 0.0169938 | 0.0055060 | 5 | 5 |
| Tungsten | 0.0001199 | 0.0000298 | 5 | 5 |
| Uranium | 0.0000171 | 0.0000063 | 5 | 5 |
| Vanadium | 0.0008733 | 0.0003261 | 5 | 5 |
| Zinc | 0.0098062 | 0.0027040 | 5 | 5 |



| Station Name | Anzac | Anzac | Anzac | Anzac |
|--------------------|------------------------------|------------------------------|-------------------|-----------------|
| Station # | AMS 14 | AMS 14 | AMS 14 | AMS 14 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 10.13 | 1.45 | 5 | 5 |
| Aluminum | 0.1439682 | 0.0580138 | 5 | 5 |
| Antimony | 0.0004912 | 0.0010229 | 5 | 5 |
| Arsenic | 0.0000971 | 0.0000361 | 5 | 5 |
| Barium | 0.0021340 | 0.0006671 | 5 | 5 |
| Beryllium | 0.0000057 | 0.0000034 | 5 | 4 |
| Bismuth | 0.0000057 | 0.0000044 | 5 | 4 |
| Cadmium | 0.0000146 | 0.0000108 | 5 | 5 |
| Calcium | 0.1974071 | 0.1007271 | 5 | 5 |
| Cerium | 0.0001975 | 0.0000999 | 5 | 5 |
| Cesium | 0.0000097 | 0.0000045 | 5 | 5 |
| Chromium | 0.0003552 | 0.0000536 | 5 | 5 |
| Cobalt | 0.0000482 | 0.0000142 | 5 | 5 |
| Copper | 0.0005721 | 0.0002225 | 5 | 5 |
| Iron | 0.1908218 | 0.0409273 | 5 | 5 |
| Lanthanum | 0.0001006 | 0.0000485 | 5 | 5 |
| Lead | 0.0001952 | 0.0002123 | 5 | 5 |
| Lithium | 0.0001053 | 0.0000498 | 5 | 5 |
| Magnesium | 0.0517597 | 0.0222838 | 5 | 5 |
| Manganese | 0.0038419 | 0.0013409 | 5 | 5 |
| Molybdenum | 0.0000557 | 0.0000149 | 5 | 5 |
| Neodymium | 0.0000838 | 0.0000434 | 5 | 5 |
| Nickel | 0.0002715 | 0.0000649 | 5 | 5 |
| Niobium | 0.0000180 | 0.0000087 | 5 | 5 |
| Palladium | 0.0000073 | 0.0000049 | 5 | 4 |
| Phosphorus | 0.0254140 | 0.0055930 | 5 | 5 |
| Platinum | 0.0000021 | 0.0000004 | 5 | 5 |
| Potassium | 0.0803434 | 0.0141909 | 5 | 5 |
| Praseodymium | 0.0000220 | 0.0000112 | 5 | 5 |
| Rubidium | 0.0002380 | 0.0000770 | 5 | 5 |
| Samarium | 0.0000152 | 0.0000075 | 5 | 5 |
| Selenium | 0.0001319 | 0.0000286 | 5 | 5 |
| Silicon | 0.5400506 | 0.2466702 | 5 | 5 |
| Silver | 0.0000016 | 0.0000007 | 4 | 4 |
| Sodium | 0.0287343 | 0.0110360 | 5 | 5 |
| Strontium | 0.0005865 | 0.0002415 | 5 | 5 |
| Tantalum | 0.0000004 | 0.0000010 | 5 | 1 |
| Thallium | 0.0000021 | 0.0000009 | 5 | 5 |
| Thorium | 0.0000255 | 0.0000142 | 5 | 5 |
| Tin | 0.0002808 | 0.0003945 | 5 | 5 |
| Titanium | 0.0060445 | 0.0024048 | 5 | 5 |
| Tungsten | 0.0000594 | 0.0000219 | 5 | 5 |
| Uranium | 0.0000071 | 0.0000034 | 5 | 5 |
| Vanadium | 0.0003310 | 0.0001506 | 5 | 5 |
| Zinc | 0.0018014 | 0.0007168 | 5 | 5 |



| Station Name | Fort McKay South | Fort McKay South | Fort McKay South | Fort McKay South |
|--------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 13 | AMS 13 | AMS 13 | AMS 13 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 22.20 | 10.09 | 5 | 5 |
| Aluminum | 0.6800895 | 0.4794933 | 5 | 5 |
| Antimony | 0.0000480 | 0.0000188 | 5 | 5 |
| Arsenic | 0.0001808 | 0.0001001 | 5 | 5 |
| Barium | 0.0062349 | 0.0042463 | 5 | 5 |
| Beryllium | 0.0000202 | 0.0000140 | 5 | 5 |
| Bismuth | 0.0000056 | 0.0000025 | 5 | 5 |
| Cadmium | 0.0000097 | 0.0000036 | 5 | 5 |
| Calcium | 0.7384241 | 0.3963015 | 5 | 5 |
| Cerium | 0.0006904 | 0.0004772 | 5 | 5 |
| Cesium | 0.0000561 | 0.0000400 | 5 | 5 |
| Chromium | 0.0010779 | 0.0004708 | 5 | 5 |
| Cobalt | 0.0001932 | 0.0001319 | 5 | 5 |
| Copper | 0.0010288 | 0.0003768 | 5 | 5 |
| Iron | 0.5792367 | 0.3790252 | 5 | 5 |
| Lanthanum | 0.0003360 | 0.0002317 | 5 | 5 |
| Lead | 0.0002629 | 0.0001521 | 5 | 5 |
| Lithium | 0.0006439 | 0.0004656 | 5 | 5 |
| Magnesium | 0.1409394 | 0.0914119 | 5 | 5 |
| Manganese | 0.0087776 | 0.0053092 | 5 | 5 |
| Molybdenum | 0.0001791 | 0.0001016 | 5 | 5 |
| Neodymium | 0.0003087 | 0.0002156 | 5 | 5 |
| Nickel | 0.0009836 | 0.0005013 | 5 | 5 |
| Niobium | 0.0000814 | 0.0000620 | 5 | 5 |
| Palladium | 0.0000158 | 0.0000069 | 5 | 5 |
| Phosphorus | 0.0248621 | 0.0038088 | 5 | 5 |
| Platinum | 0.0000027 | 0.0000004 | 5 | 5 |
| Potassium | 0.2304204 | 0.1275786 | 5 | 5 |
| Praseodymium | 0.0000804 | 0.0000559 | 5 | 5 |
| Rubidium | 0.0009367 | 0.0006115 | 5 | 5 |
| Samarium | 0.0000593 | 0.0000409 | 5 | 5 |
| Selenium | 0.0003903 | 0.0002584 | 5 | 5 |
| Silicon | 2.1063368 | 1.5357633 | 5 | 5 |
| Silver | 0.0000042 | 0.0000018 | 5 | 5 |
| Sodium | 0.1098450 | 0.0680152 | 5 | 5 |
| Strontium | 0.0026042 | 0.0016952 | 5 | 5 |
| Tantalum | 0.0000054 | 0.0000046 | 5 | 4 |
| Thallium | 0.0000073 | 0.0000045 | 5 | 5 |
| Thorium | 0.0000939 | 0.0000641 | 5 | 5 |
| Tin | 0.0001595 | 0.0000684 | 5 | 5 |
| Titanium | 0.0278065 | 0.0227638 | 5 | 5 |
| Tungsten | 0.0000525 | 0.0000371 | 5 | 5 |
| Uranium | 0.0000277 | 0.0000193 | 5 | 5 |
| Vanadium | 0.0019862 | 0.0015053 | 5 | 5 |
| Zinc | 0.0036953 | 0.0016013 | 5 | 5 |



| Station Name Station # Sample Date Particulate Size Compound Name | Horizon AMS 15 Aug 05 - Aug 29 PM10 Average µg/m ³ | Horizon AMS 15 Aug 05 - Aug 29 PM10 Std Dev µg/m ³ | Horizon AMS 15 Aug 05 - Aug 29 PM10 Total Samples (#) | Horizon AMS 15 Aug 05 - Aug 29 PM10 Total ≥ MDL (#) |
|---|--|--|---|---|
| Particulate Matter | 21.41 | 6.01 | 4 | 4 |
| Aluminum | 0.6329694 | 0.1833340 | 4 | 4 |
| Antimony | 0.0000421 | 0.0000265 | 4 | 4 |
| Arsenic | 0.0001408 | 0.0000482 | 4 | 4 |
| Barium | 0.0057545 | 0.0028819 | 4 | 4 |
| Beryllium | 0.0000199 | 0.0000084 | 4 | 4 |
| Bismuth | 0.0000033 | 0.0000025 | 4 | 3 |
| Cadmium | 0.0000093 | 0.0000012 | 4 | 4 |
| Calcium | 0.4609968 | 0.4910300 | 4 | 4 |
| Cerium | 0.0006789 | 0.0003469 | 4 | 4 |
| Cesium | 0.0000487 | 0.0000133 | 4 | 4 |
| Chromium | 0.0008718 | 0.0002149 | 4 | 4 |
| Cobalt | 0.0001681 | 0.0000764 | 4 | 4 |
| Copper | 0.0007959 | 0.0001451 | 4 | 4 |
| Iron | 0.5783036 | 0.5129270 | 4 | 4 |
| Lanthanum | 0.0003070 | 0.0001186 | 4 | 4 |
| Lead | 0.0002250 | 0.0000823 | 4 | 4 |
| Lithium | 0.0006163 | 0.0002075 | 4 | 4 |
| Magnesium | 0.1310994 | 0.0823019 | 4 | 4 |
| Manganese | 0.0090655 | 0.0075001 | 4 | 4 |
| Molybdenum | 0.0001146 | 0.0000583 | 4 | 4 |
| Neodymium | 0.0002833 | 0.0001087 | 4 | 4 |
| Nickel | 0.0008015 | 0.0002635 | 4 | 4 |
| Niobium | 0.0000712 | 0.0000256 | 4 | 4 |
| Palladium | 0.0000101 | 0.0000082 | 4 | 3 |
| Phosphorus | 0.0196851 | 0.0055961 | 4 | 4 |
| Platinum | 0.0000020 | 0.0000005 | 4 | 4 |
| Potassium | 0.1923037 | 0.0507103 | 4 | 4 |
| Praseodymium | 0.0000727 | 0.0000279 | 4 | 4 |
| Rubidium | 0.0008297 | 0.0002243 | 4 | 4 |
| Samarium | 0.0000531 | 0.0000197 | 4 | 4 |
| Selenium | 0.0003738 | 0.0001149 | 4 | 4 |
| Silicon | 1.7301093 | 0.5393820 | 4 | 4 |
| Silver | 0.0000059 | 0.0000045 | 4 | 4 |
| Sodium | 0.0864108 | 0.0228990 | 4 | 4 |
| Strontium | 0.0020832 | 0.0010553 | 4 | 4 |
| Tantalum | 0.0000046 | 0.0000018 | 4 | 4 |
| Thallium | 0.0000067 | 0.0000028 | 4 | 4 |
| Thorium | 0.0000838 | 0.0000312 | 4 | 4 |
| Tin | 0.0001085 | 0.0000182 | 4 | 4 |
| Titanium | 0.0240797 | 0.0098730 | 4 | 4 |
| Tungsten | 0.0000362 | 0.0000209 | 4 | 4 |
| Uranium | 0.0000248 | 0.0000107 | 4 | 4 |
| Vanadium | 0.0016694 | 0.0007628 | 4 | 4 |
| Zinc | 0.0029002 | 0.0002850 | 4 | 4 |



| Station Name | Muskeg River | Muskeg River | Muskeg River | Muskeg River |
|--------------------|------------------------------|------------------------------|-------------------|-----------------|
| Station # | AMS 16 | AMS 16 | AMS 16 | AMS 16 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Particulate Size | PM10 | PM10 | PM10 | PM10 |
| Compound Name | Average µg/m ³ | Std Dev µg/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Particulate Matter | 37.68 | 10.96 | 5 | 5 |
| Aluminum | 1.5411992 | 0.6333671 | 5 | 5 |
| Antimony | 0.0000428 | 0.0000122 | 5 | 5 |
| Arsenic | 0.0002850 | 0.0000934 | 5 | 5 |
| Barium | 0.0117435 | 0.0035737 | 5 | 5 |
| Beryllium | 0.0000459 | 0.0000165 | 5 | 5 |
| Bismuth | 0.0000068 | 0.0000020 | 5 | 5 |
| Cadmium | 0.0000109 | 0.0000047 | 5 | 5 |
| Calcium | 1.8236800 | 0.4525764 | 5 | 5 |
| Cerium | 0.0017336 | 0.0005982 | 5 | 5 |
| Cesium | 0.0001077 | 0.0000388 | 5 | 5 |
| Chromium | 0.0018144 | 0.0005970 | 5 | 5 |
| Cobalt | 0.0004036 | 0.0001294 | 5 | 5 |
| Copper | 0.0011221 | 0.0003506 | 5 | 5 |
| Iron | 1.5240065 | 0.3574666 | 5 | 5 |
| Lanthanum | 0.0008146 | 0.0002628 | 5 | 5 |
| Lead | 0.0004938 | 0.0001420 | 5 | 5 |
| Lithium | 0.0016638 | 0.0007168 | 5 | 5 |
| Magnesium | 0.3006746 | 0.0902742 | 5 | 5 |
| Manganese | 0.0244651 | 0.0055276 | 5 | 5 |
| Molybdenum | 0.0002953 | 0.0001111 | 5 | 5 |
| Neodymium | 0.0007315 | 0.0002408 | 5 | 5 |
| Nickel | 0.0015659 | 0.0005082 | 5 | 5 |
| Niobium | 0.0001808 | 0.0000643 | 5 | 5 |
| Palladium | 0.0000254 | 0.0000061 | 5 | 5 |
| Phosphorus | 0.0284329 | 0.0063385 | 5 | 5 |
| Platinum | 0.0000028 | 0.0000004 | 5 | 5 |
| Potassium | 0.4130632 | 0.1442027 | 5 | 5 |
| Praseodymium | 0.0001926 | 0.0000646 | 5 | 5 |
| Rubidium | 0.0019187 | 0.0006973 | 5 | 5 |
| Samarium | 0.0001361 | 0.0000465 | 5 | 5 |
| Selenium | 0.0009123 | 0.0003870 | 5 | 5 |
| Silicon | 3.7217103 | 1.3589513 | 5 | 5 |
| Silver | 0.0000064 | 0.0000016 | 5 | 5 |
| Sodium | 0.1591178 | 0.0553405 | 5 | 5 |
| Strontium | 0.0050514 | 0.0013688 | 5 | 5 |
| Tantalum | 0.0000120 | 0.0000043 | 5 | 5 |
| Thallium | 0.0000157 | 0.0000051 | 5 | 5 |
| Thorium | 0.0002233 | 0.0000770 | 5 | 5 |
| Tin | 0.0001554 | 0.0000284 | 5 | 5 |
| Titanium | 0.0563834 | 0.0206861 | 5 | 5 |
| Tungsten | 0.0001003 | 0.0000308 | 5 | 5 |
| Uranium | 0.0000585 | 0.0000202 | 5 | 5 |
| Vanadium | 0.0033462 | 0.0014801 | 5 | 5 |
| Zinc | 0.0045090 | 0.0016481 | 5 | 5 |



Wood Buffalo Environmental Association

PM10 Metal (µg/sample) Summary

| Compound | 2017 August | | PM10 Metal (µg/sample) Summary | | | | | | | | | | | | | | | | |
|--------------------|-------------|----|--------------------------------|--------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|-----------|---------|--------------|----------|--|
| | % Det | N | N < Det. | Min. | 10% | 25% | 50% | 60% | 75% | 80% | 90% | 95% | 99% Max. | Mean | Std. Dev. | Median | Outlier Test | | |
| Particulate Matter | 100.0% | 35 | 0 | 12 | 240 | 297 | 472 | 523 | 778 | 859 | 1006 | 1134 | 1176 | 1176 | 542 | 293 | 472 | 2008 | |
| Aluminum | 100.0% | 35 | 0 | 0.4296 | 3.1249 | 4.1517 | 11.9133 | 14.8375 | 28.4591 | 30.5498 | 35.8526 | 50.0375 | 55.4385 | 55.4385 | 16.3304 | 14.1995 | 11.9133 | 87.3277 | |
| Antimony | 97.1% | 35 | 1 | 0.0000 | 0.0004 | 0.0008 | 0.0014 | 0.0018 | 0.0053 | 0.0066 | 0.0109 | 0.0121 | 0.0557 | 0.0557 | 0.0045 | 0.0096 | 0.0014 | 0.0525 | |
| Arsenic | 100.0% | 35 | 0 | 0.0001 | 0.0016 | 0.0024 | 0.0035 | 0.0046 | 0.0063 | 0.0075 | 0.0085 | 0.0159 | 0.0181 | 0.0181 | 0.0048 | 0.0038 | 0.0035 | 0.0236 | |
| Barium | 97.1% | 35 | 1 | 0.0029 | 0.0419 | 0.0680 | 0.1488 | 0.2181 | 0.2546 | 0.2796 | 0.3459 | 0.3745 | 0.4282 | 0.4282 | 0.1706 | 0.1128 | 0.1488 | 0.7347 | |
| Beryllium | 94.3% | 35 | 2 | 0.0001 | 0.0001 | 0.0002 | 0.0004 | 0.0005 | 0.0009 | 0.0009 | 0.0011 | 0.0016 | 0.0041 | 0.0041 | 0.0006 | 0.0007 | 0.0004 | 0.0042 | |
| Bismuth | 94.3% | 35 | 2 | 0.0000 | 0.0000 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0004 | 0.0006 | 0.0006 | 0.0002 | 0.0001 | 0.0002 | 0.0009 | |
| Cadmium | 97.1% | 35 | 1 | 0.0000 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0003 | 0.0004 | 0.0004 | 0.0004 | 0.0008 | 0.0008 | 0.0003 | 0.0001 | 0.0003 | 0.0009 | |
| Calcium | 97.1% | 35 | 1 | 0.3141 | 3.2144 | 6.8857 | 17.5279 | 23.4170 | 37.3110 | 46.6204 | 60.1254 | 80.7174 | 83.9250 | 83.9250 | 24.3962 | 23.0335 | 17.5279 | 139.5637 | |
| Cerium | 100.0% | 35 | 0 | 0.0003 | 0.0038 | 0.0064 | 0.0131 | 0.0159 | 0.0305 | 0.0337 | 0.0418 | 0.0555 | 0.0560 | 0.0560 | 0.0188 | 0.0156 | 0.0131 | 0.0966 | |
| Cesium | 100.0% | 35 | 0 | 0.0000 | 0.0002 | 0.0003 | 0.0009 | 0.0013 | 0.0020 | 0.0023 | 0.0029 | 0.0033 | 0.0038 | 0.0038 | 0.0012 | 0.0010 | 0.0009 | 0.0064 | |
| Chromium | 100.0% | 35 | 0 | 0.0025 | 0.0078 | 0.0101 | 0.0196 | 0.0212 | 0.0340 | 0.0389 | 0.0429 | 0.0576 | 0.0578 | 0.0578 | 0.0230 | 0.0146 | 0.0196 | 0.0962 | |
| Cobalt | 100.0% | 35 | 0 | 0.0003 | 0.0011 | 0.0013 | 0.0034 | 0.0047 | 0.0082 | 0.0084 | 0.0093 | 0.0124 | 0.0131 | 0.0131 | 0.0046 | 0.0036 | 0.0034 | 0.0226 | |
| Copper | 100.0% | 35 | 0 | 0.0037 | 0.0112 | 0.0173 | 0.0253 | 0.0327 | 0.0425 | 0.0595 | 0.0696 | 0.0766 | 0.1288 | 0.1288 | 0.0345 | 0.0257 | 0.0253 | 0.1628 | |
| Iron | 100.0% | 35 | 0 | 0.2362 | 3.8288 | 5.5954 | 13.3547 | 16.1950 | 24.0567 | 32.2159 | 36.5262 | 45.1674 | 45.7508 | 45.7508 | 16.7316 | 13.4611 | 13.3547 | 84.0369 | |
| Lanthanum | 100.0% | 35 | 0 | 0.0002 | 0.0019 | 0.0025 | 0.0065 | 0.0088 | 0.0149 | 0.0162 | 0.0209 | 0.0250 | 0.0262 | 0.0262 | 0.0091 | 0.0074 | 0.0065 | 0.0461 | |
| Lead | 97.1% | 35 | 1 | 0.0002 | 0.0023 | 0.0035 | 0.0071 | 0.0091 | 0.0110 | 0.0124 | 0.0137 | 0.0152 | 0.0156 | 0.0156 | 0.0074 | 0.0044 | 0.0071 | 0.0294 | |
| Lithium | 100.0% | 35 | 0 | 0.0005 | 0.0022 | 0.0032 | 0.0100 | 0.0157 | 0.0243 | 0.0293 | 0.0345 | 0.0468 | 0.0655 | 0.0655 | 0.0157 | 0.0151 | 0.0100 | 0.0914 | |
| Magnesium | 100.0% | 35 | 0 | 0.0702 | 0.9557 | 1.4785 | 3.6107 | 4.2706 | 6.0520 | 6.3181 | 8.3953 | 9.5989 | 16.3346 | 16.3346 | 4.1443 | 3.3277 | 3.6107 | 20.7829 | |
| Manganese | 100.0% | 35 | 0 | 0.0036 | 0.0673 | 0.0899 | 0.2048 | 0.2601 | 0.3844 | 0.4869 | 0.6177 | 0.7194 | 0.7322 | 0.7322 | 0.2664 | 0.2074 | 0.2048 | 1.3031 | |
| Molybdenum | 100.0% | 35 | 0 | 0.0009 | 0.0012 | 0.0017 | 0.0039 | 0.0043 | 0.0056 | 0.0060 | 0.0072 | 0.0088 | 0.0105 | 0.0105 | 0.0039 | 0.0025 | 0.0039 | 0.0162 | |
| Neodymium | 100.0% | 35 | 0 | 0.0002 | 0.0016 | 0.0021 | 0.0057 | 0.0070 | 0.0137 | 0.0144 | 0.0177 | 0.0228 | 0.0236 | 0.0236 | 0.0080 | 0.0066 | 0.0057 | 0.0411 | |
| Nickel | 100.0% | 35 | 0 | 0.0019 | 0.0052 | 0.0082 | 0.0154 | 0.0234 | 0.0285 | 0.0372 | 0.0419 | 0.0482 | 0.0512 | 0.0512 | 0.0202 | 0.0143 | 0.0154 | 0.0917 | |
| Niobium | 100.0% | 35 | 0 | 0.0000 | 0.0004 | 0.0005 | 0.0014 | 0.0017 | 0.0033 | 0.0039 | 0.0043 | 0.0056 | 0.0062 | 0.0062 | 0.0019 | 0.0017 | 0.0014 | 0.0103 | |
| Palladium | 94.3% | 35 | 2 | 0.0000 | 0.0001 | 0.0003 | 0.0004 | 0.0004 | 0.0006 | 0.0006 | 0.0007 | 0.0008 | 0.0008 | 0.0008 | 0.0004 | 0.0002 | 0.0004 | 0.0015 | |
| Phosphorus | 100.0% | 35 | 0 | 0.2501 | 0.4160 | 0.5055 | 0.5746 | 0.6284 | 0.6955 | 0.7343 | 0.7958 | 0.8863 | 0.8876 | 0.8876 | 0.5943 | 0.1530 | 0.5746 | 1.3592 | |
| Platinum | 100.0% | 35 | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0001 | 0.0001 | |
| Potassium | 100.0% | 35 | 0 | 0.1363 | 1.7971 | 2.2672 | 4.1379 | 5.0715 | 7.7550 | 9.7150 | 10.4656 | 12.2419 | 14.2746 | 14.2746 | 5.3049 | 3.6235 | 4.1379 | 23.4225 | |
| Praseodymium | 100.0% | 35 | 0 | 0.0000 | 0.0004 | 0.0006 | 0.0015 | 0.0018 | 0.0036 | 0.0038 | 0.0047 | 0.0060 | 0.0063 | 0.0063 | 0.0021 | 0.0017 | 0.0015 | 0.0108 | |
| Rubidium | 100.0% | 35 | 0 | 0.0005 | 0.0051 | 0.0072 | 0.0166 | 0.0221 | 0.0363 | 0.0412 | 0.0480 | 0.0615 | 0.0646 | 0.0646 | 0.0220 | 0.0175 | 0.0166 | 0.1096 | |
| Samarium | 100.0% | 35 | 0 | 0.0000 | 0.0003 | 0.0004 | 0.0011 | 0.0013 | 0.0026 | 0.0026 | 0.0032 | 0.0044 | 0.0044 | 0.0044 | 0.0015 | 0.0012 | 0.0011 | 0.0076 | |
| Selenium | 100.0% | 35 | 0 | 0.0013 | 0.0026 | 0.0037 | 0.0074 | 0.0102 | 0.0161 | 0.0188 | 0.0202 | 0.0266 | 0.0353 | 0.0353 | 0.0101 | 0.0080 | 0.0074 | 0.0499 | |
| Silicon | 100.0% | 35 | 0 | 2.6305 | 12.2654 | 18.0121 | 36.1144 | 42.8039 | 80.5639 | 87.6986 | 92.4091 | 118.4163 | 127.0981 | 127.0981 | 46.3888 | 33.8353 | 36.1144 | 215.5651 | |
| Silver | 97.1% | 35 | 1 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0001 | 0.0001 | 0.0001 | 0.0004 | |
| Sodium | 100.0% | 35 | 0 | 0.0898 | 0.5925 | 0.9320 | 1.9486 | 2.1001 | 3.6962 | 4.3364 | 4.9322 | 5.2299 | 6.9578 | 6.9578 | 2.3323 | 1.7146 | 1.9486 | 10.9052 | |
| Strontium | 100.0% | 35 | 0 | 0.0011 | 0.0139 | 0.0215 | 0.0483 | 0.0626 | 0.1127 | 0.1183 | 0.1509 | 0.1552 | 0.1676 | 0.1676 | 0.0656 | 0.0506 | 0.0483 | 0.3186 | |
| Tantalum | 77.1% | 35 | 8 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0003 | 0.0003 | 0.0004 | 0.0004 | 0.0001 | 0.0001 | 0.0001 | 0.0007 | |
| Thallium | 97.1% | 35 | 1 | 0.0000 | 0.0000 | 0.0001 | 0.0001 | 0.0002 | 0.0003 | 0.0003 | 0.0004 | 0.0005 | 0.0005 | 0.0005 | 0.0002 | 0.0001 | 0.0001 | 0.0009 | |
| Thorium | 100.0% | 35 | 0 | 0.0000 | 0.0005 | 0.0007 | 0.0018 | 0.0022 | 0.0040 | 0.0044 | 0.0053 | 0.0067 | 0.0076 | 0.0076 | 0.0024 | 0.0020 | 0.0018 | 0.0125 | |
| Tin | 100.0% | 35 | 0 | 0.0010 | 0.0021 | 0.0030 | 0.0035 | 0.0045 | 0.0063 | 0.0073 | 0.0090 | 0.0116 | 0.0236 | 0.0236 | 0.0051 | 0.0041 | 0.0035 | 0.0255 | |
| Titanium | 100.0% | 35 | 0 | 0.0653 | 0.1344 | 0.1838 | 0.4661 | 0.5303 | 1.0696 | 1.2682 | 1.4834 | 1.7861 | 1.9521 | 1.9521 | 0.6461 | 0.5419 | 0.4661 | 3.3557 | |
| Tungsten | 97.1% | 35 | 1 | 0.0001 | 0.0004 | 0.0011 | 0.0018 | 0.0022 | 0.0026 | 0.0029 | 0.0033 | 0.0038 | 0.0086 | 0.0086 | 0.0020 | 0.0015 | 0.0018 | 0.0096 | |
| Uranium | 100.0% | 35 | 0 | 0.0000 | 0.0001 | 0.0002 | 0.0005 | 0.0007 | 0.0011 | 0.0013 | 0.0014 | 0.0018 | 0.0020 | 0.0020 | 0.0007 | 0.0005 | 0.0005 | 0.0034 | |
| Vanadium | 97.1% | 35 | 1 | 0.0007 | 0.0067 | 0.0097 | 0.0245 | 0.0387 | 0.0631 | 0.0741 | 0.0992 | 0.1190 | 0.1191 | 0.1191 | 0.0405 | 0.0359 | 0.0245 | 0.2201 | |
| Zinc | 100.0% | 35 | 0 | 0.0122 | 0.0336 | 0.0618 | 0.0892 | 0.1136 | 0.1313 | 0.1620 | 0.2468 | 0.2793 | 0.2873 | 0.2873 | 0.1112 | 0.0735 | 0.0892 | 0.4790 | |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

POLYCYCLIC AROMATIC HYDROCARBONS DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

PAHs: Airzone One Ltd
Mississauga, Ontario



| FILE CONTENTS DESCRIPTION | PAH - Speciated PAH Gas + Particle Phase Measurements |
|---|---|
| SAMPLING INTERVAL | 24 hour |
| SAMPLING FREQUENCY OF DATA | Once every 6 days |
| UNITS | ng/m ³ (nanogram per cubic meter) |
| OBSERVATION TYPE | Particles + gas |
| FIELD SAMPLING OR MEASUREMENT PRINCIPLE | filtration and adsorbent |
| PARTICLE DIAMETER | TSP (total suspended particle) |
| MEDIUM | a glass fiber filter + PUF/XAD-2/PUF |
| ANALYTICAL METHOD | Gas Chromatograph/Mass Spectrometer (GC/MS) |
| SAMPLE PREPARATION | Solvent Extraction |
| ANALYTICAL LABORATORY | AIRZONE One Inc. |
| USER NOTE 1 | Data are recovery corrected |
| USER NOTE 2 | Volume is given at actual conditions of temperature and pressure during sampling as measured by the sampler |
| USER NOTE 3 | Blank sample concentration (ng/m ³) is calculated using expected actual volume of sampler |
| VOLUME STANDARDIZATION | Actual Volume at Ambient Conditions |
| SAMPLING INSTRUMENT TYPE | Tisch TE-1000 High-Volume Sampler |
| FLAGS USED | |
| V0 | Valid value |
| V1 | Valid value but comprised wholly or partially of below detection limit data |
| V4 | Valid value despite failing to meet some QC or statistical criteria |
| V5 | Valid value but qualified because of possible contamination |
| V6 | Valid value but qualified due to non-standard sampling conditions |
| M1 | Missing value because no value is available |
| M2 | Missing value because invalidated by Data Originator |



| Station Name | Bertha Ganter - | | | | | | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|------------------|------------------------------|--------------|
| | Station # | Fort McKay | | | Patricia McInnes | | Travel Blank |
| Sample Date | AMS 1 | AMS 6 | | | AMS 6 | | AMS 6 |
| Total Air Volume (m ³) | 05-Aug | 05-Aug | | | 05-Aug | | 05-Aug |
| | 315.98 | 315.98 | | | 315.98 | | 316 |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 9.854 | V0 | 9.235 | V0 | 0.117 | V0 |
| Acenaphthylene | 0.011 | 5.268 | V0 | 2.812 | V0 | 0.013 | V0 |
| Acenaphthene | 0.006 | 4.216 | V0 | 1.614 | V0 | 0.030 | V0 |
| Fluorene | 0.007 | 1.797 | V0 | 0.778 | V0 | 0.031 | V0 |
| Phenanthrene | 0.007 | 3.145 | V0 | 2.117 | V0 | 0.023 | V0 |
| Anthracene | 0.017 | 0.353 | V0 | 0.294 | V0 | 0.003 | V1 |
| Acridine | 0.019 | 0.046 | V0 | 0.026 | V0 | 0.009 | V1 |
| Fluoranthene | 0.007 | 0.280 | V0 | 0.479 | V0 | 0.005 | V1 |
| Pyrene | 0.008 | 0.405 | V0 | 0.478 | V0 | 0.006 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.018 | V0 | 0.026 | V0 | 0.003 | V1 |
| Benz(a)anthracene | 0.014 | 0.119 | V0 | 0.038 | V0 | 0.002 | V1 |
| Chrysene | 0.013 | 0.105 | V0 | 0.102 | V0 | 0.002 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.090 | V0 | 0.028 | V0 | 0.002 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.084 | V0 | 0.053 | V0 | 0.002 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.084 | V0 | 0.053 | V0 | 0.002 | V1 |
| Benzo(a)pyrene | 0.016 | 0.043 | V0 | 0.035 | V0 | 0.003 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.011 | V1 | 0.015 | V1 | 0.003 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.011 | V1 | 0.018 | V0 | 0.002 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.012 | V1 | 0.011 | V1 | 0.003 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.014 | V1 | 0.012 | V1 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.012 | V1 | 0.008 | V1 | 0.003 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.011 | V1 | 0.007 | V1 | 0.003 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.019 | V1 | 0.009 | V1 | 0.004 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 05-Aug | |
| Sample Date | 05-Aug | | | 05-Aug | | 05-Aug | |
| Total Air Volume (m ³) | 316.01 | | | 315.85 | | 316 | |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 7.163 | V0 | 13.185 | V0 | 0.117 | V0 |
| Acenaphthylene | 0.011 | 2.603 | V0 | 3.433 | V0 | 0.013 | V0 |
| Acenaphthene | 0.006 | 1.884 | V0 | 8.896 | V0 | 0.030 | V0 |
| Fluorene | 0.007 | 0.744 | V0 | 5.835 | V0 | 0.031 | V0 |
| Phenanthrene | 0.007 | 1.599 | V0 | 9.142 | V0 | 0.023 | V0 |
| Anthracene | 0.017 | 0.143 | V0 | 0.927 | V0 | 0.003 | V1 |
| Acridine | 0.019 | 0.055 | V0 | 0.035 | V0 | 0.009 | V1 |
| Fluoranthene | 0.007 | 0.268 | V0 | 0.956 | V0 | 0.005 | V1 |
| Pyrene | 0.008 | 0.315 | V0 | 0.372 | V0 | 0.006 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.009 | V1 | 0.009 | V1 | 0.003 | V1 |
| Benz(a)anthracene | 0.014 | 0.022 | V0 | 0.020 | V0 | 0.002 | V1 |
| Chrysene | 0.013 | 0.068 | V0 | 0.030 | V0 | 0.002 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.061 | V0 | 0.079 | V0 | 0.002 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.021 | V0 | 0.017 | V1 | 0.002 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.021 | V0 | 0.017 | V0 | 0.002 | V1 |
| Benzo(a)pyrene | 0.016 | 0.026 | V0 | 0.013 | V1 | 0.003 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.008 | V1 | 0.008 | V1 | 0.003 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.008 | V1 | 0.009 | V1 | 0.002 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.010 | V1 | 0.011 | V1 | 0.003 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.010 | V1 | 0.012 | V1 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.008 | V1 | 0.012 | V1 | 0.003 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.007 | V1 | 0.008 | V1 | 0.003 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.012 | V1 | 0.008 | V1 | 0.004 | V1 |



| Station Name | Bertha Ganter - | | | | | | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|------------------|------------------------------|--------------|
| | Station # | Fort McKay | | | Patricia McInnes | | Travel Blank |
| Sample Date | AMS 1 | AMS 6 | | | AMS 6 | | 11-Aug |
| Total Air Volume (m ³) | 11-Aug | 11-Aug | | | 11-Aug | | 316 |
| | 315.98 | 315.96 | | | 315.96 | | 316 |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 11.840 | V0 | 5.593 | V0 | 0.145 | V0 |
| Acenaphthylene | 0.011 | 6.301 | V0 | 1.674 | V0 | 0.053 | V0 |
| Acenaphthene | 0.006 | 6.344 | V0 | 1.709 | V0 | 0.070 | V0 |
| Fluorene | 0.007 | 1.459 | V0 | 0.844 | V0 | 0.069 | V0 |
| Phenanthrene | 0.007 | 4.087 | V0 | 1.345 | V0 | 0.032 | V0 |
| Anthracene | 0.017 | 0.342 | V0 | 0.095 | V0 | 0.011 | V1 |
| Acridine | 0.019 | 0.055 | V0 | 0.023 | V0 | 0.005 | V1 |
| Fluoranthene | 0.007 | 0.372 | V0 | 0.336 | V0 | 0.008 | V0 |
| Pyrene | 0.008 | 0.527 | V0 | 0.278 | V0 | 0.007 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.035 | V0 | 0.013 | V1 | 0.002 | V1 |
| Benz(a)anthracene | 0.014 | 0.126 | V0 | 0.027 | V0 | 0.005 | V1 |
| Chrysene | 0.013 | 0.260 | V0 | 0.052 | V0 | 0.005 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.118 | V0 | 0.062 | V0 | 0.002 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.062 | V0 | 0.027 | V0 | 0.005 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.080 | V0 | 0.027 | V0 | 0.005 | V1 |
| Benzo(a)pyrene | 0.016 | 0.038 | V0 | 0.020 | V0 | 0.003 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.016 | V1 | 0.004 | V1 | 0.002 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.029 | V0 | 0.012 | V1 | 0.001 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.023 | V0 | 0.010 | V1 | 0.002 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.028 | V0 | 0.013 | V1 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.007 | V1 | 0.006 | V1 | 0.001 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.007 | V1 | 0.007 | V1 | 0.001 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.006 | V1 | 0.007 | V1 | 0.001 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 11-Aug | |
| Sample Date | 11-Aug | | | 11-Aug | | 11-Aug | |
| Total Air Volume (m ³) | 315.99 | | | 316 | | 316 | |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 16.932 | V0 | 28.426 | V0 | 0.145 | V0 |
| Acenaphthylene | 0.011 | 2.917 | V0 | 4.208 | V0 | 0.053 | V0 |
| Acenaphthene | 0.006 | 3.226 | V0 | 8.540 | V0 | 0.070 | V0 |
| Fluorene | 0.007 | 1.428 | V0 | 9.647 | V0 | 0.069 | V0 |
| Phenanthrene | 0.007 | 2.656 | V0 | 6.131 | V0 | 0.032 | V0 |
| Anthracene | 0.017 | 0.203 | V0 | 0.496 | V0 | 0.011 | V1 |
| Acridine | 0.019 | 0.068 | V0 | 0.018 | V1 | 0.005 | V1 |
| Fluoranthene | 0.007 | 0.492 | V0 | 1.982 | V0 | 0.008 | V0 |
| Pyrene | 0.008 | 0.620 | V0 | 0.729 | V0 | 0.007 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.017 | V0 | 0.013 | V1 | 0.002 | V1 |
| Benz(a)anthracene | 0.014 | 0.047 | V0 | 0.043 | V0 | 0.005 | V1 |
| Chrysene | 0.013 | 0.117 | V0 | 0.044 | V0 | 0.005 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.077 | V0 | 0.038 | V0 | 0.002 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.050 | V0 | 0.025 | V0 | 0.005 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.044 | V0 | 0.041 | V0 | 0.005 | V1 |
| Benzo(a)pyrene | 0.016 | 0.025 | V0 | 0.014 | V1 | 0.003 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.025 | V0 | 0.017 | V1 | 0.002 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.011 | V1 | 0.008 | V1 | 0.001 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.015 | V1 | 0.008 | V1 | 0.002 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.019 | V1 | 0.009 | V1 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.007 | V1 | 0.008 | V1 | 0.001 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.008 | V1 | 0.006 | V1 | 0.001 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.008 | V1 | 0.007 | V1 | 0.001 | V1 |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

Polycyclic Aromatic Hydrocarbons (PAHs)

2017

Indicated Sites and Dates

| Station Name | Bertha Ganter - | | | | | | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|------------------|------------------------------|--------------|
| | Station # | Fort McKay | | | Patricia McInnes | | Travel Blank |
| Sample Date | AMS 1 | AMS 6 | | | AMS 6 | | 17-Aug |
| Total Air Volume (m ³) | 17-Aug | 17-Aug | | | 17-Aug | | 316 |
| | 315.97 | 315.96 | | | 315.96 | | 316 |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 10.528 | V0 | 5.114 | V0 | 0.186 | V0 |
| Acenaphthylene | 0.011 | 4.993 | V0 | 2.721 | V0 | 0.059 | V0 |
| Acenaphthene | 0.006 | 2.032 | V0 | 1.908 | V0 | 0.053 | V0 |
| Fluorene | 0.007 | 1.017 | V0 | 1.017 | V0 | 0.051 | V0 |
| Phenanthrene | 0.007 | 1.368 | V0 | 0.812 | V0 | 0.026 | V0 |
| Anthracene | 0.017 | 0.115 | V0 | 0.064 | V0 | 0.013 | V1 |
| Acridine | 0.019 | 0.052 | V0 | 0.020 | V0 | 0.003 | V1 |
| Fluoranthene | 0.007 | 0.161 | V0 | 0.161 | V0 | 0.005 | V1 |
| Pyrene | 0.008 | 0.351 | V0 | 0.218 | V0 | 0.004 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.015 | V0 | 0.017 | V0 | 0.002 | V1 |
| Benz(a)anthracene | 0.014 | 0.018 | V0 | 0.053 | V0 | 0.005 | V1 |
| Chrysene | 0.013 | 0.075 | V0 | 0.076 | V0 | 0.004 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.076 | V0 | 0.047 | V0 | 0.002 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.036 | V0 | 0.031 | V0 | 0.005 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.036 | V0 | 0.031 | V0 | 0.005 | V1 |
| Benzo(a)pyrene | 0.016 | 0.022 | V0 | 0.014 | V1 | 0.003 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.005 | V1 | 0.018 | V1 | 0.001 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.013 | V1 | 0.009 | V1 | 0.001 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.013 | V1 | 0.007 | V1 | 0.002 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.027 | V0 | 0.030 | V0 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.009 | V1 | 0.007 | V1 | 0.001 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.008 | V1 | 0.007 | V1 | 0.001 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.007 | V1 | 0.008 | V1 | 0.001 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 17-Aug | |
| Sample Date | 17-Aug | | | 17-Aug | | 316 | |
| Total Air Volume (m ³) | 315.99 | | | 137.29 | | 316 | |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 7.207 | V0 | 8.679 | V6 | 0.186 | V0 |
| Acenaphthylene | 0.011 | 1.626 | V0 | 5.443 | V6 | 0.059 | V0 |
| Acenaphthene | 0.006 | 2.300 | V0 | 1.496 | V6 | 0.053 | V0 |
| Fluorene | 0.007 | 1.043 | V0 | 2.888 | V6 | 0.051 | V0 |
| Phenanthrene | 0.007 | 1.190 | V0 | 1.715 | V6 | 0.026 | V0 |
| Anthracene | 0.017 | 0.109 | V0 | 0.145 | V6 | 0.013 | V1 |
| Acridine | 0.019 | 0.040 | V0 | 0.028 | V6 | 0.003 | V1 |
| Fluoranthene | 0.007 | 0.199 | V0 | 0.210 | V6 | 0.005 | V1 |
| Pyrene | 0.008 | 0.314 | V0 | 0.150 | V6 | 0.004 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.019 | V0 | 0.014 | V6 | 0.002 | V1 |
| Benz(a)anthracene | 0.014 | 0.051 | V0 | 0.058 | V6 | 0.005 | V1 |
| Chrysene | 0.013 | 0.058 | V0 | 0.059 | V6 | 0.004 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.069 | V0 | 0.088 | V6 | 0.002 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.022 | V0 | 0.023 | V6 | 0.005 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.022 | V0 | 0.023 | V6 | 0.005 | V1 |
| Benzo(a)pyrene | 0.016 | 0.015 | V1 | 0.029 | V6 | 0.003 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.011 | V1 | 0.012 | V6 | 0.001 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.014 | V1 | 0.016 | V6 | 0.001 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.011 | V1 | 0.014 | V6 | 0.002 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.023 | V0 | 0.020 | V6 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.010 | V1 | 0.009 | V6 | 0.001 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.011 | V1 | 0.016 | V6 | 0.001 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.011 | V1 | 0.010 | V6 | 0.001 | V1 |



| Station Name | Bertha Ganter - | | | | Patricia McInnes | | Travel Blank | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|------------------|------------------------------|--------------|---------|
| | Station # | Fort McKay | AMS 1 | AMS 6 | AMS 6 | AMS 6 | 23-Aug | QC Flag |
| Sample Date | | 23-Aug | 23-Aug | 23-Aug | 23-Aug | 23-Aug | 23-Aug | |
| Total Air Volume (m ³) | | 315.97 | 315.96 | 315.96 | 315.96 | 316 | 316 | |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | |
| Naphthalene | 0.008 | 8.206 | V0 | 14.284 | V0 | 0.164 | V0 | |
| Acenaphthylene | 0.011 | 3.595 | V0 | 3.810 | V0 | 0.031 | V0 | |
| Acenaphthene | 0.006 | 4.534 | V0 | 3.584 | V0 | 0.032 | V0 | |
| Fluorene | 0.007 | 1.427 | V0 | 2.182 | V0 | 0.036 | V0 | |
| Phenanthrene | 0.007 | 2.109 | V0 | 3.443 | V0 | 0.027 | V0 | |
| Anthracene | 0.017 | 0.208 | V0 | 0.266 | V0 | 0.009 | V1 | |
| Acridine | 0.019 | 0.025 | V0 | 0.018 | V1 | 0.002 | V1 | |
| Fluoranthene | 0.007 | 0.223 | V0 | 0.445 | V0 | 0.004 | V1 | |
| Pyrene | 0.008 | 0.430 | V0 | 0.419 | V0 | 0.007 | V1 | |
| Benzo(c)phenanthrene | 0.015 | 0.014 | V1 | 0.008 | V1 | 0.001 | V1 | |
| Benz(a)anthracene | 0.014 | 0.118 | V0 | 0.056 | V0 | 0.005 | V1 | |
| Chrysene | 0.013 | 0.144 | V0 | 0.058 | V0 | 0.004 | V1 | |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.085 | V0 | 0.047 | V0 | 0.002 | V1 | |
| Benzo(b)fluoranthene | 0.020 | 0.051 | V0 | 0.034 | V0 | 0.004 | V1 | |
| Benzo(k)fluoranthene | 0.013 | 0.038 | V0 | 0.033 | V0 | 0.004 | V1 | |
| Benzo(a)pyrene | 0.016 | 0.014 | V1 | 0.022 | V0 | 0.002 | V1 | |
| 3-Methylcholanthrene | 0.022 | 0.005 | V1 | 0.016 | V1 | 0.001 | V1 | |
| Indeno(123-cd)pyrene | 0.017 | 0.020 | V0 | 0.015 | V1 | 0.001 | V1 | |
| Dibenz(a,h)anthracene | 0.020 | 0.007 | V1 | 0.008 | V1 | 0.002 | V1 | |
| Benzo(ghi)perylene | 0.020 | 0.042 | V0 | 0.028 | V0 | 0.002 | V1 | |
| Dibenzo(a,l)pyrene | 0.024 | 0.006 | V1 | 0.007 | V1 | 0.001 | V1 | |
| Dibenzo(a,i)pyrene | 0.025 | 0.006 | V1 | 0.007 | V1 | 0.001 | V1 | |
| Dibenzo(a,h)pyrene | 0.020 | 0.008 | V1 | 0.009 | V1 | 0.001 | V1 | |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 23-Aug | |
| Sample Date | 23-Aug | | | 23-Aug | | 316 | |
| Total Air Volume (m ³) | 315.99 | | | 315.99 | | 316 | |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 4.028 | V0 | 4.841 | V0 | 0.164 | V0 |
| Acenaphthylene | 0.011 | 2.020 | V0 | 1.851 | V0 | 0.031 | V0 |
| Acenaphthene | 0.006 | 1.640 | V0 | 6.306 | V0 | 0.032 | V0 |
| Fluorene | 0.007 | 0.587 | V0 | 2.866 | V0 | 0.036 | V0 |
| Phenanthrene | 0.007 | 1.432 | V0 | 5.744 | V0 | 0.027 | V0 |
| Anthracene | 0.017 | 0.190 | V0 | 0.461 | V0 | 0.009 | V1 |
| Acridine | 0.019 | 0.019 | V0 | 0.020 | V0 | 0.002 | V1 |
| Fluoranthene | 0.007 | 0.322 | V0 | 0.774 | V0 | 0.004 | V1 |
| Pyrene | 0.008 | 0.332 | V0 | 0.351 | V0 | 0.007 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.010 | V1 | 0.010 | V1 | 0.001 | V1 |
| Benz(a)anthracene | 0.014 | 0.080 | V0 | 0.060 | V0 | 0.005 | V1 |
| Chrysene | 0.013 | 0.080 | V0 | 0.060 | V0 | 0.004 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.083 | V0 | 0.066 | V0 | 0.002 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.024 | V0 | 0.014 | V1 | 0.004 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.024 | V0 | 0.014 | V0 | 0.004 | V1 |
| Benzo(a)pyrene | 0.016 | 0.016 | V0 | 0.016 | V0 | 0.002 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.022 | V0 | 0.050 | V0 | 0.001 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.010 | V1 | 0.012 | V1 | 0.001 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.010 | V1 | 0.010 | V1 | 0.002 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.025 | V0 | 0.009 | V1 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.010 | V1 | 0.010 | V1 | 0.001 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.009 | V1 | 0.010 | V1 | 0.001 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.009 | V1 | 0.010 | V1 | 0.001 | V1 |



| Station Name | Bertha Ganter - | | | | | | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|------------------|------------------------------|--------------|
| | Station # | Fort McKay | | | Patricia McInnes | | Travel Blank |
| Sample Date | AMS 1 | AMS 6 | | | AMS 6 | | 29-Aug |
| Total Air Volume (m ³) | 29-Aug | 29-Aug | | | 29-Aug | | 316 |
| | 315.98 | 315.96 | | | 315.96 | | 316 |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 3.725 | V0 | 15.467 | V0 | 0.145 | V0 |
| Acenaphthylene | 0.011 | 2.584 | V0 | 1.566 | V0 | 0.043 | V0 |
| Acenaphthene | 0.006 | 2.181 | V0 | 1.300 | V0 | 0.052 | V0 |
| Fluorene | 0.007 | 0.864 | V0 | 0.693 | V0 | 0.026 | V0 |
| Phenanthrene | 0.007 | 0.687 | V0 | 1.009 | V0 | 0.031 | V0 |
| Anthracene | 0.017 | 0.107 | V0 | 0.110 | V0 | 0.013 | V1 |
| Acridine | 0.019 | 0.027 | V0 | 0.020 | V0 | 0.002 | V1 |
| Fluoranthene | 0.007 | 0.103 | V0 | 0.355 | V0 | 0.007 | V0 |
| Pyrene | 0.008 | 0.125 | V0 | 0.384 | V0 | 0.007 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.013 | V1 | 0.012 | V1 | 0.002 | V1 |
| Benz(a)anthracene | 0.014 | 0.049 | V0 | 0.163 | V0 | 0.007 | V1 |
| Chrysene | 0.013 | 0.049 | V0 | 0.167 | V0 | 0.004 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.034 | V0 | 0.071 | V0 | 0.003 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.021 | V0 | 0.029 | V0 | 0.004 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.021 | V0 | 0.029 | V0 | 0.004 | V1 |
| Benzo(a)pyrene | 0.016 | 0.019 | V0 | 0.023 | V0 | 0.002 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.031 | V0 | 0.033 | V0 | 0.002 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.013 | V1 | 0.054 | V0 | 0.001 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.011 | V1 | 0.030 | V0 | 0.001 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.013 | V1 | 0.047 | V0 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.009 | V1 | 0.008 | V1 | 0.001 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.007 | V1 | 0.008 | V1 | 0.001 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.006 | V1 | 0.007 | V1 | 0.001 | V1 |



| Station Name | Athabasca Valley | | | Anzac | | Travel Blank | |
|------------------------------------|--------------------------|------------------------------|---------|------------------------------|---------|------------------------------|---------|
| Station # | AMS 7 | | | AMS 14 | | 29-Aug | |
| Sample Date | 29-Aug | | | 29-Aug | | 29-Aug | |
| Total Air Volume (m ³) | 316.01 | | | 315.99 | | 316 | |
| Compound Name | MDL (ng/m ³) | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag | Results (ng/m ³) | QC Flag |
| Naphthalene | 0.008 | 11.658 | V0 | 25.102 | V0 | 0.145 | V0 |
| Acenaphthylene | 0.011 | 1.938 | V0 | 2.456 | V0 | 0.043 | V0 |
| Acenaphthene | 0.006 | 1.935 | V0 | 8.823 | V0 | 0.052 | V0 |
| Fluorene | 0.007 | 0.732 | V0 | 3.941 | V0 | 0.026 | V0 |
| Phenanthrene | 0.007 | 1.435 | V0 | 8.823 | V0 | 0.031 | V0 |
| Anthracene | 0.017 | 0.233 | V0 | 0.908 | V0 | 0.013 | V1 |
| Acridine | 0.019 | 0.041 | V0 | 0.040 | V0 | 0.002 | V1 |
| Fluoranthene | 0.007 | 0.246 | V0 | 1.535 | V0 | 0.007 | V0 |
| Pyrene | 0.008 | 0.355 | V0 | 1.383 | V0 | 0.007 | V1 |
| Benzo(c)phenanthrene | 0.015 | 0.012 | V1 | 0.021 | V0 | 0.002 | V1 |
| Benz(a)anthracene | 0.014 | 0.074 | V0 | 0.482 | V0 | 0.007 | V1 |
| Chrysene | 0.013 | 0.074 | V0 | 0.326 | V0 | 0.004 | V1 |
| 7,12-Dimethylbenz(a)anthracene | 0.013 | 0.055 | V0 | 0.083 | V0 | 0.003 | V1 |
| Benzo(b)fluoranthene | 0.020 | 0.051 | V0 | 0.148 | V0 | 0.004 | V1 |
| Benzo(k)fluoranthene | 0.013 | 0.051 | V0 | 0.148 | V0 | 0.004 | V1 |
| Benzo(a)pyrene | 0.016 | 0.031 | V0 | 0.047 | V0 | 0.002 | V1 |
| 3-Methylcholanthrene | 0.022 | 0.026 | V0 | 0.042 | V0 | 0.002 | V1 |
| Indeno(123-cd)pyrene | 0.017 | 0.014 | V1 | 0.110 | V0 | 0.001 | V1 |
| Dibenz(a,h)anthracene | 0.020 | 0.013 | V1 | 0.088 | V0 | 0.001 | V1 |
| Benzo(ghi)perylene | 0.020 | 0.020 | V0 | 0.076 | V0 | 0.002 | V1 |
| Dibenzo(a,l)pyrene | 0.024 | 0.013 | V1 | 0.022 | V1 | 0.001 | V1 |
| Dibenzo(a,i)pyrene | 0.025 | 0.012 | V1 | 0.011 | V1 | 0.001 | V1 |
| Dibenzo(a,h)pyrene | 0.020 | 0.008 | V1 | 0.010 | V1 | 0.001 | V1 |



| Station Name Station # Sample Date | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 | Bertha Ganter - Fort McKay AMS 1 Aug 05 - Aug 29 |
|--|---|---|---|---|
| | Average ng/m ³ | Std Dev ng/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Compound Name | | | | |
| Naphthalene | 8.831 | 3.140 | 5 | 5 |
| Acenaphthylene | 4.548 | 1.463 | 5 | 5 |
| Acenaphthene | 3.861 | 1.797 | 5 | 5 |
| Fluorene | 1.313 | 0.373 | 5 | 5 |
| Phenanthrene | 2.279 | 1.361 | 5 | 5 |
| Anthracene | 0.225 | 0.119 | 5 | 5 |
| Acridine | 0.041 | 0.014 | 5 | 5 |
| Fluoranthene | 0.228 | 0.104 | 5 | 5 |
| Pyrene | 0.368 | 0.150 | 5 | 5 |
| Benzo(c)phenanthrene | 0.019 | 0.009 | 5 | 3 |
| Benz(a)anthracene | 0.086 | 0.049 | 5 | 5 |
| Chrysene | 0.127 | 0.082 | 5 | 5 |
| 7,12-Dimethylbenz(a)anthracene | 0.080 | 0.030 | 5 | 5 |
| Benzo(b)fluoranthene | 0.051 | 0.024 | 5 | 5 |
| Benzo(k)fluoranthene | 0.051 | 0.028 | 5 | 5 |
| Benzo(a)pyrene | 0.027 | 0.012 | 5 | 4 |
| 3-Methylcholanthrene | 0.014 | 0.011 | 5 | 1 |
| Indeno(123-cd)pyrene | 0.017 | 0.007 | 5 | 2 |
| Dibenz(a,h)anthracene | 0.013 | 0.006 | 5 | 1 |
| Benzo(ghi)perylene | 0.025 | 0.012 | 5 | 3 |
| Dibenzo(a,l)pyrene | 0.009 | 0.002 | 5 | 0 |
| Dibenzo(a,i)pyrene | 0.008 | 0.002 | 5 | 0 |
| Dibenzo(a,h)pyrene | 0.009 | 0.006 | 5 | 0 |



| Station Name Station # Sample Date | Patricia McInnes AMS 6 Aug 05 - Aug 29 Average ng/m ³ | Patricia McInnes AMS 6 Aug 05 - Aug 29 Std Dev ng/m ³ | Patricia McInnes AMS 6 Aug 05 - Aug 29 Total Samples (#) | Patricia McInnes AMS 6 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|--|--|---|---|
| Compound Name | | | | |
| Naphthalene | 9.938 | 4.798 | 5 | 5 |
| Acenaphthylene | 2.517 | 0.924 | 5 | 5 |
| Acenaphthene | 2.023 | 0.900 | 5 | 5 |
| Fluorene | 1.103 | 0.615 | 5 | 5 |
| Phenanthrene | 1.745 | 1.072 | 5 | 5 |
| Anthracene | 0.166 | 0.106 | 5 | 5 |
| Acridine | 0.021 | 0.003 | 5 | 4 |
| Fluoranthene | 0.355 | 0.124 | 5 | 5 |
| Pyrene | 0.355 | 0.106 | 5 | 5 |
| Benzo(c)phenanthrene | 0.015 | 0.007 | 5 | 2 |
| Benz(a)anthracene | 0.067 | 0.055 | 5 | 5 |
| Chrysene | 0.091 | 0.047 | 5 | 5 |
| 7,12-Dimethylbenz(a)anthracene | 0.051 | 0.016 | 5 | 5 |
| Benzo(b)fluoranthene | 0.035 | 0.011 | 5 | 5 |
| Benzo(k)fluoranthene | 0.035 | 0.011 | 5 | 5 |
| Benzo(a)pyrene | 0.023 | 0.008 | 5 | 4 |
| 3-Methylcholanthrene | 0.017 | 0.010 | 5 | 1 |
| Indeno(123-cd)pyrene | 0.022 | 0.018 | 5 | 2 |
| Dibenz(a,h)anthracene | 0.013 | 0.010 | 5 | 1 |
| Benzo(ghi)perylene | 0.026 | 0.014 | 5 | 3 |
| Dibenzo(a,l)pyrene | 0.007 | 0.001 | 5 | 0 |
| Dibenzo(a,i)pyrene | 0.007 | 0.000 | 5 | 0 |
| Dibenzo(a,h)pyrene | 0.008 | 0.001 | 5 | 0 |



| Station Name | Athabasca Valley | Athabasca Valley | Athabasca Valley | Athabasca Valley |
|--------------------------------|------------------------------|------------------------------|-------------------|------------------|
| Station # | AMS 7 | AMS 7 | AMS 7 | AMS 7 |
| Sample Date | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 | Aug 05 - Aug 29 |
| Compound Name | Average ng/m ³ | Std Dev ng/m ³ | Total Samples (#) | Total ≥ MDL (#) |
| Naphthalene | 9.398 | 5.012 | 5 | 5 |
| Acenaphthylene | 2.220 | 0.526 | 5 | 5 |
| Acenaphthene | 2.197 | 0.622 | 5 | 5 |
| Fluorene | 0.907 | 0.335 | 5 | 5 |
| Phenanthrene | 1.662 | 0.574 | 5 | 5 |
| Anthracene | 0.176 | 0.049 | 5 | 5 |
| Acridine | 0.045 | 0.018 | 5 | 5 |
| Fluoranthene | 0.305 | 0.113 | 5 | 5 |
| Pyrene | 0.387 | 0.131 | 5 | 5 |
| Benzo(c)phenanthrene | 0.013 | 0.004 | 5 | 2 |
| Benz(a)anthracene | 0.055 | 0.023 | 5 | 5 |
| Chrysene | 0.079 | 0.022 | 5 | 5 |
| 7,12-Dimethylbenz(a)anthracene | 0.069 | 0.011 | 5 | 5 |
| Benzo(b)fluoranthene | 0.034 | 0.015 | 5 | 5 |
| Benzo(k)fluoranthene | 0.033 | 0.014 | 5 | 5 |
| Benzo(a)pyrene | 0.023 | 0.007 | 5 | 4 |
| 3-Methylcholanthrene | 0.018 | 0.008 | 5 | 3 |
| Indeno(123-cd)pyrene | 0.011 | 0.003 | 5 | 0 |
| Dibenz(a,h)anthracene | 0.012 | 0.002 | 5 | 0 |
| Benzo(ghi)perylene | 0.019 | 0.006 | 5 | 3 |
| Dibenzo(a,l)pyrene | 0.010 | 0.002 | 5 | 0 |
| Dibenzo(a,i)pyrene | 0.009 | 0.002 | 5 | 0 |
| Dibenzo(a,h)pyrene | 0.010 | 0.002 | 5 | 0 |



| Station Name Station # Sample Date | Anzac AMS 14 Aug 05 - Aug 29 Average ng/m ³ | Anzac AMS 14 Aug 05 - Aug 29 Std Dev ng/m ³ | Anzac AMS 14 Aug 05 - Aug 29 Total Samples (#) | Anzac AMS 14 Aug 05 - Aug 29 Total ≥ MDL (#) |
|--|--|--|---|---|
| Compound Name | | | | |
| Naphthalene | 16.047 | 10.287 | 5 | 5 |
| Acenaphthylene | 3.478 | 1.422 | 5 | 5 |
| Acenaphthene | 6.812 | 3.158 | 5 | 5 |
| Fluorene | 5.036 | 2.847 | 5 | 5 |
| Phenanthrene | 6.311 | 2.992 | 5 | 5 |
| Anthracene | 0.587 | 0.331 | 5 | 5 |
| Acridine | 0.028 | 0.009 | 5 | 4 |
| Fluoranthene | 1.091 | 0.687 | 5 | 5 |
| Pyrene | 0.597 | 0.486 | 5 | 5 |
| Benzo(c)phenanthrene | 0.013 | 0.005 | 5 | 1 |
| Benz(a)anthracene | 0.133 | 0.196 | 5 | 5 |
| Chrysene | 0.104 | 0.125 | 5 | 5 |
| 7,12-Dimethylbenz(a)anthracene | 0.071 | 0.020 | 5 | 5 |
| Benzo(b)fluoranthene | 0.045 | 0.058 | 5 | 3 |
| Benzo(k)fluoranthene | 0.049 | 0.057 | 5 | 5 |
| Benzo(a)pyrene | 0.024 | 0.014 | 5 | 3 |
| 3-Methylcholanthrene | 0.026 | 0.019 | 5 | 2 |
| Indeno(123-cd)pyrene | 0.031 | 0.044 | 5 | 1 |
| Dibenz(a,h)anthracene | 0.026 | 0.034 | 5 | 1 |
| Benzo(ghi)perylene | 0.025 | 0.029 | 5 | 2 |
| Dibenzo(a,l)pyrene | 0.012 | 0.006 | 5 | 0 |
| Dibenzo(a,i)pyrene | 0.010 | 0.004 | 5 | 0 |
| Dibenzo(a,h)pyrene | 0.009 | 0.001 | 5 | 0 |



Wood Buffalo Environmental Association

PAH (ng/m³) Summary

2017 August

| Compound | % Det | N | N < Det. | Min. | 10% | 25% | 50% | 60% | 75% | 80% | 90% | 95% | 99% | Max. | Mean | Std. Dev. | Median | Outlier Test |
|--------------------------------|--------|----|----------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|--------|--------------|
| Naphthalene | 100.0% | 19 | 0 | 3.7249 | 4.0283 | 5.5932 | 9.8537 | 11.6580 | 14.2837 | 15.4666 | 25.1020 | 28.4258 | 28.4258 | 28.4258 | 11.1783 | 6.7440 | 9.8537 | 44.8984 |
| Acenaphthylene | 100.0% | 19 | 0 | 1.5656 | 1.6257 | 1.9376 | 2.7207 | 2.9166 | 3.8096 | 4.2077 | 5.2681 | 6.3010 | 6.3010 | 6.3010 | 3.0723 | 1.3422 | 2.7207 | 9.7835 |
| Acenaphthene | 100.0% | 19 | 0 | 1.3002 | 1.6135 | 1.8845 | 2.3004 | 3.5842 | 6.3056 | 6.3435 | 8.8226 | 8.8960 | 8.8960 | 8.8960 | 3.8406 | 2.6485 | 2.3004 | 17.0829 |
| Fluorene | 100.0% | 19 | 0 | 0.5873 | 0.6930 | 0.7782 | 1.0428 | 1.4284 | 2.1824 | 2.8664 | 5.8350 | 9.6474 | 9.6474 | 9.6474 | 2.0475 | 2.2674 | 1.0428 | 13.3847 |
| Phenanthrene | 100.0% | 19 | 0 | 0.6866 | 0.8115 | 1.3445 | 2.1091 | 2.6558 | 4.0870 | 5.7444 | 8.8227 | 9.1424 | 9.1424 | 9.1424 | 3.0670 | 2.5995 | 2.1091 | 16.0643 |
| Anthracene | 100.0% | 19 | 0 | 0.0637 | 0.0949 | 0.1098 | 0.2078 | 0.2656 | 0.3525 | 0.4608 | 0.9085 | 0.9272 | 0.9272 | 0.9272 | 0.2959 | 0.2510 | 0.2078 | 1.5510 |
| Acridine | 89.5% | 19 | 2 | 0.0176 | 0.0177 | 0.0200 | 0.0271 | 0.0396 | 0.0465 | 0.0520 | 0.0549 | 0.0679 | 0.0679 | 0.0679 | 0.0340 | 0.0155 | 0.0271 | 0.1115 |
| Fluoranthene | 100.0% | 19 | 0 | 0.1034 | 0.1607 | 0.2229 | 0.3359 | 0.3717 | 0.4916 | 0.7735 | 1.5354 | 1.9816 | 1.9816 | 1.9816 | 0.5098 | 0.4927 | 0.3359 | 2.9732 |
| Pyrene | 100.0% | 19 | 0 | 0.1253 | 0.2179 | 0.3150 | 0.3722 | 0.4046 | 0.4779 | 0.5271 | 0.7291 | 1.3826 | 1.3826 | 1.3826 | 0.4413 | 0.2650 | 0.3722 | 1.7664 |
| Benzo(c)phenanthrene | 42.1% | 19 | 11 | 0.0083 | 0.0089 | 0.0099 | 0.0132 | 0.0148 | 0.0181 | 0.0185 | 0.0263 | 0.0347 | 0.0347 | 0.0347 | 0.0152 | 0.0066 | 0.0132 | 0.0483 |
| Benz(a)anthracene | 100.0% | 19 | 0 | 0.0183 | 0.0204 | 0.0379 | 0.0526 | 0.0603 | 0.1180 | 0.1186 | 0.1630 | 0.4825 | 0.4825 | 0.4825 | 0.0866 | 0.1039 | 0.0526 | 0.6062 |
| Chrysene | 100.0% | 19 | 0 | 0.0303 | 0.0436 | 0.0577 | 0.0752 | 0.0795 | 0.1165 | 0.1436 | 0.2602 | 0.3255 | 0.3255 | 0.3255 | 0.1024 | 0.0762 | 0.0752 | 0.4832 |
| 7,12-Dimethylbenz(a)anthracene | 100.0% | 19 | 0 | 0.0281 | 0.0336 | 0.0471 | 0.0694 | 0.0755 | 0.0826 | 0.0827 | 0.0897 | 0.1176 | 0.1176 | 0.1176 | 0.0666 | 0.0220 | 0.0694 | 0.1767 |
| Benzo(b)fluoranthene | 89.5% | 19 | 2 | 0.0135 | 0.0173 | 0.0223 | 0.0306 | 0.0360 | 0.0513 | 0.0531 | 0.0836 | 0.1484 | 0.1484 | 0.1484 | 0.0421 | 0.0314 | 0.0306 | 0.1990 |
| Benzo(k)fluoranthene | 100.0% | 19 | 0 | 0.0135 | 0.0173 | 0.0223 | 0.0334 | 0.0376 | 0.0507 | 0.0531 | 0.0835 | 0.1479 | 0.1479 | 0.1479 | 0.0428 | 0.0318 | 0.0334 | 0.2019 |
| Benzo(a)pyrene | 73.7% | 19 | 5 | 0.0131 | 0.0137 | 0.0150 | 0.0220 | 0.0227 | 0.0311 | 0.0351 | 0.0426 | 0.0470 | 0.0470 | 0.0470 | 0.0239 | 0.0103 | 0.0220 | 0.0755 |
| 3-Methylcholanthrene | 36.8% | 19 | 12 | 0.0044 | 0.0051 | 0.0085 | 0.0165 | 0.0175 | 0.0260 | 0.0309 | 0.0424 | 0.0500 | 0.0500 | 0.0500 | 0.0191 | 0.0128 | 0.0165 | 0.0829 |
| Indeno(123-cd)pyrene | 26.3% | 19 | 14 | 0.0078 | 0.0084 | 0.0104 | 0.0130 | 0.0137 | 0.0179 | 0.0202 | 0.0541 | 0.1103 | 0.1103 | 0.1103 | 0.0205 | 0.0241 | 0.0130 | 0.1413 |
| Dibenz(a,h)anthracene | 15.8% | 19 | 16 | 0.0067 | 0.0070 | 0.0097 | 0.0108 | 0.0113 | 0.0134 | 0.0148 | 0.0303 | 0.0875 | 0.0875 | 0.0875 | 0.0162 | 0.0181 | 0.0108 | 0.1070 |
| Benzo(ghi)perylene | 52.6% | 19 | 9 | 0.0090 | 0.0091 | 0.0120 | 0.0203 | 0.0251 | 0.0278 | 0.0295 | 0.0467 | 0.0765 | 0.0765 | 0.0765 | 0.0240 | 0.0167 | 0.0203 | 0.1073 |
| Dibenzo(a,l)pyrene | 0.0% | 19 | 19 | 0.0059 | 0.0063 | 0.0072 | 0.0084 | 0.0094 | 0.0105 | 0.0118 | 0.0131 | 0.0221 | 0.0221 | 0.0221 | 0.0095 | 0.0036 | 0.0084 | |
| Dibenzo(a,i)pyrene | 0.0% | 19 | 19 | 0.0057 | 0.0064 | 0.0069 | 0.0075 | 0.0077 | 0.0102 | 0.0106 | 0.0108 | 0.0115 | 0.0115 | 0.0115 | 0.0082 | 0.0018 | 0.0075 | |
| Dibenzo(a,h)pyrene | 0.0% | 19 | 19 | 0.0062 | 0.0065 | 0.0071 | 0.0080 | 0.0089 | 0.0101 | 0.0102 | 0.0118 | 0.0193 | 0.0193 | 0.0193 | 0.0089 | 0.0030 | 0.0080 | |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

INTEGRATED MONITORING PROGRAM MONTHLY REPORT

PRECIPITATION DATA SUMMARY AUGUST 2017

Prepared
October 27, 2017

SAMPLE COLLECTION AND DATA COMPILATION BY:

Wood Buffalo Environmental Association
Fort McMurray, Alberta

LABORATORY ANALYSIS BY:

Precipitation: InnoTech Alberta, Inc.
Vegreville, Alberta



| FILE CONTENTS DESCRIPTION | Precipitation Measurement of ions, pH and conductivity |
|---|--|
| SAMPLING INTERVAL | A week |
| SAMPLING FREQUENCY OF DATA | A week |
| EXPLANATION OF ZERO VALUES | Zero values are contained in this file and should be treated as values below detection - Method Detection values (MDL.) are provided with each observation |
| UNITS | mg/L (milligram per liter) |
| OBSERVATION TYPE | Wet Precipitation |
| FIELD SAMPLING OR MEASUREMENT PRINCIPLE | moveable cover with precipitation sensors |
| MEDIUM | Polyethylene Collection bucket |
| ANALYTICALMETHODS | pH by pH meter Conductivity by Conductivity meter IONS by Ion Chromatography (IC) |
| ANALYTICAL LABORATORY | InnoTech Alberta Inc |
| USER NOTE 1 | Data are not blank corrected |
| SAMPLING INSTRUMENT TYPE | Total Precipitation Collector (TPC-3000) |
| FLAGS USED | |
| V0 | Valid value |
| V1 | Valid value but comprised wholly or partially of below detection limit data |
| V4 | Valid value despite failing to meet some QC or statistical criteria |
| V5 | Valid value but qualified because of possible contamination |
| V6 | Valid value but qualified due to non-standard sampling conditions |
| V8 | Dry Week |
| V9 | Insufficient sample collected for analyzes |
| V10 | Insufficient data to conduct all quality control checks |
| M1 | Missing value because no value is available |
| M2 | Missing value because invalidated by Data Originator |



Wood Buffalo Environmental Association
Precipitation summary

2017 August

| Fort McKay-Bertha Ganter AMS 1 | Start Date End Date Dry Week Precip | 02-Aug-17 09-Aug-17 | | | 09-Aug-17 15-Aug-17 | | | 15-Aug-17 22-Aug-17 | | | 22-Aug-17 28-Aug-17 | | | 28-Aug-17 05-Sep-17 | | |
|--------------------------------------|--|------------------------|-------|------|------------------------|-------|------|------------------------|-------|------|------------------------|-------|------|------------------------|-------|------|
| | | X | | | X | | | X | | | X | | | X | | |
| | | Results | MDL | Flag | Results | MDL | Flag | Results | MDL | Flag | Results | MDL | Flag | Results | MDL | Flag |
| Acidity | µeq/L | 23 | 2 | V0 | -9999 | 2 | V9 | 23 | 2 | V0 | 27 | 2 | V0 | -9999 | 2 | V9 |
| Ammonium | mg/L | 0.395 | 0.009 | V0 | 0.82 | 0.009 | V0 | 0.245 | 0.009 | V0 | 0.441 | 0.009 | V0 | -9999 | 0.009 | V9 |
| Bicarbonate (calc) | µeq/L | 34.5 | | | 36.2 | | | 0.613 | | | 16.5 | | | | | |
| Calcium | mg/L | 2.01 | 0.005 | V0 | 3.95 | 0.005 | V0 | 0.312 | 0.005 | V0 | 0.493 | 0.005 | V0 | -9999 | 0.005 | V9 |
| Chloride | mg/L | 0.287 | 0.004 | V0 | 1.84 | 0.004 | V0 | 0.114 | 0.004 | V0 | 0.352 | 0.004 | V0 | -9999 | 0.004 | V9 |
| Conductivity (25°C) | µS/cm | 18 | 1 | V0 | -9999 | 1 | V9 | 12 | 1 | V0 | 10 | 1 | V0 | -9999 | 1 | V9 |
| Conductivity (calc) | µS/cm | 17 | | | | | | 8.68 | | | 9.15 | | | | | |
| Conductivity Difference % | | -3.1 | | V0 | -9999 | | V10 | -28.3 | | V0 | -3.73 | | V0 | -9999 | | V10 |
| Magnesium | mg/L | 0.226 | 0.009 | V0 | 0.435 | 0.009 | V0 | 0.068 | 0.009 | V0 | 0.101 | 0.069 | V0 | -9999 | 0.069 | V9 |
| Nitrate | mg/L | 1.09 | 0.004 | V0 | 2.28 | 0.004 | V0 | 0.61 | 0.004 | V0 | 0.709 | 0.004 | V0 | -9999 | 0.004 | V9 |
| pH | | 6.83 | | V0 | 6.85 | | V0 | 5.08 | | V0 | 6.51 | | V0 | 7.54 | | V0 |
| Phosphate | mg/L | <0.04 | 0.04 | V1 | <0.04 | 0.04 | V1 | <0.04 | 0.04 | V1 | <0.04 | 0.04 | V1 | -9999 | 0.04 | V9 |
| Potassium | mg/L | 0.084 | 0.006 | V0 | 0.494 | 0.006 | V0 | 0.074 | 0.006 | V0 | 0.32 | 0.006 | V0 | -9999 | 0.006 | V9 |
| Sodium | mg/L | 0.202 | 0.006 | V0 | 1.17 | 0.006 | V0 | 0.067 | 0.006 | V0 | 0.188 | 0.006 | V0 | -9999 | 0.006 | V9 |
| Sulfate | mg/L | 2.64 | 0.004 | V0 | 6.54 | 0.004 | V0 | 1.44 | 0.004 | V0 | 1.28 | 0.004 | V0 | -9999 | 0.004 | V9 |
| Sum Anions | µeq/L | 115 | | | 262 | | | 43.6 | | | 64.4 | | | | | |
| Sum Cations | µeq/L | 152 | | | 342 | | | 47.9 | | | 74 | | | | | |
| Total Ions | µeq/L | 267 | | | 604 | | | 91.5 | | | 138.4 | | | | | |
| Ion Difference | % | 13.8 | | V0 | 13.2 | | V0 | 4.64 | | V0 | 6.95 | | | -9999 | | V10 |
| Ion Difference | µeq/L | 37 | | | 80 | | | 4.3 | | | 9.6 | | V0 | -9999 | | V10 |



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