



Wood Buffalo Environmental Association

SEPTEMBER 2016 MONTHLY REPORT

CONTINUOUS MONITORING
INTEGRATED MONITORING
October 28, 2016

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



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October 28, 2016

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

Enclosed is the September 2016 Ambient Air Quality Monitoring Report for the continuous ambient air quality monitoring stations of the Wood Buffalo Environmental Association regional air quality monitoring network.

The continuous ambient air quality monitoring network stations are:

AMS 1 - Fort McKay – Bertha Ganter
AMS 2 - Mildred Lake
AMS 3 - Lower Camp B (meteorology)
AMS 4 - Buffalo Viewpoint
AMS 5 - Mannix
AMS 6 - Patricia McInnes
AMS 7 - Athabasca Valley
AMS 8 - Fort Chipewyan
AMS 9 - Barge Landing
AMS 11 - Lower Camp (air quality)
AMS 13 - Fort McKay South
AMS 14 - Anzac
AMS 15 - CNRL Horizon
AMS 16 - Shell Muskeg River
AMS 17 - Wapasu
AMS 18 - Stony Mountain
AMS 19 - Firebag
AMS 20 - Brion MacKay River
AMS 21 - Conklin Community
AMS 500 - Cenovus Christina Lake
AMS 502 - ConocoPhillips Surmont

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

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



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

Aboriginal Communities

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

Government and Non-Industrial Organizations

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

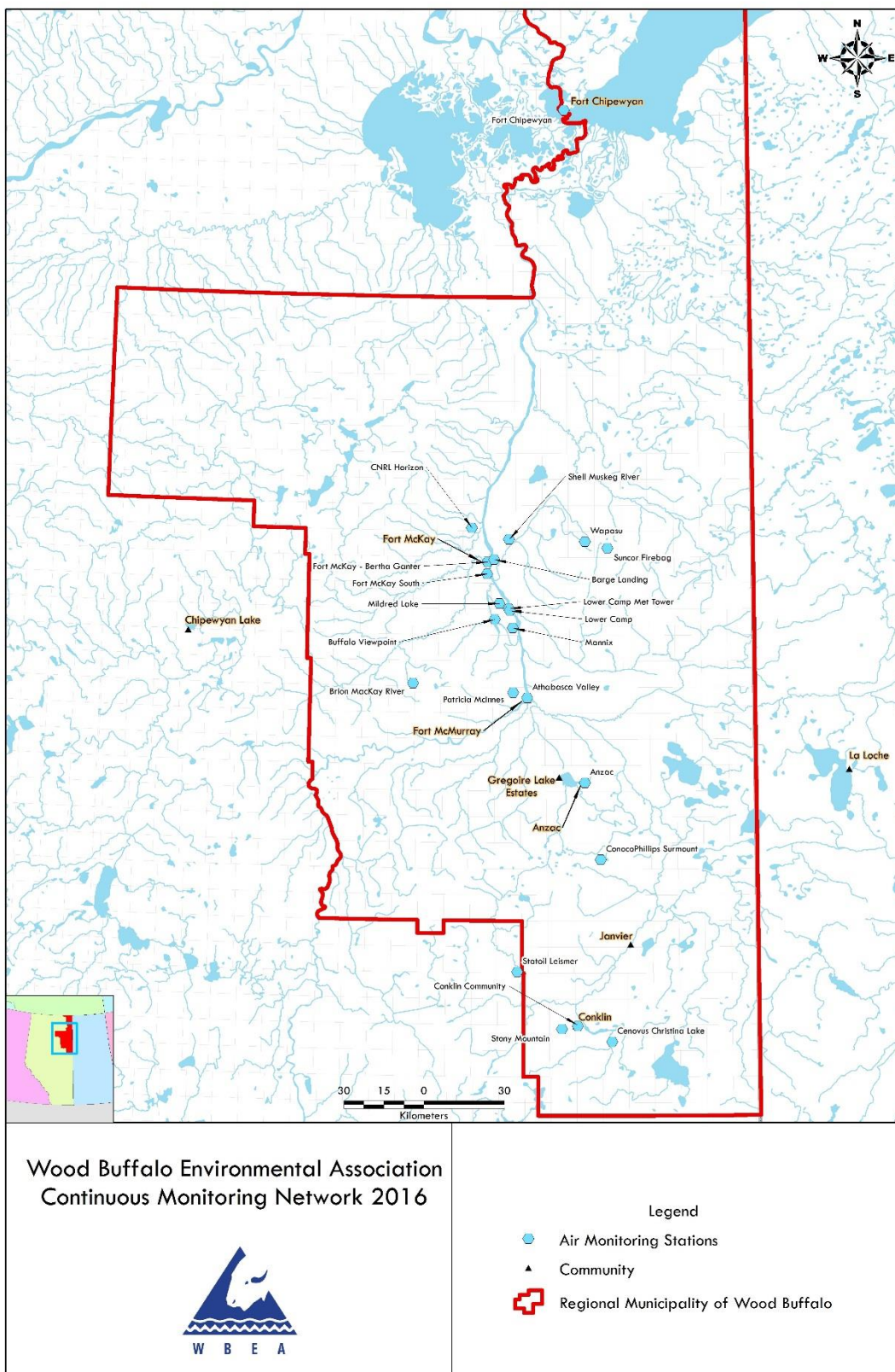


Figure 1: Map of WBEA Air Monitoring Network.

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

1.0 Concentrations in Excess of Alberta Ambient Air Quality Objectives

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

There were 3 H₂S 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 | 01Sept16, 06:00 | 315706 | 1hr | 12 | 12 | exc |
| AMS 5 Mannix | H ₂ S | 01Sept16, 20:00 | 315754 | 1hr | 10 | 10 | nae |
| AMS 11 Lower Camp | H ₂ S | 16Sept16, 23:00 | 316285 | 1hr | 11 | 11 | 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

As a result of the Alberta Environment and Parks (AEP) audit, data for Athabasca Valley (AMS 7) was re-submitted to reflect invalidation of TRS data effective July 30, 2016. Revised summary tables for Athabasca Valley and network summary for July 2016 have been submitted with this report. Please see Operational Status – Continuous Monitoring notes below for further details.

Data for AMS 17 – Wapasu precipitation has been reported since January, 2016, but data upload to the AEP airdata warehouse was not successfully completed. Data from this station has been re-submitted to include the finalized data for precipitation collection. There are no changes to any other parameters or monthly report summaries for the Wapasu air monitoring station.

2.0 Operational Status

Continuous Monitoring

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

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

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

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

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

Based on analyzer performance in previous calibrations and documented station operator activities, it has been determined that the leak has been in existence since July 30, 2016 when the analyzer was replaced. WBEA has invalidated data from the installation of the analyzer on July

30 to September 26, 2016. Throughout this time period, the analyzer appeared to have operated within criteria of the Air Monitoring Directive (AMD) which inferred that the leak had been masked by span adjustment during the installation calibration and not discoverable until such time as an audit of the whole system was performed.

In September 2016, the TRS analyzer at Athabasca Valley operated for 16% of the reporting period. This incident was reported to Alberta Environment and Parks on September 29, 2016 (reference 316745).

2. The Total Hydrocarbon (THC) analyzer at Firebag Air Monitoring Station operated less than 90% of the time in September 2016.

Alberta Environment and Parks (AEP) audited the Wood Buffalo Environmental Association's (WBEA) ambient air quality monitoring network from September 20 to 28, 2016. During the audit by AEP on September 20, results indicated the total hydrocarbon (THC) analyzer did not meet Air Monitoring Directive (AMD) audit assessment criteria. The following actions were taken following the audit:

The post audit failure on-site checklist revealed an unstable air pressure output to the FID. The control cable to the air pressure regulator was re-seated and air pressure stabilized. A multipoint calibration was performed on September 21 – air pressure remained stable and the analyzer response was as expected with no adjustments required.

Based on a review of analyzer diagnostics, it has been determined that the component failure occurred on September 15 following a routine calibration. Daily system checks indicated that the analyzer performance was within AMD criteria throughout this time period. Failure of the component to the extent of affecting data was intermittent, however, data has been conservatively flagged invalid from the onset of unstable air pressure on September 15 until the time it was stabilized on September 21, 2016.

In September 2016, the THC analyzer at Firebag Air Monitoring Station operated for 81% of the reporting period. This incident was reported to Alberta Environment and Parks on October 19, 2016 (reference number 317372).

3. The wind speed sensor at Stony Mountain Air Monitoring Station operated less than 90% of the time in September 2016, which, due to the scalar calculation, resulted in invalid wind direction data during the same time period. Data was invalidated during periods of flat-line from the wind speed sensor.

The problem was intermittent in nature as it only occurred periodically. Troubleshooting steps were taken in the field after periodic observations of the flat line response. Attempts to solve the issue were made on September 10, 23, 26, and October 16 by WBEA field technicians.

The root cause of the problem was identified to be a faulty lightning protection device that exhibited the problem intermittently. The card has been replaced and the intermittent problem has not been observed since the repair on October 16.

During data validation for monthly reports, the wind speed and direction at Stony Mountain was invalidated due to this issue for a total of 78 hours. This resulted in wind sensor data being available for 89% of the time in September, 2016. This incident was reported to Alberta Environment and Parks on October 19, 2016 (reference number 317373).

In September 2016, there was 1 incident of a monitoring instrument not required for air quality compliance operating less than 90% of the time:

1. The 45m meteorological sensors at AMS 3 – Lower Camp Met Tower had 492 hours of invalid data due to wiring issues and were repaired on September 21.

Intermittent Monitoring

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

3.0 Monitoring Notes

General Network Notes

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

Alberta Environment and Parks (AEP) audited the Wood Buffalo Environmental Association's ambient monitoring network from September 20 to 28, 2016. As a result, two calibration periods were reported this month for all analyzers that were audited; one for the AEP audit and another for the monthly multi-point calibration.

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

Station 1, Fort McKay - Bertha Ganter

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time for stabilization after exposure to high concentrations of NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1 to 3 hours following the daily spans have been reported as invalid for a total of 58 hours this month.

Preventative maintenance on September 13, stabilization time, and a follow-up calibration interrupted the normal operation of the NO₂ analyzer for 47 hours.

Maintenance and cleaning of the sample manifold on September 16 interrupted the normal operations of all air quality analyzers for 1 hour.

Maintenance to the data acquisition system on September 22 interrupted the routine operations of all parameters for 2 hours.

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

Station 2, Mildred Lake

Maintenance and replacement of the sample pump and a follow-up calibration on September 8 interrupted the normal operation of the THC analyzer for 32 hours.

Program revision uploads to the data acquisition system on September 25 interrupted the routine operation of the THC analyzer for 1 hour.

A power supply failure with the calibration system prevented the daily zero and span checks from initiating on September 25; maintenance to diagnose, repair, and re-initiate the daily zero-span sequence on September 25 and 26 interrupted the routine operations of all air quality analyzers for 2 to 3 hours.

Station 3, Lower Camp B - Meteorology

Maintenance to verify sensor responses on September 20 interrupted the routine operations of all parameters for 1 hour.

Meteorological sensors at the 45m elevation did not record data for 492 hours due to wiring issues. Wiring repairs were completed on September 21 and sensors returned to normal operations.

Station 4, Buffalo Viewpoint

Unstable operation due to a depleted SO_x scrubber on September 27 interrupted the normal operation of the H₂S analyzer for 15 hours. Maintenance on September 28 to replace the depleted SO_x scrubber and calibrate the H₂S analyzer resulted in 7 hours of invalid data.

Calibration of the meteorological sensors at the station on September 16 interrupted the normal operations of the wind sensors for 2 hours.

Station 5, Mannix

The data acquisition system on the meteorological tower failed to record data on September 24 resulting in the absence of data for 4 hours for all meteorological parameters.

Maintenance to replace the calibration cylinder, adjust response, and re-calibrate on September 28 interrupted the normal operation of the H₂S analyzer for 8 hours.

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

Station 6, Patricia McInnes

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily span and routine monthly multipoint calibration periods. Additional time for stabilization after exposure to high concentrations of the NH₃ gas is an inherent behavior in the NH₃ analyzer operations resulting from the properties of the NH₃ gas. Data for 1 to 2 hours following each daily span has been reported as invalid for a total of 34 hours this month.

Maintenance and cleaning of the sample manifold on September 19 interrupted the normal operations of all air quality analyzers for 1 hour.

Station 7, Athabasca Valley

Analyzer failure due to a leak in the sample/zero-span sample valve of the TRS analyzer resulted in 605 hours of invalid data. The leak was discovered on September 25 during an audit by Alberta Environment and Parks and was repaired that day. Maintenance to adjust the analyzer sensitivity and recalibrate on September 26 interrupted the routine operation of the TRS analyzer for 3 hours.

Maintenance and cleaning of the sample manifold on September 22 interrupted the normal operations of the O₃ and CO analyzers for 3 hours.

Station operator activities on September 28 interrupted the normal operation of the SO₂ analyzer for 2 hours.

Unstable operation due to baseline drift on September 24 and 27 affected the normal operation of the PM_{2.5} analyzer for a total of 7 hours.

Replacement of the calibration cylinder and recalibration on September 26 interrupted the routine operation of the NO₂ analyzer for 5 hours.

Calibration of the meteorological sensors at the station on September 22 interrupted the normal operations of the wind sensors for 2 hours.

Station 8, Fort Chipewyan

Intermittent spikes and spurious readings from the PM_{2.5} analyzer discovered during daily system checks lead to an investigation through remote diagnostics. There were no issues found with the PM_{2.5} analyzer itself and data appeared consistent with foreign debris in the sample chamber. An on-site visit on September 1 lead to the discovery of a spider in the equipment. The analyzer was removed from service for shop cleaning and replaced with a backup unit. Data was invalidated for 11 hours this reporting period.

Maintenance to the sample inlet, flow and zero reference checks on September 21 interrupted the normal operation of the PM_{2.5} analyzer for 1 hour.

Two instances of intermittent unstable operation affected the normal operations of the O₃ analyzer for 3 hours this reporting period.

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

Station 9, Barge Landing

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

Station 11, Lower Camp

No operational issues to report.

Station 13, Fort McKay South

Maintenance and cleaning of the sample manifold on September 20 interrupted the normal operations of the SO₂, O₃, and TRS analyzers for 1 hour.

Intermittent unstable operation due to baseline drift affected the normal operation of the PM_{2.5} analyzer for 6 hours this reporting period.

Calibration of the meteorological sensors at the station on September 23 interrupted the normal operations of the wind sensors for 1 hour.

Station 14, Anzac

Maintenance to verify analyzer response on September 15 interrupted the routine operation of the TRS analyzer for 2 hours. Data flags associated with daily zero/span sequences combined with a shift in baseline response following the maintenance indicates that the TRS analyzer was not sampling ambient air; as a result, 14 hours data was invalidated.

A station power outage on September 16 interrupted the routine operations of all air quality analyzers for 1 to 2 hours.

Maintenance and cleaning of the sample manifold on September 19 interrupted the normal operations of the SO₂, TRS, THC, and NO₂ analyzers for 1 hour.

Maintenance to replace the calibration cylinder on September 27 affected the normal operation of the SO₂ analyzer for 3 hours.

Intermittent unstable operations due to excessive baseline drift interrupted the routine operation of the THC analyzer for 27 hours this reporting period. The sample pump of the THC analyzer was replaced on September 17 during routine calibration to address the baseline drift.

Flat-line in the output signal on September 7 interrupted the normal operation of the PM_{2.5} analyzer for 24 hours. Maintenance to reset and verify operation on September 8 affected the normal operation of the PM_{2.5} analyzer for 4 hours. The sample filter tape failed to automatically advance on September 27 interrupting the normal operation of the PM_{2.5} analyzer for 12 hours.

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

Station 15, CNRL Horizon

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

Unstable operation due to baseline drift on September 19 affected the normal operation of the PM_{2.5} analyzer for 3 hours.

Station 16, Shell Muskeg River

Unstable operation due to excessive baseline drift on September 19 affected the normal operation of the THC analyzer for 2 hours. Depletion and replacement of the fuel cylinder at the station on September 21 interrupted the normal operation of the THC analyzer for 2 hours.

Station 17, Wapasu

Maintenance and cleaning of the sample manifold on September 26 interrupted the normal operations of the H₂S and O₃ analyzers for 1 hour.

There were 5 instances of excessive baseline drift interrupting the routine operation of the PM_{2.5} analyzer for a total of 24 hours this reporting period. A flat-line in the output signal on September 18 interrupted the normal operation of the PM_{2.5} analyzer for 24 hours. A remotely activated filter tape advancement on September 19 re-established normal operation and was verified by an on site inspection by the station operator.

Maintenance activities to verify proper operation and communications on September 7, 8, and 21 interrupted the routine operation of the precipitation collector for a total of 4 hours. Spurious values attributed to digital communication errors resulted in 6 hours of invalid data.

Calibration of the meteorological sensors at the station on September 8 interrupted the normal operations of the wind sensors for 1 hour.

Station 18, Stony Mountain

Maintenance and cleaning of the sample manifold on September 13 interrupted the normal operations of the SO₂, TRS, THC, and NO₂ analyzers for 1 hour.

Elevated baseline readings of NMHC observed in the THC analyzer during daily system checks on September 16 lead to the discovery of a broken sample manifold component. Details based on station operator activities, documentation, and baseline analysis of the continuous air quality analyzers determined the manifold broke on September 14; as a result, data was invalidated for a total of 54 hours. Maintenance to repair the sample manifold resulted in 1 additional hour of invalid data.

Depletion and replacement of the carrier gas cylinder at the station on September 26 interrupted the normal operation of the THC analyzer for 2 hours.

There were multiple issues with the operation of wind sensor resulting in a total of 78 hours of invalid data. A flat line in the sensor output signal on September 9 interrupted the routine operation of the wind speed sensor for 1 hour. Maintenance to calibrate the sensors on September 9 affected the normal operation of the wind sensors for 3 hours. The wind speed sensor failed to produce an output signal following maintenance on September 9 resulting in 22 hours of invalid data and was replaced on September 10 by the station operator. From September 12 to 26, intermittent failures associated with the signal cable, maintenance to replace the signal cable, and maintenance to re-wire the signal cable interrupted the routine operation of wind sensors for 52 hours.

Station 19, Firebag

Maintenance to reset communications equipment on September 9 interrupted the normal operations of all parameters for 1 hour.

Maintenance and cleaning of the sample manifold on September 15 interrupted the normal operation of the H₂S analyzer for 1 hour.

Analyzer failure due to a faulty combustion-air pressure controller, repairs, and follow-up calibration, on September 21, interrupted the routine operation of the THC analyzer for 135 hours this reporting period.

Station 20, Brion MacKay River

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

Station 21, Conklin Community

Maintenance and cleaning of the sample manifold on September 21 interrupted the normal operations of all air quality analyzers for 1 hour.

Maintenance to replace the fuel and carrier gas cylinders on September 21 interrupted the normal operation of the THC analyzer for 1 hour.

Maintenance to confirm calibration points for ozone calibrations on September 21 interrupted the routine operation of the NO₂ analyzer for 3 hours.

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

Station 500, Cenovus Christina Lake

Maintenance and cleaning of the sample manifold on September 7 interrupted the normal operations of the SO₂ and NO₂ analyzers for 1 hour.

Calibration of the meteorological sensors at the station on September 7 interrupted the normal operations of the wind sensors for 2 hours. Flat-lines in the output signal of the wind sensor resulted in 2 hours of invalid data this reporting period.

Station 502, ConocoPhillips Surmont

Maintenance and cleaning of the sample manifold on September 27 interrupted the normal operation of the H₂S analyzer for 1 hour.

Calibration of the meteorological sensors at the station on September 27 interrupted the normal operations of the wind sensors for 1 hour.

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

Yours sincerely,

Wood Buffalo Environmental Association

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

SEPTEMBER 2016

page 1 of 2

Prepared: Oct 25 2016 08:16


| APPROVAL NUMBERS | REPORT DATE | | | | | | |
|------------------|-------------------------------|----------|--------------------|-----------------------|---------------------------|-----------------------|---------------------------|
| | MONTH | YEAR | | | | | |
| 289664-00-00 | 9 | 2016 | | | | | |
| 254465-00-00 | CONTINUOUS AMBIENT MONITORING | | | | | | |
| 149968-00-01 | | | | | | | |
| 48522-01-00 | | | | | | | |
| 240008-00-03 | | | | | | | |
| 48263-00-00 | | | | | | | |
| 224816-00-03 | | | | | | | |
| 189942-00-02 | | | | | | | |
| | | | ONE-HOUR AVERAGE | | 24-HOUR AVERAGE | | |
| | PARAMETER | STN. NO. | % TIME OPERATIONAL | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION |
| 206355-00-00 | SO2(ppm) | 1 | 99.58 | 0.039 | 0 | 0.006 | 0 |
| 46586-00-00 | SO2(ppm) | 2 | 99.72 | 0.033 | 0 | 0.006 | 0 |
| 216466-00-04 | SO2(ppm) | 4 | 100.00 | 0.034 | 0 | 0.006 | 0 |
| 137467-00-00 | SO2(ppm) | 5 | 100.00 | 0.124 | 0 | 0.036 | 0 |
| 20809-01-00 | SO2(ppm) | 6 | 99.86 | 0.019 | 0 | 0.007 | 0 |
| 241311-00-00 | SO2(ppm) | 7 | 99.72 | 0.018 | 0 | 0.006 | 0 |
| 094-02-00 | SO2(ppm) | 8 | 100.00 | 0.010 | 0 | 0.001 | 0 |
| 305529-00-00 | SO2(ppm) | 11 | 100.00 | 0.060 | 0 | 0.014 | 0 |
| 026-02-00 | SO2(ppm) | 13 | 99.86 | 0.040 | 0 | 0.006 | 0 |
| 228044-00-00 | SO2(ppm) | 14 | 99.17 | 0.012 | 0 | 0.002 | 0 |
| 73203-01-00 | SO2(ppm) | 15 | 100.00 | 0.026 | 0 | 0.004 | 0 |
| | SO2(ppm) | 16 | 100.00 | 0.045 | 0 | 0.006 | 0 |
| | SO2(ppm) | 17 | 100.00 | 0.029 | 0 | 0.005 | 0 |
| | SO2(ppm) | 18 | 92.22 | 0.002 | 0 | 0.001 | 0 |
| | SO2(ppm) | 19 | 99.86 | 0.016 | 0 | 0.004 | 0 |
| | SO2(ppm) | 20 | 100.00 | 0.006 | 0 | 0.001 | 0 |
| | SO2(ppm) | 21 | 99.86 | 0.003 | 0 | 0.001 | 0 |
| | SO2(ppm) | 500 | 99.86 | 0.019 | 0 | 0.003 | 0 |
| | SO2(ppm) | 502 | 100.00 | 0.020 | 0 | 0.006 | 0 |
| | H2S(ppm) | 2 | 99.58 | 0.004 | 0 | 0.002 | 0 |
| | H2S(ppm) | 4 | 96.94 | 0.002 | 0 | 0.001 | 0 |
| | H2S(ppm) | 5 | 98.89 | 0.012 | 1 | 0.003 | 0 |
| | H2S(ppm) | 11 | 100.00 | 0.011 | 1 | 0.002 | 0 |
| | H2S(ppm) | 17 | 99.86 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 19 | 99.72 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 20 | 100.00 | 0.000 | 0 | 0.000 | 0 |
| | H2S(ppm) | 500 | 100.00 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 502 | 99.86 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 1 | 99.72 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 6 | 100.00 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 7 | 15.56 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 9 | 100.00 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 13 | 99.86 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 14 | 97.50 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 15 | 99.86 | 0.001 | 0 | 0.000 | 0 |
| | TRS(ppm) | 18 | 92.22 | 0.000 | 0 | 0.000 | 0 |
| | TRS(ppm) | 21 | 99.86 | 0.001 | 0 | 0.000 | 0 |
| | THC(ppm) | 1 | 99.58 | 3.1 | - | 2.3 | - |
| | THC(ppm) | 2 | 95.00 | 4.0 | - | 2.7 | - |
| | THC(ppm) | 4 | 100.00 | 4.7 | - | 2.7 | - |
| | THC(ppm) | 5 | 100.00 | 4.2 | - | 2.5 | - |
| | THC(ppm) | 6 | 99.86 | 2.8 | - | 2.1 | - |
| | THC(ppm) | 7 | 100.00 | 3.2 | - | 2.1 | - |
| | THC(ppm) | 9 | 100.00 | 3.1 | - | 2.4 | - |
| | THC(ppm) | 11 | 100.00 | 9.7 | - | 2.7 | - |
| | THC(ppm) | 13 | 100.00 | 3.5 | - | 2.6 | - |
| | THC(ppm) | 14 | 95.97 | 2.5 | - | 2.0 | - |
| | THC(ppm) | 15 | 100.00 | 3.8 | - | 2.4 | - |
| | THC(ppm) | 16 | 99.44 | 8.4 | - | 2.9 | - |
| | THC(ppm) | 17 | 100.00 | 2.7 | - | 2.3 | - |
| | THC(ppm) | 18 | 91.94 | 2.2 | - | 2.1 | - |
| | THC(ppm) | 19 | 81.11 | 2.8 | - | 2.3 | - |
| | THC(ppm) | 20 | 100.00 | 2.5 | - | 2.3 | - |
| | THC(ppm) | 21 | 99.72 | 3.1 | - | 2.2 | - |
| | O3(ppm) | 1 | 99.58 | 0.043 | 0 | 0.028 | - |
| | O3(ppm) | 6 | 99.86 | 0.043 | 0 | 0.032 | - |
| | O3(ppm) | 7 | 99.58 | 0.041 | 0 | 0.031 | - |

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

SEPTEMBER 2016

page 2 of 2

Prepared: Oct 25 2016 08:16

| APPROVAL NUMBERS | REPORT DATE | | | | | | |
|-------------------------------------------------------------------------------------|-------------------------------|----------|--------------------|----------------------------------|---------------------------|---------------------------|---|
| | MONTH | YEAR | | | | | |
| 289664-00-00 | 9 | 2016 | | | | | |
| 254465-00-00 | CONTINUOUS AMBIENT MONITORING | | | | | | |
| 149968-00-01 | | | | | | | |
| 48522-01-00 | | | | | | | |
| 240008-00-03 | | | ONE-HOUR AVERAGE | | 24-HOUR AVERAGE | | |
| 48263-00-00 | PARAMETER | STN. NO. | % TIME OPERATIONAL | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION | MAXIMUM CONCENTRATION | |
| 224816-00-03 | | | | | | NO. READINGS > REGULATION | |
| 189942-00-02 | O3(ppm) | 8 | 99.58 | 0.039 | 0 | 0.030 | - |
| 206355-00-00 | O3(ppm) | 13 | 99.86 | 0.041 | 0 | 0.027 | - |
| 46586-00-00 | O3(ppm) | 14 | 99.86 | 0.039 | 0 | 0.031 | - |
| 216466-00-04 | O3(ppm) | 17 | 99.86 | 0.040 | 0 | 0.030 | - |
| 137467-00-00 | O3(ppm) | 18 | 92.36 | 0.046 | 0 | 0.039 | - |
| 20809-01-00 | O3(ppm) | 21 | 100.00 | 0.044 | 0 | 0.034 | - |
| 241311-00-02 | NO2(ppm) | 1 | 93.06 | 0.027 | 0 | 0.007 | - |
| 094-02-00 | NO2(ppm) | 6 | 99.86 | 0.026 | 0 | 0.009 | - |
| 305529-00-00 | NO2(ppm) | 7 | 99.31 | 0.023 | 0 | 0.012 | - |
| 026-02-00 | NO2(ppm) | 8 | 100.00 | 0.006 | 0 | 0.003 | - |
| 228044-00-00 | NO2(ppm) | 13 | 100.00 | 0.022 | 0 | 0.007 | - |
| 73203-01-00 | NO2(ppm) | 14 | 99.72 | 0.008 | 0 | 0.003 | - |
| | NO2(ppm) | 15 | 100.00 | 0.022 | 0 | 0.008 | - |
| | NO2(ppm) | 16 | 100.00 | 0.032 | 0 | 0.015 | - |
| | NO2(ppm) | 17 | 100.00 | 0.015 | 0 | 0.005 | - |
| | NO2(ppm) | 18 | 92.22 | 0.008 | 0 | 0.002 | - |
| | NO2(ppm) | 19 | 99.86 | 0.015 | 0 | 0.004 | - |
| | NO2(ppm) | 20 | 100.00 | 0.015 | 0 | 0.004 | - |
| | NO2(ppm) | 21 | 99.44 | 0.014 | 0 | 0.002 | - |
| | NO2(ppm) | 500 | 99.86 | 0.015 | 0 | 0.004 | - |
| | NO2(ppm) | 502 | 100.00 | 0.008 | 0 | 0.003 | - |
| | CO(ppm) | 7 | 99.58 | 0.5 | 0 | 0.1 | - |
| | NH3(ppm) | 1 | 91.53 | 0.028 | 0 | 0.001 | - |
| | NH3(ppm) | 6 | 95.14 | 0.000 | 0 | 0.000 | - |
| | PM2.5(ug/m3) | 1 | 99.72 | 20.9 | - | 10.1 | 0 |
| | PM2.5(ug/m3) | 6 | 100.00 | 22.7 | - | 6.7 | 0 |
| | PM2.5(ug/m3) | 7 | 99.03 | 40.1 | - | 9.2 | 0 |
| | PM2.5(ug/m3) | 8 | 98.33 | 8.2 | - | 4.7 | 0 |
| | PM2.5(ug/m3) | 13 | 99.17 | 20.6 | - | 8.8 | 0 |
| | PM2.5(ug/m3) | 14 | 94.31 | 13.4 | - | 5.0 | 0 |
| | PM2.5(ug/m3) | 15 | 99.58 | 36.2 | - | 12.6 | 0 |
| | PM2.5(ug/m3) | 16 | 100.00 | 32.8 | - | 12.0 | 0 |
| | PM2.5(ug/m3) | 17 | 93.33 | 20.8 | - | 6.8 | 0 |
| | PM2.5(ug/m3) | 18 | 100.00 | 16.0 | - | 5.7 | 0 |
| | PM2.5(ug/m3) | 21 | 100.00 | 37.1 | - | 7.0 | 0 |
| | WIND | 1 | 99.72 | - | - | - | - |
| | WIND | 2 | 100.00 | - | - | - | - |
| | WIND | 4 | 99.72 | - | - | - | - |
| | WIND | 5 | 99.58 | - | - | - | - |
| | WIND | 6 | 100.00 | - | - | - | - |
| | WIND | 7 | 99.72 | - | - | - | - |
| | WIND | 8 | 99.86 | - | - | - | - |
| | WIND | 9 | 99.86 | - | - | - | - |
| | WIND | 11 | 100.00 | - | - | - | - |
| | WIND | 13 | 99.86 | - | - | - | - |
| | WIND | 14 | 99.58 | - | - | - | - |
| | WIND | 15 | 100.00 | - | - | - | - |
| | WIND | 16 | 100.00 | - | - | - | - |
| | WIND | 17 | 99.86 | - | - | - | - |
| | WIND | 18 | 89.17 | - | - | - | - |
| | WIND | 19 | 99.86 | - | - | - | - |
| | WIND | 20 | 99.86 | - | - | - | - |
| | WIND | 21 | 99.31 | - | - | - | - |
| | WIND | 500 | 99.44 | - | - | - | - |
| | WIND | 502 | 99.86 | - | - | - | - |
|  | | | | | | | |
| SIGNATURE OF ASSOCIATION REPRESENTATIVE | | | | FOR ALBERTA ENVIRONMENT USE ONLY | | | |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 1
BERTHA GANTER FORT MCKAY
SEPTEMBER 2016

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

October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 678 | 39 | 42 | 99.58 | 39 | 0 | 6 | 0 |
| TRS(ppb) Average | 680 | 38 | 40 | 99.72 | 2 | 0 | 1 | 0 |
| THC(ppm) Average | 679 | 38 | 41 | 99.58 | 3.1 | - | 2.3 | - |
| NMHC(ppm) Average | 679 | 38 | 41 | 99.58 | 0.512 | - | 0.087 | - |
| CH4(ppm) Average | 679 | 38 | 41 | 99.58 | 2.8 | - | 2.2 | - |
| O3 (ppb) Average | 681 | 36 | 39 | 99.58 | 43 | 0 | 28 | - |
| NO2 (ppb) Average | 631 | 39 | 89 | 93.06 | 27 | 0 | 7 | - |
| NO (ppb) Average | 631 | 39 | 89 | 93.06 | 44 | - | 6 | - |
| NOX (ppb) Average | 631 | 39 | 89 | 93.06 | 58 | - | 13 | - |
| NH3 (ppb) Average | 604 | 55 | 116 | 91.53 | 28 | 0 | 1 | - |
| PM2.5 (ug/m3) Average | 714 | 4 | 6 | 99.72 | 20.9 | - | 10.1 | 0 |
| Wind Speed 10 m (km/h) Average | 718 | 0 | 2 | 99.72 | 27 | - | 17 | - |
| Wind Direction 10 m (deg) Average | 718 | 0 | 2 | 99.72 | - | - | - | - |
| Temperature 2 m (C) Average | 718 | 0 | 2 | 99.72 | 25 | - | 14.7 | - |
| Temperature 10 m (C) Average | 718 | 0 | 2 | 99.72 | 24.2 | - | 15.4 | - |
| Relative Humidity (%) Average | 718 | 0 | 2 | 99.72 | 99 | - | 93 | - |
| Precipitation (mm) Total | 718 | 0 | 2 | 99.72 | 4.6 | - | 34.9 | - |
| Leaf Wetness (% of range) Average | 718 | 0 | 2 | 99.72 | 47 | - | 23 | - |
| Global Solar Radiation (W/m2) Average | 718 | 0 | 2 | 99.72 | 641 | - | 196 | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|---------------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 678 | 1.2 | 4 | - | 0 | 0 | 0 | 0 | 0 | 3 | 39 |
| TRS (ppb) Average | 680 | 0.4 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| THC (ppm) Average | 679 | 2.04 | 0.2 | - | 1.8 | 1.9 | 1.9 | 2 | 2.1 | 2.2 | 3.1 |
| NMHC(ppm) Average | 679 | 0.024 | 0.059 | - | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.512 |
| CH4(ppm) Average | 679 | 2.01 | 0.1 | - | 1.8 | 1.9 | 1.9 | 2 | 2 | 2.2 | 2.8 |
| O3 (ppb) Average | 681 | 18.3 | 9 | - | 2 | 6 | 11 | 18 | 25 | 30 | 43 |
| NO2 (ppb) Average | 631 | 3 | 4 | - | 0 | 0 | 0 | 2 | 4 | 8 | 27 |
| NO (ppb) Average | 631 | 1.4 | 4 | - | 0 | 0 | 0 | 0 | 1 | 3 | 44 |
| NOX (ppb) Average | 631 | 4.4 | 7 | - | 0 | 0 | 0 | 2 | 5 | 12 | 58 |
| NH3 (ppb) Average | 604 | 0 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 28 |
| PM2.5 (ug/m3) Average | 714 | 4.35 | 3.2 | - | 0.4 | 1 | 2.2 | 3.4 | 5.9 | 8.4 | 20.9 |
| Wind Speed 10 m (km/h) Average | 718 | 7.8 | 5 | - | 1 | 3 | 4 | 7 | 10 | 15 | 27 |
| Wind Direction 10 m (deg) Average | 718 | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 718 | 11.11 | 5 | - | -0.2 | 4.6 | 7.6 | 10.9 | 14.5 | 17.5 | 25 |
| Temperature 10 m (C) Average | 718 | 11.51 | 4.4 | - | 1 | 5.7 | 8.4 | 11.3 | 14.4 | 17.1 | 24.2 |
| Relative Humidity (%) Average | 718 | 72.1 | 19 | - | 26 | 43 | 58 | 76 | 89 | 96 | 99 |
| Precipitation (mm) Total | 718 | - | - | 47.28 | - | - | - | - | - | - | - |
| Leaf Wetness (% of range) Average | 718 | 4 | 9 | - | -1 | -1 | 0 | 0 | 2 | 16 | 47 |
| Global Solar Radiation (W/m2) Average | 718 | 122.9 | 177 | - | 0 | 0 | 0 | 13 | 206 | 448 | 641 |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------|-------------------|-------------------|---------------------|--------------------------------------------------|
| ALL PARAMETERS | 22 Sep 2016 17:00 | 22 Sep 2016 18:00 | 2 | Data logger program uploaded - data not recorded |
| SO2 | 16 Sep 2016 10:00 | 16 Sep 2016 10:00 | 1 | Maintenance - manifold cleaning |
| NMHC, CH4, THC | 16 Sep 2016 10:00 | 16 Sep 2016 10:00 | 1 | Maintenance - manifold cleaning |
| O3 | 16 Sep 2016 10:00 | 16 Sep 2016 10:00 | 1 | Maintenance - manifold cleaning |
| NO2, NO, NOX | 13 Sep 2016 10:00 | 15 Sep 2016 08:00 | 47 | Stabilization after maintenance work |
| NO2, NO, NOX | 16 Sep 2016 10:00 | 16 Sep 2016 10:00 | 1 | Maintenance - manifold cleaning |
| NH3 | 01 Sep 2016 09:00 | 30 Sep 2016 09:00 | 58 | Stabilization after daily span |
| NH3 | 16 Sep 2016 10:00 | 16 Sep 2016 10:00 | 1 | Maintenance - manifold cleaning |



Summary of Hour Averages

Fort McKay - Bertha Ganter - September 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 39 ppb on Sep 14 14:00 | Maximum Daily Average: 6.1 ppb on Sep 26 |
| Minimum Value: 0 ppb on Sep 1 16:00 | Hours of Data: 678 |
| Maximum Diurnal Average: 3.7 ppb at hour 14 | Hours of Missing Data: 42 |
| Monthly Average: 1.2 ppb | Hours of Calibration: 39 |
| Minimum Daily Average: 0.0 ppb on Sep 2 | Percent Operational Time: 99.6 |
| Minimum Diurnal Average: 0.3 ppb at hour 3 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 3 P ₉₉ = 20 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-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 | 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 | 0.1 | 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 | 0.1 | 0 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 6 | 0 | 0 | 1 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 6 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 20 | 7 | 7 | 12 | 8 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 20 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 6 | 15 | 23 | 23 | 18 | 18 | 11 | 7 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 5.6 | 23 |
| 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 10-Sep | 2 | Z | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 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 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0.5 | 2 |
| 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 | 2 | 1 | 7 | 35 | 39 | 16 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4.6 | 39 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 7 | 7 | 2 | -- | 7 |
| 16-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 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 | 0.1 | 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 | 0 |
| 19-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 | 0.1 | 1 |
| 20-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 | 0.1 | 1 |
| 21-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 | 0.1 | 1 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 9 | 16 | 2 | 1 | 0 | 1 | M | M | 0 | 3 | 11 | 6 | 2 | 1 | 2.9 | 16 |
| 23-Sep | 2 | 3 | Z | 3 | 4 | 3 | 5 | 6 | 10 | 8 | 2 | 4 | 7 | 8 | 7 | 3 | 1 | 8 | 10 | 3 | 1 | 1 | 1 | 1 | 4.3 | 10 |
| 24-Sep | 2 | 2 | 2 | Z | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 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 | 3 | 12 | 18 | 21 | 19 | 25 | 6 | 5 | 1 | 5 | 3 | 4 | 3 | 7 | 3 | 4 | 6.1 | 25 |
| 27-Sep | Z | 4 | 3 | 3 | 6 | 2 | 1 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 |
| 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 | 1 | 0 | 0 | 1 | 4 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 1 | 0 | 1.1 | 4 |
| 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 |

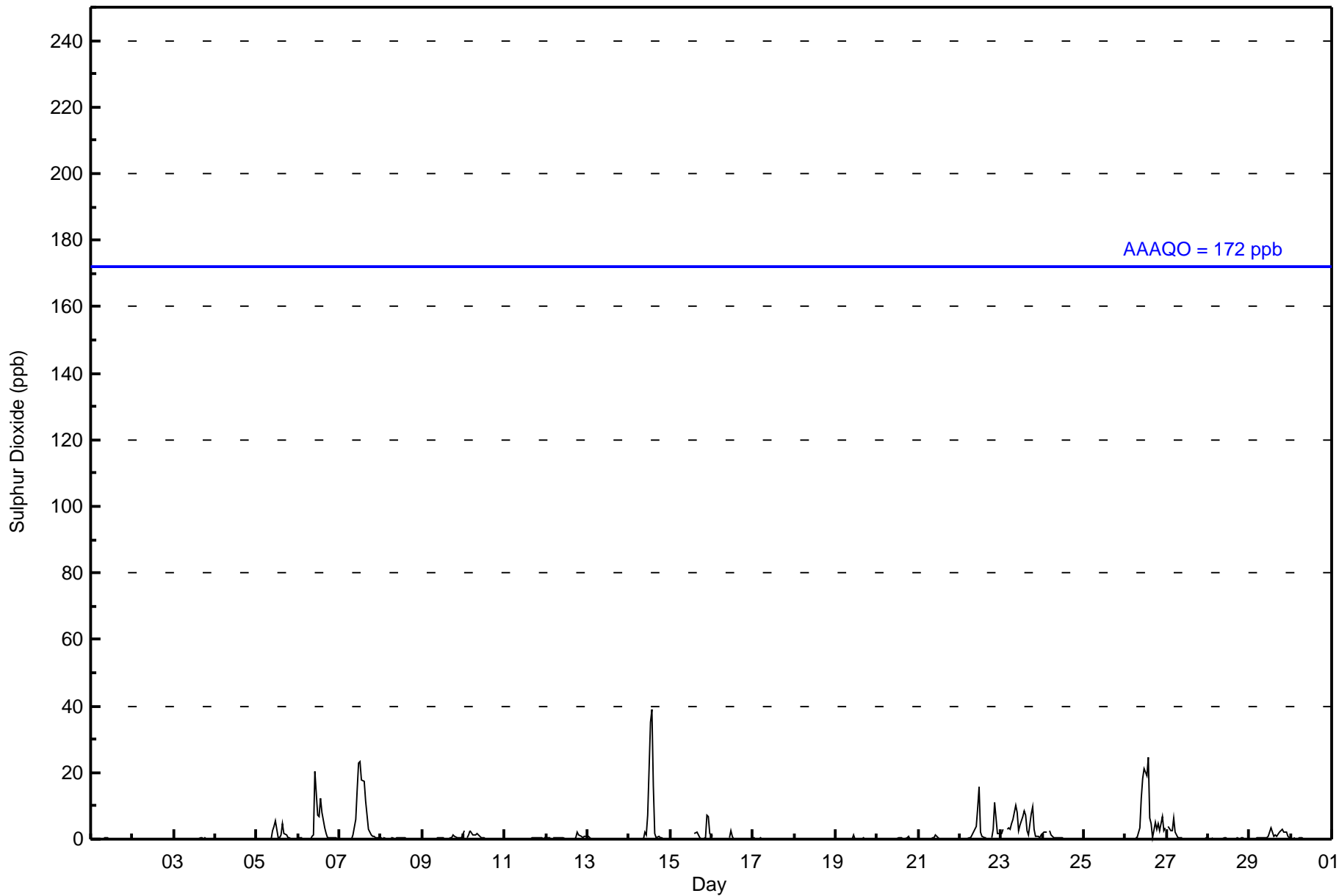
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.4 | 0.4 | 0.3 | 0.3 | 0.7 | 0.4 | 0.3 | 0.4 | 0.8 | 1.4 | 2.7 | 3.2 | 3.6 | 3.7 | 2.1 | 1.2 | 0.6 | 0.8 | 0.8 | 0.6 | 0.7 | 0.9 | 0.5 | 0.4 | Diurnal Average | |
| 2 | 4 | 3 | 3 | 6 | 3 | 5 | 6 | 10 | 12 | 20 | 23 | 35 | 39 | 18 | 11 | 7 | 8 | 10 | 4 | 11 | 7 | 7 | 4 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 660 | 97.35 | 97.35 |
| 11 - 20 | 12 | 1.77 | 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: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 57 | 5 | 0 | 3 | 6 | 4 | 13 | 61 | 101 | 84 | 43 | 45 | 29 | 93 | 66 | 50 | 660 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 57 | 5 | 0 | 3 | 6 | 4 | 13 | 76 | 104 | 84 | 43 | 45 | 29 | 93 | 66 | 50 | 678 |

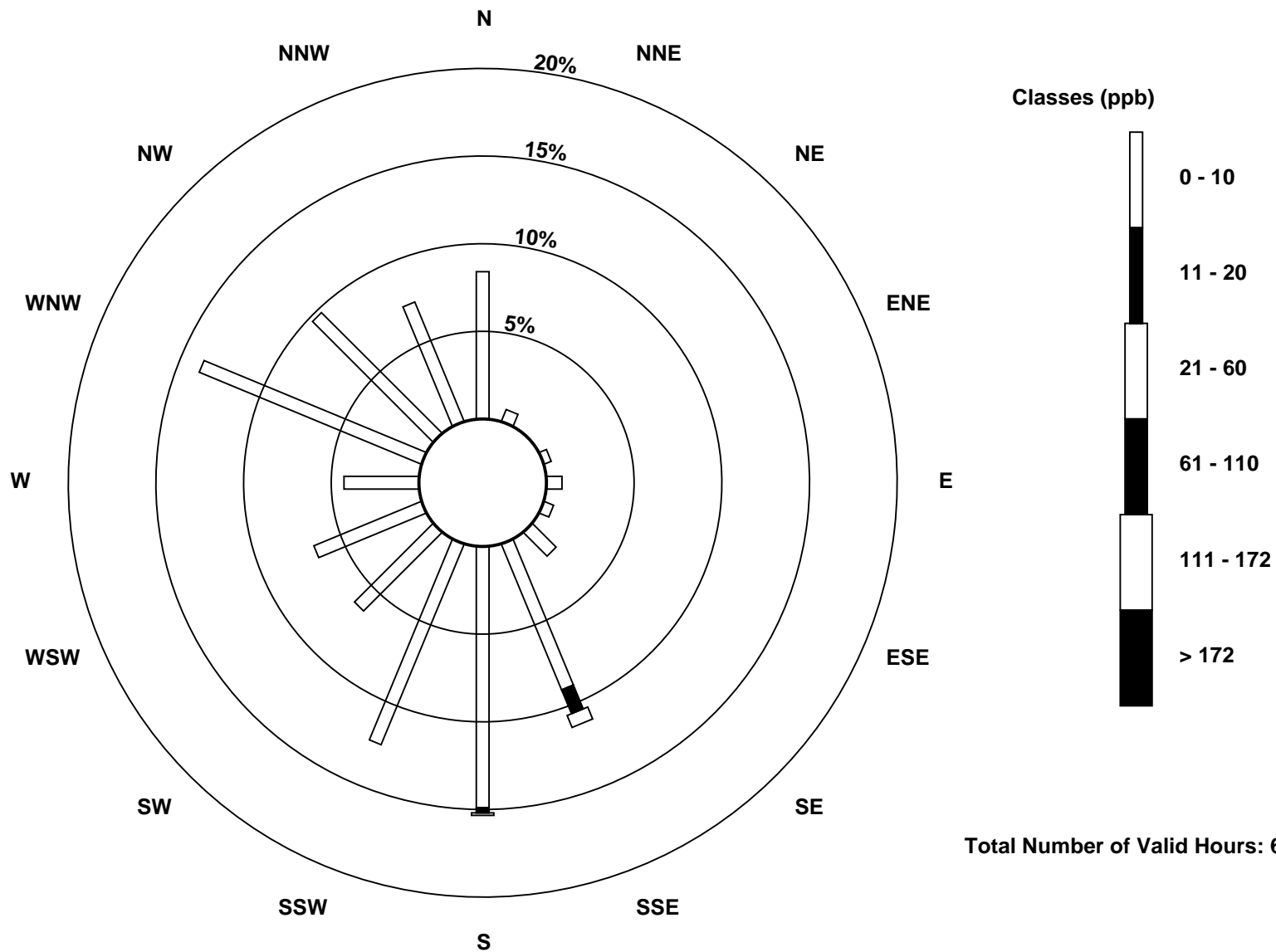
Total Number of Valid Hours: 678

Total Number of Hours: 720

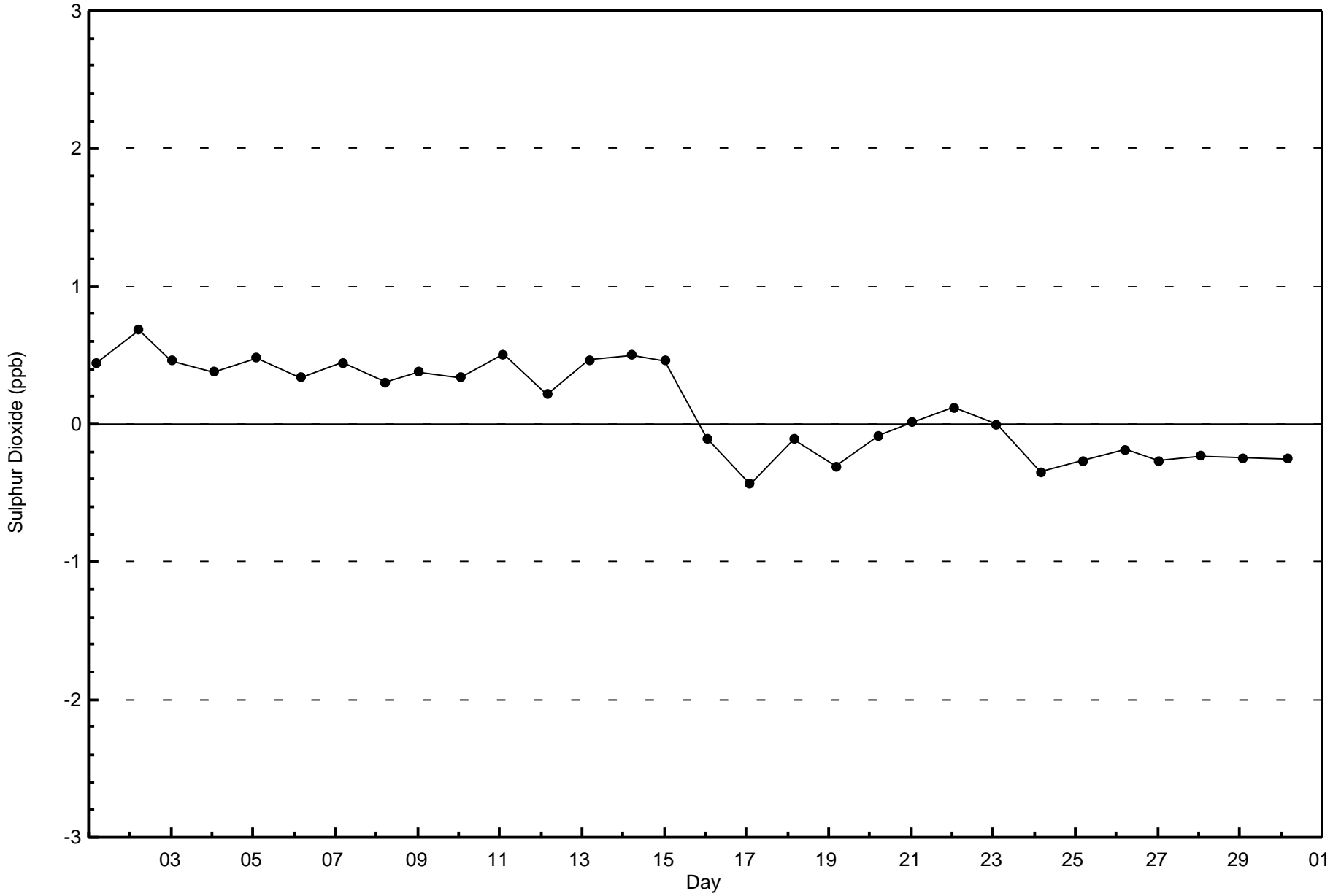


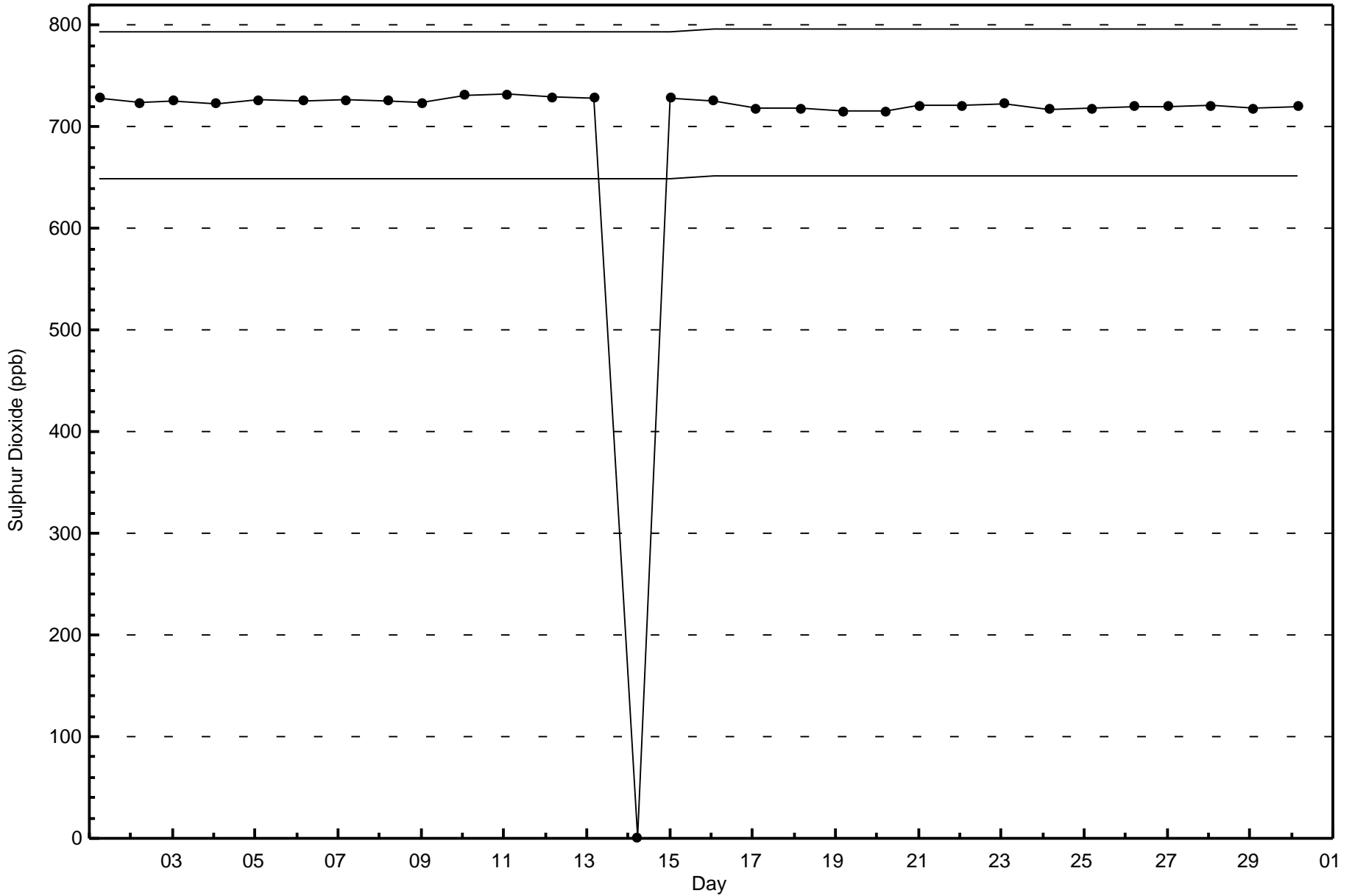
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 678







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Fort McKay - Bertha Ganter - September 2016

| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 22 09:00 | Maximum Daily Average: 0.8 ppb on Sep 23 | | Hours of Data: | 680 |
| Minimum Value: 0 ppb on Sep 12 09:00 | Minimum Daily Average: 0.3 ppb on Sep 11 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 0.6 ppb at hour 10 | Minimum Diurnal Average: 0.3 ppb at hour 17 | | Hours of Calibration: | 38 |
| Monthly Average: 0.4 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 2 | | Percent Operational Time: | 99.7 |

| 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 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 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 | 0.3 | 0 |
| 3-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 | 0.4 | 0 |
| 4-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 | 0.3 | 0 |
| 5-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 |
| 6-Sep | 0 | 0 | 1 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 8-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 | 0.3 | 0 |
| 9-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 | 0.3 | 1 |
| 10-Sep | 1 | 1 | 0 | Z | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 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 | 0.3 | 0 |
| 12-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 | 1 | 0.4 | 1 |
| 13-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 | 0.3 | 0 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 15-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 | 1 | 0.5 | 1 |
| 16-Sep | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 1 |
| 17-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 | 0.4 | 1 |
| 18-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 | 0.3 | 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 | 0.3 | 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 | 0.3 | 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 | 0.3 | 0 |
| 22-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | M | M | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 |
| 23-Sep | 1 | 1 | 1 | 2 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 |
| 24-Sep | 0 | 0 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 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 | 0.3 | 0 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0.7 | 2 |
| 27-Sep | 1 | 1 | Z | 1 | 2 | 1 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 28-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 29-Sep | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 1 | 1 | 0 | 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 | 0.3 | 0 |

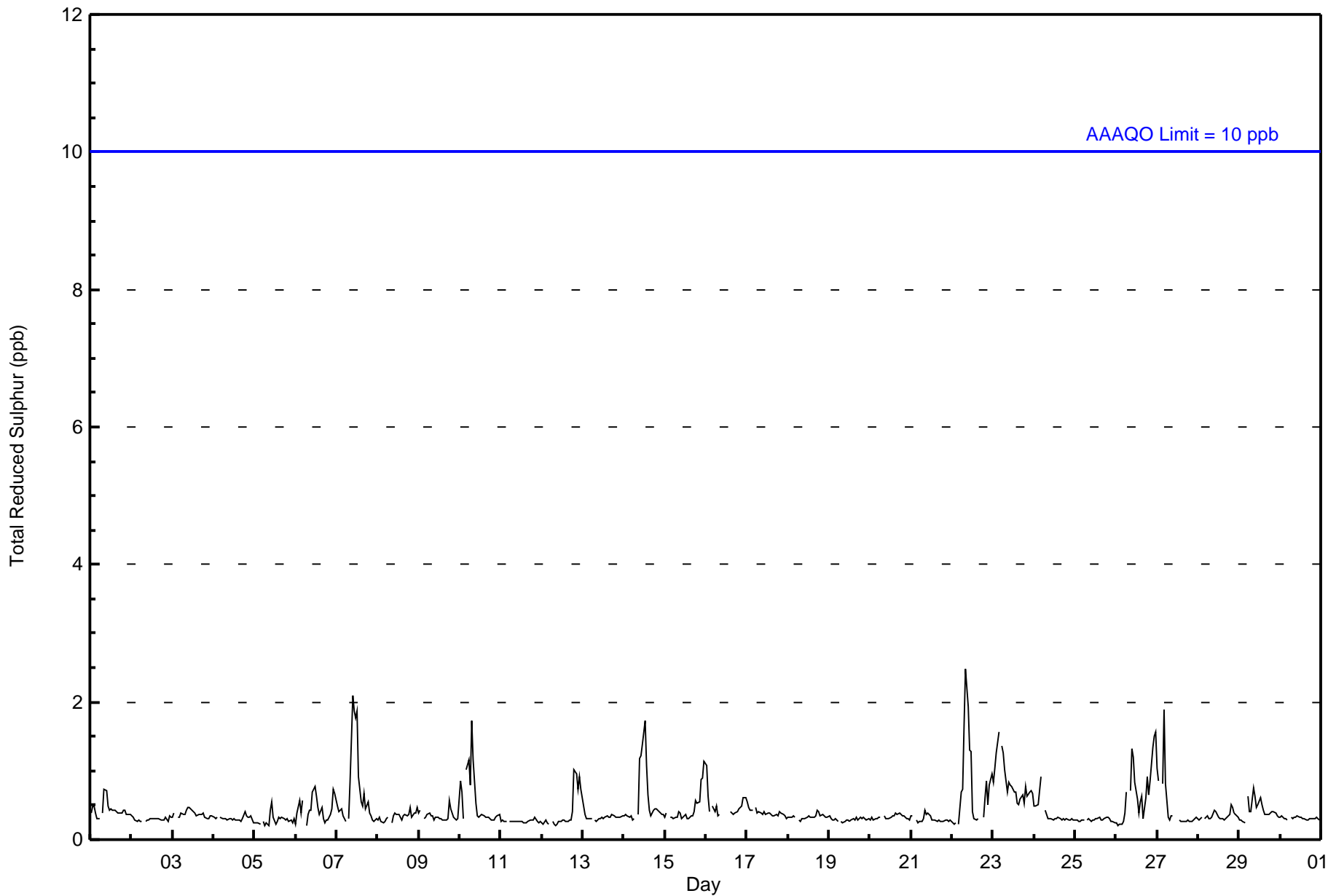
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | Diurnal Average | |
| 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| 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**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 58 | 7 | 0 | 4 | 7 | 4 | 13 | 72 | 103 | 81 | 47 | 45 | 30 | 91 | 66 | 52 | 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 | 58 | 7 | 0 | 4 | 7 | 4 | 13 | 72 | 103 | 81 | 47 | 45 | 30 | 91 | 66 | 52 | 680 |

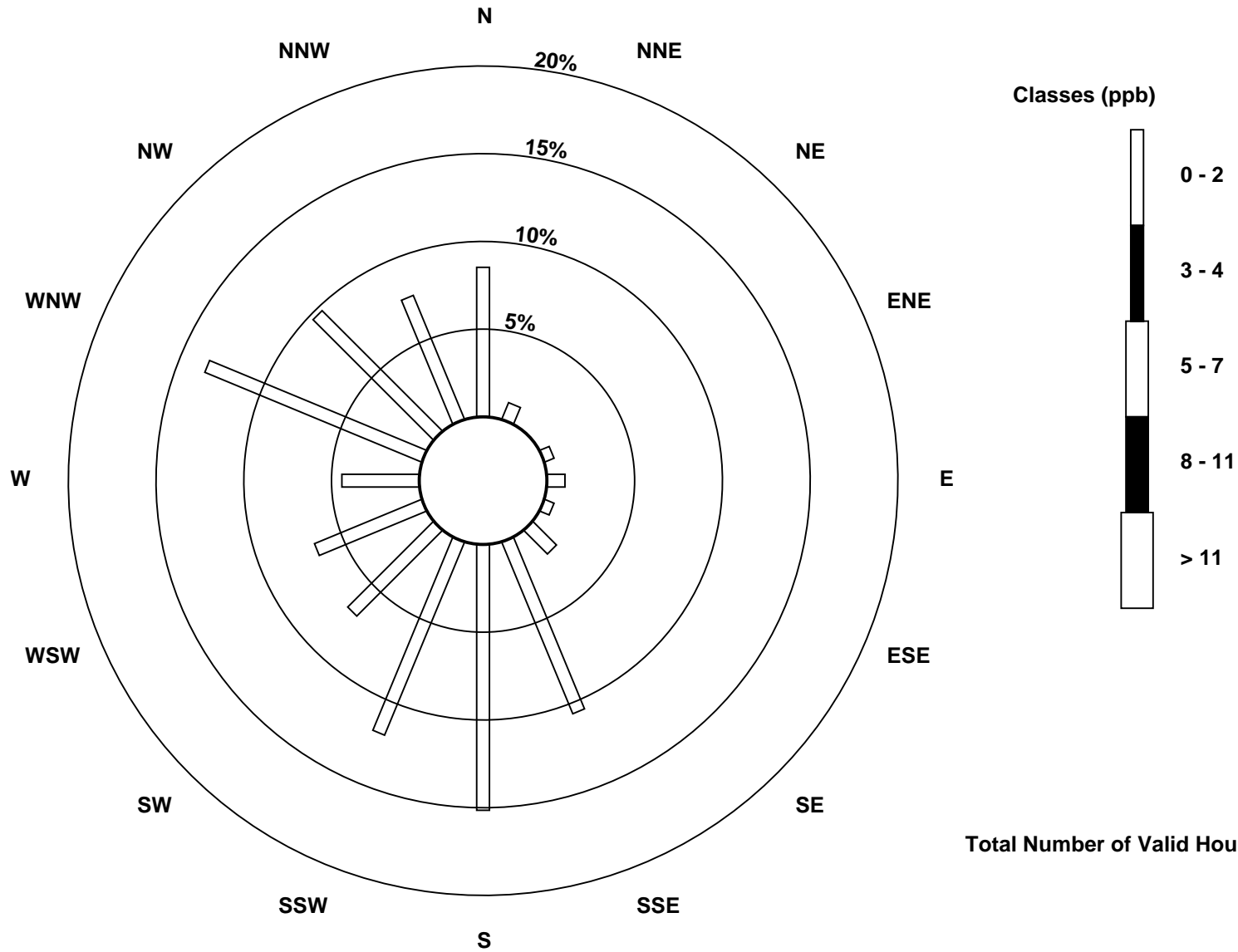
Total Number of Valid Hours: 680

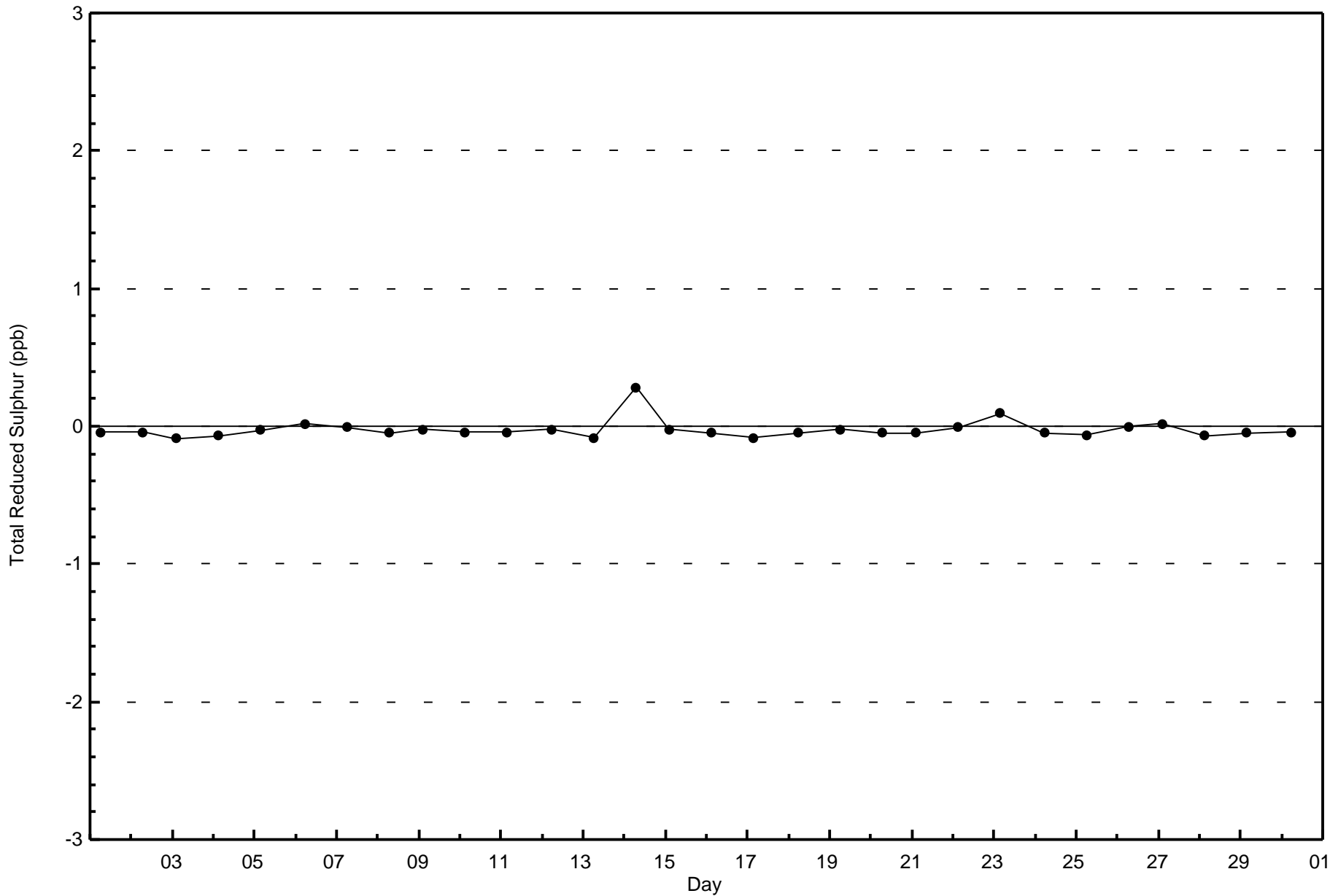
Total Number of Hours: 720

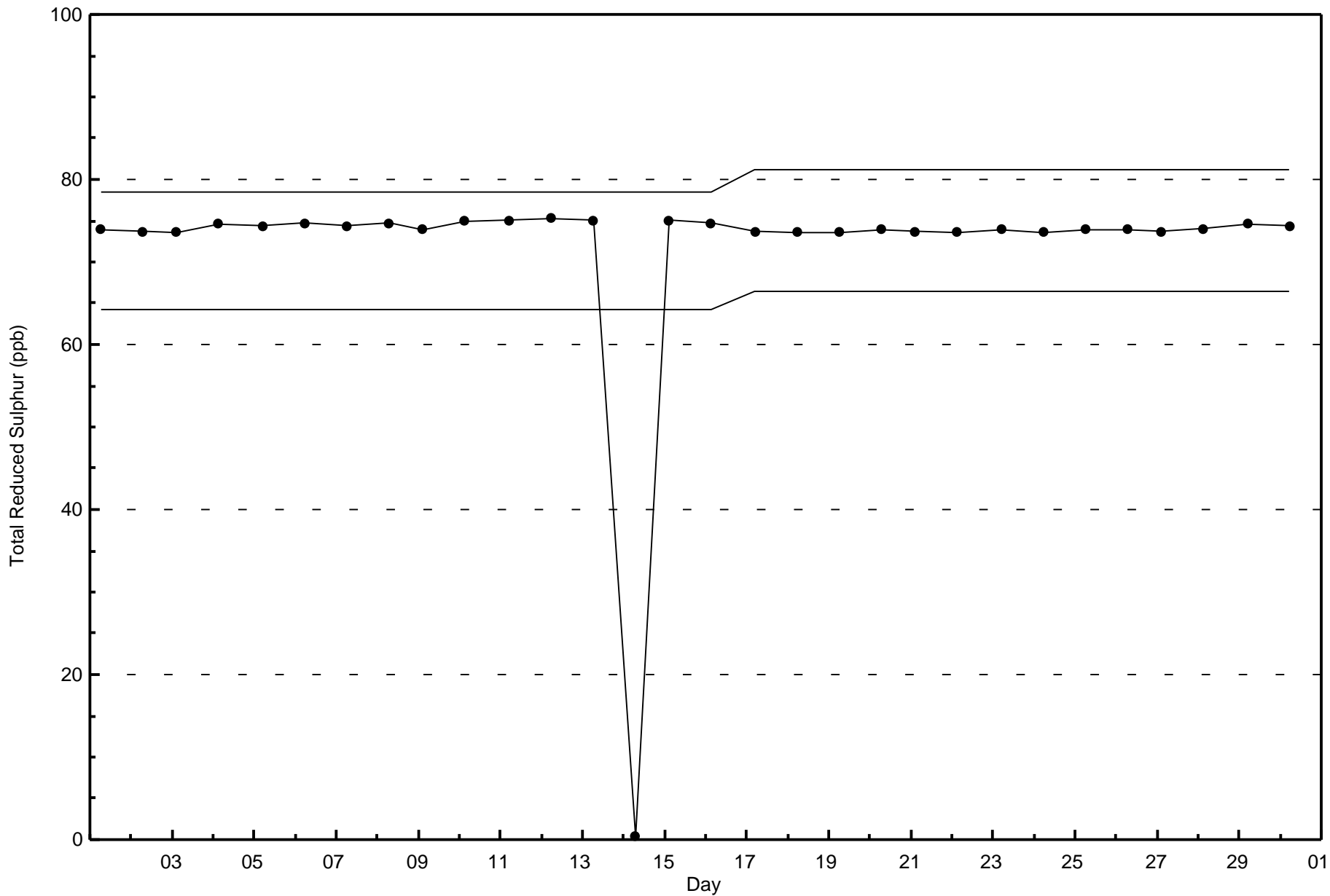


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









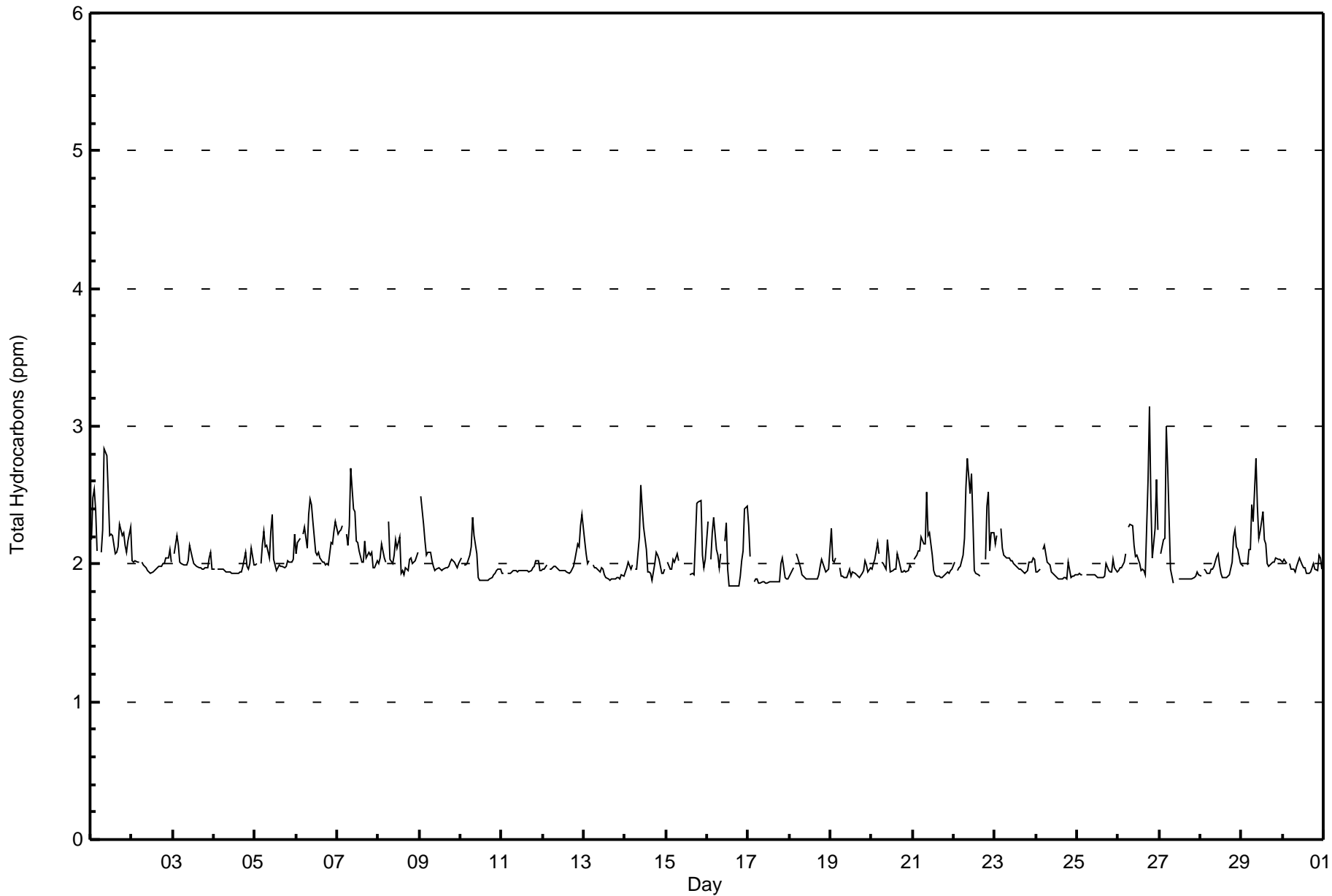
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Fort McKay - Bertha Ganter - September 2016

| Maximum Value: 3.1 ppm on Sep 26 19:00 | | | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------------------------|---------------|---------------|-----|
| Maximum Daily Average: 2.3 ppm on Sep 1 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Data: 679 | | | |
| Minimum Value: 1.8 ppm on Sep 16 14:00 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 41 | | | |
| Minimum Daily Average: 1.9 ppm on Sep 17 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Calibration: 38 | | | |
| Maximum Diurnal Average: 2.1 ppm at hour 9 | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.6 | | | |
| Minimum Diurnal Average: 1.9 ppm at hour 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.04 ppm | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 2.0 Q ₃ = 2.1 P ₉₀ = 2.2 P ₉₉ = 2.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 2.2 | 2.5 | 2.5 | 2.4 | 2.1 | Z | 2.1 | 2.2 | 2.8 | 2.8 | 2.5 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.0 | 2.8 |
| 2-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 |
| 3-Sep | Z | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.2 |
| 4-Sep | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 |
| 5-Sep | 2.0 | 2.0 | Z | 2.0 | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 2.2 | 2.4 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.1 | 2.0 | 2.4 |
| 6-Sep | 2.1 | 2.2 | 2.2 | Z | 2.2 | 2.3 | 2.1 | 2.4 | 2.5 | 2.4 | 2.3 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.1 | 2.2 | 2.3 | 2.2 | 2.0 | 2.5 |
| 7-Sep | 2.2 | 2.2 | 2.3 | 2.3 | Z | 2.2 | 2.1 | 2.3 | 2.7 | 2.4 | 2.4 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.2 | 2.0 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.2 | 2.0 | 2.7 |
| 8-Sep | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | Z | 2.3 | 2.0 | 2.0 | 2.1 | 2.2 | 2.1 | 2.2 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.3 |
| 9-Sep | Z | 2.5 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.5 |
| 10-Sep | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.3 | 2.2 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.3 |
| 11-Sep | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 12-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.3 | 2.4 | 2.0 | 2.0 | 2.4 |
| 13-Sep | 2.2 | 2.1 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 |
| 14-Sep | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.2 | 2.6 | 2.4 | 2.3 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.6 |
| 15-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | C | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 2.2 | 2.4 | 2.5 | 2.5 | 2.1 | 2.0 | 2.0 | -- | 2.5 | |
| 16-Sep | 2.3 | Z | 2.0 | 2.2 | 2.3 | 2.1 | 2.1 | 2.0 | 2.1 | M | 2.2 | 2.3 | 2.0 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 2.1 | 2.4 | 2.4 | 2.1 | 2.4 | |
| 17-Sep | 2.3 | 2.1 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.3 |
| 18-Sep | 1.9 | 1.9 | 2.0 | Z | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 1.9 | 2.1 |
| 19-Sep | 2.3 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.3 |
| 20-Sep | 2.0 | 2.0 | 2.0 | 2.2 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.2 | 2.1 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 |
| 21-Sep | Z | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.5 | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.5 |
| 22-Sep | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.5 | 2.8 | 2.5 | 2.7 | 2.3 | 2.0 | 1.9 | 1.9 | 1.9 | M | M | 2.0 | 2.4 | 2.5 | 2.1 | 2.2 | 2.2 | 2.2 | 2.8 | |
| 23-Sep | 2.1 | 2.2 | Z | 2.3 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.3 |
| 24-Sep | 1.9 | 1.9 | 2.0 | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 25-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | |
| 26-Sep | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | Z | 2.3 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.6 | 3.1 | 2.5 | 2.0 | 2.3 | 2.6 | 2.3 | 2.2 | 3.1 | |
| 27-Sep | Z | 2.1 | 2.2 | 2.2 | 3.0 | 2.7 | 2.0 | 1.9 | 1.9 | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 3.0 | |
| 28-Sep | 1.9 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.2 | |
| 29-Sep | 2.0 | 2.0 | Z | 2.0 | 2.1 | 2.1 | 2.4 | 2.3 | 2.8 | 2.4 | 2.2 | 2.2 | 2.4 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.8 |
| 30-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 |
| 2.0 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.0 2.0 2.0 1.9 1.9 1.9 2.0 2.0 2.0 2.0 2.0 2.1 2.1 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| 2.3 2.5 2.5 2.4 3.0 2.7 2.4 2.5 2.8 2.8 2.7 2.3 2.4 2.2 2.1 2.1 2.2 2.6 3.1 2.5 2.5 2.3 2.6 2.4 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 484 | 71.28 | 71.28 |
| 2.1 - 3.0 | 194 | 28.57 | 99.85 |
| 3.1 - 10.0 | 1 | 0.15 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 679

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 37 | 4 | 0 | 3 | 3 | 3 | 7 | 39 | 54 | 62 | 36 | 35 | 20 | 87 | 53 | 41 | 484 |
| 2.1 - 3.0 | 20 | 1 | 0 | 0 | 3 | 1 | 6 | 37 | 49 | 22 | 7 | 10 | 9 | 7 | 13 | 9 | 194 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 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 | 57 | 5 | 0 | 3 | 6 | 4 | 13 | 76 | 104 | 84 | 43 | 45 | 29 | 94 | 66 | 50 | 679 |

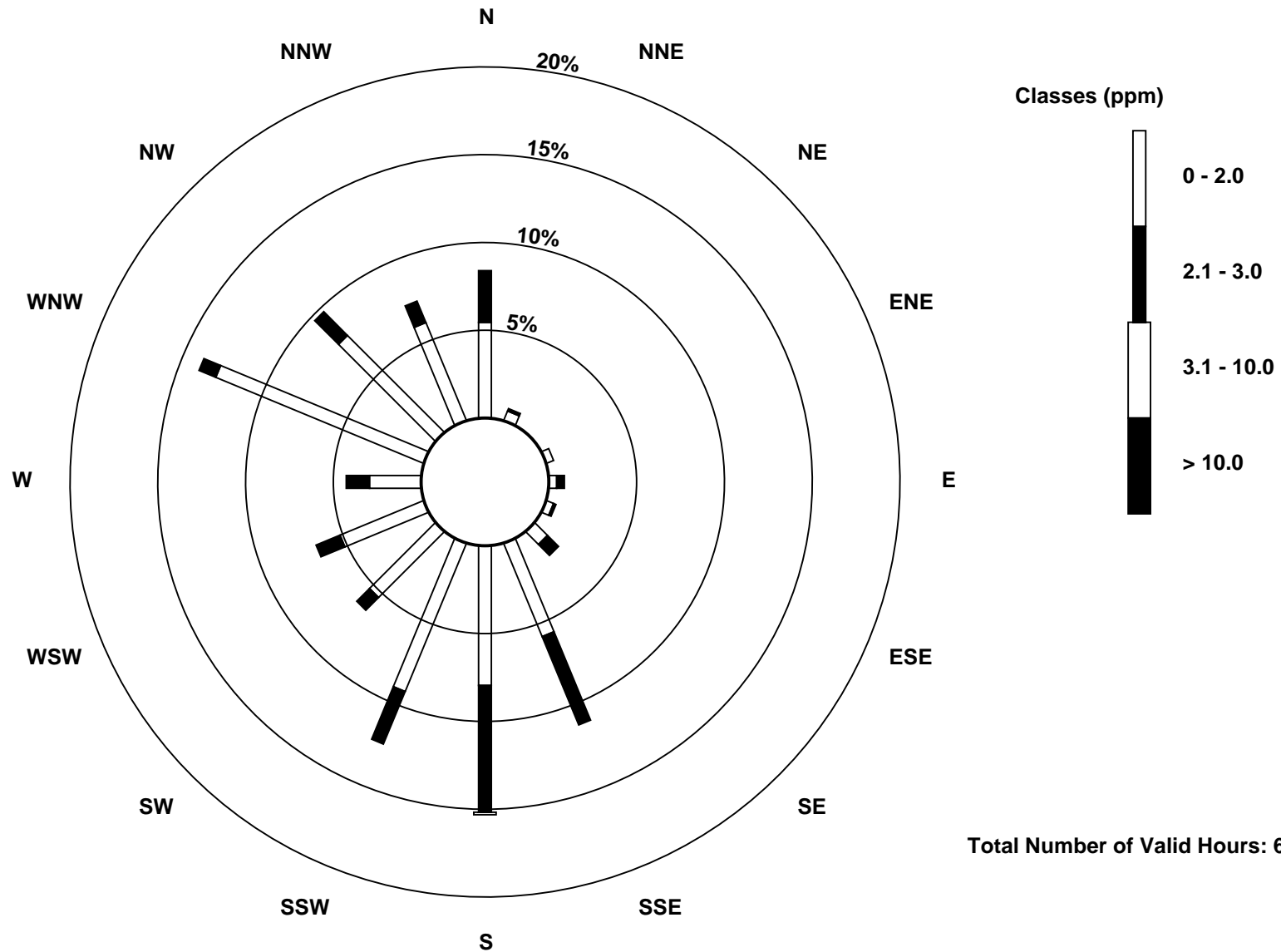
Total Number of Valid Hours: 679

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



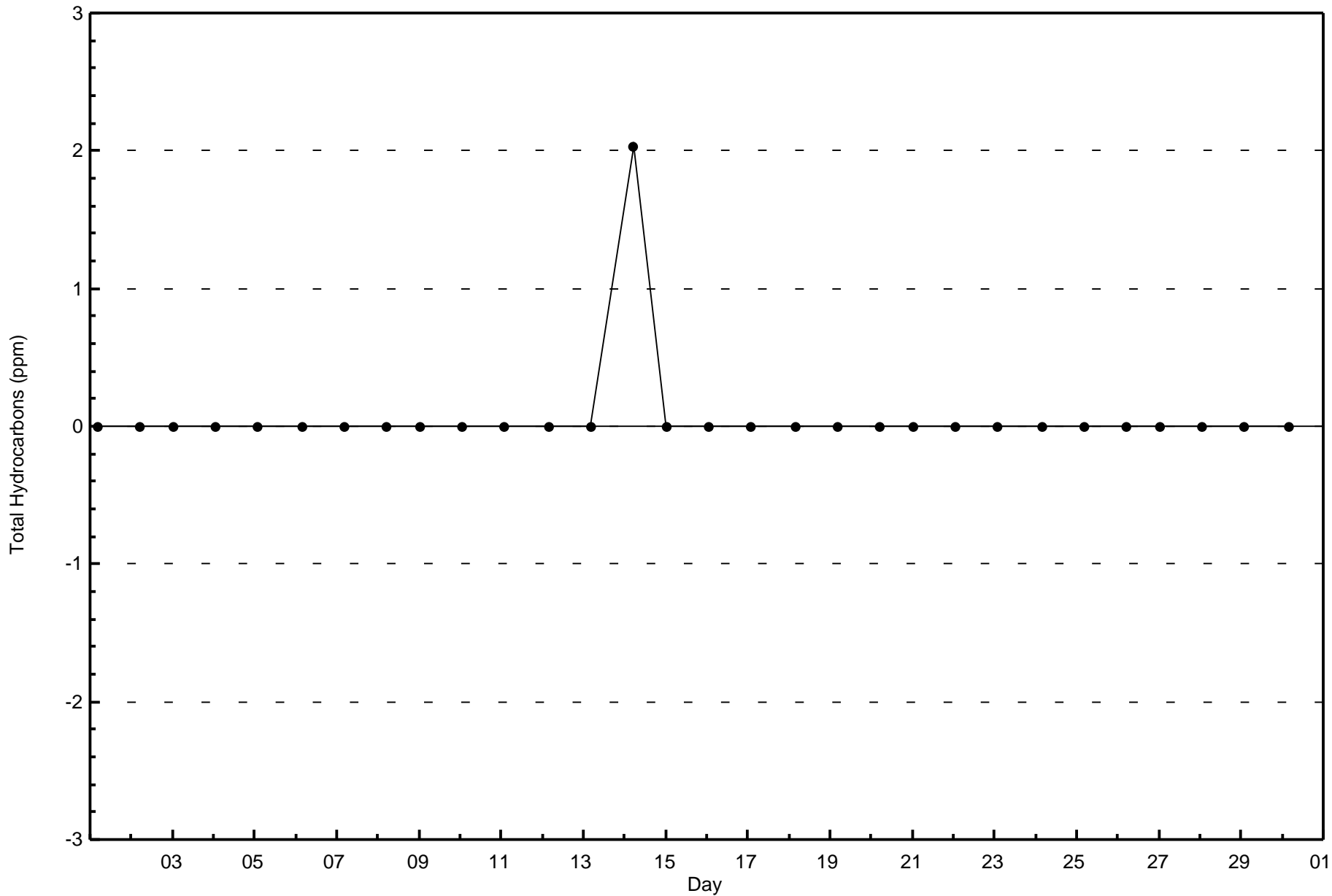
Total Number of Valid Hours: 679

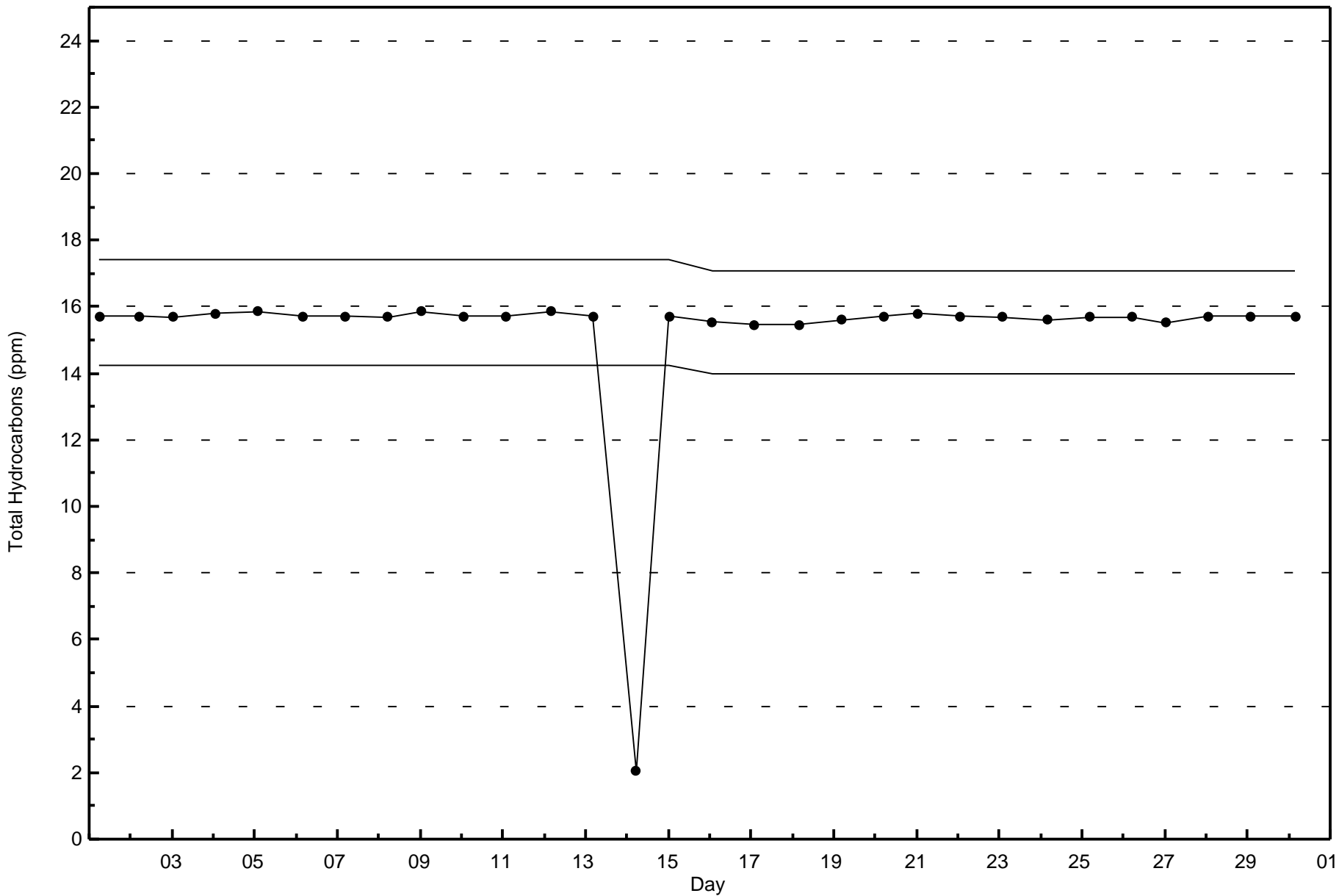


Wood Buffalo Environmental Association

Zero Responses

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





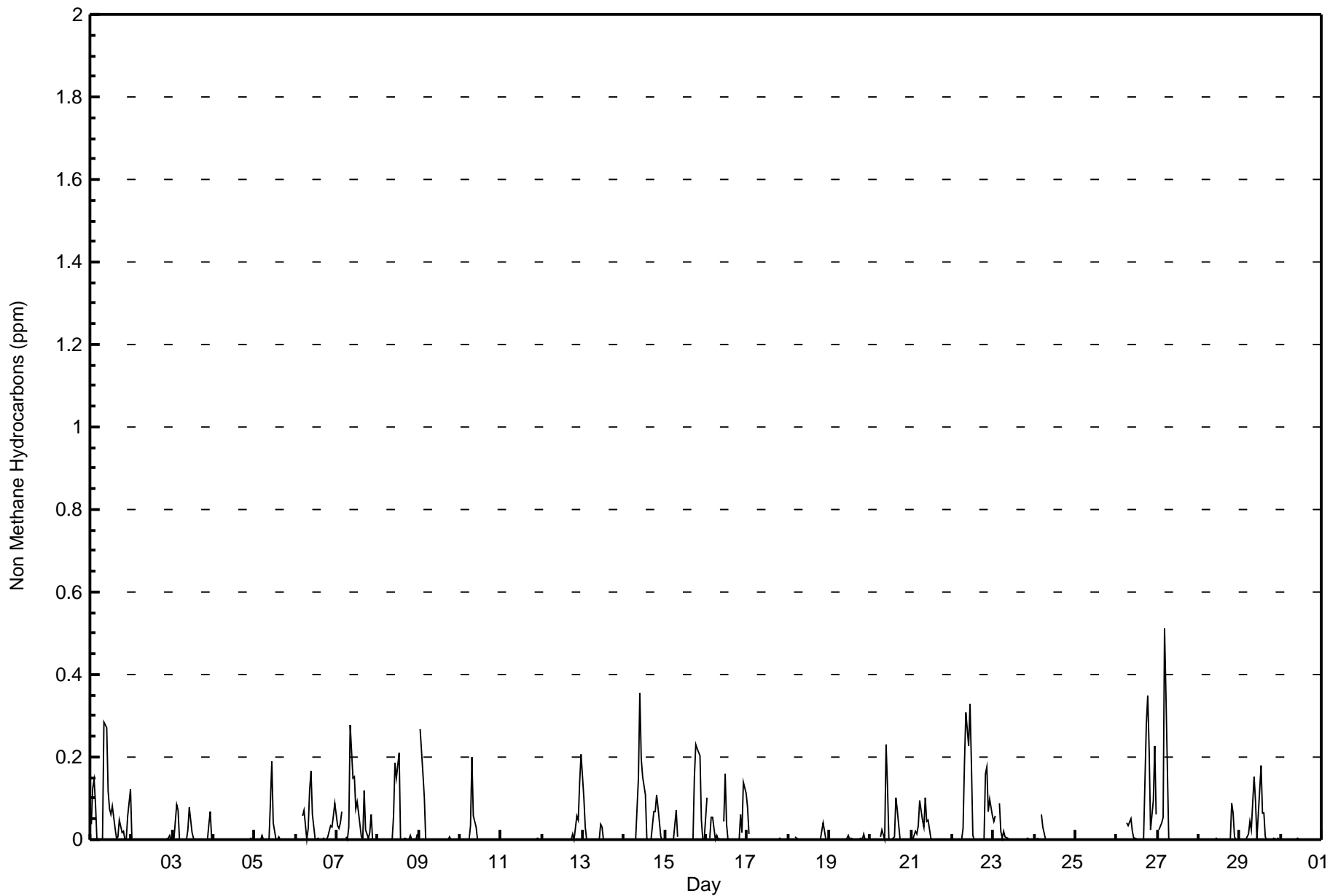


| Maximum Value: 0.512 ppm on Sep 27 05:00 | | | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 0.087 ppm on Sep 22 | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------------------|-------------------------------|-----------------|-------|-------|-------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|---------------|---------------|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|--|
| Minimum Value: 0.000 ppm on Sep 1 05:00 | | | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.000 ppm on Sep 25 | | | | | Hours of Data: 679 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.065 ppm at hour 10 | | | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.004 ppm at hour 15 | | | | | Hours of Missing Data: 41 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.024 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 = 0.3 | | | | | Hours of Calibration: 38 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 0.037 | 0.124 | 0.144 | 0.084 | 0.000 | Z | 0.001 | 0.004 | 0.284 | 0.271 | 0.120 | 0.074 | 0.062 | 0.081 | 0.027 | 0.003 | 0.008 | 0.049 | 0.018 | 0.020 | 0.000 | 0.004 | 0.058 | 0.121 | 0.069 | 0.284 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-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 | 0.002 | 0.009 | 0.000 | 0.000 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | Z | 0.000 | 0.086 | 0.070 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.023 | 0.078 | 0.017 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.038 | 0.068 | 0.000 | 0.017 | 0.086 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-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 | 0.002 | 0.000 | 0.000 | 0.002 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0.000 | 0.000 | Z | 0.000 | 0.009 | 0.002 | 0.000 | 0.000 | 0.000 | 0.093 | 0.189 | 0.042 | 0.000 | 0.000 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.015 | 0.189 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 0.000 | 0.000 | 0.000 | Z | 0.059 | 0.070 | 0.000 | 0.026 | 0.120 | 0.167 | 0.060 | 0.000 | 0.000 | 0.005 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.006 | 0.034 | 0.029 | 0.058 | 0.089 | 0.032 | 0.167 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 0.034 | 0.026 | 0.039 | 0.068 | Z | 0.005 | 0.000 | 0.031 | 0.277 | 0.148 | 0.152 | 0.076 | 0.091 | 0.063 | 0.006 | 0.004 | 0.118 | 0.024 | 0.002 | 0.018 | 0.062 | 0.000 | 0.000 | 0.000 | 0.054 | 0.277 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.059 | 0.187 | 0.148 | 0.209 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.002 | 0.009 | 0.000 | 0.000 | 0.000 | 0.012 | 0.027 | 0.209 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 0.267 | 0.159 | 0.103 | 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 | 0.008 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.023 | 0.267 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.001 | 0.035 | 0.200 | 0.057 | 0.032 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.014 | 0.200 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-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 | 0.005 | 0.000 | 0.000 | 0.000 | 0.005 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-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 | 0.014 | 0.000 | 0.057 | 0.049 | 0.138 | 0.207 | 0.020 | 0.207 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0.102 | 0.029 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.037 | 0.031 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 | 0.102 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.150 | 0.355 | 0.197 | 0.151 | 0.107 | 0.003 | 0.000 | 0.000 | 0.000 | 0.069 | 0.069 | 0.108 | 0.077 | 0.006 | 0.000 | 0.000 | 0.056 | 0.355 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.071 | 0.006 | C | C | C | C | C | C | 0.000 | 0.000 | 0.000 | 0.151 | 0.231 | 0.220 | 0.203 | 0.047 | 0.000 | 0.000 | -- | 0.231 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 0.102 | Z | 0.003 | 0.056 | 0.054 | 0.001 | 0.012 | 0.000 | 0.002 | M | 0.045 | 0.161 | 0.039 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.061 | 0.017 | 0.138 | 0.113 | 0.036 | 0.161 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 0.076 | 0.015 | 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 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.076 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0.000 | 0.000 | 0.000 | Z | 0.006 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.039 | 0.020 | 0.000 | 0.000 | 0.003 | 0.039 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0.000 | 0.000 | 0.002 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.010 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.004 | 0.000 | 0.014 | 0.000 | 0.000 | 0.000 | 0.002 | 0.014 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 0.000 | 0.000 | 0.000 | 0.001 | 0.002 | Z | 0.005 | 0.024 | 0.000 | 0.229 | 0.127 | 0.000 | 0.000 | 0.003 | 0.006 | 0.102 | 0.072 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.025 | 0.229 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 0.000 | 0.019 | 0.012 | 0.035 | 0.095 | 0.049 | 0.030 | 0.101 | 0.045 | 0.048 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.019 | 0.101 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.001 | 0.029 | 0.184 | 0.308 | 0.228 | 0.329 | 0.180 | 0.009 | 0.000 | 0.000 | 0.000 | M | M | 0.000 | 0.160 | 0.175 | 0.069 | 0.098 | 0.059 | 0.087 | 0.329 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0.043 | 0.059 | Z | 0.087 | 0.019 | 0.004 | 0.019 | 0.007 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.002 | 0.000 | 0.000 | 0.011 | 0.087 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0.000 | 0.000 | 0.003 | Z | 0.059 | 0.030 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.059 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-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 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.040 | 0.035 | 0.052 | 0.022 | 0.002 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.282 | 0.351 | 0.218 | 0.023 | 0.095 | 0.227 | 0.062 | 0.061 | 0.351 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 0.025 | 0.042 | 0.055 | 0.512 | 0.354 | 0.005 | 0.000 | 0.000 | C | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.047 | 0.512 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.087 | 0.064 | 0.006 | 0.002 | 0.000 | 0.007 | 0.087 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 0.000 | 0.000 | Z | 0.000 | 0.007 | 0.013 | 0.044 | 0.023 | 0.153 | 0.095 | 0.004 | 0.060 | 0.179 | 0.064 | 0.065 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.004 | 0.000 | 0.031 | 0.179 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.016 | 0.022 | 0.020 | 0.021 | 0.029 | 0.024 | 0.010 | 0.019 | 0.052 | 0.065 | 0.057 | 0.033 | 0.024 | 0.008 | 0.004 | 0.004 | 0.007 | 0.020 | 0.023 | 0.028 | 0.027 | 0.013 | 0.027 | 0.022 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.102 | 0.267 | 0.159 | 0.103 | 0.512 | 0.354 | 0.071 | 0.200 | 0.308 | 0.355 | 0.329 | 0.180 | 0.209 | 0.081 | 0.065 | 0.102 | 0.118 | 0.282 | 0.351 | 0.220 | 0.203 | 0.095 | 0.227 | 0.207 | Diurnal Maximum | |
| Z - zerospan | | C - Calibration | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 500 | 73.64 | 73.64 |
| 0.006 - 0.05 | 77 | 11.34 | 84.98 |
| 0.06 - 0.1 | 66 | 9.72 | 94.70 |
| > 0.1 | 36 | 5.30 | 100.00 |

Total Number of Valid Hours: 679

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 41 | 4 | 0 | 3 | 1 | 3 | 8 | 42 | 54 | 63 | 39 | 36 | 23 | 85 | 53 | 45 | 500 |
| 0.006 - 0.05 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 10 | 20 | 15 | 2 | 6 | 3 | 5 | 7 | 4 | 77 |
| 0.06 - 0.1 | 9 | 1 | 0 | 0 | 3 | 1 | 2 | 14 | 18 | 5 | 2 | 1 | 3 | 4 | 3 | 0 | 66 |
| > 0.1 | 4 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | 12 | 1 | 0 | 2 | 0 | 0 | 3 | 1 | 36 |
| Totals | 57 | 5 | 0 | 3 | 6 | 4 | 13 | 76 | 104 | 84 | 43 | 45 | 29 | 94 | 66 | 50 | 679 |

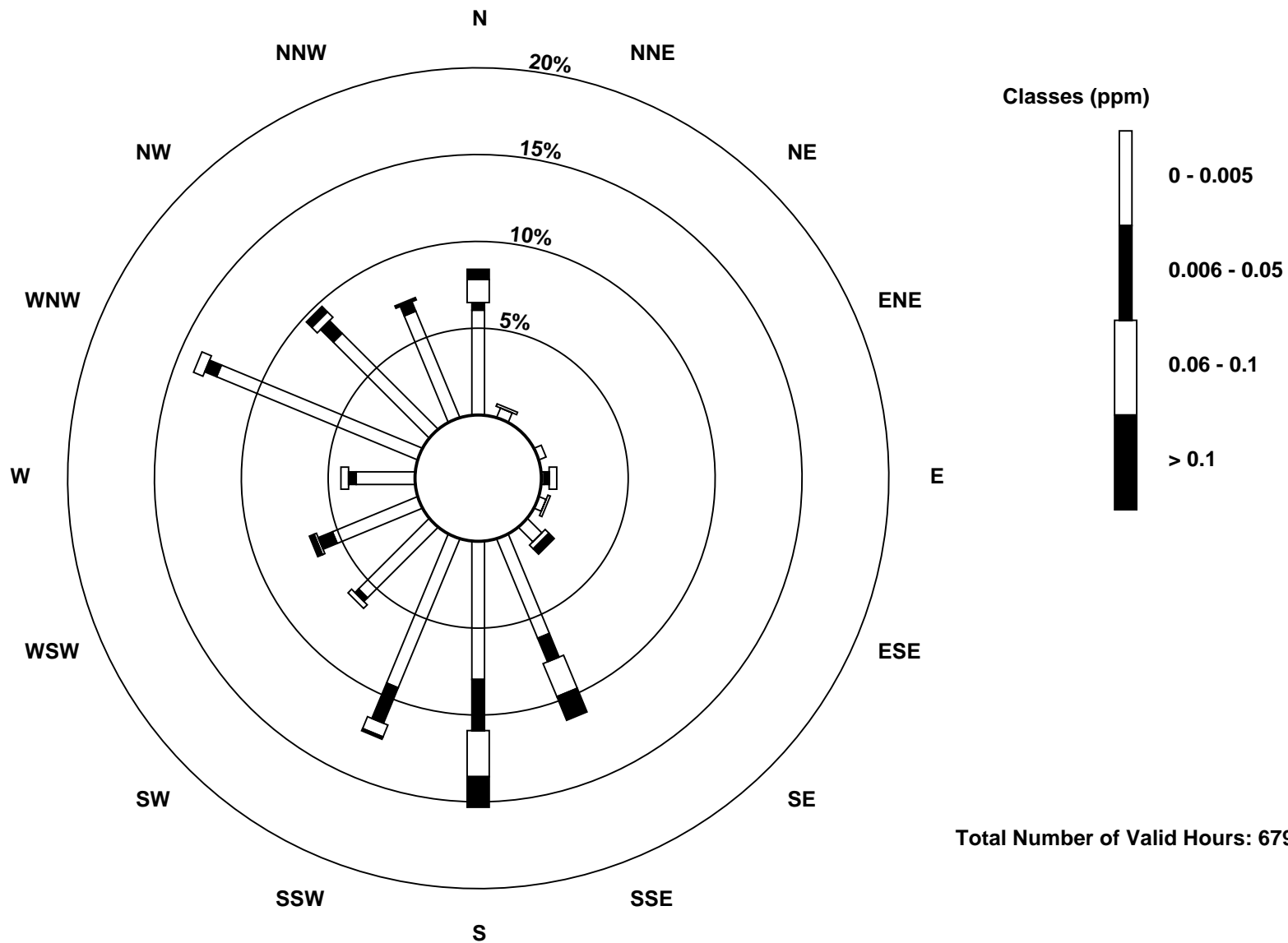
Total Number of Valid Hours: 679

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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

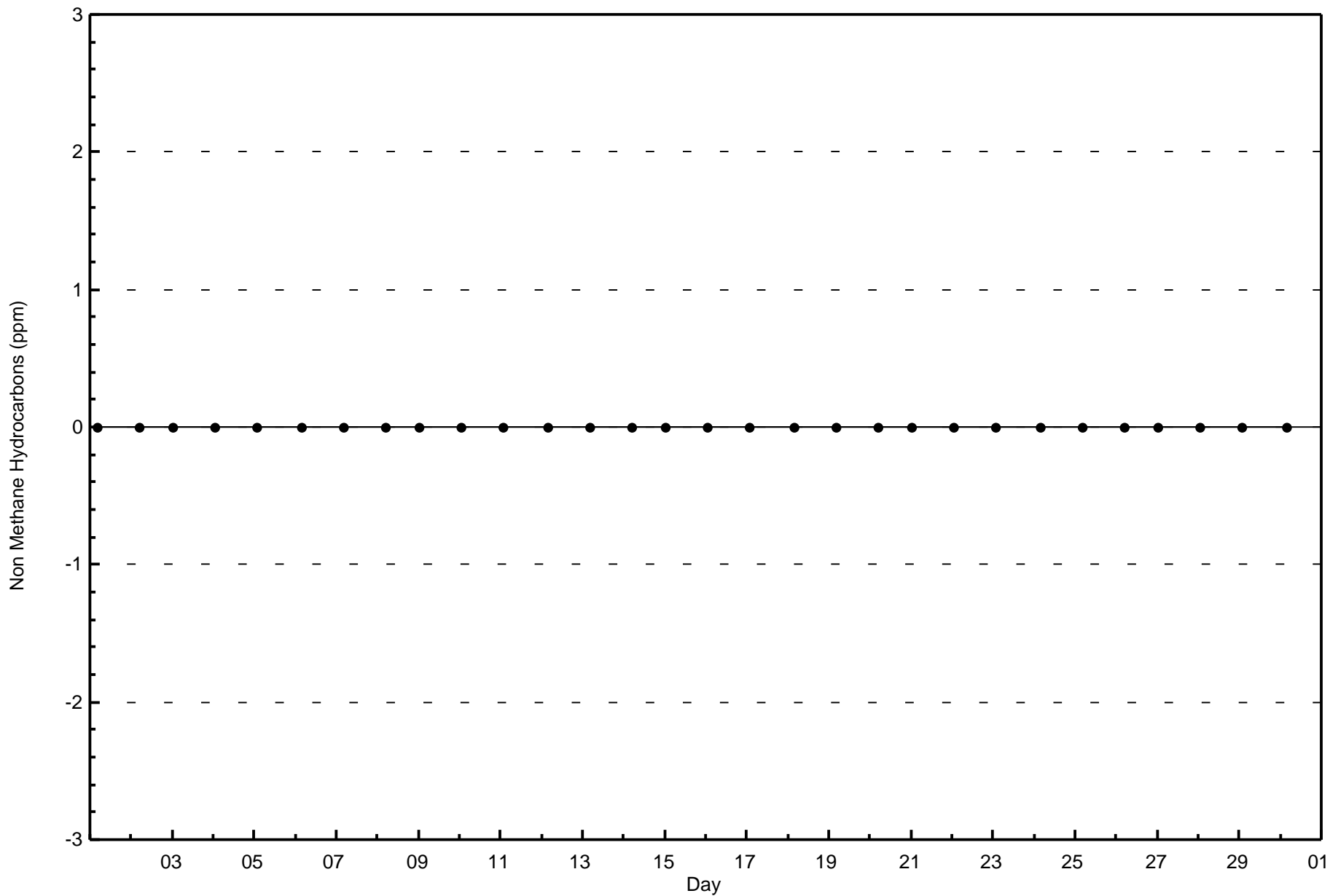


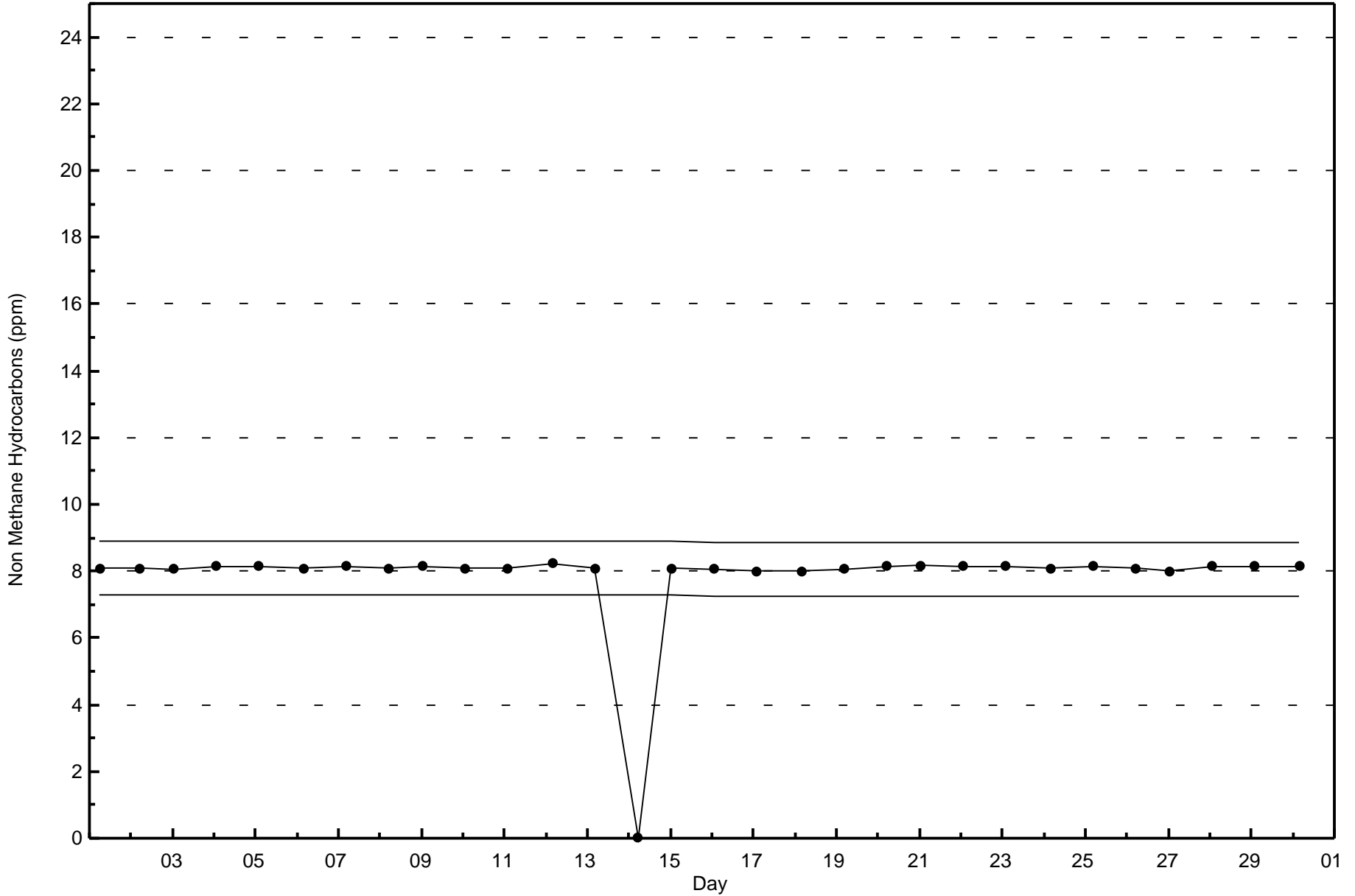
Total Number of Valid Hours: 679

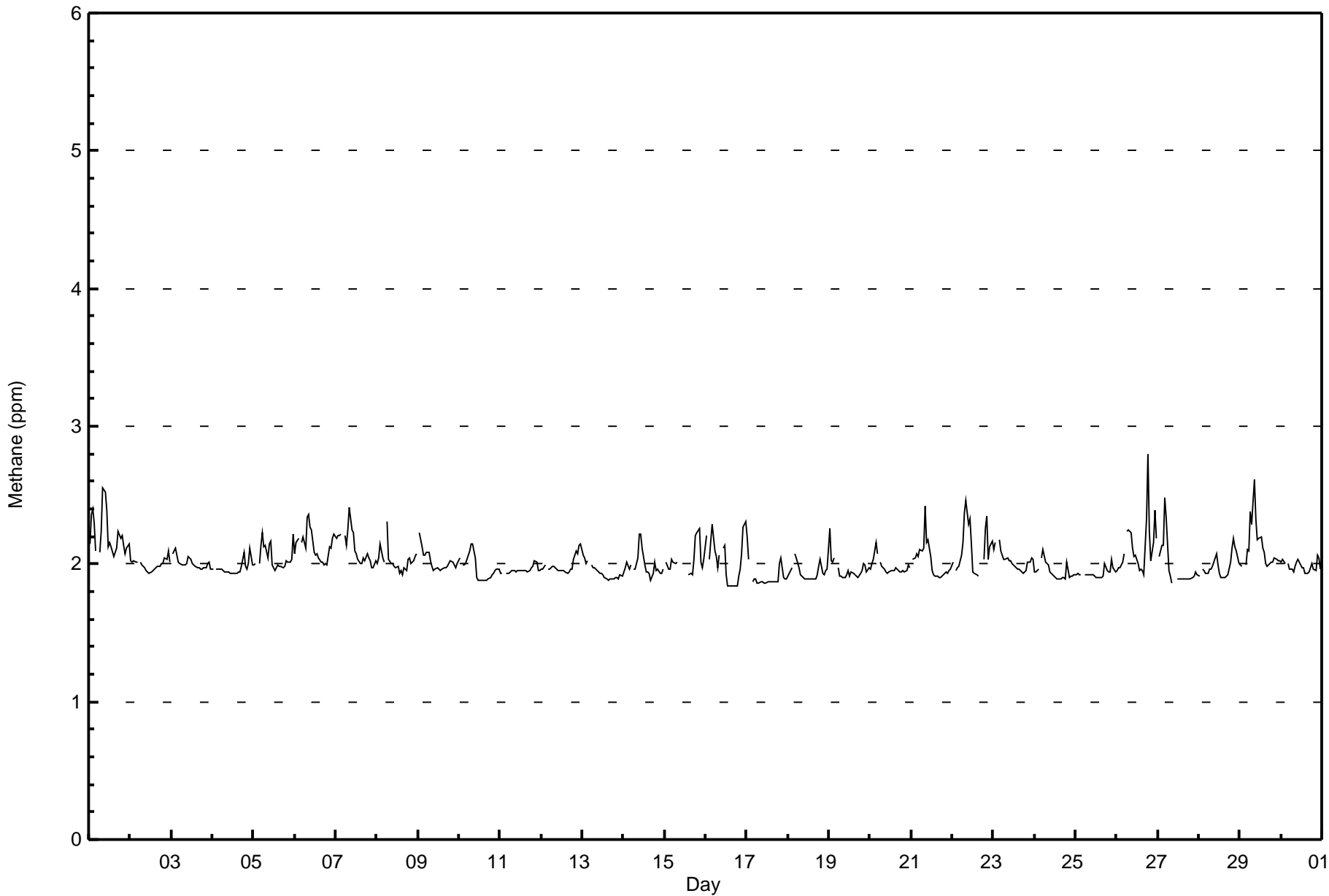


Wood Buffalo Environmental Association
Zero Responses

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









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 511 | 75.26 | 75.26 |
| 2.1 - 3.0 | 168 | 24.74 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 679

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 41 | 4 | 0 | 3 | 5 | 4 | 9 | 44 | 58 | 64 | 37 | 37 | 21 | 88 | 55 | 41 | 511 |
| 2.1 - 3.0 | 16 | 1 | 0 | 0 | 1 | 0 | 4 | 32 | 46 | 20 | 6 | 8 | 8 | 6 | 11 | 9 | 168 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 57 | 5 | 0 | 3 | 6 | 4 | 13 | 76 | 104 | 84 | 43 | 45 | 29 | 94 | 66 | 50 | 679 |

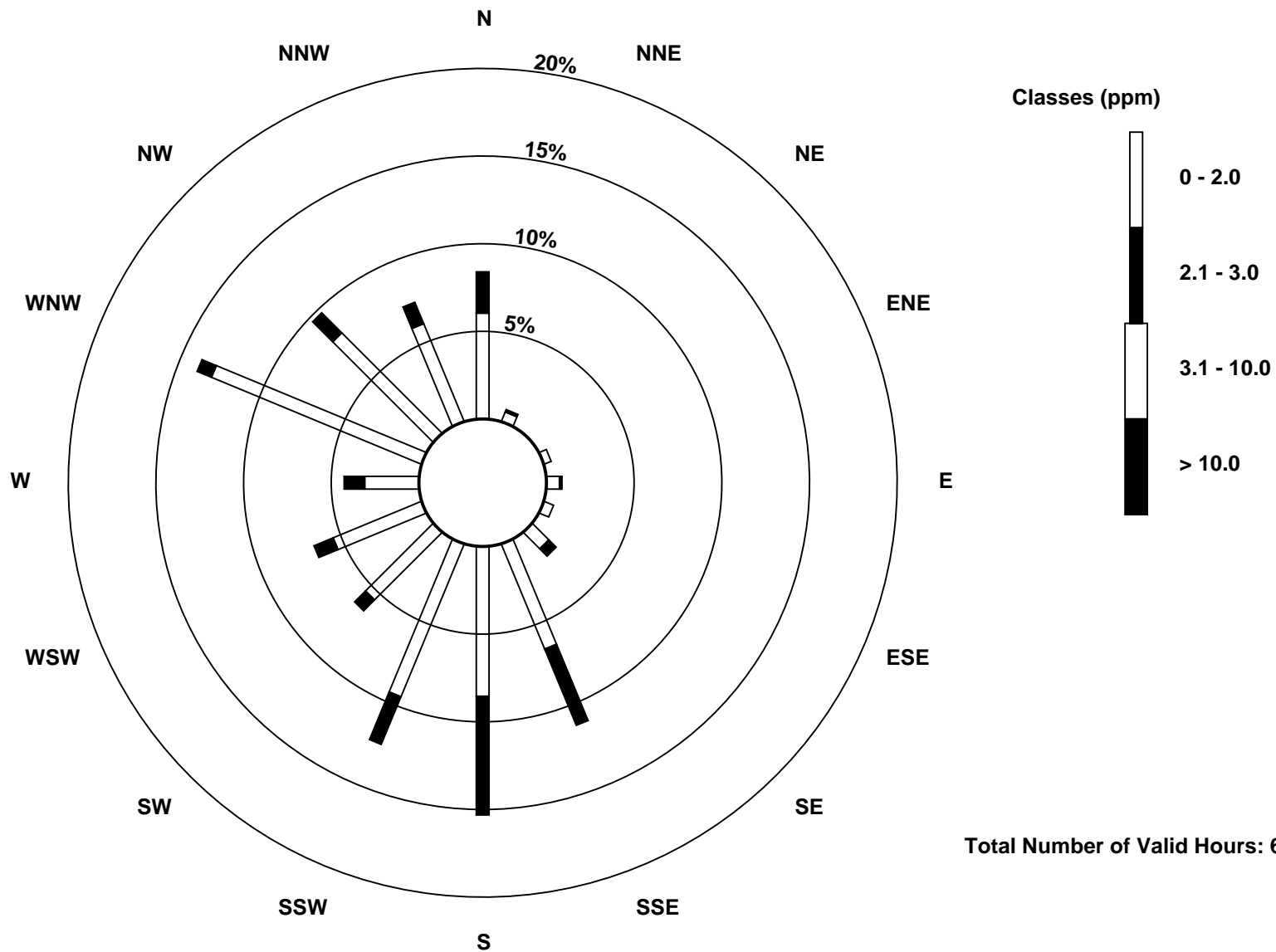
Total Number of Valid Hours: 679

Total Number of Hours: 720

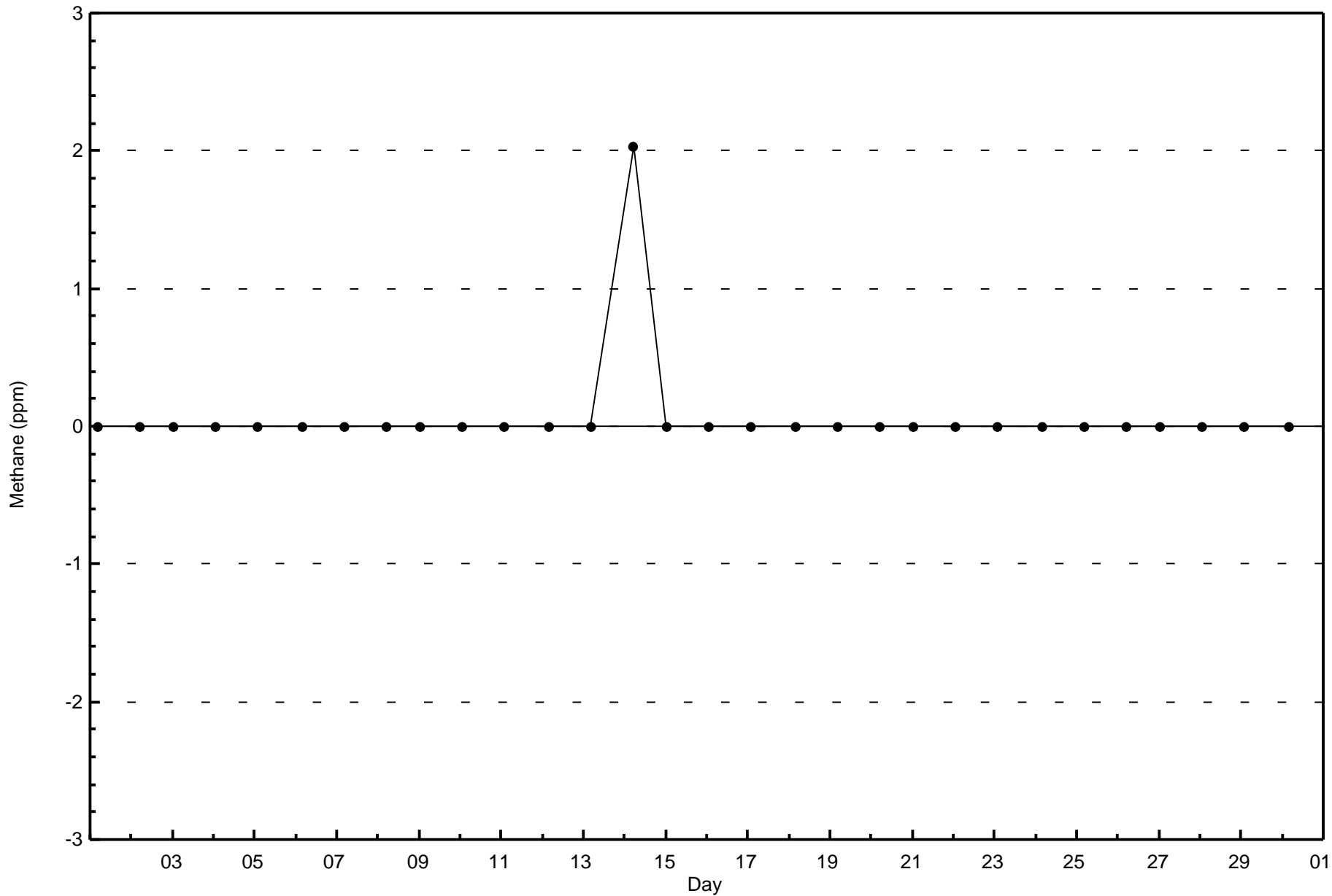


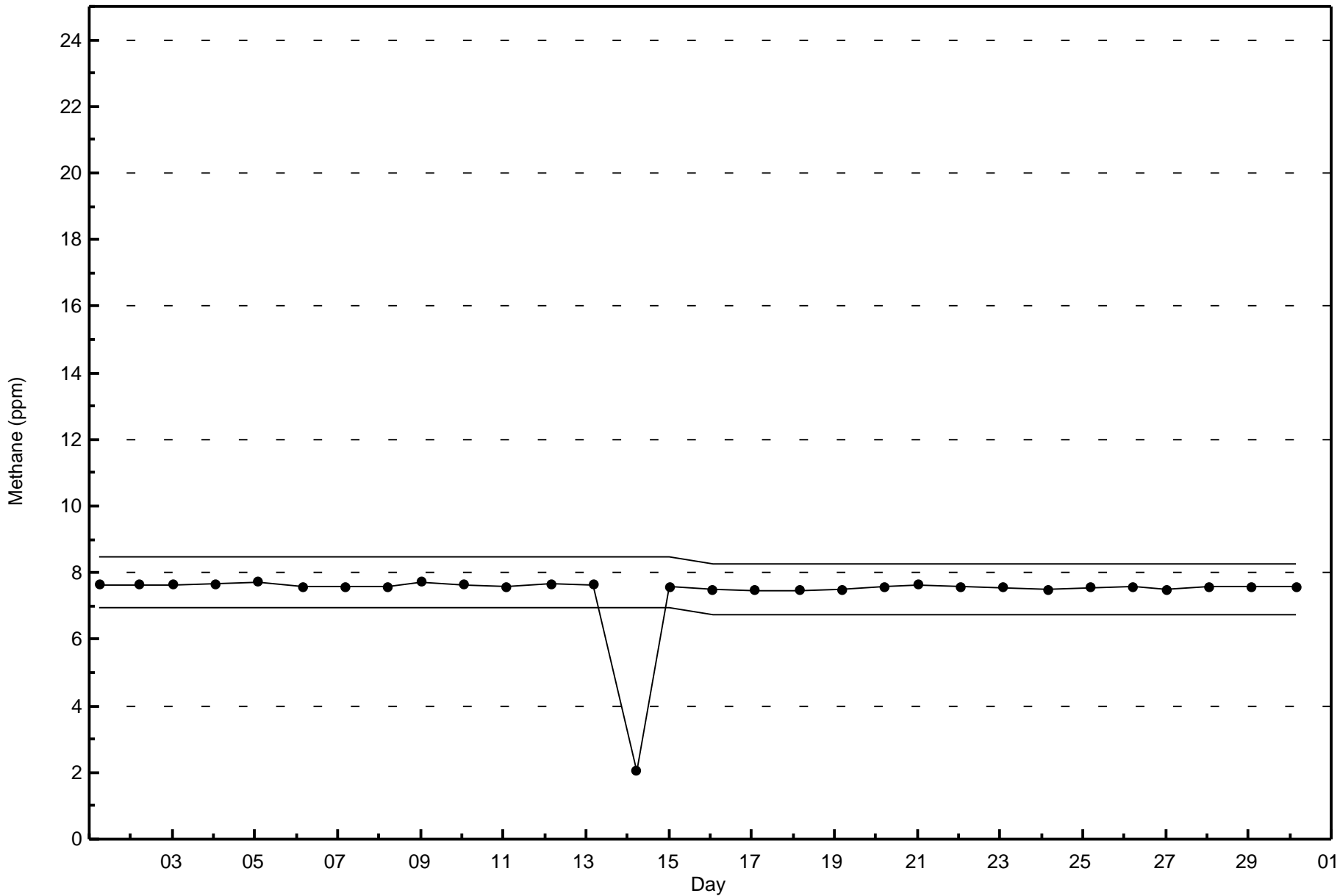
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 679







Summary of Hour Averages

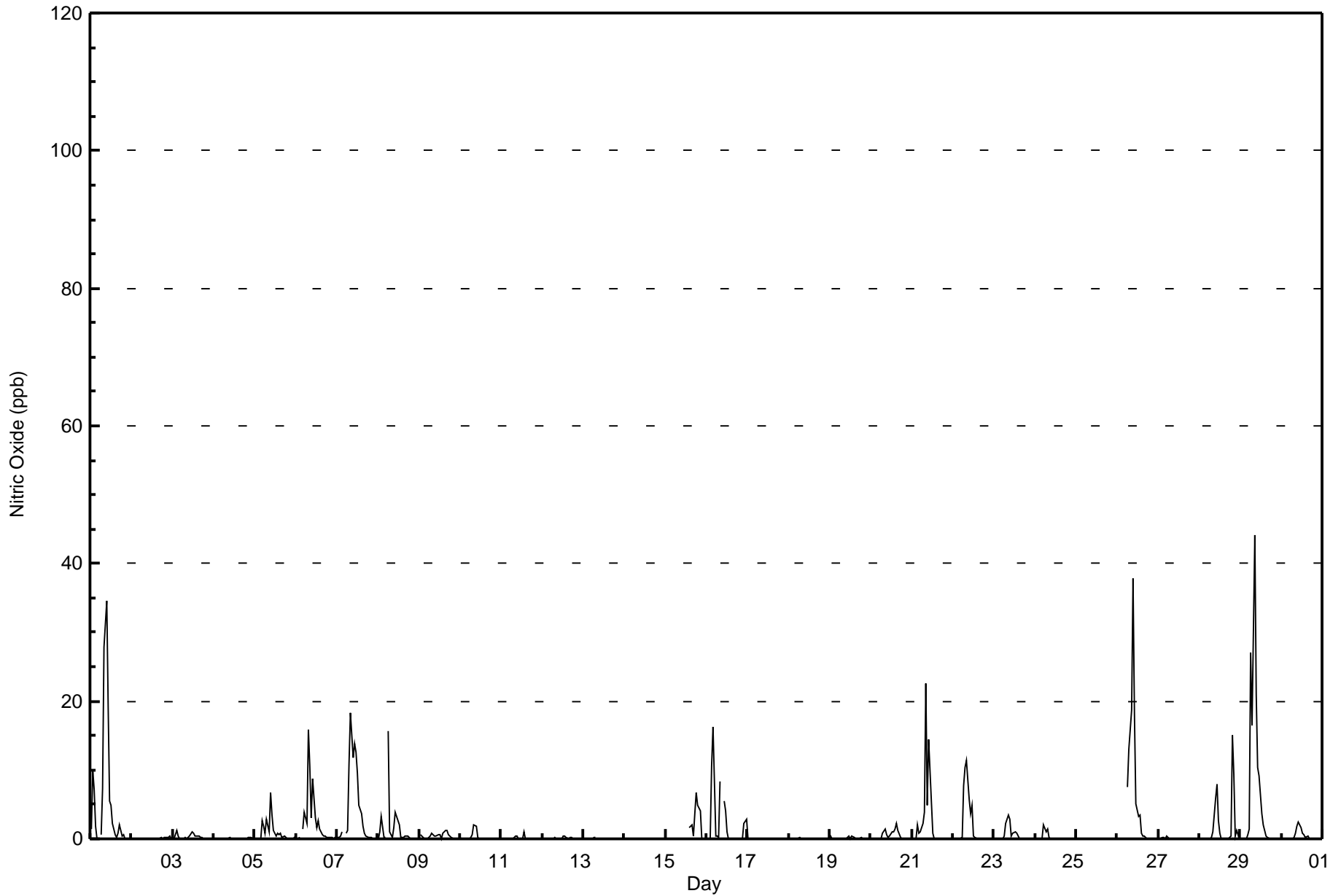
Fort McKay - Bertha Ganter - September 2016

| | | |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 44 ppb on Sep 29 09:00 | Maximum Daily Average: 6.0 ppb on Sep 29 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 2 02:00 | Minimum Daily Average: 0.0 ppb on Sep 25 | Hours of Data: 631 |
| Maximum Diurnal Average: 6.4 ppb at hour 9 | Minimum Diurnal Average: 0.0 ppb at hour 22 | Hours of Missing Data: 89 |
| Monthly Average: 1.4 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 19 | Hours of Calibration: 39 |
| | | Percent Operational Time: 93.1 |

| 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 | 10 | 7 | 2 | 0 | Z | 1 | 7 | 28 | 35 | 19 | 5 | 5 | 2 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 5.5 | 35 |
| 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | 3 | 2 | 1 | 3 | 1 | 7 | 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 7 |
| 6-Sep | 0 | 0 | 0 | Z | 1 | 4 | 2 | 16 | 11 | 3 | 9 | 3 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 16 |
| 7-Sep | 0 | 0 | 0 | 1 | Z | 1 | 1 | 11 | 18 | 12 | 14 | 13 | 10 | 5 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.0 | 18 |
| 8-Sep | 0 | 1 | 3 | 0 | 0 | Z | 16 | 1 | 0 | 2 | 4 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 16 |
| 9-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |
| 11-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 | 0.1 | 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 | C | M | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | 0 |
| 14-Sep | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | -- |
| 15-Sep | M | M | M | M | M | M | M | M | M | C | C | C | C | C | 2 | 2 | 0 | 4 | 7 | 5 | 4 | 0 | 0 | 0 | -- | 7 |
| 16-Sep | 0 | Z | 0 | 11 | 16 | 0 | 0 | 0 | 8 | M | 6 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2.4 | 16 |
| 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 21-Sep | Z | 0 | 0 | 2 | 1 | 1 | 2 | 4 | 22 | 5 | 15 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 22 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 8 | 10 | 11 | 6 | 4 | 5 | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 11 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |
| 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 | 0 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 8 | 13 | 19 | 38 | 18 | 5 | 3 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.7 | 38 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 8 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 9 | 0 | 1 | 2.0 | 15 |
| 29-Sep | 0 | 0 | Z | 0 | 1 | 1 | 27 | 16 | 44 | 21 | 10 | 9 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.0 | 44 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.1 | 0.5 | 0.5 | 0.7 | 0.9 | 0.5 | 2.4 | 3.2 | 6.4 | 5.5 | 4.4 | 2.4 | 1.3 | 0.8 | 0.5 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.8 | 0.5 | 0.0 | 0.2 | 0.1 | Diurnal Average | |
| 2 | 10 | 7 | 11 | 16 | 4 | 27 | 16 | 44 | 38 | 19 | 13 | 10 | 5 | 4 | 2 | 1 | 4 | 7 | 15 | 9 | 0 | 2 | 3 | Diurnal Maximum | | |

Z - zerospan C - Calibration M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 624 | 98.89 | 98.89 |
| 21 - 40 | 6 | 0.95 | 99.84 |
| 41 - 80 | 1 | 0.16 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 631

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 53 | 5 | 0 | 3 | 6 | 4 | 12 | 70 | 99 | 76 | 38 | 38 | 27 | 85 | 58 | 50 | 624 |
| 21 - 40 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 6 |
| 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 | 55 | 5 | 0 | 3 | 6 | 4 | 12 | 72 | 101 | 76 | 38 | 39 | 27 | 85 | 58 | 50 | 631 |

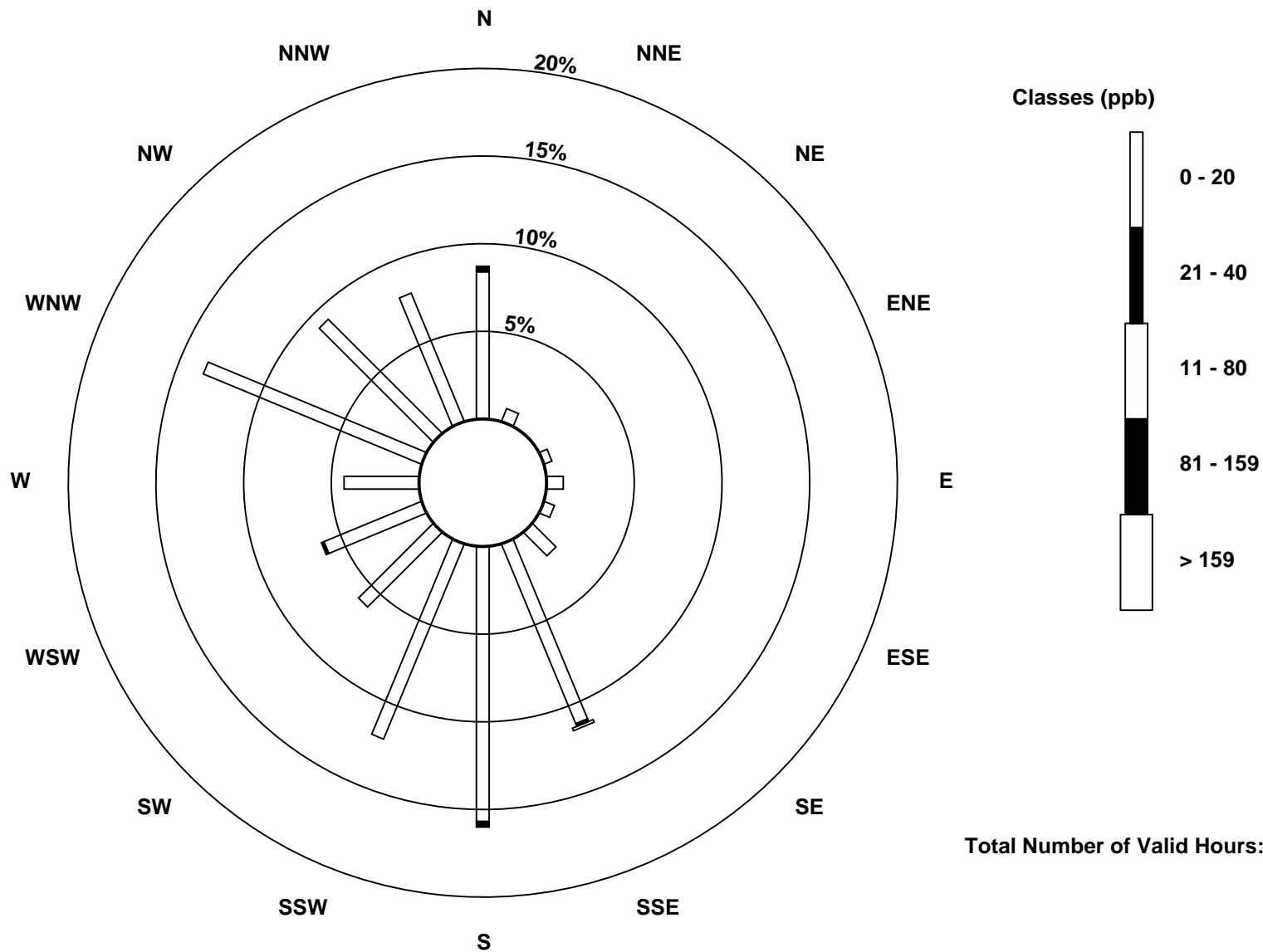
Total Number of Valid Hours: 631

Total Number of Hours: 720

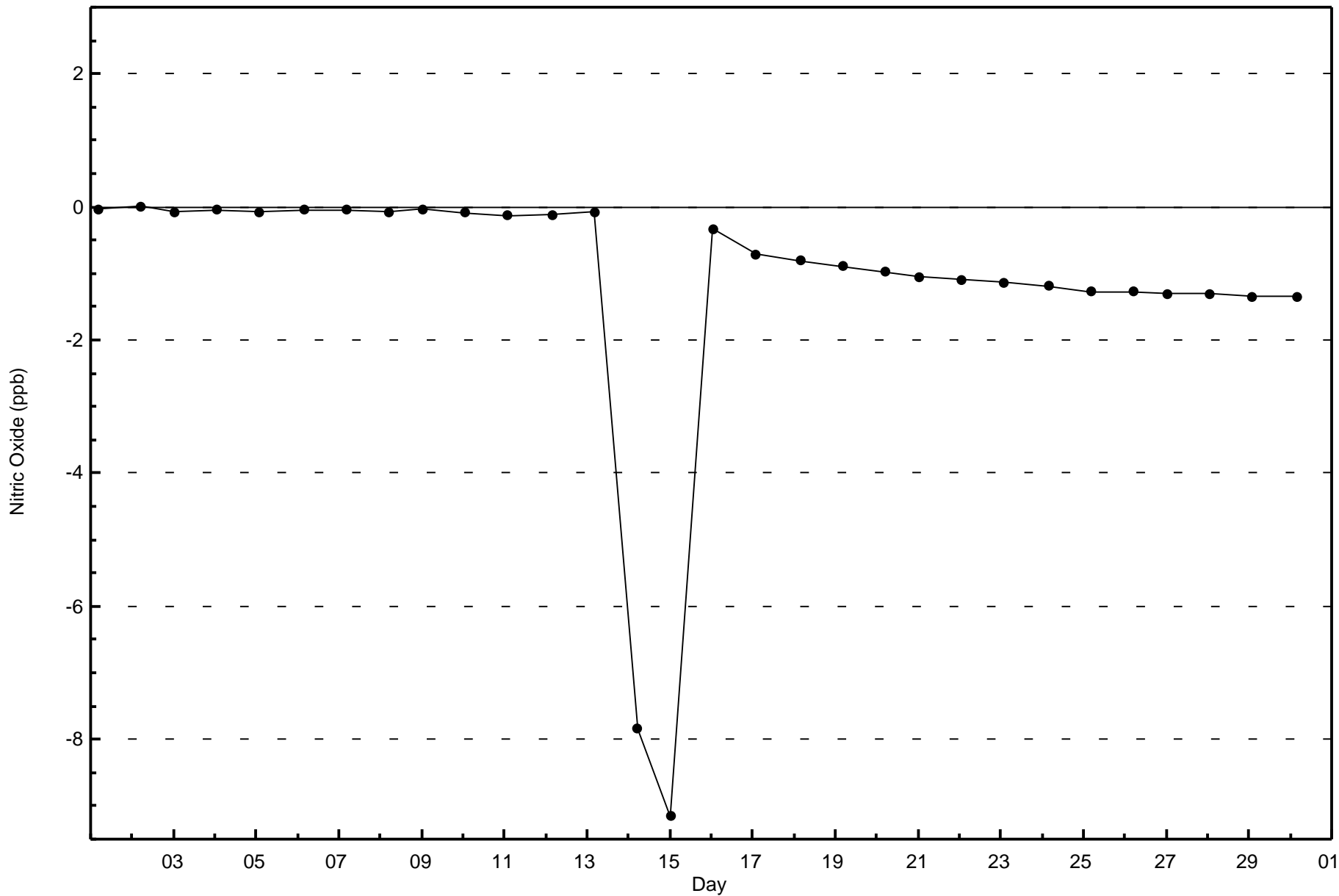


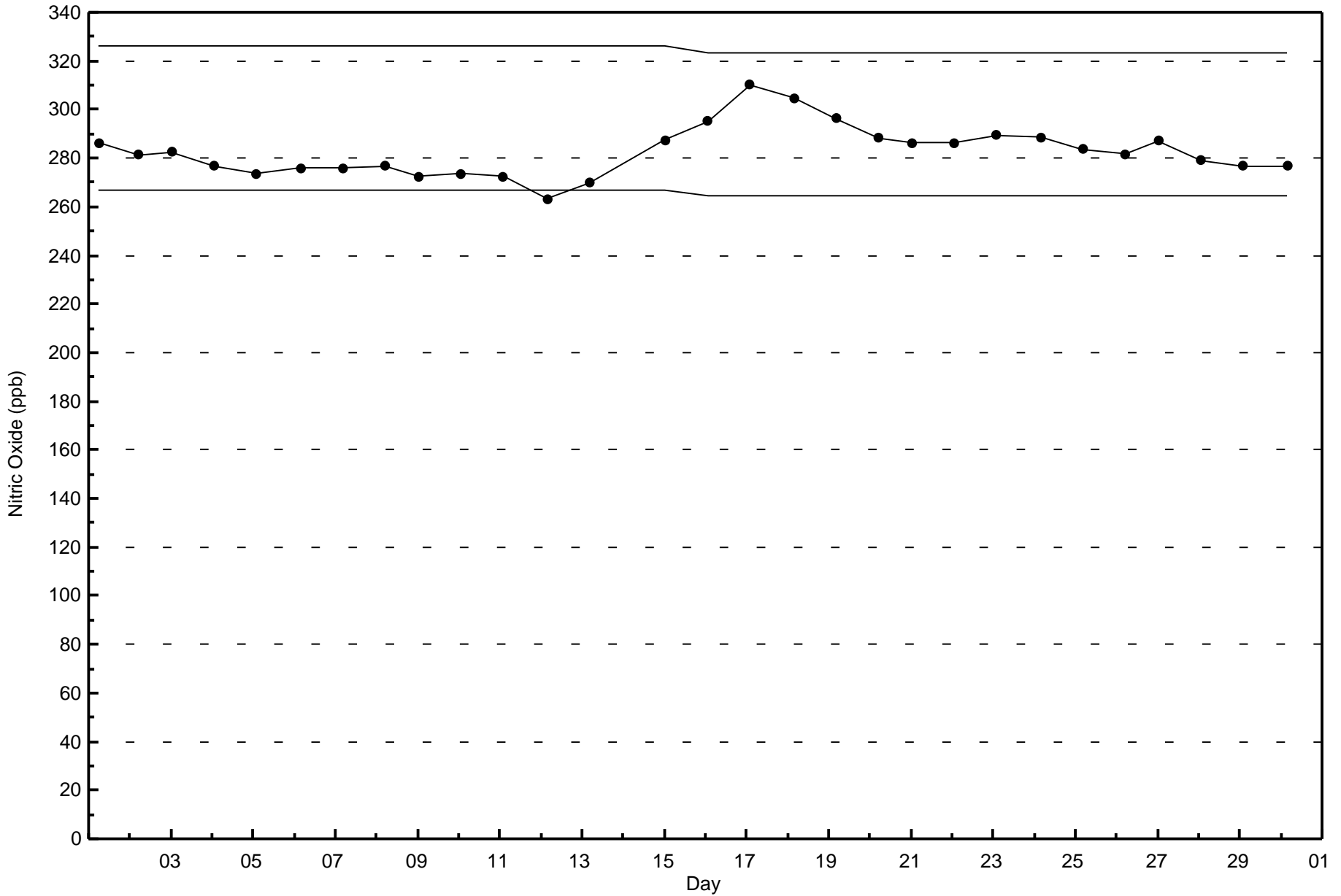
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 631







| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 27 ppb on Sep 28 20:00 | Maximum Daily Average: 7.0 ppb on Sep 29 |
| Minimum Value: 0 ppb on Sep 2 05:00 | Hours of Data: 631 |
| Maximum Diurnal Average: 4.2 ppb at hour 20 | Hours of Missing Data: 89 |
| Monthly Average: 3.0 ppb | Hours of Calibration: 39 |
| Minimum Daily Average: 0.2 ppb on Sep 2 | Percent Operational Time: 93.1 |
| Minimum Diurnal Average: 1.4 ppb at hour 16 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 4 P ₉₀ = 8 P ₉₉ = 17 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|----|
| | 1 | 2 | 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 | 7 | 4 | 1 | Z | 2 | 5 | 9 | 10 | 8 | 6 | 7 | 5 | 2 | 2 | 3 | 6 | 4 | 7 | 3 | 1 | 2 | 3 | 4.8 | 10 | |
| 2-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 | 0.2 | 2 | |
| 3-Sep | Z | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 3 | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 1 | 0 | 0.2 | 2 | |
| 5-Sep | 0 | 0 | Z | 0 | 6 | 11 | 4 | 5 | 1 | 6 | 5 | 3 | 1 | 2 | 2 | 3 | 2 | 3 | 4 | 4 | 2 | 2 | 1 | 2 | 2.9 | 11 | |
| 6-Sep | 3 | 3 | 2 | Z | 5 | 6 | 3 | 5 | 6 | 4 | 8 | 5 | 3 | 5 | 4 | 2 | 2 | 2 | 3 | 4 | 12 | 9 | 4 | 4 | 4.4 | 12 | |
| 7-Sep | 7 | 5 | 5 | 5 | Z | 2 | 3 | 4 | 7 | 8 | 8 | 10 | 10 | 8 | 7 | 5 | 4 | 3 | 3 | 2 | 3 | 1 | 0 | 2 | 4.7 | 10 | |
| 8-Sep | 1 | 5 | 10 | 3 | 1 | Z | 6 | 1 | 0 | 2 | 4 | 5 | 4 | 1 | 2 | 1 | 2 | 2 | 5 | 2 | 1 | 0 | 0 | 1 | 2.5 | 10 | |
| 9-Sep | Z | 5 | 2 | 3 | 1 | 3 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 2 | 5 | 10 | 5 | 3 | 3 | 5 | 2.8 | 10 | |
| 10-Sep | 8 | Z | 4 | 5 | 8 | 4 | 4 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1.9 | 8 | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 0 | 0.3 | 2 | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 3 | 3 | 4 | 3 | 4 | 4 | 1.2 | 4 | |
| 13-Sep | 4 | 6 | 5 | 8 | Z | 3 | 2 | 2 | C | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | 8 | |
| 14-Sep | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | -- | |
| 15-Sep | M | M | M | M | M | M | M | M | M | C | C | C | C | C | C | 2 | 4 | 3 | 11 | 17 | 17 | 15 | 12 | 9 | 5 | -- | 17 |
| 16-Sep | 5 | Z | 5 | 13 | 14 | 9 | 8 | 2 | 6 | M | 8 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 7 | 15 | 14 | 5.5 | 15 | |
| 17-Sep | 12 | 4 | Z | 0 | 2 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1.2 | 12 | |
| 18-Sep | 0 | 0 | 1 | Z | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0.5 | 3 | |
| 19-Sep | 1 | 2 | 2 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0.7 | 2 | |
| 20-Sep | 1 | 0 | 2 | 3 | 3 | Z | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 6 | 7 | 5 | 6 | 9 | 5 | 1 | 2 | 2 | 3.0 | 9 | |
| 21-Sep | Z | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 8 | 3 | 10 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 2.6 | 10 | |
| 22-Sep | 1 | Z | 1 | 1 | 2 | 6 | 8 | 10 | 11 | 8 | 8 | 9 | 2 | 2 | 1 | 1 | M | M | 10 | 3 | 3 | 5 | 3 | 3 | 4.6 | 11 | |
| 23-Sep | 4 | 5 | Z | 4 | 5 | 8 | 12 | 12 | 11 | 9 | 3 | 4 | 4 | 4 | 5 | 3 | 2 | 5 | 7 | 2 | 1 | 1 | 1 | 2 | 4.9 | 12 | |
| 24-Sep | 2 | 3 | 3 | Z | 5 | 7 | 4 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 7 | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 5 | 4 | 3 | 3 | 2 | 1.1 | 5 | |
| 26-Sep | 2 | 2 | 2 | 4 | 5 | Z | 10 | 10 | 15 | 17 | 5 | 8 | 6 | 8 | 3 | 3 | 3 | 2 | 4 | 5 | 4 | 7 | 4 | 6 | 5.8 | 17 | |
| 27-Sep | Z | 14 | 17 | 22 | 17 | 13 | 2 | 1 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 4.8 | 22 | |
| 28-Sep | 1 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 7 | 10 | 4 | 2 | 0 | 0 | 0 | 1 | 2 | 14 | 27 | 21 | 12 | 12 | 6 | 5.5 | 27 | |
| 29-Sep | 4 | 2 | Z | 2 | 8 | 10 | 13 | 12 | 14 | 12 | 10 | 10 | 8 | 6 | 5 | 3 | 4 | 4 | 7 | 7 | 6 | 6 | 5 | 4 | 7.0 | 14 | |
| 30-Sep | 4 | 3 | 3 | Z | 3 | 2 | 4 | 3 | 5 | 6 | 6 | 5 | 3 | 3 | 1 | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 5 | 1 | 3.7 | 8 | |

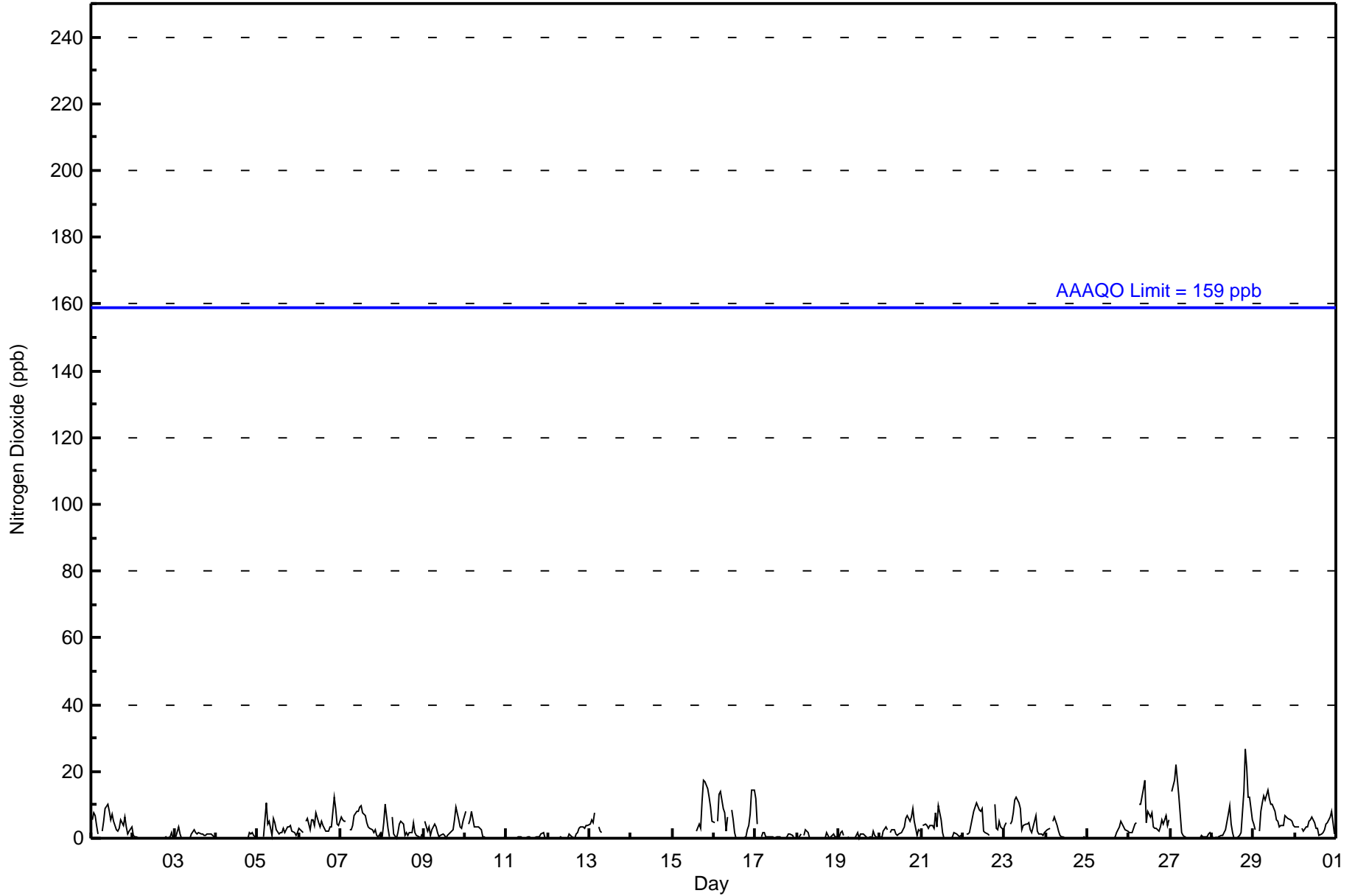
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 2.7 | 3.1 | 3.5 | 3.7 | 3.7 | 4.0 | 3.4 | 3.2 | 3.8 | 3.8 | 3.7 | 3.3 | 2.4 | 1.9 | 1.5 | 1.4 | 1.4 | 2.1 | 3.7 | 4.2 | 4.0 | 3.3 | 2.8 | 2.5 | Diurnal Average | |
| 12 | 14 | 17 | 22 | 17 | 13 | 13 | 12 | 15 | 17 | 10 | 10 | 10 | 8 | 7 | 6 | 7 | 11 | 17 | 27 | 21 | 12 | 15 | 14 | 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
Fort McKay - Bertha Ganter - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 628 | 99.52 | 99.52 |
| 21 - 40 | 3 | 0.48 | 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: 631

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 55 | 5 | 0 | 3 | 6 | 4 | 12 | 72 | 99 | 75 | 38 | 39 | 27 | 85 | 58 | 50 | 628 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 55 | 5 | 0 | 3 | 6 | 4 | 12 | 72 | 101 | 76 | 38 | 39 | 27 | 85 | 58 | 50 | 631 |

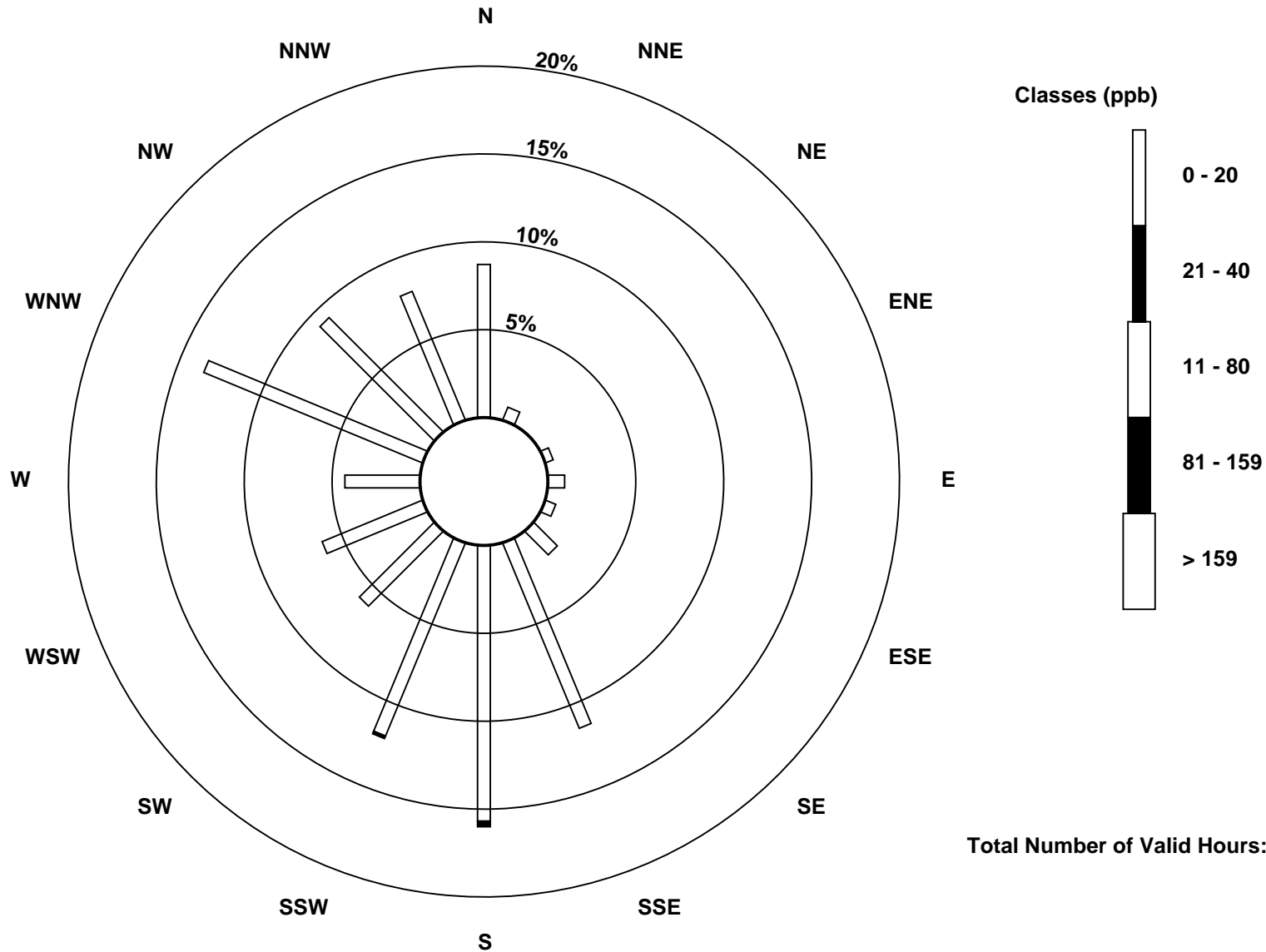
Total Number of Valid Hours: 631

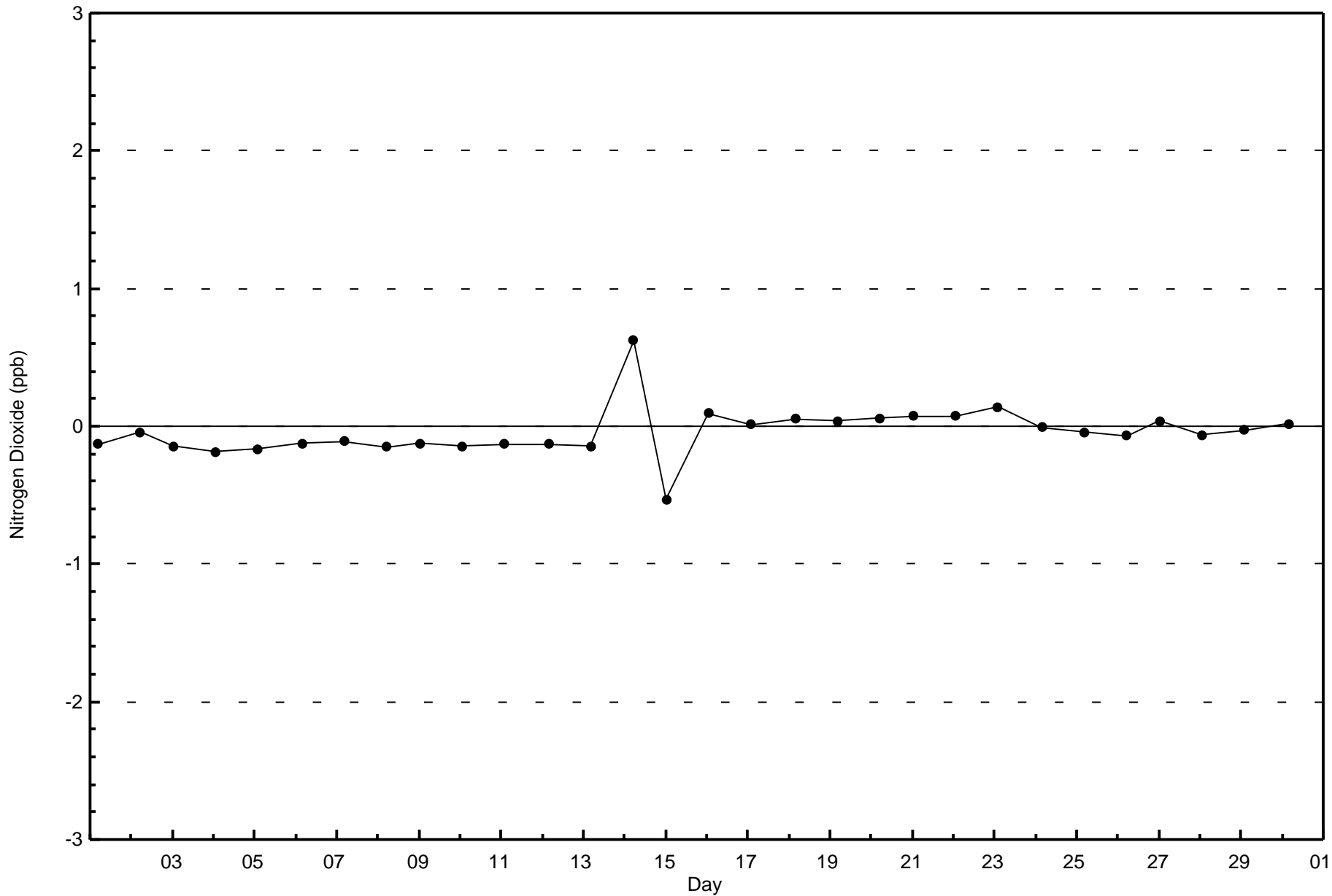
Total Number of Hours: 720

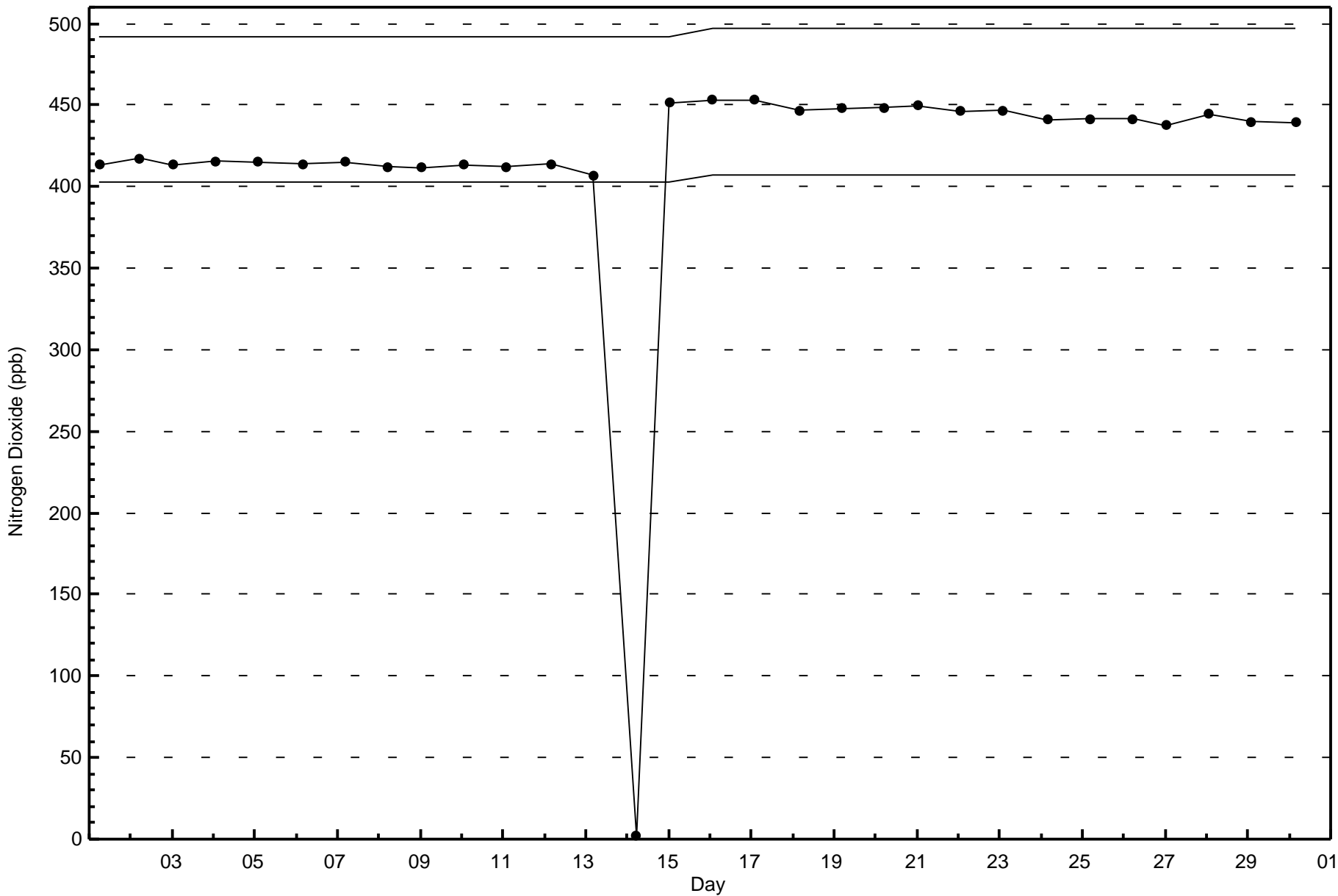


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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

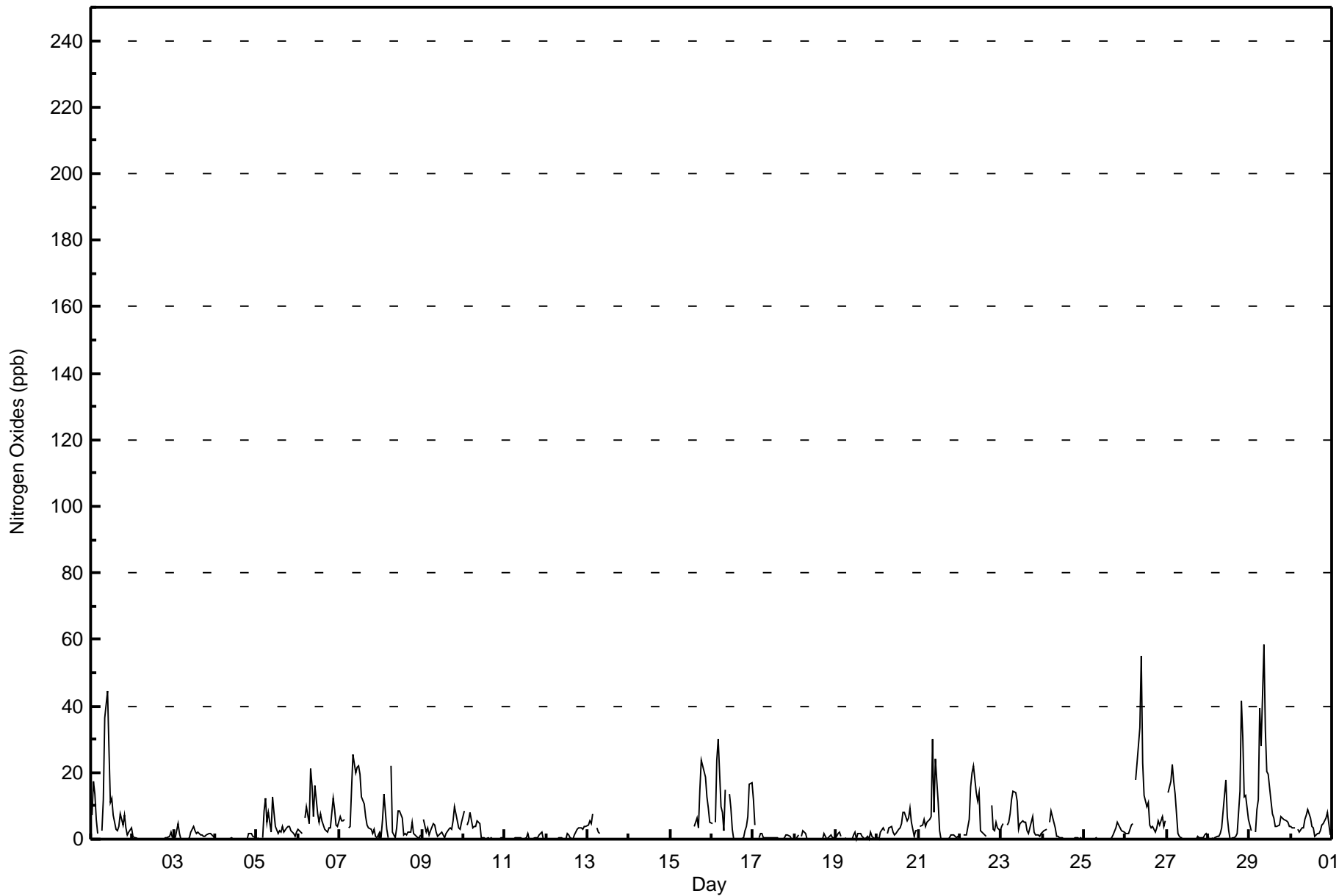








| Maximum Value: 58 ppb on Sep 29 09:00 | | Maximum Daily Average: 13.0 ppb on Sep 29 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------|-----|-----------------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|-----------------|----|--|--|
| Minimum Value: 0 ppb on Sep 16 15:00 | | Minimum Daily Average: 0.3 ppb on Sep 2 | | Hours of Data: 631 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 10.3 ppb at hour 9 | | Minimum Diurnal Average: 1.7 ppb at hour 17 | | Hours of Missing Data: 89 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 4.4 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 5 P ₉₀ = 12 P ₉₉ = 34 | | Hours of Calibration: 39 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 93.1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 7 | 18 | 14 | 6 | 1 | Z | 3 | 12 | 37 | 45 | 27 | 11 | 12 | 7 | 3 | 2 | 4 | 8 | 4 | 7 | 3 | 1 | 2 | 3 | 10.3 | 45 | | | |
| 2-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 0.3 | 2 | | | |
| 3-Sep | Z | 0 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1.3 | 5 | | | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 0 | 0.3 | 2 | | | | |
| 5-Sep | 0 | 0 | Z | 0 | 8 | 12 | 5 | 8 | 2 | 13 | 8 | 4 | 2 | 3 | 2 | 4 | 2 | 4 | 4 | 4 | 2 | 2 | 1 | 2 | 4.0 | 13 | | | |
| 6-Sep | 3 | 3 | 2 | Z | 7 | 10 | 5 | 21 | 16 | 7 | 16 | 8 | 5 | 8 | 6 | 3 | 2 | 2 | 4 | 4 | 12 | 9 | 4 | 4 | 6.9 | 21 | | | |
| 7-Sep | 7 | 6 | 5 | 6 | Z | 3 | 4 | 15 | 25 | 20 | 22 | 22 | 20 | 13 | 10 | 7 | 4 | 3 | 3 | 2 | 3 | 1 | 0 | 2 | 8.8 | 25 | | | |
| 8-Sep | 1 | 6 | 13 | 3 | 1 | Z | 22 | 2 | 0 | 3 | 8 | 9 | 6 | 1 | 2 | 1 | 2 | 2 | 5 | 2 | 1 | 0 | 0 | 1 | 4.0 | 22 | | | |
| 9-Sep | Z | 6 | 2 | 3 | 1 | 3 | 5 | 4 | 2 | 1 | 1 | 2 | 1 | 0 | 2 | 3 | 3 | 3 | 6 | 10 | 5 | 3 | 3 | 5 | 3.3 | 10 | | | |
| 10-Sep | 8 | Z | 4 | 5 | 8 | 3 | 4 | 4 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.2 | 8 | | | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 0 | 0.4 | 2 | | | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 2 | 3 | 3 | 4 | 3 | 4 | 4 | 1.3 | 4 | | | |
| 13-Sep | 4 | 6 | 5 | 8 | Z | 3 | 2 | 2 | C | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | 8 | | | |
| 14-Sep | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | M | -- | -- | | | |
| 15-Sep | M | M | M | M | M | M | M | M | M | C | C | C | C | C | C | 4 | 6 | 3 | 15 | 24 | 22 | 19 | 13 | 9 | 5 | -- | 24 | | |
| 16-Sep | 5 | Z | 5 | 24 | 30 | 10 | 8 | 2 | 15 | M | 14 | 9 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 7 | 17 | 17 | 7.8 | 30 | | | |
| 17-Sep | 12 | 4 | Z | 0 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1.2 | 12 | | | |
| 18-Sep | 0 | 0 | 1 | Z | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0.5 | 3 | | | |
| 19-Sep | 1 | 2 | 2 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0.8 | 2 | | | |
| 20-Sep | 1 | 0 | 2 | 3 | 3 | Z | 2 | 3 | 4 | 2 | 1 | 1 | 3 | 3 | 5 | 8 | 8 | 5 | 6 | 9 | 5 | 1 | 2 | 2 | 3.5 | 9 | | | |
| 21-Sep | Z | 4 | 4 | 6 | 4 | 5 | 6 | 7 | 30 | 8 | 24 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 5.1 | 30 | | | |
| 22-Sep | 1 | Z | 1 | 1 | 1 | 6 | 16 | 20 | 22 | 14 | 11 | 14 | 3 | 2 | 1 | 1 | M | M | 10 | 3 | 3 | 5 | 3 | 3 | 6.7 | 22 | | | |
| 23-Sep | 4 | 5 | Z | 4 | 5 | 7 | 12 | 14 | 14 | 12 | 3 | 5 | 5 | 5 | 5 | 3 | 2 | 5 | 7 | 2 | 1 | 1 | 1 | 2 | 5.4 | 14 | | | |
| 24-Sep | 2 | 3 | 3 | Z | 5 | 8 | 5 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 8 | | | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 5 | 4 | 3 | 3 | 2 | 1.0 | 5 | | | |
| 26-Sep | 2 | 2 | 2 | 4 | 5 | Z | 18 | 23 | 34 | 55 | 23 | 13 | 10 | 11 | 4 | 3 | 4 | 2 | 4 | 5 | 4 | 7 | 4 | 6 | 10.5 | 55 | | | |
| 27-Sep | Z | 14 | 17 | 22 | 17 | 13 | 2 | 1 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 4.9 | 22 | | | |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 13 | 18 | 7 | 2 | 0 | 0 | 0 | 1 | 2 | 14 | 42 | 31 | 13 | 13 | 6 | 7.4 | 42 | | | |
| 29-Sep | 4 | 2 | Z | 2 | 9 | 12 | 40 | 28 | 58 | 33 | 21 | 19 | 12 | 8 | 6 | 4 | 4 | 4 | 7 | 6 | 6 | 6 | 5 | 4 | 13.0 | 58 | | | |
| 30-Sep | 4 | 3 | 3 | Z | 3 | 2 | 4 | 4 | 6 | 7 | 9 | 6 | 4 | 3 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 8 | 5 | 1 | 4.1 | 9 | | | |
| | | 2.8 | 3.6 | 4.0 | 4.4 | 4.6 | 4.6 | 5.9 | 6.3 | 10.3 | 9.3 | 8.1 | 5.7 | 3.7 | 2.8 | 2.0 | 1.8 | 1.7 | 2.4 | 4.0 | 5.0 | 4.5 | 3.3 | 3.0 | 2.6 | Diurnal Average | | | |
| | | 12 | 18 | 17 | 24 | 30 | 13 | 40 | 28 | 58 | 55 | 27 | 22 | 20 | 13 | 10 | 8 | 8 | 15 | 24 | 42 | 31 | 13 | 17 | 17 | Diurnal Maximum | | | |
| Z - zerspan | | C - Calibration | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 604 | 95.72 | 95.72 |
| 21 - 40 | 23 | 3.65 | 99.37 |
| 41 - 80 | 4 | 0.63 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 631

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 52 | 5 | 0 | 3 | 6 | 4 | 11 | 62 | 95 | 72 | 38 | 38 | 27 | 85 | 57 | 49 | 604 |
| 21 - 40 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 4 | 4 | 0 | 1 | 0 | 0 | 1 | 1 | 23 |
| 11 - 80 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 55 | 5 | 0 | 3 | 6 | 4 | 12 | 72 | 101 | 76 | 38 | 39 | 27 | 85 | 58 | 50 | 631 |

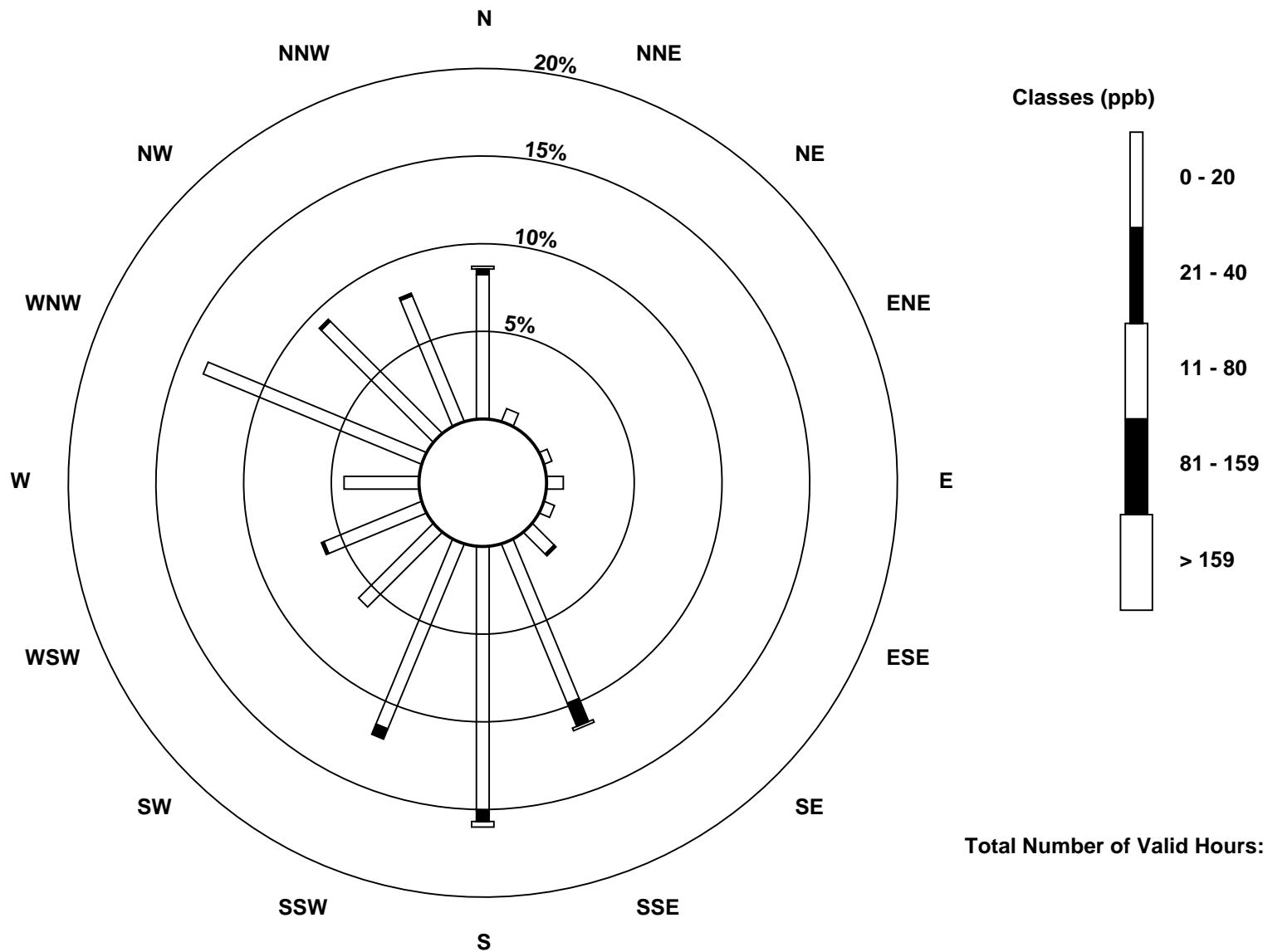
Total Number of Valid Hours: 631

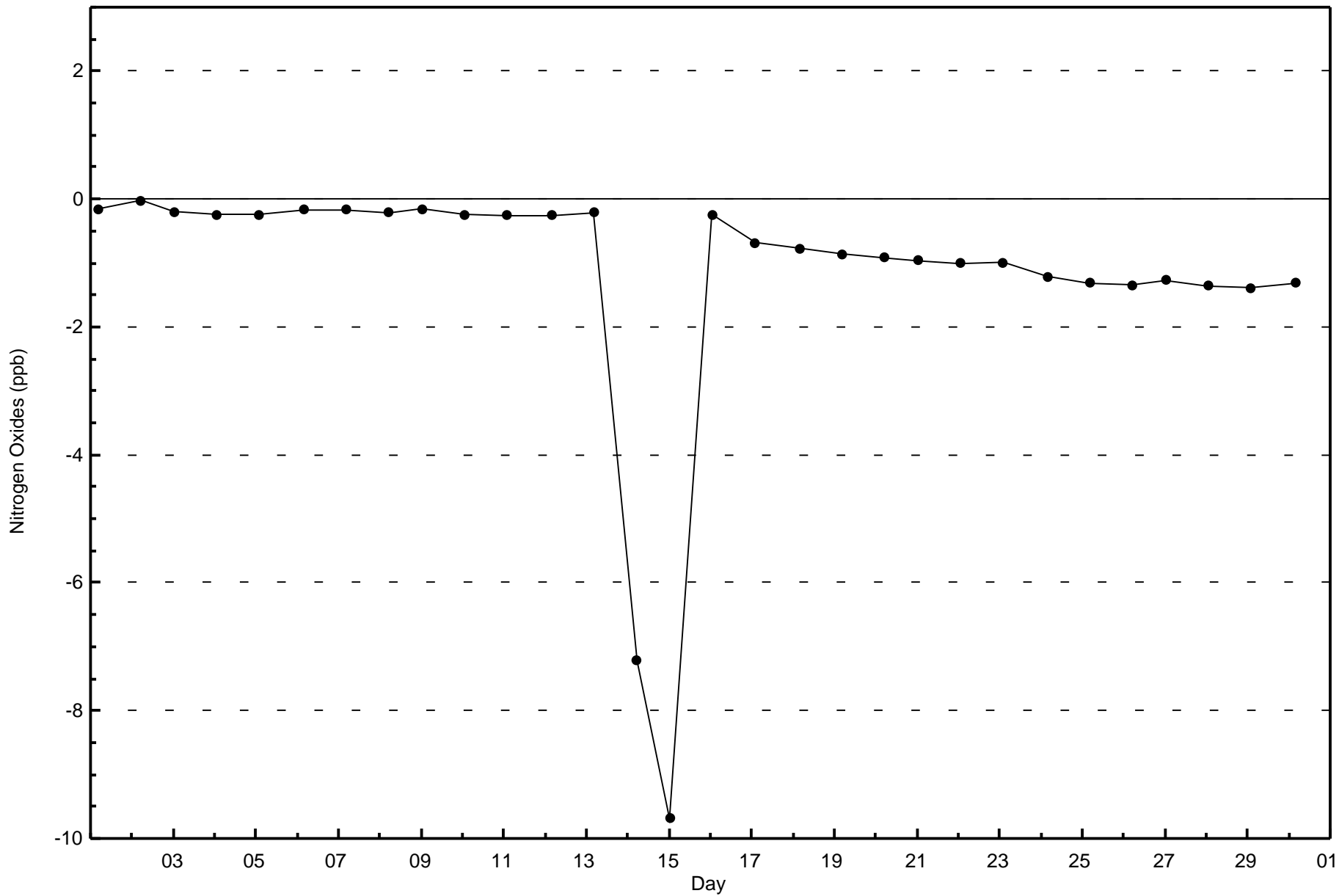
Total Number of Hours: 720

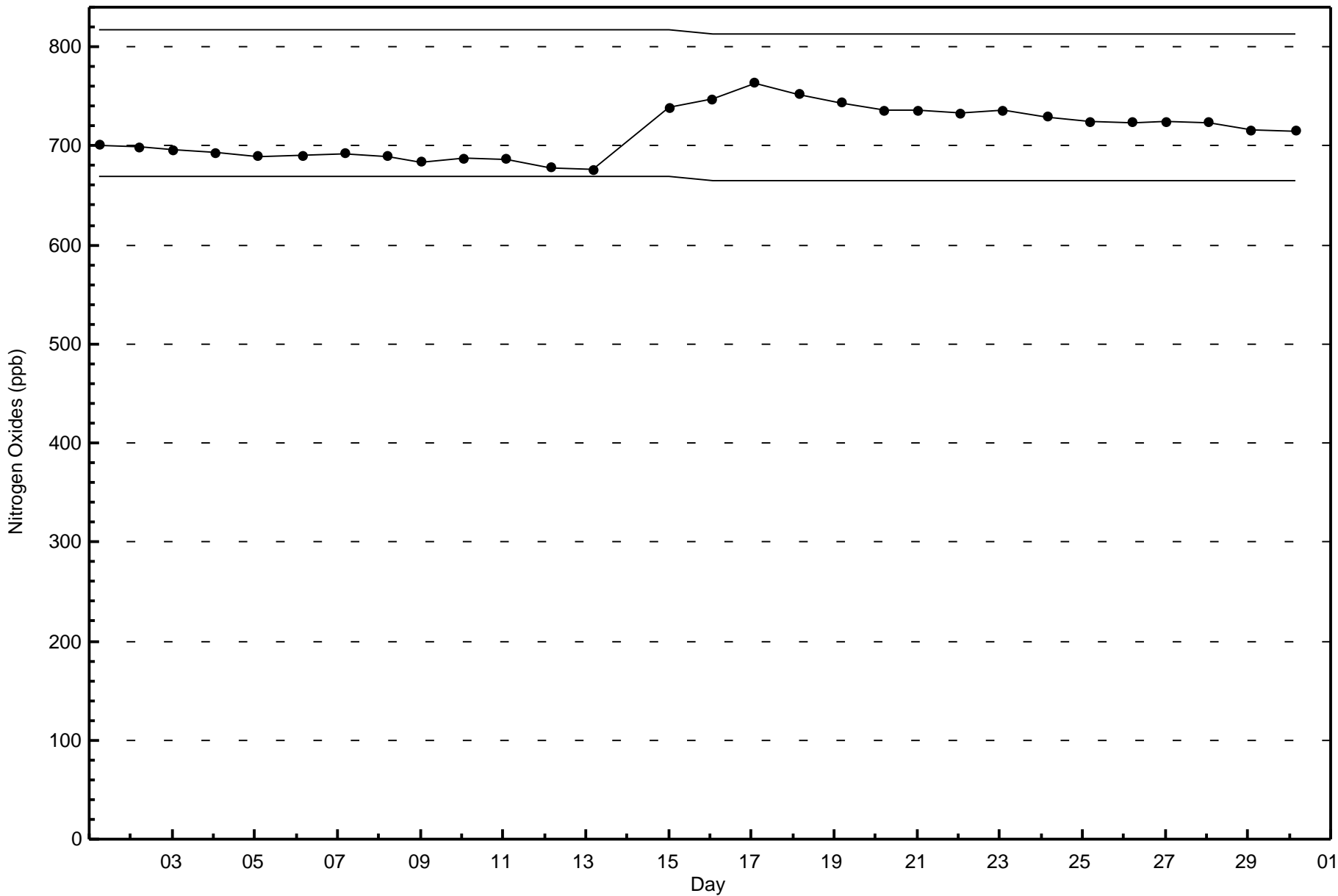


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

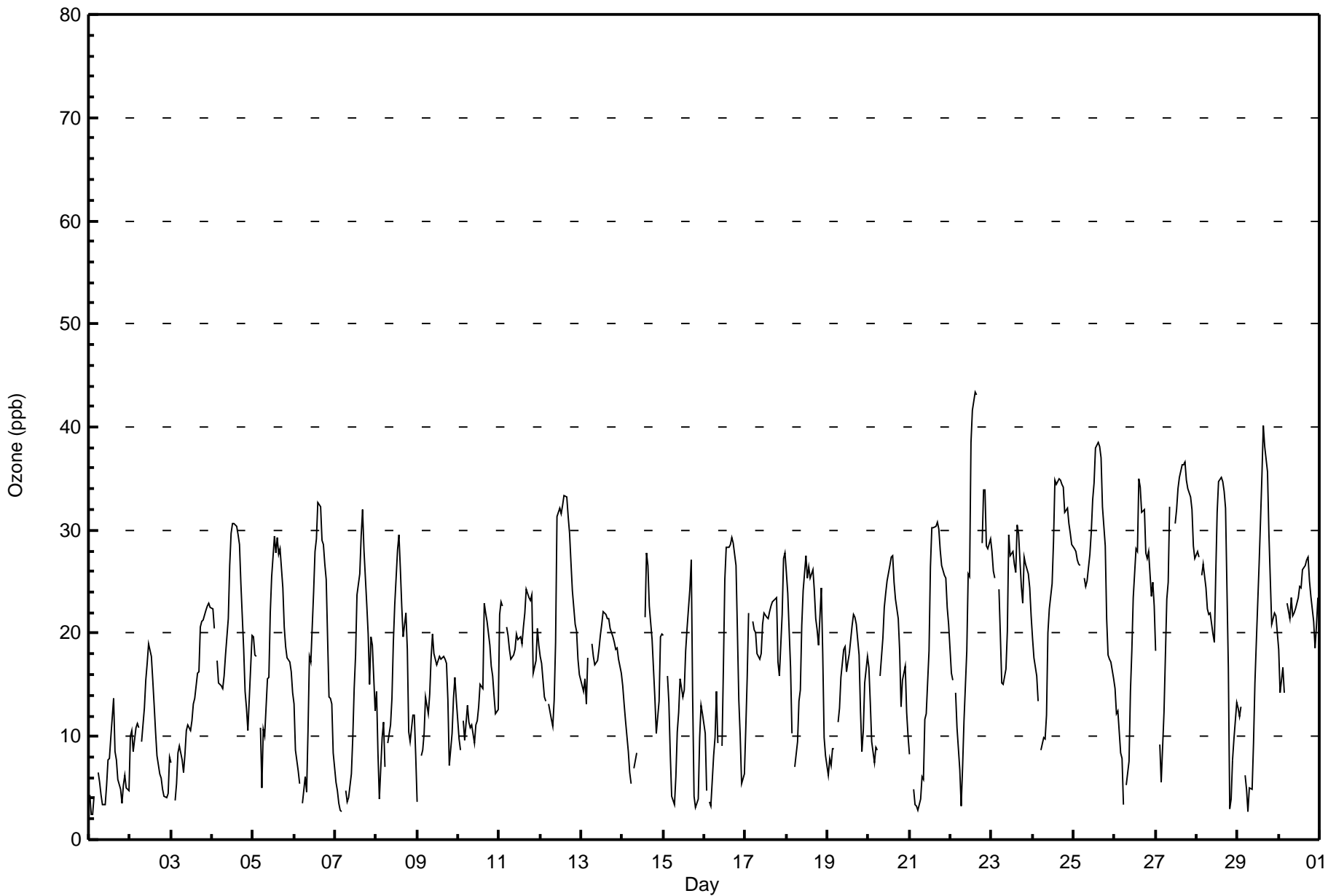
Fort McKay - Bertha Ganter - September 2016

| | | | | |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 43 ppb on Sep 22 15:00 | Maximum Daily Average: 27.8 ppb on Sep 25 | | Hours of Data: | 681 |
| Minimum Value: 2 ppb on Sep 1 03:00 | Minimum Daily Average: 5.8 ppb on Sep 1 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 27.3 ppb at hour 16 | Minimum Diurnal Average: 10.7 ppb at hour 6 | | Hours of Calibration: | 36 |
| Monthly Average: 18.3 ppb | Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 11 Median = 18 Q ₃ = 25 P ₉₀ = 30 P ₉₉ = 38 | | Percent Operational Time: | 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|---------------|---------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 4 | 2 | 2 | 4 | Z | 7 | 6 | 4 | 3 | 3 | 5 | 8 | 8 | 10 | 14 | 9 | 8 | 6 | 5 | 4 | 5 | 6 | 5 | 5 | 5.8 | 14 | |
| 2-Sep | 10 | 11 | 9 | 11 | 11 | 11 | Z | 9 | 13 | 15 | 17 | 19 | 18 | 15 | 13 | 10 | 8 | 6 | 6 | 5 | 4 | 4 | 4 | 8 | 10.4 | 19 | |
| 3-Sep | 7 | Z | 4 | 5 | 8 | 9 | 8 | 6 | 8 | 11 | 11 | 11 | 12 | 13 | 14 | 16 | 16 | 21 | 21 | 21 | 22 | 23 | 23 | 22 | 13.6 | 23 | |
| 4-Sep | 22 | 20 | Z | 17 | 15 | 15 | 15 | 16 | 18 | 21 | 27 | 30 | 31 | 31 | 30 | 30 | 29 | 25 | 18 | 14 | 13 | 11 | 14 | 20 | 20.9 | 31 | |
| 5-Sep | 20 | 18 | 18 | Z | 11 | 5 | 11 | 10 | 16 | 16 | 22 | 25 | 29 | 28 | 29 | 30 | 28 | 28 | 24 | 21 | 19 | 18 | 17 | 16 | 14 | 19.2 | 29 |
| 6-Sep | 13 | 9 | 7 | 5 | Z | 4 | 6 | 5 | 11 | 18 | 17 | 24 | 28 | 29 | 33 | 32 | 29 | 29 | 27 | 25 | 14 | 14 | 13 | 8 | 17.3 | 33 | |
| 7-Sep | 6 | 5 | 3 | 3 | 3 | Z | 5 | 4 | 4 | 6 | 10 | 15 | 18 | 24 | 26 | 29 | 32 | 28 | 23 | 20 | 15 | 20 | 19 | 12 | 14.3 | 32 | |
| 8-Sep | 14 | 8 | 4 | 10 | 11 | 7 | Z | 9 | 11 | 14 | 19 | 23 | 28 | 29 | 26 | 23 | 20 | 22 | 18 | 10 | 9 | 12 | 12 | 8 | 15.2 | 29 | |
| 9-Sep | 4 | Z | 8 | 9 | 10 | 14 | 12 | 14 | 18 | 20 | 18 | 17 | 17 | 18 | 18 | 18 | 18 | 17 | 14 | 7 | 10 | 14 | 16 | 14 | 14.0 | 20 | |
| 10-Sep | 10 | 9 | Z | 12 | 10 | 13 | 11 | 11 | 11 | 9 | 11 | 12 | 13 | 15 | 15 | 23 | 22 | 21 | 19 | 17 | 16 | 14 | 12 | 13 | 13.8 | 23 | |
| 11-Sep | 22 | 23 | 23 | Z | 21 | 20 | 18 | 17 | 18 | 18 | 20 | 19 | 20 | 19 | 21 | 22 | 24 | 24 | 23 | 24 | 16 | 17 | 20 | 19 | 20.4 | 24 | |
| 12-Sep | 18 | 17 | 14 | 13 | Z | 13 | 12 | 11 | 14 | 19 | 31 | 32 | 32 | 32 | 33 | 33 | 31 | 30 | 27 | 24 | 21 | 20 | 18 | 16 | 22.2 | 33 | |
| 13-Sep | 15 | 14 | 16 | 13 | 18 | Z | 19 | 18 | 17 | 17 | 18 | 20 | 21 | 22 | 22 | 21 | 21 | 20 | 20 | 19 | 18 | 19 | 17 | 16 | 18.4 | 22 | |
| 14-Sep | 15 | 13 | 12 | 8 | 6 | 5 | Z | 7 | 8 | C | C | C | C | 21 | 28 | 27 | 23 | 19 | 17 | 14 | 10 | 13 | 20 | 20 | 15.1 | 28 | |
| 15-Sep | 20 | Z | 16 | 13 | 8 | 4 | 3 | 6 | 10 | 12 | 16 | 14 | 15 | 18 | 20 | 24 | 27 | 14 | 4 | 3 | 4 | 10 | 13 | 12 | 12.5 | 27 | |
| 16-Sep | 10 | 5 | Z | 4 | 3 | 8 | 10 | 14 | 9 | M | 9 | 17 | 25 | 28 | 28 | 29 | 29 | 29 | 27 | 20 | 14 | 10 | 5 | 6 | 15.5 | 29 | |
| 17-Sep | 11 | 16 | 22 | Z | 21 | 20 | 20 | 18 | 17 | 18 | 21 | 22 | 22 | 21 | 22 | 23 | 23 | 23 | 23 | 17 | 16 | 22 | 27 | 28 | 20.6 | 28 | |
| 18-Sep | 26 | 24 | 17 | 10 | Z | 7 | 10 | 13 | 15 | 21 | 24 | 28 | 25 | 26 | 25 | 26 | 24 | 21 | 20 | 19 | 24 | 18 | 10 | 8 | 19.2 | 28 | |
| 19-Sep | 6 | 8 | 7 | 9 | 9 | Z | 11 | 13 | 16 | 18 | 19 | 16 | 17 | 18 | 21 | 22 | 22 | 21 | 18 | 12 | 9 | 11 | 15 | 18 | 14.6 | 22 | |
| 20-Sep | 17 | 13 | 9 | 7 | 9 | 9 | Z | 16 | 20 | 22 | 24 | 25 | 27 | 27 | 25 | 23 | 21 | 18 | 13 | 15 | 17 | 12 | 10 | 17.8 | 27 | | |
| 21-Sep | 8 | Z | 5 | 3 | 3 | 3 | 4 | 6 | 6 | 12 | 12 | 18 | 26 | 30 | 30 | 30 | 31 | 30 | 28 | 27 | 26 | 25 | 23 | 21 | 17.8 | 31 | |
| 22-Sep | 16 | 15 | Z | 14 | 11 | 7 | 3 | 7 | 12 | 18 | 26 | 25 | 39 | 42 | 43 | 43 | M | M | 29 | 34 | 34 | 28 | 28 | 29 | 24.0 | 43 | |
| 23-Sep | 28 | 26 | 25 | Z | 24 | 20 | 15 | 15 | 17 | 20 | 30 | 28 | 28 | 27 | 26 | 31 | 30 | 25 | 23 | 27 | 27 | 26 | 24 | 22 | 24.4 | 31 | |
| 24-Sep | 20 | 18 | 16 | 13 | Z | 9 | 10 | 10 | 12 | 20 | 22 | 25 | 29 | 35 | 34 | 35 | 35 | 34 | 32 | 32 | 31 | 30 | 29 | 29 | 24.5 | 35 | |
| 25-Sep | 28 | 28 | 27 | 27 | Z | 25 | 25 | 25 | 28 | 30 | 33 | 35 | 38 | 38 | 38 | 38 | 37 | 32 | 28 | 21 | 18 | 18 | 17 | 16 | 27.8 | 38 | |
| 26-Sep | 15 | 12 | 12 | 8 | 8 | 3 | Z | 5 | 8 | 14 | 18 | 24 | 28 | 28 | 35 | 34 | 32 | 32 | 28 | 27 | 28 | 24 | 25 | 23 | 20.5 | 35 | |
| 27-Sep | 18 | Z | 9 | 6 | 9 | 12 | 23 | 25 | 32 | C | C | 31 | 32 | 34 | 35 | 36 | 36 | 37 | 35 | 34 | 33 | 32 | 28 | 27 | 26.9 | 37 | |
| 28-Sep | 28 | 27 | Z | 26 | 27 | 24 | 22 | 22 | 22 | 20 | 19 | 26 | 32 | 35 | 35 | 35 | 34 | 32 | 17 | 3 | 4 | 8 | 10 | 13 | 22.6 | 35 | |
| 29-Sep | 13 | 12 | 13 | Z | 6 | 5 | 3 | 5 | 5 | 9 | 15 | 19 | 27 | 31 | 35 | 40 | 38 | 36 | 30 | 25 | 21 | 22 | 22 | 20 | 19.6 | 40 | |
| 30-Sep | 18 | 14 | 17 | 14 | Z | 23 | 21 | 23 | 22 | 22 | 22 | 24 | 25 | 24 | 26 | 27 | 27 | 27 | 25 | 24 | 21 | 19 | 21 | 23 | 22.2 | 27 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 15.4 | 14.7 | 12.5 | 10.7 | 12.1 | 10.7 | 12.2 | 12.2 | 13.9 | 16.5 | 19.1 | 21.6 | 24.3 | 25.7 | 26.8 | 27.3 | 26.1 | 24.4 | 21.5 | 18.7 | 17.2 | 17.4 | 17.3 | 16.7 | Diurnal Average | |
| 28 | 28 | 27 | 27 | 27 | 24 | 25 | 25 | 32 | 28 | 31 | 33 | 39 | 42 | 43 | 43 | 38 | 37 | 35 | 34 | 34 | 32 | 30 | 29 | Diurnal Maximum | |

Z - zerospan C - Calibration M - Maintenance
 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 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 405 | 59.47 | 59.47 |
| 21 - 50 | 276 | 40.53 | 100.00 |
| 51 - 82 | 0 | 0.00 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 37 | 3 | 0 | 4 | 2 | 2 | 6 | 39 | 57 | 56 | 24 | 30 | 20 | 53 | 41 | 31 | 405 |
| 21 - 50 | 23 | 4 | 0 | 0 | 5 | 2 | 6 | 35 | 45 | 27 | 21 | 16 | 10 | 40 | 23 | 19 | 276 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 60 | 7 | 0 | 4 | 7 | 4 | 12 | 74 | 102 | 83 | 45 | 46 | 30 | 93 | 64 | 50 | 681 |

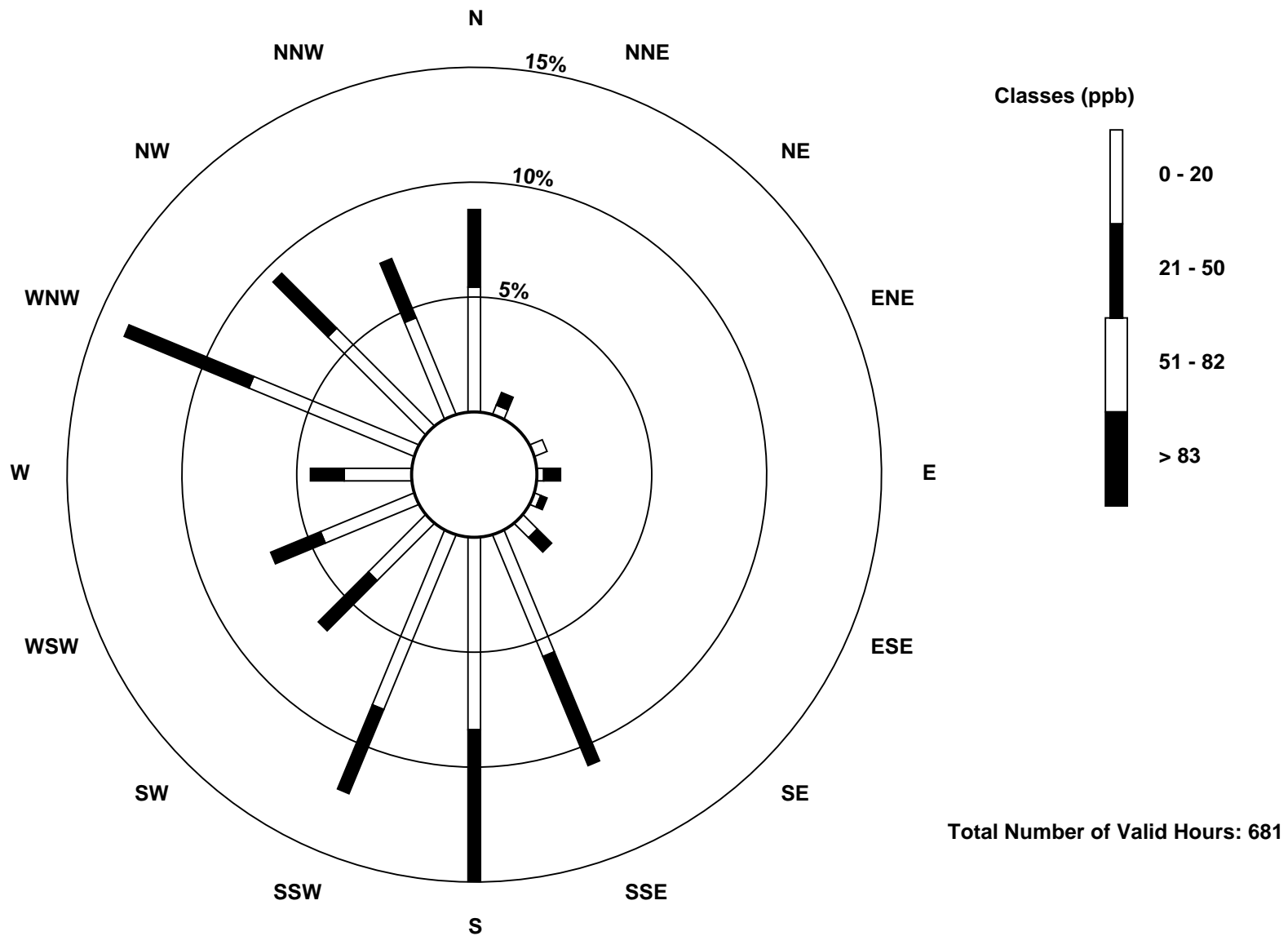
Total Number of Valid Hours: 681

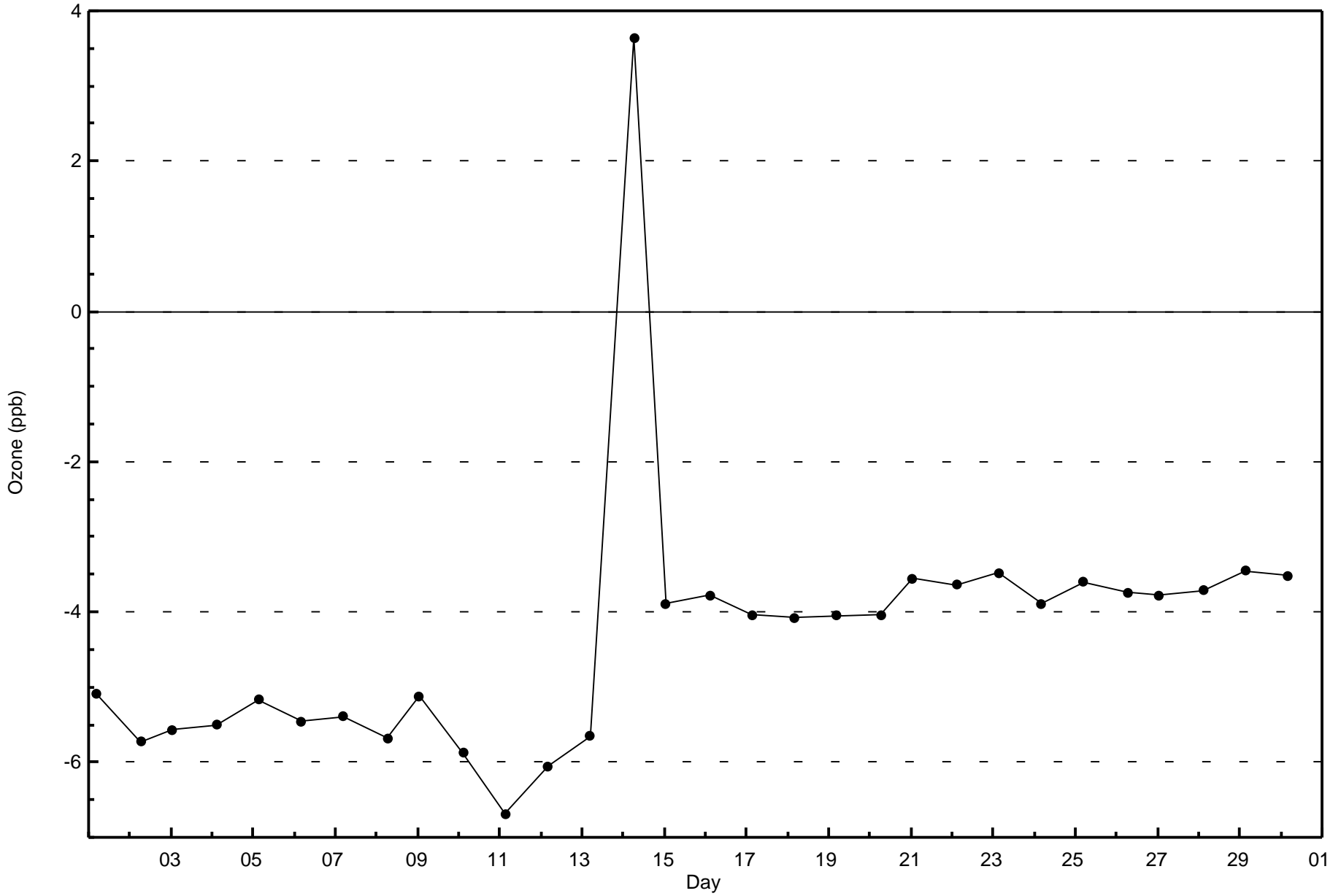
Total Number of Hours: 720

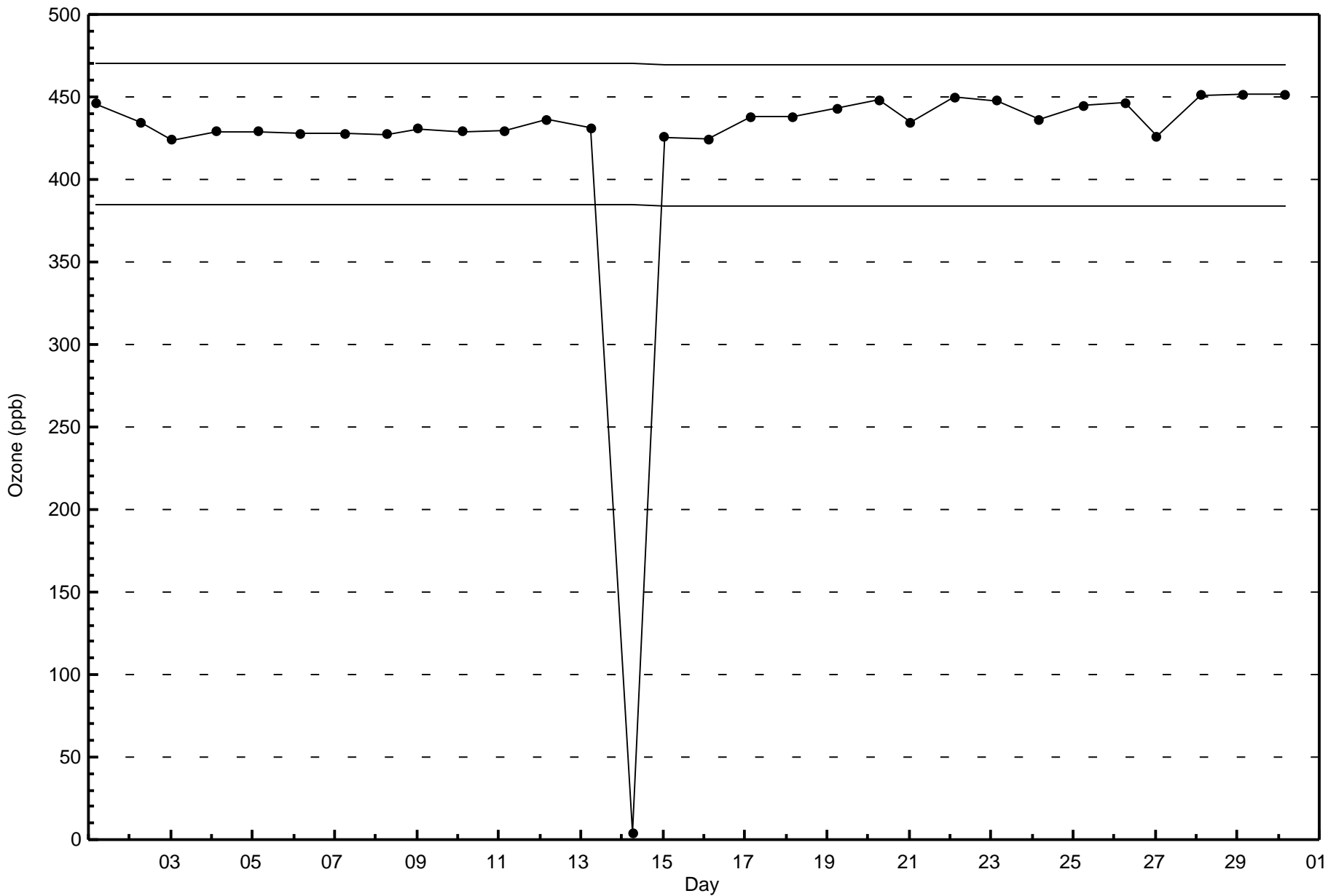


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Summary of Hour Averages

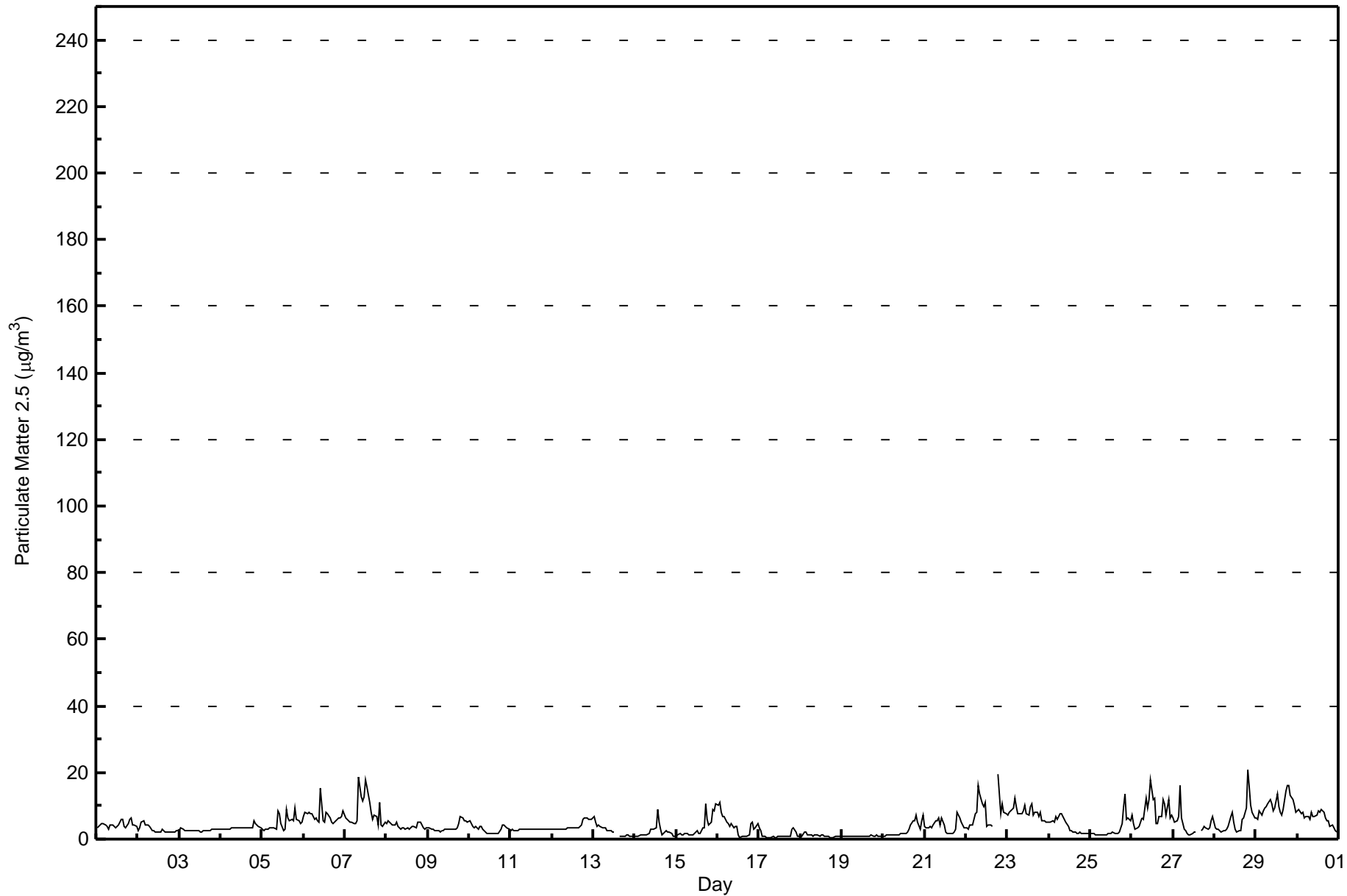
Fort McKay - Bertha Ganter - September 2016

| Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 20.9 µg/m ³ on Sep 28 20:00 Minimum Value: 0.4 µg/m ³ on Sep 18 20:00 Maximum Diurnal Average: 6.0 µg/m ³ at hour 20 Monthly Average: 4.35 µg/m ³ | | Maximum Daily Average: 10.1 µg/m ³ on Sep 29 Minimum Daily Average: 0.9 µg/m ³ on Sep 19 Minimum Diurnal Average: 3.5 µg/m ³ at hour 17 Percentiles: P ₁ = 0.6 P ₁₀ = 1.0 Q ₁ = 2.2 Median = 3.4 Q ₃ = 5.9 P ₉₀ = 8.4 P ₉₉ = 15.9 | | Hours in Service: 720 Hours of Data: 714 Hours of Missing Data: 6 Hours of Calibration: 4 Percent Operational Time: 99.7 | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------|------|-----|-----|------|------|------|------|------|------|------|------|-----|-----|------|------|------|------|------|------|----------------------------------------------------------------------------|---------------|---------------|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 3.3 | 4.0 | 4.3 | 4.5 | 4.5 | 4.2 | 3.7 | 3.2 | 4.2 | 4.2 | 3.9 | 3.6 | 4.0 | 4.2 | 6.1 | 5.9 | 3.8 | 3.5 | 4.8 | 5.8 | 6.2 | 4.3 | 4.1 | 3.9 | 4.3 | 6.2 |
| 2-Sep | 2.4 | 3.3 | 5.0 | 5.3 | 4.4 | 4.3 | 4.3 | 3.7 | 2.7 | 2.3 | 2.1 | 2.1 | 2.1 | 2.0 | 2.9 | 2.7 | 2.2 | 2.1 | 2.1 | 2.3 | 2.2 | 2.2 | 2.6 | 2.5 | 2.9 | 5.3 |
| 3-Sep | 2.7 | 3.3 | 3.1 | 2.7 | 2.6 | 2.7 | 2.7 | 2.5 | 2.4 | 2.4 | 2.5 | 2.4 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.5 | 2.7 | 2.9 | 3.0 | 3.0 | 3.0 | 3.0 | 2.7 | 3.3 |
| 4-Sep | 3.0 | 2.9 | 2.9 | 3.0 | 3.1 | 3.2 | 3.3 | 3.4 | 3.3 | 3.3 | 3.3 | 3.4 | 3.4 | 3.3 | 3.3 | 3.4 | 3.4 | 3.4 | 3.4 | 5.7 | 4.7 | 4.4 | 4.0 | 3.4 | 3.5 | 5.7 |
| 5-Sep | 3.0 | 2.7 | 2.9 | 3.1 | 3.6 | 3.6 | 3.4 | 3.3 | 2.8 | 8.4 | 7.6 | 4.7 | 2.3 | 2.9 | 8.7 | 6.5 | 5.6 | 6.0 | 5.3 | 9.3 | 6.0 | 5.3 | 4.8 | 5.2 | 4.9 | 9.3 |
| 6-Sep | 7.0 | 8.1 | 7.6 | 7.9 | 7.8 | 7.5 | 6.1 | 6.4 | 5.4 | 5.1 | 15.3 | 5.3 | 5.1 | 7.9 | 7.7 | 6.2 | 5.0 | 4.6 | 4.9 | 5.6 | 6.2 | 6.4 | 6.7 | 8.6 | 6.8 | 15.3 |
| 7-Sep | 6.2 | 6.0 | 5.7 | 5.2 | 5.0 | 4.6 | 4.6 | 5.5 | 18.4 | 12.8 | 11.5 | 12.6 | 17.6 | 15.8 | 11.1 | 7.9 | 6.1 | 7.1 | 6.7 | 4.4 | 11.2 | 4.1 | 4.0 | 4.9 | 8.3 | 18.4 |
| 8-Sep | 4.5 | 5.5 | 5.1 | 4.4 | 4.3 | 4.1 | 5.0 | 3.6 | 2.8 | 3.3 | 3.2 | 2.9 | 3.2 | 2.8 | 3.3 | 4.0 | 3.9 | 3.3 | 5.3 | 5.0 | 4.9 | 3.2 | 3.1 | 3.3 | 3.9 | 5.5 |
| 9-Sep | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.4 | 2.3 | 2.3 | 2.4 | 2.9 | 3.1 | 3.1 | 2.9 | 3.0 | 3.0 | 3.1 | 3.3 | 4.7 | 6.6 | 6.3 | 5.7 | 5.4 | 4.9 | 3.5 | 6.6 |
| 10-Sep | 5.3 | 4.6 | 3.7 | 3.6 | 3.9 | 3.0 | 4.0 | 3.8 | 2.8 | 2.0 | 1.7 | 1.7 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 3.1 | 4.3 | 4.2 | 3.7 | 3.6 | 3.1 | 3.0 | 5.3 |
| 11-Sep | 2.7 | 2.8 | 2.7 | 2.7 | 2.7 | 2.8 | 2.8 | 2.9 | 2.9 | 3.0 | 3.1 | 3.1 | 2.9 | 3.2 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 | 3.1 | 3.0 | 3.1 | 2.9 | 2.8 | 3.0 | 3.2 |
| 12-Sep | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.9 | 3.0 | 3.0 | 3.2 | 3.2 | 3.3 | 3.5 | 3.6 | 3.4 | 3.3 | 3.7 | 4.1 | 5.7 | 6.3 | 6.3 | 5.9 | 5.9 | 5.8 | 3.9 | 6.3 |
| 13-Sep | 6.9 | 5.1 | 3.7 | 4.0 | 3.7 | 3.3 | 3.5 | 3.3 | 2.7 | 2.4 | 2.4 | 2.3 | 2.3 | C | C | 1.0 | 1.0 | 1.0 | 1.0 | 1.4 | 1.2 | 0.9 | 1.0 | 1.0 | 2.5 | 6.9 |
| 14-Sep | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.8 | 2.8 | 2.9 | 3.1 | 3.5 | 8.9 | 5.2 | 3.0 | 1.3 | 2.2 | 2.4 | 2.3 | 2.1 | 1.6 | 0.9 | 0.8 | 2.2 | 8.9 |
| 15-Sep | 1.0 | 1.2 | 1.6 | 1.2 | 1.1 | 1.6 | 1.6 | 1.4 | 1.3 | 1.2 | 1.3 | 2.0 | 2.7 | 1.7 | 1.9 | 3.5 | 3.4 | 10.4 | 6.1 | 4.3 | 5.2 | 8.9 | 8.5 | 10.4 | 3.5 | 10.4 |
| 16-Sep | 10.0 | 11.2 | 7.8 | 6.7 | 6.6 | 5.0 | 4.6 | 3.8 | 4.8 | 3.5 | 3.9 | 3.8 | 1.5 | 0.6 | 0.7 | 0.8 | 0.8 | 0.9 | 1.1 | 4.6 | 5.2 | 3.0 | 3.5 | 4.7 | 4.1 | 11.2 |
| 17-Sep | 3.4 | 2.4 | 1.0 | 0.6 | 0.6 | 0.6 | 0.5 | 0.6 | 0.7 | 0.6 | 0.6 | 0.9 | 1.0 | 1.0 | 0.8 | 0.8 | 0.7 | 0.8 | 0.7 | 2.8 | 3.5 | 2.2 | 0.9 | 0.9 | 1.2 | 3.5 |
| 18-Sep | 1.0 | 1.0 | 2.1 | 2.3 | 1.4 | 1.3 | 1.2 | 0.9 | 1.2 | 1.2 | 1.1 | 1.1 | 1.3 | 1.1 | 0.8 | 0.8 | 0.7 | 0.6 | 0.4 | 0.4 | 0.7 | 0.8 | 0.7 | 0.7 | 1.0 | 2.3 |
| 19-Sep | 0.7 | 0.8 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.8 | 0.8 | 1.0 | 0.9 | 0.9 | 1.1 | 0.8 | 0.7 | 1.1 | 1.0 | 0.8 | 0.9 | 0.9 | 1.1 |
| 20-Sep | 1.0 | 1.0 | 1.1 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.3 | 1.3 | 1.5 | 1.8 | 1.8 | 1.8 | 2.0 | 2.8 | 4.2 | 5.4 | 5.5 | 7.0 | 5.1 | 3.2 | 5.6 | 7.4 | 2.8 | 7.4 |
| 21-Sep | 3.9 | 3.4 | 3.4 | 3.7 | 3.5 | 4.4 | 5.5 | 5.5 | 6.5 | 4.0 | 6.4 | 4.1 | 2.3 | 1.5 | 1.5 | 1.5 | 1.6 | 1.9 | 3.1 | 8.2 | 6.3 | 5.2 | 4.1 | 3.3 | 4.0 | 8.2 |
| 22-Sep | 3.2 | 3.0 | 4.2 | 4.4 | 4.1 | 7.6 | 8.3 | 16.0 | 13.4 | 10.6 | 9.7 | 11.2 | 3.9 | 4.1 | 4.3 | 3.8 | M | M | 19.3 | 13.7 | 7.7 | 10.5 | 8.2 | 7.5 | 8.1 | 19.3 |
| 23-Sep | 7.1 | 7.9 | 8.4 | 9.2 | 12.3 | 9.7 | 7.7 | 7.4 | 7.8 | 8.4 | 10.0 | 7.4 | 7.1 | 9.8 | 10.4 | 7.3 | 8.1 | 8.0 | 6.9 | 8.0 | 5.7 | 5.7 | 4.9 | 5.0 | 7.9 | 12.3 |
| 24-Sep | 5.2 | 5.2 | 5.5 | 5.1 | 6.7 | 6.1 | 7.8 | 7.4 | 6.8 | 6.1 | 5.1 | 3.6 | 2.7 | 2.4 | 2.1 | 2.0 | 1.8 | 1.8 | 1.9 | 1.7 | 1.5 | 1.5 | 1.6 | 1.6 | 3.9 | 7.8 |
| 25-Sep | 1.5 | 1.6 | 1.5 | 1.5 | 1.4 | 1.4 | 1.4 | 1.3 | 1.4 | 1.5 | 1.6 | 1.8 | 1.8 | 1.9 | 1.8 | 1.7 | 1.8 | 1.9 | 4.5 | 9.7 | 13.5 | 6.0 | 6.3 | 5.6 | 3.1 | 13.5 |
| 26-Sep | 7.0 | 4.5 | 3.0 | 3.5 | 3.9 | 4.9 | 6.2 | 5.7 | 12.2 | 9.4 | 11.8 | 17.6 | 11.8 | 12.5 | 4.8 | 4.8 | 6.7 | 6.9 | 11.9 | 10.4 | 7.3 | 11.9 | 6.4 | 7.3 | 8.0 | 17.6 |
| 27-Sep | 6.4 | 5.2 | 5.7 | 6.8 | 15.9 | 6.5 | 3.1 | 2.6 | 1.5 | 1.3 | 1.5 | 1.7 | 2.0 | 2.3 | C | C | 2.5 | 2.9 | 3.8 | 3.4 | 2.9 | 3.4 | 5.5 | 6.8 | 4.2 | 15.9 |
| 28-Sep | 3.2 | 2.8 | 3.0 | 2.4 | 2.3 | 2.5 | 2.7 | 2.9 | 3.6 | 6.9 | 8.2 | 4.9 | 3.1 | 2.2 | 2.4 | 2.7 | 5.9 | 6.2 | 9.4 | 20.9 | 15.8 | 10.2 | 7.9 | 6.2 | 5.8 | 20.9 |
| 29-Sep | 6.2 | 5.9 | 8.4 | 7.1 | 8.6 | 9.4 | 9.6 | 10.7 | 11.9 | 10.6 | 8.5 | 9.5 | 13.4 | 9.8 | 8.2 | 7.4 | 8.9 | 14.3 | 15.9 | 15.9 | 13.1 | 11.9 | 10.1 | 8.1 | 10.1 | 15.9 |
| 30-Sep | 8.5 | 9.1 | 7.6 | 8.2 | 6.3 | 6.8 | 6.8 | 6.1 | 8.2 | 6.7 | 6.7 | 7.2 | 8.6 | 8.2 | 8.7 | 8.0 | 6.2 | 5.5 | 5.3 | 3.9 | 4.1 | 3.6 | 2.7 | 2.3 | 6.5 | 9.1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration M - Maintenance | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³ | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 447 | 62.61 | 62.61 |
| 6 - 15 | 188 | 26.33 | 88.94 |
| 16 - 25 | 11 | 1.54 | 90.48 |
| 26 - 80 | 0 | 0.00 | 90.48 |
| > 81.0 | 0 | 0.00 | 90.48 |

Total Number of Valid Hours: 714

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 - Bertha Ganter - September 2016**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|------------------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 45 | 6 | 0 | 1 | 6 | 3 | 8 | 24 | 47 | 61 | 27 | 35 | 23 | 80 | 47 | 34 | 447 |
| 6 - 15 | 14 | 1 | 0 | 3 | 1 | 1 | 5 | 48 | 57 | 16 | 14 | 7 | 6 | 3 | 4 | 8 | 188 |
| 16 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 11 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 59 | 7 | 0 | 4 | 7 | 4 | 13 | 75 | 109 | 79 | 41 | 42 | 30 | 83 | 51 | 42 | 646 |

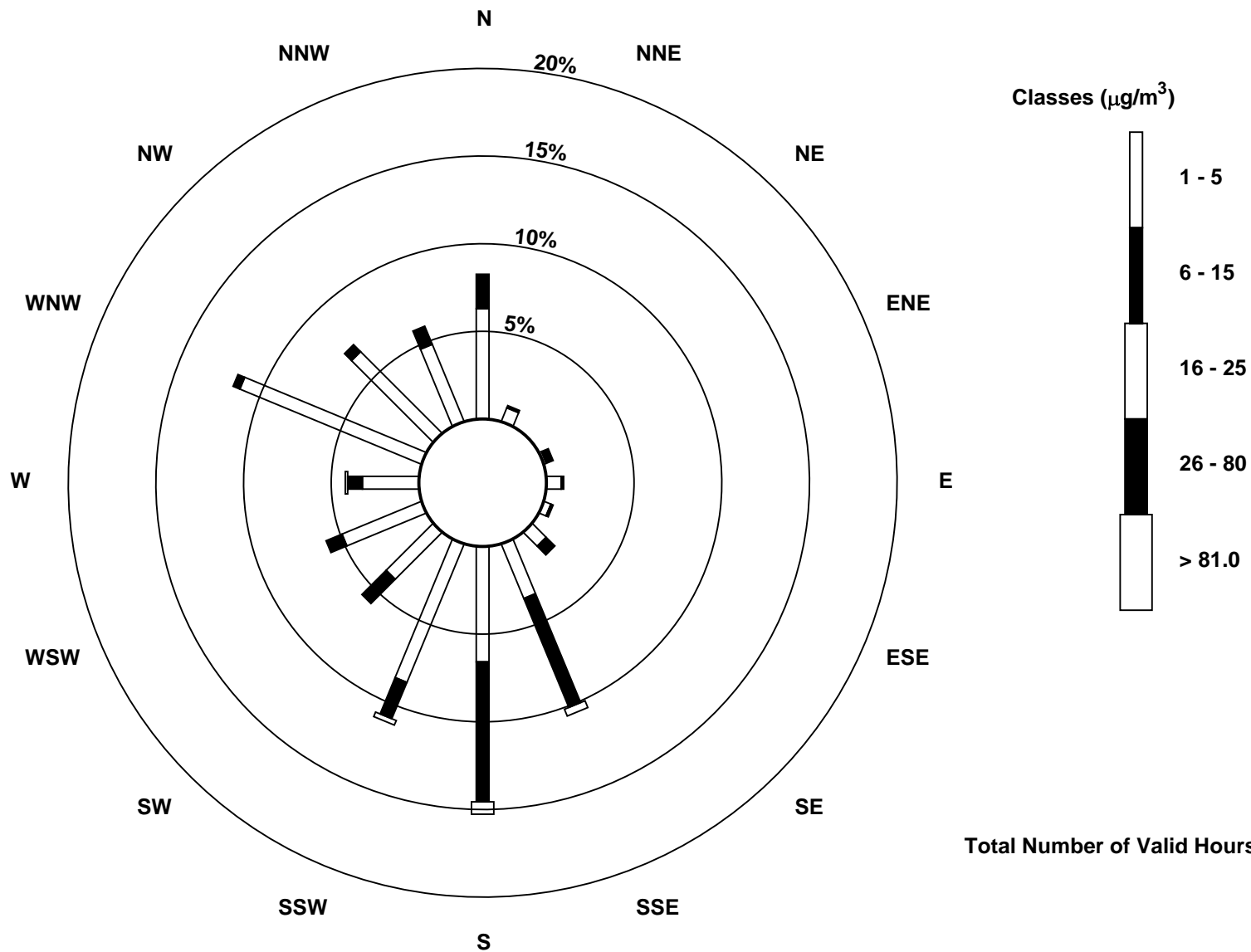
Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





| | | | | | | | |
|----------------------------------------|--------------------------------------------|------------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 | Maximum Value: 28 ppb on Sep 10 06:00 | Maximum Daily Average: 1.2 ppb on Sep 10 | Hours in Service: 720 | Hours of Data: 604 | Hours of Missing Data: 116 | Hours of Calibration: 55 | Percent Operational Time: 91.5 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Maximum Diurnal Average: 1.7 ppb at hour 6 | Minimum Daily Average: 0.0 ppb on Sep 1 | Minimum Diurnal Average: 0.0 ppb at hour 1 | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0 | | | |
| Monthly Average: 0.0 ppb | | | | | | | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|----|
| | 1 | 2 | 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 | Z | RE | RE | RE | 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 | Z | RE | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 3-Sep | 0 | 0 | 0 | Z | RE | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 4-Sep | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 9-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 |
| 10-Sep | 0 | 0 | 0 | 0 | Z | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 28 |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | 0 | -- | 0 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 15-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 |
| 16-Sep | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | M | 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 | Z | RE | RE | 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 | Z | RE | RE | 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 | Z | RE | RE | 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 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 21-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 |
| 22-Sep | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 27-Sep | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | C | C | C | C | C | C | C | C | C | C | C | 0 | 0 | 0 | 0 | -- | 0 |
| 28-Sep | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | RE | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |

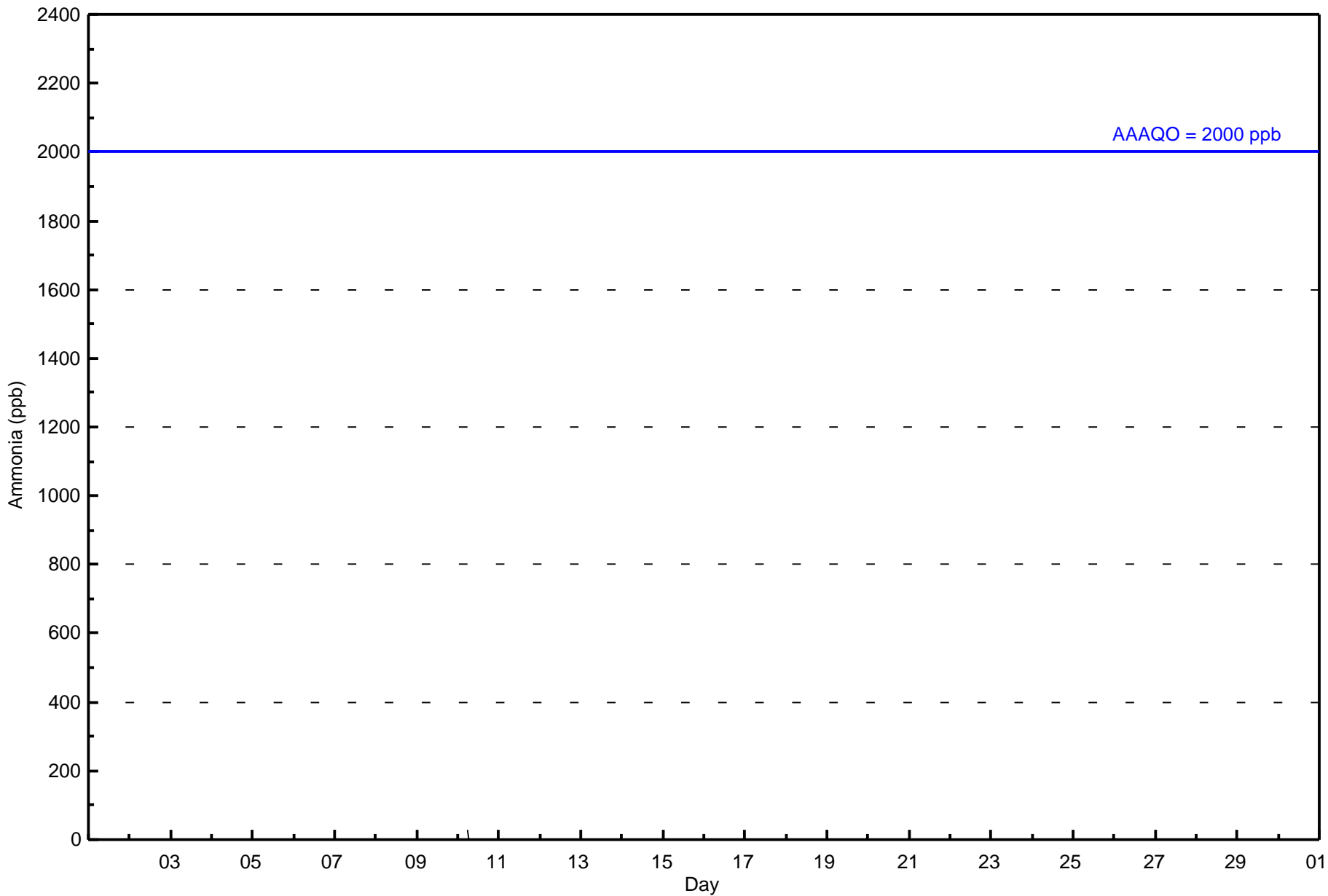
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 603 | 99.83 | 99.83 |
| 6 - 10 | 0 | 0.00 | 99.83 |
| 11 - 15 | 0 | 0.00 | 99.83 |
| 16 - 20 | 0 | 0.00 | 99.83 |
| 21 - 25 | 0 | 0.00 | 99.83 |
| > 26 | 1 | 0.17 | 100.00 |

Total Number of Valid Hours: 604

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 46 | 7 | 0 | 4 | 6 | 3 | 12 | 69 | 97 | 62 | 41 | 36 | 25 | 75 | 68 | 52 | 603 |
| 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Totals | 46 | 7 | 0 | 4 | 6 | 3 | 12 | 69 | 98 | 62 | 41 | 36 | 25 | 75 | 68 | 52 | 604 |

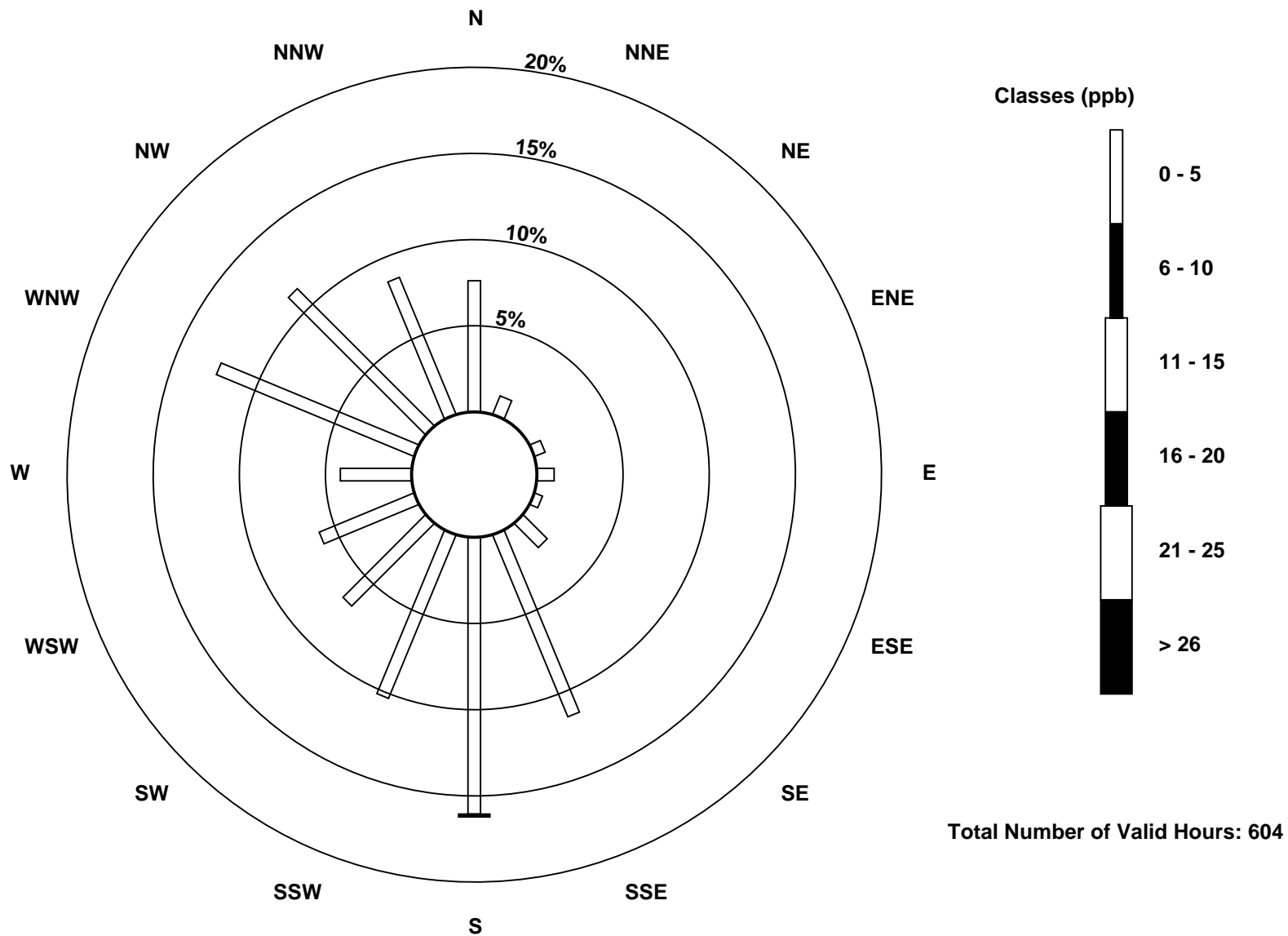
Total Number of Valid Hours: 604

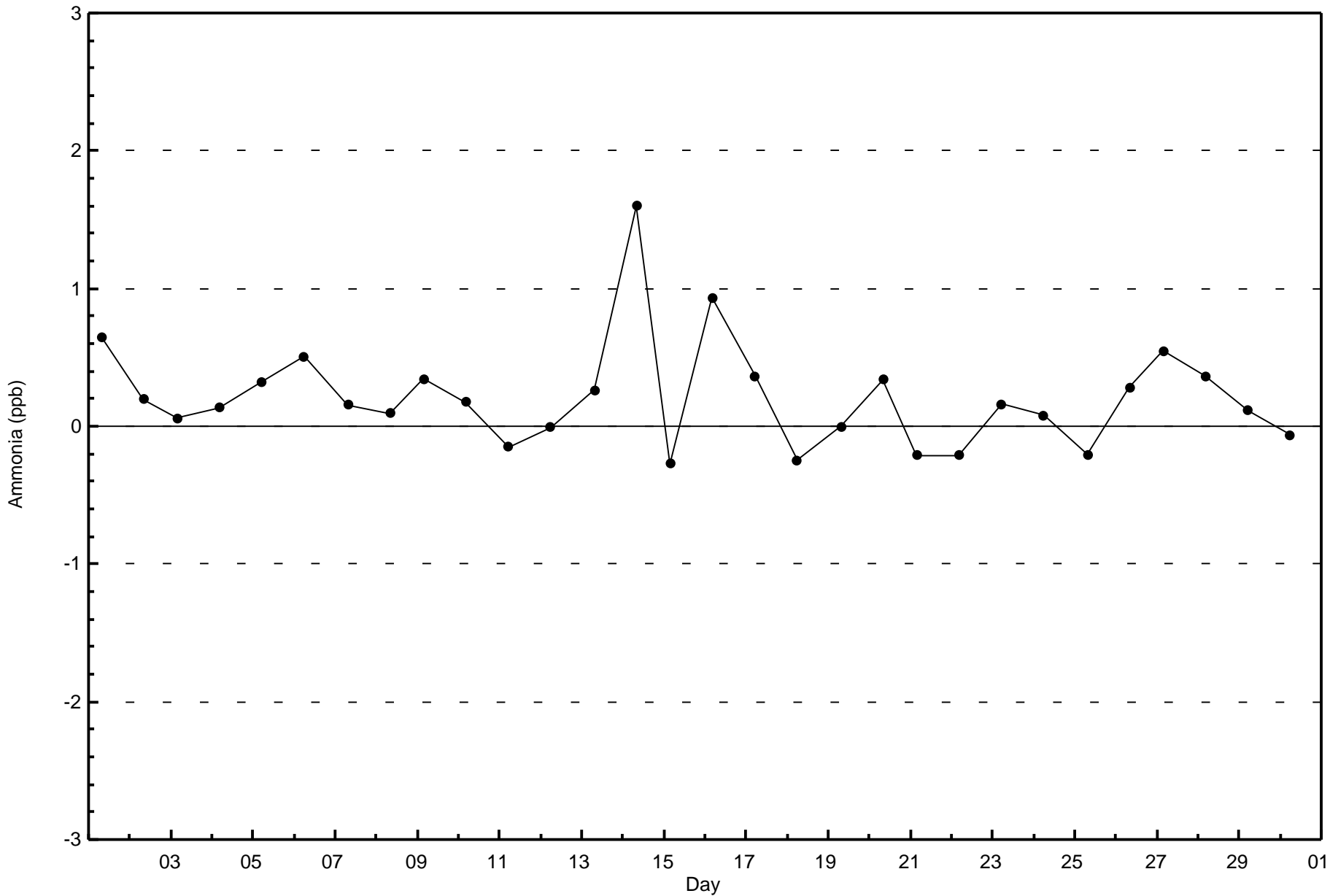
Total Number of Hours: 720

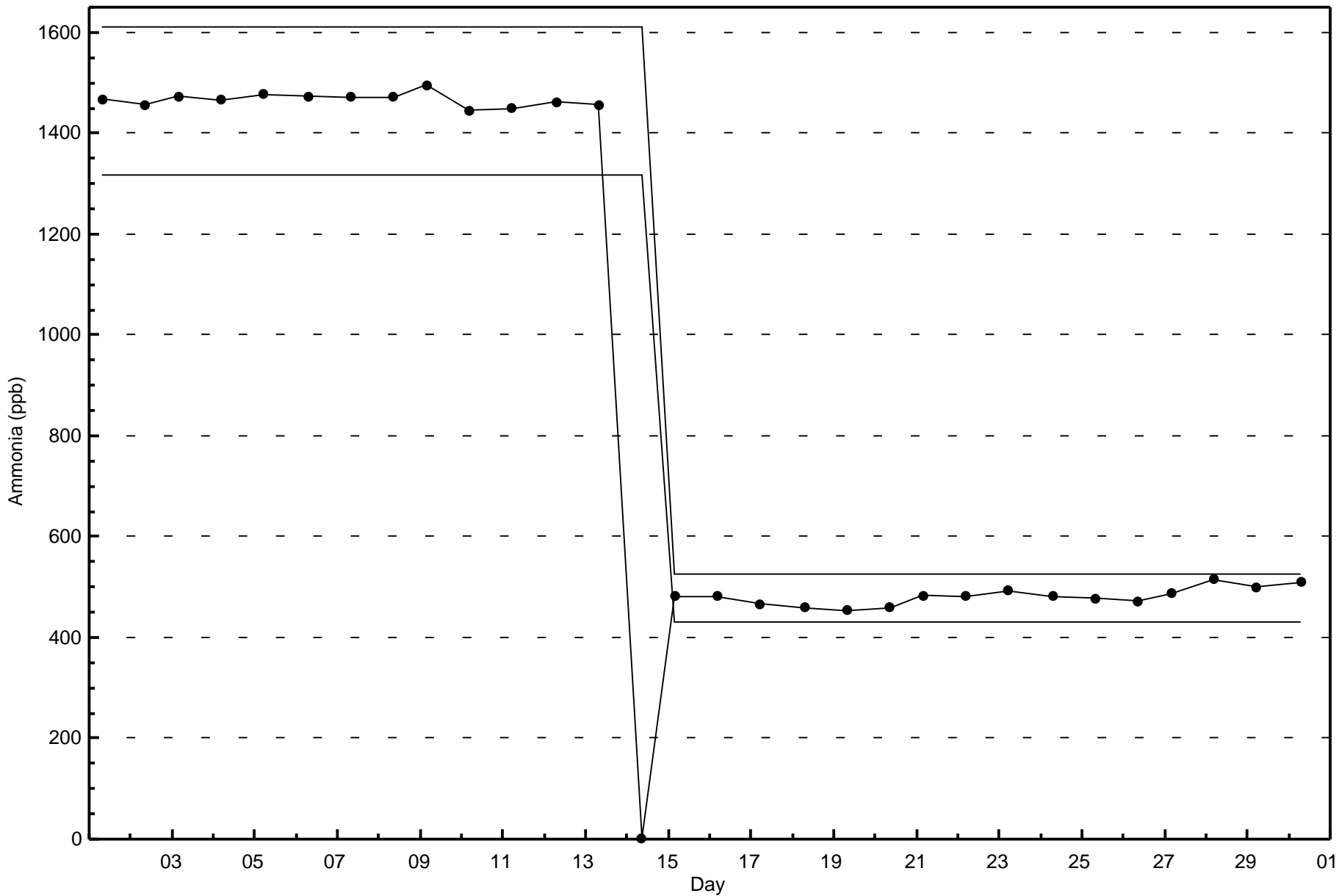


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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







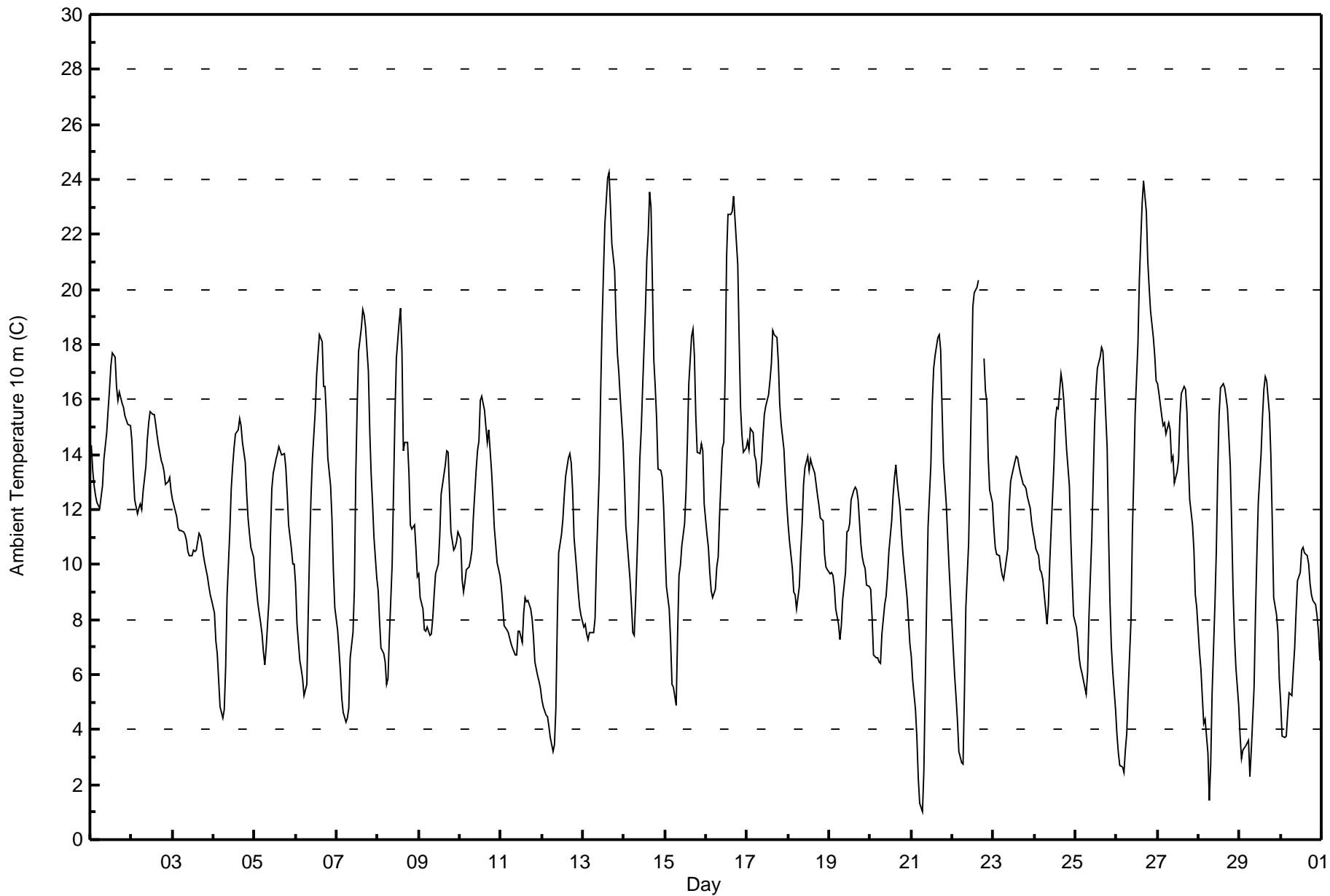


| Maximum Value: 24.2 C on Sep 13 16:00 | | Maximum Daily Average: 15.4 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 1.0 C on Sep 21 07:00 | | Minimum Daily Average: 7.5 C on Sep 11 | | Hours of Data: 718 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.4 C at hour 16 | | Minimum Diurnal Average: 7.0 C at hour 7 | | Hours of Missing Data: 2 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.51 C | | Percentiles: P ₁ = 2.6 P ₁₀ = 5.7 Q ₁ = 8.4 Median = 11.3 Q ₃ = 14.4 P ₉₀ = 17.1 P ₉₉ = 22.9 | | 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 | 13.4 | 12.9 | 12.5 | 12.3 | 12.1 | 12.5 | 12.8 | 13.8 | 14.8 | 15.6 | 16.4 | 17.2 | 17.7 | 17.5 | 16.5 | 16.0 | 16.3 | 15.9 | 15.7 | 15.4 | 15.2 | 15.1 | 15.0 | 14.9 | 17.7 |
| 2-Sep | 14.5 | 13.3 | 12.4 | 11.8 | 12.0 | 12.2 | 12.0 | 12.6 | 13.6 | 14.5 | 15.2 | 15.6 | 15.4 | 15.4 | 15.1 | 14.7 | 14.3 | 13.8 | 13.6 | 13.4 | 12.9 | 13.0 | 13.1 | 12.7 | 13.6 | 15.6 |
| 3-Sep | 12.4 | 12.1 | 11.7 | 11.4 | 11.2 | 11.2 | 11.2 | 11.1 | 10.9 | 10.5 | 10.3 | 10.3 | 10.5 | 10.5 | 11.1 | 11.0 | 10.8 | 10.4 | 10.1 | 9.6 | 9.2 | 8.9 | 8.7 | 10.7 | 12.4 | |
| 4-Sep | 8.2 | 7.2 | 6.8 | 5.8 | 4.8 | 4.4 | 4.7 | 6.2 | 8.9 | 11.2 | 12.8 | 13.6 | 14.2 | 14.7 | 14.9 | 15.3 | 15.0 | 14.4 | 13.7 | 12.6 | 11.7 | 11.1 | 10.6 | 10.3 | 10.6 | 15.3 |
| 5-Sep | 9.6 | 9.1 | 8.6 | 7.9 | 7.5 | 6.8 | 6.4 | 7.0 | 8.7 | 11.0 | 12.8 | 13.3 | 13.8 | 14.0 | 14.3 | 14.1 | 14.0 | 13.5 | 12.6 | 11.5 | 10.6 | 10.0 | 10.0 | 10.9 | 14.3 | |
| 6-Sep | 9.3 | 7.8 | 6.5 | 6.2 | 5.9 | 5.2 | 5.6 | 8.2 | 10.6 | 12.5 | 13.8 | 15.5 | 16.9 | 17.7 | 18.4 | 18.1 | 16.5 | 16.5 | 15.4 | 13.9 | 12.9 | 11.6 | 9.8 | 8.5 | 11.8 | 18.4 |
| 7-Sep | 7.6 | 6.9 | 6.1 | 5.2 | 4.6 | 4.3 | 4.4 | 4.8 | 6.6 | 7.5 | 9.1 | 13.3 | 15.8 | 17.7 | 18.6 | 19.3 | 19.1 | 18.6 | 17.0 | 14.8 | 13.3 | 12.2 | 11.0 | 9.5 | 11.1 | 19.3 |
| 8-Sep | 9.0 | 7.9 | 7.0 | 6.8 | 6.5 | 5.6 | 5.8 | 7.3 | 10.0 | 12.7 | 15.4 | 17.5 | 18.8 | 19.3 | 17.7 | 14.1 | 14.5 | 14.4 | 13.3 | 11.4 | 11.3 | 11.4 | 10.6 | 9.6 | 11.6 | 19.3 |
| 9-Sep | 9.6 | 8.8 | 8.4 | 7.6 | 7.6 | 7.7 | 7.4 | 7.5 | 8.1 | 8.9 | 9.6 | 10.0 | 11.0 | 12.6 | 12.9 | 13.6 | 14.1 | 14.1 | 12.6 | 11.2 | 10.5 | 10.7 | 10.8 | 11.2 | 10.3 | 14.1 |
| 10-Sep | 10.9 | 9.4 | 9.0 | 9.4 | 9.8 | 9.9 | 10.2 | 10.5 | 11.7 | 13.4 | 14.1 | 14.5 | 15.9 | 16.1 | 15.6 | 15.0 | 14.4 | 14.9 | 13.4 | 12.5 | 11.4 | 10.7 | 10.1 | 9.6 | 12.2 | 16.1 |
| 11-Sep | 9.2 | 8.5 | 7.8 | 7.6 | 7.5 | 7.3 | 7.1 | 7.0 | 6.7 | 6.7 | 7.6 | 7.6 | 7.1 | 8.2 | 8.8 | 8.6 | 8.7 | 8.4 | 8.0 | 7.4 | 6.5 | 6.0 | 5.8 | 5.5 | 7.5 | 9.2 |
| 12-Sep | 5.1 | 4.8 | 4.5 | 4.5 | 4.1 | 3.7 | 3.2 | 3.5 | 4.8 | 7.9 | 10.4 | 11.1 | 11.7 | 12.5 | 13.2 | 13.9 | 14.0 | 13.7 | 12.7 | 11.0 | 9.7 | 9.0 | 8.4 | 8.1 | 8.6 | 14.0 |
| 13-Sep | 7.7 | 7.8 | 7.5 | 7.3 | 7.5 | 7.5 | 7.5 | 8.1 | 10.1 | 13.3 | 16.2 | 18.7 | 20.6 | 22.4 | 24.1 | 24.2 | 23.0 | 21.7 | 20.7 | 18.9 | 17.6 | 17.0 | 16.1 | 14.5 | 15.0 | 24.2 |
| 14-Sep | 13.1 | 11.4 | 10.8 | 9.5 | 8.5 | 7.5 | 7.4 | 8.7 | 11.8 | 13.8 | 14.9 | 16.4 | 19.3 | 21.1 | 22.0 | 23.5 | 23.0 | 17.5 | 16.5 | 15.3 | 13.5 | 13.4 | 13.2 | 12.1 | 14.3 | 23.5 |
| 15-Sep | 10.6 | 9.2 | 8.4 | 7.2 | 5.6 | 5.5 | 4.9 | 7.5 | 9.6 | 10.0 | 10.7 | 11.5 | 12.7 | 14.5 | 16.6 | 18.3 | 18.5 | 17.6 | 15.4 | 14.1 | 14.1 | 14.4 | 14.1 | 12.2 | 11.8 | 18.5 |
| 16-Sep | 11.1 | 10.6 | 9.7 | 9.0 | 8.8 | 9.1 | 9.9 | 10.3 | 11.8 | 14.2 | 14.4 | 16.9 | 21.2 | 22.7 | 22.7 | 22.8 | 23.4 | 22.6 | 20.9 | 18.1 | 15.7 | 14.7 | 14.1 | 14.2 | 15.4 | 23.4 |
| 17-Sep | 14.5 | 14.2 | 15.0 | 14.8 | 14.0 | 13.8 | 13.0 | 12.9 | 13.7 | 14.7 | 15.5 | 15.8 | 16.2 | 16.7 | 17.3 | 18.5 | 18.4 | 18.2 | 17.3 | 15.8 | 15.1 | 14.2 | 13.1 | 12.2 | 15.2 | 18.5 |
| 18-Sep | 11.4 | 10.8 | 9.8 | 9.0 | 8.9 | 8.4 | 9.2 | 10.5 | 11.5 | 12.9 | 13.5 | 13.9 | 13.4 | 13.8 | 13.6 | 13.3 | 12.9 | 12.5 | 12.2 | 11.7 | 11.6 | 10.4 | 9.9 | 9.8 | 11.5 | 13.9 |
| 19-Sep | 9.7 | 9.7 | 9.6 | 9.2 | 8.4 | 7.9 | 7.3 | 7.8 | 8.7 | 9.7 | 11.2 | 11.2 | 11.5 | 12.4 | 12.7 | 12.8 | 12.7 | 12.3 | 10.8 | 10.3 | 10.0 | 9.9 | 9.3 | 9.2 | 10.2 | 12.8 |
| 20-Sep | 9.1 | 8.1 | 6.7 | 6.6 | 6.6 | 6.5 | 6.4 | 7.5 | 8.6 | 8.8 | 9.6 | 10.5 | 11.6 | 12.5 | 13.1 | 13.6 | 12.9 | 12.1 | 11.1 | 10.4 | 9.9 | 8.8 | 8.0 | 7.1 | 9.4 | 13.6 |
| 21-Sep | 6.6 | 5.8 | 4.7 | 3.7 | 2.3 | 1.3 | 1.0 | 2.5 | 5.6 | 8.7 | 11.4 | 13.6 | 15.9 | 17.1 | 17.6 | 18.3 | 18.4 | 17.8 | 15.7 | 13.8 | 12.2 | 11.0 | 9.9 | 8.9 | 10.2 | 18.4 |
| 22-Sep | 6.9 | 5.9 | 5.2 | 4.3 | 3.2 | 2.8 | 2.8 | 5.4 | 8.4 | 10.8 | 13.4 | 16.3 | 19.4 | 19.9 | 20.1 | 20.4 | M | M | 17.5 | 16.3 | 15.9 | 13.9 | 12.7 | 12.3 | 11.5 | 20.4 |
| 23-Sep | 11.4 | 10.6 | 10.4 | 10.3 | 9.9 | 9.6 | 9.5 | 9.8 | 10.6 | 12.1 | 13.0 | 13.3 | 13.7 | 14.0 | 13.9 | 13.6 | 13.3 | 12.9 | 12.9 | 12.8 | 12.5 | 12.1 | 11.6 | 11.2 | 11.9 | 14.0 |
| 24-Sep | 11.0 | 10.6 | 10.3 | 9.8 | 9.7 | 9.5 | 8.4 | 7.8 | 8.5 | 10.1 | 11.3 | 13.7 | 15.3 | 15.7 | 15.7 | 16.9 | 16.6 | 16.0 | 15.1 | 14.2 | 12.9 | 11.0 | 9.5 | 8.1 | 12.0 | 16.9 |
| 25-Sep | 7.7 | 7.3 | 6.6 | 6.2 | 6.1 | 5.6 | 5.3 | 6.0 | 8.2 | 11.0 | 13.1 | 15.1 | 16.4 | 17.1 | 17.6 | 17.9 | 17.7 | 16.6 | 14.3 | 11.1 | 8.6 | 7.0 | 6.1 | 4.7 | 10.5 | 17.9 |
| 26-Sep | 3.8 | 3.1 | 2.7 | 2.6 | 2.5 | 3.3 | 3.8 | 5.4 | 7.9 | 11.1 | 13.2 | 15.5 | 18.1 | 20.3 | 21.8 | 23.1 | 23.9 | 22.8 | 21.0 | 20.1 | 19.2 | 18.2 | 17.6 | 16.7 | 13.2 | 23.9 |
| 27-Sep | 16.6 | 16.2 | 15.4 | 15.1 | 15.2 | 14.7 | 15.1 | 14.9 | 13.8 | 13.9 | 13.0 | 13.4 | 13.8 | 15.4 | 16.2 | 16.5 | 16.4 | 15.5 | 13.7 | 12.4 | 11.4 | 10.5 | 8.9 | 8.5 | 14.0 | 16.6 |
| 28-Sep | 6.8 | 6.2 | 5.2 | 4.2 | 4.4 | 3.2 | 1.4 | 2.8 | 5.4 | 8.6 | 10.5 | 13.3 | 15.5 | 16.4 | 16.6 | 16.4 | 16.1 | 15.7 | 13.6 | 11.4 | 9.0 | 7.4 | 6.3 | 4.9 | 9.2 | 16.6 |
| 29-Sep | 3.8 | 2.9 | 3.3 | 3.4 | 3.5 | 3.6 | 2.3 | 3.3 | 5.5 | 8.2 | 10.4 | 12.3 | 14.0 | 15.4 | 16.4 | 16.8 | 16.7 | 15.4 | 14.0 | 11.5 | 8.8 | 8.2 | 7.6 | 5.9 | 8.9 | 16.8 |
| 30-Sep | 5.0 | 3.8 | 3.7 | 3.7 | 4.6 | 5.3 | 5.3 | 6.2 | 6.9 | 8.3 | 9.4 | 9.7 | 10.5 | 10.6 | 10.4 | 10.3 | 10.0 | 9.3 | 8.9 | 8.7 | 8.5 | 8.2 | 7.6 | 6.5 | 7.6 | 10.6 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 275 | 38.30 | 38.30 |
| 10 - 20 | 416 | 57.94 | 96.24 |
| > 20 | 27 | 3.76 | 100.00 |

Total Number of Valid Hours: 718

Total Number of Hours: 720

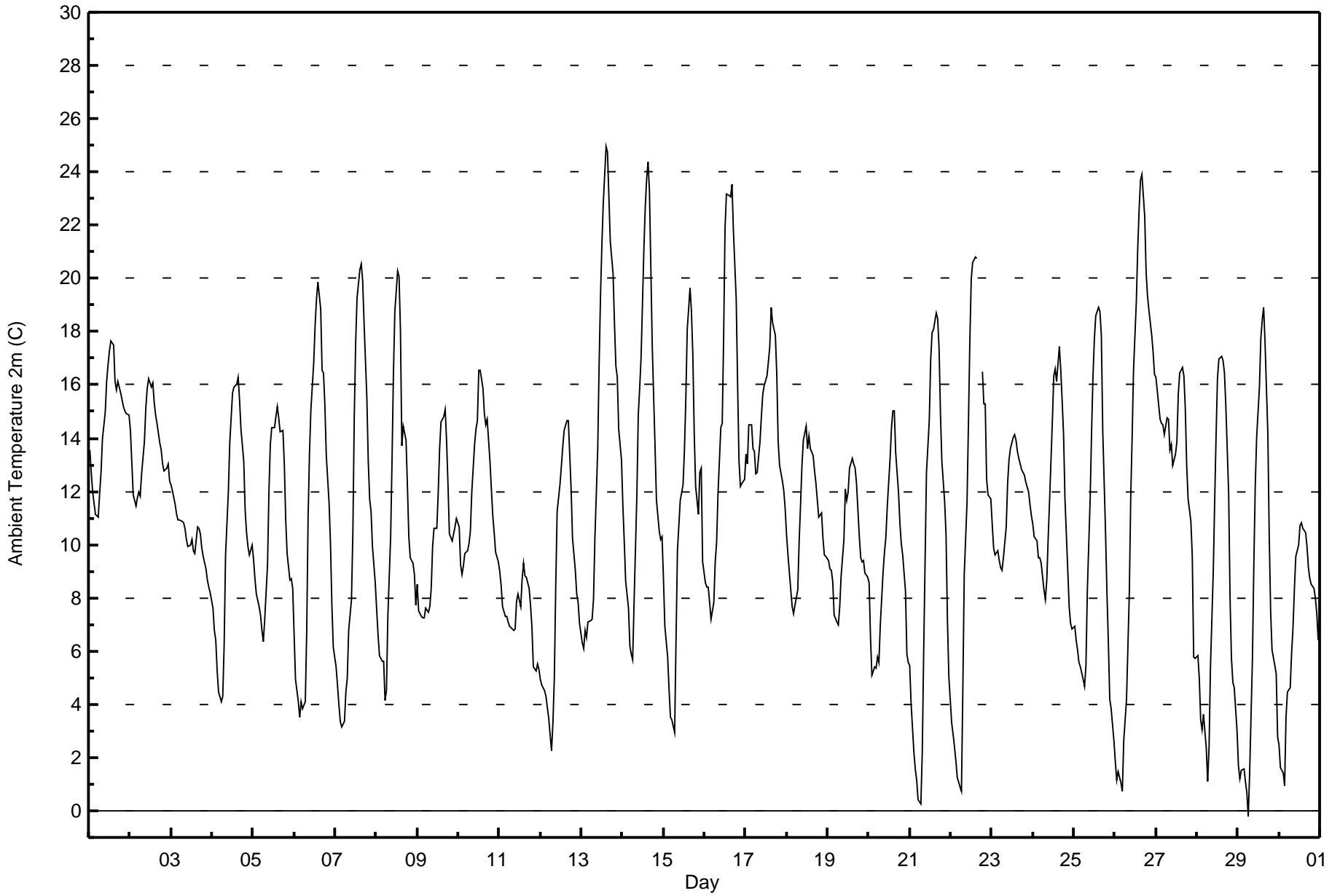


| | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 25.0 C on Sep 13 15:00 | Maximum Daily Average: 14.7 C on Sep 17 | Hours in Service: 720 |
| Minimum Value: -0.2 C on Sep 29 07:00 | Minimum Daily Average: 7.0 C on Sep 30 | Hours of Data: 718 |
| Maximum Diurnal Average: 16.9 C at hour 15 | Minimum Diurnal Average: 6.4 C at hour 7 | Hours of Missing Data: 2 |
| Monthly Average: 11.11 C | Percentiles: P ₁ = 0.9 P ₁₀ = 4.6 Q ₁ = 7.6 Median = 10.9 Q ₃ = 14.5 P ₉₀ = 17.5 P ₉₉ = 23.5 | 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 | 13.6 | 12.7 | 12.0 | 11.6 | 11.1 | 11.0 | 11.9 | 12.7 | 14.0 | 15.0 | 16.1 | 16.8 | 17.3 | 17.7 | 17.5 | 16.1 | 15.8 | 16.1 | 15.7 | 15.4 | 15.2 | 15.0 | 14.9 | 14.9 | 14.6 | 17.7 |
| 2-Sep | 14.3 | 13.1 | 11.9 | 11.5 | 11.8 | 12.0 | 11.8 | 12.7 | 13.9 | 15.1 | 15.9 | 16.2 | 15.9 | 16.1 | 15.4 | 14.9 | 14.5 | 13.8 | 13.6 | 13.0 | 12.7 | 12.9 | 13.0 | 12.4 | 13.7 | 16.2 |
| 3-Sep | 12.2 | 12.0 | 11.5 | 11.2 | 10.9 | 10.9 | 10.9 | 10.8 | 10.6 | 10.2 | 9.9 | 10.0 | 10.2 | 9.8 | 9.7 | 10.7 | 10.6 | 10.4 | 9.9 | 9.6 | 9.1 | 8.7 | 8.4 | 8.2 | 10.3 | 12.2 |
| 4-Sep | 7.6 | 6.8 | 6.4 | 5.2 | 4.5 | 4.1 | 4.3 | 6.3 | 9.6 | 12.0 | 13.8 | 14.8 | 15.7 | 15.9 | 16.0 | 16.3 | 15.5 | 14.4 | 13.1 | 11.3 | 10.5 | 9.9 | 9.6 | 10.0 | 10.6 | 16.3 |
| 5-Sep | 9.5 | 8.7 | 8.1 | 7.7 | 7.4 | 6.8 | 6.4 | 7.2 | 9.3 | 12.0 | 13.8 | 14.4 | 14.4 | 14.8 | 15.2 | 14.7 | 14.2 | 14.3 | 13.0 | 10.9 | 9.7 | 8.7 | 8.7 | 8.4 | 10.8 | 15.2 |
| 6-Sep | 6.6 | 4.9 | 4.1 | 3.5 | 4.1 | 3.8 | 4.1 | 6.7 | 11.0 | 13.4 | 15.1 | 16.8 | 18.2 | 19.2 | 19.8 | 18.9 | 16.5 | 16.4 | 15.2 | 13.4 | 11.6 | 10.0 | 7.7 | 6.1 | 11.1 | 19.8 |
| 7-Sep | 5.4 | 4.7 | 4.0 | 3.3 | 3.2 | 3.4 | 4.4 | 5.0 | 6.8 | 7.9 | 10.5 | 14.8 | 17.6 | 19.3 | 20.3 | 20.6 | 19.9 | 18.4 | 15.5 | 13.1 | 11.7 | 11.2 | 9.9 | 8.6 | 10.8 | 20.6 |
| 8-Sep | 7.6 | 6.6 | 5.8 | 5.6 | 5.6 | 4.1 | 4.5 | 7.3 | 10.3 | 13.2 | 16.4 | 18.7 | 20.3 | 20.1 | 18.1 | 13.7 | 14.4 | 13.9 | 12.2 | 10.3 | 9.5 | 9.3 | 8.9 | 7.7 | 11.0 | 20.3 |
| 9-Sep | 8.5 | 7.5 | 7.3 | 7.3 | 7.3 | 7.6 | 7.5 | 7.7 | 8.4 | 9.9 | 10.6 | 10.6 | 11.9 | 13.6 | 14.6 | 14.8 | 15.1 | 13.9 | 12.2 | 10.4 | 10.1 | 10.4 | 10.6 | 11.0 | 10.4 | 15.1 |
| 10-Sep | 10.6 | 9.3 | 8.9 | 9.2 | 9.7 | 9.8 | 10.0 | 10.5 | 12.0 | 13.7 | 14.3 | 14.6 | 16.5 | 16.5 | 15.9 | 14.9 | 14.5 | 14.7 | 13.2 | 12.1 | 11.1 | 10.4 | 9.7 | 9.4 | 12.1 | 16.5 |
| 11-Sep | 9.0 | 8.5 | 7.6 | 7.3 | 7.3 | 7.1 | 6.9 | 6.9 | 6.8 | 6.8 | 7.9 | 8.1 | 7.7 | 8.7 | 9.3 | 8.8 | 8.8 | 8.4 | 7.7 | 6.9 | 5.4 | 5.2 | 5.5 | 5.3 | 7.4 | 9.3 |
| 12-Sep | 4.9 | 4.7 | 4.5 | 4.3 | 3.9 | 3.4 | 2.3 | 3.3 | 5.0 | 8.4 | 11.3 | 12.2 | 12.9 | 13.6 | 14.3 | 14.7 | 14.7 | 13.4 | 12.1 | 10.3 | 9.0 | 8.1 | 7.8 | 7.1 | 8.6 | 14.7 |
| 13-Sep | 6.3 | 6.1 | 6.8 | 6.5 | 7.1 | 7.2 | 7.2 | 8.0 | 10.2 | 13.5 | 16.7 | 19.3 | 21.3 | 22.8 | 25.0 | 24.8 | 23.1 | 21.4 | 20.2 | 18.3 | 16.7 | 16.3 | 14.4 | 13.2 | 14.7 | 25.0 |
| 14-Sep | 11.4 | 10.1 | 8.6 | 7.6 | 6.2 | 5.9 | 5.7 | 7.8 | 11.9 | 14.9 | 15.8 | 17.0 | 21.1 | 22.7 | 23.7 | 24.4 | 23.3 | 17.5 | 15.5 | 13.6 | 11.7 | 10.5 | 10.2 | 10.3 | 13.6 | 24.4 |
| 15-Sep | 8.7 | 6.9 | 5.8 | 4.6 | 3.5 | 3.4 | 2.9 | 6.5 | 9.8 | 10.7 | 11.7 | 12.3 | 13.6 | 15.5 | 18.1 | 19.6 | 18.8 | 17.1 | 14.2 | 12.2 | 11.1 | 12.7 | 12.9 | 9.3 | 10.9 | 19.6 |
| 16-Sep | 8.6 | 8.4 | 8.4 | 7.8 | 7.2 | 7.8 | 9.4 | 10.1 | 11.9 | 14.4 | 14.5 | 17.7 | 21.9 | 23.1 | 23.1 | 23.0 | 23.5 | 21.8 | 19.2 | 16.0 | 13.1 | 12.2 | 12.3 | 12.5 | 14.5 | 23.5 |
| 17-Sep | 13.4 | 13.0 | 14.5 | 14.5 | 13.6 | 13.5 | 12.7 | 12.7 | 13.9 | 14.8 | 15.6 | 16.0 | 16.4 | 16.8 | 17.4 | 18.9 | 18.3 | 17.8 | 16.4 | 13.8 | 13.0 | 12.4 | 12.0 | 11.4 | 14.7 | 18.9 |
| 18-Sep | 10.4 | 9.6 | 8.3 | 7.7 | 7.4 | 7.7 | 8.3 | 10.2 | 11.5 | 13.0 | 13.9 | 14.4 | 13.6 | 14.1 | 13.6 | 13.4 | 12.8 | 12.3 | 11.7 | 11.0 | 11.2 | 10.2 | 9.6 | 9.5 | 11.1 | 14.4 |
| 19-Sep | 9.4 | 9.1 | 9.0 | 8.6 | 7.3 | 7.1 | 7.0 | 7.7 | 8.8 | 10.2 | 12.1 | 11.7 | 12.0 | 12.9 | 13.2 | 13.0 | 12.9 | 12.3 | 10.3 | 9.5 | 9.3 | 9.4 | 9.0 | 8.8 | 10.0 | 13.2 |
| 20-Sep | 8.6 | 6.5 | 5.1 | 5.4 | 5.4 | 5.8 | 5.6 | 7.0 | 9.0 | 9.7 | 10.3 | 11.4 | 13.2 | 14.4 | 15.0 | 15.0 | 13.5 | 12.0 | 10.8 | 10.0 | 9.6 | 8.3 | 5.9 | 5.5 | 9.3 | 15.0 |
| 21-Sep | 5.5 | 4.0 | 2.2 | 1.6 | 1.2 | 0.4 | 0.2 | 2.2 | 5.9 | 9.4 | 12.7 | 14.6 | 16.9 | 18.0 | 18.1 | 18.7 | 18.5 | 17.4 | 14.9 | 13.1 | 11.6 | 10.4 | 7.1 | 5.1 | 9.6 | 18.7 |
| 22-Sep | 3.3 | 2.9 | 2.4 | 1.9 | 1.3 | 0.9 | 0.7 | 4.6 | 8.9 | 11.6 | 14.6 | 17.6 | 20.0 | 20.6 | 20.8 | 20.8 | M | M | 16.5 | 15.3 | 15.3 | 12.4 | 11.9 | 11.7 | 10.7 | 20.8 |
| 23-Sep | 10.8 | 9.9 | 9.6 | 9.8 | 9.4 | 9.1 | 9.0 | 9.5 | 10.6 | 12.3 | 13.2 | 13.6 | 14.0 | 14.2 | 13.9 | 13.5 | 13.2 | 12.8 | 12.7 | 12.6 | 12.4 | 12.0 | 11.5 | 11.1 | 11.7 | 14.2 |
| 24-Sep | 10.8 | 10.3 | 10.1 | 9.5 | 9.5 | 9.3 | 8.3 | 7.9 | 8.7 | 10.2 | 11.7 | 14.7 | 16.4 | 16.6 | 16.1 | 17.5 | 16.6 | 15.4 | 14.1 | 11.7 | 9.0 | 7.7 | 7.0 | 6.8 | 11.5 | 17.5 |
| 25-Sep | 6.9 | 6.4 | 6.1 | 5.6 | 5.4 | 4.9 | 4.7 | 5.5 | 8.3 | 11.7 | 14.2 | 16.3 | 17.7 | 18.6 | 18.9 | 18.8 | 17.9 | 14.3 | 10.5 | 8.2 | 6.3 | 4.2 | 3.9 | 2.6 | 9.9 | 18.9 |
| 26-Sep | 1.8 | 1.2 | 1.5 | 1.1 | 0.7 | 2.6 | 3.4 | 4.2 | 8.2 | 11.8 | 14.0 | 16.6 | 19.1 | 21.1 | 22.6 | 23.7 | 23.9 | 22.4 | 20.2 | 19.4 | 18.8 | 17.9 | 17.2 | 16.4 | 12.9 | 23.9 |
| 27-Sep | 16.3 | 15.7 | 14.7 | 14.5 | 14.5 | 14.2 | 14.8 | 14.7 | 13.5 | 13.8 | 13.0 | 13.4 | 13.9 | 15.7 | 16.5 | 16.6 | 16.4 | 15.1 | 13.0 | 11.7 | 10.9 | 9.5 | 5.8 | 5.7 | 13.5 | 16.6 |
| 28-Sep | 5.8 | 5.0 | 3.4 | 3.1 | 3.6 | 2.4 | 1.1 | 2.4 | 5.4 | 9.0 | 11.6 | 14.1 | 16.3 | 17.0 | 17.1 | 16.9 | 16.5 | 15.2 | 11.9 | 8.0 | 5.7 | 4.8 | 4.6 | 3.0 | 8.5 | 17.1 |
| 29-Sep | 1.7 | 1.2 | 1.5 | 1.6 | 1.1 | 0.7 | -0.2 | 1.4 | 5.7 | 9.3 | 12.2 | 14.0 | 15.9 | 17.7 | 18.4 | 18.9 | 17.6 | 14.2 | 10.4 | 7.5 | 6.0 | 5.4 | 5.2 | 2.8 | 7.9 | 18.9 |
| 30-Sep | 2.5 | 1.6 | 1.4 | 1.0 | 3.5 | 4.5 | 4.6 | 5.9 | 6.9 | 8.4 | 9.6 | 10.0 | 10.7 | 10.8 | 10.6 | 10.4 | 9.9 | 9.1 | 8.7 | 8.5 | 8.3 | 8.0 | 7.4 | 6.4 | 7.0 | 10.8 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 8.4 | 7.6 | 7.1 | 6.7 | 6.5 | 6.4 | 6.4 | 7.5 | 9.6 | 11.5 | 13.1 | 14.4 | 15.8 | 16.6 | 16.9 | 16.9 | 16.2 | 15.0 | 13.5 | 11.9 | 10.9 | 10.1 | 9.4 | 8.7 | Diurnal Average | |
| 16.3 | 15.7 | 14.7 | 14.5 | 14.5 | 14.2 | 14.8 | 14.7 | 14.0 | 15.1 | 16.7 | 19.3 | 21.9 | 23.1 | 25.0 | 24.8 | 23.9 | 22.4 | 20.2 | 19.4 | 18.8 | 17.9 | 17.2 | 16.4 | Diurnal Maximum | |

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 1 | 0.14 | 0.14 |
| 0 - 10 | 303 | 42.20 | 42.34 |
| 10 - 20 | 383 | 53.34 | 95.68 |
| > 20 | 31 | 4.32 | 100.00 |

Total Number of Valid Hours: 718

Total Number of Hours: 720

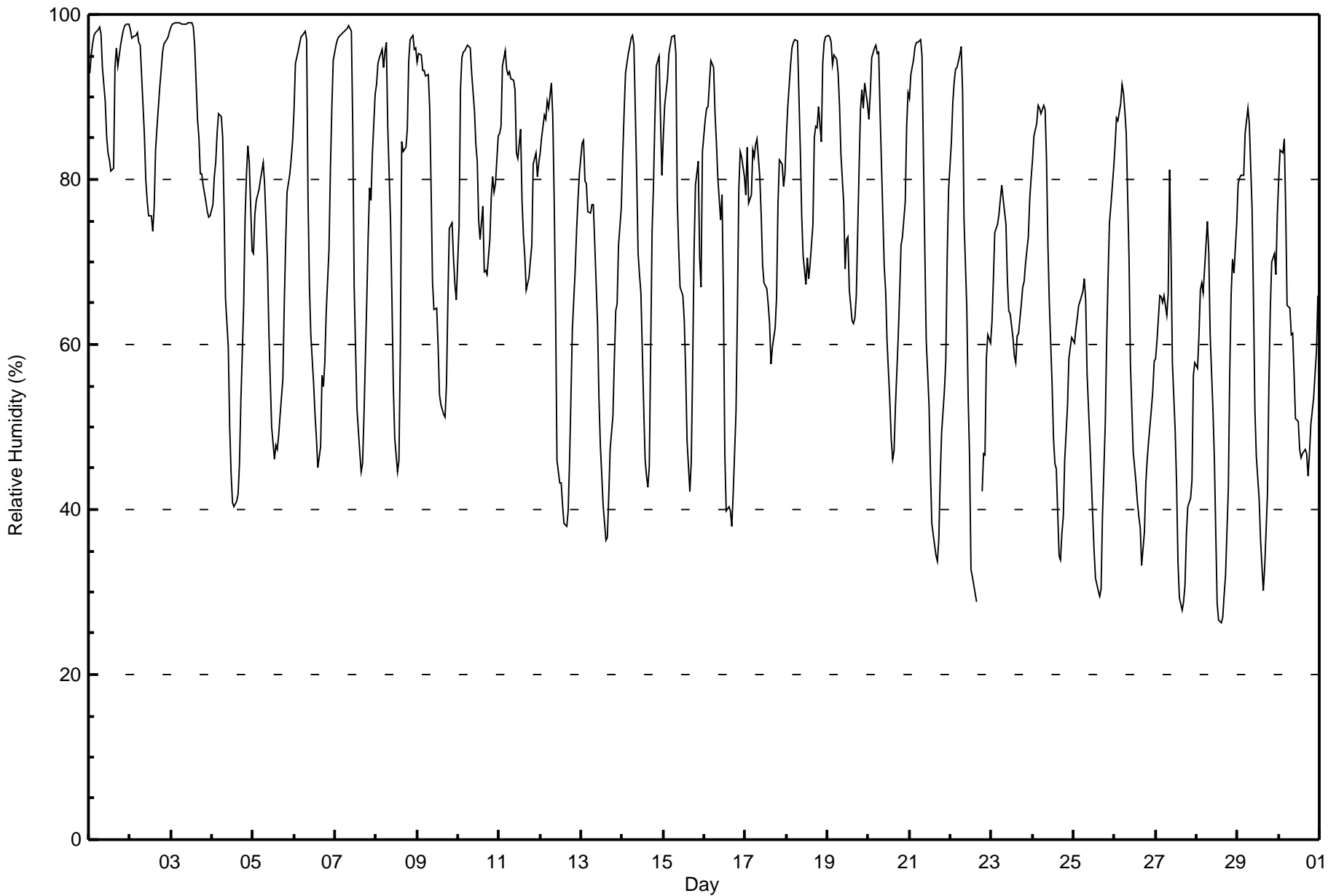


| | | |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 99 % on Sep 3 05:00 | Maximum Daily Average: 93.4 % on Sep 1 | Hours in Service: 720 |
| Minimum Value: 26 % on Sep 28 15:00 | Minimum Daily Average: 51.7 % on Sep 27 | Hours of Data: 718 |
| Maximum Diurnal Average: 88.9 % at hour 7 | Minimum Diurnal Average: 50.6 % at hour 15 | Hours of Missing Data: 2 |
| Monthly Average: 72.1 % | Percentiles: P ₁ = 29 P ₁₀ = 43 Q ₁ = 58 Median = 76 Q ₃ = 89 P ₉₀ = 96 P ₉₉ = 99 | Hours of Calibration: 0 |
| | | Percent Operational Time: 99.7 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 93 | 95 | 97 | 97 | 98 | 98 | 99 | 98 | 93 | 89 | 85 | 83 | 82 | 81 | 81 | 94 | 96 | 94 | 96 | 97 | 98 | 99 | 99 | 99 | 93.4 | 99 |
| 2-Sep | 98 | 97 | 97 | 98 | 98 | 97 | 96 | 93 | 85 | 80 | 77 | 76 | 76 | 74 | 77 | 84 | 86 | 91 | 93 | 95 | 96 | 97 | 97 | 98 | 89.8 | 98 |
| 3-Sep | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 96 | 87 | 85 | 81 | 81 | 79 | 77 | 76 | 75 | 76 | 91.6 | 99 |
| 4-Sep | 77 | 80 | 82 | 86 | 88 | 88 | 85 | 76 | 66 | 60 | 50 | 44 | 41 | 40 | 41 | 42 | 46 | 53 | 65 | 75 | 81 | 84 | 82 | 71 | 66.8 | 88 |
| 5-Sep | 71 | 76 | 77 | 79 | 80 | 81 | 82 | 79 | 70 | 62 | 56 | 50 | 46 | 48 | 47 | 49 | 51 | 56 | 65 | 72 | 79 | 81 | 83 | 85 | 67.6 | 85 |
| 6-Sep | 89 | 94 | 96 | 96 | 97 | 97 | 98 | 97 | 78 | 67 | 61 | 55 | 51 | 49 | 45 | 48 | 56 | 55 | 58 | 64 | 71 | 81 | 88 | 94 | 74.4 | 98 |
| 7-Sep | 96 | 97 | 97 | 97 | 98 | 98 | 98 | 98 | 99 | 98 | 86 | 67 | 59 | 52 | 47 | 45 | 46 | 51 | 65 | 73 | 79 | 77 | 83 | 90 | 79.1 | 99 |
| 8-Sep | 91 | 94 | 95 | 96 | 94 | 95 | 97 | 87 | 75 | 65 | 55 | 49 | 45 | 46 | 59 | 85 | 83 | 84 | 86 | 94 | 97 | 97 | 96 | 96 | 81.7 | 97 |
| 9-Sep | 94 | 95 | 95 | 93 | 93 | 92 | 93 | 89 | 79 | 68 | 64 | 64 | 60 | 54 | 53 | 52 | 51 | 55 | 65 | 74 | 75 | 71 | 67 | 65 | 73.4 | 95 |
| 10-Sep | 74 | 91 | 95 | 95 | 96 | 96 | 96 | 96 | 93 | 88 | 84 | 82 | 75 | 73 | 77 | 69 | 69 | 68 | 73 | 78 | 80 | 79 | 79 | 85 | 83.0 | 96 |
| 11-Sep | 86 | 86 | 94 | 96 | 93 | 93 | 93 | 92 | 92 | 91 | 83 | 83 | 86 | 77 | 73 | 71 | 67 | 68 | 70 | 72 | 82 | 83 | 80 | 82 | 83.1 | 96 |
| 12-Sep | 83 | 85 | 88 | 87 | 89 | 89 | 92 | 88 | 78 | 64 | 46 | 43 | 43 | 40 | 38 | 38 | 40 | 46 | 54 | 62 | 69 | 74 | 78 | 81 | 66.4 | 92 |
| 13-Sep | 84 | 85 | 80 | 79 | 76 | 76 | 77 | 77 | 72 | 63 | 54 | 48 | 44 | 41 | 36 | 37 | 42 | 47 | 51 | 58 | 64 | 65 | 72 | 77 | 62.6 | 85 |
| 14-Sep | 83 | 88 | 93 | 95 | 96 | 97 | 98 | 96 | 81 | 71 | 68 | 66 | 52 | 46 | 44 | 43 | 45 | 74 | 79 | 88 | 94 | 95 | 88 | 80 | 77.5 | 98 |
| 15-Sep | 85 | 89 | 92 | 95 | 96 | 97 | 97 | 95 | 77 | 72 | 67 | 66 | 63 | 57 | 48 | 42 | 46 | 57 | 71 | 79 | 82 | 71 | 67 | 83 | 74.9 | 97 |
| 16-Sep | 87 | 89 | 89 | 92 | 94 | 94 | 88 | 84 | 80 | 75 | 78 | 66 | 47 | 40 | 40 | 40 | 38 | 42 | 52 | 64 | 79 | 83 | 83 | 80 | 71.0 | 94 |
| 17-Sep | 78 | 84 | 77 | 78 | 83 | 83 | 84 | 85 | 80 | 76 | 70 | 67 | 67 | 65 | 63 | 58 | 60 | 62 | 66 | 77 | 82 | 82 | 79 | 81 | 74.4 | 85 |
| 18-Sep | 85 | 89 | 94 | 96 | 97 | 97 | 97 | 90 | 83 | 76 | 71 | 67 | 70 | 68 | 70 | 75 | 85 | 86 | 86 | 89 | 85 | 94 | 97 | 97 | 85.1 | 97 |
| 19-Sep | 98 | 97 | 97 | 94 | 95 | 95 | 93 | 89 | 83 | 77 | 69 | 73 | 73 | 67 | 63 | 63 | 63 | 66 | 81 | 88 | 91 | 89 | 92 | 89 | 82.6 | 98 |
| 20-Sep | 87 | 91 | 95 | 96 | 96 | 95 | 95 | 88 | 76 | 69 | 66 | 60 | 53 | 48 | 46 | 47 | 52 | 61 | 66 | 72 | 73 | 77 | 86 | 91 | 74.5 | 96 |
| 21-Sep | 90 | 93 | 95 | 96 | 97 | 97 | 97 | 95 | 83 | 71 | 61 | 53 | 45 | 38 | 37 | 34 | 34 | 37 | 44 | 49 | 54 | 58 | 71 | 79 | 66.9 | 97 |
| 22-Sep | 85 | 89 | 92 | 93 | 94 | 95 | 96 | 91 | 75 | 64 | 53 | 46 | 33 | 32 | 30 | 29 | M | M | 42 | 47 | 47 | 58 | 61 | 60 | 64.2 | 96 |
| 23-Sep | 63 | 68 | 74 | 75 | 76 | 78 | 79 | 78 | 75 | 68 | 64 | 64 | 61 | 59 | 58 | 61 | 61 | 65 | 67 | 68 | 70 | 73 | 78 | 80 | 69.1 | 80 |
| 24-Sep | 82 | 85 | 87 | 89 | 89 | 88 | 89 | 88 | 82 | 72 | 65 | 55 | 49 | 46 | 45 | 34 | 34 | 37 | 39 | 46 | 53 | 58 | 60 | 61 | 63.9 | 89 |
| 25-Sep | 60 | 62 | 63 | 65 | 65 | 66 | 68 | 65 | 56 | 48 | 44 | 39 | 35 | 32 | 30 | 29 | 30 | 39 | 50 | 60 | 68 | 75 | 77 | 81 | 54.6 | 81 |
| 26-Sep | 84 | 87 | 87 | 89 | 92 | 91 | 88 | 86 | 71 | 58 | 52 | 47 | 43 | 41 | 39 | 38 | 33 | 37 | 43 | 46 | 48 | 52 | 54 | 58 | 61.0 | 92 |
| 27-Sep | 58 | 60 | 66 | 66 | 65 | 66 | 64 | 66 | 81 | 72 | 58 | 50 | 43 | 34 | 29 | 28 | 29 | 31 | 37 | 40 | 41 | 44 | 56 | 58 | 51.7 | 81 |
| 28-Sep | 57 | 61 | 67 | 67 | 66 | 72 | 75 | 71 | 61 | 52 | 46 | 37 | 29 | 27 | 26 | 27 | 30 | 32 | 43 | 57 | 66 | 70 | 69 | 75 | 53.4 | 75 |
| 29-Sep | 79 | 80 | 80 | 80 | 86 | 87 | 89 | 87 | 76 | 65 | 52 | 46 | 41 | 36 | 33 | 30 | 33 | 42 | 55 | 64 | 70 | 71 | 68 | 76 | 63.7 | 89 |
| 30-Sep | 80 | 84 | 83 | 85 | 77 | 65 | 64 | 61 | 61 | 56 | 51 | 51 | 47 | 46 | 47 | 47 | 47 | 44 | 47 | 50 | 54 | 56 | 59 | 66 | 59.5 | 85 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|-----------------|--|
| 82.6 | 85.7 | 87.4 | 88.3 | 88.7 | 88.7 | 88.9 | 86.1 | 78.7 | 71.2 | 64.6 | 59.9 | 55.3 | 51.8 | 50.6 | 50.7 | 53.0 | 57.3 | 63.0 | 69.3 | 73.5 | 75.7 | 77.5 | 79.8 | Diurnal Average | | |
| 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 96 | 94 | 96 | 94 | 96 | 97 | 98 | 99 | 99 | 99 | Diurnal Maximum | |

M - Maintenance





| | | |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 4.6 mm on Sep 3 02:00 | Maximum Daily Total: 34.9 mm on Sep 3 | Hours in Service: 720 |
| Minimum Value: 0.0 mm on Sep 1 01:00 | Minimum Daily Total: 0.0 mm on Sep 4 | Hours of Data: 718 |
| Maximum Diurnal Total: 5.5 mm at hour 2 | Minimum Diurnal Total: 0.2 mm at hour 18 | Hours of Missing Data: 2 |
| Monthly Total: 47.28 mm | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 O ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 3.0 | Hours of Calibration: 0 |
| | | Percent Operational Time: 99.7 |

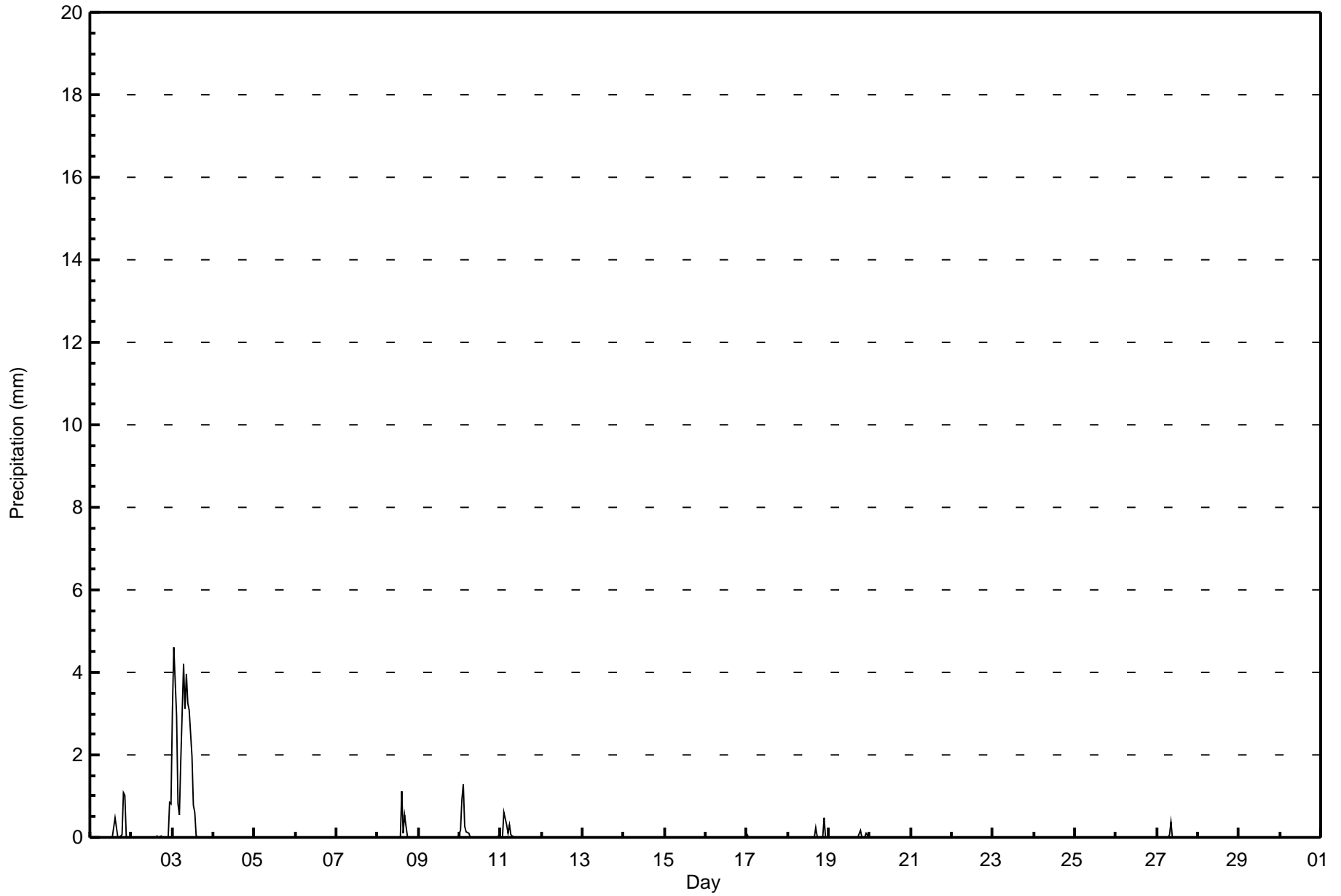
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| | 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.2 | 0.0 | 0.0 | 0.1 | 1.1 | 1.0 | 0.1 | 0.0 | 0.0 | 2.9 | 1.1 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.8 | 1.8 | 0.8 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 3.1 | 4.6 | 3.0 | 0.8 | 0.5 | 1.9 | 4.2 | 3.1 | 4.0 | 3.2 | 3.1 | 2.0 | 0.8 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 34.9 | 4.6 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 1.1 | 0.1 | 0.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 1.1 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0.2 | 0.9 | 1.3 | 0.3 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 2.9 | 1.3 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0.0 | 0.0 | 0.6 | 0.3 | 0.1 | 0.3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | 0.6 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.0 | 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.8 | 0.5 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.2 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | M | M | 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.4 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.3 | 5.5 | 4.9 | 1.4 | 0.8 | 2.3 | 4.3 | 3.2 | 4.4 | 3.2 | 3.1 | 2.0 | 0.8 | 0.6 | 1.6 | 0.4 | 0.8 | 0.2 | 0.3 | 1.1 | 1.0 | 0.5 | 1.0 | 0.9 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.1 | 4.6 | 3.0 | 0.8 | 0.5 | 1.9 | 4.2 | 3.1 | 4.0 | 3.2 | 3.1 | 2.0 | 0.8 | 0.6 | 1.1 | 0.2 | 0.5 | 0.1 | 0.2 | 1.1 | 1.0 | 0.5 | 0.8 | 0.8 | Diurnal Maximum |

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (mm) | Number of Hours | % | Cumulative % |
|----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 692 | 96.38 | 96.38 |
| 0.4 - 0.5 | 5 | 0.70 | 97.08 |
| 0.6 - 0.7 | 2 | 0.28 | 97.35 |
| 0.8 - 1.4 | 9 | 1.25 | 98.61 |
| 1.5 - 10 | 10 | 1.39 | 100.00 |
| > 10 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 718

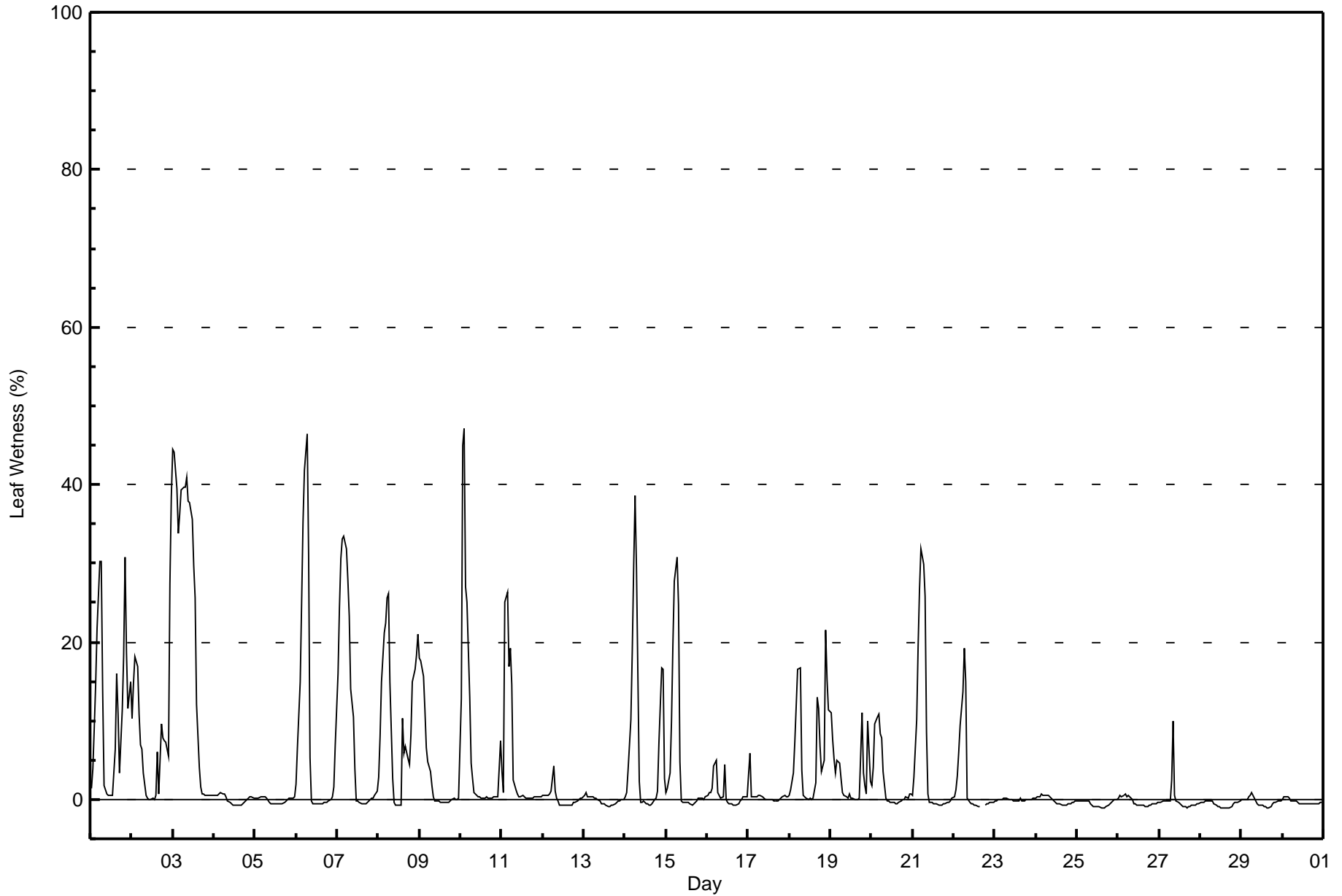
Total Number of Hours: 720



Summary of Hour Averages

Fort McKay - Bertha Ganter - September 2016

| Maximum Value: 47 % on Sep 10 03:00 | | | | | | | | | | | | | | Maximum Daily Average: 22.7 % on Sep 3 | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|--------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|--|--------------------------------|--|--|--|
| Minimum Value: -1 % on Sep 28 16:00 | | | | | | | | | | | | | | Minimum Daily Average: -0.6 % on Sep 28 | | | | | | | | | | | | | | Hours of Data: 718 | | | |
| Maximum Diurnal Average: 11.8 % at hour 6 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.4 % at hour 14 | | | | | | | | | | | | | | Hours of Missing Data: 2 | | | |
| Monthly Average: 4.0 % | | | | | | | | | | | | | | Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 16 P ₉₉ = 40 | | | | | | | | | | | | | | 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 | 1 | 4 | 9 | 15 | 22 | 30 | 30 | 14 | 2 | 1 | 0 | 0 | 0 | 0 | 6 | 16 | 11 | 3 | 11 | 18 | 31 | 19 | 12 | 15 | 11.3 | 31 | | | | | |
| 2-Sep | 10 | 15 | 18 | 17 | 11 | 7 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 1 | 10 | 8 | 7 | 7 | 5 | 27 | 38 | 8.3 | 38 | | | | | |
| 3-Sep | 45 | 44 | 39 | 34 | 36 | 39 | 40 | 40 | 41 | 38 | 38 | 35 | 30 | 26 | 12 | 4 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 22.7 | 45 | | | | | |
| 4-Sep | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 1 | | | | | |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.1 | 0 | | | | | |
| 6-Sep | 2 | 7 | 15 | 25 | 35 | 42 | 46 | 31 | 5 | 0 | 0 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 | 8.8 | 46 | | | | | |
| 7-Sep | 16 | 24 | 31 | 33 | 33 | 32 | 28 | 23 | 14 | 11 | 4 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 1 | 10.3 | 33 | | | | | |
| 8-Sep | 3 | 8 | 15 | 21 | 22 | 26 | 26 | 15 | 3 | 0 | -1 | -1 | -1 | -1 | 10 | 6 | 7 | 5 | 4 | 8 | 15 | 17 | 18 | 21 | 10.3 | 26 | | | | | |
| 9-Sep | 18 | 18 | 16 | 11 | 7 | 5 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.2 | 18 | | | | | |
| 10-Sep | 13 | 45 | 47 | 27 | 25 | 13 | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7.9 | 47 | | | | | |
| 11-Sep | 4 | 1 | 25 | 26 | 17 | 19 | 15 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.8 | 26 | | | | | |
| 12-Sep | 0 | 0 | 1 | 1 | 1 | 1 | 4 | 1 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 4 | | | | | |
| 13-Sep | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | -0.2 | 1 | | | | | |
| 14-Sep | 0 | 1 | 4 | 10 | 19 | 30 | 39 | 29 | 2 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | 0 | 0 | 1 | 7 | 17 | 17 | 3 | 7.2 | 39 | | | | | | |
| 15-Sep | 1 | 1 | 3 | 10 | 20 | 28 | 31 | 25 | 5 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.0 | 31 | | | | | |
| 16-Sep | 1 | 1 | 1 | 1 | 4 | 5 | 1 | 0 | 0 | 0 | 5 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 5 | | | | | |
| 17-Sep | 3 | 6 | 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 | | | | | |
| 18-Sep | 1 | 1 | 3 | 7 | 12 | 16 | 17 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 13 | 12 | 7 | 4 | 5 | 21 | 15 | 11 | 6.4 | 21 | | | | | |
| 19-Sep | 11 | 8 | 5 | 3 | 5 | 5 | 3 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 3 | 2 | 1 | 10 | 2 | 3.0 | 11 | | | | | |
| 20-Sep | 2 | 4 | 10 | 10 | 11 | 8 | 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2.3 | 11 | | | | | |
| 21-Sep | 1 | 3 | 10 | 19 | 27 | 32 | 30 | 26 | 9 | 1 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 6.2 | 32 | | | | | |
| 22-Sep | 0 | 1 | 3 | 6 | 9 | 14 | 19 | 15 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | M | M | -1 | -1 | -1 | 0 | 0 | 0 | 2.7 | 19 | | | | | |
| 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 | | | | | |
| 24-Sep | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | -0.1 | 1 | | | | | |
| 25-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 | -0.5 | 0 | | | | | |
| 26-Sep | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | -0.3 | 1 | | | | | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 10 | 1 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0.1 | 10 | | | | | |
| 28-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 | -0.6 | 0 | | | | | |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | -0.3 | 1 | | | | | |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | -0.3 | 0 | | | | | |
| | | | | | | | | | | | | | | 4.4 6.4 8.5 9.4 10.6 11.8 11.8 8.1 3.1 1.6 1.3 0.9 0.6 0.4 0.5 0.6 0.7 0.6 1.1 1.2 2.2 2.6 3.4 3.6 | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | 45 45 47 34 36 42 46 40 41 38 38 35 30 26 12 16 13 12 11 18 31 21 27 38 | | | | | | | | | | | | | | Diurnal Maximum | | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

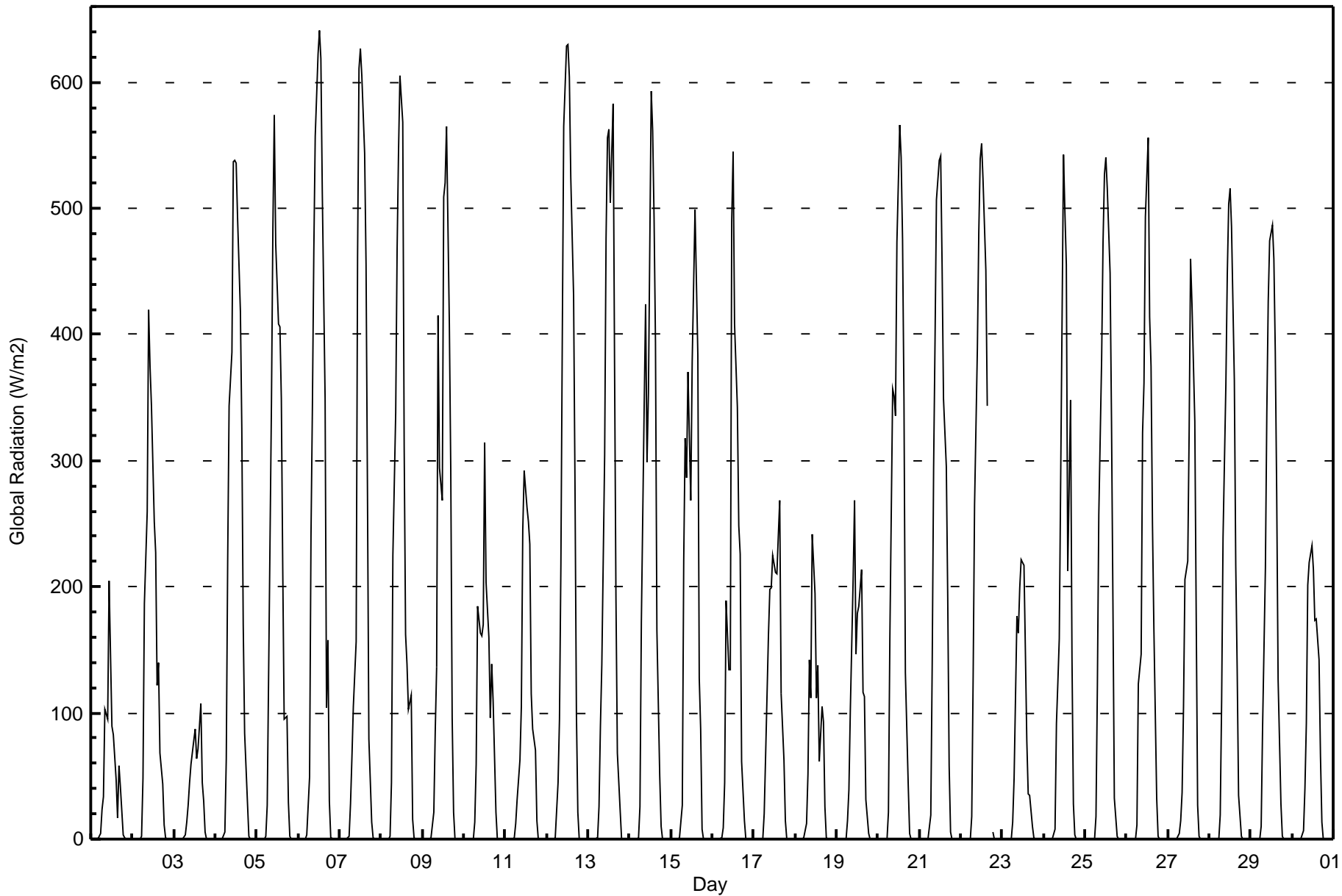
| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 121 | 29.58 | 29.58 |
| 0.4 - 0.5 | 47 | 11.49 | 41.08 |
| 0.6 - 0.7 | 27 | 6.60 | 47.68 |
| 0.8 - 1.4 | 22 | 5.38 | 53.06 |
| 1.5 - 10 | 81 | 19.80 | 72.86 |
| > 10 | 110 | 26.89 | 99.76 |

Total Number of Valid Hours: 409

Total Number of Hours: 720



| Maximum Value: 641 W/m2 on Sep 6 13:00 | | Maximum Daily Average: 195.6 W/m2 on Sep 6 | | Hours in Service: | 720 | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------------------|------|---|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 W/m2 on Sep 1 01:00 | | Minimum Daily Average: 26.5 W/m2 on Sep 3 | | Hours of Data: | 718 | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 417.3 W/m2 at hour 13 | | Minimum Diurnal Average: 0.0 W/m2 at hour 5 | | Hours of Missing Data: | 2 | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 122.9 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 13 Q ₃ = 206 P ₉₀ = 448 P ₉₉ = 605 | | 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 | 0 | 0 | 0 | 0 | 5 | 24 | 33 | 103 | 96 | 204 | 147 | 90 | 83 | 47 | 17 | 58 | 41 | 3 | 1 | 0 | 0 | 0 | 0 | 39.6 | 204 |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 48 | 187 | 260 | 420 | 375 | 344 | 252 | 227 | 122 | 140 | 68 | 43 | 11 | 1 | 0 | 0 | 0 | 0 | 104.2 | 420 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 27 | 45 | 59 | 78 | 88 | 64 | 71 | 107 | 45 | 30 | 5 | 0 | 0 | 0 | 0 | 0 | 26.5 | 107 |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 6 | 64 | 221 | 344 | 386 | 537 | 538 | 536 | 492 | 419 | 325 | 170 | 84 | 29 | 2 | 0 | 0 | 0 | 0 | 173.1 | 538 |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 27 | 131 | 346 | 483 | 573 | 472 | 409 | 406 | 349 | 214 | 96 | 98 | 29 | 2 | 0 | 0 | 0 | 0 | 151.5 | 573 |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 49 | 240 | 342 | 465 | 557 | 622 | 641 | 619 | 514 | 350 | 104 | 158 | 30 | 2 | 0 | 0 | 0 | 0 | 195.6 | 641 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 29 | 65 | 105 | 157 | 462 | 610 | 627 | 605 | 544 | 455 | 277 | 79 | 14 | 1 | 0 | 0 | 0 | 0 | 168.0 | 627 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 45 | 224 | 338 | 467 | 545 | 605 | 569 | 311 | 162 | 139 | 103 | 115 | 15 | 1 | 0 | 0 | 0 | 0 | 151.7 | 605 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 21 | 85 | 137 | 415 | 295 | 268 | 509 | 520 | 565 | 408 | 293 | 96 | 21 | 0 | 0 | 0 | 0 | 0 | 151.5 | 565 |
| 10-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 59 | 185 | 163 | 162 | 170 | 315 | 204 | 160 | 96 | 139 | 110 | 21 | 0 | 0 | 0 | 0 | 0 | 74.9 | 315 |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 31 | 62 | 105 | 245 | 292 | 263 | 252 | 234 | 115 | 87 | 71 | 14 | 0 | 0 | 0 | 0 | 0 | 74.3 | 292 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 45 | 95 | 217 | 398 | 564 | 629 | 629 | 604 | 524 | 430 | 279 | 99 | 21 | 0 | 0 | 0 | 0 | 0 | 189.0 | 629 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 26 | 89 | 139 | 305 | 476 | 556 | 563 | 504 | 582 | 380 | 192 | 69 | 23 | 0 | 0 | 0 | 0 | 0 | 162.7 | 582 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 26 | 172 | 343 | 425 | 299 | 354 | 592 | 562 | 493 | 394 | 165 | 51 | 10 | 0 | 0 | 0 | 0 | 0 | 161.9 | 592 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 27 | 220 | 318 | 287 | 371 | 269 | 378 | 438 | 498 | 384 | 127 | 88 | 8 | 0 | 0 | 0 | 0 | 0 | 142.3 | 498 |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 45 | 189 | 134 | 134 | 490 | 544 | 409 | 342 | 248 | 226 | 62 | 14 | 0 | 0 | 0 | 0 | 0 | 118.7 | 544 |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 65 | 161 | 198 | 200 | 225 | 212 | 210 | 241 | 268 | 115 | 62 | 14 | 0 | 0 | 0 | 0 | 0 | 83.0 | 268 |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 52 | 142 | 112 | 242 | 195 | 112 | 137 | 62 | 105 | 93 | 25 | 1 | 0 | 0 | 0 | 0 | 0 | 53.8 | 242 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 39 | 102 | 206 | 269 | 146 | 179 | 185 | 213 | 116 | 113 | 31 | 4 | 0 | 0 | 0 | 0 | 0 | 67.4 | 269 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 159 | 357 | 352 | 335 | 473 | 567 | 540 | 475 | 349 | 132 | 44 | 5 | 0 | 0 | 0 | 0 | 0 | 158.7 | 567 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 139 | 294 | 394 | 507 | 538 | 541 | 455 | 349 | 295 | 191 | 58 | 5 | 0 | 0 | 0 | 0 | 0 | 157.8 | 541 |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 129 | 265 | 389 | 481 | 539 | 552 | 522 | 451 | 343 | M | M | 5 | 0 | 0 | 0 | 0 | 0 | 168.0 | 552 |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 48 | 177 | 163 | 200 | 221 | 217 | 148 | 78 | 36 | 35 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 56.2 | 221 |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 92 | 124 | 159 | 286 | 543 | 497 | 455 | 213 | 347 | 144 | 28 | 3 | 0 | 0 | 0 | 0 | 0 | 120.8 | 543 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 122 | 258 | 380 | 473 | 527 | 541 | 516 | 449 | 331 | 188 | 33 | 3 | 0 | 0 | 0 | 0 | 0 | 160.0 | 541 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 123 | 147 | 322 | 362 | 493 | 556 | 414 | 374 | 250 | 168 | 32 | 2 | 0 | 0 | 0 | 0 | 0 | 135.6 | 556 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 14 | 37 | 106 | 206 | 220 | 325 | 460 | 424 | 331 | 175 | 27 | 2 | 0 | 0 | 0 | 0 | 0 | 97.3 | 460 |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 109 | 240 | 360 | 448 | 503 | 515 | 486 | 364 | 217 | 136 | 35 | 2 | 0 | 0 | 0 | 0 | 0 | 143.1 | 515 |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 88 | 215 | 338 | 426 | 474 | 486 | 460 | 386 | 275 | 127 | 28 | 2 | 0 | 0 | 0 | 0 | 0 | 138.1 | 486 |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 41 | 91 | 201 | 219 | 232 | 214 | 173 | 174 | 142 | 66 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 65.6 | 232 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (W/m²) | Number of Hours | % | Cumulative % |
|-----------------------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 375 | 52.23 | 52.23 |
| 21 - 100 | 85 | 11.84 | 64.07 |
| 101 - 300 | 129 | 17.97 | 82.03 |
| 301 - 600 | 119 | 16.57 | 98.61 |
| 601 - 900 | 10 | 1.39 | 100.00 |
| > 900 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 718

Total Number of Hours: 720

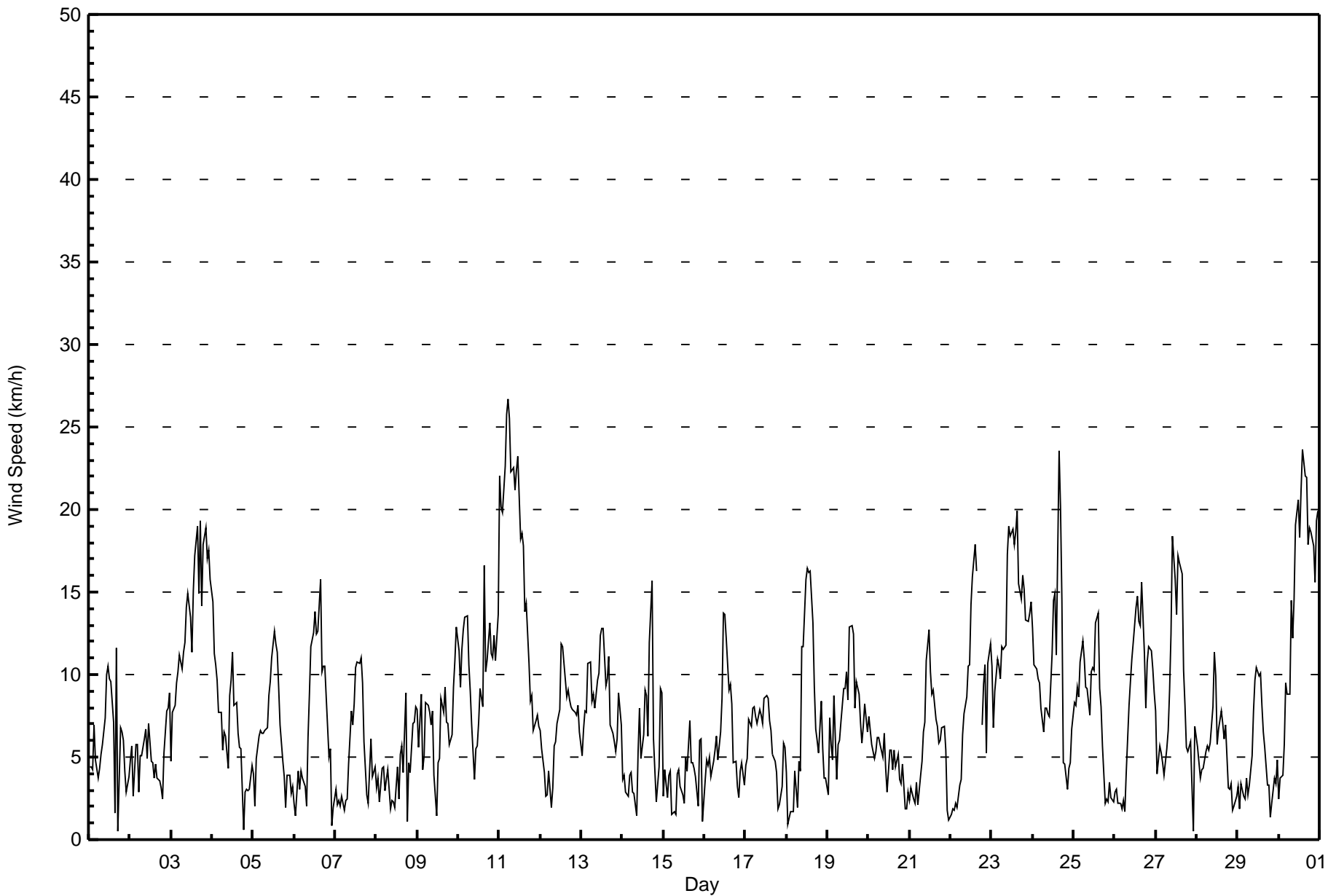


| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 27 km/h on Sep 11 06:00 | Maximum Daily Speed Average: 16.7 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 27 23:00 | Minimum Daily Speed Average: 0.3 km/h on Sep 15 | Hours of Data: 718 |
| Maximum Diurnal Speed Average: 3.4 km/h at hour 14 | Minimum Diurnal Speed Average: 1.2 km/h at hour 19 | Hours of Missing Data: 2 |
| Monthly Average Velocity: 2.3 km/h 255.5 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 4 Median = 7 Q ₃ = 10 P ₉₀ = 15 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 | N4 | N4 | N4 | N7 | NNW5 | N4 | N4 | N5 | N6 | N7 | N10 | N11 | N10 | NNE10 | E7 | W2 | N12 | WNW1 | NNW7 | NNW7 | NNW6 | NW4 | W3 | W4 | N5.1 | N12 | |
| 2-Sep | WSW5 | SW6 | WSW3 | WNW6 | WNW6 | WSW3 | W5 | SW5 | SW6 | W7 | W5 | SSW7 | WSW5 | WSW5 | WSW4 | WSW5 | WSW4 | WSW4 | NNW3 | SSW2 | WNW5 | NW8 | NW8 | NNW9 | W4.2 | NNW9 | |
| 3-Sep | N5 | NW8 | NW8 | WNW9 | WNW10 | WNW11 | WNW10 | WNW11 | NW12 | NW14 | NW15 | NW13 | NNW11 | NNW15 | NNW17 | NNW19 | NNW15 | NNW19 | NNW14 | NNW18 | NNW19 | NW17 | NW18 | NW16 | NW13.2 | NNW19 | |
| 4-Sep | NW14 | WNW11 | WNW11 | WNW10 | WNW8 | WNW8 | WNW5 | WNW7 | NW6 | WNW4 | WNW9 | WNW10 | NW11 | NW8 | NW8 | WNW6 | NW6 | NNW5 | NW1 | SSW3 | SSW3 | SSW3 | SW3 | W4 | WNW6.2 | NW14 | |
| 5-Sep | WSW4 | SW2 | SSW5 | SSW6 | SSW7 | SSW6 | SSW6 | SSW7 | SSW7 | S9 | S10 | S11 | SSW13 | S12 | S11 | SSE9 | SSE7 | SE5 | SE4 | SSE2 | SE4 | SE4 | SE3 | SSE3 | S5.8 | SSW13 | |
| 6-Sep | S2 | WNW1 | NW4 | SW3 | S4 | S4 | SW3 | SSE2 | S6 | SSE9 | SSE12 | S13 | SSE14 | SSE12 | SSE13 | SSE16 | SSW10 | S11 | SSE10 | S9 | SSW5 | SSE6 | SSE1 | S2 | S6.5 | SSE16 | |
| 7-Sep | S3 | SW2 | WSW2 | WNW2 | WSW3 | WSW2 | W2 | W2 | S5 | SSE8 | SSE7 | SSE8 | SSE10 | SSE11 | SSE11 | SSE11 | SSE9 | S6 | SW3 | NW2 | SW4 | WNW6 | WNW4 | S4 | S3.9 | SSE11 | |
| 8-Sep | SW3 | SW4 | SW2 | SSW4 | SSW4 | WSW3 | SSW4 | SSW4 | NNW2 | ESE2 | SE2 | E2 | SE4 | W2 | WNW5 | SSW6 | SW4 | NNW9 | NNW1 | WNW5 | WNW4 | NW7 | NNW7 | NW8 | W1.8 | NNW9 | |
| 9-Sep | NW8 | NW6 | NW9 | WNW4 | N5 | N8 | N8 | N8 | N7 | N8 | NNW4 | S1 | S5 | SSW5 | SSE9 | SSE8 | S9 | S7 | SSE7 | SSE6 | SSE6 | SSE9 | SSE11 | SSE13 | S1.1 | SSE13 | |
| 10-Sep | S11 | SSE9 | SSE12 | SSE13 | SSE14 | S14 | S11 | S9 | SSE7 | WSW4 | WSW5 | WSW6 | WNW7 | WNW9 | WNW8 | NW17 | WNW10 | WNW11 | WNW13 | WNW11 | WNW11 | WNW12 | NW11 | NW14 | WSW4.5 | NW17 | |
| 11-Sep | N22 | N20 | NNW20 | NNW23 | N26 | N27 | N25 | N22 | N23 | N21 | N22 | N23 | N18 | N19 | N18 | N14 | NNW14 | NNW11 | NNW8 | NNW9 | NW7 | WNW7 | WNW8 | WNW7 | N16.7 | N27 | |
| 12-Sep | NW7 | WNW5 | NW4 | W3 | WNW3 | WNW4 | WNW2 | SSW3 | SSW6 | S6 | WSW7 | SSW8 | S12 | S12 | SSW11 | SSW9 | S9 | S9 | SSE8 | S8 | S8 | S8 | S8 | S7 | SSW5.1 | S12 | |
| 13-Sep | SSW5 | SSW7 | S8 | SSW8 | S11 | S11 | S8 | S9 | S8 | SSW10 | SSW10 | SSW12 | SSW13 | SSW13 | WSW9 | SW10 | SSW11 | SW7 | SW6 | SW6 | WSW5 | WNW6 | WNW9 | WNW7 | SSW7.4 | SSW13 | |
| 14-Sep | WNW4 | NW4 | NW3 | WSW3 | WNW4 | WNW4 | WNW3 | WN3 | SSE1 | SE5 | SSE8 | S5 | SSE6 | S9 | SSE9 | SSW6 | NW12 | N16 | N6 | N6 | W4 | SW2 | WNW4 | WNW9 | NW9 | W1.9 | N16 |
| 15-Sep | N3 | NW4 | WSW3 | W4 | NW4 | WSW2 | WSW2 | SSW1 | E4 | ENE4 | NNE3 | NNE3 | N2 | S5 | S4 | SE7 | SSE5 | N5 | NNW4 | NW4 | WSW2 | S6 | S6 | ENE1 | S0.3 | SE7 | |
| 16-Sep | W4 | SW5 | SSW5 | S5 | SSW4 | SSW5 | SSW5 | SSW6 | SSW5 | S7 | S9 | SSE14 | SSW14 | WSW12 | WSW9 | SW9 | SW8 | WSW5 | SSW5 | SSW3 | S3 | S4 | S5 | SSW3 | SSW5.7 | SSE14 | |
| 17-Sep | SSW4 | SSW5 | SSW7 | SSW7 | SSE8 | SSE8 | SSW7 | SSW7 | S8 | SSW8 | SW7 | SSW9 | SSW9 | SW9 | SW7 | WSW7 | WSW5 | WNW5 | WNW4 | SW2 | W2 | WSW3 | WNW6 | WNW6 | SSW5.0 | SSW9 | |
| 18-Sep | WNW4 | WNW1 | SSE2 | SW2 | SW2 | S4 | WSW2 | W5 | WNW4 | WNW12 | NW12 | NW16 | NW16 | NW16 | NW16 | NW13 | NW9 | N7 | NNW6 | NNW5 | NNW8 | N6 | NW4 | NW4 | NW6.3 | NW16 | |
| 19-Sep | NNW3 | NW7 | NW6 | NNW5 | NW9 | WNW4 | WNW6 | WNW6 | WNW7 | WNW9 | NW9 | NW10 | NW8 | NW13 | NNW13 | NNW12 | N8 | N10 | NNW9 | NW7 | WNW6 | NW7 | NNW8 | NNW6 | NW7.4 | NNW13 | |
| 20-Sep | NNW7 | NW7 | WNW6 | NNW5 | NNW5 | NW6 | NW6 | NNW6 | N5 | N6 | N4 | NNE3 | SE5 | ESE5 | E4 | E5 | E4 | E5 | ENE4 | ENE3 | SE5 | WSW2 | W2 | SSW3 | N2.0 | NNW7 | |
| 21-Sep | NNW2 | NNW3 | WNW2 | W2 | WSW3 | SSW2 | S4 | SSW5 | S7 | S7 | SSE11 | S13 | SSW10 | SW9 | SW9 | W7 | WSW7 | SW6 | SW6 | SW7 | SW7 | SW5 | SSW2 | WSW1 | SSW4.7 | S13 | |
| 22-Sep | W2 | W2 | SW2 | SSW2 | SSW2 | S3 | S4 | S6 | SSE8 | SSE9 | SSE10 | SSE11 | SSW14 | S16 | S18 | S16 | M | M | S7 | S9 | S11 | SSE5 | S11 | S12 | S7.8 | S18 | |
| 23-Sep | S11 | S7 | S9 | S11 | S11 | S10 | S12 | SSE12 | S12 | S17 | S19 | SSE18 | SSE19 | SSE18 | SSE19 | SSE20 | S16 | SSE15 | SSE16 | S15 | S13 | S13 | S14 | S14 | S14.0 | SSE20 | |
| 24-Sep | S13 | S11 | S10 | S10 | S9 | SSW8 | SSW6 | S8 | SSW8 | WSW8 | W7 | WNW11 | WNW14 | WNW15 | WNW11 | NW24 | NW20 | WNW15 | W5 | W5 | W3 | WNW4 | W5 | WNW7 | W6.0 | NW24 | |
| 25-Sep | WNW8 | WNW8 | WNW9 | WNW9 | WNW11 | WNW12 | WNW11 | WNW9 | WNW9 | WNW8 | WNW10 | WNW10 | WNW10 | NW13 | NW14 | NW9 | NNW8 | NNW6 | W2 | W2 | SSW2 | NNW3 | SW3 | SSW2 | WNW7.5 | NW14 | |
| 26-Sep | SSW3 | SSW3 | S2 | SSW2 | SSE2 | SW2 | WSW2 | SSE4 | SSE8 | S10 | S11 | SSE12 | SSE14 | SSE15 | SSE13 | SSE13 | S16 | S11 | S8 | S11 | S12 | S11 | S10 | S9 | S8.3 | S16 | |
| 27-Sep | S8 | S4 | SSE6 | S5 | SSW5 | WSW4 | WNW6 | SSW7 | SSW9 | WNW12 | WNW18 | WNW16 | WNW14 | WNW17 | WNW17 | WNW16 | WSW10 | WSW8 | SW6 | WSW5 | WSW6 | SW3 | SW1 | SW7 | W6.6 | WNW18 | |
| 28-Sep | SW6 | SW5 | SW4 | WSW4 | WSW4 | SSW5 | SSW6 | SSW5 | S6 | S8 | SSE11 | S10 | SSW6 | SW7 | SW8 | SSW7 | S6 | SSW7 | SW3 | S3 | SSW3 | W2 | W2 | WSW3 | SSW4.8 | SSE11 | |
| 29-Sep | SSW3 | W2 | SSW3 | S3 | SSW2 | WSW4 | WSW3 | SSW3 | SSE5 | SSE8 | SE10 | SE10 | SSE10 | SE10 | SSE8 | SSE7 | SSE6 | ESE3 | S3 | W1 | NNW2 | WNW4 | NW3 | NW5 | SSE3.2 | SE10 | |
| 30-Sep | NNW2 | NW4 | NNW4 | NNW6 | N10 | N9 | N9 | N15 | N12 | NNE15 | N19 | N21 | N18 | N21 | N24 | N22 | N22 | N18 | N19 | NNE19 | NNE18 | N16 | N19 | N20 | N14.8 | N24 | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|-------|-------|--------|------|--------|------|--------|-------|-------|--------|-------|-------|--------|--------|--------|------|--------|------|--------|--------|------|------|------|-----------------|
| W2.2 | W2.5 | W2.3 | WSW2.5 | W2.3 | WSW2.3 | W2.3 | WSW2.0 | SW1.9 | SW1.9 | WSW2.2 | SW2.6 | SW3.3 | WSW3.4 | WSW2.9 | WSW3.3 | W2.8 | NNW2.1 | W1.2 | WSW1.9 | WSW2.0 | W2.2 | W2.3 | W2.6 | Diurnal Average |
| N22 | NNW20 | NNW20 | NNW23 | N26 | N27 | N25 | N22 | N23 | N21 | N22 | N23 | SSE19 | N21 | N24 | NW24 | N22 | NNW19 | N19 | NNE19 | NNW19 | NW17 | N19 | N20 | Diurnal Maximum |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 274 | 38.16 | 38.16 |
| 6 - 11 | 309 | 43.04 | 81.20 |
| 12 - 19 | 114 | 15.88 | 97.08 |
| 20 - 28 | 21 | 2.92 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 13 | 3 | 0 | 4 | 6 | 4 | 9 | 11 | 25 | 43 | 27 | 37 | 28 | 29 | 17 | 18 | 274 |
| 6 - 11 | 19 | 1 | 0 | 0 | 1 | 0 | 4 | 43 | 62 | 38 | 21 | 10 | 3 | 56 | 30 | 21 | 309 |
| 12 - 19 | 14 | 3 | 0 | 0 | 0 | 0 | 0 | 22 | 23 | 6 | 0 | 1 | 0 | 14 | 20 | 11 | 114 |
| 20 - 28 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 21 |
| 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 | 61 | 7 | 0 | 4 | 7 | 4 | 13 | 77 | 110 | 87 | 48 | 48 | 31 | 99 | 69 | 53 | 718 |

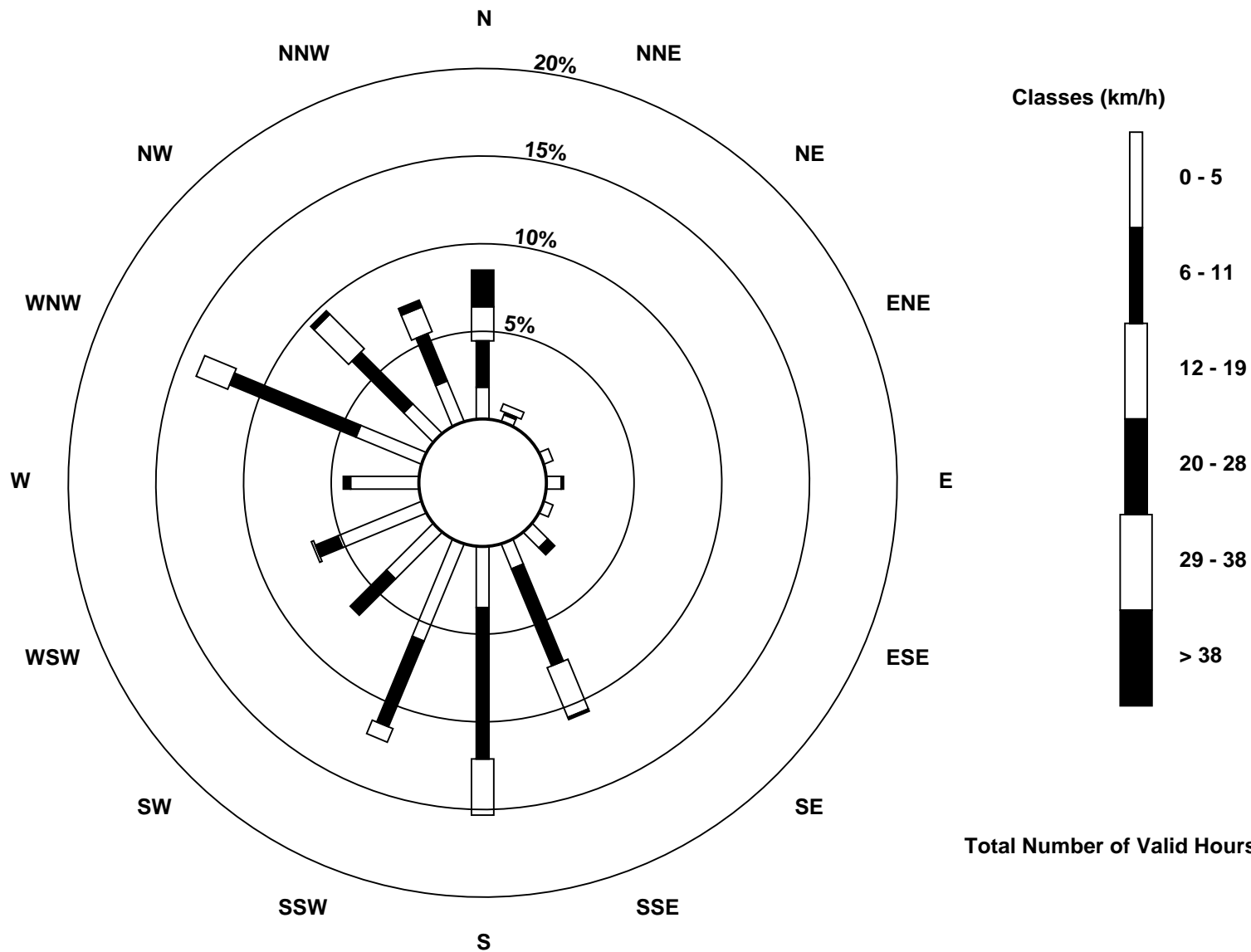
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| 6 | 5 | 5 | 5 | 6 | 6 | 7 | 5 | 6 | 7 | 6 | 6 | 6 | 7 | 6 | 8 | 8 | 7 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - September 2016

| | | | |
|---------------------------------------------------------------|--|---------------------------|------|
| Direction of Maximum Speed: 355 deg on Sep 11 06:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 349.6 deg on Sep 11 | | Hours of Data: | 718 |
| Direction of Minimum Speed: 216 deg on Sep 27 23:00 | | Hours of Missing Data: | 2 |
| Direction of Minimum Daily Speed Average: 0.3 deg on Sep 15 | | Percent Operational Time: | 99.7 |
| Monthly Average Direction: 263.8 deg | | | |

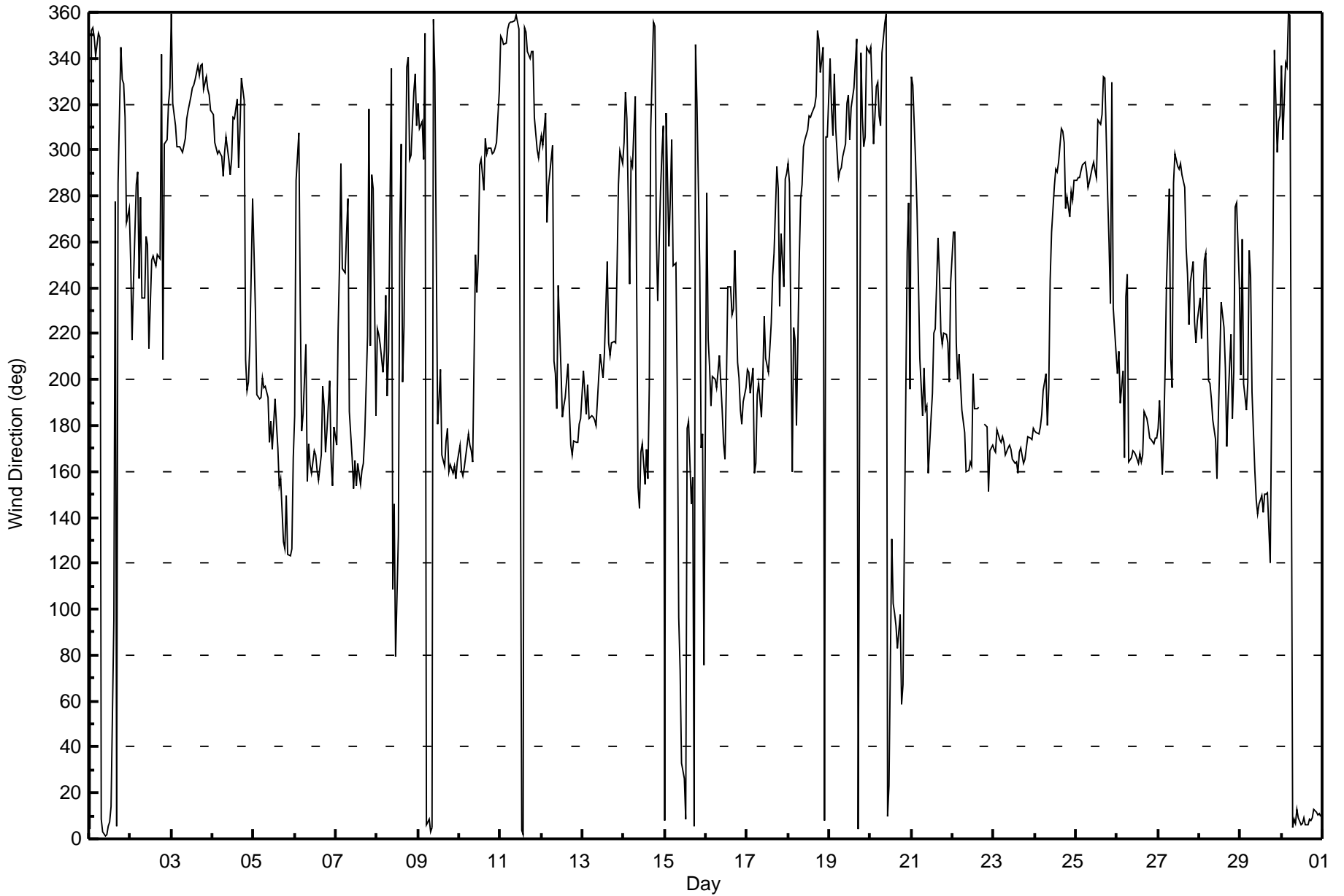
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 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 | 4 | 352 | 353 | 349 | 341 | 351 | 349 | 8 | 3 | 1 | 2 | 5 | 7 | 14 | 95 | 277 | 5 | 286 | 345 | 331 | 329 | 314 | 268 | 274 | 355.1 |
| 2-Sep | 251 | 217 | 242 | 285 | 290 | 244 | 279 | 235 | 236 | 263 | 259 | 213 | 252 | 254 | 251 | 250 | 254 | 252 | 342 | 208 | 302 | 305 | 320 | 327 | 267.6 |
| 3-Sep | 359 | 321 | 311 | 302 | 302 | 301 | 299 | 302 | 305 | 313 | 317 | 323 | 327 | 328 | 330 | 337 | 333 | 337 | 338 | 327 | 332 | 326 | 324 | 318 | 322.5 |
| 4-Sep | 316 | 303 | 301 | 298 | 300 | 297 | 288 | 299 | 306 | 296 | 289 | 296 | 314 | 314 | 322 | 292 | 310 | 331 | 322 | 209 | 196 | 199 | 215 | 279 | 299.4 |
| 5-Sep | 256 | 230 | 194 | 192 | 192 | 201 | 197 | 197 | 192 | 173 | 182 | 169 | 192 | 181 | 170 | 154 | 157 | 129 | 126 | 149 | 124 | 124 | 126 | 166 | 176.2 |
| 6-Sep | 185 | 287 | 307 | 232 | 177 | 185 | 215 | 156 | 172 | 163 | 160 | 169 | 167 | 160 | 156 | 167 | 197 | 188 | 168 | 178 | 200 | 165 | 154 | 180 | 174.3 |
| 7-Sep | 171 | 222 | 250 | 294 | 248 | 246 | 263 | 279 | 186 | 166 | 153 | 165 | 154 | 164 | 154 | 160 | 164 | 176 | 219 | 318 | 215 | 289 | 283 | 184 | 182.2 |
| 8-Sep | 222 | 219 | 215 | 203 | 213 | 237 | 193 | 213 | 335 | 109 | 146 | 79 | 133 | 263 | 303 | 199 | 223 | 336 | 340 | 296 | 298 | 325 | 333 | 311 | 266.8 |
| 9-Sep | 321 | 309 | 312 | 296 | 351 | 6 | 9 | 3 | 5 | 357 | 334 | 181 | 191 | 204 | 167 | 162 | 173 | 179 | 160 | 163 | 159 | 162 | 157 | 164 | 179.9 |
| 10-Sep | 172 | 160 | 158 | 162 | 167 | 176 | 172 | 169 | 164 | 254 | 238 | 252 | 293 | 296 | 283 | 305 | 298 | 301 | 301 | 298 | 299 | 301 | 304 | 326 | 253.1 |
| 11-Sep | 350 | 349 | 346 | 347 | 353 | 355 | 356 | 355 | 356 | 359 | 355 | 353 | 3 | 2 | 353 | 351 | 343 | 340 | 343 | 343 | 314 | 301 | 297 | 302 | 349.6 |
| 12-Sep | 306 | 302 | 316 | 268 | 284 | 290 | 302 | 208 | 202 | 187 | 241 | 204 | 183 | 188 | 192 | 207 | 187 | 171 | 167 | 173 | 173 | 173 | 181 | 183 | 199.8 |
| 13-Sep | 204 | 195 | 185 | 198 | 183 | 185 | 183 | 183 | 180 | 202 | 211 | 206 | 201 | 212 | 251 | 216 | 210 | 216 | 216 | 216 | 248 | 285 | 300 | 294 | 210.7 |
| 14-Sep | 303 | 325 | 314 | 242 | 295 | 293 | 309 | 323 | 153 | 144 | 168 | 172 | 154 | 170 | 157 | 197 | 309 | 356 | 354 | 264 | 234 | 282 | 298 | 311 | 276.1 |
| 15-Sep | 8 | 316 | 258 | 279 | 305 | 249 | 251 | 193 | 97 | 73 | 33 | 26 | 9 | 179 | 182 | 146 | 157 | 5 | 346 | 320 | 249 | 170 | 177 | 76 | 189.1 |
| 16-Sep | 281 | 218 | 206 | 189 | 201 | 200 | 197 | 203 | 210 | 186 | 172 | 165 | 197 | 240 | 240 | 228 | 230 | 256 | 207 | 201 | 187 | 180 | 190 | 197 | 206.6 |
| 17-Sep | 204 | 203 | 194 | 205 | 159 | 164 | 193 | 199 | 184 | 201 | 228 | 210 | 203 | 214 | 225 | 245 | 255 | 293 | 283 | 232 | 263 | 240 | 287 | 290 | 215.1 |
| 18-Sep | 294 | 286 | 160 | 223 | 217 | 180 | 253 | 279 | 285 | 302 | 304 | 309 | 315 | 314 | 316 | 319 | 324 | 352 | 348 | 334 | 345 | 8 | 306 | 305 | 313.6 |
| 19-Sep | 340 | 318 | 306 | 333 | 309 | 288 | 291 | 292 | 297 | 303 | 320 | 324 | 304 | 319 | 327 | 338 | 349 | 4 | 342 | 314 | 302 | 306 | 345 | 342 | 321.5 |
| 20-Sep | 345 | 326 | 303 | 328 | 330 | 315 | 311 | 342 | 355 | 360 | 10 | 23 | 131 | 102 | 98 | 93 | 83 | 98 | 58 | 67 | 131 | 256 | 277 | 196 | 10.0 |
| 21-Sep | 332 | 328 | 295 | 274 | 244 | 209 | 184 | 205 | 186 | 189 | 159 | 183 | 194 | 220 | 222 | 262 | 246 | 221 | 215 | 220 | 220 | 216 | 199 | 242 | 212.5 |
| 22-Sep | 264 | 264 | 216 | 200 | 211 | 187 | 182 | 177 | 160 | 161 | 164 | 162 | 202 | 187 | 187 | 188 | M | M | 181 | 180 | 180 | 151 | 169 | 171 | 180.1 |
| 23-Sep | 170 | 169 | 178 | 174 | 173 | 175 | 173 | 167 | 170 | 172 | 170 | 165 | 164 | 164 | 159 | 168 | 170 | 163 | 165 | 170 | 175 | 174 | 174 | 179 | 169.5 |
| 24-Sep | 178 | 177 | 176 | 179 | 185 | 195 | 203 | 180 | 196 | 244 | 264 | 284 | 292 | 290 | 294 | 309 | 308 | 303 | 274 | 280 | 271 | 282 | 278 | 286 | 258.8 |
| 25-Sep | 287 | 288 | 288 | 291 | 293 | 295 | 290 | 284 | 286 | 292 | 295 | 291 | 288 | 313 | 311 | 315 | 332 | 331 | 281 | 260 | 233 | 330 | 231 | 212 | 295.7 |
| 26-Sep | 203 | 212 | 189 | 204 | 166 | 236 | 246 | 164 | 166 | 169 | 169 | 167 | 164 | 168 | 164 | 167 | 186 | 183 | 179 | 175 | 174 | 172 | 175 | 174 | 174.3 |
| 27-Sep | 179 | 191 | 158 | 177 | 205 | 243 | 283 | 210 | 197 | 285 | 298 | 293 | 292 | 294 | 289 | 284 | 258 | 246 | 224 | 242 | 252 | 225 | 216 | 226 | 261.5 |
| 28-Sep | 236 | 218 | 235 | 252 | 255 | 200 | 198 | 192 | 182 | 174 | 157 | 184 | 208 | 233 | 223 | 205 | 171 | 192 | 220 | 183 | 204 | 275 | 277 | 241 | 203.5 |
| 29-Sep | 202 | 261 | 198 | 187 | 199 | 256 | 245 | 194 | 161 | 148 | 141 | 146 | 150 | 142 | 150 | 150 | 151 | 120 | 188 | 260 | 344 | 299 | 312 | 315 | 166.2 |
| 30-Sep | 337 | 304 | 338 | 336 | 359 | 359 | 5 | 8 | 7 | 13 | 9 | 6 | 7 | 9 | 6 | 6 | 9 | 8 | 9 | 13 | 12 | 10 | 11 | 10 | 6.7 |

274.2 274.8 260.0 255.6 262.5 257.0 262.2 245.5 220.2 235.3 240.5 231.4 225.6 244.9 245.0 249.4 268.0 299.5 273.5 256.5 254.2 268.2 276.8 275.0

Diurnal Average

M - Maintenance

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Fort McKay - Bertha Ganter - September 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 99 deg on Sep 14 09:00 | Hours of Data: 718 |
| Minimum Value: 9 deg on Sep 19 05:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 11 P ₁₀ = 14 Q ₁ = 16 Median = 23 Q ₃ = 40 P ₉₀ = 56 P ₉₉ = 86 | 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 | 21 | 22 | 21 | 17 | 22 | 25 | 30 | 22 | 15 | 15 | 14 | 15 | 17 | 30 | 35 | 83 | 17 | 82 | 27 | 28 | 19 | 26 | 35 | 37 | 83 |
| 2-Sep | 42 | 37 | 61 | 39 | 32 | 71 | 53 | 52 | 53 | 52 | 56 | 41 | 58 | 54 | 48 | 46 | 49 | 47 | 52 | 42 | 23 | 16 | 18 | 14 | 71 |
| 3-Sep | 21 | 11 | 11 | 18 | 20 | 20 | 21 | 18 | 16 | 13 | 12 | 13 | 14 | 14 | 15 | 16 | 15 | 17 | 17 | 13 | 16 | 14 | 12 | 12 | 21 |
| 4-Sep | 11 | 14 | 18 | 20 | 32 | 33 | 52 | 34 | 34 | 86 | 45 | 43 | 27 | 50 | 31 | 54 | 44 | 18 | 72 | 12 | 16 | 30 | 34 | 61 | 86 |
| 5-Sep | 61 | 60 | 16 | 16 | 17 | 18 | 16 | 21 | 26 | 31 | 28 | 27 | 28 | 28 | 24 | 22 | 20 | 15 | 17 | 44 | 16 | 11 | 24 | 34 | 61 |
| 6-Sep | 47 | 44 | 16 | 36 | 19 | 19 | 18 | 66 | 28 | 33 | 18 | 18 | 19 | 19 | 17 | 16 | 22 | 18 | 13 | 20 | 15 | 14 | 89 | 52 | 89 |
| 7-Sep | 29 | 45 | 29 | 56 | 26 | 39 | 46 | 54 | 31 | 22 | 20 | 23 | 19 | 17 | 17 | 16 | 16 | 17 | 54 | 67 | 31 | 32 | 45 | 44 | 67 |
| 8-Sep | 47 | 34 | 64 | 31 | 44 | 43 | 39 | 43 | 84 | 84 | 87 | 82 | 59 | 80 | 72 | 43 | 53 | 53 | 82 | 23 | 31 | 10 | 17 | 12 | 87 |
| 9-Sep | 18 | 14 | 13 | 31 | 28 | 13 | 20 | 17 | 21 | 34 | 59 | 96 | 59 | 70 | 32 | 36 | 23 | 19 | 12 | 12 | 14 | 15 | 14 | 16 | 96 |
| 10-Sep | 15 | 18 | 15 | 15 | 15 | 14 | 15 | 17 | 20 | 56 | 49 | 50 | 41 | 34 | 47 | 20 | 27 | 29 | 21 | 25 | 25 | 23 | 18 | 21 | 56 |
| 11-Sep | 18 | 18 | 17 | 17 | 18 | 18 | 18 | 19 | 18 | 18 | 18 | 18 | 19 | 18 | 17 | 18 | 20 | 18 | 18 | 17 | 15 | 17 | 20 | 23 | 23 |
| 12-Sep | 25 | 29 | 23 | 54 | 59 | 35 | 59 | 46 | 26 | 31 | 51 | 53 | 24 | 33 | 38 | 38 | 29 | 15 | 12 | 13 | 13 | 13 | 13 | 10 | 59 |
| 13-Sep | 16 | 21 | 12 | 17 | 14 | 15 | 14 | 15 | 17 | 28 | 31 | 27 | 34 | 35 | 52 | 35 | 28 | 27 | 36 | 23 | 44 | 45 | 19 | 23 | 52 |
| 14-Sep | 43 | 27 | 40 | 45 | 26 | 19 | 18 | 39 | 99 | 26 | 25 | 37 | 31 | 24 | 21 | 50 | 32 | 18 | 34 | 19 | 51 | 25 | 19 | 29 | 99 |
| 15-Sep | 68 | 31 | 59 | 39 | 15 | 60 | 42 | 73 | 56 | 59 | 62 | 70 | 83 | 36 | 55 | 27 | 43 | 22 | 23 | 30 | 60 | 18 | 22 | 75 | 83 |
| 16-Sep | 37 | 21 | 29 | 13 | 27 | 20 | 26 | 19 | 31 | 19 | 15 | 14 | 32 | 52 | 51 | 46 | 45 | 51 | 12 | 38 | 45 | 23 | 16 | 59 | 59 |
| 17-Sep | 20 | 21 | 19 | 31 | 12 | 13 | 20 | 22 | 19 | 27 | 44 | 26 | 26 | 31 | 46 | 53 | 41 | 27 | 24 | 36 | 49 | 39 | 33 | 29 | 53 |
| 18-Sep | 67 | 89 | 67 | 60 | 73 | 50 | 78 | 41 | 55 | 19 | 21 | 18 | 15 | 14 | 15 | 14 | 18 | 14 | 14 | 12 | 15 | 16 | 22 | 13 | 89 |
| 19-Sep | 24 | 13 | 18 | 18 | 9 | 39 | 30 | 29 | 26 | 22 | 27 | 20 | 20 | 16 | 21 | 20 | 18 | 16 | 19 | 11 | 13 | 11 | 18 | 15 | 39 |
| 20-Sep | 16 | 16 | 19 | 33 | 20 | 12 | 14 | 33 | 41 | 27 | 64 | 83 | 55 | 52 | 60 | 40 | 37 | 25 | 63 | 62 | 44 | 74 | 57 | 44 | 83 |
| 21-Sep | 69 | 30 | 32 | 48 | 30 | 60 | 16 | 30 | 23 | 29 | 19 | 18 | 31 | 44 | 43 | 52 | 44 | 29 | 15 | 17 | 23 | 19 | 80 | 87 | 87 |
| 22-Sep | 56 | 47 | 43 | 37 | 37 | 17 | 16 | 12 | 16 | 15 | 15 | 18 | 28 | 22 | 19 | 19 | M | M | 13 | 13 | 14 | 16 | 13 | 11 | 56 |
| 23-Sep | 12 | 15 | 12 | 12 | 12 | 13 | 14 | 14 | 15 | 14 | 16 | 16 | 16 | 15 | 16 | 15 | 15 | 16 | 16 | 16 | 15 | 15 | 14 | 14 | 16 |
| 24-Sep | 14 | 13 | 13 | 12 | 13 | 18 | 26 | 16 | 20 | 50 | 50 | 42 | 35 | 41 | 33 | 19 | 19 | 18 | 38 | 24 | 19 | 20 | 25 | 25 | 50 |
| 25-Sep | 27 | 22 | 30 | 23 | 20 | 17 | 22 | 31 | 32 | 33 | 32 | 31 | 41 | 26 | 28 | 34 | 24 | 20 | 34 | 27 | 49 | 41 | 55 | 33 | 55 |
| 26-Sep | 18 | 20 | 39 | 39 | 49 | 69 | 47 | 38 | 18 | 17 | 19 | 17 | 15 | 14 | 14 | 16 | 16 | 12 | 10 | 11 | 12 | 11 | 13 | 13 | 69 |
| 27-Sep | 16 | 56 | 51 | 29 | 25 | 44 | 35 | 28 | 22 | 46 | 23 | 26 | 29 | 30 | 30 | 38 | 49 | 45 | 30 | 45 | 49 | 56 | 94 | 11 | 94 |
| 28-Sep | 40 | 34 | 36 | 43 | 69 | 16 | 14 | 17 | 24 | 24 | 14 | 26 | 59 | 61 | 43 | 38 | 23 | 18 | 33 | 22 | 18 | 52 | 72 | 60 | 72 |
| 29-Sep | 41 | 52 | 22 | 22 | 62 | 11 | 32 | 29 | 17 | 13 | 13 | 12 | 15 | 12 | 18 | 16 | 15 | 13 | 16 | 55 | 61 | 48 | 27 | 17 | 62 |
| 30-Sep | 74 | 66 | 23 | 23 | 16 | 13 | 11 | 12 | 13 | 16 | 15 | 16 | 16 | 16 | 15 | 17 | 16 | 16 | 15 | 15 | 16 | 15 | 14 | 15 | 74 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 74 | 89 | 67 | 60 | 73 | 71 | 78 | 73 | 99 | 86 | 87 | 96 | 83 | 80 | 72 | 83 | 53 | 82 | 82 | 67 | 61 | 74 | 94 | 87 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 15, 2016 | Last Calibration | August 2, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Reason: | Routine | | |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Gas Cert Reference | LL107945 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 49.7 ppm | Cal Gas Exp Date | 9/08/2018 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 1730512 |
| ZAG Make/Model | API 701 | Serial Number | 587 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9036 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -614 | -614 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 809 | 811 |
| Calculated slope | 0.996978 | 0.995796 | Chamber temp | 44.9 | 44.9 |
| Calculated intercept | -0.076111 | 1.589306 | Pressure | 681.9 | 688.9 |
| Analyzer Background | 13.4 | 13.7 | Flow | 0.491 | 0.491 |
| Analyzer Coefficient | 0.944 | 0.934 | Intensity | 91 | 91 |

Analyzer make Thermo 43i Analyzer serial # JC1501301448

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.8 | ---- |
| as found span | 5500 | 81.3 | 734.7 | 740.8 | 0.992 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5500 | 81.3 | 734.7 | 737.0 | 0.997 |
| second point | 5500 | 45.6 | 412.1 | 411.6 | 1.001 |
| third point | 5500 | 22.8 | 206.0 | 203.5 | 1.012 |
| as left zero | 5500 | 0.0 | 0.0 | 0.8 | ---- |
| as left span | 5500 | 81.3 | 734.7 | 735.2 | 0.999 |
| Average Correction Factor | | | | | 1.003 |

Corrected As found 740.0 Previous response 737.0 % change -0.4%

Notes:

Inlet filter changed after as founds. Zero and span adjusted.

Calibration Performed By: Devin Russell



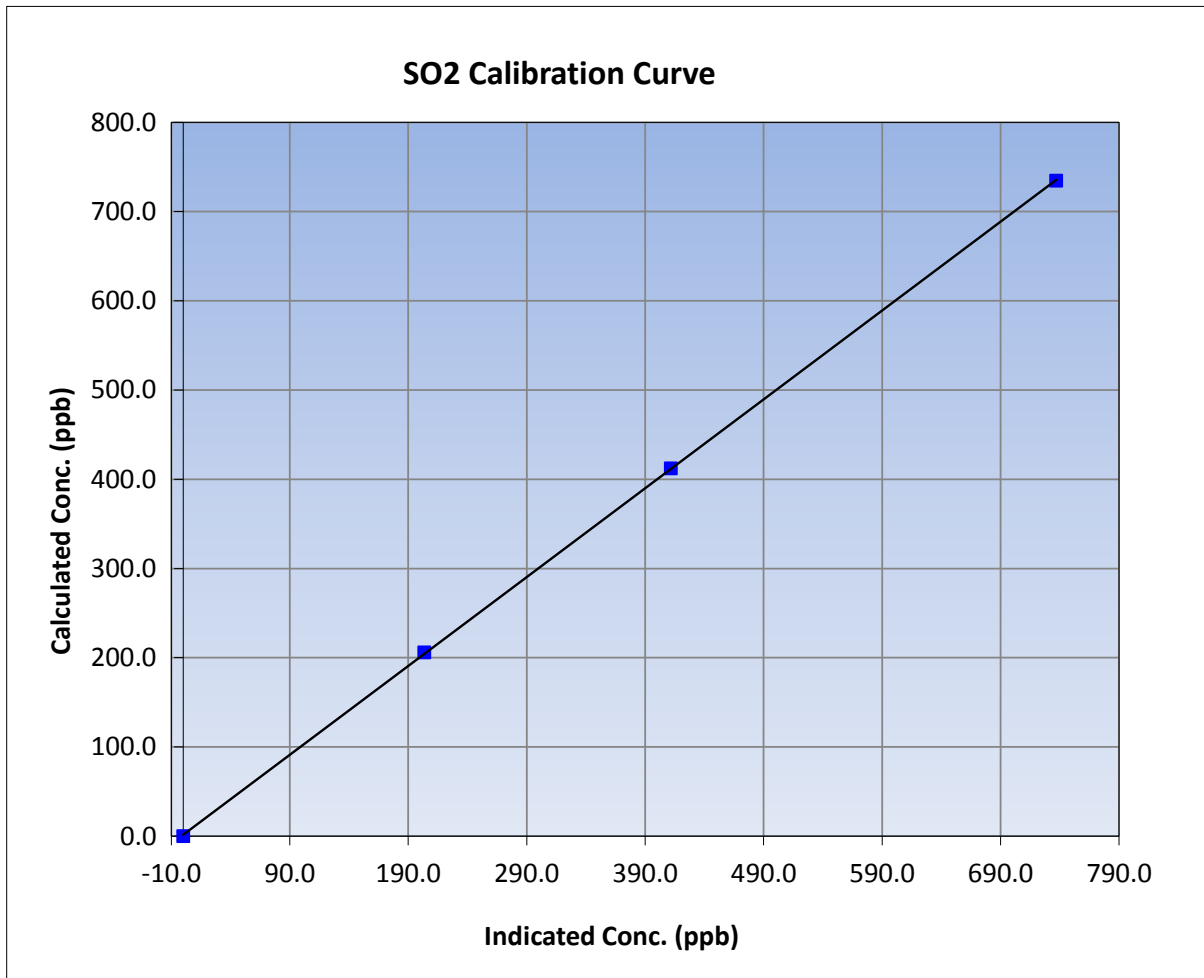
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 43i | Analyzer serial # | JC1501301448 |

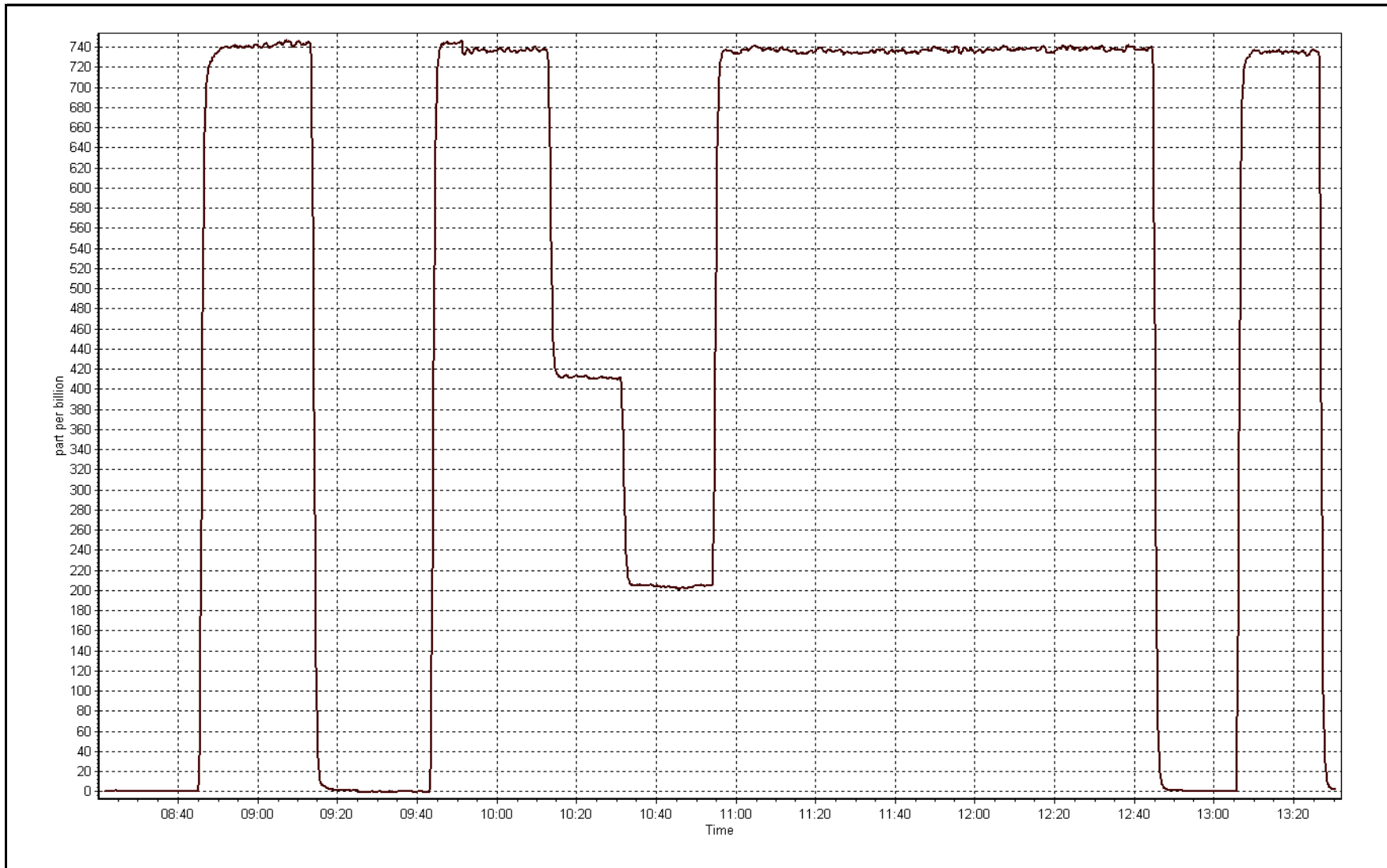
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999978 |
| 734.7 | 737.0 | 0.9968 | | |
| 412.1 | 411.6 | 1.0011 | Slope | 0.995796 |
| 206.0 | 203.5 | 1.0123 | | |
| | | | Intercept | 1.589306 |



SO2 Calibration Plot

Date: September 15, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 16, 2016 | Last Calibration | August 11, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Reason: | Routine | | |
| Start Time (MST) | 8:46 | End Time (MST) | 12:45 |
| Gas Cert Reference | ET0005004 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 4.94 ppm | Cal Gas Exp Date | 2/12/2019 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 1730512 |
| Dil air Make/Model | API 701 | Serial Number | 587 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9036 |
| SO2 gas concentration | 49.7 ppm | SO2 gas cert/exp | LL107945 8/Sep/18 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -860 | -860 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1131 | 1130 |
| Calculated slope | 0.993520 | 1.002126 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.023008 | -0.333148 | Pressure | 669.0 | 658.5 |
| Analyzer Background | 1.75 | 1.73 | Flow | 0.436 | 0.429 |
| Analyzer Coefficient | 0.940 | 0.925 | Intensity | 80 | 80 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-TLE | | Analyzer serial # | 1218153461 | |
| Converter make/model | CDN-101 | | Converter serial # | 470 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 6000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 6000 | 91.1 | 75.0 | 75.7 | 0.991 |
| SO2 scrubber check | 5500 | 22.8 | 206.0 | 0.1 | ---- |
| calibrator zero | 6000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 6000 | 91.1 | 75.0 | 75.2 | 0.997 |
| second point | 6000 | 48.6 | 40.0 | 40.3 | 0.993 |
| third point | 6000 | 24.3 | 20.0 | 20.2 | 0.992 |
| as left zero | 6000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 6000 | 91.1 | 75.0 | 75.7 | 0.991 |
| Average Correction Factor | | | | | 0.994 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 75.7 | Previous response | 75.5 | % change | -0.3% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

Inlet filter changed after as founds. Scrubber check completed after as founds. Span adjusted.

Calibration Performed By:

Devin Russell



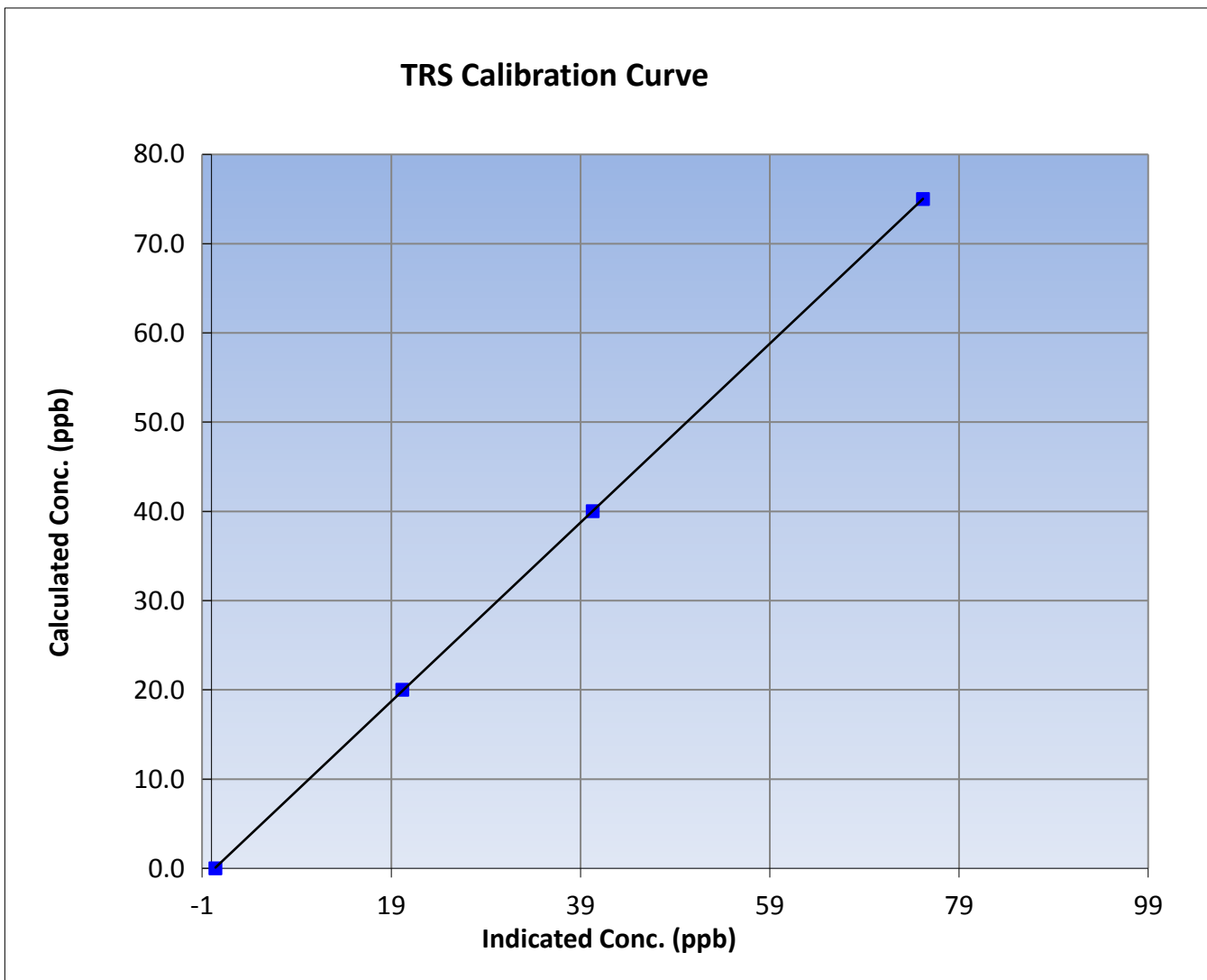
Wood Buffalo Environmental Association TRS Calibration Report

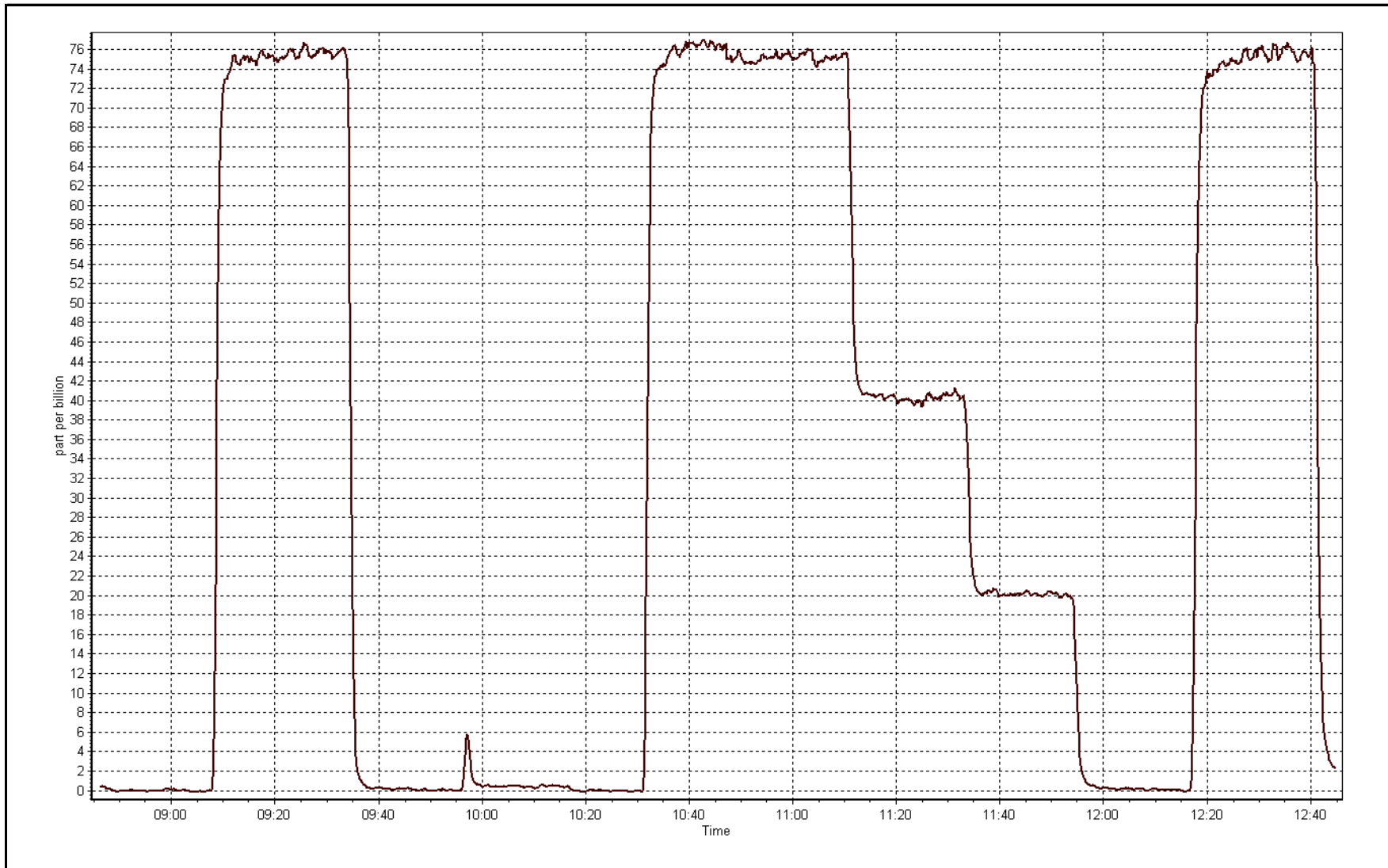
Station Information

| | | | |
|------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 16, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:46 | 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 | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999991 |
| 75.0 | 75.2 | 0.9974 | | |
| 40.0 | 40.3 | 0.9931 | Slope | 1.002126 |
| 20.0 | 20.2 | 0.9924 | | |
| | | | Intercept | -0.333148 |







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|----------------------------|---------------------|-----------------|
| Calibration Date | September 15, 2016 | Last Calibration | August 2, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Reason: | Routine | | |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Gas Cert Reference | LL107945 | Cal Gas Expiry Date | September-08-18 |
| CH4 Cal Gas Conc. | 515.0 ppm | CH4 Equiv Conc. | 1065.0 ppm |
| C3H8 Cal Gas Conc. | 200.0 ppm | Station temp. | 21 Deg C |
| Calibrator Model | Sabio 4010 | Serial Number | 1730512 |
| ZAG make/model | Teledyne API 701 | Serial Number | 587 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 9036 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|-----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.3 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 405.0 | 405.0 |
| THC Calc slope | 1.000537 | 0.997594 | Carrier Pressure | 37.3 | 37.3 |
| THC Calc intercept | 0.015459 | 0.049203 | Fuel Pressure | 44.3 | 44.3 |
| NMHC Calc slope | 1.000376 | 0.998150 | Air Pressure | 39.0 | 39.0 |
| NMHC Calc intercept | -0.013912 | -0.005555 | | | |

Analyzer make Thermo 55i Analyzer serial # 1152430012

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5500 | 81.3 | 15.74 | 15.85 | 0.993 |
| calibrator zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5500 | 81.3 | 15.74 | 15.77 | 0.998 |
| second point | 5500 | 45.6 | 8.83 | 8.75 | 1.009 |
| third point | 5500 | 22.8 | 4.41 | 4.34 | 1.017 |
| as left zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5500 | 81.3 | 15.74 | 15.67 | 1.005 |
| Average Correction Factor | | | | | 1.008 |

Corrected As found 15.85 Previous response 15.72 % change -0.8%

Notes:

Inlet filter changed after as founds. H2 and N2 cylinders changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5500 | 81.3 | 8.13 | 8.16 | 0.996 |
| calibrator zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5500 | 81.3 | 8.13 | 8.15 | 0.998 |
| second point | 5500 | 45.6 | 4.56 | 4.57 | 0.998 |
| third point | 5500 | 22.8 | 2.28 | 2.30 | 0.991 |
| as left zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5500 | 81.3 | 8.13 | 8.11 | 1.002 |
| Average Correction Factor | | | | | 0.996 |

Corrected As found 8.16 Previous response 8.14 % change -0.2%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5500 | 81.3 | 7.61 | 7.68 | 0.991 |
| calibrator zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5500 | 81.3 | 7.61 | 7.61 | 1.000 |
| second point | 5500 | 45.6 | 4.27 | 4.19 | 1.019 |
| third point | 5500 | 22.8 | 2.13 | 2.05 | 1.041 |
| as left zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5500 | 81.3 | 7.61 | 7.56 | 1.007 |
| Average Correction Factor | | | | | 1.020 |

Corrected As found 7.68 Previous response 7.58 % change -1.3%



Wood Buffalo Environmental Association

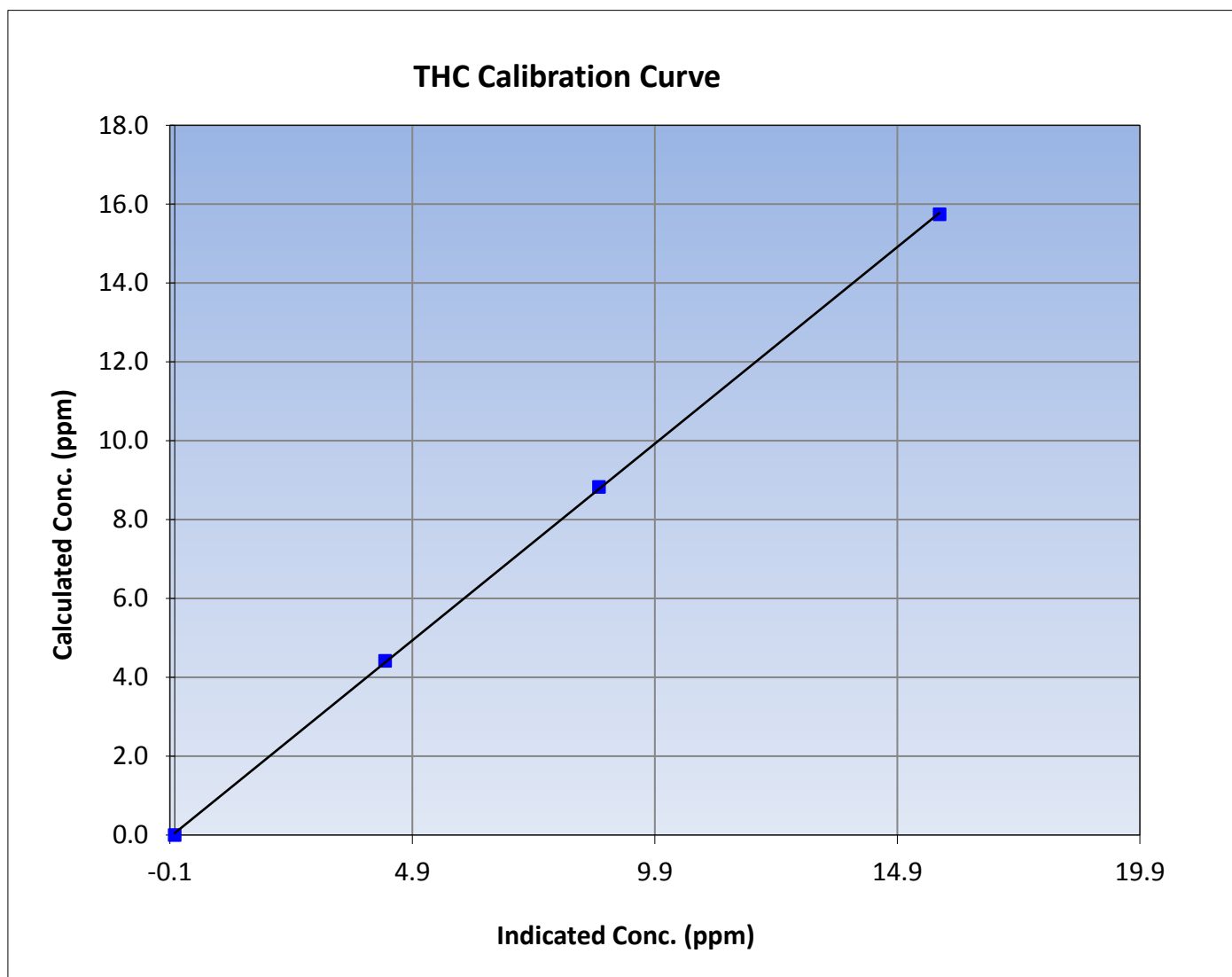
THC Calibration Summary

Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430012 |
| | 8:17 | | |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999942 |
| 15.74 | 15.77 | 0.9983 | | |
| 8.83 | 8.75 | 1.0091 | Slope | 0.997594 |
| 4.41 | 4.34 | 1.0173 | | |
| | | | Intercept | 0.049203 |





Wood Buffalo Environmental Association

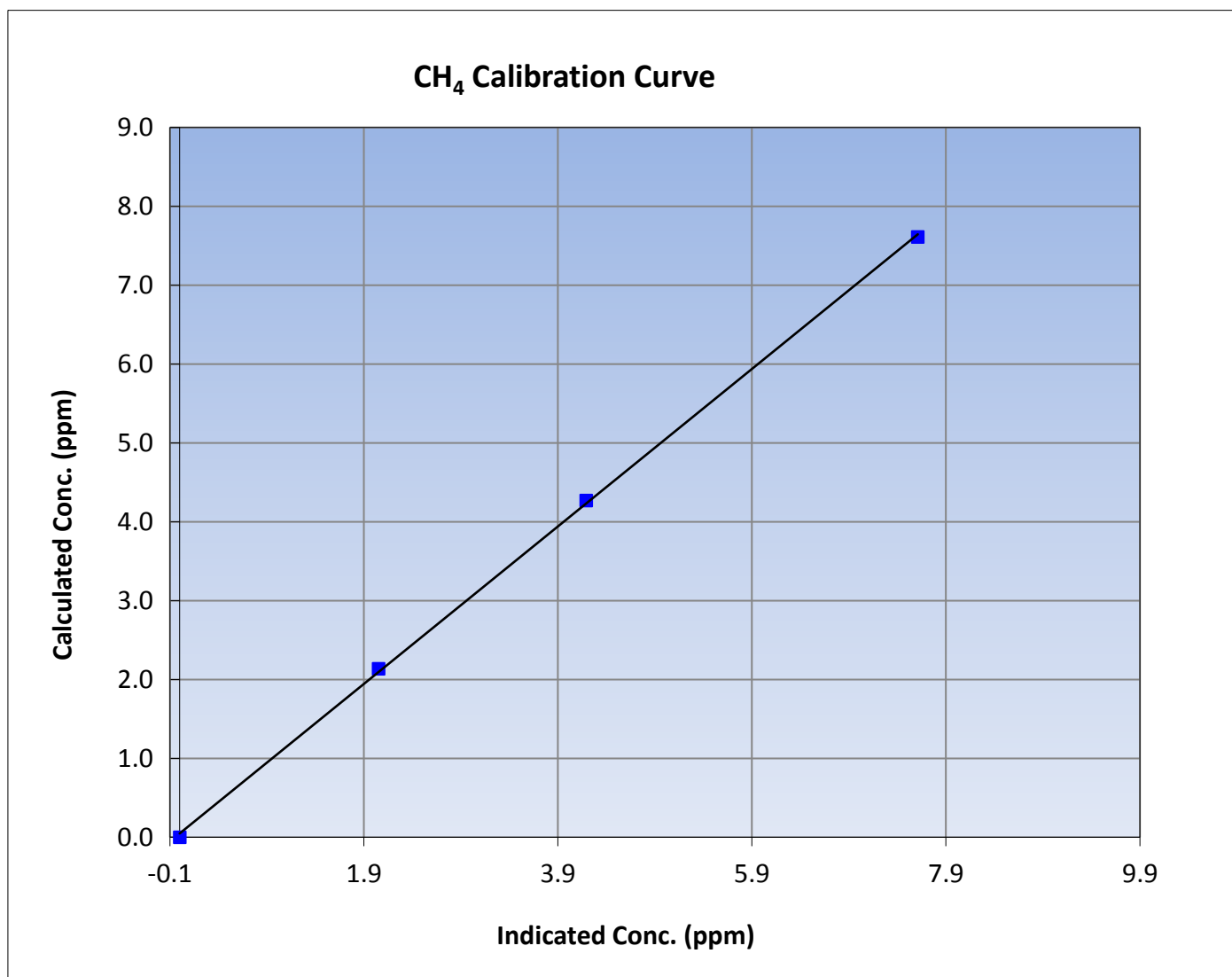
CH₄ Calibration Summary

Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430012 |
| | 8:17 | | |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999794 |
| 7.61 | 7.61 | 1.0003 | | |
| 4.27 | 4.19 | 1.0190 | Slope | 0.998394 |
| 2.13 | 2.05 | 1.0414 | | |
| | | | Intercept | 0.047401 |





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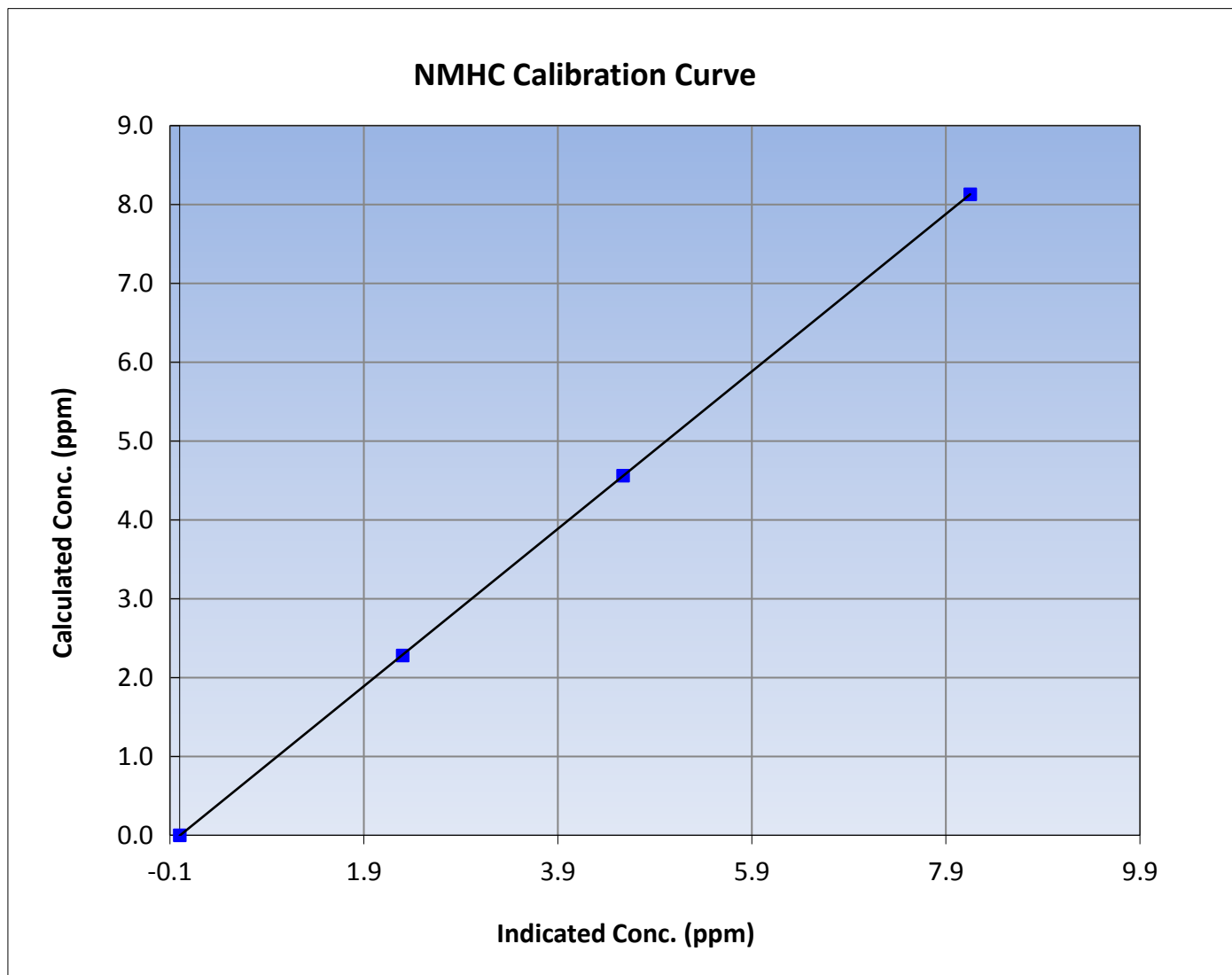
NMHC Calibration Summary

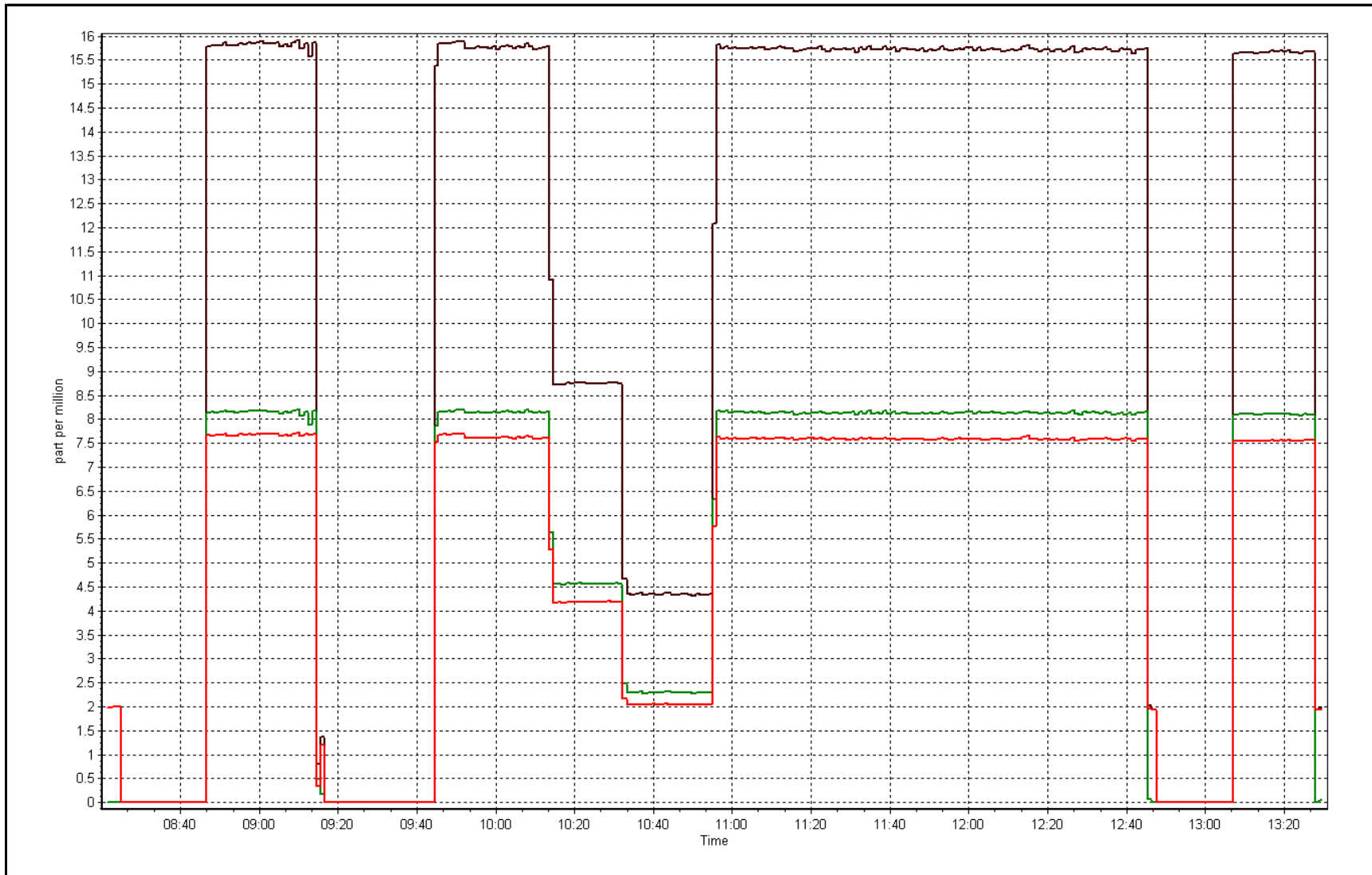
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430012 |
| | 8:17 | | |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999996 |
| 8.13 | 8.15 | 0.9975 | | |
| 4.56 | 4.57 | 0.9978 | Slope | 0.998150 |
| 2.28 | 2.30 | 0.9913 | | |
| | | | Intercept | -0.005555 |







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 14, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Reason: | Routine | | |
| Start Time (MST) | 8:55 | End Time (MST) | 12:45 |
| NO2 GPT Ref date | September-13-16 | Transfer Standard | N/A |
| Calibrator Make/Model | Sabio 4010 | Station temp. | 22 Deg C |
| ZAG make/model | Teledyne API 701 | Serial Number | 1730512 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 587 |
| | | Serial Number | 9036 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|------------------|--------|-------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 28.7 | 27.1 |
| Analyzer IP address | 192.168.1.49 | | Lamp temp. | 53.6 | 53.6 |
| Calculated slope | 0.997781 | 0.999154 | Pressure | 722.8 | 713.0 |
| Calculated intercept | -2.833886 | -0.510372 | Flow cell A | 0.769 | 0.761 |
| Analyzer Background | -2.4 | -2.4 | Flow cell B | 0.822 | 0.807 |
| Analyzer Coefficient | 1.049 | 1.040 | Cell A Intensity | 73xxx | 71xxx |
| | | | Cell B Intensity | 88xxx | 86xxx |

| | | | |
|---------------|------------|-------------------|------------|
| Analyzer make | Thermo 49i | Analyzer serial # | 1152220026 |
|---------------|------------|-------------------|------------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp Intensity | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|---------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.00 | 0.0 | 0.3 | ---- |
| as found span | 5000 | 0.98 | 418.1 | 420.5 | 0.994 |
| calibrator zero | 5000 | 0.00 | 0.0 | 0.1 | ---- |
| high point | 5000 | 0.98 | 418.1 | 419.0 | 0.998 |
| second point | 5000 | 0.56 | 251.0 | 251.3 | 0.999 |
| third point | 5000 | 0.34 | 130.3 | 131.7 | 0.989 |
| As Left Zero | 5000 | 0.00 | 0.0 | 0.4 | ---- |
| As Left Span | 5000 | 0.98 | 418.1 | 427.7 | 0.978 |
| Average Correction Factor | | | | | 0.995 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 420.2 | Previous response | 421.9 | % change | 0.4% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

Inlet filter changed after as founds. Span adjusted slightly.

Calibration Performed By: Devin Russell



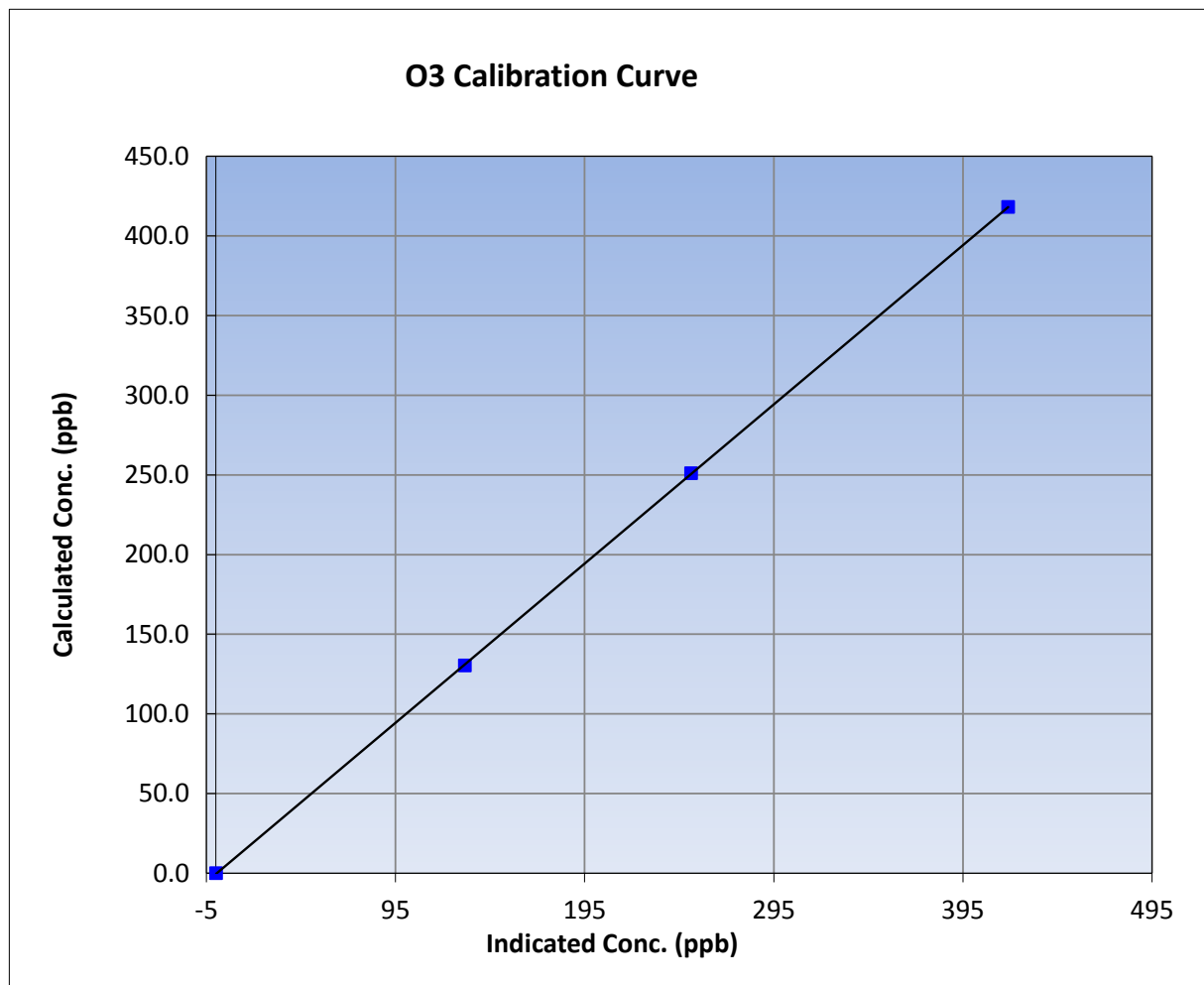
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

| | | | |
|------------------|----------------------------|----------------------|--------------|
| Calibration Date | September-14-16 | Previous Calibration | August-04-16 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:55 | End Time (MST) | 12:45 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1152220026 |

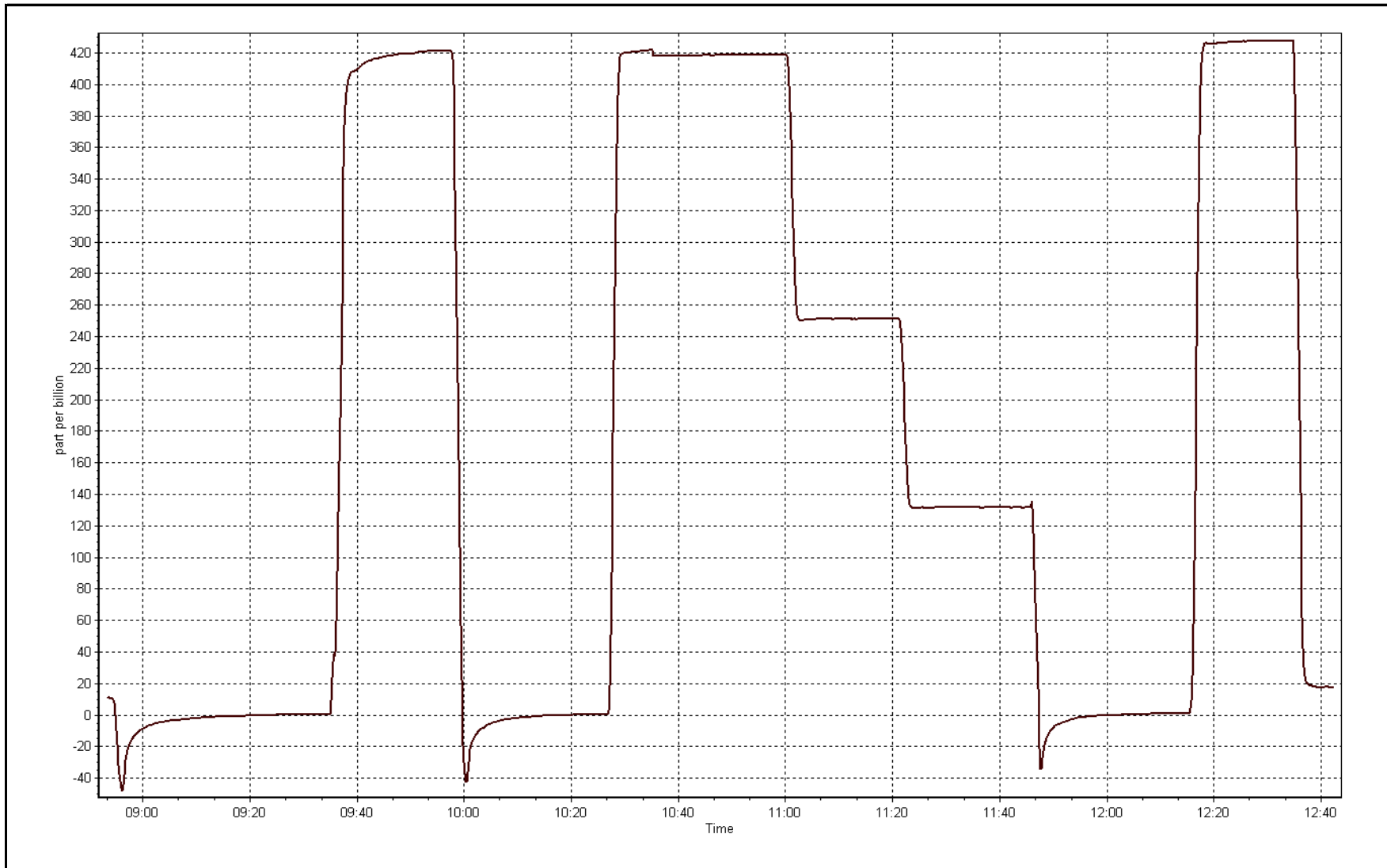
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999991 |
| 418.1 | 419.0 | 0.9980 | | |
| 251.0 | 251.3 | 0.9986 | Slope | 0.999154 |
| 130.3 | 131.7 | 0.9894 | | |
| | | | Intercept | -0.510372 |



O3 Calibration Plot

Date: September 14, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Reason: | Routine | | |
| Start Time (MST) | 7:59 | End Time (MST) | 15:15 |
| NO Cal Gas Conc | 50.7 ppm | Gas Cert Reference | LL107945 |
| NOx Cal Gas Conc | 50.9 ppm | Cal Gas Expiry Date | 9/08/2018 |
| Calibrator | Sabio 4010 | Serial Number | 1730512 |
| Zero air Generator | Teledyne API T701 | Serial Number | 587 |

DACS Information

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

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|----------|
| As Found (last calibration results) | Data Slope | 1.000505 | 0.998614 | 1.006053 |
| | Data Offset | 0.390570 | 0.619131 | 0.707260 |
| Current Calibration | Data Slope | 0.998380 | 0.997528 | 1.003367 |
| | Data Offset | 1.742144 | 1.657215 | 0.852378 |

Analyzer Information

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

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 1.000 | | 1.084 | |
| NOx coefficient | 1.002 | | 1.003 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 5.2 | | 16.3 | |
| NOx bkgrnd | 5.4 | | 16.9 | |
| Chamber Temp | 50.2 | Deg C | 50.4 | Deg C |
| Moly Temp | 322.1 | Deg C | 323.2 | Deg C |
| PMT voltage | -791.2 | V | -791.4 | V |
| PMT Temp | -3 | Deg C | -2.9 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 149.5 | mmHg | 159.3 | mmHg |
| R Cell Press Nox | 149.5 | mmHg | 159.3 | mmHg |
| NO sample flow | 0.705 | lpm | 0.616 | lpm |
| Nox sample Flow | 0.704 | lpm | 0.616 | lpm |

Notes:

Analyzer losing sensitivity. Reaction cell chamber cleaned. Adjusted PMT voltage. Zero and span adjusted. As lefts not completed.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 13, 2016 Station Number: AMS 1

Calibration Data

| Set Point | Routine | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|---------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 | ---- | ---- |
| as found span | 5500 | 81.4 | 753.3 | 750.4 | 3.0 | 675.6 | 672.9 | 2.7 | 1.1151 | 1.1151 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | 0.0 | ---- | ---- |
| high point | 5500 | 81.4 | 753.3 | 750.4 | 3.0 | 753.6 | 751.3 | 2.3 | 0.9997 | 0.9988 |
| second point | 5500 | 45.6 | 422.0 | 420.3 | 1.7 | 420.4 | 419.2 | 1.2 | 1.0038 | 1.0027 |
| third point | 5500 | 22.8 | 211.0 | 210.2 | 0.8 | 207.9 | 207.4 | 0.5 | 1.0147 | 1.0132 |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 1.0061 | 1.0049 |

Corrected As found NO_x= 675.7 NO= 672.9 Percent Change NO_x= 11.4% NO= 11.6%
 Previous Response NO_x= 752.5 NO= 750.8

GPT Calibration Data

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

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 3.0 | 750.9 | 749.4 | 0.0 | 1.0032 | 1.0013 | ---- | ---- |
| 1st NO2 (300) | 331.3 | 421.0 | 750.7 | 331.3 | 419.4 | 1.0035 | ---- | 1.0038 | 99.6% |
| 2nd NO2 (200) | 498.3 | 254.0 | 750.0 | 498.3 | 251.6 | 1.0045 | ---- | 1.0094 | 99.1% |
| 3rd NO2 (100) | 619.1 | 133.2 | 750.2 | 619.1 | 131.1 | 1.0041 | ---- | 1.0160 | 98.4% |
| 2nd NO ref point | ---- | 3.0 | 750.2 | 748.5 | 1.7 | 1.0042 | 1.0025 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0041 | | 1.0098 | 99.0% |

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

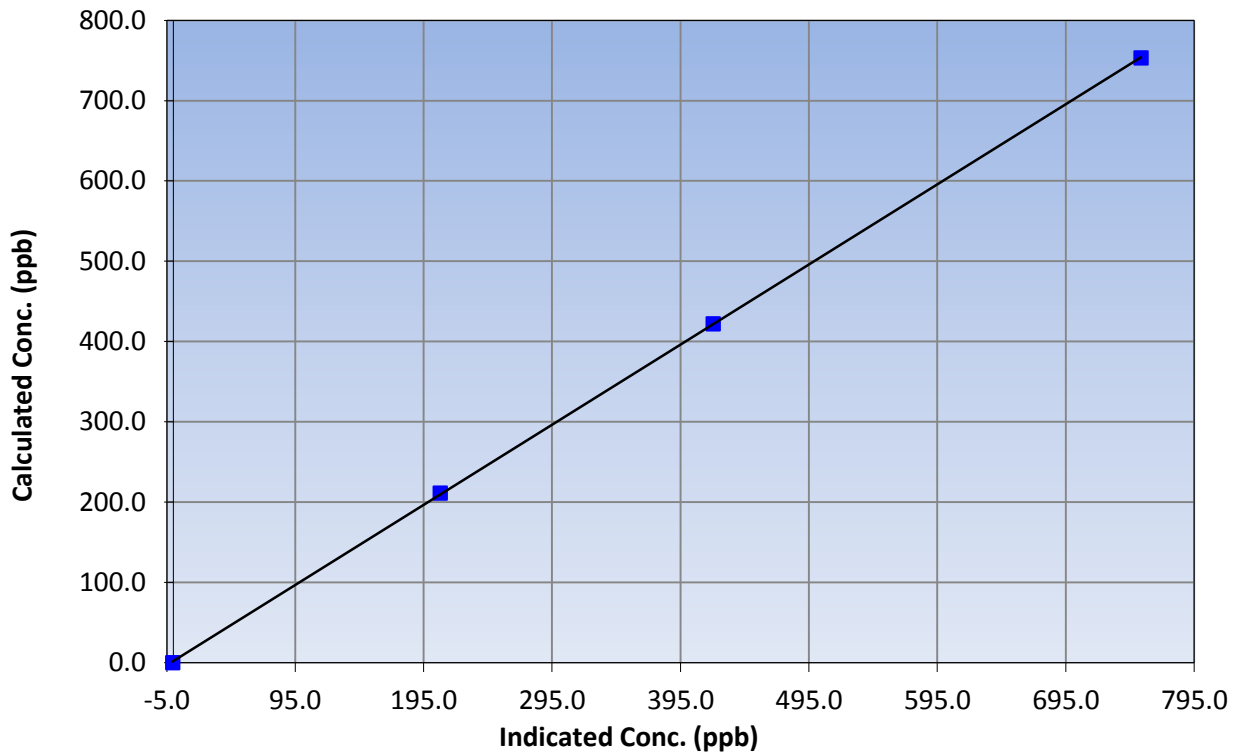
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 15:15 |
| Analyzer make | Routine | Analyzer serial # | 1218153357 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | 0.999982 |
| 753.3 | 753.6 | 0.9997 | | |
| 422.0 | 420.4 | 1.0038 | Slope | 0.998380 |
| 211.0 | 207.9 | 1.0147 | | |
| | | | Intercept | 1.742144 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

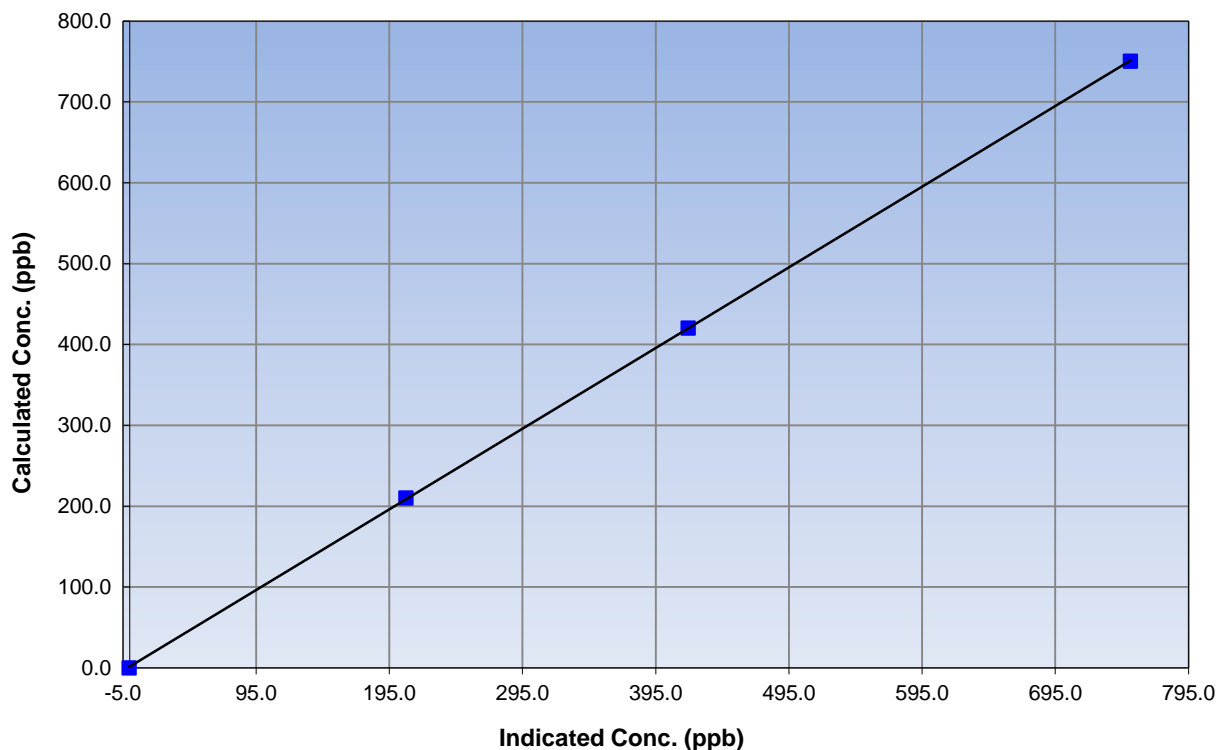
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 15:15 |
| Analyzer make | Routine | Analyzer serial # | 1218153357 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.3 | N/A | Correlation Coefficient | 0.999983 |
| 750.4 | 751.3 | 0.9988 | | |
| 420.3 | 419.2 | 1.0027 | Slope | 0.997528 |
| 210.2 | 207.4 | 1.0132 | | |
| | | | Intercept | 1.657215 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

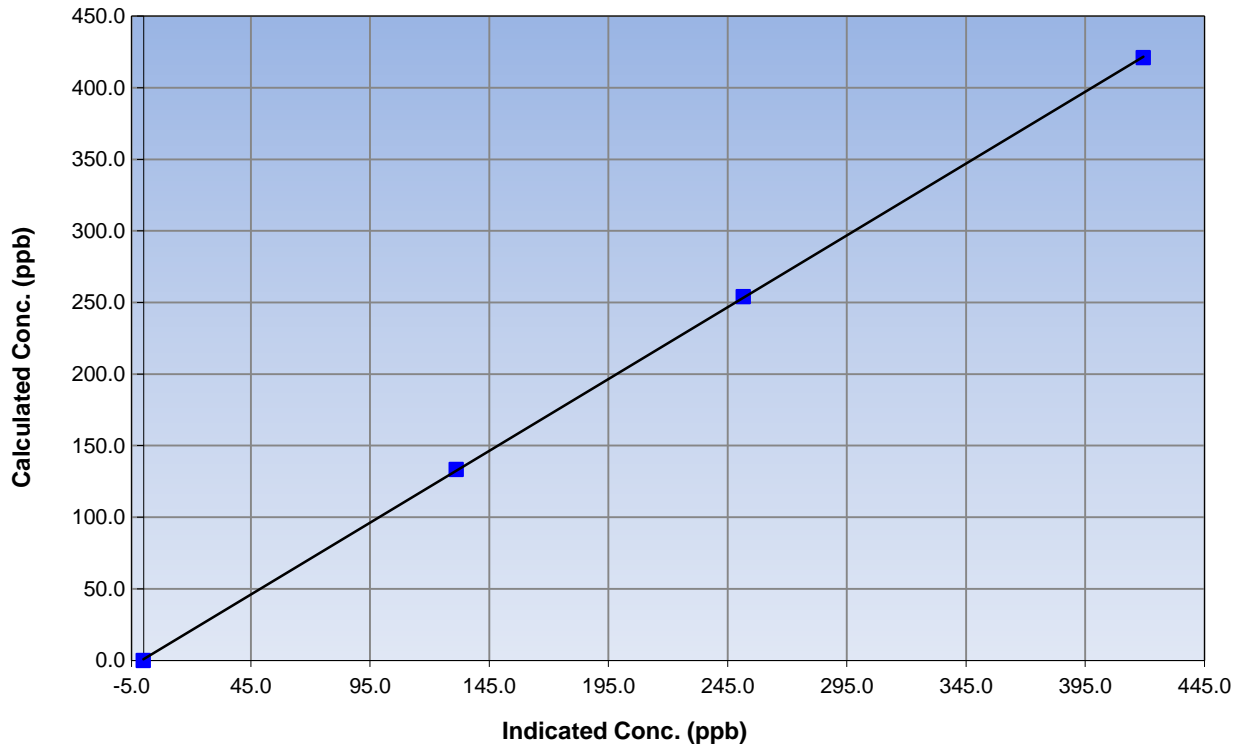
Station Information

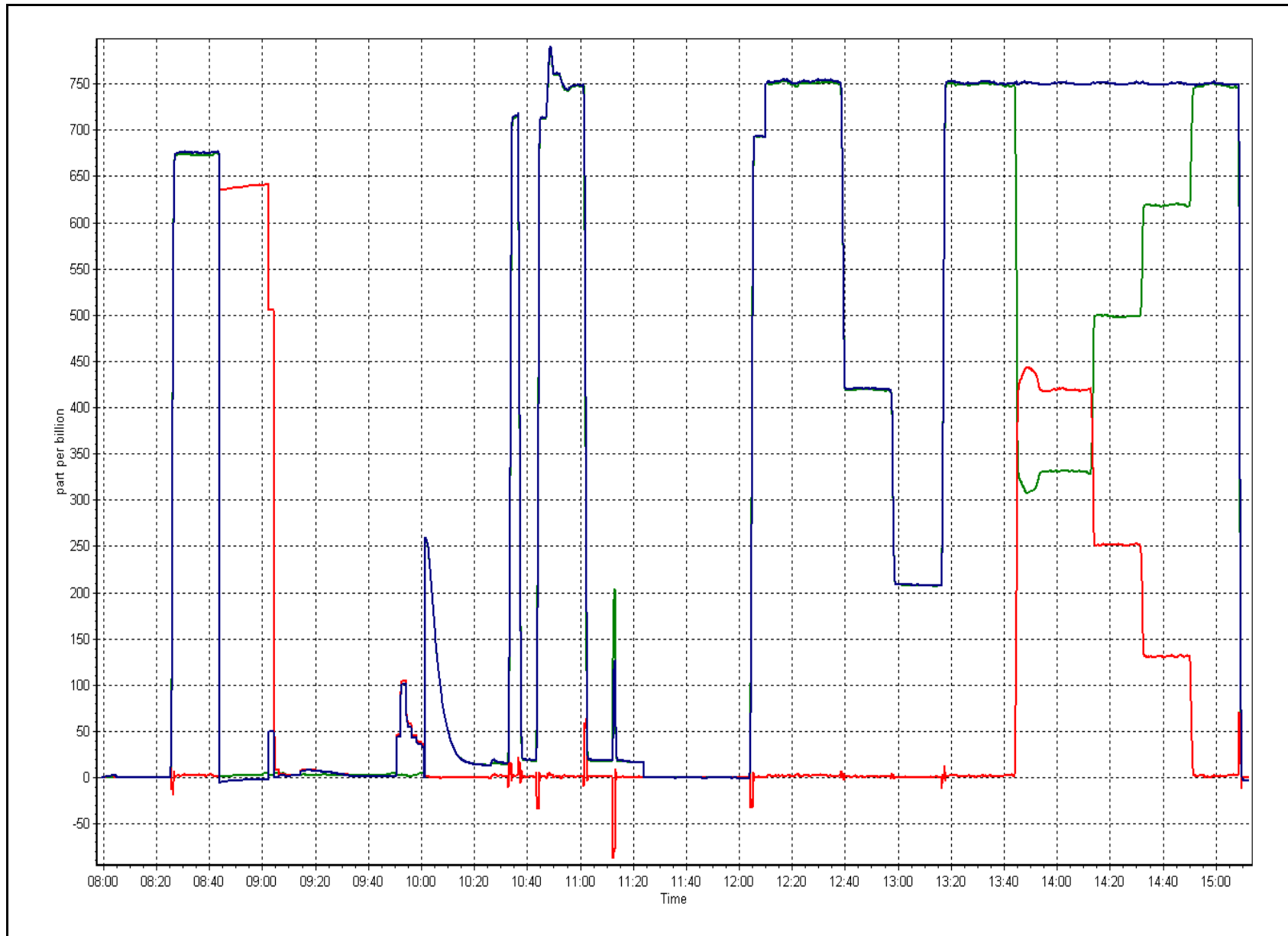
| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 9, 2016 |
| Station Number | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 15:15 |
| Analyzer make | Routine | Analyzer serial # | 1218153357 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | N/A | Correlation Coefficient | 0.999977 |
| 421.0 | 419.4 | 1.0038 | | |
| 254.0 | 251.6 | 1.0094 | Slope | 1.003367 |
| 133.2 | 131.1 | 1.0160 | | |
| | | | Intercept | 0.852378 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | | | |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------|---------|----------------------------------|
| Calibration Date | September 15, 2016 | Previous Calibration | September 13, 2016 | | |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 | | |
| Reason: | <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Routine</td> <td>Re-adjustment after maintenance.</td> </tr> </table> | | | Routine | Re-adjustment after maintenance. |
| Routine | Re-adjustment after maintenance. | | | | |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 | | |
| NO Cal Gas Conc | 50.7 ppm | Gas Cert Reference | LL107945 | | |
| NOx Cal Gas Conc | 50.9 ppm | Cal Gas Expiry Date | 9/08/2018 | | |
| Calibrator | Sabio 4010 | Serial Number | 1730512 | | |
| Zero air Generator | Teledyne API T701 | Serial Number | 587 | | |

DACs Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACs make & model | Campbell Scientific CR3000 | DACs serial No. | 9036 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|----------|
| As Found (last calibration results) | Data Slope | 0.998380 | 0.997528 | 1.003367 |
| | Data Offset | 1.742144 | 1.657215 | 0.852378 |
| Current Calibration | Data Slope | 1.001956 | 0.998061 | 1.009262 |
| | Data Offset | 1.243463 | 1.236646 | 1.264301 |

Analyzer Information

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

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 1.084 | | 1.102 | |
| NOx coefficient | 1.003 | | 0.999 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 16.3 | | 6.9 | |
| NOx bkgrnd | 16.9 | | 7.1 | |
| Chamber Temp | 50.4 | Deg C | 50.1 | Deg C |
| Moly Temp | 323.2 | Deg C | 326 | Deg C |
| PMT voltage | -791.4 | V | -791.8 | V |
| PMT Temp | -2.9 | Deg C | -3 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 159.3 | mmHg | 164.6 | mmHg |
| R Cell Press Nox | 159.3 | mmHg | 164.6 | mmHg |
| NO sample flow | 0.616 | lpm | 0.635 | lpm |
| Nox sample Flow | 0.616 | lpm | 0.635 | lpm |

Notes:

Inlet filter changed after as founds. Readjustment to zero and span after stabilizing from maintenance performed on Sept 13, 2016.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 15, 2016 Station Number: AMS 1

Calibration Data

| Set Point | Routine | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|---------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -9.8 | -9.4 | -0.4 | ---- | ---- |
| as found span | 5500 | 81.4 | 753.3 | 750.4 | 3.0 | 731.7 | 728.5 | 3.2 | 1.0295 | 1.0301 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high point | 5500 | 81.4 | 753.3 | 750.4 | 3.0 | 751.1 | 751.1 | 0.0 | 1.0030 | 0.9990 |
| second point | 5500 | 45.6 | 422.0 | 420.3 | 1.7 | 419.9 | 419.7 | 0.2 | 1.0050 | 1.0015 |
| third point | 5500 | 22.8 | 211.0 | 210.2 | 0.8 | 207.8 | 207.9 | -0.1 | 1.0152 | 1.0109 |
| as left zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as left span | 5500 | 81.4 | 753.3 | 326.2 | 427.1 | 750.6 | 317.8 | 432.8 | 1.0037 | 1.0267 |
| Average Correction Factor | | | | | | | | | 1.0078 | 1.0038 |

Corrcted As found NO_x= 741.5 NO= 737.8 Percent Change NO_x= 1.5% NO= 1.7%
 Previous Response NO_x= 752.8 NO= 750.6

GPT Calibration Data

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

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 3.0 | 750.1 | 750.1 | 0.0 | 1.0044 | 1.0004 | ---- | ---- |
| 1st NO2 (300) | 326.2 | 426.8 | 748.7 | 326.2 | 422.4 | 1.0062 | ---- | 1.0104 | 99.0% |
| 2nd NO2 (200) | 497.6 | 255.4 | 748.8 | 497.6 | 251.3 | 1.0060 | ---- | 1.0166 | 98.4% |
| 3rd NO2 (100) | 619.2 | 133.8 | 749.1 | 619.2 | 129.9 | 1.0057 | ---- | 1.0303 | 97.1% |
| 2nd NO ref point | ---- | 3.0 | 749.6 | 749.9 | -0.3 | 1.0049 | 1.0006 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0057 | | 1.0191 | 98.1% |

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

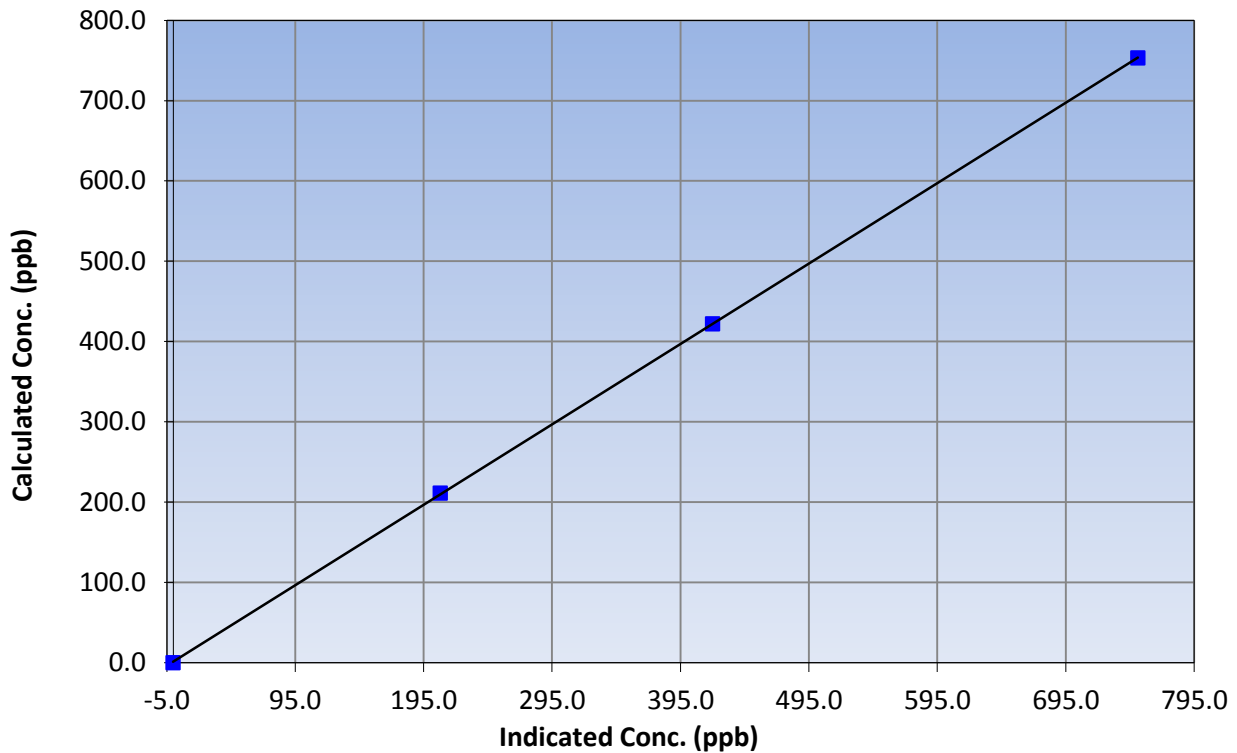
Station Information

| | | | |
|------------------|----------------------------|----------------------|--------------------|
| Calibration Date | September 15, 2016 | Previous Calibration | September 13, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Analyzer make | Routine | Analyzer serial # | 1218153357 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999988 |
| 753.3 | 751.1 | 1.0030 | | |
| 422.0 | 419.9 | 1.0050 | Slope | 1.001956 |
| 211.0 | 207.8 | 1.0152 | | |
| | | | Intercept | 1.243463 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

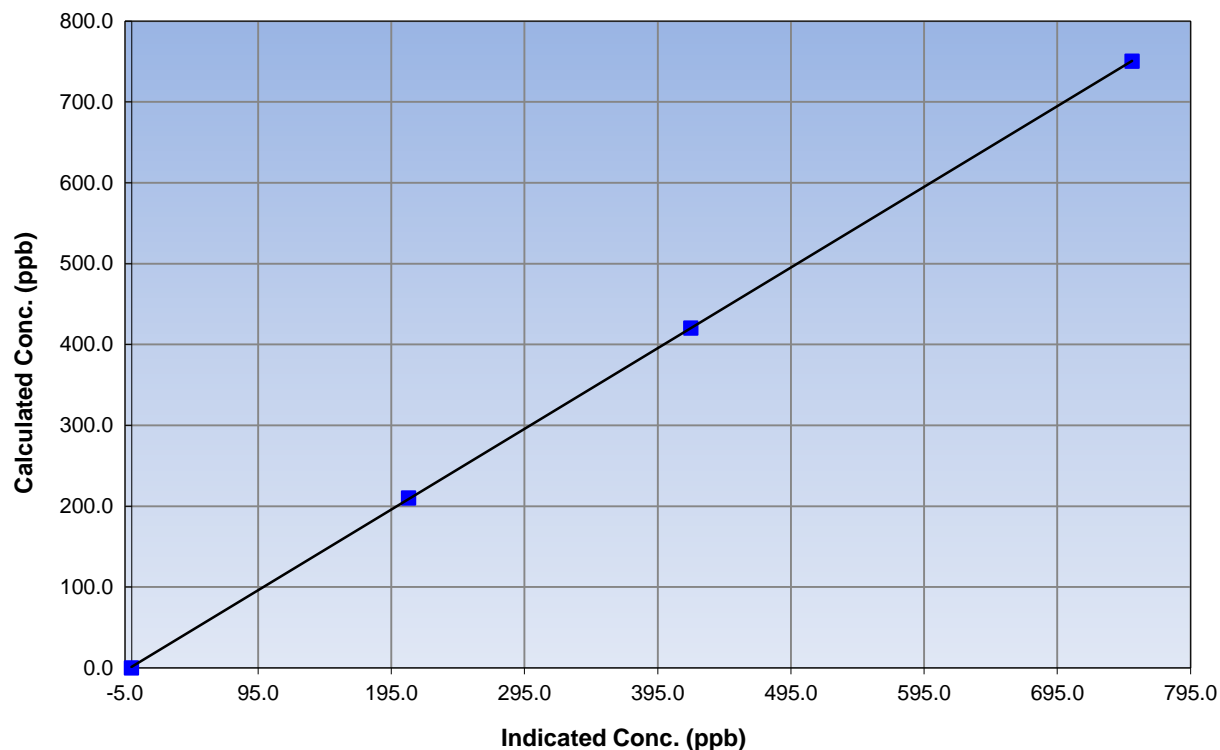
Station Information

| | | | |
|------------------|----------------------------|----------------------|--------------------|
| Calibration Date | September 15, 2016 | Previous Calibration | September 13, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Analyzer make | Routine | Analyzer serial # | 1218153357 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999988 |
| 750.4 | 751.1 | 0.9990 | | |
| 420.3 | 419.7 | 1.0015 | Slope | 0.998061 |
| 210.2 | 207.9 | 1.0109 | | |
| | | | Intercept | 1.236646 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

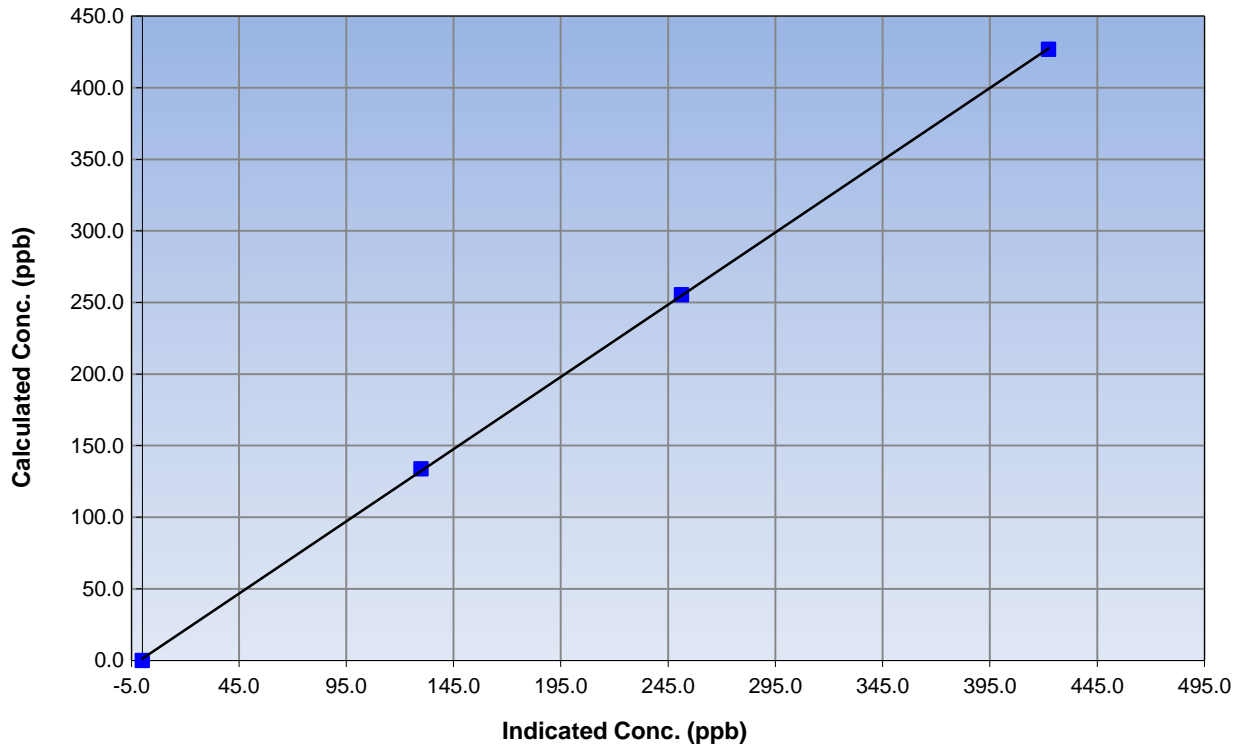
Station Information

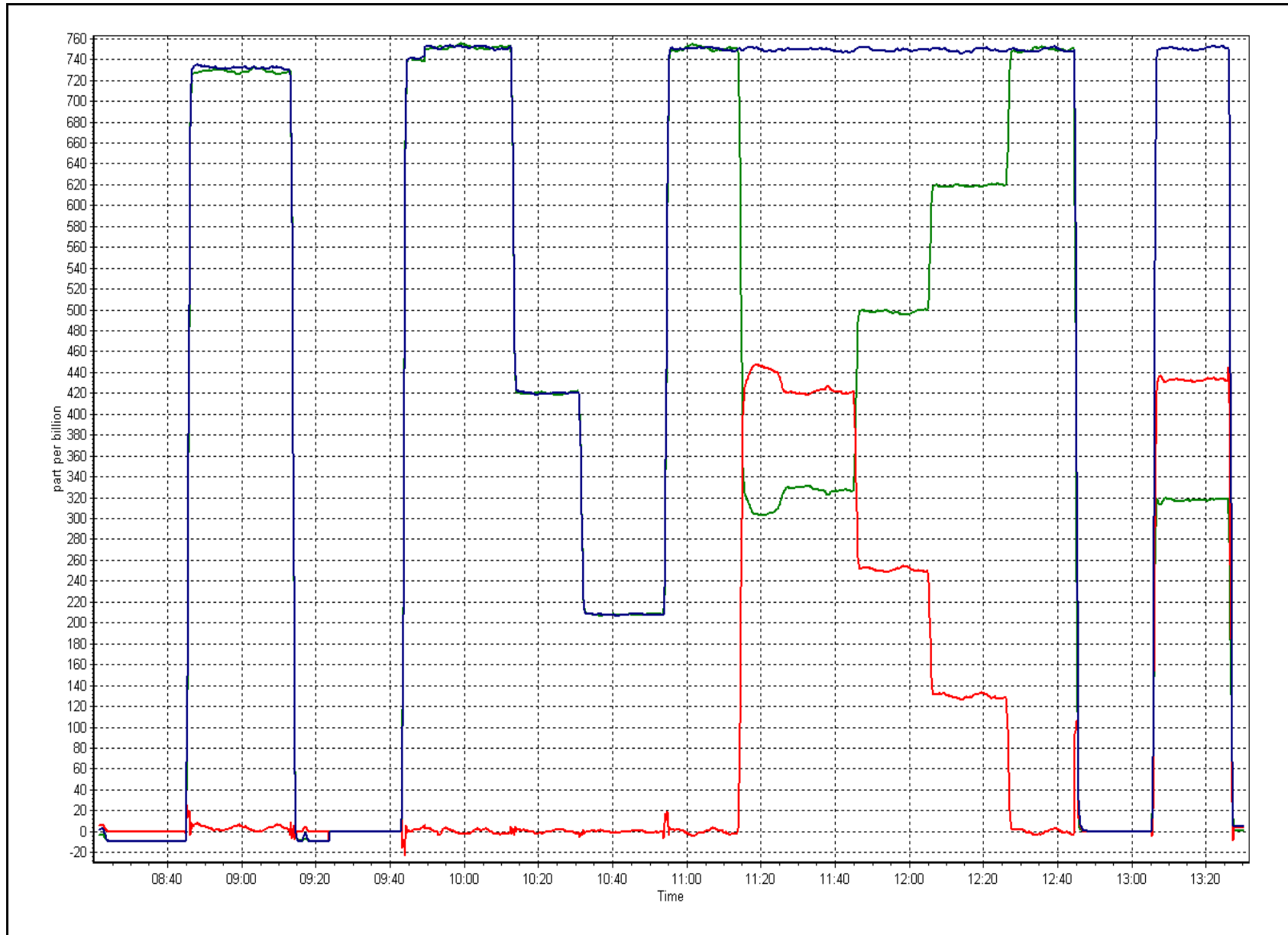
| | | | |
|------------------|----------------------------|----------------------|--------------------|
| Calibration Date | September 15, 2016 | Previous Calibration | September 13, 2016 |
| Station Number | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 8:17 | End Time (MST) | 13:30 |
| Analyzer make | Routine | Analyzer serial # | 1218153357 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | N/A | Correlation Coefficient | 0.999952 |
| 426.8 | 422.4 | 1.0104 | | |
| 255.4 | 251.3 | 1.0166 | Slope | 1.009262 |
| 133.8 | 129.9 | 1.0303 | | |
| | | | Intercept | 1.264301 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

| | | | |
|----------------------|----------------------------|-----------------------|---------------------|
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| NOX Calibration Date | September 13, 2016 | NOX Previous Cal Date | August 3, 2016 |
| NH3 Calibration Date | September 13, 2016 | NH3 Previous Cal Date | August 4, 2016 |
| Reason: | Routine | | |
| Start Time (MST) | 7:59 | End Time (MST) | 17:40 |
| Calibrator | Sabio 4010 | Station Temperature | 21.0 Deg C |
| NH3 Cal Gas Conc | 95.5 ppm | Serial Number | 14300410 |
| NOx Cal Gas Conc | 50.9 ppm | NH3 Expiry Date / SN | 24-May-2017 LL23123 |
| NO Cal Gas Conc | 50.7 ppm | NO Expiry Date / SN | 8-Sep-2018 LL107945 |

DACS Information

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

| Parameter | | NH3 | Nt | NOx | NO | NO2 |
|--------------------|-------------|--------------|----------|----------|----------|----------|
| Cal Stats As Found | Data Slope | 1.011249 | 1.000527 | 1.002422 | 1.001422 | 1.007856 |
| | Data Offset | -3.58784 | -2.95854 | 2.107753 | 1.687933 | 0.967706 |
| Cal Stats After | Data Slope | 0.997092 | 0.986651 | 1.002138 | 1.004567 | 1.002765 |
| | Data Offset | -1.09 | -2.41 | 0.321614 | 0.056670 | 0.997674 |
| IP address | | 192.168.1.77 | | | | |

Analyzer Information

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

| Test Point | before | | after | |
|-------------------|--------|-------|-------|-------|
| NH3 Conc range | 0-2500 | ppb | 2500 | ppb |
| NOX Conc range | 0-1000 | ppb | 1000 | ppb |
| NO BKG | -0.1 | ppb | -0.2 | ppb |
| NOx BKG | 0.0 | ppb | -0.2 | ppb |
| Nt BKG | 0.1 | | -0.1 | |
| NO coefficient | 1.198 | | 1.174 | |
| NO2 coefficient | 1.000 | ppb | 1.000 | ppb |
| NOx coefficient | 1.329 | | 1.312 | |
| NH3 coefficient | 0.989 | | 0.956 | |
| Nt coefficient | 1.376 | | 1.349 | |
| NH3 conv temp | 825 | DegC | 825 | Deg C |
| Chamber Temp | 50.0 | Deg C | 50.0 | Deg C |
| Moly Temp | 316.1 | Deg C | 314.7 | Deg C |
| PMT Temp | 7.0 | Deg C | 7.0 | Deg C |
| O3 flow | 85.0 | ccm | 84.0 | ccm |
| R Cell Press | 5.2 | mmHg | 5.2 | mmHg |
| PMT Voltage | 645.0 | v | 645.0 | v |
| Sample Flow 1 NO | 559.0 | ccm | 544.0 | ccm |
| Sample Flow 2 Nox | 529.0 | ccm | 517.0 | ccm |
| Sample Flow 3 Nt | 518.0 | ccm | 509.0 | ccm |

Notes:

As founds completed. Reaction cell chamber cleaned. Zero and span adjusted after stabilization. NH3 span adjusted.



Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date:

September 13, 2016

Station Number:

AMS 1

NH₃ Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated Nt conc (ppb) | Calculated NOx conc (ppb) | Calculated NH ₃ conc (ppb) | Indicated Nt conc (ppb) | Indicated NOx conc (ppb) | Indicated NH ₃ conc (ppb) | Nt Correction factor | NH ₃ Correction factor |
|---------------------------|-----------------------|----------------------------|--------------------------|---------------------------|---------------------------------------|-------------------------|--------------------------|--------------------------------------|----------------------|-----------------------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | 0.0 | 3.1 | ---- | ---- |
| as found NO | 5500 | 81.4 | 753.3 | 753.3 | ---- | 748.0 | 748.5 | -0.6 | 1.007 | ---- |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | ---- | ---- |
| high NO point | 5500 | 81.4 | 753.3 | 753.3 | ---- | 749.0 | 751.5 | -2.5 | 1.006 | ---- |
| NO/O ₃ point | 5500 | 81.4 | 753.3 | 753.3 | ---- | 746.9 | 748.4 | -1.5 | 1.009 | ---- |
| as found NH ₃ | 5000 | 94.2 | 1799.2 | NA | 1799.2 | 1746.3 | 19.7 | 1726.3 | 1.030 | 1.042 |
| first NH ₃ | 5000 | 94.2 | 1799.2 | NA | 1799.2 | 1821.2 | 19.7 | 1801.5 | 0.988 | 0.999 |
| second NH ₃ | 5000 | 52.3 | 998.9 | NA | 998.9 | 1024.9 | 12.5 | 1012.3 | 0.975 | 0.987 |
| third NH ₃ | 5000 | 26.2 | 500.4 | NA | 500.4 | 506.7 | 7.6 | 498.8 | 0.988 | 1.003 |
| Average Correction Factor | | | | | | | | | 1.0072 | 0.9963 |

Nt Corrected As Found Nt = 745.0 ppb
 NOx Corrected As Found NOx = 748.5 ppb
 NH₃ Previous Converter Efficiency = 98.9 %

Previous Response Nt = 755.9 ppb
 Previous Response NOx = 749.4 ppb
 NH₃ Current Converter Efficiency = 95.6 %

Nt percent change 1.5%
 NOx percent change 0.1%
 NH₃ percent change -3.3%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date: September 13, 2016 Station Number: AMS 1

NO_x / NO / Nt Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NO _x conc (ppb) | Calculated NO conc (ppb) | Calculated Nt conc (ppb) | Indicated NO _x conc (ppb) | Indicated NO conc (ppb) | Indicated Nt conc (ppb) | NO _x Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------------------|--------------------------|--------------------------|--------------------------------------|-------------------------|-------------------------|-----------------------------------|----------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 3.1 | ---- | ---- |
| as found span | 5500 | 81.4 | 753.3 | 750.4 | 753.3 | 748.5 | 749.0 | 748.0 | 1.0064 | 1.0019 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.2 | ---- | ---- |
| high point | 5500 | 81.4 | 753.3 | 750.4 | 753.3 | 751.5 | 747.1 | 749.0 | 1.0024 | 1.0044 |
| second point | 5500 | 45.6 | 422.0 | 420.3 | 422.0 | 421.1 | 418.4 | 419.6 | 1.0022 | 1.0047 |
| third point | 5500 | 22.8 | 211.0 | 210.2 | 211.0 | 209.3 | 208.6 | 209.6 | 1.0080 | 1.0075 |
| Average Correction Factor | | | | | | | | | 1.0042 | 1.0056 |

| | | | | |
|--------------------|-----------|------------|-----------|------------|
| | <u>Nt</u> | <u>NOX</u> | <u>NO</u> | <u>NO2</u> |
| Corrected As found | 745.0 | 748.5 | 748.1 | ---- |
| Previous Response | 755.9 | 749.4 | 747.6 | ---- |
| Percent Change | 1.5% | 0.1% | -0.1% | 0.2% |

GPT Calibration Data

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

| O ₃ Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO ₂ conc (ppb) | Indicated NO _x conc (ppb) | Indicated NO conc (ppb) | Indicated NO ₂ conc (ppb) | NO _x Correction factor | NO Correction factor | NO ₂ Correction factor | Converter Efficiency |
|-------------------------------|------------------------------|---------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-----------------------------------|----------------------|-----------------------------------|----------------------|
| 1st NO ref point | ---- | 3.0 | 748.4 | 745.7 | 2.7 | 1.0066 | 1.0063 | ---- | ---- |
| 1st NO ₂ (300) | 332.6 | 416.0 | 747.3 | 332.6 | 414.7 | 1.0081 | ---- | 1.0031 | 99.7% |
| 2nd NO ₂ (200) | 497.2 | 251.5 | 745.9 | 497.2 | 248.7 | 1.0100 | ---- | 1.0111 | 98.9% |
| 3rd NO ₂ (100) | 614.6 | 134.1 | 746.7 | 614.6 | 132.1 | 1.0089 | ---- | 1.0151 | 98.5% |
| 2nd NO ref point | ---- | 3.0 | 746.5 | 741.4 | 5.1 | 1.0091 | 1.0121 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0090 | 1.0092 | 1.0098 | 99.0% |

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NH3 Calibration Summary

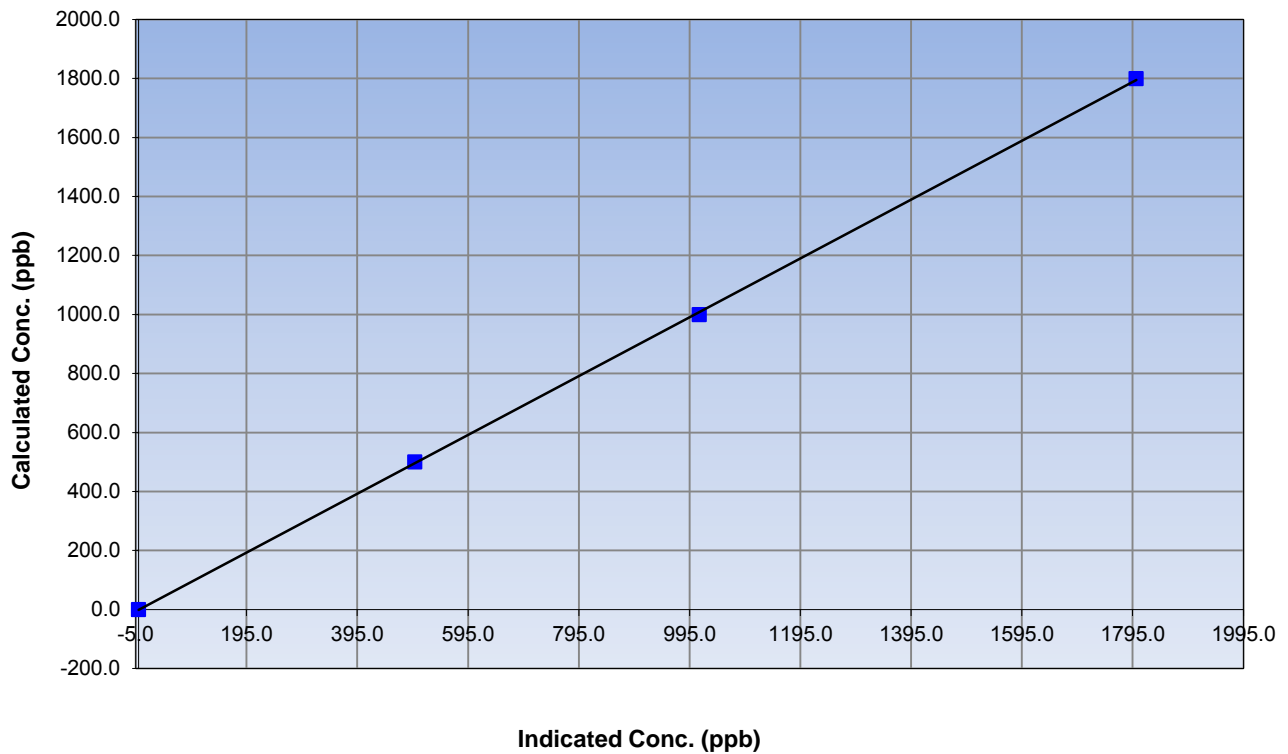
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 17:40 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

NH3 Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|----------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999931 |
| 1799.2 | 1801.5 | 0.9988 | | |
| 998.9 | 1012.3 | 0.9868 | Slope | 0.997092 |
| 500.4 | 498.8 | 1.0032 | | |
| | | | Intercept | -1.086801 |

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

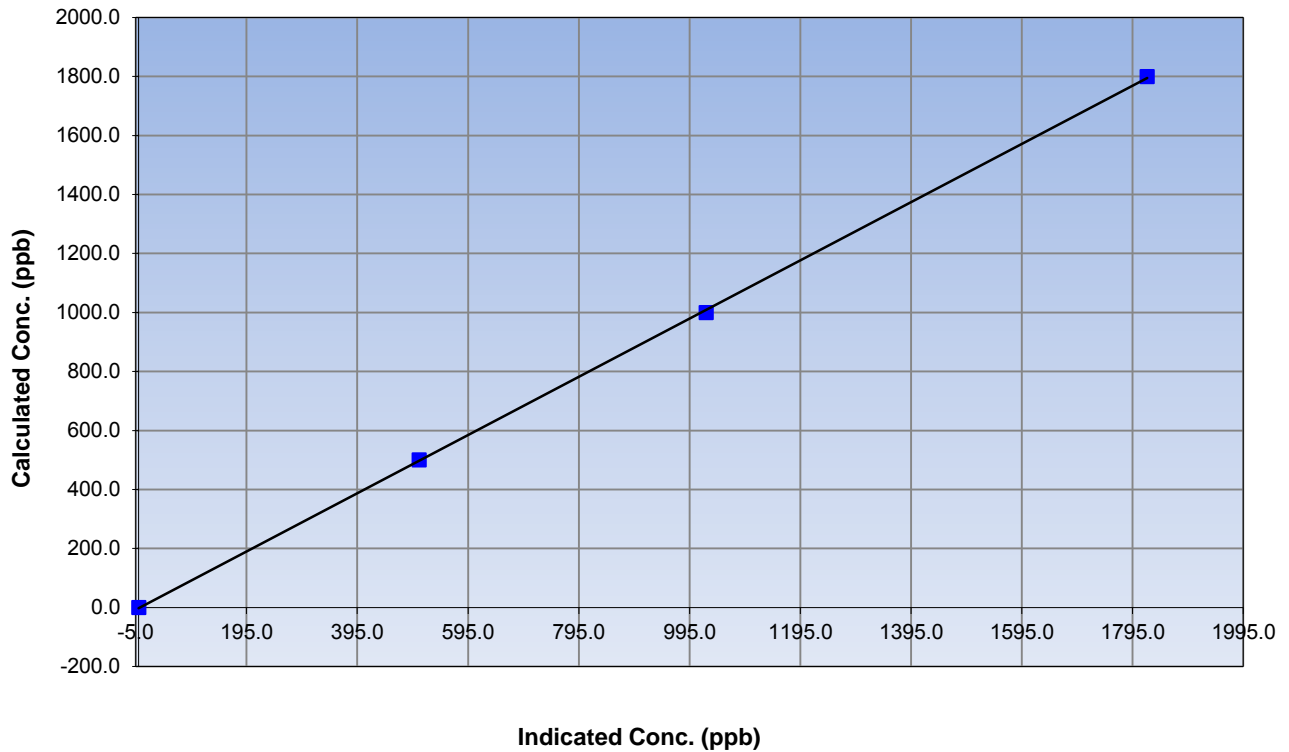
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 17:40 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Nt (NH₃) Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|----------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999924 |
| 1799.2 | 1821.2 | 0.9879 | | |
| 998.9 | 1024.9 | 0.9746 | Slope | 0.986651 |
| 500.4 | 506.7 | 0.9877 | | |
| | | | Intercept | -2.407687 |

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

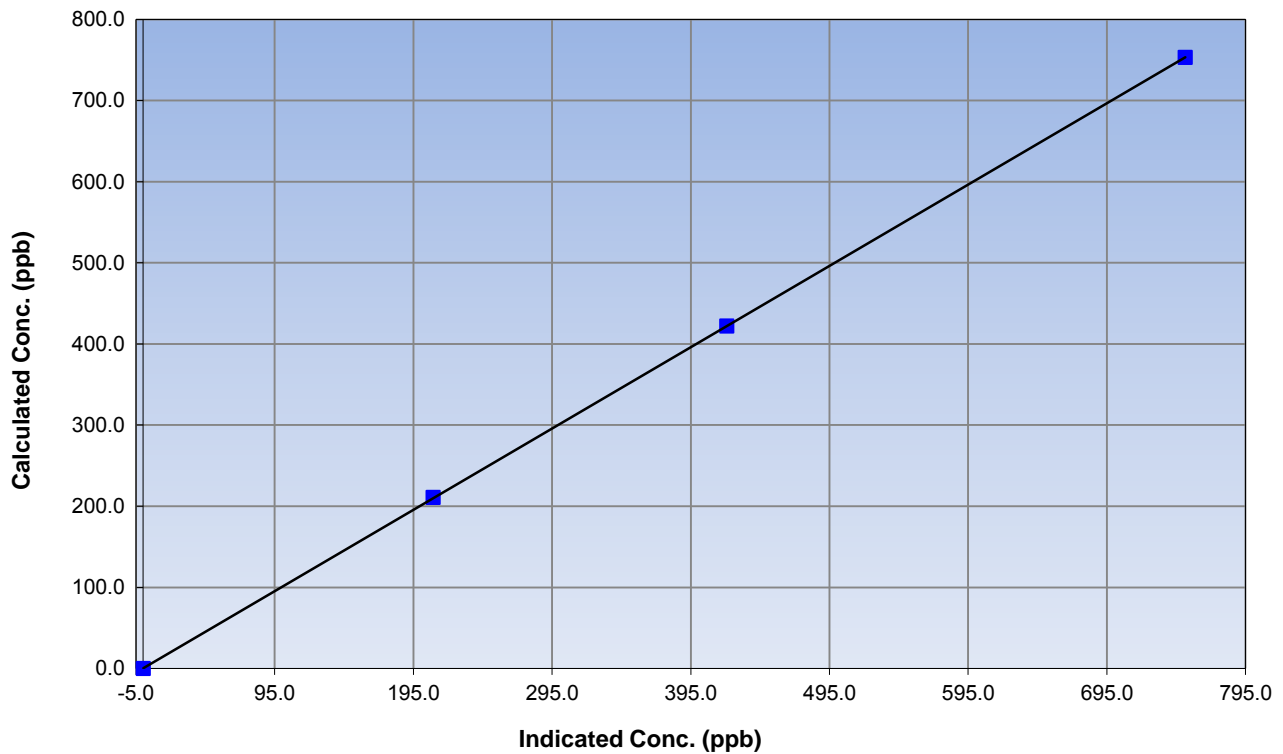
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 17:40 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

NO_x Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|----------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999996 |
| 753.3 | 751.5 | 1.0024 | | |
| 422.0 | 421.1 | 1.0022 | Slope | 1.002138 |
| 211.0 | 209.3 | 1.0080 | | |
| | | | Intercept | 0.321614 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

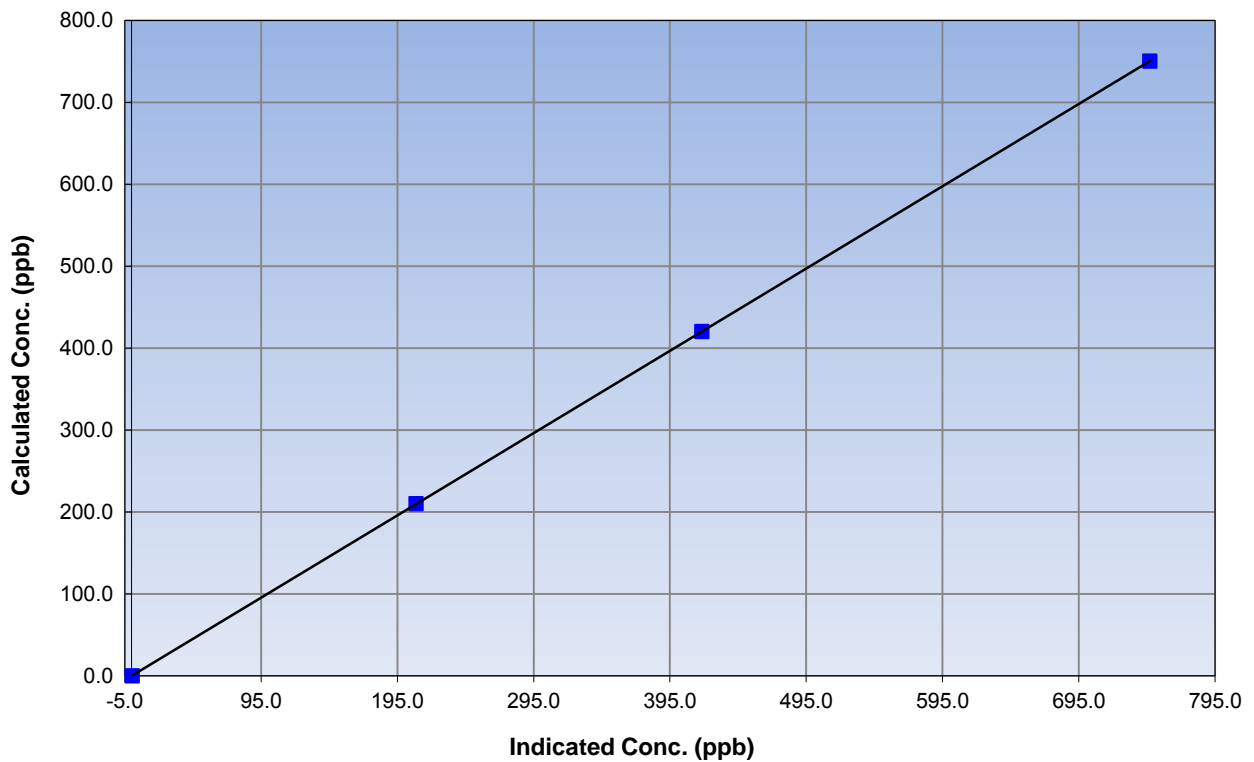
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 17:40 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999998 |
| 750.4 | 747.1 | 1.0044 | | |
| 420.3 | 418.4 | 1.0047 | Slope | 1.004567 |
| 210.2 | 208.6 | 1.0075 | | |
| | | | Intercept | 0.056670 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

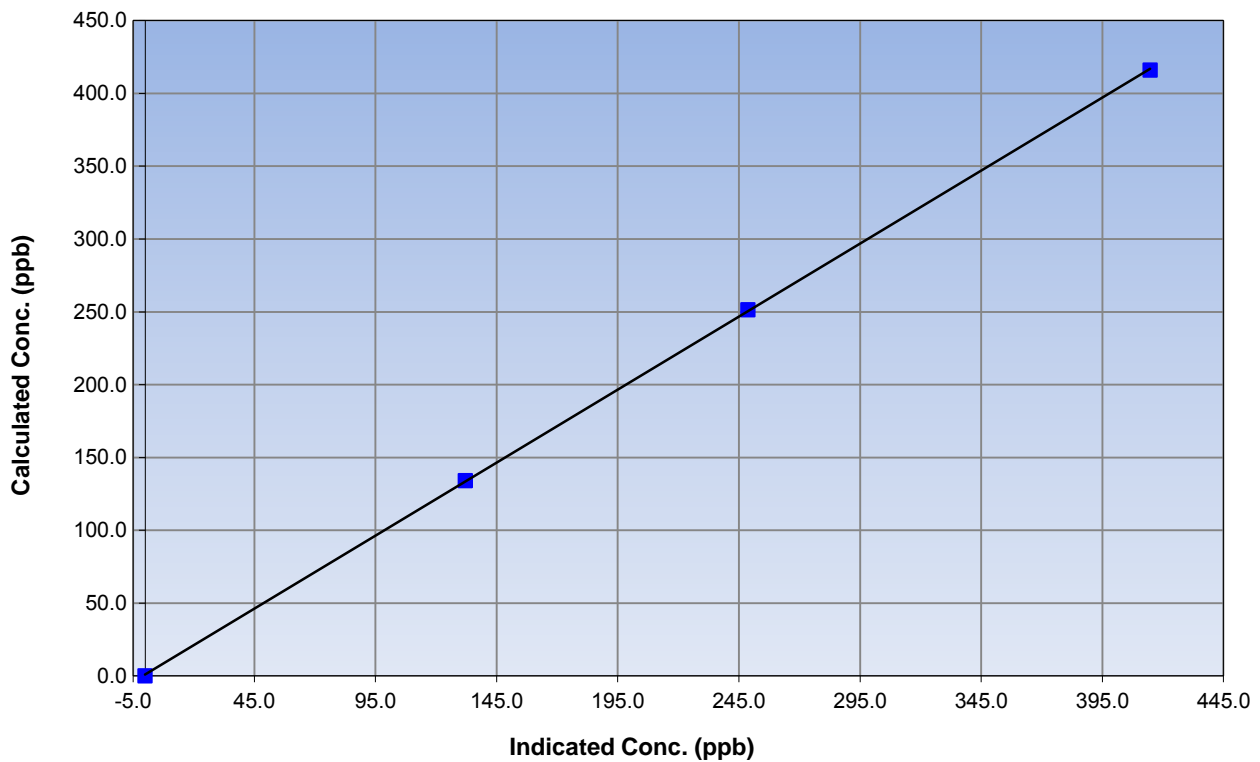
Station Information

| | | | |
|------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Bertha Ganter - Fort McKay | Station Number | AMS 1 |
| Start Time (MST) | 7:59 | End Time (MST) | 17:40 |
| Analyzer make | API T201 | Analyzer serial # | 152 |

Calibration Information

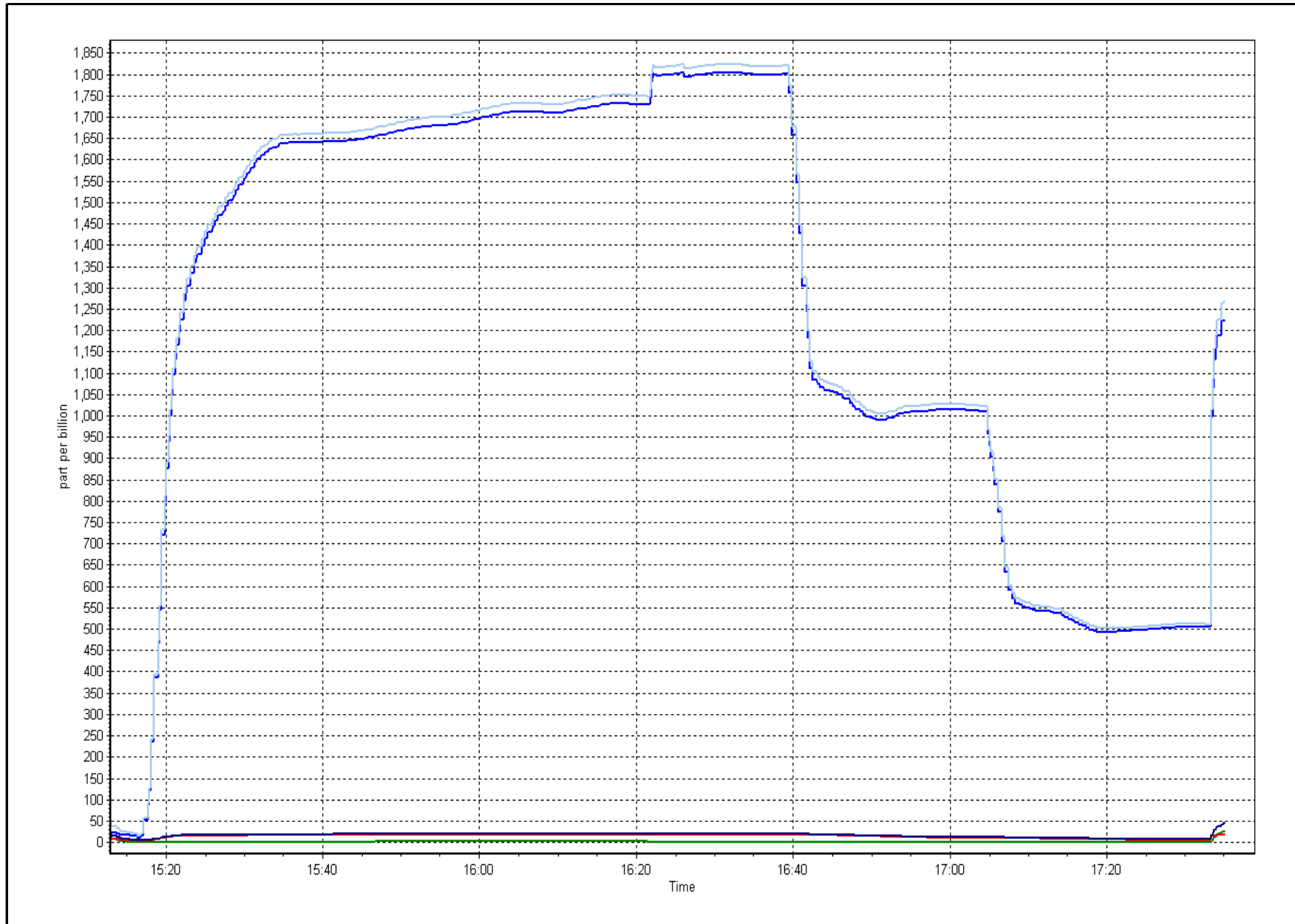
| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999968 |
| 416.0 | 414.7 | 1.0031 | | |
| 251.5 | 248.7 | 1.0111 | Slope | 1.002765 |
| 134.1 | 132.1 | 1.0151 | | |
| | | | Intercept | 0.997674 |

NO₂ Calibration Curve



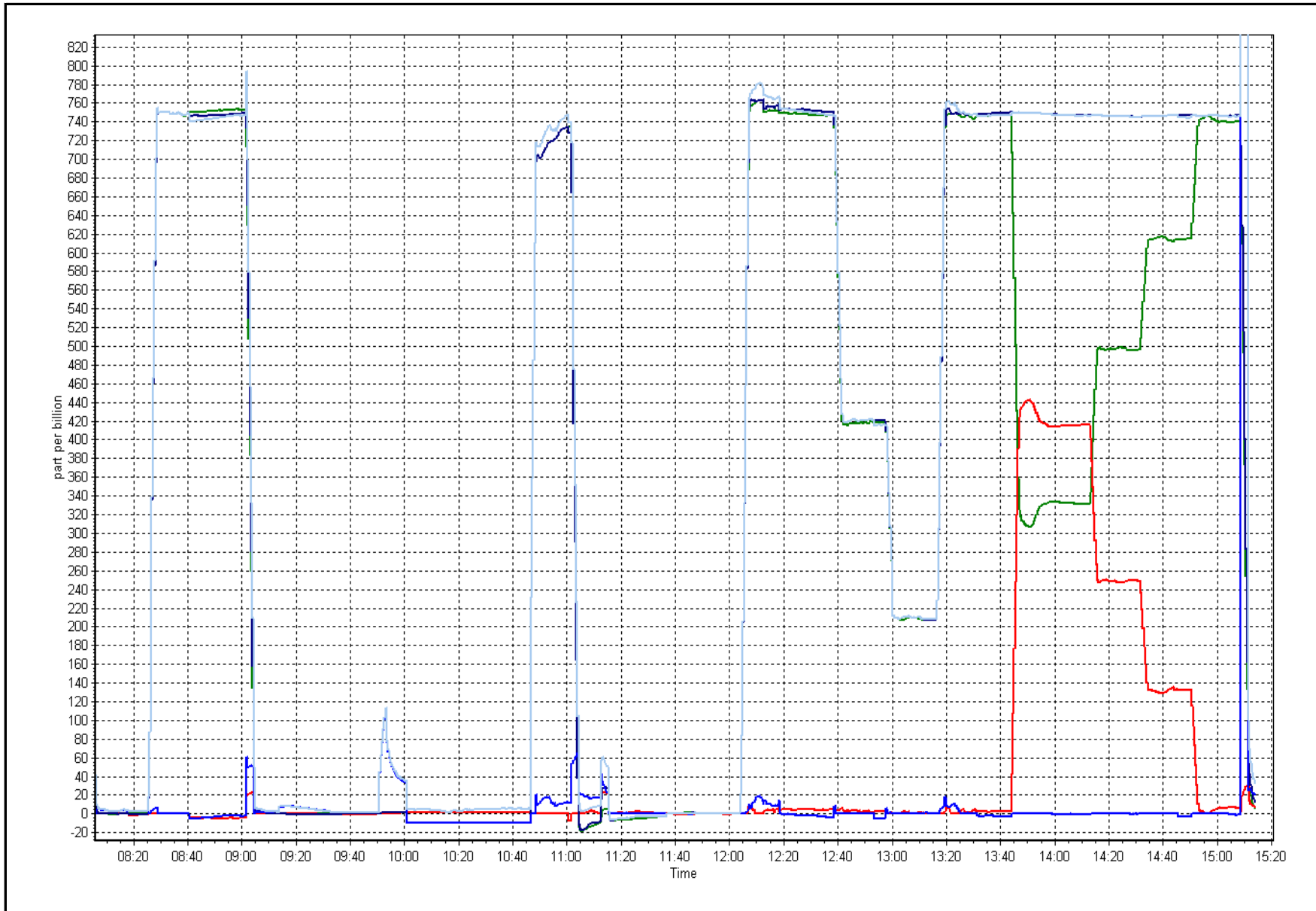
NH₃ Calibration Plot

Date: 13-Sep-2016



NOX Calibration Plot

Date: 13-Sep-2016





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|----------------------------|-----------------|-----------------|
| Station Name: | Bertha Ganter - Fort McKay | Station number: | AMS 1 |
| Calibration Date: | September 13, 2016 | Last Cal Date: | August 11, 2016 |
| Start time (MST): | 13:30 | End time (MST): | 14:34 |
| Sharp Model: | Thermo 5030 SHARP | S/N: | E-1486 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 5691 |
| Flow Standard Model: | Delta-Cal | S/N: | 141228 |
| Temp/RH standard: | Delta-Cal | S/N: | 141228 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | <u>Tolerance</u> |
|------------------------|----------------------------------------------|-----------------|---------------------------------------------------|-------------------------------------|------------------|
| T1 (°C) | 23 | 21.6 | 23 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 968 | 967.9 | 968 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1004.4 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 1.1 | ----- | 0 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

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

Annual Calibration Test

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

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

Notes: Cyclone head cleaned. Nephelometer adjusted.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 2 MILDRED LAKE SEPTEMBER 2016

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

October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 681 | 37 | 39 | 99.72 | 33 | 0 | 6 | 0 |
| H2S (ppb) Average | 680 | 37 | 40 | 99.58 | 4 | 0 | 2 | 0 |
| THC (ppm) Average | 647 | 37 | 73 | 95.00 | 4 | - | 2.7 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100.00 | 24.1 | - | 15.5 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 100 | - | 91 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100.00 | 26 | - | 18 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100.00 | - | - | - | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|-----|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 681 | 1.7 | 4 | - | 0 | 0 | 0 | 0 | 1 | 6 | 33 |
| H2S (ppb) Average | 680 | 0.5 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 4 |
| THC (ppm) Average | 647 | 2.28 | 0.4 | - | 1.7 | 2 | 2 | 2.2 | 2.4 | 2.8 | 4 |
| Temperature 2 m (C) Average | 720 | 11.71 | 4.2 | - | 3.5 | 6.5 | 8.4 | 11.4 | 14.4 | 17 | 24.1 |
| Relative Humidity (%) Average | 720 | 69.7 | 18 | - | 28 | 43 | 57 | 71 | 83 | 93 | 100 |
| Wind Speed 10 m (km/h) Average | 720 | 9.8 | 5 | - | 0 | 4 | 6 | 9 | 13 | 16 | 26 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|--------------------------------------------------|
| SO2 | 25 Sep 2016 09:00 | 25 Sep 2016 09:00 | 1 | Calibrator failed to initiate daily QA check |
| SO2 | 26 Sep 2016 12:00 | 26 Sep 2016 12:00 | 1 | Maintenance - reinitiated daily QA check |
| H2S | 25 Sep 2016 10:00 | 25 Sep 2016 10:00 | 1 | Calibrator failed to initiate daily QA check |
| H2S | 26 Sep 2016 12:00 | 26 Sep 2016 13:00 | 2 | Maintenance - reinitiated daily QA check |
| THC | 08 Sep 2016 02:00 | 09 Sep 2016 09:00 | 32 | Analyzer Failure - sample pump failure |
| THC | 25 Sep 2016 08:00 | 25 Sep 2016 08:00 | 1 | Data logger program uploaded - data not recorded |
| THC | 25 Sep 2016 09:00 | 25 Sep 2016 09:00 | 1 | Calibrator failed to initiate daily QA check |
| THC | 25 Sep 2016 11:00 | 25 Sep 2016 11:00 | 1 | Maintenance - reinitiated daily QA check |
| THC | 26 Sep 2016 12:00 | 26 Sep 2016 12:00 | 1 | Maintenance - reinitiated daily QA check |



Wood Buffalo Environmental Association

Summary of Hour Averages

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

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 33 ppb on Sep 8 13:00 | Maximum Daily Average: 5.6 ppb on Sep 15 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 1 07:00 | Minimum Daily Average: 0.0 ppb on Sep 3 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 4.3 ppb at hour 13 | Minimum Diurnal Average: 0.4 ppb at hour 19 | | Hours of Calibration: | 37 |
| Monthly Average: 1.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 6 P ₉₉ = 21 | | Percent Operational Time: | 99.7 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-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 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 4 | 1 | 0 | 3 | 4 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 4 |
| 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 | 0 |
| 4-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 3 | 2 | 0 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 6 | 1.0 | 6 |
| 5-Sep | 7 | 2 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 8 | 5 | 2 | 3 | 1 | 1.4 | 8 |
| 6-Sep | 3 | 5 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 1.0 | 7 |
| 7-Sep | 5 | 4 | 1 | 0 | 1 | Z | 1 | 1 | 0 | 1 | 3 | 4 | 12 | 9 | 6 | 5 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 2.5 | 12 |
| 8-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 33 | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 33 |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 6 | 0 | 0 | 3 | 2 | 8 | 5 | 4 | 7 | 6 | 2.2 | 8 |
| 10-Sep | 1 | 4 | Z | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 17 | 11 | 6 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.4 | 17 |
| 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 | 0.1 | 0 |
| 12-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 | 0.2 | 1 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 7 | 0 | 0 | 0 | 0 | 5 | 26 | 9 | 1 | 2.5 | 26 |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 10 | 2 | 2 | 4 | 1 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 10 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 | 16 | 30 | 23 | 17 | 3 | 2 | 3 | 2 | 8 | 4 | 8 | 5 | 1 | 5.6 | 30 |
| 16-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 6 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 6 |
| 17-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 11 | 1 | 0 | 0 | 0 | 2 | 9 | 3 | 1.6 | 11 |
| 18-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 |
| 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 | 0.1 | 0 |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 21-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 6 | 18 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1.4 | 18 |
| 22-Sep | 4 | 3 | Z | 15 | 6 | 3 | 10 | 3 | 1 | 17 | 8 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.3 | 17 |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0.7 | 5 |
| 24-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 3 | 32 | 16 | 15 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | 3.8 | 32 |
| 25-Sep | 8 | 3 | 19 | 14 | 8 | Z | 1 | 6 | AF | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.7 | 19 |
| 26-Sep | Z | 12 | 17 | 8 | 5 | 10 | 10 | 21 | 11 | 6 | 1 | M | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 7 | 0 | 0 | 1 | 5.2 | 21 |
| 27-Sep | 10 | Z | 14 | 4 | 1 | 6 | 1 | 3 | 0 | 0 | 0 | 1 | 1 | 4 | 2 | 5 | 22 | 4 | 2 | 11 | 7 | 17 | 4 | 1 | 5.1 | 22 |
| 28-Sep | 3 | 7 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 7 |
| 29-Sep | 0 | 3 | 1 | Z | 4 | 1 | 0 | 0 | 0 | 0 | 6 | 13 | 7 | 3 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2.3 | 13 |
| 30-Sep | 0 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |

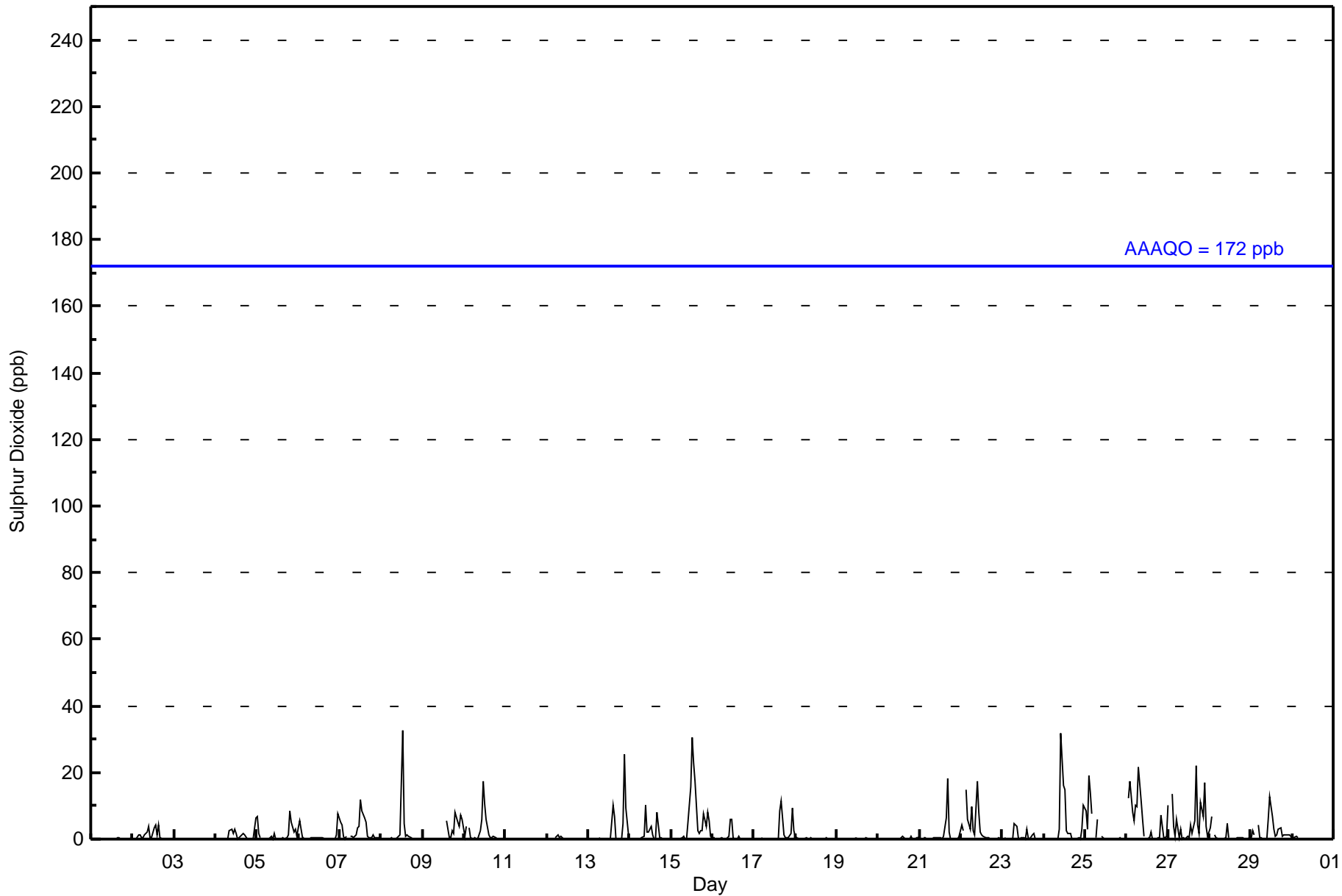
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.8 | 1.7 | 2.2 | 1.9 | 1.1 | 0.9 | 0.9 | 1.5 | 0.9 | 1.8 | 2.8 | 3.0 | 4.3 | 2.1 | 2.0 | 1.6 | 2.3 | 0.7 | 0.4 | 1.4 | 1.2 | 2.1 | 1.5 | 1.3 | Diurnal Average | |
| 10 | 12 | 19 | 15 | 8 | 10 | 10 | 21 | 11 | 17 | 32 | 17 | 33 | 23 | 17 | 9 | 22 | 4 | 2 | 11 | 7 | 26 | 9 | 10 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 654 | 96.04 | 96.04 |
| 11 - 20 | 20 | 2.94 | 98.97 |
| 21 - 60 | 7 | 1.03 | 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
Mildred Lake - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 58 | 34 | 9 | 4 | 13 | 14 | 17 | 75 | 93 | 63 | 52 | 40 | 19 | 68 | 43 | 52 | 654 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 6 | 1 | 0 | 0 | 0 | 3 | 7 | 0 | 0 | 20 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 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 | 58 | 34 | 9 | 4 | 13 | 16 | 19 | 82 | 95 | 63 | 53 | 40 | 24 | 76 | 43 | 52 | 681 |

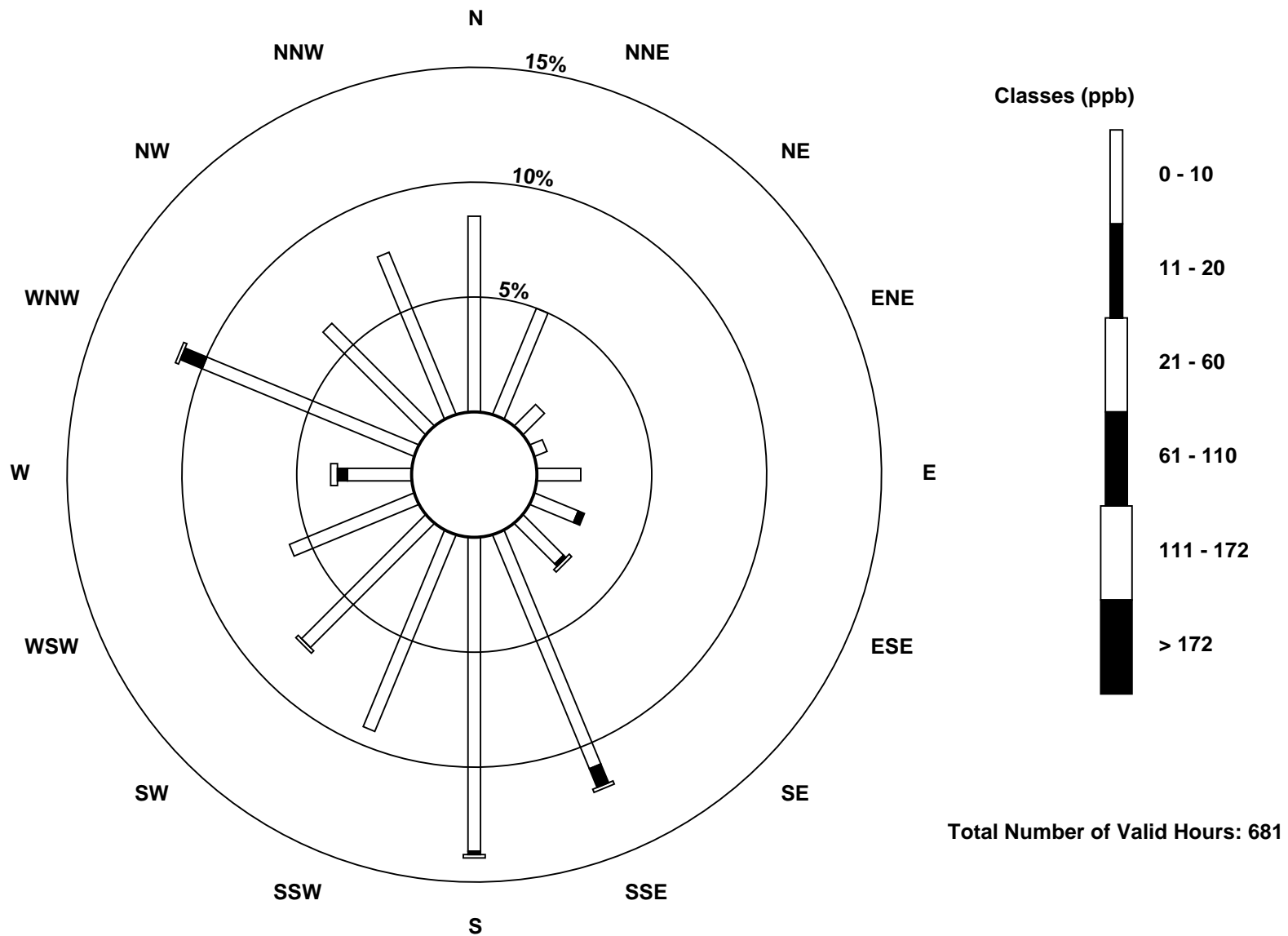
Total Number of Valid Hours: 681

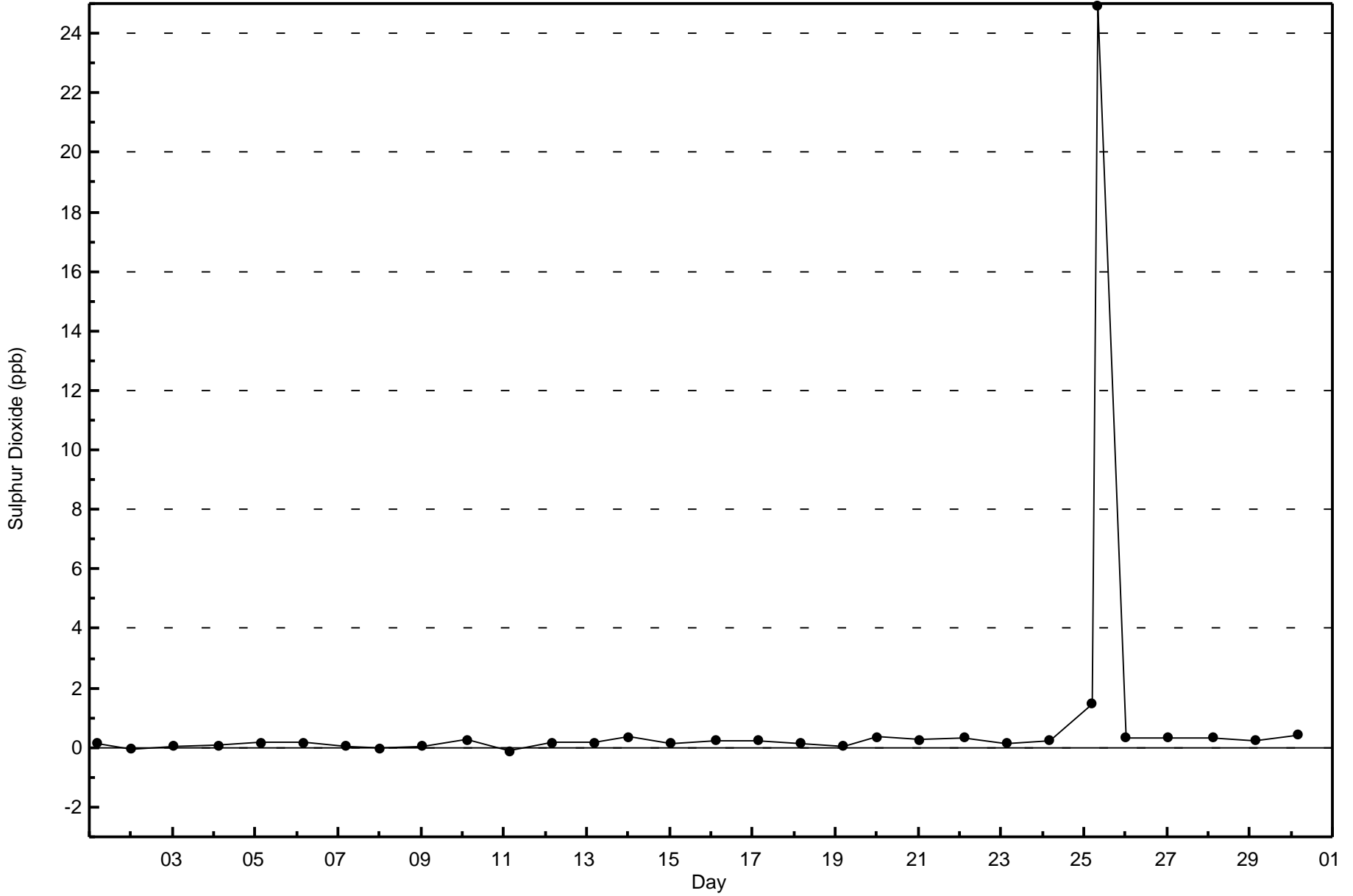
Total Number of Hours: 720

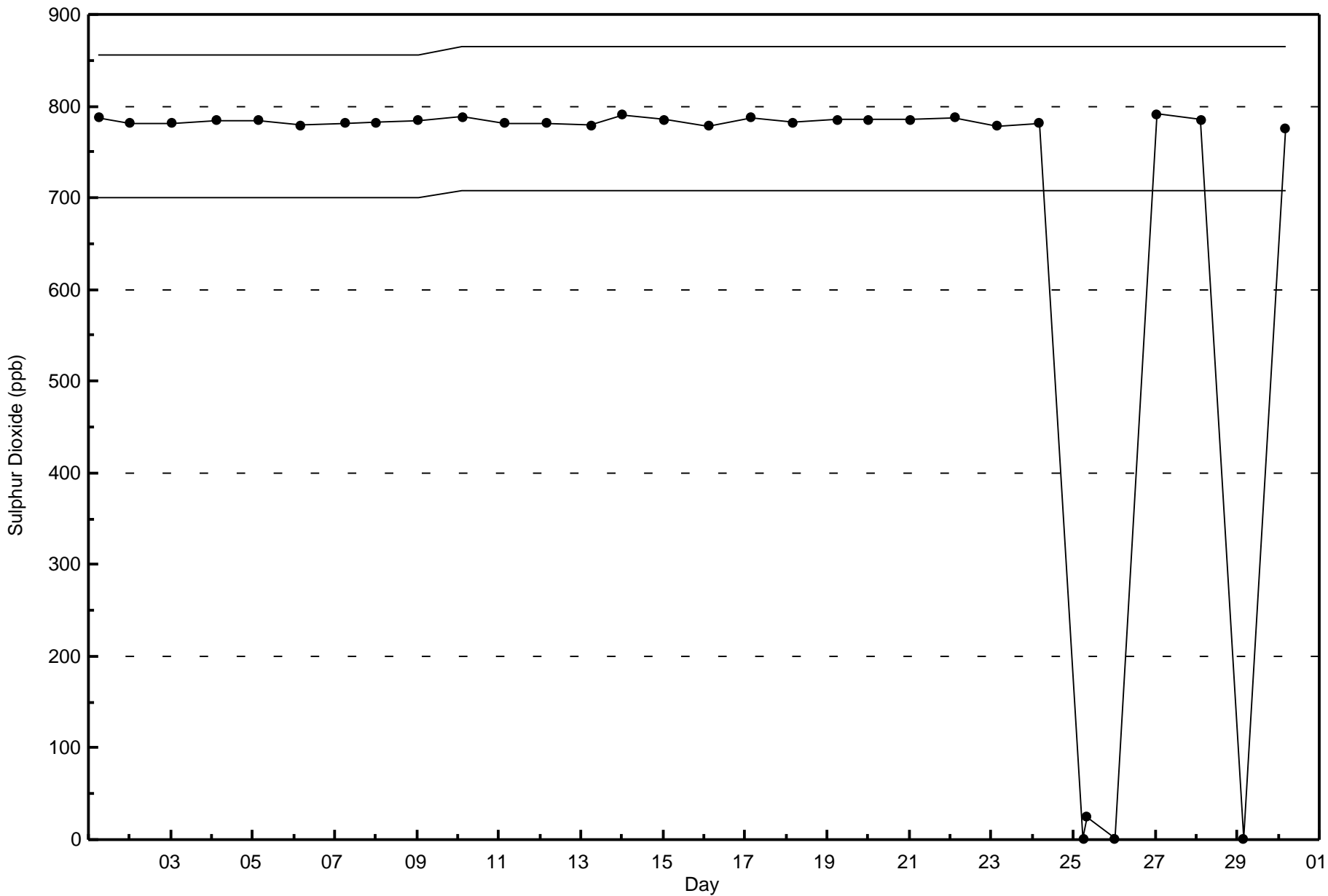


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Mildred Lake - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4 ppb on Sep 26 03:00 | Maximum Daily Average: 1.7 ppb on Sep 26 |
| Minimum Value: 0 ppb on Sep 11 22:00 | Hours of Data: 680 |
| Maximum Diurnal Average: 0.9 ppb at hour 3 | Hours of Missing Data: 40 |
| Monthly Average: 0.5 ppb | Hours of Calibration: 37 |
| Minimum Daily Average: 0.1 ppb on Sep 17 | Percent Operational Time: 99.6 |
| Minimum Diurnal Average: 0.2 ppb at hour 17 | |
| 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 | | | |
| 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 | 0.3 | 0 |
| 2-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.4 | 1 |
| 3-Sep | 0 | 0 | Z | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 4-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 | 0 | 0.3 | 1 |
| 5-Sep | 1 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 0.6 | 2 |
| 6-Sep | 2 | 2 | 1 | 1 | 1 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 0.7 | 3 |
| 7-Sep | 3 | 2 | 1 | 0 | 1 | 1 | Z | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.9 | 3 |
| 8-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 9-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 2 | 1 | 1 | 0.5 | 2 |
| 10-Sep | 1 | 2 | 2 | Z | 1 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 |
| 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 | 0.1 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0.1 | 1 |
| 14-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 15-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 0.5 | 2 |
| 16-Sep | 1 | 3 | 3 | Z | 0 | 2 | 1 | 2 | 2 | 2 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 |
| 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 | 1 | 0 | 0.1 | 1 |
| 18-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 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 20-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 | 1 | 0.3 | 1 |
| 21-Sep | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 22-Sep | 2 | 2 | 3 | Z | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1.3 | 3 |
| 23-Sep | 0 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 |
| 24-Sep | 1 | 1 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 25-Sep | 1 | 1 | 1 | 2 | 1 | 1 | Z | 1 | 1 | AF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 26-Sep | 2 | Z | 4 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | M | M | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 2 | 1.7 | 4 |
| 27-Sep | 2 | 2 | Z | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.5 | 2 |
| 28-Sep | 0 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 29-Sep | 0 | 1 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 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 | 0.2 | 0 |

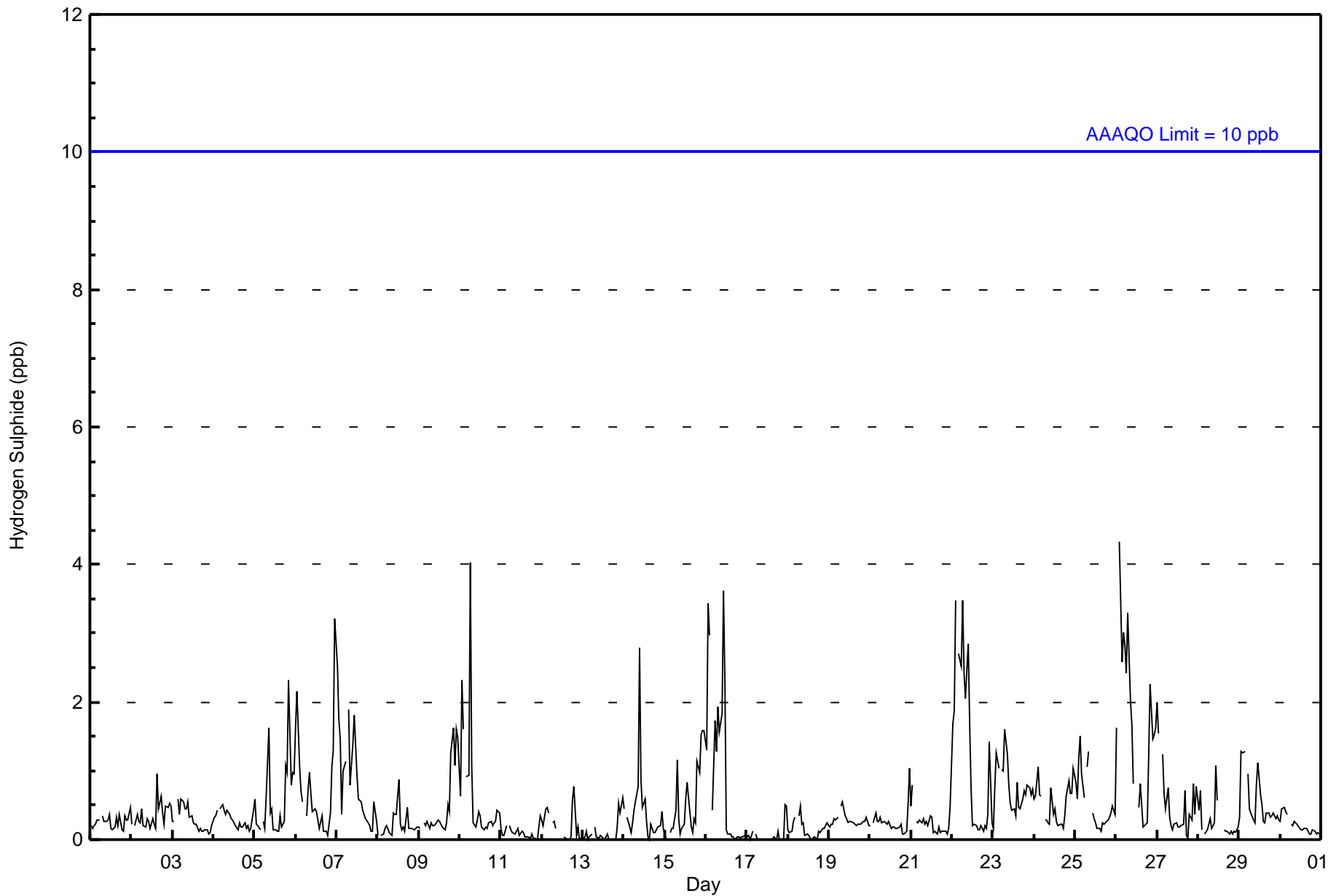
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.6 | 0.8 | 0.9 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.6 | Diurnal Average |
| 3 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 663 | 97.50 | 97.50 |
| 3 - 4 | 17 | 2.50 | 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
Mildred Lake - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 58 | 34 | 9 | 4 | 13 | 16 | 18 | 70 | 91 | 62 | 49 | 39 | 26 | 75 | 46 | 53 | 663 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 17 |
| 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 | 58 | 34 | 9 | 4 | 13 | 16 | 19 | 82 | 94 | 63 | 49 | 39 | 26 | 75 | 46 | 53 | 680 |

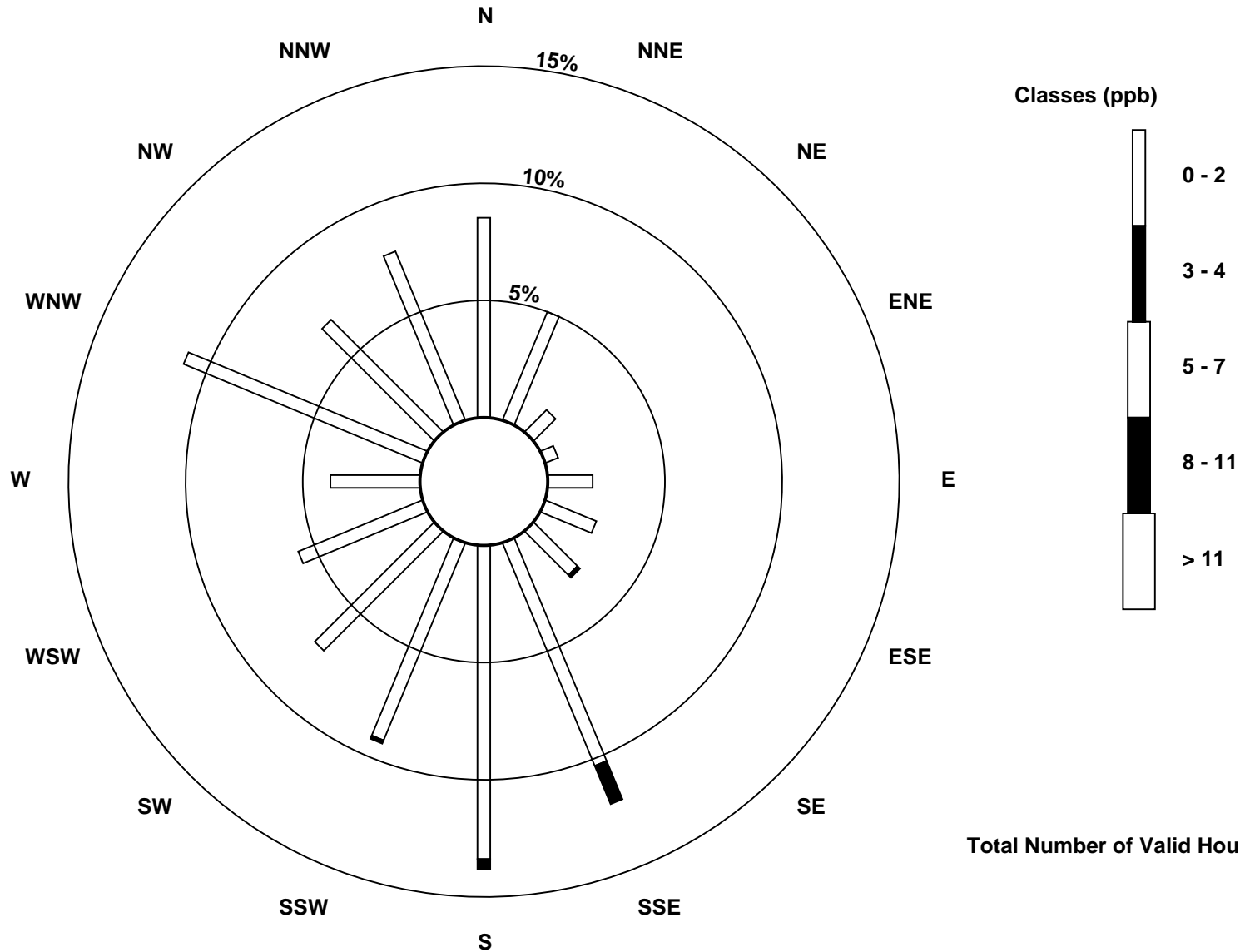
Total Number of Valid Hours: 680

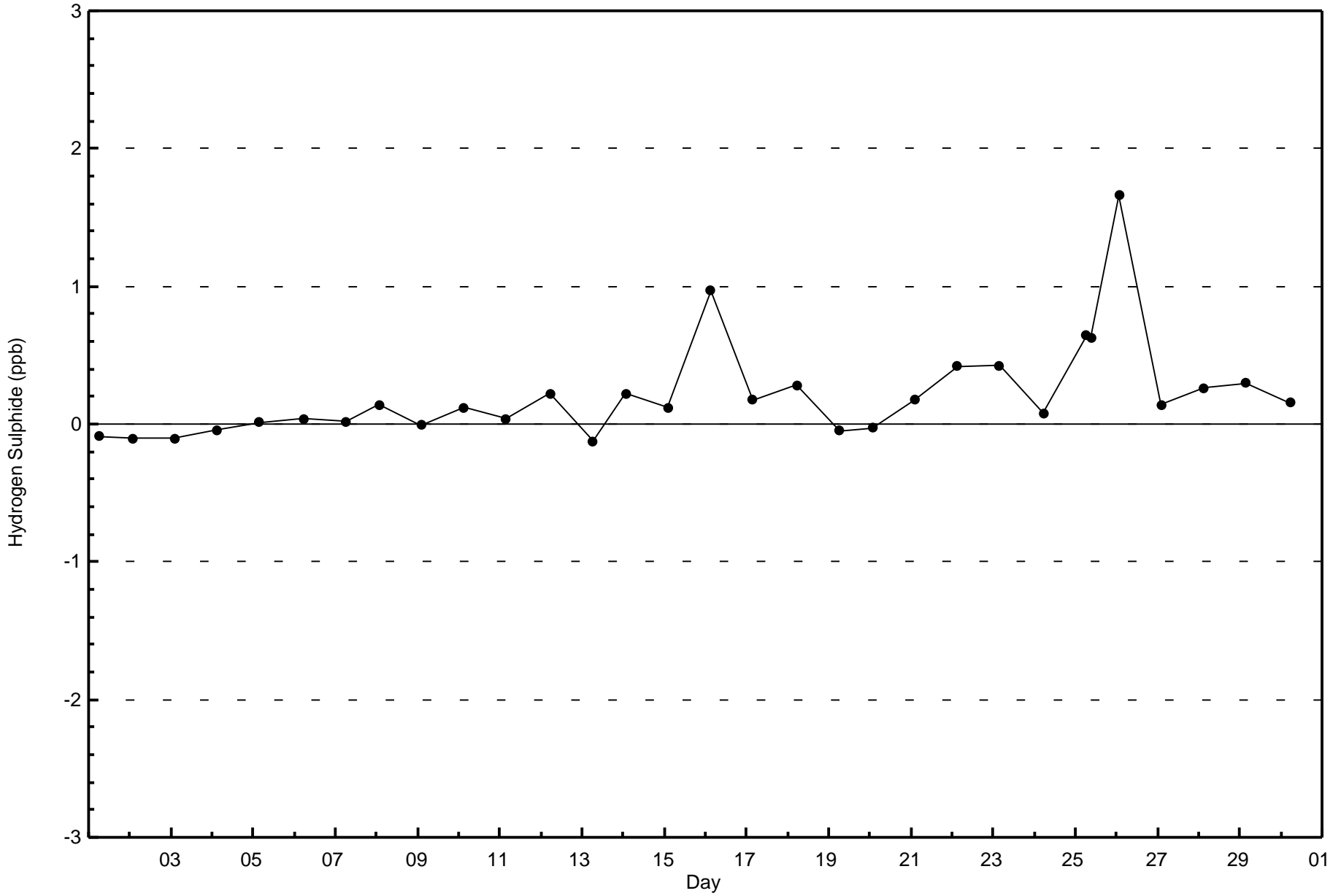
Total Number of Hours: 720

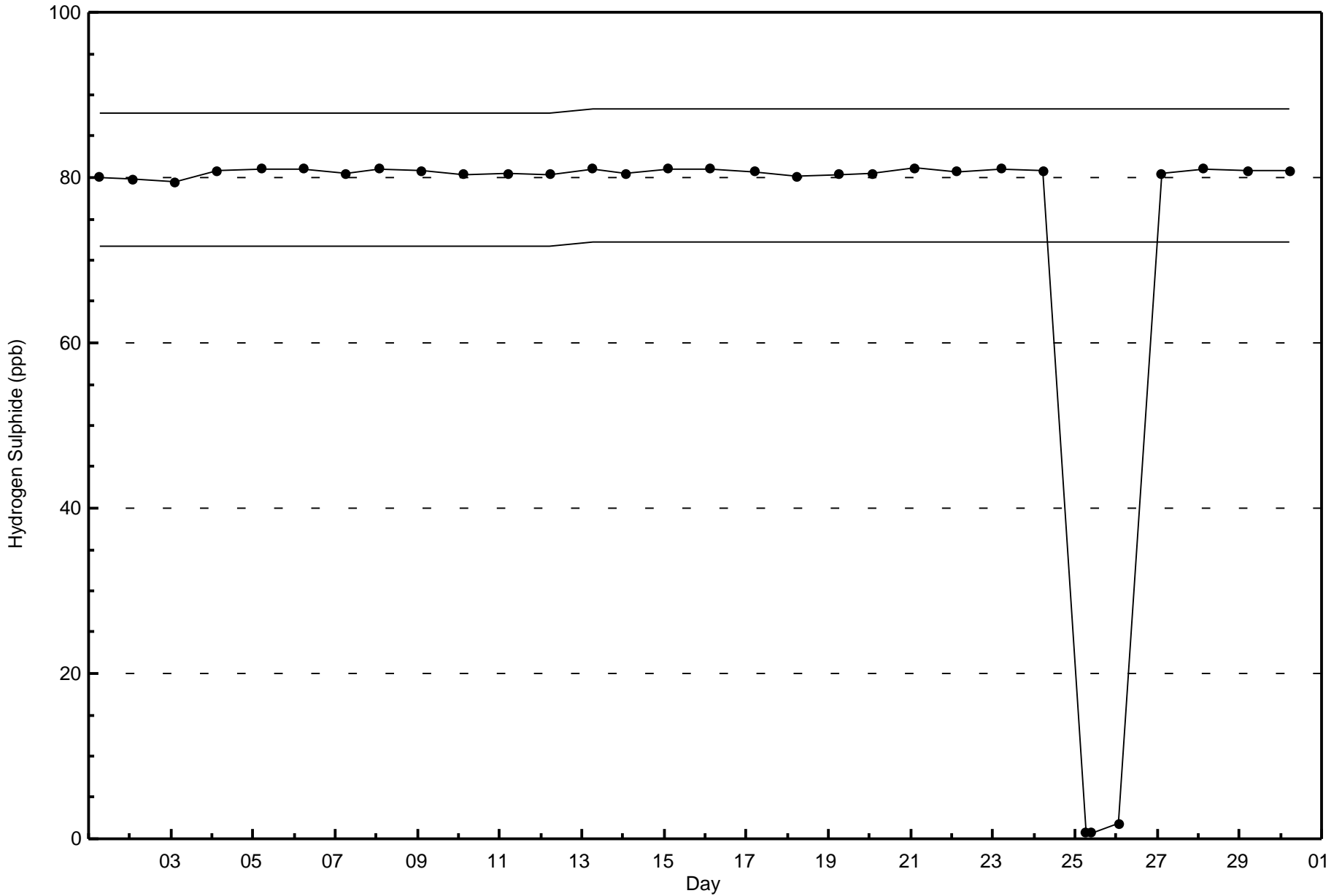


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





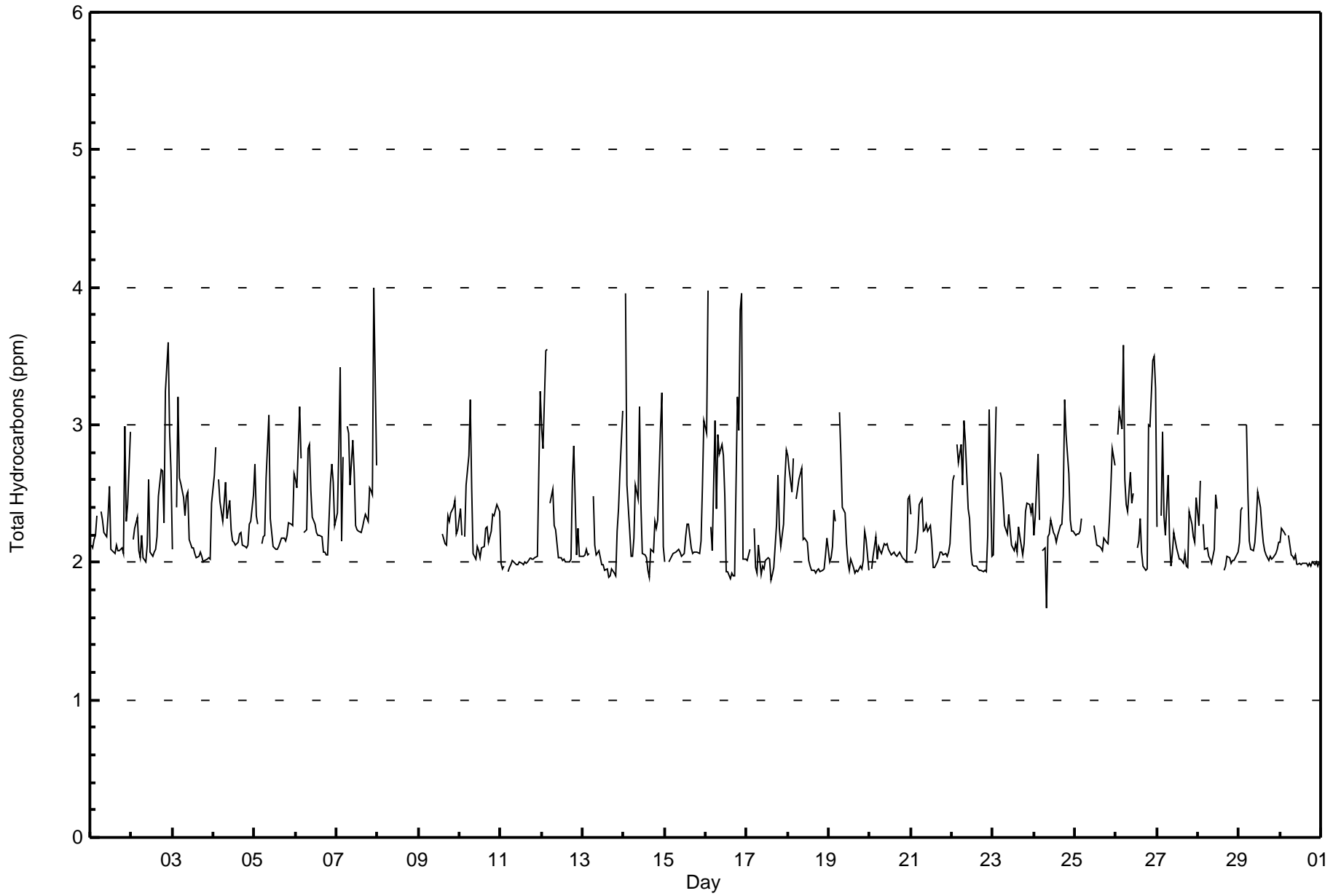




Wood Buffalo Environmental Association
Summary of Hour Averages

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

| Maximum Value: 4.0 ppm on Sep 7 23:00 | | Maximum Daily Average: 2.7 ppm on Sep 26 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|-----|-----------------|-----|-----|-----|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| Minimum Value: 1.7 ppm on Sep 24 08:00 | | Minimum Daily Average: 2.0 ppm on Sep 30 | | Hours of Data: 647 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.5 ppm at hour 2 | | Minimum Diurnal Average: 2.1 ppm at hour 16 | | Hours of Missing Data: 73 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.28 ppm | | Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.8 P ₉₉ = 3.4 | | Hours of Calibration: 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.8 P ₉₉ = 3.4 | | 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 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | Z | 2.4 | 2.3 | 2.2 | 2.2 | 2.3 | 2.6 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 3.0 | 2.3 | 2.4 | 3.0 | 2.3 | 3.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | Z | 2.2 | 2.3 | 2.3 | 2.1 | 2.0 | 2.2 | 2.0 | 2.0 | 2.1 | 2.6 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.5 | 2.7 | 2.7 | 2.3 | 3.2 | 3.6 | 3.0 | 2.7 | 2.4 | 3.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 2.1 | Z | 2.4 | 3.2 | 2.6 | 2.6 | 2.5 | 2.3 | 2.5 | 2.5 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.4 | 2.3 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 2.6 | 2.8 | Z | 2.6 | 2.4 | 2.3 | 2.4 | 2.6 | 2.3 | 2.5 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.5 | 2.3 | 2.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 2.7 | 2.3 | 2.3 | Z | 2.1 | 2.2 | 2.2 | 2.6 | 3.1 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.6 | 2.3 | 3.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 2.6 | 2.5 | 3.1 | 2.8 | Z | 2.2 | 2.2 | 2.8 | 2.9 | 2.5 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.6 | 2.7 | 2.6 | 2.3 | 2.4 | 3.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 2.4 | 2.8 | 3.4 | 2.2 | 2.8 | Z | 3.0 | 2.9 | 2.6 | 2.9 | 2.7 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.3 | 2.5 | 2.5 | 2.5 | 4.0 | 2.7 | 2.6 | 4.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | Z | 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 | C | C | C | C | C | 2.2 | 2.1 | 2.1 | 2.3 | 2.3 | 2.4 | 2.4 | 2.5 | 2.2 | 2.2 | -- | 2.5 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 2.4 | 2.2 | Z | 2.2 | 2.6 | 2.8 | 3.2 | 2.5 | 2.1 | 2.0 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.3 | 2.1 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.3 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 2.0 | 2.0 | 2.0 | Z | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.7 | 3.2 | 2.1 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 3.0 | 2.8 | 3.5 | 3.5 | Z | 2.4 | 2.5 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.6 | 2.8 | 2.1 | 2.2 | 2.0 | 2.0 | 2.4 | 3.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.5 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 | 2.4 | 2.7 | 3.1 | 2.1 | 3.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | Z | 4.0 | 2.6 | 2.2 | 2.0 | 2.0 | 2.2 | 2.6 | 2.5 | 3.1 | 2.4 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 2.1 | 2.1 | 2.3 | 2.2 | 2.3 | 3.0 | 3.2 | 2.1 | 2.4 | 4.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.6 | 3.0 | 2.2 | 3.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2.9 | 4.0 | Z | 2.3 | 2.1 | 3.0 | 2.4 | 2.9 | 2.8 | 2.9 | 2.8 | 2.5 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 3.2 | 3.0 | 3.8 | 4.0 | 2.0 | 2.0 | 2.6 | 4.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 2.0 | 2.1 | 2.1 | Z | 2.3 | 2.0 | 1.9 | 2.1 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.3 | 2.6 | 2.3 | 2.1 | 2.3 | 2.6 | 2.8 | 2.1 | 2.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 2.8 | 2.7 | 2.5 | 2.8 | Z | 2.5 | 2.6 | 2.6 | 2.7 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.1 | 2.2 | 2.2 | 2.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 2.0 | 2.0 | 2.1 | 2.4 | 2.3 | Z | 3.1 | 2.8 | 2.4 | 2.4 | 2.1 | 2.0 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 | 1.9 | 2.2 | 3.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | Z | 2.0 | 2.0 | 2.2 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.5 | 2.5 | 2.1 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 2.4 | Z | 2.1 | 2.1 | 2.2 | 2.4 | 2.5 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 2.6 | 2.6 | Z | 2.9 | 2.7 | 2.9 | 2.6 | 3.0 | 2.9 | 2.4 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 | 3.1 | 2.0 | 2.3 | 3.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 2.1 | 2.7 | 3.1 | Z | 2.7 | 2.6 | 2.4 | 2.3 | 2.2 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.1 | 2.1 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 3.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 2.2 | 2.3 | 2.8 | 2.3 | Z | 2.1 | 2.1 | 1.7 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.3 | 2.5 | 3.2 | 2.9 | 2.6 | 2.3 | 2.2 | 2.2 | 2.3 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | Z | 2.6 | M | AF | 2.5 | M | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.3 | 2.5 | 2.8 | 2.7 | 2.3 | 2.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | Z | 2.9 | 3.1 | 3.0 | 3.6 | 2.6 | 2.4 | 2.4 | 2.6 | 2.4 | 2.5 | M | 2.1 | 2.2 | 2.3 | 2.1 | 2.0 | 1.9 | 2.0 | 3.0 | 3.0 | 3.5 | 3.5 | 3.3 | 2.7 | 3.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 2.3 | Z | 2.3 | 3.0 | 2.3 | 2.2 | 2.6 | 2.2 | 2.0 | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.4 | 2.3 | 2.2 | 2.1 | 2.5 | 2.2 | 3.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 2.3 | 2.6 | Z | 2.3 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.5 | 2.4 | C | C | C | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 2.1 | 2.4 | 2.4 | Z | 3.0 | 2.5 | 2.2 | 2.1 | 2.1 | 2.1 | 2.3 | 2.5 | 2.4 | 2.3 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 3.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 2.1 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.1 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.3 | 2.5 | 2.5 | 2.5 | 2.4 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.4 | 2.5 | 2.5 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.0 | 4.0 | 3.5 | 3.5 | 3.6 | 3.0 | 3.2 | 3.0 | 3.1 | 3.1 | 2.8 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 | 2.5 | 2.7 | 3.2 | 3.0 | 3.8 | 4.0 | 4.0 | 3.3 | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | M - Maintenance | | | | AF - Analyzer Failure | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 173 | 26.74 | 26.74 |
| 2.1 - 3.0 | 446 | 68.93 | 95.67 |
| 3.1 - 10.0 | 28 | 4.33 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 647

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 31 | 19 | 1 | 1 | 3 | 5 | 1 | 1 | 11 | 21 | 26 | 19 | 4 | 5 | 2 | 23 | 173 |
| 2.1 - 3.0 | 23 | 9 | 7 | 3 | 9 | 11 | 17 | 76 | 77 | 36 | 19 | 19 | 20 | 67 | 32 | 21 | 446 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 6 | 2 | 2 | 1 | 0 | 2 | 6 | 3 | 28 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 54 | 28 | 8 | 4 | 12 | 16 | 19 | 82 | 94 | 59 | 47 | 39 | 24 | 74 | 40 | 47 | 647 |

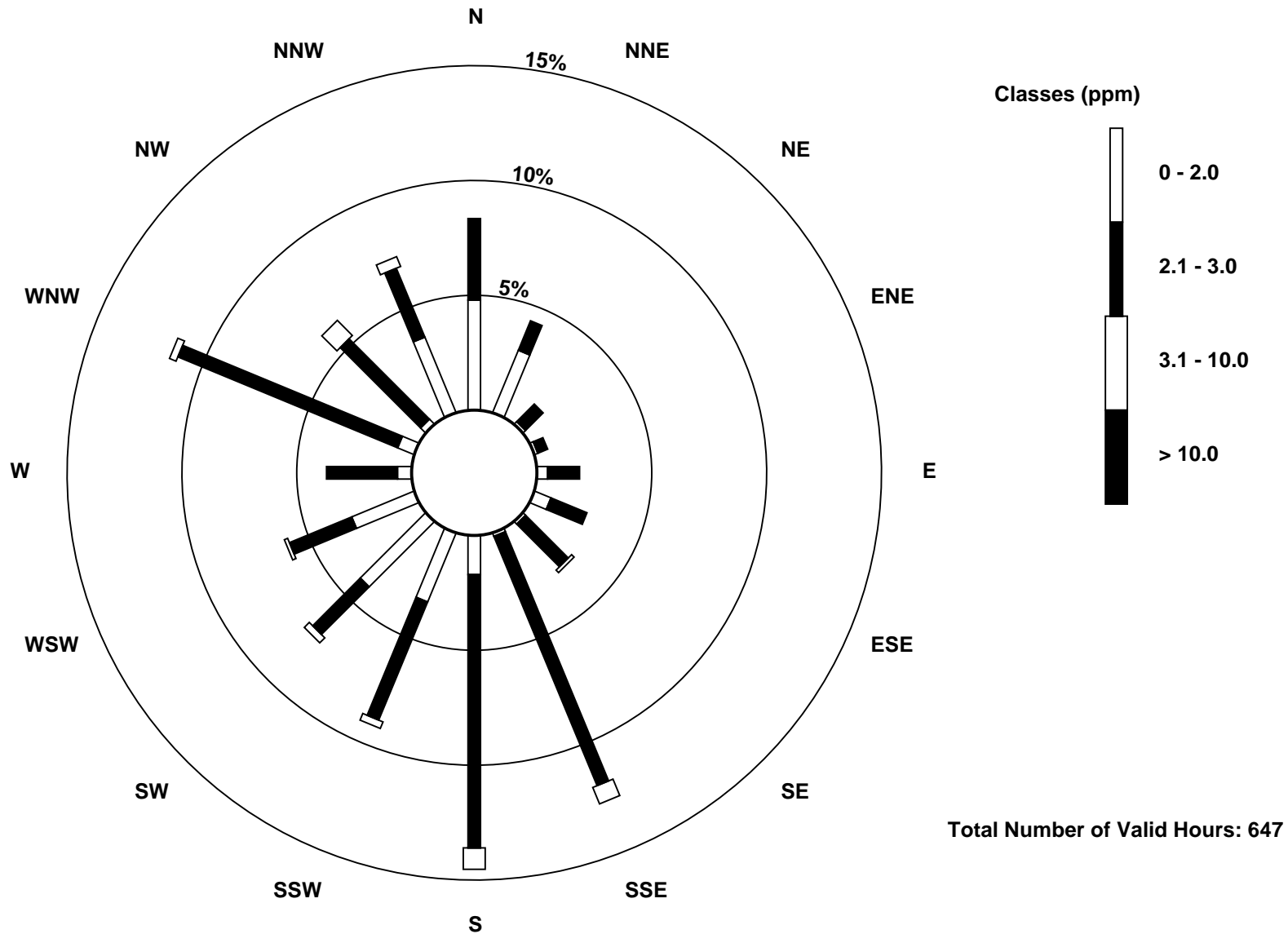
Total Number of Valid Hours: 647

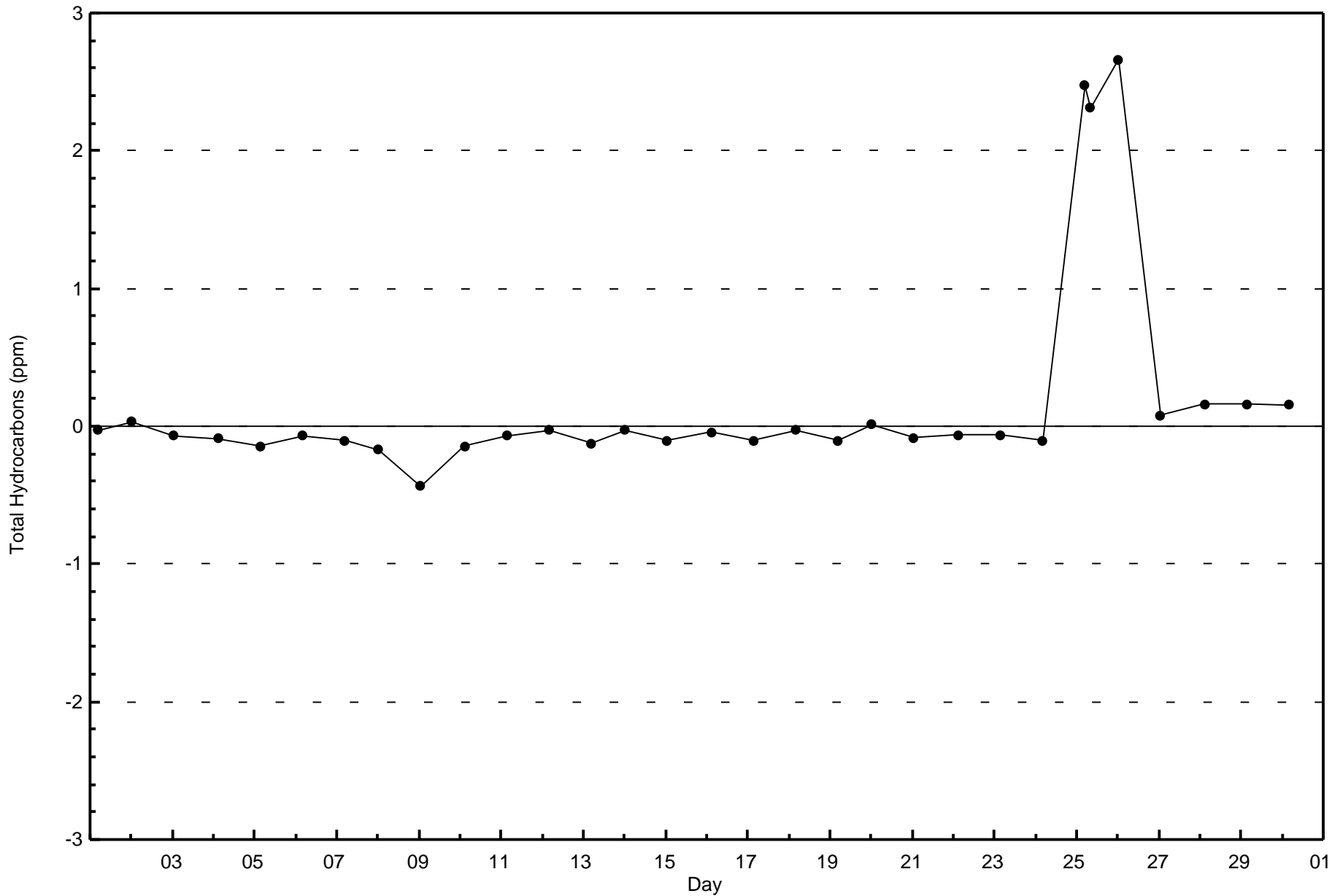
Total Number of Hours: 720

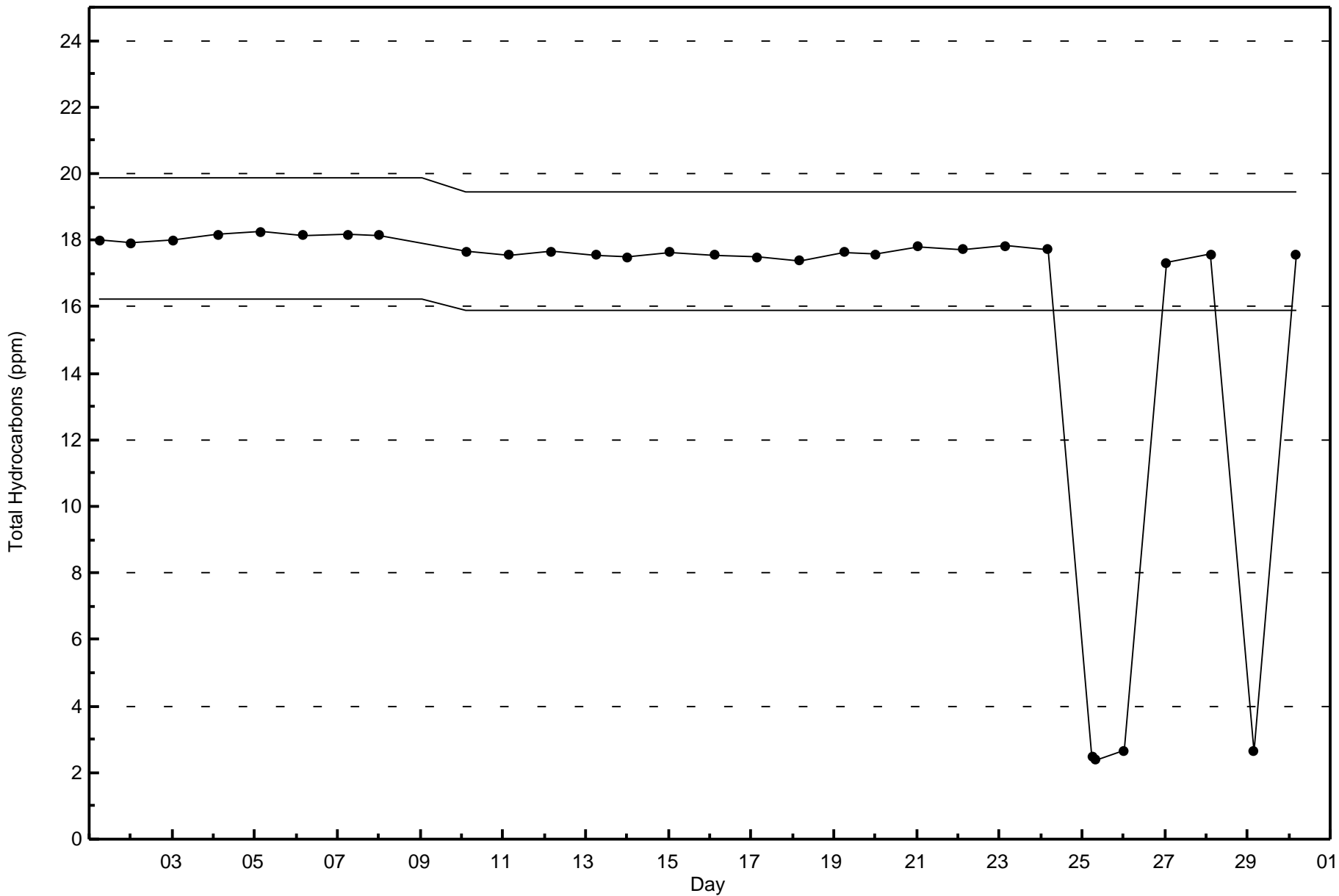


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association
Summary of Hour Averages

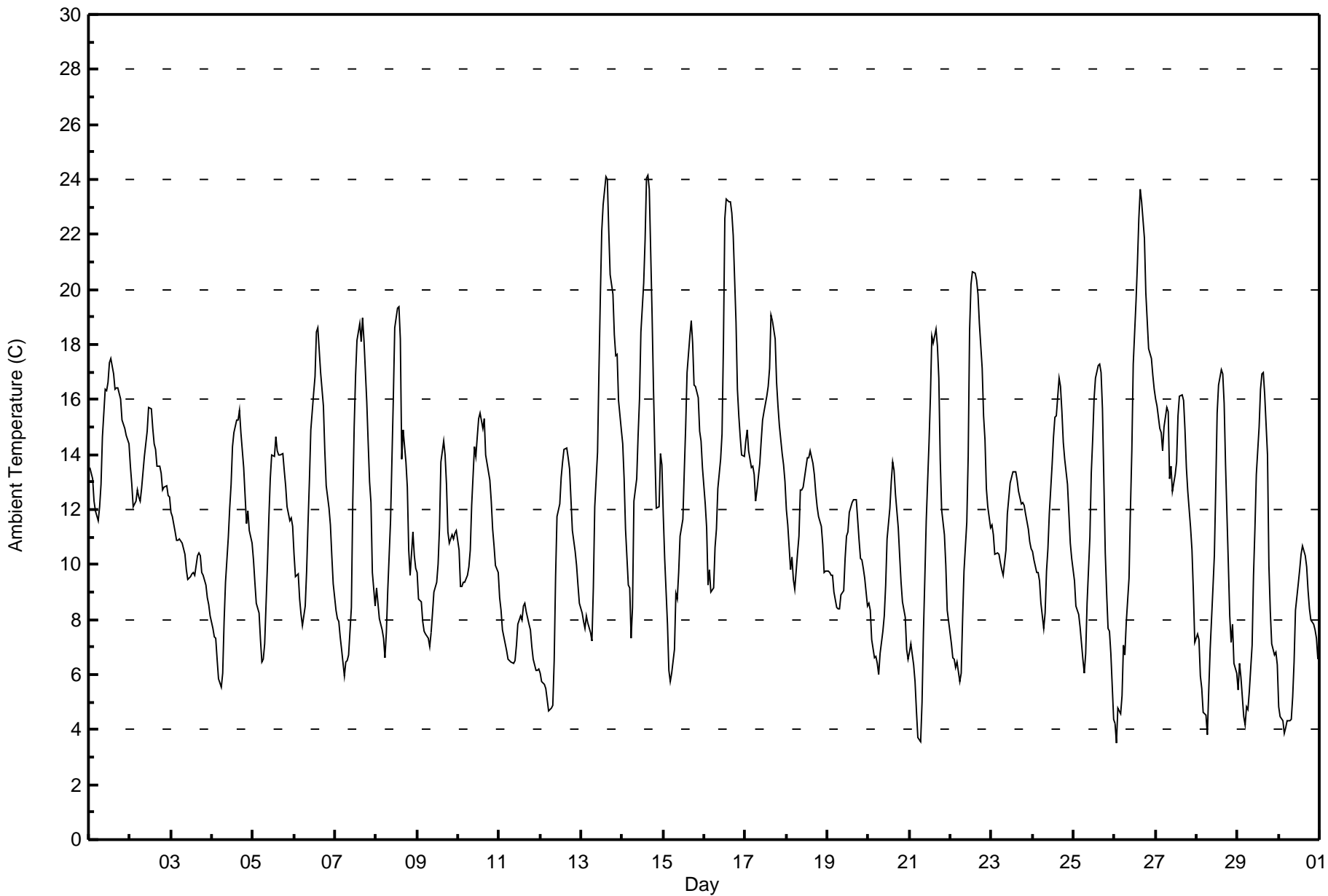
Ambient Temperature (AT) - C
Mildred Lake - September 2016

| Maximum Value: 24.1 C on Sep 14 16:00 | | Maximum Daily Average: 15.5 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: 3.5 C on Sep 26 02:00 | | Minimum Daily Average: 7.1 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.4 C at hour 15 | | Minimum Diurnal Average: 7.8 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.71 C | | Percentiles: P ₁ = 4.2 P ₁₀ = 6.5 Q ₁ = 8.4 Median = 11.4 Q ₃ = 14.4 P ₉₀ = 17.0 P ₉₉ = 23.0 | | 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 | 13.5 | 13.3 | 13.1 | 12.3 | 12.0 | 11.6 | 12.1 | 12.9 | 14.7 | 16.4 | 16.3 | 16.6 | 17.4 | 17.5 | 16.9 | 16.4 | 16.4 | 16.4 | 16.0 | 15.3 | 15.1 | 14.9 | 14.7 | 14.4 | 14.8 | 17.5 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 13.6 | 12.9 | 12.1 | 12.3 | 12.7 | 12.4 | 12.3 | 12.8 | 13.9 | 14.4 | 14.9 | 15.7 | 15.7 | 14.9 | 14.4 | 14.2 | 13.6 | 13.6 | 13.3 | 12.7 | 12.8 | 12.9 | 12.5 | 12.4 | 13.5 | 15.7 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 11.9 | 11.7 | 11.2 | 10.9 | 10.9 | 10.9 | 10.8 | 10.6 | 10.4 | 9.8 | 9.5 | 9.5 | 9.7 | 9.7 | 9.6 | 10.3 | 10.4 | 10.3 | 9.7 | 9.6 | 9.3 | 8.8 | 8.5 | 8.2 | 10.1 | 11.9 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 7.7 | 7.4 | 7.3 | 6.6 | 5.8 | 5.6 | 6.1 | 7.9 | 9.4 | 11.0 | 12.1 | 12.9 | 14.3 | 14.8 | 15.3 | 15.2 | 15.6 | 14.8 | 13.5 | 12.5 | 11.5 | 12.0 | 11.2 | 10.8 | 10.9 | 15.6 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 10.2 | 9.4 | 8.6 | 8.2 | 7.3 | 6.5 | 6.6 | 7.1 | 10.0 | 11.7 | 13.1 | 14.0 | 13.9 | 14.6 | 14.2 | 14.0 | 14.0 | 14.0 | 13.4 | 12.8 | 12.1 | 11.6 | 11.7 | 11.4 | 11.3 | 14.6 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 10.4 | 9.5 | 9.7 | 8.7 | 8.2 | 7.8 | 8.5 | 9.8 | 11.5 | 13.1 | 14.9 | 16.2 | 16.8 | 18.5 | 18.6 | 17.0 | 16.4 | 15.8 | 14.1 | 12.9 | 12.0 | 11.4 | 10.3 | 9.3 | 12.6 | 18.6 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 8.4 | 8.1 | 7.9 | 7.4 | 6.9 | 6.0 | 6.5 | 6.5 | 6.7 | 8.4 | 12.3 | 15.0 | 16.9 | 18.1 | 18.8 | 18.1 | 19.0 | 18.1 | 15.9 | 14.4 | 13.0 | 12.2 | 9.7 | 8.5 | 11.8 | 19.0 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 9.2 | 8.6 | 8.0 | 7.6 | 7.3 | 6.6 | 7.5 | 9.1 | 11.6 | 13.8 | 16.1 | 18.6 | 19.3 | 19.4 | 18.2 | 13.8 | 14.9 | 13.7 | 12.8 | 10.5 | 9.6 | 11.2 | 10.3 | 9.9 | 12.0 | 19.4 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 9.7 | 8.7 | 8.7 | 7.9 | 7.6 | 7.5 | 7.3 | 7.0 | 7.5 | 8.3 | 9.0 | 9.4 | 10.0 | 11.4 | 13.7 | 14.5 | 14.0 | 12.9 | 11.2 | 10.8 | 11.1 | 10.9 | 11.2 | 11.2 | 10.1 | 14.5 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 10.6 | 9.2 | 9.2 | 9.4 | 9.4 | 9.6 | 9.9 | 10.5 | 12.2 | 14.3 | 13.9 | 14.7 | 15.3 | 15.5 | 15.0 | 15.3 | 14.0 | 13.7 | 13.1 | 12.3 | 11.3 | 10.7 | 10.0 | 9.7 | 12.0 | 15.5 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 8.8 | 8.4 | 7.6 | 7.1 | 6.9 | 6.6 | 6.5 | 6.5 | 6.4 | 6.5 | 7.1 | 7.8 | 8.2 | 8.0 | 8.5 | 8.6 | 8.3 | 7.9 | 7.6 | 7.0 | 6.6 | 6.1 | 6.2 | 6.2 | 7.3 | 8.8 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 6.1 | 5.7 | 5.6 | 5.5 | 5.1 | 4.7 | 4.8 | 4.9 | 6.5 | 9.6 | 11.7 | 12.2 | 13.2 | 13.7 | 14.2 | 14.2 | 13.9 | 13.5 | 12.4 | 11.2 | 10.5 | 10.0 | 9.2 | 8.6 | 9.4 | 14.2 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 8.2 | 7.9 | 7.7 | 8.1 | 7.9 | 7.5 | 7.2 | 9.1 | 12.1 | 14.1 | 17.0 | 19.7 | 22.1 | 23.1 | 24.1 | 24.0 | 22.2 | 20.6 | 19.8 | 18.4 | 17.6 | 17.6 | 16.0 | 14.9 | 15.3 | 24.1 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 14.4 | 13.1 | 11.3 | 9.3 | 9.1 | 7.3 | 8.5 | 12.3 | 13.1 | 14.7 | 16.0 | 18.5 | 20.2 | 21.8 | 24.0 | 24.1 | 23.6 | 19.1 | 16.4 | 14.1 | 12.1 | 12.1 | 14.0 | 13.6 | 15.1 | 24.1 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 11.8 | 10.2 | 7.8 | 6.1 | 5.8 | 6.1 | 6.9 | 8.9 | 8.7 | 9.7 | 11.0 | 11.7 | 13.4 | 15.0 | 17.0 | 18.3 | 18.9 | 18.0 | 16.5 | 16.5 | 16.1 | 14.9 | 14.5 | 13.5 | 12.4 | 18.9 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 12.2 | 11.4 | 9.2 | 9.8 | 9.0 | 9.2 | 10.6 | 11.3 | 12.7 | 13.8 | 14.7 | 18.0 | 22.6 | 23.3 | 23.2 | 23.2 | 22.8 | 22.0 | 18.8 | 16.4 | 15.4 | 14.7 | 14.0 | 14.0 | 15.5 | 23.3 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 14.5 | 14.9 | 14.1 | 13.5 | 13.6 | 13.3 | 12.3 | 12.7 | 13.7 | 14.5 | 15.2 | 15.6 | 16.1 | 16.5 | 17.1 | 19.1 | 18.9 | 18.2 | 16.6 | 15.8 | 15.0 | 14.0 | 13.6 | 13.0 | 15.1 | 19.1 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 12.0 | 11.5 | 9.8 | 10.3 | 9.5 | 9.1 | 10.4 | 11.0 | 12.7 | 12.7 | 12.8 | 13.5 | 13.9 | 13.9 | 14.2 | 13.7 | 13.3 | 12.6 | 12.1 | 11.7 | 11.4 | 10.7 | 9.7 | 9.8 | 11.8 | 14.2 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 9.8 | 9.7 | 9.6 | 9.6 | 9.0 | 8.4 | 8.4 | 8.4 | 8.9 | 9.0 | 10.2 | 11.0 | 11.2 | 11.9 | 12.3 | 12.3 | 12.4 | 12.3 | 10.9 | 10.2 | 10.2 | 9.8 | 9.5 | 8.5 | 10.2 | 12.4 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 8.6 | 8.3 | 7.3 | 6.6 | 6.7 | 6.4 | 6.0 | 6.8 | 7.6 | 8.2 | 9.3 | 10.9 | 12.1 | 13.0 | 13.7 | 13.4 | 12.6 | 11.3 | 10.3 | 9.4 | 8.7 | 8.1 | 6.9 | 6.6 | 9.1 | 13.7 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 6.8 | 7.1 | 6.4 | 5.8 | 4.7 | 3.7 | 3.6 | 5.0 | 7.5 | 9.5 | 11.6 | 14.4 | 16.1 | 18.3 | 18.0 | 18.6 | 17.9 | 16.8 | 13.8 | 12.0 | 11.1 | 10.0 | 8.4 | 7.9 | 10.6 | 18.6 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 7.1 | 6.6 | 6.5 | 6.2 | 6.5 | 5.7 | 6.0 | 8.0 | 9.8 | 11.6 | 13.9 | 18.5 | 20.2 | 20.6 | 20.6 | 20.4 | 19.8 | 18.8 | 17.2 | 15.4 | 14.6 | 12.8 | 12.1 | 11.4 | 12.9 | 20.6 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 11.4 | 11.1 | 10.3 | 10.4 | 10.4 | 10.0 | 9.8 | 9.6 | 10.5 | 11.9 | 12.4 | 12.9 | 13.4 | 13.4 | 13.4 | 13.1 | 12.6 | 12.2 | 12.3 | 12.2 | 11.8 | 11.3 | 10.8 | 10.6 | 11.6 | 13.4 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 10.5 | 10.2 | 9.7 | 9.7 | 9.4 | 8.6 | 7.7 | 8.2 | 9.7 | 10.6 | 11.9 | 13.6 | 14.7 | 15.3 | 15.4 | 16.8 | 16.5 | 15.6 | 14.4 | 13.8 | 12.9 | 11.8 | 10.8 | 10.2 | 12.0 | 16.8 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 9.4 | 8.5 | 8.3 | 8.2 | 7.7 | 6.6 | 6.0 | 6.7 | 8.6 | 11.0 | 13.3 | 14.6 | 16.0 | 16.8 | 17.2 | 17.3 | 17.0 | 15.6 | 10.4 | 8.9 | 7.7 | 7.6 | 6.7 | 4.4 | 10.6 | 17.3 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 4.2 | 3.5 | 4.8 | 4.6 | 5.2 | 7.1 | 6.7 | 7.9 | 9.5 | 12.0 | 14.1 | 17.3 | 19.6 | 21.0 | 22.6 | 23.7 | 23.2 | 21.8 | 19.9 | 18.9 | 17.9 | 17.5 | 16.9 | 16.4 | 14.0 | 23.7 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 16.0 | 15.7 | 14.9 | 14.8 | 14.1 | 15.0 | 15.7 | 15.6 | 13.1 | 13.6 | 12.7 | 13.3 | 13.7 | 15.4 | 16.1 | 16.2 | 16.0 | 14.9 | 13.5 | 12.7 | 11.3 | 10.5 | 9.0 | 7.2 | 13.8 | 16.2 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 7.5 | 7.3 | 6.0 | 5.5 | 4.6 | 4.5 | 3.8 | 5.4 | 6.9 | 9.2 | 10.3 | 12.8 | 15.5 | 16.5 | 17.1 | 16.9 | 15.9 | 13.6 | 10.0 | 8.1 | 7.2 | 7.9 | 6.4 | 6.0 | 9.4 | 17.1 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 5.4 | 6.4 | 5.9 | 4.5 | 4.2 | 4.8 | 4.7 | 5.4 | 7.1 | 9.6 | 11.3 | 13.3 | 15.0 | 16.4 | 17.0 | 17.0 | 16.2 | 14.0 | 10.0 | 8.3 | 7.1 | 6.7 | 6.8 | 6.4 | 9.3 | 17.0 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 4.8 | 4.5 | 4.3 | 3.9 | 4.1 | 4.3 | 4.3 | 4.3 | 5.2 | 6.5 | 8.3 | 9.3 | 9.8 | 10.4 | 10.7 | 10.3 | 9.9 | 9.1 | 8.4 | 8.0 | 7.8 | 7.6 | 7.3 | 6.6 | 7.1 | 10.7 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.8 | 9.4 | 8.8 | 8.4 | 8.0 | 7.8 | 7.9 | 8.7 | 9.9 | 11.3 | 12.6 | 14.1 | 15.2 | 16.0 | 16.4 | 16.3 | 16.0 | 15.0 | 13.5 | 12.4 | 11.7 | 11.3 | 10.6 | 10.0 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 16.0 | 15.7 | 14.9 | 14.8 | 14.1 | 15.0 | 15.7 | 15.6 | 14.7 | 16.4 | 17.0 | 19.7 | 22.6 | 23.3 | 24.1 | 24.1 | 23.6 | 22.0 | 19.9 | 18.9 | 17.9 | 17.6 | 16.9 | 16.4 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 282 | 39.17 | 39.17 |
| 10 - 20 | 412 | 57.22 | 96.39 |
| > 20 | 26 | 3.61 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

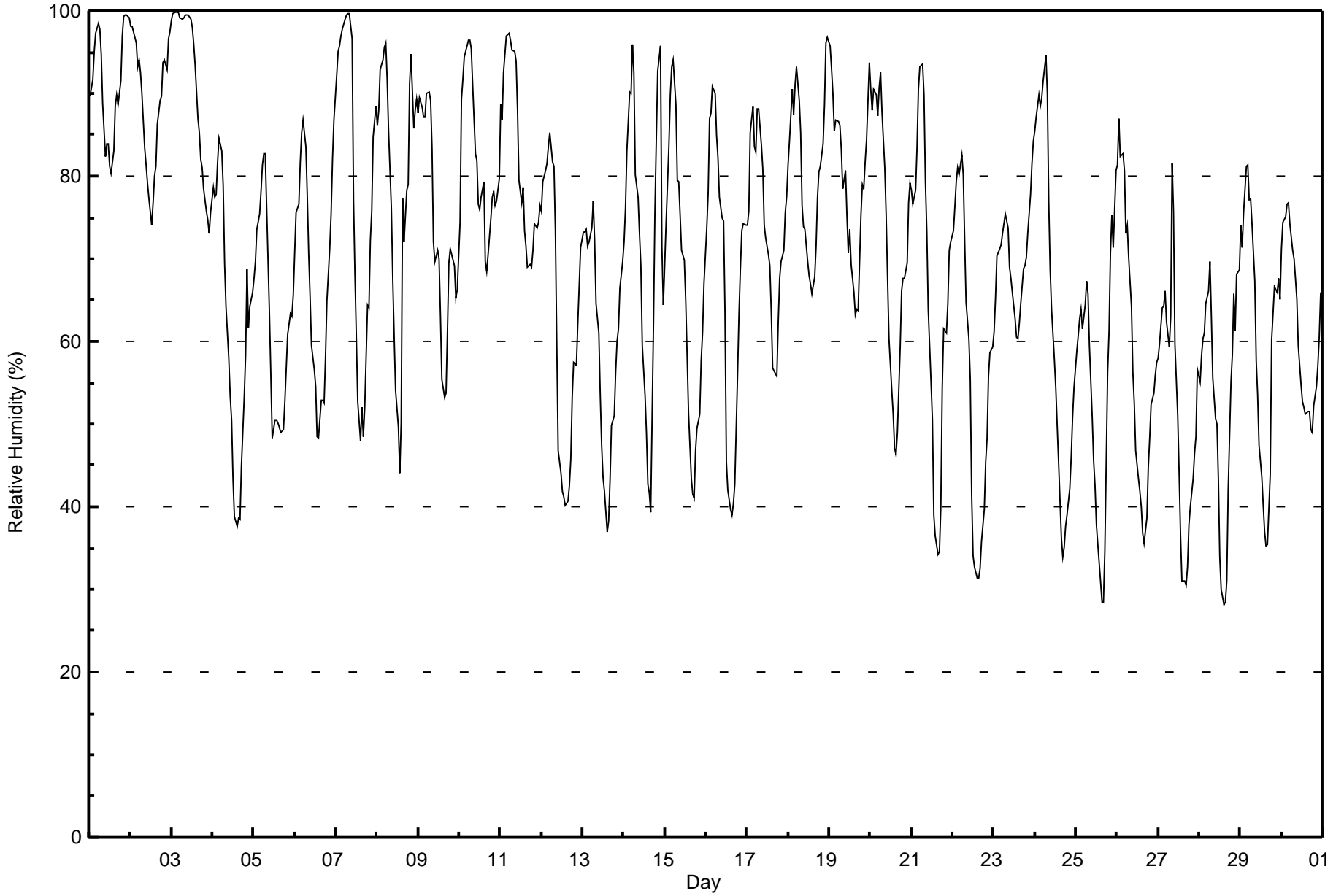


Wood Buffalo Environmental Association

Summary of Hour Averages

**Relative Humidity (RH) - %
Mildred Lake - September 2016**

| Maximum Value: 100 % on Sep 3 04:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 91.4 % on Sep 3 | | | | | | Hours in Service: 720 | |
|-------------------------------------------|-------------------------------|-----|-----|-----|-----|----|----|-----|-----|----|----|----|----|----|----|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|-----|----|---------------------------------|---------------|
| Minimum Value: 28 % on Sep 28 15:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 51.8 % on Sep 27 | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 85.7 % at hour 6 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 51.1 % at hour 16 | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 69.7 % | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 31 P ₁₀ = 43 Q ₁ = 57 Median = 71 O ₃ = 83 P ₉₀ = 93 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 | 90 | 91 | 92 | 95 | 97 | 98 | 98 | 95 | 89 | 82 | 84 | 84 | 81 | 80 | 83 | 88 | 90 | 89 | 92 | 97 | 99 | 99 | 100 | 99 | 91.3 | 100 |
| 2-Sep | 98 | 98 | 97 | 96 | 93 | 94 | 93 | 90 | 83 | 81 | 79 | 77 | 74 | 77 | 80 | 81 | 86 | 89 | 90 | 94 | 94 | 93 | 97 | 98 | 88.9 | 98 |
| 3-Sep | 99 | 100 | 100 | 100 | 100 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 96 | 93 | 87 | 85 | 82 | 81 | 78 | 76 | 75 | 73 | 76 | 91.4 | 100 |
| 4-Sep | 79 | 77 | 78 | 82 | 85 | 83 | 79 | 69 | 64 | 58 | 53 | 51 | 43 | 39 | 38 | 39 | 39 | 45 | 53 | 58 | 69 | 62 | 64 | 66 | 61.3 | 85 |
| 5-Sep | 68 | 70 | 74 | 75 | 78 | 81 | 83 | 83 | 70 | 63 | 56 | 48 | 51 | 50 | 50 | 50 | 49 | 49 | 53 | 57 | 61 | 63 | 63 | 66 | 62.9 | 83 |
| 6-Sep | 71 | 76 | 77 | 82 | 85 | 87 | 84 | 78 | 71 | 65 | 60 | 57 | 55 | 48 | 48 | 53 | 53 | 52 | 58 | 65 | 71 | 75 | 82 | 87 | 68.3 | 87 |
| 7-Sep | 92 | 95 | 96 | 97 | 98 | 99 | 99 | 100 | 100 | 97 | 77 | 68 | 61 | 53 | 48 | 52 | 49 | 52 | 64 | 64 | 72 | 76 | 85 | 89 | 78.4 | 100 |
| 8-Sep | 86 | 88 | 93 | 94 | 96 | 96 | 92 | 85 | 76 | 68 | 61 | 54 | 50 | 44 | 50 | 77 | 72 | 78 | 79 | 91 | 95 | 86 | 88 | 89 | 78.7 | 96 |
| 9-Sep | 88 | 89 | 88 | 87 | 87 | 90 | 90 | 89 | 83 | 72 | 70 | 71 | 70 | 63 | 55 | 53 | 54 | 61 | 70 | 71 | 70 | 69 | 65 | 66 | 73.9 | 90 |
| 10-Sep | 74 | 89 | 92 | 94 | 95 | 96 | 96 | 95 | 91 | 83 | 82 | 77 | 76 | 78 | 79 | 70 | 68 | 70 | 75 | 77 | 78 | 77 | 77 | 80 | 82.1 | 96 |
| 11-Sep | 89 | 87 | 93 | 97 | 97 | 97 | 96 | 95 | 95 | 94 | 88 | 79 | 77 | 79 | 73 | 71 | 69 | 69 | 69 | 71 | 74 | 74 | 74 | 76 | 82.7 | 97 |
| 12-Sep | 76 | 79 | 81 | 81 | 84 | 85 | 82 | 81 | 73 | 60 | 47 | 44 | 42 | 41 | 40 | 41 | 43 | 46 | 53 | 58 | 57 | 62 | 67 | 71 | 62.2 | 85 |
| 13-Sep | 73 | 73 | 74 | 72 | 72 | 74 | 77 | 72 | 65 | 61 | 54 | 48 | 44 | 42 | 37 | 38 | 43 | 50 | 51 | 56 | 60 | 62 | 66 | 70 | 59.7 | 77 |
| 14-Sep | 72 | 76 | 83 | 90 | 90 | 96 | 93 | 80 | 77 | 73 | 69 | 60 | 53 | 49 | 43 | 42 | 39 | 62 | 76 | 84 | 93 | 96 | 71 | 64 | 72.1 | 96 |
| 15-Sep | 69 | 74 | 84 | 90 | 93 | 94 | 89 | 80 | 79 | 75 | 71 | 70 | 65 | 58 | 51 | 43 | 41 | 41 | 47 | 50 | 51 | 58 | 61 | 67 | 66.7 | 94 |
| 16-Sep | 74 | 78 | 87 | 88 | 91 | 90 | 85 | 82 | 77 | 75 | 75 | 64 | 45 | 42 | 40 | 39 | 40 | 43 | 56 | 63 | 69 | 73 | 74 | 74 | 67.7 | 91 |
| 17-Sep | 74 | 76 | 85 | 89 | 84 | 83 | 88 | 88 | 84 | 81 | 74 | 73 | 71 | 69 | 64 | 57 | 56 | 56 | 62 | 68 | 70 | 71 | 76 | 77 | 73.9 | 89 |
| 18-Sep | 81 | 84 | 91 | 87 | 91 | 93 | 89 | 85 | 76 | 74 | 74 | 70 | 68 | 67 | 66 | 68 | 72 | 77 | 81 | 81 | 84 | 89 | 96 | 97 | 80.9 | 97 |
| 19-Sep | 96 | 93 | 90 | 85 | 87 | 87 | 86 | 83 | 79 | 81 | 75 | 71 | 74 | 69 | 66 | 63 | 64 | 64 | 75 | 79 | 78 | 82 | 84 | 94 | 79.3 | 96 |
| 20-Sep | 91 | 88 | 90 | 90 | 87 | 91 | 92 | 88 | 81 | 75 | 68 | 60 | 54 | 51 | 47 | 46 | 49 | 59 | 66 | 68 | 68 | 70 | 77 | 79 | 72.3 | 92 |
| 21-Sep | 78 | 77 | 78 | 83 | 90 | 93 | 94 | 90 | 79 | 73 | 64 | 55 | 50 | 39 | 36 | 34 | 35 | 40 | 54 | 61 | 61 | 65 | 71 | 72 | 65.6 | 94 |
| 22-Sep | 73 | 76 | 79 | 81 | 80 | 83 | 80 | 72 | 65 | 60 | 55 | 41 | 34 | 33 | 31 | 31 | 33 | 36 | 40 | 45 | 48 | 56 | 59 | 59 | 56.3 | 83 |
| 23-Sep | 61 | 65 | 70 | 71 | 72 | 73 | 74 | 75 | 74 | 69 | 68 | 66 | 63 | 61 | 60 | 62 | 65 | 69 | 69 | 70 | 73 | 78 | 82 | 84 | 69.7 | 84 |
| 24-Sep | 85 | 87 | 90 | 89 | 89 | 92 | 95 | 90 | 77 | 69 | 64 | 58 | 54 | 50 | 45 | 36 | 34 | 35 | 38 | 39 | 42 | 46 | 51 | 54 | 62.9 | 95 |
| 25-Sep | 59 | 61 | 63 | 64 | 61 | 64 | 67 | 66 | 59 | 51 | 46 | 42 | 38 | 35 | 31 | 29 | 28 | 35 | 56 | 61 | 71 | 75 | 71 | 81 | 54.8 | 81 |
| 26-Sep | 81 | 87 | 82 | 83 | 81 | 73 | 74 | 70 | 64 | 56 | 52 | 47 | 43 | 42 | 40 | 37 | 36 | 39 | 45 | 48 | 52 | 54 | 56 | 57 | 58.3 | 87 |
| 27-Sep | 58 | 60 | 64 | 64 | 66 | 62 | 59 | 63 | 81 | 76 | 60 | 51 | 44 | 37 | 31 | 31 | 31 | 33 | 38 | 40 | 43 | 46 | 48 | 57 | 51.8 | 81 |
| 28-Sep | 55 | 58 | 60 | 61 | 65 | 66 | 70 | 63 | 56 | 51 | 50 | 43 | 34 | 30 | 28 | 28 | 31 | 42 | 55 | 59 | 66 | 61 | 68 | 69 | 52.9 | 70 |
| 29-Sep | 74 | 71 | 76 | 81 | 81 | 77 | 77 | 74 | 67 | 58 | 54 | 48 | 43 | 40 | 37 | 35 | 35 | 44 | 60 | 63 | 67 | 66 | 68 | 65 | 60.9 | 81 |
| 30-Sep | 71 | 74 | 75 | 77 | 77 | 74 | 71 | 70 | 68 | 65 | 60 | 55 | 53 | 52 | 51 | 52 | 52 | 49 | 49 | 52 | 54 | 57 | 61 | 66 | 61.8 | 77 |
| | | | | | | | | | | | | | | | | | | | 77.8 79.9 82.7 84.2 85.1 85.7 85.0 81.7 76.8 71.5 66.2 61.0 56.9 53.8 51.5 51.1 51.3 55.2 61.8 65.7 68.9 70.5 72.5 75.0 | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | 99 100 100 100 100 99 99 100 100 99 99 99 98 96 93 88 90 89 92 97 99 99 100 99 | | | | | | Diurnal Maximum | |





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Mildred Lake - September 2016

| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Speed: 26 km/h on Sep 11 05:00 | Maximum Daily Speed Average: 17.4 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 14 06:00 | Minimum Daily Speed Average: 1.5 km/h on Sep 9 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 4.4 km/h at hour 16 | Minimum Diurnal Speed Average: 0.6 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 2.4 km/h 253.2 deg | Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 16 P ₉₉ = 23 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | E6 | E7 | NE4 | N8 | N9 | N9 | N9 | NNE7 | NE7 | NNE9 | N11 | NNE6 | E9 | ESE10 | SE8 | SSE2 | NE7 | SE2 | NNE5 | N4 | NNW5 | NNW7 | WNW6 | WNW8 | NNE4.2 | N11 | |
| 2-Sep | W7 | WSW7 | WSW7 | WNW11 | W10 | W7 | WNW9 | WSW6 | WSW8 | W7 | NW5 | WSW8 | W7 | WSW6 | WSW6 | WNW9 | NW7 | WNW6 | N4 | NW3 | NW7 | NW9 | NW10 | NNW14 | WNW6.5 | NNW14 | |
| 3-Sep | N14 | NNW13 | NNW11 | NW9 | WNW12 | WNW13 | WNW14 | WNW14 | WNW14 | NW14 | NW16 | NW16 | NNW15 | NNW17 | NNW17 | NNW17 | NNW16 | NNW21 | NNW17 | NNW19 | NNW23 | NNW17 | NNW17 | NW13 | NNW14.7 | NNW23 | |
| 4-Sep | NNW14 | NW15 | NW14 | NW12 | WNW10 | WNW11 | NW6 | NW4 | WNW6 | NW8 | NW12 | WNW10 | WNW9 | NW8 | NW7 | NW6 | WNW4 | WNW3 | NE5 | NE5 | S3 | WSW5 | WSW7 | W6 | NW6.8 | NW15 | |
| 5-Sep | W6 | SW6 | SW7 | SSW8 | S10 | S10 | SSW8 | SSW7 | SSW6 | S7 | S10 | SSW14 | SSW12 | SSW12 | S9 | SSE10 | SSE9 | SSE10 | SSE9 | SSE10 | SE9 | ESE7 | SSE10 | SSE12 | S7.9 | SSW14 | |
| 6-Sep | SSE10 | SSE11 | S12 | S9 | S9 | S8 | S9 | S11 | S12 | SSE12 | S14 | SSE14 | SSE12 | SSE12 | SSE14 | S17 | SSW12 | S13 | SSW11 | S11 | S9 | SSE11 | SSE9 | SSE8 | S11.0 | S17 | |
| 7-Sep | SSE6 | S7 | S6 | S6 | S5 | S6 | S7 | SSE9 | SSE8 | S7 | S9 | S10 | SSE9 | SSE10 | SSE9 | SSE5 | S7 | S6 | SSW5 | WNW4 | SW4 | WSW4 | SW1 | SSW5 | S5.9 | SSE10 | |
| 8-Sep | W6 | SW4 | WSW5 | SSW5 | SW5 | S6 | SSW6 | SSW8 | SSW6 | E2 | SW4 | SW6 | SW5 | NNW6 | NW7 | NW4 | SW6 | WNW8 | NE7 | NNW3 | NNW5 | N8 | N7 | N7 | W2.4 | WNW8 | |
| 9-Sep | NNW10 | NNW9 | N7 | NNW8 | NNE6 | NNE6 | NNE8 | NNE9 | NNE9 | NNE9 | N5 | NW6 | SW5 | S2 | SW5 | SSW8 | S8 | SE8 | SE7 | SE8 | SE10 | SE11 | SSE15 | SSE16 | E1.5 | SSE16 | |
| 10-Sep | SSE15 | SSE13 | SE15 | SSE18 | SSE18 | SSE14 | SSE13 | S11 | SSW10 | WSW11 | WNW13 | WNW13 | WNW11 | WNW11 | WNW13 | NW17 | NW17 | WNW16 | WNW15 | WNW14 | WNW15 | WNW15 | WNW14 | NW14 | W6.1 | SSE18 | |
| 11-Sep | N19 | N24 | N22 | N22 | N26 | N25 | N24 | N25 | N22 | N21 | N21 | N23 | N23 | N19 | N17 | N17 | N14 | NNW13 | NNW9 | N8 | NNW7 | NNW7 | NW9 | NW8 | N17.4 | N26 | |
| 12-Sep | NW8 | NNW9 | NNW8 | NNW7 | SW1 | SSE0 | W3 | WNW4 | WSW4 | SW7 | SW9 | SW8 | SW8 | SW9 | SW9 | SW9 | SSW10 | S10 | SSE10 | S10 | SSW13 | S12 | SSW14 | S15 | SW5.6 | S15 | |
| 13-Sep | S14 | S8 | S10 | SSW12 | SSW12 | S9 | SSE6 | S9 | SW11 | SW10 | SW12 | SW11 | SW11 | SW11 | WSW12 | WSW11 | WSW12 | WSW10 | WSW12 | WSW10 | W10 | WNW12 | WNW11 | WNW9 | SW8.6 | S14 | |
| 14-Sep | NW9 | NNW8 | N5 | N5 | NNE5 | S0 | SSW2 | ESE2 | ESE1 | S6 | SSE9 | SSE10 | SE10 | SSE10 | SW9 | SW11 | WNW13 | NNW20 | N11 | NNE2 | SW3 | WSW5 | NW11 | NNW15 | WNW1.9 | NNW20 | |
| 15-Sep | N9 | N7 | N4 | NNE5 | NE4 | NE5 | ENE5 | ENE6 | E9 | E8 | ESE4 | ESE5 | S7 | SE8 | ESE10 | SE12 | SE10 | SE8 | ESE8 | SSE12 | SSE13 | SE10 | S10 | S9 | ESE4.7 | SSE13 | |
| 16-Sep | S7 | S6 | SSW4 | SSW8 | S7 | S6 | SSW6 | S7 | S8 | S9 | SSE9 | SSE10 | SW13 | WSW15 | WSW16 | WSW16 | WSW12 | WSW9 | SW6 | W2 | WSW3 | SSW5 | SSW5 | SSW5 | SSW6.8 | WSW16 | |
| 17-Sep | SSW6 | SW8 | SW8 | SSE4 | S8 | SSW10 | SSW7 | SSW6 | SSW10 | SSW7 | SW8 | SW8 | SW8 | SW9 | WSW10 | W10 | WNW11 | WNW11 | WNW5 | W6 | WSW7 | WSW7 | WNW7 | W7 | SW6.2 | WNW11 | |
| 18-Sep | W3 | WNW5 | SW1 | NNW2 | WNW3 | SSW3 | W6 | WNW7 | WNW9 | WNW14 | WNW12 | NW13 | NW17 | NNW20 | NNW19 | NNW16 | N14 | N10 | N7 | N7 | N6 | N8 | N5 | N5 | NW7.6 | NNW20 | |
| 19-Sep | N5 | NNW9 | NNW8 | NW10 | NNW10 | NNW9 | WNW10 | WNW11 | WNW12 | WNW11 | NW10 | NNW11 | NNW11 | NW10 | NNW13 | NNW16 | NNW11 | N9 | NNE7 | N8 | NNW7 | NW7 | N11 | N8 | NNW9.2 | NNW16 | |
| 20-Sep | N9 | N8 | NNW6 | N6 | N8 | N5 | N4 | NNW7 | NNE7 | NNW6 | NNW5 | NNW6 | NNW3 | SW5 | SW5 | SSW3 | SE6 | ESE6 | E4 | E6 | E8 | ESE6 | S6 | ESE5 | NNE2.4 | N9 | |
| 21-Sep | ESE4 | S5 | S6 | SSW8 | SSW5 | SW4 | SW4 | SSW6 | SSW7 | SSW7 | S10 | S10 | S10 | SW10 | SW10 | WSW9 | W9 | SW7 | SW6 | SW6 | SW6 | SW5 | SSW4 | S5 | SSW6.0 | SW10 | |
| 22-Sep | SSE5 | SE5 | SSE6 | SSE9 | SSE8 | SSE8 | SSE9 | SSE11 | SSE11 | SSE8 | SE9 | SSW8 | SW14 | SW13 | SSW15 | SSW16 | SSW16 | SSW14 | S14 | S12 | SSW13 | S9 | S8 | S10 | S9.6 | SSW16 | |
| 23-Sep | S13 | S13 | S10 | SSE14 | SSE16 | SSE17 | SSE18 | SSE15 | SSE16 | SSE19 | SSE22 | SSE21 | SSE21 | SSE23 | SSE22 | S19 | SSE20 | SSE19 | SSE19 | SSE19 | S17 | S16 | S16 | S17 | S14 | SSE17.3 | SSE23 |
| 24-Sep | S14 | S12 | SSE11 | S11 | S12 | SSW12 | SSW9 | SSW7 | WSW11 | WSW15 | W13 | WNW15 | WNW16 | WNW20 | WNW19 | WNW21 | WNW21 | NW15 | NW8 | WNW9 | WNW11 | WNW13 | WNW14 | WNW12 | W8.9 | WNW21 | |
| 25-Sep | WNW14 | WNW16 | WNW13 | WNW13 | WNW13 | WNW15 | WNW14 | WNW13 | WNW13 | WNW10 | NW14 | NW14 | NW12 | NW13 | NW15 | NNW15 | NNW12 | N5 | NE2 | SSW3 | SSW3 | WSW5 | SSW2 | ESE4 | WNW9.3 | WNW16 | |
| 26-Sep | SSE4 | SSE4 | SE6 | S6 | SSE6 | SSE10 | SSE9 | SSE9 | SSE11 | SSE14 | SSE13 | S13 | S14 | SSE14 | SSE14 | S16 | SSW17 | S13 | S13 | S12 | SSE13 | SSE15 | SSW13 | SSE13 | S11.1 | SSW17 | |
| 27-Sep | SSE14 | SSE9 | SSE6 | S8 | S8 | W8 | NW9 | W13 | WSW12 | W14 | NW20 | WNW17 | WNW16 | WNW18 | WNW20 | WNW19 | W19 | WSW13 | WSW12 | W12 | W10 | W9 | WNW5 | WNW7 | W9.3 | WNW20 | |
| 28-Sep | WSW7 | W7 | WSW8 | WSW7 | SW8 | WSW8 | SSW5 | S6 | S9 | SSW9 | S9 | S7 | SSW7 | SSW7 | WSW8 | SW8 | SW8 | SW5 | S4 | SSW4 | SW4 | SSW4 | SSW3 | E2 | SW5.5 | SSW9 | |
| 29-Sep | ENE3 | E3 | E2 | SSE5 | S5 | S6 | S7 | SSW8 | SSW9 | SSW7 | S7 | S8 | S6 | S6 | S4 | S3 | ESE4 | E5 | ENE5 | ESE2 | ESE4 | SE2 | N8 | N9 | SSE2.9 | N9 | |
| 30-Sep | N7 | N8 | N10 | N6 | NNE11 | NNE13 | NNE12 | NNE13 | NNE14 | NNE18 | NNE18 | NNE19 | NNE19 | NNE21 | NNE21 | NNE22 | NNE21 | NNE19 | NNE19 | NNE18 | NNE17 | NNE14 | NNE16 | NNE21 | NNE15.7 | NNE22 | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|--------|--------|--------|-------|-------|--------|-------|-------|--------|-------|--------|--------|--------|-------|-------|-------|-------|--------|--------|--------|--------|------|-------|-----------------|
| W1.4 | WNW1.3 | WSW1.4 | WSW2.0 | SW2.1 | SW2.2 | WSW1.9 | SW2.2 | SW2.9 | WSW3.0 | W3.0 | WSW3.5 | WSW3.8 | WSW3.9 | W4.4 | W4.4 | W4.0 | W2.5 | WSW0.8 | WSW1.4 | WSW2.0 | WSW2.1 | W2.4 | W1.8 | Diurnal Average |
| N19 | N24 | N22 | N22 | N26 | N25 | N24 | N25 | N22 | N21 | SSE22 | N23 | N23 | SSE23 | SSE22 | NNE22 | WNW21 | NNW21 | SSE19 | NNW19 | NNW23 | NNW17 | S17 | NNE21 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

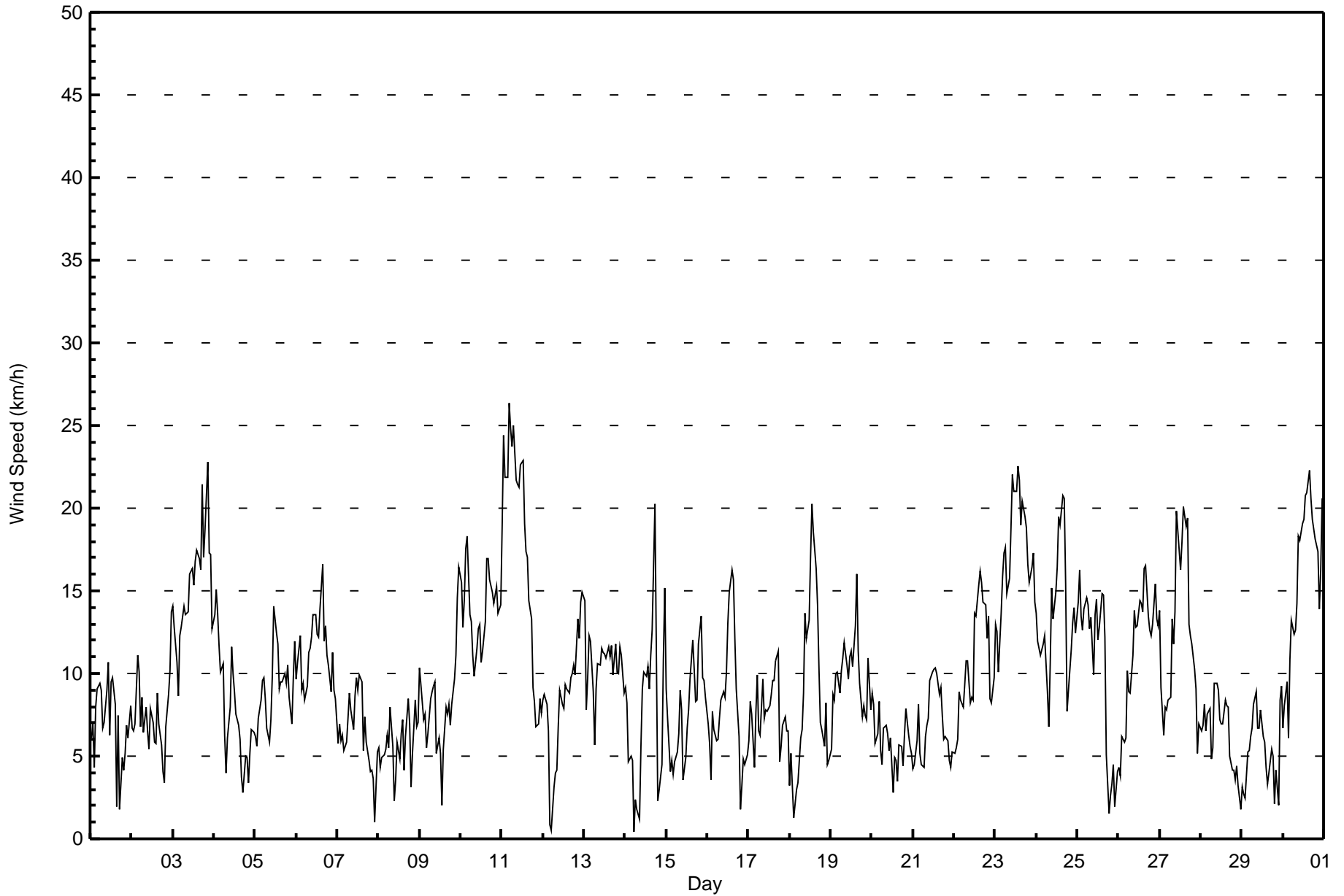
Wind Speed (WS) - km/h
Mildred Lake - September 2016

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



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 127 | 17.64 | 17.64 |
| 6 - 11 | 365 | 50.69 | 68.33 |
| 12 - 19 | 196 | 27.22 | 95.56 |
| 20 - 28 | 32 | 4.44 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 12 | 4 | 6 | 3 | 6 | 10 | 3 | 8 | 9 | 21 | 17 | 7 | 3 | 8 | 4 | 6 | 127 |
| 6 - 11 | 32 | 12 | 3 | 1 | 7 | 6 | 15 | 40 | 66 | 32 | 33 | 24 | 18 | 28 | 23 | 25 | 365 |
| 12 - 19 | 7 | 14 | 0 | 0 | 0 | 0 | 1 | 35 | 27 | 15 | 4 | 11 | 5 | 39 | 18 | 20 | 196 |
| 20 - 28 | 12 | 5 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 4 | 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 | 63 | 35 | 9 | 4 | 13 | 16 | 19 | 89 | 102 | 68 | 54 | 42 | 26 | 79 | 46 | 55 | 720 |

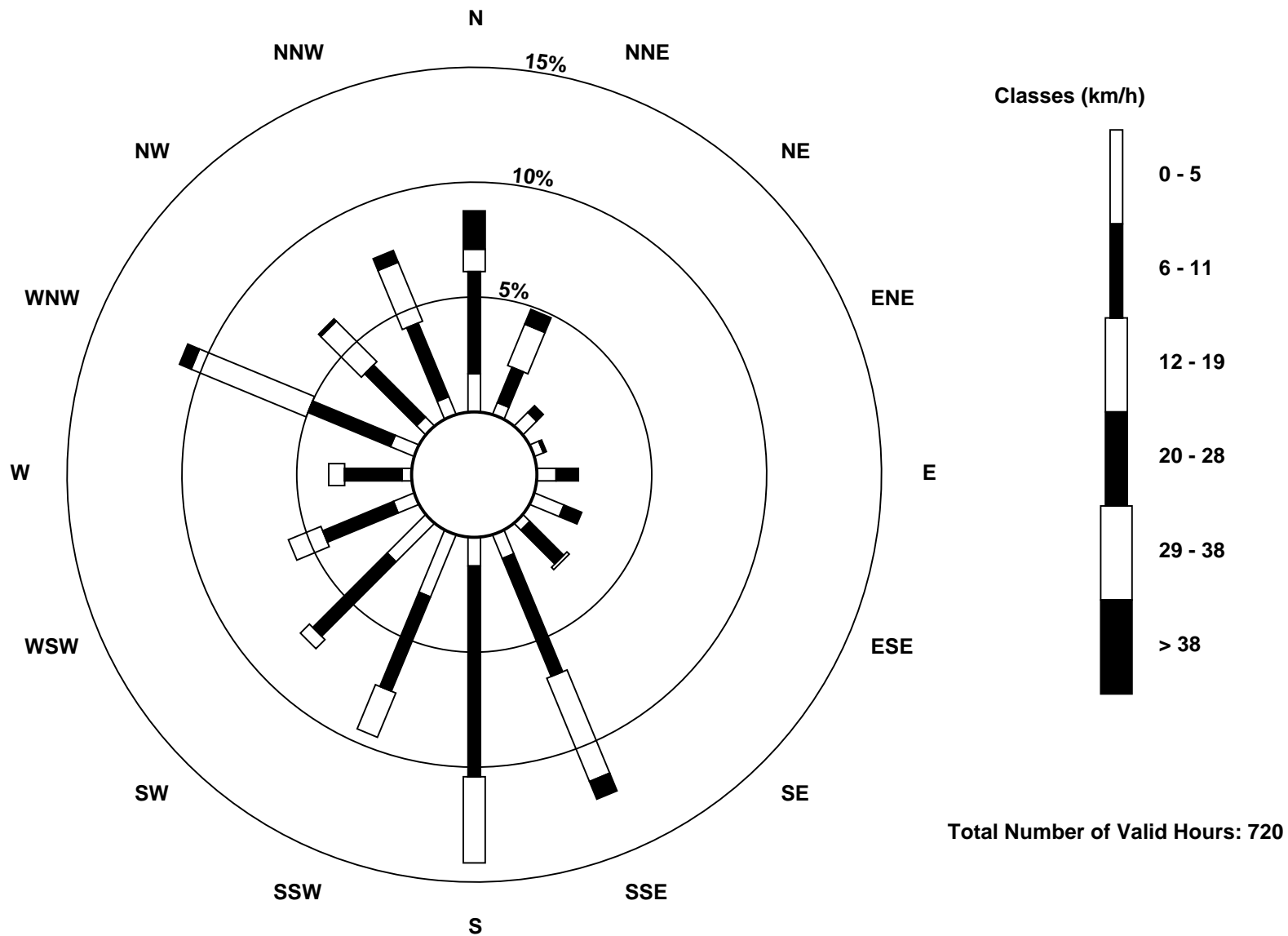
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|---------------------------------------------------------------|---------------------------------|
| Direction of Maximum Speed: 360 deg on Sep 11 05:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 357.8 deg on Sep 11 | Hours of Data: 720 |
| Direction of Minimum Speed: 185 deg on Sep 14 06:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 1.5 deg on Sep 9 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 260.5 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 | 90 | 99 | 43 | 0 | 358 | 2 | 7 | 32 | 34 | 12 | 352 | 16 | 100 | 106 | 131 | 163 | 38 | 125 | 17 | 353 | 331 | 345 | 293 | 292 | 24.1 |
| 2-Sep | 273 | 238 | 251 | 288 | 271 | 270 | 284 | 249 | 253 | 276 | 311 | 241 | 264 | 253 | 255 | 295 | 309 | 303 | 9 | 312 | 318 | 304 | 305 | 333 | 284.0 |
| 3-Sep | 358 | 347 | 327 | 312 | 298 | 297 | 296 | 297 | 303 | 311 | 322 | 326 | 329 | 332 | 332 | 337 | 334 | 339 | 345 | 338 | 339 | 331 | 329 | 319 | 326.8 |
| 4-Sep | 312 | 319 | 312 | 304 | 297 | 293 | 322 | 325 | 289 | 310 | 304 | 293 | 295 | 322 | 315 | 318 | 293 | 302 | 37 | 36 | 183 | 245 | 241 | 268 | 304.4 |
| 5-Sep | 274 | 235 | 223 | 203 | 187 | 190 | 201 | 204 | 196 | 181 | 181 | 199 | 206 | 204 | 185 | 155 | 164 | 163 | 156 | 151 | 141 | 119 | 150 | 161 | 181.9 |
| 6-Sep | 150 | 154 | 170 | 177 | 176 | 184 | 179 | 174 | 173 | 168 | 173 | 164 | 160 | 164 | 167 | 173 | 193 | 190 | 193 | 190 | 169 | 163 | 155 | 149 | 171.4 |
| 7-Sep | 153 | 177 | 189 | 181 | 178 | 170 | 173 | 168 | 165 | 179 | 177 | 173 | 164 | 157 | 155 | 164 | 177 | 171 | 207 | 283 | 227 | 252 | 219 | 195 | 176.6 |
| 8-Sep | 259 | 229 | 241 | 205 | 222 | 188 | 198 | 202 | 202 | 80 | 230 | 221 | 230 | 330 | 323 | 304 | 228 | 299 | 41 | 339 | 343 | 358 | 350 | 350 | 270.3 |
| 9-Sep | 344 | 344 | 352 | 346 | 15 | 17 | 31 | 28 | 12 | 14 | 359 | 306 | 214 | 188 | 224 | 207 | 180 | 135 | 128 | 138 | 138 | 138 | 148 | 161 | 86.0 |
| 10-Sep | 168 | 150 | 146 | 157 | 164 | 166 | 165 | 170 | 192 | 253 | 295 | 287 | 296 | 288 | 294 | 315 | 308 | 295 | 298 | 298 | 302 | 303 | 303 | 309 | 260.5 |
| 11-Sep | 354 | 354 | 356 | 355 | 360 | 3 | 4 | 5 | 5 | 1 | 4 | 6 | 356 | 359 | 10 | 1 | 2 | 348 | 348 | 3 | 345 | 330 | 319 | 307 | 357.8 |
| 12-Sep | 313 | 328 | 339 | 332 | 232 | 165 | 268 | 295 | 237 | 219 | 233 | 224 | 233 | 220 | 228 | 214 | 202 | 190 | 168 | 179 | 192 | 180 | 192 | 188 | 215.8 |
| 13-Sep | 188 | 174 | 173 | 193 | 195 | 180 | 150 | 189 | 232 | 228 | 228 | 231 | 227 | 229 | 255 | 257 | 243 | 242 | 247 | 252 | 259 | 282 | 299 | 291 | 228.9 |
| 14-Sep | 313 | 345 | 355 | 7 | 22 | 185 | 198 | 118 | 111 | 177 | 165 | 165 | 143 | 151 | 233 | 233 | 284 | 348 | 6 | 23 | 219 | 237 | 307 | 341 | 301.0 |
| 15-Sep | 357 | 356 | 5 | 12 | 39 | 50 | 59 | 74 | 80 | 86 | 116 | 110 | 177 | 141 | 122 | 125 | 136 | 135 | 120 | 156 | 160 | 146 | 188 | 184 | 120.3 |
| 16-Sep | 187 | 170 | 200 | 203 | 182 | 174 | 195 | 190 | 177 | 181 | 161 | 164 | 223 | 237 | 250 | 252 | 245 | 242 | 221 | 279 | 245 | 212 | 202 | 206 | 211.8 |
| 17-Sep | 207 | 228 | 217 | 148 | 183 | 198 | 202 | 199 | 196 | 212 | 234 | 226 | 228 | 229 | 238 | 261 | 286 | 301 | 289 | 259 | 258 | 257 | 283 | 280 | 236.1 |
| 18-Sep | 273 | 286 | 235 | 327 | 292 | 199 | 277 | 283 | 299 | 293 | 296 | 307 | 321 | 327 | 333 | 343 | 350 | 1 | 2 | 5 | 351 | 8 | 6 | 352 | 324.8 |
| 19-Sep | 352 | 348 | 335 | 325 | 338 | 339 | 302 | 299 | 297 | 299 | 313 | 327 | 347 | 324 | 329 | 336 | 348 | 356 | 16 | 350 | 342 | 324 | 352 | 358 | 332.4 |
| 20-Sep | 1 | 356 | 334 | 349 | 355 | 358 | 356 | 346 | 18 | 345 | 347 | 342 | 340 | 229 | 215 | 192 | 132 | 105 | 81 | 80 | 100 | 116 | 171 | 114 | 21.8 |
| 21-Sep | 122 | 177 | 187 | 198 | 208 | 227 | 217 | 208 | 204 | 202 | 185 | 171 | 179 | 217 | 228 | 252 | 276 | 236 | 217 | 215 | 224 | 230 | 204 | 183 | 208.7 |
| 22-Sep | 148 | 133 | 152 | 159 | 165 | 159 | 157 | 167 | 163 | 149 | 137 | 205 | 224 | 221 | 207 | 201 | 198 | 194 | 189 | 191 | 193 | 177 | 181 | 185 | 183.5 |
| 23-Sep | 177 | 172 | 170 | 167 | 165 | 166 | 166 | 163 | 163 | 168 | 166 | 166 | 165 | 166 | 162 | 170 | 165 | 161 | 163 | 172 | 172 | 173 | 169 | 176 | 167.2 |
| 24-Sep | 178 | 174 | 167 | 175 | 177 | 196 | 200 | 210 | 239 | 253 | 277 | 292 | 290 | 295 | 298 | 301 | 298 | 305 | 309 | 300 | 298 | 297 | 295 | 289 | 268.6 |
| 25-Sep | 293 | 293 | 288 | 288 | 291 | 291 | 293 | 296 | 288 | 299 | 310 | 309 | 308 | 314 | 321 | 332 | 338 | 356 | 40 | 209 | 213 | 242 | 206 | 102 | 301.6 |
| 26-Sep | 158 | 147 | 139 | 173 | 167 | 168 | 164 | 155 | 166 | 164 | 168 | 175 | 176 | 164 | 163 | 183 | 199 | 188 | 185 | 170 | 160 | 164 | 163 | 159 | 169.7 |
| 27-Sep | 157 | 155 | 152 | 176 | 188 | 276 | 307 | 275 | 238 | 271 | 307 | 299 | 296 | 296 | 296 | 292 | 276 | 255 | 254 | 262 | 259 | 278 | 283 | 302 | 272.1 |
| 28-Sep | 257 | 271 | 255 | 254 | 236 | 243 | 212 | 179 | 190 | 199 | 175 | 177 | 195 | 207 | 244 | 220 | 226 | 220 | 191 | 198 | 225 | 211 | 200 | 93 | 216.8 |
| 29-Sep | 77 | 99 | 93 | 152 | 182 | 188 | 191 | 194 | 196 | 201 | 175 | 181 | 183 | 180 | 175 | 179 | 104 | 100 | 77 | 103 | 111 | 138 | 0 | 4 | 159.7 |
| 30-Sep | 7 | 6 | 11 | 10 | 13 | 21 | 26 | 19 | 17 | 16 | 15 | 16 | 19 | 16 | 18 | 14 | 19 | 16 | 18 | 16 | 17 | 25 | 21 | 25 | 17.3 |

261.1 285.9 253.8 236.6 228.5 227.8 237.4 227.8 227.3 248.7 261.4 252.6 248.9 254.2 264.3 271.4 269.4 275.5 250.2 244.4 238.4 249.9 262.0 270.4

Diurnal Average

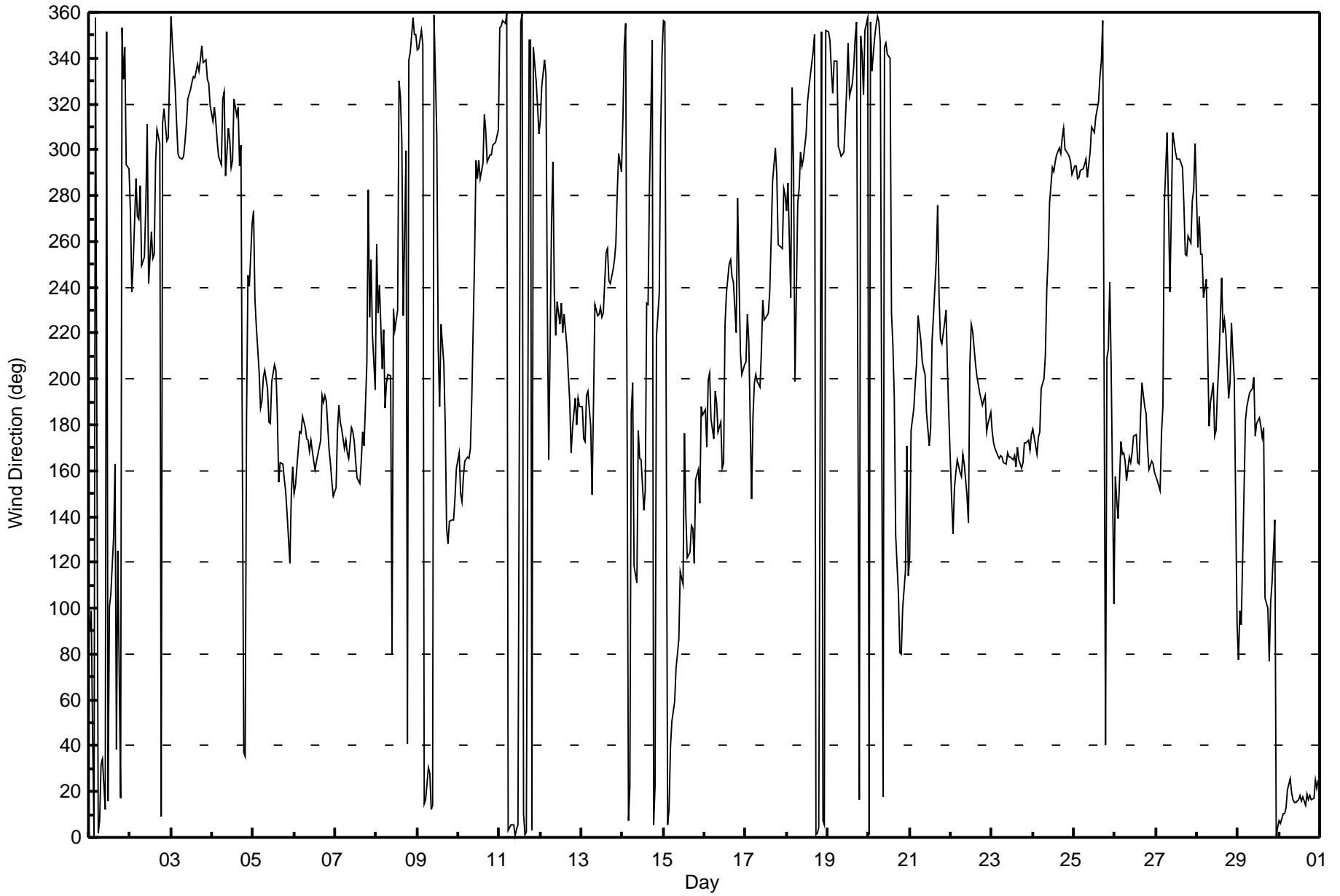
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Sep 12 06:00 Minimum Value: 8 deg on Sep 29 19:00 Percentiles: P ₁ = 10 P ₁₀ = 12 Q ₁ = 15 Median = 19 Q ₃ = 26 P ₉₀ = 40 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 | 20 | 23 | 24 | 18 | 10 | 10 | 12 | 19 | 19 | 18 | 12 | 26 | 22 | 20 | 24 | 92 | 48 | 87 | 40 | 45 | 28 | 22 | 33 | 33 | 92 | |
| 2-Sep | 29 | 27 | 27 | 25 | 29 | 32 | 30 | 32 | 28 | 35 | 41 | 30 | 30 | 29 | 25 | 23 | 25 | 28 | 56 | 40 | 14 | 18 | 17 | 17 | 56 | |
| 3-Sep | 15 | 15 | 13 | 18 | 18 | 20 | 19 | 20 | 18 | 18 | 15 | 13 | 12 | 12 | 11 | 11 | 12 | 13 | 11 | 12 | 12 | 12 | 18 | 20 | | |
| 4-Sep | 17 | 16 | 17 | 19 | 21 | 24 | 38 | 55 | 40 | 36 | 22 | 27 | 30 | 48 | 43 | 36 | 70 | 56 | 16 | 26 | 51 | 43 | 31 | 33 | 70 | |
| 5-Sep | 44 | 34 | 26 | 19 | 14 | 11 | 13 | 14 | 28 | 28 | 32 | 21 | 20 | 20 | 26 | 21 | 18 | 13 | 15 | 16 | 18 | 16 | 21 | 11 | 44 | |
| 6-Sep | 14 | 14 | 12 | 15 | 15 | 15 | 15 | 15 | 17 | 15 | 17 | 20 | 18 | 20 | 16 | 18 | 15 | 15 | 13 | 14 | 11 | 12 | 14 | 14 | 20 | |
| 7-Sep | 15 | 18 | 23 | 17 | 22 | 21 | 21 | 20 | 25 | 31 | 27 | 27 | 29 | 24 | 25 | 37 | 24 | 13 | 36 | 37 | 40 | 54 | 72 | 15 | 72 | |
| 8-Sep | 21 | 32 | 17 | 18 | 14 | 18 | 21 | 15 | 25 | 84 | 61 | 30 | 42 | 42 | 39 | 67 | 44 | 41 | 45 | 56 | 14 | 12 | 14 | 12 | 84 | |
| 9-Sep | 9 | 9 | 14 | 20 | 20 | 14 | 20 | 23 | 16 | 21 | 47 | 30 | 25 | 78 | 66 | 27 | 23 | 18 | 12 | 13 | 16 | 19 | 18 | 16 | 78 | |
| 10-Sep | 17 | 17 | 18 | 15 | 14 | 16 | 14 | 18 | 19 | 31 | 24 | 23 | 24 | 26 | 19 | 20 | 20 | 20 | 19 | 20 | 19 | 19 | 21 | 22 | 31 | |
| 11-Sep | 15 | 15 | 15 | 15 | 18 | 16 | 17 | 17 | 16 | 15 | 15 | 17 | 16 | 16 | 16 | 16 | 14 | 13 | 13 | 12 | 16 | 13 | 15 | 18 | 18 | |
| 12-Sep | 21 | 21 | 16 | 17 | 102 | 103 | 49 | 53 | 37 | 30 | 29 | 33 | 34 | 32 | 29 | 26 | 19 | 18 | 13 | 15 | 13 | 16 | 12 | 12 | 103 | |
| 13-Sep | 13 | 25 | 20 | 12 | 12 | 16 | 30 | 22 | 31 | 28 | 27 | 27 | 29 | 26 | 28 | 28 | 25 | 24 | 23 | 23 | 23 | 25 | 19 | 19 | 31 | |
| 14-Sep | 28 | 14 | 17 | 14 | 30 | 83 | 24 | 52 | 76 | 27 | 18 | 21 | 24 | 26 | 30 | 27 | 26 | 25 | 11 | 58 | 25 | 26 | 18 | 10 | 83 | |
| 15-Sep | 13 | 14 | 70 | 11 | 23 | 15 | 20 | 18 | 21 | 27 | 60 | 37 | 43 | 29 | 24 | 18 | 21 | 22 | 16 | 19 | 15 | 24 | 23 | 15 | 70 | |
| 16-Sep | 15 | 37 | 88 | 10 | 14 | 13 | 25 | 16 | 16 | 14 | 21 | 24 | 25 | 29 | 25 | 25 | 26 | 28 | 22 | 67 | 45 | 29 | 23 | 19 | 88 | |
| 17-Sep | 21 | 26 | 20 | 55 | 30 | 17 | 18 | 20 | 13 | 20 | 28 | 25 | 25 | 25 | 27 | 31 | 25 | 22 | 40 | 31 | 25 | 29 | 30 | 25 | 55 | |
| 18-Sep | 67 | 26 | 80 | 66 | 53 | 34 | 22 | 17 | 22 | 20 | 21 | 21 | 22 | 16 | 14 | 13 | 13 | 12 | 12 | 12 | 18 | 21 | 18 | 13 | 80 | |
| 19-Sep | 15 | 12 | 12 | 13 | 13 | 15 | 18 | 18 | 19 | 19 | 22 | 20 | 18 | 20 | 23 | 15 | 16 | 16 | 22 | 13 | 16 | 14 | 24 | 12 | 24 | |
| 20-Sep | 13 | 12 | 12 | 10 | 12 | 10 | 14 | 14 | 29 | 21 | 61 | 68 | 92 | 49 | 45 | 56 | 26 | 11 | 14 | 22 | 11 | 38 | 15 | 37 | 92 | |
| 21-Sep | 20 | 77 | 14 | 12 | 21 | 25 | 29 | 18 | 17 | 18 | 18 | 22 | 24 | 25 | 29 | 35 | 25 | 27 | 17 | 15 | 23 | 18 | 24 | 17 | 77 | |
| 22-Sep | 16 | 15 | 15 | 9 | 12 | 11 | 10 | 13 | 14 | 20 | 22 | 46 | 25 | 24 | 18 | 17 | 15 | 13 | 11 | 12 | 11 | 13 | 13 | 14 | 46 | |
| 23-Sep | 15 | 13 | 12 | 11 | 11 | 12 | 12 | 12 | 13 | 13 | 13 | 14 | 13 | 12 | 14 | 14 | 12 | 13 | 13 | 15 | 15 | 15 | 13 | 16 | 16 | |
| 24-Sep | 16 | 15 | 14 | 15 | 16 | 13 | 16 | 20 | 28 | 24 | 23 | 24 | 23 | 20 | 21 | 20 | 19 | 17 | 14 | 14 | 15 | 15 | 17 | 20 | 28 | |
| 25-Sep | 17 | 16 | 18 | 19 | 18 | 17 | 17 | 18 | 20 | 27 | 20 | 22 | 26 | 27 | 20 | 15 | 14 | 13 | 68 | 52 | 18 | 19 | 67 | 20 | 68 | |
| 26-Sep | 23 | 26 | 12 | 16 | 49 | 14 | 19 | 24 | 14 | 13 | 15 | 17 | 16 | 16 | 15 | 21 | 15 | 13 | 13 | 12 | 11 | 10 | 12 | 12 | 49 | |
| 27-Sep | 13 | 26 | 34 | 21 | 18 | 41 | 19 | 30 | 25 | 36 | 17 | 19 | 19 | 22 | 20 | 21 | 22 | 22 | 23 | 22 | 22 | 26 | 39 | 17 | 41 | |
| 28-Sep | 26 | 26 | 23 | 28 | 20 | 18 | 41 | 35 | 16 | 20 | 17 | 19 | 21 | 35 | 28 | 28 | 24 | 29 | 11 | 24 | 34 | 31 | 49 | 70 | 70 | |
| 29-Sep | 34 | 54 | 41 | 25 | 14 | 12 | 11 | 12 | 12 | 21 | 23 | 21 | 30 | 36 | 55 | 70 | 31 | 11 | 8 | 51 | 29 | 63 | 10 | 11 | 70 | |
| 30-Sep | 23 | 14 | 12 | 19 | 13 | 16 | 15 | 15 | 15 | 15 | 15 | 17 | 18 | 17 | 18 | 17 | 18 | 17 | 17 | 16 | 17 | 17 | 16 | 16 | 23 | |
| | | 67 | 77 | 88 | 66 | 102 | 103 | 49 | 55 | 76 | 84 | 61 | 68 | 92 | 78 | 66 | 92 | 70 | 87 | 68 | 67 | 51 | 63 | 72 | 70 | |
| | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-----------------|
| Calibration Date | September 9, 2016 | Last Calibration | August 10, 2016 |
| Station Name | Mildred Lake | Station Number | AMS 2 |
| Reason: | Routine | | |
| Start Time (MST) | 10:03 | End Time (MST) | 13:15 |
| Gas Cert Reference | SA1301009 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 47.2 ppm | Cal Gas Exp Date | 12/12/2016 |
| Calibrator Make/Model | API T700 | Serial Number | 1185 |
| ZAG Make/Model | API 701 | Serial Number | 4767 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8790 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -653 | -653 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 798 | 800 |
| Calculated slope | 1.000559 | 1.001124 | Chamber temp | 45.2 | 45.0 |
| Calculated intercept | -2.812864 | -3.591847 | Pressure | 698.5 | 700.0 |
| Analyzer Background | 17.9 | 17.9 | Flow | 0.496 | 0.496 |
| Analyzer Coefficient | 0.865 | 0.865 | Intensity | 91 | 90 |

Analyzer make TEI 43i Analyzer serial # JC1404901075

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 5000 | 82.8 | 781.6 | 782.1 | 0.999 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 82.8 | 781.6 | 782.1 | 0.999 |
| second point | 5000 | 41.5 | 391.8 | 397.9 | 0.985 |
| third point | 5000 | 20.9 | 197.3 | 203.5 | 0.970 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 5000 | 82.8 | 781.6 | 790.9 | 0.988 |
| Average Correction Factor | | | | | 0.985 |

Corrected As found 782.1 Previous response 784.0 % change 0.2%

Notes:

Inlet filter changed after as founds. No Adjustments made.

Calibration Performed By: Jayme Rycroft



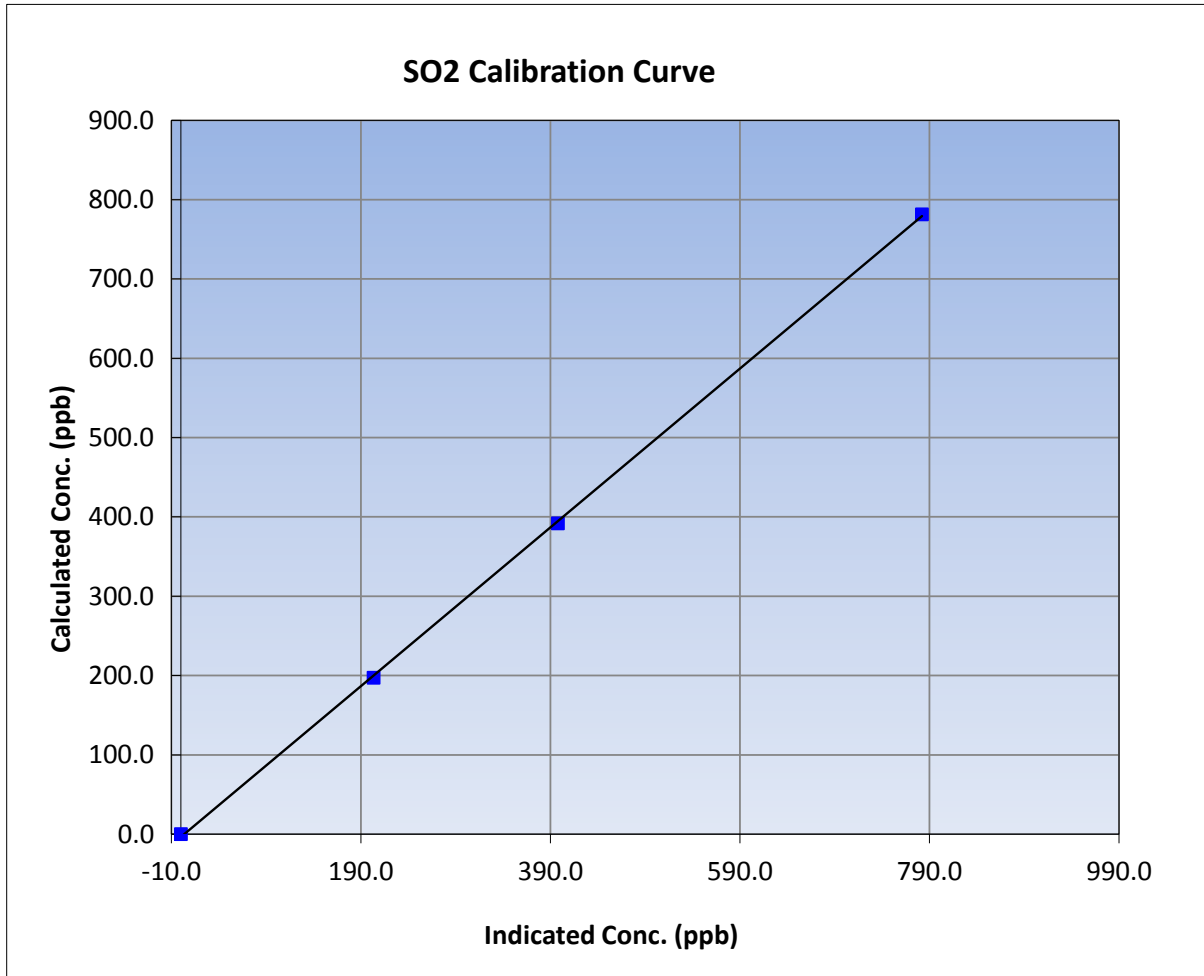
Wood Buffalo Environmental Association SO2 Calibration Report

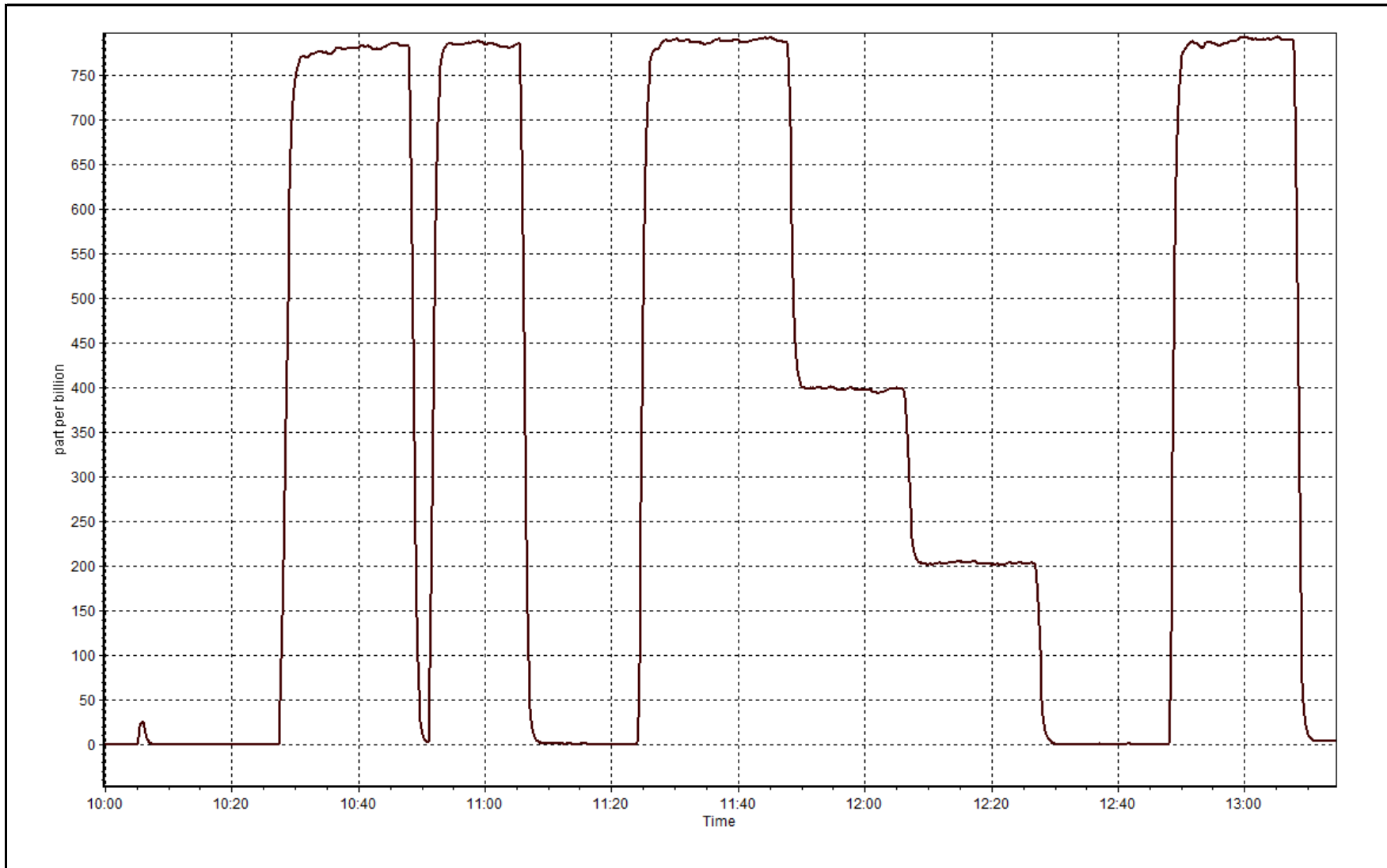
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 9, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Mildred Lake | Station Number | AMS 2 |
| Start Time (MST) | 10:03 | End Time (MST) | 13:15 |
| Analyzer make | TEI 43i | Analyzer serial # | JC1404901075 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999897 |
| 781.6 | 782.1 | 0.9994 | | |
| 391.8 | 397.9 | 0.9846 | Slope | 1.001124 |
| 197.3 | 203.5 | 0.9698 | | |
| | | | Intercept | -3.591847 |







Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|---------------------|
| Calibration Date | September 12, 2016 | Last Calibration | August 11, 2016 |
| Station Name | Mildred Lake | Station Number | AMS 2 |
| Reason: | Routine | | |
| Start Time (MST) | 9:38 | End Time (MST) | 12:40 |
| Gas Cert Reference | ALM028262 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.04 ppm | Cal Gas Exp Date | September 9, 2017 |
| Calibrator Make/Model | API T700 | Serial Number | 1185 |
| ZAG air Make/Model | API 701 | Serial Number | 825 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 8790 |
| SO2 gas concentration | 47.2 ppm | SO2 gas cert/exp | SA1301009 12-Dec-16 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -601 | -601 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 786 | 785 |
| Calculated slope | 0.990937 | 0.995228 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.198357 | -0.294986 | Pressure | 552.7 | 551.2 |
| Analyzer Background | 15.6 | 15.6 | Flow | 1.045 | 1.040 |
| Analyzer Coefficient | 0.932 | 0.932 | Intensity | 88 | 87 |
| | | | Converter temp. | 325 | 327 |

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

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 5000 | 80.2 | 80.8 | 81.5 | 0.992 |
| SO2 scrubber check | 5000 | 21.4 | 202.0 | 1.4 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 5000 | 80.2 | 80.8 | 81.5 | 0.992 |
| second point | 5000 | 40.2 | 40.5 | 41.1 | 0.987 |
| third point | 5000 | 20.2 | 20.4 | 20.9 | 0.975 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 5000 | 80.2 | 80.8 | 82.3 | 0.982 |
| Average Correction Factor | | | | | 0.985 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 81.3 | Previous response | 81.8 | % change | 0.6% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Inlet filter changed and scrubber check done after as founds.

Calibration Performed By: Jayme Rycroft



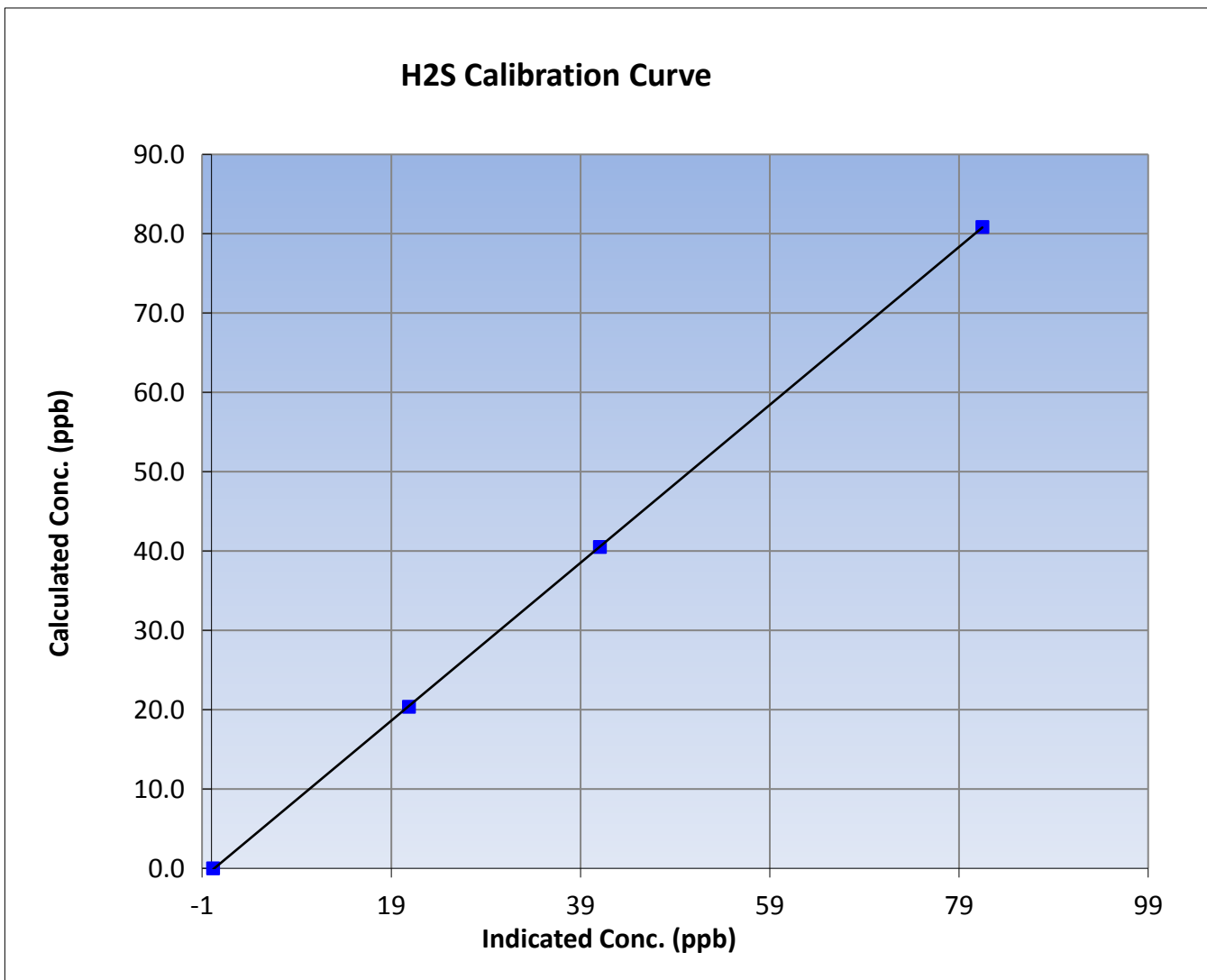
Wood Buffalo Environmental Association H2S Calibration Report

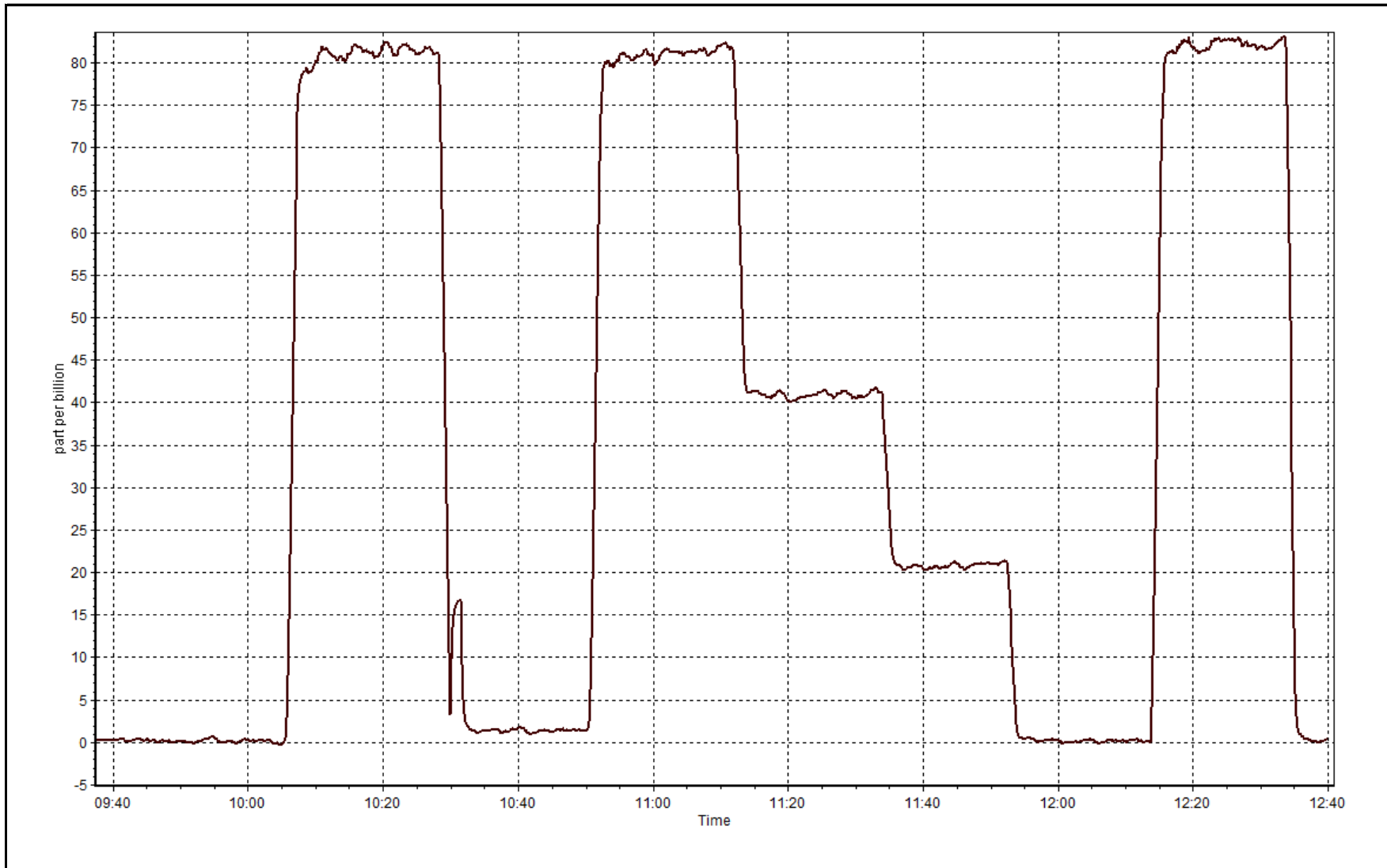
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | Mildred Lake | Station Number | AMS 2 |
| Start Time (MST) | 9:38 | End Time (MST) | 12:40 |
| Analyzer make | TEI 450i | Analyzer serial # | 815129107 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999990 |
| 80.8 | 81.5 | 0.9923 | | |
| 40.5 | 41.1 | 0.9869 | Slope | 0.995228 |
| 20.4 | 20.9 | 0.9752 | | |
| | | | Intercept | -0.294986 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|-----------------|
| Calibration Date | September 9, 2016 | Last Calibration | August 10, 2016 |
| Station Name | Mildred Lake | Station Number | AMS 2 |
| Reason: | Routine | | |
| Start Time (MST) | 8:40 | End Time (MST) | 13:15 |
| Gas Cert Reference | SA1301009 | Cal Gas Expiry Date | 12/12/2016 |
| CH4 Cal Gas Conc. | 510 ppm | CH4 Equiv Conc. | 1087.5 ppm |
| C3H8 Cal Gas Conc. | 210 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 1185 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4767 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 8790 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|---------------------|---------------|--------------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 6.7 | 6.7 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 39.9 | 39.9 |
| Calculated slope | 1.003347 | 1.015105 | Fuel Pressure | 25.7 | 25.7 |
| Calculated intercept | -0.112297 | -0.047945 | Analyzer Coeff | 4.526 | 4.526 |
| | | | Analyzer BKG | 2.17 | 2.17 |

| | | | |
|---------------|---------------|-------------------|------------|
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1300156231 |
|---------------|---------------|-------------------|------------|

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | | | | | |
| as found span | | | | | |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.05 | ---- |
| high point | 5000 | 82.8 | 18.01 | 17.74 | 1.015 |
| second point | 5000 | 41.5 | 9.03 | 8.98 | 1.005 |
| third point | 5000 | 20.9 | 4.55 | 4.63 | 0.982 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 82.8 | 18.01 | 17.64 | 1.021 |
| Average Correction Factor | | | | | 1.001 |

| | | | | | |
|--------------------|----|-------------------|----|----------|----|
| Corrected As found | NA | Previous response | NA | % change | NA |
|--------------------|----|-------------------|----|----------|----|

Notes:

Analyzer pump not working when arrived. Could not capture as found zero and span. Changed out the pump, sounded noisy, rebuilt original pump and replaced the new one. No adjustments made

Calibration Performed By:

Jayme Rycroft



Wood Buffalo Environmental Association THC Calibration Report

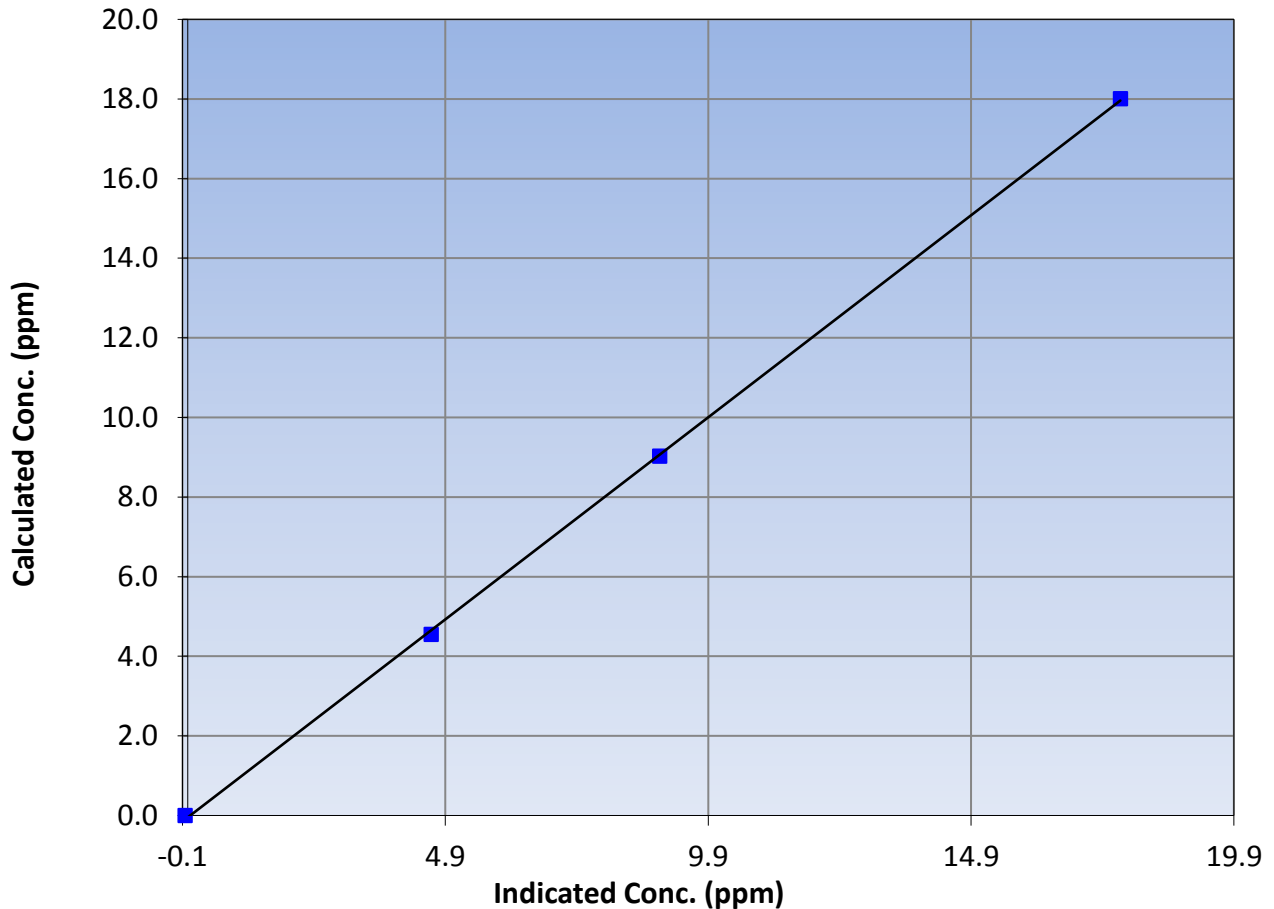
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 9, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Mildred Lake | Station Number | AMS 2 |
| Start Time (MST) | 8:40 | End Time (MST) | 13:15 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1300156231 |

Calibration Data

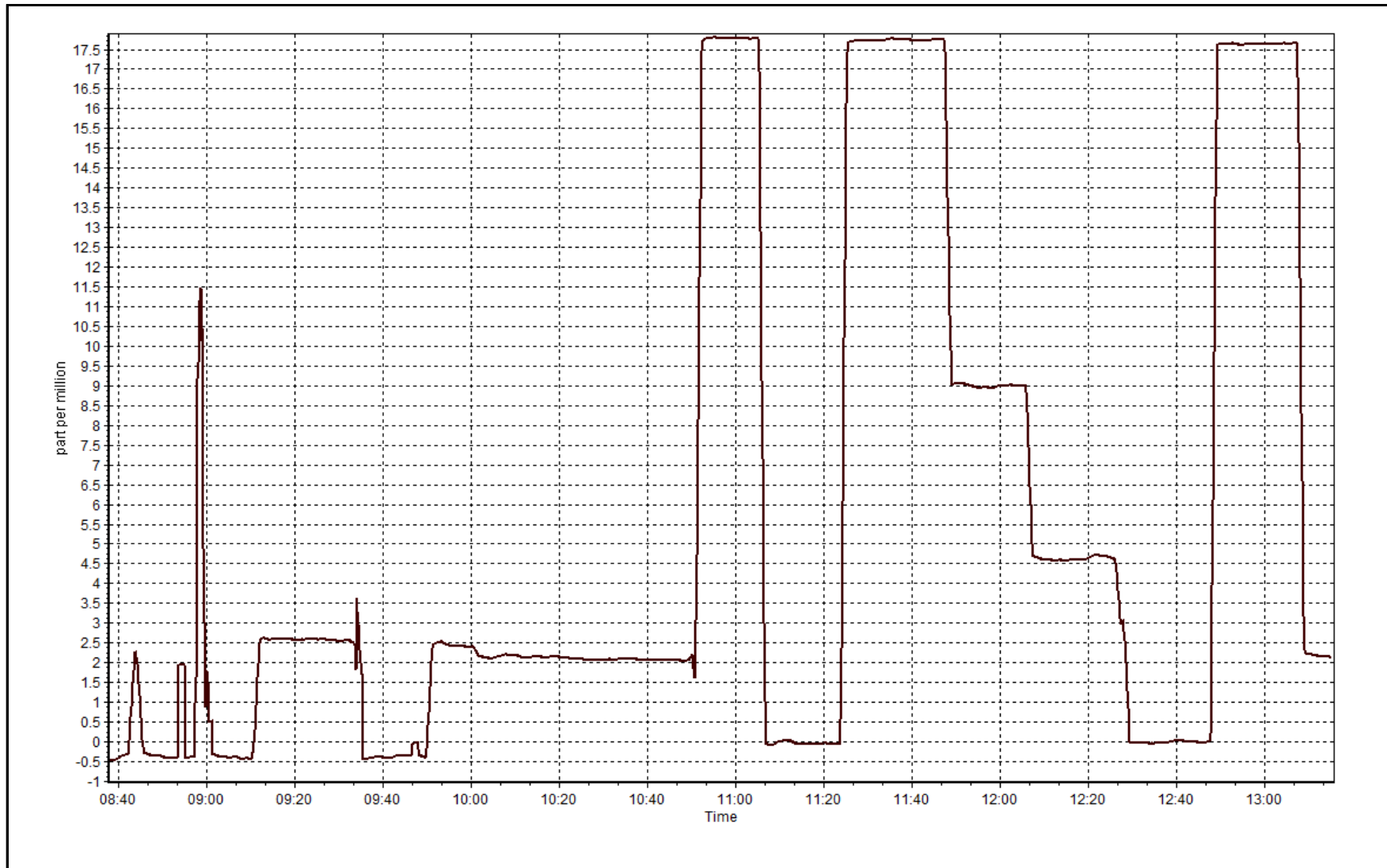
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | -0.05 | ---- | Correlation Coefficient | 0.999858 |
| 18.01 | 17.74 | 1.0152 | | |
| 9.03 | 8.98 | 1.0052 | | |
| 4.55 | 4.63 | 0.9818 | | |
| | | | Slope | 1.015105 |
| | | | Intercept | -0.047945 |

THC Calibration Curve



THC Calibration Plot

Date: September 9, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 3 LOWER CAMP METEOROLOGY SEPTEMBER 2016

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

October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|------------------------------------------|------------------|-------------------------|-----------------------|---------------------|-------------------------|-----------------------|--------------------------|------------------------|
| Temperature 20 m (C) Average | 719 | 0 | 1 | 99.86 | 24.1 | - | 16.0 | - |
| Temperature 45 m (C) Average | 228 | 0 | 492 | 31.67 | 24.1 | - | 14.4 | - |
| Temperature 100 m (C) Average | 719 | 0 | 1 | 99.86 | 23.6 | - | 16.9 | - |
| Temperature 167 m (C) Average | 719 | 0 | 1 | 99.86 | 23 | - | 17.1 | - |
| Relative Humidity 20 m (%) Average | 719 | 0 | 1 | 99.86 | 99 | - | 90.0 | - |
| Relative Humidity 45 m (%) Average | 228 | 0 | 492 | 31.67 | 91 | - | 67.0 | - |
| Relative Humidity 100 m (%) Average | 719 | 0 | 1 | 99.86 | 99 | - | 88.0 | - |
| Relative Humidity 167 m (%) Average | 719 | 0 | 1 | 99.86 | 98 | - | 88.0 | - |
| Wind Speed 20 m (km/h) Average | 719 | 0 | 1 | 99.86 | 22 | - | 18.0 | - |
| Wind Speed 45 m (km/h) Average | 228 | 0 | 492 | 31.67 | 28 | - | 21.0 | - |
| Wind Speed 100 m (km/h) Average | 719 | 0 | 1 | 99.86 | 40 | - | 28.0 | - |
| Wind Speed 167 m (km/h) Average | 719 | 0 | 1 | 99.86 | 45 | - | 32.0 | - |
| Wind Direction 20 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |
| Wind Direction 45 m (deg) Average | 228 | 0 | 492 | 31.67 | - | - | - | - |
| Wind Direction 100 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |
| Wind Direction 167 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 719 | 0 | 1 | 99.86 | 0.9 | - | 0.3 | - |
| Vertical Wind Speed 45 m (km/h) Average | 228 | 0 | 492 | 31.67 | 1.5 | - | 0.9 | - |
| Vertical Wind Speed 100 m (km/h) Average | 719 | 0 | 1 | 99.86 | 3.9 | - | 1.5 | - |
| Vertical Wind Speed 167 m (km/h) Average | 719 | 0 | 1 | 99.86 | 4.4 | - | 1.4 | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|------------------------------------------|--------|-------|--------|-------|------------|------|------|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| Temperature 20 m (C) Average | 719 | 12.1 | 4.1 | - | 2.9 | 6.9 | 9 | 11.9 | 14.8 | 17.3 | 24.1 |
| Temperature 45 m (C) Average | 228 | 11.87 | 4.6 | - | 3 | 5.7 | 8.3 | 11.3 | 15.5 | 17.5 | 24.1 |
| Temperature 100 m (C) Average | 719 | 12.07 | 3.9 | - | 3.7 | 7 | 9.1 | 12 | 14.6 | 17.1 | 23.6 |
| Temperature 167 m (C) Average | 719 | 11.89 | 3.8 | - | 3.6 | 7.1 | 9.1 | 11.8 | 14.4 | 16.7 | 23 |
| Relative Humidity 20 m (%) Average | 719 | 68.9 | 18 | - | 27 | 42 | 56 | 71 | 84 | 92 | 99 |
| Relative Humidity 45 m (%) Average | 228 | 56.6 | 17 | - | 26 | 33 | 42 | 57 | 69 | 82 | 91 |
| Relative Humidity 100 m (%) Average | 719 | 65.3 | 18 | - | 27 | 40 | 51 | 67 | 80 | 88 | 99 |
| Relative Humidity 167 m (%) Average | 719 | 64.5 | 18 | - | 28 | 39 | 51 | 65 | 80 | 89 | 98 |
| Wind Speed 20 m (km/h) Average | 719 | 8.4 | 5 | - | 0 | 2 | 4 | 8 | 12 | 16 | 22 |
| Wind Speed 45 m (km/h) Average | 228 | 13.5 | 7 | - | 1 | 4 | 8 | 14 | 19 | 23 | 28 |
| Wind Speed 100 m (km/h) Average | 719 | 16.5 | 9 | - | 1 | 7 | 10 | 15 | 23 | 29 | 40 |
| Wind Speed 167 m (km/h) Average | 719 | 19.6 | 10 | - | 0 | 8 | 12 | 18 | 27 | 34 | 45 |
| Wind Direction 20 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 45 m (deg) Average | 228 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 100 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 167 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 719 | -0.05 | 0.3 | - | -1.1 | -0.4 | -0.2 | -0.1 | 0.1 | 0.3 | 0.9 |
| Vertical Wind Speed 45 m (km/h) Average | 228 | 0.13 | 0.6 | - | -1.6 | -0.6 | -0.3 | 0.1 | 0.6 | 1 | 1.5 |
| Vertical Wind Speed 100 m (km/h) Average | 719 | 0.31 | 0.7 | - | -1.5 | -0.5 | -0.1 | 0.2 | 0.6 | 1.2 | 3.9 |
| Vertical Wind Speed 167 m (km/h) Average | 719 | 0.63 | 0.9 | - | -1.4 | -0.3 | 0.1 | 0.5 | 1.1 | 1.7 | 4.4 |

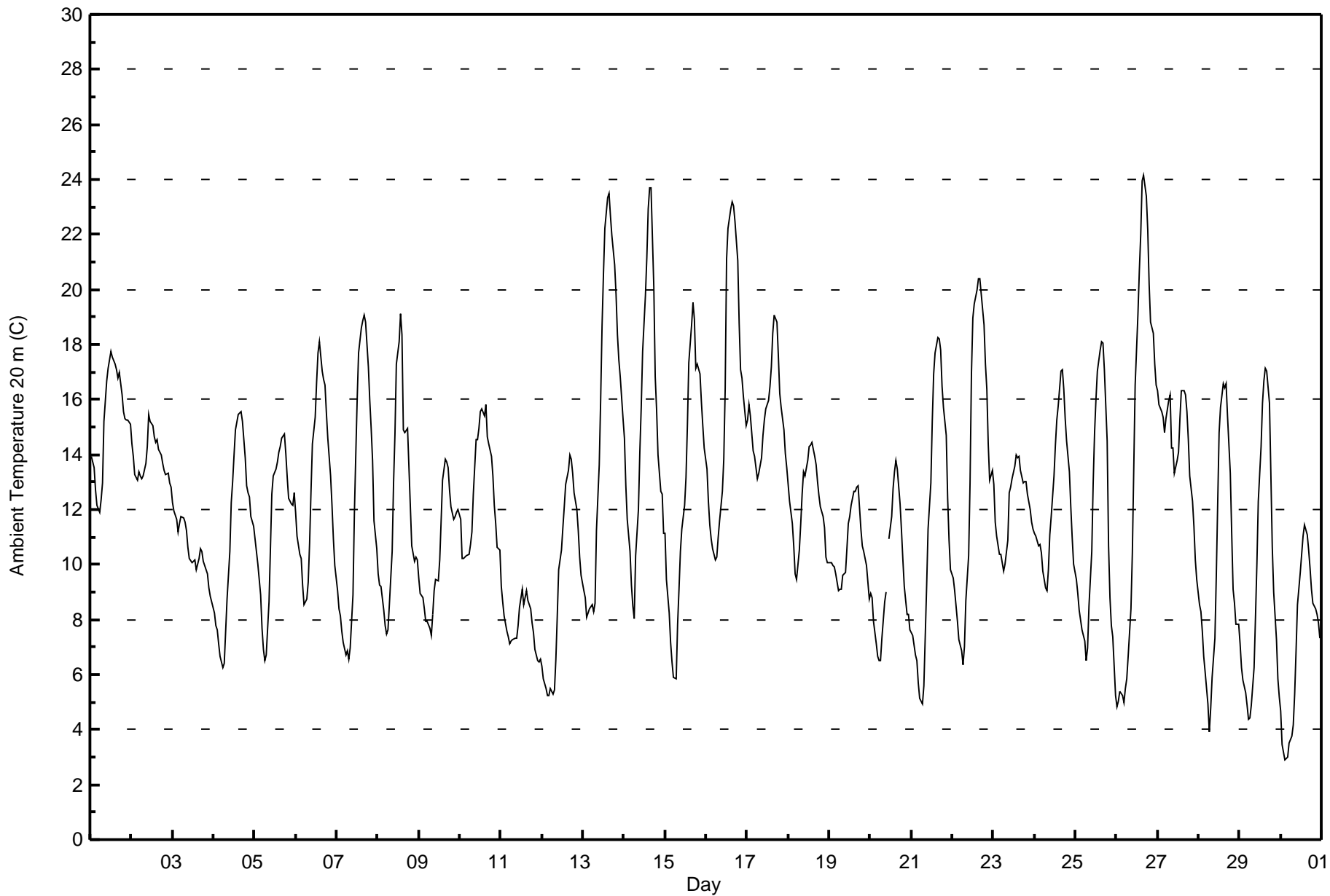
WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS 3)
 SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|------------------------------------------------------|-------------------|-------------------|------------------|-----------------------------------------|
| ALL PARAMETERS | 20 Sep 2016 11:00 | 20 Sep 2016 11:00 | 1 | Maintenance - Sensor responses verified |
| Wind Speed, Wind Direction, Vertical Wind Speed 45 m | 01 Sep 2016 01:00 | 21 Sep 2016 12:00 | 492 | Sensor Wiring Failure |
| Temperature, Relative Humidity 45 m | 01 Sep 2016 01:00 | 21 Sep 2016 12:00 | 492 | Sensor Wiring Failure |



| Maximum Value: 24.1 C on Sep 26 17:00 | | Maximum Daily Average: 16.0 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 2.9 C on Sep 30 03:00 | | Minimum Daily Average: 7.2 C on Sep 30 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.5 C at hour 16 | | Minimum Diurnal Average: 8.2 C at hour 7 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.10 C | | Percentiles: P ₁ = 4.1 P ₁₀ = 6.9 Q ₁ = 9.0 Median = 11.9 Q ₃ = 14.8 P ₉₀ = 17.3 P ₉₉ = 23.4 | | 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 | 13.9 | 13.7 | 13.5 | 12.7 | 12.1 | 11.9 | 12.4 | 13.0 | 15.2 | 16.7 | 17.2 | 17.5 | 17.7 | 17.6 | 17.3 | 17.1 | 16.8 | 17.0 | 16.2 | 15.5 | 15.3 | 15.3 | 15.2 | 15.1 | 15.2 | 17.7 |
| 2-Sep | 14.4 | 13.9 | 13.3 | 13.1 | 13.4 | 13.2 | 13.1 | 13.2 | 13.7 | 14.3 | 15.4 | 15.2 | 15.0 | 14.6 | 14.5 | 14.5 | 14.2 | 14.0 | 13.7 | 13.4 | 13.3 | 13.3 | 13.0 | 12.8 | 13.9 | 15.4 |
| 3-Sep | 12.3 | 12.0 | 11.6 | 11.2 | 11.5 | 11.8 | 11.7 | 11.5 | 11.3 | 10.6 | 10.2 | 10.1 | 10.1 | 10.1 | 9.8 | 10.2 | 10.6 | 10.5 | 10.1 | 10.0 | 9.7 | 9.2 | 8.8 | 8.6 | 10.6 | 12.3 |
| 4-Sep | 8.2 | 7.8 | 7.6 | 7.1 | 6.7 | 6.2 | 6.4 | 7.6 | 8.8 | 10.5 | 12.3 | 13.0 | 14.0 | 14.9 | 15.5 | 15.6 | 15.2 | 13.9 | 12.8 | 12.6 | 12.5 | 11.7 | 11.4 | 11.2 | 15.6 | |
| 5-Sep | 10.9 | 10.5 | 10.0 | 8.9 | 7.7 | 6.9 | 6.5 | 6.7 | 8.6 | 10.6 | 12.6 | 13.2 | 13.5 | 13.7 | 14.1 | 14.3 | 14.6 | 14.7 | 14.1 | 13.2 | 12.4 | 12.2 | 12.1 | 12.6 | 11.4 | 14.7 |
| 6-Sep | 11.9 | 11.0 | 10.4 | 10.2 | 9.2 | 8.5 | 8.7 | 9.4 | 10.8 | 12.7 | 14.4 | 15.3 | 16.6 | 17.7 | 18.1 | 17.0 | 16.7 | 16.5 | 15.5 | 14.6 | 13.2 | 12.2 | 10.9 | 10.0 | 13.0 | 18.1 |
| 7-Sep | 9.1 | 8.4 | 8.1 | 7.6 | 7.2 | 6.7 | 6.9 | 6.6 | 7.0 | 8.9 | 11.8 | 14.0 | 16.0 | 17.7 | 18.6 | 18.9 | 19.1 | 18.8 | 17.2 | 15.9 | 15.0 | 13.8 | 11.6 | 10.6 | 12.3 | 19.1 |
| 8-Sep | 9.7 | 9.2 | 9.2 | 8.3 | 7.8 | 7.5 | 7.6 | 8.6 | 10.5 | 13.0 | 14.7 | 17.3 | 18.1 | 19.1 | 18.3 | 14.9 | 14.8 | 15.0 | 13.5 | 12.1 | 10.7 | 10.1 | 10.3 | 10.2 | 12.1 | 19.1 |
| 9-Sep | 9.5 | 9.0 | 8.8 | 8.4 | 7.9 | 7.9 | 7.7 | 7.4 | 8.2 | 9.0 | 9.5 | 9.4 | 10.2 | 11.6 | 13.1 | 13.8 | 13.7 | 13.5 | 12.7 | 12.1 | 11.7 | 11.8 | 11.9 | 12.0 | 10.4 | 13.8 |
| 10-Sep | 11.6 | 10.2 | 10.2 | 10.2 | 10.3 | 10.4 | 10.7 | 11.2 | 12.6 | 14.6 | 14.6 | 15.0 | 15.6 | 15.6 | 15.4 | 15.8 | 14.6 | 14.4 | 13.9 | 13.2 | 12.2 | 11.5 | 10.6 | 10.5 | 12.7 | 15.8 |
| 11-Sep | 9.2 | 8.7 | 8.1 | 7.6 | 7.4 | 7.1 | 7.2 | 7.3 | 7.3 | 7.3 | 7.8 | 8.4 | 9.1 | 8.5 | 8.8 | 9.0 | 8.7 | 8.4 | 7.9 | 7.5 | 6.9 | 6.5 | 6.5 | 6.5 | 7.8 | 9.2 |
| 12-Sep | 6.3 | 5.9 | 5.5 | 5.2 | 5.3 | 5.5 | 5.3 | 5.4 | 6.6 | 8.2 | 9.8 | 10.5 | 11.3 | 12.1 | 12.9 | 13.4 | 14.0 | 13.8 | 13.3 | 12.6 | 12.0 | 11.2 | 10.3 | 9.6 | 9.4 | 14.0 |
| 13-Sep | 9.1 | 8.8 | 8.1 | 8.3 | 8.4 | 8.6 | 8.3 | 8.6 | 11.2 | 13.6 | 16.0 | 18.7 | 20.6 | 22.2 | 23.4 | 23.5 | 22.7 | 22.0 | 20.9 | 19.8 | 18.4 | 17.4 | 16.8 | 15.3 | 15.4 | 23.5 |
| 14-Sep | 14.6 | 12.9 | 11.6 | 10.5 | 9.3 | 8.5 | 8.0 | 10.3 | 12.0 | 14.1 | 15.7 | 17.7 | 19.8 | 21.1 | 22.9 | 23.7 | 23.7 | 20.1 | 16.8 | 15.6 | 14.0 | 12.7 | 12.6 | 11.1 | 15.0 | 23.7 |
| 15-Sep | 11.2 | 9.5 | 8.2 | 7.2 | 6.4 | 5.9 | 5.8 | 7.8 | 9.1 | 10.5 | 11.3 | 12.1 | 13.2 | 15.1 | 17.3 | 18.7 | 19.5 | 18.9 | 17.1 | 17.3 | 16.9 | 15.9 | 15.0 | 14.2 | 12.7 | 19.5 |
| 16-Sep | 13.5 | 12.3 | 11.4 | 10.9 | 10.6 | 10.2 | 10.3 | 11.0 | 11.6 | 12.7 | 13.8 | 16.4 | 21.1 | 22.2 | 23.0 | 23.2 | 23.0 | 22.5 | 21.1 | 18.8 | 17.1 | 16.8 | 16.1 | 15.1 | 16.0 | 23.2 |
| 17-Sep | 15.2 | 15.8 | 15.4 | 14.2 | 14.0 | 13.6 | 13.1 | 13.3 | 13.9 | 14.7 | 15.3 | 15.6 | 16.0 | 16.5 | 17.2 | 18.4 | 19.1 | 18.8 | 17.6 | 16.2 | 15.7 | 14.9 | 14.0 | 13.5 | 15.5 | 19.1 |
| 18-Sep | 12.9 | 12.3 | 11.5 | 10.7 | 9.6 | 9.4 | 10.5 | 11.5 | 12.6 | 13.4 | 13.2 | 13.8 | 14.3 | 14.3 | 14.4 | 13.9 | 13.6 | 13.0 | 12.5 | 12.1 | 11.8 | 11.3 | 10.3 | 10.1 | 12.2 | 14.4 |
| 19-Sep | 10.1 | 10.1 | 10.0 | 9.9 | 9.6 | 9.0 | 9.1 | 9.1 | 9.6 | 9.7 | 10.6 | 11.5 | 11.7 | 12.1 | 12.7 | 12.7 | 12.8 | 12.9 | 11.3 | 10.7 | 10.5 | 10.2 | 10.0 | 8.8 | 10.6 | 12.9 |
| 20-Sep | 8.9 | 8.8 | 7.9 | 7.1 | 6.7 | 6.5 | 6.5 | 7.3 | 8.7 | 9.0 | M | 10.9 | 11.7 | 12.8 | 13.4 | 13.8 | 13.5 | 12.2 | 11.2 | 10.1 | 9.2 | 8.2 | 8.2 | 7.6 | 9.6 | 13.8 |
| 21-Sep | 7.5 | 7.4 | 6.7 | 6.5 | 5.7 | 5.1 | 4.9 | 5.6 | 7.4 | 9.3 | 11.3 | 13.0 | 15.2 | 16.9 | 17.7 | 18.2 | 18.2 | 17.8 | 16.5 | 15.7 | 14.7 | 12.4 | 10.9 | 9.8 | 11.4 | 18.2 |
| 22-Sep | 9.5 | 9.0 | 8.5 | 7.9 | 7.3 | 6.9 | 6.4 | 7.0 | 8.7 | 10.3 | 13.0 | 16.9 | 19.0 | 19.5 | 20.0 | 20.4 | 20.4 | 19.9 | 18.7 | 17.3 | 16.3 | 14.4 | 13.0 | 13.4 | 13.5 | 20.4 |
| 23-Sep | 12.9 | 11.5 | 11.0 | 10.4 | 10.4 | 10.1 | 9.7 | 10.0 | 10.9 | 12.6 | 12.8 | 13.1 | 13.6 | 14.0 | 13.9 | 13.9 | 13.4 | 13.0 | 13.0 | 13.0 | 12.6 | 12.0 | 11.5 | 11.3 | 12.1 | 14.0 |
| 24-Sep | 11.1 | 11.0 | 10.7 | 10.7 | 10.4 | 9.8 | 9.2 | 9.0 | 9.8 | 11.1 | 11.7 | 13.2 | 14.3 | 15.2 | 15.7 | 17.0 | 17.1 | 16.3 | 15.3 | 14.5 | 13.4 | 12.1 | 11.0 | 10.0 | 12.5 | 17.1 |
| 25-Sep | 9.5 | 9.0 | 8.3 | 8.0 | 7.6 | 7.2 | 6.5 | 7.0 | 8.5 | 10.5 | 13.0 | 14.8 | 16.0 | 17.0 | 17.8 | 18.1 | 18.0 | 17.1 | 14.5 | 10.7 | 8.8 | 7.8 | 7.4 | 5.2 | 11.2 | 18.1 |
| 26-Sep | 4.8 | 5.1 | 5.4 | 5.2 | 5.0 | 5.5 | 5.8 | 6.6 | 8.4 | 10.4 | 13.5 | 16.5 | 19.1 | 20.7 | 22.0 | 24.0 | 24.1 | 23.4 | 22.2 | 20.2 | 18.8 | 18.4 | 17.3 | 16.5 | 14.1 | 24.1 |
| 27-Sep | 16.3 | 15.8 | 15.6 | 15.4 | 14.8 | 15.3 | 15.9 | 16.2 | 14.2 | 14.2 | 13.3 | 13.8 | 14.1 | 15.3 | 16.3 | 16.3 | 16.2 | 15.6 | 14.5 | 13.2 | 12.3 | 11.4 | 10.2 | 9.4 | 14.4 | 16.3 |
| 28-Sep | 8.5 | 8.3 | 7.6 | 6.7 | 6.1 | 4.9 | 3.9 | 4.8 | 5.9 | 7.3 | 9.6 | 12.3 | 14.8 | 15.7 | 16.6 | 16.4 | 16.6 | 15.4 | 13.3 | 11.1 | 9.1 | 8.6 | 7.8 | 7.8 | 10.0 | 16.6 |
| 29-Sep | 7.1 | 6.3 | 5.8 | 5.3 | 4.9 | 4.4 | 4.4 | 4.9 | 6.3 | 8.1 | 10.0 | 12.3 | 14.3 | 15.9 | 16.7 | 17.1 | 17.0 | 15.9 | 13.3 | 10.6 | 9.0 | 7.3 | 5.9 | 5.2 | 9.5 | 17.1 |
| 30-Sep | 4.7 | 3.5 | 2.9 | 2.9 | 3.0 | 3.5 | 3.7 | 4.2 | 5.3 | 6.8 | 8.5 | 9.7 | 10.4 | 11.0 | 11.4 | 11.1 | 10.5 | 9.8 | 9.1 | 8.6 | 8.4 | 8.2 | 7.9 | 7.3 | 7.2 | 11.4 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 234 | 32.55 | 32.55 |
| 10 - 20 | 457 | 63.56 | 96.11 |
| > 20 | 28 | 3.89 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



| | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 24.1 C on Sep 26 17:00 | Maximum Daily Average: 14.4 C on Sep 27 | Hours in Service: 720 |
| Minimum Value: 3.0 C on Sep 30 04:00 | Minimum Daily Average: 7.2 C on Sep 30 | Hours of Data: 228 |
| Maximum Diurnal Average: 17.0 C at hour 16 | Minimum Diurnal Average: 7.4 C at hour 7 | Hours of Missing Data: 492 |
| Monthly Average: 11.87 C | Percentiles: P ₁ = 3.2 P ₁₀ = 5.7 Q ₁ = 8.3 Median = 11.3 Q ₃ = 15.5 P ₉₀ = 17.5 P ₉₉ = 23.7 | Hours of Calibration: 0 |
| | | Percent Operational Time: 31.7 |

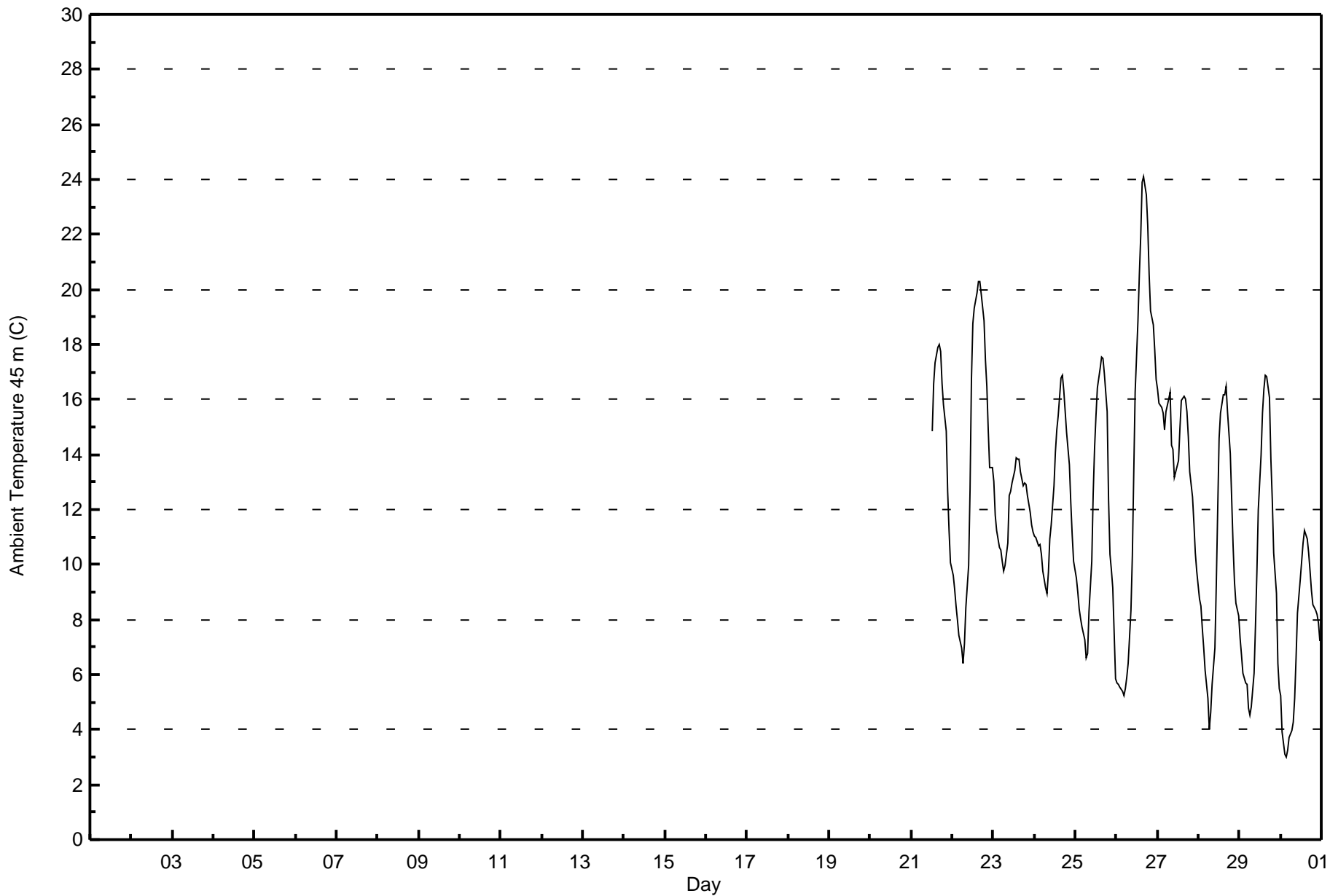
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|----|
| | 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 | 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 | 14.9 | 16.6 | 17.4 | 17.9 | 18.0 | 17.7 | 16.6 | 15.8 | 14.9 | 12.7 | 11.2 | 10.1 | -- | 18.0 | |
| 22-Sep | 9.6 | 9.1 | 8.5 | 8.0 | 7.4 | 7.0 | 6.4 | 7.1 | 8.5 | 10.0 | 12.7 | 16.7 | 18.8 | 19.3 | 19.9 | 20.3 | 20.3 | 19.8 | 18.8 | 17.4 | 16.5 | 14.9 | 13.5 | 13.5 | 13.5 | 20.3 | |
| 23-Sep | 13.0 | 11.8 | 11.2 | 10.6 | 10.6 | 10.1 | 9.7 | 10.0 | 10.8 | 12.5 | 12.7 | 13.0 | 13.4 | 13.9 | 13.8 | 13.4 | 12.9 | 13.0 | 12.9 | 12.5 | 11.9 | 11.4 | 11.2 | 12.1 | 13.9 | | |
| 24-Sep | 11.0 | 11.0 | 10.7 | 10.7 | 10.4 | 9.7 | 9.2 | 9.0 | 9.7 | 11.0 | 11.4 | 12.9 | 14.1 | 14.9 | 15.4 | 16.8 | 16.9 | 16.3 | 15.5 | 14.8 | 13.6 | 12.3 | 11.1 | 10.1 | 12.4 | 16.9 | |
| 25-Sep | 9.5 | 9.0 | 8.4 | 8.0 | 7.7 | 7.3 | 6.6 | 6.8 | 8.3 | 10.1 | 12.5 | 14.2 | 15.4 | 16.4 | 17.2 | 17.5 | 17.5 | 16.9 | 15.6 | 12.3 | 10.4 | 9.8 | 9.1 | 5.9 | 11.4 | 17.5 | |
| 26-Sep | 5.7 | 5.6 | 5.5 | 5.4 | 5.2 | 5.5 | 5.9 | 6.4 | 8.3 | 10.3 | 13.3 | 16.3 | 18.9 | 20.5 | 22.0 | 23.9 | 24.1 | 23.4 | 22.3 | 20.5 | 19.2 | 18.7 | 17.8 | 16.7 | 14.2 | 24.1 | |
| 27-Sep | 16.4 | 15.9 | 15.7 | 15.5 | 14.9 | 15.5 | 16.0 | 16.3 | 14.3 | 14.2 | 13.2 | 13.6 | 13.8 | 15.0 | 16.0 | 16.1 | 16.0 | 15.6 | 14.6 | 13.4 | 12.5 | 11.5 | 10.4 | 9.7 | 14.4 | 16.4 | |
| 28-Sep | 8.7 | 8.5 | 7.7 | 6.9 | 6.1 | 5.1 | 4.0 | 4.6 | 5.6 | 7.0 | 9.3 | 12.0 | 14.6 | 15.5 | 16.2 | 16.2 | 16.5 | 15.6 | 14.0 | 12.4 | 10.7 | 9.4 | 8.6 | 8.1 | 10.1 | 16.5 | |
| 29-Sep | 7.3 | 6.7 | 6.1 | 5.7 | 5.6 | 4.8 | 4.5 | 4.8 | 6.0 | 7.8 | 9.7 | 12.0 | 14.0 | 15.5 | 16.4 | 16.9 | 16.8 | 16.1 | 13.9 | 12.4 | 10.4 | 8.9 | 6.4 | 5.5 | 9.8 | 16.9 | |
| 30-Sep | 5.2 | 3.9 | 3.1 | 3.0 | 3.3 | 3.7 | 4.0 | 4.3 | 5.1 | 6.6 | 8.3 | 9.5 | 10.1 | 10.8 | 11.2 | 10.9 | 10.4 | 9.8 | 9.1 | 8.5 | 8.4 | 8.2 | 7.9 | 7.2 | 7.2 | 11.2 | |
| | 9.6 | 9.1 | 8.5 | 8.2 | 7.9 | 7.6 | 7.4 | 7.7 | 8.5 | 9.9 | 11.5 | 13.3 | 14.8 | 15.8 | 16.5 | 17.0 | 17.0 | 16.4 | 15.3 | 14.0 | 12.9 | 11.8 | 10.8 | 9.8 | | Diurnal Average | |
| | 16.4 | 15.9 | 15.7 | 15.5 | 14.9 | 15.5 | 16.0 | 16.3 | 14.3 | 14.2 | 13.3 | 16.7 | 18.9 | 20.5 | 22.0 | 23.9 | 24.1 | 23.4 | 22.3 | 20.5 | 19.2 | 18.7 | 17.8 | 16.7 | | Diurnal Maximum | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 85 | 37.28 | 37.28 |
| 10 - 20 | 134 | 58.77 | 96.05 |
| > 20 | 9 | 3.95 | 100.00 |

Total Number of Valid Hours: 228

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

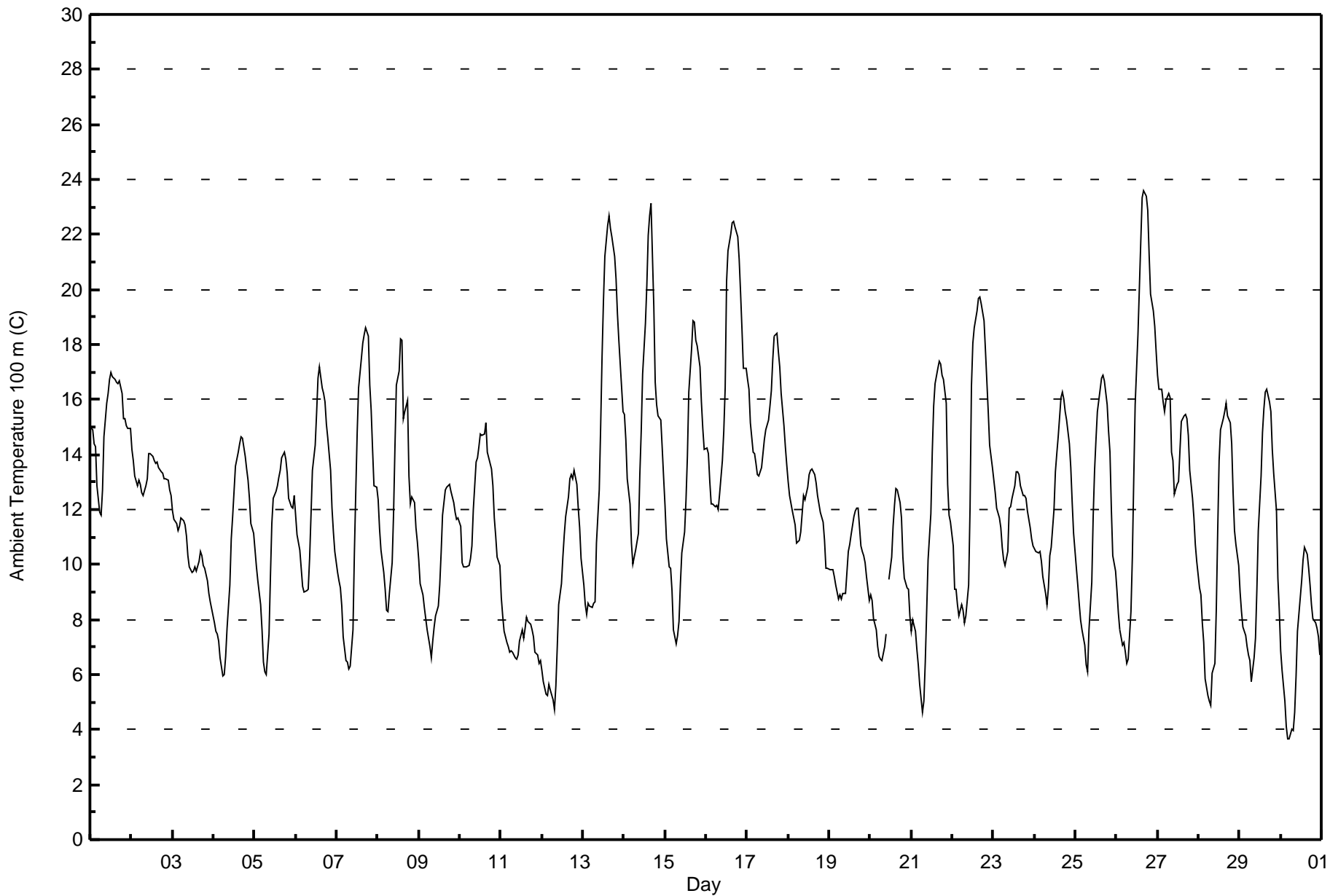
Ambient Temperature 100 m (AT100m) - C
Lower Camp Met Tower - September 2016

| Maximum Value: 23.6 C on Sep 26 17:00 | | Maximum Daily Average: 16.9 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|------|
| Minimum Value: 3.7 C on Sep 30 05:00 | | Minimum Daily Average: 7.1 C on Sep 30 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.8 C at hour 17 | | Minimum Diurnal Average: 8.5 C at hour 7 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 12.07 C | | Percentiles: P ₁ = 4.7 P ₁₀ = 7.0 Q ₁ = 9.1 Median = 12.0 Q ₃ = 14.6 P ₉₀ = 17.1 P ₉₉ = 22.6 | | 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 | 15.0 | 14.9 | 14.4 | 14.3 | 12.8 | 11.9 | 11.8 | 12.7 | 14.7 | 15.9 | 16.2 | 16.7 | 17.0 | 16.8 | 16.7 | 16.6 | 16.6 | 16.7 | 16.2 | 15.3 | 15.3 | 15.1 | 14.9 | 15.0 | 15.1 | 17.0 | |
| 2-Sep | 14.2 | 13.8 | 13.2 | 12.9 | 13.0 | 12.9 | 12.6 | 12.5 | 12.9 | 13.1 | 14.1 | 14.0 | 13.9 | 13.8 | 13.7 | 13.7 | 13.5 | 13.4 | 13.3 | 13.1 | 13.1 | 13.0 | 12.7 | 12.5 | 13.3 | 14.2 | |
| 3-Sep | 12.0 | 11.7 | 11.5 | 11.2 | 11.4 | 11.7 | 11.6 | 11.4 | 11.1 | 10.3 | 9.9 | 9.7 | 9.7 | 9.9 | 9.8 | 10.1 | 10.5 | 10.3 | 10.0 | 9.9 | 9.4 | 9.0 | 8.6 | 8.4 | 10.4 | 12.0 | |
| 4-Sep | 7.9 | 7.6 | 7.5 | 7.2 | 6.6 | 5.9 | 6.0 | 6.7 | 7.7 | 9.3 | 11.0 | 11.8 | 12.7 | 13.6 | 14.1 | 14.4 | 14.6 | 14.6 | 13.9 | 13.5 | 13.1 | 12.4 | 11.5 | 11.1 | 10.6 | 14.6 | |
| 5-Sep | 10.5 | 9.9 | 9.4 | 8.6 | 7.6 | 6.4 | 6.1 | 6.0 | 7.5 | 9.6 | 11.5 | 12.4 | 12.7 | 12.9 | 13.2 | 13.4 | 13.9 | 14.1 | 13.8 | 13.3 | 12.4 | 12.1 | 12.0 | 12.5 | 10.9 | 14.1 | |
| 6-Sep | 11.8 | 11.1 | 10.5 | 9.9 | 9.2 | 9.0 | 9.0 | 9.1 | 10.2 | 11.8 | 13.4 | 14.3 | 15.5 | 16.8 | 17.2 | 16.4 | 16.2 | 15.9 | 15.1 | 14.6 | 13.4 | 12.1 | 11.2 | 10.5 | 12.7 | 17.2 | |
| 7-Sep | 9.7 | 9.4 | 9.1 | 8.5 | 7.4 | 6.5 | 6.5 | 6.2 | 6.3 | 7.6 | 10.4 | 12.7 | 14.8 | 16.4 | 17.5 | 18.0 | 18.4 | 18.6 | 18.3 | 16.5 | 15.6 | 14.2 | 12.9 | 12.8 | 12.3 | 18.6 | |
| 8-Sep | 12.4 | 11.3 | 10.5 | 9.7 | 9.1 | 8.3 | 8.3 | 8.9 | 10.1 | 11.8 | 14.3 | 16.5 | 17.0 | 18.2 | 18.2 | 15.3 | 15.5 | 16.0 | 13.2 | 12.2 | 12.5 | 12.3 | 11.3 | 10.8 | 12.7 | 18.2 | |
| 9-Sep | 10.2 | 9.3 | 8.9 | 8.5 | 8.0 | 7.6 | 7.0 | 6.6 | 7.2 | 7.7 | 8.1 | 8.5 | 9.3 | 10.4 | 11.8 | 12.7 | 12.8 | 12.9 | 12.9 | 12.7 | 12.3 | 11.9 | 11.6 | 11.7 | 10.0 | 12.9 | |
| 10-Sep | 11.4 | 10.1 | 9.9 | 9.9 | 9.9 | 9.9 | 10.2 | 10.7 | 12.0 | 13.7 | 13.9 | 14.3 | 14.7 | 14.7 | 14.7 | 15.2 | 14.1 | 13.9 | 13.5 | 12.8 | 11.7 | 11.0 | 10.3 | 10.0 | 12.2 | 15.2 | |
| 11-Sep | 8.8 | 8.1 | 7.6 | 7.1 | 7.0 | 6.8 | 6.9 | 6.8 | 6.6 | 6.5 | 6.7 | 7.2 | 7.6 | 7.3 | 7.7 | 8.1 | 7.9 | 7.8 | 7.6 | 7.4 | 6.8 | 6.7 | 6.4 | 6.5 | 7.3 | 8.8 | |
| 12-Sep | 6.2 | 5.7 | 5.3 | 5.2 | 5.6 | 5.4 | 5.1 | 4.7 | 5.6 | 7.0 | 8.5 | 9.3 | 10.3 | 11.1 | 11.7 | 12.4 | 13.1 | 13.3 | 13.1 | 13.4 | 12.9 | 12.1 | 11.4 | 10.2 | 9.1 | 13.4 | |
| 13-Sep | 9.2 | 8.5 | 8.2 | 8.6 | 8.5 | 8.5 | 8.6 | 8.7 | 10.8 | 12.7 | 15.0 | 17.5 | 19.6 | 21.2 | 22.3 | 22.7 | 22.2 | 21.9 | 21.2 | 20.4 | 19.1 | 18.2 | 17.3 | 15.6 | 15.3 | 22.7 | |
| 14-Sep | 15.5 | 14.6 | 13.1 | 12.2 | 10.8 | 10.0 | 10.3 | 10.5 | 11.2 | 13.3 | 14.9 | 16.9 | 18.8 | 20.1 | 22.0 | 22.7 | 23.2 | 23.2 | 19.4 | 16.6 | 15.8 | 15.4 | 15.2 | 14.2 | 13.2 | 15.4 | 23.2 |
| 15-Sep | 12.1 | 10.9 | 9.9 | 9.8 | 9.1 | 7.6 | 7.1 | 7.4 | 7.9 | 9.3 | 10.4 | 11.2 | 12.4 | 13.9 | 16.3 | 17.8 | 18.9 | 18.8 | 18.2 | 18.0 | 17.2 | 15.9 | 14.9 | 14.2 | 12.9 | 18.9 | |
| 16-Sep | 14.2 | 14.0 | 13.0 | 12.2 | 12.2 | 12.1 | 12.1 | 12.0 | 12.6 | 13.8 | 14.9 | 16.4 | 20.3 | 21.4 | 22.0 | 22.4 | 22.5 | 22.3 | 21.9 | 21.1 | 19.9 | 18.6 | 17.1 | 17.2 | 16.9 | 22.5 | |
| 17-Sep | 16.7 | 16.4 | 15.2 | 14.1 | 14.0 | 13.7 | 13.3 | 13.2 | 13.5 | 14.0 | 14.5 | 14.9 | 15.2 | 15.7 | 16.3 | 17.4 | 18.3 | 18.4 | 17.7 | 17.2 | 16.2 | 15.0 | 14.3 | 13.6 | 15.4 | 18.4 | |
| 18-Sep | 13.0 | 12.5 | 12.0 | 11.7 | 11.4 | 10.8 | 10.9 | 11.2 | 11.8 | 12.5 | 12.4 | 12.8 | 13.3 | 13.4 | 13.5 | 13.3 | 13.0 | 12.5 | 12.2 | 11.9 | 11.5 | 10.9 | 9.9 | 9.8 | 12.0 | 13.5 | |
| 19-Sep | 9.8 | 9.8 | 9.8 | 9.6 | 9.3 | 8.8 | 8.9 | 8.7 | 9.0 | 8.9 | 9.7 | 10.5 | 10.7 | 11.1 | 11.7 | 11.9 | 12.0 | 12.1 | 10.7 | 10.5 | 10.3 | 10.1 | 9.5 | 8.7 | 10.1 | 12.1 | |
| 20-Sep | 8.9 | 8.7 | 8.1 | 7.6 | 7.0 | 6.7 | 6.5 | 6.5 | 7.0 | 7.5 | M | 9.5 | 10.3 | 11.4 | 12.2 | 12.8 | 12.7 | 12.2 | 11.7 | 10.3 | 9.5 | 9.1 | 9.1 | 8.1 | 9.3 | 12.8 | |
| 21-Sep | 7.6 | 8.0 | 7.6 | 6.9 | 6.3 | 5.6 | 4.6 | 5.0 | 6.5 | 8.3 | 10.2 | 11.8 | 14.1 | 15.8 | 16.6 | 17.1 | 17.4 | 17.3 | 16.9 | 16.7 | 15.8 | 12.9 | 11.8 | 11.5 | 11.3 | 17.4 | |
| 22-Sep | 10.7 | 9.1 | 9.1 | 8.5 | 8.2 | 8.5 | 8.3 | 7.9 | 8.1 | 9.3 | 12.1 | 16.5 | 18.1 | 18.6 | 19.2 | 19.7 | 19.7 | 19.5 | 18.8 | 17.8 | 16.7 | 15.6 | 14.3 | 13.6 | 13.7 | 19.7 | |
| 23-Sep | 13.0 | 12.6 | 12.1 | 11.7 | 11.3 | 10.6 | 10.2 | 10.0 | 10.5 | 12.1 | 12.1 | 12.4 | 12.9 | 13.4 | 13.4 | 13.3 | 12.9 | 12.5 | 12.5 | 12.4 | 12.0 | 11.3 | 10.9 | 10.7 | 11.9 | 13.4 | |
| 24-Sep | 10.6 | 10.5 | 10.4 | 10.5 | 10.1 | 9.6 | 8.9 | 8.6 | 9.2 | 10.3 | 10.6 | 12.0 | 13.4 | 14.0 | 14.6 | 16.0 | 16.3 | 16.0 | 16.0 | 15.6 | 15.3 | 14.4 | 13.5 | 12.2 | 11.1 | 12.2 | 16.3 |
| 25-Sep | 9.9 | 9.3 | 8.6 | 8.0 | 7.6 | 7.1 | 6.3 | 6.1 | 7.7 | 9.4 | 11.8 | 13.4 | 14.6 | 15.6 | 16.4 | 16.8 | 16.9 | 16.7 | 15.8 | 14.8 | 14.1 | 12.0 | 10.3 | 9.8 | 11.6 | 16.9 | |
| 26-Sep | 9.1 | 8.2 | 7.6 | 7.1 | 7.2 | 6.8 | 6.4 | 6.6 | 8.3 | 10.3 | 13.1 | 15.8 | 18.3 | 20.0 | 21.7 | 23.4 | 23.6 | 23.4 | 22.9 | 21.3 | 19.8 | 19.2 | 18.7 | 17.8 | 14.9 | 23.6 | |
| 27-Sep | 16.9 | 16.4 | 16.4 | 15.9 | 15.5 | 16.0 | 16.2 | 16.1 | 14.1 | 13.8 | 12.6 | 12.9 | 13.0 | 14.1 | 15.2 | 15.4 | 15.5 | 15.3 | 14.7 | 13.4 | 12.4 | 11.7 | 10.7 | 10.1 | 14.3 | 16.9 | |
| 28-Sep | 9.2 | 8.9 | 7.9 | 7.2 | 5.8 | 5.2 | 5.0 | 4.9 | 6.0 | 6.4 | 8.4 | 11.2 | 13.8 | 14.9 | 15.3 | 15.6 | 15.8 | 15.4 | 15.1 | 14.4 | 12.6 | 11.2 | 10.7 | 10.0 | 10.5 | 15.8 | |
| 29-Sep | 9.0 | 8.3 | 7.7 | 7.4 | 7.0 | 6.7 | 6.5 | 5.7 | 6.6 | 7.3 | 9.1 | 11.2 | 13.2 | 14.8 | 15.7 | 16.3 | 16.4 | 15.9 | 15.6 | 14.2 | 13.3 | 12.0 | 9.5 | 8.3 | 10.7 | 16.4 | |
| 30-Sep | 6.9 | 6.2 | 5.0 | 4.1 | 3.7 | 3.7 | 4.0 | 4.0 | 4.6 | 6.0 | 7.6 | 8.8 | 9.4 | 10.2 | 10.6 | 10.4 | 9.9 | 9.3 | 8.6 | 8.0 | 7.9 | 7.7 | 7.4 | 6.7 | 7.1 | 10.6 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 239 | 33.24 | 33.24 |
| 10 - 20 | 454 | 63.14 | 96.38 |
| > 20 | 26 | 3.62 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720

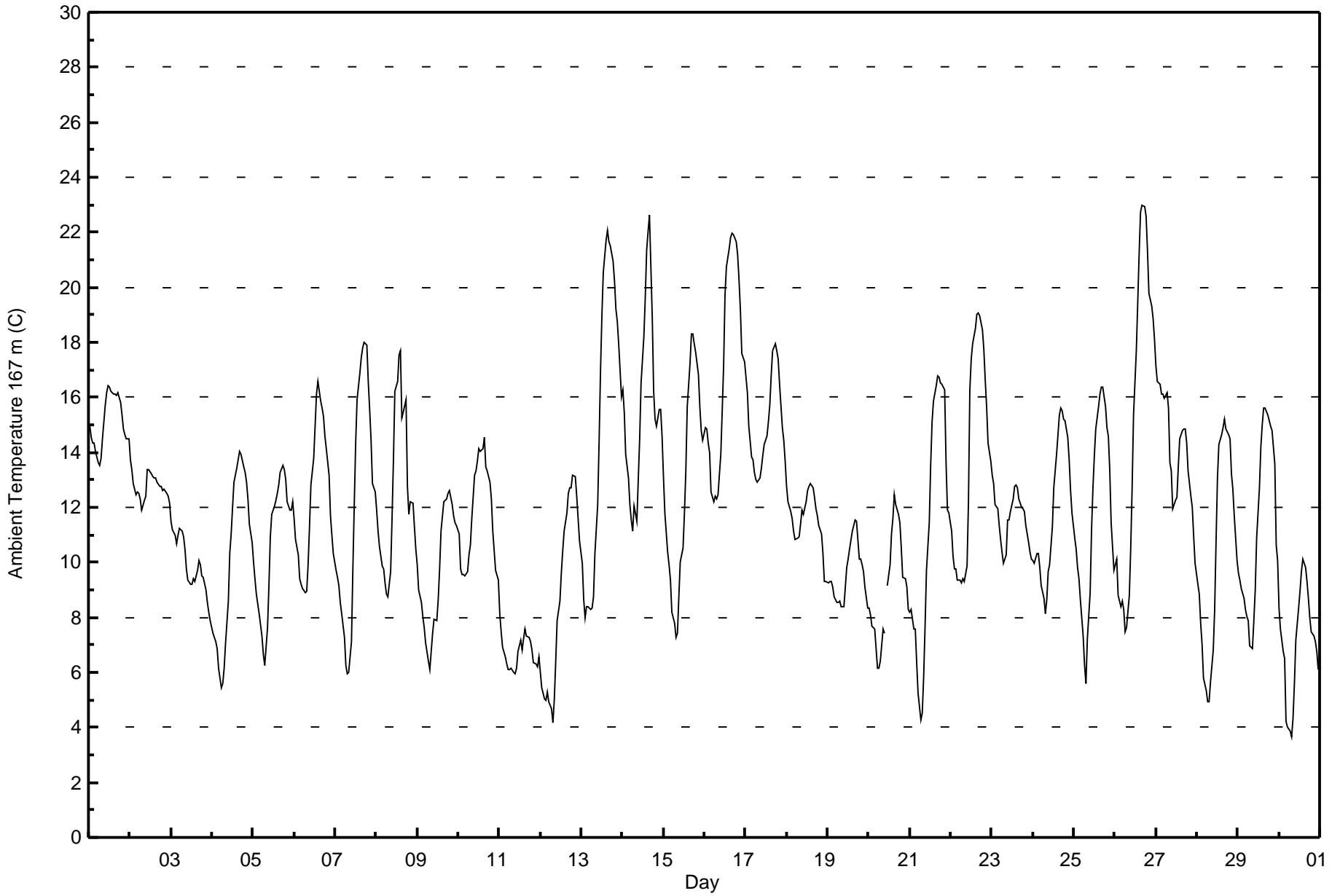


| Maximum Value: 23.0 C on Sep 26 17:00 | | Maximum Daily Average: 17.1 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 3.6 C on Sep 30 08:00 | | Minimum Daily Average: 6.7 C on Sep 11 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.2 C at hour 17 | | Minimum Diurnal Average: 8.5 C at hour 8 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.89 C | | Percentiles: P ₁ = 4.5 P ₁₀ = 7.1 Q ₁ = 9.1 Median = 11.8 Q ₃ = 14.4 P ₉₀ = 16.7 P ₉₉ = 22.0 | | 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 | 15.0 | 14.6 | 14.3 | 14.3 | 14.1 | 13.6 | 13.5 | 13.8 | 14.5 | 15.7 | 16.2 | 16.4 | 16.4 | 16.2 | 16.1 | 16.1 | 16.1 | 16.2 | 15.8 | 15.4 | 14.9 | 14.6 | 14.5 | 14.5 | 15.1 | 16.4 |
| 2-Sep | 13.7 | 13.4 | 12.8 | 12.5 | 12.6 | 12.5 | 12.3 | 11.9 | 12.3 | 12.4 | 13.3 | 13.4 | 13.2 | 13.1 | 13.1 | 13.1 | 12.9 | 12.8 | 12.8 | 12.6 | 12.6 | 12.5 | 12.4 | 12.1 | 12.8 | 13.7 |
| 3-Sep | 11.5 | 11.2 | 11.0 | 10.7 | 11.0 | 11.2 | 11.1 | 10.9 | 10.5 | 9.8 | 9.4 | 9.2 | 9.2 | 9.4 | 9.3 | 9.7 | 10.1 | 9.9 | 9.5 | 9.4 | 9.0 | 8.5 | 8.2 | 7.9 | 9.9 | 11.5 |
| 4-Sep | 7.4 | 7.3 | 7.1 | 6.9 | 6.2 | 5.5 | 5.6 | 6.2 | 7.1 | 8.6 | 10.3 | 11.0 | 12.0 | 12.9 | 13.4 | 13.7 | 14.0 | 13.9 | 13.5 | 13.2 | 12.9 | 12.3 | 11.4 | 10.7 | 10.1 | 14.0 |
| 5-Sep | 10.0 | 9.4 | 8.9 | 8.2 | 7.7 | 7.3 | 6.7 | 6.2 | 7.6 | 9.1 | 11.0 | 11.8 | 12.0 | 12.2 | 12.5 | 12.8 | 13.3 | 13.5 | 13.4 | 13.0 | 12.2 | 11.9 | 11.9 | 12.2 | 10.6 | 13.5 |
| 6-Sep | 11.6 | 10.9 | 10.3 | 9.4 | 9.2 | 9.1 | 8.9 | 8.9 | 9.9 | 11.3 | 12.8 | 13.8 | 14.9 | 16.1 | 16.6 | 15.8 | 15.6 | 15.3 | 14.6 | 14.1 | 13.2 | 11.7 | 11.0 | 10.3 | 12.3 | 16.6 |
| 7-Sep | 9.7 | 9.4 | 9.2 | 8.6 | 8.2 | 7.3 | 6.2 | 5.9 | 6.0 | 7.1 | 9.8 | 12.1 | 14.3 | 15.9 | 16.9 | 17.5 | 17.8 | 18.0 | 17.9 | 16.6 | 15.5 | 14.4 | 12.9 | 12.6 | 12.1 | 18.0 |
| 8-Sep | 11.9 | 11.1 | 10.6 | 9.9 | 9.8 | 9.3 | 8.9 | 8.8 | 9.7 | 11.6 | 13.7 | 16.2 | 16.6 | 17.6 | 17.7 | 15.2 | 15.5 | 15.9 | 12.7 | 11.7 | 12.2 | 12.1 | 11.3 | 10.5 | 12.5 | 17.7 |
| 9-Sep | 9.9 | 9.0 | 8.5 | 8.0 | 7.6 | 7.1 | 6.4 | 6.1 | 6.8 | 7.4 | 7.9 | 7.9 | 8.6 | 9.8 | 11.1 | 12.2 | 12.3 | 12.3 | 12.5 | 12.6 | 12.1 | 11.7 | 11.4 | 11.4 | 9.6 | 12.6 |
| 10-Sep | 11.1 | 9.7 | 9.5 | 9.6 | 9.5 | 9.7 | 10.3 | 10.6 | 11.6 | 13.2 | 13.3 | 13.7 | 14.1 | 14.0 | 14.1 | 14.5 | 13.5 | 13.3 | 12.9 | 12.3 | 11.1 | 10.4 | 9.7 | 9.4 | 11.7 | 14.5 |
| 11-Sep | 8.1 | 7.5 | 6.9 | 6.5 | 6.3 | 6.1 | 6.1 | 6.2 | 6.0 | 6.0 | 6.2 | 6.8 | 7.1 | 6.8 | 7.2 | 7.6 | 7.3 | 7.3 | 7.1 | 6.8 | 6.3 | 6.3 | 6.2 | 6.5 | 6.7 | 8.1 |
| 12-Sep | 6.0 | 5.4 | 5.0 | 5.0 | 5.3 | 4.9 | 4.7 | 4.2 | 5.0 | 6.4 | 7.9 | 8.6 | 9.6 | 10.4 | 11.1 | 11.8 | 12.5 | 12.7 | 12.7 | 13.2 | 13.1 | 12.4 | 11.6 | 10.8 | 8.8 | 13.2 |
| 13-Sep | 10.0 | 8.7 | 8.0 | 8.4 | 8.4 | 8.3 | 8.3 | 8.8 | 10.3 | 12.1 | 14.4 | 16.9 | 18.9 | 20.6 | 21.7 | 22.1 | 21.7 | 21.5 | 21.0 | 20.3 | 19.2 | 18.8 | 18.0 | 16.0 | 15.1 | 22.1 |
| 14-Sep | 16.3 | 15.5 | 13.9 | 13.1 | 12.1 | 11.5 | 11.2 | 12.0 | 11.5 | 13.0 | 14.5 | 16.5 | 18.2 | 19.6 | 21.4 | 22.0 | 22.6 | 18.9 | 16.2 | 15.2 | 15.0 | 15.5 | 15.5 | 14.6 | 15.7 | 22.6 |
| 15-Sep | 13.1 | 11.8 | 10.4 | 9.9 | 9.3 | 8.2 | 7.8 | 7.3 | 7.4 | 8.8 | 10.0 | 10.6 | 11.8 | 13.3 | 15.7 | 17.2 | 18.3 | 18.3 | 18.0 | 17.6 | 16.8 | 15.7 | 14.8 | 14.4 | 12.8 | 18.3 |
| 16-Sep | 14.9 | 14.9 | 14.4 | 14.0 | 12.6 | 12.2 | 12.4 | 12.3 | 12.5 | 14.0 | 15.5 | 17.1 | 19.7 | 20.8 | 21.4 | 21.8 | 22.0 | 21.9 | 21.7 | 21.2 | 20.3 | 19.2 | 17.6 | 17.3 | 17.1 | 22.0 |
| 17-Sep | 16.7 | 16.2 | 14.9 | 13.9 | 13.7 | 13.3 | 13.0 | 12.9 | 13.1 | 13.4 | 13.9 | 14.3 | 14.6 | 15.1 | 15.7 | 16.8 | 17.7 | 17.9 | 17.7 | 17.4 | 16.5 | 14.9 | 14.4 | 13.7 | 15.1 | 17.9 |
| 18-Sep | 12.8 | 12.2 | 11.8 | 11.6 | 11.1 | 10.8 | 10.9 | 10.9 | 11.4 | 11.9 | 11.8 | 12.2 | 12.6 | 12.8 | 12.9 | 12.7 | 12.4 | 11.9 | 11.7 | 11.4 | 11.0 | 10.3 | 9.3 | 9.3 | 11.6 | 12.9 |
| 19-Sep | 9.3 | 9.3 | 9.3 | 9.1 | 8.8 | 8.6 | 8.6 | 8.6 | 8.4 | 8.4 | 9.1 | 9.8 | 10.1 | 10.5 | 11.2 | 11.3 | 11.5 | 11.5 | 10.1 | 10.1 | 9.9 | 9.7 | 9.1 | 8.3 | 9.6 | 11.5 |
| 20-Sep | 8.4 | 8.1 | 7.7 | 7.6 | 6.9 | 6.2 | 6.2 | 6.4 | 7.6 | 7.4 | M | 9.1 | 9.9 | 11.0 | 11.6 | 12.5 | 12.1 | 11.7 | 11.4 | 10.5 | 9.5 | 9.4 | 9.1 | 8.3 | 9.1 | 12.5 |
| 21-Sep | 8.2 | 8.3 | 7.6 | 7.6 | 6.3 | 5.2 | 4.2 | 4.5 | 5.9 | 7.7 | 9.7 | 11.4 | 13.5 | 15.1 | 15.9 | 16.4 | 16.8 | 16.7 | 16.5 | 16.5 | 16.3 | 13.6 | 11.9 | 11.8 | 11.1 | 16.8 |
| 22-Sep | 11.2 | 10.2 | 9.8 | 9.8 | 9.3 | 9.3 | 9.3 | 9.4 | 9.3 | 9.9 | 12.2 | 16.2 | 17.4 | 17.9 | 18.5 | 19.0 | 19.1 | 18.9 | 18.5 | 17.7 | 16.6 | 15.7 | 14.4 | 13.7 | 13.9 | 19.1 |
| 23-Sep | 13.2 | 12.8 | 12.1 | 12.0 | 11.4 | 10.9 | 10.4 | 10.0 | 10.2 | 11.5 | 11.6 | 11.8 | 12.3 | 12.7 | 12.8 | 12.7 | 12.3 | 12.0 | 12.0 | 11.8 | 11.3 | 10.7 | 10.4 | 10.1 | 11.6 | 13.2 |
| 24-Sep | 10.1 | 10.0 | 10.3 | 10.3 | 9.8 | 9.1 | 8.7 | 8.1 | 8.6 | 9.7 | 9.9 | 11.3 | 12.7 | 13.3 | 13.9 | 15.4 | 15.6 | 15.5 | 15.2 | 15.1 | 14.6 | 13.7 | 12.6 | 11.8 | 11.9 | 15.6 |
| 25-Sep | 10.9 | 10.5 | 9.8 | 9.4 | 8.6 | 7.3 | 6.2 | 5.6 | 7.2 | 8.9 | 11.2 | 12.7 | 13.9 | 14.8 | 15.7 | 16.1 | 16.4 | 16.4 | 15.6 | 14.9 | 14.6 | 13.4 | 11.4 | 9.7 | 11.7 | 16.4 |
| 26-Sep | 9.9 | 10.1 | 8.8 | 8.4 | 8.6 | 8.3 | 7.5 | 7.6 | 8.8 | 10.5 | 12.7 | 15.3 | 17.7 | 19.4 | 21.2 | 22.7 | 23.0 | 22.9 | 22.6 | 21.3 | 19.8 | 19.3 | 18.9 | 18.1 | 15.1 | 23.0 |
| 27-Sep | 17.1 | 16.6 | 16.5 | 16.1 | 16.1 | 16.0 | 16.2 | 15.6 | 13.6 | 13.3 | 11.9 | 12.3 | 12.3 | 13.5 | 14.5 | 14.8 | 14.9 | 14.8 | 14.4 | 13.3 | 12.4 | 12.0 | 11.0 | 10.0 | 14.1 | 17.1 |
| 28-Sep | 9.2 | 8.8 | 7.8 | 7.0 | 5.8 | 5.4 | 4.9 | 5.0 | 5.6 | 6.8 | 8.3 | 10.8 | 13.1 | 14.3 | 14.7 | 14.9 | 15.2 | 14.9 | 14.7 | 14.5 | 13.2 | 12.7 | 11.7 | 10.1 | 10.4 | 15.2 |
| 29-Sep | 9.6 | 9.4 | 9.0 | 8.7 | 8.3 | 8.0 | 7.9 | 7.0 | 6.9 | 7.9 | 9.0 | 10.9 | 12.7 | 14.2 | 15.0 | 15.6 | 15.6 | 15.3 | 15.2 | 14.9 | 14.8 | 13.6 | 10.6 | 10.1 | 11.3 | 15.6 |
| 30-Sep | 8.3 | 7.6 | 6.8 | 6.5 | 4.2 | 4.0 | 3.9 | 3.6 | 4.3 | 5.6 | 7.2 | 8.3 | 9.0 | 9.6 | 10.1 | 9.8 | 9.3 | 8.7 | 8.0 | 7.5 | 7.3 | 7.1 | 6.8 | 6.1 | 7.1 | 10.1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 254 | 35.33 | 35.33 |
| 10 - 20 | 441 | 61.34 | 96.66 |
| > 20 | 24 | 3.34 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720

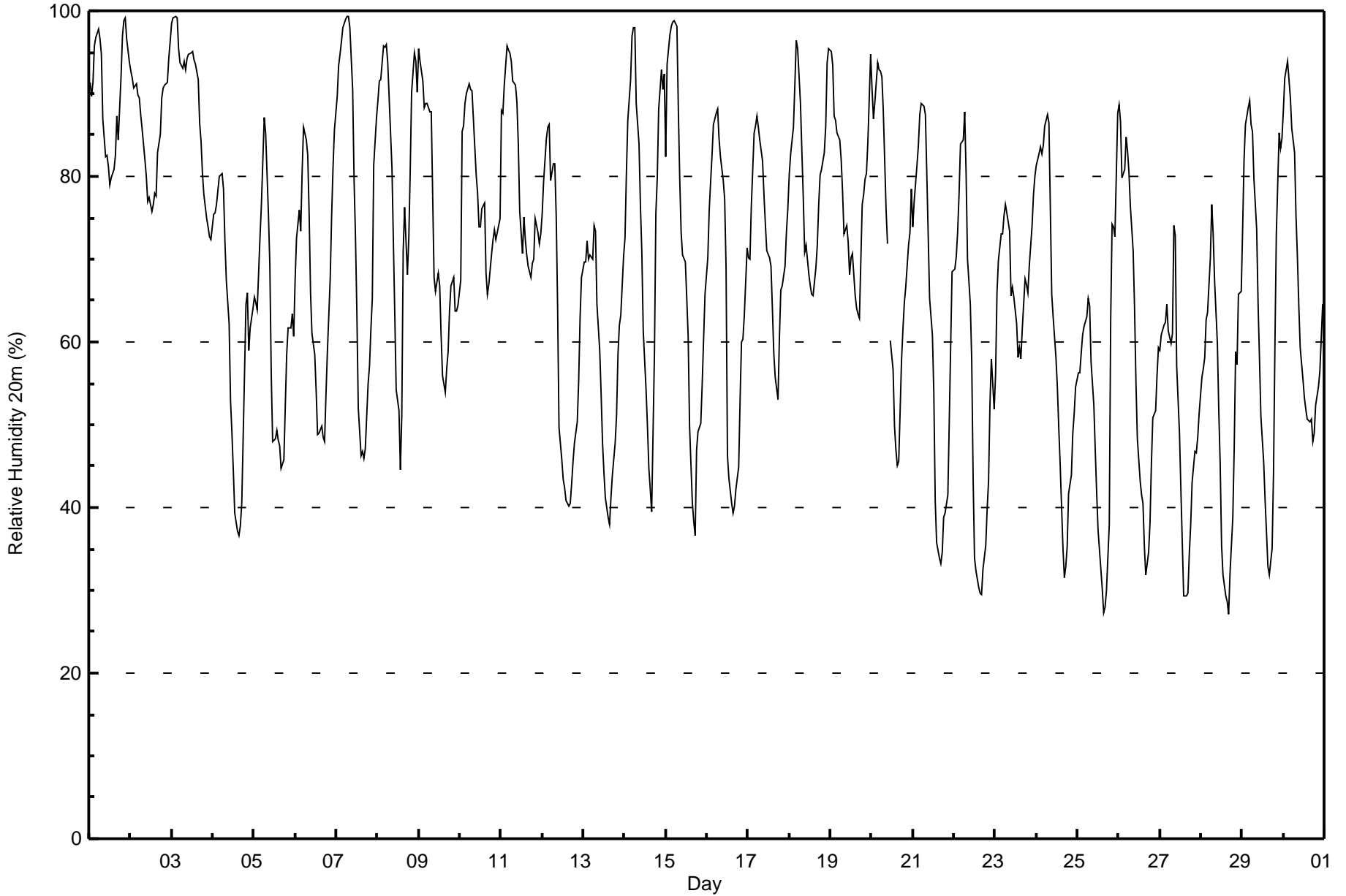


| Maximum Value: 99 % on Sep 3 03:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 89.9 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 27 % on Sep 28 17:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 50.8 % on Sep 27 | | | | | | | | | | | | | | | | | | Hours of Data: 719 | | | | | | | | | | | | | |
| Maximum Diurnal Average: 85.9 % at hour 6 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 49.8 % at hour 17 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 1 | | | | | | | | | | | | | |
| Monthly Average: 68.9 % | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 30 P ₁₀ = 42 Q ₁ = 56 Median = 71 Q ₃ = 84 P ₉₀ = 92 P ₉₉ = 99 | | | | | | | | | | | | | | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.9 | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 91 | 90 | 91 | 96 | 97 | 98 | 97 | 95 | 87 | 82 | 83 | 81 | 79 | 80 | 81 | 83 | 87 | 84 | 92 | 97 | 99 | 99 | 97 | 94 | 89.9 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 93 | 92 | 91 | 91 | 90 | 89 | 87 | 86 | 82 | 80 | 77 | 77 | 76 | 77 | 78 | 78 | 83 | 85 | 89 | 91 | 91 | 91 | 94 | 96 | 86.0 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 98 | 99 | 99 | 99 | 95 | 94 | 93 | 94 | 93 | 94 | 95 | 95 | 95 | 94 | 94 | 92 | 86 | 84 | 80 | 78 | 75 | 74 | 73 | 72 | 89.4 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 75 | 76 | 77 | 78 | 80 | 80 | 78 | 72 | 67 | 62 | 53 | 49 | 44 | 39 | 37 | 38 | 41 | 57 | 65 | 66 | 59 | 62 | 64 | 60.7 | 80 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 65 | 65 | 64 | 73 | 77 | 82 | 87 | 85 | 75 | 69 | 56 | 48 | 48 | 49 | 48 | 47 | 45 | 46 | 52 | 58 | 62 | 62 | 63 | 61 | 62.0 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 67 | 73 | 76 | 73 | 81 | 86 | 84 | 83 | 75 | 66 | 61 | 58 | 54 | 49 | 49 | 50 | 48 | 48 | 54 | 59 | 68 | 75 | 81 | 86 | 66.8 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 90 | 93 | 95 | 96 | 98 | 99 | 99 | 99 | 98 | 91 | 80 | 73 | 64 | 52 | 46 | 47 | 46 | 47 | 55 | 57 | 62 | 65 | 81 | 87 | 75.8 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 89 | 91 | 92 | 96 | 96 | 96 | 94 | 90 | 81 | 72 | 63 | 54 | 52 | 45 | 51 | 71 | 76 | 68 | 73 | 81 | 90 | 95 | 94 | 90 | 79.1 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 96 | 94 | 91 | 88 | 89 | 89 | 88 | 88 | 78 | 68 | 66 | 68 | 67 | 61 | 56 | 54 | 57 | 59 | 64 | 67 | 68 | 64 | 64 | 64 | 72.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 67 | 85 | 86 | 89 | 90 | 91 | 91 | 90 | 87 | 80 | 78 | 74 | 74 | 76 | 77 | 68 | 66 | 67 | 71 | 72 | 74 | 72 | 73 | 75 | 78.1 | 91 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 88 | 88 | 91 | 96 | 95 | 95 | 94 | 91 | 91 | 89 | 84 | 76 | 71 | 75 | 72 | 70 | 69 | 68 | 69 | 70 | 75 | 73 | 72 | 73 | 80.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 75 | 79 | 85 | 86 | 86 | 79 | 82 | 82 | 75 | 64 | 50 | 46 | 43 | 42 | 41 | 40 | 41 | 43 | 46 | 48 | 50 | 55 | 63 | 68 | 61.2 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 70 | 70 | 72 | 70 | 70 | 70 | 74 | 73 | 65 | 59 | 54 | 48 | 44 | 41 | 39 | 38 | 41 | 44 | 48 | 51 | 58 | 62 | 63 | 70 | 58.1 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 73 | 80 | 87 | 92 | 97 | 98 | 98 | 89 | 84 | 76 | 71 | 61 | 54 | 50 | 45 | 42 | 40 | 59 | 76 | 80 | 88 | 93 | 90 | 92 | 75.6 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 82 | 94 | 97 | 98 | 99 | 99 | 98 | 88 | 80 | 73 | 70 | 70 | 65 | 61 | 50 | 40 | 38 | 37 | 47 | 49 | 50 | 55 | 60 | 66 | 69.4 | 99 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 70 | 76 | 79 | 82 | 86 | 88 | 88 | 85 | 82 | 79 | 77 | 69 | 46 | 44 | 41 | 39 | 40 | 42 | 45 | 53 | 60 | 60 | 63 | 71 | 65.3 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 70 | 70 | 76 | 85 | 86 | 87 | 86 | 84 | 82 | 78 | 74 | 71 | 70 | 69 | 64 | 59 | 56 | 53 | 61 | 66 | 67 | 69 | 73 | 76 | 72.2 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 80 | 83 | 86 | 91 | 96 | 95 | 89 | 83 | 77 | 71 | 72 | 68 | 67 | 66 | 66 | 69 | 72 | 77 | 80 | 81 | 83 | 86 | 94 | 96 | 80.3 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 95 | 93 | 87 | 87 | 85 | 84 | 82 | 78 | 73 | 74 | 72 | 68 | 70 | 71 | 66 | 64 | 63 | 63 | 77 | 78 | 80 | 80 | 84 | 95 | 77.9 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 90 | 87 | 89 | 94 | 93 | 93 | 92 | 88 | 76 | 72 | M | 60 | 57 | 50 | 47 | 45 | 46 | 58 | 62 | 65 | 67 | 72 | 73 | 78 | 71.8 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 74 | 77 | 81 | 84 | 87 | 89 | 88 | 87 | 80 | 73 | 65 | 61 | 54 | 41 | 36 | 34 | 33 | 35 | 39 | 39 | 41 | 50 | 59 | 69 | 61.6 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 69 | 70 | 73 | 78 | 84 | 84 | 88 | 80 | 70 | 65 | 58 | 43 | 34 | 32 | 30 | 30 | 30 | 33 | 35 | 40 | 43 | 53 | 58 | 52 | 55.5 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 56 | 66 | 70 | 73 | 73 | 75 | 77 | 76 | 73 | 66 | 67 | 65 | 62 | 58 | 59 | 58 | 61 | 68 | 67 | 66 | 69 | 74 | 78 | 80 | 68.2 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 81 | 82 | 84 | 83 | 84 | 86 | 87 | 86 | 76 | 66 | 63 | 58 | 55 | 50 | 45 | 35 | 31 | 33 | 35 | 42 | 44 | 49 | 51 | 55 | 60.9 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 56 | 56 | 59 | 61 | 62 | 63 | 65 | 64 | 58 | 52 | 47 | 42 | 37 | 35 | 30 | 27 | 28 | 30 | 38 | 63 | 74 | 74 | 73 | 88 | 53.4 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 89 | 87 | 80 | 81 | 85 | 83 | 81 | 76 | 71 | 64 | 55 | 48 | 43 | 42 | 41 | 35 | 32 | 35 | 38 | 45 | 51 | 52 | 56 | 59 | 59.5 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 59 | 61 | 62 | 62 | 65 | 61 | 60 | 61 | 74 | 73 | 57 | 49 | 42 | 36 | 29 | 29 | 30 | 34 | 38 | 43 | 47 | 47 | 48 | 51 | 50.8 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 56 | 57 | 58 | 63 | 64 | 70 | 77 | 73 | 67 | 60 | 52 | 45 | 35 | 32 | 29 | 29 | 27 | 32 | 39 | 47 | 59 | 57 | 66 | 66 | 52.5 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 74 | 82 | 86 | 88 | 89 | 86 | 85 | 80 | 74 | 65 | 58 | 51 | 45 | 41 | 37 | 33 | 32 | 35 | 44 | 60 | 73 | 85 | 83 | 85 | 65.5 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 88 | 92 | 94 | 92 | 89 | 86 | 83 | 75 | 70 | 64 | 59 | 55 | 53 | 52 | 51 | 50 | 51 | 48 | 49 | 52 | 55 | 56 | 60 | 65 | 66.3 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 77.6 | 80.2 | 82.0 | 84.2 | 85.6 | 85.9 | 85.7 | 82.8 | 77.4 | 71.6 | 66.1 | 61.1 | 56.7 | 53.6 | 51.1 | 49.8 | 49.8 | 51.8 | 57.2 | 62.1 | 66.2 | 68.6 | 71.7 | 74.8 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 94 | 95 | 95 | 95 | 94 | 94 | 92 | 87 | 85 | 92 | 97 | 99 | 99 | 97 | 96 | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 56 | 7.79 | 7.79 |
| 40 - 60 | 168 | 23.37 | 31.15 |
| 60 - 80 | 261 | 36.30 | 67.45 |
| 80 - 100 | 234 | 32.55 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

Lower Camp Met Tower - September 2016

| | | |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 91 % on Sep 30 03:00 | Maximum Daily Average: 67.3 % on Sep 23 | Hours in Service: 720 |
| Minimum Value: 26 % on Sep 28 17:00 | Minimum Daily Average: 49.6 % on Sep 27 | Hours of Data: 228 |
| Maximum Diurnal Average: 76.6 % at hour 7 | Minimum Diurnal Average: 34.9 % at hour 17 | Hours of Missing Data: 492 |
| Monthly Average: 56.6 % | Percentiles: P ₁ = 28 P ₁₀ = 33 Q ₁ = 42 Median = 57 O ₃ = 69 P ₉₀ = 82 P ₉₉ = 90 | Hours of Calibration: 0 |
| | | Percent Operational Time: 31.7 |

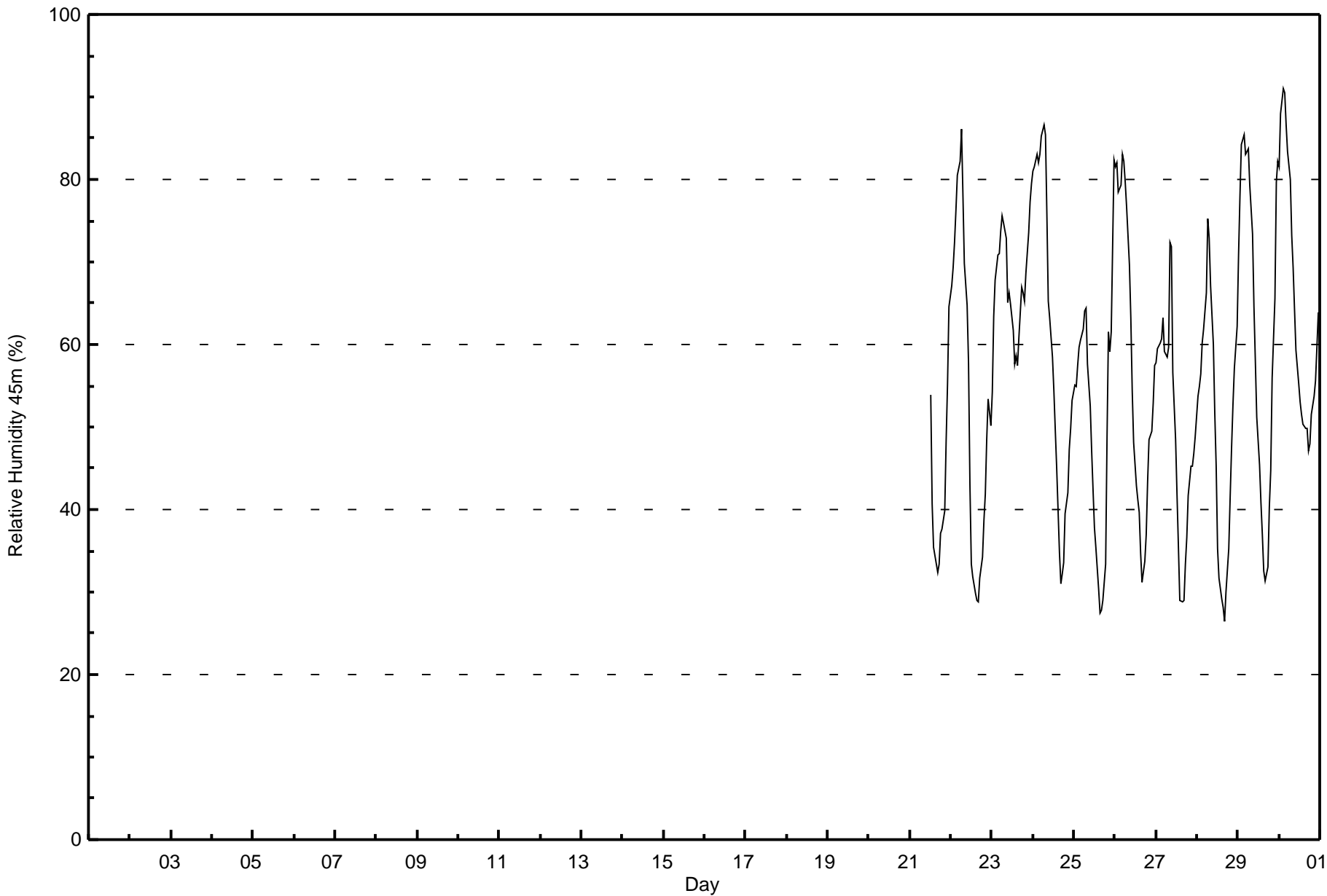
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|----|
| | 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 | 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 | 54 | 41 | 35 | 33 | 32 | 33 | 37 | 38 | 40 | 48 | 55 | 65 | -- | 65 | |
| 22-Sep | 67 | 69 | 72 | 76 | 81 | 82 | 86 | 78 | 70 | 65 | 58 | 43 | 33 | 32 | 30 | 29 | 29 | 32 | 34 | 39 | 42 | 49 | 53 | 50 | 54.1 | 86 | |
| 23-Sep | 54 | 63 | 68 | 71 | 71 | 74 | 76 | 75 | 73 | 65 | 66 | 65 | 62 | 58 | 59 | 57 | 61 | 67 | 66 | 65 | 69 | 74 | 77 | 80 | 67.3 | 80 | |
| 24-Sep | 81 | 82 | 83 | 82 | 83 | 85 | 87 | 85 | 76 | 65 | 63 | 59 | 54 | 50 | 45 | 35 | 31 | 32 | 34 | 40 | 42 | 47 | 50 | 53 | 60.1 | 87 | |
| 25-Sep | 55 | 55 | 57 | 60 | 60 | 62 | 64 | 64 | 58 | 53 | 47 | 42 | 38 | 35 | 30 | 27 | 28 | 29 | 33 | 49 | 62 | 59 | 62 | 82 | 50.5 | 82 | |
| 26-Sep | 82 | 82 | 78 | 79 | 83 | 82 | 80 | 77 | 70 | 63 | 54 | 48 | 43 | 41 | 40 | 35 | 31 | 34 | 37 | 43 | 49 | 50 | 53 | 57 | 57.9 | 83 | |
| 27-Sep | 58 | 60 | 60 | 61 | 63 | 59 | 58 | 60 | 72 | 72 | 57 | 48 | 42 | 36 | 29 | 29 | 29 | 33 | 37 | 42 | 45 | 45 | 47 | 49 | 49.6 | 72 | |
| 28-Sep | 54 | 55 | 56 | 60 | 62 | 66 | 75 | 73 | 67 | 60 | 52 | 45 | 35 | 32 | 29 | 28 | 26 | 30 | 35 | 42 | 47 | 53 | 57 | 62 | 50.1 | 75 | |
| 29-Sep | 71 | 78 | 84 | 85 | 83 | 83 | 84 | 79 | 73 | 65 | 58 | 51 | 45 | 41 | 37 | 33 | 31 | 33 | 40 | 45 | 56 | 66 | 80 | 82 | 61.8 | 85 | |
| 30-Sep | 82 | 88 | 91 | 91 | 87 | 83 | 80 | 73 | 69 | 64 | 59 | 55 | 53 | 52 | 50 | 50 | 50 | 47 | 48 | 52 | 54 | 56 | 60 | 64 | 64.8 | 91 | |
| | 67.0 | 70.2 | 72.3 | 73.9 | 74.8 | 75.3 | 76.6 | 73.8 | 69.8 | 63.5 | 57.1 | 50.8 | 46.0 | 41.6 | 38.4 | 35.6 | 34.9 | 37.0 | 40.2 | 45.3 | 50.5 | 54.6 | 59.4 | 64.4 | | Diurnal Average | |
| | 82 | 88 | 91 | 91 | 87 | 85 | 87 | 85 | 76 | 72 | 66 | 65 | 62 | 58 | 59 | 57 | 61 | 67 | 66 | 65 | 69 | 74 | 80 | 82 | | Diurnal Maximum | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 49 | 21.49 | 21.49 |
| 40 - 60 | 84 | 36.84 | 58.33 |
| 60 - 80 | 67 | 29.39 | 87.72 |
| 80 - 100 | 28 | 12.28 | 100.00 |

Total Number of Valid Hours: 228

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 100m (RH100m) - %

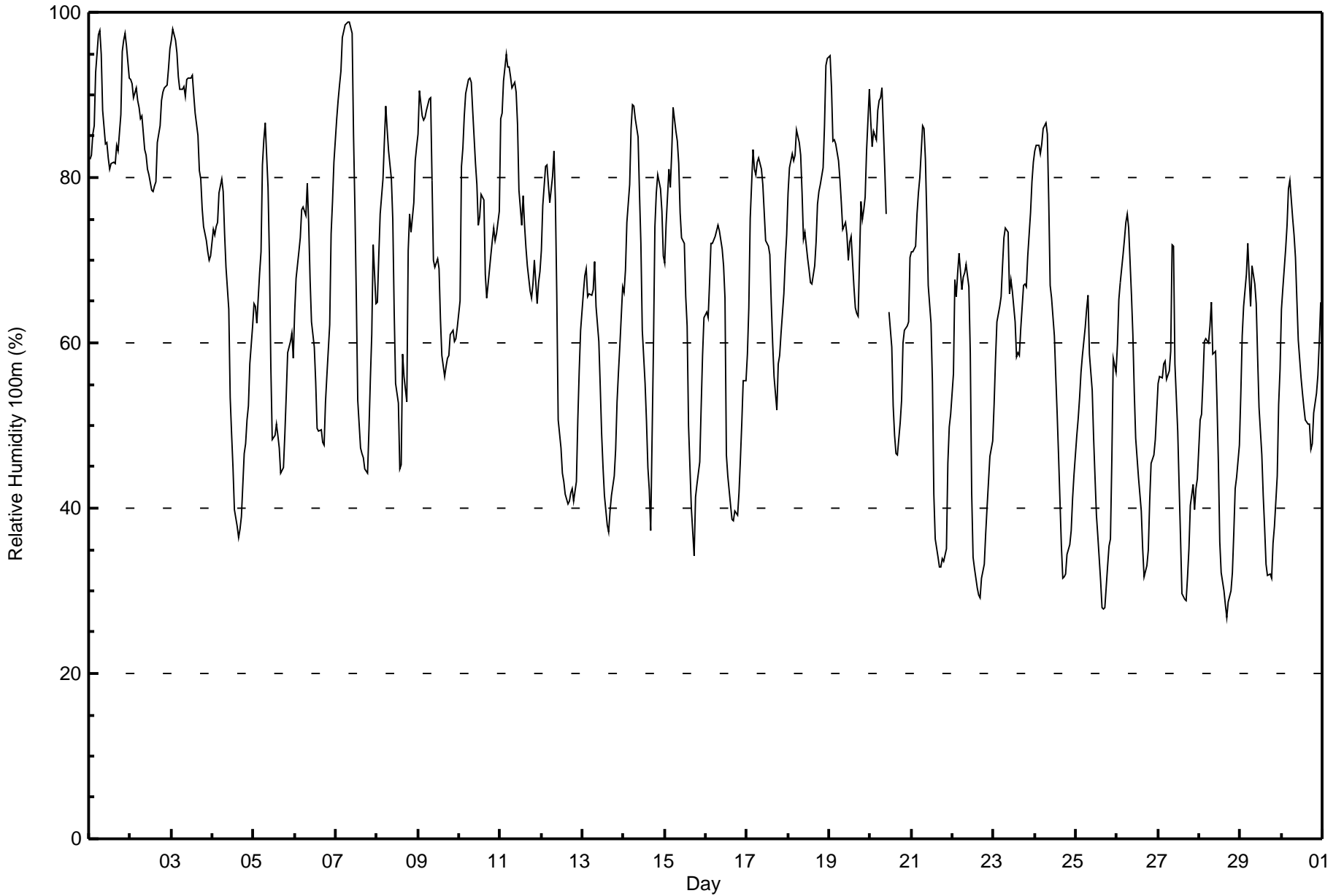
Lower Camp Met Tower - September 2016

| Maximum Value: 99 % on Sep 7 09:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 88.2 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|---------------|---------------|--|--|--|--|--|--|--|--|--|--------------------------------|--|
| Minimum Value: 27 % on Sep 28 17:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 45.7 % on Sep 28 | | | | | | | | | | | | | | | | | | Hours of Data: 719 | |
| Maximum Diurnal Average: 80.6 % at hour 8 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 48.6 % at hour 17 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 1 | |
| Monthly Average: 65.3 % | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 29 P ₁₀ = 40 Q ₁ = 51 Median = 67 Q ₃ = 80 P ₉₀ = 88 P ₉₉ = 97 | | | | | | | | | | | | | | | | | | 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 | 82 | 83 | 85 | 86 | 93 | 97 | 98 | 95 | 88 | 84 | 84 | 82 | 81 | 82 | 82 | 82 | 84 | 83 | 88 | 95 | 97 | 97 | 96 | 92 | 88.2 | 98 | | | | | | | | | | | |
| 2-Sep | 92 | 91 | 90 | 91 | 89 | 89 | 87 | 87 | 83 | 83 | 81 | 80 | 78 | 78 | 79 | 79 | 84 | 86 | 89 | 90 | 91 | 91 | 93 | 96 | 86.7 | 96 | | | | | | | | | | | |
| 3-Sep | 97 | 98 | 97 | 95 | 92 | 91 | 91 | 91 | 90 | 92 | 92 | 92 | 92 | 90 | 88 | 85 | 81 | 80 | 76 | 74 | 72 | 71 | 70 | 71 | 86.1 | 98 | | | | | | | | | | | |
| 4-Sep | 74 | 73 | 74 | 75 | 78 | 80 | 78 | 73 | 69 | 64 | 53 | 49 | 45 | 40 | 38 | 36 | 37 | 39 | 47 | 48 | 51 | 52 | 57 | 62 | 58.0 | 80 | | | | | | | | | | | |
| 5-Sep | 65 | 64 | 62 | 68 | 71 | 81 | 85 | 87 | 79 | 70 | 57 | 48 | 49 | 50 | 49 | 47 | 44 | 45 | 49 | 54 | 59 | 60 | 61 | 58 | 61.0 | 87 | | | | | | | | | | | |
| 6-Sep | 64 | 68 | 71 | 73 | 76 | 76 | 75 | 79 | 74 | 68 | 62 | 59 | 55 | 50 | 49 | 49 | 48 | 48 | 53 | 56 | 62 | 73 | 77 | 82 | 64.6 | 82 | | | | | | | | | | | |
| 7-Sep | 87 | 89 | 91 | 93 | 97 | 98 | 99 | 99 | 99 | 97 | 85 | 76 | 65 | 53 | 47 | 47 | 46 | 45 | 44 | 50 | 56 | 61 | 72 | 65 | 73.4 | 99 | | | | | | | | | | | |
| 8-Sep | 65 | 71 | 76 | 80 | 84 | 89 | 86 | 83 | 80 | 75 | 64 | 55 | 53 | 45 | 45 | 59 | 56 | 53 | 71 | 76 | 73 | 77 | 82 | 84 | 70.0 | 89 | | | | | | | | | | | |
| 9-Sep | 85 | 91 | 87 | 87 | 87 | 88 | 89 | 90 | 80 | 70 | 69 | 70 | 69 | 63 | 59 | 56 | 57 | 58 | 58 | 61 | 61 | 60 | 60 | 62 | 71.6 | 91 | | | | | | | | | | | |
| 10-Sep | 65 | 81 | 83 | 87 | 90 | 92 | 92 | 92 | 88 | 82 | 79 | 74 | 75 | 78 | 77 | 68 | 65 | 67 | 71 | 72 | 74 | 72 | 73 | 76 | 78.2 | 92 | | | | | | | | | | | |
| 11-Sep | 87 | 88 | 92 | 95 | 93 | 93 | 92 | 91 | 92 | 90 | 86 | 78 | 74 | 78 | 74 | 72 | 69 | 66 | 66 | 67 | 70 | 65 | 67 | 69 | 79.8 | 95 | | | | | | | | | | | |
| 12-Sep | 71 | 77 | 81 | 82 | 79 | 77 | 80 | 83 | 77 | 66 | 51 | 47 | 44 | 43 | 42 | 41 | 41 | 42 | 42 | 41 | 43 | 51 | 57 | 62 | 59.1 | 83 | | | | | | | | | | | |
| 13-Sep | 66 | 68 | 69 | 66 | 66 | 66 | 67 | 70 | 64 | 60 | 55 | 49 | 45 | 41 | 38 | 37 | 40 | 42 | 44 | 47 | 53 | 56 | 60 | 67 | 55.6 | 70 | | | | | | | | | | | |
| 14-Sep | 66 | 69 | 75 | 79 | 86 | 89 | 89 | 87 | 85 | 78 | 72 | 61 | 55 | 51 | 45 | 42 | 37 | 60 | 74 | 78 | 80 | 79 | 76 | 70 | 70.1 | 89 | | | | | | | | | | | |
| 15-Sep | 70 | 74 | 81 | 79 | 83 | 89 | 86 | 84 | 82 | 76 | 73 | 72 | 66 | 62 | 50 | 40 | 37 | 34 | 41 | 43 | 46 | 52 | 58 | 63 | 64.2 | 89 | | | | | | | | | | | |
| 16-Sep | 64 | 63 | 67 | 72 | 72 | 73 | 74 | 74 | 74 | 71 | 69 | 65 | 46 | 44 | 40 | 39 | 38 | 40 | 39 | 42 | 46 | 50 | 55 | 55 | 57.3 | 74 | | | | | | | | | | | |
| 17-Sep | 59 | 64 | 75 | 83 | 81 | 80 | 82 | 82 | 81 | 79 | 76 | 72 | 72 | 71 | 65 | 60 | 56 | 52 | 57 | 58 | 61 | 66 | 70 | 73 | 69.8 | 83 | | | | | | | | | | | |
| 18-Sep | 78 | 81 | 83 | 82 | 83 | 86 | 84 | 83 | 78 | 73 | 73 | 70 | 69 | 67 | 67 | 69 | 72 | 77 | 78 | 79 | 81 | 86 | 94 | 94 | 78.7 | 94 | | | | | | | | | | | |
| 19-Sep | 95 | 91 | 84 | 85 | 84 | 82 | 80 | 77 | 74 | 75 | 73 | 70 | 72 | 73 | 67 | 64 | 64 | 63 | 77 | 75 | 76 | 78 | 83 | 91 | 77.2 | 95 | | | | | | | | | | | |
| 20-Sep | 87 | 84 | 86 | 85 | 88 | 89 | 90 | 91 | 81 | 76 | M | 64 | 60 | 52 | 49 | 47 | 47 | 50 | 53 | 60 | 61 | 62 | 62 | 70 | 69.2 | 91 | | | | | | | | | | | |
| 21-Sep | 71 | 71 | 72 | 76 | 78 | 80 | 86 | 86 | 82 | 75 | 67 | 62 | 55 | 42 | 36 | 34 | 33 | 33 | 34 | 34 | 35 | 45 | 50 | 51 | 57.9 | 86 | | | | | | | | | | | |
| 22-Sep | 56 | 68 | 66 | 68 | 71 | 66 | 68 | 69 | 69 | 67 | 59 | 42 | 34 | 33 | 30 | 30 | 29 | 32 | 33 | 37 | 40 | 43 | 46 | 48 | 50.2 | 71 | | | | | | | | | | | |
| 23-Sep | 53 | 58 | 63 | 64 | 66 | 69 | 73 | 74 | 73 | 66 | 68 | 66 | 63 | 58 | 59 | 59 | 62 | 67 | 67 | 67 | 71 | 76 | 80 | 82 | 66.7 | 82 | | | | | | | | | | | |
| 24-Sep | 83 | 84 | 84 | 83 | 84 | 86 | 87 | 85 | 77 | 67 | 65 | 61 | 56 | 51 | 46 | 35 | 32 | 32 | 32 | 34 | 36 | 37 | 41 | 44 | 59.3 | 87 | | | | | | | | | | | |
| 25-Sep | 49 | 51 | 53 | 56 | 58 | 62 | 64 | 66 | 59 | 54 | 49 | 44 | 39 | 37 | 31 | 28 | 28 | 28 | 33 | 35 | 36 | 46 | 58 | 56 | 46.7 | 66 | | | | | | | | | | | |
| 26-Sep | 60 | 65 | 67 | 71 | 72 | 75 | 76 | 74 | 66 | 61 | 54 | 49 | 44 | 42 | 40 | 35 | 32 | 33 | 35 | 41 | 45 | 46 | 48 | 52 | 53.4 | 76 | | | | | | | | | | | |
| 27-Sep | 55 | 56 | 56 | 57 | 58 | 56 | 57 | 59 | 72 | 72 | 57 | 49 | 43 | 36 | 30 | 29 | 29 | 32 | 35 | 40 | 43 | 40 | 42 | 44 | 47.7 | 72 | | | | | | | | | | | |
| 28-Sep | 51 | 51 | 55 | 60 | 60 | 60 | 62 | 65 | 59 | 59 | 53 | 46 | 36 | 32 | 30 | 28 | 27 | 29 | 30 | 32 | 37 | 42 | 44 | 48 | 45.7 | 65 | | | | | | | | | | | |
| 29-Sep | 54 | 61 | 64 | 68 | 72 | 68 | 64 | 69 | 67 | 65 | 58 | 52 | 46 | 42 | 38 | 33 | 32 | 32 | 32 | 36 | 38 | 44 | 53 | 57 | 51.9 | 72 | | | | | | | | | | | |
| 30-Sep | 64 | 67 | 71 | 74 | 79 | 80 | 75 | 73 | 70 | 65 | 60 | 56 | 54 | 52 | 51 | 50 | 50 | 47 | 48 | 52 | 54 | 56 | 60 | 65 | 61.4 | 80 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | 70.4 73.3 75.4 77.3 79.1 80.2 80.4 80.6 77.1 72.6 67.1 62.1 57.8 54.5 51.4 49.4 48.6 49.8 53.2 55.8 58.3 61.2 64.9 66.9 | | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | 97 98 97 95 97 98 99 99 99 97 92 92 92 90 88 85 84 86 89 95 97 97 96 96 | | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 75 | 10.43 | 10.43 |
| 40 - 60 | 193 | 26.84 | 37.27 |
| 60 - 80 | 278 | 38.66 | 75.94 |
| 80 - 100 | 173 | 24.06 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 167m (RH167m) - %

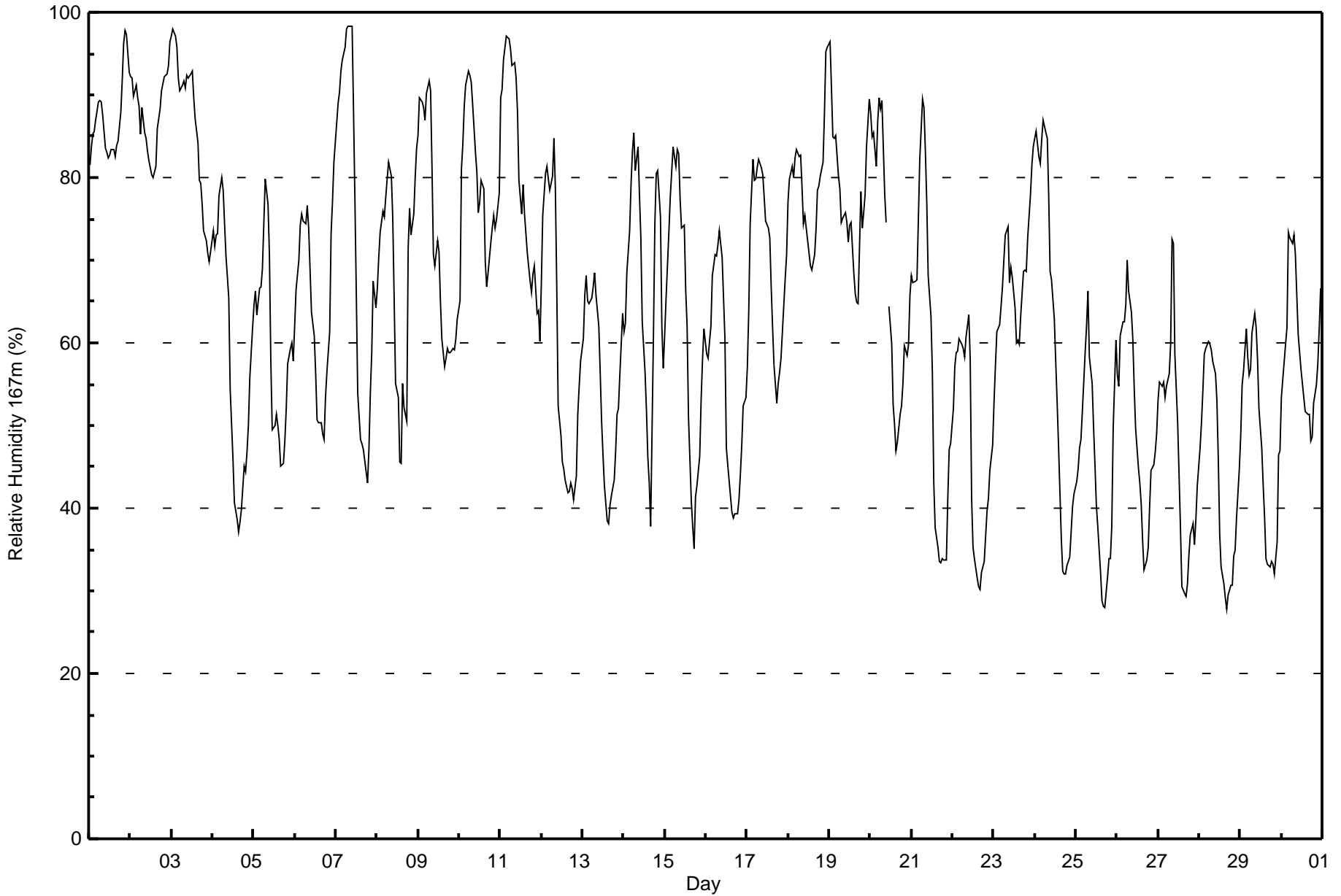
Lower Camp Met Tower - September 2016

| Maximum Value: 98 % on Sep 7 09:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 87.7 % on Sep 2 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 28 % on Sep 28 17:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 44.3 % on Sep 28 | | | | | | | | | | | | | | | | | Hours of Data: 719 | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 78.8 % at hour 8 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 49.3 % at hour 17 | | | | | | | | | | | | | | | | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | |
| Monthly Average: 64.5 % | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 30 P ₁₀ = 39 Q ₁ = 51 Median = 65 Q ₃ = 80 P ₉₀ = 89 P ₉₉ = 97 | | | | | | | | | | | | | | | | | 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 | 81 | 84 | 85 | 86 | 87 | 89 | 89 | 89 | 88 | 84 | 83 | 82 | 83 | 83 | 83 | 82 | 84 | 84 | 88 | 92 | 96 | 98 | 97 | 93 | 87.1 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 92 | 92 | 90 | 91 | 90 | 89 | 85 | 89 | 85 | 85 | 83 | 82 | 80 | 80 | 81 | 81 | 86 | 88 | 91 | 91 | 92 | 92 | 94 | 96 | 87.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 97 | 98 | 97 | 96 | 92 | 91 | 91 | 92 | 91 | 92 | 92 | 93 | 93 | 90 | 87 | 84 | 80 | 79 | 77 | 74 | 72 | 71 | 70 | 71 | 86.2 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 74 | 72 | 73 | 73 | 78 | 80 | 79 | 74 | 71 | 65 | 54 | 50 | 46 | 41 | 39 | 37 | 38 | 40 | 45 | 44 | 47 | 50 | 56 | 62 | 57.8 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 65 | 66 | 63 | 67 | 67 | 69 | 74 | 80 | 77 | 71 | 58 | 49 | 50 | 51 | 50 | 48 | 45 | 45 | 48 | 52 | 57 | 59 | 60 | 58 | 59.6 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 62 | 66 | 70 | 74 | 76 | 75 | 74 | 77 | 74 | 69 | 64 | 61 | 56 | 51 | 50 | 50 | 49 | 48 | 53 | 56 | 61 | 73 | 77 | 82 | 64.6 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 87 | 89 | 90 | 93 | 94 | 96 | 98 | 98 | 98 | 98 | 88 | 77 | 66 | 54 | 48 | 48 | 47 | 46 | 43 | 47 | 54 | 59 | 67 | 64 | 72.9 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 67 | 70 | 73 | 76 | 75 | 78 | 80 | 82 | 80 | 75 | 65 | 55 | 53 | 46 | 45 | 55 | 52 | 50 | 72 | 76 | 73 | 76 | 80 | 84 | 68.3 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 85 | 90 | 89 | 88 | 87 | 90 | 92 | 90 | 81 | 71 | 69 | 72 | 71 | 65 | 61 | 57 | 58 | 59 | 59 | 59 | 59 | 59 | 60 | 63 | 72.3 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 65 | 81 | 84 | 89 | 91 | 93 | 92 | 91 | 89 | 83 | 81 | 76 | 77 | 80 | 79 | 70 | 67 | 69 | 72 | 74 | 75 | 74 | 75 | 78 | 79.3 | 93 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 90 | 91 | 94 | 97 | 97 | 97 | 96 | 94 | 94 | 92 | 88 | 80 | 76 | 79 | 76 | 73 | 71 | 67 | 66 | 68 | 69 | 64 | 64 | 60 | 80.9 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 67 | 75 | 80 | 81 | 80 | 78 | 80 | 85 | 79 | 67 | 52 | 49 | 46 | 45 | 43 | 42 | 42 | 43 | 42 | 41 | 44 | 51 | 55 | 58 | 59.4 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 61 | 66 | 68 | 65 | 65 | 65 | 67 | 68 | 66 | 62 | 57 | 51 | 46 | 43 | 38 | 38 | 40 | 42 | 43 | 47 | 51 | 52 | 56 | 64 | 55.0 | 68 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 61 | 62 | 68 | 74 | 79 | 83 | 85 | 81 | 84 | 78 | 73 | 63 | 56 | 52 | 46 | 43 | 38 | 61 | 74 | 80 | 81 | 75 | 62 | 57 | 67.4 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 61 | 65 | 73 | 78 | 81 | 84 | 81 | 83 | 83 | 77 | 74 | 74 | 66 | 62 | 51 | 41 | 38 | 35 | 41 | 43 | 46 | 53 | 58 | 62 | 63.0 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 59 | 58 | 60 | 62 | 68 | 71 | 70 | 72 | 74 | 70 | 65 | 61 | 47 | 45 | 41 | 40 | 39 | 39 | 39 | 41 | 44 | 48 | 52 | 53 | 55.0 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 57 | 64 | 74 | 82 | 80 | 80 | 81 | 82 | 81 | 80 | 78 | 75 | 74 | 73 | 67 | 62 | 57 | 53 | 55 | 56 | 58 | 65 | 68 | 71 | 69.7 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 77 | 80 | 81 | 80 | 82 | 83 | 83 | 83 | 79 | 74 | 75 | 72 | 71 | 69 | 69 | 71 | 74 | 79 | 79 | 80 | 82 | 88 | 95 | 96 | 79.3 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 96 | 91 | 85 | 85 | 85 | 80 | 79 | 75 | 75 | 76 | 75 | 72 | 74 | 75 | 68 | 66 | 65 | 65 | 78 | 74 | 76 | 78 | 84 | 90 | 77.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 88 | 85 | 85 | 81 | 87 | 90 | 88 | 89 | 78 | 75 | M | 64 | 60 | 52 | 50 | 47 | 48 | 51 | 52 | 55 | 60 | 59 | 60 | 66 | 68.3 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 68 | 67 | 67 | 68 | 75 | 82 | 90 | 88 | 83 | 77 | 68 | 63 | 56 | 43 | 38 | 35 | 34 | 33 | 34 | 34 | 34 | 41 | 47 | 48 | 57.3 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 52 | 57 | 59 | 59 | 60 | 60 | 59 | 58 | 61 | 63 | 58 | 41 | 35 | 34 | 31 | 31 | 30 | 32 | 34 | 37 | 40 | 41 | 45 | 48 | 46.9 | 63 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 53 | 57 | 61 | 62 | 64 | 67 | 70 | 73 | 74 | 67 | 69 | 68 | 64 | 60 | 60 | 63 | 69 | 69 | 69 | 69 | 73 | 78 | 82 | 84 | 67.3 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 85 | 86 | 83 | 82 | 85 | 87 | 85 | 85 | 78 | 69 | 68 | 63 | 58 | 53 | 48 | 36 | 32 | 32 | 32 | 33 | 34 | 37 | 40 | 42 | 59.6 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 43 | 45 | 47 | 48 | 52 | 59 | 62 | 66 | 58 | 55 | 50 | 45 | 40 | 38 | 32 | 29 | 28 | 28 | 32 | 34 | 34 | 38 | 50 | 60 | 44.7 | 66 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 56 | 55 | 61 | 62 | 63 | 65 | 70 | 66 | 64 | 61 | 55 | 50 | 45 | 43 | 41 | 36 | 33 | 34 | 35 | 40 | 44 | 45 | 47 | 49 | 50.7 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 53 | 55 | 55 | 55 | 53 | 55 | 56 | 60 | 73 | 72 | 59 | 50 | 44 | 38 | 31 | 30 | 29 | 31 | 34 | 37 | 38 | 36 | 39 | 43 | 46.9 | 73 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 47 | 50 | 54 | 59 | 59 | 60 | 60 | 59 | 58 | 56 | 53 | 46 | 37 | 33 | 31 | 29 | 28 | 30 | 31 | 31 | 34 | 35 | 39 | 45 | 44.3 | 60 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 49 | 55 | 57 | 62 | 58 | 56 | 57 | 61 | 64 | 62 | 58 | 52 | 47 | 43 | 39 | 34 | 33 | 33 | 34 | 33 | 32 | 36 | 46 | 47 | 47.8 | 64 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 53 | 56 | 60 | 62 | 73 | 73 | 72 | 73 | 71 | 66 | 61 | 57 | 55 | 53 | 52 | 51 | 51 | 48 | 49 | 53 | 55 | 57 | 62 | 67 | 59.5 | 73 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 68.4 | 70.9 | 73.0 | 74.6 | 76.1 | 77.4 | 78.2 | 78.8 | 76.9 | 73.1 | 68.0 | 63.1 | 59.1 | 55.7 | 52.5 | 50.2 | 49.3 | 50.4 | 53.4 | 55.0 | 57.2 | 59.6 | 62.8 | 65.2 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 97 | 98 | 97 | 97 | 97 | 97 | 98 | 98 | 98 | 98 | 92 | 93 | 93 | 90 | 87 | 84 | 86 | 88 | 91 | 92 | 96 | 98 | 97 | 96 | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 78 | 10.85 | 10.85 |
| 40 - 60 | 217 | 30.18 | 41.03 |
| 60 - 80 | 254 | 35.33 | 76.36 |
| 80 - 100 | 170 | 23.64 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 22 km/h on Sep 10 06:00 | Maximum Daily Speed Average: 17.8 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 14 07:00 | Minimum Daily Speed Average: 1.1 km/h on Sep 8 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 4.5 km/h at hour 14 | Minimum Diurnal Speed Average: 1.8 km/h at hour 2 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 2.6 km/h 222.7 deg | Percentiles: P ₁ = 0 P ₁₀ = 2 Q ₁ = 4 Median = 8 Q ₃ = 12 P ₉₀ = 16 P ₉₉ = 20 | 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 | N1 | ENE3 | NNE3 | NNW5 | NW4 | NNW3 | NNW4 | NW3 | NNW4 | N5 | N4 | E3 | ESE9 | ESE8 | SE7 | S2 | NNE4 | SE1 | NNW3 | NW3 | NW3 | NW3 | W8 | W10 | NNW1.5 | W10 |
| 2-Sep | W9 | SW9 | WSW8 | WNW9 | WSW10 | WSW8 | W11 | WSW6 | WSW9 | W8 | WSW8 | W11 | W9 | W8 | W7 | WNW9 | WNW5 | WNW6 | NE1 | NW3 | NW6 | NW4 | WNW9 | NNW8 | W6.9 | W11 |
| 3-Sep | N9 | NNW7 | NW6 | NW8 | WNW12 | WNW13 | WNW13 | WNW14 | WNW17 | WNW13 | NW13 | NW12 | NW11 | NW11 | NW9 | NNW7 | NW10 | NNW11 | NNW11 | NNW12 | NNW14 | NW12 | NW11 | NW12 | NW10.9 | WNW17 |
| 4-Sep | NW12 | NW10 | NNW6 | NW8 | NW7 | WNW6 | NW5 | WNW6 | W7 | W7 | W9 | W10 | W8 | W6 | WNW4 | W6 | WSW5 | SW5 | NNW3 | NNW1 | S2 | SW9 | SW7 | WSW6 | WNW5.5 | NW12 |
| 5-Sep | WSW5 | SSW5 | S5 | S9 | SSE10 | SSE7 | SSE7 | SE6 | SSE8 | SSE9 | SSW10 | SSW10 | SSW10 | S8 | SSE8 | S8 | S9 | SSE5 | SSE4 | SSW1 | ESE3 | SSE6 | SSE15 | S6.7 | SSE15 | |
| 6-Sep | SSE10 | SSE8 | SSE8 | SSE13 | SSE13 | SSE13 | SSE11 | SSE11 | SSE10 | S11 | S11 | SSE11 | SSE12 | SSE10 | SSE13 | S18 | S14 | S16 | SSW10 | SSW8 | SSE10 | SSE8 | SSE7 | SE5 | SSE10.6 | S18 |
| 7-Sep | E3 | ESE3 | SE4 | SE4 | SE4 | SE6 | SSE9 | S8 | S7 | SSE7 | SSE8 | SSE9 | SSE8 | SSE9 | SSE9 | SE7 | SSE8 | SSE6 | SSW3 | WSW3 | SSW3 | S2 | ESE1 | SSE4 | SSE5.2 | SSE9 |
| 8-Sep | SSE1 | SE5 | SSE4 | SE5 | SE6 | SE6 | SE7 | SE8 | SE6 | SW2 | SW3 | SSW2 | WSW5 | W4 | NW3 | NNW3 | SW1 | WNW8 | NE4 | NNW2 | NNW2 | NNW3 | NNW2 | NNW3 | S1.1 | WNW8 |
| 9-Sep | N2 | NW3 | NNW4 | NNW5 | NNW3 | NNW4 | NE4 | NNE5 | N8 | N7 | NNW5 | SW3 | S2 | W4 | WSW5 | SSE3 | SSE9 | SSE7 | SE4 | SE6 | SE8 | SE12 | SE15 | SSE17 | SE1.6 | SSE17 |
| 10-Sep | S17 | SSE13 | SSE16 | SSE21 | SSE21 | SSE22 | SSE18 | SSE15 | S8 | WSW12 | W13 | W13 | W13 | W14 | WNW12 | NW12 | NW16 | WNW15 | WNW14 | WNW16 | WNW18 | NW16 | NW13 | NW16 | WSW6.3 | SSE22 |
| 11-Sep | NNW12 | NNW14 | NNW13 | NNW14 | NNW16 | NNW15 | N15 | N15 | N16 | N14 | N13 | N17 | N15 | N14 | N14 | N13 | N10 | NNW8 | NNW6 | NNW6 | NNW4 | NW5 | NNW4 | NNW4 | N11.4 | N17 |
| 12-Sep | NNW4 | NNW3 | NNW2 | NNW2 | NNW2 | WNW4 | W3 | W2 | WSW6 | WSW7 | WSW8 | W7 | SW8 | SW8 | SW7 | SW9 | SSW8 | S12 | S15 | S15 | S17 | SSE18 | SSE17 | S16 | SSW5.8 | SSE18 |
| 13-Sep | SSE16 | SSE10 | ESE7 | SE10 | SSE12 | SSE15 | SSE12 | SE12 | S10 | SW9 | SW9 | SW10 | SW14 | WSW14 | W12 | WSW15 | WSW14 | WSW15 | WSW12 | WSW13 | W10 | W12 | WNW9 | WNW3 | SW7.6 | SSE16 |
| 14-Sep | NNW3 | NW3 | NW2 | NNW3 | W0 | W0 | NE0 | NNW2 | NNW2 | SE3 | SSE5 | SSE11 | SSE9 | SSE11 | WSW9 | W11 | W13 | NNW13 | N8 | NW2 | S1 | SE2 | NE2 | NW2 | WSW1.3 | NNW13 |
| 15-Sep | NW4 | SSW1 | NNW0 | NNW3 | NNW1 | SE0 | WNW2 | NNE1 | ENE3 | NE3 | S2 | S2 | S5 | SSE3 | SE7 | SE10 | SE10 | SE8 | SE3 | SE12 | SSE16 | SSE9 | S4 | S5 | SSE3.5 | SSE16 |
| 16-Sep | SSE6 | SE5 | SE7 | SE7 | SE8 | SE7 | SE10 | SSE10 | SSE12 | SSE11 | SE11 | SE12 | SW15 | SW21 | WSW17 | WSW17 | WSW12 | WSW9 | WSW8 | W4 | W4 | WSW3 | SSE2 | SSE4 | SSW5.7 | WSW21 |
| 17-Sep | SE5 | S7 | SSW7 | SE7 | SE9 | SSE9 | SE3 | SE4 | S5 | SSW6 | SW8 | SW7 | SW9 | SW8 | WSW9 | WSW9 | W11 | WNW11 | W3 | WSW5 | WSW8 | W8 | W11 | W6 | SW5.0 | W11 |
| 18-Sep | SSE3 | SSE3 | SSE4 | W0 | NE1 | SE5 | WSW3 | WNW6 | W8 | WNW12 | NW14 | NNW15 | NW12 | NW14 | NNW10 | N9 | NNW8 | NNW6 | NNW4 | NNW3 | NNW3 | N5 | NNW4 | NNW3 | NW4.7 | WNW15 |
| 19-Sep | NW3 | NNW5 | NNW6 | NNW5 | NNW6 | NNW5 | WNW8 | NW12 | NW14 | NW12 | NW8 | NW6 | NNW6 | NNW5 | NNW7 | NNW7 | N8 | NNW6 | N6 | NNW5 | NNW4 | NW4 | N7 | NW5 | NNW6.2 | NW14 |
| 20-Sep | NNW5 | NNW6 | NNW3 | NNW3 | NNW4 | NW4 | NNW3 | NW2 | N5 | N4 | M | NW2 | NNE3 | ENE2 | WSW4 | SW1 | SSE3 | ESE3 | ENE1 | NE3 | ENE3 | SE1 | ESE3 | NE2 | N1.7 | NNW6 |
| 21-Sep | SE4 | N1 | ENE1 | SSE2 | SE2 | SSW2 | SSE3 | SSE4 | SSE3 | SSE4 | SSE6 | SSE10 | SSE8 | WSW8 | WSW10 | W10 | WSW10 | WSW12 | SW8 | SW9 | SW9 | SE1 | SE8 | SE7 | SSW4.1 | WSW12 |
| 22-Sep | SE9 | SE6 | SSE11 | SSE13 | SSE15 | SSE15 | SSE14 | SSE17 | SSE12 | SSE11 | SSE11 | S13 | SW17 | SW15 | SSW14 | SSW15 | SSW16 | S13 | S13 | S12 | S12 | SSE13 | SSE13 | SSE17 | S12.1 | SSE17 |
| 23-Sep | SSE20 | SSE17 | SSE12 | SSE14 | SSE19 | SSE19 | SSE16 | SSE14 | SSE13 | SSE21 | SSE22 | SSE19 | SSE20 | S21 | SSE20 | S18 | S18 | SSE17 | S17 | S19 | S17 | S19 | S19 | S20 | SSE17.8 | SSE22 |
| 24-Sep | S19 | SSE18 | SSE16 | SSE15 | SSE16 | S10 | SSE10 | S9 | S7 | WSW15 | W16 | W16 | W16 | W19 | WNW16 | WNW19 | NW21 | NW14 | NW7 | W8 | W11 | W16 | W16 | W15 | WSW8.4 | NW21 |
| 25-Sep | W15 | W16 | W15 | W13 | WNW8 | WNW6 | WNW6 | W5 | WNW10 | W9 | W12 | NW12 | NW11 | NW10 | NW11 | NW10 | NNW6 | NNW4 | WSW1 | S1 | SSW1 | SSE3 | SE4 | E1 | WNW6.7 | W16 |
| 26-Sep | SSE2 | SE3 | SE5 | SE4 | SE6 | SE6 | SE7 | ESE4 | SSE7 | S10 | SSE11 | SSE14 | SSE16 | SSE15 | SSE16 | S16 | SSW15 | S13 | S15 | SSE16 | SSE17 | SSE17 | SSE20 | SSE14 | SSE10.7 | SSE20 |
| 27-Sep | SSE11 | S4 | SSE7 | SSE6 | SSE6 | WSW7 | W7 | W11 | SW14 | W15 | NW17 | WNW15 | WNW13 | WNW17 | WNW18 | W20 | W19 | W14 | WSW12 | W9 | W9 | W13 | WNW6 | W8 | W9.1 | W20 |
| 28-Sep | W7 | W9 | W10 | W4 | SSE5 | SSE7 | SE6 | SE8 | SSE11 | SE9 | SE7 | SSE4 | SSW3 | SE2 | W5 | W5 | SW10 | WSW6 | SW2 | NNW2 | SSE2 | SE4 | SE6 | SE5 | SSW3.2 | SSE11 |
| 29-Sep | NNE1 | N3 | N1 | WSW1 | E1 | SE2 | SE7 | SE6 | SE8 | SSE8 | SSE8 | SSE5 | SE5 | SSE5 | SE5 | SE4 | S3 | ESE4 | WNW1 | N1 | S1 | W1 | NNW4 | NW3 | SE2.4 | SSE8 |
| 30-Sep | NW1 | NW2 | NW2 | NW3 | NW4 | NNW4 | N2 | NNW4 | NNW4 | N9 | N13 | N13 | N13 | N13 | NNE16 | NNE17 | NNE16 | NNE15 | N13 | N13 | N11 | N9 | N11 | N13 | N8.9 | NNE17 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|-------|-------|-------|-------|-------|-------|--------|-------|--------|--------|-------|--------|--------|--------|--------|--------|--------|-------|-------|-------|--------|--------|-----------------|-----------------|--|
| SSW2.3SSW1.8 | S1.9 | S2.1 | S3.0 | S3.2 | S2.9 | S2.5 | SSW2.6 | SW3.3 | WSW3.3 | WSW3.5 | SW4.1 | WSW4.9 | WSW4.2 | WSW4.9 | WSW4.4 | WSW3.5 | WSW2.2 | SW2.4 | SW2.6 | SW2.4 | SSW2.3 | SSW2.6 | Diurnal Average | | |
| SSE20 | SSE18 | SSE16 | SSE21 | SSE21 | SSE22 | SSE18 | SSE17 | WNW17 | SSE21 | SSE22 | SSE19 | SSE20 | S21 | SSE20 | W20 | NW21 | SSE17 | S17 | S19 | WNW18 | S19 | SSE20 | S20 | 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 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 10 km/h on Sep 24 17:00 | Hours of Data: 719 |
| Minimum Value: 1 km/h on Sep 15 02:00 | Hours of Missing Data: 1 |
| 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: 99.9 |

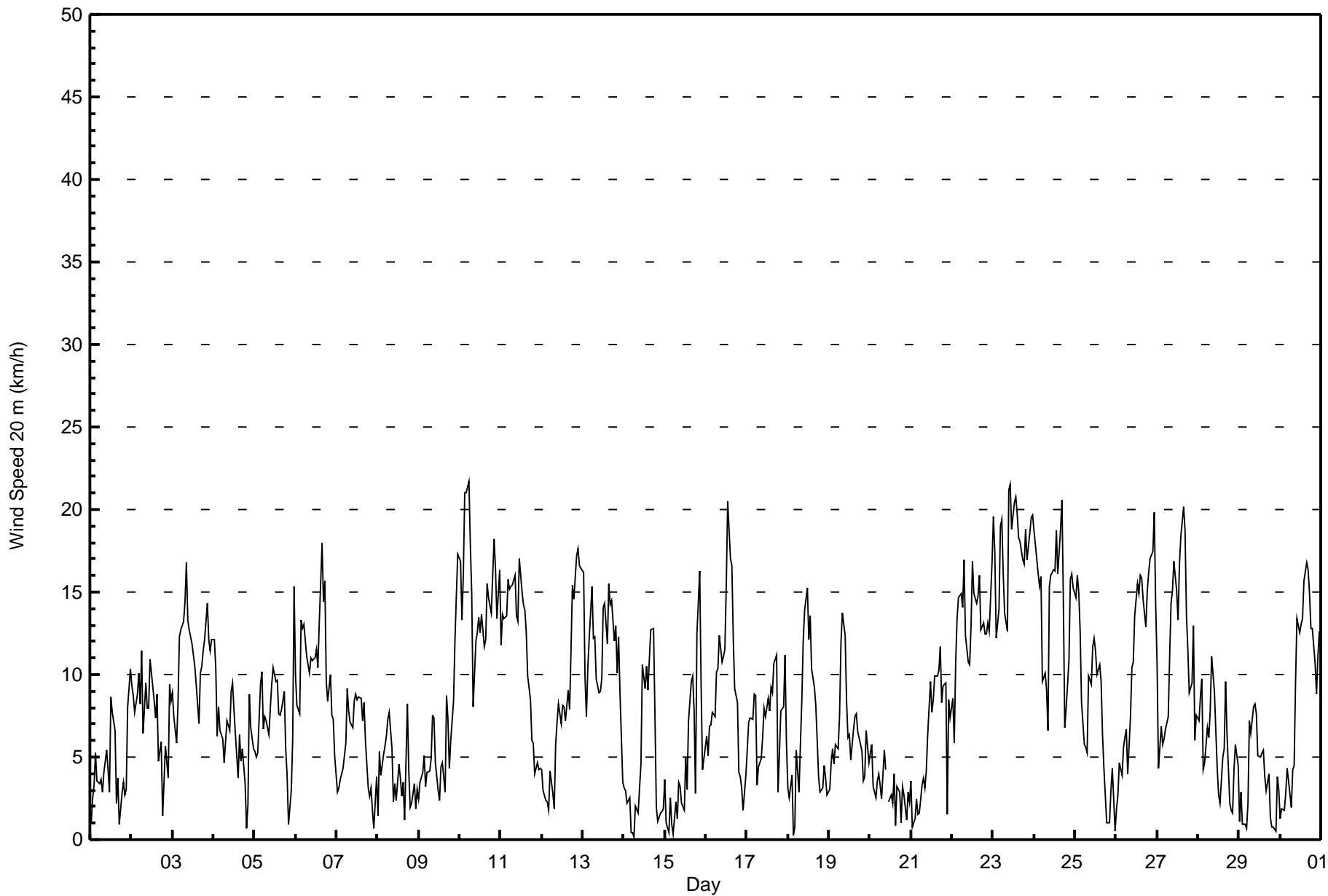
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8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

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 249 | 34.63 | 34.63 |
| 6 - 11 | 263 | 36.58 | 71.21 |
| 12 - 19 | 193 | 26.84 | 98.05 |
| 20 - 28 | 14 | 1.95 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

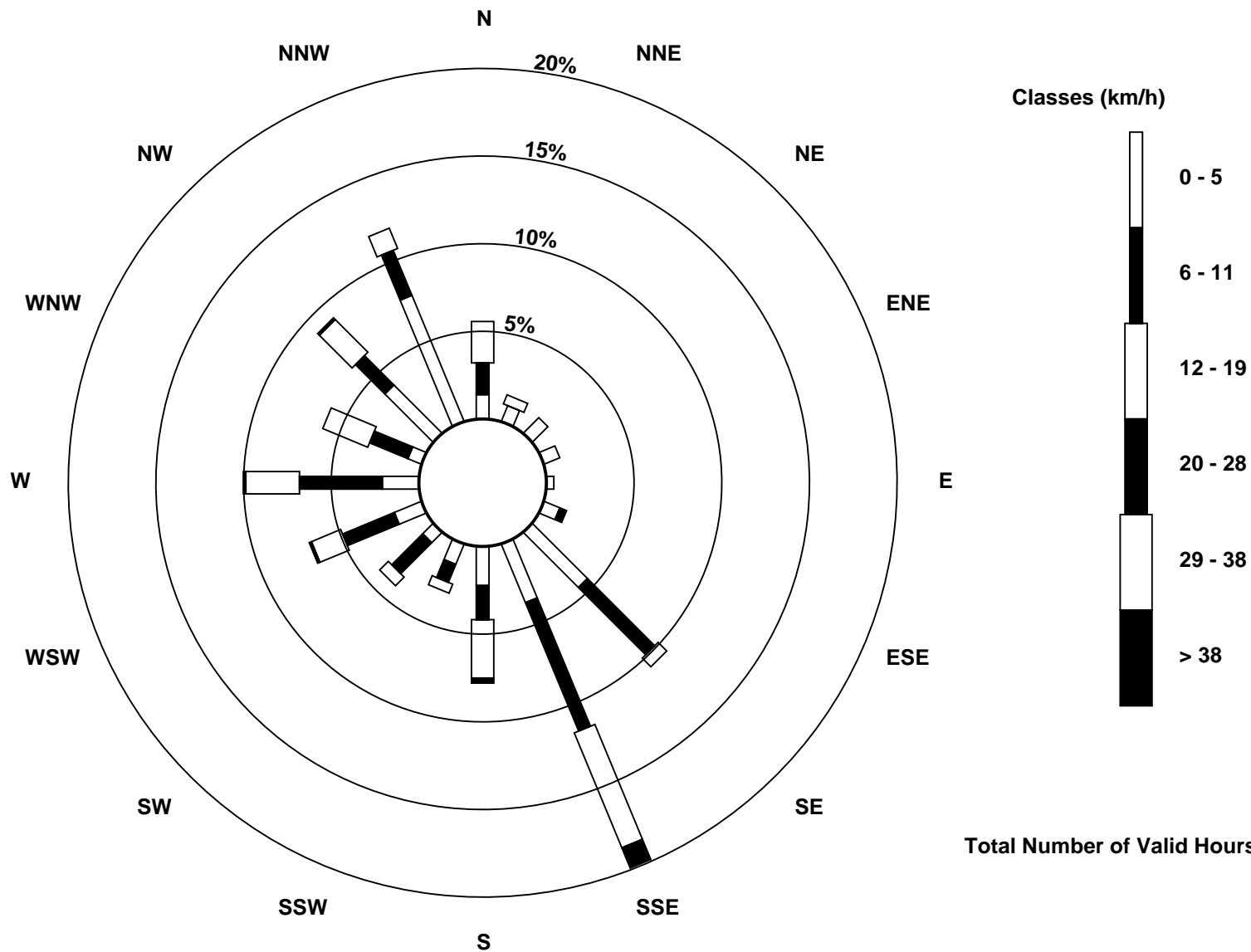
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 719



| | | |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 28 km/h on Sep 27 16:00 | Maximum Daily Speed Average: 20.7 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 29 22:00 | Minimum Daily Speed Average: 3.2 km/h on Sep 29 | Hours of Data: 228 |
| Maximum Diurnal Speed Average: 7.7 km/h at hour 1 | Minimum Diurnal Speed Average: 4.0 km/h at hour 11 | Hours of Missing Data: 492 |
| Monthly Average Velocity: 5.1 km/h 196.7 deg | Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 8 Median = 14 Q ₃ = 19 P ₉₀ = 23 P ₉₉ = 28 | Percent Operational Time: 31.7 |

| 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 | AF | 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 | SSE9 | SW10 | WSW12 | WSW13 | WSW14 | SW15 | SSW12 | SSW13 | SSW14 | SSE2 | SE10 | SE11 | ---- | SW15 | |
| 22-Sep | SE11 | SE8 | SE13 | SSE16 | SSE18 | SSE19 | SE18 | SSE20 | SE15 | SE13 | SE12 | S16 | SW20 | SSW18 | SSW17 | SSW16 | S17 | S14 | S15 | S14 | SSE16 | SSE14 | SSE20 | SSE14.4 | SW20 | | |
| 23-Sep | SSE23 | SSE21 | SSE16 | SSE18 | SSE23 | SSE23 | SE20 | SE18 | SE17 | SSE24 | SSE25 | SSE22 | SSE25 | SSE24 | SSE24 | SSE20 | SSE20 | SSE19 | SSE21 | SSE19 | SSE20 | SSE21 | SSE21 | SSE20.7 | SSE25 | | |
| 24-Sep | SSE21 | SSE20 | SSE19 | SSE17 | SSE18 | SSE11 | SSE10 | SE10 | S7 | WSW22 | W22 | W23 | W23 | W26 | W22 | WNW26 | WNW28 | WNW20 | WNW10 | W12 | W16 | W23 | W24 | W23 | WSW12.0 | WNW28 | |
| 25-Sep | W22 | W24 | W23 | W20 | W13 | W9 | W9 | W8 | W14 | W12 | W16 | WNW16 | WNW13 | NW14 | NW13 | NNW10 | NNW8 | W1 | S2 | S1 | SSE4 | SSE5 | SE1 | W9.8 | W24 | | |
| 26-Sep | SE4 | SE6 | SE7 | SE6 | SE8 | ESE9 | SE10 | ESE6 | SSE9 | SSE13 | SSE13 | SSE16 | SSE18 | SSE17 | SSE19 | SSE18 | S18 | S15 | S17 | SSE20 | SSE20 | SSE20 | SSE23 | SE19 | SSE13.3 | SSE23 | |
| 27-Sep | SSE14 | SSE6 | SE10 | SE9 | SE9 | WSW10 | W11 | W16 | SW19 | WSW21 | WNW23 | WNW20 | WNW18 | W23 | WNW25 | W28 | W27 | WSW19 | WSW16 | WSW13 | W14 | W18 | W9 | W12 | W12.6 | W28 | |
| 28-Sep | WSW11 | W13 | WSW15 | WSW9 | SSE5 | SSE8 | SE8 | SE10 | SE14 | SE11 | SE7 | SSE5 | SSW3 | ESE3 | W6 | WSW7 | SW12 | SW9 | SSW4 | WSW2 | SE3 | ESE6 | SE9 | SE7 | S4.5 | WSW15 | |
| 29-Sep | ESE1 | N3 | N1 | SW1 | SE2 | SE4 | SE10 | SE9 | SE9 | SE10 | SE8 | SE5 | SE5 | SE6 | SE6 | SE4 | SSE4 | ESE6 | ESE1 | NNE1 | SSE1 | N1 | NNW7 | NNW4 | SE3.2 | SE10 | |
| 30-Sep | NW2 | NNW3 | NNW2 | NW3 | NNW7 | NNW6 | N4 | NNW7 | NNW7 | N13 | N18 | N17 | N18 | N19 | N24 | N25 | NNE25 | NNE22 | N19 | N18 | N15 | N13 | N16 | N19 | N13.2 | NNE25 | |
| S7.7 S5.5 S6.4 S6.4 SSE7.7 SSE6.8 SSE6.7 SSE6.3 S7.2 SSW7.0 SW4.0 SW4.6 SW5.1 SW6.5 WSW5.4 WSW7.2 WSW7.1 SW4.4 SSW5.2 SSW5.2 SSW5.6 S5.3 S5.0 S4.9 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| SSE23 W24 W23 W20 SSE23 SSE23 SE20 SSE20 SW19 SSE24 SSE25 W23 SSE25 W26 WNW25 W28 WNW28 NNE22 N19 SSE21 SSE20 W23 W24 W23 | | | | | | | | | | | | | | | | | | | | | | | | 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 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 10 km/h on Sep 24 17:00 | Hours of Data: 228 |
| Minimum Value: 1 km/h on Sep 29 04:00 | Hours of Missing Data: 492 |
| Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 4 Q ₃ = 5 P ₉₀ = 7 P ₉₉ = 8 | Hours of Calibration: 0 |
| | Percent Operational Time: 31.7 |

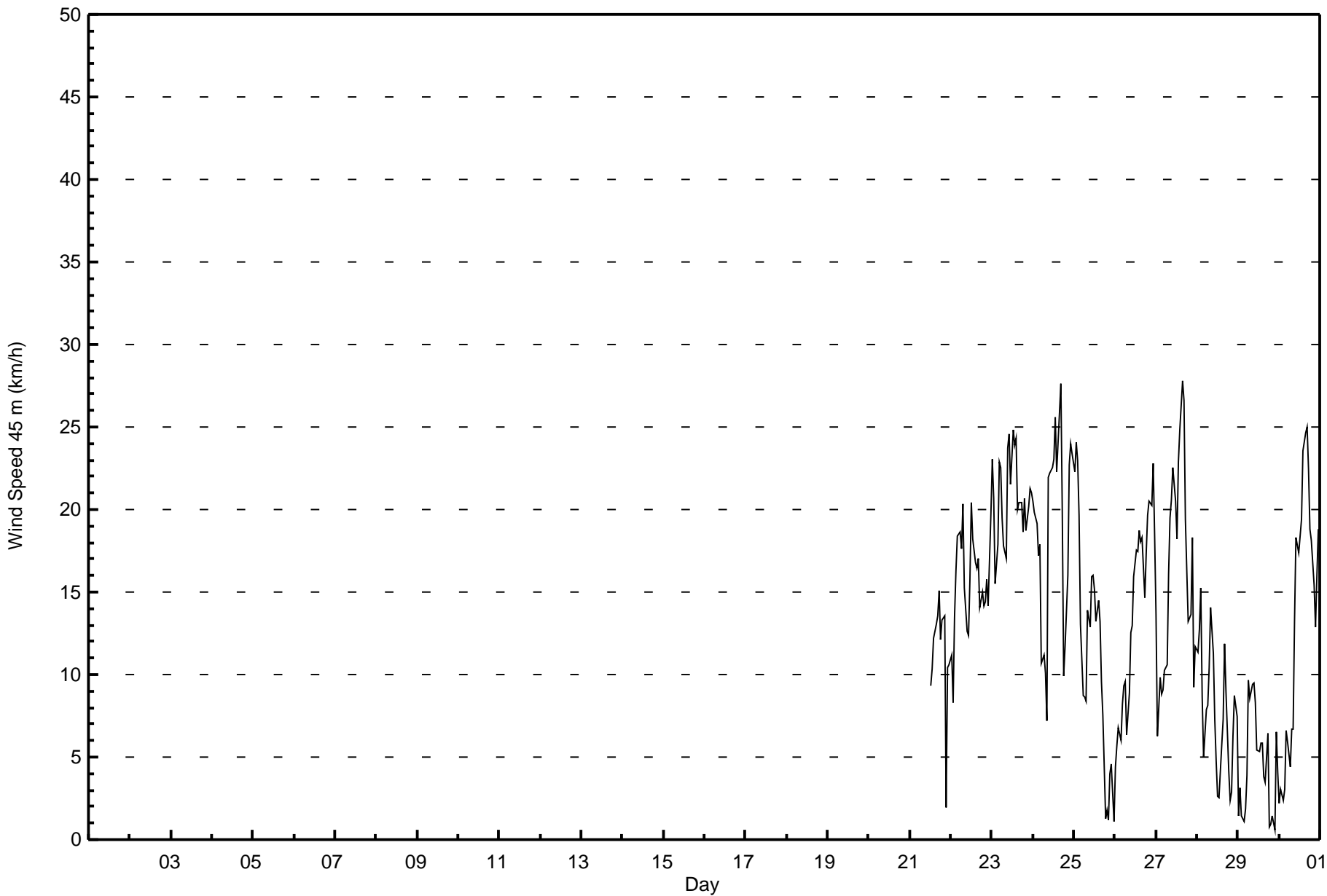
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | | |
|-----------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|----|----|
| | 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 | AF | 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 | 3 | 4 | 5 | 5 | 3 | 2 | 3 | 4 | 4 | 3 | 2 | 2 | 2 | 5 | |
| 22-Sep | 2 | 3 | 3 | 5 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 6 | 5 | 4 | 4 | 3 | 2 | 3 | 3 | 3 | 3 | 5 | 6 | | |
| 23-Sep | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 8 | 6 | 6 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 8 | |
| 24-Sep | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 7 | 6 | 6 | 7 | 7 | 8 | 7 | 10 | 7 | 2 | 3 | 4 | 4 | 5 | 6 | 10 | | |
| 25-Sep | 5 | 6 | 6 | 6 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 6 | 4 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 6 | | |
| 26-Sep | 2 | 1 | 2 | 1 | 3 | 2 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | | |
| 27-Sep | 5 | 4 | 5 | 3 | 5 | 6 | 3 | 7 | 6 | 7 | 8 | 7 | 7 | 6 | 9 | 8 | 8 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 9 | | |
| 28-Sep | 2 | 4 | 3 | 5 | 3 | 2 | 2 | 4 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 3 | 4 | 4 | 2 | 2 | 2 | 2 | 3 | 4 | 5 | | |
| 29-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | | |
| 30-Sep | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 5 | 5 | 7 | 7 | 9 | 7 | 8 | 8 | 6 | 5 | 5 | 4 | 5 | 6 | 9 | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 35 | 15.35 | 15.35 |
| 6 - 11 | 57 | 25.00 | 40.35 |
| 12 - 19 | 82 | 35.96 | 76.32 |
| 20 - 28 | 54 | 23.68 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

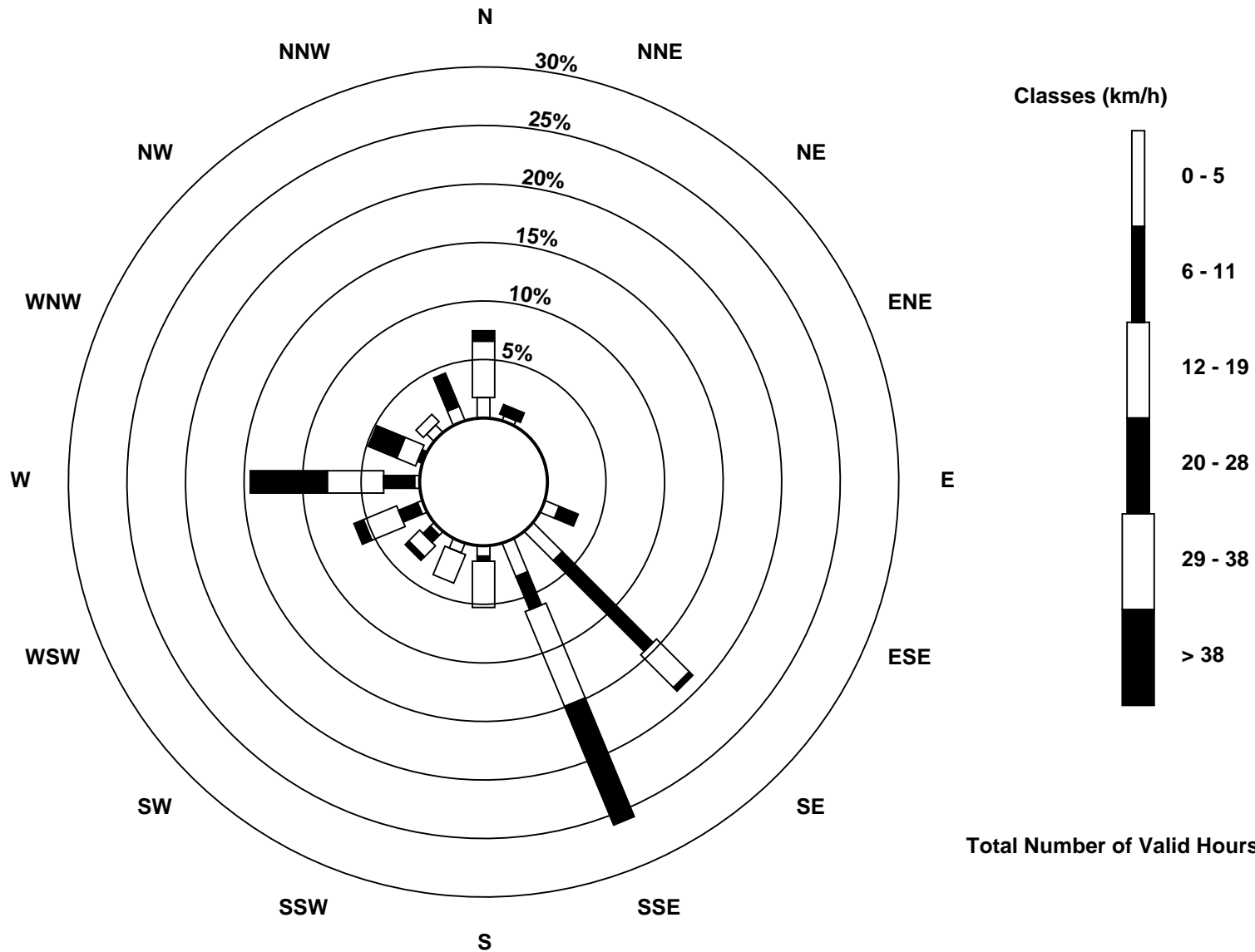
Total Number of Valid Hours: 228

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





| | | |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 40 km/h on Sep 25 02:00 | Maximum Daily Speed Average: 28.3 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 20 16:00 | Minimum Daily Speed Average: 2.8 km/h on Sep 14 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 7.5 km/h at hour 16 | Minimum Diurnal Speed Average: 3.1 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 5.0 km/h 233.1 deg | Percentiles: P ₁ = 2 P ₁₀ = 7 Q ₁ = 10 Median = 15 Q ₃ = 23 P ₉₀ = 29 P ₉₉ = 37 | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | E12 | ESE11 | ESE12 | NE5 | N10 | NNW11 | N9 | NNE7 | NE8 | NNE7 | NNW9 | E8 | ESE16 | ESE15 | ESE14 | SE6 | NNE12 | SE4 | NNE9 | N7 | NW8 | NW10 | W16 | W21 | NE3.6 | W21 |
| 2-Sep | WSW22 | SW16 | WSW17 | W20 | WSW21 | WSW20 | WSW23 | WSW10 | WSW14 | WSW12 | WSW11 | WSW17 | WSW15 | WSW14 | WSW13 | W17 | WNW8 | W11 | N5 | NW6 | NNW12 | WNW13 | WNW22 | NW22 | W13.8 | WSW23 |
| 3-Sep | N21 | NNW21 | NW15 | NNW20 | NNW29 | NNW30 | W28 | NNW28 | NNW33 | NNW28 | NW28 | NW26 | NW23 | NW22 | NW23 | NW19 | NW25 | NNW26 | NNW29 | NW28 | NW33 | NW28 | NW26 | NNW26 | NW24.3 | WNW33 |
| 4-Sep | NNW27 | NNW26 | NW19 | NNW26 | NNW17 | W14 | W11 | NNW11 | W11 | W9 | W15 | W16 | W12 | W9 | W7 | W9 | WSW7 | SW8 | N8 | NE8 | S5 | WSW17 | WSW15 | WSW14 | W11.6 | WNW27 |
| 5-Sep | WSW11 | SW9 | SSW7 | S9 | SSE11 | SSE11 | SSE12 | SE11 | SE10 | SE9 | SSE14 | SSW14 | SSW12 | SSW12 | S10 | SSE12 | S11 | SSE12 | SE16 | SE19 | SE12 | SE11 | SE16 | SSE28 | SSE11.1 | SSE28 |
| 6-Sep | SSE20 | SSE18 | SSE18 | SSE17 | SSE17 | SSE16 | SSE18 | SSE16 | SSE14 | SSE13 | SSE14 | SE19 | SE18 | SSE14 | SSE21 | SSE22 | S18 | S22 | S16 | S17 | SSE16 | SSE17 | SE20 | SE19 | SSE17.2 | SSE22 |
| 7-Sep | SE13 | SSE15 | SSE12 | SSE9 | SSE10 | SSE11 | SSE15 | SSE14 | SSE11 | SE10 | SE14 | SE14 | SE12 | SE13 | SE13 | SE11 | SSE11 | SSE9 | SSW11 | SW15 | SW11 | SW9 | W4 | SSW7 | SSE9.6 | SSE15 |
| 8-Sep | SW11 | SW7 | SW9 | SW6 | S4 | S5 | S5 | SSW7 | SSW4 | W2 | SSW2 | S1 | WSW5 | W6 | NNW7 | NNW11 | SSW5 | W19 | NE13 | N3 | NW9 | NNW16 | NNW15 | NNW14 | W3.7 | W19 |
| 9-Sep | NNW13 | NNW9 | NNW11 | NNW11 | N9 | N10 | NE9 | NNE11 | N14 | N13 | NNW8 | WSW3 | SSW3 | WSW7 | WSW7 | SSE3 | SE12 | SE14 | SE15 | SE17 | SE24 | SE29 | SE35 | SE38 | ESE4.1 | SE38 |
| 10-Sep | SSE27 | SE29 | SE34 | SSE38 | SSE33 | SSE33 | SSE30 | SSE23 | S14 | WSW21 | W24 | W27 | WSW23 | W24 | W22 | NNW24 | NNW31 | W29 | NNW27 | NNW34 | NNW35 | NNW33 | NNW28 | NNW31 | WSW12.8 | SSE38 |
| 11-Sep | NNW29 | NNW33 | NNW32 | NNW32 | NNW37 | NNW36 | N34 | N33 | N34 | NNW29 | NNW29 | N33 | NNW28 | NNW29 | N27 | N24 | NNW21 | NNW19 | NNW16 | NNW16 | NNW11 | NW14 | NW12 | NW12 | NNW25.5 | NNW37 |
| 12-Sep | NW11 | NW9 | NNW7 | NNW5 | W6 | WSW12 | WSW9 | WSW5 | WSW7 | WSW10 | WSW11 | WSW10 | SW12 | SSW11 | SW11 | SW13 | SSW11 | SSE15 | SSE19 | S27 | S28 | S26 | SSW23 | S27 | SSW9.9 | S28 |
| 13-Sep | S25 | SSE15 | SE13 | SSE10 | SSE16 | SSE16 | SSE14 | SSE16 | SSW11 | SW14 | SW13 | SW15 | SW21 | SW21 | WSW21 | WSW25 | WSW24 | SW27 | WSW27 | WSW28 | WSW25 | WSW28 | W26 | W14 | SW15.5 | WSW28 |
| 14-Sep | WNW11 | NW10 | NNW10 | NNW9 | N6 | E1 | WSW1 | ESE3 | E1 | SE8 | SE10 | SE16 | SE14 | SE19 | SW15 | WSW18 | WSW24 | NNW27 | N19 | N7 | SSW2 | SW5 | W9 | NNW16 | WNW2.8 | NNW27 |
| 15-Sep | NNW14 | NNW9 | N3 | NNE8 | NNE10 | NE8 | NE12 | ENE6 | ENE8 | ENE6 | ESE2 | SE3 | SE7 | SE7 | SE14 | SE18 | SE21 | SE21 | SE19 | SE33 | SE37 | SE28 | SE18 | SE17 | ESE9.4 | SE37 |
| 16-Sep | SSE17 | SSE12 | SSE9 | S8 | S9 | SSE11 | S11 | S11 | S10 | SSE16 | SSE19 | SW24 | SW30 | WSW29 | WSW27 | WSW23 | WSW18 | WSW20 | SW16 | SW18 | SW18 | SW9 | SSW7 | SSW12.9 | SW30 | |
| 17-Sep | SSW7 | SW19 | SW19 | SE11 | SSE9 | S9 | SSW10 | SSW9 | SSW10 | SSW10 | SW11 | SW11 | SW13 | SW12 | WSW15 | WSW14 | WSW20 | W24 | WSW11 | WSW19 | WSW22 | WSW20 | WSW25 | WSW20 | SW12.8 | WSW25 |
| 18-Sep | WSW9 | WSW7 | WSW7 | W6 | W8 | SW7 | WSW12 | W15 | W17 | W24 | NNW27 | NNW27 | NW22 | NW27 | NW23 | NNW20 | NNW20 | NNW16 | NNW12 | N9 | NNW9 | N10 | N8 | N7 | NW11.9 | WNW27 |
| 19-Sep | NNW7 | NNW14 | NNW14 | NNW13 | NNW14 | NW15 | NNW19 | NNW27 | NNW27 | NNW24 | NNW16 | NW11 | NNW12 | NW9 | NNW13 | NW17 | NNW16 | NNW14 | NNE13 | NNW15 | NNW10 | NW11 | NNW14 | NNW14 | NW13.9 | WNW27 |
| 20-Sep | N15 | NNW16 | NNW10 | NNW11 | NNW12 | N11 | N9 | NNW6 | N9 | N7 | M | NW5 | N5 | NNE3 | WSW4 | WNW1 | SE4 | E11 | E12 | ESE9 | ESE9 | ESE10 | SSE9 | SE7 | NNE3.7 | NNW16 |
| 21-Sep | SE9 | SSE8 | SSE7 | S8 | SSW9 | SW11 | SSW6 | SSW6 | S3 | S4 | SSE8 | SE15 | SSE12 | SW11 | WSW15 | WSW16 | WSW15 | SW19 | SW24 | SW30 | SW33 | SSW7 | SSE5 | SSE6 | SSW9.9 | SW33 |
| 22-Sep | SSE11 | SE15 | SSE14 | SSE19 | SSE21 | SSE21 | SSE22 | SSE24 | SE18 | SE16 | SE16 | S20 | SW24 | SSW21 | SSW20 | SSW17 | S18 | S18 | S22 | S26 | S24 | SSE23 | SSE21 | SSE25 | S18.3 | S26 |
| 23-Sep | SSE28 | SSE29 | SSE24 | SSE28 | SSE32 | SSE30 | SSE28 | SSE29 | SE29 | SSE31 | SSE30 | SSE28 | SSE35 | SSE31 | SSE36 | SSE25 | SSE29 | SE33 | SSE26 | SSE26 | SSE23 | SSE24 | SSE26 | SSE24 | SSE28.3 | SSE36 |
| 24-Sep | SSE23 | SSE24 | SSE26 | SSE21 | SSE22 | S17 | S13 | S9 | SSW10 | WSW26 | WSW29 | W29 | W31 | W34 | W29 | NNW35 | NNW37 | NNW31 | NNW18 | W19 | W25 | W32 | W36 | W36 | WSW17.7 | WNW37 |
| 25-Sep | W39 | W40 | W39 | W34 | W26 | W15 | W16 | W16 | W19 | W15 | W18 | NNW19 | NNW19 | NNW17 | NNW19 | NNW14 | NNW12 | NE5 | SSE2 | S3 | WSW5 | WSW6 | SE5 | W15.4 | W40 | |
| 26-Sep | SSE7 | SSE13 | SSE16 | SSE12 | SSE13 | SSE16 | SSE15 | SE15 | SE18 | SE22 | SSE16 | SSE19 | SSE19 | SSE20 | SSE21 | S21 | SSW20 | S22 | S31 | SSE25 | SSE27 | SSE28 | SSE31 | SSE27 | SSE19.3 | SSE31 |
| 27-Sep | SE25 | SE19 | SE21 | SE19 | SSE19 | WSW20 | W18 | W23 | SW26 | WSW29 | NNW30 | NNW27 | NNW24 | W30 | NNW32 | W38 | W36 | WSW28 | WSW24 | WSW21 | WSW24 | W29 | W17 | W17 | WSW17.7 | W38 |
| 28-Sep | WSW17 | W22 | WSW21 | WSW16 | SW7 | SSW6 | S8 | SSE11 | S8 | SE13 | SE9 | SSE5 | SW3 | SE2 | W7 | WSW9 | SW13 | SW14 | SSW12 | SSW10 | SSW7 | SSW6 | SSW7 | SSE6 | SW7.5 | W22 |
| 29-Sep | SE13 | SE9 | SE6 | SE8 | SSE10 | SSE10 | SSE11 | S10 | SSE7 | SE10 | SE9 | SE6 | SE6 | SE6 | SE6 | ESE4 | SE4 | ESE9 | E13 | E6 | ESE8 | SE10 | NNW11 | N13 | SE6.2 | N13 |
| 30-Sep | NNW10 | NNW11 | N13 | NNW11 | NNW14 | N14 | N12 | N13 | N11 | N19 | N25 | N26 | N27 | N28 | NNE34 | NNE35 | NNE36 | NNE33 | NNE29 | NNE28 | NNE25 | NNE19 | NNE25 | N28 | N21.5 | NNE36 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|--------|--------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|------|--------|--------|-------|-------|-------|-------|--------|-------|-----------------|
| SW4.3 | SW3.8 | SSW4.2 | SSW3.8 | SSW4.1 | SSW4.7 | SSW4.5 | SSW4.1 | SW4.0 | WSW5.0 | WSW5.0 | WSW5.2 | WSW6.0 | WSW6.0 | WSW6.7 | W7.5 | WSW7.0 | WSW5.8 | SW3.1 | SW5.6 | SW6.6 | SW6.4 | WSW6.2 | SW5.2 | Diurnal Average |
| W39 | W40 | W39 | SSE38 | NNW37 | NNW36 | N34 | N33 | N34 | SSE31 | WNW30 | N33 | SSE35 | W34 | SSE36 | W38 | NNW37 | NNE33 | S31 | NNW34 | SE37 | WNW33 | W36 | SE38 | 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

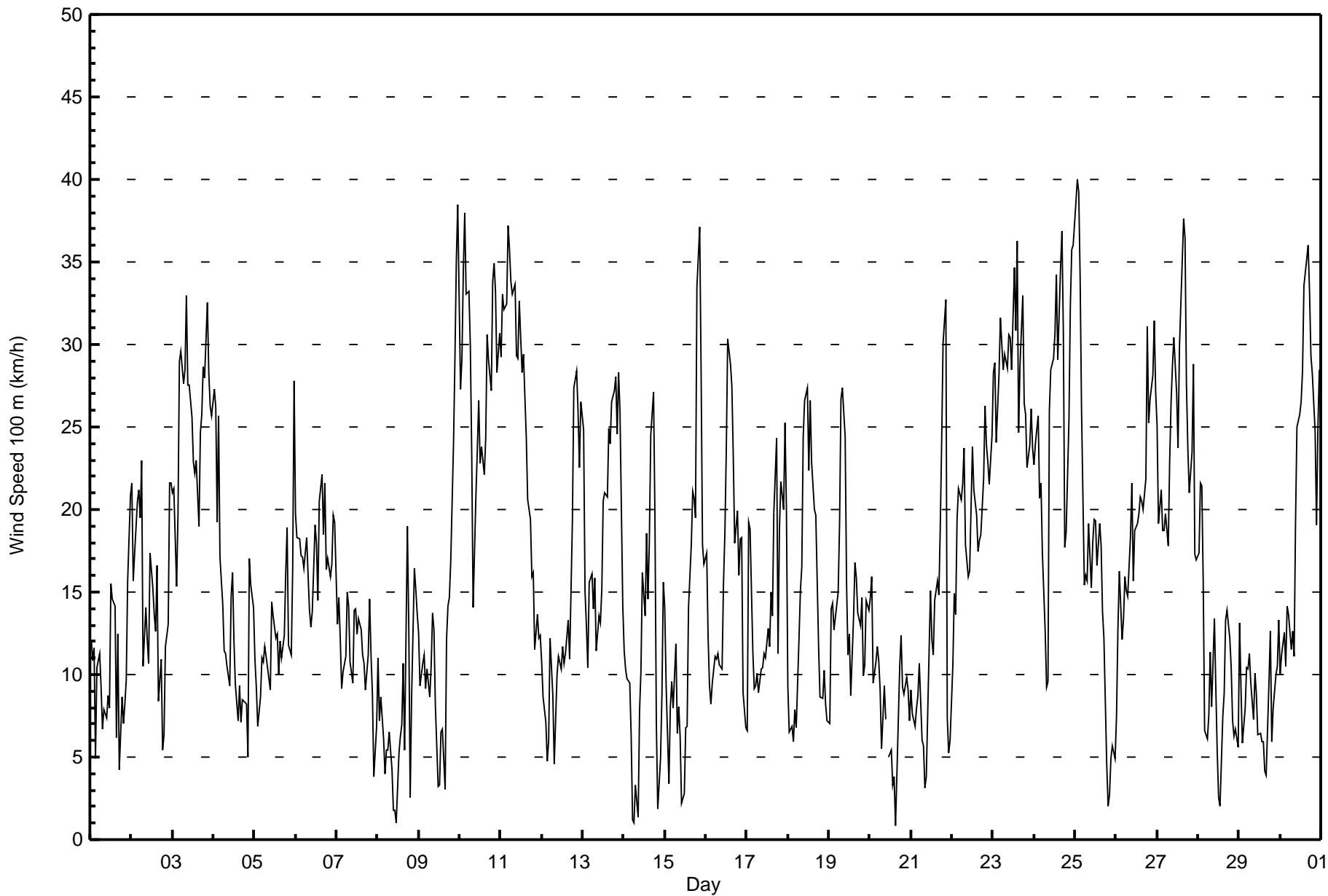
Wind Speed 100 m (WS100m) - km/h
Lower Camp Met Tower - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 13 km/h on Sep 13 23:00 | Hours of Data: 719 |
| Minimum Value: 1 km/h on Sep 14 06:00 | 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 = 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 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 5 | 4 | 3 | 4 | 3 | 9 | 4 | 3 | 3 | 2 | 1 | 4 | 5 | 9 |
| 2-Sep | 4 | 3 | 4 | 6 | 3 | 3 | 3 | 5 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 6 |
| 3-Sep | 5 | 2 | 2 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 6 | 7 | 6 | 7 | 5 | 4 | 4 | 7 |
| 4-Sep | 4 | 4 | 5 | 6 | 7 | 4 | 3 | 4 | 3 | 3 | 6 | 5 | 4 | 4 | 4 | 3 | 2 | 3 | 2 | 3 | 1 | 2 | 3 | 7 | |
| 5-Sep | 3 | 4 | 2 | 2 | 3 | 4 | 3 | 2 | 3 | 2 | 4 | 5 | 4 | 4 | 3 | 4 | 3 | 2 | 3 | 5 | 4 | 3 | 6 | 6 | 6 |
| 6-Sep | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 8 | 6 | 4 | 4 | 5 | 5 | 4 | 3 | 3 | 3 | 8 |
| 7-Sep | 3 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 7 | 9 | 5 | 3 | 2 | 2 | 9 |
| 8-Sep | 1 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 6 | 12 | 8 | 9 | 7 | 2 | 2 | 3 | 2 | 2 | 12 |
| 9-Sep | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 5 | 7 | 7 |
| 10-Sep | 6 | 4 | 5 | 6 | 6 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 7 | 7 | 7 | 7 | 5 | 8 | 6 | 7 | 5 | 8 |
| 11-Sep | 6 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 2 | 4 | 2 | 2 | 3 | 2 | 7 |
| 12-Sep | 2 | 3 | 1 | 1 | 3 | 4 | 4 | 2 | 4 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 |
| 13-Sep | 5 | 5 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 4 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 13 | 11 | 13 |
| 14-Sep | 8 | 1 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 4 | 4 | 3 | 2 | 3 | 3 | 6 | 3 | 6 | 4 | 5 | 2 | 2 | 3 | 3 | 8 |
| 15-Sep | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 5 |
| 16-Sep | 3 | 4 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 5 | 3 | 6 | 6 | 5 | 4 | 3 | 3 | 1 | 1 | 2 | 2 | 4 | 3 | 6 |
| 17-Sep | 3 | 8 | 5 | 5 | 4 | 3 | 4 | 4 | 4 | 3 | 2 | 3 | 3 | 3 | 3 | 5 | 4 | 7 | 3 | 3 | 2 | 2 | 2 | 3 | 8 |
| 18-Sep | 4 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 4 | 5 | 4 | 4 | 6 | 6 | 7 | 4 | 4 | 2 | 2 | 2 | 1 | 4 | 2 | 1 | 7 |
| 19-Sep | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 5 | 4 | 3 | 3 | 3 | 2 | 4 | 2 | 4 | 2 | 5 |
| 20-Sep | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | M | 3 | 4 | 2 | 2 | 2 | 2 | 4 | 4 | 3 | 3 | 2 | 3 | 2 | 4 |
| 21-Sep | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 4 | 4 | 4 | 5 | 3 | 2 | 2 | 2 | 3 | 8 | 2 | 2 | 8 |
| 22-Sep | 4 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 6 | 6 | 6 | 5 | 5 | 4 | 5 | 4 | 3 | 5 | 4 | 5 | 5 | 6 |
| 23-Sep | 5 | 5 | 5 | 6 | 5 | 5 | 4 | 5 | 4 | 9 | 7 | 7 | 7 | 8 | 7 | 7 | 8 | 4 | 6 | 6 | 5 | 6 | 5 | 5 | 9 |
| 24-Sep | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 7 | 4 | 5 | 7 | 7 | 8 | 8 | 10 | 8 | 3 | 4 | 4 | 2 | 2 | 2 | 10 |
| 25-Sep | 2 | 4 | 4 | 3 | 6 | 5 | 5 | 5 | 5 | 3 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 2 | 3 | 2 | 1 | 3 | 4 | 3 | 6 |
| 26-Sep | 2 | 3 | 2 | 2 | 4 | 4 | 5 | 4 | 2 | 3 | 3 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 3 | 4 | 5 | 5 | 4 | 4 | 5 |
| 27-Sep | 2 | 7 | 3 | 2 | 6 | 10 | 4 | 8 | 5 | 8 | 8 | 8 | 6 | 6 | 8 | 8 | 7 | 4 | 4 | 3 | 4 | 4 | 5 | 2 | 10 |
| 28-Sep | 2 | 5 | 3 | 3 | 4 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 5 |
| 29-Sep | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 3 | 1 | 3 | 4 | 2 | 4 |
| 30-Sep | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 4 | 4 | 4 | 5 | 6 | 7 | 5 | 7 | 6 | 5 | 4 | 5 | 4 | 4 | 4 | 7 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|----|---|---|---|---|---|---|---|---|---|----|----|---|---|---|---|---|----|----|--|
| 8 | 8 | 6 | 6 | 7 | 10 | 6 | 8 | 5 | 9 | 8 | 8 | 7 | 8 | 8 | 12 | 10 | 9 | 7 | 9 | 8 | 8 | 13 | 11 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 48 | 6.68 | 6.68 |
| 6 - 11 | 209 | 29.07 | 35.74 |
| 12 - 19 | 223 | 31.02 | 66.76 |
| 20 - 28 | 159 | 22.11 | 88.87 |
| 29 - 38 | 77 | 10.71 | 99.58 |
| > 38 | 3 | 0.42 | 100.00 |

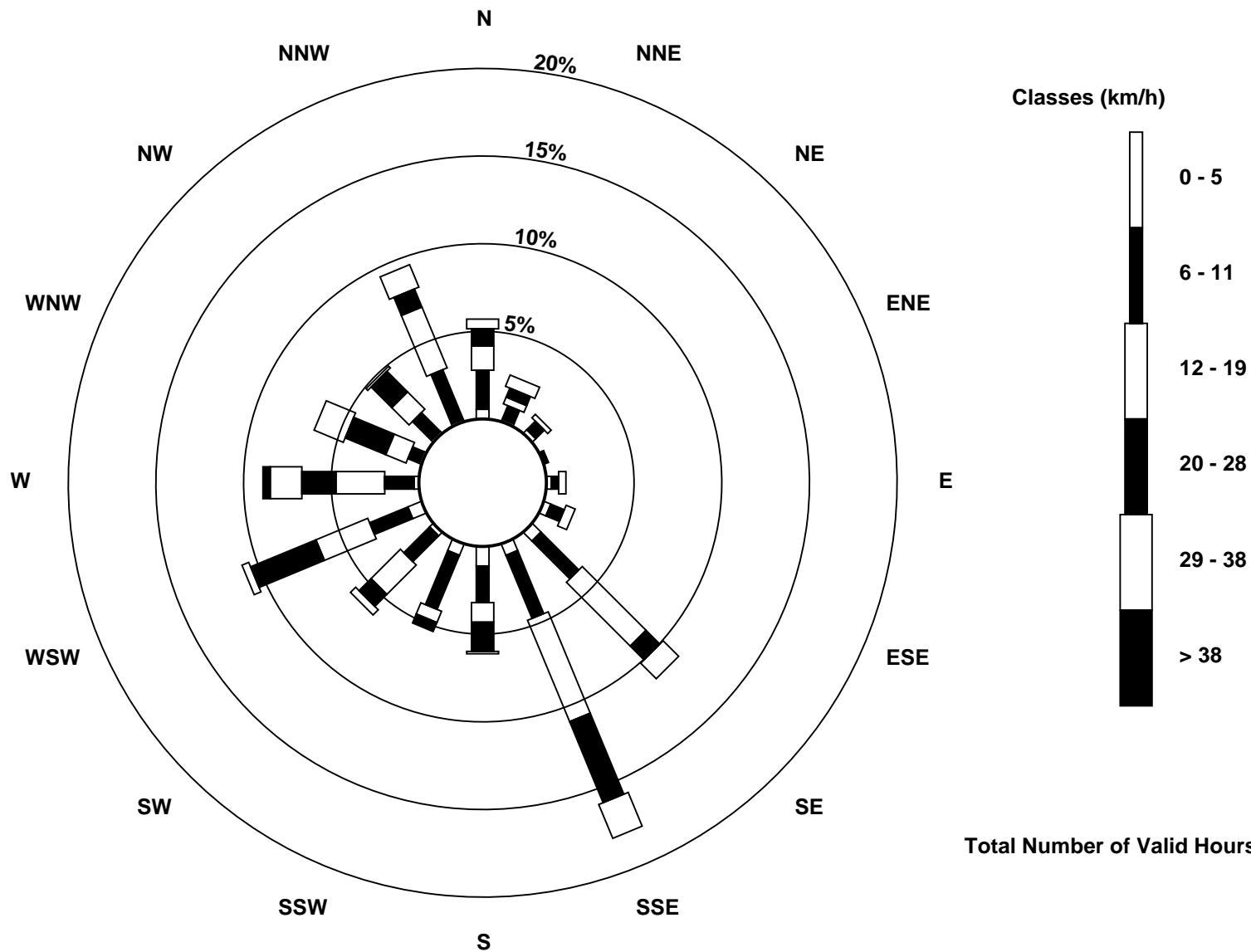
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 719



| | | |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 45 km/h on Sep 25 02:00 | Maximum Daily Speed Average: 31.6 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 8 12:00 | Minimum Daily Speed Average: 4.4 km/h on Sep 9 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 9.9 km/h at hour 23 | Minimum Diurnal Speed Average: 4.4 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 7.1 km/h 245.9 deg | Percentiles: P ₁ = 2 P ₁₀ = 8 Q ₁ = 12 Median = 18 Q ₃ = 27 P ₉₀ = 34 P ₉₉ = 41 | 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 | ESE14 | SE13 | SE16 | SE7 | ENE7 | NE11 | NE14 | ENE16 | ENE10 | NE7 | N8 | E11 | ESE16 | E15 | ESE15 | SE9 | NE14 | SE5 | NNE9 | NNE9 | NW9 | NNW12 | W17 | W23 | ENE5.2 | W23 |
| 2-Sep | W26 | WSW19 | WSW24 | W28 | WSW26 | WSW25 | W28 | WSW13 | WSW16 | W14 | W12 | WSW19 | W17 | WSW15 | WSW14 | W17 | WNW9 | WNW11 | NNW7 | NW8 | WNW14 | WNW16 | WNW23 | NW26 | W16.4 | W28 |
| 3-Sep | N25 | NNW26 | NW20 | NNW23 | NNW34 | NNW35 | NNW33 | NNW34 | NNW37 | NNW32 | NW34 | NW31 | NW27 | NW27 | NW29 | NNW25 | NW31 | NNW32 | NNW35 | NNW34 | NNW39 | NW35 | NW33 | NW29 | NW29.3 | NNW39 |
| 4-Sep | WNW32 | NW34 | NW27 | WNW33 | WNW22 | W19 | WNW16 | WNW13 | W11 | W11 | W15 | W19 | W13 | W10 | W9 | W10 | WSW8 | WSW10 | N9 | NNE8 | SW5 | WSW21 | WSW22 | WSW20 | WNW14.8 | NW34 |
| 5-Sep | WSW15 | SW12 | SW9 | SSW10 | SSW10 | SSW9 | SSW7 | S6 | S6 | SSE8 | SSE16 | SSW16 | SSW14 | SSW14 | S11 | SSE12 | S13 | SSE15 | SE20 | SE26 | SE20 | SE19 | SSE20 | SSE29 | S12.3 | SSE29 |
| 6-Sep | SSE25 | SSE24 | SSE23 | S18 | S18 | S20 | S19 | S18 | S13 | SSE13 | SSE15 | SSE19 | SSE18 | SSE15 | SSE21 | S26 | S21 | S24 | S21 | S21 | S22 | SSE17 | SSE21 | SSE22 | SSE19.3 | S26 |
| 7-Sep | SSE17 | SSE16 | SSE14 | S16 | S14 | S12 | SSE13 | SSE16 | SSE10 | SSE8 | SE13 | SE14 | SE11 | SE12 | SE12 | SE10 | SSE11 | S10 | SW13 | SW17 | WSW13 | WSW16 | W10 | SSW8 | S10.4 | SSE17 |
| 8-Sep | WSW12 | SW12 | WSW13 | WSW14 | SW12 | SW13 | SW13 | SW11 | SW8 | WNW2 | NW1 | SSW0 | W5 | WNW8 | NW9 | NW13 | SW8 | WNW23 | NE18 | N4 | NW10 | N23 | N23 | N19 | WNW6.4 | N23 |
| 9-Sep | NNW16 | N12 | N12 | N11 | N11 | N11 | NE10 | NNE13 | N14 | N13 | N9 | WSW4 | SW3 | WSW8 | WSW7 | SSW2 | SSE10 | SE14 | SE17 | SSE22 | SE29 | SE34 | SSE38 | SSE37 | ESE4.4 | SSE38 |
| 10-Sep | SSE31 | SSE32 | SSE35 | SSE36 | SSE34 | S35 | S30 | S25 | SSW19 | WSW26 | W28 | W30 | W26 | W27 | W26 | WNW28 | WNW36 | W35 | WNW32 | WNW38 | WNW40 | WNW37 | WNW33 | WNW34 | WSW16.8 | WNW40 |
| 11-Sep | NNW34 | NNW39 | NNW38 | NNW38 | N43 | N42 | N40 | N38 | N37 | N34 | N34 | N35 | NNW30 | N32 | N28 | N25 | NNW23 | NNW22 | NNW19 | N19 | NNW15 | NNW16 | NW18 | NW18 | NNW29.3 | N43 |
| 12-Sep | NW17 | NW14 | NW12 | WNW9 | W9 | W15 | W12 | W5 | WSW8 | WSW12 | WSW13 | WSW11 | SW13 | SW13 | SW13 | SW15 | SSW12 | S15 | S24 | S25 | SSW28 | SSW33 | SSW40 | SSW39 | SW13.3 | SSW40 |
| 13-Sep | SSW34 | SSW21 | S12 | SSW13 | S18 | SSW19 | SSW15 | SSW15 | SW17 | SW16 | SW15 | SW17 | SW23 | SW24 | WSW25 | WSW29 | WSW29 | WSW34 | WSW38 | WSW40 | WSW36 | W40 | W34 | W21 | SW21.8 | WSW40 |
| 14-Sep | WNW20 | NW18 | NNW15 | N12 | NNE9 | ESE5 | S3 | S1 | SSE5 | SSE9 | SSE11 | SSE15 | SE13 | SSE17 | SW18 | WSW22 | W28 | NNW31 | N23 | NNE8 | SSE1 | WSW9 | NNW20 | NW27 | WNW5.0 | NNW31 |
| 15-Sep | NNW25 | NNW20 | N12 | NE15 | NE18 | NE18 | NE20 | ENE12 | ENE11 | ENE7 | E2 | ESE4 | SE7 | SE11 | SE15 | SE19 | SE23 | SE24 | SE26 | SSE37 | SSE38 | SSE29 | SE25 | SE17 | ESE10.5 | SSE38 |
| 16-Sep | S14 | SSW9 | SSW9 | SW13 | SW14 | SSW11 | SSW14 | SSW14 | SSW14 | SSW11 | S16 | SW26 | SW34 | WSW35 | WSW33 | WSW30 | WSW25 | WSW25 | WSW22 | WSW24 | WSW24 | SW22 | SW18 | SW18.2 | WSW35 | |
| 17-Sep | SW16 | SW27 | SW27 | S10 | SSW12 | SSW16 | SW21 | SW19 | SW17 | SW15 | SW13 | SW12 | SW13 | SW12 | WSW18 | WSW17 | W23 | W28 | W20 | WSW23 | W29 | W30 | W35 | W25 | WSW18.4 | W35 |
| 18-Sep | WSW18 | W13 | W14 | WNW9 | W9 | WSW10 | W17 | WNW18 | WNW19 | WNW26 | WNW28 | WNW29 | NW26 | NW29 | NW25 | NNW23 | NNW24 | N19 | N14 | N12 | N10 | N12 | N11 | N8 | NW14.7 | NW29 |
| 19-Sep | NNW8 | NNW17 | NNW16 | NW17 | NW16 | NNW20 | NNW21 | WNW30 | WNW30 | WNW25 | WNW16 | NW12 | NNW14 | NW10 | NNW15 | NW19 | NNW17 | NNW15 | N16 | NNW19 | NNW13 | NW14 | NNW18 | N18 | NW16.2 | WNW30 |
| 20-Sep | N18 | N19 | NNW13 | NNW15 | N17 | N14 | N13 | N10 | N10 | N8 | M | NNW6 | N6 | NNE3 | WSW3 | WNW1 | ESE4 | ESE11 | ESE15 | ESE18 | SE12 | SE11 | S13 | SSE14 | NNE4.6 | N19 |
| 21-Sep | SSE15 | SSE14 | S14 | SSW11 | SW13 | SW11 | SW8 | SW9 | SW7 | SSW5 | S7 | SSE14 | S12 | SW13 | WSW17 | WSW18 | WSW18 | WSW22 | SW27 | SW32 | SW37 | SW23 | SW14 | SSW13 | SW13.8 | SW37 |
| 22-Sep | SSW11 | S12 | SSW11 | S11 | S14 | S11 | S11 | S13 | S13 | SSE12 | SSE14 | SSW23 | SW26 | SSW24 | SSW23 | SSW21 | SSW22 | S21 | S27 | S32 | S33 | S34 | S31 | S33 | S19.5 | S34 |
| 23-Sep | S36 | S37 | S33 | SSE35 | S36 | SSE36 | SSE33 | SSE29 | SSE28 | SSE34 | SSE31 | SSE29 | SSE34 | SSE32 | SSE38 | SSE28 | SSE31 | SSE34 | SSE30 | SSE30 | SSE26 | SSE26 | SSE28 | S30 | SSE31.6 | SSE38 |
| 24-Sep | S27 | S27 | S25 | S26 | S26 | SSW19 | SW20 | SW15 | SW15 | WSW31 | W32 | W32 | W34 | W37 | W33 | WNW39 | WNW41 | WNW37 | WNW22 | WNW23 | WNW29 | WNW32 | W35 | WNW37 | WSW21.4 | WNW41 |
| 25-Sep | W43 | W45 | W44 | W41 | W34 | WNW25 | W25 | W22 | W24 | WNW16 | WNW19 | WNW20 | WNW21 | WNW14 | NW21 | NW19 | NNW15 | NNW14 | NNE8 | ENE1 | SW4 | W15 | W19 | WSW4 | WNW19.9 | W45 |
| 26-Sep | SSW5 | S10 | SSE15 | S16 | SSE16 | SSE19 | SSE19 | SSE26 | SSE22 | SSE21 | SSE19 | SSE18 | S20 | SSE20 | SSE21 | S24 | SSW25 | S25 | S32 | S31 | S34 | S34 | S34 | SSE32 | S21.8 | S34 |
| 27-Sep | SSE27 | SSE23 | SE23 | SSE21 | S23 | W26 | WNW23 | W28 | WSW32 | W35 | WNW35 | WNW32 | WNW27 | W33 | WNW36 | W41 | W41 | WSW34 | WSW33 | WSW33 | W35 | W34 | WNW22 | WNW20 | W22.3 | W41 |
| 28-Sep | W21 | W24 | W26 | W22 | WSW16 | WSW13 | SW10 | SSW10 | SSW9 | SSE6 | SSE7 | S5 | WSW4 | S1 | W9 | WSW10 | SW15 | SW15 | SW14 | SSW15 | SW16 | SW16 | SW18 | SSW9 | SW11.4 | W26 |
| 29-Sep | SSE5 | SSE9 | SSE10 | SSE12 | SSE13 | S16 | S13 | SSW13 | SSW8 | S5 | SSE7 | SSE5 | SSE6 | SSE6 | SE5 | SE3 | SE4 | ESE9 | E11 | E12 | E13 | ESE14 | NE4 | NE9 | SE6.7 | S16 |
| 30-Sep | NNE5 | NNE6 | NE12 | NNE17 | NNE17 | N21 | NNE17 | NNE18 | N15 | N22 | NNE25 | NNE27 | NNE27 | NNE30 | NNE35 | NNE37 | NNE40 | NNE38 | NNE35 | NNE33 | NNE30 | NNE23 | NNE28 | NNE32 | NNE24.4 | NNE40 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|-------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|--------|-------|------|-------|--------|--------|-------|-------|--------|--------|--------|-----------------|
| WSW7.2 | WSW6.2 | SW6.0 | WSW6.0 | SW6.2 | WSW6.7 | WSW6.6 | SW5.9 | WSW6.5 | WSW6.9 | W6.5 | WSW6.7 | WSW7.0 | WSW7.7 | W8.2 | W8.9 | W8.6 | WSW7.5 | WSW4.4 | SW6.6 | SW8.5 | WSW9.7 | WSW9.9 | WSW8.0 | Diurnal Average |
| W43 | W45 | W44 | W41 | N43 | N42 | N40 | N38 | N37 | W35 | WNW35 | N35 | W34 | W37 | SSE38 | W41 | WNW41 | NNE38 | WSW38 | WSW40 | WNW40 | W40 | SSW40 | SSW39 | 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

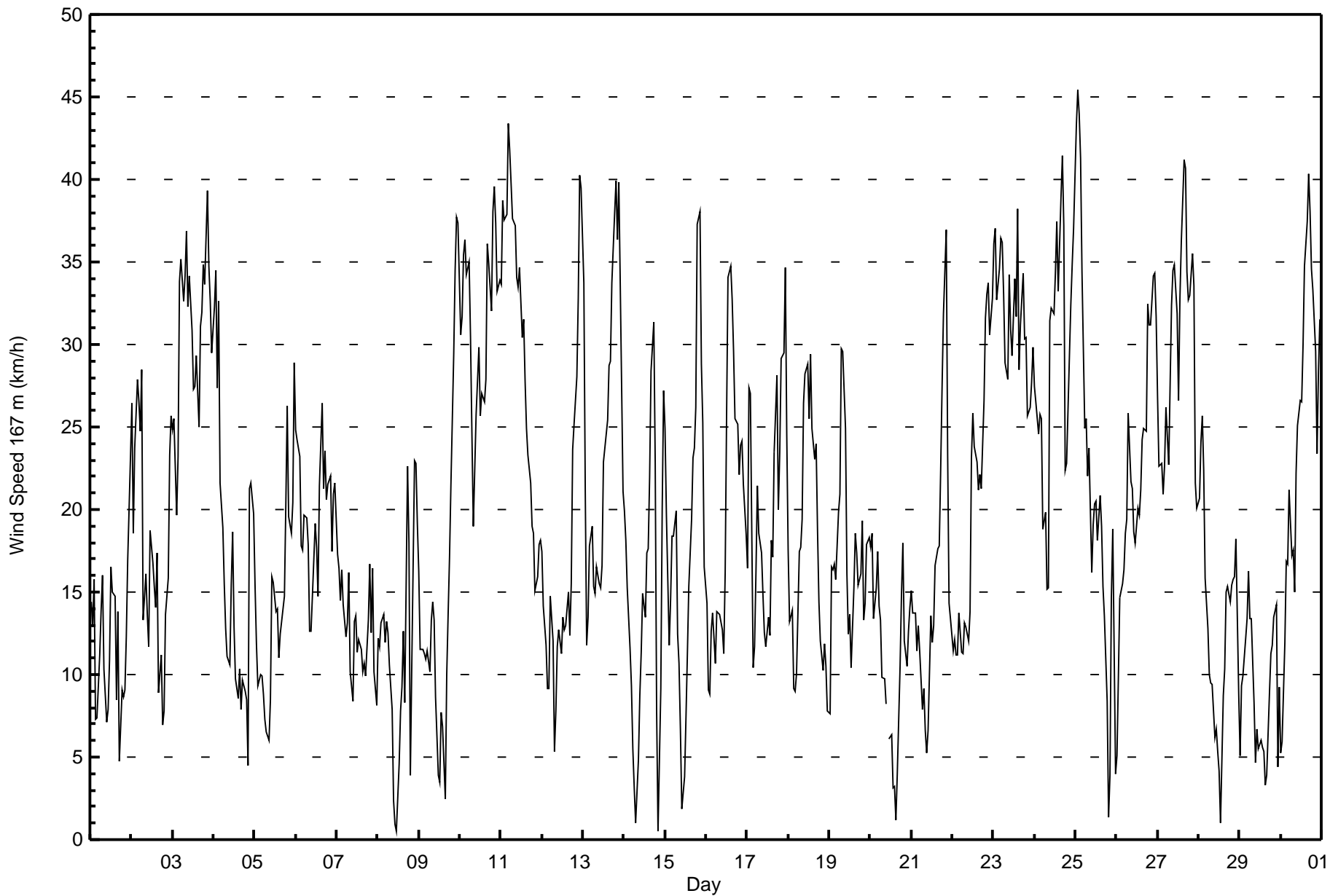
Wind Speed 167 m (WS167m) - km/h
Lower Camp Met Tower - September 2016

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

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|---|---|---|---|----|----|---|--|
| 9 | 8 | 5 | 6 | 8 | 9 | 6 | 9 | 6 | 8 | 8 | 7 | 7 | 7 | 8 | 13 | 10 | 9 | 8 | 8 | 7 | 12 | 11 | 7 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 38 | 5.29 | 5.29 |
| 6 - 11 | 119 | 16.55 | 21.84 |
| 12 - 19 | 248 | 34.49 | 56.33 |
| 20 - 28 | 160 | 22.25 | 78.58 |
| 29 - 38 | 135 | 18.78 | 97.36 |
| > 38 | 19 | 2.64 | 100.00 |

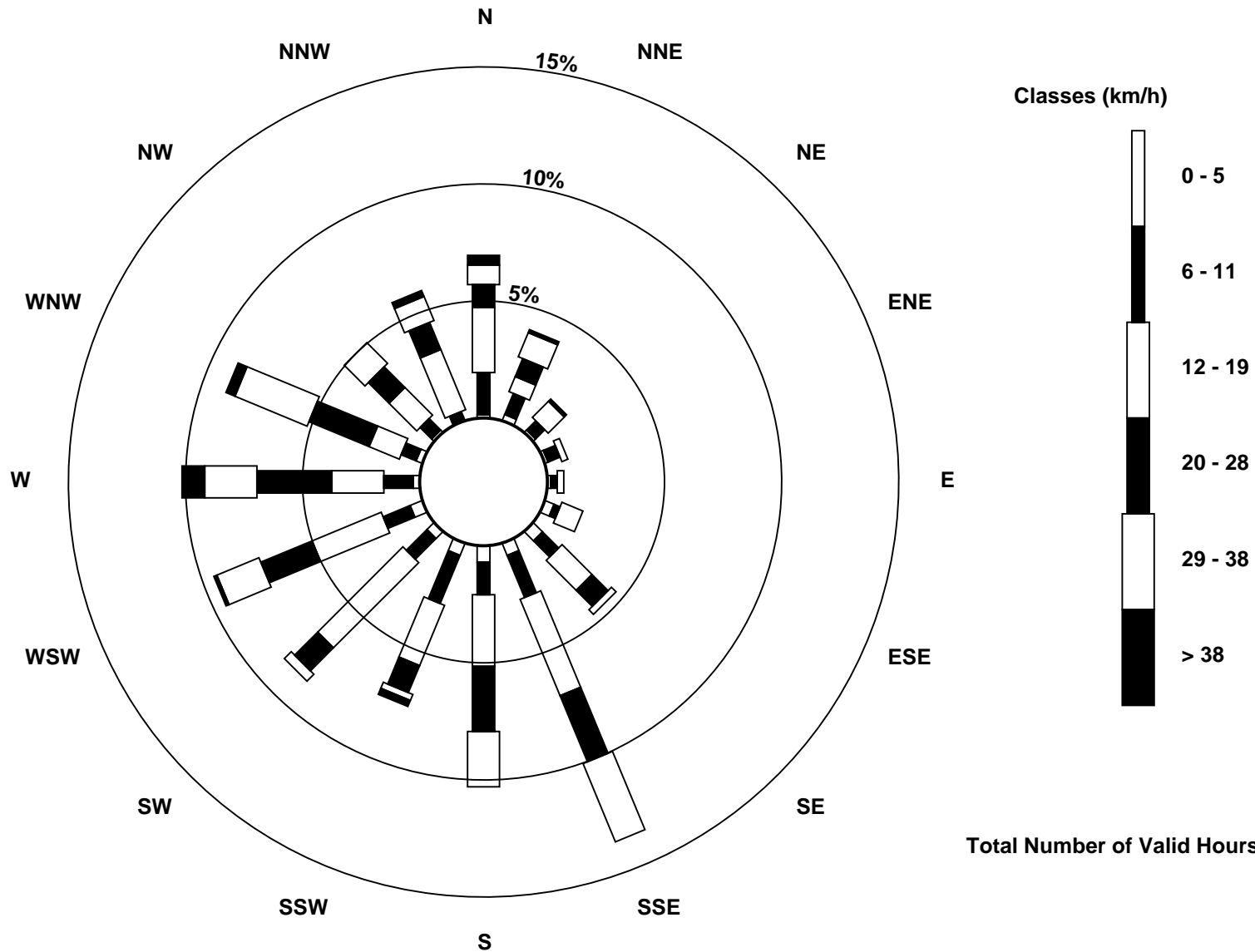
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | | | |
|---------------------------------------------------------------|--|---------------------------|------|
| Direction of Maximum Speed: 165 deg on Sep 10 06:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 165.4 deg on Sep 23 | | Hours of Data: | 719 |
| Direction of Minimum Speed: 53 deg on Sep 14 07:00 | | Hours of Missing Data: | 1 |
| Direction of Minimum Daily Speed Average: 1.1 deg on Sep 8 | | Percent Operational Time: | 99.9 |
| Monthly Average Direction: 273.1 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 | 355 | 67 | 21 | 348 | 321 | 340 | 346 | 324 | 348 | 355 | 349 | 87 | 117 | 123 | 139 | 180 | 15 | 130 | 340 | 306 | 324 | 306 | 276 | 279 | 345.7 |
| 2-Sep | 275 | 231 | 252 | 286 | 254 | 256 | 267 | 248 | 256 | 262 | 254 | 268 | 264 | 259 | 264 | 285 | 296 | 290 | 42 | 305 | 324 | 317 | 294 | 327 | 272.0 |
| 3-Sep | 351 | 338 | 318 | 304 | 303 | 302 | 291 | 293 | 297 | 301 | 312 | 318 | 316 | 323 | 326 | 330 | 323 | 331 | 340 | 328 | 328 | 323 | 320 | 308 | 315.9 |
| 4-Sep | 308 | 315 | 333 | 326 | 304 | 283 | 306 | 291 | 271 | 274 | 270 | 281 | 277 | 272 | 291 | 274 | 237 | 236 | 330 | 335 | 182 | 234 | 229 | 254 | 281.9 |
| 5-Sep | 258 | 195 | 187 | 169 | 161 | 164 | 153 | 143 | 141 | 149 | 167 | 201 | 205 | 200 | 184 | 166 | 181 | 174 | 157 | 150 | 203 | 105 | 150 | 166 | 172.0 |
| 6-Sep | 163 | 155 | 154 | 166 | 161 | 158 | 163 | 160 | 165 | 172 | 172 | 160 | 157 | 168 | 163 | 175 | 179 | 185 | 198 | 197 | 162 | 159 | 150 | 143 | 167.3 |
| 7-Sep | 96 | 122 | 133 | 128 | 145 | 143 | 166 | 178 | 169 | 163 | 149 | 158 | 152 | 150 | 149 | 139 | 161 | 158 | 205 | 244 | 201 | 176 | 107 | 153 | 156.0 |
| 8-Sep | 157 | 145 | 160 | 141 | 134 | 137 | 133 | 145 | 143 | 235 | 216 | 200 | 246 | 261 | 306 | 327 | 226 | 285 | 40 | 338 | 332 | 334 | 328 | 331 | 177.4 |
| 9-Sep | 0 | 321 | 334 | 327 | 337 | 330 | 39 | 13 | 1 | 360 | 348 | 230 | 184 | 260 | 254 | 159 | 152 | 150 | 139 | 144 | 145 | 135 | 144 | 155 | 136.0 |
| 10-Sep | 170 | 151 | 153 | 157 | 166 | 165 | 160 | 156 | 173 | 250 | 280 | 277 | 272 | 271 | 288 | 311 | 312 | 295 | 303 | 302 | 301 | 305 | 307 | 305 | 246.2 |
| 11-Sep | 343 | 344 | 345 | 345 | 347 | 348 | 354 | 355 | 358 | 349 | 351 | 356 | 353 | 353 | 357 | 358 | 351 | 341 | 332 | 338 | 332 | 322 | 336 | 334 | 348.9 |
| 12-Sep | 347 | 339 | 342 | 332 | 332 | 301 | 259 | 267 | 247 | 254 | 252 | 270 | 222 | 216 | 230 | 229 | 213 | 176 | 171 | 172 | 170 | 167 | 168 | 169 | 200.1 |
| 13-Sep | 165 | 157 | 120 | 136 | 155 | 160 | 149 | 145 | 181 | 236 | 222 | 233 | 233 | 246 | 262 | 255 | 248 | 243 | 257 | 246 | 271 | 280 | 288 | 288 | 217.7 |
| 14-Sep | 347 | 315 | 304 | 342 | 263 | 263 | 53 | 338 | 329 | 139 | 149 | 161 | 158 | 147 | 249 | 262 | 265 | 335 | 351 | 315 | 184 | 138 | 44 | 320 | 257.4 |
| 15-Sep | 305 | 195 | 340 | 334 | 330 | 138 | 300 | 19 | 57 | 42 | 171 | 182 | 174 | 147 | 146 | 138 | 140 | 131 | 146 | 145 | 152 | 161 | 190 | 177 | 149.1 |
| 16-Sep | 166 | 140 | 139 | 138 | 142 | 136 | 146 | 154 | 151 | 149 | 146 | 142 | 227 | 236 | 258 | 258 | 258 | 254 | 248 | 261 | 276 | 249 | 168 | 162 | 196.9 |
| 17-Sep | 144 | 188 | 210 | 132 | 145 | 149 | 141 | 143 | 178 | 207 | 228 | 230 | 224 | 228 | 258 | 252 | 270 | 283 | 277 | 247 | 253 | 272 | 271 | 266 | 226.8 |
| 18-Sep | 157 | 158 | 165 | 269 | 46 | 143 | 246 | 283 | 279 | 295 | 307 | 301 | 316 | 322 | 340 | 349 | 344 | 344 | 331 | 327 | 342 | 9 | 328 | 327 | 315.7 |
| 19-Sep | 318 | 334 | 327 | 344 | 341 | 332 | 298 | 306 | 305 | 304 | 307 | 324 | 343 | 336 | 340 | 333 | 352 | 341 | 9 | 344 | 341 | 325 | 354 | 325 | 327.3 |
| 20-Sep | 344 | 335 | 332 | 348 | 347 | 326 | 327 | 324 | 4 | 354 | M | 310 | 16 | 61 | 238 | 230 | 154 | 113 | 65 | 48 | 69 | 134 | 123 | 36 | 358.6 |
| 21-Sep | 131 | 11 | 63 | 147 | 140 | 201 | 161 | 150 | 153 | 162 | 152 | 152 | 161 | 238 | 250 | 259 | 250 | 241 | 220 | 218 | 221 | 129 | 137 | 143 | 198.5 |
| 22-Sep | 142 | 145 | 157 | 160 | 161 | 160 | 155 | 161 | 151 | 152 | 154 | 184 | 224 | 217 | 208 | 205 | 199 | 188 | 190 | 178 | 176 | 161 | 160 | 167 | 175.1 |
| 23-Sep | 165 | 159 | 157 | 156 | 157 | 159 | 159 | 156 | 153 | 167 | 168 | 168 | 162 | 170 | 162 | 176 | 173 | 164 | 172 | 174 | 171 | 171 | 170 | 169 | 165.4 |
| 24-Sep | 169 | 167 | 164 | 167 | 167 | 176 | 162 | 170 | 187 | 257 | 271 | 274 | 278 | 281 | 286 | 300 | 305 | 311 | 309 | 279 | 275 | 270 | 272 | 275 | 250.0 |
| 25-Sep | 275 | 277 | 280 | 280 | 294 | 288 | 286 | 274 | 283 | 274 | 280 | 309 | 309 | 311 | 324 | 326 | 344 | 340 | 247 | 176 | 197 | 147 | 136 | 79 | 292.1 |
| 26-Sep | 154 | 144 | 132 | 133 | 129 | 128 | 140 | 110 | 166 | 169 | 157 | 163 | 167 | 163 | 160 | 177 | 199 | 184 | 179 | 161 | 161 | 163 | 158 | 156 | 162.8 |
| 27-Sep | 163 | 176 | 163 | 151 | 149 | 242 | 278 | 269 | 236 | 259 | 309 | 299 | 300 | 284 | 292 | 280 | 279 | 265 | 250 | 264 | 274 | 277 | 291 | 270 | 268.9 |
| 28-Sep | 259 | 276 | 259 | 269 | 164 | 152 | 139 | 144 | 150 | 145 | 139 | 158 | 212 | 135 | 281 | 262 | 234 | 241 | 231 | 328 | 147 | 127 | 140 | 144 | 191.5 |
| 29-Sep | 25 | 352 | 360 | 249 | 100 | 124 | 145 | 146 | 146 | 150 | 156 | 149 | 138 | 148 | 145 | 139 | 170 | 122 | 283 | 355 | 185 | 275 | 330 | 308 | 145.6 |
| 30-Sep | 309 | 318 | 323 | 304 | 317 | 339 | 8 | 334 | 334 | 359 | 2 | 4 | 9 | 9 | 12 | 12 | 20 | 20 | 11 | 9 | 9 | 10 | 8 | 10 | 5.6 |

196.1 199.2 188.5 175.2 171.5 175.2 175.4 183.4 208.0 234.3 239.7 239.6 236.0 241.8 255.3 257.5 251.7 247.8 241.1 228.8 220.8 220.8 212.5 212.2

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

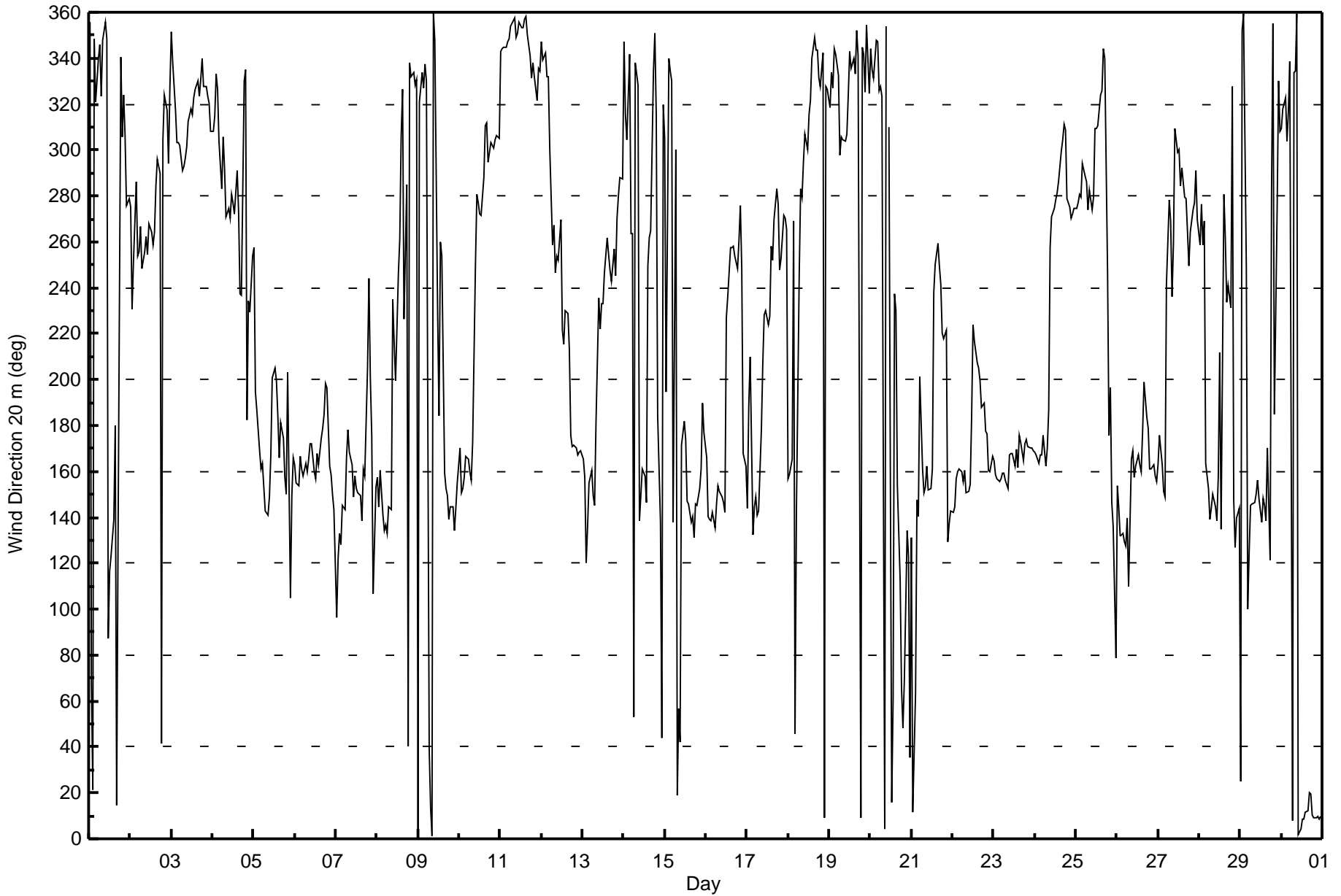
Wind Direction 20 m (WD20m) - deg
Lower Camp Met Tower - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 103 deg on Sep 20 16:00 | Hours of Data: 719 |
| Minimum Value: 6 deg on Sep 26 23:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 17 Median = 22 Q ₃ = 32 P ₉₀ = 59 P ₉₉ = 92 | 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 | 83 | 35 | 45 | 27 | 36 | 42 | 27 | 38 | 23 | 24 | 28 | 65 | 26 | 29 | 31 | 71 | 81 | 93 | 40 | 36 | 32 | 24 | 19 | 24 | 93 |
| 2-Sep | 20 | 18 | 25 | 28 | 22 | 28 | 20 | 40 | 22 | 27 | 35 | 22 | 24 | 23 | 25 | 24 | 28 | 20 | 63 | 26 | 13 | 35 | 23 | 20 | 63 |
| 3-Sep | 22 | 23 | 18 | 19 | 21 | 22 | 21 | 20 | 18 | 20 | 20 | 19 | 18 | 20 | 18 | 23 | 19 | 20 | 22 | 19 | 20 | 19 | 17 | 21 | 23 |
| 4-Sep | 18 | 24 | 27 | 29 | 27 | 47 | 29 | 31 | 25 | 35 | 32 | 29 | 39 | 51 | 81 | 38 | 40 | 32 | 29 | 83 | 40 | 12 | 14 | 26 | 83 |
| 5-Sep | 33 | 25 | 15 | 14 | 10 | 22 | 22 | 20 | 27 | 19 | 32 | 22 | 17 | 20 | 26 | 22 | 20 | 15 | 27 | 45 | 76 | 48 | 20 | 13 | 76 |
| 6-Sep | 14 | 17 | 22 | 9 | 9 | 8 | 10 | 15 | 16 | 13 | 18 | 24 | 21 | 22 | 19 | 13 | 12 | 12 | 13 | 13 | 13 | 15 | 17 | 31 | 31 |
| 7-Sep | 28 | 24 | 19 | 16 | 25 | 19 | 21 | 21 | 25 | 27 | 23 | 20 | 22 | 19 | 20 | 20 | 17 | 16 | 55 | 88 | 57 | 87 | 89 | 20 | 89 |
| 8-Sep | 60 | 14 | 35 | 21 | 14 | 14 | 19 | 16 | 22 | 73 | 26 | 42 | 32 | 61 | 66 | 90 | 73 | 44 | 74 | 84 | 69 | 22 | 50 | 28 | 90 |
| 9-Sep | 25 | 19 | 21 | 16 | 26 | 23 | 39 | 37 | 26 | 29 | 43 | 54 | 60 | 49 | 50 | 56 | 20 | 19 | 37 | 28 | 18 | 18 | 18 | 20 | 60 |
| 10-Sep | 16 | 18 | 16 | 14 | 13 | 9 | 13 | 17 | 29 | 25 | 21 | 20 | 20 | 25 | 23 | 25 | 22 | 22 | 21 | 20 | 19 | 21 | 22 | 20 | 29 |
| 11-Sep | 24 | 23 | 23 | 23 | 22 | 23 | 21 | 21 | 22 | 22 | 24 | 20 | 22 | 22 | 22 | 23 | 22 | 24 | 18 | 20 | 18 | 25 | 26 | 25 | 26 |
| 12-Sep | 24 | 33 | 25 | 22 | 44 | 33 | 68 | 64 | 25 | 24 | 24 | 35 | 29 | 26 | 33 | 25 | 25 | 18 | 8 | 8 | 8 | 8 | 10 | 10 | 68 |
| 13-Sep | 10 | 22 | 24 | 18 | 12 | 11 | 16 | 18 | 25 | 22 | 29 | 27 | 20 | 19 | 21 | 15 | 14 | 10 | 16 | 12 | 17 | 16 | 69 | 77 | 77 |
| 14-Sep | 49 | 32 | 41 | 39 | 90 | 84 | 95 | 47 | 69 | 59 | 38 | 15 | 18 | 21 | 47 | 21 | 20 | 31 | 21 | 60 | 49 | 84 | 65 | 58 | 95 |
| 15-Sep | 20 | 46 | 96 | 45 | 69 | 90 | 30 | 71 | 44 | 52 | 41 | 63 | 21 | 46 | 22 | 25 | 24 | 23 | 72 | 17 | 17 | 43 | 66 | 47 | 96 |
| 16-Sep | 35 | 30 | 11 | 12 | 16 | 15 | 16 | 16 | 16 | 19 | 16 | 18 | 19 | 16 | 20 | 17 | 17 | 15 | 11 | 25 | 27 | 69 | 58 | 28 | 69 |
| 17-Sep | 18 | 44 | 25 | 27 | 19 | 15 | 43 | 33 | 39 | 20 | 15 | 21 | 15 | 17 | 19 | 21 | 25 | 24 | 55 | 35 | 17 | 15 | 15 | 35 | 55 |
| 18-Sep | 36 | 36 | 19 | 102 | 89 | 21 | 55 | 28 | 25 | 24 | 22 | 21 | 24 | 23 | 24 | 21 | 22 | 22 | 21 | 22 | 23 | 24 | 26 | 23 | 102 |
| 19-Sep | 21 | 16 | 16 | 21 | 20 | 18 | 22 | 21 | 20 | 21 | 26 | 30 | 26 | 36 | 44 | 23 | 23 | 22 | 30 | 20 | 25 | 27 | 24 | 19 | 44 |
| 20-Sep | 20 | 19 | 18 | 26 | 17 | 17 | 16 | 47 | 29 | 39 | M | 80 | 87 | 79 | 48 | 103 | 32 | 37 | 77 | 41 | 69 | 85 | 57 | 43 | 103 |
| 21-Sep | 27 | 101 | 83 | 49 | 49 | 52 | 46 | 33 | 35 | 30 | 29 | 18 | 32 | 24 | 28 | 27 | 17 | 13 | 11 | 11 | 16 | 98 | 8 | 11 | 101 |
| 22-Sep | 12 | 16 | 12 | 12 | 9 | 10 | 12 | 9 | 15 | 15 | 18 | 32 | 16 | 14 | 16 | 12 | 10 | 12 | 9 | 10 | 11 | 9 | 8 | 10 | 32 |
| 23-Sep | 8 | 9 | 10 | 11 | 9 | 9 | 11 | 16 | 18 | 13 | 11 | 16 | 14 | 12 | 17 | 13 | 16 | 14 | 13 | 12 | 12 | 11 | 11 | 9 | 18 |
| 24-Sep | 8 | 8 | 9 | 8 | 8 | 12 | 10 | 18 | 22 | 20 | 21 | 21 | 22 | 23 | 25 | 22 | 20 | 19 | 21 | 14 | 16 | 16 | 18 | 22 | 25 |
| 25-Sep | 22 | 22 | 26 | 26 | 36 | 39 | 45 | 67 | 27 | 26 | 29 | 26 | 29 | 29 | 29 | 24 | 23 | 17 | 75 | 71 | 71 | 23 | 59 | 84 | 84 |
| 26-Sep | 41 | 22 | 24 | 21 | 20 | 25 | 20 | 60 | 23 | 15 | 12 | 16 | 15 | 13 | 11 | 17 | 12 | 13 | 10 | 10 | 8 | 9 | 6 | 10 | 60 |
| 27-Sep | 17 | 54 | 42 | 34 | 62 | 57 | 20 | 24 | 16 | 32 | 20 | 24 | 27 | 23 | 24 | 20 | 21 | 17 | 15 | 21 | 17 | 17 | 44 | 15 | 62 |
| 28-Sep | 18 | 19 | 18 | 53 | 26 | 13 | 15 | 19 | 14 | 20 | 21 | 26 | 37 | 71 | 49 | 37 | 19 | 14 | 40 | 52 | 74 | 29 | 24 | 54 | 74 |
| 29-Sep | 77 | 22 | 58 | 49 | 92 | 76 | 14 | 20 | 17 | 17 | 14 | 24 | 23 | 22 | 17 | 33 | 27 | 24 | 52 | 70 | 56 | 76 | 33 | 62 | 92 |
| 30-Sep | 80 | 57 | 35 | 18 | 20 | 26 | 71 | 18 | 26 | 21 | 21 | 24 | 25 | 24 | 24 | 23 | 24 | 24 | 22 | 23 | 25 | 26 | 23 | 22 | 80 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|----|-----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|--|
| 83 | 101 | 96 | 102 | 92 | 90 | 95 | 71 | 69 | 73 | 43 | 80 | 87 | 79 | 81 | 103 | 81 | 93 | 77 | 88 | 76 | 98 | 89 | 84 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Lower Camp Met Tower - September 2016

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 270 deg on Sep 27 16:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 154.2 deg on Sep 23 | Hours of Data: 228 |
| Direction of Minimum Speed: 3 deg on Sep 29 22:00 | Hours of Missing Data: 492 |
| Direction of Minimum Daily Speed Average: 3.2 deg on Sep 29 | Percent Operational Time: 31.7 |
| Monthly Average Direction: 219.2 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 | 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 | 151 | 233 | 243 | 252 | 242 | 234 | 213 | 210 | 212 | 150 | 127 | 135 | -- |
| 22-Sep | 135 | 136 | 145 | 147 | 148 | 149 | 146 | 150 | 140 | 140 | 141 | 174 | 216 | 209 | 199 | 195 | 187 | 178 | 179 | 170 | 169 | 156 | 157 | 159 | 165.0 |
| 23-Sep | 157 | 151 | 149 | 148 | 149 | 148 | 144 | 142 | 140 | 158 | 157 | 156 | 148 | 158 | 149 | 166 | 160 | 148 | 160 | 165 | 162 | 161 | 160 | 161 | 154.2 |
| 24-Sep | 160 | 159 | 156 | 160 | 160 | 168 | 158 | 161 | 184 | 248 | 261 | 266 | 269 | 270 | 276 | 290 | 295 | 300 | 299 | 270 | 266 | 260 | 262 | 262 | 246.8 |
| 25-Sep | 265 | 266 | 267 | 267 | 274 | 280 | 277 | 267 | 271 | 267 | 272 | 300 | 300 | 300 | 315 | 317 | 334 | 335 | 268 | 188 | 185 | 156 | 149 | 133 | 280.6 |
| 26-Sep | 144 | 140 | 132 | 131 | 129 | 123 | 133 | 109 | 150 | 152 | 148 | 152 | 159 | 155 | 152 | 168 | 188 | 176 | 172 | 152 | 154 | 156 | 152 | 144 | 153.3 |
| 27-Sep | 147 | 150 | 144 | 137 | 142 | 239 | 270 | 260 | 228 | 251 | 300 | 288 | 291 | 276 | 282 | 270 | 269 | 256 | 243 | 253 | 261 | 266 | 274 | 263 | 259.5 |
| 28-Sep | 247 | 266 | 247 | 253 | 162 | 151 | 138 | 137 | 142 | 136 | 131 | 147 | 206 | 123 | 278 | 253 | 226 | 230 | 196 | 247 | 140 | 121 | 131 | 134 | 187.6 |
| 29-Sep | 113 | 6 | 11 | 229 | 132 | 128 | 138 | 137 | 137 | 139 | 140 | 137 | 130 | 138 | 134 | 128 | 156 | 107 | 117 | 16 | 147 | 3 | 345 | 339 | 128.1 |
| 30-Sep | 318 | 331 | 338 | 320 | 330 | 340 | 0 | 336 | 332 | 353 | 359 | 2 | 7 | 4 | 8 | 9 | 16 | 15 | 8 | 6 | 8 | 7 | 7 | 8 | 3.3 |
| | 179.4 | 189.7 | 183.3 | 175.8 | 157.7 | 162.0 | 155.3 | 163.3 | 172.7 | 195.8 | 219.1 | 228.5 | 225.0 | 234.7 | 247.6 | 254.8 | 246.8 | 229.6 | 202.2 | 195.7 | 194.9 | 190.7 | 171.0 | 174.5 | |
| | Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | | |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 104 deg on Sep 29 19:00 | Hours of Data: 228 |
| Minimum Value: 5 deg on Sep 22 19:00 | Hours of Missing Data: 492 |
| Percentiles: P ₁ = 6 P ₁₀ = 8 Q ₁ = 10 Median = 14 Q ₃ = 20 P ₉₀ = 42 P ₉₉ = 87 | Hours of Calibration: 0 |
| | Percent Operational Time: 31.7 |

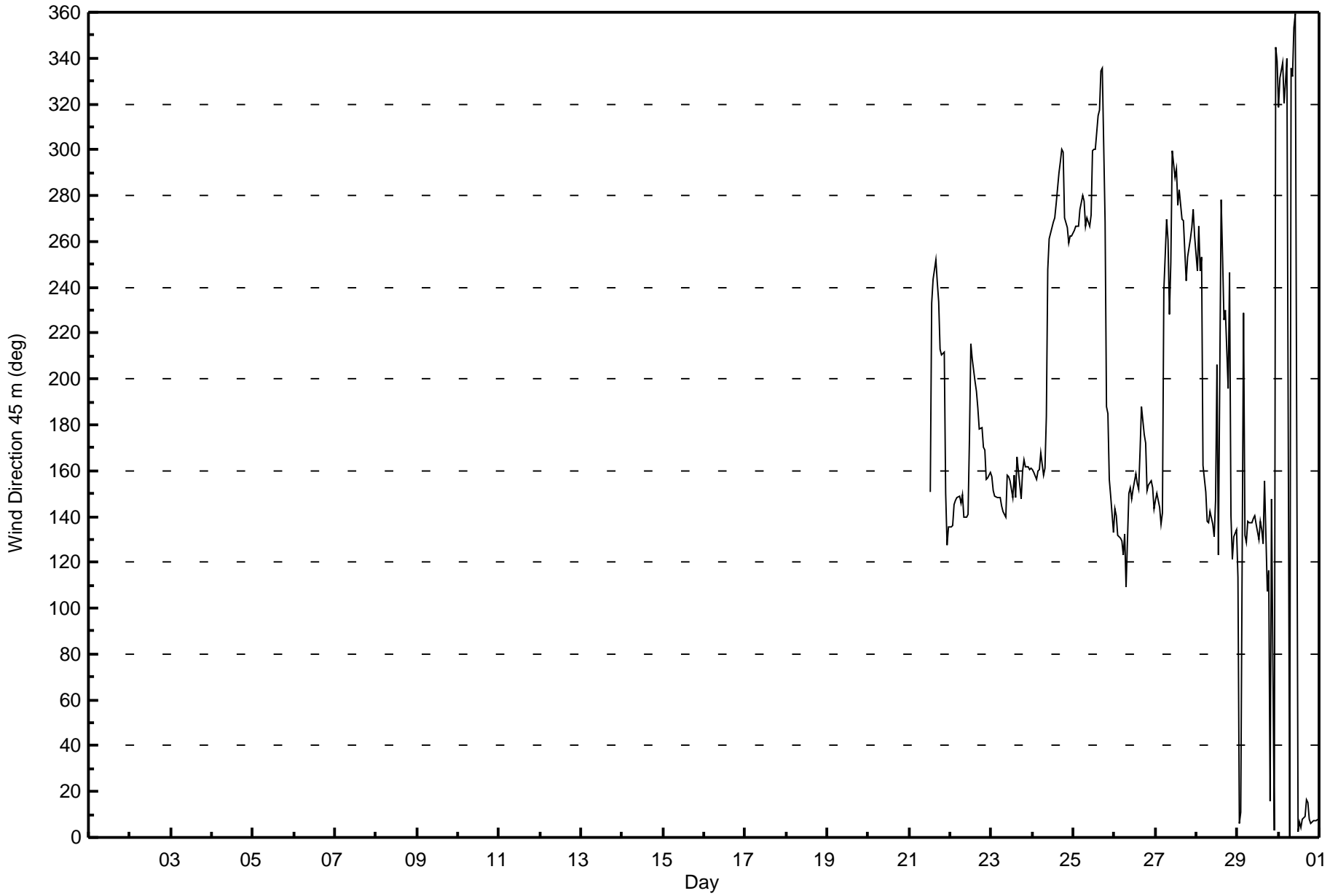
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|---------------|-----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | AF | 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 | 29 | 20 | 22 | 20 | 12 | 9 | 9 | 9 | 12 | 92 | 6 | 6 | | 92 | |
| 22-Sep | 7 | 12 | 9 | 9 | 6 | 6 | 8 | 6 | 12 | 11 | 14 | 33 | 16 | 13 | 17 | 13 | 9 | 9 | 5 | 8 | 8 | 9 | 9 | 8 | | 33 | |
| 23-Sep | 7 | 8 | 9 | 8 | 7 | 8 | 9 | 12 | 13 | 12 | 11 | 14 | 13 | 11 | 15 | 10 | 14 | 13 | 13 | 9 | 10 | 9 | 8 | 7 | | 15 | |
| 24-Sep | 6 | 6 | 7 | 7 | 7 | 8 | 9 | 17 | 22 | 12 | 13 | 14 | 14 | 16 | 18 | 15 | 14 | 14 | 17 | 10 | 10 | 8 | 9 | 11 | | 22 | |
| 25-Sep | 12 | 12 | 13 | 14 | 22 | 21 | 27 | 42 | 18 | 18 | 23 | 20 | 23 | 24 | 24 | 18 | 18 | 11 | 70 | 43 | 53 | 23 | 20 | 55 | | 70 | |
| 26-Sep | 25 | 9 | 12 | 10 | 12 | 15 | 13 | 40 | 22 | 12 | 10 | 13 | 12 | 11 | 9 | 14 | 11 | 9 | 7 | 11 | 8 | 8 | 6 | 8 | | 40 | |
| 27-Sep | 14 | 57 | 32 | 20 | 54 | 53 | 14 | 18 | 12 | 29 | 16 | 19 | 21 | 16 | 19 | 14 | 13 | 10 | 10 | 16 | 13 | 10 | 37 | 9 | | 57 | |
| 28-Sep | 10 | 14 | 11 | 28 | 35 | 14 | 12 | 13 | 9 | 15 | 18 | 24 | 39 | 65 | 46 | 31 | 19 | 19 | 17 | 51 | 67 | 15 | 9 | 33 | | 67 | |
| 29-Sep | 66 | 20 | 42 | 44 | 76 | 23 | 10 | 15 | 12 | 12 | 12 | 20 | 22 | 18 | 14 | 33 | 25 | 16 | 104 | 62 | 29 | 95 | 13 | 53 | | 104 | |
| 30-Sep | 68 | 25 | 44 | 25 | 13 | 17 | 26 | 14 | 19 | 16 | 16 | 18 | 19 | 19 | 18 | 16 | 16 | 17 | 17 | 18 | 18 | 20 | 17 | 16 | | 68 | |
| | 68 | 57 | 44 | 44 | 76 | 53 | 27 | 42 | 22 | 29 | 23 | 33 | 39 | 65 | 46 | 33 | 25 | 19 | 104 | 62 | 67 | 95 | 37 | 55 | | | |
| | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 268 deg on Sep 25 02:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 155.4 deg on Sep 23 | Hours of Data: 719 |
| Direction of Minimum Speed: 284 deg on Sep 20 16:00 | Hours of Missing Data: 1 |
| Direction of Minimum Daily Speed Average: 2.8 deg on Sep 14 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 258.0 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 | 92 | 104 | 112 | 49 | 356 | 348 | 354 | 30 | 38 | 12 | 344 | 92 | 107 | 107 | 123 | 136 | 27 | 133 | 15 | 1 | 311 | 318 | 269 | 266 | 39.5 |
| 2-Sep | 258 | 235 | 249 | 263 | 248 | 247 | 257 | 242 | 248 | 257 | 253 | 255 | 255 | 249 | 253 | 271 | 292 | 278 | 5 | 307 | 297 | 285 | 282 | 315 | 264.2 |
| 3-Sep | 352 | 337 | 317 | 294 | 291 | 289 | 280 | 282 | 288 | 294 | 305 | 308 | 310 | 315 | 317 | 323 | 319 | 328 | 338 | 323 | 323 | 316 | 313 | 302 | 309.9 |
| 4-Sep | 296 | 301 | 305 | 297 | 282 | 266 | 281 | 282 | 265 | 269 | 267 | 271 | 269 | 272 | 272 | 266 | 238 | 231 | 355 | 41 | 189 | 239 | 237 | 251 | 276.6 |
| 5-Sep | 246 | 219 | 201 | 175 | 164 | 150 | 151 | 142 | 137 | 146 | 158 | 195 | 200 | 194 | 175 | 150 | 170 | 160 | 141 | 135 | 132 | 137 | 142 | 155 | 161.5 |
| 6-Sep | 154 | 155 | 155 | 163 | 164 | 165 | 162 | 155 | 156 | 160 | 159 | 142 | 145 | 156 | 152 | 166 | 174 | 176 | 189 | 187 | 166 | 148 | 144 | 144 | 159.8 |
| 7-Sep | 145 | 148 | 156 | 168 | 151 | 150 | 147 | 148 | 153 | 146 | 137 | 135 | 136 | 141 | 141 | 136 | 155 | 164 | 213 | 231 | 233 | 225 | 271 | 199 | 159.9 |
| 8-Sep | 232 | 218 | 226 | 214 | 188 | 180 | 183 | 196 | 203 | 263 | 204 | 183 | 250 | 277 | 309 | 302 | 198 | 277 | 42 | 6 | 319 | 342 | 345 | 339 | 280.9 |
| 9-Sep | 335 | 344 | 339 | 341 | 360 | 349 | 37 | 17 | 2 | 356 | 348 | 240 | 199 | 253 | 251 | 165 | 140 | 138 | 139 | 142 | 141 | 138 | 141 | 145 | 115.8 |
| 10-Sep | 157 | 143 | 144 | 147 | 154 | 157 | 154 | 156 | 183 | 243 | 268 | 263 | 258 | 263 | 276 | 303 | 299 | 280 | 291 | 289 | 290 | 292 | 293 | 294 | 241.2 |
| 11-Sep | 339 | 339 | 340 | 341 | 344 | 348 | 353 | 356 | 357 | 347 | 346 | 352 | 345 | 348 | 354 | 356 | 346 | 338 | 333 | 348 | 345 | 326 | 315 | 305 | 345.1 |
| 12-Sep | 318 | 324 | 329 | 329 | 260 | 258 | 254 | 257 | 244 | 244 | 245 | 256 | 216 | 211 | 221 | 220 | 204 | 167 | 166 | 178 | 177 | 180 | 192 | 185 | 208.7 |
| 13-Sep | 178 | 165 | 141 | 160 | 162 | 168 | 165 | 151 | 198 | 225 | 217 | 225 | 223 | 235 | 250 | 242 | 237 | 233 | 245 | 240 | 250 | 258 | 270 | 267 | 222.3 |
| 14-Sep | 300 | 326 | 334 | 342 | 6 | 92 | 238 | 113 | 97 | 138 | 146 | 146 | 141 | 141 | 232 | 250 | 256 | 329 | 354 | 356 | 210 | 224 | 266 | 340 | 287.8 |
| 15-Sep | 334 | 339 | 351 | 13 | 27 | 49 | 52 | 69 | 59 | 52 | 122 | 127 | 150 | 125 | 132 | 127 | 132 | 129 | 134 | 144 | 145 | 140 | 143 | 145 | 121.3 |
| 16-Sep | 151 | 161 | 168 | 174 | 173 | 164 | 170 | 171 | 175 | 172 | 152 | 149 | 220 | 228 | 245 | 245 | 245 | 241 | 242 | 236 | 233 | 235 | 214 | 199 | 209.2 |
| 17-Sep | 192 | 220 | 215 | 143 | 163 | 185 | 205 | 204 | 207 | 210 | 222 | 223 | 217 | 220 | 247 | 243 | 258 | 269 | 255 | 241 | 249 | 254 | 258 | 255 | 232.5 |
| 18-Sep | 242 | 250 | 241 | 273 | 270 | 231 | 251 | 267 | 274 | 280 | 293 | 294 | 307 | 314 | 326 | 335 | 335 | 345 | 347 | 355 | 347 | 7 | 356 | 349 | 305.2 |
| 19-Sep | 342 | 332 | 328 | 328 | 330 | 322 | 287 | 295 | 291 | 292 | 299 | 312 | 330 | 324 | 332 | 324 | 344 | 342 | 13 | 336 | 343 | 315 | 343 | 338 | 320.8 |
| 20-Sep | 351 | 343 | 338 | 334 | 347 | 352 | 351 | 347 | 7 | 350 | M | 323 | 5 | 29 | 243 | 284 | 125 | 101 | 97 | 109 | 112 | 123 | 160 | 141 | 21.1 |
| 21-Sep | 137 | 160 | 159 | 173 | 207 | 221 | 205 | 197 | 186 | 169 | 150 | 144 | 155 | 231 | 240 | 250 | 239 | 234 | 224 | 223 | 221 | 200 | 168 | 166 | 206.9 |
| 22-Sep | 153 | 141 | 154 | 152 | 149 | 153 | 154 | 155 | 145 | 138 | 139 | 182 | 218 | 211 | 203 | 198 | 190 | 183 | 184 | 178 | 174 | 164 | 163 | 165 | 169.7 |
| 23-Sep | 163 | 161 | 160 | 159 | 158 | 157 | 154 | 147 | 145 | 158 | 154 | 152 | 147 | 154 | 147 | 162 | 154 | 145 | 155 | 163 | 161 | 161 | 160 | 164 | 155.4 |
| 24-Sep | 163 | 160 | 159 | 167 | 168 | 179 | 188 | 189 | 206 | 245 | 257 | 265 | 267 | 269 | 277 | 290 | 293 | 297 | 296 | 276 | 274 | 270 | 268 | 267 | 252.6 |
| 25-Sep | 265 | 268 | 267 | 264 | 266 | 276 | 270 | 265 | 269 | 273 | 277 | 299 | 299 | 299 | 313 | 317 | 331 | 343 | 38 | 157 | 189 | 237 | 239 | 146 | 278.7 |
| 26-Sep | 159 | 149 | 149 | 155 | 155 | 151 | 148 | 143 | 142 | 144 | 157 | 156 | 162 | 157 | 157 | 170 | 193 | 182 | 179 | 161 | 160 | 161 | 159 | 156 | 159.8 |
| 27-Sep | 144 | 139 | 137 | 142 | 156 | 254 | 276 | 261 | 231 | 253 | 298 | 286 | 291 | 275 | 282 | 268 | 265 | 253 | 247 | 251 | 255 | 267 | 269 | 276 | 255.2 |
| 28-Sep | 255 | 265 | 253 | 254 | 218 | 200 | 177 | 158 | 169 | 139 | 139 | 147 | 234 | 132 | 275 | 244 | 226 | 224 | 213 | 206 | 197 | 192 | 197 | 157 | 216.0 |
| 29-Sep | 137 | 146 | 139 | 146 | 153 | 161 | 166 | 170 | 160 | 130 | 131 | 134 | 141 | 146 | 133 | 122 | 143 | 105 | 91 | 95 | 115 | 136 | 347 | 350 | 132.2 |
| 30-Sep | 340 | 341 | 350 | 346 | 344 | 349 | 6 | 357 | 351 | 1 | 5 | 9 | 11 | 11 | 12 | 12 | 18 | 18 | 13 | 12 | 14 | 15 | 12 | 11 | 7.6 |

218.0 218.6 207.7 212.5 204.0 211.2 207.2 202.6 225.8 241.2 250.0 241.4 238.8 244.9 256.7 262.9 258.5 250.8 233.3 219.6 221.8 229.1 237.6 233.7

Diurnal Average

M - Maintenance

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

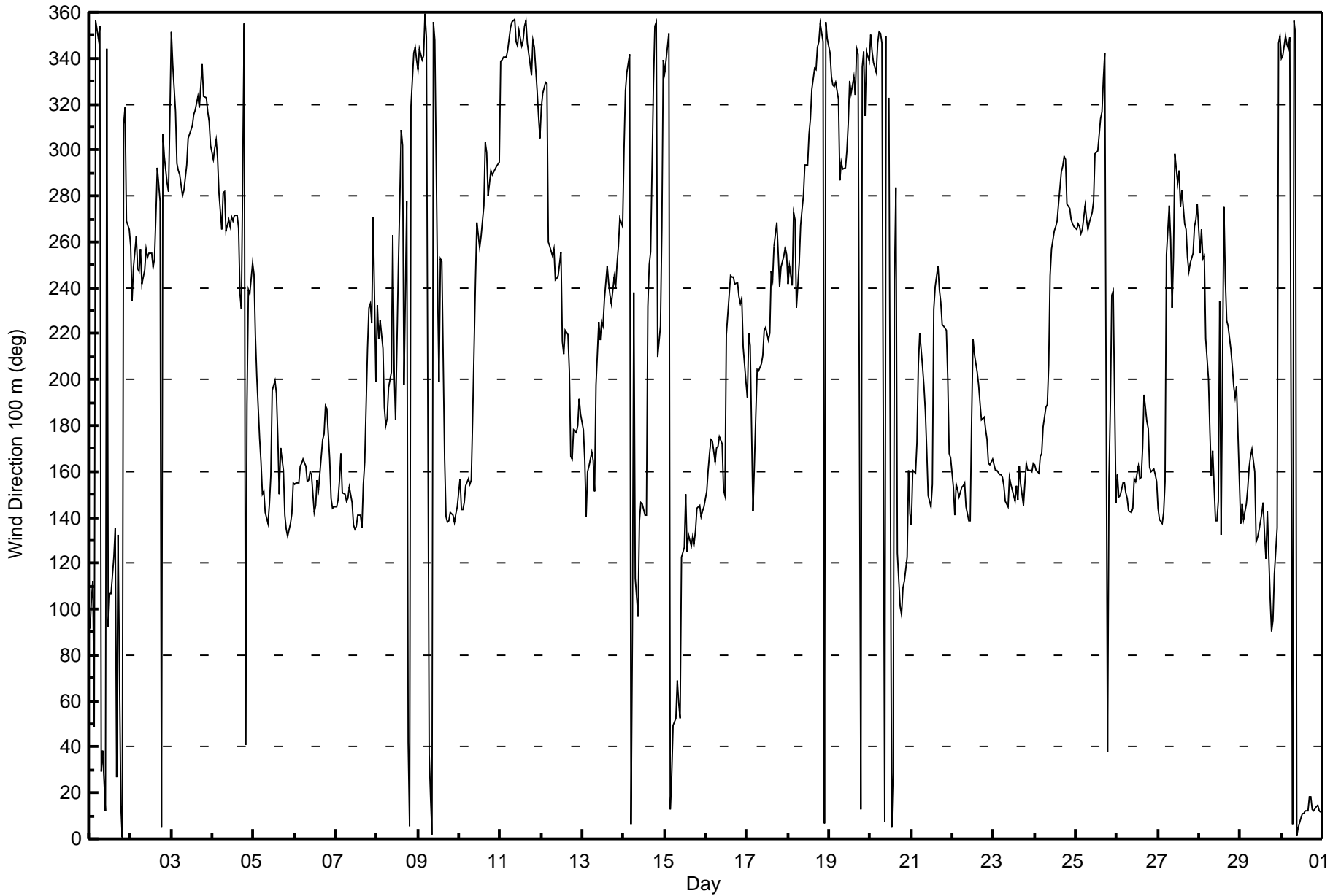
Wind Direction 100 m (WD100m) - deg
Lower Camp Met Tower - September 2016

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 101 deg on Sep 20 16:00 | Hours of Data: 719 |
| Minimum Value: 2 deg on Sep 21 21:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 7 Median = 11 Q ₃ = 16 P ₉₀ = 26 P ₉₉ = 70 | 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 | 7 | 10 | 7 | 50 | 19 | 6 | 7 | 20 | 19 | 15 | 12 | 51 | 13 | 12 | 13 | 40 | 51 | 77 | 30 | 31 | 17 | 11 | 13 | 17 | 77 |
| 2-Sep | 5 | 8 | 11 | 12 | 5 | 7 | 6 | 21 | 11 | 13 | 17 | 8 | 10 | 9 | 13 | 11 | 22 | 13 | 40 | 16 | 8 | 9 | 10 | 11 | 40 |
| 3-Sep | 10 | 7 | 9 | 9 | 6 | 7 | 9 | 8 | 6 | 7 | 7 | 8 | 7 | 8 | 7 | 8 | 8 | 10 | 9 | 9 | 8 | 7 | 6 | 12 | 12 |
| 4-Sep | 6 | 7 | 12 | 8 | 15 | 16 | 14 | 15 | 14 | 21 | 17 | 18 | 25 | 36 | 43 | 27 | 34 | 11 | 34 | 26 | 59 | 5 | 5 | 10 | 59 |
| 5-Sep | 14 | 16 | 14 | 16 | 12 | 11 | 9 | 7 | 9 | 17 | 23 | 22 | 16 | 19 | 21 | 15 | 13 | 13 | 10 | 7 | 11 | 13 | 10 | 7 | 23 |
| 6-Sep | 8 | 9 | 10 | 6 | 6 | 5 | 5 | 8 | 9 | 10 | 14 | 14 | 13 | 16 | 14 | 9 | 8 | 7 | 11 | 10 | 10 | 7 | 4 | 4 | 16 |
| 7-Sep | 7 | 5 | 6 | 11 | 10 | 7 | 13 | 13 | 20 | 16 | 7 | 6 | 6 | 6 | 8 | 10 | 12 | 10 | 22 | 53 | 26 | 37 | 52 | 31 | 53 |
| 8-Sep | 6 | 17 | 16 | 18 | 18 | 14 | 17 | 16 | 31 | 95 | 61 | 82 | 21 | 39 | 37 | 58 | 48 | 22 | 37 | 66 | 14 | 11 | 7 | 6 | 95 |
| 9-Sep | 8 | 8 | 8 | 8 | 12 | 11 | 18 | 17 | 11 | 13 | 27 | 57 | 46 | 29 | 28 | 60 | 10 | 8 | 6 | 6 | 3 | 4 | 3 | 7 | 60 |
| 10-Sep | 9 | 6 | 4 | 5 | 7 | 5 | 6 | 8 | 27 | 14 | 9 | 6 | 7 | 17 | 14 | 15 | 12 | 14 | 11 | 8 | 8 | 8 | 9 | 12 | 27 |
| 11-Sep | 11 | 8 | 9 | 8 | 8 | 9 | 9 | 9 | 8 | 10 | 9 | 9 | 10 | 9 | 8 | 10 | 9 | 11 | 10 | 9 | 8 | 8 | 12 | 11 | 12 |
| 12-Sep | 13 | 17 | 15 | 16 | 22 | 10 | 19 | 24 | 15 | 12 | 14 | 23 | 20 | 27 | 25 | 17 | 20 | 14 | 5 | 2 | 3 | 8 | 9 | 8 | 27 |
| 13-Sep | 6 | 16 | 13 | 18 | 12 | 9 | 11 | 15 | 17 | 11 | 20 | 11 | 11 | 11 | 8 | 5 | 5 | 3 | 6 | 3 | 4 | 3 | 19 | 41 | 41 |
| 14-Sep | 37 | 13 | 6 | 6 | 19 | 48 | 60 | 13 | 84 | 24 | 12 | 6 | 8 | 9 | 38 | 10 | 11 | 30 | 6 | 16 | 54 | 28 | 30 | 12 | 84 |
| 15-Sep | 4 | 10 | 30 | 19 | 11 | 14 | 10 | 14 | 17 | 27 | 50 | 43 | 9 | 18 | 8 | 11 | 9 | 6 | 8 | 4 | 4 | 6 | 11 | 7 | 50 |
| 16-Sep | 6 | 9 | 9 | 12 | 10 | 8 | 11 | 9 | 12 | 16 | 12 | 11 | 13 | 9 | 8 | 6 | 6 | 5 | 4 | 4 | 4 | 6 | 16 | 25 | 25 |
| 17-Sep | 23 | 16 | 10 | 25 | 22 | 17 | 17 | 17 | 17 | 11 | 8 | 12 | 9 | 11 | 9 | 10 | 14 | 11 | 14 | 5 | 4 | 5 | 3 | 6 | 25 |
| 18-Sep | 14 | 17 | 18 | 23 | 11 | 22 | 16 | 8 | 12 | 11 | 6 | 7 | 13 | 11 | 12 | 10 | 9 | 8 | 10 | 9 | 7 | 10 | 13 | 9 | 23 |
| 19-Sep | 11 | 7 | 4 | 8 | 7 | 7 | 9 | 6 | 5 | 5 | 13 | 18 | 16 | 19 | 16 | 12 | 11 | 12 | 20 | 10 | 15 | 13 | 24 | 8 | 24 |
| 20-Sep | 9 | 7 | 12 | 6 | 11 | 10 | 11 | 16 | 12 | 20 | M | 58 | 53 | 58 | 68 | 101 | 26 | 17 | 13 | 25 | 11 | 18 | 11 | 19 | 101 |
| 21-Sep | 9 | 21 | 26 | 18 | 16 | 8 | 16 | 18 | 29 | 32 | 18 | 8 | 25 | 16 | 15 | 13 | 10 | 6 | 4 | 2 | 2 | 73 | 24 | 17 | 73 |
| 22-Sep | 12 | 4 | 6 | 6 | 5 | 4 | 3 | 3 | 7 | 4 | 4 | 29 | 12 | 10 | 15 | 13 | 10 | 8 | 6 | 3 | 7 | 5 | 5 | 6 | 29 |
| 23-Sep | 6 | 5 | 7 | 6 | 5 | 6 | 7 | 6 | 6 | 10 | 9 | 11 | 7 | 10 | 9 | 9 | 11 | 5 | 11 | 8 | 8 | 7 | 6 | 6 | 11 |
| 24-Sep | 6 | 5 | 4 | 7 | 8 | 5 | 14 | 17 | 18 | 10 | 7 | 8 | 10 | 10 | 17 | 12 | 10 | 9 | 12 | 8 | 7 | 4 | 3 | 4 | 18 |
| 25-Sep | 3 | 4 | 4 | 4 | 9 | 15 | 15 | 18 | 13 | 14 | 20 | 14 | 17 | 16 | 20 | 13 | 13 | 8 | 69 | 47 | 20 | 19 | 40 | 39 | 69 |
| 26-Sep | 12 | 9 | 4 | 6 | 10 | 10 | 8 | 12 | 5 | 4 | 10 | 9 | 11 | 9 | 7 | 15 | 11 | 8 | 2 | 8 | 5 | 4 | 3 | 5 | 15 |
| 27-Sep | 5 | 7 | 5 | 7 | 31 | 35 | 11 | 17 | 7 | 26 | 11 | 15 | 18 | 11 | 15 | 9 | 7 | 6 | 5 | 8 | 7 | 8 | 11 | 10 | 35 |
| 28-Sep | 7 | 6 | 6 | 6 | 33 | 22 | 17 | 9 | 13 | 8 | 8 | 20 | 48 | 77 | 35 | 24 | 16 | 12 | 10 | 9 | 24 | 23 | 23 | 17 | 77 |
| 29-Sep | 4 | 5 | 16 | 5 | 6 | 7 | 6 | 12 | 21 | 6 | 7 | 12 | 15 | 20 | 11 | 21 | 32 | 12 | 3 | 16 | 9 | 13 | 41 | 7 | 41 |
| 30-Sep | 7 | 4 | 11 | 14 | 9 | 8 | 10 | 10 | 12 | 11 | 8 | 10 | 11 | 11 | 10 | 9 | 9 | 9 | 9 | 9 | 11 | 12 | 9 | 8 | 14 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|--|
| 37 | 21 | 30 | 50 | 33 | 48 | 60 | 24 | 84 | 95 | 61 | 82 | 53 | 77 | 68 | 101 | 51 | 77 | 69 | 66 | 59 | 73 | 52 | 41 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





| Maximum Value: 0.9 km/h on Sep 12 21:00 | | Maximum Daily Average: 0.3 km/h on Sep 23 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.1 km/h on Sep 11 12:00 | | Minimum Daily Average: -0.4 km/h on Sep 3 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.0 km/h at hour 5 | | Minimum Diurnal Average: -0.2 km/h at hour 15 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: -0.05 km/h | | Percentiles: P ₁ = -0.7 P ₁₀ = -0.4 Q ₁ = -0.2 Median = -0.1 Q ₃ = 0.1 P ₉₀ = 0.3 P ₉₉ = 0.7 | | 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 | -0.1 | -0.2 | -0.1 | -0.5 | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | -0.6 | 0.0 | -0.1 | -0.5 | -0.1 | 0.0 | 0.1 | -0.2 | -0.1 | -0.2 | -0.2 | -0.1 | 0.0 | -0.2 | -0.4 | -0.2 | 0.1 |
| 2-Sep | -0.4 | 0.0 | -0.1 | -0.4 | 0.0 | 0.0 | -0.2 | -0.1 | -0.2 | 0.0 | 0.1 | -0.4 | -0.2 | -0.2 | -0.2 | -0.3 | -0.2 | -0.3 | -0.1 | -0.2 | -0.4 | -0.1 | -0.3 | -0.2 | -0.2 | 0.1 |
| 3-Sep | -0.4 | -0.1 | -0.3 | -0.3 | -0.3 | -0.3 | -0.5 | -0.5 | -0.6 | -0.4 | -0.5 | -0.5 | -0.7 | -0.4 | -0.4 | -0.3 | -0.4 | -0.4 | -0.2 | -0.5 | -0.6 | -0.5 | -0.5 | -0.5 | -0.4 | -0.1 |
| 4-Sep | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | -0.3 | -0.2 | -0.2 | -0.2 | -0.1 | 0.0 | -0.3 | -0.3 | -0.3 | -0.2 | -0.3 | 0.3 | 0.0 | -0.3 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | -0.1 |
| 5-Sep | -0.1 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.4 | 0.3 | 0.4 | 0.5 | 0.4 | 0.3 | 0.1 | 0.1 | -0.1 | 0.0 | 0.5 | 0.2 | 0.5 |
| 6-Sep | 0.0 | 0.1 | 0.2 | 0.6 | 0.4 | 0.3 | 0.5 | -0.1 | -0.1 | 0.4 | 0.3 | 0.4 | 0.1 | 0.0 | 0.4 | 0.7 | 0.7 | 0.5 | 0.3 | 0.1 | 0.2 | 0.1 | 0.1 | 0.0 | 0.3 | 0.7 |
| 7-Sep | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.3 | 0.1 | 0.4 | 0.5 | 0.4 | 0.3 | 0.1 | 0.0 | 0.2 | 0.2 | 0.1 | -0.2 | 0.1 | 0.0 | -0.1 | 0.1 | 0.1 | 0.5 |
| 8-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.4 | -0.1 | 0.0 | 0.0 | -0.1 | -0.2 | -0.1 | -0.1 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | 0.0 | -0.1 | 0.0 | 0.4 |
| 9-Sep | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.3 | -0.2 | -0.5 | -0.6 | -0.1 | 0.2 | 0.0 | -0.1 | 0.0 | 0.3 | 0.1 | 0.2 | 0.0 | 0.0 | -0.2 | -0.1 | 0.0 | 0.3 | -0.1 | 0.3 |
| 10-Sep | 0.4 | 0.1 | 0.5 | 0.6 | 0.5 | 0.7 | 0.3 | 0.4 | 0.4 | -0.2 | -0.5 | -0.5 | -0.5 | -0.3 | -0.3 | -0.4 | -0.6 | -0.4 | -0.5 | -0.5 | -0.6 | -0.5 | -0.4 | -0.6 | -0.1 | 0.7 |
| 11-Sep | -0.2 | -0.3 | -0.4 | -0.3 | -0.4 | -0.4 | -0.6 | -0.4 | -0.8 | -0.5 | -0.3 | -1.1 | -0.7 | -0.4 | -0.7 | -0.6 | -0.3 | -0.4 | -0.2 | -0.1 | -0.2 | -0.2 | -0.3 | -0.2 | -0.4 | -0.1 |
| 12-Sep | -0.2 | -0.1 | -0.2 | -0.1 | 0.0 | -0.2 | 0.1 | 0.1 | 0.0 | -0.1 | -0.1 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.6 | 0.7 | 0.8 | 0.9 | 0.8 | 0.7 | 0.8 | 0.2 | 0.9 |
| 13-Sep | 0.7 | 0.2 | -0.6 | -0.2 | 0.1 | 0.3 | 0.2 | -0.1 | 0.3 | 0.0 | 0.2 | -0.1 | 0.1 | -0.3 | -0.5 | -0.3 | -0.1 | -0.2 | -0.3 | -0.2 | -0.4 | -0.4 | -0.4 | -0.1 | -0.1 | 0.7 |
| 14-Sep | -0.1 | -0.2 | -0.1 | -0.1 | 0.0 | 0.1 | 0.1 | -0.1 | -0.1 | 0.1 | 0.2 | -0.2 | 0.2 | 0.4 | -0.4 | -0.3 | -0.4 | -0.6 | -0.2 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | -0.1 | 0.4 |
| 15-Sep | -0.1 | 0.1 | 0.0 | -0.1 | 0.1 | 0.0 | 0.0 | -0.1 | -0.3 | -0.1 | 0.4 | 0.4 | 0.3 | 0.5 | 0.1 | -0.1 | 0.0 | -0.2 | 0.1 | 0.3 | 0.7 | 0.2 | 0.2 | 0.1 | 0.1 | 0.7 |
| 16-Sep | 0.0 | 0.0 | 0.2 | -0.1 | 0.3 | 0.3 | 0.4 | 0.1 | 0.4 | 0.2 | 0.1 | -0.1 | -0.2 | -0.2 | -0.5 | -0.5 | -0.3 | -0.1 | -0.1 | 0.0 | 0.0 | -0.1 | 0.1 | 0.0 | 0.0 | 0.4 |
| 17-Sep | 0.1 | 0.1 | 0.2 | -0.2 | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.3 | 0.0 | 0.1 | 0.0 | 0.0 | -0.2 | -0.3 | -0.3 | -0.4 | 0.0 | 0.1 | -0.1 | -0.4 | -0.4 | -0.1 | 0.0 | 0.3 |
| 18-Sep | 0.2 | 0.0 | 0.2 | 0.1 | 0.0 | 0.1 | -0.1 | -0.2 | -0.5 | -0.4 | -0.5 | -0.6 | -0.5 | -0.5 | -0.3 | -0.4 | 0.0 | -0.1 | -0.2 | -0.1 | -0.2 | -0.2 | -0.1 | 0.0 | -0.2 | 0.2 |
| 19-Sep | -0.1 | -0.1 | -0.2 | -0.1 | -0.2 | -0.2 | -0.2 | -0.3 | -0.4 | -0.4 | -0.1 | -0.2 | -0.2 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.4 | -0.1 | -0.2 | -0.2 | -0.3 | -0.1 | -0.2 | -0.1 |
| 20-Sep | -0.1 | -0.2 | -0.2 | -0.1 | -0.2 | -0.3 | -0.2 | 0.0 | -0.3 | -0.1 | M | 0.1 | -0.2 | 0.1 | 0.3 | 0.1 | 0.3 | 0.0 | -0.1 | -0.2 | -0.2 | -0.1 | 0.0 | -0.1 | -0.1 | 0.3 |
| 21-Sep | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.0 | 0.0 | 0.2 | 0.4 | -0.1 | -0.2 | -0.1 | -0.3 | -0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.4 | 0.3 | 0.1 | 0.4 |
| 22-Sep | 0.2 | 0.1 | 0.1 | 0.1 | -0.1 | 0.2 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.1 | 0.0 | -0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.2 | 0.5 | 0.6 | 0.4 | 0.4 | 0.5 | 0.2 | 0.6 |
| 23-Sep | 0.6 | 0.1 | 0.1 | 0.1 | -0.2 | -0.2 | -0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.3 | 0.1 | 0.2 | 0.2 | 0.5 | 0.4 | 0.1 | 0.3 | 0.6 | 0.5 | 0.4 | 0.5 | 0.6 | 0.3 | 0.6 |
| 24-Sep | 0.5 | 0.4 | 0.3 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | -0.2 | -0.6 | -0.6 | -0.5 | -0.7 | -0.5 | -0.6 | -0.7 | -0.3 | -0.3 | -0.4 | -0.3 | -0.6 | -0.5 | -0.3 | -0.2 | 0.5 |
| 25-Sep | -0.4 | -0.2 | -0.3 | -0.2 | -0.1 | -0.3 | -0.2 | -0.3 | -0.3 | -0.2 | -0.3 | -0.5 | -0.5 | -0.5 | -0.4 | -0.3 | -0.1 | -0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | -0.2 | 0.2 |
| 26-Sep | 0.0 | 0.1 | 0.0 | 0.2 | -0.1 | -0.3 | -0.3 | -0.3 | 0.1 | 0.0 | -0.2 | -0.1 | 0.4 | 0.2 | -0.1 | 0.5 | 0.2 | 0.3 | 0.5 | 0.3 | 0.5 | 0.4 | 0.3 | -0.1 | 0.1 | 0.5 |
| 27-Sep | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | -0.1 | -0.3 | -0.3 | -0.2 | -0.4 | -0.5 | -0.3 | -0.2 | -0.7 | -0.5 | -0.9 | -0.7 | -0.5 | -0.2 | -0.4 | -0.4 | -0.5 | -0.3 | -0.2 | -0.3 | 0.1 |
| 28-Sep | -0.2 | -0.3 | -0.2 | 0.1 | 0.1 | 0.2 | 0.0 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | -0.3 | 0.0 | -0.1 | -0.2 | -0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.2 | 0.2 | 0.0 | 0.4 |
| 29-Sep | 0.0 | -0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.3 | -0.1 | 0.2 | 0.1 | -0.1 | 0.1 | 0.1 | 0.1 | 0.0 | -0.2 | -0.1 | 0.0 | 0.3 |
| 30-Sep | 0.0 | -0.1 | 0.0 | -0.1 | -0.2 | -0.2 | -0.1 | -0.1 | 0.0 | -0.4 | -0.7 | -0.5 | -0.4 | -0.6 | -0.4 | -0.5 | -0.2 | -0.1 | -0.4 | -0.2 | -0.2 | -0.4 | -0.2 | -0.2 | -0.3 | 0.0 |
| | | | | | | | | | | | | | | | | | | | | | | | | 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 2016

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.4 km/h on Sep 30 17:00 | Hours of Data: 719 |
| Minimum Value: 0.1 km/h on Sep 14 06:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 1.0 Median = 1.6 Q ₃ = 2.2 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 | 0.4 | 0.6 | 0.6 | 0.8 | 0.7 | 0.8 | 0.8 | 0.8 | 1.2 | 1.2 | 1.2 | 1.5 | 2.2 | 1.9 | 1.6 | 0.6 | 1.8 | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 1.6 | 2.0 | 2.2 |
| 2-Sep | 1.9 | 1.0 | 1.4 | 2.0 | 2.0 | 1.8 | 2.2 | 1.4 | 1.8 | 1.9 | 2.0 | 2.4 | 2.1 | 1.8 | 1.6 | 2.0 | 1.1 | 1.2 | 0.6 | 0.4 | 0.8 | 1.0 | 2.1 | 1.9 | 2.4 |
| 3-Sep | 2.1 | 1.8 | 1.2 | 1.8 | 2.8 | 3.0 | 3.0 | 3.1 | 3.5 | 2.9 | 2.8 | 2.7 | 2.5 | 2.2 | 2.1 | 1.7 | 2.1 | 2.4 | 2.8 | 2.7 | 3.2 | 2.6 | 2.3 | 2.5 | 3.5 |
| 4-Sep | 2.7 | 2.6 | 1.7 | 2.2 | 1.7 | 1.4 | 1.1 | 1.5 | 1.7 | 1.8 | 2.4 | 2.3 | 2.1 | 1.8 | 1.7 | 1.6 | 1.4 | 0.8 | 0.6 | 0.3 | 0.5 | 1.1 | 1.0 | 1.3 | 2.7 |
| 5-Sep | 1.2 | 0.9 | 0.8 | 1.3 | 1.2 | 1.5 | 1.8 | 1.7 | 1.8 | 1.9 | 1.9 | 1.7 | 1.5 | 1.5 | 1.5 | 1.6 | 1.3 | 1.3 | 1.2 | 1.3 | 0.6 | 0.8 | 1.3 | 2.2 | 2.2 |
| 6-Sep | 1.8 | 1.7 | 1.5 | 1.5 | 1.4 | 1.4 | 1.4 | 1.9 | 2.0 | 1.6 | 1.9 | 2.4 | 2.4 | 1.9 | 2.4 | 2.3 | 1.7 | 1.7 | 1.4 | 1.1 | 1.1 | 1.5 | 1.4 | 1.1 | 2.4 |
| 7-Sep | 0.6 | 0.5 | 0.5 | 0.5 | 1.0 | 1.3 | 1.7 | 1.4 | 1.6 | 1.6 | 2.1 | 2.2 | 2.2 | 2.1 | 1.9 | 1.6 | 1.4 | 0.7 | 0.6 | 1.1 | 0.8 | 0.7 | 0.5 | 0.4 | 2.2 |
| 8-Sep | 0.4 | 0.6 | 0.8 | 0.8 | 0.8 | 0.8 | 1.3 | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.4 | 1.2 | 1.0 | 1.9 | 1.2 | 2.0 | 1.8 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 2.0 |
| 9-Sep | 0.5 | 0.5 | 0.7 | 1.0 | 0.6 | 0.8 | 1.3 | 1.6 | 1.9 | 1.9 | 1.6 | 1.2 | 1.2 | 1.5 | 1.7 | 1.4 | 1.7 | 1.7 | 1.2 | 1.1 | 1.8 | 2.6 | 3.2 | 3.8 | 3.8 |
| 10-Sep | 2.1 | 2.6 | 3.3 | 3.8 | 2.9 | 2.6 | 2.7 | 2.6 | 1.9 | 2.3 | 2.5 | 2.7 | 2.5 | 2.8 | 2.6 | 2.9 | 3.6 | 3.2 | 3.1 | 3.6 | 3.8 | 3.5 | 3.1 | 3.4 | 3.8 |
| 11-Sep | 2.9 | 3.3 | 3.4 | 3.3 | 3.8 | 3.7 | 3.6 | 3.6 | 3.7 | 3.4 | 3.3 | 3.8 | 3.7 | 3.5 | 3.1 | 2.9 | 2.4 | 2.0 | 1.2 | 1.4 | 0.7 | 0.7 | 0.8 | 0.9 | 3.8 |
| 12-Sep | 0.8 | 0.7 | 0.4 | 0.3 | 0.4 | 1.1 | 0.9 | 0.8 | 1.4 | 1.6 | 1.9 | 1.8 | 1.8 | 1.7 | 1.8 | 1.8 | 1.5 | 1.4 | 1.4 | 1.3 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 |
| 13-Sep | 2.0 | 1.8 | 1.7 | 1.6 | 1.8 | 1.6 | 2.1 | 2.1 | 1.4 | 1.6 | 1.7 | 1.9 | 2.3 | 2.3 | 2.4 | 2.7 | 2.2 | 1.7 | 2.1 | 1.8 | 1.6 | 2.3 | 2.4 | 1.5 | 2.7 |
| 14-Sep | 1.1 | 0.4 | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.5 | 0.8 | 1.2 | 1.4 | 1.9 | 1.9 | 2.5 | 2.1 | 2.2 | 2.4 | 3.1 | 1.8 | 0.6 | 0.2 | 0.3 | 0.6 | 0.6 | 3.1 |
| 15-Sep | 0.3 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 0.4 | 0.7 | 1.2 | 1.4 | 1.0 | 1.1 | 1.1 | 1.3 | 2.0 | 2.3 | 2.5 | 1.8 | 0.8 | 2.7 | 3.4 | 2.6 | 1.4 | 1.2 | 3.4 |
| 16-Sep | 1.5 | 1.1 | 0.8 | 0.9 | 1.4 | 1.3 | 1.9 | 1.7 | 2.2 | 2.2 | 2.2 | 2.4 | 2.2 | 2.7 | 3.1 | 3.0 | 2.4 | 1.4 | 1.0 | 0.6 | 0.6 | 0.7 | 0.5 | 0.8 | 3.1 |
| 17-Sep | 0.8 | 1.3 | 1.4 | 1.4 | 1.3 | 1.2 | 1.0 | 0.9 | 1.1 | 1.1 | 1.2 | 1.3 | 1.2 | 1.2 | 1.8 | 1.8 | 2.2 | 2.4 | 0.6 | 1.0 | 1.4 | 1.3 | 1.8 | 1.4 | 2.4 |
| 18-Sep | 0.8 | 0.5 | 0.5 | 0.3 | 0.2 | 0.6 | 0.9 | 1.3 | 1.9 | 2.9 | 3.1 | 3.3 | 2.9 | 3.2 | 2.6 | 2.2 | 2.0 | 1.5 | 0.8 | 0.5 | 0.5 | 1.3 | 0.8 | 0.5 | 3.3 |
| 19-Sep | 0.5 | 1.0 | 1.0 | 1.0 | 1.2 | 1.1 | 1.7 | 2.6 | 3.0 | 2.8 | 2.0 | 1.7 | 1.6 | 1.5 | 1.8 | 1.9 | 2.0 | 1.5 | 1.5 | 1.1 | 0.7 | 0.6 | 1.6 | 0.9 | 3.0 |
| 20-Sep | 1.2 | 1.3 | 0.5 | 0.3 | 0.6 | 0.6 | 0.4 | 0.6 | 1.6 | 1.5 | M | 1.7 | 1.8 | 1.8 | 1.5 | 1.3 | 0.8 | 0.6 | 0.6 | 0.8 | 1.1 | 0.9 | 0.5 | 0.5 | 1.8 |
| 21-Sep | 0.6 | 0.5 | 0.5 | 0.5 | 0.3 | 0.4 | 0.7 | 0.8 | 1.0 | 1.3 | 1.8 | 2.3 | 1.9 | 1.7 | 2.0 | 2.0 | 1.6 | 1.5 | 1.1 | 1.5 | 1.7 | 0.8 | 0.8 | 0.9 | 2.3 |
| 22-Sep | 1.2 | 1.2 | 1.7 | 1.9 | 1.9 | 2.0 | 2.2 | 2.1 | 2.3 | 2.1 | 2.2 | 2.3 | 2.1 | 1.9 | 1.9 | 1.8 | 1.6 | 1.5 | 1.3 | 1.3 | 1.4 | 1.4 | 1.3 | 2.1 | 2.3 |
| 23-Sep | 2.3 | 1.9 | 1.7 | 2.0 | 2.3 | 2.4 | 2.7 | 2.8 | 2.8 | 2.9 | 3.0 | 3.0 | 3.7 | 2.9 | 3.7 | 2.3 | 2.7 | 3.2 | 2.5 | 2.3 | 2.1 | 2.2 | 2.2 | 2.0 | 3.7 |
| 24-Sep | 1.9 | 1.9 | 2.0 | 1.8 | 1.7 | 1.1 | 1.1 | 1.3 | 1.2 | 2.9 | 3.3 | 3.4 | 3.5 | 3.9 | 3.6 | 3.9 | 4.3 | 3.3 | 1.1 | 1.1 | 1.9 | 2.6 | 3.0 | 3.2 | 4.3 |
| 25-Sep | 3.1 | 3.5 | 3.4 | 2.9 | 2.4 | 1.7 | 1.6 | 2.0 | 2.4 | 2.2 | 2.5 | 2.7 | 2.7 | 2.4 | 2.7 | 2.2 | 1.5 | 0.7 | 0.2 | 0.2 | 0.2 | 0.4 | 0.6 | 0.2 | 3.5 |
| 26-Sep | 0.2 | 0.3 | 0.8 | 0.6 | 0.9 | 1.3 | 1.4 | 1.4 | 1.3 | 1.7 | 1.7 | 2.4 | 2.2 | 2.1 | 2.2 | 2.0 | 1.7 | 1.4 | 1.5 | 1.7 | 1.8 | 1.8 | 1.8 | 2.0 | 2.4 |
| 27-Sep | 1.8 | 1.1 | 1.2 | 1.1 | 1.6 | 1.7 | 1.2 | 2.2 | 2.1 | 3.1 | 3.6 | 3.3 | 3.2 | 3.5 | 3.9 | 4.1 | 3.8 | 2.4 | 1.8 | 1.5 | 1.6 | 2.3 | 1.3 | 1.2 | 4.1 |
| 28-Sep | 1.2 | 1.6 | 1.6 | 1.2 | 0.9 | 0.9 | 0.9 | 1.6 | 2.1 | 2.3 | 1.9 | 1.5 | 1.4 | 1.4 | 1.6 | 1.3 | 1.4 | 0.8 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.7 | 2.3 |
| 29-Sep | 0.3 | 0.3 | 0.1 | 0.1 | 0.2 | 0.3 | 1.0 | 1.3 | 1.6 | 1.8 | 1.6 | 1.6 | 1.6 | 1.7 | 1.4 | 1.2 | 0.7 | 0.6 | 0.2 | 0.2 | 0.2 | 0.2 | 0.6 | 0.4 | 1.8 |
| 30-Sep | 0.2 | 0.2 | 0.2 | 0.3 | 0.6 | 0.8 | 0.7 | 0.8 | 1.1 | 2.2 | 3.1 | 3.1 | 3.4 | 3.5 | 4.1 | 4.2 | 4.4 | 4.0 | 3.3 | 3.2 | 2.8 | 2.3 | 2.8 | 3.3 | 4.4 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 3.1 | 3.5 | 3.4 | 3.8 | 3.8 | 3.7 | 3.6 | 3.6 | 3.6 | 3.7 | 3.4 | 3.6 | 3.8 | 3.7 | 3.9 | 4.1 | 4.2 | 4.4 | 4.0 | 3.3 | 3.6 | 3.8 | 3.5 | 3.2 | 3.8 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



| | | |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 1.5 km/h on Sep 26 23:00 | Maximum Daily Average: 0.9 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Value: -1.6 km/h on Sep 24 17:00 | Minimum Daily Average: -0.5 km/h on Sep 27 | Hours of Data: 228 |
| Maximum Diurnal Average: 0.4 km/h at hour 23 | Minimum Diurnal Average: -0.3 km/h at hour 17 | Hours of Missing Data: 492 |
| Monthly Average: 0.13 km/h | Percentiles: $P_1 = -1.4$ $P_{10} = -0.6$ $Q_1 = -0.3$ Median = 0.1 $Q_3 = 0.6$ $P_{90} = 1.0$ $P_{99} = 1.2$ | Hours of Calibration: 0 |
| | | Percent Operational Time: 31.7 |

| 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 | 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 | 0.6 | 0.0 | -0.2 | -0.1 | -0.1 | 0.0 | 0.0 | 0.2 | 0.2 | 0.2 | 1.1 | 1.1 | -- | 1.1 |
| 22-Sep | 0.8 | 0.5 | 0.6 | 0.9 | 0.7 | 1.3 | 1.2 | 1.1 | 0.5 | 0.6 | 0.4 | 0.1 | 0.1 | -0.4 | -0.1 | -0.1 | -0.2 | 0.2 | -0.2 | 0.4 | 0.6 | 1.1 | 1.0 | 1.2 | 0.5 | 1.3 |
| 23-Sep | 1.3 | 1.0 | 0.8 | 0.8 | 0.8 | 0.7 | 0.4 | 0.9 | 0.8 | 1.0 | 1.3 | 1.1 | 1.1 | 1.2 | 1.3 | 0.6 | 1.0 | 0.9 | 0.8 | 1.0 | 0.9 | 0.9 | 1.2 | 1.0 | 0.9 | 1.3 |
| 24-Sep | 1.0 | 0.7 | 0.9 | 0.9 | 0.9 | 0.6 | 0.9 | 0.6 | 0.3 | -0.3 | -0.6 | -1.2 | -1.0 | -1.2 | -0.9 | -1.6 | -1.6 | -0.9 | -0.7 | -0.6 | -0.6 | -0.7 | -0.6 | -0.4 | -0.2 | 1.0 |
| 25-Sep | -0.5 | -0.5 | -0.3 | -0.3 | -0.1 | -0.4 | -0.3 | -0.4 | -0.3 | -0.4 | -0.6 | -0.9 | -0.9 | -0.9 | -0.9 | -0.6 | -0.3 | -0.3 | 0.0 | 0.1 | 0.1 | 0.3 | 0.4 | 0.2 | -0.3 | 0.4 |
| 26-Sep | 0.2 | 0.4 | 0.3 | 0.6 | 0.3 | 0.0 | 0.0 | -0.2 | 0.5 | 0.4 | 0.4 | 0.4 | 0.8 | 0.9 | 0.7 | 0.7 | -0.2 | 0.1 | 0.2 | 0.9 | 1.3 | 1.3 | 1.5 | 0.7 | 0.5 | 1.5 |
| 27-Sep | 0.5 | 0.2 | 0.3 | 0.5 | 0.3 | -0.1 | -0.6 | -0.4 | -0.1 | -0.5 | -1.2 | -1.0 | -0.8 | -1.4 | -1.1 | -1.3 | -1.4 | -0.5 | -0.2 | -0.3 | -0.6 | -1.0 | -0.5 | -0.4 | -0.5 | 0.5 |
| 28-Sep | -0.1 | -0.7 | -0.1 | 0.2 | 0.4 | 0.6 | 0.5 | 0.6 | 0.7 | 0.6 | 0.6 | 0.5 | -0.4 | 0.0 | 0.0 | -0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.8 | 0.8 | 0.2 | 0.8 |
| 29-Sep | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.4 | 0.7 | 0.6 | 0.6 | 0.6 | 0.4 | 0.5 | 0.4 | 0.1 | 0.4 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | -0.3 | -0.2 | 0.2 | 0.7 |
| 30-Sep | -0.1 | -0.1 | 0.0 | -0.2 | -0.3 | -0.2 | -0.2 | -0.1 | -0.2 | -0.6 | -0.9 | -0.4 | -0.2 | -0.4 | -0.4 | -0.5 | -0.1 | -0.2 | -0.3 | -0.5 | -0.2 | -0.3 | -0.3 | -0.4 | -0.3 | 0.0 |
| | 0.4 | 0.2 | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.0 | -0.1 | 0.0 | -0.2 | -0.2 | -0.3 | -0.3 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.4 | 0.4 | Diurnal Average | |
| | 1.3 | 1.0 | 0.9 | 0.9 | 0.9 | 1.3 | 1.2 | 1.1 | 0.8 | 1.0 | 1.3 | 1.1 | 1.1 | 1.2 | 1.3 | 0.7 | 1.0 | 0.9 | 0.8 | 1.0 | 1.3 | 1.3 | 1.5 | 1.2 | 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 2016

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.4 km/h on Sep 30 15:00 | Hours of Data: 228 |
| Minimum Value: 0.2 km/h on Sep 29 03:00 | Hours of Missing Data: 492 |
| Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 1.3 Median = 1.8 Q ₃ = 2.6 P ₉₀ = 3.5 P ₉₉ = 4.3 | Hours of Calibration: 0 |
| | Percent Operational Time: 31.7 |

| 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 | 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 | 2.1 | 1.9 | 2.2 | 2.1 | 1.6 | 1.4 | 1.3 | 1.6 | 2.0 | 1.2 | 0.8 | 0.9 | 2.2 |
| 22-Sep | 1.1 | 1.2 | 1.5 | 1.8 | 1.5 | 1.8 | 1.9 | 1.8 | 2.2 | 2.0 | 2.1 | 2.6 | 2.5 | 2.4 | 2.2 | 2.1 | 2.1 | 1.7 | 1.4 | 1.5 | 1.7 | 1.5 | 1.4 | 2.1 | 2.6 |
| 23-Sep | 2.4 | 1.9 | 1.7 | 2.1 | 2.2 | 2.4 | 2.7 | 3.1 | 3.0 | 3.2 | 3.2 | 3.8 | 3.4 | 3.9 | 2.7 | 3.1 | 3.5 | 2.9 | 2.8 | 2.4 | 2.4 | 2.4 | 2.2 | 3.9 | 3.9 |
| 24-Sep | 2.1 | 1.9 | 1.9 | 1.8 | 1.8 | 1.3 | 1.2 | 1.4 | 1.5 | 2.8 | 3.6 | 3.4 | 3.6 | 4.0 | 3.9 | 4.3 | 4.3 | 3.6 | 1.2 | 1.2 | 2.0 | 2.5 | 3.0 | 3.2 | 4.3 |
| 25-Sep | 3.4 | 3.7 | 3.8 | 3.2 | 2.7 | 1.9 | 1.9 | 2.4 | 2.7 | 2.2 | 2.4 | 2.8 | 2.8 | 2.6 | 2.8 | 2.5 | 1.8 | 0.8 | 0.2 | 0.2 | 0.2 | 0.5 | 0.6 | 0.3 | 3.8 |
| 26-Sep | 0.3 | 0.4 | 0.7 | 0.6 | 0.9 | 1.3 | 1.3 | 1.3 | 1.5 | 1.9 | 1.7 | 2.3 | 2.4 | 2.1 | 2.1 | 2.5 | 2.2 | 1.6 | 1.7 | 1.6 | 1.8 | 1.8 | 1.7 | 1.9 | 2.5 |
| 27-Sep | 2.0 | 1.3 | 1.4 | 1.2 | 1.8 | 1.7 | 1.3 | 2.2 | 2.1 | 3.2 | 3.9 | 3.6 | 3.4 | 3.8 | 4.2 | 4.4 | 4.1 | 2.6 | 1.8 | 1.7 | 1.9 | 2.5 | 1.5 | 1.1 | 4.4 |
| 28-Sep | 1.1 | 1.7 | 1.6 | 1.2 | 1.1 | 1.1 | 1.0 | 1.7 | 2.0 | 2.3 | 1.9 | 1.6 | 1.6 | 1.6 | 1.8 | 1.4 | 1.4 | 0.7 | 0.5 | 0.5 | 0.7 | 0.7 | 0.6 | 0.8 | 2.3 |
| 29-Sep | 0.5 | 0.3 | 0.2 | 0.2 | 0.4 | 0.4 | 1.1 | 1.4 | 1.5 | 1.7 | 1.5 | 1.7 | 1.6 | 1.6 | 1.5 | 1.3 | 0.7 | 0.5 | 0.4 | 0.3 | 0.2 | 0.2 | 0.7 | 0.5 | 1.7 |
| 30-Sep | 0.3 | 0.2 | 0.3 | 0.3 | 0.7 | 1.0 | 0.9 | 1.1 | 1.4 | 2.3 | 3.2 | 3.3 | 3.7 | 3.7 | 4.4 | 4.3 | 4.4 | 4.1 | 3.6 | 3.4 | 3.2 | 2.6 | 2.9 | 3.5 | 4.4 |
| | 3.4 | 3.7 | 3.8 | 3.2 | 2.7 | 2.4 | 2.7 | 3.1 | 3.0 | 3.2 | 3.9 | 3.6 | 3.8 | 4.0 | 4.4 | 4.4 | 4.4 | 4.1 | 3.6 | 3.4 | 3.2 | 2.6 | 3.0 | 3.5 | |

Diurnal Maximum

AF - Analyzer Failure



| Maximum Value: 3.9 km/h on Sep 23 18:00 | | Maximum Daily Average: 1.5 km/h on Sep 23 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.5 km/h on Sep 26 19:00 | | Minimum Daily Average: -0.6 km/h on Sep 3 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.5 km/h at hour 8 | | Minimum Diurnal Average: 0.1 km/h at hour 16 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.31 km/h | | Percentiles: P ₁ = -1.2 P ₁₀ = -0.5 Q ₁ = -0.1 Median = 0.2 Q ₃ = 0.6 P ₉₀ = 1.2 P ₉₉ = 2.9 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.9 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0.3 | 0.0 | 0.3 | 0.0 | 0.1 | 0.1 | -0.1 | 0.0 | -0.1 | -0.1 | -0.1 | 0.4 | 0.6 | 0.2 | 0.6 | 0.4 | 0.1 | 0.2 | 0.2 | 0.1 | -0.2 | -0.3 | -0.3 | -0.1 | 0.1 | 0.6 |
| 2-Sep | 0.4 | 0.7 | 0.7 | 0.3 | 1.6 | 1.6 | 0.4 | 0.6 | 0.8 | 0.2 | -0.1 | 0.2 | 0.8 | 0.5 | 0.5 | -0.2 | -0.1 | -0.4 | -0.1 | -0.3 | -1.1 | 0.1 | -0.1 | -0.6 | 0.3 | 1.6 |
| 3-Sep | 0.0 | -0.6 | -0.6 | -0.5 | -0.5 | -0.7 | 0.0 | -0.3 | -1.1 | -0.8 | -0.8 | -0.5 | -0.7 | -0.4 | -0.5 | -0.6 | -0.6 | -0.6 | -1.0 | -0.8 | -1.1 | -0.7 | -0.7 | -0.7 | -0.6 | 0.0 |
| 4-Sep | -0.9 | -0.3 | 0.5 | 0.7 | 0.6 | 0.2 | -0.4 | 0.4 | -0.2 | 0.4 | 0.5 | 0.7 | 0.4 | 0.6 | 0.0 | 0.0 | 1.0 | 0.7 | 0.1 | 0.2 | 0.9 | 1.3 | 1.4 | 1.0 | 0.4 | 1.4 |
| 5-Sep | 0.6 | 0.6 | -0.1 | 0.1 | 0.9 | 0.9 | 0.9 | 0.7 | 0.7 | 0.2 | 0.3 | 0.4 | 0.4 | 0.2 | 0.4 | 0.8 | 0.1 | 0.7 | 1.6 | 2.4 | 1.1 | -0.6 | 0.8 | 2.2 | 0.7 | 2.4 |
| 6-Sep | 1.9 | 1.3 | 1.0 | 0.2 | 0.6 | 0.5 | 0.8 | 1.0 | 0.9 | 0.7 | 1.4 | 1.5 | 1.2 | 0.7 | 1.5 | 0.3 | 0.2 | -0.3 | 0.1 | 0.2 | 0.8 | 1.3 | 1.1 | 1.6 | 0.9 | 1.9 |
| 7-Sep | 0.7 | 0.5 | 0.3 | 0.1 | 0.9 | 0.3 | 1.2 | 1.2 | 0.4 | 0.8 | 0.7 | 1.2 | 0.8 | 0.3 | 0.3 | 0.3 | 0.6 | 0.2 | 0.6 | 1.4 | 0.6 | 0.0 | -0.1 | 0.3 | 0.6 | 1.4 |
| 8-Sep | 0.3 | 0.1 | 0.2 | -0.1 | 0.1 | -0.1 | -0.1 | 0.1 | 0.1 | 0.7 | -0.4 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.3 | 0.0 | -0.2 | -0.3 | -0.2 | -0.4 | 0.0 | 0.7 |
| 9-Sep | -0.3 | -0.1 | -0.2 | 0.0 | -0.1 | -0.1 | -0.3 | 0.0 | 0.3 | -0.5 | -0.4 | 0.0 | -0.3 | -0.1 | 0.3 | 0.3 | 0.6 | 0.9 | 1.0 | 0.7 | 1.1 | 1.4 | 2.2 | 3.0 | 0.4 | 3.0 |
| 10-Sep | 0.8 | 2.2 | 2.4 | 2.4 | 2.5 | 1.6 | 1.8 | 2.3 | 1.1 | 0.7 | -0.3 | 0.0 | 0.4 | 0.2 | -0.1 | 0.0 | -1.2 | -0.4 | -0.2 | -1.0 | -1.0 | -1.3 | -0.9 | -1.4 | 0.4 | 2.5 |
| 11-Sep | -1.0 | -0.7 | -0.9 | -0.9 | -0.7 | -0.1 | 0.4 | 0.5 | 0.1 | -0.4 | -0.4 | -0.9 | -0.5 | -0.8 | -0.3 | -0.2 | -0.3 | -0.4 | -0.5 | -0.1 | -0.1 | -0.4 | -0.7 | -0.7 | -0.4 | 0.5 |
| 12-Sep | -0.6 | -0.4 | -0.3 | -0.2 | 0.0 | 0.8 | 1.2 | 0.9 | 0.6 | 0.2 | 0.2 | -0.5 | 0.4 | 0.5 | 0.3 | 0.1 | 0.5 | 0.3 | 0.1 | 0.2 | 0.3 | 0.3 | 1.2 | 0.3 | 0.3 | 1.2 |
| 13-Sep | 0.1 | 0.7 | -0.2 | -0.4 | 0.2 | 0.1 | 0.2 | 0.2 | -0.2 | 0.4 | 0.2 | 0.5 | 0.9 | 0.9 | 0.2 | 0.1 | 0.7 | 0.9 | 0.5 | 0.3 | 0.2 | -0.3 | 0.0 | 0.6 | 0.3 | 0.9 |
| 14-Sep | 0.3 | -0.2 | -0.1 | -0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 | 0.6 | 0.6 | 0.5 | 0.3 | 1.0 | 0.5 | 0.1 | 0.2 | -0.5 | 0.1 | -0.1 | 0.0 | 0.0 | -0.3 | -0.2 | 0.1 | 1.0 |
| 15-Sep | -0.3 | -0.1 | 0.0 | -0.1 | 0.1 | 0.1 | 0.0 | 0.0 | -0.3 | 0.2 | 0.6 | 0.5 | 0.3 | 0.6 | 0.5 | 0.5 | 1.1 | 0.9 | 1.7 | 1.8 | 3.1 | 3.6 | 2.1 | 0.6 | 0.7 | 3.6 |
| 16-Sep | 0.8 | 0.8 | 0.4 | -0.1 | 0.3 | 0.5 | 0.5 | 0.2 | 0.6 | 0.6 | 0.4 | 0.5 | 0.7 | 1.1 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.7 | 0.7 | 1.5 | -0.1 | -0.1 | 0.5 | 1.5 |
| 17-Sep | -0.2 | 1.1 | 0.8 | 0.1 | -0.3 | -0.1 | 0.5 | 0.4 | 0.3 | 0.3 | 0.7 | 0.7 | 0.5 | 0.1 | 0.1 | 0.3 | 0.2 | -0.4 | 0.8 | 1.4 | 1.0 | 0.2 | 0.3 | 1.8 | 0.4 | 1.8 |
| 18-Sep | 1.4 | -0.1 | 0.0 | -0.1 | -0.1 | 0.0 | 0.1 | 0.2 | 0.1 | -0.3 | -0.7 | -1.4 | -0.1 | -0.9 | -0.8 | -0.7 | -0.8 | -0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | -0.2 | 1.4 |
| 19-Sep | -0.1 | -0.3 | -0.6 | -0.5 | -0.7 | -0.9 | 0.0 | -0.7 | -0.8 | -0.6 | -0.2 | -0.2 | -0.1 | -0.1 | -0.2 | -0.4 | -0.4 | -0.2 | 0.2 | -0.3 | -0.2 | -0.5 | -0.4 | -0.2 | -0.4 | 0.2 |
| 20-Sep | 0.0 | -0.3 | 0.0 | -0.2 | -0.2 | -0.1 | -0.2 | 0.0 | -0.5 | -0.3 | M | 0.2 | 0.0 | 0.5 | 1.3 | 1.0 | 0.5 | 0.5 | 0.6 | 0.2 | 0.1 | -0.1 | 0.3 | 0.3 | 0.2 | 1.3 |
| 21-Sep | 0.4 | 0.3 | 0.2 | 0.0 | 0.4 | 1.1 | -0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.6 | 1.1 | 0.7 | 0.5 | 0.6 | 0.5 | 0.7 | 1.3 | 2.0 | 3.0 | 1.1 | 0.1 | 0.2 | 0.6 | 3.0 |
| 22-Sep | 0.3 | 0.5 | 0.5 | 1.5 | 1.1 | 2.2 | 2.2 | 1.5 | 0.6 | 0.4 | 0.8 | 0.1 | 1.0 | -0.3 | -0.3 | 0.5 | 0.4 | -0.2 | -0.4 | -0.6 | -0.2 | 0.3 | 0.5 | 0.5 | 0.5 | 2.2 |
| 23-Sep | 0.4 | 0.5 | 0.8 | 0.6 | 0.5 | 0.7 | 1.5 | 2.1 | 1.9 | 0.9 | 2.8 | 2.5 | 3.2 | 3.6 | 2.8 | 0.6 | 2.6 | 3.9 | 2.2 | 0.1 | 0.8 | 1.0 | 0.7 | 0.2 | 1.5 | 3.9 |
| 24-Sep | 0.2 | 0.3 | 0.4 | 0.3 | 0.4 | -0.1 | 0.1 | 0.0 | 0.1 | 0.6 | 0.5 | -0.3 | -0.9 | -0.3 | -0.1 | -1.2 | -1.4 | -1.1 | -0.7 | -0.4 | -0.2 | 0.2 | 0.7 | 1.7 | -0.1 | 1.7 |
| 25-Sep | 1.3 | 0.7 | 2.0 | 2.1 | 2.3 | 0.1 | 0.8 | 0.7 | 0.5 | 0.2 | -0.3 | -0.2 | -0.8 | -0.8 | -0.8 | -0.6 | -0.2 | -0.2 | 0.1 | 0.2 | 0.0 | 0.0 | -0.1 | 0.4 | 0.3 | 2.3 |
| 26-Sep | 0.3 | 0.9 | 0.8 | 0.7 | 0.2 | 0.5 | 0.1 | 0.2 | 1.6 | 1.3 | 0.3 | 0.7 | 0.8 | 1.1 | 0.9 | 0.5 | 0.1 | -0.3 | -1.5 | 0.5 | 0.7 | 0.4 | 1.0 | 1.5 | 0.6 | 1.6 |
| 27-Sep | 1.8 | 1.3 | 1.2 | 1.4 | 1.5 | -0.2 | -0.5 | 0.0 | 1.0 | 0.4 | -0.5 | -0.2 | 0.1 | -1.2 | -0.3 | -0.8 | -0.4 | 0.4 | 0.4 | 0.1 | 0.2 | -0.5 | -0.1 | -0.2 | 0.2 | 1.8 |
| 28-Sep | 0.7 | -0.2 | 0.6 | 1.7 | 1.2 | -0.2 | -0.1 | 0.6 | 0.1 | 0.6 | 0.5 | 0.1 | -0.7 | -0.5 | 0.4 | 0.5 | 0.7 | 0.3 | 0.5 | -0.2 | -0.1 | -0.1 | 0.0 | 0.4 | 0.3 | 1.7 |
| 29-Sep | 1.2 | 0.6 | 0.4 | 0.6 | 0.6 | 0.1 | -0.1 | 0.5 | 0.4 | -0.1 | 0.0 | 0.1 | 0.3 | 0.1 | -0.1 | 0.2 | 0.3 | 0.3 | 0.5 | 0.2 | 0.3 | 0.7 | -0.1 | -0.1 | 0.3 | 1.2 |
| 30-Sep | -0.1 | -0.1 | -0.2 | -0.3 | -0.2 | -0.1 | 0.0 | 0.2 | 0.0 | 0.2 | 0.3 | 0.8 | 0.8 | 0.4 | 0.4 | 0.4 | 0.1 | 0.3 | 0.6 | 0.2 | 0.6 | 0.1 | 0.3 | 0.2 | 0.2 | 0.8 |
| | | | | | | | | | | | | | | | | | | | | | | | | 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 2016

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.6 km/h on Sep 30 17:00 | Hours of Data: 719 |
| Minimum Value: 0.1 km/h on Sep 14 06:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 1.1 Median = 1.6 Q ₃ = 2.3 P ₉₀ = 3.1 P ₉₉ = 4.1 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 0.8 | 0.8 | 0.7 | 1.1 | 0.9 | 0.6 | 0.6 | 0.7 | 0.8 | 0.9 | 0.9 | 1.6 | 2.2 | 1.9 | 1.4 | 0.9 | 1.7 | 0.7 | 0.9 | 0.8 | 0.4 | 0.7 | 1.2 | 1.6 | 2.2 |
| 2-Sep | 1.6 | 1.0 | 1.4 | 2.2 | 1.7 | 1.7 | 1.6 | 1.7 | 1.9 | 2.3 | 2.4 | 2.0 | 2.4 | 1.8 | 1.6 | 1.7 | 1.2 | 0.8 | 0.5 | 0.5 | 0.8 | 1.3 | 1.5 | 1.6 | 2.4 |
| 3-Sep | 1.9 | 1.6 | 1.3 | 1.4 | 2.0 | 2.6 | 2.8 | 3.1 | 2.4 | 2.4 | 2.8 | 2.8 | 2.3 | 2.4 | 2.2 | 2.1 | 2.4 | 2.9 | 3.5 | 2.7 | 3.3 | 2.5 | 2.4 | 1.8 | 3.5 |
| 4-Sep | 2.1 | 2.3 | 2.4 | 2.3 | 2.1 | 2.2 | 1.7 | 1.9 | 2.1 | 2.5 | 2.9 | 3.0 | 3.2 | 2.9 | 2.6 | 2.4 | 2.2 | 1.5 | 0.7 | 0.7 | 1.3 | 0.8 | 1.0 | 1.7 | 3.2 |
| 5-Sep | 1.7 | 1.2 | 0.9 | 1.3 | 1.2 | 1.5 | 1.3 | 1.2 | 1.4 | 1.3 | 2.4 | 2.6 | 2.3 | 2.4 | 2.4 | 1.9 | 1.6 | 1.8 | 1.6 | 1.8 | 1.9 | 1.6 | 1.9 | 2.3 | 2.6 |
| 6-Sep | 2.3 | 2.2 | 2.2 | 1.3 | 1.2 | 1.1 | 1.4 | 1.5 | 1.4 | 2.0 | 2.3 | 2.2 | 2.4 | 2.6 | 2.9 | 2.3 | 1.8 | 1.9 | 1.5 | 1.4 | 1.4 | 1.7 | 1.3 | 1.3 | 2.9 |
| 7-Sep | 1.4 | 0.9 | 0.7 | 1.0 | 1.2 | 1.1 | 1.7 | 1.5 | 1.5 | 1.7 | 1.8 | 1.6 | 1.4 | 1.5 | 1.6 | 1.4 | 1.5 | 1.0 | 1.0 | 1.4 | 1.5 | 1.7 | 0.8 | 0.7 | 1.8 |
| 8-Sep | 0.7 | 1.0 | 1.3 | 1.2 | 0.6 | 0.8 | 0.9 | 0.9 | 1.1 | 1.9 | 0.9 | 1.4 | 1.6 | 2.1 | 1.2 | 2.1 | 1.3 | 2.4 | 2.0 | 0.5 | 0.3 | 0.8 | 0.6 | 0.9 | 2.4 |
| 9-Sep | 0.5 | 0.5 | 0.5 | 0.8 | 0.9 | 1.4 | 2.0 | 2.1 | 2.1 | 2.2 | 2.0 | 1.6 | 2.1 | 2.1 | 2.7 | 1.8 | 1.4 | 1.3 | 1.1 | 1.4 | 1.1 | 1.7 | 2.0 | 2.7 | 2.7 |
| 10-Sep | 2.3 | 2.0 | 2.2 | 2.6 | 3.1 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.8 | 2.2 | 2.2 | 2.4 | 3.1 | 3.5 | 3.7 | 3.5 | 3.5 | 3.0 | 3.2 | 3.1 | 3.0 | 2.8 | 3.7 |
| 11-Sep | 3.3 | 4.1 | 4.0 | 3.8 | 4.1 | 3.8 | 3.9 | 3.7 | 3.7 | 3.6 | 3.7 | 3.3 | 3.8 | 3.2 | 2.7 | 2.4 | 2.5 | 1.9 | 1.3 | 1.6 | 1.0 | 0.6 | 1.4 | 1.5 | 4.1 |
| 12-Sep | 1.4 | 1.2 | 0.7 | 0.4 | 0.8 | 1.5 | 1.3 | 1.1 | 1.6 | 2.0 | 2.7 | 2.6 | 2.9 | 2.6 | 2.6 | 2.7 | 2.3 | 1.6 | 1.2 | 0.8 | 1.1 | 1.5 | 1.6 | 2.0 | 2.9 |
| 13-Sep | 1.9 | 2.2 | 1.9 | 1.9 | 1.9 | 1.5 | 1.4 | 1.7 | 1.8 | 2.5 | 2.1 | 2.8 | 3.3 | 2.9 | 2.0 | 1.7 | 1.6 | 1.6 | 1.7 | 1.4 | 1.2 | 1.2 | 1.9 | 1.9 | 3.3 |
| 14-Sep | 1.7 | 0.6 | 0.2 | 0.3 | 0.3 | 0.1 | 0.2 | 0.3 | 0.7 | 1.1 | 1.3 | 1.8 | 1.7 | 2.1 | 2.6 | 2.0 | 1.6 | 3.2 | 1.5 | 0.9 | 0.3 | 0.8 | 1.6 | 1.0 | 3.2 |
| 15-Sep | 0.6 | 0.6 | 0.5 | 0.6 | 0.7 | 1.1 | 1.0 | 1.0 | 1.6 | 1.7 | 1.3 | 1.5 | 1.0 | 1.6 | 1.8 | 2.0 | 1.9 | 1.3 | 1.4 | 2.2 | 2.8 | 2.1 | 2.3 | 1.6 | 2.8 |
| 16-Sep | 1.9 | 1.6 | 0.9 | 0.8 | 1.0 | 1.1 | 1.1 | 1.1 | 1.4 | 1.1 | 1.2 | 1.6 | 3.2 | 3.6 | 2.7 | 2.4 | 1.8 | 1.5 | 0.5 | 0.6 | 0.8 | 1.0 | 1.7 | 1.7 | 3.6 |
| 17-Sep | 1.5 | 1.7 | 1.9 | 1.4 | 1.5 | 1.5 | 1.9 | 1.6 | 1.7 | 1.5 | 1.7 | 2.0 | 1.9 | 1.7 | 1.9 | 2.0 | 2.1 | 2.1 | 1.3 | 0.7 | 1.0 | 1.2 | 1.0 | 1.5 | 2.1 |
| 18-Sep | 1.6 | 1.0 | 1.1 | 0.7 | 0.5 | 0.9 | 1.3 | 1.6 | 1.9 | 2.8 | 2.1 | 2.6 | 3.5 | 3.3 | 2.8 | 2.3 | 2.4 | 1.7 | 1.0 | 0.9 | 0.7 | 1.5 | 1.3 | 0.6 | 3.5 |
| 19-Sep | 0.5 | 0.8 | 0.6 | 1.0 | 0.8 | 0.9 | 1.2 | 1.7 | 2.0 | 1.8 | 1.9 | 2.2 | 2.1 | 1.9 | 2.3 | 2.1 | 1.7 | 1.6 | 1.6 | 1.0 | 0.8 | 0.9 | 1.4 | 1.0 | 2.3 |
| 20-Sep | 1.5 | 1.3 | 1.0 | 0.4 | 0.8 | 1.0 | 0.8 | 1.1 | 1.4 | 1.4 | M | 2.2 | 2.1 | 1.8 | 2.2 | 1.8 | 1.2 | 0.5 | 1.0 | 1.2 | 1.0 | 0.8 | 1.2 | 1.0 | 2.2 |
| 21-Sep | 0.8 | 1.2 | 1.5 | 1.2 | 1.0 | 1.1 | 1.1 | 1.0 | 0.9 | 1.1 | 1.3 | 1.7 | 2.0 | 2.6 | 2.8 | 2.5 | 1.9 | 1.4 | 0.5 | 0.5 | 1.2 | 2.3 | 1.2 | 1.1 | 2.8 |
| 22-Sep | 0.9 | 1.0 | 0.9 | 1.1 | 1.2 | 1.1 | 1.1 | 1.2 | 1.4 | 1.1 | 1.2 | 2.7 | 3.3 | 2.9 | 3.0 | 2.5 | 2.1 | 1.8 | 1.7 | 1.4 | 1.5 | 1.5 | 1.6 | 1.8 | 3.3 |
| 23-Sep | 1.9 | 2.1 | 2.3 | 2.4 | 2.3 | 2.7 | 2.8 | 2.4 | 2.4 | 3.6 | 3.8 | 3.3 | 3.4 | 4.0 | 3.7 | 3.3 | 3.4 | 2.8 | 3.4 | 2.8 | 2.7 | 2.7 | 2.5 | 2.0 | 4.0 |
| 24-Sep | 1.7 | 1.8 | 1.4 | 1.5 | 1.4 | 1.1 | 1.3 | 1.5 | 1.7 | 2.9 | 3.1 | 2.9 | 3.2 | 3.4 | 3.8 | 4.3 | 4.1 | 3.4 | 1.2 | 1.6 | 1.7 | 1.1 | 0.9 | 1.6 | 4.3 |
| 25-Sep | 1.5 | 2.3 | 2.0 | 2.0 | 2.3 | 2.8 | 2.9 | 2.7 | 2.6 | 2.4 | 2.6 | 3.2 | 3.2 | 3.1 | 3.1 | 2.8 | 1.8 | 0.7 | 0.4 | 0.3 | 0.3 | 0.9 | 0.9 | 0.5 | 3.2 |
| 26-Sep | 0.6 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 1.2 | 1.9 | 1.3 | 1.6 | 2.0 | 2.1 | 2.7 | 2.5 | 2.2 | 2.5 | 2.1 | 1.6 | 1.4 | 1.8 | 1.9 | 1.5 | 1.8 | 1.8 | 2.7 |
| 27-Sep | 1.7 | 1.6 | 0.9 | 1.2 | 2.7 | 1.5 | 1.8 | 2.3 | 2.4 | 3.1 | 4.2 | 3.8 | 3.5 | 3.6 | 4.4 | 3.5 | 3.3 | 2.3 | 1.6 | 1.9 | 2.1 | 2.0 | 1.6 | 1.1 | 4.4 |
| 28-Sep | 1.2 | 1.5 | 1.2 | 1.4 | 1.7 | 1.3 | 1.0 | 1.2 | 1.2 | 0.9 | 1.1 | 1.2 | 1.6 | 1.6 | 2.1 | 1.8 | 1.8 | 0.8 | 0.7 | 1.0 | 1.3 | 1.1 | 1.4 | 0.8 | 2.1 |
| 29-Sep | 0.7 | 0.6 | 0.6 | 0.5 | 0.7 | 0.7 | 1.0 | 1.1 | 0.9 | 0.7 | 0.6 | 1.0 | 1.2 | 1.3 | 1.1 | 1.3 | 0.9 | 0.5 | 0.3 | 0.8 | 0.6 | 0.6 | 0.7 | 0.5 | 1.3 |
| 30-Sep | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.9 | 1.2 | 1.3 | 1.4 | 2.3 | 2.8 | 3.3 | 3.5 | 3.7 | 4.0 | 4.1 | 4.6 | 4.2 | 3.7 | 3.5 | 3.6 | 3.0 | 3.1 | 3.2 | 4.6 |
| | 3.3 | 4.1 | 4.0 | 3.8 | 4.1 | 3.8 | 3.9 | 3.7 | 3.7 | 3.6 | 4.2 | 3.8 | 3.8 | 4.0 | 4.4 | 4.3 | 4.6 | 4.2 | 3.7 | 3.5 | 3.6 | 3.1 | 3.1 | 3.2 | |

Diurnal Maximum

M - Maintenance



| Maximum Value: 4.4 km/h on Sep 15 22:00 Maximum Daily Average: 1.4 km/h on Sep 23 | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9 | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------------------------------------------------------------------------------------------------------------------------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.4 km/h on Sep 11 04:00 Minimum Daily Average: -0.3 km/h on Sep 3 Maximum Diurnal Average: 0.9 km/h at hour 8 Minimum Diurnal Average: 0.4 km/h at hour 11 Monthly Average: 0.63 km/h Percentiles: P ₁ = -0.9 P ₁₀ = -0.3 Q ₁ = 0.1 Median = 0.5 Q ₃ = 1.1 P ₉₀ = 1.7 P ₉₉ = 3.7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.8 | 0.6 | 0.8 | 0.6 | 0.5 | 0.4 | 0.1 | 0.7 | 0.1 | 0.1 | 0.1 | 1.2 | 0.7 | 0.4 | 0.9 | 1.0 | 0.2 | 0.3 | 0.4 | 0.2 | 0.0 | -0.1 | 0.1 | 0.5 | 0.4 | 1.2 |
| 2-Sep | 0.8 | 0.8 | 1.3 | 1.4 | 2.0 | 2.2 | 0.8 | 1.1 | 1.3 | 0.7 | 0.0 | 0.7 | 1.1 | 0.7 | 1.1 | 0.2 | 0.3 | -0.2 | 0.0 | -0.2 | -0.7 | 0.6 | 0.2 | -0.6 | 0.7 | 2.2 |
| 3-Sep | 0.6 | -0.3 | -0.5 | -0.2 | -0.1 | -0.1 | 1.1 | 0.3 | -0.8 | -0.6 | -0.7 | -0.4 | -0.7 | -0.4 | -0.4 | -0.3 | -0.4 | -0.3 | -0.3 | -0.5 | -0.8 | -0.8 | -0.7 | -0.5 | -0.3 | 1.1 |
| 4-Sep | -0.4 | 0.1 | 1.5 | 2.0 | 1.7 | 0.7 | -0.1 | 0.7 | 0.0 | 0.3 | 1.0 | 1.3 | 1.1 | 0.9 | 0.3 | 0.4 | 1.3 | 1.0 | 0.5 | 0.3 | 1.4 | 1.8 | 2.1 | 1.4 | 0.9 | 2.1 |
| 5-Sep | 1.5 | 1.3 | 0.6 | 0.8 | 1.3 | 0.8 | 0.5 | 0.2 | 0.3 | 0.1 | 0.3 | 1.2 | 1.3 | 1.1 | 0.8 | 0.7 | 0.2 | 1.1 | 2.8 | 3.8 | 2.6 | -0.7 | 1.6 | 1.9 | 1.1 | 3.8 |
| 6-Sep | 1.8 | 1.4 | 1.1 | 0.1 | 0.4 | 0.3 | 0.3 | 0.9 | 0.6 | 0.7 | 1.7 | 2.0 | 1.3 | 0.9 | 1.3 | 0.1 | 0.2 | -0.1 | 1.0 | 1.1 | 0.9 | 1.4 | 1.0 | 1.4 | 0.9 | 2.0 |
| 7-Sep | 0.9 | 0.3 | 0.2 | 0.3 | 0.6 | -0.1 | 0.7 | 1.4 | 0.5 | 0.7 | 0.6 | 1.1 | 0.5 | -0.3 | -0.2 | 0.0 | 0.3 | 0.2 | 1.4 | 2.2 | 1.2 | 1.0 | 0.1 | 0.6 | 0.6 | 2.2 |
| 8-Sep | 0.6 | 0.7 | 0.9 | 0.4 | 0.7 | 0.4 | 0.4 | 0.6 | 0.4 | 0.6 | -0.6 | 0.3 | -0.1 | -0.4 | 0.0 | 0.5 | 0.5 | 0.2 | 0.7 | 0.2 | -0.1 | -0.1 | 0.0 | -0.1 | 0.3 | 0.9 |
| 9-Sep | -0.1 | 0.0 | 0.1 | 0.2 | 0.2 | 0.0 | -0.1 | 0.2 | 0.5 | -0.7 | -0.8 | 0.0 | -0.5 | -0.1 | 0.5 | 0.2 | 0.5 | 0.8 | 1.3 | 1.0 | 1.2 | 1.9 | 2.0 | 2.6 | 0.4 | 2.6 |
| 10-Sep | 1.0 | 2.4 | 2.0 | 1.6 | 1.8 | 1.0 | 0.7 | 1.5 | 2.1 | 1.4 | 0.0 | 0.3 | 1.0 | 0.6 | 0.4 | 0.8 | -1.0 | 0.3 | 0.4 | -0.6 | -0.9 | -0.9 | -0.3 | -1.3 | 0.6 | 2.4 |
| 11-Sep | -0.7 | -0.6 | -0.3 | -1.4 | -0.8 | 0.3 | 1.1 | 1.0 | 0.5 | 0.1 | -0.3 | -0.6 | -0.3 | -0.6 | -0.2 | 0.0 | -0.2 | 0.0 | -0.2 | 0.2 | -0.1 | -0.2 | -0.8 | -0.3 | -0.2 | 1.1 |
| 12-Sep | -0.5 | -0.1 | -0.3 | -0.2 | 0.3 | 1.5 | 1.6 | 0.8 | 1.2 | 0.5 | 0.4 | -0.3 | 0.9 | 1.0 | 0.9 | 1.1 | 0.9 | 0.4 | -0.2 | 0.9 | 2.0 | 2.9 | 4.1 | 4.1 | 1.0 | 4.1 |
| 13-Sep | 3.5 | 1.7 | 0.2 | 0.1 | 0.8 | 1.3 | 1.1 | 0.9 | 0.4 | 0.9 | 1.0 | 1.1 | 2.0 | 1.7 | 0.8 | 0.8 | 1.6 | 1.9 | 1.1 | 1.3 | 0.7 | 0.3 | 1.0 | 1.4 | 1.2 | 3.5 |
| 14-Sep | 0.7 | -0.3 | -0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.3 | 0.4 | 0.4 | 0.7 | -0.1 | -0.2 | 0.9 | 1.2 | 0.6 | 0.7 | -0.3 | 0.3 | -0.3 | 0.1 | 0.7 | 0.2 | -0.5 | 0.2 | 1.2 |
| 15-Sep | -0.3 | 0.2 | 0.1 | 0.1 | 0.3 | 0.4 | 0.4 | 0.3 | -0.2 | 0.5 | 0.7 | 0.4 | 0.1 | 0.8 | 0.4 | 0.6 | 1.3 | 1.5 | 2.4 | 1.7 | 2.9 | 4.4 | 3.9 | 0.4 | 1.0 | 4.4 |
| 16-Sep | 0.2 | 0.6 | 0.9 | 0.8 | 1.1 | 0.9 | 1.2 | 1.1 | 1.4 | 1.4 | 0.5 | 0.6 | 2.3 | 2.0 | 1.4 | 1.3 | 1.1 | 1.1 | 0.6 | 1.1 | 1.1 | 1.9 | 1.6 | 1.1 | 1.1 | 2.3 |
| 17-Sep | 0.7 | 2.3 | 2.8 | 0.7 | 0.2 | 1.0 | 2.9 | 2.5 | 1.8 | 1.6 | 1.2 | 1.3 | 1.2 | 0.7 | 0.5 | 0.6 | 0.8 | 0.3 | 1.6 | 1.6 | 1.2 | 0.7 | 1.0 | 2.4 | 1.3 | 2.9 |
| 18-Sep | 2.5 | 0.3 | 0.4 | -0.1 | 0.2 | 0.3 | 0.5 | 0.7 | 0.6 | 0.2 | -0.4 | -1.3 | -0.1 | -0.7 | -0.8 | -0.3 | -0.8 | -0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.0 | 0.1 | 0.1 | 2.5 |
| 19-Sep | 0.0 | -0.1 | -0.5 | -0.4 | -0.5 | -0.7 | 0.3 | -0.3 | -0.5 | -0.2 | -0.1 | 0.3 | -0.2 | -0.1 | 0.2 | -0.4 | -0.2 | 0.1 | 0.5 | -0.2 | -0.2 | -0.3 | -0.2 | 0.0 | -0.2 | 0.5 |
| 20-Sep | 0.0 | -0.2 | -0.1 | -0.2 | -0.1 | -0.1 | 0.0 | 0.0 | -0.7 | -0.3 | M | 0.2 | -0.3 | 0.4 | 1.2 | 1.3 | 0.3 | 1.1 | 1.2 | 1.1 | 0.5 | 0.4 | 0.5 | 1.0 | 0.3 | 1.3 |
| 21-Sep | 0.8 | 0.5 | 0.3 | 1.0 | 1.5 | 1.7 | 0.2 | 0.7 | 0.4 | 0.5 | 0.0 | 0.2 | 0.9 | 1.3 | 0.8 | 0.9 | 1.0 | 1.3 | 2.0 | 2.6 | 3.7 | 3.1 | 0.4 | 0.7 | 1.1 | 3.7 |
| 22-Sep | 0.8 | 0.1 | 0.9 | 0.7 | 0.2 | 0.7 | 0.7 | 1.2 | 0.3 | 0.0 | 0.3 | 1.0 | 2.4 | 1.1 | 0.9 | 1.8 | 1.3 | 0.7 | 1.4 | -0.1 | -0.2 | 0.0 | 0.8 | -0.1 | 0.7 | 2.4 |
| 23-Sep | -0.7 | -0.2 | 0.5 | 0.6 | 0.3 | 0.5 | 0.9 | 1.5 | 1.8 | 0.3 | 2.5 | 2.9 | 3.7 | 4.0 | 2.6 | 0.8 | 3.1 | 4.0 | 2.3 | 0.0 | 0.5 | 0.8 | 0.5 | 0.3 | 1.4 | 4.0 |
| 24-Sep | 0.3 | 0.3 | 0.0 | -0.2 | 0.2 | 1.6 | 1.9 | 1.0 | 1.2 | 1.5 | 1.1 | 0.6 | -0.4 | 0.6 | 0.4 | -0.8 | -1.1 | -0.9 | -0.5 | -0.2 | -0.3 | 0.0 | 0.6 | 1.5 | 0.3 | 1.9 |
| 25-Sep | 1.9 | 1.1 | 2.6 | 2.5 | 3.4 | 1.4 | 2.6 | 2.9 | 1.7 | 0.5 | 0.5 | 0.4 | -0.7 | -0.9 | -0.8 | -0.5 | -0.1 | -0.1 | 0.3 | 0.2 | 0.3 | 0.4 | 0.4 | 0.2 | 0.8 | 3.4 |
| 26-Sep | 0.5 | 0.6 | 0.6 | 0.4 | 0.4 | 0.6 | 0.5 | 1.3 | 2.1 | 1.4 | 0.2 | 0.2 | 0.5 | 0.6 | 0.5 | 0.6 | 1.7 | 0.9 | 0.6 | 0.2 | 0.5 | 0.6 | 1.0 | 1.7 | 0.8 | 2.1 |
| 27-Sep | 2.1 | 1.5 | 1.6 | 1.7 | 1.3 | 0.2 | -0.3 | 0.7 | 1.8 | 1.2 | -0.5 | 0.5 | 0.8 | -0.7 | 0.9 | 0.0 | 0.2 | 1.1 | 0.9 | 0.7 | 1.2 | -0.4 | 0.4 | -0.1 | 0.7 | 2.1 |
| 28-Sep | 0.6 | 0.2 | 0.8 | 2.4 | 3.3 | 0.5 | 0.5 | 0.8 | 0.5 | 0.4 | 0.3 | 0.0 | -0.8 | -0.8 | 0.8 | 1.0 | 1.4 | 1.0 | 1.2 | 1.6 | 1.2 | 1.2 | 0.8 | 0.5 | 0.8 | 3.3 |
| 29-Sep | 0.4 | 0.6 | 0.6 | 0.7 | 0.6 | -0.1 | 0.0 | 1.7 | 0.9 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | -0.4 | -0.1 | 0.4 | 0.5 | 0.7 | 0.5 | 0.8 | 0.9 | 0.3 | 0.2 | 0.4 | 1.7 |
| 30-Sep | 0.2 | 0.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.3 | 0.3 | 0.4 | 0.2 | 0.4 | 1.0 | 1.3 | 0.6 | 1.1 | 1.0 | 0.5 | 0.8 | 0.8 | 0.6 | 0.5 | 0.6 | 0.6 | 0.4 | 0.5 | 1.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | 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 2016

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.6 km/h on Sep 27 15:00 | Hours of Data: 719 |
| Minimum Value: 0.2 km/h on Sep 14 06:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 1.0 Median = 1.5 Q ₃ = 2.2 P ₉₀ = 3.1 P ₉₉ = 4.1 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 1.1 | 0.8 | 0.9 | 1.3 | 1.1 | 0.7 | 0.6 | 0.7 | 1.2 | 1.1 | 1.1 | 1.9 | 2.4 | 2.0 | 1.4 | 1.1 | 1.6 | 1.0 | 0.7 | 0.8 | 0.5 | 0.6 | 0.9 | 1.2 | 2.4 |
| 2-Sep | 1.1 | 1.0 | 1.3 | 1.8 | 1.3 | 1.4 | 1.0 | 1.7 | 1.8 | 2.2 | 2.3 | 1.5 | 2.0 | 1.5 | 1.4 | 1.4 | 1.2 | 0.8 | 0.6 | 0.5 | 0.8 | 1.3 | 1.2 | 1.3 | 2.3 |
| 3-Sep | 4.3 | 1.1 | 1.1 | 1.3 | 1.6 | 2.3 | 3.0 | 3.4 | 2.2 | 2.3 | 2.6 | 2.7 | 2.2 | 2.3 | 2.0 | 2.2 | 2.3 | 2.8 | 3.3 | 2.5 | 3.1 | 2.2 | 2.2 | 2.0 | 4.3 |
| 4-Sep | 2.0 | 2.3 | 2.5 | 2.0 | 2.2 | 2.2 | 1.7 | 2.0 | 1.9 | 2.4 | 2.8 | 3.1 | 3.5 | 3.2 | 3.0 | 2.6 | 2.1 | 1.5 | 1.1 | 0.4 | 1.4 | 0.9 | 0.7 | 1.4 | 3.5 |
| 5-Sep | 1.4 | 1.1 | 1.0 | 1.0 | 0.9 | 1.2 | 0.8 | 0.7 | 0.8 | 1.1 | 2.1 | 2.3 | 2.3 | 2.1 | 2.3 | 1.9 | 1.3 | 1.8 | 1.5 | 1.9 | 2.1 | 2.0 | 2.6 | 2.0 | 2.6 |
| 6-Sep | 2.1 | 1.9 | 1.7 | 0.9 | 0.7 | 0.8 | 0.6 | 0.8 | 1.1 | 1.8 | 2.4 | 2.4 | 2.4 | 2.6 | 3.0 | 1.8 | 1.3 | 1.2 | 1.3 | 1.2 | 1.1 | 1.8 | 1.6 | 1.6 | 3.0 |
| 7-Sep | 1.5 | 1.0 | 0.9 | 0.7 | 0.9 | 0.7 | 1.5 | 1.6 | 1.4 | 1.6 | 1.6 | 1.4 | 1.6 | 1.8 | 1.8 | 1.6 | 1.5 | 0.9 | 1.0 | 1.6 | 1.6 | 1.7 | 1.2 | 0.6 | 1.8 |
| 8-Sep | 0.6 | 0.8 | 1.0 | 1.5 | 0.5 | 0.6 | 1.0 | 0.9 | 1.2 | 1.7 | 1.2 | 1.6 | 1.5 | 2.2 | 1.3 | 2.6 | 1.3 | 2.5 | 2.1 | 0.9 | 0.4 | 1.1 | 0.9 | 1.2 | 2.6 |
| 9-Sep | 0.6 | 0.4 | 0.7 | 1.0 | 1.1 | 1.6 | 1.7 | 2.2 | 2.4 | 2.3 | 2.0 | 1.7 | 1.6 | 2.4 | 2.7 | 1.9 | 1.4 | 1.3 | 1.3 | 1.5 | 1.6 | 2.1 | 2.4 | 3.2 | 3.2 |
| 10-Sep | 2.3 | 2.2 | 2.5 | 3.2 | 3.4 | 1.8 | 1.4 | 1.5 | 1.9 | 2.1 | 2.5 | 2.0 | 1.8 | 2.0 | 2.6 | 4.0 | 3.7 | 3.5 | 3.4 | 3.2 | 2.9 | 3.0 | 3.1 | 2.7 | 4.0 |
| 11-Sep | 3.1 | 3.6 | 3.5 | 3.6 | 3.5 | 3.5 | 4.0 | 3.8 | 3.6 | 3.2 | 3.5 | 3.3 | 3.9 | 2.9 | 3.0 | 2.6 | 2.3 | 1.8 | 1.3 | 1.8 | 1.1 | 0.7 | 1.3 | 1.6 | 4.0 |
| 12-Sep | 1.5 | 1.7 | 0.9 | 0.6 | 0.9 | 1.3 | 1.4 | 1.4 | 1.4 | 1.7 | 2.6 | 2.6 | 3.2 | 2.8 | 2.9 | 2.9 | 2.2 | 1.3 | 0.6 | 1.0 | 1.1 | 1.0 | 1.3 | 1.4 | 3.2 |
| 13-Sep | 1.2 | 1.8 | 1.5 | 1.6 | 1.5 | 1.2 | 1.1 | 1.9 | 2.0 | 2.5 | 2.1 | 2.9 | 3.1 | 2.8 | 1.6 | 1.5 | 1.4 | 1.2 | 1.4 | 1.0 | 0.8 | 1.2 | 2.3 | 1.8 | 3.1 |
| 14-Sep | 2.7 | 1.0 | 0.3 | 0.5 | 0.5 | 0.2 | 0.3 | 0.2 | 0.5 | 1.0 | 1.3 | 2.2 | 1.9 | 2.4 | 2.6 | 1.8 | 1.4 | 2.8 | 1.7 | 1.1 | 0.5 | 0.9 | 1.9 | 1.4 | 2.8 |
| 15-Sep | 0.6 | 0.3 | 0.5 | 0.7 | 0.6 | 0.8 | 0.5 | 0.9 | 1.6 | 1.8 | 1.4 | 1.4 | 0.8 | 1.5 | 1.9 | 2.3 | 2.0 | 1.3 | 1.7 | 2.5 | 3.2 | 2.3 | 3.0 | 1.7 | 3.2 |
| 16-Sep | 1.4 | 1.0 | 0.7 | 0.7 | 0.9 | 0.9 | 1.0 | 1.4 | 1.5 | 1.3 | 0.9 | 1.5 | 3.8 | 3.5 | 2.4 | 2.1 | 1.3 | 1.2 | 0.5 | 0.5 | 0.7 | 0.7 | 1.0 | 1.7 | 3.8 |
| 17-Sep | 1.5 | 1.4 | 1.5 | 1.7 | 1.4 | 1.4 | 1.7 | 1.5 | 1.5 | 1.4 | 1.7 | 2.0 | 2.0 | 1.9 | 1.6 | 1.7 | 1.9 | 1.8 | 1.1 | 0.5 | 0.6 | 0.9 | 1.1 | 1.0 | 2.0 |
| 18-Sep | 1.6 | 0.9 | 0.8 | 0.6 | 0.6 | 0.6 | 1.1 | 1.6 | 2.2 | 2.6 | 1.8 | 2.7 | 3.7 | 3.5 | 2.9 | 2.3 | 2.0 | 1.5 | 1.3 | 1.3 | 1.2 | 1.5 | 1.5 | 0.8 | 3.7 |
| 19-Sep | 0.7 | 0.7 | 0.6 | 1.0 | 0.8 | 0.6 | 0.9 | 1.1 | 1.5 | 1.4 | 2.0 | 2.3 | 2.0 | 2.0 | 2.5 | 1.9 | 1.7 | 1.7 | 1.4 | 1.0 | 1.0 | 0.8 | 1.4 | 1.0 | 2.5 |
| 20-Sep | 1.9 | 1.6 | 1.1 | 0.5 | 0.9 | 1.3 | 0.7 | 1.2 | 1.6 | 1.4 | M | 2.0 | 2.1 | 2.0 | 2.3 | 1.7 | 1.2 | 0.7 | 1.0 | 1.0 | 1.2 | 0.8 | 0.8 | 1.2 | 2.3 |
| 21-Sep | 1.0 | 1.0 | 1.3 | 0.9 | 0.9 | 0.8 | 1.2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.6 | 2.1 | 3.1 | 2.7 | 2.3 | 1.8 | 1.1 | 0.5 | 0.3 | 0.7 | 3.2 | 1.9 | 1.5 | 3.2 |
| 22-Sep | 0.8 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.7 | 1.0 | 2.8 | 3.4 | 3.1 | 2.9 | 2.3 | 1.4 | 1.3 | 1.1 | 1.2 | 1.0 | 0.9 | 1.0 | 1.1 | 3.4 |
| 23-Sep | 1.2 | 1.2 | 1.3 | 1.7 | 1.5 | 1.9 | 2.8 | 3.1 | 3.2 | 3.6 | 4.0 | 3.7 | 4.0 | 4.4 | 4.0 | 2.7 | 3.9 | 3.6 | 3.6 | 2.2 | 2.1 | 2.2 | 2.0 | 1.2 | 4.4 |
| 24-Sep | 1.2 | 1.2 | 0.8 | 0.8 | 1.0 | 0.9 | 1.6 | 1.6 | 1.6 | 2.8 | 2.4 | 2.9 | 2.9 | 3.3 | 3.9 | 4.2 | 4.1 | 3.0 | 1.3 | 1.9 | 1.7 | 1.6 | 1.0 | 1.9 | 4.2 |
| 25-Sep | 1.0 | 1.1 | 1.2 | 1.1 | 1.9 | 2.7 | 2.9 | 2.3 | 2.5 | 2.3 | 3.0 | 3.8 | 3.6 | 3.5 | 3.6 | 2.9 | 1.9 | 0.7 | 0.4 | 0.3 | 0.4 | 0.9 | 0.8 | 0.5 | 3.8 |
| 26-Sep | 0.4 | 0.6 | 0.7 | 0.7 | 0.7 | 1.0 | 1.2 | 1.9 | 1.6 | 1.7 | 1.6 | 1.8 | 2.1 | 2.3 | 1.8 | 1.9 | 1.6 | 1.3 | 1.2 | 1.6 | 1.3 | 0.8 | 1.2 | 1.3 | 2.3 |
| 27-Sep | 2.0 | 2.0 | 1.4 | 1.4 | 2.0 | 1.8 | 2.2 | 2.4 | 2.2 | 2.9 | 4.2 | 3.9 | 3.6 | 3.5 | 4.6 | 3.1 | 2.5 | 1.6 | 1.6 | 1.3 | 1.3 | 1.8 | 1.8 | 1.3 | 4.6 |
| 28-Sep | 1.2 | 1.4 | 1.2 | 1.6 | 1.5 | 1.2 | 0.8 | 0.8 | 1.1 | 0.7 | 0.8 | 0.8 | 1.3 | 1.5 | 2.2 | 1.9 | 2.2 | 1.0 | 0.5 | 0.5 | 1.7 | 1.8 | 1.9 | 1.0 | 2.2 |
| 29-Sep | 0.6 | 0.6 | 0.5 | 0.6 | 0.7 | 0.6 | 0.6 | 0.9 | 0.7 | 0.5 | 0.6 | 0.8 | 1.0 | 1.3 | 1.2 | 1.2 | 1.2 | 1.0 | 0.3 | 0.4 | 0.3 | 0.7 | 0.7 | 0.5 | 1.3 |
| 30-Sep | 0.5 | 0.4 | 0.5 | 0.7 | 1.0 | 1.1 | 1.2 | 1.5 | 1.4 | 2.4 | 3.1 | 3.7 | 3.9 | 3.9 | 4.3 | 4.1 | 4.5 | 3.9 | 3.9 | 3.9 | 4.2 | 3.5 | 3.6 | 3.1 | 4.5 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 4.3 | 3.6 | 3.5 | 3.6 | 3.5 | 3.5 | 4.0 | 3.8 | 3.6 | 3.6 | 4.2 | 3.9 | 4.0 | 4.4 | 4.6 | 4.2 | 4.5 | 3.9 | 3.9 | 3.9 | 4.2 | 3.5 | 3.6 | 3.2 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 4 BUFFALO VIEWPOINT SEPTEMBER 2016

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

October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 682 | 38 | 38 | 100.00 | 34 | 0 | 6 | 0 |
| H2S (ppb) Average | 661 | 37 | 59 | 96.94 | 2 | 0 | 1 | 0 |
| THC (ppm) Average | 685 | 35 | 35 | 100.00 | 4.7 | - | 2.7 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100.00 | 24.3 | - | 15 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 92 | - |
| Wind Speed 10 m (km/h) Average | 718 | 0 | 2 | 99.72 | 43 | - | 27 | - |
| 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 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 682 | 0.6 | 3 | - | 0 | 0 | 0 | 0 | 0 | 1 | 34 |
| H2S (ppb) Average | 661 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| THC (ppm) Average | 685 | 2.25 | 0.2 | - | 2 | 2.1 | 2.2 | 2.2 | 2.3 | 2.4 | 4.7 |
| Temperature 2 m (C) Average | 720 | 11.42 | 4.4 | - | 1.6 | 6.1 | 8.3 | 11.1 | 14.2 | 17.2 | 24.3 |
| Relative Humidity (%) Average | 720 | 70.8 | 18 | - | 29 | 43 | 56 | 73 | 85 | 94 | 99 |
| Wind Speed 10 m (km/h) Average | 718 | 11.3 | 6 | - | 0 | 5 | 7 | 10 | 13 | 19 | 43 |
| Wind Direction 10 m (deg) Average | 718 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|-------------------------------------|
| H2S | 27 Sep 2016 19:00 | 28 Sep 2016 09:00 | 15 | Unstable Operation - baseline drift |
| H2S | 28 Sep 2016 10:00 | 28 Sep 2016 16:00 | 7 | Maintenance - replace SOX scrubber |
| Wind Speed, Wind Direction | 16 Sep 2016 10:00 | 16 Sep 2016 11:00 | 2 | Maintenance - sensor calibration |



| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 34 ppb on Sep 15 13:00 | Maximum Daily Average: 5.7 ppb on Sep 20 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 21 15:00 | Minimum Daily Average: 0.1 ppb on Sep 24 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 2.1 ppb at hour 13 | Minimum Diurnal Average: 0.2 ppb at hour 6 | | Hours of Calibration: | 38 |
| 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 = 14 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 13 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 13 |
| 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 | 1 | 1 | 0 | 0 | 0 | 0 | 0.2 | 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 | 0.2 | 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 | 0.2 | 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 | 0.1 | 0 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 5 | 6 | 8 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1.2 | 8 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 4 | 6 | Z | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1.5 | 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 | 0.2 | 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 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 2 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 23 | 27 | 34 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 4.5 | 34 |
| 16-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 | 0.2 | 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 | 0.1 | 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 | 0.1 | 0 |
| 19-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 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 5 | 15 | 23 | 16 | 30 | 13 | 8 | 4 | 8 | 3 | 2 | 1 | 0 | 5.7 | 30 |
| 21-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 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 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 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 26-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 | 0.3 | 1 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 1 | 0 | 1 | 1 | 0.8 | 4 |
| 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 |

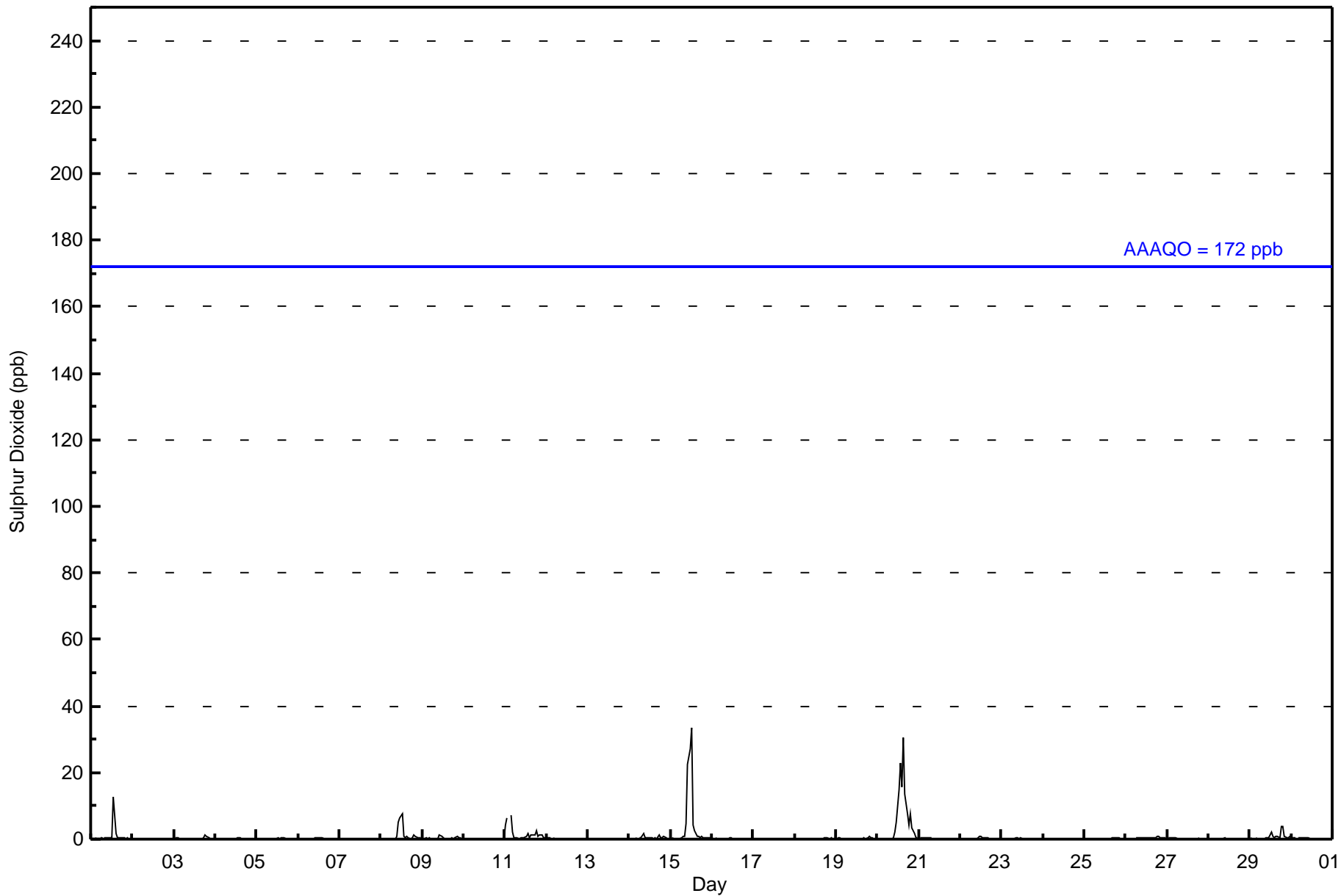
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.3 | 0.4 | 0.2 | 0.5 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.4 | 1.2 | 1.5 | 2.1 | 1.6 | 0.9 | 1.3 | 0.7 | 0.5 | 0.6 | 0.7 | 0.4 | 0.3 | 0.2 | 0.2 | Diurnal Average | |
| 4 | 6 | 0 | 7 | 2 | 0 | 0 | 1 | 2 | 5 | 23 | 27 | 34 | 23 | 16 | 30 | 13 | 8 | 4 | 8 | 3 | 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
Buffalo Viewpoint - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 673 | 98.68 | 98.68 |
| 11 - 20 | 4 | 0.59 | 99.27 |
| 21 - 60 | 5 | 0.73 | 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
Buffalo Viewpoint - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 48 | 24 | 7 | 1 | 9 | 19 | 57 | 150 | 39 | 34 | 44 | 53 | 58 | 46 | 53 | 29 | 671 |
| 11 - 20 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 21 - 60 | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 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 | 26 | 9 | 2 | 10 | 21 | 58 | 150 | 39 | 34 | 44 | 53 | 58 | 46 | 53 | 29 | 680 |

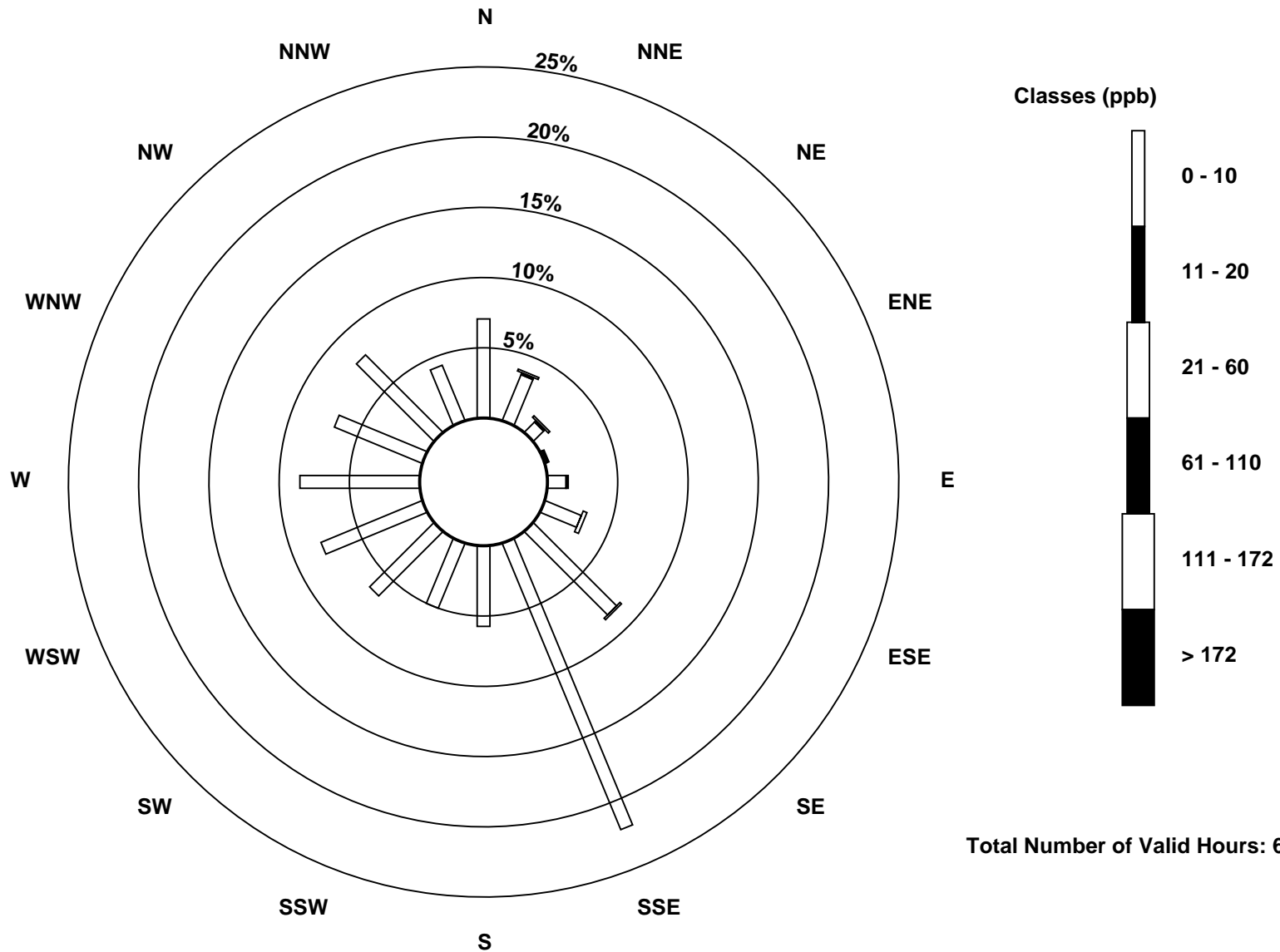
Total Number of Valid Hours: 680

Total Number of Hours: 720

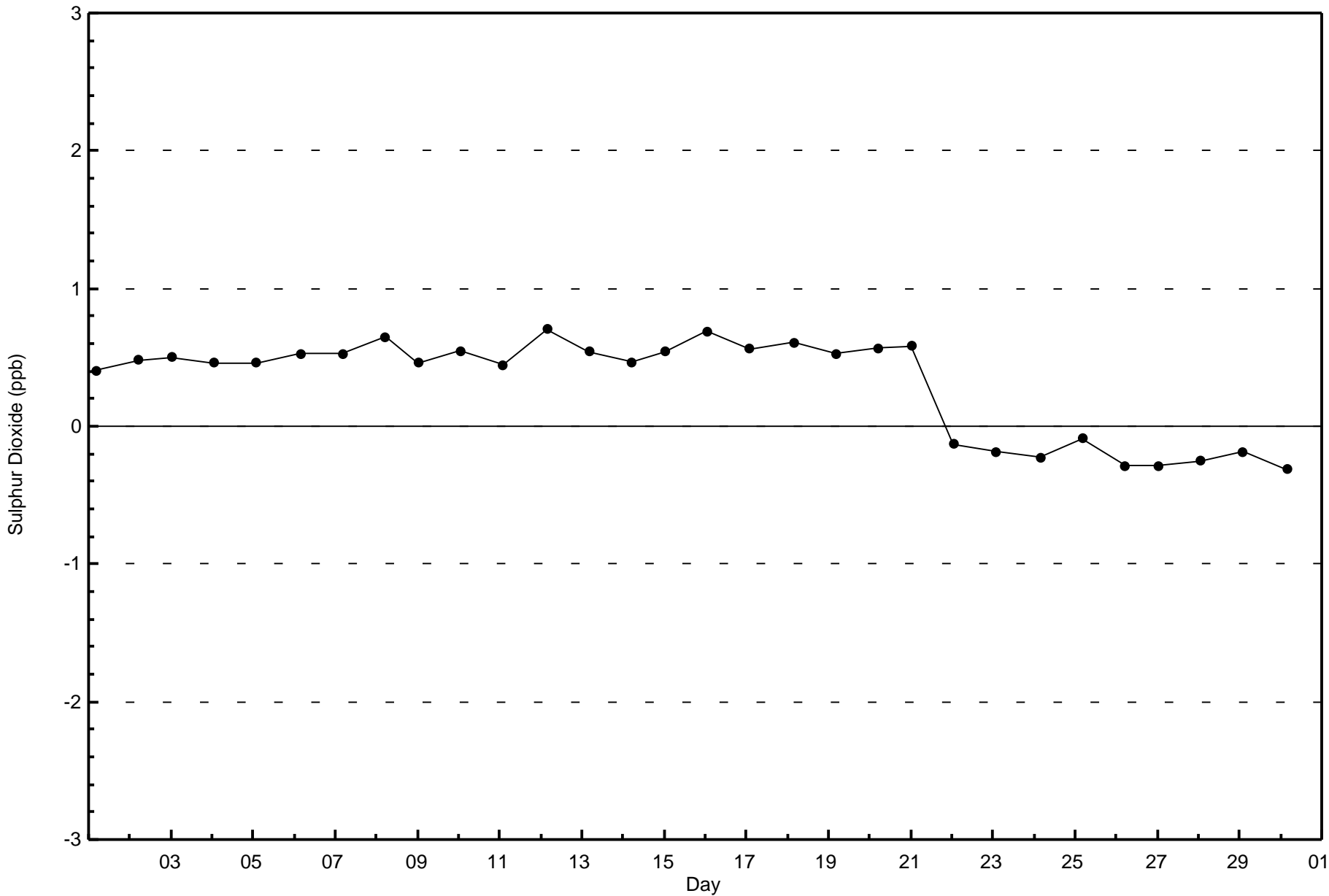


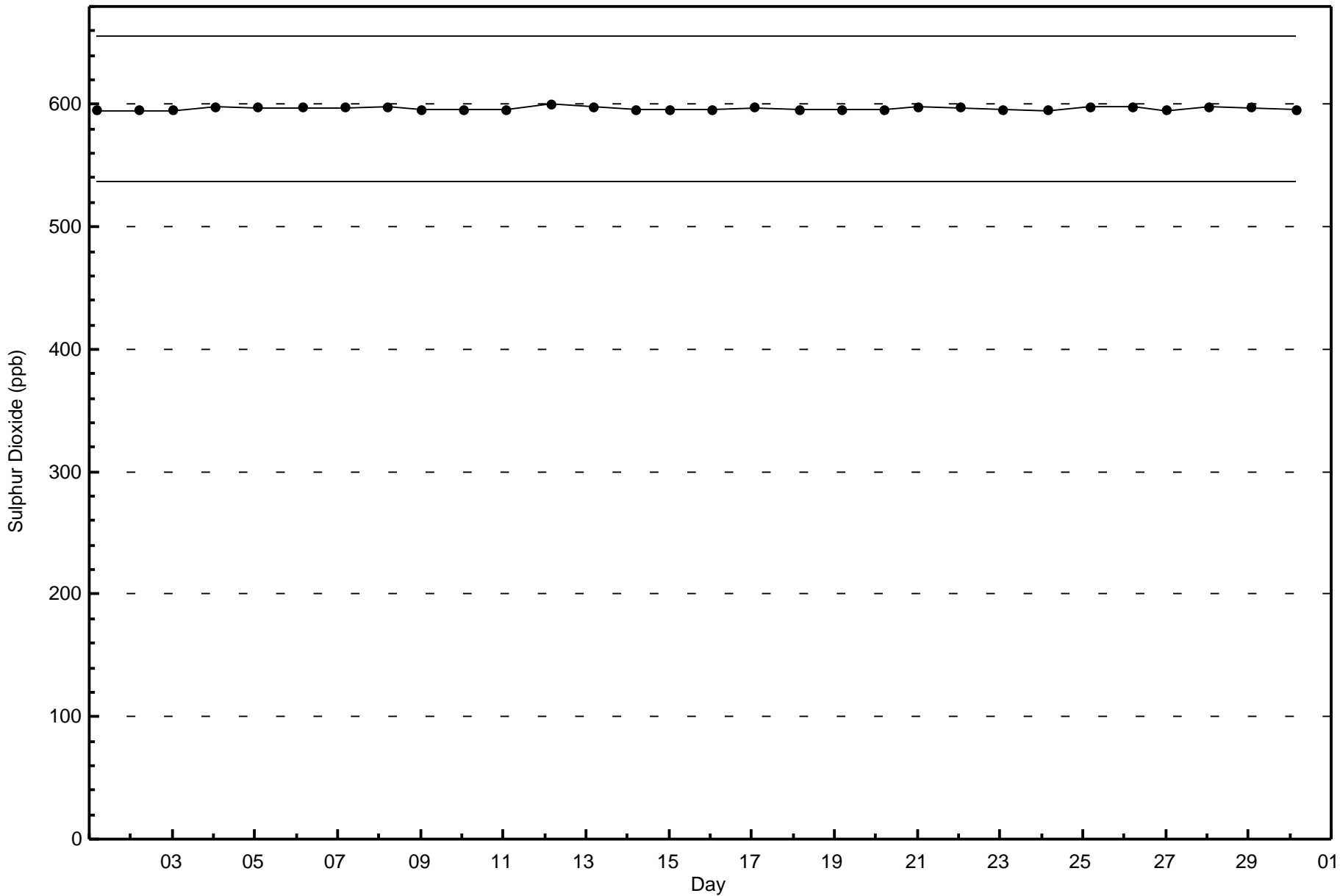
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 680





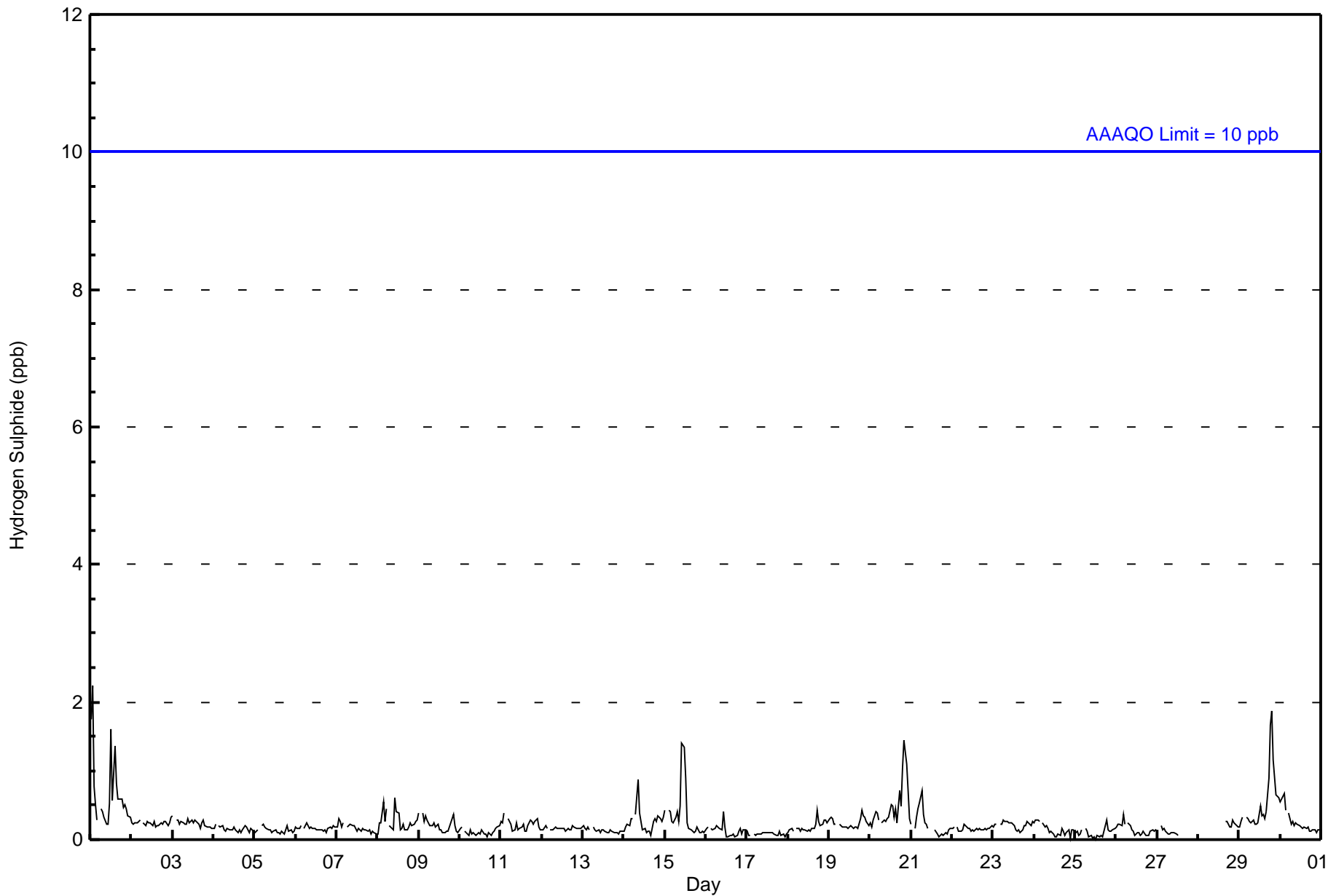


| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 1 02:00 | Maximum Daily Average: 0.7 ppb on Sep 1 | | Hours of Data: | 661 |
| Minimum Value: 0 ppb on Sep 25 13:00 | Minimum Daily Average: 0.1 ppb on Sep 17 | | Hours of Missing Data: | 59 |
| Maximum Diurnal Average: 0.3 ppb at hour 2 | Minimum Diurnal Average: 0.2 ppb at hour 17 | | Hours of Calibration: | 37 |
| 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: | 96.9 |

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

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

Z - zerspan C - Calibration M - Maintenance UO - Unstable Operation
 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
Buffalo Viewpoint - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 661 | 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: 661

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 47 | 26 | 9 | 2 | 10 | 20 | 58 | 143 | 39 | 35 | 40 | 45 | 57 | 44 | 54 | 30 | 659 |
| 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 | 26 | 9 | 2 | 10 | 20 | 58 | 143 | 39 | 35 | 40 | 45 | 57 | 44 | 54 | 30 | 659 |

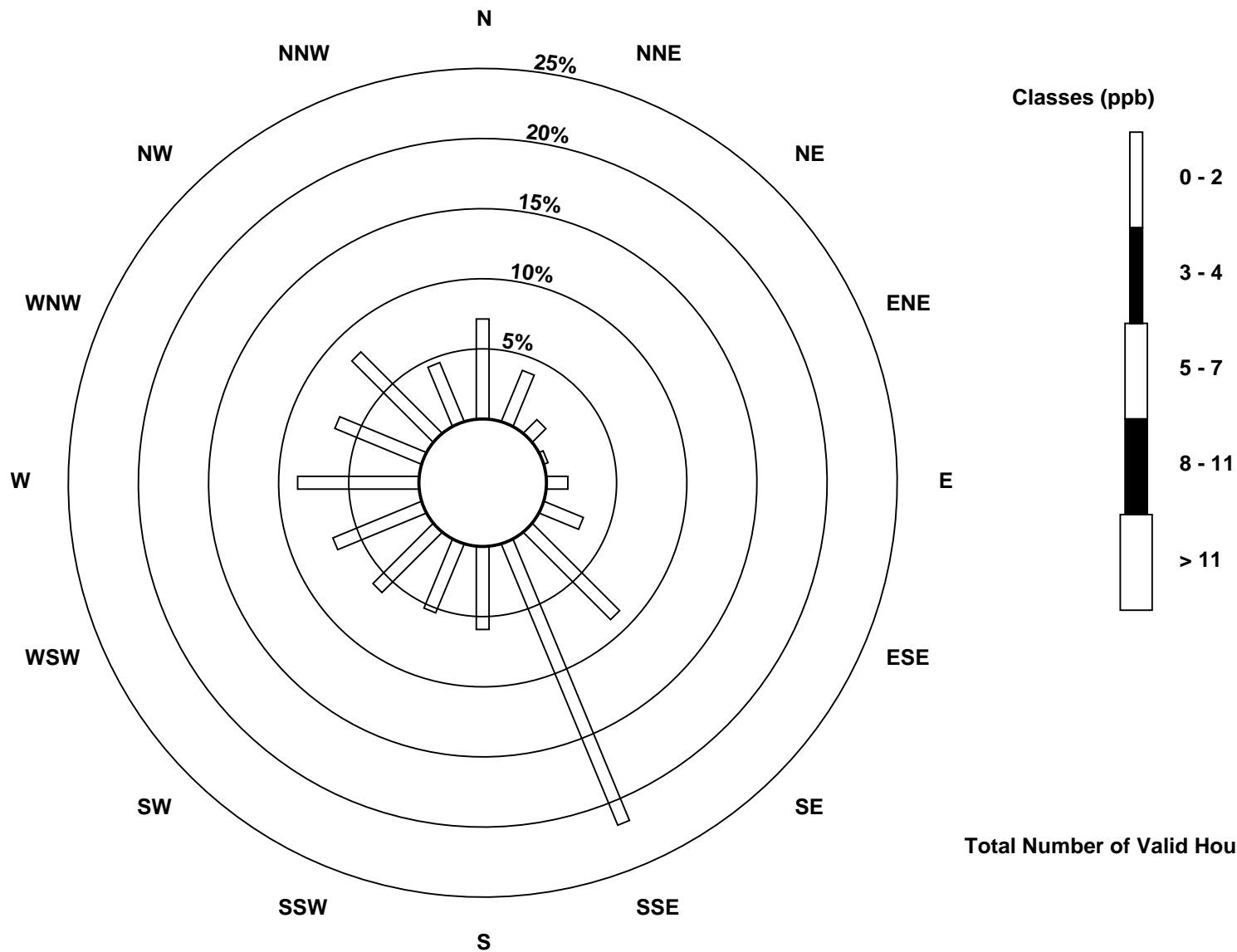
Total Number of Valid Hours: 659

Total Number of Hours: 720

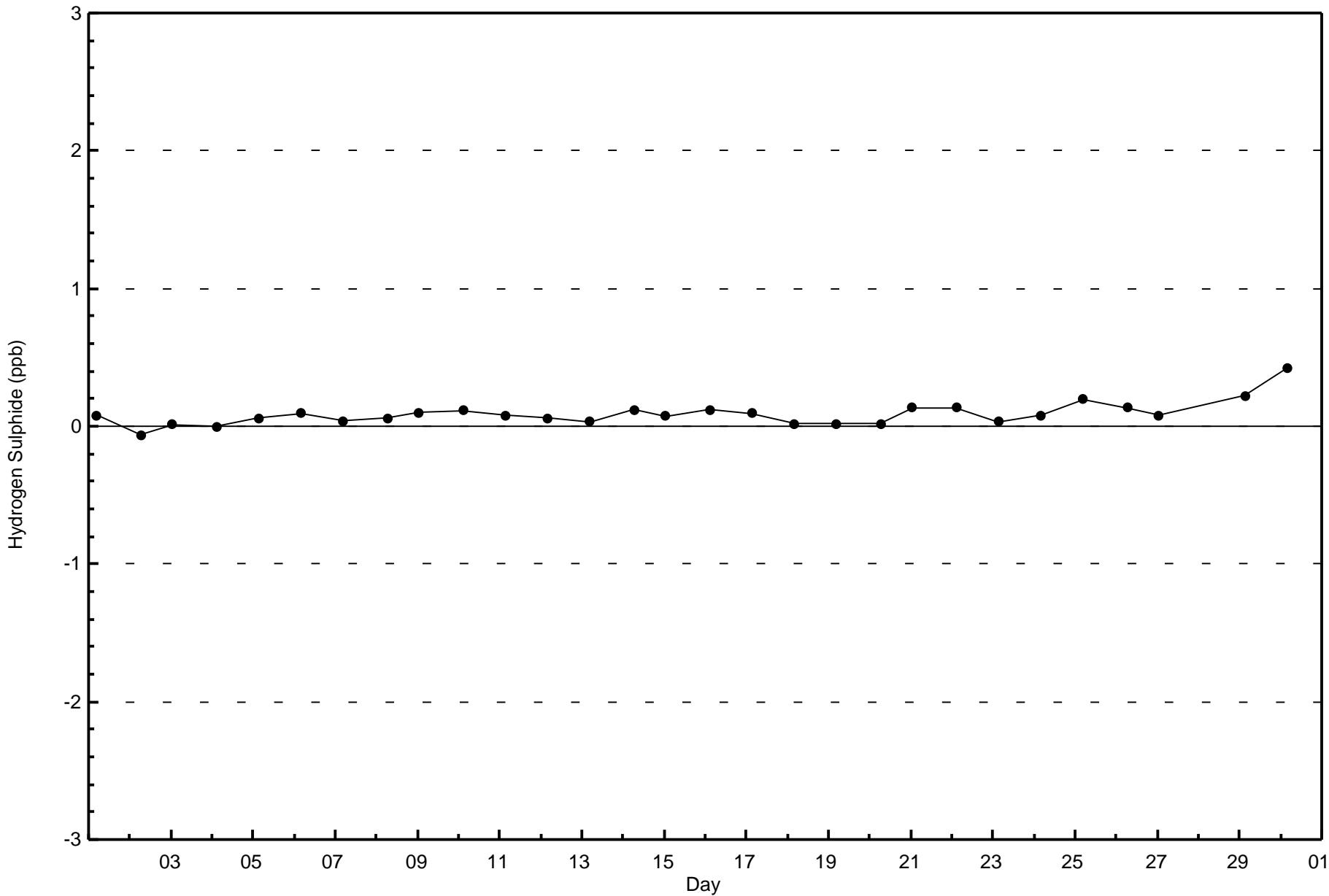


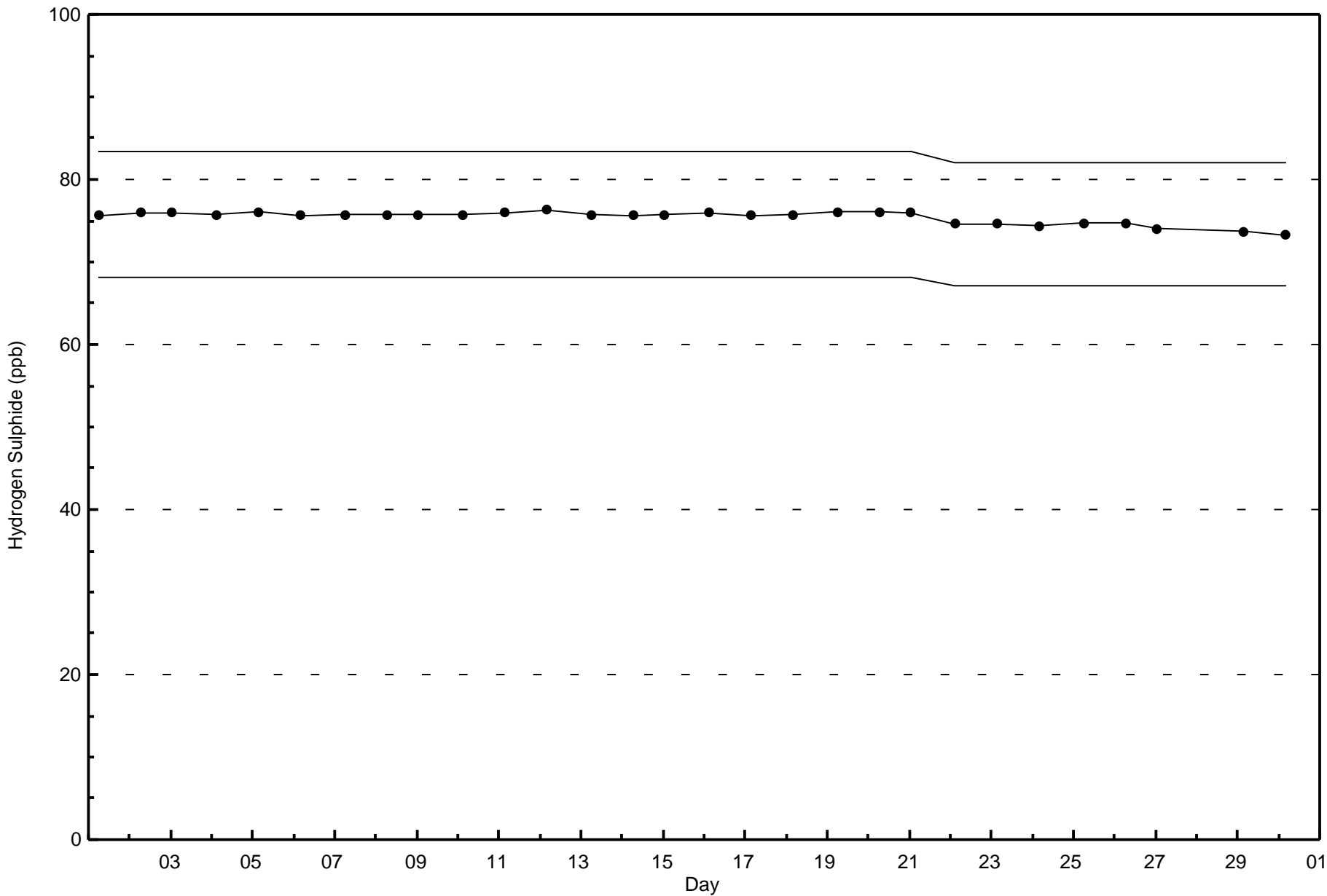
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 659





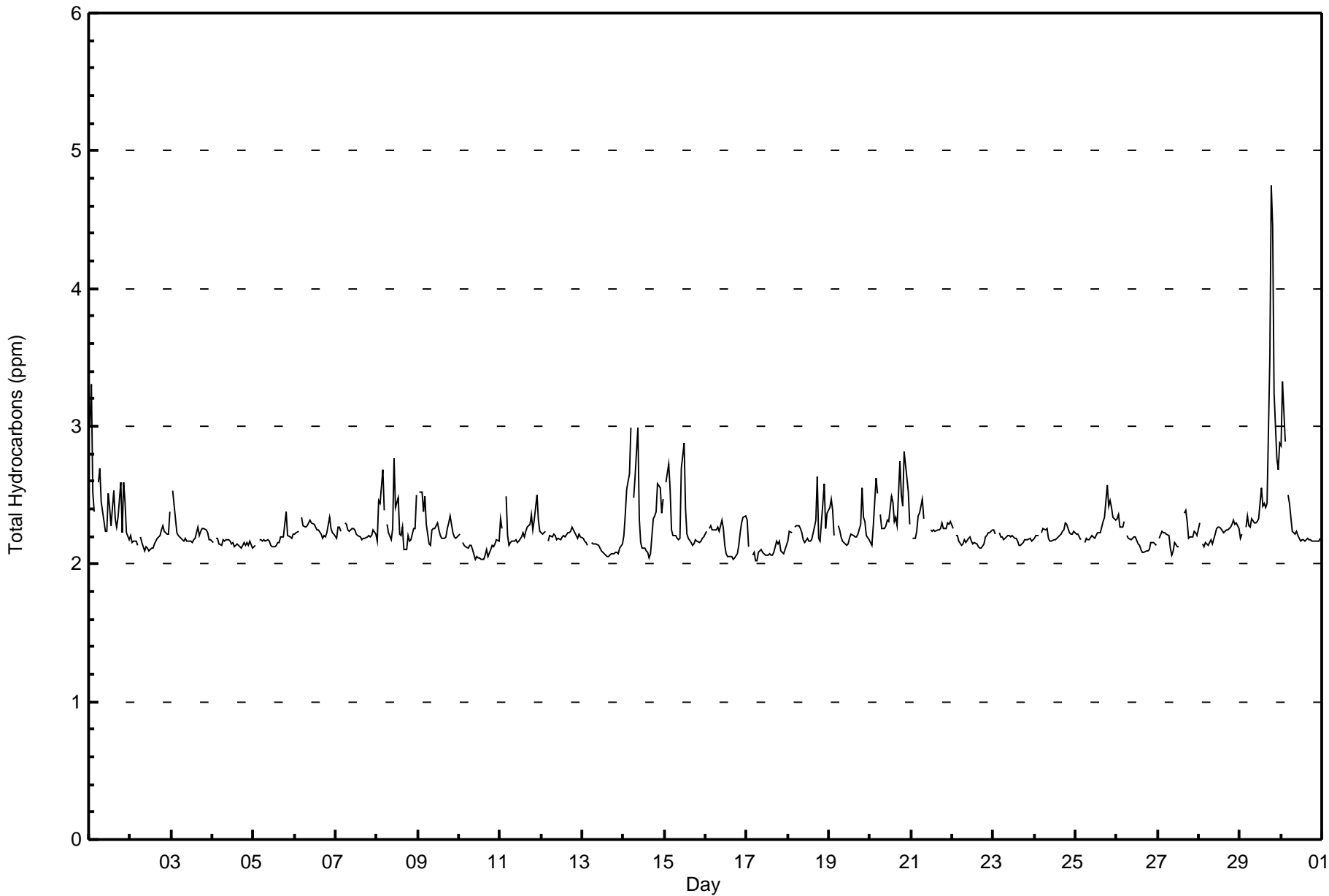


| Maximum Value: 4.7 ppm on Sep 29 19:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.7 ppm on Sep 29 | | | | | Hours in Service: 720 | |
|-------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----------------|---------------------------------|---------------|
| Minimum Value: 2.0 ppm on Sep 17 06:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.1 ppm on Sep 17 | | | | | Hours of Data: 685 | |
| Maximum Diurnal Average: 2.4 ppm at hour 2 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.2 ppm at hour 14 | | | | | Hours of Missing Data: 35 | |
| Monthly Average: 2.25 ppm | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 2.9 | | | | | Hours of Calibration: 35 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 3.0 | 3.3 | 2.5 | 2.4 | Z | 2.6 | 2.7 | 2.5 | 2.4 | 2.2 | 2.2 | 2.5 | 2.4 | 2.3 | 2.5 | 2.3 | 2.3 | 2.3 | 2.6 | 2.2 | 2.6 | 2.4 | 2.2 | 2.2 | 2.5 | 3.3 |
| 2-Sep | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.4 | 2.2 | 2.4 |
| 3-Sep | Z | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.5 |
| 4-Sep | 2.2 | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 |
| 5-Sep | 2.1 | 2.1 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 |
| 6-Sep | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 |
| 7-Sep | 2.2 | 2.3 | 2.3 | 2.2 | Z | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| 8-Sep | 2.2 | 2.5 | 2.4 | 2.7 | 2.4 | Z | 2.3 | 2.2 | 2.2 | 2.3 | 2.8 | 2.4 | 2.5 | 2.2 | 2.2 | 2.3 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.5 | 2.3 | 2.8 |
| 9-Sep | Z | 2.5 | 2.5 | 2.4 | 2.5 | 2.3 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.5 |
| 10-Sep | 2.2 | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 |
| 11-Sep | 2.3 | 2.3 | Z | 2.5 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.2 | 2.3 | 2.5 | 2.3 | 2.2 | 2.3 | 2.5 |
| 12-Sep | 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 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| 13-Sep | 2.2 | 2.2 | 2.2 | 2.1 | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| 14-Sep | 2.2 | 2.4 | 2.5 | 2.7 | 3.0 | Z | 2.5 | 2.6 | 3.0 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.3 | 2.3 | 2.4 | 2.6 | 2.6 | 2.4 | 2.5 | 2.4 | 3.0 |
| 15-Sep | Z | 2.6 | 2.7 | 2.5 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.7 | 2.9 | 2.4 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.9 |
| 16-Sep | 2.2 | Z | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 |
| 17-Sep | 2.3 | 2.1 | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 |
| 18-Sep | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.6 | 2.2 | 2.2 | 2.4 | 2.6 | 2.3 | 2.4 | 2.3 | 2.6 |
| 19-Sep | 2.4 | 2.5 | 2.4 | 2.2 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.6 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.6 |
| 20-Sep | 2.2 | 2.1 | 2.3 | 2.6 | 2.5 | Z | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.5 | 2.5 | 2.3 | 2.3 | 2.3 | 2.7 | 2.5 | 2.4 | 2.8 | 2.6 | 2.5 | 2.3 | 2.4 | 2.8 |
| 21-Sep | Z | 2.2 | 2.2 | 2.2 | 2.4 | 2.4 | 2.5 | 2.3 | C | C | C | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.5 |
| 22-Sep | 2.3 | Z | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| 23-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 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 24-Sep | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| 25-Sep | 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 | 2.3 | 2.3 | 2.3 | 2.6 | 2.4 | 2.5 | 2.4 | 2.3 | 2.3 | 2.3 | 2.6 |
| 26-Sep | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.4 |
| 27-Sep | Z | 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 | 2.1 | 2.1 | 2.1 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 |
| 28-Sep | 2.3 | Z | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 |
| 29-Sep | 2.2 | 2.2 | Z | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.6 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 3.5 | 4.7 | 4.5 | 3.2 | 2.8 | 2.7 | 2.9 | 4.7 |
| 30-Sep | 2.9 | 3.3 | 2.9 | Z | 2.5 | 2.4 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 3.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 2.3 2.4 2.3 2.3 2.3 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.2 2.3 2.3 2.3 2.3 2.3 2.2 2.3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.0 3.3 2.9 2.7 3.0 2.6 2.7 2.6 3.0 2.3 2.8 2.9 2.6 2.5 2.5 2.4 2.4 3.5 4.7 4.5 3.2 2.8 2.7 2.9 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 10 | 1.46 | 1.46 |
| 2.1 - 3.0 | 669 | 97.66 | 99.12 |
| 3.1 - 10.0 | 6 | 0.88 | 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 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 2 | 0 | 0 | 0 | 10 |
| 2.1 - 3.0 | 48 | 26 | 9 | 2 | 8 | 19 | 58 | 150 | 37 | 33 | 42 | 50 | 58 | 46 | 53 | 28 | 667 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 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 | 48 | 26 | 9 | 2 | 10 | 21 | 58 | 150 | 39 | 34 | 44 | 54 | 60 | 46 | 53 | 29 | 683 |

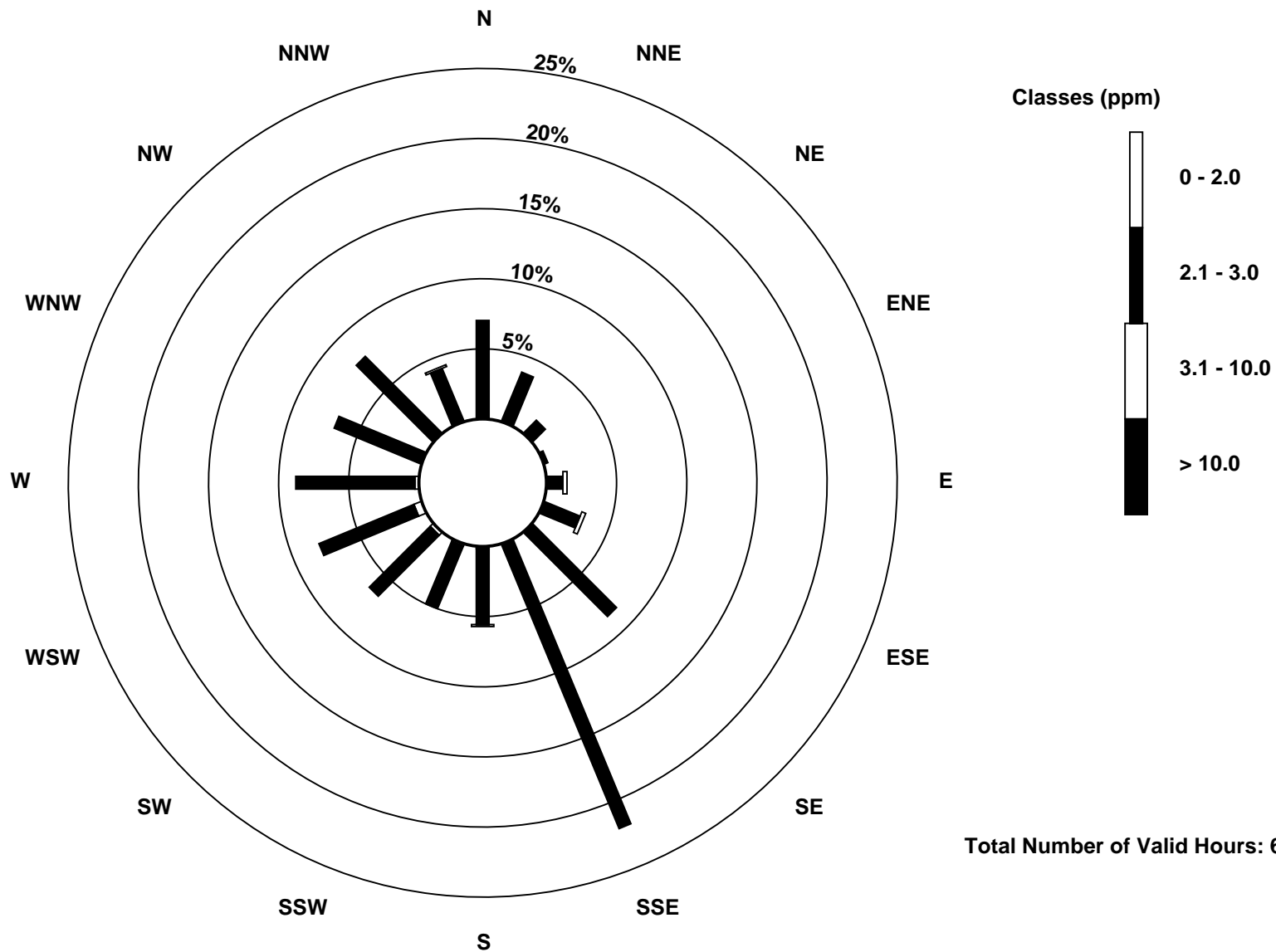
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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

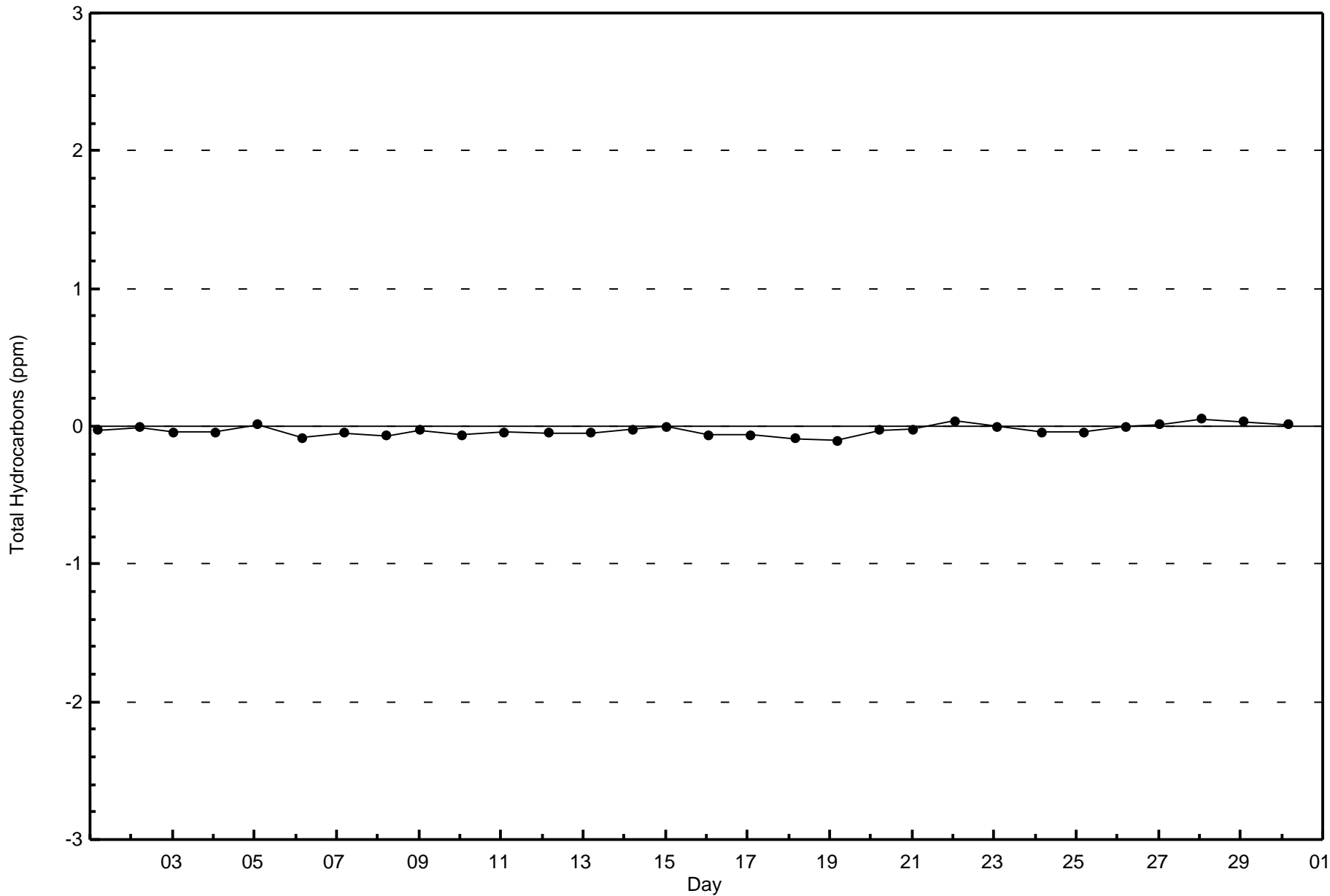


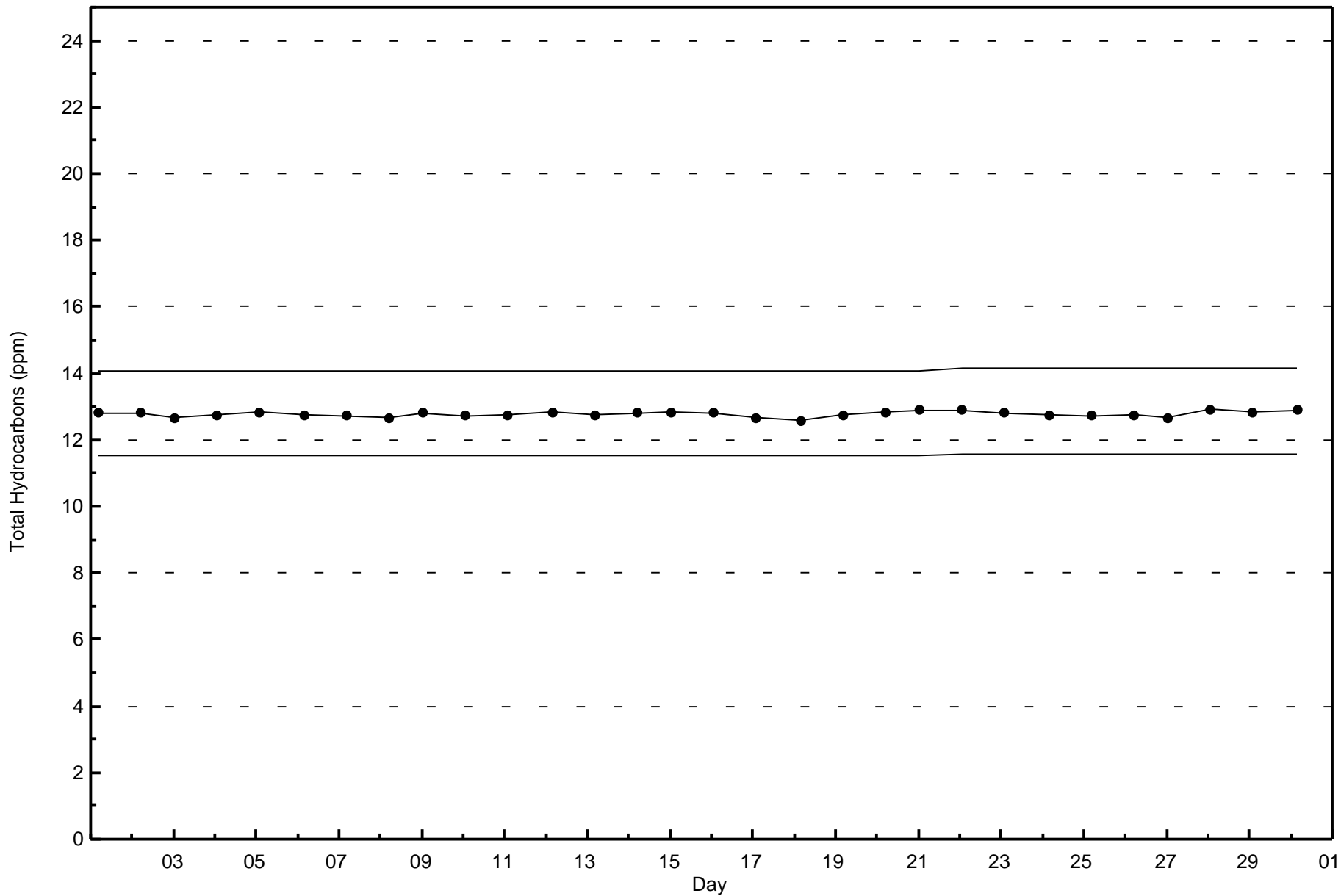
Total Number of Valid Hours: 683



Wood Buffalo Environmental Association
Zero Responses

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







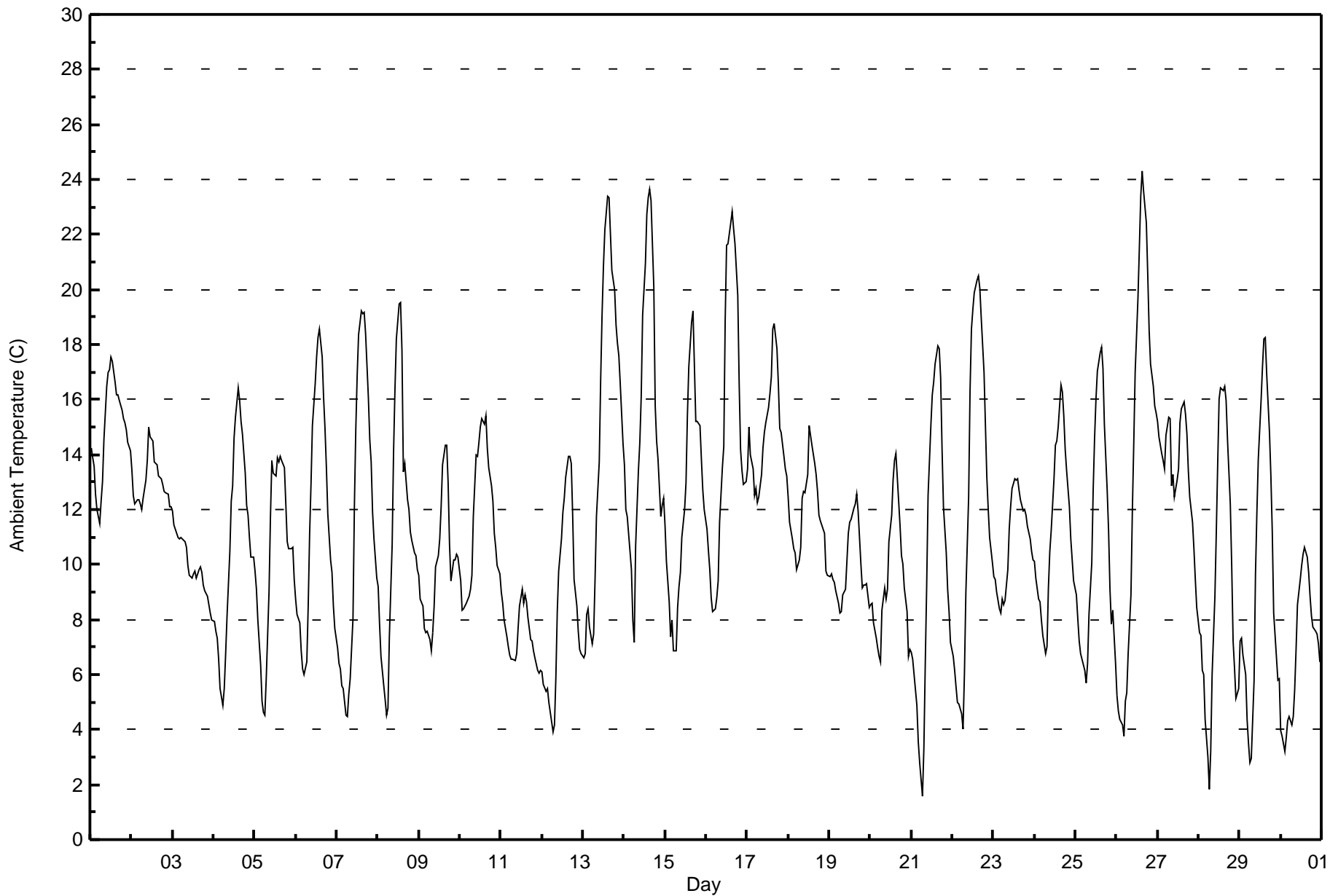
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Buffalo Viewpoint - September 2016

| Maximum Value: 24.3 C on Sep 26 16:00 | | Maximum Daily Average: 15.0 C on Sep 14 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: 1.6 C on Sep 21 07:00 | | Minimum Daily Average: 6.9 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.3 C at hour 16 | | Minimum Diurnal Average: 7.0 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.42 C | | Percentiles: P ₁ = 3.2 P ₁₀ = 6.1 Q ₁ = 8.3 Median = 11.1 Q ₃ = 14.2 P ₉₀ = 17.2 P ₉₉ = 23.3 | | 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 | 14.2 | 13.9 | 13.6 | 12.6 | 12.0 | 11.5 | 12.3 | 13.0 | 14.5 | 16.5 | 17.0 | 17.1 | 17.6 | 17.4 | 16.6 | 16.2 | 16.2 | 15.9 | 15.6 | 15.3 | 15.1 | 14.9 | 14.4 | 14.1 | 14.9 | 17.6 | |
| 2-Sep | 13.4 | 12.5 | 12.2 | 12.3 | 12.3 | 12.2 | 12.0 | 12.4 | 13.0 | 13.8 | 15.0 | 14.6 | 14.5 | 13.7 | 13.7 | 13.6 | 13.2 | 13.1 | 12.9 | 12.6 | 12.6 | 12.6 | 12.1 | 12.1 | 13.0 | 15.0 | |
| 3-Sep | 11.9 | 11.4 | 11.1 | 11.0 | 10.9 | 11.0 | 10.9 | 10.8 | 10.6 | 10.0 | 9.6 | 9.5 | 9.7 | 9.8 | 9.5 | 9.8 | 9.9 | 9.7 | 9.2 | 9.0 | 8.8 | 8.5 | 8.2 | 8.0 | 10.0 | 11.9 | |
| 4-Sep | 7.9 | 7.6 | 7.3 | 6.6 | 5.5 | 4.9 | 5.5 | 6.8 | 8.2 | 10.5 | 12.3 | 12.9 | 14.6 | 15.4 | 16.4 | 15.9 | 15.2 | 14.7 | 13.3 | 12.1 | 11.8 | 11.0 | 10.3 | 10.3 | 10.7 | 16.4 | |
| 5-Sep | 9.8 | 9.1 | 8.0 | 6.3 | 5.0 | 4.6 | 4.5 | 5.8 | 9.0 | 11.7 | 13.8 | 13.3 | 13.2 | 13.9 | 13.7 | 13.9 | 13.8 | 13.5 | 12.2 | 10.8 | 10.6 | 10.6 | 10.6 | 9.4 | 10.3 | 13.9 | |
| 6-Sep | 8.7 | 8.2 | 7.9 | 6.9 | 6.2 | 6.0 | 6.4 | 8.5 | 11.1 | 12.9 | 15.1 | 16.6 | 17.6 | 18.2 | 18.6 | 17.6 | 16.1 | 14.9 | 13.5 | 11.8 | 10.1 | 9.7 | 8.5 | 7.7 | 11.6 | 18.6 | |
| 7-Sep | 7.0 | 6.4 | 6.2 | 5.6 | 5.5 | 4.5 | 4.5 | 5.3 | 5.8 | 8.0 | 12.1 | 14.9 | 16.9 | 18.4 | 19.2 | 19.1 | 19.2 | 18.4 | 16.0 | 14.5 | 13.7 | 11.9 | 10.9 | 9.5 | 11.4 | 19.2 | |
| 8-Sep | 9.2 | 7.8 | 6.7 | 5.6 | 5.1 | 4.5 | 4.8 | 7.4 | 10.7 | 14.1 | 16.4 | 18.2 | 19.5 | 19.5 | 17.8 | 13.4 | 13.7 | 12.3 | 12.0 | 11.2 | 10.9 | 10.4 | 10.3 | 9.8 | 11.3 | 19.5 | |
| 9-Sep | 9.6 | 8.8 | 8.5 | 7.7 | 7.5 | 7.6 | 7.3 | 6.9 | 7.5 | 8.5 | 9.9 | 10.3 | 10.9 | 12.1 | 13.6 | 14.3 | 14.3 | 13.0 | 10.7 | 9.4 | 10.2 | 10.2 | 10.4 | 10.3 | 10.0 | 14.3 | |
| 10-Sep | 9.4 | 8.4 | 8.4 | 8.5 | 8.6 | 8.9 | 9.1 | 9.6 | 11.8 | 14.0 | 13.9 | 14.4 | 15.0 | 15.3 | 15.1 | 15.4 | 14.2 | 13.5 | 12.9 | 12.3 | 11.2 | 10.6 | 10.0 | 9.6 | 11.7 | 15.4 | |
| 11-Sep | 9.0 | 8.6 | 8.0 | 7.4 | 7.0 | 6.7 | 6.6 | 6.6 | 6.5 | 6.8 | 7.7 | 8.5 | 9.1 | 8.6 | 8.9 | 8.6 | 8.1 | 7.3 | 7.2 | 6.9 | 6.6 | 6.2 | 6.1 | 6.2 | 7.5 | 9.1 | |
| 12-Sep | 6.1 | 5.7 | 5.4 | 5.5 | 5.0 | 4.6 | 3.9 | 4.2 | 5.9 | 8.3 | 9.7 | 10.9 | 11.9 | 12.4 | 13.2 | 13.9 | 13.9 | 13.7 | 11.8 | 9.5 | 8.5 | 7.6 | 6.9 | 6.8 | 8.6 | 13.9 | |
| 13-Sep | 6.6 | 6.7 | 8.2 | 8.4 | 7.7 | 7.1 | 7.5 | 9.4 | 11.8 | 13.7 | 16.7 | 19.1 | 20.8 | 22.1 | 23.4 | 23.4 | 22.0 | 20.7 | 20.0 | 18.7 | 18.1 | 17.6 | 16.6 | 14.4 | 15.0 | 23.4 | |
| 14-Sep | 13.6 | 12.0 | 11.8 | 10.5 | 9.8 | 8.0 | 7.2 | 10.7 | 13.4 | 14.4 | 16.1 | 19.1 | 21.0 | 22.7 | 23.3 | 23.6 | 23.2 | 20.1 | 15.8 | 14.5 | 13.8 | 11.7 | 12.1 | 12.4 | 15.0 | 23.6 | |
| 15-Sep | 11.4 | 10.1 | 8.6 | 7.4 | 8.0 | 6.9 | 6.9 | 8.4 | 9.2 | 9.7 | 11.0 | 12.0 | 13.0 | 15.4 | 17.2 | 18.8 | 19.2 | 17.2 | 15.2 | 15.2 | 15.0 | 13.8 | 12.7 | 12.0 | 12.3 | 19.2 | |
| 16-Sep | 11.3 | 10.5 | 9.8 | 8.8 | 8.3 | 8.4 | 8.8 | 9.4 | 11.5 | 13.5 | 14.3 | 18.9 | 21.6 | 21.6 | 22.4 | 22.8 | 22.2 | 21.6 | 19.8 | 16.6 | 14.2 | 13.4 | 12.9 | 13.0 | 14.8 | 22.8 | |
| 17-Sep | 13.5 | 15.0 | 14.0 | 13.5 | 12.5 | 12.8 | 12.3 | 12.4 | 13.3 | 14.2 | 14.8 | 15.2 | 15.7 | 16.2 | 16.8 | 18.6 | 18.8 | 17.9 | 16.6 | 15.0 | 14.8 | 13.9 | 13.5 | 13.2 | 14.8 | 18.8 | |
| 18-Sep | 12.4 | 11.6 | 10.9 | 10.6 | 10.4 | 9.8 | 10.2 | 10.6 | 12.4 | 12.7 | 12.6 | 13.3 | 15.1 | 14.7 | 14.3 | 13.7 | 13.3 | 12.7 | 11.8 | 11.6 | 11.3 | 11.1 | 9.8 | 9.6 | 11.9 | 15.1 | |
| 19-Sep | 9.6 | 9.6 | 9.5 | 9.4 | 9.1 | 8.6 | 8.2 | 8.3 | 8.9 | 9.1 | 10.1 | 11.1 | 11.5 | 11.6 | 12.1 | 12.2 | 12.6 | 12.0 | 10.0 | 9.1 | 9.2 | 9.3 | 9.3 | 8.4 | 10.0 | 12.6 | |
| 20-Sep | 8.5 | 8.6 | 7.9 | 7.3 | 7.0 | 6.7 | 6.5 | 8.3 | 9.1 | 8.8 | 9.1 | 10.8 | 11.8 | 13.1 | 13.8 | 14.0 | 13.2 | 11.4 | 10.3 | 10.0 | 9.1 | 8.3 | 6.7 | 6.9 | 9.5 | 14.0 | |
| 21-Sep | 6.8 | 6.5 | 5.4 | 4.9 | 3.6 | 2.8 | 1.6 | 3.3 | 6.4 | 9.2 | 12.5 | 15.1 | 16.2 | 16.6 | 17.3 | 18.0 | 17.8 | 16.8 | 14.2 | 12.1 | 10.4 | 9.1 | 8.3 | 7.2 | 10.1 | 18.0 | |
| 22-Sep | 6.7 | 6.2 | 5.5 | 5.0 | 4.9 | 4.6 | 4.0 | 6.1 | 8.9 | 12.5 | 16.3 | 18.5 | 19.3 | 19.9 | 20.4 | 20.5 | 20.0 | 19.0 | 17.0 | 15.0 | 13.2 | 12.0 | 11.0 | 10.1 | 12.4 | 20.5 | |
| 23-Sep | 9.6 | 9.5 | 9.0 | 8.4 | 8.3 | 8.8 | 8.5 | 8.7 | 9.8 | 11.3 | 12.1 | 12.7 | 13.1 | 13.1 | 13.1 | 12.7 | 12.3 | 11.9 | 12.0 | 11.8 | 11.4 | 10.9 | 10.5 | 10.2 | 10.8 | 13.1 | |
| 24-Sep | 10.1 | 9.5 | 8.7 | 8.7 | 8.0 | 7.4 | 6.7 | 7.0 | 9.1 | 10.5 | 11.2 | 13.1 | 14.3 | 14.5 | 15.0 | 16.5 | 16.2 | 15.4 | 14.2 | 13.4 | 12.1 | 10.9 | 10.2 | 9.4 | 11.3 | 16.5 | |
| 25-Sep | 8.9 | 8.1 | 7.2 | 6.8 | 6.5 | 6.2 | 5.7 | 6.4 | 8.2 | 10.1 | 12.7 | 14.6 | 16.0 | 17.0 | 17.7 | 17.9 | 17.2 | 15.1 | 12.7 | 11.2 | 9.1 | 7.8 | 8.3 | 6.4 | 10.7 | 17.9 | |
| 26-Sep | 5.2 | 4.7 | 4.4 | 4.2 | 3.8 | 5.0 | 5.3 | 6.7 | 8.9 | 12.0 | 14.4 | 17.0 | 19.7 | 21.5 | 23.4 | 24.3 | 23.6 | 22.4 | 20.6 | 18.5 | 17.3 | 16.5 | 15.7 | 15.5 | 13.8 | 24.3 | |
| 27-Sep | 15.2 | 14.6 | 14.1 | 13.8 | 13.5 | 14.7 | 15.3 | 15.3 | 12.9 | 13.3 | 12.5 | 13.1 | 13.5 | 15.2 | 15.7 | 15.9 | 15.5 | 14.7 | 13.4 | 12.4 | 11.6 | 10.6 | 9.5 | 8.5 | 13.5 | 15.9 | |
| 28-Sep | 7.5 | 7.4 | 6.1 | 6.0 | 4.4 | 3.0 | 1.8 | 3.2 | 6.0 | 8.8 | 11.2 | 13.7 | 16.0 | 16.4 | 16.3 | 16.5 | 16.0 | 14.5 | 12.2 | 10.0 | 7.2 | 6.2 | 5.2 | 5.5 | 9.2 | 16.5 | |
| 29-Sep | 7.2 | 7.3 | 6.7 | 6.0 | 4.4 | 3.5 | 2.8 | 2.9 | 5.8 | 9.7 | 11.9 | 13.8 | 16.0 | 17.2 | 18.2 | 18.3 | 17.0 | 14.8 | 13.2 | 11.2 | 8.2 | 6.6 | 5.8 | 5.9 | 9.8 | 18.3 | |
| 30-Sep | 4.0 | 3.7 | 3.2 | 3.7 | 4.3 | 4.5 | 4.2 | 4.5 | 5.4 | 6.9 | 8.5 | 9.5 | 10.0 | 10.4 | 10.6 | 10.3 | 9.7 | 8.8 | 8.2 | 7.7 | 7.6 | 7.5 | 7.1 | 6.4 | 6.9 | 10.6 | |
| | | 9.5 | 9.0 | 8.5 | 8.0 | 7.5 | 7.2 | 7.0 | 8.0 | 9.5 | 11.2 | 12.7 | 14.1 | 15.2 | 15.8 | 16.2 | 16.3 | 15.9 | 14.9 | 13.5 | 12.3 | 11.5 | 10.7 | 10.1 | 9.6 | Diurnal Average | |
| | | 15.2 | 15.0 | 14.1 | 13.8 | 13.5 | 14.7 | 15.3 | 15.3 | 14.5 | 16.5 | 17.0 | 19.1 | 21.6 | 22.7 | 23.4 | 24.3 | 23.6 | 22.4 | 20.6 | 18.7 | 18.1 | 17.6 | 16.6 | 15.5 | Diurnal Maximum | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 300 | 41.67 | 41.67 |
| 10 - 20 | 393 | 54.58 | 96.25 |
| > 20 | 27 | 3.75 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



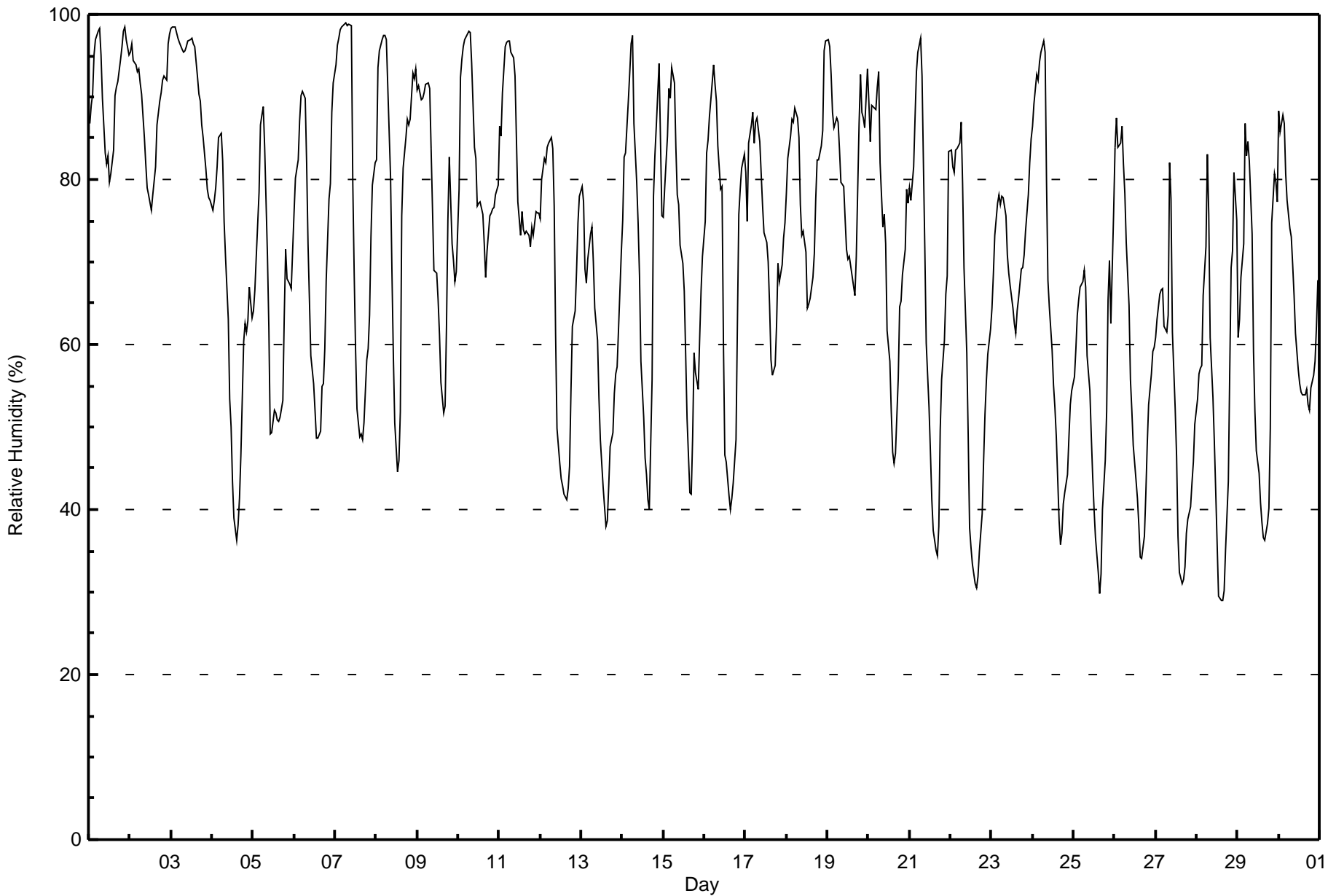
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Buffalo Viewpoint - September 2016

| Maximum Value: 99 % on Sep 7 07:00 Maximum Daily Average: 92.2 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 29 % on Sep 28 16:00 Minimum Daily Average: 52.1 % on Sep 27 Maximum Diurnal Average: 87.7 % at hour 7 Minimum Diurnal Average: 51.6 % at hour 16 Monthly Average: 70.8 % Percentiles: P ₁ = 31 P ₁₀ = 43 Q ₁ = 56 Median = 73 Q ₃ = 85 P ₉₀ = 94 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 | 87 | 89 | 90 | 95 | 97 | 98 | 98 | 95 | 90 | 83 | 82 | 83 | 80 | 81 | 84 | 90 | 91 | 92 | 95 | 96 | 98 | 98 | 97 | 95 | 91.0 | 98 |
| 2-Sep | 95 | 96 | 94 | 94 | 93 | 93 | 92 | 90 | 85 | 82 | 79 | 78 | 76 | 78 | 80 | 81 | 87 | 89 | 91 | 92 | 93 | 92 | 97 | 98 | 88.6 | 98 |
| 3-Sep | 98 | 99 | 99 | 98 | 97 | 97 | 96 | 95 | 96 | 96 | 97 | 97 | 97 | 96 | 96 | 92 | 90 | 89 | 87 | 85 | 81 | 79 | 78 | 78 | 92.2 | 99 |
| 4-Sep | 76 | 77 | 79 | 81 | 85 | 86 | 82 | 75 | 71 | 63 | 53 | 50 | 43 | 39 | 36 | 38 | 41 | 47 | 60 | 63 | 61 | 63 | 67 | 63 | 62.6 | 86 |
| 5-Sep | 64 | 67 | 71 | 78 | 87 | 88 | 89 | 84 | 71 | 62 | 49 | 49 | 52 | 52 | 51 | 51 | 51 | 53 | 63 | 72 | 68 | 67 | 67 | 71 | 65.7 | 89 |
| 6-Sep | 76 | 80 | 82 | 87 | 90 | 91 | 90 | 82 | 72 | 65 | 59 | 55 | 52 | 49 | 49 | 50 | 55 | 55 | 59 | 68 | 78 | 80 | 88 | 92 | 71.0 | 92 |
| 7-Sep | 94 | 96 | 97 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 80 | 69 | 59 | 52 | 49 | 49 | 48 | 51 | 58 | 60 | 64 | 73 | 79 | 82 | 77.1 | 99 |
| 8-Sep | 82 | 93 | 96 | 97 | 98 | 97 | 97 | 91 | 80 | 69 | 59 | 50 | 45 | 46 | 52 | 76 | 81 | 85 | 87 | 87 | 87 | 93 | 92 | 93 | 80.6 | 98 |
| 9-Sep | 91 | 91 | 90 | 90 | 90 | 92 | 92 | 91 | 84 | 76 | 69 | 69 | 65 | 61 | 55 | 52 | 52 | 62 | 75 | 83 | 72 | 70 | 68 | 69 | 75.4 | 92 |
| 10-Sep | 79 | 92 | 95 | 96 | 97 | 98 | 98 | 98 | 94 | 84 | 83 | 77 | 77 | 77 | 76 | 72 | 68 | 71 | 76 | 76 | 76 | 77 | 78 | 79 | 83.1 | 98 |
| 11-Sep | 86 | 85 | 91 | 96 | 97 | 97 | 97 | 95 | 95 | 93 | 85 | 77 | 73 | 76 | 74 | 73 | 74 | 73 | 72 | 74 | 73 | 76 | 76 | 76 | 82.7 | 97 |
| 12-Sep | 75 | 80 | 83 | 82 | 84 | 84 | 85 | 84 | 77 | 61 | 50 | 46 | 44 | 43 | 42 | 41 | 43 | 45 | 54 | 62 | 64 | 69 | 75 | 78 | 64.6 | 85 |
| 13-Sep | 79 | 77 | 69 | 67 | 70 | 73 | 74 | 70 | 64 | 61 | 54 | 48 | 46 | 43 | 38 | 39 | 43 | 48 | 49 | 54 | 56 | 57 | 62 | 71 | 58.9 | 79 |
| 14-Sep | 75 | 83 | 83 | 90 | 93 | 96 | 97 | 87 | 80 | 75 | 68 | 58 | 51 | 46 | 44 | 41 | 40 | 56 | 78 | 83 | 86 | 94 | 85 | 76 | 73.5 | 97 |
| 15-Sep | 75 | 79 | 85 | 91 | 90 | 93 | 92 | 84 | 78 | 77 | 72 | 70 | 66 | 59 | 51 | 42 | 42 | 49 | 59 | 57 | 55 | 61 | 66 | 71 | 69.3 | 93 |
| 16-Sep | 75 | 83 | 85 | 88 | 90 | 94 | 92 | 90 | 84 | 79 | 79 | 60 | 47 | 46 | 42 | 40 | 41 | 43 | 49 | 63 | 76 | 79 | 81 | 83 | 70.3 | 94 |
| 17-Sep | 81 | 75 | 84 | 87 | 88 | 84 | 87 | 88 | 85 | 81 | 77 | 73 | 72 | 70 | 65 | 58 | 56 | 57 | 62 | 70 | 68 | 70 | 73 | 75 | 74.4 | 88 |
| 18-Sep | 78 | 83 | 85 | 87 | 87 | 89 | 88 | 85 | 77 | 73 | 74 | 71 | 64 | 65 | 66 | 68 | 71 | 78 | 82 | 82 | 84 | 86 | 96 | 97 | 79.8 | 97 |
| 19-Sep | 97 | 96 | 93 | 88 | 86 | 87 | 87 | 83 | 80 | 79 | 75 | 72 | 70 | 71 | 68 | 67 | 66 | 71 | 87 | 93 | 88 | 87 | 86 | 93 | 82.1 | 97 |
| 20-Sep | 89 | 85 | 89 | 89 | 88 | 91 | 93 | 82 | 74 | 76 | 72 | 62 | 58 | 52 | 47 | 46 | 47 | 56 | 65 | 65 | 68 | 72 | 79 | 77 | 71.7 | 93 |
| 21-Sep | 79 | 77 | 82 | 87 | 93 | 95 | 97 | 93 | 82 | 72 | 60 | 52 | 47 | 41 | 37 | 35 | 34 | 38 | 50 | 56 | 61 | 66 | 68 | 83 | 66.1 | 97 |
| 22-Sep | 84 | 82 | 81 | 84 | 84 | 84 | 87 | 79 | 69 | 59 | 49 | 38 | 35 | 33 | 31 | 31 | 32 | 35 | 40 | 46 | 51 | 56 | 59 | 62 | 57.9 | 87 |
| 23-Sep | 64 | 69 | 73 | 77 | 78 | 77 | 78 | 78 | 76 | 71 | 69 | 67 | 64 | 63 | 61 | 64 | 66 | 69 | 69 | 71 | 74 | 78 | 82 | 85 | 71.8 | 85 |
| 24-Sep | 86 | 89 | 93 | 92 | 94 | 95 | 97 | 95 | 80 | 68 | 65 | 59 | 55 | 52 | 49 | 39 | 36 | 37 | 41 | 42 | 44 | 49 | 53 | 54 | 65.2 | 97 |
| 25-Sep | 56 | 59 | 64 | 65 | 67 | 68 | 69 | 67 | 59 | 54 | 49 | 44 | 40 | 37 | 32 | 30 | 32 | 40 | 46 | 52 | 65 | 70 | 62 | 76 | 54.3 | 76 |
| 26-Sep | 84 | 88 | 84 | 84 | 86 | 82 | 78 | 72 | 65 | 56 | 52 | 48 | 44 | 41 | 38 | 34 | 34 | 37 | 42 | 48 | 53 | 56 | 59 | 60 | 59.3 | 88 |
| 27-Sep | 61 | 63 | 66 | 67 | 67 | 62 | 62 | 64 | 82 | 78 | 61 | 52 | 46 | 37 | 32 | 31 | 32 | 33 | 37 | 39 | 40 | 43 | 46 | 50 | 52.1 | 82 |
| 28-Sep | 53 | 56 | 57 | 57 | 66 | 72 | 83 | 76 | 61 | 54 | 48 | 42 | 36 | 30 | 29 | 29 | 30 | 35 | 43 | 57 | 69 | 71 | 81 | 75 | 54.6 | 83 |
| 29-Sep | 61 | 63 | 68 | 72 | 87 | 83 | 85 | 82 | 73 | 59 | 52 | 47 | 44 | 41 | 39 | 37 | 36 | 38 | 40 | 50 | 75 | 81 | 80 | 77 | 61.2 | 87 |
| 30-Sep | 88 | 86 | 88 | 87 | 81 | 77 | 74 | 73 | 70 | 66 | 61 | 57 | 55 | 54 | 54 | 54 | 55 | 53 | 52 | 55 | 56 | 58 | 62 | 68 | 66.0 | 88 |
| 79.1 81.3 83.1 85.1 86.9 87.4 87.7 84.2 78.3 72.3 66.0 60.7 56.9 54.3 52.2 51.6 52.5 56.2 62.3 66.6 69.5 72.4 74.7 76.9 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 98 99 99 98 99 99 99 99 99 99 99 97 97 97 96 96 92 91 92 95 96 98 98 97 98 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





| | | |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 43 km/h on Sep 11 07:00 | Maximum Daily Speed Average: 26.1 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 4 19:00 | Minimum Daily Speed Average: 1.5 km/h on Sep 9 | Hours of Data: 718 |
| Maximum Diurnal Speed Average: 5.6 km/h at hour 16 | Minimum Diurnal Speed Average: 1.3 km/h at hour 19 | Hours of Missing Data: 2 |
| Monthly Average Velocity: 2.7 km/h 254.9 deg | Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 10 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 33 | 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 | E8 | ESE9 | E5 | N5 | NNE7 | NNE7 | N9 | NNE9 | NNE9 | NNE8 | N8 | NNE8 | E10 | E9 | E7 | SE2 | NNE8 | SW2 | N7 | NNW4 | WNW9 | W9 | W9WSW13 | NNE3.5 | WSW13 | |
| 2-Sep | WSW11 | SSW8 | WSW9 | W16WSW13 | SW9WSW10 | SSW4 | WSW9 | WSW9 | W9WSW11 | W10 | WSW9 | SW8 | W11 | W8 | WSW6 | NW5 | W6 | WNW9 | W11 | W13 | NW18 | W8.9 | NW18 | | | |
| 3-Sep | NNW21 | NW16WNW13 | W12 | W13 | W15 | W16 | W18WNW17WNW21 | NW22 | NW23 | NW19 | NW20 | NW20 | NW22 | NW21 | NW25 | NW25 | NW21 | NW24 | NW21 | NW20WNW17 | NW18.4 | NW25 | | | | |
| 4-Sep | WNW22WNW21WNW16 | W14WSW12 | W13 | W12 | W10WSW11 | W11 | W13 | W12WNW10 | WNW9 | NW8 | WNW6 | WSW4 | SW3 | W0 | NE4 | SW7 | SSW7 | SSW7WSW11 | W8.7 | WNW22 | | | | | | |
| 5-Sep | WSW10 | SW7 | S6 | SSE7 | SSE8 | SSE7 | SSE7 | SSE7 | SSE6 | S7 | S12 | S12 | SSW11 | S10 | SSE7 | ESE8 | SE10 | SE9 | SE7 | SE8 | SE10 | SE9 | SSE9 | SSE10 | SSE7.2 | S12 |
| 6-Sep | SE10 | SE11 | SE11 | SE8 | SE7 | SSE7 | SSE7 | SSE9 | SSE9 | SSE10 | SSE11 | SE11 | SE11 | SE11 | SE13 | SSE16 | S9 | SSE12 | SSE10 | SSE9 | SE8 | SSE9 | SE7 | SSE9 | SSE9.7 | SSE16 |
| 7-Sep | SSE7 | SSE7 | SSE8 | SSE9 | SSE9 | SSE8 | SSE9 | SSE9 | SSE7 | SSE4 | ESE7 | ESE9 | ESE9 | ESE10 | SE8 | SSE4 | SE7 | SSE5 | SSW7 | SW5 | SSW7 | SSW7 | S5 | SSE4 | SSE6.1 | ESE10 |
| 8-Sep | SSW3 | S6 | S6 | SSE7 | SSE8 | SSE8 | SSE8 | S6 | S5 | NW5 | NNW4 | NNW4 | NW6 | NW7 | W8 | NW7 | SW5 | W3 | N10 | SW2 | WNW6 | NNW17 | NNW13 | NW10 | WNW1.9 | NNW17 |
| 9-Sep | NW12 | NW12 | NW13 | NW12 | NNW10 | N9 | NNE13 | NNE13 | N13 | N10 | NNE6 | NW4 | SW5 | SW6 | SW5 | S5 | SSE5 | SE8 | SE6 | SE8 | SE11 | SE12 | SE14 | SSE12 | NNE1.5 | SE14 |
| 10-Sep | SSE13 | SE12 | SE13 | SE15 | SSE15 | SSE14 | SSE14 | SE12 | SSE8 | SW12 | W14WSW16WSW15 | W16 | W16 | WNW19 | WNW24 | W18 | W16 | WNW19 | WNW17 | WNW18 | WSW8.2 | WNW24 | | | | |
| 11-Sep | NNW27 | NNW34 | NNW32 | NNW33 | NNW39 | N41 | N43 | N39 | N37 | N37 | N35 | N30 | NNW31 | N27 | N24 | N21 | NNW18 | NW19 | NNW14 | NNW14 | NNW11 | NW11 | WNW13 | WNW11 | NNW26.1 | N43 |
| 12-Sep | WNW10 | W9 | W9 | WSW8 | WSW5 | WSW10 | WSW11 | WSW8 | SSW3 | SW7 | WSW8 | SSW9 | SSW10 | SSW11 | SSW10 | SSW9 | S10 | S7 | SSE8 | SSE9 | SSE9 | SSE9 | SSE11 | SSE12 | SSW6.3 | SSE12 |
| 13-Sep | SE12 | SE10 | S12 | S12 | SSE11 | SSE10 | S7 | SSW10 | SSW9 | SSW8 | SSW10 | SSW10 | SSW15 | SW14 | WSW16 | SW14 | SW13 | SW13 | SW13 | SW14 | SW14 | WSW14 | W15 | W11 | SSW10.1 | WSW16 |
| 14-Sep | WNW11 | NW7 | W4 | NW5 | WNW3 | SSE5 | SSE5 | SE1 | NNE2 | SE7 | SE9 | ESE9 | ESE9 | S9 | SW10 | WSW14 | WSW13 | NNW22 | NNW15 | N5 | SSW5 | S7 | WSW8 | WNW11 | WSW2.6 | NNW22 |
| 15-Sep | NW10 | WNW9 | NNW7 | N7 | ENE4 | NE8 | NE8 | NE9 | NE10 | NE6 | ESE4 | ESE4 | SE7 | ESE9 | SE10 | ESE11 | SE11 | ESE7 | SE6 | SSE11 | SSE12 | SE9 | SSE9 | SSE10 | ESE4.2 | SSE12 |
| 16-Sep | SE10 | SE7 | SSE7 | SSE8 | SE8 | SE8 | SSE6 | SSE7 | SSE7 | M | M | SSW9 | SW15 | SW17 | WSW19 | WSW17 | WSW12 | SW10 | SW9 | SSE8 | SSE7 | SSE9 | SE10 | SSE10 | S7.7 | WSW19 |
| 17-Sep | SSE9 | SW12 | SSW9 | S7 | SSE8 | SSW9 | S8 | S6 | S8 | SSW6 | SW7 | SW8 | SW8 | SW9 | WSW11 | WSW13 | W15 | WNW12 | SW8 | SW9 | SW10 | WSW12 | WSW15 | W10 | SW8.0 | WSW15 |
| 18-Sep | W9 | W8 | SW6 | WSW5 | WSW5 | SSW5 | W11 | W11 | WNW11 | WNW16 | WNW19 | WNW18 | NW22 | NW23 | NW21 | NW19 | NNW17 | N13 | N12 | N11 | NNW7 | NNW11 | NNE7 | N7 | NNW9.9 | NW23 |
| 19-Sep | N6 | NW11 | NW12 | NW13 | NW14 | WNW11 | WNW13 | WNW18 | WNW15 | WNW16 | WNW13 | NW12 | NW14 | NW14 | NW17 | NW16 | NW14 | WNW11 | NNW8 | NNW8 | NW11 | NW9 | NW14 | N16 | NW12.1 | WNW18 |
| 20-Sep | N17 | N20 | N9 | NW10 | N12 | N10 | N8 | N11 | N11 | NNW5 | NW6 | NNW4 | NE5 | NNE5 | NNE7 | NE6 | ENE5 | ESE6 | SE5 | E5 | ESE5 | E2 | SE8 | SE7 | NNE5.1 | N20 |
| 21-Sep | SE6 | SSE7 | SSE7 | S7 | S6 | S6 | S7 | SSE6 | S5 | SSW6 | SSE6 | SSE8 | SSW7 | SW8 | SW10 | WSW10 | WSW9 | SW9 | SSW7 | S8 | SSE9 | SSE10 | SE10 | SE11 | S6.6 | SE11 |
| 22-Sep | SE10 | SE11 | SE7 | SE8 | SSE7 | SSE7 | SSE6 | SSE6 | SSE8 | SE6 | SSE5 | SSW15 | SSW16 | SSW14 | S14 | S14 | S12 | S12 | SSE12 | SSE11 | SSE11 | SSE10 | SSE11 | SSE13 | SSE9.6 | SSW16 |
| 23-Sep | SSE15 | SSE11 | SSE11 | SSE11 | SSE14 | SSE15 | SSE15 | SSE11 | SSE11 | SSE16 | SSW20 | SSE16 | SSE17 | SSE17 | SSE18 | SSE13 | SSE14 | SSE14 | SSE15 | SSE13 | SSE12 | SSE13 | SSE13 | SSE12 | SSE14.0 | SSE20 |
| 24-Sep | SSE12 | SSE10 | SSE11 | SSE11 | SSE10 | SSE9 | SSE8 | SSE7 | SW10 | WSW17 | WSW19 | W19 | W22 | W23 | WNW19 | WNW24 | WNW26 | WNW19 | W9 | WSW11 | WSW12 | W14 | W14 | WSW10.0 | WNW26 | |
| 25-Sep | WSW18 | W15 | W11 | W12 | W13 | W13 | W14 | W13 | W18 | W13 | WNW14 | WNW15 | NW14 | NW13 | NW14 | NW15 | NNW13 | NNW10 | SE1 | S5 | SSW5 | SW6 | SW6 | SSE6 | W9.6 | WSW18 |
| 26-Sep | SSE7 | SE9 | SSE8 | SSE9 | SSE9 | SE9 | SSE9 | SSE11 | SSE11 | SSE13 | SSE12 | SSE12 | SSE14 | SSE14 | SSE15 | S15 | S14 | S12 | SSE13 | SSE12 | SSE11 | SSE11 | SSE12 | SE13 | SSE11.3 | SSE15 |
| 27-Sep | SE12 | SSE8 | SSE7 | SSE7 | SSE9 | WSW11 | W13 | WSW15 | SW12 | W14 | NW23 | WNW21 | W17 | WNW22 | WNW24 | W24 | W21 | WSW16 | SW13 | WSW14 | WSW15 | WSW17 | WSW10 | W10 | WSW11.7 | W24 |
| 28-Sep | WSW9 | WSW10 | WSW11 | WSW11 | S5 | SSE6 | SE8 | SE7 | SSE8 | SE6 | SE5 | ESE3 | N6 | SW8 | SW8 | SW7 | SW7 | SSW6 | S5 | S6 | SSE9 | SSE9 | SE10 | SE5 | S4.9 | WSW11 |
| 29-Sep | E5 | ESE5 | SE4 | SE5 | SSE7 | SSE7 | S7 | SSE7 | SSE6 | SSE3 | ESE5 | ESE4 | NNE6 | NNE6 | N9 | N8 | NE5 | E7 | ESE6 | E4 | S6 | SSE6 | N4 | N5 | ESE2.5 | N9 |
| 30-Sep | NNW3 | NNW8 | N11 | N11 | N13 | N13 | NNE12 | N14 | N14 | N18 | N22 | NNE24 | NNE26 | NNE30 | NNE32 | N33 | NNE32 | N30 | NNE29 | NNE28 | NNE27 | NNE27 | NNE25 | N22 | N20.9 | N33 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|-------|--------|--------|------|------|------|-------|-------|-------|------|-------|------|-------|-------|-------|-------|-------|--------|-----------------|
| WSW1.9 | WSW2.2 | WSW2.2 | WSW2.6 | SSW2.0 | SSW2.0 | SW1.9 | WSW1.9 | WSW2.0 | W3.3 | W3.8 | W3.7 | W3.8 | W4.4 | W4.9 | W5.6 | W4.5 | W3.4 | W1.3 | SW1.5 | SW3.1 | SW3.1 | SW2.8 | WSW2.5 | Diurnal Average |
| NNW27 | NNW34 | NNW32 | NNW33 | NNW39 | N41 | N43 | N39 | N37 | N37 | N35 | N30 | NNW31 | NNE30 | NNE32 | N33 | NNE32 | N30 | NNE29 | NNE28 | NNE27 | NNE27 | NNE25 | N22 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

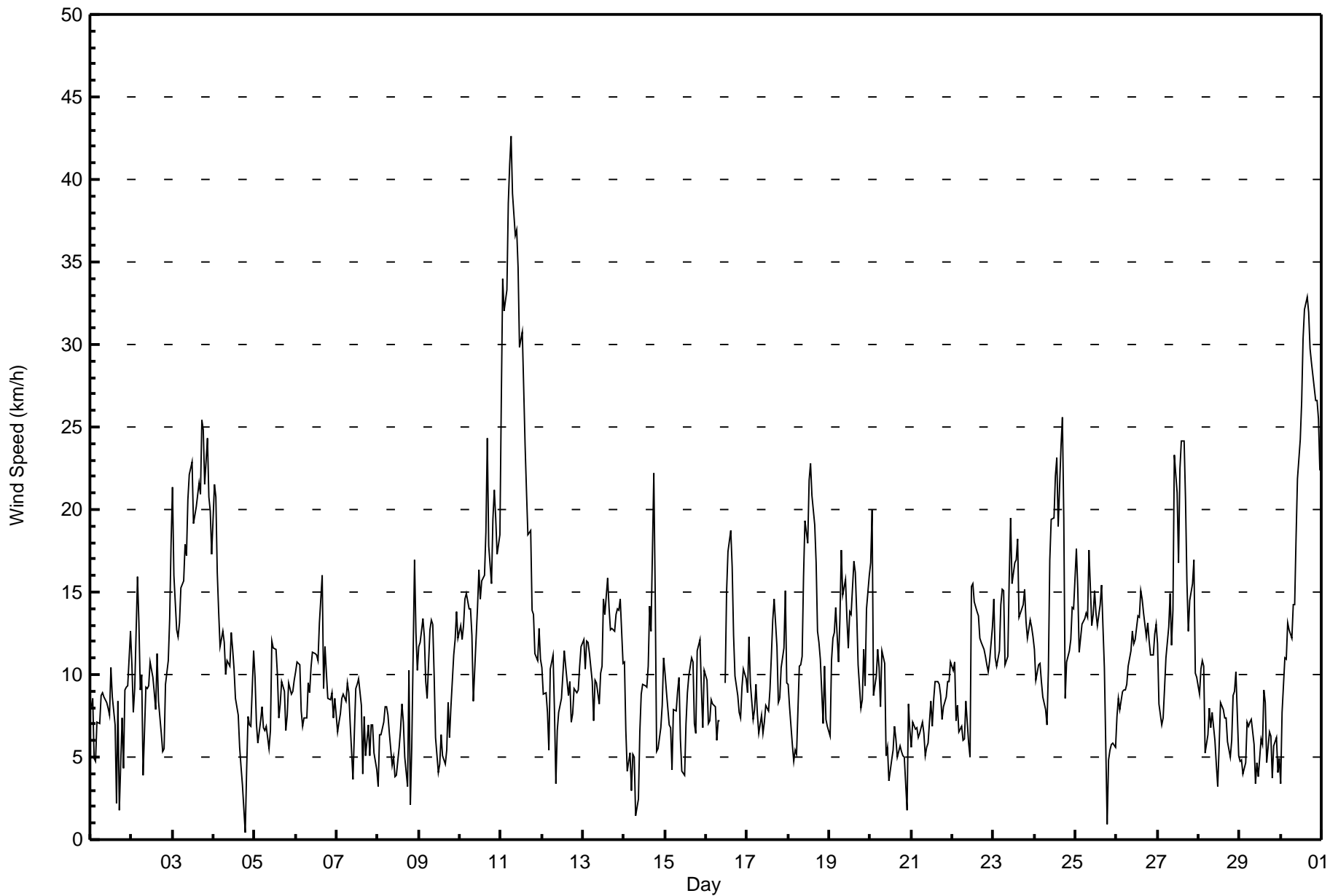
Wind Speed (WS) - km/h
Buffalo Viewpoint - September 2016

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|--|
| 7 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 8 | 6 | 6 | 7 | 7 | 6 | 12 | 8 | 8 | 7 | 6 | 6 | 6 | 5 | 5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 78 | 10.86 | 10.86 |
| 6 - 11 | 374 | 52.09 | 62.95 |
| 12 - 19 | 202 | 28.13 | 91.09 |
| 20 - 28 | 46 | 6.41 | 97.49 |
| 29 - 38 | 14 | 1.95 | 99.44 |
| > 38 | 4 | 0.56 | 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 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 4 | 2 | 3 | 2 | 5 | 7 | 8 | 9 | 7 | 6 | 7 | 4 | 3 | 1 | 4 | 6 | 78 |
| 6 - 11 | 20 | 12 | 6 | 0 | 5 | 14 | 48 | 108 | 23 | 25 | 26 | 29 | 22 | 14 | 13 | 9 | 374 |
| 12 - 19 | 11 | 3 | 0 | 0 | 0 | 0 | 10 | 39 | 11 | 5 | 12 | 24 | 32 | 24 | 23 | 8 | 202 |
| 20 - 28 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 10 | 16 | 3 | 46 |
| 29 - 38 | 6 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 14 |
| > 38 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| Totals | 50 | 27 | 9 | 2 | 10 | 21 | 66 | 157 | 41 | 36 | 45 | 57 | 61 | 49 | 56 | 31 | 718 |

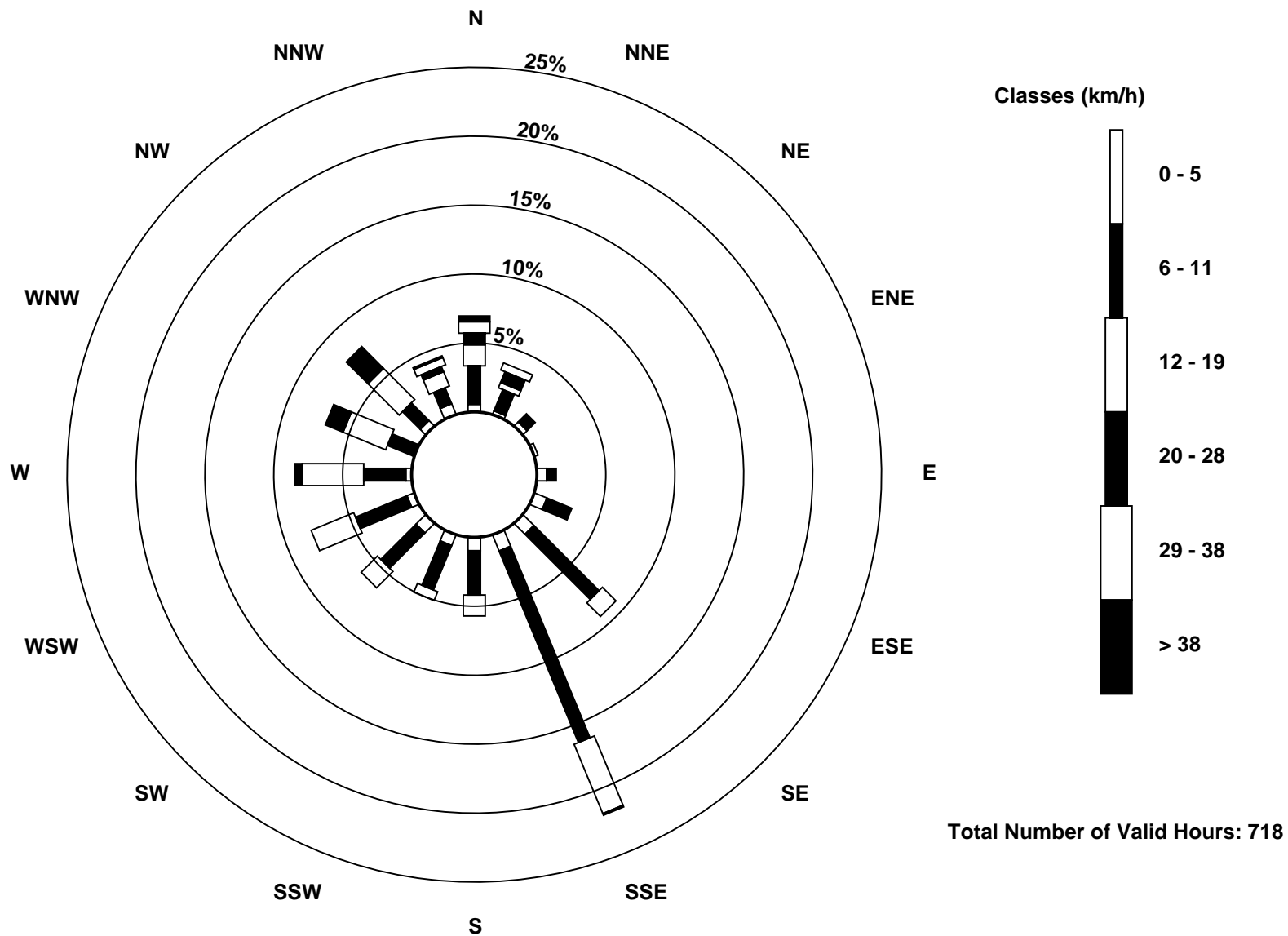
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 349 deg on Sep 11 07:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 344.0 deg on Sep 11 | Hours of Data: 718 |
| Direction of Minimum Speed: 266 deg on Sep 4 19:00 | Hours of Missing Data: 2 |
| Direction of Minimum Daily Speed Average: 1.5 deg on Sep 9 | Percent Operational Time: 99.7 |
| Monthly Average Direction: 248.3 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 | 86 | 108 | 93 | 358 | 19 | 13 | 4 | 25 | 30 | 25 | 3 | 26 | 88 | 84 | 96 | 145 | 25 | 220 | 2 | 348 | 302 | 271 | 260 | 250 | 22.0 |
| 2-Sep | 248 | 198 | 246 | 260 | 243 | 232 | 252 | 201 | 244 | 257 | 266 | 253 | 270 | 247 | 236 | 273 | 269 | 257 | 307 | 272 | 285 | 264 | 278 | 310 | 260.0 |
| 3-Sep | 343 | 309 | 298 | 281 | 277 | 273 | 270 | 268 | 284 | 296 | 305 | 307 | 304 | 307 | 311 | 317 | 309 | 317 | 322 | 320 | 323 | 313 | 306 | 299 | 305.0 |
| 4-Sep | 300 | 300 | 297 | 281 | 257 | 261 | 271 | 265 | 254 | 270 | 277 | 281 | 294 | 299 | 318 | 283 | 255 | 236 | 266 | 38 | 215 | 211 | 203 | 241 | 274.9 |
| 5-Sep | 246 | 227 | 178 | 153 | 148 | 149 | 155 | 149 | 165 | 171 | 181 | 191 | 197 | 183 | 152 | 123 | 127 | 133 | 127 | 129 | 137 | 141 | 151 | 149 | 160.9 |
| 6-Sep | 146 | 143 | 143 | 142 | 140 | 157 | 156 | 154 | 154 | 148 | 150 | 140 | 142 | 142 | 138 | 165 | 174 | 162 | 158 | 153 | 146 | 152 | 138 | 148 | 149.8 |
| 7-Sep | 159 | 152 | 154 | 149 | 156 | 161 | 157 | 162 | 160 | 148 | 106 | 115 | 106 | 113 | 127 | 154 | 125 | 154 | 203 | 233 | 213 | 193 | 183 | 153 | 152.1 |
| 8-Sep | 213 | 181 | 172 | 152 | 162 | 161 | 150 | 169 | 190 | 310 | 342 | 334 | 306 | 310 | 272 | 318 | 229 | 268 | 9 | 232 | 298 | 346 | 343 | 323 | 287.6 |
| 9-Sep | 321 | 316 | 318 | 315 | 331 | 357 | 16 | 21 | 8 | 10 | 14 | 324 | 223 | 221 | 217 | 176 | 158 | 125 | 125 | 137 | 139 | 141 | 142 | 152 | 17.6 |
| 10-Sep | 147 | 139 | 142 | 146 | 150 | 153 | 149 | 146 | 168 | 234 | 268 | 258 | 253 | 274 | 276 | 293 | 300 | 274 | 278 | 284 | 281 | 284 | 288 | 293 | 252.0 |
| 11-Sep | 338 | 345 | 343 | 340 | 344 | 349 | 349 | 349 | 350 | 351 | 351 | 351 | 347 | 351 | 356 | 353 | 342 | 323 | 332 | 346 | 330 | 316 | 302 | 294 | 344.0 |
| 12-Sep | 285 | 269 | 272 | 257 | 248 | 257 | 251 | 247 | 198 | 215 | 247 | 196 | 199 | 201 | 211 | 211 | 191 | 171 | 149 | 150 | 153 | 149 | 147 | 152 | 208.6 |
| 13-Sep | 145 | 146 | 176 | 181 | 167 | 165 | 180 | 198 | 203 | 207 | 208 | 209 | 210 | 220 | 245 | 231 | 225 | 219 | 228 | 221 | 226 | 238 | 266 | 270 | 211.1 |
| 14-Sep | 283 | 306 | 264 | 319 | 283 | 162 | 158 | 128 | 22 | 134 | 129 | 111 | 119 | 180 | 223 | 239 | 252 | 329 | 344 | 353 | 198 | 191 | 253 | 295 | 256.0 |
| 15-Sep | 309 | 302 | 329 | 6 | 71 | 48 | 49 | 37 | 45 | 56 | 112 | 123 | 125 | 117 | 117 | 121 | 127 | 123 | 141 | 148 | 148 | 154 | 160 | 151 | 105.9 |
| 16-Sep | 144 | 139 | 156 | 159 | 146 | 137 | 155 | 157 | 147 | M | M | 193 | 214 | 226 | 238 | 244 | 237 | 233 | 214 | 166 | 163 | 148 | 141 | 149 | 187.1 |
| 17-Sep | 152 | 214 | 200 | 184 | 159 | 197 | 185 | 184 | 183 | 197 | 216 | 218 | 215 | 221 | 249 | 254 | 261 | 282 | 236 | 218 | 234 | 243 | 251 | 269 | 223.9 |
| 18-Sep | 269 | 266 | 231 | 247 | 246 | 195 | 270 | 277 | 288 | 284 | 290 | 291 | 306 | 317 | 314 | 323 | 333 | 349 | 3 | 2 | 335 | 337 | 15 | 11 | 308.0 |
| 19-Sep | 8 | 320 | 308 | 306 | 310 | 303 | 293 | 299 | 289 | 299 | 297 | 304 | 310 | 306 | 307 | 313 | 316 | 296 | 327 | 340 | 320 | 311 | 325 | 1 | 311.5 |
| 20-Sep | 356 | 356 | 352 | 320 | 351 | 7 | 1 | 3 | 11 | 333 | 306 | 338 | 36 | 20 | 24 | 42 | 64 | 112 | 131 | 90 | 116 | 87 | 138 | 140 | 14.4 |
| 21-Sep | 145 | 161 | 164 | 185 | 179 | 183 | 169 | 158 | 179 | 192 | 160 | 165 | 208 | 218 | 224 | 239 | 238 | 219 | 200 | 186 | 168 | 153 | 139 | 135 | 182.4 |
| 22-Sep | 134 | 136 | 144 | 143 | 152 | 163 | 160 | 156 | 156 | 134 | 155 | 199 | 197 | 196 | 191 | 185 | 178 | 175 | 165 | 161 | 156 | 153 | 157 | 154 | 166.7 |
| 23-Sep | 154 | 159 | 153 | 153 | 154 | 155 | 153 | 158 | 155 | 153 | 152 | 155 | 150 | 149 | 148 | 155 | 151 | 147 | 152 | 157 | 156 | 156 | 153 | 157 | 153.2 |
| 24-Sep | 161 | 159 | 152 | 154 | 156 | 160 | 163 | 162 | 221 | 242 | 254 | 265 | 265 | 280 | 285 | 286 | 296 | 290 | 270 | 255 | 253 | 252 | 259 | 262 | 251.7 |
| 25-Sep | 256 | 264 | 279 | 270 | 271 | 275 | 271 | 271 | 259 | 269 | 284 | 297 | 304 | 305 | 307 | 321 | 331 | 330 | 141 | 190 | 193 | 215 | 227 | 164 | 278.9 |
| 26-Sep | 148 | 144 | 153 | 149 | 153 | 146 | 151 | 148 | 153 | 153 | 157 | 158 | 161 | 159 | 156 | 182 | 179 | 169 | 162 | 152 | 154 | 149 | 151 | 146 | 156.6 |
| 27-Sep | 145 | 158 | 147 | 167 | 158 | 254 | 264 | 255 | 214 | 264 | 305 | 286 | 281 | 283 | 284 | 263 | 260 | 248 | 234 | 244 | 244 | 255 | 254 | 261 | 256.3 |
| 28-Sep | 245 | 253 | 240 | 245 | 171 | 158 | 136 | 142 | 156 | 135 | 135 | 122 | 356 | 214 | 234 | 223 | 221 | 201 | 175 | 180 | 158 | 152 | 143 | 143 | 188.0 |
| 29-Sep | 101 | 109 | 143 | 144 | 165 | 163 | 176 | 161 | 152 | 161 | 119 | 116 | 14 | 22 | 353 | 355 | 49 | 99 | 105 | 82 | 181 | 167 | 7 | 358 | 111.7 |
| 30-Sep | 332 | 335 | 2 | 356 | 355 | 3 | 13 | 1 | 360 | 1 | 11 | 14 | 14 | 15 | 13 | 11 | 13 | 9 | 13 | 15 | 20 | 22 | 18 | 9 | 10.4 |

248.9 253.5 236.4 237.6 209.7 212.9 232.7 241.1 242.4 270.3 281.2 264.5 266.3 266.5 273.7 275.9 276.7 271.5 267.6 223.6 223.0 227.2 234.8 243.8

Diurnal Average

M - Maintenance

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

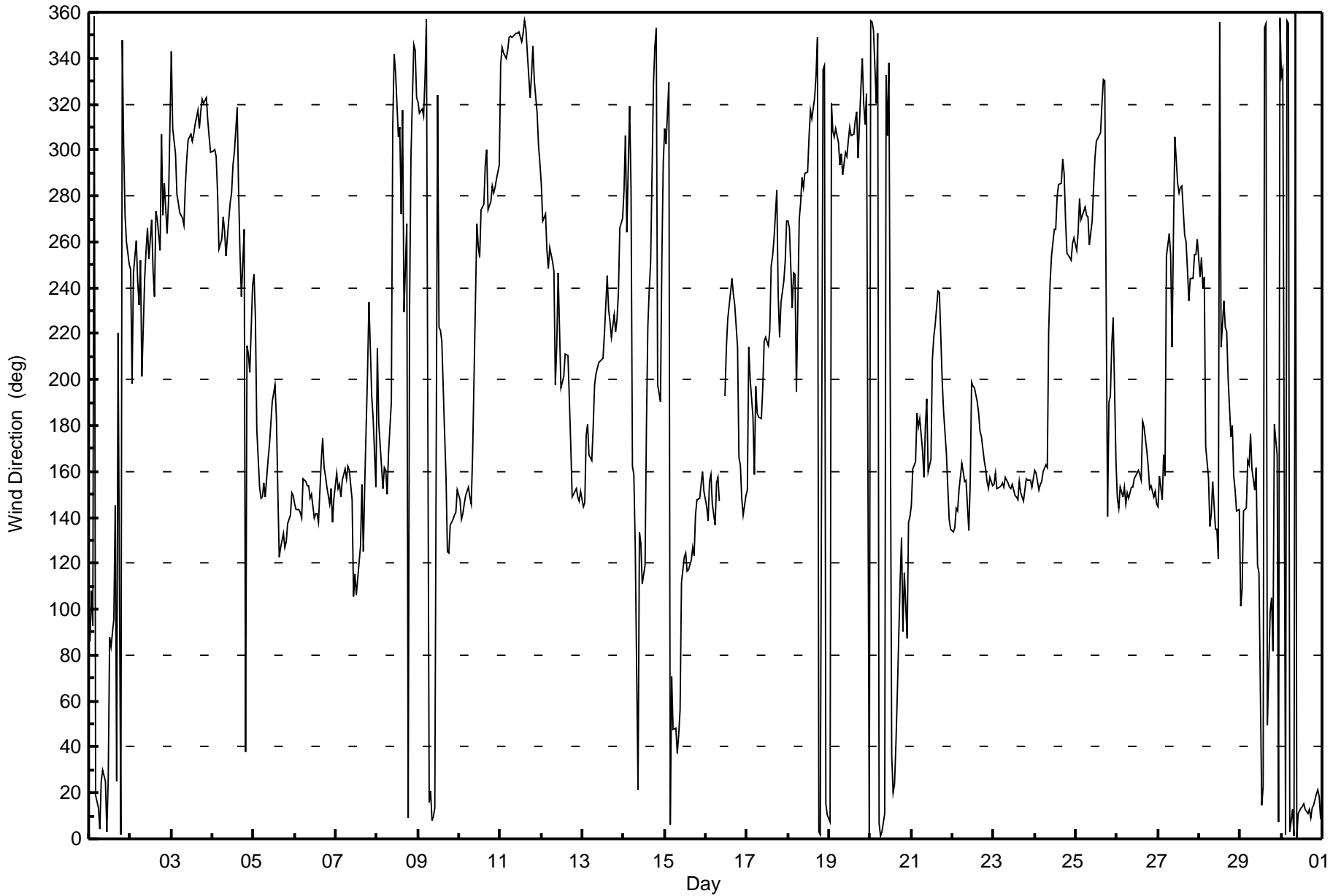
Wind Direction (WD) - deg
Buffalo Viewpoint - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 93 deg on Sep 8 16:00 | Hours of Data: 718 |
| Minimum Value: 5 deg on Sep 16 23:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 8 P ₁₀ = 14 Q ₁ = 16 Median = 18 Q ₃ = 24 P ₉₀ = 36 P ₉₉ = 78 | 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 | 15 | 16 | 29 | 34 | 15 | 13 | 15 | 15 | 16 | 19 | 17 | 43 | 24 | 27 | 31 | 74 | 51 | 68 | 23 | 50 | 17 | 23 | 22 | 14 | 74 |
| 2-Sep | 16 | 22 | 20 | 18 | 20 | 20 | 17 | 36 | 21 | 30 | 24 | 22 | 25 | 19 | 22 | 21 | 22 | 24 | 70 | 18 | 17 | 20 | 18 | 15 | 70 |
| 3-Sep | 19 | 14 | 15 | 18 | 17 | 18 | 17 | 17 | 19 | 16 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 13 | 13 | 13 | 14 | 14 | 14 | 16 | 19 |
| 4-Sep | 15 | 15 | 16 | 21 | 17 | 19 | 16 | 22 | 21 | 25 | 25 | 25 | 26 | 29 | 43 | 41 | 50 | 61 | 86 | 59 | 14 | 22 | 22 | 17 | 86 |
| 5-Sep | 18 | 24 | 19 | 15 | 16 | 15 | 15 | 21 | 28 | 36 | 29 | 23 | 23 | 29 | 32 | 26 | 20 | 19 | 14 | 15 | 18 | 17 | 18 | 17 | 36 |
| 6-Sep | 16 | 15 | 14 | 11 | 16 | 20 | 20 | 20 | 25 | 27 | 27 | 28 | 25 | 30 | 24 | 23 | 23 | 20 | 19 | 16 | 14 | 18 | 19 | 17 | 30 |
| 7-Sep | 17 | 14 | 13 | 12 | 14 | 15 | 14 | 20 | 25 | 55 | 39 | 26 | 25 | 25 | 31 | 70 | 24 | 25 | 30 | 48 | 27 | 19 | 23 | 28 | 70 |
| 8-Sep | 31 | 17 | 9 | 18 | 11 | 21 | 13 | 19 | 36 | 44 | 50 | 52 | 35 | 29 | 25 | 93 | 48 | 79 | 52 | 68 | 14 | 20 | 23 | 11 | 93 |
| 9-Sep | 14 | 14 | 12 | 13 | 15 | 21 | 17 | 19 | 17 | 20 | 32 | 56 | 60 | 47 | 59 | 52 | 42 | 17 | 14 | 12 | 19 | 20 | 21 | 22 | 60 |
| 10-Sep | 21 | 20 | 21 | 20 | 22 | 21 | 20 | 20 | 32 | 21 | 20 | 17 | 17 | 24 | 18 | 20 | 19 | 19 | 17 | 19 | 17 | 18 | 19 | 19 | 32 |
| 11-Sep | 20 | 18 | 16 | 16 | 16 | 20 | 18 | 19 | 18 | 18 | 17 | 18 | 18 | 19 | 18 | 21 | 17 | 14 | 17 | 15 | 16 | 17 | 15 | 16 | 21 |
| 12-Sep | 16 | 16 | 16 | 19 | 27 | 13 | 13 | 23 | 50 | 29 | 33 | 41 | 33 | 23 | 27 | 31 | 22 | 21 | 16 | 16 | 18 | 16 | 14 | 18 | 50 |
| 13-Sep | 16 | 17 | 20 | 20 | 17 | 15 | 24 | 22 | 25 | 29 | 26 | 25 | 20 | 20 | 19 | 19 | 16 | 13 | 15 | 13 | 15 | 17 | 25 | 15 | 29 |
| 14-Sep | 16 | 22 | 38 | 17 | 45 | 21 | 16 | 81 | 57 | 26 | 24 | 24 | 26 | 40 | 23 | 21 | 18 | 36 | 15 | 72 | 15 | 24 | 29 | 16 | 81 |
| 15-Sep | 14 | 15 | 28 | 34 | 26 | 13 | 14 | 16 | 19 | 39 | 45 | 58 | 23 | 24 | 22 | 23 | 22 | 15 | 22 | 19 | 18 | 19 | 29 | 16 | 58 |
| 16-Sep | 14 | 17 | 18 | 8 | 11 | 10 | 22 | 16 | 14 | M | M | 36 | 19 | 19 | 19 | 18 | 18 | 16 | 16 | 12 | 21 | 11 | 5 | 9 | 36 |
| 17-Sep | 16 | 17 | 17 | 27 | 17 | 21 | 16 | 23 | 22 | 19 | 21 | 17 | 19 | 20 | 20 | 21 | 18 | 16 | 18 | 11 | 14 | 15 | 13 | 23 | 27 |
| 18-Sep | 18 | 13 | 29 | 31 | 25 | 34 | 21 | 18 | 21 | 18 | 18 | 18 | 18 | 15 | 16 | 15 | 15 | 17 | 16 | 17 | 17 | 24 | 16 | 16 | 34 |
| 19-Sep | 18 | 20 | 13 | 15 | 14 | 17 | 16 | 14 | 18 | 18 | 17 | 21 | 17 | 17 | 16 | 15 | 17 | 18 | 26 | 19 | 12 | 20 | 25 | 16 | 26 |
| 20-Sep | 17 | 18 | 18 | 18 | 19 | 15 | 16 | 16 | 20 | 35 | 35 | 71 | 57 | 40 | 32 | 26 | 22 | 14 | 13 | 32 | 17 | 87 | 9 | 15 | 87 |
| 21-Sep | 16 | 16 | 14 | 8 | 10 | 10 | 9 | 12 | 27 | 32 | 46 | 36 | 49 | 29 | 26 | 27 | 24 | 16 | 8 | 9 | 12 | 8 | 12 | 6 | 49 |
| 22-Sep | 7 | 8 | 8 | 9 | 12 | 13 | 15 | 18 | 20 | 24 | 53 | 22 | 22 | 24 | 25 | 25 | 25 | 21 | 18 | 17 | 15 | 16 | 17 | 18 | 53 |
| 23-Sep | 17 | 19 | 18 | 17 | 16 | 18 | 19 | 21 | 22 | 22 | 21 | 23 | 22 | 22 | 20 | 21 | 22 | 21 | 21 | 22 | 20 | 20 | 20 | 20 | 23 |
| 24-Sep | 20 | 19 | 17 | 18 | 18 | 16 | 16 | 14 | 25 | 17 | 15 | 18 | 21 | 18 | 20 | 19 | 18 | 17 | 19 | 13 | 14 | 13 | 15 | 15 | 25 |
| 25-Sep | 14 | 17 | 19 | 18 | 16 | 16 | 16 | 19 | 14 | 20 | 24 | 18 | 21 | 21 | 22 | 16 | 14 | 8 | 84 | 25 | 24 | 15 | 17 | 36 | 84 |
| 26-Sep | 15 | 11 | 15 | 10 | 30 | 20 | 18 | 20 | 19 | 21 | 24 | 24 | 24 | 23 | 23 | 26 | 23 | 20 | 17 | 16 | 15 | 15 | 17 | 16 | 30 |
| 27-Sep | 17 | 29 | 26 | 25 | 18 | 47 | 17 | 22 | 18 | 39 | 16 | 19 | 19 | 21 | 19 | 19 | 16 | 15 | 15 | 14 | 15 | 13 | 15 | 14 | 47 |
| 28-Sep | 15 | 15 | 15 | 14 | 48 | 25 | 7 | 14 | 18 | 26 | 42 | 69 | 49 | 61 | 32 | 38 | 24 | 17 | 21 | 11 | 16 | 15 | 5 | 39 | 69 |
| 29-Sep | 23 | 17 | 32 | 26 | 15 | 11 | 11 | 11 | 20 | 74 | 40 | 68 | 35 | 40 | 17 | 18 | 32 | 11 | 12 | 36 | 12 | 17 | 76 | 40 | 76 |
| 30-Sep | 82 | 18 | 12 | 15 | 16 | 17 | 14 | 16 | 16 | 17 | 16 | 16 | 17 | 16 | 17 | 18 | 17 | 16 | 16 | 17 | 16 | 15 | 15 | 17 | 82 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 82 | 29 | 38 | 34 | 48 | 47 | 24 | 81 | 57 | 74 | 53 | 71 | 60 | 61 | 59 | 93 | 51 | 79 | 86 | 72 | 27 | 87 | 76 | 40 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 21, 2016 | Last Calibration | August 5, 2016 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Reason: | Routine | | |
| Start Time (MST) | 7:50 | End Time (MST) | 10:42 |
| Gas Cert Reference | LL107929 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 49.7 ppm | Cal Gas Exp Date | 08-Spet-2018 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11551008 |
| ZAG Make/Model | API 701 | Serial Number | 4297 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2635 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|--------------|---------------|--------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -593 | -593 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 827 | 829 |
| Calculated slope | 0.993969 | 0.990551 | Chamber temp | 45.0 | 45.1 |
| Calculated intercept | 0.331207 | 1.087149 | Pressure | 709.1 | 701.5 |
| Analyzer Background | 10.5 | 11.4 | Flow | 0.507 | 0.501 |
| Analyzer Coefficient | 0.804 | 0.804 | Intensity | 85 | 85 |

Analyzer make TEI 43i Analyzer serial # JC1327300932

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 5000 | 60.4 | 600.4 | 605.0 | 0.992 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 60.4 | 600.4 | 605.0 | 0.992 |
| second point | 5000 | 30.2 | 300.2 | 303.0 | 0.991 |
| third point | 5000 | 15.1 | 150.1 | 148.5 | 1.011 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 60.4 | 600.4 | 602.7 | 0.996 |
| Average Correction Factor | | | | | 0.998 |

Corrected As found 604.3 Previous response 603.7 % change -0.1%

Notes:

Inlet filter changed after as founds. Adjusted zero

Calibration Performed By: Evan Magill



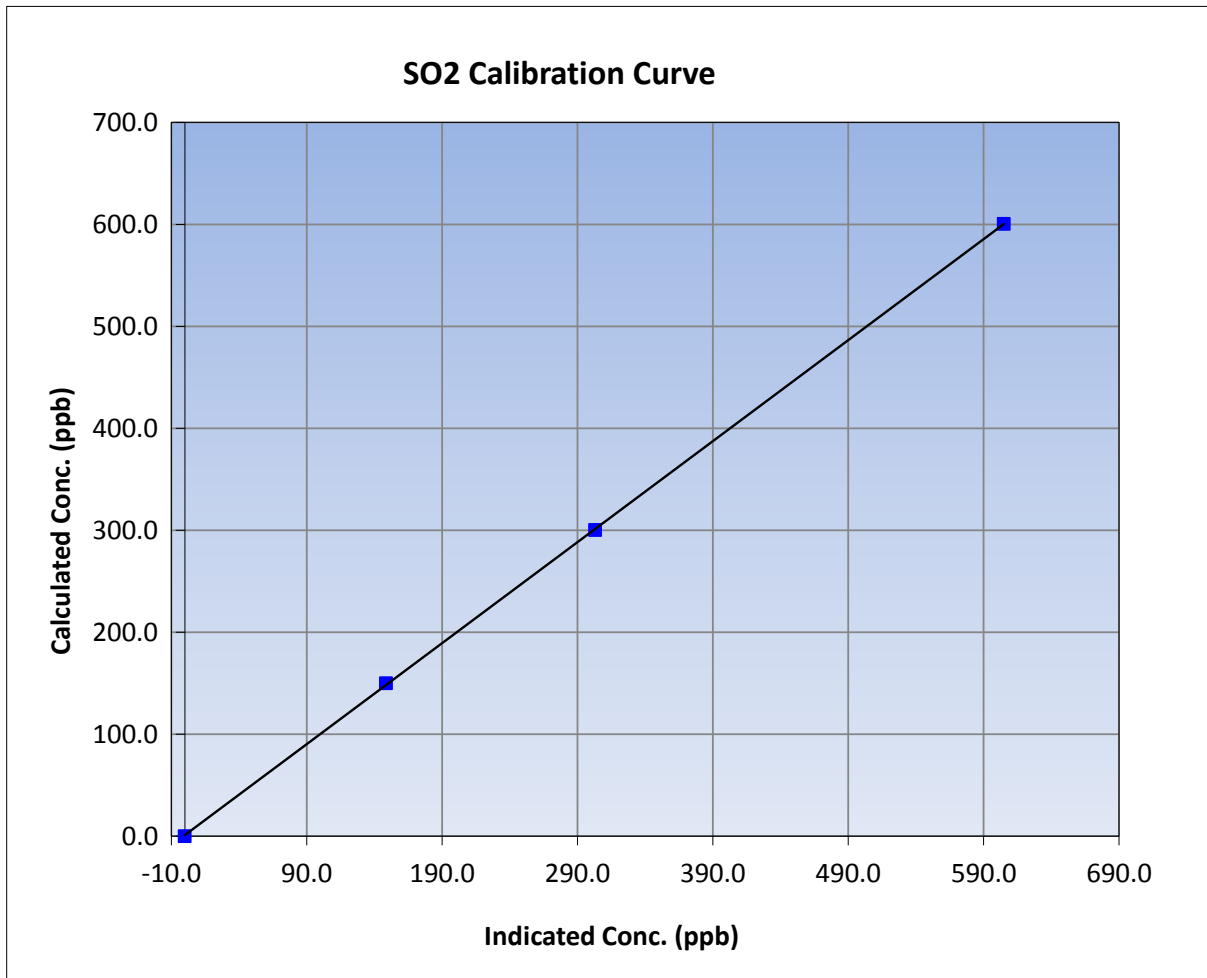
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 21, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Start Time (MST) | 7:50 | End Time (MST) | 10:42 |
| Analyzer make | TEI 43i | Analyzer serial # | JC1327300932 |

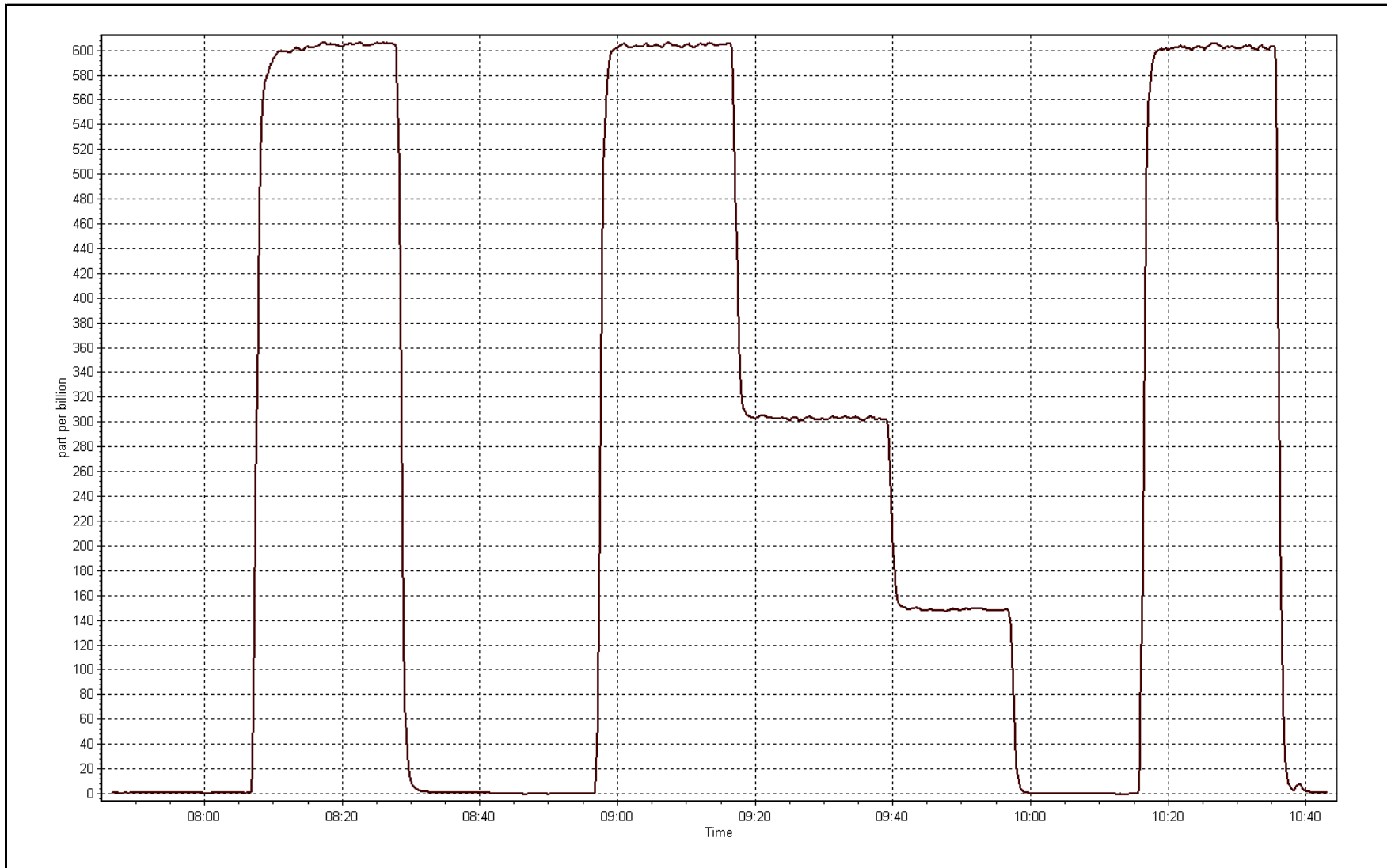
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999972 |
| 600.4 | 605.0 | 0.9924 | | |
| 300.2 | 303.0 | 0.9907 | Slope | 0.990551 |
| 150.1 | 148.5 | 1.0107 | | |
| | | | Intercept | 1.087149 |



SO2 Calibration Plot

Date: September 21, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-----------------------|
| Calibration Date | September 21, 2016 | Last Calibration | August 5, 2016 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Reason: | Routine | | |
| Start Time (MST) | 10:51 | End Time (MST) | 13:35 |
| Gas Cert Reference | LL101590 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 9.75 ppm | Cal Gas Exp Date | 2/22/2016 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11551008 |
| ZAG air Make/Model | API 701 | Serial Number | 4297 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2635 |
| SO2 gas concentration | 49.7 ppm | SO2 gas cert/exp | LL107929 08-Spet-2018 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -616 | -618 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 873 | 874 |
| Calculated slope | 0.988388 | 1.001484 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.107853 | -0.036422 | Pressure | 553.2 | 543.9 |
| Analyzer Background | 13.8 | 13.6 | Flow | 1.050 | 1.034 |
| Analyzer Coefficient | 0.845 | 0.832 | Intensity | 94 | 94 |
| | | | Converter temp. | 330 | 331 |

| | | | |
|----------------------|----------|--------------------|------------|
| Analyzer make/model | TEI 450i | Analyzer serial # | 1336160094 |
| Converter make/model | na | Converter serial # | na |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 6000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 6000 | 46.2 | 75.1 | 76.0 | 0.988 |
| SO2 scrubber check | 5000 | 15.1 | 150.1 | 1.6 | ---- |
| calibrator zero | 6000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 6000 | 46.2 | 75.1 | 74.9 | 1.002 |
| second point | 6000 | 25.8 | 41.9 | 42.1 | 0.996 |
| third point | 6000 | 15.4 | 25.0 | 25.0 | 1.003 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 6000 | 46.2 | 75.1 | 74.5 | 1.007 |
| Average Correction Factor | | | | | 1.000 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 76.0 | Previous response | 76.1 | % change | 0.2% |
|--------------------|------|-------------------|------|----------|------|

Notes:

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

Calibration Performed By: Evan Magill



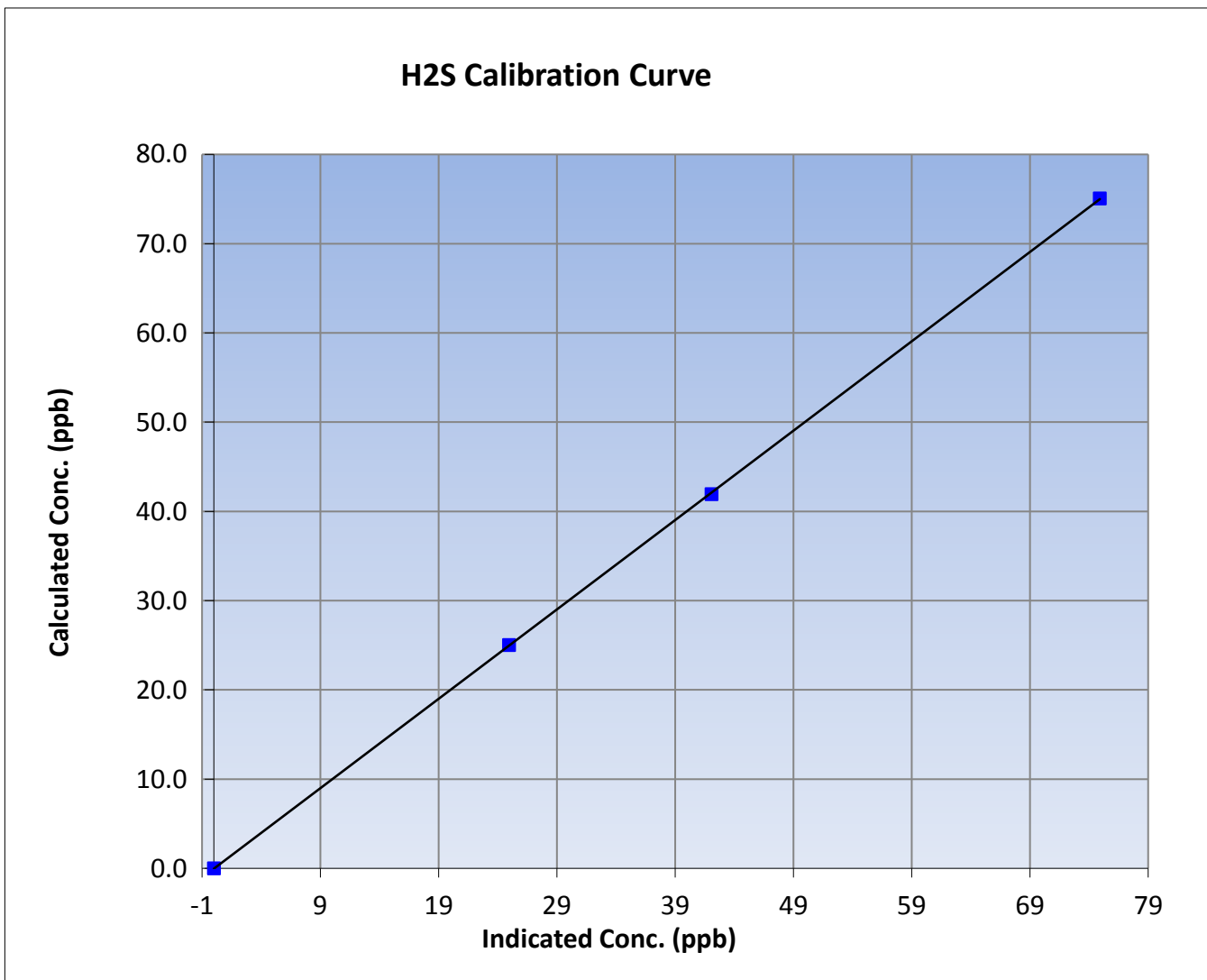
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 21, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Start Time (MST) | 10:51 | End Time (MST) | 13:35 |
| Analyzer make | TEI 450i | Analyzer serial # | 1336160094 |

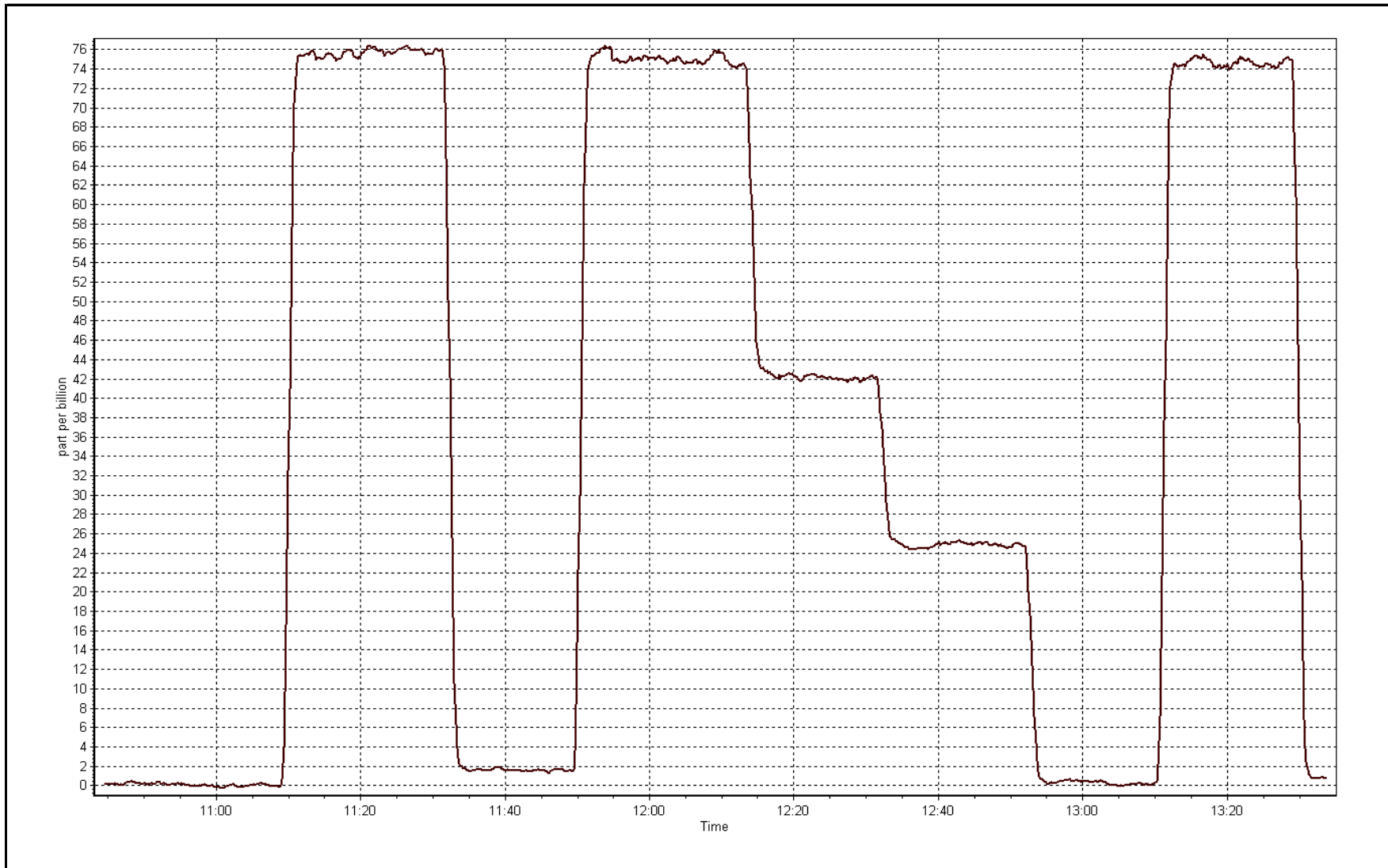
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999985 |
| 75.1 | 74.9 | 1.0021 | | |
| 41.9 | 42.1 | 0.9963 | Slope | 1.001484 |
| 25.0 | 25.0 | 1.0026 | | |
| | | | Intercept | -0.036422 |



H2S Calibration Plot

Date: September 21, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|--------------------------------------------------------------------------------------------------------|------------------|--------------------------|
| Calibration Date | September 28, 2016 | Last Calibration | September 21, 2016 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Reason: | <input type="checkbox"/> Other: <input checked="" type="checkbox"/> Maintenance: Changing Sox Scrubber | | |
| Start Time (MST) | 8:25 | End Time (MST) | 13:55 |
| Gas Cert Reference | LL101590 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 9.75 ppm | Cal Gas Exp Date | 2/22/2016 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11551008 |
| ZAG air Make/Model | API 701 | Serial Number | 4297 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2635 |
| SO2 gas concentration | 49.7 ppm | SO2 gas cert/exp | LL107929 08-Spet-2018 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -618 | -606 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 874 | 874 |
| Calculated slope | 1.001484 | 1.019961 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.036422 | -1.492649 | Pressure | 543.9 | 560.1 |
| Analyzer Background | 13.6 | 13.4 | Flow | 1.034 | 1.064 |
| Analyzer Coefficient | 0.832 | 0.832 | Intensity | 94 | 94 |
| | | | Converter temp. | 331 | 329 |

| | | | |
|----------------------|----------|--------------------|------------|
| Analyzer make/model | TEI 450i | Analyzer serial # | 1336160094 |
| Converter make/model | na | Converter serial # | na |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 6000 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 6000 | 46.1 | 74.9 | 74.7 | 1.004 |
| SO2 scrubber check | 5000 | 15.1 | 150.1 | 1.6 | ---- |
| calibrator zero | 6000 | 0.0 | 0.0 | 1.8 | ---- |
| high point | 6000 | 46.1 | 74.9 | 75.0 | 0.999 |
| second point | 6000 | 25.8 | 41.9 | 42.8 | 0.980 |
| third point | 6000 | 15.4 | 25.0 | 25.4 | 0.985 |
| as left zero | 6000 | 0.0 | 0.0 | 1.0 | ---- |
| as left span | 6000 | 46.2 | 75.1 | 74.6 | 1.007 |
| Average Correction Factor | | | | | 0.988 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 74.3 | Previous response | 74.8 | % change | 0.7% |
|--------------------|------|-------------------|------|----------|------|

Notes:

As founds completed. Scrubber check completed after as founds with 150 and 600 ppb SO2. SO2 was breaking through; scrubber was replaced. Scrubber check completed again at 150 and 600 ppb, showing 1.5 ppb and 6 ppb respectively. After settling back down to baseline, multipoint completed. Sensitivity and linearity were good.

Calibration Performed By:

Devin Russell



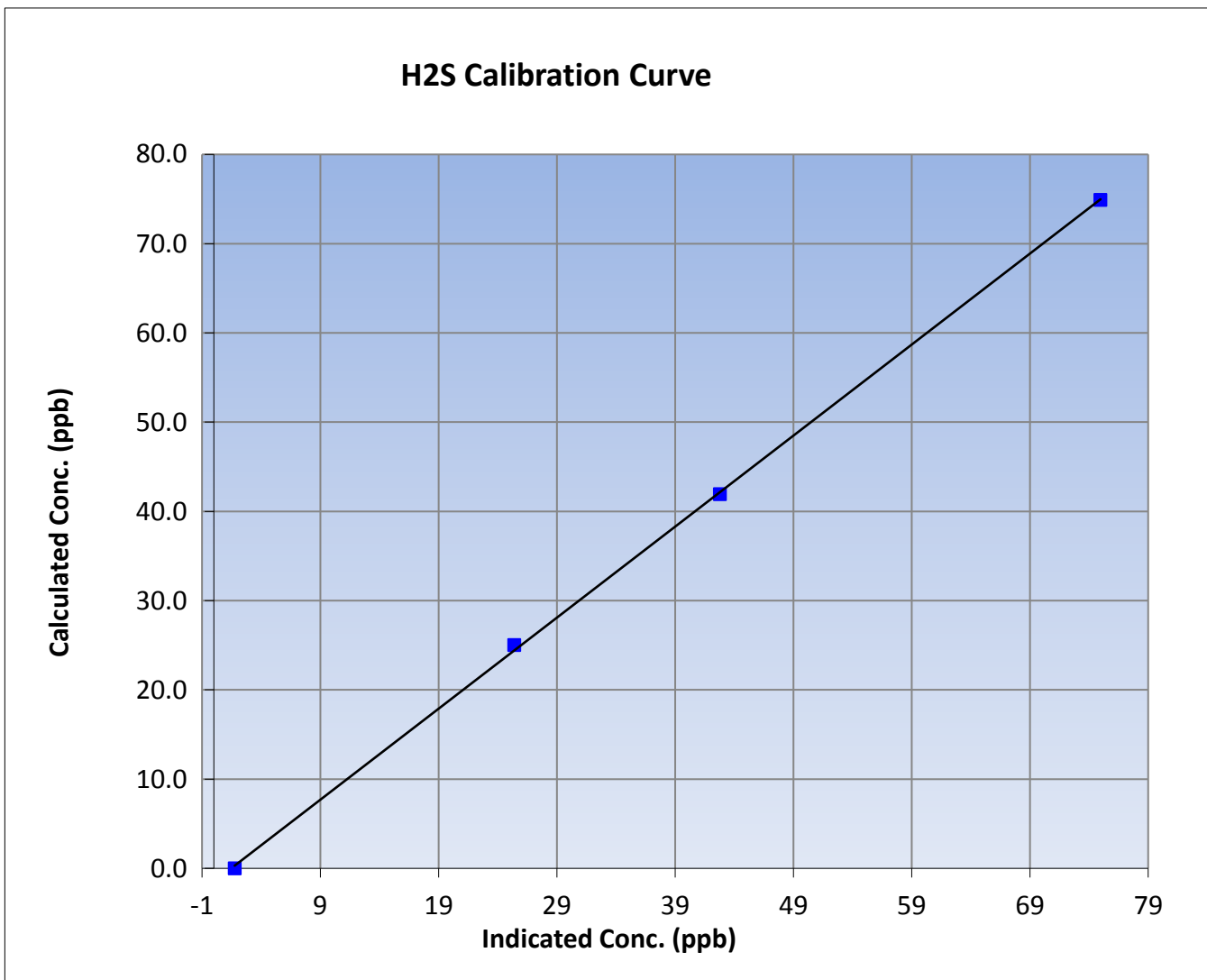
Wood Buffalo Environmental Association H2S Calibration Report

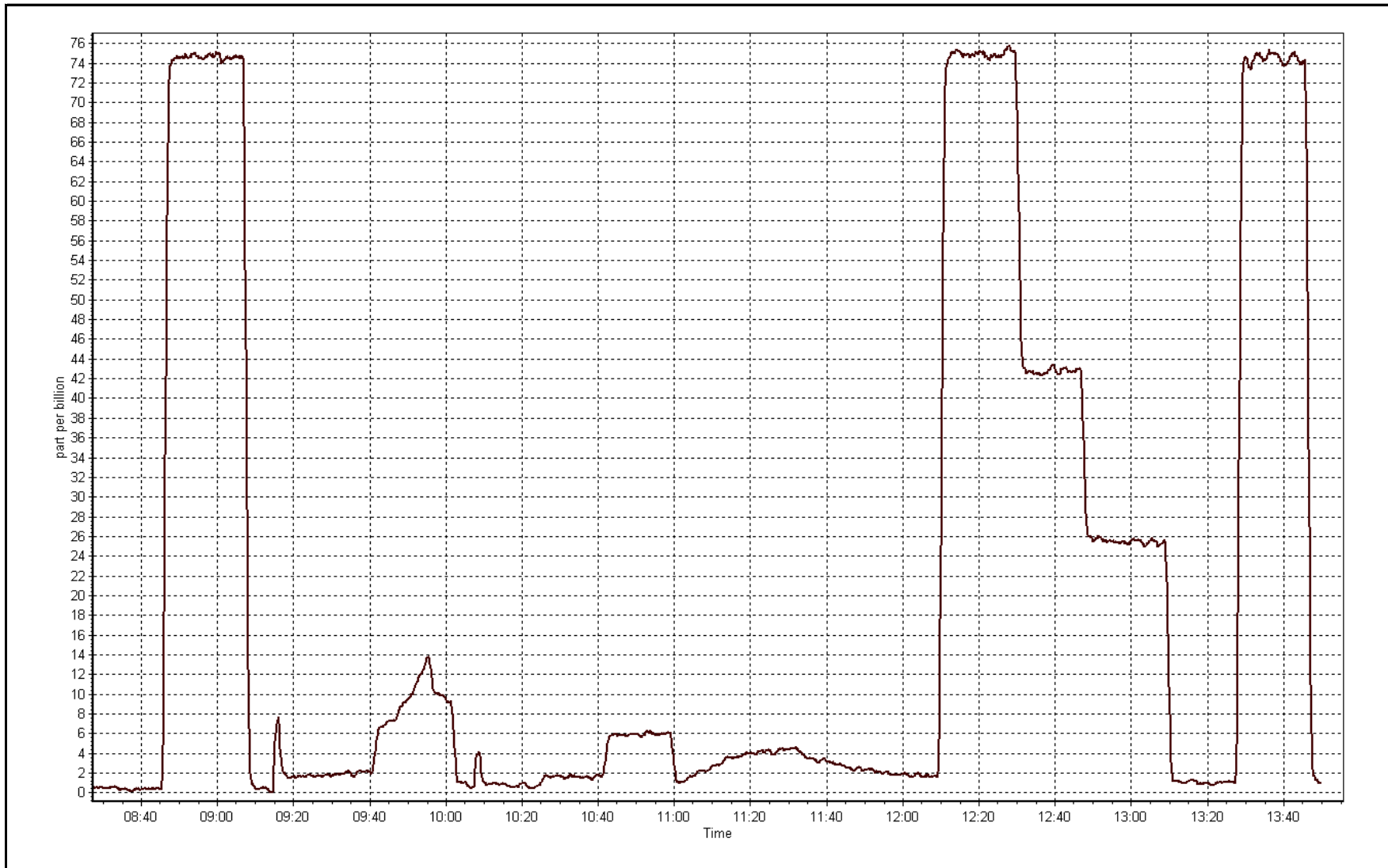
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 28, 2016 | Previous Calibration | September 21, 2016 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Start Time (MST) | 8:25 | End Time (MST) | 13:55 |
| Analyzer make | TEI 450i | Analyzer serial # | 1336160094 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 1.8 | ---- | Correlation Coefficient | 0.999827 |
| 74.9 | 75.0 | 0.9992 | | |
| 41.9 | 42.8 | 0.9796 | Slope | 1.019961 |
| 25.0 | 25.4 | 0.9848 | | |
| | | | Intercept | -1.492649 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|--------------|
| Calibration Date | September-21-16 | Last Calibration | August-05-16 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Reason: | Routine | | |
| Start Time (MST) | 7:50 | End Time (MST) | 10:42 |
| Gas Cert Reference | LL107929 | Cal Gas Expiry Date | 08-Sep-18 |
| CH4 Cal Gas Conc. | 514 ppm | CH4 Equiv Conc. | 1061.3 ppm |
| C3H8 Cal Gas Conc. | 199 ppm | Station temp. | 21 Deg C |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11551008 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4297 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2635 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 8.5 | 8.5 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 30.4 | 30.4 |
| Calculated slope | 0.999913 | 1.012929 | Fuel Pressure | 19.9 | 19.9 |
| Calculated intercept | 0.014190 | -0.086487 | Analyzer Coeff | 4.2 | 4.1 |
| | | | Analyzer BKG | 0.880 | 0.810 |

| | | | |
|---------------|------------|-------------------|------------|
| Analyzer make | TEI 51i-LT | Analyzer serial # | 1201650671 |
|---------------|------------|-------------------|------------|

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | -0.06 | ---- |
| as found span | 5000 | 60.4 | 12.82 | 12.70 | 1.009 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.04 | ---- |
| high point | 5000 | 60.4 | 12.82 | 12.70 | 1.009 |
| second point | 5000 | 30.2 | 6.41 | 6.49 | 0.988 |
| third point | 5000 | 15.1 | 3.20 | 3.26 | 0.983 |
| as left zero | 5000 | 0.0 | 0.00 | 0.06 | ---- |
| as left span | 5000 | 60.4 | 12.82 | 12.92 | 0.992 |
| Average Correction Factor | | | | | 0.993 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 12.76 | Previous response | 12.81 | % change | 0.4% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

Inlet filter changed after as founds. Adjusted zero.

Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association THC Calibration Report

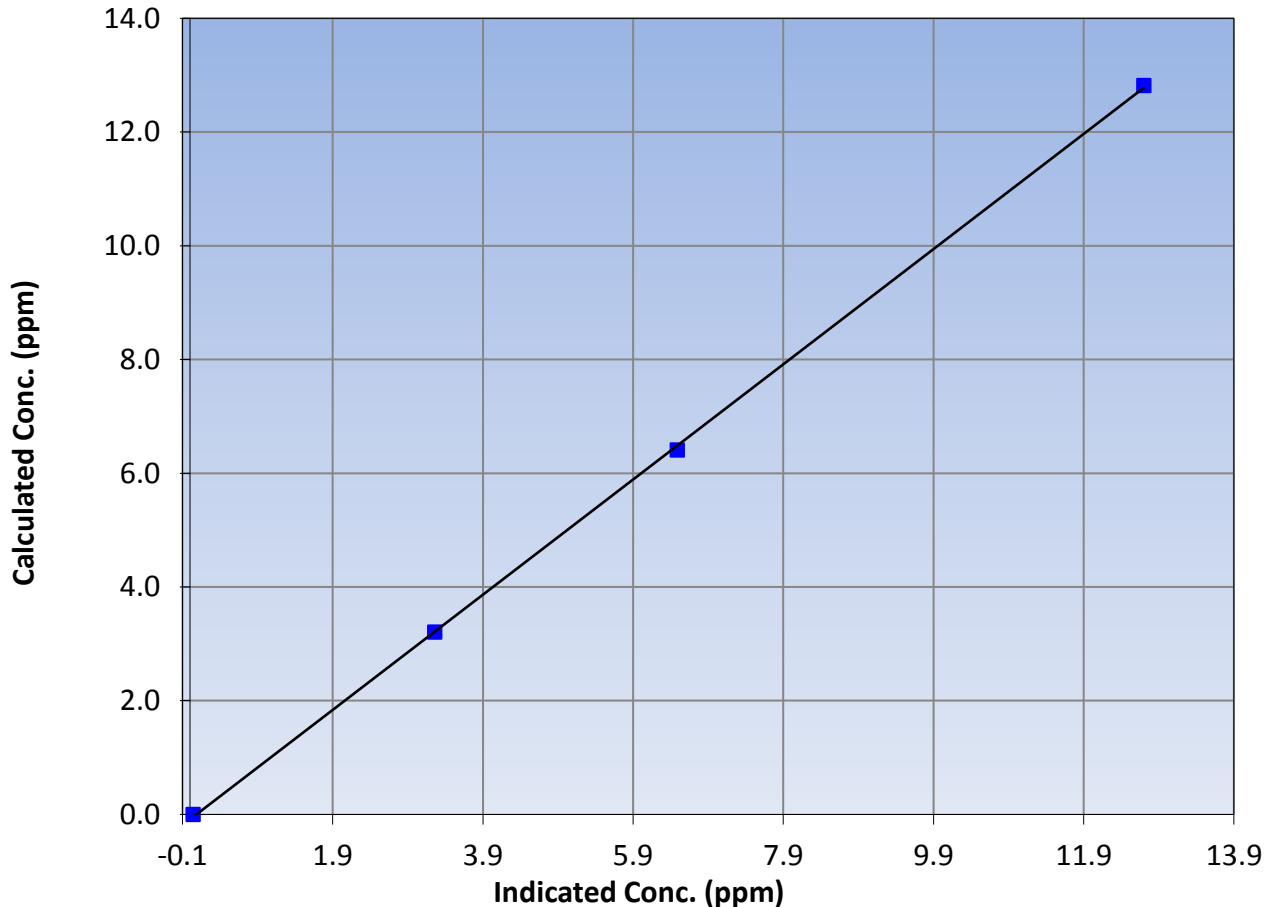
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 21, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Start Time (MST) | 7:50 | End Time (MST) | 10:42 |
| Analyzer make | TEI 51i-LT | Analyzer serial # | 1201650671 |

Calibration Data

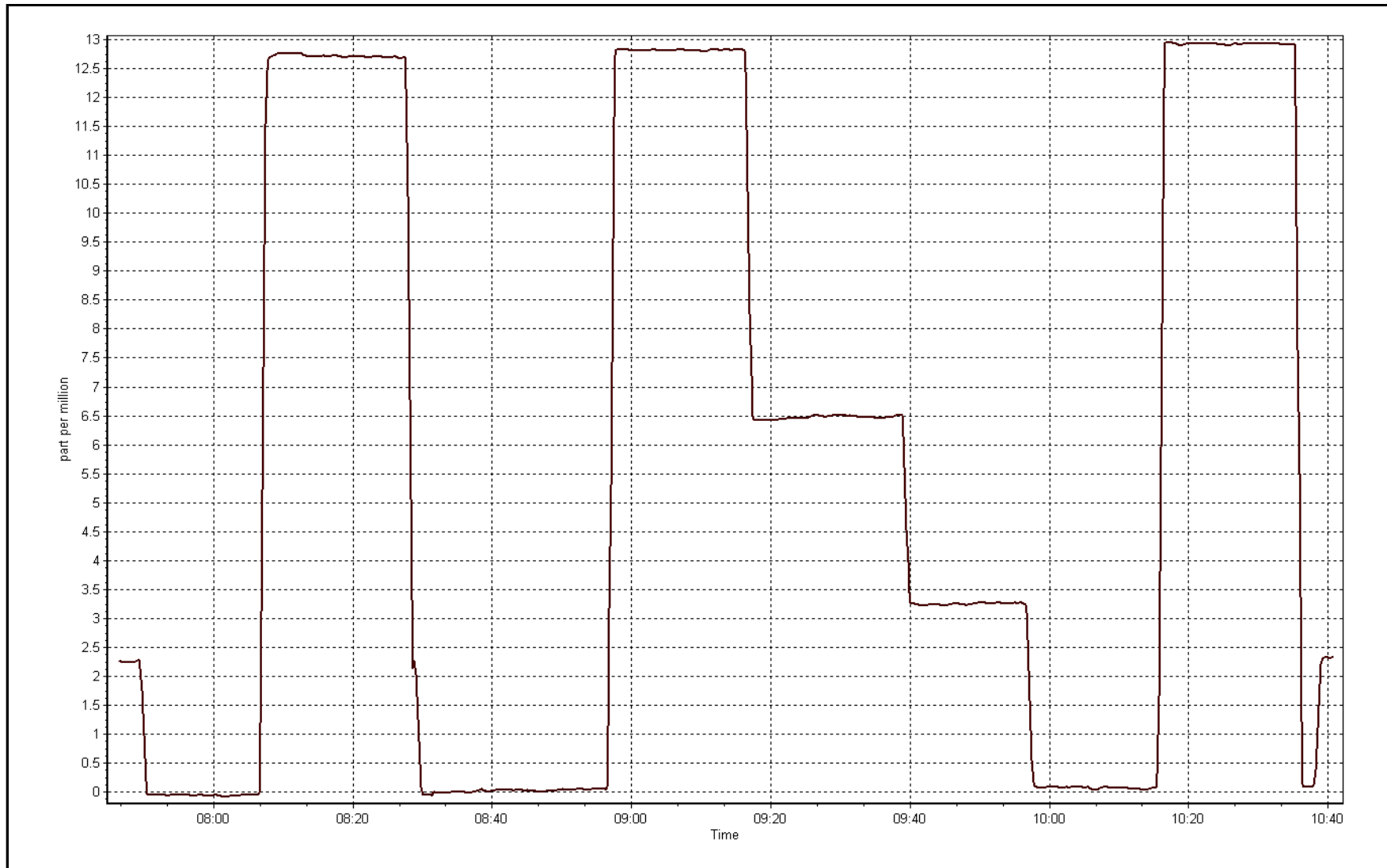
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.04 | ---- | Correlation Coefficient | 0.999889 |
| 12.82 | 12.70 | 1.0094 | | |
| 6.41 | 6.49 | 0.9877 | Slope | 1.012929 |
| 3.20 | 3.26 | 0.9831 | | |
| | | | Intercept | -0.086487 |

THC Calibration Curve



THC Calibration Plot

Date: September 21, 2016





Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

| | | | |
|------------------|---------------------------------------------|---------------------------------------|----------------------------------|
| Calibration Date | September 16, 2016 | Previous Calibration | August 7, 2015 |
| Station Name | Buffalo Viewpoint | Station Number | AMS 4 |
| Reason: | <input checked="" type="checkbox"/> Routine | <input type="checkbox"/> Installation | <input type="checkbox"/> Removal |
| Start Time (MST) | 8:44 | End Time (MST) | 10:16 |
| Barometric Press | n/a | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053 | Serial Number | J6774 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | G3211 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 2635 |
| DACS voltage range | 5000 | DACS channel # | N/A |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 1.00048201 | Calculated slope | 0.998843 |
| Calculated intercept | -0.08588355 | Calculated intercept | -0.025014 |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.3 | 0.9957 |
| 400 | 39.4 | 39.4 | 0.9990 |
| 600 | 58.6 | 58.7 | 0.9977 |
| 800 | 77.8 | 77.8 | 0.9989 |
| Average Correction Factor | | | 0.9978 |

WIND DIRECTION

| | | | |
|--------------------------------------|---------------------------|-------------------------------------|--------------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | P10612 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 2635 |
| DACS voltage range | 5000 | DACS channel # | N/A |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 1.002144745 | Calculated slope | 1.007776 |
| Calculated intercept | 1.55767774 | Calculated intercept | 0.689078 |
| As Found Declination (west of North) | 14 | As Left Declination (west of North) | 14 |

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | 0.3 | n/a |
| 90 | 88.0 | 1.0227 |
| 180 | 177.5 | 1.0142 |
| 270 | 266.0 | 1.0152 |
| 357 | 354.9 | 1.0059 |
| Average Correction Factor | | 1.0145 |

Notes:

Annual audit. Declination captured using compass method.

Calibration Performed By: Evan Magill and Jayme Marcoux



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

AMS 5 MANNIX SEPTEMBER 2016

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

October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 683 | 37 | 37 | 100.00 | 124 | 0 | 36 | 0 |
| H2S (ppb) Average | 674 | 38 | 46 | 98.89 | 12 | 1 | 3 | 0 |
| THC (ppm) Average | 684 | 36 | 36 | 100.00 | 4.2 | - | 2.5 | - |
| Temperature 2 m (C) Average | 717 | 0 | 3 | 99.58 | 23.6 | - | 15.3 | - |
| Temperature 20 m (C) Average | 717 | 0 | 3 | 99.58 | 23.5 | - | 16.1 | - |
| Temperature 45 m (C) Average | 717 | 0 | 3 | 99.58 | 23.1 | - | 16.4 | - |
| Temperature 75 m (C) Average | 717 | 0 | 3 | 99.58 | 22.9 | - | 16.9 | - |
| Temperature 90 m (C) Average | 717 | 0 | 3 | 99.58 | 22.8 | - | 17 | - |
| Relative Humidity 2 m (%) Average | 717 | 0 | 3 | 99.58 | 98 | - | 90 | - |
| Relative Humidity 20 m (%) Average | 717 | 0 | 3 | 99.58 | 98 | - | 87 | - |
| Relative Humidity 45 m (%) Average | 717 | 0 | 3 | 99.58 | 99 | - | 88 | - |
| Relative Humidity 75 m (%) Average | 717 | 0 | 3 | 99.58 | 98 | - | 88 | - |
| Relative Humidity 90 m (%) Average | 717 | 0 | 3 | 99.58 | 98 | - | 89 | - |
| Wind Speed 20 m (km/h) Average | 717 | 0 | 3 | 99.58 | 31 | - | 19 | - |
| Wind Speed 45 m (km/h) Average | 717 | 0 | 3 | 99.58 | 39 | - | 27 | - |
| Wind Speed 75 m (km/h) Average | 714 | 0 | 6 | 99.17 | 44 | - | 29 | - |
| Wind Speed 90 m (km/h) Average | 717 | 0 | 3 | 99.58 | 46 | - | 32 | - |
| Wind Direction 20 m (deg) Average | 717 | 0 | 3 | 99.58 | - | - | - | - |
| Wind Direction 45 m (deg) Average | 717 | 0 | 3 | 99.58 | - | - | - | - |
| Wind Direction 75 m (deg) Average | 714 | 0 | 6 | 99.17 | - | - | - | - |
| Wind Direction 90 m (deg) Average | 717 | 0 | 3 | 99.58 | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 717 | 0 | 3 | 99.58 | 1.3 | - | 0.7 | - |
| Vertical Wind Speed 45 m (km/h) Average | 717 | 0 | 3 | 99.58 | 2.1 | - | 1.6 | - |
| Vertical Wind Speed 75 m (km/h) Average | 714 | 0 | 6 | 99.17 | 1.6 | - | 0.9 | - |
| Vertical Wind Speed 90 m (km/h) Average | 717 | 0 | 3 | 99.58 | 9.1 | - | 3.3 | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------------|--------|-------|--------|-------|------------|------|------|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 683 | 2.2 | 9 | - | 0 | 0 | 0 | 0 | 1 | 3 | 124 |
| H2S (ppb) Average | 674 | 0.6 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 12 |
| THC (ppm) Average | 684 | 2.26 | 0.2 | - | 2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.4 | 4.2 |
| Temperature 2 m (C) Average | 717 | 11.28 | 4.3 | - | 1.4 | 5.7 | 8.2 | 10.9 | 14.2 | 17 | 23.6 |
| Temperature 20 m (C) Average | 717 | 11.74 | 4 | - | 3.3 | 6.7 | 8.7 | 11.6 | 14.4 | 17 | 23.5 |
| Temperature 45 m (C) Average | 717 | 11.71 | 4 | - | 3.8 | 6.6 | 8.7 | 11.6 | 14.4 | 16.7 | 23.1 |
| Temperature 75 m (C) Average | 717 | 11.67 | 3.9 | - | 3.5 | 6.8 | 8.7 | 11.5 | 14.2 | 16.6 | 22.9 |
| Temperature 90 m (C) Average | 717 | 11.65 | 3.9 | - | 3.4 | 6.8 | 8.7 | 11.5 | 14.2 | 16.6 | 22.8 |
| Relative Humidity 2 m (%) Average | 717 | 70.5 | 18 | - | 27 | 44 | 56 | 73 | 86 | 94 | 98 |
| Relative Humidity 20 m (%) Average | 717 | 66.1 | 18 | - | 26 | 40 | 52 | 68 | 81 | 89 | 98 |
| Relative Humidity 45 m (%) Average | 717 | 65.4 | 18 | - | 26 | 39 | 51 | 67 | 80 | 88 | 99 |
| Relative Humidity 75 m (%) Average | 717 | 64.7 | 18 | - | 27 | 38 | 51 | 66 | 79 | 88 | 98 |
| Relative Humidity 90 m (%) Average | 717 | 64.6 | 18 | - | 27 | 39 | 51 | 65 | 79 | 89 | 98 |
| Wind Speed 20 m (km/h) Average | 717 | 11.3 | 6 | - | 1 | 5 | 7 | 10 | 14 | 19 | 31 |
| Wind Speed 45 m (km/h) Average | 717 | 16.3 | 7 | - | 1 | 7 | 11 | 15 | 21 | 26 | 39 |
| Wind Speed 75 m (km/h) Average | 714 | 18.8 | 8 | - | 1 | 8 | 12 | 18 | 26 | 30 | 44 |
| Wind Speed 90 m (km/h) Average | 717 | 20 | 9 | - | 1 | 9 | 13 | 20 | 27 | 31 | 46 |
| Wind Direction 20 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 45 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 75 m (deg) Average | 714 | - | - | - | - | - | - | - | - | - | - |
| Wind Direction 90 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |
| Vertical Wind Speed 20 m (km/h) Average | 717 | 0.07 | 0.4 | - | -0.8 | -0.4 | -0.2 | 0 | 0.4 | 0.6 | 1.3 |
| Vertical Wind Speed 45 m (km/h) Average | 717 | 0.21 | 0.8 | - | -1.9 | -0.7 | -0.3 | 0.1 | 0.9 | 1.3 | 2.1 |
| Vertical Wind Speed 75 m (km/h) Average | 714 | 0.25 | 0.4 | - | -1 | -0.2 | 0 | 0.2 | 0.5 | 0.8 | 1.6 |
| Vertical Wind Speed 90 m (km/h) Average | 717 | 0.98 | 1 | - | -0.7 | 0 | 0.3 | 0.7 | 1.5 | 2.4 | 9.1 |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|------------------------------------------------------|-------------------|-------------------|------------------|---------------------------------------------|
| H2S | 28 Sep 2016 10:00 | 28 Sep 2016 17:00 | 8 | Maintenance - replaced calibration cylinder |
| ALL METEOROLOGICAL PARAMETERS | 24 Sep 2016 01:00 | 24 Sep 2016 03:00 | 3 | DAS collection error - data not recorded |
| Wind Speed, Wind Direction, Vertical Wind Speed 75 m | 01 Sep 2016 21:00 | 01 Sep 2016 21:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction, Vertical Wind Speed 75 m | 01 Sep 2016 23:00 | 02 Sep 2016 00:00 | 2 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Mannix - September 2016

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 124 ppb on Sep 30 11:00 | Maximum Daily Average: 35.5 ppb on Sep 30 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 18 04:00 | Minimum Daily Average: 0.1 ppb on Sep 17 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 5.6 ppb at hour 11 | Minimum Diurnal Average: 0.5 ppb at hour 1 | | Hours of Calibration: | 37 |
| Monthly Average: 2.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 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 | 0 | 0 | 0 | 0 | 0 | Z | 7 | 2 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.7 | 7 |
| 2-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 | 1 |
| 3-Sep | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 4 | 5 | 2 | 2 | 3 | 0 | 0 | 0 | 4 | 7 | 3 | 1.8 | 7 |
| 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 | 0.1 | 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 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | 22 | 10 | 3 | 7 | 1 | 1 | 0 | 1 | 0 | 3 | 2 | 4 | 4 | 3.1 | 22 |
| 9-Sep | 2 | Z | 2 | 2 | 2 | 2 | 1 | 3 | 12 | 1 | 2 | 6 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1.8 | 12 |
| 10-Sep | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 11-Sep | 2 | 2 | 1 | Z | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 5 | 4 | 1 | 1 | 1 | 1.5 | 5 |
| 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 | 0.1 | 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 | 0.2 | 0 |
| 14-Sep | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 14 | 15 | 1 | 0 | 0 | 1.9 | 15 |
| 15-Sep | 1 | Z | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 14 | 8 | 5 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 14 |
| 16-Sep | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 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 | 1 | 11 | 6 | 4 | 4 | 3 | 1 | 3 | 2 | 2 | 2 | 1.8 | 11 |
| 19-Sep | 1 | 2 | 1 | 1 | 0 | Z | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | 3 | 4 | 2 | 5 | 7 | 3 | 1.9 | 7 |
| 20-Sep | Z | 4 | 4 | 1 | 5 | 15 | 7 | 2 | 4 | 2 | 3 | 2 | 6 | 7 | 9 | 10 | 11 | 5 | 2 | 2 | 1 | 0 | 0 | 0 | 4.5 | 15 |
| 21-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 | 0.3 | 1 |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | 0.3 | 0 |
| 24-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 11 | 10 | 4 | 15 | 3 | 2 | 0 | 0 | 0 | 2.3 | 15 |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 27-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 4 | 6 | 3 | 2 | 1 | 2 | 1.2 | 6 |
| 30-Sep | 2 | 5 | 9 | 10 | 19 | 29 | 19 | Z | 107 | 57 | 124 | 94 | 63 | 30 | 39 | 26 | 17 | 4 | 35 | 53 | 21 | 2 | 25 | 27 | 35.5 | 124 |

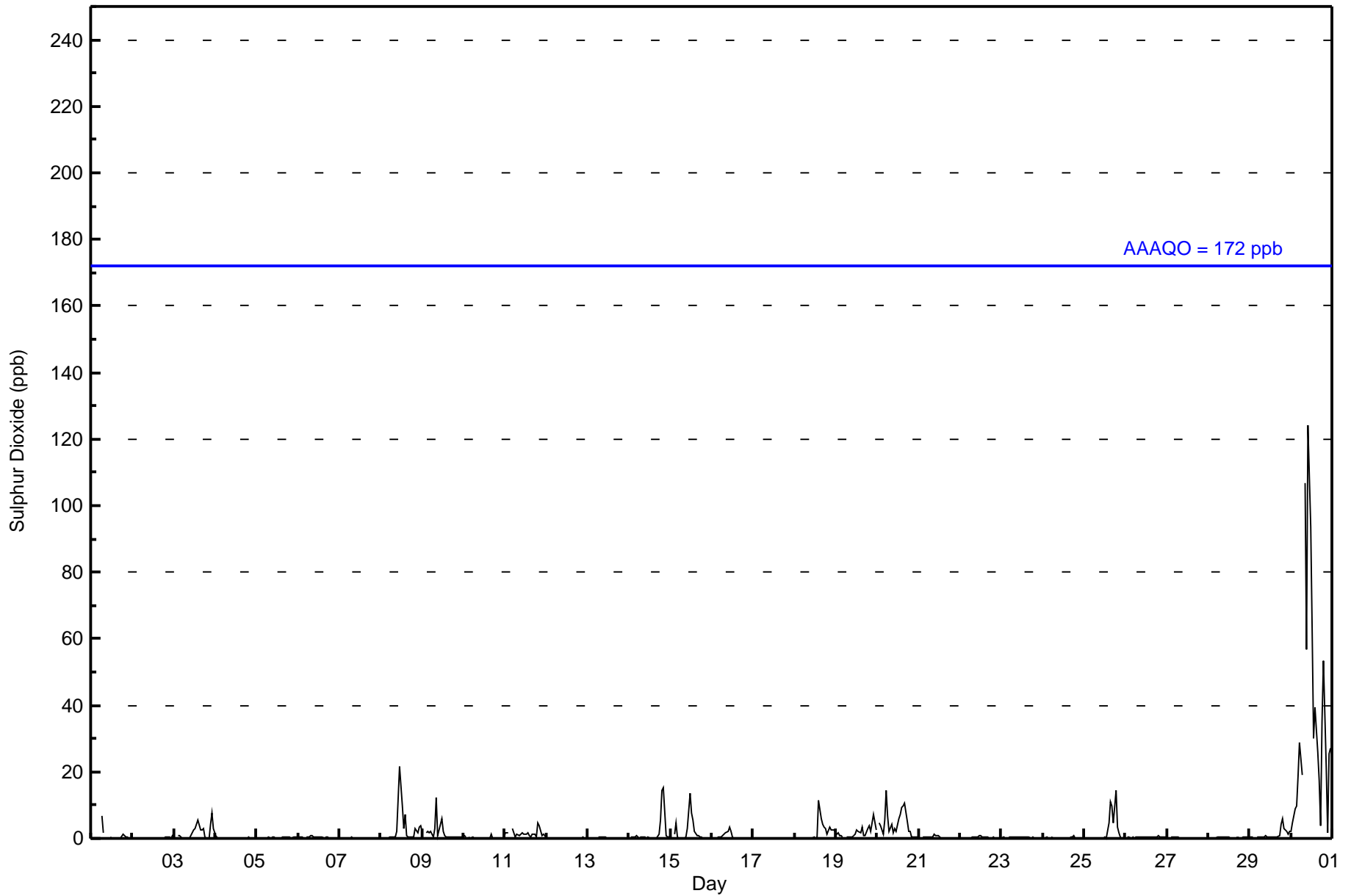
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.5 | 0.6 | 0.9 | 0.9 | 1.3 | 2.1 | 1.3 | 0.5 | 4.8 | 2.6 | 5.6 | 5.2 | 3.3 | 2.0 | 2.9 | 2.2 | 1.8 | 1.0 | 2.5 | 3.1 | 1.9 | 0.8 | 1.8 | 1.6 | Diurnal Average | |
| 2 | 5 | 9 | 10 | 19 | 29 | 19 | 3 | 107 | 57 | 124 | 94 | 63 | 30 | 39 | 26 | 17 | 5 | 35 | 53 | 21 | 5 | 25 | 27 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mannix - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 655 | 95.90 | 95.90 |
| 11 - 20 | 13 | 1.90 | 97.80 |
| 21 - 60 | 11 | 1.61 | 99.41 |
| 61 - 110 | 3 | 0.44 | 99.85 |
| 111 - 172 | 1 | 0.15 | 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
Mannix - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 13 | 7 | 4 | 5 | 8 | 21 | 96 | 114 | 46 | 40 | 36 | 57 | 88 | 37 | 30 | 50 | 652 |
| 11 - 20 | 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 0 | 1 | 13 |
| 21 - 60 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 11 |
| 61 - 110 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| 111 - 172 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 11 | 4 | 6 | 9 | 21 | 96 | 114 | 46 | 40 | 36 | 59 | 89 | 40 | 30 | 53 | 680 |

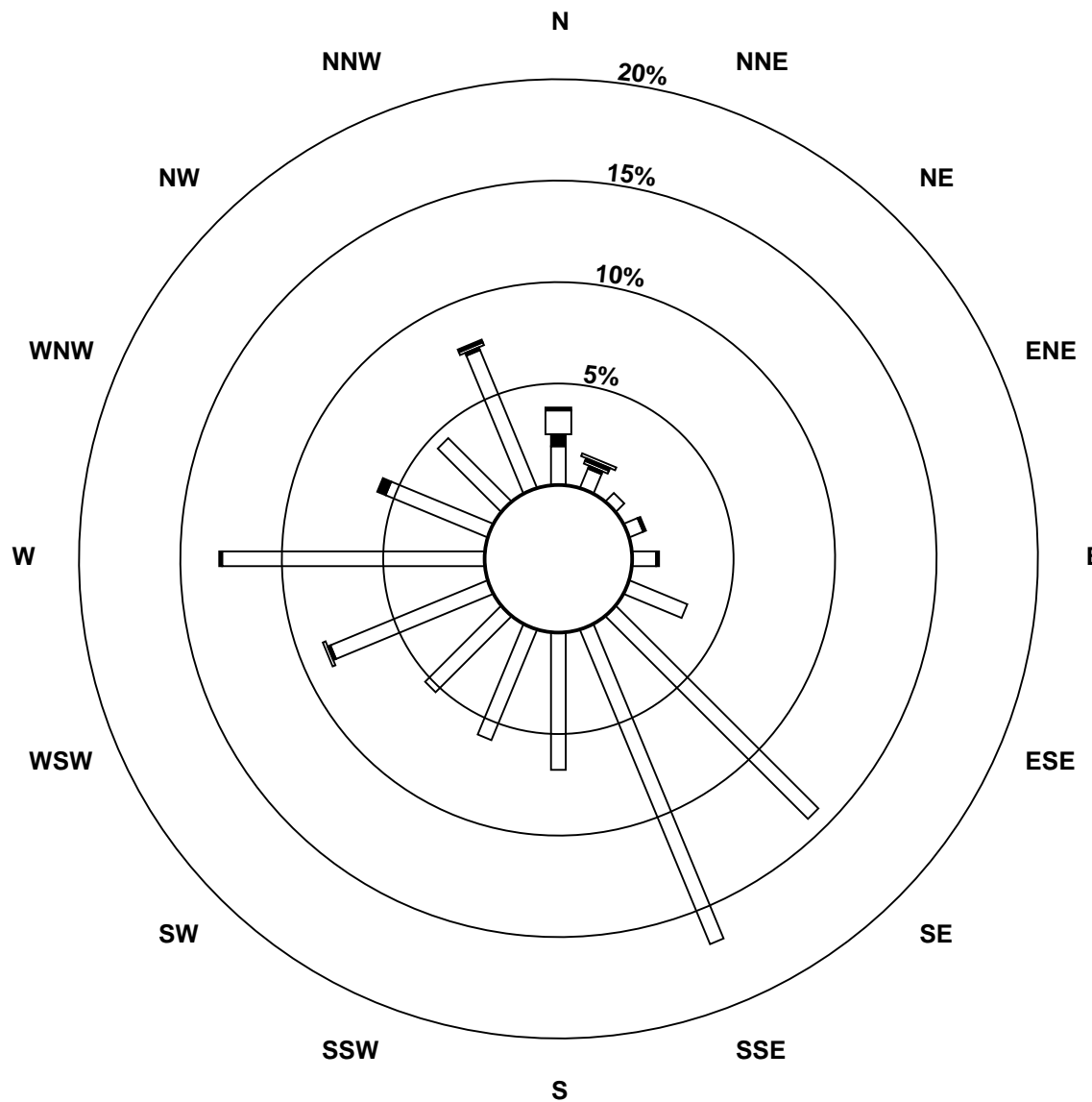
Total Number of Valid Hours: 680

Total Number of Hours: 720

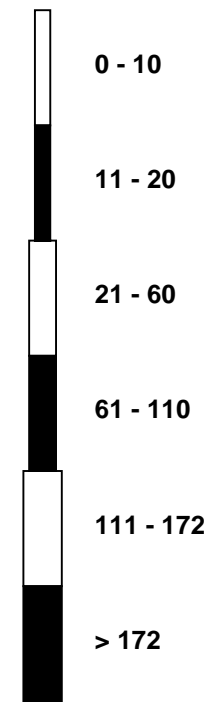


Wood Buffalo Environmental Association
Wind Rose Sep 2016

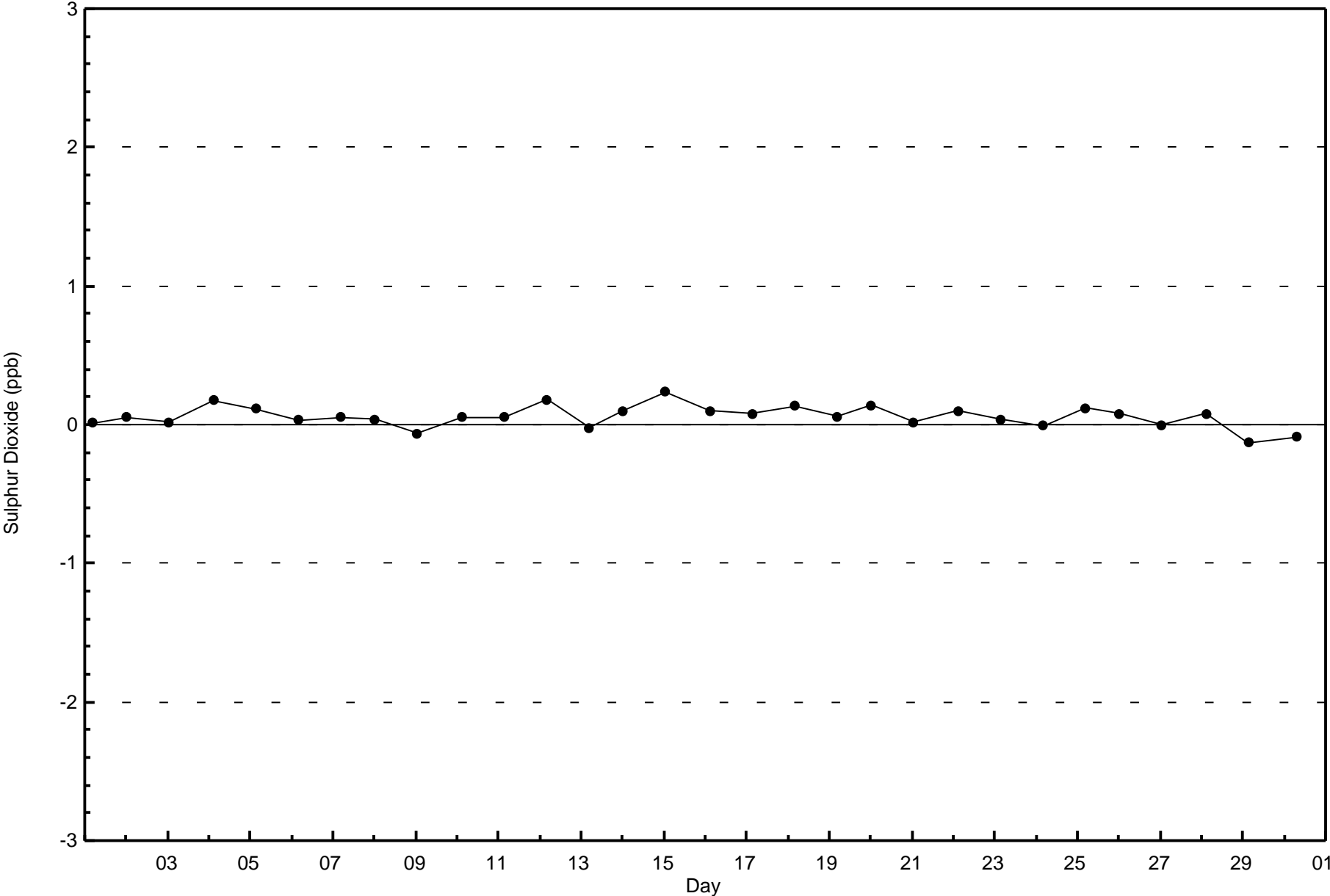
Sulphur Dioxide (SO₂) - ppb
Mannix (AMS 5)

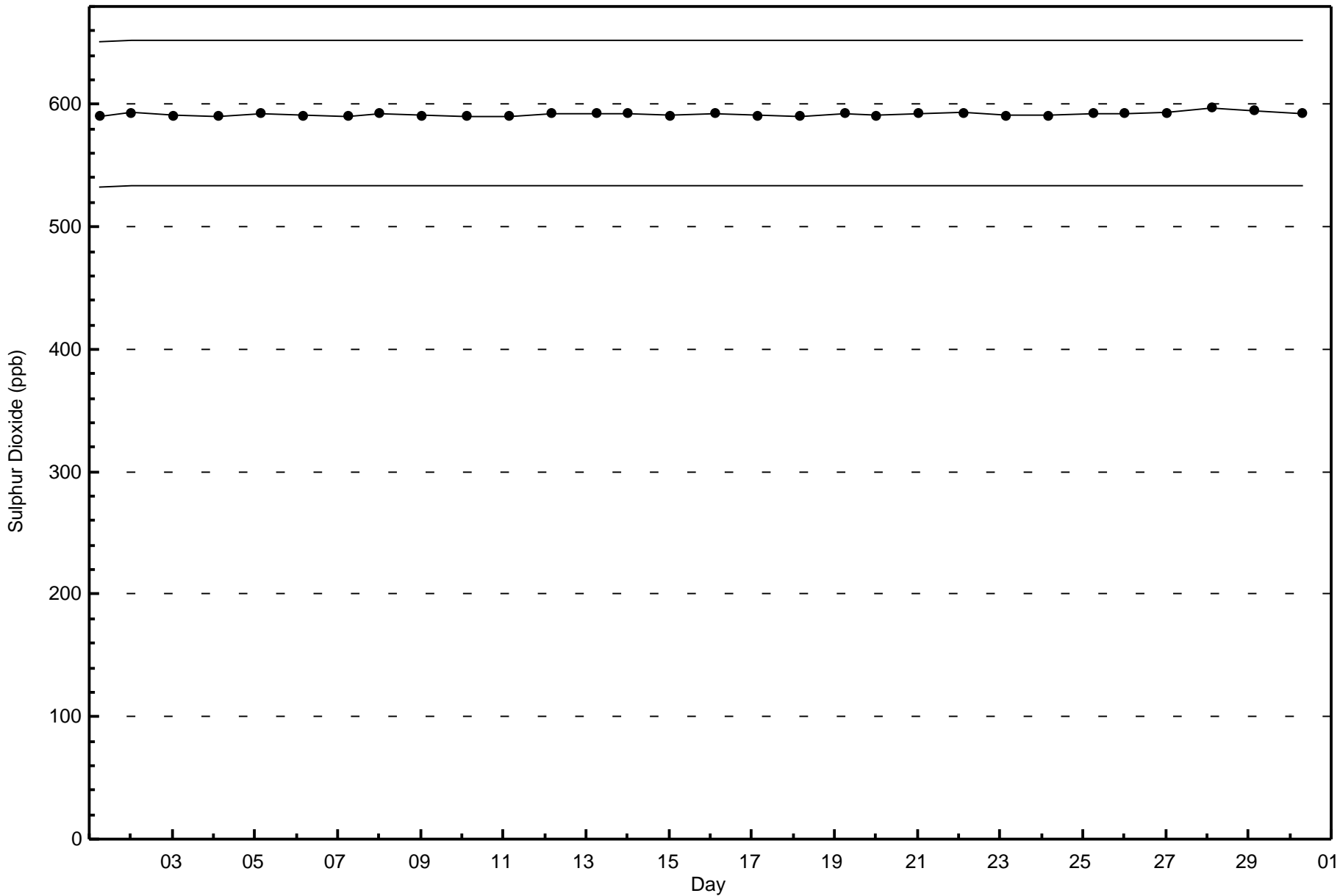


Classes (ppb)



Total Number of Valid Hours: 680





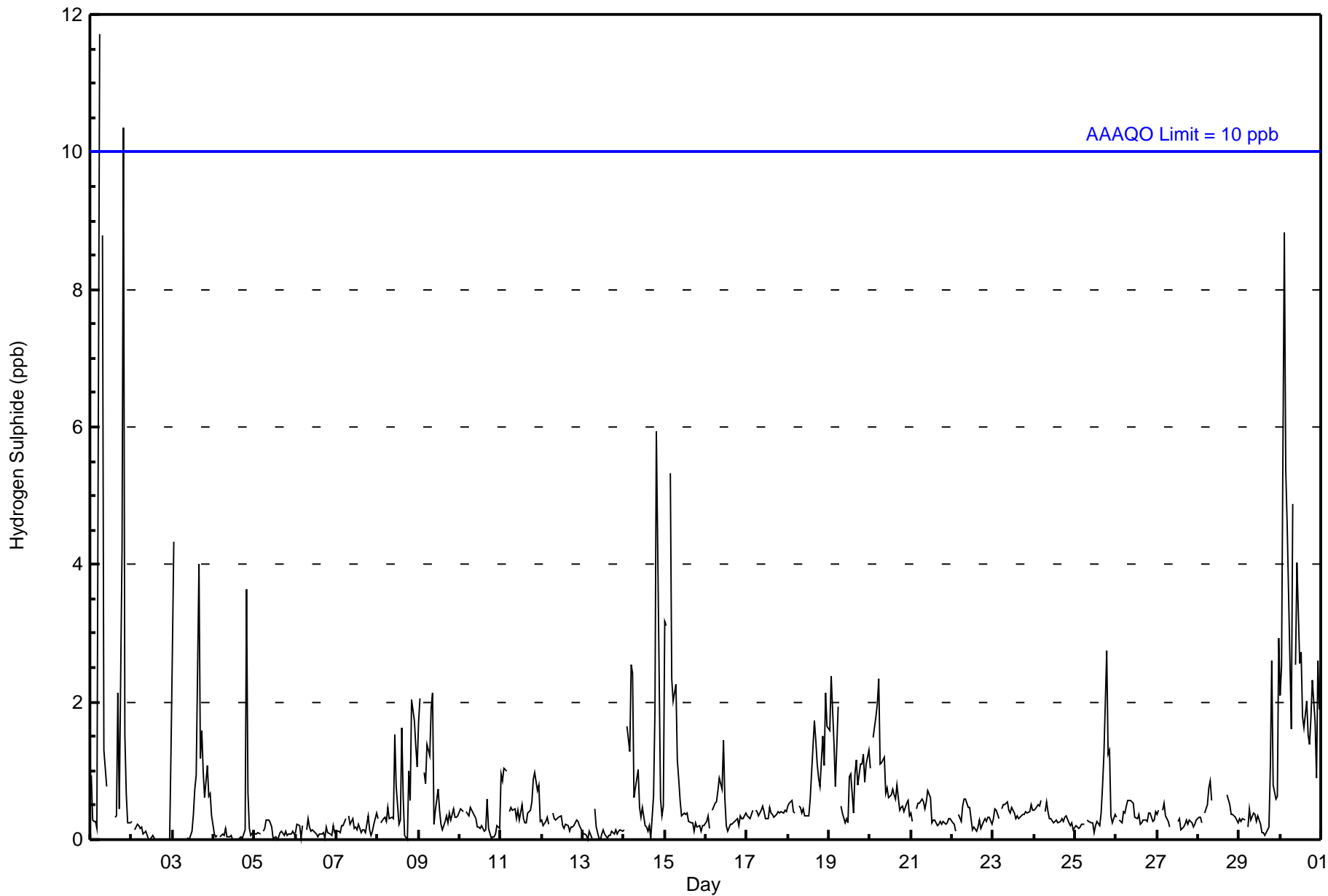


| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 1 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 12 ppb on Sep 1 06:00 | Maximum Daily Average: 2.8 ppb on Sep 30 | | Hours of Data: | 674 |
| Minimum Value: 0 ppb on Sep 2 11:00 | Minimum Daily Average: 0.1 ppb on Sep 13 | | Hours of Missing Data: | 46 |
| Maximum Diurnal Average: 1.2 ppb at hour 6 | Minimum Diurnal Average: 0.3 ppb at hour 14 | | Hours of Calibration: | 38 |
| 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 = 5 | | Percent Operational Time: | 98.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|----|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1 | 0 | 0 | 0 | 0 | 12 | Z | 9 | 1 | 1 | C | C | C | C | 0 | 0 | 2 | 0 | 4 | 10 | 2 | 1 | 0 | 0 | 2.4 | 12 |
| 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 | 0.1 | 1 |
| 3-Sep | 3 | 4 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0.9 | 4 |
| 4-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0.2 | 4 |
| 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 8-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 0.7 | 2 |
| 9-Sep | 2 | 2 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 2 |
| 10-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 11-Sep | 1 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0.6 | 1 |
| 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 | 0.2 | 0 |
| 13-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 |
| 14-Sep | 0 | Z | 2 | 1 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 4 | 1 | 0 | 0 | 1.2 | 6 |
| 15-Sep | 3 | 3 | Z | 5 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 5 |
| 16-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 |
| 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 | 0.4 | 0 |
| 18-Sep | 0 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 0.8 | 2 |
| 19-Sep | 2 | 2 | 2 | 1 | 1 | 2 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 |
| 20-Sep | 1 | Z | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.9 | 2 |
| 21-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 22-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 23-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.4 | 1 |
| 24-Sep | 0 | 0 | 1 | 0 | 1 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0.5 | 3 |
| 26-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 27-Sep | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 28-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | M | M | M | M | M | M | M | M | M | M | 1 | 1 | 0 | 0 | 0 | -- | 1 |
| 29-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 1 | 1 | 3 | 0.6 | 3 |
| 30-Sep | 2 | 3 | 9 | 5 | 5 | 4 | 2 | 5 | Z | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 3 | 2 | 2.8 | 9 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.7 | 0.8 | 0.8 | 0.9 | 0.7 | 1.2 | 0.6 | 0.9 | 0.5 | 0.4 | 0.5 | 0.4 | 0.4 | 0.3 | 0.4 | 0.5 | 0.5 | 0.4 | 0.7 | 1.2 | 0.7 | 0.4 | 0.5 | 0.6 | Diurnal Average | |
| 3 | 4 | 9 | 5 | 5 | 12 | 2 | 9 | 2 | 3 | 4 | 3 | 3 | 2 | 2 | 4 | 2 | 2 | 4 | 10 | 4 | 2 | 3 | 3 | Diurnal Maximum | |

Z - zeronspan 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 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 646 | 95.85 | 95.85 |
| 3 - 4 | 19 | 2.82 | 98.66 |
| 5 - 7 | 5 | 0.74 | 99.41 |
| 8 - 11 | 3 | 0.45 | 99.85 |
| > 11 | 1 | 0.15 | 100.00 |

Total Number of Valid Hours: 674

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 16 | 8 | 5 | 3 | 8 | 18 | 94 | 113 | 48 | 36 | 33 | 59 | 90 | 39 | 25 | 48 | 643 |
| 3 - 4 | 6 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 2 | 19 |
| 5 - 7 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 |
| 8 - 11 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Totals | 26 | 11 | 6 | 4 | 8 | 18 | 94 | 113 | 48 | 36 | 33 | 60 | 90 | 40 | 32 | 52 | 671 |

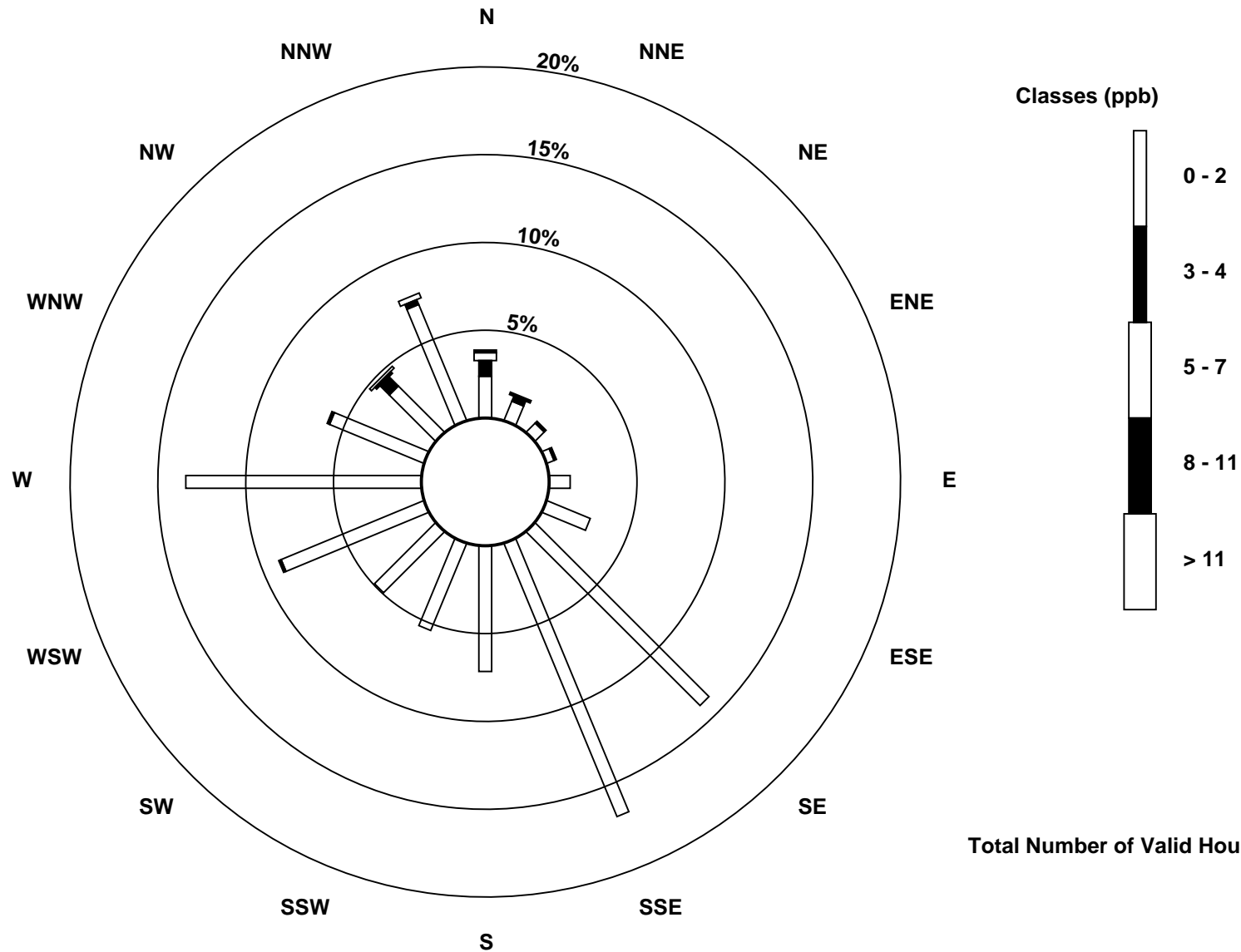
Total Number of Valid Hours: 671

Total Number of Hours: 720

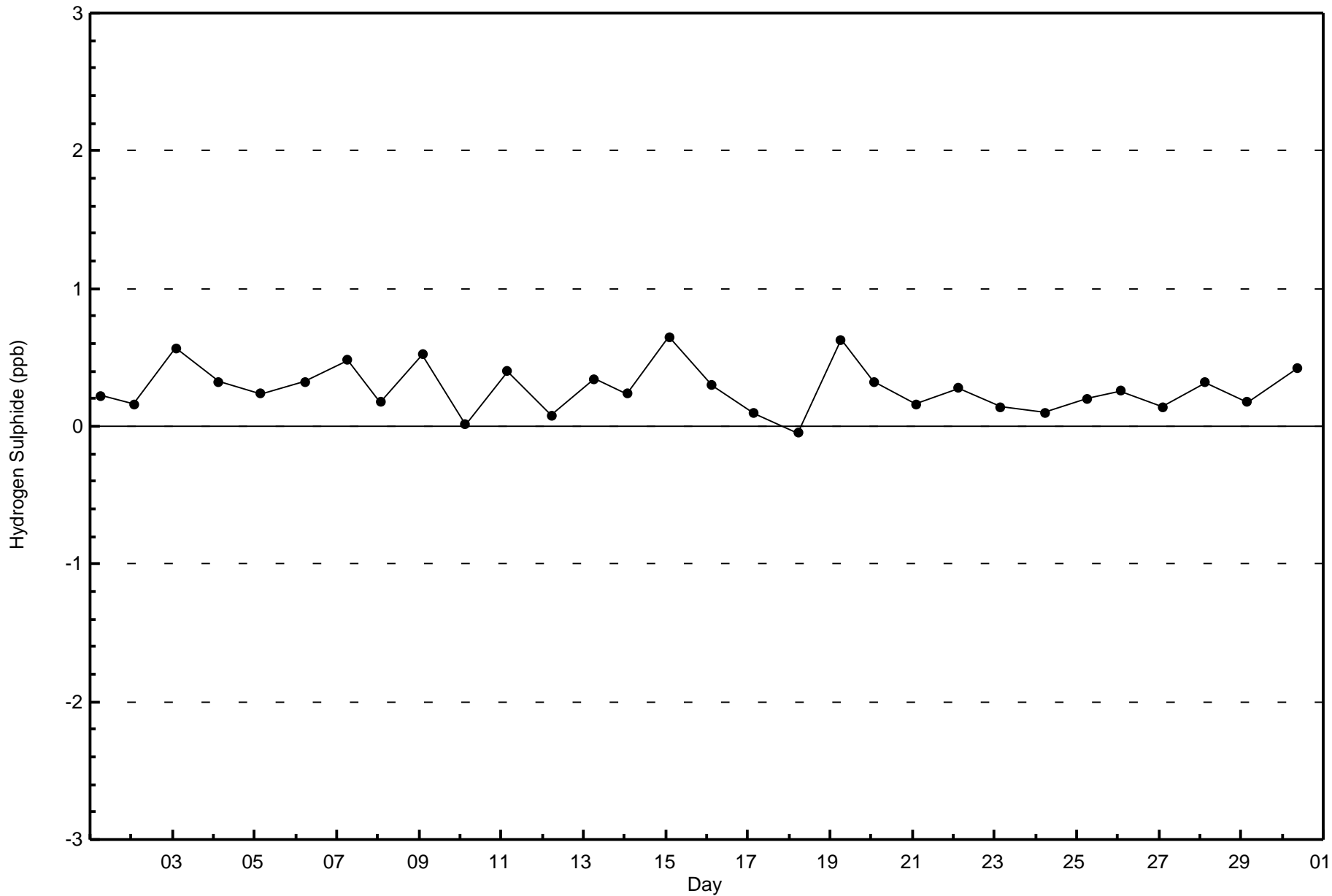


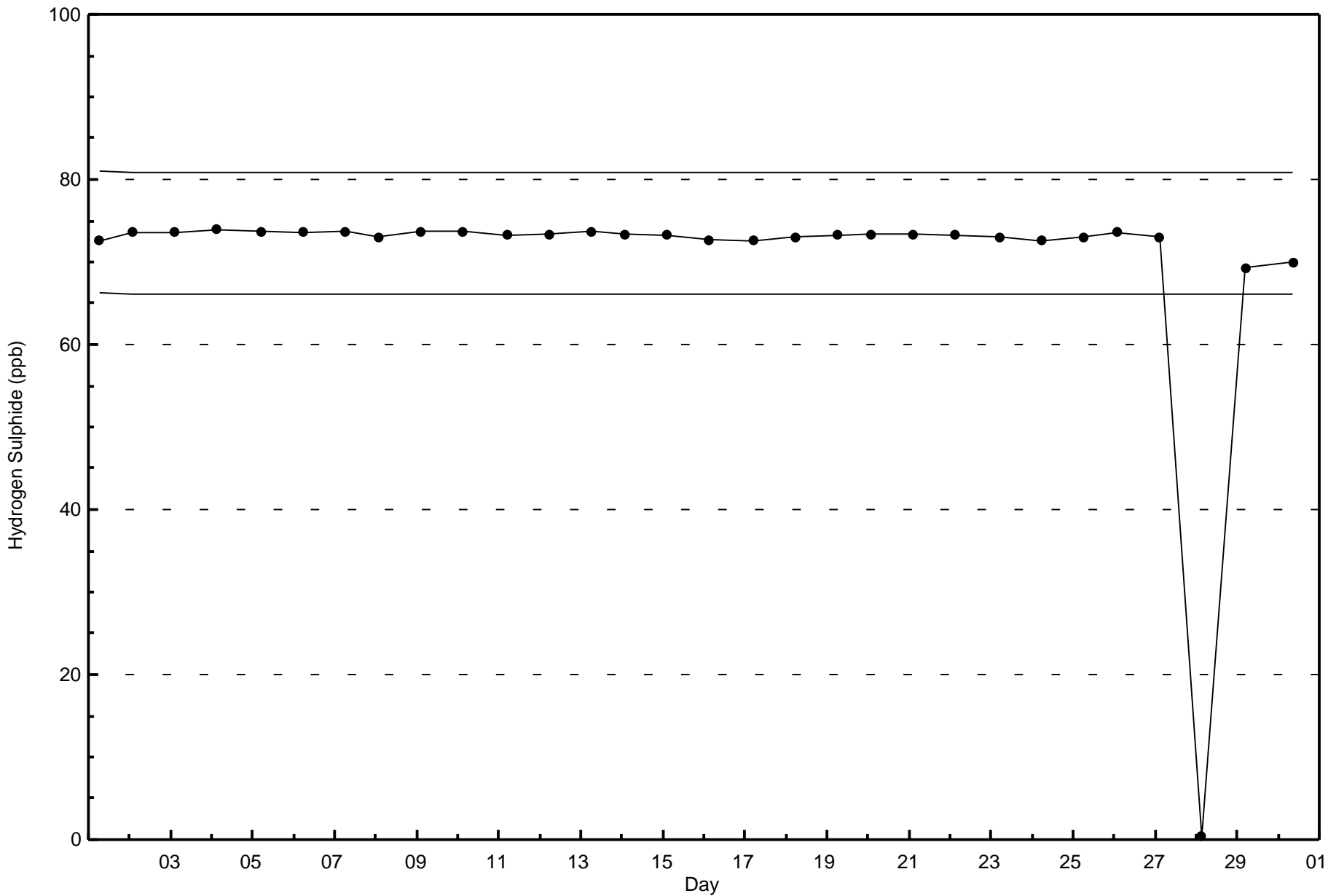
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



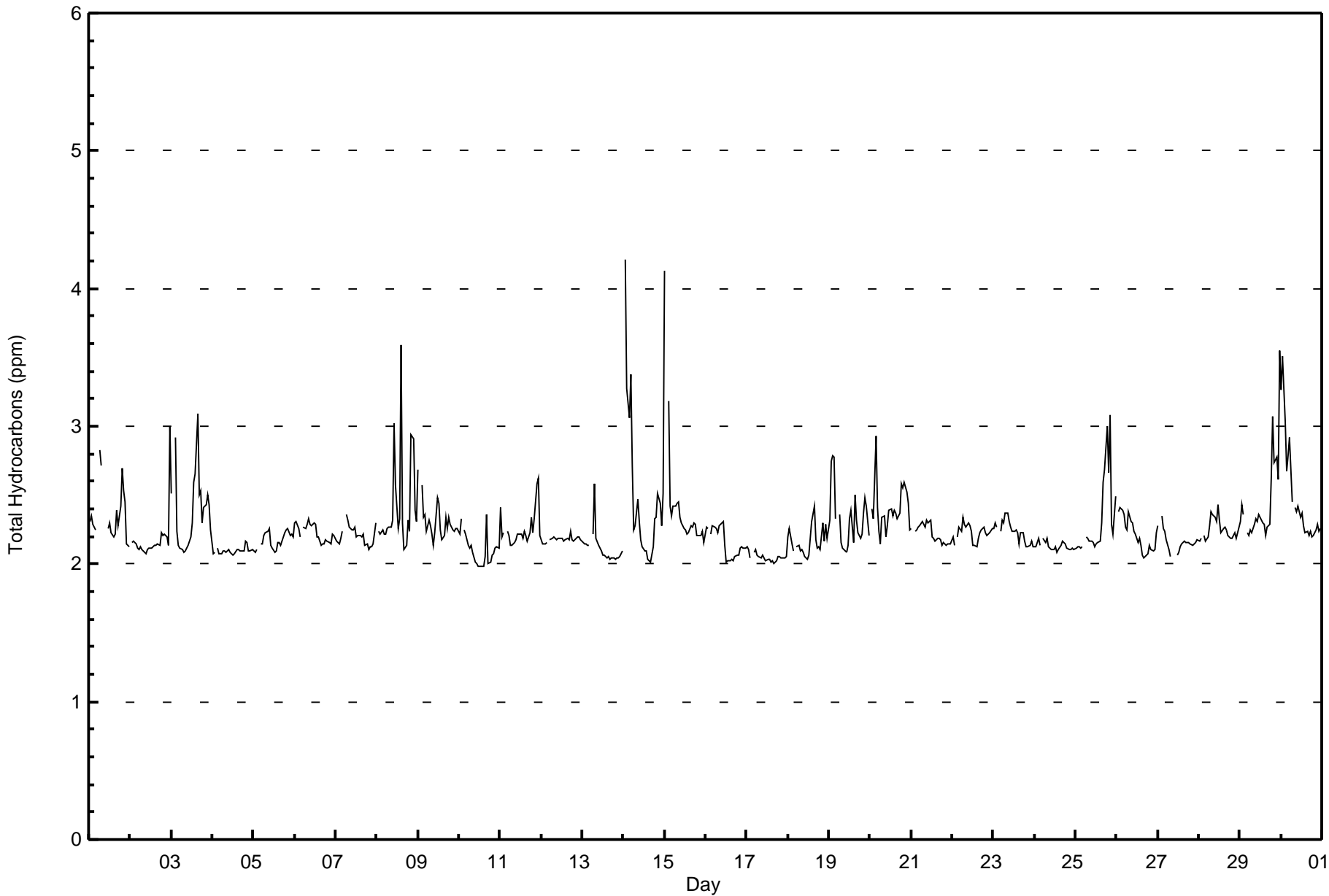
Total Number of Valid Hours: 671







| Maximum Value: 4.2 ppm on Sep 14 02:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.5 ppm on Sep 30 | | | | | Hours in Service: 720 | |
|--------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----------------|---------------------------------|---------------|
| Minimum Value: 2.0 ppm on Sep 10 15:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.1 ppm on Sep 17 | | | | | Hours of Data: 684 | |
| Maximum Diurnal Average: 2.4 ppm at hour 3 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.2 ppm at hour 14 | | | | | Hours of Missing Data: 36 | |
| Monthly Average: 2.26 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 = 3.2 | | | | | Hours of Calibration: 36 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | Z | 2.8 | 2.7 | C | C | C | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.4 | 2.3 | 2.4 | 2.7 | 2.5 | 2.4 | 2.1 | 2.1 | 2.4 | 2.8 |
| 2-Sep | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 3.0 | 2.2 | 3.0 |
| 3-Sep | 2.5 | Z | 2.9 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.6 | 2.7 | 3.1 | 2.5 | 2.5 | 2.3 | 2.4 | 2.4 | 2.5 | 2.4 | 2.2 | 2.4 | 3.1 |
| 4-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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| 5-Sep | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| 6-Sep | 2.3 | 2.3 | 2.3 | 2.2 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| 7-Sep | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | Z | 2.4 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.4 |
| 8-Sep | Z | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 3.0 | 2.6 | 2.3 | 2.3 | 3.6 | 2.3 | 2.1 | 2.1 | 2.3 | 2.2 | 2.9 | 2.9 | 2.4 | 2.3 | 2.4 | 3.6 |
| 9-Sep | 2.7 | Z | 2.6 | 2.3 | 2.4 | 2.2 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 2.5 | 2.4 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.7 |
| 10-Sep | 2.2 | 2.3 | Z | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.4 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.4 |
| 11-Sep | 2.4 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.6 | 2.6 | 2.2 | 2.3 | 2.6 |
| 12-Sep | 2.2 | 2.1 | 2.1 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 13-Sep | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.6 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.6 |
| 14-Sep | Z | 4.2 | 3.3 | 3.1 | 3.4 | 2.7 | 2.2 | 2.3 | 2.5 | 2.3 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.3 | 2.3 | 2.3 | 2.5 | 2.4 | 2.3 | 2.5 | 2.5 | 4.2 |
| 15-Sep | 4.1 | Z | 3.2 | 2.4 | 2.3 | 2.4 | 2.4 | 2.4 | 2.5 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 | 4.1 |
| 16-Sep | 2.3 | 2.3 | Z | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 |
| 17-Sep | 2.1 | 2.1 | 2.0 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 |
| 18-Sep | 2.2 | 2.3 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.4 |
| 19-Sep | 2.3 | 2.7 | 2.8 | 2.8 | 2.3 | Z | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.4 | 2.2 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.4 | 2.5 | 2.4 | 2.2 | 2.3 | 2.8 |
| 20-Sep | Z | 2.4 | 2.3 | 2.9 | 2.4 | 2.2 | 2.1 | 2.3 | 2.4 | 2.2 | 2.3 | 2.4 | 2.4 | 2.3 | 2.4 | 2.4 | 2.3 | 2.4 | 2.6 | 2.6 | 2.6 | 2.5 | 2.4 | 2.2 | 2.4 | 2.9 |
| 21-Sep | 2.3 | Z | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 |
| 22-Sep | 2.2 | 2.1 | Z | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 |
| 23-Sep | 2.3 | 2.3 | 2.3 | Z | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.4 |
| 24-Sep | 2.1 | 2.1 | 2.2 | 2.1 | Z | 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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| 25-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.6 | 2.7 | 3.0 | 2.7 | 3.1 | 2.3 | 2.2 | 2.5 | 2.3 | 3.1 |
| 26-Sep | Z | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.2 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 |
| 27-Sep | 2.3 | Z | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | C | C | C | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 |
| 28-Sep | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.4 | 2.3 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 |
| 29-Sep | 2.3 | 2.4 | 2.4 | Z | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.6 | 3.1 | 2.7 | 2.8 | 2.6 | 3.5 | 2.4 | 3.5 |
| 30-Sep | 3.3 | 3.5 | 3.0 | 2.7 | 2.8 | 2.9 | 2.5 | Z | 2.4 | 2.4 | 2.4 | 2.3 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.3 | 2.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 38 | 5.56 | 5.56 |
| 2.1 - 3.0 | 633 | 92.54 | 98.10 |
| 3.1 - 10.0 | 13 | 1.90 | 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
Mannix - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 5 | 17 | 8 | 0 | 0 | 0 | 38 |
| 2.1 - 3.0 | 25 | 11 | 3 | 5 | 9 | 21 | 96 | 113 | 44 | 35 | 31 | 41 | 82 | 37 | 24 | 53 | 630 |
| 3.1 - 10.0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 6 | 0 | 13 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 11 | 4 | 6 | 9 | 21 | 96 | 114 | 46 | 40 | 36 | 59 | 90 | 40 | 30 | 53 | 681 |

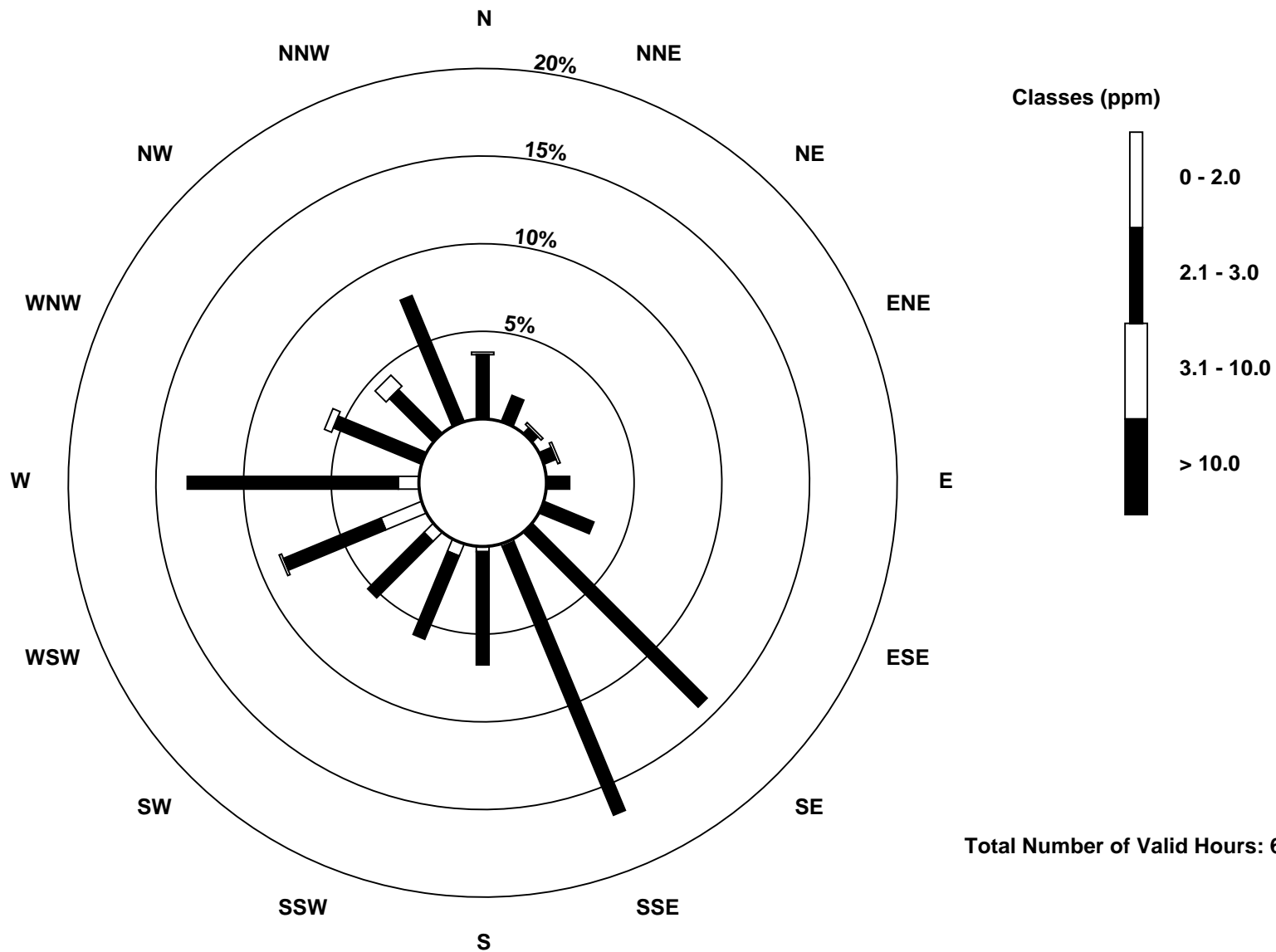
Total Number of Valid Hours: 681

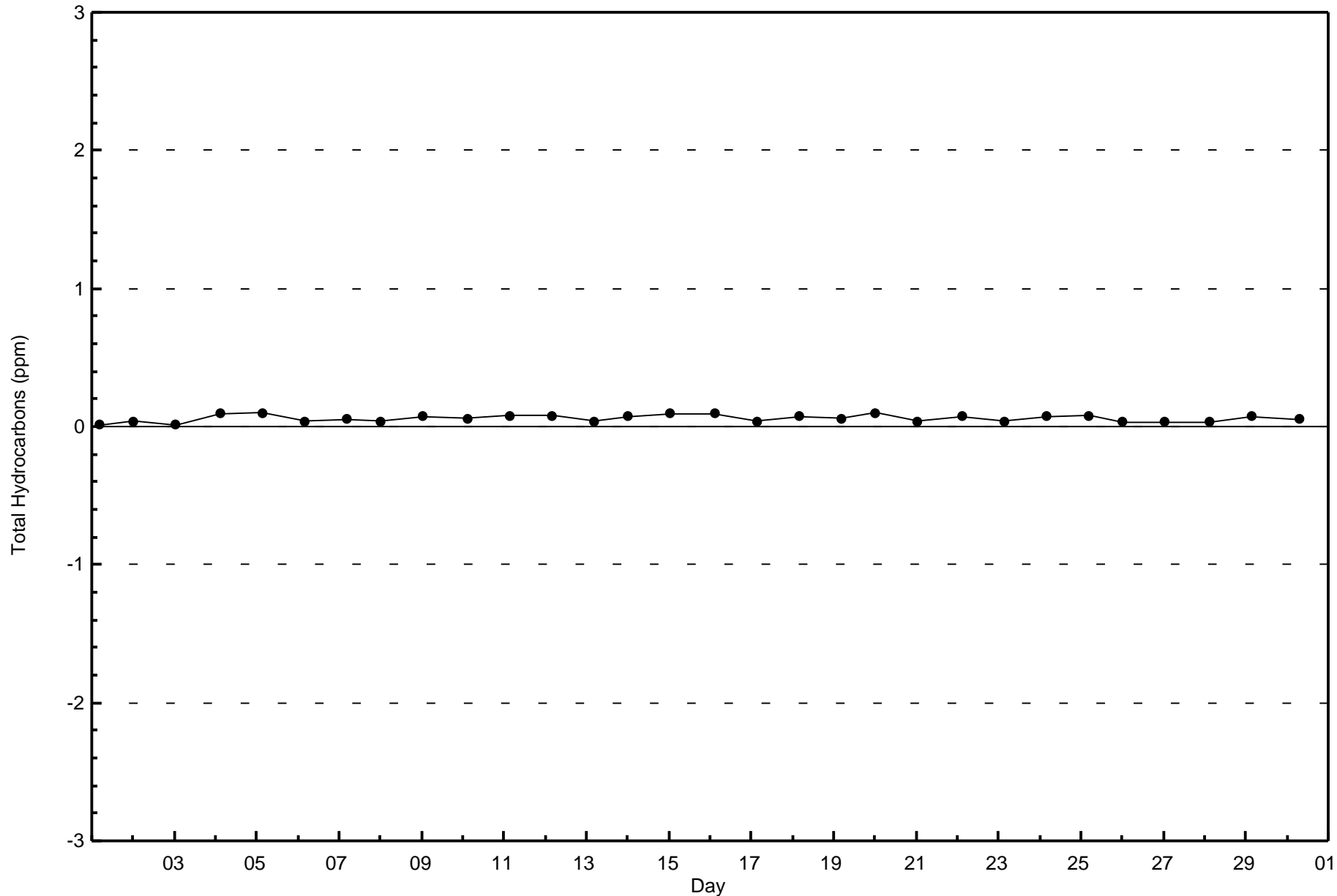
Total Number of Hours: 720

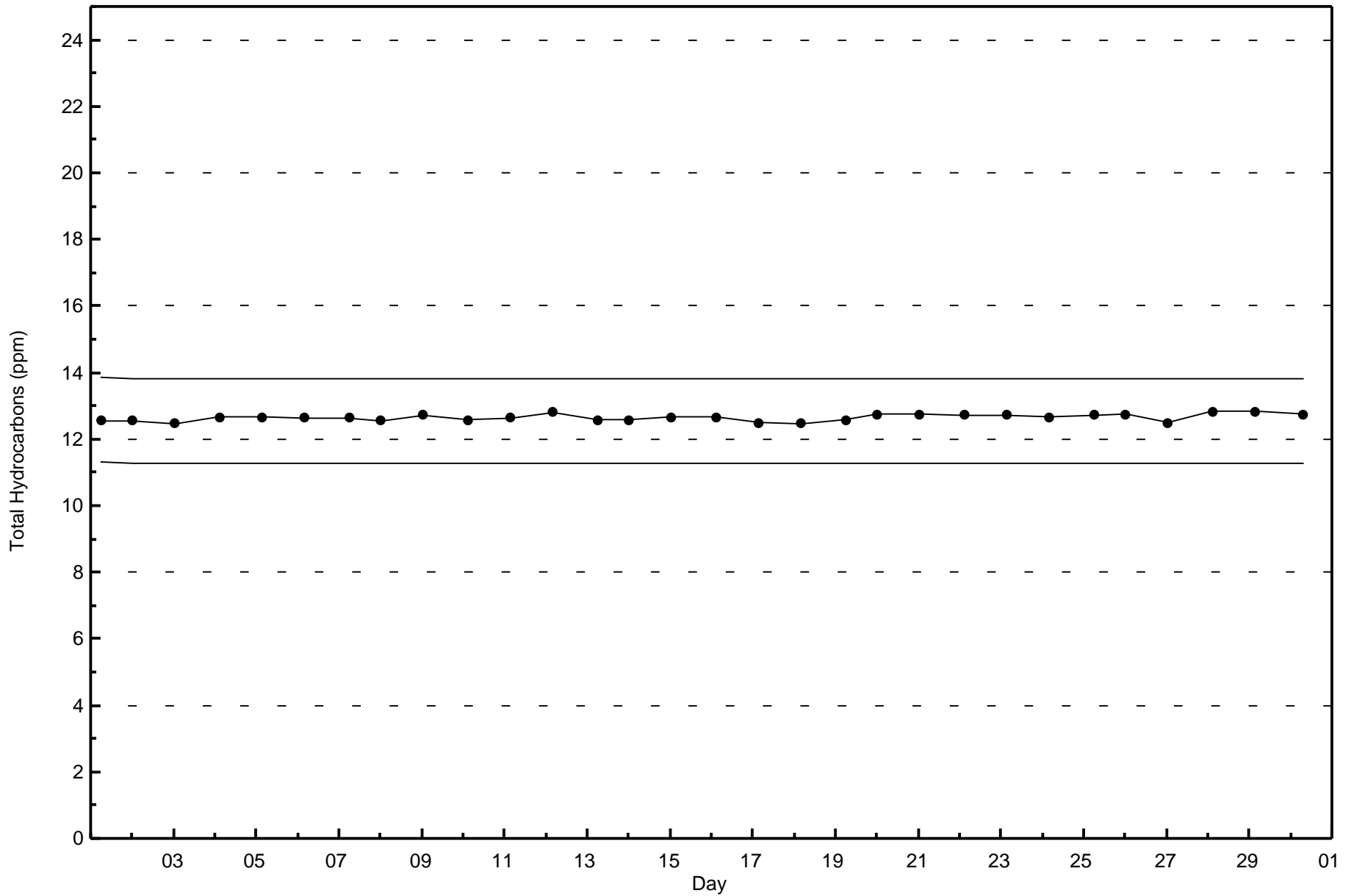


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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

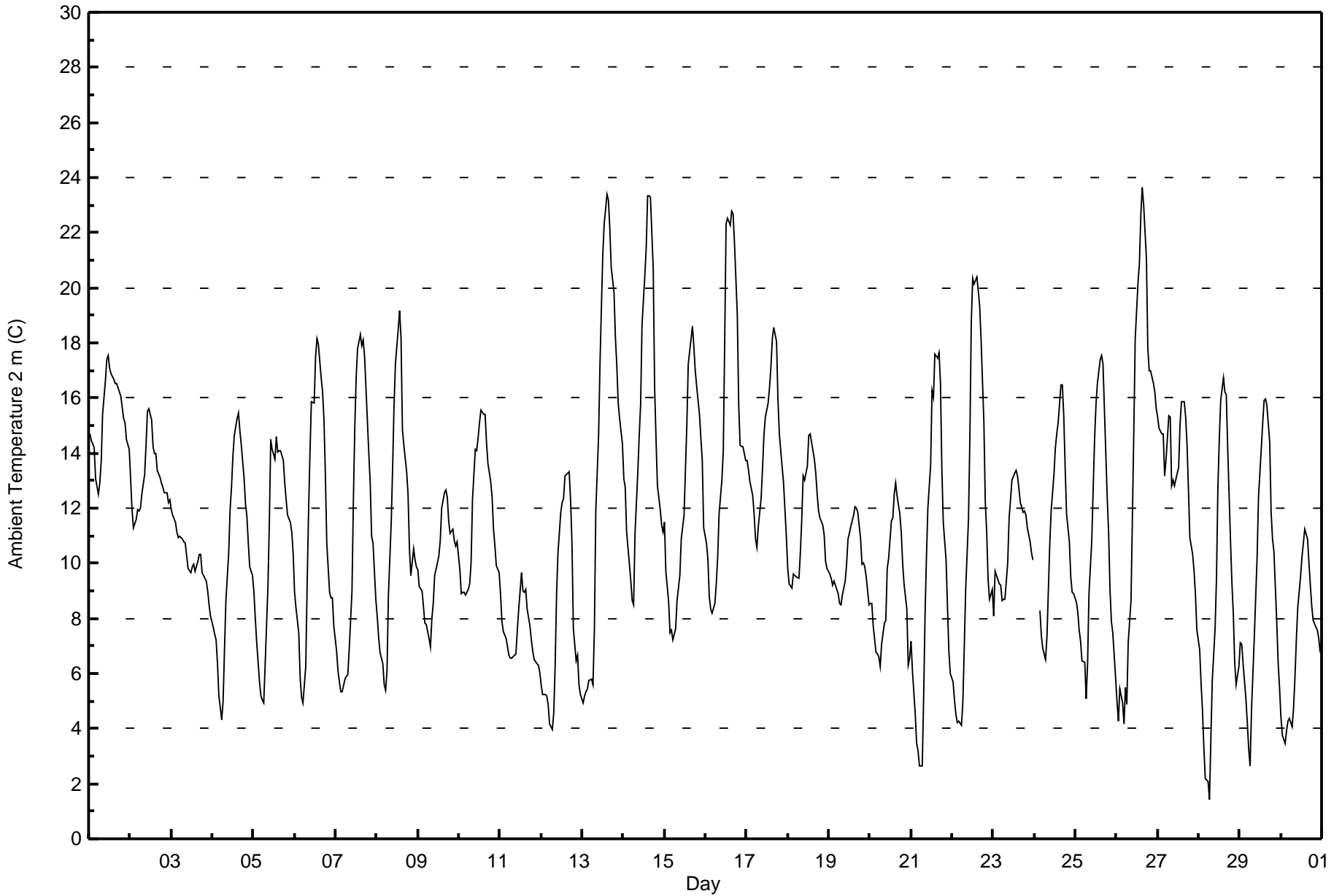








| Maximum Value: 23.6 C on Sep 26 16:00 | | Maximum Daily Average: 15.3 C on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------------------------------------------------------------------------------------------------------------------------|---------------|---------------|
| Minimum Value: 1.4 C on Sep 28 07:00 | | Minimum Daily Average: 7.2 C on Sep 30 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.1 C at hour 15 | | Minimum Diurnal Average: 7.1 C at hour 6 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.28 C | | Percentiles: P ₁ = 3.2 P ₁₀ = 5.7 Q ₁ = 8.2 Median = 10.9 Q ₃ = 14.2 P ₉₀ = 17.0 P ₉₉ = 23.0 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 14.7 | 14.5 | 14.3 | 14.2 | 13.1 | 12.5 | 12.9 | 13.7 | 15.4 | 16.6 | 17.4 | 17.5 | 17.1 | 16.9 | 16.7 | 16.5 | 16.5 | 16.4 | 16.1 | 15.7 | 15.2 | 15.1 | 14.5 | 14.1 | 15.3 | 17.5 |
| 2-Sep | 13.1 | 11.9 | 11.3 | 11.6 | 12.0 | 11.9 | 12.0 | 12.5 | 13.2 | 14.3 | 15.5 | 15.6 | 15.2 | 14.2 | 14.0 | 14.0 | 13.3 | 13.1 | 12.9 | 12.8 | 12.6 | 12.6 | 12.2 | 12.3 | 13.1 | 15.6 |
| 3-Sep | 12.0 | 11.8 | 11.5 | 11.1 | 10.9 | 11.0 | 10.9 | 10.8 | 10.7 | 10.2 | 9.8 | 9.7 | 9.9 | 10.0 | 9.7 | 10.1 | 10.3 | 10.3 | 9.7 | 9.6 | 9.4 | 9.0 | 8.5 | 8.1 | 10.2 | 12.0 |
| 4-Sep | 7.7 | 7.4 | 7.2 | 6.3 | 5.2 | 4.3 | 5.0 | 6.9 | 8.6 | 10.4 | 12.0 | 12.8 | 13.9 | 14.6 | 15.2 | 15.4 | 14.8 | 14.3 | 13.1 | 12.1 | 11.7 | 10.7 | 9.9 | 9.5 | 10.4 | 15.4 |
| 5-Sep | 8.9 | 8.0 | 7.1 | 5.7 | 5.2 | 5.0 | 4.9 | 6.3 | 9.1 | 11.4 | 14.5 | 14.2 | 13.8 | 14.6 | 14.0 | 14.1 | 14.1 | 13.7 | 12.9 | 12.3 | 11.8 | 11.5 | 11.1 | 10.4 | 10.6 | 14.6 |
| 6-Sep | 8.9 | 8.4 | 7.5 | 5.8 | 5.1 | 4.9 | 6.2 | 9.3 | 11.8 | 14.0 | 15.9 | 15.8 | 17.5 | 18.1 | 17.9 | 16.7 | 16.2 | 15.2 | 13.2 | 10.7 | 9.0 | 8.7 | 8.7 | 7.7 | 11.4 | 18.1 |
| 7-Sep | 6.8 | 6.1 | 5.7 | 5.3 | 5.3 | 5.8 | 5.9 | 5.9 | 6.9 | 9.0 | 12.3 | 14.9 | 16.8 | 17.8 | 18.3 | 17.9 | 18.1 | 17.5 | 15.1 | 14.0 | 12.9 | 11.0 | 10.7 | 8.7 | 11.2 | 18.3 |
| 8-Sep | 8.1 | 7.3 | 6.8 | 6.3 | 5.6 | 5.4 | 6.1 | 8.8 | 11.5 | 13.5 | 15.7 | 17.3 | 18.5 | 19.1 | 18.1 | 14.8 | 14.3 | 13.3 | 12.5 | 10.5 | 9.6 | 10.5 | 10.1 | 9.9 | 11.4 | 19.1 |
| 9-Sep | 9.8 | 9.1 | 9.0 | 8.5 | 7.8 | 7.8 | 7.3 | 7.0 | 8.0 | 8.6 | 9.5 | 10.0 | 10.3 | 10.8 | 12.0 | 12.6 | 12.7 | 12.4 | 11.6 | 11.1 | 11.2 | 10.9 | 10.6 | 10.8 | 10.0 | 12.7 |
| 10-Sep | 9.8 | 8.9 | 8.9 | 9.0 | 8.9 | 9.0 | 9.3 | 10.0 | 12.3 | 14.2 | 14.1 | 14.6 | 15.1 | 15.5 | 15.4 | 15.4 | 14.4 | 13.6 | 13.0 | 12.4 | 11.2 | 10.6 | 9.9 | 9.7 | 11.9 | 15.5 |
| 11-Sep | 8.9 | 7.9 | 7.5 | 7.3 | 7.0 | 6.7 | 6.6 | 6.6 | 6.6 | 6.7 | 7.6 | 8.4 | 9.7 | 9.0 | 8.9 | 9.1 | 8.3 | 7.7 | 7.2 | 6.8 | 6.5 | 6.4 | 6.3 | 6.0 | 7.5 | 9.7 |
| 12-Sep | 5.6 | 5.2 | 5.2 | 5.2 | 4.9 | 4.2 | 4.0 | 4.6 | 6.3 | 8.8 | 10.4 | 11.9 | 12.2 | 12.4 | 13.2 | 13.3 | 13.3 | 12.3 | 10.7 | 7.6 | 6.5 | 6.6 | 5.6 | 5.2 | 8.1 | 13.3 |
| 13-Sep | 4.9 | 5.2 | 5.4 | 5.4 | 5.7 | 5.8 | 5.6 | 7.6 | 11.9 | 14.6 | 17.2 | 19.3 | 21.2 | 22.3 | 23.4 | 23.2 | 22.2 | 20.8 | 19.8 | 18.2 | 17.2 | 15.8 | 15.3 | 14.4 | 14.3 | 23.4 |
| 14-Sep | 13.1 | 12.7 | 11.1 | 9.9 | 9.4 | 8.7 | 8.5 | 11.1 | 13.3 | 14.7 | 15.8 | 18.7 | 20.4 | 21.4 | 23.3 | 23.4 | 23.3 | 20.7 | 16.4 | 14.5 | 12.8 | 12.0 | 11.4 | 11.1 | 14.9 | 23.4 |
| 15-Sep | 11.5 | 9.7 | 8.6 | 7.5 | 7.6 | 7.2 | 7.6 | 8.7 | 9.1 | 9.5 | 10.9 | 11.7 | 13.4 | 15.0 | 17.2 | 18.2 | 18.6 | 17.9 | 17.0 | 16.4 | 15.4 | 14.5 | 13.7 | 11.3 | 12.4 | 18.6 |
| 16-Sep | 10.7 | 10.2 | 8.8 | 8.3 | 8.2 | 8.5 | 9.3 | 10.2 | 11.8 | 13.0 | 14.1 | 18.0 | 22.3 | 22.5 | 22.3 | 22.8 | 22.7 | 21.6 | 19.0 | 15.8 | 14.3 | 14.2 | 14.2 | 13.7 | 14.9 | 22.8 |
| 17-Sep | 13.7 | 13.4 | 13.0 | 12.4 | 11.8 | 10.9 | 10.6 | 11.4 | 12.4 | 13.4 | 14.6 | 15.3 | 15.8 | 16.4 | 17.1 | 18.1 | 18.6 | 18.1 | 15.9 | 14.7 | 14.1 | 12.9 | 11.9 | 11.0 | 14.1 | 18.6 |
| 18-Sep | 9.8 | 9.2 | 9.1 | 9.6 | 9.5 | 9.5 | 9.5 | 10.4 | 11.6 | 13.1 | 13.0 | 13.5 | 14.6 | 14.7 | 14.4 | 13.8 | 13.3 | 12.5 | 11.9 | 11.6 | 11.4 | 11.0 | 10.1 | 9.8 | 11.5 | 14.7 |
| 19-Sep | 9.6 | 9.5 | 9.2 | 9.4 | 9.2 | 8.9 | 8.5 | 8.5 | 8.9 | 9.3 | 9.9 | 10.9 | 11.1 | 11.3 | 11.7 | 12.0 | 12.0 | 11.8 | 10.9 | 10.0 | 10.0 | 9.9 | 9.5 | 8.5 | 10.0 | 12.0 |
| 20-Sep | 8.5 | 8.5 | 7.7 | 6.8 | 6.7 | 6.6 | 6.2 | 7.1 | 7.8 | 7.9 | 9.8 | 10.2 | 11.5 | 11.7 | 12.5 | 12.9 | 12.5 | 11.8 | 11.1 | 10.0 | 9.3 | 8.3 | 6.3 | 6.5 | 9.1 | 12.9 |
| 21-Sep | 7.2 | 6.1 | 4.5 | 3.4 | 3.2 | 2.6 | 2.6 | 5.1 | 8.1 | 10.2 | 12.0 | 13.6 | 16.3 | 16.0 | 17.6 | 17.4 | 17.7 | 16.5 | 13.4 | 11.5 | 10.1 | 8.4 | 6.8 | 6.0 | 9.9 | 17.7 |
| 22-Sep | 5.7 | 5.0 | 4.5 | 4.2 | 4.3 | 4.1 | 5.0 | 7.0 | 9.0 | 11.6 | 14.6 | 18.8 | 20.3 | 20.2 | 20.4 | 19.9 | 19.3 | 18.1 | 15.1 | 12.2 | 11.1 | 9.4 | 8.7 | 9.0 | 11.6 | 20.4 |
| 23-Sep | 8.1 | 9.7 | 9.6 | 9.3 | 9.2 | 8.6 | 8.7 | 8.7 | 10.0 | 11.6 | 12.3 | 13.0 | 13.3 | 13.4 | 13.2 | 12.7 | 12.2 | 11.9 | 11.9 | 11.8 | 11.3 | 10.8 | 10.4 | 10.1 | 10.9 | 13.4 |
| 24-Sep | DF | DF | DF | 8.3 | 7.4 | 6.9 | 6.5 | 7.3 | 9.0 | 10.7 | 11.9 | 13.2 | 14.2 | 14.7 | 15.1 | 16.5 | 16.4 | 15.3 | 13.5 | 11.8 | 10.8 | 9.5 | 9.0 | 8.9 | 11.3 | 16.5 |
| 25-Sep | 8.6 | 8.2 | 7.6 | 7.2 | 6.5 | 6.4 | 5.1 | 6.4 | 8.9 | 10.8 | 12.7 | 14.5 | 15.8 | 16.5 | 17.4 | 17.6 | 17.2 | 15.6 | 12.4 | 11.1 | 9.0 | 7.9 | 7.5 | 5.8 | 10.7 | 17.6 |
| 26-Sep | 5.0 | 4.3 | 5.5 | 4.9 | 4.2 | 5.5 | 4.9 | 7.1 | 8.7 | 11.7 | 14.8 | 18.1 | 20.2 | 20.9 | 22.6 | 23.6 | 23.1 | 21.0 | 17.8 | 17.0 | 17.0 | 16.5 | 16.2 | 15.6 | 13.6 | 23.6 |
| 27-Sep | 15.3 | 14.9 | 14.7 | 14.7 | 13.2 | 13.8 | 15.4 | 15.3 | 12.8 | 13.0 | 12.8 | 13.3 | 13.5 | 15.1 | 15.9 | 15.9 | 15.3 | 14.3 | 12.6 | 10.9 | 10.3 | 9.7 | 8.8 | 7.6 | 13.3 | 15.9 |
| 28-Sep | 6.9 | 5.7 | 4.7 | 3.3 | 2.2 | 2.1 | 1.4 | 3.7 | 5.7 | 7.6 | 9.5 | 12.7 | 14.5 | 15.9 | 16.7 | 16.2 | 16.1 | 14.2 | 10.8 | 9.3 | 8.2 | 6.4 | 5.6 | 6.3 | 8.6 | 16.7 |
| 29-Sep | 7.1 | 7.1 | 6.3 | 5.1 | 4.2 | 3.2 | 2.7 | 4.7 | 7.3 | 8.8 | 10.2 | 12.4 | 14.2 | 15.1 | 15.9 | 16.0 | 15.7 | 14.4 | 11.8 | 10.9 | 10.4 | 7.9 | 6.4 | 5.5 | 9.3 | 16.0 |
| 30-Sep | 4.4 | 3.8 | 3.4 | 3.9 | 4.3 | 4.4 | 4.1 | 4.7 | 5.8 | 7.2 | 8.4 | 9.5 | 10.2 | 10.7 | 11.2 | 10.9 | 10.0 | 9.2 | 8.4 | 7.9 | 7.7 | 7.6 | 7.2 | 6.7 | 7.2 | 11.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.1 8.6 8.1 7.7 7.3 7.1 7.1 8.2 9.8 11.2 12.6 14.0 15.1 15.6 16.1 16.0 15.8 14.9 13.3 12.0 11.3 10.6 9.9 9.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 15.3 14.9 14.7 14.7 13.2 13.8 15.4 15.3 15.4 16.6 17.4 19.3 22.3 22.5 23.4 23.6 23.3 21.6 19.8 18.2 17.2 16.5 16.2 15.6 | | |
| DF - DAS Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 302 | 42.12 | 42.12 |
| 10 - 20 | 388 | 54.11 | 96.23 |
| > 20 | 27 | 3.77 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



Summary of Hour Averages

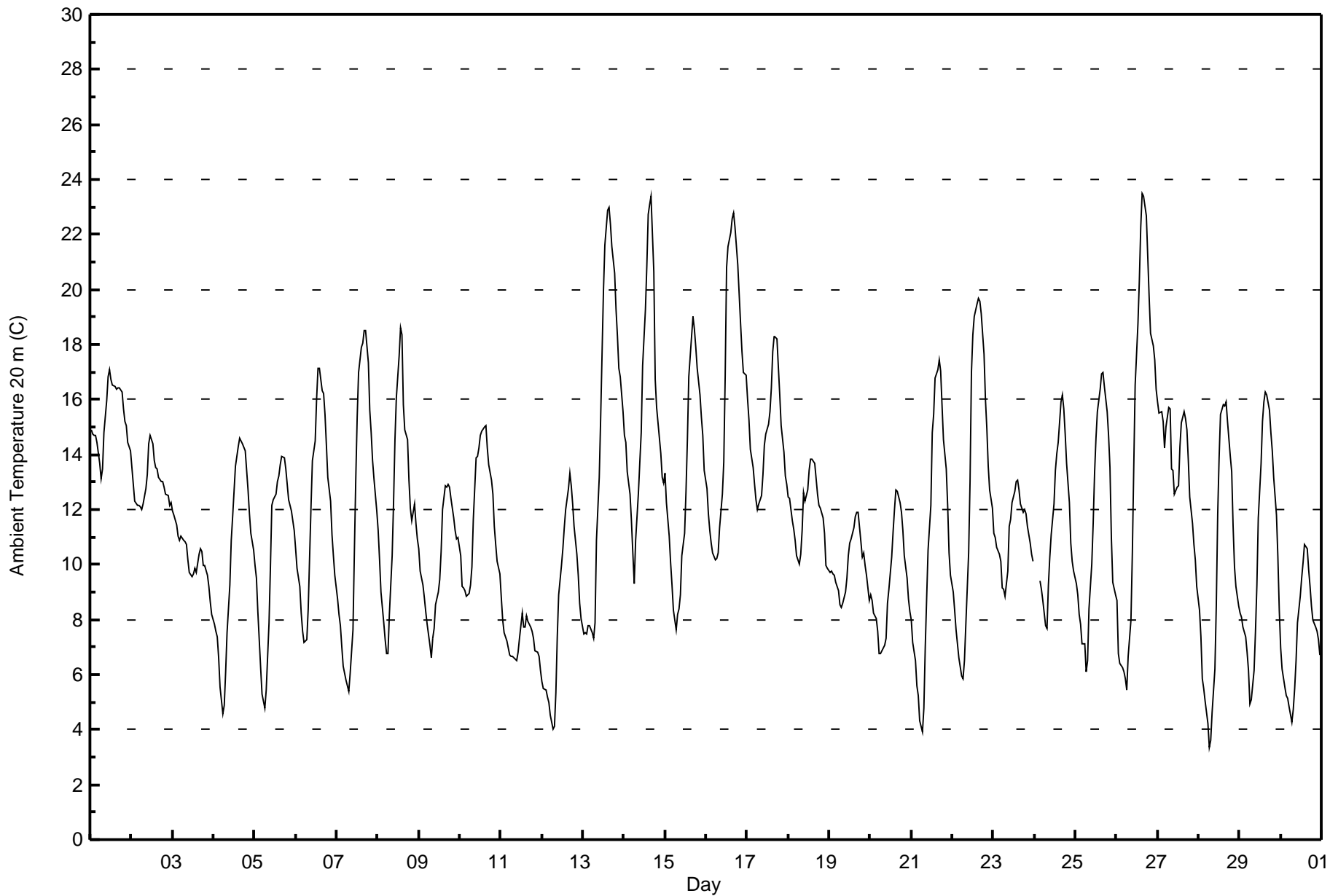
Mannix - September 2016

| Maximum Value: 23.5 C on Sep 26 16:00 | | Maximum Daily Average: 16.1 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 3.3 C on Sep 28 07:00 | | Minimum Daily Average: 7.3 C on Sep 11 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.8 C at hour 16 | | Minimum Diurnal Average: 7.7 C at hour 7 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.74 C | | Percentiles: P ₁ = 4.2 P ₁₀ = 6.7 Q ₁ = 8.7 Median = 11.6 Q ₃ = 14.4 P ₉₀ = 17.0 P ₉₉ = 22.7 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 14.9 | 14.8 | 14.7 | 14.7 | 14.4 | 13.7 | 13.1 | 13.5 | 14.8 | 15.9 | 16.8 | 17.1 | 16.7 | 16.5 | 16.5 | 16.4 | 16.4 | 16.4 | 16.2 | 15.7 | 15.2 | 15.0 | 14.4 | 14.2 | 15.3 | 17.1 |
| 2-Sep | 13.5 | 12.9 | 12.3 | 12.1 | 12.1 | 12.1 | 12.0 | 12.2 | 12.8 | 13.3 | 14.4 | 14.7 | 14.4 | 13.8 | 13.5 | 13.5 | 13.1 | 13.0 | 13.0 | 12.8 | 12.6 | 12.5 | 12.1 | 12.3 | 13.0 | 14.7 |
| 3-Sep | 11.9 | 11.8 | 11.5 | 11.1 | 10.9 | 11.0 | 10.9 | 10.8 | 10.7 | 10.2 | 9.7 | 9.6 | 9.7 | 9.9 | 9.7 | 10.4 | 10.6 | 10.5 | 10.0 | 10.0 | 9.6 | 9.2 | 8.7 | 8.2 | 10.3 | 11.9 |
| 4-Sep | 7.9 | 7.6 | 7.4 | 6.6 | 5.5 | 4.6 | 4.9 | 6.1 | 7.5 | 9.3 | 10.9 | 11.7 | 12.7 | 13.6 | 14.3 | 14.6 | 14.5 | 14.4 | 14.1 | 13.4 | 12.7 | 11.8 | 11.1 | 10.5 | 10.3 | 14.6 |
| 5-Sep | 10.0 | 9.5 | 8.3 | 6.3 | 5.3 | 5.0 | 4.8 | 5.5 | 7.9 | 9.9 | 12.2 | 12.3 | 12.6 | 13.0 | 13.2 | 13.6 | 13.9 | 13.9 | 13.5 | 12.9 | 12.4 | 11.9 | 11.6 | 11.2 | 10.4 | 13.9 |
| 6-Sep | 10.6 | 9.9 | 9.2 | 8.3 | 7.6 | 7.2 | 7.3 | 8.4 | 10.3 | 12.1 | 13.8 | 14.5 | 16.0 | 17.1 | 17.2 | 16.3 | 16.2 | 15.4 | 14.3 | 13.2 | 12.3 | 11.1 | 10.3 | 9.6 | 12.0 | 17.2 |
| 7-Sep | 8.8 | 8.2 | 7.8 | 7.0 | 6.3 | 5.8 | 5.6 | 5.4 | 6.0 | 7.7 | 10.5 | 13.1 | 15.4 | 17.0 | 17.9 | 18.0 | 18.5 | 18.5 | 17.4 | 15.6 | 14.8 | 13.8 | 13.1 | 11.9 | 11.8 | 18.5 |
| 8-Sep | 11.3 | 10.2 | 9.0 | 7.9 | 7.3 | 6.8 | 6.8 | 8.2 | 10.3 | 12.2 | 14.6 | 16.1 | 17.6 | 18.6 | 18.3 | 15.8 | 14.9 | 14.6 | 13.0 | 12.0 | 11.6 | 12.2 | 11.5 | 11.0 | 12.2 | 18.6 |
| 9-Sep | 10.6 | 9.7 | 9.3 | 8.8 | 8.3 | 7.8 | 7.1 | 6.6 | 7.3 | 7.7 | 8.6 | 9.0 | 9.5 | 10.5 | 12.0 | 12.9 | 12.8 | 12.9 | 12.8 | 12.4 | 11.7 | 11.2 | 10.9 | 11.0 | 10.1 | 12.9 |
| 10-Sep | 10.3 | 9.2 | 9.2 | 9.0 | 8.8 | 9.0 | 9.3 | 9.9 | 11.7 | 13.9 | 13.9 | 14.2 | 14.7 | 14.8 | 15.0 | 15.1 | 14.3 | 13.6 | 13.1 | 12.5 | 11.4 | 10.7 | 10.1 | 9.6 | 11.8 | 15.1 |
| 11-Sep | 8.8 | 8.0 | 7.5 | 7.2 | 7.0 | 6.7 | 6.6 | 6.6 | 6.6 | 6.5 | 6.8 | 7.3 | 8.2 | 7.7 | 7.8 | 8.1 | 7.9 | 7.7 | 7.6 | 7.3 | 6.9 | 6.8 | 6.6 | 6.2 | 7.3 | 8.8 |
| 12-Sep | 5.7 | 5.5 | 5.4 | 5.2 | 5.0 | 4.5 | 4.0 | 4.1 | 5.3 | 7.4 | 8.9 | 10.0 | 10.6 | 11.4 | 12.0 | 12.8 | 13.3 | 12.8 | 12.2 | 11.4 | 10.4 | 9.6 | 8.6 | 8.0 | 8.5 | 13.3 |
| 13-Sep | 7.5 | 7.5 | 7.5 | 7.8 | 7.8 | 7.5 | 7.3 | 7.9 | 10.9 | 13.2 | 15.3 | 17.6 | 19.9 | 21.6 | 22.9 | 23.0 | 22.4 | 21.6 | 20.6 | 19.3 | 18.3 | 17.2 | 16.8 | 15.6 | 14.9 | 23.0 |
| 14-Sep | 14.7 | 14.4 | 13.3 | 12.6 | 11.6 | 10.4 | 9.3 | 10.9 | 12.6 | 13.8 | 14.8 | 17.2 | 19.3 | 20.9 | 22.7 | 23.1 | 23.4 | 20.6 | 16.7 | 15.7 | 15.1 | 14.0 | 13.2 | 13.0 | 15.6 | 23.4 |
| 15-Sep | 13.3 | 12.3 | 11.0 | 10.1 | 9.3 | 8.3 | 7.6 | 8.2 | 8.4 | 8.9 | 10.3 | 11.1 | 12.7 | 14.5 | 16.9 | 18.3 | 19.0 | 18.6 | 17.9 | 17.2 | 16.2 | 15.4 | 14.7 | 13.4 | 13.1 | 19.0 |
| 16-Sep | 12.8 | 11.9 | 11.2 | 10.8 | 10.4 | 10.2 | 10.2 | 10.4 | 11.3 | 12.6 | 13.7 | 16.8 | 20.8 | 21.6 | 22.1 | 22.6 | 22.8 | 22.3 | 20.9 | 19.8 | 18.8 | 17.7 | 17.0 | 16.9 | 16.1 | 22.8 |
| 17-Sep | 16.0 | 15.2 | 14.2 | 13.5 | 12.9 | 12.4 | 12.0 | 12.2 | 12.5 | 13.3 | 14.3 | 14.7 | 15.1 | 15.6 | 16.4 | 17.7 | 18.3 | 18.2 | 17.2 | 16.2 | 15.0 | 14.1 | 13.2 | 12.9 | 14.7 | 18.3 |
| 18-Sep | 12.5 | 12.4 | 11.6 | 11.3 | 10.9 | 10.3 | 10.0 | 10.4 | 11.2 | 12.6 | 12.3 | 12.7 | 13.4 | 13.8 | 13.8 | 13.7 | 13.1 | 12.6 | 12.2 | 12.0 | 11.7 | 11.1 | 10.0 | 9.9 | 11.9 | 13.8 |
| 19-Sep | 9.7 | 9.8 | 9.6 | 9.6 | 9.4 | 9.0 | 8.5 | 8.5 | 8.6 | 9.0 | 9.5 | 10.3 | 10.8 | 11.0 | 11.4 | 11.8 | 11.9 | 11.9 | 10.8 | 10.3 | 10.4 | 10.0 | 9.6 | 8.7 | 10.0 | 11.9 |
| 20-Sep | 8.9 | 8.7 | 8.2 | 8.0 | 7.6 | 6.8 | 6.8 | 6.9 | 7.1 | 7.3 | 8.6 | 9.1 | 10.3 | 11.2 | 12.0 | 12.7 | 12.7 | 12.3 | 11.9 | 11.3 | 10.3 | 9.5 | 8.7 | 8.3 | 9.4 | 12.7 |
| 21-Sep | 8.0 | 7.2 | 6.5 | 5.6 | 5.2 | 4.3 | 3.9 | 4.8 | 7.0 | 8.8 | 10.5 | 12.1 | 14.8 | 15.5 | 16.8 | 17.1 | 17.5 | 17.0 | 15.8 | 14.5 | 13.5 | 12.1 | 10.4 | 9.6 | 10.8 | 17.5 |
| 22-Sep | 9.0 | 8.3 | 7.6 | 7.1 | 6.6 | 6.0 | 5.8 | 6.5 | 7.8 | 10.4 | 13.0 | 17.0 | 18.4 | 19.0 | 19.5 | 19.7 | 19.6 | 19.1 | 17.7 | 16.0 | 15.0 | 13.6 | 12.7 | 12.1 | 12.8 | 19.7 |
| 23-Sep | 11.2 | 11.0 | 10.6 | 10.4 | 10.1 | 9.2 | 9.1 | 8.8 | 9.8 | 11.4 | 11.6 | 12.3 | 12.7 | 13.0 | 13.0 | 12.7 | 12.2 | 11.9 | 12.0 | 11.9 | 11.4 | 10.8 | 10.3 | 10.1 | 11.1 | 13.0 |
| 24-Sep | DF | DF | DF | 9.4 | 9.1 | 8.7 | 7.8 | 7.7 | 9.2 | 10.3 | 11.1 | 12.2 | 13.4 | 14.0 | 14.4 | 15.9 | 16.2 | 15.7 | 14.7 | 13.7 | 12.3 | 10.8 | 10.1 | 9.7 | 11.7 | 16.2 |
| 25-Sep | 9.3 | 8.9 | 8.2 | 7.8 | 7.1 | 7.1 | 6.1 | 6.5 | 8.4 | 10.0 | 11.5 | 13.3 | 14.6 | 15.5 | 16.4 | 16.9 | 17.0 | 16.5 | 15.6 | 14.7 | 13.5 | 11.0 | 9.4 | 8.9 | 11.4 | 17.0 |
| 26-Sep | 8.7 | 6.8 | 6.4 | 6.2 | 6.1 | 5.8 | 5.4 | 6.6 | 8.0 | 10.4 | 13.5 | 16.5 | 18.8 | 20.3 | 22.2 | 23.5 | 23.4 | 22.7 | 21.2 | 19.7 | 18.4 | 18.0 | 17.5 | 16.4 | 14.3 | 23.5 |
| 27-Sep | 15.9 | 15.5 | 15.5 | 15.2 | 14.2 | 15.0 | 15.7 | 15.7 | 13.5 | 13.4 | 12.6 | 12.8 | 12.9 | 14.3 | 15.2 | 15.5 | 15.3 | 14.9 | 13.8 | 12.5 | 11.5 | 10.7 | 10.2 | 9.2 | 13.8 | 15.9 |
| 28-Sep | 8.3 | 7.4 | 5.9 | 5.5 | 5.0 | 4.2 | 3.3 | 3.6 | 4.6 | 6.2 | 8.6 | 11.8 | 13.9 | 15.5 | 15.8 | 15.8 | 15.9 | 15.2 | 14.0 | 13.4 | 11.4 | 9.9 | 9.2 | 8.5 | 9.7 | 15.9 |
| 29-Sep | 8.3 | 8.1 | 7.7 | 7.4 | 6.8 | 6.2 | 4.9 | 5.1 | 6.2 | 7.6 | 9.3 | 11.7 | 13.7 | 15.2 | 15.9 | 16.3 | 16.2 | 15.6 | 14.8 | 14.1 | 13.2 | 11.8 | 10.3 | 8.3 | 10.6 | 16.3 |
| 30-Sep | 7.0 | 6.2 | 5.6 | 5.2 | 5.1 | 4.8 | 4.3 | 4.7 | 5.5 | 6.5 | 7.9 | 8.8 | 9.5 | 10.1 | 10.7 | 10.6 | 9.8 | 9.2 | 8.5 | 8.0 | 7.7 | 7.6 | 7.3 | 6.7 | 7.4 | 10.7 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| DF - DAS Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 260 | 36.26 | 36.26 |
| 10 - 20 | 433 | 60.39 | 96.65 |
| > 20 | 24 | 3.35 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720

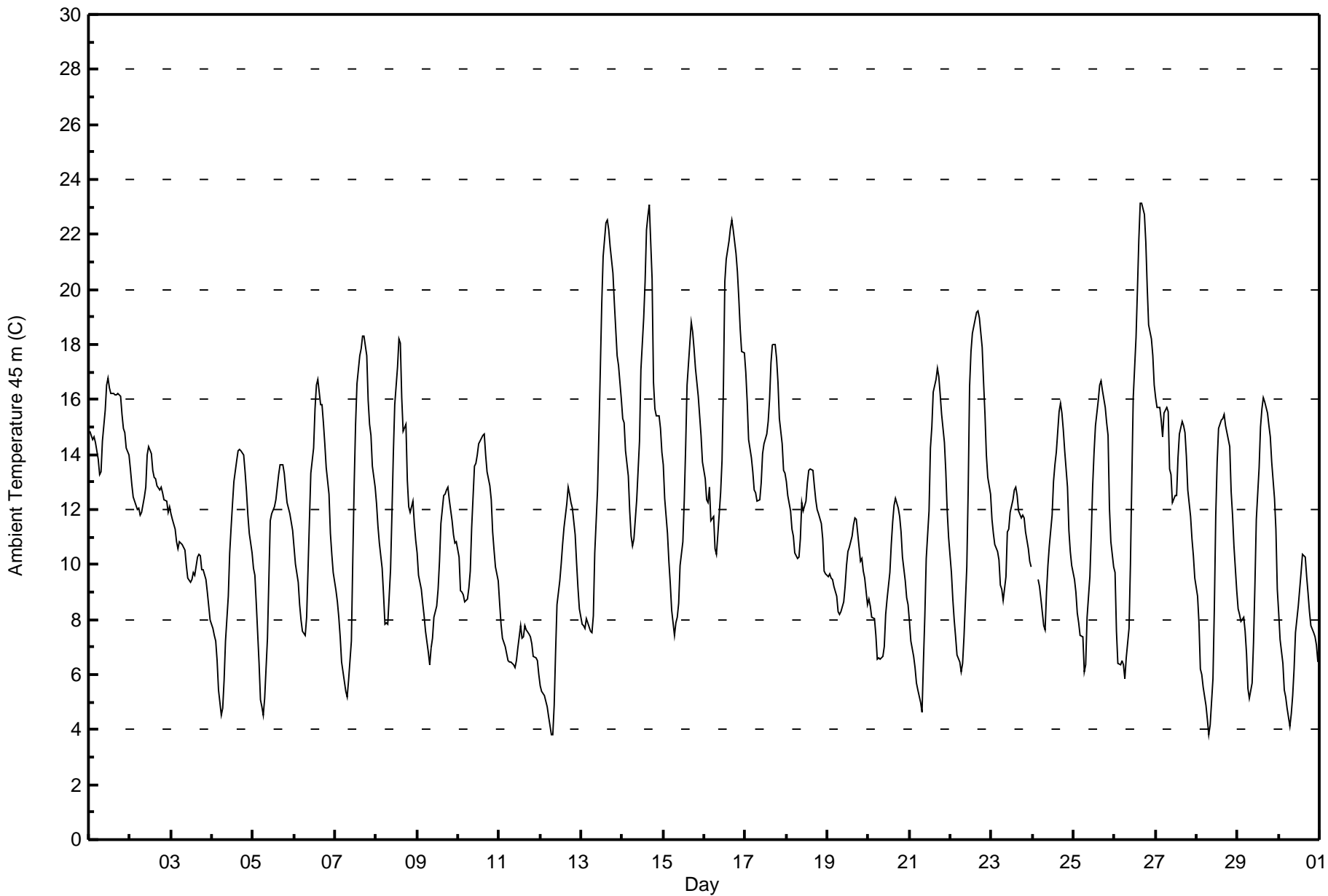


| Maximum Value: 23.1 C on Sep 26 17:00 | | Maximum Daily Average: 16.4 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------------------|---------------|---------------|
| Minimum Value: 3.8 C on Sep 28 08:00 | | Minimum Daily Average: 7.0 C on Sep 11 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.5 C at hour 17 | | Minimum Diurnal Average: 7.9 C at hour 7 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.71 C | | Percentiles: P ₁ = 4.5 P ₁₀ = 6.6 Q ₁ = 8.7 Median = 11.6 Q ₃ = 14.4 P ₉₀ = 16.7 P ₉₉ = 22.5 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 14.8 | 14.7 | 14.6 | 14.6 | 14.4 | 13.8 | 13.3 | 13.4 | 14.5 | 15.6 | 16.5 | 16.8 | 16.4 | 16.2 | 16.2 | 16.2 | 16.2 | 16.1 | 15.5 | 15.0 | 14.8 | 14.3 | 14.0 | 15.2 | 16.8 | |
| 2-Sep | 13.4 | 12.9 | 12.4 | 12.2 | 12.0 | 12.0 | 11.8 | 11.9 | 12.5 | 12.8 | 14.0 | 14.3 | 14.0 | 13.4 | 13.2 | 13.1 | 12.9 | 12.7 | 12.8 | 12.6 | 12.4 | 12.3 | 11.9 | 12.1 | 12.7 | 14.3 |
| 3-Sep | 11.8 | 11.7 | 11.3 | 10.8 | 10.6 | 10.8 | 10.7 | 10.6 | 10.5 | 10.0 | 9.5 | 9.4 | 9.4 | 9.7 | 9.6 | 10.3 | 10.4 | 10.3 | 9.8 | 9.8 | 9.4 | 9.0 | 8.5 | 8.0 | 10.1 | 11.8 |
| 4-Sep | 7.7 | 7.4 | 7.2 | 6.5 | 5.5 | 4.5 | 4.8 | 5.8 | 7.2 | 8.8 | 10.4 | 11.3 | 12.2 | 13.0 | 13.8 | 14.1 | 14.2 | 14.1 | 14.0 | 13.4 | 12.6 | 11.8 | 11.1 | 10.4 | 10.1 | 14.2 |
| 5-Sep | 9.9 | 9.6 | 8.6 | 6.4 | 5.1 | 4.8 | 4.5 | 5.1 | 7.3 | 9.4 | 11.6 | 11.9 | 12.1 | 12.4 | 12.8 | 13.3 | 13.6 | 13.6 | 13.3 | 12.8 | 12.3 | 11.8 | 11.5 | 11.2 | 10.2 | 13.6 |
| 6-Sep | 10.6 | 10.0 | 9.3 | 8.6 | 8.0 | 7.6 | 7.4 | 8.1 | 9.8 | 11.6 | 13.3 | 14.2 | 15.6 | 16.5 | 16.7 | 15.8 | 15.8 | 15.2 | 14.4 | 13.5 | 12.5 | 11.1 | 10.4 | 9.7 | 11.9 | 16.7 |
| 7-Sep | 9.0 | 8.7 | 8.1 | 7.4 | 6.4 | 5.7 | 5.4 | 5.2 | 5.8 | 7.2 | 10.2 | 12.9 | 15.1 | 16.6 | 17.6 | 17.8 | 18.3 | 18.3 | 17.6 | 16.0 | 15.1 | 14.7 | 13.6 | 12.8 | 11.9 | 18.3 |
| 8-Sep | 12.2 | 11.4 | 10.8 | 9.9 | 8.9 | 7.8 | 7.9 | 7.8 | 9.8 | 11.9 | 14.0 | 15.8 | 17.2 | 18.2 | 18.0 | 16.1 | 14.8 | 15.1 | 13.1 | 12.1 | 11.9 | 12.3 | 11.5 | 10.9 | 12.5 | 18.2 |
| 9-Sep | 10.4 | 9.6 | 9.1 | 8.6 | 8.1 | 7.6 | 6.8 | 6.3 | 7.0 | 7.3 | 8.1 | 8.5 | 9.1 | 10.1 | 11.5 | 12.5 | 12.6 | 12.7 | 12.8 | 12.4 | 11.6 | 11.1 | 10.8 | 10.8 | 9.8 | 12.8 |
| 10-Sep | 10.3 | 9.1 | 9.0 | 8.9 | 8.7 | 8.8 | 9.1 | 9.8 | 11.3 | 13.6 | 13.7 | 14.0 | 14.4 | 14.5 | 14.7 | 14.8 | 14.0 | 13.4 | 12.9 | 12.4 | 11.2 | 10.5 | 9.9 | 9.4 | 11.6 | 14.8 |
| 11-Sep | 8.6 | 7.8 | 7.3 | 7.0 | 6.8 | 6.5 | 6.5 | 6.5 | 6.4 | 6.2 | 6.5 | 7.0 | 7.8 | 7.3 | 7.4 | 7.8 | 7.6 | 7.5 | 7.4 | 7.1 | 6.7 | 6.6 | 6.5 | 6.0 | 7.0 | 8.6 |
| 12-Sep | 5.6 | 5.4 | 5.3 | 5.1 | 4.8 | 4.5 | 3.8 | 3.8 | 4.9 | 6.8 | 8.5 | 9.4 | 10.0 | 10.7 | 11.3 | 12.2 | 12.8 | 12.6 | 12.3 | 12.0 | 11.1 | 10.1 | 9.2 | 8.4 | 8.4 | 12.8 |
| 13-Sep | 7.8 | 7.8 | 7.7 | 8.0 | 7.9 | 7.6 | 7.5 | 8.2 | 10.4 | 12.7 | 14.8 | 17.2 | 19.5 | 21.2 | 22.4 | 22.5 | 22.1 | 21.5 | 20.6 | 19.5 | 18.5 | 17.6 | 17.2 | 16.0 | 14.8 | 22.5 |
| 14-Sep | 15.3 | 15.2 | 14.1 | 13.2 | 12.0 | 11.0 | 10.7 | 10.9 | 12.3 | 13.4 | 14.5 | 17.1 | 19.0 | 20.3 | 22.2 | 22.7 | 23.1 | 20.4 | 16.6 | 15.6 | 15.4 | 15.4 | 14.9 | 14.1 | 15.8 | 23.1 |
| 15-Sep | 13.6 | 12.4 | 11.1 | 10.1 | 9.3 | 8.3 | 7.4 | 7.9 | 8.1 | 8.6 | 10.0 | 10.8 | 12.3 | 14.3 | 16.5 | 18.0 | 18.8 | 18.5 | 17.9 | 17.1 | 16.1 | 15.4 | 14.7 | 13.7 | 13.0 | 18.8 |
| 16-Sep | 13.1 | 12.3 | 12.2 | 12.8 | 11.6 | 11.7 | 10.6 | 10.4 | 11.1 | 12.6 | 13.8 | 16.5 | 20.3 | 21.1 | 21.8 | 22.2 | 22.5 | 22.2 | 21.3 | 20.6 | 19.7 | 18.5 | 17.8 | 17.7 | 16.4 | 22.5 |
| 17-Sep | 17.0 | 15.9 | 14.5 | 13.9 | 13.4 | 12.7 | 12.6 | 12.3 | 12.4 | 13.0 | 14.0 | 14.4 | 14.7 | 15.2 | 16.0 | 17.3 | 18.0 | 18.0 | 17.5 | 16.6 | 15.3 | 14.4 | 13.4 | 13.3 | 14.8 | 18.0 |
| 18-Sep | 13.0 | 12.5 | 11.9 | 11.3 | 11.0 | 10.4 | 10.2 | 10.3 | 10.9 | 12.3 | 11.9 | 12.3 | 13.0 | 13.4 | 13.5 | 13.4 | 12.8 | 12.3 | 12.0 | 11.9 | 11.5 | 10.9 | 9.7 | 9.7 | 11.8 | 13.5 |
| 19-Sep | 9.6 | 9.6 | 9.5 | 9.4 | 9.2 | 8.8 | 8.3 | 8.2 | 8.3 | 8.7 | 9.2 | 10.0 | 10.5 | 10.7 | 11.0 | 11.5 | 11.7 | 11.6 | 10.6 | 10.1 | 10.2 | 9.8 | 9.5 | 8.6 | 9.8 | 11.7 |
| 20-Sep | 8.8 | 8.5 | 8.1 | 8.0 | 7.4 | 6.6 | 6.6 | 6.6 | 6.7 | 7.0 | 8.2 | 8.8 | 9.7 | 10.7 | 11.5 | 12.2 | 12.4 | 12.0 | 11.8 | 11.2 | 10.3 | 9.4 | 8.8 | 8.5 | 9.2 | 12.4 |
| 21-Sep | 8.0 | 7.2 | 6.7 | 6.3 | 5.7 | 5.5 | 5.0 | 4.6 | 6.5 | 8.1 | 10.2 | 11.9 | 14.2 | 15.0 | 16.3 | 16.7 | 17.1 | 16.8 | 16.2 | 15.4 | 14.4 | 13.4 | 11.9 | 11.0 | 11.0 | 17.1 |
| 22-Sep | 9.7 | 8.8 | 8.0 | 7.3 | 6.7 | 6.4 | 6.1 | 6.4 | 7.4 | 9.9 | 12.7 | 16.5 | 17.7 | 18.4 | 18.9 | 19.2 | 19.2 | 19.0 | 17.9 | 16.6 | 15.5 | 14.0 | 13.2 | 12.5 | 12.8 | 19.2 |
| 23-Sep | 11.7 | 11.1 | 10.8 | 10.5 | 10.2 | 9.3 | 9.1 | 8.7 | 9.6 | 11.2 | 11.3 | 11.9 | 12.3 | 12.7 | 12.8 | 12.5 | 12.0 | 11.7 | 11.8 | 11.7 | 11.2 | 10.6 | 10.1 | 9.9 | 11.0 | 12.8 |
| 24-Sep | DF | DF | DF | 9.5 | 9.2 | 8.8 | 7.8 | 7.6 | 9.0 | 10.0 | 10.7 | 11.8 | 13.0 | 13.6 | 14.1 | 15.5 | 15.9 | 15.5 | 14.9 | 14.1 | 12.8 | 11.3 | 10.5 | 10.0 | 11.7 | 15.9 |
| 25-Sep | 9.5 | 9.0 | 8.2 | 7.9 | 7.4 | 7.4 | 6.1 | 6.3 | 8.1 | 9.6 | 11.1 | 12.9 | 14.1 | 15.1 | 16.0 | 16.5 | 16.7 | 16.3 | 15.7 | 15.1 | 14.7 | 12.0 | 10.8 | 9.9 | 11.5 | 16.7 |
| 26-Sep | 9.7 | 7.6 | 6.4 | 6.4 | 6.5 | 6.3 | 5.8 | 6.6 | 7.7 | 10.0 | 13.1 | 16.1 | 18.3 | 20.0 | 21.8 | 23.1 | 23.1 | 22.7 | 21.7 | 20.1 | 18.7 | 18.2 | 17.6 | 16.5 | 14.3 | 23.1 |
| 27-Sep | 16.1 | 15.7 | 15.7 | 15.3 | 14.6 | 15.5 | 15.7 | 15.6 | 13.5 | 13.3 | 12.3 | 12.5 | 12.5 | 13.9 | 14.8 | 15.2 | 15.0 | 14.8 | 13.9 | 12.7 | 11.7 | 10.9 | 10.3 | 9.5 | 13.8 | 16.1 |
| 28-Sep | 8.9 | 7.9 | 6.2 | 6.0 | 5.5 | 4.9 | 4.4 | 3.8 | 4.2 | 5.8 | 8.4 | 11.8 | 13.7 | 14.9 | 15.2 | 15.3 | 15.5 | 15.1 | 14.5 | 14.3 | 12.7 | 11.8 | 10.7 | 9.1 | 10.0 | 15.5 |
| 29-Sep | 8.4 | 8.2 | 7.9 | 8.1 | 7.6 | 6.8 | 5.5 | 5.1 | 5.7 | 7.2 | 9.2 | 11.6 | 13.5 | 15.0 | 15.7 | 16.1 | 15.9 | 15.5 | 15.0 | 14.6 | 13.7 | 12.4 | 11.3 | 9.1 | 10.8 | 16.1 |
| 30-Sep | 8.3 | 7.3 | 6.4 | 5.4 | 5.2 | 4.8 | 4.1 | 4.6 | 5.2 | 6.2 | 7.5 | 8.5 | 9.1 | 9.7 | 10.4 | 10.3 | 9.6 | 9.0 | 8.3 | 7.8 | 7.5 | 7.4 | 7.0 | 6.5 | 7.3 | 10.4 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | DF - DAS Failure | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 264 | 36.82 | 36.82 |
| 10 - 20 | 428 | 59.69 | 96.51 |
| > 20 | 25 | 3.49 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720

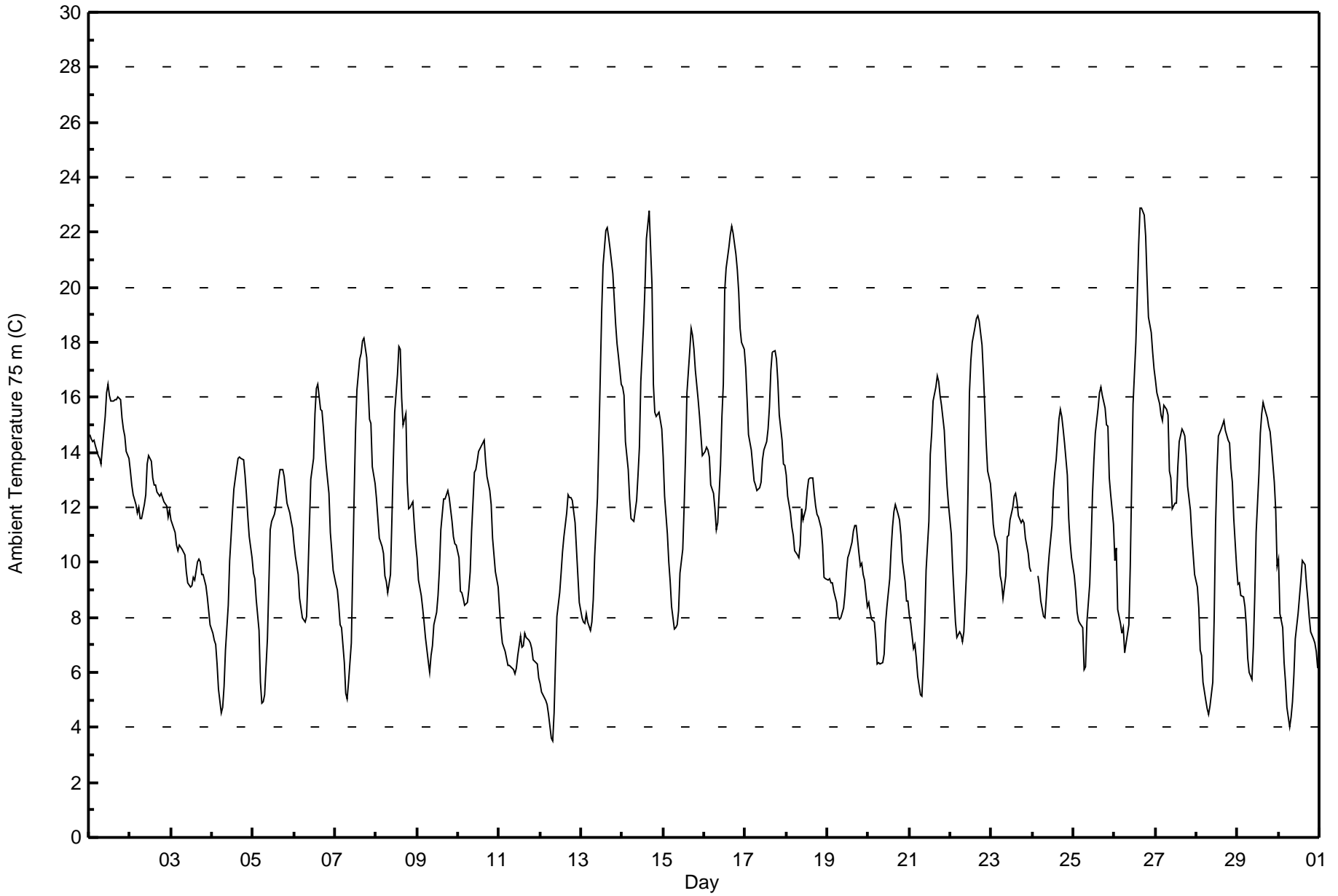


| Maximum Value: 22.9 C on Sep 26 17:00 | | Maximum Daily Average: 16.9 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------------------|---------------|---------------|
| Minimum Value: 3.5 C on Sep 12 08:00 | | Minimum Daily Average: 6.7 C on Sep 11 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.2 C at hour 17 | | Minimum Diurnal Average: 8.1 C at hour 8 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.67 C | | Percentiles: P ₁ = 4.5 P ₁₀ = 6.8 Q ₁ = 8.7 Median = 11.5 Q ₃ = 14.2 P ₉₀ = 16.6 P ₉₉ = 22.2 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 14.6 | 14.5 | 14.4 | 14.5 | 14.3 | 13.9 | 13.8 | 13.6 | 14.2 | 15.3 | 16.2 | 16.5 | 16.1 | 15.9 | 15.9 | 15.9 | 15.9 | 16.0 | 15.9 | 15.2 | 14.8 | 14.6 | 14.0 | 13.8 | 15.0 | 16.5 |
| 2-Sep | 13.3 | 12.8 | 12.5 | 12.1 | 11.8 | 12.0 | 11.6 | 11.6 | 12.1 | 12.4 | 13.6 | 13.9 | 13.7 | 13.1 | 12.8 | 12.8 | 12.5 | 12.4 | 12.5 | 12.4 | 12.2 | 12.1 | 11.6 | 11.9 | 12.5 | 13.9 |
| 3-Sep | 11.5 | 11.4 | 11.1 | 10.6 | 10.4 | 10.6 | 10.5 | 10.4 | 10.3 | 9.7 | 9.2 | 9.1 | 9.2 | 9.5 | 9.4 | 10.0 | 10.1 | 10.0 | 9.5 | 9.5 | 9.2 | 8.7 | 8.2 | 7.7 | 9.8 | 11.5 |
| 4-Sep | 7.4 | 7.2 | 7.0 | 6.3 | 5.4 | 4.5 | 4.7 | 5.5 | 6.8 | 8.5 | 10.1 | 10.9 | 11.8 | 12.7 | 13.4 | 13.8 | 13.9 | 13.8 | 13.7 | 13.2 | 12.5 | 11.7 | 10.9 | 10.2 | 9.8 | 13.9 |
| 5-Sep | 9.6 | 9.4 | 8.6 | 7.6 | 5.6 | 4.9 | 4.9 | 5.2 | 7.2 | 9.2 | 11.2 | 11.5 | 11.7 | 12.0 | 12.5 | 13.0 | 13.4 | 13.4 | 13.1 | 12.6 | 12.2 | 11.8 | 11.5 | 11.3 | 10.1 | 13.4 |
| 6-Sep | 10.7 | 10.2 | 9.5 | 8.7 | 8.3 | 8.0 | 7.9 | 8.0 | 9.6 | 11.3 | 13.0 | 13.8 | 15.4 | 16.3 | 16.5 | 15.6 | 15.5 | 14.9 | 14.2 | 13.5 | 12.5 | 11.1 | 10.4 | 9.7 | 11.9 | 16.5 |
| 7-Sep | 9.2 | 9.0 | 8.5 | 7.7 | 7.6 | 6.3 | 5.2 | 5.0 | 5.6 | 7.1 | 9.8 | 12.4 | 14.8 | 16.3 | 17.4 | 17.6 | 18.1 | 18.1 | 17.5 | 16.4 | 15.2 | 15.0 | 13.5 | 12.8 | 11.9 | 18.1 |
| 8-Sep | 12.3 | 11.6 | 10.9 | 10.6 | 10.3 | 9.5 | 9.3 | 8.9 | 9.6 | 11.5 | 13.6 | 15.4 | 16.8 | 17.9 | 17.7 | 16.0 | 15.0 | 15.4 | 12.9 | 12.0 | 12.0 | 12.2 | 11.4 | 10.7 | 12.6 | 17.9 |
| 9-Sep | 10.2 | 9.4 | 8.8 | 8.3 | 7.8 | 7.3 | 6.4 | 6.0 | 6.6 | 7.0 | 7.7 | 8.2 | 8.8 | 9.8 | 11.2 | 12.3 | 12.3 | 12.5 | 12.6 | 12.3 | 11.5 | 10.9 | 10.7 | 10.6 | 9.5 | 12.6 |
| 10-Sep | 10.2 | 9.0 | 8.9 | 8.7 | 8.4 | 8.5 | 9.0 | 9.7 | 11.1 | 13.3 | 13.4 | 13.7 | 14.0 | 14.1 | 14.4 | 14.4 | 13.7 | 13.1 | 12.6 | 12.1 | 10.9 | 10.3 | 9.7 | 9.1 | 11.3 | 14.4 |
| 11-Sep | 8.3 | 7.6 | 7.1 | 6.8 | 6.5 | 6.3 | 6.2 | 6.2 | 6.1 | 5.9 | 6.1 | 6.6 | 7.3 | 6.9 | 7.0 | 7.4 | 7.3 | 7.2 | 7.1 | 6.9 | 6.4 | 6.4 | 6.3 | 5.8 | 6.7 | 8.3 |
| 12-Sep | 5.6 | 5.3 | 5.1 | 5.0 | 4.8 | 4.5 | 3.6 | 3.5 | 4.5 | 6.4 | 8.0 | 8.9 | 9.6 | 10.4 | 10.9 | 11.8 | 12.5 | 12.4 | 12.3 | 12.3 | 11.5 | 10.5 | 9.5 | 8.5 | 8.2 | 12.5 |
| 13-Sep | 8.0 | 7.8 | 7.8 | 8.1 | 7.9 | 7.5 | 7.8 | 8.6 | 10.2 | 12.3 | 14.5 | 16.7 | 19.1 | 20.8 | 22.1 | 22.2 | 21.8 | 21.4 | 20.5 | 19.6 | 18.7 | 18.0 | 17.5 | 16.5 | 14.8 | 22.2 |
| 14-Sep | 16.4 | 16.0 | 14.4 | 13.4 | 12.3 | 11.6 | 11.5 | 11.5 | 12.2 | 13.2 | 14.2 | 16.6 | 18.7 | 20.1 | 21.8 | 22.3 | 22.8 | 20.1 | 16.5 | 15.4 | 15.3 | 15.5 | 15.2 | 14.8 | 15.9 | 22.8 |
| 15-Sep | 13.8 | 12.4 | 11.0 | 10.0 | 9.3 | 8.4 | 7.6 | 7.6 | 7.7 | 8.2 | 9.6 | 10.5 | 12.1 | 13.9 | 16.2 | 17.7 | 18.5 | 18.3 | 17.7 | 17.0 | 15.9 | 15.3 | 14.6 | 13.9 | 12.8 | 18.5 |
| 16-Sep | 14.0 | 14.2 | 14.1 | 13.8 | 12.8 | 12.5 | 12.0 | 11.2 | 11.4 | 13.5 | 15.3 | 16.5 | 19.9 | 20.7 | 21.5 | 21.9 | 22.2 | 22.0 | 21.2 | 20.6 | 19.8 | 18.5 | 18.0 | 17.8 | 16.9 | 22.2 |
| 17-Sep | 17.1 | 15.9 | 14.6 | 14.1 | 13.5 | 13.0 | 12.8 | 12.6 | 12.7 | 12.9 | 13.8 | 14.1 | 14.4 | 14.9 | 15.7 | 17.0 | 17.7 | 17.7 | 17.4 | 16.6 | 15.3 | 14.4 | 13.6 | 13.5 | 14.8 | 17.7 |
| 18-Sep | 13.1 | 12.4 | 11.8 | 11.3 | 11.0 | 10.4 | 10.3 | 10.2 | 10.6 | 11.9 | 11.6 | 11.9 | 12.6 | 13.0 | 13.1 | 13.1 | 12.5 | 12.1 | 11.7 | 11.6 | 11.2 | 10.6 | 9.5 | 9.4 | 11.5 | 13.1 |
| 19-Sep | 9.4 | 9.4 | 9.3 | 9.2 | 9.0 | 8.5 | 8.0 | 7.9 | 8.0 | 8.3 | 8.9 | 9.6 | 10.2 | 10.3 | 10.7 | 11.1 | 11.4 | 11.3 | 10.3 | 9.9 | 10.0 | 9.5 | 9.4 | 8.4 | 9.5 | 11.4 |
| 20-Sep | 8.5 | 8.2 | 7.9 | 7.8 | 7.2 | 6.3 | 6.4 | 6.3 | 6.4 | 6.7 | 7.8 | 8.4 | 9.4 | 10.5 | 11.3 | 11.9 | 12.1 | 11.8 | 11.5 | 11.0 | 10.1 | 9.3 | 8.6 | 8.6 | 8.9 | 12.1 |
| 21-Sep | 8.1 | 7.8 | 6.9 | 7.0 | 6.5 | 5.8 | 5.2 | 5.2 | 6.3 | 7.8 | 9.7 | 11.5 | 13.9 | 14.7 | 15.9 | 16.4 | 16.8 | 16.6 | 16.1 | 15.7 | 14.8 | 13.7 | 12.7 | 12.1 | 11.1 | 16.8 |
| 22-Sep | 11.0 | 9.8 | 8.8 | 7.8 | 7.3 | 7.5 | 7.3 | 7.1 | 7.5 | 9.8 | 12.7 | 16.2 | 17.3 | 18.0 | 18.6 | 18.9 | 19.0 | 18.8 | 17.9 | 16.8 | 15.6 | 14.3 | 13.3 | 12.9 | 13.1 | 19.0 |
| 23-Sep | 12.2 | 11.4 | 11.0 | 10.6 | 10.3 | 9.5 | 9.2 | 8.7 | 9.5 | 11.0 | 11.0 | 11.6 | 12.0 | 12.4 | 12.5 | 12.2 | 11.7 | 11.4 | 11.5 | 11.4 | 10.9 | 10.3 | 9.8 | 9.6 | 10.9 | 12.5 |
| 24-Sep | DF | DF | DF | 9.5 | 9.2 | 8.6 | 8.0 | 8.0 | 8.8 | 9.6 | 10.3 | 11.4 | 12.6 | 13.3 | 13.7 | 15.2 | 15.5 | 15.3 | 14.9 | 14.3 | 13.2 | 11.6 | 10.7 | 10.2 | 11.6 | 15.5 |
| 25-Sep | 9.5 | 8.9 | 8.2 | 7.9 | 7.8 | 7.6 | 6.1 | 6.2 | 7.8 | 9.2 | 10.7 | 12.5 | 13.7 | 14.7 | 15.6 | 16.2 | 16.4 | 16.1 | 15.6 | 15.0 | 14.9 | 13.1 | 12.5 | 11.4 | 11.6 | 16.4 |
| 26-Sep | 10.1 | 10.5 | 8.3 | 7.8 | 7.4 | 7.6 | 6.7 | 7.0 | 7.7 | 9.9 | 12.9 | 15.8 | 18.0 | 19.7 | 21.6 | 22.9 | 22.9 | 22.6 | 21.8 | 20.3 | 18.9 | 18.3 | 17.6 | 17.0 | 14.7 | 22.9 |
| 27-Sep | 16.6 | 16.2 | 15.8 | 15.4 | 15.1 | 15.7 | 15.6 | 15.4 | 13.3 | 13.1 | 12.0 | 12.2 | 12.2 | 13.5 | 14.4 | 14.9 | 14.7 | 14.6 | 13.9 | 12.8 | 11.9 | 11.0 | 10.3 | 9.5 | 13.7 | 16.6 |
| 28-Sep | 9.1 | 8.4 | 6.8 | 6.6 | 5.7 | 5.0 | 4.7 | 4.5 | 4.8 | 5.6 | 8.0 | 11.4 | 13.3 | 14.6 | 14.8 | 15.0 | 15.1 | 14.8 | 14.5 | 14.3 | 13.4 | 12.9 | 11.6 | 9.9 | 10.2 | 15.1 |
| 29-Sep | 9.2 | 9.3 | 8.8 | 8.7 | 8.4 | 7.7 | 6.5 | 6.0 | 5.7 | 6.9 | 8.8 | 11.1 | 13.2 | 14.7 | 15.4 | 15.8 | 15.6 | 15.2 | 15.0 | 14.8 | 14.2 | 12.9 | 11.9 | 9.9 | 11.1 | 15.8 |
| 30-Sep | 10.1 | 8.1 | 7.6 | 6.4 | 5.6 | 4.7 | 4.0 | 4.4 | 5.0 | 5.9 | 7.2 | 8.2 | 8.7 | 9.4 | 10.1 | 9.9 | 9.2 | 8.7 | 8.0 | 7.5 | 7.2 | 7.1 | 6.7 | 6.2 | 7.3 | 10.1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | DF - DAS Failure | | |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

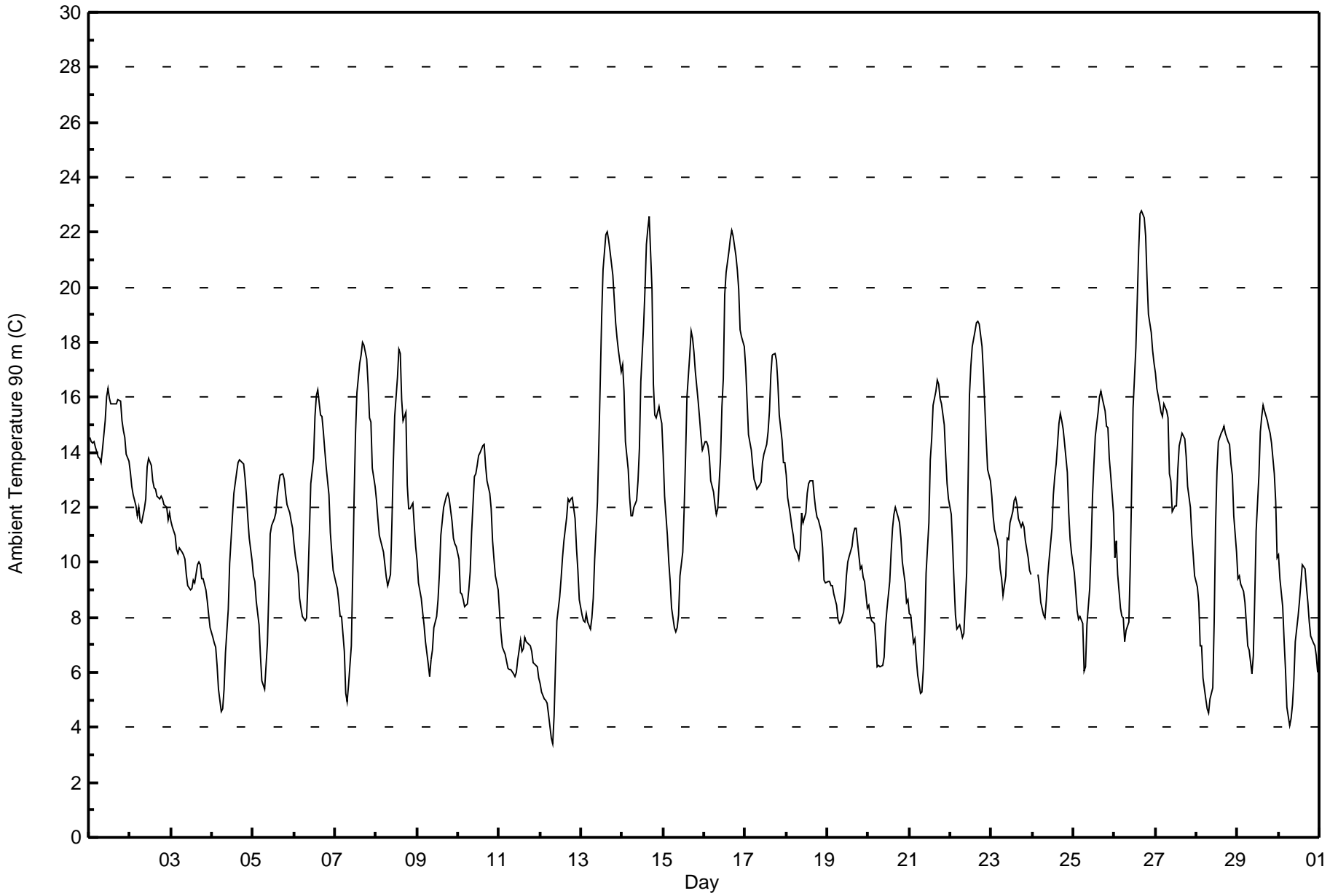
| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 264 | 36.82 | 36.82 |
| 10 - 20 | 429 | 59.83 | 96.65 |
| > 20 | 24 | 3.35 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



| Maximum Value: 22.8 C on Sep 26 17:00 | | Maximum Daily Average: 17.0 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------------------|---------------|---------------|
| Minimum Value: 3.4 C on Sep 12 08:00 | | Minimum Daily Average: 6.6 C on Sep 11 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.1 C at hour 17 | | Minimum Diurnal Average: 8.1 C at hour 8 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.65 C | | Percentiles: P ₁ = 4.5 P ₁₀ = 6.8 Q ₁ = 8.7 Median = 11.5 Q ₃ = 14.2 P ₉₀ = 16.6 P ₉₉ = 22.0 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 14.5 | 14.4 | 14.3 | 14.4 | 14.2 | 13.8 | 13.8 | 13.6 | 14.1 | 15.2 | 16.0 | 16.3 | 16.0 | 15.8 | 15.8 | 15.8 | 15.8 | 15.9 | 15.9 | 15.2 | 14.8 | 14.5 | 13.9 | 13.7 | 14.9 | 16.3 |
| 2-Sep | 13.3 | 12.8 | 12.5 | 12.0 | 11.7 | 12.0 | 11.5 | 11.5 | 12.0 | 12.3 | 13.5 | 13.8 | 13.5 | 12.9 | 12.7 | 12.7 | 12.4 | 12.3 | 12.4 | 12.3 | 12.1 | 12.0 | 11.6 | 11.8 | 12.4 | 13.8 |
| 3-Sep | 11.5 | 11.3 | 11.0 | 10.5 | 10.3 | 10.5 | 10.4 | 10.3 | 10.1 | 9.5 | 9.1 | 9.0 | 9.1 | 9.3 | 9.2 | 9.9 | 10.0 | 9.9 | 9.4 | 9.4 | 9.0 | 8.6 | 8.1 | 7.6 | 9.7 | 11.5 |
| 4-Sep | 7.3 | 7.1 | 6.9 | 6.2 | 5.4 | 4.6 | 4.7 | 5.4 | 6.7 | 8.3 | 9.9 | 10.8 | 11.7 | 12.5 | 13.3 | 13.6 | 13.7 | 13.7 | 13.6 | 13.1 | 12.4 | 11.6 | 10.9 | 10.1 | 9.7 | 13.7 |
| 5-Sep | 9.5 | 9.3 | 8.6 | 7.7 | 6.6 | 5.7 | 5.5 | 5.4 | 7.0 | 8.9 | 11.0 | 11.3 | 11.6 | 11.8 | 12.4 | 12.8 | 13.2 | 13.2 | 13.0 | 12.5 | 12.1 | 11.8 | 11.5 | 11.3 | 10.2 | 13.2 |
| 6-Sep | 10.7 | 10.2 | 9.6 | 8.7 | 8.4 | 8.0 | 7.9 | 8.0 | 9.4 | 11.1 | 12.8 | 13.8 | 15.3 | 16.1 | 16.3 | 15.4 | 15.3 | 14.7 | 14.1 | 13.5 | 12.5 | 11.1 | 10.4 | 9.7 | 11.8 | 16.3 |
| 7-Sep | 9.2 | 9.1 | 8.6 | 8.0 | 8.0 | 6.8 | 5.2 | 4.9 | 5.6 | 7.0 | 9.5 | 12.4 | 14.7 | 16.2 | 17.2 | 17.6 | 18.0 | 17.9 | 17.4 | 16.5 | 15.3 | 15.1 | 13.4 | 12.8 | 11.9 | 18.0 |
| 8-Sep | 12.3 | 11.6 | 11.0 | 10.6 | 10.4 | 9.9 | 9.4 | 9.2 | 9.6 | 11.4 | 13.6 | 15.3 | 16.7 | 17.7 | 17.6 | 15.9 | 15.1 | 15.4 | 12.8 | 11.9 | 11.9 | 12.2 | 11.3 | 10.6 | 12.6 | 17.7 |
| 9-Sep | 10.1 | 9.3 | 8.7 | 8.2 | 7.7 | 7.1 | 6.3 | 5.9 | 6.5 | 6.8 | 7.6 | 8.0 | 8.7 | 9.6 | 11.0 | 12.0 | 12.2 | 12.4 | 12.5 | 12.3 | 11.5 | 10.9 | 10.7 | 10.6 | 9.4 | 12.5 |
| 10-Sep | 10.1 | 8.9 | 8.9 | 8.6 | 8.4 | 8.5 | 9.0 | 9.7 | 11.1 | 13.1 | 13.2 | 13.5 | 13.9 | 14.0 | 14.2 | 14.3 | 13.5 | 13.0 | 12.5 | 12.0 | 10.8 | 10.1 | 9.5 | 9.0 | 11.2 | 14.3 |
| 11-Sep | 8.2 | 7.4 | 6.9 | 6.6 | 6.4 | 6.2 | 6.1 | 6.1 | 6.0 | 5.8 | 6.0 | 6.4 | 7.2 | 6.7 | 6.8 | 7.3 | 7.1 | 7.0 | 7.0 | 6.8 | 6.3 | 6.3 | 6.2 | 5.8 | 6.6 | 8.2 |
| 12-Sep | 5.6 | 5.3 | 5.0 | 5.0 | 4.9 | 4.5 | 3.6 | 3.4 | 4.4 | 6.2 | 7.9 | 8.7 | 9.4 | 10.2 | 10.8 | 11.6 | 12.3 | 12.2 | 12.3 | 12.4 | 11.6 | 10.5 | 9.7 | 8.6 | 8.2 | 12.4 |
| 13-Sep | 8.1 | 7.9 | 7.8 | 8.2 | 7.8 | 7.6 | 8.0 | 8.7 | 10.1 | 12.2 | 14.3 | 16.6 | 18.9 | 20.7 | 21.9 | 22.0 | 21.7 | 21.3 | 20.4 | 19.6 | 18.7 | 18.2 | 17.7 | 16.9 | 14.8 | 22.0 |
| 14-Sep | 17.2 | 16.2 | 14.4 | 13.4 | 12.4 | 11.7 | 11.7 | 12.0 | 12.3 | 13.0 | 14.1 | 16.6 | 18.6 | 19.9 | 21.6 | 22.1 | 22.6 | 19.9 | 16.5 | 15.3 | 15.2 | 15.6 | 15.3 | 15.0 | 15.9 | 22.6 |
| 15-Sep | 13.9 | 12.4 | 11.0 | 10.0 | 9.3 | 8.4 | 7.6 | 7.5 | 7.6 | 8.1 | 9.5 | 10.4 | 12.0 | 13.8 | 16.0 | 17.5 | 18.4 | 18.2 | 17.7 | 16.9 | 15.9 | 15.3 | 14.6 | 14.1 | 12.7 | 18.4 |
| 16-Sep | 14.4 | 14.4 | 14.2 | 13.8 | 13.0 | 12.6 | 12.1 | 11.7 | 11.9 | 13.8 | 15.6 | 16.7 | 19.7 | 20.5 | 21.3 | 21.8 | 22.1 | 21.9 | 21.1 | 20.6 | 19.9 | 18.4 | 18.2 | 17.8 | 17.0 | 22.1 |
| 17-Sep | 17.1 | 15.9 | 14.6 | 14.1 | 13.5 | 13.0 | 12.8 | 12.6 | 12.8 | 12.9 | 13.6 | 13.9 | 14.3 | 14.7 | 15.5 | 16.8 | 17.5 | 17.6 | 17.3 | 16.5 | 15.4 | 14.4 | 13.6 | 13.6 | 14.8 | 17.6 |
| 18-Sep | 13.2 | 12.4 | 11.7 | 11.3 | 11.0 | 10.5 | 10.3 | 10.1 | 10.5 | 11.8 | 11.4 | 11.8 | 12.5 | 12.9 | 13.0 | 12.9 | 12.4 | 11.9 | 11.6 | 11.6 | 11.1 | 10.5 | 9.3 | 9.3 | 11.5 | 13.2 |
| 19-Sep | 9.3 | 9.3 | 9.2 | 9.1 | 8.9 | 8.4 | 7.9 | 7.8 | 7.8 | 8.2 | 8.7 | 9.5 | 10.0 | 10.2 | 10.6 | 11.0 | 11.2 | 11.2 | 10.2 | 9.8 | 9.9 | 9.4 | 9.3 | 8.3 | 9.4 | 11.2 |
| 20-Sep | 8.4 | 8.1 | 7.9 | 7.8 | 7.1 | 6.2 | 6.3 | 6.2 | 6.2 | 6.6 | 7.7 | 8.3 | 9.3 | 10.4 | 11.2 | 11.7 | 12.0 | 11.6 | 11.4 | 10.9 | 10.0 | 9.3 | 8.5 | 8.6 | 8.8 | 12.0 |
| 21-Sep | 8.1 | 8.1 | 7.1 | 7.2 | 6.5 | 5.9 | 5.3 | 5.3 | 6.1 | 7.5 | 9.6 | 11.5 | 13.7 | 14.5 | 15.7 | 16.2 | 16.6 | 16.5 | 16.0 | 15.8 | 15.0 | 13.9 | 12.9 | 12.3 | 11.1 | 16.6 |
| 22-Sep | 11.7 | 10.6 | 9.2 | 8.1 | 7.6 | 7.7 | 7.5 | 7.3 | 7.4 | 9.6 | 12.8 | 16.1 | 17.2 | 17.8 | 18.4 | 18.7 | 18.8 | 18.7 | 17.9 | 16.9 | 15.6 | 14.4 | 13.4 | 13.0 | 13.2 | 18.8 |
| 23-Sep | 12.4 | 11.6 | 11.2 | 10.8 | 10.5 | 9.8 | 9.4 | 8.8 | 9.5 | 10.9 | 10.8 | 11.4 | 11.9 | 12.3 | 12.4 | 12.1 | 11.6 | 11.3 | 11.4 | 11.3 | 10.8 | 10.2 | 9.7 | 9.5 | 10.9 | 12.4 |
| 24-Sep | DF | DF | DF | 9.5 | 9.1 | 8.5 | 8.1 | 8.0 | 8.7 | 9.5 | 10.1 | 11.2 | 12.5 | 13.1 | 13.6 | 15.1 | 15.4 | 15.2 | 14.8 | 14.4 | 13.3 | 11.8 | 10.9 | 10.3 | 11.6 | 15.4 |
| 25-Sep | 9.6 | 8.9 | 8.2 | 7.9 | 8.0 | 7.8 | 6.1 | 6.2 | 7.7 | 9.1 | 10.6 | 12.4 | 13.6 | 14.6 | 15.5 | 16.0 | 16.2 | 16.0 | 15.5 | 14.9 | 14.9 | 13.8 | 13.2 | 11.8 | 11.6 | 16.2 |
| 26-Sep | 10.2 | 10.8 | 9.6 | 8.4 | 8.0 | 8.0 | 7.1 | 7.5 | 7.8 | 9.9 | 12.8 | 15.6 | 17.8 | 19.5 | 21.4 | 22.7 | 22.8 | 22.5 | 21.8 | 20.3 | 19.0 | 18.4 | 17.7 | 17.2 | 14.9 | 22.8 |
| 27-Sep | 16.9 | 16.3 | 15.8 | 15.5 | 15.3 | 15.7 | 15.5 | 15.3 | 13.2 | 13.0 | 11.8 | 12.0 | 12.0 | 13.4 | 14.2 | 14.7 | 14.6 | 14.5 | 13.8 | 12.8 | 12.0 | 11.0 | 10.3 | 9.5 | 13.7 | 16.9 |
| 28-Sep | 9.1 | 8.5 | 7.0 | 7.0 | 5.8 | 5.0 | 4.7 | 4.5 | 5.0 | 5.5 | 7.8 | 11.3 | 13.3 | 14.4 | 14.7 | 14.8 | 15.0 | 14.7 | 14.4 | 14.3 | 13.6 | 13.1 | 11.7 | 10.4 | 10.2 | 15.0 |
| 29-Sep | 9.4 | 9.5 | 9.2 | 8.9 | 8.6 | 7.8 | 6.9 | 6.8 | 6.0 | 6.6 | 8.7 | 11.1 | 13.1 | 14.7 | 15.3 | 15.7 | 15.5 | 15.1 | 14.9 | 14.7 | 14.3 | 13.2 | 12.2 | 10.2 | 11.2 | 15.7 |
| 30-Sep | 10.3 | 9.4 | 8.4 | 7.2 | 6.1 | 4.7 | 4.1 | 4.3 | 4.8 | 5.7 | 7.1 | 8.0 | 8.6 | 9.2 | 9.9 | 9.8 | 9.1 | 8.5 | 7.9 | 7.3 | 7.1 | 6.9 | 6.6 | 6.0 | 7.4 | 10.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | DF - DAS Failure | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 266 | 37.10 | 37.10 |
| 10 - 20 | 429 | 59.83 | 96.93 |
| > 20 | 22 | 3.07 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

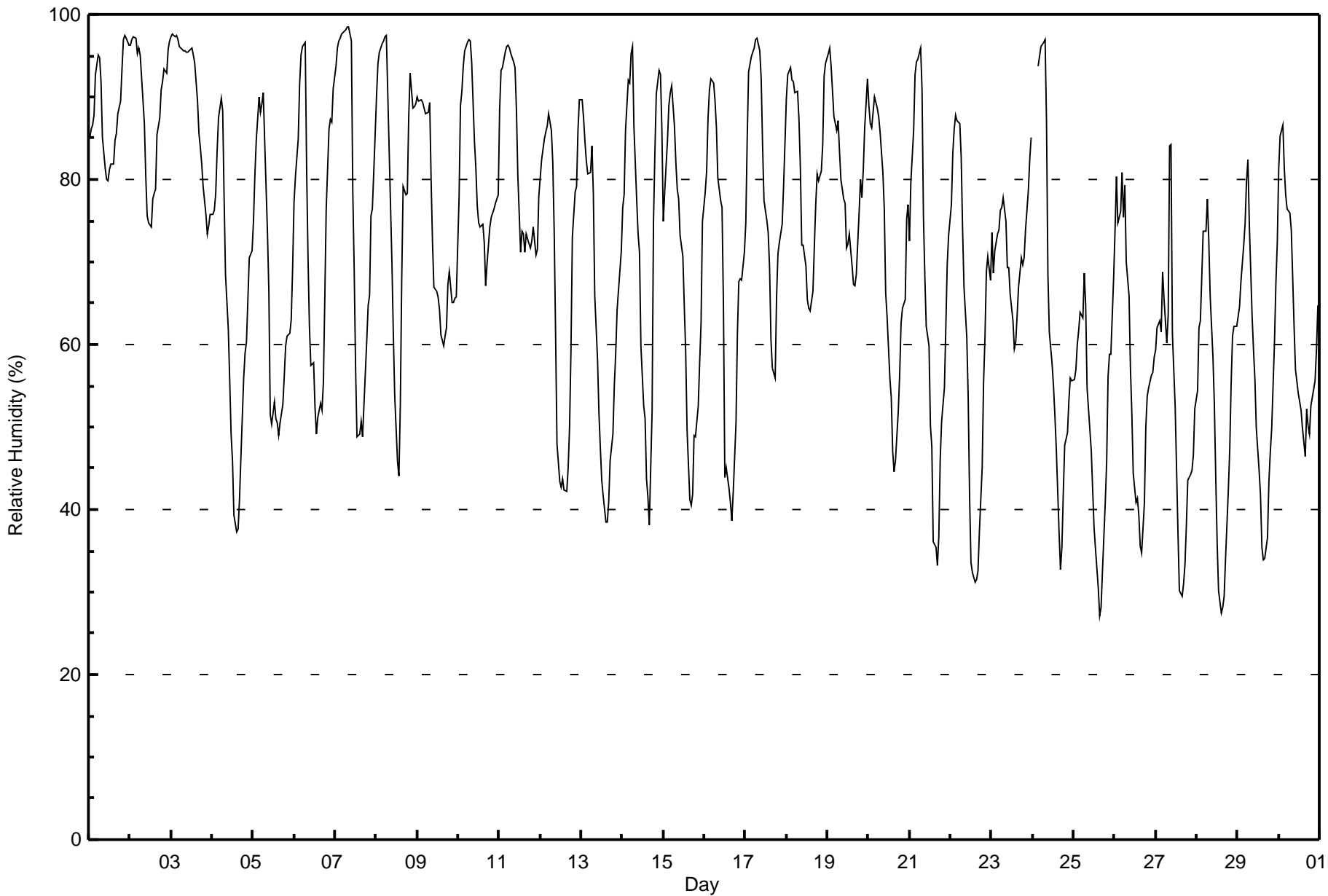
Mannix - September 2016

| Maximum Value: 98 % on Sep 7 09:00 Maximum Daily Average: 90.0 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 27 % on Sep 25 16:00 Minimum Daily Average: 50.4 % on Sep 25 Maximum Diurnal Average: 87.9 % at hour 7 Minimum Diurnal Average: 50.9 % at hour 16 Monthly Average: 70.5 % Percentiles: P ₁ = 30 P ₁₀ = 44 Q ₁ = 56 Median = 73 Q ₃ = 86 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 | 85 | 86 | 87 | 88 | 93 | 95 | 95 | 92 | 85 | 81 | 80 | 80 | 81 | 82 | 82 | 85 | 86 | 88 | 89 | 93 | 97 | 97 | 97 | 96 | 88.3 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 96 | 97 | 97 | 97 | 95 | 96 | 95 | 92 | 87 | 80 | 76 | 75 | 74 | 78 | 78 | 79 | 85 | 87 | 91 | 92 | 93 | 93 | 96 | 97 | 88.6 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 97 | 98 | 97 | 97 | 97 | 96 | 96 | 96 | 96 | 95 | 95 | 96 | 96 | 95 | 94 | 90 | 86 | 84 | 82 | 79 | 76 | 73 | 74 | 76 | 90.0 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 76 | 76 | 78 | 83 | 87 | 90 | 88 | 78 | 68 | 62 | 56 | 49 | 46 | 39 | 37 | 38 | 41 | 46 | 56 | 59 | 60 | 65 | 70 | 71 | 63.4 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 75 | 80 | 85 | 90 | 88 | 89 | 90 | 85 | 74 | 66 | 52 | 50 | 53 | 51 | 50 | 49 | 51 | 53 | 56 | 60 | 61 | 61 | 63 | 69 | 66.7 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 77 | 80 | 85 | 92 | 95 | 96 | 97 | 81 | 71 | 62 | 58 | 58 | 52 | 49 | 51 | 53 | 52 | 55 | 66 | 76 | 86 | 87 | 87 | 91 | 73.2 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 94 | 96 | 97 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 79 | 69 | 57 | 49 | 49 | 51 | 49 | 53 | 60 | 65 | 66 | 76 | 76 | 85 | 77.3 | 98 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 90 | 94 | 95 | 96 | 97 | 97 | 97 | 91 | 77 | 70 | 61 | 54 | 46 | 44 | 53 | 68 | 79 | 78 | 78 | 88 | 93 | 89 | 89 | 89 | 79.7 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 90 | 89 | 90 | 89 | 89 | 88 | 88 | 89 | 80 | 72 | 67 | 67 | 66 | 64 | 61 | 60 | 61 | 62 | 67 | 69 | 65 | 65 | 66 | 66 | 73.8 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 78 | 89 | 91 | 94 | 96 | 97 | 97 | 97 | 94 | 85 | 81 | 77 | 75 | 74 | 75 | 72 | 67 | 70 | 74 | 75 | 76 | 76 | 77 | 78 | 81.9 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 88 | 93 | 94 | 95 | 96 | 96 | 96 | 95 | 94 | 93 | 89 | 81 | 71 | 74 | 73 | 71 | 73 | 72 | 72 | 73 | 74 | 71 | 72 | 78 | 82.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 80 | 82 | 85 | 86 | 86 | 88 | 86 | 82 | 74 | 61 | 48 | 43 | 43 | 44 | 42 | 42 | 45 | 50 | 59 | 73 | 78 | 79 | 86 | 90 | 68.1 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 90 | 87 | 84 | 82 | 81 | 81 | 84 | 78 | 66 | 58 | 52 | 47 | 44 | 42 | 38 | 39 | 41 | 46 | 49 | 55 | 59 | 64 | 67 | 71 | 62.7 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 77 | 78 | 86 | 92 | 92 | 95 | 96 | 86 | 77 | 73 | 71 | 60 | 53 | 51 | 44 | 41 | 38 | 52 | 75 | 83 | 90 | 93 | 93 | 86 | 74.3 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 75 | 78 | 85 | 89 | 90 | 91 | 86 | 82 | 79 | 78 | 73 | 71 | 65 | 59 | 50 | 41 | 40 | 42 | 49 | 49 | 53 | 58 | 63 | 75 | 67.5 | 91 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 78 | 81 | 87 | 91 | 92 | 92 | 90 | 86 | 80 | 77 | 77 | 65 | 44 | 45 | 43 | 41 | 39 | 42 | 51 | 61 | 68 | 68 | 68 | 71 | 68.2 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 75 | 85 | 93 | 95 | 95 | 96 | 97 | 97 | 96 | 92 | 84 | 77 | 75 | 74 | 69 | 60 | 57 | 56 | 66 | 71 | 72 | 75 | 79 | 84 | 80.0 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 90 | 93 | 94 | 92 | 92 | 90 | 91 | 87 | 81 | 72 | 72 | 70 | 65 | 64 | 64 | 67 | 72 | 77 | 81 | 80 | 81 | 84 | 93 | 94 | 81.1 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 95 | 96 | 94 | 91 | 88 | 86 | 87 | 83 | 80 | 78 | 77 | 72 | 72 | 73 | 69 | 67 | 67 | 69 | 76 | 80 | 78 | 81 | 86 | 92 | 80.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 89 | 87 | 86 | 90 | 89 | 89 | 88 | 86 | 81 | 76 | 66 | 63 | 56 | 54 | 47 | 45 | 46 | 52 | 56 | 62 | 64 | 66 | 75 | 77 | 70.4 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 73 | 80 | 86 | 93 | 94 | 95 | 96 | 91 | 76 | 68 | 62 | 60 | 50 | 48 | 36 | 35 | 33 | 37 | 46 | 51 | 55 | 62 | 70 | 73 | 65.4 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 77 | 83 | 86 | 88 | 87 | 87 | 83 | 74 | 67 | 61 | 54 | 42 | 34 | 32 | 31 | 32 | 33 | 37 | 45 | 55 | 61 | 69 | 71 | 68 | 60.6 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 74 | 69 | 71 | 73 | 74 | 76 | 77 | 78 | 75 | 69 | 69 | 66 | 63 | 60 | 60 | 63 | 67 | 71 | 70 | 70 | 74 | 79 | 82 | 85 | 71.5 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | DF | DF | DF | 94 | 95 | 96 | 97 | 97 | 87 | 69 | 62 | 58 | 55 | 51 | 47 | 37 | 33 | 35 | 42 | 48 | 49 | 53 | 56 | 56 | 62.6 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 56 | 57 | 60 | 62 | 64 | 63 | 69 | 65 | 55 | 50 | 47 | 42 | 38 | 35 | 31 | 27 | 28 | 33 | 41 | 46 | 56 | 59 | 59 | 68 | 50.4 | 69 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 74 | 80 | 75 | 76 | 81 | 75 | 79 | 70 | 66 | 57 | 52 | 44 | 41 | 41 | 39 | 36 | 35 | 41 | 50 | 54 | 55 | 56 | 57 | 59 | 58.0 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 59 | 62 | 63 | 62 | 69 | 66 | 60 | 64 | 84 | 84 | 61 | 52 | 45 | 37 | 30 | 30 | 31 | 33 | 38 | 44 | 44 | 45 | 47 | 52 | 52.6 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 54 | 62 | 63 | 68 | 74 | 74 | 78 | 73 | 66 | 58 | 53 | 44 | 36 | 30 | 28 | 28 | 29 | 34 | 42 | 47 | 55 | 61 | 62 | 62 | 53.4 | 78 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 63 | 65 | 68 | 72 | 75 | 80 | 82 | 75 | 63 | 59 | 56 | 50 | 45 | 42 | 35 | 34 | 34 | 37 | 43 | 47 | 50 | 60 | 67 | 72 | 57.3 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 81 | 85 | 87 | 81 | 78 | 77 | 76 | 74 | 68 | 62 | 57 | 54 | 53 | 52 | 50 | 46 | 52 | 50 | 49 | 53 | 54 | 56 | 59 | 65 | 63.3 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 79.6 | 82.4 | 84.4 | 86.5 | 87.6 | 87.8 | 87.9 | 84.0 | 78.2 | 72.3 | 66.2 | 61.2 | 56.4 | 54.4 | 52.0 | 50.9 | 51.7 | 54.7 | 60.7 | 65.3 | 68.2 | 70.7 | 73.5 | 76.6 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 97 | 98 | 97 | 97 | 98 | 98 | 98 | 98 | 98 | 97 | 95 | 96 | 96 | 95 | 94 | 90 | 86 | 88 | 91 | 93 | 97 | 97 | 97 | 97 | Diurnal Maximum | |
| DF - DAS Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mannix - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mannix - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 45 | 6.28 | 6.28 |
| 40 - 60 | 166 | 23.15 | 29.43 |
| 60 - 80 | 253 | 35.29 | 64.71 |
| 80 - 100 | 253 | 35.29 | 100.00 |

Total Number of Valid Hours: 717

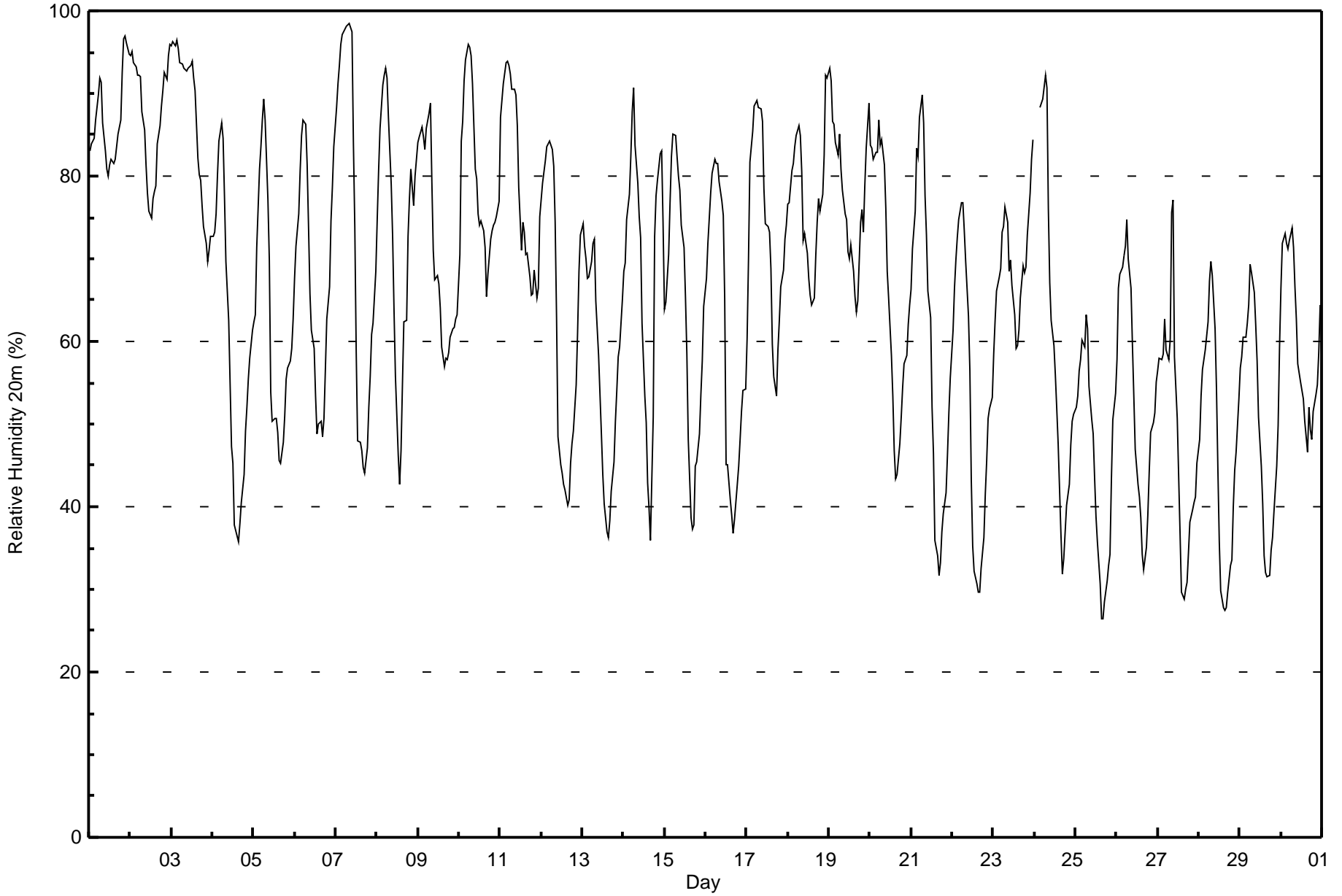
Total Number of Hours: 720



| | | |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 98 % on Sep 7 09:00 | Maximum Daily Average: 87.3 % on Sep 2 | Hours in Service: 720 |
| Minimum Value: 26 % on Sep 25 16:00 | Minimum Daily Average: 45.6 % on Sep 25 | Hours of Data: 717 |
| Maximum Diurnal Average: 83.3 % at hour 7 | Minimum Diurnal Average: 48.7 % at hour 16 | Hours of Missing Data: 3 |
| Monthly Average: 66.1 % | Percentiles: P ₁ = 30 P ₁₀ = 40 Q ₁ = 52 Median = 68 Q ₃ = 81 P ₉₀ = 89 P ₉₉ = 97 | Hours of Calibration: 0 |
| | | Percent Operational Time: 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 83 | 84 | 84 | 85 | 87 | 90 | 92 | 91 | 87 | 83 | 81 | 80 | 81 | 82 | 81 | 82 | 84 | 85 | 87 | 93 | 97 | 97 | 96 | 95 | 86.9 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 95 | 95 | 94 | 93 | 92 | 92 | 92 | 88 | 86 | 81 | 78 | 76 | 75 | 77 | 78 | 79 | 84 | 86 | 88 | 90 | 92 | 92 | 95 | 96 | 87.3 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 96 | 96 | 96 | 96 | 95 | 94 | 94 | 93 | 93 | 93 | 93 | 94 | 92 | 90 | 82 | 80 | 80 | 76 | 74 | 72 | 70 | 71 | 73 | 86.9 | 96 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 73 | 73 | 75 | 80 | 84 | 86 | 85 | 77 | 70 | 63 | 55 | 47 | 45 | 38 | 36 | 36 | 38 | 41 | 44 | 49 | 52 | 55 | 58 | 61 | 59.3 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 62 | 63 | 71 | 81 | 83 | 87 | 89 | 87 | 77 | 70 | 54 | 50 | 51 | 51 | 49 | 46 | 45 | 48 | 51 | 55 | 57 | 58 | 59 | 63 | 62.8 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 68 | 72 | 75 | 81 | 85 | 87 | 86 | 81 | 74 | 66 | 61 | 59 | 53 | 49 | 50 | 50 | 49 | 51 | 57 | 63 | 67 | 75 | 79 | 83 | 67.5 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 88 | 91 | 93 | 96 | 97 | 98 | 98 | 98 | 98 | 98 | 84 | 74 | 59 | 48 | 48 | 47 | 45 | 44 | 47 | 52 | 56 | 61 | 62 | 68 | 72.9 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 75 | 81 | 86 | 91 | 92 | 93 | 92 | 87 | 79 | 73 | 64 | 56 | 46 | 43 | 47 | 55 | 62 | 63 | 73 | 77 | 81 | 76 | 80 | 82 | 73.0 | 93 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 84 | 85 | 86 | 85 | 83 | 86 | 88 | 89 | 79 | 71 | 67 | 68 | 67 | 64 | 59 | 57 | 58 | 58 | 59 | 61 | 62 | 62 | 63 | 63 | 70.9 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 70 | 84 | 87 | 91 | 94 | 96 | 96 | 95 | 91 | 81 | 80 | 75 | 74 | 74 | 73 | 71 | 65 | 68 | 72 | 73 | 74 | 74 | 75 | 77 | 79.7 | 96 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 87 | 89 | 91 | 94 | 94 | 93 | 92 | 91 | 91 | 90 | 86 | 79 | 71 | 74 | 73 | 70 | 71 | 68 | 66 | 66 | 69 | 65 | 67 | 75 | 79.6 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 77 | 79 | 82 | 84 | 84 | 84 | 83 | 81 | 74 | 63 | 48 | 45 | 44 | 43 | 42 | 40 | 41 | 45 | 48 | 49 | 55 | 61 | 69 | 73 | 62.2 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 74 | 72 | 70 | 68 | 68 | 70 | 72 | 72 | 65 | 58 | 54 | 49 | 44 | 40 | 37 | 36 | 38 | 42 | 45 | 50 | 54 | 58 | 59 | 65 | 56.7 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 68 | 70 | 75 | 78 | 82 | 88 | 91 | 84 | 79 | 75 | 72 | 62 | 53 | 50 | 43 | 40 | 36 | 51 | 73 | 78 | 80 | 83 | 83 | 74 | 69.5 | 91 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 64 | 65 | 70 | 77 | 82 | 85 | 85 | 82 | 80 | 78 | 74 | 71 | 65 | 58 | 48 | 39 | 37 | 38 | 45 | 45 | 49 | 54 | 58 | 64 | 63.1 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 68 | 72 | 75 | 78 | 80 | 82 | 82 | 81 | 79 | 77 | 75 | 65 | 45 | 45 | 41 | 39 | 37 | 38 | 43 | 45 | 48 | 52 | 54 | 54 | 60.6 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 60 | 70 | 82 | 86 | 89 | 89 | 89 | 88 | 88 | 87 | 78 | 74 | 74 | 73 | 69 | 60 | 56 | 53 | 59 | 63 | 67 | 69 | 72 | 74 | 73.7 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 77 | 77 | 81 | 82 | 84 | 85 | 86 | 85 | 81 | 72 | 73 | 71 | 68 | 66 | 64 | 65 | 70 | 74 | 77 | 76 | 78 | 83 | 92 | 92 | 77.3 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 93 | 92 | 87 | 86 | 84 | 83 | 85 | 81 | 78 | 75 | 75 | 71 | 70 | 72 | 69 | 65 | 64 | 65 | 74 | 76 | 73 | 79 | 83 | 89 | 77.8 | 93 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 84 | 83 | 82 | 83 | 83 | 87 | 84 | 84 | 81 | 76 | 69 | 65 | 58 | 53 | 47 | 43 | 44 | 48 | 51 | 54 | 57 | 58 | 62 | 64 | 66.7 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 66 | 71 | 76 | 83 | 82 | 87 | 90 | 86 | 78 | 73 | 66 | 63 | 52 | 46 | 36 | 34 | 32 | 33 | 37 | 39 | 42 | 46 | 51 | 56 | 59.4 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 61 | 66 | 70 | 73 | 75 | 77 | 77 | 73 | 70 | 63 | 56 | 43 | 35 | 32 | 31 | 30 | 30 | 33 | 36 | 42 | 46 | 51 | 52 | 53 | 53.1 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 58 | 62 | 66 | 68 | 69 | 73 | 74 | 76 | 74 | 68 | 70 | 67 | 63 | 59 | 59 | 61 | 65 | 69 | 68 | 69 | 73 | 78 | 82 | 84 | 69.1 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | DF | DF | DF | 88 | 89 | 89 | 92 | 91 | 76 | 67 | 63 | 60 | 56 | 52 | 48 | 37 | 32 | 34 | 37 | 40 | 43 | 47 | 50 | 51 | 59.1 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 52 | 53 | 57 | 58 | 60 | 59 | 63 | 61 | 55 | 50 | 49 | 44 | 39 | 36 | 31 | 26 | 26 | 29 | 31 | 33 | 34 | 43 | 50 | 54 | 45.6 | 63 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 58 | 66 | 68 | 69 | 70 | 72 | 75 | 70 | 66 | 60 | 53 | 47 | 43 | 41 | 39 | 34 | 32 | 35 | 39 | 44 | 49 | 50 | 51 | 55 | 53.7 | 75 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 56 | 58 | 58 | 59 | 63 | 59 | 58 | 60 | 76 | 77 | 58 | 51 | 44 | 37 | 30 | 29 | 30 | 31 | 34 | 38 | 40 | 40 | 41 | 45 | 48.8 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 48 | 53 | 57 | 58 | 59 | 62 | 67 | 70 | 68 | 62 | 54 | 45 | 36 | 30 | 28 | 28 | 28 | 30 | 33 | 33 | 40 | 44 | 47 | 53 | 47.1 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 57 | 58 | 61 | 61 | 62 | 64 | 69 | 68 | 66 | 62 | 58 | 51 | 45 | 40 | 34 | 32 | 32 | 32 | 35 | 36 | 39 | 45 | 50 | 59 | 50.7 | 69 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 66 | 72 | 73 | 72 | 71 | 72 | 74 | 71 | 67 | 63 | 57 | 55 | 54 | 53 | 50 | 47 | 52 | 49 | 48 | 52 | 54 | 55 | 59 | 64 | 60.4 | 74 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 71.4 | 74.2 | 76.8 | 79.3 | 80.8 | 82.3 | 83.3 | 81.5 | 77.5 | 72.5 | 66.9 | 61.8 | 56.8 | 54.0 | 51.0 | 48.7 | 48.7 | 50.6 | 54.4 | 57.2 | 59.9 | 62.7 | 65.7 | 68.7 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 96 | 96 | 96 | 96 | 97 | 98 | 98 | 98 | 98 | 98 | 93 | 93 | 94 | 92 | 90 | 82 | 84 | 86 | 88 | 93 | 97 | 97 | 96 | 96 | Diurnal Maximum | |

DF - DAS Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 70 | 9.76 | 9.76 |
| 40 - 60 | 197 | 27.48 | 37.24 |
| 60 - 80 | 258 | 35.98 | 73.22 |
| 80 - 100 | 192 | 26.78 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



| | | |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 99 % on Sep 7 09:00 | Maximum Daily Average: 87.9 % on Sep 2 | Hours in Service: 720 |
| Minimum Value: 26 % on Sep 25 17:00 | Minimum Daily Average: 44.7 % on Sep 25 | Hours of Data: 717 |
| Maximum Diurnal Average: 81.8 % at hour 7 | Minimum Diurnal Average: 48.9 % at hour 17 | Hours of Missing Data: 3 |
| Monthly Average: 65.4 % | Percentiles: P ₁ = 29 P ₁₀ = 39 Q ₁ = 51 Median = 67 Q ₃ = 80 P ₉₀ = 88 P ₉₉ = 98 | Hours of Calibration: 0 |
| | | Percent Operational Time: 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 83 | 84 | 85 | 85 | 87 | 89 | 92 | 92 | 88 | 84 | 82 | 81 | 82 | 83 | 82 | 83 | 84 | 85 | 87 | 93 | 97 | 98 | 96 | 95 | 87.4 | 98 |
| 2-Sep | 95 | 95 | 93 | 93 | 93 | 92 | 92 | 89 | 87 | 82 | 79 | 77 | 76 | 78 | 79 | 80 | 85 | 87 | 89 | 91 | 93 | 92 | 95 | 97 | 87.9 | 97 |
| 3-Sep | 96 | 96 | 96 | 97 | 97 | 95 | 94 | 94 | 93 | 93 | 94 | 94 | 91 | 89 | 81 | 80 | 80 | 76 | 74 | 72 | 70 | 71 | 73 | 87.0 | 97 | |
| 4-Sep | 73 | 73 | 75 | 80 | 84 | 86 | 84 | 78 | 70 | 63 | 55 | 47 | 45 | 38 | 37 | 36 | 38 | 40 | 42 | 48 | 50 | 54 | 56 | 61 | 58.9 | 86 |
| 5-Sep | 61 | 61 | 66 | 77 | 83 | 87 | 90 | 88 | 79 | 71 | 54 | 51 | 51 | 51 | 50 | 46 | 45 | 47 | 51 | 55 | 56 | 57 | 59 | 62 | 62.5 | 90 |
| 6-Sep | 67 | 70 | 74 | 79 | 82 | 84 | 84 | 82 | 75 | 67 | 62 | 59 | 54 | 50 | 51 | 51 | 49 | 51 | 56 | 60 | 65 | 74 | 78 | 84 | 67.0 | 84 |
| 7-Sep | 88 | 90 | 93 | 96 | 98 | 98 | 99 | 99 | 99 | 99 | 86 | 74 | 59 | 49 | 48 | 47 | 45 | 43 | 44 | 48 | 53 | 56 | 58 | 62 | 72.2 | 99 |
| 8-Sep | 67 | 71 | 73 | 77 | 82 | 86 | 85 | 88 | 81 | 74 | 65 | 56 | 47 | 43 | 47 | 51 | 60 | 55 | 71 | 75 | 77 | 75 | 80 | 82 | 69.4 | 88 |
| 9-Sep | 84 | 85 | 86 | 85 | 84 | 87 | 89 | 90 | 80 | 72 | 69 | 69 | 68 | 65 | 61 | 58 | 59 | 58 | 58 | 60 | 61 | 62 | 63 | 63 | 71.5 | 90 |
| 10-Sep | 69 | 84 | 87 | 92 | 95 | 97 | 96 | 95 | 92 | 81 | 80 | 76 | 75 | 75 | 74 | 72 | 66 | 68 | 73 | 74 | 74 | 75 | 75 | 78 | 80.1 | 97 |
| 11-Sep | 88 | 89 | 92 | 94 | 94 | 94 | 92 | 91 | 91 | 91 | 87 | 80 | 72 | 76 | 74 | 71 | 71 | 68 | 66 | 66 | 69 | 65 | 66 | 75 | 80.0 | 94 |
| 12-Sep | 76 | 78 | 82 | 83 | 83 | 83 | 83 | 82 | 76 | 64 | 49 | 46 | 45 | 44 | 43 | 41 | 41 | 45 | 46 | 45 | 50 | 58 | 66 | 71 | 61.6 | 83 |
| 13-Sep | 72 | 70 | 68 | 66 | 66 | 69 | 70 | 70 | 66 | 59 | 54 | 49 | 44 | 41 | 37 | 36 | 38 | 41 | 45 | 49 | 53 | 56 | 57 | 62 | 55.8 | 72 |
| 14-Sep | 65 | 66 | 70 | 74 | 81 | 84 | 87 | 83 | 80 | 76 | 73 | 62 | 54 | 51 | 44 | 40 | 36 | 51 | 73 | 78 | 78 | 77 | 70 | 65 | 67.3 | 87 |
| 15-Sep | 61 | 63 | 69 | 77 | 82 | 85 | 85 | 84 | 81 | 80 | 75 | 72 | 66 | 59 | 49 | 39 | 37 | 38 | 45 | 45 | 49 | 53 | 57 | 62 | 63.1 | 85 |
| 16-Sep | 66 | 69 | 70 | 67 | 73 | 73 | 79 | 81 | 80 | 76 | 74 | 65 | 46 | 46 | 41 | 39 | 37 | 38 | 40 | 42 | 45 | 49 | 51 | 51 | 58.2 | 81 |
| 17-Sep | 55 | 66 | 78 | 81 | 83 | 85 | 85 | 87 | 87 | 87 | 79 | 75 | 75 | 74 | 70 | 60 | 56 | 53 | 56 | 59 | 64 | 67 | 71 | 72 | 71.9 | 87 |
| 18-Sep | 74 | 76 | 78 | 81 | 82 | 84 | 84 | 85 | 81 | 73 | 74 | 72 | 69 | 67 | 65 | 66 | 71 | 75 | 78 | 76 | 78 | 83 | 93 | 92 | 77.4 | 93 |
| 19-Sep | 93 | 91 | 86 | 86 | 84 | 83 | 85 | 81 | 79 | 76 | 75 | 71 | 71 | 72 | 69 | 66 | 64 | 65 | 75 | 76 | 73 | 79 | 82 | 88 | 78.0 | 93 |
| 20-Sep | 84 | 84 | 82 | 82 | 83 | 88 | 84 | 85 | 83 | 77 | 70 | 66 | 59 | 54 | 48 | 44 | 44 | 48 | 50 | 54 | 56 | 58 | 61 | 61 | 67.0 | 88 |
| 21-Sep | 65 | 69 | 74 | 78 | 80 | 80 | 82 | 86 | 80 | 75 | 67 | 63 | 53 | 47 | 36 | 34 | 32 | 33 | 35 | 35 | 38 | 40 | 45 | 49 | 57.4 | 86 |
| 22-Sep | 57 | 63 | 67 | 71 | 73 | 73 | 74 | 73 | 71 | 64 | 57 | 43 | 36 | 33 | 31 | 30 | 30 | 32 | 35 | 39 | 43 | 48 | 49 | 51 | 51.9 | 74 |
| 23-Sep | 56 | 62 | 65 | 67 | 68 | 73 | 74 | 77 | 75 | 69 | 71 | 68 | 64 | 60 | 62 | 66 | 70 | 69 | 69 | 74 | 79 | 83 | 85 | 85 | 69.3 | 85 |
| 24-Sep | DF | DF | DF | 88 | 88 | 89 | 92 | 89 | 76 | 68 | 64 | 61 | 57 | 53 | 48 | 37 | 32 | 33 | 35 | 37 | 40 | 45 | 48 | 49 | 58.5 | 92 |
| 25-Sep | 51 | 52 | 56 | 57 | 58 | 57 | 63 | 62 | 55 | 51 | 49 | 44 | 39 | 36 | 31 | 26 | 26 | 28 | 30 | 32 | 31 | 41 | 45 | 51 | 44.7 | 63 |
| 26-Sep | 54 | 62 | 67 | 67 | 67 | 68 | 72 | 70 | 67 | 61 | 54 | 48 | 43 | 42 | 39 | 34 | 32 | 34 | 37 | 43 | 47 | 49 | 50 | 54 | 52.7 | 72 |
| 27-Sep | 55 | 56 | 56 | 58 | 60 | 56 | 57 | 60 | 74 | 77 | 58 | 51 | 44 | 37 | 30 | 29 | 30 | 30 | 33 | 37 | 38 | 39 | 40 | 43 | 47.9 | 77 |
| 28-Sep | 46 | 51 | 54 | 55 | 56 | 58 | 60 | 66 | 69 | 63 | 54 | 44 | 36 | 30 | 28 | 28 | 28 | 29 | 31 | 31 | 35 | 37 | 40 | 49 | 44.9 | 69 |
| 29-Sep | 55 | 57 | 58 | 56 | 58 | 61 | 66 | 67 | 67 | 63 | 57 | 51 | 45 | 41 | 34 | 32 | 32 | 31 | 32 | 33 | 37 | 41 | 44 | 55 | 48.9 | 67 |
| 30-Sep | 58 | 63 | 66 | 70 | 71 | 72 | 74 | 72 | 67 | 64 | 58 | 56 | 55 | 54 | 51 | 47 | 53 | 50 | 49 | 52 | 54 | 55 | 59 | 65 | 59.7 | 74 |

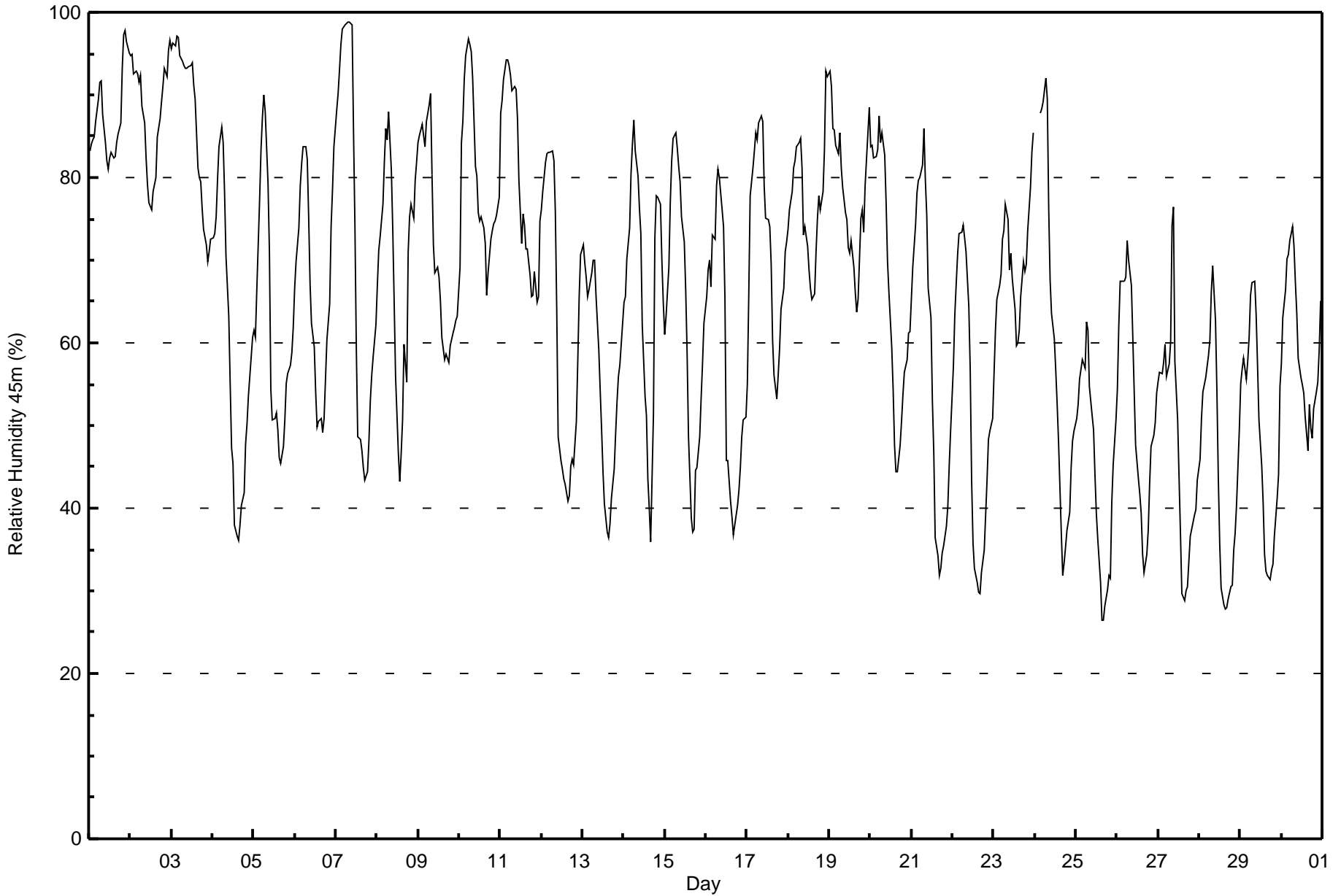
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|-----------------|--|
| 69.4 | 72.3 | 74.8 | 77.3 | 79.1 | 80.5 | 81.8 | 81.5 | 78.3 | 73.3 | 67.5 | 62.3 | 57.5 | 54.6 | 51.5 | 48.9 | 48.9 | 50.3 | 53.5 | 55.9 | 58.4 | 61.0 | 63.7 | 66.9 | Diurnal Average | | |
| 96 | 96 | 96 | 97 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 93 | 94 | 94 | 91 | 89 | 83 | 85 | 87 | 89 | 93 | 97 | 98 | 96 | 97 | Diurnal Maximum | |

DF - DAS Failure



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 76 | 10.60 | 10.60 |
| 40 - 60 | 203 | 28.31 | 38.91 |
| 60 - 80 | 260 | 36.26 | 75.17 |
| 80 - 100 | 178 | 24.83 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720

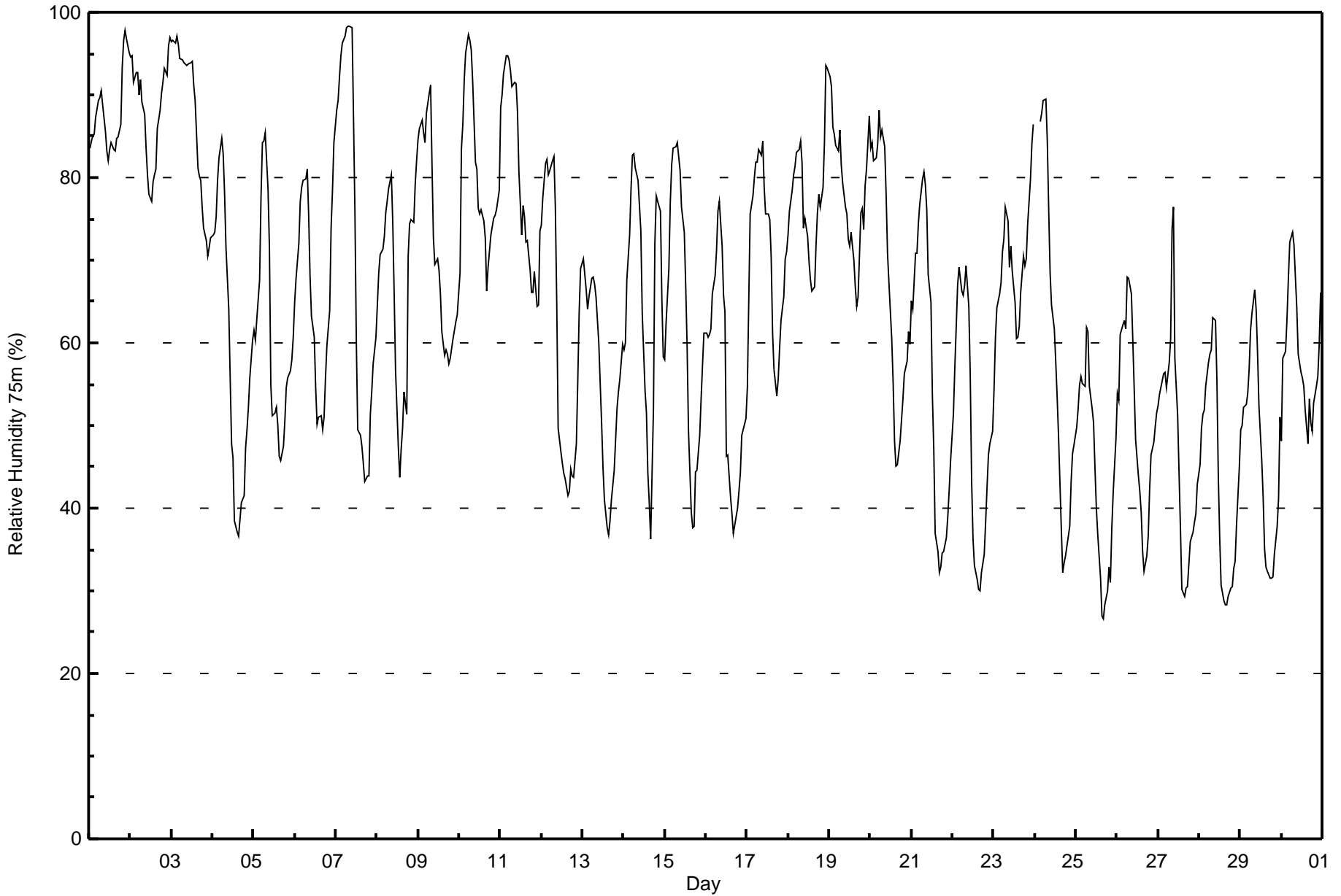


| Maximum Value: 98 % on Sep 7 09:00 Maximum Daily Average: 88.3 % on Sep 2 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 27 % on Sep 25 17:00 Minimum Daily Average: 43.6 % on Sep 28 Maximum Diurnal Average: 79.7 % at hour 8 Minimum Diurnal Average: 49.2 % at hour 17 Monthly Average: 64.7 % Percentiles: P ₁ = 29 P ₁₀ = 38 Q ₁ = 51 Median = 66 Q ₃ = 79 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 | 84 | 84 | 85 | 85 | 87 | 89 | 90 | 90 | 89 | 86 | 83 | 82 | 83 | 84 | 83 | 83 | 85 | 85 | 86 | 93 | 97 | 98 | 97 | 95 | 87.7 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 95 | 95 | 92 | 93 | 93 | 90 | 92 | 89 | 88 | 84 | 80 | 78 | 77 | 80 | 80 | 81 | 86 | 88 | 90 | 92 | 93 | 92 | 96 | 97 | 88.3 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 96 | 97 | 96 | 97 | 96 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 91 | 89 | 81 | 80 | 80 | 77 | 74 | 72 | 70 | 72 | 73 | 87.2 | 97 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 73 | 73 | 75 | 80 | 82 | 85 | 83 | 78 | 71 | 64 | 56 | 48 | 46 | 38 | 37 | 39 | 41 | 41 | 47 | 49 | 52 | 56 | 60 | 58.9 | 85 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 61 | 60 | 63 | 68 | 78 | 84 | 84 | 85 | 79 | 72 | 55 | 51 | 51 | 52 | 50 | 46 | 46 | 47 | 50 | 55 | 56 | 57 | 58 | 61 | 61.2 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 65 | 68 | 72 | 77 | 79 | 80 | 80 | 81 | 75 | 68 | 63 | 61 | 55 | 50 | 51 | 51 | 49 | 51 | 56 | 60 | 64 | 74 | 78 | 84 | 66.3 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 88 | 89 | 92 | 95 | 96 | 97 | 98 | 98 | 98 | 98 | 87 | 76 | 60 | 50 | 49 | 48 | 45 | 43 | 44 | 44 | 51 | 54 | 58 | 61 | 71.7 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 65 | 68 | 71 | 71 | 73 | 76 | 77 | 79 | 80 | 75 | 66 | 57 | 47 | 44 | 47 | 50 | 54 | 51 | 71 | 74 | 75 | 75 | 79 | 82 | 66.9 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 85 | 86 | 87 | 85 | 84 | 88 | 90 | 91 | 81 | 73 | 70 | 70 | 69 | 66 | 61 | 58 | 59 | 59 | 57 | 58 | 60 | 62 | 63 | 63 | 71.9 | 91 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 68 | 84 | 86 | 92 | 95 | 97 | 97 | 95 | 92 | 82 | 81 | 76 | 76 | 76 | 75 | 73 | 66 | 69 | 73 | 74 | 75 | 75 | 76 | 78 | 80.5 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 88 | 90 | 92 | 95 | 95 | 94 | 93 | 91 | 92 | 91 | 88 | 81 | 73 | 77 | 75 | 72 | 72 | 69 | 66 | 66 | 69 | 64 | 65 | 74 | 80.5 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 74 | 77 | 82 | 82 | 80 | 81 | 82 | 83 | 76 | 65 | 50 | 47 | 45 | 44 | 43 | 42 | 42 | 45 | 44 | 44 | 48 | 55 | 64 | 69 | 61.0 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 70 | 68 | 66 | 64 | 66 | 68 | 68 | 67 | 66 | 60 | 55 | 50 | 45 | 41 | 38 | 37 | 39 | 41 | 45 | 48 | 52 | 54 | 56 | 60 | 55.1 | 70 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 59 | 60 | 68 | 73 | 79 | 83 | 83 | 81 | 80 | 77 | 74 | 64 | 54 | 52 | 44 | 41 | 36 | 52 | 72 | 78 | 77 | 76 | 65 | 58 | 66.0 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 58 | 62 | 69 | 77 | 81 | 84 | 84 | 84 | 83 | 81 | 76 | 73 | 67 | 60 | 49 | 39 | 38 | 38 | 44 | 45 | 49 | 53 | 57 | 61 | 63.0 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 61 | 61 | 61 | 62 | 66 | 68 | 71 | 76 | 77 | 72 | 66 | 64 | 46 | 46 | 41 | 39 | 37 | 38 | 40 | 42 | 44 | 49 | 50 | 51 | 55.3 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 55 | 65 | 76 | 78 | 80 | 82 | 82 | 83 | 83 | 84 | 79 | 76 | 76 | 75 | 70 | 61 | 57 | 54 | 56 | 59 | 63 | 66 | 70 | 71 | 70.8 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 73 | 76 | 78 | 80 | 81 | 83 | 83 | 84 | 82 | 74 | 75 | 73 | 70 | 68 | 66 | 67 | 72 | 76 | 78 | 76 | 79 | 84 | 94 | 93 | 77.7 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 92 | 91 | 86 | 85 | 84 | 83 | 86 | 82 | 79 | 77 | 76 | 72 | 72 | 73 | 70 | 67 | 64 | 66 | 76 | 76 | 74 | 79 | 81 | 87 | 78.3 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 84 | 84 | 82 | 82 | 84 | 88 | 85 | 86 | 84 | 78 | 71 | 67 | 60 | 55 | 48 | 45 | 45 | 48 | 51 | 53 | 56 | 58 | 61 | 60 | 67.3 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 65 | 64 | 71 | 71 | 74 | 77 | 80 | 81 | 79 | 76 | 68 | 65 | 54 | 47 | 37 | 35 | 32 | 33 | 35 | 35 | 36 | 39 | 42 | 46 | 55.9 | 81 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 51 | 57 | 62 | 67 | 69 | 66 | 66 | 67 | 69 | 64 | 56 | 43 | 36 | 33 | 31 | 30 | 30 | 32 | 34 | 38 | 43 | 46 | 48 | 49 | 49.6 | 69 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 54 | 61 | 64 | 66 | 67 | 71 | 73 | 76 | 75 | 69 | 72 | 69 | 65 | 60 | 61 | 62 | 66 | 71 | 69 | 70 | 74 | 80 | 84 | 86 | 69.4 | 86 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | DF | DF | DF | 87 | 88 | 89 | 89 | 84 | 76 | 68 | 65 | 62 | 58 | 54 | 49 | 37 | 32 | 33 | 34 | 35 | 38 | 43 | 47 | 48 | 58.0 | 89 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 50 | 52 | 55 | 56 | 55 | 55 | 62 | 61 | 55 | 52 | 50 | 45 | 40 | 37 | 31 | 27 | 27 | 28 | 30 | 33 | 31 | 37 | 42 | 49 | 44.1 | 62 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 54 | 53 | 61 | 62 | 63 | 62 | 68 | 68 | 66 | 60 | 54 | 48 | 44 | 42 | 39 | 35 | 32 | 34 | 37 | 42 | 46 | 48 | 50 | 52 | 50.9 | 68 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 52 | 54 | 55 | 56 | 56 | 55 | 58 | 60 | 74 | 76 | 58 | 51 | 44 | 37 | 30 | 29 | 30 | 31 | 33 | 36 | 37 | 38 | 39 | 43 | 47.3 | 76 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 45 | 50 | 51 | 52 | 55 | 58 | 59 | 59 | 63 | 63 | 56 | 44 | 36 | 31 | 29 | 28 | 28 | 29 | 30 | 31 | 33 | 34 | 38 | 45 | 43.6 | 63 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 50 | 50 | 52 | 53 | 54 | 57 | 62 | 64 | 66 | 64 | 59 | 52 | 46 | 41 | 35 | 33 | 32 | 32 | 32 | 32 | 34 | 38 | 41 | 51 | 47.0 | 66 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 48 | 58 | 59 | 63 | 68 | 72 | 73 | 72 | 68 | 64 | 59 | 56 | 56 | 55 | 52 | 48 | 53 | 50 | 49 | 53 | 55 | 56 | 60 | 66 | 58.9 | 73 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 67.7 | 70.3 | 72.8 | 75.1 | 77.0 | 78.5 | 79.7 | 79.7 | 78.0 | 73.7 | 68.0 | 63.2 | 58.2 | 55.3 | 52.1 | 49.4 | 49.2 | 50.4 | 53.3 | 55.5 | 57.7 | 60.2 | 62.8 | 65.8 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 96 | 97 | 96 | 97 | 96 | 97 | 98 | 98 | 98 | 98 | 94 | 94 | 94 | 91 | 89 | 83 | 86 | 88 | 90 | 93 | 97 | 98 | 97 | 97 | Diurnal Maximum | |
| DF - DAS Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

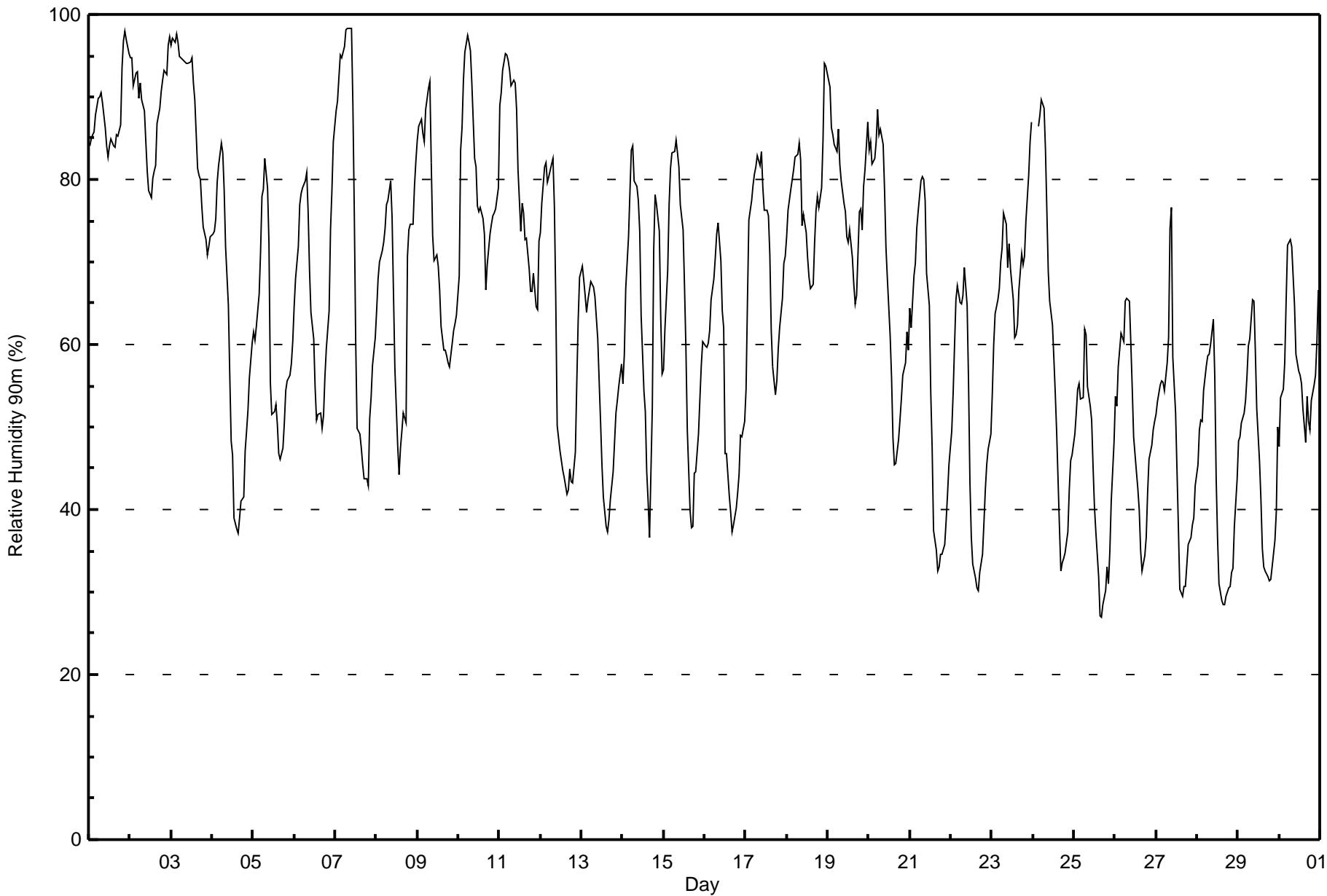
| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 80 | 11.16 | 11.16 |
| 40 - 60 | 206 | 28.73 | 39.89 |
| 60 - 80 | 261 | 36.40 | 76.29 |
| 80 - 100 | 170 | 23.71 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



| Maximum Value: 98 % on Sep 7 09:00 Maximum Daily Average: 88.7 % on Sep 2 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 27 % on Sep 25 17:00 Minimum Daily Average: 43.3 % on Sep 28 Maximum Diurnal Average: 79.3 % at hour 7 Minimum Diurnal Average: 49.4 % at hour 17 Monthly Average: 64.6 % Percentiles: P ₁ = 29 P ₁₀ = 39 Q ₁ = 51 Median = 65 Q ₃ = 79 P ₉₀ = 89 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 | 84 | 85 | 85 | 86 | 88 | 90 | 90 | 91 | 89 | 86 | 84 | 83 | 84 | 85 | 84 | 84 | 85 | 85 | 87 | 94 | 97 | 98 | 97 | 95 | 88.1 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 95 | 95 | 91 | 93 | 93 | 90 | 92 | 90 | 88 | 84 | 81 | 79 | 78 | 80 | 81 | 82 | 87 | 89 | 91 | 92 | 93 | 93 | 96 | 97 | 88.7 | 97 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 96 | 97 | 97 | 98 | 97 | 95 | 95 | 94 | 94 | 94 | 94 | 95 | 92 | 90 | 81 | 80 | 80 | 77 | 74 | 73 | 71 | 72 | 73 | 87.6 | 98 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 73 | 74 | 75 | 80 | 82 | 84 | 83 | 79 | 72 | 65 | 56 | 48 | 47 | 39 | 38 | 37 | 39 | 41 | 42 | 47 | 49 | 52 | 56 | 60 | 59.1 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 62 | 61 | 62 | 66 | 71 | 78 | 79 | 83 | 79 | 72 | 55 | 52 | 52 | 53 | 50 | 47 | 46 | 47 | 50 | 54 | 56 | 56 | 58 | 60 | 60.4 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 65 | 68 | 72 | 77 | 78 | 79 | 80 | 81 | 76 | 69 | 64 | 61 | 55 | 51 | 51 | 52 | 50 | 51 | 56 | 60 | 64 | 74 | 79 | 85 | 66.5 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 88 | 90 | 92 | 95 | 95 | 96 | 98 | 98 | 98 | 98 | 89 | 76 | 60 | 50 | 49 | 47 | 45 | 44 | 44 | 43 | 51 | 54 | 58 | 61 | 71.7 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 64 | 68 | 70 | 71 | 72 | 74 | 77 | 77 | 80 | 75 | 66 | 57 | 48 | 44 | 47 | 50 | 52 | 51 | 71 | 74 | 75 | 75 | 79 | 82 | 66.6 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 85 | 86 | 87 | 86 | 85 | 88 | 91 | 92 | 82 | 73 | 70 | 71 | 70 | 67 | 62 | 59 | 59 | 59 | 58 | 57 | 60 | 62 | 63 | 64 | 72.3 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 68 | 83 | 86 | 92 | 95 | 98 | 97 | 96 | 92 | 82 | 81 | 77 | 76 | 77 | 75 | 73 | 67 | 70 | 73 | 75 | 76 | 76 | 77 | 79 | 80.8 | 98 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 89 | 90 | 93 | 95 | 95 | 94 | 93 | 91 | 92 | 92 | 88 | 81 | 74 | 77 | 76 | 73 | 73 | 69 | 67 | 66 | 69 | 65 | 64 | 73 | 80.8 | 95 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 74 | 77 | 82 | 82 | 80 | 80 | 82 | 82 | 77 | 65 | 50 | 47 | 46 | 45 | 44 | 42 | 42 | 45 | 43 | 43 | 47 | 55 | 63 | 68 | 60.9 | 82 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 69 | 68 | 66 | 64 | 65 | 68 | 67 | 67 | 66 | 61 | 56 | 51 | 45 | 41 | 38 | 37 | 39 | 41 | 45 | 48 | 52 | 53 | 55 | 58 | 55.0 | 69 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 55 | 59 | 67 | 73 | 79 | 84 | 84 | 80 | 79 | 77 | 74 | 64 | 54 | 52 | 45 | 41 | 37 | 52 | 71 | 78 | 77 | 74 | 63 | 56 | 65.6 | 84 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 57 | 62 | 69 | 77 | 81 | 83 | 83 | 85 | 83 | 81 | 77 | 74 | 67 | 60 | 50 | 40 | 38 | 38 | 44 | 45 | 49 | 53 | 57 | 60 | 63.1 | 85 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 60 | 60 | 60 | 62 | 65 | 68 | 71 | 73 | 75 | 70 | 64 | 62 | 47 | 47 | 42 | 40 | 37 | 38 | 40 | 42 | 44 | 49 | 49 | 51 | 54.8 | 75 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 55 | 65 | 75 | 77 | 79 | 81 | 82 | 83 | 82 | 83 | 79 | 76 | 76 | 76 | 71 | 62 | 57 | 54 | 56 | 59 | 62 | 66 | 70 | 71 | 70.7 | 83 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 73 | 76 | 79 | 80 | 81 | 83 | 83 | 84 | 82 | 74 | 76 | 74 | 70 | 68 | 67 | 67 | 72 | 76 | 78 | 77 | 79 | 85 | 94 | 94 | 78.1 | 94 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 92 | 91 | 86 | 85 | 84 | 83 | 86 | 82 | 80 | 77 | 76 | 73 | 72 | 74 | 70 | 67 | 65 | 66 | 76 | 76 | 74 | 79 | 81 | 87 | 78.6 | 92 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 84 | 85 | 82 | 82 | 85 | 88 | 85 | 86 | 84 | 79 | 72 | 68 | 61 | 56 | 49 | 45 | 46 | 49 | 51 | 53 | 56 | 58 | 62 | 59 | 67.7 | 88 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 64 | 62 | 68 | 70 | 74 | 76 | 80 | 80 | 80 | 78 | 69 | 65 | 54 | 48 | 37 | 35 | 33 | 33 | 35 | 35 | 36 | 39 | 42 | 46 | 55.7 | 80 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 50 | 54 | 60 | 65 | 67 | 65 | 65 | 66 | 69 | 65 | 56 | 43 | 37 | 33 | 32 | 30 | 30 | 32 | 35 | 38 | 42 | 45 | 47 | 49 | 49.0 | 69 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 54 | 60 | 64 | 65 | 67 | 70 | 72 | 76 | 75 | 69 | 72 | 69 | 65 | 61 | 61 | 62 | 67 | 71 | 70 | 71 | 75 | 80 | 85 | 87 | 69.5 | 87 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | DF | DF | DF | 86 | 88 | 90 | 89 | 84 | 76 | 69 | 65 | 62 | 58 | 54 | 49 | 38 | 33 | 34 | 34 | 35 | 37 | 42 | 46 | 47 | 57.9 | 90 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 49 | 52 | 55 | 55 | 53 | 54 | 62 | 61 | 55 | 53 | 51 | 45 | 40 | 37 | 32 | 27 | 27 | 28 | 30 | 33 | 31 | 35 | 41 | 48 | 43.9 | 62 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 54 | 52 | 57 | 61 | 61 | 60 | 65 | 66 | 65 | 60 | 55 | 49 | 45 | 43 | 40 | 35 | 33 | 34 | 37 | 42 | 46 | 48 | 50 | 51 | 50.3 | 66 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 51 | 53 | 55 | 56 | 55 | 54 | 58 | 61 | 74 | 77 | 58 | 52 | 45 | 38 | 30 | 30 | 31 | 31 | 33 | 36 | 37 | 38 | 39 | 43 | 47.3 | 77 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 45 | 50 | 51 | 51 | 54 | 57 | 59 | 59 | 60 | 63 | 56 | 44 | 36 | 31 | 29 | 29 | 28 | 29 | 31 | 31 | 32 | 33 | 38 | 44 | 43.3 | 63 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 48 | 49 | 51 | 52 | 53 | 56 | 60 | 61 | 65 | 65 | 59 | 52 | 46 | 41 | 35 | 33 | 33 | 32 | 31 | 31 | 33 | 36 | 40 | 50 | 46.4 | 65 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 48 | 54 | 55 | 58 | 65 | 72 | 73 | 72 | 68 | 65 | 59 | 57 | 56 | 55 | 52 | 48 | 54 | 51 | 50 | 53 | 55 | 56 | 60 | 67 | 58.4 | 73 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 67.3 | 69.8 | 72.2 | 74.7 | 76.3 | 78.0 | 79.3 | 79.3 | 77.9 | 74.1 | 68.4 | 63.5 | 58.7 | 55.8 | 52.6 | 49.8 | 49.4 | 50.7 | 53.4 | 55.4 | 57.6 | 60.0 | 62.6 | 65.4 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 96 | 97 | 97 | 98 | 97 | 98 | 98 | 98 | 98 | 98 | 94 | 94 | 95 | 92 | 90 | 84 | 87 | 89 | 91 | 94 | 97 | 98 | 97 | 97 | Diurnal Maximum | |
| DF - DAS Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 80 | 11.16 | 11.16 |
| 40 - 60 | 213 | 29.71 | 40.86 |
| 60 - 80 | 255 | 35.56 | 76.43 |
| 80 - 100 | 169 | 23.57 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



| | | |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 31 km/h on Sep 24 16:00 | Maximum Daily Speed Average: 17.7 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 14 08:00 | Minimum Daily Speed Average: 2.3 km/h on Sep 9 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 6.5 km/h at hour 16 | Minimum Diurnal Speed Average: 2.2 km/h at hour 19 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 3.7 km/h 231.5 deg | Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 10 Q ₃ = 14 P ₉₀ = 19 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 | E11 | ESE12 | ESE10 | SE6 | SE2 | NW2 | N6 | NNE8 | NE9 | NE7 | NE8 | E15 | ENE13 | ENE12 | E12 | SE5 | NE6 | SSW3 | N6 | NW5 | W7 | W9 | W14 | WSW13 | ENE3.1 | E15 |
| 2-Sep | WSW10 | SSW6 | WSW8 | W13 | WSW13 | SW12 | SW7 | SW7 | WSW9 | W10 | W7 | W12 | W10 | W11 | W12 | W15 | W11 | W9 | WNW3 | W8 | W12 | W14 | W18 | WNW13 | W9.9 | W18 |
| 3-Sep | NNW17 | NW15 | NNW11 | W16 | W22 | W23 | W22 | W24 | W23 | W22 | WNW21 | WNW18 | WNW16 | WNW16 | WNW17 | NW17 | NW17 | NW19 | NW19 | NW18 | NW22 | NW21 | WNW17 | WNW18 | NNW17.7 | W24 |
| 4-Sep | WNW19 | WNW19 | W17 | W17 | W16 | WSW11 | WSW7 | WSW9 | W7 | W9 | W15 | W17 | W12 | W10 | W8 | W8 | W8 | WSW7 | SW4 | N5 | WSW7 | SW6 | SSW6 | SW7 | W9.6 | WNW19 |
| 5-Sep | SSW5 | S6 | S6 | SSE8 | SSE10 | SSE8 | SSE7 | SE6 | SE6 | SE7 | SSE11 | S13 | SSW10 | S9 | SE9 | SE10 | SSE10 | SE9 | SE10 | SE11 | SE12 | SE12 | SE12 | SE10 | SSE8.4 | S13 |
| 6-Sep | SE9 | SE10 | SE9 | SSE9 | SSE8 | SSE7 | SSE8 | SSE9 | SSE10 | SSE12 | SSE11 | SE11 | SE11 | SSE11 | SSE17 | SSE21 | SSE17 | SSE16 | S10 | S8 | SSE10 | SSE11 | SE10 | SE8 | SSE10.8 | SSE21 |
| 7-Sep | SSE8 | SSE8 | SSE8 | SSE7 | SSE8 | SSE6 | SE8 | SE9 | SSE9 | SSE9 | SE9 | SE9 | ESE10 | ESE9 | SE8 | SE7 | SE8 | SSE7 | SSW7 | SW8 | SW5 | SW8 | SW7 | S3 | SSE6.5 | ESE10 |
| 8-Sep | S7 | SSE5 | SSW5 | S4 | S6 | S5 | SSE5 | SSE4 | S3 | W5 | W2 | WSW6 | W8 | WNW9 | WNW6 | WNW10 | SW5 | WNW10 | N9 | NNW2 | NW4 | NNW10 | NNW11 | NNW10 | W2.8 | NNW11 |
| 9-Sep | NW8 | NNW7 | NNW6 | NNW7 | NNW6 | N9 | NNE11 | NNE11 | N10 | NNW9 | NNW5 | NNW4 | W3 | WNW2 | ESE2 | SE4 | SE7 | SE7 | SE8 | SE11 | SE14 | SE14 | SE16 | SE16 | ENE2.3 | SE16 |
| 10-Sep | SSE14 | SE14 | SE18 | SE16 | SE14 | SSE14 | SSE14 | SSE11 | S8 | WSW16 | W19 | W22 | WSW20 | W22 | W22 | WNW19 | WNW22 | W21 | W22 | W23 | W27 | W24 | W21 | W21 | WSW11.0 | W27 |
| 11-Sep | NW17 | NNW20 | NNW19 | NNW21 | NNW23 | NNW24 | NNW25 | NNW24 | NNW23 | NNW21 | NNW20 | NNW21 | NNW17 | NNW18 | NNW17 | NNW17 | NNW14 | NNW12 | NNW10 | NNW11 | NNW10 | NW8 | WNW8 | W10 | NNW16.6 | NNW25 |
| 12-Sep | WSW10 | W9 | W8 | WSW9 | WSW9 | WSW8 | WSW7 | WSW5 | SW5 | SSW6 | SW6 | SSW6 | SSW9 | SSW10 | SSW10 | SSW10 | S9 | SSE11 | SSE12 | SSE11 | SSE14 | SSE14 | SSE12 | SSE12 | SSW7.1 | SSE14 |
| 13-Sep | SSE11 | S12 | S12 | S10 | S11 | S12 | SSE8 | SSE8 | S7 | SSW11 | SSW13 | SSW14 | SW16 | SW18 | SW18 | SW19 | WSW16 | SW16 | WSW17 | WSW16 | WSW15 | WSW13 | W14 | W16 | SW11.2 | SW19 |
| 14-Sep | WNW10 | WNW8 | WNW4 | NW4 | NE1 | S2 | SW5 | SSE1 | SE3 | SSE7 | SSE6 | SE8 | SE10 | SSE10 | SW13 | WSW18 | WSW19 | NW16 | NNW15 | N5 | WSW2 | SW9 | WSW9 | WNW10 | WSW3.7 | WSW19 |
| 15-Sep | NW9 | NW6 | NW3 | N5 | NNE5 | NNE8 | NE9 | NE9 | ENE9 | E6 | ESE4 | E5 | SE5 | ESE6 | ESE9 | ESE10 | SE12 | ESE8 | SE11 | SE16 | SE13 | SE11 | SE8 | ESE5.2 | SE16 | |
| 16-Sep | SE8 | SE9 | SSE8 | SSE10 | SSE8 | SSE8 | SSE9 | SSE8 | SSE7 | SE7 | SE9 | SSE10 | SSW15 | SW19 | WSW20 | SW19 | WSW19 | SW15 | SW9 | SSW7 | SSW7 | SSW8 | SSW7 | S7 | SSW8.5 | WSW20 |
| 17-Sep | S7 | SSW10 | S9 | S7 | S7 | SSE8 | S9 | S6 | SSE6 | SSE6 | SSW7 | SSW9 | SSW10 | SSW10 | SW9 | WSW11 | WSW17 | W15 | WSW9 | SW10 | SW12 | WSW11 | WSW10 | SW7 | SW7.7 | WSW17 |
| 18-Sep | SSE3 | SW4 | SSW6 | WSW6 | W9 | SW7 | WSW9 | W9 | W14 | W23 | W25 | W22 | WNW22 | WNW19 | WNW19 | NW14 | NNW10 | NNW11 | NNW10 | NNW9 | NNW7 | NNW7 | NNE8 | N5 | WNW9.3 | W25 |
| 19-Sep | NNW5 | NW7 | NW7 | WNW11 | WNW11 | WNW10 | W13 | WNW17 | W19 | W16 | WNW13 | W12 | NW9 | WNW9 | WNW15 | WNW12 | NW11 | NW7 | N10 | NNW9 | NNW10 | WNW9 | NW8 | NNW12 | WNW10.0 | W19 |
| 20-Sep | NNW12 | NNW11 | NNW10 | NW6 | NNW10 | N10 | N10 | NNW7 | NNW6 | NNW5 | NNW5 | W6 | NW5 | W4 | NW4 | NW3 | ENE5 | E6 | ESE6 | ESE6 | ESE5 | SE6 | SE7 | SE8 | N3.1 | NNW12 |
| 21-Sep | SE6 | SSE9 | SSE8 | SSE7 | S7 | SSW8 | S5 | SSE4 | S3 | SSE5 | SSE5 | SE8 | SSE10 | S8 | SW12 | SW12 | WSW13 | SW12 | SSW9 | SSW10 | SSW10 | S7 | SSE10 | SSE9 | S6.9 | WSW13 |
| 22-Sep | SSE8 | SSE10 | SSE10 | SSE9 | SE8 | SE10 | SE10 | SSE11 | SE9 | SE6 | SE9 | S11 | S15 | SSW16 | S15 | S19 | S17 | S14 | S12 | SSE13 | SSE14 | SSE12 | SSE14 | SSE16 | SSE11.5 | S19 |
| 23-Sep | SSE14 | SSE14 | SSE13 | SSE15 | SSE17 | SE15 | SE17 | SE17 | SE15 | SSE20 | SE18 | SE18 | SE19 | SE20 | SE20 | SSE17 | SE16 | SE15 | SSE16 | SSE16 | SSE15 | SSE15 | SSE14 | SSE14 | SE16.2 | SE20 |
| 24-Sep | DF | DF | DF | SSE12 | SSE13 | SSE10 | S8 | S7 | SSW8 | SW16 | WSW20 | WSW23 | WSW22 | W28 | W24 | W31 | WNW30 | W24 | W9 | WSW9 | WSW11 | WSW14 | W16 | W19 | WSW14.0 | W31 |
| 25-Sep | W20 | W19 | W20 | W21 | W19 | W15 | SW6 | SW9 | WSW14 | W18 | W17 | W21 | WNW17 | WNW14 | WNW14 | WNW14 | NW10 | NNW6 | WNW3 | WSW5 | WSW7 | WSW11 | WSW10 | S2 | W12.1 | W21 |
| 26-Sep | SSE8 | SE8 | SE8 | SE7 | SE8 | SE10 | SSE8 | SE10 | SSE9 | SE11 | SSE12 | SSE15 | SSE17 | SE13 | SSE14 | S16 | S14 | S14 | SSE15 | SSE12 | SSE17 | SSE16 | SSE13 | SE13 | SSE11.7 | SSE17 |
| 27-Sep | SE12 | SE11 | SE10 | SE11 | SSE10 | WSW10 | W14 | WSW17 | SW13 | SW14 | WNW25 | W26 | W26 | W22 | W30 | W27 | WSW24 | WSW15 | WSW14 | SW13 | WSW15 | W14 | W12 | W13 | WSW12.6 | W30 |
| 28-Sep | WSW10 | W10 | WSW8 | WSW8 | SSW10 | S7 | SSE7 | SE7 | SE7 | SE7 | ESE5 | ESE5 | ESE6 | SSW6 | SW10 | SSW8 | SSW8 | SSW7 | S7 | S9 | SSW6 | S7 | SSE8 | SE6 | S5.5 | W10 |
| 29-Sep | SE6 | SE6 | SE6 | SE9 | SSE10 | SSE9 | SSE8 | SSE11 | SSE8 | SE5 | ESE5 | ESE5 | SE5 | SE5 | ESE7 | ESE5 | E6 | E7 | ENE5 | ENE7 | E6 | E3 | N3 | N3 | ESE5.2 | SSE11 |
| 30-Sep | NW4 | NW3 | N7 | NNW6 | NW6 | N7 | NNE12 | N12 | NNW10 | NNW9 | NNE18 | N23 | NNE20 | NNE23 | N26 | N29 | N27 | N22 | N23 | N24 | N19 | NNE20 | N20 | N21 | N16.0 | N29 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-----------------|--|
| SW2.5 | SSW2.5 | SSW2.8 | SSW3.6 | SSW3.9 | SSW3.3 | SSW2.4 | SSW2.4 | SW2.6 | SW3.8 | WSW4.0 | WSW4.5 | WSW4.9 | WSW5.2 | WSW5.9 | WSW6.5 | WSW5.4 | WSW4.4 | WSW2.2 | SW2.8 | SW3.8 | SW4.5 | SW4.1 | SW3.5 | Diurnal Average | |
| W20 | NNW20 | W20 | W21 | NNW23 | NNW24 | NNW25 | NNW24 | W23 | W23 | W25 | W26 | W26 | W28 | W30 | W31 | NNW30 | W24 | N23 | N24 | W27 | W24 | W21 | W21 | Diurnal Maximum | |

DF - DAS Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

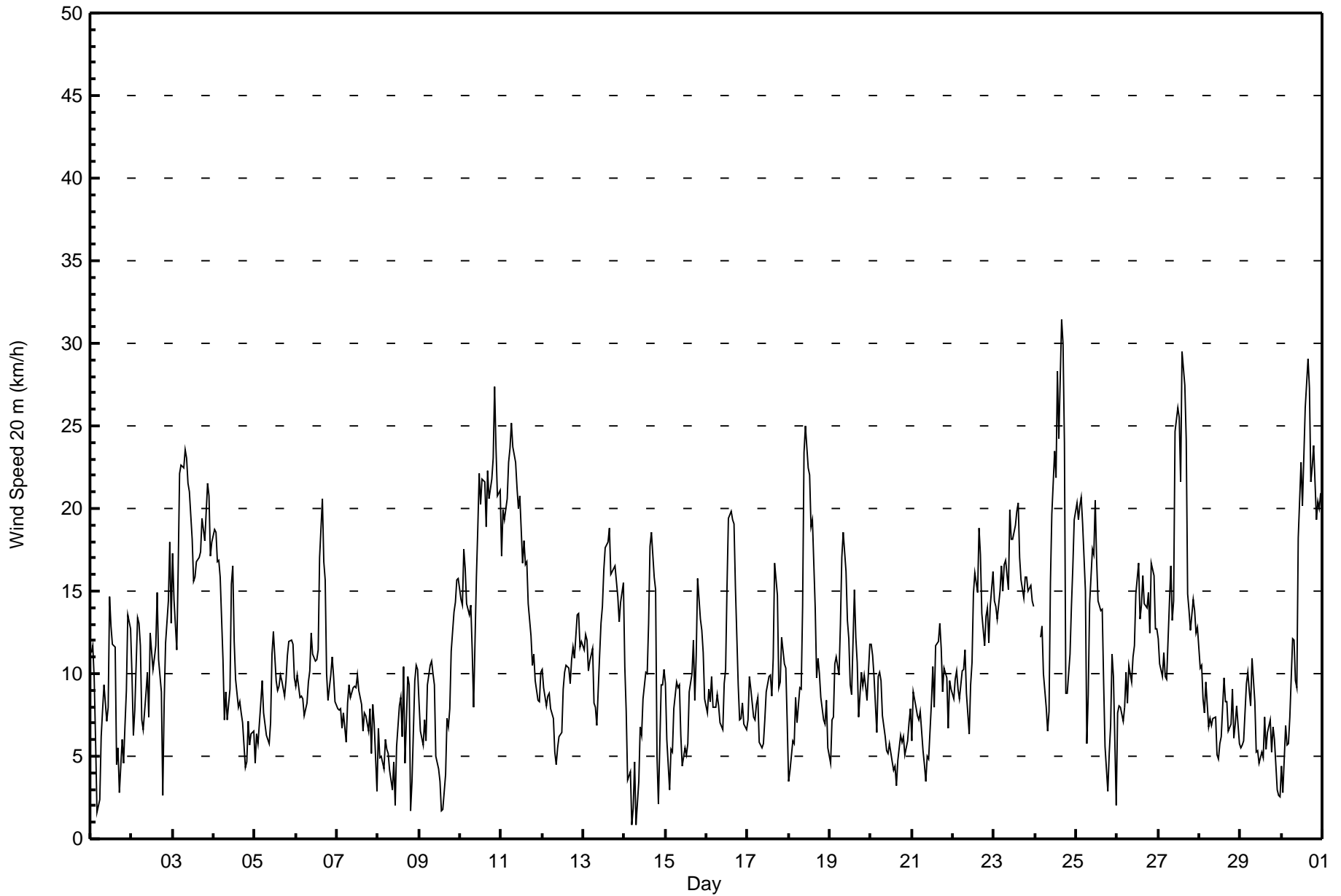
Wind Speed 20 m (WS20m) - km/h
Mannix - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 9 km/h on Sep 8 18:00 | Hours of Data: 717 |
| Minimum Value: 1 km/h on Sep 29 20:00 | Hours of Missing Data: 3 |
| 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: 99.6 |

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

Diurnal Maximum

DF - DAS Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 80 | 11.16 | 11.16 |
| 6 - 11 | 361 | 50.35 | 61.51 |
| 12 - 19 | 205 | 28.59 | 90.10 |
| 20 - 28 | 67 | 9.34 | 99.44 |
| 29 - 38 | 4 | 0.56 | 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 20 m (WS20m) - km/h
Mannix - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 6 | 1 | 1 | 2 | 2 | 8 | 8 | 8 | 8 | 4 | 5 | 3 | 4 | 4 | 10 | 6 | 80 |
| 6 - 11 | 10 | 5 | 6 | 2 | 5 | 12 | 62 | 72 | 29 | 32 | 17 | 32 | 22 | 14 | 12 | 29 | 361 |
| 12 - 19 | 2 | 2 | 0 | 2 | 2 | 1 | 27 | 41 | 12 | 4 | 15 | 22 | 35 | 20 | 9 | 11 | 205 |
| 20 - 28 | 8 | 3 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 6 | 30 | 4 | 2 | 10 | 67 |
| 29 - 38 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 4 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 27 | 11 | 7 | 6 | 9 | 21 | 99 | 123 | 49 | 40 | 37 | 63 | 93 | 43 | 33 | 56 | 717 |

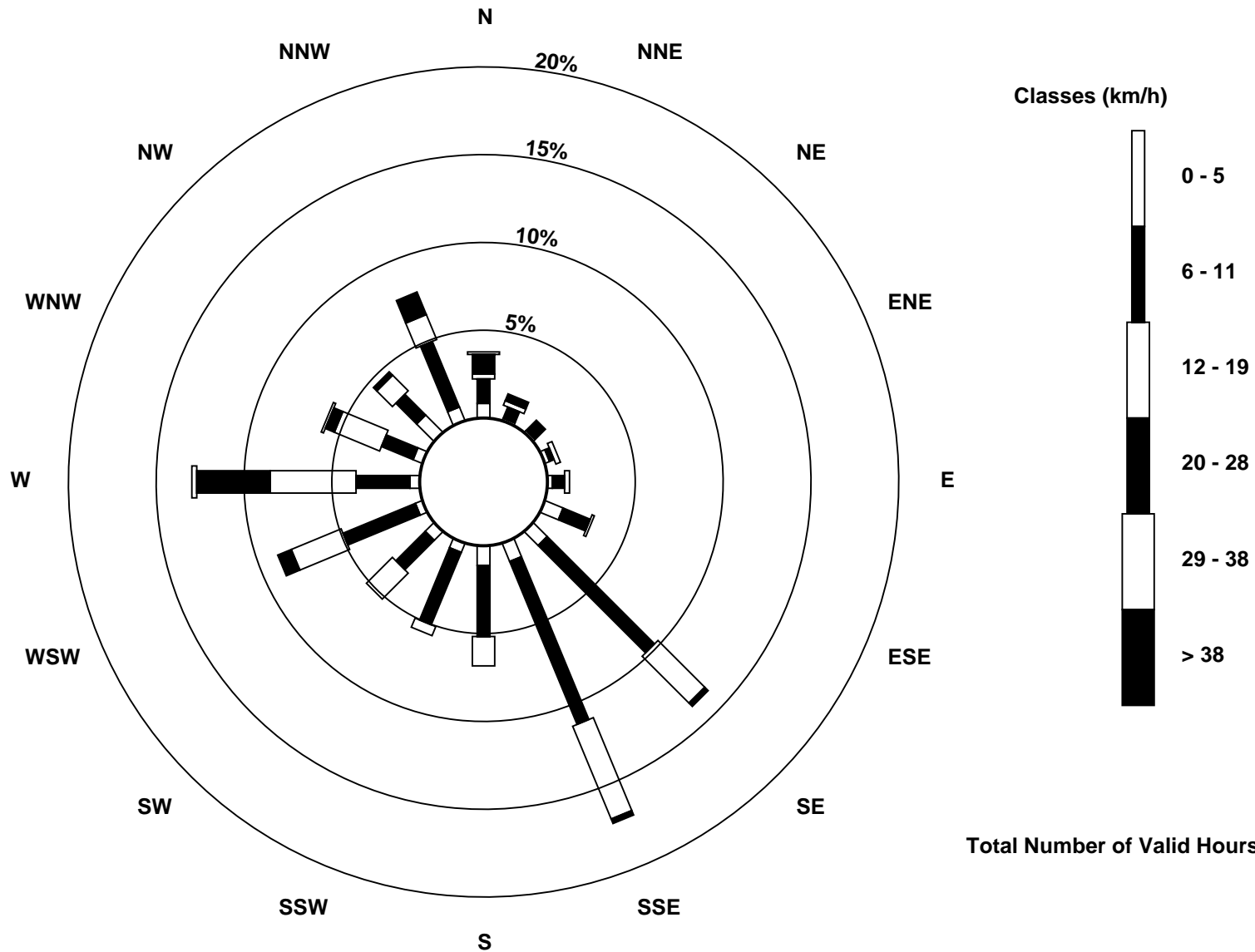
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 717



| | | |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 39 km/h on Sep 30 16:00 | Maximum Daily Speed Average: 25.1 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 9 15:00 | Minimum Daily Speed Average: 3.0 km/h on Sep 9 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 8.2 km/h at hour 16 | Minimum Diurnal Speed Average: 3.5 km/h at hour 19 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 5.2 km/h 223.5 deg | Percentiles: P ₁ = 3 P ₁₀ = 7 Q ₁ = 11 Median = 15 Q ₃ = 21 P ₉₀ = 26 P ₉₉ = 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 | E15 | E14 | ESE12 | ESE9 | ESE3 | NNW4 | N10 | NNE11 | NE11 | NE8 | NE9 | ENE17 | ENE16 | ENE14 | E14 | ESE6 | NE7 | S4 | NNW9 | NW7 | WNW11 | W12 | WSW17 | WSW17 | ENE4.1 | WSW17 |
| 2-Sep | WSW15 | SW10 | WSW13 | WSW18 | WSW18 | SW18 | SW10 | SW9 | WSW10 | WSW11 | WSW8 | WSW14 | W12 | W13 | W13 | W17 | W13 | W11 | WNV5 | W10 | W16 | W18 | W21 | WNW21 | WSW12.8 | W21 |
| 3-Sep | NNW27 | NW24 | WNW18 | W21 | W26 | W26 | W26 | W27 | W27 | W27 | WNW29 | WNW27 | WNW24 | WNW24 | WNW25 | NW27 | WNW28 | NW31 | NW29 | NW29 | NW34 | WNW31 | WNW25 | WNW26 | WNW25.0 | NW34 |
| 4-Sep | WNW27 | WNW27 | W22 | W21 | WSW20 | WSW16 | WSW10 | WSW10 | WSW8 | W11 | W18 | W20 | W14 | W12 | W10 | W10 | W9 | WSW9 | SW6 | N7 | SW10 | SW9 | SSW11 | SW10 | W12.6 | WNW27 |
| 5-Sep | SSW7 | SSW11 | S10 | SSE15 | SSE15 | SSE11 | SE10 | SE8 | SE7 | SE8 | SSE16 | S19 | SSW15 | S15 | SE12 | SE13 | SE13 | SE12 | SE14 | SE16 | SE18 | SE19 | SE19 | SE16 | SSE12.4 | S19 |
| 6-Sep | SE15 | SE17 | SE15 | SSE16 | SSE16 | SE14 | SSE14 | SE13 | SE14 | SE16 | SE15 | SE14 | SE13 | SSE16 | SSE23 | SSE28 | SSE24 | SSE23 | S18 | SSE18 | SE17 | SE17 | SE16 | SE13 | SSE16.7 | SSE28 |
| 7-Sep | SE13 | SSE14 | SSE14 | SSE13 | SSE14 | SE9 | SE11 | SE13 | SSE11 | SE12 | SE11 | ESE11 | ESE11 | ESE10 | SE10 | SE8 | SE9 | SSE11 | SSW10 | SW15 | SW10 | SW16 | SW12 | S6 | SSE9.4 | SW16 |
| 8-Sep | S7 | S5 | SSW8 | SSW7 | S11 | S9 | S9 | SSE6 | S4 | W5 | W3 | WSW6 | W9 | WNW12 | WNW10 | W15 | SSW7 | W16 | N14 | NNW3 | WNW8 | NNW18 | NNW19 | NNW18 | W4.7 | NNW19 |
| 9-Sep | NW15 | NNW11 | NNW10 | NNW13 | NNW10 | N14 | NNE13 | NNE13 | N14 | NNW14 | NNW7 | NW6 | W4 | W2 | SE1 | SE5 | ESE9 | SE9 | SE12 | SE17 | SE20 | SE20 | SE23 | SE23 | ENE3.0 | SE23 |
| 10-Sep | SSE22 | SE21 | SE24 | SE23 | SE21 | SSE20 | SSE21 | SSE18 | S14 | SW20 | WSW22 | WSW25 | WSW24 | W25 | W25 | W25 | WNW30 | W25 | W25 | W27 | W33 | W29 | W28 | W26 | WSW13.1 | W33 |
| 11-Sep | NW26 | NNW31 | NNW30 | NNW31 | NNW34 | NNW35 | NNW37 | NNW35 | NNW34 | NNW31 | NNW30 | NNW30 | NNW25 | NNW27 | NNW25 | NNW24 | NNW21 | NNW19 | NW17 | NNW18 | NNW15 | NW14 | WNW13 | W13 | NNW25.1 | NNW37 |
| 12-Sep | W13 | W12 | W11 | WSW12 | WSW12 | WSW13 | WSW11 | WSW6 | SSW6 | SSW8 | SW8 | S9 | SSW12 | SSW14 | SSW16 | SSW15 | S14 | SE15 | SSE19 | SSE20 | SSE24 | SSE24 | SSE21 | SSE22 | SSW10.7 | SSE24 |
| 13-Sep | SSE21 | SSE23 | S23 | S22 | S22 | S21 | SSE15 | SSE13 | S11 | SSW16 | SSW19 | SSW20 | SW22 | SW24 | SW23 | SW25 | SW21 | SW23 | SW24 | SW24 | SW22 | WSW21 | W21 | W22 | SSW17.6 | SW25 |
| 14-Sep | W18 | NW15 | NW8 | NNW9 | N5 | NNE2 | SSW5 | SE1 | SE4 | SE9 | SE8 | SE10 | SE13 | SE14 | SW18 | SW23 | WSW23 | NW22 | NNW24 | N8 | W2 | SW12 | WSW16 | WNW20 | W5.1 | NNW24 |
| 15-Sep | NNW19 | NW12 | NNW6 | N9 | NNE9 | NNE13 | NNE14 | NE11 | NE11 | ENE7 | E5 | E6 | SE6 | ESE6 | ESE10 | ESE12 | ESE15 | ESE11 | SE17 | SE23 | SE19 | SE20 | SE18 | SE16 | E6.4 | SE23 |
| 16-Sep | SE15 | SE16 | SSE16 | S14 | SSE14 | SSE14 | SSE15 | SSE13 | SSE10 | SSE10 | SE15 | SSE15 | SSW23 | SSW28 | SW26 | SW25 | WSW25 | SW21 | SW16 | SW14 | SSW15 | SW16 | SSW16 | SSW15 | S13.9 | SSW28 |
| 17-Sep | S14 | SSW18 | S17 | S16 | S14 | SSE15 | S17 | S13 | S10 | SE9 | SSW11 | SSW13 | SSW15 | SSW15 | SW12 | WSW13 | WSW20 | W18 | WSW15 | SW17 | SW19 | WSW18 | WSW17 | WSW12 | SSW13.0 | WSW20 |
| 18-Sep | SW6 | WSW8 | SW9 | W8 | W13 | WSW11 | WSW14 | W13 | W16 | W26 | W29 | W27 | WNW29 | WNW27 | WNW28 | NW21 | NNW15 | NNW16 | NNW16 | NNW14 | NNW12 | NNW11 | N11 | N8 | WNW13.2 | W29 |
| 19-Sep | NNW9 | NW12 | NW13 | WNW17 | WNW17 | WNW16 | W17 | W23 | W22 | W21 | W17 | W15 | NW14 | WNW13 | W19 | WNW17 | NW17 | NW11 | N14 | NNW14 | NNW15 | WNW13 | NW13 | NNW19 | WNW14.5 | W23 |
| 20-Sep | NNW19 | NW18 | NNW16 | NW12 | NNW16 | N15 | N14 | NNW13 | NNW10 | NNW8 | NW7 | WNW7 | NW7 | W5 | NW6 | NW5 | ENE5 | E8 | ESE7 | ESE8 | ESE6 | ESE8 | SE10 | SE13 | NNW5.1 | NNW19 |
| 21-Sep | SE9 | SSE16 | SSE14 | SSE16 | S14 | SSW12 | SSW9 | S6 | S4 | SSE6 | SE6 | SE10 | SSE15 | S11 | SW15 | SW14 | WSW16 | SW16 | SSW16 | SSW21 | SSW21 | SSW16 | S15 | SSE17 | S11.5 | SSW21 |
| 22-Sep | SSE17 | SSE18 | SSE19 | SE17 | SE15 | SE19 | SE19 | SE19 | SE13 | SE8 | SE12 | S17 | S23 | S25 | S23 | SSE27 | S26 | S24 | S23 | SSE24 | SSE23 | SSE20 | SSE23 | SSE28 | SSE19.4 | SSE28 |
| 23-Sep | SSE24 | SE23 | SE22 | SE24 | SE25 | SE25 | SE26 | SE24 | SE22 | SE28 | SE25 | SE24 | SE25 | SE26 | SE28 | SE23 | SE21 | SE20 | SE22 | SE23 | SE21 | SE21 | SE20 | SSE20 | SE23.4 | SE28 |
| 24-Sep | DF | DF | DF | SSE20 | SSE20 | SSE17 | S16 | S13 | SSW12 | SW20 | WSW23 | WSW27 | WSW26 | W33 | W28 | W37 | W37 | W30 | W14 | WSW15 | WSW18 | WSW21 | WSW23 | WSW25 | WSW18.0 | W37 |
| 25-Sep | WSW26 | WSW24 | WSW24 | W25 | W25 | W22 | WSW11 | SW11 | WSW17 | W20 | W20 | W23 | W20 | W18 | WNW18 | WNW19 | NW14 | NNW9 | NW5 | SW3 | SW10 | WSW15 | WSW17 | WSW6 | W15.7 | WSW26 |
| 26-Sep | SSE10 | SSE15 | SE14 | SE14 | SE16 | SE17 | SE13 | SE16 | SE13 | SE15 | SSE16 | SSE19 | SSE21 | SE18 | SE19 | SSE23 | S23 | SSE23 | SSE25 | SE20 | SSE26 | SSE25 | SE21 | SE20 | SSE17.9 | SSE26 |
| 27-Sep | SE19 | SE17 | ESE14 | SE17 | SSE17 | WSW16 | W19 | WSW21 | SW19 | SW20 | WNW33 | W30 | W29 | W25 | W35 | WSW31 | WSW28 | WSW20 | SW21 | SW20 | SW22 | WSW20 | W17 | W18 | WSW16.2 | W35 |
| 28-Sep | WSW18 | W17 | WSW15 | WSW14 | SSW15 | SSW10 | SSE10 | SSE11 | SE9 | SE8 | ESE5 | ESE5 | ESE6 | SSW8 | SSW13 | SSW11 | SSW12 | SSW10 | S14 | S17 | SSW13 | S14 | SSE14 | SSE13 | SSW9.1 | WSW18 |
| 29-Sep | SE11 | SE11 | SE11 | SE17 | SE18 | SE16 | SSE16 | SSE16 | SSE10 | SE6 | ESE5 | ESE5 | SE6 | ESE5 | ESE8 | E6 | E7 | E9 | NE9 | NE11 | E10 | E7 | ENE5 | N7 | ESE7.9 | SE18 |
| 30-Sep | NNW9 | NNW6 | N11 | N10 | NNW10 | NNW12 | N17 | N17 | NNW13 | NNW13 | N25 | N30 | N27 | N30 | N34 | N39 | N36 | N30 | N32 | N25 | N27 | N26 | N28 | N22.2 | N39 | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|--------|--------|--------|--------|--------|-------|-------|--------|-------|--------|--------|-------|--------|--------|--------|--------|--------|-------|--------|-------|-------|-------|-------|-----------------|
| SW3.9 | SSW4.0 | SSW4.4 | SSW5.5 | SSW6.2 | SSW5.1 | S4.1 | S3.6 | SSW3.6 | SW4.8 | WSW5.1 | WSW5.7 | SW6.4 | WSW6.8 | WSW7.6 | WSW8.2 | WSW6.9 | WSW6.0 | SW3.5 | SSW4.4 | SW6.1 | SW6.9 | SW6.4 | SW5.5 | Diurnal Average |
| WNW27 | NNW31 | NNW30 | NNW31 | NNW34 | NNW35 | NNW37 | NNW35 | NNW34 | NNW31 | WNW33 | W30 | W29 | W33 | W35 | N39 | W37 | NW31 | N30 | N32 | NW34 | WNW31 | W28 | N28 | Diurnal Maximum |

DF - DAS Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

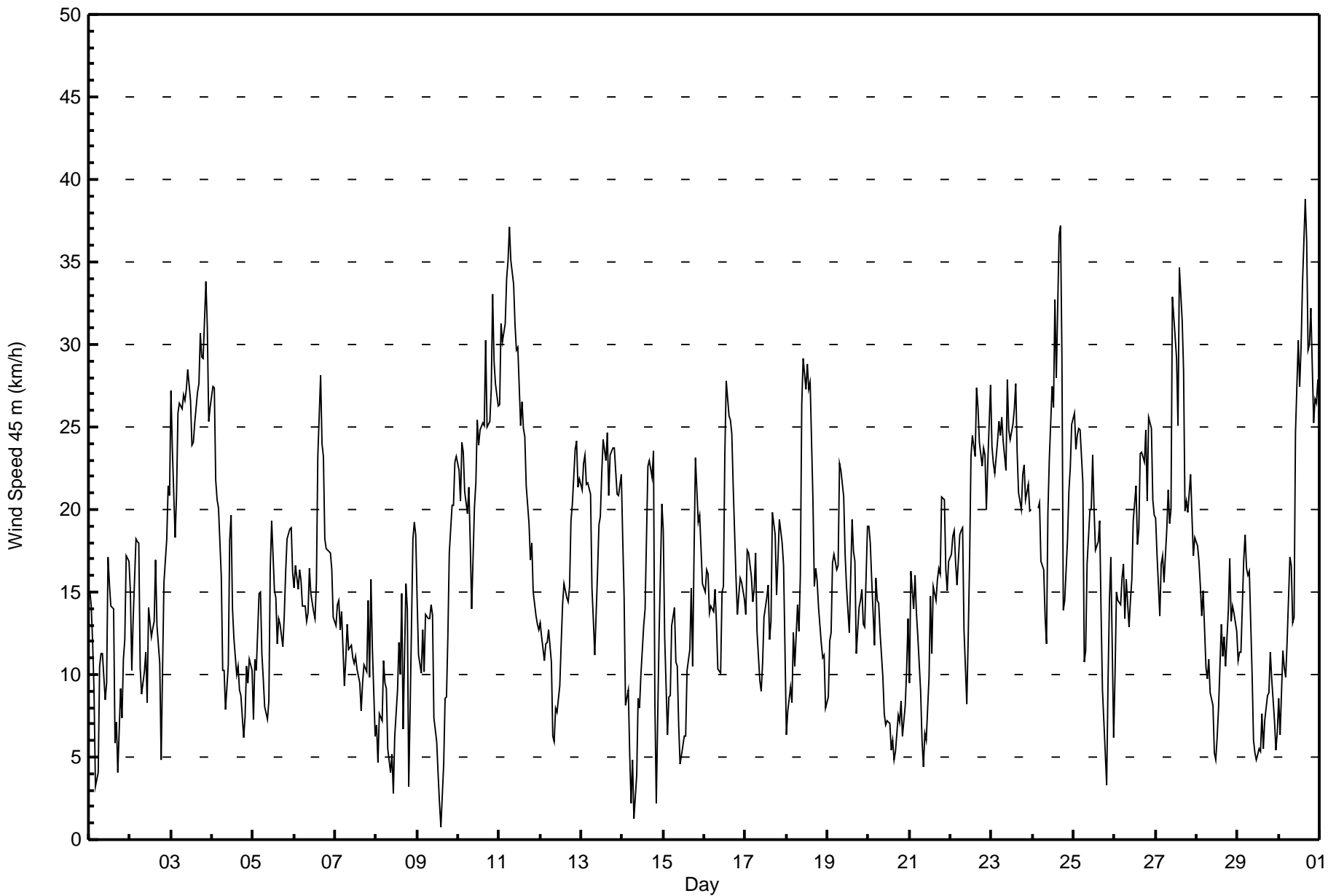
Wind Speed 45 m (WS45m) - km/h
Mannix - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on Sep 8 18:00 | Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 |
| Minimum Value: 1 km/h on Sep 28 20:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7 | |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|---|---|---|--|
| 5 | 7 | 5 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 6 | 6 | 6 | 7 | 7 | 8 | 11 | 10 | 12 | 8 | 6 | 7 | 6 | 5 | 5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 32 | 4.46 | 4.46 |
| 6 - 11 | 169 | 23.57 | 28.03 |
| 12 - 19 | 290 | 40.45 | 68.48 |
| 20 - 28 | 187 | 26.08 | 94.56 |
| 29 - 38 | 38 | 5.30 | 99.86 |
| > 38 | 1 | 0.14 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 1 | 1 | 0 | 2 | 1 | 6 | 3 | 1 | 4 | 1 | 1 | 0 | 6 | 1 | 2 | 2 | 32 |
| 6 - 11 | 9 | 2 | 8 | 1 | 7 | 15 | 27 | 12 | 11 | 15 | 13 | 14 | 9 | 4 | 7 | 15 | 169 |
| 12 - 19 | 8 | 4 | 0 | 3 | 3 | 4 | 63 | 40 | 20 | 23 | 15 | 28 | 30 | 12 | 14 | 23 | 290 |
| 20 - 28 | 6 | 0 | 0 | 0 | 0 | 0 | 34 | 32 | 10 | 5 | 18 | 22 | 35 | 13 | 5 | 7 | 187 |
| 29 - 38 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 5 | 4 | 11 | 38 |
| > 38 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Totals | 32 | 7 | 8 | 6 | 11 | 25 | 127 | 85 | 45 | 44 | 47 | 65 | 90 | 35 | 32 | 58 | 717 |

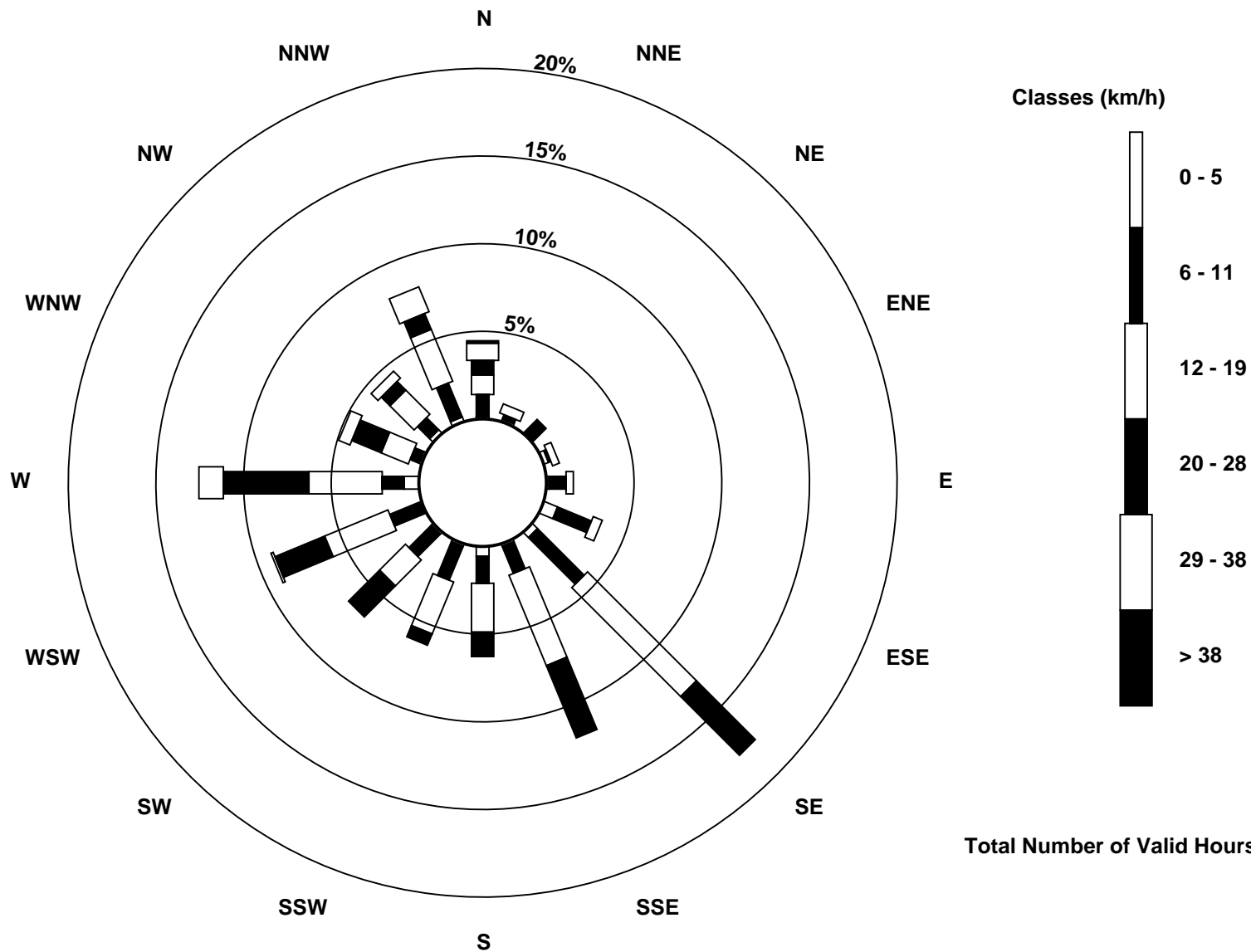
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





| | | |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 44 km/h on Sep 30 16:00 | Maximum Daily Speed Average: 28.5 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 25 20:00 | Minimum Daily Speed Average: 3.8 km/h on Sep 9 | Hours of Data: 714 |
| Maximum Diurnal Speed Average: 8.5 km/h at hour 16 | Minimum Diurnal Speed Average: 3.9 km/h at hour 19 | Hours of Missing Data: 6 |
| Monthly Average Velocity: 5.9 km/h 225.9 deg | Percentiles: P ₁ = 3 P ₁₀ = 8 Q ₁ = 12 Median = 18 Q ₃ = 26 P ₉₀ = 30 P ₉₉ = 39 | 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 | E12 | ESE11 | ESE10 | ESE8 | ESE4 | NE3 | NNE10 | NE15 | NE12 | NE9 | NE10 | E17 | ENE17 | ENE15 | E12 | ESE6 | NE10 | SSE5 | N9 | NNW8 | AF | W13 | AF | AF | ENE7.1 | ENE17 |
| 2-Sep | WSW19 | SW13 | WSW19 | W23 | WSW21 | WSW22 | WSW13 | SW10 | WSW10 | WSW11 | WSW8 | WSW14 | W12 | W13 | W13 | W17 | W13 | W11 | WNW5 | W11 | WNW18 | W21 | W24 | WNW24 | W14.3 | WNW24 |
| 3-Sep | NNW32 | NNW27 | WNW20 | W22 | W28 | W29 | W28 | W29 | W28 | W29 | WNW31 | WNW29 | WNW26 | WNW26 | WNW28 | NW30 | NW31 | NW34 | NW34 | NW33 | NW38 | NW33 | WNW28 | WNW29 | NNW27.5 | NW38 |
| 4-Sep | WNW31 | WNW30 | WNW25 | W23 | W24 | WSW20 | W13 | WSW12 | WSW8 | W11 | W19 | W20 | W14 | W12 | W10 | W11 | W9 | WSW9 | SW7 | N8 | SW13 | SW12 | SSW12 | SW13 | W14.0 | WNW31 |
| 5-Sep | SW9 | SSW12 | SSW12 | S13 | SSW18 | SSE14 | SSE12 | SSE10 | SSE8 | SE9 | SSE18 | S21 | SSW17 | S16 | SE12 | SE14 | SE14 | SE13 | SE18 | SE13 | SE22 | SE24 | SE25 | SE22 | SSE13.9 | SE25 |
| 6-Sep | SE21 | SE22 | SSE22 | SSE20 | SSE19 | SSE17 | SSE19 | SE17 | SE15 | SE17 | SE15 | SE13 | SE13 | SSE17 | SSE25 | SSE29 | SSE26 | SSE26 | S21 | SSE23 | SE23 | SE23 | SE21 | SE17 | SSE19.7 | SSE29 |
| 7-Sep | SE17 | SE18 | SSE19 | SSE18 | SSE21 | SSE16 | SE12 | SE14 | SSE12 | SE11 | SE9 | SE10 | ESE9 | ESE8 | SE9 | SE7 | SE9 | SSE12 | SSW11 | SW19 | SW13 | SW19 | SW13 | SSW6 | SSE10.6 | SSE21 |
| 8-Sep | SSW5 | SW3 | WSW8 | WSW9 | SSW6 | SW9 | SW10 | SSW8 | SSW5 | W5 | W3 | W6 | W9 | WNW12 | WNW11 | WNW16 | SSW10 | WNW18 | N18 | NNE4 | NW10 | NNW23 | NNW24 | NNW23 | WNW6.6 | NNW24 |
| 9-Sep | NNW18 | NNW13 | NNW13 | NNW15 | NNW12 | N16 | NNE15 | NNE15 | N16 | NNW15 | NNW8 | NW6 | W4 | W3 | SE1 | SE5 | ESE7 | SE8 | SE11 | SE20 | SE24 | SE22 | SE28 | SE28 | ENE3.8 | SE28 |
| 10-Sep | SSE28 | SE23 | SE27 | SE29 | SE26 | SSE25 | SSE27 | SSE23 | S18 | SW23 | WSW23 | W27 | WSW26 | W26 | W26 | W26 | WNW32 | W27 | W27 | W30 | W35 | W31 | W30 | W28 | SW14.1 | W35 |
| 11-Sep | NW30 | NNW35 | NNW35 | NNW37 | NNW40 | NNW40 | NNW43 | NNW40 | NNW38 | NNW36 | NNW33 | NNW33 | NNW27 | NNW29 | NNW27 | NNW27 | NNW23 | NNW21 | NW19 | NNW21 | NNW17 | NW16 | NW15 | W14 | NNW28.5 | NNW43 |
| 12-Sep | W16 | W15 | W13 | W13 | W14 | WSW16 | WSW15 | WSW7 | SW6 | SSW8 | SW8 | S10 | SSW12 | SSW15 | SSW17 | SSW16 | S16 | SE18 | SSE25 | SSE26 | SSE28 | SSE29 | S29 | S29 | SSW12.2 | SSE29 |
| 13-Sep | S28 | S29 | S29 | S28 | S27 | S26 | S20 | S16 | SSW13 | SSW17 | SSW20 | SSW21 | SW24 | SW27 | SW25 | SW27 | SW23 | SW27 | SW29 | SW30 | WSW29 | WSW28 | W27 | W28 | SSW21.6 | SW30 |
| 14-Sep | W25 | NW18 | NW12 | NNW11 | NNE9 | ENE5 | SE4 | ESE3 | SE4 | SE9 | SE9 | SE10 | SE13 | SE15 | SW20 | SW24 | WSW26 | NW25 | NNW28 | N11 | NW1 | SW11 | W18 | WNW26 | W5.3 | NNW28 |
| 15-Sep | NNW23 | NW17 | NNW9 | N12 | NNE13 | NNE19 | NNE20 | NE12 | NE11 | ENE7 | E4 | E5 | SE6 | ESE6 | ESE8 | ESE9 | ESE13 | ESE9 | SE19 | SE27 | SE23 | SE24 | SE23 | SSE21 | E7.1 | SE27 |
| 16-Sep | SSE19 | SSE16 | SSE12 | SSW11 | S11 | S9 | SSE13 | SSE16 | SSE13 | S13 | SSE17 | S18 | SSW25 | SSW30 | SW28 | SW28 | SW28 | SW24 | SW19 | SW17 | SW19 | SW19 | SW20 | SSW19 | SSW16.3 | SSW30 |
| 17-Sep | SSW16 | SW22 | SSW22 | S20 | S19 | S18 | SSW21 | SSW17 | SSW13 | S11 | SSW12 | SSW15 | SSW16 | SSW17 | SW13 | WSW14 | WSW21 | W20 | WSW18 | SW21 | SW24 | WSW23 | WSW22 | WSW16 | SW16.3 | WSW24 |
| 18-Sep | WSW10 | WSW11 | SW10 | W12 | W15 | WSW12 | WSW18 | W16 | W18 | W27 | W30 | W28 | WNW29 | WNW29 | WNW29 | NW23 | NNW18 | NNW19 | NNW19 | NNW17 | NNW14 | NNW13 | N13 | N9 | WNW15.1 | W30 |
| 19-Sep | NNW11 | NW14 | NW15 | WNW19 | WNW20 | WNW18 | W18 | WNW25 | W24 | W22 | WNW18 | W16 | NW15 | WNW13 | WNW20 | WNW18 | NW19 | NW13 | N17 | NNW17 | NNW18 | WNW15 | NW15 | NNW24 | NW16.2 | WNW25 |
| 20-Sep | NNW23 | NNW21 | NNW19 | NW14 | NNW19 | N17 | N17 | NNW15 | NNW11 | NNW8 | NNW7 | WNW8 | NW7 | WNW5 | NW6 | NNW5 | ENE6 | E6 | ESE6 | ESE7 | E5 | ESE6 | SE11 | SE17 | N6.4 | NNW23 |
| 21-Sep | SE13 | SSE19 | SSE19 | S18 | S13 | SSW10 | SSW9 | SSW8 | S5 | SSE7 | SE6 | SE10 | SSE15 | S12 | SW17 | SW15 | WSW17 | SW19 | SSW19 | SSW26 | SSW27 | SSW22 | SSW18 | S18 | S13.1 | SSW27 |
| 22-Sep | S19 | SSE23 | SSE23 | SSE23 | SSE22 | SSE21 | SSE24 | SSE24 | SSE15 | SE10 | SSE14 | S20 | S25 | S26 | S26 | SSE29 | S29 | S29 | S28 | SSE30 | SSE29 | SSE27 | SSE29 | SSE35 | SSE23.8 | SSE35 |
| 23-Sep | SSE33 | SE31 | SE30 | SE32 | SSE34 | SE33 | SE33 | SE30 | SE29 | SE33 | SE27 | SE26 | SE27 | SE29 | SE31 | SE27 | SE24 | SE22 | SE26 | SE26 | SE24 | SE25 | SE24 | SSE23 | SE28.3 | SSE34 |
| 24-Sep | DF | DF | DF | SSE26 | SSE25 | SSE21 | S20 | SSW18 | SSW15 | SW22 | WSW26 | WSW29 | WSW28 | W35 | W29 | W38 | W39 | W32 | W17 | W20 | WSW24 | WSW28 | WSW29 | W30 | WSW21.0 | W39 |
| 25-Sep | WSW31 | W28 | W28 | W29 | W30 | W27 | WSW16 | WSW14 | WSW19 | W20 | W20 | W24 | W20 | WNW18 | WNW19 | WNW21 | NW15 | NNW11 | NNW6 | SW1 | SW8 | WSW20 | W24 | W10 | W18.0 | WSW31 |
| 26-Sep | S8 | SSE15 | SSE20 | SSE21 | SSE23 | SE20 | SE18 | SE17 | SE16 | SE17 | SSE18 | SSE20 | SSE23 | SE20 | SSE21 | SSE26 | S27 | SSE27 | SSE31 | SSE27 | SSE30 | SSE31 | SE27 | SE26 | SSE21.5 | SSE31 |
| 27-Sep | SE26 | SE23 | SE12 | SE19 | SSE22 | WSW21 | W22 | WSW24 | SW23 | SW23 | WNW35 | W32 | W30 | W26 | W36 | W33 | WSW31 | WSW23 | SW26 | SW26 | WSW29 | WSW25 | W22 | W23 | WSW18.8 | W36 |
| 28-Sep | W22 | W23 | WSW23 | WSW22 | SW18 | SW13 | S9 | S10 | SSE10 | SE8 | ESE4 | SE5 | ESE6 | SSW8 | SSW14 | SSW12 | SSW13 | SSW12 | S16 | S19 | SSW18 | SSW18 | SSW14 | S15 | SSW11.0 | W23 |
| 29-Sep | SSE13 | SSE14 | SSE15 | SE16 | SSE18 | SSE21 | SSE22 | SSE20 | SSE11 | SE6 | ESE5 | ESE4 | SE6 | ESE5 | ESE6 | E5 | E7 | E8 | ENE10 | ENE13 | ENE13 | E10 | ENE8 | NNE8 | SE8.5 | SSE22 |
| 30-Sep | N7 | NNW10 | N15 | N16 | N14 | N16 | N22 | N20 | N15 | N17 | N30 | N35 | N32 | N33 | N37 | N44 | N41 | N34 | N34 | N36 | N28 | N30 | N30 | N31 | N26.0 | N44 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|-------|--------|--------|--------|--------|--------|-------|--------|-------|-------|-------|-------|-----------------|
| SW5.3 | SW5.0 | SSW5.5 | SSW6.4 | SSW7.1 | SSW6.0 | SSW4.9 | SSW4.7 | SSW4.3 | SW5.2 | WSW5.5 | WSW6.1 | SW6.5 | WSW6.9 | WSW8.0 | WSW8.9 | WSW7.4 | WSW6.5 | SW3.9 | SSW5.2 | SW7.3 | SW8.3 | SW7.5 | SW6.2 | Diurnal Average |
| SSE33 | NNW35 | NNW35 | NNW37 | NNW40 | NNW40 | NNW43 | NNW40 | NNW38 | NNW36 | NNW35 | N35 | N32 | W35 | N37 | N44 | N41 | N34 | NW34 | N36 | NW38 | NW33 | W30 | SSE35 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

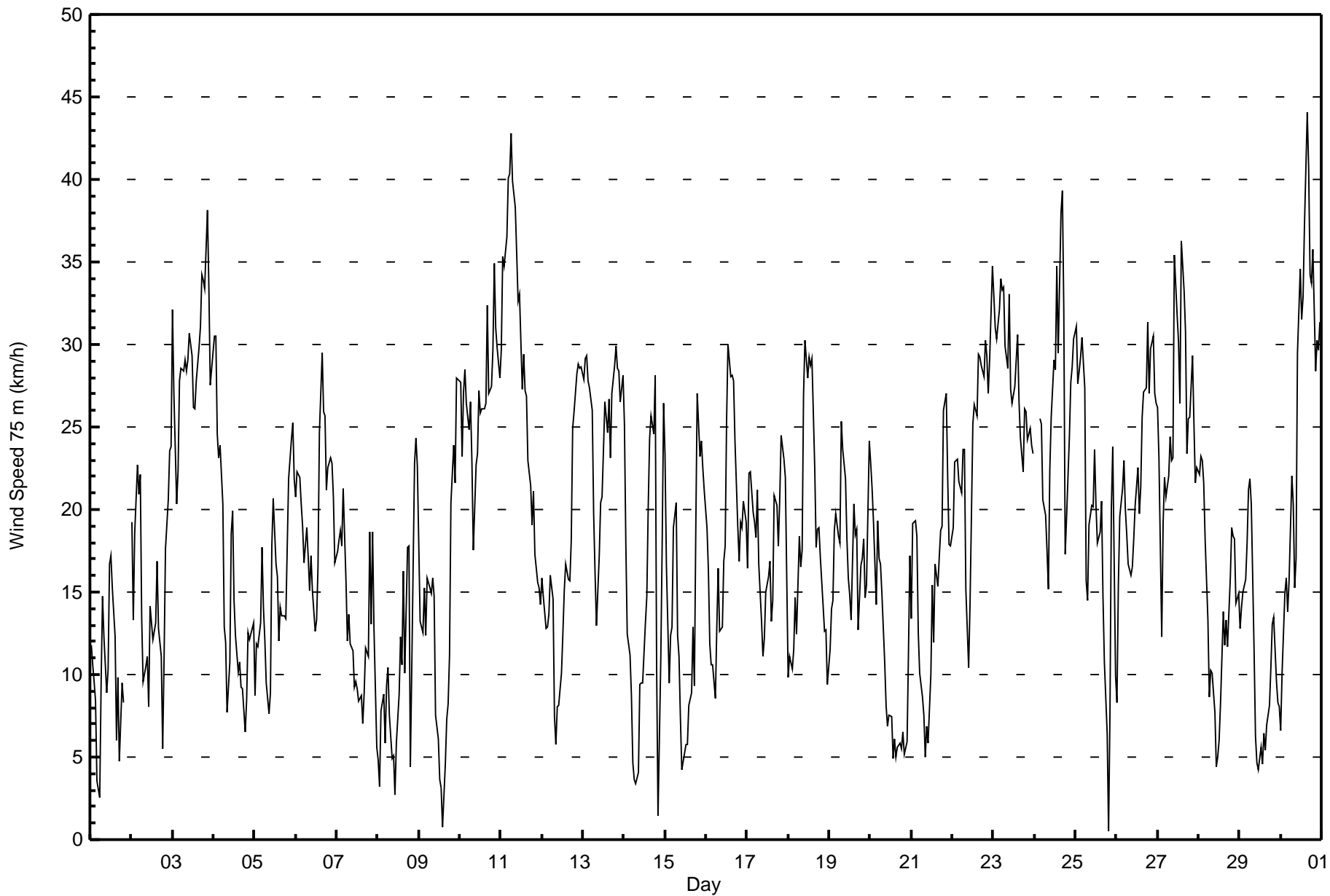
Wind Speed 75 m (WS75m) - km/h
Mannix - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 13 km/h on Sep 8 18:00 | Hours of Data: 714 |
| Minimum Value: 1 km/h on Sep 29 19:00 | Hours of Missing Data: 6 |
| Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.2 |

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

Diurnal Maximum

DF - DAS Failure AF - Analyzer Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 32 | 4.48 | 4.48 |
| 6 - 11 | 125 | 17.51 | 21.99 |
| 12 - 19 | 238 | 33.33 | 55.32 |
| 20 - 28 | 217 | 30.39 | 85.71 |
| 29 - 38 | 95 | 13.31 | 99.02 |
| > 38 | 7 | 0.98 | 100.00 |

Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 0 | 1 | 1 | 1 | 4 | 6 | 5 | 1 | 1 | 2 | 2 | 0 | 4 | 2 | 1 | 1 | 32 |
| 6 - 11 | 5 | 3 | 4 | 4 | 4 | 17 | 18 | 7 | 6 | 11 | 10 | 10 | 9 | 2 | 4 | 11 | 125 |
| 12 - 19 | 14 | 4 | 3 | 4 | 3 | 1 | 30 | 31 | 17 | 29 | 18 | 16 | 24 | 12 | 13 | 19 | 238 |
| 20 - 28 | 3 | 1 | 0 | 0 | 0 | 0 | 38 | 40 | 15 | 8 | 19 | 24 | 40 | 12 | 4 | 13 | 217 |
| 29 - 38 | 11 | 0 | 0 | 0 | 0 | 0 | 10 | 14 | 5 | 1 | 2 | 6 | 19 | 10 | 8 | 9 | 95 |
| > 38 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 7 |
| Totals | 35 | 9 | 8 | 9 | 11 | 24 | 101 | 93 | 44 | 51 | 51 | 56 | 97 | 38 | 30 | 57 | 714 |

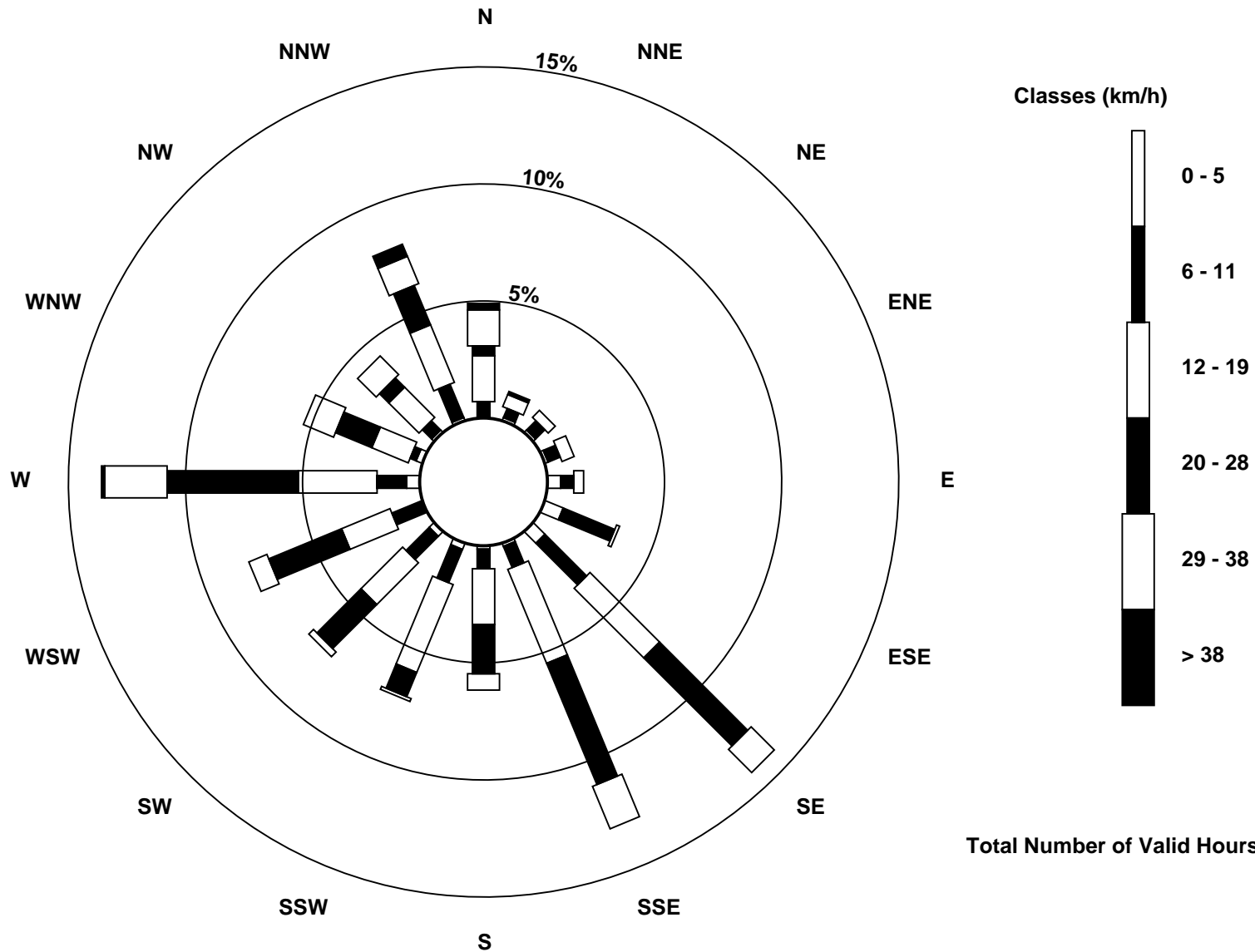
Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 90 m (WS90m) - km/h

Mannix - September 2016

| | | |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 46 km/h on Sep 30 16:00 | Maximum Daily Speed Average: 31.6 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 25 20:00 | Minimum Daily Speed Average: 4.3 km/h on Sep 9 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 8.9 km/h at hour 16 | Minimum Diurnal Speed Average: 4.0 km/h at hour 19 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 6.4 km/h 227.1 deg | Percentiles: P ₁ = 3 P ₁₀ = 9 Q ₁ = 13 Median = 20 Q ₃ = 27 P ₉₀ = 31 P ₉₉ = 39 | 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 | ESE19 | ESE20 | ESE16 | ESE12 | ESE5 | ENE3 | NE9 | NE15 | ENE13 | NE9 | NE11 | E19 | ENE18 | ENE17 | E17 | ESE8 | NE11 | SSE6 | N9 | NNW8 | WNW12 | W13 | W21 | WSW23 | ENE5.6 | WSW23 |
| 2-Sep | WSW20 | SW15 | WSW21 | W24 | WSW22 | WSW23 | WSW15 | SW10 | WSW11 | WSW11 | WSW8 | WSW14 | W12 | W12 | W13 | W16 | W13 | W11 | WNW6 | W11 | WNW18 | W21 | W25 | NW25 | W14.8 | NW25 |
| 3-Sep | NW30 | NW28 | NW21 | W23 | W29 | W29 | W29 | W30 | W29 | NNW29 | NNW31 | NNW30 | NNW27 | NW27 | NW29 | NW31 | NW32 | NW35 | NNW35 | NW35 | NW39 | NNW34 | NNW28 | NNW29 | NNW28.4 | NW39 |
| 4-Sep | NNW31 | NNW31 | NNW25 | W24 | W25 | W22 | W14 | W12 | WSW8 | W11 | W18 | W20 | W14 | W12 | W10 | W11 | W9 | WSW9 | SW7 | N8 | WSW13 | SW13 | SW13 | WSW15 | W14.4 | NNW31 |
| 5-Sep | SW10 | SSW12 | SSW12 | S16 | S13 | SSE12 | SSE10 | SSE10 | SSE8 | SE10 | SSE19 | S21 | SSW17 | S16 | SE13 | SE15 | SSE15 | SE15 | SE16 | SE21 | SE25 | SE28 | SE29 | SSE25 | SSE14.8 | SE29 |
| 6-Sep | SSE24 | SSE25 | SSE25 | SSE22 | SSE21 | SSE18 | SSE21 | SE20 | SSE16 | SSE18 | SE16 | SE15 | SE15 | SSE18 | SSE26 | SSE30 | SSE27 | SSE27 | S23 | S25 | SSE26 | SE26 | SE23 | SE19 | SSE21.6 | SSE30 |
| 7-Sep | SE20 | SE20 | SSE21 | SSE20 | SSE22 | SSE19 | SE14 | SE15 | SSE12 | SE12 | SE11 | SE11 | SE11 | ESE10 | SE10 | SE8 | SE10 | SSE12 | SSW12 | SW19 | SW15 | SW19 | SW13 | SSW6 | SSE11.8 | SSE22 |
| 8-Sep | SW5 | SW4 | WSW9 | WSW10 | SW7 | SW9 | SW11 | SW10 | SSW6 | WNW5 | W3 | W6 | W9 | WNW12 | WNW10 | W27 | SSW12 | WNW18 | N19 | NNE5 | NW11 | NNW24 | NNW26 | NNW24 | WNW7.3 | W27 |
| 9-Sep | NNW19 | NNW14 | NNW13 | NNW16 | NNW13 | N16 | NNE16 | NNE15 | N16 | NNW15 | NNW7 | NNW6 | W4 | W4 | SSE1 | SSE5 | ESE9 | SE9 | SE13 | SE24 | SE27 | SE26 | SE32 | SE32 | ENE4.3 | SE32 |
| 10-Sep | SSE31 | SE27 | SE31 | SE32 | SE30 | SSE28 | SSE29 | SSE25 | S19 | SW23 | W24 | W28 | WSW26 | W26 | W26 | WNW26 | WNW33 | W27 | W28 | W30 | W35 | W31 | W30 | W28 | SW14.3 | W35 |
| 11-Sep | NNW31 | NNW37 | NNW37 | NNW38 | NNW43 | NNW43 | NNW45 | N42 | N40 | NNW37 | NNW34 | NNW34 | NNW28 | NNW31 | NNW28 | NNW28 | NNW23 | NNW22 | NNW20 | NNW22 | NNW18 | NW16 | NW16 | NNW15 | NNW29.8 | NNW45 |
| 12-Sep | W16 | W16 | NNW13 | W13 | W13 | W17 | WSW16 | WSW8 | SW6 | SSW8 | SW9 | S11 | SSW13 | SSW16 | SSW17 | SSW16 | S16 | SSE20 | SSE27 | SSE29 | SSE31 | SSE30 | S32 | S32 | SSW13.1 | S32 |
| 13-Sep | S31 | S32 | S32 | S30 | S30 | S28 | S21 | S18 | SSW14 | SSW18 | SSW21 | SSW21 | SW24 | SW27 | SW25 | SW27 | SW24 | SW29 | WSW31 | WSW33 | WSW31 | WSW32 | W29 | W30 | SW23.2 | WSW33 |
| 14-Sep | WNW26 | NW19 | NW14 | N12 | NNE9 | ENE6 | SE5 | SE7 | SE6 | SE11 | SE11 | SE11 | SE15 | SSE16 | SW21 | SW25 | WSW26 | NW25 | N30 | N11 | NNW2 | SW11 | W19 | NW28 | W5.0 | N30 |
| 15-Sep | NNW25 | NNW18 | NNW11 | NNE14 | NNE15 | NNE20 | NE22 | NE13 | NE11 | ENE8 | ESE5 | E6 | SE7 | ESE8 | ESE11 | ESE14 | ESE17 | ESE14 | SE22 | SE31 | SE27 | SE27 | SE25 | SSE25 | E8.6 | SE31 |
| 16-Sep | SSE20 | SSE14 | S10 | SSW11 | SSW11 | SSW9 | S11 | S16 | S13 | S15 | S18 | S19 | SSW26 | SSW31 | SW29 | SW29 | WSW29 | SW25 | SW20 | SW19 | SW21 | SW20 | SW22 | SW21 | SSW17.4 | SSW31 |
| 17-Sep | SSW18 | SW24 | SSW25 | SSW21 | SSW21 | SSW20 | SSW23 | SSW18 | SSW15 | SSW13 | SSW13 | SSW16 | SSW17 | SSW18 | SW14 | WSW15 | WSW21 | W20 | WSW19 | SW22 | WSW27 | WSW25 | WSW24 | WSW18 | SW17.8 | WSW27 |
| 18-Sep | WSW12 | WSW12 | WSW11 | W13 | W15 | W13 | W20 | W18 | W18 | W27 | W30 | W28 | WNW29 | WNW29 | WNW29 | NW23 | NNW19 | NNW20 | NNW20 | N18 | NNW15 | NNW13 | N13 | N10 | WNW15.7 | W30 |
| 19-Sep | NNW12 | NNW14 | NW15 | NNW19 | NNW20 | NW19 | NNW18 | NNW26 | W24 | NNW22 | NNW18 | NNW16 | NW15 | NNW13 | NNW20 | NW18 | NNW19 | NW13 | N17 | NNW18 | NNW19 | NNW15 | NW16 | NNW26 | NW16.5 | NNW26 |
| 20-Sep | NNW25 | NNW22 | NNW21 | NNW15 | N20 | N18 | N17 | NNW16 | NNW11 | NNW8 | NNW7 | WNW7 | NW7 | WNW5 | NW6 | NNW5 | ENE6 | E9 | ESE9 | ESE11 | ESE7 | ESE9 | SE13 | SE19 | N6.3 | NNW25 |
| 21-Sep | SE17 | SSE22 | SSE21 | S17 | SSW11 | SSW9 | SW8 | SSW8 | SSW6 | SSE7 | SSE7 | SE12 | SSE16 | S13 | SW17 | SW16 | WSW17 | SW19 | SSW20 | SSW28 | SSW30 | SSW26 | SSW20 | SSW20 | SSW13.9 | SSW30 |
| 22-Sep | S18 | S23 | S25 | SSE24 | SSE23 | SSE20 | SSE23 | SSE24 | SSE17 | SSE13 | SSE17 | S21 | S26 | S27 | S26 | S30 | S30 | S30 | SSE33 | SSE33 | SSE31 | SSE33 | SSE38 | S25.3 | SSE38 | |
| 23-Sep | SSE37 | SSE36 | SSE35 | SSE37 | SSE39 | SSE38 | SE38 | SE34 | SE33 | SE37 | SE30 | SE29 | SE30 | SE32 | SE34 | SSE29 | SE28 | SE25 | SE29 | SSE28 | SSE26 | SSE27 | SE26 | SSE25 | SE31.6 | SSE39 |
| 24-Sep | DF | DF | DF | SSE29 | SSE28 | S22 | SSW20 | SSW19 | SW17 | SW23 | WSW26 | WSW29 | WSW29 | W35 | W29 | W37 | WNW39 | W33 | W18 | W21 | W26 | W30 | W31 | W32 | WSW22.0 | WNW39 |
| 25-Sep | W33 | W29 | W30 | W31 | W32 | W29 | WSW18 | WSW16 | WSW20 | W20 | W20 | W23 | WNW20 | WNW18 | WNW19 | WNW20 | NNW15 | NNW11 | N7 | SE1 | SW7 | W21 | W25 | W11 | W18.7 | W33 |
| 26-Sep | SSW8 | SSE13 | SSE18 | SSE21 | SSE26 | SE23 | SE24 | SE20 | SE20 | SSE20 | SSE21 | SSE24 | SE21 | SSE23 | S27 | S29 | S29 | S34 | SSE30 | SSE33 | SSE34 | SSE31 | SSE30 | SSE23.5 | S34 | |
| 27-Sep | SE30 | SE27 | SE16 | SE23 | S24 | WSW22 | W23 | WSW25 | SW24 | SW25 | WNW36 | W31 | W30 | W26 | W36 | W33 | WSW31 | WSW25 | WSW27 | WSW28 | WSW32 | W27 | W23 | W23 | WSW19.5 | W36 |
| 28-Sep | W22 | W25 | WSW26 | WSW25 | SW20 | SW15 | SSW9 | S10 | SSE10 | SE9 | SE6 | SSE6 | ESE7 | SSW9 | SW14 | SSW12 | SSW14 | SSW12 | S16 | S19 | SSW20 | SSW20 | SSW16 | S15 | SW12.0 | WSW26 |
| 29-Sep | S12 | SSE12 | SSE13 | SSE14 | SSE17 | SSE21 | SSE21 | S18 | S13 | SSE7 | SE6 | SE5 | SE6 | SE5 | ESE8 | ESE6 | E8 | E10 | ENE10 | ENE13 | ENE15 | E16 | E14 | NNE7 | SE8.7 | SSE21 |
| 30-Sep | N4 | N9 | NNE15 | NNE17 | N17 | N17 | N24 | N22 | N17 | N19 | N31 | N36 | N33 | N34 | N38 | N46 | N42 | N36 | N35 | N37 | N30 | NNE32 | N31 | N33 | N27.1 | N46 |

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| SW6.4 SW5.5 SSW6.2 SSW7.0 SSW7.7 SW6.6 SSW5.4 SSW5.4 SSW5.1 SW5.6 WSW5.7 WSW6.1 SW6.5 WSW7.1 WSW7.9 WSW8.9 WSW7.3 WSW6.5 SW4.0 SSW5.6 SW7.8 SW8.8 SW8.4 SW7.3 | Diurnal Average |
| SSE37 NNW37 NNW37 NNW38 NNW43 NNW43 NNW45 N42 N40 NNW37 NNW36 N36 N33 W35 N38 N46 N42 N36 NNW35 N37 NNW39 NNW34 SSE33 SSE38 | Diurnal Maximum |

DF - DAS Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

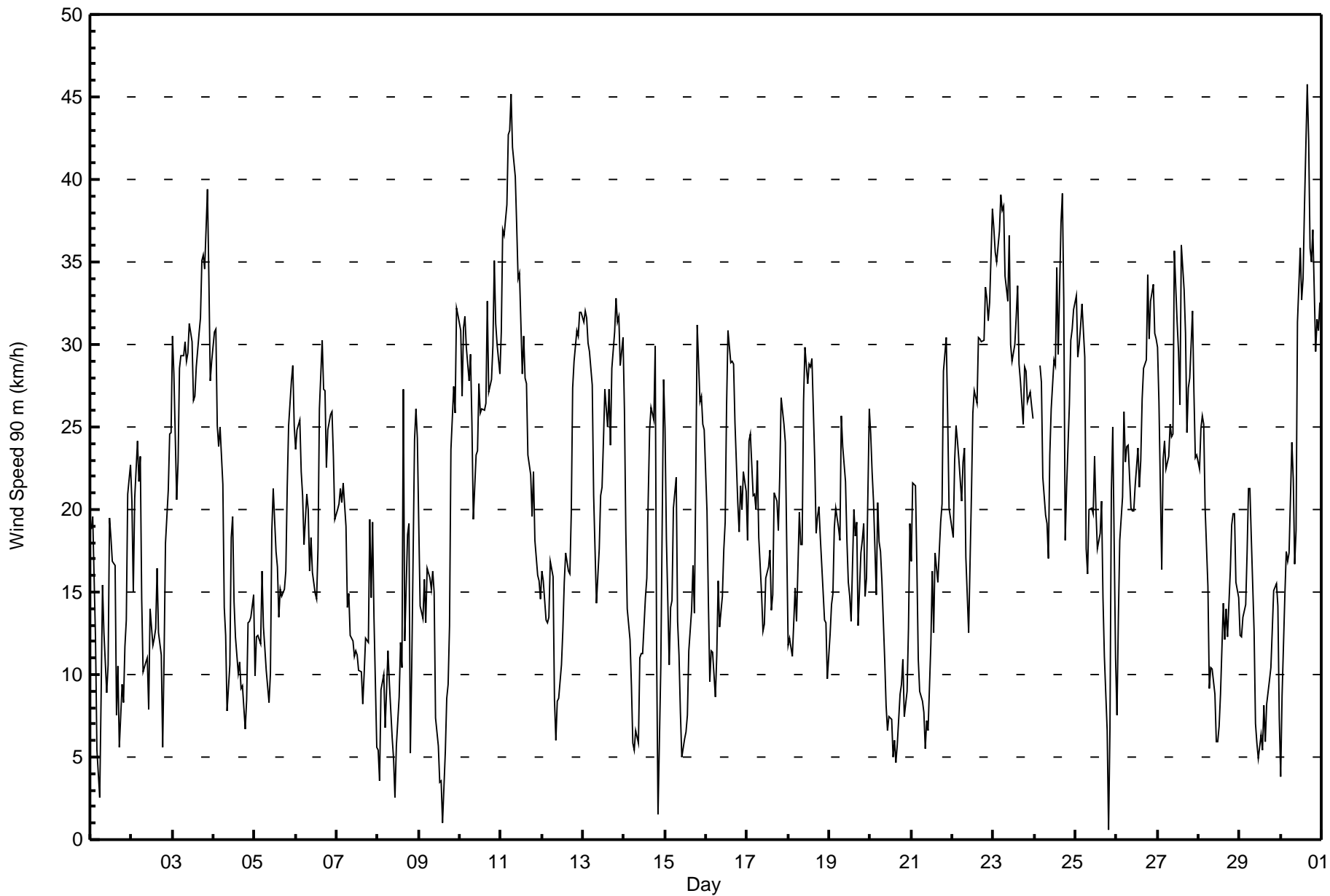
Wind Speed 90 m (WS90m) - km/h
Mannix - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 28 km/h on Sep 8 16:00 | Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 |
| Minimum Value: 1 km/h on Sep 7 02:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 2 O ₁ = 2 Median = 3 O 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 | 2 | 3 | 4 | 4 | 3 | 2 | 4 | 1 | 2 | 2 | 2 | 4 | 3 | 3 | 5 | 3 | 11 | 3 | 4 | 3 | 2 | 3 | 2 | 3 | 11 |
| 2-Sep | 5 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 3 | 4 | 2 | 2 | 3 | 5 |
| 3-Sep | 15 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 5 | 5 | 6 | 5 | 5 | 7 | 6 | 6 | 6 | 4 | 4 | 15 |
| 4-Sep | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 2 | 2 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 4 |
| 5-Sep | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 2 | 3 | 2 | 5 |
| 6-Sep | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 8 | 3 | 4 | 4 | 2 | 1 | 1 | 2 | 2 | 1 | 8 |
| 7-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 7 | 5 | 5 | 2 | 4 | 2 | 7 |
| 8-Sep | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 28 | 3 | 13 | 8 | 2 | 1 | 6 | 2 | 3 | 28 |
| 9-Sep | 3 | 4 | 3 | 2 | 3 | 3 | 2 | 3 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 5 | 4 | 4 | 5 |
| 10-Sep | 3 | 5 | 6 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 6 |
| 11-Sep | 5 | 6 | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 5 | 6 | 5 | 5 | 4 | 5 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 7 |
| 12-Sep | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 4 |
| 13-Sep | 2 | 3 | 2 | 2 | 3 | 4 | 3 | 2 | 4 | 3 | 4 | 4 | 7 | 5 | 4 | 4 | 5 | 4 | 3 | 3 | 4 | 2 | 3 | 2 | 7 |
| 14-Sep | 4 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 4 | 4 | 4 | 4 | 5 | 4 | 8 | 7 | 4 | 3 | 3 | 4 | 2 | 8 |
| 15-Sep | 4 | 2 | 4 | 6 | 2 | 5 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 4 | 4 | 5 | 5 | 2 | 2 | 2 | 6 |
| 16-Sep | 5 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 5 | 7 | 5 | 5 | 6 | 5 | 2 | 2 | 2 | 2 | 3 | 1 | 7 |
| 17-Sep | 2 | 4 | 5 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 3 | 2 | 2 | 3 | 4 | 7 | 5 | 4 | 1 | 1 | 1 | 1 | 2 | 4 | 7 |
| 18-Sep | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 3 | 5 | 4 | 3 | 3 | 3 | 4 | 4 | 2 | 3 | 5 |
| 19-Sep | 4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 4 | 4 |
| 20-Sep | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 4 | 4 | 4 |
| 21-Sep | 3 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 7 | 5 | 5 | 2 | 2 | 1 | 1 | 3 | 2 | 1 | 7 |
| 22-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 4 | 2 | 3 | 6 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 2 | 6 |
| 23-Sep | 2 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 7 | 6 | 7 | 5 | 6 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 7 |
| 24-Sep | DF | DF | DF | 2 | 2 | 2 | 1 | 2 | 4 | 4 | 5 | 4 | 7 | 5 | 5 | 6 | 7 | 7 | 3 | 3 | 2 | 1 | 2 | 2 | 7 |
| 25-Sep | 3 | 3 | 3 | 3 | 2 | 3 | 8 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 1 | 2 | 5 | 3 | 4 | 8 |
| 26-Sep | 3 | 2 | 2 | 1 | 2 | 4 | 2 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 6 | 5 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 6 |
| 27-Sep | 1 | 3 | 3 | 4 | 2 | 4 | 3 | 5 | 6 | 5 | 6 | 6 | 5 | 7 | 8 | 7 | 6 | 3 | 3 | 4 | 2 | 3 | 2 | 1 | 8 |
| 28-Sep | 2 | 2 | 1 | 2 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 5 | 5 | 5 | 6 | 2 | 2 | 1 | 2 | 3 | 2 | 1 | 6 |
| 29-Sep | 2 | 2 | 2 | 1 | 3 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 4 | 3 | 4 |
| 30-Sep | 1 | 1 | 3 | 2 | 3 | 5 | 4 | 5 | 6 | 6 | 5 | 4 | 4 | 5 | 7 | 6 | 7 | 7 | 5 | 5 | 5 | 5 | 5 | 5 | 7 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|---|---|---|---|---|---|--|
| 15 | 6 | 6 | 6 | 7 | 7 | 8 | 7 | 7 | 7 | 7 | 6 | 6 | 7 | 7 | 8 | 28 | 11 | 13 | 8 | 6 | 6 | 6 | 5 | 5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 20 | 2.79 | 2.79 |
| 6 - 11 | 120 | 16.74 | 19.53 |
| 12 - 19 | 215 | 29.99 | 49.51 |
| 20 - 28 | 214 | 29.85 | 79.36 |
| 29 - 38 | 138 | 19.25 | 98.61 |
| > 38 | 10 | 1.39 | 100.00 |

Total Number of Valid Hours: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 1 | 1 | 0 | 1 | 0 | 2 | 4 | 2 | 0 | 0 | 2 | 0 | 3 | 2 | 0 | 2 | 20 |
| 6 - 11 | 6 | 2 | 5 | 4 | 4 | 14 | 16 | 8 | 4 | 13 | 12 | 9 | 9 | 3 | 3 | 8 | 120 |
| 12 - 19 | 13 | 6 | 2 | 5 | 4 | 6 | 18 | 22 | 20 | 25 | 15 | 13 | 23 | 14 | 11 | 18 | 215 |
| 20 - 28 | 1 | 2 | 1 | 0 | 0 | 1 | 26 | 41 | 14 | 16 | 18 | 23 | 34 | 12 | 8 | 17 | 214 |
| 29 - 38 | 12 | 1 | 0 | 0 | 0 | 0 | 18 | 23 | 13 | 3 | 3 | 9 | 29 | 11 | 7 | 9 | 138 |
| > 38 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 10 |
| Totals | 37 | 12 | 8 | 10 | 8 | 23 | 82 | 97 | 51 | 57 | 50 | 54 | 98 | 43 | 30 | 57 | 717 |

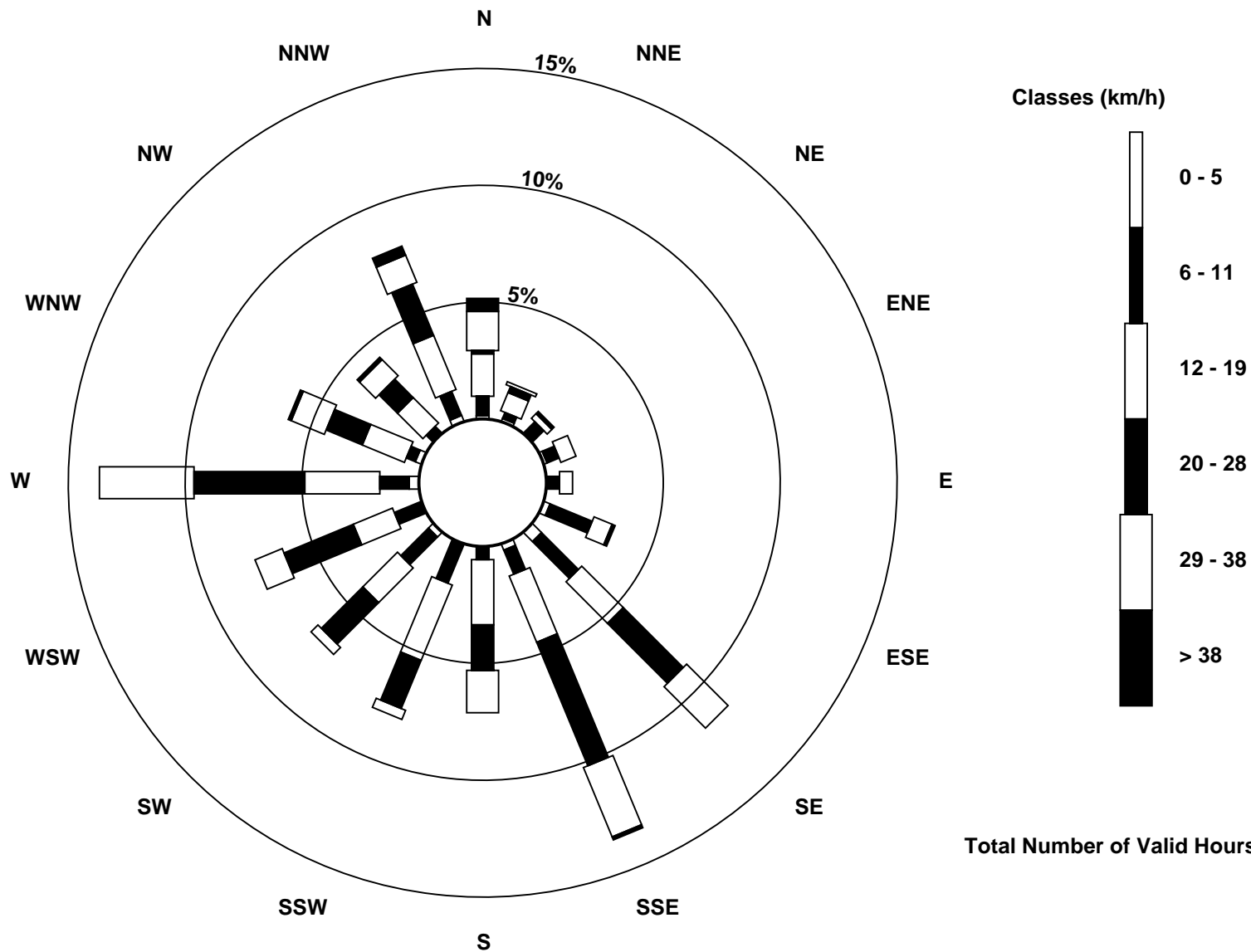
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





| | | | |
|--------------------------------------------------------------|--|---------------------------|------|
| Direction of Maximum Speed: 274 deg on Sep 24 16:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 293.7 deg on Sep 3 | | Hours of Data: | 717 |
| Direction of Minimum Speed: 150 deg on Sep 14 08:00 | | Hours of Missing Data: | 3 |
| Direction of Minimum Daily Speed Average: 2.3 deg on Sep 9 | | Percent Operational Time: | 99.6 |
| Monthly Average Direction: 247.3 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 | 92 | 104 | 115 | 125 | 134 | 316 | 356 | 30 | 52 | 56 | 44 | 86 | 75 | 75 | 97 | 125 | 46 | 197 | 352 | 322 | 281 | 270 | 261 | 250 | 68.9 |
| 2-Sep | 242 | 210 | 239 | 260 | 242 | 230 | 236 | 226 | 249 | 261 | 264 | 262 | 272 | 272 | 267 | 275 | 275 | 268 | 284 | 267 | 276 | 267 | 275 | 298 | 261.4 |
| 3-Sep | 340 | 321 | 294 | 277 | 272 | 270 | 266 | 267 | 272 | 279 | 285 | 291 | 293 | 300 | 299 | 307 | 306 | 309 | 326 | 313 | 315 | 305 | 295 | 290 | 293.7 |
| 4-Sep | 290 | 288 | 278 | 264 | 261 | 243 | 241 | 252 | 259 | 273 | 273 | 277 | 271 | 277 | 279 | 276 | 263 | 242 | 233 | 358 | 239 | 227 | 203 | 231 | 266.3 |
| 5-Sep | 200 | 190 | 178 | 160 | 157 | 155 | 150 | 146 | 141 | 130 | 166 | 174 | 198 | 186 | 145 | 142 | 153 | 142 | 134 | 134 | 136 | 138 | 141 | 145 | 153.9 |
| 6-Sep | 141 | 140 | 144 | 156 | 151 | 150 | 166 | 147 | 147 | 150 | 148 | 132 | 144 | 153 | 156 | 158 | 159 | 162 | 178 | 174 | 150 | 149 | 143 | 143 | 152.3 |
| 7-Sep | 150 | 157 | 151 | 158 | 150 | 153 | 135 | 144 | 150 | 149 | 131 | 128 | 119 | 117 | 132 | 134 | 134 | 162 | 199 | 220 | 227 | 214 | 229 | 179 | 153.9 |
| 8-Sep | 175 | 167 | 198 | 178 | 170 | 170 | 163 | 160 | 181 | 263 | 263 | 252 | 272 | 295 | 300 | 286 | 222 | 282 | 9 | 336 | 309 | 328 | 335 | 338 | 272.4 |
| 9-Sep | 325 | 337 | 334 | 329 | 337 | 7 | 29 | 20 | 360 | 345 | 334 | 328 | 260 | 289 | 115 | 138 | 125 | 132 | 134 | 136 | 137 | 131 | 136 | 142 | 72.8 |
| 10-Sep | 152 | 133 | 134 | 139 | 142 | 153 | 153 | 155 | 174 | 238 | 260 | 263 | 256 | 268 | 274 | 283 | 289 | 271 | 267 | 271 | 276 | 276 | 280 | 279 | 248.7 |
| 11-Sep | 323 | 333 | 331 | 331 | 334 | 338 | 344 | 344 | 343 | 341 | 337 | 338 | 337 | 337 | 340 | 343 | 340 | 333 | 328 | 338 | 332 | 313 | 298 | 264 | 334.4 |
| 12-Sep | 257 | 260 | 271 | 255 | 243 | 240 | 249 | 247 | 214 | 210 | 230 | 192 | 206 | 203 | 205 | 211 | 184 | 148 | 154 | 160 | 158 | 158 | 162 | 167 | 200.6 |
| 13-Sep | 162 | 169 | 171 | 183 | 176 | 171 | 159 | 147 | 188 | 209 | 208 | 212 | 222 | 221 | 236 | 234 | 240 | 233 | 241 | 239 | 243 | 253 | 268 | 272 | 218.0 |
| 14-Sep | 284 | 297 | 299 | 321 | 56 | 180 | 231 | 150 | 128 | 149 | 151 | 131 | 139 | 148 | 225 | 239 | 247 | 307 | 346 | 357 | 245 | 235 | 244 | 291 | 248.7 |
| 15-Sep | 307 | 316 | 313 | 5 | 18 | 26 | 38 | 53 | 64 | 81 | 103 | 97 | 140 | 118 | 119 | 109 | 127 | 121 | 132 | 139 | 140 | 141 | 137 | 146 | 106.2 |
| 16-Sep | 140 | 145 | 152 | 159 | 147 | 148 | 149 | 155 | 150 | 145 | 146 | 166 | 204 | 214 | 237 | 234 | 242 | 233 | 230 | 209 | 205 | 213 | 207 | 190 | 194.9 |
| 17-Sep | 171 | 206 | 186 | 174 | 170 | 164 | 181 | 174 | 165 | 166 | 209 | 205 | 207 | 210 | 225 | 241 | 256 | 270 | 249 | 229 | 236 | 246 | 248 | 230 | 216.6 |
| 18-Sep | 165 | 226 | 204 | 256 | 261 | 235 | 250 | 259 | 269 | 269 | 275 | 279 | 290 | 301 | 298 | 312 | 333 | 342 | 342 | 343 | 334 | 343 | 19 | 357 | 291.4 |
| 19-Sep | 336 | 326 | 319 | 292 | 294 | 301 | 275 | 283 | 278 | 281 | 284 | 281 | 314 | 296 | 284 | 301 | 326 | 315 | 0 | 338 | 342 | 285 | 304 | 338 | 301.5 |
| 20-Sep | 336 | 327 | 336 | 322 | 345 | 7 | 358 | 330 | 331 | 337 | 329 | 281 | 319 | 276 | 306 | 318 | 77 | 101 | 109 | 107 | 105 | 129 | 140 | 143 | 352.5 |
| 21-Sep | 134 | 165 | 155 | 168 | 182 | 192 | 184 | 166 | 179 | 159 | 151 | 130 | 158 | 179 | 223 | 236 | 248 | 232 | 209 | 201 | 200 | 187 | 162 | 155 | 186.8 |
| 22-Sep | 148 | 150 | 151 | 148 | 142 | 146 | 142 | 147 | 140 | 129 | 134 | 173 | 184 | 193 | 191 | 174 | 174 | 180 | 176 | 165 | 160 | 155 | 158 | 159 | 162.6 |
| 23-Sep | 155 | 147 | 148 | 150 | 153 | 143 | 143 | 137 | 141 | 148 | 141 | 141 | 143 | 144 | 153 | 141 | 140 | 147 | 147 | 152 | 150 | 151 | 149 | 155 | 146.1 |
| 24-Sep | DF | DF | DF | 157 | 159 | 168 | 179 | 173 | 213 | 235 | 252 | 254 | 255 | 264 | 273 | 274 | 282 | 277 | 272 | 257 | 256 | 258 | 262 | 260 | 253.4 |
| 25-Sep | 260 | 262 | 262 | 266 | 259 | 263 | 232 | 229 | 257 | 271 | 280 | 275 | 282 | 285 | 295 | 300 | 312 | 333 | 296 | 239 | 240 | 240 | 242 | 182 | 268.1 |
| 26-Sep | 156 | 144 | 138 | 140 | 141 | 143 | 149 | 135 | 147 | 142 | 155 | 154 | 159 | 143 | 149 | 171 | 188 | 172 | 168 | 149 | 154 | 155 | 149 | 141 | 153.4 |
| 27-Sep | 135 | 138 | 131 | 141 | 155 | 240 | 270 | 252 | 223 | 236 | 291 | 275 | 271 | 270 | 278 | 264 | 256 | 244 | 237 | 234 | 238 | 263 | 265 | 268 | 251.9 |
| 28-Sep | 254 | 266 | 248 | 239 | 204 | 177 | 147 | 146 | 142 | 133 | 116 | 116 | 107 | 201 | 218 | 211 | 204 | 211 | 188 | 188 | 210 | 181 | 154 | 145 | 190.6 |
| 29-Sep | 141 | 134 | 132 | 141 | 148 | 152 | 152 | 165 | 154 | 132 | 118 | 122 | 130 | 126 | 109 | 105 | 93 | 90 | 57 | 62 | 92 | 91 | 352 | 11 | 123.7 |
| 30-Sep | 305 | 321 | 0 | 347 | 326 | 349 | 17 | 2 | 348 | 347 | 15 | 11 | 14 | 12 | 8 | 5 | 6 | 5 | 3 | 3 | 8 | 13 | 8 | 10 | 5.1 |

221.5 213.7 203.3 210.1 206.8 204.4 199.5 197.9 216.1 232.5 251.2 242.8 236.7 242.9 249.9 251.4 251.7 247.5 244.2 221.5 223.3 227.1 230.0 233.2

Diurnal Average

DF - DAS Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

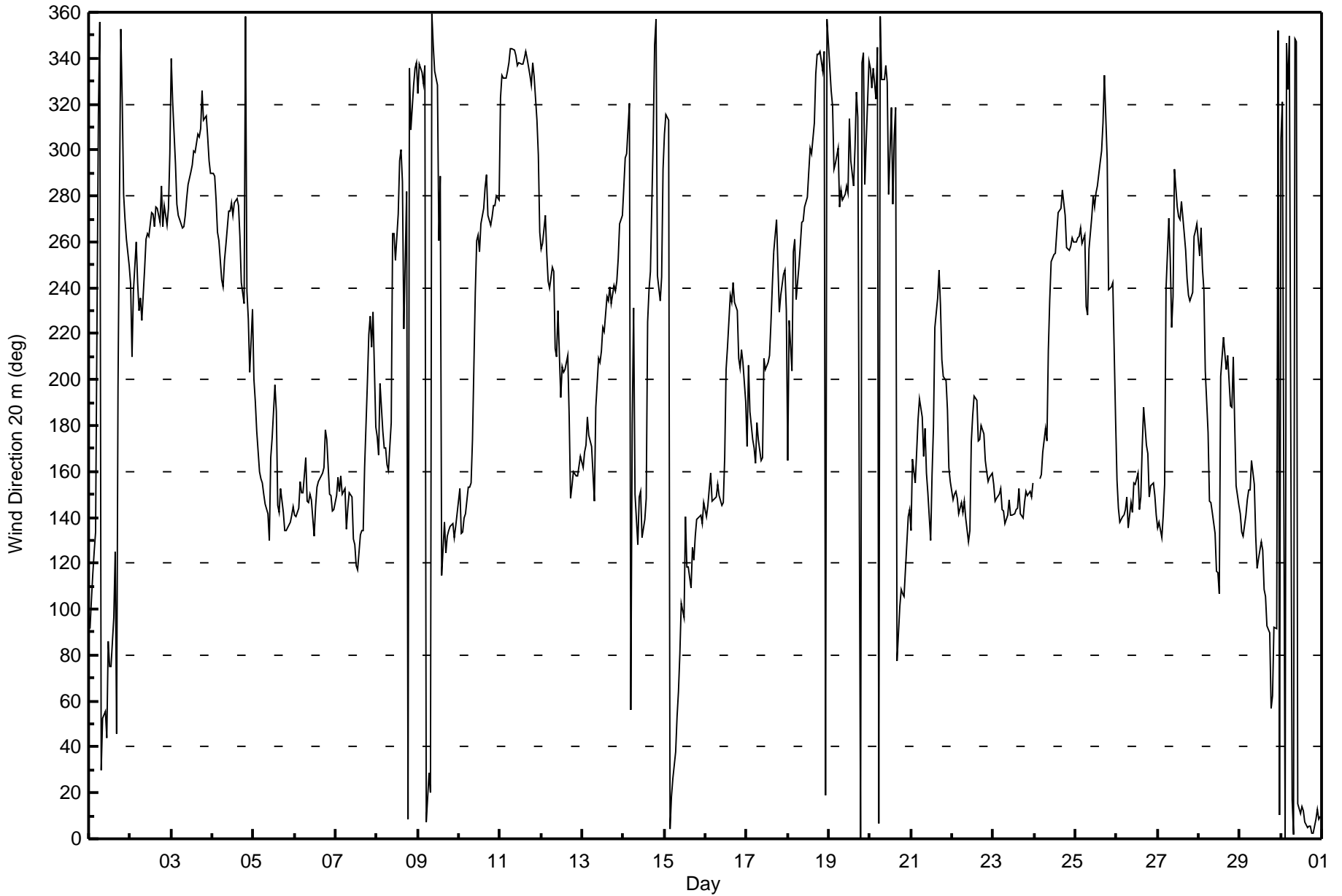
Wind Direction 20 m (WD20m) - deg
Mannix - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 93 deg on Sep 9 14:00 | Hours of Data: 717 |
| Minimum Value: 5 deg on Sep 25 23:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 6 P ₁₀ = 10 Q ₁ = 11 Median = 14 Q ₃ = 19 P ₉₀ = 29 P ₉₉ = 74 | 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 | 10 | 10 | 13 | 37 | 63 | 37 | 26 | 15 | 14 | 23 | 21 | 13 | 15 | 17 | 14 | 31 | 88 | 56 | 24 | 43 | 16 | 19 | 14 | 10 | 88 |
| 2-Sep | 14 | 17 | 11 | 13 | 19 | 16 | 18 | 17 | 17 | 21 | 29 | 18 | 19 | 14 | 11 | 10 | 13 | 18 | 58 | 14 | 13 | 13 | 8 | 18 | 58 |
| 3-Sep | 16 | 18 | 16 | 10 | 7 | 7 | 8 | 7 | 8 | 10 | 11 | 13 | 13 | 15 | 14 | 16 | 16 | 16 | 16 | 15 | 14 | 14 | 14 | 14 | 18 |
| 4-Sep | 12 | 11 | 14 | 9 | 11 | 15 | 13 | 22 | 19 | 17 | 13 | 11 | 19 | 24 | 34 | 33 | 21 | 15 | 16 | 56 | 14 | 21 | 14 | 13 | 56 |
| 5-Sep | 18 | 15 | 20 | 12 | 12 | 13 | 14 | 16 | 20 | 19 | 26 | 23 | 27 | 26 | 25 | 17 | 16 | 13 | 11 | 10 | 11 | 11 | 11 | 11 | 27 |
| 6-Sep | 9 | 9 | 12 | 11 | 10 | 9 | 11 | 13 | 15 | 18 | 18 | 16 | 17 | 21 | 17 | 14 | 15 | 14 | 15 | 14 | 10 | 11 | 11 | 9 | 21 |
| 7-Sep | 10 | 10 | 12 | 14 | 13 | 17 | 14 | 14 | 18 | 16 | 14 | 16 | 22 | 20 | 19 | 16 | 15 | 19 | 31 | 35 | 43 | 22 | 36 | 43 | 43 |
| 8-Sep | 14 | 26 | 21 | 43 | 20 | 14 | 17 | 20 | 42 | 33 | 88 | 28 | 20 | 31 | 22 | 57 | 51 | 85 | 43 | 68 | 40 | 19 | 14 | 16 | 88 |
| 9-Sep | 17 | 23 | 23 | 17 | 21 | 20 | 14 | 17 | 22 | 21 | 36 | 46 | 49 | 93 | 78 | 49 | 19 | 15 | 10 | 10 | 11 | 11 | 11 | 14 | 93 |
| 10-Sep | 14 | 11 | 10 | 12 | 13 | 15 | 11 | 14 | 24 | 14 | 11 | 10 | 12 | 12 | 10 | 15 | 16 | 12 | 8 | 9 | 8 | 9 | 12 | 11 | 24 |
| 11-Sep | 19 | 15 | 15 | 15 | 15 | 15 | 14 | 15 | 15 | 16 | 15 | 15 | 19 | 17 | 16 | 15 | 16 | 18 | 16 | 16 | 16 | 18 | 24 | 15 | 24 |
| 12-Sep | 10 | 9 | 13 | 11 | 11 | 11 | 11 | 20 | 25 | 30 | 41 | 45 | 34 | 32 | 26 | 27 | 23 | 15 | 11 | 9 | 9 | 10 | 11 | 12 | 45 |
| 13-Sep | 12 | 14 | 14 | 16 | 15 | 15 | 13 | 12 | 30 | 19 | 20 | 18 | 18 | 16 | 16 | 12 | 13 | 11 | 12 | 9 | 10 | 9 | 13 | 7 | 30 |
| 14-Sep | 18 | 12 | 31 | 19 | 75 | 87 | 13 | 67 | 25 | 19 | 18 | 18 | 19 | 27 | 22 | 16 | 13 | 36 | 17 | 20 | 74 | 8 | 10 | 17 | 87 |
| 15-Sep | 14 | 17 | 30 | 16 | 11 | 12 | 14 | 13 | 22 | 30 | 29 | 24 | 22 | 18 | 19 | 13 | 15 | 14 | 11 | 12 | 12 | 10 | 11 | 10 | 30 |
| 16-Sep | 12 | 12 | 9 | 8 | 9 | 10 | 11 | 12 | 14 | 14 | 11 | 20 | 21 | 17 | 12 | 13 | 13 | 11 | 8 | 9 | 18 | 9 | 16 | 11 | 21 |
| 17-Sep | 14 | 20 | 22 | 13 | 14 | 11 | 19 | 18 | 16 | 15 | 27 | 15 | 15 | 18 | 21 | 18 | 16 | 12 | 12 | 9 | 7 | 8 | 7 | 19 | 27 |
| 18-Sep | 29 | 18 | 28 | 28 | 12 | 23 | 19 | 14 | 10 | 9 | 10 | 11 | 15 | 14 | 13 | 21 | 17 | 15 | 15 | 16 | 18 | 25 | 14 | 18 | 29 |
| 19-Sep | 25 | 15 | 24 | 13 | 12 | 15 | 13 | 11 | 10 | 11 | 12 | 12 | 20 | 21 | 11 | 18 | 17 | 24 | 23 | 17 | 18 | 23 | 35 | 15 | 35 |
| 20-Sep | 17 | 15 | 15 | 16 | 18 | 14 | 14 | 17 | 21 | 27 | 36 | 44 | 51 | 75 | 54 | 61 | 25 | 9 | 13 | 20 | 18 | 16 | 12 | 12 | 75 |
| 21-Sep | 15 | 14 | 11 | 16 | 11 | 11 | 15 | 17 | 32 | 27 | 39 | 18 | 25 | 33 | 23 | 20 | 16 | 15 | 10 | 9 | 9 | 11 | 6 | 9 | 39 |
| 22-Sep | 11 | 10 | 10 | 10 | 12 | 10 | 11 | 11 | 14 | 13 | 12 | 30 | 20 | 19 | 20 | 16 | 16 | 15 | 13 | 10 | 9 | 8 | 9 | 10 | 30 |
| 23-Sep | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 10 | 12 | 12 | 13 | 12 | 13 | 12 | 13 | 12 | 13 | 12 | 11 | 12 | 11 | 11 | 12 | 11 | 13 |
| 24-Sep | DF | DF | DF | 10 | 10 | 11 | 13 | 18 | 24 | 14 | 13 | 12 | 16 | 14 | 12 | 11 | 12 | 8 | 13 | 8 | 7 | 6 | 6 | 5 | 24 |
| 25-Sep | 6 | 6 | 6 | 5 | 6 | 9 | 51 | 18 | 15 | 10 | 10 | 9 | 17 | 19 | 19 | 17 | 20 | 16 | 41 | 12 | 8 | 6 | 5 | 59 | 59 |
| 26-Sep | 15 | 10 | 11 | 12 | 12 | 11 | 14 | 11 | 13 | 13 | 15 | 14 | 13 | 15 | 13 | 23 | 16 | 12 | 10 | 12 | 9 | 9 | 10 | 9 | 23 |
| 27-Sep | 10 | 16 | 10 | 12 | 11 | 42 | 10 | 14 | 19 | 26 | 12 | 10 | 10 | 15 | 11 | 12 | 11 | 12 | 10 | 10 | 9 | 11 | 7 | 6 | 42 |
| 28-Sep | 8 | 9 | 11 | 23 | 12 | 21 | 8 | 11 | 13 | 14 | 18 | 31 | 27 | 41 | 27 | 27 | 25 | 14 | 12 | 7 | 14 | 18 | 11 | 11 | 41 |
| 29-Sep | 18 | 11 | 12 | 10 | 8 | 8 | 14 | 9 | 14 | 19 | 19 | 25 | 23 | 24 | 18 | 30 | 15 | 11 | 9 | 16 | 11 | 24 | 65 | 63 | 65 |
| 30-Sep | 18 | 45 | 11 | 20 | 18 | 30 | 11 | 15 | 21 | 30 | 16 | 12 | 12 | 12 | 13 | 12 | 12 | 13 | 12 | 12 | 13 | 11 | 11 | 12 | 45 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 29 | 45 | 31 | 43 | 75 | 87 | 51 | 67 | 42 | 33 | 88 | 46 | 51 | 93 | 78 | 61 | 88 | 85 | 58 | 68 | 74 | 25 | 65 | 63 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - September 2016

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 0 deg on Sep 30 16:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 331.3 deg on Sep 11 | Hours of Data: 717 |
| Direction of Minimum Speed: 141 deg on Sep 9 15:00 | Hours of Missing Data: 3 |
| Direction of Minimum Daily Speed Average: 3.0 deg on Sep 9 | Percent Operational Time: 99.6 |
| Monthly Average Direction: 248.1 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 | 88 | 100 | 106 | 119 | 118 | 345 | 359 | 30 | 46 | 48 | 38 | 78 | 67 | 68 | 90 | 118 | 41 | 181 | 345 | 323 | 285 | 267 | 257 | 246 | 56.7 |
| 2-Sep | 241 | 216 | 240 | 258 | 240 | 230 | 234 | 222 | 243 | 255 | 257 | 255 | 269 | 267 | 262 | 270 | 271 | 266 | 287 | 265 | 276 | 264 | 271 | 297 | 257.8 |
| 3-Sep | 337 | 318 | 294 | 273 | 268 | 266 | 262 | 263 | 268 | 275 | 283 | 289 | 292 | 297 | 298 | 305 | 303 | 306 | 322 | 311 | 311 | 302 | 294 | 287 | 293.2 |
| 4-Sep | 287 | 285 | 277 | 262 | 258 | 247 | 249 | 250 | 252 | 269 | 269 | 274 | 267 | 275 | 275 | 274 | 259 | 238 | 228 | 353 | 233 | 222 | 204 | 231 | 263.3 |
| 5-Sep | 210 | 192 | 186 | 159 | 152 | 150 | 146 | 143 | 144 | 130 | 162 | 169 | 192 | 179 | 141 | 138 | 146 | 135 | 126 | 127 | 131 | 134 | 137 | 140 | 151.0 |
| 6-Sep | 139 | 139 | 142 | 152 | 149 | 145 | 154 | 142 | 143 | 145 | 143 | 127 | 138 | 149 | 149 | 154 | 154 | 156 | 172 | 168 | 145 | 144 | 137 | 135 | 147.6 |
| 7-Sep | 141 | 148 | 148 | 160 | 147 | 146 | 132 | 139 | 147 | 142 | 124 | 122 | 115 | 111 | 127 | 128 | 128 | 160 | 192 | 214 | 222 | 217 | 227 | 187 | 154.3 |
| 8-Sep | 178 | 182 | 203 | 206 | 173 | 180 | 181 | 162 | 180 | 269 | 259 | 255 | 268 | 293 | 297 | 281 | 207 | 280 | 357 | 347 | 302 | 328 | 334 | 335 | 276.8 |
| 9-Sep | 323 | 331 | 328 | 328 | 332 | 360 | 20 | 12 | 354 | 340 | 330 | 322 | 260 | 268 | 141 | 142 | 119 | 126 | 126 | 129 | 131 | 126 | 131 | 137 | 59.2 |
| 10-Sep | 147 | 127 | 128 | 134 | 137 | 147 | 148 | 152 | 172 | 233 | 255 | 257 | 250 | 263 | 269 | 280 | 286 | 266 | 263 | 267 | 272 | 272 | 277 | 276 | 238.9 |
| 11-Sep | 320 | 328 | 327 | 329 | 331 | 334 | 341 | 342 | 341 | 338 | 334 | 335 | 334 | 335 | 336 | 339 | 335 | 328 | 323 | 335 | 329 | 313 | 300 | 265 | 331.3 |
| 12-Sep | 259 | 262 | 271 | 258 | 246 | 245 | 245 | 244 | 208 | 204 | 224 | 188 | 198 | 194 | 196 | 203 | 179 | 144 | 149 | 157 | 154 | 155 | 165 | 166 | 192.8 |
| 13-Sep | 164 | 168 | 170 | 181 | 174 | 170 | 162 | 155 | 189 | 204 | 202 | 207 | 216 | 215 | 230 | 229 | 234 | 227 | 235 | 232 | 236 | 245 | 261 | 267 | 209.6 |
| 14-Sep | 278 | 304 | 318 | 334 | 8 | 32 | 201 | 146 | 127 | 140 | 145 | 127 | 135 | 143 | 217 | 233 | 242 | 307 | 343 | 355 | 262 | 231 | 247 | 294 | 262.1 |
| 15-Sep | 307 | 316 | 327 | 1 | 17 | 19 | 27 | 45 | 53 | 69 | 101 | 95 | 133 | 114 | 112 | 103 | 120 | 114 | 126 | 133 | 135 | 135 | 134 | 144 | 98.0 |
| 16-Sep | 141 | 142 | 152 | 170 | 152 | 156 | 147 | 150 | 148 | 148 | 144 | 164 | 198 | 206 | 231 | 228 | 237 | 229 | 228 | 216 | 206 | 214 | 210 | 201 | 190.9 |
| 17-Sep | 187 | 210 | 188 | 175 | 178 | 168 | 184 | 180 | 169 | 168 | 207 | 201 | 202 | 204 | 221 | 237 | 249 | 265 | 248 | 226 | 233 | 238 | 243 | 240 | 211.8 |
| 18-Sep | 222 | 239 | 221 | 265 | 260 | 238 | 250 | 262 | 264 | 266 | 271 | 275 | 286 | 296 | 295 | 309 | 330 | 337 | 338 | 341 | 332 | 338 | 10 | 353 | 290.1 |
| 19-Sep | 332 | 322 | 316 | 291 | 292 | 298 | 274 | 279 | 275 | 277 | 280 | 277 | 310 | 294 | 281 | 298 | 323 | 313 | 353 | 333 | 336 | 287 | 304 | 336 | 300.4 |
| 20-Sep | 333 | 325 | 331 | 320 | 340 | 1 | 353 | 329 | 331 | 332 | 326 | 284 | 314 | 281 | 306 | 316 | 68 | 94 | 103 | 105 | 103 | 122 | 134 | 139 | 346.6 |
| 21-Sep | 129 | 159 | 150 | 161 | 173 | 192 | 193 | 176 | 181 | 158 | 144 | 127 | 157 | 175 | 214 | 230 | 241 | 226 | 207 | 201 | 199 | 196 | 173 | 163 | 184.4 |
| 22-Sep | 152 | 150 | 150 | 146 | 142 | 146 | 143 | 144 | 140 | 133 | 137 | 170 | 179 | 186 | 184 | 168 | 169 | 173 | 171 | 159 | 154 | 149 | 153 | 153 | 158.7 |
| 23-Sep | 148 | 143 | 144 | 144 | 145 | 146 | 141 | 138 | 133 | 136 | 142 | 136 | 136 | 138 | 138 | 146 | 136 | 135 | 141 | 146 | 144 | 145 | 142 | 149 | 140.9 |
| 24-Sep | DF | DF | DF | 150 | 154 | 165 | 176 | 177 | 209 | 231 | 245 | 250 | 250 | 259 | 267 | 269 | 277 | 272 | 269 | 256 | 253 | 254 | 257 | 256 | 244.8 |
| 25-Sep | 255 | 257 | 258 | 262 | 259 | 263 | 242 | 233 | 250 | 266 | 274 | 270 | 277 | 281 | 291 | 295 | 307 | 329 | 326 | 232 | 235 | 248 | 249 | 241 | 266.0 |
| 26-Sep | 163 | 147 | 139 | 139 | 141 | 136 | 133 | 127 | 137 | 136 | 152 | 150 | 153 | 139 | 146 | 166 | 181 | 167 | 164 | 146 | 150 | 149 | 144 | 137 | 149.0 |
| 27-Sep | 131 | 132 | 122 | 133 | 155 | 238 | 265 | 248 | 218 | 231 | 287 | 269 | 265 | 264 | 272 | 258 | 251 | 240 | 233 | 232 | 235 | 256 | 262 | 266 | 244.0 |
| 28-Sep | 253 | 262 | 245 | 247 | 209 | 197 | 159 | 149 | 143 | 129 | 111 | 123 | 105 | 196 | 211 | 204 | 200 | 206 | 183 | 183 | 197 | 188 | 166 | 152 | 194.7 |
| 29-Sep | 143 | 135 | 131 | 135 | 143 | 146 | 147 | 157 | 153 | 134 | 116 | 119 | 130 | 121 | 105 | 100 | 85 | 81 | 52 | 53 | 80 | 90 | 57 | 9 | 119.9 |
| 30-Sep | 343 | 339 | 355 | 351 | 330 | 347 | 7 | 356 | 345 | 344 | 4 | 3 | 7 | 5 | 2 | 0 | 0 | 1 | 358 | 357 | 3 | 7 | 3 | 3 | 359.4 |

221.1 210.5 198.7 198.9 194.9 198.9 190.7 187.9 207.6 227.8 246.0 236.7 231.6 236.6 244.9 247.4 247.0 242.7 234.0 211.5 216.1 219.6 222.6 226.4

Diurnal Average

DF - DAS Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

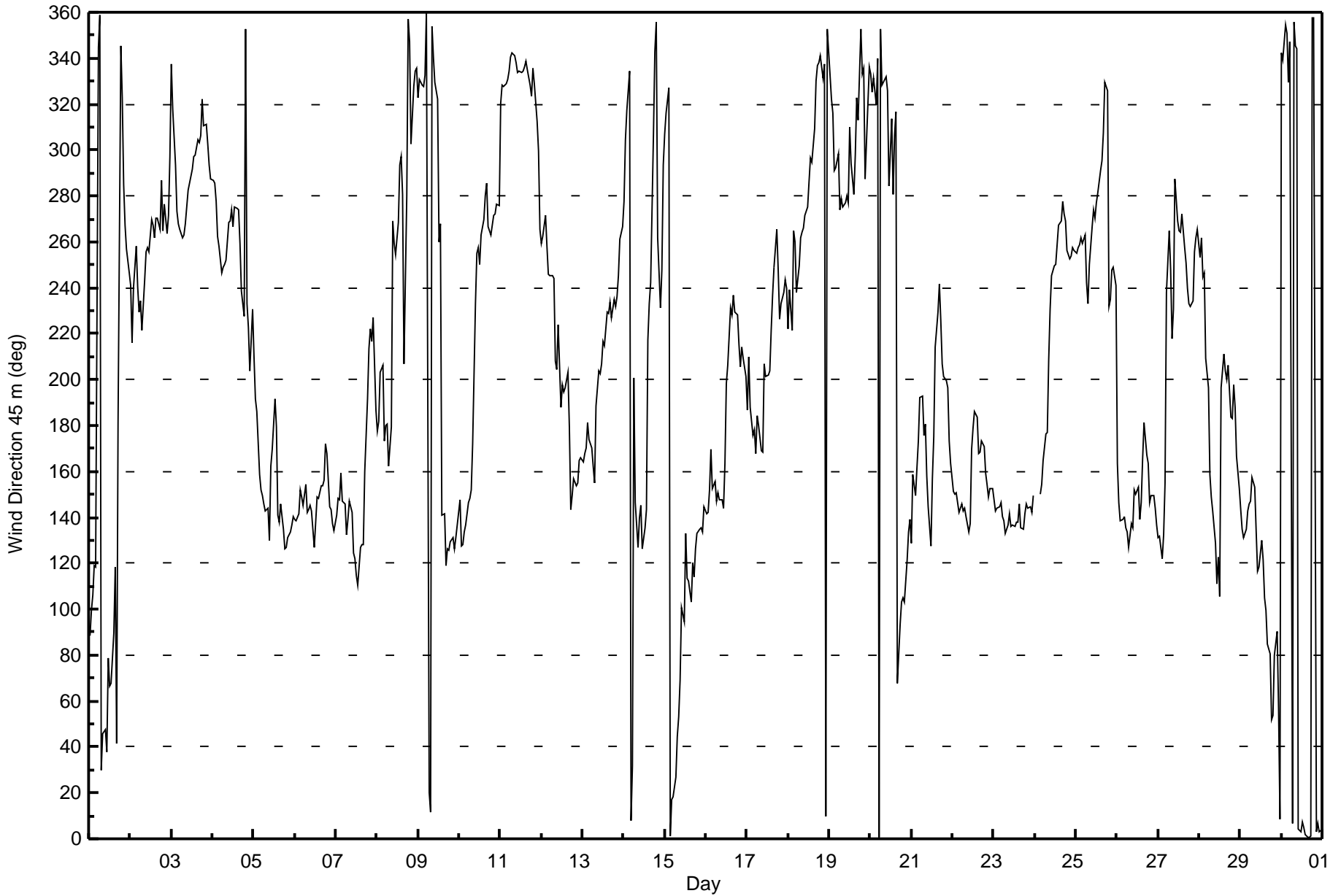
Wind Direction 45 m (WD45m) - deg
Mannix - September 2016

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 105 deg on Sep 9 15:00 | Hours of Data: 717 |
| Minimum Value: 2 deg on Sep 12 21:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 7 Median = 10 Q ₃ = 15 P ₉₀ = 22 P ₉₉ = 64 | 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 | 8 | 8 | 11 | 17 | 28 | 43 | 11 | 13 | 12 | 18 | 18 | 12 | 13 | 15 | 12 | 28 | 87 | 51 | 24 | 37 | 12 | 17 | 13 | 7 | 87 |
| 2-Sep | 8 | 11 | 7 | 9 | 14 | 10 | 14 | 13 | 14 | 19 | 24 | 15 | 17 | 11 | 9 | 8 | 11 | 18 | 49 | 13 | 8 | 11 | 6 | 14 | 49 |
| 3-Sep | 10 | 12 | 11 | 7 | 5 | 6 | 6 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 8 | 10 | 11 | 10 | 10 | 8 | 9 | 9 | 9 | 10 | 12 |
| 4-Sep | 7 | 6 | 11 | 8 | 10 | 8 | 9 | 19 | 17 | 14 | 10 | 9 | 16 | 19 | 28 | 31 | 18 | 14 | 14 | 55 | 10 | 16 | 10 | 9 | 55 |
| 5-Sep | 15 | 10 | 15 | 6 | 6 | 8 | 9 | 12 | 20 | 17 | 21 | 13 | 20 | 16 | 23 | 12 | 11 | 9 | 7 | 7 | 6 | 6 | 7 | 6 | 23 |
| 6-Sep | 4 | 5 | 7 | 5 | 5 | 4 | 4 | 8 | 11 | 12 | 15 | 12 | 14 | 16 | 12 | 9 | 10 | 9 | 8 | 8 | 5 | 6 | 6 | 6 | 16 |
| 7-Sep | 7 | 6 | 6 | 9 | 8 | 10 | 10 | 10 | 14 | 10 | 10 | 13 | 19 | 18 | 17 | 12 | 15 | 19 | 31 | 31 | 27 | 16 | 18 | 24 | 31 |
| 8-Sep | 13 | 24 | 9 | 22 | 11 | 10 | 17 | 16 | 34 | 32 | 73 | 22 | 16 | 22 | 15 | 55 | 45 | 76 | 39 | 57 | 22 | 12 | 8 | 8 | 76 |
| 9-Sep | 11 | 15 | 16 | 10 | 15 | 15 | 10 | 13 | 16 | 12 | 25 | 35 | 43 | 74 | 105 | 45 | 17 | 12 | 5 | 4 | 6 | 7 | 7 | 9 | 105 |
| 10-Sep | 10 | 8 | 8 | 8 | 9 | 10 | 6 | 8 | 17 | 12 | 9 | 9 | 8 | 12 | 8 | 13 | 14 | 11 | 6 | 8 | 7 | 7 | 9 | 9 | 17 |
| 11-Sep | 14 | 10 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 10 | 9 | 9 | 13 | 10 | 9 | 9 | 10 | 12 | 10 | 10 | 11 | 12 | 20 | 12 | 20 |
| 12-Sep | 8 | 6 | 9 | 8 | 6 | 5 | 8 | 13 | 19 | 21 | 34 | 34 | 26 | 26 | 21 | 23 | 17 | 10 | 6 | 3 | 2 | 5 | 4 | 5 | 34 |
| 13-Sep | 5 | 7 | 5 | 7 | 6 | 8 | 8 | 11 | 20 | 12 | 13 | 12 | 13 | 10 | 13 | 9 | 10 | 7 | 8 | 6 | 7 | 5 | 14 | 5 | 20 |
| 14-Sep | 13 | 6 | 16 | 14 | 24 | 67 | 25 | 62 | 19 | 14 | 15 | 15 | 20 | 18 | 13 | 10 | 36 | 12 | 12 | 71 | 6 | 10 | 11 | 11 | 71 |
| 15-Sep | 6 | 9 | 22 | 14 | 9 | 9 | 9 | 11 | 18 | 28 | 31 | 23 | 18 | 18 | 17 | 13 | 12 | 11 | 6 | 7 | 8 | 5 | 6 | 4 | 31 |
| 16-Sep | 6 | 5 | 5 | 9 | 3 | 5 | 6 | 6 | 9 | 13 | 6 | 14 | 15 | 12 | 10 | 10 | 10 | 9 | 3 | 6 | 8 | 4 | 7 | 6 | 15 |
| 17-Sep | 11 | 11 | 17 | 7 | 8 | 6 | 13 | 14 | 9 | 9 | 22 | 9 | 9 | 11 | 17 | 15 | 13 | 10 | 9 | 6 | 4 | 4 | 4 | 11 | 22 |
| 18-Sep | 24 | 12 | 17 | 9 | 6 | 18 | 16 | 9 | 10 | 8 | 8 | 8 | 12 | 9 | 8 | 18 | 11 | 9 | 8 | 10 | 13 | 20 | 10 | 13 | 24 |
| 19-Sep | 17 | 9 | 18 | 8 | 7 | 8 | 11 | 7 | 7 | 8 | 8 | 9 | 15 | 18 | 8 | 15 | 10 | 20 | 19 | 11 | 13 | 19 | 30 | 11 | 30 |
| 20-Sep | 11 | 9 | 10 | 10 | 13 | 10 | 9 | 12 | 16 | 18 | 28 | 34 | 40 | 50 | 44 | 52 | 22 | 7 | 12 | 16 | 17 | 11 | 9 | 10 | 52 |
| 21-Sep | 9 | 8 | 7 | 11 | 4 | 13 | 13 | 17 | 25 | 20 | 30 | 16 | 19 | 31 | 19 | 16 | 13 | 12 | 5 | 4 | 4 | 4 | 5 | 7 | 31 |
| 22-Sep | 4 | 4 | 4 | 5 | 6 | 4 | 5 | 6 | 10 | 12 | 11 | 24 | 14 | 14 | 12 | 9 | 10 | 7 | 6 | 4 | 5 | 4 | 5 | 5 | 24 |
| 23-Sep | 5 | 6 | 7 | 7 | 6 | 6 | 7 | 7 | 7 | 8 | 8 | 9 | 10 | 9 | 10 | 9 | 9 | 8 | 8 | 8 | 7 | 8 | 8 | 7 | 10 |
| 24-Sep | DF | DF | DF | 5 | 5 | 7 | 5 | 10 | 17 | 12 | 11 | 9 | 13 | 12 | 10 | 9 | 10 | 7 | 11 | 6 | 4 | 3 | 4 | 3 | 17 |
| 25-Sep | 4 | 5 | 5 | 5 | 3 | 5 | 39 | 13 | 12 | 8 | 8 | 7 | 15 | 17 | 16 | 13 | 17 | 12 | 24 | 22 | 7 | 5 | 4 | 43 | 43 |
| 26-Sep | 16 | 7 | 6 | 6 | 7 | 7 | 8 | 7 | 10 | 10 | 11 | 10 | 9 | 11 | 9 | 20 | 9 | 7 | 5 | 8 | 4 | 5 | 6 | 4 | 20 |
| 27-Sep | 6 | 8 | 7 | 10 | 10 | 34 | 8 | 13 | 15 | 25 | 10 | 9 | 8 | 13 | 9 | 10 | 9 | 10 | 7 | 6 | 5 | 10 | 6 | 5 | 34 |
| 28-Sep | 3 | 6 | 5 | 13 | 9 | 15 | 11 | 7 | 9 | 11 | 17 | 24 | 26 | 45 | 21 | 21 | 20 | 11 | 6 | 4 | 9 | 17 | 14 | 5 | 45 |
| 29-Sep | 8 | 5 | 9 | 4 | 4 | 3 | 6 | 4 | 11 | 18 | 14 | 21 | 25 | 20 | 19 | 31 | 13 | 10 | 5 | 9 | 6 | 11 | 46 | 39 | 46 |
| 30-Sep | 9 | 8 | 7 | 12 | 16 | 21 | 7 | 11 | 17 | 23 | 12 | 7 | 8 | 8 | 9 | 8 | 8 | 9 | 9 | 8 | 9 | 8 | 7 | 7 | 23 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|--|
| 24 | 24 | 22 | 22 | 28 | 67 | 39 | 62 | 34 | 32 | 73 | 35 | 43 | 74 | 105 | 55 | 87 | 76 | 49 | 57 | 71 | 20 | 46 | 43 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 4 deg on Sep 30 16:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 335.0 deg on Sep 11 | Hours of Data: 714 |
| Direction of Minimum Speed: 230 deg on Sep 25 20:00 | Hours of Missing Data: 6 |
| Direction of Minimum Daily Speed Average: 3.8 deg on Sep 9 | Percent Operational Time: 99.2 |
| Monthly Average Direction: 249.0 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 | 93 | 103 | 110 | 118 | 111 | 36 | 23 | 47 | 52 | 51 | 44 | 79 | 68 | 68 | 89 | 115 | 44 | 163 | 355 | 335 | AF | 270 | AF | AF | 65.3 |
| 2-Sep | 245 | 226 | 245 | 260 | 246 | 237 | 240 | 225 | 243 | 256 | 257 | 254 | 268 | 268 | 263 | 272 | 274 | 268 | 298 | 273 | 283 | 268 | 274 | 301 | 260.4 |
| 3-Sep | 341 | 322 | 300 | 277 | 272 | 268 | 265 | 266 | 270 | 278 | 287 | 293 | 296 | 301 | 301 | 308 | 306 | 310 | 324 | 314 | 314 | 306 | 298 | 291 | 297.3 |
| 4-Sep | 289 | 288 | 282 | 268 | 263 | 256 | 263 | 258 | 253 | 269 | 271 | 275 | 269 | 277 | 277 | 273 | 261 | 239 | 227 | 358 | 235 | 224 | 213 | 234 | 266.4 |
| 5-Sep | 223 | 202 | 201 | 177 | 160 | 156 | 151 | 148 | 151 | 138 | 162 | 169 | 192 | 177 | 139 | 139 | 144 | 134 | 126 | 128 | 132 | 134 | 138 | 142 | 153.5 |
| 6-Sep | 142 | 145 | 147 | 159 | 159 | 150 | 147 | 142 | 144 | 144 | 142 | 127 | 136 | 148 | 148 | 154 | 154 | 156 | 172 | 167 | 145 | 143 | 136 | 131 | 148.4 |
| 7-Sep | 139 | 141 | 147 | 156 | 155 | 153 | 136 | 140 | 150 | 138 | 124 | 125 | 120 | 113 | 128 | 125 | 128 | 160 | 194 | 218 | 228 | 224 | 230 | 195 | 158.4 |
| 8-Sep | 209 | 217 | 237 | 245 | 202 | 224 | 222 | 201 | 199 | 280 | 267 | 262 | 271 | 297 | 298 | 285 | 197 | 287 | 2 | 17 | 309 | 335 | 342 | 340 | 291.2 |
| 9-Sep | 327 | 333 | 334 | 334 | 337 | 3 | 23 | 13 | 356 | 344 | 335 | 325 | 276 | 268 | 129 | 143 | 117 | 125 | 125 | 130 | 131 | 128 | 132 | 137 | 56.3 |
| 10-Sep | 147 | 130 | 131 | 135 | 138 | 147 | 150 | 157 | 179 | 233 | 256 | 259 | 251 | 264 | 271 | 281 | 287 | 268 | 266 | 270 | 273 | 274 | 278 | 278 | 236.0 |
| 11-Sep | 324 | 331 | 330 | 331 | 334 | 339 | 345 | 347 | 346 | 342 | 337 | 337 | 336 | 337 | 339 | 342 | 337 | 331 | 325 | 339 | 334 | 318 | 307 | 275 | 335.0 |
| 12-Sep | 271 | 271 | 278 | 272 | 260 | 257 | 249 | 248 | 216 | 209 | 222 | 184 | 196 | 193 | 196 | 202 | 180 | 146 | 152 | 159 | 158 | 161 | 172 | 171 | 195.2 |
| 13-Sep | 170 | 173 | 176 | 185 | 178 | 175 | 175 | 176 | 195 | 205 | 201 | 209 | 216 | 215 | 230 | 230 | 234 | 227 | 236 | 234 | 237 | 246 | 261 | 269 | 211.9 |
| 14-Sep | 278 | 314 | 322 | 348 | 16 | 59 | 143 | 123 | 127 | 137 | 143 | 129 | 138 | 144 | 218 | 234 | 244 | 309 | 348 | 0 | 313 | 226 | 263 | 302 | 276.7 |
| 15-Sep | 314 | 321 | 336 | 9 | 26 | 21 | 31 | 48 | 53 | 69 | 99 | 92 | 129 | 116 | 113 | 105 | 121 | 116 | 127 | 133 | 135 | 135 | 135 | 147 | 91.9 |
| 16-Sep | 155 | 153 | 164 | 199 | 187 | 183 | 160 | 161 | 164 | 177 | 167 | 170 | 199 | 206 | 232 | 229 | 236 | 231 | 231 | 224 | 217 | 220 | 218 | 213 | 201.9 |
| 17-Sep | 204 | 215 | 197 | 186 | 187 | 182 | 196 | 196 | 193 | 185 | 209 | 202 | 202 | 204 | 223 | 237 | 250 | 268 | 250 | 229 | 236 | 240 | 246 | 250 | 217.5 |
| 18-Sep | 248 | 245 | 235 | 271 | 265 | 253 | 257 | 268 | 267 | 268 | 274 | 276 | 288 | 298 | 296 | 312 | 332 | 339 | 343 | 347 | 335 | 343 | 9 | 356 | 293.6 |
| 19-Sep | 340 | 326 | 320 | 295 | 295 | 303 | 280 | 282 | 278 | 280 | 282 | 280 | 314 | 297 | 284 | 302 | 325 | 319 | 356 | 334 | 338 | 296 | 311 | 342 | 305.5 |
| 20-Sep | 340 | 331 | 335 | 325 | 345 | 4 | 356 | 335 | 340 | 336 | 330 | 287 | 316 | 293 | 314 | 329 | 68 | 92 | 105 | 106 | 101 | 117 | 135 | 139 | 349.5 |
| 21-Sep | 129 | 148 | 150 | 169 | 183 | 206 | 210 | 205 | 185 | 157 | 146 | 133 | 157 | 177 | 215 | 231 | 241 | 227 | 210 | 207 | 205 | 205 | 195 | 189 | 190.9 |
| 22-Sep | 172 | 165 | 165 | 155 | 153 | 159 | 153 | 154 | 151 | 146 | 151 | 172 | 180 | 185 | 182 | 168 | 169 | 174 | 172 | 161 | 155 | 150 | 153 | 154 | 163.2 |
| 23-Sep | 152 | 145 | 146 | 146 | 148 | 143 | 141 | 135 | 137 | 142 | 137 | 137 | 136 | 138 | 139 | 145 | 137 | 135 | 142 | 146 | 144 | 145 | 143 | 150 | 142.1 |
| 24-Sep | DF | DF | DF | 152 | 156 | 168 | 188 | 197 | 212 | 232 | 245 | 251 | 251 | 260 | 268 | 271 | 279 | 274 | 274 | 262 | 257 | 255 | 258 | 260 | 245.7 |
| 25-Sep | 256 | 260 | 261 | 264 | 265 | 268 | 252 | 245 | 253 | 269 | 275 | 272 | 279 | 284 | 294 | 297 | 310 | 334 | 347 | 230 | 233 | 256 | 261 | 267 | 269.6 |
| 26-Sep | 179 | 162 | 156 | 153 | 148 | 136 | 130 | 126 | 133 | 135 | 154 | 150 | 152 | 141 | 148 | 166 | 181 | 168 | 165 | 148 | 153 | 151 | 146 | 140 | 151.6 |
| 27-Sep | 136 | 134 | 124 | 132 | 162 | 246 | 267 | 250 | 221 | 232 | 288 | 271 | 266 | 265 | 274 | 260 | 252 | 242 | 236 | 236 | 239 | 257 | 264 | 270 | 244.6 |
| 28-Sep | 261 | 267 | 251 | 251 | 223 | 214 | 188 | 169 | 151 | 132 | 114 | 142 | 109 | 199 | 212 | 202 | 201 | 205 | 184 | 182 | 197 | 204 | 195 | 171 | 207.6 |
| 29-Sep | 160 | 153 | 148 | 141 | 153 | 155 | 157 | 168 | 163 | 145 | 123 | 116 | 130 | 120 | 110 | 101 | 84 | 80 | 58 | 57 | 74 | 86 | 75 | 16 | 128.1 |
| 30-Sep | 1 | 348 | 11 | 9 | 353 | 356 | 9 | 359 | 354 | 351 | 5 | 4 | 9 | 8 | 4 | 4 | 3 | 4 | 2 | 1 | 7 | 10 | 6 | 6 | 3.8 |

227.8 219.1 209.7 206.3 201.4 208.4 198.9 198.9 209.3 228.7 247.5 239.6 233.5 237.6 246.7 249.9 248.5 245.0 236.0 211.7 214.3 221.9 222.7 228.5

Diurnal Average

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

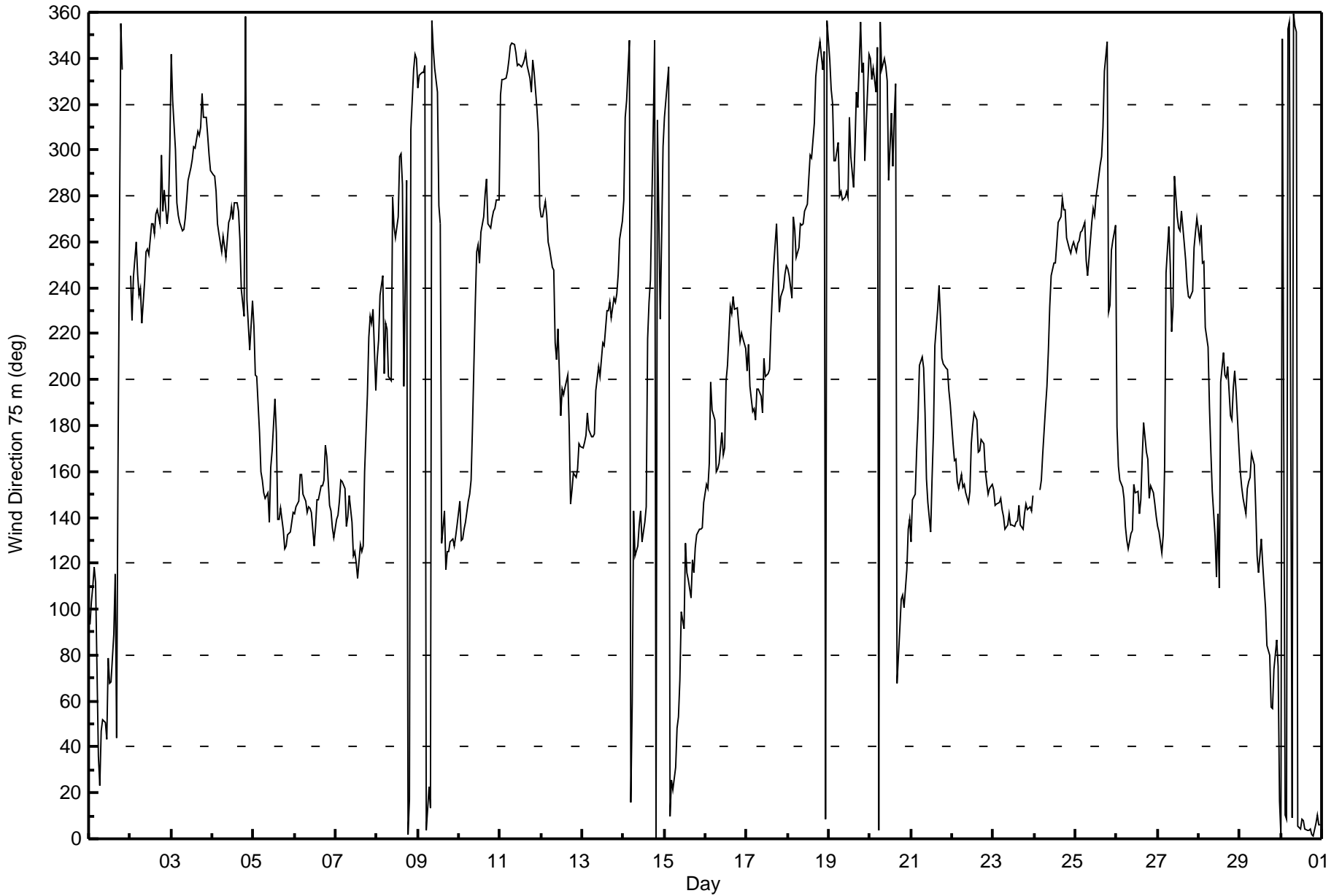
Wind Direction 75 m (WD75m) - deg
Mannix - September 2016

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 99 deg on Sep 25 20:00 | Hours of Data: 714 |
| Minimum Value: 2 deg on Sep 29 06:00 | Hours of Missing Data: 6 |
| Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 6 Median = 9 Q ₃ = 14 P ₉₀ = 20 P ₉₉ = 62 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.2 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 13 | 14 | 14 | 15 | 23 | 81 | 12 | 8 | 10 | 15 | 16 | 11 | 11 | 14 | 14 | 22 | 68 | 42 | 30 | 34 | AF | 19 | AF | AF | 81 |
| 2-Sep | 7 | 9 | 7 | 8 | 11 | 6 | 12 | 12 | 14 | 18 | 24 | 13 | 16 | 11 | 8 | 7 | 10 | 17 | 33 | 11 | 5 | 9 | 5 | 14 | 33 |
| 3-Sep | 9 | 11 | 9 | 6 | 5 | 6 | 6 | 6 | 7 | 6 | 6 | 7 | 7 | 9 | 8 | 8 | 10 | 10 | 9 | 7 | 8 | 8 | 9 | 10 | 11 |
| 4-Sep | 6 | 5 | 10 | 9 | 8 | 5 | 8 | 14 | 19 | 15 | 9 | 8 | 16 | 18 | 25 | 28 | 18 | 13 | 12 | 59 | 8 | 14 | 11 | 8 | 59 |
| 5-Sep | 13 | 11 | 10 | 10 | 7 | 7 | 7 | 10 | 19 | 17 | 18 | 11 | 18 | 14 | 20 | 11 | 12 | 9 | 9 | 9 | 6 | 5 | 5 | 4 | 20 |
| 6-Sep | 3 | 4 | 5 | 4 | 5 | 4 | 3 | 6 | 8 | 11 | 14 | 12 | 14 | 15 | 11 | 8 | 10 | 8 | 6 | 8 | 4 | 3 | 6 | 5 | 15 |
| 7-Sep | 5 | 4 | 4 | 5 | 4 | 6 | 9 | 8 | 13 | 11 | 12 | 13 | 18 | 17 | 17 | 14 | 16 | 18 | 32 | 25 | 25 | 15 | 22 | 21 | 32 |
| 8-Sep | 22 | 30 | 10 | 12 | 11 | 14 | 11 | 13 | 28 | 34 | 65 | 24 | 16 | 20 | 15 | 54 | 29 | 63 | 37 | 45 | 11 | 11 | 6 | 6 | 65 |
| 9-Sep | 9 | 12 | 13 | 8 | 12 | 13 | 8 | 13 | 15 | 11 | 20 | 33 | 44 | 62 | 96 | 46 | 18 | 11 | 9 | 5 | 5 | 8 | 6 | 8 | 96 |
| 10-Sep | 8 | 8 | 7 | 7 | 7 | 8 | 5 | 7 | 17 | 12 | 8 | 9 | 7 | 12 | 8 | 12 | 14 | 10 | 6 | 8 | 7 | 7 | 8 | 9 | 17 |
| 11-Sep | 13 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 12 | 9 | 7 | 7 | 9 | 11 | 9 | 8 | 10 | 9 | 18 | 10 | 18 |
| 12-Sep | 6 | 5 | 7 | 6 | 5 | 6 | 5 | 13 | 19 | 20 | 31 | 31 | 26 | 24 | 21 | 22 | 16 | 9 | 4 | 3 | 3 | 5 | 4 | 4 | 31 |
| 13-Sep | 4 | 5 | 5 | 5 | 5 | 5 | 9 | 14 | 15 | 11 | 11 | 10 | 12 | 9 | 13 | 8 | 9 | 6 | 7 | 5 | 5 | 4 | 15 | 4 | 15 |
| 14-Sep | 10 | 7 | 7 | 11 | 16 | 15 | 24 | 19 | 19 | 13 | 14 | 16 | 14 | 18 | 16 | 12 | 9 | 36 | 10 | 10 | 74 | 7 | 14 | 9 | 74 |
| 15-Sep | 5 | 7 | 22 | 10 | 6 | 7 | 6 | 9 | 16 | 24 | 27 | 20 | 16 | 19 | 18 | 16 | 13 | 14 | 7 | 7 | 7 | 4 | 4 | 5 | 27 |
| 16-Sep | 5 | 6 | 9 | 11 | 9 | 12 | 9 | 6 | 10 | 20 | 7 | 12 | 14 | 11 | 10 | 9 | 9 | 8 | 3 | 5 | 7 | 5 | 5 | 5 | 20 |
| 17-Sep | 9 | 8 | 13 | 8 | 6 | 6 | 10 | 11 | 9 | 8 | 16 | 8 | 7 | 9 | 15 | 13 | 12 | 9 | 9 | 7 | 3 | 3 | 3 | 5 | 16 |
| 18-Sep | 13 | 9 | 11 | 7 | 4 | 11 | 14 | 7 | 9 | 7 | 7 | 7 | 11 | 7 | 7 | 17 | 9 | 8 | 6 | 7 | 10 | 19 | 8 | 12 | 19 |
| 19-Sep | 13 | 8 | 16 | 6 | 6 | 6 | 10 | 6 | 7 | 8 | 7 | 8 | 15 | 16 | 7 | 15 | 8 | 18 | 17 | 10 | 11 | 15 | 28 | 9 | 28 |
| 20-Sep | 9 | 7 | 8 | 9 | 10 | 8 | 8 | 10 | 16 | 16 | 28 | 35 | 36 | 56 | 40 | 45 | 20 | 13 | 16 | 17 | 19 | 14 | 9 | 9 | 56 |
| 21-Sep | 6 | 8 | 5 | 10 | 7 | 11 | 7 | 7 | 24 | 15 | 29 | 15 | 17 | 31 | 19 | 16 | 14 | 12 | 4 | 3 | 4 | 3 | 4 | 7 | 31 |
| 22-Sep | 7 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 8 | 11 | 12 | 18 | 13 | 13 | 11 | 9 | 8 | 6 | 5 | 3 | 5 | 3 | 5 | 3 | 18 |
| 23-Sep | 4 | 4 | 5 | 5 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 8 | 8 | 8 | 10 | 7 | 9 | 8 | 7 | 6 | 6 | 6 | 6 | 5 | 10 |
| 24-Sep | DF | DF | DF | 4 | 4 | 8 | 7 | 6 | 12 | 11 | 9 | 8 | 13 | 12 | 9 | 9 | 9 | 7 | 8 | 5 | 3 | 3 | 4 | 3 | 13 |
| 25-Sep | 4 | 5 | 5 | 4 | 4 | 4 | 24 | 11 | 10 | 8 | 8 | 6 | 14 | 16 | 15 | 11 | 16 | 11 | 26 | 99 | 11 | 4 | 10 | 21 | 99 |
| 26-Sep | 15 | 5 | 5 | 4 | 5 | 8 | 6 | 7 | 9 | 10 | 10 | 9 | 8 | 9 | 8 | 19 | 9 | 6 | 5 | 7 | 4 | 4 | 4 | 3 | 19 |
| 27-Sep | 5 | 5 | 9 | 10 | 15 | 26 | 7 | 14 | 13 | 24 | 8 | 8 | 7 | 12 | 8 | 10 | 8 | 8 | 7 | 5 | 4 | 8 | 5 | 4 | 26 |
| 28-Sep | 3 | 6 | 3 | 6 | 7 | 11 | 16 | 8 | 7 | 11 | 20 | 24 | 26 | 48 | 22 | 20 | 19 | 11 | 5 | 3 | 8 | 13 | 13 | 6 | 48 |
| 29-Sep | 6 | 4 | 7 | 3 | 5 | 2 | 5 | 3 | 9 | 17 | 17 | 26 | 24 | 20 | 20 | 27 | 14 | 13 | 4 | 6 | 5 | 13 | 26 | 22 | 27 |
| 30-Sep | 7 | 6 | 11 | 9 | 15 | 14 | 5 | 9 | 14 | 18 | 9 | 6 | 6 | 7 | 8 | 6 | 7 | 8 | 7 | 6 | 8 | 7 | 7 | 6 | 18 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 22 | 30 | 22 | 15 | 23 | 81 | 24 | 19 | 28 | 34 | 65 | 35 | 44 | 62 | 96 | 54 | 68 | 63 | 37 | 99 | 74 | 19 | 28 | 22 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure AF - Analyzer Failure





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 90 m (WD90m) - deg

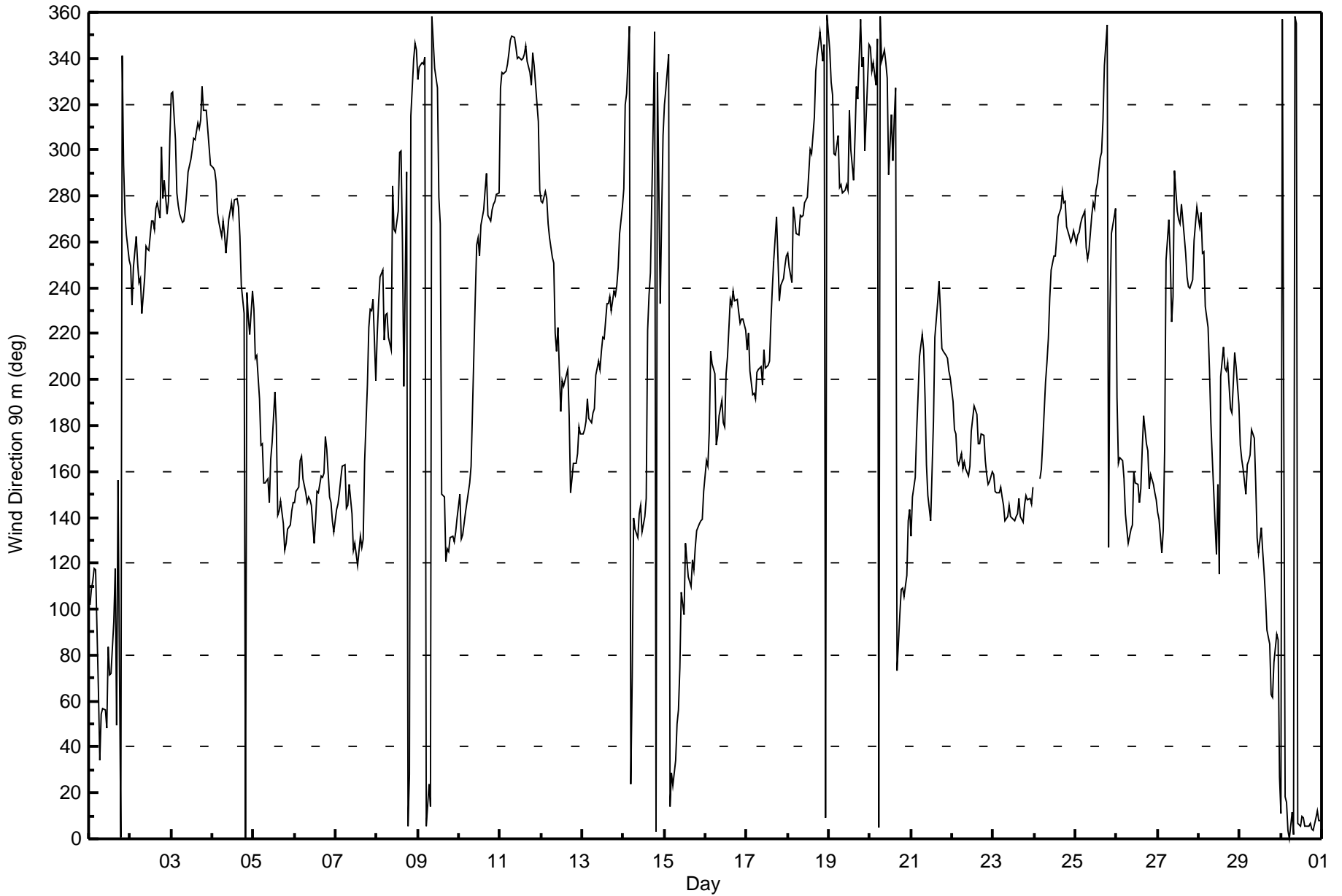
Mannix - September 2016

| | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 99 deg on Sep 9 15:00 | | | Hours of Data: | 717 |
| Minimum Value: 2 deg on Sep 28 03:00 | | | Hours of Missing Data: | 3 |
| | | | Hours of Calibration: | 0 |
| | | | Percent Operational Time: | 99.6 |
| Percentiles: P ₁ = 3 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 13 P ₉₀ = 20 P ₉₉ = 62 | | | | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 7 | 7 | 9 | 12 | 19 | 70 | 23 | 8 | 10 | 16 | 16 | 11 | 11 | 13 | 12 | 20 | 66 | 38 | 31 | 34 | 9 | 18 | 13 | 6 | 70 |
| 2-Sep | 7 | 7 | 7 | 7 | 10 | 6 | 10 | 12 | 13 | 17 | 23 | 12 | 15 | 11 | 7 | 6 | 10 | 17 | 33 | 10 | 5 | 8 | 5 | 14 | 33 |
| 3-Sep | 40 | 10 | 9 | 6 | 5 | 6 | 6 | 6 | 7 | 6 | 6 | 7 | 7 | 9 | 7 | 8 | 10 | 9 | 8 | 7 | 7 | 8 | 9 | 10 | 40 |
| 4-Sep | 5 | 4 | 9 | 8 | 7 | 4 | 7 | 12 | 19 | 15 | 9 | 8 | 16 | 18 | 24 | 28 | 18 | 13 | 10 | 61 | 9 | 13 | 10 | 7 | 61 |
| 5-Sep | 11 | 11 | 9 | 11 | 7 | 12 | 8 | 7 | 18 | 16 | 18 | 10 | 17 | 14 | 20 | 11 | 11 | 9 | 7 | 6 | 5 | 4 | 4 | 3 | 20 |
| 6-Sep | 3 | 4 | 5 | 4 | 3 | 6 | 3 | 5 | 8 | 10 | 14 | 10 | 13 | 14 | 11 | 8 | 9 | 8 | 6 | 8 | 4 | 2 | 6 | 3 | 14 |
| 7-Sep | 4 | 4 | 3 | 3 | 5 | 5 | 9 | 8 | 13 | 11 | 11 | 13 | 18 | 19 | 18 | 14 | 16 | 18 | 32 | 22 | 24 | 15 | 22 | 21 | 32 |
| 8-Sep | 18 | 26 | 7 | 10 | 10 | 9 | 9 | 9 | 20 | 37 | 68 | 26 | 16 | 21 | 15 | 49 | 23 | 52 | 36 | 41 | 10 | 11 | 5 | 6 | 68 |
| 9-Sep | 9 | 12 | 12 | 8 | 12 | 12 | 7 | 13 | 14 | 10 | 20 | 36 | 46 | 56 | 99 | 42 | 18 | 14 | 7 | 3 | 4 | 6 | 4 | 8 | 99 |
| 10-Sep | 8 | 8 | 7 | 7 | 7 | 7 | 4 | 7 | 17 | 11 | 8 | 9 | 7 | 11 | 7 | 12 | 14 | 10 | 6 | 8 | 6 | 6 | 8 | 9 | 17 |
| 11-Sep | 13 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 11 | 8 | 7 | 6 | 8 | 10 | 8 | 8 | 9 | 9 | 18 | 10 | 18 |
| 12-Sep | 5 | 4 | 6 | 5 | 4 | 6 | 4 | 11 | 18 | 18 | 27 | 30 | 24 | 23 | 20 | 22 | 16 | 8 | 4 | 3 | 3 | 5 | 3 | 3 | 30 |
| 13-Sep | 4 | 5 | 5 | 5 | 5 | 5 | 10 | 13 | 13 | 11 | 11 | 10 | 11 | 9 | 12 | 8 | 9 | 5 | 6 | 5 | 4 | 4 | 14 | 4 | 14 |
| 14-Sep | 9 | 8 | 6 | 12 | 22 | 12 | 15 | 10 | 17 | 11 | 14 | 15 | 13 | 19 | 16 | 11 | 8 | 36 | 8 | 9 | 76 | 9 | 15 | 8 | 76 |
| 15-Sep | 5 | 6 | 21 | 10 | 6 | 7 | 5 | 9 | 17 | 24 | 28 | 21 | 19 | 18 | 17 | 13 | 11 | 10 | 5 | 6 | 6 | 3 | 4 | 5 | 28 |
| 16-Sep | 8 | 8 | 13 | 11 | 7 | 12 | 12 | 8 | 14 | 19 | 7 | 11 | 14 | 11 | 10 | 8 | 8 | 8 | 3 | 4 | 6 | 5 | 5 | 5 | 19 |
| 17-Sep | 9 | 7 | 12 | 8 | 6 | 6 | 9 | 9 | 7 | 7 | 13 | 7 | 7 | 9 | 15 | 13 | 12 | 9 | 8 | 7 | 3 | 3 | 3 | 4 | 15 |
| 18-Sep | 10 | 8 | 10 | 5 | 5 | 10 | 12 | 6 | 8 | 7 | 7 | 7 | 10 | 7 | 6 | 17 | 9 | 8 | 5 | 6 | 10 | 18 | 7 | 11 | 18 |
| 19-Sep | 12 | 8 | 15 | 6 | 6 | 6 | 10 | 5 | 6 | 7 | 6 | 8 | 15 | 15 | 7 | 15 | 8 | 17 | 17 | 10 | 11 | 14 | 26 | 7 | 26 |
| 20-Sep | 9 | 7 | 8 | 10 | 9 | 7 | 7 | 10 | 16 | 16 | 31 | 33 | 35 | 63 | 54 | 46 | 23 | 8 | 10 | 10 | 13 | 9 | 10 | 8 | 63 |
| 21-Sep | 3 | 6 | 5 | 9 | 10 | 8 | 7 | 8 | 23 | 16 | 27 | 14 | 16 | 31 | 19 | 16 | 13 | 11 | 4 | 3 | 3 | 2 | 3 | 4 | 31 |
| 22-Sep | 6 | 4 | 3 | 3 | 4 | 5 | 4 | 3 | 7 | 10 | 12 | 16 | 12 | 13 | 11 | 9 | 8 | 5 | 5 | 3 | 5 | 3 | 4 | 3 | 16 |
| 23-Sep | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 5 | 6 | 7 | 8 | 8 | 8 | 10 | 7 | 8 | 8 | 7 | 7 | 6 | 6 | 6 | 5 | 10 |
| 24-Sep | DF | DF | DF | 4 | 3 | 8 | 8 | 6 | 11 | 10 | 9 | 9 | 12 | 11 | 9 | 8 | 9 | 6 | 8 | 5 | 3 | 3 | 3 | 3 | 12 |
| 25-Sep | 4 | 5 | 4 | 4 | 4 | 4 | 15 | 10 | 9 | 7 | 7 | 6 | 14 | 15 | 15 | 11 | 16 | 11 | 25 | 91 | 12 | 5 | 10 | 17 | 91 |
| 26-Sep | 20 | 6 | 5 | 2 | 6 | 10 | 4 | 4 | 7 | 10 | 9 | 9 | 8 | 9 | 7 | 19 | 9 | 5 | 5 | 6 | 4 | 4 | 3 | 3 | 20 |
| 27-Sep | 6 | 4 | 6 | 10 | 18 | 23 | 7 | 14 | 12 | 23 | 8 | 8 | 7 | 11 | 8 | 10 | 8 | 8 | 6 | 4 | 3 | 8 | 5 | 4 | 23 |
| 28-Sep | 3 | 5 | 2 | 5 | 6 | 10 | 16 | 8 | 10 | 10 | 19 | 23 | 26 | 45 | 20 | 20 | 18 | 11 | 6 | 3 | 9 | 9 | 10 | 7 | 45 |
| 29-Sep | 8 | 5 | 7 | 4 | 5 | 3 | 2 | 4 | 11 | 17 | 15 | 33 | 23 | 21 | 18 | 28 | 13 | 10 | 5 | 5 | 3 | 7 | 17 | 16 | 33 |
| 30-Sep | 13 | 9 | 9 | 7 | 13 | 11 | 4 | 8 | 13 | 16 | 7 | 5 | 5 | 6 | 7 | 6 | 6 | 7 | 6 | 6 | 7 | 7 | 7 | 6 | 16 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 40 | 26 | 21 | 12 | 22 | 70 | 23 | 14 | 23 | 37 | 68 | 36 | 46 | 63 | 99 | 49 | 66 | 52 | 36 | 91 | 76 | 18 | 26 | 21 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure





| Maximum Value: 1.3 km/h on Sep 1 13:00 | | Maximum Daily Average: 0.7 km/h on Sep 23 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|-----|
| Minimum Value: -0.8 km/h on Sep 4 01:00 | | Minimum Daily Average: -0.4 km/h on Sep 3 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.2 km/h at hour 8 | | Minimum Diurnal Average: 0.0 km/h at hour 16 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.07 km/h | | Percentiles: P ₁ = -0.7 P ₁₀ = -0.4 Q ₁ = -0.2 Median = 0.0 Q ₃ = 0.4 P ₉₀ = 0.6 P ₉₉ = 1.0 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 1.1 | 1.2 | 1.1 | 0.6 | 0.1 | -0.1 | -0.1 | 0.2 | 0.6 | 0.5 | 0.4 | 1.3 | 1.3 | 1.0 | 1.0 | 0.5 | 0.5 | 0.2 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | -0.2 | 0.5 | 1.3 | |
| 2-Sep | -0.4 | -0.2 | -0.3 | -0.2 | -0.3 | -0.4 | -0.3 | -0.2 | -0.1 | -0.2 | -0.2 | -0.1 | -0.2 | -0.1 | 0.1 | -0.3 | -0.1 | -0.2 | 0.0 | 0.0 | -0.2 | -0.1 | -0.2 | -0.4 | -0.2 | 0.1 | |
| 3-Sep | -0.2 | -0.5 | -0.4 | -0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.2 | -0.1 | -0.7 | -0.7 | -0.6 | -0.6 | -0.8 | -0.6 | -0.6 | -0.5 | -0.4 | -0.5 | -0.7 | -0.8 | -0.7 | -0.7 | -0.4 | 0.3 | |
| 4-Sep | -0.8 | -0.7 | -0.2 | 0.0 | -0.1 | -0.4 | -0.4 | -0.4 | -0.1 | -0.2 | -0.1 | -0.3 | -0.3 | 0.0 | -0.1 | -0.2 | -0.2 | -0.2 | 0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.2 | 0.1 | |
| 5-Sep | 0.0 | 0.0 | 0.0 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 | 0.2 | 0.1 | 0.2 | 0.5 | 0.6 | 0.5 | 0.4 | 0.4 | 0.5 | 0.4 | 0.6 | 0.6 | 0.4 | 0.4 | 0.6 |
| 6-Sep | 0.3 | 0.4 | 0.3 | 0.5 | 0.5 | 0.4 | 0.2 | 0.4 | 0.4 | 0.6 | 0.5 | 0.5 | 0.4 | 0.5 | 0.7 | 0.6 | 0.8 | 0.5 | 0.0 | 0.1 | 0.5 | 0.5 | 0.4 | 0.3 | 0.4 | 0.8 | |
| 7-Sep | 0.3 | 0.3 | 0.4 | 0.3 | 0.4 | 0.4 | 0.5 | 0.6 | 0.3 | 0.5 | 0.6 | 0.7 | 1.1 | 1.0 | 0.3 | 0.3 | 0.3 | 0.2 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | 0.0 | 0.3 | 1.1 | |
| 8-Sep | -0.1 | -0.1 | -0.2 | 0.1 | 0.0 | 0.0 | 0.1 | 0.4 | 0.1 | -0.2 | 0.4 | -0.4 | -0.2 | -0.2 | 0.1 | -0.3 | 0.0 | -0.3 | 0.2 | 0.1 | 0.0 | -0.1 | -0.1 | 0.0 | 0.0 | 0.4 | |
| 9-Sep | -0.1 | -0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.3 | 0.1 | 0.1 | -0.1 | 0.2 | 0.2 | -0.4 | 0.4 | 0.5 | 0.4 | 0.6 | 0.4 | 0.5 | 0.5 | 0.4 | 0.8 | 0.7 | 0.7 | 0.3 | 0.8 | |
| 10-Sep | 0.6 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.3 | -0.4 | -0.2 | 0.0 | -0.2 | -0.2 | -0.3 | -0.2 | -0.7 | -0.2 | 0.2 | -0.1 | -0.2 | 0.0 | -0.4 | -0.3 | 0.1 | 0.7 | |
| 11-Sep | -0.5 | -0.3 | -0.4 | -0.5 | -0.6 | -0.6 | -0.6 | -0.5 | -0.2 | -0.4 | -0.5 | -0.5 | 0.1 | -0.3 | -0.3 | -0.5 | -0.2 | -0.2 | -0.3 | -0.1 | -0.3 | -0.3 | -0.2 | -0.1 | -0.3 | 0.1 | |
| 12-Sep | -0.2 | -0.1 | 0.1 | -0.1 | -0.3 | -0.3 | -0.3 | -0.1 | -0.1 | -0.1 | -0.1 | 0.3 | -0.1 | 0.0 | -0.2 | -0.2 | 0.0 | 0.5 | 0.6 | 0.4 | 0.6 | 0.5 | 0.5 | 0.4 | 0.1 | 0.6 | |
| 13-Sep | 0.5 | 0.3 | 0.2 | 0.0 | 0.2 | 0.2 | 0.4 | 0.4 | 0.2 | -0.3 | -0.3 | -0.5 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | -0.4 | -0.5 | -0.4 | -0.2 | 0.0 | -0.1 | 0.5 | |
| 14-Sep | -0.2 | -0.3 | -0.1 | -0.2 | 0.0 | -0.1 | -0.2 | 0.0 | 0.2 | 0.2 | 0.1 | 0.5 | 0.5 | 0.8 | -0.1 | -0.5 | -0.4 | -0.2 | -0.2 | -0.1 | -0.1 | -0.3 | -0.2 | -0.4 | -0.1 | 0.8 | |
| 15-Sep | -0.3 | -0.1 | -0.1 | 0.0 | 0.1 | 0.3 | 0.4 | 0.5 | 0.7 | 0.5 | 0.4 | 0.3 | 0.4 | 0.5 | 0.9 | 0.8 | 0.8 | 0.8 | 0.7 | 0.6 | 0.5 | 0.6 | 0.4 | 0.3 | 0.4 | 0.9 | |
| 16-Sep | 0.4 | 0.5 | 0.3 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 | 0.5 | 0.4 | -0.3 | -0.5 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | -0.1 | -0.2 | -0.2 | 0.0 | 0.0 | 0.5 | |
| 17-Sep | 0.1 | -0.3 | 0.0 | 0.1 | 0.2 | 0.3 | 0.1 | 0.1 | 0.2 | 0.3 | 0.0 | -0.1 | -0.2 | -0.1 | 0.1 | -0.2 | -0.3 | -0.2 | -0.2 | -0.3 | -0.4 | -0.3 | -0.3 | -0.3 | -0.1 | 0.3 | |
| 18-Sep | 0.1 | -0.2 | -0.2 | 0.0 | 0.0 | -0.3 | -0.2 | -0.2 | 0.0 | 0.0 | -0.1 | -0.4 | -0.7 | -0.7 | -0.7 | -0.4 | 0.0 | -0.2 | -0.1 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | -0.2 | 0.1 | |
| 19-Sep | 0.0 | -0.1 | -0.1 | -0.3 | -0.4 | -0.2 | 0.0 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | -0.4 | -0.4 | -0.2 | 0.0 | 0.0 | -0.2 | -0.2 | 0.0 | 0.0 | -0.1 | -0.2 | 0.0 | |
| 20-Sep | -0.1 | -0.2 | -0.1 | -0.1 | 0.0 | 0.0 | -0.1 | 0.0 | 0.2 | 0.1 | 0.3 | -0.2 | 0.3 | -0.1 | -0.1 | 0.4 | 0.5 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 | 0.4 | 0.2 | 0.6 | |
| 21-Sep | 0.3 | 0.3 | 0.4 | 0.2 | -0.1 | -0.2 | -0.1 | 0.2 | 0.3 | 0.5 | 0.5 | 0.6 | 0.7 | 0.4 | -0.1 | -0.4 | -0.2 | -0.3 | -0.3 | -0.2 | -0.1 | 0.0 | 0.3 | 0.3 | 0.1 | 0.7 | |
| 22-Sep | 0.5 | 0.6 | 0.6 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.0 | -0.1 | -0.1 | 0.1 | 0.2 | 0.0 | 0.1 | 0.4 | 0.7 | 0.5 | 0.5 | 0.6 | 0.4 | 0.7 | |
| 23-Sep | 0.7 | 0.5 | 0.6 | 0.7 | 0.9 | 0.6 | 0.6 | 0.5 | 0.5 | 0.7 | 0.9 | 0.7 | 0.8 | 0.6 | 0.9 | 0.7 | 0.6 | 0.7 | 0.7 | 0.6 | 0.6 | 0.7 | 0.6 | 0.6 | 0.7 | 0.9 | |
| 24-Sep | DF | DF | DF | 0.6 | 0.6 | 0.3 | 0.0 | 0.2 | 0.0 | -0.4 | -0.4 | -0.6 | -0.3 | -0.7 | -0.3 | -0.5 | -0.7 | -0.4 | -0.1 | -0.2 | -0.3 | -0.4 | -0.2 | -0.3 | -0.2 | 0.6 | |
| 25-Sep | -0.2 | -0.2 | -0.2 | -0.1 | -0.4 | -0.3 | -0.1 | -0.3 | -0.3 | 0.0 | -0.2 | -0.2 | -0.1 | -0.2 | -0.4 | -0.1 | -0.2 | -0.1 | 0.0 | -0.1 | -0.1 | -0.3 | -0.3 | 0.1 | -0.2 | 0.1 | |
| 26-Sep | 0.2 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.3 | 0.5 | 0.3 | 0.4 | 0.5 | 0.5 | 0.5 | 0.7 | 0.7 | 0.2 | -0.1 | 0.1 | 0.3 | 0.5 | 0.8 | 0.7 | 0.6 | 0.4 | 0.4 | 0.8 | |
| 27-Sep | 0.5 | 0.4 | 0.5 | 0.4 | 0.6 | -0.2 | -0.2 | -0.3 | -0.4 | -0.5 | -0.8 | -0.4 | -0.3 | -0.2 | -0.4 | -0.4 | -0.6 | -0.4 | -0.3 | -0.5 | -0.5 | -0.1 | -0.2 | -0.1 | -0.2 | 0.6 | |
| 28-Sep | -0.3 | -0.1 | -0.3 | -0.3 | -0.3 | 0.0 | 0.3 | 0.4 | 0.4 | 0.5 | 0.3 | 0.4 | 0.4 | 0.2 | -0.1 | -0.1 | 0.2 | -0.1 | -0.1 | -0.1 | -0.1 | 0.0 | 0.3 | 0.2 | 0.1 | 0.5 | |
| 29-Sep | 0.2 | 0.4 | 0.3 | 0.5 | 0.4 | 0.4 | 0.4 | 0.2 | 0.5 | 0.6 | 0.3 | 0.1 | 0.1 | 0.2 | 0.4 | 0.5 | 0.5 | 0.5 | 0.3 | 0.2 | 0.4 | 0.2 | 0.0 | 0.0 | 0.3 | 0.6 | |
| 30-Sep | -0.3 | -0.1 | -0.1 | -0.1 | -0.1 | 0.0 | 0.0 | -0.1 | -0.2 | 0.1 | 0.2 | -0.1 | 0.1 | -0.3 | -0.4 | -0.4 | -0.4 | 0.0 | -0.1 | -0.4 | -0.1 | -0.1 | -0.3 | 0.0 | -0.1 | 0.2 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| DF - DAS Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.5 km/h on Sep 11 07:00 | Hours of Data: 717 |
| Minimum Value: 0.1 km/h on Sep 25 21:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 0.4 P ₁₀ = 0.7 Q ₁ = 1.1 Median = 1.5 Q ₃ = 2.0 P ₉₀ = 2.7 P ₉₉ = 3.8 | 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 | 1.4 | 1.6 | 1.5 | 1.3 | 0.4 | 0.5 | 1.0 | 1.0 | 1.4 | 1.4 | 1.4 | 1.8 | 1.8 | 1.6 | 1.6 | 0.8 | 1.6 | 0.7 | 1.0 | 0.9 | 0.9 | 1.2 | 1.5 | 1.5 | 1.8 |
| 2-Sep | 1.2 | 0.7 | 0.8 | 1.4 | 1.7 | 1.5 | 1.0 | 1.1 | 1.2 | 1.6 | 1.5 | 1.7 | 1.5 | 1.3 | 1.3 | 1.5 | 1.2 | 1.1 | 0.8 | 0.8 | 1.3 | 1.5 | 1.7 | 2.2 | 2.2 |
| 3-Sep | 3.1 | 2.7 | 1.9 | 1.7 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.5 | 2.7 | 2.7 | 2.4 | 2.5 | 2.6 | 2.9 | 2.9 | 3.3 | 3.4 | 3.2 | 3.5 | 3.0 | 2.6 | 2.5 | 3.5 |
| 4-Sep | 2.5 | 2.5 | 2.0 | 1.4 | 1.3 | 1.3 | 0.9 | 1.2 | 1.3 | 1.6 | 1.8 | 1.9 | 1.9 | 1.9 | 1.8 | 1.7 | 1.2 | 0.9 | 0.6 | 0.8 | 0.9 | 0.8 | 0.9 | 1.0 | 2.5 |
| 5-Sep | 0.7 | 0.9 | 0.8 | 1.3 | 1.5 | 1.2 | 1.1 | 1.2 | 1.3 | 1.5 | 2.5 | 2.4 | 2.0 | 2.0 | 1.7 | 1.7 | 1.6 | 1.4 | 1.5 | 1.6 | 1.9 | 1.8 | 1.8 | 1.4 | 2.5 |
| 6-Sep | 1.2 | 1.3 | 1.2 | 1.2 | 1.0 | 0.7 | 1.2 | 1.5 | 1.9 | 2.1 | 2.1 | 1.9 | 1.9 | 2.2 | 2.7 | 3.0 | 2.8 | 2.6 | 1.7 | 1.2 | 1.3 | 1.5 | 1.3 | 0.9 | 3.0 |
| 7-Sep | 0.8 | 0.8 | 0.9 | 0.7 | 1.1 | 1.1 | 1.3 | 1.6 | 1.5 | 1.6 | 1.7 | 1.8 | 1.8 | 1.7 | 1.7 | 1.1 | 1.3 | 1.1 | 0.9 | 1.2 | 0.8 | 0.8 | 0.7 | 0.3 | 1.8 |
| 8-Sep | 0.6 | 0.5 | 0.5 | 0.4 | 0.6 | 0.5 | 0.8 | 0.9 | 1.2 | 1.2 | 1.5 | 1.4 | 1.6 | 1.8 | 1.2 | 2.7 | 1.0 | 1.8 | 2.1 | 0.6 | 0.6 | 1.9 | 2.0 | 2.1 | 2.7 |
| 9-Sep | 1.6 | 1.2 | 1.3 | 1.5 | 1.3 | 1.6 | 1.5 | 1.6 | 1.9 | 2.0 | 1.5 | 1.5 | 1.4 | 1.2 | 1.5 | 1.4 | 1.5 | 1.2 | 1.1 | 1.7 | 2.1 | 2.2 | 2.4 | 2.5 | 2.5 |
| 10-Sep | 2.2 | 2.2 | 2.5 | 2.5 | 2.3 | 2.3 | 2.1 | 1.8 | 1.7 | 2.2 | 2.0 | 2.2 | 2.4 | 2.2 | 2.1 | 2.5 | 3.0 | 2.2 | 1.9 | 2.1 | 2.6 | 2.5 | 2.5 | 2.3 | 3.0 |
| 11-Sep | 3.1 | 3.6 | 3.6 | 3.7 | 4.1 | 4.3 | 4.5 | 4.0 | 3.9 | 3.8 | 3.4 | 3.5 | 3.2 | 3.3 | 3.0 | 2.9 | 2.6 | 2.2 | 2.0 | 2.2 | 1.7 | 1.5 | 1.4 | 1.0 | 4.5 |
| 12-Sep | 0.9 | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 1.0 | 0.9 | 1.1 | 1.6 | 1.6 | 1.8 | 2.1 | 2.2 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.3 | 1.5 | 2.0 | 1.6 | 1.9 | 2.2 |
| 13-Sep | 1.8 | 2.1 | 2.0 | 1.8 | 2.0 | 2.0 | 1.3 | 1.1 | 1.6 | 2.0 | 2.3 | 2.4 | 2.7 | 2.7 | 2.4 | 2.4 | 2.2 | 2.0 | 2.1 | 1.8 | 1.7 | 1.2 | 1.3 | 1.0 | 2.7 |
| 14-Sep | 1.1 | 0.9 | 0.5 | 0.5 | 0.4 | 0.4 | 0.5 | 0.6 | 0.9 | 1.3 | 1.2 | 1.8 | 1.9 | 2.0 | 2.4 | 2.5 | 2.5 | 2.8 | 2.7 | 0.9 | 0.4 | 0.5 | 0.8 | 1.2 | 2.8 |
| 15-Sep | 1.6 | 1.1 | 0.6 | 0.7 | 0.6 | 1.2 | 1.5 | 1.4 | 1.6 | 1.3 | 1.2 | 1.2 | 1.3 | 1.4 | 1.6 | 1.6 | 2.0 | 1.5 | 1.7 | 2.5 | 2.2 | 1.8 | 1.7 | 1.0 | 2.5 |
| 16-Sep | 1.1 | 1.3 | 0.8 | 0.9 | 0.8 | 0.9 | 1.2 | 1.2 | 1.2 | 1.1 | 1.4 | 1.9 | 2.8 | 3.1 | 2.5 | 2.6 | 2.6 | 2.0 | 0.8 | 0.6 | 0.7 | 0.8 | 0.7 | 0.7 | 3.1 |
| 17-Sep | 0.8 | 1.5 | 1.5 | 1.1 | 1.1 | 1.1 | 1.3 | 1.0 | 0.9 | 1.0 | 1.3 | 1.5 | 1.7 | 1.8 | 1.6 | 1.7 | 2.0 | 1.7 | 0.8 | 0.8 | 1.1 | 1.0 | 0.8 | 0.5 | 2.0 |
| 18-Sep | 0.4 | 0.5 | 0.5 | 0.3 | 0.6 | 0.6 | 0.9 | 1.0 | 1.4 | 2.0 | 2.5 | 2.4 | 2.8 | 2.8 | 2.8 | 2.4 | 1.9 | 1.9 | 1.8 | 1.6 | 1.4 | 1.4 | 1.3 | 0.9 | 2.8 |
| 19-Sep | 0.9 | 1.3 | 1.5 | 1.6 | 1.7 | 1.9 | 1.5 | 2.2 | 2.1 | 2.0 | 1.8 | 1.6 | 1.6 | 1.5 | 1.9 | 1.9 | 2.0 | 1.4 | 1.7 | 1.8 | 1.8 | 1.3 | 1.4 | 2.0 | 2.2 |
| 20-Sep | 2.2 | 1.9 | 1.8 | 1.1 | 1.8 | 1.6 | 1.5 | 1.5 | 1.3 | 1.2 | 1.6 | 1.5 | 1.8 | 1.5 | 1.4 | 1.4 | 1.1 | 0.7 | 0.7 | 0.8 | 0.7 | 1.0 | 0.8 | 0.9 | 2.2 |
| 21-Sep | 0.8 | 1.4 | 1.0 | 0.9 | 0.7 | 0.7 | 0.6 | 0.8 | 1.1 | 1.4 | 1.6 | 1.7 | 2.1 | 1.8 | 2.0 | 1.7 | 1.7 | 1.6 | 1.0 | 1.1 | 1.0 | 0.6 | 0.7 | 0.9 | 2.1 |
| 22-Sep | 1.1 | 1.2 | 1.3 | 1.2 | 1.3 | 1.3 | 1.5 | 1.7 | 1.5 | 1.3 | 1.6 | 2.4 | 2.8 | 2.9 | 2.7 | 3.0 | 2.8 | 2.5 | 1.9 | 1.7 | 1.6 | 1.3 | 1.6 | 2.0 | 3.0 |
| 23-Sep | 1.6 | 2.0 | 1.9 | 2.2 | 2.4 | 2.3 | 2.5 | 2.5 | 2.4 | 3.0 | 2.9 | 2.7 | 2.8 | 2.9 | 3.1 | 2.4 | 2.5 | 2.2 | 2.3 | 2.3 | 2.1 | 2.2 | 2.1 | 1.9 | 3.1 |
| 24-Sep | DF | DF | DF | 1.6 | 1.6 | 1.3 | 1.2 | 1.3 | 1.6 | 2.2 | 2.6 | 2.8 | 3.0 | 2.8 | 2.4 | 3.0 | 3.4 | 2.2 | 0.8 | 0.5 | 0.7 | 0.9 | 1.0 | 1.4 | 3.4 |
| 25-Sep | 1.5 | 1.4 | 1.4 | 1.3 | 1.4 | 1.4 | 1.3 | 1.0 | 1.5 | 1.7 | 1.8 | 2.0 | 2.1 | 2.0 | 2.0 | 2.2 | 1.6 | 0.9 | 0.4 | 0.2 | 0.1 | 0.4 | 0.4 | 0.3 | 2.2 |
| 26-Sep | 0.5 | 1.0 | 1.2 | 1.1 | 1.1 | 1.4 | 1.0 | 1.7 | 1.4 | 1.7 | 1.8 | 2.2 | 2.3 | 2.1 | 2.1 | 2.6 | 2.5 | 2.0 | 1.7 | 1.4 | 1.9 | 1.9 | 1.7 | 1.5 | 2.6 |
| 27-Sep | 1.6 | 1.4 | 1.3 | 1.4 | 1.2 | 1.4 | 1.4 | 2.0 | 1.8 | 2.0 | 3.0 | 2.4 | 2.2 | 2.5 | 2.8 | 2.8 | 2.7 | 1.8 | 1.6 | 1.4 | 1.5 | 1.3 | 0.9 | 0.6 | 3.0 |
| 28-Sep | 0.9 | 0.6 | 0.7 | 0.5 | 0.7 | 0.6 | 0.6 | 0.9 | 1.1 | 1.3 | 1.4 | 1.3 | 1.5 | 1.8 | 1.8 | 1.6 | 1.6 | 0.9 | 0.6 | 0.6 | 0.4 | 0.6 | 0.5 | 0.6 | 1.8 |
| 29-Sep | 0.9 | 0.8 | 0.8 | 0.9 | 0.9 | 0.8 | 0.9 | 1.2 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.2 | 1.0 | 0.6 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.5 | 1.4 |
| 30-Sep | 0.4 | 0.2 | 0.4 | 0.7 | 0.9 | 1.4 | 1.6 | 2.0 | 2.0 | 2.2 | 3.0 | 3.3 | 3.0 | 3.2 | 3.5 | 4.0 | 3.8 | 3.4 | 3.4 | 3.5 | 2.7 | 2.8 | 2.6 | 3.0 | 4.0 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 3.1 | 3.6 | 3.6 | 3.7 | 4.1 | 4.3 | 4.5 | 4.0 | 3.9 | 3.8 | 3.4 | 3.5 | 3.2 | 3.3 | 3.5 | 4.0 | 3.8 | 3.4 | 3.4 | 3.5 | 3.5 | 3.0 | 2.6 | 3.0 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure



Summary of Hour Averages

Mannix - September 2016

| Maximum Value: 2.1 km/h on Sep 23 10:00 | | Maximum Daily Average: 1.6 km/h on Sep 23 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -1.9 km/h on Sep 11 06:00 | | Minimum Daily Average: -1.2 km/h on Sep 11 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.4 km/h at hour 5 | | Minimum Diurnal Average: 0.1 km/h at hour 19 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.21 km/h | | Percentiles: P ₁ = -1.6 P ₁₀ = -0.7 Q ₁ = -0.3 Median = 0.1 Q ₃ = 0.9 P ₉₀ = 1.3 P ₉₉ = 1.8 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0.8 | 0.9 | 1.5 | 1.0 | 0.2 | -0.2 | -0.4 | 0.0 | 0.2 | 0.2 | 0.0 | 0.8 | 0.9 | 0.8 | 0.6 | 0.6 | 0.4 | 0.3 | -0.2 | -0.2 | -0.2 | -0.1 | -0.2 | -0.2 | 0.3 | 1.5 |
| 2-Sep | -0.4 | -0.2 | -0.3 | -0.4 | -0.1 | -0.2 | -0.2 | -0.2 | 0.5 | 0.3 | 0.1 | 0.2 | -0.2 | 0.1 | 0.2 | -0.4 | -0.2 | -0.2 | 0.0 | 0.0 | -0.3 | -0.3 | -0.3 | -0.6 | -0.1 | 0.5 |
| 3-Sep | -1.6 | -1.1 | -0.5 | -0.1 | -0.2 | 0.1 | 0.0 | 0.1 | 0.0 | -0.2 | -0.6 | -0.4 | -0.5 | -0.5 | -0.7 | -0.9 | -0.9 | -0.9 | -1.1 | -0.9 | -1.2 | -1.1 | -0.6 | -0.8 | -0.6 | 0.1 |
| 4-Sep | -0.7 | -0.8 | -0.4 | -0.2 | -0.3 | -0.4 | -0.5 | -0.1 | 0.0 | -0.2 | -0.5 | -0.5 | 0.0 | -0.2 | -0.3 | 0.2 | -0.2 | -0.2 | 0.2 | -0.1 | 0.0 | 0.0 | -0.1 | 0.0 | -0.2 | 0.2 |
| 5-Sep | 0.0 | 0.2 | 0.2 | 1.1 | 1.0 | 0.8 | 0.8 | 0.7 | 0.5 | 0.7 | 1.2 | 1.0 | 0.7 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 0.7 | 0.9 | 1.0 | 1.2 | 1.4 | 1.1 | 0.9 | 1.4 |
| 6-Sep | 1.0 | 1.0 | 1.0 | 1.2 | 1.2 | 0.9 | 0.8 | 1.0 | 1.3 | 1.4 | 1.3 | 0.6 | 0.8 | 1.1 | 1.7 | 1.6 | 1.9 | 1.7 | 0.8 | 0.8 | 1.3 | 1.2 | 1.0 | 0.8 | 1.1 | 1.9 |
| 7-Sep | 0.8 | 1.0 | 1.0 | 0.7 | 1.1 | 0.8 | 0.7 | 1.0 | 0.7 | 1.1 | 0.5 | 0.9 | 1.4 | 1.6 | 0.8 | 0.3 | 0.4 | 0.6 | 0.2 | 0.1 | 0.0 | 0.0 | -0.1 | 0.2 | 0.7 | 1.6 |
| 8-Sep | 0.2 | 0.1 | 0.0 | 0.1 | 0.3 | 0.1 | 0.0 | 0.4 | 0.3 | -0.2 | 0.8 | -0.2 | -0.5 | -0.3 | 0.2 | -0.4 | 0.0 | -0.4 | -0.3 | 0.1 | -0.2 | -0.9 | -1.1 | -1.1 | -0.1 | 0.8 |
| 9-Sep | -0.5 | -0.4 | -0.1 | -0.4 | -0.2 | -0.1 | -0.3 | -0.2 | -0.2 | -0.6 | 0.1 | 0.3 | -0.4 | 0.5 | 0.9 | 0.8 | 0.9 | 0.6 | 0.9 | 1.3 | 1.3 | 1.3 | 1.5 | 1.6 | 0.4 | 1.6 |
| 10-Sep | 1.5 | 1.2 | 1.2 | 1.6 | 1.7 | 1.8 | 1.6 | 1.6 | 0.9 | 0.1 | -0.3 | -0.2 | -0.2 | -0.3 | -0.4 | -0.3 | -0.6 | -0.2 | 0.0 | -0.4 | -0.4 | -0.4 | -0.5 | -0.6 | 0.4 | 1.8 |
| 11-Sep | -1.2 | -1.6 | -1.3 | -1.5 | -1.5 | -1.9 | -1.8 | -1.8 | -1.6 | -1.5 | -1.4 | -1.5 | -0.1 | -1.4 | -1.4 | -1.4 | -0.9 | -0.8 | -0.9 | -1.0 | -1.0 | -0.5 | -0.4 | -0.2 | -1.2 | -0.1 |
| 12-Sep | -0.3 | -0.2 | -0.1 | -0.2 | -0.3 | -0.3 | -0.3 | 0.2 | 0.1 | 0.2 | 0.3 | 1.1 | 0.5 | 0.6 | 0.2 | 0.2 | 0.5 | 1.3 | 1.4 | 1.3 | 1.6 | 1.5 | 1.1 | 1.1 | 0.5 | 1.6 |
| 13-Sep | 1.2 | 1.1 | 1.0 | 0.9 | 1.0 | 1.0 | 0.9 | 0.9 | 0.7 | 0.1 | 0.2 | 0.0 | 0.2 | -0.2 | -0.4 | -0.1 | -0.1 | -0.2 | -0.4 | -0.3 | -0.4 | -0.5 | -0.6 | -0.4 | 0.2 | 1.2 |
| 14-Sep | -0.6 | -0.7 | -0.3 | -0.4 | -0.2 | 0.0 | 0.1 | 0.1 | 0.2 | 0.4 | 0.1 | 0.7 | 1.2 | 1.6 | 0.3 | -0.1 | -0.3 | -0.6 | -1.3 | -0.4 | 0.0 | -0.1 | -0.1 | -0.8 | 0.0 | 1.6 |
| 15-Sep | -0.7 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.1 | 0.1 | 0.4 | 0.2 | 0.2 | 0.2 | 0.3 | 0.5 | 1.1 | 1.0 | 1.1 | 1.2 | 1.3 | 1.5 | 1.2 | 1.3 | 1.3 | 1.1 | 0.5 | 1.5 |
| 16-Sep | 1.1 | 1.2 | 0.9 | 0.3 | 0.6 | 0.6 | 1.0 | 1.0 | 0.9 | 0.6 | 1.4 | 1.0 | 0.4 | 0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 0.0 | -0.1 | -0.1 | 0.0 | 0.4 | 1.4 |
| 17-Sep | 0.3 | -0.1 | 0.5 | 0.8 | 0.7 | 0.9 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.1 | 0.1 | 0.3 | 0.4 | 0.1 | -0.3 | -0.4 | -0.2 | -0.1 | -0.3 | -0.3 | -0.6 | -0.2 | 0.2 | 0.9 |
| 18-Sep | 0.0 | 0.0 | -0.1 | -0.2 | 0.0 | -0.3 | -0.3 | -0.3 | -0.1 | -0.3 | -0.3 | -0.3 | -0.9 | -0.9 | -0.9 | -0.7 | -0.3 | -0.9 | -0.9 | -0.6 | -0.4 | -0.3 | -0.1 | -0.3 | -0.4 | 0.0 |
| 19-Sep | -0.3 | -0.5 | -0.5 | -0.5 | -0.5 | -0.4 | -0.4 | -0.6 | -0.2 | -0.3 | -0.2 | -0.4 | -0.5 | -0.3 | -0.6 | -0.3 | -0.6 | -0.2 | -0.6 | -0.9 | -0.9 | -0.1 | -0.3 | -0.9 | -0.5 | -0.1 |
| 20-Sep | -1.0 | -0.8 | -1.0 | -0.5 | -0.4 | -0.5 | -0.5 | -0.4 | 0.2 | -0.3 | 0.3 | -0.1 | 0.3 | 0.0 | -0.2 | 0.3 | 0.8 | 0.3 | 0.6 | 0.6 | 0.5 | 0.9 | 0.7 | 0.9 | 0.0 | 0.9 |
| 21-Sep | 0.7 | 1.0 | 1.1 | 0.9 | 0.2 | 0.0 | 0.0 | 0.2 | 0.6 | 0.9 | 0.9 | 1.0 | 1.4 | 1.0 | 0.6 | -0.4 | -0.2 | -0.2 | -0.1 | -0.1 | 0.0 | 0.2 | 0.6 | 1.0 | 0.5 | 1.4 |
| 22-Sep | 1.4 | 1.6 | 1.6 | 1.2 | 1.2 | 1.3 | 1.3 | 1.5 | 1.0 | 0.6 | 0.9 | 1.7 | 1.0 | 0.7 | 0.6 | 1.1 | 1.0 | 0.9 | 0.8 | 1.4 | 1.6 | 1.4 | 1.5 | 1.8 | 1.2 | 1.8 |
| 23-Sep | 1.8 | 1.6 | 1.6 | 1.8 | 1.9 | 1.8 | 1.6 | 1.4 | 1.3 | 2.1 | 1.6 | 1.6 | 1.6 | 1.3 | 1.8 | 1.3 | 1.5 | 1.4 | 1.6 | 1.6 | 1.5 | 1.7 | 1.6 | 1.4 | 1.6 | 2.1 |
| 24-Sep | DF | DF | DF | 1.5 | 1.4 | 0.9 | 0.5 | 0.6 | 0.5 | 0.0 | 0.3 | -0.5 | -0.3 | -0.7 | -0.4 | -0.8 | -0.9 | -0.7 | -0.3 | -0.3 | -0.5 | -0.6 | -0.5 | -0.6 | -0.1 | 1.5 |
| 25-Sep | -0.6 | -0.4 | -0.4 | -0.6 | -0.5 | -0.4 | 0.1 | -0.3 | -0.3 | -0.1 | -0.3 | -0.6 | 0.1 | -0.1 | -0.4 | -0.2 | -0.2 | -0.5 | -0.2 | 0.0 | 0.0 | -0.2 | -0.4 | 0.1 | -0.3 | 0.1 |
| 26-Sep | 0.5 | 1.2 | 1.1 | 0.8 | 1.1 | 1.2 | 0.9 | 1.0 | 0.8 | 1.0 | 1.3 | 1.4 | 1.2 | 1.4 | 1.4 | 1.1 | 0.8 | 1.0 | 1.2 | 1.3 | 1.8 | 1.8 | 1.5 | 1.1 | 1.2 | 1.8 |
| 27-Sep | 1.2 | 1.3 | 0.8 | 0.9 | 1.2 | -0.1 | -0.3 | -0.3 | -0.1 | -0.4 | -0.9 | -0.7 | -0.5 | -0.1 | -0.7 | -0.2 | -0.4 | -0.4 | -0.3 | -0.4 | -0.3 | -0.4 | -0.4 | -0.4 | -0.1 | 1.3 |
| 28-Sep | -0.4 | -0.4 | -0.4 | -0.5 | -0.2 | 0.1 | 0.5 | 0.9 | 0.8 | 0.5 | 0.2 | 0.4 | 0.3 | 0.4 | 0.4 | 0.2 | 0.6 | 0.0 | 0.3 | 0.5 | 0.1 | 0.3 | 0.6 | 0.8 | 0.3 | 0.9 |
| 29-Sep | 0.8 | 0.9 | 0.9 | 1.3 | 1.2 | 1.2 | 1.1 | 0.8 | 0.7 | 0.7 | 0.1 | 0.1 | 0.2 | 0.2 | 0.6 | 0.6 | 0.5 | 0.2 | 0.1 | 0.0 | 0.3 | 0.1 | 0.0 | -0.1 | 0.5 | 1.3 |
| 30-Sep | -0.5 | -0.2 | -0.4 | -0.5 | -0.4 | -0.5 | -0.7 | -0.9 | -0.6 | -0.1 | -0.5 | -1.2 | -1.0 | -1.3 | -1.3 | -1.8 | -1.6 | -0.9 | -1.2 | -1.3 | -1.1 | -0.9 | -1.1 | -1.1 | -0.9 | -0.1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| DF - DAS Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.6 km/h on Sep 11 07:00 | Hours of Data: 717 |
| Minimum Value: 0.2 km/h on Sep 25 21:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 1.0 Median = 1.6 Q ₃ = 2.2 P ₉₀ = 2.7 P ₉₉ = 3.8 | 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 | 1.2 | 1.7 | 1.9 | 1.6 | 0.8 | 0.5 | 0.7 | 1.0 | 1.4 | 1.6 | 1.5 | 1.9 | 1.8 | 1.8 | 1.7 | 1.0 | 1.5 | 0.8 | 0.8 | 0.7 | 0.5 | 1.1 | 1.3 | 1.7 | 1.9 |
| 2-Sep | 1.2 | 0.8 | 0.8 | 1.5 | 1.6 | 1.2 | 1.1 | 1.3 | 1.6 | 2.1 | 2.0 | 2.2 | 1.8 | 1.4 | 1.4 | 1.4 | 1.2 | 1.0 | 0.8 | 0.7 | 1.0 | 1.2 | 1.5 | 1.9 | 2.2 |
| 3-Sep | 2.8 | 2.7 | 1.5 | 1.3 | 1.6 | 2.0 | 2.0 | 2.1 | 2.0 | 2.2 | 2.3 | 2.4 | 2.2 | 2.5 | 2.4 | 2.8 | 2.7 | 3.4 | 3.7 | 3.4 | 3.8 | 3.1 | 2.5 | 2.2 | 3.8 |
| 4-Sep | 2.3 | 2.2 | 1.9 | 1.5 | 1.2 | 1.1 | 1.0 | 1.4 | 1.8 | 1.9 | 1.9 | 2.0 | 2.4 | 2.4 | 2.4 | 2.3 | 1.6 | 1.1 | 0.6 | 0.8 | 1.1 | 0.8 | 0.8 | 1.2 | 2.4 |
| 5-Sep | 0.9 | 0.9 | 0.6 | 0.7 | 1.0 | 1.1 | 1.0 | 1.2 | 1.5 | 1.7 | 2.6 | 2.1 | 2.0 | 2.3 | 2.2 | 2.0 | 1.9 | 1.6 | 1.4 | 1.6 | 1.8 | 1.8 | 2.0 | 1.3 | 2.6 |
| 6-Sep | 1.0 | 1.1 | 1.4 | 1.0 | 0.6 | 0.4 | 0.6 | 1.6 | 1.9 | 2.1 | 2.4 | 2.1 | 2.2 | 2.4 | 2.6 | 2.4 | 2.6 | 2.2 | 1.2 | 0.9 | 1.2 | 1.5 | 1.0 | 0.8 | 2.6 |
| 7-Sep | 0.6 | 0.4 | 0.5 | 0.4 | 0.9 | 1.2 | 1.5 | 1.6 | 1.5 | 1.8 | 1.8 | 2.0 | 2.1 | 2.1 | 2.2 | 1.5 | 1.7 | 1.0 | 0.6 | 1.2 | 0.9 | 0.5 | 0.5 | 0.5 | 2.2 |
| 8-Sep | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.9 | 1.3 | 1.6 | 1.7 | 1.9 | 2.1 | 2.0 | 1.3 | 2.8 | 1.1 | 1.8 | 2.1 | 0.6 | 0.6 | 1.9 | 1.9 | 1.9 | 2.8 |
| 9-Sep | 1.7 | 1.3 | 1.5 | 1.6 | 1.5 | 1.8 | 1.6 | 1.8 | 2.2 | 2.2 | 1.8 | 2.0 | 1.8 | 1.6 | 1.8 | 2.0 | 1.7 | 1.4 | 1.0 | 1.3 | 1.9 | 2.1 | 2.3 | 2.7 | 2.7 |
| 10-Sep | 2.0 | 2.2 | 2.4 | 2.7 | 2.6 | 2.4 | 1.8 | 1.7 | 1.7 | 2.7 | 2.1 | 2.5 | 2.4 | 2.4 | 2.2 | 2.4 | 2.9 | 2.4 | 2.1 | 2.4 | 2.7 | 2.5 | 2.3 | 2.2 | 2.9 |
| 11-Sep | 3.2 | 3.6 | 3.8 | 3.8 | 4.4 | 4.5 | 4.6 | 4.2 | 4.1 | 3.7 | 3.7 | 3.6 | 3.5 | 3.4 | 3.1 | 2.7 | 2.5 | 2.3 | 1.9 | 2.3 | 1.6 | 1.5 | 1.5 | 0.8 | 4.6 |
| 12-Sep | 0.7 | 0.7 | 0.8 | 0.6 | 0.6 | 0.7 | 1.1 | 1.4 | 1.4 | 2.0 | 2.2 | 2.3 | 2.5 | 2.6 | 2.5 | 2.4 | 2.1 | 1.7 | 1.3 | 0.6 | 0.7 | 1.0 | 1.0 | 1.4 | 2.6 |
| 13-Sep | 1.4 | 1.7 | 1.5 | 1.5 | 1.6 | 1.5 | 0.9 | 1.1 | 1.9 | 2.1 | 2.3 | 2.5 | 2.9 | 2.8 | 2.4 | 2.4 | 2.2 | 1.8 | 2.0 | 1.7 | 1.6 | 1.0 | 1.2 | 0.8 | 2.9 |
| 14-Sep | 0.7 | 0.7 | 0.6 | 0.5 | 0.5 | 0.2 | 0.3 | 0.5 | 0.9 | 1.4 | 1.3 | 2.0 | 2.3 | 2.2 | 2.7 | 2.6 | 2.7 | 3.0 | 2.4 | 1.0 | 0.3 | 0.2 | 0.5 | 0.8 | 3.0 |
| 15-Sep | 1.3 | 1.2 | 0.8 | 0.9 | 0.7 | 1.4 | 1.6 | 1.5 | 1.9 | 1.6 | 1.5 | 1.4 | 1.7 | 1.7 | 2.2 | 2.0 | 2.2 | 1.8 | 1.6 | 2.6 | 2.2 | 1.6 | 1.5 | 0.8 | 2.6 |
| 16-Sep | 1.0 | 1.0 | 0.6 | 0.4 | 0.4 | 0.6 | 0.8 | 1.0 | 1.1 | 1.0 | 1.1 | 1.7 | 2.9 | 3.1 | 2.8 | 2.7 | 2.8 | 2.0 | 0.6 | 0.4 | 0.5 | 0.4 | 0.4 | 0.5 | 3.1 |
| 17-Sep | 0.6 | 1.4 | 1.5 | 1.0 | 0.9 | 0.7 | 0.8 | 0.8 | 0.7 | 0.9 | 1.5 | 1.5 | 1.6 | 1.9 | 1.9 | 2.2 | 2.1 | 1.5 | 0.5 | 0.5 | 0.9 | 0.8 | 0.6 | 0.4 | 2.2 |
| 18-Sep | 0.6 | 0.7 | 0.5 | 0.4 | 0.3 | 0.4 | 0.7 | 1.2 | 1.5 | 2.1 | 2.4 | 2.3 | 2.7 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.6 | 1.4 | 1.5 | 1.5 | 1.3 | 1.1 | 2.7 |
| 19-Sep | 1.0 | 1.2 | 1.5 | 1.2 | 1.5 | 1.7 | 1.3 | 1.9 | 2.0 | 2.0 | 1.7 | 1.6 | 1.6 | 1.4 | 1.7 | 1.9 | 2.0 | 1.4 | 1.9 | 1.7 | 1.7 | 1.2 | 1.3 | 2.2 | 2.2 |
| 20-Sep | 2.4 | 2.0 | 1.7 | 1.0 | 2.0 | 1.6 | 1.7 | 1.6 | 1.5 | 1.4 | 2.2 | 2.1 | 2.2 | 2.0 | 2.0 | 1.8 | 1.6 | 0.7 | 0.8 | 1.0 | 0.8 | 1.1 | 0.7 | 0.8 | 2.4 |
| 21-Sep | 0.8 | 0.7 | 0.7 | 0.7 | 0.4 | 0.2 | 0.3 | 0.7 | 1.5 | 2.0 | 2.1 | 2.0 | 2.5 | 2.0 | 2.6 | 1.9 | 2.0 | 1.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.5 | 2.6 |
| 22-Sep | 0.7 | 1.0 | 1.0 | 1.1 | 1.1 | 1.0 | 1.2 | 1.7 | 1.4 | 1.4 | 1.5 | 2.5 | 2.7 | 2.7 | 2.7 | 2.5 | 2.2 | 2.0 | 1.5 | 1.2 | 1.2 | 1.2 | 1.3 | 1.5 | 2.7 |
| 23-Sep | 1.5 | 2.1 | 2.1 | 2.3 | 2.3 | 2.3 | 2.6 | 2.5 | 2.6 | 3.2 | 3.0 | 3.1 | 3.3 | 3.3 | 3.4 | 2.6 | 3.1 | 2.7 | 2.5 | 2.3 | 2.2 | 2.3 | 2.3 | 1.9 | 3.4 |
| 24-Sep | DF | DF | DF | 1.2 | 1.1 | 1.1 | 0.8 | 1.1 | 1.9 | 2.6 | 3.3 | 2.9 | 3.2 | 3.1 | 2.8 | 3.2 | 3.4 | 2.3 | 0.8 | 0.5 | 0.5 | 0.7 | 1.0 | 1.1 | 3.4 |
| 25-Sep | 1.6 | 1.6 | 1.3 | 1.5 | 0.9 | 1.1 | 1.3 | 1.1 | 1.7 | 1.8 | 1.9 | 2.0 | 2.7 | 2.3 | 2.5 | 2.5 | 1.8 | 0.9 | 0.4 | 0.2 | 0.2 | 0.4 | 0.4 | 0.3 | 2.7 |
| 26-Sep | 0.5 | 0.7 | 1.0 | 1.1 | 0.9 | 1.2 | 0.9 | 1.5 | 1.5 | 1.8 | 1.9 | 2.6 | 2.6 | 2.4 | 2.4 | 2.5 | 2.2 | 1.5 | 1.3 | 1.2 | 1.3 | 1.5 | 1.7 | 1.2 | 2.6 |
| 27-Sep | 1.4 | 1.2 | 1.0 | 1.4 | 1.0 | 1.5 | 1.5 | 2.2 | 1.9 | 2.2 | 2.9 | 2.5 | 2.4 | 2.9 | 3.1 | 3.3 | 3.0 | 2.0 | 1.8 | 1.4 | 1.4 | 1.4 | 1.0 | 0.7 | 3.3 |
| 28-Sep | 0.5 | 0.6 | 0.6 | 0.7 | 0.5 | 0.4 | 0.6 | 0.8 | 1.1 | 1.5 | 1.5 | 1.4 | 1.8 | 2.1 | 2.4 | 1.8 | 1.7 | 0.7 | 0.3 | 0.3 | 0.3 | 0.5 | 0.5 | 0.6 | 2.4 |
| 29-Sep | 0.8 | 0.8 | 0.9 | 0.6 | 0.6 | 0.6 | 0.8 | 0.9 | 1.2 | 1.5 | 1.4 | 1.6 | 1.8 | 1.7 | 1.7 | 1.6 | 1.3 | 0.6 | 0.4 | 0.3 | 0.4 | 0.5 | 0.6 | 0.5 | 1.8 |
| 30-Sep | 0.4 | 0.2 | 0.3 | 0.6 | 0.8 | 1.4 | 1.6 | 2.2 | 2.4 | 2.7 | 3.4 | 3.0 | 3.0 | 2.9 | 3.5 | 3.8 | 3.6 | 3.7 | 3.4 | 3.4 | 2.9 | 3.0 | 2.8 | 2.7 | 3.8 |

Diurnal Maximum

DF - DAS Failure



| Maximum Value: 1.6 km/h on Sep 22 12:00 Maximum Daily Average: 0.9 km/h on Sep 22 | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 714 Hours of Missing Data: 6 Hours of Calibration: 0 Percent Operational Time: 99.2 | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------------------------------------|---------------|---------------|
| Minimum Value: -1.0 km/h on Sep 11 12:00 Minimum Daily Average: -0.5 km/h on Sep 11 Maximum Diurnal Average: 0.4 km/h at hour 5 Minimum Diurnal Average: 0.1 km/h at hour 19 Monthly Average: 0.25 km/h Percentiles: P ₁ = -0.9 P ₁₀ = -0.2 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 0.8 P ₉₉ = 1.2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0.4 | 0.7 | 1.0 | 0.7 | 0.2 | 0.3 | 0.1 | 0.1 | 0.1 | 0.4 | -0.1 | 0.4 | 0.7 | 0.6 | 0.1 | 0.3 | 0.1 | 0.3 | 0.1 | 0.0 | AF | 0.2 | AF | AF | 0.3 | 1.0 |
| 2-Sep | -0.2 | -0.3 | -0.1 | 0.1 | 0.1 | -0.1 | 0.1 | -0.2 | 0.6 | 0.5 | 0.4 | 0.4 | 0.2 | 0.4 | 0.5 | 0.0 | 0.3 | 0.1 | 0.2 | 0.3 | 0.2 | 0.1 | 0.4 | 0.2 | 0.2 | 0.6 |
| 3-Sep | -0.9 | -0.3 | 0.4 | 0.8 | 0.8 | 1.1 | 0.8 | 1.0 | 0.9 | 0.9 | 0.6 | 0.8 | 0.7 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | -0.2 | 0.1 | 0.2 | 0.2 | 0.4 | 0.3 | 0.5 | 1.1 |
| 4-Sep | 0.4 | 0.3 | 0.3 | 0.4 | 0.2 | 0.1 | -0.3 | 0.0 | 0.1 | 0.1 | -0.2 | 0.0 | 0.3 | 0.1 | -0.1 | 0.5 | 0.1 | -0.1 | 0.2 | 0.2 | 0.1 | 0.1 | -0.1 | 0.2 | 0.1 | 0.5 |
| 5-Sep | 0.0 | 0.0 | 0.1 | 0.4 | 0.6 | 0.6 | 0.7 | 0.3 | 0.2 | 0.4 | 1.0 | 0.8 | 0.4 | 0.7 | 0.4 | 0.3 | 0.5 | 0.3 | -0.2 | -0.2 | -0.1 | 0.0 | 0.2 | 0.4 | 0.3 | 1.0 |
| 6-Sep | 0.3 | 0.4 | 0.6 | 1.0 | 0.8 | 0.6 | 0.7 | 0.4 | 0.7 | 0.9 | 0.5 | -0.5 | 0.2 | 0.6 | 0.9 | 0.7 | 1.2 | 1.2 | 0.6 | 0.5 | 0.7 | 0.4 | 0.1 | -0.1 | 0.6 | 1.2 |
| 7-Sep | 0.2 | 0.4 | 0.6 | 0.7 | 1.1 | 0.8 | 0.2 | 0.3 | 0.4 | 0.4 | -0.3 | 0.4 | 1.0 | 1.6 | 0.6 | -0.3 | -0.2 | 0.3 | 0.3 | 0.1 | 0.1 | 0.1 | 0.0 | 0.2 | 0.4 | 1.6 |
| 8-Sep | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | -0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 1.2 | -0.1 | -0.3 | 0.3 | 0.8 | 0.1 | -0.1 | 0.1 | 0.0 | 0.1 | 0.2 | -0.4 | -0.3 | -0.7 | 0.1 | 1.2 |
| 9-Sep | -0.2 | 0.0 | 0.4 | 0.0 | 0.2 | 0.3 | -0.2 | 0.0 | 0.6 | -0.4 | 0.3 | 0.7 | -0.4 | 0.5 | 1.0 | 0.4 | 0.6 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.5 | 0.2 | 1.0 |
| 10-Sep | 0.7 | -0.2 | -0.2 | 0.2 | 0.6 | 1.0 | 0.9 | 0.9 | 0.4 | 0.6 | 0.2 | 0.6 | 0.1 | 0.3 | 0.5 | 0.8 | 0.7 | 0.5 | 0.6 | 0.5 | 0.8 | 0.7 | 0.6 | 0.1 | 0.5 | 1.0 |
| 11-Sep | -0.4 | -0.9 | -0.6 | -0.8 | -0.9 | -0.9 | -0.7 | -0.7 | -0.7 | -0.8 | -0.6 | -1.0 | 1.0 | -0.7 | -0.9 | -0.9 | -0.1 | -0.3 | -0.5 | -0.7 | -0.5 | 0.0 | 0.2 | 0.2 | -0.5 | 1.0 |
| 12-Sep | 0.1 | 0.2 | 0.2 | 0.2 | 0.0 | 0.2 | 0.0 | 0.1 | 0.1 | 0.2 | 0.3 | 1.3 | 0.4 | 0.6 | -0.1 | 0.1 | 0.2 | 0.7 | 1.1 | 1.0 | 1.1 | 1.0 | 0.5 | 0.6 | 0.4 | 1.3 |
| 13-Sep | 0.7 | 0.6 | 0.7 | 0.5 | 0.7 | 0.6 | 0.5 | 0.4 | 0.6 | 0.0 | 0.1 | 0.0 | 0.2 | -0.2 | -0.1 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.1 | 0.2 | 0.2 | 0.7 |
| 14-Sep | 0.1 | -0.2 | -0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.1 | 0.0 | 0.0 | 0.1 | 0.5 | 1.0 | 0.3 | 0.3 | 0.1 | 0.0 | -0.6 | -0.2 | 0.1 | 0.0 | 0.2 | 0.0 | 0.1 | 1.0 |
| 15-Sep | 0.0 | -0.1 | -0.1 | -0.1 | 0.0 | -0.1 | 0.1 | 0.0 | 0.3 | -0.2 | 0.0 | 0.0 | 0.1 | 0.2 | 0.7 | 0.9 | 0.4 | 0.8 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.8 | 0.2 | 0.9 |
| 16-Sep | 0.9 | 0.8 | 0.4 | 0.0 | 0.0 | 0.1 | 0.4 | 0.6 | 0.5 | 0.1 | 0.7 | 0.6 | 0.2 | 0.2 | 0.1 | 0.3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.2 | 0.9 |
| 17-Sep | 0.1 | -0.1 | 0.2 | 0.5 | 0.5 | 0.6 | 0.1 | 0.3 | 0.2 | 0.5 | 0.5 | 0.0 | -0.1 | 0.2 | 0.6 | 0.4 | 0.2 | 0.2 | 0.2 | 0.0 | -0.1 | 0.0 | -0.3 | 0.1 | 0.2 | 0.6 |
| 18-Sep | 0.1 | 0.1 | 0.0 | 0.0 | 0.4 | -0.1 | 0.0 | 0.0 | 0.3 | 0.5 | 0.6 | 0.6 | 0.3 | 0.3 | 0.1 | 0.3 | 0.1 | -0.4 | -0.5 | -0.1 | -0.1 | 0.2 | 0.2 | 0.0 | 0.1 | 0.6 |
| 19-Sep | 0.0 | -0.2 | 0.1 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.7 | 0.5 | 0.2 | 0.2 | -0.1 | 0.3 | 0.1 | 0.4 | -0.1 | 0.4 | -0.2 | -0.4 | -0.3 | 0.4 | 0.3 | -0.4 | 0.1 | 0.7 |
| 20-Sep | -0.2 | -0.5 | -0.7 | 0.0 | 0.2 | -0.2 | 0.1 | 0.1 | 0.7 | -0.2 | 0.3 | 0.1 | 0.4 | 0.2 | 0.0 | 0.5 | 0.7 | -0.1 | 0.6 | 0.4 | 0.3 | 0.4 | 0.1 | 0.3 | 0.1 | 0.7 |
| 21-Sep | 0.1 | 0.8 | 0.9 | 0.6 | 0.1 | -0.1 | 0.0 | 0.1 | 0.6 | 0.7 | 0.6 | 0.6 | 1.1 | 0.9 | 0.6 | -0.3 | 0.1 | 0.0 | -0.1 | -0.3 | -0.3 | 0.0 | 0.1 | 0.4 | 0.3 | 1.1 |
| 22-Sep | 0.7 | 1.1 | 1.1 | 1.2 | 1.0 | 0.9 | 1.1 | 1.3 | 0.7 | 0.4 | 0.4 | 1.6 | 0.6 | 0.2 | 0.3 | 0.5 | 0.5 | 0.6 | 0.6 | 1.1 | 1.1 | 0.9 | 1.0 | 1.4 | 0.9 | 1.6 |
| 23-Sep | 1.3 | 0.8 | 0.8 | 1.0 | 1.1 | 0.7 | 0.4 | 0.0 | 0.2 | 0.9 | 0.4 | 0.2 | 0.1 | 0.0 | 0.4 | 0.5 | 0.6 | 0.2 | 0.6 | 0.8 | 0.7 | 1.0 | 0.6 | 0.8 | 0.6 | 1.3 |
| 24-Sep | DF | DF | DF | 1.1 | 1.0 | 0.6 | 0.2 | 0.3 | 0.5 | 0.4 | 1.0 | 0.0 | 0.5 | 0.2 | 0.6 | 0.5 | 0.5 | 0.5 | 0.2 | 0.1 | 0.0 | -0.1 | 0.0 | -0.1 | 0.4 | 1.1 |
| 25-Sep | -0.1 | 0.0 | 0.0 | -0.1 | 0.0 | 0.4 | 0.6 | -0.2 | 0.1 | 0.5 | 0.5 | 0.1 | 0.8 | 0.5 | 0.2 | 0.5 | 0.5 | -0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.8 |
| 26-Sep | 0.2 | 0.8 | 0.9 | 0.8 | 0.8 | 0.2 | -0.1 | 0.1 | 0.1 | 0.2 | 1.1 | 0.9 | 0.5 | 0.7 | 0.7 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 1.1 | 1.2 | 1.0 | 0.1 | 0.6 | 1.2 |
| 27-Sep | 0.0 | 0.1 | -0.3 | -0.1 | 0.7 | 0.0 | 0.4 | 0.3 | -0.1 | -0.1 | 0.5 | 0.3 | 0.3 | 1.0 | 0.7 | 0.9 | 0.1 | 0.0 | -0.1 | -0.1 | -0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 1.0 |
| 28-Sep | 0.1 | 0.2 | 0.0 | -0.2 | -0.2 | 0.0 | 0.1 | 0.3 | 0.5 | 0.1 | 0.0 | 0.1 | 0.1 | 0.5 | 0.4 | 0.0 | 0.6 | 0.1 | 0.3 | 0.3 | 0.1 | 0.1 | 0.2 | 0.4 | 0.2 | 0.6 |
| 29-Sep | 0.5 | 0.8 | 0.8 | 0.4 | 0.7 | 1.0 | 0.9 | 0.3 | 0.4 | 0.5 | -0.3 | -0.1 | -0.1 | -0.3 | 0.4 | 0.6 | 0.4 | -0.1 | 0.2 | 0.1 | 0.0 | -0.2 | 0.1 | 0.1 | 0.3 | 1.0 |
| 30-Sep | -0.1 | -0.1 | 0.0 | -0.2 | -0.1 | -0.3 | -0.4 | -0.5 | -0.2 | 0.3 | -0.1 | -0.4 | -0.6 | -0.5 | -0.5 | -0.9 | -0.9 | -0.2 | -0.5 | -0.5 | -0.6 | -0.4 | -0.5 | -0.5 | -0.3 | 0.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | DF - DAS Failure AF - Analyzer Failure | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 4.5 km/h on Sep 11 07:00 | Hours of Data: 714 |
| Minimum Value: 0.2 km/h on Sep 8 05:00 | Hours of Missing Data: 6 |
| Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.5 Q ₃ = 2.2 P ₉₀ = 2.8 P ₉₉ = 3.6 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.2 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 2.5 | 3.0 | 2.6 | 2.0 | 1.1 | 0.5 | 0.5 | 0.7 | 1.6 | 1.9 | 1.5 | 2.5 | 2.0 | 1.9 | 2.4 | 1.4 | 1.5 | 0.9 | 0.6 | 0.7 | AF | 0.9 | AF | AF | 3.0 |
| 2-Sep | 0.9 | 0.8 | 0.7 | 1.4 | 1.3 | 0.7 | 0.8 | 1.4 | 1.6 | 2.1 | 2.1 | 2.3 | 1.9 | 1.5 | 1.7 | 1.3 | 1.3 | 1.0 | 0.8 | 0.7 | 1.0 | 1.0 | 1.3 | 1.6 | 2.3 |
| 3-Sep | 2.4 | 2.3 | 1.4 | 1.3 | 1.6 | 2.0 | 2.1 | 2.2 | 2.1 | 2.1 | 2.3 | 2.4 | 2.3 | 2.6 | 2.7 | 2.9 | 2.5 | 3.0 | 3.6 | 3.1 | 3.4 | 3.1 | 2.6 | 2.2 | 3.6 |
| 4-Sep | 2.2 | 2.0 | 1.8 | 1.6 | 1.2 | 0.9 | 0.9 | 1.3 | 1.8 | 2.0 | 2.0 | 2.1 | 2.7 | 2.8 | 2.6 | 2.5 | 1.9 | 1.2 | 0.5 | 0.9 | 1.2 | 0.7 | 1.0 | 1.4 | 2.8 |
| 5-Sep | 1.1 | 1.1 | 0.8 | 0.6 | 0.6 | 0.8 | 0.7 | 0.9 | 1.3 | 1.7 | 2.7 | 2.3 | 2.2 | 2.7 | 2.7 | 2.0 | 2.0 | 1.5 | 1.6 | 1.8 | 1.7 | 1.5 | 1.7 | 1.1 | 2.7 |
| 6-Sep | 0.7 | 0.9 | 1.3 | 0.9 | 0.4 | 0.3 | 0.6 | 1.3 | 1.9 | 2.3 | 2.7 | 2.2 | 2.5 | 2.6 | 2.7 | 2.2 | 2.7 | 2.2 | 1.2 | 0.8 | 0.8 | 1.1 | 0.7 | 0.8 | 2.7 |
| 7-Sep | 0.4 | 0.4 | 0.3 | 0.3 | 0.6 | 0.9 | 1.3 | 1.4 | 1.4 | 1.6 | 2.0 | 2.3 | 2.5 | 2.6 | 2.5 | 1.7 | 1.8 | 0.9 | 0.6 | 1.1 | 0.9 | 0.5 | 0.6 | 0.5 | 2.6 |
| 8-Sep | 0.5 | 0.6 | 0.3 | 0.2 | 0.2 | 0.3 | 0.3 | 0.5 | 1.1 | 1.7 | 2.0 | 2.0 | 2.2 | 2.4 | 1.5 | 2.8 | 1.2 | 2.2 | 2.1 | 0.7 | 0.6 | 1.5 | 1.5 | 1.6 | 2.8 |
| 9-Sep | 1.5 | 1.4 | 1.4 | 1.4 | 1.4 | 1.6 | 1.5 | 1.6 | 2.1 | 2.2 | 2.0 | 2.4 | 1.8 | 2.0 | 1.9 | 2.4 | 2.1 | 1.6 | 1.4 | 1.3 | 1.8 | 2.2 | 2.2 | 2.6 | 2.6 |
| 10-Sep | 1.7 | 2.0 | 2.2 | 2.4 | 2.5 | 2.2 | 1.5 | 1.7 | 1.5 | 2.6 | 2.0 | 2.6 | 2.3 | 2.4 | 2.5 | 2.5 | 2.8 | 2.5 | 2.2 | 2.5 | 2.8 | 2.5 | 2.4 | 2.3 | 2.8 |
| 11-Sep | 3.1 | 3.3 | 3.7 | 3.6 | 4.1 | 4.3 | 4.5 | 4.0 | 4.0 | 3.7 | 3.6 | 3.5 | 3.8 | 3.2 | 2.7 | 2.3 | 2.5 | 2.2 | 1.7 | 2.1 | 1.4 | 1.7 | 1.5 | 0.7 | 4.5 |
| 12-Sep | 0.5 | 0.6 | 0.7 | 0.4 | 0.3 | 0.4 | 0.8 | 1.3 | 1.3 | 2.1 | 2.5 | 2.6 | 2.8 | 2.9 | 2.7 | 2.7 | 2.3 | 1.4 | 0.8 | 0.5 | 0.5 | 0.8 | 1.0 | 1.3 | 2.9 |
| 13-Sep | 1.4 | 1.6 | 1.3 | 1.4 | 1.6 | 1.2 | 0.8 | 1.1 | 2.1 | 2.2 | 2.4 | 2.5 | 2.9 | 2.8 | 2.4 | 2.5 | 2.0 | 1.6 | 2.0 | 1.6 | 1.5 | 1.0 | 1.2 | 0.7 | 2.9 |
| 14-Sep | 0.8 | 0.8 | 0.8 | 0.5 | 0.5 | 0.2 | 0.2 | 0.5 | 1.0 | 1.4 | 1.2 | 2.1 | 2.5 | 2.5 | 2.8 | 2.5 | 2.5 | 2.9 | 1.9 | 1.0 | 0.3 | 0.3 | 0.5 | 0.8 | 2.9 |
| 15-Sep | 1.2 | 1.2 | 0.8 | 1.0 | 0.7 | 0.9 | 0.9 | 1.3 | 2.0 | 1.8 | 1.7 | 1.7 | 1.8 | 1.8 | 2.5 | 2.6 | 2.5 | 2.3 | 2.0 | 2.8 | 2.2 | 1.3 | 1.0 | 0.8 | 2.8 |
| 16-Sep | 0.6 | 0.7 | 0.8 | 0.5 | 0.6 | 0.8 | 0.6 | 0.8 | 0.9 | 0.8 | 0.6 | 1.5 | 3.0 | 3.1 | 2.7 | 2.8 | 2.6 | 1.8 | 0.7 | 0.5 | 0.6 | 0.4 | 0.2 | 0.6 | 3.1 |
| 17-Sep | 0.6 | 1.4 | 1.6 | 1.1 | 0.9 | 0.9 | 0.8 | 0.6 | 0.5 | 0.9 | 1.4 | 1.3 | 1.5 | 1.8 | 1.9 | 2.2 | 2.2 | 1.4 | 0.5 | 0.6 | 0.8 | 0.6 | 0.5 | 0.5 | 2.2 |
| 18-Sep | 0.8 | 0.8 | 0.6 | 0.5 | 0.4 | 0.4 | 0.6 | 1.1 | 1.6 | 2.2 | 2.5 | 2.4 | 3.2 | 2.7 | 2.4 | 2.3 | 2.1 | 1.8 | 1.3 | 1.3 | 1.3 | 1.6 | 1.3 | 1.1 | 3.2 |
| 19-Sep | 1.0 | 1.3 | 1.5 | 1.1 | 1.3 | 1.5 | 1.2 | 1.7 | 2.2 | 2.0 | 1.5 | 1.5 | 1.6 | 1.6 | 1.7 | 2.0 | 1.9 | 1.6 | 1.8 | 1.7 | 1.4 | 1.3 | 1.3 | 2.0 | 2.2 |
| 20-Sep | 2.2 | 1.8 | 1.4 | 1.0 | 1.7 | 1.6 | 1.5 | 1.5 | 1.8 | 1.4 | 2.4 | 2.3 | 2.6 | 2.4 | 2.1 | 2.1 | 2.0 | 1.4 | 1.6 | 1.7 | 1.2 | 1.3 | 0.7 | 0.7 | 2.6 |
| 21-Sep | 0.9 | 0.5 | 0.6 | 0.7 | 0.5 | 0.2 | 0.3 | 0.4 | 1.5 | 2.0 | 2.3 | 2.1 | 2.6 | 2.2 | 2.7 | 2.1 | 2.0 | 1.3 | 0.4 | 0.2 | 0.4 | 0.5 | 0.3 | 0.4 | 2.7 |
| 22-Sep | 0.4 | 0.5 | 0.5 | 0.8 | 0.8 | 0.7 | 0.6 | 0.8 | 1.1 | 1.2 | 1.3 | 2.9 | 3.1 | 2.7 | 3.1 | 2.5 | 2.0 | 1.9 | 1.4 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 3.1 |
| 23-Sep | 1.0 | 1.6 | 1.8 | 2.0 | 2.0 | 1.7 | 2.1 | 2.0 | 2.1 | 3.1 | 3.1 | 3.1 | 3.3 | 3.2 | 3.5 | 2.5 | 3.0 | 2.9 | 2.5 | 2.3 | 2.2 | 2.1 | 2.0 | 1.6 | 3.5 |
| 24-Sep | DF | DF | DF | 0.9 | 0.9 | 1.0 | 0.5 | 0.9 | 2.1 | 2.6 | 3.4 | 3.2 | 3.1 | 3.1 | 2.9 | 3.4 | 3.4 | 2.3 | 0.9 | 0.6 | 0.5 | 0.7 | 1.0 | 1.1 | 3.4 |
| 25-Sep | 1.6 | 1.7 | 1.5 | 1.5 | 1.0 | 1.1 | 1.1 | 1.0 | 1.6 | 1.8 | 1.9 | 2.1 | 2.8 | 2.7 | 2.7 | 2.6 | 2.0 | 0.8 | 0.4 | 0.3 | 0.2 | 0.5 | 0.5 | 0.5 | 2.8 |
| 26-Sep | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 1.0 | 1.1 | 1.8 | 1.4 | 1.7 | 1.9 | 2.6 | 2.8 | 2.4 | 2.2 | 2.5 | 2.3 | 1.3 | 1.2 | 1.1 | 1.0 | 1.1 | 1.5 | 0.9 | 2.8 |
| 27-Sep | 1.0 | 0.9 | 1.5 | 1.4 | 1.0 | 1.5 | 1.7 | 2.4 | 2.0 | 2.0 | 2.8 | 2.6 | 2.7 | 3.3 | 3.1 | 3.6 | 3.0 | 2.0 | 1.8 | 1.4 | 1.2 | 1.5 | 1.0 | 0.7 | 3.6 |
| 28-Sep | 0.5 | 0.7 | 0.4 | 0.6 | 0.4 | 0.5 | 0.7 | 0.4 | 0.8 | 1.5 | 1.4 | 1.2 | 1.9 | 2.6 | 2.7 | 1.9 | 1.8 | 0.8 | 0.3 | 0.2 | 0.3 | 0.6 | 0.4 | 0.4 | 2.7 |
| 29-Sep | 0.5 | 0.4 | 0.6 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 0.9 | 1.4 | 1.2 | 1.6 | 2.1 | 1.8 | 2.1 | 2.0 | 1.7 | 1.1 | 0.3 | 0.2 | 0.6 | 1.4 | 1.5 | 0.6 | 2.1 |
| 30-Sep | 0.3 | 0.2 | 0.3 | 0.6 | 1.0 | 1.4 | 1.2 | 2.2 | 2.5 | 2.7 | 3.1 | 2.7 | 2.6 | 2.8 | 3.5 | 3.4 | 3.4 | 3.6 | 3.1 | 3.4 | 2.9 | 3.0 | 2.7 | 2.6 | 3.6 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 3.1 | 3.3 | 3.7 | 3.6 | 4.1 | 4.3 | 4.5 | 4.0 | 4.0 | 4.0 | 3.7 | 3.6 | 3.5 | 3.8 | 3.3 | 3.5 | 3.6 | 3.4 | 3.6 | 3.6 | 3.4 | 3.4 | 3.1 | 2.7 | 2.6 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure AF - Analyzer Failure



| Maximum Value: 9.1 km/h on Sep 8 16:00 | | Maximum Daily Average: 3.3 km/h on Sep 3 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------------------|---------------|---------------|
| Minimum Value: -0.7 km/h on Sep 6 12:00 | | Minimum Daily Average: 0.2 km/h on Sep 29 | | Hours of Data: 717 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 1.4 km/h at hour 16 | | Minimum Diurnal Average: 0.7 km/h at hour 8 | | Hours of Missing Data: 3 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.98 km/h | | Percentiles: P ₁ = -0.5 P ₁₀ = 0.0 Q ₁ = 0.3 Median = 0.7 Q ₃ = 1.5 P ₉₀ = 2.4 P ₉₉ = 3.6 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0.0 | -0.2 | 0.3 | 0.1 | 0.2 | 0.4 | 0.4 | 0.4 | 0.3 | 0.6 | 0.2 | 0.2 | 0.7 | 0.6 | -0.1 | 0.2 | 0.5 | 0.3 | 0.8 | 0.8 | 1.4 | 1.2 | 1.2 | 0.8 | 0.5 | 1.4 |
| 2-Sep | 0.6 | -0.1 | 0.7 | 1.5 | 1.0 | 0.5 | 0.6 | -0.1 | 0.9 | 1.1 | 0.9 | 1.0 | 1.0 | 1.1 | 1.3 | 1.1 | 1.2 | 0.8 | 0.8 | 1.2 | 1.9 | 1.7 | 2.1 | 2.5 | 1.1 | 2.5 |
| 3-Sep | 7.2 | 2.2 | 2.5 | 2.5 | 2.9 | 3.0 | 2.6 | 2.8 | 2.9 | 3.1 | 3.3 | 3.6 | 3.3 | 3.4 | 3.4 | 3.6 | 3.6 | 3.8 | 3.1 | 3.4 | 4.0 | 3.5 | 3.1 | 3.0 | 3.3 | 7.2 |
| 4-Sep | 3.3 | 3.1 | 2.5 | 2.1 | 1.9 | 1.4 | 0.6 | 0.7 | 0.4 | 0.7 | 1.1 | 1.4 | 1.3 | 0.9 | 0.5 | 1.2 | 0.7 | 0.2 | 0.2 | 1.0 | 0.3 | 0.2 | 0.0 | 0.5 | 1.1 | 3.3 |
| 5-Sep | 0.1 | 0.0 | 0.0 | 0.2 | 0.3 | 0.4 | 0.6 | 0.3 | 0.2 | 0.2 | 1.0 | 0.8 | 0.4 | 0.7 | 0.1 | 0.3 | 0.4 | 0.2 | -0.6 | -0.4 | -0.1 | 0.3 | 0.5 | 0.6 | 0.3 | 1.0 |
| 6-Sep | 0.6 | 0.6 | 0.7 | 0.8 | 0.6 | 0.5 | 0.6 | 0.5 | 0.7 | 0.9 | 0.5 | -0.7 | 0.1 | 0.5 | 0.9 | 0.4 | 1.1 | 1.1 | 0.5 | 0.5 | 0.7 | 0.6 | 0.4 | 0.2 | 0.6 | 1.1 |
| 7-Sep | 0.3 | 0.5 | 0.7 | 0.7 | 0.8 | 0.8 | 0.3 | 0.3 | 0.3 | 0.3 | -0.6 | 0.1 | 0.3 | 0.7 | 0.3 | -0.5 | -0.4 | 0.3 | 0.3 | 0.3 | 0.5 | 0.4 | 0.3 | 0.2 | 0.3 | 0.8 |
| 8-Sep | 0.1 | 0.1 | 0.4 | 0.5 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 | 1.3 | 0.1 | 0.2 | 1.5 | 1.7 | 9.1 | -0.1 | 1.8 | 1.4 | 0.5 | 1.4 | 1.8 | 2.0 | 1.4 | 1.1 | 9.1 |
| 9-Sep | 1.6 | 1.3 | 1.9 | 1.5 | 1.5 | 1.5 | 0.3 | 0.9 | 1.9 | 0.9 | 1.0 | 1.2 | -0.2 | 0.7 | 1.2 | 0.3 | 0.3 | -0.4 | -0.3 | 0.1 | 0.0 | -0.2 | 0.2 | 0.6 | 0.7 | 1.9 |
| 10-Sep | 0.8 | -0.2 | 0.1 | 0.6 | 0.9 | 1.1 | 0.9 | 0.9 | 0.3 | 1.1 | 1.4 | 2.3 | 1.2 | 2.0 | 2.4 | 3.0 | 3.7 | 2.3 | 2.4 | 2.7 | 3.4 | 3.1 | 3.1 | 2.4 | 1.7 | 3.7 |
| 11-Sep | 2.6 | 2.5 | 2.8 | 2.7 | 2.8 | 2.8 | 2.8 | 2.9 | 2.8 | 2.5 | 2.5 | 2.1 | 3.6 | 2.1 | 1.3 | 1.2 | 2.0 | 1.6 | 1.3 | 1.3 | 1.0 | 1.6 | 1.8 | 1.5 | 2.2 | 3.6 |
| 12-Sep | 1.5 | 1.5 | 1.2 | 1.3 | 0.9 | 1.3 | 0.7 | 0.4 | 0.1 | 0.1 | 0.3 | 1.4 | 0.3 | 0.5 | -0.2 | 0.1 | 0.2 | 0.8 | 1.0 | 0.8 | 0.9 | 0.8 | 0.8 | 0.8 | 0.7 | 1.5 |
| 13-Sep | 0.8 | 0.7 | 0.7 | 0.5 | 0.7 | 0.7 | 0.4 | 0.3 | 0.5 | -0.1 | 0.0 | -0.1 | 0.3 | -0.2 | 0.4 | 0.7 | 0.7 | 0.3 | 0.6 | 0.7 | 0.8 | 1.0 | 1.7 | 2.6 | 0.6 | 2.6 |
| 14-Sep | 2.6 | 1.5 | 1.2 | 1.0 | 0.4 | 0.2 | 0.1 | 0.4 | 0.0 | -0.1 | 0.0 | -0.2 | 0.5 | 0.9 | 0.4 | 0.8 | 1.0 | 2.6 | 1.9 | 0.5 | 0.2 | 0.1 | 1.7 | 2.9 | 0.9 | 2.9 |
| 15-Sep | 2.2 | 1.8 | 0.9 | 0.8 | 0.6 | 0.8 | 0.7 | 0.2 | 0.4 | -0.3 | -0.2 | -0.1 | -0.1 | -0.1 | 0.2 | 0.3 | -0.3 | 0.2 | -0.5 | 0.2 | 0.0 | 0.3 | 0.6 | 0.9 | 0.4 | 2.2 |
| 16-Sep | 0.6 | 0.6 | 0.2 | 0.0 | -0.1 | 0.0 | 0.2 | 0.4 | 0.3 | -0.1 | 0.6 | 0.5 | 0.0 | 0.2 | 0.7 | 0.6 | 0.7 | 0.5 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.3 | 0.7 |
| 17-Sep | 0.0 | -0.1 | 0.1 | 0.3 | 0.5 | 0.4 | 0.0 | 0.1 | 0.0 | 0.2 | 0.4 | -0.1 | -0.3 | 0.1 | 0.7 | 0.6 | 1.1 | 1.6 | 1.0 | 0.3 | 0.5 | 0.7 | 0.6 | 0.9 | 0.4 | 1.6 |
| 18-Sep | 0.8 | 0.7 | 0.3 | 1.0 | 1.6 | 0.7 | 1.2 | 1.2 | 1.6 | 2.3 | 2.8 | 2.8 | 2.8 | 3.1 | 3.0 | 2.6 | 1.8 | 1.3 | 1.1 | 1.5 | 1.2 | 1.4 | 1.0 | 0.7 | 1.6 | 3.1 |
| 19-Sep | 1.1 | 1.1 | 1.6 | 2.3 | 2.5 | 2.3 | 1.8 | 2.4 | 2.6 | 2.2 | 1.7 | 1.5 | 1.4 | 1.5 | 1.8 | 2.2 | 1.6 | 1.7 | 1.1 | 1.1 | 1.3 | 1.8 | 2.1 | 1.9 | 1.8 | 2.6 |
| 20-Sep | 1.9 | 1.5 | 1.0 | 1.5 | 2.1 | 1.0 | 1.7 | 1.5 | 1.8 | 0.5 | 0.6 | 0.7 | 0.9 | 0.4 | 0.5 | 1.0 | 0.6 | -0.2 | 0.2 | 0.1 | 0.2 | 0.3 | 0.1 | 0.4 | 0.8 | 2.1 |
| 21-Sep | 0.2 | 0.9 | 0.9 | 0.4 | 0.0 | -0.1 | 0.0 | 0.1 | 0.5 | 0.5 | 0.4 | 0.5 | 1.1 | 1.0 | 0.7 | 0.0 | 0.7 | 0.2 | -0.2 | -0.4 | -0.4 | -0.2 | -0.2 | 0.0 | 0.3 | 1.1 |
| 22-Sep | 0.4 | 1.1 | 1.2 | 1.0 | 0.8 | 0.6 | 0.8 | 1.1 | 0.7 | 0.4 | 0.4 | 1.6 | 0.6 | 0.0 | 0.2 | 0.4 | 0.4 | 0.6 | 0.6 | 1.0 | 1.1 | 0.9 | 1.0 | 1.3 | 0.8 | 1.6 |
| 23-Sep | 1.3 | 1.2 | 1.0 | 1.3 | 1.5 | 1.0 | 0.7 | 0.5 | 0.6 | 1.1 | 0.6 | 0.1 | 0.0 | 0.3 | 0.6 | 0.6 | 0.6 | 0.2 | 0.7 | 0.8 | 0.8 | 1.0 | 0.7 | 0.8 | 0.7 | 1.5 |
| 24-Sep | DF | DF | DF | 1.1 | 0.9 | 0.5 | -0.1 | 0.0 | 0.4 | 0.9 | 1.9 | 1.3 | 1.7 | 2.1 | 2.6 | 3.2 | 3.7 | 3.0 | 1.8 | 1.5 | 1.6 | 1.5 | 1.8 | 1.9 | 1.6 | 3.7 |
| 25-Sep | 1.6 | 1.7 | 1.8 | 1.9 | 2.3 | 2.7 | 1.7 | 0.5 | 1.1 | 1.8 | 2.0 | 1.8 | 2.3 | 1.9 | 1.8 | 2.3 | 2.0 | 1.0 | 0.6 | 0.2 | 0.2 | 1.6 | 1.9 | 1.2 | 1.6 | 2.7 |
| 26-Sep | 0.2 | 0.6 | 0.6 | 0.7 | 0.9 | 0.5 | 0.3 | -0.1 | 0.0 | 0.2 | 1.1 | 0.8 | 0.4 | 0.8 | 0.7 | 0.6 | 0.5 | 0.6 | 0.7 | 0.9 | 1.0 | 1.2 | 1.1 | 0.6 | 0.6 | 1.2 |
| 27-Sep | 0.5 | 0.6 | -0.7 | -0.1 | 0.6 | 1.1 | 1.9 | 1.5 | 0.1 | 0.6 | 3.8 | 2.4 | 2.3 | 2.6 | 3.4 | 2.9 | 1.5 | 0.7 | 0.5 | 0.7 | 1.0 | 1.8 | 1.6 | 2.0 | 1.4 | 3.8 |
| 28-Sep | 1.6 | 2.1 | 1.3 | 1.1 | 0.1 | 0.1 | 0.0 | 0.2 | 0.3 | 0.2 | -0.2 | 0.1 | 0.0 | 0.5 | 0.5 | -0.1 | 0.6 | 0.1 | 0.2 | 0.2 | 0.1 | 0.0 | 0.0 | 0.3 | 0.4 | 2.1 |
| 29-Sep | 0.4 | 0.6 | 0.8 | 0.6 | 0.5 | 0.8 | 0.6 | 0.4 | 0.3 | 0.5 | -0.3 | -0.3 | -0.1 | -0.6 | 0.2 | 0.3 | 0.3 | 0.0 | 0.3 | 0.3 | 0.2 | -0.2 | 0.0 | 0.5 | 0.2 | 0.8 |
| 30-Sep | 0.3 | 0.6 | 0.8 | 0.9 | 1.1 | 0.9 | 1.0 | 0.9 | 1.0 | 1.9 | 2.0 | 2.1 | 1.4 | 1.6 | 2.0 | 2.0 | 1.8 | 2.3 | 2.0 | 1.9 | 1.3 | 1.5 | 1.6 | 1.6 | 1.4 | 2.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | DF - DAS Failure | | |



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 2 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 18.0 km/h on Sep 8 16:00 | Hours of Data: 717 |
| Minimum Value: 0.2 km/h on Sep 8 05:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.5 Q ₃ = 2.2 P ₉₀ = 2.8 P ₉₉ = 4.0 | 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 | 1.2 | 2.0 | 2.2 | 1.8 | 1.1 | 0.6 | 0.7 | 0.7 | 1.6 | 1.8 | 1.5 | 1.8 | 1.6 | 1.5 | 1.6 | 1.1 | 1.6 | 0.8 | 0.7 | 0.9 | 0.4 | 1.0 | 1.1 | 1.3 | 2.2 |
| 2-Sep | 1.0 | 0.8 | 0.8 | 1.4 | 1.4 | 0.8 | 0.8 | 1.4 | 1.6 | 2.1 | 2.1 | 2.3 | 1.9 | 1.5 | 1.8 | 1.3 | 1.3 | 1.0 | 0.9 | 0.7 | 1.0 | 1.1 | 1.3 | 1.6 | 2.3 |
| 3-Sep | 14.9 | 2.3 | 1.3 | 1.3 | 1.5 | 2.0 | 2.1 | 2.3 | 2.2 | 2.1 | 2.2 | 2.4 | 2.3 | 2.7 | 2.7 | 2.9 | 2.4 | 3.0 | 3.5 | 3.1 | 3.3 | 3.1 | 2.6 | 2.2 | 14.9 |
| 4-Sep | 2.0 | 1.9 | 1.9 | 1.7 | 1.2 | 0.9 | 1.0 | 1.3 | 1.7 | 2.0 | 2.0 | 2.2 | 2.7 | 3.0 | 2.8 | 2.6 | 2.0 | 1.2 | 0.5 | 1.0 | 1.2 | 0.8 | 1.1 | 1.5 | 3.0 |
| 5-Sep | 1.2 | 1.1 | 0.8 | 0.6 | 0.5 | 0.7 | 0.6 | 0.8 | 1.2 | 1.7 | 2.9 | 2.4 | 2.1 | 2.7 | 2.8 | 2.0 | 2.0 | 1.4 | 1.5 | 1.4 | 1.6 | 1.3 | 1.4 | 0.8 | 2.9 |
| 6-Sep | 0.7 | 0.9 | 1.3 | 0.9 | 0.4 | 0.3 | 0.6 | 1.2 | 1.9 | 2.3 | 2.7 | 2.1 | 2.4 | 2.6 | 2.8 | 2.1 | 2.6 | 2.2 | 1.2 | 0.6 | 0.6 | 0.9 | 0.5 | 0.5 | 2.8 |
| 7-Sep | 0.4 | 0.3 | 0.2 | 0.3 | 0.5 | 0.6 | 1.2 | 1.2 | 1.3 | 1.5 | 1.8 | 2.0 | 2.1 | 2.1 | 2.2 | 1.6 | 1.6 | 0.9 | 0.7 | 1.3 | 1.2 | 0.7 | 0.8 | 0.5 | 2.2 |
| 8-Sep | 0.5 | 0.6 | 0.5 | 0.3 | 0.2 | 0.2 | 0.3 | 0.4 | 1.0 | 1.7 | 2.1 | 1.9 | 2.3 | 2.4 | 1.4 | 18.0 | 1.3 | 3.1 | 2.4 | 0.8 | 0.8 | 1.6 | 1.5 | 1.6 | 18.0 |
| 9-Sep | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 1.7 | 1.5 | 1.6 | 2.2 | 2.1 | 2.1 | 2.4 | 1.9 | 2.1 | 1.9 | 2.4 | 1.7 | 1.3 | 1.4 | 0.7 | 1.3 | 1.9 | 1.8 | 2.2 | 2.4 |
| 10-Sep | 1.6 | 1.8 | 1.9 | 2.1 | 2.3 | 2.1 | 1.3 | 1.7 | 1.5 | 2.7 | 2.1 | 2.8 | 2.3 | 2.5 | 2.5 | 2.4 | 2.8 | 2.6 | 2.1 | 2.5 | 2.7 | 2.4 | 2.3 | 2.3 | 2.8 |
| 11-Sep | 3.1 | 3.2 | 3.5 | 3.6 | 4.1 | 4.1 | 4.5 | 4.1 | 4.0 | 3.7 | 3.6 | 3.4 | 3.8 | 3.2 | 2.6 | 2.3 | 2.5 | 2.2 | 1.8 | 2.0 | 1.4 | 1.7 | 1.6 | 0.9 | 4.5 |
| 12-Sep | 0.6 | 0.7 | 0.8 | 0.5 | 0.4 | 0.5 | 0.9 | 1.2 | 1.3 | 2.0 | 2.6 | 2.8 | 2.8 | 3.0 | 2.8 | 3.0 | 2.4 | 1.4 | 0.8 | 0.5 | 0.6 | 0.9 | 1.1 | 1.3 | 3.0 |
| 13-Sep | 1.4 | 1.6 | 1.4 | 1.5 | 1.6 | 1.2 | 0.9 | 1.1 | 2.2 | 2.5 | 2.6 | 3.1 | 2.8 | 2.7 | 2.7 | 2.1 | 1.7 | 2.0 | 1.7 | 1.5 | 1.1 | 1.4 | 0.8 | 3.1 | |
| 14-Sep | 0.9 | 1.0 | 1.0 | 0.7 | 0.6 | 0.3 | 0.3 | 0.4 | 0.8 | 1.4 | 1.2 | 1.9 | 2.5 | 2.6 | 2.9 | 2.7 | 2.7 | 2.7 | 2.0 | 1.2 | 0.4 | 0.4 | 0.9 | 1.0 | 2.9 |
| 15-Sep | 1.4 | 1.3 | 0.9 | 1.0 | 0.6 | 0.7 | 0.7 | 1.2 | 1.8 | 1.6 | 1.5 | 1.3 | 1.6 | 1.6 | 2.0 | 1.9 | 2.1 | 1.9 | 1.6 | 2.6 | 2.1 | 1.3 | 0.9 | 0.7 | 2.6 |
| 16-Sep | 0.7 | 0.9 | 0.8 | 0.6 | 0.7 | 0.8 | 0.7 | 0.7 | 0.8 | 0.8 | 0.6 | 1.5 | 3.3 | 3.3 | 2.8 | 2.9 | 2.6 | 2.0 | 0.8 | 0.5 | 0.7 | 0.5 | 0.2 | 0.6 | 3.3 |
| 17-Sep | 0.7 | 1.6 | 1.6 | 1.2 | 1.0 | 1.0 | 0.8 | 0.6 | 0.5 | 0.9 | 1.5 | 1.2 | 1.5 | 1.8 | 1.9 | 2.4 | 2.3 | 1.4 | 0.7 | 0.7 | 0.8 | 0.7 | 0.5 | 0.7 | 2.4 |
| 18-Sep | 0.9 | 0.8 | 0.7 | 0.6 | 0.5 | 0.5 | 0.7 | 1.1 | 1.5 | 2.1 | 2.4 | 2.4 | 3.2 | 2.5 | 2.2 | 2.3 | 2.1 | 1.7 | 1.2 | 1.3 | 1.3 | 1.6 | 1.4 | 1.2 | 3.2 |
| 19-Sep | 1.1 | 1.4 | 1.5 | 1.1 | 1.3 | 1.5 | 1.2 | 1.6 | 2.1 | 1.9 | 1.4 | 1.5 | 1.7 | 1.5 | 1.6 | 1.9 | 1.9 | 1.5 | 1.9 | 1.6 | 1.4 | 1.3 | 1.3 | 1.9 | 2.1 |
| 20-Sep | 2.4 | 1.8 | 1.4 | 1.0 | 1.8 | 1.7 | 1.7 | 1.4 | 1.7 | 1.5 | 2.4 | 2.3 | 2.7 | 2.5 | 2.2 | 2.1 | 1.7 | 0.7 | 1.0 | 1.1 | 0.9 | 1.1 | 0.6 | 0.5 | 2.7 |
| 21-Sep | 0.5 | 0.4 | 0.6 | 0.7 | 0.5 | 0.3 | 0.4 | 0.3 | 1.4 | 1.9 | 2.1 | 2.0 | 2.7 | 2.2 | 2.8 | 2.2 | 2.1 | 1.3 | 0.5 | 0.2 | 0.4 | 0.5 | 0.4 | 0.5 | 2.8 |
| 22-Sep | 0.5 | 0.5 | 0.5 | 0.7 | 0.8 | 0.8 | 0.6 | 0.7 | 1.1 | 1.1 | 1.2 | 3.0 | 3.1 | 2.8 | 3.2 | 2.6 | 2.0 | 1.8 | 1.4 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 3.2 |
| 23-Sep | 1.0 | 1.5 | 1.6 | 1.9 | 1.8 | 1.5 | 1.9 | 1.7 | 1.8 | 2.9 | 3.0 | 3.0 | 3.3 | 3.2 | 3.6 | 2.5 | 3.0 | 2.9 | 2.4 | 2.4 | 2.2 | 2.2 | 1.9 | 1.6 | 3.6 |
| 24-Sep | DF | DF | DF | 0.8 | 0.9 | 1.1 | 0.5 | 1.0 | 2.1 | 2.7 | 3.4 | 3.3 | 3.2 | 3.2 | 3.0 | 3.5 | 3.3 | 2.3 | 0.9 | 0.8 | 0.6 | 0.7 | 1.1 | 1.1 | 3.5 |
| 25-Sep | 1.6 | 1.8 | 1.6 | 1.6 | 1.2 | 1.1 | 1.4 | 1.0 | 1.7 | 1.8 | 1.9 | 2.2 | 2.6 | 2.8 | 2.7 | 2.5 | 1.9 | 0.9 | 0.5 | 0.4 | 0.3 | 0.7 | 0.7 | 0.7 | 2.8 |
| 26-Sep | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.8 | 0.8 | 1.1 | 1.1 | 1.5 | 2.0 | 2.7 | 2.9 | 2.4 | 2.3 | 2.5 | 2.3 | 1.3 | 1.1 | 1.0 | 1.1 | 1.1 | 1.4 | 0.9 | 2.9 |
| 27-Sep | 0.8 | 0.7 | 1.1 | 1.2 | 1.1 | 1.9 | 1.8 | 2.5 | 2.1 | 2.2 | 2.7 | 2.6 | 2.7 | 3.3 | 3.1 | 3.7 | 3.1 | 2.0 | 1.8 | 1.6 | 1.2 | 1.5 | 1.0 | 0.8 | 3.7 |
| 28-Sep | 0.6 | 0.8 | 0.4 | 0.6 | 0.4 | 0.5 | 0.8 | 0.4 | 0.7 | 1.4 | 1.1 | 1.2 | 1.6 | 2.8 | 3.0 | 2.0 | 1.9 | 0.9 | 0.3 | 0.2 | 0.4 | 0.7 | 0.4 | 0.4 | 3.0 |
| 29-Sep | 0.5 | 0.5 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.8 | 1.3 | 1.1 | 1.4 | 1.9 | 1.6 | 1.7 | 1.9 | 1.4 | 0.8 | 0.4 | 0.2 | 0.5 | 0.4 | 0.6 | 0.7 | 1.9 |
| 30-Sep | 0.5 | 0.3 | 0.3 | 0.6 | 1.1 | 1.5 | 1.1 | 2.4 | 2.7 | 2.8 | 3.1 | 2.9 | 2.7 | 3.1 | 3.6 | 3.4 | 3.7 | 3.9 | 3.6 | 3.7 | 3.2 | 3.2 | 3.0 | 2.8 | 3.9 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|--|
| 14.9 | 3.2 | 3.5 | 3.6 | 4.1 | 4.1 | 4.5 | 4.1 | 4.0 | 3.7 | 3.6 | 3.4 | 3.8 | 3.3 | 3.6 | 18.0 | 3.7 | 3.9 | 3.6 | 3.7 | 3.3 | 3.2 | 3.0 | 2.8 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

DF - DAS Failure



Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 1, 2016 | Last Calibration | August 2, 2016 |
| Station Name | Mannix | Station Number | AMS 5 |
| Reason: | Routine | | |
| Start Time (MST) | 8:30 | End Time (MST) | 10:55 |
| Gas Cert Reference | S960161A | Station temp. | 22 Deg C |
| Cal Gas Concentration | 50 ppm | Cal Gas Exp Date | 26/09/2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11061107 |
| ZAG Make/Model | API 701 | Serial Number | 1083 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2633 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|--------------|---------------|--------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -635 | -635 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 813 | 812 |
| Calculated slope | 0.998200 | 0.998990 | Chamber temp | 45.0 | 45.2 |
| Calculated intercept | 0.884160 | 1.129377 | Pressure | 693.7 | 691.6 |
| Analyzer Background | 7.3 | 7.4 | Flow | 0.470 | 0.468 |
| Analyzer Coefficient | 0.974 | 0.974 | Intensity | 90 | 90 |

Analyzer make TEI 43i Analyzer serial # 1008841399

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 5000 | 60.0 | 600.0 | 599.5 | 1.001 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 60.0 | 600.0 | 599.5 | 1.001 |
| second point | 5000 | 30.0 | 300.0 | 300.3 | 0.999 |
| third point | 5000 | 15.0 | 150.0 | 146.7 | 1.022 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 5000 | 60.0 | 600.0 | 602.4 | 0.996 |
| Average Correction Factor | | | | | 1.007 |

Corrected As found 599.4 Previous response 600.2 % change 0.1%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill



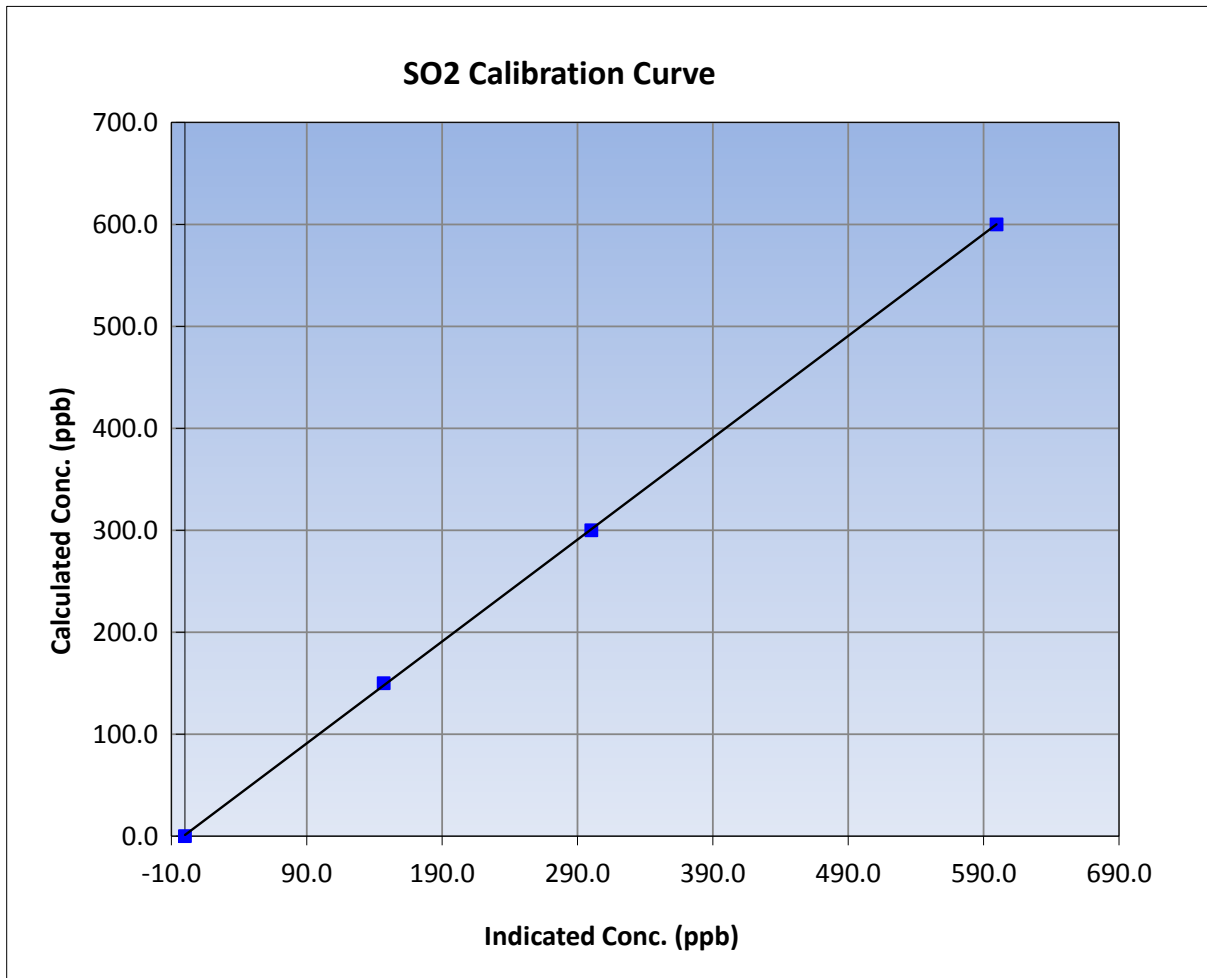
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Mannix | Station Number | AMS 5 |
| Start Time (MST) | 8:30 | End Time (MST) | 10:55 |
| Analyzer make | TEI 43i | Analyzer serial # | 1008841399 |

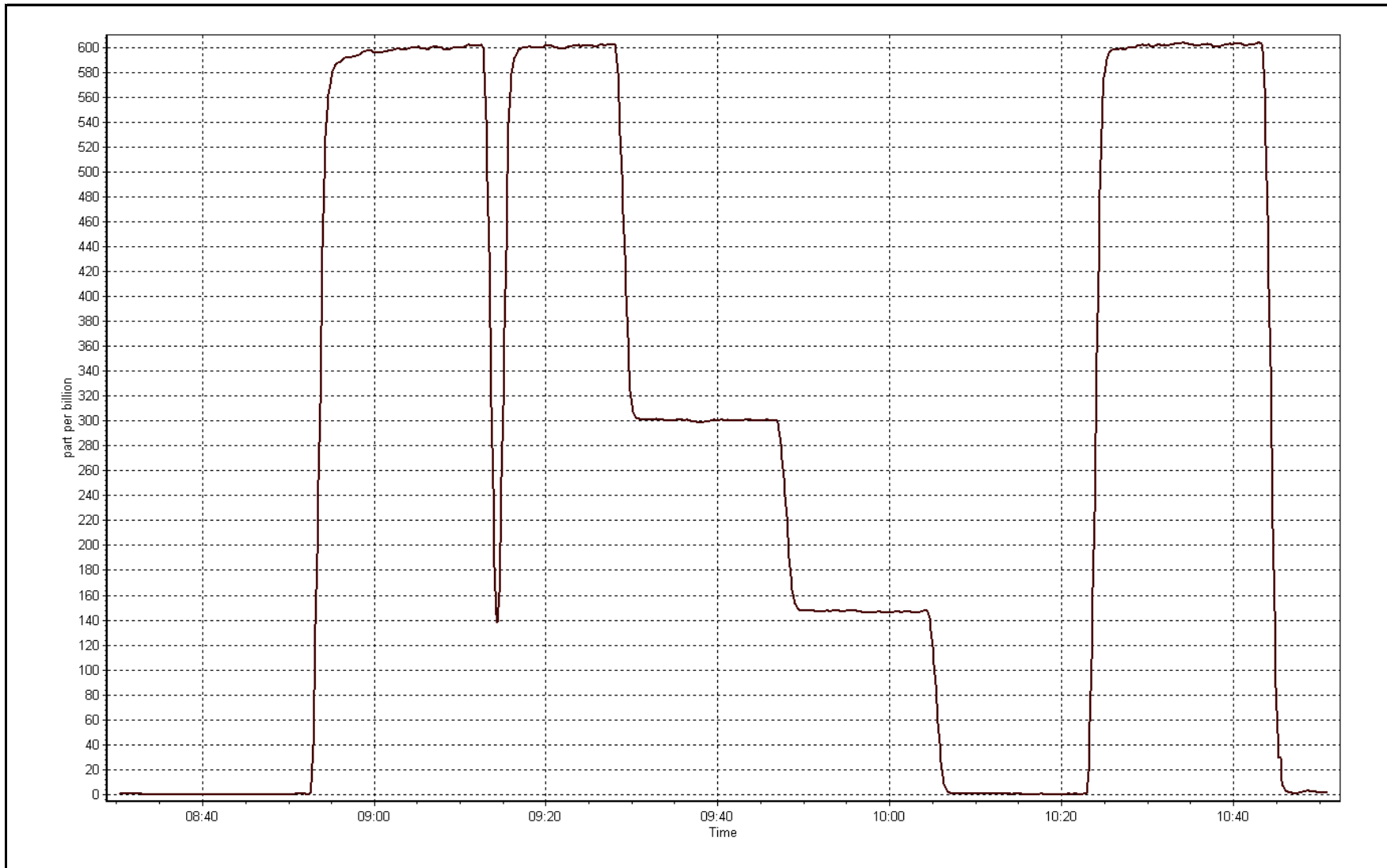
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999960 |
| 600.0 | 599.5 | 1.0008 | | |
| 300.0 | 300.3 | 0.9992 | Slope | 0.998990 |
| 150.0 | 146.7 | 1.0224 | | |
| | | | Intercept | 1.129377 |



SO2 Calibration Plot

Date: September 1, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | September 1, 2016 | Last Calibration | August 2, 2016 |
| Station Name | Mannix | Station Number | AMS 5 |
| Reason: | Routine | | |
| Start Time (MST) | 10:55 | End Time (MST) | 13:38 |
| Gas Cert Reference | CC62844 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 5.04 ppm | Cal Gas Exp Date | 09/09/2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11061107 |
| ZAG air Make/Model | API 701 | Serial Number | 138 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2633 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S960161A 09-Sep-17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -657 | -657 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 811 | 809 |
| Calculated slope | 1.008282 | 0.999366 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.246879 | -0.213043 | Pressure | 507.7 | 504.1 |
| Analyzer Background | 20.7 | 21 | Flow | 1.008 | 1.003 |
| Analyzer Coefficient | 1.007 | 1.019 | Intensity | 104 | 102 |
| | | | Converter temp. | 325 | 327 |

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

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 5000 | 74.4 | 75.0 | 72.9 | 1.028 |
| SO2 scrubber check | 5000 | 15.0 | 150.0 | 1.6 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 5000 | 74.4 | 75.0 | 75.2 | 0.997 |
| second point | 5000 | 41.7 | 42.0 | 42.3 | 0.993 |
| third point | 5000 | 24.8 | 25.0 | 25.2 | 0.992 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 74.4 | 75.0 | 75.4 | 0.995 |
| Average Correction Factor | | | | | 0.994 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 72.7 | Previous response | 74.6 | % change | 2.6% |
|--------------------|------|-------------------|------|----------|------|

Notes:

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

Calibration Performed By: Evan Magill



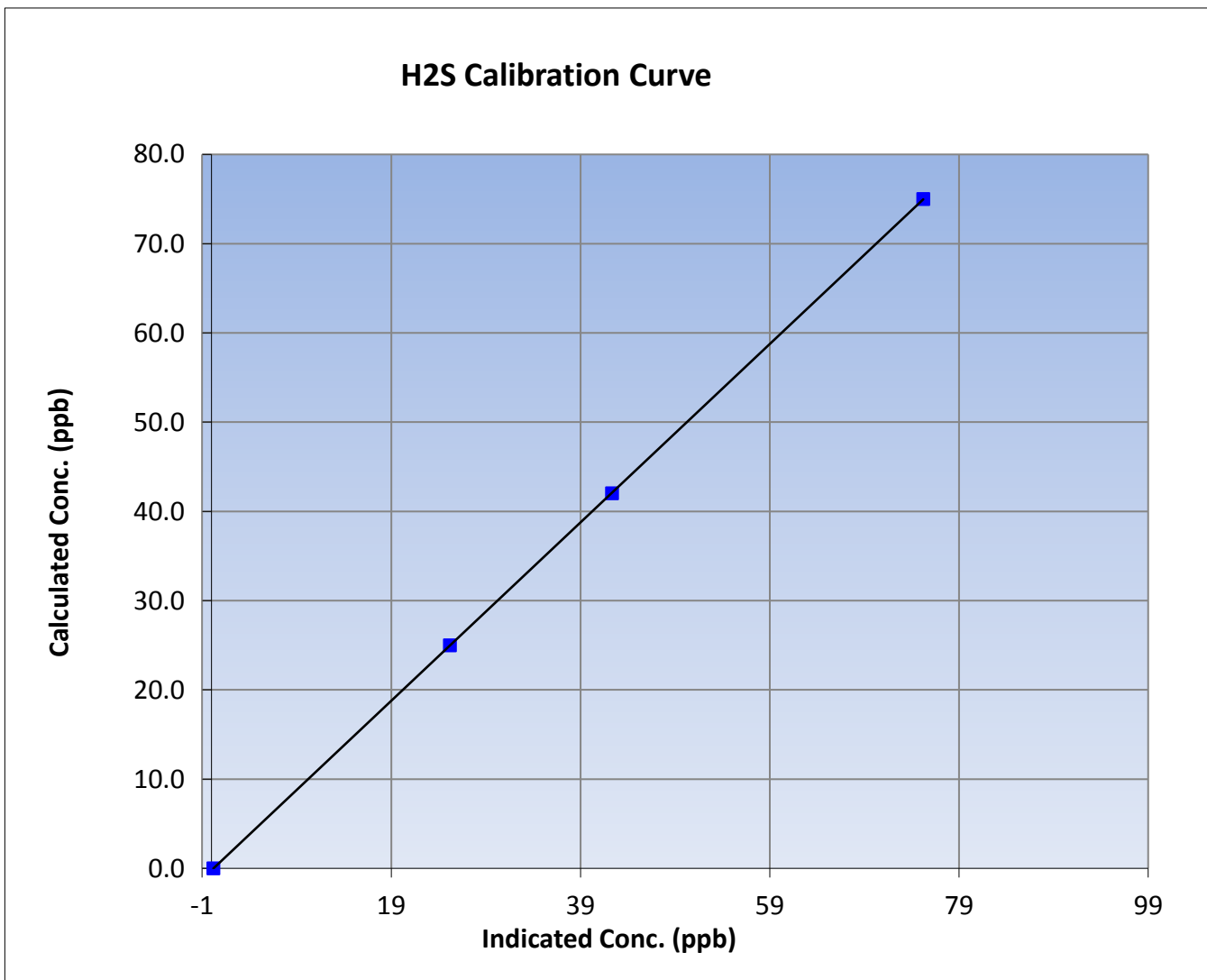
Wood Buffalo Environmental Association H2S Calibration Report

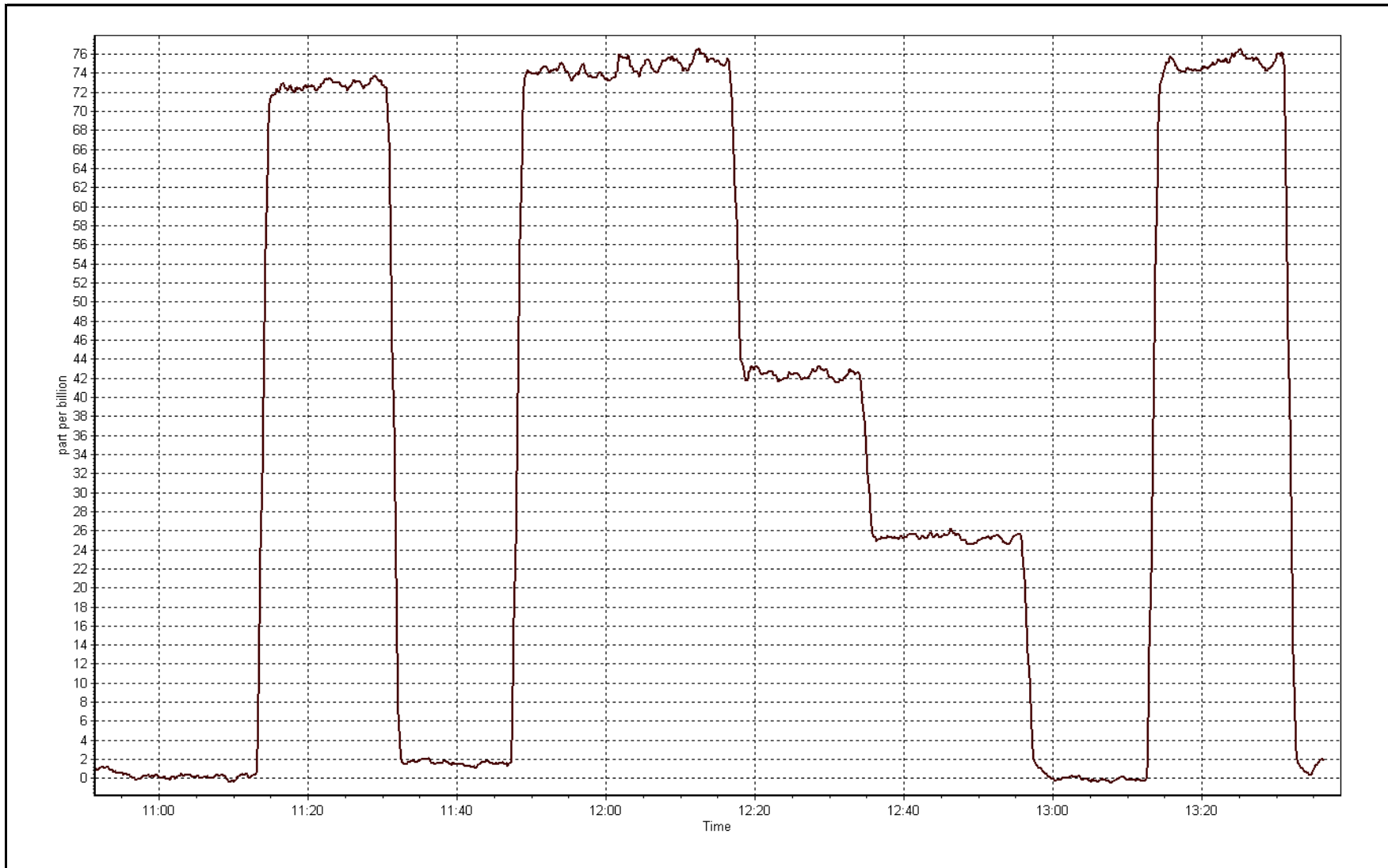
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Mannix | Station Number | AMS 5 |
| Start Time (MST) | 10:55 | End Time (MST) | 13:38 |
| Analyzer make | Thermo 450i | Analyzer serial # | 815129108 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999999 |
| 75.0 | 75.2 | 0.9969 | | |
| 42.0 | 42.3 | 0.9930 | Slope | 0.999366 |
| 25.0 | 25.2 | 0.9916 | | |
| | | | Intercept | -0.213043 |







Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|---------------------------------------------------------------|------------------|--------------------|
| Calibration Date | September 28, 2016 | Last Calibration | September 1, 2016 |
| Station Name | Mannix | Station Number | AMS 5 |
| Reason: | Other: Audit of analyzer and calibration cylinder replacement | | |
| Start Time (MST) | 9:58 | End Time (MST) | 16:45 |
| Gas Cert Reference | ET0055008 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 5.03 ppm | Cal Gas Exp Date | February 12, 2019 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11061107 |
| ZAG air Make/Model | API 701 | Serial Number | 138 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2633 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S960161A 09-Sep-17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-----------------|--------|--------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -657.0 | -643.8 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 809 | 791 |
| Calculated slope | 1.000000 | 1.013232 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.000000 | 0.046683 | Pressure | 507.7 | 513.8 |
| Analyzer Background | 20.7 | 15.3 | Flow | 1.008 | 1.017 |
| Analyzer Coefficient | 1.007 | 0.957 | Intensity | 104 | 96 |
| | | | Converter temp. | 325 | 325 |

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

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as found span | 5000 | 69.8 | 70.2 | 91.8 | 0.765 |
| SO2 scrubber check | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 74.4 | 74.8 | 74.0 | 1.012 |
| second point | 5000 | 41.7 | 42.0 | 41.3 | 1.017 |
| third point | 5000 | 24.8 | 24.9 | 24.4 | 1.024 |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.018 |

| | | | | | |
|--------------------|------|-------------------|------|----------|--------|
| Corrected As found | 91.5 | Previous response | 70.2 | % change | -30.3% |
|--------------------|------|-------------------|------|----------|--------|

Notes:

Conducted as found with audit cylinder; as found is reflection of response change difference which was comparable to Sep 27 audit. Replaced calibration cylinder CC62844 with recent CGA cylinder. Adjusted lamp and PMT voltage, AEP audit conducted same day following calibration.

Calibration Performed By: Kelly Baragar



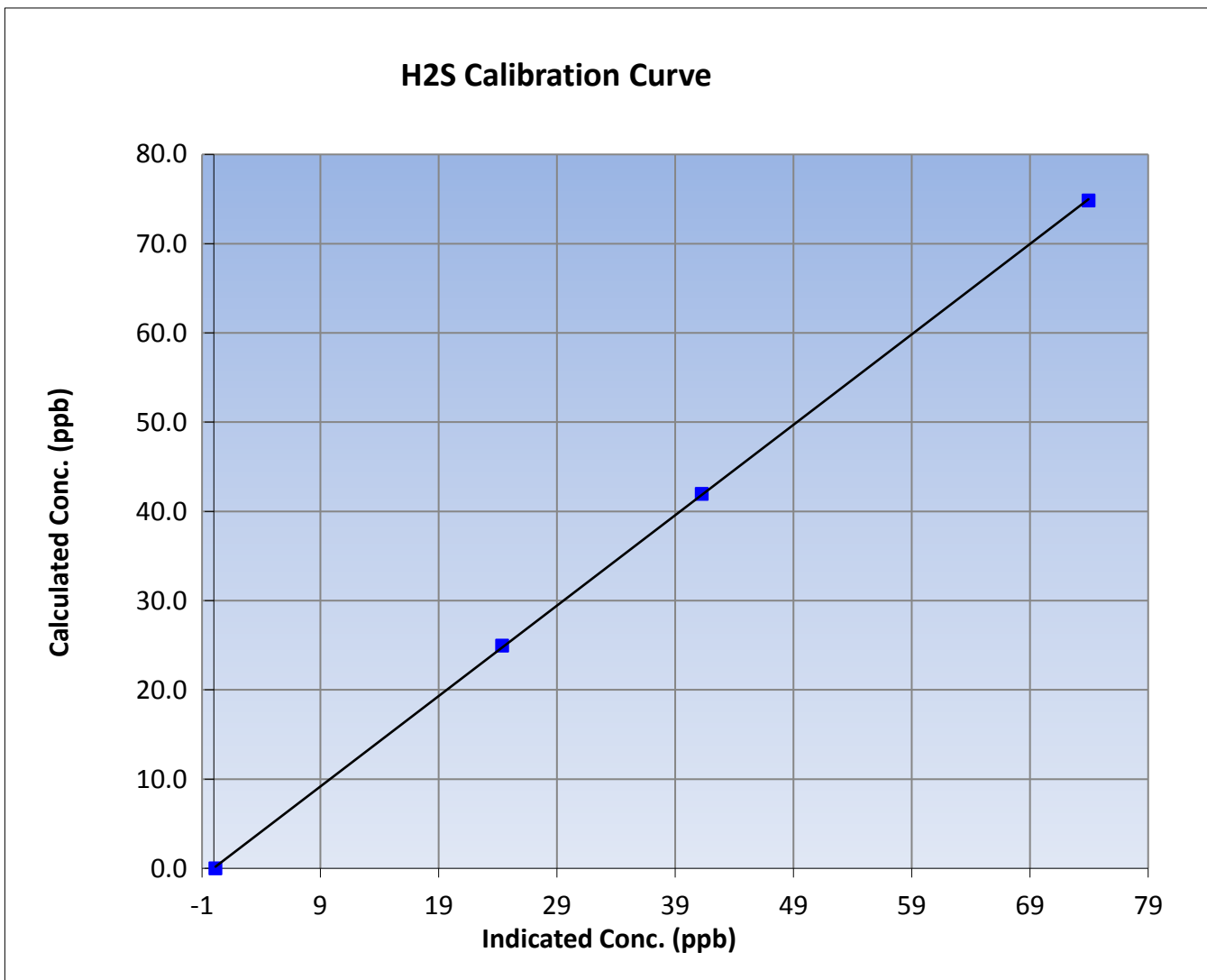
Wood Buffalo Environmental Association H2S Calibration Report

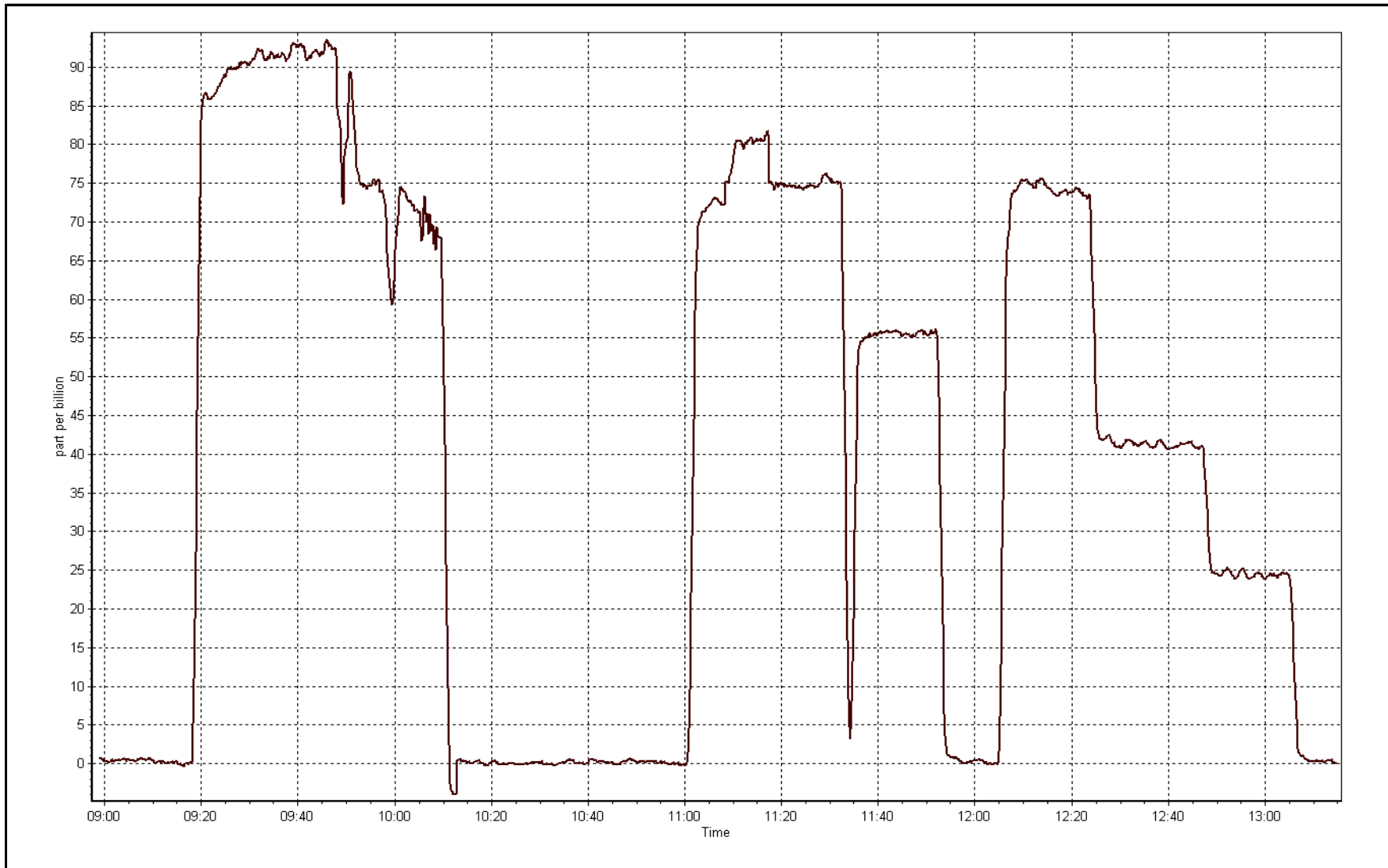
Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 28, 2016 | Previous Calibration | September 1, 2016 |
| Station Name | Mannix | Station Number | AMS 5 |
| Start Time (MST) | 9:58 | End Time (MST) | 16:45 |
| Analyzer make | Thermo 450i | Analyzer serial # | 815129108 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999964 |
| 74.8 | 74.0 | 1.0121 | | |
| 42.0 | 41.3 | 1.0170 | Slope | 1.013232 |
| 24.9 | 24.4 | 1.0238 | | |
| | | | Intercept | 0.046683 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|--------------|
| Calibration Date | September-01-16 | Last Calibration | August-02-16 |
| Station Name | Mannix | Station Number | AMS 5 |
| Reason: | Routine | | |
| Start Time (MST) | 8:30 | End Time (MST) | 10:55 |
| Gas Cert Reference | S961061A | Cal Gas Expiry Date | Sept-26-2017 |
| CH4 Cal Gas Conc. | 499 ppm | CH4 Equiv Conc. | 1038.0 ppm |
| C3H8 Cal Gas Conc. | 196 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11061107 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1083 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2633 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 9.4 | 9.4 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 42.3 | 42.3 |
| Calculated slope | 0.991564 | 0.997594 | Fuel Pressure | 20.2 | 20.2 |
| Calculated intercept | 0.028122 | -0.009832 | Analyzer Coeff | 3.398 | 3.398 |
| | | | Analyzer BKG | 2.96 | 2.96 |

Analyzer make Thermo 51i-LT Analyzer serial # 1317958295

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.04 | ---- |
| as found span | 5000 | 60.0 | 12.46 | 12.51 | 0.996 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.04 | ---- |
| high point | 5000 | 60.0 | 12.46 | 12.51 | 0.996 |
| second point | 5000 | 30.0 | 6.23 | 6.24 | 0.998 |
| third point | 5000 | 15.0 | 3.11 | 3.10 | 1.005 |
| as left zero | 5000 | 0.0 | 0.00 | 0.06 | ---- |
| as left span | 5000 | 60.0 | 12.46 | 12.55 | 0.993 |
| Average Correction Factor | | | | | 0.999 |

Corrected As found 12.47 Previous response 12.53 % change 0.5%

Notes:

Inlet filter changed after as founds. No adjustments.

Calibration Performed By:

Evan Magill



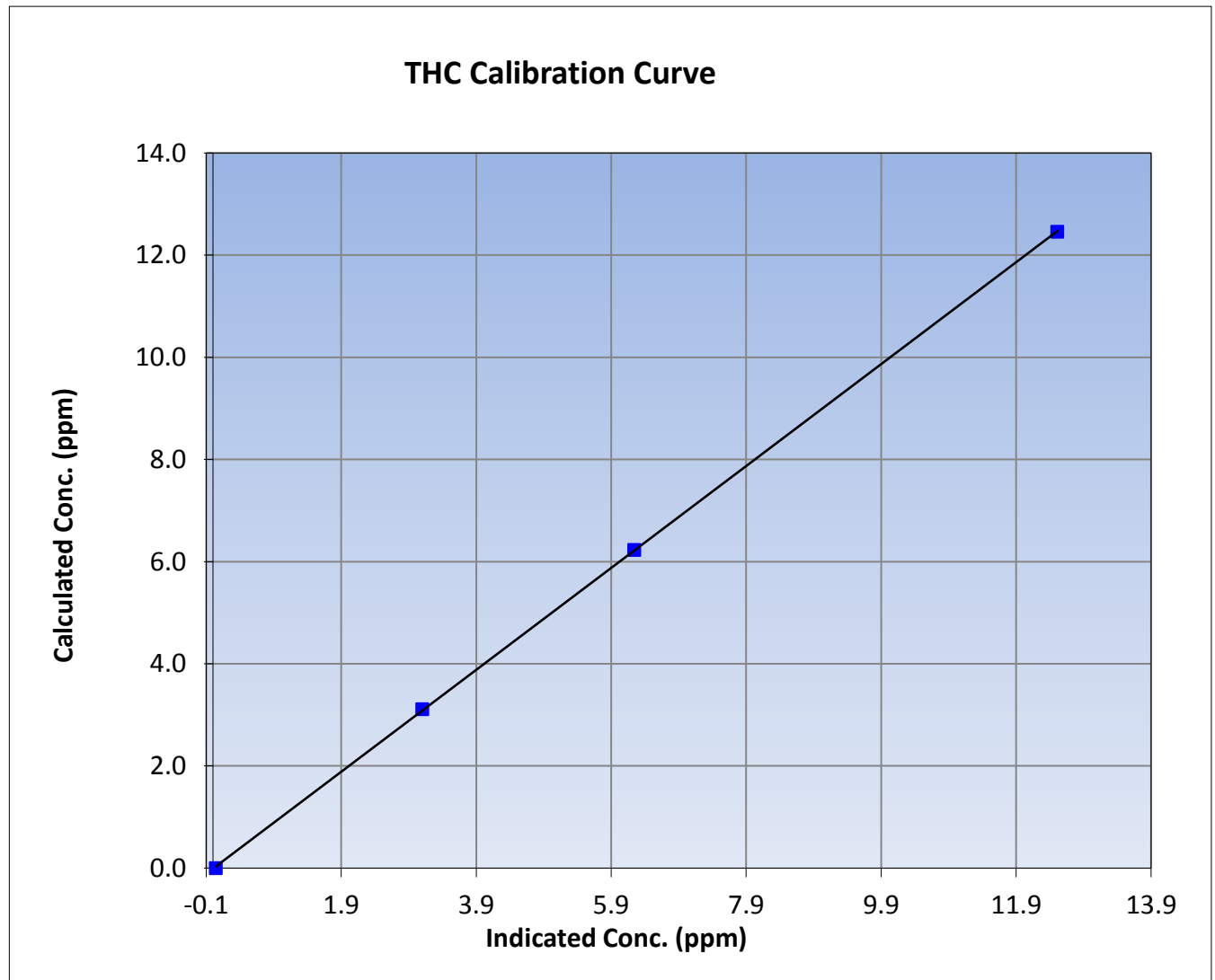
Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Mannix | Station Number | AMS 5 |
| Start Time (MST) | 8:30 | End Time (MST) | 10:55 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1317958295 |

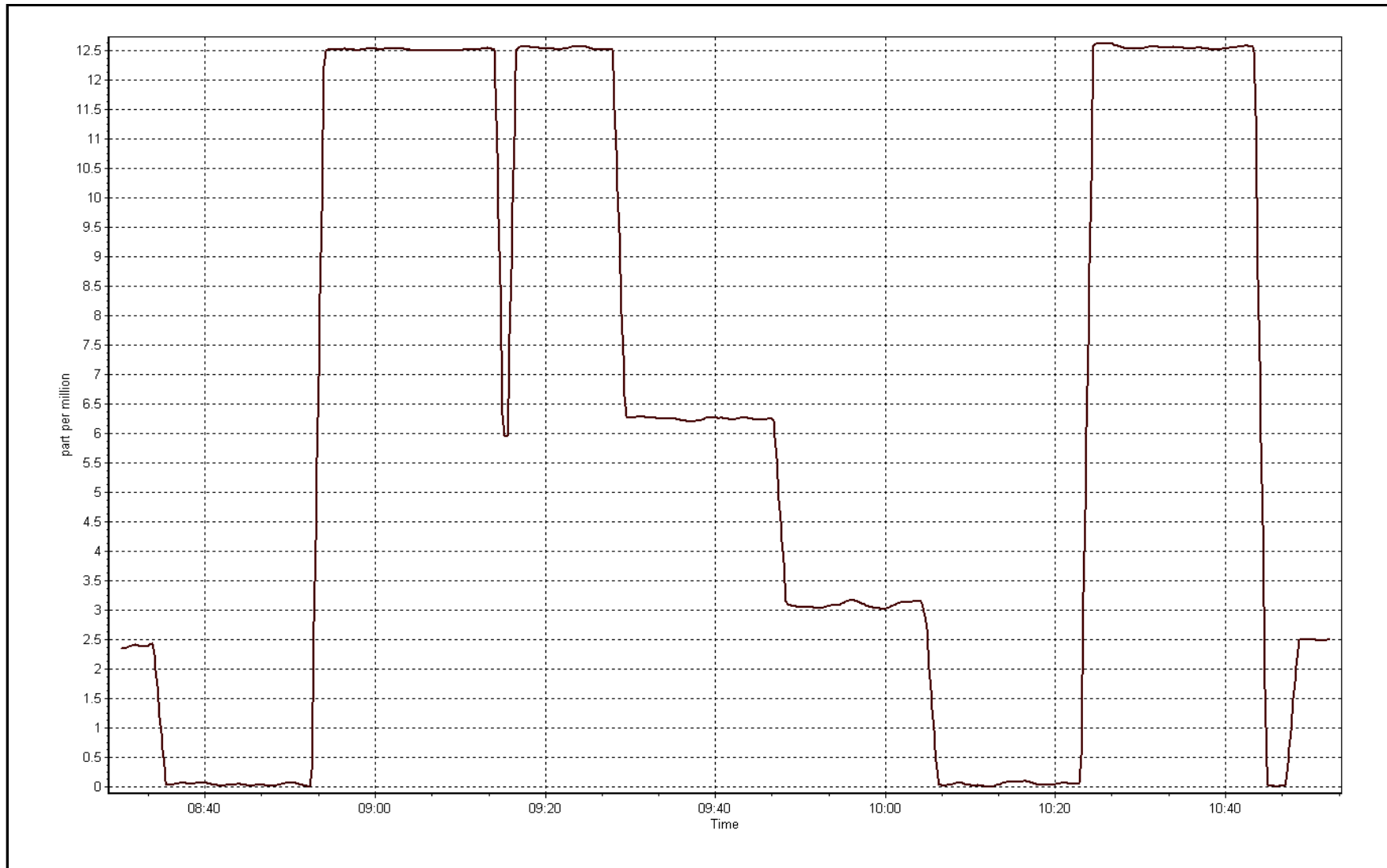
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.04 | ---- | Correlation Coefficient | 0.999974 |
| 12.46 | 12.51 | 0.9957 | | |
| 6.23 | 6.24 | 0.9981 | Slope | 0.997594 |
| 3.11 | 3.10 | 1.0045 | | |
| | | | Intercept | -0.009832 |



THC Calibration Plot

Date: September 1, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 6
PATRICIA MCINNES
SEPTEMBER 2016

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

October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 682 | 37 | 38 | 99.86 | 19 | 0 | 7 | 0 |
| TRS (ppb) Average | 681 | 39 | 39 | 100.00 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 683 | 36 | 37 | 99.86 | 2.8 | - | 2.1 | - |
| NMHC(ppm) Average | 683 | 36 | 37 | 99.86 | 0.109 | - | 0.007 | - |
| CH4(ppm) Average | 683 | 36 | 37 | 99.86 | 2.8 | - | 2.1 | - |
| O3 (ppb) Average | 683 | 36 | 37 | 99.86 | 43 | 0 | 32 | - |
| NO2 (ppb) Average | 678 | 41 | 42 | 99.86 | 26 | 0 | 9 | - |
| NO (ppb) Average | 678 | 41 | 42 | 99.86 | 41 | - | 5 | - |
| NOX (ppb) Average | 678 | 41 | 42 | 99.86 | 58 | - | 13 | - |
| NH3 (ppb) Average | 636 | 49 | 84 | 95.14 | 0 | 0 | 0 | - |
| PM2.5 (ug/m3) Average | 716 | 4 | 4 | 100.00 | 22.7 | - | 6.7 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 23.7 | - | 15.5 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 89 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100.00 | 30 | - | 19 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100.00 | - | - | - | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|-----|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 682 | 0.6 | 2 | - | 0 | 0 | 0 | 0 | 0 | 1 | 19 |
| TRS (ppb) Average | 681 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 683 | 1.97 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.1 | 2.8 |
| NMHC(ppm) Average | 683 | 0 | 0.005 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0.109 |
| CH4(ppm) Average | 683 | 1.97 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.1 | 2.8 |
| O3 (ppb) Average | 683 | 22.8 | 8 | - | 5 | 12 | 17 | 23 | 28 | 33 | 43 |
| NO2 (ppb) Average | 678 | 2.7 | 4 | - | 0 | 0 | 0 | 2 | 4 | 7 | 26 |
| NO (ppb) Average | 678 | 1.2 | 3 | - | 0 | 0 | 0 | 0 | 1 | 3 | 41 |
| NOX (ppb) Average | 678 | 3.9 | 6 | - | 0 | 0 | 0 | 2 | 5 | 9 | 58 |
| NH3 (ppb) Average | 636 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PM2.5 (ug/m3) Average | 716 | 3.07 | 2.7 | - | 0.4 | 0.8 | 1.3 | 2.3 | 4 | 6.3 | 22.7 |
| Temperature 2 m (C) Average | 720 | 11.29 | 4.5 | - | 1.5 | 5.7 | 7.9 | 10.9 | 14.3 | 17 | 23.7 |
| Relative Humidity (%) Average | 720 | 68.8 | 18 | - | 29 | 42 | 55 | 71 | 84 | 92 | 99 |
| Wind Speed 10 m (km/h) Average | 720 | 10.6 | 5 | - | 1 | 5 | 6 | 10 | 14 | 18 | 30 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------------------|-------------------|-------------------|---------------------|---------------------------------------|
| AIR QUALITY ANALYZERS | 19 Sep 2016 13:00 | 19 Sep 2016 13:00 | 1 | Maintenance - sample manifold cleaned |
| NH3 | 01 Sep 2016 07:00 | 30 Sep 2016 06:00 | 34 | Stabilization after daily span |



| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 19 ppb on Sep 20 16:00 | Maximum Daily Average: 6.8 ppb on Sep 20 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 3 21:00 | Minimum Daily Average: 0.0 ppb on Sep 4 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 1.1 ppb at hour 12 | Minimum Diurnal Average: 0.2 ppb at hour 24 | | Hours of Calibration: | 37 |
| Monthly Average: 0.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 13 | | 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 | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 3-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 |
| 4-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 |
| 5-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 |
| 6-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 | 0.2 | 0 |
| 7-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 | 0.0 | 0 |
| 8-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.2 | 1 |
| 9-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 6 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 |
| 10-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 |
| 11-Sep | 0 | 2 | 1 | 2 | 2 | Z | 1 | 3 | 5 | 3 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1.2 | 5 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 13-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 | 0.1 | 0 |
| 14-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 1 | 1 | 0 | 0 | 0.6 | 4 |
| 15-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 16-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 |
| 17-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 |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.2 | 1 |
| 19-Sep | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.2 | 1 |
| 20-Sep | 2 | 0 | Z | 0 | 0 | 0 | 2 | 3 | 3 | 4 | 5 | 6 | 9 | 9 | 13 | 19 | 17 | 18 | 16 | 10 | 7 | 5 | 6 | 2 | 6.8 | 19 | |
| 21-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 | 0.2 | 1 |
| 22-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 | 0.2 | 1 |
| 23-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 |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 25-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 | 0.0 | 0 |
| 26-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 27-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 | 0.1 | 1 |
| 28-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 |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 30-Sep | 0 | 0 | 1 | 1 | 4 | 4 | Z | 9 | 19 | 13 | 12 | 14 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 19 |

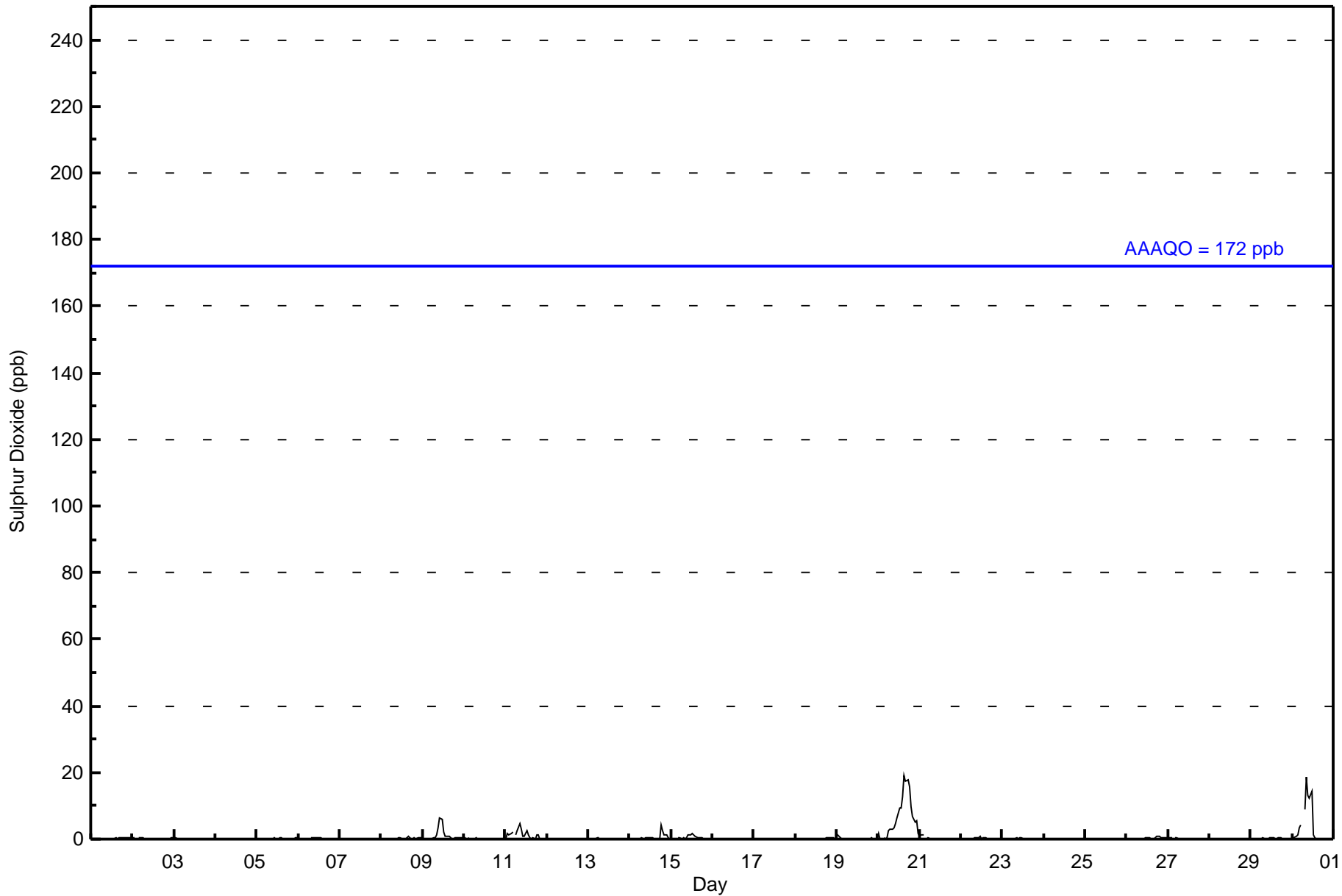
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | 0.7 | 1.0 | 0.9 | 1.0 | 1.1 | 0.7 | 0.6 | 0.6 | 0.8 | 0.7 | 0.7 | 0.8 | 0.6 | 0.4 | 0.3 | 0.3 | 0.2 | Diurnal Average | |
| 2 | 2 | 1 | 2 | 4 | 4 | 2 | 9 | 19 | 13 | 12 | 14 | 9 | 9 | 13 | 19 | 17 | 18 | 16 | 10 | 7 | 5 | 6 | 2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 673 | 98.68 | 98.68 |
| 11 - 20 | 9 | 1.32 | 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: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 32 | 9 | 7 | 7 | 8 | 19 | 67 | 45 | 50 | 68 | 76 | 72 | 45 | 70 | 57 | 41 | 673 |
| 11 - 20 | 3 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 9 | 9 | 8 | 9 | 19 | 68 | 45 | 50 | 68 | 76 | 72 | 45 | 70 | 57 | 42 | 682 |

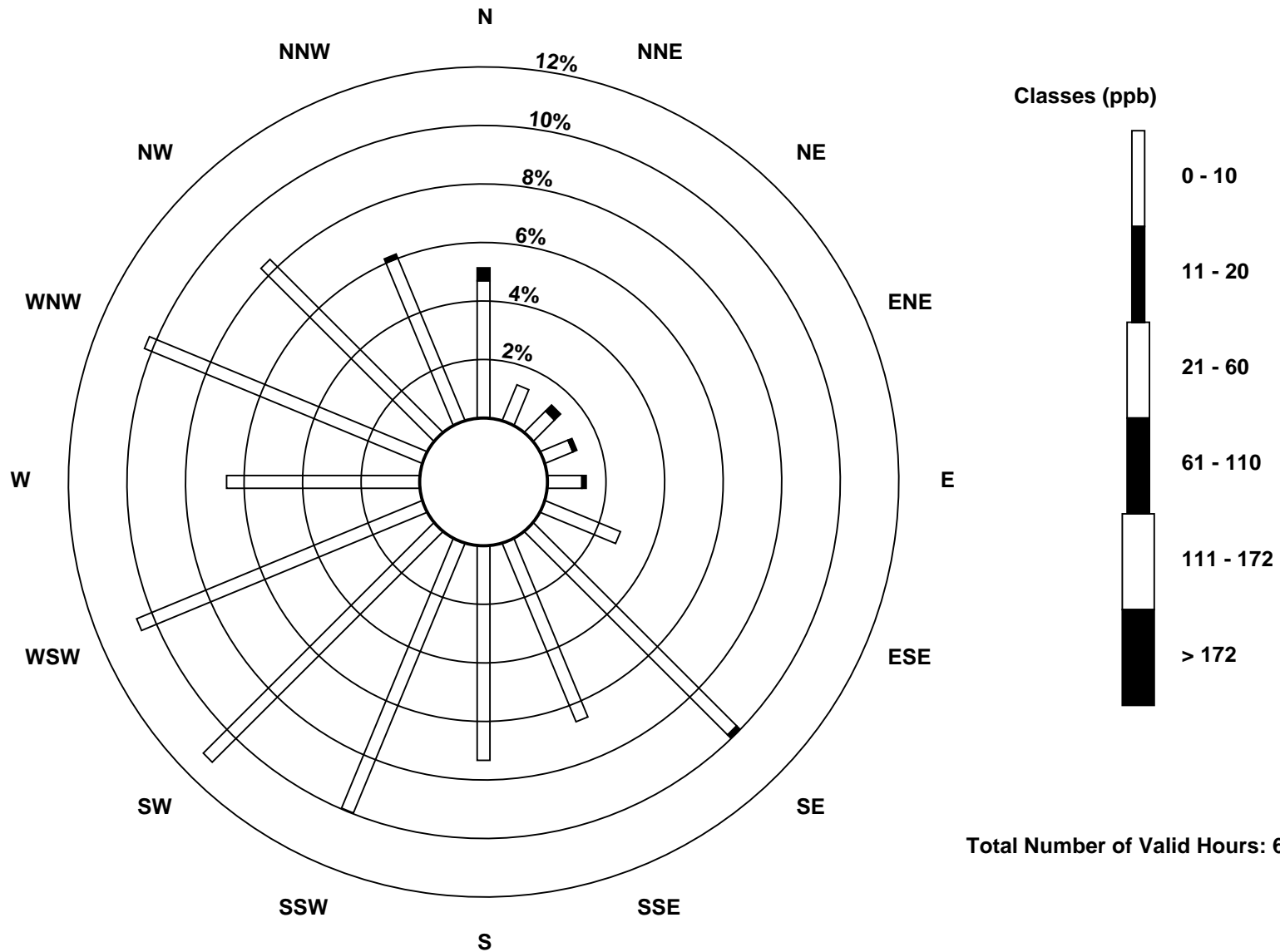
Total Number of Valid Hours: 682

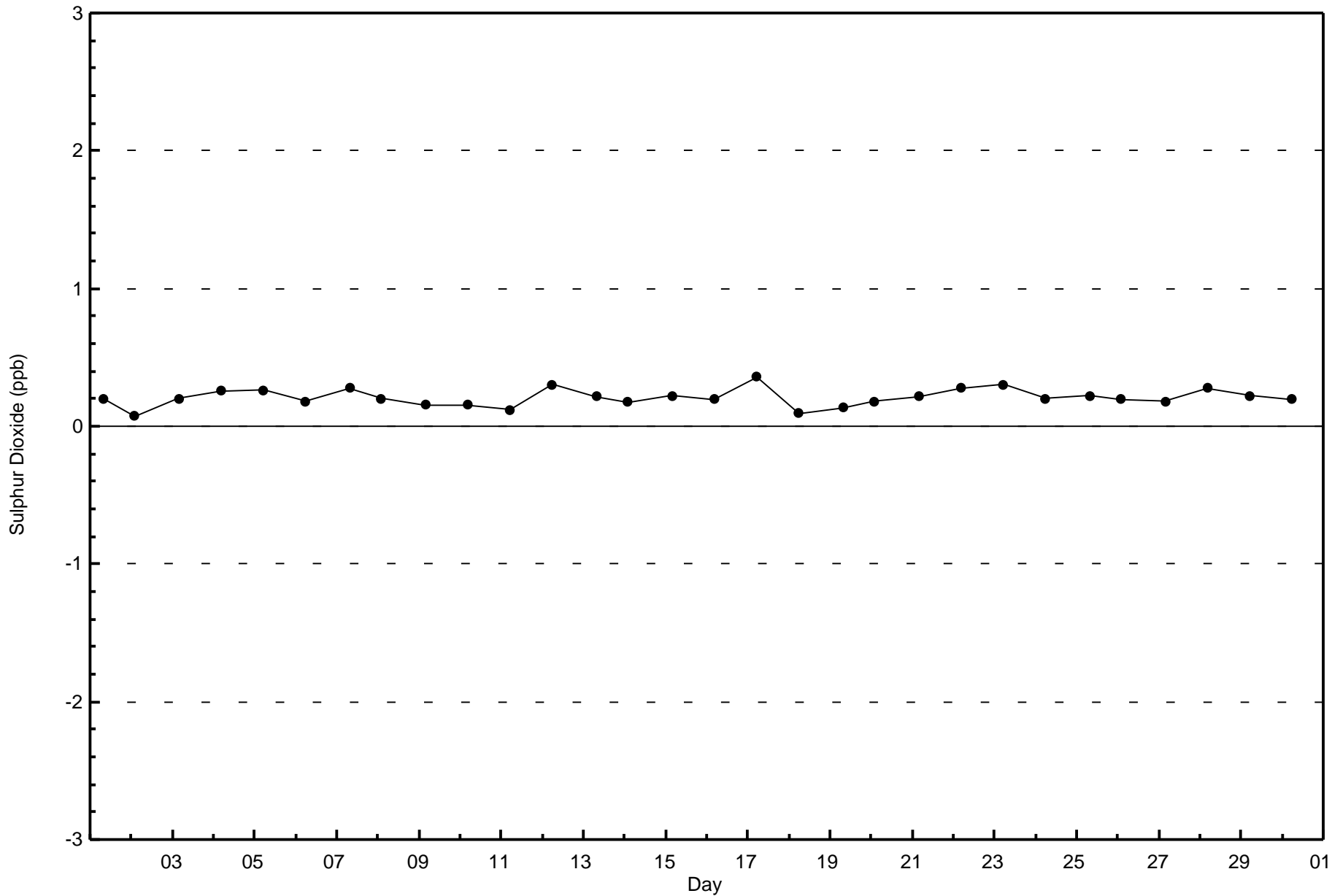
Total Number of Hours: 720

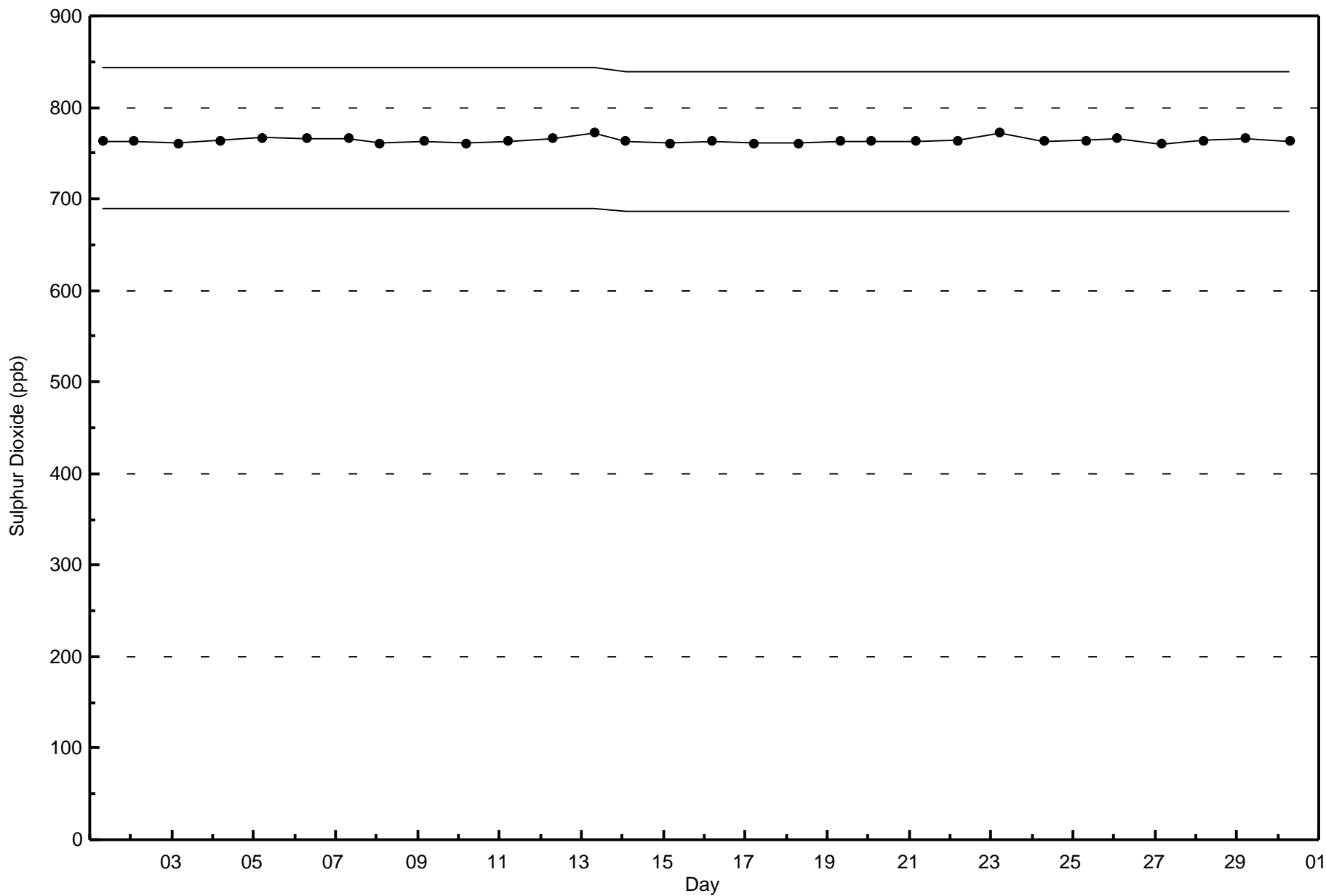


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 30 09:00 | Maximum Daily Average: 0.3 ppb on Sep 30 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 27 16:00 | Minimum Daily Average: 0.1 ppb on Sep 5 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 0.2 ppb at hour 9 | Minimum Diurnal Average: 0.1 ppb at hour 16 | | Hours of Calibration: | 39 |
| Monthly Average: 0.1 ppb | Percentiles: $P_1 = 0$ $P_{10} = 0$ $Q_1 = 0$ Median = 0 $Q_3 = 0$ $P_{90} = 0$ $P_{99} = 1$ | | Percent Operational Time: | 100.0 |

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

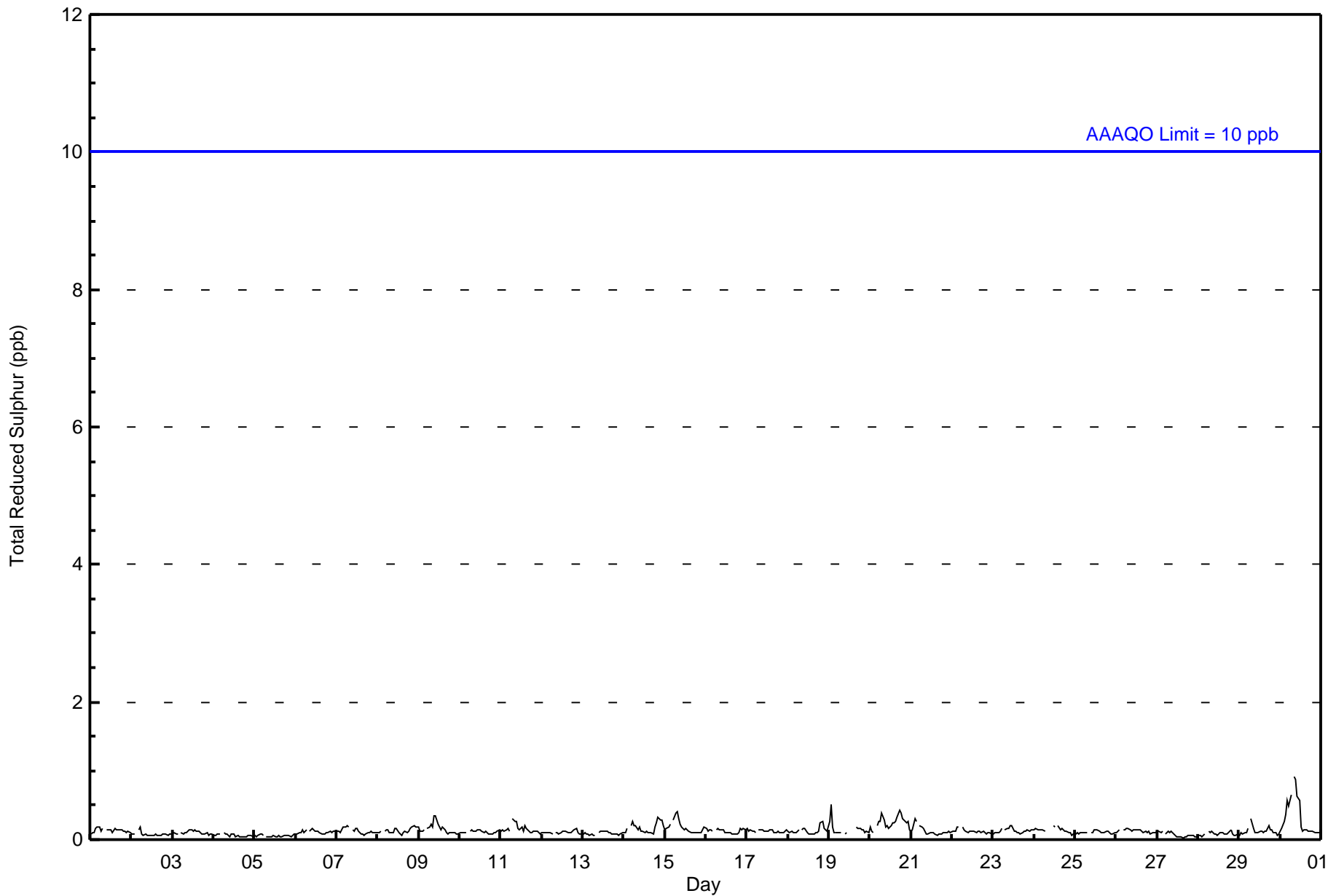
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Diurnal Average |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| 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**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 34 | 9 | 8 | 8 | 9 | 19 | 66 | 44 | 54 | 70 | 76 | 75 | 41 | 68 | 58 | 42 | 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 | 34 | 9 | 8 | 8 | 9 | 19 | 66 | 44 | 54 | 70 | 76 | 75 | 41 | 68 | 58 | 42 | 681 |

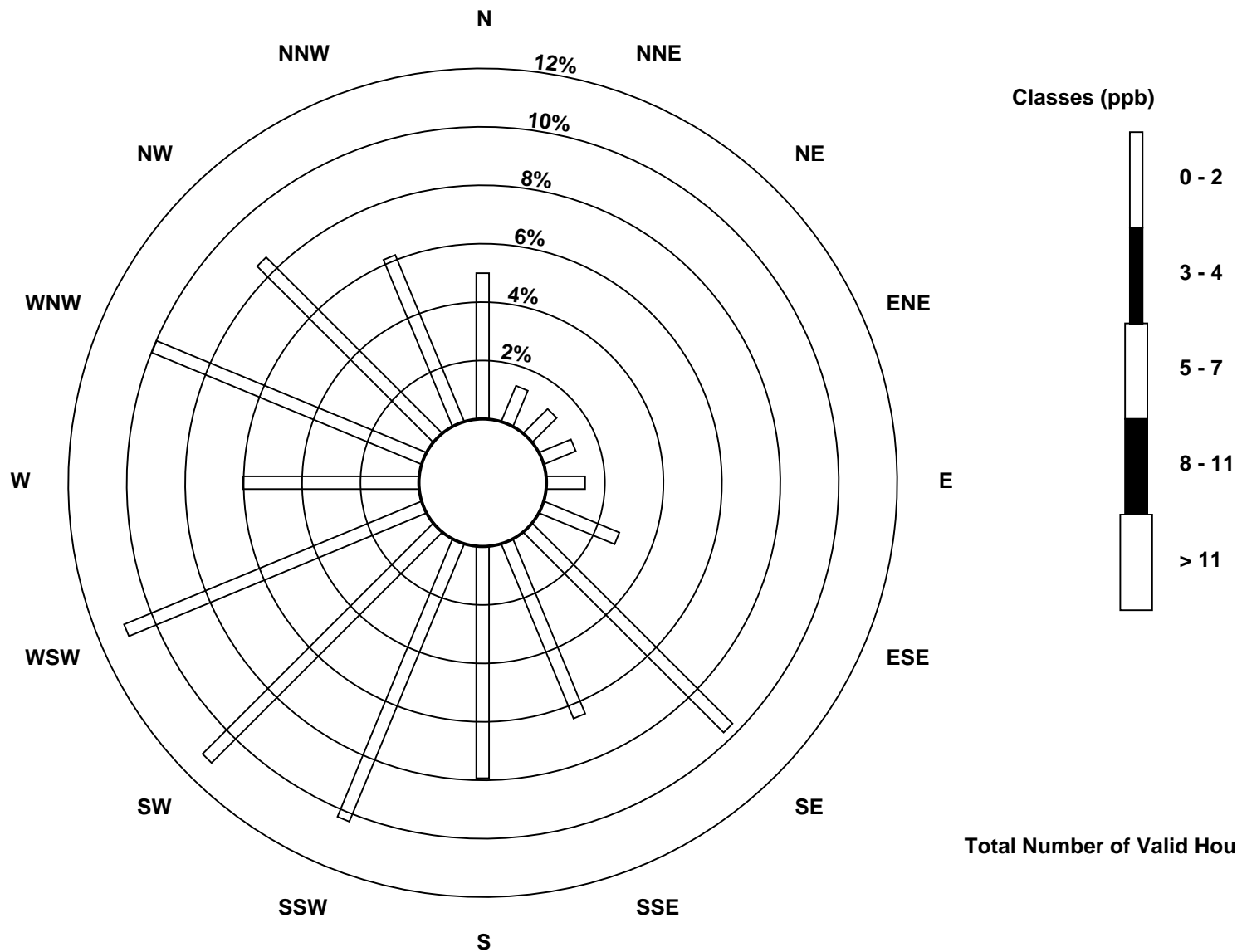
Total Number of Valid Hours: 681

Total Number of Hours: 720

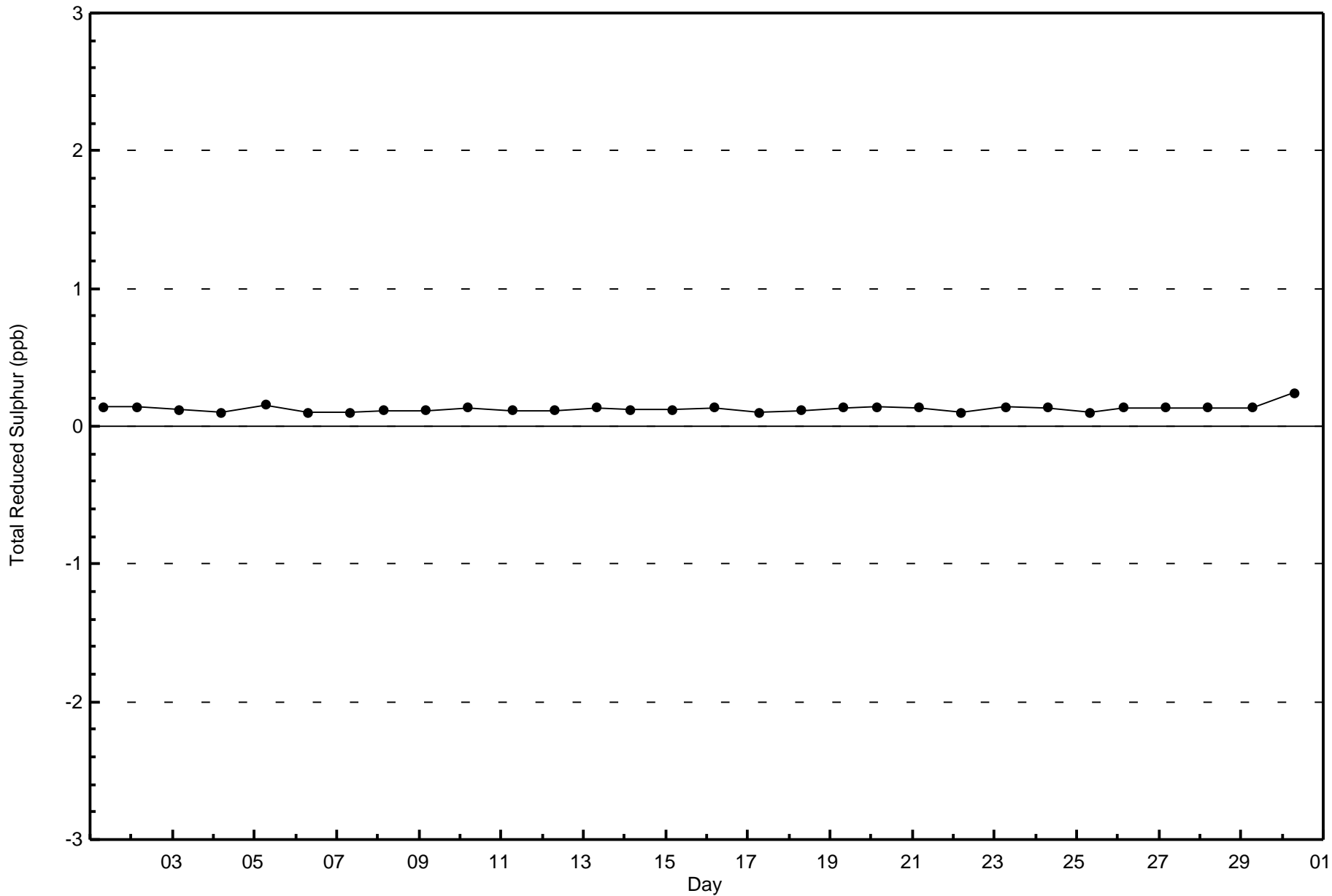


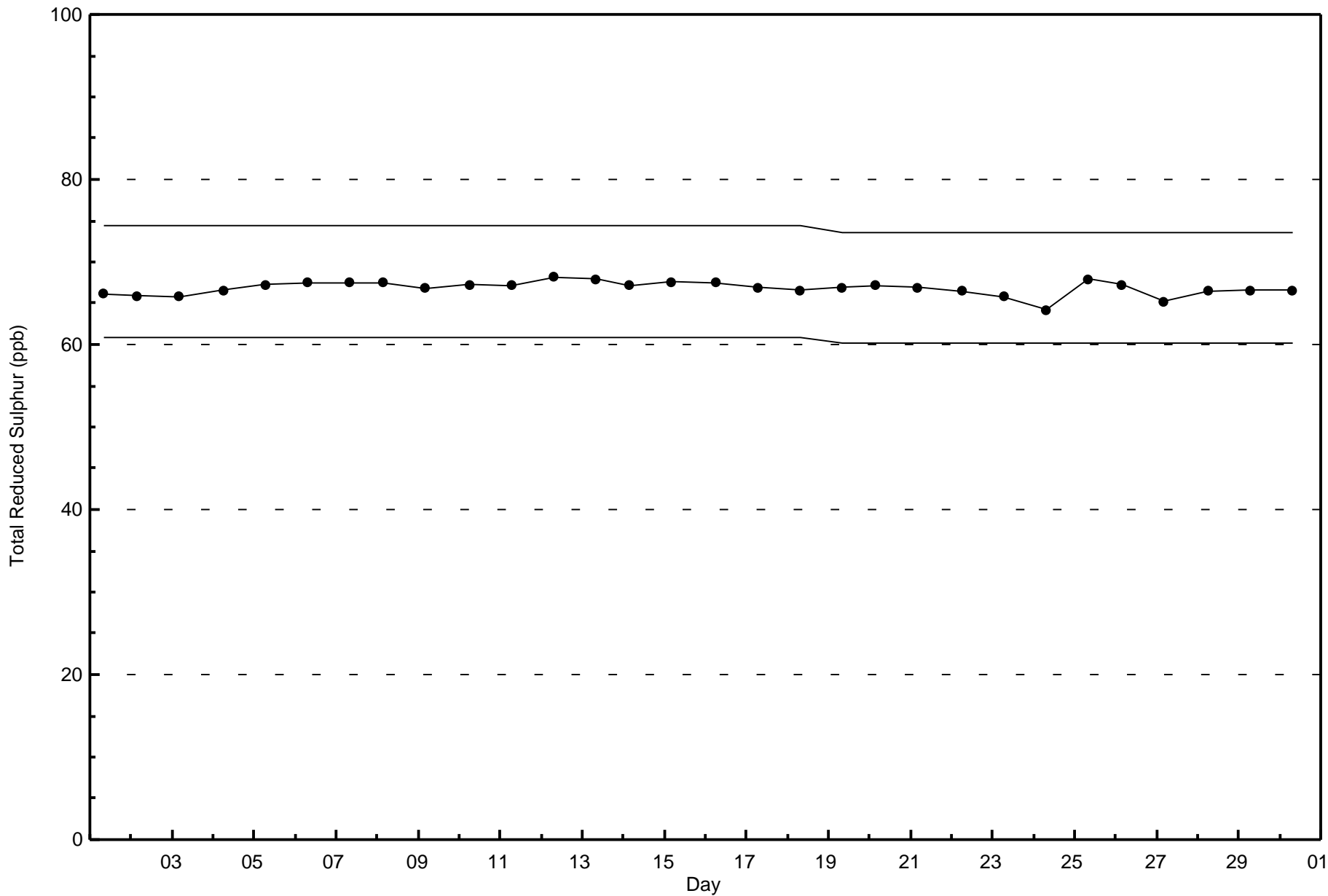
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 681







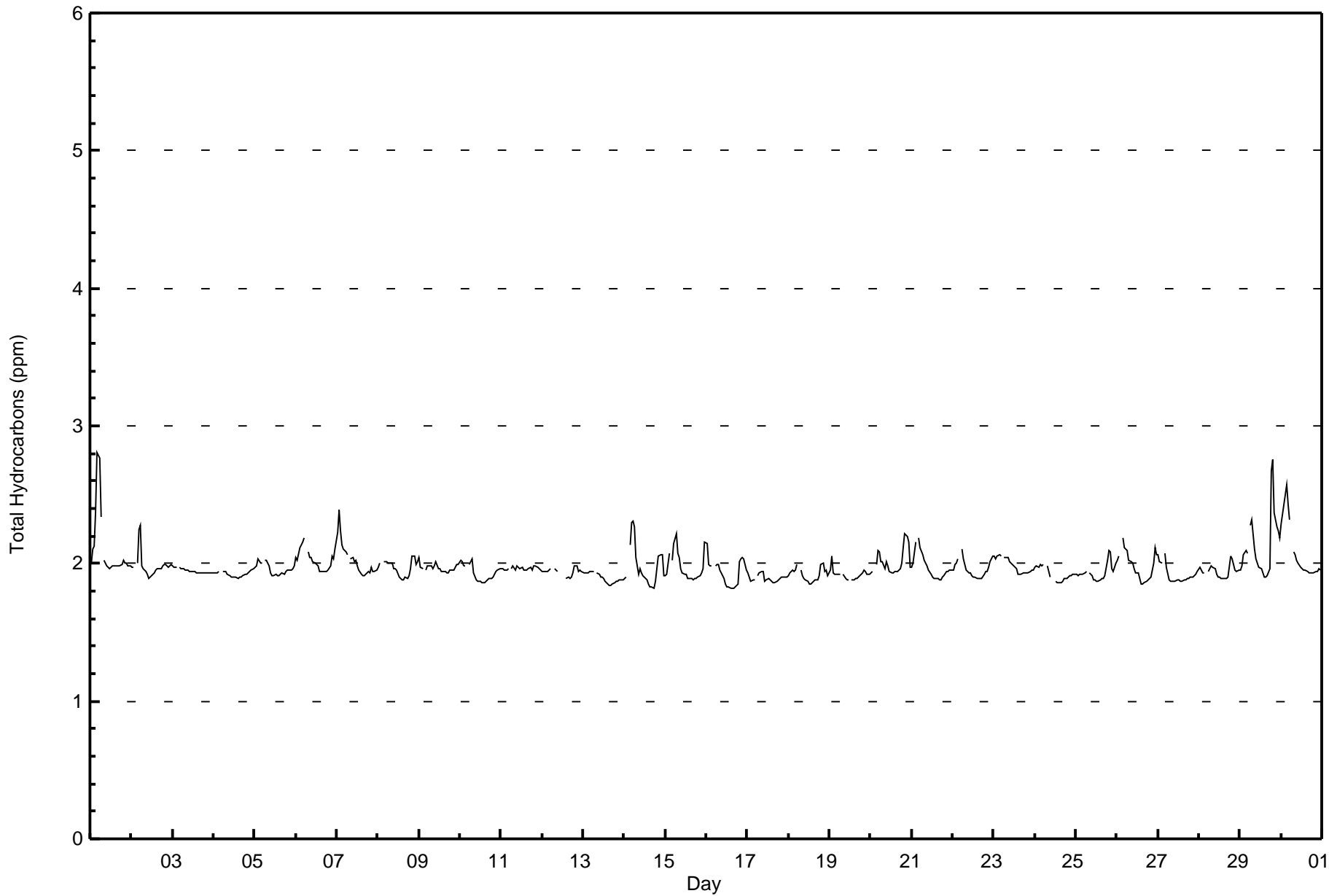
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Patricia McInnes - September 2016

| Maximum Value: 2.8 ppm on Sep 1 05:00 | | Maximum Daily Average: 2.1 ppm on Sep 29 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|
| Minimum Value: 1.8 ppm on Sep 16 16:00 | | Minimum Daily Average: 1.9 ppm on Sep 17 | | Hours of Data: 683 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.1 ppm at hour 5 | | Minimum Diurnal Average: 1.9 ppm at hour 15 | | Hours of Missing Data: 37 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.97 ppm | | Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.4 | | Hours of Calibration: 36 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.9 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 2.0 | 2.1 | 2.1 | 2.4 | 2.8 | 2.8 | 2.3 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.8 |
| 2-Sep | 2.0 | 2.0 | Z | 2.0 | 2.3 | 2.3 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.3 |
| 3-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 4-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 |
| 5-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 6-Sep | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | Z | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | 2.2 |
| 7-Sep | 2.2 | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.4 |
| 8-Sep | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 |
| 9-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 10-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 |
| 11-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 12-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | Z | 2.0 | 2.0 | 1.9 | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.0 | 1.9 | 2.0 |
| 13-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 14-Sep | 1.9 | 1.9 | Z | 2.1 | 2.3 | 2.3 | 2.3 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 2.1 | 2.1 | 2.1 | 1.9 | 2.3 |
| 15-Sep | 1.9 | 1.9 | 2.1 | Z | 2.0 | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.0 | 2.2 |
| 16-Sep | 2.2 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.2 |
| 17-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 18-Sep | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.0 | 1.9 | 2.0 |
| 19-Sep | 2.0 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 20-Sep | 1.9 | 1.9 | Z | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.0 | 2.2 |
| 21-Sep | 2.0 | 2.0 | 2.2 | Z | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.2 |
| 22-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 |
| 23-Sep | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 |
| 24-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 25-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.0 | 1.9 | 2.0 | 2.1 |
| 26-Sep | 2.0 | 2.1 | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.2 |
| 27-Sep | 2.1 | 2.0 | 2.0 | Z | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 28-Sep | 2.0 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 2.1 |
| 29-Sep | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | Z | 2.3 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.7 | 2.8 | 2.4 | 2.3 | 2.2 | 2.2 | 2.8 |
| 30-Sep | 2.3 | 2.4 | 2.5 | 2.6 | 2.4 | 2.3 | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.6 | 2.6 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 598 | 87.55 | 87.55 |
| 2.1 - 3.0 | 85 | 12.45 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Patricia McInnes - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 25 | 8 | 7 | 7 | 8 | 19 | 58 | 33 | 38 | 60 | 71 | 70 | 40 | 67 | 49 | 38 | 598 |
| 2.1 - 3.0 | 10 | 1 | 2 | 1 | 1 | 0 | 10 | 12 | 12 | 8 | 6 | 3 | 4 | 3 | 8 | 4 | 85 |
| 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 | 9 | 9 | 8 | 9 | 19 | 68 | 45 | 50 | 68 | 77 | 73 | 44 | 70 | 57 | 42 | 683 |

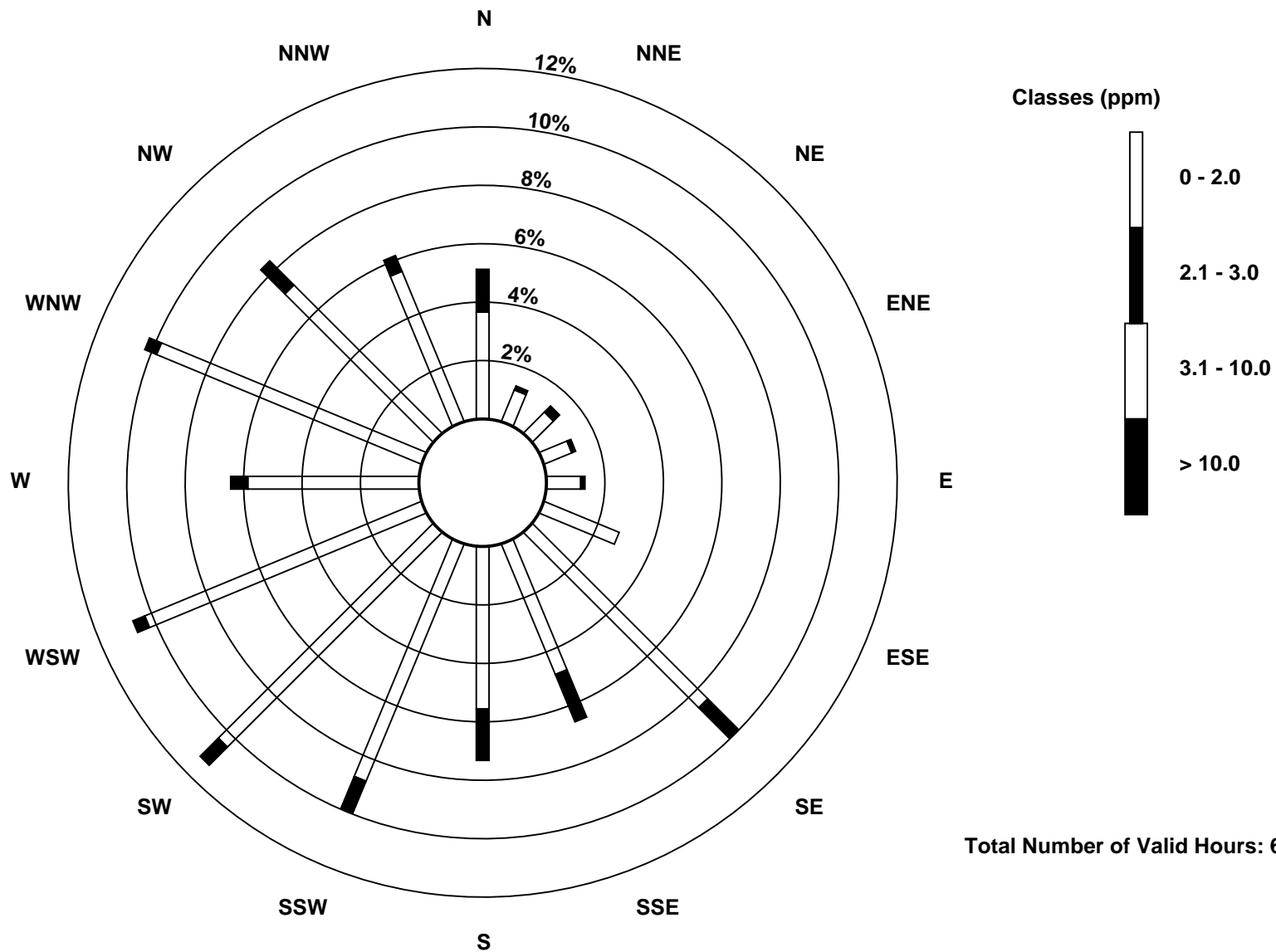
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

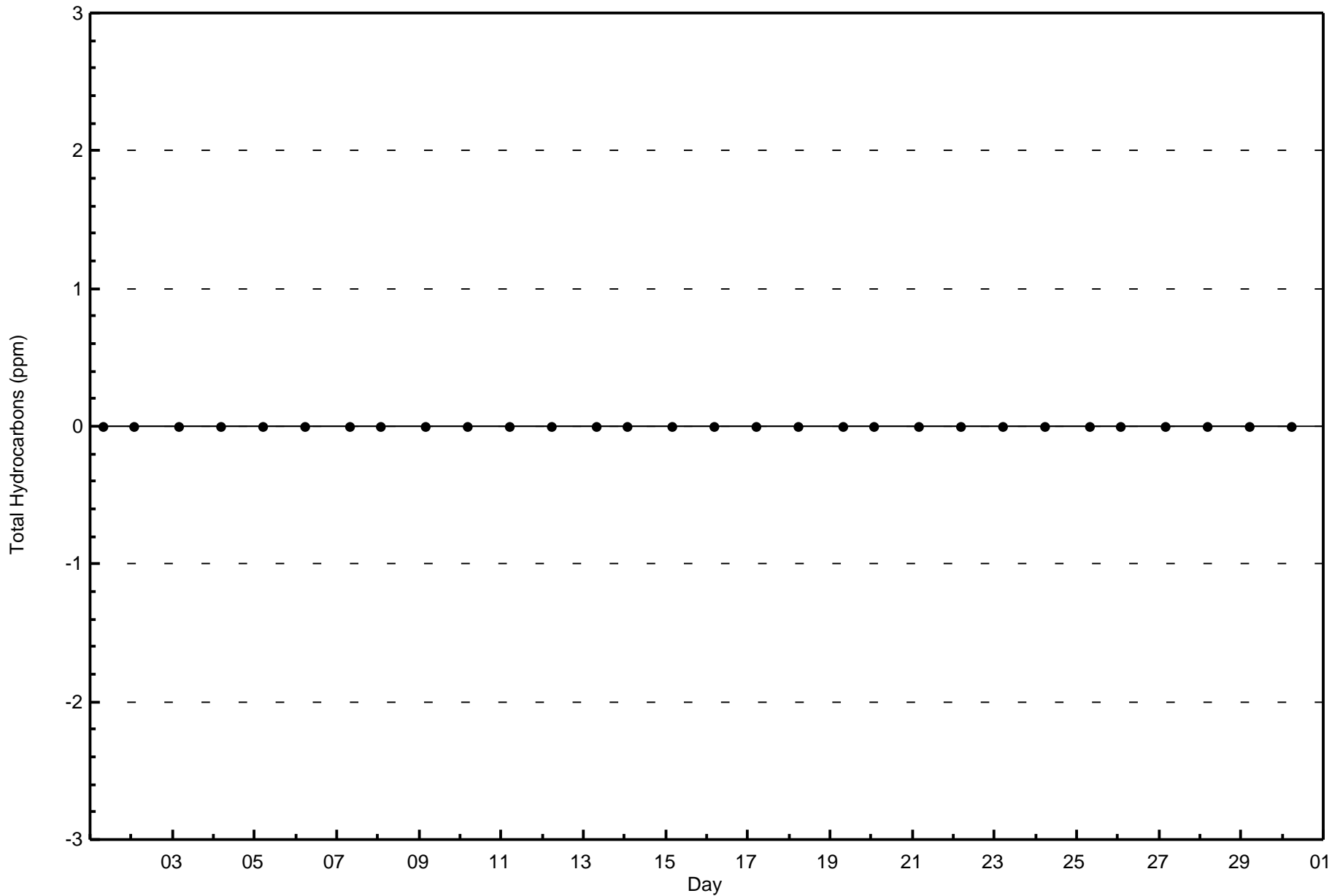
Total Hydrocarbons (THC) - ppm
Patricia McInnes (AMS 6)

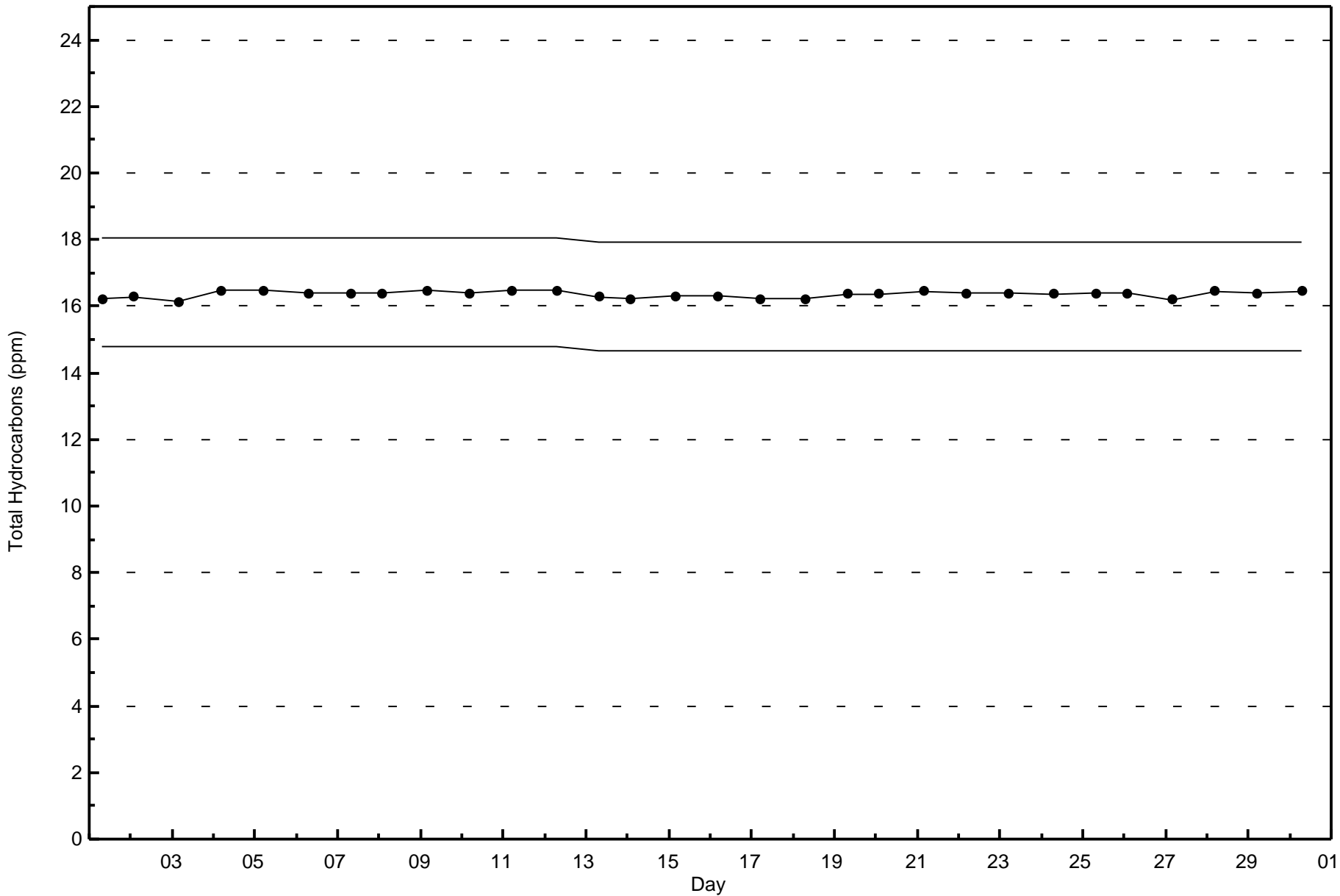




Wood Buffalo Environmental Association
Zero Responses

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







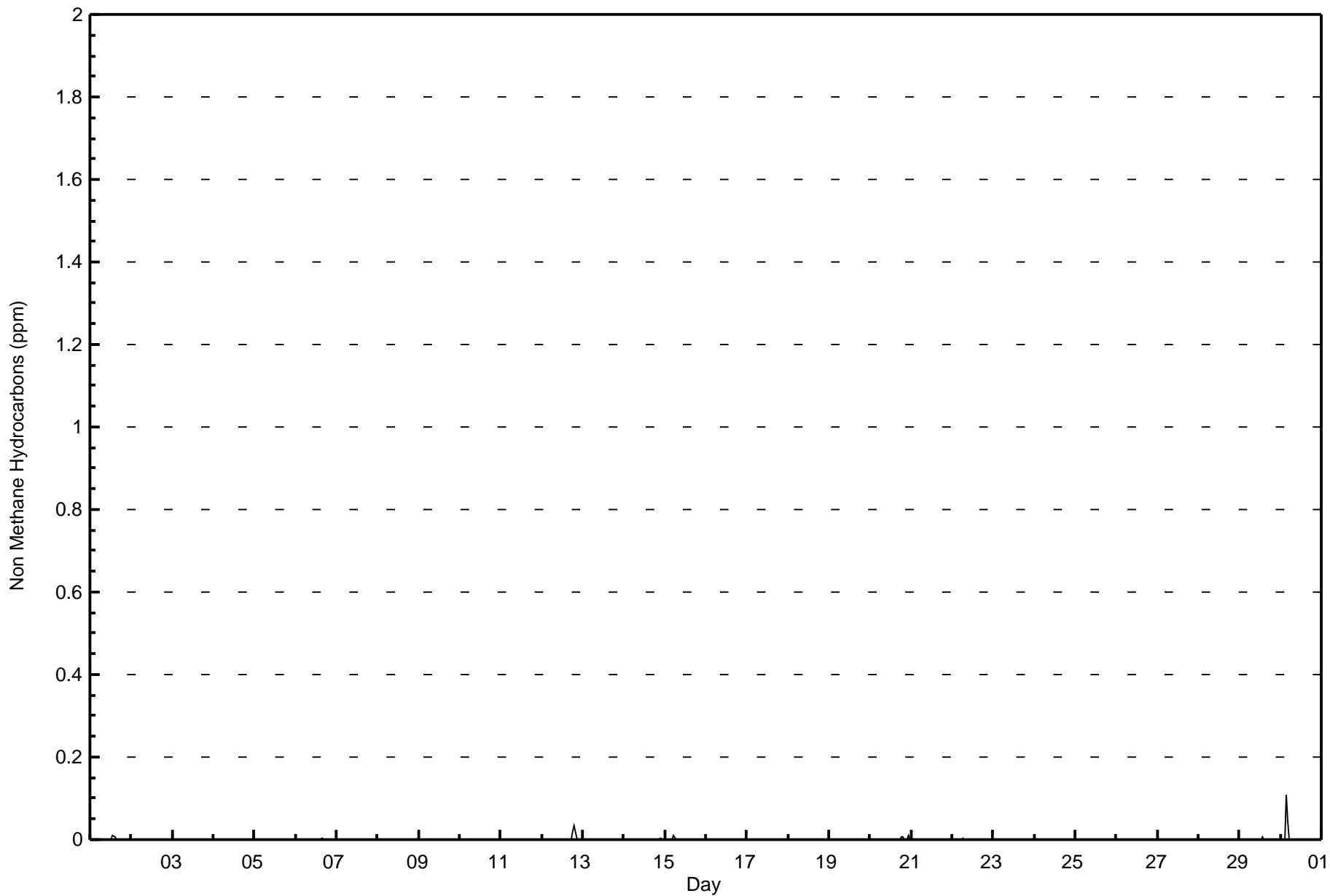
Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

Patricia McInnes - September 2016

| Maximum Value: 0.109 ppm on Sep 30 04:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 0.007 ppm on Sep 30 | | | | | Hours in Service: 720 | | |
|--------------------------------------------------------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-----------------|--------------------------------|---------------|-------|
| Minimum Value: 0.000 ppm on Sep 1 01:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.000 ppm on Sep 2 | | | | | Hours of Data: 683 | | |
| Maximum Diurnal Average: 0.004 ppm at hour 4 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.000 ppm at hour 1 | | | | | Hours of Missing Data: 37 | | |
| Monthly Average: 0.000 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: 36 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.9 | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.010 | 0.007 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.010 |
| 2-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 | 0.000 | 0.000 | 0.000 | 0.000 |
| 3-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 | 0.000 |
| 4-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 | 0.000 |
| 5-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 | 0.000 |
| 6-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| 7-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 8-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 | 0.000 | 0.000 | 0.000 | 0.000 |
| 9-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 | 0.000 |
| 10-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 | 0.000 |
| 11-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 | 0.000 |
| 12-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | C | C | C | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.021 | 0.034 | 0.003 | 0.000 | 0.000 | 0.000 | 0.003 | 0.034 |
| 13-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 14-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 | 0.000 | 0.001 | 0.004 | 0.000 |
| 15-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 |
| 16-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 | 0.000 |
| 17-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 | 0.000 |
| 18-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 19-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | M | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 20-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 | 0.006 | 0.007 | 0.000 | 0.000 | 0.010 | 0.000 | 0.001 | 0.010 |
| 21-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 | 0.000 |
| 22-Sep | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| 23-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 | 0.000 |
| 24-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | C | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 25-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 26-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 | 0.000 | 0.000 | 0.000 | 0.000 |
| 27-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 | 0.000 |
| 28-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 | 0.000 |
| 29-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 | 0.007 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 |
| 30-Sep | 0.000 | 0.000 | 0.000 | 0.109 | 0.047 | 0.005 | 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 | 0.007 | 0.109 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 672 | 98.39 | 98.39 |
| 0.006 - 0.05 | 10 | 1.46 | 99.85 |
| 0.06 - 0.1 | 1 | 0.15 | 100.00 |
| > 0.1 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 34 | 8 | 8 | 7 | 9 | 19 | 65 | 43 | 49 | 68 | 77 | 73 | 44 | 70 | 57 | 41 | 672 |
| 0.006 - 0.05 | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 |
| 0.06 - 0.1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| > 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 9 | 9 | 8 | 9 | 19 | 68 | 45 | 50 | 68 | 77 | 73 | 44 | 70 | 57 | 42 | 683 |

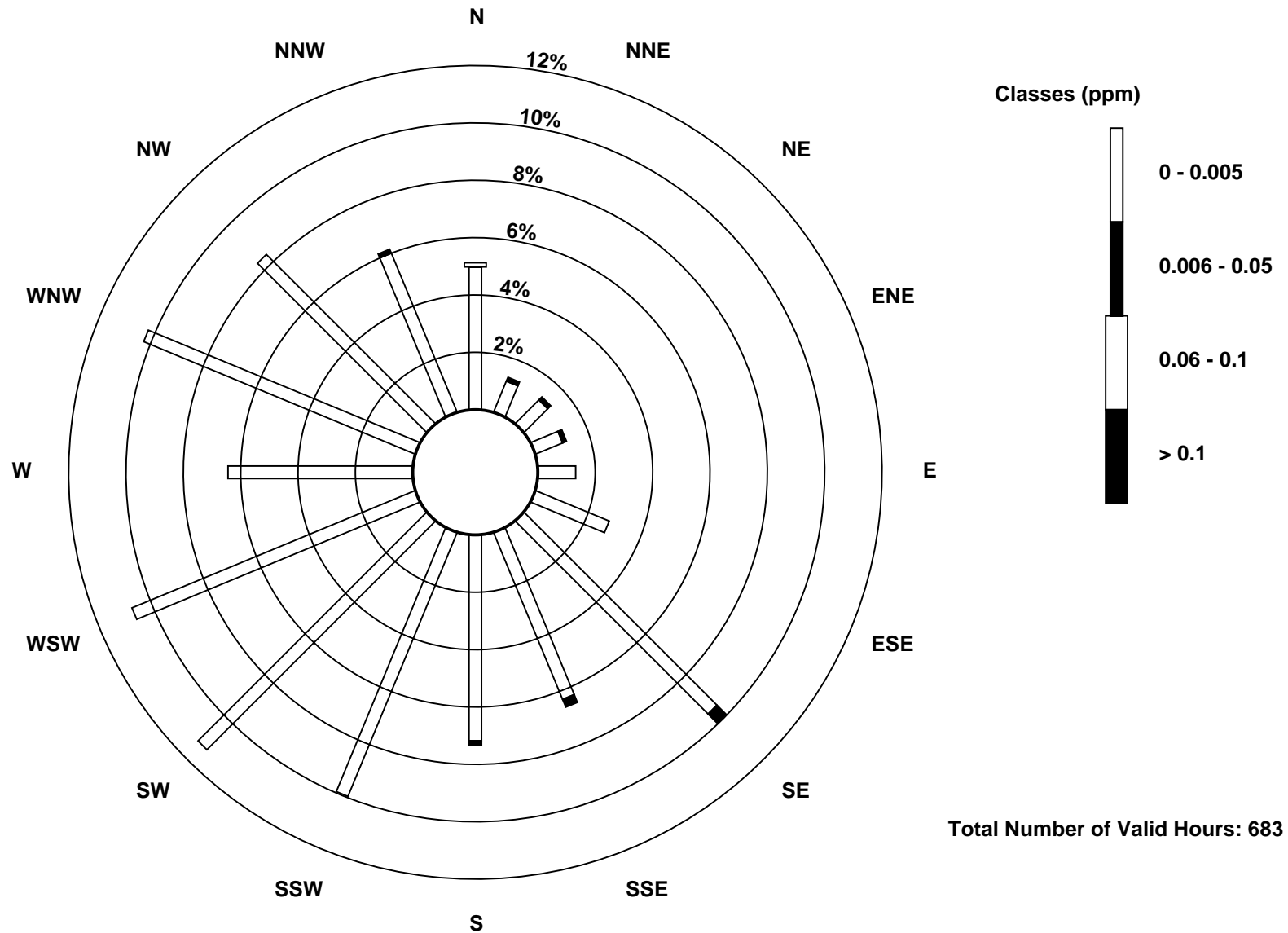
Total Number of Valid Hours: 683

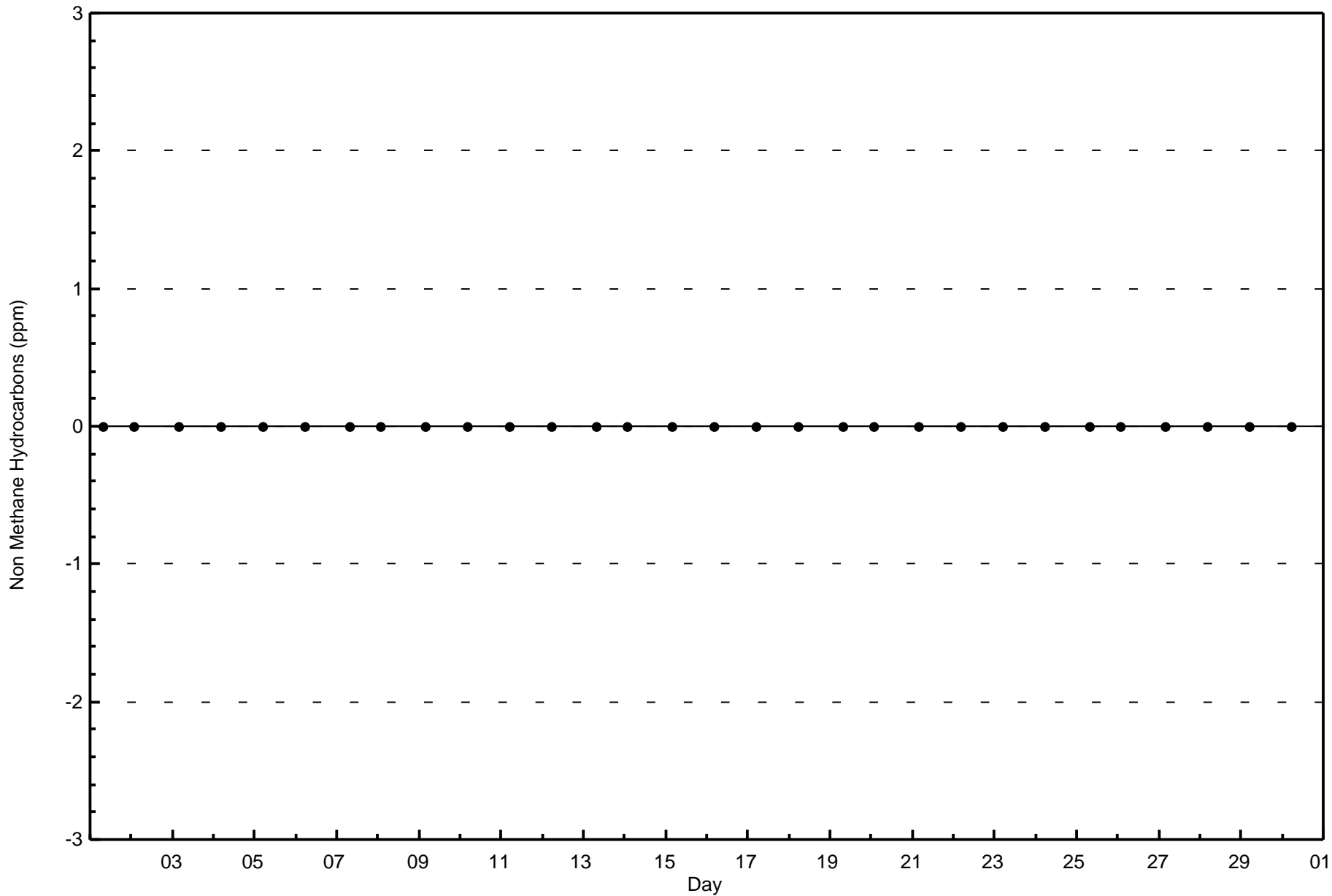
Total Number of Hours: 720

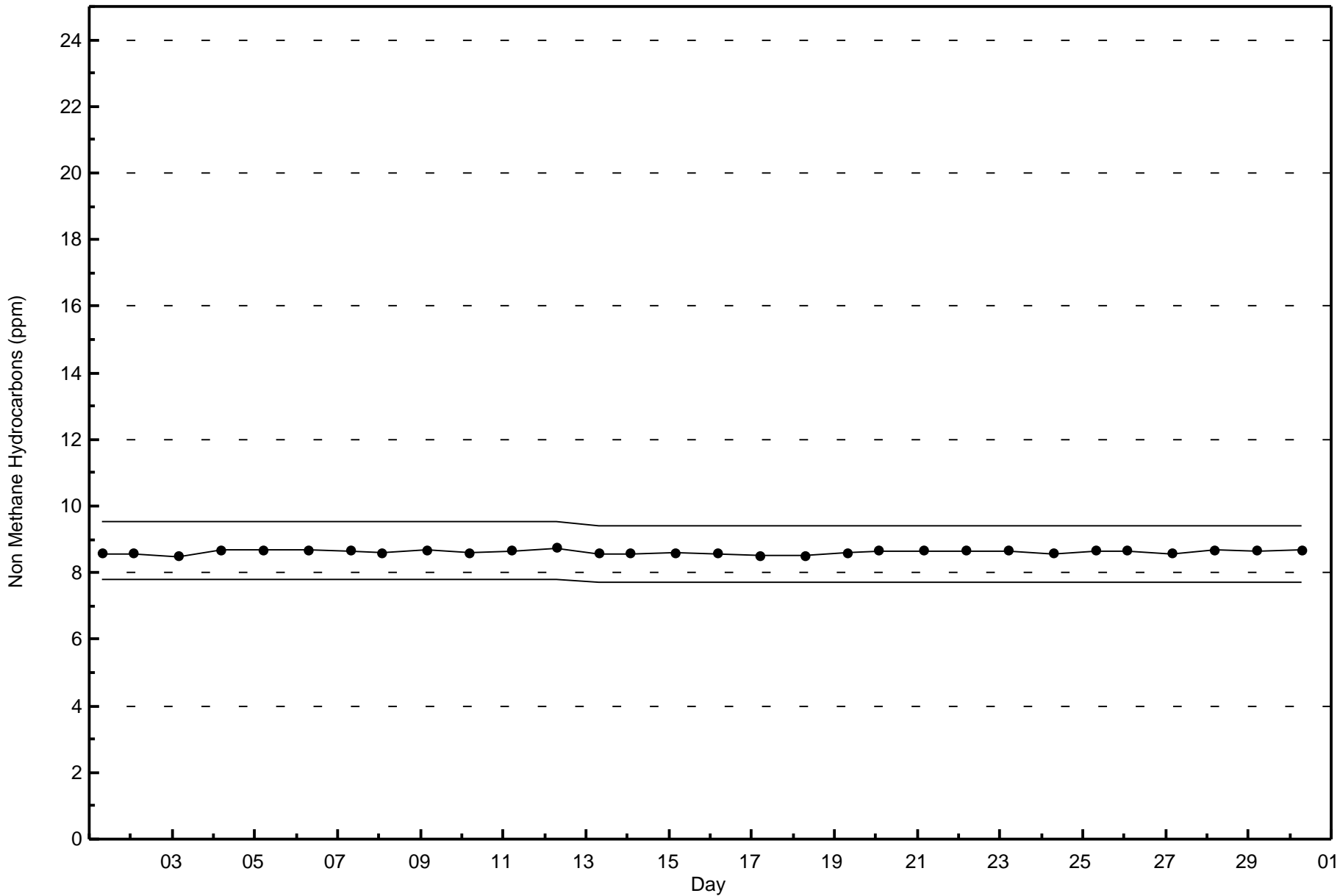


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

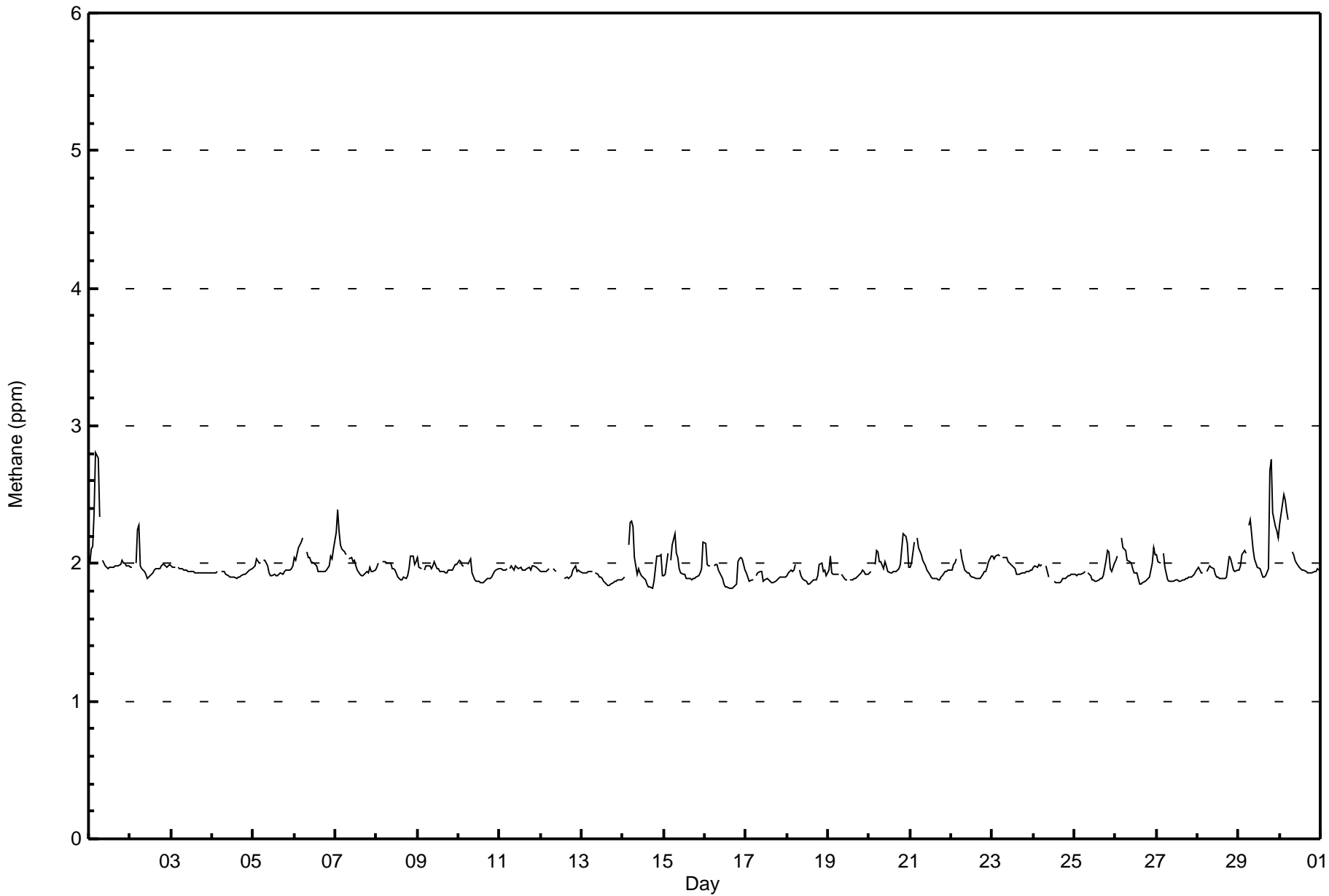
Methane (CH₄) - ppm

Patricia McInnes - September 2016

| | | | | |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2.8 ppm on Sep 1 05:00 | Maximum Daily Average: 2.1 ppm on Sep 29 | | Hours of Data: | 683 |
| Minimum Value: 1.8 ppm on Sep 16 16:00 | Minimum Daily Average: 1.9 ppm on Sep 17 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 2.1 ppm at hour 5 | Minimum Diurnal Average: 1.9 ppm at hour 15 | | Hours of Calibration: | 36 |
| Monthly Average: 1.97 ppm | Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.4 | | 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 | 2.0 | 2.1 | 2.1 | 2.4 | 2.8 | 2.8 | 2.3 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.8 |
| 2-Sep | 2.0 | 2.0 | Z | 2.0 | 2.3 | 2.3 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.3 |
| 3-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 4-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 5-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 6-Sep | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | Z | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | 2.2 |
| 7-Sep | 2.2 | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.4 |
| 8-Sep | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 |
| 9-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 10-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.0 |
| 11-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 12-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | Z | 2.0 | 2.0 | 1.9 | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.0 | 1.9 | 2.0 |
| 13-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 14-Sep | 1.9 | 1.9 | Z | 2.1 | 2.3 | 2.3 | 2.3 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 2.1 | 2.1 | 2.1 | 1.9 | 2.0 | 2.3 |
| 15-Sep | 1.9 | 1.9 | 2.1 | Z | 2.0 | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.0 | 2.2 |
| 16-Sep | 2.2 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.2 |
| 17-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 18-Sep | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 |
| 19-Sep | 2.0 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 20-Sep | 1.9 | 1.9 | Z | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 2.2 |
| 21-Sep | 2.0 | 2.0 | 2.2 | Z | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.2 |
| 22-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 |
| 23-Sep | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 |
| 24-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 25-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.0 | 1.9 | 2.0 | 2.1 |
| 26-Sep | 2.0 | 2.1 | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 2.0 | 2.2 |
| 27-Sep | 2.1 | 2.0 | 2.0 | Z | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 28-Sep | 2.0 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 2.1 |
| 29-Sep | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | Z | 2.3 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.7 | 2.8 | 2.4 | 2.3 | 2.2 | 2.2 | 2.1 | 2.8 |
| 30-Sep | 2.3 | 2.4 | 2.5 | 2.5 | 2.4 | 2.3 | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.1 | 2.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |

Z - zerspan C - Calibration M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 598 | 87.55 | 87.55 |
| 2.1 - 3.0 | 85 | 12.45 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 25 | 8 | 7 | 7 | 8 | 19 | 58 | 33 | 38 | 60 | 71 | 70 | 40 | 67 | 49 | 38 | 598 |
| 2.1 - 3.0 | 10 | 1 | 2 | 1 | 1 | 0 | 10 | 12 | 12 | 8 | 6 | 3 | 4 | 3 | 8 | 4 | 85 |
| 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 | 9 | 9 | 8 | 9 | 19 | 68 | 45 | 50 | 68 | 77 | 73 | 44 | 70 | 57 | 42 | 683 |

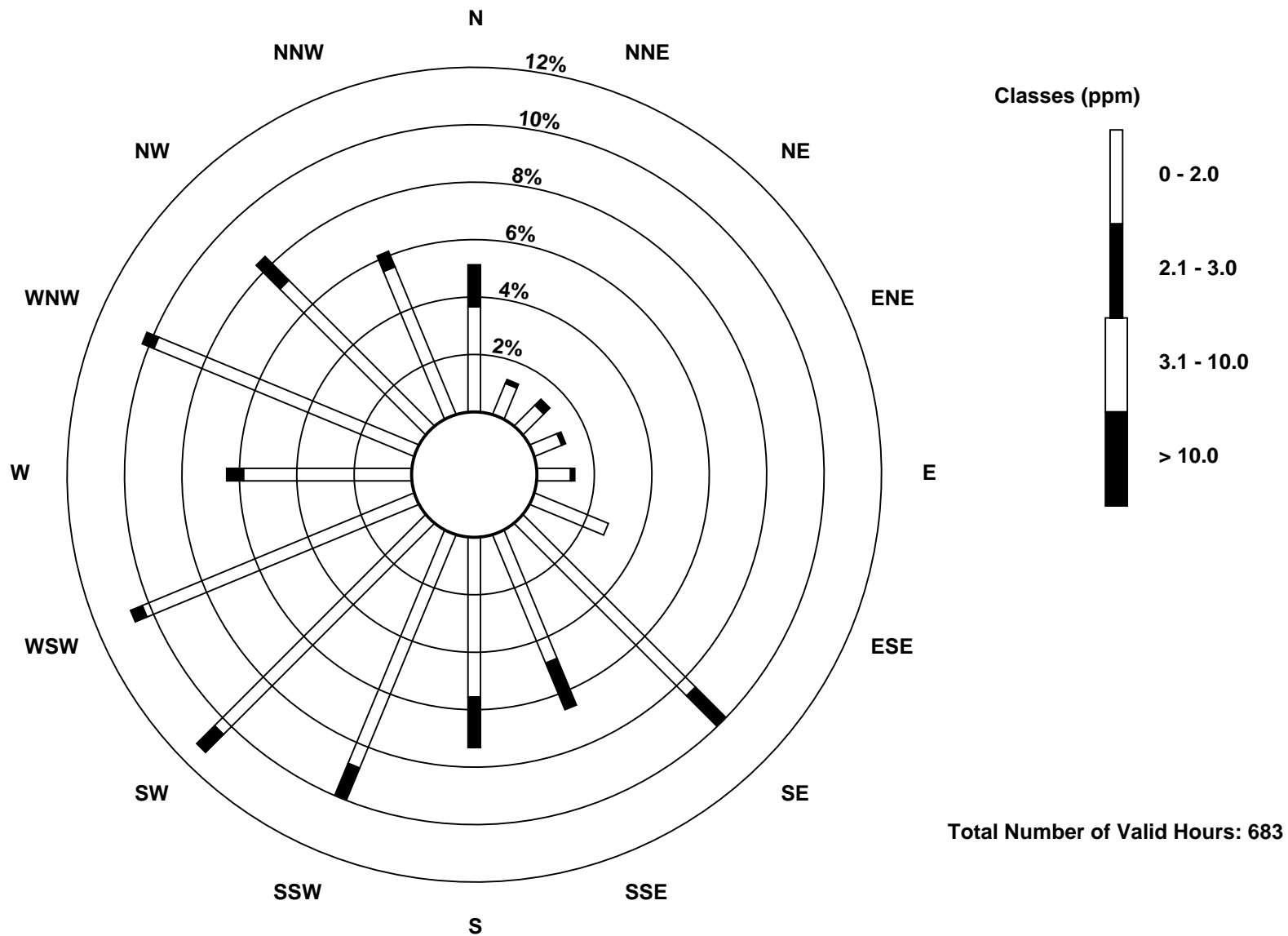
Total Number of Valid Hours: 683

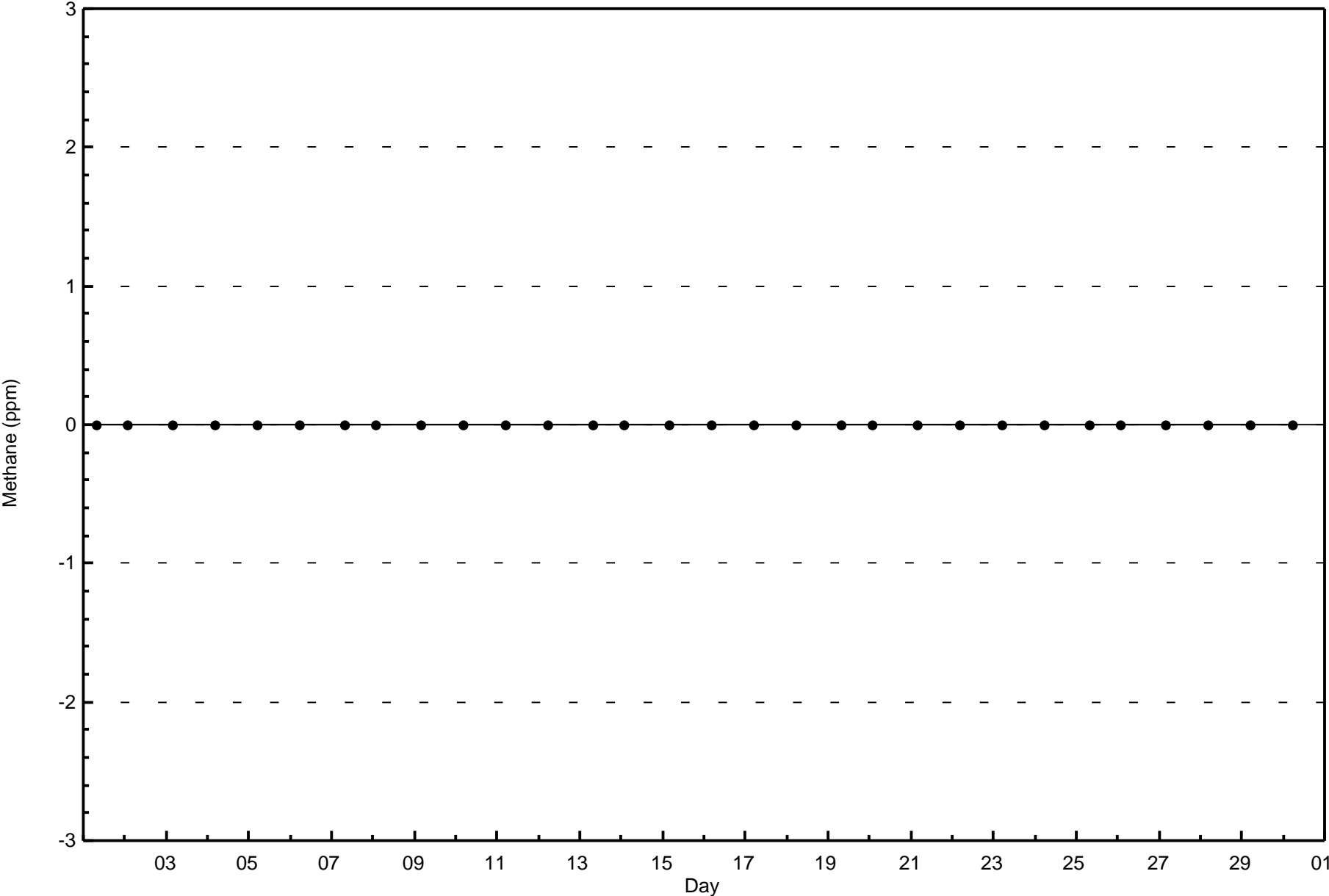
Total Number of Hours: 720

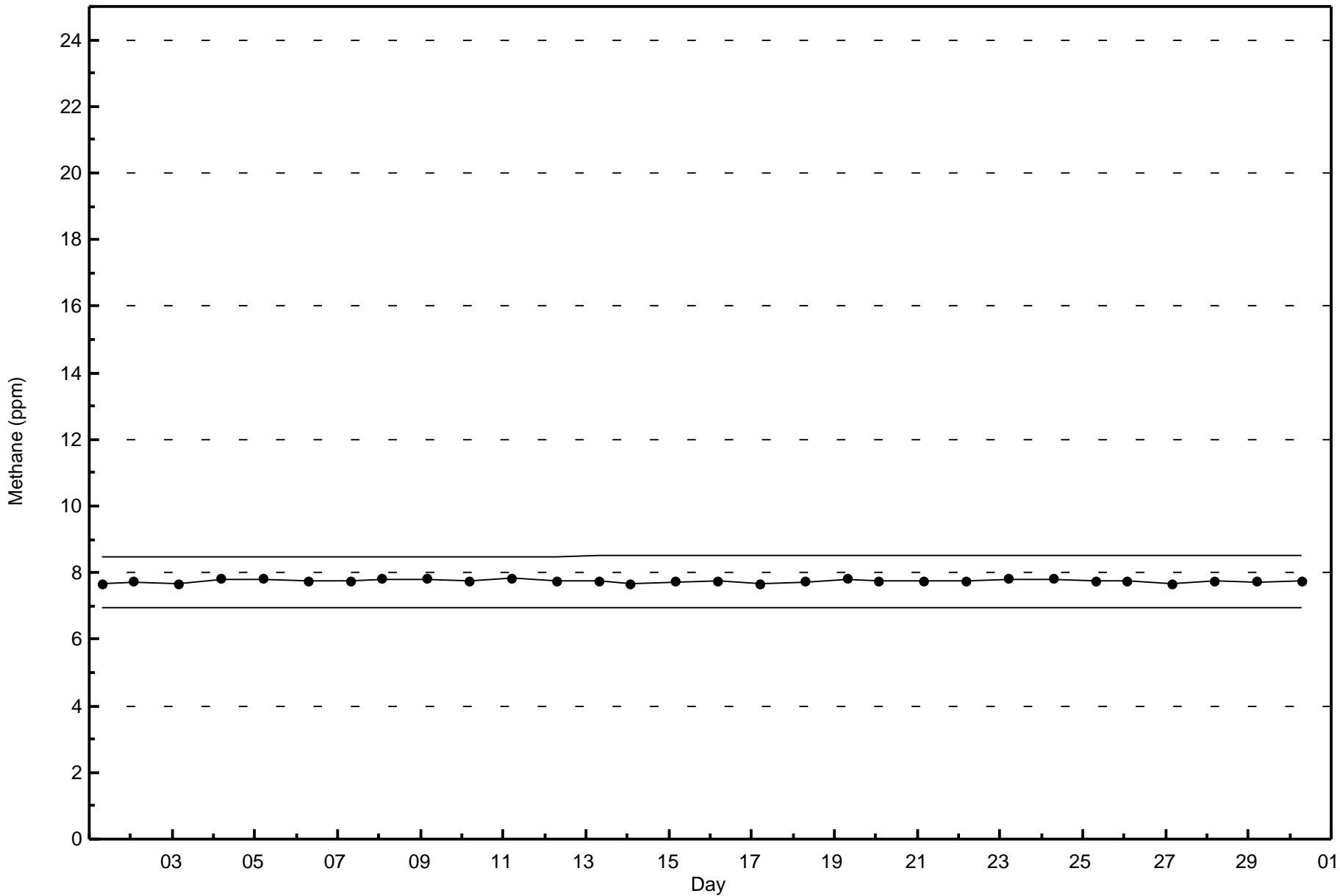


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Patricia McInnes - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 43 ppb on Sep 22 15:00 | Maximum Daily Average: 32.3 ppb on Sep 27 |
| Minimum Value: 5 ppb on Sep 30 04:00 | Hours of Data: 683 |
| Maximum Diurnal Average: 29.7 ppb at hour 16 | Hours of Missing Data: 37 |
| Monthly Average: 22.8 ppb | Hours of Calibration: 36 |
| Minimum Daily Average: 13.5 ppb on Sep 1 | Percent Operational Time: 99.9 |
| Minimum Diurnal Average: 14.1 ppb at hour 7 | |
| Percentiles: P ₁ = 7 P ₁₀ = 12 O ₁ = 17 Median = 23 O ₃ = 28 P ₉₀ = 33 P ₉₉ = 39 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 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 | 12 | 10 | 7 | 7 | Z | 11 | 13 | 15 | 16 | 17 | 16 | 16 | 15 | 16 | 15 | 14 | 13 | 12 | 12 | 14 | 16 | 16 | 13.5 | 17 |
| 2-Sep | 18 | Z | 12 | 12 | 7 | 10 | 13 | 14 | 16 | 21 | 24 | 22 | 20 | 16 | 14 | 13 | 12 | 12 | 11 | 11 | 10 | 11 | 9 | 9 | 13.8 | 24 |
| 3-Sep | 9 | 10 | Z | 10 | 11 | 10 | 10 | 10 | 9 | 12 | 16 | 17 | 17 | 17 | 18 | 20 | 20 | 22 | 24 | 26 | 25 | 25 | 26 | 27 | 17.0 | 27 |
| 4-Sep | 26 | 24 | 22 | Z | 21 | 20 | 20 | 21 | 23 | 28 | 32 | 32 | 33 | 34 | 35 | 35 | 34 | 33 | 32 | 31 | 28 | 26 | 25 | 24 | 27.8 | 35 |
| 5-Sep | 23 | 21 | 17 | 16 | Z | 13 | 13 | 15 | 19 | 24 | 29 | 30 | 29 | 31 | 32 | 34 | 31 | 30 | 28 | 26 | 26 | 28 | 26 | 23 | 24.5 | 34 |
| 6-Sep | 19 | 21 | 16 | 13 | 10 | Z | 8 | 11 | 17 | 19 | 24 | 28 | 29 | 29 | 29 | 31 | 30 | 30 | 29 | 24 | 24 | 19 | 19 | 14 | 21.5 | 31 |
| 7-Sep | 12 | 10 | 10 | 10 | 10 | 8 | Z | 8 | 11 | 14 | 17 | 19 | 25 | 28 | 30 | 31 | 31 | 25 | 22 | 28 | 21 | 24 | 23 | 23 | 19.0 | 31 |
| 8-Sep | 21 | Z | 16 | 16 | 14 | 14 | 12 | 15 | 15 | 16 | 18 | 22 | 28 | 29 | 30 | 31 | 24 | 26 | 28 | 23 | 22 | 18 | 18 | 17 | 20.6 | 31 |
| 9-Sep | 15 | 18 | Z | 19 | 18 | 17 | 17 | 14 | 16 | 19 | 20 | 18 | 20 | 20 | 20 | 21 | 21 | 21 | 15 | 18 | 20 | 19 | 19 | 18 | 18.4 | 21 |
| 10-Sep | 16 | 17 | 17 | Z | 15 | 14 | 12 | 12 | 16 | 17 | 17 | 18 | 18 | 25 | 26 | 26 | 26 | 25 | 22 | 19 | 20 | 20 | 18 | 17 | 18.8 | 26 |
| 11-Sep | 17 | 20 | 23 | 23 | Z | 23 | 23 | 22 | 22 | 19 | 20 | 22 | 24 | 25 | 25 | 25 | 23 | 22 | 24 | 23 | 23 | 22 | 22 | 23 | 22.4 | 25 |
| 12-Sep | 25 | 25 | 25 | 24 | 22 | Z | 18 | 18 | 19 | 28 | 33 | 31 | 30 | 33 | 33 | 33 | 34 | 33 | 29 | 21 | 21 | 24 | 23 | 23 | 26.2 | 34 |
| 13-Sep | 25 | 27 | 29 | 29 | 28 | 26 | Z | 24 | 22 | 22 | 22 | 23 | 24 | 25 | 27 | 27 | 26 | 25 | 24 | 24 | 23 | 23 | 22 | 21 | 24.7 | 29 |
| 14-Sep | 20 | Z | 16 | 12 | 10 | 9 | 8 | 8 | 12 | 14 | 19 | 22 | 26 | 27 | 24 | 27 | 29 | 30 | 21 | 18 | 16 | 12 | 13 | 26 | 18.2 | 30 |
| 15-Sep | 29 | 28 | Z | 22 | 19 | 11 | 9 | 12 | 10 | 14 | 18 | 19 | 22 | 29 | 29 | 31 | 31 | 29 | 29 | 30 | 27 | 24 | 21 | 12 | 21.9 | 31 |
| 16-Sep | 14 | 21 | 20 | Z | 22 | 19 | 16 | 17 | 19 | 19 | 20 | 25 | 26 | 28 | 30 | 32 | 32 | 33 | 33 | 26 | 18 | 23 | 21 | 25 | 23.4 | 33 |
| 17-Sep | 25 | 27 | 28 | 27 | Z | 24 | 21 | 19 | 16 | 17 | 24 | 23 | 23 | 22 | 24 | 27 | 29 | 29 | 29 | 31 | 33 | 33 | 32 | 31 | 25.8 | 33 |
| 18-Sep | 30 | 27 | 24 | 24 | 22 | Z | 18 | 20 | 24 | 27 | 27 | 31 | 34 | 35 | 35 | 33 | 30 | 29 | 26 | 24 | 25 | 23 | 23 | 27 | 26.8 | 35 |
| 19-Sep | 17 | 14 | 16 | 16 | 17 | 17 | Z | 16 | 17 | 23 | 25 | 25 | M | 23 | 22 | 23 | 21 | 22 | 22 | 20 | 17 | 18 | 20 | 18 | 19.4 | 25 |
| 20-Sep | 19 | Z | 19 | 19 | 17 | 13 | 14 | 18 | 20 | 16 | 22 | 26 | 26 | 26 | 26 | 26 | 25 | 19 | 12 | 8 | 7 | 10 | 13 | 20 | 18.4 | 26 |
| 21-Sep | 21 | 18 | Z | 10 | 13 | 7 | 9 | 13 | 14 | 17 | 19 | 25 | 29 | 33 | 32 | 33 | 33 | 34 | 30 | 28 | 24 | 25 | 26 | 27 | 22.6 | 34 |
| 22-Sep | 25 | 22 | 20 | Z | 12 | 7 | 9 | 13 | 21 | 25 | 31 | 39 | 42 | 43 | 43 | 43 | 42 | 39 | 36 | 36 | 34 | 34 | 32 | 32 | 29.5 | 43 |
| 23-Sep | 33 | 32 | 28 | 25 | Z | 20 | 19 | 19 | C | C | C | C | 25 | 25 | 31 | 29 | 27 | 27 | 28 | 27 | 26 | 25 | 23 | 22 | 25.8 | 33 |
| 24-Sep | 20 | 19 | 17 | 17 | 16 | Z | 11 | 15 | 21 | 27 | 29 | 30 | C | C | 36 | 36 | 37 | 37 | 36 | 34 | 33 | 33 | 32 | 31 | 26.9 | 37 |
| 25-Sep | 31 | 31 | 31 | 29 | 28 | 26 | Z | 24 | 27 | 31 | 33 | 36 | 37 | 37 | 36 | 35 | 34 | 33 | 21 | 25 | 19 | 27 | 27 | 20 | 29.4 | 37 |
| 26-Sep | 21 | Z | 15 | 10 | 12 | 9 | 8 | 15 | 17 | 18 | 22 | 27 | 31 | 33 | 33 | 35 | 34 | 32 | 32 | 34 | 32 | 27 | 22 | 25 | 23.7 | 35 |
| 27-Sep | 26 | 27 | Z | 23 | 20 | 26 | 29 | 33 | 34 | 33 | 35 | 35 | 35 | 36 | 38 | 38 | 38 | 38 | 36 | 35 | 35 | 34 | 33 | 28 | 32.3 | 38 |
| 28-Sep | 28 | 29 | 29 | Z | 25 | 23 | 21 | 20 | 21 | 24 | 29 | 32 | 35 | 35 | 36 | 36 | 36 | 34 | 23 | 18 | 24 | 27 | 28 | 27 | 27.8 | 36 |
| 29-Sep | 27 | 25 | 22 | 16 | Z | 10 | 6 | 7 | 13 | 22 | 26 | 30 | 34 | 37 | 40 | 39 | 36 | 23 | 22 | 19 | 18 | 23 | 17 | 18 | 23.0 | 40 |
| 30-Sep | 18 | 14 | 6 | 5 | 6 | Z | 9 | 17 | 19 | 20 | 22 | 24 | 26 | 26 | 27 | 28 | 28 | 27 | 28 | 29 | 27 | 27 | 25 | 25 | 21.0 | 29 |

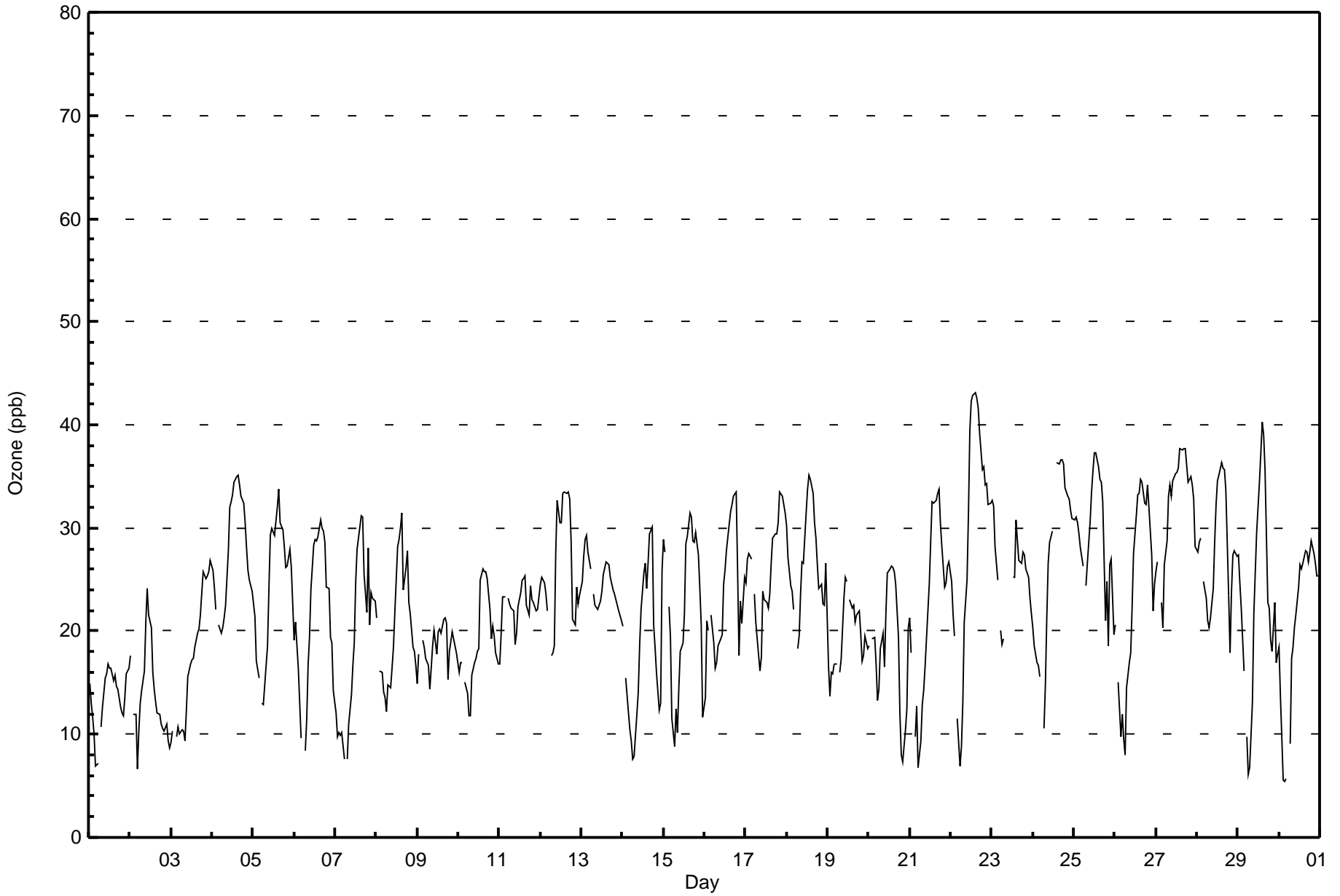
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 21.4 | 21.5 | 19.6 | 17.5 | 16.0 | 15.4 | 14.1 | 16.1 | 18.0 | 20.7 | 23.7 | 25.7 | 27.4 | 28.4 | 29.3 | 29.7 | 28.9 | 27.7 | 25.5 | 24.2 | 23.0 | 23.3 | 22.4 | 22.3 | Diurnal Average | |
| 33 | 32 | 31 | 29 | 28 | 26 | 29 | 33 | 34 | 33 | 35 | 39 | 42 | 43 | 43 | 43 | 42 | 39 | 36 | 36 | 35 | 34 | 33 | 32 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Patricia McInnes - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 266 | 38.95 | 38.95 |
| 21 - 50 | 417 | 61.05 | 100.00 |
| 51 - 82 | 0 | 0.00 | 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 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 16 | 3 | 7 | 7 | 5 | 6 | 30 | 19 | 21 | 29 | 20 | 12 | 16 | 27 | 29 | 19 | 266 |
| 21 - 50 | 20 | 6 | 2 | 1 | 4 | 13 | 33 | 26 | 29 | 40 | 58 | 65 | 27 | 43 | 30 | 20 | 417 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 36 | 9 | 9 | 8 | 9 | 19 | 63 | 45 | 50 | 69 | 78 | 77 | 43 | 70 | 59 | 39 | 683 |

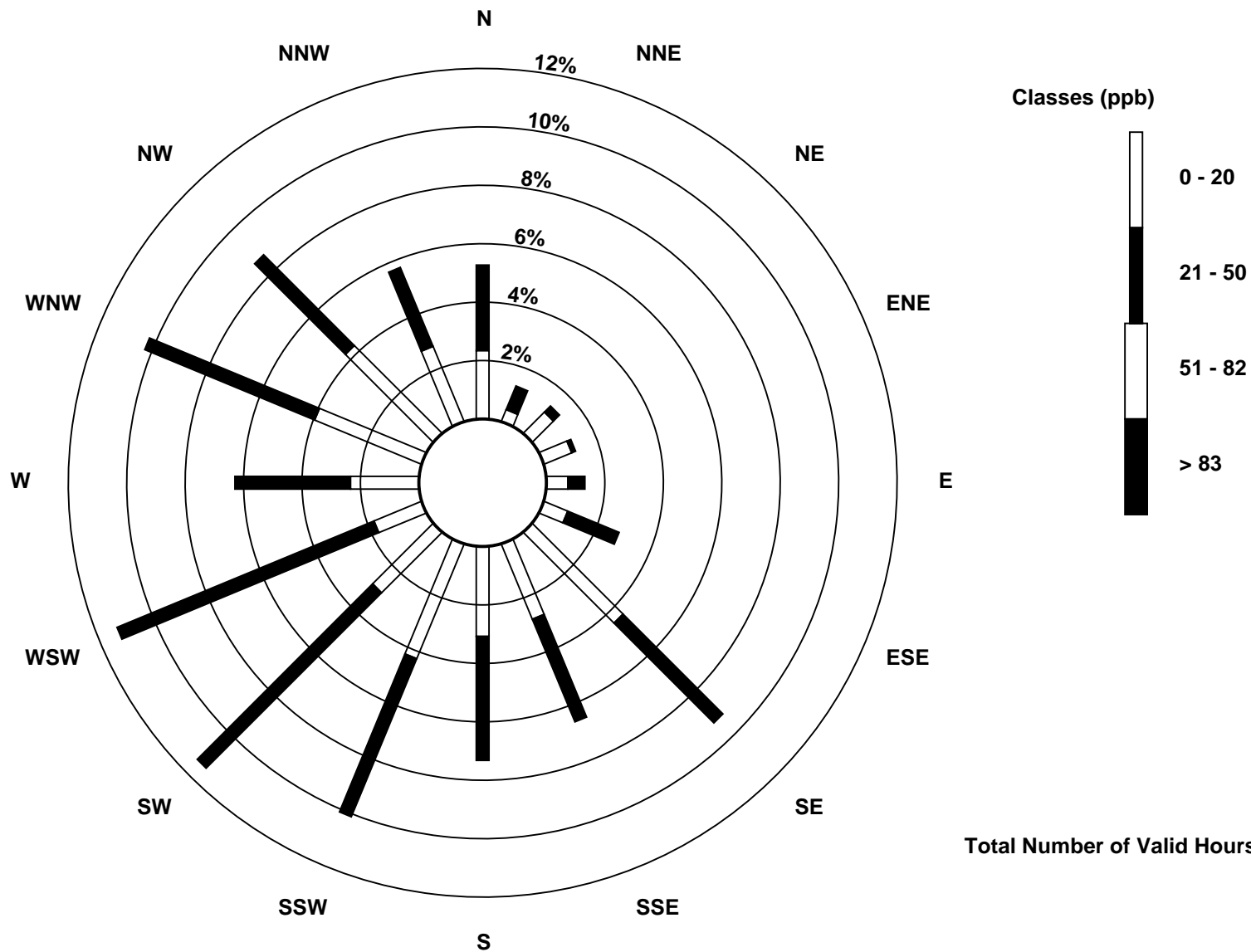
Total Number of Valid Hours: 683

Total Number of Hours: 720

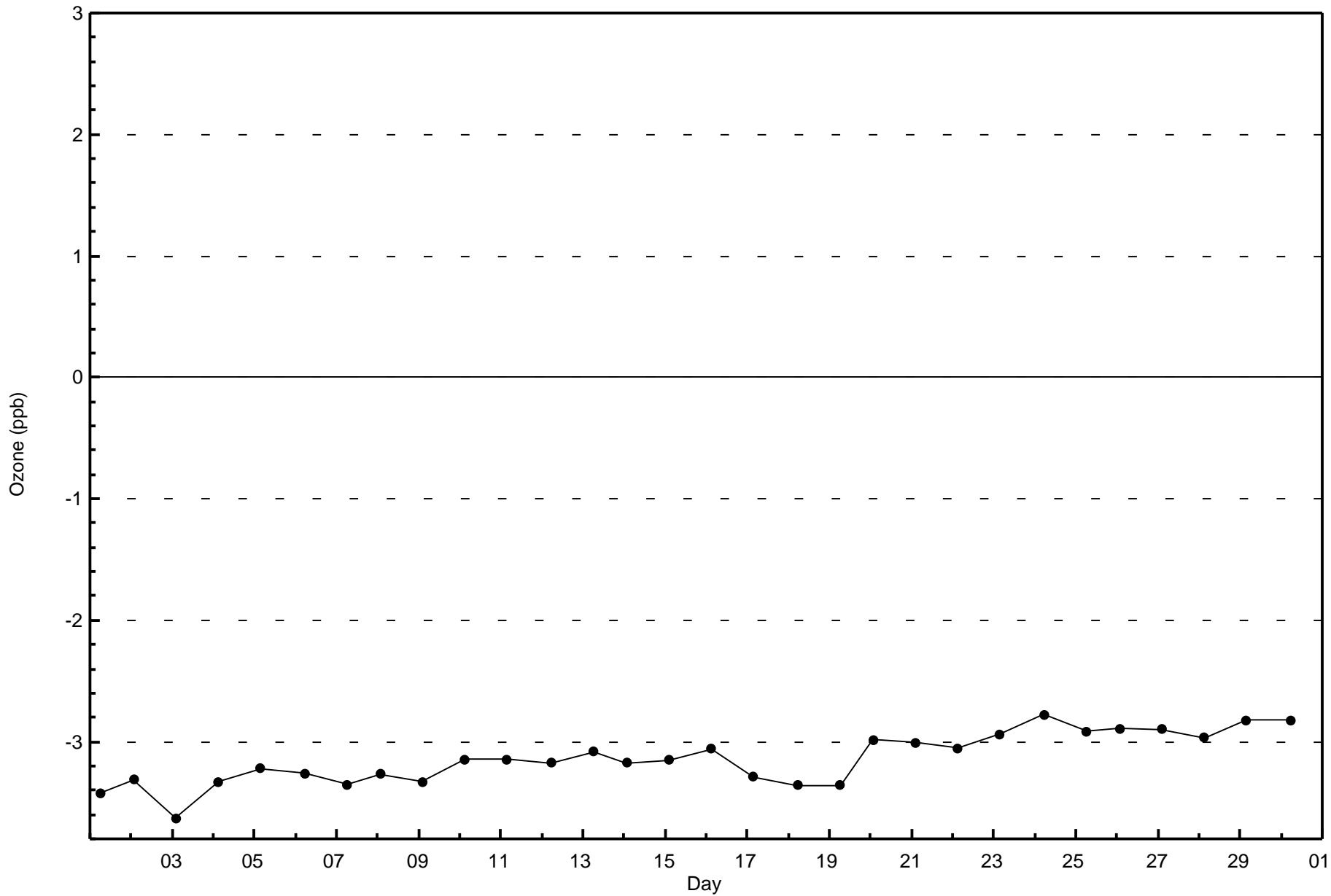


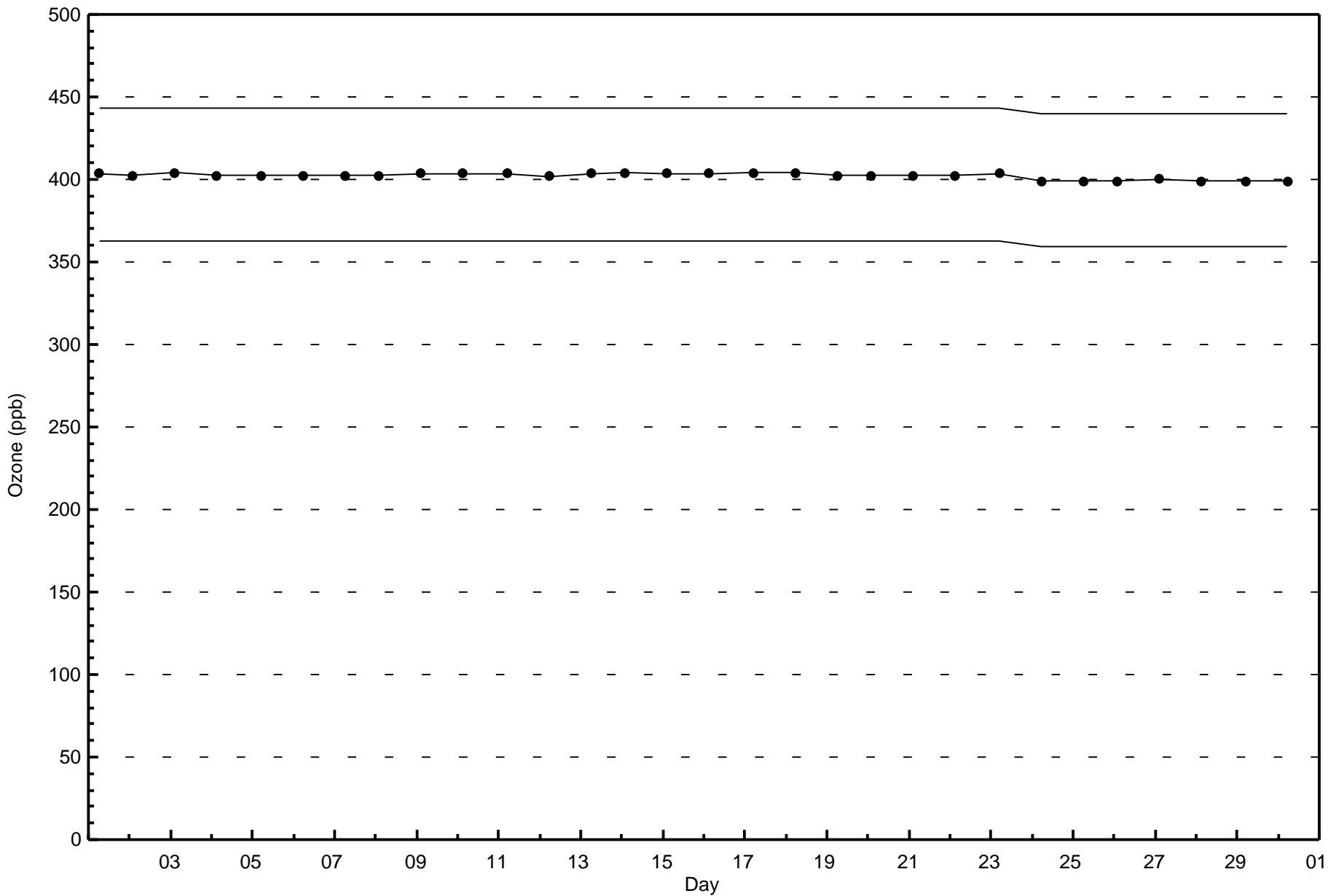
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 683





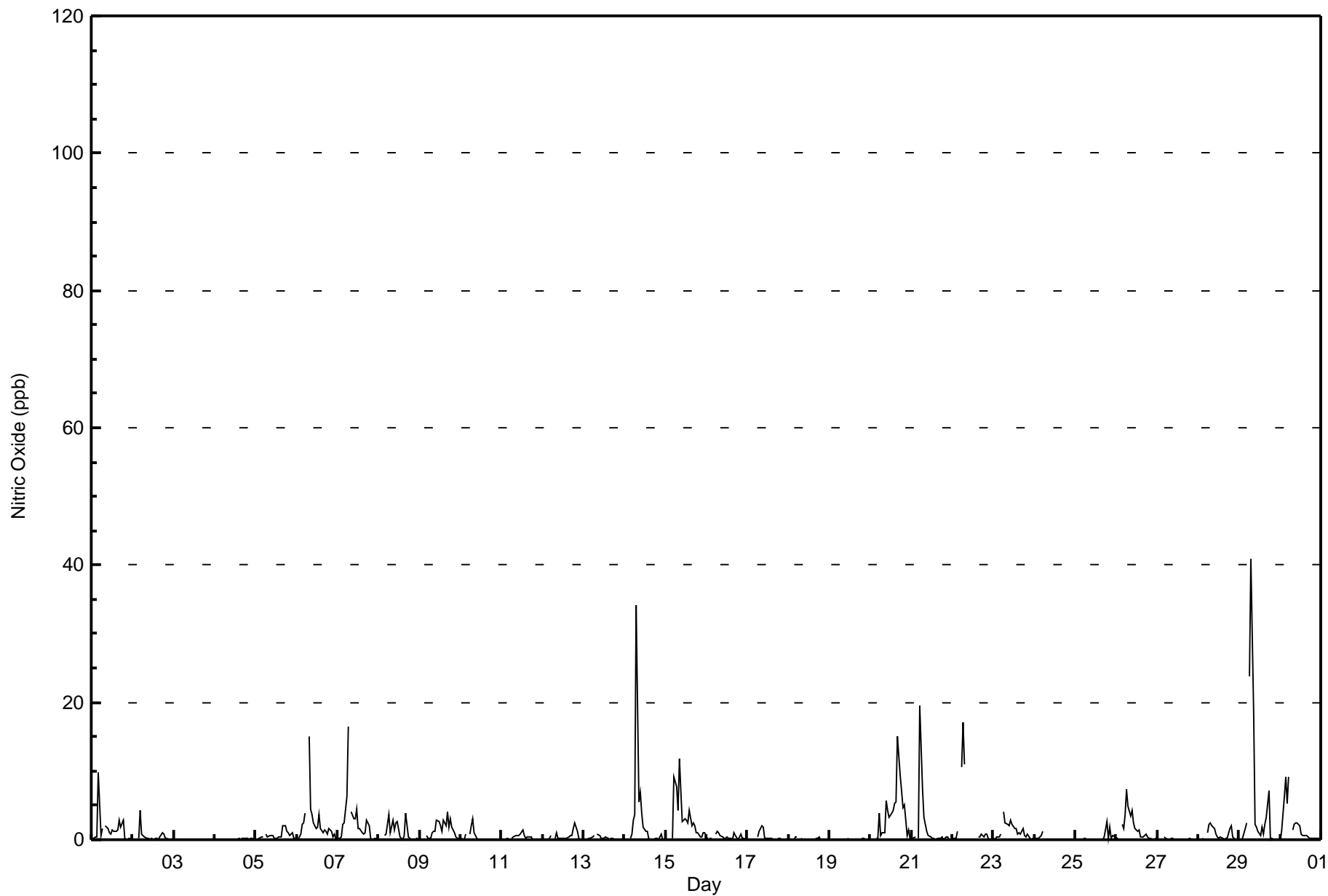


| Maximum Value: 41 ppb on Sep 29 08:00 | | Maximum Daily Average: 4.7 ppb on Sep 29 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------|-----|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|-----------------|---|
| Minimum Value: 0 ppb on Sep 3 06:00 | | Minimum Daily Average: 0.0 ppb on Sep 3 | | Hours of Data: 678 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 5.2 ppb at hour 8 | | Minimum Diurnal Average: 0.1 ppb at hour 1 | | Hours of Missing Data: 42 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.2 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 16 | | Hours of Calibration: 41 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 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 | 10 | 1 | 2 | Z | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 1.4 | 10 | |
| 2-Sep | 0 | 0 | Z | 0 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 4 | |
| 3-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 | |
| 4-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 | |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0.6 | 2 | |
| 6-Sep | 0 | 0 | 1 | 2 | 2 | 4 | Z | 15 | 4 | 4 | 2 | 2 | 2 | 4 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 2.3 | 15 | |
| 7-Sep | 0 | 0 | 0 | 2 | 2 | 6 | 16 | Z | 4 | 3 | 3 | 5 | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 2.3 | 16 | |
| 8-Sep | 0 | 0 | Z | 1 | 1 | 2 | 4 | 1 | 3 | 1 | 2 | 3 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 | |
| 9-Sep | 0 | 0 | 0 | Z | 1 | 0 | 0 | 1 | 1 | 1 | 3 | 3 | 2 | 1 | 3 | 2 | 4 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 1.3 | 4 | |
| 10-Sep | 0 | 0 | 0 | 1 | Z | 1 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 1 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0.5 | 2 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 14-Sep | 0 | 0 | Z | 0 | 1 | 3 | 4 | 34 | 6 | 7 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2.8 | 34 | |
| 15-Sep | 0 | 0 | 0 | Z | 0 | 9 | 8 | 4 | 12 | 7 | 3 | 3 | 3 | 3 | 4 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 1 | 1 | 2.9 | 12 | |
| 16-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | |
| 18-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 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | |
| 20-Sep | 0 | 0 | Z | 0 | 0 | 4 | 1 | 1 | 1 | 6 | 4 | 3 | 4 | 4 | 5 | 6 | 15 | 9 | 7 | 5 | 5 | 1 | 1 | 0 | 3.6 | 15 | |
| 21-Sep | 0 | 0 | 0 | Z | 0 | 19 | 7 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 19 | |
| 22-Sep | 0 | 0 | 0 | 1 | Z | 11 | 17 | 11 | C | C | C | C | C | C | C | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | -- | 17 | |
| 23-Sep | 0 | 0 | 0 | 0 | 1 | Z | 4 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 1.2 | 4 | |
| 24-Sep | 0 | 0 | 0 | 0 | 1 | 1 | Z | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 1 | 0 | 0.3 | 3 |
| 26-Sep | 0 | 0 | Z | 2 | 2 | 4 | 7 | 5 | 3 | 4 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 7 | |
| 27-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 | |
| 28-Sep | 0 | 0 | 0 | 0 | Z | 1 | 2 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0.7 | 3 | |
| 29-Sep | 0 | 0 | 0 | 2 | 2 | Z | 24 | 41 | 19 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 4.7 | 41 | |
| 30-Sep | 0 | 1 | 6 | 9 | 5 | 9 | Z | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 9 | |
| | | 0.1 | 0.1 | 0.4 | 0.9 | 1.4 | 3.1 | 4.1 | 5.2 | 2.5 | 1.8 | 1.3 | 1.1 | 0.8 | 0.8 | 0.7 | 0.7 | 1.4 | 1.2 | 0.9 | 0.6 | 0.5 | 0.2 | 0.2 | 0.1 | Diurnal Average | |
| | | 0 | 1 | 6 | 9 | 10 | 19 | 24 | 41 | 19 | 7 | 4 | 5 | 4 | 4 | 5 | 6 | 15 | 9 | 7 | 5 | 5 | 1 | 1 | 1 | Diurnal Maximum | |
| Z - zerospan | | C - Calibration | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 675 | 99.56 | 99.56 |
| 21 - 40 | 2 | 0.29 | 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: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 35 | 9 | 9 | 8 | 8 | 19 | 66 | 45 | 48 | 66 | 76 | 73 | 44 | 70 | 57 | 42 | 675 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 11 - 80 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 9 | 9 | 8 | 9 | 19 | 68 | 45 | 48 | 66 | 76 | 73 | 44 | 70 | 57 | 42 | 678 |

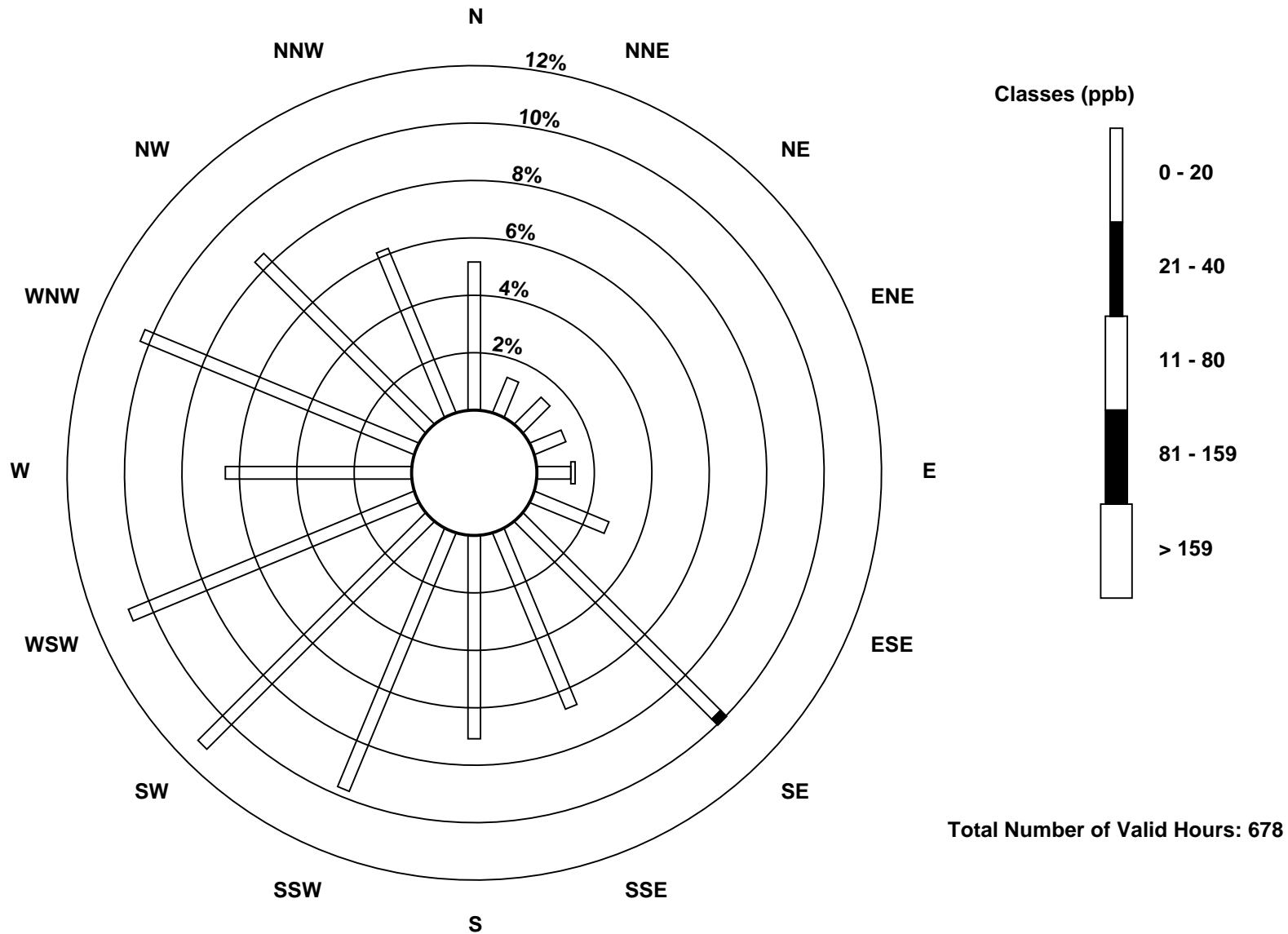
Total Number of Valid Hours: 678

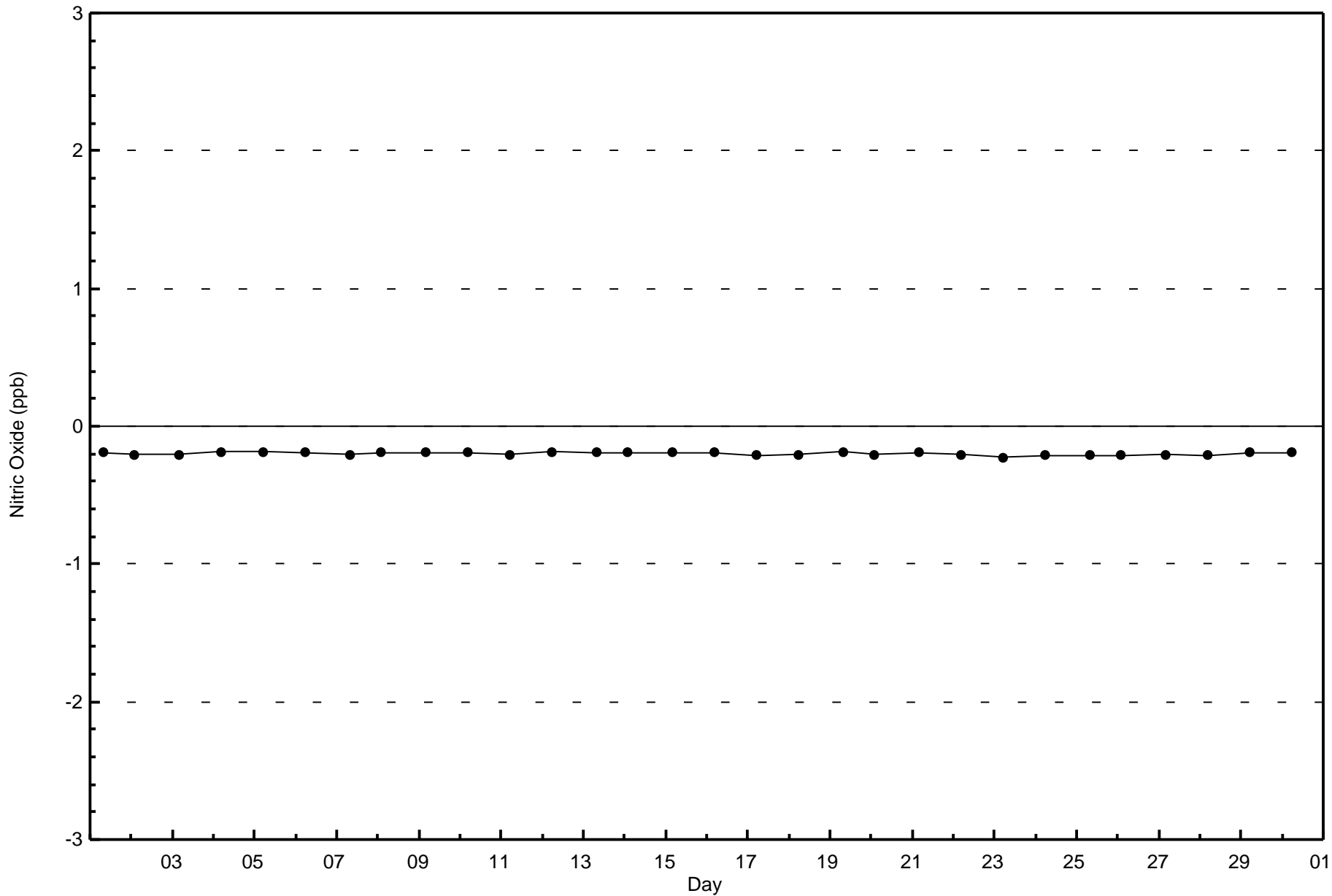
Total Number of Hours: 720

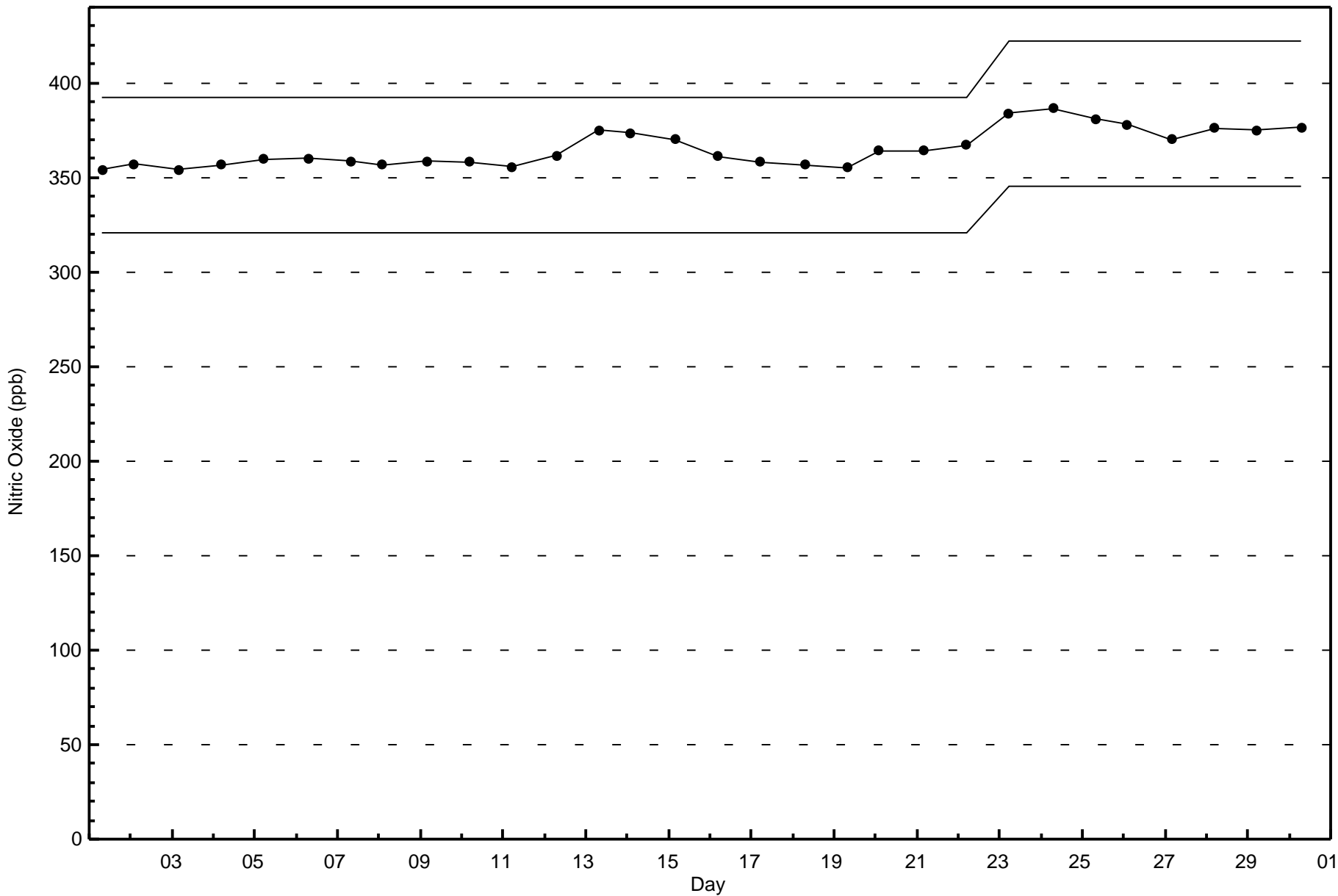


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Patricia McInnes - September 2016

| | | | | |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 26 ppb on Sep 30 06:00 | Maximum Daily Average: 9.1 ppb on Sep 20 | | Hours of Data: | 678 |
| Minimum Value: 0 ppb on Sep 2 16:00 | Minimum Daily Average: 0.0 ppb on Sep 3 | | Hours of Missing Data: | 42 |
| Maximum Diurnal Average: 5.3 ppb at hour 6 | Minimum Diurnal Average: 1.2 ppb at hour 14 | | Hours of Calibration: | 41 |
| Monthly Average: 2.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 4 P ₉₀ = 7 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 | 2 | 3 | 3 | 1 | 3 | 1 | 2 | Z | 2 | 2 | 1 | 1 | 2 | 1 | 3 | 2 | 3 | 3 | 5 | 2 | 1 | 1 | 1 | 1 | 1.9 | 5 |
| 2-Sep | 0 | 0 | Z | 1 | 5 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 |
| 3-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 |
| 4-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.3 | 1 |
| 5-Sep | 0 | 1 | 2 | 1 | 1 | Z | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 4 | 4 | 5 | 4 | 2 | 2 | 3 | 1.7 | 5 |
| 6-Sep | 3 | 2 | 4 | 8 | 9 | 6 | Z | 9 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 6 | 7 | 5 | 5 | 4 | 4.5 | 9 |
| 7-Sep | 2 | 1 | 2 | 5 | 4 | 5 | 7 | Z | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 7 | 8 | 2 | 2 | 1 | 1 | 1 | 2.8 | 8 | |
| 8-Sep | 1 | 1 | Z | 2 | 3 | 3 | 5 | 1 | 2 | 1 | 2 | 3 | 1 | 0 | 0 | 1 | 7 | 1 | 2 | 3 | 2 | 2 | 3 | 4 | 2.1 | 7 |
| 9-Sep | 2 | 0 | 0 | Z | 1 | 0 | 1 | 4 | 5 | 3 | 4 | 5 | 2 | 2 | 3 | 2 | 3 | 2 | 8 | 5 | 3 | 2 | 2 | 2 | 2.6 | 8 |
| 10-Sep | 3 | 2 | 1 | 1 | Z | 3 | 5 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 5 |
| 11-Sep | 0 | 2 | 2 | 3 | 3 | Z | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 1.7 | 3 |
| 12-Sep | 0 | 0 | 0 | 0 | 1 | 5 | Z | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 6 | 13 | 10 | 1 | 1 | 0 | 1.9 | 13 |
| 13-Sep | 0 | 0 | 1 | 1 | 1 | 2 | 2 | Z | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 14-Sep | 0 | 1 | Z | 3 | 2 | 2 | 2 | 11 | 4 | 6 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 4 | 8 | 8 | 9 | 4 | 0 | 3.3 | 11 |
| 15-Sep | 0 | 0 | 1 | Z | 6 | 11 | 8 | 8 | 11 | 6 | 3 | 3 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 3 | 2 | 3 | 4 | 7 | 4.5 | 11 |
| 16-Sep | 4 | 1 | 1 | 1 | Z | 3 | 5 | 3 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 9 | 3 | 6 | 1 | 2.1 | 9 |
| 17-Sep | 1 | 0 | 0 | 1 | 1 | Z | 1 | 3 | 6 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 1.0 | 6 |
| 18-Sep | 0 | 1 | 1 | 1 | 2 | 5 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 3 | 2 | 1 | 2 | 0 | 1.0 | 5 |
| 19-Sep | 2 | 3 | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0.6 | 3 |
| 20-Sep | 2 | 2 | Z | 2 | 1 | 4 | 5 | 3 | 4 | 8 | 6 | 4 | 5 | 6 | 8 | 10 | 15 | 19 | 26 | 24 | 21 | 15 | 15 | 6 | 9.1 | 26 |
| 21-Sep | 4 | 6 | 7 | Z | 2 | 13 | 8 | 4 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 4 | 4 | 7 | 5 | 2 | 1 | 3.2 | 13 |
| 22-Sep | 2 | 3 | 4 | 6 | Z | 15 | 21 | 13 | C | C | C | C | C | C | C | 1 | 2 | 4 | 6 | 5 | 5 | 4 | 4 | 4 | -- | 21 |
| 23-Sep | 3 | 3 | 4 | 7 | 8 | Z | 10 | 7 | 6 | 5 | 6 | 5 | 4 | 4 | 3 | 4 | 4 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 4.4 | 10 |
| 24-Sep | 2 | 2 | 2 | 2 | 2 | 4 | Z | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.9 | 4 |
| 25-Sep | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | 1 | 6 | 2 | 3 | 6 | 1.5 | 12 |
| 26-Sep | 4 | 6 | Z | 9 | 10 | 14 | 15 | 9 | 6 | 5 | 3 | 3 | 3 | 3 | 1 | 1 | 2 | 5 | 5 | 3 | 3 | 4 | 7 | 5 | 5.4 | 15 |
| 27-Sep | 4 | 4 | 3 | Z | 9 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 1 | 1.3 | 9 |
| 28-Sep | 1 | 1 | 1 | 2 | Z | 5 | 6 | 6 | 3 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 3 | 8 | 7 | 5 | 3 | 2 | 2 | 2.7 | 8 |
| 29-Sep | 2 | 3 | 4 | 10 | 14 | Z | 14 | 18 | 13 | 3 | 3 | 2 | 1 | 2 | 2 | 4 | 8 | 21 | 8 | 4 | 2 | 1 | 1 | 2 | 6.2 | 21 |
| 30-Sep | 3 | 8 | 21 | 26 | 26 | 26 | Z | 11 | 10 | 8 | 7 | 5 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 5 | 6 | 5 | 8.1 | 26 |

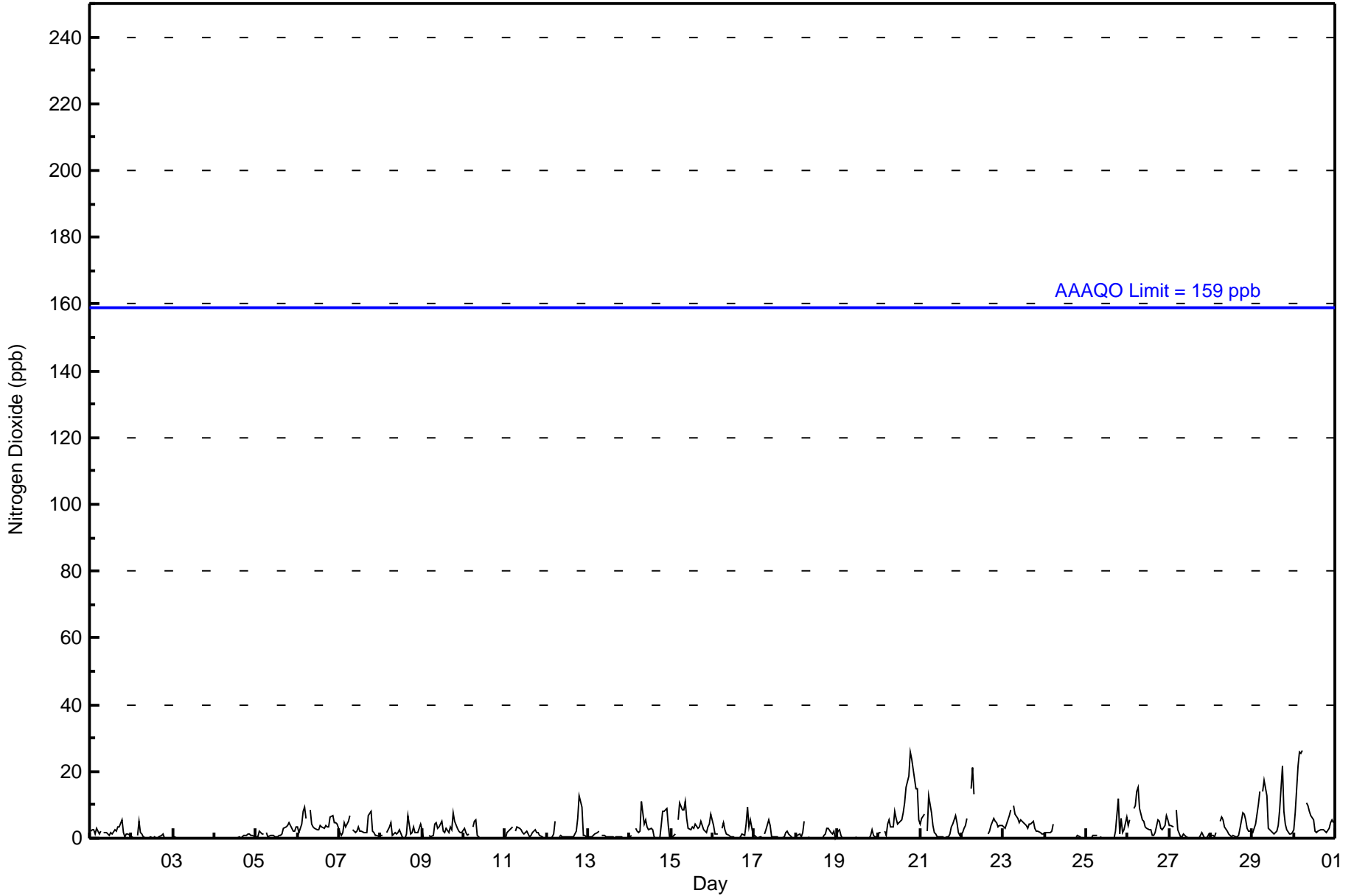
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.6 | 1.8 | 2.6 | 3.7 | 4.5 | 5.3 | 5.0 | 4.8 | 3.2 | 2.3 | 1.7 | 1.6 | 1.3 | 1.2 | 1.2 | 1.4 | 2.2 | 3.3 | 4.3 | 3.8 | 3.6 | 2.4 | 2.4 | 1.9 | Diurnal Average | |
| 4 | 8 | 21 | 26 | 26 | 26 | 21 | 18 | 13 | 8 | 7 | 5 | 5 | 6 | 8 | 10 | 15 | 21 | 26 | 24 | 21 | 15 | 15 | 7 | 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
Patricia McInnes - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 669 | 98.67 | 98.67 |
| 21 - 40 | 9 | 1.33 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 32 | 9 | 9 | 8 | 8 | 19 | 67 | 44 | 46 | 66 | 76 | 73 | 44 | 70 | 57 | 41 | 669 |
| 21 - 40 | 3 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 9 | 9 | 8 | 9 | 19 | 68 | 45 | 48 | 66 | 76 | 73 | 44 | 70 | 57 | 42 | 678 |

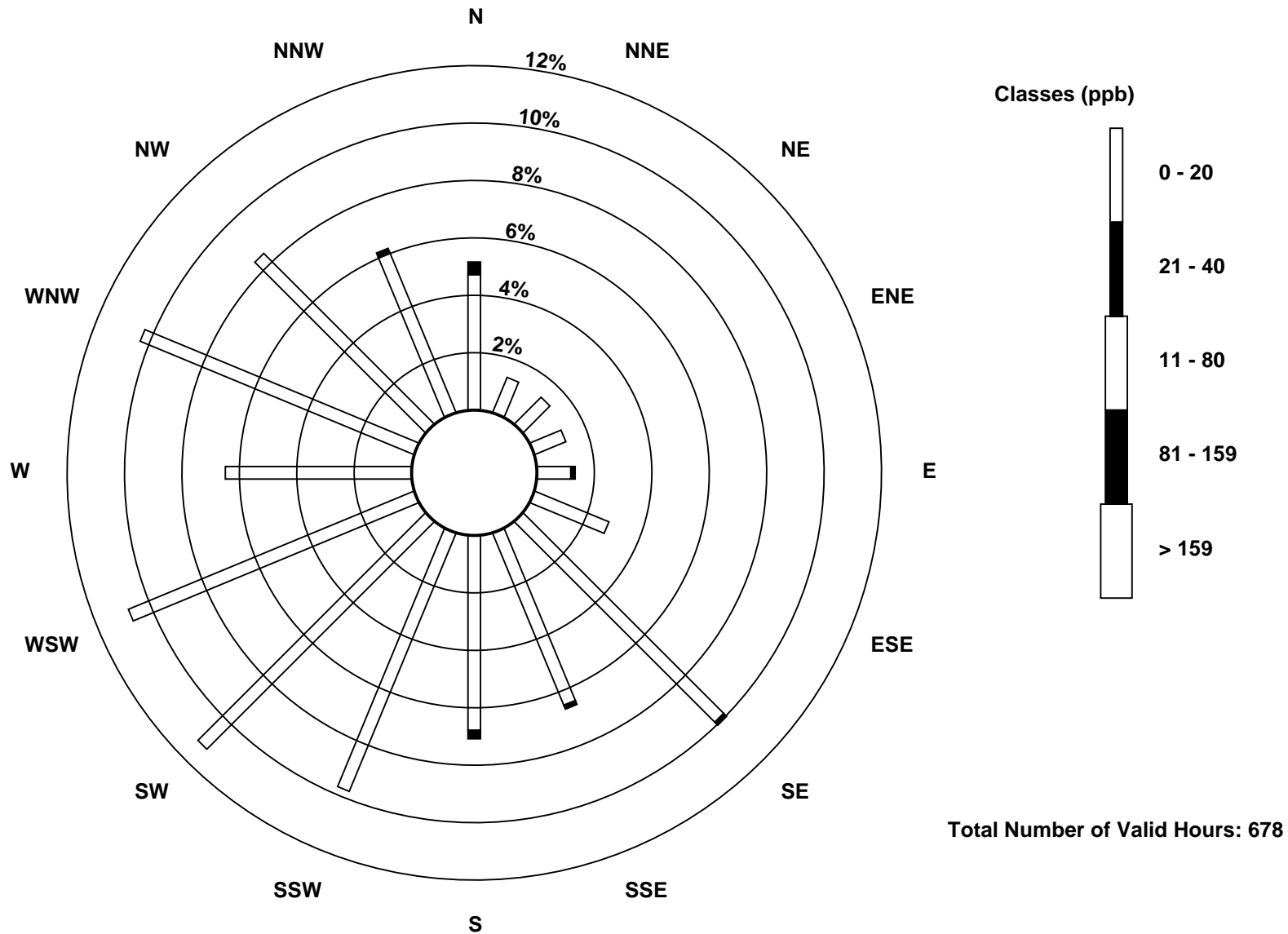
Total Number of Valid Hours: 678

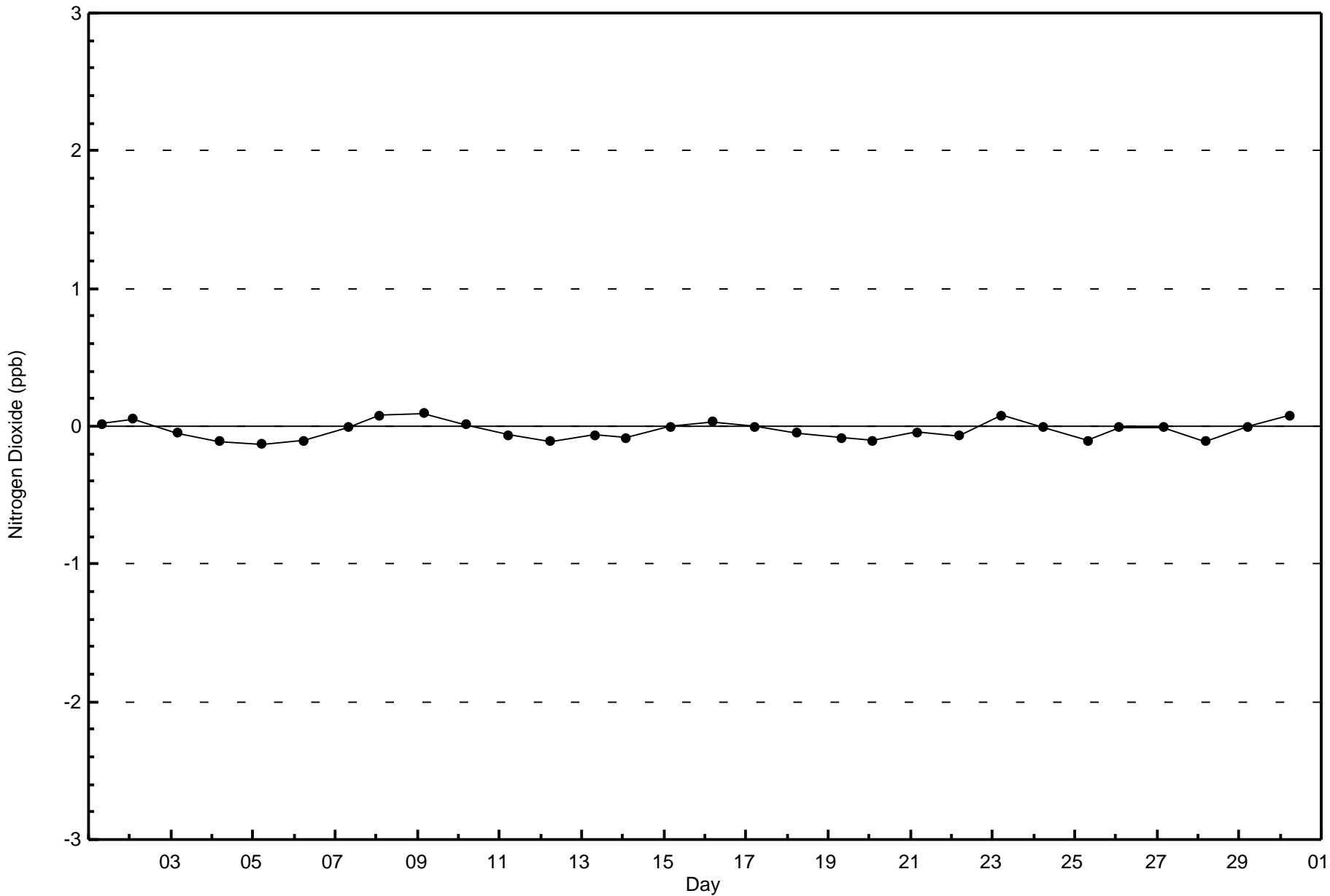
Total Number of Hours: 720

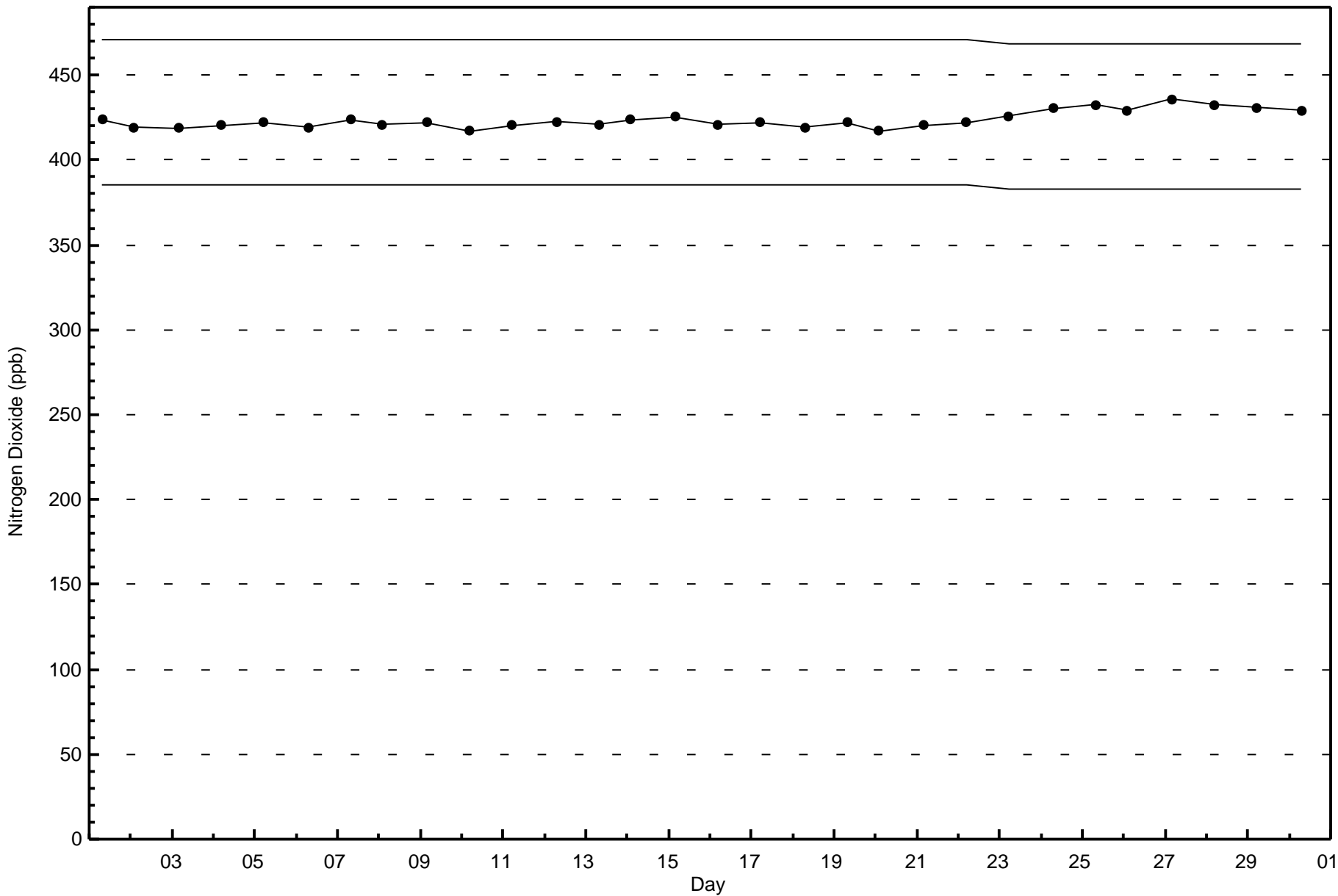


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association
Summary of Hour Averages

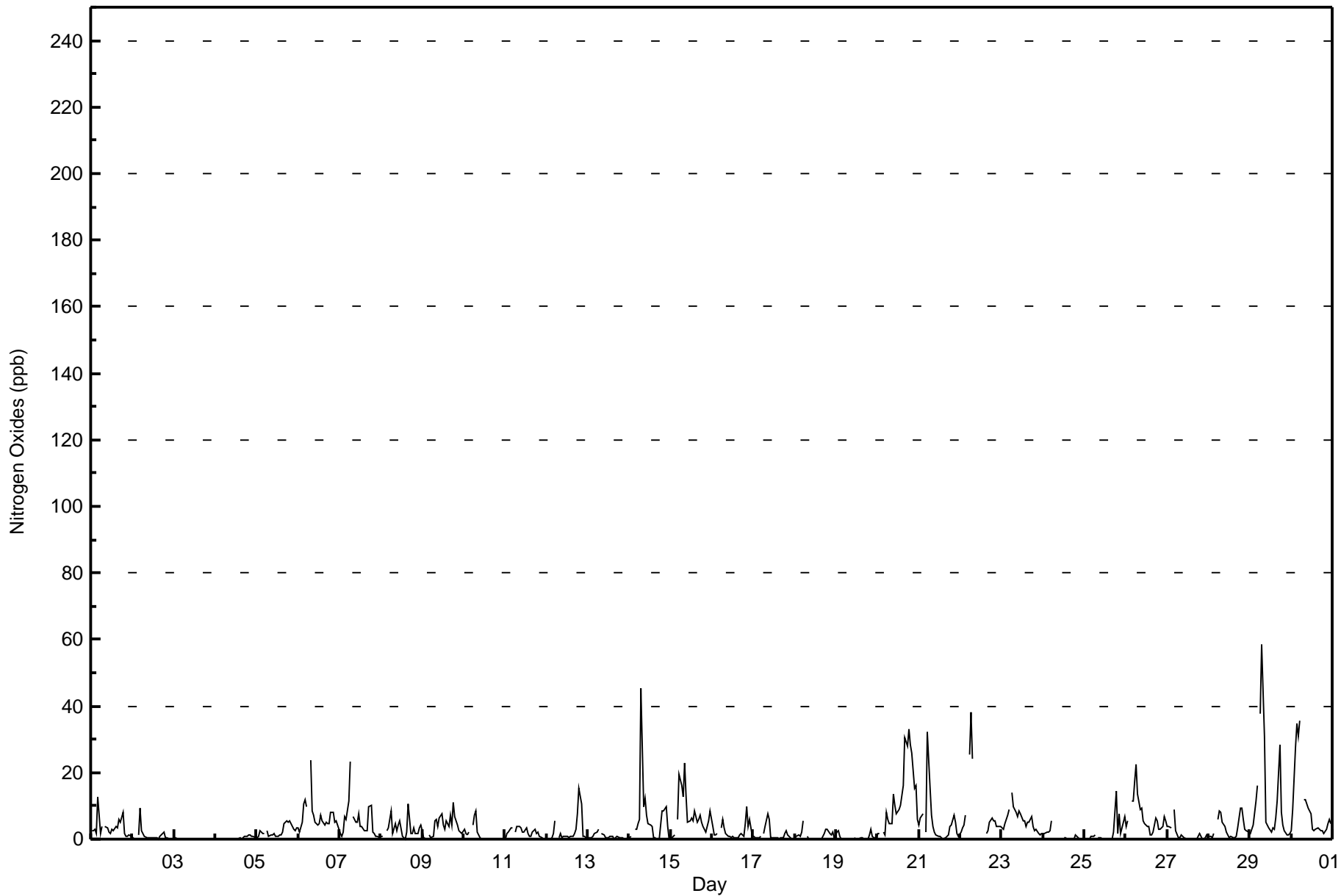
Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - September 2016

| Maximum Value: 58 ppb on Sep 29 08:00 Maximum Daily Average: 12.7 ppb on Sep 20 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 678 Hours of Missing Data: 42 Hours of Calibration: 41 Percent Operational Time: 99.9 | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 3 11:00 Minimum Daily Average: 0.0 ppb on Sep 3 Maximum Diurnal Average: 10.1 ppb at hour 8 Minimum Diurnal Average: 1.6 ppb at hour 1 Monthly Average: 3.9 ppb Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 5 P ₉₀ = 9 P ₉₉ = 32 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 3 | 3 | 3 | 2 | 13 | 2 | 4 | Z | 4 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 6 | 5 | 8 | 2 | 1 | 1 | 1 | 1 | 3.3 | 13 |
| 2-Sep | 0 | 0 | Z | 1 | 9 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1.1 | 9 |
| 3-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 |
| 4-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.4 | 1 |
| 5-Sep | 0 | 1 | 2 | 2 | 2 | Z | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 5 | 5 | 5 | 5 | 4 | 3 | 2 | 4 | 2.3 | 5 |
| 6-Sep | 3 | 2 | 5 | 10 | 12 | 10 | Z | 24 | 9 | 7 | 5 | 4 | 4 | 7 | 5 | 4 | 5 | 5 | 4 | 8 | 8 | 5 | 5 | 4 | 6.8 | 24 |
| 7-Sep | 2 | 1 | 2 | 7 | 6 | 11 | 23 | Z | 7 | 5 | 5 | 8 | 4 | 4 | 3 | 2 | 2 | 10 | 10 | 2 | 2 | 1 | 1 | 1 | 5.1 | 23 |
| 8-Sep | 1 | 1 | Z | 3 | 3 | 6 | 8 | 2 | 5 | 2 | 4 | 5 | 1 | 0 | 0 | 2 | 11 | 2 | 2 | 4 | 2 | 2 | 3 | 4 | 3.2 | 11 |
| 9-Sep | 2 | 0 | 0 | Z | 1 | 1 | 1 | 5 | 6 | 4 | 7 | 8 | 4 | 3 | 6 | 4 | 7 | 4 | 11 | 7 | 4 | 3 | 2 | 2 | 4.0 | 11 |
| 10-Sep | 3 | 2 | 1 | 2 | Z | 4 | 7 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 8 |
| 11-Sep | 0 | 2 | 2 | 3 | 3 | Z | 2 | 4 | 4 | 3 | 2 | 2 | 4 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 2.0 | 4 |
| 12-Sep | 0 | 0 | 0 | 0 | 2 | 5 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 8 | 15 | 11 | 1 | 1 | 0 | 2.4 | 15 |
| 13-Sep | 0 | 0 | 1 | 1 | 2 | 2 | 3 | Z | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.8 | 3 |
| 14-Sep | 0 | 1 | Z | 3 | 3 | 5 | 6 | 45 | 10 | 12 | 7 | 4 | 4 | 4 | 1 | 0 | 0 | 0 | 4 | 8 | 8 | 10 | 4 | 0 | 6.1 | 45 |
| 15-Sep | 0 | 0 | 1 | Z | 6 | 20 | 16 | 13 | 23 | 13 | 5 | 6 | 6 | 5 | 9 | 5 | 6 | 7 | 5 | 4 | 2 | 4 | 5 | 8 | 7.4 | 23 |
| 16-Sep | 4 | 1 | 1 | 2 | Z | 4 | 6 | 4 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 5 | 10 | 4 | 6 | 1 | 2.4 | 10 |
| 17-Sep | 1 | 0 | 0 | 1 | 1 | Z | 2 | 4 | 8 | 6 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 3 | 1 | 0 | 0 | 0 | 1.3 | 8 |
| 18-Sep | 0 | 1 | 1 | 1 | 2 | 5 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 3 | 1 | 1 | 2 | 0 | 1.1 | 5 |
| 19-Sep | 2 | 3 | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0.6 | 3 |
| 20-Sep | 2 | 2 | Z | 2 | 1 | 8 | 6 | 5 | 5 | 14 | 10 | 7 | 9 | 10 | 13 | 16 | 30 | 28 | 33 | 28 | 26 | 15 | 16 | 6 | 12.7 | 33 |
| 21-Sep | 4 | 6 | 8 | Z | 2 | 32 | 15 | 7 | 4 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 4 | 4 | 7 | 5 | 2 | 1 | 4.8 | 32 |
| 22-Sep | 2 | 3 | 4 | 7 | Z | 25 | 38 | 24 | C | C | C | C | C | C | C | 2 | 2 | 5 | 6 | 6 | 5 | 4 | 4 | 4 | -- | 38 |
| 23-Sep | 3 | 3 | 5 | 7 | 9 | Z | 14 | 10 | 8 | 7 | 8 | 7 | 6 | 5 | 4 | 5 | 5 | 7 | 4 | 3 | 3 | 2 | 1 | 1 | 5.6 | 14 |
| 24-Sep | 2 | 2 | 2 | 2 | 3 | 6 | Z | 2 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1.0 | 6 |
| 25-Sep | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 15 | 2 | 8 | 2 | 3 | 7 | 1.9 | 15 |
| 26-Sep | 4 | 6 | Z | 11 | 11 | 17 | 22 | 14 | 9 | 9 | 6 | 5 | 4 | 4 | 1 | 1 | 2 | 6 | 6 | 3 | 3 | 4 | 7 | 6 | 7.0 | 22 |
| 27-Sep | 4 | 4 | 3 | Z | 9 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 1.3 | 9 |
| 28-Sep | 1 | 1 | 1 | 2 | Z | 6 | 8 | 8 | 5 | 4 | 2 | 1 | 0 | 1 | 0 | 1 | 1 | 3 | 9 | 9 | 6 | 3 | 2 | 2 | 3.4 | 9 |
| 29-Sep | 2 | 3 | 4 | 12 | 16 | Z | 38 | 58 | 31 | 5 | 4 | 3 | 2 | 3 | 3 | 6 | 12 | 29 | 8 | 4 | 2 | 1 | 1 | 2 | 10.9 | 58 |
| 30-Sep | 2 | 9 | 28 | 35 | 31 | 36 | Z | 12 | 12 | 11 | 9 | 7 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 5 | 6 | 5 | 10.1 | 36 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 1.6 1.9 3.0 4.6 5.9 8.4 9.0 10.1 5.7 4.1 3.0 2.7 2.1 2.0 2.0 2.0 3.6 4.5 5.2 4.5 4.1 2.6 2.6 2.1 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 4 9 28 35 31 36 38 58 31 14 10 8 9 10 13 16 30 29 33 28 26 15 16 8 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 656 | 96.76 | 96.76 |
| 21 - 40 | 20 | 2.95 | 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: 678

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 32 | 9 | 7 | 8 | 6 | 19 | 63 | 43 | 42 | 66 | 76 | 73 | 44 | 70 | 57 | 41 | 656 |
| 21 - 40 | 3 | 0 | 2 | 0 | 2 | 0 | 4 | 2 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 20 |
| 11 - 80 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 9 | 9 | 8 | 9 | 19 | 68 | 45 | 48 | 66 | 76 | 73 | 44 | 70 | 57 | 42 | 678 |

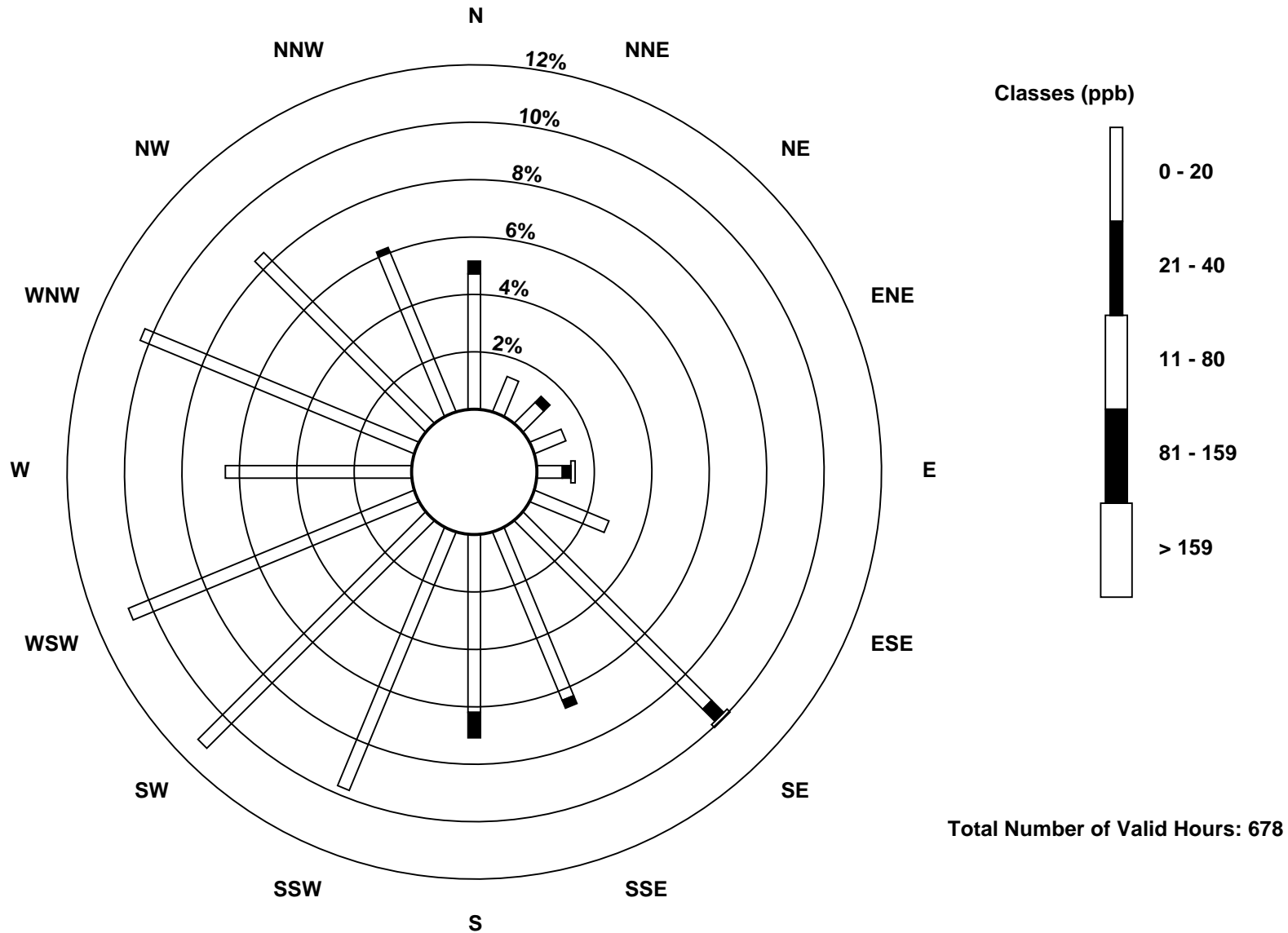
Total Number of Valid Hours: 678

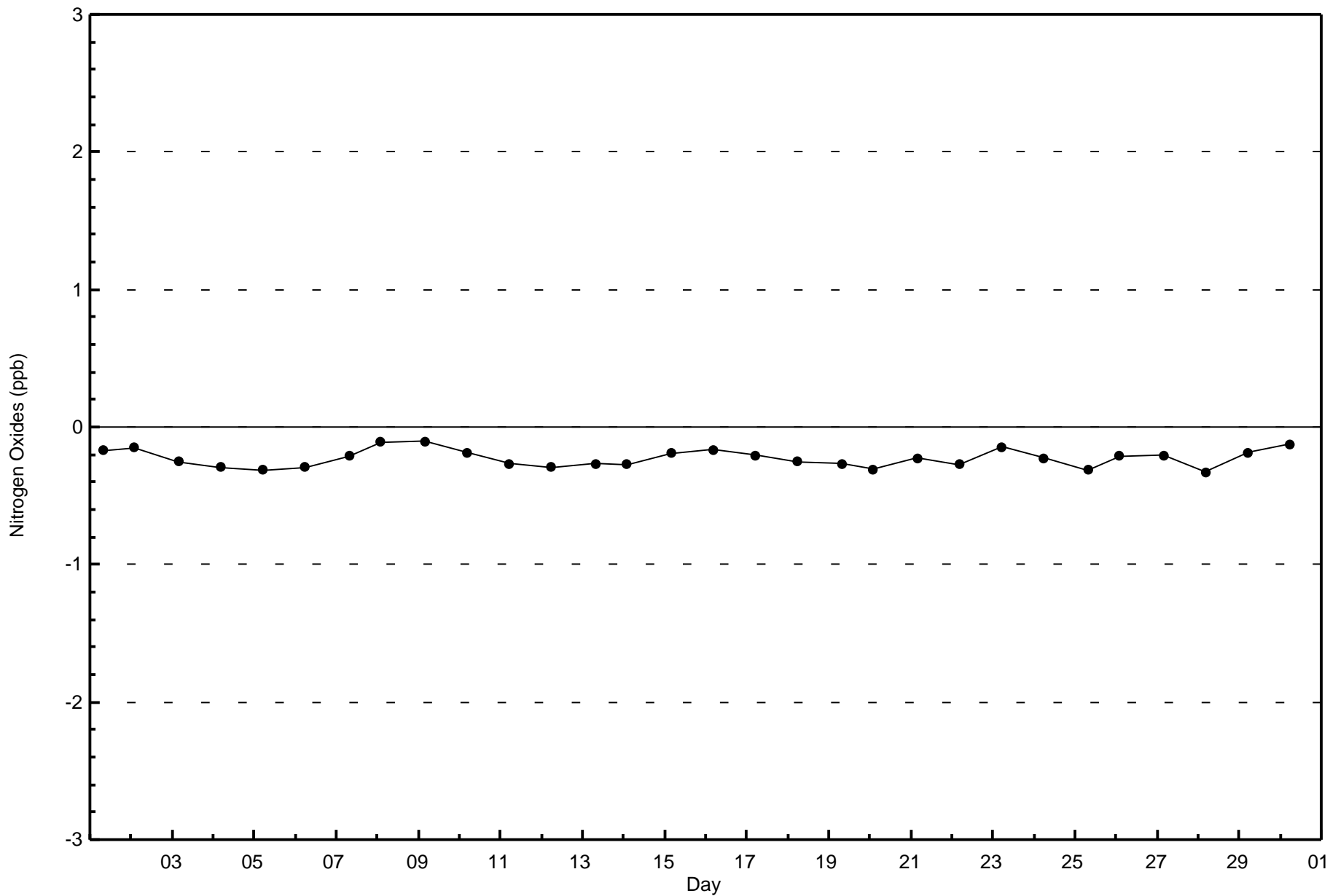
Total Number of Hours: 720

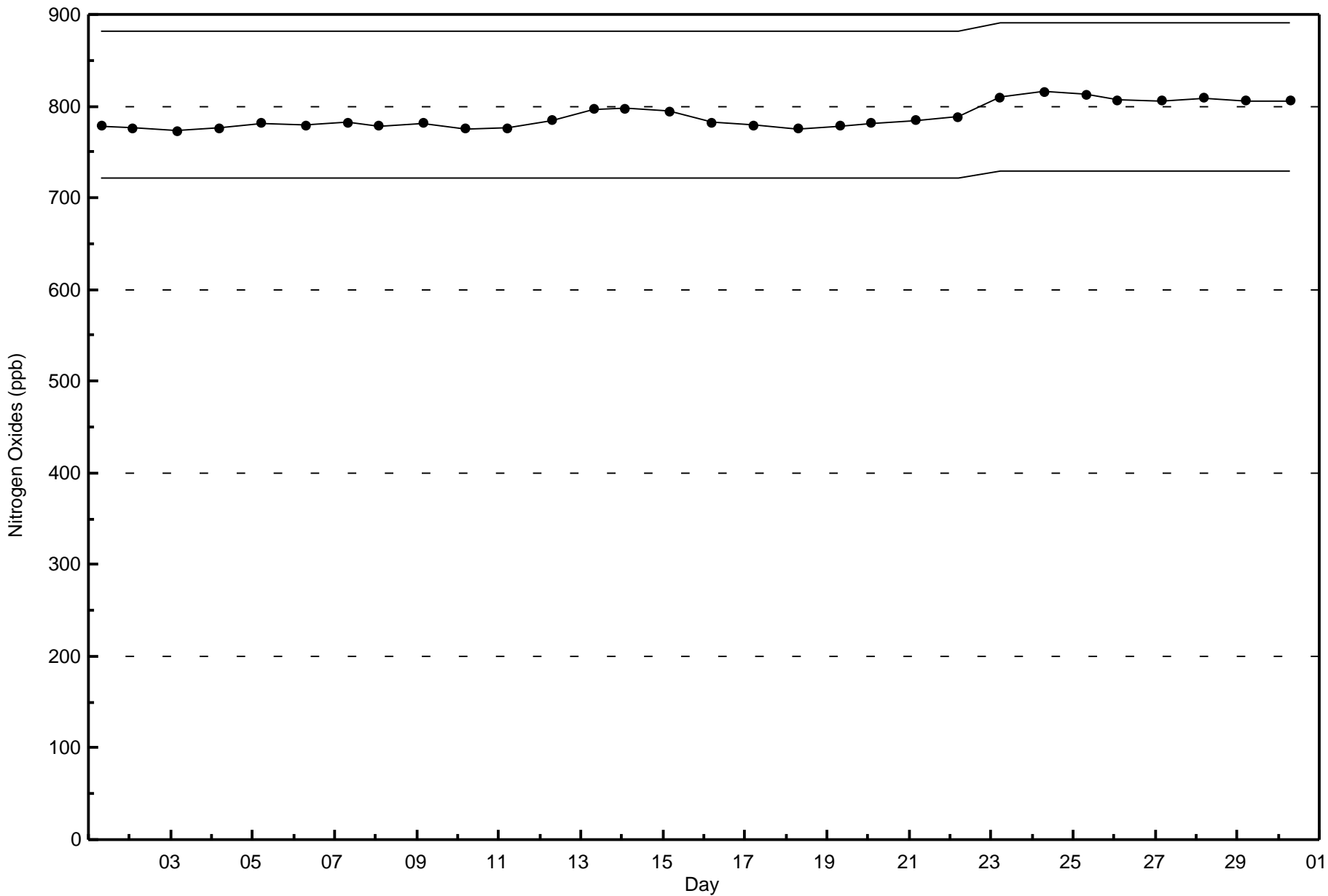


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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







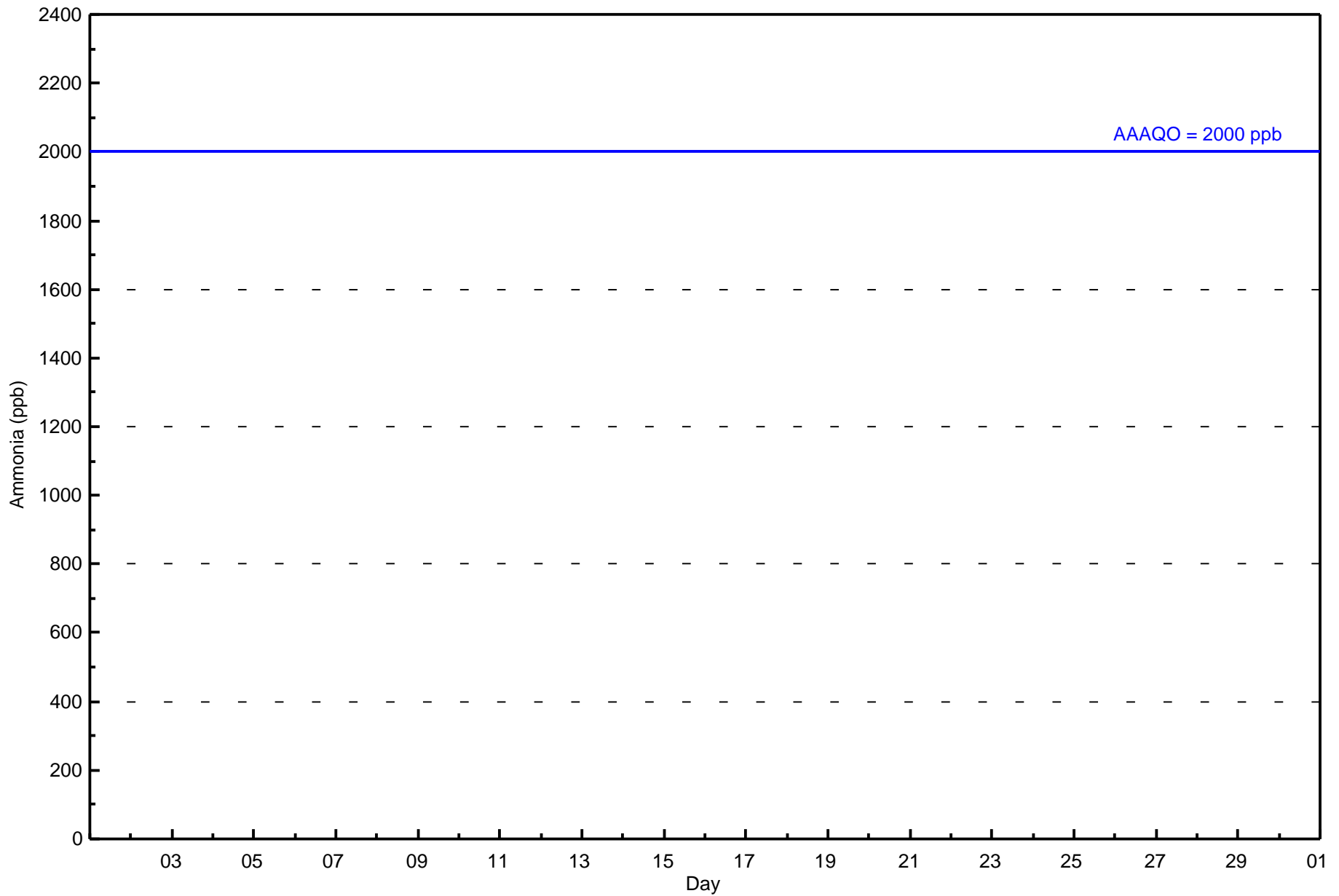


| | | | |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 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: 636 |
| Monthly Average: 0.0 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 0 P ₉₉ = 0 | | Hours of Missing Data: 84 |
| | | | Hours of Calibration: 49 |
| | | | Percent Operational Time: 95.1 |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | Diurnal Average |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 636 | 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: 636

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 35 | 9 | 9 | 8 | 9 | 19 | 64 | 43 | 44 | 56 | 72 | 72 | 41 | 66 | 53 | 36 | 636 |
| 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 | 35 | 9 | 9 | 8 | 9 | 19 | 64 | 43 | 44 | 56 | 72 | 72 | 41 | 66 | 53 | 36 | 636 |

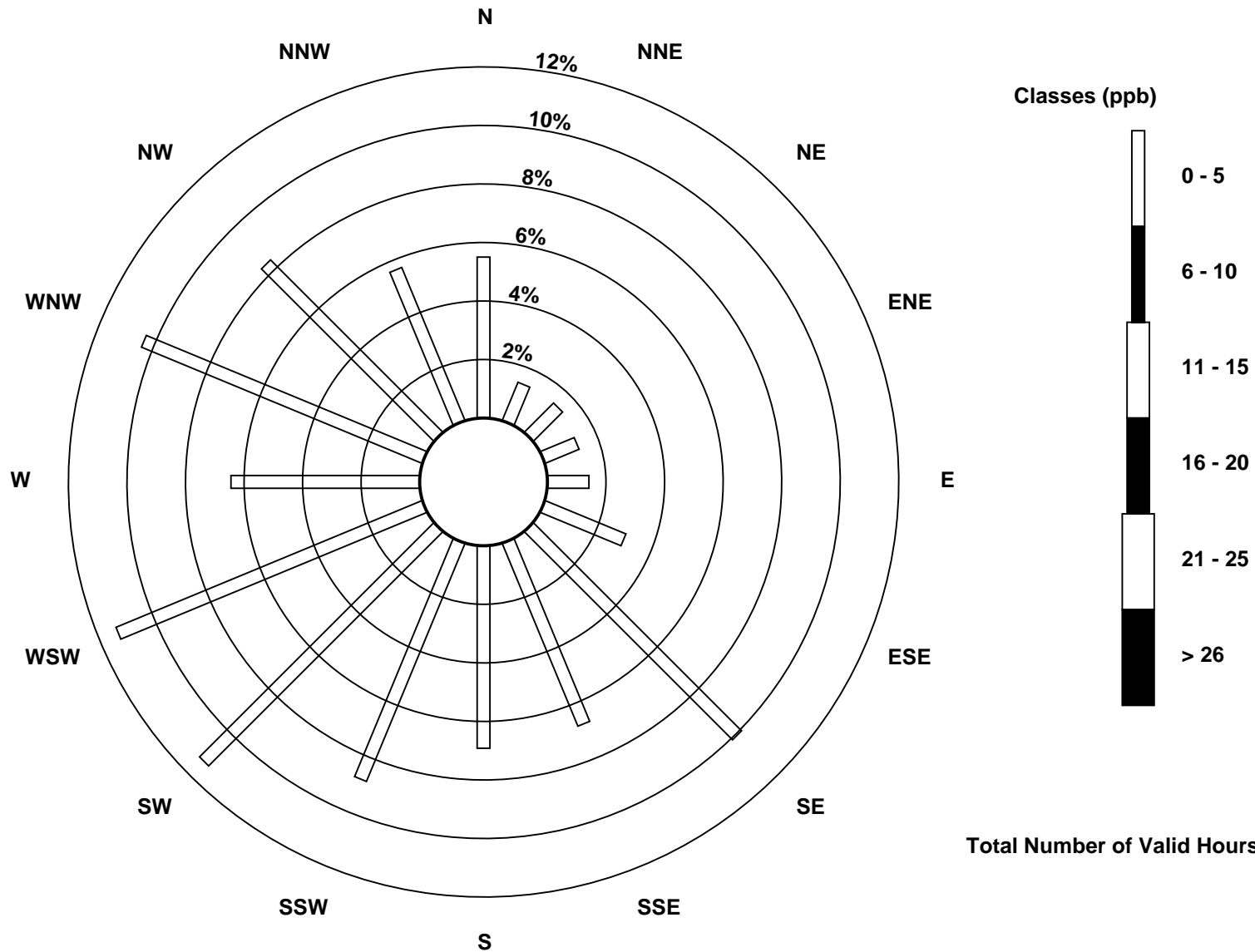
Total Number of Valid Hours: 636

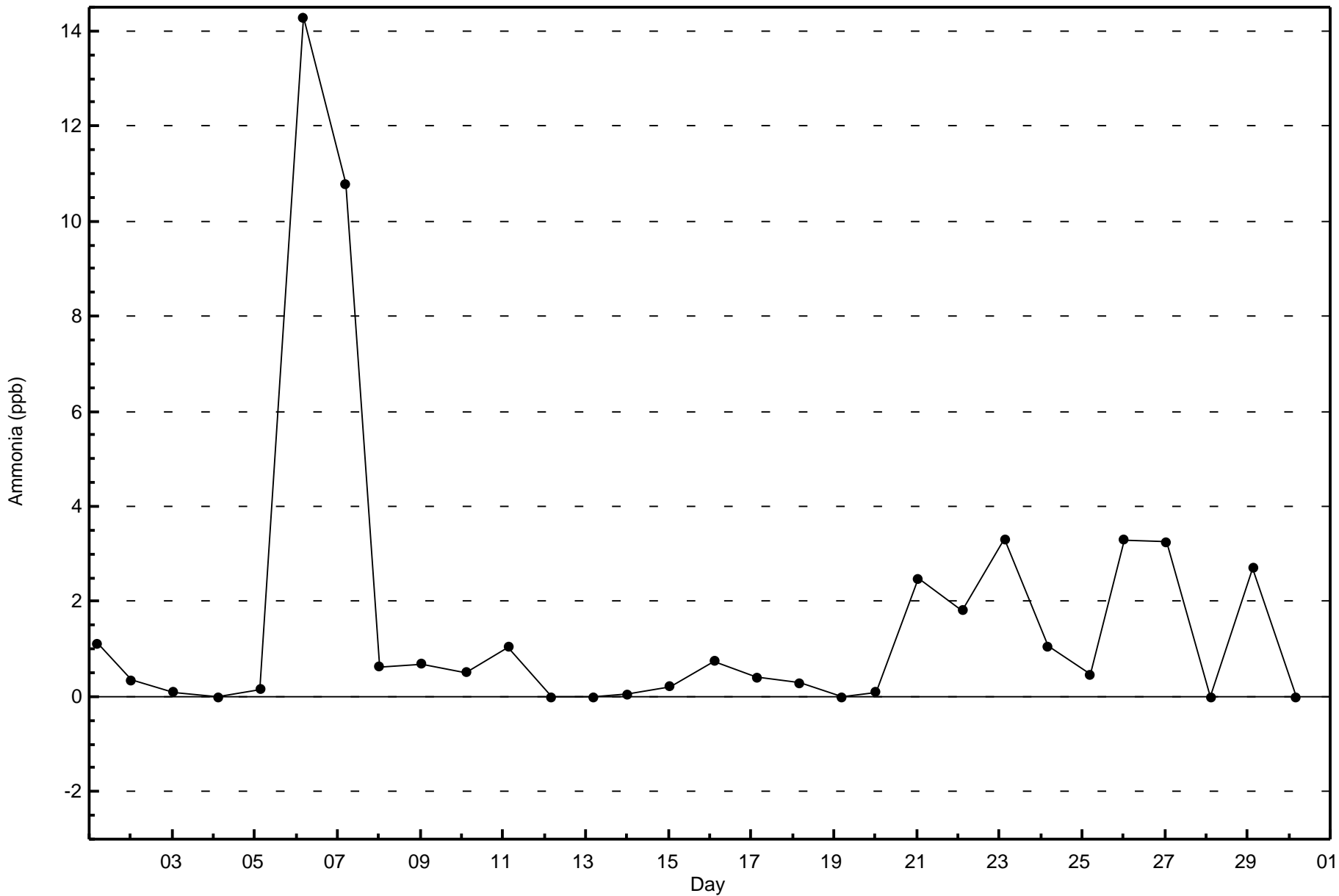
Total Number of Hours: 720

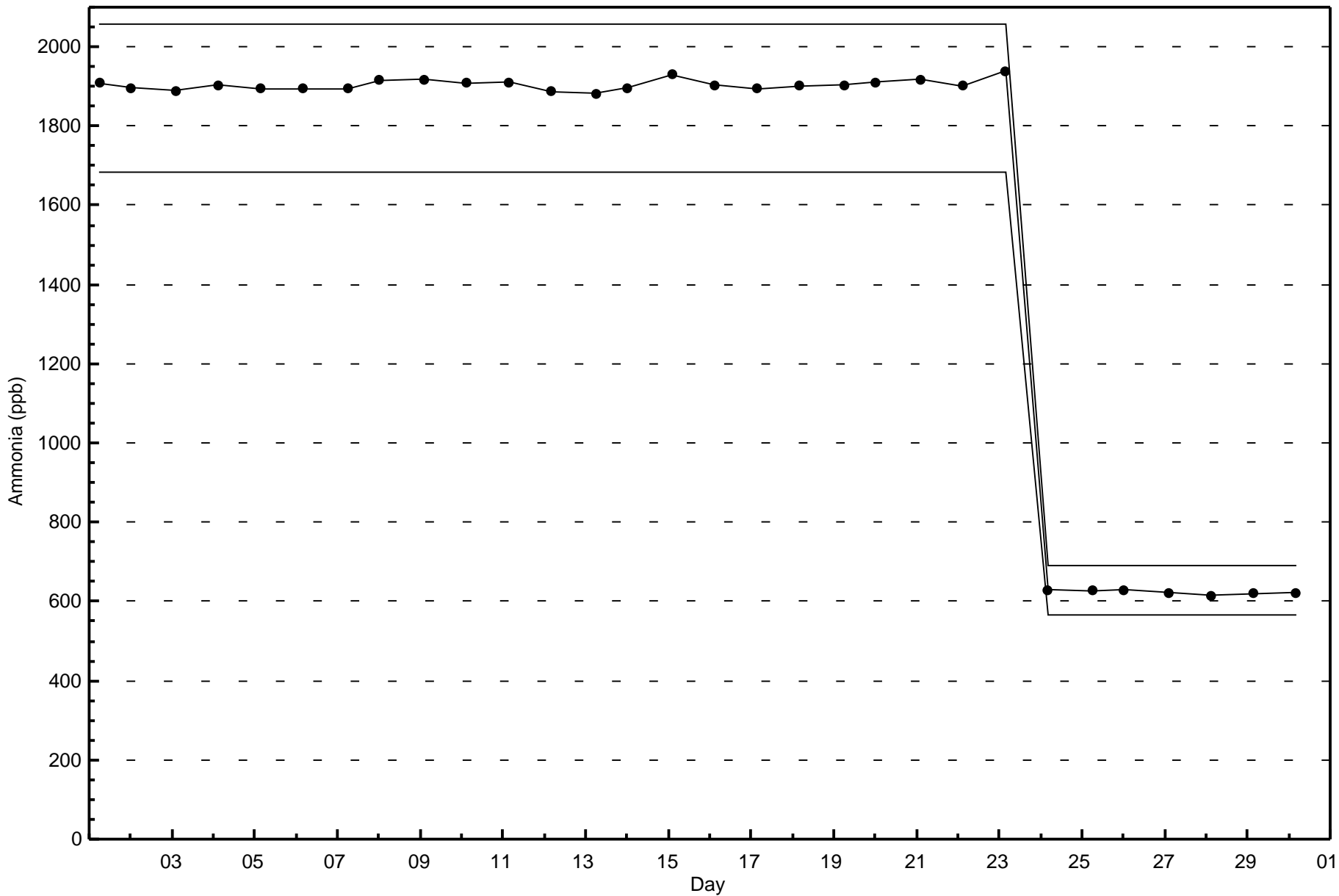


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









| | | | |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 22.7 µg/m ³ on Sep 28 20:00 | Maximum Daily Average: 6.7 µg/m ³ on Sep 30 | Hours of Data: | 716 |
| Minimum Value: 0.4 µg/m ³ on Sep 25 05:00 | Minimum Daily Average: 0.7 µg/m ³ on Sep 3 | Hours of Missing Data: | 4 |
| Maximum Diurnal Average: 4.9 µg/m ³ at hour 21 | Minimum Diurnal Average: 1.7 µg/m ³ at hour 13 | Hours of Calibration: | 4 |
| Monthly Average: 3.07 µg/m ³ | Percentiles: P ₁ = 0.5 P ₁₀ = 0.8 Q ₁ = 1.3 Median = 2.3 Q ₃ = 4.0 P ₉₀ = 6.3 P ₉₉ = 14.7 | 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 | 2.7 | 2.2 | 4.1 | 2.9 | 3.2 | 3.5 | 6.7 | 2.8 | 2.9 | 3.4 | 3.4 | 3.4 | 4.0 | 5.3 | 3.9 | 3.9 | 6.8 | 7.3 | 4.4 | 5.3 | 3.4 | 2.4 | 2.5 | 2.6 | 3.9 | 7.3 |
| 2-Sep | 2.7 | 3.2 | 3.8 | 3.4 | 1.7 | 2.4 | 2.7 | 2.6 | 2.2 | 2.0 | 1.6 | 1.6 | 1.5 | 1.6 | 1.4 | 1.4 | 1.4 | 1.6 | 1.0 | 0.9 | 1.2 | 0.9 | 0.9 | 0.9 | 1.9 | 3.8 |
| 3-Sep | 0.9 | 1.0 | 0.9 | 0.9 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.6 | 0.7 | 1.0 |
| 4-Sep | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.8 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.9 | 1.1 | 1.0 | 1.7 | 1.4 | 0.8 | 1.7 | |
| 5-Sep | 1.7 | 2.6 | 5.2 | 2.8 | 2.6 | 2.4 | 2.3 | 1.6 | 1.5 | 1.6 | 1.7 | 1.2 | 1.3 | 4.1 | 5.3 | 4.7 | 3.8 | 3.1 | 4.0 | 4.6 | 5.1 | 4.5 | 4.6 | 5.4 | 3.2 | 5.4 |
| 6-Sep | 9.2 | 8.9 | 9.2 | 8.3 | 7.9 | 7.4 | 7.7 | 7.0 | 3.5 | 2.6 | 2.4 | 2.3 | 2.1 | 2.9 | 3.0 | 1.3 | 1.2 | 2.2 | 4.2 | 7.1 | 11.6 | 5.3 | 6.1 | 4.6 | 5.3 | 11.6 |
| 7-Sep | 2.9 | 2.3 | 1.8 | 2.0 | 1.9 | 2.1 | 2.8 | 2.3 | 2.2 | 1.6 | 1.5 | 2.0 | 1.9 | 2.2 | 2.2 | 3.2 | 2.5 | 6.3 | 9.0 | 5.3 | 5.8 | 1.1 | 1.3 | 2.4 | 2.9 | 9.0 |
| 8-Sep | 2.9 | 3.6 | 4.0 | 4.0 | 4.3 | 4.9 | 4.6 | 2.7 | 2.2 | 2.1 | 2.3 | 2.3 | 1.5 | 1.3 | 1.7 | 1.9 | 3.1 | 1.9 | 1.2 | 1.9 | 2.7 | 4.1 | 4.8 | 4.5 | 2.9 | 4.9 |
| 9-Sep | 2.8 | 1.7 | 1.4 | 1.3 | 1.5 | 1.4 | 1.4 | 3.5 | 3.7 | 2.5 | 6.8 | 7.5 | 2.6 | 1.5 | 1.8 | 1.5 | 1.3 | 1.1 | 2.6 | 3.0 | 3.6 | 2.5 | 1.9 | 2.3 | 2.6 | 7.5 |
| 10-Sep | 2.3 | 1.5 | 2.0 | 2.0 | 1.9 | 1.4 | 1.5 | 1.4 | 1.0 | 0.9 | 0.9 | 1.0 | 0.9 | 0.8 | 0.8 | 1.0 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 2.3 |
| 11-Sep | 0.7 | 2.4 | 2.4 | 3.6 | 4.2 | 1.1 | 0.9 | 1.4 | 1.1 | 1.3 | 1.0 | 1.0 | 1.3 | 1.1 | 0.8 | 0.9 | 1.2 | 1.0 | 1.7 | 1.4 | 0.8 | 0.8 | 0.8 | 0.7 | 1.4 | 4.2 |
| 12-Sep | 0.7 | 0.8 | 0.8 | 0.9 | 1.1 | 1.2 | 0.9 | 0.8 | 0.8 | 0.7 | 0.7 | 0.6 | 0.8 | 0.8 | 0.9 | 1.1 | 1.0 | 1.3 | 3.8 | 14.9 | 6.4 | 2.0 | 2.0 | 2.2 | 2.0 | 14.9 |
| 13-Sep | 2.4 | 2.6 | 2.6 | 2.5 | 2.6 | 2.7 | 2.9 | 3.7 | 2.1 | 1.7 | 1.6 | 2.8 | 1.9 | 1.8 | 1.9 | 1.5 | 1.4 | 1.7 | 2.5 | 2.8 | 3.2 | 3.0 | 3.0 | 3.3 | 2.4 | 3.7 |
| 14-Sep | 4.8 | 5.4 | 5.6 | 6.4 | 6.0 | 5.6 | 8.1 | 10.7 | 2.7 | 4.1 | 2.5 | 2.4 | 2.4 | 2.3 | 1.5 | 1.5 | 1.7 | 1.7 | 8.0 | 3.6 | 3.0 | 5.7 | 5.5 | 3.1 | 4.3 | 10.7 |
| 15-Sep | 3.4 | 4.2 | 4.9 | 5.9 | 7.2 | 10.6 | 7.7 | 7.3 | 6.0 | 4.6 | 2.4 | 2.6 | 2.8 | 2.3 | 2.4 | 1.7 | 2.0 | 2.7 | 4.2 | 3.0 | 3.7 | 6.0 | 5.9 | 15.2 | 4.9 | 15.2 |
| 16-Sep | 6.4 | 6.2 | 5.8 | 5.7 | 4.9 | 5.0 | 6.1 | 4.8 | 3.5 | 1.6 | 1.3 | 1.0 | 1.2 | 1.2 | 1.2 | 1.3 | 2.6 | 2.5 | 2.3 | 5.6 | 21.2 | 4.8 | 20.4 | 4.8 | 5.1 | 21.2 |
| 17-Sep | 1.2 | 0.7 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.7 | 0.8 | 0.6 | 0.6 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.4 | 2.2 | 2.9 | 2.7 | 2.4 | 2.5 | 2.2 | 1.3 | 2.9 |
| 18-Sep | 1.7 | 5.3 | 3.8 | 2.7 | 3.7 | 3.1 | 2.9 | 2.2 | 1.9 | 1.7 | 1.7 | 1.7 | 1.6 | 1.6 | 2.1 | 1.8 | 2.0 | 2.1 | 3.7 | 4.3 | 2.6 | 2.5 | 1.8 | 1.5 | 2.5 | 5.3 |
| 19-Sep | 5.6 | 6.8 | 2.7 | 2.5 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.8 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.6 | 1.7 | 1.7 | 1.8 | 2.3 | 3.5 | 2.4 | 1.7 | 1.7 | 2.4 | 6.8 |
| 20-Sep | 2.4 | 2.1 | 2.3 | 2.5 | 3.4 | 2.7 | 3.7 | 3.8 | 2.4 | 5.0 | 3.7 | 4.4 | 5.4 | 4.5 | 5.7 | 6.9 | 6.3 | 6.7 | 13.2 | 15.1 | 16.0 | 11.1 | 12.2 | 4.3 | 6.1 | 16.0 |
| 21-Sep | 3.5 | 4.8 | 6.9 | 6.4 | 4.4 | 6.3 | 4.6 | 4.3 | 2.4 | 1.8 | 1.4 | 1.1 | 0.8 | 0.7 | 0.7 | 0.8 | 0.9 | 0.7 | 1.4 | 2.1 | 2.6 | 2.8 | 2.5 | 2.6 | 2.8 | 6.9 |
| 22-Sep | 3.3 | 4.4 | 4.6 | 4.9 | 5.0 | 6.3 | 7.5 | 5.5 | C | C | 1.5 | 1.4 | 1.2 | 1.2 | 1.1 | 1.4 | 1.4 | 1.8 | 2.6 | 2.9 | 1.8 | 1.8 | 1.7 | 1.9 | 3.0 | 7.5 |
| 23-Sep | 1.9 | 1.9 | 2.0 | 2.2 | 2.4 | 2.5 | 2.6 | 2.8 | 2.8 | 2.7 | 2.6 | 2.2 | 2.1 | 2.1 | 1.9 | 2.3 | 2.6 | 3.6 | 3.4 | 2.2 | 2.5 | 2.5 | 1.5 | 1.3 | 2.4 | 3.6 |
| 24-Sep | 1.4 | 1.4 | 1.9 | 3.0 | 4.5 | 6.0 | 6.0 | 5.4 | 4.3 | 3.3 | 2.5 | 1.7 | 1.6 | 1.3 | C | C | 0.6 | 0.7 | 1.0 | 1.4 | 1.5 | 1.6 | 1.5 | 1.4 | 2.5 | 6.0 |
| 25-Sep | 1.3 | 1.2 | 1.1 | 1.0 | 0.4 | 0.5 | 0.7 | 0.8 | 0.5 | 1.1 | 1.0 | 1.2 | 1.5 | 1.1 | 1.3 | 0.9 | 1.0 | 2.1 | 6.8 | 3.1 | 11.1 | 4.5 | 3.0 | 4.6 | 2.2 | 11.1 |
| 26-Sep | 2.6 | 2.8 | 2.4 | 3.0 | 4.2 | 5.3 | 6.0 | 4.5 | 3.6 | 3.0 | 2.1 | 1.8 | 1.5 | 1.4 | 0.8 | 1.0 | 1.6 | 2.5 | 2.1 | 2.7 | 2.2 | 2.9 | 5.5 | 3.6 | 2.9 | 6.0 |
| 27-Sep | 3.3 | 3.7 | 3.8 | 4.3 | 5.0 | 4.5 | 2.5 | 2.0 | 1.9 | 1.6 | 1.4 | 0.8 | 0.6 | 0.7 | 1.0 | 1.0 | 2.3 | 1.0 | 1.5 | 1.4 | 1.4 | 1.6 | 1.6 | 2.1 | 2.1 | 5.0 |
| 28-Sep | 1.3 | 0.4 | 0.5 | 0.6 | 1.4 | 1.7 | 3.2 | 3.4 | 2.3 | 2.1 | 1.8 | 1.1 | 1.0 | 1.6 | 2.1 | 3.3 | 3.8 | 5.0 | 9.9 | 22.7 | 12.8 | 6.5 | 5.8 | 6.7 | 4.2 | 22.7 |
| 29-Sep | 6.8 | 6.7 | 6.1 | 6.7 | 7.3 | 8.9 | 11.1 | 12.1 | 6.4 | 3.2 | 2.8 | 2.2 | 1.9 | 2.6 | 2.3 | 2.2 | 3.0 | 7.0 | 8.1 | 7.0 | 6.7 | 5.1 | 5.6 | 7.0 | 5.8 | 12.1 |
| 30-Sep | 5.8 | 8.4 | 12.2 | 12.7 | 11.6 | 10.7 | 10.7 | 10.0 | 8.5 | 6.1 | 5.7 | 4.3 | 2.8 | 3.1 | 4.7 | 5.5 | 5.9 | 4.7 | 3.4 | 4.1 | 4.7 | 5.8 | 4.9 | 4.2 | 6.7 | 12.7 |

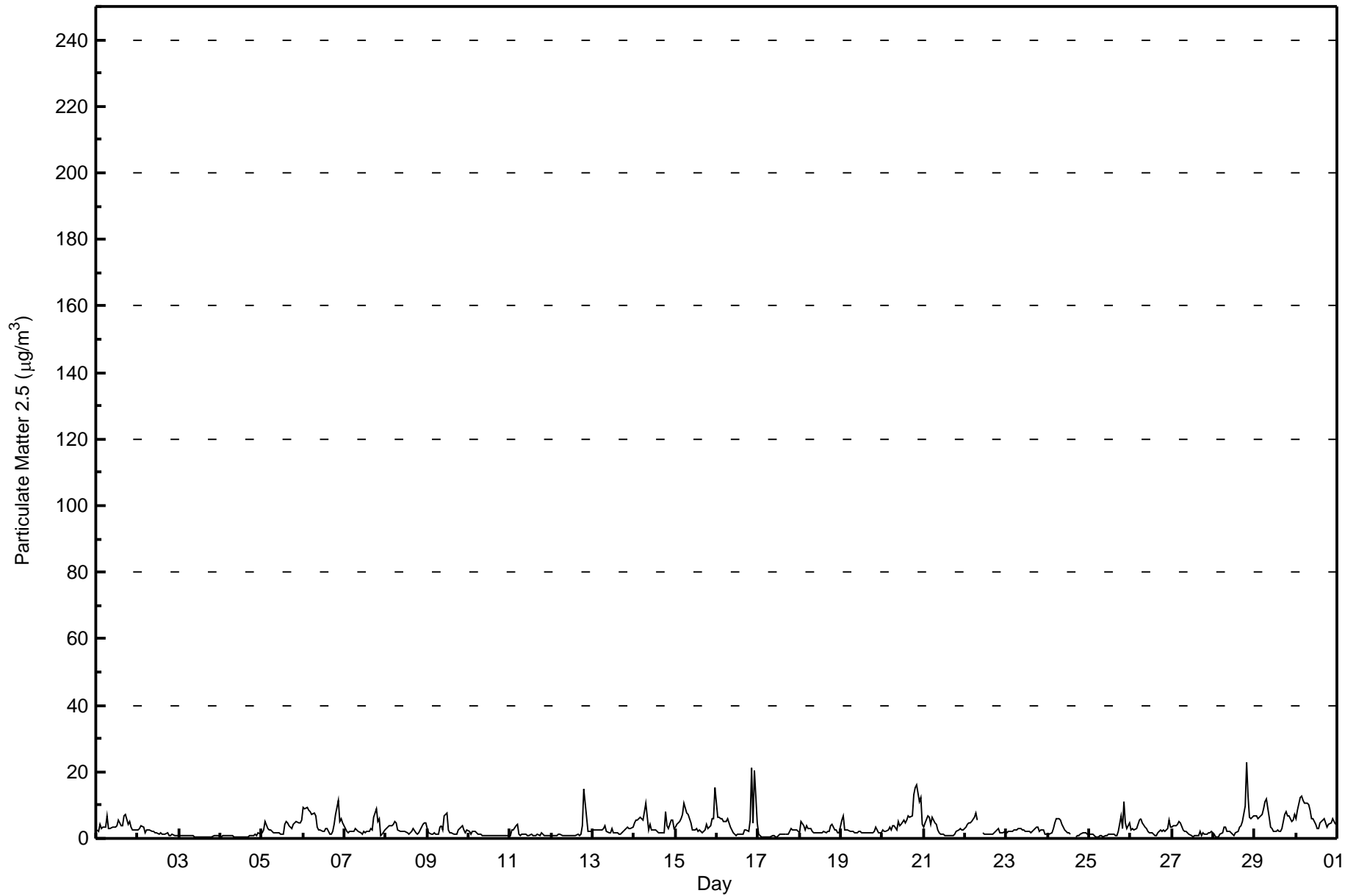
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-----------------|--|
| 3.0 | 3.3 | 3.5 | 3.6 | 3.6 | 3.8 | 4.1 | 3.8 | 2.6 | 2.3 | 2.1 | 2.0 | 1.7 | 1.8 | 2.0 | 2.0 | 2.2 | 2.6 | 3.7 | 4.5 | 4.9 | 3.3 | 3.8 | 3.3 | Diurnal Average | |
| 9.2 | 8.9 | 12.2 | 12.7 | 11.6 | 10.7 | 11.1 | 12.1 | 8.5 | 6.1 | 6.8 | 7.5 | 5.4 | 5.3 | 5.7 | 6.9 | 6.8 | 7.3 | 13.2 | 22.7 | 21.2 | 11.1 | 20.4 | 15.2 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 493 | 68.85 | 68.85 |
| 6 - 15 | 100 | 13.97 | 82.82 |
| 16 - 25 | 4 | 0.56 | 83.38 |
| 26 - 80 | 0 | 0.00 | 83.38 |
| > 81.0 | 0 | 0.00 | 83.38 |

Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|------------------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 22 | 6 | 6 | 7 | 6 | 18 | 58 | 38 | 33 | 54 | 60 | 54 | 26 | 28 | 40 | 37 | 493 |
| 6 - 15 | 15 | 3 | 3 | 1 | 3 | 1 | 12 | 7 | 15 | 11 | 9 | 5 | 4 | 3 | 4 | 4 | 100 |
| 16 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 37 | 9 | 9 | 8 | 9 | 19 | 70 | 45 | 49 | 68 | 69 | 59 | 30 | 31 | 44 | 41 | 597 |

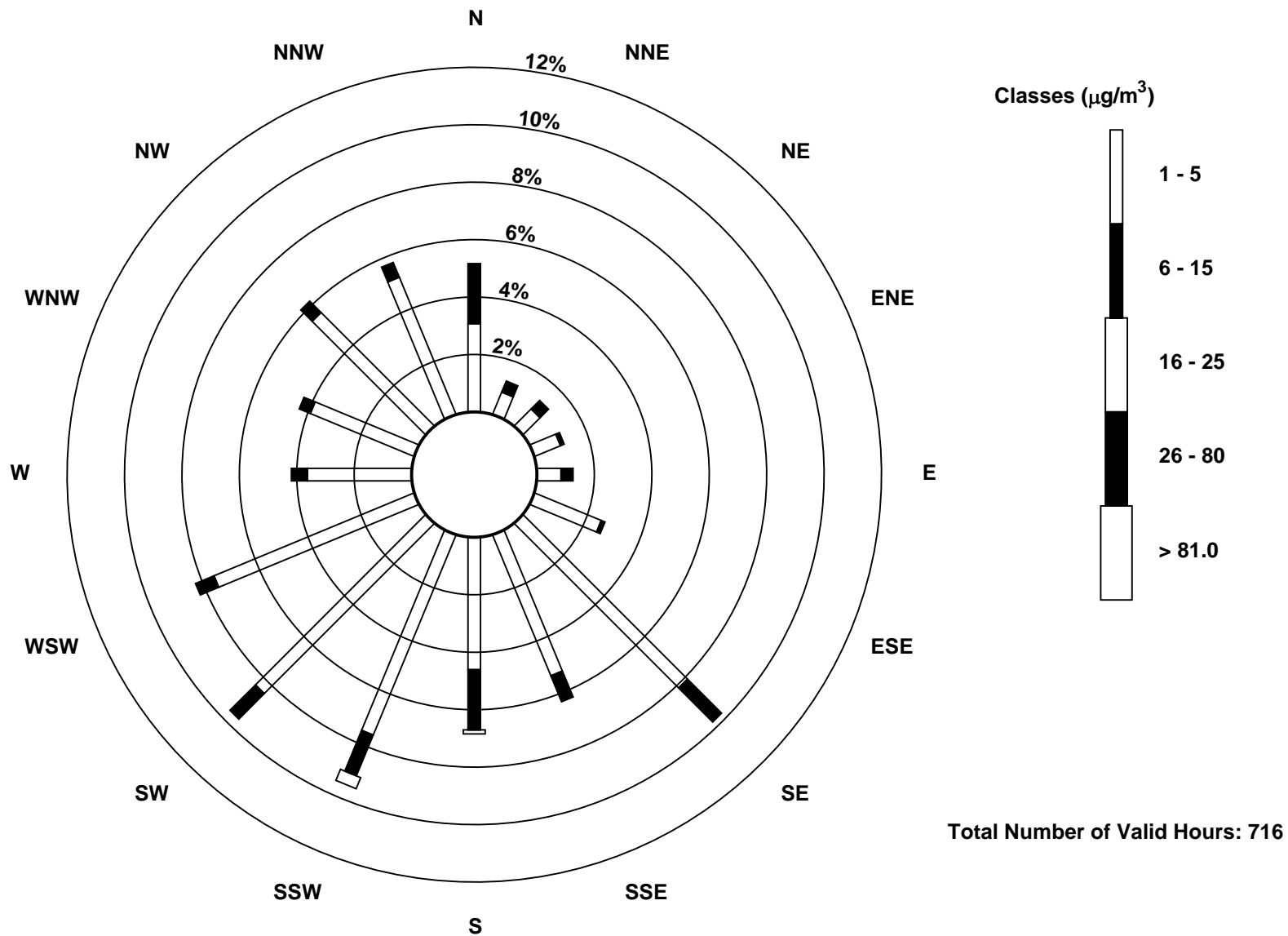
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

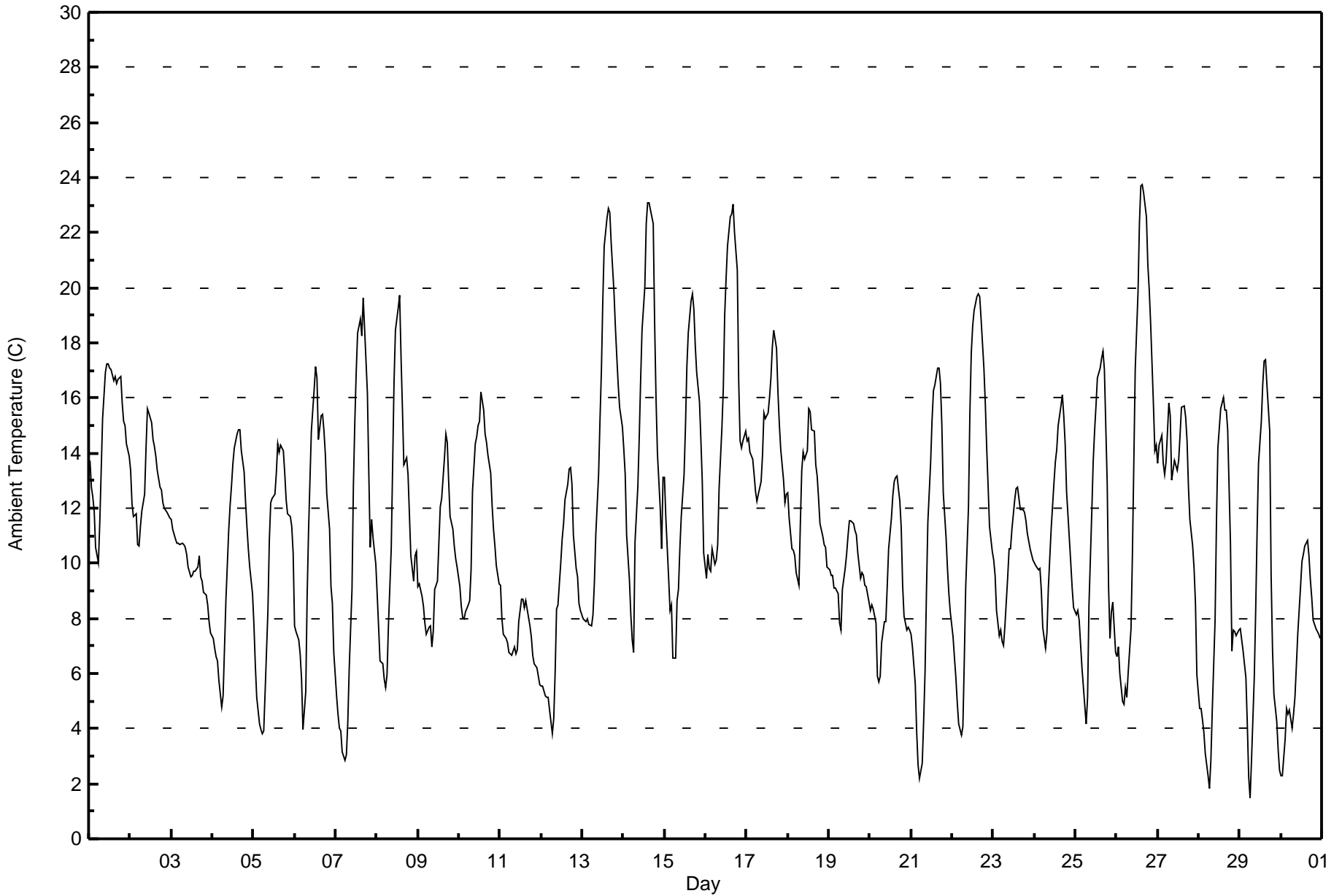
Patricia McInnes - September 2016

| Maximum Value: 23.7 C on Sep 26 16:00 | | Maximum Daily Average: 15.5 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: 1.5 C on Sep 29 07:00 | | Minimum Daily Average: 6.9 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.0 C at hour 16 | | Minimum Diurnal Average: 6.7 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.29 C | | Percentiles: P ₁ = 2.4 P ₁₀ = 5.7 Q ₁ = 7.9 Median = 10.9 Q ₃ = 14.3 P ₉₀ = 17.0 P ₉₉ = 22.8 | | 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 | 13.7 | 12.8 | 12.4 | 11.9 | 10.6 | 10.0 | 11.5 | 13.4 | 15.2 | 16.9 | 17.2 | 17.2 | 17.1 | 17.0 | 16.6 | 16.8 | 16.5 | 16.7 | 16.8 | 15.8 | 15.1 | 15.0 | 14.3 | 13.9 | 14.8 | 17.2 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 13.4 | 12.2 | 11.7 | 11.8 | 10.7 | 10.7 | 11.3 | 11.9 | 12.5 | 14.2 | 15.6 | 15.5 | 15.1 | 14.5 | 14.2 | 13.9 | 13.4 | 12.8 | 12.7 | 12.2 | 12.0 | 11.8 | 11.8 | 11.7 | 12.8 | 15.6 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 11.6 | 11.2 | 10.9 | 10.7 | 10.7 | 10.7 | 10.7 | 10.7 | 10.6 | 10.3 | 9.9 | 9.5 | 9.5 | 9.7 | 9.7 | 9.9 | 10.3 | 9.5 | 9.3 | 8.9 | 8.9 | 8.5 | 7.9 | 7.5 | 9.9 | 11.6 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 7.3 | 6.9 | 6.6 | 6.5 | 5.7 | 4.8 | 5.2 | 6.9 | 8.7 | 11.2 | 12.1 | 12.8 | 13.6 | 14.2 | 14.7 | 14.9 | 14.9 | 14.1 | 13.3 | 12.3 | 11.3 | 10.5 | 9.8 | 8.9 | 10.3 | 14.9 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 7.8 | 6.3 | 5.1 | 4.2 | 4.0 | 3.8 | 3.9 | 5.3 | 8.3 | 10.8 | 12.2 | 12.4 | 12.5 | 13.3 | 14.4 | 14.0 | 14.3 | 14.1 | 13.2 | 12.3 | 11.8 | 11.7 | 11.3 | 10.4 | 9.9 | 14.4 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 7.8 | 7.5 | 7.2 | 6.7 | 5.8 | 4.0 | 5.3 | 8.8 | 11.2 | 13.0 | 14.8 | 16.3 | 17.1 | 16.7 | 14.5 | 15.4 | 14.8 | 13.9 | 12.5 | 11.2 | 9.2 | 8.6 | 6.7 | 11.0 | 17.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 5.2 | 4.5 | 4.0 | 3.9 | 3.2 | 2.8 | 3.0 | 4.2 | 6.1 | 9.0 | 12.8 | 15.1 | 16.9 | 18.4 | 18.9 | 18.2 | 19.6 | 18.5 | 16.2 | 13.3 | 10.6 | 11.6 | 10.9 | 10.0 | 10.7 | 19.6 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 8.8 | 7.7 | 6.4 | 6.3 | 5.8 | 5.5 | 6.0 | 7.7 | 10.5 | 13.5 | 16.6 | 18.4 | 19.3 | 19.7 | 17.5 | 15.6 | 13.6 | 13.8 | 13.2 | 11.8 | 10.3 | 9.4 | 10.3 | 10.4 | 11.6 | 19.7 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 9.2 | 9.3 | 8.8 | 8.4 | 7.9 | 7.4 | 7.7 | 7.8 | 7.0 | 7.5 | 9.1 | 9.3 | 10.7 | 12.1 | 12.3 | 13.9 | 14.7 | 14.4 | 13.0 | 11.7 | 11.2 | 10.6 | 10.2 | 9.9 | 10.2 | 14.7 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 9.1 | 8.5 | 8.1 | 8.0 | 8.2 | 8.5 | 8.7 | 9.8 | 12.6 | 14.3 | 14.6 | 15.0 | 15.1 | 16.2 | 15.6 | 14.7 | 14.4 | 13.9 | 13.3 | 12.1 | 11.3 | 10.6 | 9.9 | 9.3 | 11.7 | 16.2 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 9.2 | 8.0 | 7.4 | 7.3 | 7.1 | 6.8 | 6.7 | 6.7 | 7.0 | 6.7 | 6.9 | 7.9 | 8.7 | 8.7 | 8.4 | 8.6 | 8.3 | 7.7 | 7.3 | 6.7 | 6.3 | 6.2 | 5.9 | 5.6 | 7.3 | 9.2 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 5.5 | 5.5 | 5.2 | 5.1 | 5.1 | 4.7 | 3.8 | 4.4 | 6.0 | 8.3 | 8.5 | 10.0 | 10.9 | 11.4 | 12.3 | 12.9 | 13.4 | 13.5 | 12.9 | 11.0 | 9.8 | 9.5 | 8.6 | 8.3 | 8.6 | 13.5 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 8.0 | 8.0 | 7.9 | 8.0 | 7.8 | 7.7 | 8.1 | 9.3 | 11.0 | 13.2 | 15.2 | 17.0 | 19.5 | 21.5 | 22.5 | 22.9 | 22.7 | 21.6 | 19.8 | 18.5 | 17.5 | 16.5 | 15.6 | 14.9 | 14.8 | 22.9 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 14.1 | 13.2 | 11.1 | 9.4 | 8.1 | 7.2 | 6.8 | 10.8 | 12.8 | 14.5 | 16.6 | 18.4 | 20.1 | 22.3 | 23.1 | 23.1 | 22.8 | 22.3 | 18.7 | 16.0 | 14.0 | 12.0 | 10.5 | 13.1 | 15.0 | 23.1 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 13.1 | 11.6 | 9.4 | 8.3 | 8.5 | 6.6 | 6.6 | 8.6 | 9.0 | 10.5 | 11.7 | 13.2 | 15.0 | 17.1 | 18.4 | 19.5 | 19.8 | 19.2 | 17.9 | 16.9 | 15.8 | 14.5 | 13.0 | 10.4 | 13.1 | 19.8 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 9.5 | 10.3 | 9.8 | 9.7 | 10.5 | 9.9 | 10.1 | 10.7 | 12.7 | 14.9 | 16.3 | 19.0 | 20.3 | 21.5 | 22.6 | 22.7 | 23.0 | 22.0 | 20.6 | 16.7 | 14.5 | 14.2 | 14.5 | 14.8 | 15.5 | 23.0 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 14.4 | 14.6 | 14.0 | 13.8 | 13.2 | 12.6 | 12.3 | 12.5 | 13.0 | 14.0 | 15.4 | 15.2 | 15.4 | 16.0 | 16.7 | 17.9 | 18.5 | 17.8 | 16.2 | 15.0 | 14.1 | 13.0 | 12.2 | 12.5 | 14.6 | 18.5 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 12.6 | 11.6 | 10.5 | 10.5 | 10.3 | 9.7 | 9.2 | 11.4 | 13.4 | 14.0 | 13.8 | 14.1 | 15.6 | 15.5 | 14.8 | 14.8 | 13.6 | 13.2 | 12.4 | 11.4 | 11.0 | 10.7 | 10.6 | 9.9 | 12.3 | 15.6 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 9.8 | 9.6 | 9.6 | 9.1 | 9.1 | 8.9 | 7.8 | 7.6 | 9.0 | 9.8 | 10.3 | 11.0 | 11.5 | 11.5 | 11.4 | 11.2 | 11.1 | 10.4 | 9.4 | 9.7 | 9.6 | 9.2 | 9.1 | 8.6 | 9.8 | 11.5 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 8.3 | 8.5 | 8.4 | 7.8 | 5.9 | 5.7 | 5.9 | 7.1 | 7.9 | 7.9 | 9.2 | 10.5 | 11.6 | 12.5 | 13.0 | 13.1 | 13.2 | 12.3 | 11.3 | 9.2 | 8.1 | 7.6 | 7.7 | 7.6 | 9.2 | 13.2 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 7.4 | 7.0 | 5.6 | 3.9 | 2.7 | 2.2 | 2.8 | 4.3 | 6.1 | 8.9 | 11.5 | 13.7 | 15.2 | 16.3 | 16.5 | 17.1 | 17.1 | 16.5 | 15.0 | 12.5 | 10.9 | 9.8 | 8.9 | 8.3 | 10.0 | 17.1 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 7.3 | 6.5 | 5.8 | 5.0 | 4.2 | 3.8 | 4.1 | 6.4 | 9.1 | 12.0 | 15.5 | 17.6 | 18.6 | 19.2 | 19.7 | 19.8 | 19.7 | 18.9 | 17.1 | 15.8 | 14.2 | 12.8 | 11.3 | 10.4 | 12.3 | 19.8 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 10.1 | 9.6 | 8.3 | 7.4 | 7.6 | 7.2 | 7.0 | 7.7 | 9.5 | 10.5 | 11.2 | 12.3 | 12.7 | 12.8 | 12.4 | 11.9 | 12.0 | 11.9 | 11.6 | 11.1 | 10.5 | 10.3 | 10.1 | 10.3 | 10.3 | 12.8 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 10.0 | 9.9 | 9.8 | 9.8 | 9.0 | 7.7 | 6.9 | 7.5 | 9.1 | 10.2 | 11.3 | 12.9 | 13.7 | 14.1 | 15.0 | 15.7 | 16.1 | 15.4 | 14.3 | 12.6 | 10.9 | 10.0 | 9.1 | 8.4 | 11.2 | 16.1 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 8.1 | 8.3 | 7.9 | 7.1 | 6.2 | 4.8 | 4.2 | 5.1 | 8.5 | 11.8 | 13.7 | 14.8 | 15.7 | 16.7 | 17.1 | 17.4 | 17.7 | 17.0 | 12.9 | 9.1 | 7.3 | 8.2 | 8.6 | 6.8 | 10.6 | 17.7 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 6.6 | 6.9 | 6.0 | 5.0 | 4.9 | 5.5 | 5.1 | 6.1 | 7.6 | 10.3 | 13.6 | 17.0 | 19.8 | 22.3 | 23.7 | 23.7 | 23.4 | 22.6 | 20.9 | 19.9 | 18.7 | 15.8 | 14.1 | 14.3 | 13.9 | 23.7 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 13.6 | 14.3 | 14.6 | 13.7 | 13.2 | 13.7 | 15.8 | 15.4 | 13.0 | 13.4 | 13.7 | 13.4 | 13.7 | 14.6 | 15.6 | 15.7 | 15.3 | 14.5 | 12.8 | 11.6 | 10.6 | 9.8 | 8.5 | 5.9 | 13.2 | 15.8 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 4.7 | 4.7 | 4.3 | 3.9 | 3.1 | 2.3 | 1.9 | 2.8 | 4.7 | 7.9 | 11.6 | 14.2 | 14.9 | 15.6 | 16.0 | 15.6 | 15.6 | 14.9 | 10.7 | 6.8 | 7.6 | 7.5 | 7.4 | 7.6 | 8.6 | 16.0 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 7.6 | 7.2 | 6.8 | 5.8 | 4.2 | 2.2 | 1.5 | 2.9 | 5.9 | 8.3 | 11.2 | 13.6 | 15.2 | 16.5 | 17.4 | 17.4 | 16.5 | 14.8 | 9.5 | 6.9 | 5.3 | 4.3 | 3.3 | 2.5 | 8.6 | 17.4 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 2.3 | 2.3 | 3.6 | 4.7 | 4.5 | 4.7 | 4.0 | 4.5 | 5.1 | 6.2 | 7.4 | 9.1 | 10.1 | 10.3 | 10.6 | 10.9 | 10.2 | 9.4 | 8.7 | 7.9 | 7.6 | 7.5 | 7.4 | 7.3 | 6.9 | 10.9 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.2 | 8.8 | 8.2 | 7.8 | 7.3 | 6.7 | 6.8 | 7.9 | 9.4 | 11.1 | 12.6 | 13.9 | 14.8 | 15.6 | 15.9 | 16.0 | 15.9 | 15.3 | 13.8 | 12.3 | 11.3 | 10.6 | 10.1 | 9.5 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 14.4 | 14.6 | 14.6 | 13.8 | 13.2 | 13.7 | 15.8 | 15.4 | 15.2 | 16.9 | 17.2 | 19.0 | 20.3 | 22.3 | 23.7 | 23.7 | 23.4 | 22.6 | 20.9 | 19.9 | 18.7 | 16.5 | 15.6 | 14.9 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 301 | 41.81 | 41.81 |
| 10 - 20 | 395 | 54.86 | 96.67 |
| > 20 | 24 | 3.33 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



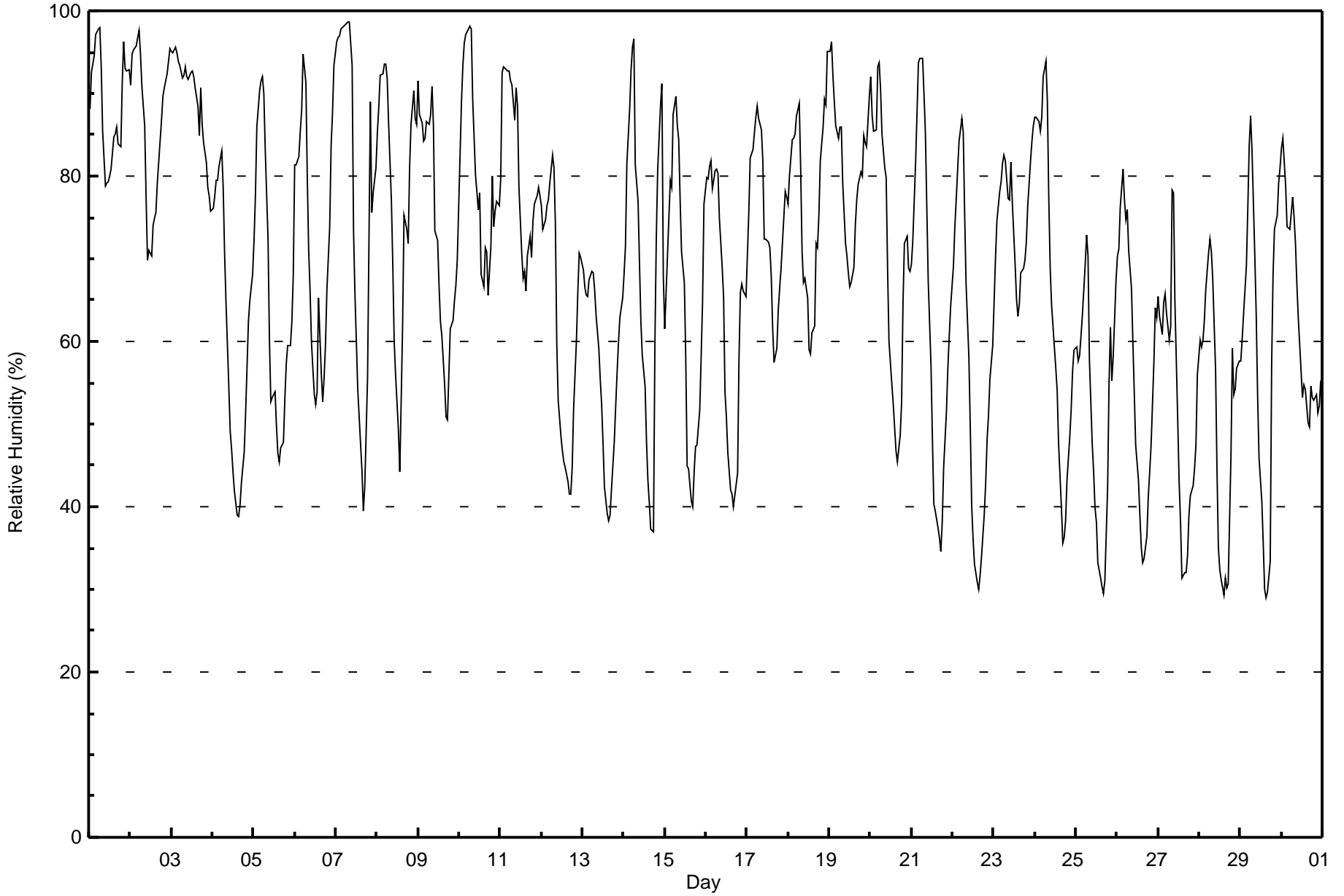
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Patricia McInnes - September 2016

| Maximum Value: 99 % on Sep 7 09:00 Maximum Daily Average: 89.4 % on Sep 3 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----------------------------------------------------------------------------------------|------|------|------|------|------|------|------|-----------------|---------------|----|
| Minimum Value: 29 % on Sep 29 16:00 Minimum Daily Average: 51.4 % on Sep 25 Maximum Diurnal Average: 86.2 % at hour 7 Minimum Diurnal Average: 50.5 % at hour 16 Monthly Average: 68.8 % Percentiles: P ₁ = 30 P ₁₀ = 42 Q ₁ = 55 Median = 71 Q ₃ = 84 P ₉₀ = 92 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 | 88 | 93 | 94 | 95 | 97 | 98 | 98 | 93 | 85 | 79 | 79 | 79 | 80 | 81 | 85 | 85 | 86 | 84 | 84 | 91 | 96 | 93 | 93 | 93 | 88.7 | 98 | |
| 2-Sep | 91 | 95 | 95 | 96 | 97 | 98 | 95 | 91 | 86 | 77 | 70 | 71 | 70 | 74 | 75 | 76 | 79 | 84 | 87 | 90 | 91 | 92 | 94 | 95 | 86.2 | 98 | |
| 3-Sep | 95 | 95 | 96 | 95 | 94 | 93 | 92 | 92 | 93 | 92 | 92 | 93 | 92 | 91 | 89 | 85 | 91 | 86 | 84 | 82 | 79 | 78 | 76 | 76 | 89.4 | 96 | |
| 4-Sep | 76 | 78 | 80 | 80 | 81 | 83 | 79 | 71 | 65 | 55 | 49 | 47 | 44 | 42 | 39 | 39 | 40 | 43 | 47 | 51 | 57 | 62 | 65 | 68 | 60.0 | 83 | |
| 5-Sep | 72 | 78 | 86 | 90 | 92 | 92 | 90 | 83 | 72 | 60 | 53 | 53 | 54 | 50 | 46 | 45 | 47 | 48 | 53 | 57 | 59 | 60 | 62 | 68 | 65.5 | 92 | |
| 6-Sep | 81 | 81 | 82 | 85 | 88 | 95 | 91 | 80 | 71 | 66 | 60 | 54 | 52 | 54 | 65 | 56 | 53 | 56 | 60 | 66 | 74 | 84 | 88 | 93 | 72.3 | 95 | |
| 7-Sep | 96 | 97 | 97 | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 93 | 73 | 66 | 60 | 54 | 48 | 44 | 40 | 42 | 56 | 72 | 89 | 76 | 78 | 81 | 77.2 | 99 |
| 8-Sep | 85 | 88 | 92 | 92 | 93 | 94 | 92 | 86 | 77 | 69 | 60 | 56 | 49 | 44 | 53 | 62 | 75 | 74 | 72 | 81 | 86 | 90 | 87 | 86 | 76.9 | 94 | |
| 9-Sep | 92 | 88 | 87 | 84 | 85 | 87 | 86 | 87 | 91 | 86 | 73 | 72 | 67 | 62 | 61 | 55 | 51 | 51 | 56 | 61 | 63 | 65 | 67 | 70 | 72.7 | 92 | |
| 10-Sep | 83 | 89 | 93 | 96 | 97 | 98 | 98 | 98 | 89 | 80 | 78 | 76 | 78 | 68 | 67 | 71 | 71 | 66 | 72 | 80 | 74 | 76 | 77 | 77 | 81.3 | 98 | |
| 11-Sep | 80 | 93 | 93 | 93 | 93 | 93 | 92 | 91 | 87 | 91 | 88 | 79 | 71 | 68 | 68 | 66 | 70 | 73 | 70 | 75 | 77 | 78 | 79 | 78 | 80.9 | 93 | |
| 12-Sep | 76 | 74 | 75 | 76 | 77 | 79 | 83 | 81 | 74 | 60 | 53 | 48 | 47 | 45 | 45 | 43 | 42 | 42 | 45 | 52 | 60 | 66 | 71 | 70 | 61.8 | 83 | |
| 13-Sep | 69 | 67 | 66 | 65 | 68 | 69 | 68 | 66 | 63 | 59 | 55 | 52 | 48 | 42 | 39 | 38 | 39 | 42 | 48 | 52 | 56 | 60 | 63 | 65 | 56.6 | 69 | |
| 14-Sep | 68 | 71 | 82 | 88 | 93 | 96 | 97 | 81 | 77 | 69 | 62 | 58 | 55 | 48 | 43 | 41 | 37 | 37 | 60 | 73 | 81 | 89 | 91 | 68 | 69.3 | 97 | |
| 15-Sep | 62 | 66 | 75 | 80 | 79 | 88 | 90 | 86 | 84 | 77 | 71 | 67 | 58 | 45 | 44 | 41 | 40 | 44 | 47 | 48 | 52 | 58 | 65 | 77 | 64.3 | 90 | |
| 16-Sep | 80 | 80 | 81 | 82 | 78 | 81 | 81 | 80 | 75 | 69 | 65 | 54 | 51 | 47 | 42 | 42 | 40 | 41 | 44 | 58 | 66 | 67 | 66 | 65 | 64.0 | 82 | |
| 17-Sep | 71 | 76 | 82 | 83 | 85 | 87 | 88 | 87 | 86 | 82 | 72 | 72 | 72 | 71 | 68 | 62 | 57 | 59 | 64 | 67 | 69 | 75 | 78 | 77 | 74.6 | 88 | |
| 18-Sep | 77 | 80 | 84 | 85 | 85 | 87 | 89 | 81 | 71 | 67 | 68 | 65 | 59 | 59 | 61 | 62 | 72 | 71 | 75 | 82 | 86 | 89 | 89 | 95 | 76.6 | 95 | |
| 19-Sep | 95 | 96 | 92 | 89 | 86 | 85 | 86 | 86 | 79 | 72 | 70 | 68 | 67 | 67 | 69 | 74 | 77 | 79 | 81 | 80 | 85 | 84 | 83 | 90 | 80.9 | 96 | |
| 20-Sep | 92 | 87 | 85 | 86 | 93 | 94 | 90 | 85 | 81 | 80 | 69 | 60 | 55 | 53 | 50 | 47 | 45 | 49 | 52 | 65 | 72 | 73 | 69 | 69 | 70.8 | 94 | |
| 21-Sep | 69 | 72 | 82 | 88 | 94 | 94 | 94 | 90 | 85 | 76 | 67 | 57 | 48 | 40 | 39 | 37 | 36 | 35 | 38 | 45 | 52 | 57 | 61 | 64 | 63.4 | 94 | |
| 22-Sep | 69 | 74 | 77 | 81 | 84 | 87 | 85 | 75 | 67 | 58 | 50 | 40 | 36 | 33 | 31 | 30 | 32 | 34 | 39 | 43 | 48 | 51 | 55 | 59 | 55.8 | 87 | |
| 23-Sep | 65 | 70 | 75 | 78 | 79 | 81 | 83 | 82 | 77 | 77 | 82 | 77 | 69 | 65 | 63 | 65 | 68 | 69 | 70 | 72 | 76 | 82 | 84 | 86 | 74.8 | 86 | |
| 24-Sep | 87 | 87 | 87 | 85 | 87 | 92 | 94 | 89 | 78 | 69 | 64 | 59 | 57 | 54 | 48 | 40 | 36 | 36 | 38 | 43 | 48 | 52 | 56 | 59 | 64.4 | 94 | |
| 25-Sep | 59 | 58 | 58 | 61 | 63 | 69 | 73 | 70 | 58 | 48 | 44 | 40 | 38 | 33 | 31 | 30 | 29 | 31 | 42 | 55 | 62 | 55 | 58 | 67 | 51.4 | 73 | |
| 26-Sep | 70 | 71 | 76 | 81 | 77 | 75 | 76 | 71 | 66 | 60 | 54 | 48 | 43 | 39 | 35 | 33 | 34 | 36 | 41 | 44 | 48 | 57 | 64 | 63 | 56.8 | 81 | |
| 27-Sep | 66 | 63 | 61 | 65 | 66 | 63 | 60 | 62 | 78 | 78 | 65 | 51 | 43 | 38 | 31 | 32 | 32 | 34 | 39 | 41 | 43 | 45 | 47 | 56 | 52.4 | 78 | |
| 28-Sep | 60 | 59 | 60 | 62 | 66 | 71 | 72 | 71 | 68 | 57 | 45 | 35 | 32 | 31 | 29 | 31 | 30 | 31 | 46 | 59 | 54 | 54 | 57 | 58 | 51.6 | 72 | |
| 29-Sep | 58 | 60 | 63 | 69 | 76 | 84 | 87 | 83 | 70 | 63 | 53 | 46 | 41 | 36 | 30 | 29 | 30 | 33 | 57 | 68 | 74 | 75 | 79 | 81 | 60.3 | 87 | |
| 30-Sep | 83 | 85 | 79 | 74 | 74 | 74 | 77 | 75 | 72 | 67 | 63 | 56 | 53 | 55 | 54 | 50 | 50 | 55 | 53 | 53 | 54 | 51 | 52 | 55 | 63.1 | 85 | |
| | 77.2 | 79.0 | 81.2 | 82.7 | 84.2 | 86.1 | 86.2 | 82.4 | 77.5 | 71.2 | 65.0 | 60.0 | 56.3 | 53.0 | 51.7 | 50.5 | 50.8 | 52.3 | 57.4 | 63.6 | 67.7 | 69.8 | 71.9 | 73.7 | Diurnal Average | | |
| | 96 | 97 | 97 | 98 | 98 | 98 | 99 | 99 | 99 | 93 | 92 | 93 | 93 | 92 | 91 | 89 | 86 | 91 | 87 | 91 | 96 | 93 | 94 | 95 | Diurnal Maximum | | |





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Patricia McInnes - September 2016

| | | |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Speed: 30 km/h on Sep 11 06:00 | Maximum Daily Speed Average: 18.6 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 15 06:00 | Minimum Daily Speed Average: 1.6 km/h on Sep 9 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 6.4 km/h at hour 16 | Minimum Diurnal Speed Average: 2.9 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 4.2 km/h 257.0 deg | Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 6 Median = 10 Q ₃ = 14 P ₉₀ = 18 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 | NE6 | NE5 | NE4 | N2 | ENE1 | NW4 | N7 | N8 | NE7 | ESE9 | SE11 | E14 | ENE13 | NE11 | ENE9 | NE9 | ESE6 | SE7 | ENE5 | WNNW8 | WNNW7 | W10WSW10 | WSW11 | NE2.8 | E14 | |
| 2-Sep | WSW10 | WSW11 | WSW9 | WSW5 | SSW2 | WNNW7 | SW7 | SW10 | WSW12 | W8 | W6WSW11 | WNNW8 | WSW11 | W11 | NW13 | NW11 | NNW9 | N7 | NW9 | WNNW9 | W13WNNW14 | NW14 | W7.7 | WNNW14 | | |
| 3-Sep | NW18 | NW14 | WNNW13 | WNNW14 | W15 | W17 | W17 | W16 | WNNW17 | WNNW20 | NW21 | NW21 | NW21 | NW22 | NW21 | NW19 | NW20 | NW21 | NW18 | NW17 | NW17 | WNNW18 | WNNW20 | WNNW17.2 | NW22 | |
| 4-Sep | WNNW17 | WNNW15 | WNNW16 | WNNW15 | WNNW15 | WNNW10 | WNNW6 | WSW6 | NW9 | WNNW14 | WNNW13 | WNNW11 | W12 | WSW9 | WSW9 | WSW11 | SW13 | SW14 | SW11 | SW9 | SW9 | SW9 | SW10 | W10.0 | WNNW17 | |
| 5-Sep | SW9 | SSW6 | S5 | SSW6 | SSW6 | SSW7 | SSW9 | SW9 | SSW9 | S10 | S12 | SW13 | SW12 | S11 | SE9 | S8 | ESE12 | ESE12 | SE10 | SE9 | SE10 | SE11 | SE7 | SE4 | S7.2 | SW13 |
| 6-Sep | SSW3 | SSW5 | S6 | SSE6 | SSW5 | SSW3 | S4 | SE7 | SE6 | SE10 | SE11 | SE10 | ESE13 | SE12 | SE12 | SSE12 | SSE15 | SSE13 | SSE10 | SSE7 | SE9 | SSE3 | SE5 | SSE3 | SSW7.3 | SSE15 |
| 7-Sep | SW3 | SW4 | SW4 | S3 | S4 | SSW4 | S4 | SSW5 | SSW6 | SSE5 | SE7 | SE8 | SE8 | ESE8 | SE6 | SSW6 | SSE4 | S5 | W7 | W7 | SW6 | WSW10 | SW8 | SW8 | SSW4.0 | WSW10 |
| 8-Sep | SW6 | SSW4 | SSW3 | SW5 | SSW5 | SSW6 | SSW5 | SW6 | SSE5 | S3 | ENE3 | NNE2 | NNW7 | N10 | NW11 | NNW13 | NNW5 | NW6 | NNW8 | NW6 | NW8 | NW8 | NNW10 | NNW8 | NW3.3 | NNW13 |
| 9-Sep | WNNW6 | NW9 | NNW10 | NW12 | NNW10 | NW6 | NNW7 | N7 | NNE10 | NNW8 | NNE7 | WNNW2 | W3 | SW3 | ENE5 | SE6 | ESE6 | SSE7 | SE6 | SE10 | SE10 | SE12 | SE11 | SE10 | NE1.6 | SE12 |
| 10-Sep | SE6 | SE13 | SE14 | SE13 | SE10 | SE8 | SE6 | SSE8 | SW11 | WSW17 | W18 | W18 | WNNW15 | W18 | WNNW17 | WNNW14 | WNNW17 | WNNW18 | W14 | W12 | WNNW20 | WNNW17 | WNNW16 | WNNW17 | W8.0 | WNNW20 |
| 11-Sep | NW18 | NNW20 | NNW21 | NNW24 | NNW28 | NNW30 | N28 | N28 | N28 | N24 | NNW23 | N25 | N23 | NNW25 | NNW21 | NNW19 | NNW17 | NNW14 | NNW13 | NW6 | NW6 | WNNW6 | WNNW7 | WNNW7 | NNW18.6 | NNW30 |
| 12-Sep | WNNW8 | WNNW8 | W9 | WNNW6 | W3 | SW5 | WSW10 | W6 | SW4 | SSW9 | WSW9 | SW7 | SSW9 | SSW12 | SW11 | SSW12 | SSW12 | S12 | S8 | SSE6 | S8 | SSW10 | SSW10 | SSW13 | SW7.1 | SSW13 |
| 13-Sep | SSW13 | SSW13 | SSW12 | SSW12 | SSW12 | SSW14 | SW15 | SW22 | SW23 | SW17 | SW20 | SW22 | WSW22 | SW20 | WSW17 | W18 | W18 | WSW16 | WSW14 | WSW14 | WSW15 | WSW15 | WSW17 | WNNW12 | SW15.5 | SW23 |
| 14-Sep | WNNW12 | NNW6 | N3 | SW3 | WSW2 | WSW3 | W2 | SE4 | SE5 | ESE6 | SSE9 | SSE8 | ESE5 | SSE5 | WSW15 | WSW18 | W18 | W19 | NNW18 | NNW13 | NW6 | SW5 | W6 | NW13 | W4.2 | W19 |
| 15-Sep | NW11 | NW7 | NNW6 | NW7 | N7 | NNE1 | WNNW3 | N5 | NE7 | E5 | ENE6 | E6 | E9 | ESE11 | ESE12 | ESE15 | ESE14 | ESE11 | ESE11 | SE14 | SE13 | SE8 | SE6 | SSE4 | E4.5 | ESE15 |
| 16-Sep | SSW5 | S9 | SSW7 | SSW8 | SW13 | SSW8 | SSW8 | SW7 | SW11 | SW13 | SW11 | SW13 | SSW16 | SW19 | WSW20 | WSW19 | WSW17 | WSW15 | WSW8 | WSW5 | SSW6 | SW5 | SSW6 | SSW7 | SW10.1 | WSW20 |
| 17-Sep | SSW8 | WSW13 | SW11 | SW10 | SSW11 | SSW10 | SSW9 | SSW6 | S5 | S4 | WSW13 | SW14 | SW16 | WSW16 | WSW17 | WSW17 | WSW17 | WSW15 | WSW9 | WSW8 | WSW10 | WSW12 | WSW12 | WSW12 | SW11.0 | WSW17 |
| 18-Sep | WSW11 | SW4 | SW7 | SW8 | SW5 | SW4 | SW7 | W8 | NW13 | WNNW13 | WNNW17 | WNNW25 | WNNW24 | NW22 | NW21 | NW19 | NW11 | NNW10 | N8 | NNW6 | NNW7 | WNNW5 | NW9 | NW8 | WNNW9.4 | WNNW25 |
| 19-Sep | N6 | NW7 | NW10 | WNNW10 | WNNW11 | NW10 | WNNW11 | WNNW10 | WNNW14 | WNNW16 | NW13 | NW12 | NW12 | NW10 | NNW11 | W9 | W10 | WNNW11 | WNNW8 | NNW8 | NW4 | WNNW7 | NNW11 | NW11 | NW9.6 | WNNW16 |
| 20-Sep | NNW11 | NNW9 | NNW11 | N8 | NW4 | NNW8 | NNW7 | NNW7 | NW6 | NW6 | NNW6 | N8 | NNE9 | NNE8 | ENE7 | NE8 | NE8 | E6 | SE5 | SE3 | S2 | S3 | SE5 | ESE5 | N4.0 | NNW11 |
| 21-Sep | SE7 | S4 | S4 | S3 | SW1 | S4 | SSW6 | S6 | S8 | S9 | SSW9 | SSW10 | S11 | SW11 | WSW9 | WSW11 | WSW8 | WSW10 | SW8 | SW6 | SW6 | SW7 | SW8 | SW8 | SSW6.5 | WSW11 |
| 22-Sep | SW7 | SSW7 | SSW7 | SSW7 | S7 | S7 | S8 | S7 | S8 | S10 | SSW11 | SW17 | SSW16 | SSW17 | SSW17 | SSW17 | S16 | SSW14 | S11 | S11 | SSE11 | SSE9 | S7 | SSE6 | S10.1 | SSW17 |
| 23-Sep | SSE8 | SSE9 | SE6 | SE8 | SE8 | SE9 | SE12 | SE16 | SE15 | SE14 | SE14 | SE15 | SE15 | SE15 | SSE16 | SE13 | SE14 | SE14 | SSE12 | SSE14 | SSE12 | SSE12 | SSE12 | SSE9 | SE12.0 | SE16 |
| 24-Sep | SSE10 | SSE8 | SSE8 | SSE11 | S10 | S7 | SSW7 | SW11 | SW14 | WSW19 | WSW21 | W22 | W22 | W25 | W25 | WNNW25 | WNNW23 | WNNW18 | W14 | WSW9 | WSW11 | W14 | W16 | WSW15 | WSW11.8 | W25 |
| 25-Sep | WSW19 | W18 | W17 | WSW14 | WSW11 | SW14 | SW16 | WSW17 | W16 | W14 | NW16 | NW21 | NW18 | NW16 | NW17 | WNNW12 | WNNW8 | WNNW4 | WSW2 | W5 | WSW5 | WSW11 | WSW5 | SSE5 | W10.6 | NW21 |
| 26-Sep | SSW5 | S4 | S4 | SSE4 | SSE6 | SSE5 | SE5 | SE8 | SE7 | SE7 | SE8 | SE8 | SSE6 | SSE9 | S17 | SSW16 | SSW17 | S13 | S13 | S15 | SSE11 | S4 | SE4 | SE6 | S7.6 | S17 |
| 27-Sep | SE7 | SSE6 | SE7 | S6 | SSW8 | SW11 | W14 | W16 | SW10 | WSW14 | WNNW21 | WNNW22 | WNNW22 | WNNW21 | WNNW24 | W21 | W20 | W16 | WSW12 | WSW13 | WSW14 | WSW14 | WSW10 | WSW7 | W11.7 | WNNW24 |
| 28-Sep | WSW8 | WSW10 | WSW10 | SW10 | SW8 | SW9 | SW9 | S8 | S8 | S8 | SSW7 | SSW8 | SW12 | SW11 | SW9 | SW11 | WSW10 | SW8 | SSW3 | SSW5 | SW7 | SW7 | SW7 | SW7 | SW7.9 | SW12 |
| 29-Sep | SW6 | SSW5 | S7 | SSE5 | S5 | SW3 | SE1 | E1 | SSE6 | S7 | S6 | S5 | S7 | SE4 | ESE3 | E6 | E7 | E5 | N4 | NW2 | NW3 | NW5 | W2 | WNNW4 | S2.2 | S7 |
| 30-Sep | N4 | N5 | N7 | N8 | NNW7 | N8 | N10 | N12 | NNW14 | N14 | N15 | N18 | N22 | N23 | N23 | N23 | N23 | N22 | N19 | N17 | N18 | NNE19 | NNE20 | NNE20 | N15.3 | N23 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------------------|-------|-------|-------|-------|------|------|------------|------------------------------|-------|-----------------|-------|-----|-----|--------|-----|-----|-------|------|--------|-------|-------|--------|-----------------|--|
| W4.5WSW3.8WSW3.2WSW3.6WSW3.5WSW3.6WSW4.1WSW3.7WSW3.8WSW4.3 | W5.1 | W5.6 | W5.0 | W5.2 | W5.7 | W6.4 | W4.8WSW4.3 | W2.9WSW3.0WSW3.3WSW4.9WSW4.4 | W4.3 | Diurnal Average | | | | | | | | | | | | | | |
| WSW19NNW20 | NNW21 | NNW24 | NNW28 | NNW30 | N28 | N28 | N28 | N24 | NNW23 | N25 | NNW24 | W25 | W25 | WNNW25 | N23 | N22 | NNW21 | NW18 | WNNW20 | NNE19 | NNE20 | WNNW20 | Diurnal Maximum | |

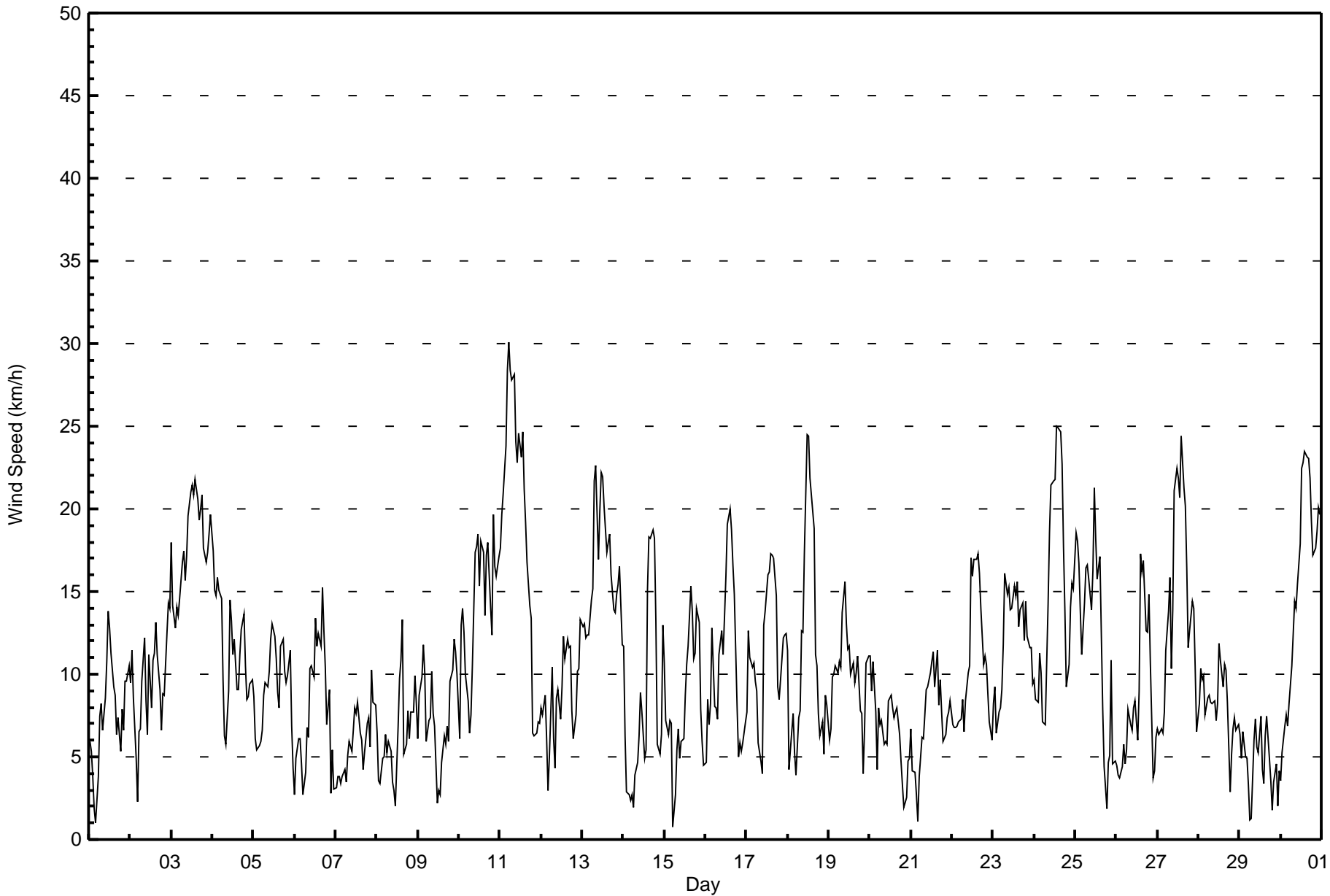
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 117 | 16.25 | 16.25 |
| 6 - 11 | 342 | 47.50 | 63.75 |
| 12 - 19 | 203 | 28.19 | 91.94 |
| 20 - 28 | 57 | 7.92 | 99.86 |
| 29 - 38 | 1 | 0.14 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

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

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 6 | 2 | 2 | 4 | 3 | 3 | 10 | 12 | 20 | 16 | 15 | 7 | 4 | 6 | 6 | 1 | 117 |
| 6 - 11 | 13 | 4 | 7 | 3 | 5 | 9 | 42 | 24 | 28 | 40 | 47 | 33 | 11 | 24 | 26 | 26 | 342 |
| 12 - 19 | 7 | 1 | 0 | 1 | 1 | 7 | 18 | 9 | 7 | 19 | 16 | 35 | 24 | 31 | 19 | 8 | 203 |
| 20 - 28 | 12 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 6 | 12 | 9 | 8 | 57 |
| 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 | 38 | 9 | 9 | 8 | 9 | 19 | 70 | 45 | 55 | 75 | 83 | 78 | 45 | 73 | 60 | 44 | 720 |

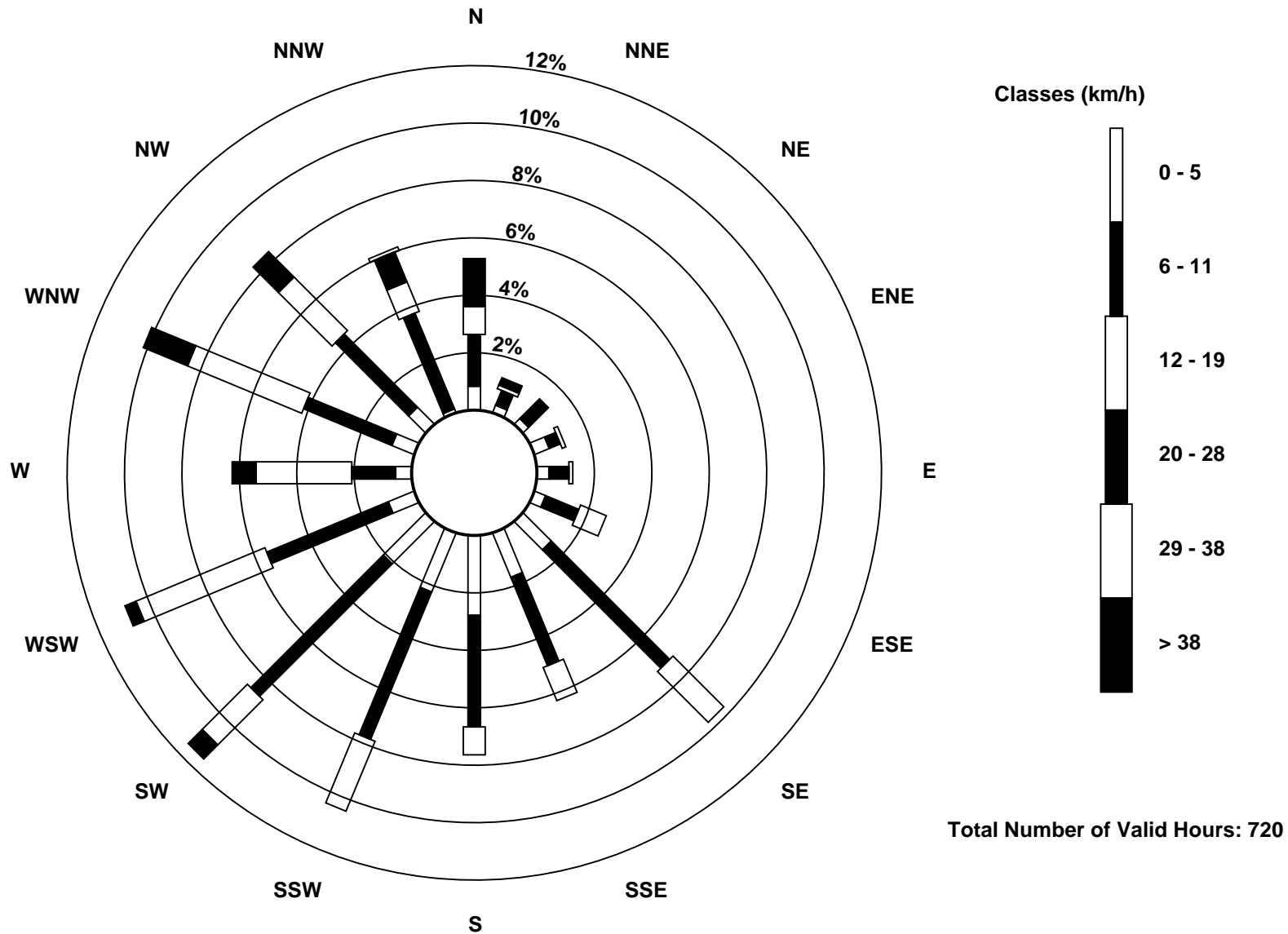
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

| | |
|---------------------------------------------------------------|---------------------------------|
| Direction of Maximum Speed: 345 deg on Sep 11 06:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 342.5 deg on Sep 11 | Hours of Data: 720 |
| Direction of Minimum Speed: 33 deg on Sep 15 06:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 1.6 deg on Sep 9 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 258.9 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 | 51 | 40 | 55 | 9 | 65 | 320 | 351 | 6 | 48 | 116 | 124 | 97 | 61 | 55 | 76 | 45 | 108 | 134 | 68 | 297 | 286 | 271 | 245 | 253 | 55.3 |
| 2-Sep | 239 | 245 | 246 | 251 | 199 | 285 | 225 | 223 | 245 | 267 | 260 | 258 | 284 | 240 | 279 | 308 | 315 | 342 | 349 | 314 | 300 | 277 | 299 | 322 | 277.3 |
| 3-Sep | 312 | 312 | 298 | 286 | 282 | 281 | 274 | 269 | 272 | 291 | 296 | 305 | 309 | 308 | 314 | 316 | 312 | 321 | 326 | 323 | 315 | 307 | 303 | 301 | 302.8 |
| 4-Sep | 299 | 293 | 289 | 288 | 291 | 294 | 289 | 287 | 256 | 304 | 289 | 299 | 299 | 259 | 240 | 255 | 243 | 220 | 226 | 226 | 226 | 230 | 231 | 231 | 269.0 |
| 5-Sep | 217 | 204 | 188 | 196 | 201 | 201 | 198 | 214 | 200 | 179 | 187 | 223 | 214 | 180 | 141 | 170 | 112 | 118 | 134 | 128 | 125 | 128 | 134 | 124 | 171.2 |
| 6-Sep | 202 | 212 | 172 | 168 | 197 | 195 | 191 | 135 | 138 | 144 | 134 | 126 | 120 | 129 | 140 | 163 | 147 | 158 | 165 | 149 | 136 | 167 | 134 | 161 | 149.5 |
| 7-Sep | 227 | 228 | 214 | 191 | 188 | 202 | 190 | 192 | 192 | 159 | 135 | 125 | 124 | 111 | 139 | 203 | 157 | 170 | 268 | 281 | 234 | 237 | 231 | 222 | 192.3 |
| 8-Sep | 220 | 197 | 201 | 228 | 206 | 213 | 210 | 222 | 168 | 174 | 68 | 21 | 332 | 354 | 320 | 329 | 340 | 321 | 340 | 320 | 323 | 315 | 331 | 334 | 304.6 |
| 9-Sep | 302 | 320 | 328 | 325 | 341 | 322 | 335 | 7 | 15 | 341 | 18 | 298 | 279 | 234 | 71 | 125 | 117 | 149 | 138 | 127 | 128 | 134 | 133 | 141 | 40.6 |
| 10-Sep | 124 | 124 | 128 | 129 | 129 | 131 | 133 | 161 | 217 | 256 | 261 | 278 | 284 | 275 | 295 | 286 | 282 | 285 | 269 | 268 | 287 | 282 | 283 | 284 | 263.3 |
| 11-Sep | 307 | 336 | 337 | 337 | 341 | 345 | 349 | 358 | 1 | 353 | 347 | 349 | 354 | 346 | 347 | 347 | 346 | 340 | 337 | 320 | 314 | 302 | 285 | 291 | 342.5 |
| 12-Sep | 289 | 282 | 274 | 284 | 281 | 230 | 242 | 269 | 223 | 212 | 252 | 221 | 205 | 202 | 226 | 208 | 194 | 183 | 170 | 165 | 187 | 192 | 193 | 203 | 218.1 |
| 13-Sep | 209 | 210 | 208 | 205 | 203 | 207 | 215 | 229 | 228 | 229 | 232 | 235 | 237 | 226 | 239 | 260 | 259 | 250 | 248 | 253 | 252 | 254 | 256 | 288 | 235.2 |
| 14-Sep | 300 | 327 | 10 | 223 | 249 | 257 | 270 | 134 | 124 | 119 | 159 | 161 | 120 | 166 | 239 | 257 | 261 | 272 | 334 | 344 | 321 | 235 | 272 | 311 | 272.1 |
| 15-Sep | 311 | 311 | 344 | 316 | 350 | 33 | 291 | 7 | 44 | 87 | 60 | 87 | 99 | 106 | 109 | 107 | 108 | 119 | 123 | 127 | 126 | 137 | 143 | 168 | 97.5 |
| 16-Sep | 203 | 191 | 197 | 210 | 227 | 197 | 200 | 221 | 231 | 229 | 226 | 223 | 208 | 234 | 237 | 242 | 257 | 254 | 252 | 254 | 213 | 233 | 213 | 202 | 226.9 |
| 17-Sep | 210 | 244 | 221 | 217 | 213 | 213 | 212 | 200 | 186 | 183 | 237 | 230 | 234 | 237 | 243 | 254 | 258 | 248 | 243 | 240 | 245 | 245 | 248 | 243 | 235.0 |
| 18-Sep | 246 | 217 | 225 | 234 | 234 | 217 | 226 | 267 | 304 | 291 | 289 | 302 | 300 | 310 | 322 | 315 | 321 | 345 | 356 | 347 | 335 | 297 | 322 | 326 | 299.8 |
| 19-Sep | 349 | 322 | 307 | 300 | 302 | 308 | 295 | 292 | 294 | 292 | 307 | 304 | 309 | 323 | 327 | 281 | 280 | 300 | 293 | 328 | 316 | 299 | 330 | 326 | 306.0 |
| 20-Sep | 336 | 333 | 345 | 352 | 304 | 339 | 337 | 342 | 326 | 316 | 332 | 8 | 27 | 31 | 57 | 49 | 55 | 97 | 126 | 146 | 173 | 174 | 128 | 113 | 9.0 |
| 21-Sep | 137 | 169 | 182 | 182 | 225 | 189 | 209 | 191 | 186 | 181 | 194 | 198 | 190 | 215 | 256 | 241 | 246 | 246 | 217 | 228 | 224 | 219 | 220 | 217 | 210.2 |
| 22-Sep | 221 | 203 | 194 | 194 | 183 | 172 | 169 | 170 | 183 | 183 | 201 | 215 | 213 | 209 | 202 | 199 | 190 | 193 | 175 | 171 | 156 | 161 | 169 | 162 | 190.4 |
| 23-Sep | 151 | 147 | 125 | 131 | 135 | 125 | 125 | 133 | 129 | 131 | 133 | 132 | 131 | 156 | 146 | 130 | 139 | 148 | 156 | 149 | 150 | 155 | 159 | 159 | 139.5 |
| 24-Sep | 155 | 160 | 147 | 164 | 173 | 187 | 205 | 220 | 234 | 249 | 254 | 268 | 278 | 275 | 280 | 288 | 296 | 283 | 274 | 252 | 255 | 261 | 259 | 257 | 255.7 |
| 25-Sep | 258 | 263 | 265 | 256 | 244 | 227 | 232 | 245 | 266 | 272 | 304 | 307 | 314 | 322 | 321 | 299 | 298 | 301 | 246 | 275 | 250 | 237 | 258 | 159 | 273.5 |
| 26-Sep | 208 | 169 | 183 | 152 | 166 | 147 | 138 | 145 | 146 | 135 | 143 | 140 | 149 | 152 | 186 | 212 | 203 | 188 | 176 | 172 | 167 | 177 | 132 | 136 | 169.7 |
| 27-Sep | 134 | 151 | 140 | 175 | 207 | 236 | 276 | 259 | 231 | 243 | 290 | 286 | 294 | 284 | 285 | 276 | 273 | 266 | 251 | 242 | 254 | 257 | 251 | 237 | 262.3 |
| 28-Sep | 255 | 239 | 238 | 227 | 217 | 217 | 214 | 191 | 184 | 176 | 196 | 199 | 221 | 215 | 227 | 234 | 239 | 221 | 202 | 208 | 222 | 230 | 223 | 216 | 218.8 |
| 29-Sep | 216 | 210 | 187 | 168 | 177 | 215 | 133 | 99 | 165 | 181 | 181 | 170 | 170 | 143 | 115 | 88 | 87 | 80 | 8 | 319 | 311 | 321 | 277 | 290 | 168.8 |
| 30-Sep | 7 | 2 | 355 | 352 | 340 | 7 | 354 | 349 | 345 | 358 | 352 | 356 | 1 | 355 | 7 | 8 | 5 | 3 | 1 | 358 | 8 | 15 | 16 | 17 | 1.9 |

| | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 259.4 | 255.1 | 251.4 | 246.9 | 244.6 | 246.9 | 247.7 | 244.8 | 241.5 | 242.2 | 259.1 | 267.2 | 273.7 | 265.2 | 271.4 | 270.9 | 266.0 | 255.4 | 263.2 | 251.0 | 247.0 | 248.0 | 255.2 | 261.7 |
| Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | |

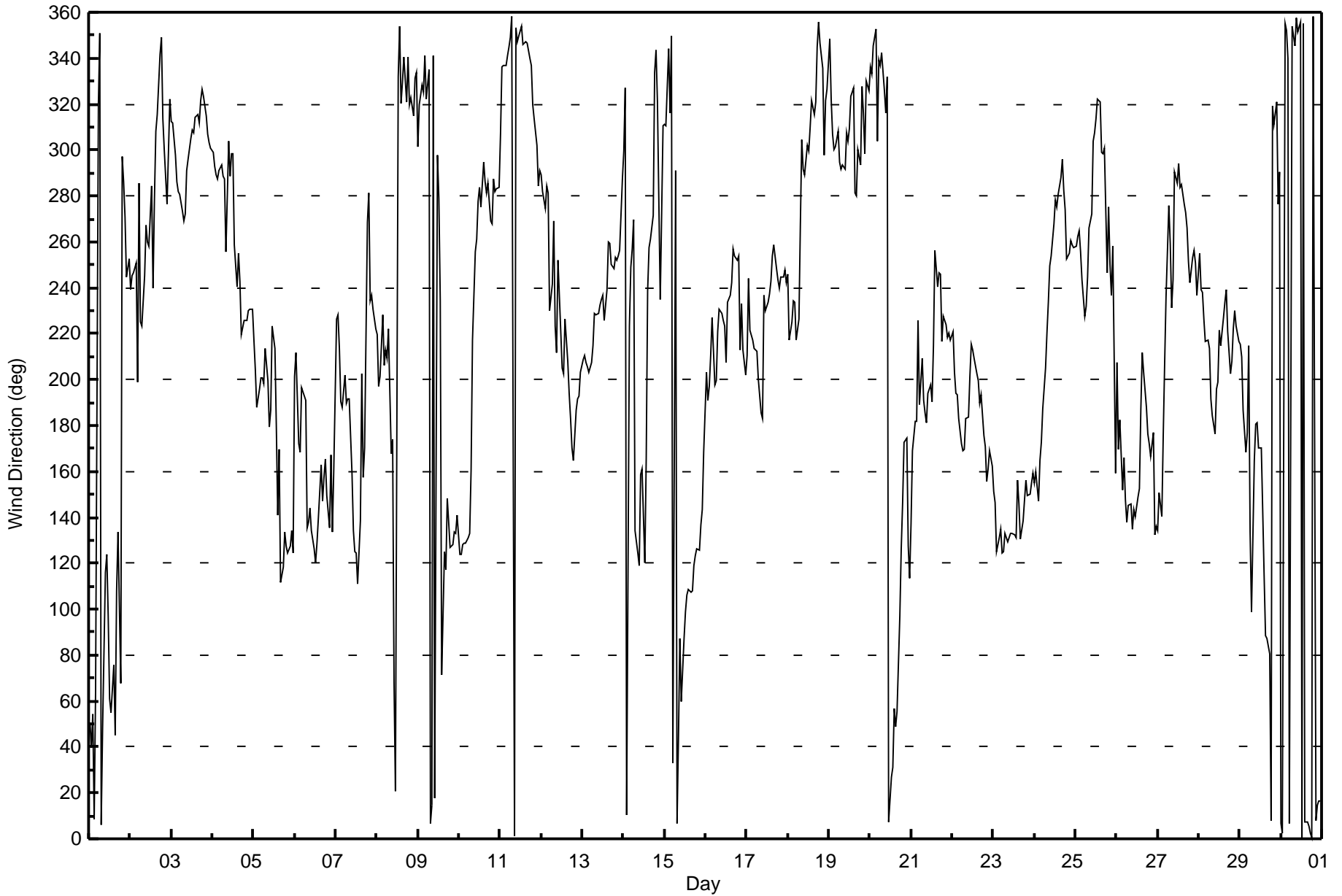
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 89 deg on Sep 9 14:00 Minimum Value: 6 deg on Sep 22 06:00 Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 12 Median = 15 Q ₃ = 23 P ₉₀ = 34 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 | 24 | 11 | 22 | 62 | 81 | 19 | 17 | 13 | 32 | 25 | 19 | 21 | 16 | 17 | 25 | 34 | 66 | 18 | 38 | 23 | 18 | 15 | 12 | 11 | 81 |
| 2-Sep | 15 | 9 | 12 | 22 | 74 | 30 | 22 | 14 | 18 | 28 | 46 | 25 | 25 | 15 | 19 | 13 | 14 | 15 | 38 | 16 | 17 | 15 | 15 | 16 | 74 |
| 3-Sep | 10 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 13 | 11 | 11 | 11 | 11 | 11 | 11 | 13 | 13 | 13 | 15 | 13 | 11 | 10 | 10 | 15 |
| 4-Sep | 11 | 11 | 12 | 11 | 10 | 10 | 21 | 27 | 29 | 28 | 19 | 19 | 35 | 21 | 41 | 27 | 26 | 17 | 11 | 10 | 10 | 9 | 11 | 12 | 41 |
| 5-Sep | 12 | 18 | 11 | 13 | 15 | 19 | 19 | 18 | 21 | 23 | 25 | 24 | 26 | 27 | 34 | 33 | 16 | 13 | 13 | 10 | 11 | 13 | 14 | 22 | 34 |
| 6-Sep | 20 | 14 | 21 | 12 | 11 | 19 | 20 | 18 | 22 | 20 | 25 | 31 | 20 | 31 | 20 | 15 | 16 | 17 | 12 | 15 | 14 | 48 | 34 | 36 | 48 |
| 7-Sep | 18 | 11 | 17 | 31 | 29 | 28 | 28 | 25 | 25 | 34 | 29 | 26 | 31 | 30 | 49 | 50 | 73 | 28 | 55 | 55 | 32 | 7 | 14 | 13 | 73 |
| 8-Sep | 15 | 52 | 26 | 44 | 21 | 16 | 23 | 24 | 22 | 70 | 65 | 80 | 55 | 29 | 41 | 27 | 87 | 66 | 33 | 22 | 10 | 13 | 12 | 9 | 87 |
| 9-Sep | 15 | 13 | 11 | 14 | 17 | 16 | 14 | 24 | 21 | 19 | 32 | 75 | 67 | 89 | 49 | 32 | 38 | 35 | 17 | 11 | 12 | 13 | 15 | 19 | 89 |
| 10-Sep | 28 | 14 | 12 | 13 | 12 | 12 | 11 | 12 | 24 | 14 | 16 | 15 | 19 | 17 | 17 | 24 | 15 | 14 | 15 | 15 | 13 | 14 | 13 | 13 | 28 |
| 11-Sep | 17 | 11 | 11 | 12 | 12 | 14 | 16 | 17 | 16 | 16 | 13 | 14 | 17 | 15 | 14 | 14 | 14 | 12 | 12 | 11 | 11 | 12 | 13 | 9 | 17 |
| 12-Sep | 10 | 10 | 9 | 59 | 76 | 31 | 9 | 36 | 38 | 28 | 17 | 65 | 35 | 26 | 29 | 21 | 22 | 15 | 12 | 8 | 11 | 14 | 14 | 15 | 76 |
| 13-Sep | 16 | 16 | 15 | 15 | 14 | 15 | 15 | 11 | 14 | 16 | 14 | 13 | 14 | 15 | 16 | 16 | 13 | 12 | 10 | 9 | 9 | 8 | 8 | 17 | 17 |
| 14-Sep | 8 | 47 | 55 | 38 | 32 | 32 | 67 | 18 | 23 | 23 | 23 | 28 | 45 | 47 | 22 | 17 | 13 | 21 | 12 | 12 | 16 | 23 | 27 | 8 | 67 |
| 15-Sep | 10 | 19 | 18 | 10 | 13 | 81 | 45 | 23 | 29 | 34 | 30 | 29 | 20 | 20 | 20 | 17 | 14 | 14 | 15 | 16 | 15 | 12 | 14 | 13 | 81 |
| 16-Sep | 14 | 14 | 12 | 15 | 10 | 16 | 16 | 17 | 12 | 13 | 13 | 17 | 17 | 19 | 16 | 17 | 18 | 14 | 13 | 19 | 16 | 15 | 15 | 12 | 19 |
| 17-Sep | 22 | 13 | 14 | 15 | 15 | 13 | 14 | 17 | 18 | 25 | 16 | 14 | 12 | 15 | 14 | 16 | 15 | 11 | 10 | 8 | 8 | 9 | 9 | 10 | 25 |
| 18-Sep | 11 | 46 | 17 | 15 | 57 | 38 | 17 | 25 | 17 | 19 | 17 | 14 | 15 | 14 | 14 | 13 | 19 | 12 | 16 | 15 | 11 | 25 | 23 | 12 | 57 |
| 19-Sep | 15 | 12 | 11 | 9 | 10 | 11 | 12 | 10 | 15 | 15 | 14 | 22 | 16 | 15 | 23 | 16 | 14 | 12 | 8 | 28 | 43 | 28 | 13 | 25 | 43 |
| 20-Sep | 13 | 12 | 14 | 20 | 19 | 13 | 19 | 16 | 39 | 32 | 51 | 32 | 33 | 31 | 37 | 29 | 22 | 27 | 15 | 23 | 45 | 54 | 22 | 18 | 54 |
| 21-Sep | 15 | 14 | 14 | 25 | 50 | 28 | 13 | 18 | 17 | 15 | 23 | 24 | 23 | 31 | 35 | 21 | 21 | 17 | 13 | 7 | 7 | 8 | 7 | 8 | 50 |
| 22-Sep | 7 | 11 | 10 | 10 | 13 | 6 | 6 | 11 | 13 | 14 | 26 | 17 | 21 | 21 | 21 | 19 | 18 | 15 | 12 | 12 | 10 | 10 | 16 | 17 | 26 |
| 23-Sep | 12 | 8 | 11 | 9 | 9 | 9 | 10 | 12 | 14 | 14 | 13 | 14 | 14 | 14 | 18 | 15 | 13 | 15 | 13 | 13 | 14 | 13 | 12 | 14 | 18 |
| 24-Sep | 15 | 12 | 12 | 15 | 12 | 14 | 14 | 12 | 15 | 13 | 13 | 16 | 15 | 15 | 16 | 15 | 17 | 12 | 11 | 7 | 6 | 8 | 8 | 7 | 17 |
| 25-Sep | 8 | 9 | 9 | 8 | 10 | 12 | 9 | 10 | 12 | 15 | 14 | 16 | 15 | 17 | 16 | 23 | 24 | 39 | 81 | 17 | 20 | 8 | 80 | 35 | 81 |
| 26-Sep | 14 | 21 | 15 | 17 | 19 | 23 | 17 | 17 | 17 | 21 | 20 | 18 | 33 | 35 | 19 | 18 | 17 | 13 | 12 | 12 | 12 | 24 | 24 | 13 | 35 |
| 27-Sep | 7 | 31 | 13 | 20 | 14 | 17 | 15 | 14 | 23 | 25 | 22 | 15 | 14 | 18 | 16 | 17 | 15 | 12 | 12 | 10 | 8 | 8 | 9 | 13 | 31 |
| 28-Sep | 11 | 7 | 8 | 9 | 14 | 10 | 15 | 19 | 16 | 20 | 28 | 33 | 25 | 32 | 43 | 28 | 25 | 14 | 16 | 10 | 10 | 8 | 9 | 11 | 43 |
| 29-Sep | 11 | 13 | 10 | 18 | 11 | 38 | 82 | 75 | 22 | 18 | 37 | 36 | 27 | 62 | 69 | 34 | 17 | 18 | 24 | 66 | 30 | 18 | 47 | 20 | 82 |
| 30-Sep | 27 | 20 | 13 | 14 | 16 | 17 | 14 | 14 | 12 | 17 | 16 | 16 | 16 | 16 | 14 | 14 | 15 | 15 | 16 | 17 | 14 | 13 | 13 | 13 | 27 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 12, 2016 | Last Calibration | August 3, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Reason: | Routine | | |
| Start Time (MST) | 9:46 | End Time (MST) | 13:25 |
| Gas Cert Reference | LL107926 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 50.8 ppm | Cal Gas Exp Date | February-16-19 |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 2449 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 60 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 10957 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|--------------|---------------|--------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -678 | -678 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 756 | 755 |
| Calculated slope | 1.002045 | 1.002475 | Chamber temp | 45.2 | 45.0 |
| Calculated intercept | 0.987051 | 1.275006 | Pressure | 695.2 | 700.0 |
| Analyzer Background | 6.0 | 6.0 | Flow | 0.439 | 0.450 |
| Analyzer Coefficient | 1.122 | 1.128 | Intensity | 92 | 92 |

Analyzer make Thermo 43i Analyzer serial # 1008841397

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 5500 | 84.1 | 776.8 | 774.2 | 1.003 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.6 | ---- |
| high point | 5500 | 84.1 | 776.8 | 774.7 | 1.003 |
| second point | 5500 | 42.1 | 388.9 | 385.1 | 1.010 |
| third point | 5500 | 21.1 | 194.9 | 191.7 | 1.017 |
| as left zero | 5500 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 5500 | 84.1 | 776.8 | 777.2 | 0.999 |
| Average Correction Factor | | | | | 1.010 |

Corrected As found 773.8 Previous response 774.2 % change 0.0%

Notes:

Pump changed after as founds. Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



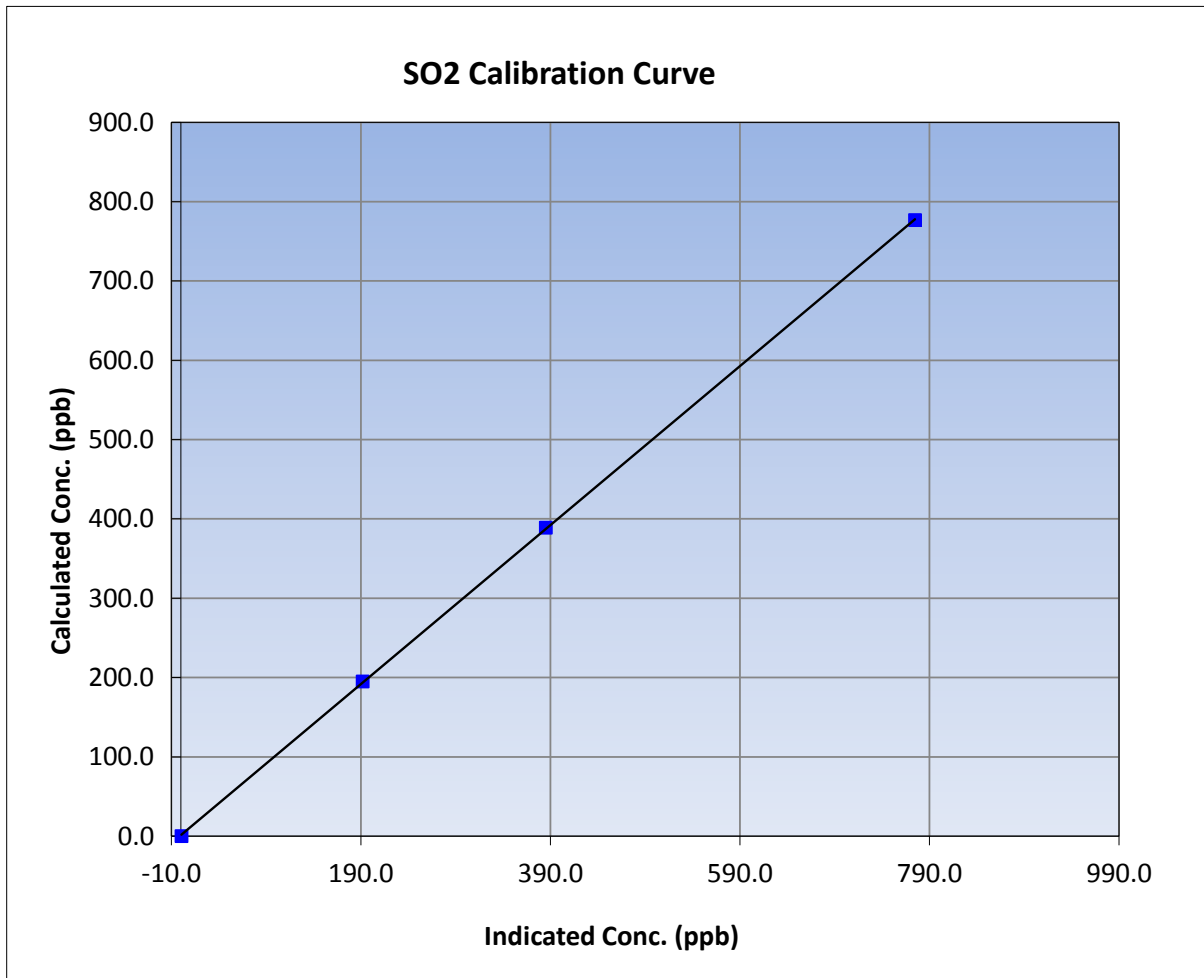
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Start Time (MST) | 9:46 | End Time (MST) | 13:25 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1008841397 |

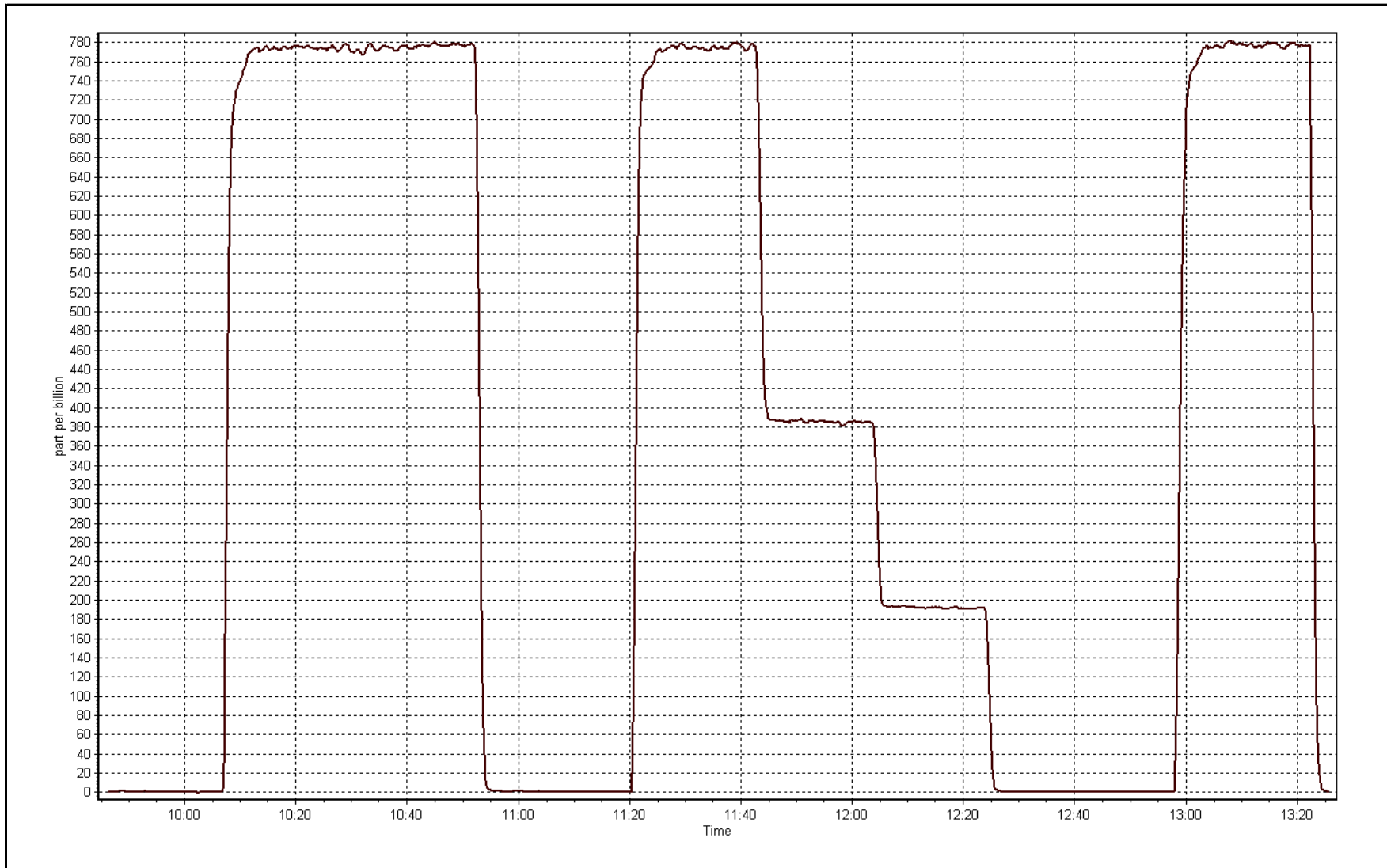
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.6 | ---- | Correlation Coefficient | 0.999973 |
| 776.8 | 774.7 | 1.0027 | | |
| 388.9 | 385.1 | 1.0097 | Slope | 1.002475 |
| 194.9 | 191.7 | 1.0166 | | |
| | | | Intercept | 1.275006 |



SO2 Calibration Plot

Date: September 12, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 19, 2016 | Last Calibration | August 2, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Reason: | Routine | | |
| Start Time (MST) | 10:58 | End Time (MST) | 15:00 |
| Gas Cert Reference | SA5551 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.28 ppm | Cal Gas Exp Date | 2/13/18 |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 2449 |
| Dil air Make/Model | Teledyne API 701 | Serial Number | 60 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9036 |
| SO2 gas concentration | 49.8 ppm | SO2 gas cert/exp | LL107926 6/Feb/19 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -720 | -720 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 976 | 982 |
| Calculated slope | 0.996028 | 0.995894 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.381498 | -0.484119 | Pressure | 678.8 | 686.0 |
| Analyzer Background | 2.22 | 2.17 | Flow | 0.428 | 0.432 |
| Analyzer Coefficient | 1.210 | 1.199 | Intensity | 91 | 91 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-TLE | | Analyzer serial # | 1218153358 | |
| Converter make/model | CDN-101 | | Converter serial # | 520 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 5500 | 73.1 | 70.2 | 71.3 | 0.984 |
| SO2 scrubber check | 5500 | 21.1 | 191.1 | 0.2 | ---- |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 5500 | 73.1 | 70.2 | 70.9 | 0.990 |
| second point | 5500 | 41.8 | 40.1 | 40.9 | 0.980 |
| third point | 5500 | 20.9 | 20.1 | 20.6 | 0.973 |
| as left zero | 5500 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 5500 | 73.1 | 70.2 | 71.0 | 0.989 |
| Average Correction Factor | | | | | 0.981 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 71.2 | Previous response | 70.8 | % change | -0.5% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

Inlet filter changed after as founds. Scrubber check completed after as founds. Span slow to stabilize and noisy. No indication in diagnostics for slow stabilization or noise. Span adjusted.

Calibration Performed By:

Devin Russell



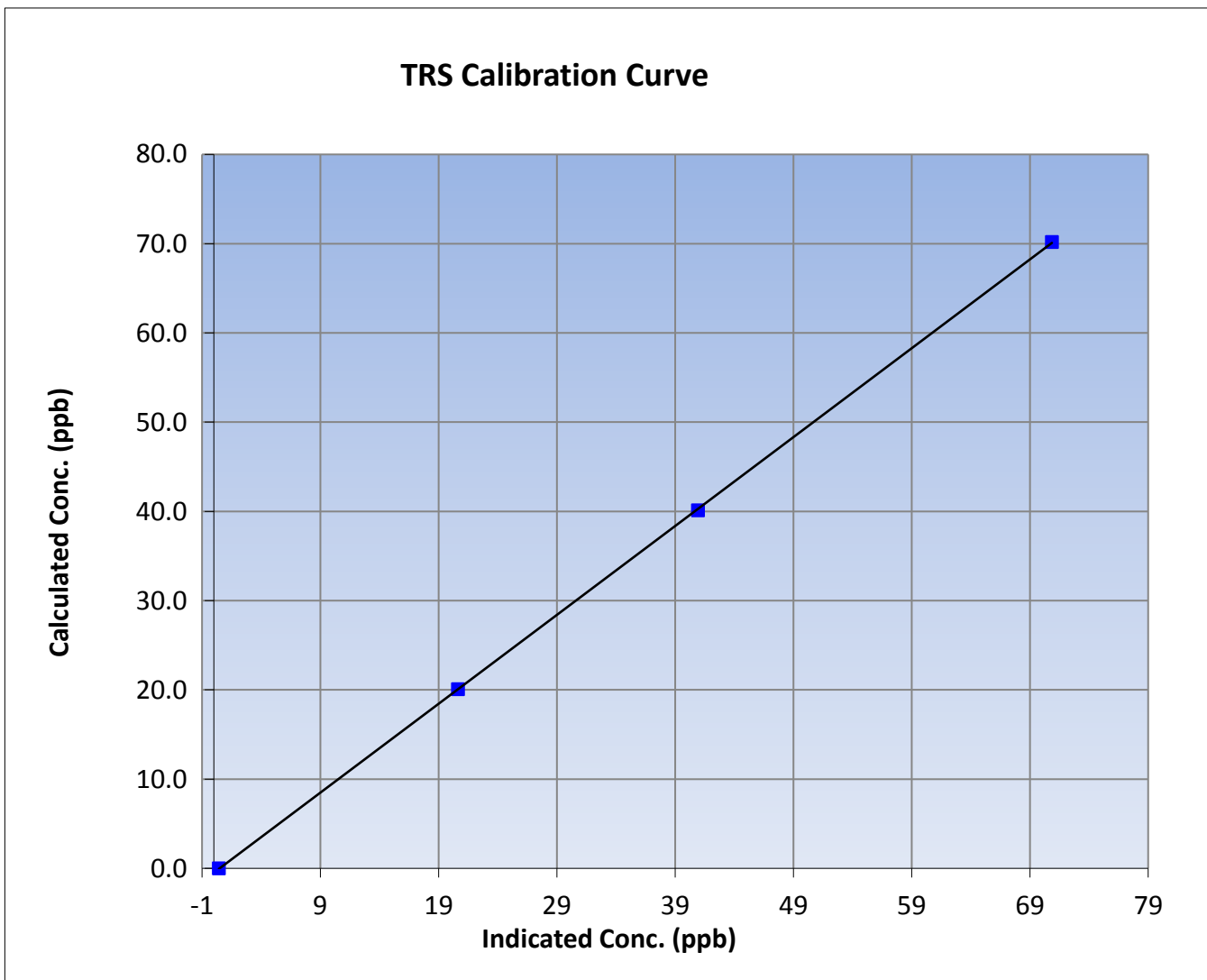
Wood Buffalo Environmental Association TRS Calibration Report

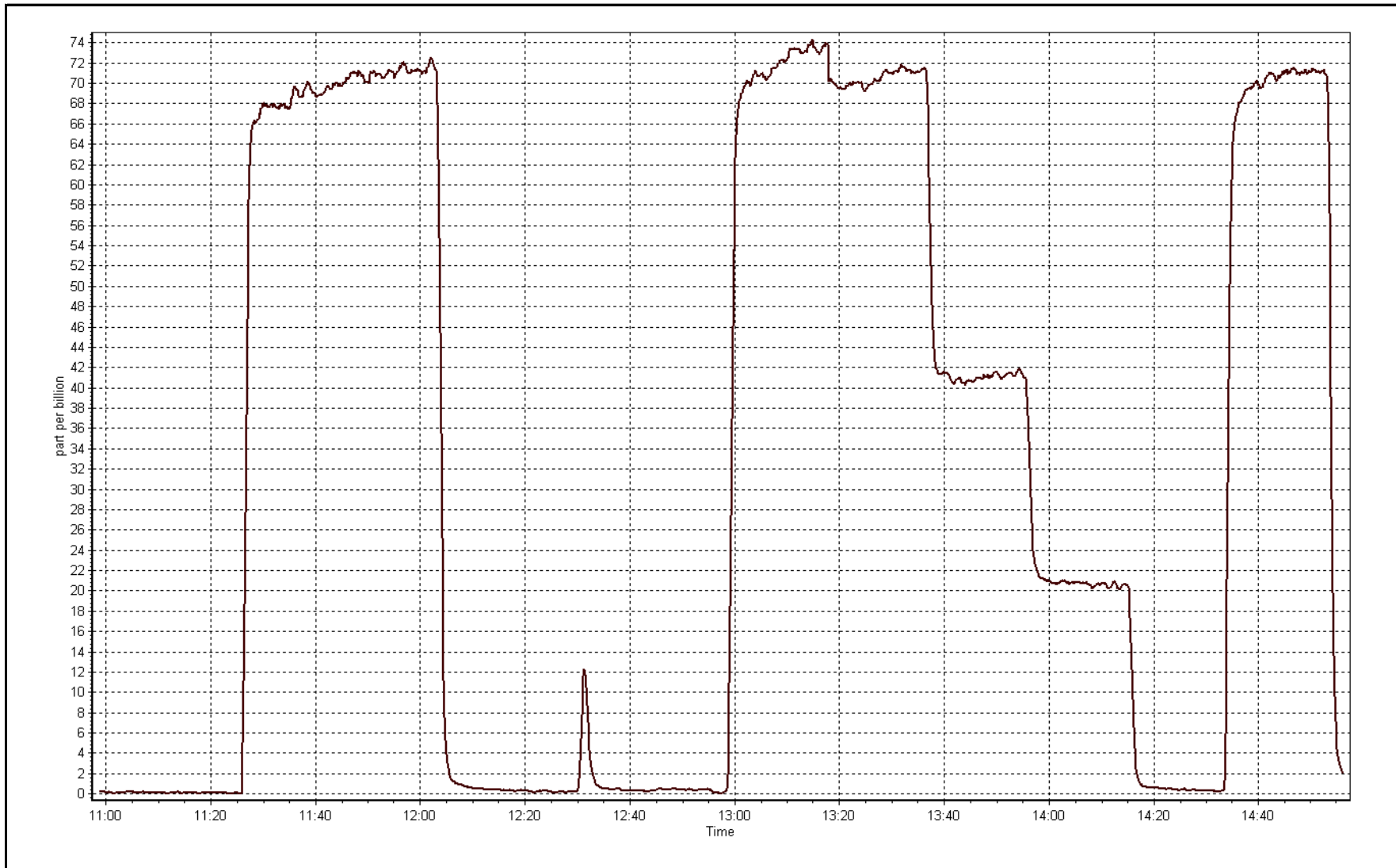
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 2, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Start Time (MST) | 10:58 | End Time (MST) | 15:00 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1218153358 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999986 |
| 70.2 | 70.9 | 0.9903 | | |
| 40.1 | 40.9 | 0.9802 | Slope | 0.995894 |
| 20.1 | 20.6 | 0.9726 | | |
| | | | Intercept | -0.484119 |







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|----------------------------|---------------------|----------------|
| Calibration Date | September-12-16 | Last Calibration | August-03-16 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Reason: | Routine | | |
| Start Time (MST) | 9:46 | End Time (MST) | 13:25 |
| Gas Cert Reference | LL107926 | Cal Gas Expiry Date | February-16-19 |
| CH4 Cal Gas Conc. | 505.0 ppm | CH4 Equiv Conc. | 1068.8 ppm |
| C3H8 Cal Gas Conc. | 205.0 ppm | Station temp. | 21 Deg C |
| Calibrator Model | Teledyne API T700 | Serial Number | 2449 |
| ZAG make/model | Teledyne API 701 | Serial Number | 60 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 10957 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.4 | 75.2 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.1 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 405.0 | 405.0 |
| THC Calc slope | 0.999219 | 0.997722 | Carrier Pressure | 34.5 | 34.5 |
| THC Calc intercept | 0.023842 | 0.051985 | Fuel Pressure | 42.3 | 42.3 |
| NMHC Calc slope | 0.998528 | 0.997852 | Air Pressure | 32.4 | 32.4 |
| NMHC Calc intercept | 0.010111 | 0.020143 | | | |

Analyzer make Thermo 55i Analyzer serial # 1331259521

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5500 | 84.1 | 16.34 | 16.53 | 0.989 |
| calibrator zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5500 | 84.1 | 16.34 | 16.36 | 0.999 |
| second point | 5500 | 42.1 | 8.18 | 8.10 | 1.010 |
| third point | 5500 | 21.1 | 4.10 | 4.02 | 1.020 |
| as left zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5500 | 84.1 | 16.34 | 16.36 | 0.999 |
| Average Correction Factor | | | | | 1.010 |

Corrected As found 16.53 Previous response 16.33 % change -1.2%

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5500 | 84.1 | 8.62 | 8.73 | 0.987 |
| calibrator zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5500 | 84.1 | 8.62 | 8.63 | 0.999 |
| second point | 5500 | 42.1 | 4.32 | 4.29 | 1.006 |
| third point | 5500 | 21.1 | 2.16 | 2.13 | 1.015 |
| as left zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5500 | 84.1 | 8.62 | 8.63 | 0.999 |
| Average Correction Factor | | | | | 1.007 |

Corrected As found 8.73 Previous response 8.62 % change -1.2%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5500 | 84.1 | 7.72 | 7.79 | 0.991 |
| calibrator zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5500 | 84.1 | 7.72 | 7.73 | 0.999 |
| second point | 5500 | 42.1 | 3.87 | 3.81 | 1.015 |
| third point | 5500 | 21.1 | 1.94 | 1.89 | 1.025 |
| as left zero | 5500 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5500 | 84.1 | 7.72 | 7.73 | 0.999 |
| Average Correction Factor | | | | | 1.013 |

Corrected As found 7.79 Previous response 7.71 % change -1.0%



Wood Buffalo Environmental Association

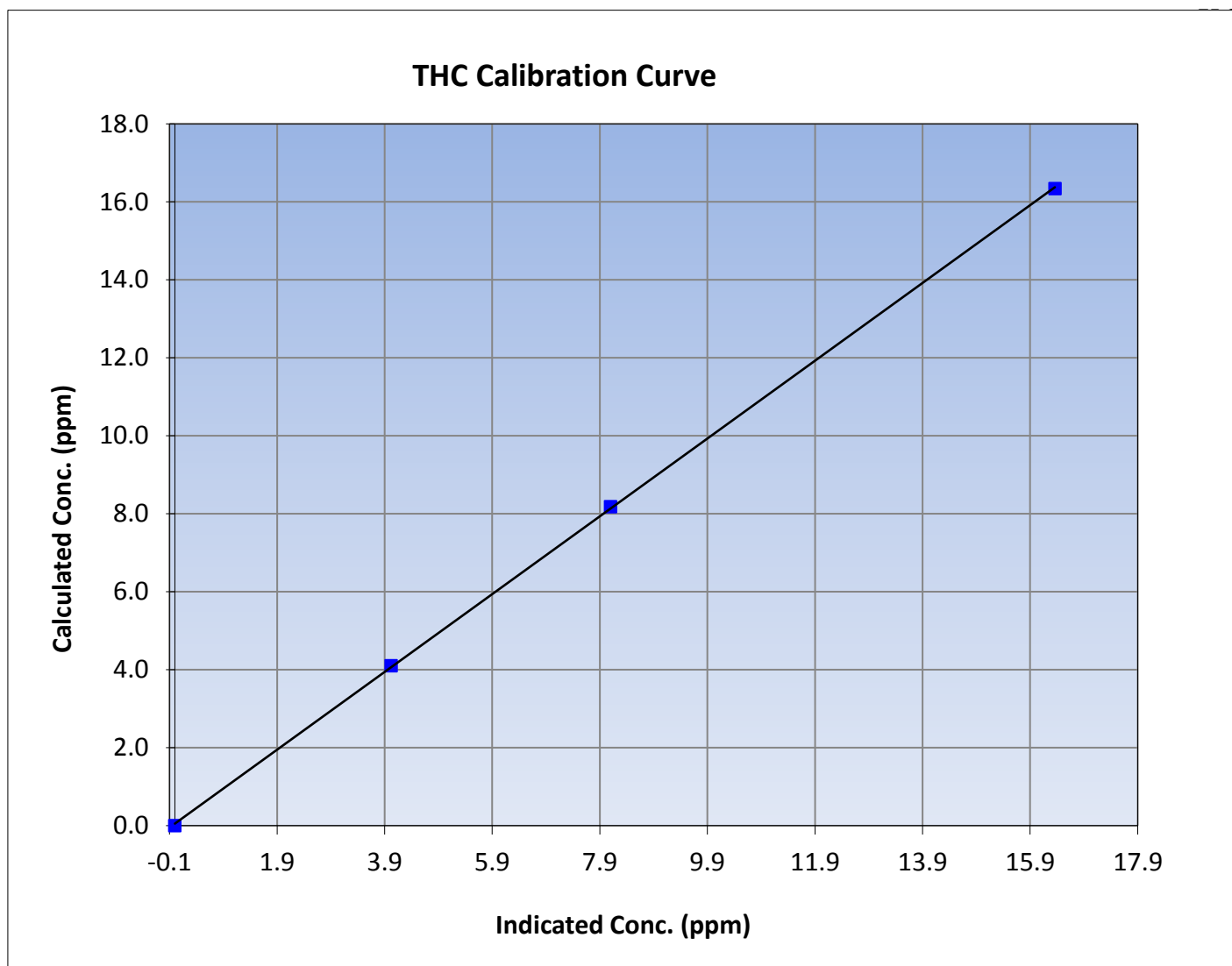
THC Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Start Time (MST) | 9:46 | End Time (MST) | 13:25 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999949 |
| 16.34 | 16.36 | 0.9989 | | |
| 8.18 | 8.10 | 1.0100 | Slope | 0.997722 |
| 4.10 | 4.02 | 1.0199 | | |
| | | | Intercept | 0.051985 |





Wood Buffalo Environmental Association

CH₄ Calibration Summary

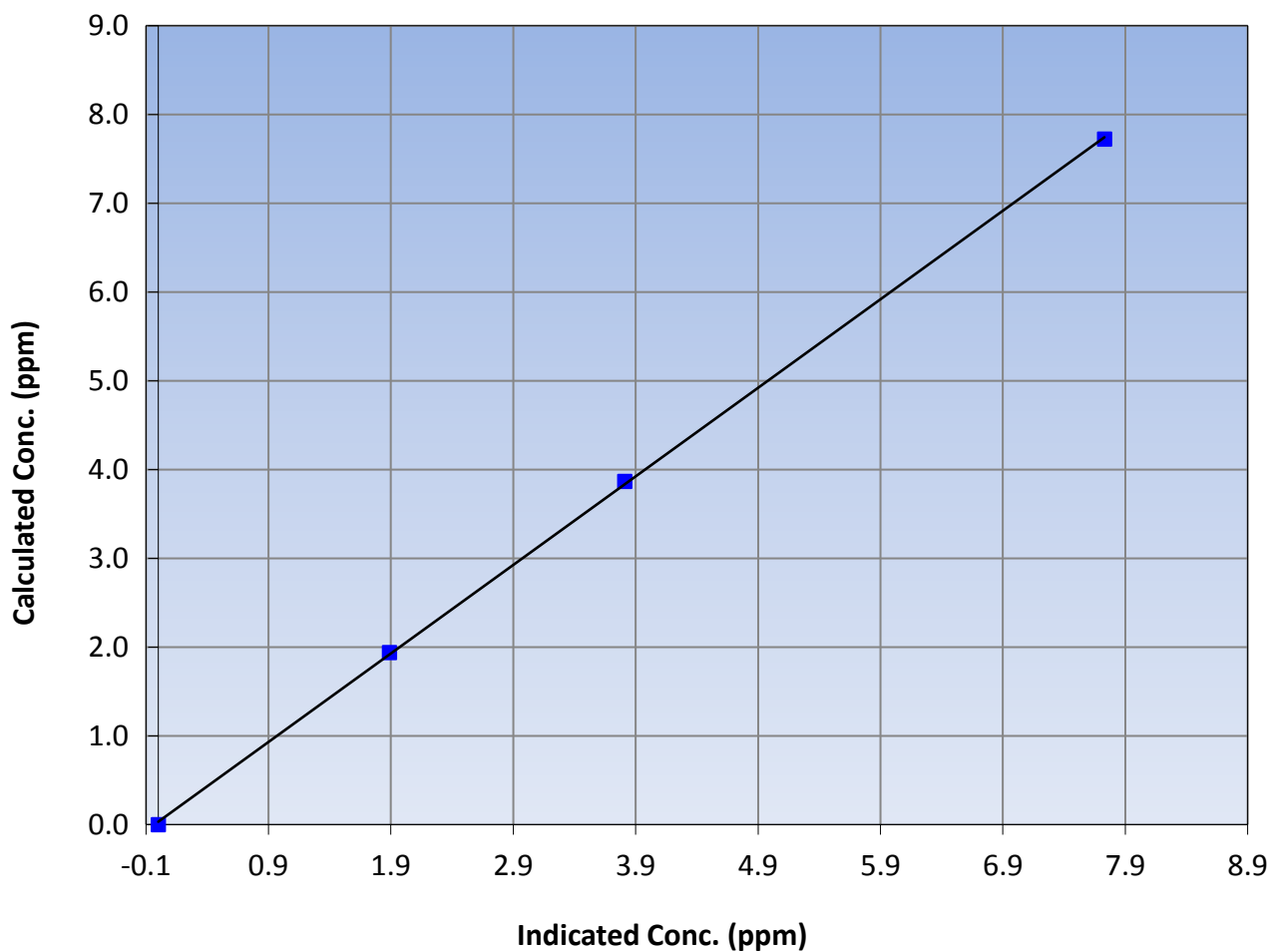
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Start Time (MST) | 9:46 | End Time (MST) | 13:25 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999909 |
| 7.72 | 7.73 | 0.9990 | | |
| 3.87 | 3.81 | 1.0146 | Slope | 0.997565 |
| 1.94 | 1.89 | 1.0251 | | |
| | | | Intercept | 0.031880 |

CH₄ Calibration Curve





Wood Buffalo Environmental Association

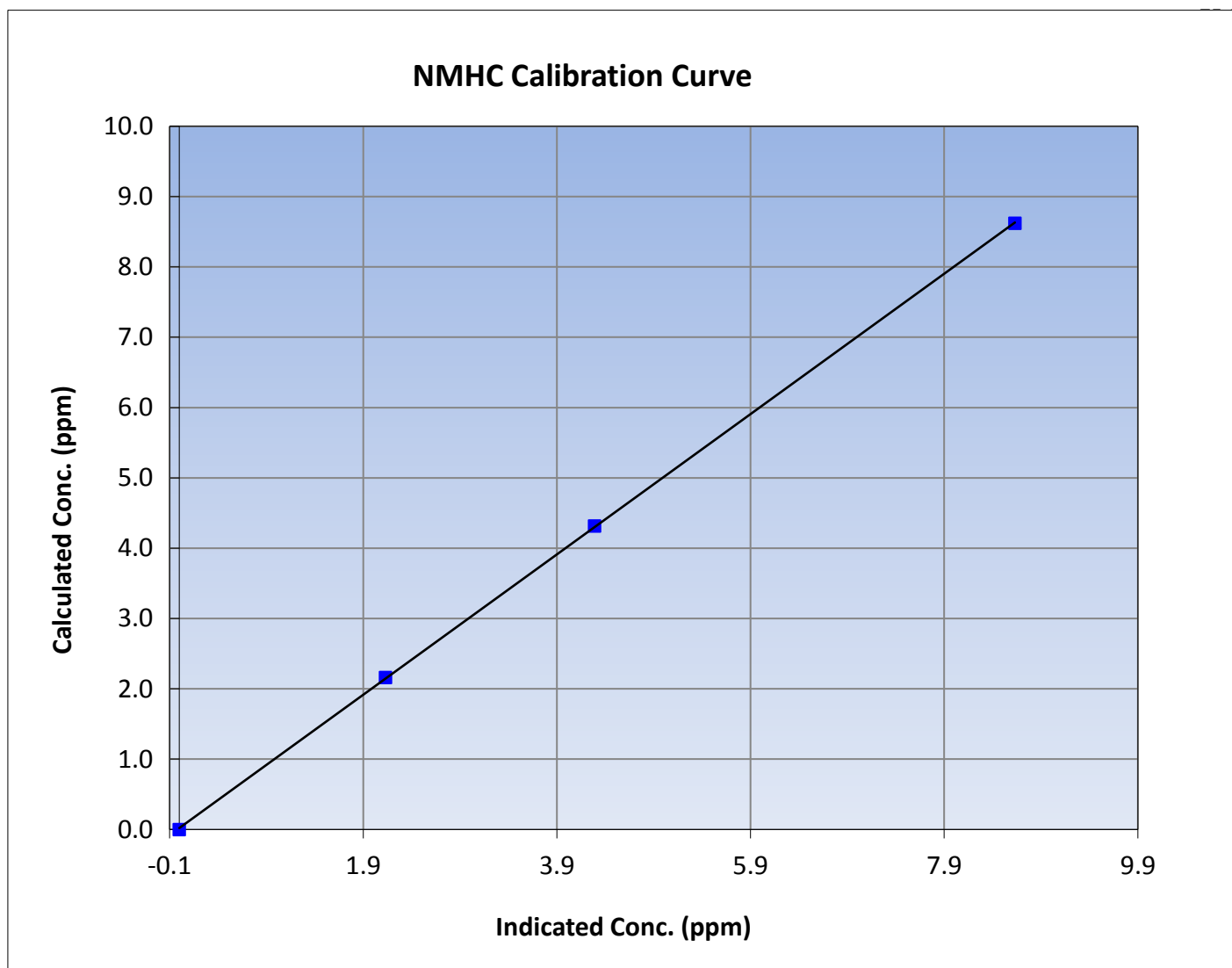
NMHC Calibration Summary

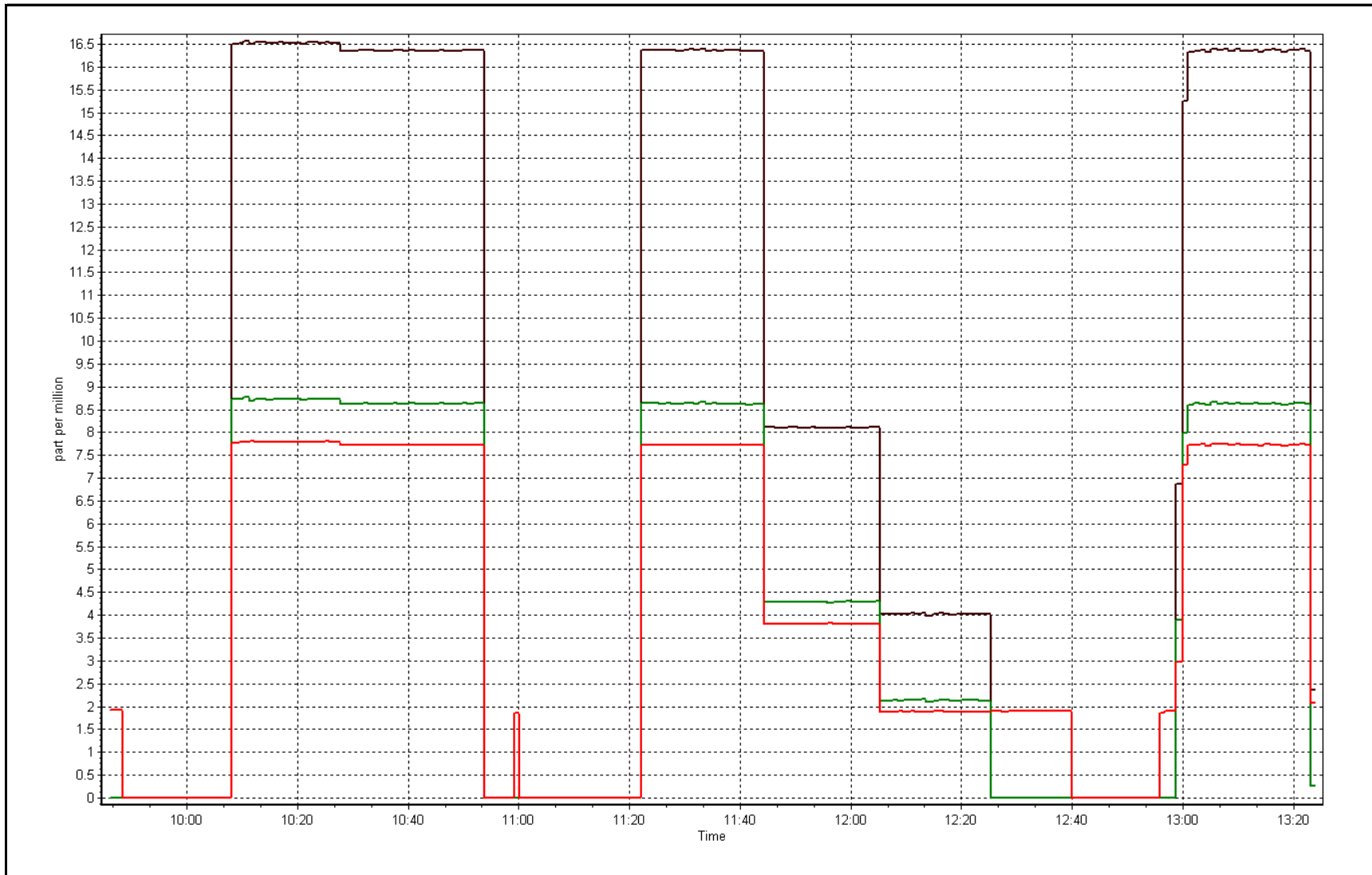
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Start Time (MST) | 9:46 | End Time (MST) | 13:25 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1331259521 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999975 |
| 8.62 | 8.63 | 0.9989 | | |
| 4.32 | 4.29 | 1.0059 | Slope | 0.997852 |
| 2.16 | 2.13 | 1.0154 | | |
| | | | Intercept | 0.020143 |







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 23, 2016 | Previous Calibration | August 30, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Reason: | Routine | | |
| Start Time (MST) | 8:00 | End Time (MST) | 11:30 |
| NO2 GPT Ref date | NA | Transfer Standard | API T700 |
| Calibrator Make/Model | Teledyne API T700 | Station temp. | 23 Deg C |
| ZAG make/model | Teledyne API 701 | Serial Number | 2449 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 60 |
| | | Serial Number | 10957 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|------------------|--------|-------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 25.2 | 27.5 |
| Analyzer IP address | 192.168.1.48 | | Lamp temp. | 53.5 | 53.5 |
| Calculated slope | 1.004770 | 0.999564 | Pressure | 674.5 | 666.2 |
| Calculated intercept | -1.304516 | -2.607549 | Flow cell A | 0.720 | 0.713 |
| Analyzer Background | -1.8 | -1.8 | Flow cell B | 0.734 | 0.728 |
| Analyzer Coefficient | 1.001 | 0.993 | Cell A Intensity | 85048 | 83658 |
| | | | Cell B Intensity | 85410 | 84070 |

| | | | |
|---------------|------------|-------------------|------------|
| Analyzer make | Thermo 49i | Analyzer serial # | 1300156234 |
|---------------|------------|-------------------|------------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator O3 Generator Drive Voltage (mV) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|--------------------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5500 | 800.0 | 0.0 | 0.0 | ---- |
| as found span | 5500 | 1107.2 | 400.0 | 404.6 | 0.989 |
| calibrator zero | 5500 | 800.0 | 0.0 | 0.0 | ---- |
| high point | 5500 | 1107.2 | 400.0 | 401.4 | 0.997 |
| second point | 5500 | 930.9 | 200.0 | 204.2 | 0.979 |
| third point | 5500 | 823.3 | 100.0 | 105.2 | 0.951 |
| as left zero | 5500 | 800.0 | 0.0 | -0.1 | ---- |
| as left span | 5500 | 1107.2 | 400.0 | 401.3 | 0.997 |
| Average Correction Factor | | | | | 0.976 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|-------|
| Corrected As found | 404.6 | Previous response | 399.4 | % change | -1.3% |
|--------------------|-------|-------------------|-------|----------|-------|

Notes:

Inlet filter changed after as founds. Span adjusted.

Calibration Performed By: Devin Russell



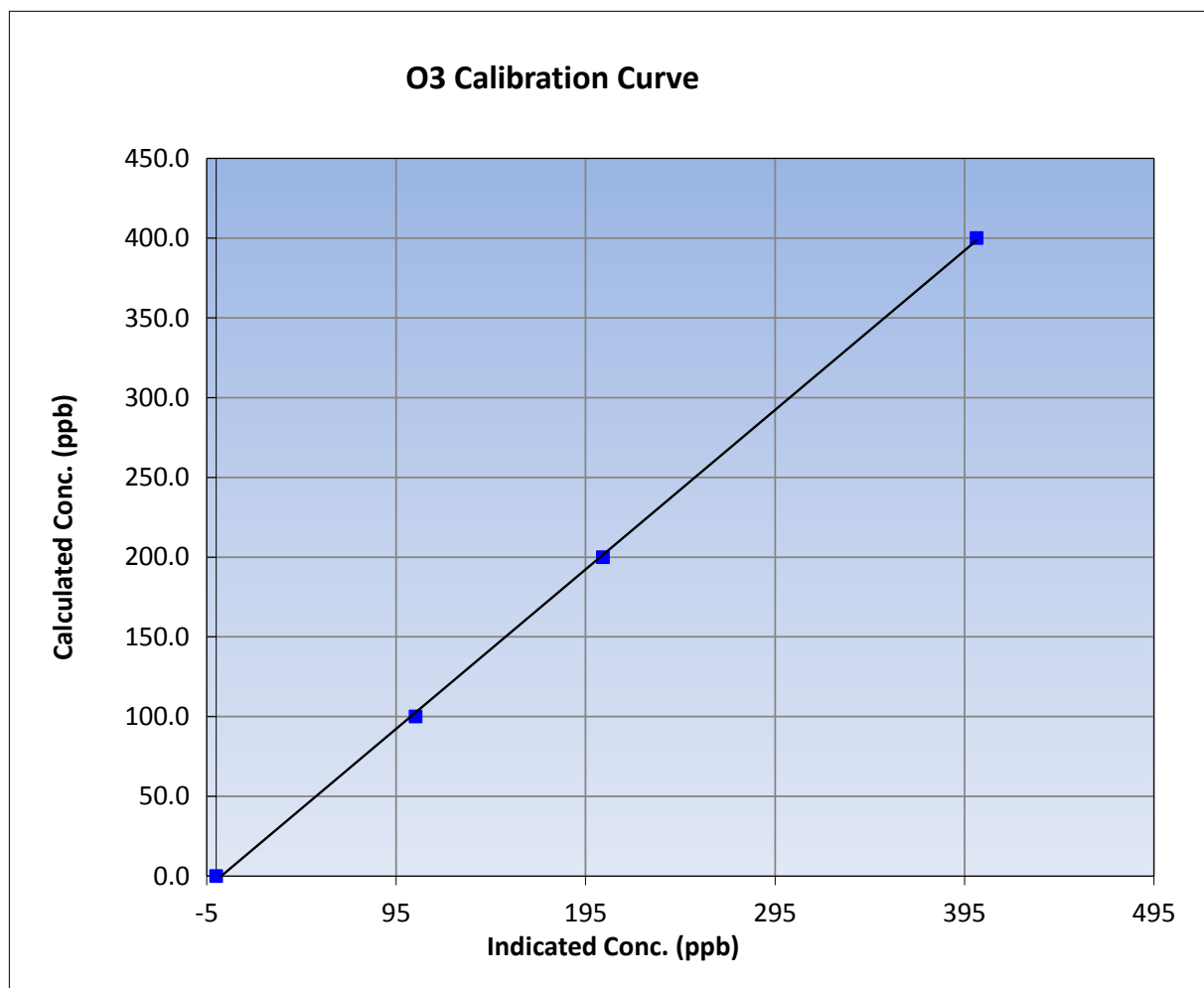
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

| | | | |
|------------------|------------------|----------------------|-----------------|
| Calibration Date | September-23-16 | Previous Calibration | August 30, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 11:30 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1300156234 |

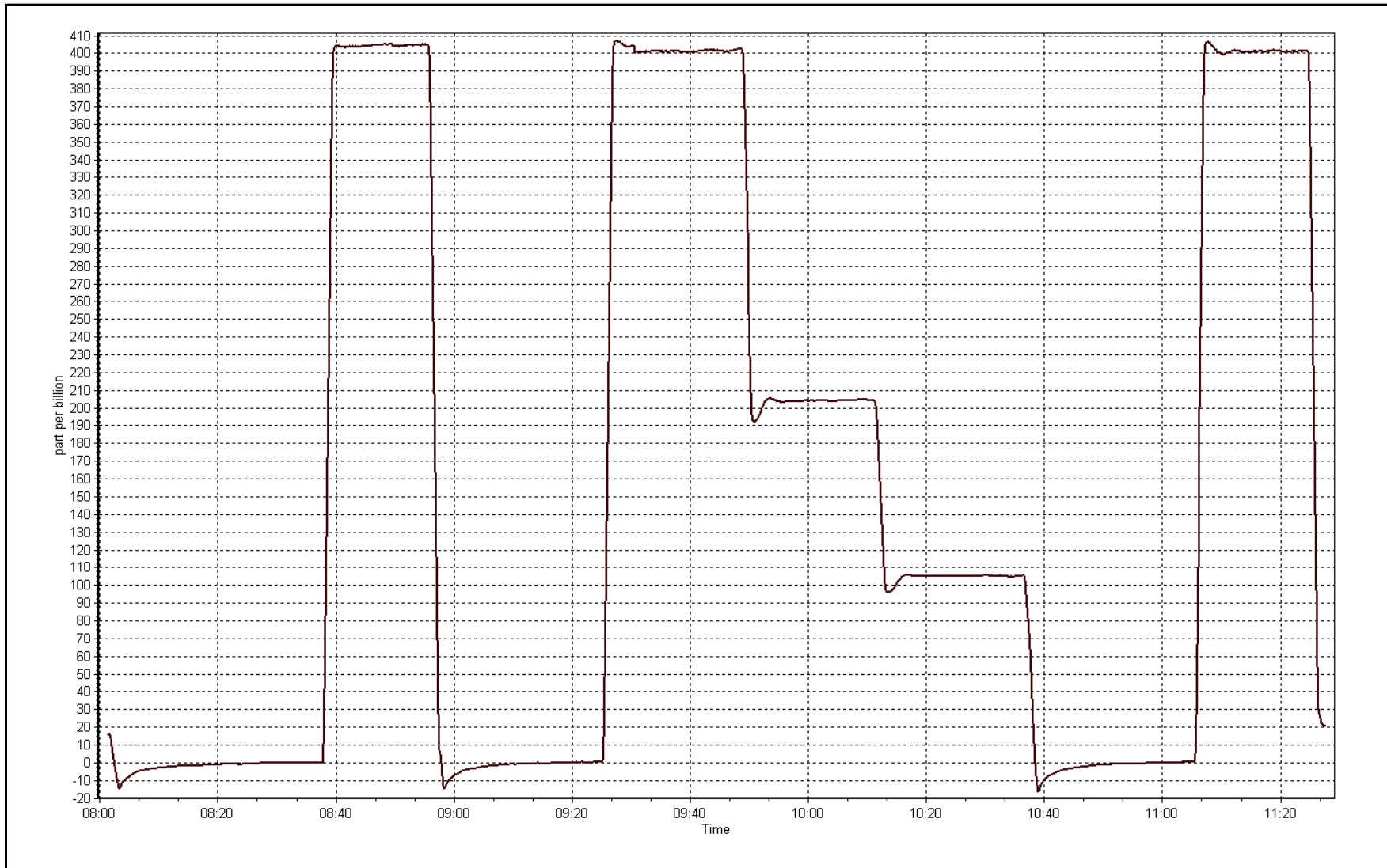
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999798 |
| 400.0 | 401.4 | 0.9966 | | |
| 200.0 | 204.2 | 0.9794 | Slope | 0.999564 |
| 100.0 | 105.2 | 0.9506 | | |
| | | | Intercept | -2.607549 |



O3 Calibration Plot

Date: September 23, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Reason: | Routine | | |
| Start Time (MST) | 8:00 | End Time (MST) | 13:00 |
| NO Cal Gas Conc | 52.4 ppm | Gas Cert Reference | LL107926 |
| NOX Cal Gas Conc | 52.4 ppm | Cal Gas Expiry Date | 2/16/19 |
| Calibrator | Teledyne API T700 | Serial Number | 2449 |
| Zero air Generator | Teledyne API 701 | Serial Number | 60 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|-------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 10957 |
|-------------------|----------------------------|-----------------|-------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.997673 | 1.000546 | 0.996837 |
| | Data Offset | 1.286984 | 1.583707 | 0.336073 |
| Current Calibration | Data Slope | 0.993479 | 0.993995 | 0.997767 |
| | Data Offset | 1.127191 | 1.117023 | -0.932743 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1218153460 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.43 | | 192.168.1.42 | |
| NO coefficient | 1.017 | | 1.042 | |
| NOX coefficient | 1.003 | | 1.001 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 3.0 | | 3.0 | |
| NOX bkgrnd | 3.2 | | 3.3 | |
| Chamber Temp | 50.7 | Deg C | 50.6 | Deg C |
| Moly Temp | 324.7 | Deg C | 325.3 | Deg C |
| PMT voltage | -773.3 | V | -773.7 | V |
| PMT Temp | -2.9 | Deg C | -2.7 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 187.1 | mmHg | 186.8 | mmHg |
| R Cell Press Nox | 186.8 | mmHg | 186.8 | mmHg |
| NO sample flow | 0.763 | lpm | 0.765 | lpm |
| Nox sample Flow | 0.762 | lpm | 0.764 | lpm |

Notes:

Inlet filter changed after as founds. Span adjusted. Second High NO point used for GPT reference.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 22, 2016 Station Number: AMS 6

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.2 | 0.1 | ---- | ---- |
| as found span | 5500 | 84.1 | 801.2 | 801.2 | 0.0 | 782.8 | 779.7 | 3.0 | 1.0236 | 1.0276 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.2 | 0.1 | ---- | ---- |
| high point | 5500 | 84.1 | 801.2 | 801.2 | 0.0 | 805.6 | 805.2 | 0.4 | 0.9946 | 0.9951 |
| second point | 5500 | 42.1 | 401.1 | 401.1 | 0.0 | 402.9 | 402.7 | 0.2 | 0.9955 | 0.9960 |
| third point | 5500 | 21.1 | 201.0 | 201.0 | 0.0 | 199.6 | 199.6 | -0.1 | 1.0073 | 1.0070 |
| as left zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | -0.1 | 2.4 | ---- | ---- |
| as left span | 5432 | 84.1 | 811.3 | 382.7 | 428.6 | 821.0 | 386.3 | 434.7 | 0.9882 | 0.9909 |
| Average Correction Factor | | | | | | | | | 0.9991 | 0.9994 |

Corrected As found NO_x= 783.0 NO= 780.0 Percent Change NO_x= 2.4% NO= 2.5%
 Previous Response NO_x= 801.8 NO= 799.2

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.90 ccm NOx ref calc conc = 827.9 ppb NO ref calc conc = 827.9 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 816.9 | 814.9 | 0.1 | 1.0135 | 1.0160 | ---- | ---- |
| 1st NO2 (400) | 382.7 | 432.2 | 816.5 | 382.7 | 433.7 | 1.0140 | ---- | 0.9966 | 100.3% |
| 2nd NO2 (200) | 602.6 | 212.3 | 816.7 | 602.6 | 214.1 | 1.0137 | ---- | 0.9914 | 100.9% |
| 3rd NO2 (100) | 708.2 | 106.7 | 816.9 | 708.2 | 108.7 | 1.0135 | ---- | 0.9815 | 101.9% |
| 2nd NO ref point | ---- | 0.0 | 814.5 | 813.1 | 1.4 | 1.0165 | 1.0182 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0144 | | 0.9898 | 101.0% |

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

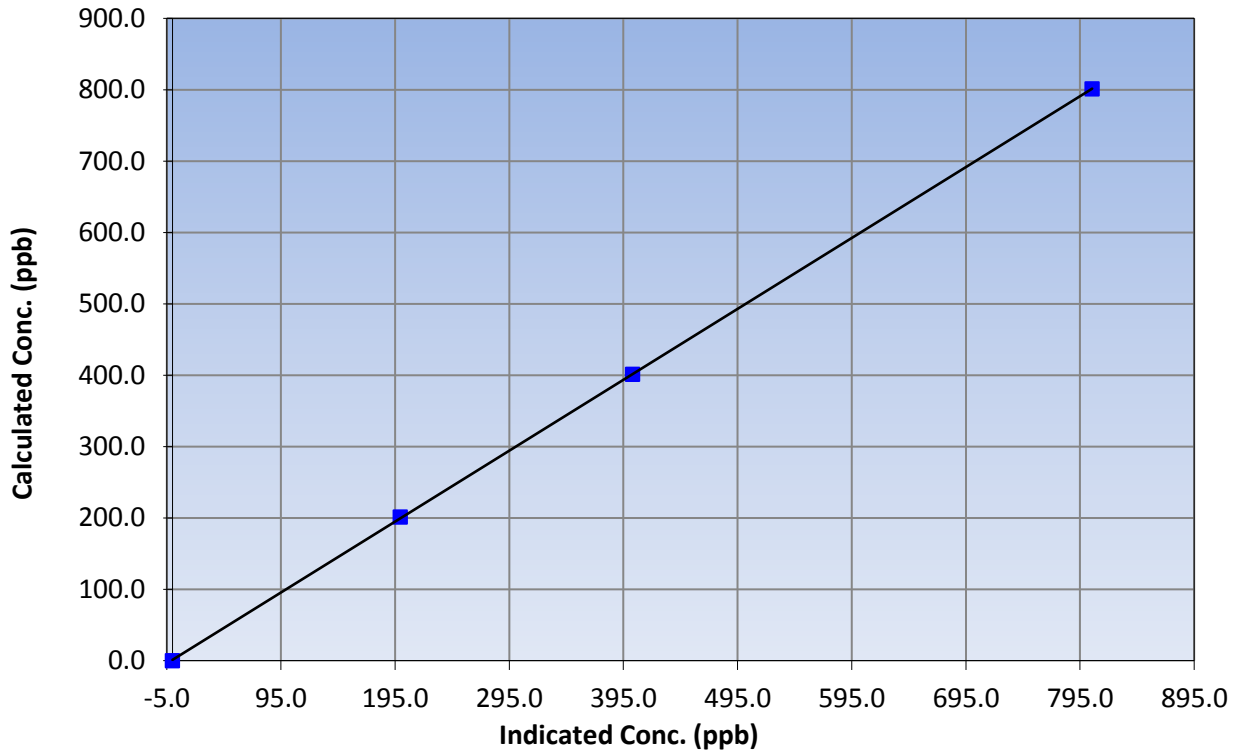
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 13:00 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999989 |
| 801.2 | 805.6 | 0.9946 | | |
| 401.1 | 402.9 | 0.9955 | Slope | 0.993479 |
| 201.0 | 199.6 | 1.0073 | | |
| | | | Intercept | 1.127191 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

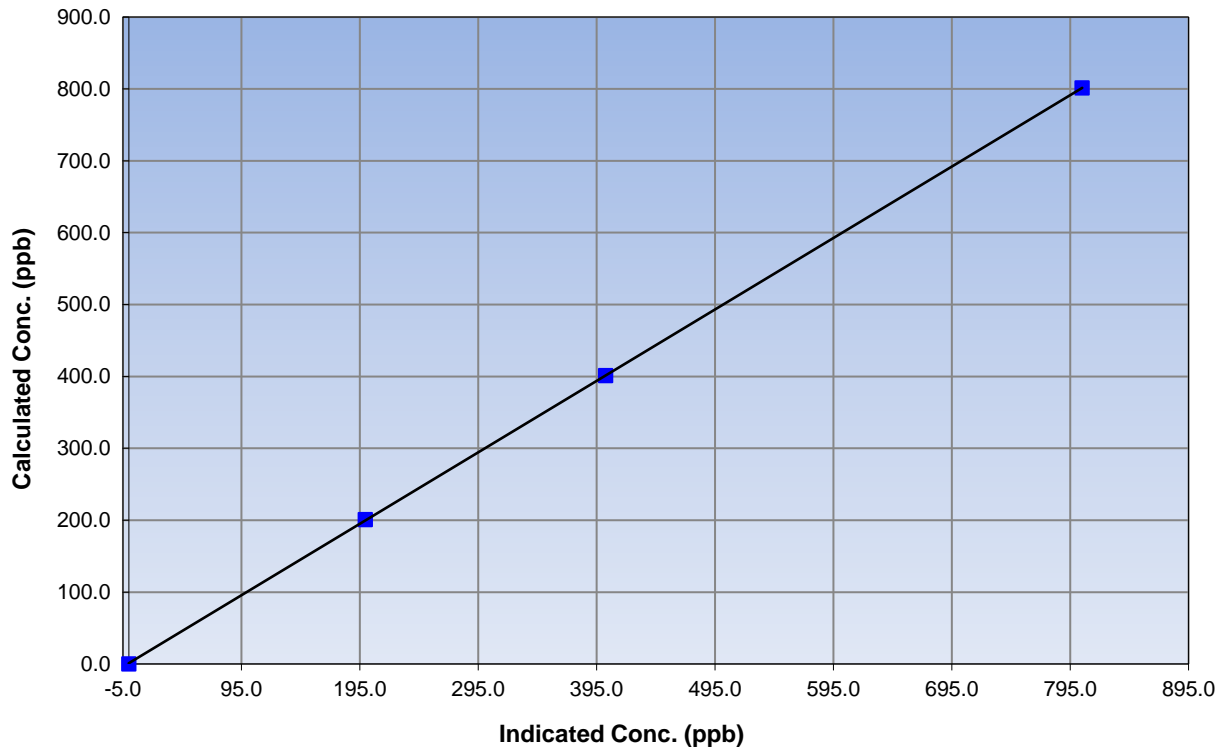
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnes | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 13:00 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | N/A | Correlation Coefficient | 0.999991 |
| 801.2 | 805.2 | 0.9951 | | |
| 401.1 | 402.7 | 0.9960 | Slope | 0.993995 |
| 201.0 | 199.6 | 1.0070 | | |
| | | | Intercept | 1.117023 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

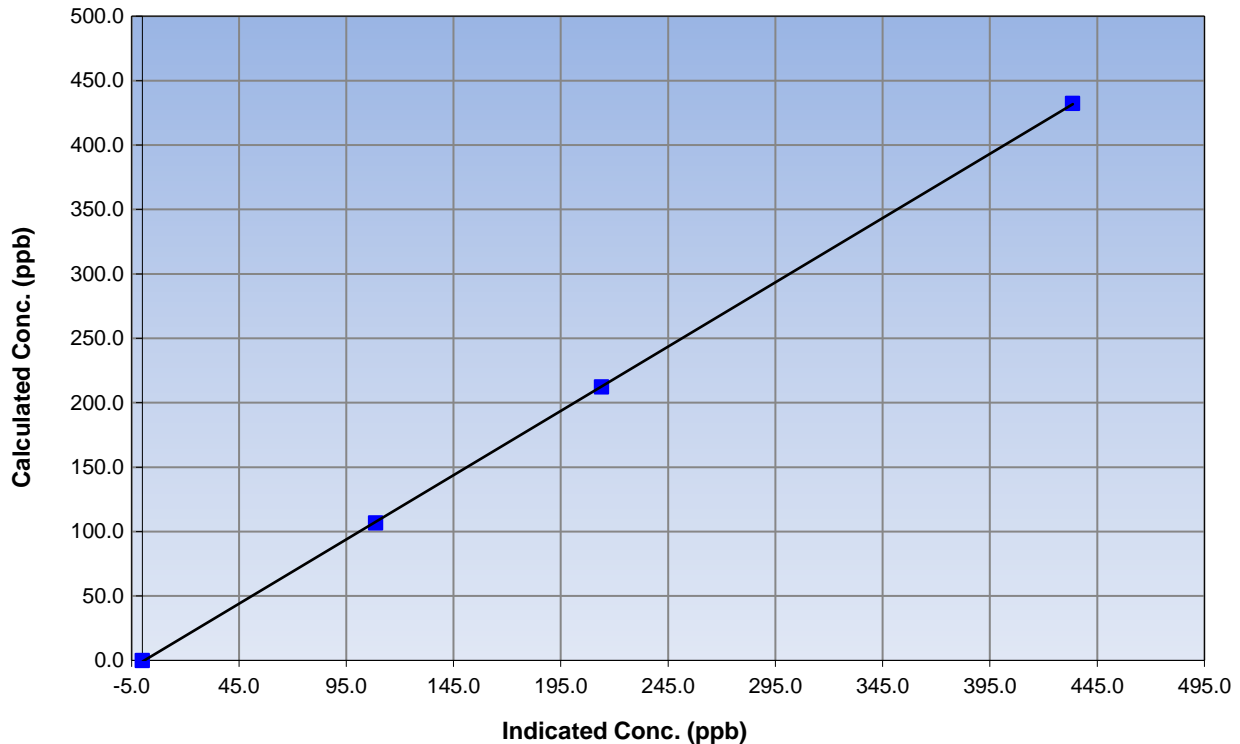
Station Information

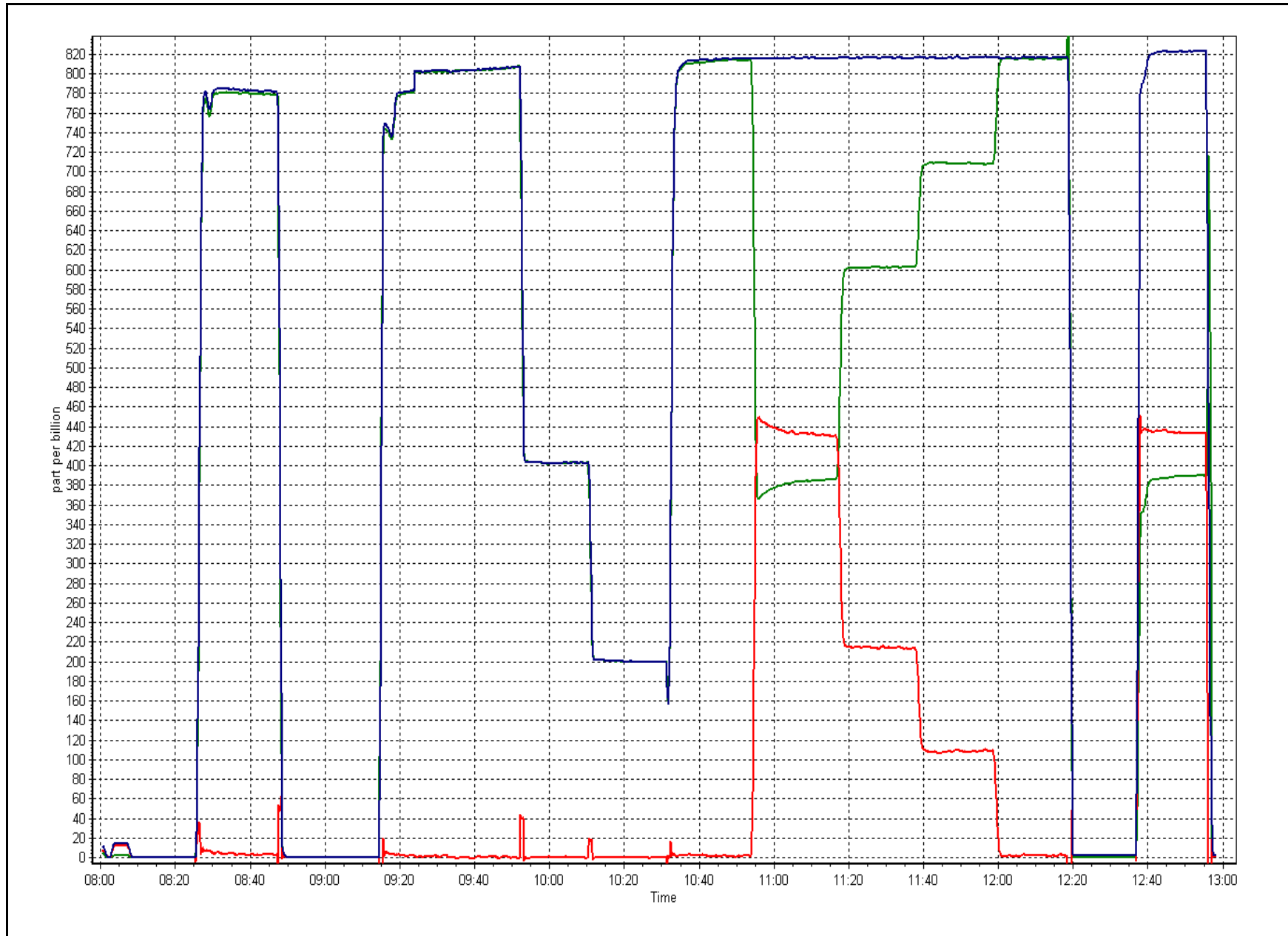
| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Number | Patricia McInnes | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 13:00 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153460 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | N/A | Correlation Coefficient | 0.999983 |
| 432.2 | 433.7 | 0.9966 | | |
| 212.3 | 214.1 | 0.9914 | Slope | 0.997767 |
| 106.7 | 108.7 | 0.9815 | | |
| | | | Intercept | -0.932743 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

N_t-NO_x-NH₃ Calibration Report

Station Information

| | | | |
|----------------------|--------------------|-----------------------|----------------------|
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| NOX Calibration Date | September 22, 2016 | NOX Previous Cal Date | August 4, 2016 |
| NH3 Calibration Date | September 22, 2016 | NH3 Previous Cal Date | August 5, 2016 |
| Reason: | Routine | | |
| Start Time (MST) | 8:00 | End Time (MST) | 15:25 |
| Calibrator | Teledyne API T700 | Station Temperature | 21.0 Deg C |
| NH3 Cal Gas Conc | 75.1 ppm | Serial Number | 2449 |
| NOx Cal Gas Conc | 52.4 ppm | NH3 Expiry Date / SN | 4/Aug/2015 SGAL-3617 |
| NO Cal Gas Conc | 52.4 ppm | NO Expiry Date / SN | 16/Feb/2019 LL107926 |

DACs Information

DACS make & model Campbell Scientific CR3000 DACS serial No. 10957

| Parameter | | NH3 | Nt | NOx | NO | NO2 |
|--------------------|-------------|--------------|-------------|-----------|----------|-----------|
| Cal Stats As Found | Data Slope | 0.986347 | 0.968966 | 1.003754 | 0.998442 | 1.022292 |
| | Data Offset | -5.578637 | -7.9933582 | -0.594887 | 0.498390 | 0.338649 |
| Cal Stats After | Data Slope | 0.996919 | 0.976583 | 0.998470 | 0.997418 | 0.999648 |
| | Data Offset | -2.158052 | -3.55500759 | 1.524707 | 2.067183 | -0.861985 |
| IP address | | 192.168.1.17 | | | | |

Analyzer Information

Analyzer make/model Teledyne T201 Analyzer serial # 215
 Converter Converter serial #

| Test Point | before | | after | |
|-------------------|--------|-------|-------|-------|
| NH3 Conc range | 2500 | ppb | 2500 | ppb |
| NOx Conc range | 1000 | ppb | 1000 | ppb |
| NO BKG | -2.9 | | -2.9 | ppb |
| NOx BKG | -3.1 | | -3.1 | ppb |
| Nt BKG | -0.3 | | -0.3 | |
| NO coefficient | 1.049 | | 1.072 | |
| NO2 coefficient | 1.000 | | 1.000 | ppb |
| NOx coefficient | 1.066 | | 1.090 | |
| NH3 coefficient | 0.965 | | 1.000 | |
| Nt coefficient | 1.085 | | 1.109 | |
| NH3 conv temp | 825 | DegC | 825 | Deg C |
| Chamber Temp | 49.9 | Deg C | 50.0 | Deg C |
| Moly Temp | 314.6 | Deg C | 315.6 | Deg C |
| PMT Temp | 7.0 | Deg C | 7.0 | Deg C |
| O3 flow | 86.0 | ccm | 87.0 | ccm |
| R Cell Press | 6.0 | "Hg | 6.0 | mmHg |
| PMT Voltage | 693.0 | v | 693.0 | v |
| Sample Flow 1 NO | 559.0 | ccm | 562.0 | ccm |
| Sample Flow 2 Nox | 559.0 | ccm | 562.0 | ccm |
| Sample Flow 3 Nt | 543.0 | ccm | 552.0 | ccm |

Notes:

Inlet filter changed after as founds. Span adjusted. Second high NO point used for GPT reference. NH3 span adjusted.



Wood Buffalo Environmental Association

NH₃ Calibration Report

Station Information

Calibration Date: September 22, 2016 Station Number: AMS 6

NH₃ Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated Nt conc (ppb) | Calculated NOx conc (ppb) | Calculated NH ₃ conc (ppb) | Indicated Nt conc (ppb) | Indicated NOx conc (ppb) | Indicated NH ₃ conc (ppb) | Nt Correction factor | NH ₃ Correction factor |
|---------------------------|-----------------------|----------------------------|--------------------------|---------------------------|---------------------------------------|-------------------------|--------------------------|--------------------------------------|----------------------|-----------------------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.3 | -0.3 | ---- | ---- |
| as found NO | 5500 | 84.1 | 801.2 | 801.2 | ---- | 783.0 | 786.2 | -3.2 | 1.023 | ---- |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | -1.5 | 0.1 | -1.5 | ---- | ---- |
| high NO point | 5500 | 84.1 | 801.2 | 801.2 | ---- | 802.6 | 801.3 | 1.3 | 0.998 | ---- |
| NO/O ₃ point | 5500 | 84.1 | 801.2 | 801.2 | ---- | 810.3 | 807.8 | 2.4 | 0.989 | ---- |
| as found NH ₃ | 3537 | 93.4 | 1983.1 | NA | 1983.1 | 2074.6 | 40.5 | 2033.9 | 0.956 | 0.975 |
| first NH ₃ | 3537 | 93.4 | 1983.1 | NA | 1983.1 | 2031.9 | 41.6 | 1990.0 | 0.976 | 0.997 |
| second NH ₃ | 3537 | 46.8 | 993.7 | NA | 993.7 | 1023.3 | 23.9 | 999.4 | 0.971 | 0.994 |
| third NH ₃ | 3537 | 23.4 | 496.8 | NA | 496.8 | 517.8 | 12.7 | 505.2 | 0.959 | 0.984 |
| Average Correction Factor | | | | | | | | | 0.9936 | 0.9915 |

Nt Corrected As Found Nt = 782.0 ppb
 NOx Corrected As Found NOx = 784.9 ppb
 NH₃ Previous Converter Efficiency = 96.5 %

Previous Response Nt = 834.9 ppb
 Previous Response NOx = 798.8 ppb
 NH₃ Current Converter Efficiency = 100.0 %

Nt percent change 6.8%
 NOx percent change 1.8%
 NH₃ percent change 3.5%



Wood Buffalo Environmental Association

NO_x(NH₃) Calibration Report

Station Information

Calibration Date: September 22, 2016 Station Number: AMS 6

NO_x / NO / Nt Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NO _x conc (ppb) | Calculated NO conc (ppb) | Calculated Nt conc (ppb) | Indicated NO _x conc (ppb) | Indicated NO conc (ppb) | Indicated Nt conc (ppb) | NO _x Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------------------|--------------------------|--------------------------|--------------------------------------|-------------------------|-------------------------|-----------------------------------|----------------------|
| as found zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.0 | 1.0 | ---- | ---- |
| as found span | 5500 | 84.1 | 801.2 | 801.2 | 801.2 | 786.2 | 784.6 | 783.0 | 1.0191 | 1.0212 |
| calibrator zero | 5500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.4 | -1.5 | ---- | ---- |
| high point | 5500 | 84.1 | 801.2 | 801.2 | 801.2 | 801.3 | 801.8 | 802.6 | 0.9999 | 0.9993 |
| second point | 5500 | 42.1 | 401.1 | 401.1 | 401.1 | 400.7 | 400.0 | 401.5 | 1.0010 | 1.0028 |
| third point | 5500 | 21.1 | 201.0 | 201.0 | 201.0 | 197.4 | 197.3 | 199.2 | 1.0186 | 1.0190 |
| Average Correction Factor | | | | | | | | | 1.0065 | 1.0070 |

| | <u>Nt</u> | <u>NOX</u> | <u>NO</u> | <u>NO2</u> |
|--------------------|-----------|------------|-----------|------------|
| Corrected As found | 782.0 | 784.9 | 783.6 | ---- |
| Previous Response | 834.9 | 798.8 | 802.0 | ---- |
| Percent Change | 6.8% | 1.8% | 2.4% | -0.6% |

GPT Calibration Data

Dilution Flow (total) 5500 ccm Source Gas Flow 86.9 ccm NO_x ref calc conc = 827.9 ppb NO ref calc conc = 827.9 ppb

| O ₃ Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO ₂ conc (ppb) | Indicated NO _x conc (ppb) | Indicated NO conc (ppb) | Indicated NO ₂ conc (ppb) | NO _x Correction factor | NO Correction factor | NO ₂ Correction factor | Converter Efficiency |
|-------------------------------|------------------------------|---------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-----------------------------------|----------------------|-----------------------------------|----------------------|
| 1st NO ref point | ---- | 0.0 | 807.8 | 807.7 | 0.1 | 1.0249 | 1.0250 | ---- | ---- |
| 1st NO ₂ (400) | 382.4 | 425.3 | 808.4 | 382.4 | 426.0 | 1.0242 | ---- | 0.9984 | 100.2% |
| 2nd NO ₂ (200) | 598.0 | 209.7 | 809.2 | 598.0 | 211.2 | 1.0231 | ---- | 0.9927 | 100.7% |
| 3rd NO ₂ (100) | 701.3 | 106.4 | 808.8 | 701.3 | 107.5 | 1.0237 | ---- | 0.9902 | 101.0% |
| 2nd NO ref point | ---- | 0.0 | 811.8 | 810.5 | 1.3 | 1.0199 | 1.0215 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0227 | 1.0233 | 0.9938 | 100.6% |

Calibration Performed By: Devin Russell



Wood Buffalo Environmental Association

NH3 Calibration Summary

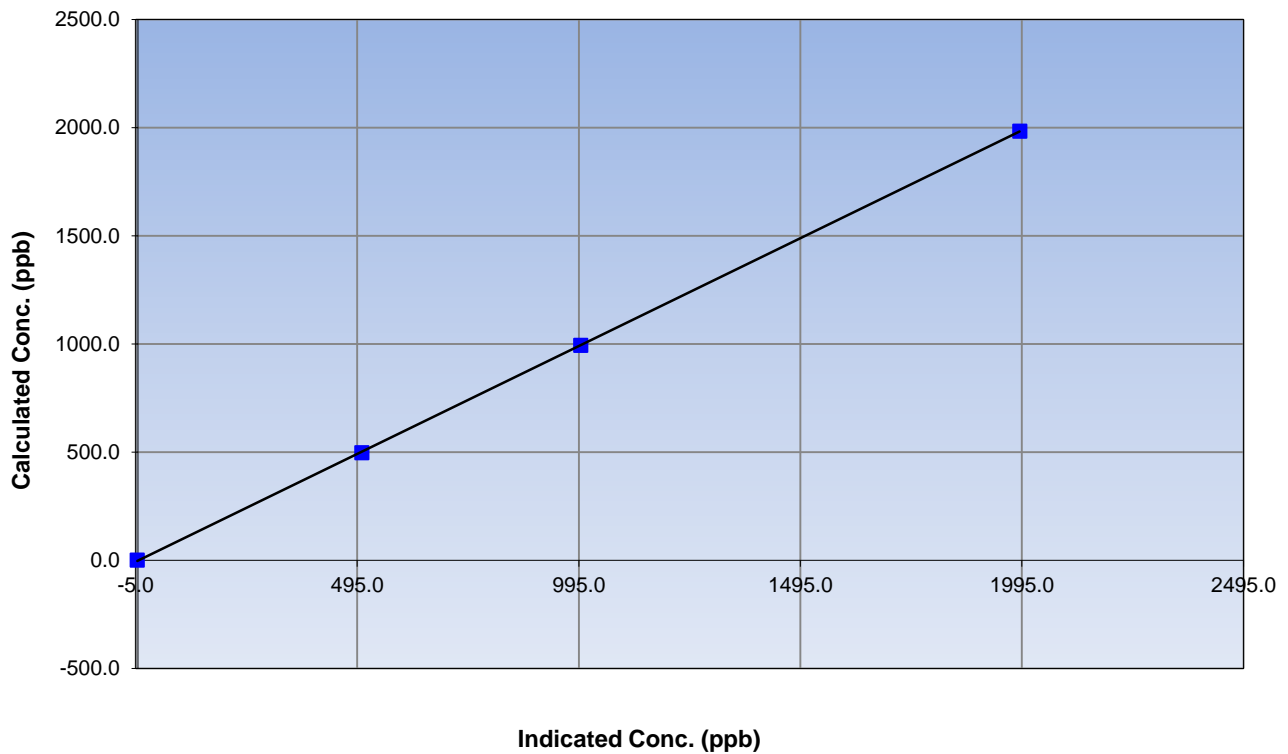
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 15:25 |
| Analyzer make | Teledyne T201 | Analyzer serial # | 215 |

NH3 Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|----------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -1.5 | ---- | Correlation Coefficient | 0.999983 |
| 1983.1 | 1990.0 | 0.9965 | | |
| 993.7 | 999.4 | 0.9943 | Slope | 0.996919 |
| 496.8 | 505.2 | 0.9835 | | |
| | | | Intercept | -2.158052 |

NH3 Calibration Curve





Wood Buffalo Environmental Association

Nt Calibration Summary

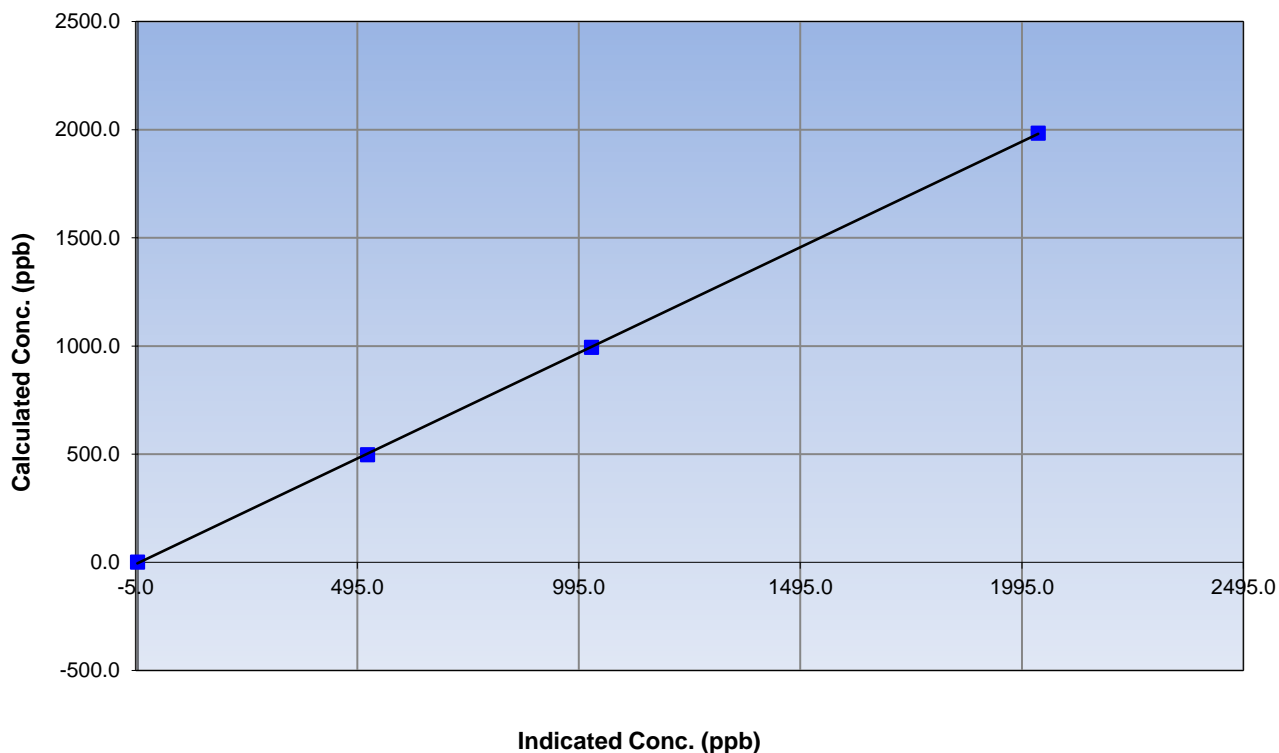
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 15:25 |
| Analyzer make | Teledyne T201 | Analyzer serial # | 215 |

Nt (NH₃) Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|----------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -1.5 | ---- | Correlation Coefficient | 0.999971 |
| 1983.1 | 2031.9 | 0.9760 | | |
| 993.7 | 1023.3 | 0.9711 | Slope | 0.976583 |
| 496.8 | 517.8 | 0.9595 | | |
| | | | Intercept | -3.555008 |

Nt Calibration Curve





Wood Buffalo Environmental Association

NOx Calibration Summary

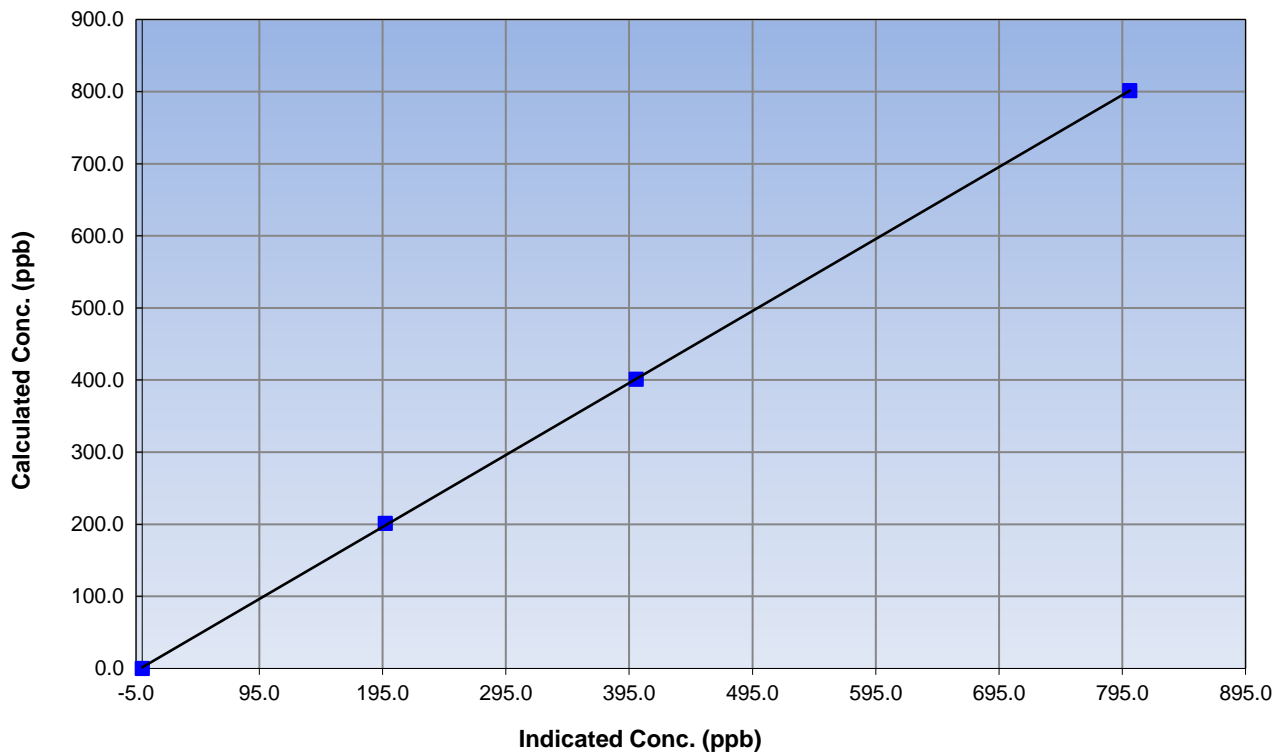
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 15:25 |
| Analyzer make | Teledyne T201 | Analyzer serial # | 215 |

NO_x Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|----------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999975 |
| 801.2 | 801.3 | 0.9999 | | |
| 401.1 | 400.7 | 1.0010 | Slope | 0.998470 |
| 201.0 | 197.4 | 1.0186 | | |
| | | | Intercept | 1.524707 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

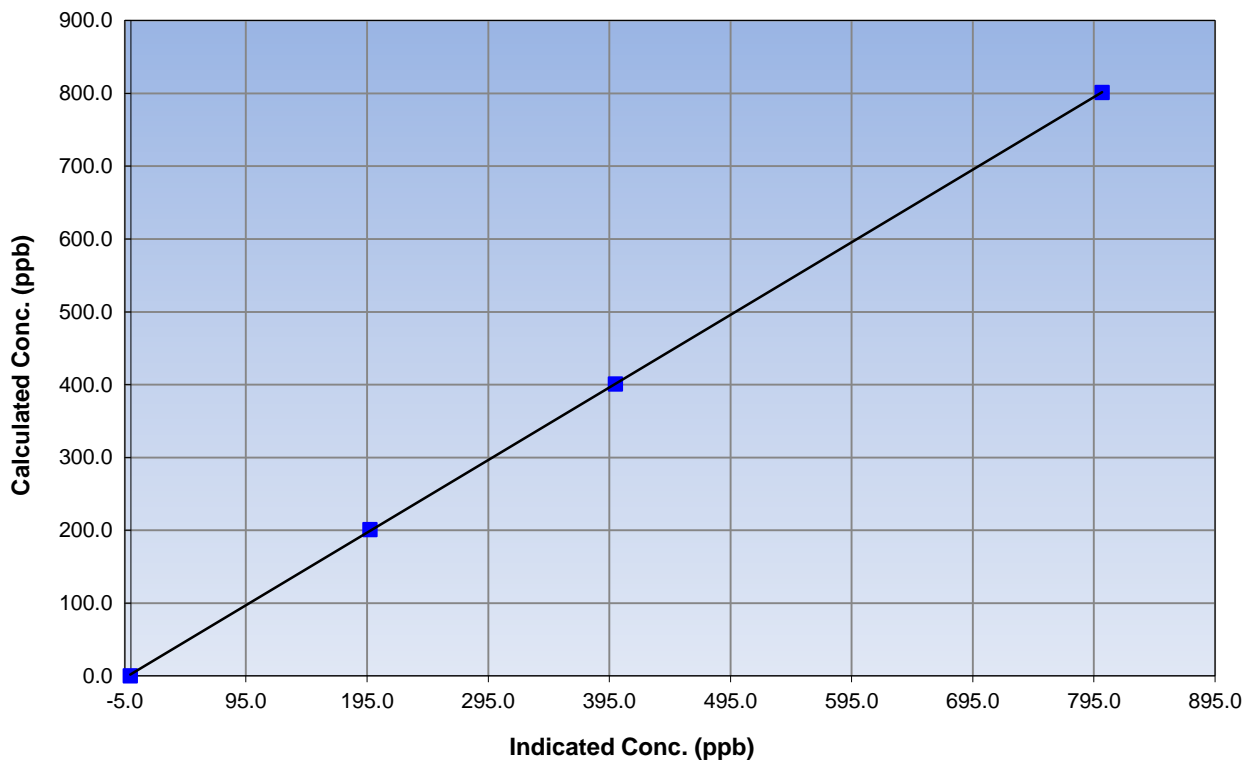
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 15:25 |
| Analyzer make | Teledyne T201 | Analyzer serial # | 215 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999977 |
| 801.2 | 801.8 | 0.9993 | | |
| 401.1 | 400.0 | 1.0028 | Slope | 0.997418 |
| 201.0 | 197.3 | 1.0190 | | |
| | | | Intercept | 2.067183 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

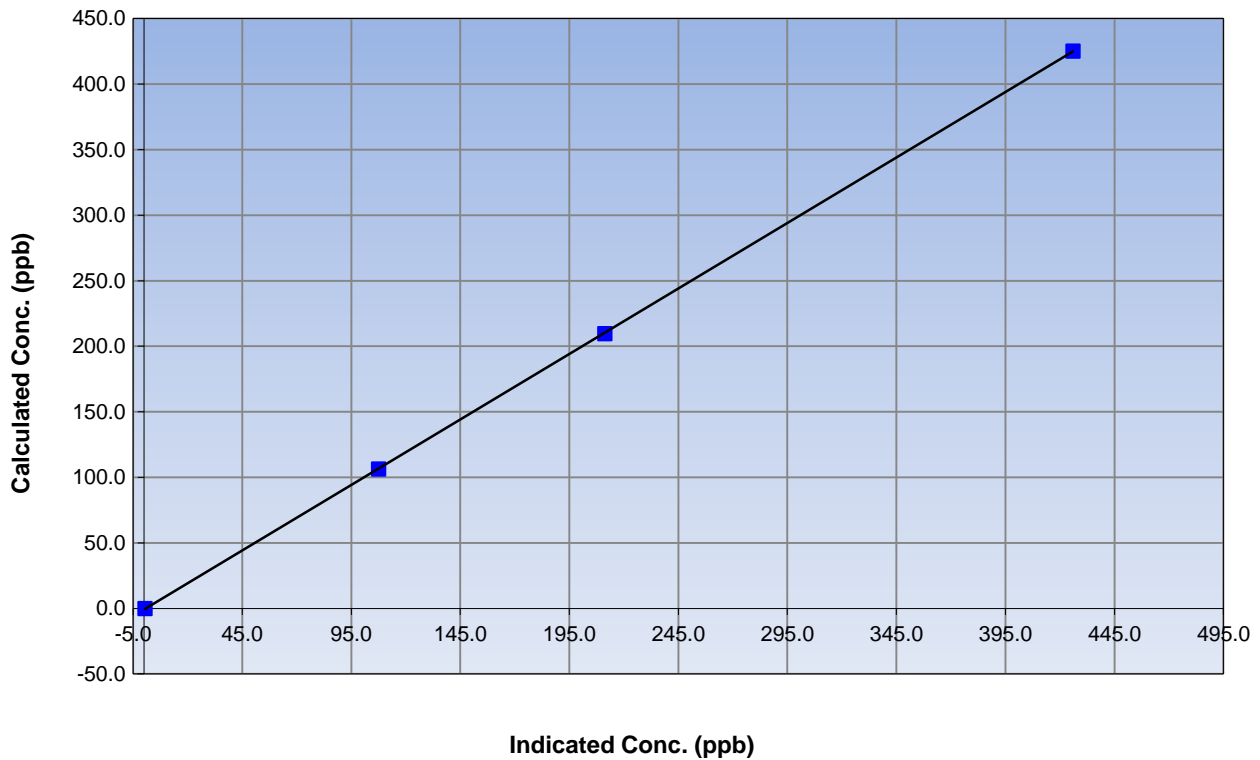
Station Information

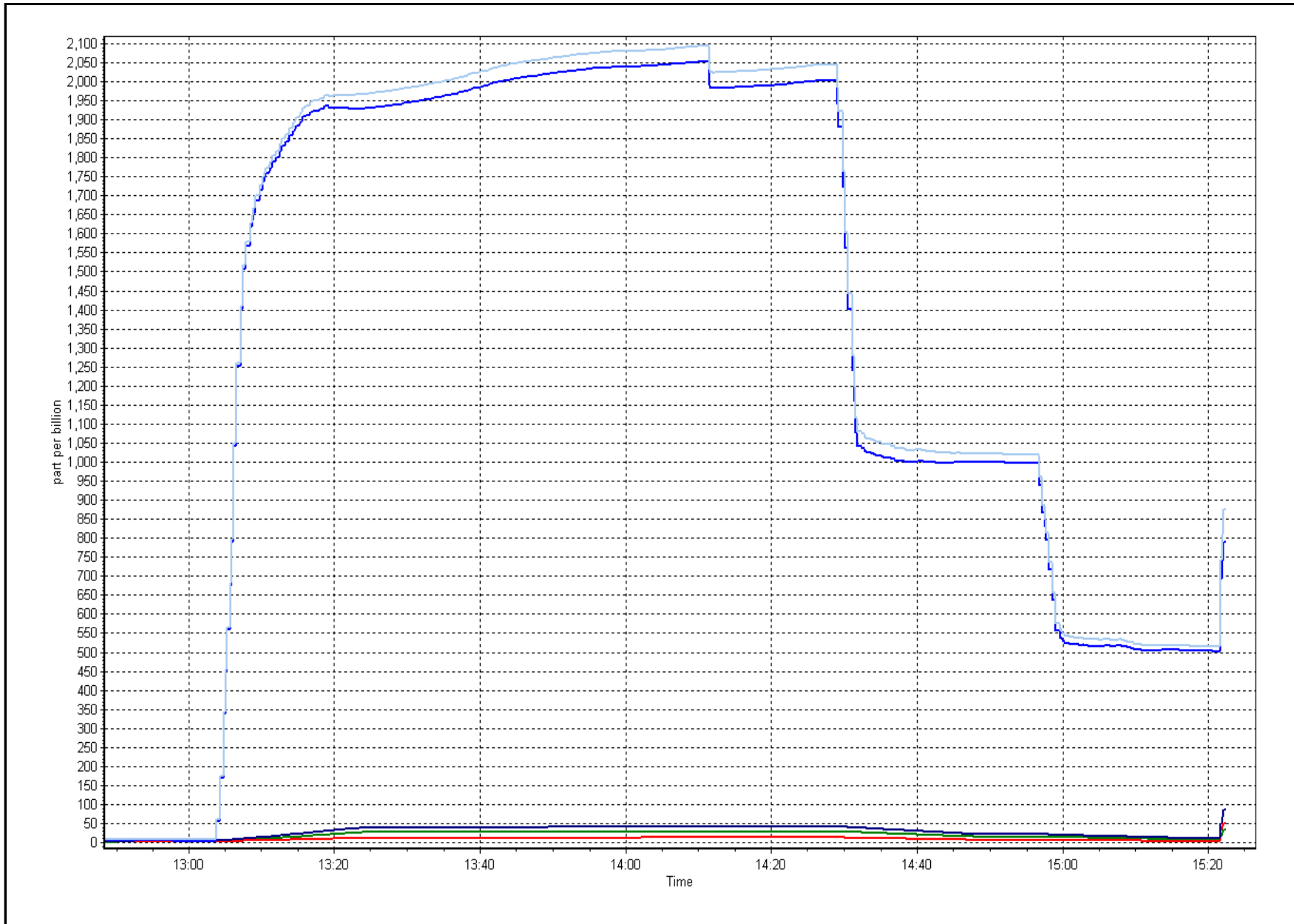
| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Patricia McInnis | Station Number | AMS 6 |
| Start Time (MST) | 8:00 | End Time (MST) | 15:25 |
| Analyzer make | Teledyne T201 | Analyzer serial # | 215 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999993 |
| 425.3 | 426.0 | 0.9984 | | |
| 209.7 | 211.2 | 0.9927 | Slope | 0.999648 |
| 106.4 | 107.5 | 0.9902 | | |
| | | | Intercept | -0.861985 |

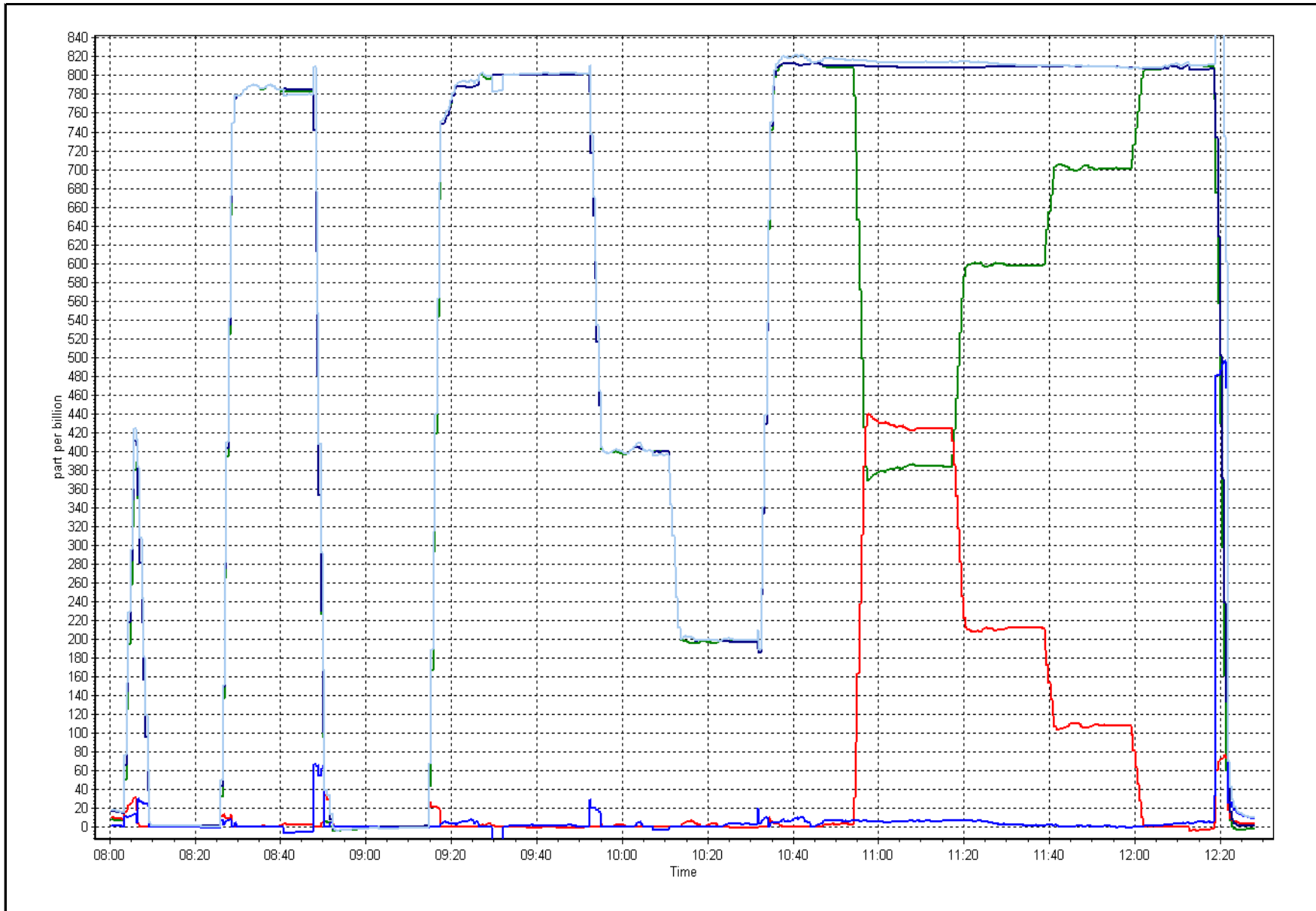
NO₂ Calibration Curve





NOX Calibration Plot

Date: September 22, 2016





Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|----------------|
| Station Name: | Patricia McInnis | Station number: | AMS 6 |
| Calibration Date: | September 22, 2016 | Last Cal Date: | August 5, 2016 |
| Start time (MST): | 8:00 | End time (MST): | 10:05 |
| Sharp Model: | Thermo SHARP 5030 | S/N: | E-1475 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 5680 |
| Flow Standard Model: | Delta Cal | S/N: | 141228 |
| Temp/RH standard: | Delta Cal | S/N: | 141228 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | <u>Tolerance</u> |
|------------------------|--------------------------------------------------|-----------------|---------------------------------------------------|-------------------------------------|------------------|
| T1 (°C) | 10 | 7.6 | 8 | <input checked="" type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 977 | 973.25 | 977 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 975.6 | 1002 | <input checked="" type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.5 | ----- | 0 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input checked="" type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | |
|------------|-------------------------|------------------------|------------------|
| Leak Test: | Date of check: _____ | Last Cal Date: _____ | <u>Tolerance</u> |
| | Flow w/o adaptor: _____ | Flow w/ adaptor: _____ | 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|------------------------------|-----------------------------------|
| Foil Calibration | Foil Mass: _____ | S/N: _____ |
| | Date of check: _____ | Last Cal Date: _____ |
| | New Correction Factor: _____ | Previous Correction Factor: _____ |

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

Notes: Cyclone head cleaned. T1, and flow adjusted. Nephelometer zeroed. Tape was changed as it was getting low. Nephelometer zero before and after tape change was 0.0 ug/m3.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
SEPTEMBER 2016

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

October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 676 | 42 | 44 | 99.72 | 18 | 0 | 6 | 0 |
| TRS (ppb) Average | 100 | 12 | 620 | 15.56 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 681 | 39 | 39 | 100.00 | 3.2 | - | 2.1 | - |
| NMHC (ppm) Average | 681 | 39 | 39 | 100.00 | 0.514 | - | 0.05 | - |
| CH4(ppm) Average | 681 | 39 | 39 | 100.00 | 3 | - | 2 | - |
| O3 (ppb) Average | 682 | 35 | 38 | 99.58 | 41 | 0 | 31 | - |
| NO2 (ppb) Average | 669 | 46 | 51 | 99.31 | 23 | 0 | 12 | - |
| NO (ppb) Average | 669 | 46 | 51 | 99.31 | 29 | - | 6 | - |
| NOX (ppb) Average | 669 | 46 | 51 | 99.31 | 52 | - | 17 | - |
| PM2.5 (ug/m3) Average | 710 | 3 | 10 | 99.03 | 40.1 | - | 9.2 | 0 |
| CO(ppm) Average | 680 | 37 | 40 | 99.58 | 0.5 | 0 | 0.1 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 24.9 | - | 15.6 | - |
| Barometric Pressure (inHg) Average | 720 | 0 | 0 | 100.00 | 29.3 | - | 29.3 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 87 | - |
| Wind Speed 10 m (km/h) Average | 718 | 0 | 2 | 99.72 | 31 | - | 20 | - |
| 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 - ATHABASCA VALLEY (AMS 7)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|------------------------------------|--------|-------|--------|-------|------------|------|------|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 676 | 0.7 | 2 | - | 0 | 0 | 0 | 0 | 0 | 1 | 18 |
| TRS (ppb) Average | 100 | 0.4 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| THC (ppm) Average | 681 | 1.94 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.1 | 3.2 |
| NMHC (ppm) Average | 681 | 0.007 | 0.036 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0.514 |
| CH4(ppm) Average | 681 | 1.93 | 0.1 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2 | 3 |
| O3 (ppb) Average | 682 | 20.6 | 8 | - | 6 | 10 | 14 | 20 | 26 | 33 | 41 |
| NO2 (ppb) Average | 669 | 4.6 | 4 | - | 0 | 1 | 1 | 4 | 6 | 10 | 23 |
| NO (ppb) Average | 669 | 2.2 | 4 | - | 0 | 0 | 0 | 1 | 2 | 6 | 29 |
| NOX (ppb) Average | 669 | 6.7 | 7 | - | 0 | 1 | 2 | 4 | 9 | 16 | 52 |
| PM2.5 (ug/m3) Average | 710 | 5.12 | 3.5 | - | 0 | 2.4 | 3 | 4.2 | 6.3 | 8.6 | 40.1 |
| CO(ppm) Average | 680 | 0.09 | 0 | - | 0 | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 |
| Temperature 2 m (C) Average | 720 | 11.98 | 4.4 | - | 2.3 | 6.4 | 8.8 | 11.8 | 14.9 | 17.5 | 24.9 |
| Barometric Pressure (inHg) Average | 720 | 28.91 | 0.2 | - | 28.4 | 28.6 | 28.7 | 28.9 | 29.1 | 29.2 | 29.3 |
| Relative Humidity (%) Average | 720 | 69.1 | 17 | - | 28 | 42 | 56 | 72 | 83 | 90 | 99 |
| Wind Speed 10 m (km/h) Average | 718 | 9.7 | 6 | - | 0 | 3 | 5 | 9 | 13 | 19 | 31 |
| Wind Direction 10 m (deg) Average | 718 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|------------------------------------------------------------|
| SO2 | 28 Sep 2016 09:00 | 28 Sep 2016 10:00 | 2 | Maintenance - station operator on site |
| TRS | 01 Sep 2016 01:00 | 25 Sep 2016 10:00 | 586 | Analyzer Failure - leak in zero/span solenoid |
| TRS | 25 Sep 2016 17:00 | 26 Sep 2016 11:00 | 19 | Analyzer Failure - leak in zero/span solenoid |
| TRS | 26 Sep 2016 12:00 | 26 Sep 2016 14:00 | 3 | Maintenance - repair leak and calibration |
| O3 | 22 Sep 2016 10:00 | 22 Sep 2016 12:00 | 3 | Maintenance - sample manifold cleaned |
| NO2, NO, NOX | 26 Sep 2016 14:00 | 26 Sep 2016 18:00 | 5 | Maintenance - new calibration cylinder and span adjustment |
| PM2.5 | 24 Sep 2016 16:00 | 24 Sep 2016 18:00 | 3 | Unstable operation - excessive baseline drift |
| PM2.5 | 27 Sep 2016 10:00 | 27 Sep 2016 13:00 | 4 | Unstable operation - excessive baseline drift |
| CO | 22 Sep 2016 10:00 | 22 Sep 2016 12:00 | 3 | Maintenance - sample manifold cleaned |
| Wind Speed, Wind Direction | 22 Sep 2016 12:00 | 22 Sep 2016 13:00 | 2 | Maintenance - sensor calibration |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Athabasca Valley - September 2016

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 18 ppb on Sep 20 18:00 | Maximum Daily Average: 5.8 ppb on Sep 20 | | Hours of Data: | 676 |
| Minimum Value: 0 ppb on Sep 14 16:00 | Minimum Daily Average: 0.1 ppb on Sep 16 | | Hours of Missing Data: | 44 |
| Maximum Diurnal Average: 1.2 ppb at hour 11 | Minimum Diurnal Average: 0.3 ppb at hour 5 | | Hours of Calibration: | 42 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 10 | | 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 | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 6-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 |
| 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 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 5 | 12 | 10 | 5 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 2.0 | 12 |
| 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 | 1 | 1 | 2 | 4 | 2 | 0 | 3 | 4 | 5 | 4 | 5 | 9 | 9 | 10 | 1 | 1 | 3 | 1 | 1 | 1 | 0 | 2.9 | 10 |
| 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 | 0.2 | 0 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 6 | 2 | 1 | 1 | 0 | 0.9 | 7 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 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 | 0.1 | 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 | 0.1 | 0 |
| 18-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 8 | 3 | 3 | 1 | 1 | 1.0 | 8 |
| 19-Sep | 1 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 1 | 1 | 0 | 0.6 | 6 |
| 20-Sep | 2 | 3 | 2 | 1 | 1 | Z | 0 | 1 | 1 | 2 | 5 | 5 | 6 | 8 | 11 | 17 | 17 | 18 | 11 | 6 | 6 | 4 | 2 | 2 | 5.8 | 18 |
| 21-Sep | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 |
| 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 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 |
| 26-Sep | 0 | 0 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 27-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 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | M | M | 0 | 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 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 4 | 5 | 6 | 6 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 6 |

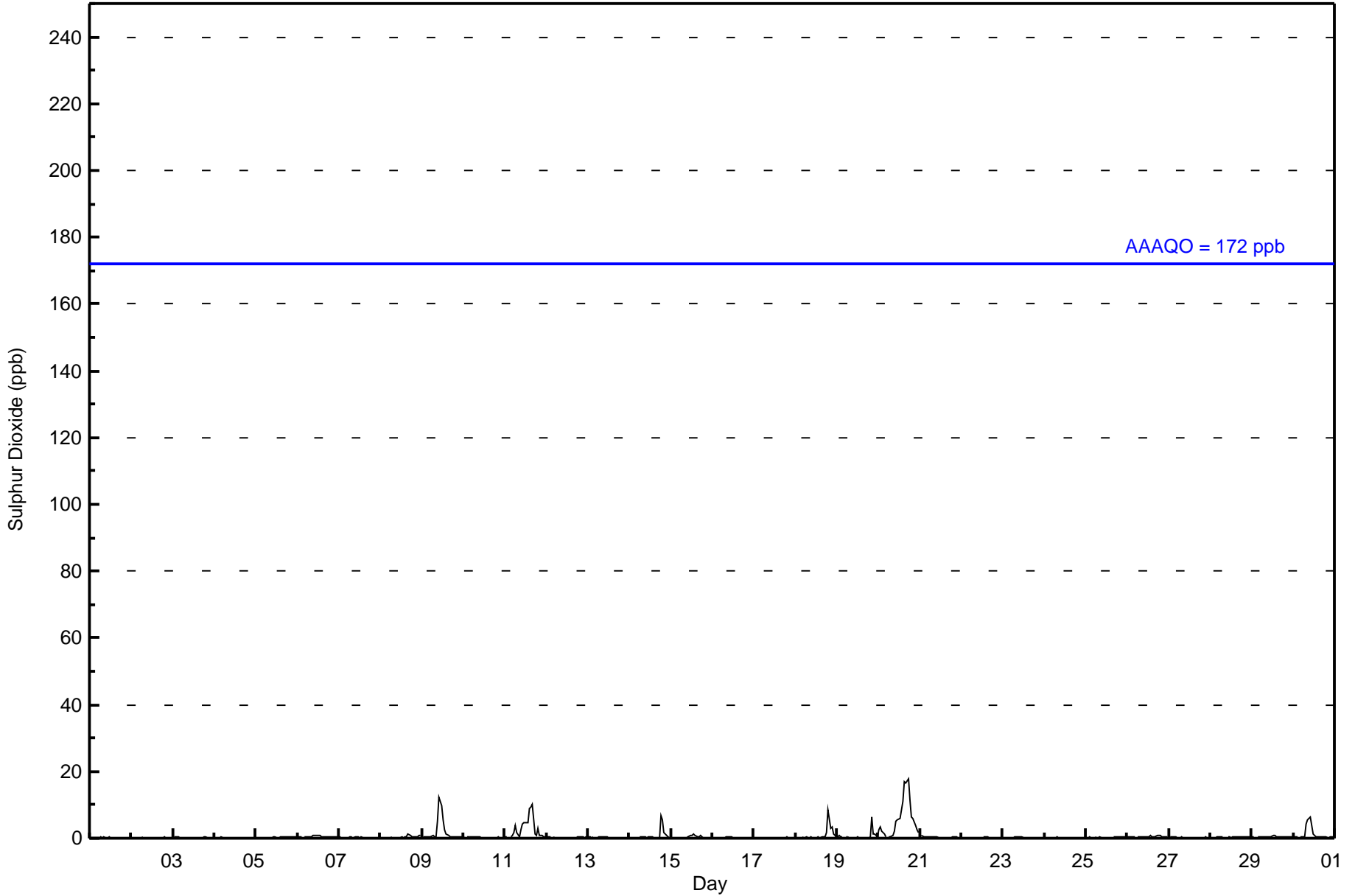
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.5 | 0.8 | 1.2 | 1.0 | 0.8 | 0.8 | 0.9 | 1.1 | 1.1 | 0.9 | 0.9 | 1.0 | 0.8 | 0.5 | 0.4 | 0.3 | Diurnal Average | |
| 2 | 3 | 2 | 1 | 1 | 2 | 4 | 4 | 5 | 6 | 12 | 10 | 6 | 8 | 11 | 17 | 17 | 18 | 11 | 8 | 6 | 4 | 2 | 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
Athabasca Valley - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 670 | 99.11 | 99.11 |
| 11 - 20 | 6 | 0.89 | 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
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 30 | 8 | 5 | 14 | 15 | 35 | 151 | 52 | 35 | 24 | 59 | 57 | 35 | 49 | 47 | 54 | 670 |
| 11 - 20 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 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 | 30 | 9 | 5 | 15 | 15 | 36 | 151 | 52 | 35 | 24 | 59 | 57 | 35 | 49 | 47 | 57 | 676 |

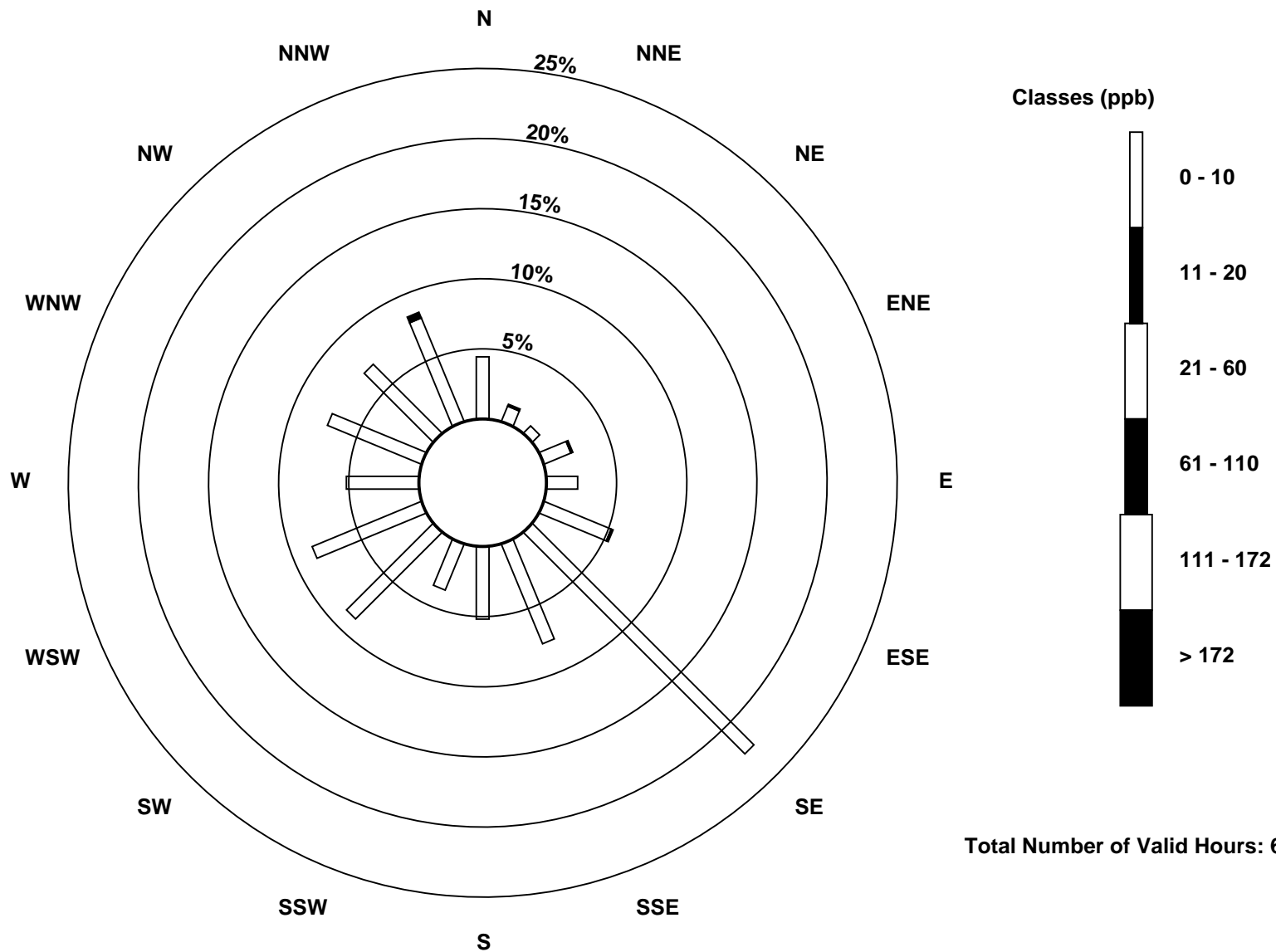
Total Number of Valid Hours: 676

Total Number of Hours: 720

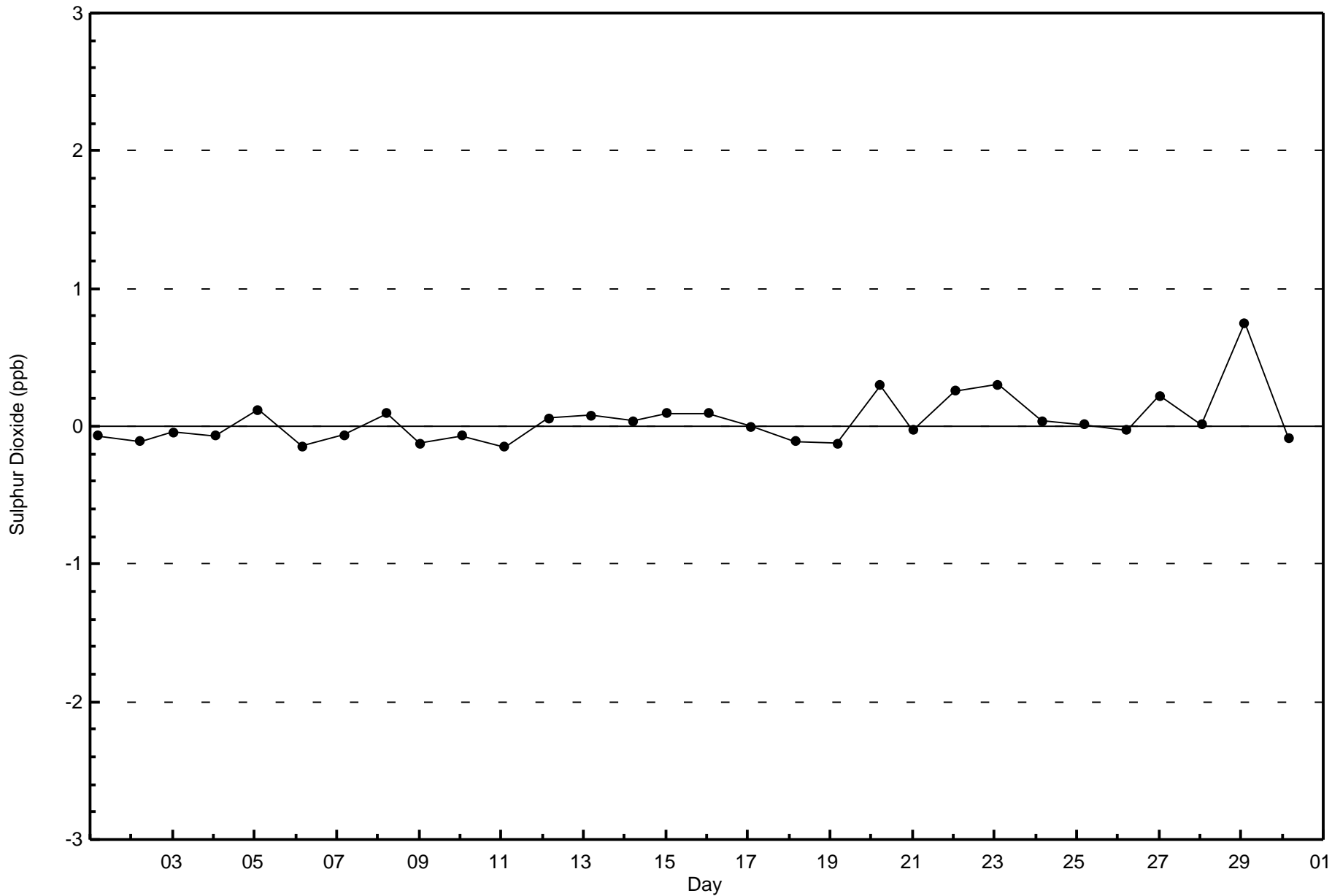


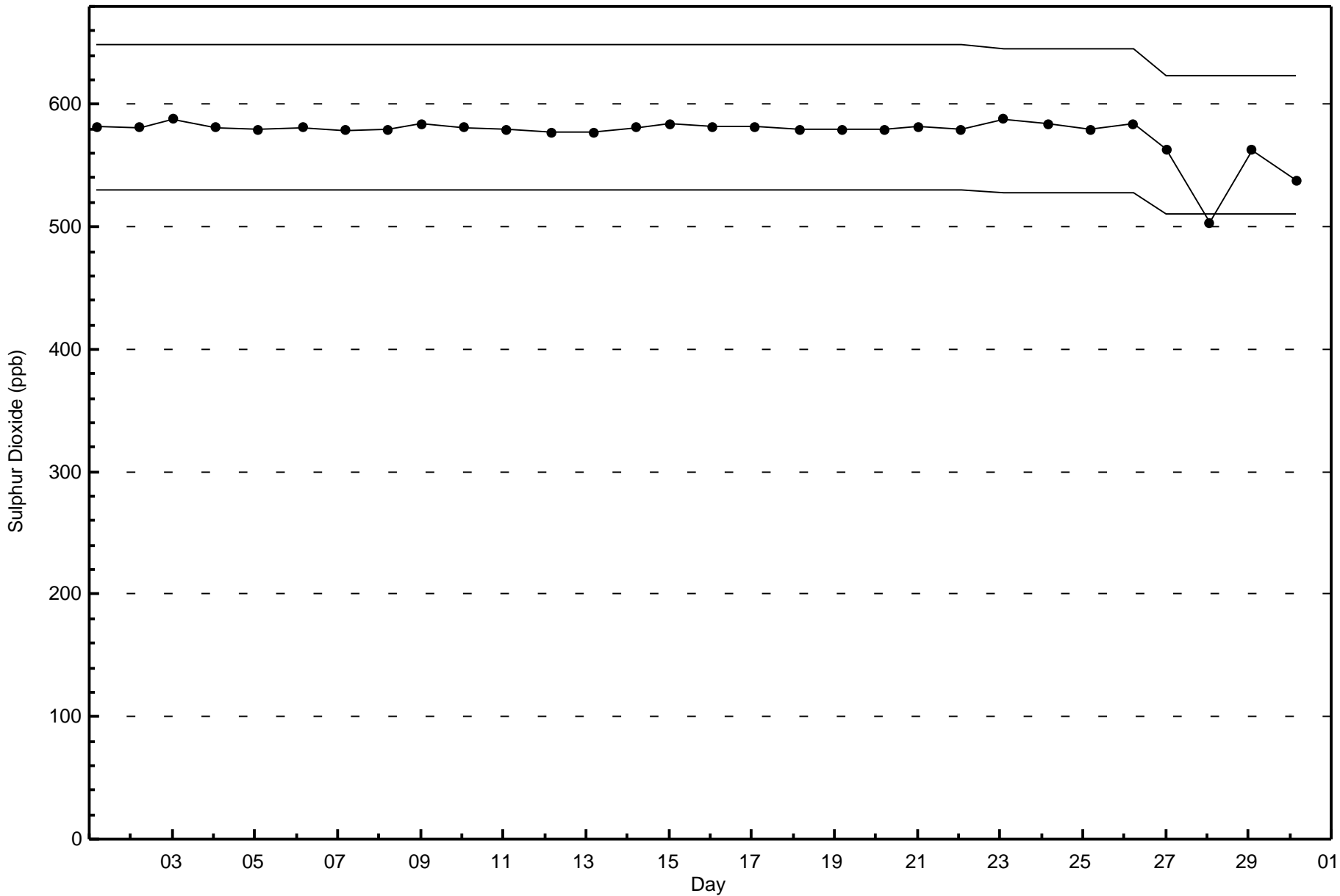
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 676







Wood Buffalo Environmental Association
Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 30 08:00 | Maximum Daily Average: 0.4 ppb on Sep 30 | | Hours of Data: | 100 |
| Minimum Value: 0 ppb on Sep 27 13:00 | Minimum Daily Average: 0.2 ppb on Sep 27 | | Hours of Missing Data: | 620 |
| Maximum Diurnal Average: 0.6 ppb at hour 8 | Minimum Diurnal Average: 0.3 ppb at hour 16 | | Hours of Calibration: | 12 |
| 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 = 1 | | Percent Operational Time: | 15.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-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 | C | C | C | C | C | C | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | -- |
| 26-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | M | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 |
| 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 | 0.2 | 0 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0.4 | 1 |
| 29-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 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 | 1 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |

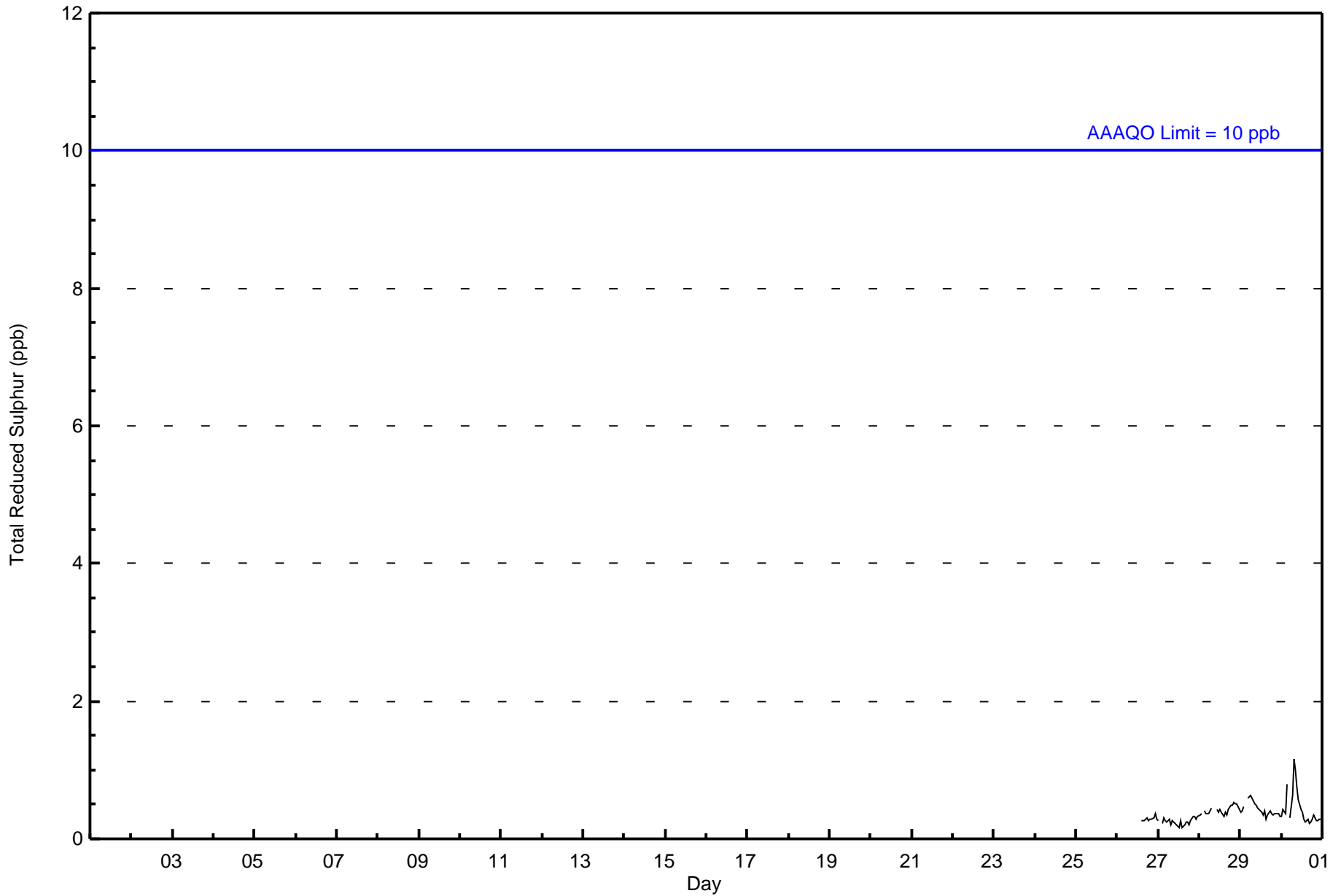
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.3 | 0.4 | 0.4 | 0.5 | 0.4 | 0.4 | 0.5 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 | Diurnal Average | | |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 100 | 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: 100

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 10 | 4 | 1 | 5 | 3 | 4 | 22 | 4 | 5 | 4 | 7 | 11 | 5 | 5 | 0 | 10 | 100 |
| 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 | 10 | 4 | 1 | 5 | 3 | 4 | 22 | 4 | 5 | 4 | 7 | 11 | 5 | 5 | 0 | 10 | 100 |

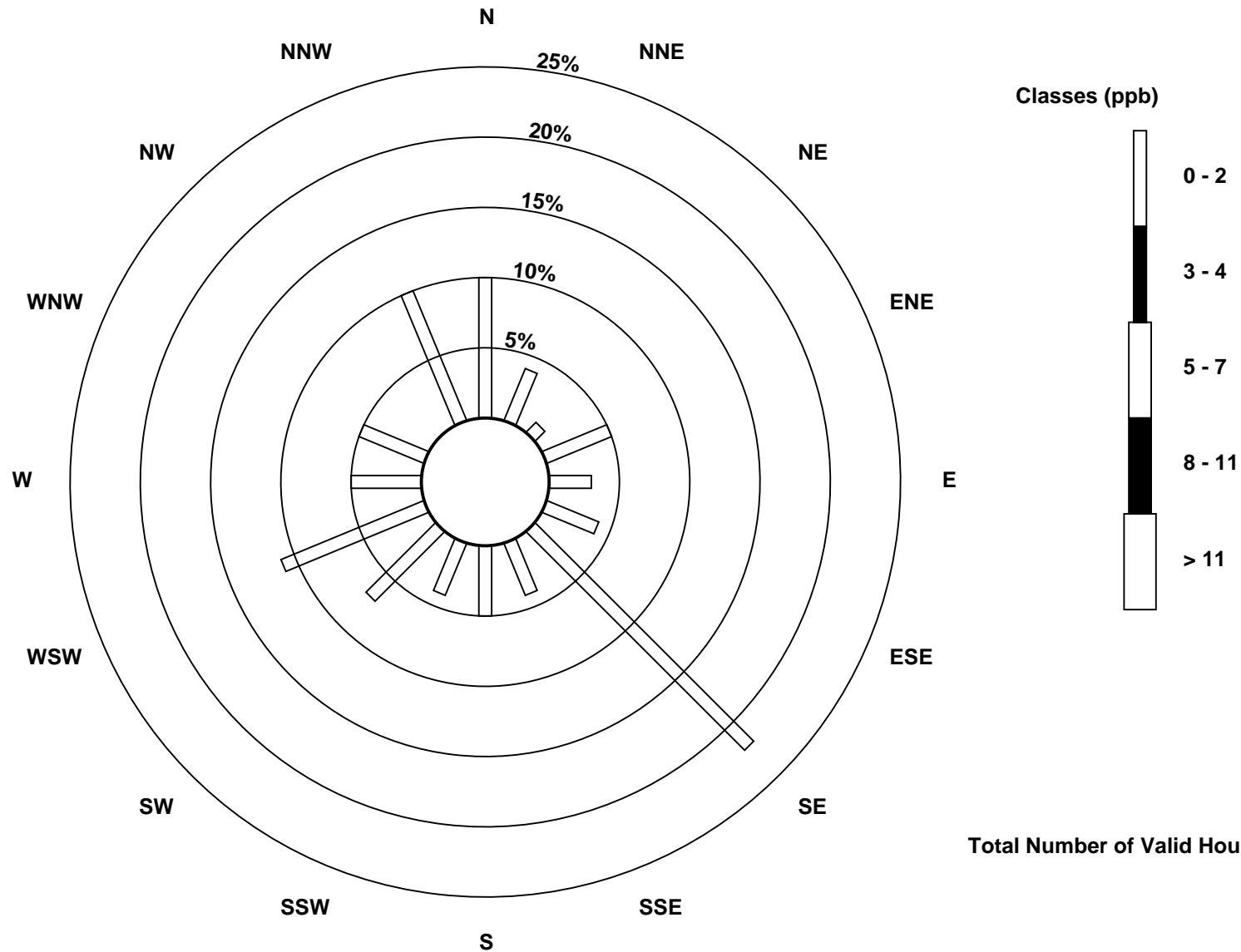
Total Number of Valid Hours: 100

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

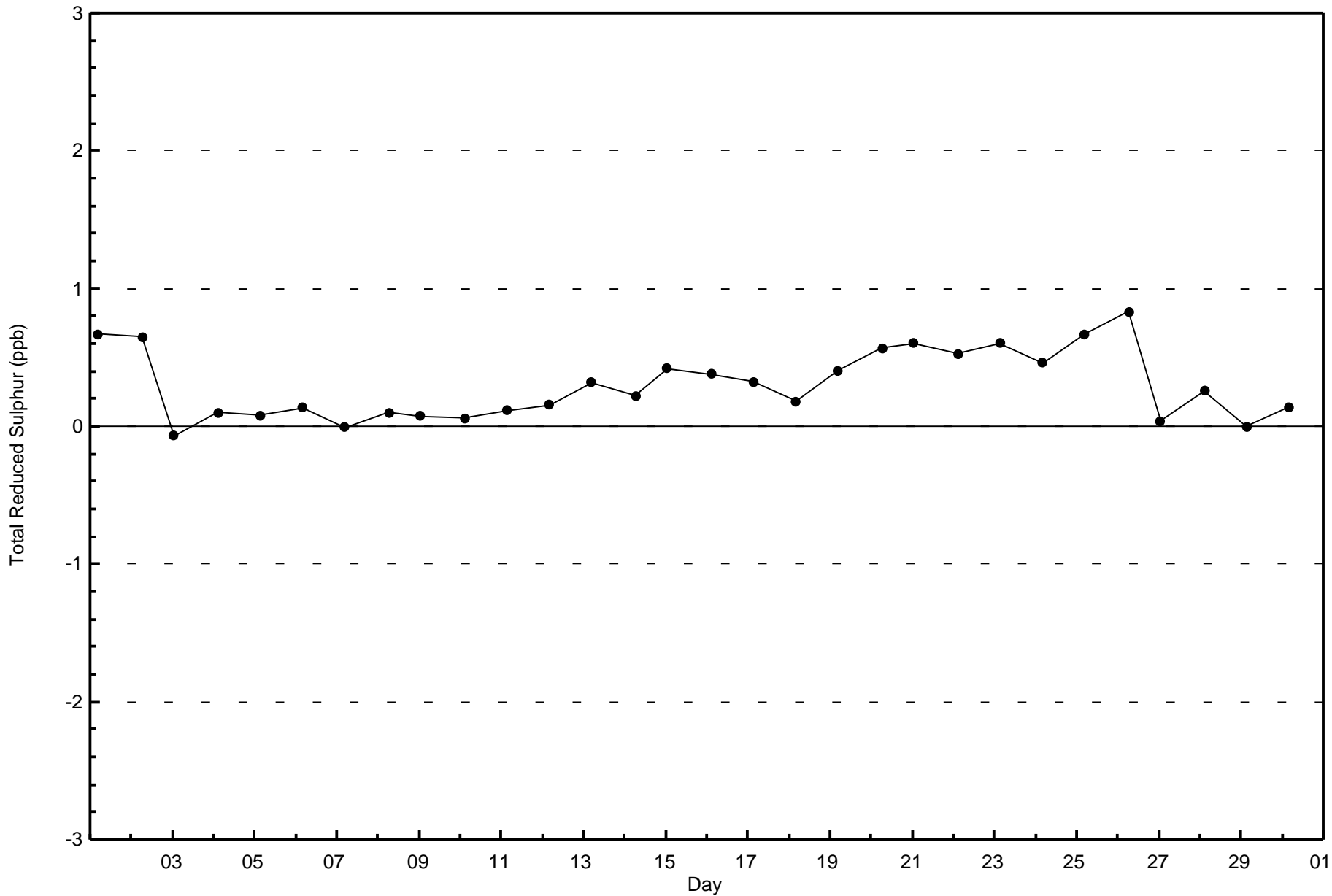
Total Reduced Sulphur (TRS) - ppb
Athabasca Valley (AMS 7)

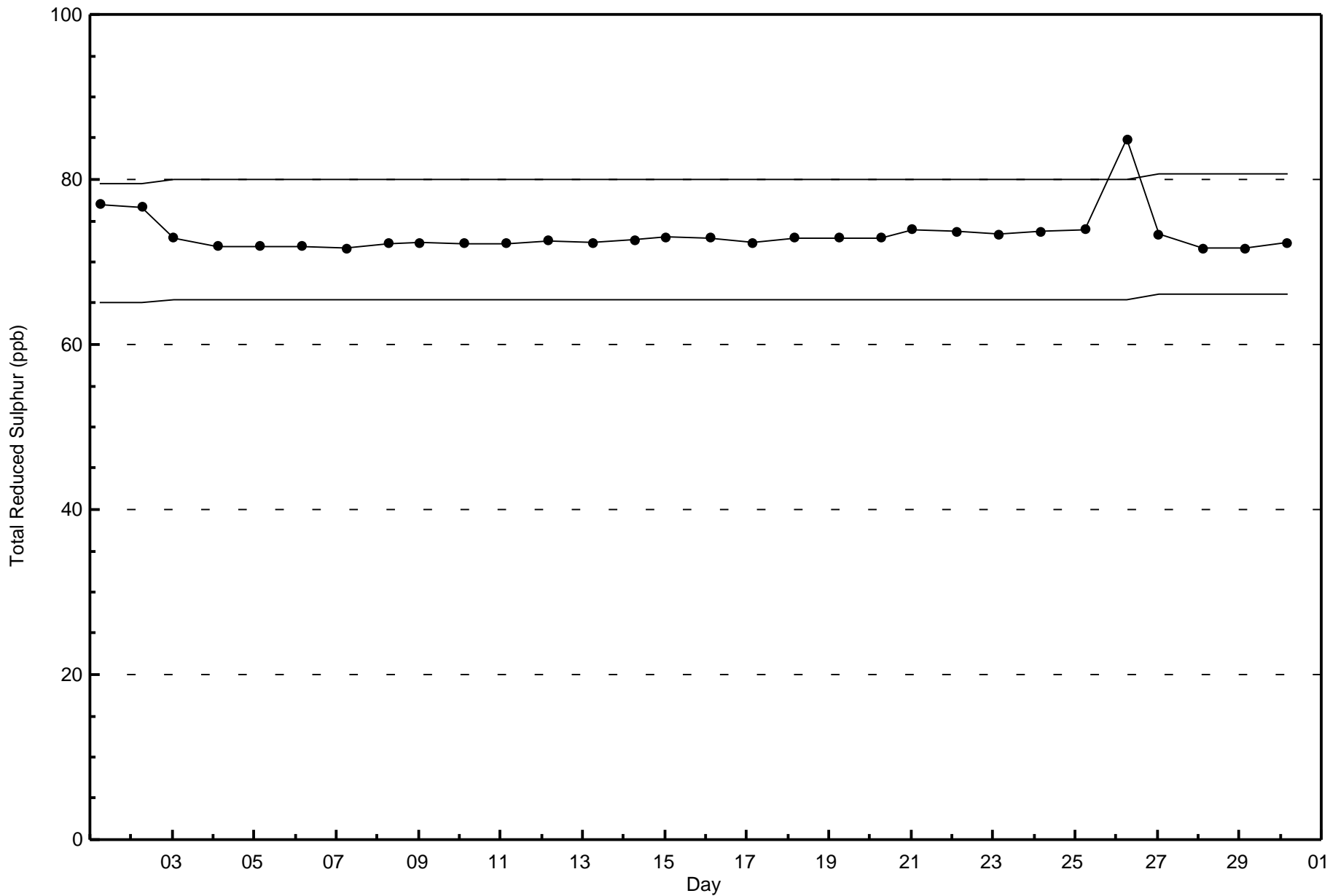




Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - September 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

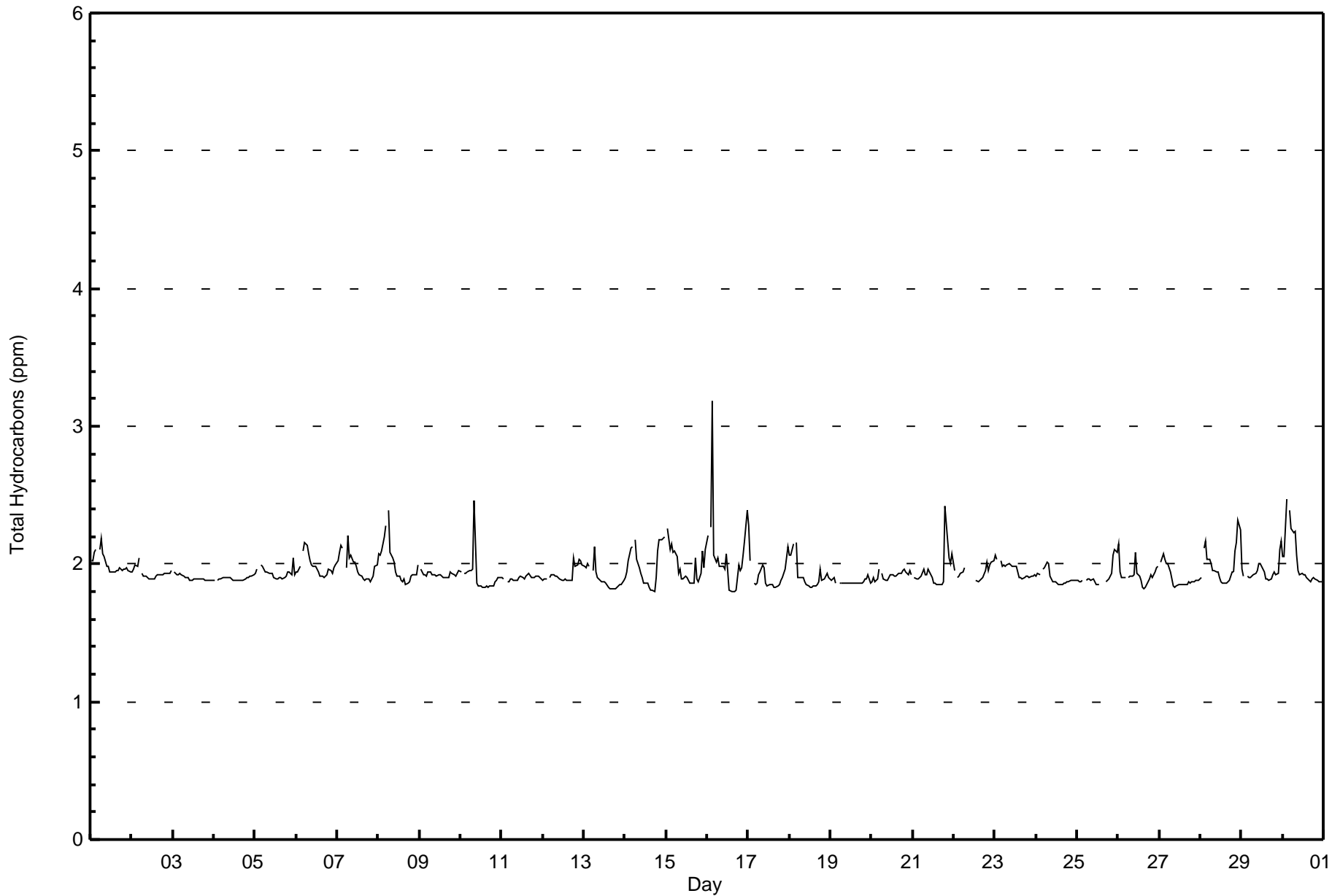
Total Hydrocarbons (THC) - ppm
Athabasca Valley - September 2016

| Maximum Value: 3.2 ppm on Sep 16 04:00 Maximum Daily Average: 2.1 ppm on Sep 16 | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 681 Hours of Missing Data: 39 Hours of Calibration: 39 Percent Operational Time: 100.0 | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----------------------------------|---------------|---------------|
| Minimum Value: 1.8 ppm on Sep 16 16:00 Minimum Daily Average: 1.9 ppm on Sep 19 Maximum Diurnal Average: 2.0 ppm at hour 4 Minimum Diurnal Average: 1.9 ppm at hour 17 Monthly Average: 1.94 ppm Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 2.0 | 2.0 | 2.1 | 2.1 | Z | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.2 |
| 2-Sep | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 3-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 4-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 5-Sep | 1.9 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 |
| 6-Sep | 1.9 | 1.9 | 2.0 | Z | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.2 |
| 7-Sep | 2.0 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.2 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.2 |
| 8-Sep | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | Z | 2.4 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.4 |
| 9-Sep | Z | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 |
| 10-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.5 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.5 |
| 11-Sep | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 12-Sep | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 13-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 14-Sep | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | Z | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 15-Sep | Z | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.1 | 2.0 | 2.1 | 2.0 | 2.3 |
| 16-Sep | 2.2 | Z | 2.3 | 3.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.4 | 3.2 |
| 17-Sep | 2.3 | 2.0 | Z | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.3 |
| 18-Sep | 2.1 | 2.1 | 2.1 | Z | 2.2 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 |
| 19-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 20-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 21-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.4 | 2.2 | 2.0 | 2.0 | 2.1 | 2.4 |
| 22-Sep | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | C | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | -- |
| 23-Sep | 2.1 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 24-Sep | 1.9 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 25-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.1 | 2.1 | 2.1 | |
| 26-Sep | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 |
| 27-Sep | Z | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 |
| 28-Sep | 1.9 | Z | 2.1 | 2.2 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 2.3 | 2.2 | 2.0 | 2.3 |
| 29-Sep | 2.0 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 1.9 | 2.2 |
| 30-Sep | 2.1 | 2.1 | 2.5 | Z | 2.4 | 2.3 | 2.2 | 2.2 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 601 | 88.25 | 88.25 |
| 2.1 - 3.0 | 79 | 11.60 | 99.85 |
| 3.1 - 10.0 | 1 | 0.15 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Athabasca Valley - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 26 | 7 | 3 | 11 | 12 | 27 | 124 | 43 | 27 | 19 | 58 | 57 | 35 | 48 | 49 | 55 | 601 |
| 2.1 - 3.0 | 4 | 2 | 2 | 4 | 4 | 9 | 27 | 10 | 7 | 5 | 1 | 0 | 0 | 1 | 0 | 3 | 79 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 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 | 30 | 9 | 5 | 15 | 16 | 36 | 151 | 53 | 35 | 24 | 59 | 57 | 35 | 49 | 49 | 58 | 681 |

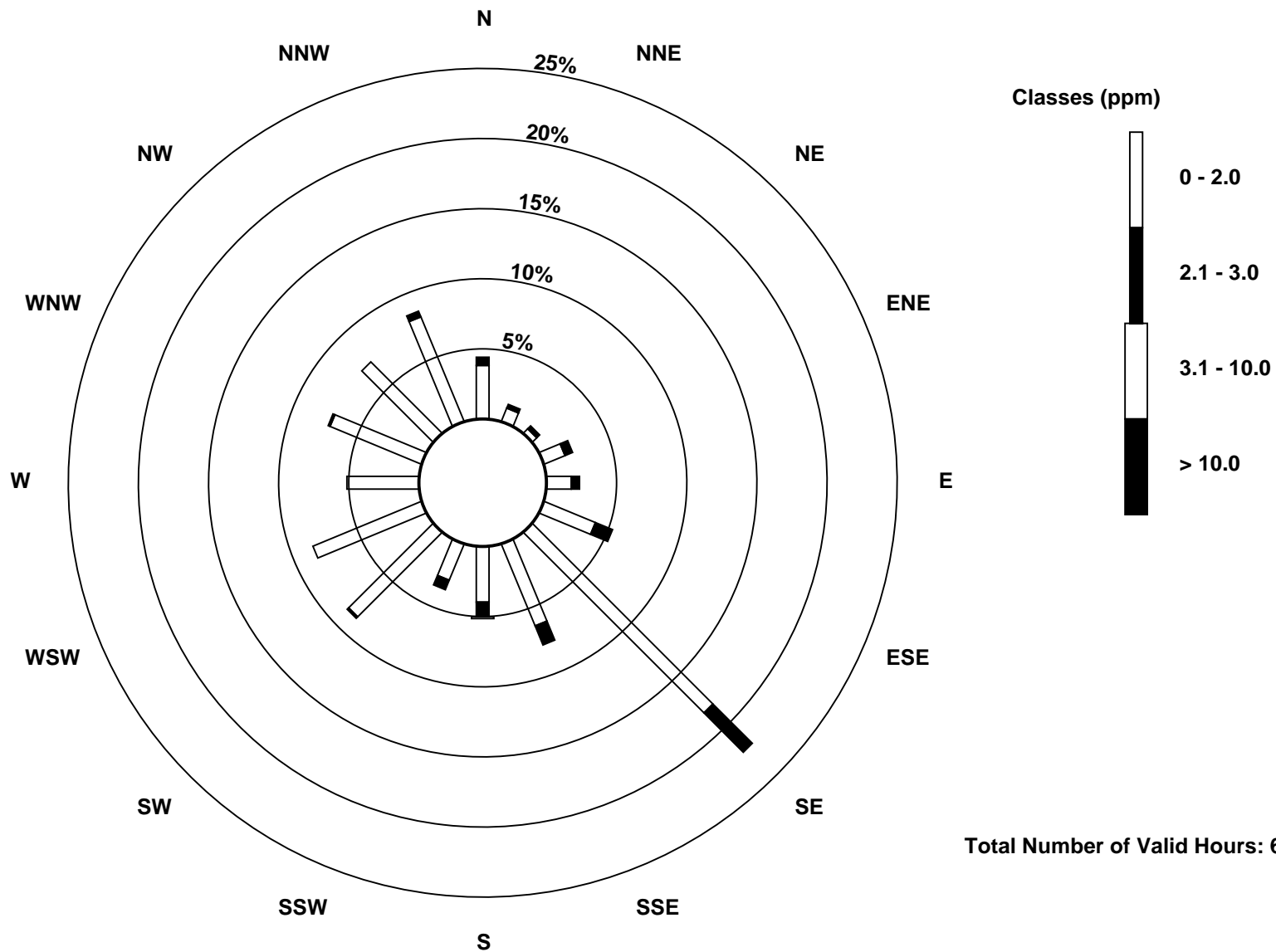
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

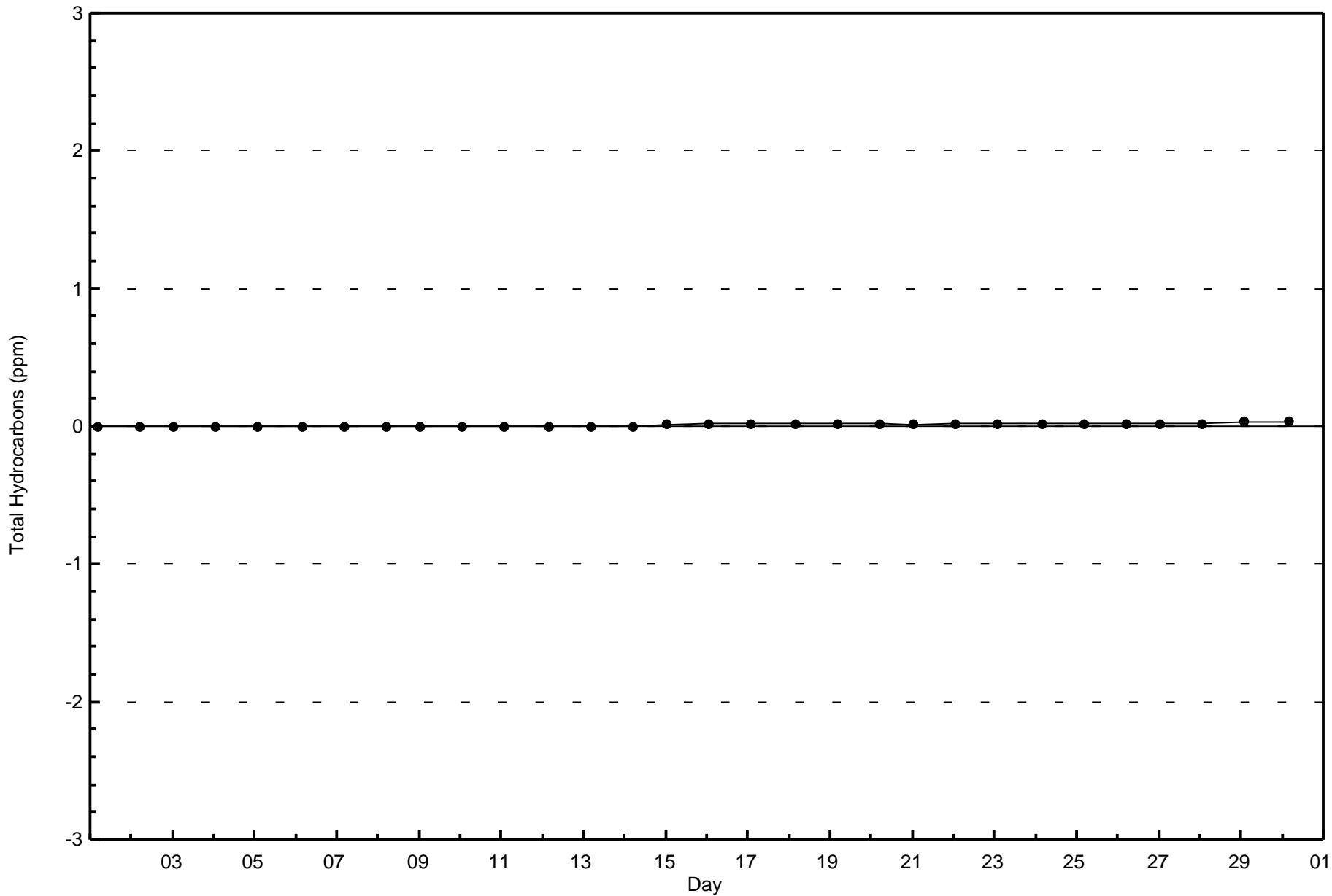
Total Hydrocarbons (THC) - ppm
Athabasca Valley (AMS 7)

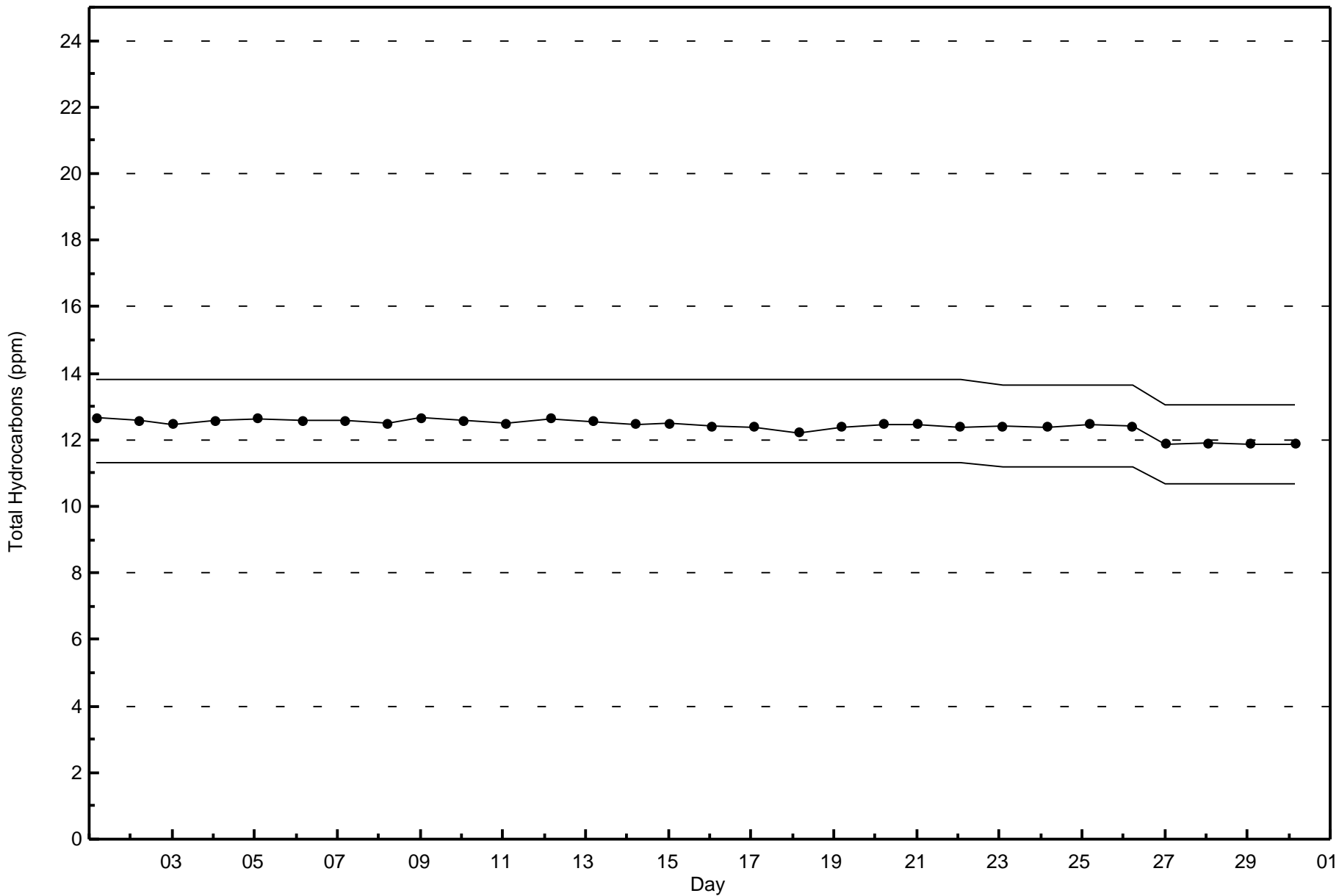




Wood Buffalo Environmental Association
Zero Responses

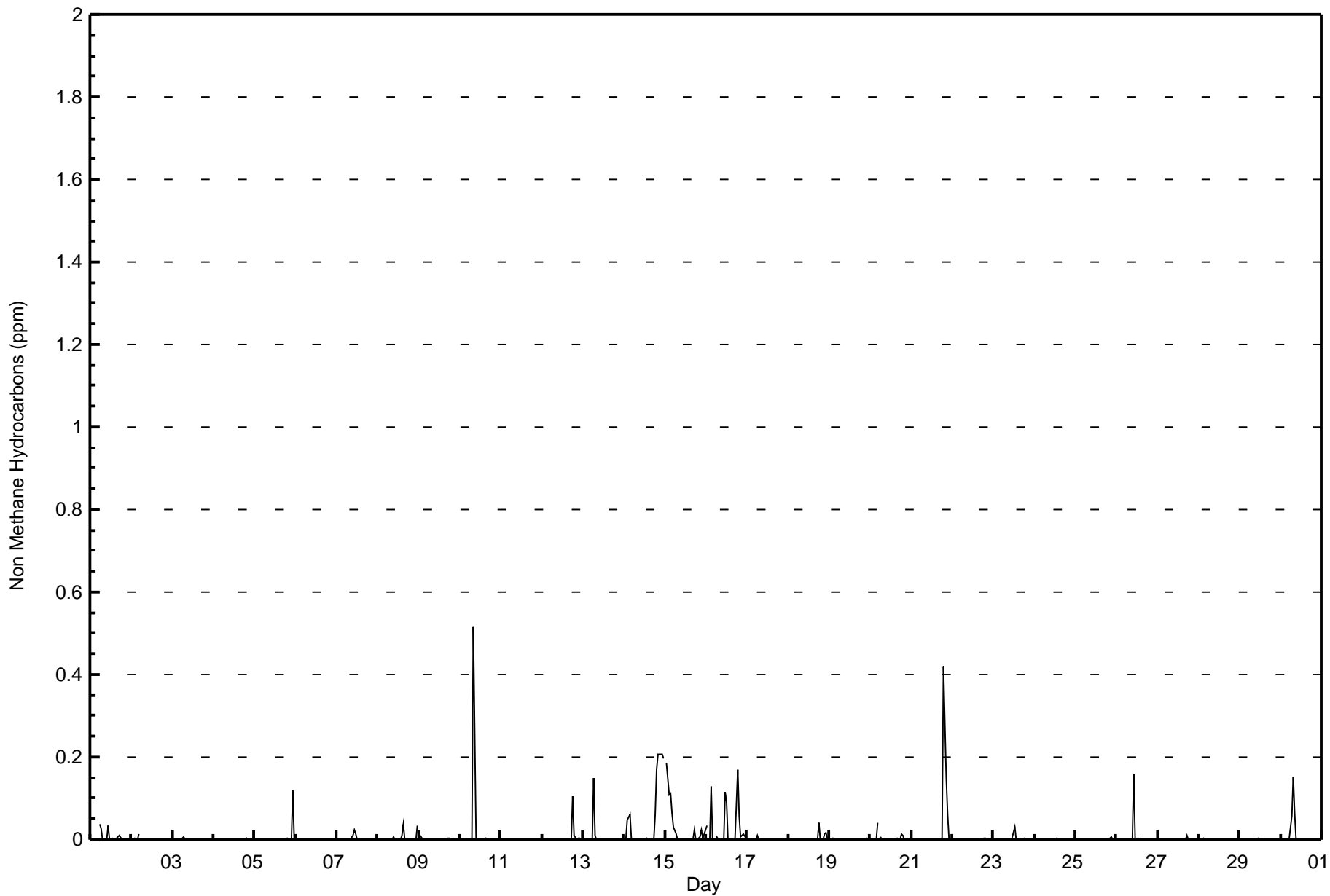
Total Hydrocarbons (THC) - ppm
Athabasca Valley - September 2016







| Maximum Value: 0.514 ppm on Sep 10 09:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 0.050 ppm on Sep 14 | | | | | Hours in Service: | 720 |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-----------------|---------------------------|---------------|
| Minimum Value: 0.000 ppm on Sep 1 01:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.000 ppm on Sep 6 | | | | | Hours of Data: | 681 |
| Maximum Diurnal Average: 0.023 ppm at hour 20 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.000 ppm at hour 14 | | | | | Hours of Missing Data: | 39 |
| Monthly Average: 0.007 ppm | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2 | | | | | Hours of Calibration: | 39 |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: | 100.0 |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.039 | 0.027 | 0.000 | 0.000 | 0.000 | 0.035 | 0.001 | 0.000 | 0.002 | 0.000 | 0.003 | 0.006 | 0.011 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.039 |
| 2-Sep | 0.000 | 0.000 | 0.005 | 0.000 | 0.014 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.014 |
| 3-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.006 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 |
| 4-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 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 |
| 5-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 | 0.004 | 0.000 | 0.000 | 0.120 | 0.000 | 0.005 | 0.120 |
| 6-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 |
| 7-Sep | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.011 | 0.024 | 0.015 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.024 |
| 8-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.007 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.037 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.002 | 0.033 | 0.004 | 0.037 |
| 9-Sep | Z | 0.011 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.002 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.011 |
| 10-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.514 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.023 | 0.514 |
| 11-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 | 0.000 | 0.000 | 0.000 |
| 12-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 | 0.001 | 0.106 | 0.010 | 0.000 | 0.003 | 0.003 | 0.000 | 0.005 | 0.106 |
| 13-Sep | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.150 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 | 0.150 |
| 14-Sep | 0.000 | 0.000 | 0.048 | 0.062 | 0.000 | Z | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.061 | 0.168 | 0.208 | 0.206 | 0.206 | 0.195 | 0.050 | 0.208 |
| 15-Sep | Z | 0.187 | 0.110 | 0.111 | 0.064 | 0.032 | 0.013 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.022 | 0.000 | 0.006 | 0.023 | 0.004 | 0.014 | 0.025 | 0.187 | |
| 16-Sep | 0.032 | Z | 0.002 | 0.130 | 0.000 | 0.000 | 0.007 | 0.000 | 0.000 | 0.000 | 0.000 | 0.116 | 0.091 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.169 | 0.059 | 0.008 | 0.011 | 0.013 | 0.004 | 0.028 | 0.169 |
| 17-Sep | 0.000 | 0.000 | Z | 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 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 |
| 18-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 | 0.042 | 0.001 | 0.000 | 0.014 | 0.018 | 0.003 | 0.003 | 0.042 |
| 19-Sep | 0.000 | 0.000 | 0.003 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.003 |
| 20-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.040 | Z | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.005 | 0.001 | 0.015 | 0.009 | 0.000 | 0.000 | 0.000 | 0.002 | 0.003 | 0.040 |
| 21-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 | 0.002 | 0.002 | 0.422 | 0.150 | 0.061 | 0.000 | 0.000 | 0.028 | 0.422 |
| 22-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | C | C | C | C | C | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | -- | 0.004 |
| 23-Sep | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.030 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.030 |
| 24-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 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 |
| 25-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 | C | C | C | 0.000 | 0.000 | 0.000 | 0.002 | 0.006 | 0.000 | 0.000 | 0.000 | 0.006 |
| 26-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.159 | 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 | 0.007 | 0.159 |
| 27-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 | 0.011 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.011 |
| 28-Sep | 0.000 | Z | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 |
| 29-Sep | 0.000 | 0.000 | Z | 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 | 0.003 |
| 30-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.058 | 0.152 | 0.064 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.012 | 0.152 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 0.001 0.008 0.007 0.012 0.005 0.003 0.009 0.006 0.020 0.001 0.008 0.005 0.004 0.000 0.000 0.002 0.000 0.002 0.014 0.023 0.012 0.011 0.012 0.008 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.032 0.187 0.110 0.130 0.064 0.039 0.150 0.152 0.514 0.011 0.159 0.116 0.091 0.003 0.010 0.037 0.006 0.022 0.169 0.422 0.208 0.206 0.206 0.195 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 614 | 90.16 | 90.16 |
| 0.006 - 0.05 | 40 | 5.87 | 96.04 |
| 0.06 - 0.1 | 15 | 2.20 | 98.24 |
| > 0.1 | 12 | 1.76 | 100.00 |

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 27 | 8 | 4 | 15 | 13 | 28 | 137 | 40 | 30 | 23 | 57 | 56 | 33 | 44 | 47 | 52 | 614 |
| 0.006 - 0.05 | 2 | 1 | 1 | 0 | 2 | 6 | 10 | 8 | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 2 | 40 |
| 0.06 - 0.1 | 1 | 0 | 0 | 0 | 1 | 0 | 3 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 15 |
| > 0.1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 2 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 12 |
| Totals | 30 | 9 | 5 | 15 | 16 | 36 | 151 | 53 | 35 | 24 | 59 | 57 | 35 | 49 | 49 | 58 | 681 |

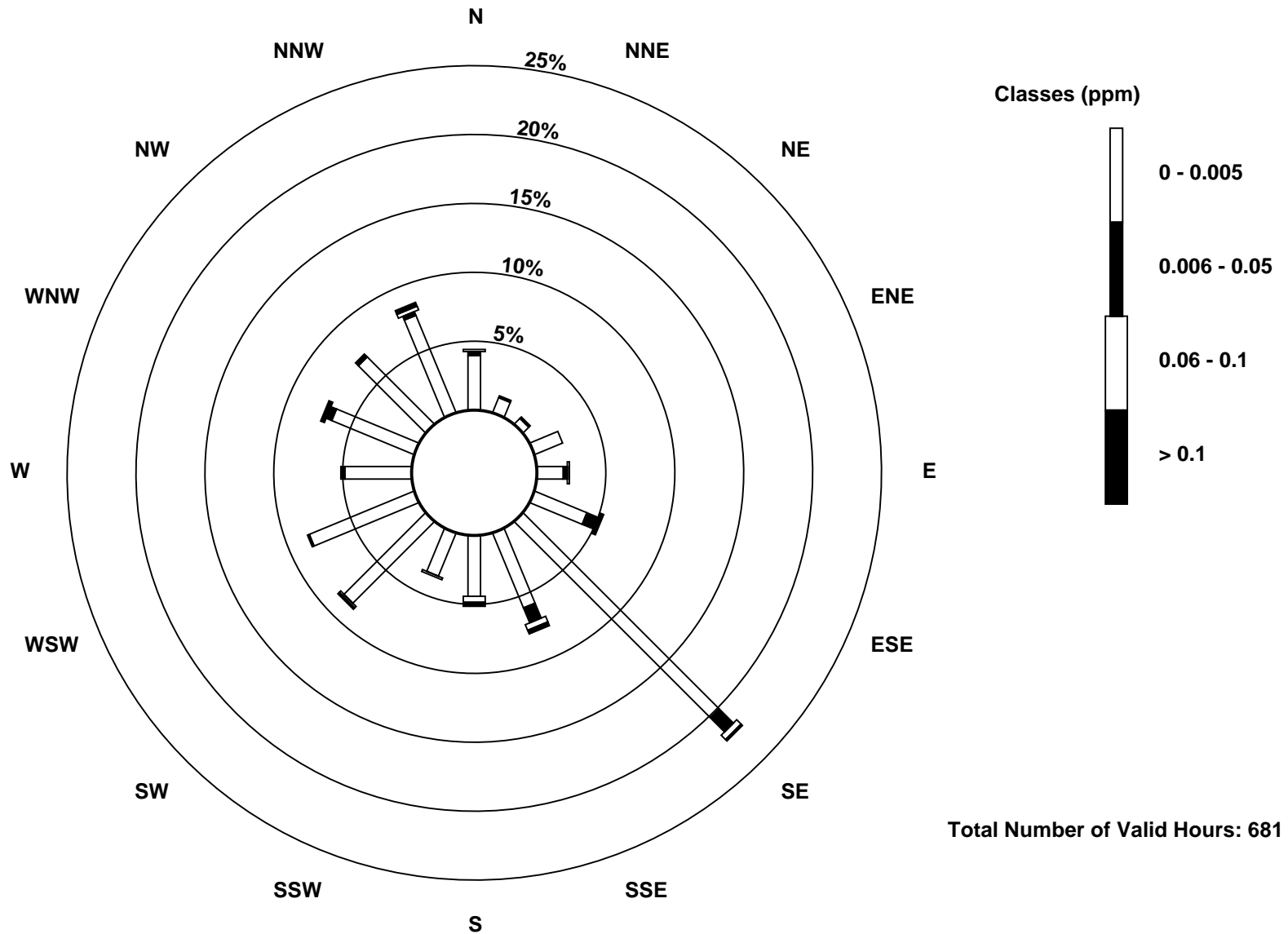
Total Number of Valid Hours: 681

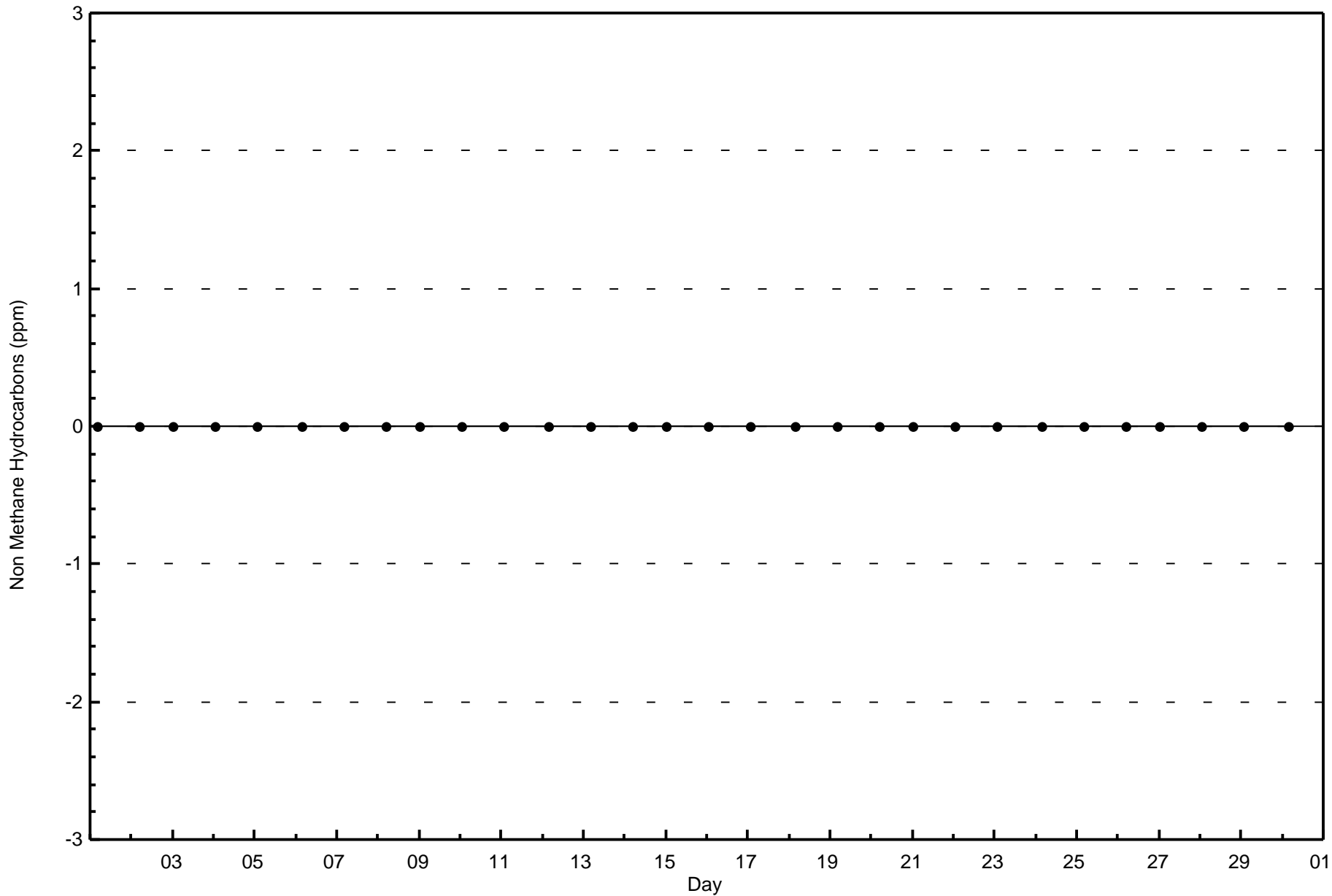
Total Number of Hours: 720

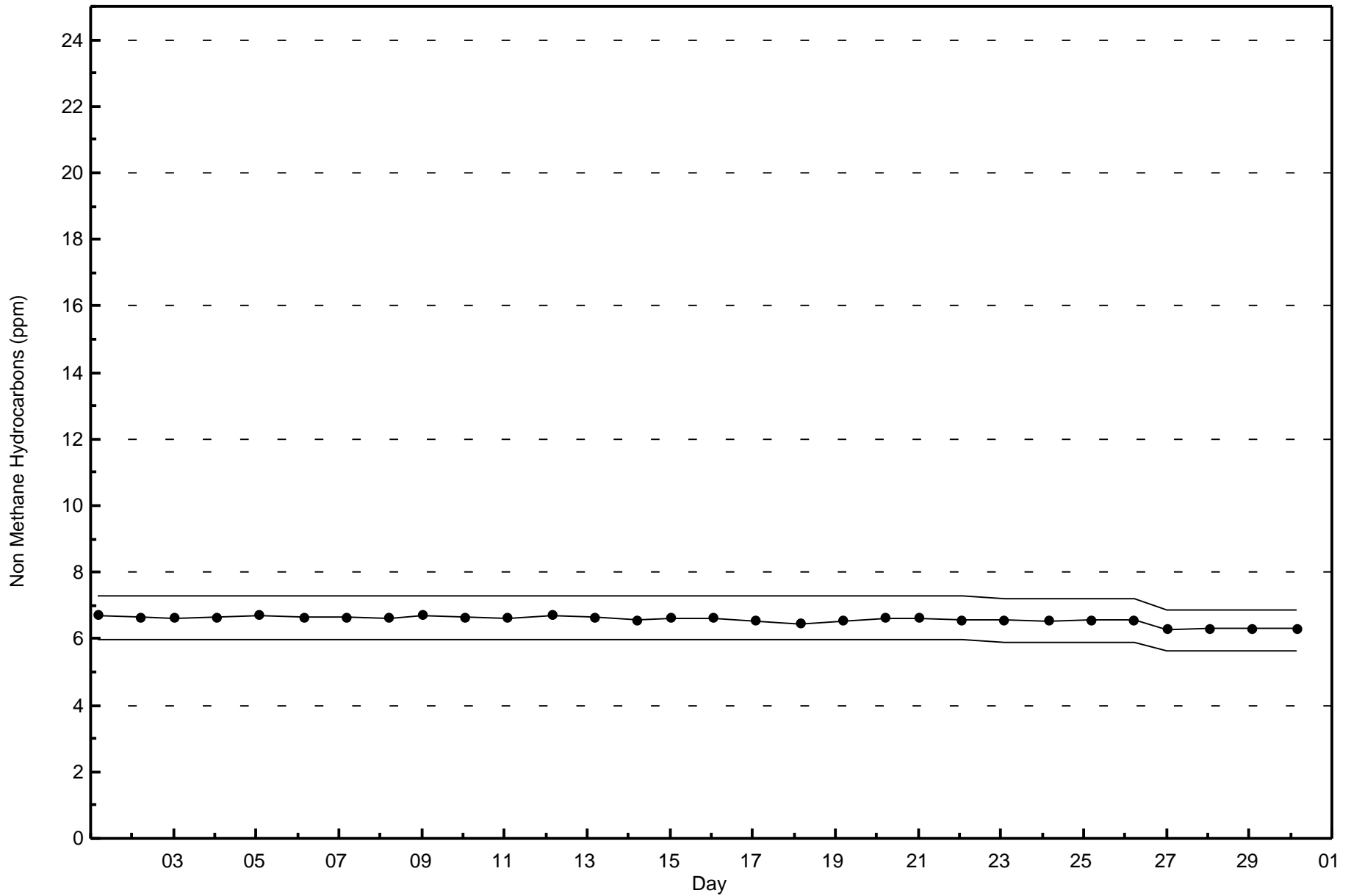


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

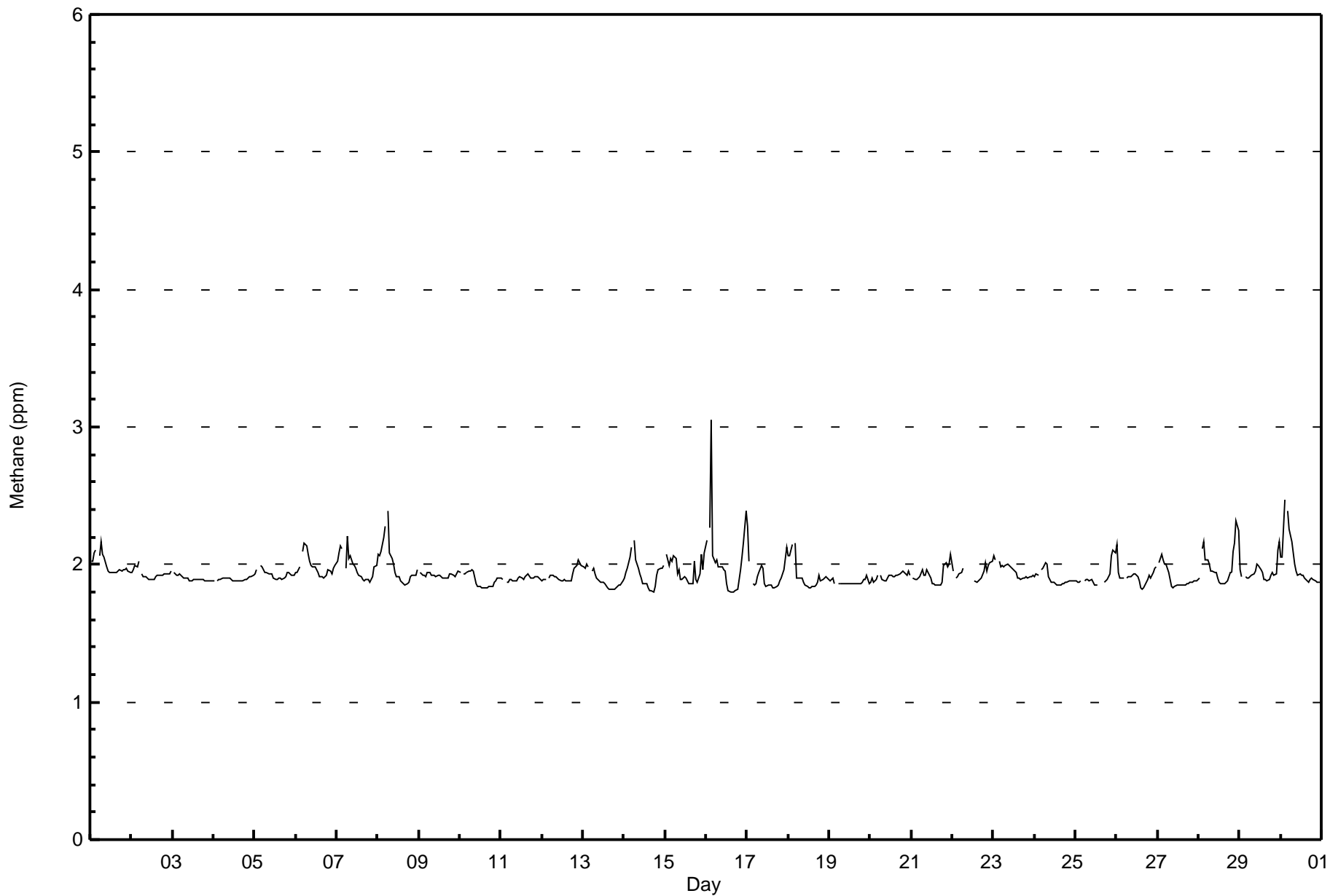
Methane (CH₄) - ppm

Athabasca Valley - September 2016

| | | | | |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 3.0 ppm on Sep 16 04:00 | Maximum Daily Average: 2.0 ppm on Sep 16 | | Hours of Data: | 681 |
| Minimum Value: 1.8 ppm on Sep 16 16:00 | Minimum Daily Average: 1.9 ppm on Sep 19 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 2.0 ppm at hour 4 | Minimum Diurnal Average: 1.9 ppm at hour 16 | | Hours of Calibration: | 39 |
| Monthly Average: 1.93 ppm | Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.3 | | 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 | 2.0 | 2.0 | 2.1 | 2.1 | Z | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 1.9 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 1.9 | 1.9 | 2.0 | Z | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 2.0 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.2 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | Z | 2.4 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | Z | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.1 | 2.0 | 2.1 | 2.0 | 2.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2.2 | Z | 2.3 | 3.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.4 | 2.0 | 3.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 2.3 | 2.0 | Z | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 1.9 | 2.3 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 2.1 | 2.1 | 2.1 | Z | 2.2 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 1.9 | 2.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | C | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | -- | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 2.1 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 1.9 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.1 | 2.1 | 1.9 | 2.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 2.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 1.9 | Z | 2.1 | 2.2 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 2.3 | 2.2 | 2.0 | 2.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 2.0 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 1.9 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 2.1 | 2.1 | 2.5 | Z | 2.4 | 2.3 | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.3 | 2.1 | 2.5 | 3.0 | 2.4 | 2.3 | 2.4 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | Diurnal Maximum | |

Z - zerospan C - Calibration





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 617 | 90.60 | 90.60 |
| 2.1 - 3.0 | 64 | 9.40 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Athabasca Valley - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 26 | 8 | 3 | 11 | 13 | 28 | 127 | 45 | 30 | 20 | 59 | 57 | 35 | 49 | 49 | 57 | 617 |
| 2.1 - 3.0 | 4 | 1 | 2 | 4 | 3 | 8 | 24 | 8 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 64 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 9 | 5 | 15 | 16 | 36 | 151 | 53 | 35 | 24 | 59 | 57 | 35 | 49 | 49 | 58 | 681 |

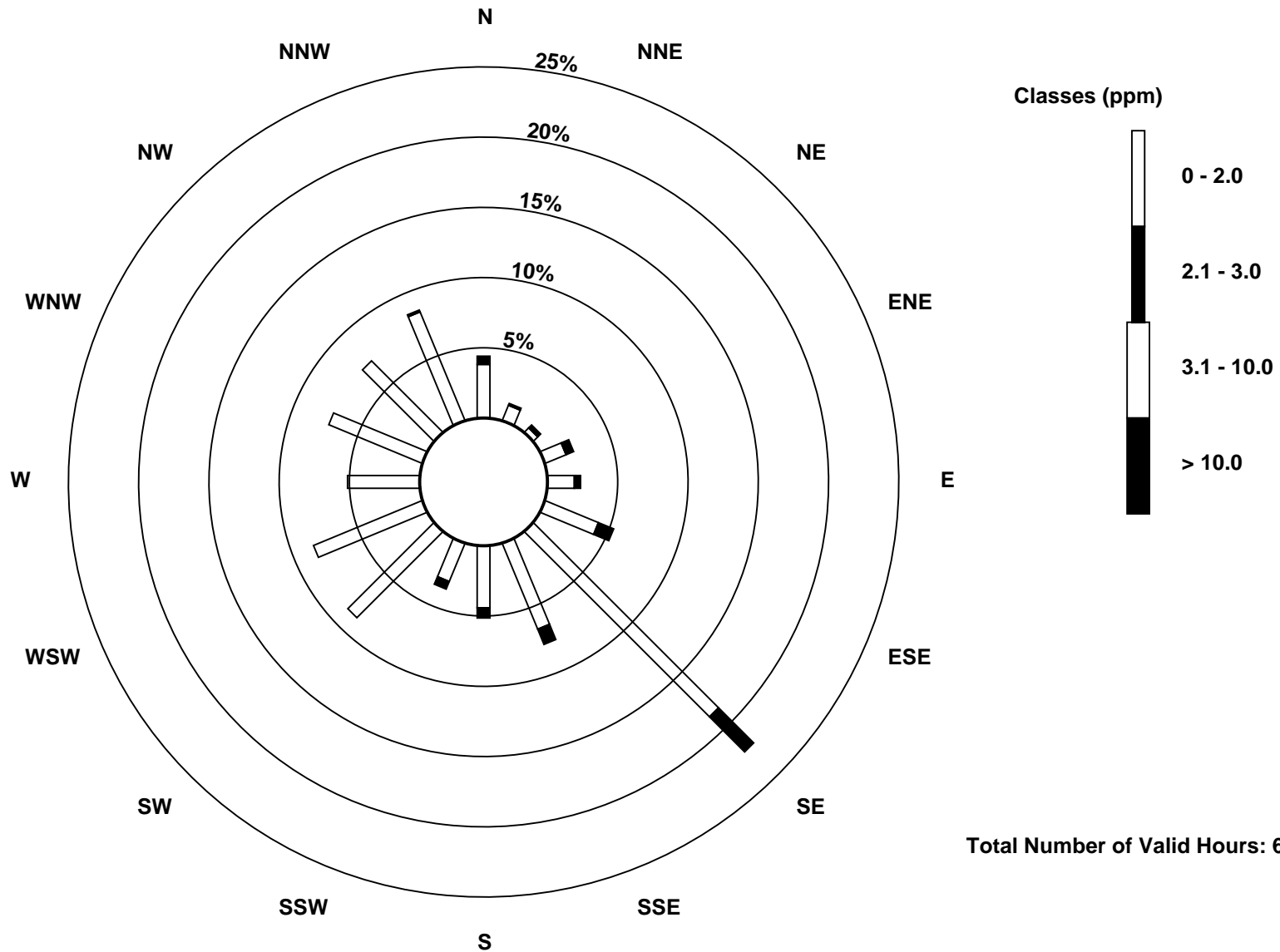
Total Number of Valid Hours: 681

Total Number of Hours: 720

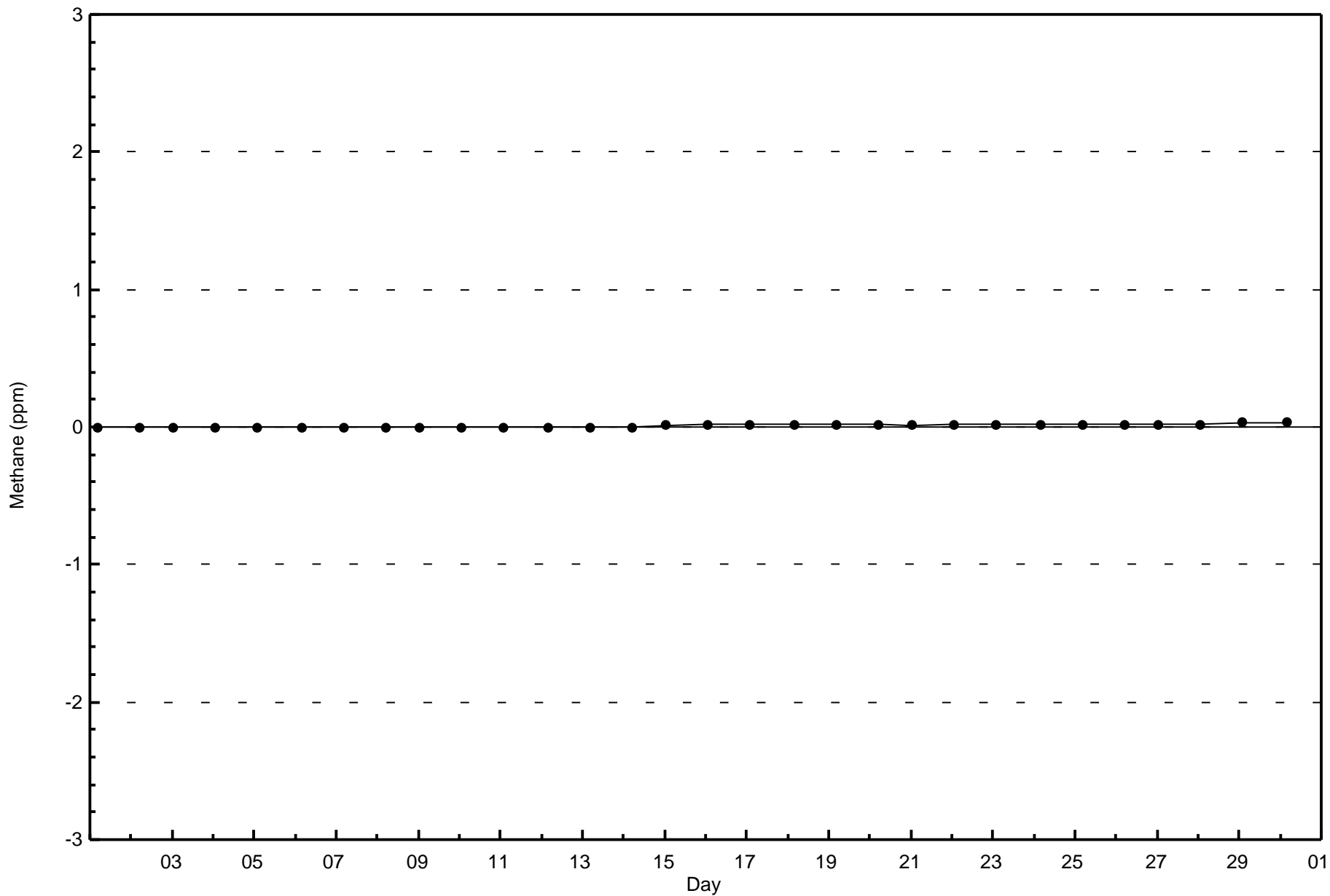


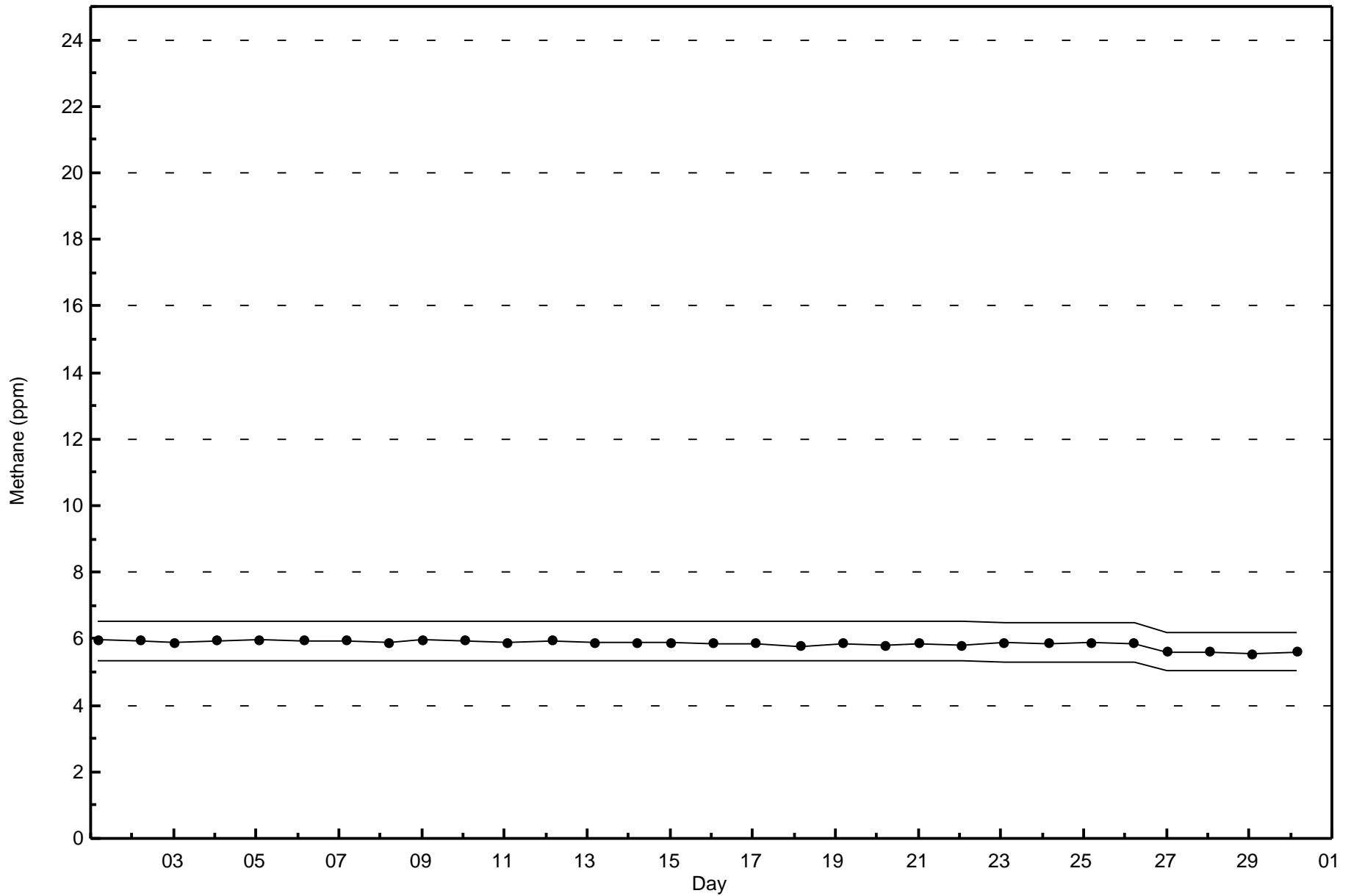
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 681







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

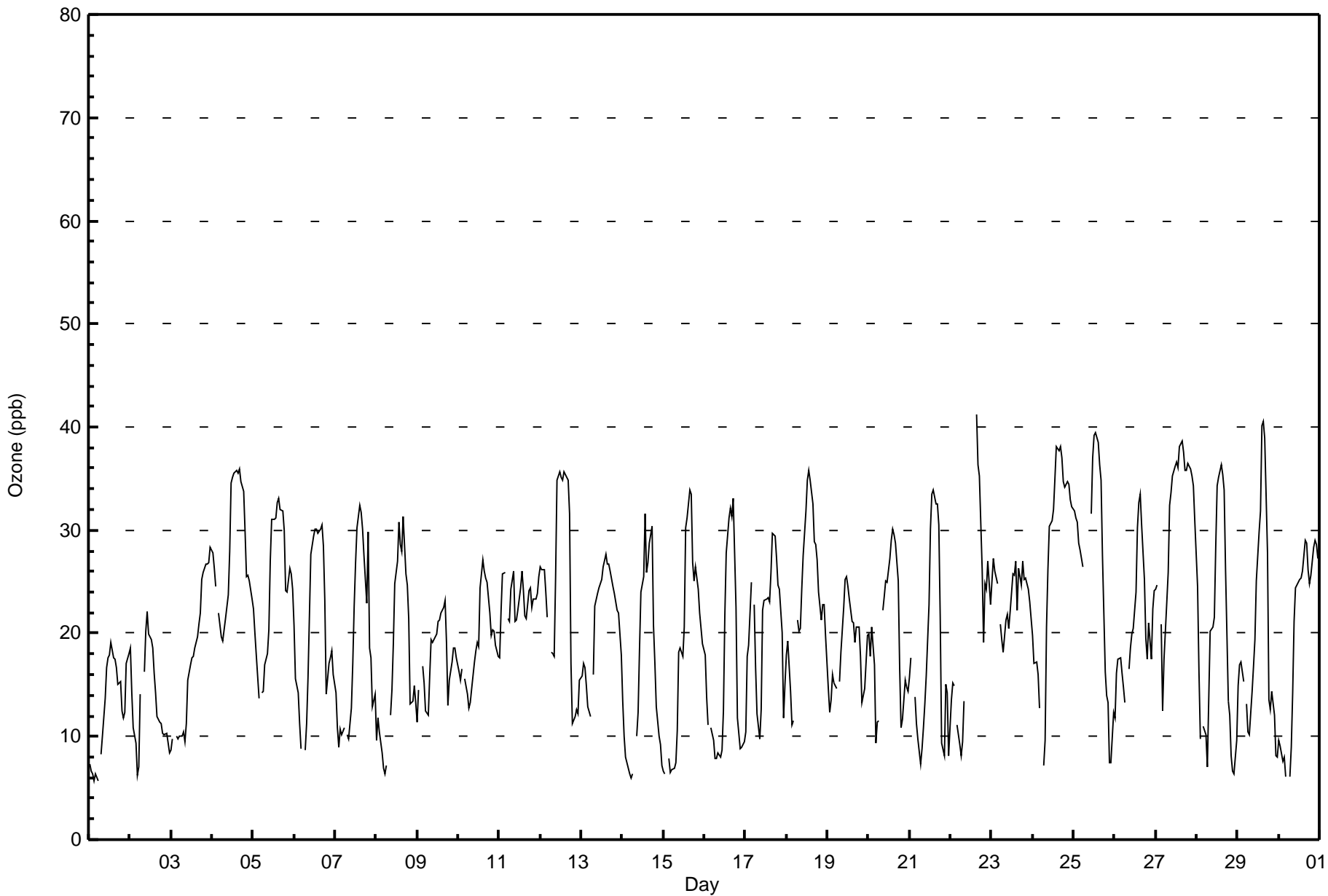
Athabasca Valley - September 2016

| | | | | |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 41 ppb on Sep 22 16:00 | Maximum Daily Average: 31.2 ppb on Sep 27 | | Hours of Data: | 682 |
| Minimum Value: 6 ppb on Sep 1 06:00 | Minimum Daily Average: 12.8 ppb on Sep 1 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 29.7 ppb at hour 16 | Minimum Diurnal Average: 12.2 ppb at hour 5 | | Hours of Calibration: | 35 |
| Monthly Average: 20.6 ppb | Percentiles: P ₁ = 6 P ₁₀ = 10 Q ₁ = 14 Median = 20 Q ₃ = 26 P ₉₀ = 33 P ₉₉ = 39 | | 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 | 7 | 7 | 6 | 6 | 6 | 6 | Z | 8 | 10 | 14 | 17 | 18 | 18 | 19 | 18 | 18 | 17 | 15 | 15 | 12 | 12 | 12 | 17 | 18 | 12.8 | 19 |
| 2-Sep | 19 | 14 | 11 | 9 | 6 | 7 | 14 | Z | 16 | 20 | 22 | 20 | 19 | 19 | 16 | 14 | 12 | 11 | 11 | 10 | 10 | 10 | 9 | 8 | 13.5 | 22 |
| 3-Sep | 9 | 10 | Z | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 15 | 17 | 18 | 18 | 19 | 20 | 21 | 22 | 25 | 26 | 27 | 27 | 27 | 28 | 17.3 | 28 |
| 4-Sep | 28 | 26 | 25 | Z | 22 | 20 | 19 | 20 | 21 | 24 | 28 | 35 | 35 | 36 | 36 | 36 | 36 | 35 | 34 | 30 | 26 | 26 | 25 | 23 | 28.0 | 36 |
| 5-Sep | 22 | 20 | 18 | 14 | Z | 14 | 14 | 17 | 18 | 20 | 27 | 31 | 31 | 31 | 33 | 33 | 32 | 32 | 30 | 24 | 24 | 26 | 26 | 24 | 24.4 | 33 |
| 6-Sep | 21 | 16 | 14 | 11 | 9 | Z | 9 | 11 | 16 | 22 | 28 | 29 | 30 | 30 | 30 | 30 | 30 | 29 | 23 | 14 | 17 | 18 | 18 | 16 | 20.5 | 30 |
| 7-Sep | 14 | 11 | 9 | 11 | 10 | 11 | Z | 10 | 10 | 13 | 17 | 23 | 27 | 30 | 32 | 32 | 30 | 27 | 23 | 30 | 19 | 18 | 13 | 14 | 18.8 | 32 |
| 8-Sep | 10 | 12 | 10 | 8 | 7 | 6 | 7 | Z | 12 | 15 | 19 | 25 | 27 | 31 | 29 | 28 | 31 | 26 | 25 | 21 | 13 | 13 | 15 | 13 | 17.5 | 31 |
| 9-Sep | 11 | 15 | Z | 17 | 15 | 12 | 12 | 16 | 19 | 19 | 19 | 20 | 21 | 21 | 22 | 23 | 23 | 19 | 13 | 16 | 17 | 19 | 19 | 18 | 17.6 | 23 |
| 10-Sep | 16 | 15 | 17 | Z | 16 | 14 | 13 | 13 | 15 | 17 | 18 | 19 | 19 | 24 | 27 | 26 | 25 | 25 | 22 | 20 | 20 | 20 | 19 | 18 | 19.1 | 27 |
| 11-Sep | 18 | 22 | 26 | 26 | Z | 21 | 21 | 24 | 26 | 21 | 21 | 22 | 24 | 26 | 24 | 22 | 21 | 24 | 24 | 22 | 23 | 23 | 24 | 25 | 23.2 | 26 |
| 12-Sep | 26 | 26 | 26 | 24 | 22 | Z | 18 | 18 | 18 | 25 | 35 | 36 | 35 | 35 | 36 | 35 | 35 | 32 | 17 | 11 | 12 | 13 | 12 | 15 | 24.4 | 36 |
| 13-Sep | 16 | 17 | 17 | 15 | 13 | 12 | Z | 16 | 23 | 24 | 24 | 25 | 25 | 26 | 28 | 27 | 27 | 26 | 25 | 24 | 23 | 22 | 22 | 18 | 21.5 | 28 |
| 14-Sep | 13 | 10 | 8 | 7 | 6 | 6 | 6 | Z | 10 | 12 | 18 | 24 | 25 | 32 | 26 | 27 | 29 | 30 | 21 | 17 | 13 | 10 | 9 | 7 | 16.0 | 32 |
| 15-Sep | 7 | 6 | Z | 8 | 6 | 7 | 7 | 7 | 11 | 18 | 19 | 18 | 21 | 30 | 31 | 34 | 33 | 27 | 25 | 26 | 24 | 22 | 20 | 19 | 18.6 | 34 |
| 16-Sep | 18 | 14 | 11 | Z | 11 | 10 | 8 | 8 | 8 | 8 | 9 | 12 | 22 | 28 | 31 | 32 | 31 | 33 | 23 | 12 | 10 | 9 | 9 | 9 | 15.9 | 33 |
| 17-Sep | 10 | 18 | 19 | 25 | Z | 23 | 17 | 12 | 10 | 13 | 22 | 23 | 23 | 24 | 23 | 26 | 30 | 29 | 27 | 25 | 24 | 20 | 12 | 15 | 20.4 | 30 |
| 18-Sep | 18 | 19 | 14 | 11 | 12 | Z | 21 | 20 | 20 | 24 | 27 | 32 | 35 | 36 | 35 | 32 | 29 | 29 | 27 | 24 | 21 | 23 | 23 | 20 | 24.1 | 36 |
| 19-Sep | 15 | 12 | 14 | 16 | 15 | 15 | Z | 15 | 18 | 22 | 25 | 26 | 25 | 23 | 21 | 21 | 19 | 21 | 21 | 18 | 13 | 14 | 15 | 20 | 18.4 | 26 |
| 20-Sep | 20 | 18 | 21 | 17 | 9 | 11 | 11 | Z | 22 | 24 | 25 | 25 | 27 | 29 | 30 | 30 | 29 | 25 | 17 | 11 | 12 | 15 | 15 | 14 | 19.9 | 30 |
| 21-Sep | 16 | 18 | Z | 14 | 11 | 10 | 7 | 9 | 11 | 13 | 16 | 23 | 30 | 34 | 34 | 33 | 33 | 31 | 22 | 9 | 8 | 15 | 14 | 8 | 18.1 | 34 |
| 22-Sep | 14 | 15 | 15 | Z | 11 | 9 | 8 | 10 | 13 | M | M | M | C | C | C | 41 | 36 | 35 | 26 | 19 | 25 | 24 | 27 | 23 | -- | 41 |
| 23-Sep | 25 | 27 | 26 | 25 | Z | 21 | 19 | 18 | 21 | 22 | 20 | 22 | 26 | 26 | 27 | 22 | 26 | 25 | 27 | 25 | 25 | 24 | 23 | 21 | 23.7 | 27 |
| 24-Sep | 20 | 17 | 17 | 16 | 13 | Z | 7 | 10 | 21 | 26 | 30 | 31 | 32 | 35 | 38 | 38 | 38 | 37 | 35 | 34 | 35 | 34 | 33 | 32 | 27.3 | 38 |
| 25-Sep | 32 | 31 | 31 | 29 | 28 | 26 | Z | 25 | C | C | 32 | 37 | 39 | 39 | 39 | 36 | 35 | 28 | 16 | 14 | 13 | 8 | 7 | 12 | 26.6 | 39 |
| 26-Sep | 12 | 16 | 17 | 18 | 16 | 15 | 13 | Z | 17 | 19 | 20 | 20 | 24 | 30 | 33 | 33 | 30 | 25 | 20 | 18 | 21 | 17 | 22 | 24 | 20.9 | 33 |
| 27-Sep | 24 | 25 | Z | 21 | 12 | 17 | 23 | 26 | 32 | 34 | 35 | 36 | 37 | 36 | 38 | 39 | 38 | 36 | 36 | 36 | 36 | 35 | 34 | 31 | 31.2 | 39 |
| 28-Sep | 25 | 16 | 10 | Z | 11 | 10 | 7 | 14 | 20 | 21 | 22 | 28 | 34 | 35 | 36 | 35 | 34 | 26 | 13 | 12 | 8 | 7 | 6 | 10 | 19.2 | 36 |
| 29-Sep | 15 | 17 | 17 | 15 | Z | 13 | 10 | 10 | 14 | 17 | 19 | 25 | 30 | 32 | 40 | 41 | 39 | 28 | 13 | 13 | 14 | 12 | 8 | 8 | 19.6 | 41 |
| 30-Sep | 10 | 9 | 8 | 8 | 6 | Z | 6 | 9 | 14 | 21 | 24 | 25 | 25 | 26 | 29 | 29 | 26 | 25 | 26 | 28 | 29 | 29 | 27 | 27 | 20.2 | 29 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 17.0 | 16.7 | 16.2 | 15.2 | 12.2 | 13.1 | 12.4 | 14.3 | 16.4 | 19.2 | 22.6 | 25.1 | 27.1 | 29.0 | 29.5 | 29.7 | 29.3 | 27.1 | 22.7 | 20.0 | 19.2 | 18.9 | 18.4 | 18.0 | Diurnal Average | |
| 32 | 31 | 31 | 29 | 28 | 26 | 23 | 26 | 32 | 34 | 35 | 37 | 39 | 39 | 40 | 41 | 39 | 37 | 36 | 36 | 36 | 35 | 34 | 32 | Diurnal Maximum | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 345 | 50.59 | 50.59 |
| 21 - 50 | 337 | 49.41 | 100.00 |
| 51 - 82 | 0 | 0.00 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 10 | 6 | 3 | 8 | 13 | 21 | 116 | 39 | 18 | 8 | 15 | 13 | 14 | 19 | 24 | 18 | 345 |
| 21 - 50 | 20 | 4 | 2 | 7 | 3 | 15 | 37 | 17 | 15 | 12 | 40 | 44 | 23 | 29 | 30 | 39 | 337 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 10 | 5 | 15 | 16 | 36 | 153 | 56 | 33 | 20 | 55 | 57 | 37 | 48 | 54 | 57 | 682 |

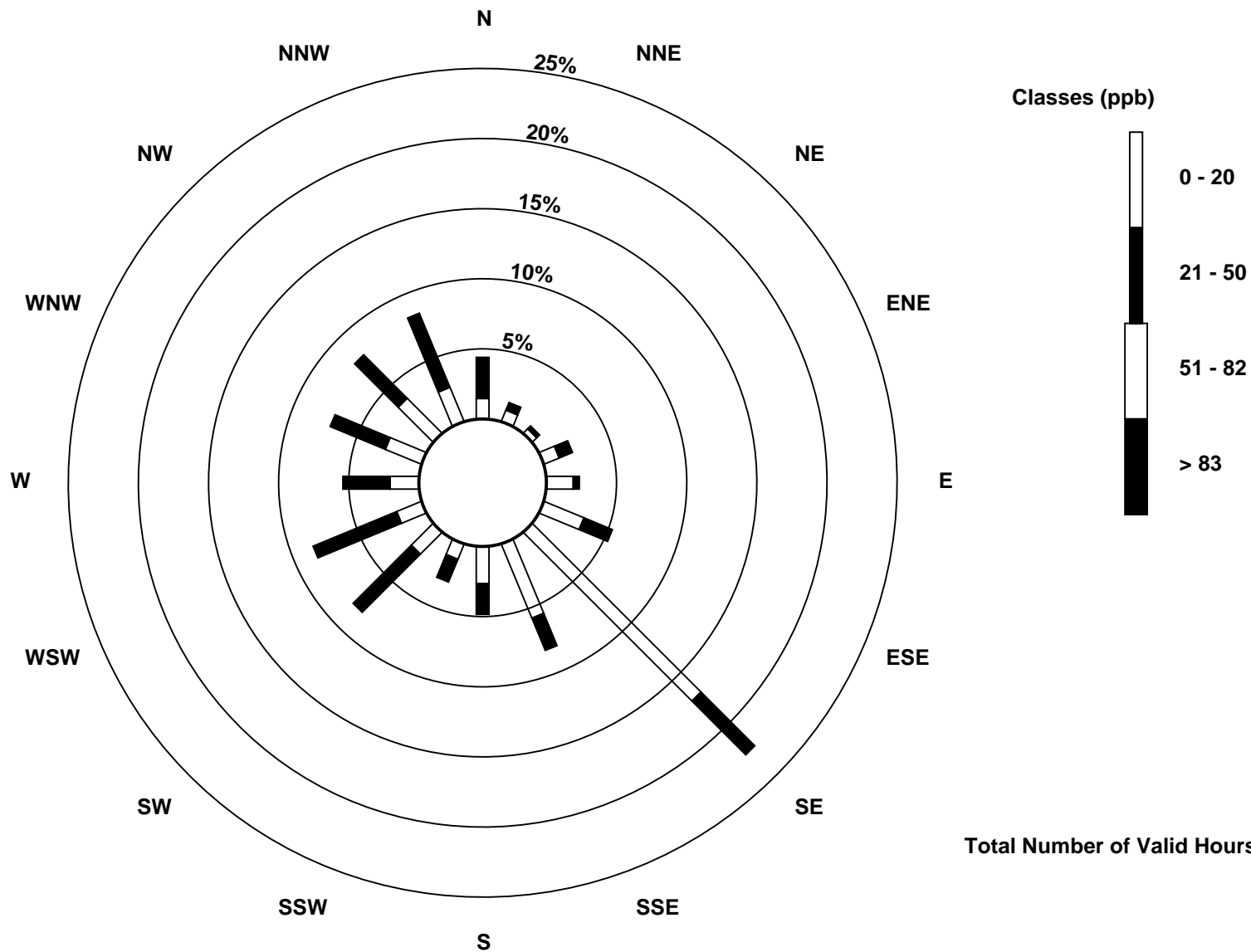
Total Number of Valid Hours: 682

Total Number of Hours: 720

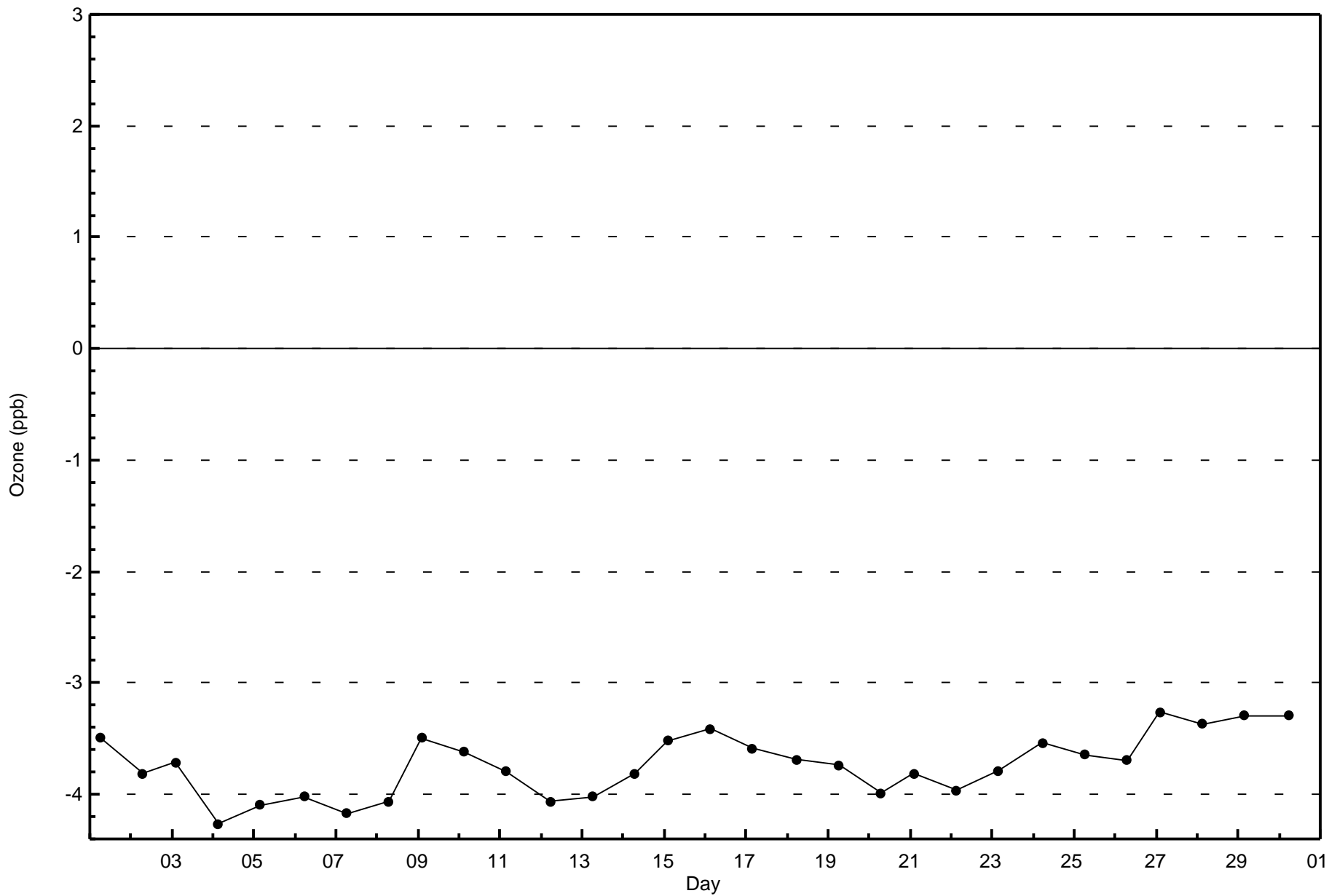


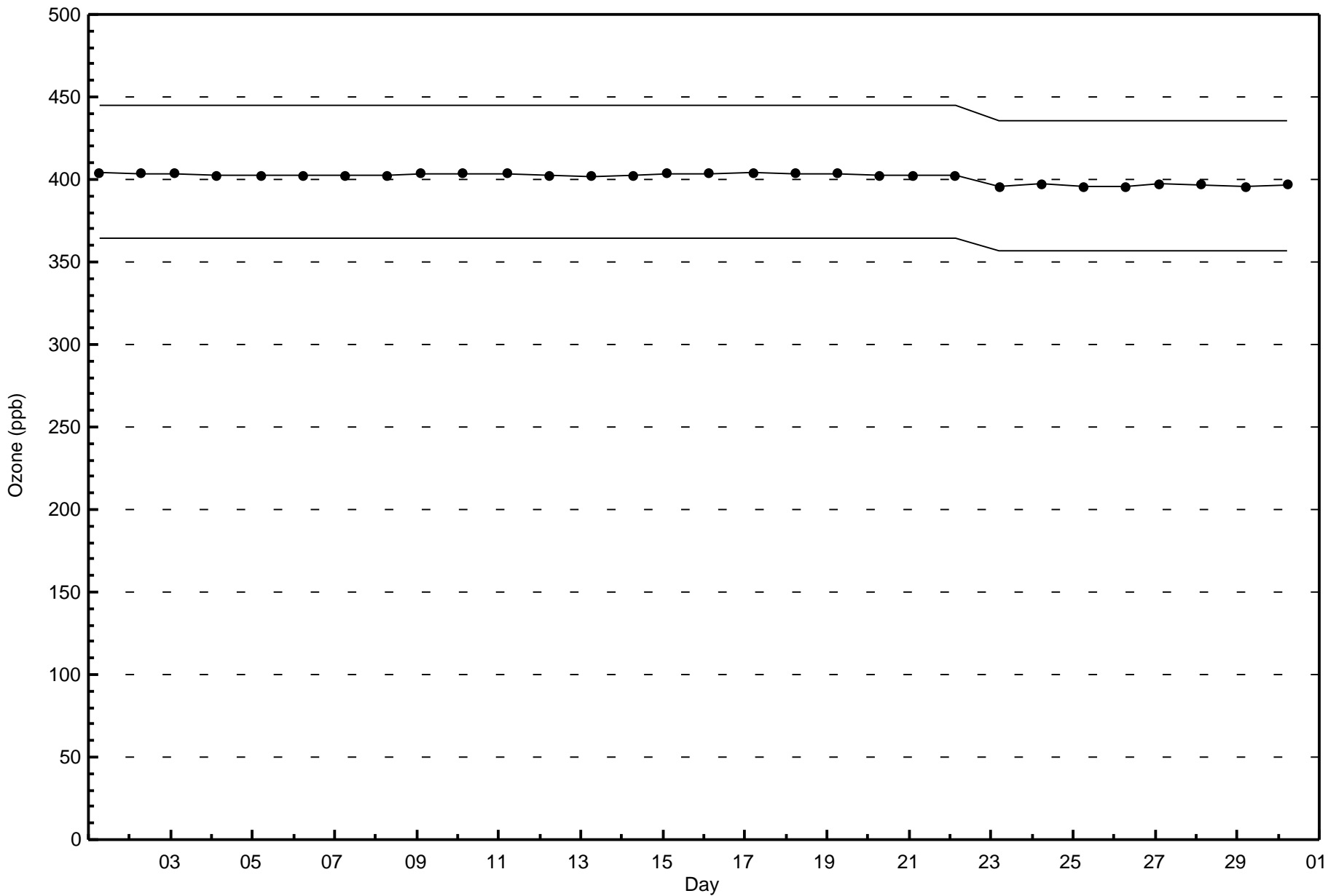
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 682







Wood Buffalo Environmental Association
Summary of Hour Averages

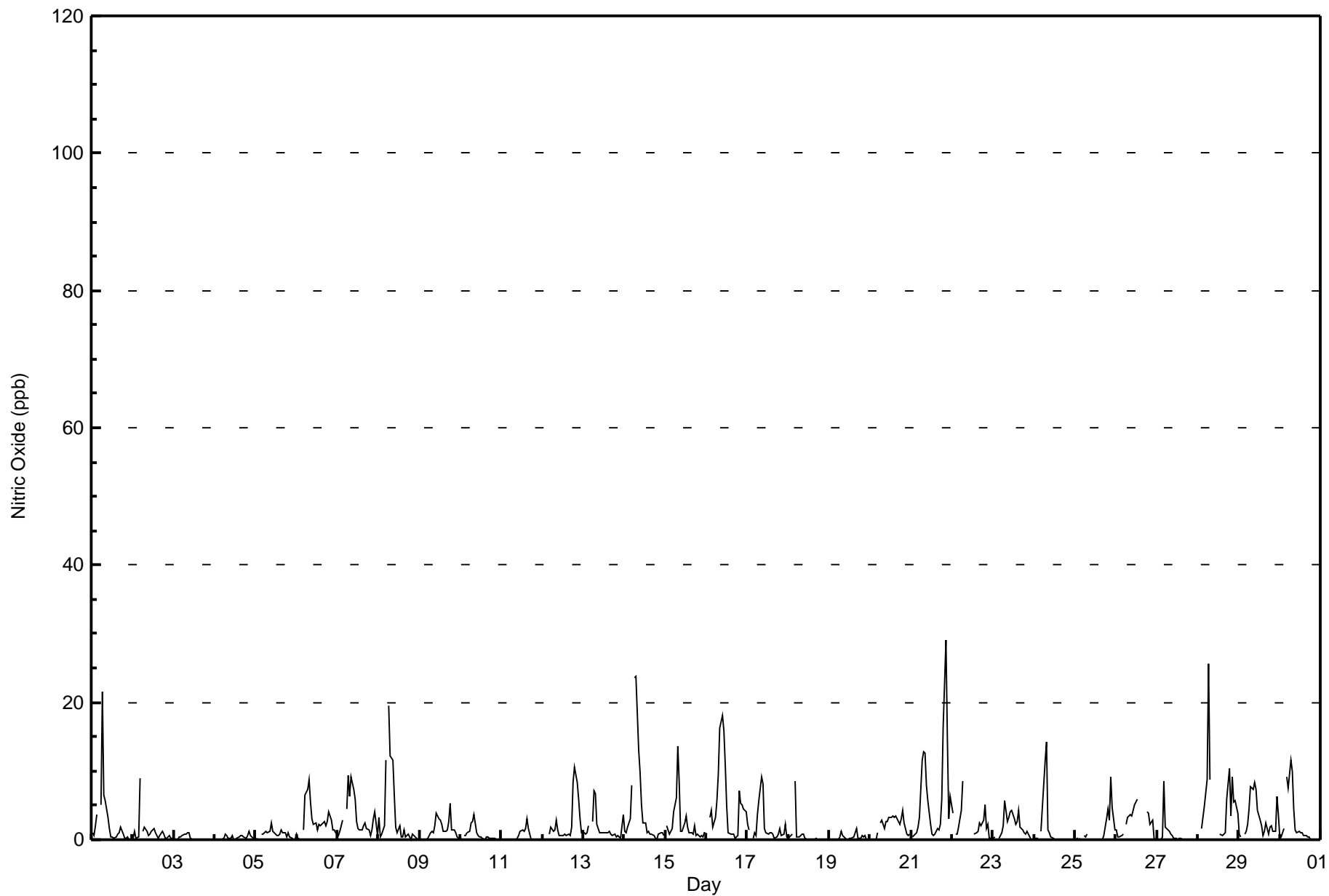
Nitric Oxide (NO) - ppb
Athabasca Valley - September 2016

| Maximum Value: 29 ppb on Sep 21 21:00 | | Maximum Daily Average: 6.2 ppb on Sep 21 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|-----|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Minimum Value: 0 ppb on Sep 3 20:00 | | Minimum Daily Average: 0.2 ppb on Sep 3 | | Hours of Data: 669 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 6.5 ppb at hour 7 | | Minimum Diurnal Average: 0.5 ppb at hour 2 | | Hours of Missing Data: 51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.2 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 6 P ₉₉ = 18 | | Hours of Calibration: 46 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 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 | 1 | 1 | 2 | 4 | Z | 5 | 21 | 7 | 6 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 2.5 | 21 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 0 | 1 | 0 | 0 | 9 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1.1 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0.8 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 1 | 0 | 0 | Z | 1 | 7 | 7 | 9 | 5 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 4 | 3 | 1 | 1 | 1 | 2.8 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 1 | 1 | 2 | 3 | Z | 5 | 9 | 6 | 9 | 7 | 6 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 4 | 1 | 3.2 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 3 | 0 | 1 | 2 | 12 | Z | 20 | 12 | 12 | 7 | 2 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 3.4 | 20 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 3 | 5 | 1 | 1 | 1 | 1 | 0 | 1.5 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0 | Z | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0 | 0 | 0 | Z | 1 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 8 | 11 | 8 | 6 | 3 | 1 | 2.3 | 11 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 1 | 1 | 1 | 2 | Z | 3 | 7 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 4 | 1.7 | 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 1 | 1 | 2 | 3 | 8 | Z | 24 | 24 | 13 | 10 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 4.5 | 24 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 2 | 1 | 1 | 2 | 4 | 6 | 14 | 8 | 1 | 1 | 2 | 4 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 0 | 1 | 2.5 | 14 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 1 | Z | 3 | 4 | 2 | 3 | 6 | 10 | 16 | 18 | 16 | 11 | 5 | 1 | 1 | 1 | 1 | 0 | 1 | 7 | 5 | 5 | 5 | 4 | 5.4 | 18 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 2 | 1 | Z | 0 | 1 | 1 | 4 | 6 | 9 | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 1 | 2 | 0 | 2.0 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0 | 0 | 1 | Z | 9 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0.3 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 0 | 0 | 0 | 0 | 1 | Z | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 4 | 2 | 1 | 1 | 2.1 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 0 | 1 | 1 | 2 | 3 | 12 | 13 | 13 | 8 | 6 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 6 | 16 | 29 | 15 | 3 | 6 | 6.2 | 29 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 4 | Z | 1 | 1 | 2 | 4 | 8 | C | C | C | C | C | C | 1 | 1 | 1 | 2 | 2 | 3 | 5 | 2 | 2 | 0 | 0 | -- | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0 | 0 | Z | 0 | 1 | 1 | 2 | 6 | 3 | 3 | 4 | 4 | 3 | 2 | 3 | 4 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1.9 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0 | 0 | 0 | Z | 1 | 5 | 11 | 14 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 14 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 1 | 0 | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 1 | 3 | 4 | 3 | 9 | 5 | 1 | 1.6 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 1 | 0 | 0 | 1 | 1 | Z | 2 | 3 | 4 | 4 | 4 | 5 | 6 | M | M | M | M | M | 4 | 4 | 2 | 3 | 0 | 0 | 2.5 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 0 | 0 | 0 | 9 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 0 | Z | 2 | 3 | 5 | 9 | 26 | 9 | C | C | C | C | C | 1 | 1 | 1 | 1 | 6 | 10 | 4 | 9 | 6 | 6 | 4 | 5.6 | 26 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 1 | 0 | Z | 1 | 1 | 2 | 4 | 8 | 7 | 8 | 7 | 4 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 6 | 4 | 3.1 | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 0 | 0 | 2 | Z | 9 | 8 | 12 | 10 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.3 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.7 | 0.5 | 0.8 | 1.2 | 3.1 | 2.7 | 6.5 | 5.9 | 4.8 | 3.6 | 2.6 | 1.9 | 1.6 | 1.0 | 0.9 | 1.2 | 1.1 | 1.1 | 1.9 | 2.3 | 2.5 | 2.0 | 1.3 | 1.0 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 4 | 2 | 3 | 4 | 12 | 9 | 26 | 24 | 16 | 18 | 16 | 11 | 6 | 3 | 3 | 4 | 3 | 6 | 10 | 16 | 29 | 15 | 6 | 6 | Diurnal Maximum |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 664 | 99.25 | 99.25 |
| 21 - 40 | 5 | 0.75 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 669

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 29 | 9 | 5 | 14 | 15 | 35 | 149 | 49 | 33 | 21 | 57 | 57 | 35 | 49 | 49 | 58 | 664 |
| 21 - 40 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 9 | 5 | 14 | 15 | 36 | 151 | 50 | 33 | 21 | 57 | 57 | 35 | 49 | 49 | 58 | 669 |

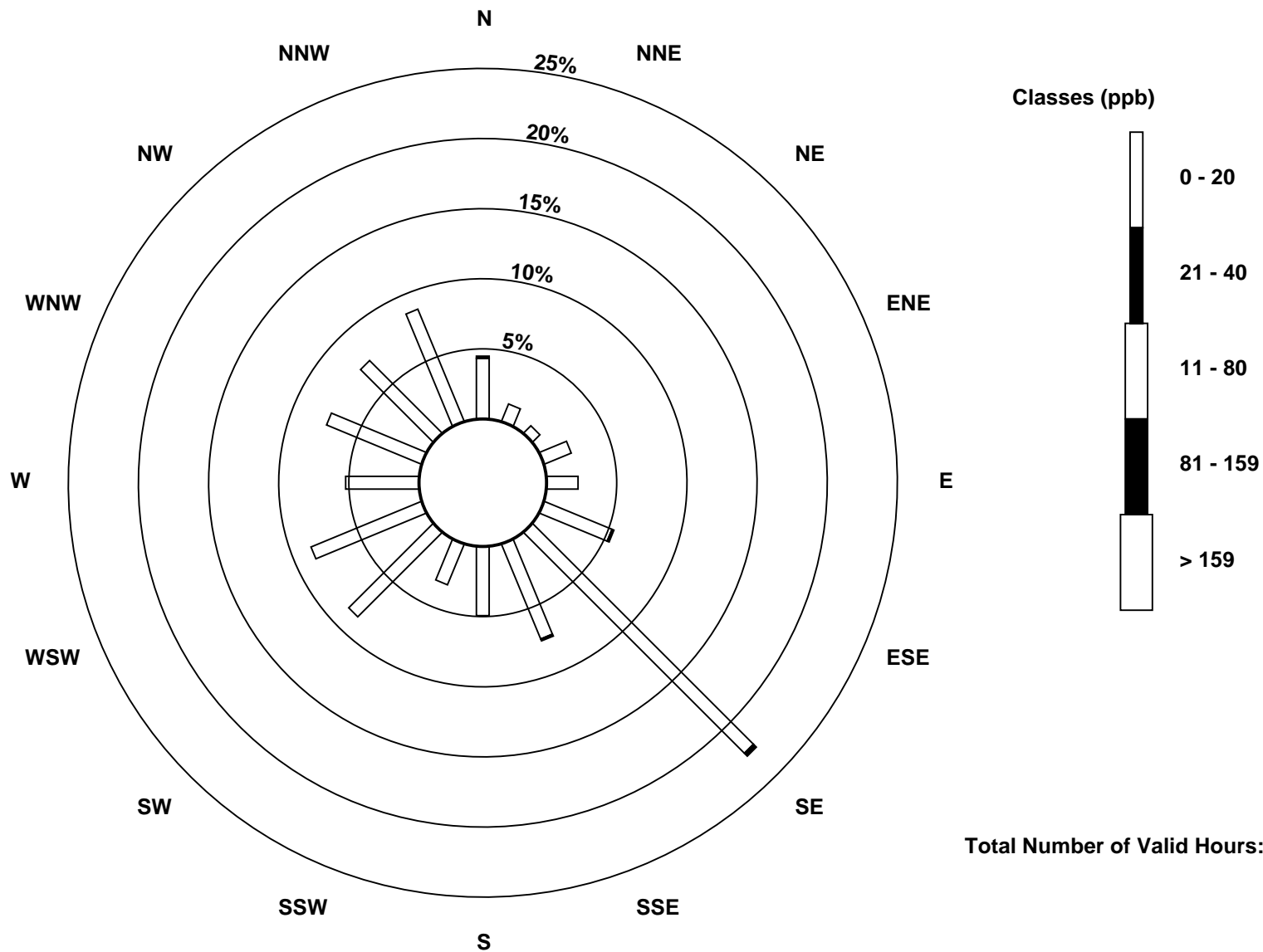
Total Number of Valid Hours: 669

Total Number of Hours: 720

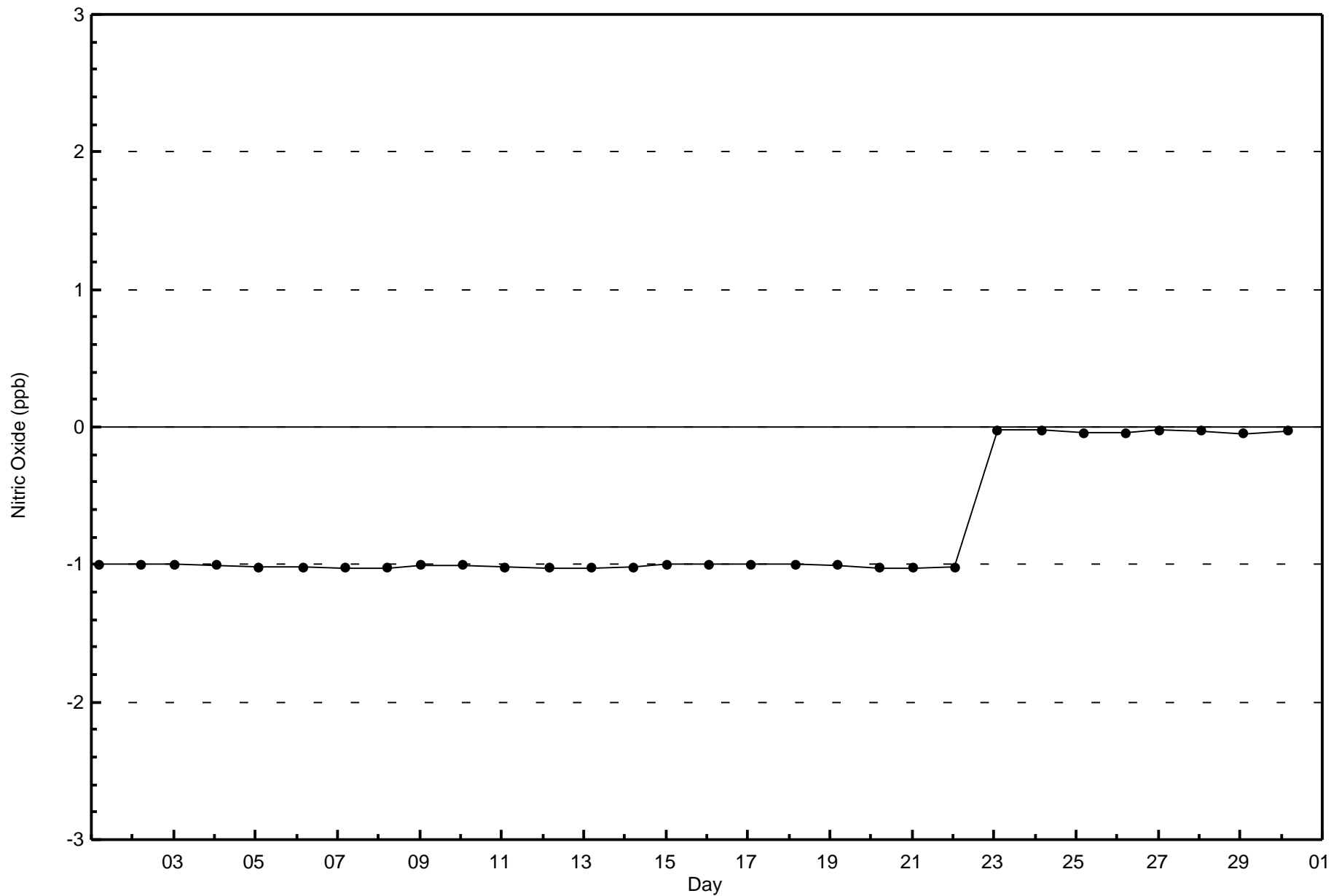


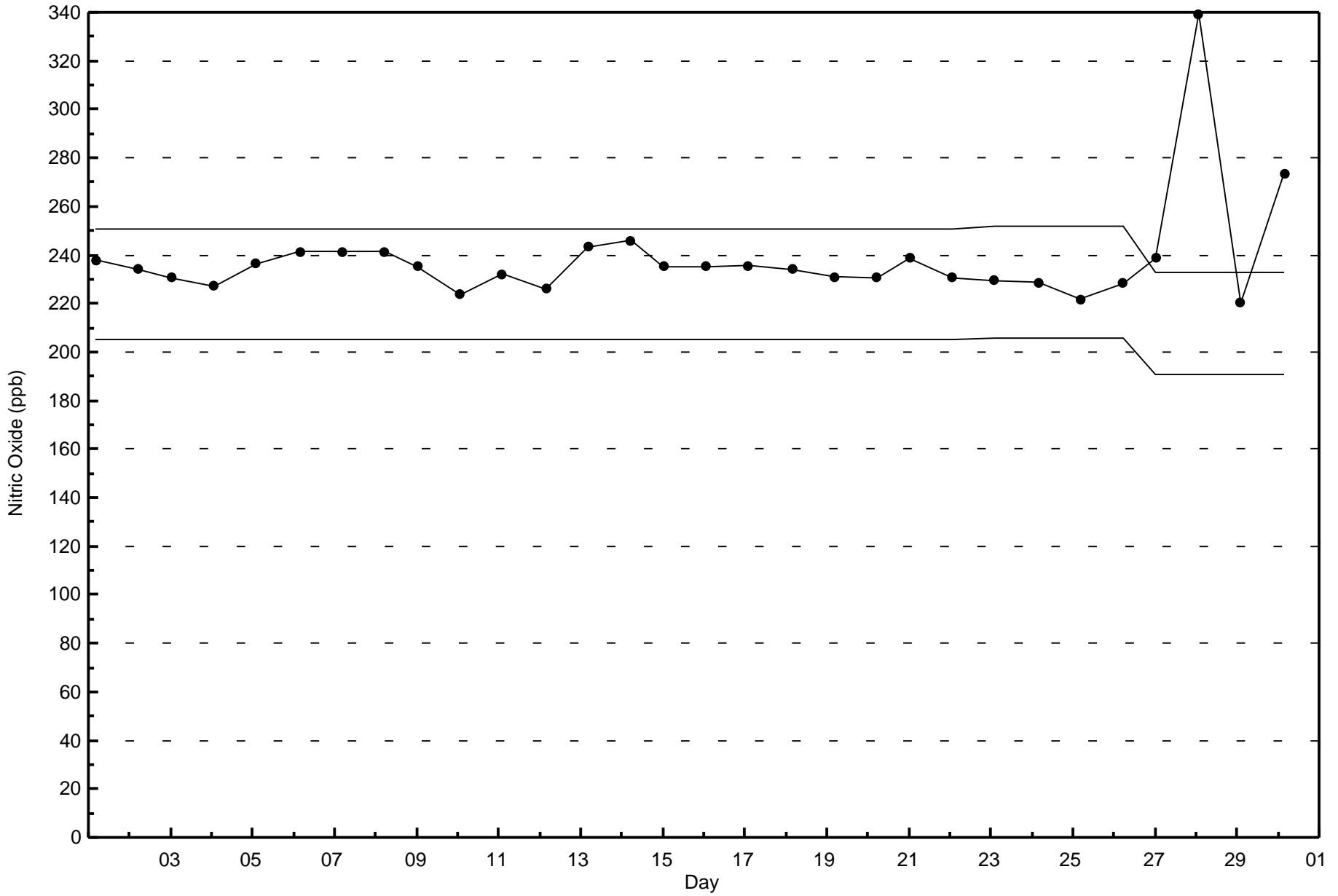
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 669







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Athabasca Valley - September 2016

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 23 ppb on Sep 21 21:00 | Maximum Daily Average: 11.9 ppb on Sep 28 |
| Minimum Value: 0 ppb on Sep 4 00:00 | Hours of Data: 669 |
| Maximum Diurnal Average: 8.1 ppb at hour 20 | Hours of Missing Data: 51 |
| Monthly Average: 4.6 ppb | Hours of Calibration: 46 |
| Minimum Daily Average: 0.7 ppb on Sep 3 | Percent Operational Time: 99.3 |
| Minimum Diurnal Average: 1.8 ppb at hour 14 | |
| Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 4 Q ₃ = 6 P ₉₀ = 10 P ₉₉ = 19 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 4 | 3 | 2 | 4 | Z | 4 | 5 | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 2 | 4 | 3 | 1 | 1 | 1 | 2.2 | 5 |
| 2-Sep | 1 | 3 | 2 | 3 | 6 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1.6 | 6 |
| 3-Sep | Z | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.7 | 2 |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 6 | 3 | 2 | 2 | 1.3 | 6 |
| 5-Sep | 2 | 2 | Z | 4 | 3 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 7 | 6 | 4 | 3 | 3 | 2.6 | 7 |
| 6-Sep | 4 | 4 | 2 | Z | 6 | 9 | 7 | 6 | 4 | 3 | 2 | 3 | 2 | 4 | 5 | 6 | 6 | 5 | 9 | 15 | 11 | 8 | 5 | 6 | 5.7 | 15 |
| 7-Sep | 5 | 6 | 6 | 4 | Z | 5 | 6 | 4 | 5 | 4 | 4 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 5 | 2 | 8 | 6 | 9 | 6 | 4.4 | 9 |
| 8-Sep | 10 | 7 | 6 | 7 | 9 | Z | 8 | 5 | 5 | 3 | 2 | 1 | 2 | 1 | 3 | 5 | 4 | 5 | 5 | 8 | 14 | 10 | 7 | 6 | 5.7 | 14 |
| 9-Sep | Z | 3 | 3 | 2 | 4 | 7 | 7 | 5 | 3 | 5 | 5 | 5 | 3 | 2 | 2 | 1 | 1 | 5 | 11 | 8 | 5 | 4 | 3 | 3 | 4.1 | 11 |
| 10-Sep | 3 | Z | 2 | 2 | 3 | 5 | 6 | 5 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1.9 | 6 |
| 11-Sep | 0 | 1 | Z | 2 | 2 | 4 | 5 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 4 | 6 | 6 | 2 | 3 | 6 | 4 | 4 | 2 | 1 | 2.7 | 6 |
| 12-Sep | 1 | 1 | 0 | Z | 3 | 4 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 19 | 21 | 17 | 14 | 12 | 7 | 5.2 | 21 |
| 13-Sep | 6 | 6 | 8 | 9 | Z | 9 | 12 | 9 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 0 | 3 | 3 | 3.6 | 12 |
| 14-Sep | 5 | 5 | 5 | 6 | 6 | Z | 6 | 7 | 6 | 5 | 4 | 3 | 4 | 2 | 2 | 1 | 1 | 2 | 5 | 8 | 11 | 9 | 7 | 6 | 5.0 | 11 |
| 15-Sep | Z | 5 | 3 | 3 | 4 | 4 | 4 | 6 | 6 | 1 | 1 | 3 | 3 | 2 | 2 | 1 | 2 | 7 | 7 | 6 | 5 | 5 | 4 | 5 | 3.8 | 7 |
| 16-Sep | 5 | Z | 6 | 9 | 5 | 7 | 8 | 8 | 9 | 10 | 9 | 7 | 4 | 1 | 1 | 1 | 2 | 2 | 10 | 13 | 9 | 9 | 9 | 9 | 6.6 | 13 |
| 17-Sep | 9 | 5 | Z | 2 | 3 | 3 | 7 | 11 | 12 | 10 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 5 | 4 | 6 | 13 | 11 | 5.0 | 13 |
| 18-Sep | 8 | 7 | 7 | Z | 9 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 4 | 3 | 3 | 2.9 | 9 |
| 19-Sep | 3 | 4 | 2 | 1 | Z | 3 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 4 | 7 | 6 | 4 | 1 | 2.5 | 7 |
| 20-Sep | 3 | 4 | 2 | 6 | 13 | Z | 10 | 6 | 4 | 3 | 4 | 4 | 4 | 5 | 6 | 7 | 9 | 11 | 14 | 16 | 16 | 11 | 9 | 9 | 7.6 | 16 |
| 21-Sep | Z | 4 | 4 | 4 | 5 | 6 | 8 | 7 | 6 | 4 | 4 | 2 | 1 | 1 | 2 | 3 | 3 | 6 | 12 | 22 | 23 | 15 | 13 | 14 | 7.2 | 23 |
| 22-Sep | 9 | Z | 3 | 4 | 5 | 7 | 8 | C | C | C | C | C | C | 2 | 3 | 3 | 8 | 8 | 15 | 20 | 12 | 13 | 6 | 5 | -- | 20 |
| 23-Sep | 6 | 5 | Z | 5 | 6 | 8 | 8 | 7 | 6 | 5 | 7 | 7 | 5 | 5 | 9 | 11 | 6 | 7 | 5 | 5 | 4 | 4 | 3 | 3 | 6.0 | 11 |
| 24-Sep | 3 | 4 | 4 | Z | 5 | 8 | 10 | 8 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 0 | 1 | 0 | 0 | 2.6 | 10 |
| 25-Sep | 0 | 0 | 0 | 1 | Z | 3 | 2 | 2 | C | C | C | C | C | 0 | 0 | 1 | 1 | 7 | 13 | 9 | 7 | 13 | 13 | 8 | 4.5 | 13 |
| 26-Sep | 8 | 4 | 3 | 3 | 4 | Z | 6 | 5 | 4 | 4 | 5 | 6 | 8 | M | M | M | M | M | 17 | 18 | 13 | 15 | 6 | 6 | 7.5 | 18 |
| 27-Sep | Z | 5 | 5 | 6 | 12 | 5 | 4 | 4 | 5 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 3 | 2 | 1 | 1 | 1 | 2 | 3.0 | 12 |
| 28-Sep | 2 | Z | 15 | 15 | 14 | 17 | 22 | 14 | C | C | C | C | C | 2 | 2 | 3 | 4 | 12 | 19 | 12 | 16 | 16 | 17 | 14 | 11.9 | 22 |
| 29-Sep | 7 | 5 | Z | 5 | 5 | 6 | 9 | 9 | 6 | 8 | 7 | 6 | 4 | 4 | 3 | 3 | 6 | 13 | 19 | 12 | 9 | 8 | 13 | 11 | 7.6 | 19 |
| 30-Sep | 10 | 9 | 10 | Z | 11 | 10 | 14 | 18 | 14 | 6 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 3 | 3 | 3 | 3 | 6.6 | 18 |

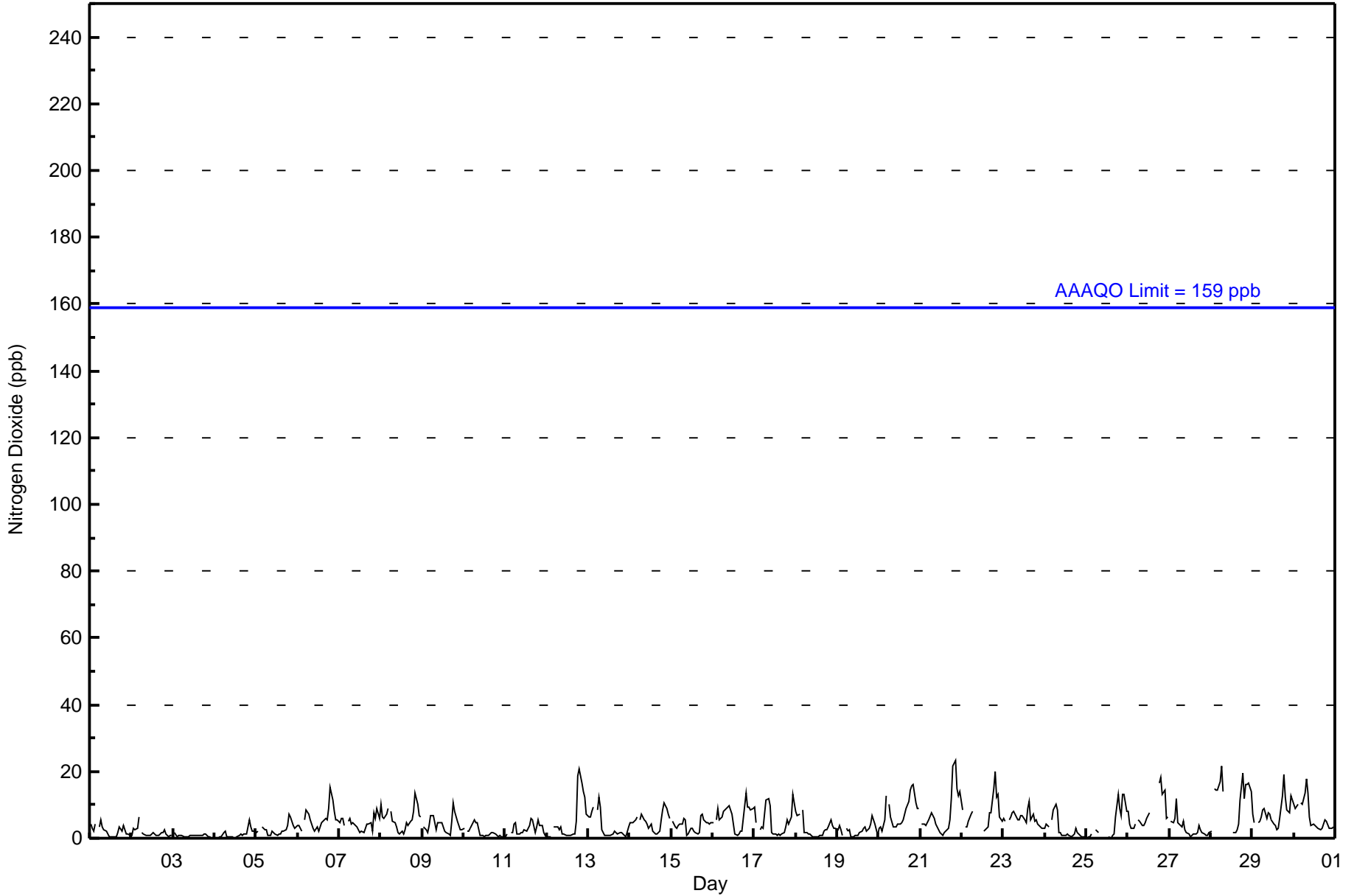
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 4.5 | 4.1 | 4.1 | 4.3 | 5.7 | 5.5 | 6.5 | 5.5 | 4.1 | 3.2 | 2.6 | 2.5 | 2.2 | 1.8 | 2.0 | 2.6 | 2.9 | 4.4 | 7.4 | 8.1 | 7.4 | 6.4 | 5.7 | 5.0 | Diurnal Average | |
| 10 | 9 | 15 | 15 | 14 | 17 | 22 | 18 | 14 | 10 | 9 | 7 | 8 | 5 | 9 | 11 | 9 | 13 | 19 | 22 | 23 | 16 | 17 | 14 | 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
Athabasca Valley - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 665 | 99.40 | 99.40 |
| 21 - 40 | 4 | 0.60 | 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
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 30 | 9 | 5 | 14 | 15 | 36 | 149 | 48 | 33 | 21 | 57 | 57 | 35 | 49 | 49 | 58 | 665 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 30 | 9 | 5 | 14 | 15 | 36 | 151 | 50 | 33 | 21 | 57 | 57 | 35 | 49 | 49 | 58 | 669 |

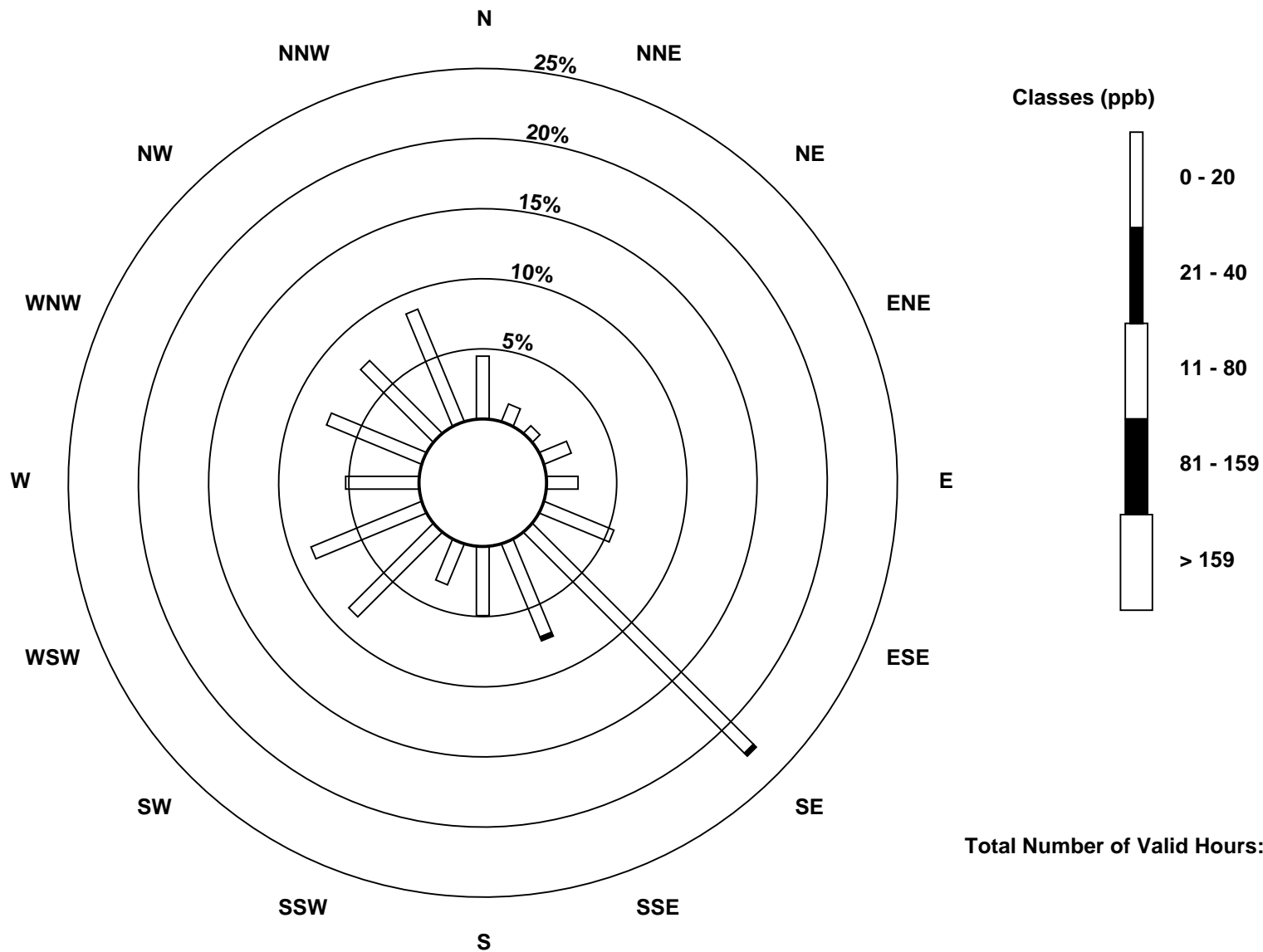
Total Number of Valid Hours: 669

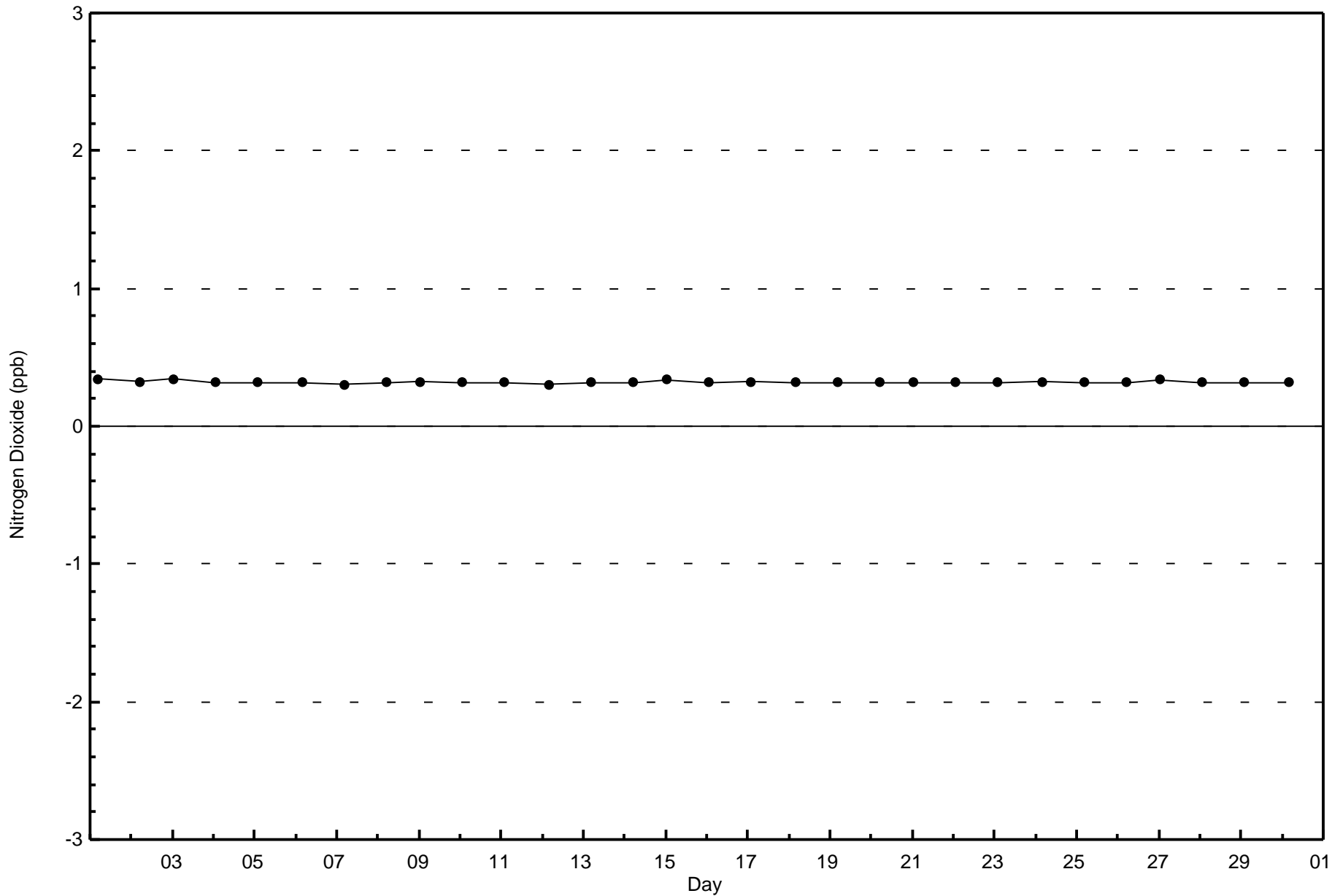
Total Number of Hours: 720

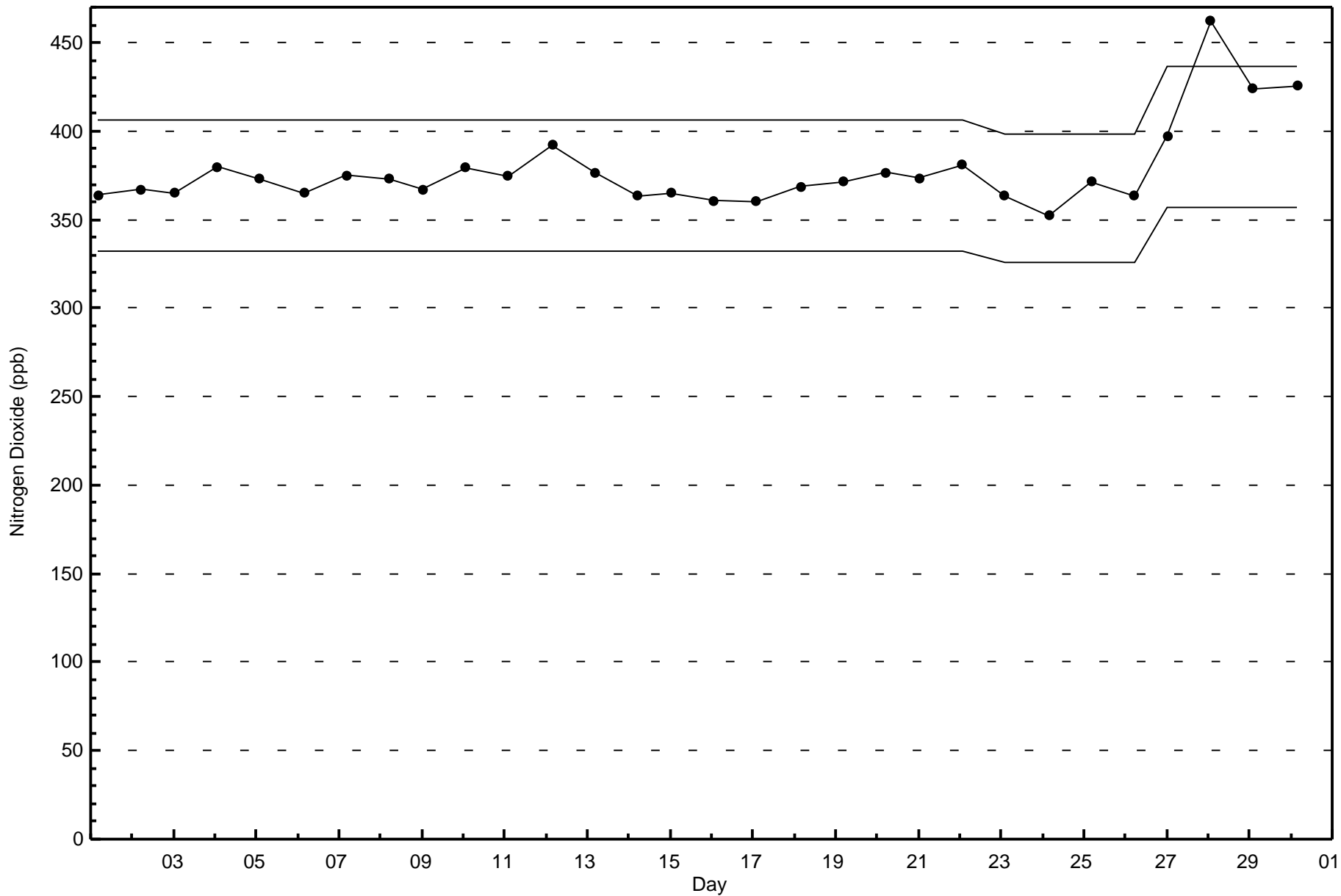


Wood Buffalo Environmental Association
Wind Rose Sep 2016

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









Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - September 2016

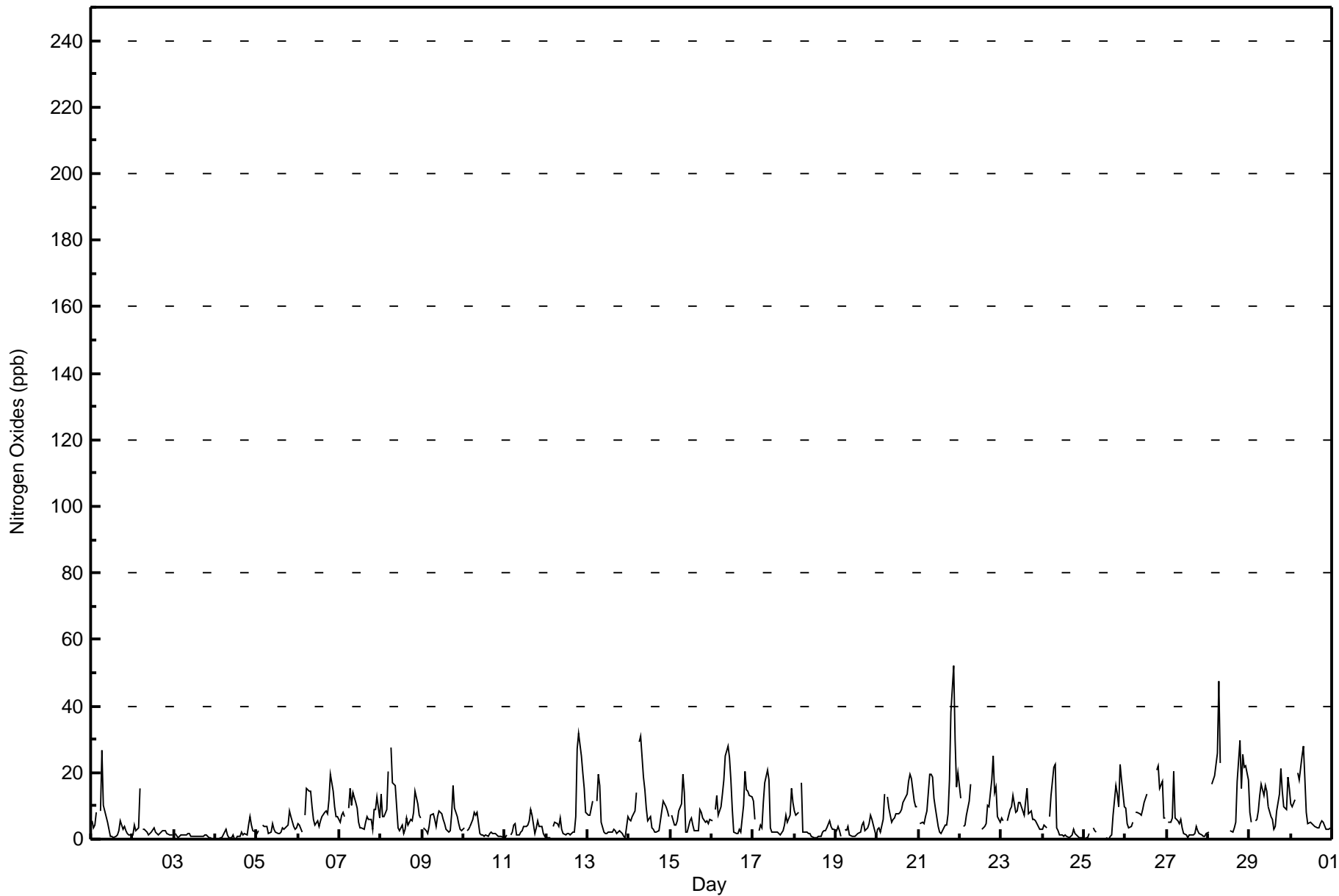
| Maximum Value: 52 ppb on Sep 21 21:00 | | Maximum Daily Average: 17.4 ppb on Sep 28 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 4 00:00 | | Minimum Daily Average: 1.0 ppb on Sep 3 | | Hours of Data: 669 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 13.0 ppb at hour 7 | | Minimum Diurnal Average: 2.7 ppb at hour 14 | | Hours of Missing Data: 51 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 6.7 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 9 P ₉₀ = 16 P ₉₉ = 30 | | Hours of Calibration: 46 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 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 | 5 | 3 | 4 | 8 | Z | 9 | 27 | 10 | 8 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 5 | 3 | 4 | 3 | 2 | 1 | 1 | 4.7 | 27 |
| 2-Sep | 1 | 4 | 3 | 3 | 15 | Z | 3 | 3 | 2 | 1 | 2 | 2 | 4 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2.7 | 15 |
| 3-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.0 | 2 |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 2 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 1 | 4 | 7 | 4 | 3 | 2 | 1.6 | 7 |
| 5-Sep | 2 | 2 | Z | 4 | 4 | 4 | 4 | 2 | 2 | 5 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 8 | 7 | 4 | 3 | 3 | 3.4 | 8 |
| 6-Sep | 4 | 4 | 2 | Z | 7 | 15 | 14 | 14 | 10 | 6 | 4 | 6 | 4 | 6 | 7 | 8 | 9 | 8 | 12 | 19 | 14 | 10 | 7 | 7 | 8.5 | 19 |
| 7-Sep | 5 | 7 | 8 | 7 | Z | 9 | 15 | 10 | 14 | 11 | 9 | 5 | 4 | 3 | 3 | 5 | 7 | 6 | 6 | 3 | 9 | 9 | 13 | 6 | 7.6 | 15 |
| 8-Sep | 13 | 7 | 7 | 9 | 20 | Z | 27 | 17 | 16 | 10 | 4 | 2 | 4 | 2 | 3 | 6 | 4 | 6 | 6 | 8 | 14 | 11 | 7 | 6 | 9.2 | 27 |
| 9-Sep | Z | 3 | 3 | 2 | 4 | 7 | 8 | 6 | 4 | 7 | 8 | 8 | 6 | 5 | 3 | 2 | 2 | 8 | 16 | 10 | 7 | 5 | 3 | 3 | 5.5 | 16 |
| 10-Sep | 3 | Z | 3 | 3 | 4 | 6 | 8 | 7 | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 2.6 | 8 |
| 11-Sep | 0 | 1 | Z | 1 | 2 | 4 | 4 | 1 | 1 | 2 | 2 | 4 | 4 | 4 | 6 | 9 | 7 | 2 | 3 | 6 | 4 | 4 | 2 | 1 | 3.2 | 9 |
| 12-Sep | 0 | 0 | 0 | Z | 4 | 5 | 4 | 4 | 6 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 7 | 27 | 32 | 25 | 20 | 15 | 8 | 7.5 | 32 |
| 13-Sep | 7 | 7 | 9 | 11 | Z | 11 | 19 | 16 | 5 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 7 | 5.2 | 19 | |
| 14-Sep | 6 | 6 | 7 | 9 | 14 | Z | 29 | 31 | 19 | 15 | 9 | 6 | 7 | 3 | 3 | 2 | 2 | 2 | 6 | 8 | 12 | 10 | 8 | 7 | 9.5 | 31 |
| 15-Sep | Z | 7 | 4 | 4 | 5 | 8 | 10 | 20 | 14 | 2 | 2 | 5 | 6 | 4 | 3 | 3 | 2 | 9 | 8 | 6 | 5 | 5 | 6 | 6.3 | 20 | |
| 16-Sep | 6 | Z | 9 | 13 | 7 | 10 | 14 | 18 | 25 | 28 | 24 | 18 | 9 | 2 | 2 | 2 | 3 | 2 | 10 | 20 | 15 | 14 | 13 | 13 | 12.0 | 28 |
| 17-Sep | 11 | 6 | Z | 3 | 4 | 4 | 11 | 17 | 21 | 18 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 4 | 7 | 5 | 7 | 15 | 11 | 7.0 | 21 |
| 18-Sep | 8 | 7 | 8 | Z | 17 | 2 | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 4 | 3 | 3 | 3.5 | 17 |
| 19-Sep | 3 | 4 | 2 | 1 | Z | 3 | 2 | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 5 | 2 | 3 | 5 | 7 | 6 | 4 | 1 | 2.8 | 7 |
| 20-Sep | 3 | 3 | 2 | 6 | 14 | Z | 13 | 9 | 5 | 6 | 6 | 8 | 8 | 8 | 9 | 11 | 12 | 13 | 17 | 20 | 18 | 11 | 10 | 10 | 9.6 | 20 |
| 21-Sep | Z | 5 | 5 | 5 | 7 | 9 | 20 | 20 | 19 | 12 | 9 | 4 | 2 | 2 | 3 | 4 | 4 | 8 | 18 | 38 | 52 | 30 | 16 | 20 | 13.4 | 52 |
| 22-Sep | 12 | Z | 4 | 4 | 7 | 11 | 16 | C | C | C | C | C | C | 3 | 4 | 5 | 10 | 10 | 18 | 25 | 14 | 16 | 7 | 5 | -- | 25 |
| 23-Sep | 6 | 5 | Z | 6 | 7 | 9 | 10 | 13 | 8 | 9 | 11 | 11 | 8 | 7 | 11 | 15 | 7 | 9 | 6 | 6 | 6 | 4 | 3 | 3 | 7.8 | 15 |
| 24-Sep | 3 | 4 | 4 | Z | 7 | 13 | 21 | 23 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 0 | 4.2 | 23 |
| 25-Sep | 0 | 1 | 0 | 2 | Z | 3 | 3 | 2 | C | C | C | C | C | 0 | 0 | 1 | 1 | 7 | 16 | 14 | 10 | 22 | 18 | 10 | 6.1 | 22 |
| 26-Sep | 9 | 5 | 3 | 4 | 5 | Z | 8 | 8 | 8 | 7 | 9 | 11 | 14 | M | M | M | M | M | 21 | 22 | 15 | 17 | 6 | 6 | 10.0 | 22 |
| 27-Sep | Z | 5 | 5 | 6 | 20 | 6 | 5 | 5 | 6 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 3 | 2 | 1 | 1 | 1 | 2 | 3.7 | 20 |
| 28-Sep | 2 | Z | 17 | 18 | 19 | 26 | 47 | 23 | C | C | C | C | C | 3 | 2 | 3 | 5 | 17 | 30 | 15 | 25 | 21 | 22 | 18 | 17.4 | 47 |
| 29-Sep | 8 | 5 | Z | 5 | 6 | 8 | 13 | 17 | 13 | 16 | 15 | 10 | 7 | 6 | 3 | 4 | 8 | 14 | 21 | 14 | 10 | 9 | 19 | 15 | 10.7 | 21 |
| 30-Sep | 11 | 10 | 12 | Z | 20 | 18 | 25 | 28 | 18 | 8 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 9.0 | 28 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.3 13 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.6 10 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.8 17 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.4 18 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.8 20 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.2 26 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 13.0 47 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 11.4 31 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.9 25 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 6.8 28 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.2 24 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.4 18 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.8 14 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.7 8 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.9 11 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.7 15 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.0 12 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.6 17 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.3 30 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 10.4 38 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.9 52 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.4 30 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 7.0 22 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.9 20 | | |

Z - zerospan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 639 | 95.52 | 95.52 |
| 21 - 40 | 28 | 4.19 | 99.70 |
| 41 - 80 | 2 | 0.30 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 669

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 28 | 9 | 4 | 14 | 15 | 32 | 138 | 42 | 33 | 21 | 57 | 57 | 35 | 48 | 49 | 57 | 639 |
| 21 - 40 | 2 | 0 | 1 | 0 | 0 | 4 | 12 | 7 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 28 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 9 | 5 | 14 | 15 | 36 | 151 | 50 | 33 | 21 | 57 | 57 | 35 | 49 | 49 | 58 | 669 |

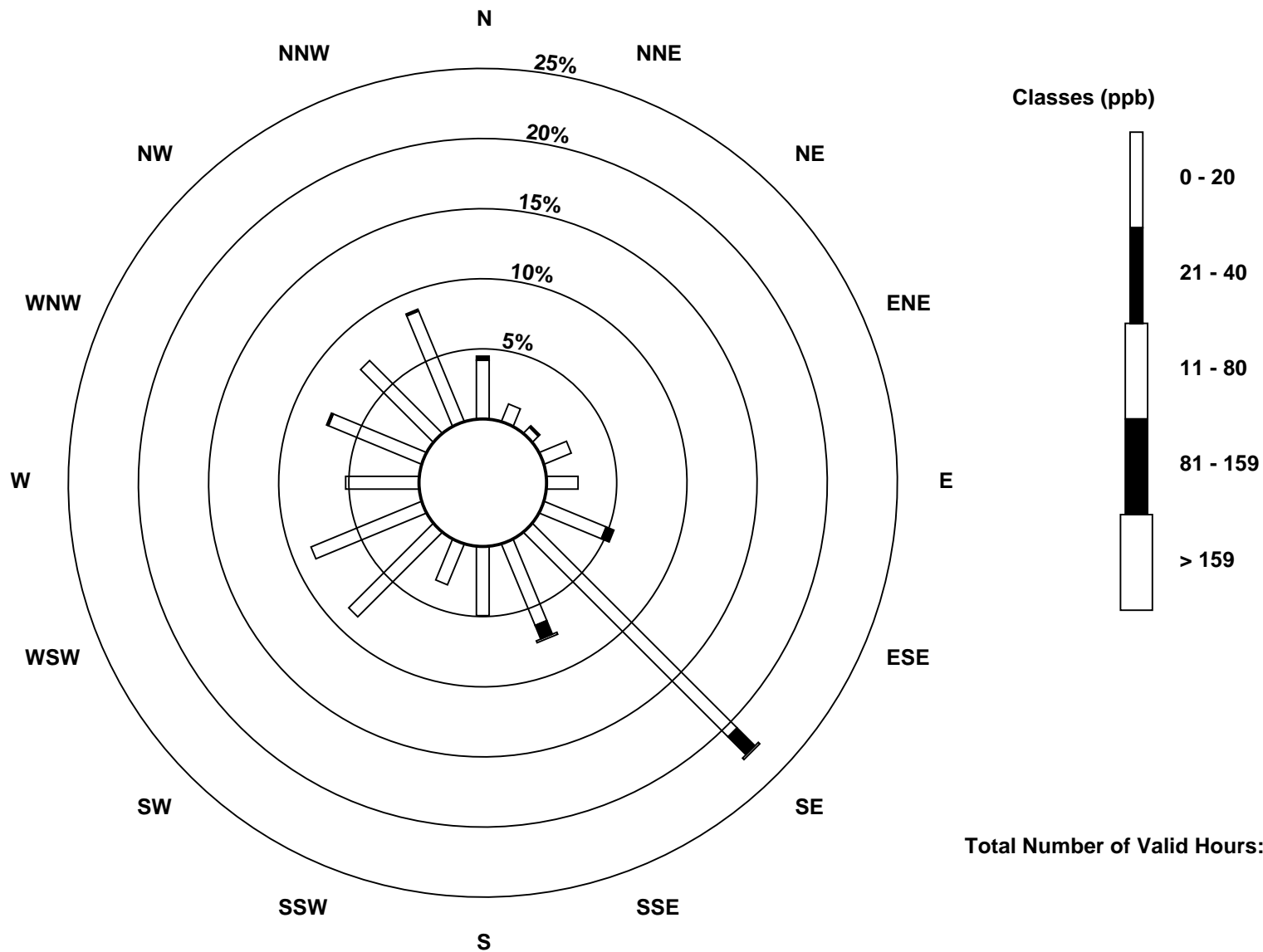
Total Number of Valid Hours: 669

Total Number of Hours: 720

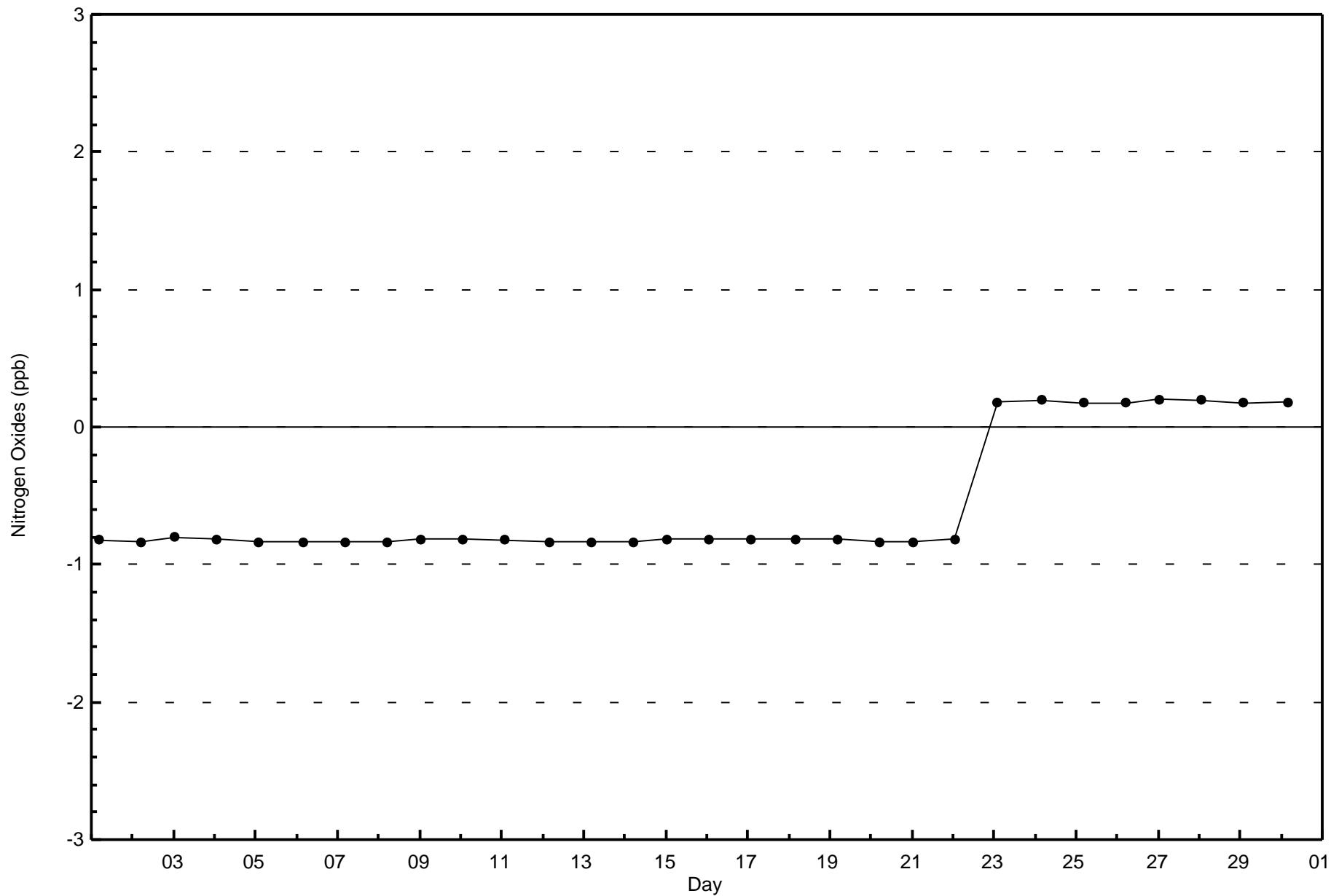


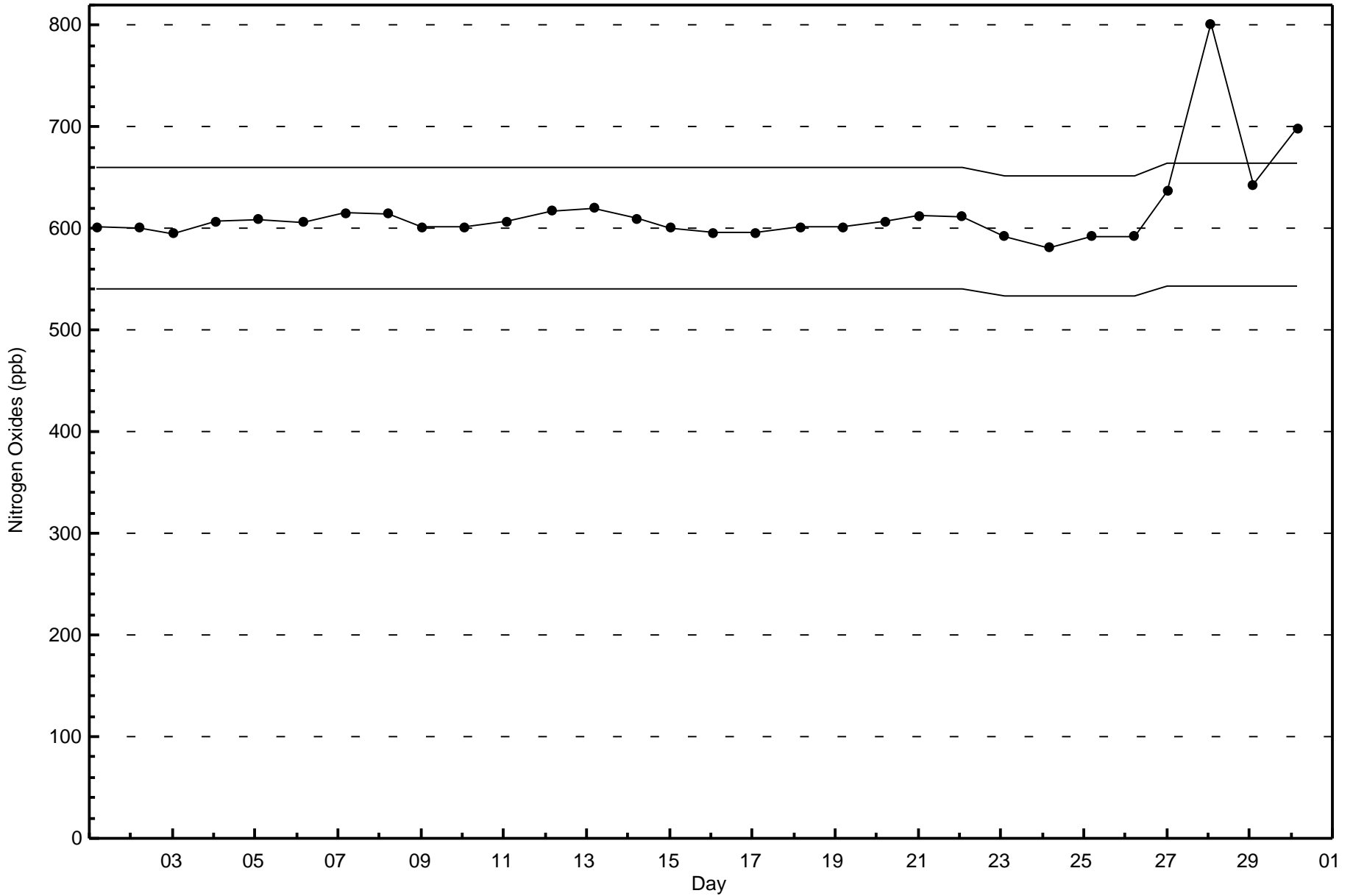
Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 669







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Athabasca Valley - September 2016

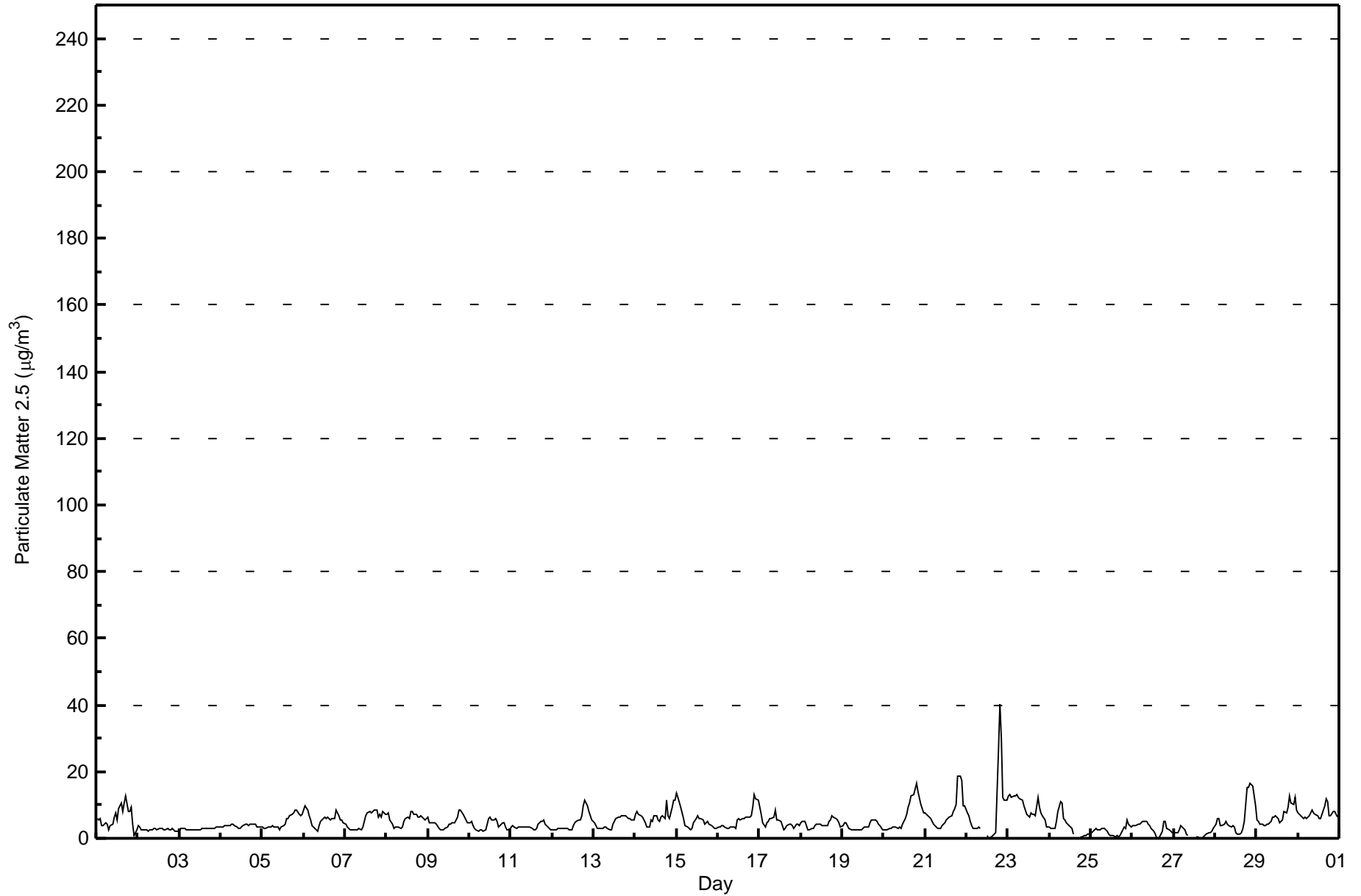
| Number of Exceedences (AAAQO): 24-hr: 0 Maximum Value: 40.1 µg/m ³ on Sep 22 20:00 Minimum Value: 0.0 µg/m ³ on Sep 26 16:00 Maximum Diurnal Average: 8.2 µg/m ³ at hour 20 Monthly Average: 5.12 µg/m ³ | | Maximum Daily Average: 9.2 µg/m ³ on Sep 23 Minimum Daily Average: 1.6 µg/m ³ on Sep 27 Minimum Diurnal Average: 3.8 µg/m ³ at hour 9 Percentiles: P ₁ = 0.4 P ₁₀ = 2.4 Q ₁ = 3.0 Median = 4.2 Q ₃ = 6.3 P ₉₀ = 8.6 P ₉₉ = 16.3 | | Hours in Service: 720 Hours of Data: 710 Hours of Missing Data: 10 Hours of Calibration: 3 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 | 5.9 | 5.6 | 5.8 | 3.9 | 3.9 | 4.5 | 4.4 | 2.5 | 3.8 | 4.3 | 6.3 | 7.5 | 5.6 | 8.7 | 10.8 | 8.0 | 10.5 | 12.6 | 8.0 | 8.1 | 9.2 | 4.3 | 1.0 | 2.6 | 6.2 | 12.6 |
| 2-Sep | 3.6 | 3.4 | 2.4 | 2.4 | 2.6 | 2.3 | 2.2 | 2.4 | 2.7 | 2.8 | 2.8 | 2.6 | 2.8 | 2.8 | 2.8 | 2.4 | 2.7 | 2.8 | 2.5 | 2.4 | 2.8 | 2.3 | 2.2 | 2.1 | 2.6 | 3.6 |
| 3-Sep | 2.0 | 3.0 | 3.0 | 2.8 | 2.7 | 2.7 | 2.6 | 2.7 | 2.8 | 2.6 | 2.5 | 2.5 | 2.6 | 2.9 | 2.9 | 3.0 | 2.9 | 2.9 | 3.0 | 3.0 | 3.1 | 3.2 | 3.2 | 3.2 | 2.8 | 3.2 |
| 4-Sep | 3.4 | 3.4 | 3.6 | 3.7 | 3.8 | 4.0 | 4.2 | 4.2 | 3.9 | 3.5 | 3.0 | 3.0 | 3.3 | 3.7 | 4.1 | 4.2 | 4.0 | 4.1 | 4.2 | 4.1 | 4.0 | 3.5 | 3.5 | 3.5 | 3.8 | 4.2 |
| 5-Sep | 3.5 | 3.0 | 2.8 | 3.2 | 3.3 | 3.5 | 3.6 | 3.6 | 3.4 | 3.2 | 2.8 | 3.3 | 3.9 | 4.3 | 5.9 | 6.0 | 6.7 | 7.3 | 7.7 | 8.4 | 8.4 | 7.3 | 6.7 | 7.0 | 5.0 | 8.4 |
| 6-Sep | 8.5 | 9.8 | 8.6 | 6.9 | 5.5 | 3.9 | 3.1 | 2.7 | 2.3 | 3.7 | 5.0 | 5.9 | 6.3 | 6.1 | 6.2 | 5.7 | 5.9 | 5.9 | 6.1 | 8.4 | 6.9 | 5.6 | 5.6 | 4.7 | 5.8 | 9.8 |
| 7-Sep | 4.2 | 3.4 | 2.8 | 2.7 | 2.6 | 2.5 | 2.7 | 2.8 | 3.0 | 2.6 | 3.3 | 5.1 | 6.9 | 7.7 | 7.9 | 7.6 | 7.9 | 8.5 | 8.3 | 6.2 | 7.3 | 6.2 | 7.9 | 7.1 | 5.3 | 8.5 |
| 8-Sep | 7.2 | 7.5 | 5.5 | 4.1 | 3.0 | 3.2 | 3.4 | 3.3 | 3.1 | 3.6 | 5.2 | 6.1 | 6.5 | 5.9 | 7.9 | 8.2 | 7.1 | 7.0 | 6.3 | 6.3 | 6.8 | 6.1 | 5.4 | 6.0 | 5.6 | 8.2 |
| 9-Sep | 6.2 | 4.8 | 4.5 | 4.7 | 4.6 | 4.1 | 3.0 | 2.7 | 2.6 | 2.6 | 2.8 | 3.4 | 4.3 | 4.3 | 4.7 | 4.9 | 5.4 | 6.2 | 8.3 | 8.3 | 7.3 | 6.3 | 5.5 | 4.8 | 4.8 | 8.3 |
| 10-Sep | 4.5 | 4.9 | 4.0 | 3.1 | 2.4 | 2.2 | 2.4 | 2.4 | 2.3 | 2.7 | 4.1 | 6.0 | 6.3 | 5.7 | 5.7 | 5.8 | 5.0 | 3.6 | 4.2 | 4.8 | 4.5 | 3.5 | 2.7 | 2.6 | 4.0 | 6.3 |
| 11-Sep | 3.3 | 3.7 | 3.3 | 3.1 | 3.4 | 3.4 | 3.5 | 3.5 | 3.3 | 3.2 | 3.5 | 3.6 | 3.0 | 2.6 | 2.6 | 3.0 | 4.4 | 5.2 | 5.1 | 5.6 | 4.2 | 3.4 | 2.8 | 2.5 | 3.6 | 5.6 |
| 12-Sep | 2.6 | 2.6 | 2.7 | 2.8 | 2.9 | 2.9 | 2.9 | 3.0 | 3.1 | 2.8 | 2.5 | 2.5 | 3.7 | 4.7 | 5.0 | 5.4 | 5.5 | 6.6 | 9.6 | 11.5 | 9.6 | 8.1 | 6.6 | 5.4 | 4.8 | 11.5 |
| 13-Sep | 4.5 | 3.8 | 2.8 | 2.8 | 2.9 | 3.0 | 3.3 | 3.2 | 2.9 | 2.7 | 2.7 | 4.4 | 5.2 | 5.7 | 6.2 | 6.5 | 6.7 | 6.7 | 6.8 | 6.2 | 6.0 | 5.7 | 5.5 | 5.6 | 4.7 | 6.8 |
| 14-Sep | 7.0 | 7.9 | 7.1 | 6.8 | 6.4 | 5.6 | 4.7 | 3.2 | 3.3 | 5.5 | 5.1 | 6.6 | 6.6 | 5.4 | 5.2 | 6.3 | 6.7 | 6.0 | 11.4 | 6.7 | 5.9 | 9.3 | 11.6 | 11.6 | 6.8 | 11.6 |
| 15-Sep | 13.4 | 12.4 | 9.4 | 7.6 | 5.8 | 3.9 | 3.2 | 3.1 | 2.3 | 3.2 | 4.5 | 6.0 | 6.6 | 5.8 | 6.1 | 5.6 | 4.4 | 4.6 | 5.0 | 4.3 | 3.6 | 3.2 | 3.1 | 3.0 | 5.4 | 13.4 |
| 16-Sep | 3.2 | 3.6 | 3.9 | 3.7 | 3.3 | 2.9 | 3.0 | 3.3 | 3.5 | 3.6 | 3.0 | 5.3 | 6.0 | 5.5 | 5.8 | 6.0 | 6.3 | 6.4 | 6.5 | 6.7 | 9.2 | 13.1 | 11.9 | 11.3 | 5.7 | 13.1 |
| 17-Sep | 9.1 | 7.0 | 4.5 | 3.4 | 4.6 | 5.3 | 5.7 | 6.1 | 6.5 | 8.4 | 5.4 | 5.4 | 5.1 | 3.9 | 2.4 | 2.9 | 3.7 | 4.1 | 4.2 | 3.8 | 3.1 | 4.3 | 4.3 | 4.0 | 4.9 | 9.1 |
| 18-Sep | 4.9 | 5.1 | 5.1 | 3.7 | 2.4 | 2.7 | 3.1 | 2.8 | 3.7 | 4.3 | 4.3 | 4.1 | 3.7 | 3.7 | 3.7 | 3.7 | 5.0 | 5.5 | 6.9 | 6.2 | 6.1 | 5.5 | 4.8 | 3.6 | 4.4 | 6.9 |
| 19-Sep | 3.8 | 4.7 | 4.9 | 3.7 | 3.1 | 2.6 | 2.6 | 2.7 | 2.6 | 2.5 | 2.5 | 2.6 | 2.9 | 3.3 | 3.5 | 3.3 | 4.7 | 5.4 | 5.5 | 5.5 | 4.9 | 4.2 | 3.7 | 2.5 | 3.7 | 5.5 |
| 20-Sep | 2.7 | 2.7 | 2.7 | 2.9 | 3.1 | 3.2 | 3.3 | 3.3 | 3.1 | 3.2 | 3.1 | 4.4 | 6.0 | 7.3 | 9.1 | 10.4 | 12.9 | 13.2 | 14.9 | 16.4 | 14.2 | 10.3 | 8.9 | 7.8 | 7.0 | 16.4 |
| 21-Sep | 7.7 | 7.1 | 6.5 | 5.9 | 5.2 | 4.3 | 3.2 | 2.9 | 2.9 | 3.0 | 3.7 | 4.7 | 5.5 | 5.8 | 6.5 | 6.9 | 8.1 | 8.9 | 10.0 | 18.8 | 18.6 | 17.4 | 9.7 | 9.6 | 7.6 | 18.8 |
| 22-Sep | 7.6 | 6.7 | 5.3 | 4.0 | 3.0 | 2.8 | 3.0 | 3.2 | 3.0 | C | C | C | 1.0 | 0.0 | 0.2 | 0.7 | 1.2 | 1.9 | 26.9 | 40.1 | 30.1 | 12.4 | 11.4 | 11.3 | 8.4 | 40.1 |
| 23-Sep | 12.9 | 13.1 | 12.3 | 12.5 | 12.9 | 13.2 | 12.1 | 11.9 | 11.3 | 9.8 | 8.4 | 7.2 | 6.3 | 7.7 | 7.0 | 7.0 | 6.8 | 12.2 | 9.5 | 7.8 | 7.0 | 5.3 | 3.4 | 3.6 | 9.2 | 13.2 |
| 24-Sep | 3.2 | 3.2 | 3.0 | 2.9 | 5.2 | 7.9 | 11.2 | 10.6 | 6.1 | 5.5 | 4.6 | 3.8 | 3.2 | 2.9 | 1.3 | UO | UO | UO | 0.6 | 0.6 | 1.0 | 1.0 | 1.1 | 1.3 | 3.8 | 11.2 |
| 25-Sep | 1.7 | 2.1 | 2.4 | 2.9 | 2.5 | 2.6 | 2.8 | 2.9 | 2.9 | 2.3 | 1.4 | 0.8 | 0.8 | 0.7 | 0.6 | 0.7 | 0.5 | 1.0 | 2.6 | 3.2 | 3.0 | 5.6 | 4.3 | 3.4 | 2.2 | 5.6 |
| 26-Sep | 3.9 | 3.7 | 3.9 | 4.1 | 4.4 | 4.6 | 4.9 | 5.2 | 4.9 | 4.2 | 3.9 | 2.8 | 2.2 | 1.4 | 0.2 | 0.0 | 0.6 | 2.3 | 4.9 | 5.2 | 3.0 | 2.4 | 2.1 | 1.8 | 3.2 | 5.2 |
| 27-Sep | 1.6 | 1.5 | 1.7 | 2.4 | 3.9 | 3.3 | 2.6 | 1.4 | 0.7 | UO | UO | UO | UO | 0.3 | 0.5 | 0.2 | 0.2 | 0.4 | 0.8 | 1.4 | 1.7 | 1.7 | 1.9 | 2.9 | 1.6 | 3.9 |
| 28-Sep | 4.4 | 5.9 | 5.9 | 3.7 | 4.0 | 4.4 | 5.2 | 4.4 | 3.8 | 3.3 | 3.8 | 3.3 | 1.8 | 1.2 | 1.1 | 1.8 | 2.8 | 5.2 | 15.2 | 15.4 | 16.7 | 16.3 | 15.5 | 9.7 | 6.4 | 16.7 |
| 29-Sep | 5.7 | 5.2 | 4.4 | 4.1 | 3.8 | 3.8 | 4.2 | 4.2 | 5.2 | 6.2 | 6.3 | 6.8 | 5.8 | 4.9 | 5.3 | 5.5 | 8.0 | 7.7 | 9.1 | 12.9 | 10.5 | 10.2 | 12.1 | 8.6 | 6.7 | 12.9 |
| 30-Sep | 7.6 | 7.2 | 6.6 | 6.1 | 6.4 | 5.9 | 6.9 | 7.5 | 8.4 | 7.6 | 7.1 | 6.8 | 6.0 | 5.8 | 7.4 | 9.6 | 11.8 | 10.9 | 6.8 | 6.7 | 7.9 | 8.2 | 7.3 | 6.4 | 7.5 | 11.8 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.3 13.4 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.3 13.1 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.7 12.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.2 12.5 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.1 12.9 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.0 13.2 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.1 12.1 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.9 11.9 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.8 11.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.0 9.8 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.1 8.4 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.5 7.5 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.5 6.9 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.4 8.7 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.6 10.8 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.9 10.4 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.5 12.9 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 6.0 13.2 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 7.4 26.9 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.2 40.1 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 7.6 30.1 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 6.5 17.4 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.9 15.5 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.3 11.6 | | |

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}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - September 2016**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 431 | 60.70 | 60.70 |
| 6 - 15 | 246 | 34.65 | 95.35 |
| 16 - 25 | 6 | 0.85 | 96.20 |
| 26 - 80 | 3 | 0.42 | 96.62 |
| > 81.0 | 0 | 0.00 | 96.62 |

Total Number of Valid Hours: 710

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 2016

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|------------------------------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 16 | 6 | 4 | 8 | 5 | 11 | 97 | 29 | 20 | 16 | 46 | 37 | 25 | 30 | 43 | 38 | 431 |
| 6 - 15 | 15 | 4 | 1 | 7 | 12 | 24 | 65 | 23 | 14 | 6 | 12 | 16 | 8 | 12 | 7 | 20 | 246 |
| 16 - 25 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 10 | 5 | 15 | 18 | 36 | 164 | 57 | 34 | 22 | 58 | 53 | 33 | 42 | 50 | 58 | 686 |

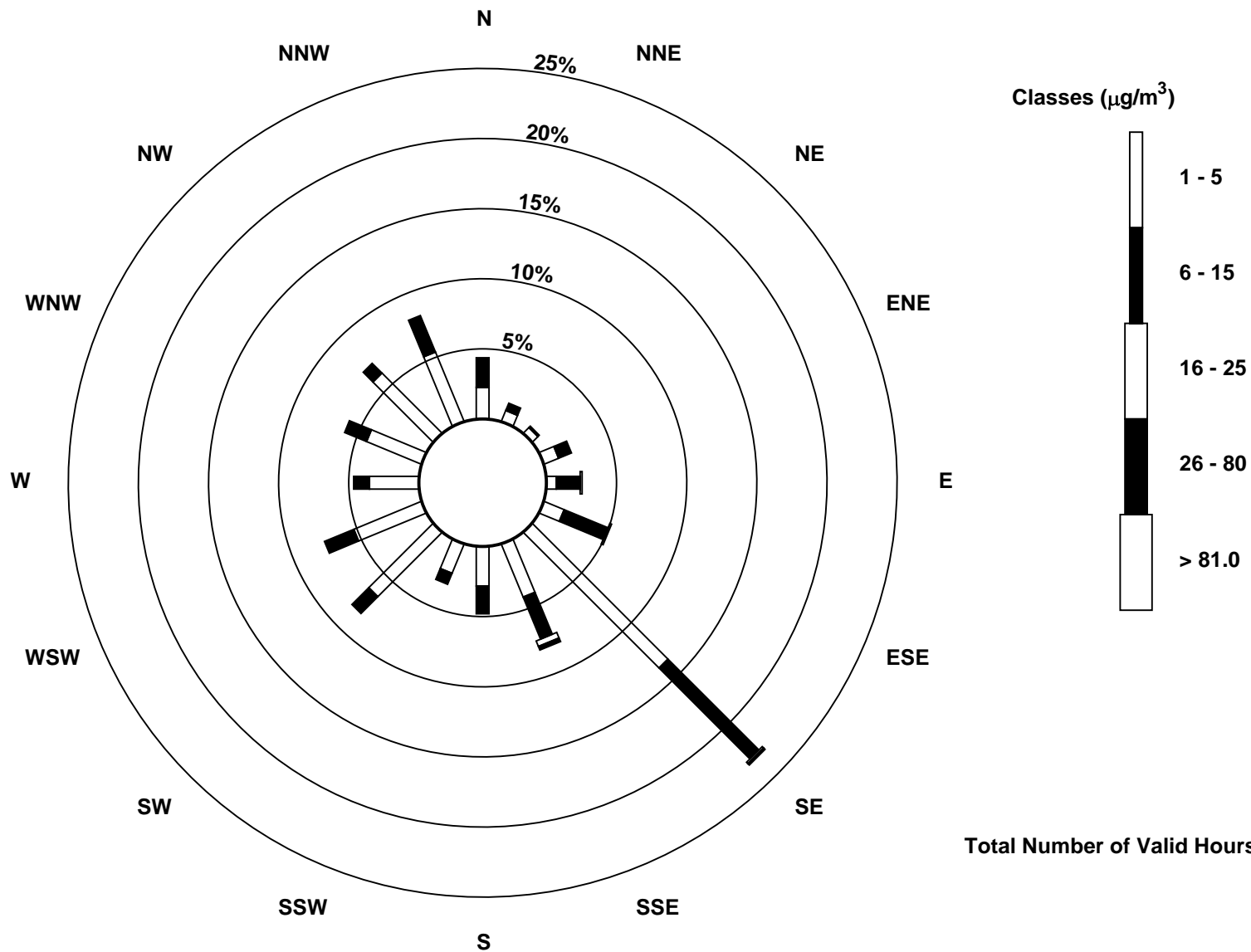
Total Number of Valid Hours: 709

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 709



Wood Buffalo Environmental Association

Summary of Hour Averages

Carbon Monoxide (CO) - ppm

Athabasca Valley - September 2016

| | | | | |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 0.5 ppm on Sep 21 21:00 | Maximum Daily Average: 0.1 ppm on Sep 16 | | Hours of Data: | 680 |
| Minimum Value: 0.0 ppm on Sep 12 15:00 | Minimum Daily Average: 0.1 ppm on Sep 4 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 0.1 ppm at hour 20 | Minimum Diurnal Average: 0.1 ppm at hour 15 | | Hours of Calibration: | 37 |
| Monthly Average: 0.09 ppm | Percentiles: $P_1 = 0.0$ $P_{10} = 0.0$ $Q_1 = 0.1$ Median = 0.1 $Q_3 = 0.1$ $P_{90} = 0.1$ $P_{99} = 0.2$ | | 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 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 2-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | C | C | C | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 3-Sep | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 4-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| 5-Sep | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| 6-Sep | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 7-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 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 |
| 8-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 9-Sep | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 10-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 |
| 11-Sep | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 12-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 13-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | Z | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 14-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 15-Sep | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 16-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 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 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| 17-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 |
| 18-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 19-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 20-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 21-Sep | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.5 | 0.3 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 |
| 22-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.2 | 0.1 | M | M | M | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| 23-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 24-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | Z | 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25-Sep | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.0 | 0.1 | 0.0 | C | C | C | C | C | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| 26-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 27-Sep | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 28-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 |
| 29-Sep | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| 30-Sep | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

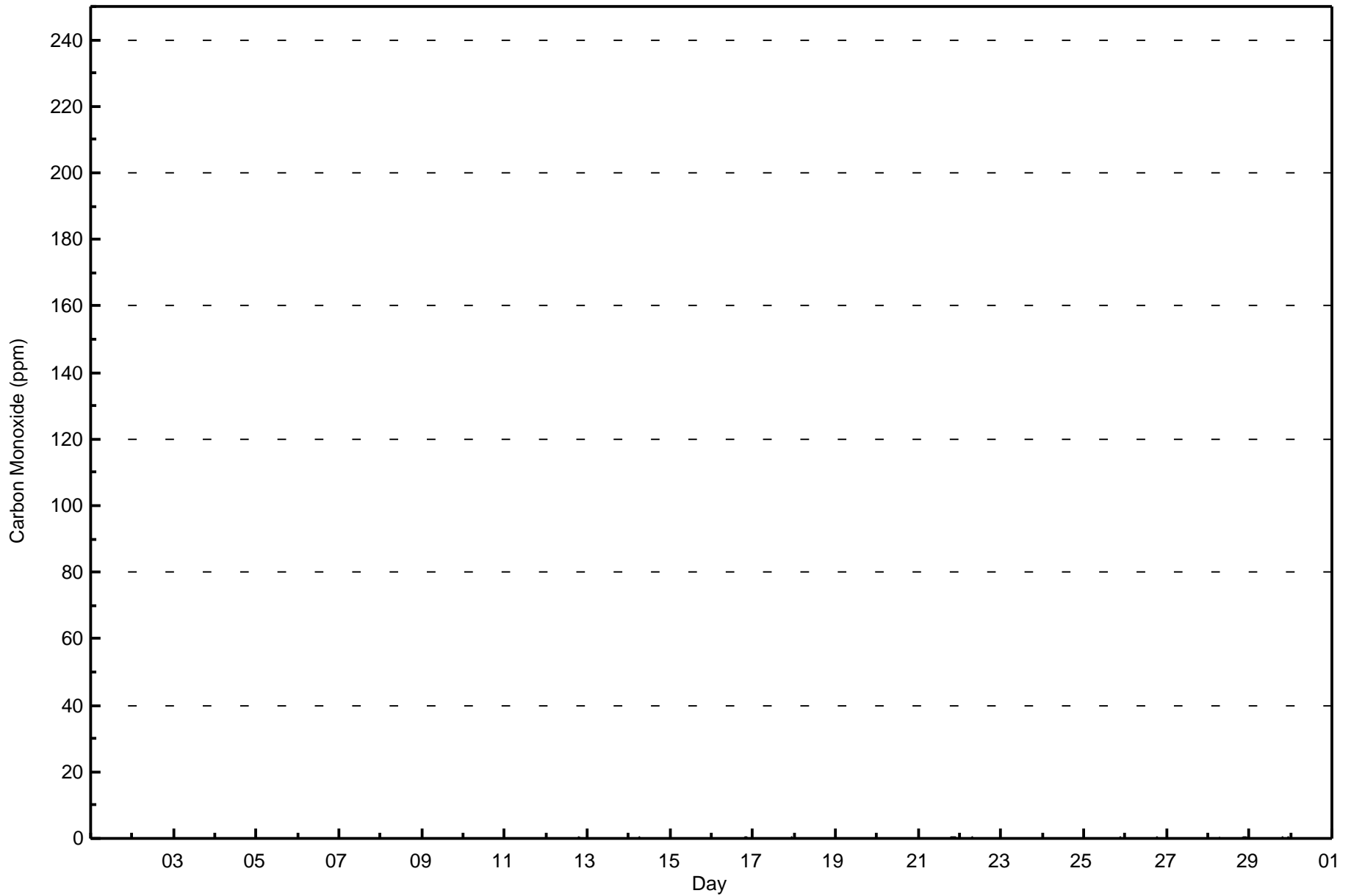
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Diurnal Average |
| 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.5 | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | Diurnal Maximum | |

Z - zeronspan C - Calibration M - Maintenance
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm



Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 678 | 99.71 | 99.71 |
| 0.4 - 0.5 | 2 | 0.29 | 100.00 |
| 0.6 - 0.7 | 0 | 0.00 | 100.00 |
| 0.8 - 1.4 | 0 | 0.00 | 100.00 |
| 1.5 - 10 | 0 | 0.00 | 100.00 |
| > 10 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.3 | 30 | 9 | 5 | 15 | 16 | 36 | 156 | 52 | 34 | 22 | 56 | 57 | 37 | 47 | 50 | 55 | 677 |
| 0.4 - 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 0.6 - 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0.8 - 1.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.5 - 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 9 | 5 | 15 | 16 | 36 | 156 | 54 | 34 | 22 | 56 | 57 | 37 | 47 | 50 | 55 | 679 |

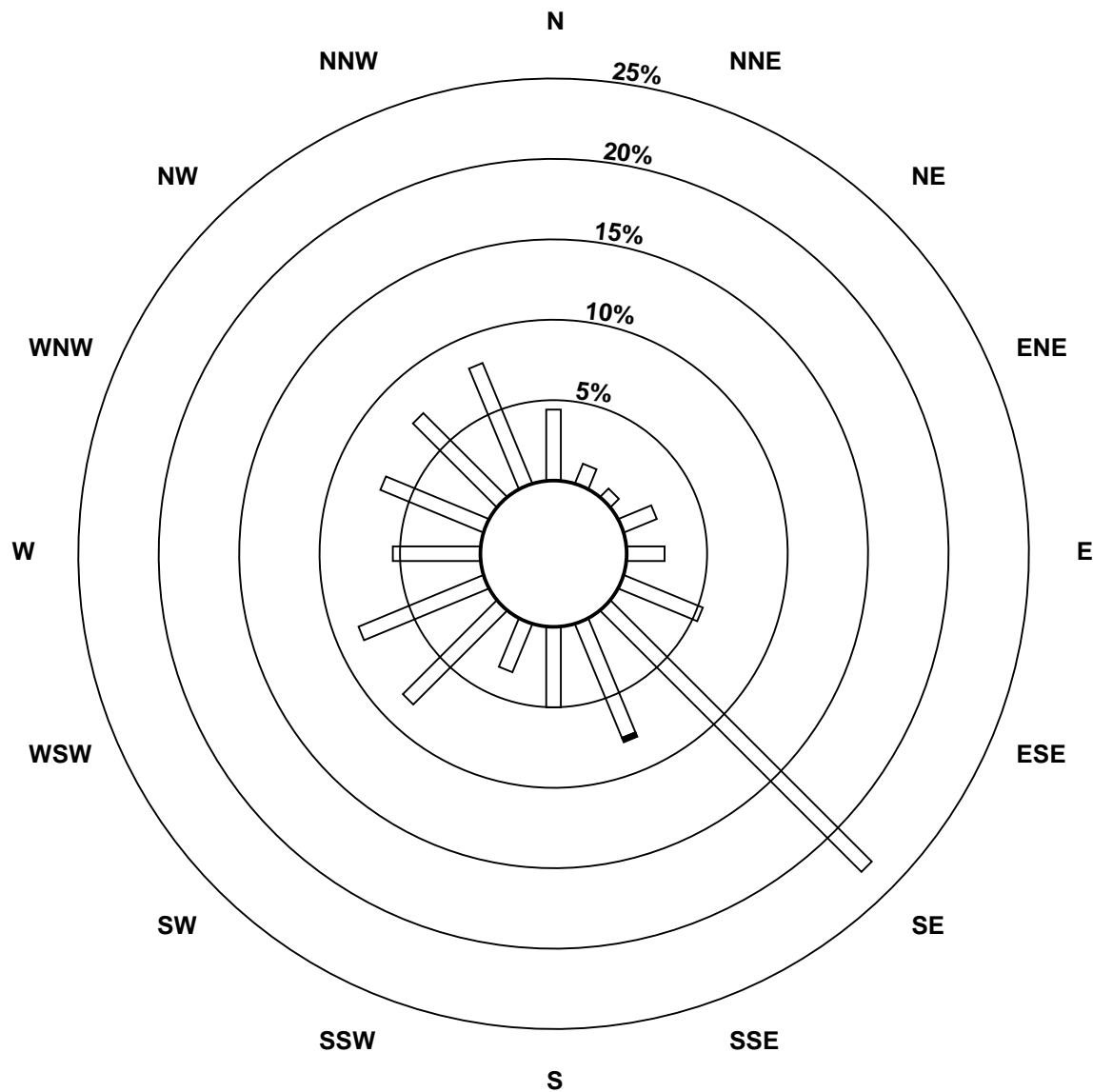
Total Number of Valid Hours: 679

Total Number of Hours: 720

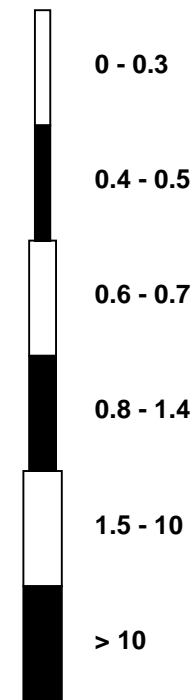


Wood Buffalo Environmental Association
Wind Rose Sep 2016

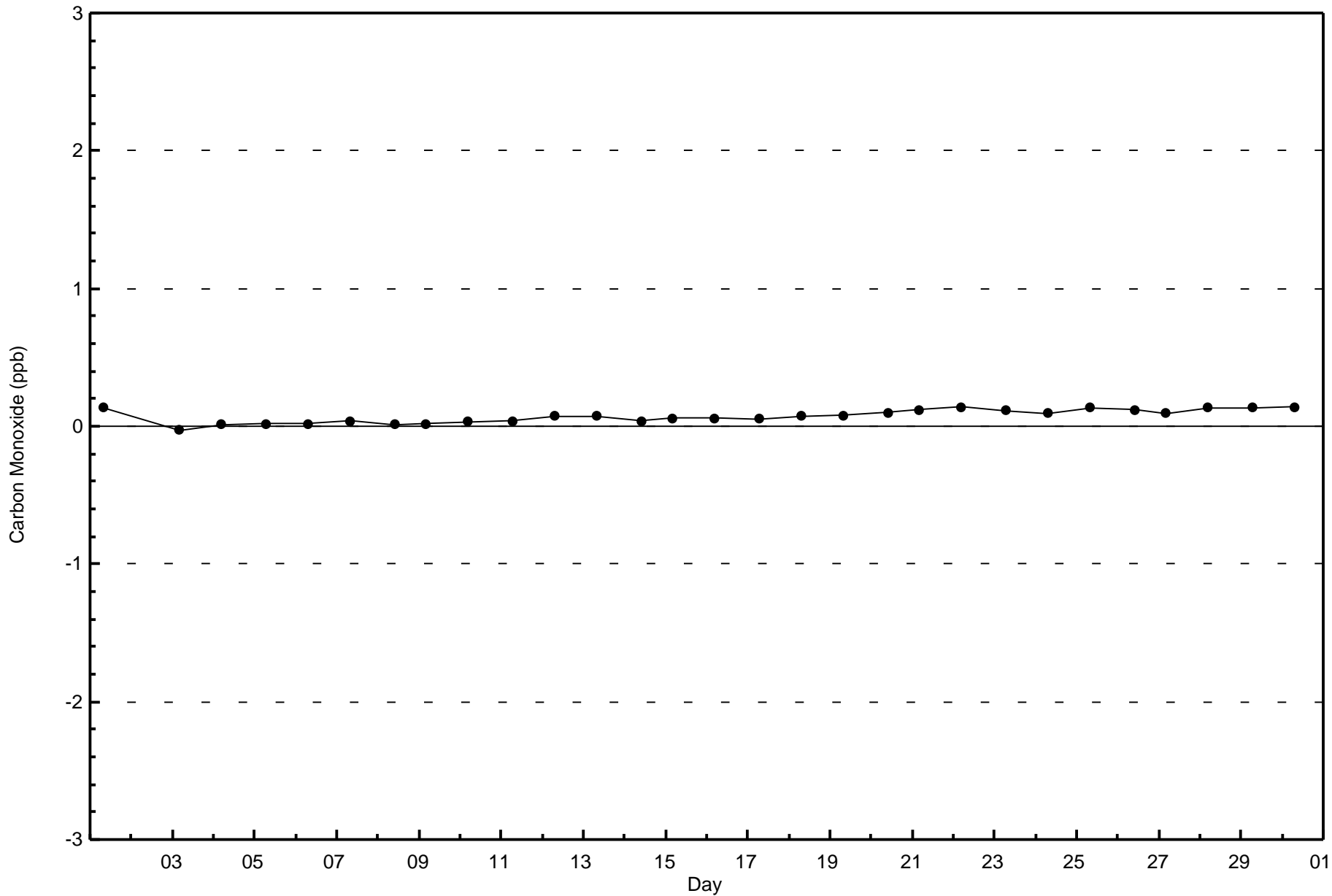
Carbon Monoxide (CO) - ppm
Athabasca Valley (AMS 7)



Classes (ppm)



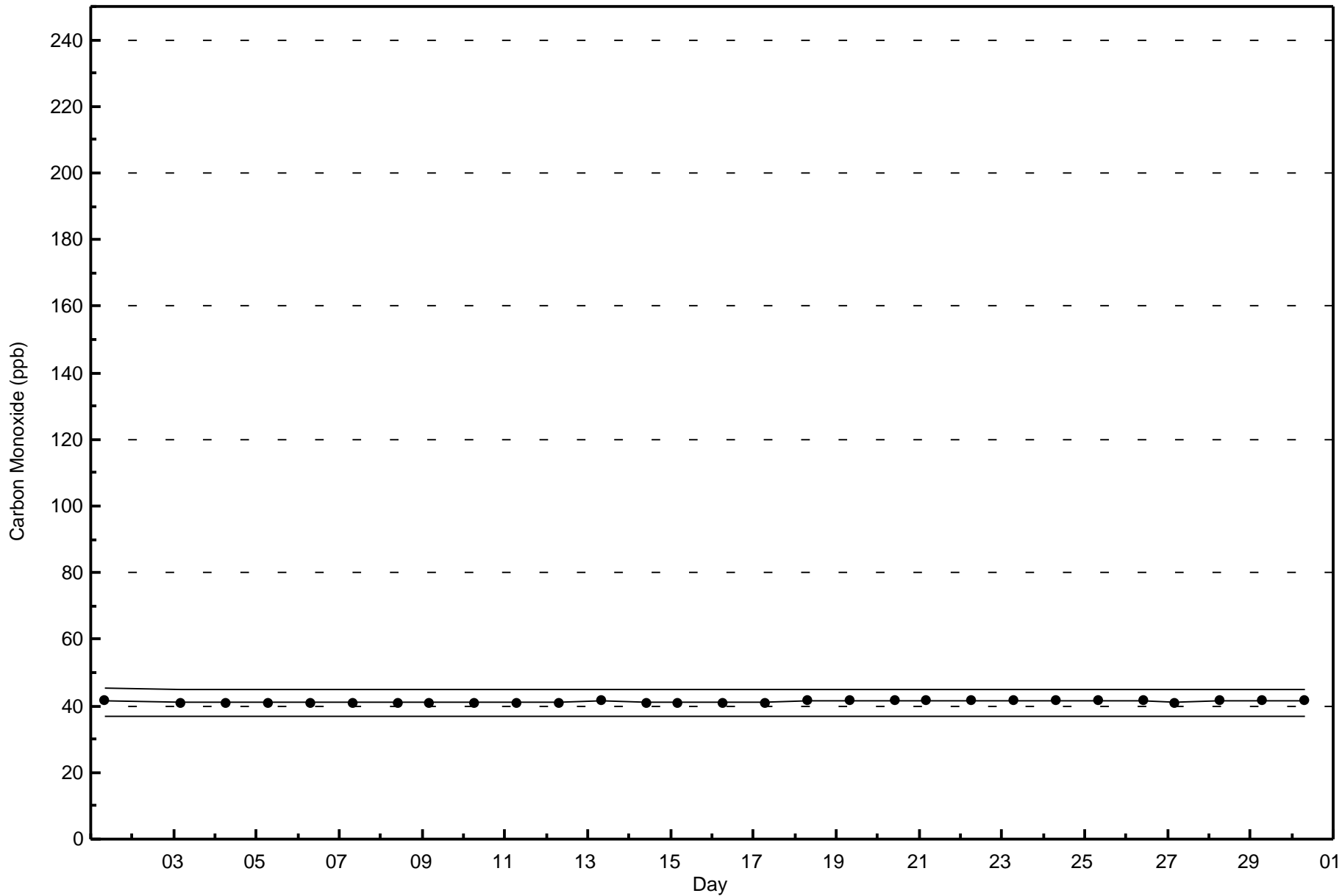
Total Number of Valid Hours: 679





Wood Buffalo Environmental Association
Span Responses

Carbon Monoxide (CO) - ppb
Athabasca Valley - September 2016

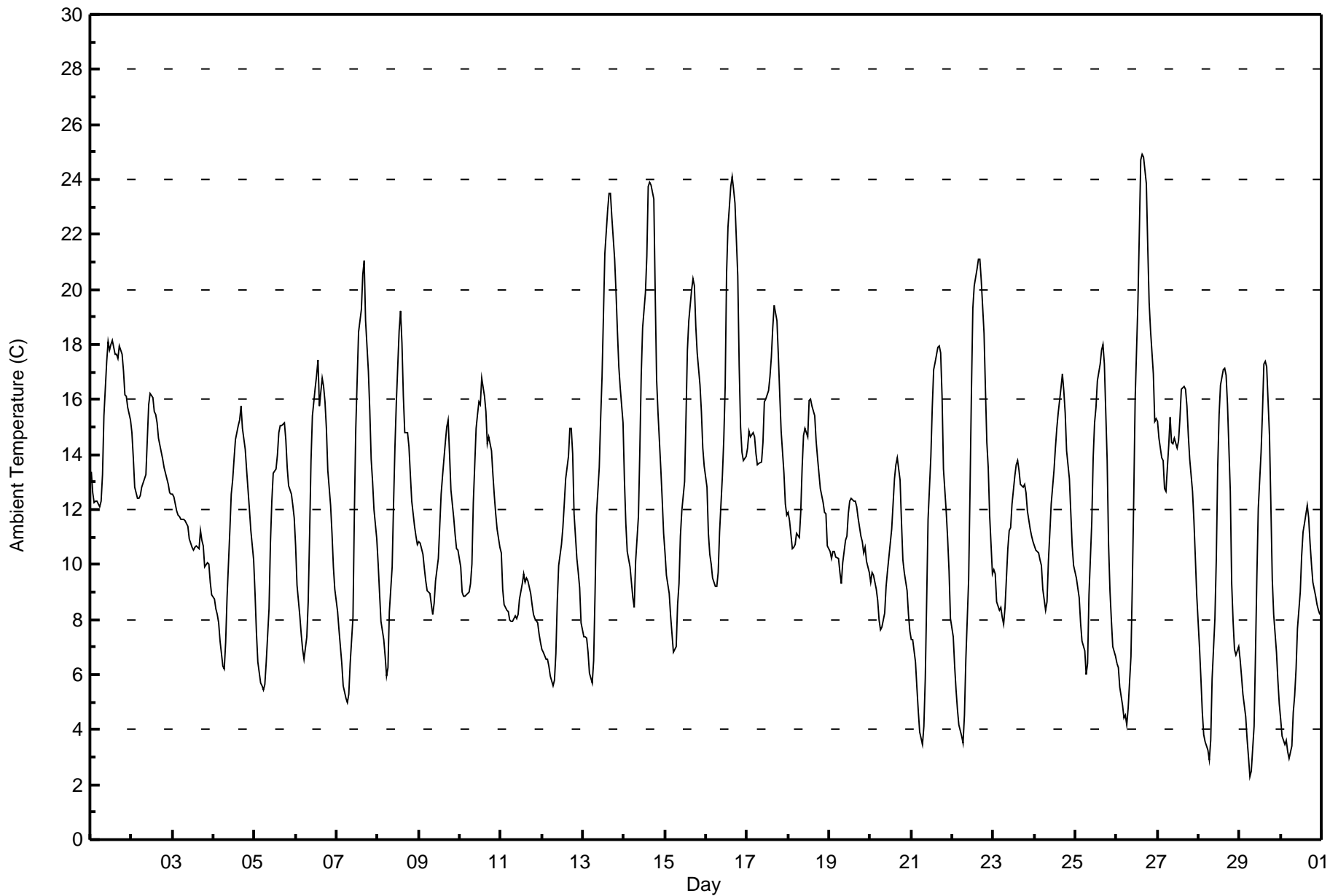




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Athabasca Valley - September 2016

| Maximum Value: 24.9 C on Sep 26 16:00 | | Maximum Daily Average: 15.6 C on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 2.3 C on Sep 29 07:00 | | Minimum Daily Average: 7.4 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.9 C at hour 16 | | Minimum Diurnal Average: 7.6 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.98 C | | Percentiles: P ₁ = 3.4 P ₁₀ = 6.4 Q ₁ = 8.8 Median = 11.8 Q ₃ = 14.9 P ₉₀ = 17.5 P ₉₉ = 23.7 | | 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 | 13.4 | 12.6 | 12.3 | 12.3 | 12.3 | 12.1 | 12.3 | 13.3 | 15.4 | 17.4 | 18.1 | 17.8 | 18.0 | 18.1 | 17.6 | 17.7 | 17.5 | 18.0 | 17.7 | 17.1 | 16.2 | 16.1 | 15.7 | 15.2 | 15.6 | 18.1 |
| 2-Sep | 14.8 | 13.9 | 12.8 | 12.4 | 12.4 | 12.5 | 12.8 | 13.0 | 13.3 | 14.5 | 15.8 | 16.2 | 16.1 | 15.6 | 15.4 | 15.1 | 14.6 | 14.1 | 13.8 | 13.5 | 13.3 | 12.9 | 12.6 | 12.5 | 13.9 | 16.2 |
| 3-Sep | 12.6 | 12.5 | 11.9 | 11.8 | 11.8 | 11.6 | 11.7 | 11.6 | 11.5 | 11.4 | 10.9 | 10.6 | 10.5 | 10.6 | 10.7 | 10.6 | 11.2 | 10.9 | 10.7 | 9.9 | 10.1 | 10.0 | 9.4 | 8.9 | 11.0 | 12.6 |
| 4-Sep | 8.8 | 8.4 | 8.2 | 7.9 | 7.2 | 6.3 | 6.2 | 7.2 | 8.8 | 11.3 | 12.6 | 13.1 | 13.9 | 14.5 | 15.0 | 15.3 | 15.7 | 15.0 | 14.2 | 13.4 | 12.7 | 12.0 | 11.2 | 10.2 | 11.2 | 15.7 |
| 5-Sep | 8.9 | 7.5 | 6.5 | 5.7 | 5.6 | 5.5 | 5.6 | 6.5 | 8.4 | 10.8 | 12.3 | 13.3 | 13.5 | 14.0 | 14.8 | 15.1 | 15.1 | 15.1 | 14.5 | 13.5 | 12.9 | 12.6 | 12.1 | 11.7 | 10.9 | 15.1 |
| 6-Sep | 10.7 | 9.2 | 8.1 | 7.5 | 6.9 | 6.6 | 7.4 | 8.6 | 11.1 | 13.8 | 15.4 | 16.4 | 16.9 | 17.5 | 15.8 | 16.8 | 16.5 | 15.9 | 14.9 | 13.4 | 12.2 | 11.1 | 9.9 | 9.1 | 12.2 | 17.5 |
| 7-Sep | 8.3 | 7.6 | 7.0 | 6.4 | 5.6 | 5.2 | 5.0 | 5.3 | 6.4 | 8.1 | 11.9 | 15.0 | 16.7 | 18.4 | 19.3 | 20.6 | 21.0 | 18.9 | 17.0 | 15.6 | 13.8 | 13.0 | 12.0 | 10.9 | 12.0 | 21.0 |
| 8-Sep | 10.0 | 9.0 | 7.9 | 7.3 | 6.6 | 5.9 | 6.2 | 8.3 | 9.9 | 12.2 | 14.3 | 15.9 | 18.5 | 19.2 | 18.1 | 16.1 | 14.8 | 14.8 | 14.3 | 13.3 | 12.3 | 11.4 | 11.0 | 10.7 | 12.0 | 19.2 |
| 9-Sep | 10.8 | 10.8 | 10.4 | 9.9 | 9.4 | 9.0 | 9.0 | 8.5 | 8.2 | 8.6 | 9.4 | 10.2 | 11.4 | 12.6 | 13.2 | 14.5 | 15.0 | 15.3 | 14.0 | 12.7 | 11.7 | 11.1 | 10.6 | 10.5 | 11.1 | 15.3 |
| 10-Sep | 9.9 | 9.0 | 8.9 | 8.9 | 8.9 | 9.0 | 9.3 | 10.0 | 12.3 | 14.9 | 15.4 | 15.9 | 15.8 | 16.8 | 16.1 | 15.5 | 14.4 | 14.6 | 14.1 | 13.3 | 12.5 | 11.8 | 11.3 | 10.6 | 12.5 | 16.8 |
| 11-Sep | 10.4 | 9.1 | 8.5 | 8.4 | 8.3 | 8.0 | 7.9 | 7.9 | 8.1 | 8.0 | 8.2 | 8.8 | 9.3 | 9.7 | 9.3 | 9.5 | 9.4 | 8.9 | 8.6 | 8.2 | 8.1 | 7.9 | 7.5 | 7.1 | 8.6 | 10.4 |
| 12-Sep | 6.9 | 6.8 | 6.6 | 6.5 | 6.3 | 6.0 | 5.6 | 5.8 | 6.8 | 8.7 | 10.0 | 10.7 | 11.4 | 12.2 | 13.1 | 13.9 | 15.0 | 14.9 | 14.0 | 11.9 | 10.2 | 9.7 | 9.1 | 7.9 | 9.6 | 15.0 |
| 13-Sep | 7.4 | 7.4 | 7.3 | 6.8 | 6.1 | 5.7 | 6.5 | 9.0 | 11.8 | 13.5 | 15.3 | 16.8 | 19.1 | 21.3 | 22.9 | 23.5 | 23.5 | 22.7 | 21.1 | 19.9 | 18.5 | 17.2 | 16.4 | 15.2 | 14.8 | 23.5 |
| 14-Sep | 13.0 | 11.5 | 10.5 | 9.9 | 9.4 | 8.8 | 8.4 | 10.1 | 11.7 | 14.1 | 16.9 | 18.6 | 19.9 | 21.2 | 23.7 | 23.9 | 23.8 | 23.3 | 19.8 | 16.7 | 15.5 | 13.5 | 12.4 | 11.1 | 15.3 | 23.9 |
| 15-Sep | 10.4 | 9.6 | 9.0 | 8.1 | 7.5 | 6.8 | 7.0 | 8.6 | 9.3 | 11.0 | 12.0 | 13.0 | 15.3 | 17.8 | 18.9 | 20.0 | 20.4 | 20.1 | 18.7 | 17.7 | 16.5 | 15.5 | 14.3 | 13.6 | 13.4 | 20.4 |
| 16-Sep | 12.8 | 11.1 | 10.4 | 10.0 | 9.5 | 9.2 | 9.2 | 9.7 | 11.2 | 13.2 | 14.5 | 16.5 | 20.6 | 22.3 | 23.7 | 24.1 | 23.6 | 23.1 | 20.5 | 17.2 | 15.0 | 14.1 | 13.8 | 13.9 | 15.4 | 24.1 |
| 17-Sep | 14.2 | 14.9 | 14.6 | 14.8 | 14.7 | 14.0 | 13.6 | 13.7 | 13.7 | 14.4 | 15.9 | 16.0 | 16.3 | 16.8 | 17.5 | 18.6 | 19.4 | 18.9 | 17.6 | 16.2 | 14.8 | 13.3 | 12.2 | 11.8 | 15.3 | 19.4 |
| 18-Sep | 11.9 | 11.6 | 10.6 | 10.6 | 10.7 | 11.1 | 11.0 | 11.9 | 13.5 | 14.7 | 14.9 | 14.6 | 16.0 | 16.0 | 15.8 | 15.4 | 14.5 | 13.9 | 13.3 | 12.8 | 12.2 | 11.9 | 11.9 | 10.7 | 13.0 | 16.0 |
| 19-Sep | 10.5 | 10.2 | 10.5 | 10.5 | 10.3 | 10.2 | 9.7 | 9.3 | 10.1 | 10.9 | 11.0 | 11.8 | 12.3 | 12.4 | 12.3 | 12.3 | 12.1 | 11.7 | 11.1 | 10.8 | 10.4 | 10.6 | 10.1 | 9.7 | 10.9 | 12.4 |
| 20-Sep | 9.4 | 9.7 | 9.6 | 9.1 | 8.7 | 8.0 | 7.6 | 7.7 | 8.2 | 9.2 | 9.7 | 10.3 | 11.3 | 12.2 | 13.1 | 13.6 | 13.9 | 13.0 | 11.5 | 10.2 | 9.7 | 9.1 | 8.2 | 7.6 | 10.0 | 13.9 |
| 21-Sep | 7.3 | 7.3 | 6.4 | 5.5 | 4.7 | 3.9 | 3.5 | 4.1 | 5.8 | 8.7 | 11.7 | 13.9 | 15.7 | 17.1 | 17.3 | 17.9 | 18.0 | 17.7 | 16.1 | 13.5 | 11.9 | 10.9 | 9.8 | 8.0 | 10.7 | 18.0 |
| 22-Sep | 7.4 | 6.3 | 5.4 | 4.7 | 4.2 | 3.8 | 3.5 | 4.5 | 6.5 | 9.5 | 12.8 | 16.3 | 19.3 | 20.1 | 20.7 | 21.1 | 21.1 | 20.3 | 18.4 | 16.4 | 14.4 | 13.5 | 11.8 | 9.6 | 12.2 | 21.1 |
| 23-Sep | 9.8 | 9.6 | 8.6 | 8.4 | 8.5 | 8.1 | 7.8 | 8.4 | 10.6 | 11.2 | 11.4 | 12.2 | 13.2 | 13.6 | 13.8 | 13.4 | 12.9 | 12.8 | 12.9 | 12.6 | 11.9 | 11.3 | 11.0 | 10.8 | 11.0 | 13.8 |
| 24-Sep | 10.7 | 10.6 | 10.4 | 10.2 | 10.0 | 9.1 | 8.3 | 8.6 | 10.1 | 11.1 | 12.2 | 13.4 | 14.2 | 15.0 | 15.5 | 16.4 | 16.9 | 16.3 | 15.5 | 14.1 | 13.1 | 11.9 | 10.7 | 10.0 | 12.3 | 16.9 |
| 25-Sep | 9.5 | 9.1 | 8.8 | 7.9 | 7.2 | 6.9 | 6.0 | 6.4 | 8.9 | 11.5 | 13.9 | 15.1 | 15.7 | 16.7 | 17.3 | 17.8 | 18.0 | 17.3 | 13.8 | 10.7 | 9.0 | 8.0 | 7.0 | 6.7 | 11.2 | 18.0 |
| 26-Sep | 6.4 | 6.2 | 5.5 | 4.9 | 4.4 | 4.5 | 4.2 | 4.8 | 6.7 | 9.4 | 12.5 | 16.0 | 19.6 | 22.1 | 24.7 | 24.9 | 24.8 | 23.9 | 21.5 | 19.5 | 18.5 | 16.9 | 15.2 | 15.3 | 13.9 | 24.9 |
| 27-Sep | 15.2 | 14.6 | 13.9 | 13.8 | 12.8 | 12.7 | 14.3 | 15.4 | 14.4 | 14.4 | 14.6 | 14.2 | 14.5 | 15.3 | 16.3 | 16.5 | 16.4 | 15.8 | 14.7 | 13.8 | 12.7 | 11.6 | 10.3 | 8.9 | 14.0 | 16.5 |
| 28-Sep | 7.0 | 5.8 | 4.6 | 3.8 | 3.5 | 3.3 | 2.9 | 3.6 | 5.8 | 8.0 | 10.2 | 13.5 | 15.4 | 16.5 | 17.1 | 17.1 | 16.9 | 15.8 | 12.6 | 9.3 | 7.9 | 6.9 | 6.7 | 7.0 | 9.2 | 17.1 |
| 29-Sep | 6.5 | 5.9 | 5.3 | 4.5 | 3.6 | 3.0 | 2.3 | 2.5 | 4.1 | 6.8 | 9.6 | 12.1 | 14.1 | 15.6 | 17.3 | 17.4 | 17.2 | 14.7 | 12.1 | 9.4 | 8.2 | 6.8 | 5.8 | 4.9 | 8.7 | 17.4 |
| 30-Sep | 4.4 | 3.8 | 3.4 | 3.6 | 3.2 | 2.9 | 3.4 | 4.6 | 5.2 | 6.2 | 7.7 | 9.0 | 10.3 | 11.2 | 11.5 | 12.2 | 11.7 | 10.8 | 10.0 | 9.3 | 8.9 | 8.6 | 8.3 | 8.2 | 7.4 | 12.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Athabasca Valley - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 251 | 34.86 | 34.86 |
| 10 - 20 | 436 | 60.56 | 95.42 |
| > 20 | 33 | 4.58 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

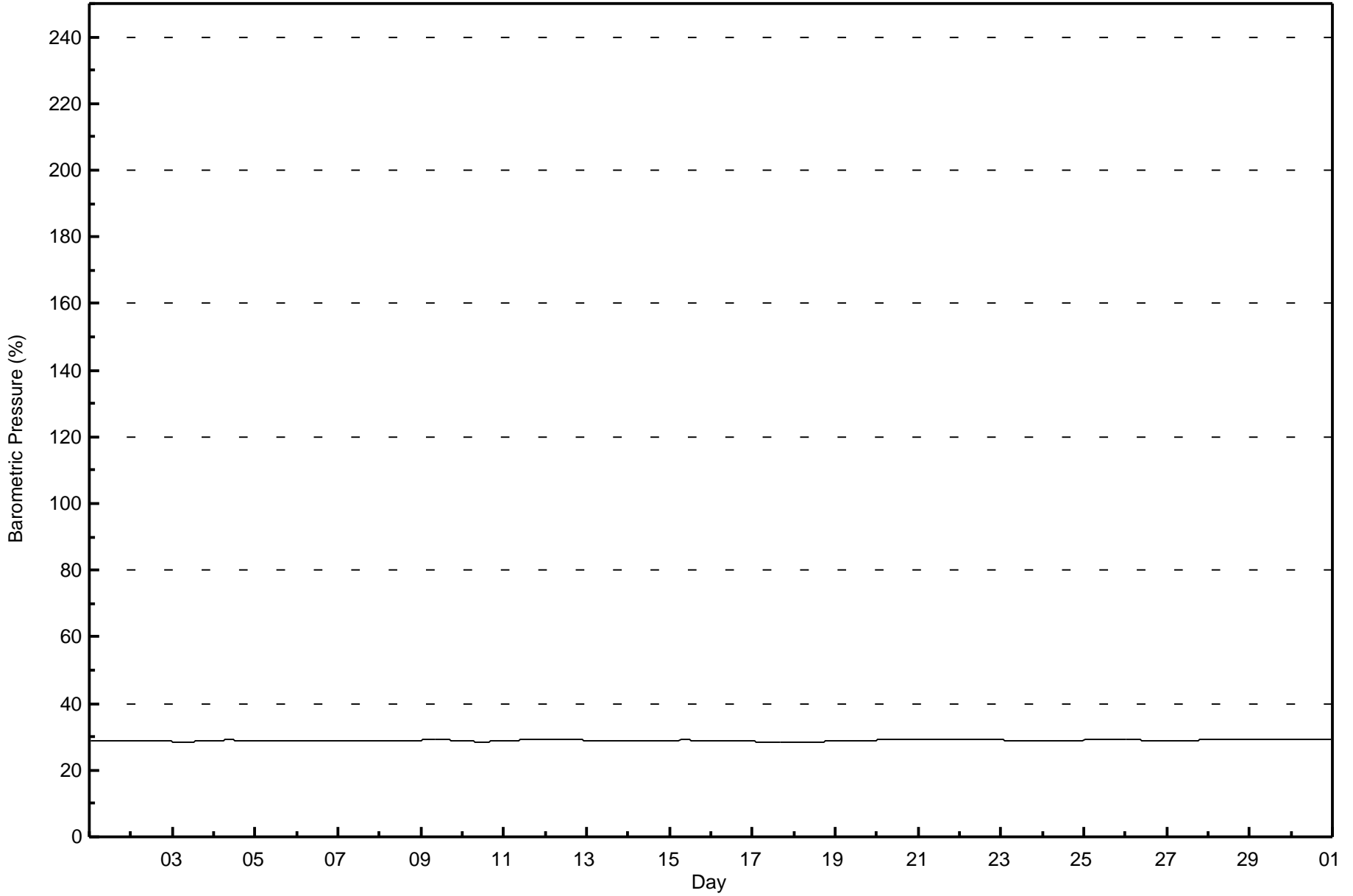
Barometric Pressure (BP) - %
Athabasca Valley - September 2016

| Maximum Value: 29.3 % on Sep 28 09:00 Maximum Daily Average: 29.3 % on Sep 28 | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------------------------------------------------------------------------------------------------------------|------|------|---------------|---------------|
| Minimum Value: 28.4 % on Sep 17 21:00 Minimum Daily Average: 28.5 % on Sep 17 Maximum Diurnal Average: 28.9 % at hour 9 Minimum Diurnal Average: 28.9 % at hour 17 Monthly Average: 28.91 % Percentiles: P₁ = 28.4 P₁₀ = 28.6 Q₁ = 28.7 Median = 28.9 Q₃ = 29.1 P₉₀ = 29.2 P₉₉ = 29.3 | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.9 |
| 2-Sep | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.7 | 28.8 |
| 3-Sep | 28.6 | 28.6 | 28.6 | 28.6 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.6 | 28.9 |
| 4-Sep | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 |
| 5-Sep | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 |
| 6-Sep | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 |
| 7-Sep | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.9 |
| 8-Sep | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 28.8 |
| 9-Sep | 29.0 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.8 | 29.0 | 29.1 |
| 10-Sep | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.8 | 28.8 |
| 11-Sep | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.3 | 29.3 | 29.3 | 29.3 | 29.1 | 29.3 |
| 12-Sep | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.2 | 29.3 |
| 13-Sep | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 29.0 | 29.0 |
| 14-Sep | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.8 | 28.9 |
| 15-Sep | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.1 | 29.1 |
| 16-Sep | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.9 |
| 17-Sep | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.5 | 28.6 |
| 18-Sep | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.5 |
| 19-Sep | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 |
| 20-Sep | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.2 |
| 21-Sep | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 |
| 22-Sep | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.2 | 29.2 |
| 23-Sep | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 29.0 |
| 24-Sep | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 29.0 |
| 25-Sep | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 |
| 26-Sep | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.9 | 29.1 | 29.1 |
| 27-Sep | 28.7 | 28.7 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.2 | 28.9 |
| 28-Sep | 29.2 | 29.2 | 29.2 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.2 | 29.2 | 29.2 | 29.2 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 |
| 29-Sep | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.3 |
| 30-Sep | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.3 | 29.3 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.3 | 29.3 | 29.3 | 29.3 | 29.3 |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - %
Athabasca Valley - September 2016





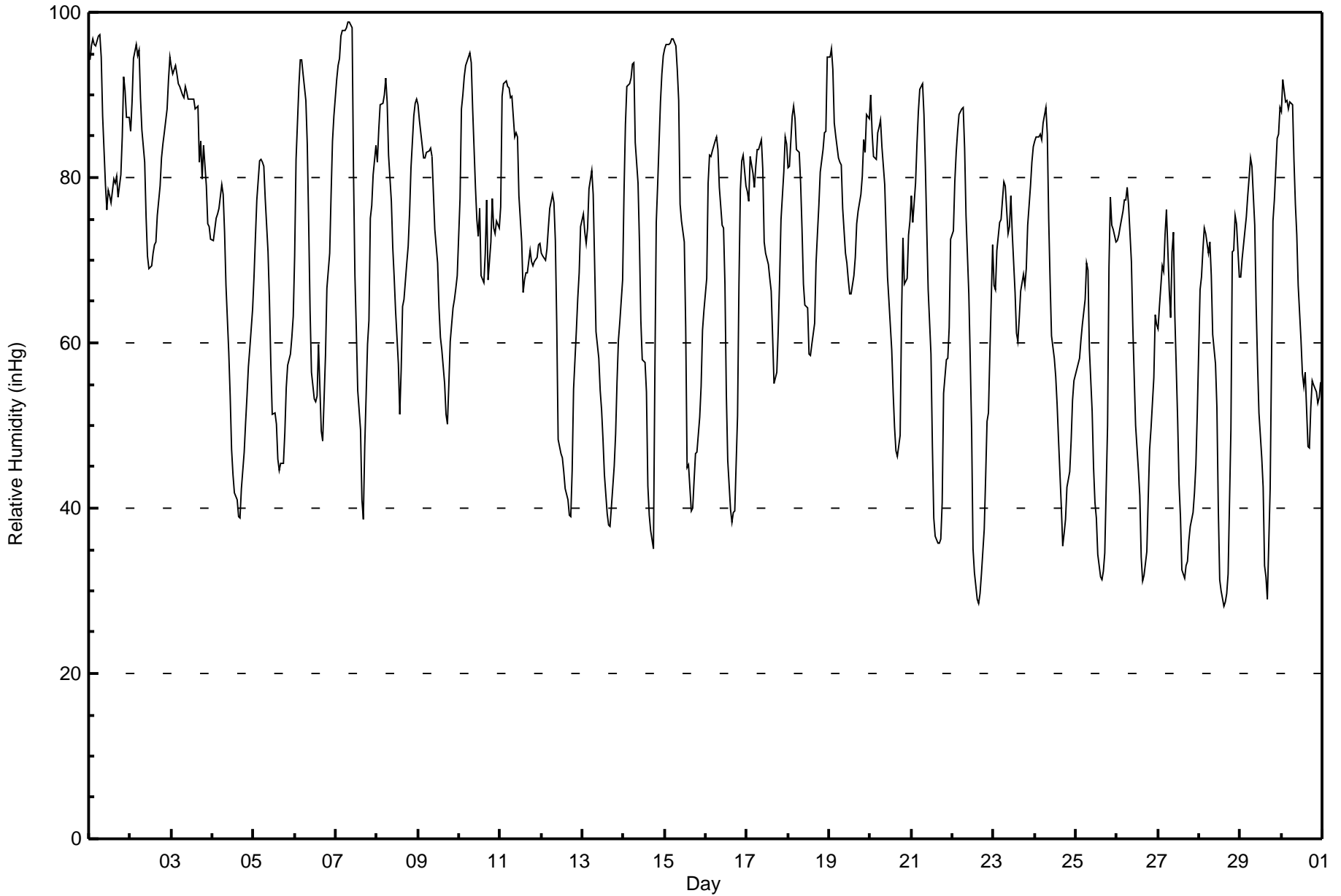
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - inHg

Athabasca Valley - September 2016

| Maximum Value: 99 inHg on Sep 7 09:00 Maximum Daily Average: 86.8 inHg on Sep 1 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 28 inHg on Sep 28 15:00 Minimum Daily Average: 52.7 inHg on Sep 27 Maximum Diurnal Average: 85.4 inHg at hour 6 Minimum Diurnal Average: 49.3 inHg at hour 16 Monthly Average: 69.1 inHg Percentiles: P ₁ = 30 P ₁₀ = 42 Q ₁ = 56 Median = 72 Q ₃ = 83 P ₉₀ = 90 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 | 94 | 96 | 97 | 96 | 96 | 97 | 97 | 95 | 88 | 79 | 76 | 78 | 78 | 77 | 80 | 79 | 80 | 78 | 80 | 85 | 92 | 91 | 87 | 87 | 86.8 | 97 |
| 2-Sep | 86 | 89 | 94 | 96 | 95 | 95 | 90 | 86 | 82 | 75 | 71 | 69 | 69 | 71 | 72 | 72 | 75 | 79 | 82 | 84 | 85 | 88 | 92 | 95 | 83.0 | 96 |
| 3-Sep | 93 | 93 | 94 | 93 | 91 | 91 | 90 | 90 | 91 | 90 | 89 | 89 | 90 | 90 | 88 | 89 | 82 | 84 | 80 | 84 | 79 | 74 | 74 | 73 | 86.7 | 94 |
| 4-Sep | 72 | 74 | 75 | 76 | 76 | 79 | 78 | 73 | 67 | 59 | 54 | 47 | 44 | 42 | 41 | 39 | 39 | 42 | 47 | 50 | 54 | 57 | 59 | 64 | 58.7 | 79 |
| 5-Sep | 68 | 73 | 77 | 82 | 82 | 82 | 81 | 78 | 71 | 65 | 57 | 51 | 52 | 50 | 46 | 45 | 45 | 45 | 49 | 55 | 57 | 59 | 61 | 63 | 62.3 | 82 |
| 6-Sep | 70 | 82 | 91 | 94 | 94 | 93 | 89 | 84 | 75 | 64 | 56 | 53 | 53 | 54 | 60 | 49 | 48 | 53 | 58 | 67 | 71 | 78 | 84 | 87 | 71.2 | 94 |
| 7-Sep | 92 | 94 | 94 | 97 | 98 | 98 | 98 | 99 | 99 | 98 | 80 | 68 | 61 | 54 | 49 | 41 | 39 | 47 | 60 | 63 | 75 | 77 | 80 | 84 | 76.9 | 99 |
| 8-Sep | 82 | 86 | 89 | 89 | 90 | 92 | 89 | 83 | 77 | 72 | 68 | 64 | 57 | 51 | 57 | 64 | 65 | 70 | 72 | 76 | 81 | 87 | 89 | 90 | 76.6 | 92 |
| 9-Sep | 89 | 87 | 84 | 82 | 82 | 83 | 83 | 84 | 83 | 78 | 74 | 70 | 64 | 61 | 59 | 55 | 51 | 50 | 55 | 60 | 64 | 65 | 67 | 68 | 70.7 | 89 |
| 10-Sep | 78 | 88 | 90 | 92 | 93 | 95 | 95 | 94 | 88 | 79 | 75 | 73 | 76 | 68 | 67 | 71 | 77 | 68 | 72 | 77 | 74 | 73 | 75 | 74 | 79.7 | 95 |
| 11-Sep | 77 | 90 | 91 | 92 | 91 | 91 | 90 | 90 | 85 | 85 | 85 | 78 | 72 | 66 | 68 | 68 | 68 | 71 | 70 | 69 | 70 | 70 | 72 | 72 | 78.4 | 92 |
| 12-Sep | 71 | 70 | 70 | 71 | 74 | 76 | 78 | 77 | 72 | 62 | 48 | 47 | 46 | 44 | 42 | 41 | 39 | 39 | 45 | 54 | 62 | 65 | 69 | 74 | 59.9 | 78 |
| 13-Sep | 76 | 73 | 72 | 74 | 79 | 81 | 78 | 70 | 61 | 58 | 54 | 52 | 48 | 44 | 39 | 38 | 38 | 40 | 45 | 49 | 55 | 60 | 63 | 68 | 59.0 | 81 |
| 14-Sep | 78 | 86 | 91 | 91 | 92 | 94 | 94 | 84 | 79 | 72 | 63 | 58 | 58 | 54 | 43 | 39 | 37 | 35 | 56 | 75 | 79 | 89 | 93 | 95 | 72.3 | 95 |
| 15-Sep | 96 | 96 | 96 | 96 | 97 | 97 | 96 | 93 | 89 | 77 | 75 | 72 | 62 | 45 | 45 | 40 | 40 | 43 | 47 | 47 | 51 | 55 | 62 | 64 | 70.0 | 97 |
| 16-Sep | 68 | 79 | 83 | 83 | 83 | 84 | 85 | 83 | 79 | 74 | 74 | 67 | 54 | 46 | 40 | 38 | 40 | 40 | 51 | 67 | 78 | 82 | 83 | 79 | 68.3 | 85 |
| 17-Sep | 78 | 77 | 83 | 81 | 79 | 81 | 83 | 83 | 84 | 81 | 72 | 71 | 69 | 68 | 66 | 61 | 55 | 56 | 61 | 68 | 75 | 81 | 85 | 84 | 74.3 | 85 |
| 18-Sep | 81 | 81 | 87 | 89 | 87 | 83 | 83 | 79 | 74 | 67 | 65 | 64 | 59 | 58 | 60 | 62 | 70 | 73 | 77 | 81 | 83 | 85 | 86 | 95 | 76.2 | 95 |
| 19-Sep | 95 | 96 | 93 | 87 | 85 | 82 | 82 | 82 | 76 | 71 | 70 | 68 | 66 | 66 | 68 | 70 | 74 | 76 | 78 | 80 | 85 | 83 | 88 | 87 | 79.4 | 96 |
| 20-Sep | 90 | 85 | 83 | 82 | 85 | 86 | 87 | 84 | 79 | 73 | 68 | 65 | 59 | 54 | 50 | 47 | 46 | 49 | 63 | 73 | 67 | 68 | 73 | 75 | 70.5 | 90 |
| 21-Sep | 78 | 75 | 79 | 84 | 88 | 91 | 91 | 88 | 81 | 74 | 66 | 59 | 48 | 39 | 37 | 36 | 36 | 36 | 41 | 54 | 58 | 58 | 62 | 73 | 63.7 | 91 |
| 22-Sep | 74 | 80 | 83 | 86 | 88 | 88 | 89 | 83 | 75 | 66 | 58 | 50 | 35 | 32 | 29 | 28 | 30 | 32 | 37 | 44 | 51 | 52 | 59 | 72 | 59.1 | 89 |
| 23-Sep | 67 | 66 | 71 | 75 | 75 | 77 | 79 | 79 | 73 | 74 | 78 | 73 | 66 | 61 | 60 | 63 | 66 | 68 | 67 | 69 | 74 | 79 | 82 | 84 | 72.0 | 84 |
| 24-Sep | 84 | 85 | 85 | 85 | 85 | 87 | 88 | 85 | 75 | 67 | 61 | 58 | 56 | 53 | 48 | 40 | 35 | 37 | 39 | 43 | 44 | 48 | 53 | 55 | 62.4 | 88 |
| 25-Sep | 57 | 58 | 58 | 60 | 62 | 65 | 70 | 69 | 59 | 52 | 45 | 41 | 39 | 34 | 32 | 31 | 32 | 35 | 50 | 69 | 78 | 74 | 74 | 72 | 54.8 | 78 |
| 26-Sep | 72 | 73 | 74 | 76 | 77 | 77 | 79 | 77 | 70 | 62 | 56 | 50 | 45 | 41 | 34 | 31 | 32 | 35 | 41 | 47 | 50 | 56 | 63 | 62 | 57.5 | 79 |
| 27-Sep | 62 | 64 | 69 | 69 | 73 | 76 | 66 | 63 | 71 | 73 | 63 | 51 | 43 | 39 | 33 | 32 | 33 | 34 | 36 | 38 | 39 | 42 | 45 | 52 | 52.7 | 76 |
| 28-Sep | 66 | 68 | 71 | 74 | 73 | 71 | 72 | 68 | 61 | 57 | 52 | 40 | 31 | 30 | 28 | 29 | 30 | 32 | 50 | 71 | 71 | 75 | 74 | 68 | 56.8 | 75 |
| 29-Sep | 68 | 70 | 72 | 75 | 78 | 80 | 82 | 81 | 74 | 65 | 57 | 52 | 46 | 43 | 33 | 32 | 29 | 42 | 58 | 75 | 77 | 85 | 85 | 88 | 64.5 | 88 |
| 30-Sep | 88 | 92 | 89 | 89 | 88 | 89 | 89 | 82 | 77 | 73 | 67 | 60 | 56 | 55 | 56 | 47 | 47 | 52 | 55 | 55 | 54 | 53 | 53 | 55 | 67.6 | 92 |
| 78.3 80.9 82.9 83.8 84.6 85.4 85.1 82.1 77.2 71.5 65.9 61.2 56.7 53.0 51.0 49.3 49.4 51.4 57.4 64.2 67.8 70.3 73.0 75.3 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 96 96 97 97 98 98 98 99 99 98 89 89 90 90 88 89 82 84 82 85 92 91 93 95 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 31 km/h on Sep 24 16:00 | Maximum Daily Speed Average: 18.7 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 7 21:00 | Minimum Daily Speed Average: 1.5 km/h on Sep 9 | Hours of Data: 718 |
| Maximum Diurnal Speed Average: 6.5 km/h at hour 15 | Minimum Diurnal Speed Average: 1.5 km/h at hour 2 | Hours of Missing Data: 2 |
| Monthly Average Velocity: 2.5 km/h 251.6 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 9 Q ₃ = 13 P ₉₀ = 19 P ₉₉ = 27 | 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 | N4 | NNE2 | ESE3 | ENE2 | N2 | NE2 | N8 | N9 | N4 | SE5 | SE14 | E14 | E11 | E11 | E10 | E10 | ESE10 | SE9 | ENE4 | NW9 | WNW9 | WSW11 | WSW12 | WSW15 | E1.7 | WSW15 |
| 2-Sep | SW9 | SSE3 | ESE2 | ENE1 | SE2 | W6 | SW7 | SW13 | SW13 | WNW6 | SW8 | SW12 | SW11 | WSW11 | WNW12 | NW13 | NW12 | NNW9 | NNW8 | NNW9 | NW8 | WSW11 | NNW6 | NW12 | W5.7 | NW13 |
| 3-Sep | NW19 | NW16 | WNW12 | W18 | W15 | WSW13 | WSW16 | WSW15 | WSW15 | W17 | WNW23 | WNW23 | WNW24 | WNW23 | NW23 | NW20 | WNW24 | NW27 | NW26 | NW21 | WNW22 | WNW20 | WNW21 | WNW21 | WNW18.7 | NW27 |
| 4-Sep | WNW21 | W20 | W18 | W10 | NNW6 | WNW1 | SW6 | SW7 | SSW8 | S3 | ENE3 | WNW15 | NW11 | W9 | W9 | SW9 | SW16 | SW14 | WSW13 | SW7 | SSW6 | SSW5 | SSE4 | SSE4 | WSW7.1 | WNW21 |
| 5-Sep | SSE6 | S7 | SSE7 | SSE7 | SSE6 | S6 | SW7 | SW3 | ENE2 | NE4 | WSW9 | WSW12 | WSW9 | SSE4 | ESE10 | ESE10 | ESE10 | SE9 | SE7 | SE6 | SE9 | SSE8 | SE8 | SSE4.9 | WSW12 | |
| 6-Sep | SE5 | S2 | ESE1 | E2 | E2 | E1 | ENE2 | SSE3 | SSE6 | SE10 | ESE10 | ESE11 | ESE13 | ESE9 | SSW11 | SSE13 | SSE17 | S10 | S7 | SE5 | SE8 | SSE3 | SE5 | SE4 | SE5.9 | SSE17 |
| 7-Sep | SE3 | SE2 | SSE3 | S4 | SSE5 | S5 | SSW6 | SW8 | SSW4 | SE5 | E5 | SE6 | ESE7 | E4 | ENE7 | SSE5 | S5 | ESE3 | WSW6 | WNW4 | W0 | SSE4 | S3 | SSE4 | SSE3.0 | SW8 |
| 8-Sep | SE5 | SE3 | SE3 | SE5 | SSE4 | SE6 | SE6 | S3 | ESE4 | E2 | NW4 | NW5 | N4 | N6 | WNW9 | NNW13 | NNW9 | NW5 | NNW7 | NW8 | NNW5 | NW7 | NW4 | W2 | NNW1.9 | NNW13 |
| 9-Sep | W3 | NW5 | NW12 | NW12 | NNW11 | NW8 | NW9 | NNE9 | N10 | NNW12 | NNW8 | N3 | WSW3 | WSW3 | NNW5 | ENE3 | NE3 | SE2 | SE7 | SE10 | SE10 | SE14 | SE16 | SSE13 | N1.5 | SE16 |
| 10-Sep | SE11 | SE11 | SE16 | SE14 | SE14 | SE14 | SE13 | SE14 | S6 | WSW13 | W20 | WNW22 | WNW16 | W22 | NW19 | W17 | W15 | WNW19 | W16 | W14 | W21 | WNW17 | W17 | W19 | WSW8.0 | WNW22 |
| 11-Sep | WNW20 | NNW22 | NNW23 | NNW24 | NNW26 | NNW30 | NNW29 | NNW23 | N23 | NNW25 | NNW24 | NNW23 | NNW24 | NNW22 | N18 | NNW17 | N15 | NNW18 | NNW15 | NW9 | NW9 | NW9 | W8 | WNW9 | NNW18.6 | NNW30 |
| 12-Sep | NW6 | NW5 | NW3 | NW4 | SSW4 | SSW5 | WSW6 | WNW6 | ENE2 | SW6 | SSW9 | WSW10 | SW11 | SW11 | SW11 | SW10 | SSW5 | S8 | SSE6 | SE4 | SE5 | SE8 | SSE9 | SE9 | SSW4.2 | SW11 |
| 13-Sep | SE9 | SE9 | SE9 | SE10 | SE9 | SE10 | SE10 | SSE7 | SSW11 | SW19 | SW20 | SW20 | SW21 | SW20 | WSW15 | WSW13 | W19 | WSW16 | WSW13 | WSW12 | WSW15 | WSW17 | WSW20 | SW6 | SW10.3 | SW21 |
| 14-Sep | S4 | S1 | ESE2 | SE3 | SE3 | E2 | ESE3 | SE7 | ESE3 | S0 | SSE7 | SE8 | NW4 | NW5 | SW13 | W20 | WSW16 | W18 | NNW23 | NNW10 | WNW4 | S1 | SW1 | ESE2 | W2.5 | NNW23 |
| 15-Sep | SE2 | ESE1 | SSW1 | S1 | E2 | ESE1 | NNE0 | SSW1 | NNE3 | NE1 | NNW5 | WNW4 | ESE5 | ESE9 | ESE11 | ESE14 | ESE12 | ESE7 | SE5 | SE10 | SE7 | SSE8 | SE7 | SSE6 | ESE4.0 | ESE14 |
| 16-Sep | SSE5 | SSW4 | SSW3 | S4 | SE8 | SE9 | SE10 | SE9 | SE7 | SE6 | SE7 | SE9 | SW7 | WSW15 | SW19 | WSW19 | WSW13 | WSW12 | WNW3 | S0 | SSE2 | SSE2 | SSE2 | S4 | SSW4.8 | WSW19 |
| 17-Sep | S3 | SSW5 | SSE6 | S5 | S8 | S8 | SSE7 | SE6 | ESE4 | SE5 | SW12 | SW13 | SW14 | SW14 | SW12 | WSW12 | W18 | WSW12 | WSW10 | SW8 | WSW5 | SSE3 | SE4 | SE5 | SW6.3 | W18 |
| 18-Sep | SE6 | SE8 | ESE4 | S3 | SSW5 | SW7 | SW7 | SW7 | WNW4 | NW7 | WNW19 | NW18 | NW24 | NW24 | NW22 | NW18 | NNW13 | N9 | N6 | NNW6 | NNW8 | WNW7 | WNW10 | NNW10 | NW7.4 | NW24 |
| 19-Sep | NW8 | NNW9 | NW9 | NW12 | WNW7 | NW9 | WNW13 | W17 | NW15 | WNW19 | NW12 | NW11 | NNW12 | NNW11 | NNW8 | W8 | W12 | WNW9 | WNW6 | N5 | N2 | WNW3 | NNW8 | NNW10 | NW8.9 | WNW19 |
| 20-Sep | NNW10 | NW10 | NNW12 | N8 | NNW6 | NW8 | NW9 | NNW8 | N9 | NNE8 | N6 | N7 | N9 | NNW7 | NNW8 | NNW8 | NNE5 | ENE4 | ESE1 | E2 | ESE6 | SE5 | SE6 | SE4 | N4.8 | NNW12 |
| 21-Sep | SE6 | SE10 | SE11 | SE12 | SE11 | SE11 | SE10 | SE9 | SE8 | ESE6 | E3 | S3 | SW8 | SW9 | SW10 | SW12 | SW10 | WSW8 | SSW4 | SSE5 | SSE5 | SSE7 | SSE7 | SE5 | SSE5.9 | SE12 |
| 22-Sep | SE8 | SE11 | SE12 | SE9 | SE10 | SE8 | SE8 | SE10 | SE10 | SE9 | ESE5 | M | M | SW12 | S15 | S13 | S11 | S12 | SSE9 | SSE8 | SE8 | SSE8 | SSE5 | SE4 | SSE8.3 | SSW15 |
| 23-Sep | SE7 | SE11 | SE10 | SE10 | SE15 | SE17 | SE17 | SE18 | SE15 | SE13 | SE13 | SE17 | SE16 | SSE14 | SSE11 | SE12 | SE12 | SE13 | SE12 | SE13 | SE12 | SE12 | SE12 | SE9 | SE13.1 | SE18 |
| 24-Sep | SE10 | SSE8 | SE13 | SE13 | SE9 | SE7 | SE6 | SSE3 | SW12 | SW13 | W18 | W22 | W25 | W27 | WNW27 | WNW31 | WNW27 | W21 | W13 | WSW11 | WSW16 | WSW19 | WSW18 | WSW19 | WSW11.0 | WNW31 |
| 25-Sep | WSW19 | WSW19 | WSW15 | SSW9 | SW12 | SW12 | SW10 | SW11 | SW8 | SSW5 | NW4 | NW20 | NNW20 | NNW17 | NW19 | NW13 | NW8 | WNW2 | WSW2 | S1 | SSE2 | SE5 | SE4 | SE5 | W6.3 | NW20 |
| 26-Sep | SE6 | SE10 | SE12 | SE11 | SE10 | SE9 | SE11 | SE12 | SE12 | SE12 | SE8 | SSE6 | SE5 | SSE2 | S12 | SSW13 | SSW10 | SSE9 | SSE9 | SE9 | SE8 | S5 | SE6 | SE8 | SSE8.3 | SSW13 |
| 27-Sep | SE9 | SE6 | SE6 | S5 | SSW3 | SW10 | WSW13 | WSW13 | WSW10 | SW12 | WNW19 | WNW23 | WNW24 | W21 | W28 | W29 | WNW22 | W14 | WSW9 | WSW13 | W16 | WSW18 | WSW15 | WSW7 | W11.9 | W29 |
| 28-Sep | S1 | SSE4 | SE3 | SE5 | SE6 | SE5 | SE6 | SSE7 | SSE5 | E3 | ENE6 | S5 | SW6 | SW8 | WSW8 | SW8 | WSW7 | SW6 | ESE1 | SE1 | SE5 | ESE4 | NE3 | SE4 | S2.8 | WSW8 |
| 29-Sep | SE10 | SE10 | SE12 | SE10 | SE11 | SE12 | SE9 | SE9 | SE11 | SE9 | E7 | ENE8 | E6 | NNW2 | NNE2 | NNE3 | ENE3 | NNW3 | WNW4 | SW1 | WSW3 | SSW1 | ESE2 | ESE2 | ESE4.7 | SE12 |
| 30-Sep | NNE1 | ENE2 | ENE1 | NNE2 | SE2 | E3 | N3 | NNW10 | NNW12 | NNW13 | NNW14 | NNW17 | NNW19 | NNW24 | N18 | N18 | N19 | N16 | N13 | NNW16 | N11 | N12 | N11 | N10 | N10.5 | NNW24 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------|--------|--------|--------|-------|-------|--------|--------|--------|-------|--------|--------|--------|------|-------|-------|------|------|------|--------|-------|-------|-------|-----------------|--|
| SSW2.0 | S1.5 | SSE1.7 | SSE1.9 | SSE2.6 | S2.5 | S2.4 | SSW2.6 | SSW1.8 | WSW1.7 | W3.0 | NNW5.2 | WNW5.7 | NNW6.5 | W6.5 | W6.4 | W5.2 | W4.6 | W3.2 | W2.1 | WSW2.5 | SW3.5 | SW2.8 | SW2.0 | Diurnal Average | |
| WNW21 | NNW22 | NNW23 | NNW24 | NNW26 | NNW30 | NNW29 | NNW23 | N23 | NNW25 | NNW24 | NNW23 | W25 | W27 | W28 | WNW31 | NNW27 | NW27 | NW26 | NW21 | WNW22 | WNW20 | WNW21 | WNW21 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

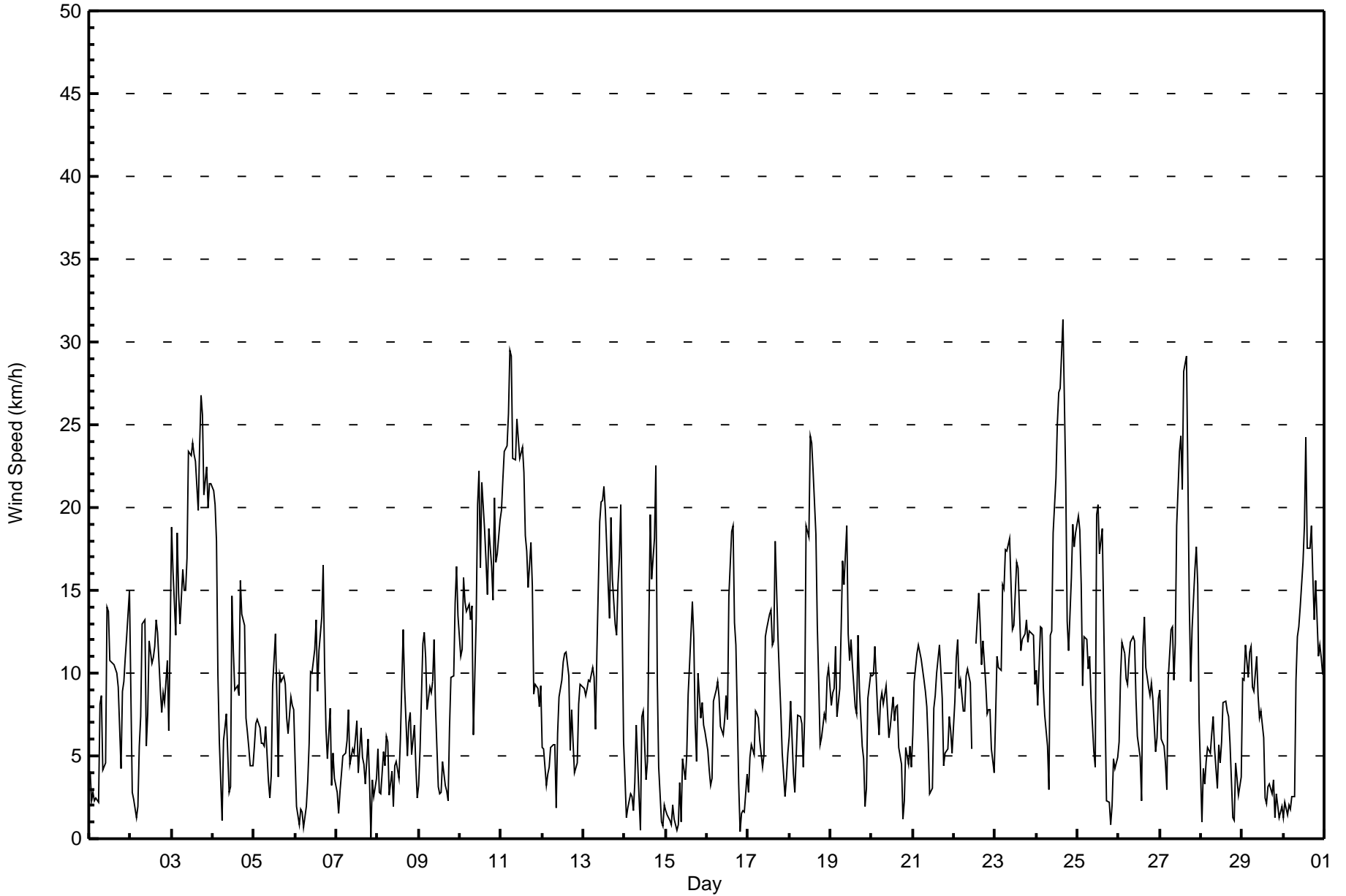
Wind Speed (WS) - km/h
Athabasca Valley - September 2016

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | 5 | 6 | 4 | 6 | 6 | 6 | 6 | 7 | 7 | 6 | 8 | 7 | 6 | 8 | 8 | 8 | 8 | 7 | 7 | 6 | 6 | 4 | 4 | 5 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Athabasca Valley - September 2016

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 203 | 28.27 | 28.27 |
| 6 - 11 | 284 | 39.55 | 67.83 |
| 12 - 19 | 171 | 23.82 | 91.64 |
| 20 - 28 | 56 | 7.80 | 99.44 |
| 29 - 38 | 4 | 0.56 | 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
Athabasca Valley - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 8 | 8 | 5 | 12 | 11 | 21 | 38 | 25 | 24 | 15 | 3 | 5 | 3 | 9 | 11 | 5 | 203 |
| 6 - 11 | 14 | 2 | 0 | 3 | 6 | 13 | 91 | 28 | 9 | 8 | 33 | 16 | 5 | 11 | 20 | 25 | 284 |
| 12 - 19 | 8 | 0 | 0 | 0 | 1 | 3 | 36 | 4 | 3 | 2 | 20 | 35 | 19 | 11 | 14 | 15 | 171 |
| 20 - 28 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 10 | 18 | 10 | 12 | 56 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 4 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 10 | 5 | 15 | 18 | 37 | 165 | 57 | 36 | 25 | 60 | 57 | 38 | 50 | 55 | 59 | 718 |

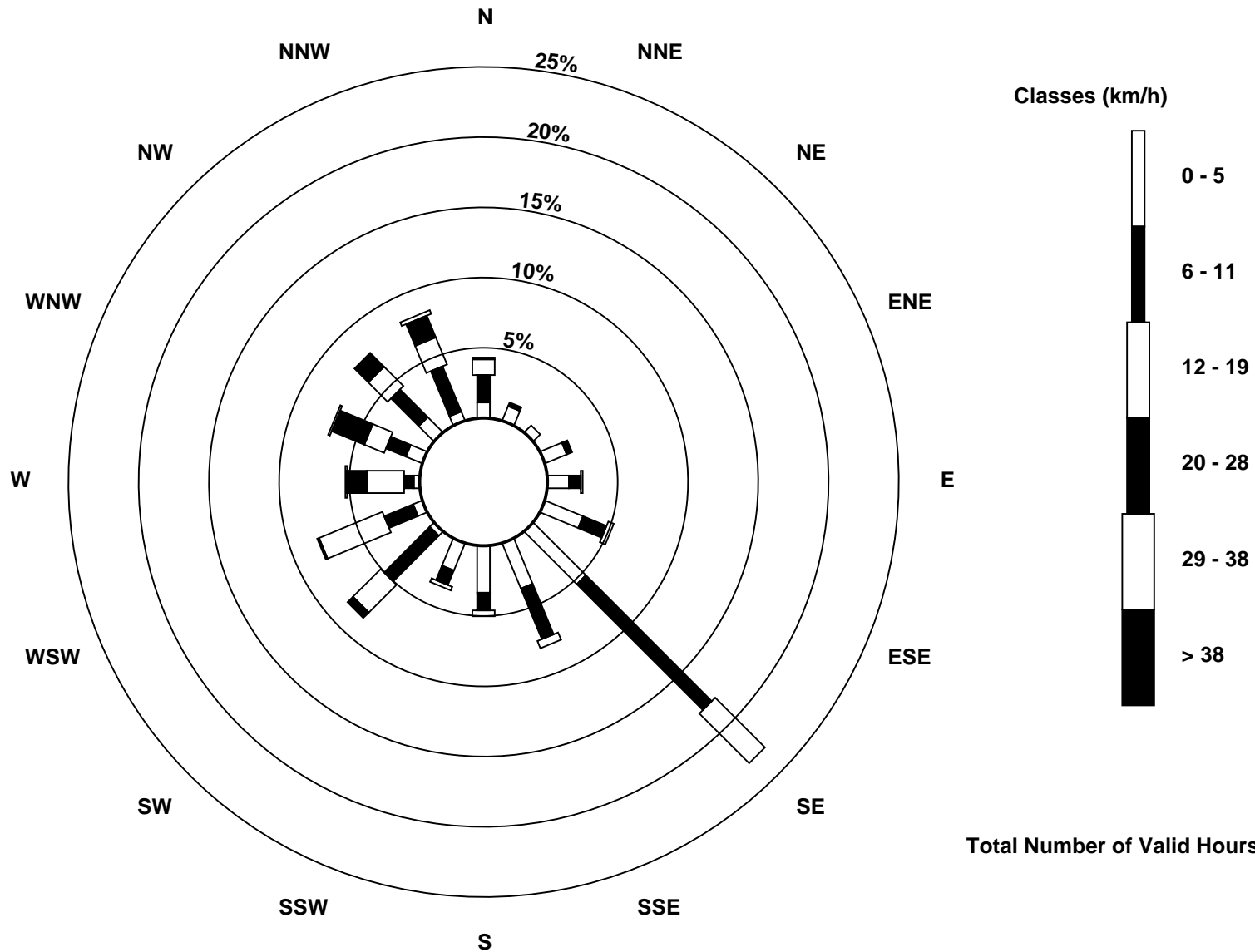
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

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



Total Number of Valid Hours: 718



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - September 2016

| | |
|--------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 282 deg on Sep 24 16:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 294.5 deg on Sep 3 | Hours of Data: 718 |
| Direction of Minimum Speed: 269 deg on Sep 7 21:00 | Hours of Missing Data: 2 |
| Direction of Minimum Daily Speed Average: 1.5 deg on Sep 9 | Percent Operational Time: 99.7 |
| Monthly Average Direction: 260.3 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 | 5 | 29 | 104 | 58 | 9 | 41 | 357 | 349 | 350 | 143 | 137 | 91 | 85 | 95 | 86 | 79 | 120 | 145 | 70 | 315 | 288 | 251 | 249 | 251 | 82.0 |
| 2-Sep | 234 | 164 | 115 | 76 | 138 | 279 | 234 | 231 | 235 | 283 | 234 | 223 | 222 | 242 | 285 | 309 | 326 | 343 | 336 | 329 | 307 | 246 | 328 | 325 | 273.0 |
| 3-Sep | 312 | 310 | 291 | 271 | 268 | 255 | 254 | 255 | 256 | 277 | 282 | 298 | 302 | 300 | 309 | 311 | 303 | 308 | 321 | 318 | 303 | 303 | 294 | 292 | 294.5 |
| 4-Sep | 285 | 280 | 279 | 279 | 342 | 294 | 231 | 216 | 212 | 186 | 60 | 286 | 313 | 268 | 269 | 230 | 223 | 233 | 245 | 226 | 199 | 194 | 150 | 161 | 256.1 |
| 5-Sep | 168 | 169 | 157 | 150 | 158 | 171 | 170 | 222 | 235 | 60 | 42 | 237 | 249 | 253 | 158 | 121 | 119 | 120 | 128 | 137 | 138 | 138 | 149 | 146 | 160.0 |
| 6-Sep | 141 | 189 | 112 | 92 | 95 | 98 | 75 | 167 | 151 | 129 | 120 | 120 | 120 | 120 | 195 | 156 | 149 | 186 | 180 | 140 | 140 | 166 | 129 | 132 | 143.9 |
| 7-Sep | 127 | 126 | 159 | 181 | 159 | 174 | 201 | 223 | 210 | 127 | 101 | 129 | 119 | 100 | 75 | 167 | 175 | 119 | 241 | 297 | 269 | 166 | 172 | 150 | 157.8 |
| 8-Sep | 145 | 127 | 143 | 139 | 150 | 133 | 134 | 169 | 110 | 80 | 320 | 323 | 10 | 350 | 303 | 331 | 343 | 309 | 332 | 311 | 342 | 314 | 321 | 278 | 334.5 |
| 9-Sep | 265 | 307 | 323 | 319 | 333 | 319 | 322 | 13 | 1 | 337 | 338 | 351 | 256 | 240 | 329 | 59 | 36 | 137 | 131 | 130 | 132 | 140 | 139 | 147 | 1.5 |
| 10-Sep | 137 | 132 | 138 | 141 | 141 | 142 | 138 | 138 | 169 | 249 | 270 | 284 | 293 | 277 | 304 | 276 | 280 | 288 | 269 | 263 | 280 | 282 | 275 | 279 | 255.7 |
| 11-Sep | 294 | 329 | 330 | 330 | 332 | 339 | 341 | 347 | 356 | 348 | 345 | 343 | 344 | 346 | 352 | 343 | 350 | 341 | 329 | 321 | 323 | 306 | 281 | 288 | 336.0 |
| 12-Sep | 309 | 325 | 322 | 308 | 204 | 200 | 241 | 294 | 64 | 215 | 209 | 241 | 231 | 229 | 230 | 236 | 213 | 179 | 157 | 146 | 127 | 143 | 148 | 137 | 211.9 |
| 13-Sep | 139 | 140 | 144 | 145 | 137 | 131 | 133 | 149 | 212 | 226 | 226 | 228 | 229 | 234 | 240 | 258 | 276 | 252 | 249 | 256 | 247 | 248 | 245 | 233 | 224.4 |
| 14-Sep | 189 | 190 | 118 | 126 | 126 | 96 | 112 | 131 | 112 | 170 | 167 | 140 | 319 | 317 | 227 | 264 | 257 | 264 | 331 | 348 | 292 | 189 | 229 | 121 | 259.5 |
| 15-Sep | 144 | 102 | 205 | 185 | 96 | 114 | 28 | 209 | 16 | 40 | 335 | 285 | 111 | 114 | 104 | 104 | 108 | 122 | 128 | 127 | 135 | 152 | 145 | 149 | 119.2 |
| 16-Sep | 154 | 211 | 200 | 169 | 138 | 140 | 138 | 141 | 135 | 138 | 126 | 134 | 217 | 242 | 234 | 243 | 244 | 248 | 290 | 185 | 156 | 154 | 161 | 169 | 194.3 |
| 17-Sep | 177 | 204 | 166 | 186 | 187 | 182 | 168 | 146 | 119 | 129 | 220 | 236 | 234 | 226 | 222 | 254 | 268 | 246 | 244 | 228 | 245 | 159 | 144 | 132 | 216.3 |
| 18-Sep | 135 | 140 | 121 | 172 | 210 | 233 | 231 | 226 | 297 | 322 | 286 | 318 | 310 | 320 | 326 | 325 | 335 | 351 | 1 | 345 | 330 | 295 | 302 | 336 | 311.3 |
| 19-Sep | 321 | 329 | 311 | 306 | 285 | 313 | 294 | 280 | 308 | 286 | 304 | 305 | 330 | 333 | 341 | 280 | 259 | 299 | 293 | 7 | 8 | 289 | 332 | 343 | 306.7 |
| 20-Sep | 331 | 322 | 346 | 10 | 340 | 322 | 315 | 331 | 359 | 16 | 355 | 4 | 10 | 343 | 345 | 334 | 18 | 69 | 123 | 96 | 117 | 126 | 125 | 125 | 356.1 |
| 21-Sep | 132 | 140 | 143 | 140 | 136 | 135 | 139 | 133 | 136 | 108 | 89 | 190 | 221 | 224 | 233 | 225 | 231 | 240 | 201 | 163 | 155 | 162 | 150 | 132 | 165.4 |
| 22-Sep | 133 | 137 | 134 | 133 | 136 | 138 | 135 | 136 | 134 | 138 | 105 | M | M | 217 | 191 | 191 | 182 | 173 | 160 | 150 | 137 | 151 | 149 | 141 | 153.4 |
| 23-Sep | 139 | 129 | 128 | 131 | 141 | 136 | 138 | 143 | 136 | 131 | 136 | 137 | 131 | 130 | 150 | 157 | 130 | 136 | 140 | 146 | 137 | 138 | 141 | 144 | 137.5 |
| 24-Sep | 135 | 147 | 138 | 140 | 143 | 138 | 133 | 157 | 225 | 236 | 260 | 270 | 277 | 278 | 284 | 282 | 303 | 281 | 273 | 250 | 249 | 246 | 246 | 245 | 255.8 |
| 25-Sep | 248 | 248 | 246 | 209 | 222 | 226 | 219 | 225 | 219 | 213 | 325 | 308 | 320 | 331 | 325 | 321 | 312 | 295 | 250 | 186 | 158 | 129 | 132 | 136 | 267.0 |
| 26-Sep | 142 | 132 | 133 | 134 | 136 | 132 | 133 | 137 | 144 | 143 | 135 | 148 | 137 | 156 | 190 | 208 | 202 | 166 | 147 | 143 | 139 | 180 | 126 | 136 | 149.2 |
| 27-Sep | 138 | 137 | 134 | 183 | 211 | 234 | 241 | 245 | 252 | 236 | 297 | 289 | 298 | 278 | 278 | 278 | 285 | 267 | 251 | 252 | 259 | 245 | 245 | 247 | 263.4 |
| 28-Sep | 178 | 150 | 129 | 129 | 140 | 134 | 142 | 147 | 168 | 83 | 72 | 186 | 227 | 234 | 240 | 230 | 243 | 235 | 103 | 140 | 128 | 105 | 56 | 133 | 170.5 |
| 29-Sep | 142 | 135 | 136 | 133 | 134 | 133 | 133 | 127 | 135 | 135 | 95 | 77 | 86 | 347 | 28 | 30 | 61 | 335 | 284 | 228 | 248 | 201 | 111 | 110 | 123.6 |
| 30-Sep | 29 | 76 | 61 | 19 | 126 | 85 | 352 | 345 | 338 | 342 | 346 | 343 | 342 | 342 | 351 | 9 | 8 | 356 | 349 | 340 | 350 | 352 | 352 | 1 | 351.9 |

| | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 205.7 | 188.7 | 163.1 | 165.8 | 160.8 | 170.5 | 187.7 | 197.9 | 206.2 | 236.8 | 276.6 | 281.9 | 289.7 | 281.6 | 278.2 | 275.3 | 276.7 | 265.9 | 278.0 | 267.9 | 248.4 | 225.8 | 226.4 | 225.1 |
| Diurnal Average | | | | | | | | | | | | | | | | | | | | | | | |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

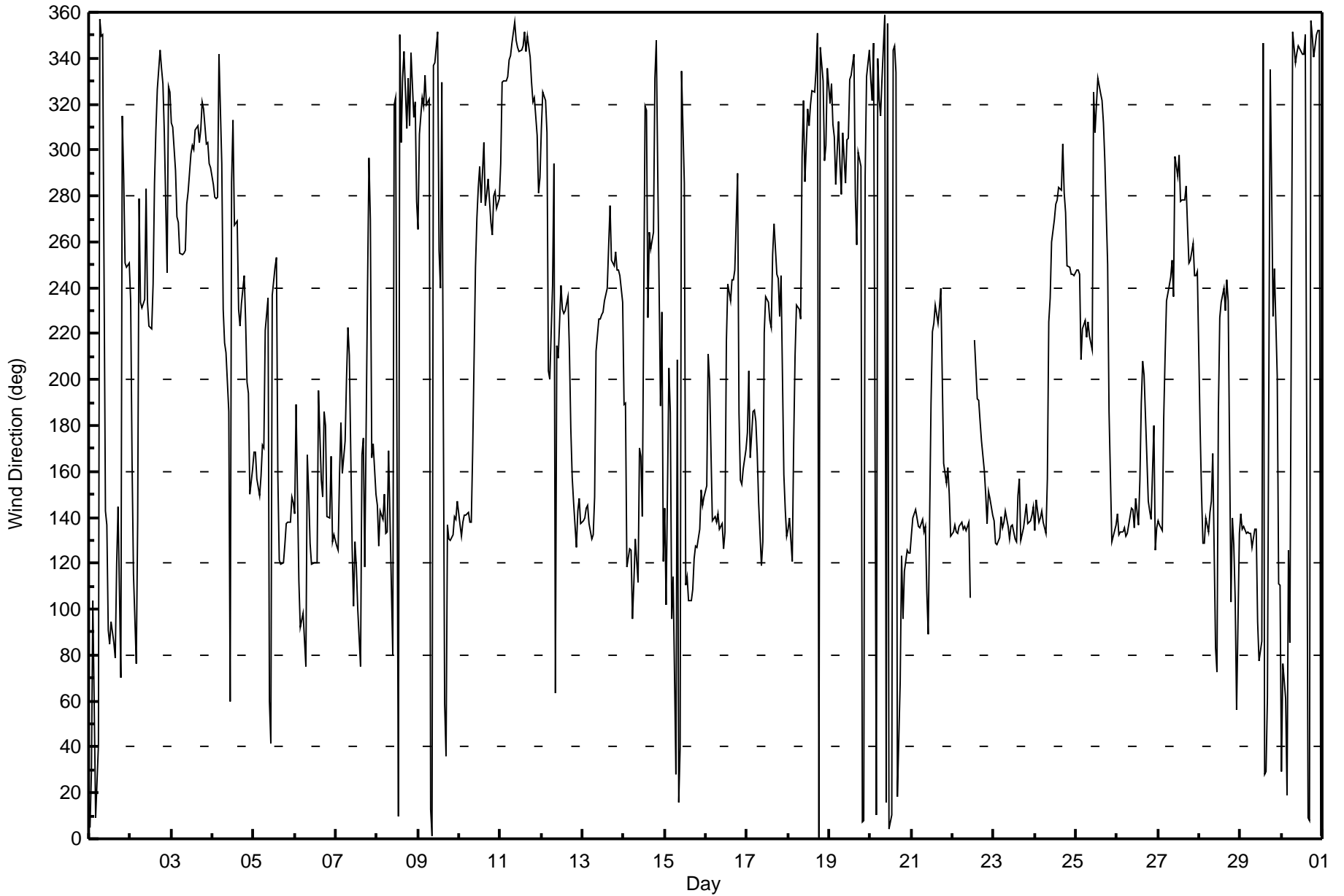
Wind Direction (WD) - deg
Athabasca Valley - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 108 deg on Sep 14 10:00 | Hours of Data: 718 |
| Minimum Value: 7 deg on Sep 13 00:00 | Hours of Missing Data: 2 |
| Percentiles: P ₁ = 9 P ₁₀ = 12 Q ₁ = 14 Median = 19 Q ₃ = 35 P ₉₀ = 62 P ₉₉ = 91 | 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 | 22 | 41 | 26 | 68 | 43 | 45 | 26 | 13 | 42 | 89 | 18 | 17 | 18 | 21 | 16 | 24 | 41 | 23 | 38 | 28 | 24 | 15 | 11 | 12 | 89 |
| 2-Sep | 32 | 49 | 54 | 81 | 89 | 28 | 20 | 13 | 12 | 50 | 26 | 13 | 14 | 13 | 17 | 18 | 13 | 29 | 21 | 18 | 35 | 16 | 36 | 11 | 89 |
| 3-Sep | 11 | 12 | 24 | 10 | 11 | 14 | 12 | 13 | 13 | 18 | 10 | 13 | 12 | 12 | 10 | 10 | 10 | 11 | 11 | 11 | 16 | 10 | 12 | 11 | 24 |
| 4-Sep | 11 | 11 | 10 | 41 | 41 | 92 | 28 | 15 | 15 | 64 | 72 | 21 | 26 | 31 | 28 | 18 | 11 | 14 | 12 | 28 | 24 | 62 | 35 | 32 | 92 |
| 5-Sep | 22 | 16 | 13 | 14 | 18 | 23 | 31 | 22 | 50 | 64 | 61 | 60 | 14 | 28 | 79 | 30 | 21 | 20 | 19 | 20 | 20 | 18 | 18 | 17 | 79 |
| 6-Sep | 26 | 40 | 46 | 23 | 26 | 83 | 34 | 57 | 48 | 21 | 26 | 23 | 24 | 40 | 29 | 21 | 17 | 18 | 24 | 21 | 16 | 57 | 21 | 51 | 83 |
| 7-Sep | 47 | 55 | 41 | 39 | 20 | 18 | 38 | 13 | 54 | 33 | 53 | 40 | 35 | 72 | 34 | 51 | 72 | 69 | 76 | 89 | 96 | 56 | 57 | 41 | 96 |
| 8-Sep | 20 | 38 | 44 | 17 | 22 | 16 | 14 | 74 | 67 | 88 | 35 | 16 | 58 | 25 | 35 | 41 | 65 | 66 | 32 | 24 | 18 | 14 | 43 | 62 | 88 |
| 9-Sep | 47 | 40 | 11 | 15 | 13 | 12 | 11 | 24 | 25 | 13 | 29 | 80 | 70 | 79 | 55 | 76 | 60 | 83 | 22 | 14 | 17 | 14 | 12 | 22 | 83 |
| 10-Sep | 17 | 14 | 14 | 14 | 12 | 12 | 11 | 11 | 50 | 22 | 14 | 14 | 19 | 15 | 14 | 18 | 18 | 11 | 19 | 13 | 14 | 13 | 12 | 11 | 50 |
| 11-Sep | 20 | 10 | 10 | 10 | 10 | 11 | 12 | 17 | 20 | 18 | 15 | 14 | 15 | 16 | 20 | 15 | 18 | 13 | 11 | 17 | 12 | 18 | 30 | 17 | 30 |
| 12-Sep | 37 | 28 | 58 | 44 | 29 | 43 | 61 | 44 | 75 | 44 | 29 | 26 | 21 | 20 | 19 | 20 | 36 | 22 | 17 | 32 | 29 | 17 | 10 | 7 | 75 |
| 13-Sep | 10 | 9 | 10 | 10 | 12 | 15 | 18 | 54 | 36 | 18 | 15 | 14 | 12 | 14 | 19 | 17 | 14 | 11 | 11 | 9 | 9 | 8 | 78 | 78 | |
| 14-Sep | 56 | 78 | 61 | 63 | 46 | 44 | 22 | 13 | 74 | 108 | 37 | 41 | 56 | 20 | 34 | 17 | 13 | 15 | 19 | 34 | 74 | 79 | 74 | 108 | |
| 15-Sep | 75 | 81 | 81 | 78 | 50 | 83 | 82 | 93 | 36 | 94 | 33 | 39 | 49 | 29 | 23 | 20 | 21 | 31 | 78 | 20 | 28 | 17 | 23 | 21 | 94 |
| 16-Sep | 30 | 16 | 24 | 32 | 10 | 13 | 13 | 14 | 12 | 25 | 20 | 17 | 56 | 19 | 18 | 18 | 17 | 12 | 60 | 99 | 79 | 72 | 68 | 41 | 99 |
| 17-Sep | 61 | 46 | 30 | 43 | 22 | 17 | 12 | 16 | 26 | 28 | 15 | 14 | 14 | 14 | 15 | 19 | 17 | 13 | 13 | 16 | 29 | 56 | 31 | 22 | 61 |
| 18-Sep | 15 | 13 | 28 | 54 | 38 | 39 | 34 | 27 | 65 | 25 | 17 | 16 | 16 | 16 | 14 | 13 | 19 | 17 | 19 | 20 | 16 | 23 | 36 | 11 | 65 |
| 19-Sep | 13 | 12 | 17 | 11 | 17 | 10 | 17 | 13 | 15 | 11 | 20 | 31 | 16 | 14 | 23 | 38 | 14 | 41 | 36 | 53 | 66 | 59 | 12 | 19 | 66 |
| 20-Sep | 11 | 14 | 20 | 21 | 27 | 13 | 11 | 16 | 22 | 27 | 44 | 37 | 25 | 35 | 25 | 13 | 43 | 26 | 86 | 47 | 26 | 34 | 30 | 37 | 86 |
| 21-Sep | 29 | 15 | 10 | 12 | 11 | 11 | 12 | 11 | 14 | 28 | 66 | 76 | 29 | 25 | 17 | 17 | 20 | 18 | 19 | 13 | 23 | 18 | 19 | 28 | 76 |
| 22-Sep | 13 | 11 | 11 | 13 | 13 | 17 | 15 | 14 | 14 | 14 | 30 | M | M | 24 | 25 | 26 | 21 | 15 | 14 | 17 | 17 | 16 | 42 | 48 | 48 |
| 23-Sep | 24 | 14 | 14 | 16 | 12 | 13 | 11 | 13 | 16 | 15 | 15 | 16 | 15 | 15 | 17 | 18 | 17 | 15 | 15 | 16 | 14 | 14 | 15 | 17 | 24 |
| 24-Sep | 15 | 23 | 11 | 13 | 15 | 16 | 17 | 61 | 17 | 18 | 17 | 17 | 13 | 14 | 16 | 12 | 16 | 11 | 11 | 10 | 9 | 9 | 9 | 9 | 61 |
| 25-Sep | 10 | 11 | 18 | 46 | 16 | 24 | 28 | 18 | 21 | 69 | 84 | 17 | 16 | 19 | 16 | 20 | 27 | 29 | 71 | 92 | 62 | 26 | 34 | 29 | 92 |
| 26-Sep | 17 | 14 | 13 | 14 | 24 | 19 | 15 | 15 | 16 | 15 | 21 | 31 | 39 | 96 | 31 | 21 | 25 | 16 | 14 | 13 | 18 | 31 | 34 | 12 | 96 |
| 27-Sep | 18 | 21 | 17 | 48 | 65 | 21 | 10 | 14 | 41 | 24 | 30 | 23 | 16 | 19 | 19 | 14 | 13 | 14 | 10 | 13 | 11 | 9 | 9 | 26 | 65 |
| 28-Sep | 84 | 36 | 37 | 28 | 24 | 34 | 12 | 14 | 36 | 75 | 14 | 59 | 34 | 27 | 27 | 23 | 23 | 26 | 70 | 81 | 23 | 43 | 52 | 29 | 84 |
| 29-Sep | 11 | 12 | 11 | 15 | 13 | 13 | 15 | 16 | 12 | 12 | 23 | 14 | 18 | 53 | 77 | 63 | 28 | 39 | 16 | 73 | 71 | 74 | 74 | 59 | 77 |
| 30-Sep | 31 | 43 | 49 | 40 | 43 | 20 | 68 | 17 | 13 | 18 | 17 | 15 | 13 | 12 | 19 | 17 | 17 | 19 | 19 | 15 | 19 | 19 | 19 | 18 | 68 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 84 | 81 | 81 | 81 | 89 | 92 | 82 | 93 | 75 | 108 | 84 | 80 | 70 | 96 | 79 | 76 | 72 | 83 | 86 | 99 | 96 | 74 | 79 | 78 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | September 22, 2016 | Last Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Gas Cert Reference | S970259A | Station temp. | 22 Deg C |
| Cal Gas Concentration | 50 ppm | Cal Gas Exp Date | September 26, 2017 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| ZAG Make/Model | API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|---------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -619 | -619 |
| Analyzer IP address | 192.168.1.103 | | Lamp voltage | 803 | 803 |
| Calculated slope | 0.997550 | 1.003009 | Chamber temp | 43.8 | 43.8 |
| Calculated intercept | 0.985147 | 0.905423 | Pressure | 711.5 | 711.5 |
| Analyzer Background | 18.4 | 18.4 | Flow | 0.482 | 0.482 |
| Analyzer Coefficient | 1.059 | 1.059 | Intensity | 43677 | 43677 |

Analyzer make Thermo 45C Analyzer serial # 630718530

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 5000 | 60.7 | 607.0 | 602.1 | 1.008 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 60.7 | 607.0 | 605.0 | 1.003 |
| second point | 5000 | 30.4 | 304.0 | 301.0 | 1.010 |
| third point | 5000 | 15.2 | 152.0 | 150.1 | 1.013 |
| as left zero | 5000 | 0.0 | 0.0 | 0.9 | ---- |
| as left span | 5000 | 60.7 | 607.0 | 607.4 | 0.999 |
| Average Correction Factor | | | | | 1.009 |

Corrected As found 602.0 Previous response 607.5 % change 0.9%

Notes:

no adjustments or maintenance done, filter changed out

Calibration Performed By:

Melissa Lemay



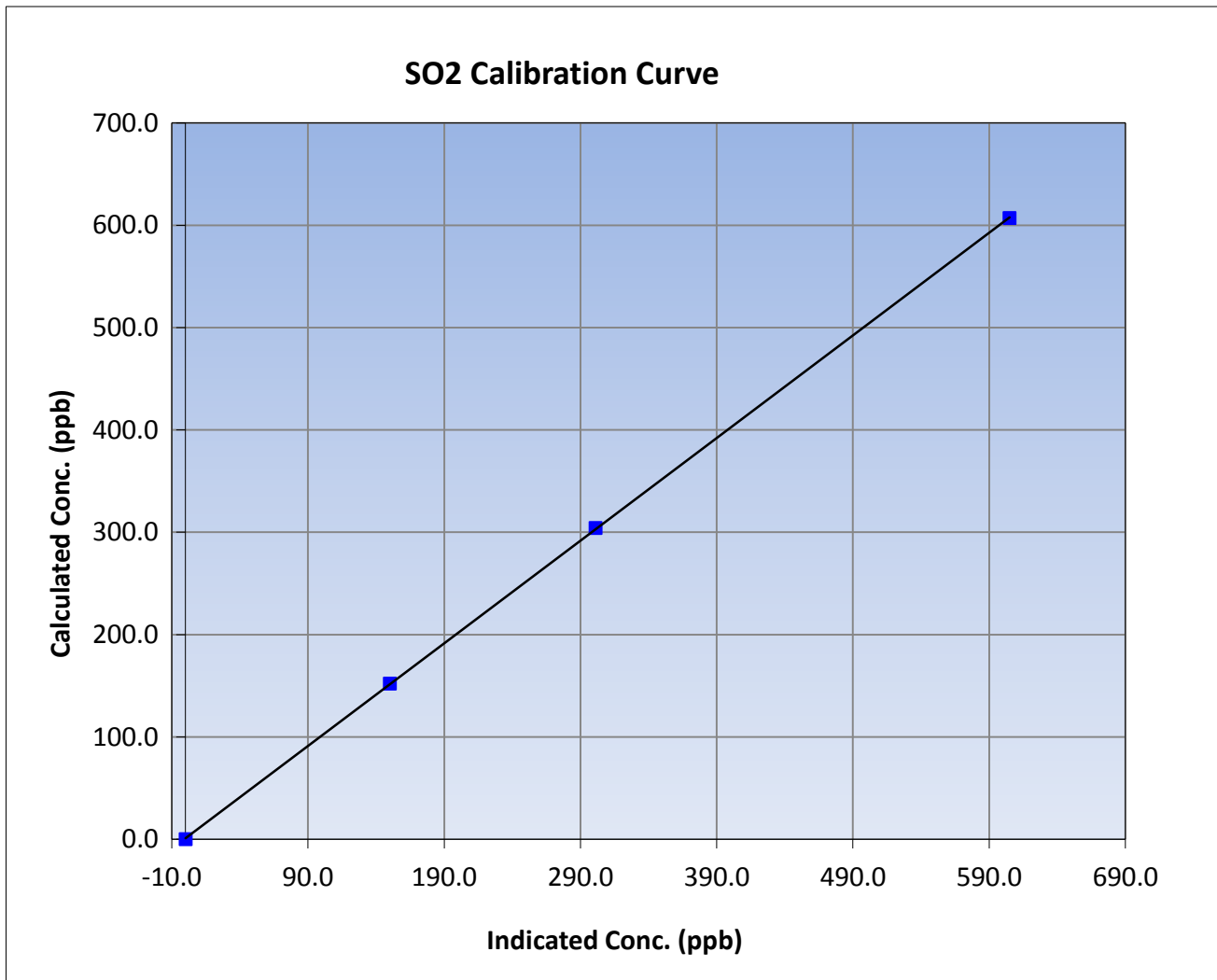
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 45C | Analyzer serial # | 630718530 |

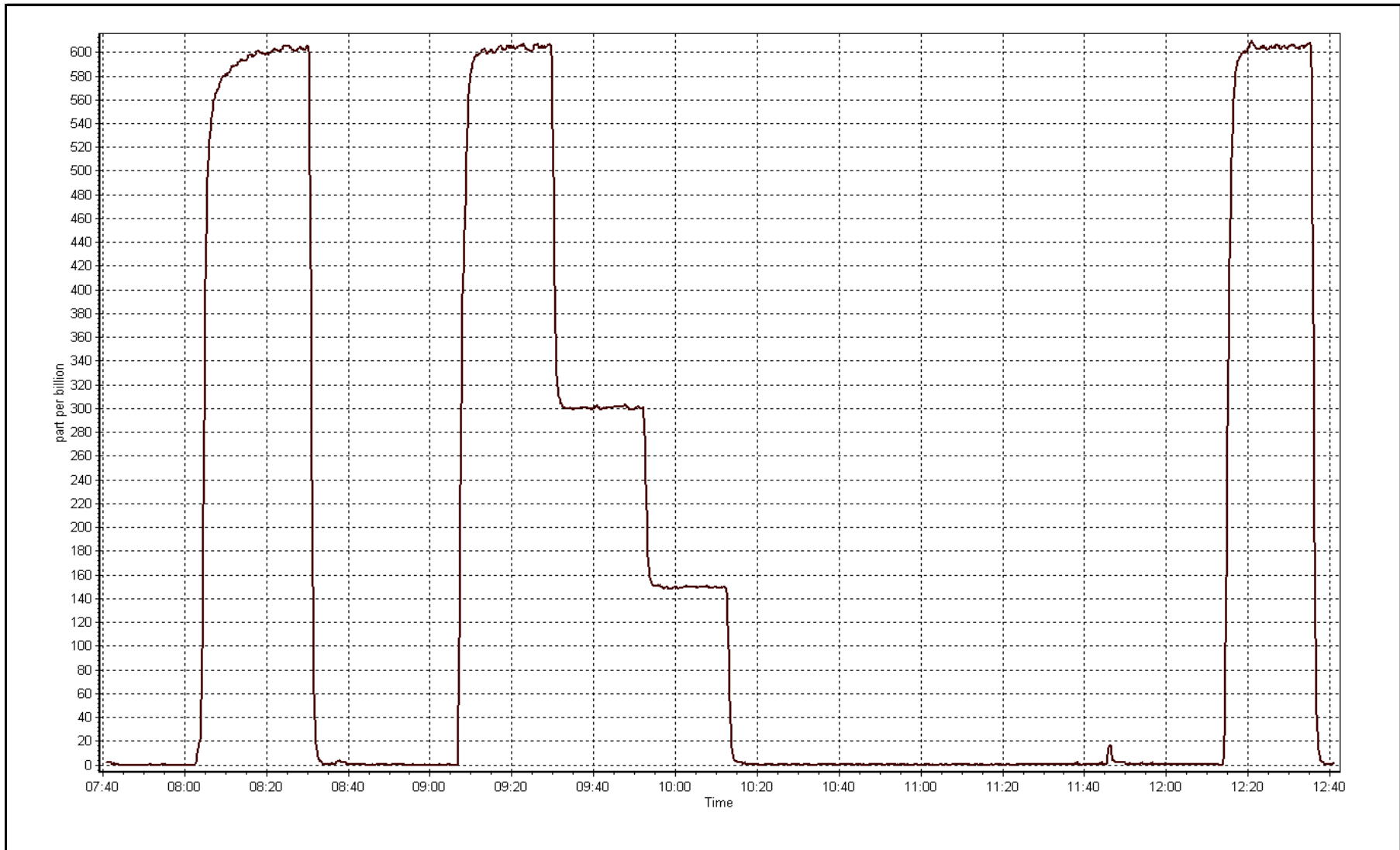
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999984 |
| 607.0 | 605.0 | 1.0033 | | |
| 304.0 | 301.0 | 1.0100 | Slope | 1.003009 |
| 152.0 | 150.1 | 1.0127 | | |
| | | | Intercept | 0.905423 |



SO2 Calibration Plot

Date: September 22, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | September 2, 2016 | Last Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 10:48 | End Time (MST) | 13:47 |
| Gas Cert Reference | ALM052589 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.02 ppm | Cal Gas Exp Date | September 9, 2017 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| Dil air Make/Model | API 701-H | Serial Number | 198 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S970259A 26/Sep/17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -611 | -611 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 839 | 839 |
| Calculated slope | 0.998353 | 1.008416 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.159263 | -0.047851 | Pressure | 710.3 | 710.3 |
| Analyzer Background | 19.8 | 19.1 | Flow | 0.453 | 0.453 |
| Analyzer Coefficient | 1.119 | 1.041 | Intensity | 91 | 91 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i | | Analyzer serial # | 1160290014 | |
| Converter make/model | CDN-101 | | Converter serial # | 460 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 5000 | 74.7 | 75.0 | 80.7 | 0.929 |
| SO2 scrubber check | 5000 | 20.0 | 200.0 | 0.9 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 74.7 | 75.0 | 74.5 | 1.007 |
| second point | 5000 | 40.0 | 40.2 | 39.6 | 1.014 |
| third point | 5000 | 20.0 | 20.1 | 20.2 | 0.994 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 74.7 | 75.0 | 76.5 | 0.980 |
| Average Correction Factor | | | | | 1.005 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 80.1 | Previous response | 75.3 | % change | -6.0% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

scrubber test done after as founds, filter changed out, zero and span adjusted, lamp voltage has increased since last month, last month was 797mV, now 839mV, all other diagnostics were similar to last calibration

Calibration Performed By:

Melissa Lemay



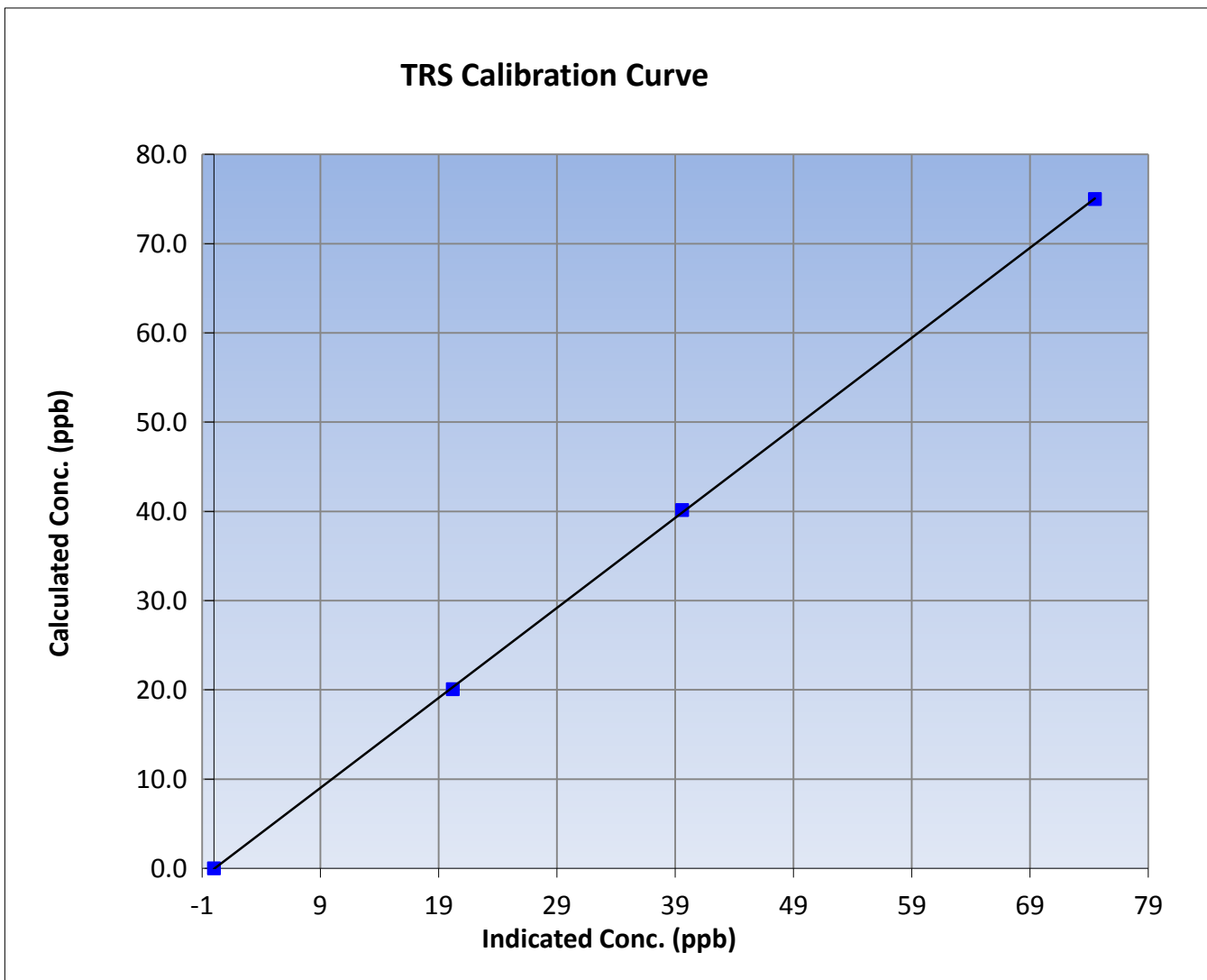
Wood Buffalo Environmental Association TRS Calibration Report

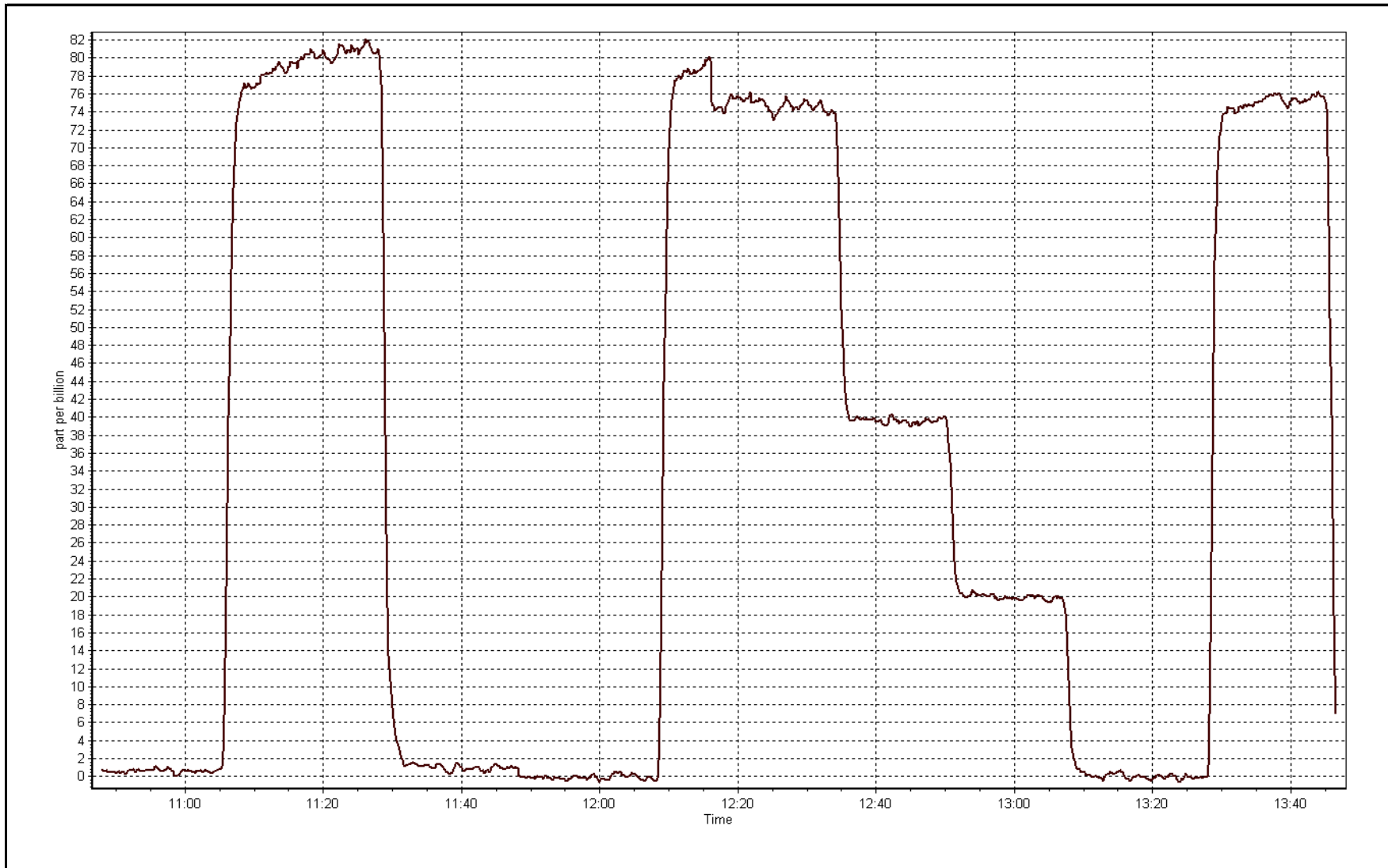
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 2, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 10:48 | End Time (MST) | 13:47 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1160290014 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999953 |
| 75.0 | 74.5 | 1.0067 | | |
| 40.2 | 39.6 | 1.0141 | Slope | 1.008416 |
| 20.1 | 20.2 | 0.9941 | | |
| | | | Intercept | -0.047851 |







Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

| | | | |
|-----------------------|-------------------------------------------------|------------------|--------------------|
| Calibration Date | September 26, 2016 | Last Calibration | September 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Other: <input type="checkbox"/> Audit follow-up | | |
| Start Time (MST) | 10:35 | End Time (MST) | 13:10 |
| Gas Cert Reference | ALM052589 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.02 ppm | Cal Gas Exp Date | September 9, 2017 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| Dil air Make/Model | API 701-H | Serial Number | 198 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S970259A 26/Sep/17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -610 | -610 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 829 | 828 |
| Calculated slope | 1.008416 | 1.001213 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.047851 | -0.108878 | Pressure | 710.3 | 710.0 |
| Analyzer Background | 19.0 | 17.0 | Flow | 0.435 | 0.435 |
| Analyzer Coefficient | 1.041 | 0.900 | Intensity | 91 | 91 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i | | Analyzer serial # | 1160290014 | |
| Converter make/model | CDN-101 | | Converter serial # | 460 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.7 | ---- |
| as found span | 5000 | 74.7 | 75.0 | 87.3 | 0.859 |
| SO2 scrubber check | | | | | |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 74.7 | 75.0 | 75.1 | 0.999 |
| second point | 5000 | 40.0 | 40.2 | 40.2 | 1.000 |
| third point | 5000 | 20.0 | 20.1 | 20.2 | 0.995 |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 0.998 |

| | | | | | |
|--------------------|------|-------------------|------|----------|--------|
| Corrected As found | 86.7 | Previous response | 74.4 | % change | -14.1% |
|--------------------|------|-------------------|------|----------|--------|

Notes:

Follow-up to AEP audit of September 26; analyzer response zero and span adjusted.

Calibration Performed By: Kelly Baragar



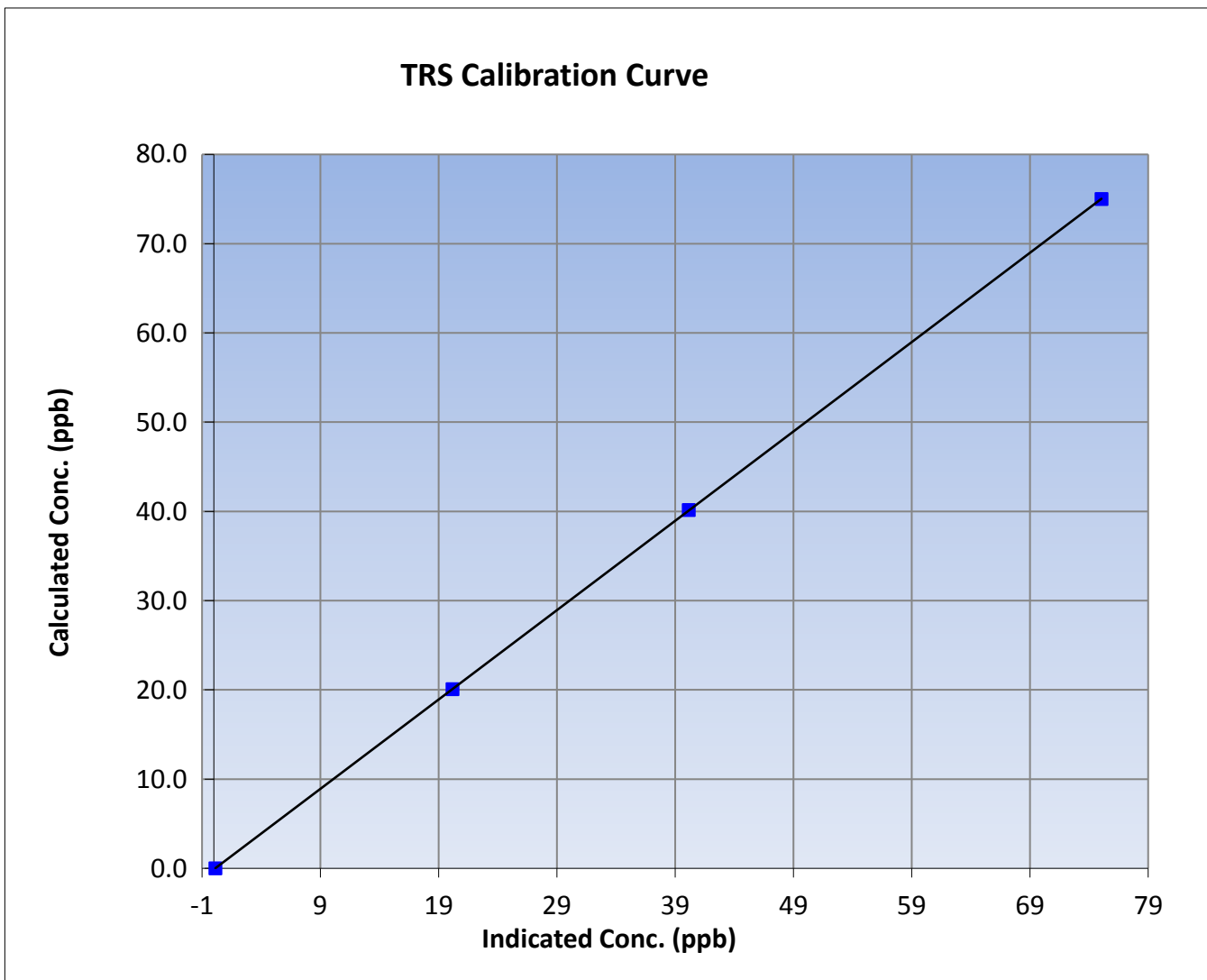
Wood Buffalo Environmental Association TRS Calibration Report

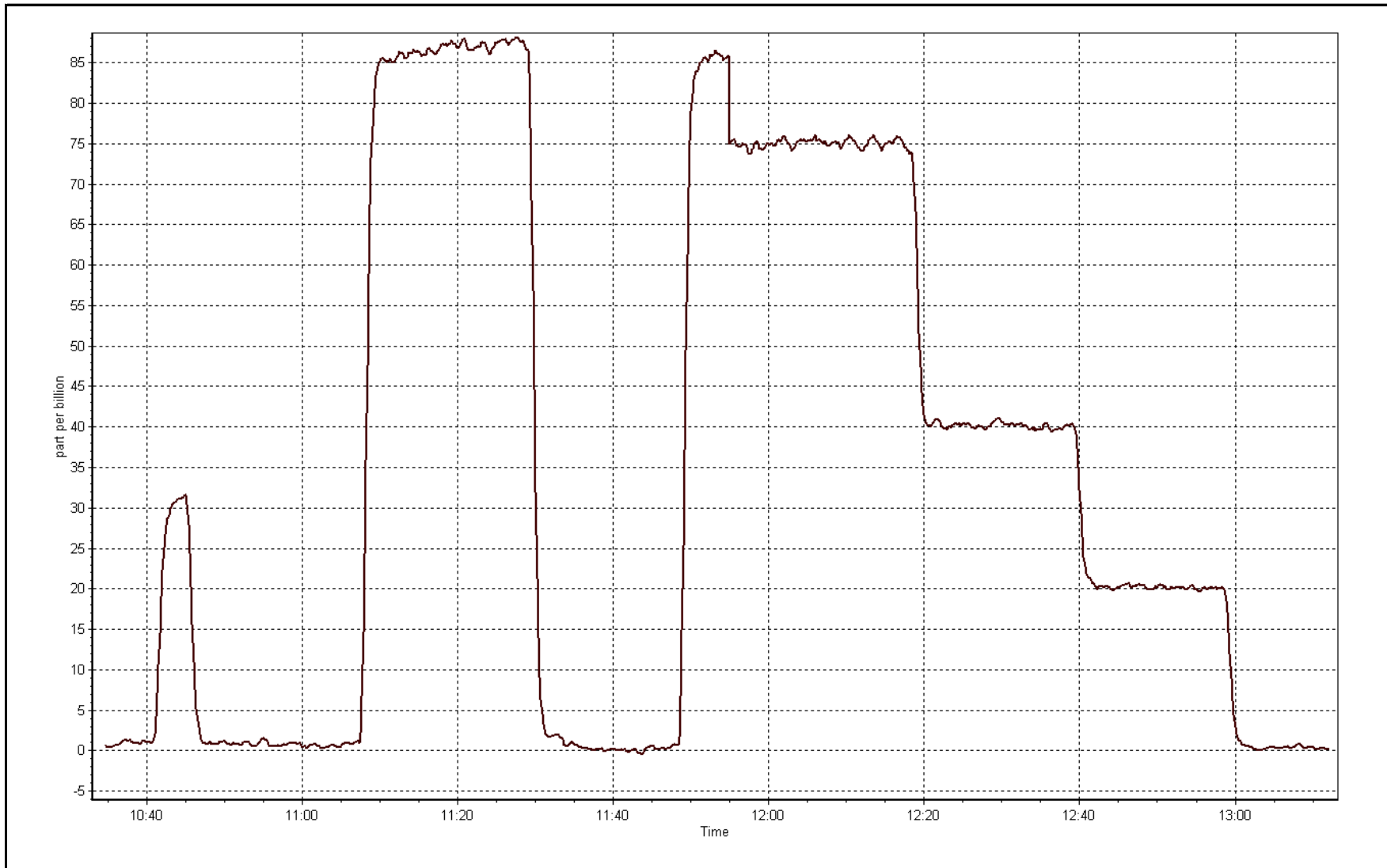
Station Information

| | | | |
|------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 10:35 | End Time (MST) | 13:10 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1160290014 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999998 |
| 75.0 | 75.1 | 0.9993 | | |
| 40.2 | 40.2 | 1.0002 | Slope | 1.001213 |
| 20.1 | 20.2 | 0.9950 | | |
| | | | Intercept | -0.108878 |







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|----------------------------|---------------------|--------------------|
| Calibration Date | September 22, 2016 | Last Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Gas Cert Reference | S970259A | Cal Gas Expiry Date | September 26, 2017 |
| CH4 Cal Gas Conc. | 490.0 ppm | CH4 Equiv Conc. | 1040.0 ppm |
| C3H8 Cal Gas Conc. | 200.0 ppm | Station temp. | 22 Deg C |
| Calibrator Model | Sabio 4010 | Serial Number | 11021107 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 5564 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|-----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.1 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 405.0 | 405.0 |
| THC Calc slope | 1.002161 | 1.008738 | Carrier Pressure | 36.8 | 36.8 |
| THC Calc intercept | 0.008196 | -0.007852 | Fuel Pressure | 45.6 | 45.6 |
| NMHC Calc slope | 1.001557 | 1.008284 | Air Pressure | 34.2 | 34.2 |
| NMHC Calc intercept | -0.003801 | -0.005815 | | | |

Analyzer make Thermo 55i Analyzer serial # 1426262594

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 12.63 | 12.59 | 1.003 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.02 | ---- |
| high point | 5000 | 60.7 | 12.63 | 12.54 | 1.007 |
| second point | 5000 | 30.4 | 6.32 | 6.24 | 1.013 |
| third point | 5000 | 15.2 | 3.16 | 3.15 | 1.004 |
| as left zero | 5000 | 0.0 | 0.00 | 0.02 | ---- |
| as left span | 5000 | 60.7 | 12.63 | 12.51 | 1.009 |
| Average Correction Factor | | | | | 1.008 |

Corrected As found 12.59 Previous response 12.59 % change 0.0%

Notes:

tried to adjust zero, zero would stay around 0.02ppm, Chromatograms are good, span not adjusted, filter changed out

]

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 6.68 | 6.70 | 0.997 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 60.7 | 6.68 | 6.63 | 1.007 |
| second point | 5000 | 30.4 | 3.34 | 3.31 | 1.010 |
| third point | 5000 | 15.2 | 1.67 | 1.68 | 0.995 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 60.7 | 6.68 | 6.59 | 1.013 |
| Average Correction Factor | | | | | 1.004 |

Corrected As found 6.70 Previous response 6.67 % change -0.4%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 5.95 | 5.89 | 1.010 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.02 | ---- |
| high point | 5000 | 60.7 | 5.95 | 5.91 | 1.007 |
| second point | 5000 | 30.4 | 2.98 | 2.93 | 1.017 |
| third point | 5000 | 15.2 | 1.49 | 1.47 | 1.013 |
| as left zero | 5000 | 0.0 | 0.00 | 0.02 | ---- |
| as left span | 5000 | 60.7 | 5.95 | 5.92 | 1.005 |
| Average Correction Factor | | | | | 1.012 |

Corrected As found 5.89 Previous response 5.92 % change 0.5%



Wood Buffalo Environmental Association

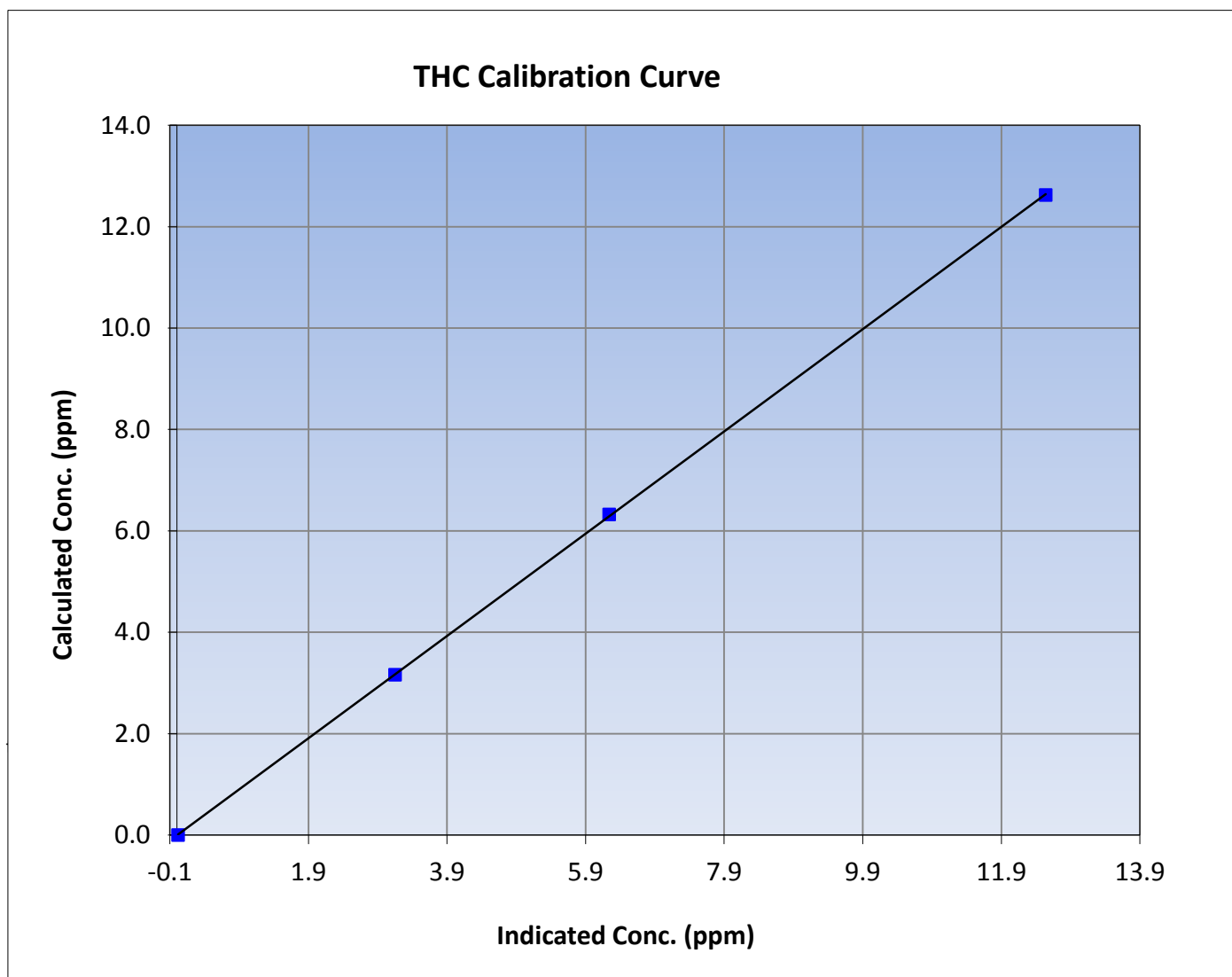
THC Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |
| | | | 0.528 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.02 | ---- | Correlation Coefficient | 0.999979 |
| 12.63 | 12.54 | 1.0068 | | |
| 6.32 | 6.24 | 1.0133 | Slope | 1.008738 |
| 3.16 | 3.15 | 1.0037 | | |
| | | | Intercept | -0.007852 |





Wood Buffalo Environmental Association

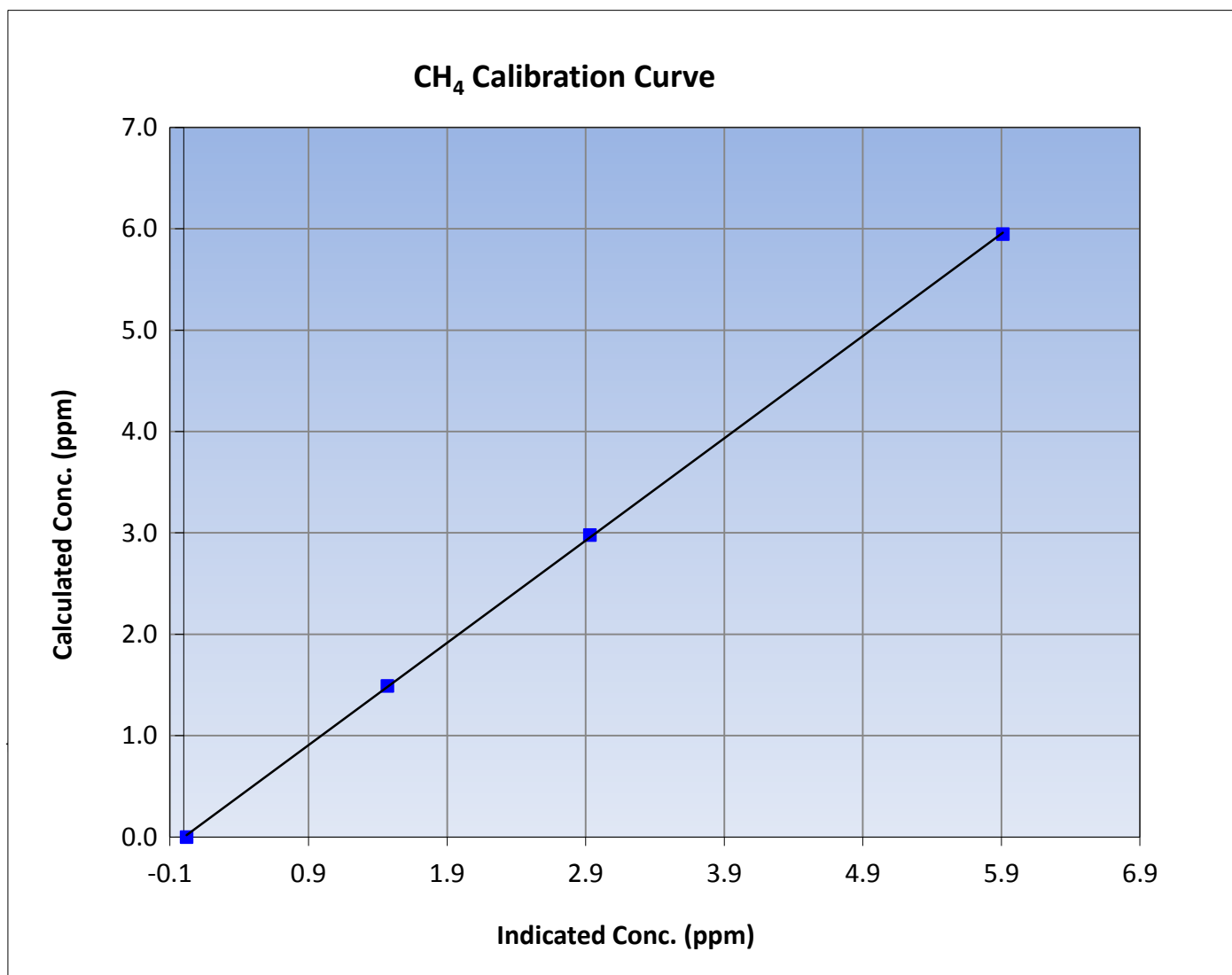
CH₄ Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |
| | | | 0.528 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.02 | ---- | Correlation Coefficient | 0.999939 |
| 5.95 | 5.91 | 1.0065 | | |
| 2.98 | 2.93 | 1.0168 | Slope | 1.009211 |
| 1.49 | 1.47 | 1.0133 | | |
| | | | Intercept | -0.001938 |





Wood Buffalo Environmental Association

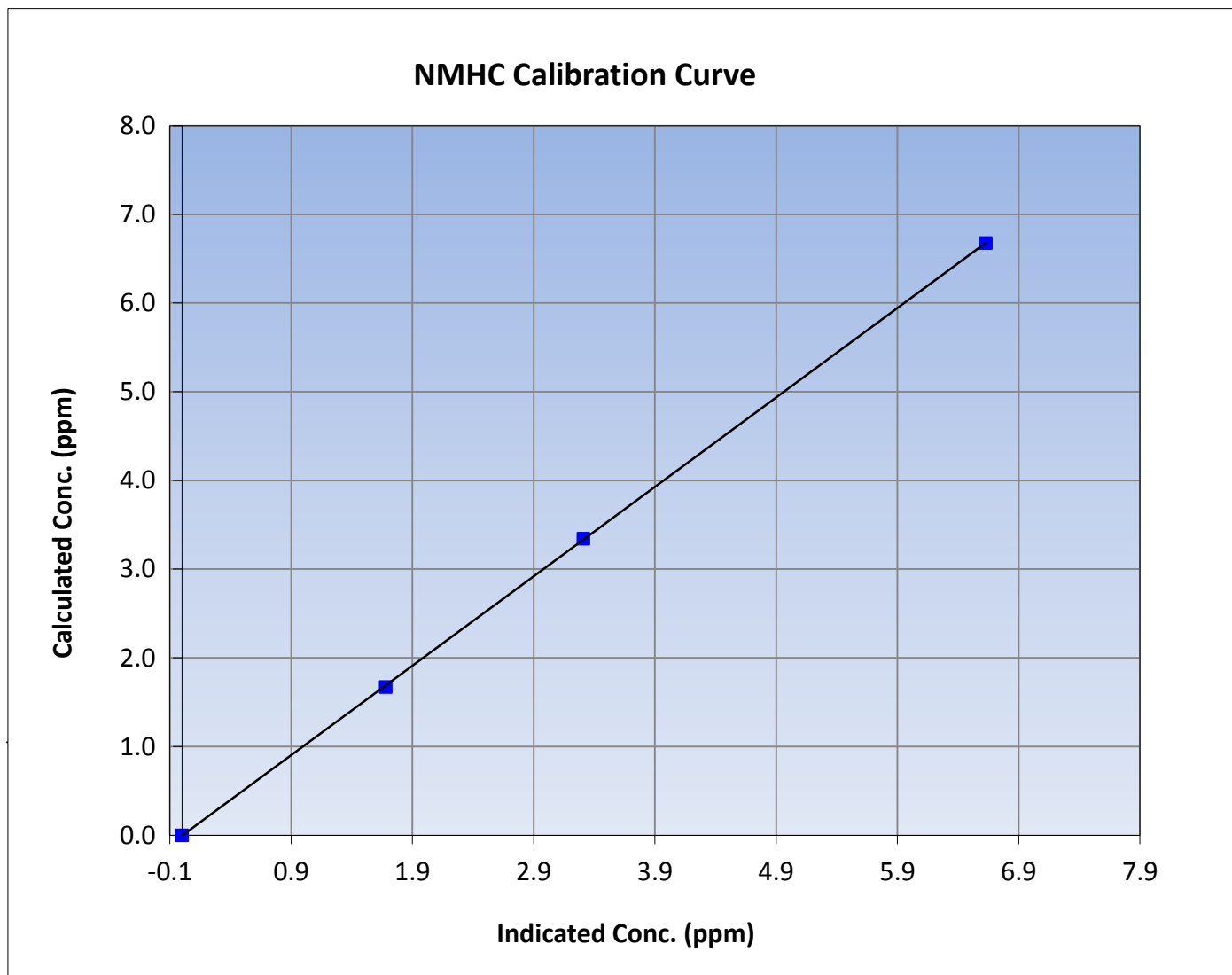
NMHC Calibration Summary

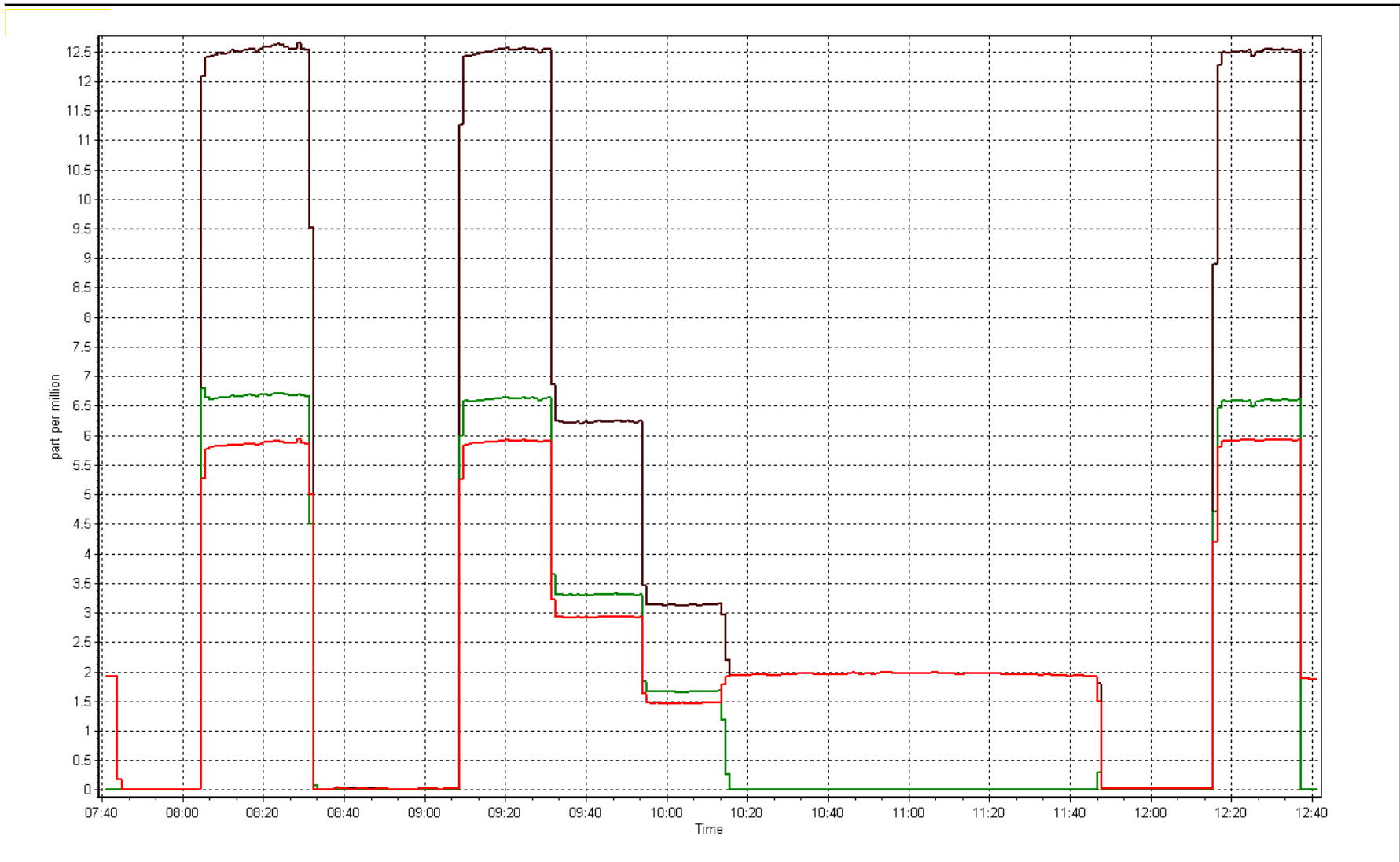
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |
| | | | 0.528 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999981 |
| 6.68 | 6.63 | 1.0071 | | |
| 3.34 | 3.31 | 1.0103 | Slope | 1.008284 |
| 1.67 | 1.68 | 0.9952 | | |
| | | | Intercept | -0.005815 |







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 12:35 | End Time (MST) | 15:02 |
| NO2 GPT Ref date | NA | Transfer Standard | GPTPS |
| | | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 5564 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|------------------|--------|-------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 27.2 | 27.2 |
| Analyzer IP address | 192.168.1.48 | | Lamp temp. | 67.9 | 67.9 |
| Calculated slope | 0.998913 | 1.000894 | Pressure | 717.1 | 717.1 |
| Calculated intercept | -0.259345 | -0.256492 | Flow cell A | 0.760 | 0.760 |
| Analyzer Background | -2.0 | -2.0 | Flow cell B | 0.778 | 0.778 |
| Analyzer Coefficient | 1.038 | 1.020 | Cell A Intensity | 64619 | 64619 |
| | | | Cell B Intensity | 57427 | 57427 |

| | | | |
|---------------|---------|-------------------|------------|
| Analyzer make | TEI 49i | Analyzer serial # | 1507964700 |
|---------------|---------|-------------------|------------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp Intensity | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|---------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.00 | 0.0 | -0.6 | ---- |
| as found span | 5000 | 995.40 | 400.0 | 405.8 | 0.986 |
| calibrator zero | 5000 | 0.00 | 0.0 | -0.6 | ---- |
| high point | 5000 | 994.20 | 400.0 | 399.5 | 1.001 |
| second point | 5000 | 842.70 | 200.0 | 200.4 | 0.998 |
| third point | 5000 | 0.43 | 100.0 | 101.1 | 0.989 |
| as left zero | 5000 | 0.00 | 0.0 | 0.8 | ---- |
| as left span | 5000 | 994.10 | 400.0 | 397.8 | 1.006 |
| Average Correction Factor | | | | | 0.996 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|-------|
| Corrected As found | 406.4 | Previous response | 400.7 | % change | -1.4% |
|--------------------|-------|-------------------|-------|----------|-------|

Notes:

Span adjusted, filter changed out, no maintenance done

Calibration Performed By: Melissa Lemay



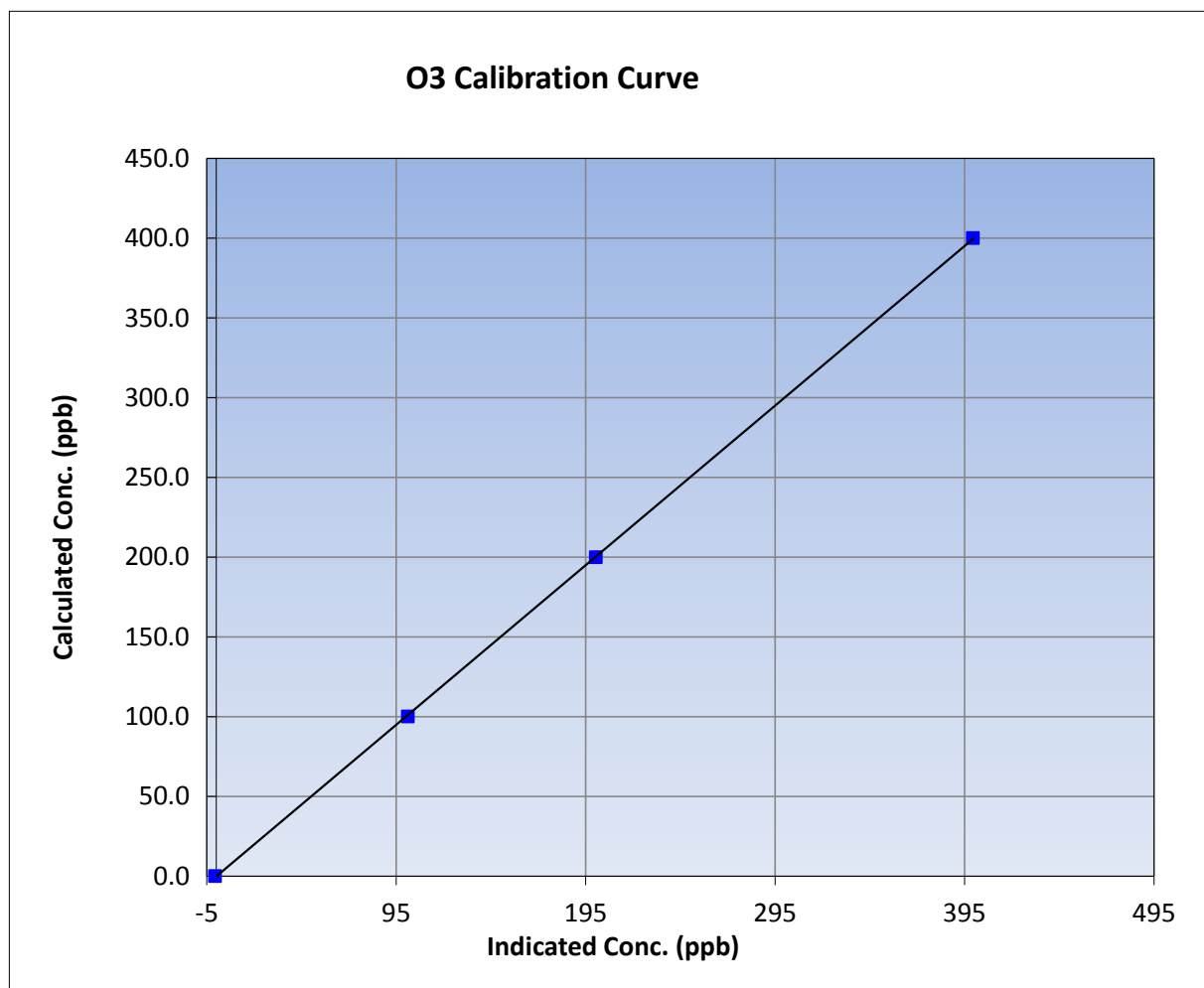
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

| | | | |
|------------------|------------------|----------------------|-----------------|
| Calibration Date | September-22-16 | Previous Calibration | August 11, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 12:35 | End Time (MST) | 15:02 |
| Analyzer make | TEI 49i | Analyzer serial # | 1507964700 |

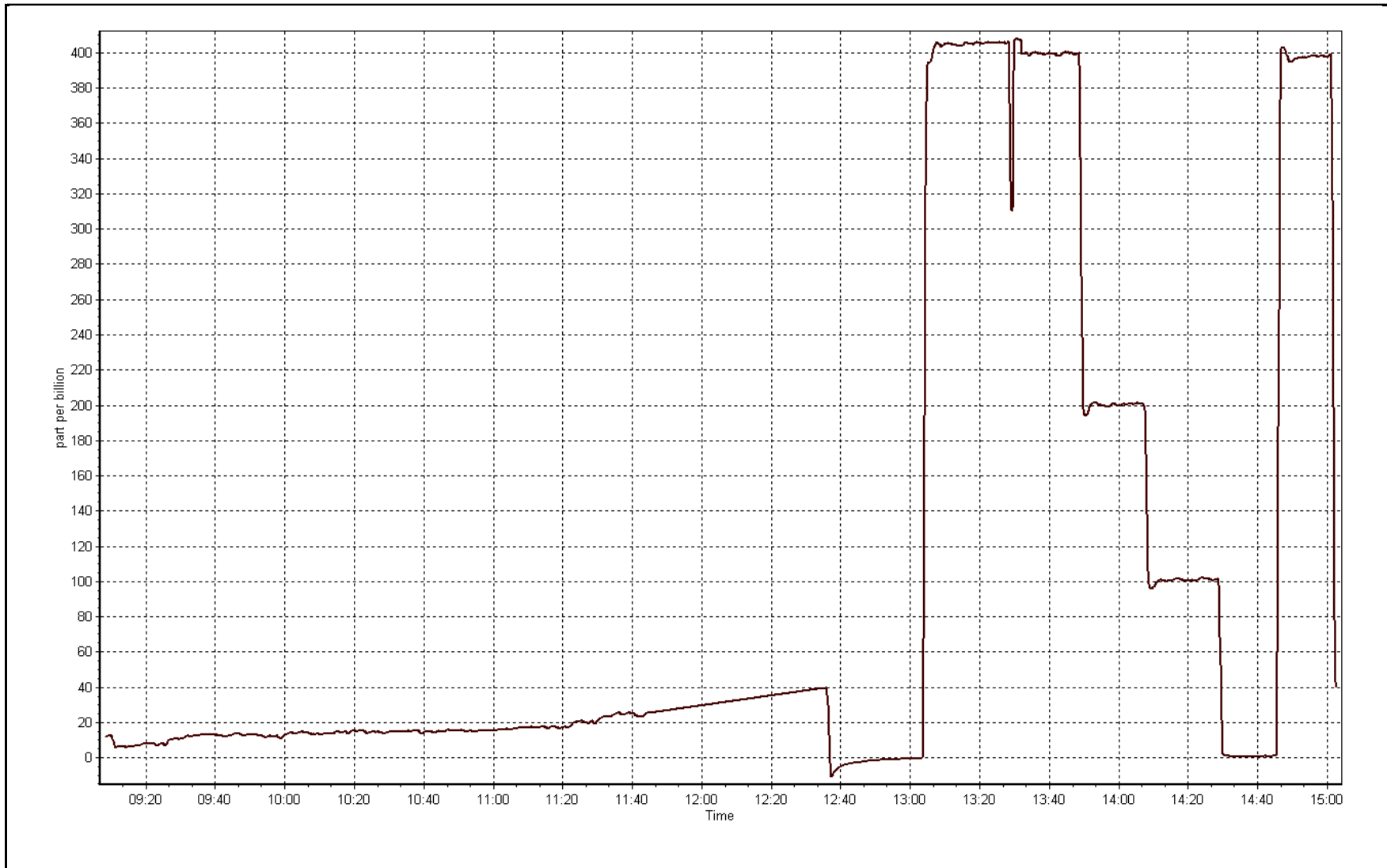
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.6 | ---- | Correlation Coefficient | 0.999979 |
| 400.0 | 399.5 | 1.0013 | | |
| 200.0 | 200.4 | 0.9980 | Slope | 1.000894 |
| 100.0 | 101.1 | 0.9891 | | |
| | | | Intercept | -0.256492 |



O3 Calibration Plot

Date: September 22, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| NO Cal Gas Conc | 49.4 ppm | Gas Cert Reference | S970259A |
| NOx Cal Gas Conc | 49.4 ppm | Cal Gas Expiry Date | September 26, 2017 |
| Calibrator | API T700 | Serial Number | 2445 |
| Zero air Generator | Teledyne PAI T701 | Serial Number | 1864 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.997898 | 0.996107 | 1.005859 |
| | Data Offset | 1.336274 | 1.157521 | 0.126215 |
| Current Calibration | Data Slope | 0.999145 | 1.000347 | 0.992828 |
| | Data Offset | 0.860057 | 1.020339 | -0.076895 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|-----------|
| Analyzer make/model | Thermo 42C | Analyzer serial # | 601114773 |
|---------------------|------------|-------------------|-----------|

| Test Point | before | | after | |
|---------------------|---------------|-------|---------------|-------|
| Concentration range | 0-1000 | ppb | 0-1000 | ppb |
| Analyzer IP | 192.168.1.103 | | 192.168.1.103 | |
| NO coefficient | 1.065 | | 1.023 | |
| NOX coefficient | 0.998 | | 1.001 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 3.9 | | 2.9 | |
| NOX bkgrnd | 4.1 | | 3.0 | |
| Chamber Temp | 49.6 | Deg C | 49.6 | Deg C |
| Moly Temp | 324 | Deg C | 324 | Deg C |
| PMT voltage | -784 | V | -784 | V |
| PMT Temp | -3.5 | Deg C | -3.5 | Deg C |
| O3 flow | ok | | ok | |
| R Cell press NO | 137.1 | mmHg | 135.6 | mmHg |
| R Cell Press Nox | 137.1 | mmHg | 135.6 | mmHg |
| NO sample flow | 0.919 | lpm | 0.907 | lpm |
| Nox sample Flow | 0.919 | lpm | 0.907 | lpm |

Notes:

Diagonstics similar to last calibration, Reaction cell cleaned last month, During GPT the Pressure and flow slightly changed from 137.1 to 135.6mmHg, and flow 0.919 to 0.907LPM; second high GPT point used



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 22, 2016 Station Number: AMS 7

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.8 | -1.0 | 0.3 | ---- | ---- |
| as found span | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 626.4 | 626.3 | 0.3 | 0.9574 | 0.9576 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.1 | 0.3 | ---- | ---- |
| high point | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 599.9 | 599.1 | 1.1 | 0.9997 | 1.0010 |
| second point | 5000 | 30.4 | 300.4 | 300.4 | 0.0 | 299.2 | 298.3 | 0.6 | 1.0039 | 1.0069 |
| third point | 5000 | 15.2 | 150.2 | 150.2 | 0.0 | 148.4 | 148.5 | 0.2 | 1.0120 | 1.0113 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | ---- | ---- |
| as left span | 5000 | 60.7 | 599.7 | 223.8 | 375.9 | 585.6 | 235.1 | 350.5 | 1.0241 | 0.9519 |
| Average Correction Factor | | | | | | | | | 1.0052 | 1.0064 |

Corrected As found NO_x= 627.2 NO= 627.3 Percent Change NO_x= -4.4% NO= -4.2%
 Previous Response NO_x= 599.6 NO= 600.9

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.70 ccm NOx ref calc conc = 599.7 ppb NO ref calc conc = 599.7 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 593.0 | 592.7 | 0.3 | 1.0113 | 1.0118 | ---- | ---- |
| 1st NO2 (300) | 223.8 | 368.9 | 595.5 | 223.8 | 371.7 | 1.0071 | ---- | 0.9925 | 100.8% |
| 2nd NO2 (200) | 415.1 | 177.6 | 594.0 | 415.1 | 179.0 | 1.0096 | ---- | 0.9922 | 100.8% |
| 3rd NO2 (100) | 503.8 | 88.9 | 593.1 | 503.8 | 89.3 | 1.0112 | ---- | 0.9955 | 100.4% |
| 2nd NO ref point | | 0.0 | 598.6 | 598.8 | -0.1 | 1.0019 | 1.0015 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0074 | | 0.9934 | 100.7% |

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

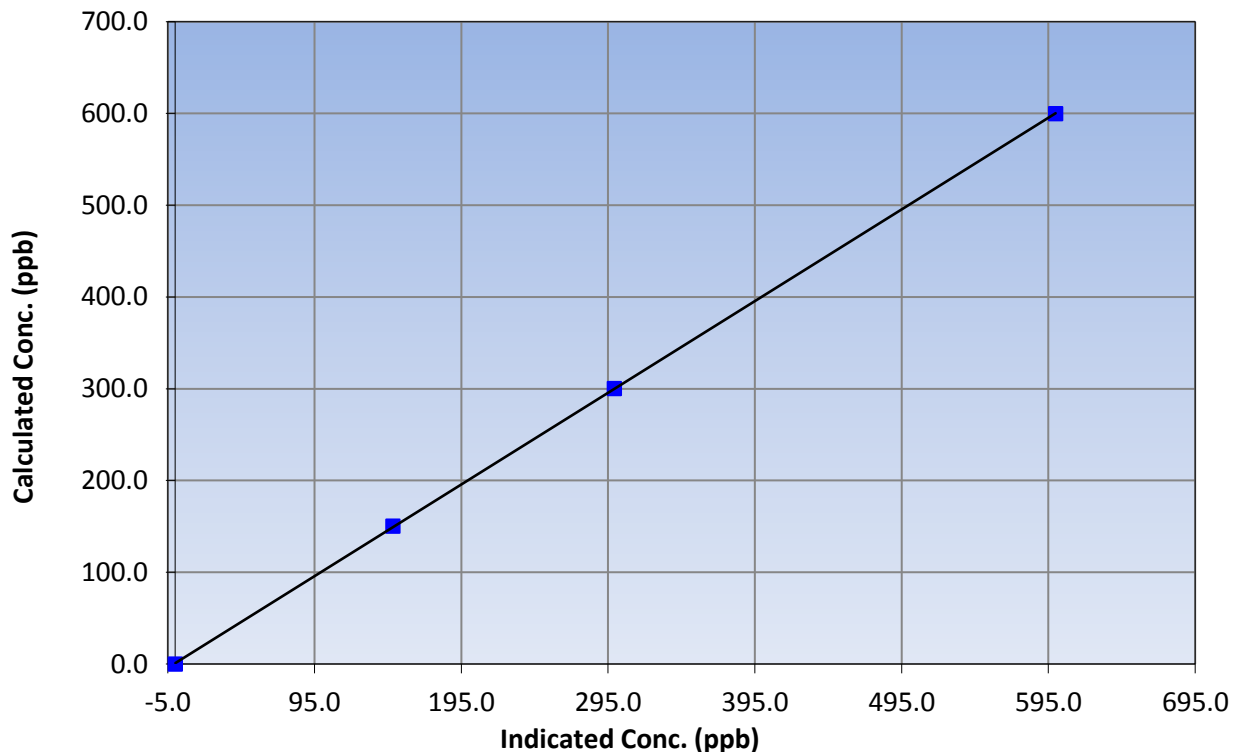
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999986 |
| 599.7 | 599.9 | 0.9997 | | |
| 300.4 | 299.2 | 1.0039 | Slope | 0.999145 |
| 150.2 | 148.4 | 1.0120 | | |
| | | | Intercept | 0.860057 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

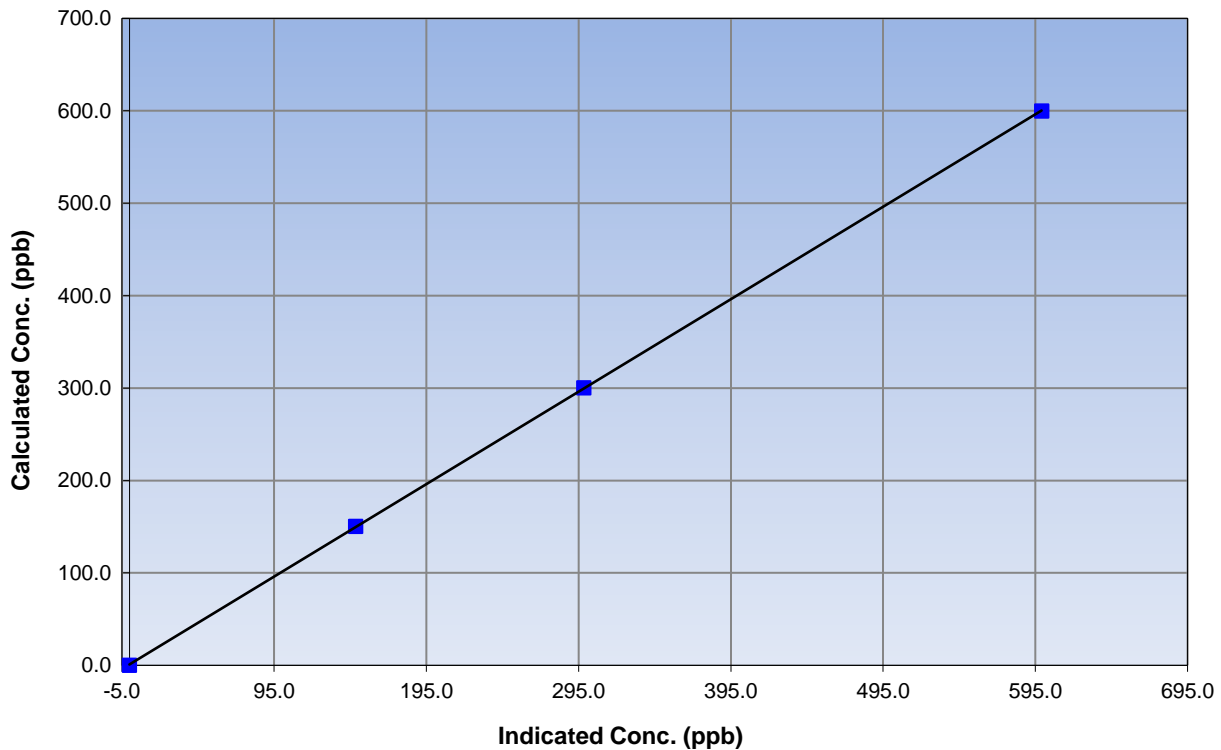
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999988 |
| 599.7 | 599.1 | 1.0010 | | |
| 300.4 | 298.3 | 1.0069 | Slope | 1.000347 |
| 150.2 | 148.5 | 1.0113 | | |
| | | | Intercept | 1.020339 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

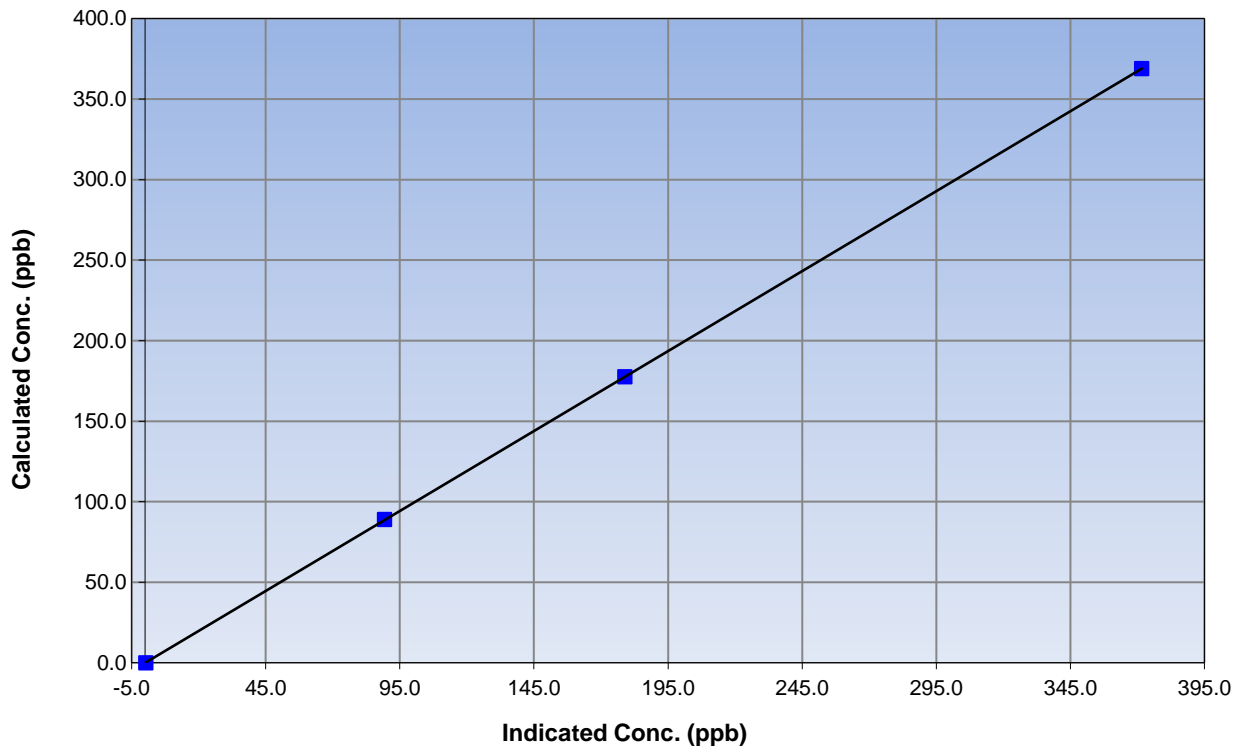
Station Information

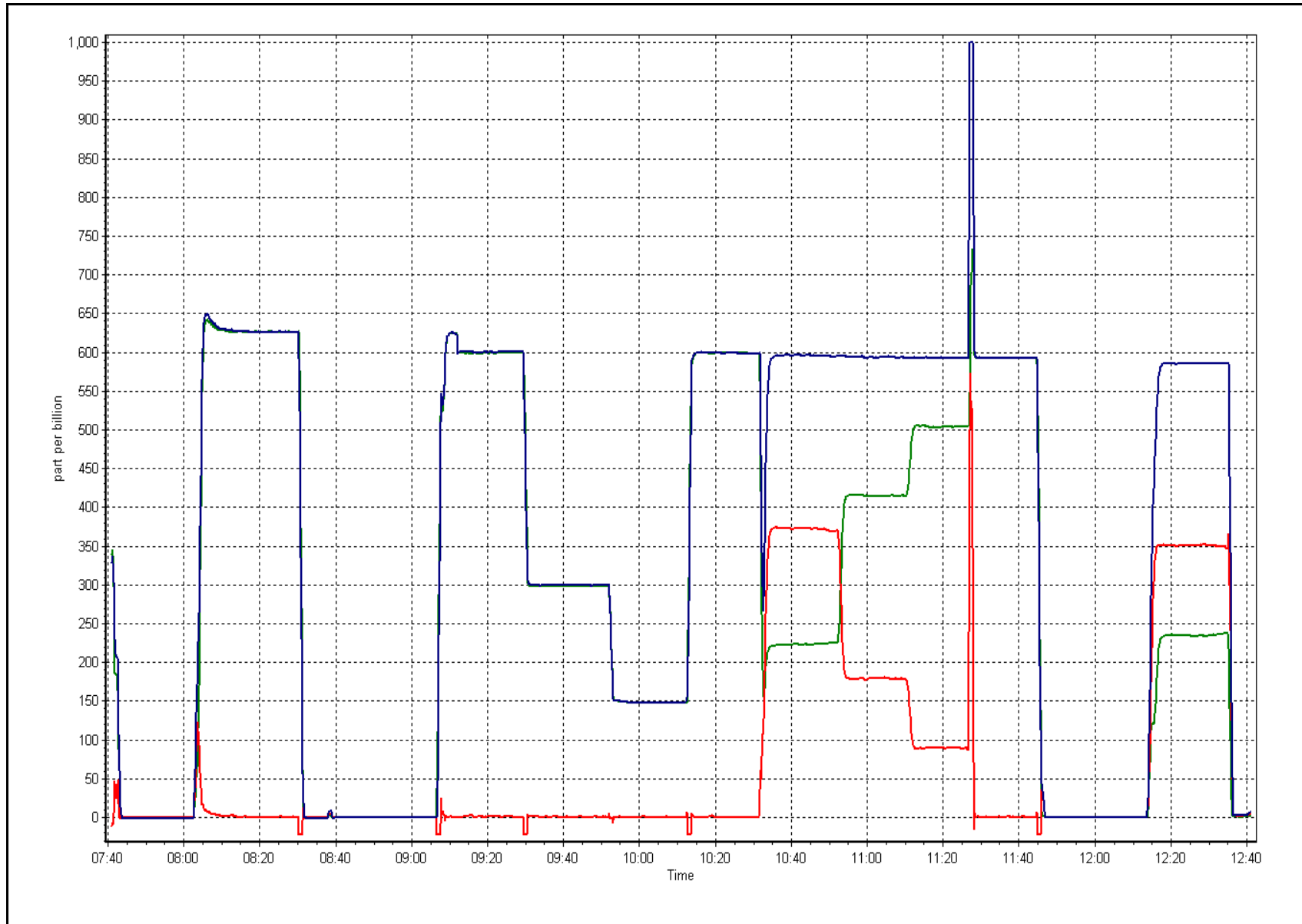
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 10, 2016 |
| Station Number | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:40 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | | | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|-------|----------|
| 0.0 | 0.3 | N/A | Correlation Coefficient | 0.999998 | | |
| 368.9 | 371.7 | 0.9925 | | | | |
| 177.6 | 179.0 | 0.9922 | | | Slope | 0.992828 |
| 88.9 | 89.3 | 0.9955 | | | | |
| | | | Intercept | -0.076895 | | |

NO₂ Calibration Curve







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 22, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 13:05 | End Time (MST) | 12:40 |
| NO Cal Gas Conc | 49.4 ppm | Gas Cert Reference | S970259A |
| NOx Cal Gas Conc | 49.4 ppm | Cal Gas Expiry Date | September 26, 2017 |
| Calibrator | API T700 | Serial Number | 2445 |
| Zero air Generator | Teledyne PAI T701 | Serial Number | 1864 |

DACs Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACs make & model | Campbell Scientific CR3000 | DACs serial No. | 8205 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|-----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.999145 | 1.000347 | 0.992828 |
| | Data Offset | 0.860057 | 1.020339 | -0.076895 |
| Current Calibration | Data Slope | 1.011325 | 1.014576 | |
| | Data Offset | -0.202265 | 0.101458 | |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|-----------|
| Analyzer make/model | Thermo 42C | Analyzer serial # | 601114773 |
|---------------------|------------|-------------------|-----------|

| Test Point | before | | after | |
|---------------------|---------------|-------|---------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.103 | | 192.168.1.103 | |
| NO coefficient | 1.023 | | 1.023 | |
| NOx coefficient | 1.001 | | 1.001 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 2.9 | | 2.9 | |
| NOx bkgrnd | 3.0 | | 3.0 | |
| Chamber Temp | 49.7 | Deg C | 49.7 | Deg C |
| Moly Temp | 324 | Deg C | 324 | Deg C |
| PMT voltage | -784 | V | -784 | V |
| PMT Temp | -3.6 | Deg C | -3.6 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 134.6 | mmHg | 134.6 | mmHg |
| R Cell Press Nox | 134.6 | mmHg | 134.6 | mmHg |
| NO sample flow | 0.901 | lpm | 0.901 | lpm |
| Nox sample Flow | 0.901 | lpm | 0.901 | lpm |

Notes:

As found with site cylinder prior to cylinder replacement.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 26, 2016 Station Number: AMS 7

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.1 | 0.3 | ---- | ---- |
| as found span | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 593.2 | 591.0 | 2.3 | 1.0110 | 1.0147 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.1 | 0.3 | ---- | ---- |
| high point | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 593.2 | 591.0 | 2.3 | 1.0110 | 1.0147 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 1.0110 | 1.0147 |

Corrected As found NO_x= 593.0 NO= 591.1 Percent Change NO_x= 1.1% NO= 1.2%
 Previous Response NO_x= 599.4 NO= 598.5

GPT Calibration Data

Dilution Flow (total) 5000 ccm 1.000347 60.70 ccm NOX ref calc conc = 599.7 ppb NO ref calc conc = 599.7 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | | | | | | | | |
| 1st NO2 (300) | | | | | | | | | |
| 2nd NO2 (200) | | | | | | | | | |
| 3rd NO2 (100) | | | | | | | | | |
| 2nd NO ref point | | | | | | | | | |
| Average Correction Factor | | | | | | | | | |

Calibration Performed By: Kelly Baragar



Wood Buffalo Environmental Association

NO_x Calibration Summary

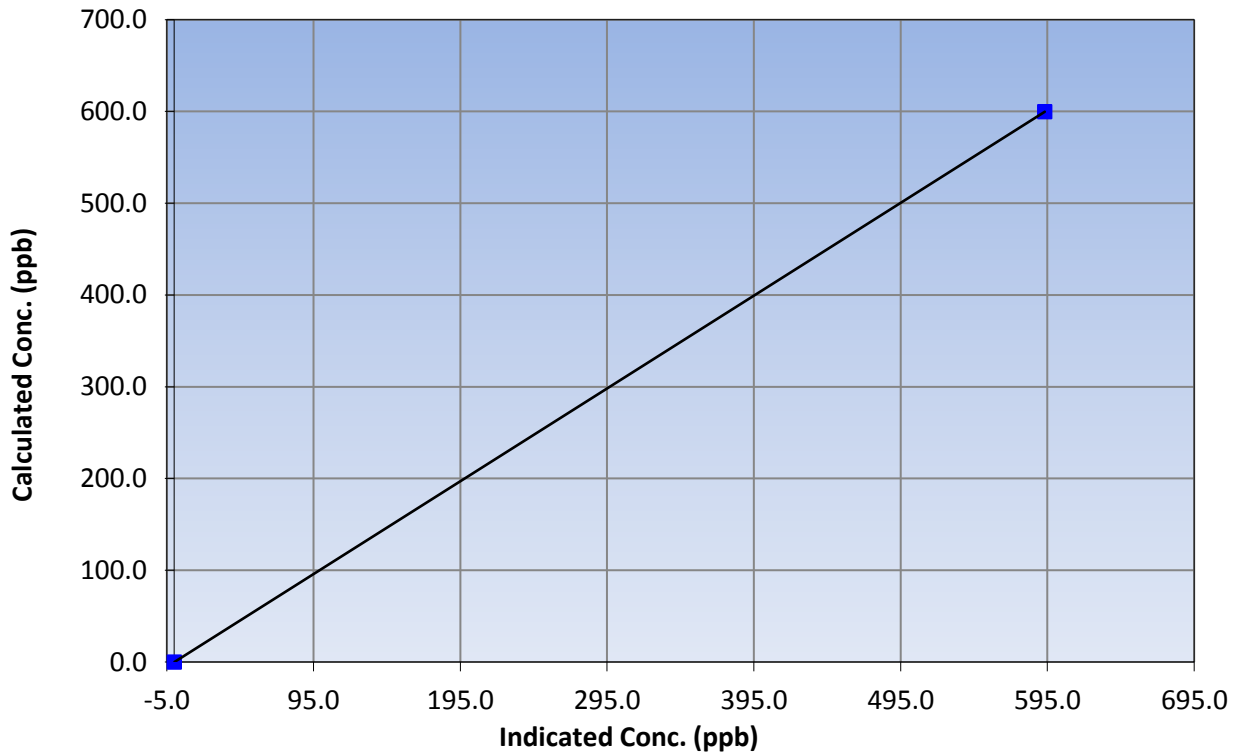
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 22, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 13:05 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 1.000000 |
| 599.7 | 593.2 | 1.0110 | | |
| | | | Slope | 1.011325 |
| | | | Intercept | -0.202265 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

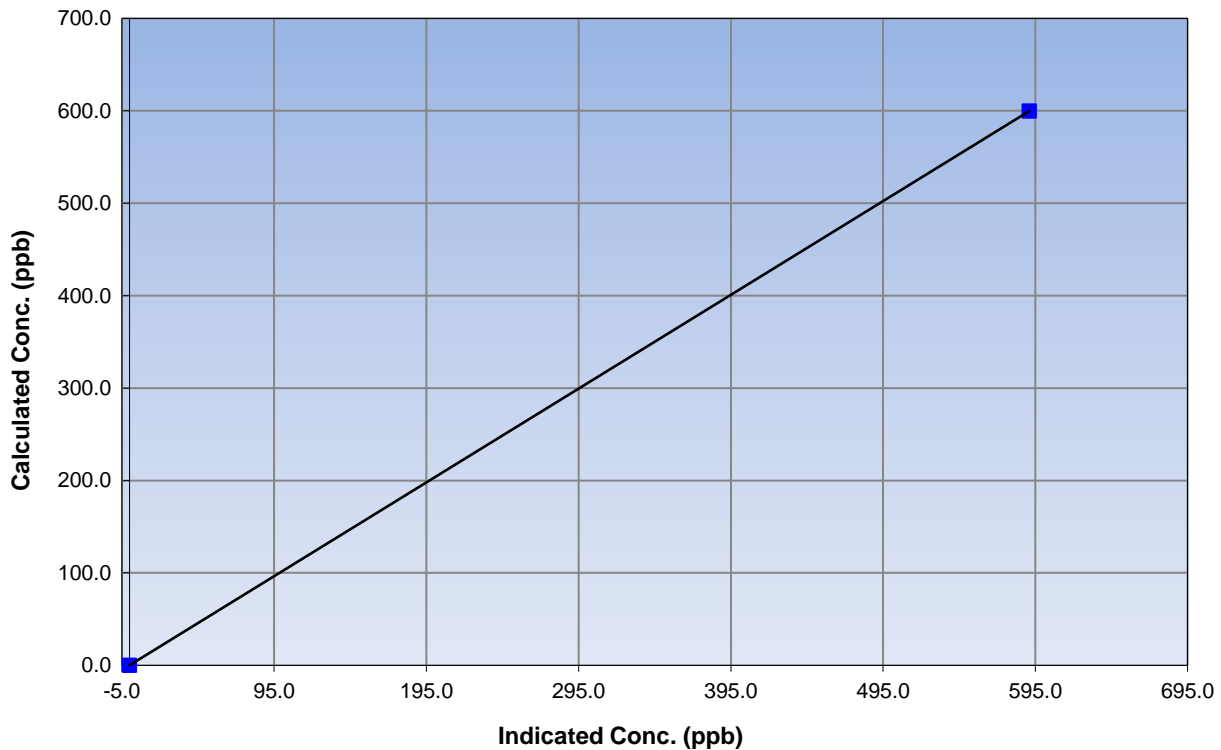
Station Information

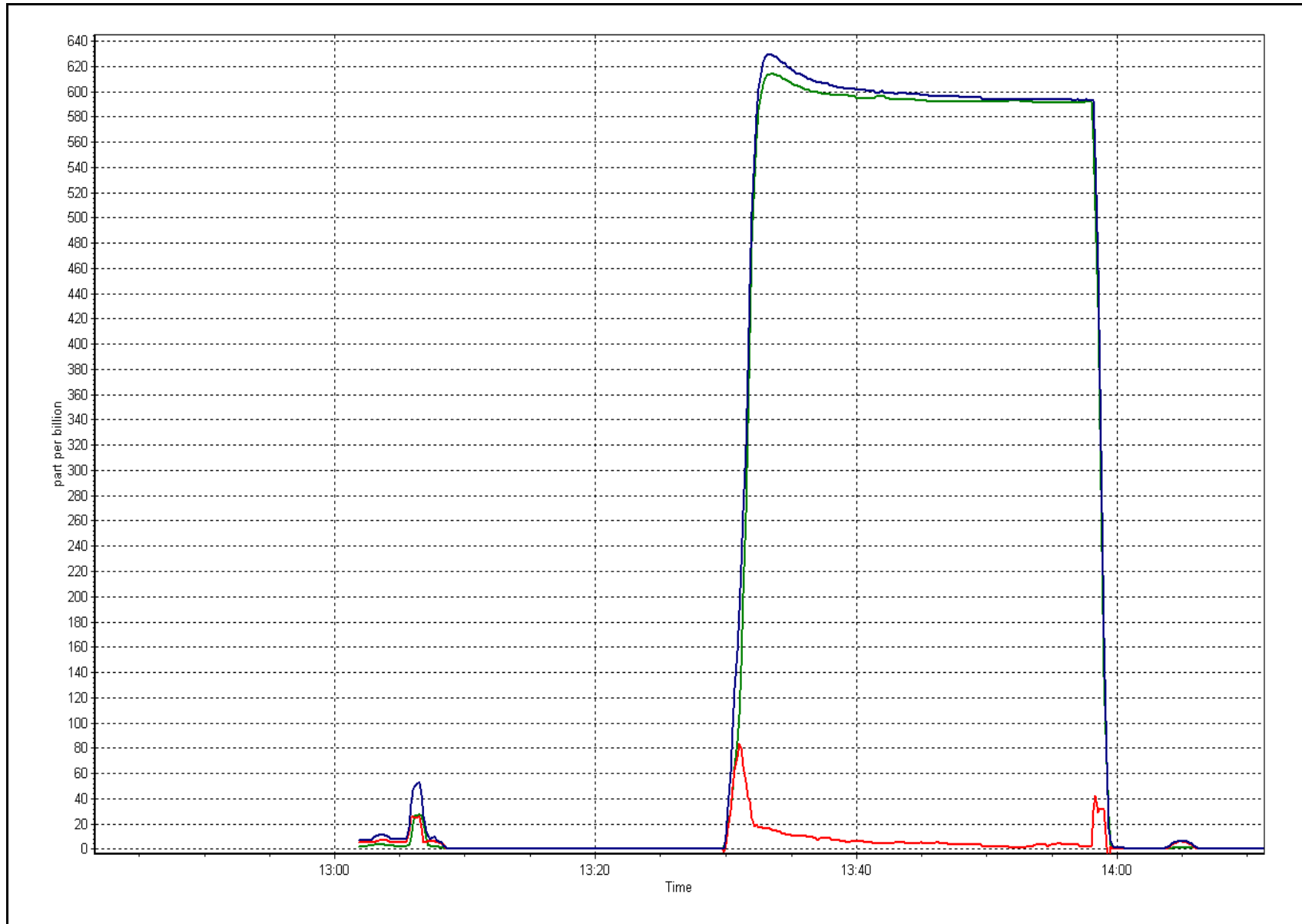
| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 22, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 13:05 | End Time (MST) | 12:40 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ----- | Correlation Coefficient | 1.000000 |
| 599.7 | 591.0 | 1.0147 | | |
| | | | Slope | 1.014576 |
| | | | Intercept | 0.101458 |

NO Calibration Curve







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 22, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 13:05 | End Time (MST) | 17:55 |
| NO Cal Gas Conc | 50.8 ppm | Gas Cert Reference | LL110103 |
| NOx Cal Gas Conc | 50.8 ppm | Cal Gas Expiry Date | February 16, 2019 |
| Calibrator | API T700 | Serial Number | 2445 |
| Zero air Generator | Teledyne PAI T701 | Serial Number | 1864 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|-----------|-----------|-----------|
| As Found (last calibration results) | Data Slope | 1.011325 | 1.014576 | 1.005859 |
| | Data Offset | -0.202265 | 0.101458 | 0.126215 |
| Current Calibration | Data Slope | 0.998156 | 0.997872 | 0.993092 |
| | Data Offset | -0.781815 | -0.248024 | -0.181420 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|-----------|
| Analyzer make/model | Thermo 42C | Analyzer serial # | 601114773 |
|---------------------|------------|-------------------|-----------|

| Test Point | before | | after | |
|---------------------|---------------|-------|---------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.103 | | 192.168.1.103 | |
| NO coefficient | 1.023 | | 1.135 | |
| NOX coefficient | 1.001 | | 1.001 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 2.9 | | 3.2 | |
| NOX bkgrnd | 3.0 | | 3.3 | |
| Chamber Temp | 49.7 | Deg C | 49.5 | Deg C |
| Moly Temp | 324 | Deg C | 324 | Deg C |
| PMT voltage | -784 | V | -784 | V |
| PMT Temp | -3.6 | Deg C | -3.6 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 134.6 | mmHg | 134.6 | mmHg |
| R Cell Press Nox | 134.6 | mmHg | 134.6 | mmHg |
| NO sample flow | 0.901 | lpm | 0.900 | lpm |
| Nox sample Flow | 0.901 | lpm | 0.900 | lpm |

Notes:

Calibration cylinder changed from result of AEP audit conducted September 25, 2016. As found change reflects the response from the new calibration cylinder.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 26, 2016 Station Number: AMS 7

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.1 | 0.3 | ---- | ---- |
| as found span | 5000 | 59.1 | 600.5 | 600.5 | 0.0 | 551.8 | 551.5 | 0.6 | 1.0882 | 1.0888 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.1 | 0.3 | ---- | ---- |
| high point | 5000 | 59.0 | 599.4 | 599.4 | 0.0 | 600.7 | 600.5 | 0.2 | 0.9979 | 0.9982 |
| second point | 5000 | 29.5 | 299.7 | 299.7 | 0.0 | 302.4 | 301.7 | 0.7 | 0.9913 | 0.9936 |
| third point | 5000 | 14.8 | 150.4 | 150.4 | 0.0 | 151.4 | 150.7 | 0.6 | 0.9935 | 0.9977 |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 0.9942 | 0.9965 |

Corrected As found NO_x= 551.6 NO= 551.6 Percent Change NO_x= 7.7% NO= 7.3%
 Previous Response NO_x= 593.9 NO= 591.7

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 59.00 ccm NOx ref calc conc = 599.4 ppb NO ref calc conc = 599.4 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 591.2 | 590.5 | 0.3 | 1.0139 | 1.0151 | ---- | ---- |
| 1st NO2 (300) | 198.1 | 392.4 | 593.3 | 198.1 | 395.3 | 1.0103 | ---- | 0.9927 | 100.7% |
| 2nd NO2 (200) | 394.9 | 195.6 | 592.2 | 394.9 | 197.3 | 1.0122 | ---- | 0.9914 | 100.9% |
| 3rd NO2 (100) | 491.5 | 99.0 | 591.1 | 491.5 | 99.7 | 1.0141 | ---- | 0.9939 | 100.6% |
| 2nd NO ref point | | 0.0 | 599.2 | 596.9 | 2.3 | 1.0005 | 1.0043 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0093 | | 0.9926 | 100.7% |

Calibration Performed By: Kelly Baragar



Wood Buffalo Environmental Association

NO_x Calibration Summary

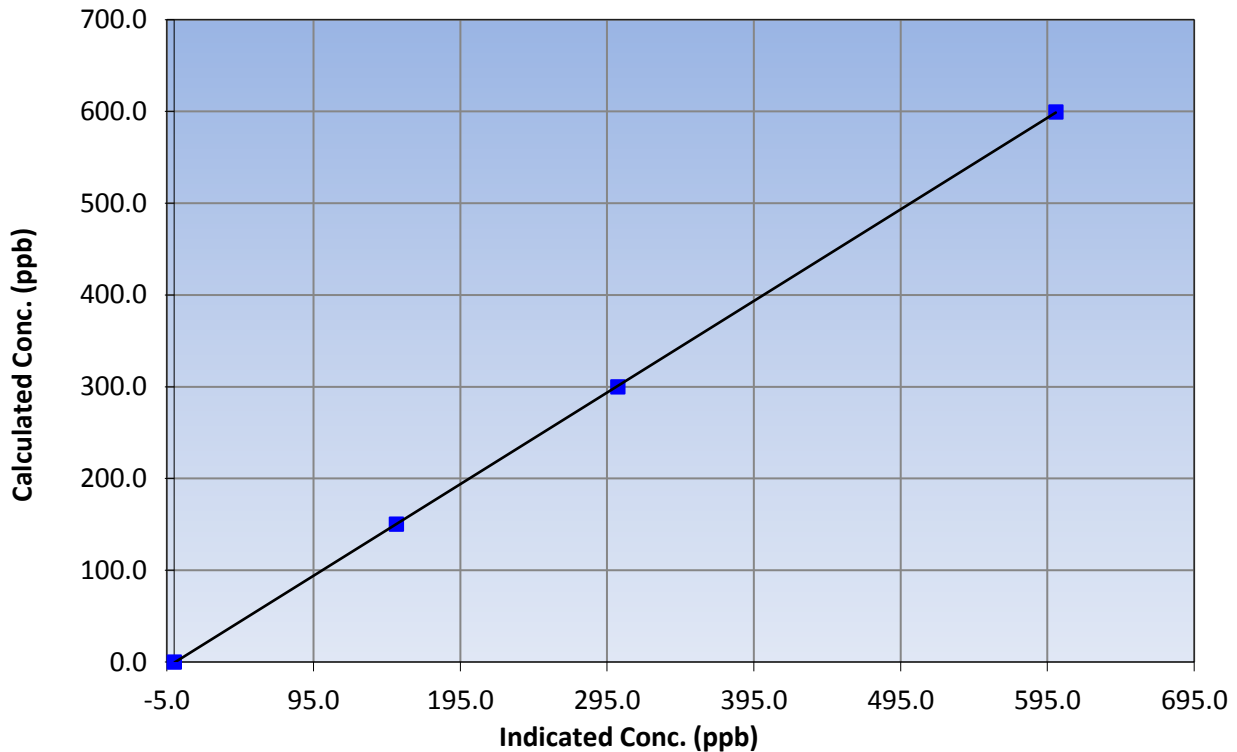
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 22, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 13:05 | End Time (MST) | 17:55 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999988 |
| 599.4 | 600.7 | 0.9979 | | |
| 299.7 | 302.4 | 0.9913 | Slope | 0.998156 |
| 150.4 | 151.4 | 0.9935 | | |
| | | | Intercept | -0.781815 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

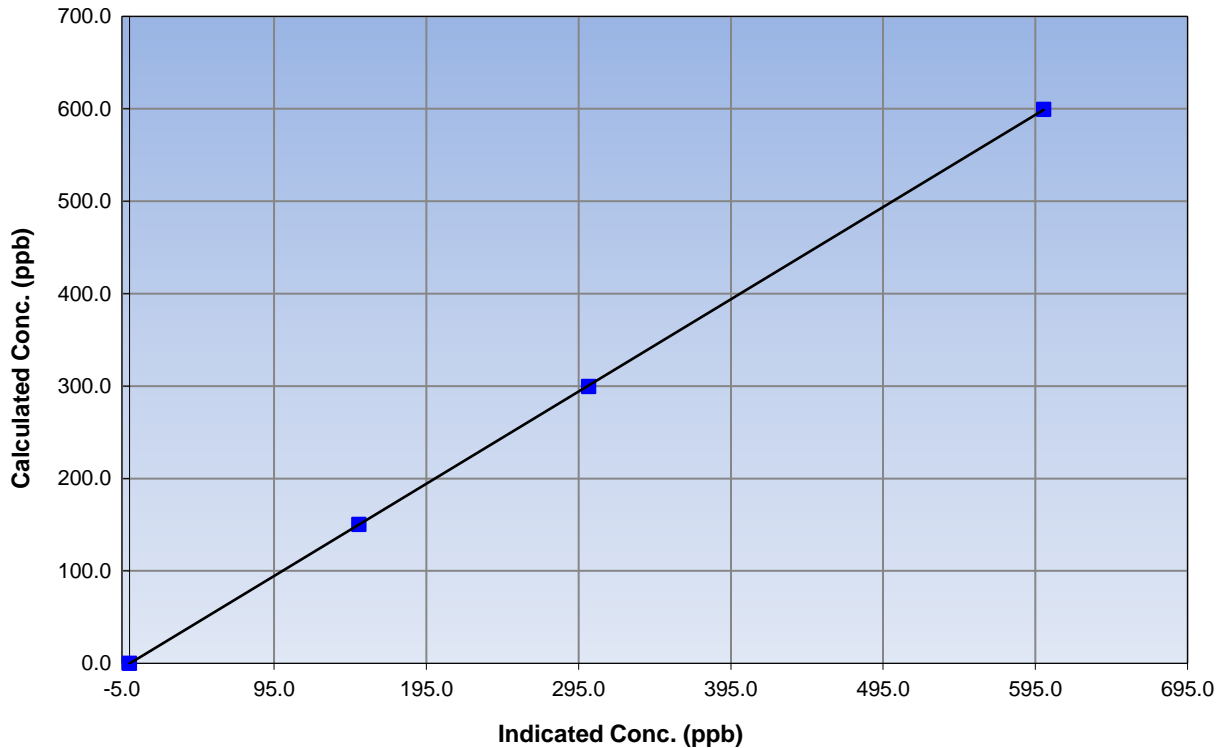
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 22, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 13:05 | End Time (MST) | 17:55 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999993 |
| 599.4 | 600.5 | 0.9982 | | |
| 299.7 | 301.7 | 0.9936 | Slope | 0.997872 |
| 150.4 | 150.7 | 0.9977 | | |
| | | | Intercept | -0.248024 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

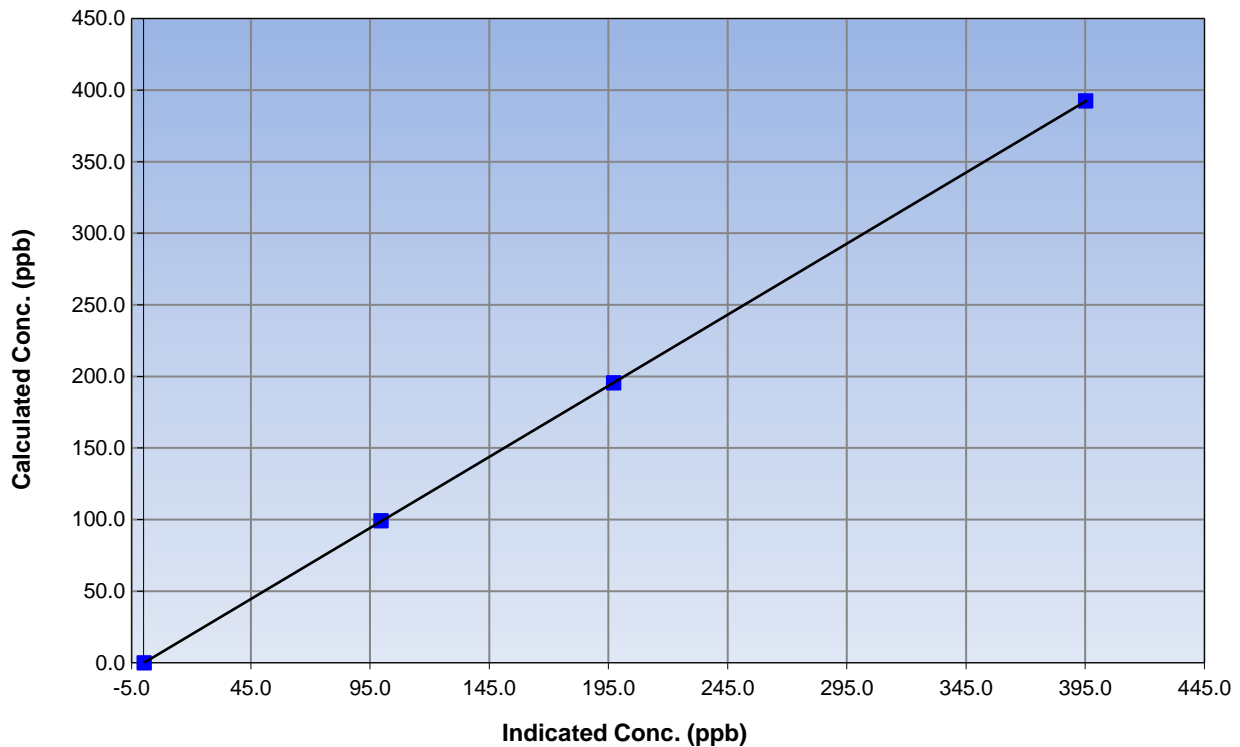
Station Information

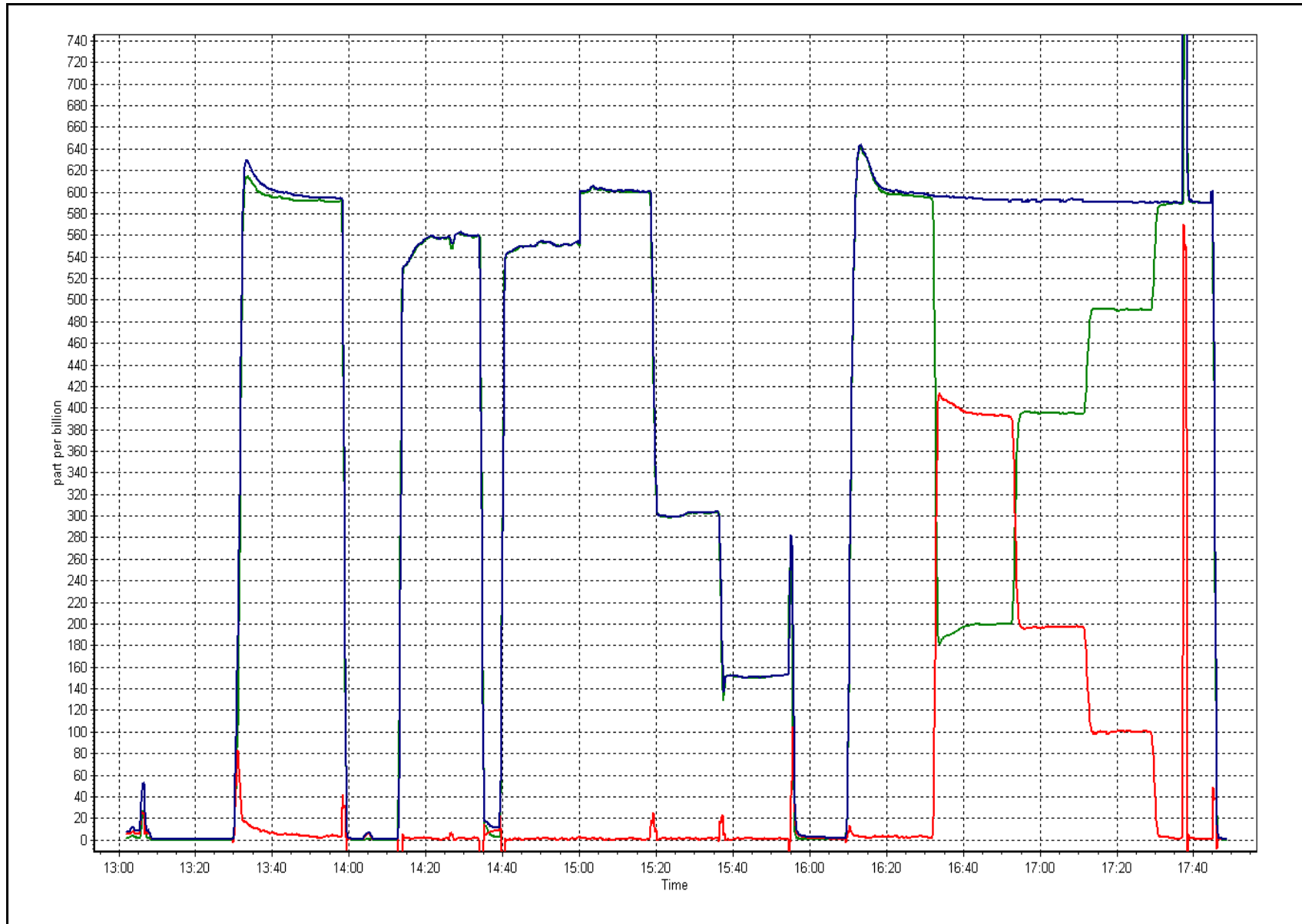
| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | September 22, 2016 |
| Station Number | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 13:05 | End Time (MST) | 17:55 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.3 | N/A | Correlation Coefficient | 0.999999 |
| 392.4 | 395.3 | 0.9927 | | |
| 195.6 | 197.3 | 0.9914 | | |
| 99.0 | 99.7 | 0.9939 | | |
| | | | Slope | 0.993092 |
| | | | Intercept | -0.181420 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|-------------------|-----------------|----------------|
| Station Name: | Athabasca Valley | Station number: | AMS 7 |
| Calibration Date: | September 22,2016 | Last Cal Date: | August 11,2016 |
| Start time (MST): | 9:29 | End time (MST): | 11:11 |
| Sharp Model: | Thermo 5030 | S/N: | E515 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 3256 |
| Flow Standard Model: | Delta Cal | S/N: | 141229 |
| Temp/RH standard: | Delta Cal | S/N: | 141229 |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------------------------------|----------|---------------------------------------------------|-------------------------------------|---------------|
| T1 (°C) | 10 | 9.6 | 10 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 991 | 988 | 991 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1005 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 2.4 | ----- | -0.2 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input type="checkbox"/> | | | | |
| Cyclone cleaning : | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | Tolerance |
|------------|-------------------|--------------------|------------------|----------------------|
| Leak Test: | Date of check: | <u>Sep 22,2016</u> | Last Cal Date: | <u>July 22,2016</u> |
| | Flow w/o adaptor: | <u>16.66</u> | Flow w/ adaptor: | <u>16.25</u> 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|------------------------------------|-----------------------------------------|
| Foil Calibration | Foil Mass: <u>1337</u> | S/N: <u>2518</u> |
| | Date of check: <u>July 22,2016</u> | Last Cal Date: <u>June 2,2016</u> |
| | New Correction Factor: <u>6895</u> | Previous Correction Factor: <u>6885</u> |

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

Notes: Nephelometer adjusted, did a leak check to check why nephelometer high, leak check passed, Leak check just passed, check for a leak, none detected cyclone head cleaned, no other adjustments done

Calibration by: Melissa Lemay



Wood Buffalo Environmental Association CO Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|------------------|
| Calibration Date | September 2, 2016 | Last Calibration | August 9, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 9:36 | End Time (MST) | 10:50 |
| Gas Cert Reference | CC101396 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 2970 ppm | Cal Gas Exp Date | February 2, 2023 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| ZAG Make/Model | API 701 | Serial Number | 5564 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 1864 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|---------------|----------|----------|
| Analyzer Range | 0 - 1000 ppb | | Chamber temp. | 48.3 | 48.3 |
| Analyzer IP address | 192.168.1.48 | | Pressure | 728.0 | 728.0 |
| Calculated slope | 1.004382 | 1.005961 | Flow | 0.491 | 0.491 |
| Calculated intercept | 0.029667 | 0.011744 | Intensity | 199498 | 199498 |
| Analyzer Background | 5.932 | 6.133 | S/R ratio | 1.171233 | 1.171233 |
| Analyzer Coefficient | 1.065 | 1.065 | | | |

Analyzer make Thermo 48i-TLE Analyzer serial # 1408761381

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 5000 | 69.7 | 41.4 | 41.6 | 0.996 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 69.7 | 41.4 | 41.1 | 1.006 |
| second point | 5000 | 35.2 | 20.9 | 20.8 | 1.006 |
| third point | 5000 | 15.2 | 9.0 | 9.0 | 1.007 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 5000 | 69.7 | 41.4 | 41.0 | 1.011 |
| Average Correction Factor | | | | | 1.006 |

Corrected As found 41.4 Previous response 41.2 % change -0.5%

Notes:

Filter changed out, zero adjusted, no maintenance done, spike in second point due to zero valve switching to zero mode

Calibration Performed By:

Melissa Lemay



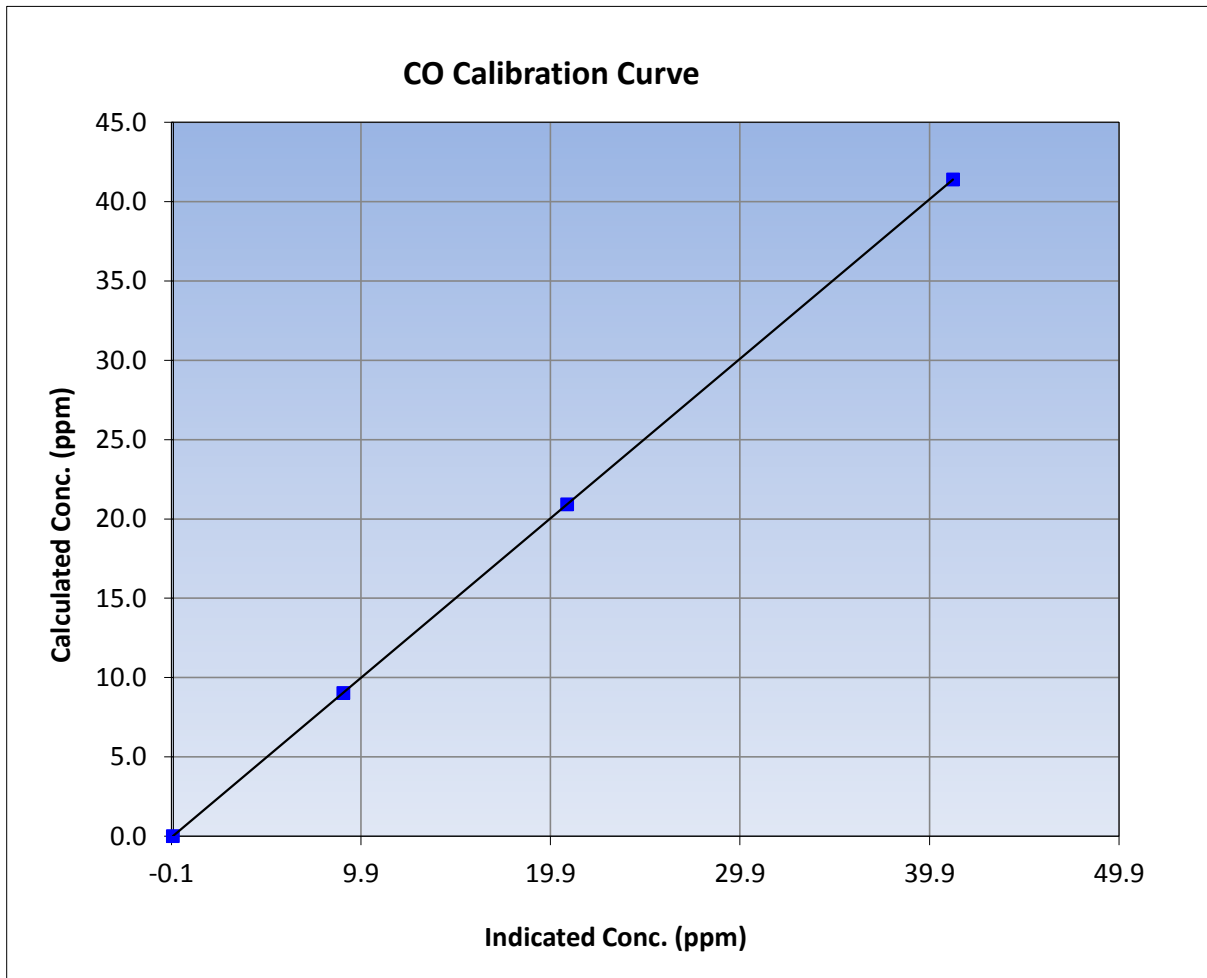
Wood Buffalo Environmental Association CO Calibration Report

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 2, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:36 | End Time (MST) | 10:50 |
| Analyzer make | Thermo 48i-TLE | Analyzer serial # | 1408761381 |

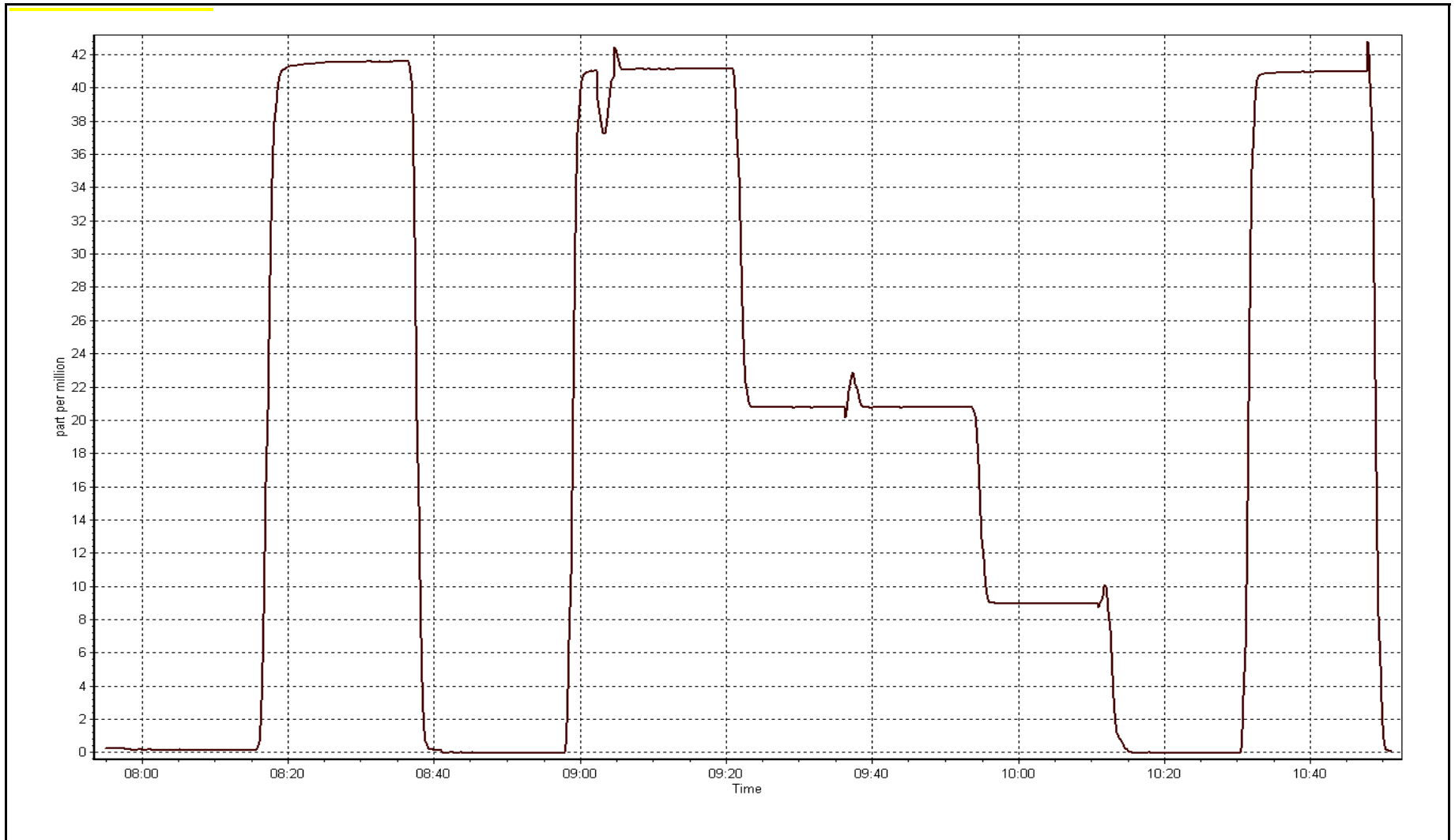
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 1.000000 |
| 41.4 | 41.1 | 1.0064 | | |
| 20.9 | 20.8 | 1.0062 | Slope | 1.005961 |
| 9.0 | 9.0 | 1.0066 | | |
| | | | Intercept | 0.011744 |



CO Calibration Plot

Date: September 2, 2016





Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

| | | | |
|------------------|---------------------------------------------|---------------------------------------|----------------------------------|
| Calibration Date | September 22, 2016 | Previous Calibration | July 27, 2015 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | <input checked="" type="checkbox"/> Routine | <input type="checkbox"/> Installation | <input type="checkbox"/> Removal |
| Start Time (MST) | 11:33 | End Time (MST) | 13:01 |
| Barometric Press | 732 | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053-120 | Serial Number | K13090 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|----------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | E5131 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 8205 |
| DACS voltage range | 5000 | DACS channel # | P2 |
| <u>Before</u> | | <u>After</u> | |
| Calculated slope | 0.991653 | Calculated slope | 0.997419 |
| Calculated intercept | 0.404012 | Calculated intercept | 0.066761 |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.1 | 1.0031 |
| 400 | 39.4 | 39.4 | 0.9990 |
| 600 | 58.6 | 58.5 | 1.0009 |
| 800 | 77.8 | 78.0 | 0.9968 |
| Average Correction Factor | | | 1.0000 |

WIND DIRECTION

| | | | |
|--------------------------------------|---------------------------|-------------------------------------|-----------------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | N/A (faded out) |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 8205 |
| DACS voltage range | 5000 | DACS channel # | SE 24 |
| <u>Before</u> | | <u>After</u> | |
| Calculated slope | 0.996322 | Calculated slope | 0.991886 |
| Calculated intercept | -0.036131 | Calculated intercept | 0.364654 |
| As Found Declination (west of North) | 14 | As Left Declination (west of North) | 14 |

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | 0.7 | n/a |
| 90 | 89.4 | 1.0067 |
| 180 | 181.0 | 0.9945 |
| 270 | 270.7 | 0.9974 |
| 357 | 360.7 | 0.9897 |
| Average Correction Factor | | 0.9971 |

Notes:

Bearings good
 North good before and after take down of tower
 North was checked with solar noon

Calibration Performed By: Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 8
FORT CHIPEWYAN
SEPTEMBER 2016

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 685 | 35 | 35 | 100.00 | 10 | 0 | 1 | 0 |
| O3(ppb) Average | 684 | 33 | 36 | 99.58 | 39 | 0 | 30 | - |
| NO2(ppb) Average | 684 | 36 | 36 | 100.00 | 6 | 0 | 3 | - |
| NO(ppb) Average | 684 | 36 | 36 | 100.00 | 8 | - | 1 | - |
| NOX(ppb) Average | 684 | 36 | 36 | 100.00 | 12 | - | 4 | - |
| PM2.5(ug/m3) Average | 705 | 3 | 15 | 98.33 | 8.2 | - | 4.7 | 0 |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 39 | - | 26 | - |
| Wind Direction 10 m (deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 20.8 | - | 15 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 100 | - | 99 | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100.00 | 12.2 | - | 28.7 | - |
| Leaf Wetness (% of range) Average | 720 | 0 | 0 | 100.00 | 38 | - | 15 | - |
| Global Solar Radiation (W/m2) Average | 720 | 0 | 0 | 100.00 | 684 | - | 213 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | | |
|---------------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max | |
| SO2(ppb) Average | 685 | 0.2 | 1 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| O3(ppb) Average | 684 | 20.3 | 7 | - | 3 | 11 | 15 | 20 | 25 | 29 | 39 | 39 |
| NO2(ppb) Average | 684 | 0.6 | 1 | - | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 6 |
| NO(ppb) Average | 684 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 8 |
| NOX(ppb) Average | 684 | 0.7 | 1 | - | 0 | 0 | 0 | 0 | 1 | 2 | 12 | 12 |
| PM2.5(ug/m3) Average | 705 | 1.8 | 1.5 | - | 0.2 | 0.4 | 0.6 | 1.4 | 2.4 | 3.8 | 8.2 | 8.2 |
| Wind Speed 10 m (km/h) Average | 719 | 13.3 | 7 | - | 1 | 5 | 8 | 12 | 18 | 23 | 39 | 39 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 10.84 | 3.7 | - | 0.8 | 6.4 | 8.5 | 10.7 | 13.4 | 15.7 | 20.8 | 20.8 |
| Relative Humidity (%) Average | 720 | 76.4 | 17 | - | 28 | 51 | 64 | 80 | 91 | 98 | 100 | 100 |
| Precipitation (mm) Total | 720 | - | - | 71.88 | - | - | - | - | - | - | - | - |
| Leaf Wetness (% of range) Average | 720 | 2.7 | 6 | - | -1 | -1 | 0 | 0 | 2 | 11 | 38 | 38 |
| Global Solar Radiation (W/m2) Average | 720 | 123.2 | 179 | - | 0 | 0 | 0 | 15 | 202 | 440 | 684 | 684 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS 8)
 SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|---------------------------------------------------------|
| O3 | 13 Sep 2016 12:00 | 13 Sep 2016 12:00 | 1 | Unstable Operation - noise outside of specifications |
| O3 | 17 Sep 2016 08:00 | 17 Sep 2016 09:00 | 2 | Unstable Operation - noise outside of specifications |
| PM2.5 | 01 Sep 2016 01:00 | 01 Sep 2016 11:00 | 11 | Unstable Operation - debris in chamber |
| PM2.5 | 21 Sep 2016 08:00 | 21 Sep 2016 08:00 | 1 | Maintenance - Flow and zero check, sample head cleaning |
| WS | 01 Sep 2016 14:00 | 01 Sep 2016 14:00 | 1 | Maintenance - sensor calibration |



| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 10 ppb on Sep 5 21:00 | Maximum Daily Average: 1.2 ppb on Sep 5 | | Hours of Data: | 685 |
| Minimum Value: 0 ppb on Sep 2 11:00 | Minimum Daily Average: 0.0 ppb on Sep 19 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 0.5 ppb at hour 21 | Minimum Diurnal Average: 0.1 ppb at hour 16 | | Hours of Calibration: | 35 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 10 | 9 | 4 | 1 | 1.2 | 10 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0.5 | 2 |
| 7-Sep | 0 | 0 | 0 | 1 | Z | 4 | 6 | 4 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 |
| 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 | 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 | 0 |
| 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 | 0.1 | 1 |
| 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 | 0 |
| 12-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 | 0.1 | 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 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 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 | 0.0 | 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 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 1 | 0 | 1 | 0.7 | 3 |
| 23-Sep | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 2 |
| 24-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 0.1 | 0 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 27-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 |
| 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 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 | 0.0 | 0 |

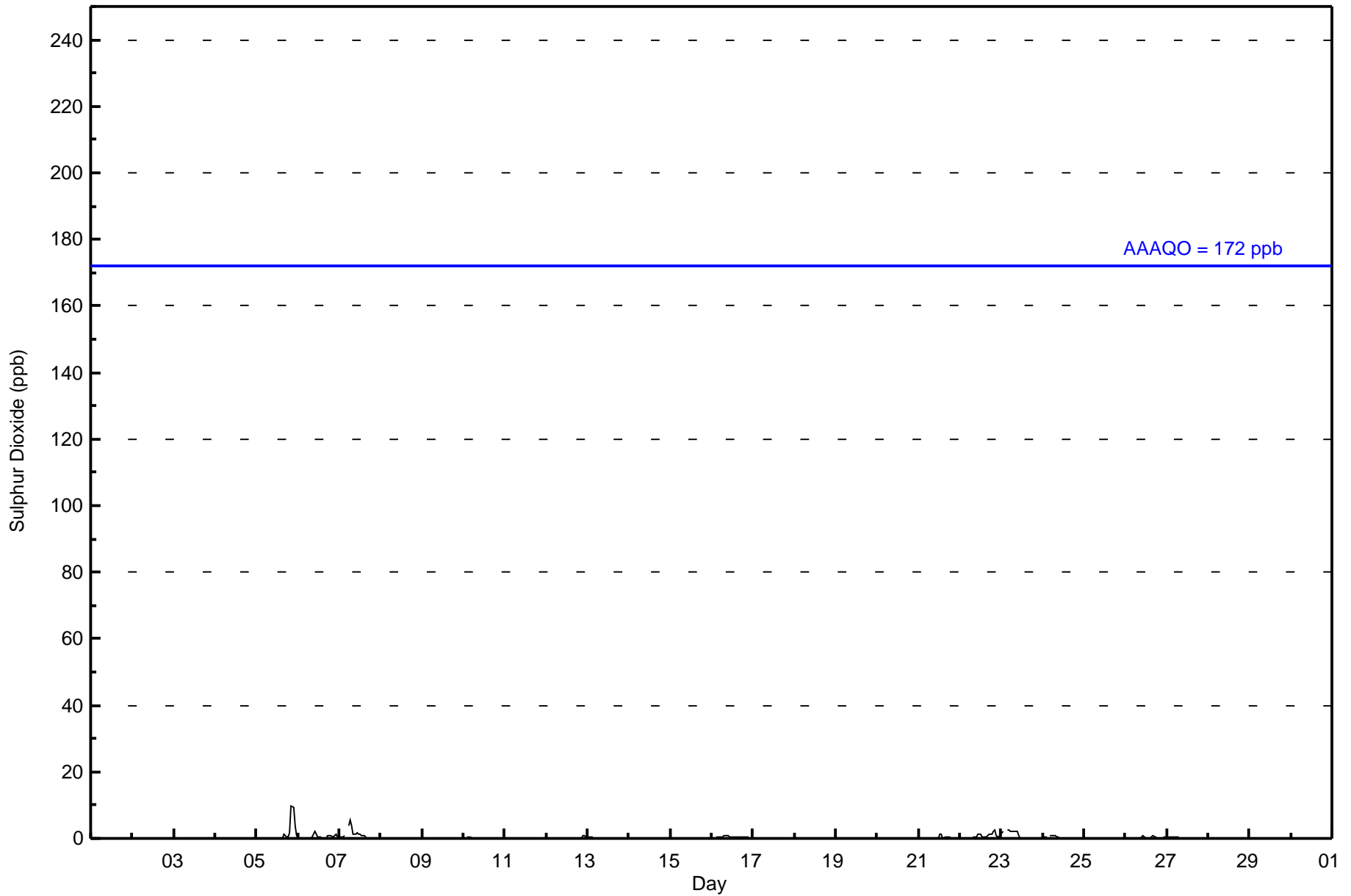
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.5 | 0.4 | 0.2 | 0.1 | Diurnal Average |
| 2 | 2 | 0 | 2 | 2 | 4 | 6 | 4 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 10 | 9 | 4 | 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 Chipewyan - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 685 | 100.00 | 100.00 |
| 11 - 20 | 0 | 0.00 | 100.00 |
| 21 - 60 | 0 | 0.00 | 100.00 |
| 61 - 110 | 0 | 0.00 | 100.00 |
| 111 - 172 | 0 | 0.00 | 100.00 |
| > 172 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 31 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 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 | 31 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 684 |

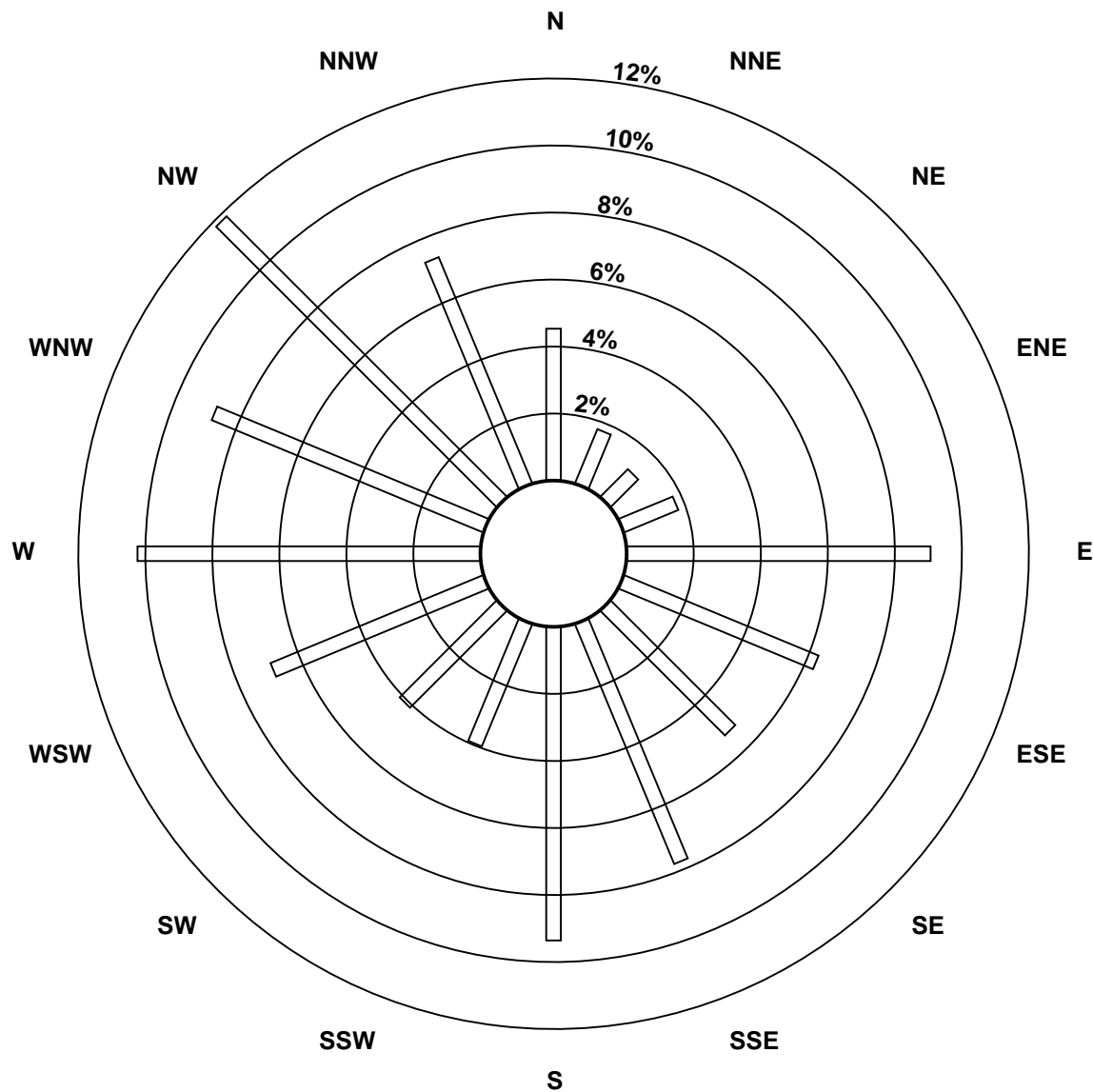
Total Number of Valid Hours: 684

Total Number of Hours: 720

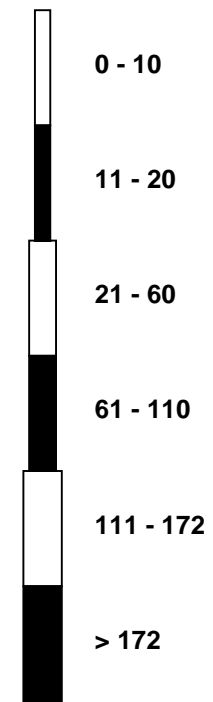


Wood Buffalo Environmental Association
Wind Rose Sep 2016

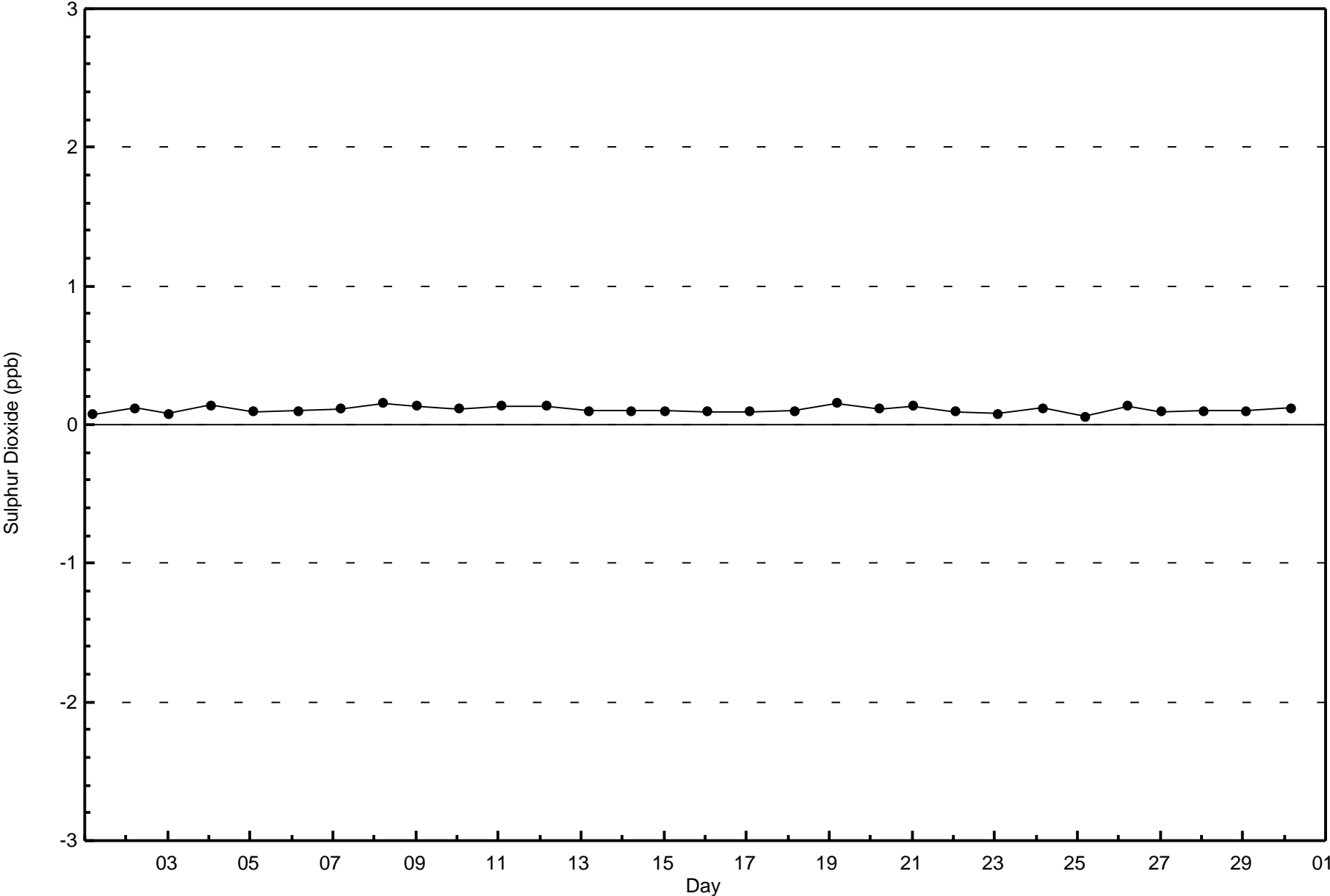
Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan (AMS 8)

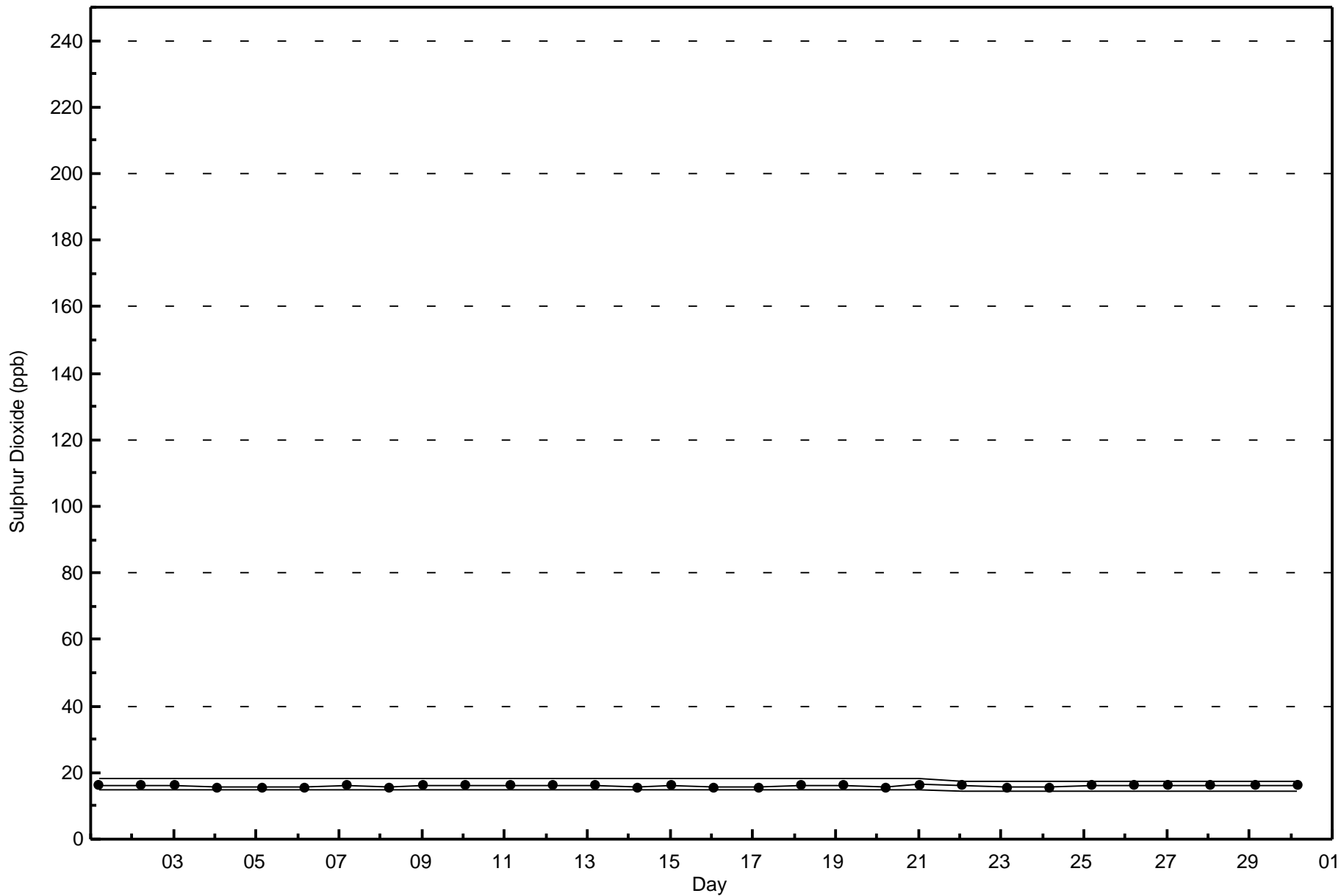


Classes (ppb)



Total Number of Valid Hours: 684





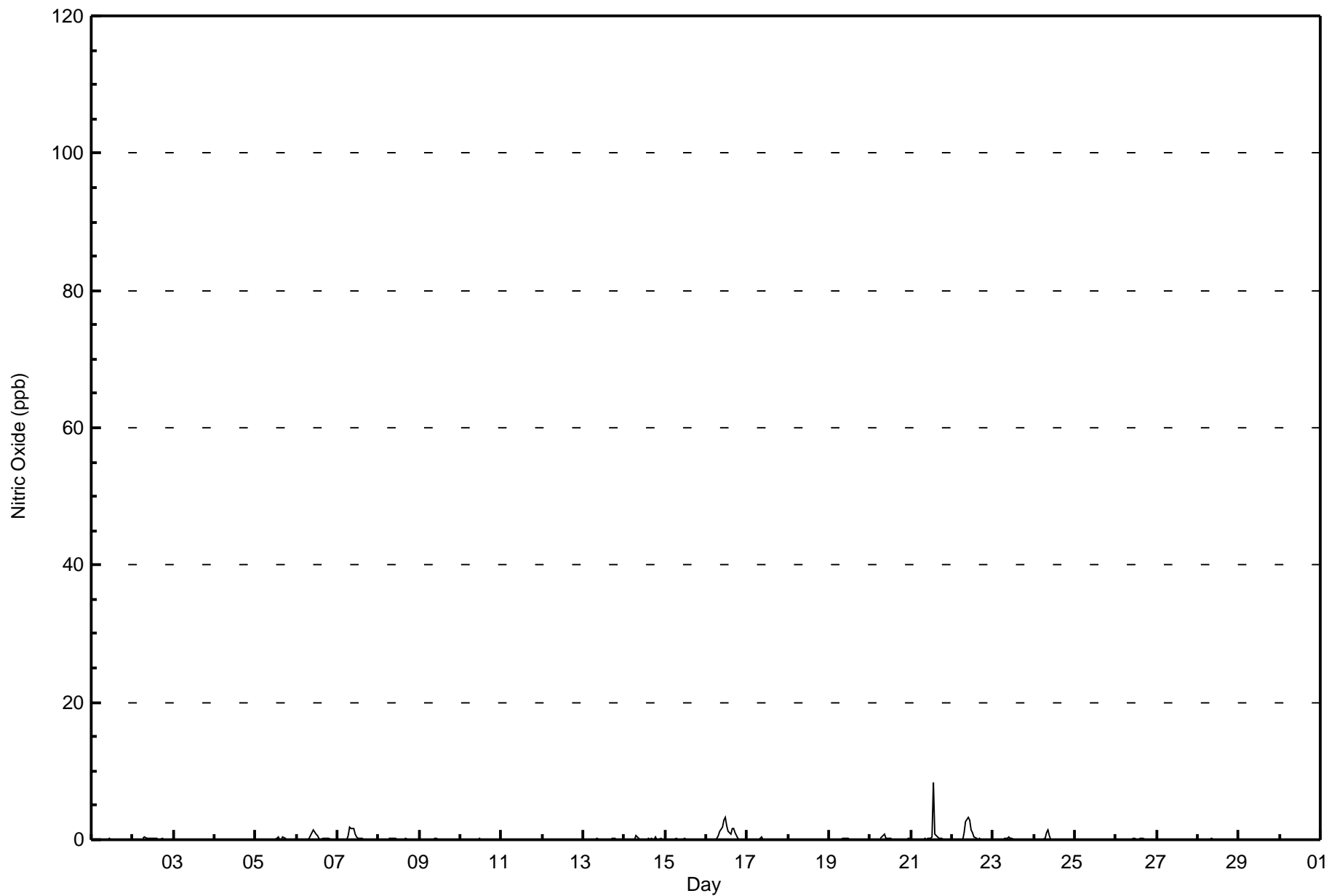


| Maximum Value: 8 ppb on Sep 21 14:00 | | | | | | | | | | | | | | Maximum Daily Average: 0.8 ppb on Sep 16 | | | | | | | | | | | | | | Hours in Service: 720 | |
|---------------------------------------------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|------------------------------|---------------|---------------|---|---------------------------------|--|
| Minimum Value: 0 ppb on Sep 1 01:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 3 | | | | | | | | | | | | | | Hours of Data: 684 | |
| Maximum Diurnal Average: 0.4 ppb at hour 14 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.0 ppb at hour 1 | | | | | | | | | | | | | | Hours of Missing Data: 36 | |
| Monthly Average: 0.1 ppb | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2 | | | | | | | | | | | | | | 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 | 0 | 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 | Z | 0 | 0 | 0 | 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 | 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 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | |
| 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 | 0.0 | 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 | 0.0 | 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 | 0.0 | 0 | | |
| 14-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 | 0.1 | 1 | | |
| 15-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 | | |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 3 | | |
| 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 | 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 | 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 | 1 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 | | |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 8 | | |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 | | |
| 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 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 | | |
| 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 | 0.0 | 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 | 0.1 | 0 | | |
| 27-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 | | |
| 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 | 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 | 0.0 | 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 | 0.0 | 0 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Chipewyan - September 2016

| 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 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 30 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 683 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 683 |

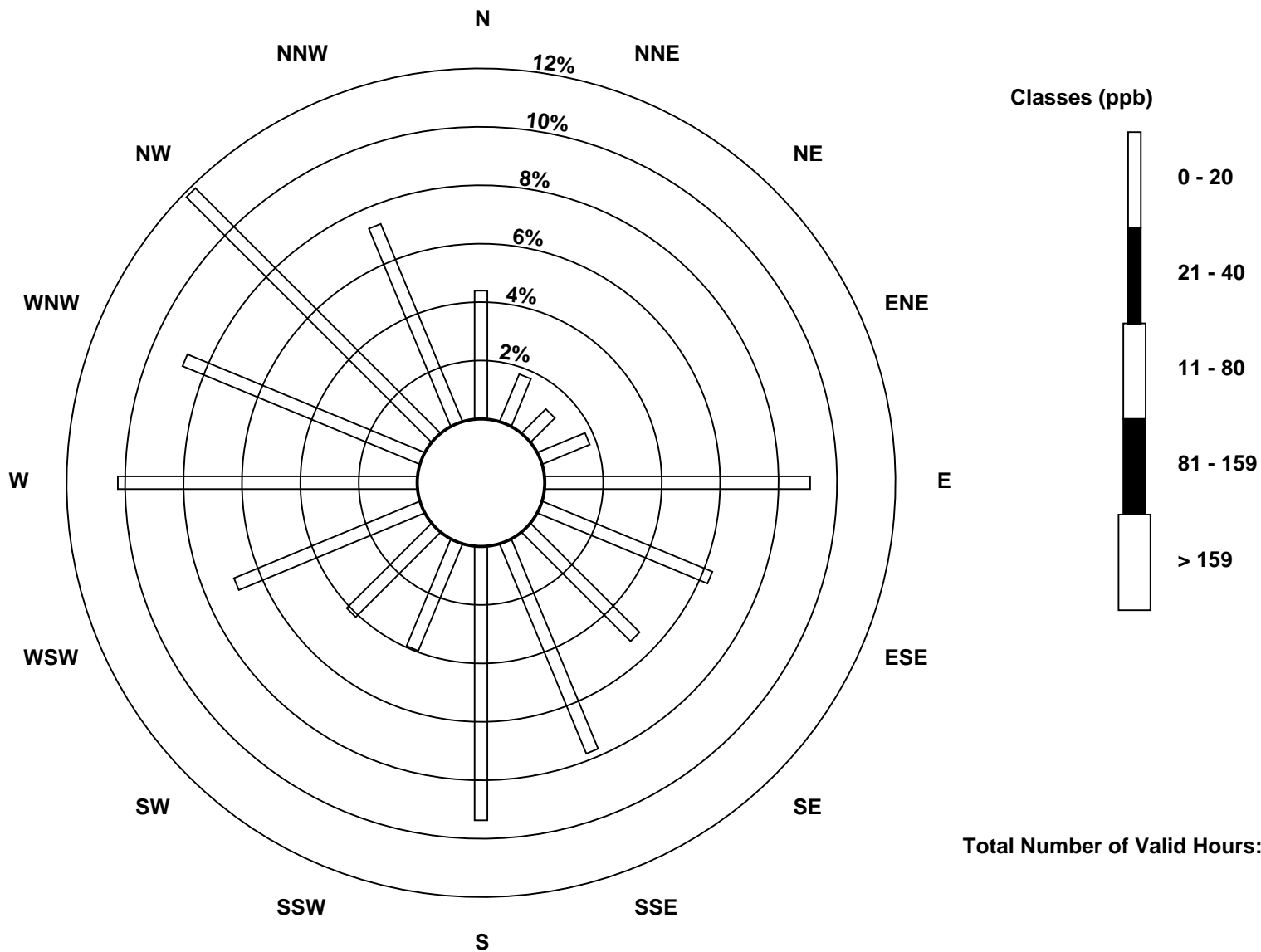
Total Number of Valid Hours: 683

Total Number of Hours: 720

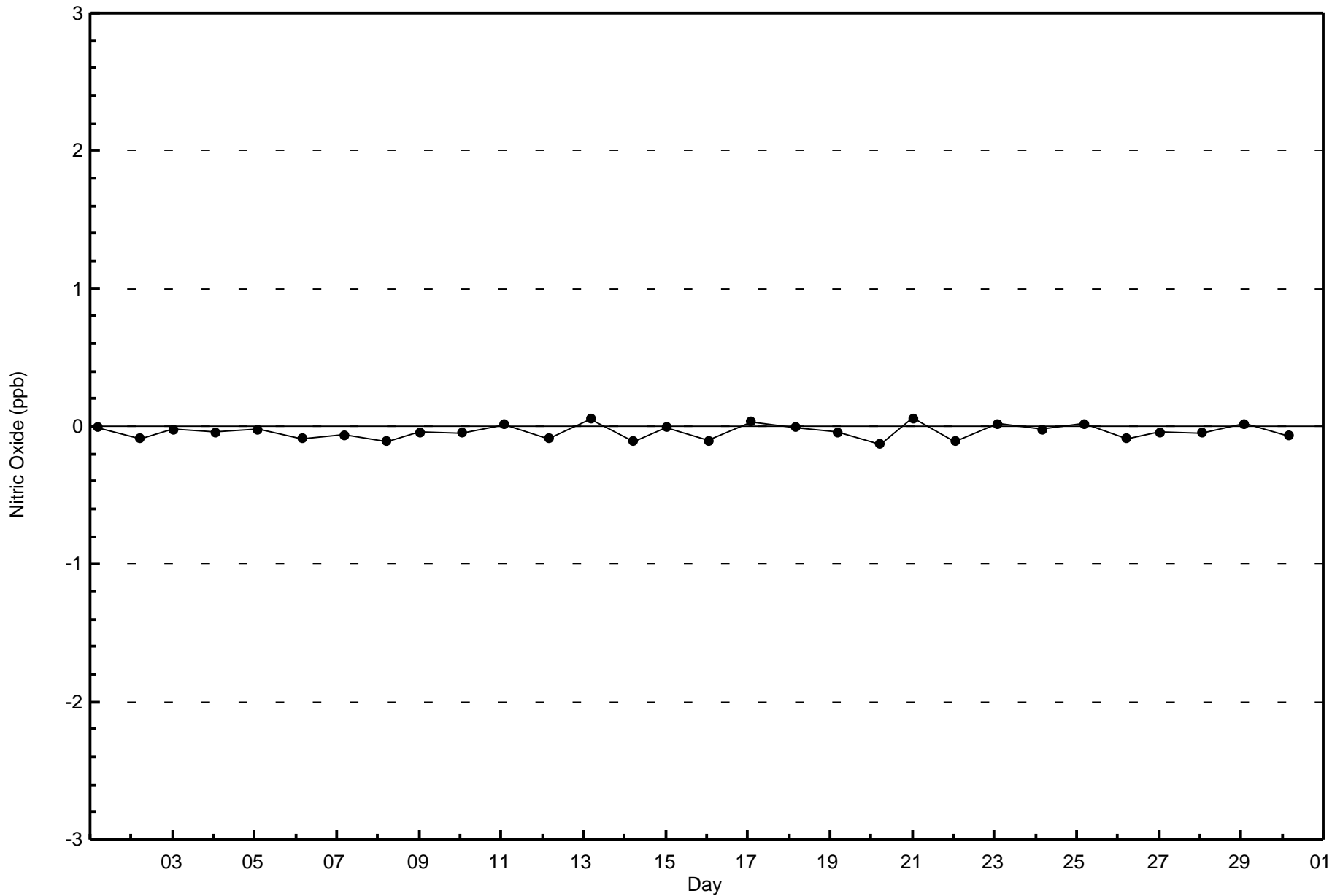


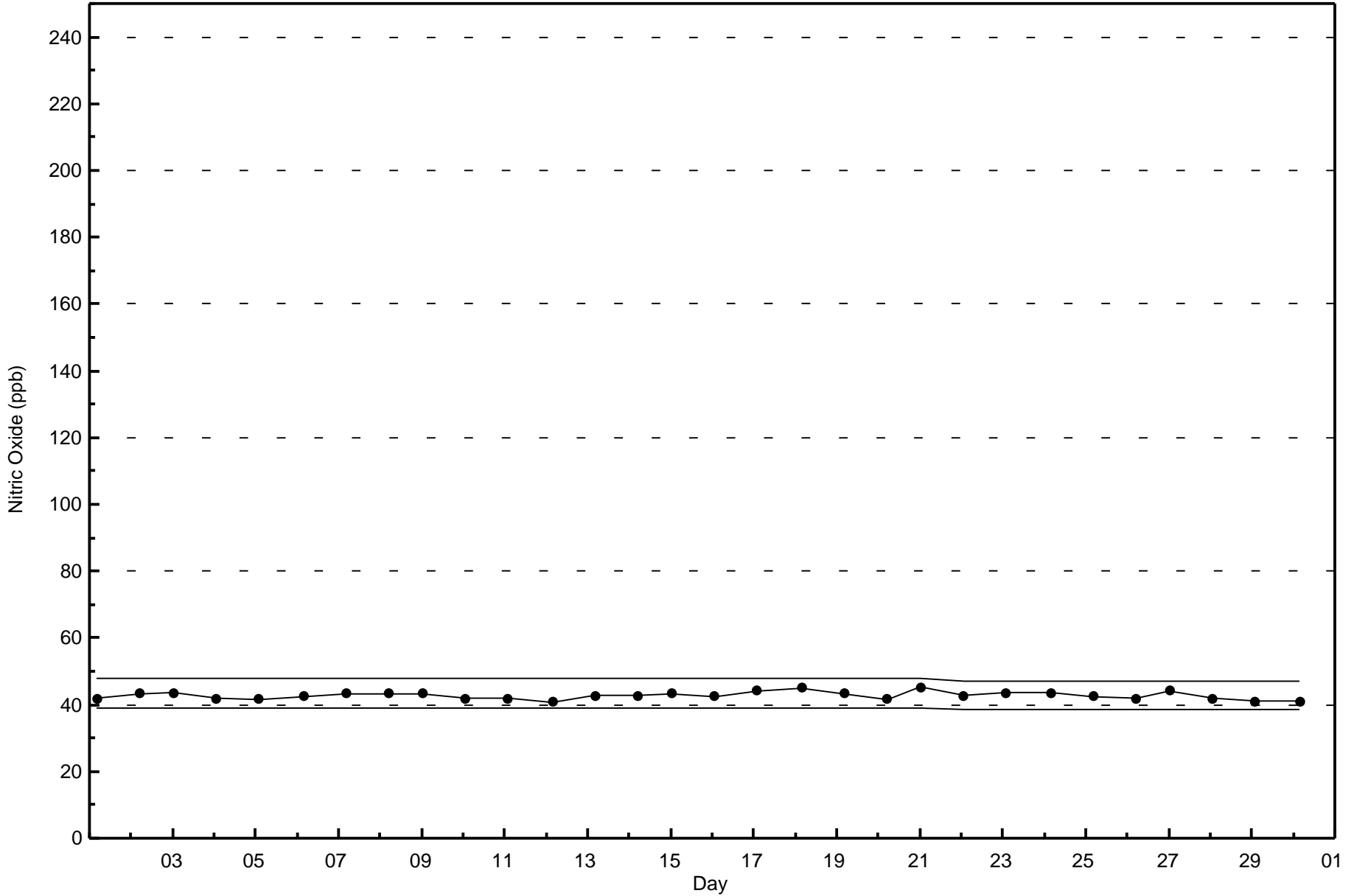
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitric Oxide (NO) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 683







| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 6 ppb on Sep 7 07:00 | Maximum Daily Average: 3.0 ppb on Sep 16 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.1 ppb on Sep 15 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 0.8 ppb at hour 19 | Minimum Diurnal Average: 0.4 ppb at hour 16 | | Hours of Calibration: | 36 |
| Monthly Average: 0.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 2 P ₉₉ = 5 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0.2 | 1 |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 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 | 0.1 | 0 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0.6 | 2 |
| 6-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 1.2 | 3 |
| 7-Sep | 3 | 3 | 2 | 2 | Z | 4 | 6 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1.5 | 6 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 9-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 |
| 10-Sep | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 5 | 0.7 | 5 |
| 13-Sep | 5 | 5 | 5 | 4 | Z | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 5 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 15-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 |
| 16-Sep | 0 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 3 | 2 | 1 | 3.0 | 5 |
| 17-Sep | 1 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.4 | 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 | 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 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | -- | 0 |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0.6 | 4 |
| 22-Sep | 1 | Z | 1 | 0 | 0 | 1 | 1 | 3 | 4 | 5 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 1.9 | 5 |
| 23-Sep | 3 | 3 | Z | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 3 |
| 24-Sep | 1 | 1 | 1 | Z | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 3 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.2 | 1 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 27-Sep | Z | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0.2 | 2 |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0.3 | 1 |
| 30-Sep | 0 | 0 | 1 | Z | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |

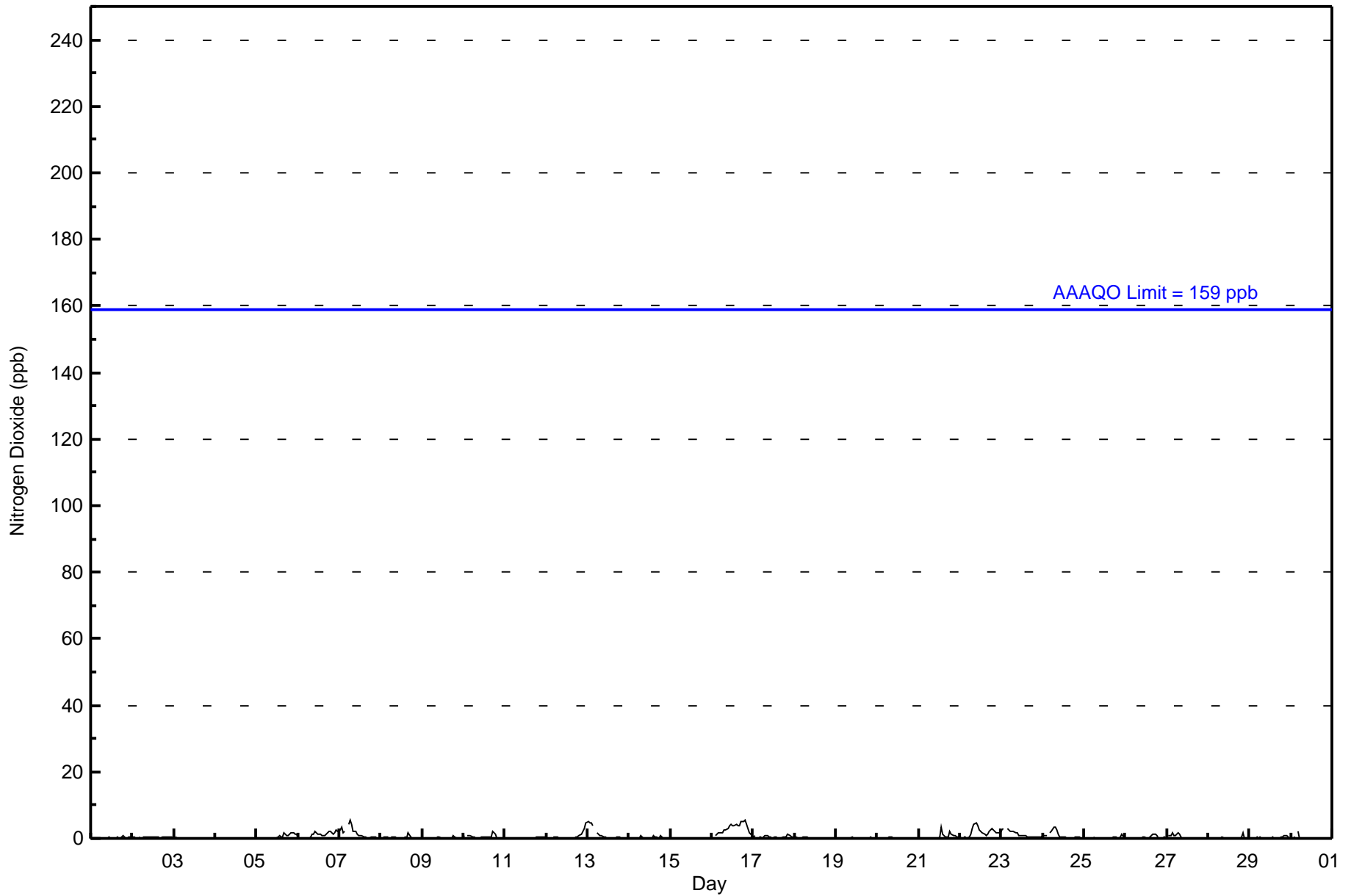
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.6 | 0.7 | 0.5 | 0.6 | 0.5 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.5 | 0.5 | 0.6 | 0.5 | 0.4 | 0.5 | 0.6 | 0.8 | 0.7 | 0.7 | 0.5 | 0.5 | 0.5 | Diurnal Average | |
| 5 | 5 | 5 | 4 | 3 | 4 | 6 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 3 | 3 | 5 | Diurnal Maximum | |

Z - zerspan 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 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - September 2016

| 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 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 30 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 683 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 683 |

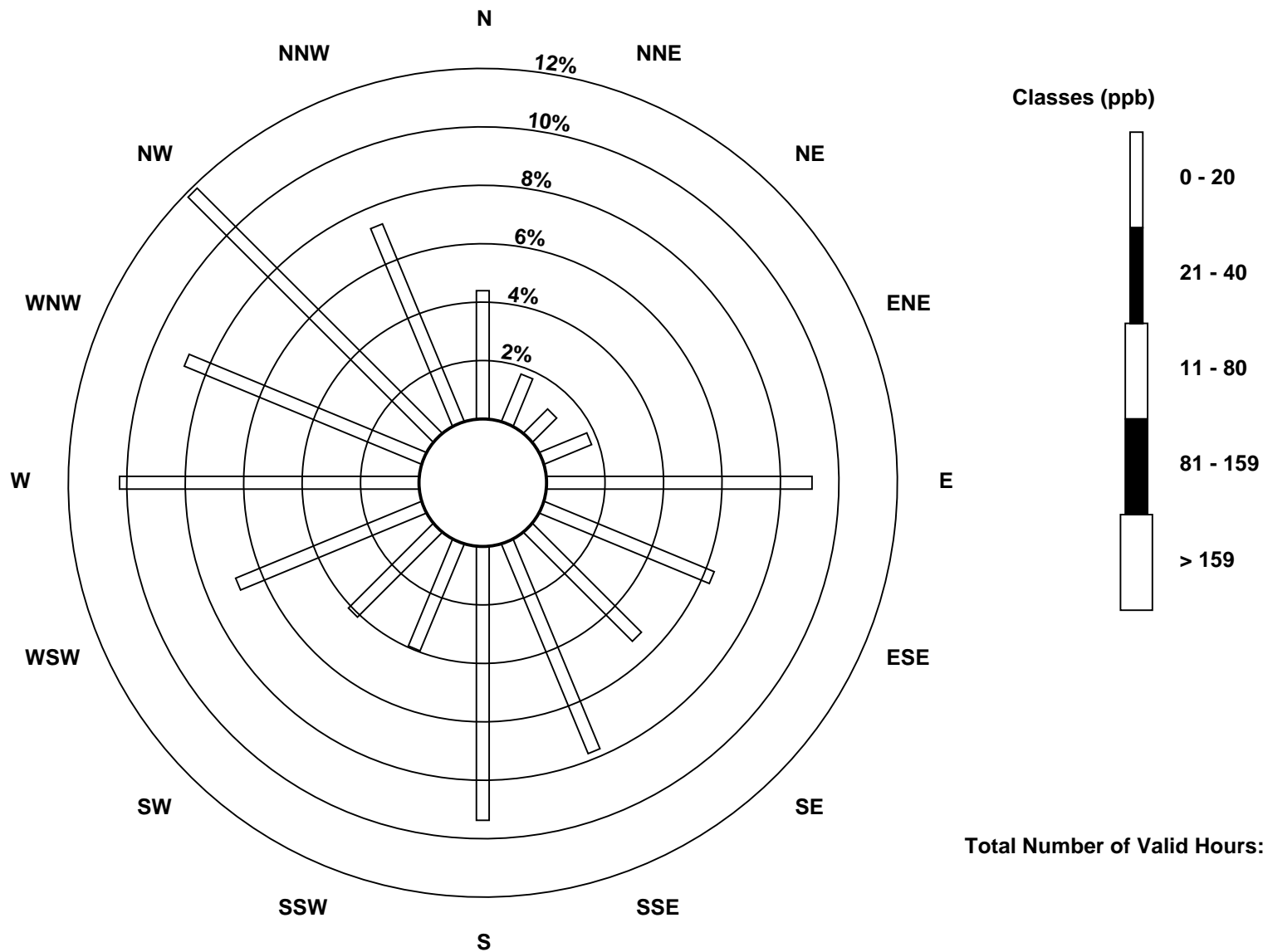
Total Number of Valid Hours: 683

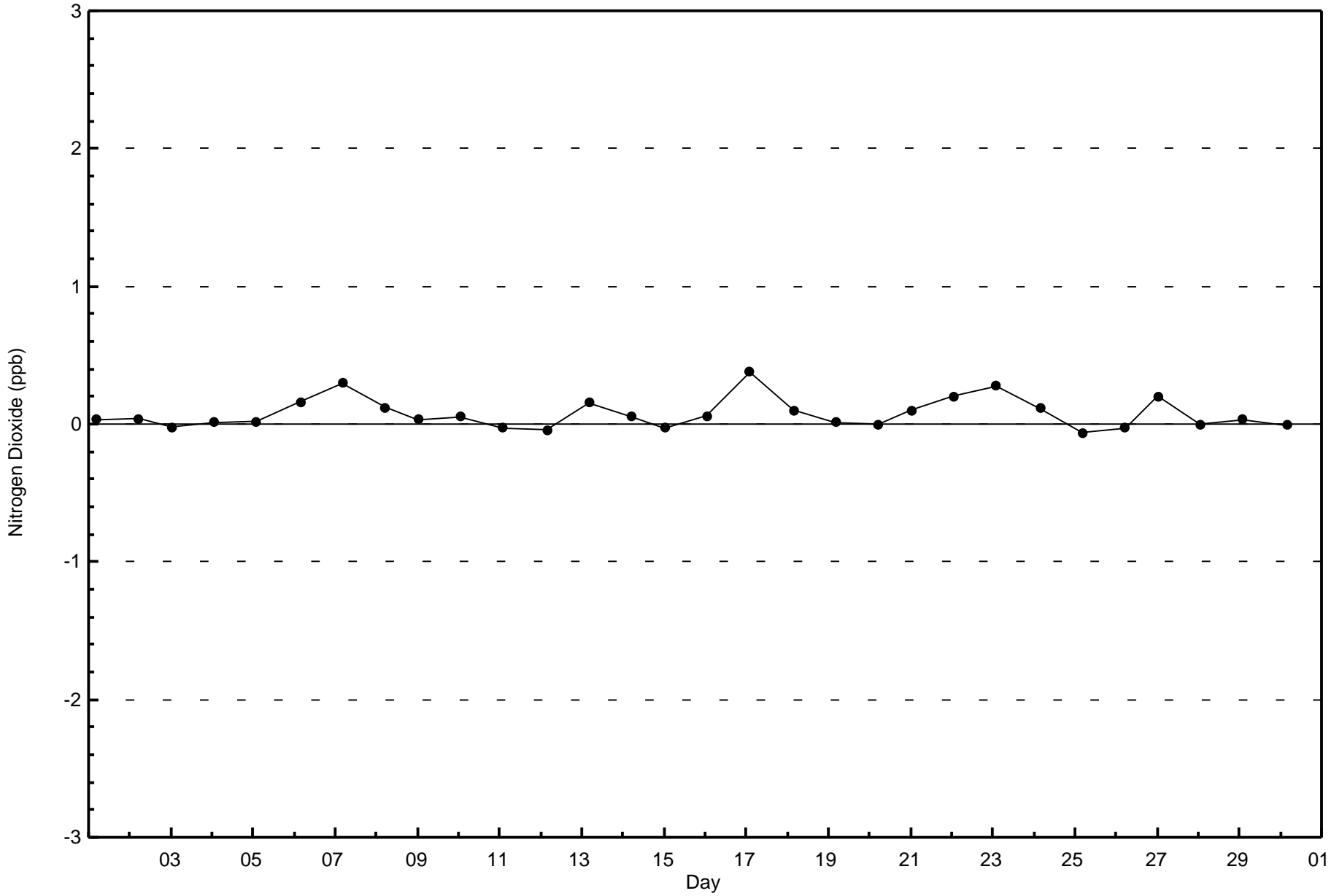
Total Number of Hours: 720

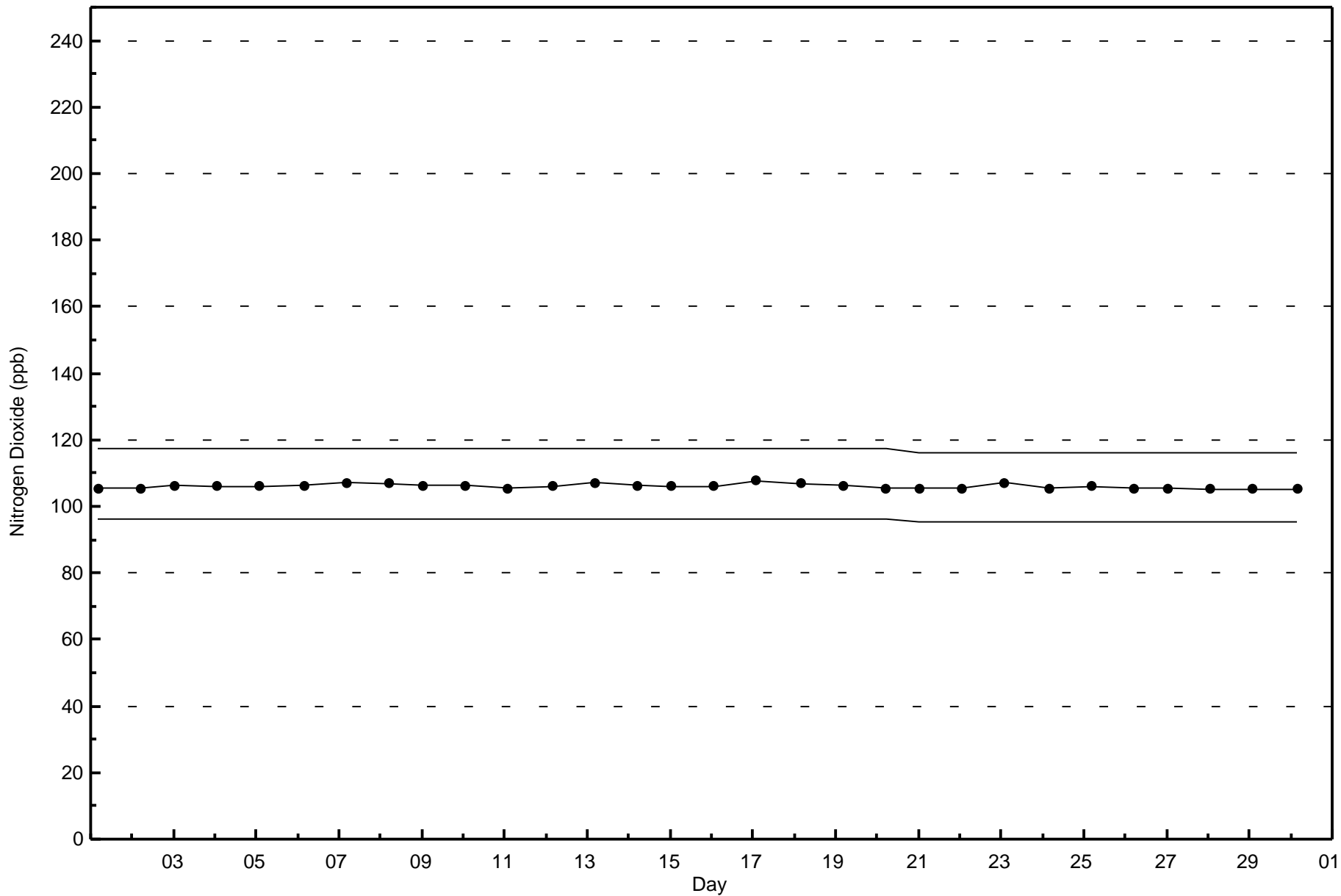


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan (AMS 8)









| | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Value: 12 ppb on Sep 21 14:00 | Maximum Daily Average: 3.8 ppb on Sep 16 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 9 23:00 | Minimum Daily Average: 0.1 ppb on Sep 4 | Hours of Data: 684 |
| Maximum Diurnal Average: 1.0 ppb at hour 9 | Minimum Diurnal Average: 0.5 ppb at hour 16 | Hours of Missing Data: 36 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 6 | Hours of 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 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 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 | 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 | 0.1 | 0 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0.6 | 2 | |
| 6-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 2 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 1.4 | 4 | |
| 7-Sep | 3 | 3 | 2 | 2 | Z | 4 | 6 | 6 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1.9 | 6 | |
| 8-Sep | 0 | 0 | 1 | 1 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 10-Sep | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0.2 | 1 | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 5 | 0.7 | 5 | |
| 13-Sep | 5 | 5 | 5 | 4 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 5 | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 15-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 | |
| 16-Sep | 0 | Z | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 5 | 7 | 7 | 6 | 5 | 5 | 5 | 6 | 6 | 5 | 5 | 4 | 3 | 2 | 1 | 3.8 | 7 | |
| 17-Sep | 1 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.5 | 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 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | -- | 1 | |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1.1 | 12 | |
| 22-Sep | 1 | Z | 1 | 0 | 0 | 1 | 1 | 4 | 7 | 8 | 7 | 4 | 3 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2.5 | 8 | |
| 23-Sep | 3 | 3 | Z | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1.3 | 3 | | |
| 24-Sep | 1 | 1 | 1 | Z | 2 | 2 | 3 | 4 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 | |
| 25-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 | 0.2 | 1 | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0.2 | 2 | |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0.3 | 1 | |
| 30-Sep | 0 | 0 | 1 | Z | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | |

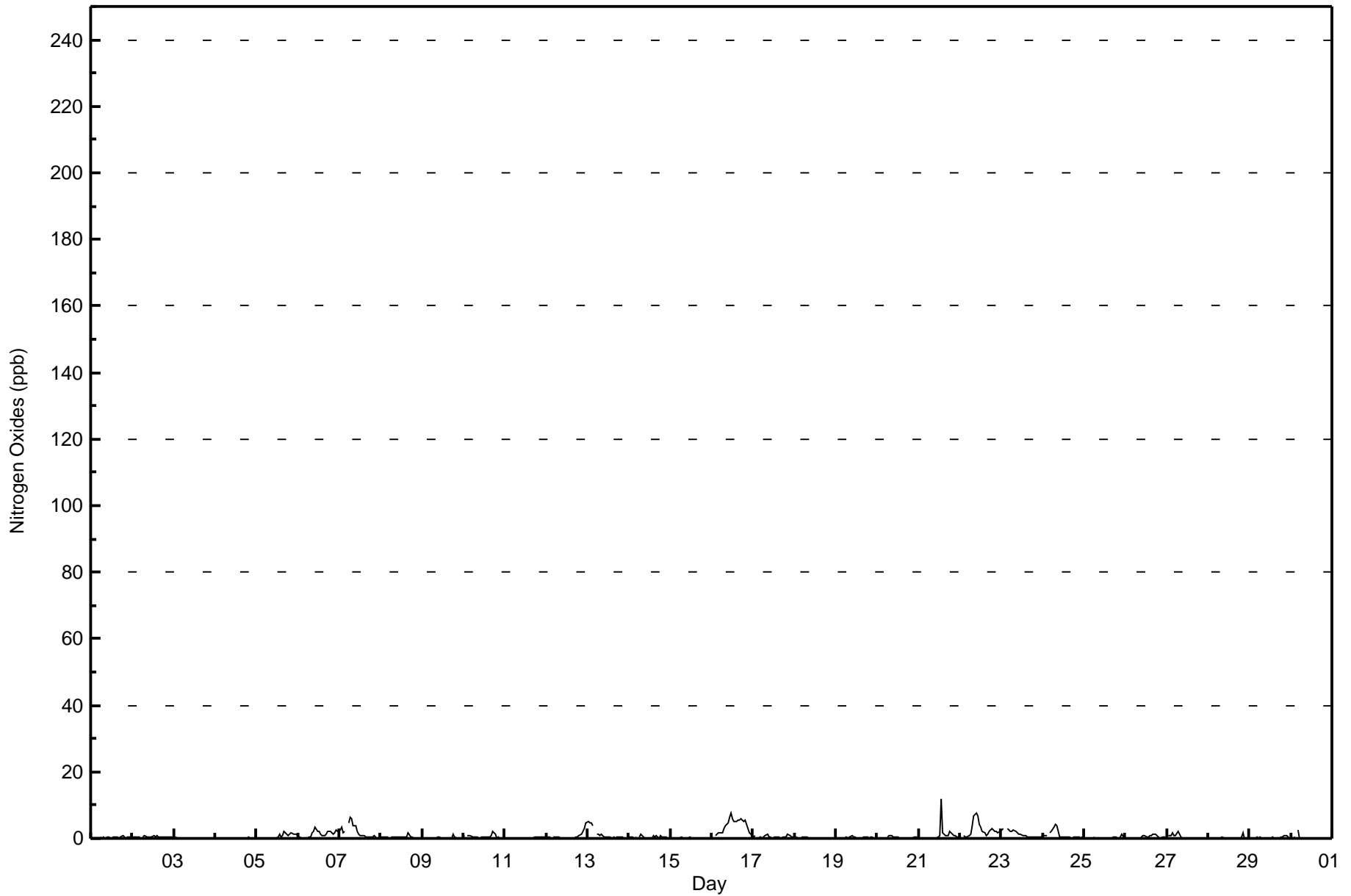
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.6 | 0.7 | 0.6 | 0.6 | 0.6 | 0.7 | 0.8 | 1.0 | 1.0 | 1.0 | 0.9 | 0.7 | 0.6 | 0.9 | 0.6 | 0.5 | 0.7 | 0.7 | 0.8 | 0.7 | 0.7 | 0.6 | 0.5 | 0.5 | Diurnal Average | |
| 5 | 5 | 5 | 4 | 3 | 4 | 6 | 6 | 7 | 8 | 7 | 7 | 6 | 12 | 5 | 5 | 6 | 6 | 5 | 5 | 4 | 3 | 3 | 5 | Diurnal Maximum | |

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - September 2016**

| 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 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 30 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 683 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 30 | 12 | 8 | 12 | 62 | 43 | 36 | 53 | 64 | 27 | 28 | 47 | 70 | 60 | 81 | 50 | 683 |

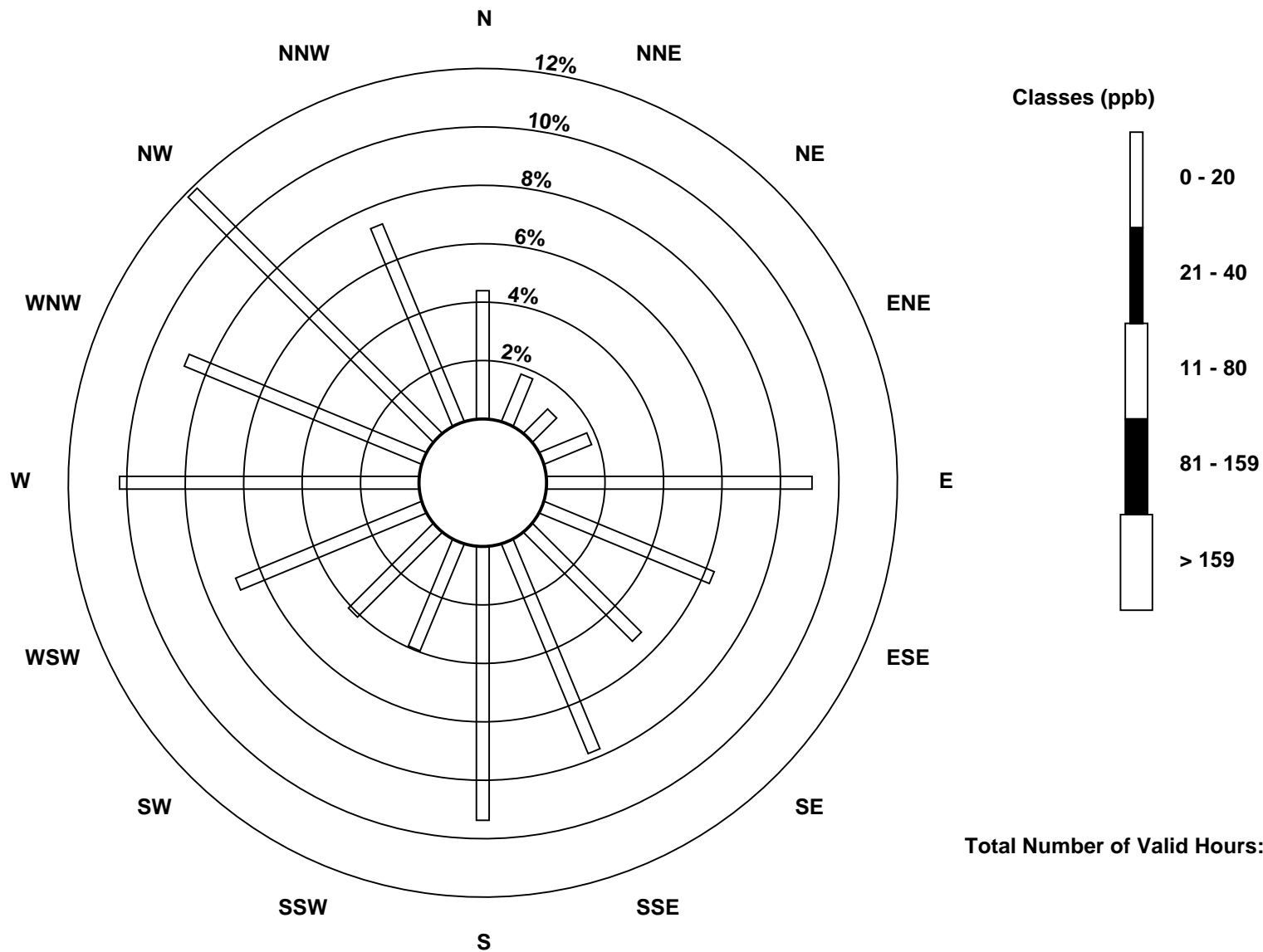
Total Number of Valid Hours: 683

Total Number of Hours: 720

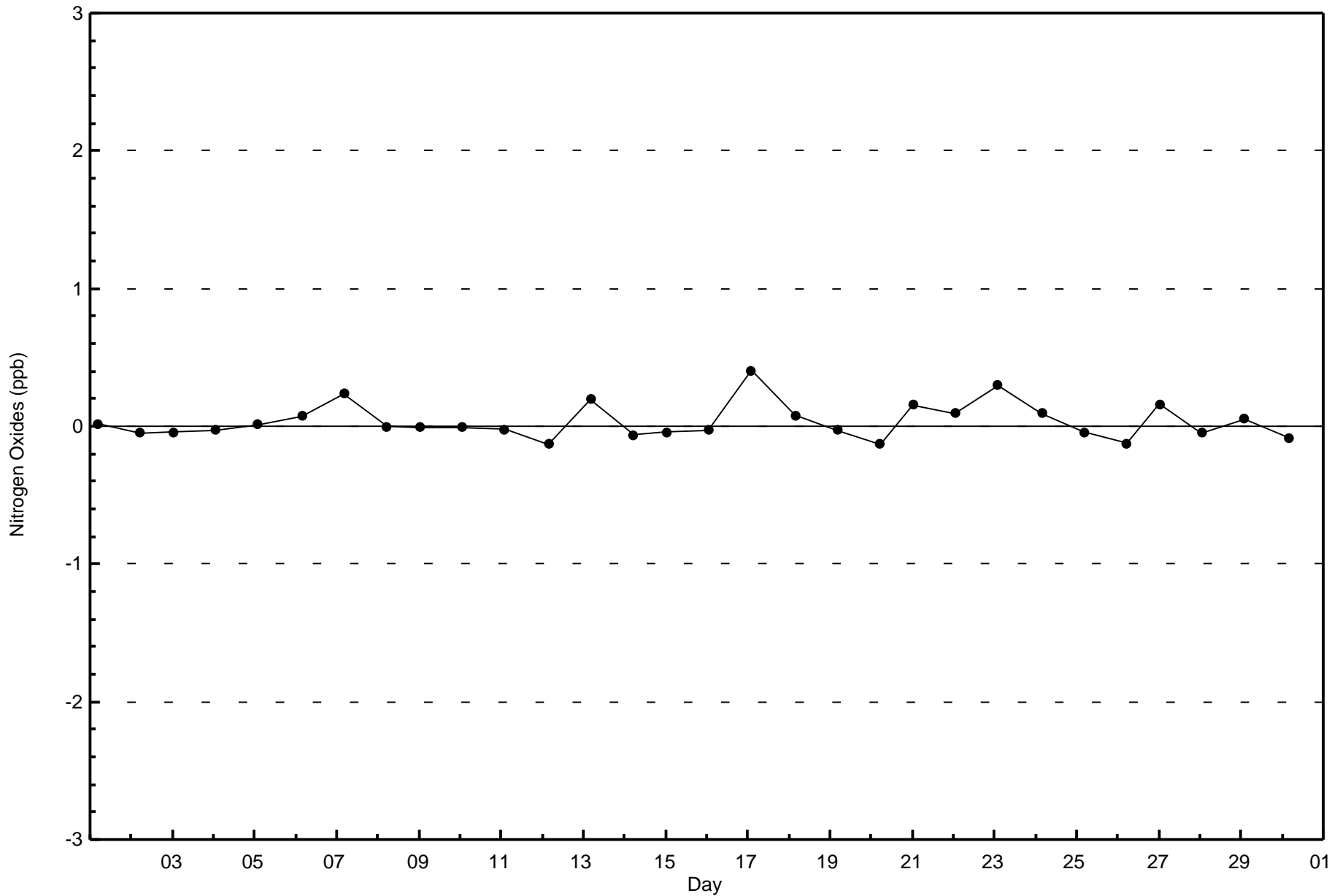


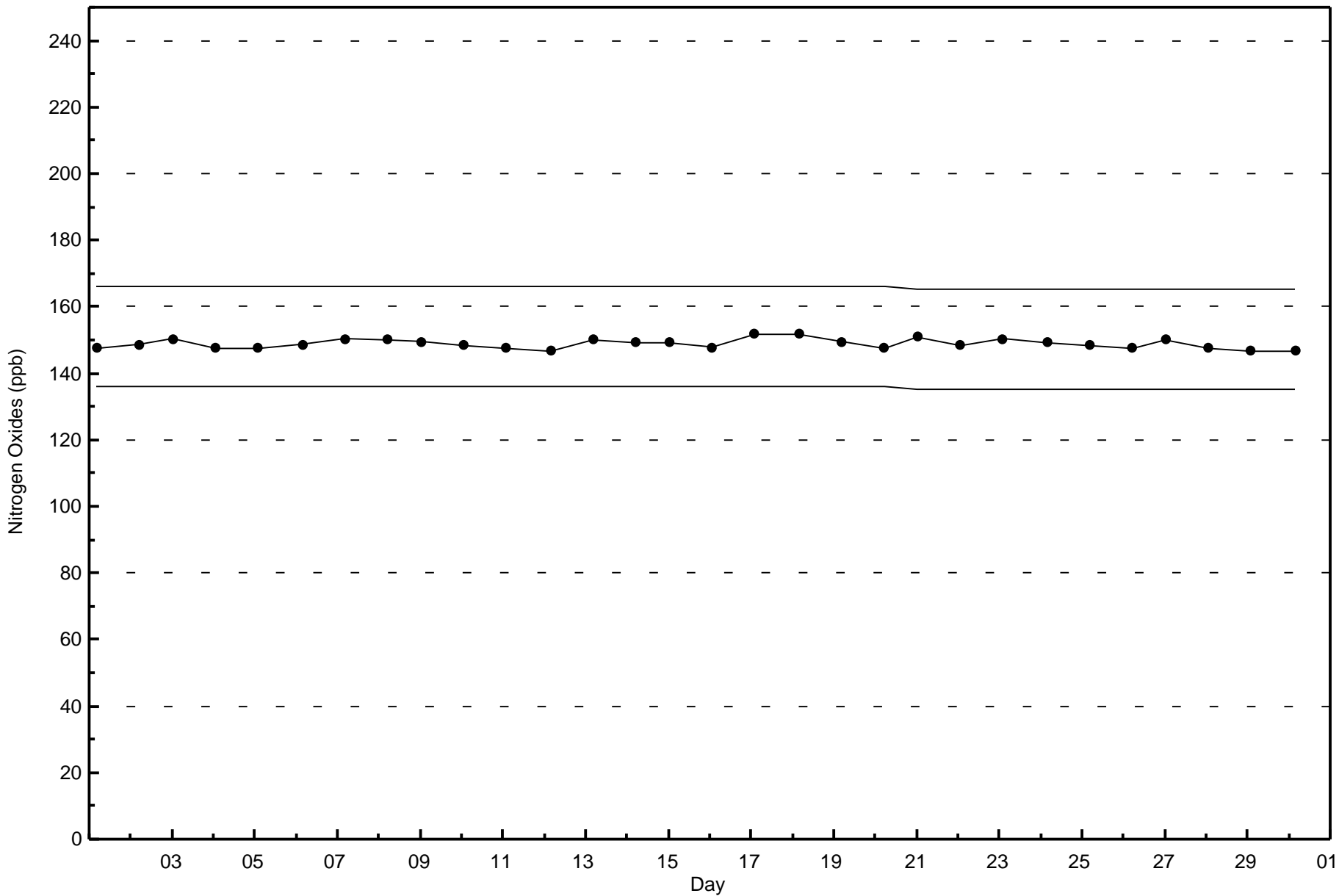
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 683







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Fort Chipewyan - September 2016

| | | | | |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 39 ppb on Sep 22 18:00 | Maximum Daily Average: 29.9 ppb on Sep 23 | | Hours of Data: | 684 |
| Minimum Value: 3 ppb on Sep 3 00:00 | Minimum Daily Average: 7.6 ppb on Sep 2 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 25.1 ppb at hour 16 | Minimum Diurnal Average: 15.2 ppb at hour 6 | | Hours of Calibration: | 33 |
| Monthly Average: 20.3 ppb | Percentiles: P ₁ = 5 P ₁₀ = 11 Q ₁ = 15 Median = 20 Q ₃ = 25 P ₉₀ = 29 P ₉₉ = 37 | | Percent Operational Time: | 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 19 | 18 | 17 | 16 | 15 | 14 | 14 | Z | 13 | 13 | 13 | 13 | 14 | 14 | 15 | 15 | 15 | 14 | 13 | 14 | 15 | 14 | 12 | 11 | 14.4 | 19 |
| 2-Sep | 12 | 11 | 11 | 10 | 9 | 7 | 7 | 6 | Z | 8 | 10 | 10 | 10 | 9 | 9 | 10 | 6 | 6 | 5 | 5 | 4 | 3 | 4 | 3 | 7.6 | 12 |
| 3-Sep | 3 | 3 | 5 | Z | 7 | 7 | 8 | 9 | 9 | 11 | 12 | 14 | 15 | 16 | 17 | 19 | 19 | 21 | 22 | 23 | 22 | 20 | 20 | 22 | 14.1 | 23 |
| 4-Sep | 23 | 19 | 15 | 15 | Z | 14 | 16 | 17 | 17 | 18 | 19 | 20 | 25 | 27 | 28 | 27 | 28 | 27 | 25 | 23 | 22 | 21 | 22 | 20 | 21.2 | 28 |
| 5-Sep | 17 | 14 | 16 | 17 | 16 | Z | 15 | 15 | 14 | 18 | 19 | 21 | 22 | 28 | 33 | 35 | 37 | 35 | 33 | 30 | 28 | 25 | 23 | 24 | 23.2 | 37 |
| 6-Sep | 23 | 21 | 20 | 21 | 20 | 19 | Z | 17 | 17 | 17 | 19 | 22 | 25 | 29 | 30 | 32 | 31 | 28 | 24 | 22 | 24 | 22 | 21 | 21 | 22.9 | 32 |
| 7-Sep | 20 | 19 | 20 | 19 | 18 | 14 | 12 | Z | 15 | 18 | 22 | 25 | 29 | 31 | 32 | 31 | 28 | 27 | 25 | 24 | 21 | 21 | 21 | 20 | 22.2 | 32 |
| 8-Sep | 18 | 17 | 15 | 14 | 14 | 13 | 16 | 15 | Z | 16 | 19 | 22 | 26 | 27 | 25 | 23 | 22 | 18 | 19 | 16 | 15 | 16 | 19 | 19 | 18.4 | 27 |
| 9-Sep | 20 | 23 | 23 | Z | 21 | 22 | 21 | 20 | 22 | 24 | 23 | 25 | 25 | 27 | 25 | 26 | 28 | 29 | 25 | 28 | 26 | 23 | 22 | 20 | 23.8 | 29 |
| 10-Sep | 18 | 17 | 17 | 17 | Z | 17 | 17 | 17 | 18 | 18 | 17 | 16 | 15 | 15 | 16 | 16 | 17 | 16 | 20 | 23 | 24 | 24 | 22 | 21 | 18.1 | 24 |
| 11-Sep | 18 | 16 | 16 | 15 | 14 | Z | 14 | 15 | 16 | 17 | 17 | 18 | 21 | 26 | 27 | 27 | 26 | 24 | 21 | 20 | 19 | 17 | 15 | 16 | 18.9 | 27 |
| 12-Sep | 17 | 19 | 16 | 15 | 16 | 13 | Z | 15 | 15 | 19 | 23 | 25 | 26 | 27 | 28 | 29 | 29 | 30 | 30 | 29 | 27 | 25 | 23 | 19 | 22.4 | 30 |
| 13-Sep | 18 | 18 | 17 | 16 | 17 | 18 | 17 | Z | 17 | 19 | 19 | UO | 19 | 20 | 20 | 20 | 19 | 18 | 19 | 18 | 16 | 14 | 12 | 12 | 17.4 | 20 |
| 14-Sep | 11 | 10 | 9 | 11 | 10 | 10 | 10 | 9 | Z | 15 | 18 | 19 | 18 | 17 | 17 | 17 | 16 | 14 | 12 | 12 | 20 | 21 | 18 | 16 | 14.4 | 21 |
| 15-Sep | 14 | 16 | 18 | Z | 14 | 13 | 13 | 14 | 16 | 18 | 18 | 20 | 21 | 20 | 21 | 22 | 21 | 20 | 19 | 18 | 18 | 18 | 19 | 18 | 17.7 | 22 |
| 16-Sep | 18 | 16 | 14 | 11 | Z | 9 | 10 | 11 | 11 | 11 | 11 | 11 | 14 | 15 | 14 | 16 | 16 | 16 | 15 | 13 | 15 | 15 | 16 | 14 | 13.6 | 18 |
| 17-Sep | 13 | 12 | 10 | 10 | 11 | Z | 15 | UO | UO | 21 | 23 | 24 | 24 | 23 | 25 | 25 | 23 | 22 | 20 | 19 | 17 | 17 | 16 | 14 | 18.3 | 25 |
| 18-Sep | 12 | 11 | 11 | 11 | 9 | 9 | Z | 10 | 11 | 13 | 16 | 21 | 17 | 16 | 15 | 15 | 14 | 13 | 15 | 14 | 12 | 12 | 12 | 12 | 13.1 | 21 |
| 19-Sep | 12 | 12 | 12 | 12 | 12 | 12 | 11 | Z | 9 | 8 | 8 | 8 | 14 | 16 | 17 | 18 | 12 | 10 | 12 | 16 | 17 | 14 | 16 | 17 | 12.9 | 18 |
| 20-Sep | 16 | 15 | 12 | 11 | 10 | 10 | 9 | 9 | Z | 9 | 12 | 19 | 22 | 21 | 20 | 20 | 18 | 17 | 17 | 17 | 17 | 15 | 14 | 17 | 15.2 | 22 |
| 21-Sep | 20 | 20 | 20 | Z | 19 | 17 | 17 | C | C | C | 18 | 19 | 21 | 20 | 21 | 23 | 25 | 23 | 20 | 20 | 20 | 19 | 19 | 19 | 20.1 | 25 |
| 22-Sep | 20 | 18 | 19 | 18 | Z | 16 | 16 | 16 | 15 | 17 | 20 | 24 | 27 | 33 | 36 | 38 | 39 | 39 | 39 | 38 | 37 | 35 | 33 | 31 | 27.1 | 39 |
| 23-Sep | 28 | 28 | 29 | 29 | 30 | Z | 29 | 27 | 29 | 30 | 33 | 34 | 35 | 36 | 34 | 34 | 32 | 30 | 29 | 28 | 27 | 26 | 27 | 27 | 29.9 | 36 |
| 24-Sep | 25 | 24 | 22 | 19 | 17 | 14 | Z | 11 | 13 | 18 | 23 | 23 | 23 | 24 | 28 | 30 | 28 | 25 | 23 | 24 | 22 | 21 | 21 | 21 | 21.8 | 30 |
| 25-Sep | 22 | 23 | 24 | 24 | 25 | 24 | 23 | Z | 25 | 26 | 28 | 30 | 33 | 33 | 33 | 33 | 33 | 31 | 31 | 31 | 31 | 29 | 25 | 26 | 28.0 | 33 |
| 26-Sep | 27 | 24 | 24 | 23 | 23 | 24 | 23 | 22 | Z | 24 | 27 | 29 | 30 | 31 | 34 | 33 | 34 | 32 | 29 | 29 | 29 | 30 | 30 | 30 | 27.9 | 34 |
| 27-Sep | 29 | 27 | 26 | Z | 23 | 18 | 16 | 20 | 19 | 22 | 23 | 23 | 26 | 29 | 31 | 33 | 34 | 33 | 33 | 30 | 26 | 24 | 24 | 24 | 25.8 | 34 |
| 28-Sep | 26 | 25 | 25 | 25 | Z | 25 | 24 | 24 | 26 | 26 | 26 | 28 | 29 | 29 | 29 | 29 | 29 | 28 | 27 | 26 | 23 | 25 | 25 | 24 | 26.1 | 29 |
| 29-Sep | 25 | 24 | 24 | 25 | 26 | Z | 24 | 22 | 20 | 22 | 24 | 24 | 28 | 32 | 33 | 34 | 34 | 34 | 32 | 31 | 30 | 31 | 29 | 27 | 27.5 | 34 |
| 30-Sep | 26 | 27 | 27 | 23 | 23 | 20 | Z | 18 | 18 | 17 | 18 | 23 | 28 | 28 | 28 | 28 | 27 | 26 | 24 | 25 | 25 | 25 | 26 | 26 | 24.1 | 28 |

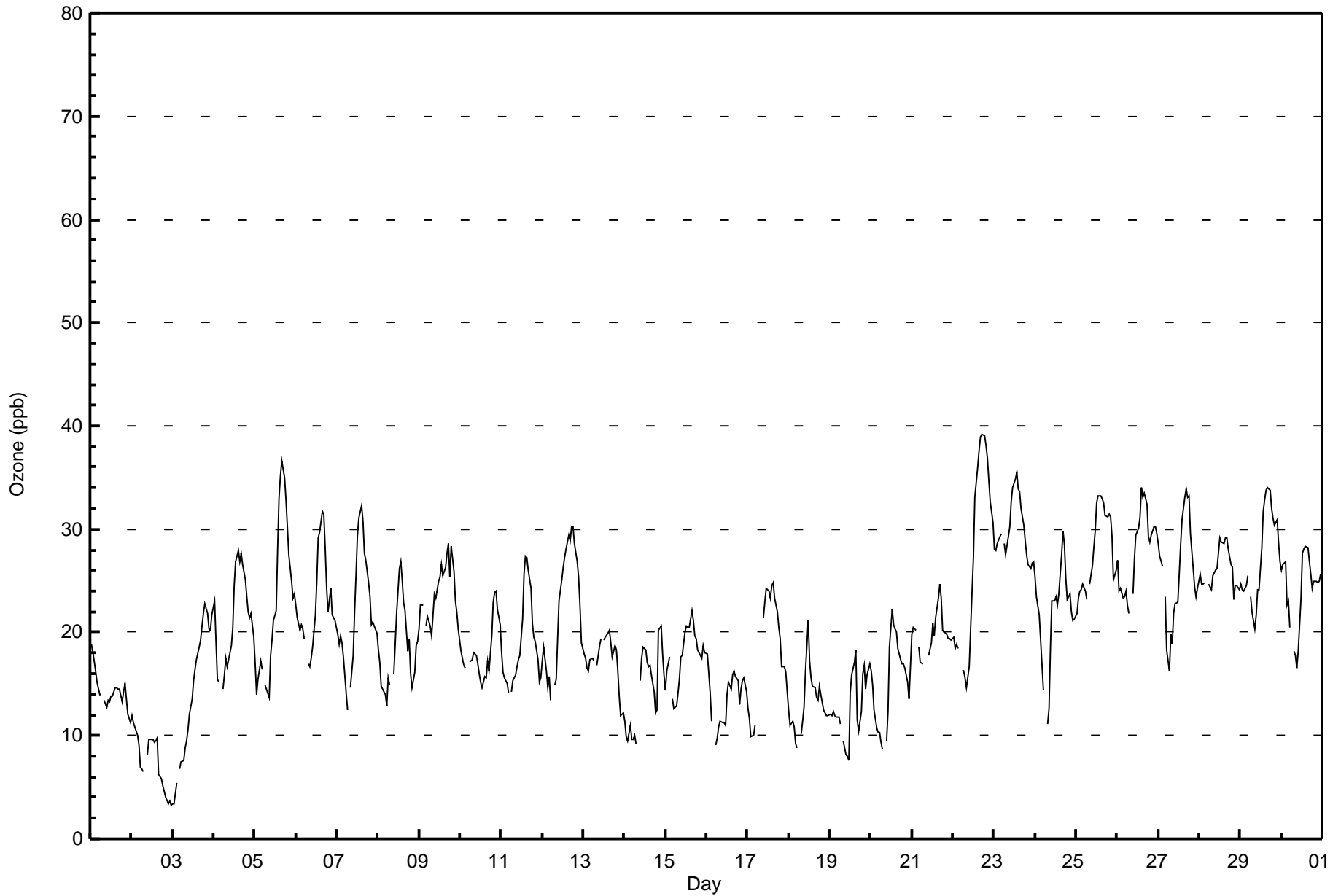
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|-----------------|--|
| 19.0 | 18.3 | 17.8 | 17.1 | 16.7 | 15.2 | 15.9 | 15.6 | 16.7 | 17.7 | 19.3 | 21.0 | 22.8 | 23.9 | 24.6 | 25.1 | 24.7 | 23.7 | 22.8 | 22.2 | 21.6 | 20.8 | 20.1 | 19.7 | Diurnal Average | | |
| 29 | 28 | 29 | 29 | 30 | 25 | 29 | 27 | 29 | 30 | 33 | 34 | 35 | 36 | 36 | 38 | 39 | 39 | 39 | 39 | 38 | 37 | 35 | 33 | 31 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort Chipewyan - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Fort Chipewyan - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 371 | 54.24 | 54.24 |
| 21 - 50 | 313 | 45.76 | 100.00 |
| 51 - 82 | 0 | 0.00 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Fort Chipewyan - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 17 | 5 | 6 | 12 | 41 | 19 | 20 | 16 | 17 | 16 | 13 | 13 | 29 | 45 | 60 | 41 | 370 |
| 21 - 50 | 15 | 8 | 2 | 1 | 20 | 22 | 16 | 33 | 49 | 10 | 12 | 38 | 40 | 13 | 24 | 10 | 313 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 32 | 13 | 8 | 13 | 61 | 41 | 36 | 49 | 66 | 26 | 25 | 51 | 69 | 58 | 84 | 51 | 683 |

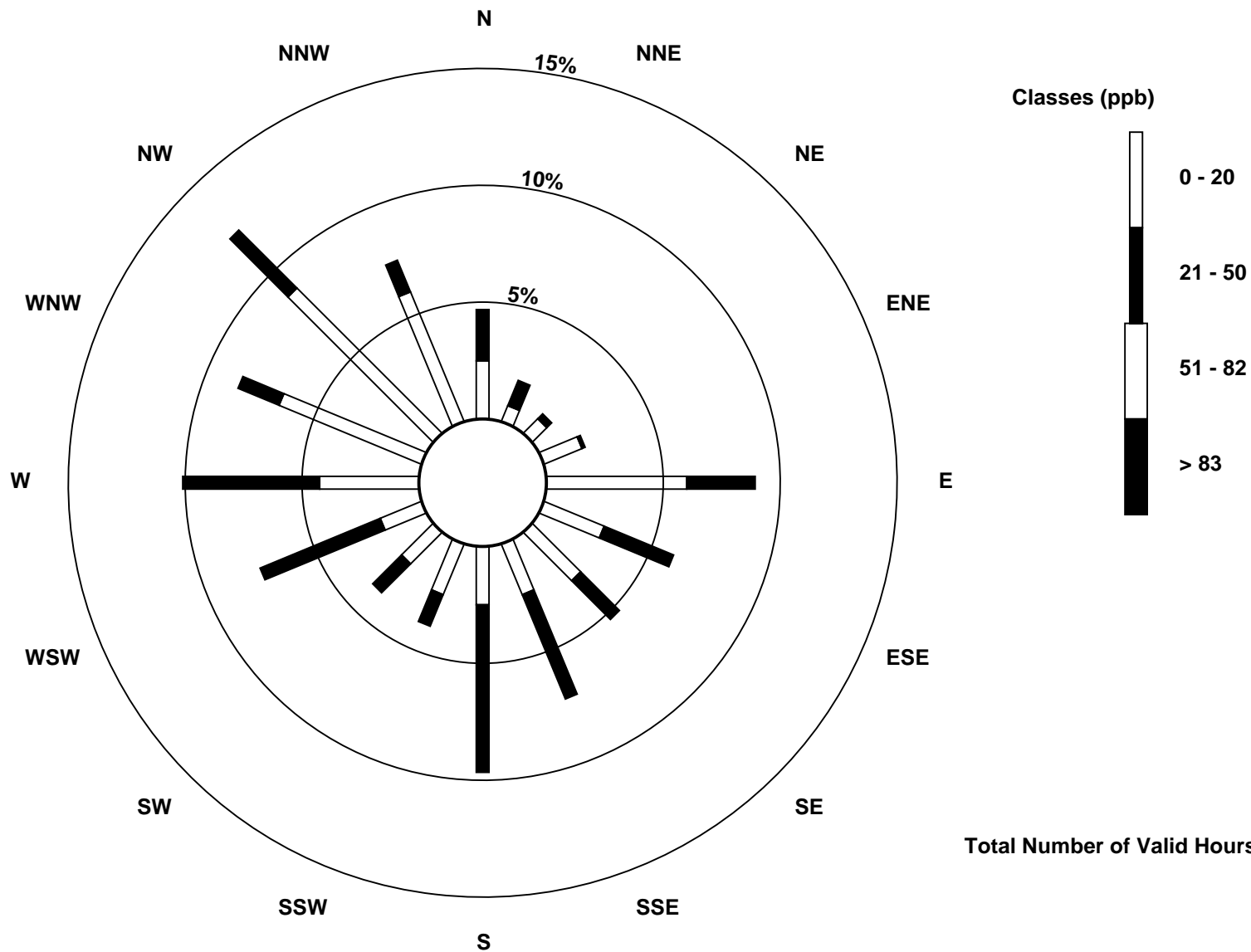
Total Number of Valid Hours: 683

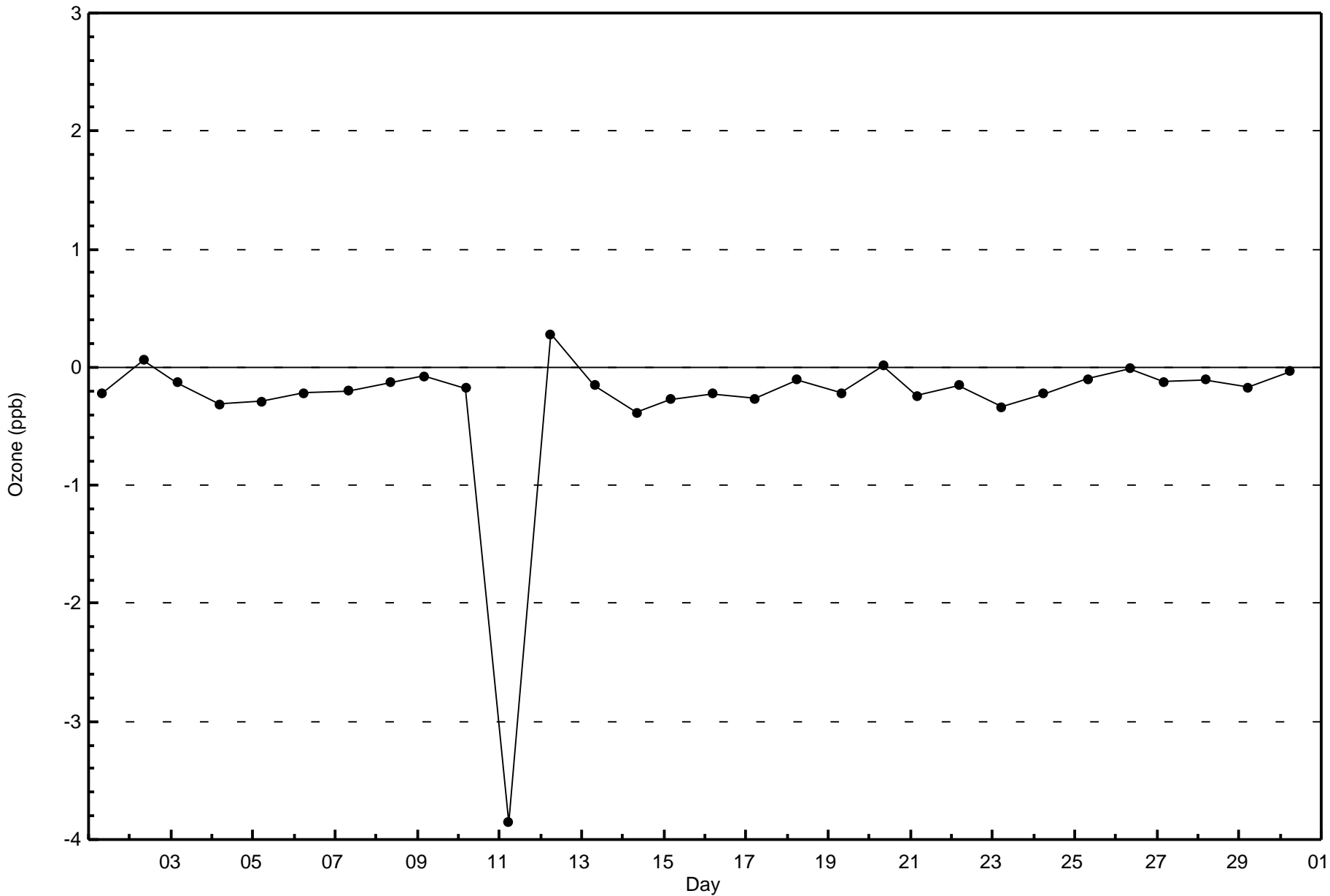
Total Number of Hours: 720

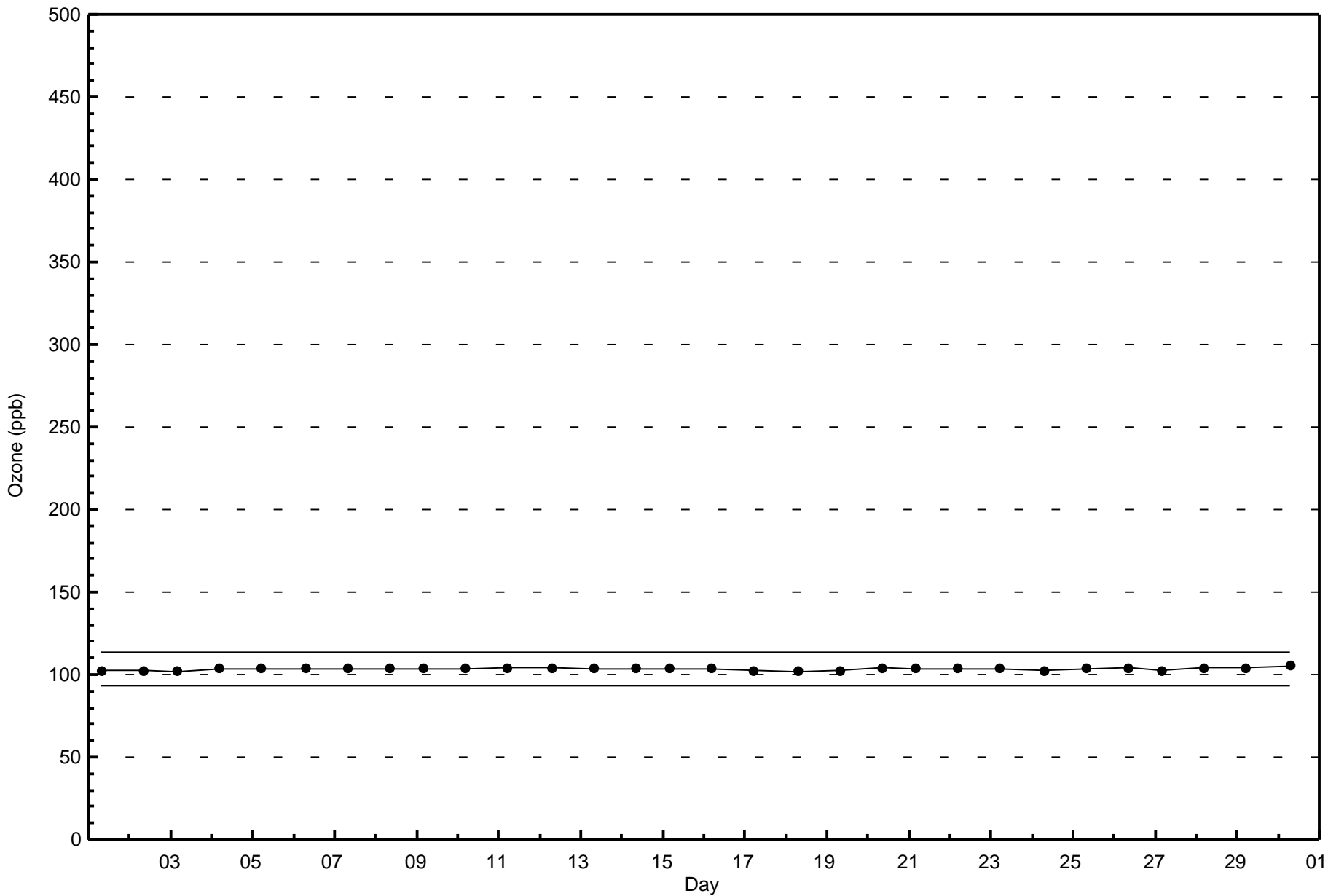


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Ozone (O₃) - ppb
Fort Chipewyan (AMS 8)







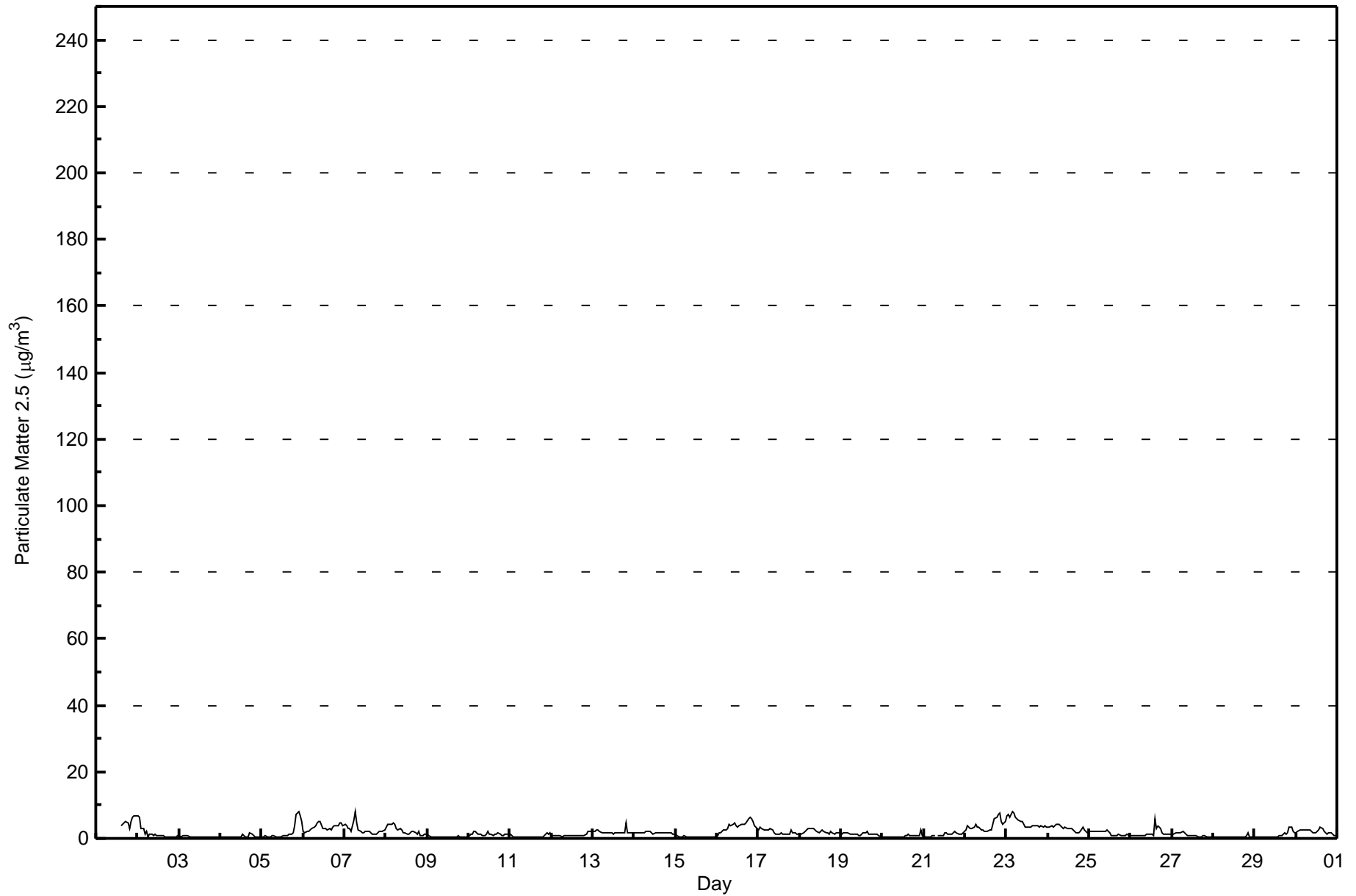


| Number of Exceedences (AAAQO): 24-hr: 0 | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------------------------|---------------|---------------|
| Maximum Value: 8.2 µg/m ³ on Sep 5 22:00 | | | | | | | | | | | | | | Maximum Daily Average: 4.7 µg/m ³ on Sep 23 | | | | | | | | | | Hours of Data: 705 | | |
| Minimum Value: 0.2 µg/m ³ on Sep 3 23:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.4 µg/m ³ on Sep 15 | | | | | | | | | | Hours of Missing Data: 15 | | |
| Maximum Diurnal Average: 2.1 µg/m ³ at hour 21 | | | | | | | | | | | | | | Minimum Diurnal Average: 1.4 µg/m ³ at hour 13 | | | | | | | | | | Hours of Calibration: 3 | | |
| Monthly Average: 1.80 µg/m ³ | | | | | | | | | | | | | | Percentiles: P ₁ = 0.3 P ₁₀ = 0.4 Q ₁ = 0.6 Median = 1.4 Q ₃ = 2.4 P ₉₀ = 3.8 P ₉₉ = 7.3 | | | | | | | | | | 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 | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | C | C | C | 3.6 | 4.3 | 4.8 | 5.0 | 4.7 | 2.8 | 5.2 | 6.4 | 6.7 | 6.8 | -- | 6.8 |
| 2-Sep | 6.8 | 6.2 | 3.1 | 3.1 | 1.5 | 2.1 | 0.5 | 1.3 | 1.3 | 1.0 | 1.1 | 1.1 | 0.9 | 0.8 | 0.9 | 0.9 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 1.6 | 6.8 |
| 3-Sep | 0.7 | 0.6 | 0.9 | 0.8 | 0.8 | 0.7 | 0.6 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.6 | 0.6 | 0.3 | 0.2 | 0.2 | 0.5 | 0.9 |
| 4-Sep | 0.3 | 0.3 | 0.3 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | 0.5 | 0.6 | 0.5 | 0.4 | 1.3 | 0.6 | 0.4 | 0.5 | 1.7 | 1.1 | 0.7 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 1.7 |
| 5-Sep | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.7 | 0.7 | 0.6 | 0.7 | 1.5 | 1.2 | 1.6 | 3.8 | 7.3 | 8.2 | 6.6 | 4.9 | 1.9 | 8.2 |
| 6-Sep | 2.3 | 1.9 | 1.9 | 2.0 | 2.4 | 3.0 | 3.4 | 3.9 | 4.5 | 5.3 | 5.2 | 3.1 | 2.9 | 2.9 | 2.4 | 3.1 | 2.7 | 3.5 | 3.6 | 3.8 | 3.8 | 4.5 | 4.5 | 3.7 | 3.3 | 5.3 |
| 7-Sep | 4.0 | 3.7 | 2.9 | 2.8 | 2.1 | 5.5 | 8.0 | 4.7 | 2.7 | 2.0 | 1.7 | 1.8 | 2.0 | 2.0 | 2.0 | 1.7 | 1.4 | 1.5 | 1.4 | 1.6 | 2.0 | 2.1 | 2.1 | 2.5 | 2.7 | 8.0 |
| 8-Sep | 3.4 | 4.2 | 4.4 | 4.3 | 4.8 | 4.1 | 3.1 | 2.7 | 2.9 | 2.4 | 1.8 | 1.5 | 1.4 | 1.4 | 1.7 | 2.1 | 2.2 | 1.8 | 1.2 | 1.9 | 0.9 | 0.9 | 1.1 | 1.1 | 2.4 | 4.8 |
| 9-Sep | 1.2 | 1.0 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.4 | 1.0 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 1.2 |
| 10-Sep | 1.0 | 1.1 | 1.5 | 2.2 | 1.9 | 1.2 | 1.3 | 1.1 | 1.0 | 1.1 | 1.3 | 2.2 | 1.2 | 1.4 | 1.0 | 1.4 | 1.2 | 1.6 | 1.3 | 1.0 | 1.0 | 1.3 | 1.2 | 1.1 | 1.3 | 2.2 |
| 11-Sep | 1.1 | 1.0 | 0.4 | 0.3 | 0.4 | 0.5 | 0.6 | 0.5 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.5 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.9 | 1.7 | 1.1 | 1.7 | 0.6 | 1.7 |
| 12-Sep | 0.6 | 0.7 | 0.9 | 0.9 | 1.0 | 0.9 | 0.6 | 0.7 | 0.7 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 1.0 | 1.0 | 1.0 | 1.3 | 2.0 | 2.2 | 2.1 | 1.0 | 2.2 |
| 13-Sep | 2.0 | 2.3 | 2.5 | 2.5 | 2.0 | 1.7 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.3 | 1.6 | 1.8 | 1.8 | 1.8 | 1.6 | 1.6 | 4.7 | 1.6 | 1.7 | 1.6 | 1.7 | 1.9 | 4.7 |
| 14-Sep | 1.7 | 1.7 | 1.6 | 1.6 | 1.6 | 1.7 | 1.8 | 1.9 | 2.1 | 2.0 | 1.5 | 1.4 | 1.5 | 1.7 | 1.6 | 1.6 | 1.9 | 1.6 | 1.6 | 1.8 | 1.6 | 1.5 | 1.3 | 1.3 | 1.7 | 2.1 |
| 15-Sep | 1.2 | 0.8 | 0.4 | 0.4 | 0.4 | 0.7 | 0.6 | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.5 | 0.4 | 1.2 |
| 16-Sep | 0.7 | 1.6 | 1.9 | 2.2 | 2.5 | 2.7 | 3.1 | 4.2 | 4.0 | 4.0 | 4.6 | 3.7 | 3.6 | 3.9 | 4.3 | 4.4 | 4.2 | 4.5 | 5.8 | 6.4 | 6.0 | 5.2 | 3.7 | 3.0 | 3.8 | 6.4 |
| 17-Sep | 2.7 | 3.2 | 2.8 | 2.6 | 2.7 | 2.7 | 2.7 | 3.0 | 2.7 | 1.6 | 1.5 | 1.3 | 1.3 | 1.5 | 1.3 | 1.2 | 1.3 | 1.4 | 1.4 | 2.6 | 1.8 | 1.6 | 1.4 | 1.4 | 2.0 | 3.2 |
| 18-Sep | 1.4 | 1.5 | 1.8 | 2.1 | 2.5 | 2.9 | 3.2 | 3.1 | 2.9 | 2.4 | 2.1 | 1.7 | 2.0 | 2.5 | 2.1 | 1.7 | 1.6 | 1.4 | 2.2 | 1.6 | 1.3 | 1.6 | 1.6 | 1.7 | 2.0 | 3.2 |
| 19-Sep | 1.5 | 1.5 | 1.6 | 1.6 | 1.5 | 1.5 | 1.4 | 1.3 | 1.1 | 1.1 | 1.0 | 0.9 | 1.3 | 1.6 | 1.6 | 2.0 | 1.4 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 0.7 | 0.5 | 1.3 | 2.0 |
| 20-Sep | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.5 | 0.6 | 0.6 | 0.8 | 0.7 | 1.1 | 0.8 | 0.8 | 0.8 | 0.9 | 0.8 | 0.9 | 2.4 | 0.8 | 0.7 | 2.4 |
| 21-Sep | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.8 | M | 1.0 | 1.0 | 1.0 | 1.1 | 1.6 | 1.5 | 1.2 | 1.4 | 1.5 | 1.5 | 2.0 | 1.6 | 1.3 | 1.2 | 1.2 | 1.5 | 1.1 | 2.0 |
| 22-Sep | 2.7 | 4.0 | 3.5 | 3.0 | 3.1 | 3.4 | 4.3 | 3.6 | 3.2 | 2.6 | 2.4 | 2.2 | 2.2 | 2.3 | 2.5 | 2.5 | 4.2 | 6.0 | 6.2 | 7.3 | 7.6 | 5.1 | 4.2 | 4.9 | 3.9 | 7.6 |
| 23-Sep | 7.0 | 7.1 | 6.2 | 8.0 | 7.5 | 6.5 | 5.7 | 5.6 | 5.2 | 4.9 | 4.0 | 3.2 | 3.5 | 3.3 | 3.2 | 3.9 | 3.8 | 3.7 | 3.9 | 3.5 | 3.7 | 3.6 | 3.6 | 3.4 | 4.7 | 8.0 |
| 24-Sep | 3.5 | 3.6 | 3.8 | 3.6 | 3.7 | 4.2 | 4.4 | 3.9 | 3.4 | 2.9 | 3.2 | 3.1 | 2.8 | 3.1 | 2.8 | 2.3 | 1.9 | 1.7 | 1.8 | 2.1 | 3.3 | 2.7 | 1.9 | 1.8 | 3.0 | 4.4 |
| 25-Sep | 2.2 | 2.1 | 2.0 | 2.1 | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.1 | 1.7 | 0.9 | 0.8 | 0.8 | 1.0 | 1.4 | 0.8 | 0.9 | 1.0 | 1.1 | 1.4 | 1.0 | 1.6 | 2.3 |
| 26-Sep | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 1.0 | 1.3 | 1.4 | 1.4 | 1.2 | 1.0 | 5.8 | 3.0 | 3.7 | 2.9 | 1.5 | 1.1 | 1.2 | 1.3 | 1.4 | 1.4 | 1.6 | 5.8 |
| 27-Sep | 1.4 | 1.4 | 1.6 | 1.9 | 1.7 | 1.7 | 2.0 | 1.5 | 1.3 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 0.8 | 0.5 | 0.5 | 0.5 | 0.7 | 0.6 | 0.5 | 0.3 | 0.3 | 0.4 | 1.0 | 2.0 |
| 28-Sep | 0.4 | 0.5 | 0.6 | 0.5 | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.9 | 1.8 | 0.5 | 0.5 | 0.5 | 0.5 | 1.8 |
| 29-Sep | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.6 | 0.9 | 0.9 | 1.0 | 1.5 | 1.4 | 1.8 | 3.2 | 3.2 | 2.0 | 1.8 | 1.0 | 3.2 |
| 30-Sep | 1.8 | 2.2 | 2.3 | 2.5 | 2.4 | 2.4 | 2.4 | 2.7 | 2.4 | 2.2 | 1.9 | 1.8 | 2.2 | 2.4 | 3.5 | 3.1 | 1.9 | 1.6 | 1.3 | 1.6 | 1.5 | 1.1 | 0.8 | 1.0 | 2.0 | 3.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 1.9 2.0 1.8 1.9 1.8 2.0 2.0 1.9 1.8 1.6 1.6 1.4 1.4 1.5 1.7 1.6 1.7 1.8 1.8 2.0 2.1 2.1 1.9 1.8 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 7.0 7.1 6.2 8.0 7.5 6.5 8.0 5.6 5.2 5.3 5.2 3.7 3.6 3.9 5.8 4.4 4.8 6.0 6.2 7.3 7.6 8.2 6.7 6.8 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C - Calibration M - Maintenance UO - Unstable Operation | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³ | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - September 2016

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 412 | 58.44 | 58.44 |
| 6 - 15 | 25 | 3.55 | 61.99 |
| 16 - 25 | 0 | 0.00 | 61.99 |
| 26 - 80 | 0 | 0.00 | 61.99 |
| > 81.0 | 0 | 0.00 | 61.99 |

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 Chipewyan - September 2016

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|----------------------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 17 | 13 | 6 | 6 | 36 | 25 | 31 | 44 | 45 | 18 | 15 | 20 | 35 | 39 | 43 | 19 | 412 |
| 6 - 15 | 0 | 0 | 0 | 4 | 3 | 0 | 2 | 3 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 |
| 16 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 17 | 13 | 6 | 10 | 39 | 25 | 33 | 47 | 58 | 18 | 15 | 20 | 35 | 39 | 43 | 19 | 437 |

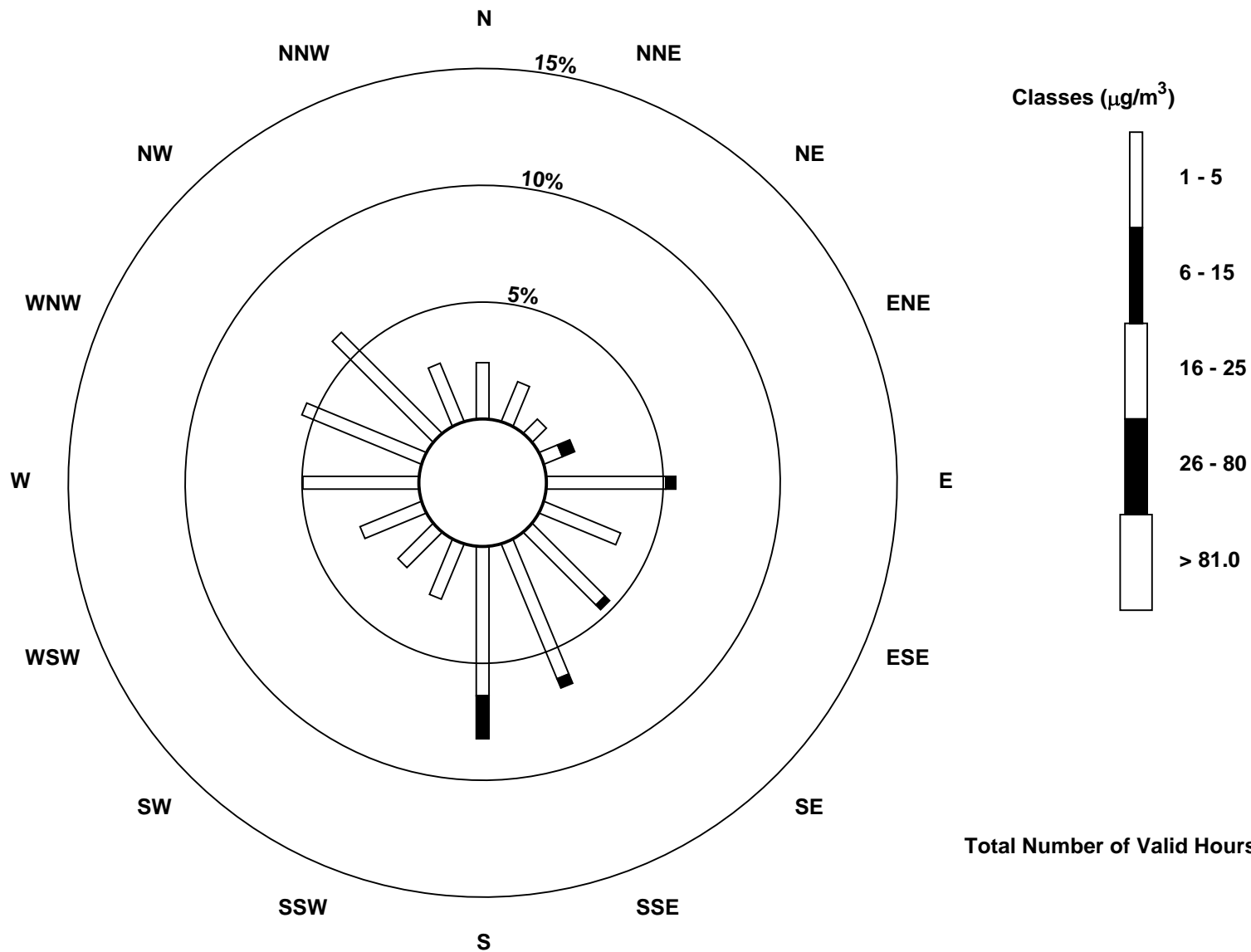
Total Number of Valid Hours: 705

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan (AMS 8)



Total Number of Valid Hours: 705

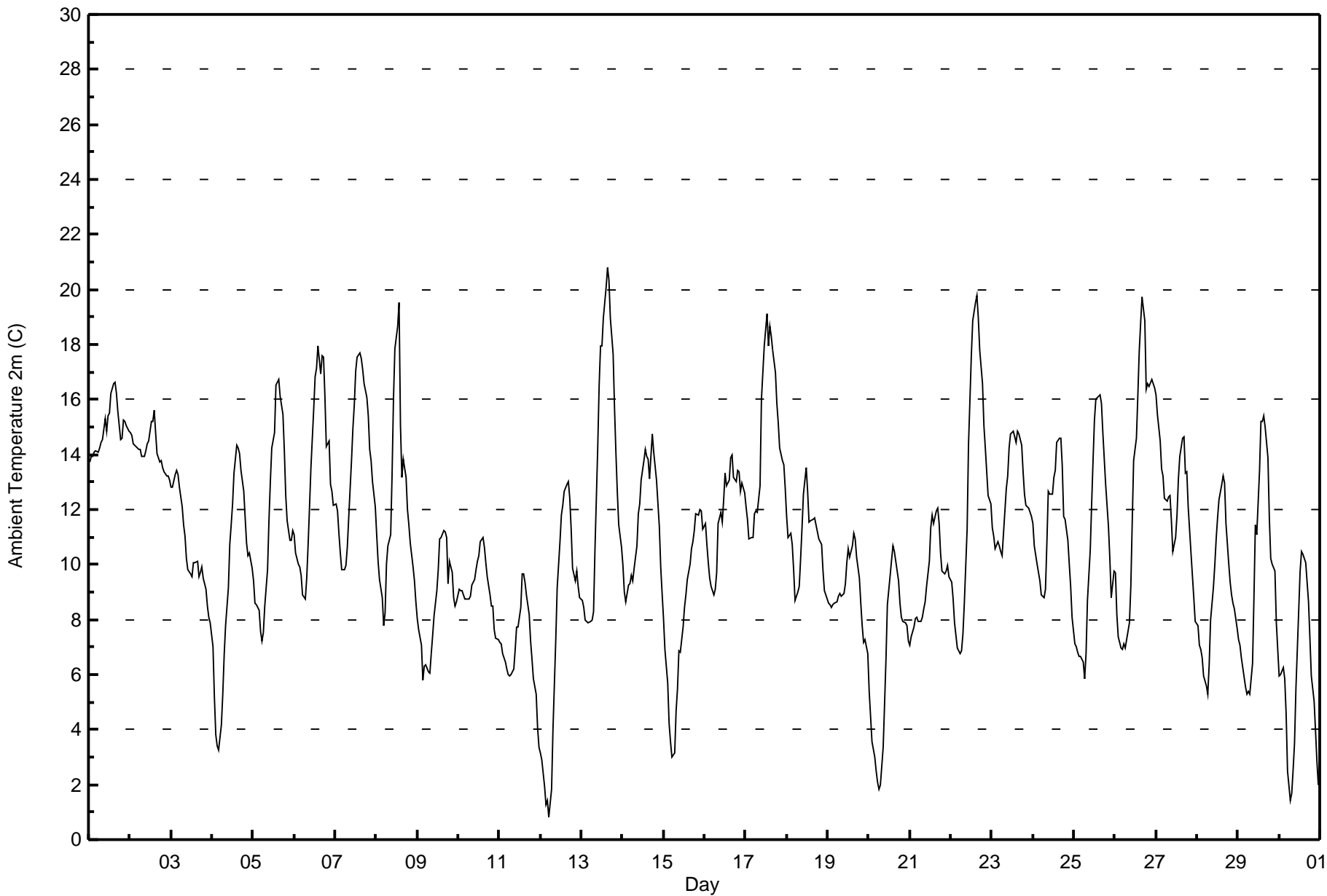


| Maximum Value: 20.8 C on Sep 13 16:00 | | Maximum Daily Average: 15.0 C on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|-----------------|
| Minimum Value: 0.8 C on Sep 12 06:00 | | Minimum Daily Average: 5.8 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 14.1 C at hour 16 | | Minimum Diurnal Average: 7.8 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.84 C | | Percentiles: P ₁ = 1.9 P ₁₀ = 6.4 Q ₁ = 8.5 Median = 10.7 Q ₃ = 13.4 P ₉₀ = 15.7 P ₉₉ = 19.5 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 13.7 | 13.9 | 14.0 | 14.1 | 14.1 | 14.1 | 14.2 | 14.4 | 14.5 | 15.3 | 14.9 | 15.4 | 15.5 | 16.2 | 16.6 | 16.6 | 16.2 | 15.6 | 14.6 | 14.6 | 15.2 | 15.2 | 15.0 | 14.8 | 15.0 | 16.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 14.8 | 14.7 | 14.4 | 14.3 | 14.3 | 14.2 | 14.2 | 13.9 | 13.9 | 14.1 | 14.4 | 14.5 | 15.2 | 15.2 | 15.6 | 14.8 | 14.0 | 13.7 | 13.8 | 13.5 | 13.4 | 13.2 | 13.2 | 13.1 | 14.2 | 15.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 12.8 | 12.8 | 13.3 | 13.4 | 13.2 | 12.8 | 12.1 | 11.4 | 11.1 | 10.2 | 9.8 | 9.6 | 10.1 | 10.1 | 10.1 | 9.6 | 9.7 | 9.9 | 9.5 | 9.1 | 8.5 | 8.1 | 7.9 | 10.6 | 13.4 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 7.0 | 5.2 | 3.8 | 3.4 | 3.2 | 4.2 | 5.3 | 6.7 | 7.8 | 9.1 | 10.7 | 11.4 | 12.2 | 13.3 | 14.3 | 14.2 | 14.0 | 13.4 | 12.6 | 11.7 | 10.8 | 10.3 | 10.4 | 9.9 | 9.4 | 14.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 9.4 | 8.6 | 8.6 | 8.4 | 7.6 | 7.2 | 7.5 | 8.5 | 9.8 | 11.6 | 13.0 | 14.3 | 14.8 | 16.5 | 16.6 | 16.8 | 16.1 | 15.5 | 14.2 | 12.5 | 11.6 | 10.9 | 10.9 | 11.2 | 11.8 | 16.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 11.1 | 10.4 | 10.0 | 9.9 | 9.6 | 8.9 | 8.8 | 9.5 | 10.7 | 12.1 | 13.5 | 15.7 | 16.9 | 17.1 | 18.0 | 16.9 | 17.6 | 17.5 | 16.1 | 14.3 | 14.5 | 12.9 | 12.7 | 12.1 | 13.2 | 18.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 12.2 | 12.0 | 11.1 | 10.4 | 9.8 | 9.8 | 9.9 | 10.6 | 11.7 | 13.8 | 14.9 | 15.8 | 17.0 | 17.5 | 17.7 | 17.5 | 17.1 | 16.6 | 16.1 | 15.4 | 14.2 | 13.8 | 13.0 | 12.1 | 13.8 | 17.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 11.1 | 10.1 | 9.5 | 8.8 | 7.8 | 8.2 | 10.0 | 10.7 | 11.1 | 13.3 | 16.0 | 17.9 | 18.7 | 19.5 | 15.0 | 13.2 | 13.9 | 13.2 | 12.0 | 11.4 | 10.8 | 9.9 | 9.4 | 8.6 | 12.1 | 19.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 8.0 | 7.6 | 7.0 | 5.8 | 6.3 | 6.3 | 6.1 | 6.0 | 6.8 | 7.4 | 8.1 | 9.0 | 9.8 | 11.0 | 11.0 | 11.2 | 11.2 | 11.0 | 9.3 | 10.1 | 9.7 | 8.8 | 8.5 | 8.7 | 8.5 | 11.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 9.1 | 9.0 | 9.0 | 8.9 | 8.8 | 8.7 | 8.7 | 8.9 | 9.2 | 9.5 | 9.8 | 10.1 | 10.3 | 10.8 | 11.0 | 10.6 | 10.1 | 9.6 | 8.9 | 8.5 | 8.5 | 7.6 | 7.3 | 7.3 | 9.2 | 11.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 7.2 | 7.1 | 6.7 | 6.5 | 6.2 | 6.0 | 6.0 | 6.0 | 6.2 | 6.9 | 7.7 | 7.7 | 8.5 | 9.7 | 9.7 | 9.3 | 8.9 | 8.2 | 7.2 | 6.6 | 5.9 | 5.3 | 4.0 | 3.4 | 6.9 | 9.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 3.1 | 2.9 | 1.9 | 1.3 | 1.4 | 0.8 | 1.8 | 4.0 | 5.7 | 7.3 | 9.2 | 10.8 | 11.8 | 12.1 | 12.6 | 12.9 | 13.0 | 12.4 | 11.3 | 9.9 | 9.4 | 9.8 | 9.2 | 8.8 | 7.6 | 13.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 8.7 | 8.4 | 8.0 | 7.9 | 7.9 | 7.9 | 8.0 | 8.3 | 10.5 | 14.3 | 16.5 | 18.0 | 18.0 | 18.9 | 20.1 | 20.8 | 20.3 | 19.0 | 17.7 | 15.7 | 14.0 | 12.6 | 11.5 | 10.6 | 13.5 | 20.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 10.0 | 9.0 | 8.7 | 9.3 | 9.3 | 9.6 | 9.4 | 9.9 | 10.7 | 11.9 | 12.2 | 13.1 | 13.8 | 14.2 | 13.9 | 13.8 | 13.1 | 14.8 | 14.1 | 13.6 | 13.1 | 11.4 | 9.9 | 9.0 | 11.6 | 14.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 8.1 | 6.9 | 5.7 | 4.2 | 3.5 | 3.0 | 3.2 | 4.7 | 5.5 | 6.9 | 6.8 | 7.7 | 8.4 | 8.9 | 9.5 | 10.0 | 10.6 | 10.8 | 11.2 | 11.8 | 11.8 | 12.0 | 12.0 | 11.3 | 8.1 | 12.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 11.5 | 10.7 | 10.1 | 9.5 | 9.2 | 8.9 | 9.1 | 9.7 | 11.5 | 11.9 | 11.5 | 12.4 | 13.3 | 12.9 | 13.1 | 13.9 | 14.0 | 13.2 | 13.0 | 13.4 | 13.4 | 12.7 | 13.0 | 12.6 | 11.8 | 14.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 12.1 | 11.6 | 11.0 | 11.0 | 11.0 | 11.8 | 11.9 | 11.9 | 12.9 | 16.0 | 17.0 | 17.9 | 19.1 | 17.9 | 18.7 | 18.3 | 17.8 | 17.0 | 15.9 | 15.1 | 14.2 | 13.8 | 13.6 | 12.8 | 14.6 | 19.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 11.8 | 11.0 | 11.1 | 10.7 | 9.8 | 8.7 | 9.0 | 9.2 | 10.2 | 11.4 | 12.6 | 13.5 | 12.7 | 11.5 | 11.6 | 11.6 | 11.7 | 11.4 | 11.2 | 11.0 | 10.7 | 9.8 | 9.1 | 8.9 | 10.8 | 13.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 8.6 | 8.5 | 8.4 | 8.5 | 8.6 | 8.6 | 8.8 | 9.0 | 8.9 | 8.9 | 9.3 | 10.1 | 10.6 | 10.3 | 10.7 | 11.1 | 10.9 | 10.3 | 9.5 | 8.6 | 7.8 | 7.2 | 7.3 | 6.8 | 9.1 | 11.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 5.4 | 4.5 | 3.6 | 3.0 | 2.5 | 2.1 | 1.8 | 2.0 | 3.4 | 4.9 | 6.6 | 8.5 | 9.6 | 10.2 | 10.7 | 10.5 | 10.1 | 9.4 | 8.6 | 8.1 | 7.9 | 7.9 | 7.8 | 7.2 | 6.5 | 10.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 7.1 | 7.4 | 7.7 | 8.0 | 8.1 | 8.0 | 7.9 | 8.1 | 8.4 | 8.7 | 9.2 | 10.1 | 11.4 | 11.8 | 11.5 | 12.0 | 12.0 | 11.5 | 10.4 | 9.8 | 9.6 | 9.7 | 9.9 | 9.6 | 9.5 | 12.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 9.4 | 8.7 | 7.9 | 7.4 | 7.0 | 6.8 | 6.9 | 7.5 | 8.6 | 11.3 | 14.4 | 16.0 | 17.6 | 18.8 | 19.5 | 19.8 | 19.0 | 17.8 | 16.6 | 15.1 | 14.2 | 13.4 | 12.5 | 12.2 | 12.8 | 19.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 11.3 | 11.0 | 10.6 | 10.8 | 10.7 | 10.5 | 10.3 | 11.1 | 12.8 | 13.2 | 14.2 | 14.8 | 14.8 | 14.7 | 14.5 | 14.8 | 14.7 | 14.3 | 13.4 | 12.6 | 12.1 | 12.0 | 11.9 | 11.8 | 12.6 | 14.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 11.5 | 10.7 | 10.0 | 9.7 | 9.4 | 8.9 | 8.8 | 9.1 | 10.8 | 12.6 | 12.5 | 12.5 | 13.2 | 13.4 | 14.4 | 14.6 | 14.6 | 13.6 | 11.7 | 11.6 | 10.9 | 10.0 | 9.2 | 8.1 | 11.3 | 14.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 7.1 | 7.0 | 6.8 | 6.7 | 6.7 | 6.5 | 5.8 | 6.7 | 8.7 | 10.5 | 12.2 | 13.8 | 15.3 | 16.0 | 16.1 | 16.2 | 15.9 | 14.8 | 12.9 | 12.1 | 11.4 | 10.2 | 8.8 | 9.8 | 10.8 | 16.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 9.7 | 8.2 | 7.4 | 7.0 | 6.9 | 7.1 | 7.0 | 7.3 | 7.9 | 9.2 | 11.5 | 13.8 | 14.6 | 16.1 | 17.7 | 18.8 | 19.7 | 18.9 | 16.4 | 16.6 | 16.5 | 16.7 | 16.6 | 16.4 | 12.8 | 19.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 16.2 | 15.5 | 14.5 | 13.5 | 13.2 | 12.4 | 12.3 | 12.5 | 12.5 | 11.6 | 10.5 | 11.0 | 11.8 | 13.1 | 13.9 | 14.6 | 14.6 | 13.3 | 13.4 | 12.1 | 10.4 | 9.6 | 8.8 | 7.9 | 12.5 | 16.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 7.8 | 7.0 | 6.9 | 6.6 | 5.9 | 5.6 | 5.3 | 6.4 | 8.0 | 9.2 | 10.0 | 11.0 | 11.7 | 12.3 | 12.9 | 13.2 | 13.0 | 11.5 | 10.0 | 9.3 | 8.9 | 8.6 | 8.4 | 7.7 | 9.0 | 13.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 7.3 | 7.1 | 6.6 | 5.9 | 5.6 | 5.3 | 5.4 | 5.3 | 6.4 | 8.8 | 11.5 | 11.1 | 13.4 | 15.2 | 15.2 | 15.4 | 15.0 | 13.9 | 11.7 | 10.2 | 10.0 | 9.8 | 7.9 | 6.9 | 9.6 | 15.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 5.9 | 6.0 | 6.3 | 5.9 | 4.6 | 2.5 | 1.4 | 1.7 | 2.6 | 3.5 | 5.5 | 8.3 | 9.7 | 10.5 | 10.4 | 10.1 | 9.4 | 8.6 | 7.3 | 6.0 | 5.0 | 3.9 | 2.8 | 2.0 | 5.8 | 10.5 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 9.6 | 9.1 | 8.7 | 8.4 | 8.1 | 7.8 | 7.9 | 8.4 | 9.3 | 10.5 | 11.5 | 12.5 | 13.3 | 13.9 | 14.1 | 14.1 | 13.9 | 13.3 | 12.4 | 11.7 | 11.2 | 10.6 | 10.1 | 9.6 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 16.2 | 15.5 | 14.5 | 14.3 | 14.3 | 14.2 | 14.2 | 14.4 | 14.5 | 16.0 | 17.0 | 18.0 | 19.1 | 19.5 | 20.1 | 20.8 | 20.3 | 19.0 | 17.7 | 16.6 | 16.5 | 16.7 | 16.6 | 16.4 | 16.4 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 310 | 43.06 | 43.06 |
| 10 - 20 | 407 | 56.53 | 99.58 |
| > 20 | 3 | 0.42 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



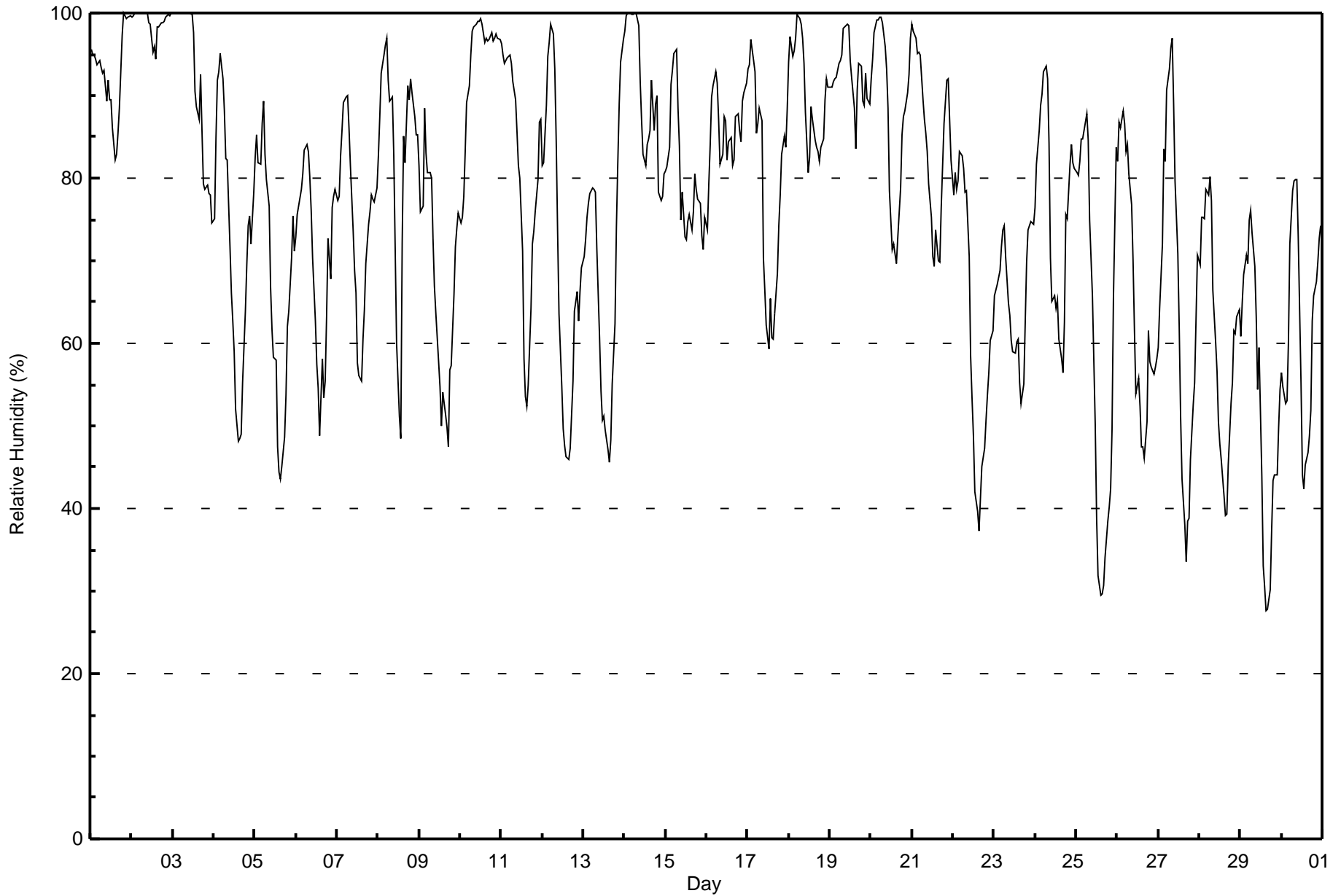
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort Chipewyan - September 2016

| Maximum Value: 100 % on Sep 2 03:00 Maximum Daily Average: 98.9 % on Sep 2 | | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----------------|---------------|---------------|
| Minimum Value: 28 % on Sep 29 16:00 Minimum Daily Average: 53.0 % on Sep 29 Maximum Diurnal Average: 89.5 % at hour 6 Minimum Diurnal Average: 61.5 % at hour 16 Monthly Average: 76.4 % Percentiles: P ₁ = 31 P ₁₀ = 51 Q ₁ = 64 Median = 80 O ₃ = 91 P ₉₀ = 98 P ₉₉ = 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 96 | 95 | 95 | 94 | 94 | 94 | 93 | 93 | 93 | 89 | 92 | 90 | 90 | 86 | 82 | 83 | 85 | 89 | 97 | 100 | 100 | 99 | 100 | 100 | 92.8 | 100 |
| 2-Sep | 99 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 99 | 95 | 96 | 94 | 98 | 98 | 99 | 99 | 99 | 100 | 100 | 100 | 100 | 98.9 | 100 |
| 3-Sep | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 90 | 89 | 87 | 93 | 86 | 79 | 79 | 79 | 78 | 78 | 75 | 92.1 | 100 |
| 4-Sep | 75 | 85 | 92 | 93 | 95 | 92 | 88 | 82 | 82 | 72 | 66 | 63 | 59 | 52 | 48 | 48 | 49 | 55 | 64 | 69 | 74 | 75 | 72 | 78 | 72.1 | 95 |
| 5-Sep | 83 | 85 | 82 | 82 | 87 | 89 | 83 | 80 | 77 | 67 | 62 | 58 | 58 | 47 | 44 | 44 | 45 | 49 | 54 | 62 | 64 | 70 | 75 | 71 | 67.4 | 89 |
| 6-Sep | 73 | 76 | 78 | 79 | 81 | 83 | 84 | 83 | 80 | 76 | 70 | 63 | 57 | 55 | 49 | 58 | 53 | 55 | 63 | 73 | 68 | 77 | 78 | 79 | 70.4 | 84 |
| 7-Sep | 77 | 78 | 83 | 86 | 89 | 90 | 90 | 86 | 81 | 74 | 69 | 66 | 58 | 56 | 55 | 61 | 64 | 70 | 74 | 76 | 78 | 77 | 77 | 79 | 74.8 | 90 |
| 8-Sep | 83 | 87 | 93 | 95 | 96 | 97 | 92 | 89 | 90 | 83 | 71 | 60 | 51 | 48 | 72 | 85 | 82 | 91 | 89 | 92 | 90 | 87 | 85 | 85 | 83.2 | 97 |
| 9-Sep | 82 | 76 | 77 | 89 | 83 | 81 | 81 | 80 | 73 | 67 | 64 | 58 | 55 | 50 | 54 | 51 | 50 | 47 | 57 | 57 | 66 | 72 | 74 | 76 | 67.4 | 89 |
| 10-Sep | 75 | 75 | 78 | 83 | 89 | 91 | 95 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 97 | 97 | 97 | 97 | 98 | 97 | 97 | 97 | 97 | 97 | 93.6 | 99 |
| 11-Sep | 96 | 95 | 94 | 95 | 95 | 95 | 94 | 92 | 90 | 86 | 81 | 80 | 71 | 58 | 53 | 52 | 55 | 64 | 72 | 74 | 76 | 80 | 87 | 87 | 80.1 | 96 |
| 12-Sep | 82 | 82 | 89 | 95 | 96 | 99 | 97 | 93 | 85 | 74 | 64 | 55 | 50 | 48 | 46 | 46 | 47 | 51 | 55 | 64 | 66 | 63 | 66 | 69 | 70.1 | 99 |
| 13-Sep | 71 | 72 | 75 | 77 | 78 | 79 | 79 | 78 | 72 | 61 | 54 | 51 | 51 | 49 | 47 | 46 | 48 | 55 | 62 | 74 | 82 | 89 | 94 | 97 | 68.4 | 97 |
| 14-Sep | 98 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 92 | 87 | 83 | 82 | 84 | 85 | 86 | 92 | 86 | 89 | 90 | 78 | 77 | 78 | 81 | 90.2 | 100 |
| 15-Sep | 81 | 81 | 84 | 91 | 93 | 95 | 96 | 88 | 84 | 75 | 78 | 73 | 73 | 75 | 76 | 74 | 76 | 80 | 79 | 77 | 77 | 73 | 71 | 75 | 80.2 | 96 |
| 16-Sep | 74 | 79 | 84 | 90 | 91 | 93 | 91 | 87 | 82 | 83 | 87 | 87 | 82 | 84 | 85 | 82 | 82 | 88 | 88 | 86 | 84 | 89 | 90 | 91 | 85.9 | 93 |
| 17-Sep | 93 | 94 | 97 | 94 | 93 | 85 | 87 | 89 | 87 | 70 | 66 | 62 | 59 | 65 | 61 | 60 | 64 | 69 | 74 | 78 | 83 | 85 | 84 | 88 | 78.7 | 97 |
| 18-Sep | 94 | 97 | 95 | 95 | 97 | 100 | 99 | 99 | 97 | 94 | 88 | 81 | 83 | 89 | 87 | 85 | 84 | 83 | 82 | 84 | 85 | 90 | 92 | 91 | 90.3 | 100 |
| 19-Sep | 91 | 91 | 92 | 92 | 92 | 94 | 94 | 95 | 98 | 99 | 99 | 99 | 94 | 92 | 89 | 84 | 91 | 94 | 94 | 89 | 89 | 93 | 90 | 89 | 92.5 | 99 |
| 20-Sep | 92 | 94 | 98 | 99 | 99 | 99 | 100 | 99 | 96 | 93 | 88 | 78 | 71 | 72 | 71 | 70 | 73 | 79 | 85 | 88 | 88 | 90 | 93 | 97 | 88.0 | 100 |
| 21-Sep | 99 | 98 | 97 | 95 | 95 | 95 | 89 | 87 | 85 | 83 | 79 | 75 | 71 | 69 | 74 | 70 | 70 | 76 | 82 | 87 | 92 | 92 | 87 | 82 | 84.6 | 99 |
| 22-Sep | 78 | 81 | 79 | 80 | 83 | 83 | 81 | 78 | 79 | 71 | 59 | 53 | 49 | 42 | 40 | 37 | 41 | 45 | 47 | 51 | 54 | 57 | 60 | 62 | 62.0 | 83 |
| 23-Sep | 66 | 66 | 67 | 69 | 72 | 74 | 74 | 71 | 65 | 63 | 60 | 59 | 59 | 60 | 61 | 55 | 53 | 55 | 63 | 70 | 74 | 75 | 74 | 74 | 65.7 | 75 |
| 24-Sep | 76 | 82 | 86 | 89 | 90 | 93 | 94 | 92 | 84 | 70 | 65 | 66 | 64 | 65 | 60 | 58 | 56 | 63 | 76 | 75 | 82 | 84 | 82 | 81 | 76.4 | 94 |
| 25-Sep | 81 | 80 | 82 | 85 | 85 | 87 | 88 | 85 | 75 | 66 | 58 | 50 | 39 | 32 | 30 | 30 | 31 | 34 | 39 | 40 | 42 | 49 | 65 | 84 | 59.8 | 88 |
| 26-Sep | 82 | 87 | 86 | 88 | 87 | 83 | 84 | 81 | 77 | 70 | 62 | 54 | 56 | 52 | 47 | 47 | 46 | 51 | 61 | 58 | 57 | 56 | 57 | 58 | 66.1 | 88 |
| 27-Sep | 59 | 64 | 72 | 84 | 82 | 91 | 93 | 96 | 97 | 89 | 80 | 71 | 62 | 51 | 44 | 38 | 34 | 39 | 39 | 46 | 52 | 55 | 63 | 71 | 65.4 | 97 |
| 28-Sep | 70 | 75 | 75 | 75 | 79 | 78 | 80 | 77 | 66 | 60 | 57 | 50 | 48 | 46 | 42 | 39 | 39 | 45 | 53 | 55 | 61 | 61 | 63 | 64 | 60.8 | 80 |
| 29-Sep | 61 | 65 | 68 | 71 | 70 | 75 | 76 | 73 | 69 | 63 | 54 | 59 | 44 | 33 | 31 | 28 | 28 | 30 | 37 | 43 | 44 | 44 | 50 | 54 | 53.0 | 76 |
| 30-Sep | 57 | 55 | 53 | 53 | 60 | 72 | 79 | 80 | 80 | 80 | 73 | 55 | 44 | 42 | 45 | 47 | 49 | 52 | 63 | 66 | 67 | 70 | 73 | 74 | 62.0 | 80 |
| 81.4 83.2 84.9 87.2 88.4 89.5 89.4 87.7 84.6 78.9 74.4 69.9 65.7 63.0 61.9 61.5 62.5 65.9 70.5 73.3 75.0 76.9 78.5 80.3 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 100 100 100 100 100 100 100 100 100 100 100 100 99 99 97 98 98 99 99 100 100 100 100 100 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Chipewyan - September 2016**

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 21 | 2.92 | 2.92 |
| 40 - 60 | 123 | 17.08 | 20.00 |
| 60 - 80 | 223 | 30.97 | 50.97 |
| 80 - 100 | 330 | 45.83 | 96.81 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

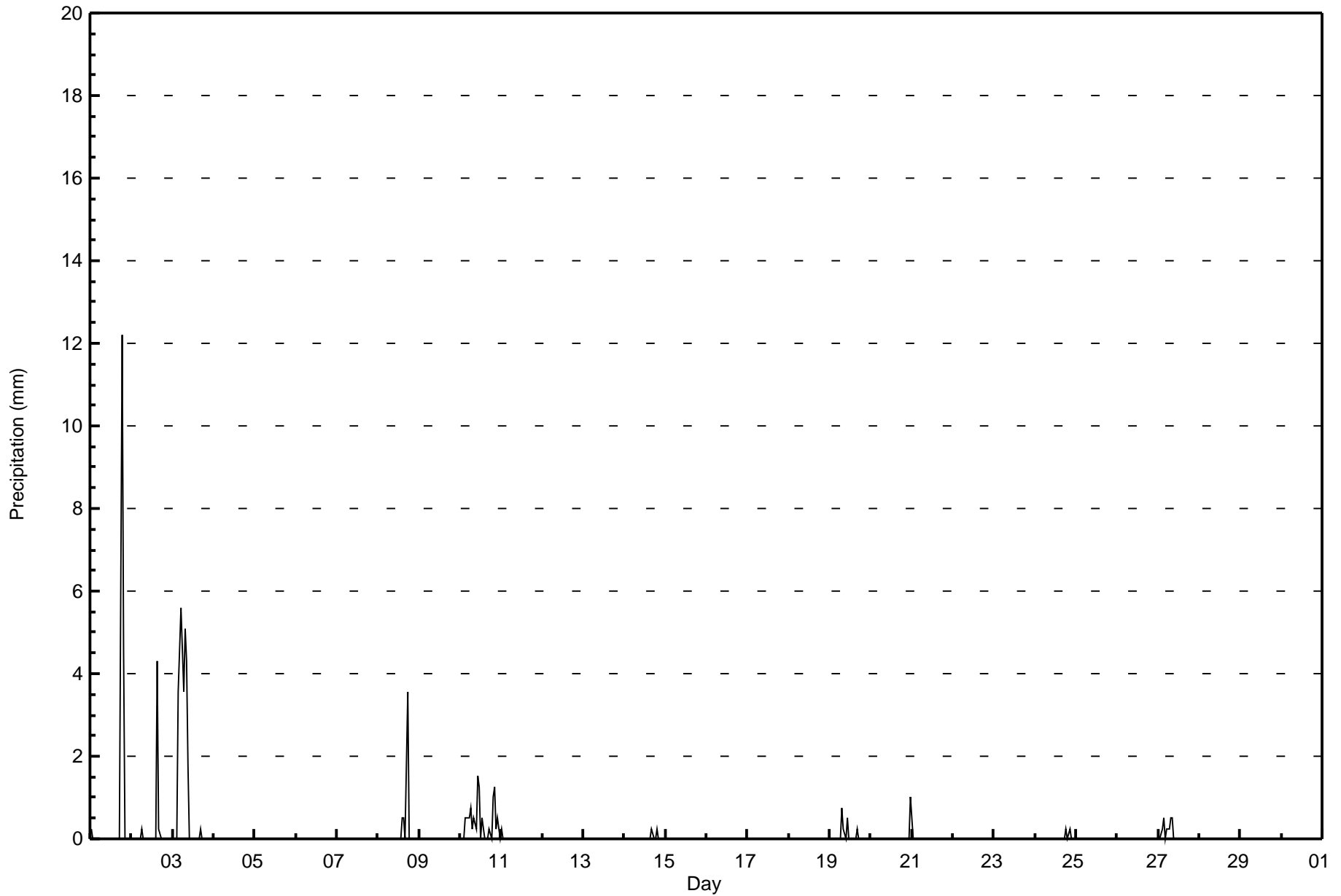
Fort Chipewyan - September 2016

| Maximum Value: 12.2 mm on Sep 1 19:00 Maximum Daily Total: 28.7 mm on Sep 3 | | | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|---------------------------------|---------------|---------------|-----|
| Minimum Value: 0.0 mm on Sep 1 02:00 Minimum Daily Total: 0.0 mm on Sep 4 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Data: 720 | | | |
| Maximum Diurnal Total: 12.4 mm at hour 19 Minimum Diurnal Total: 0.0 mm at hour 2 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | | | |
| Monthly Total: 71.88 mm Percentiles: P₁ = 0.0 P₁₀ = 0.0 Q₁ = 0.0 Median = 0.0 Q₃ = 0.0 P₉₀ = 0.0 P₉₉ = 4.3 | | | | | | | | | | | | | | | | | | | | | | | | 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 | 0.3 | 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 | 12.2 | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 17.0 | 12.2 | |
| 2-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.8 | 4.3 | |
| 3-Sep | 0.0 | 0.0 | 0.0 | 3.6 | 4.6 | 5.6 | 3.6 | 5.1 | 4.3 | 1.8 | 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 | 28.7 | 5.6 | |
| 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 | 0.5 | 0.5 | 0.0 | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.6 | 3.6 | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10-Sep | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | 0.5 | 0.8 | 0.3 | 0.5 | 0.3 | 1.5 | 1.3 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 1.0 | 1.3 | 0.3 | 0.5 | 0.0 | 9.9 | 1.5 | |
| 11-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 | 0.3 | 0.3 | |
| 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 | 0.0 | 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 | 0.3 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.3 | |
| 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 | 0.8 | 0.3 | 0.0 | 0.5 | 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 | 1.8 | 0.8 | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.0 | 1.0 | |
| 21-Sep | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | |
| 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 |
| 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 |
| 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 | 0.3 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.5 | 0.3 | |
| 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 |
| 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 | 0.3 | 0.5 | 0.0 | 0.3 | 0.3 | 0.5 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.3 | 0.5 | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1.0 0.0 0.3 4.6 5.1 6.4 4.8 6.6 5.6 2.0 2.0 1.3 0.0 0.5 0.5 4.8 1.0 3.8 12.4 5.8 1.5 0.3 0.5 1.0 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| 0.5 0.0 0.3 3.6 4.6 5.6 3.6 5.1 4.3 1.8 1.5 1.3 0.0 0.5 0.5 4.3 0.3 3.6 12.2 4.6 1.3 0.3 0.5 1.0 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort Chipewyan - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort Chipewyan - September 2016

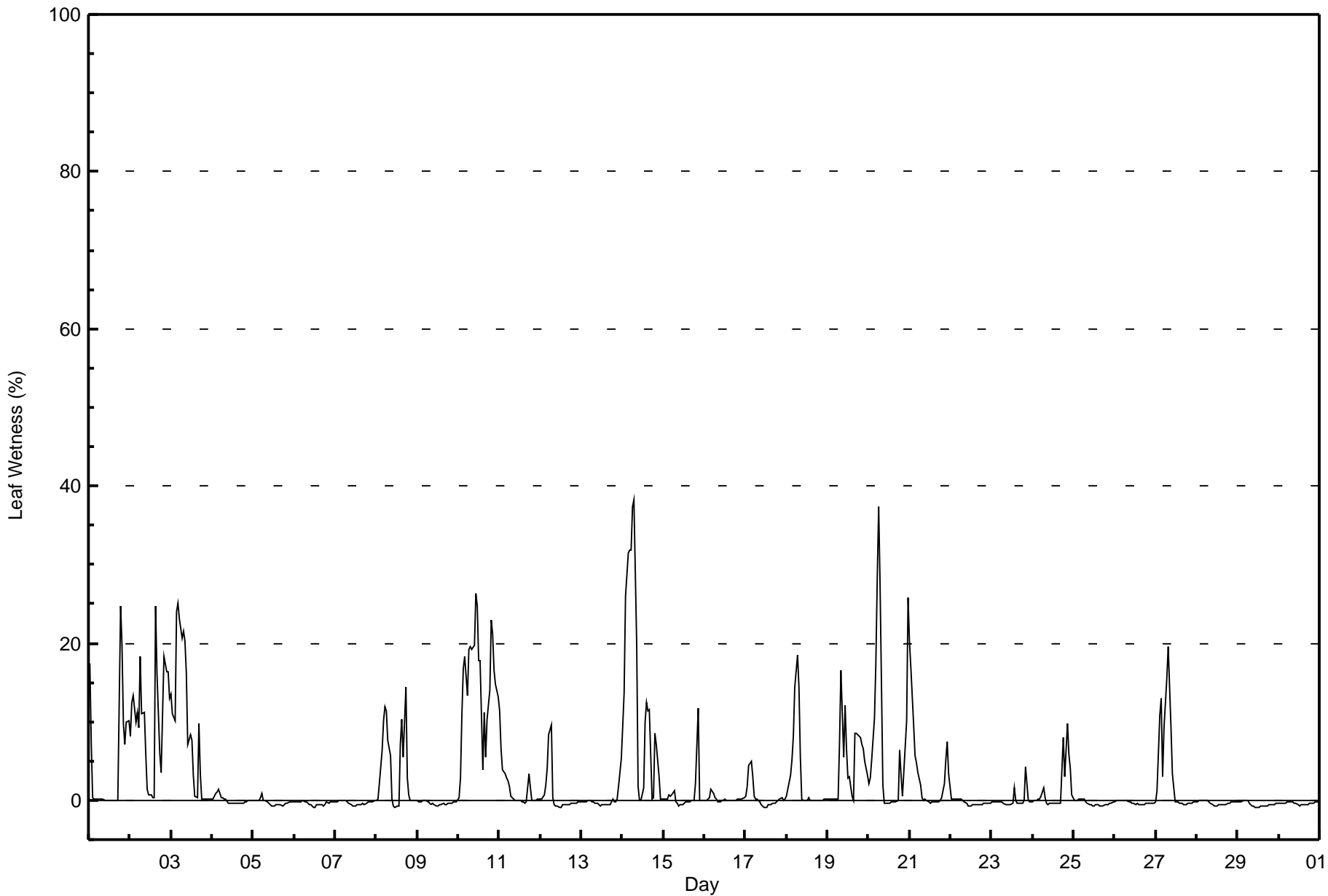
| Concentration Ranges (mm) | Number of Hours | % | Cumulative % |
|----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 689 | 95.69 | 95.69 |
| 0.4 - 0.5 | 13 | 1.81 | 97.50 |
| 0.6 - 0.7 | 0 | 0.00 | 97.50 |
| 0.8 - 1.4 | 6 | 0.83 | 98.33 |
| 1.5 - 10 | 11 | 1.53 | 99.86 |
| > 10 | 1 | 0.14 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 38 % on Sep 14 08:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 15.0 % on Sep 10 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | |
|------------------------------------------|-------------------------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|--------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|-----|----|-----|----|---------------|---------------|-----|--|-----|--|-----|--|-----|---------------------------------|-----|--|-----|--|-----|--|-----|--|-----|--|-----|--|-----|--|-----------------|--|
| Minimum Value: -1 % on Sep 29 11:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: -0.5 % on Sep 29 | | | | | | | | | | | | | | | | | Hours of Data: 720 | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 6.5 % at hour 7 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.5 % at hour 15 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | |
| Monthly Average: 2.7 % | | | | | | | | | | | | | | | | | Percentiles: P ₁ = -1 P ₁₀ = -1 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 11 P ₉₉ = 26 | | | | | | | | | | | | | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 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 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 20 | 10 | 7 | 10 | 10 | 4.5 | 25 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 8 | 12 | 13 | 10 | 11 | 9 | 18 | 11 | 11 | 6 | 1 | 1 | 1 | 0 | 0 | 25 | 16 | 6 | 3 | 11 | 18 | 16 | 16 | 13 | 10.0 | 25 | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 14 | 11 | 10 | 24 | 25 | 23 | 21 | 22 | 20 | 16 | 7 | 8 | 8 | 3 | 0 | 0 | 10 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 9.4 | 25 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | -0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | -0.4 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 0 | 0 | 2 | 6 | 10 | 12 | 11 | 8 | 6 | 0 | -1 | -1 | -1 | -1 | 7 | 10 | 5 | 14 | 3 | 1 | 0 | 0 | 0 | 0 | 3.9 | 14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | 0 | 0 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | -0.3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0 | 3 | 11 | 17 | 18 | 13 | 19 | 19 | 19 | 20 | 26 | 25 | 18 | 18 | 4 | 11 | 5 | 10 | 14 | 23 | 21 | 17 | 15 | 13 | 15.0 | 26 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 11 | 7 | 4 | 3 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 1.6 | 11 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0 | 0 | 1 | 2 | 4 | 8 | 10 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 2 | 5 | 0.0 | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 9 | 14 | 26 | 32 | 32 | 32 | 37 | 38 | 20 | 2 | 0 | 0 | 2 | 10 | 12 | 11 | 12 | 0 | 0 | 9 | 7 | 3 | 0 | 0 | 12.8 | 38 | | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | -1 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | 0 | 0 | 0 | 0.6 | 12 | | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 1 | 2 | 4 | 5 | 3 | 1 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0 | 1 | 3 | 5 | 8 | 14 | 18 | 14 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.0 | 18 | | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 17 | 5 | 12 | 7 | 3 | 3 | 1 | 0 | 9 | 9 | 8 | 8 | 7 | 7 | 5 | 3 | 4.6 | 17 | | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 2 | 3 | 5 | 11 | 18 | 28 | 37 | 27 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 1 | 7 | 10 | 26 | 7.7 | 37 | | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 20 | 17 | 10 | 6 | 5 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 8 | 3 | 3.3 | 20 | | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | -0.3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0.0 | 4 | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 8 | 3 | 10 | 6 | 4 | 1 | 1.4 | 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-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 | -0.3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 26-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 | -0.3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 0 | 1 | 11 | 13 | 3 | 9 | 15 | 19 | 14 | 9 | 3 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.9 | 19 | | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | 0 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.3 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | -0.5 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.4 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2.7 | | 2.6 | | 3.4 | | 4.5 | | 4.8 | | 5.3 | | 6.5 | | 5.5 | | 3.6 | | 1.7 | | 1.3 | | 0.9 | | 0.6 | | 0.9 | | 0.5 | | 1.6 | | 1.6 | | 1.4 | | 2.1 | | 2.5 | | 2.9 | | 2.1 | | 2.2 | | 2.4 | | Diurnal Average | |
| | 20 | | 17 | | 26 | | 32 | | 32 | | 32 | | 37 | | 38 | | 20 | | 20 | | 26 | | 25 | | 18 | | 18 | | 12 | | 25 | | 16 | | 14 | | 25 | | 23 | | 21 | | 17 | | 16 | | 26 | | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Fort Chipewyan - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 109 | 33.75 | 33.75 |
| 0.4 - 0.5 | 12 | 3.72 | 37.46 |
| 0.6 - 0.7 | 9 | 2.79 | 40.25 |
| 0.8 - 1.4 | 10 | 3.10 | 43.34 |
| 1.5 - 10 | 96 | 29.72 | 73.07 |
| > 10 | 86 | 26.63 | 99.69 |

Total Number of Valid Hours: 323

Total Number of Hours: 720



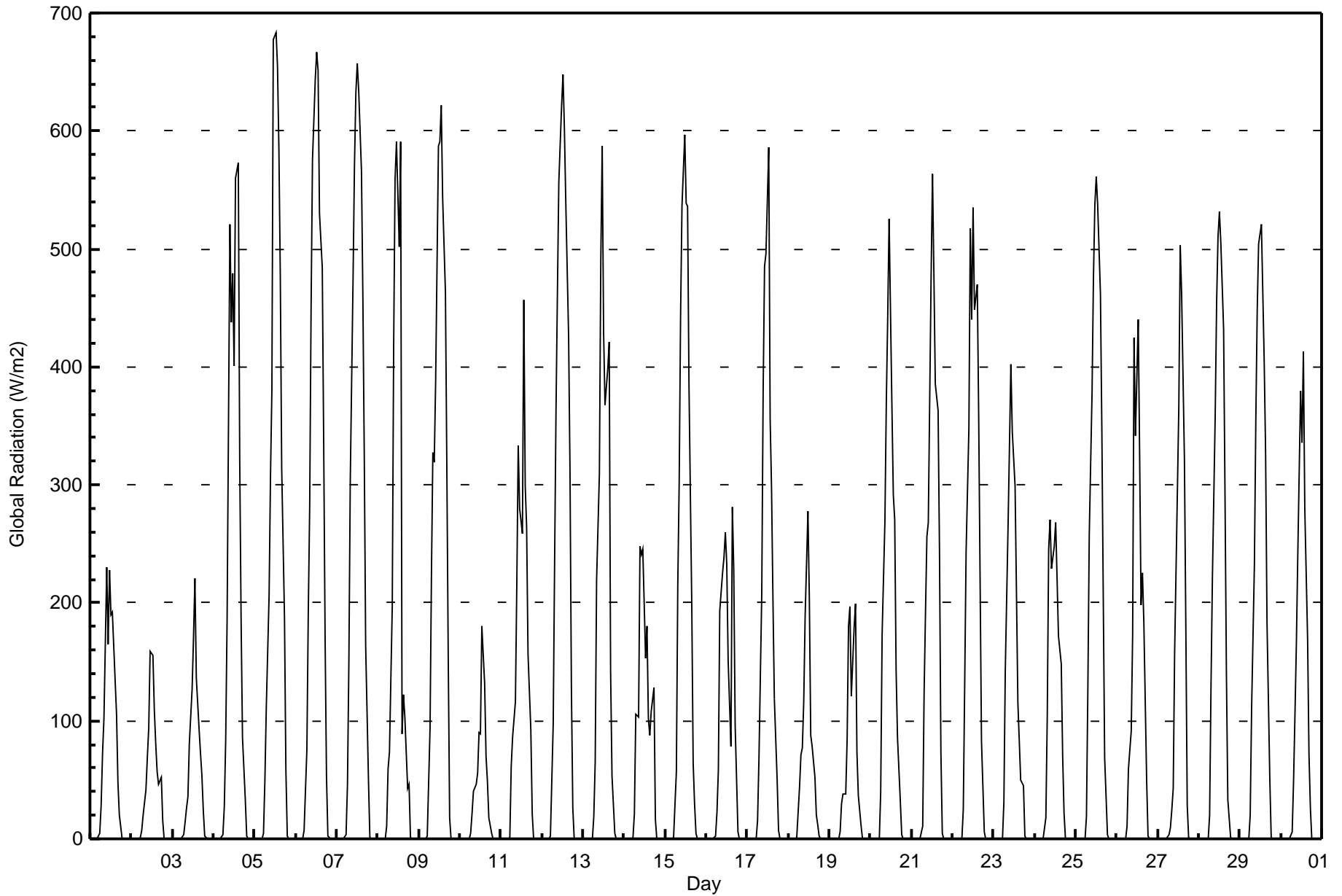
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Fort Chipewyan - September 2016

| Maximum Value: 684 W/m2 on Sep 5 13:00 | | Maximum Daily Average: 213.4 W/m2 on Sep 6 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------|-----|-----|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|-----|-----|-----|---------------|-----------------|
| Minimum Value: 0 W/m2 on Sep 1 01:00 | | Minimum Daily Average: 33.5 W/m2 on Sep 10 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 412.3 W/m2 at hour 12 | | Minimum Diurnal Average: 0.0 W/m2 at hour 5 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 123.2 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 15 Q ₃ = 202 P ₉₀ = 440 P ₉₉ = 645 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 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 | 4 | 28 | 72 | 102 | 230 | 165 | 228 | 190 | 193 | 135 | 105 | 47 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 63.3 | 230 |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 20 | 41 | 69 | 94 | 159 | 155 | 109 | 80 | 57 | 46 | 52 | 15 | 0 | 0 | 0 | 0 | 0 | 37.8 | 159 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 26 | 35 | 81 | 127 | 171 | 221 | 137 | 92 | 73 | 53 | 24 | 2 | 0 | 0 | 0 | 0 | 44.2 | 221 |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 27 | 84 | 187 | 520 | 438 | 479 | 400 | 561 | 573 | 322 | 186 | 86 | 34 | 3 | 0 | 0 | 0 | 0 | 162.6 | 573 |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 5 | 50 | 112 | 207 | 307 | 380 | 677 | 684 | 655 | 585 | 478 | 315 | 187 | 59 | 2 | 0 | 0 | 0 | 0 | 196.0 | 684 |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 7 | 76 | 192 | 281 | 450 | 575 | 644 | 667 | 652 | 531 | 484 | 337 | 172 | 53 | 2 | 0 | 0 | 0 | 0 | 213.4 | 667 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 47 | 150 | 304 | 475 | 570 | 633 | 658 | 635 | 566 | 459 | 325 | 164 | 49 | 1 | 0 | 0 | 0 | 0 | 210.0 | 658 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 11 | 60 | 74 | 197 | 418 | 558 | 590 | 501 | 591 | 88 | 122 | 103 | 43 | 46 | 1 | 0 | 0 | 0 | 0 | 141.9 | 591 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 94 | 225 | 327 | 319 | 388 | 588 | 591 | 621 | 543 | 463 | 314 | 153 | 18 | 1 | 0 | 0 | 0 | 0 | 193.6 | 621 |
| 10-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 22 | 41 | 47 | 56 | 91 | 89 | 181 | 132 | 70 | 49 | 18 | 5 | 0 | 0 | 0 | 0 | 0 | 33.5 | 181 |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 62 | 87 | 116 | 217 | 333 | 280 | 259 | 457 | 298 | 265 | 156 | 93 | 22 | 1 | 0 | 0 | 0 | 0 | 110.2 | 457 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 98 | 235 | 363 | 463 | 556 | 622 | 648 | 602 | 538 | 426 | 310 | 126 | 26 | 0 | 0 | 0 | 0 | 0 | 209.0 | 648 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 66 | 220 | 309 | 490 | 587 | 429 | 368 | 399 | 422 | 143 | 54 | 5 | 0 | 0 | 0 | 0 | 0 | 146.3 | 587 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 22 | 106 | 103 | 248 | 241 | 246 | 153 | 180 | 102 | 88 | 108 | 128 | 17 | 0 | 0 | 0 | 0 | 0 | 72.6 | 248 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 57 | 215 | 301 | 443 | 537 | 597 | 539 | 536 | 385 | 198 | 64 | 30 | 4 | 0 | 0 | 0 | 0 | 0 | 162.8 | 597 |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 23 | 59 | 194 | 225 | 238 | 260 | 232 | 150 | 78 | 282 | 228 | 96 | 6 | 0 | 0 | 0 | 0 | 0 | 86.3 | 282 |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 67 | 207 | 380 | 485 | 496 | 586 | 356 | 297 | 202 | 119 | 50 | 7 | 0 | 0 | 0 | 0 | 0 | 136.1 | 586 |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 44 | 71 | 78 | 117 | 189 | 277 | 204 | 87 | 78 | 53 | 21 | 12 | 2 | 0 | 0 | 0 | 0 | 0 | 51.4 | 277 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 30 | 38 | 38 | 84 | 180 | 197 | 121 | 179 | 200 | 73 | 37 | 10 | 0 | 0 | 0 | 0 | 0 | 49.8 | 200 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 173 | 270 | 370 | 442 | 526 | 367 | 291 | 271 | 142 | 86 | 33 | 3 | 0 | 0 | 0 | 0 | 0 | 125.6 | 526 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 123 | 193 | 256 | 268 | 476 | 564 | 478 | 386 | 363 | 243 | 73 | 5 | 0 | 0 | 0 | 0 | 0 | 143.3 | 564 |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 130 | 244 | 348 | 518 | 440 | 535 | 448 | 470 | 358 | 220 | 83 | 6 | 0 | 0 | 0 | 0 | 0 | 159.4 | 535 |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 142 | 266 | 333 | 403 | 346 | 299 | 208 | 116 | 83 | 50 | 45 | 2 | 0 | 0 | 0 | 0 | 0 | 96.9 | 403 |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 104 | 246 | 271 | 229 | 248 | 268 | 221 | 171 | 148 | 70 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 84.0 | 271 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 127 | 257 | 379 | 476 | 538 | 561 | 537 | 462 | 346 | 207 | 69 | 3 | 0 | 0 | 0 | 0 | 0 | 165.9 | 561 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 59 | 91 | 173 | 425 | 342 | 440 | 325 | 198 | 225 | 184 | 49 | 2 | 0 | 0 | 0 | 0 | 0 | 105.2 | 440 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | 25 | 43 | 158 | 296 | 367 | 504 | 461 | 321 | 180 | 29 | 1 | 0 | 0 | 0 | 0 | 0 | 99.9 | 504 |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 131 | 222 | 359 | 454 | 511 | 531 | 505 | 432 | 291 | 140 | 34 | 1 | 0 | 0 | 0 | 0 | 0 | 151.3 | 531 |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 111 | 233 | 353 | 448 | 505 | 521 | 463 | 404 | 328 | 184 | 51 | 1 | 0 | 0 | 0 | 0 | 0 | 150.9 | 521 |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 50 | 107 | 166 | 241 | 380 | 336 | 413 | 280 | 170 | 71 | 26 | 0 | 0 | 0 | 0 | 0 | 0 | 93.6 | 413 |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.7 | 31.6 | 101.9 | 182.8 | 278.7 | 350.7 | 412.3 | 404.7 | 388.9 | 312.5 | 252.2 | 155.1 | 69.6 | 14.3 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | Diurnal Average |
| | | 0 | 0 | 0 | 0 | 0 | 11 | 98 | 235 | 363 | 520 | 575 | 677 | 684 | 655 | 585 | 484 | 337 | 187 | 59 | 3 | 0 | 0 | 0 | 0 | Diurnal Maximum |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m²
Fort Chipewyan - September 2016

| Concentration Ranges (W/m²) | Number of Hours | % | Cumulative % |
|-----------------------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 372 | 51.67 | 51.67 |
| 21 - 100 | 97 | 13.47 | 65.14 |
| 101 - 300 | 125 | 17.36 | 82.50 |
| 301 - 600 | 113 | 15.69 | 98.19 |
| 601 - 900 | 13 | 1.81 | 100.00 |
| > 900 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| | | |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 39 km/h on Sep 10 06:00 | Maximum Daily Speed Average: 25.9 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 5 11:00 | Minimum Daily Speed Average: 2.2 km/h on Sep 14 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 4.4 km/h at hour 10 | Minimum Diurnal Speed Average: 1.0 km/h at hour 20 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 2.3 km/h 223.0 deg | Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 8 Median = 12 Q ₃ = 18 P ₉₀ = 23 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 | E28 | E26 | E21 | E18 | ENE14 | ENE14 | ENE14 | E12 | E9 | E7 | E13 | E12 | E15 | M | ENE18 | NE16 | NE14 | NNE12 | N8 | NE25 | SE20 | SSE6 | ENE4 | E6 | ENE12.7 | E28 |
| 2-Sep | ENE3 | ENE2 | E7 | E4 | ENE4 | WNW1 | SW5 | W6 | WNW7 | WNW7 | W8WNW11 | WNW8 | NW6 | NNW3 | W1 | W9 | NW9 | WNW6 | NW6 | W6 | NW7 | NW7 | NW7 | WNW3.9 | WNW11 | |
| 3-Sep | NW9 | NNW9 | NNW8 | N8 | N11 | N15 | NNW16 | N19 | N18 | NNW18 | NNW23 | NNW23 | NNW23 | NNW24 | NNW23 | NNW21 | NNW20 | NW19 | NW20 | NW21 | NW18 | NW17 | NW18 | NW15 | NNW16.9 | NNW24 |
| 4-Sep | NW11 | W7 | W9 | W8WNW10 | WNW12 | SW2 | W12WSW17 | W19 | W17 | W20 | W19 | W21 | W18WSW18 | WSW16 | WSW12 | WSW10 | WSW8 | WSW10 | WSW10 | W11 | W10 | | | | W12.9 | W21 |
| 5-Sep | WSW9 | WSW10 | WSW9 | W10 | WSW6 | SW3 | SSW6 | S4 | SSW6 | SW6 | S1 | SE8 | ESE11 | SSE14 | S17 | S18 | S21 | S18 | S15 | S12 | S13 | SSE7 | SE10 | SSW12 | S8.2 | S21 |
| 6-Sep | SSE13 | SSE17 | SSE18 | SSE16 | SSE14 | SSE12 | SSE12 | SSE12 | SE12 | SE14 | SE15 | S12 | SSE8 | SE8 | SSE5 | E10 | SE9 | S10 | SSW11 | S10 | SSE20 | S22 | S19 | S19 | SSE12.3 | S22 |
| 7-Sep | S16 | S15 | S14 | S13 | S10 | S10 | S9 | SSE8 | SSE6 | SE11 | SE13 | ESE17 | SE17 | SE15 | ESE16 | E16 | E17 | E14 | E11 | E13 | E9 | ESE12 | SE12 | ESE6 | SE10.2 | E17 |
| 8-Sep | ESE7 | ESE6 | ESE5 | SSE2 | W6 | WNW8 | NW8 | W1 | WSW5 | WNW8 | W8 | W9 | WNW9 | W10 | NNW7 | N7 | S1 | WNW6 | NW13 | NW12 | NW17 | NW15 | NW18 | NW18 | NW6.3 | NW18 |
| 9-Sep | NW18 | NW17 | NW13 | WNW11 | WNW13 | NW15 | NW13 | NW13 | NW15 | NW12 | NW13 | WNW12 | WNW9 | W6 | SW15 | SW12 | SSW11 | SW6 | E5 | ESE19 | ESE24 | ESE24 | ESE25 | ESE25 | WNW2.7 | ESE25 |
| 10-Sep | SE26 | SE23 | SE23 | SE27 | ESE33 | ESE39 | SE33 | SE29 | SE26 | SE22 | ESE18 | ESE11 | E5 | NE5 | NE10 | NE9 | NNE12 | NNE12 | NNE15 | NE23 | NE21 | NNE19 | NNE19 | N17 | E14.0 | ESE39 |
| 11-Sep | N15 | N16 | N15 | N13 | N13 | NNW13 | NNW13 | NNW14 | NNW15 | N14 | N14 | NNW15 | NNW13 | NNW13 | NNW13 | NNW14 | NW12 | NW10 | NW7 | NW7 | WNW7 | WNW7 | WNW9 | NW9 | NNW11.5 | N16 |
| 12-Sep | NW10 | NW10 | WNW7 | W9 | WNW9 | WNW9 | WNW9 | W8 | WSW9 | SW13 | SSW14 | SW15 | SW15 | SW14 | SSW15 | S19 | S23 | S21 | SSE21 | S20 | S24 | S28 | SSW24 | SSW21 | SSW11.7 | S28 |
| 13-Sep | SSW21 | SSW18 | SSW19 | SSW21 | SSW17 | SSW17 | SSW16 | SSW16 | SW15 | WSW19 | W28 | W28 | W23 | W23 | W22 | W24 | W17 | WSW12 | WNW18 | NW10 | NW9 | NNW8 | NNW7 | NNW6 | WSW13.3 | W28 |
| 14-Sep | WNW6 | WNW6 | WNW9 | WNW8 | WNW7 | WNW7 | N3 | ESE6 | SSE13 | SSE15 | SSE18 | SSE18 | S15 | E2 | E5 | E5 | SE12 | SSW7 | SW8 | WNW8 | NW14 | NW15 | NW13 | NW13 | SW2.2 | SSE18 |
| 15-Sep | NW15 | NW15 | WNW12 | W10 | WNW11 | WNW9 | WNW9 | NW7 | NW5 | NNW4 | ESE12 | E10 | E15 | E17 | E24 | E23 | E24 | E28 | E26 | E25 | E22 | ESE22 | SSE14 | SSW10 | E6.8 | E28 |
| 16-Sep | SSW7 | SW9 | SW5 | SW5 | SW7 | SW5 | SW5 | SSW5 | SSE2 | E5 | E11 | E12 | E11 | E10 | E7 | E8 | E9 | E9 | E10 | E7 | E8 | E10 | ESE11 | E8 | ESE4.5 | E12 |
| 17-Sep | E7 | E7 | SE5 | ESE3 | E4 | S6 | S5 | SW9 | SW7 | WSW14 | SW12 | SW12 | SSW10 | SSE3 | WSW9 | WSW8 | WSW6 | WSW5 | WSW5 | WSW5 | W5 | W7 | WNW10 | WNW7 | SW4.6 | WSW14 |
| 18-Sep | WNW9 | NW11 | NNW11 | NNW10 | NW8 | WNW10 | WNW12 | WNW12 | WNW10 | WNW10 | NW14 | NW15 | NW16 | NW15 | NW14 | NW14 | NW14 | NW14 | NW11 | NW10 | NW10 | NW15 | NW16 | NW17 | NW11.9 | NW17 |
| 19-Sep | NW16 | NW13 | NW13 | NW14 | NW11 | WNW9 | WNW10 | WNW12 | NW13 | NW12 | NW11 | NW12 | NNW11 | NNW9 | NNW7 | NNW7 | NW9 | NW8 | NW8 | NNW8 | NW8 | NW7 | NNW8 | NNW8 | NW9.9 | NW16 |
| 20-Sep | NNW10 | NNW11 | NNW11 | NNW11 | NNW9 | NNW8 | NW8 | NW6 | NW6 | WNW9 | WNW11 | WNW12 | WNW11 | WSW9 | WSW9 | WNW9 | NNW6 | N5 | N5 | N6 | N5 | WNW1 | NNE3 | WNW3 | NW6.6 | WNW12 |
| 21-Sep | WSW3 | S4 | SSE7 | SE8 | SE8 | SE10 | ESE8 | SE12 | SSE11 | SE10 | ESE12 | ESE11 | E12 | E14 | E16 | E18 | E17 | E10 | ENE8 | ENE9 | ENE9 | E8 | ESE8 | E8 | ESE8.8 | E18 |
| 22-Sep | ESE9 | SE7 | S7 | S8 | S8 | SSE7 | SE7 | SE9 | SE9 | SSE9 | SSE14 | S18 | S23 | S25 | S24 | S24 | S25 | S20 | SSE21 | S23 | S20 | S20 | S18 | S21 | SSE15.1 | S25 |
| 23-Sep | S21 | S23 | S24 | S24 | S28 | S28 | S26 | S23 | S28 | S35 | S35 | S34 | SSE29 | SSE28 | SSE25 | SSE26 | SSE25 | SSE26 | SSE30 | SSE28 | SSE21 | SE20 | SSE20 | SSE21 | SSE25.9 | S35 |
| 24-Sep | S24 | S22 | SSE18 | S18 | S18 | S19 | SSW16 | SSW12 | SSW12 | SW14 | WSW19 | WSW18 | WSW21 | WSW19 | WSW18 | W18 | W17 | W17 | W11 | NW6 | WNW5 | WSW7 | W11 | W12 | SW11.6 | SSE24 |
| 25-Sep | WNW14 | W15 | W14 | W13 | W14 | W14 | W14 | W13 | W17 | WNW15 | W17 | WNW18 | WNW19 | NW19 | NW19 | NW17 | NW13 | NW8 | NNW6 | NNW7 | N8 | NNE4 | ENE11 | E21 | WNW10.5 | E21 |
| 26-Sep | E24 | ESE21 | SE20 | ESE21 | ESE21 | ESE22 | ESE20 | ESE21 | ESE22 | ESE20 | ESE23 | SE23 | SE24 | SE24 | SE22 | SSE22 | S26 | SSE19 | SE17 | SE21 | SSE23 | SSE22 | S25 | S27 | SE20.5 | S27 |
| 27-Sep | S22 | SSE13 | SSE11 | ESE6 | E7 | WNW7 | W6 | WSW8 | WSW14 | W26 | W27 | W29 | W26 | W30 | W31 | W31 | W27 | WSW19 | W28 | W26 | WNW30 | WNW26 | W18 | W17 | W16.7 | W31 |
| 28-Sep | W19 | WSW14 | W18 | W16 | W15 | WSW14 | WSW13 | WSW17 | WSW18 | WSW17 | WSW16 | W16 | W18 | W16 | W16 | WNW14 | W10 | WSW4 | SSW4 | ESE2 | ESE5 | SSW6 | S5 | SSW6 | WSW11.2 | W19 |
| 29-Sep | WSW7 | SW5 | WSW5 | W6 | W5 | WSW5 | SW3 | SW6 | WSW5 | WSW6 | S5 | ESE6 | ESE4 | SSE4 | WSW4 | WSW7 | WSW7 | WSW5 | SW5 | SSW2 | ESE2 | ESE2 | NNW5 | NNW9 | WSW3.0 | NNW9 |
| 30-Sep | N12 | N13 | NNE10 | NNE10 | N11 | NNW12 | NNW15 | N14 | NNW13 | NNW12 | NNW11 | N12 | NNE14 | NNE11 | NNE10 | N10 | N9 | N8 | N11 | NNW12 | N13 | N14 | N16 | N16 | N11.8 | N16 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|-------|-------|-------|--------|--------|-------|-------|-----------------|
| SSW2.0 | SSW2.0 | SSW2.5 | SSW2.5 | SSW1.8 | SW2.0 | SW2.3 | SW2.6 | SW3.5 | SW4.4 | SW4.3 | SW4.2 | WSW3.1 | WSW3.9 | WSW2.9 | WSW2.3 | SSW2.4 | SW2.0 | SW1.4 | E1.0 | SSE1.2 | SSW1.9 | SW1.7 | SW1.8 | Diurnal Average |
| E28 | E26 | S24 | SE27 | ESE33 | ESE39 | SE33 | SE29 | S28 | S35 | S35 | S34 | SSE29 | W30 | W31 | W31 | W27 | E28 | SSE30 | SSE28 | WNW30 | S28 | S25 | S27 | Diurnal Maximum |

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



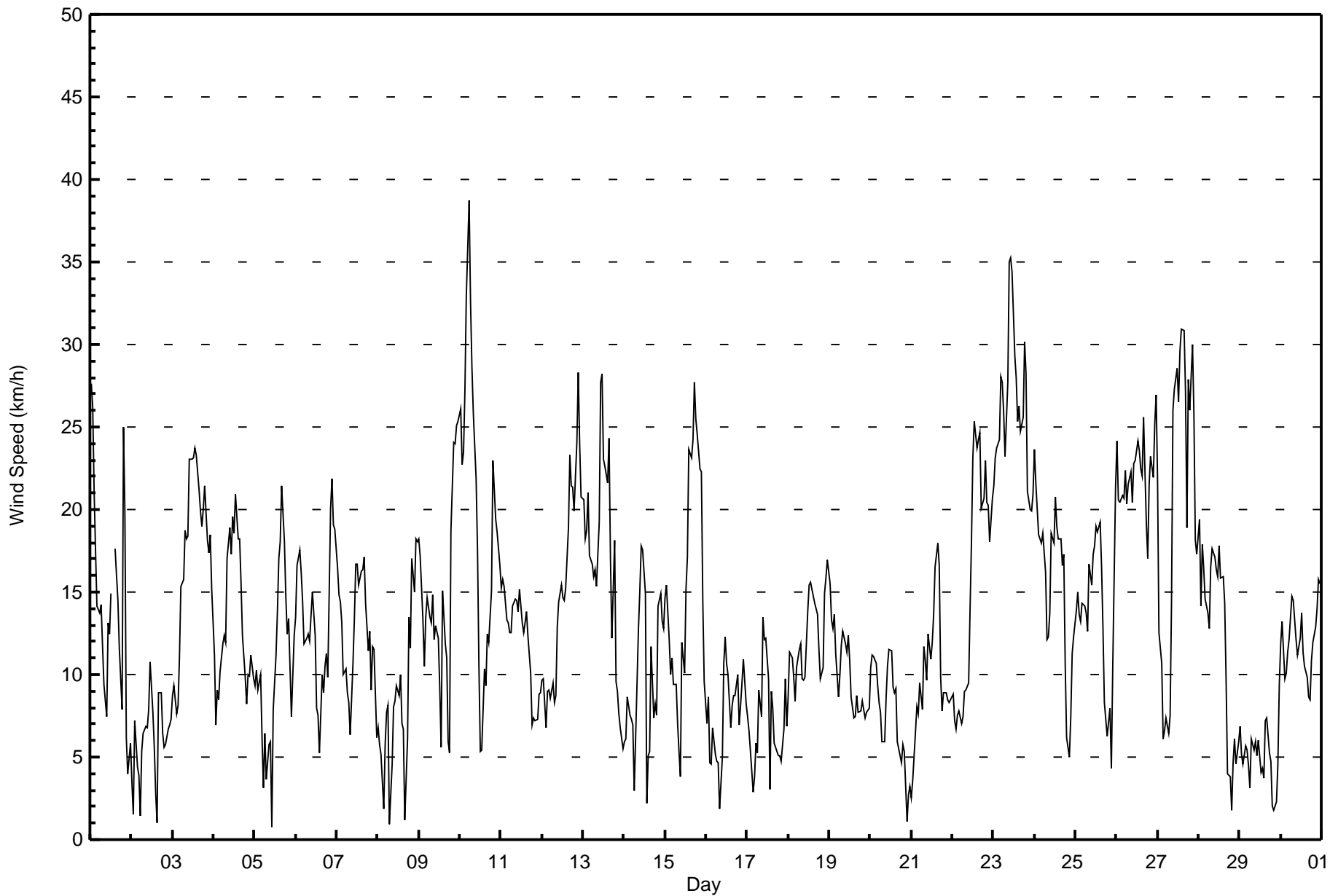
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Chipewyan - September 2016

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

M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Chipewyan - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 74 | 10.29 | 10.29 |
| 6 - 11 | 258 | 35.88 | 46.18 |
| 12 - 19 | 254 | 35.33 | 81.50 |
| 20 - 28 | 119 | 16.55 | 98.05 |
| 29 - 38 | 13 | 1.81 | 99.86 |
| > 38 | 1 | 0.14 | 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 Chipewyan - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 4 | 2 | 1 | 4 | 8 | 7 | 1 | 5 | 7 | 3 | 10 | 10 | 4 | 4 | 1 | 3 | 74 |
| 6 - 11 | 11 | 4 | 2 | 5 | 25 | 13 | 13 | 11 | 8 | 10 | 9 | 19 | 24 | 44 | 34 | 26 | 258 |
| 12 - 19 | 18 | 7 | 2 | 4 | 17 | 7 | 10 | 20 | 19 | 11 | 10 | 22 | 28 | 14 | 48 | 17 | 254 |
| 20 - 28 | 0 | 0 | 3 | 0 | 12 | 15 | 13 | 16 | 31 | 4 | 0 | 2 | 13 | 1 | 2 | 7 | 119 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 13 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Totals | 33 | 13 | 8 | 13 | 62 | 44 | 39 | 54 | 68 | 28 | 29 | 53 | 73 | 64 | 85 | 53 | 719 |

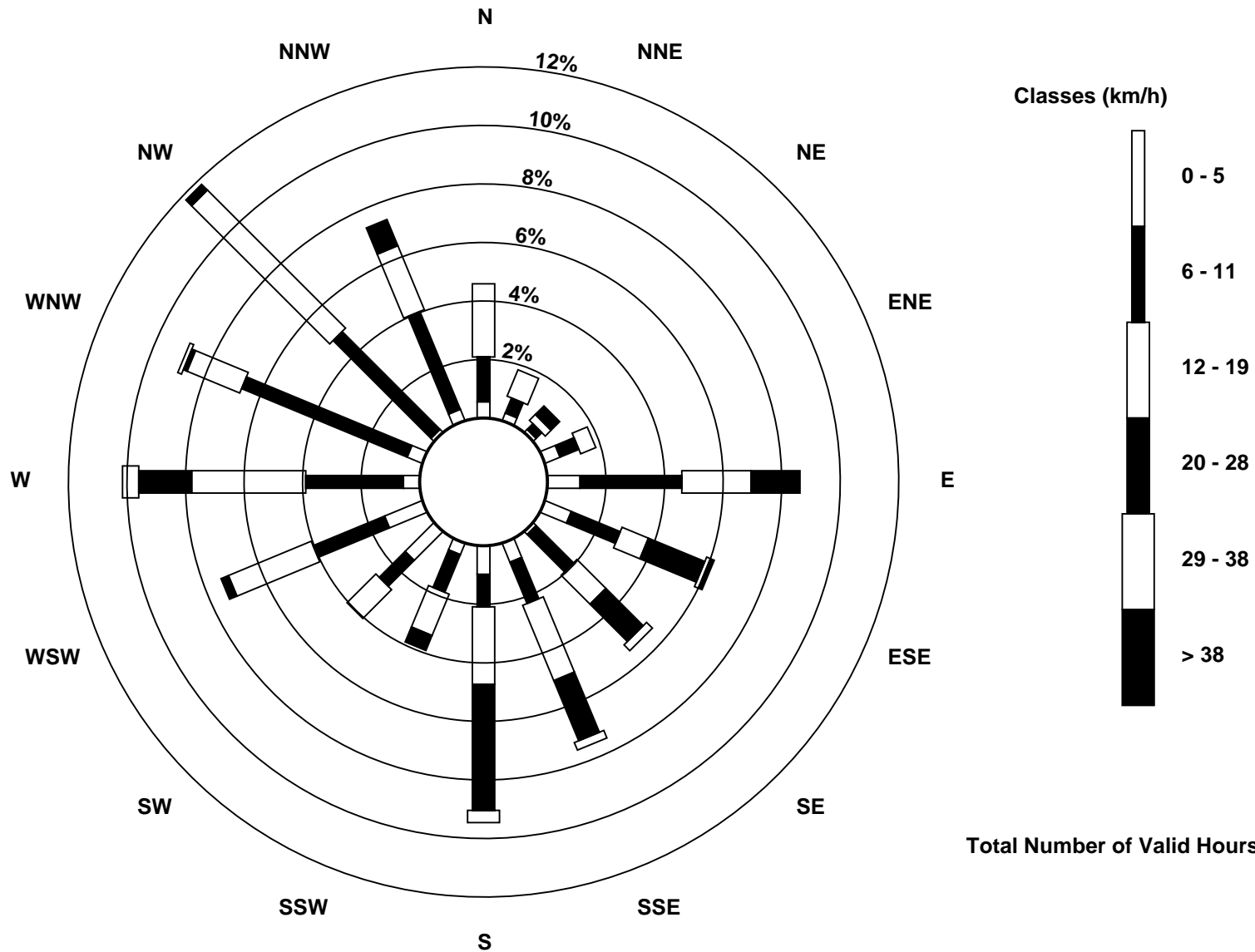
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Fort Chipewyan (AMS 8)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - September 2016

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 113 deg on Sep 10 06:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 166.0 deg on Sep 23 | Hours of Data: 719 |
| Direction of Minimum Speed: 189 deg on Sep 5 11:00 | Hours of Missing Data: 1 |
| Direction of Minimum Daily Speed Average: 2.2 deg on Sep 14 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 280.4 deg | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 80 | 85 | 87 | 84 | 74 | 71 | 77 | 84 | 87 | 89 | 95 | 99 | 92 | M | 57 | 41 | 37 | 26 | 352 | 44 | 125 | 163 | 60 | 98 | 75.5 |
| 2-Sep | 75 | 61 | 88 | 80 | 71 | 287 | 232 | 269 | 283 | 290 | 270 | 288 | 300 | 312 | 339 | 263 | 271 | 317 | 301 | 306 | 280 | 304 | 323 | 309 | 299.4 |
| 3-Sep | 312 | 329 | 347 | 0 | 2 | 354 | 348 | 349 | 349 | 340 | 340 | 339 | 337 | 337 | 336 | 333 | 327 | 322 | 323 | 324 | 313 | 309 | 310 | 310 | 333.0 |
| 4-Sep | 304 | 276 | 275 | 279 | 291 | 285 | 270 | 269 | 249 | 260 | 261 | 273 | 271 | 266 | 276 | 257 | 254 | 248 | 251 | 257 | 251 | 253 | 260 | 262 | 265.9 |
| 5-Sep | 250 | 235 | 258 | 269 | 254 | 214 | 212 | 190 | 213 | 236 | 189 | 129 | 117 | 167 | 169 | 173 | 177 | 180 | 181 | 178 | 178 | 158 | 138 | 149 | 183.9 |
| 6-Sep | 149 | 153 | 147 | 150 | 150 | 155 | 150 | 148 | 129 | 124 | 137 | 174 | 157 | 129 | 153 | 95 | 135 | 179 | 198 | 169 | 165 | 179 | 188 | 184 | 156.8 |
| 7-Sep | 188 | 181 | 180 | 185 | 186 | 187 | 174 | 158 | 147 | 135 | 128 | 120 | 133 | 124 | 117 | 93 | 85 | 84 | 84 | 101 | 97 | 122 | 137 | 116 | 133.8 |
| 8-Sep | 117 | 116 | 115 | 164 | 264 | 299 | 313 | 281 | 255 | 282 | 274 | 269 | 302 | 276 | 336 | 351 | 187 | 301 | 322 | 316 | 318 | 322 | 317 | 318 | 306.9 |
| 9-Sep | 321 | 322 | 312 | 286 | 302 | 310 | 315 | 310 | 314 | 315 | 311 | 290 | 288 | 279 | 235 | 223 | 206 | 228 | 84 | 113 | 116 | 123 | 118 | 118 | 291.8 |
| 10-Sep | 130 | 132 | 129 | 130 | 116 | 113 | 127 | 124 | 124 | 126 | 117 | 118 | 81 | 40 | 43 | 34 | 27 | 28 | 28 | 42 | 35 | 18 | 12 | 8 | 94.5 |
| 11-Sep | 0 | 358 | 358 | 352 | 350 | 348 | 347 | 346 | 346 | 352 | 349 | 343 | 339 | 337 | 333 | 330 | 325 | 321 | 306 | 308 | 299 | 298 | 293 | 305 | 338.3 |
| 12-Sep | 307 | 312 | 285 | 274 | 295 | 292 | 282 | 265 | 243 | 229 | 211 | 214 | 227 | 216 | 201 | 190 | 174 | 171 | 167 | 175 | 179 | 190 | 198 | 199 | 208.0 |
| 13-Sep | 197 | 198 | 198 | 199 | 198 | 202 | 193 | 203 | 218 | 253 | 262 | 263 | 267 | 265 | 261 | 268 | 268 | 253 | 283 | 308 | 325 | 336 | 331 | 331 | 244.4 |
| 14-Sep | 289 | 282 | 290 | 284 | 291 | 297 | 359 | 107 | 160 | 149 | 150 | 151 | 190 | 97 | 96 | 88 | 130 | 196 | 223 | 295 | 315 | 324 | 313 | 305 | 228.0 |
| 15-Sep | 307 | 312 | 294 | 273 | 282 | 286 | 296 | 305 | 316 | 327 | 118 | 99 | 89 | 86 | 83 | 83 | 84 | 84 | 84 | 84 | 91 | 119 | 153 | 205 | 82.2 |
| 16-Sep | 210 | 228 | 226 | 223 | 231 | 231 | 232 | 211 | 163 | 93 | 96 | 86 | 90 | 90 | 87 | 89 | 84 | 91 | 79 | 80 | 79 | 86 | 102 | 95 | 106.9 |
| 17-Sep | 89 | 83 | 124 | 105 | 96 | 183 | 187 | 223 | 226 | 239 | 235 | 235 | 208 | 155 | 253 | 254 | 252 | 248 | 233 | 251 | 267 | 271 | 282 | 285 | 231.3 |
| 18-Sep | 285 | 304 | 340 | 343 | 318 | 302 | 299 | 288 | 292 | 290 | 291 | 305 | 311 | 307 | 307 | 315 | 314 | 319 | 321 | 309 | 307 | 313 | 315 | 315 | 309.2 |
| 19-Sep | 310 | 311 | 316 | 311 | 307 | 302 | 297 | 303 | 307 | 316 | 313 | 321 | 345 | 347 | 331 | 327 | 315 | 320 | 309 | 330 | 309 | 313 | 328 | 338 | 316.7 |
| 20-Sep | 344 | 337 | 336 | 336 | 330 | 334 | 326 | 317 | 304 | 286 | 291 | 292 | 285 | 252 | 256 | 298 | 330 | 355 | 351 | 359 | 354 | 286 | 12 | 283 | 315.1 |
| 21-Sep | 258 | 181 | 155 | 125 | 131 | 124 | 118 | 136 | 148 | 135 | 123 | 111 | 89 | 90 | 89 | 87 | 86 | 80 | 72 | 67 | 71 | 82 | 112 | 96 | 104.8 |
| 22-Sep | 110 | 130 | 182 | 182 | 169 | 152 | 145 | 135 | 129 | 148 | 166 | 174 | 182 | 187 | 182 | 179 | 169 | 171 | 165 | 172 | 172 | 170 | 169 | 169 | 168.5 |
| 23-Sep | 175 | 173 | 172 | 177 | 173 | 174 | 176 | 170 | 175 | 175 | 176 | 173 | 166 | 164 | 154 | 156 | 160 | 163 | 154 | 150 | 154 | 145 | 152 | 162 | 166.0 |
| 24-Sep | 169 | 172 | 167 | 174 | 171 | 181 | 193 | 206 | 201 | 228 | 248 | 243 | 243 | 243 | 257 | 268 | 263 | 268 | 277 | 315 | 286 | 247 | 275 | 276 | 224.6 |
| 25-Sep | 282 | 280 | 279 | 279 | 281 | 277 | 278 | 272 | 281 | 283 | 275 | 290 | 303 | 311 | 313 | 306 | 315 | 316 | 335 | 335 | 360 | 20 | 71 | 84 | 298.8 |
| 26-Sep | 100 | 117 | 133 | 121 | 108 | 107 | 103 | 113 | 120 | 119 | 121 | 130 | 125 | 133 | 140 | 152 | 169 | 161 | 141 | 145 | 152 | 164 | 171 | 171 | 134.5 |
| 27-Sep | 171 | 147 | 168 | 114 | 101 | 299 | 269 | 242 | 241 | 260 | 263 | 264 | 267 | 263 | 268 | 264 | 260 | 253 | 259 | 274 | 285 | 285 | 273 | 268 | 259.5 |
| 28-Sep | 267 | 257 | 262 | 263 | 261 | 258 | 256 | 246 | 249 | 250 | 258 | 259 | 259 | 266 | 279 | 283 | 276 | 240 | 209 | 119 | 106 | 193 | 172 | 212 | 256.5 |
| 29-Sep | 248 | 234 | 241 | 262 | 274 | 253 | 236 | 224 | 240 | 249 | 180 | 105 | 120 | 161 | 239 | 256 | 252 | 248 | 219 | 195 | 119 | 106 | 340 | 344 | 240.5 |
| 30-Sep | 358 | 8 | 19 | 18 | 357 | 345 | 346 | 350 | 344 | 340 | 346 | 0 | 22 | 15 | 14 | 7 | 8 | 358 | 350 | 348 | 349 | 350 | 352 | 353 | 357.3 |

205.4 203.0 197.1 203.2 212.4 228.3 229.6 217.8 223.8 236.0 224.7 234.3 239.9 241.6 250.0 250.7 211.9 217.2 231.4 80.1 153.7 198.6 222.2 226.5

Diurnal Average

M - Maintenance

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

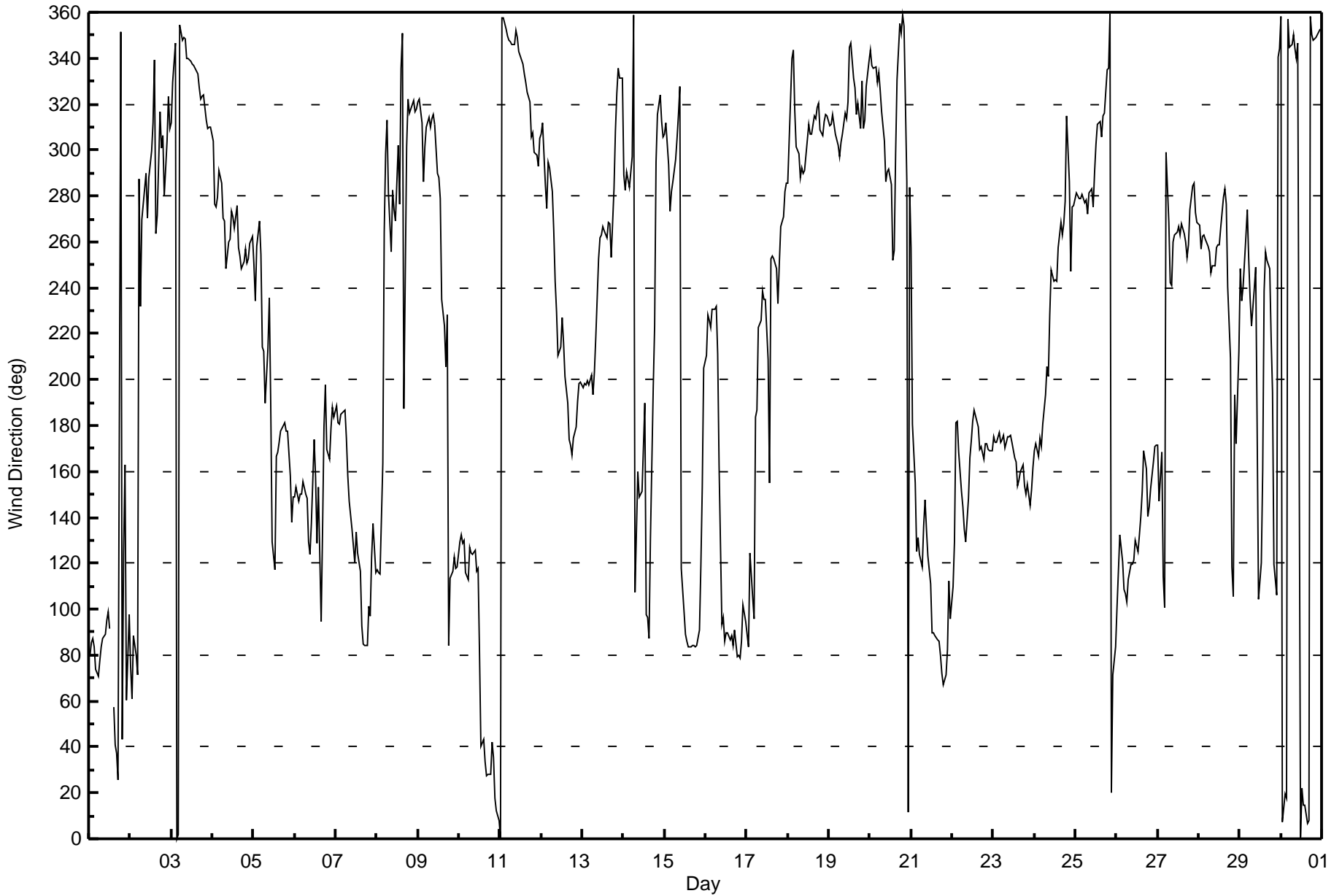
Wind Direction (WD) - deg
Fort Chipewyan - September 2016

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 97 deg on Sep 5 11:00 | Hours of Data: 719 |
| Minimum Value: 5 deg on Sep 12 02:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 5 P ₁₀ = 7 Q ₁ = 10 Median = 16 Q ₃ = 20 P ₉₀ = 27 P ₉₉ = 70 | 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 | 7 | 8 | 7 | 7 | 10 | 10 | 9 | 7 | 10 | 16 | 7 | 13 | 7 | M | 13 | 16 | 14 | 25 | 67 | 25 | 31 | 28 | 20 | 12 | 67 |
| 2-Sep | 28 | 97 | 8 | 8 | 15 | 57 | 11 | 16 | 14 | 17 | 18 | 15 | 19 | 22 | 37 | 93 | 23 | 18 | 22 | 24 | 17 | 16 | 18 | 14 | 97 |
| 3-Sep | 17 | 23 | 24 | 22 | 19 | 22 | 23 | 22 | 23 | 25 | 23 | 24 | 24 | 24 | 23 | 26 | 24 | 23 | 22 | 23 | 19 | 17 | 18 | 19 | 26 |
| 4-Sep | 18 | 17 | 13 | 14 | 15 | 14 | 15 | 14 | 14 | 17 | 18 | 17 | 17 | 17 | 19 | 17 | 16 | 14 | 12 | 12 | 16 | 15 | 14 | 14 | 19 |
| 5-Sep | 15 | 11 | 13 | 12 | 18 | 22 | 11 | 30 | 14 | 35 | 97 | 15 | 27 | 20 | 16 | 13 | 10 | 9 | 6 | 6 | 8 | 21 | 8 | 6 | 97 |
| 6-Sep | 9 | 6 | 6 | 5 | 6 | 9 | 8 | 10 | 15 | 16 | 19 | 16 | 25 | 36 | 57 | 9 | 30 | 21 | 8 | 15 | 8 | 7 | 7 | 6 | 57 |
| 7-Sep | 7 | 8 | 8 | 9 | 13 | 16 | 13 | 19 | 22 | 18 | 16 | 6 | 12 | 11 | 6 | 15 | 5 | 5 | 8 | 7 | 8 | 16 | 26 | 50 | 50 |
| 8-Sep | 37 | 25 | 32 | 61 | 13 | 17 | 17 | 90 | 25 | 20 | 25 | 24 | 29 | 36 | 42 | 29 | 71 | 53 | 23 | 18 | 20 | 23 | 19 | 21 | 90 |
| 9-Sep | 20 | 22 | 19 | 16 | 18 | 20 | 21 | 18 | 21 | 24 | 23 | 27 | 36 | 64 | 20 | 19 | 13 | 22 | 72 | 6 | 5 | 5 | 5 | 6 | 72 |
| 10-Sep | 8 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 7 | 9 | 10 | 27 | 16 | 16 | 14 | 14 | 16 | 12 | 16 | 18 | 19 | 19 | 27 |
| 11-Sep | 21 | 20 | 20 | 20 | 19 | 20 | 20 | 19 | 21 | 20 | 25 | 23 | 25 | 28 | 26 | 25 | 23 | 30 | 14 | 11 | 11 | 12 | 8 | 6 | 30 |
| 12-Sep | 5 | 5 | 25 | 18 | 23 | 11 | 7 | 22 | 25 | 14 | 14 | 17 | 19 | 18 | 19 | 18 | 10 | 8 | 8 | 8 | 7 | 7 | 8 | 8 | 25 |
| 13-Sep | 7 | 8 | 8 | 8 | 9 | 10 | 11 | 11 | 14 | 19 | 15 | 16 | 18 | 16 | 16 | 17 | 15 | 26 | 20 | 22 | 19 | 21 | 17 | 26 | |
| 14-Sep | 26 | 16 | 18 | 11 | 10 | 12 | 47 | 27 | 9 | 11 | 10 | 15 | 13 | 76 | 25 | 26 | 39 | 26 | 11 | 32 | 19 | 21 | 18 | 18 | 76 |
| 15-Sep | 17 | 19 | 22 | 15 | 13 | 12 | 15 | 28 | 39 | 58 | 16 | 14 | 11 | 7 | 6 | 6 | 7 | 6 | 6 | 7 | 7 | 13 | 13 | 17 | 58 |
| 16-Sep | 28 | 11 | 16 | 16 | 9 | 24 | 22 | 32 | 63 | 16 | 11 | 7 | 7 | 6 | 13 | 7 | 8 | 7 | 11 | 8 | 9 | 7 | 9 | 10 | 63 |
| 17-Sep | 10 | 16 | 28 | 42 | 29 | 17 | 23 | 12 | 13 | 16 | 20 | 18 | 21 | 56 | 21 | 20 | 16 | 12 | 12 | 15 | 15 | 13 | 12 | 18 | 56 |
| 18-Sep | 11 | 13 | 16 | 17 | 27 | 11 | 13 | 12 | 14 | 15 | 17 | 19 | 20 | 17 | 19 | 19 | 21 | 21 | 24 | 20 | 18 | 18 | 18 | 17 | 27 |
| 19-Sep | 18 | 20 | 21 | 17 | 18 | 21 | 17 | 20 | 19 | 18 | 17 | 21 | 22 | 24 | 25 | 26 | 22 | 19 | 15 | 19 | 12 | 17 | 20 | 20 | 26 |
| 20-Sep | 17 | 15 | 14 | 14 | 14 | 17 | 18 | 27 | 18 | 18 | 20 | 21 | 19 | 26 | 33 | 23 | 26 | 33 | 19 | 15 | 16 | 75 | 34 | 36 | 75 |
| 21-Sep | 28 | 44 | 11 | 19 | 13 | 8 | 16 | 9 | 18 | 14 | 8 | 8 | 7 | 5 | 5 | 5 | 6 | 8 | 8 | 5 | 7 | 13 | 12 | 7 | 44 |
| 22-Sep | 10 | 20 | 11 | 11 | 16 | 12 | 14 | 11 | 13 | 18 | 11 | 8 | 7 | 10 | 10 | 12 | 7 | 7 | 8 | 6 | 6 | 6 | 10 | 8 | 20 |
| 23-Sep | 6 | 7 | 8 | 7 | 6 | 7 | 6 | 8 | 9 | 8 | 9 | 10 | 11 | 11 | 10 | 9 | 10 | 9 | 10 | 10 | 11 | 7 | 10 | 9 | 11 |
| 24-Sep | 8 | 8 | 9 | 9 | 8 | 9 | 8 | 10 | 10 | 19 | 14 | 14 | 14 | 14 | 17 | 16 | 15 | 14 | 13 | 25 | 33 | 14 | 14 | 13 | 33 |
| 25-Sep | 11 | 12 | 12 | 11 | 13 | 12 | 13 | 15 | 16 | 17 | 16 | 21 | 20 | 21 | 20 | 19 | 19 | 17 | 13 | 15 | 13 | 64 | 17 | 10 | 64 |
| 26-Sep | 11 | 8 | 7 | 5 | 5 | 6 | 7 | 9 | 6 | 7 | 7 | 6 | 7 | 11 | 7 | 12 | 8 | 11 | 9 | 6 | 8 | 9 | 7 | 7 | 12 |
| 27-Sep | 8 | 20 | 40 | 53 | 56 | 35 | 39 | 27 | 16 | 15 | 16 | 16 | 16 | 16 | 16 | 16 | 15 | 14 | 16 | 16 | 16 | 15 | 15 | 15 | 56 |
| 28-Sep | 15 | 15 | 15 | 15 | 15 | 13 | 15 | 14 | 14 | 15 | 18 | 17 | 17 | 20 | 17 | 17 | 15 | 31 | 10 | 66 | 29 | 34 | 37 | 32 | 66 |
| 29-Sep | 15 | 12 | 14 | 20 | 18 | 24 | 38 | 17 | 24 | 31 | 24 | 13 | 40 | 32 | 61 | 26 | 15 | 14 | 6 | 20 | 24 | 19 | 70 | 18 | 70 |
| 30-Sep | 17 | 15 | 13 | 13 | 16 | 16 | 17 | 17 | 15 | 14 | 18 | 23 | 19 | 23 | 25 | 21 | 19 | 20 | 22 | 20 | 20 | 21 | 19 | 20 | 25 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 37 | 97 | 40 | 61 | 56 | 57 | 47 | 90 | 63 | 58 | 97 | 27 | 40 | 76 | 61 | 93 | 71 | 53 | 72 | 66 | 33 | 75 | 70 | 50 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 20, 2016 | Last Calibration | August 9, 2016 |
| Station Name | Fort Chipewyan | Station Number | AMS 8 |
| Reason: | Routine | | |
| Start Time (MST) | 13:20 | End Time (MST) | 17:55 |
| Gas Cert Reference | LL79696 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 2.35 ppm | Cal Gas Exp Date | 2/13/18 |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 747 |
| ZAG Make/Model | Teledyne API T701 | Serial Number | 4698 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 11039 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -827 | -827 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 987 | 989 |
| Calculated slope | 1.007272 | 1.010967 | Chamber temp | 44.9 | 45.1 |
| Calculated intercept | -0.027984 | -0.133600 | Pressure | 730.0 | 717.3 |
| Analyzer Background | 1.17 | 1.18 | Flow | 0.448 | 0.440 |
| Analyzer Coefficient | 1.062 | 1.062 | Intensity | 91 | 91 |

Analyzer make Thermo 43i-TLE Analyzer serial # 1136451241

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 6000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 6000 | 44.8 | 17.5 | 17.2 | 1.018 |
| calibrator zero | 6000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 6000 | 44.8 | 17.5 | 17.5 | 1.005 |
| second point | 6000 | 29.9 | 11.7 | 11.8 | 0.995 |
| third point | 6000 | 15.0 | 5.9 | 5.9 | 0.992 |
| as left zero | 6000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 6000 | 44.8 | 17.5 | 17.1 | 1.028 |
| Average Correction Factor | | | | | 0.997 |

Corrected As found 17.1 Previous response 17.4 % change 2.2%

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By: Devin Russell



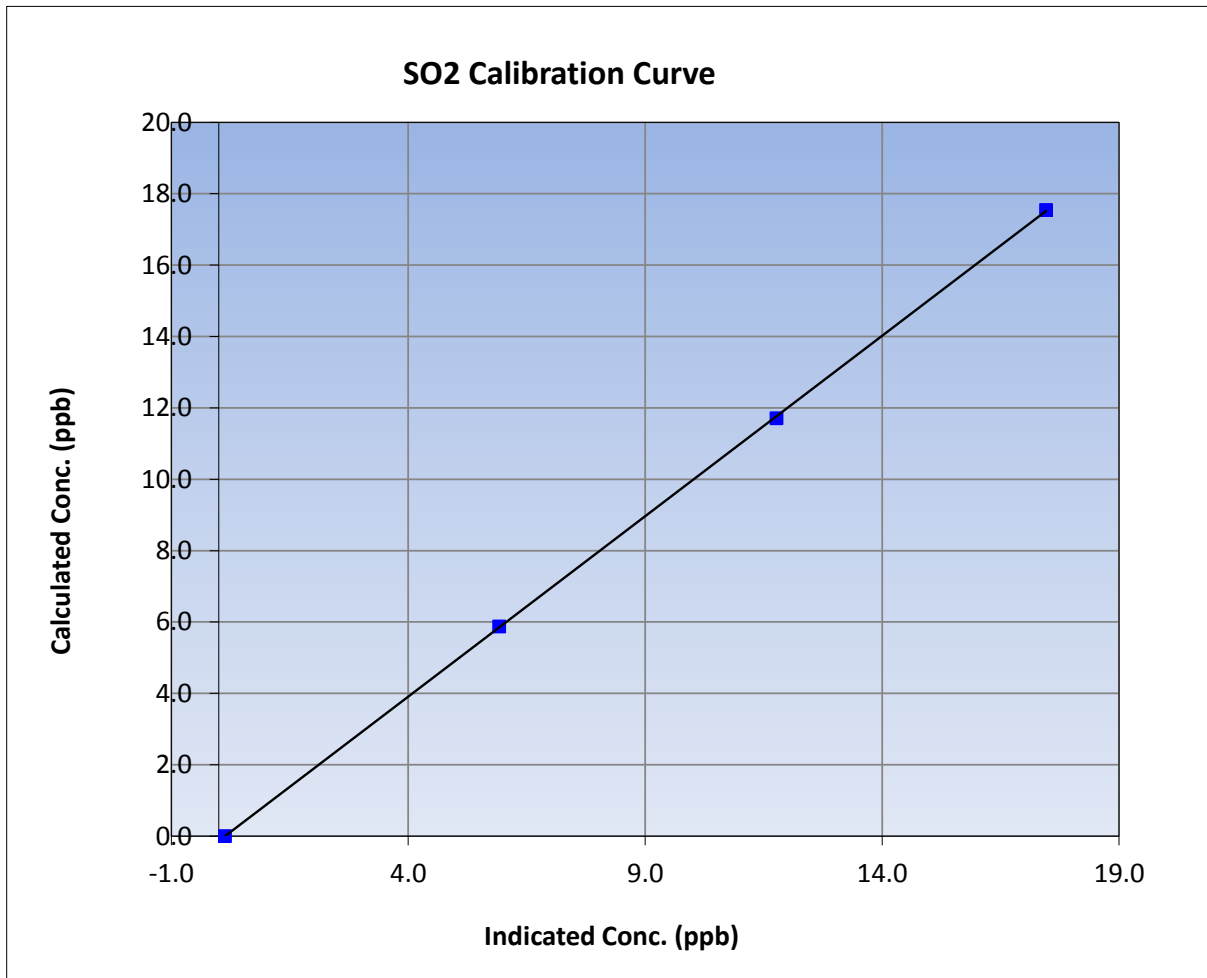
Wood Buffalo Environmental Association SO2 Calibration Report

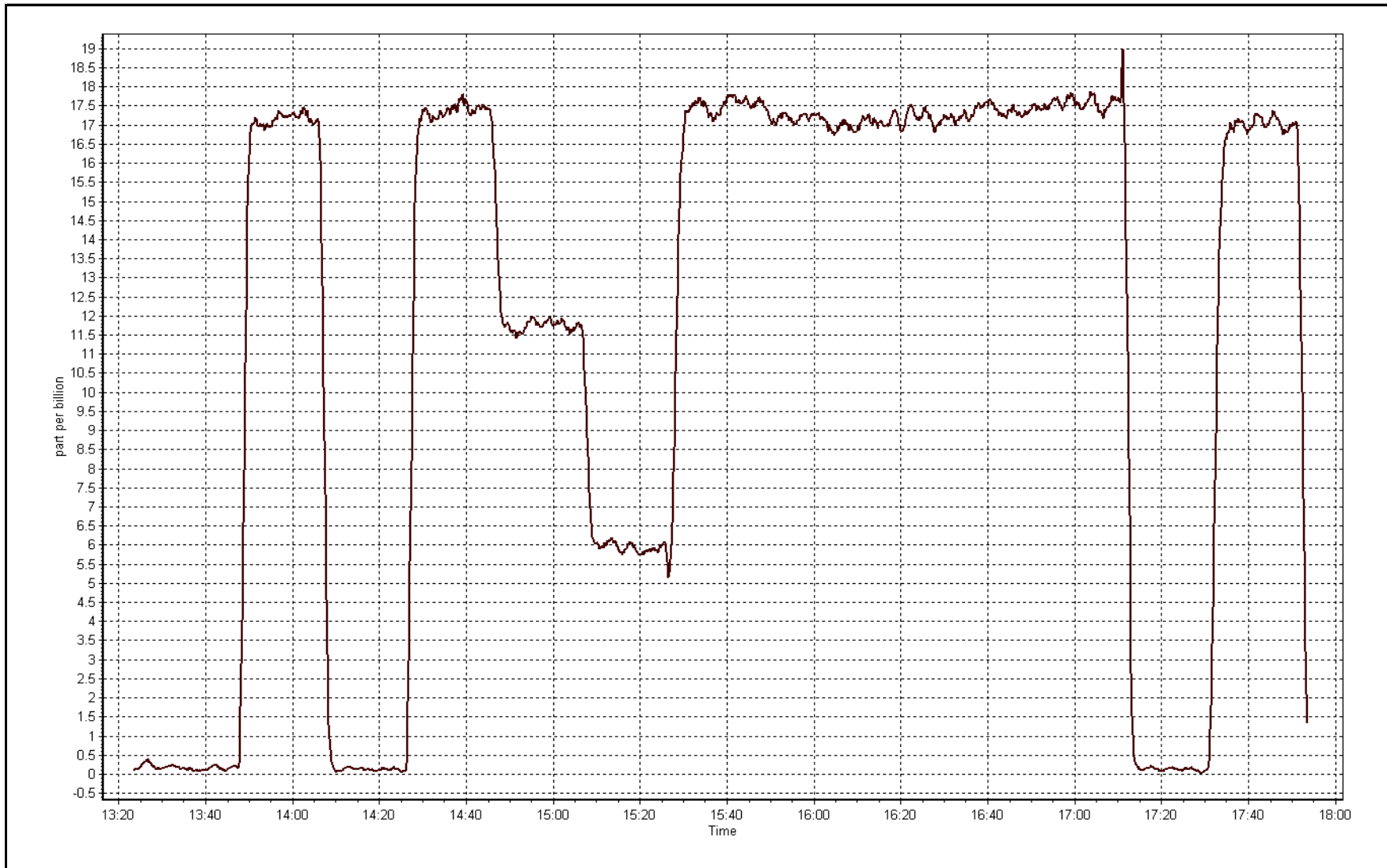
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Fort Chipewyan | Station Number | AMS 8 |
| Start Time (MST) | 13:20 | End Time (MST) | 17:55 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1136451241 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999974 |
| 17.5 | 17.5 | 1.0050 | | |
| 11.7 | 11.8 | 0.9950 | Slope | 1.010967 |
| 5.9 | 5.9 | 0.9924 | | |
| | | | Intercept | -0.133600 |







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 21, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Fort Chipewyan | Station Number | AMS 8 |
| Reason: | Routine | | |
| Start Time (MST) | 6:45 | End Time (MST) | 9:30 |
| NO2 GPT Ref date | September-20-16 | Transfer Standard | NO2 |
| | | Station temp. | 23 Deg C |
| Calibrator Make/Model | Teledyne API 700 | Serial Number | 747 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4698 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 11039 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|--------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 38.6 | 38.9 |
| Analyzer IP address | 192.168.1.79 | | Lamp temp. | 58.0 | 58.0 |
| Calculated slope | 0.992422 | 0.993057 | Pressure | 27.1 | 27.5 |
| Calculated intercept | 0.103318 | 0.153502 | Flow cell A | 775 | 811 |
| Analyzer Background | -0.4 | -0.4 | Flow cell B | 776 | 787 |
| Analyzer Coefficient | 1.032 | 1.032 | O3 Measure | 4581.6 | 4540.7 |
| | | | O3 Reference | 4581.7 | 4540.9 |

| | | | |
|---------------|-------------------|-------------------|------|
| Analyzer make | Teledyne API T400 | Analyzer serial # | 1020 |
|---------------|-------------------|-------------------|------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator O3 generator reference voltage - generator drive voltage (ppb of O3 called from from calibrator) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------|---------------------------|
| As found zero | 6000 | 0.00 | 0.0 | -0.1 | ---- |
| As found span | 6000 | 237.0 - 830.8 (100ppb) | 102.8 | 103.3 | 0.995 |
| calibrator zero | 6000 | 0.00 | 0.0 | -0.1 | ---- |
| high point | 6000 | 237.0 - 830.8 (100ppb) | 102.8 | 103.5 | 0.993 |
| second point | 6000 | 190.8-799.1 (80 ppb) | 83.2 | 83.5 | 0.996 |
| third point | 6000 | 115.2-733.3 (50 ppb) | 52.6 | 52.7 | 0.997 |
| as left zero | 6000 | 237.0 - 830.8 (100ppb) | 0.0 | 0.1 | ---- |
| as left span | 6000 | 0.00 | 102.8 | 104.2 | 0.987 |
| Average Correction Factor | | | | | 0.996 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 103.3 | Previous response | 103.5 | % change | 0.1% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

Inlet filter changed after as founds. No adjustments made.

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association O3 Calibration Report

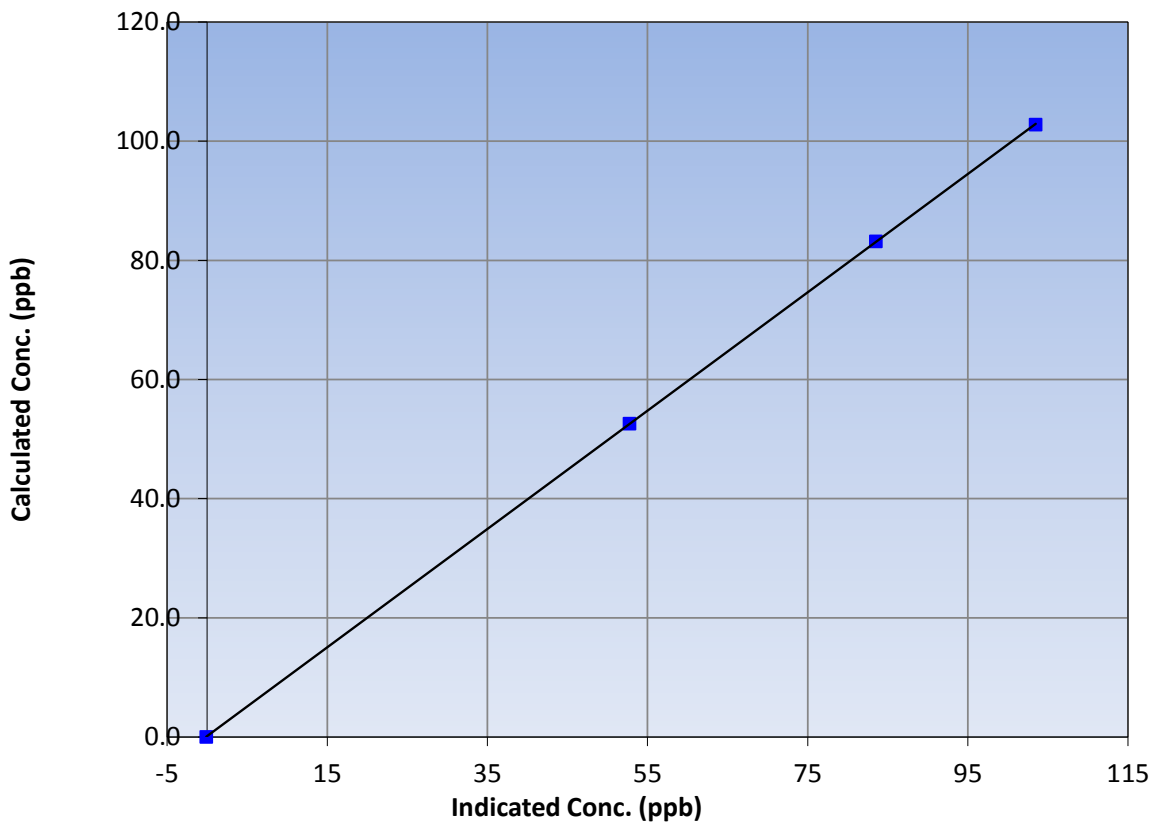
Station Information

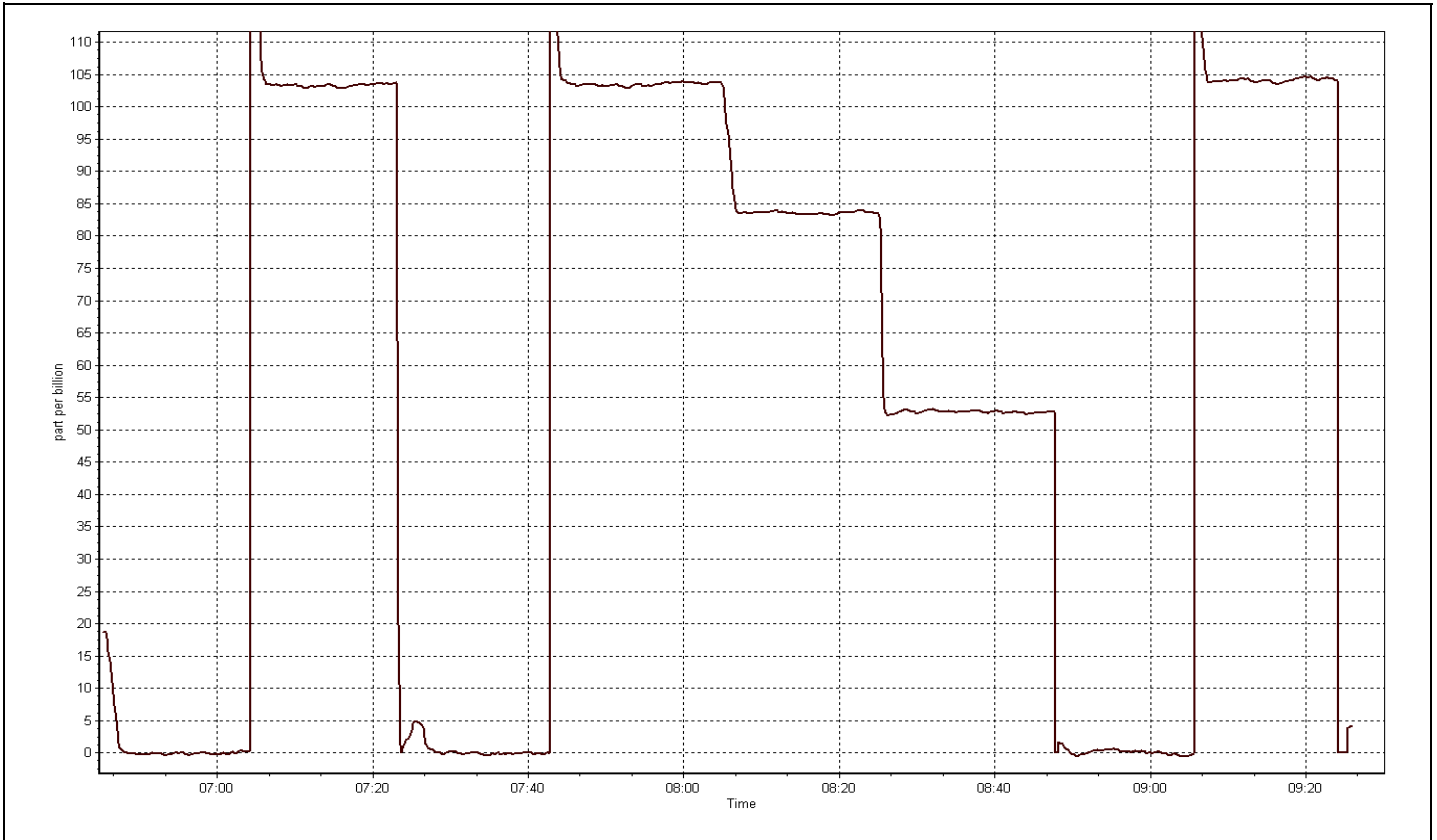
| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September-21-16 | Previous Calibration | August 9, 2016 |
| Station Name | Fort Chipewyan | Station Number | AMS 8 |
| Start Time (MST) | 6:45 | End Time (MST) | 9:30 |
| Analyzer make | Teledyne API T400 | Analyzer serial # | 1020 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999995 |
| 102.8 | 103.5 | 0.9934 | | |
| 83.2 | 83.5 | 0.9960 | Slope | 0.993057 |
| 52.6 | 52.7 | 0.9973 | | |
| | | | Intercept | 0.153502 |

O3 Calibration Curve







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Fort Chipewyan | Station Number | AMS 8 |
| Reason: | Routine | | |
| Start Time (MST) | 13:20 | End Time (MST) | 17:55 |
| NO Cal Gas Conc | 20.1 ppm | Gas Cert Reference | LL79696 |
| NOx Cal Gas Conc | 20.1 ppm | Cal Gas Expiry Date | 2/13/18 |
| Calibrator | Teledyne API T700 | Serial Number | 747 |
| Zero air Generator | Teledyne API 701 | Serial Number | 4698 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|-------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 11039 |
|-------------------|----------------------------|-----------------|-------|

Calibration Statistics

| Parameter | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|
| As Found (last calibration results) | Data Slope | 0.996576 | 0.999536 |
| | Data Offset | 0.726835 | 0.885749 |
| Current Calibration | Data Slope | 0.993165 | 0.998882 |
| | Data Offset | 0.519664 | 0.617171 |

Analyzer Information

| | | | |
|---------------------|--------------------|-------------------|-----|
| Analyzer make/model | Teledyne API T200u | Analyzer serial # | 172 |
|---------------------|--------------------|-------------------|-----|

| Test Point | before | | after | |
|---------------------|--------------|--------|--------------|--------|
| | | ppb | | ppb |
| Concentration range | 0-200 | | 0-200 | |
| Analyzer IP | 192.168.1.72 | | 192.168.1.72 | |
| NO coefficient | 1.251 | | 1.251 | |
| NOX coefficient | 1.270 | | 1.270 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 0.1 | | 0.1 | |
| NOX bkgrnd | 0.2 | | 0.2 | |
| Chamber Temp | 40 | Deg C | 40 | Deg C |
| Moly Temp | 316.9 | Deg C | 315 | Deg C |
| PMT voltage | 502 | V | 502 | V |
| PMT Temp | 5 | Deg C | 5 | Deg C |
| O3 flow | 88 | ccm | 89 | ccm |
| R Cell press NO | 3.8 | "Hg | 3.8 | "Hg |
| R Cell Press Nox | 3.8 | "Hg | 3.8 | "Hg |
| NO sample flow | 1140 | cc/min | 1118 | cc/min |
| Nox sample Flow | 1116 | cc/min | 1094 | cc/min |

Notes:

Inlet filter changed after as founds. No adjustments made.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

September 20, 2016

Station Number:

AMS 8

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 6000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | ---- | ---- |
| as found span | 6000 | 44.8 | 150.1 | 150.1 | 0.0 | 151.2 | 150.4 | 0.8 | 0.9924 | 0.9977 |
| calibrator zero | 6000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high point | 6000 | 44.8 | 150.1 | 150.1 | 0.0 | 151.0 | 150.0 | 1.0 | 0.9937 | 1.0003 |
| second point | 6000 | 29.9 | 100.2 | 100.2 | 0.0 | 99.9 | 99.4 | 0.5 | 1.0026 | 1.0078 |
| third point | 6000 | 15.0 | 50.3 | 50.3 | 0.0 | 49.6 | 49.0 | 0.6 | 1.0135 | 1.0259 |
| as left zero | 6000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as left span | 6000 | 44.8 | 150.1 | 46.5 | 103.6 | 150.9 | 46.5 | 104.4 | 0.9946 | 0.9996 |
| Average Correction Factor | | | | | | | | | 1.0033 | 1.0113 |

Corrected As found

NO_x= 151.1

NO= 150.3

Percent Change

NO_x= -0.8%

NO= -0.7%

Previous Response

NO_x= 149.9

NO= 149.3

GPT Calibration Data

Dilution Flow (total) 6000 ccm

Source Gas Flow 44.80 ccm

NOx ref calc conc = 150.1 ppb

NO ref calc conc = 150.1 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 150.8 | 149.3 | 0.0 | 0.9956 | 1.0052 | ---- | ---- |
| 1st NO2 (100) | 46.5 | 102.8 | 150.2 | 46.5 | 103.7 | 0.9993 | ---- | 0.9915 | 100.9% |
| 2nd NO2 (80) | 66.1 | 83.2 | 150.4 | 66.1 | 84.2 | 0.9982 | ---- | 0.9875 | 101.3% |
| 3rd NO2 (50) | 96.7 | 52.6 | 149.6 | 96.7 | 52.9 | 1.0033 | ---- | 0.9947 | 100.5% |
| 2nd NO ref point | ---- | 0.0 | 149.9 | 149.1 | 0.7 | 1.0014 | 1.0064 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0006 | | 0.9913 | 100.9% |

Calibration Performed By:

Devin Russell



Wood Buffalo Environmental Association

NO_x Calibration Summary

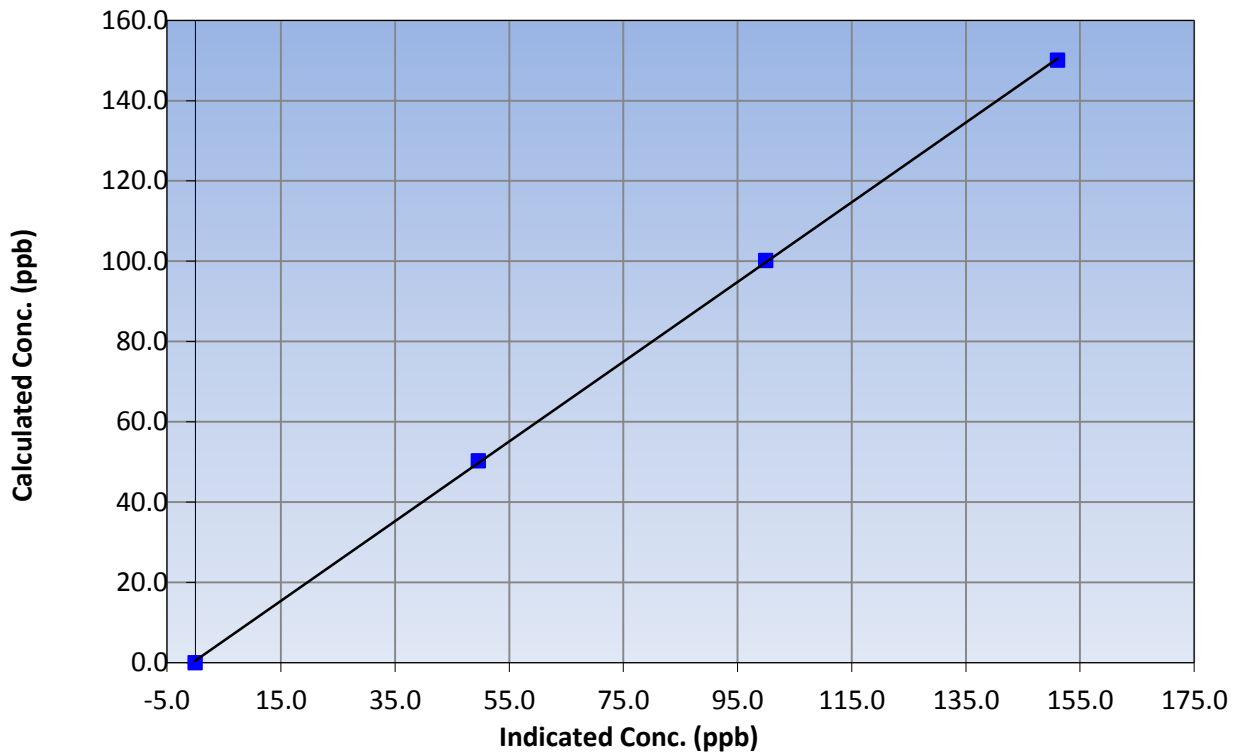
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Fort Chipewyan | Station Number | AMS 8 |
| Start Time (MST) | 13:20 | End Time (MST) | 17:55 |
| Analyzer make | Teledyne API T200u | Analyzer serial # | 172 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999934 |
| 150.1 | 151.0 | 0.9937 | | |
| 100.2 | 99.9 | 1.0026 | Slope | 0.993165 |
| 50.3 | 49.6 | 1.0135 | | |
| | | | Intercept | 0.519664 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

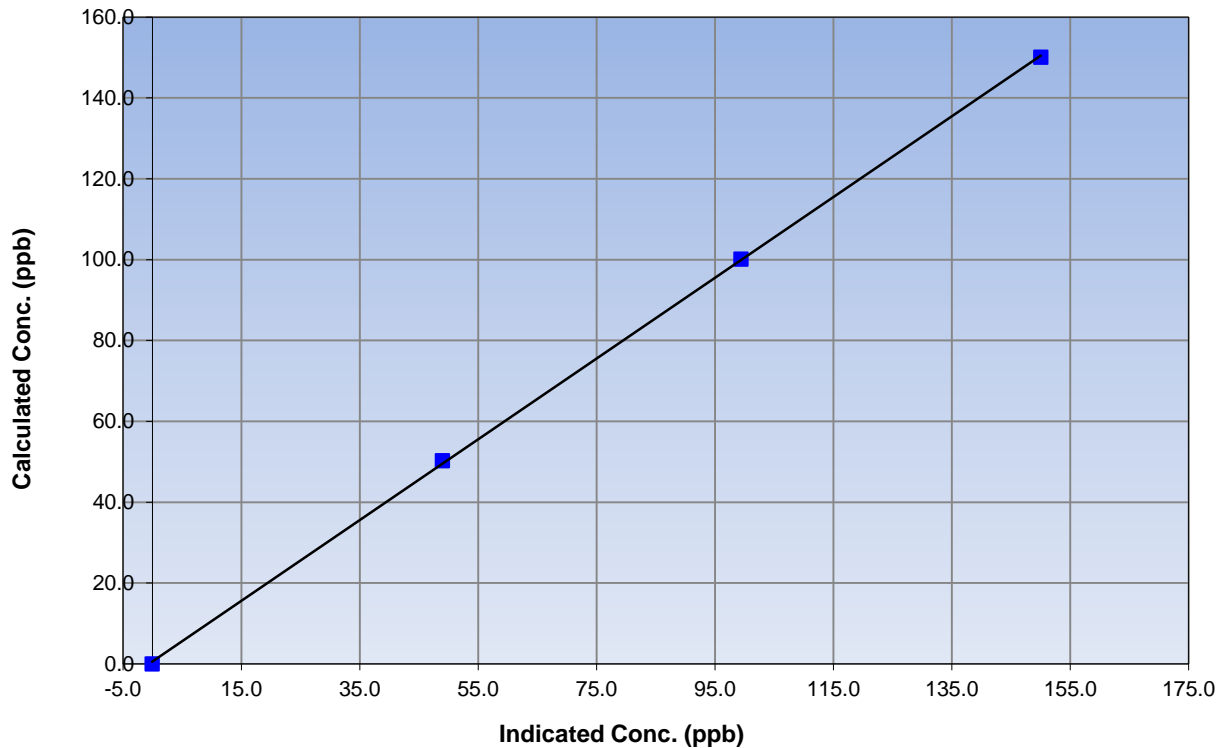
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Fort Chipewyan | Station Number | AMS 8 |
| Start Time (MST) | 13:20 | End Time (MST) | 17:55 |
| Analyzer make | Teledyne API T200u | Analyzer serial # | 172 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999915 |
| 150.1 | 150.0 | 1.0003 | | |
| 100.2 | 99.4 | 1.0078 | Slope | 0.998882 |
| 50.3 | 49.0 | 1.0259 | | |
| | | | Intercept | 0.617171 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

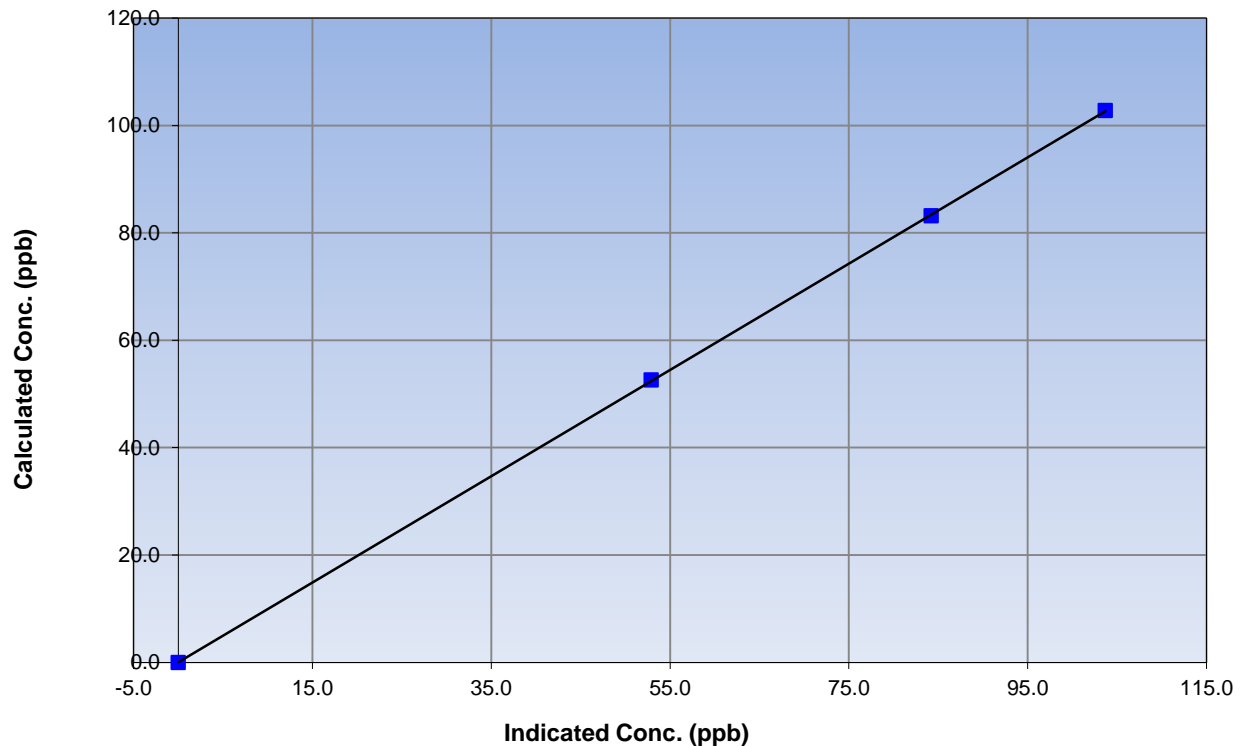
Station Information

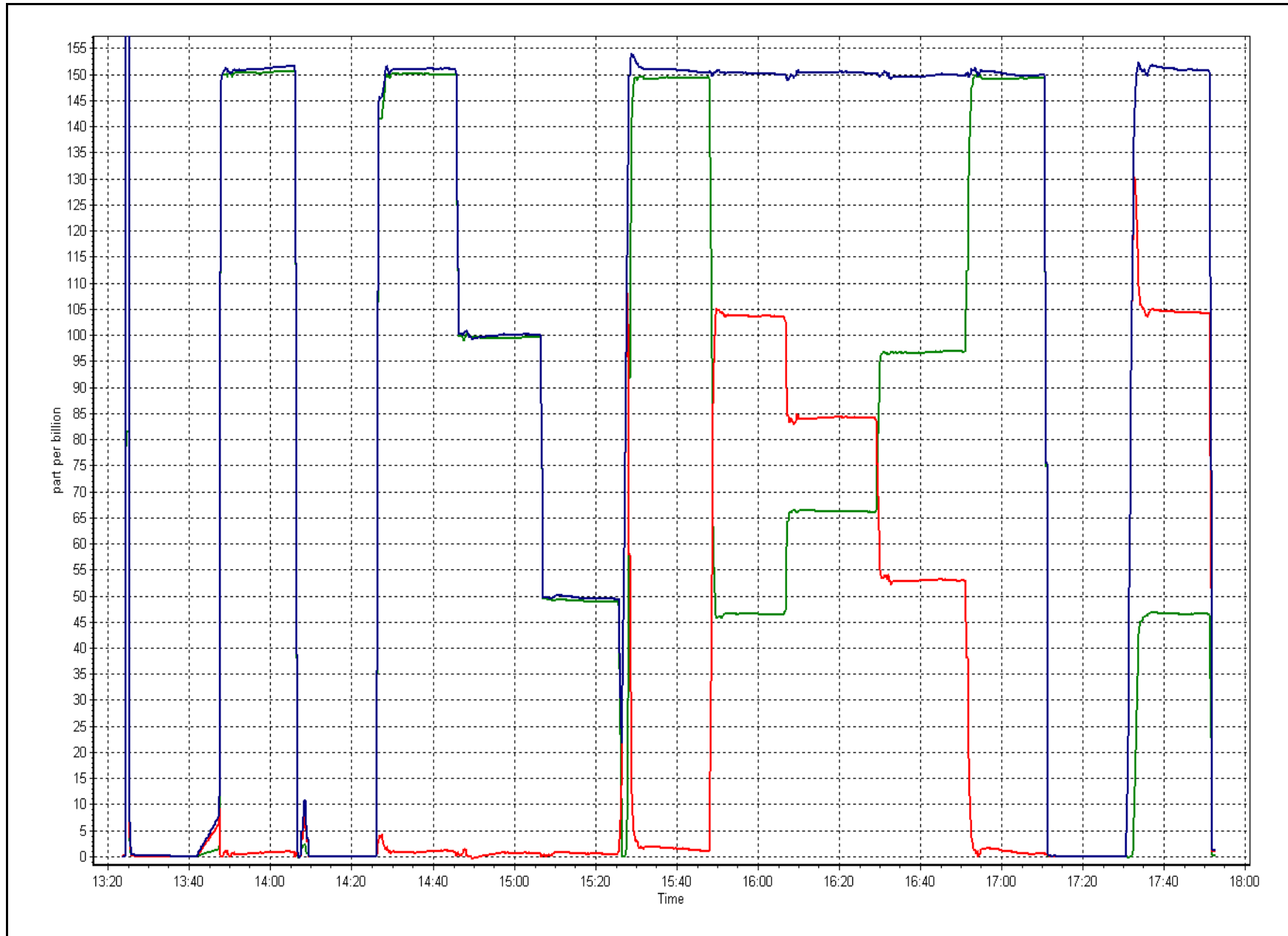
| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 9, 2016 |
| Station Number | Fort Chipewyan | Station Number | AMS 8 |
| Start Time (MST) | 13:20 | End Time (MST) | 17:55 |
| Analyzer make | Teledyne API T200u | Analyzer serial # | 172 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | N/A | Correlation Coefficient | 0.999980 |
| 102.8 | 103.7 | 0.9915 | | |
| 83.2 | 84.2 | 0.9875 | Slope | 0.990002 |
| 52.6 | 52.9 | 0.9947 | | |
| | | | Intercept | 0.049414 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|-------------------|-----------------|--------|
| Station Name: | Fort Chipewyan | Station number: | AMS 8 |
| Calibration Date: | September 1, 2016 | Last Cal Date: | NA |
| Start time (MST): | 11:50 | End time (MST): | 13:30 |
| Sharp Model: | Thermo 5030 | S/N: | E-2025 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 7414 |
| Flow Standard Model: | Delta Cal | S/N: | 141228 |
| Temp/RH standard: | Delta Cal | S/N: | 141228 |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|---------------------------------------|----------|----------------------------------------|-------------------------------------|---------------|
| T1 (°C) | 14 | 14.4 | 14 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 977 | 977.25 | 977 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 993 | 1000 | <input checked="" type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.8 | | 0.3 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input type="checkbox"/> | | PM2.5 Cyclone <input type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | Tolerance |
|------------|-------------------|--------------------------|------------------|----------------------|
| Leak Test: | Date of check: | <u>September 1, 2016</u> | Last Cal Date: | <u>NA</u> |
| | Flow w/o adaptor: | <u>16.53</u> | Flow w/ adaptor: | <u>16.19</u> 0.4 LPM |

Annual Calibration Test

| | | | | |
|------------------|------------------------|-------|-----------------------------|-------|
| Foil Calibration | Foil Mass: | _____ | S/N: | _____ |
| | Date of check: | _____ | Last Cal Date: | _____ |
| | New Correction Factor: | _____ | Previous Correction Factor: | _____ |

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

Notes: Installation calibration. Original AMS 08 SHARP being installed. Flow adjusted slightly from 993 LPH to 1000 LPH. Nephelometer zero adjusted. New cyclone head installed.

Calibration by: Devin Russell



Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|-------------------|-----------------|----------------|
| Station Name: | Fort Chipewyan | Station number: | AMS 8 |
| Calibration Date: | September 1, 2016 | Last Cal Date: | August 9, 2016 |
| Start time (MST): | 10:25 | End time (MST): | 11:48 |
| Sharp Model: | Thermo 5030 | S/N: | CM-2383 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 10384 |
| Flow Standard Model: | Delta Cal | S/N: | 141228 |
| Temp/RH standard: | Delta Cal | S/N: | 141228 |

Monthly Calibration Test

| <u>Parameter</u> | <u>As found</u> | <u>Measured</u> | <u>As left</u> | <u>Adjusted</u> | <u>Tolerance</u> |
|------------------------|---------------------------------------|-----------------|----------------------------------------|--------------------------|------------------|
| T1 (°C) | 14 | 13.9 | NA | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 976 | 977.25 | NA | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 993 | NA | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.4 | | NA | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input type="checkbox"/> | | PM2.5 Cyclone <input type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | <u>Tolerance</u> |
|------------|-------------------------|------------------------|------------------|
| Leak Test: | Date of check: _____ | Last Cal Date: _____ | |
| | Flow w/o adaptor: _____ | Flow w/ adaptor: _____ | 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|------------------------------|-----------------------------------|
| Foil Calibration | Foil Mass: _____ | S/N: _____ |
| | Date of check: _____ | Last Cal Date: _____ |
| | New Correction Factor: _____ | Previous Correction Factor: _____ |

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

Notes: Removal calibration. Unstable readings over the past week. Water found on inlet to PM2.5 cyclone. Bugs and spider webs found inside head in mostly all of the chambers. Thorough inspection of Nephelometer and beta chamber needed at FOC.

Calibration by: Devin Russell



Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|-------------------|
| Station Name: | Fort Chipewyan | Station number: | AMS 8 |
| Calibration Date: | September 21, 2016 | Last Cal Date: | September 1, 2016 |
| Start time (MST): | 6:45 | End time (MST): | 7:40 |
| Sharp Model: | Thermo 5030 | S/N: | E-2025 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 7414 |
| Flow Standard Model: | Delta Cal | S/N: | 141228 |
| Temp/RH standard: | Delta Cal | S/N: | 141228 |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|----------------------------------------------|----------|---------------------------------------------------|--------------------------|---------------|
| T1 (°C) | 7 | 7.6 | 7 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 988 | 989.9 | 988 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1003.8 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.1 | | 0.1 | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | |
|------------|-------------------------|-----------------------------------------|------------------|
| Leak Test: | Date of check: _____ | Last Cal Date: <u>September 1, 2016</u> | <u>Tolerance</u> |
| | Flow w/o adaptor: _____ | Flow w/ adaptor: _____ | 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|------------------------------|-----------------------------------|
| Foil Calibration | Foil Mass: _____ | S/N: _____ |
| | Date of check: _____ | Last Cal Date: _____ |
| | New Correction Factor: _____ | Previous Correction Factor: _____ |

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

Notes: Cyclone head not cleaned; new head was recently installed on September 1. No adjustments needed to flow, temperature, pressure or nephelometer.

Calibration by: Devin Russell



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 9
BARGE LANDING
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| TRS(ppb) Average | 683 | 37 | 37 | 100.00 | 2 | 0 | 1 | 0 |
| THC(ppm) Average | 683 | 37 | 37 | 100.00 | 3.1 | - | 2.4 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100.00 | 24.7 | - | 15.1 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 92 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 17 | - | 11 | - |
| 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 - BARGE LANDING (AMS 9)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| TRS(ppb) Average | 683 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| THC(ppm) Average | 683 | 2.18 | 0.2 | - | 1.9 | 2 | 2.1 | 2.1 | 2.3 | 2.5 | 3.1 |
| Temperature (C) Average | 720 | 11.37 | 4.8 | - | 0.5 | 5.2 | 7.9 | 11 | 14.5 | 17.4 | 24.7 |
| Relative Humidity (%) Average | 720 | 71.1 | 19 | - | 28 | 43 | 57 | 73 | 87 | 96 | 99 |
| Wind Speed 10 m (km/h) Average | 719 | 6.3 | 3 | - | 0 | 2 | 4 | 6 | 8 | 11 | 17 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS 9)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|-----------------------------------|
| Wind Speed, Wind Direction | 04 Sep 2016 19:00 | 04 Sep 2016 19:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 14 11:00 | Maximum Daily Average: 0.5 ppb on Sep 22 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 24 12:00 | Minimum Daily Average: 0.1 ppb on Sep 11 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 0.4 ppb at hour 7 | Minimum Diurnal Average: 0.2 ppb at hour 17 | | Hours of Calibration: | 37 |
| Monthly Average: 0.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 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 | 1 | 1 | 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 | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 4-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 |
| 5-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 | 0.2 | 1 |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 2 | C | C | C | C | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 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 | 0.3 | 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 | 0.2 | 0 |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | 0.1 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.2 | 1 |
| 13-Sep | 1 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 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 | 0.2 | 0 |
| 16-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 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 | 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 | 0.2 | 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 | 0.2 | 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 | 0.2 | 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 | 0.2 | 0 |
| 22-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | C | C | C | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.5 | 1 |
| 23-Sep | 1 | 1 | 1 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.4 | 1 |
| 24-Sep | 1 | 1 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | 0.1 | 0 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.4 | 1 |
| 27-Sep | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 0.2 | 0 |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | 0.2 | 0 |

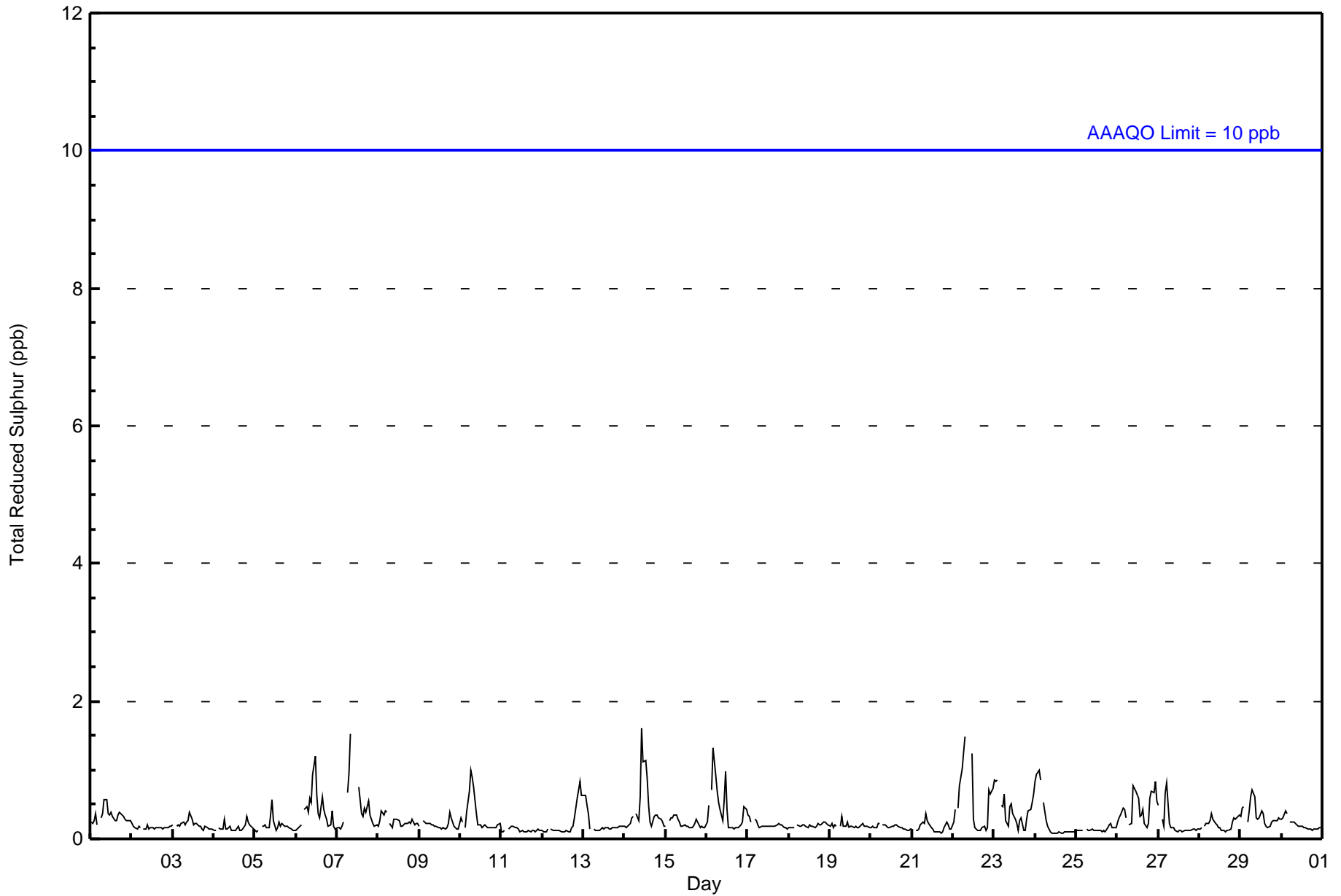
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.2 | Diurnal Average | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 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

Total Reduced Sulphur (TRS) - ppb
Barge Landing - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 683 | 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: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 44 | 24 | 6 | 13 | 7 | 16 | 37 | 85 | 70 | 80 | 49 | 74 | 34 | 40 | 40 | 63 | 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 | 44 | 24 | 6 | 13 | 7 | 16 | 37 | 85 | 70 | 80 | 49 | 74 | 34 | 40 | 40 | 63 | 682 |

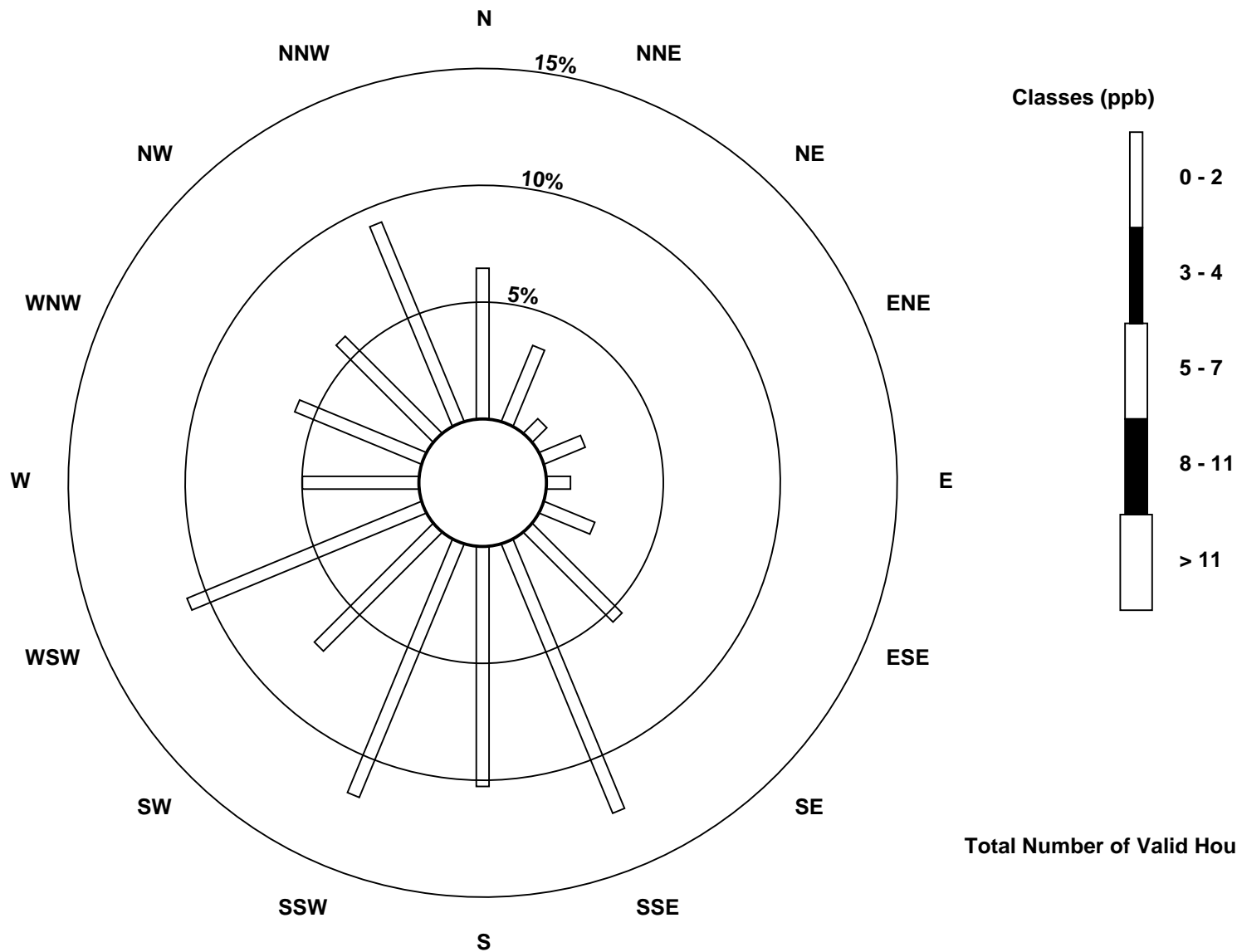
Total Number of Valid Hours: 682

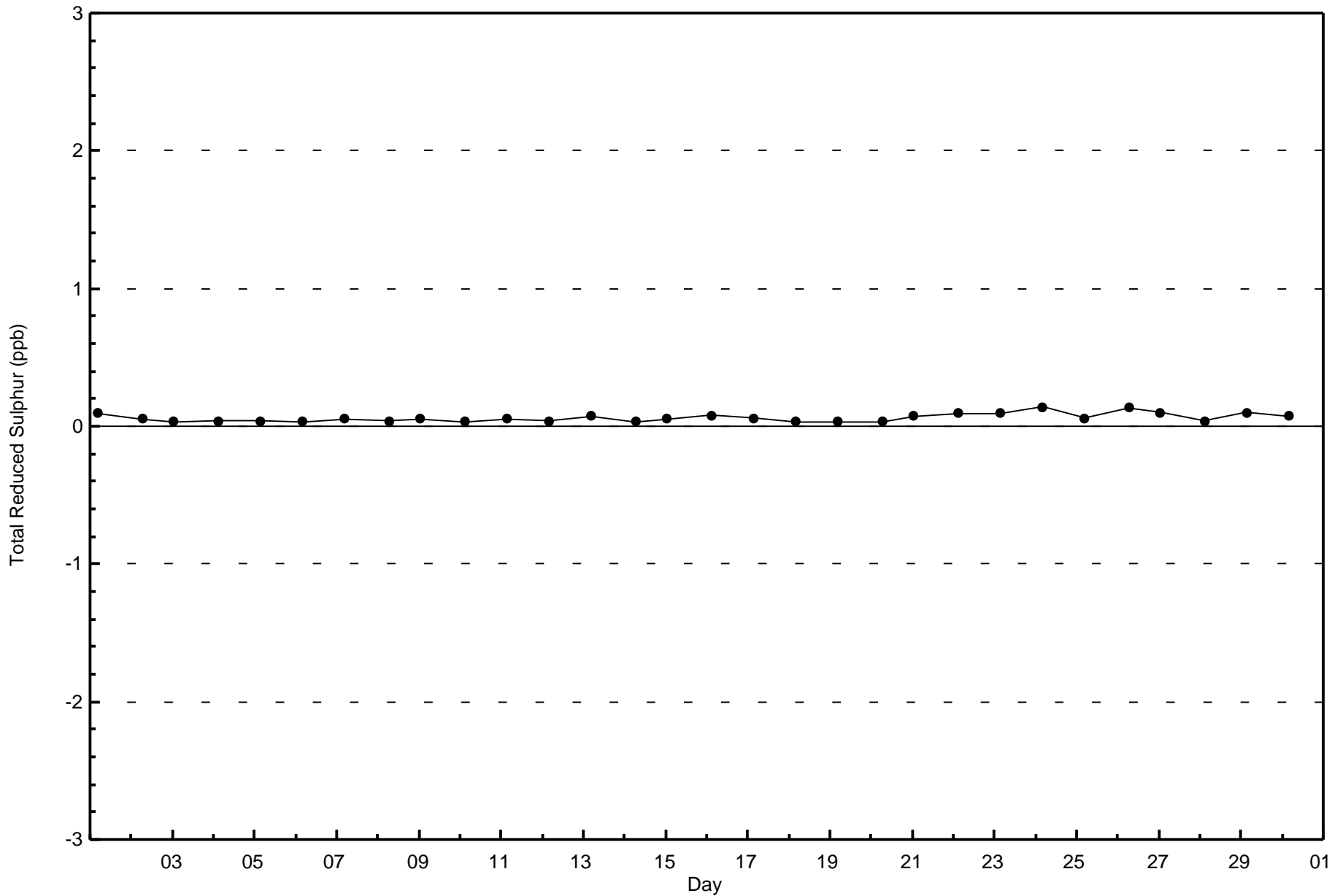
Total Number of Hours: 720

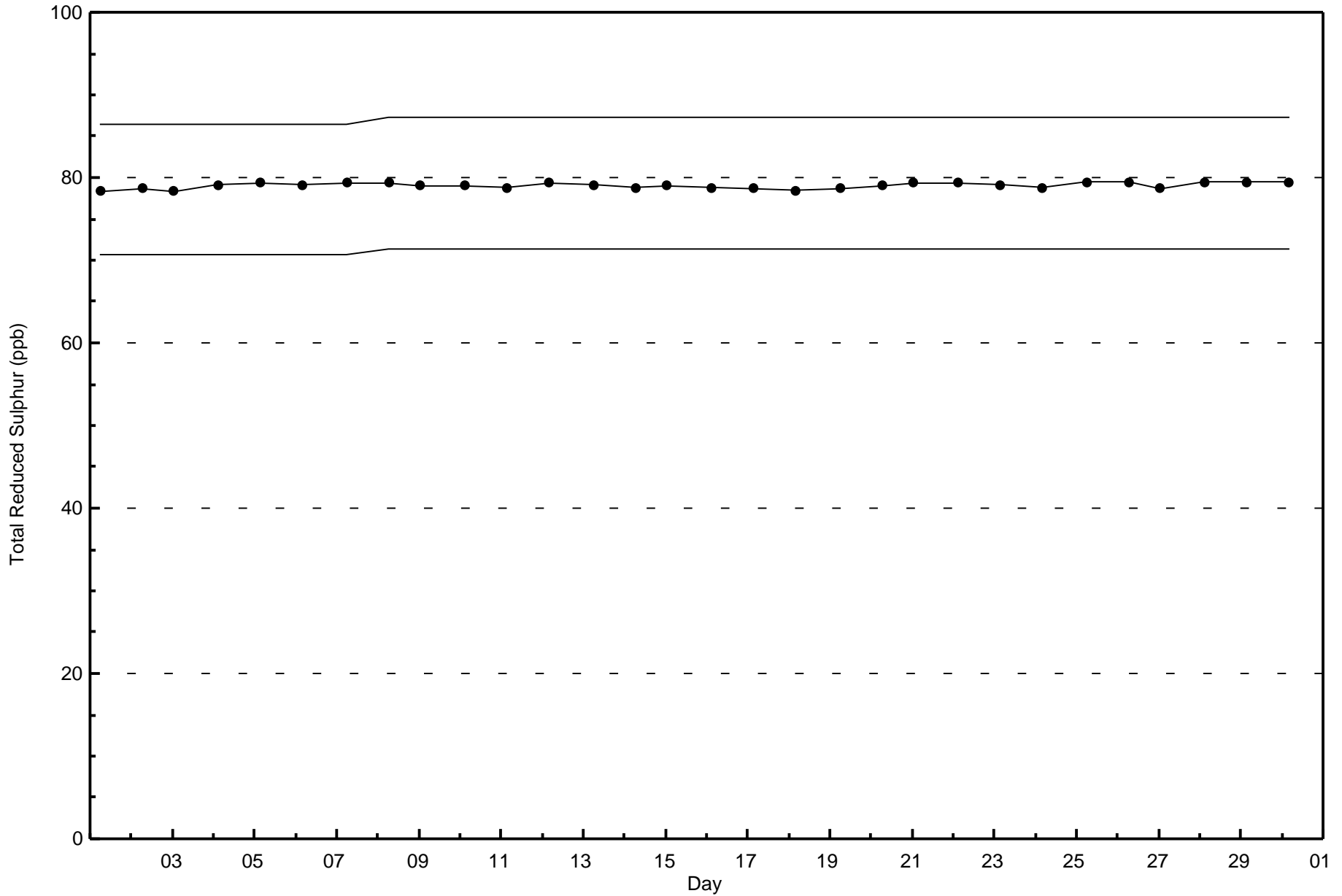


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Reduced Sulphur (TRS) - ppb
Barge Landing (AMS 9)





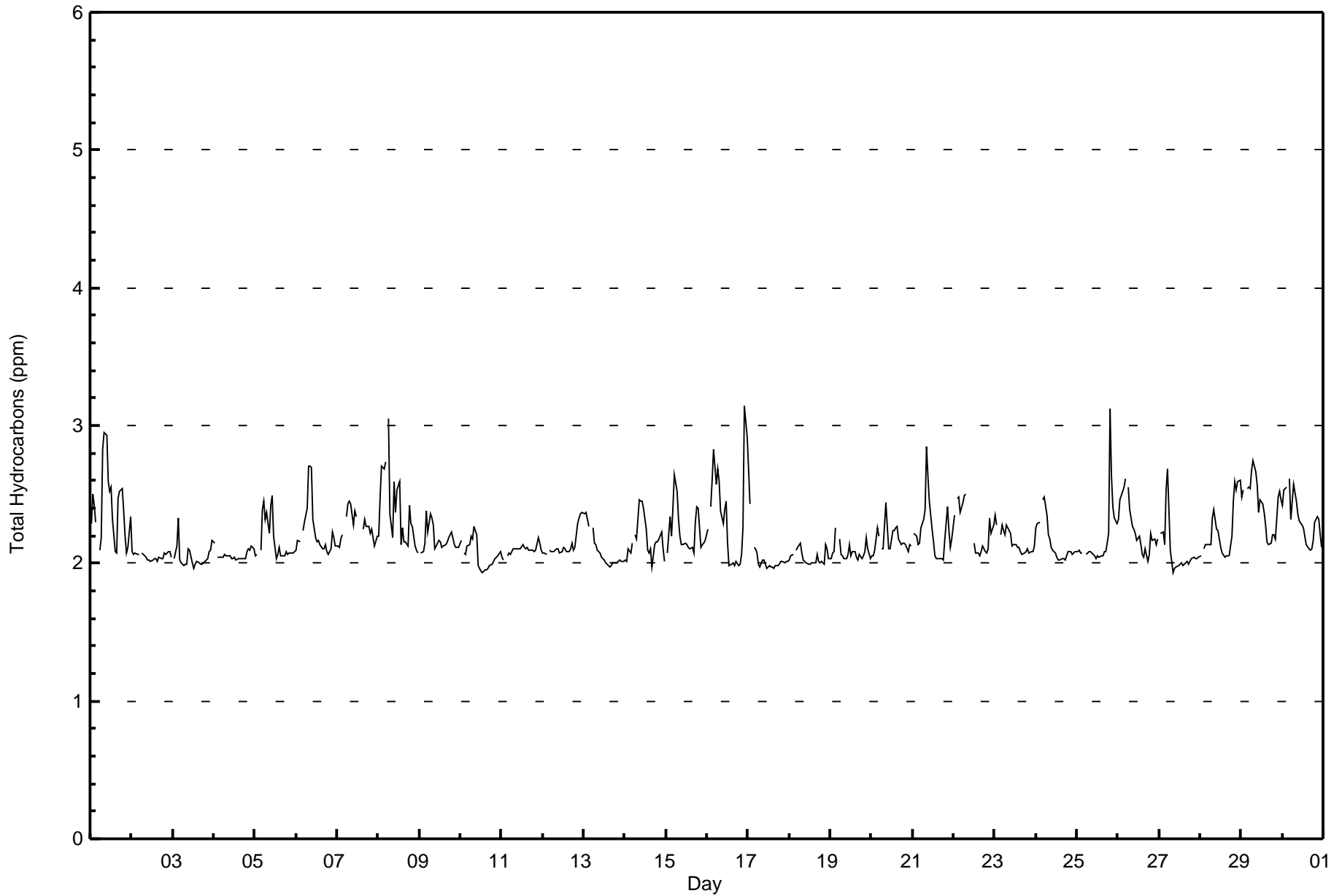




Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Barge Landing - September 2016

| Maximum Value: 3.1 ppm on Sep 16 23:00 | | Maximum Daily Average: 2.4 ppm on Sep 29 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|-----|
| Minimum Value: 1.9 ppm on Sep 10 14:00 | | Minimum Daily Average: 2.0 ppm on Sep 18 | | Hours of Data: 683 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.3 ppm at hour 5 | | Minimum Diurnal Average: 2.1 ppm at hour 16 | | Hours of Missing Data: 37 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.18 ppm | | Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 2.8 | | Hours of Calibration: 37 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 2.3 | 2.5 | 2.4 | 2.3 | Z | 2.1 | 2.2 | 2.8 | 2.9 | 2.9 | 2.6 | 2.5 | 2.6 | 2.3 | 2.1 | 2.1 | 2.5 | 2.5 | 2.5 | 2.4 | 2.2 | 2.1 | 2.1 | 2.3 | 2.4 | 2.9 | |
| 2-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | |
| 3-Sep | Z | 2.0 | 2.1 | 2.3 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.0 | 2.3 |
| 4-Sep | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 5-Sep | 2.1 | 2.1 | Z | 2.1 | 2.4 | 2.5 | 2.3 | 2.4 | 2.2 | 2.4 | 2.5 | 2.2 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.5 |
| 6-Sep | 2.1 | 2.2 | 2.2 | Z | 2.2 | 2.3 | 2.4 | 2.7 | 2.7 | 2.7 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.7 |
| 7-Sep | 2.1 | 2.1 | 2.2 | 2.2 | Z | 2.3 | 2.4 | 2.5 | 2.4 | 2.3 | 2.4 | 2.3 | C | C | C | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.5 | |
| 8-Sep | 2.2 | 2.5 | 2.7 | 2.7 | 2.7 | Z | 3.1 | 2.4 | 2.2 | 2.6 | 2.4 | 2.5 | 2.6 | 2.1 | 2.3 | 2.2 | 2.2 | 2.1 | 2.4 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.4 | 3.1 | |
| 9-Sep | Z | 2.1 | 2.1 | 2.1 | 2.4 | 2.2 | 2.4 | 2.3 | 2.3 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | |
| 10-Sep | 2.2 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.3 | |
| 11-Sep | 2.0 | 2.0 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | |
| 12-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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.3 | 2.3 | 2.4 | 2.4 | 2.1 | 2.4 | |
| 13-Sep | 2.4 | 2.4 | 2.3 | 2.3 | Z | 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 | 2.0 | 2.0 | 2.1 | 2.4 | |
| 14-Sep | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.2 | 2.2 | 2.5 | 2.4 | 2.5 | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 2.2 | 2.5 | |
| 15-Sep | Z | 2.1 | 2.3 | 2.2 | 2.4 | 2.6 | 2.5 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.4 | 2.4 | 2.1 | 2.1 | 2.1 | 2.2 | 2.6 | |
| 16-Sep | 2.2 | Z | 2.4 | 2.6 | 2.8 | 2.6 | 2.7 | 2.6 | 2.4 | 2.3 | 2.4 | 2.4 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.3 | 3.1 | 2.9 | 2.3 | 3.1 | |
| 17-Sep | 2.7 | 2.4 | Z | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.7 | |
| 18-Sep | 2.0 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.2 | |
| 19-Sep | 2.0 | 2.1 | 2.1 | 2.3 | Z | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.1 | 2.0 | 2.1 | 2.3 | |
| 20-Sep | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | Z | 2.1 | 2.1 | 2.4 | 2.3 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | |
| 21-Sep | Z | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.3 | 2.4 | 2.8 | 2.6 | 2.5 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.4 | 2.2 | 2.1 | 2.2 | 2.2 | 2.8 | |
| 22-Sep | 2.3 | Z | 2.5 | 2.5 | 2.4 | 2.4 | 2.5 | 2.5 | C | C | C | C | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.3 | 2.3 | 2.5 | |
| 23-Sep | 2.3 | 2.3 | Z | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | |
| 24-Sep | 2.3 | 2.3 | 2.3 | Z | 2.5 | 2.5 | 2.3 | 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 | 2.5 | |
| 25-Sep | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 3.1 | 2.6 | 2.4 | 2.3 | 2.3 | 2.2 | 3.1 | |
| 26-Sep | 2.3 | 2.5 | 2.5 | 2.6 | 2.6 | Z | 2.6 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.3 | 2.6 | |
| 27-Sep | Z | 2.2 | 2.2 | 2.1 | 2.5 | 2.7 | 2.1 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.7 | |
| 28-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.4 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.5 | 2.6 | 2.5 | 2.6 | 2.2 | 2.6 | |
| 29-Sep | 2.5 | 2.5 | Z | 2.5 | 2.6 | 2.5 | 2.7 | 2.7 | 2.7 | 2.6 | 2.4 | 2.5 | 2.4 | 2.4 | 2.3 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.5 | 2.5 | 2.5 | 2.4 | 2.7 | |
| 30-Sep | 2.4 | 2.5 | 2.6 | Z | 2.6 | 2.3 | 2.6 | 2.5 | 2.5 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.6 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 154 | 22.55 | 22.55 |
| 2.1 - 3.0 | 526 | 77.01 | 99.56 |
| 3.1 - 10.0 | 3 | 0.44 | 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
Barge Landing - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 9 | 15 | 39 | 16 | 30 | 15 | 21 | 153 |
| 2.1 - 3.0 | 40 | 24 | 6 | 14 | 7 | 15 | 37 | 84 | 65 | 69 | 32 | 37 | 17 | 14 | 27 | 38 | 526 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 45 | 24 | 6 | 14 | 7 | 15 | 37 | 86 | 67 | 80 | 47 | 76 | 33 | 44 | 42 | 59 | 682 |

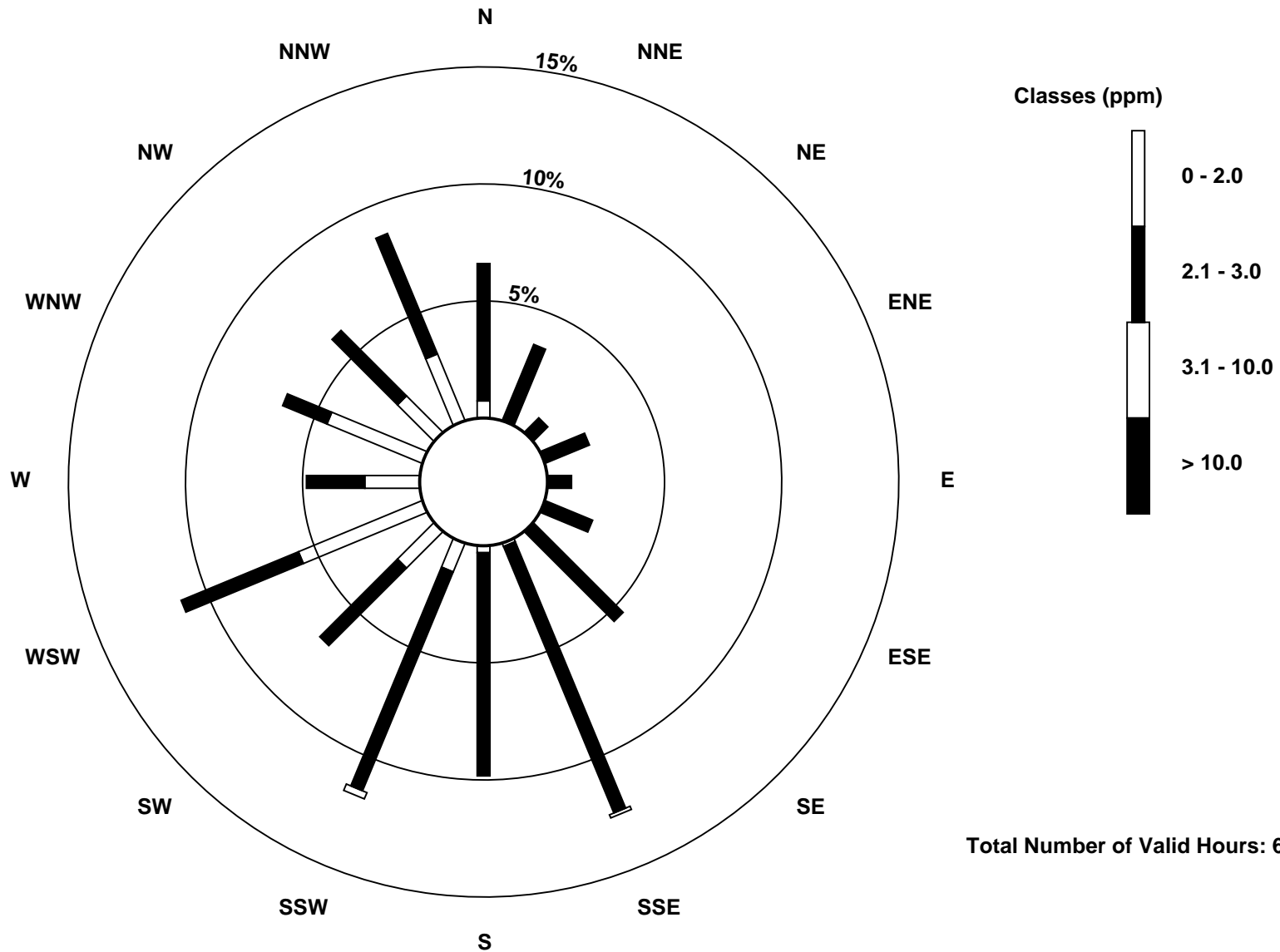
Total Number of Valid Hours: 682

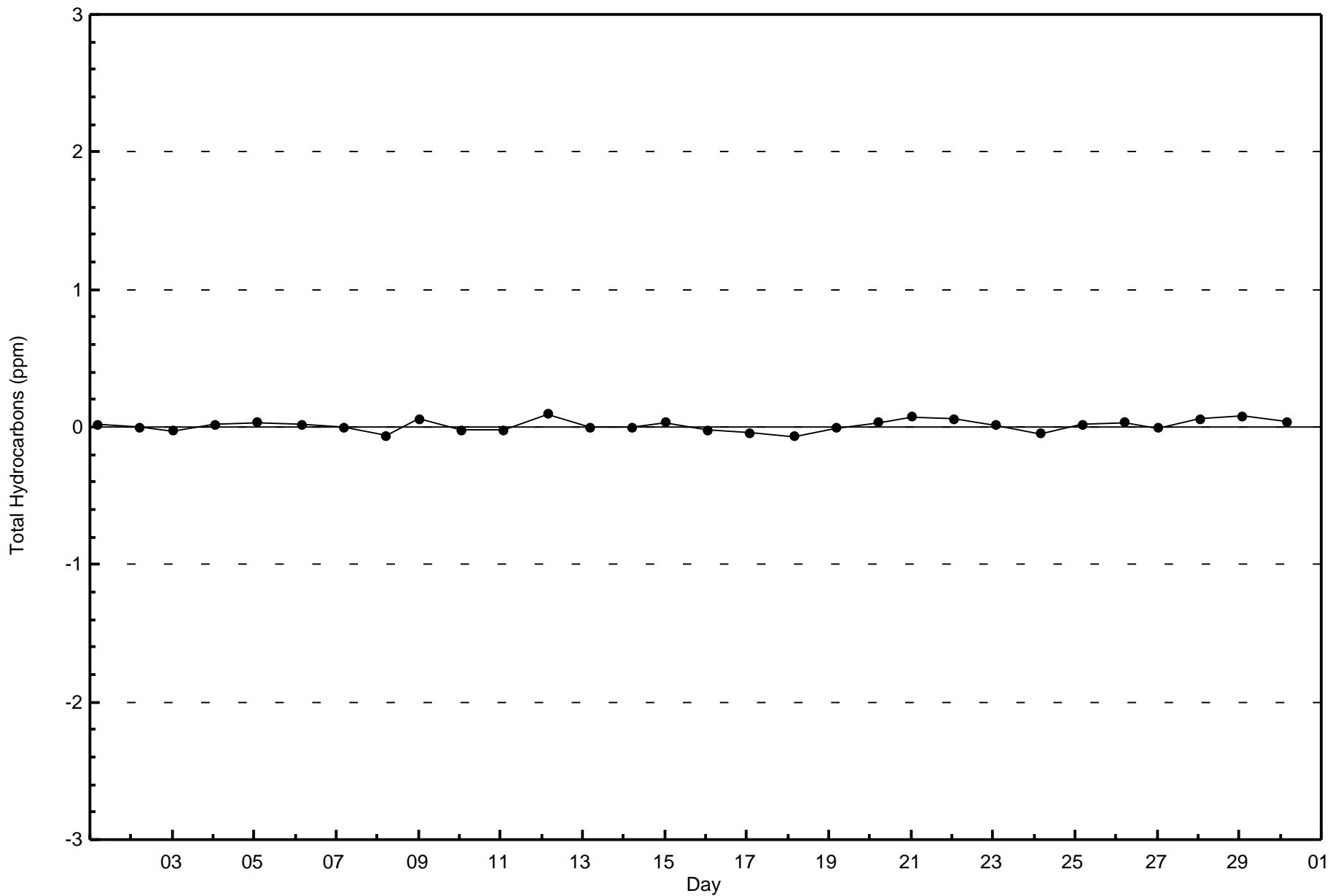
Total Number of Hours: 720

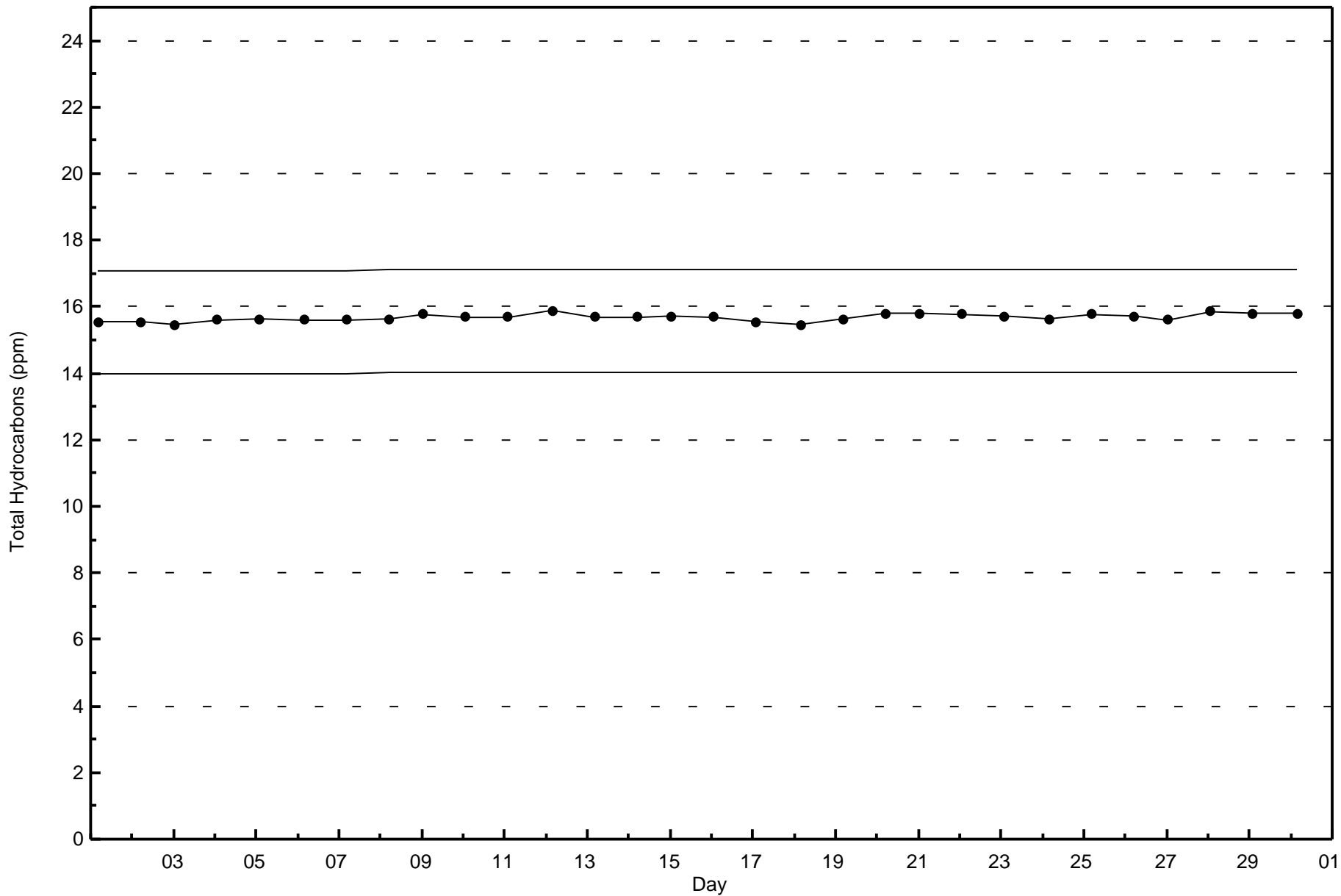


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Hydrocarbons (THC) - ppm
Barge Landing (AMS 9)









Wood Buffalo Environmental Association
Summary of Hour Averages

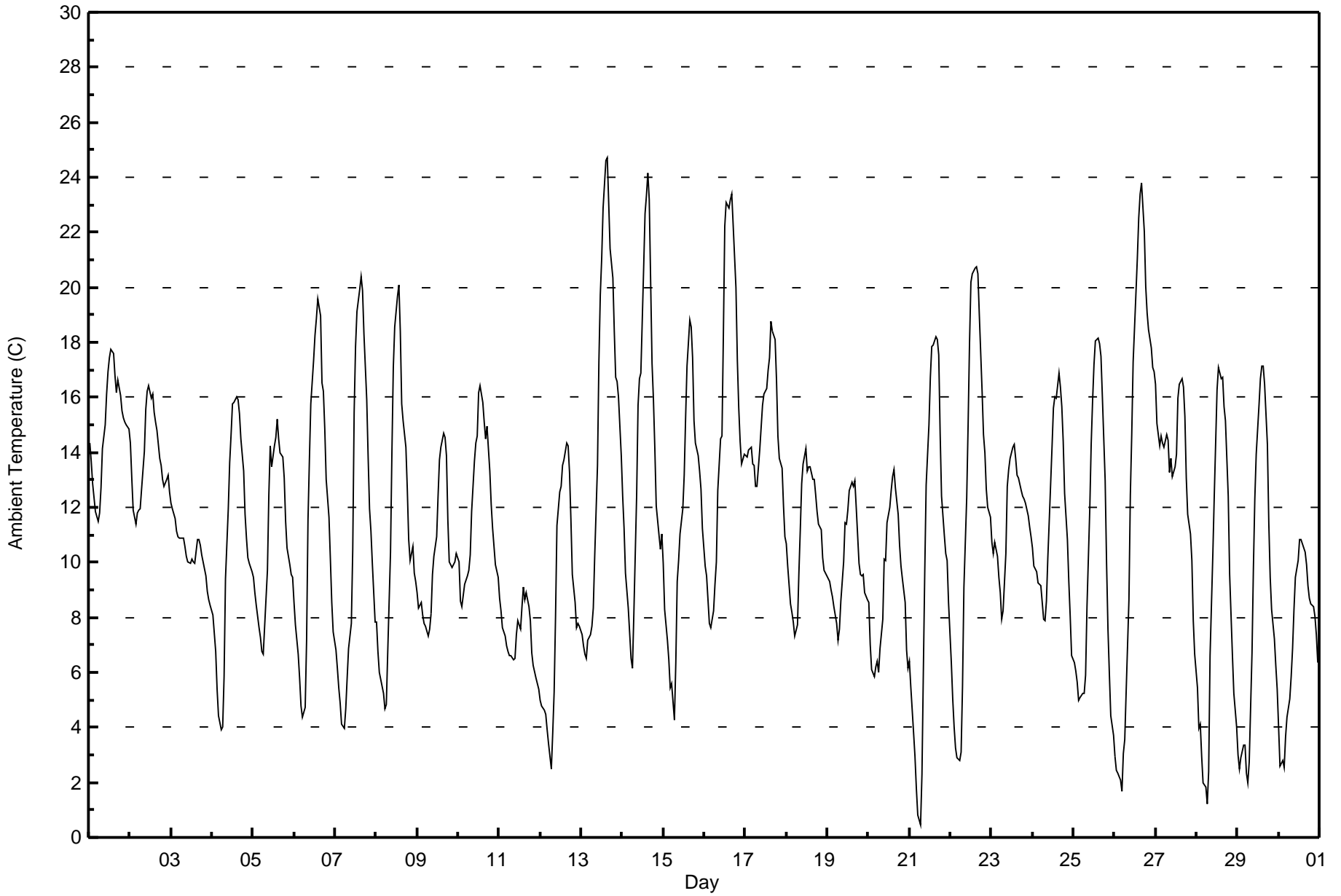
Ambient Temperature (AT) - C
Barge Landing - September 2016

| Maximum Value: 24.7 C on Sep 13 16:00 | | Maximum Daily Average: 15.1 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: 0.5 C on Sep 21 07:00 | | Minimum Daily Average: 7.3 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.7 C at hour 16 | | Minimum Diurnal Average: 6.6 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.37 C | | Percentiles: P ₁ = 2.0 P ₁₀ = 5.2 Q ₁ = 7.9 Median = 11.0 Q ₃ = 14.5 P ₉₀ = 17.4 P ₉₉ = 23.3 | | 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 | 14.3 | 13.7 | 12.9 | 12.4 | 11.8 | 11.5 | 11.8 | 12.7 | 14.1 | 15.0 | 16.1 | 16.9 | 17.4 | 17.7 | 17.6 | 16.8 | 16.2 | 16.7 | 16.0 | 15.5 | 15.2 | 15.1 | 15.0 | 14.9 | 14.9 | 17.7 | |
| 2-Sep | 14.3 | 13.1 | 11.9 | 11.4 | 11.8 | 11.9 | 11.9 | 12.7 | 14.1 | 15.5 | 16.2 | 16.4 | 16.0 | 16.1 | 15.5 | 15.1 | 14.8 | 13.8 | 13.5 | 13.0 | 12.7 | 13.0 | 13.2 | 12.5 | 13.8 | 16.4 | |
| 3-Sep | 12.1 | 11.9 | 11.6 | 11.1 | 10.9 | 10.9 | 10.9 | 10.9 | 10.6 | 10.2 | 10.0 | 10.0 | 10.1 | 10.0 | 10.0 | 10.8 | 10.8 | 10.6 | 10.3 | 10.0 | 9.5 | 9.0 | 8.7 | 8.4 | 10.4 | 12.1 | |
| 4-Sep | 8.1 | 7.4 | 6.8 | 5.4 | 4.4 | 3.9 | 4.0 | 5.9 | 9.4 | 12.0 | 13.6 | 14.6 | 15.7 | 15.8 | 16.0 | 15.9 | 15.4 | 14.5 | 13.3 | 11.8 | 10.9 | 10.2 | 10.0 | 9.7 | 10.6 | 16.0 | |
| 5-Sep | 9.5 | 8.9 | 8.5 | 7.6 | 7.3 | 6.8 | 6.6 | 7.7 | 9.7 | 12.5 | 14.2 | 13.5 | 14.3 | 14.5 | 15.2 | 14.5 | 14.0 | 13.8 | 13.0 | 11.5 | 10.5 | 9.9 | 9.5 | 9.5 | 11.0 | 15.2 | |
| 6-Sep | 8.5 | 7.7 | 6.6 | 5.8 | 4.8 | 4.4 | 4.7 | 7.2 | 11.5 | 13.7 | 15.8 | 17.4 | 18.2 | 18.9 | 19.6 | 18.9 | 16.5 | 16.2 | 14.8 | 13.0 | 11.6 | 10.1 | 8.5 | 7.5 | 11.8 | 19.6 | |
| 7-Sep | 6.8 | 6.2 | 5.4 | 4.9 | 4.1 | 4.0 | 4.7 | 5.8 | 6.8 | 7.8 | 10.5 | 15.5 | 17.9 | 19.1 | 19.9 | 20.4 | 19.9 | 18.3 | 15.9 | 13.8 | 11.9 | 11.1 | 10.0 | 7.8 | 11.2 | 20.4 | |
| 8-Sep | 7.9 | 6.7 | 6.0 | 5.5 | 5.2 | 4.7 | 4.8 | 6.7 | 10.4 | 14.0 | 17.1 | 18.6 | 19.7 | 20.1 | 18.4 | 15.8 | 15.1 | 14.2 | 12.6 | 10.8 | 10.1 | 10.6 | 9.6 | 9.3 | 11.4 | 20.1 | |
| 9-Sep | 8.9 | 8.3 | 8.5 | 8.1 | 7.8 | 7.7 | 7.3 | 7.6 | 8.1 | 9.5 | 10.2 | 10.9 | 12.4 | 13.7 | 14.2 | 14.7 | 14.5 | 13.9 | 11.6 | 10.0 | 9.8 | 9.9 | 10.0 | 10.3 | 10.3 | 14.7 | |
| 10-Sep | 10.0 | 8.6 | 8.4 | 8.8 | 9.2 | 9.5 | 9.7 | 10.3 | 11.9 | 13.7 | 14.3 | 14.6 | 16.2 | 16.4 | 15.8 | 15.1 | 14.5 | 15.0 | 13.3 | 12.1 | 11.2 | 10.6 | 9.9 | 9.4 | 12.0 | 16.4 | |
| 11-Sep | 8.7 | 8.2 | 7.6 | 7.3 | 7.0 | 6.8 | 6.6 | 6.6 | 6.5 | 6.5 | 7.4 | 7.9 | 7.6 | 8.4 | 9.1 | 8.7 | 8.9 | 8.4 | 7.9 | 6.7 | 6.3 | 5.8 | 5.6 | 5.4 | 7.3 | 9.1 | |
| 12-Sep | 5.0 | 4.8 | 4.6 | 4.5 | 3.9 | 3.4 | 2.5 | 3.8 | 5.3 | 8.1 | 11.3 | 12.5 | 12.7 | 13.5 | 13.7 | 14.3 | 14.3 | 13.3 | 11.5 | 9.6 | 8.6 | 7.6 | 7.8 | 7.7 | 8.5 | 14.3 | |
| 13-Sep | 7.4 | 7.0 | 6.7 | 6.5 | 7.2 | 7.4 | 7.7 | 8.3 | 10.2 | 13.5 | 17.3 | 19.7 | 21.0 | 22.9 | 24.6 | 24.7 | 23.1 | 21.4 | 20.3 | 18.4 | 16.7 | 16.6 | 16.0 | 13.9 | 14.9 | 24.7 | |
| 14-Sep | 12.4 | 11.2 | 9.6 | 8.3 | 7.4 | 6.5 | 6.1 | 8.1 | 12.5 | 15.7 | 16.7 | 16.9 | 20.7 | 22.7 | 23.3 | 24.2 | 23.2 | 17.2 | 15.9 | 14.1 | 12.0 | 11.0 | 10.5 | 11.0 | 14.1 | 24.2 | |
| 15-Sep | 10.0 | 8.3 | 7.2 | 6.5 | 5.5 | 5.6 | 4.3 | 6.4 | 9.3 | 10.1 | 11.1 | 11.9 | 13.2 | 15.3 | 17.1 | 18.8 | 18.6 | 17.5 | 15.1 | 14.3 | 13.9 | 13.3 | 12.7 | 11.3 | 11.5 | 18.8 | |
| 16-Sep | 9.9 | 9.5 | 8.7 | 7.8 | 7.6 | 8.3 | 9.2 | 10.0 | 12.6 | 14.5 | 14.6 | 18.3 | 22.2 | 23.1 | 22.9 | 23.2 | 23.4 | 22.3 | 20.0 | 17.3 | 15.6 | 14.4 | 13.6 | 13.9 | 15.1 | 23.4 | |
| 17-Sep | 13.9 | 13.8 | 14.1 | 14.2 | 13.6 | 13.5 | 12.7 | 12.8 | 14.1 | 14.9 | 15.7 | 16.1 | 16.3 | 17.0 | 17.4 | 18.8 | 18.4 | 18.1 | 16.6 | 14.6 | 13.8 | 13.4 | 12.1 | 10.9 | 14.9 | 18.8 | |
| 18-Sep | 10.7 | 9.9 | 8.5 | 8.2 | 7.8 | 7.3 | 7.7 | 9.6 | 11.2 | 12.8 | 13.6 | 14.1 | 13.3 | 13.5 | 13.5 | 13.0 | 13.0 | 12.5 | 11.8 | 11.4 | 11.2 | 10.2 | 9.7 | 9.6 | 11.0 | 14.1 | |
| 19-Sep | 9.4 | 9.3 | 9.0 | 8.8 | 8.4 | 7.8 | 7.2 | 7.6 | 8.6 | 10.0 | 11.5 | 11.4 | 11.9 | 12.6 | 12.9 | 12.8 | 13.0 | 12.0 | 9.9 | 9.6 | 9.5 | 9.6 | 8.9 | 8.7 | 10.0 | 13.0 | |
| 20-Sep | 8.6 | 7.0 | 6.1 | 5.9 | 6.2 | 6.4 | 6.0 | 6.9 | 7.9 | 10.1 | 10.1 | 11.4 | 12.0 | 12.6 | 13.1 | 13.4 | 12.7 | 11.7 | 10.6 | 9.9 | 9.4 | 8.5 | 6.8 | 6.2 | 9.1 | 13.4 | |
| 21-Sep | 6.4 | 5.5 | 3.8 | 3.0 | 1.8 | 0.8 | 0.5 | 2.3 | 6.0 | 9.7 | 12.8 | 15.0 | 16.7 | 17.9 | 17.9 | 18.2 | 18.1 | 17.5 | 14.7 | 12.4 | 11.0 | 10.3 | 10.1 | 8.6 | 10.0 | 18.2 | |
| 22-Sep | 6.3 | 5.0 | 4.0 | 3.3 | 2.9 | 2.8 | 3.1 | 5.5 | 9.1 | 12.4 | 15.0 | 17.9 | 20.2 | 20.5 | 20.7 | 20.8 | 20.5 | 19.0 | 16.2 | 14.7 | 14.0 | 12.7 | 12.0 | 11.6 | 12.1 | 20.8 | |
| 23-Sep | 10.8 | 10.3 | 10.7 | 10.2 | 9.4 | 8.9 | 7.9 | 8.2 | 10.3 | 12.8 | 13.4 | 13.8 | 14.2 | 14.3 | 13.8 | 13.2 | 13.1 | 12.6 | 12.4 | 12.3 | 12.2 | 11.7 | 11.3 | 10.9 | 11.6 | 14.3 | |
| 24-Sep | 10.5 | 9.9 | 9.6 | 9.2 | 9.2 | 9.2 | 7.9 | 7.9 | 8.6 | 10.2 | 11.5 | 14.2 | 15.6 | 16.0 | 16.0 | 16.9 | 16.4 | 15.7 | 14.4 | 12.5 | 10.8 | 9.3 | 8.0 | 6.6 | 11.5 | 16.9 | |
| 25-Sep | 6.4 | 6.1 | 5.7 | 5.0 | 5.1 | 5.3 | 5.2 | 5.9 | 8.4 | 11.9 | 14.3 | 15.8 | 17.2 | 18.1 | 18.1 | 18.0 | 17.5 | 16.0 | 13.0 | 10.0 | 7.6 | 5.9 | 4.4 | 3.7 | 10.2 | 18.1 | |
| 26-Sep | 2.9 | 2.4 | 2.3 | 2.1 | 1.7 | 3.0 | 3.5 | 5.3 | 8.7 | 12.5 | 14.6 | 17.3 | 19.8 | 21.1 | 22.5 | 23.4 | 23.8 | 22.0 | 20.0 | 19.1 | 18.5 | 17.8 | 17.1 | 16.9 | 13.3 | 23.8 | |
| 27-Sep | 16.5 | 15.0 | 14.2 | 14.6 | 14.3 | 14.2 | 14.6 | 14.4 | 13.3 | 13.8 | 13.1 | 13.5 | 13.9 | 16.0 | 16.5 | 16.7 | 16.4 | 15.3 | 13.1 | 11.7 | 11.0 | 10.0 | 7.9 | 6.7 | 13.6 | 16.7 | |
| 28-Sep | 5.5 | 4.0 | 4.1 | 2.9 | 2.0 | 1.9 | 1.2 | 2.4 | 6.6 | 10.3 | 12.4 | 14.3 | 16.3 | 17.1 | 16.7 | 16.7 | 15.7 | 15.2 | 12.4 | 9.6 | 8.1 | 6.6 | 5.2 | 4.0 | 8.8 | 17.1 | |
| 29-Sep | 3.0 | 2.5 | 2.9 | 3.4 | 3.4 | 2.3 | 2.0 | 2.8 | 6.7 | 9.8 | 12.3 | 13.9 | 15.7 | 16.7 | 17.1 | 17.2 | 16.4 | 14.3 | 11.4 | 9.5 | 8.3 | 7.2 | 6.3 | 5.4 | 8.8 | 17.2 | |
| 30-Sep | 4.0 | 2.6 | 2.8 | 2.5 | 3.7 | 4.4 | 5.0 | 5.8 | 6.8 | 8.3 | 9.4 | 10.1 | 10.8 | 10.8 | 10.7 | 10.4 | 9.9 | 9.1 | 8.7 | 8.5 | 8.4 | 8.0 | 7.4 | 6.4 | 7.3 | 10.8 | |
| | | 9.0 | 8.2 | 7.6 | 7.2 | 6.8 | 6.7 | 6.6 | 7.6 | 9.6 | 11.7 | 13.2 | 14.5 | 15.6 | 16.4 | 16.7 | 16.7 | 16.3 | 15.3 | 13.7 | 12.3 | 11.3 | 10.7 | 9.9 | 9.3 | Diurnal Average | |
| | | 16.5 | 15.0 | 14.2 | 14.6 | 14.3 | 14.2 | 14.6 | 14.4 | 14.1 | 15.7 | 17.3 | 19.7 | 22.2 | 23.1 | 24.6 | 24.7 | 23.8 | 22.3 | 20.3 | 19.1 | 18.5 | 17.8 | 17.1 | 16.9 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Barge Landing - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 298 | 41.39 | 41.39 |
| 10 - 20 | 391 | 54.31 | 95.69 |
| > 20 | 31 | 4.31 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



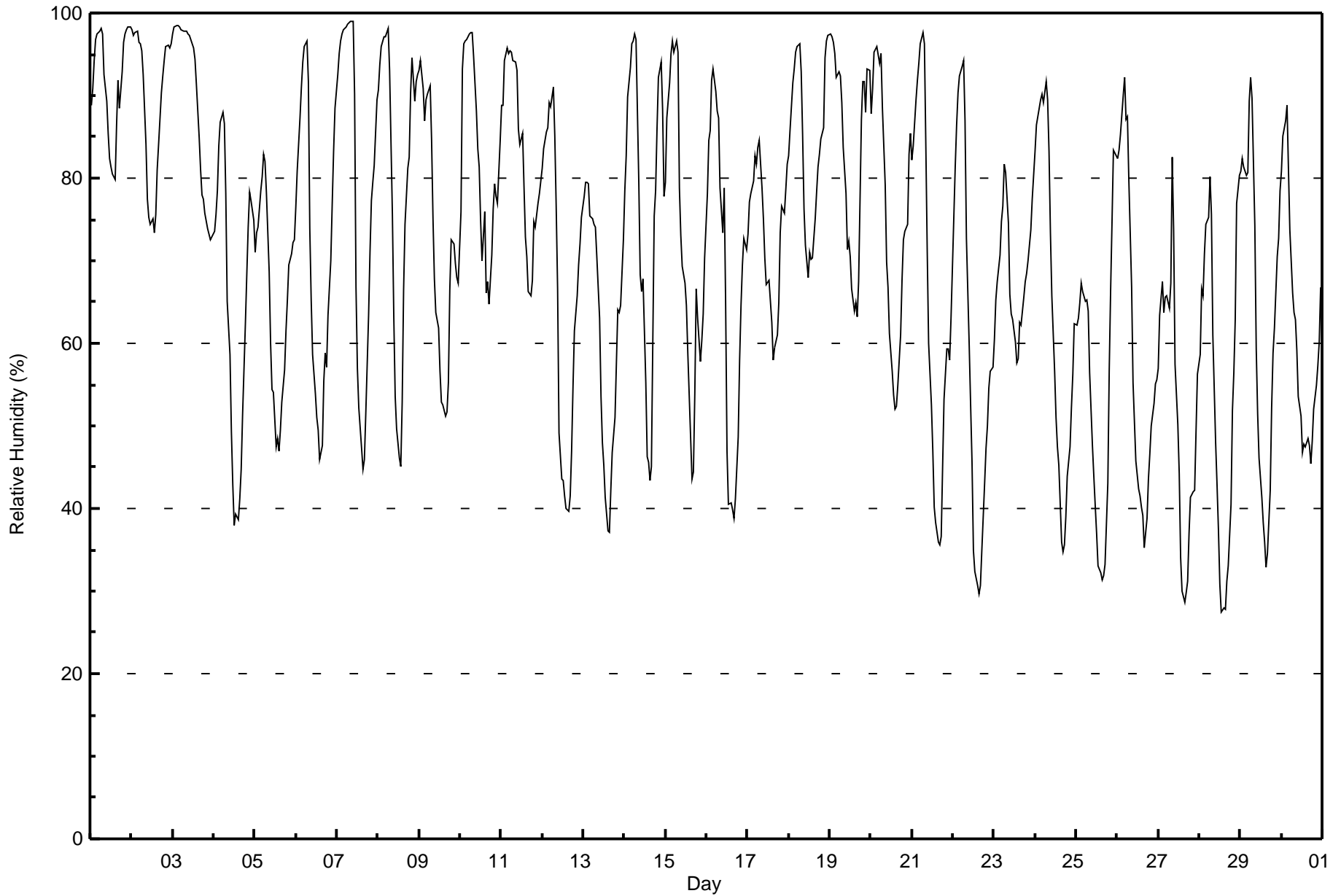
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Barge Landing - September 2016

| Maximum Value: 99 % on Sep 7 09:00 Maximum Daily Average: 91.7 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 28 % on Sep 28 14:00 Minimum Daily Average: 51.9 % on Sep 27 Maximum Diurnal Average: 89.1 % at hour 7 Minimum Diurnal Average: 50.5 % at hour 16 Monthly Average: 71.1 % Percentiles: P ₁ = 31 P ₁₀ = 43 Q ₁ = 57 Median = 73 Q ₃ = 87 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 | 89 | 91 | 94 | 97 | 97 | 98 | 98 | 98 | 92 | 89 | 85 | 82 | 81 | 81 | 80 | 86 | 92 | 89 | 93 | 96 | 97 | 98 | 98 | 98 | 91.7 | 98 |
| 2-Sep | 98 | 97 | 98 | 98 | 97 | 96 | 96 | 93 | 84 | 77 | 75 | 74 | 75 | 73 | 76 | 81 | 84 | 90 | 92 | 94 | 96 | 96 | 96 | 96 | 88.9 | 98 |
| 3-Sep | 97 | 98 | 98 | 99 | 98 | 98 | 98 | 98 | 98 | 97 | 97 | 96 | 96 | 94 | 91 | 85 | 81 | 78 | 77 | 76 | 74 | 73 | 73 | 73 | 89.3 | 99 |
| 4-Sep | 73 | 76 | 78 | 84 | 87 | 88 | 87 | 78 | 65 | 59 | 49 | 43 | 38 | 39 | 39 | 41 | 45 | 51 | 62 | 68 | 74 | 78 | 77 | 75 | 64.8 | 88 |
| 5-Sep | 71 | 73 | 74 | 79 | 80 | 83 | 82 | 78 | 69 | 60 | 54 | 54 | 47 | 48 | 47 | 49 | 53 | 57 | 61 | 65 | 70 | 71 | 72 | 73 | 65.5 | 83 |
| 6-Sep | 76 | 81 | 87 | 91 | 94 | 96 | 97 | 92 | 74 | 65 | 59 | 54 | 51 | 50 | 46 | 48 | 55 | 59 | 57 | 63 | 70 | 77 | 83 | 89 | 71.4 | 97 |
| 7-Sep | 92 | 95 | 97 | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 90 | 67 | 57 | 52 | 47 | 45 | 46 | 51 | 63 | 71 | 77 | 79 | 82 | 90 | 78.8 | 99 |
| 8-Sep | 91 | 94 | 96 | 97 | 97 | 98 | 98 | 93 | 76 | 63 | 54 | 50 | 46 | 45 | 53 | 66 | 74 | 81 | 82 | 90 | 95 | 89 | 92 | 93 | 79.7 | 98 |
| 9-Sep | 93 | 94 | 91 | 87 | 89 | 90 | 91 | 85 | 75 | 68 | 64 | 62 | 57 | 53 | 53 | 51 | 52 | 55 | 66 | 73 | 72 | 70 | 68 | 67 | 71.9 | 94 |
| 10-Sep | 76 | 93 | 96 | 97 | 97 | 97 | 98 | 98 | 95 | 88 | 84 | 81 | 75 | 70 | 76 | 66 | 67 | 65 | 71 | 76 | 79 | 78 | 77 | 85 | 82.7 | 98 |
| 11-Sep | 89 | 89 | 94 | 96 | 95 | 95 | 95 | 94 | 94 | 93 | 86 | 84 | 85 | 79 | 73 | 71 | 66 | 66 | 68 | 75 | 74 | 77 | 78 | 80 | 83.2 | 96 |
| 12-Sep | 81 | 84 | 86 | 86 | 89 | 89 | 91 | 85 | 76 | 67 | 49 | 44 | 43 | 42 | 40 | 40 | 42 | 47 | 55 | 62 | 66 | 69 | 72 | 75 | 65.7 | 91 |
| 13-Sep | 78 | 80 | 79 | 79 | 75 | 75 | 74 | 74 | 70 | 63 | 54 | 48 | 45 | 41 | 37 | 37 | 42 | 47 | 51 | 58 | 64 | 64 | 65 | 73 | 61.4 | 80 |
| 14-Sep | 78 | 83 | 90 | 93 | 96 | 97 | 97 | 97 | 79 | 68 | 66 | 68 | 55 | 46 | 46 | 43 | 45 | 75 | 78 | 86 | 92 | 94 | 88 | 78 | 76.7 | 97 |
| 15-Sep | 79 | 87 | 92 | 95 | 97 | 95 | 97 | 95 | 79 | 73 | 69 | 67 | 65 | 59 | 54 | 43 | 44 | 54 | 67 | 63 | 58 | 60 | 64 | 70 | 71.9 | 97 |
| 16-Sep | 78 | 85 | 86 | 92 | 93 | 91 | 88 | 87 | 79 | 73 | 79 | 65 | 47 | 41 | 41 | 40 | 39 | 41 | 49 | 58 | 65 | 70 | 73 | 71 | 67.8 | 93 |
| 17-Sep | 73 | 77 | 78 | 80 | 83 | 82 | 84 | 85 | 79 | 75 | 70 | 67 | 68 | 65 | 63 | 58 | 59 | 61 | 65 | 73 | 77 | 76 | 79 | 82 | 73.2 | 85 |
| 18-Sep | 83 | 86 | 92 | 93 | 95 | 96 | 96 | 93 | 85 | 76 | 72 | 68 | 71 | 70 | 70 | 75 | 78 | 81 | 83 | 85 | 86 | 95 | 97 | 97 | 84.3 | 97 |
| 19-Sep | 97 | 97 | 96 | 95 | 92 | 93 | 92 | 89 | 84 | 78 | 71 | 72 | 71 | 67 | 64 | 65 | 63 | 67 | 87 | 92 | 92 | 88 | 93 | 93 | 83.3 | 97 |
| 20-Sep | 88 | 91 | 95 | 96 | 95 | 94 | 95 | 89 | 79 | 70 | 67 | 61 | 57 | 54 | 52 | 52 | 55 | 61 | 68 | 73 | 74 | 74 | 83 | 85 | 75.3 | 96 |
| 21-Sep | 82 | 84 | 89 | 92 | 94 | 96 | 98 | 96 | 84 | 71 | 60 | 52 | 47 | 40 | 38 | 36 | 36 | 37 | 45 | 53 | 59 | 59 | 58 | 63 | 65.4 | 98 |
| 22-Sep | 75 | 81 | 86 | 90 | 92 | 94 | 94 | 87 | 73 | 60 | 52 | 46 | 35 | 32 | 31 | 30 | 31 | 35 | 43 | 47 | 50 | 55 | 57 | 57 | 59.7 | 94 |
| 23-Sep | 60 | 65 | 68 | 71 | 75 | 77 | 82 | 81 | 75 | 66 | 64 | 63 | 60 | 58 | 58 | 62 | 62 | 66 | 67 | 69 | 70 | 74 | 77 | 80 | 68.7 | 82 |
| 24-Sep | 83 | 86 | 88 | 89 | 90 | 89 | 92 | 89 | 83 | 73 | 66 | 57 | 51 | 47 | 45 | 36 | 35 | 36 | 39 | 44 | 47 | 52 | 56 | 62 | 64.1 | 92 |
| 25-Sep | 62 | 63 | 65 | 67 | 66 | 65 | 65 | 64 | 56 | 48 | 44 | 40 | 37 | 33 | 32 | 31 | 32 | 33 | 43 | 57 | 66 | 75 | 83 | 83 | 54.7 | 83 |
| 26-Sep | 82 | 83 | 85 | 90 | 92 | 87 | 88 | 80 | 67 | 55 | 50 | 46 | 42 | 42 | 40 | 39 | 35 | 39 | 44 | 47 | 50 | 53 | 55 | 56 | 60.3 | 92 |
| 27-Sep | 57 | 63 | 68 | 64 | 66 | 66 | 64 | 67 | 83 | 74 | 57 | 50 | 44 | 34 | 30 | 29 | 30 | 31 | 37 | 41 | 42 | 42 | 49 | 56 | 51.9 | 83 |
| 28-Sep | 59 | 67 | 66 | 71 | 74 | 75 | 80 | 76 | 61 | 48 | 43 | 37 | 31 | 28 | 28 | 28 | 31 | 33 | 40 | 52 | 56 | 63 | 77 | 80 | 54.3 | 80 |
| 29-Sep | 81 | 82 | 81 | 80 | 81 | 89 | 92 | 90 | 74 | 59 | 52 | 46 | 41 | 38 | 36 | 33 | 35 | 42 | 52 | 59 | 62 | 71 | 73 | 78 | 63.7 | 92 |
| 30-Sep | 81 | 85 | 87 | 89 | 81 | 74 | 66 | 64 | 63 | 59 | 53 | 51 | 47 | 48 | 47 | 48 | 48 | 45 | 48 | 52 | 55 | 57 | 60 | 67 | 61.5 | 89 |
| 80.2 83.7 86.0 87.8 88.6 88.7 89.1 86.4 78.3 70.5 64.6 59.9 55.5 52.3 51.1 50.5 51.9 55.8 61.8 67.2 70.3 72.5 75.1 77.5 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 98 98 98 99 98 98 99 99 99 99 97 96 96 94 91 86 92 90 93 96 97 98 98 98 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





| | | |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 17 km/h on Sep 27 15:00 | Maximum Daily Speed Average: 11.2 km/h on Sep 23 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 8 11:00 | Minimum Daily Speed Average: 1.1 km/h on Sep 9 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 4.0 km/h at hour 13 | Minimum Diurnal Speed Average: 0.7 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 2.1 km/h 228.5 deg | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 8 P ₉₀ = 11 P ₉₉ = 15 | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|------|-------|-------|-------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | ENE3 | NNE3 | N3 | NNW5 | NNW4 | N3 | N2 | ENE2 | N3 | NNW5 | NNW6 | N6 | NNE8 | NE8 | E6 | SSE0 | NNE7 | ESE2 | NNW3 | NW4 | NNW5 | NW3 | W3 | W3 | N2.9 | NNE8 |
| 2-Sep | WSW7 | SW4 | SW5 | WSW5 | W5 | SW4 | WSW5 | SW5 | WSW8 | WSW8 | WSW6 | WSW7 | WSW7 | WSW6 | WSW5 | WSW6 | WSW5 | WSW5 | NNW2 | SW2 | WNW3 | NW4 | NNW5 | NNW5 | WSW4.4 | WSW8 |
| 3-Sep | N5 | NW5 | NW5 | NNW5 | NW6 | NW4 | WNW7 | WNW7 | WNW8 | NW8 | NW8 | NNW10 | NNW8 | NNW8 | NNW9 | NNW10 | NNW12 | NNW13 | NNW10 | NNW10 | NNW13 | NNW10 | NNW9 | NW9 | NNW7.8 | NNW13 |
| 4-Sep | NW8 | NW6 | NW5 | WNW4 | WNW5 | WNW5 | W5 | W6 | W5 | WSW5 | WNW8 | WNW8 | WNW7 | NW6 | WNW5 | WNW5 | NW4 | NNW3 | AF | SE3 | SSE3 | SSE2 | S3 | WSW5 | WNW3.9 | WNW8 |
| 5-Sep | WSW5 | SW3 | SSW5 | SSW4 | SSW5 | SSW5 | SSW5 | SSW6 | SW6 | SSW8 | S8 | SW8 | SSW9 | SSW9 | SSW9 | SSE7 | SSE5 | SE4 | ESE4 | ESE5 | SE5 | SE6 | SE6 | SE6 | S5.0 | SSW9 |
| 6-Sep | SE6 | SSE4 | SE3 | SE3 | SE4 | S4 | SSE3 | SW3 | SSW6 | S8 | S8 | S10 | SSE11 | S8 | S9 | SSE13 | SSW7 | S6 | S8 | S7 | S5 | SE7 | SE6 | SSE5 | S6.0 | SSE13 |
| 7-Sep | SE6 | SE5 | SE3 | SE2 | S1 | SSE2 | SSE3 | SW3 | SSW4 | S6 | SW4 | WSW5 | S7 | S7 | SSW6 | SSW7 | S7 | S4 | SSE3 | NW2 | S3 | W4 | WSW2 | SSE4 | S3.4 | S7 |
| 8-Sep | SW4 | SSW3 | SSW3 | S3 | SW4 | SSW2 | SSW3 | SW6 | W2 | ESE1 | ESE0 | NW3 | SSE2 | WSW3 | NNW3 | SSW5 | SW5 | NNW4 | ENE2 | NW2 | NW3 | N4 | N4 | NNW5 | WSW1.4 | SW6 |
| 9-Sep | NNW3 | NNW2 | NNW5 | WNW3 | N4 | N5 | NNE7 | N6 | NNE6 | N5 | NNW4 | WNW3 | WSW5 | SW6 | SSW6 | SSW6 | SSW7 | S6 | SE7 | SE7 | SE9 | SE10 | SE11 | SSE11 | SSE1.1 | SE11 |
| 10-Sep | SSE9 | SE10 | SE11 | SSE12 | SSE12 | S10 | SSE9 | SSE8 | S7 | WSW6 | WSW8 | WSW9 | W8 | WNW8 | W9 | WNW11 | WNW9 | WNW9 | W10 | W9 | W9 | WNW8 | WNW7 | NNW7 | SW4.2 | SSE12 |
| 11-Sep | N12 | N13 | N12 | N13 | N15 | N14 | N14 | N13 | N12 | N12 | N13 | N12 | N11 | N11 | N11 | N9 | NNW9 | N8 | NNW7 | NNW5 | NNW4 | NW3 | NW3 | NW4 | N9.9 | N15 |
| 12-Sep | NW4 | NW4 | NW4 | W4 | W4 | WNW3 | W2 | WSW5 | WSW6 | SW6 | WSW8 | SW9 | SSW10 | SSW9 | SSW10 | SW9 | SSW8 | SSE7 | SSE7 | SSE8 | SSE7 | SSE8 | SSE8 | S8 | SSW4.7 | SSW10 |
| 13-Sep | S8 | SSW6 | S6 | SSW7 | SSW9 | SSW9 | SSW9 | SSW9 | SSW9 | SSW8 | SW8 | SSW12 | SW13 | SW12 | WSW12 | SW11 | SW11 | SW10 | WSW9 | WSW8 | WSW8 | W10 | WNW6 | W4 | SW8.1 | SW13 |
| 14-Sep | WNW4 | NW4 | N1 | WSW1 | SSE1 | W0 | WNW1 | NW1 | W2 | WSW4 | SSW6 | WSW2 | SSW4 | SSW6 | S6 | SW8 | WNW9 | N9 | N5 | W2 | S2 | SSW2 | NW2 | NNW5 | W1.9 | WNW9 |
| 15-Sep | NNW5 | NW3 | ENE1 | WSW2 | NE3 | ENE1 | SE2 | WSW3 | E4 | ENE5 | ENE4 | ENE3 | N2 | WNW4 | NNW3 | SE7 | SE5 | NE2 | NE2 | ESE3 | S4 | SSE7 | SSE5 | SE4 | ESE1.3 | SE7 |
| 16-Sep | SW2 | SW4 | SSW3 | SSE4 | SSE5 | SSE5 | SSE5 | SSW4 | SSW6 | SSW7 | S7 | S9 | SW11 | WSW15 | WSW15 | WSW12 | WSW12 | WSW7 | SW4 | SSW4 | S4 | S5 | SSE5 | S4 | SSW5.6 | WSW15 |
| 17-Sep | S5 | S5 | S6 | S6 | S7 | S7 | SSW7 | SW6 | SSW7 | SW8 | SW8 | SW9 | SSW8 | SW9 | WSW9 | WSW9 | WSW7 | W4 | WSW3 | S3 | SSW3 | SW5 | SW4 | WSW3 | SSW5.6 | WSW9 |
| 18-Sep | WSW4 | WSW2 | WSW2 | SW1 | WNW2 | SSE4 | SW2 | WSW4 | WSW5 | NW6 | WNW6 | NW10 | NW10 | NW9 | NW9 | NNW7 | NNW6 | N5 | NNW4 | NNW3 | N4 | N3 | NNW3 | NW3 | NW3.7 | NW10 |
| 19-Sep | NNW2 | NNW3 | NNW3 | NNW3 | NW4 | WSW3 | WSW6 | W5 | W6 | W5 | NW5 | NNW6 | NW5 | NNW7 | NW7 | NNW6 | NNW6 | N6 | NNW5 | NNW3 | WNW3 | NW4 | NNW5 | N5 | NW4.0 | NNW7 |
| 20-Sep | N6 | NNW3 | NW2 | NNW2 | N4 | NNW3 | NW2 | N4 | NNE4 | N4 | N4 | NE4 | ENE5 | ENE5 | ENE5 | ENE5 | E4 | E5 | E6 | E6 | ESE6 | SE1 | SW1 | SE3 | NE2.4 | ESE6 |
| 21-Sep | ESE2 | ENE2 | ESE2 | ESE3 | SSE4 | SSW3 | SSW4 | SW5 | SSW5 | SW6 | SSW8 | SSW9 | SSW11 | SW9 | WSW10 | WSW9 | WSW9 | WSW7 | SW5 | SSW5 | S5 | S6 | SSW5 | S4 | SSW4.7 | SSW11 |
| 22-Sep | SE3 | ESE2 | SE3 | SE4 | S4 | SSE5 | SSE5 | S7 | S7 | SSW7 | SSE8 | S8 | SSW13 | SSW13 | SSW13 | SSW12 | SSW10 | S8 | SSE6 | S8 | S8 | SSE8 | SSE8 | SSE10 | S7.0 | SSW13 |
| 23-Sep | SSE9 | SSE9 | SSE11 | SSE10 | SSE10 | SSE9 | SSE9 | SE9 | SSE8 | SSE12 | S14 | SSE15 | SSE14 | SSE15 | SSE14 | SSE11 | SSE11 | SSE14 | SSE11 | SSE11 | SSE10 | S11 | S11 | SSE11.2 | SSE15 | SSE15 |
| 24-Sep | S9 | S8 | SSE8 | S7 | S7 | SSW7 | SW7 | SSW7 | SW8 | WSW10 | WSW11 | WSW13 | W13 | W13 | WNW10 | WNW13 | WNW14 | WNW11 | W5 | W5 | WSW6 | WSW6 | WSW5 | SSE2 | WSW6.2 | WNW14 |
| 25-Sep | SW3 | WSW2 | WSW4 | S3 | WSW6 | WNW6 | W8 | WSW8 | WSW10 | WSW8 | WNW8 | W11 | WNW9 | NW9 | NNW8 | NNW8 | NNW6 | NNW4 | E2 | SSW2 | SSE2 | N1 | SSE2 | SE4 | W3.8 | W11 |
| 26-Sep | SE5 | SE4 | SE3 | SSE3 | ESE3 | SSW2 | SSE2 | SSE6 | S5 | S8 | S9 | S10 | S10 | SSE11 | SSE11 | SSE11 | SSW11 | S9 | S8 | SSE9 | SSE10 | S8 | SSE8 | SSE9 | SSE7.0 | SSE11 |
| 27-Sep | SSE5 | WNW0 | SE6 | SSE6 | SSW5 | SW6 | W8 | SW6 | SSW9 | WNW9 | WNW13 | WNW14 | W12 | WNW14 | WNW17 | W15 | WSW15 | WSW12 | WSW7 | WSW9 | W10 | WSW6 | W1 | SW5 | W7.1 | WNW17 |
| 28-Sep | SSW4 | SSE4 | SSW5 | S3 | SSW2 | SSW4 | SSW3 | S3 | S5 | SSW7 | SSW8 | SSW8 | SW7 | WSW9 | WSW6 | SW7 | SSE3 | SSW5 | SSW3 | SSE4 | SSE4 | SE2 | ENE1 | SSE2 | SSW4.0 | WSW9 |
| 29-Sep | S4 | SSW1 | S4 | SSE4 | SSE4 | SW3 | S4 | S3 | S5 | SSW7 | SSW5 | SSE7 | S6 | SSW6 | S4 | SE6 | SE4 | ESE4 | ESE4 | ESE2 | ESE2 | NNW5 | NNW3 | NNW5 | S2.6 | SSE7 |
| 30-Sep | N3 | NE1 | N4 | NNW4 | N5 | NNE5 | NNE5 | NNE5 | N6 | NNE8 | NNE11 | NNE13 | NNE12 | NNE14 | NNE14 | NNE15 | NNE16 | NNE14 | NNE12 | NNE12 | NNE13 | NNE12 | NNE13 | NNE13 | NNE9.5 | NNE16 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|------------------------|-------|-------|-------|--------|--------|--------|-------|--------|--------|--------|--------|-------|--------|-------|--------|--------|--------|-------|-----------------|-------|-------|-------|-----------------|--|--|--|
| SSW1.1SSW0.8 | S1.3SSW1.6SSW1.5SSW1.8 | SW2.1 | SW2.7 | SW3.2 | WSW3.4 | WSW3.2 | WSW3.7 | SW4.0 | WSW4.0 | WSW3.9 | WSW3.5 | WSW3.2 | W1.6 | SSW0.7 | S1.4 | SSW1.7 | SSW1.4 | SSW1.2 | S1.0 | Diurnal Average | | | | | | | |
| N12 | N13 | N12 | N13 | N15 | N14 | N14 | N13 | N12 | N12 | S14 | SSE15 | SSE14 | WSW15 | WNW17 | NNE15 | NNE16 | NNE14 | SSE14 | NNE12 | NNE13 | NNE12 | NNE13 | 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

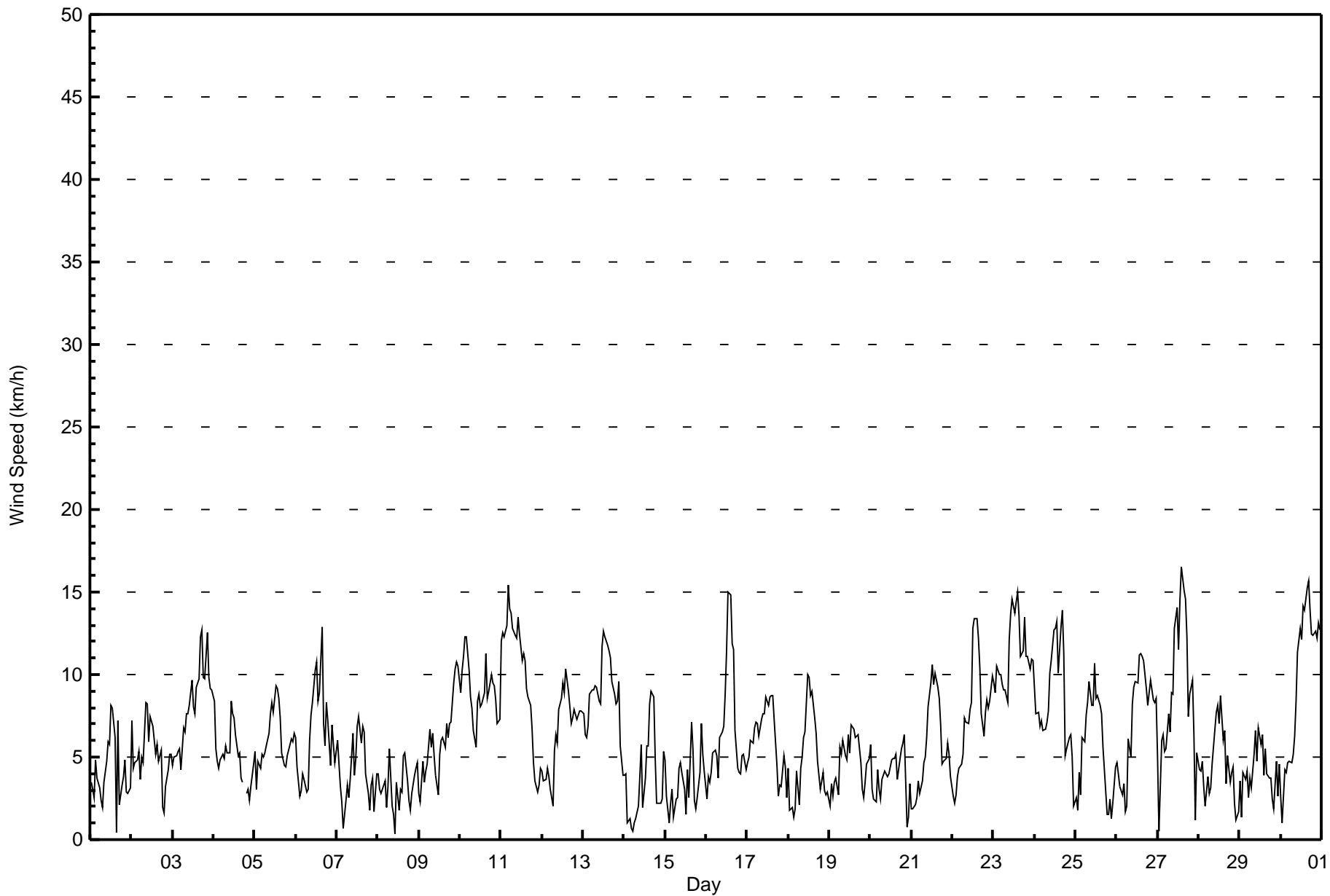
Wind Speed (WS) - km/h
Barge Landing - September 2016

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 4 | 4 | 4 | 4 | 4 | 4 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 348 | 48.40 | 48.40 |
| 6 - 11 | 307 | 42.70 | 91.10 |
| 12 - 19 | 64 | 8.90 | 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: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Barge Landing - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 24 | 5 | 5 | 14 | 4 | 16 | 22 | 36 | 28 | 36 | 24 | 29 | 20 | 16 | 29 | 40 | 348 |
| 6 - 11 | 11 | 6 | 1 | 0 | 3 | 1 | 17 | 44 | 46 | 45 | 24 | 40 | 11 | 22 | 15 | 21 | 307 |
| 12 - 19 | 12 | 13 | 0 | 0 | 0 | 0 | 0 | 10 | 1 | 5 | 2 | 8 | 4 | 6 | 0 | 3 | 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 | 47 | 24 | 6 | 14 | 7 | 17 | 39 | 90 | 75 | 86 | 50 | 77 | 35 | 44 | 44 | 64 | 719 |

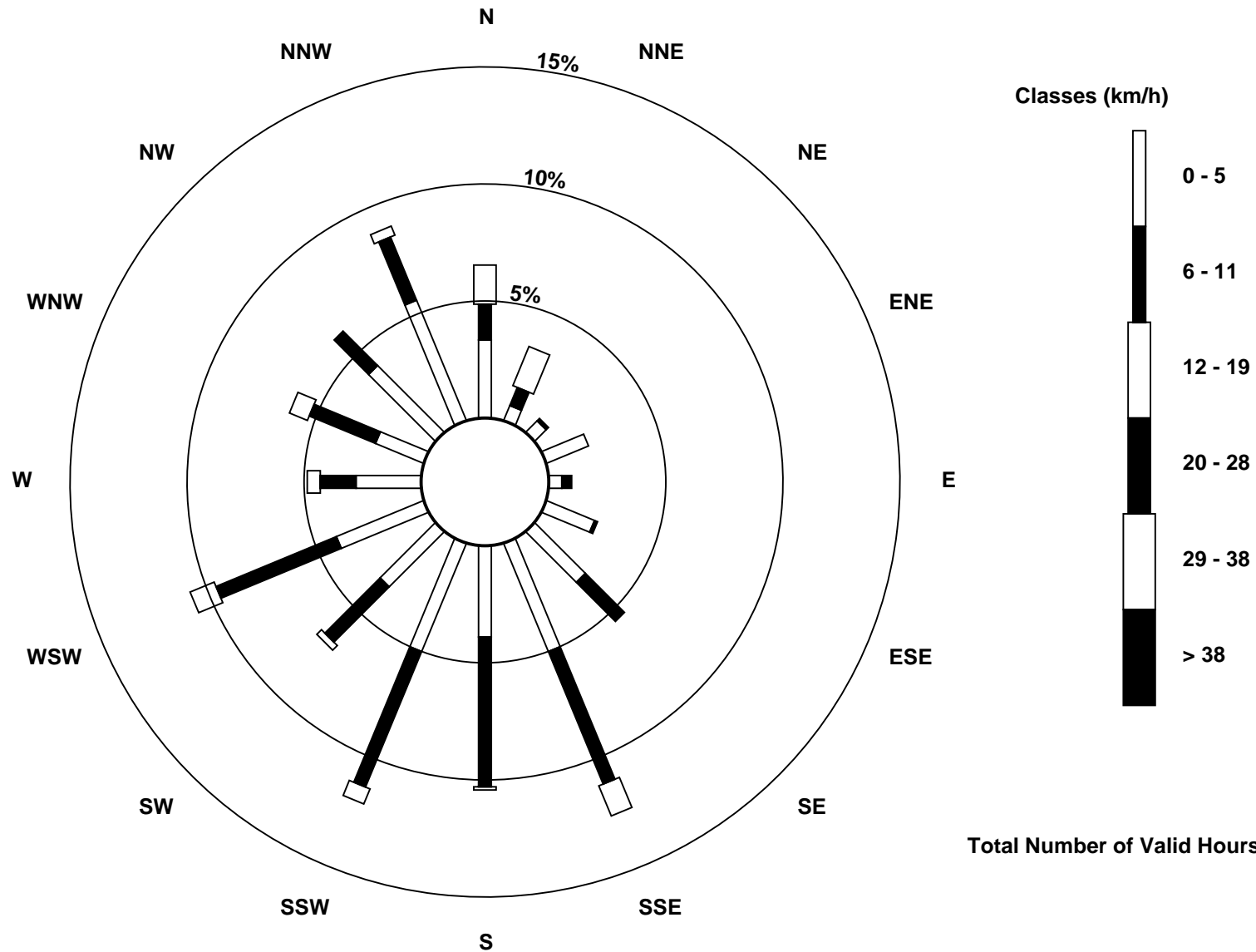
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Barge Landing (AMS 9)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Barge Landing - September 2016

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 286 deg on Sep 27 15:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 161.4 deg on Sep 23 | Hours of Data: 719 |
| Direction of Minimum Speed: 104 deg on Sep 8 11:00 | Hours of Missing Data: 1 |
| Direction of Minimum Daily Speed Average: 1.1 deg on Sep 9 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 255.8 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 | 60 | 31 | 7 | 343 | 346 | 357 | 354 | 61 | 358 | 335 | 332 | 10 | 30 | 49 | 92 | 167 | 16 | 109 | 342 | 322 | 333 | 315 | 267 | 262 | 5.5 |
| 2-Sep | 248 | 215 | 224 | 250 | 260 | 221 | 248 | 222 | 240 | 252 | 245 | 243 | 249 | 238 | 250 | 239 | 248 | 245 | 343 | 229 | 296 | 317 | 335 | 343 | 252.3 |
| 3-Sep | 3 | 322 | 310 | 298 | 304 | 312 | 284 | 295 | 298 | 318 | 323 | 332 | 333 | 330 | 334 | 338 | 339 | 341 | 343 | 335 | 335 | 328 | 328 | 321 | 326.1 |
| 4-Sep | 323 | 314 | 314 | 301 | 287 | 287 | 275 | 270 | 268 | 244 | 283 | 282 | 295 | 313 | 288 | 303 | 314 | 332 | AF | 140 | 151 | 160 | 185 | 244 | 286.4 |
| 5-Sep | 242 | 231 | 198 | 193 | 193 | 201 | 201 | 205 | 223 | 205 | 191 | 223 | 207 | 200 | 193 | 166 | 160 | 133 | 118 | 121 | 127 | 124 | 134 | 137 | 183.4 |
| 6-Sep | 136 | 154 | 134 | 140 | 142 | 172 | 159 | 225 | 204 | 186 | 182 | 176 | 165 | 181 | 183 | 166 | 207 | 175 | 173 | 169 | 187 | 136 | 143 | 149 | 170.2 |
| 7-Sep | 131 | 139 | 143 | 124 | 170 | 158 | 164 | 218 | 200 | 170 | 215 | 240 | 188 | 171 | 206 | 201 | 174 | 176 | 166 | 310 | 179 | 270 | 239 | 156 | 182.1 |
| 8-Sep | 226 | 203 | 209 | 191 | 217 | 208 | 192 | 230 | 275 | 122 | 104 | 313 | 155 | 249 | 330 | 208 | 225 | 334 | 76 | 306 | 307 | 350 | 350 | 332 | 251.9 |
| 9-Sep | 343 | 334 | 345 | 300 | 355 | 0 | 30 | 9 | 17 | 350 | 345 | 303 | 251 | 235 | 211 | 207 | 196 | 177 | 141 | 131 | 139 | 144 | 145 | 149 | 154.0 |
| 10-Sep | 161 | 140 | 141 | 147 | 155 | 170 | 167 | 165 | 183 | 253 | 246 | 252 | 266 | 288 | 265 | 298 | 284 | 289 | 281 | 279 | 279 | 291 | 297 | 341 | 235.6 |
| 11-Sep | 353 | 352 | 354 | 354 | 356 | 359 | 357 | 0 | 357 | 360 | 358 | 350 | 354 | 0 | 360 | 352 | 344 | 349 | 346 | 345 | 341 | 308 | 306 | 314 | 352.8 |
| 12-Sep | 323 | 319 | 318 | 272 | 270 | 289 | 276 | 240 | 237 | 219 | 242 | 225 | 208 | 193 | 208 | 216 | 200 | 165 | 152 | 156 | 160 | 151 | 167 | 176 | 205.9 |
| 13-Sep | 181 | 197 | 185 | 197 | 197 | 198 | 201 | 196 | 202 | 209 | 217 | 207 | 217 | 232 | 248 | 236 | 225 | 236 | 242 | 242 | 250 | 259 | 283 | 279 | 221.4 |
| 14-Sep | 297 | 319 | 352 | 250 | 161 | 279 | 290 | 304 | 277 | 249 | 196 | 258 | 199 | 201 | 188 | 228 | 294 | 354 | 356 | 265 | 190 | 207 | 322 | 344 | 268.2 |
| 15-Sep | 330 | 317 | 74 | 251 | 42 | 62 | 125 | 244 | 90 | 72 | 57 | 72 | 357 | 291 | 327 | 132 | 132 | 51 | 56 | 115 | 181 | 154 | 158 | 144 | 108.0 |
| 16-Sep | 227 | 216 | 202 | 164 | 158 | 164 | 164 | 205 | 201 | 200 | 175 | 179 | 222 | 244 | 245 | 246 | 242 | 256 | 219 | 203 | 187 | 179 | 167 | 175 | 211.0 |
| 17-Sep | 178 | 181 | 178 | 184 | 186 | 190 | 200 | 214 | 200 | 225 | 235 | 225 | 210 | 231 | 237 | 245 | 250 | 264 | 247 | 183 | 211 | 226 | 235 | 248 | 216.4 |
| 18-Sep | 255 | 258 | 241 | 228 | 282 | 162 | 224 | 250 | 246 | 305 | 298 | 307 | 317 | 318 | 315 | 327 | 327 | 352 | 348 | 338 | 351 | 0 | 334 | 315 | 307.9 |
| 19-Sep | 337 | 333 | 340 | 329 | 308 | 251 | 253 | 260 | 269 | 279 | 318 | 330 | 306 | 330 | 322 | 345 | 342 | 2 | 346 | 341 | 296 | 310 | 335 | 351 | 318.5 |
| 20-Sep | 356 | 347 | 313 | 327 | 356 | 330 | 313 | 351 | 17 | 349 | 8 | 47 | 75 | 74 | 68 | 78 | 82 | 98 | 80 | 85 | 110 | 143 | 219 | 129 | 46.8 |
| 21-Sep | 102 | 73 | 104 | 106 | 160 | 206 | 192 | 231 | 210 | 219 | 192 | 211 | 208 | 234 | 239 | 251 | 252 | 238 | 214 | 192 | 190 | 189 | 203 | 179 | 212.3 |
| 22-Sep | 144 | 119 | 124 | 142 | 169 | 167 | 166 | 174 | 190 | 195 | 167 | 183 | 209 | 208 | 202 | 212 | 210 | 187 | 166 | 171 | 170 | 154 | 165 | 161 | 182.4 |
| 23-Sep | 158 | 163 | 167 | 159 | 158 | 150 | 147 | 146 | 154 | 167 | 170 | 166 | 166 | 161 | 154 | 163 | 162 | 160 | 154 | 161 | 167 | 168 | 170 | 175 | 161.4 |
| 24-Sep | 170 | 169 | 168 | 171 | 181 | 207 | 231 | 209 | 216 | 246 | 249 | 253 | 275 | 277 | 284 | 302 | 297 | 292 | 274 | 260 | 258 | 251 | 243 | 151 | 247.2 |
| 25-Sep | 230 | 241 | 248 | 185 | 257 | 295 | 261 | 249 | 251 | 254 | 286 | 270 | 288 | 320 | 307 | 335 | 329 | 342 | 91 | 192 | 164 | 3 | 158 | 134 | 275.8 |
| 26-Sep | 138 | 139 | 133 | 166 | 123 | 201 | 167 | 147 | 181 | 179 | 181 | 174 | 184 | 166 | 164 | 161 | 193 | 177 | 172 | 165 | 160 | 174 | 167 | 162 | 168.1 |
| 27-Sep | 156 | 284 | 136 | 167 | 209 | 229 | 264 | 221 | 212 | 283 | 298 | 283 | 281 | 285 | 286 | 279 | 254 | 253 | 249 | 254 | 259 | 253 | 279 | 234 | 259.4 |
| 28-Sep | 197 | 158 | 210 | 189 | 197 | 201 | 211 | 178 | 187 | 210 | 209 | 206 | 220 | 237 | 240 | 236 | 164 | 207 | 198 | 147 | 148 | 144 | 76 | 159 | 201.2 |
| 29-Sep | 188 | 192 | 175 | 166 | 158 | 229 | 176 | 174 | 187 | 208 | 194 | 168 | 186 | 202 | 171 | 126 | 139 | 116 | 110 | 122 | 104 | 346 | 342 | 345 | 171.2 |
| 30-Sep | 356 | 41 | 357 | 346 | 360 | 14 | 14 | 16 | 1 | 20 | 32 | 33 | 31 | 28 | 13 | 21 | 25 | 21 | 21 | 27 | 28 | 21 | 18 | 16 | 20.6 |

202.2 197.1 185.5 194.7 206.0 212.6 219.8 221.9 226.4 236.7 241.9 241.9 236.2 246.2 247.3 244.5 253.2 262.6 196.3 191.2 196.9 207.0 203.2 185.8

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

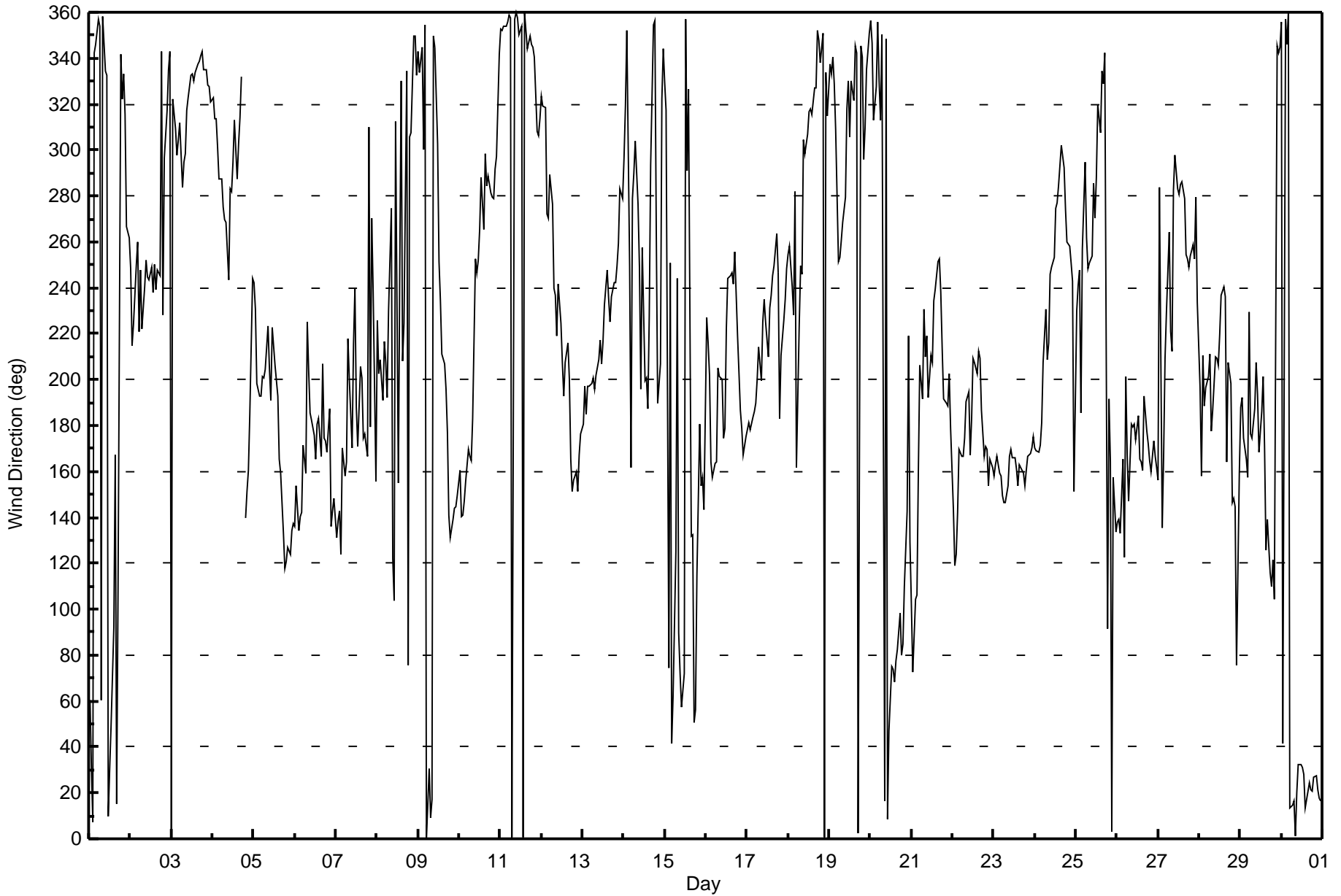
Wind Direction (WD) - deg
Barge Landing - September 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 107 deg on Sep 8 11:00 | Hours of Data: 719 |
| Minimum Value: 9 deg on Sep 26 00:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 11 P ₁₀ = 17 Q ₁ = 22 Median = 27 Q ₃ = 36 P ₉₀ = 54 P ₉₉ = 94 | 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 | 33 | 23 | 40 | 16 | 25 | 18 | 32 | 69 | 35 | 21 | 22 | 26 | 23 | 25 | 25 | 101 | 26 | 88 | 36 | 27 | 21 | 30 | 39 | 32 | 101 |
| 2-Sep | 20 | 28 | 29 | 37 | 26 | 34 | 36 | 36 | 22 | 25 | 39 | 31 | 26 | 30 | 26 | 25 | 25 | 25 | 53 | 58 | 33 | 23 | 20 | 23 | 58 |
| 3-Sep | 28 | 19 | 23 | 27 | 28 | 34 | 36 | 38 | 30 | 25 | 24 | 23 | 22 | 21 | 25 | 24 | 23 | 25 | 24 | 23 | 24 | 22 | 24 | 24 | 38 |
| 4-Sep | 23 | 32 | 30 | 31 | 37 | 43 | 36 | 33 | 35 | 37 | 39 | 41 | 40 | 39 | 49 | 37 | 39 | 19 | AF | 34 | 15 | 24 | 23 | 21 | 49 |
| 5-Sep | 24 | 39 | 23 | 21 | 22 | 24 | 24 | 31 | 32 | 34 | 36 | 34 | 30 | 34 | 38 | 30 | 30 | 16 | 12 | 12 | 16 | 12 | 12 | 11 | 39 |
| 6-Sep | 11 | 11 | 21 | 16 | 16 | 13 | 30 | 44 | 40 | 37 | 38 | 33 | 29 | 42 | 40 | 29 | 30 | 28 | 23 | 26 | 34 | 11 | 21 | 21 | 44 |
| 7-Sep | 11 | 22 | 22 | 18 | 73 | 33 | 28 | 50 | 41 | 30 | 56 | 54 | 42 | 35 | 47 | 40 | 33 | 29 | 45 | 47 | 61 | 34 | 46 | 38 | 73 |
| 8-Sep | 43 | 40 | 40 | 25 | 32 | 56 | 31 | 20 | 69 | 87 | 107 | 67 | 83 | 64 | 72 | 32 | 37 | 72 | 84 | 47 | 48 | 15 | 19 | 14 | 107 |
| 9-Sep | 27 | 24 | 21 | 39 | 37 | 22 | 25 | 24 | 23 | 38 | 56 | 71 | 68 | 62 | 56 | 54 | 35 | 33 | 13 | 11 | 13 | 15 | 16 | 21 | 71 |
| 10-Sep | 24 | 15 | 15 | 17 | 21 | 25 | 23 | 23 | 27 | 36 | 23 | 24 | 27 | 34 | 35 | 34 | 33 | 38 | 31 | 33 | 35 | 33 | 35 | 29 | 38 |
| 11-Sep | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 24 | 24 | 25 | 25 | 24 | 24 | 24 | 23 | 22 | 19 | 25 | 40 | 30 | 24 | 40 |
| 12-Sep | 21 | 26 | 25 | 27 | 27 | 46 | 62 | 19 | 26 | 33 | 31 | 39 | 38 | 42 | 34 | 32 | 32 | 26 | 13 | 13 | 15 | 12 | 19 | 21 | 62 |
| 13-Sep | 22 | 21 | 25 | 22 | 25 | 25 | 26 | 28 | 27 | 29 | 31 | 29 | 30 | 24 | 26 | 24 | 26 | 22 | 20 | 18 | 17 | 23 | 40 | 44 | 44 |
| 14-Sep | 25 | 22 | 64 | 49 | 95 | 70 | 47 | 32 | 61 | 51 | 43 | 75 | 79 | 52 | 49 | 32 | 38 | 22 | 27 | 55 | 56 | 41 | 78 | 16 | 95 |
| 15-Sep | 13 | 47 | 67 | 58 | 35 | 63 | 34 | 61 | 33 | 28 | 43 | 50 | 82 | 49 | 77 | 46 | 22 | 34 | 40 | 69 | 31 | 13 | 17 | 9 | 82 |
| 16-Sep | 31 | 19 | 30 | 17 | 13 | 19 | 21 | 36 | 34 | 29 | 25 | 31 | 38 | 25 | 23 | 23 | 22 | 25 | 22 | 19 | 29 | 16 | 18 | 21 | 38 |
| 17-Sep | 20 | 22 | 22 | 23 | 24 | 24 | 25 | 29 | 29 | 28 | 26 | 25 | 31 | 26 | 24 | 26 | 21 | 25 | 41 | 22 | 18 | 18 | 27 | 84 | 84 |
| 18-Sep | 33 | 74 | 59 | 82 | 57 | 35 | 62 | 26 | 19 | 36 | 34 | 31 | 27 | 25 | 27 | 27 | 23 | 21 | 18 | 19 | 22 | 26 | 24 | 16 | 82 |
| 19-Sep | 21 | 27 | 21 | 21 | 25 | 28 | 22 | 37 | 30 | 39 | 41 | 27 | 41 | 26 | 29 | 25 | 23 | 25 | 18 | 15 | 29 | 22 | 25 | 21 | 41 |
| 20-Sep | 20 | 21 | 28 | 18 | 19 | 20 | 26 | 28 | 36 | 59 | 55 | 67 | 45 | 41 | 35 | 30 | 29 | 21 | 20 | 21 | 25 | 94 | 64 | 37 | 94 |
| 21-Sep | 53 | 42 | 21 | 26 | 36 | 39 | 27 | 23 | 32 | 35 | 39 | 36 | 32 | 34 | 30 | 29 | 25 | 21 | 25 | 21 | 18 | 18 | 24 | 34 | 53 |
| 22-Sep | 19 | 31 | 16 | 9 | 11 | 12 | 14 | 24 | 29 | 33 | 29 | 33 | 31 | 32 | 29 | 28 | 29 | 24 | 15 | 18 | 19 | 16 | 19 | 18 | 33 |
| 23-Sep | 16 | 19 | 24 | 18 | 17 | 16 | 11 | 14 | 23 | 26 | 27 | 26 | 27 | 25 | 22 | 25 | 22 | 24 | 20 | 24 | 25 | 24 | 25 | 25 | 27 |
| 24-Sep | 24 | 22 | 21 | 22 | 22 | 25 | 23 | 24 | 27 | 28 | 22 | 25 | 35 | 34 | 36 | 32 | 33 | 31 | 32 | 19 | 14 | 15 | 24 | 66 | 66 |
| 25-Sep | 67 | 98 | 49 | 55 | 23 | 32 | 25 | 19 | 16 | 20 | 35 | 34 | 40 | 34 | 38 | 27 | 34 | 17 | 43 | 57 | 35 | 65 | 58 | 9 | 98 |
| 26-Sep | 13 | 14 | 22 | 36 | 34 | 90 | 59 | 17 | 36 | 30 | 32 | 31 | 35 | 28 | 26 | 25 | 29 | 24 | 19 | 18 | 19 | 25 | 20 | 19 | 90 |
| 27-Sep | 43 | 102 | 43 | 27 | 24 | 34 | 24 | 26 | 28 | 44 | 31 | 32 | 32 | 33 | 31 | 35 | 22 | 20 | 15 | 16 | 17 | 36 | 101 | 25 | 102 |
| 28-Sep | 29 | 36 | 26 | 43 | 84 | 38 | 29 | 41 | 38 | 29 | 32 | 31 | 45 | 36 | 44 | 29 | 49 | 34 | 22 | 13 | 15 | 80 | 76 | 74 | 84 |
| 29-Sep | 33 | 86 | 16 | 15 | 80 | 28 | 16 | 25 | 25 | 29 | 45 | 37 | 44 | 43 | 77 | 30 | 25 | 12 | 9 | 30 | 54 | 23 | 20 | 13 | 86 |
| 30-Sep | 60 | 75 | 11 | 17 | 17 | 17 | 25 | 21 | 25 | 26 | 18 | 19 | 20 | 19 | 23 | 21 | 19 | 20 | 19 | 17 | 18 | 19 | 21 | 20 | 75 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|----|----|----|----|----|----|----|----|-----|----|----|----|----|-----|----|----|----|----|----|----|-----|----|--|
| 67 | 102 | 67 | 82 | 95 | 90 | 62 | 69 | 69 | 87 | 107 | 75 | 83 | 64 | 77 | 101 | 49 | 88 | 84 | 69 | 61 | 94 | 101 | 84 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | September 7, 2016 | Last Calibration | August 9, 2016 |
| Station Name | Barge Landing | Station Number | AMS 9 |
| Reason: | Routine | | |
| Start Time (MST) | 9:02 | End Time (MST) | 11:55 |
| Gas Cert Reference | LL29997 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.18 ppm | Cal Gas Exp Date | 2/12/2019 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11071107 |
| Dil air Make/Model | API 701 | Serial Number | 4888 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 5564 |
| SO2 gas concentration | 47.8 ppm | SO2 gas cert/exp | LL104180 12/Feb/18 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -690 | -690 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 1007 | 1007 |
| Calculated slope | 1.004151 | 0.995147 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.402911 | -0.316929 | Pressure | 685.4 | 682.1 |
| Analyzer Background | 1.91 | 1.89 | Flow | 0.432 | 0.431 |
| Analyzer Coefficient | 1.041 | 1.041 | Intensity | 90 | 91 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-TLE | | Analyzer serial # | 1331259320 | |
| Converter make/model | CDN-101 | | Converter serial # | 519 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 5000 | 77.2 | 80.0 | 80.0 | 1.000 |
| SO2 scrubber check | 5000 | 15.4 | 147.2 | 0.1 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 77.2 | 80.0 | 80.5 | 0.993 |
| second point | 5000 | 38.6 | 40.0 | 40.7 | 0.983 |
| third point | 5000 | 19.3 | 20.0 | 20.6 | 0.971 |
| as left zero | 6000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 5000 | 77.2 | 80.0 | 80.5 | 0.994 |
| Average Correction Factor | | | | | 0.982 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 79.9 | Previous response | 80.1 | % change | 0.2% |
|--------------------|------|-------------------|------|----------|------|

Notes:

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

Calibration Performed By:

Jayme Rycroft



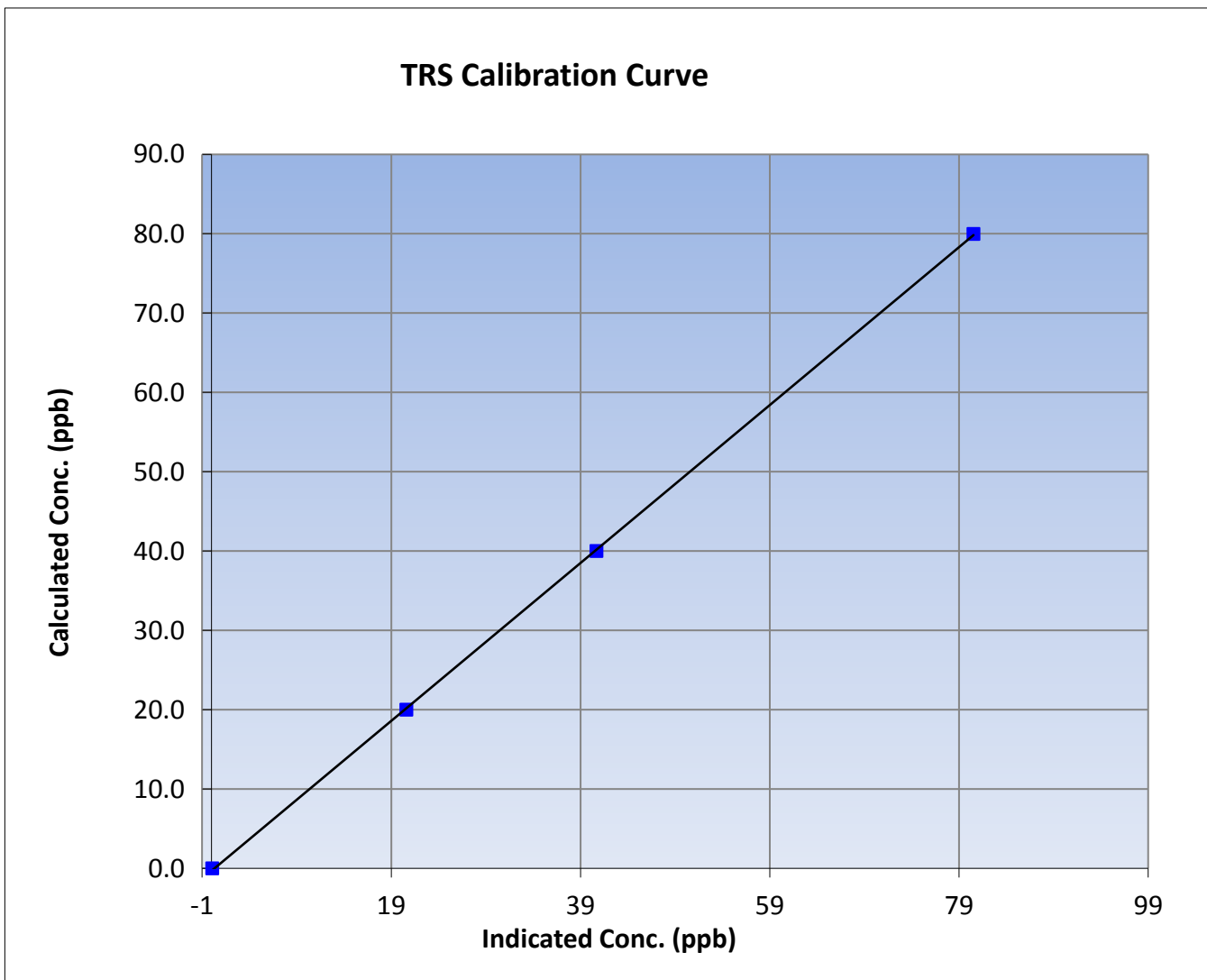
Wood Buffalo Environmental Association TRS Calibration Report

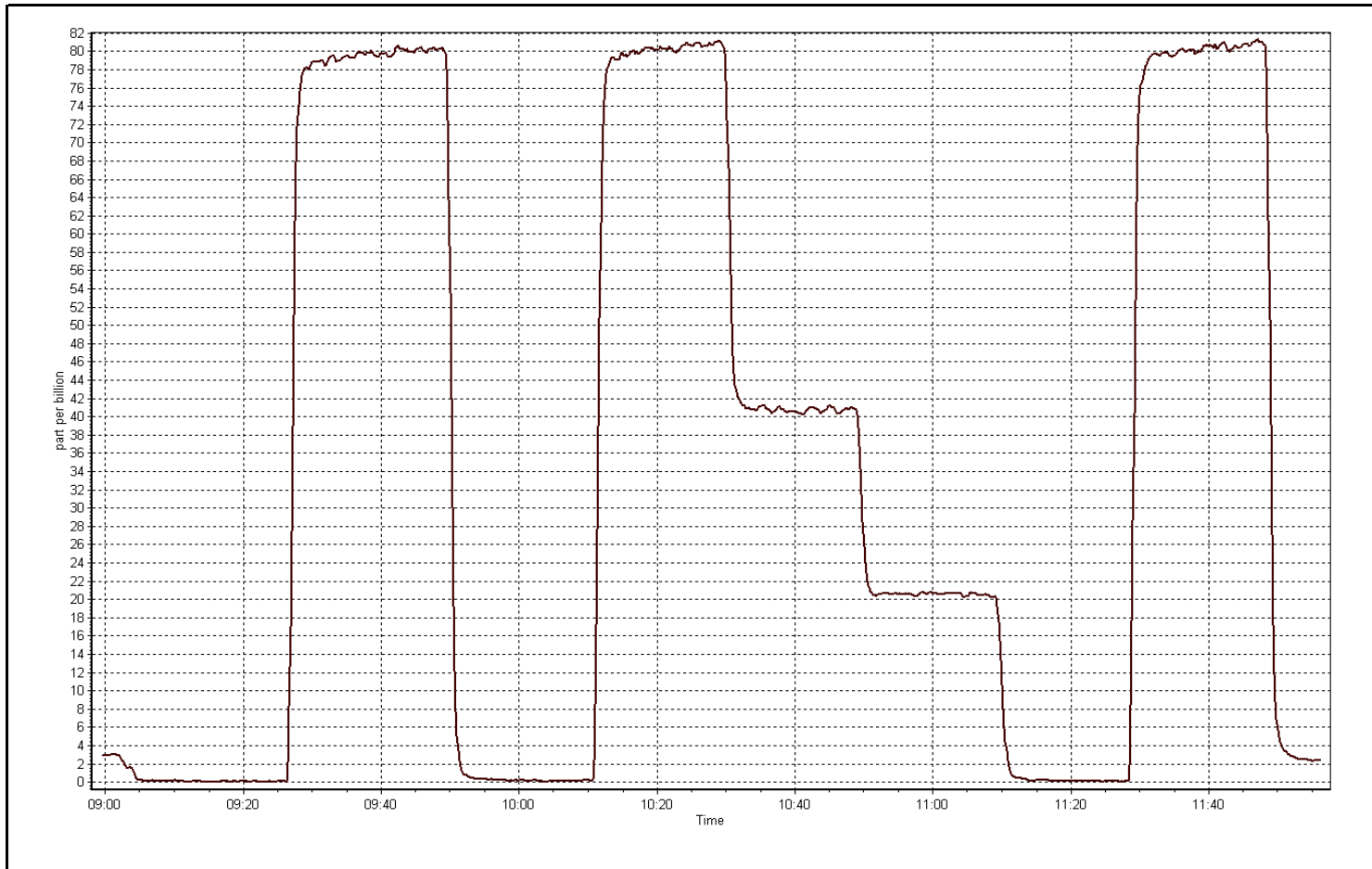
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Barge Landing | Station Number | AMS 9 |
| Start Time (MST) | 9:02 | End Time (MST) | 11:55 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1331259320 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999957 |
| 80.0 | 80.5 | 0.9930 | | |
| 40.0 | 40.7 | 0.9825 | Slope | 0.995147 |
| 20.0 | 20.6 | 0.9706 | | |
| | | | Intercept | -0.316929 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|-------------------|
| Calibration Date | September 7, 2016 | Last Calibration | August 9, 2016 |
| Station Name | Barge Landing | Station Number | AMS 9 |
| Reason: | Routine | | |
| Start Time (MST) | 11:49 | End Time (MST) | 14:28 |
| Gas Cert Reference | LL104180 | Cal Gas Expiry Date | February 12, 2018 |
| CH4 Cal Gas Conc. | 490 ppm | CH4 Equiv Conc. | 1023.5 ppm |
| C3H8 Cal Gas Conc. | 194 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11071107 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4888 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 5564 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 9.1 | 9.1 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 34.7 | 34.7 |
| Calculated slope | 1.000775 | 1.001951 | Fuel Pressure | 24.1 | 24.1 |
| Calculated intercept | 0.013627 | -0.004376 | Analyzer Coeff | 4.241 | 4.270 |
| | | | Analyzer BKG | 5.41 | 5.45 |

Analyzer make Thermo 51i-LT Analyzer serial # 1327059296

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.03 | ---- |
| as found span | 5000 | 76.7 | 15.70 | 15.52 | 1.012 |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.02 | ---- |
| high point | 5000 | 76.7 | 15.70 | 15.66 | 1.003 |
| second point | 5000 | 41.0 | 8.39 | 8.40 | 0.999 |
| third point | 5000 | 15.4 | 3.15 | 3.17 | 0.994 |
| as left zero | 5000 | 0.0 | 0.00 | 0.03 | ---- |
| as left span | 5000 | 76.7 | 15.70 | 15.61 | 1.006 |
| Average Correction Factor | | | | | 0.999 |

Corrected As found 15.49 Previous response 15.67 % change 1.2%

Notes:

Inlet filter changed after as founds. Adjusted span.

Calibration Performed By:

Jayne Rycroft



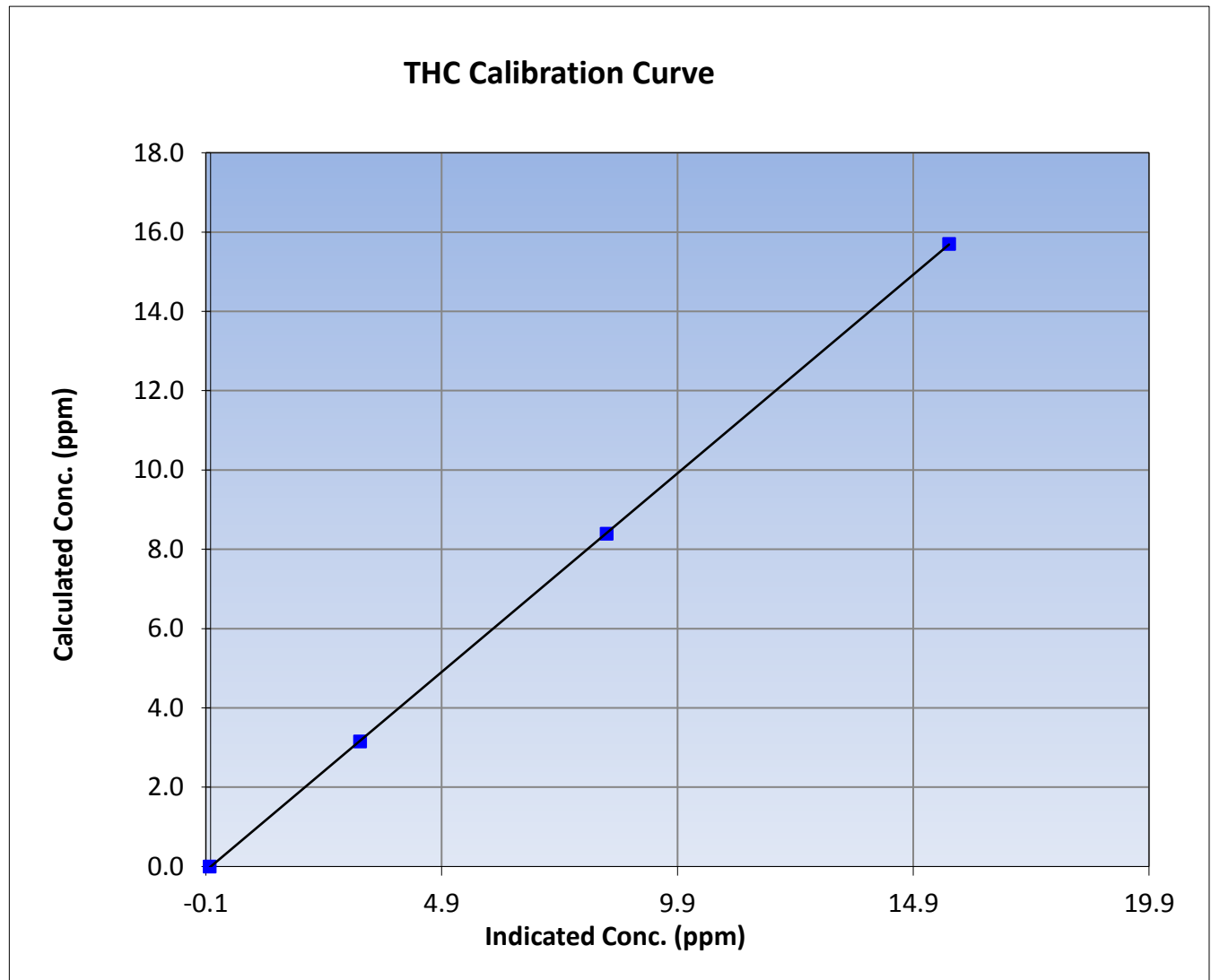
Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 7, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Barge Landing | Station Number | AMS 9 |
| Start Time (MST) | 11:49 | End Time (MST) | 14:28 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1327059296 |

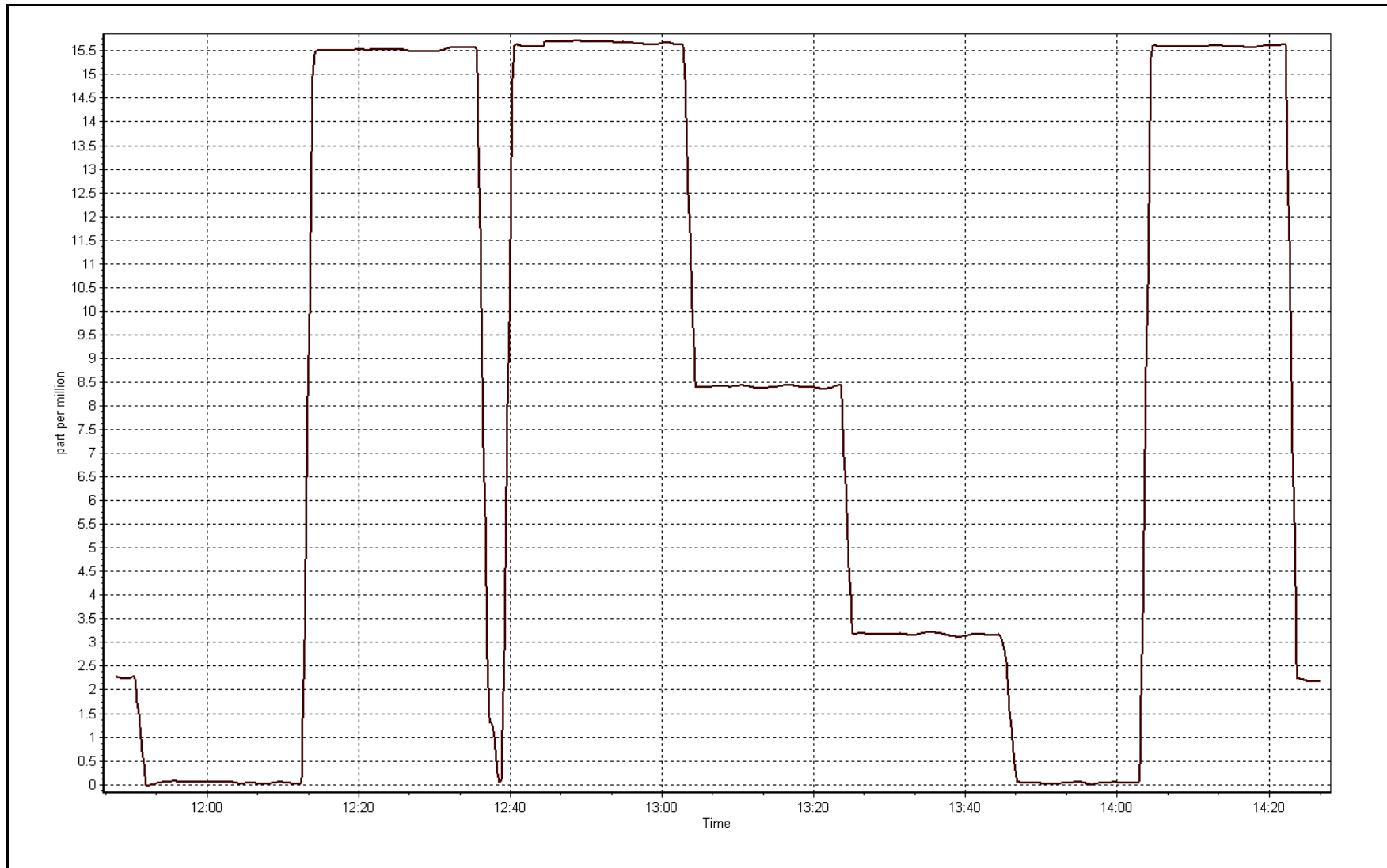
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | -0.02 | ---- | Correlation Coefficient | 0.999989 |
| 15.70 | 15.66 | 1.0026 | | |
| 8.39 | 8.40 | 0.9991 | Slope | 1.001951 |
| 3.15 | 3.17 | 0.9944 | | |
| | | | Intercept | -0.004376 |



THC Calibration Plot

Date: September 7, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 11
LOWER CAMP
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 684 | 36 | 36 | 100.00 | 60 | 0 | 14 | 0 |
| H2S (ppb) Average | 684 | 36 | 36 | 100.00 | 11 | 1 | 2 | 0 |
| THC (ppm) Average | 684 | 36 | 36 | 100.00 | 9.7 | - | 2.7 | - |
| Temperature (C) Average | 720 | 0 | 0 | 100.00 | 24.9 | - | 15.5 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 92 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100.00 | 27 | - | 17 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100.00 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 684 | 3.7 | 8 | - | 0 | 0 | 0 | 1 | 3 | 10 | 60 |
| H2S (ppb) Average | 684 | 0.6 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 11 |
| THC (ppm) Average | 684 | 2.3 | 0.4 | - | 2 | 2.1 | 2.1 | 2.2 | 2.4 | 2.6 | 9.7 |
| Temperature 2 m (C) Average | 720 | 11.98 | 4.3 | - | 2.7 | 6.8 | 8.8 | 11.7 | 14.7 | 17.3 | 24.9 |
| Relative Humidity (%) Average | 720 | 71.8 | 18 | - | 28 | 44 | 58 | 74 | 87 | 95 | 99 |
| Wind Speed 10 m (km/h) Average | 720 | 9.1 | 5 | - | 0 | 3 | 5 | 8 | 12 | 17 | 27 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS 11)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-----------------|---------------|---------------------|-------|
|-----------|-----------------|---------------|---------------------|-------|

No operational issues to report



Wood Buffalo Environmental Association

Summary of Hour Averages

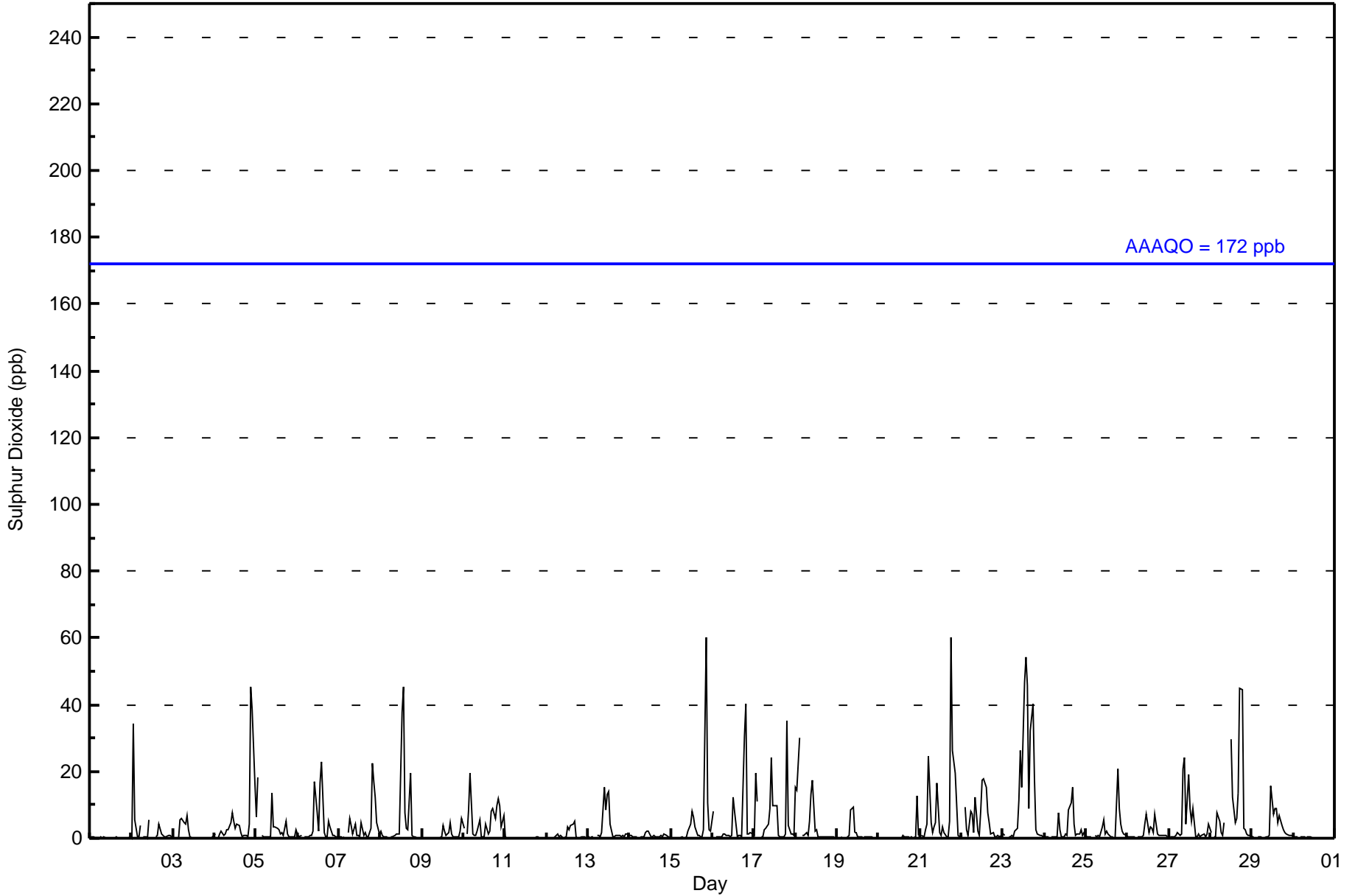
Sulphur Dioxide (SO₂) - ppb
Lower Camp - September 2016

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 60 ppb on Sep 21 19:00 | Maximum Daily Average: 13.7 ppb on Sep 23 |
| Minimum Value: 0 ppb on Sep 3 23:00 | Hours of Data: 684 |
| Maximum Diurnal Average: 7.5 ppb at hour 14 | Hours of Missing Data: 36 |
| Monthly Average: 3.7 ppb | Hours of Calibration: 36 |
| Minimum Daily Average: 0.1 ppb on Sep 11 | Percent Operational Time: 100.0 |
| Minimum Diurnal Average: 0.9 ppb at hour 4 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 10 P ₉₉ = 45 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|---|----|----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 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 | 34 | 5 | 0 | 0 | 4 | Z | 0 | 0 | 0 | 6 | C | C | C | 1 | 1 | 4 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 3.1 | 34 |
| 3-Sep | Z | 0 | 0 | 0 | 6 | 6 | 5 | 4 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 7 |
| 4-Sep | 1 | Z | 0 | 1 | 2 | 1 | 1 | 3 | 3 | 5 | 8 | 5 | 3 | 4 | 4 | 2 | 0 | 1 | 1 | 0 | 4 | 45 | 39 | 16 | 6.5 | 45 |
| 5-Sep | 6 | 18 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 13 | 3 | 3 | 3 | 3 | 1 | 2 | 1 | 5 | 1 | 1 | 0 | 0 | 1 | 3 | 3.0 | 18 |
| 6-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 17 | 8 | 2 | 17 | 23 | 2 | 0 | 1 | 5 | 3 | 1 | 1 | 0 | 0 | 3.8 | 23 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 2 | 6 | 4 | 1 | 4 | 1 | 1 | 0 | 4 | 1 | 2 | 0 | 0 | 3 | 22 | 17 | 12 | 5 | 1 | 3.8 | 22 |
| 8-Sep | 2 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 38 | 45 | 7 | 3 | 2 | 20 | 1 | 0 | 0 | 0 | 0 | 0 | 5.5 | 45 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 1 | 2 | 5 | 1 | 0 | 0 | 0 | 0 | 2 | 6 | 1.1 | 6 |
| 10-Sep | 3 | Z | 1 | 9 | 20 | 1 | 1 | 1 | 2 | 6 | 0 | 0 | 4 | 1 | 2 | 8 | 9 | 6 | 10 | 12 | 10 | 4 | 7 | 5.1 | 20 | |
| 11-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 | 0.1 | 1 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 4 | 2 | 4 | 4 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 5 |
| 13-Sep | 0 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 15 | 8 | 13 | 14 | 4 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 3.0 | 15 |
| 14-Sep | 1 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.7 | 2 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 8 | 6 | 4 | 1 | 1 | 0 | 0 | 3 | 60 | 11 | 3 | 2 | 4.6 | 60 |
| 16-Sep | 8 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 12 | 8 | 1 | 1 | 1 | 0 | 30 | 40 | 1 | 1 | 2 | 1 | 4.9 | 40 |
| 17-Sep | 1 | 20 | 11 | Z | 1 | 0 | 3 | 3 | 4 | 9 | 24 | 10 | 10 | 10 | 1 | 1 | 0 | 0 | 1 | 35 | 4 | 1 | 1 | 1 | 6.5 | 35 |
| 18-Sep | 15 | 14 | 30 | Z | 1 | 1 | 2 | 1 | 5 | 13 | 17 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4.7 | 30 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 9 | 9 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 9 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1 | 0.7 | 13 |
| 21-Sep | Z | 1 | 1 | 3 | 4 | 25 | 5 | 2 | 3 | 5 | 16 | 2 | 1 | 3 | 2 | 0 | 0 | 5 | 60 | 26 | 19 | 10 | 1 | 1 | 8.4 | 60 |
| 22-Sep | 1 | Z | 9 | 3 | 1 | 8 | 7 | 2 | 12 | 2 | 1 | 8 | 17 | 18 | 15 | 8 | 4 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 5.3 | 18 |
| 23-Sep | 1 | 1 | Z | 0 | 1 | 1 | 1 | 2 | 3 | 11 | 26 | 15 | 47 | 54 | 46 | 9 | 32 | 40 | 18 | 3 | 1 | 1 | 1 | 1 | 13.7 | 54 |
| 24-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 8 | 2 | 0 | 0 | 1 | 1 | 9 | 11 | 15 | 4 | 1 | 1 | 1 | 3 | 1 | 2 | 2.8 | 15 |
| 25-Sep | 1 | 0 | 0 | 0 | Z | 1 | 0 | 1 | 0 | 3 | 6 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 21 | 9 | 4 | 2 | 1 | 1 | 2.4 | 21 |
| 26-Sep | 1 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 4 | 7 | 2 | 3 | 3 | 2 | 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.7 | 7 |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 21 | 24 | 4 | 19 | 9 | 5 | 9 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 4 | 4.7 | 24 |
| 28-Sep | 2 | Z | 0 | 1 | 8 | 5 | 2 | 1 | 5 | C | C | C | 30 | 12 | 5 | 6 | 14 | 45 | 45 | 3 | 2 | 1 | 1 | 1 | 9.3 | 45 |
| 29-Sep | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 16 | 7 | 9 | 9 | 5 | 7 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 3.0 | 16 |
| 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 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----------------|
| 1.9 | 3.8 | 2.5 | 0.9 | 1.9 | 2.3 | 1.4 | 1.0 | 3.0 | 4.6 | 5.3 | 4.4 | 7.5 | 7.5 | 4.9 | 2.1 | 3.7 | 4.8 | 6.8 | 5.5 | 4.5 | 3.5 | 2.6 | 1.8 | | Diurnal Average |
| 15 | 34 | 30 | 9 | 20 | 25 | 7 | 4 | 21 | 24 | 26 | 19 | 47 | 54 | 46 | 11 | 32 | 45 | 60 | 40 | 60 | 45 | 39 | 16 | | Diurnal Maximum |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 619 | 90.50 | 90.50 |
| 11 - 20 | 37 | 5.41 | 95.91 |
| 21 - 60 | 28 | 4.09 | 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
Lower Camp - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 22 | 11 | 13 | 9 | 18 | 38 | 125 | 55 | 17 | 8 | 6 | 55 | 81 | 63 | 64 | 34 | 619 |
| 11 - 20 | 0 | 0 | 0 | 0 | 1 | 4 | 6 | 5 | 4 | 5 | 5 | 0 | 3 | 4 | 0 | 0 | 37 |
| 21 - 60 | 0 | 1 | 0 | 2 | 0 | 0 | 6 | 5 | 0 | 2 | 9 | 1 | 1 | 1 | 0 | 0 | 28 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 22 | 12 | 13 | 11 | 19 | 42 | 137 | 65 | 21 | 15 | 20 | 56 | 85 | 68 | 64 | 34 | 684 |

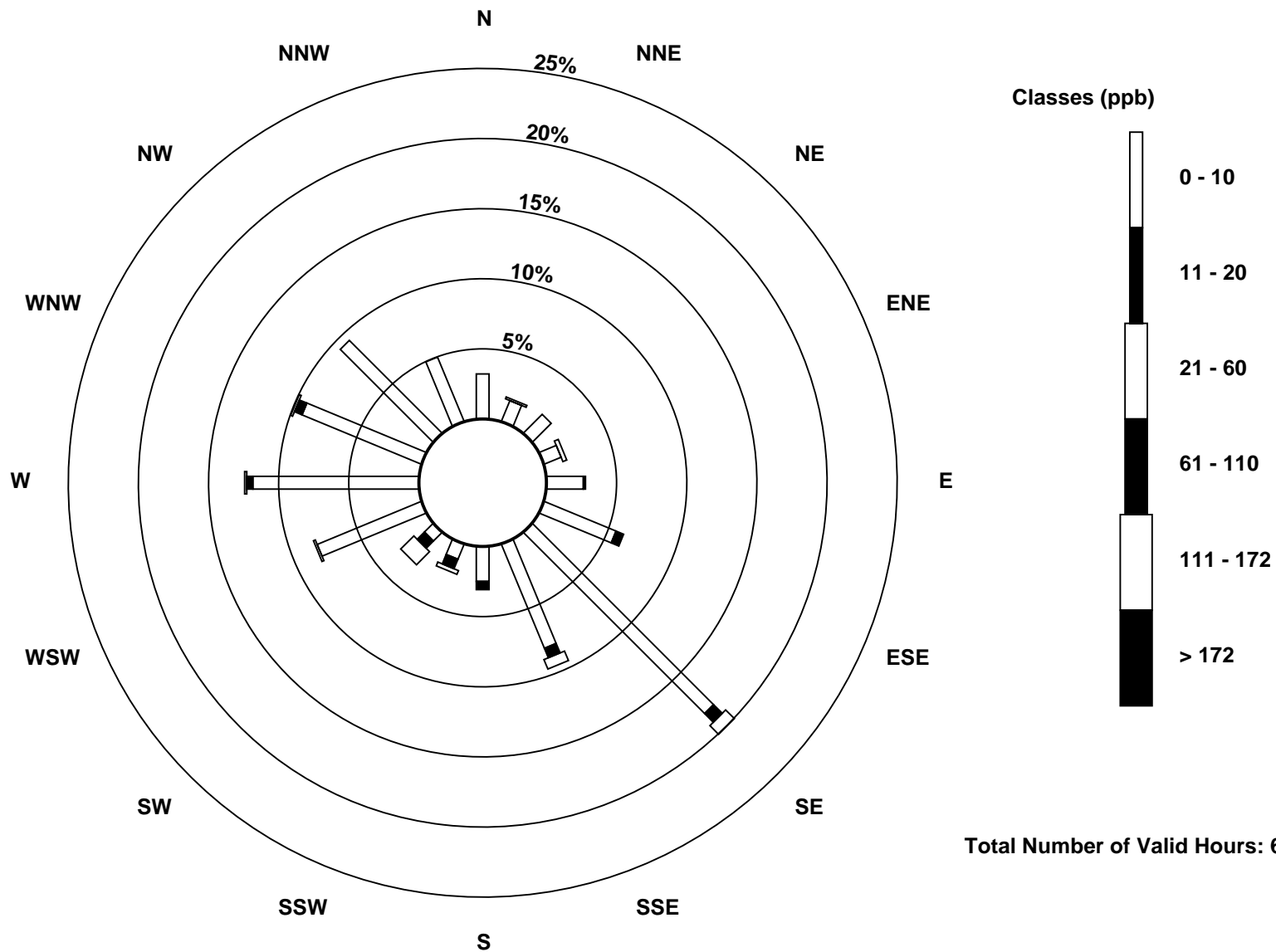
Total Number of Valid Hours: 684

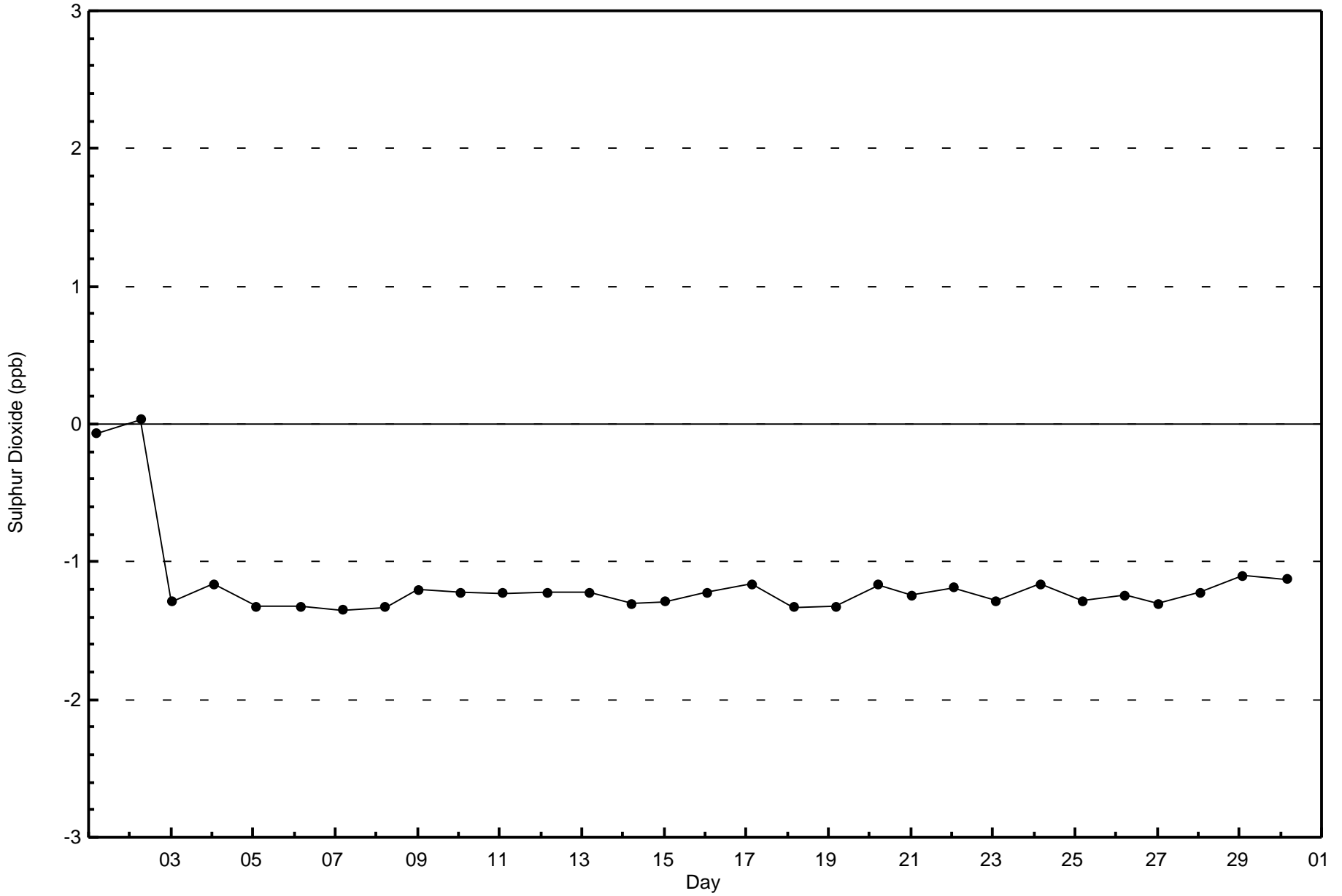
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
Lower Camp (AMS 11)

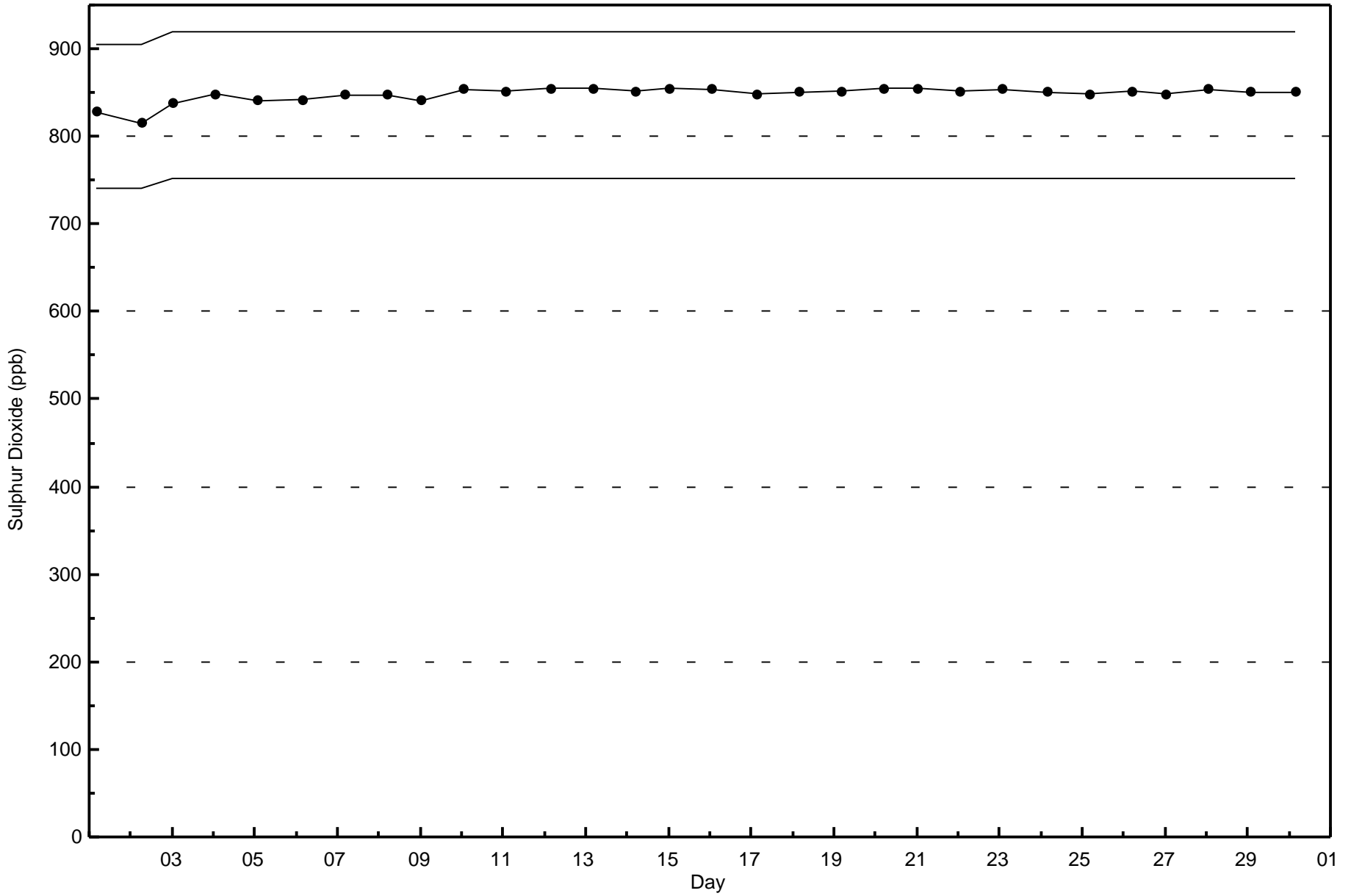






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Lower Camp - September 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 1 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 11 ppb on Sep 16 23:00 | Maximum Daily Average: 1.7 ppb on Sep 16 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 11 07:00 | Minimum Daily Average: 0.1 ppb on Sep 11 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 1.2 ppb at hour 2 | Minimum Diurnal Average: 0.3 ppb at hour 15 | | Hours of Calibration: | 36 |
| Monthly Average: 0.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 5 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 2-Sep | 0 | 7 | 1 | 0 | 0 | 1 | 0 | Z | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0.8 | 7 |
| 3-Sep | 1 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 4-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 4 | 2 | 0.7 | 5 |
| 5-Sep | 1 | 2 | 1 | Z | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.6 | 2 |
| 6-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0.8 | 2 |
| 7-Sep | 0 | 1 | 1 | 1 | 1 | Z | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 1 | 1 | 0.9 | 3 |
| 8-Sep | 2 | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 |
| 10-Sep | 2 | 1 | Z | 1 | 2 | 3 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 3 |
| 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 | 0.1 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0.4 | 2 |
| 13-Sep | 1 | 1 | 1 | 0 | 0 | Z | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 14-Sep | 0 | 1 | 0 | 1 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 0.6 | 2 |
| 15-Sep | 1 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0.5 | 3 |
| 16-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 4 | 1 | 4 | 11 | 5 | 1.7 | 11 |
| 17-Sep | 1 | 3 | 3 | 3 | Z | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 1.4 | 5 |
| 18-Sep | 2 | 3 | 5 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0.8 | 5 |
| 19-Sep | 1 | 1 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 20-Sep | 0 | 0 | 0 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0.3 | 3 |
| 21-Sep | 0 | Z | 1 | 1 | 1 | 5 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1 | 1 | 1 | 0 | 0 | 1.1 | 5 |
| 22-Sep | 0 | 0 | Z | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0.6 | 1 |
| 23-Sep | 4 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1.1 | 4 |
| 24-Sep | 2 | 2 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.3 | 1 |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0.6 | 1 |
| 27-Sep | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 4 |
| 28-Sep | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | C | C | C | 3 | 1 | 1 | 1 | 2 | 4 | 5 | 2 | 2 | 1 | 1 | 1 | 1.4 | 5 |
| 29-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 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 | 0.2 | 0 |

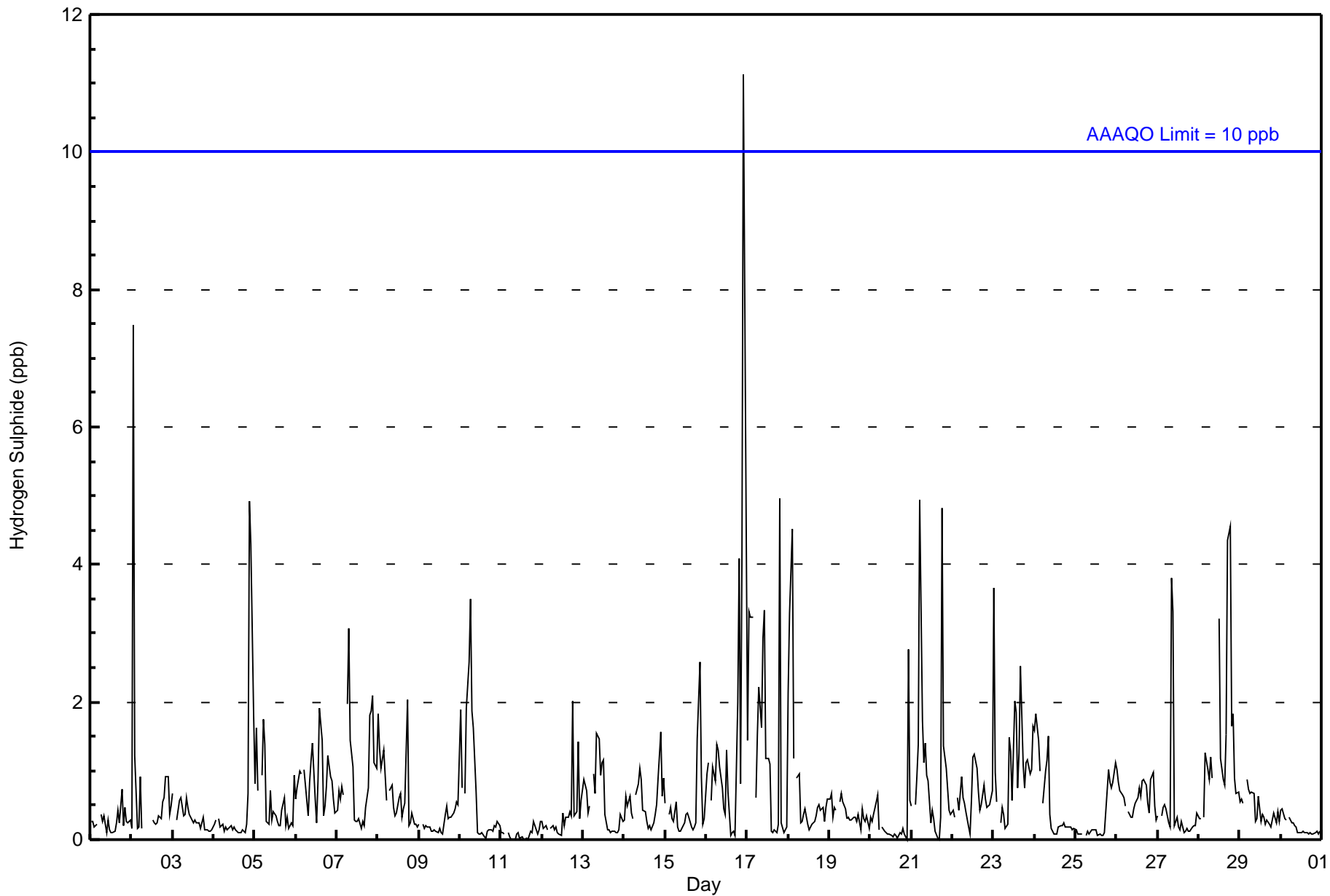
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.8 | 1.2 | 0.8 | 0.7 | 0.6 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.5 | 0.3 | 0.5 | 0.4 | 0.3 | 0.3 | 0.4 | 0.5 | 0.8 | 0.8 | 0.6 | 0.8 | 1.0 | 0.7 | Diurnal Average | |
| 4 | 7 | 5 | 3 | 2 | 5 | 3 | 3 | 4 | 3 | 3 | 3 | 1 | 3 | 2 | 2 | 1 | 3 | 4 | 5 | 5 | 3 | 5 | 11 | 5 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 655 | 95.76 | 95.76 |
| 3 - 4 | 20 | 2.92 | 98.68 |
| 5 - 7 | 8 | 1.17 | 99.85 |
| 8 - 11 | 0 | 0.00 | 99.85 |
| > 11 | 1 | 0.15 | 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 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 21 | 11 | 12 | 10 | 18 | 40 | 132 | 59 | 17 | 14 | 13 | 55 | 88 | 68 | 61 | 36 | 655 |
| 3 - 4 | 0 | 1 | 0 | 2 | 0 | 2 | 2 | 4 | 4 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 20 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 8 |
| 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Totals | 21 | 12 | 12 | 12 | 18 | 42 | 137 | 65 | 21 | 15 | 20 | 56 | 88 | 68 | 61 | 36 | 684 |

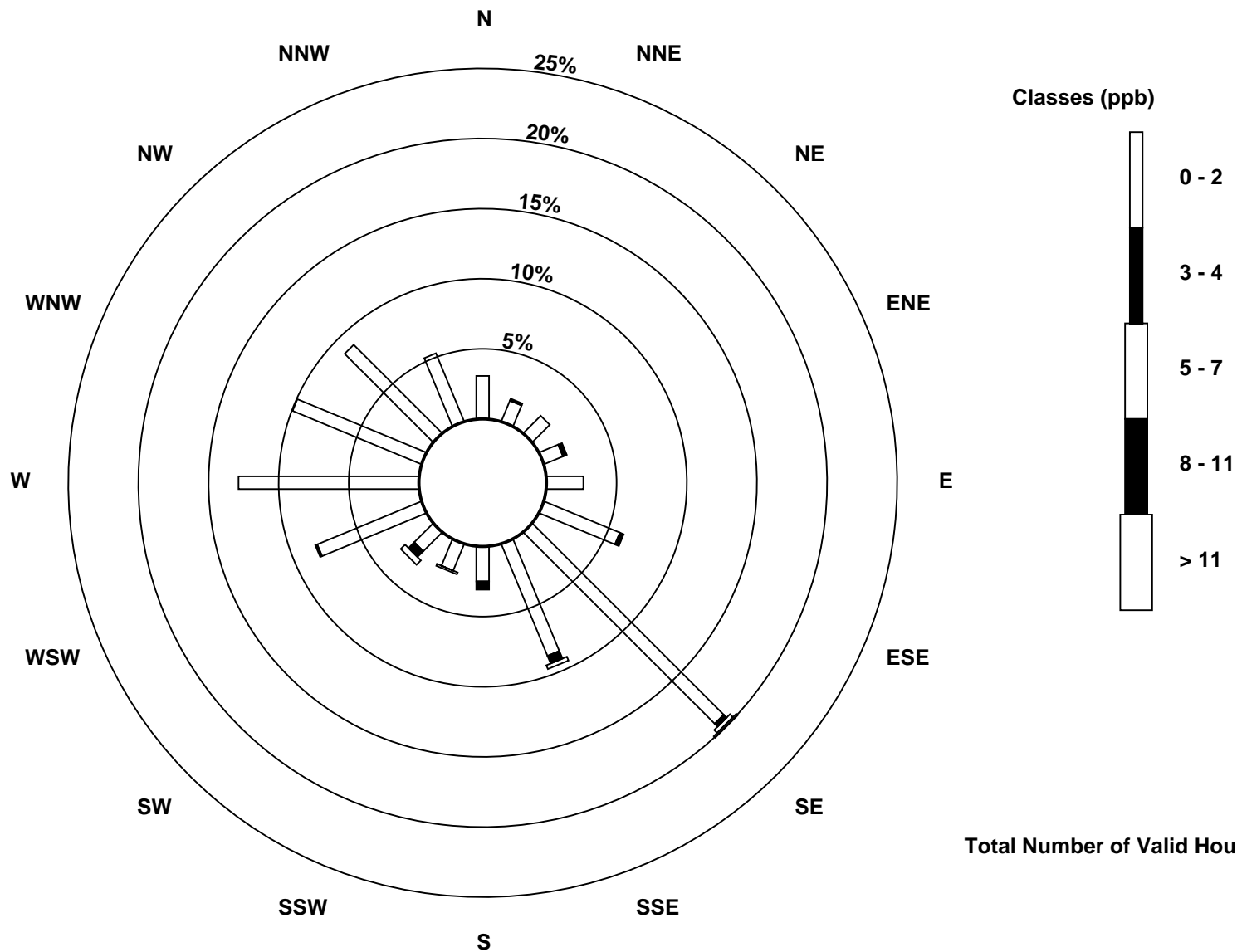
Total Number of Valid Hours: 684

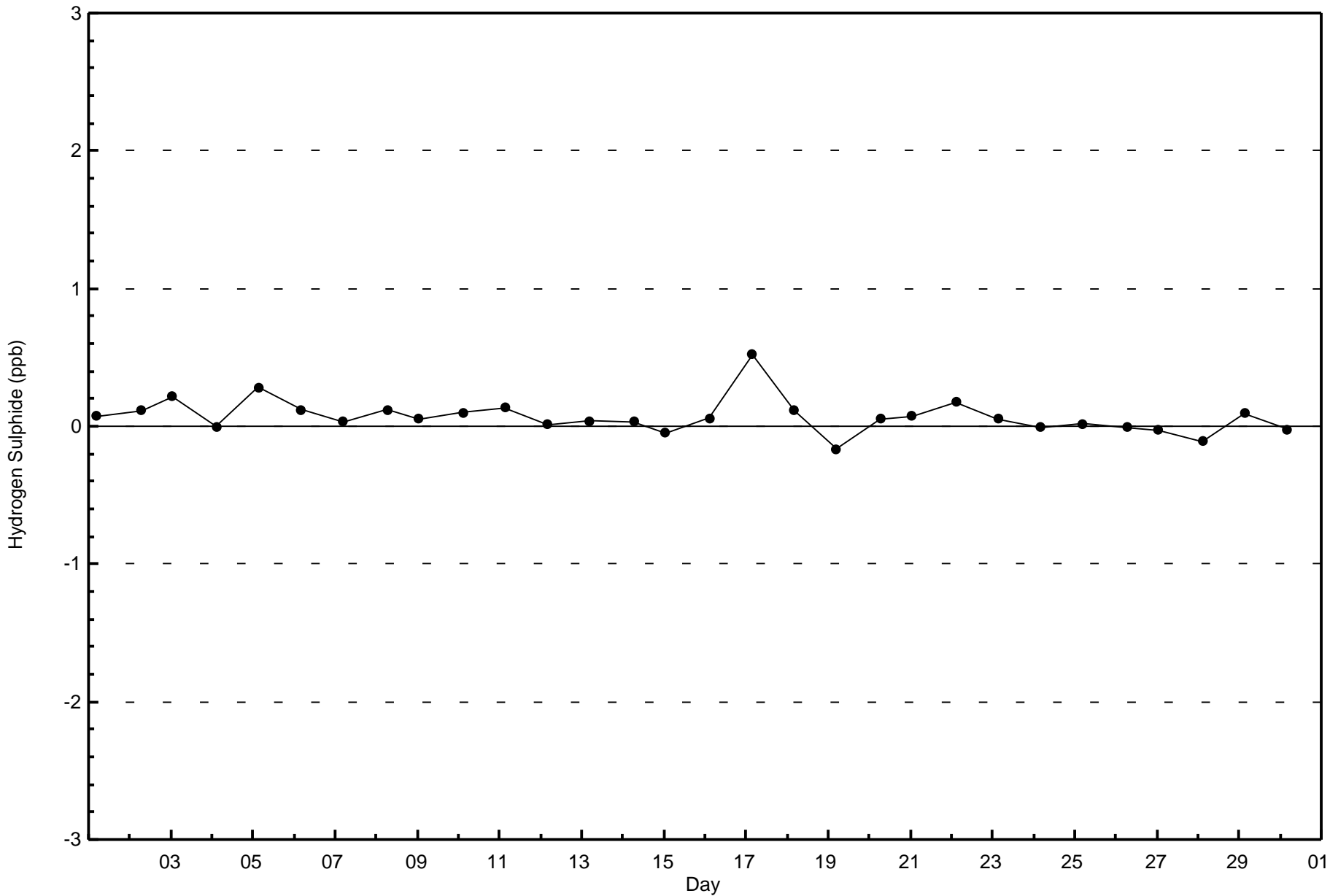
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Hydrogen Sulphide (H₂S) - ppb
Lower Camp (AMS 11)

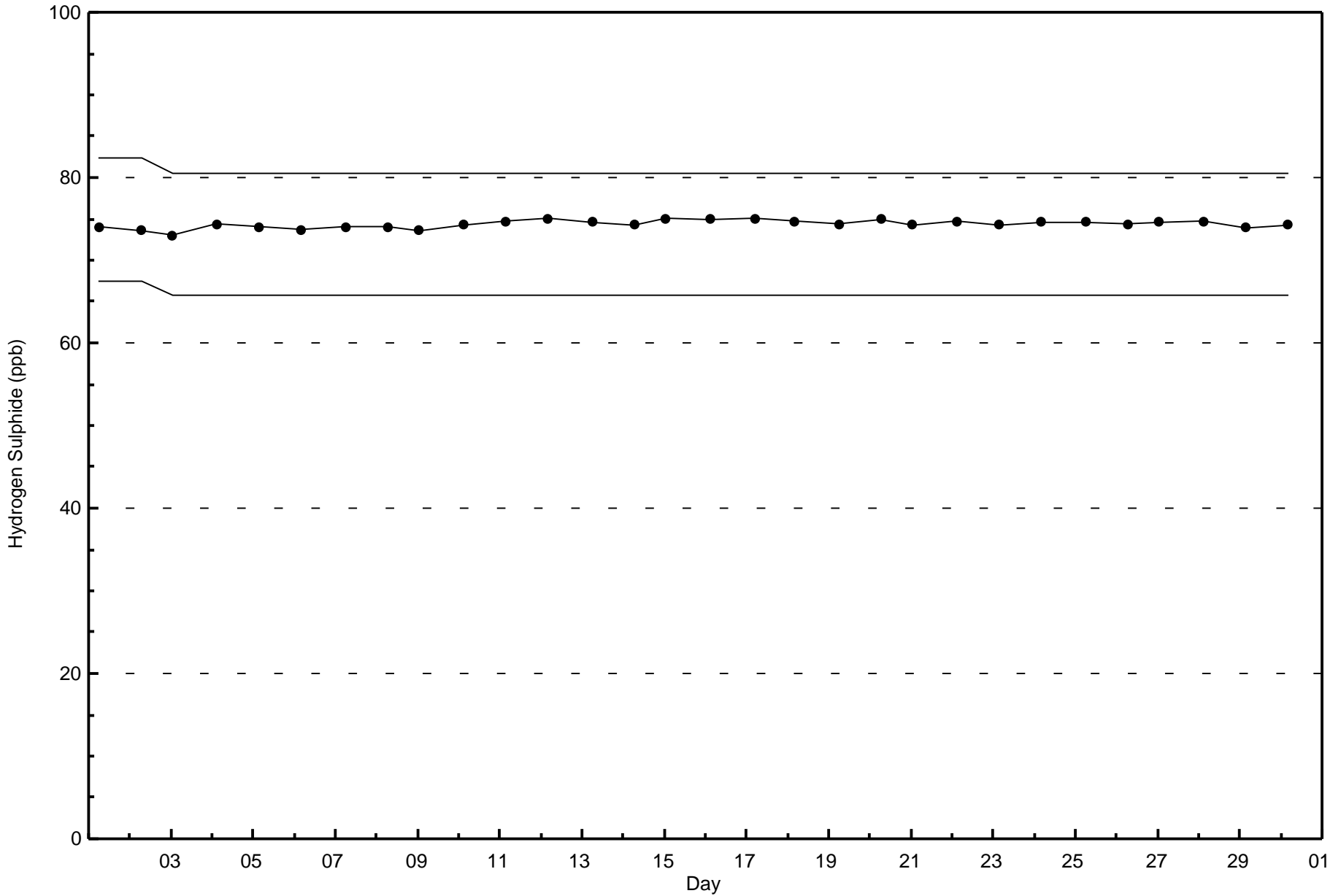






Wood Buffalo Environmental Association
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - September 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

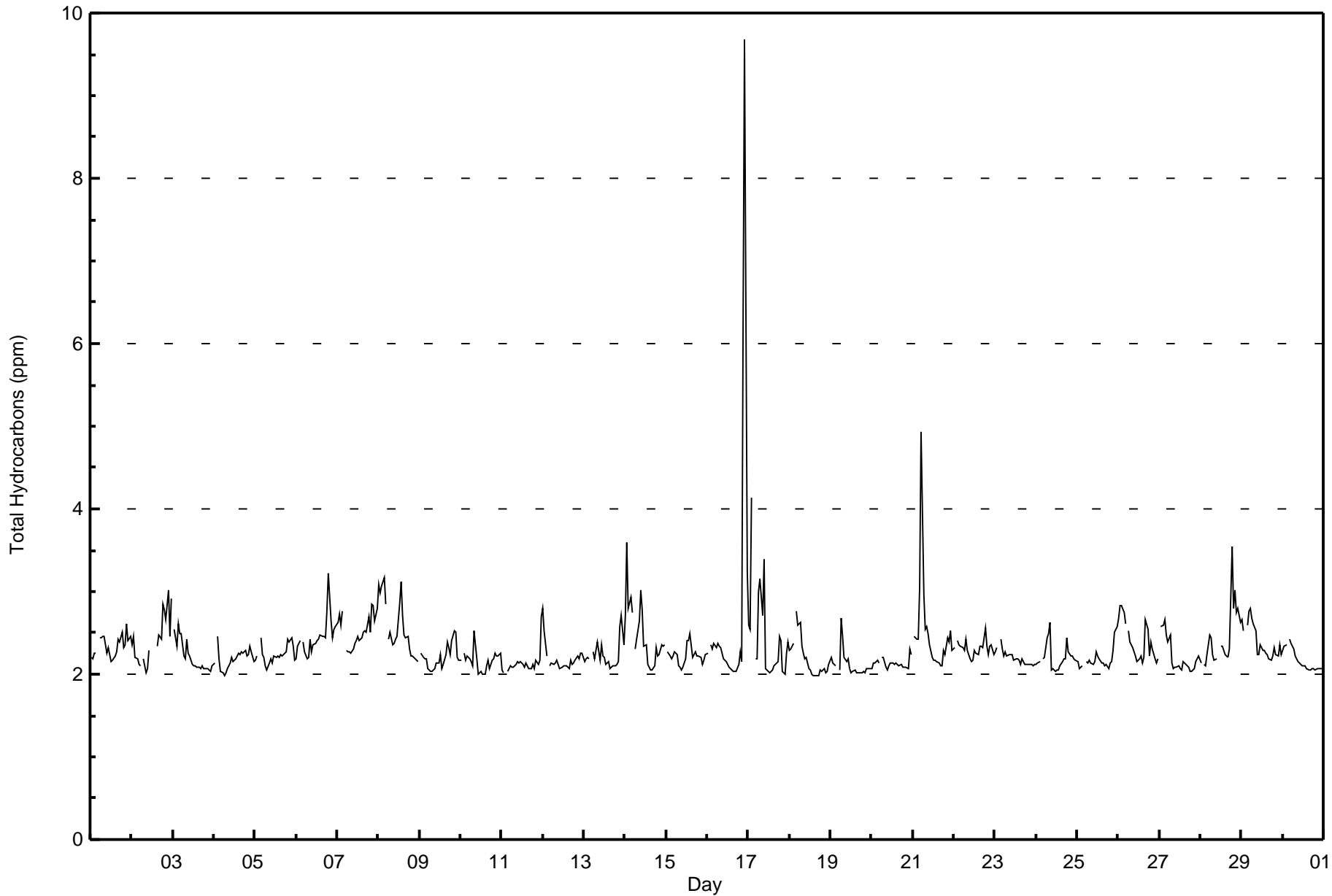
Total Hydrocarbons (THC) - ppm
Lower Camp - September 2016

| Maximum Value: 9.7 ppm on Sep 16 23:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.7 ppm on Sep 16 | | | | | Hours in Service: 720 | | |
|---------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|------------------------------|---------------------------------|---------------|-----|
| Minimum Value: 2.0 ppm on Sep 18 16:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.1 ppm on Sep 19 | | | | | Hours of Data: 684 | | |
| Maximum Diurnal Average: 2.5 ppm at hour 23 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.2 ppm at hour 16 | | | | | Hours of Missing Data: 36 | | |
| Monthly Average: 2.30 ppm | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.6 P ₉₉ = 3.3 | | | | | 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 | 2.2 | 2.2 | 2.3 | 2.3 | Z | 2.4 | 2.4 | 2.5 | 2.5 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 2.2 | 2.3 | 2.4 | 2.4 | 2.5 | 2.3 | 2.4 | 2.6 | 2.4 | 2.5 | 2.3 | 2.6 | |
| 2-Sep | 2.4 | 2.5 | 2.2 | 2.2 | 2.1 | 2.1 | Z | 2.2 | 2.0 | 2.1 | 2.3 | C | C | C | C | 2.3 | 2.5 | 2.4 | 2.8 | 2.8 | 2.7 | 3.0 | 2.5 | 2.9 | 2.4 | 3.0 | |
| 3-Sep | Z | 2.5 | 2.3 | 2.6 | 2.5 | 2.5 | 2.2 | 2.2 | 2.4 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.6 | |
| 4-Sep | 2.1 | Z | 2.5 | 2.2 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.5 | |
| 5-Sep | 2.2 | 2.2 | Z | 2.4 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.4 | |
| 6-Sep | 2.2 | 2.3 | 2.4 | Z | 2.4 | 2.3 | 2.2 | 2.2 | 2.4 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.4 | 2.8 | 3.2 | 2.7 | 2.4 | 2.5 | 2.6 | 2.4 | 3.2 | |
| 7-Sep | 2.6 | 2.7 | 2.6 | 2.8 | Z | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.7 | 2.5 | 2.9 | 2.8 | 2.6 | 2.8 | 2.5 | 2.9 | |
| 8-Sep | 3.1 | 3.0 | 3.1 | 3.2 | 2.8 | Z | 2.4 | 2.5 | 2.4 | 2.4 | 2.4 | 2.5 | 2.9 | 3.1 | 2.7 | 2.5 | 2.4 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.6 | 3.2 | |
| 9-Sep | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.4 | 2.3 | 2.2 | 2.4 | 2.5 | 2.5 | 2.2 | 2.2 | 2.2 | 2.5 | |
| 10-Sep | 2.2 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.5 | 2.2 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.2 | 2.5 | |
| 11-Sep | 2.0 | 2.0 | Z | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.7 | 2.1 | 2.7 | |
| 12-Sep | 2.8 | 2.5 | 2.2 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.8 | |
| 13-Sep | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.2 | 2.3 | 2.4 | 2.2 | 2.4 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.6 | 2.7 | 2.4 | 2.2 | 2.7 | |
| 14-Sep | 2.7 | 3.6 | 2.8 | 2.9 | 2.7 | Z | 2.3 | 2.4 | 2.6 | 3.0 | 2.8 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.5 | 3.6 | |
| 15-Sep | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | 2.4 | 2.5 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.5 | |
| 16-Sep | 2.2 | Z | 2.4 | 2.3 | 2.4 | 2.3 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.3 | 2.2 | 6.2 | 9.7 | 3.2 | 2.7 | 9.7 | |
| 17-Sep | 2.6 | 2.5 | 4.1 | Z | 2.2 | 2.2 | 3.0 | 3.2 | 2.7 | 3.4 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.5 | 2.4 | 2.0 | 2.0 | 2.3 | 2.4 | 2.4 | 4.1 | |
| 18-Sep | 2.3 | 2.3 | 2.4 | Z | 2.8 | 2.6 | 2.6 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.2 | 2.8 | |
| 19-Sep | 2.2 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.7 | 2.5 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.7 | |
| 20-Sep | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.1 | 2.3 | |
| 21-Sep | Z | 2.5 | 2.4 | 2.4 | 3.0 | 4.9 | 3.0 | 2.5 | 2.6 | 2.5 | 2.4 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.4 | 2.4 | 2.5 | 2.3 | 2.5 | 4.9 | |
| 22-Sep | 2.3 | Z | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.6 | 2.3 | 2.2 | 2.3 | 2.4 | 2.2 | 2.3 | 2.6 | |
| 23-Sep | 2.3 | 2.3 | Z | 2.4 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | |
| 24-Sep | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.2 | 2.4 | 2.5 | 2.6 | 2.0 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.6 | |
| 25-Sep | 2.2 | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.5 | 2.6 | 2.2 | 2.6 |
| 26-Sep | 2.7 | 2.8 | 2.8 | 2.7 | 2.6 | Z | 2.5 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.7 | 2.5 | 2.2 | 2.4 | 2.3 | 2.2 | 2.1 | 2.2 | 2.4 | 2.8 | |
| 27-Sep | Z | 2.6 | 2.6 | 2.7 | 2.5 | 2.4 | 2.5 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.7 | |
| 28-Sep | 2.1 | Z | 2.1 | 2.1 | 2.2 | 2.5 | 2.4 | 2.2 | 2.2 | 2.2 | 2.2 | C | C | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 3.5 | 2.8 | 3.0 | 2.8 | 2.8 | 2.6 | 3.5 | |
| 29-Sep | 2.7 | 2.5 | Z | 2.6 | 2.8 | 2.8 | 2.7 | 2.6 | 2.5 | 2.2 | 2.2 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.4 | 2.2 | 2.4 | 2.8 | |
| 30-Sep | 2.3 | 2.3 | 2.4 | Z | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Lower Camp - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 48 | 7.02 | 7.02 |
| 2.1 - 3.0 | 622 | 90.94 | 97.95 |
| 3.1 - 10.0 | 14 | 2.05 | 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
Lower Camp - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals | |
|-------------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|----|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | | |
| 0 - 2.0 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 14 | 6 | 2 | 9 | 9 | 48 |
| 2.1 - 3.0 | 21 | 8 | 12 | 10 | 18 | 42 | 132 | 64 | 18 | 14 | 19 | 41 | 78 | 65 | 55 | 25 | 622 | |
| 3.1 - 10.0 | 0 | 0 | 0 | 1 | 1 | 0 | 6 | 1 | 3 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 14 | |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Totals | 22 | 12 | 13 | 11 | 19 | 42 | 138 | 65 | 21 | 15 | 20 | 55 | 85 | 68 | 64 | 34 | 684 | |

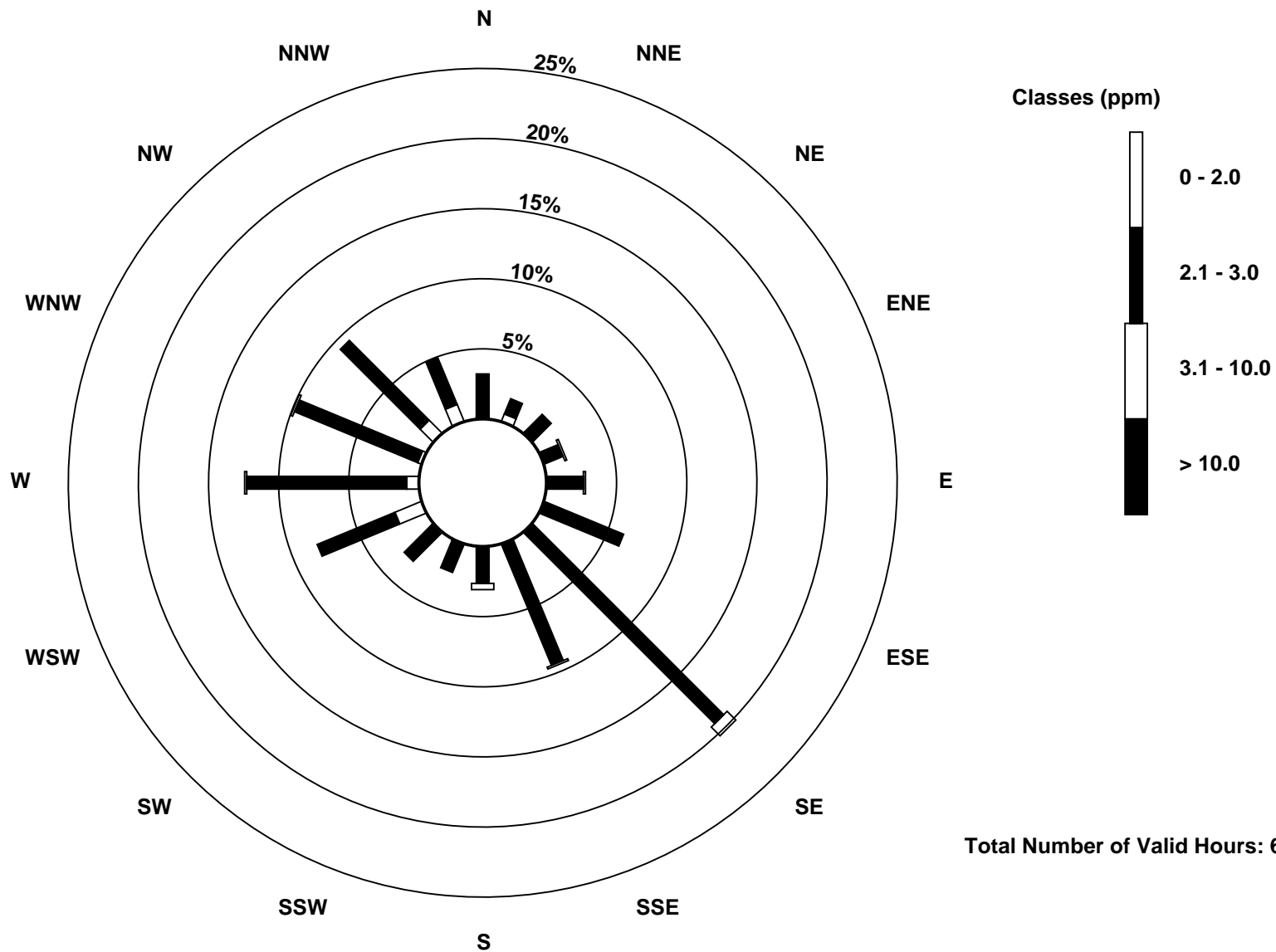
Total Number of Valid Hours: 684

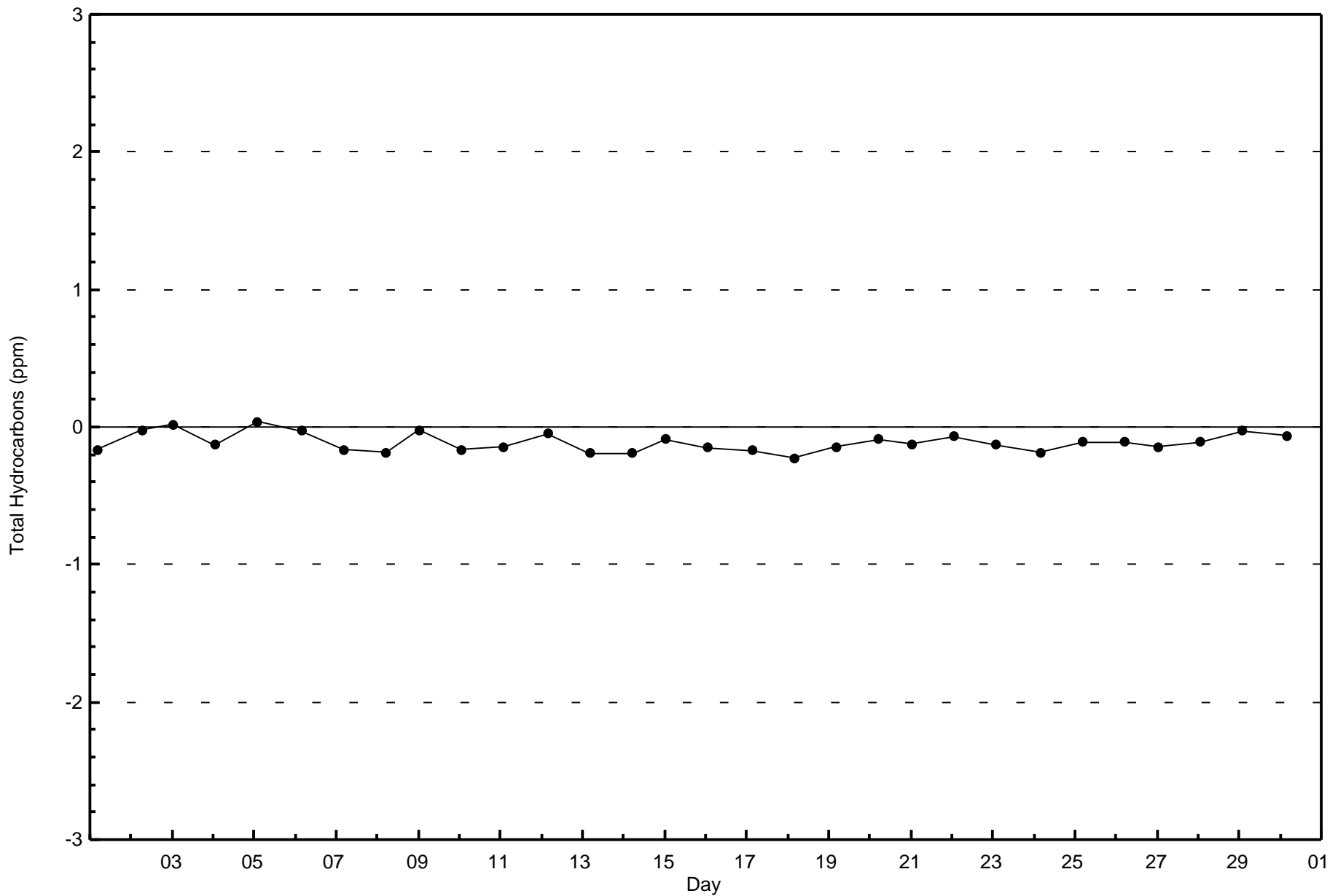
Total Number of Hours: 720

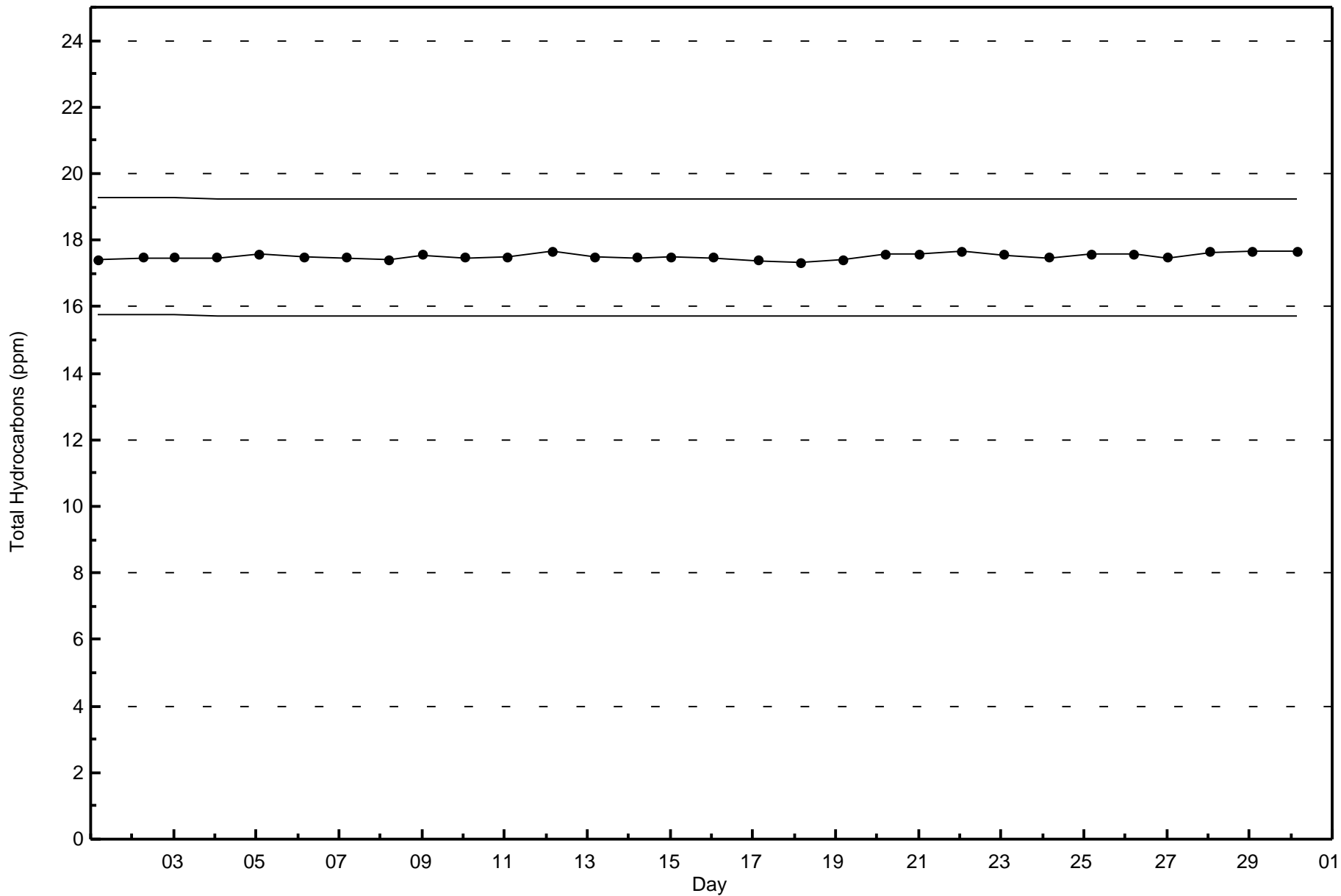


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Hydrocarbons (THC) - ppm
Lower Camp (AMS 11)





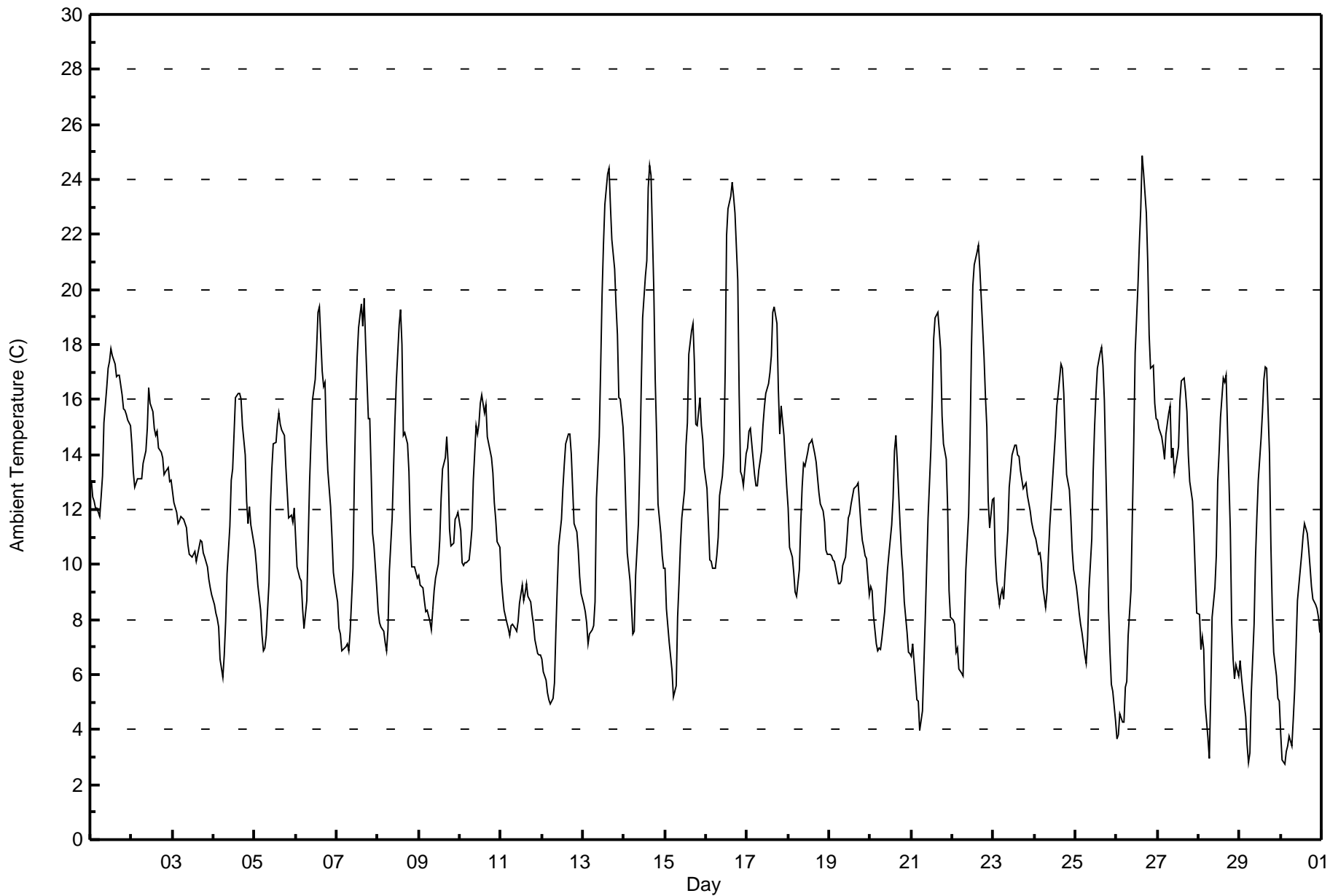




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Lower Camp - September 2016

| Maximum Value: 24.9 C on Sep 26 16:00 | | Maximum Daily Average: 15.5 C on Sep 13 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 2.7 C on Sep 30 03:00 | | Minimum Daily Average: 7.2 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.9 C at hour 16 | | Minimum Diurnal Average: 7.9 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.98 C | | Percentiles: P ₁ = 3.4 P ₁₀ = 6.8 Q ₁ = 8.8 Median = 11.7 Q ₃ = 14.7 P ₉₀ = 17.3 P ₉₉ = 23.7 | | 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 | 13.1 | 12.5 | 12.3 | 12.1 | 12.1 | 11.8 | 12.5 | 13.2 | 15.2 | 16.4 | 17.2 | 17.4 | 17.9 | 17.6 | 17.3 | 16.8 | 16.9 | 16.9 | 16.2 | 15.7 | 15.6 | 15.5 | 15.2 | 15.0 | 15.1 | 17.9 |
| 2-Sep | 14.4 | 13.4 | 12.8 | 13.1 | 13.1 | 13.1 | 13.1 | 13.7 | 14.1 | 14.9 | 16.4 | 15.8 | 15.6 | 15.0 | 14.7 | 14.8 | 14.2 | 14.1 | 13.9 | 13.3 | 13.4 | 13.5 | 13.0 | 13.1 | 14.0 | 16.4 |
| 3-Sep | 12.6 | 12.3 | 11.9 | 11.5 | 11.6 | 11.8 | 11.7 | 11.5 | 11.3 | 10.7 | 10.4 | 10.3 | 10.4 | 10.5 | 10.1 | 10.6 | 10.9 | 10.8 | 10.4 | 10.3 | 9.9 | 9.5 | 9.1 | 8.9 | 10.8 | 12.6 |
| 4-Sep | 8.5 | 8.2 | 8.0 | 7.7 | 6.6 | 5.9 | 6.7 | 7.9 | 9.7 | 11.4 | 13.1 | 13.4 | 14.7 | 16.1 | 16.2 | 16.2 | 16.0 | 15.1 | 14.0 | 12.3 | 11.5 | 12.1 | 11.4 | 10.8 | 11.4 | 16.2 |
| 5-Sep | 10.5 | 9.9 | 9.3 | 8.3 | 7.4 | 6.9 | 7.0 | 7.4 | 9.4 | 12.1 | 13.5 | 14.4 | 14.4 | 15.1 | 15.5 | 15.1 | 14.9 | 14.7 | 13.6 | 12.7 | 11.7 | 11.8 | 11.6 | 12.0 | 11.6 | 15.5 |
| 6-Sep | 11.0 | 9.9 | 9.5 | 9.4 | 8.4 | 7.7 | 8.7 | 10.9 | 13.0 | 14.6 | 15.9 | 16.7 | 17.9 | 19.2 | 19.4 | 17.0 | 16.5 | 16.6 | 14.6 | 13.4 | 12.1 | 11.0 | 9.7 | 9.3 | 13.0 | 19.4 |
| 7-Sep | 8.7 | 7.7 | 7.5 | 6.9 | 6.9 | 7.0 | 7.1 | 6.9 | 7.6 | 9.9 | 13.2 | 15.9 | 17.5 | 18.6 | 19.5 | 18.7 | 19.7 | 18.1 | 15.3 | 15.3 | 13.3 | 11.2 | 10.7 | 9.1 | 12.2 | 19.7 |
| 8-Sep | 8.3 | 7.9 | 7.7 | 7.6 | 7.2 | 6.9 | 7.6 | 9.8 | 11.7 | 13.5 | 15.3 | 16.7 | 18.7 | 19.2 | 18.0 | 14.7 | 14.8 | 14.4 | 13.4 | 11.2 | 9.9 | 9.9 | 9.7 | 9.5 | 11.8 | 19.2 |
| 9-Sep | 9.6 | 9.2 | 9.2 | 8.7 | 8.3 | 8.4 | 8.0 | 7.6 | 8.3 | 9.1 | 9.5 | 10.0 | 10.9 | 12.4 | 13.5 | 13.9 | 14.7 | 13.7 | 11.3 | 10.7 | 10.8 | 11.7 | 11.8 | 11.9 | 10.5 | 14.7 |
| 10-Sep | 11.2 | 10.1 | 10.0 | 10.1 | 10.1 | 10.2 | 10.7 | 11.3 | 13.1 | 15.1 | 14.7 | 15.1 | 15.9 | 16.2 | 15.5 | 15.8 | 14.7 | 14.4 | 13.9 | 13.3 | 12.3 | 11.6 | 10.8 | 10.6 | 12.8 | 16.2 |
| 11-Sep | 9.5 | 8.8 | 8.3 | 7.9 | 7.7 | 7.4 | 7.8 | 7.8 | 7.7 | 7.6 | 7.9 | 8.6 | 9.2 | 8.7 | 8.9 | 9.3 | 8.9 | 8.6 | 8.2 | 7.8 | 7.3 | 6.8 | 6.7 | 6.7 | 8.1 | 9.5 |
| 12-Sep | 6.6 | 6.1 | 5.8 | 5.4 | 5.1 | 4.9 | 5.1 | 5.7 | 7.6 | 9.2 | 10.7 | 11.6 | 12.7 | 13.6 | 14.4 | 14.8 | 14.7 | 14.0 | 12.8 | 11.5 | 11.2 | 10.5 | 9.5 | 8.9 | 9.7 | 14.8 |
| 13-Sep | 8.5 | 8.3 | 7.9 | 7.1 | 7.5 | 7.6 | 7.8 | 8.7 | 12.4 | 14.7 | 17.2 | 19.8 | 21.6 | 23.1 | 24.2 | 24.4 | 23.0 | 21.8 | 20.7 | 19.4 | 18.3 | 16.1 | 16.0 | 15.0 | 15.5 | 24.4 |
| 14-Sep | 13.9 | 12.0 | 10.4 | 9.4 | 8.5 | 7.5 | 7.6 | 9.6 | 11.5 | 13.7 | 16.4 | 19.0 | 20.5 | 21.1 | 23.7 | 24.5 | 24.1 | 20.0 | 16.7 | 14.7 | 12.2 | 11.1 | 10.3 | 9.9 | 14.5 | 24.5 |
| 15-Sep | 9.9 | 8.4 | 7.2 | 6.7 | 6.1 | 5.2 | 5.6 | 8.1 | 9.3 | 10.7 | 11.7 | 12.7 | 14.4 | 15.1 | 17.6 | 18.5 | 18.8 | 17.3 | 15.1 | 15.0 | 16.1 | 15.0 | 14.5 | 13.5 | 12.2 | 18.8 |
| 16-Sep | 12.7 | 11.5 | 10.2 | 10.1 | 9.9 | 9.9 | 10.3 | 11.0 | 12.5 | 13.2 | 14.0 | 17.0 | 22.0 | 22.9 | 23.4 | 23.9 | 23.4 | 22.8 | 20.3 | 16.2 | 13.4 | 13.2 | 12.9 | 14.1 | 15.4 | 23.9 |
| 17-Sep | 14.3 | 14.8 | 14.9 | 13.8 | 13.3 | 12.9 | 12.9 | 13.4 | 14.1 | 15.1 | 15.7 | 16.2 | 16.6 | 17.0 | 17.6 | 19.2 | 19.4 | 18.8 | 16.4 | 14.8 | 15.8 | 14.7 | 13.7 | 12.8 | 15.3 | 19.4 |
| 18-Sep | 12.0 | 10.6 | 10.3 | 9.7 | 9.0 | 8.8 | 9.8 | 11.5 | 12.8 | 13.7 | 13.6 | 14.1 | 14.4 | 14.4 | 14.5 | 14.1 | 13.7 | 13.2 | 12.6 | 12.2 | 11.9 | 11.5 | 10.5 | 10.4 | 12.1 | 14.5 |
| 19-Sep | 10.4 | 10.3 | 10.2 | 10.1 | 9.9 | 9.3 | 9.3 | 9.4 | 10.0 | 10.3 | 10.9 | 11.7 | 11.9 | 12.2 | 12.8 | 12.8 | 12.9 | 13.0 | 11.4 | 10.9 | 10.6 | 10.3 | 10.2 | 8.9 | 10.8 | 13.0 |
| 20-Sep | 9.2 | 9.1 | 8.1 | 7.1 | 6.8 | 7.0 | 6.9 | 7.3 | 8.3 | 9.0 | 9.8 | 10.4 | 11.4 | 12.4 | 14.1 | 14.7 | 13.7 | 11.4 | 10.4 | 9.7 | 8.6 | 7.5 | 6.8 | 6.8 | 9.5 | 14.7 |
| 21-Sep | 6.6 | 7.1 | 5.8 | 5.1 | 5.1 | 4.0 | 4.7 | 6.4 | 8.0 | 9.9 | 11.7 | 14.2 | 16.0 | 18.2 | 19.0 | 19.1 | 18.5 | 17.8 | 15.4 | 14.4 | 13.8 | 12.0 | 9.1 | 8.1 | 11.2 | 19.1 |
| 22-Sep | 8.0 | 7.8 | 6.8 | 7.0 | 6.2 | 6.0 | 6.0 | 8.1 | 9.8 | 11.8 | 14.5 | 17.9 | 20.1 | 20.9 | 21.4 | 21.6 | 20.7 | 19.7 | 17.6 | 16.1 | 15.0 | 12.3 | 11.4 | 12.4 | 13.3 | 21.6 |
| 23-Sep | 12.4 | 10.3 | 9.4 | 8.6 | 8.9 | 9.1 | 8.7 | 9.7 | 11.3 | 12.8 | 13.4 | 14.0 | 14.3 | 14.4 | 14.0 | 13.9 | 13.4 | 12.8 | 12.9 | 12.9 | 12.5 | 11.9 | 11.5 | 11.3 | 11.8 | 14.4 |
| 24-Sep | 11.1 | 10.9 | 10.4 | 10.4 | 10.0 | 9.2 | 8.4 | 9.0 | 10.3 | 11.5 | 12.2 | 13.9 | 14.8 | 15.8 | 16.2 | 17.3 | 17.1 | 16.2 | 14.6 | 13.3 | 12.7 | 11.7 | 10.5 | 9.8 | 12.4 | 17.3 |
| 25-Sep | 9.2 | 8.8 | 8.3 | 7.8 | 7.5 | 6.7 | 6.4 | 7.3 | 9.1 | 10.9 | 13.4 | 15.0 | 16.2 | 17.1 | 17.7 | 17.9 | 17.2 | 16.0 | 11.2 | 8.4 | 6.8 | 5.6 | 5.4 | 4.3 | 10.6 | 17.9 |
| 26-Sep | 3.7 | 3.8 | 4.6 | 4.3 | 4.3 | 5.5 | 5.8 | 7.4 | 9.0 | 11.7 | 14.5 | 17.7 | 20.1 | 21.6 | 23.0 | 24.9 | 24.2 | 22.8 | 21.0 | 18.3 | 17.1 | 17.2 | 15.8 | 15.3 | 13.9 | 24.9 |
| 27-Sep | 15.2 | 14.9 | 14.6 | 14.3 | 13.9 | 14.7 | 15.5 | 15.7 | 13.9 | 14.2 | 13.3 | 13.9 | 14.3 | 16.0 | 16.7 | 16.8 | 16.3 | 15.6 | 14.0 | 13.0 | 12.3 | 11.1 | 9.7 | 8.3 | 14.1 | 16.8 |
| 28-Sep | 8.2 | 6.9 | 7.4 | 6.9 | 4.9 | 3.7 | 3.0 | 5.3 | 8.1 | 9.2 | 10.3 | 13.0 | 14.1 | 15.3 | 16.8 | 16.6 | 16.9 | 14.9 | 11.3 | 7.9 | 6.6 | 5.9 | 6.3 | 5.9 | 9.4 | 16.9 |
| 29-Sep | 6.5 | 5.9 | 5.4 | 4.5 | 3.5 | 2.8 | 3.2 | 5.4 | 7.8 | 10.2 | 11.7 | 13.1 | 14.6 | 15.6 | 16.7 | 17.2 | 17.1 | 14.0 | 10.7 | 8.4 | 6.8 | 5.9 | 5.2 | 5.0 | 9.0 | 17.2 |
| 30-Sep | 3.9 | 2.9 | 2.7 | 3.2 | 3.4 | 3.8 | 3.4 | 4.4 | 5.5 | 7.0 | 8.7 | 9.8 | 10.4 | 11.0 | 11.5 | 11.1 | 10.6 | 9.9 | 9.2 | 8.7 | 8.6 | 8.4 | 8.1 | 7.5 | 7.2 | 11.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Lower Camp - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 255 | 35.42 | 35.42 |
| 10 - 20 | 434 | 60.28 | 95.69 |
| > 20 | 31 | 4.31 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

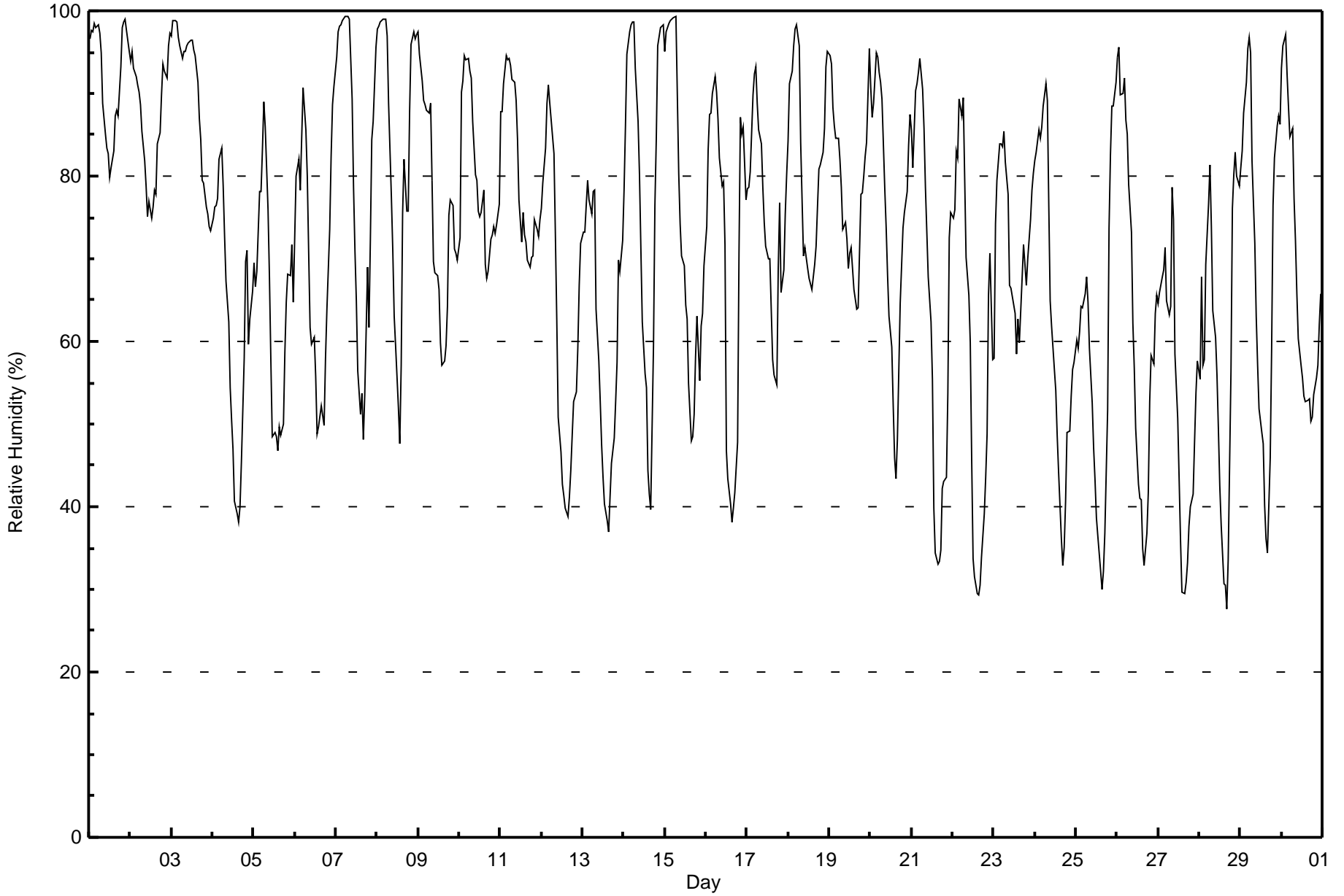
**Relative Humidity (RH) - %
Lower Camp - September 2016**

| Maximum Value: 99 % on Sep 7 07:00 Maximum Daily Average: 92.0 % on Sep 1 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------|----|----|----|----|----|----|----|---------------|---------------|
| Minimum Value: 28 % on Sep 28 17:00 Minimum Daily Average: 53.1 % on Sep 27 Maximum Diurnal Average: 88.9 % at hour 6 Minimum Diurnal Average: 51.2 % at hour 16 Monthly Average: 71.8 % Percentiles: P ₁ = 30 P ₁₀ = 44 Q ₁ = 58 Median = 74 Q ₃ = 87 P ₉₀ = 95 P ₉₉ = 99 | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 97 | 98 | 98 | 98 | 98 | 98 | 97 | 95 | 89 | 85 | 83 | 83 | 80 | 81 | 83 | 87 | 88 | 87 | 93 | 98 | 99 | 99 | 98 | 95 | 92.0 | 99 |
| 2-Sep | 94 | 95 | 93 | 92 | 91 | 90 | 89 | 85 | 82 | 79 | 75 | 77 | 75 | 76 | 78 | 78 | 84 | 85 | 90 | 94 | 93 | 92 | 96 | 97 | 86.7 | 97 |
| 3-Sep | 97 | 99 | 99 | 99 | 97 | 96 | 94 | 95 | 95 | 96 | 96 | 97 | 97 | 95 | 95 | 91 | 87 | 84 | 80 | 79 | 76 | 75 | 74 | 73 | 90.2 | 99 |
| 4-Sep | 75 | 76 | 76 | 77 | 82 | 83 | 79 | 73 | 67 | 62 | 54 | 50 | 47 | 41 | 39 | 38 | 40 | 45 | 58 | 70 | 71 | 60 | 63 | 66 | 62.2 | 83 |
| 5-Sep | 69 | 67 | 69 | 78 | 78 | 83 | 89 | 86 | 76 | 68 | 58 | 49 | 49 | 48 | 47 | 50 | 49 | 50 | 59 | 65 | 68 | 68 | 72 | 65 | 64.9 | 89 |
| 6-Sep | 72 | 80 | 82 | 78 | 85 | 91 | 86 | 80 | 71 | 62 | 60 | 60 | 56 | 49 | 50 | 52 | 51 | 50 | 58 | 64 | 74 | 82 | 89 | 91 | 69.6 | 91 |
| 7-Sep | 94 | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 89 | 79 | 71 | 65 | 56 | 51 | 54 | 48 | 53 | 69 | 62 | 72 | 84 | 87 | 96 | 80.0 | 99 |
| 8-Sep | 98 | 98 | 99 | 99 | 99 | 99 | 97 | 89 | 77 | 71 | 63 | 60 | 52 | 48 | 57 | 75 | 82 | 76 | 76 | 88 | 96 | 97 | 97 | 97 | 82.9 | 99 |
| 9-Sep | 97 | 95 | 92 | 89 | 89 | 88 | 88 | 89 | 80 | 70 | 68 | 68 | 66 | 60 | 57 | 58 | 60 | 64 | 75 | 77 | 77 | 71 | 71 | 70 | 75.7 | 97 |
| 10-Sep | 73 | 90 | 92 | 95 | 94 | 94 | 93 | 92 | 87 | 80 | 79 | 76 | 75 | 76 | 78 | 69 | 68 | 68 | 72 | 73 | 74 | 73 | 74 | 77 | 80.0 | 95 |
| 11-Sep | 88 | 88 | 91 | 95 | 94 | 94 | 93 | 92 | 91 | 89 | 84 | 77 | 72 | 76 | 73 | 72 | 70 | 69 | 70 | 70 | 75 | 74 | 73 | 75 | 81.0 | 95 |
| 12-Sep | 76 | 79 | 83 | 89 | 91 | 89 | 85 | 83 | 73 | 63 | 51 | 47 | 43 | 41 | 40 | 39 | 41 | 44 | 49 | 53 | 54 | 59 | 67 | 72 | 62.9 | 91 |
| 13-Sep | 73 | 73 | 76 | 80 | 77 | 75 | 78 | 78 | 64 | 58 | 53 | 47 | 44 | 40 | 38 | 37 | 41 | 45 | 48 | 53 | 58 | 70 | 68 | 72 | 60.3 | 80 |
| 14-Sep | 78 | 86 | 95 | 98 | 98 | 99 | 99 | 93 | 87 | 80 | 71 | 62 | 56 | 54 | 44 | 42 | 40 | 59 | 76 | 85 | 96 | 98 | 98 | 98 | 78.9 | 99 |
| 15-Sep | 95 | 97 | 98 | 99 | 99 | 99 | 99 | 90 | 80 | 74 | 70 | 69 | 64 | 63 | 55 | 48 | 48 | 51 | 58 | 63 | 55 | 62 | 63 | 69 | 73.8 | 99 |
| 16-Sep | 74 | 83 | 87 | 88 | 90 | 92 | 90 | 87 | 82 | 79 | 79 | 72 | 47 | 43 | 40 | 38 | 40 | 42 | 48 | 71 | 87 | 85 | 86 | 77 | 71.1 | 92 |
| 17-Sep | 79 | 79 | 81 | 90 | 92 | 93 | 89 | 86 | 84 | 79 | 74 | 72 | 70 | 70 | 64 | 58 | 56 | 55 | 69 | 77 | 66 | 69 | 75 | 80 | 75.2 | 93 |
| 18-Sep | 84 | 91 | 93 | 96 | 98 | 98 | 96 | 84 | 77 | 70 | 71 | 69 | 68 | 67 | 66 | 69 | 71 | 76 | 81 | 81 | 83 | 86 | 93 | 95 | 81.9 | 98 |
| 19-Sep | 95 | 94 | 88 | 86 | 85 | 85 | 82 | 79 | 74 | 74 | 72 | 69 | 71 | 71 | 66 | 65 | 64 | 64 | 78 | 78 | 80 | 82 | 84 | 95 | 78.4 | 95 |
| 20-Sep | 91 | 87 | 89 | 95 | 94 | 93 | 91 | 89 | 78 | 74 | 68 | 63 | 59 | 52 | 46 | 43 | 48 | 65 | 69 | 74 | 76 | 78 | 84 | 88 | 74.8 | 95 |
| 21-Sep | 86 | 81 | 90 | 91 | 93 | 94 | 91 | 86 | 79 | 73 | 68 | 62 | 55 | 40 | 34 | 33 | 33 | 35 | 42 | 43 | 44 | 54 | 73 | 76 | 64.8 | 94 |
| 22-Sep | 75 | 76 | 83 | 82 | 89 | 87 | 89 | 80 | 70 | 66 | 60 | 46 | 34 | 32 | 30 | 29 | 30 | 34 | 39 | 44 | 49 | 66 | 71 | 58 | 59.1 | 89 |
| 23-Sep | 58 | 74 | 80 | 84 | 84 | 84 | 85 | 82 | 78 | 67 | 66 | 65 | 63 | 59 | 63 | 60 | 64 | 72 | 69 | 67 | 70 | 75 | 78 | 80 | 71.9 | 85 |
| 24-Sep | 82 | 83 | 86 | 85 | 86 | 89 | 91 | 89 | 77 | 65 | 62 | 57 | 54 | 49 | 44 | 36 | 33 | 35 | 41 | 49 | 49 | 53 | 57 | 57 | 62.8 | 91 |
| 25-Sep | 60 | 59 | 61 | 64 | 64 | 66 | 68 | 65 | 59 | 53 | 47 | 43 | 39 | 37 | 32 | 30 | 32 | 37 | 52 | 74 | 83 | 88 | 89 | 91 | 58.0 | 91 |
| 26-Sep | 94 | 96 | 90 | 90 | 92 | 87 | 85 | 79 | 73 | 62 | 57 | 50 | 43 | 41 | 41 | 35 | 33 | 37 | 42 | 53 | 58 | 57 | 63 | 66 | 63.4 | 96 |
| 27-Sep | 65 | 66 | 68 | 69 | 71 | 65 | 63 | 64 | 79 | 75 | 59 | 51 | 43 | 36 | 30 | 30 | 31 | 33 | 38 | 40 | 41 | 48 | 54 | 58 | 53.1 | 79 |
| 28-Sep | 55 | 68 | 57 | 58 | 69 | 77 | 81 | 74 | 64 | 61 | 56 | 49 | 43 | 38 | 31 | 31 | 28 | 34 | 56 | 76 | 80 | 83 | 80 | 79 | 59.4 | 83 |
| 29-Sep | 81 | 83 | 88 | 91 | 95 | 97 | 95 | 82 | 72 | 63 | 57 | 52 | 49 | 48 | 40 | 36 | 34 | 46 | 59 | 76 | 82 | 86 | 87 | 86 | 70.3 | 97 |
| 30-Sep | 93 | 96 | 97 | 92 | 88 | 85 | 86 | 77 | 72 | 66 | 60 | 57 | 56 | 53 | 53 | 53 | 50 | 51 | 54 | 56 | 57 | 62 | 66 | 66 | 68.1 | 97 |
| 81.6 84.5 85.9 87.5 88.7 88.9 88.3 84.0 77.8 71.7 66.8 62.3 57.8 54.6 52.2 51.2 51.6 54.9 62.1 68.2 71.3 74.4 77.4 78.8 | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | |
| 98 99 99 99 99 99 99 99 99 99 96 96 97 97 95 95 91 88 87 93 98 99 99 98 98 | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Lower Camp - September 2016





| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Speed: 27 km/h on Sep 24 17:00 | Maximum Daily Speed Average: 15.3 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 25 19:00 | Minimum Daily Speed Average: 0.2 km/h on Sep 8 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 5.3 km/h at hour 15 | Minimum Diurnal Speed Average: 1.4 km/h at hour 3 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 2.5 km/h 246.9 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 12 P ₉₀ = 17 P ₉₉ = 24 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | W2 | WNW1 | WNW4 | WNW6 | W6 | W5 | NW5 | WNW4 | NW4 | N6 | NW6 | E6 | ESE13 | ESE11 | ESE9 | SSE2 | N6 | ENE1 | NNW4 | W5 | NW4 | W4 | W11 | W13 | WNW1.7 | ESE13 | |
| 2-Sep | W12 | SW6 | WSW9 | W13 | WSW14 | WSW12 | WSW14 | WSW7 | WSW10 | W11 | W9 | W14 | W13 | WSW12 | WSW11 | W13 | W10 | W9 | NE3 | WNW4 | NW7 | W9 | W15 | NW13 | W9.7 | W15 | |
| 3-Sep | NNW12 | NW11 | WNW9 | WNW13 | WNW17 | W17 | W21 | W21 | W20 | WNW19 | WNW19 | WNW18 | WNW15 | WNW14 | WNW14 | NW10 | WNW15 | NW15 | NW17 | NW16 | NW20 | WNW17 | WNW16 | WNW17 | WNW15.3 | W21 | |
| 4-Sep | WNW18 | WNW16 | NW11 | WNW15 | W11 | WSW10 | WNW9 | W11 | W10 | W9 | W12 | W15 | W11 | W10 | W8 | W9 | WSW6 | WSW6 | NW5 | WNW2 | S2 | SW9 | SW4 | SSW3 | W8.5 | WNW18 | |
| 5-Sep | SSW2 | SSE4 | SSE4 | SE7 | SE7 | SE6 | SE11 | SE12 | ESE11 | SE10 | SE10 | S8 | S7 | S8 | SSE6 | SE7 | S5 | SSE6 | SE7 | ESE10 | ESE4 | NNE3 | ESE5 | SSE10 | SE6.4 | SE12 | |
| 6-Sep | SE7 | SE7 | SE7 | SSE8 | SE8 | SE8 | SSE7 | SE9 | SE9 | SSE8 | SE9 | SE12 | SE12 | SE10 | SE12 | SSE10 | SSE9 | S9 | S7 | S6 | SSE6 | SE6 | SE8 | SE6 | SSE8.0 | SE12 | |
| 7-Sep | ESE3 | SE1 | E3 | E3 | ESE7 | SE7 | SSE8 | SSE7 | SE8 | SE9 | SE11 | SE11 | SE10 | SE11 | SE10 | ESE9 | SE6 | SE4 | SSW2 | SW5 | S2 | ESE2 | S0 | ESE3 | SE5.4 | SE11 | |
| 8-Sep | E2 | SE4 | SE3 | SE5 | SE5 | SE5 | SE8 | SE8 | SE7 | NW2 | NW3 | NNW4 | W5 | WNW3 | WNW4 | NW6 | ESE0 | W10 | NE7 | NW2 | NW2 | W6 | W4 | NW3 | SSW0.2 | W10 | |
| 9-Sep | NW3 | NW6 | NW6 | NW8 | NW5 | NW7 | NE7 | NNE7 | N10 | NNW9 | NNW7 | WSW5 | NNE1 | WNW6 | WNW5 | E5 | SE9 | SE8 | ESE7 | SE6 | ESE9 | ESE16 | SE18 | SE18 | ENE1.8 | SE18 | |
| 10-Sep | SSE11 | SE13 | SE18 | SE18 | SSE13 | SSE13 | SE13 | SE12 | SSE8 | WSW14 | W16 | W17 | WSW16 | WSW19 | W17 | WNW20 | WNW21 | W20 | WNW19 | WNW22 | WNW23 | WNW21 | WNW20 | WNW19 | WSW8.9 | WNW23 | |
| 11-Sep | NW17 | NNW20 | NW19 | NNW19 | NNW21 | NNW20 | NNW20 | N20 | N21 | NNW18 | NNW18 | NNW19 | NNW18 | NNW17 | NNW17 | N16 | NNW12 | NNW12 | NW9 | NW9 | NW7 | NW7 | NW6 | NW5 | NNW15.0 | NNW21 | |
| 12-Sep | NNW6 | NW5 | N4 | W2 | WNW2 | W3 | WSW7 | WSW4 | WSW6 | W8 | W10 | W6 | SW8 | SSW6 | SSW8 | SW9 | S7 | SSE7 | SSE9 | SSE8 | SSE10 | SSE10 | SSE10 | SSE10 | SSW4.0 | SSE10 | |
| 13-Sep | SSE10 | SSE8 | ESE10 | ESE9 | SE9 | SE9 | SE10 | SE12 | SSE6 | SW9 | SSW8 | SW10 | SW15 | WSW17 | W15 | WSW18 | WSW16 | SW14 | WSW14 | WSW14 | W13 | W12 | WNW13 | W8 | SW7.1 | WSW18 | |
| 14-Sep | WNW5 | W4 | WNW2 | WNW3 | NNW1 | E1 | NE1 | NW3 | NW3 | NW3 | E3 | SE6 | SE10 | SE10 | SE13 | WSW12 | W13 | WSW15 | NW16 | NNW9 | WNW2 | ESE2 | E2 | E3 | W3 | W1.5 | NW16 |
| 15-Sep | WNW3 | ESE2 | WNW0 | WNW3 | WNW1 | ESE1 | W3 | NE3 | ENE6 | ENE5 | ESE4 | SE4 | SE5 | ESE7 | SE10 | ESE13 | SE14 | ESE11 | ESE3 | SE10 | SE14 | SE13 | SSE8 | SE9 | SE5.0 | SE14 | |
| 16-Sep | SE10 | SE6 | SE6 | SE6 | SE8 | SE8 | SE10 | SE9 | SE10 | SE10 | SE11 | SE10 | SW14 | SW19 | WSW20 | WSW19 | WSW14 | WSW11 | SW8 | NNE2 | NNE2 | ENE3 | SE2 | SE6 | S5.3 | WSW20 | |
| 17-Sep | SE5 | S6 | S6 | ESE7 | ESE7 | SE5 | ESE2 | SE4 | SSE4 | S4 | SW7 | SSW5 | SW8 | SSW6 | WSW11 | W11 | W14 | W14 | W2 | SW3 | WSW12 | WSW12 | W12 | WSW5 | SW4.7 | W14 | |
| 18-Sep | SSE4 | S3 | SSE4 | ENE0 | E1 | SE4 | W2 | W11 | WSW13 | W18 | WNW17 | WNW20 | WNW19 | NW20 | NW15 | NNW11 | NNW12 | NNW9 | NW6 | NW5 | NW5 | NNE7 | NW5 | NW5 | WNW6.8 | WNW20 | |
| 19-Sep | NW5 | NW7 | NW7 | NNW7 | NNW8 | NW8 | W13 | WNW15 | W16 | WNW14 | WNW12 | WNW10 | NW9 | NW8 | NW10 | NW11 | NNW10 | NNW9 | NNE8 | NNW7 | NNW5 | WNW5 | NNW9 | WNW6 | NW8.4 | W16 | |
| 20-Sep | NW7 | NW9 | NW5 | NW3 | NW5 | NW6 | NW5 | NW4 | N8 | N6 | NNE7 | NW6 | NNW6 | NNE4 | W5 | S3 | SE3 | ESE4 | E1 | NE3 | NE3 | E4 | ESE2 | WNW3 | NNW2.9 | NW9 | |
| 21-Sep | SE1 | E1 | NE1 | WSW1 | NE1 | SSE2 | SE3 | ESE3 | SE5 | SE6 | ESE8 | SE11 | SE8 | WSW8 | WSW11 | WSW12 | WSW11 | SW12 | SSW7 | SSW8 | SSW9 | SSE3 | ESE4 | SE6 | S3.5 | WSW12 | |
| 22-Sep | SE8 | SE8 | SE9 | SE11 | SE10 | SE11 | SE11 | SE11 | ESE13 | SE11 | SE12 | SSE11 | SSW12 | SSW12 | SSW12 | S9 | S9 | S7 | S6 | SSE7 | SSE7 | SE8 | SE7 | SSE9 | SSE8.5 | ESE13 | |
| 23-Sep | SSE10 | SE8 | SE7 | SE7 | SE9 | SE9 | SE9 | SE12 | SE13 | SSE14 | SSE14 | SE13 | SE18 | SSE14 | SE17 | SSE10 | SSE13 | SE23 | SSE11 | SSE11 | SSE11 | SSE11 | SSE11 | SSE11 | SE11.3 | SE18 | |
| 24-Sep | SSE11 | SSE9 | SSE9 | SSE8 | SSE9 | SSE7 | SSE6 | SSE6 | S4 | WSW17 | W21 | W20 | W21 | W24 | W23 | WNW24 | WNW27 | WNW22 | WNW8 | W9 | WSW13 | WSW18 | WSW18 | WSW19 | WSW10.6 | WNW27 | |
| 25-Sep | W16 | W21 | W19 | W16 | W12 | WNW7 | W9 | W8 | W14 | W15 | W14 | WNW16 | WNW15 | WNW12 | NW13 | NW13 | NNW8 | NW5 | ENE0 | ENE1 | E2 | E3 | ESE4 | NE1 | W8.8 | W21 | |
| 26-Sep | E1 | ENE1 | ESE5 | ESE2 | ESE5 | E9 | E8 | ESE9 | SE8 | SE11 | SE8 | SE10 | SSE11 | SE11 | SE10 | SSE10 | S10 | SSE8 | SSE7 | SSE7 | SSE10 | SE11 | SE12 | SE11 | SE7.6 | SE12 | |
| 27-Sep | SE9 | SSE4 | SSE5 | SE5 | SE8 | WSW7 | W10 | WSW13 | SW12 | WSW15 | WNW25 | W21 | W19 | W20 | W26 | W25 | W23 | WSW17 | WSW12 | WSW13 | WSW15 | W14 | W7 | WSW8 | W11.4 | W26 | |
| 28-Sep | WSW10 | W6 | WSW14 | WSW11 | SE5 | SSE5 | SE5 | SE8 | SE10 | SE12 | SE9 | SE6 | ENE3 | E4 | W6 | WSW3 | SW9 | SW6 | SE1 | NNE1 | E2 | E2 | ESE3 | SE4 | S2.9 | WSW14 | |
| 29-Sep | NE1 | WNW4 | W2 | N0 | NE2 | ENE1 | SE7 | SE8 | SE9 | SE10 | SE8 | SE7 | SE7 | ESE9 | SE7 | SE5 | SE3 | SE4 | NW1 | ENE1 | ENE1 | NE1 | W5 | W4 | SE3.0 | SE10 | |
| 30-Sep | NW2 | WNW2 | WNW3 | WNW5 | WNW7 | NW5 | NNW1 | NW6 | NW6 | NNW11 | N14 | N17 | N17 | N20 | N22 | N23 | NNE26 | NNE24 | N19 | N17 | N14 | N12 | N16 | N17 | N11.9 | NNE26 | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|--------|-------|--------|--------|--------|--------|------|--------|--------|--------|--------|--------|--------|------|------|-------|-------|-------|--------|--------|--------|--------|-------|-----------------|
| SW1.6 | WSW1.6 | SW1.4 | WSW1.5 | SSW1.5 | SSW1.6 | SSW1.8 | S1.8 | SSW1.8 | WSW2.9 | WSW3.2 | WSW3.4 | WSW3.8 | WSW4.3 | W5.3 | W5.3 | W4.8 | W4.0 | W1.9 | WSW2.1 | WSW2.1 | WSW2.0 | WSW2.3 | SW2.5 | Diurnal Average |
| WNW18 | W21 | W19 | NNW19 | NNW21 | NNW20 | W21 | W21 | N21 | WNW19 | WNW25 | W21 | W21 | W24 | W26 | W25 | WNW27 | NNE24 | WNW19 | WNW22 | WNW23 | WNW21 | WNW20 | WNW19 | Diurnal Maximum |

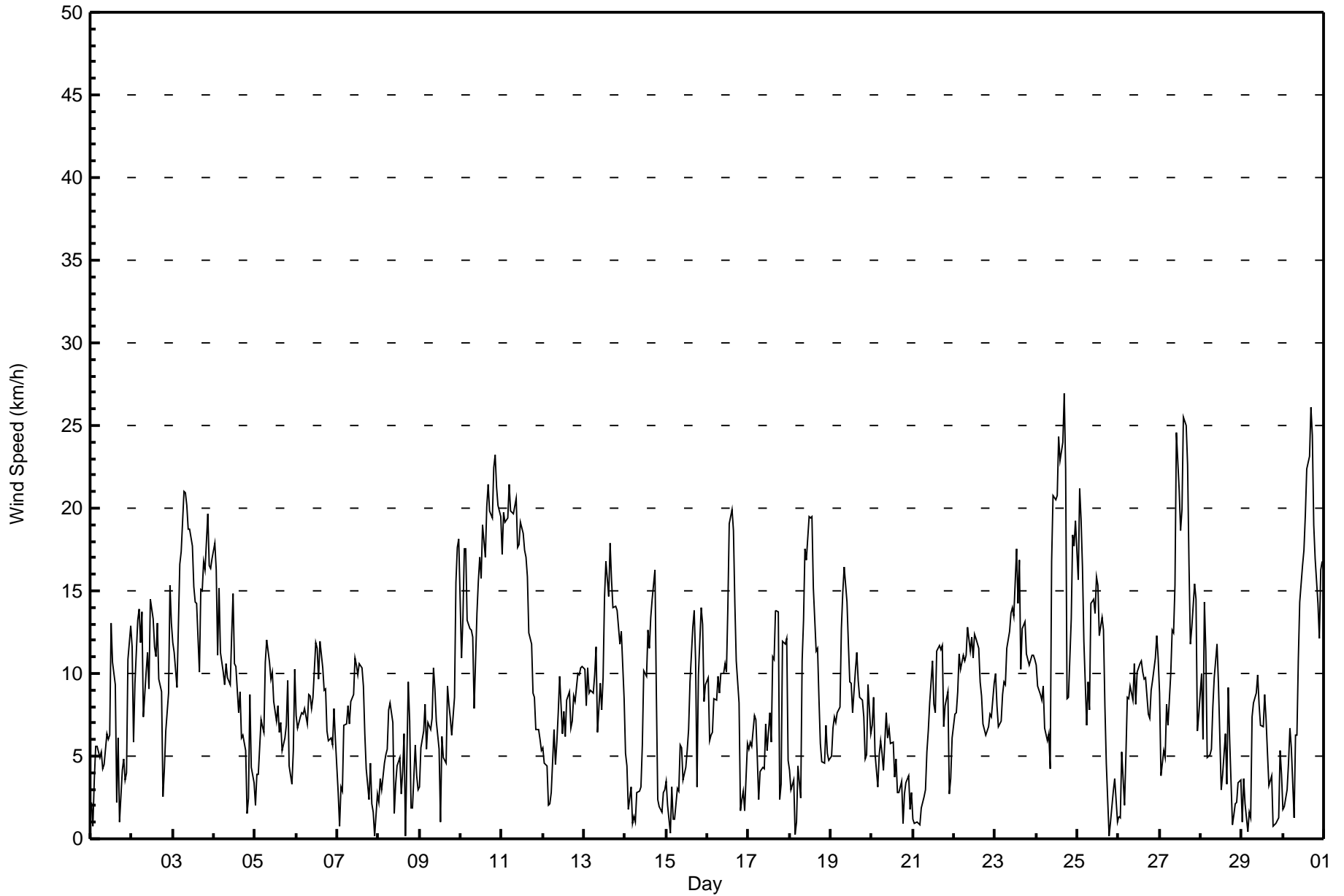
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Lower Camp - September 2016

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - September 2016

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 200 | 27.78 | 27.78 |
| 6 - 11 | 315 | 43.75 | 71.53 |
| 12 - 19 | 165 | 22.92 | 94.44 |
| 20 - 28 | 40 | 5.56 | 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
Lower Camp - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 2 | 6 | 11 | 11 | 18 | 22 | 25 | 11 | 8 | 4 | 3 | 5 | 17 | 24 | 28 | 5 | 200 |
| 6 - 11 | 5 | 4 | 2 | 1 | 3 | 17 | 99 | 51 | 13 | 8 | 11 | 18 | 30 | 10 | 27 | 16 | 315 |
| 12 - 19 | 10 | 0 | 0 | 0 | 0 | 5 | 24 | 6 | 0 | 3 | 6 | 33 | 31 | 26 | 9 | 12 | 165 |
| 20 - 28 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 14 | 11 | 2 | 4 | 40 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 22 | 12 | 13 | 12 | 21 | 44 | 148 | 68 | 21 | 15 | 20 | 58 | 92 | 71 | 66 | 37 | 720 |

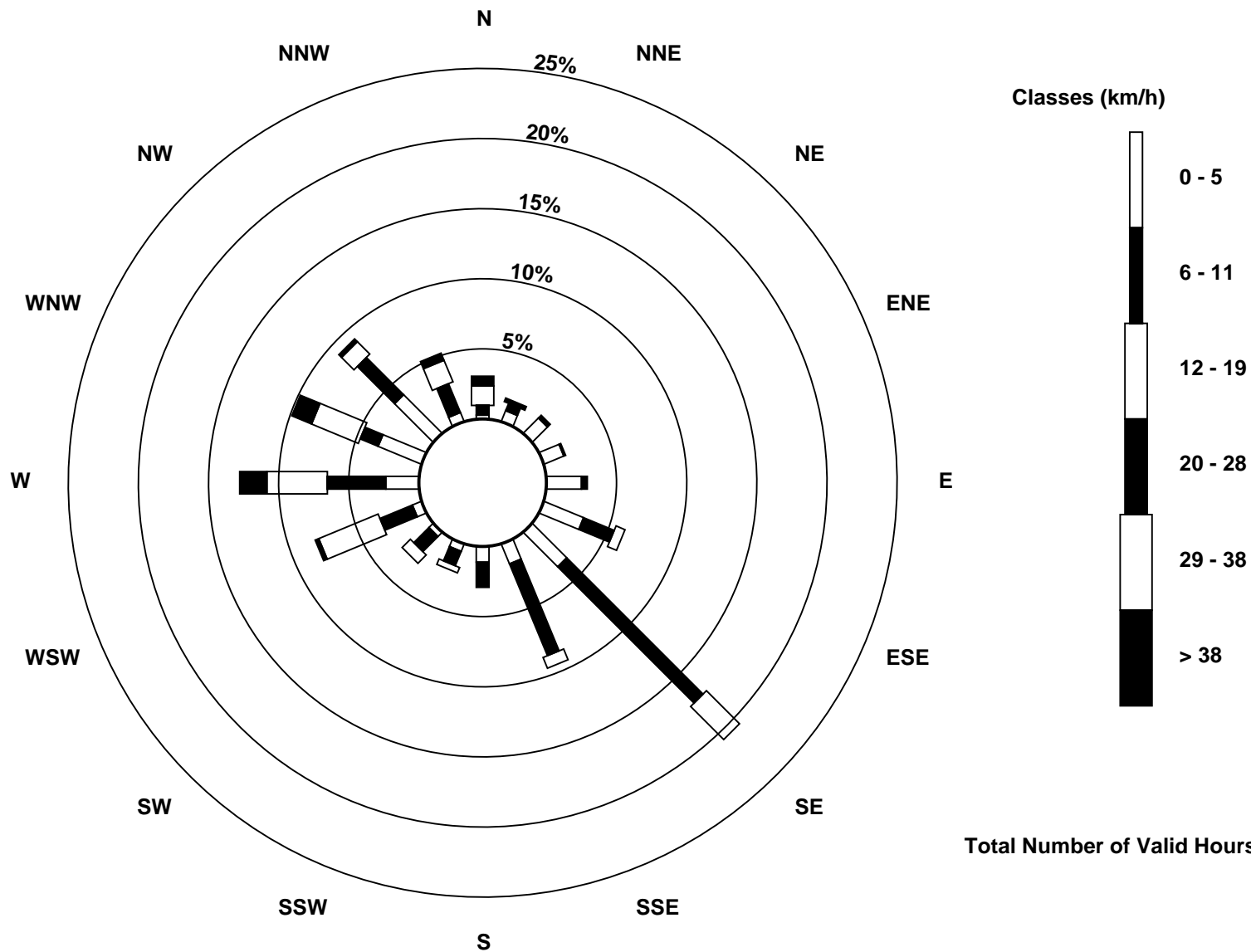
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Lower Camp (AMS 11)



Total Number of Valid Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Lower Camp - September 2016

| | | |
|--------------------------------------------------------------|------------------------------------------------------------|---------------------------------|
| Direction of Maximum Speed: 290 deg on Sep 24 17:00 | | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 296.0 deg on Sep 3 | | Hours of Data: 720 |
| Direction of Minimum Speed: 64 deg on Sep 25 19:00 | Direction of Minimum Daily Speed Average: 0.2 deg on Sep 8 | Hours of Missing Data: 0 |
| Monthly Average Direction: 267.4 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 | 278 | 282 | 285 | 282 | 277 | 280 | 311 | 297 | 316 | 350 | 326 | 93 | 105 | 108 | 121 | 157 | 6 | 74 | 336 | 268 | 304 | 279 | 262 | 264 | 299.5 | |
| 2-Sep | 260 | 214 | 244 | 267 | 241 | 242 | 253 | 246 | 255 | 261 | 265 | 265 | 259 | 253 | 252 | 271 | 269 | 279 | 41 | 299 | 312 | 280 | 274 | 305 | 263.4 | |
| 3-Sep | 345 | 319 | 293 | 287 | 284 | 280 | 269 | 271 | 281 | 287 | 291 | 294 | 295 | 300 | 301 | 310 | 302 | 311 | 323 | 307 | 308 | 301 | 299 | 292 | 296.0 | |
| 4-Sep | 289 | 294 | 311 | 300 | 271 | 258 | 282 | 268 | 264 | 267 | 265 | 266 | 263 | 262 | 277 | 268 | 240 | 237 | 315 | 288 | 174 | 224 | 223 | 204 | 271.2 | |
| 5-Sep | 203 | 166 | 164 | 145 | 144 | 137 | 130 | 124 | 121 | 130 | 141 | 184 | 185 | 180 | 161 | 141 | 169 | 158 | 130 | 115 | 113 | 22 | 110 | 150 | 142.9 | |
| 6-Sep | 144 | 138 | 137 | 153 | 146 | 144 | 148 | 136 | 142 | 154 | 143 | 133 | 133 | 139 | 138 | 164 | 166 | 169 | 184 | 179 | 147 | 137 | 135 | 136 | 146.7 | |
| 7-Sep | 110 | 144 | 99 | 85 | 119 | 134 | 147 | 154 | 136 | 129 | 131 | 132 | 131 | 128 | 129 | 119 | 144 | 145 | 212 | 220 | 182 | 103 | 172 | 112 | 133.8 | |
| 8-Sep | 86 | 124 | 124 | 125 | 131 | 134 | 125 | 132 | 129 | 326 | 306 | 335 | 271 | 292 | 282 | 308 | 119 | 271 | 48 | 309 | 326 | 275 | 280 | 309 | 213.3 | |
| 9-Sep | 324 | 306 | 315 | 313 | 326 | 326 | 42 | 24 | 4 | 348 | 335 | 241 | 17 | 294 | 283 | 86 | 130 | 131 | 121 | 128 | 118 | 117 | 131 | 136 | 74.6 | |
| 10-Sep | 156 | 136 | 135 | 137 | 152 | 151 | 145 | 144 | 155 | 241 | 270 | 263 | 257 | 258 | 270 | 292 | 293 | 275 | 283 | 285 | 283 | 289 | 290 | 287 | 254.1 | |
| 11-Sep | 325 | 328 | 326 | 327 | 329 | 334 | 348 | 351 | 353 | 334 | 335 | 344 | 339 | 337 | 346 | 352 | 339 | 331 | 318 | 323 | 322 | 304 | 315 | 318 | 335.4 | |
| 12-Sep | 327 | 322 | 351 | 278 | 285 | 279 | 240 | 257 | 248 | 261 | 266 | 268 | 217 | 195 | 205 | 221 | 191 | 158 | 162 | 160 | 158 | 153 | 153 | 152 | 206.4 | |
| 13-Sep | 153 | 147 | 103 | 104 | 141 | 143 | 138 | 131 | 159 | 221 | 213 | 221 | 222 | 238 | 260 | 248 | 242 | 233 | 248 | 242 | 259 | 279 | 282 | 276 | 220.4 | |
| 14-Sep | 293 | 279 | 295 | 290 | 334 | 80 | 48 | 325 | 315 | 87 | 128 | 131 | 132 | 128 | 237 | 259 | 256 | 316 | 329 | 296 | 110 | 92 | 101 | 275 | 258.9 | |
| 15-Sep | 295 | 108 | 288 | 301 | 295 | 105 | 271 | 49 | 58 | 67 | 119 | 130 | 138 | 122 | 128 | 119 | 124 | 114 | 117 | 128 | 138 | 131 | 157 | 143 | 124.5 | |
| 16-Sep | 140 | 131 | 133 | 135 | 139 | 127 | 138 | 139 | 138 | 140 | 137 | 131 | 219 | 229 | 251 | 251 | 251 | 245 | 235 | 19 | 21 | 73 | 135 | 143 | 183.8 | |
| 17-Sep | 135 | 179 | 184 | 117 | 117 | 136 | 123 | 128 | 147 | 179 | 217 | 201 | 218 | 212 | 256 | 259 | 261 | 266 | 280 | 230 | 244 | 257 | 261 | 253 | 224.7 | |
| 18-Sep | 154 | 176 | 163 | 78 | 86 | 127 | 264 | 262 | 256 | 277 | 283 | 296 | 300 | 308 | 322 | 335 | 330 | 329 | 309 | 313 | 321 | 15 | 326 | 320 | 300.5 | |
| 19-Sep | 313 | 317 | 309 | 329 | 329 | 316 | 280 | 284 | 280 | 289 | 294 | 299 | 326 | 326 | 325 | 318 | 337 | 331 | 14 | 327 | 330 | 303 | 346 | 301 | 312.0 | |
| 20-Sep | 322 | 317 | 319 | 326 | 324 | 313 | 318 | 322 | 351 | 355 | 16 | 321 | 340 | 13 | 271 | 188 | 130 | 112 | 95 | 37 | 42 | 96 | 118 | 294 | 338.9 | |
| 21-Sep | 145 | 81 | 48 | 252 | 44 | 163 | 140 | 113 | 124 | 124 | 123 | 129 | 134 | 241 | 244 | 251 | 247 | 235 | 200 | 198 | 198 | 165 | 118 | 136 | 186.6 | |
| 22-Sep | 138 | 135 | 132 | 142 | 136 | 141 | 139 | 134 | 118 | 127 | 130 | 165 | 207 | 211 | 199 | 190 | 183 | 169 | 171 | 161 | 159 | 141 | 143 | 150 | 154.3 | |
| 23-Sep | 149 | 139 | 135 | 136 | 137 | 139 | 136 | 133 | 130 | 148 | 147 | 141 | 137 | 148 | 140 | 157 | 150 | 137 | 149 | 160 | 153 | 153 | 152 | 156 | 144.3 | |
| 24-Sep | 155 | 155 | 153 | 157 | 153 | 156 | 149 | 148 | 169 | 249 | 259 | 264 | 265 | 267 | 272 | 286 | 290 | 295 | 291 | 267 | 258 | 251 | 253 | 254 | 254.5 | |
| 25-Sep | 261 | 260 | 259 | 261 | 269 | 288 | 277 | 278 | 269 | 264 | 267 | 291 | 290 | 299 | 306 | 306 | 330 | 306 | 64 | 76 | 87 | 101 | 104 | 51 | 278.5 | |
| 26-Sep | 81 | 72 | 120 | 104 | 107 | 94 | 99 | 112 | 142 | 143 | 135 | 140 | 147 | 144 | 143 | 160 | 184 | 167 | 162 | 147 | 147 | 145 | 142 | 144 | 139.7 | |
| 27-Sep | 146 | 155 | 150 | 141 | 139 | 238 | 265 | 257 | 228 | 248 | 295 | 281 | 280 | 276 | 275 | 268 | 263 | 252 | 242 | 254 | 256 | 262 | 274 | 256 | 259.6 | |
| 28-Sep | 245 | 271 | 243 | 252 | 142 | 149 | 143 | 134 | 136 | 130 | 129 | 127 | 57 | 88 | 277 | 238 | 226 | 219 | 139 | 22 | 94 | 95 | 118 | 131 | 178.3 | |
| 29-Sep | 37 | 283 | 281 | 11 | 52 | 62 | 133 | 133 | 132 | 133 | 133 | 133 | 133 | 129 | 123 | 126 | 124 | 138 | 126 | 318 | 66 | 74 | 41 | 278 | 276 | 130.7 |
| 30-Sep | 311 | 293 | 284 | 285 | 282 | 304 | 332 | 304 | 306 | 347 | 352 | 359 | 4 | 4 | 6 | 8 | 14 | 12 | 4 | 359 | 1 | 1 | 6 | 1 | 357.2 | |

231.7 245.1 222.9 239.1 196.2 192.5 193.6 186.3 203.1 241.3 258.4 251.9 246.3 250.8 262.3 268.9 264.8 265.2 279.7 255.3 247.6 246.4 247.5 234.2

Diurnal Average

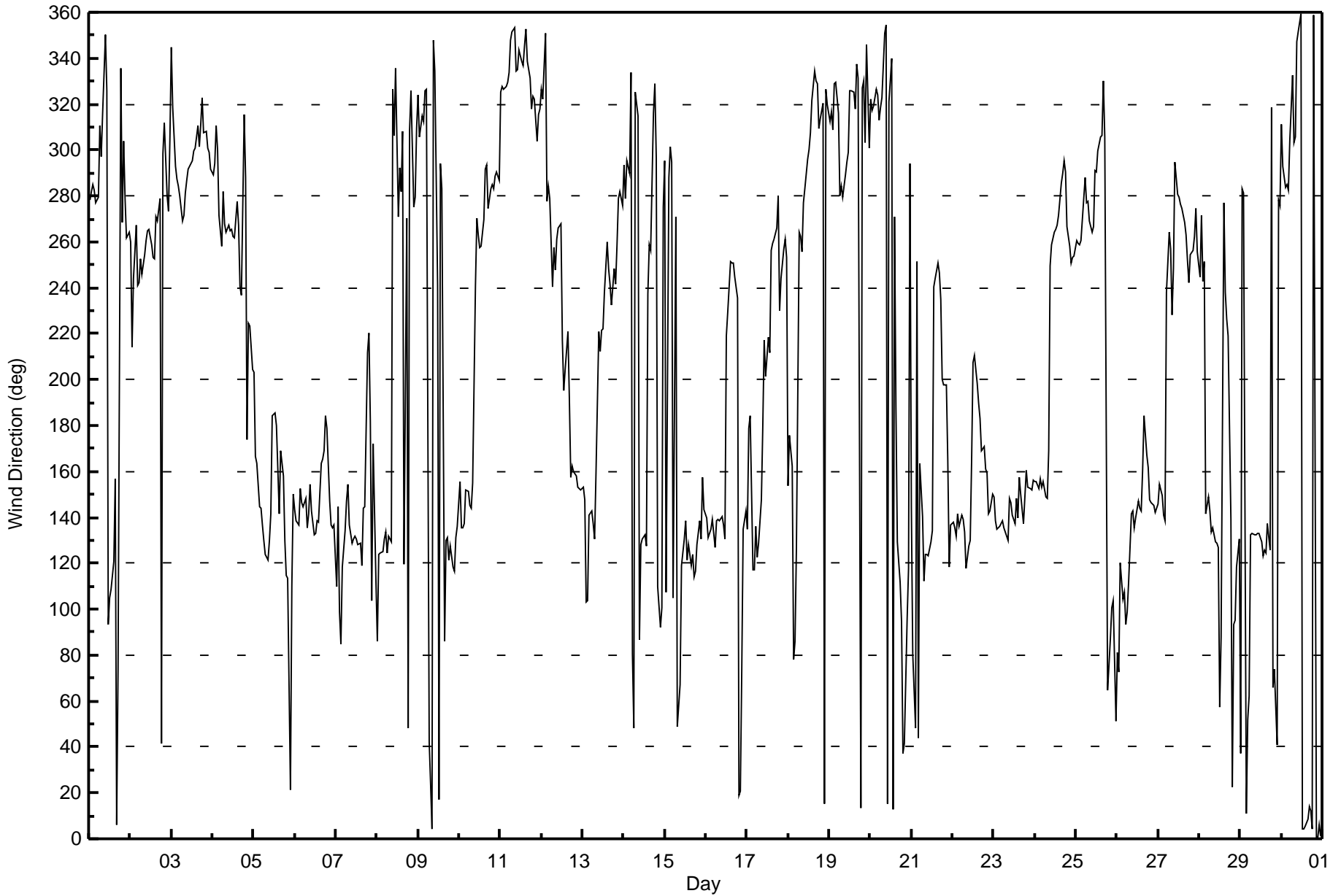
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Lower Camp - September 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Sep 18 07:00 Minimum Value: 9 deg on Sep 24 22:00 Percentiles: P ₁ = 11 P ₁₀ = 13 Q ₁ = 17 Median = 23 Q ₃ = 35 P ₉₀ = 60 P ₉₉ = 95 | | 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 | 50 | 90 | 54 | 21 | 22 | 24 | 31 | 24 | 31 | 20 | 25 | 55 | 21 | 20 | 20 | 69 | 79 | 98 | 38 | 27 | 39 | 26 | 13 | 17 | 98 | |
| 2-Sep | 14 | 30 | 17 | 15 | 14 | 21 | 12 | 21 | 15 | 19 | 19 | 13 | 15 | 14 | 14 | 13 | 13 | 13 | 62 | 28 | 15 | 18 | 12 | 13 | 62 | |
| 3-Sep | 21 | 14 | 14 | 12 | 12 | 11 | 10 | 11 | 12 | 12 | 12 | 11 | 11 | 12 | 12 | 15 | 14 | 15 | 16 | 15 | 14 | 13 | 12 | 13 | 21 | |
| 4-Sep | 11 | 13 | 24 | 16 | 15 | 19 | 14 | 16 | 15 | 19 | 17 | 15 | 25 | 27 | 46 | 24 | 35 | 18 | 30 | 70 | 53 | 18 | 61 | 51 | 70 | |
| 5-Sep | 67 | 26 | 21 | 27 | 27 | 31 | 22 | 16 | 18 | 21 | 41 | 43 | 39 | 44 | 42 | 33 | 37 | 31 | 31 | 26 | 56 | 53 | 53 | 33 | 67 | |
| 6-Sep | 34 | 33 | 23 | 26 | 20 | 19 | 26 | 27 | 30 | 34 | 31 | 22 | 23 | 28 | 25 | 31 | 32 | 31 | 25 | 23 | 25 | 35 | 22 | 27 | 35 | |
| 7-Sep | 52 | 96 | 42 | 38 | 25 | 26 | 37 | 35 | 38 | 38 | 19 | 19 | 16 | 13 | 15 | 17 | 25 | 24 | 87 | 80 | 75 | 69 | 96 | 49 | 96 | |
| 8-Sep | 48 | 30 | 36 | 18 | 23 | 21 | 21 | 25 | 22 | 84 | 76 | 31 | 57 | 78 | 60 | 83 | 80 | 68 | 61 | 82 | 87 | 17 | 26 | 45 | 87 | |
| 9-Sep | 29 | 18 | 19 | 11 | 17 | 21 | 21 | 29 | 20 | 25 | 38 | 41 | 86 | 41 | 62 | 46 | 16 | 19 | 22 | 24 | 24 | 16 | 15 | 22 | 86 | |
| 10-Sep | 29 | 22 | 17 | 20 | 30 | 26 | 24 | 22 | 37 | 28 | 13 | 13 | 13 | 16 | 12 | 16 | 14 | 14 | 14 | 13 | 12 | 13 | 13 | 13 | 37 | |
| 11-Sep | 18 | 16 | 16 | 15 | 16 | 17 | 21 | 21 | 21 | 19 | 18 | 20 | 20 | 18 | 19 | 20 | 19 | 24 | 15 | 14 | 16 | 24 | 23 | 31 | 31 | |
| 12-Sep | 24 | 36 | 29 | 49 | 52 | 96 | 14 | 26 | 32 | 26 | 20 | 58 | 45 | 60 | 47 | 39 | 43 | 31 | 26 | 24 | 25 | 23 | 21 | 21 | 96 | |
| 13-Sep | 23 | 36 | 30 | 29 | 26 | 21 | 17 | 20 | 41 | 25 | 42 | 33 | 22 | 18 | 14 | 14 | 13 | 12 | 14 | 13 | 17 | 14 | 23 | 38 | 42 | |
| 14-Sep | 52 | 48 | 63 | 40 | 69 | 50 | 54 | 43 | 35 | 53 | 27 | 18 | 15 | 15 | 44 | 17 | 14 | 30 | 17 | 68 | 43 | 72 | 56 | 64 | 72 | |
| 15-Sep | 52 | 39 | 93 | 59 | 80 | 80 | 18 | 75 | 22 | 40 | 25 | 23 | 25 | 17 | 14 | 18 | 15 | 23 | 41 | 21 | 21 | 22 | 37 | 24 | 93 | |
| 16-Sep | 19 | 32 | 24 | 26 | 25 | 22 | 17 | 20 | 20 | 18 | 15 | 24 | 32 | 18 | 14 | 13 | 13 | 14 | 13 | 78 | 64 | 45 | 67 | 18 | 78 | |
| 17-Sep | 25 | 46 | 43 | 34 | 32 | 31 | 85 | 46 | 53 | 48 | 25 | 34 | 27 | 37 | 16 | 18 | 16 | 13 | 75 | 93 | 14 | 14 | 12 | 55 | 93 | |
| 18-Sep | 24 | 50 | 28 | 98 | 78 | 27 | 101 | 17 | 17 | 15 | 13 | 12 | 14 | 15 | 18 | 18 | 15 | 16 | 17 | 24 | 17 | 26 | 31 | 17 | 101 | |
| 19-Sep | 19 | 13 | 13 | 15 | 15 | 12 | 21 | 12 | 12 | 13 | 13 | 17 | 22 | 21 | 20 | 18 | 19 | 21 | 23 | 17 | 26 | 26 | 25 | 19 | 26 | |
| 20-Sep | 16 | 15 | 19 | 40 | 17 | 18 | 20 | 36 | 23 | 34 | 29 | 40 | 45 | 55 | 57 | 68 | 32 | 24 | 89 | 66 | 59 | 54 | 75 | 36 | 89 | |
| 21-Sep | 86 | 99 | 92 | 92 | 77 | 41 | 52 | 63 | 18 | 19 | 17 | 18 | 33 | 38 | 21 | 19 | 15 | 16 | 20 | 21 | 25 | 80 | 14 | 17 | 99 | |
| 22-Sep | 19 | 19 | 18 | 18 | 18 | 17 | 18 | 17 | 20 | 21 | 19 | 42 | 29 | 33 | 37 | 37 | 36 | 30 | 25 | 23 | 25 | 16 | 19 | 27 | 42 | |
| 23-Sep | 26 | 28 | 31 | 28 | 28 | 28 | 31 | 26 | 20 | 28 | 27 | 27 | 21 | 27 | 24 | 35 | 30 | 24 | 30 | 30 | 28 | 29 | 28 | 27 | 35 | |
| 24-Sep | 27 | 28 | 27 | 25 | 23 | 23 | 23 | 28 | 41 | 16 | 12 | 13 | 14 | 13 | 14 | 14 | 12 | 16 | 15 | 12 | 9 | 10 | 12 | 12 | 41 | |
| 25-Sep | 12 | 11 | 12 | 12 | 21 | 21 | 21 | 57 | 17 | 13 | 24 | 13 | 19 | 21 | 26 | 19 | 22 | 23 | 90 | 87 | 39 | 18 | 35 | 55 | 90 | |
| 26-Sep | 57 | 67 | 35 | 54 | 39 | 19 | 33 | 26 | 24 | 22 | 20 | 24 | 28 | 23 | 24 | 34 | 31 | 25 | 26 | 21 | 21 | 20 | 15 | 19 | 67 | |
| 27-Sep | 27 | 67 | 37 | 30 | 29 | 67 | 16 | 22 | 23 | 34 | 13 | 15 | 18 | 16 | 13 | 13 | 12 | 12 | 13 | 16 | 13 | 11 | 47 | 49 | 67 | |
| 28-Sep | 16 | 49 | 12 | 27 | 21 | 29 | 40 | 24 | 20 | 15 | 16 | 19 | 35 | 51 | 51 | 81 | 21 | 23 | 78 | 34 | 42 | 41 | 17 | 48 | 81 | |
| 29-Sep | 77 | 22 | 34 | 86 | 65 | 54 | 29 | 25 | 22 | 17 | 17 | 14 | 14 | 10 | 14 | 26 | 21 | 16 | 70 | 85 | 56 | 32 | 19 | 69 | 86 | |
| 30-Sep | 76 | 43 | 36 | 20 | 16 | 20 | 95 | 18 | 22 | 23 | 20 | 21 | 19 | 22 | 19 | 19 | 15 | 15 | 17 | 19 | 20 | 21 | 17 | 19 | 95 | |
| | | 86 | 99 | 93 | 98 | 80 | 96 | 101 | 75 | 53 | 84 | 76 | 58 | 86 | 78 | 62 | 83 | 80 | 98 | 90 | 93 | 87 | 80 | 96 | 69 | |
| | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 2, 2016 | Last Calibration | August 5, 2016 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Reason: | Routine | | |
| Start Time (MST) | 11:30 | End Time (MST) | 14:05 |
| Gas Cert Reference | LL101792 | Station temp. | 20 Deg C |
| Cal Gas Concentration | 49.5 ppm | Cal Gas Exp Date | 2/16/2019 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11051107 |
| ZAG Make/Model | API 701 | Serial Number | 3411 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2403 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -675 | -675 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 794 | 796 |
| Calculated slope | 0.999869 | 1.002044 | Chamber temp | 45.0 | 44.9 |
| Calculated intercept | 0.390210 | 1.509087 | Pressure | 704.8 | 708.4 |
| Analyzer Background | 11.2 | 12.7 | Flow | 0.474 | 0.485 |
| Analyzer Coefficient | 1.012 | 1.041 | Intensity | 91 | 91 |

Analyzer make TEI 43i Analyzer serial # 100841398

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5000 | 83.8 | 829.6 | 805.7 | 1.030 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 83.8 | 829.6 | 827.2 | 1.003 |
| second point | 5000 | 42.4 | 419.8 | 416.6 | 1.008 |
| third point | 5000 | 21.2 | 209.9 | 206.5 | 1.016 |
| as left zero | 5000 | 0.0 | 0.0 | -1.1 | ---- |
| as left span | 5000 | 83.8 | 829.6 | 830.7 | 0.999 |
| Average Correction Factor | | | | | 1.009 |

Corrected As found 805.7 Previous response 829.3 % change 2.9%

Notes:

Adjusted span after as found.

Calibration Performed By: Jayme Rycroft



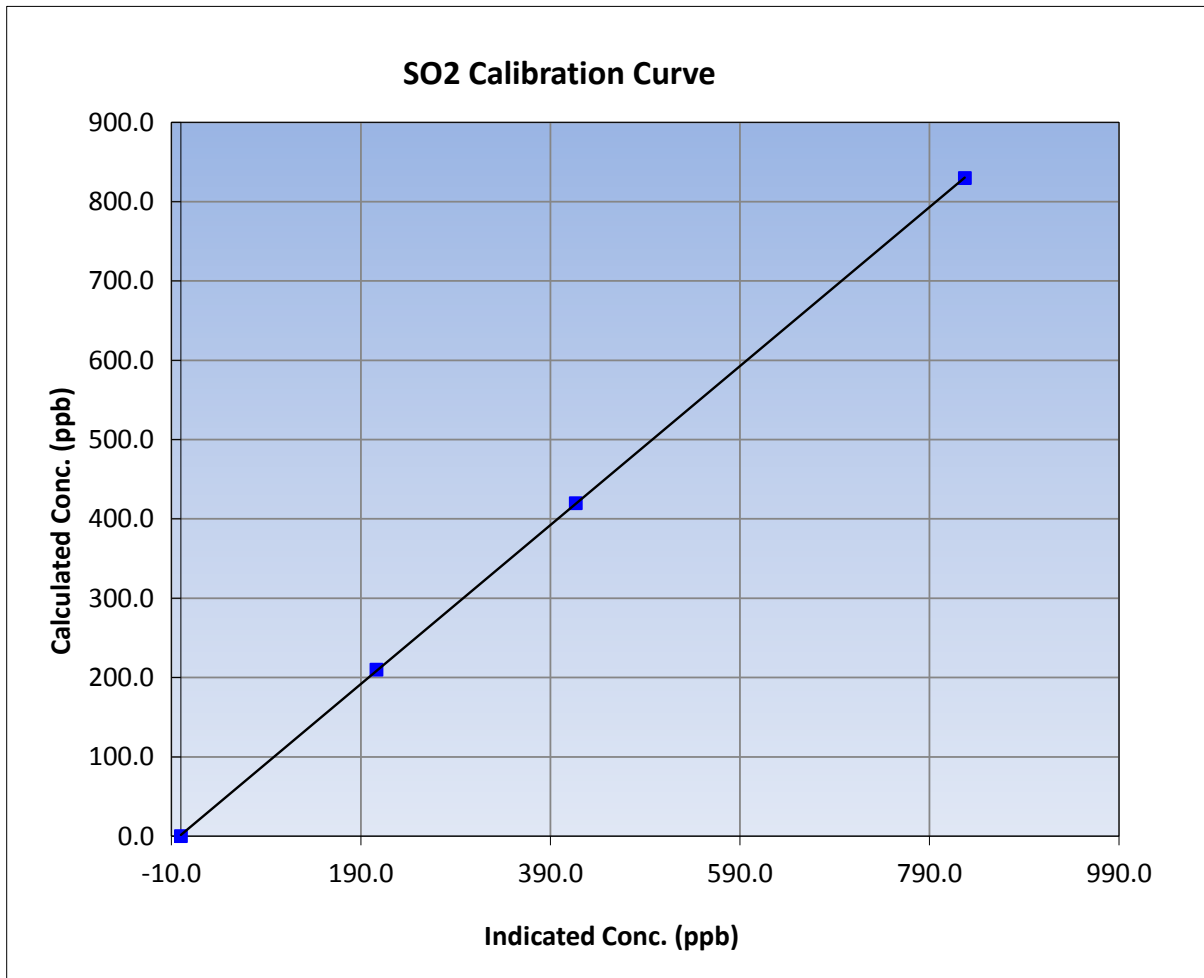
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 2, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Start Time (MST) | 11:30 | End Time (MST) | 14:05 |
| Analyzer make | TEI 43i | Analyzer serial # | 100841398 |

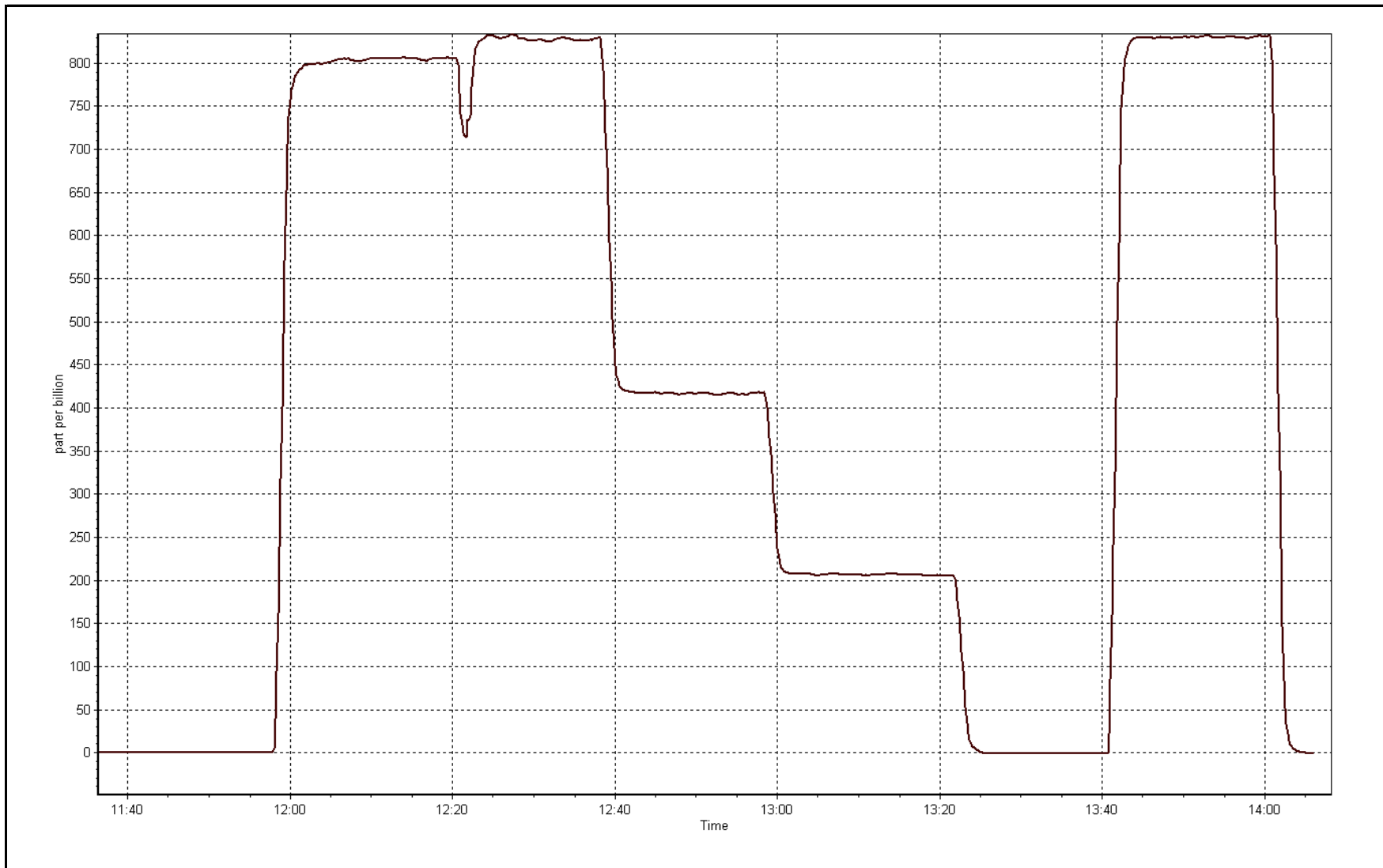
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999985 |
| 829.6 | 827.2 | 1.0029 | | |
| 419.8 | 416.6 | 1.0076 | Slope | 1.002044 |
| 209.9 | 206.5 | 1.0164 | | |
| | | | Intercept | 1.509087 |



SO2 Calibration Plot

Date: September 2, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | September 2, 2016 | Last Calibration | August 4, 2016 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Reason: | Routine | | |
| Start Time (MST) | 8:46 | End Time (MST) | 11:45 |
| Gas Cert Reference | ALM061435 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.15 ppm | Cal Gas Exp Date | 9/9/2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11051107 |
| ZAG air Make/Model | API 701 | Serial Number | 3411 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2403 |
| SO2 gas concentration | 49.5 ppm | SO2 gas cert/exp | LL101792 2/16/2019 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -671 | -671 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 790 | 790 |
| Calculated slope | 1.003824 | 1.007262 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.344816 | -0.005744 | Pressure | 565.4 | 542.2 |
| Analyzer Background | 10.8 | 10.8 | Flow | 1.024 | 0.982 |
| Analyzer Coefficient | 1.178 | 1.178 | Intensity | 91 | 91 |
| | | | Converter temp. | 327 | 326 |

| | | | |
|----------------------|-------------|--------------------|------------|
| Analyzer make/model | Thermo 450i | Analyzer serial # | 1410661328 |
| Converter make/model | NA | Converter serial # | NA |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5000 | 72.8 | 75.0 | 74.7 | 1.004 |
| SO2 scrubber check | 5000 | 20.5 | 203.0 | 1.1 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 72.8 | 75.0 | 74.4 | 1.008 |
| second point | 5000 | 38.8 | 40.0 | 39.8 | 1.004 |
| third point | 5000 | 19.4 | 20.0 | 19.8 | 1.010 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 5000 | 72.8 | 75.0 | 73.3 | 1.023 |
| Average Correction Factor | | | | | 1.007 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 74.7 | Previous response | 75.0 | % change | 0.5% |
|--------------------|------|-------------------|------|----------|------|

Notes:

No Adjustments

Calibration Performed By: Jayme Rycroft



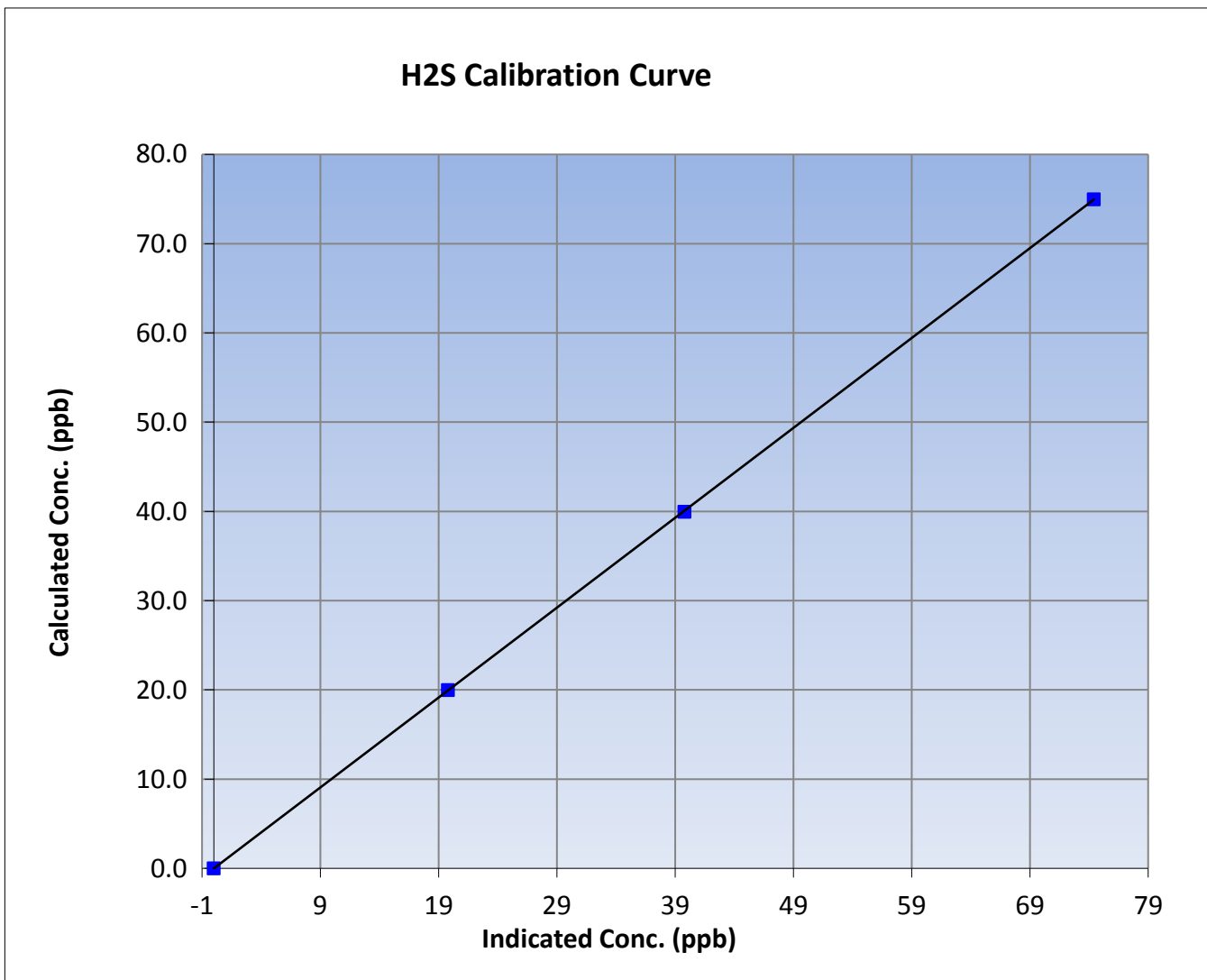
Wood Buffalo Environmental Association H2S Calibration Report

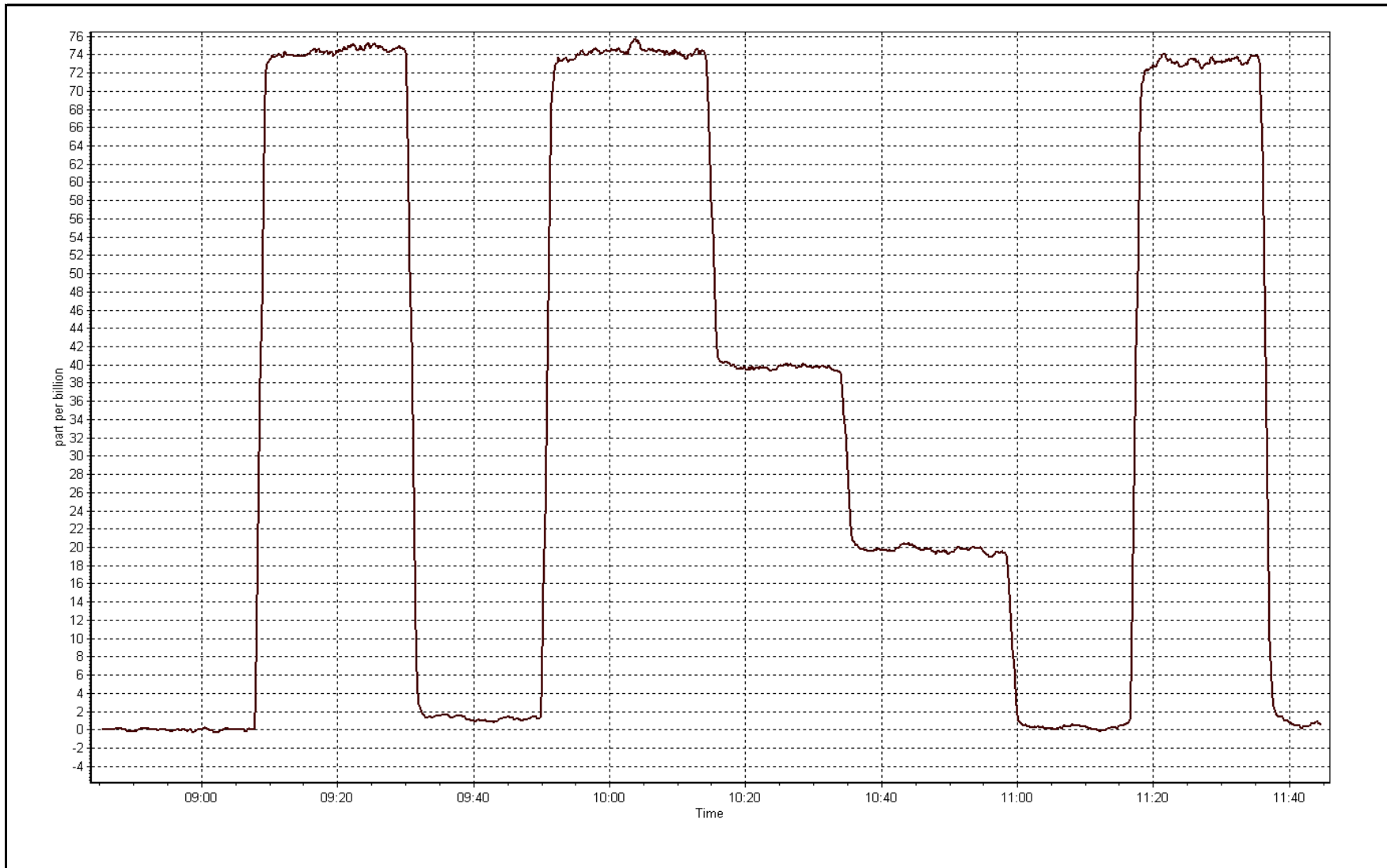
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 2, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Start Time (MST) | 8:46 | End Time (MST) | 11:45 |
| Analyzer make | Thermo 450i | Analyzer serial # | 1410661328 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999994 |
| 75.0 | 74.4 | 1.0078 | | |
| 40.0 | 39.8 | 1.0041 | Slope | 1.007262 |
| 20.0 | 19.8 | 1.0097 | | |
| | | | Intercept | -0.005744 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|----------------|
| Calibration Date | September 2, 2016 | Last Calibration | August 5, 2016 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Reason: | Routine | | |
| Start Time (MST) | 11:30 | End Time (MST) | 14:05 |
| Gas Cert Reference | LL101792 | Cal Gas Expiry Date | 2/16/2019 |
| CH4 Cal Gas Conc. | 493 ppm | CH4 Equiv Conc. | 1043.0 ppm |
| C3H8 Cal Gas Conc. | 200 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11051107 |
| ZAG make/model | Teledyne API 701 | Serial Number | 3411 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2403 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|---------------------|---------------|--------------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 7.8 | 7.8 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 40.2 | 40.2 |
| Calculated slope | 1.001909 | 1.017534 | Fuel Pressure | 25.2 | 25.1 |
| Calculated intercept | -0.020275 | -0.241205 | Analyzer Coeff | 4.452 | 4.452 |
| | | | Analyzer BKG | 3.18 | 3.18 |

| | | | |
|---------------|--------|-------------------|------------|
| Analyzer make | 51i-LT | Analyzer serial # | 1218153353 |
|---------------|--------|-------------------|------------|

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.24 | ---- |
| as found span | 5000 | 83.8 | 17.48 | 17.40 | 1.005 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.24 | ---- |
| high point | 5000 | 83.8 | 17.48 | 17.40 | 1.005 |
| second point | 5000 | 42.4 | 8.84 | 8.98 | 0.985 |
| third point | 5000 | 21.2 | 4.42 | 4.55 | 0.973 |
| as left zero | 5000 | 0.0 | 0.00 | 0.06 | ---- |
| as left span | 5000 | 83.8 | 17.48 | 17.44 | 1.002 |
| Average Correction Factor | | | | | 0.987 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 17.16 | Previous response | 17.47 | % change | 1.8% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

| |
|----------------------|
| No adjustments made. |
|----------------------|

Calibration Performed By:

Jayme Rycroft



Wood Buffalo Environmental Association THC Calibration Report

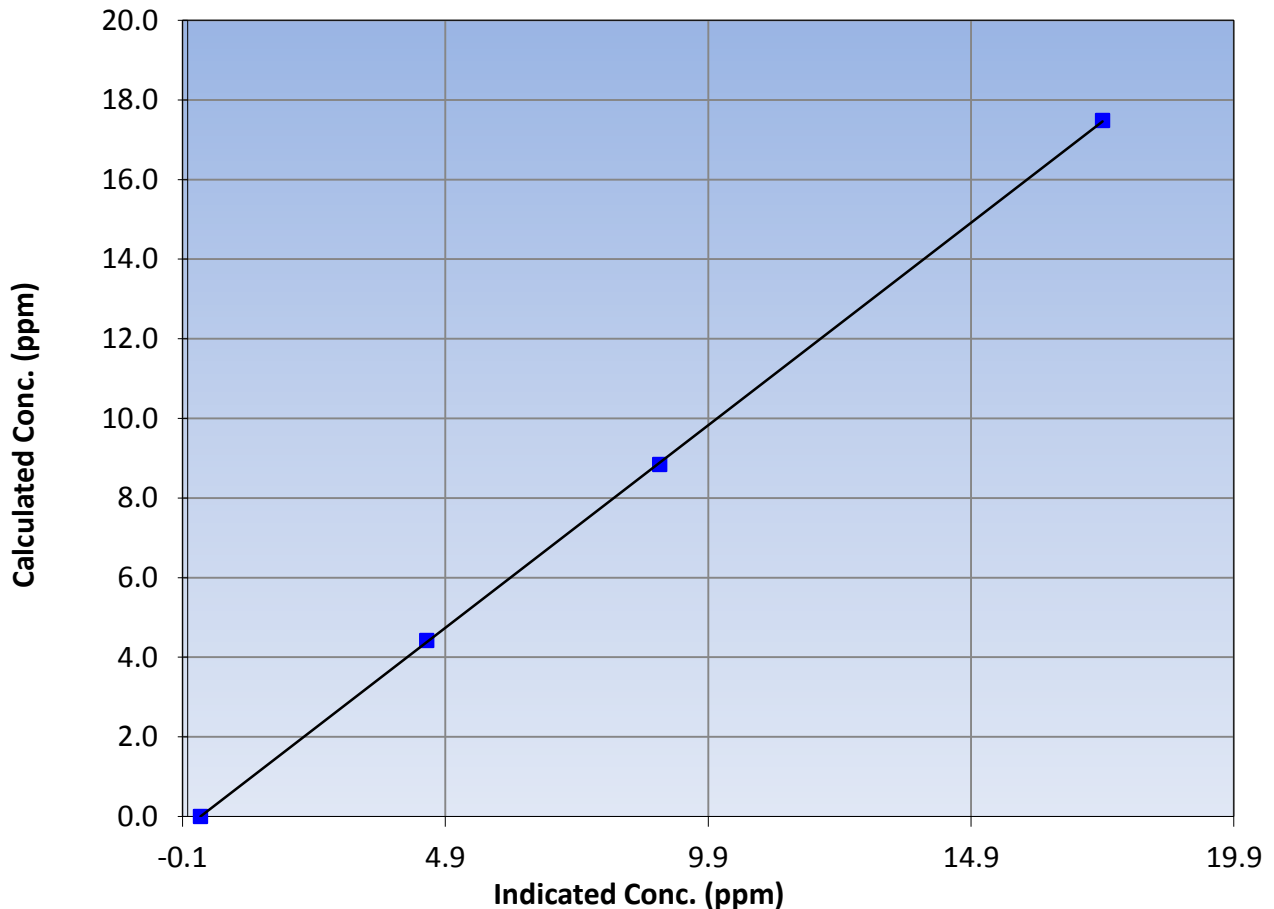
Station Information

| | | | |
|------------------|-------------------|----------------------|----------------|
| Calibration Date | September 2, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Lower Camp | Station Number | AMS 11 |
| Start Time (MST) | 11:30 | End Time (MST) | 14:05 |
| Analyzer make | 51i-LT | Analyzer serial # | 1218153353 |

Calibration Data

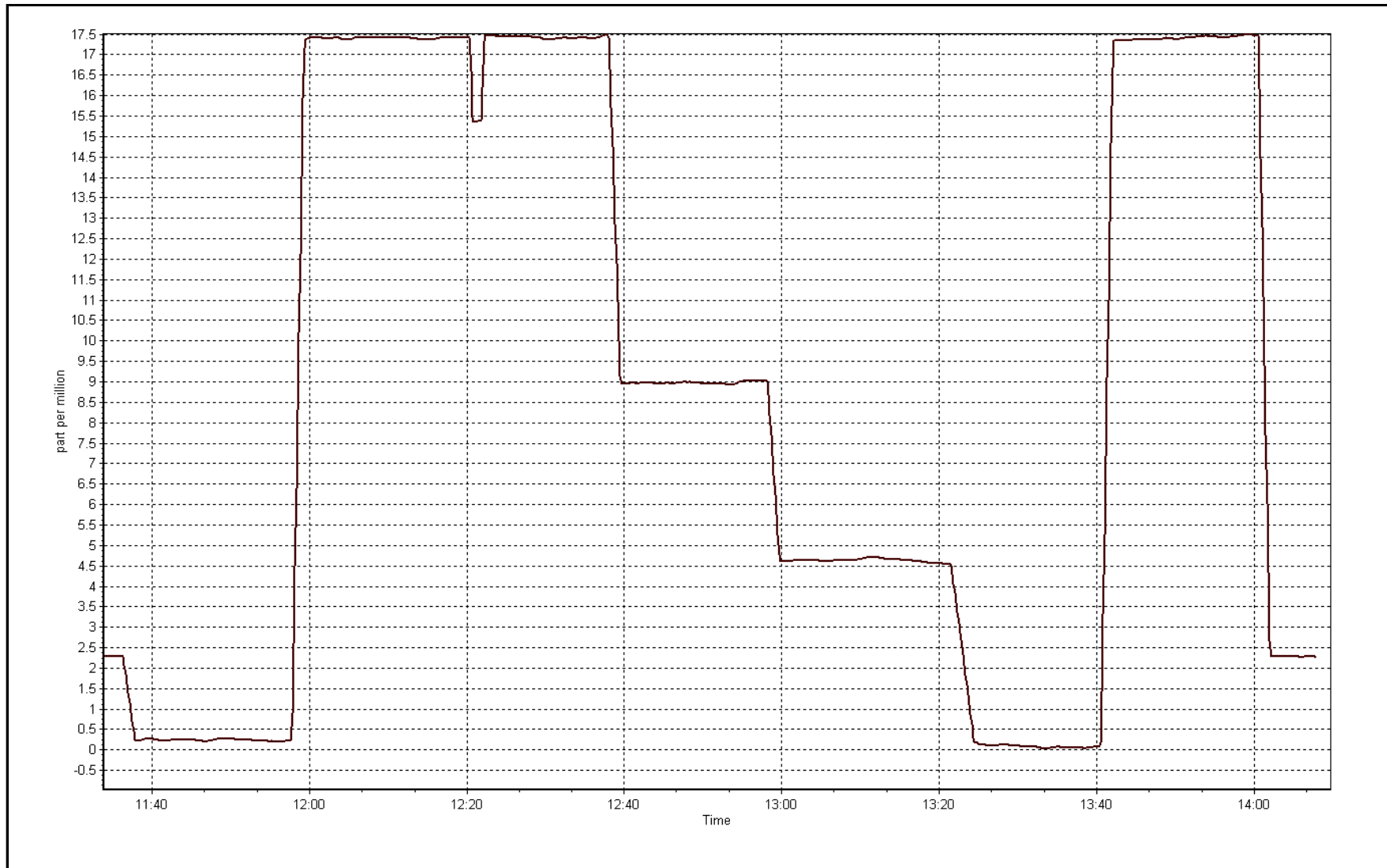
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.24 | ---- | Correlation Coefficient | 0.999974 |
| 17.48 | 17.40 | 1.0046 | | |
| 8.84 | 8.98 | 0.9849 | | |
| 4.42 | 4.55 | 0.9728 | | |
| | | | Slope | 1.017534 |
| | | | Intercept | -0.241205 |

THC Calibration Curve



THC Calibration Plot

Date: September 2, 2016





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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 13
FORT MCKAY SOUTH
SEPTEMBER 2016

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|----------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 681 | 38 | 39 | 99.86 | 40 | 0 | 6 | 0 |
| TRS(ppb) Average | 683 | 36 | 37 | 99.86 | 2 | 0 | 1 | 0 |
| THC(ppm) Average | 684 | 36 | 36 | 100.00 | 3.5 | - | 2.6 | - |
| O3(ppb) Average | 684 | 35 | 36 | 99.86 | 41 | 0 | 27 | - |
| NO2(ppb) Average | 682 | 38 | 38 | 100.00 | 22 | 0 | 7 | - |
| NO(ppb) Average | 682 | 38 | 38 | 100.00 | 65 | - | 8 | - |
| NOX(ppb) Average | 682 | 38 | 38 | 100.00 | 71 | - | 14 | - |
| PM2.5(ug/m3) Average | 711 | 3 | 9 | 99.17 | 20.6 | - | 8.8 | 0 |
| ET(C) Average | 720 | 0 | 0 | 100.00 | 24.3 | - | 14.8 | - |
| RH(%) Average | 720 | 0 | 0 | 100.00 | 98 | - | 92 | - |
| WS(km/h) Average | 719 | 0 | 1 | 99.86 | 26 | - | 17 | - |
| WD(deg) Average | 719 | 0 | 1 | 99.86 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS 13)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2(ppb) Average | 681 | 1 | 4 | - | 0 | 0 | 0 | 0 | 0 | 2 | 40 |
| TRS(ppb) Average | 683 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| THC(ppm) Average | 684 | 2.23 | 0.2 | - | 2 | 2.1 | 2.1 | 2.1 | 2.3 | 2.5 | 3.5 |
| O3(ppb) Average | 684 | 15.2 | 9 | - | 1 | 3 | 8 | 15 | 22 | 28 | 41 |
| NO2(ppb) Average | 682 | 2.7 | 3 | - | 0 | 0 | 0 | 2 | 4 | 7 | 22 |
| NO(ppb) Average | 682 | 1.9 | 5 | - | 0 | 0 | 0 | 0 | 1 | 5 | 65 |
| NOX(ppb) Average | 682 | 4.6 | 8 | - | 0 | 0 | 0 | 2 | 5 | 12 | 71 |
| PM2.5(ug/m3) Average | 711 | 3.79 | 3 | - | 0.1 | 1 | 1.7 | 3 | 5 | 8.2 | 20.6 |
| Temperature 2 m (C) Average | 720 | 10.72 | 5.3 | - | -2.3 | 3.9 | 7.2 | 10.8 | 14.4 | 17.4 | 24.3 |
| Relative Humidity (%) Average | 720 | 72.5 | 19 | - | 27 | 44 | 58 | 76 | 90 | 95 | 98 |
| Wind Speed 10 m (km/h) Average | 719 | 7.8 | 5 | - | 0 | 2 | 4 | 7 | 10 | 14 | 26 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -FORT McKAY SOUTH (AMS 13)
 SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|----------------------------------------|
| SO2 | 20 Sep 2016 09:00 | 20 Sep 2016 09:00 | 1 | Maintenance - cleaned glass manifold |
| TRS | 20 Sep 2016 09:00 | 20 Sep 2016 09:00 | 1 | Maintenance - cleaned glass manifold |
| O3 | 20 Sep 2016 09:00 | 20 Sep 2016 09:00 | 1 | Maintenance - cleaned glass manifold |
| PM2.5 | 10 Sep 2016 16:00 | 10 Sep 2016 16:00 | 1 | Unstable Operation - negative baseline |
| PM2.5 | 21 Sep 2016 14:00 | 21 Sep 2016 16:00 | 3 | Unstable Operation - negative baseline |
| PM2.5 | 25 Sep 2016 16:00 | 25 Sep 2016 17:00 | 2 | Unstable Operation - negative baseline |
| Wind Speed, Wind Direction | 23 Sep 2016 09:00 | 23 Sep 2016 09:00 | 1 | Maintenance - sensor calibration |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort McKay South - September 2016

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 40 ppb on Sep 14 13:00 | Maximum Daily Average: 5.9 ppb on Sep 26 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.0 ppb on Sep 1 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 4.2 ppb at hour 13 | Minimum Diurnal Average: 0.3 ppb at hour 7 | | Hours of Calibration: | 38 |
| Monthly Average: 1.0 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 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 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 2-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 |
| 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 | 0.2 | 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 | 0 |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 5 | 2 | 2 | 0 | 0 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 5 |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 5 | 21 | 4 | 8 | 10 | 7 | 2 | 1 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 2.9 | 21 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 3 | 6 | 17 | 27 | 25 | 20 | 8 | 5 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 5.2 | 27 |
| 8-Sep | Z | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 7 | 0.6 | 7 |
| 10-Sep | 2 | 2 | Z | 7 | 2 | 1 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 7 |
| 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 | 0.1 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 11 | 40 | 25 | 6 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3.9 | 40 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 4 | 3 | 1 | 1 | 0 | 0 | 2 | 3 | 3 | 1 | 0.9 | 4 |
| 16-Sep | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 |
| 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 | 0.1 | 0 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 22 | 16 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 7 | 6 | 1 | 2 | 2.9 | 22 |
| 23-Sep | 1 | 1 | 1 | Z | 0 | 0 | 1 | 3 | 5 | 2 | 1 | 1 | 1 | 2 | 4 | 2 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 1.4 | 5 |
| 24-Sep | 3 | 3 | 2 | 1 | Z | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 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 | 0.1 | 0 |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 18 | C | C | C | 39 | 17 | 5 | 4 | 1 | 4 | 2 | 9 | 3 | 13 | 1 | 1 | 5.9 | 39 |
| 27-Sep | 1 | Z | 3 | 8 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 8 |
| 28-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 |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0.7 | 2 |
| 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 |

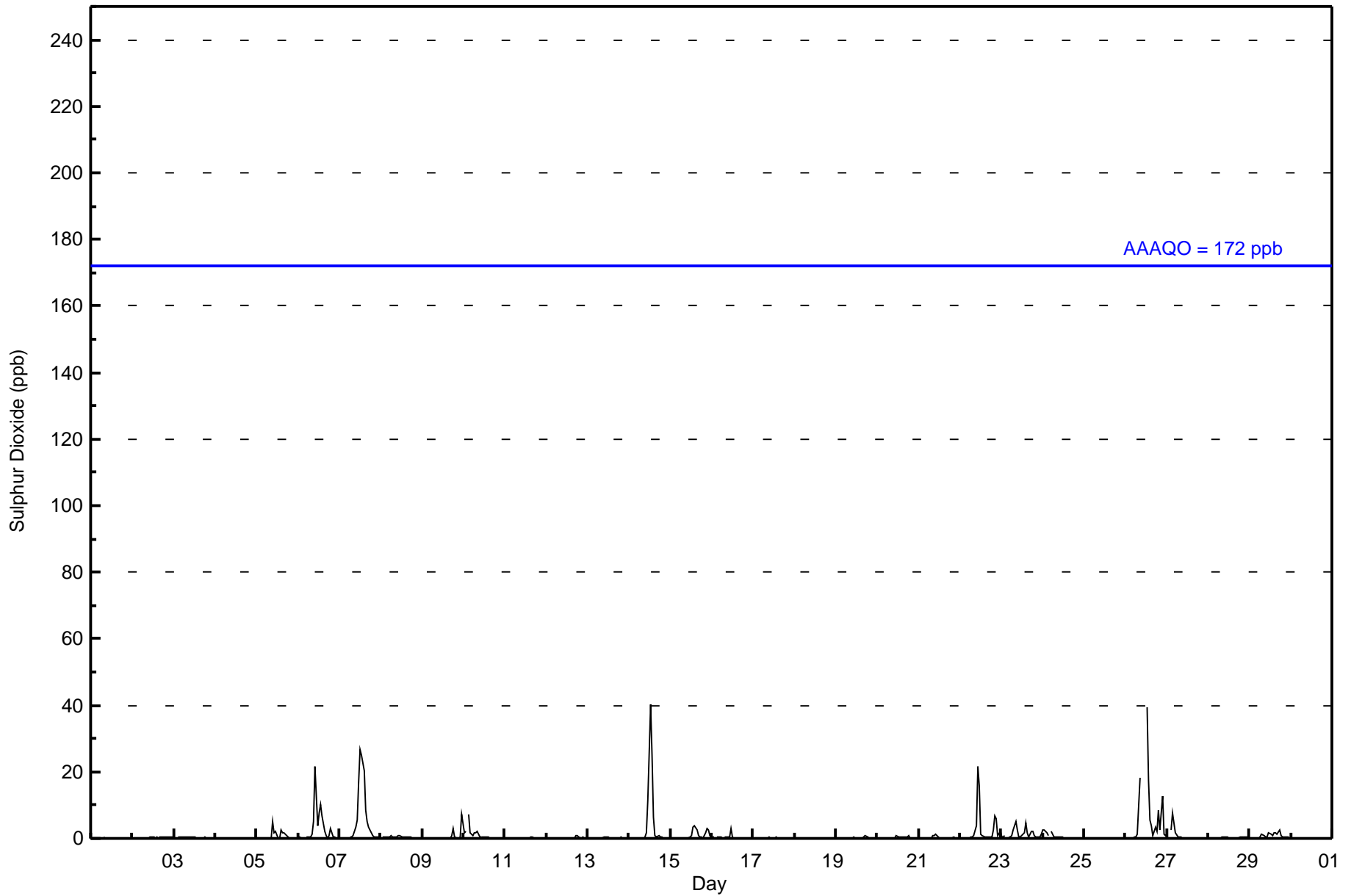
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.3 | 0.3 | 0.3 | 0.7 | 0.4 | 0.3 | 0.3 | 0.4 | 1.1 | 0.9 | 2.1 | 2.1 | 4.2 | 3.0 | 1.8 | 0.9 | 0.5 | 0.6 | 0.5 | 0.7 | 0.5 | 0.9 | 0.3 | 0.5 | Diurnal Average | |
| 3 | 3 | 3 | 8 | 5 | 2 | 2 | 3 | 18 | 5 | 22 | 17 | 40 | 25 | 20 | 8 | 5 | 4 | 3 | 9 | 7 | 13 | 3 | 7 | 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
Fort McKay South - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 667 | 97.94 | 97.94 |
| 11 - 20 | 7 | 1.03 | 98.97 |
| 21 - 60 | 7 | 1.03 | 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
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 42 | 8 | 8 | 5 | 8 | 3 | 10 | 43 | 105 | 88 | 66 | 75 | 72 | 46 | 46 | 41 | 666 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 42 | 8 | 8 | 5 | 8 | 5 | 13 | 52 | 105 | 88 | 66 | 75 | 72 | 46 | 46 | 41 | 680 |

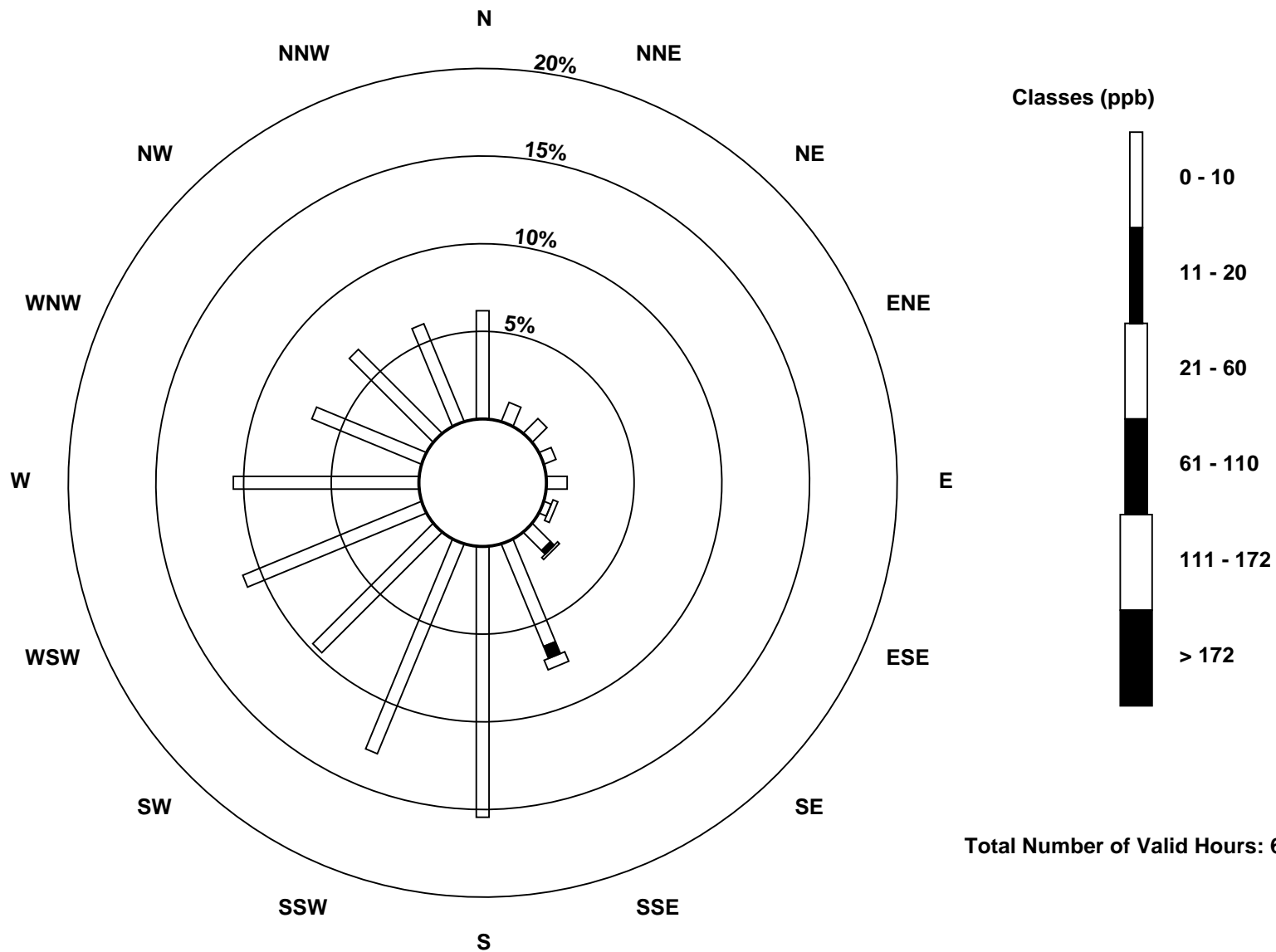
Total Number of Valid Hours: 680

Total Number of Hours: 720

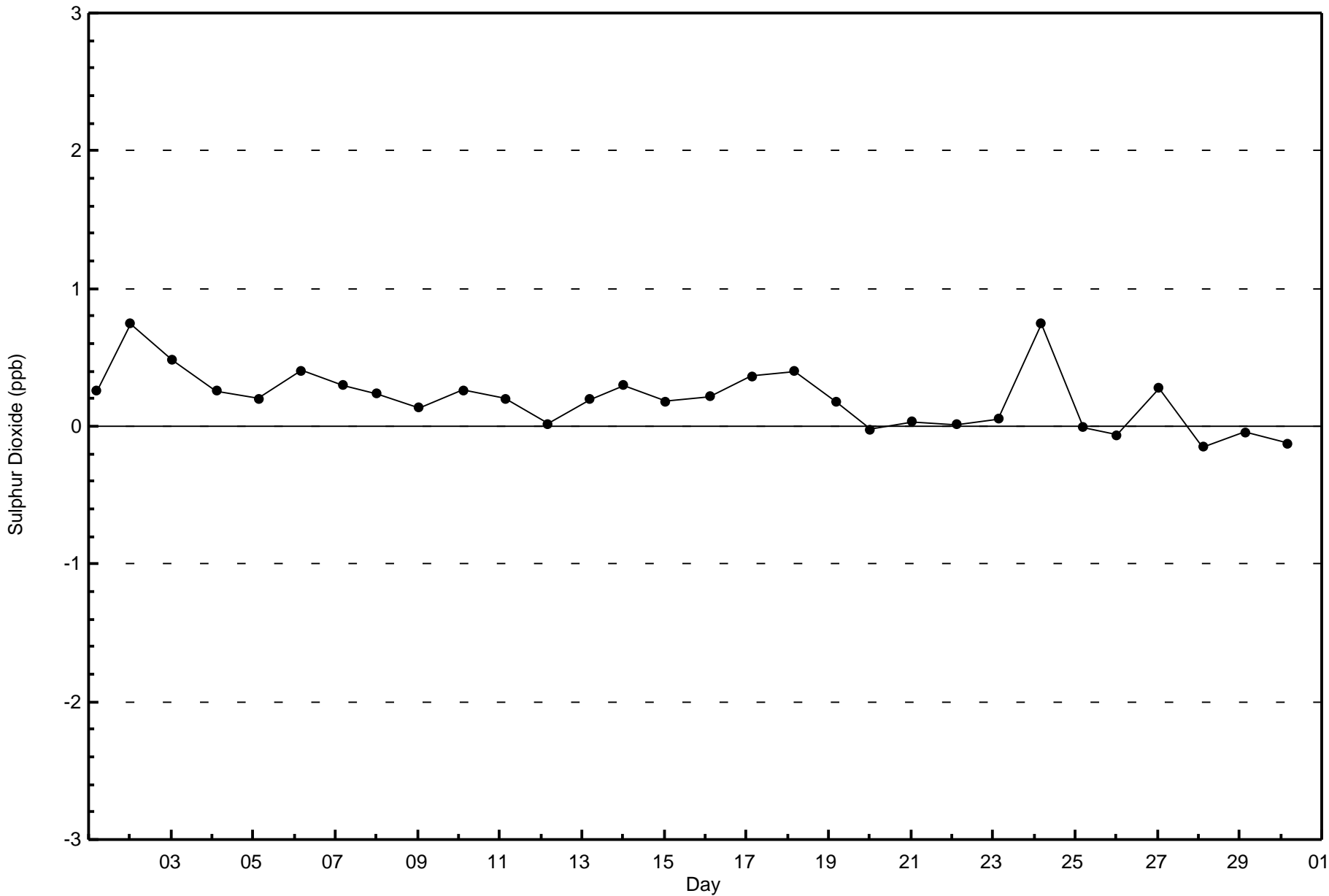


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
Fort McKay South (AMS 13)



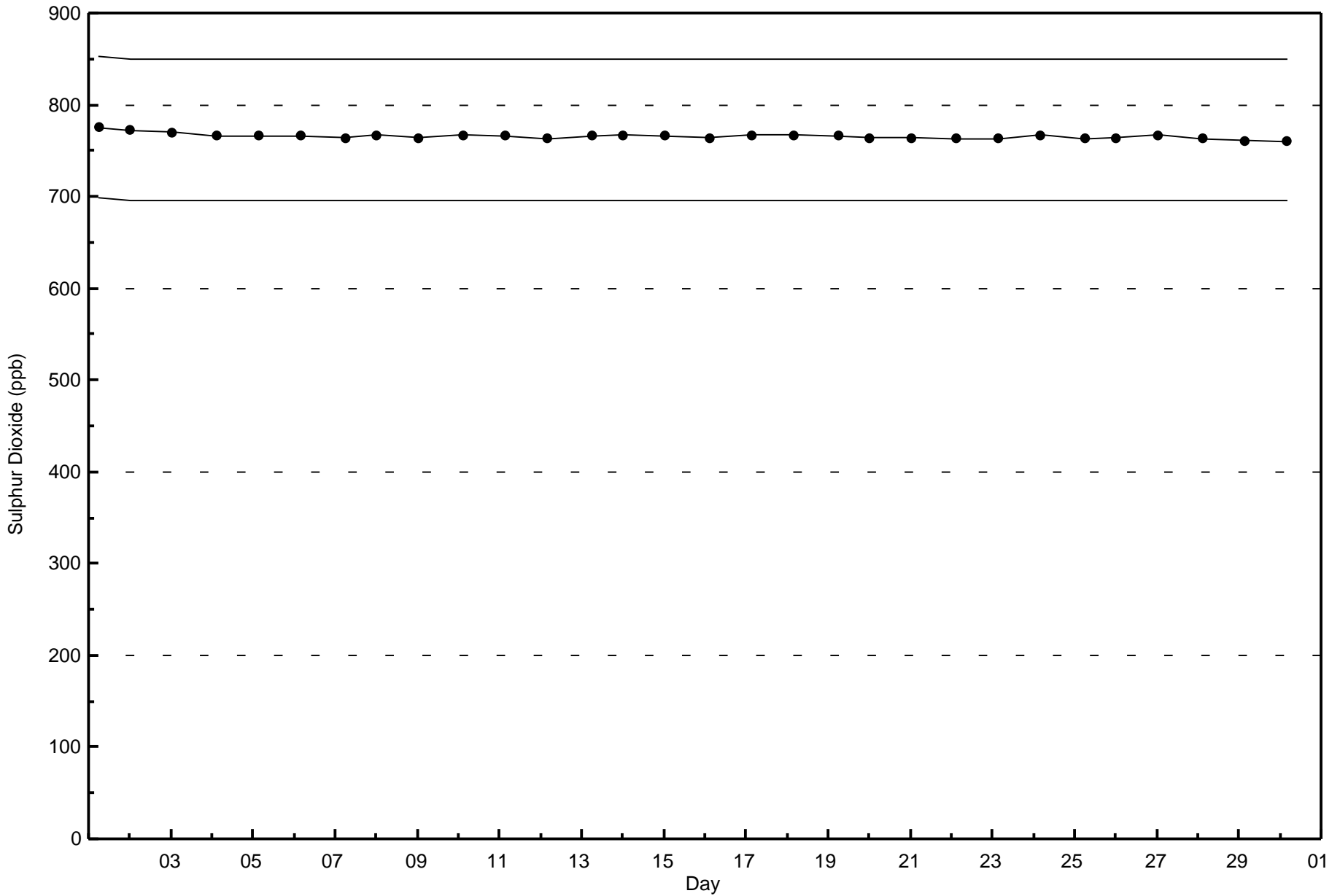
Total Number of Valid Hours: 680





Wood Buffalo Environmental Association
Span Responses

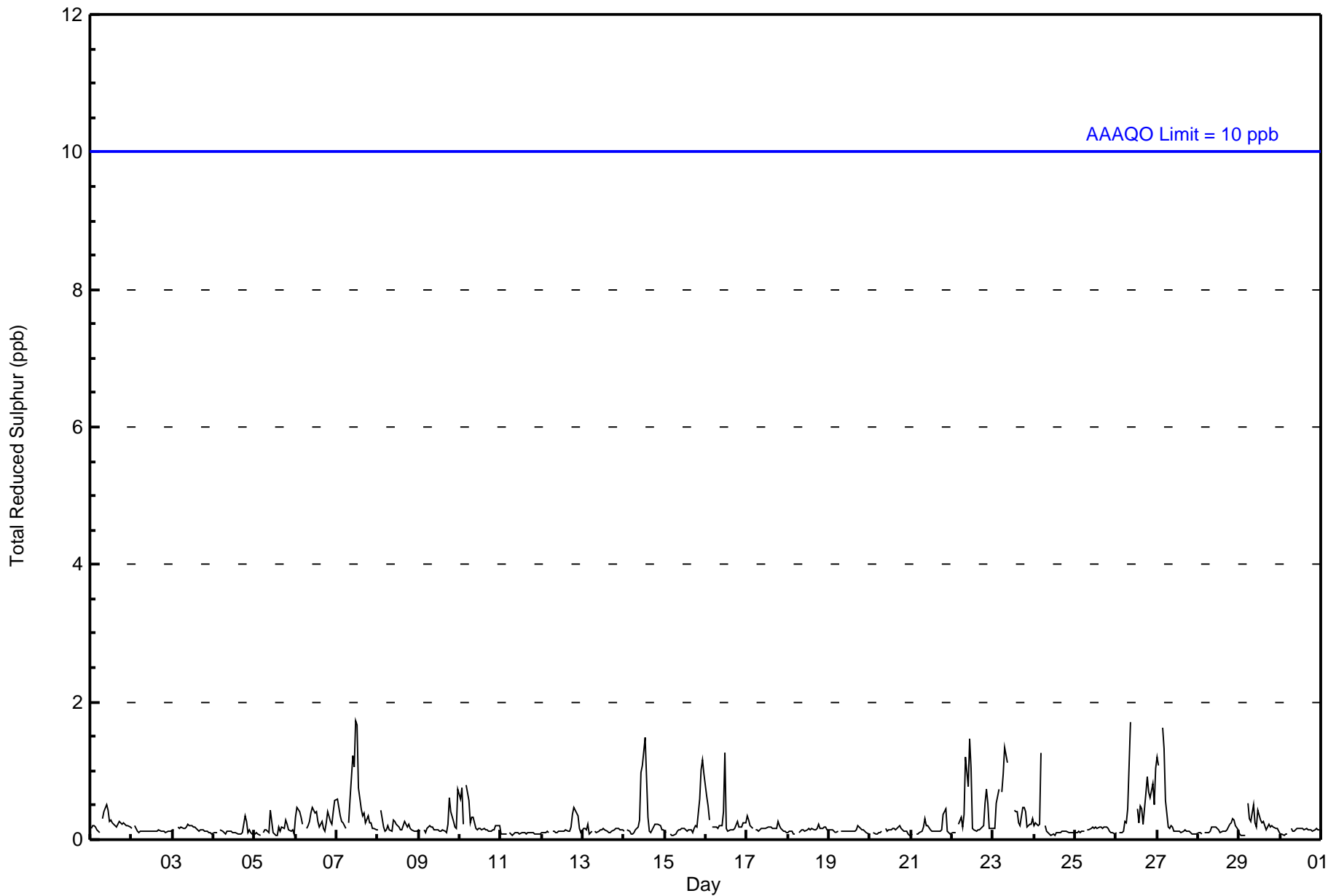
Sulphur Dioxide (SO₂) - ppb
Fort McKay South - September 2016





Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 683 | 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: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 44 | 8 | 8 | 5 | 8 | 5 | 13 | 50 | 103 | 88 | 67 | 71 | 74 | 46 | 49 | 43 | 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 | 44 | 8 | 8 | 5 | 8 | 5 | 13 | 50 | 103 | 88 | 67 | 71 | 74 | 46 | 49 | 43 | 682 |

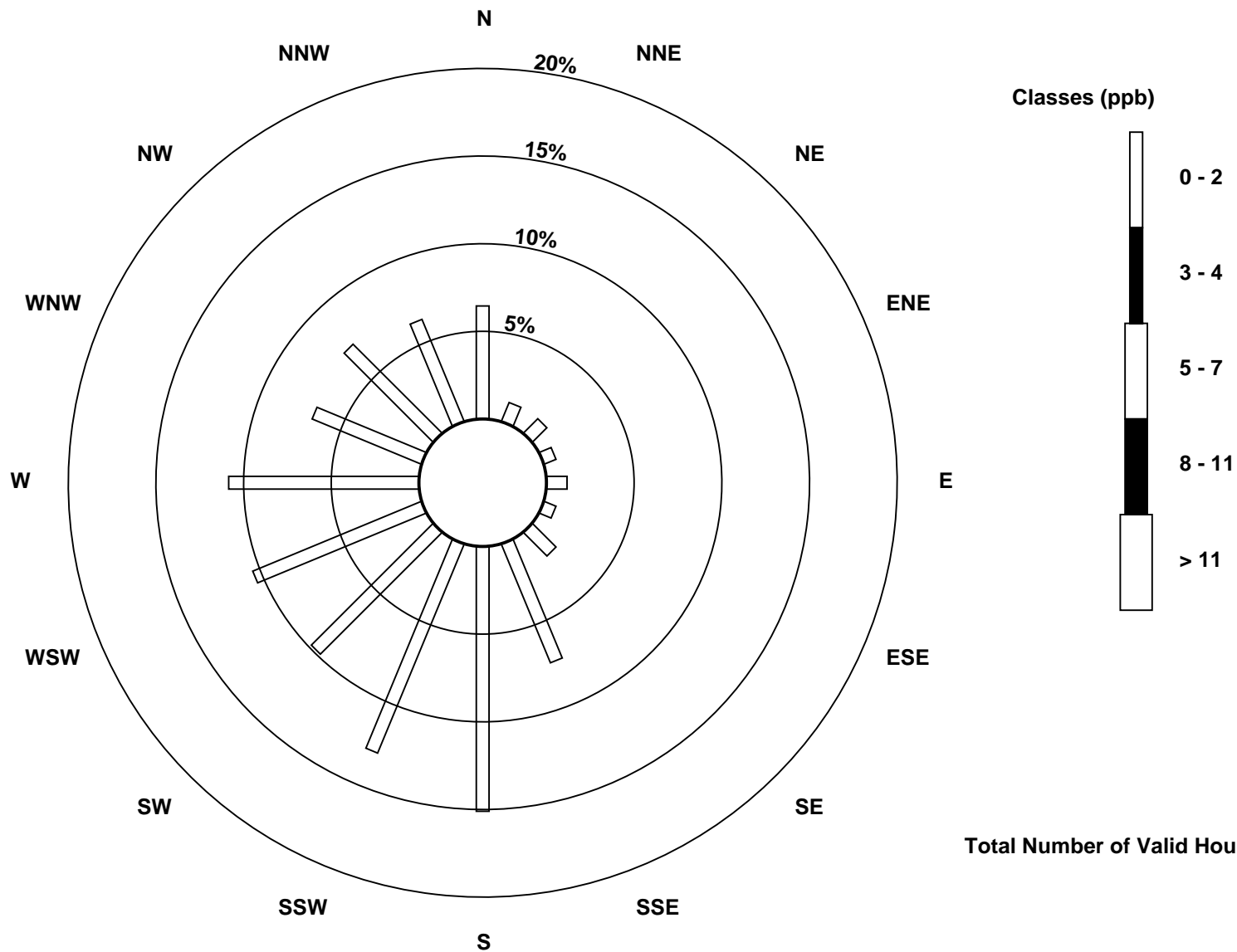
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Reduced Sulphur (TRS) - ppb
Fort McKay South (AMS 13)

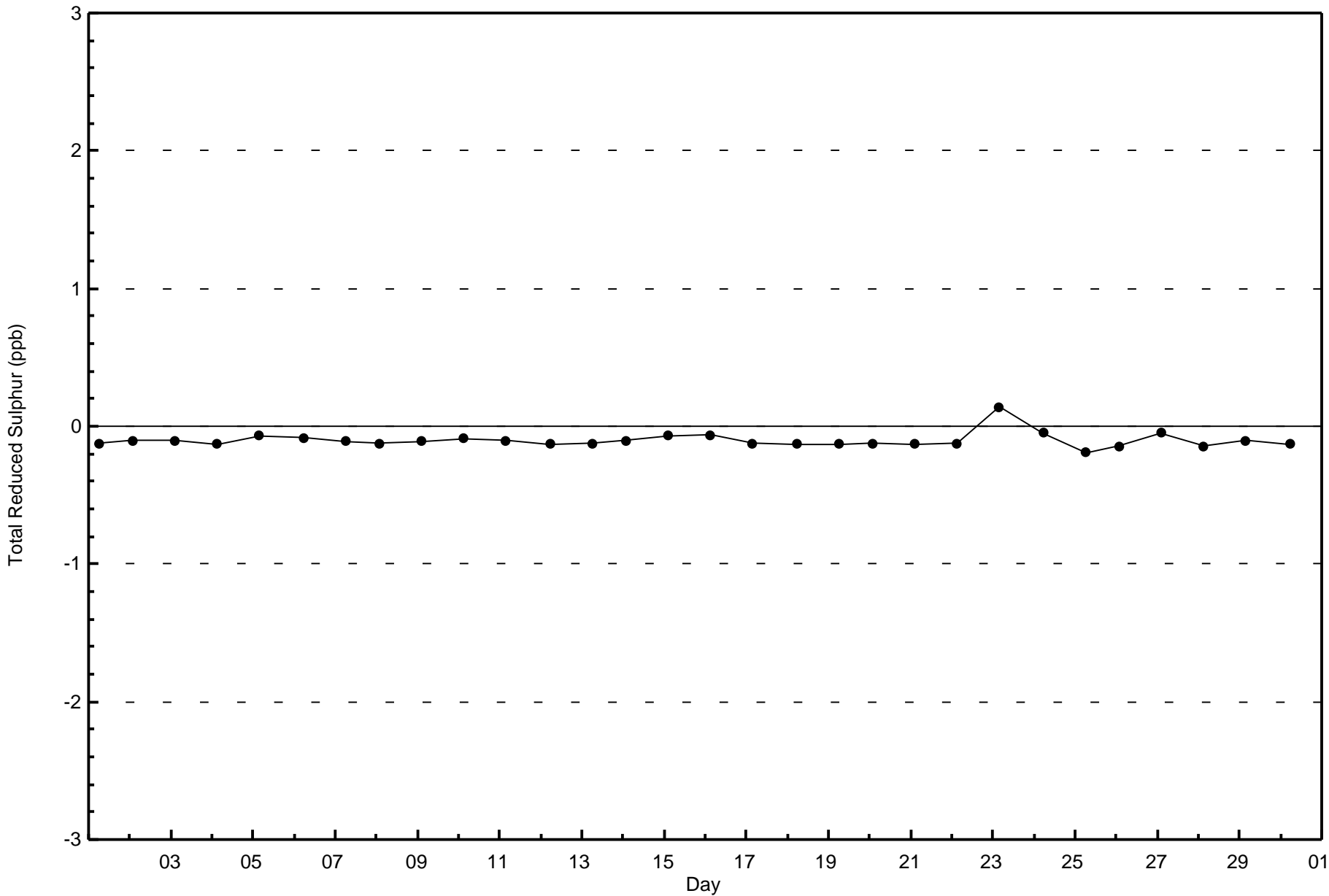


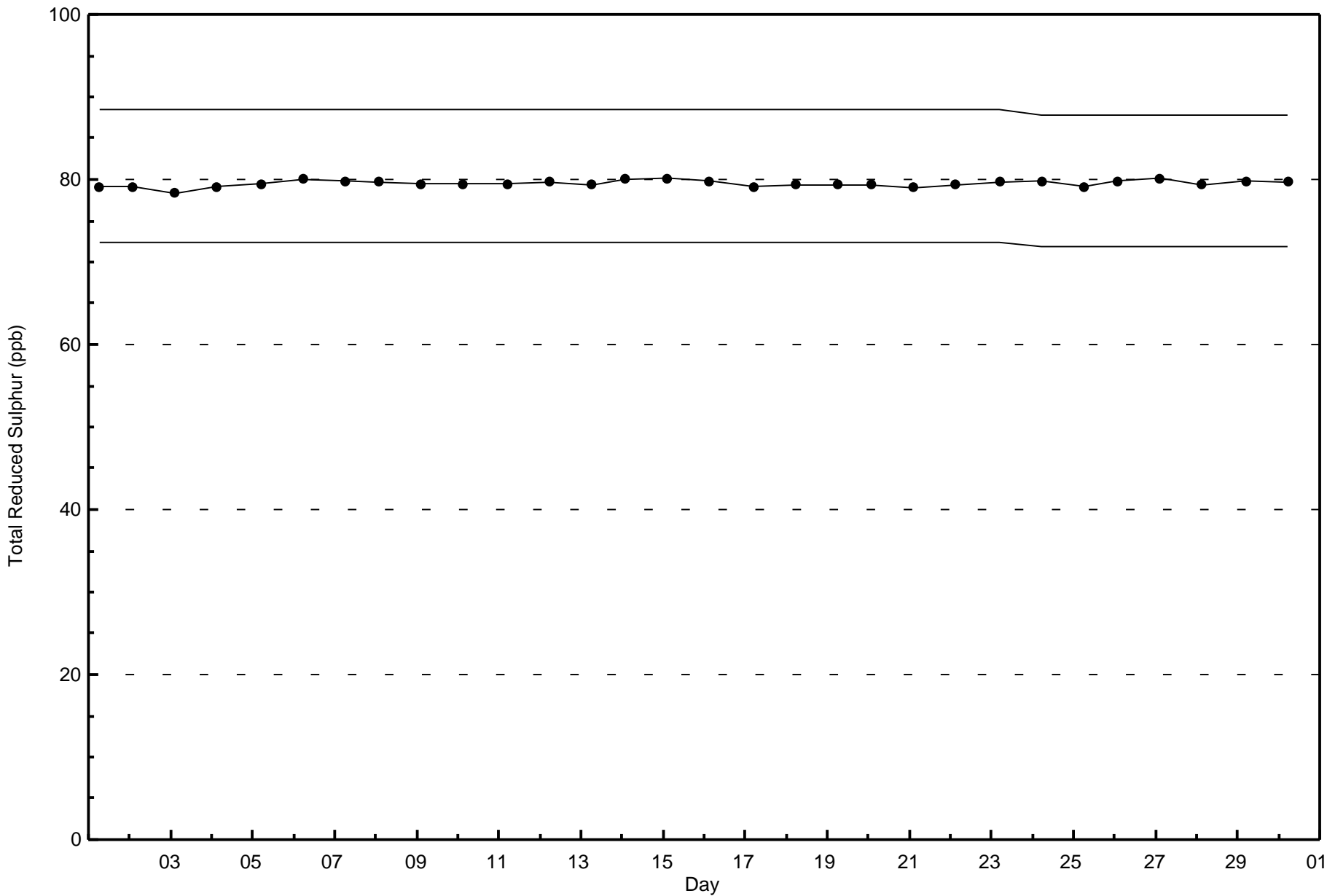
Total Number of Valid Hours: 682



Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Fort McKay South - September 2016





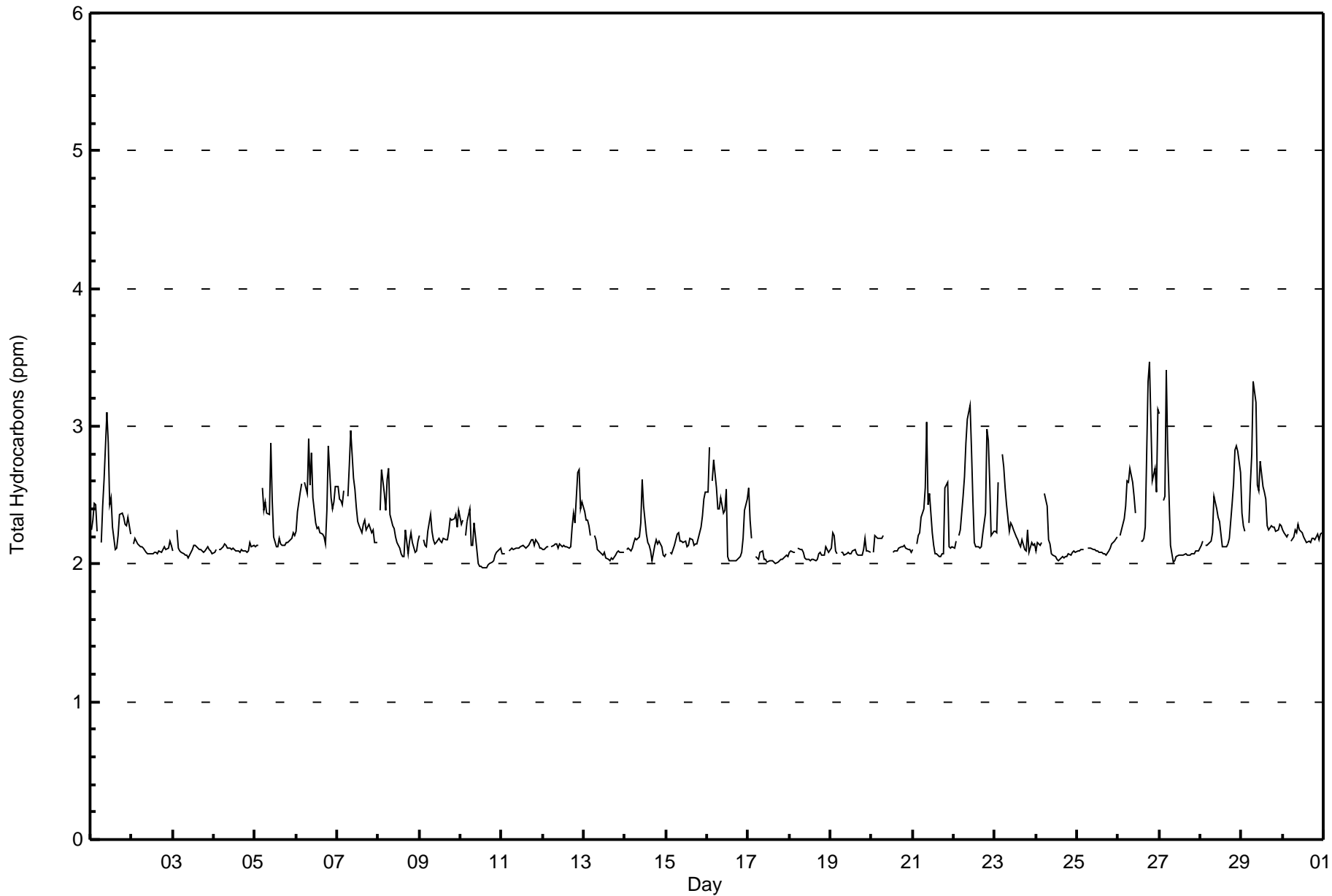


| Maximum Value: 3.5 ppm on Sep 26 19:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.6 ppm on Sep 26 | | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|------------------------------|---------------|---------------|-----|--|--|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: 2.0 ppm on Sep 10 15:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.1 ppm on Sep 18 | | | | | | | | | | | | | | | | | | Hours of Data: 684 | |
| Maximum Diurnal Average: 2.3 ppm at hour 9 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.1 ppm at hour 16 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 36 | |
| Monthly Average: 2.23 ppm | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 3.1 | | | | | | | | | | | | | | | | | | 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 | 2.2 | 2.3 | 2.4 | 2.4 | 2.2 | Z | 2.2 | 2.4 | 2.6 | 3.1 | 2.9 | 2.4 | 2.5 | 2.3 | 2.1 | 2.1 | 2.2 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.4 | 3.1 | | | | | | | | | | | |
| 2-Sep | Z | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | | | | | | | | | | | |
| 3-Sep | 2.1 | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | | | | | | | | | | | |
| 4-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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | | | | | | | | | | | |
| 5-Sep | 2.1 | 2.1 | 2.1 | Z | 2.6 | 2.4 | 2.4 | 2.4 | 2.4 | 2.9 | 2.5 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.9 | | | | | | | | | | | |
| 6-Sep | 2.2 | 2.4 | 2.5 | 2.6 | Z | 2.6 | 2.5 | 2.9 | 2.6 | 2.8 | 2.5 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.4 | 2.9 | 2.5 | 2.4 | 2.4 | 2.6 | 2.4 | 2.9 | | | | | | | | | | | |
| 7-Sep | 2.6 | 2.5 | 2.5 | 2.4 | 2.5 | Z | 2.5 | 2.7 | 3.0 | 2.6 | 2.5 | 2.4 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 | 3.0 | | | | | | | | | | | |
| 8-Sep | Z | 2.4 | 2.7 | 2.5 | 2.4 | 2.6 | 2.7 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.7 | | | | | | | | | | | |
| 9-Sep | 2.2 | Z | 2.2 | 2.1 | 2.1 | 2.2 | 2.4 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.4 | 2.2 | 2.4 | | | | | | | | | | |
| 10-Sep | 2.3 | 2.3 | Z | 2.2 | 2.3 | 2.4 | 2.1 | 2.1 | 2.3 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.4 | | | | | | | | | | | |
| 11-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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | | | | | | | | | | | |
| 12-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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.4 | 2.3 | 2.7 | 2.7 | 2.4 | 2.5 | 2.2 | 2.7 | | | | | | | | | | | |
| 13-Sep | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.4 | | | | | | | | | | | |
| 14-Sep | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.6 | 2.4 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.6 | | | | | | | | | | | |
| 15-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.5 | 2.2 | 2.5 | | | | | | | | | | |
| 16-Sep | 2.5 | 2.9 | Z | 2.6 | 2.8 | 2.6 | 2.4 | 2.4 | 2.5 | 2.4 | 2.4 | 2.5 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.4 | 2.5 | 2.3 | 2.9 | | | | | | | | | | |
| 17-Sep | 2.5 | 2.3 | 2.2 | Z | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.5 | | | | | | | | | | |
| 18-Sep | 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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | | | | | | | | | | |
| 19-Sep | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | | | | | | | | | | |
| 20-Sep | Z | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | C | C | C | C | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | | | | | | | | | | |
| 21-Sep | 2.1 | Z | 2.1 | 2.2 | 2.2 | 2.3 | 2.4 | 2.6 | 3.0 | 2.4 | 2.5 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.5 | 2.6 | 2.1 | 2.1 | 2.1 | 2.3 | 3.0 | | | | | | | | | | |
| 22-Sep | 2.1 | 2.2 | Z | 2.2 | 2.3 | 2.5 | 2.6 | 2.9 | 3.1 | 3.1 | 2.8 | 2.5 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | 3.0 | 2.9 | 2.6 | 2.2 | 2.2 | 2.5 | 3.1 | | | | | | | | | | | |
| 23-Sep | 2.2 | 2.2 | 2.6 | Z | 2.8 | 2.7 | 2.5 | 2.4 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.3 | 2.8 | | | | | | | | | | | |
| 24-Sep | 2.1 | 2.2 | 2.1 | 2.2 | Z | 2.5 | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.5 | | | | | | | | | | | |
| 25-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 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | | | | | | | | | | |
| 26-Sep | Z | 2.2 | 2.2 | 2.3 | 2.4 | 2.6 | 2.6 | 2.7 | 2.6 | 2.5 | 2.4 | C | C | 2.2 | 2.2 | 2.2 | 2.3 | 3.3 | 3.5 | 3.0 | 2.6 | 2.7 | 2.5 | 3.1 | 2.6 | 3.5 | | | | | | | | | | | |
| 27-Sep | 3.1 | Z | 2.5 | 2.5 | 3.4 | 2.8 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 3.4 | | | | | | | | | | | |
| 28-Sep | 2.1 | 2.2 | Z | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.5 | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | 2.6 | 2.8 | 2.9 | 2.8 | 2.7 | 2.3 | 2.9 | | | | | | | | | | |
| 29-Sep | 2.4 | 2.3 | 2.2 | Z | 2.3 | 2.6 | 2.8 | 3.3 | 3.2 | 2.6 | 2.5 | 2.7 | 2.6 | 2.5 | 2.5 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.5 | 3.3 | | | | | | | | | | | |
| 30-Sep | 2.3 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay South - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay South - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 51 | 7.46 | 7.46 |
| 2.1 - 3.0 | 623 | 91.08 | 98.54 |
| 3.1 - 10.0 | 10 | 1.46 | 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
Fort McKay South - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals | |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|----|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 8 | 7 | 12 | 8 | 3 | 2 | 51 |
| 2.1 - 3.0 | 45 | 8 | 8 | 5 | 8 | 5 | 14 | 50 | 99 | 76 | 58 | 68 | 60 | 38 | 42 | 38 | 622 | |
| 3.1 - 10.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Totals | 46 | 8 | 8 | 5 | 8 | 5 | 14 | 52 | 105 | 88 | 66 | 75 | 72 | 46 | 45 | 40 | 683 | |

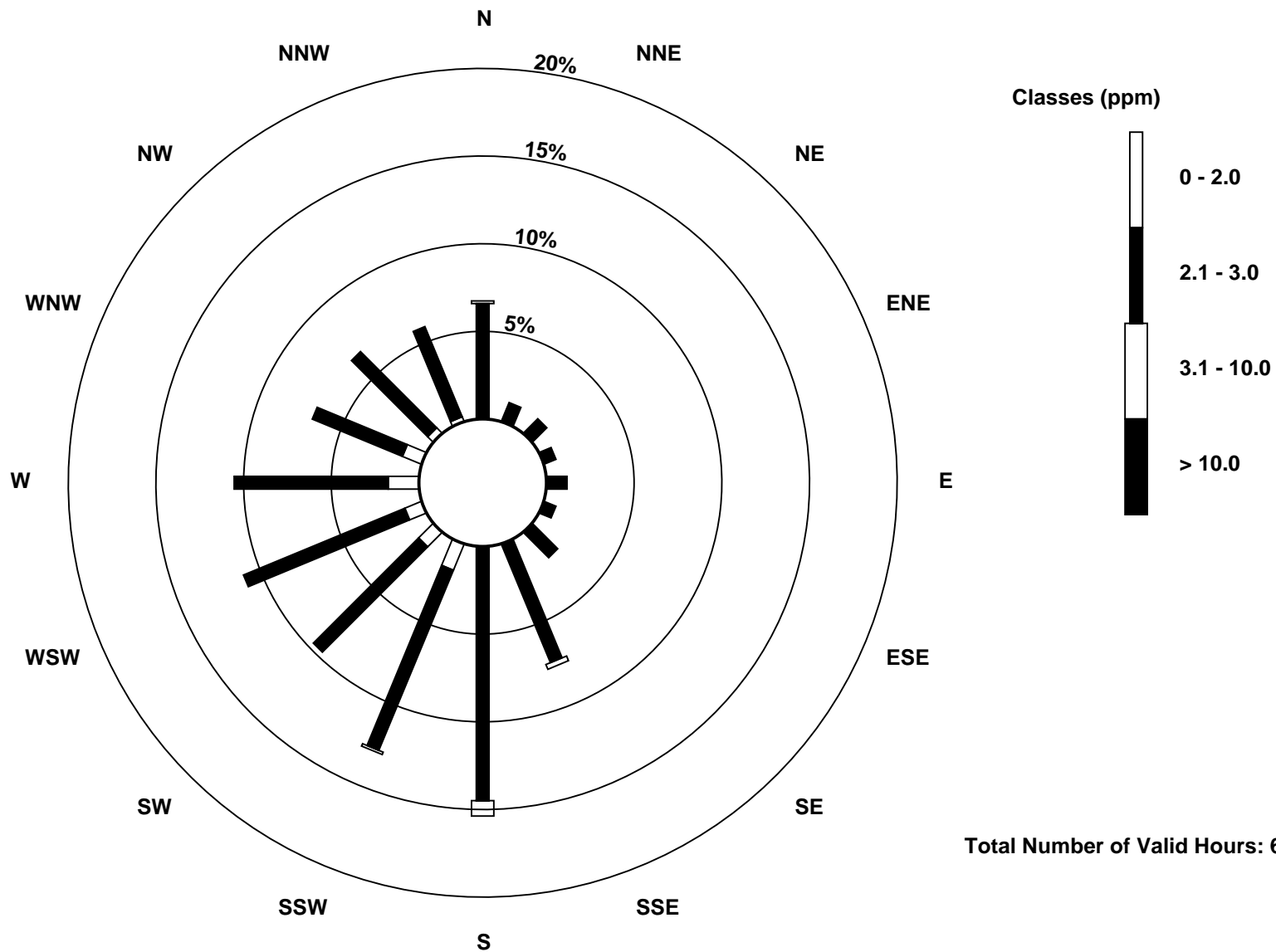
Total Number of Valid Hours: 683

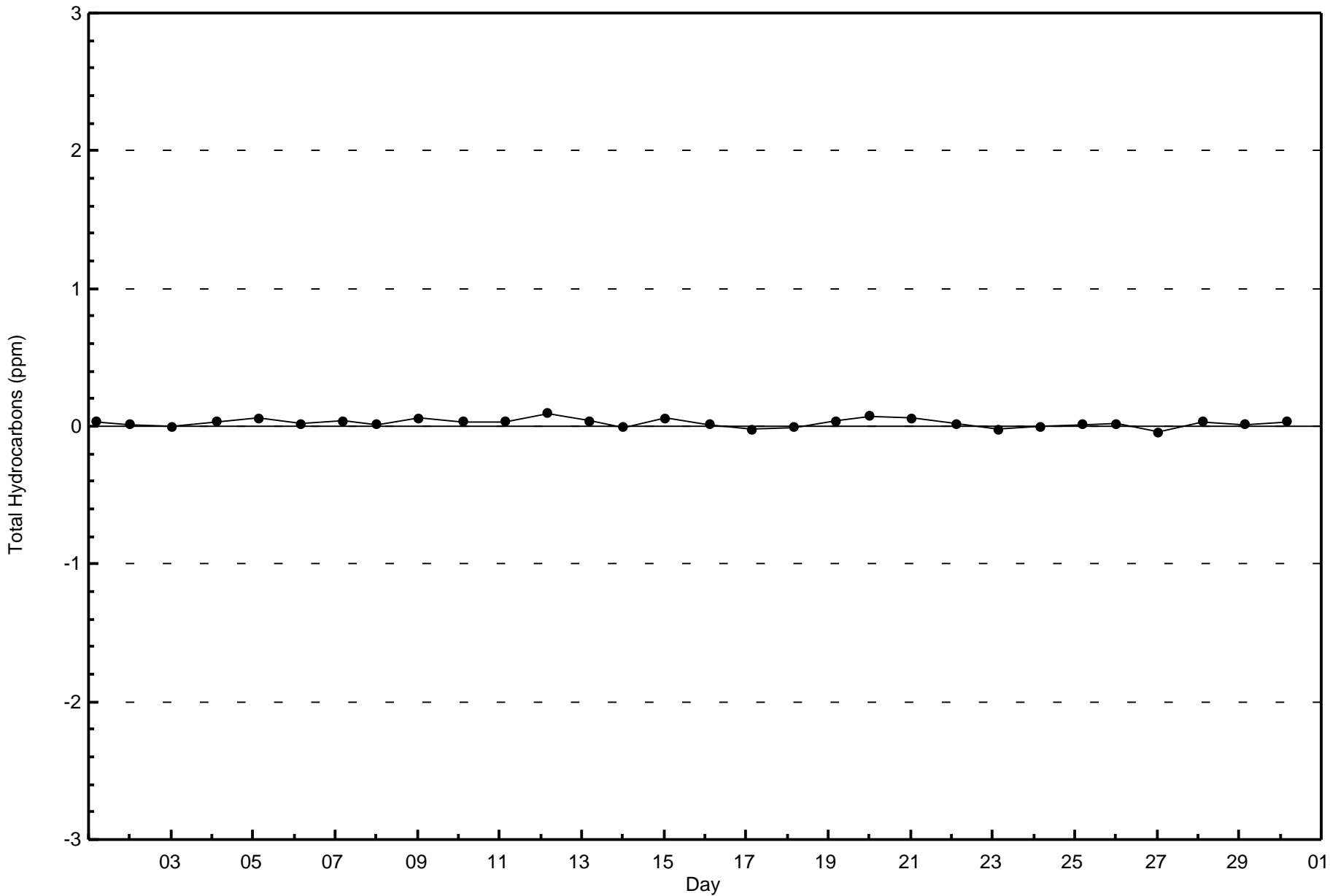
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Hydrocarbons (THC) - ppm
Fort McKay South (AMS 13)

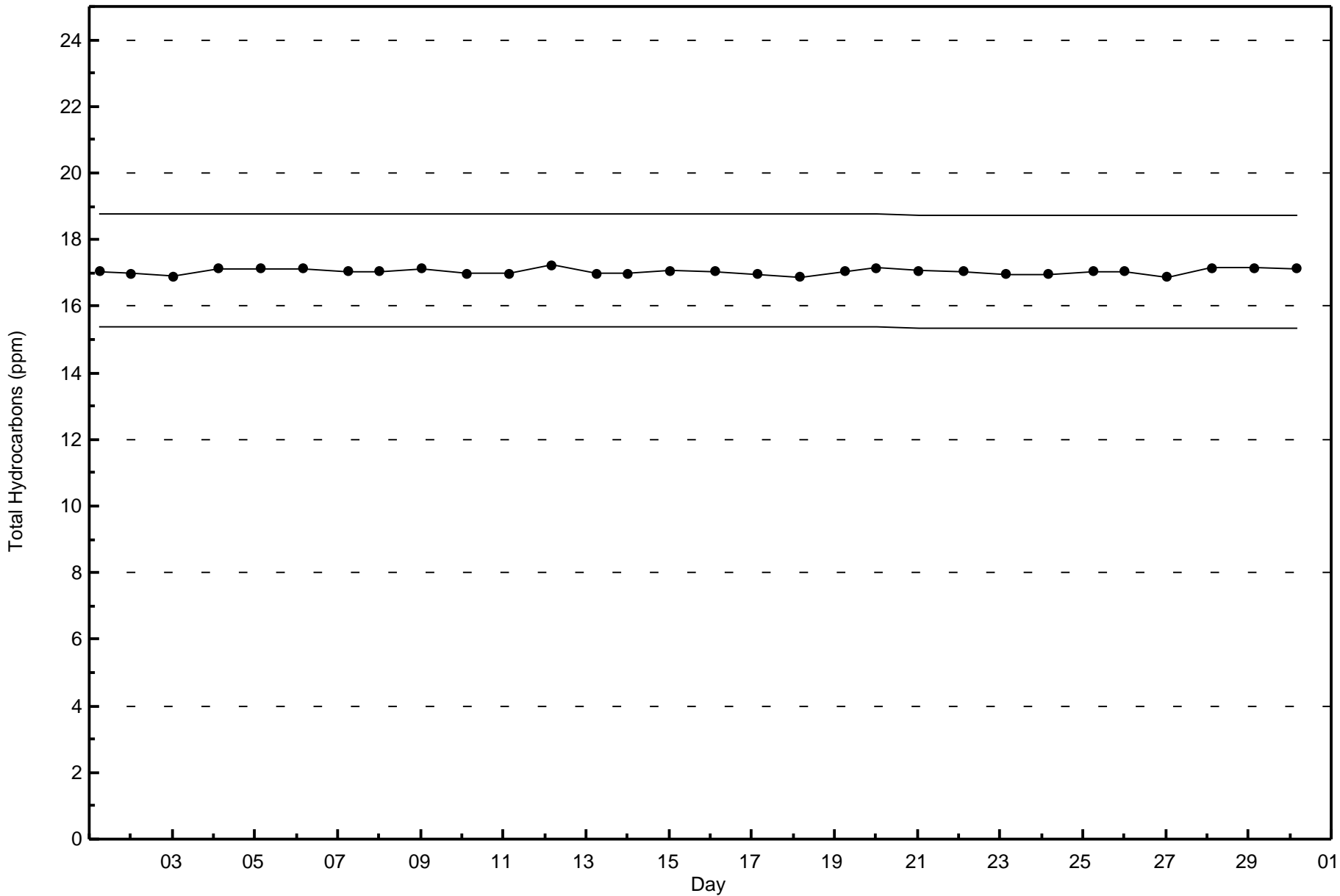






Wood Buffalo Environmental Association
Span Responses

Total Hydrocarbons (THC) - ppm
Fort McKay South - September 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

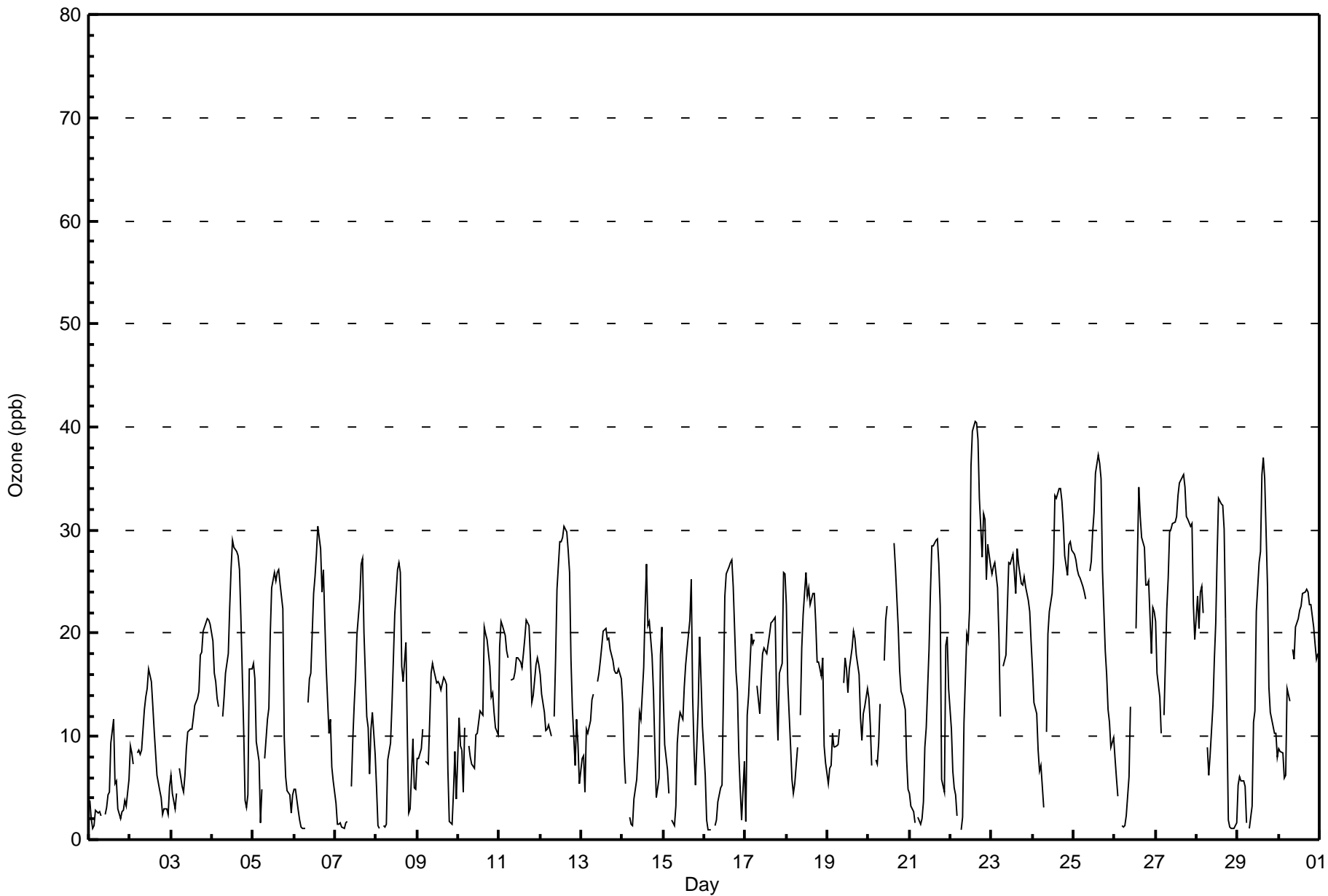
Fort McKay South - September 2016

| | | | | |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 41 ppb on Sep 22 15:00 | Maximum Daily Average: 26.6 ppb on Sep 27 | | Hours of Data: | 684 |
| Minimum Value: 1 ppb on Sep 16 04:00 | Minimum Daily Average: 3.9 ppb on Sep 1 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 25.0 ppb at hour 16 | Minimum Diurnal Average: 7.2 ppb at hour 7 | | Hours of Calibration: | 35 |
| Monthly Average: 15.2 ppb | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 8 Median = 15 Q ₃ = 22 P ₉₀ = 28 P ₉₉ = 36 | | Percent Operational Time: | 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 4 | 2 | 1 | 1 | 3 | 3 | 3 | 2 | Z | 2 | 3 | 4 | 5 | 9 | 12 | 5 | 6 | 3 | 2 | 3 | 3 | 4 | 3 | 6 | 3.9 | 12 |
| 2-Sep | 9 | 8 | 7 | Z | 8 | 9 | 8 | 9 | 13 | 14 | 15 | 17 | 15 | 13 | 11 | 8 | 6 | 5 | 4 | 2 | 3 | 3 | 2 | 5 | 8.5 | 17 |
| 3-Sep | 6 | 4 | 3 | 4 | Z | 7 | 5 | 5 | 6 | 9 | 10 | 11 | 11 | 12 | 13 | 14 | 14 | 18 | 18 | 20 | 21 | 21 | 21 | 21 | 12.0 | 21 |
| 4-Sep | 19 | 16 | 15 | 14 | 13 | Z | 12 | 14 | 16 | 18 | 22 | 26 | 29 | 28 | 28 | 28 | 26 | 26 | 22 | 11 | 4 | 3 | 4 | 17 | 17.5 | 29 |
| 5-Sep | 17 | 16 | 10 | 8 | 2 | 5 | Z | 8 | 12 | 13 | 20 | 24 | 26 | 25 | 26 | 26 | 25 | 22 | 10 | 6 | 5 | 4 | 3 | 4 | 13.7 | 26 |
| 6-Sep | 5 | 5 | 3 | 2 | 1 | 1 | 1 | Z | 13 | 16 | 16 | 24 | 26 | 28 | 30 | 28 | 24 | 26 | 21 | 17 | 10 | 12 | 7 | 6 | 14.0 | 30 |
| 7-Sep | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | Z | 5 | 10 | 13 | 16 | 20 | 23 | 27 | 27 | 20 | 12 | 11 | 6 | 11 | 12 | 8 | 10.2 | 27 |
| 8-Sep | 5 | 1 | 1 | Z | 1 | 1 | 2 | 8 | 9 | 13 | 17 | 22 | 26 | 27 | 26 | 17 | 15 | 19 | 10 | 3 | 3 | 10 | 5 | 5 | 10.7 | 27 |
| 9-Sep | 8 | 8 | 9 | 11 | Z | 8 | 7 | 12 | 16 | 17 | 16 | 15 | 15 | 15 | 15 | 16 | 15 | 15 | 7 | 2 | 1 | 5 | 9 | 4 | 10.6 | 17 |
| 10-Sep | 12 | 9 | 9 | 5 | 11 | Z | 9 | 8 | 7 | 7 | 10 | 10 | 11 | 13 | 12 | 21 | 20 | 19 | 17 | 14 | 14 | 12 | 11 | 10 | 11.8 | 21 |
| 11-Sep | 19 | 21 | 21 | 20 | 18 | 18 | Z | 15 | 16 | 16 | 18 | 18 | 17 | 17 | 18 | 20 | 21 | 21 | 18 | 13 | 14 | 17 | 18 | 17 | 17.8 | 21 |
| 12-Sep | 16 | 14 | 12 | 11 | 11 | 11 | 10 | Z | 12 | 17 | 24 | 29 | 29 | 29 | 30 | 30 | 28 | 26 | 17 | 13 | 7 | 12 | 9 | 5 | 17.5 | 30 |
| 13-Sep | 8 | 8 | 5 | 11 | 10 | 12 | 14 | Z | 15 | 16 | 17 | 19 | 20 | 20 | 19 | 19 | 18 | 17 | 16 | 16 | 16 | 17 | 16 | 16 | 15.0 | 20 |
| 14-Sep | 13 | 8 | 5 | Z | 2 | 2 | 1 | 4 | 6 | 8 | 12 | 12 | 17 | 22 | 27 | 21 | 18 | 14 | 9 | 4 | 6 | 18 | 21 | 11.8 | 27 | |
| 15-Sep | 14 | 9 | 7 | 4 | Z | 2 | 1 | 3 | 9 | 11 | 12 | 12 | 15 | 17 | 18 | 21 | 25 | 14 | 9 | 5 | 13 | 20 | 16 | 11 | 11.7 | 25 |
| 16-Sep | 6 | 2 | 1 | 1 | 1 | Z | 1 | 2 | 4 | 5 | 5 | 14 | 24 | 26 | 26 | 27 | 27 | 25 | 16 | 14 | 8 | 5 | 2 | 8 | 10.9 | 27 |
| 17-Sep | 2 | 12 | 14 | 20 | 19 | 19 | Z | 15 | 12 | 15 | 18 | 19 | 18 | 19 | 20 | 21 | 21 | 22 | 14 | 10 | 16 | 17 | 26 | 26 | 17.1 | 26 |
| 18-Sep | 23 | 15 | 9 | 6 | 4 | 5 | 9 | Z | 12 | 19 | 22 | 26 | 24 | 24 | 23 | 24 | 24 | 21 | 17 | 17 | 16 | 18 | 9 | 7 | 16.3 | 26 |
| 19-Sep | 5 | 7 | 7 | 10 | 9 | 9 | 9 | 11 | Z | 15 | 18 | 17 | 14 | 17 | 19 | 20 | 20 | 18 | 16 | 12 | 10 | 12 | 13 | 15 | 13.1 | 20 |
| 20-Sep | 14 | 11 | 7 | Z | 8 | 7 | 9 | 13 | M | 17 | 21 | 23 | C | C | C | 29 | 26 | 21 | 16 | 14 | 14 | 13 | 8 | 5 | 14.5 | 29 |
| 21-Sep | 5 | 3 | 3 | 2 | Z | 2 | 2 | 2 | 4 | 9 | 11 | 18 | 24 | 28 | 29 | 29 | 29 | 27 | 23 | 6 | 5 | 19 | 20 | 15 | 13.6 | 29 |
| 22-Sep | 11 | 7 | 5 | 4 | 2 | Z | 1 | 2 | 11 | 20 | 19 | 22 | 36 | 40 | 41 | 40 | 39 | 33 | 27 | 32 | 31 | 25 | 29 | 27 | 21.9 | 41 |
| 23-Sep | 26 | 26 | 27 | 24 | 19 | 12 | Z | 17 | 18 | 23 | 27 | 27 | 28 | 26 | 24 | 28 | 27 | 25 | 25 | 25 | 25 | 23 | 22 | 19 | 23.6 | 28 |
| 24-Sep | 16 | 13 | 12 | 9 | 7 | 7 | 3 | Z | 17 | 10 | 20 | 22 | 24 | 27 | 33 | 33 | 34 | 34 | 31 | 28 | 26 | 29 | 29 | 28 | 22.1 | 34 |
| 25-Sep | 28 | 27 | 26 | 26 | 25 | 25 | 24 | 23 | Z | 26 | 27 | 30 | 32 | 35 | 37 | 37 | 35 | 26 | 18 | 16 | 13 | 11 | 9 | 10 | 24.6 | 37 |
| 26-Sep | 8 | 6 | 4 | Z | 1 | 1 | 1 | 2 | 6 | 13 | C | C | 21 | 27 | 34 | 31 | 29 | 28 | 25 | 25 | 25 | 18 | 23 | 22 | 16.7 | 34 |
| 27-Sep | 21 | 16 | 14 | 10 | Z | 12 | 22 | 25 | 30 | 30 | 31 | 31 | 31 | 33 | 35 | 35 | 35 | 34 | 31 | 31 | 30 | 31 | 23 | 19 | 26.6 | 35 |
| 28-Sep | 24 | 21 | 24 | 25 | 22 | Z | 9 | 6 | 8 | 13 | 18 | 21 | 28 | 33 | 33 | 32 | 30 | 21 | 2 | 1 | 1 | 1 | 1 | 2 | 16.3 | 33 |
| 29-Sep | 5 | 6 | 6 | 6 | 5 | 2 | Z | 1 | 3 | 11 | 12 | 22 | 27 | 28 | 35 | 37 | 35 | 25 | 15 | 12 | 12 | 10 | 10 | 8 | 14.5 | 37 |
| 30-Sep | 9 | 9 | 8 | 6 | 6 | 15 | 13 | Z | 18 | 17 | 21 | 21 | 22 | 23 | 24 | 24 | 24 | 23 | 23 | 21 | 19 | 17 | 18 | 18 | 17.6 | 24 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 12.0 | 10.4 | 9.2 | 9.6 | 8.5 | 7.8 | 7.2 | 8.9 | 11.4 | 14.5 | 17.1 | 19.6 | 21.7 | 23.7 | 24.8 | 25.0 | 24.4 | 21.6 | 16.2 | 13.5 | 12.5 | 13.6 | 13.6 | 12.8 | Diurnal Average | |
| 28 | 27 | 27 | 26 | 25 | 25 | 24 | 25 | 30 | 30 | 31 | 31 | 36 | 40 | 41 | 40 | 39 | 34 | 31 | 32 | 31 | 31 | 29 | 28 | Diurnal Maximum | |

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 477 | 69.74 | 69.74 |
| 21 - 50 | 207 | 30.26 | 100.00 |
| 51 - 82 | 0 | 0.00 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 31 | 6 | 6 | 4 | 3 | 2 | 7 | 24 | 68 | 70 | 50 | 51 | 51 | 32 | 37 | 34 | 476 |
| 21 - 50 | 12 | 3 | 1 | 1 | 3 | 3 | 7 | 28 | 36 | 18 | 15 | 24 | 20 | 15 | 13 | 8 | 207 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 43 | 9 | 7 | 5 | 6 | 5 | 14 | 52 | 104 | 88 | 65 | 75 | 71 | 47 | 50 | 42 | 683 |

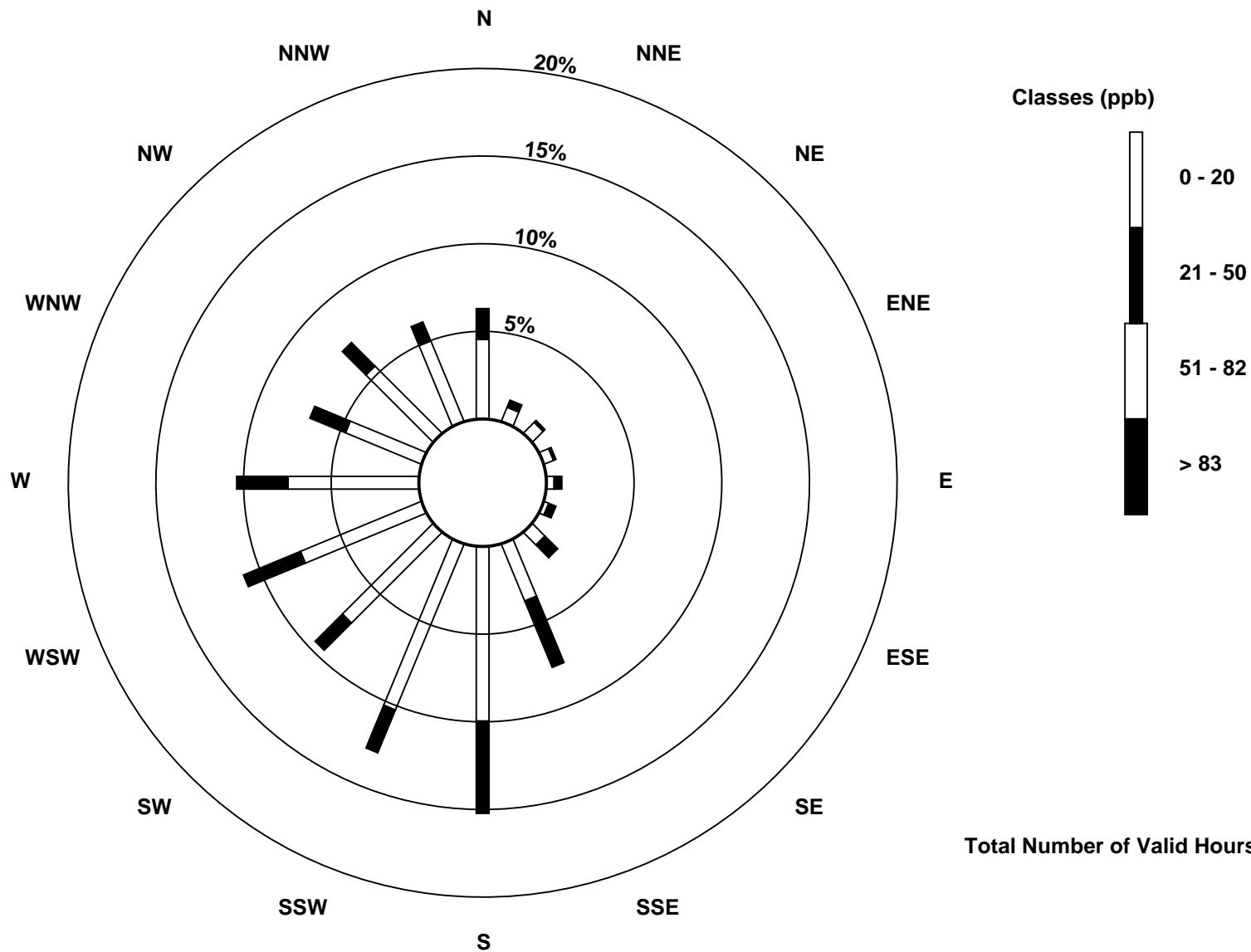
Total Number of Valid Hours: 683

Total Number of Hours: 720

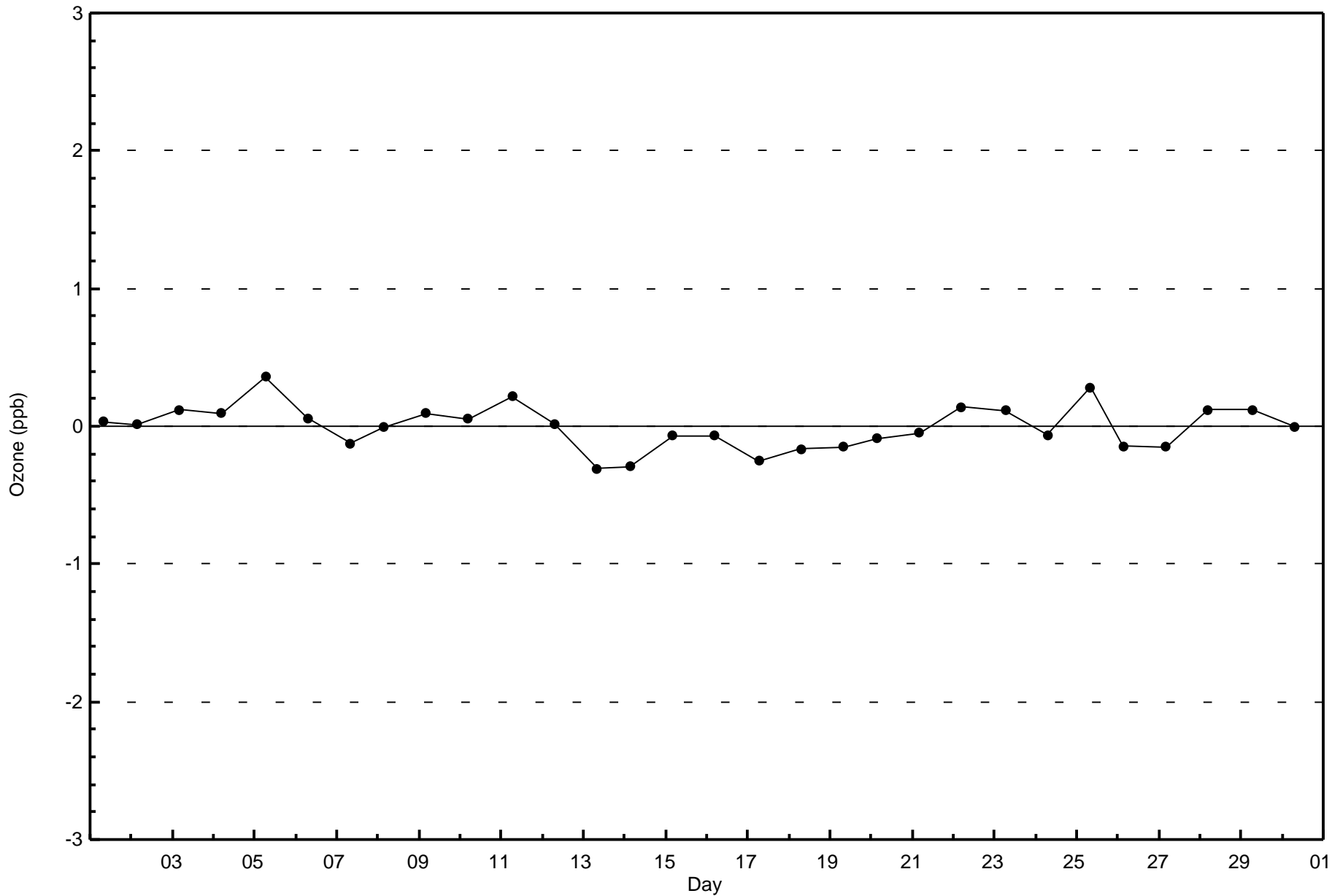


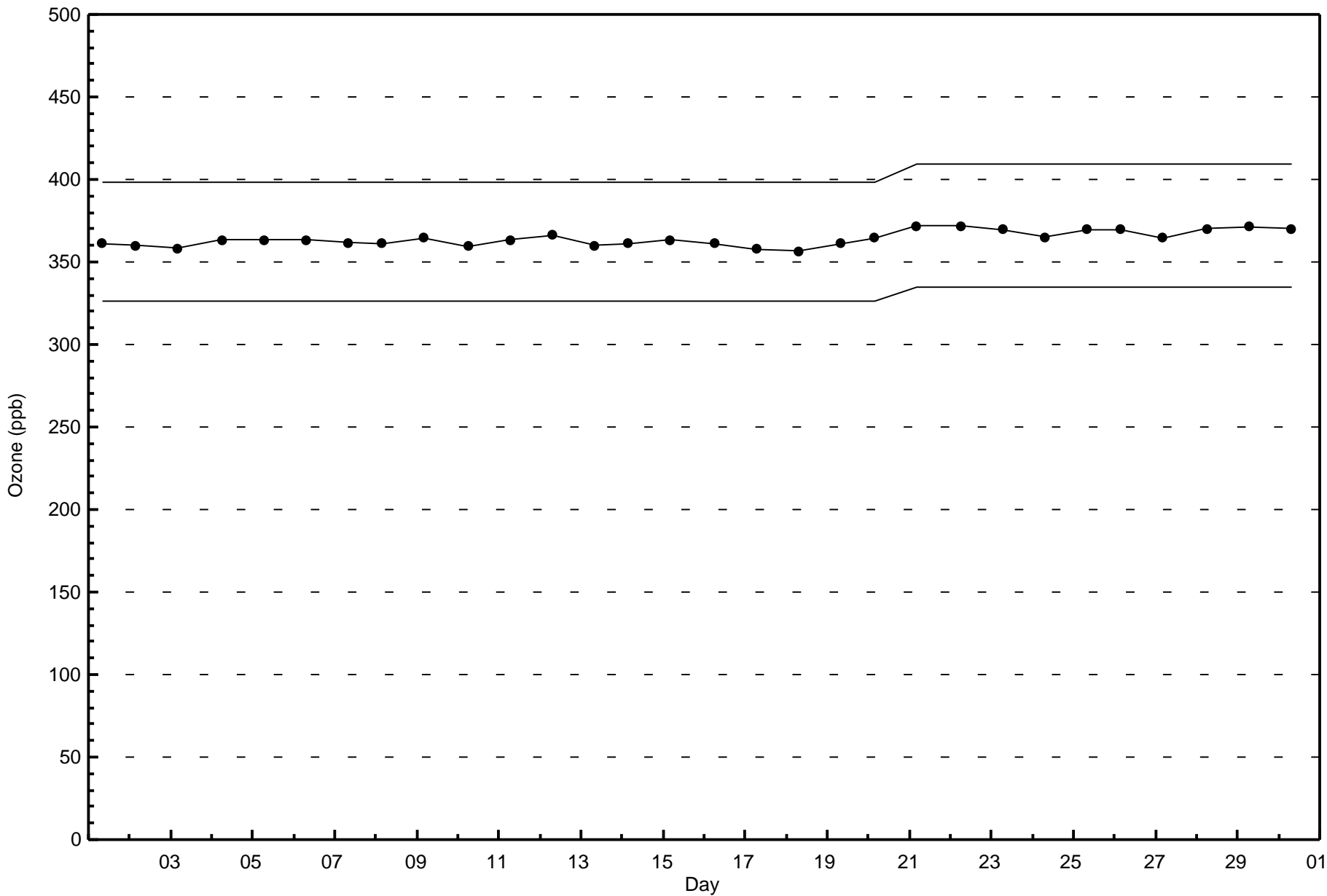
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Ozone (O₃) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 683







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

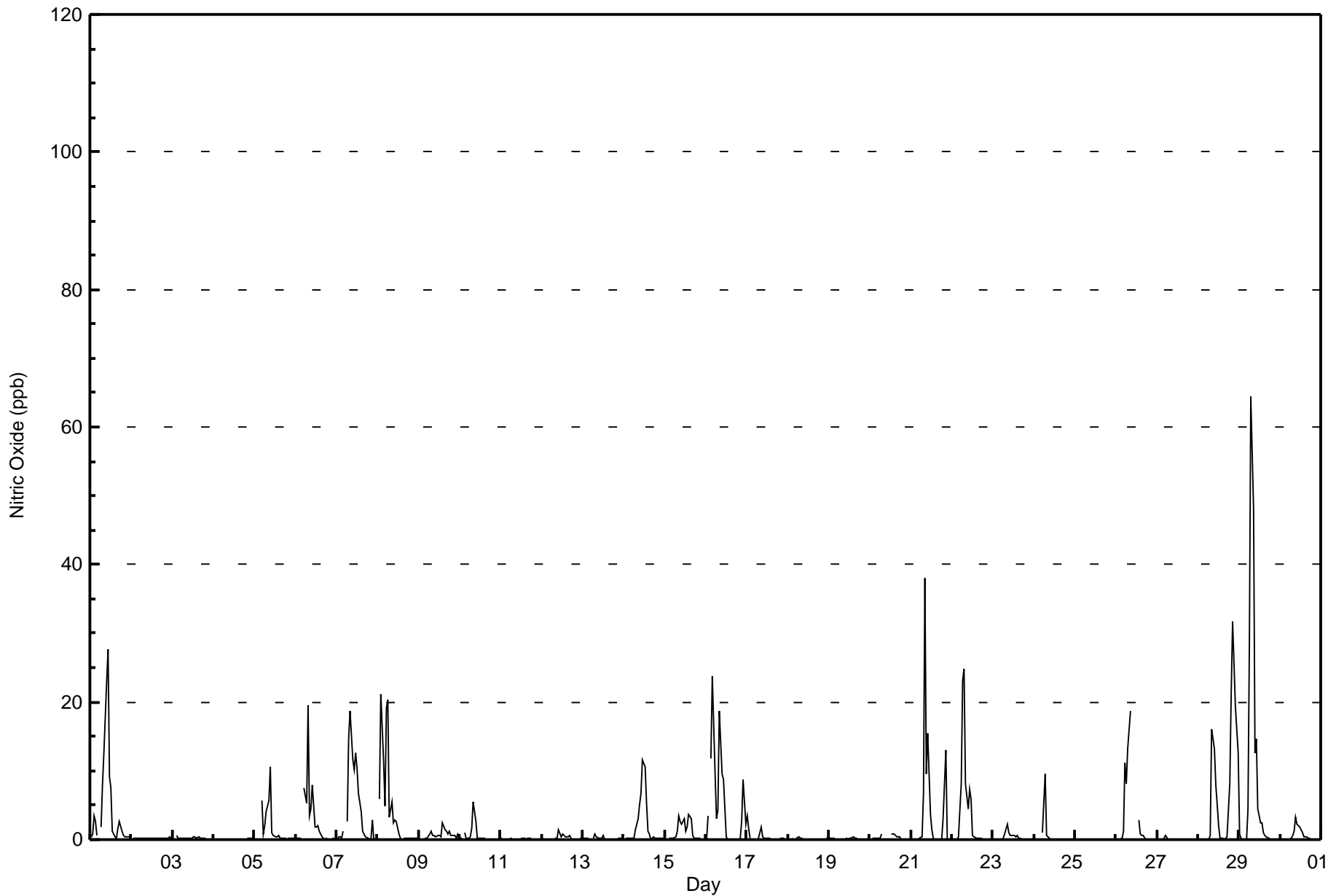
Fort McKay South - September 2016

| Maximum Value: 65 ppb on Sep 29 08:00 | | Maximum Daily Average: 8.1 ppb on Sep 29 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 4 08:00 | | Minimum Daily Average: 0.0 ppb on Sep 25 | | Hours of Data: 682 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 7.4 ppb at hour 9 | | Minimum Diurnal Average: 0.2 ppb at hour 18 | | Hours of Missing Data: 38 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.9 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 5 P ₉₉ = 25 | | Hours of Calibration: 38 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 1 | 3 | 3 | 1 | Z | 2 | 8 | 13 | 23 | 28 | 9 | 8 | 1 | 0 | 0 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 4.7 | 28 |
| 2-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 |
| 3-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 |
| 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 | 0.1 | 0 |
| 5-Sep | 0 | 0 | 0 | Z | 6 | 1 | 2 | 4 | 6 | 11 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 11 |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 8 | 5 | 19 | 3 | 4 | 8 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 19 |
| 7-Sep | 0 | 0 | 0 | 0 | 1 | Z | 3 | 15 | 19 | 12 | 10 | 13 | 10 | 7 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 4.3 | 19 |
| 8-Sep | Z | 6 | 21 | 11 | 5 | 19 | 20 | 3 | 6 | 2 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.5 | 21 |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.7 | 3 |
| 10-Sep | 0 | 0 | Z | 1 | 0 | 0 | 0 | 2 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 |
| 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 | 0.1 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 5 | 7 | 12 | 11 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 12 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 | 3 | 1 | 2 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 4 |
| 16-Sep | 0 | 3 | Z | 12 | 24 | 10 | 3 | 4 | 19 | 10 | 9 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 2 | 4.9 | 24 |
| 17-Sep | 3 | 2 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 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 | 0.1 | 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 | 0.1 | 0 |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | C | C | C | C | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 7 | 38 | 10 | 15 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 13 | 0 | 0 | 4.0 | 38 |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 8 | 23 | 25 | 8 | 5 | 7 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.7 | 25 |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 24-Sep | 0 | 0 | 0 | 0 | Z | 1 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 10 |
| 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 | Z | 0 | 0 | 0 | 1 | 11 | 8 | 13 | 19 | C | C | C | C | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.0 | 19 |
| 27-Sep | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 1 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 16 | 13 | 8 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 21 | 32 | 26 | 19 | 7.2 | 32 |
| 29-Sep | 1 | 0 | 0 | Z | 0 | 4 | 28 | 65 | 48 | 13 | 15 | 4 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.1 | 65 |
| 30-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 0.3 0.5 1.1 1.2 1.6 2.6 3.6 5.8 7.4 4.2 4.2 2.5 1.6 0.9 0.6 0.4 0.3 0.2 0.4 0.9 1.6 1.1 1.0 0.6 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 6 21 12 24 19 28 65 48 23 28 13 11 7 4 3 2 3 8 21 32 26 19 13 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan | | C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort McKay South - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 669 | 98.09 | 98.09 |
| 21 - 40 | 11 | 1.61 | 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: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 44 | 8 | 8 | 5 | 8 | 5 | 13 | 50 | 102 | 85 | 62 | 75 | 72 | 46 | 45 | 40 | 668 |
| 21 - 40 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 11 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 46 | 8 | 8 | 5 | 8 | 5 | 13 | 51 | 105 | 88 | 66 | 75 | 72 | 46 | 45 | 40 | 681 |

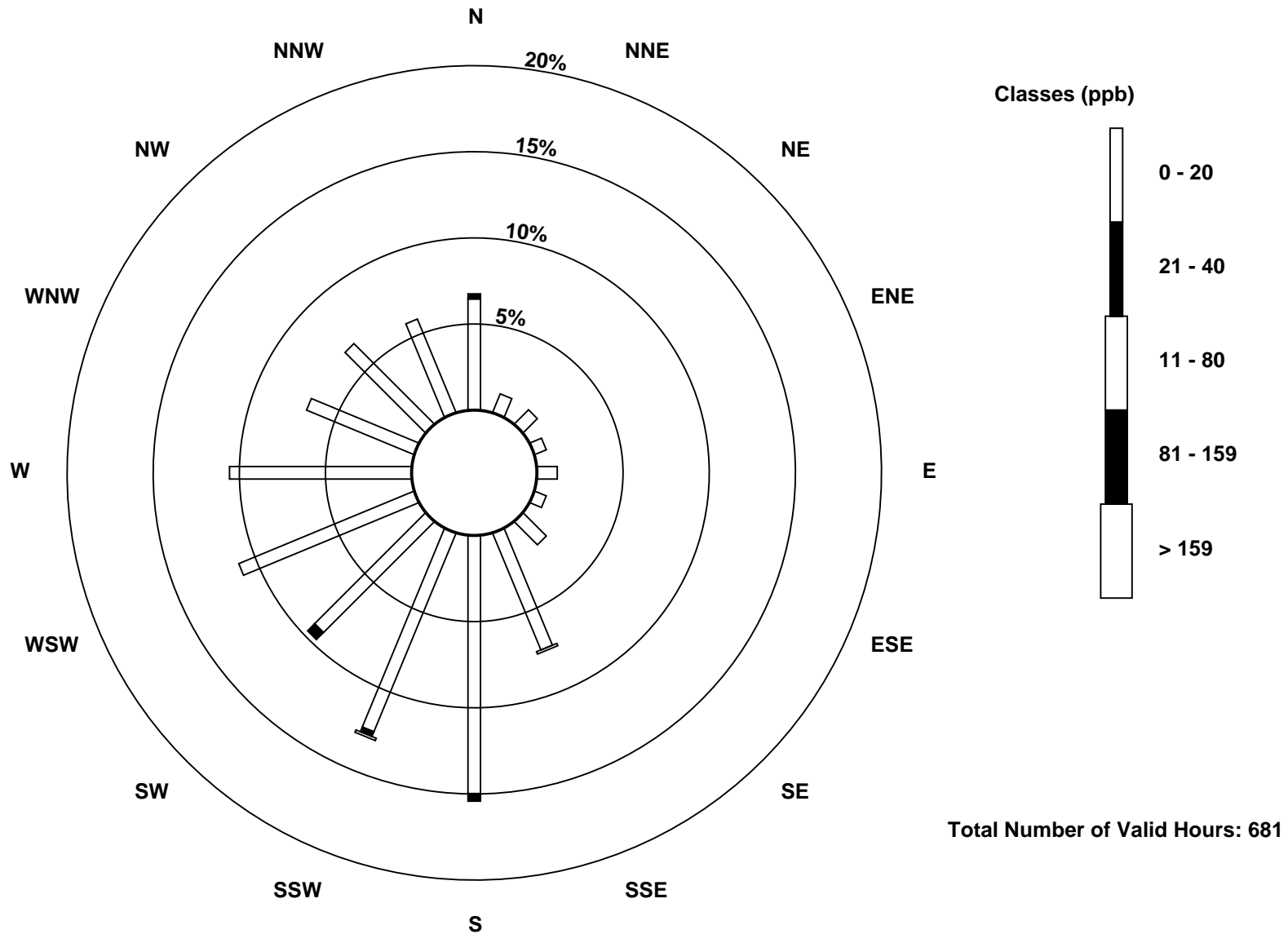
Total Number of Valid Hours: 681

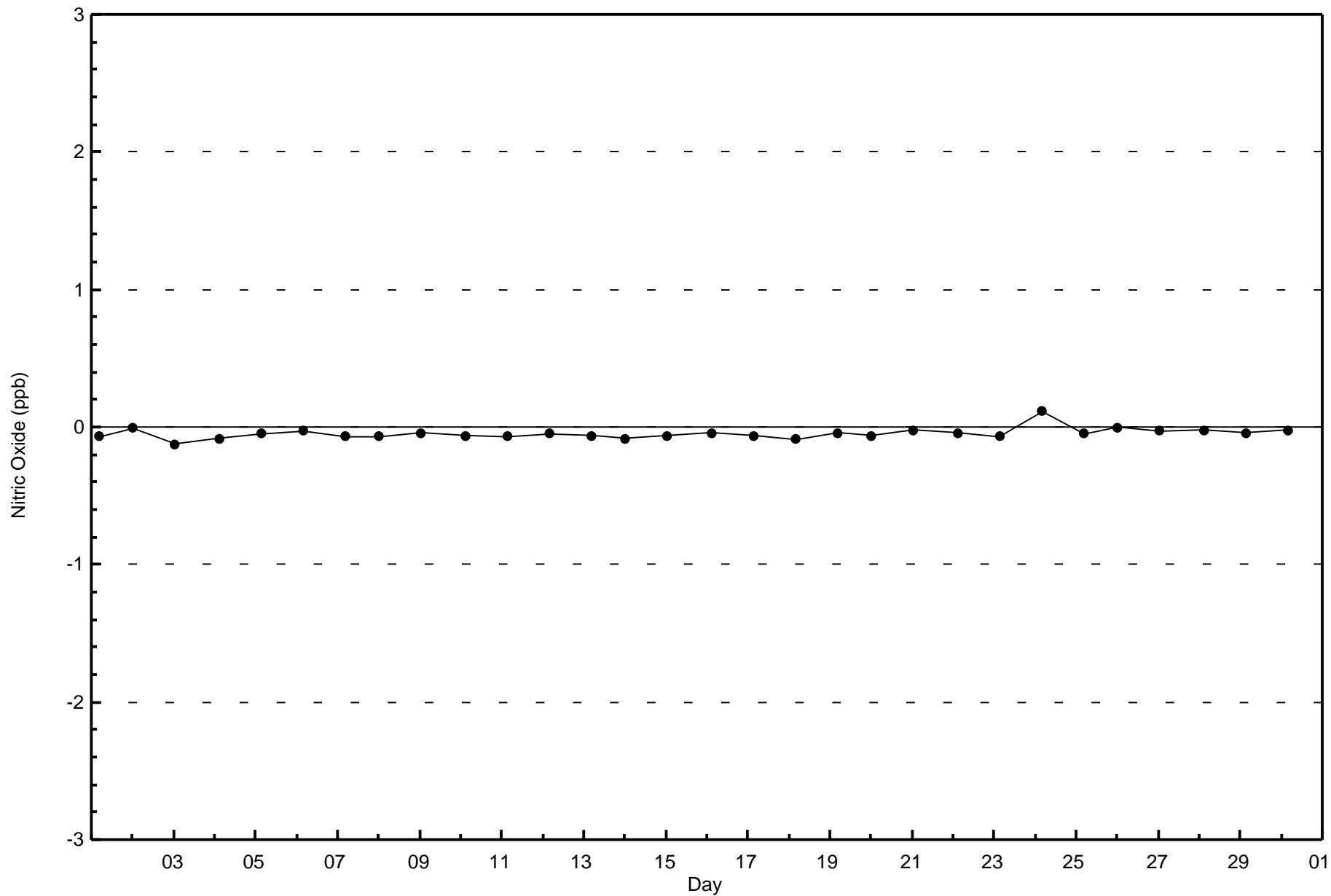
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitric Oxide (NO) - ppb
Fort McKay South (AMS 13)

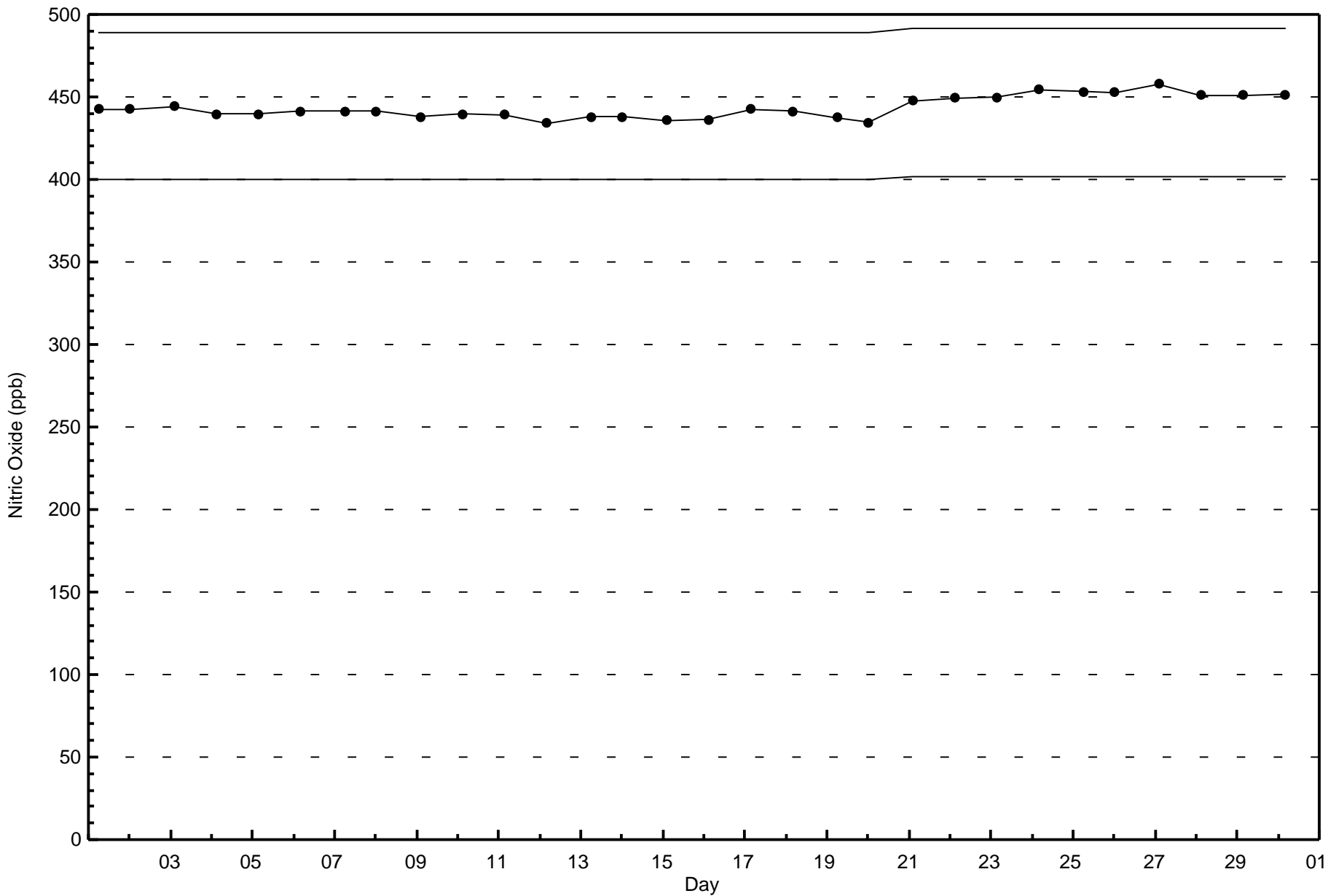






Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Fort McKay South - September 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort McKay South - September 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 22 ppb on Sep 28 19:00 | Maximum Daily Average: 7.0 ppb on Sep 28 |
| Minimum Value: 0 ppb on Sep 3 09:00 | Hours of Data: 682 |
| Maximum Diurnal Average: 4.5 ppb at hour 9 | Hours of Missing Data: 38 |
| Monthly Average: 2.7 ppb | Hours of Calibration: 38 |
| Minimum Daily Average: 0.2 ppb on Sep 4 | Percent Operational Time: 100.0 |
| Minimum Diurnal Average: 1.4 ppb at hour 16 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 4 P ₉₀ = 7 P ₉₉ = 15 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|----|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|----|
| | 1 | 2 | 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 | 5 | 5 | 3 | Z | 2 | 6 | 7 | 9 | 11 | 8 | 9 | 4 | 1 | 1 | 3 | 6 | 5 | 5 | 5 | 3 | 3 | 2 | 4.7 | 11 | |
| 2-Sep | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 | |
| 3-Sep | 1 | Z | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.7 | 3 | |
| 4-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.2 | 1 | |
| 5-Sep | 0 | 0 | 1 | Z | 10 | 8 | 8 | 7 | 5 | 9 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3.3 | 10 | | |
| 6-Sep | 2 | 2 | 1 | 1 | Z | 2 | 1 | 6 | 4 | 5 | 7 | 4 | 4 | 5 | 4 | 3 | 2 | 2 | 5 | 8 | 9 | 6 | 2 | 1 | 3.7 | 9 | |
| 7-Sep | 1 | 4 | 3 | 1 | 1 | Z | 2 | 4 | 6 | 8 | 7 | 10 | 10 | 9 | 7 | 4 | 4 | 3 | 3 | 2 | 2 | 6 | 1 | 1 | 4.3 | 10 | |
| 8-Sep | Z | 4 | 7 | 5 | 2 | 2 | 2 | 2 | 4 | 2 | 3 | 4 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 2.4 | 7 | |
| 9-Sep | 1 | Z | 2 | 1 | 1 | 4 | 7 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 8 | 6 | 7 | 8 | 7 | 14 | 3.7 | 14 | |
| 10-Sep | 3 | 5 | Z | 11 | 5 | 3 | 4 | 4 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2.1 | 11 | |
| 11-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 0 | 0 | 0.6 | 2 | |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 3 | 6 | 1.5 | 6 | |
| 13-Sep | 5 | 3 | 3 | 6 | 5 | Z | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.7 | 6 | |
| 14-Sep | Z | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 8 | 11 | 12 | 9 | 4 | 2 | 1 | 3 | 4 | 3 | 2 | 1 | 0 | 0 | 3.0 | 12 | |
| 15-Sep | 1 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 3 | 4 | 2 | 3 | 5 | 5 | 3 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 2.1 | 5 | |
| 16-Sep | 2 | 5 | Z | 5 | 7 | 8 | 5 | 4 | 10 | 9 | 9 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 10 | 13 | 4.4 | 13 | |
| 17-Sep | 16 | 8 | 7 | Z | 1 | 0 | 0 | 2 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 16 | |
| 18-Sep | 1 | 1 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 0.6 | 2 | |
| 19-Sep | 1 | 3 | 2 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 0.8 | 3 | |
| 20-Sep | Z | 1 | 3 | 1 | 2 | 2 | 2 | 2 | C | C | C | C | 2 | 2 | 2 | 2 | 3 | 5 | 3 | 2 | 2 | 1 | 1 | 0 | 1.9 | 5 | |
| 21-Sep | 1 | Z | 2 | 1 | 1 | 3 | 2 | 2 | 9 | 6 | 10 | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 19 | 21 | 5 | 5 | 5 | 4.4 | 21 |
| 22-Sep | 1 | 1 | Z | 2 | 2 | 5 | 5 | 5 | 9 | 8 | 10 | 9 | 3 | 2 | 2 | 1 | 2 | 5 | 5 | 2 | 3 | 6 | 3 | 4 | 4.2 | 10 | |
| 23-Sep | 3 | 2 | 2 | Z | 4 | 6 | 7 | 7 | 7 | 5 | 3 | 3 | 3 | 5 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 3.4 | 7 | | |
| 24-Sep | 3 | 4 | 3 | 4 | Z | 5 | 8 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 8 | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0.3 | 1 | |
| 26-Sep | Z | 0 | 1 | 4 | 6 | 8 | 4 | 6 | 16 | C | C | C | C | 6 | 4 | 3 | 3 | 3 | 4 | 6 | 5 | 11 | 3 | 2 | 4.9 | 16 | |
| 27-Sep | 3 | Z | 10 | 14 | 17 | 11 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.6 | 17 | |
| 28-Sep | 0 | 3 | Z | 0 | 0 | 1 | 1 | 1 | 13 | 13 | 10 | 8 | 4 | 1 | 1 | 1 | 2 | 7 | 22 | 17 | 18 | 15 | 14 | 11 | 7.0 | 22 | |
| 29-Sep | 3 | 1 | 0 | Z | 3 | 10 | 10 | 7 | 13 | 12 | 13 | 8 | 6 | 7 | 4 | 4 | 4 | 5 | 3 | 4 | 5 | 4 | 4 | 3 | 5.8 | 13 | |
| 30-Sep | 3 | 2 | 1 | 2 | Z | 4 | 6 | 7 | 7 | 9 | 7 | 6 | 5 | 4 | 2 | 3 | 3 | 5 | 6 | 4 | 6 | 7 | 7 | 5 | 4.7 | 9 | |

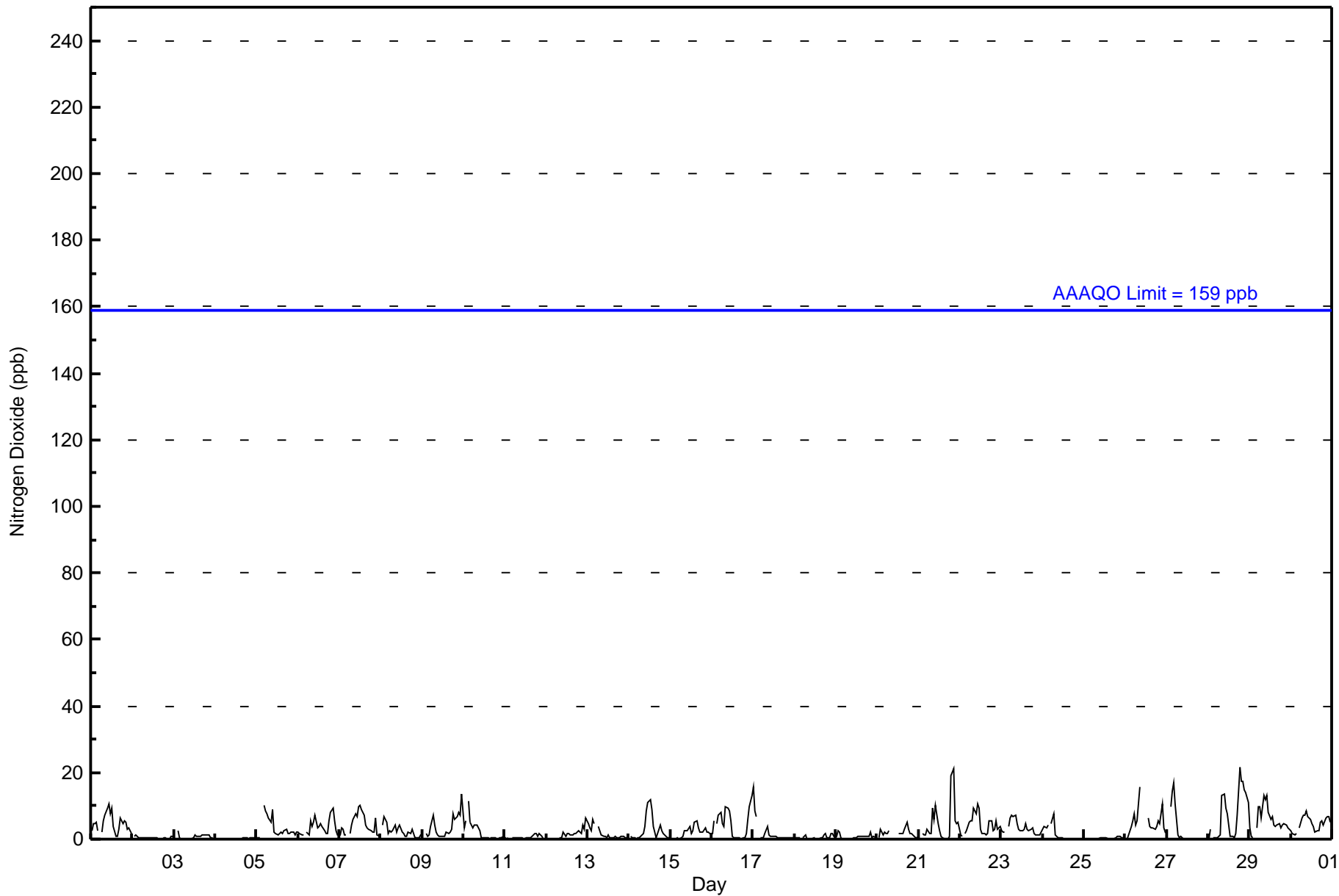
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 2.1 | 2.2 | 2.3 | 2.6 | 2.9 | 3.3 | 2.8 | 2.8 | 4.5 | 3.9 | 3.9 | 3.3 | 2.6 | 2.1 | 1.7 | 1.4 | 1.5 | 2.2 | 2.9 | 3.2 | 3.4 | 3.2 | 2.5 | 2.7 | Diurnal Average | |
| 16 | 8 | 10 | 14 | 17 | 11 | 10 | 7 | 16 | 13 | 13 | 11 | 12 | 9 | 7 | 5 | 4 | 7 | 22 | 19 | 21 | 15 | 14 | 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 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - September 2016**

| 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 Dioxide (NO₂) - ppb
Fort McKay South - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 46 | 8 | 8 | 5 | 8 | 5 | 13 | 51 | 105 | 88 | 64 | 75 | 72 | 46 | 45 | 40 | 679 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 46 | 8 | 8 | 5 | 8 | 5 | 13 | 51 | 105 | 88 | 66 | 75 | 72 | 46 | 45 | 40 | 681 |

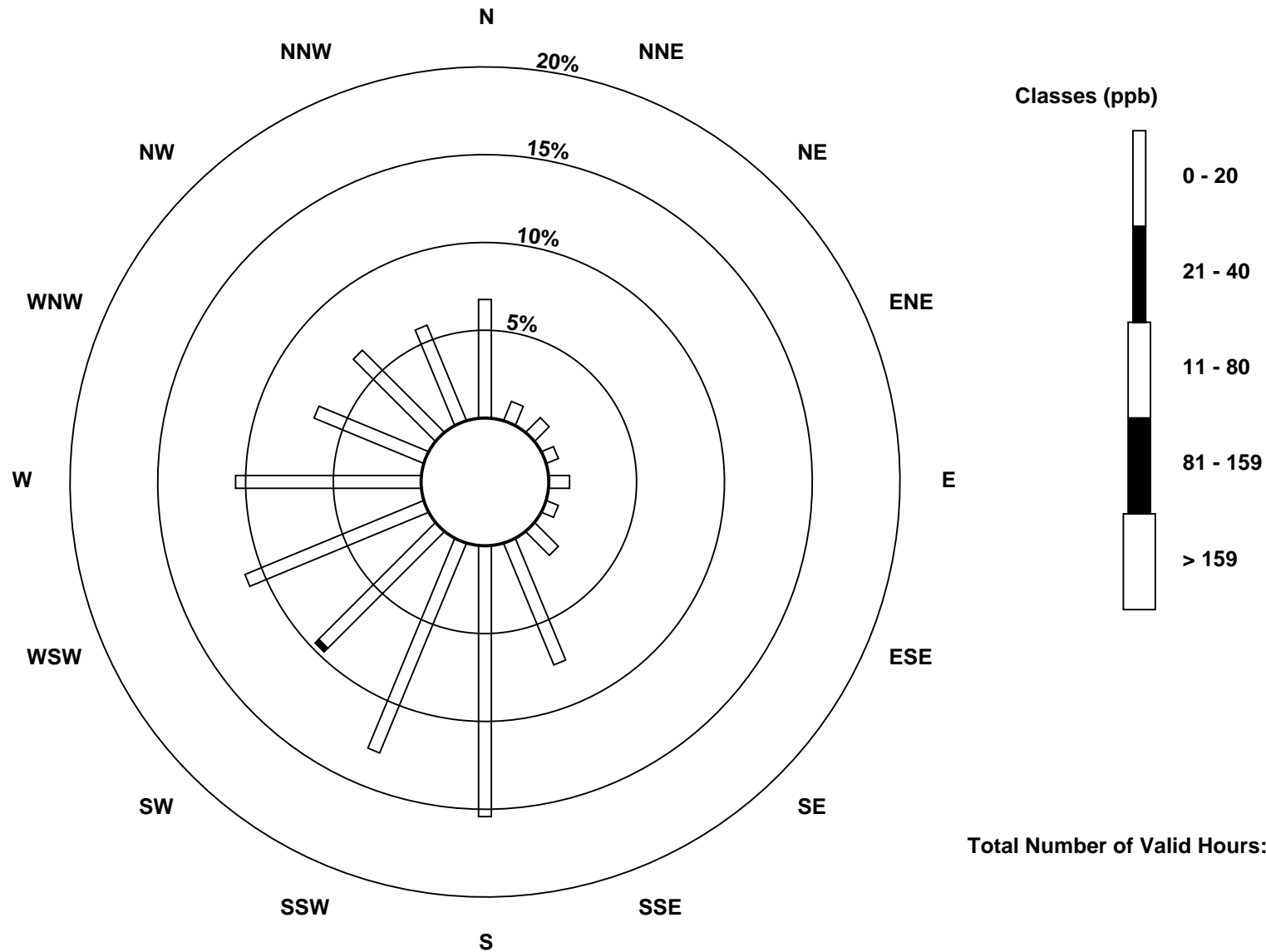
Total Number of Valid Hours: 681

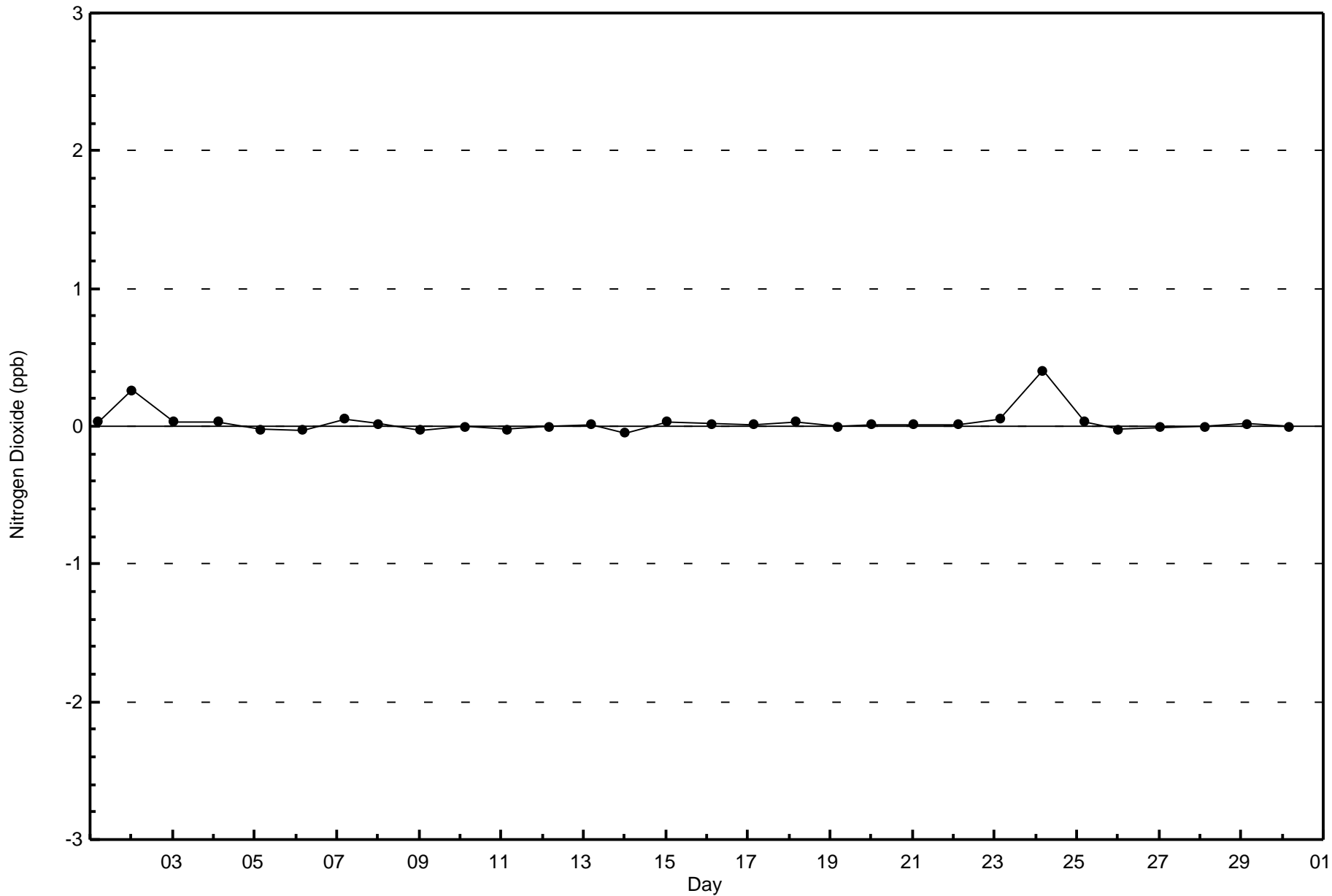
Total Number of Hours: 720

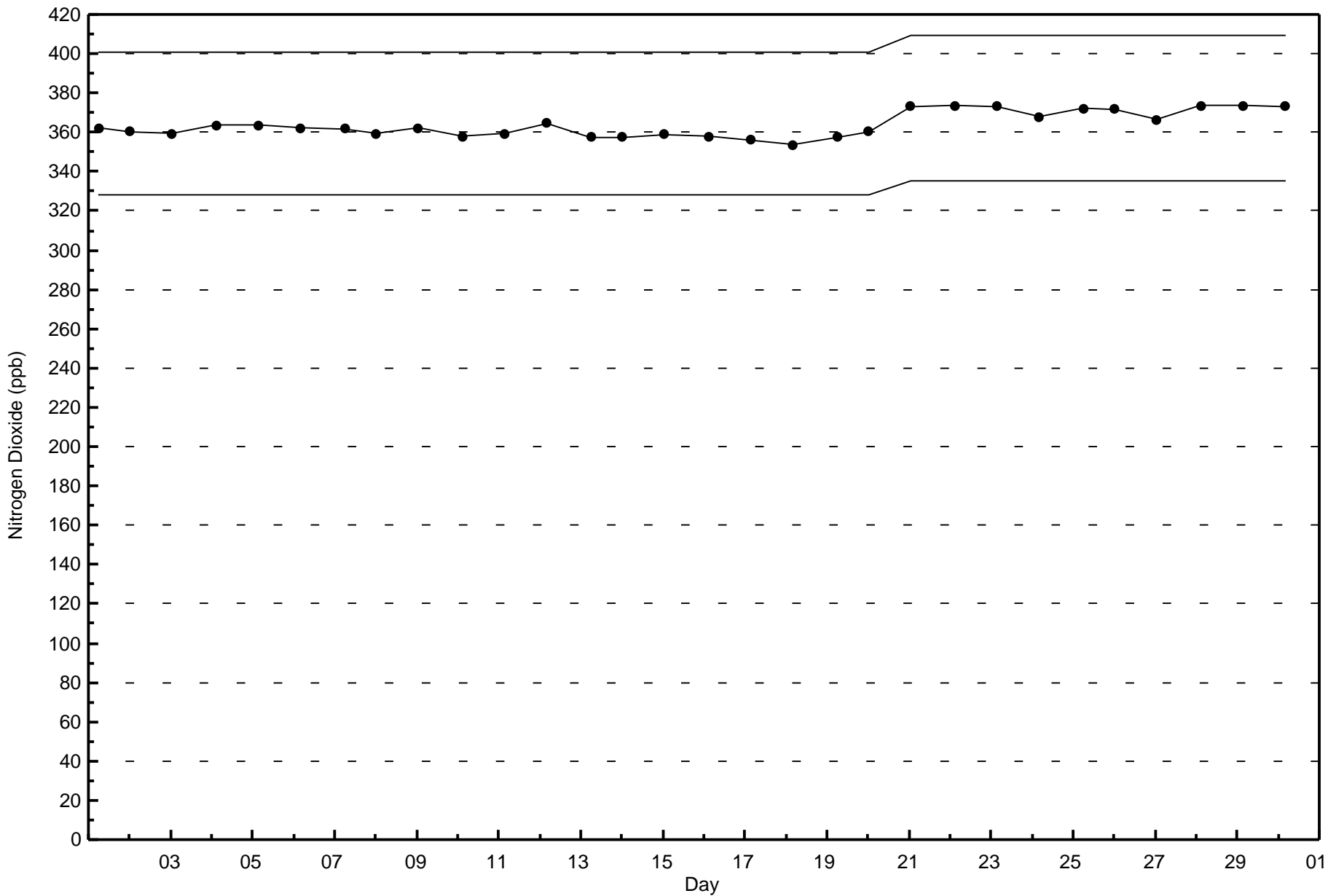


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South (AMS 13)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Fort McKay South - September 2016

| | | |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Value: 71 ppb on Sep 29 08:00 | Maximum Daily Average: 14.2 ppb on Sep 28 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 24 19:00 | Minimum Daily Average: 0.3 ppb on Sep 4 | Hours of Data: 682 |
| Maximum Diurnal Average: 11.8 ppb at hour 9 | Minimum Diurnal Average: 1.7 ppb at hour 16 | Hours of Missing Data: 38 |
| Monthly Average: 4.6 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 5 P ₉₀ = 12 P ₉₉ = 38 | Hours of Calibration: 38 |
| | | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 3 | 6 | 8 | 8 | 3 | Z | 4 | 14 | 20 | 32 | 38 | 17 | 17 | 5 | 1 | 1 | 5 | 9 | 6 | 6 | 5 | 3 | 4 | 2 | 9.4 | 38 | |
| 2-Sep | Z | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0.6 | 1 |
| 3-Sep | 1 | Z | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0.9 | 3 | |
| 4-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.3 | 1 | |
| 5-Sep | 0 | 1 | 1 | Z | 16 | 9 | 10 | 10 | 11 | 20 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 3 | 4.7 | 20 | |
| 6-Sep | 2 | 2 | 1 | 2 | Z | 10 | 7 | 25 | 7 | 9 | 15 | 5 | 6 | 7 | 5 | 3 | 2 | 2 | 6 | 8 | 9 | 6 | 3 | 1 | 6.2 | 25 | |
| 7-Sep | 1 | 4 | 3 | 1 | 3 | Z | 4 | 19 | 25 | 19 | 17 | 22 | 20 | 16 | 11 | 5 | 4 | 3 | 3 | 2 | 2 | 9 | 1 | 1 | 8.6 | 25 | |
| 8-Sep | Z | 10 | 28 | 16 | 7 | 22 | 23 | 6 | 10 | 5 | 6 | 7 | 3 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 6.9 | 28 | |
| 9-Sep | 1 | Z | 2 | 1 | 1 | 4 | 8 | 5 | 3 | 2 | 1 | 1 | 1 | 1 | 5 | 3 | 3 | 4 | 9 | 6 | 8 | 9 | 8 | 15 | 4.4 | 15 | |
| 10-Sep | 4 | 6 | Z | 12 | 5 | 3 | 5 | 6 | 10 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2.7 | 12 | |
| 11-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 0 | 0 | 0.7 | 2 | |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 4 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 3 | 6 | 1.7 | 6 | |
| 13-Sep | 5 | 3 | 3 | 6 | 5 | Z | 4 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.8 | 6 | |
| 14-Sep | Z | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 5 | 9 | 15 | 22 | 22 | 14 | 5 | 3 | 1 | 3 | 5 | 3 | 2 | 1 | 1 | 0 | 5.1 | 22 | |
| 15-Sep | 1 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 5 | 5 | 7 | 3 | 4 | 9 | 8 | 4 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 3.2 | 9 | |
| 16-Sep | 2 | 9 | Z | 16 | 31 | 17 | 8 | 8 | 28 | 19 | 17 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 9 | 18 | 16 | 9.3 | 31 | |
| 17-Sep | 19 | 10 | 7 | Z | 1 | 0 | 1 | 2 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.4 | 19 | |
| 18-Sep | 1 | 1 | 0 | 0 | Z | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 2 | 2 | 0.7 | 2 | |
| 19-Sep | 1 | 3 | 2 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0.9 | 3 | |
| 20-Sep | Z | 1 | 3 | 2 | 2 | 2 | 2 | 3 | C | C | C | C | 2 | 3 | 3 | 2 | 3 | 5 | 3 | 2 | 2 | 1 | 1 | 0 | 2.2 | 5 | |
| 21-Sep | 1 | Z | 2 | 1 | 2 | 3 | 2 | 9 | 47 | 15 | 26 | 8 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 22 | 34 | 5 | 5 | 5 | 8.4 | 47 | |
| 22-Sep | 1 | 1 | Z | 2 | 3 | 13 | 29 | 30 | 17 | 12 | 18 | 15 | 3 | 2 | 2 | 1 | 2 | 6 | 5 | 2 | 3 | 6 | 3 | 4 | 7.8 | 30 | |
| 23-Sep | 3 | 2 | 2 | Z | 4 | 7 | 7 | 8 | 9 | 6 | 4 | 3 | 3 | 3 | 5 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 3.7 | 9 | |
| 24-Sep | 3 | 4 | 3 | 4 | Z | 5 | 17 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 17 | |
| 25-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 | 0.3 | 1 | |
| 26-Sep | Z | 0 | 1 | 4 | 7 | 19 | 12 | 19 | 34 | C | C | C | C | 9 | 5 | 4 | 4 | 3 | 4 | 6 | 5 | 11 | 3 | 2 | 7.9 | 34 | |
| 27-Sep | 3 | Z | 10 | 14 | 17 | 11 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.6 | 17 | |
| 28-Sep | 0 | 3 | Z | 0 | 0 | 1 | 1 | 2 | 29 | 27 | 17 | 13 | 6 | 1 | 1 | 1 | 2 | 8 | 30 | 39 | 49 | 40 | 33 | 24 | 14.2 | 49 | |
| 29-Sep | 4 | 1 | 0 | Z | 3 | 14 | 38 | 71 | 61 | 25 | 28 | 12 | 8 | 9 | 5 | 4 | 5 | 5 | 3 | 4 | 5 | 4 | 3 | 3 | 13.8 | 71 | |
| 30-Sep | 3 | 2 | 1 | 2 | Z | 3 | 6 | 8 | 8 | 12 | 9 | 8 | 6 | 5 | 2 | 3 | 3 | 5 | 6 | 4 | 6 | 7 | 7 | 5 | 5.3 | 12 | |

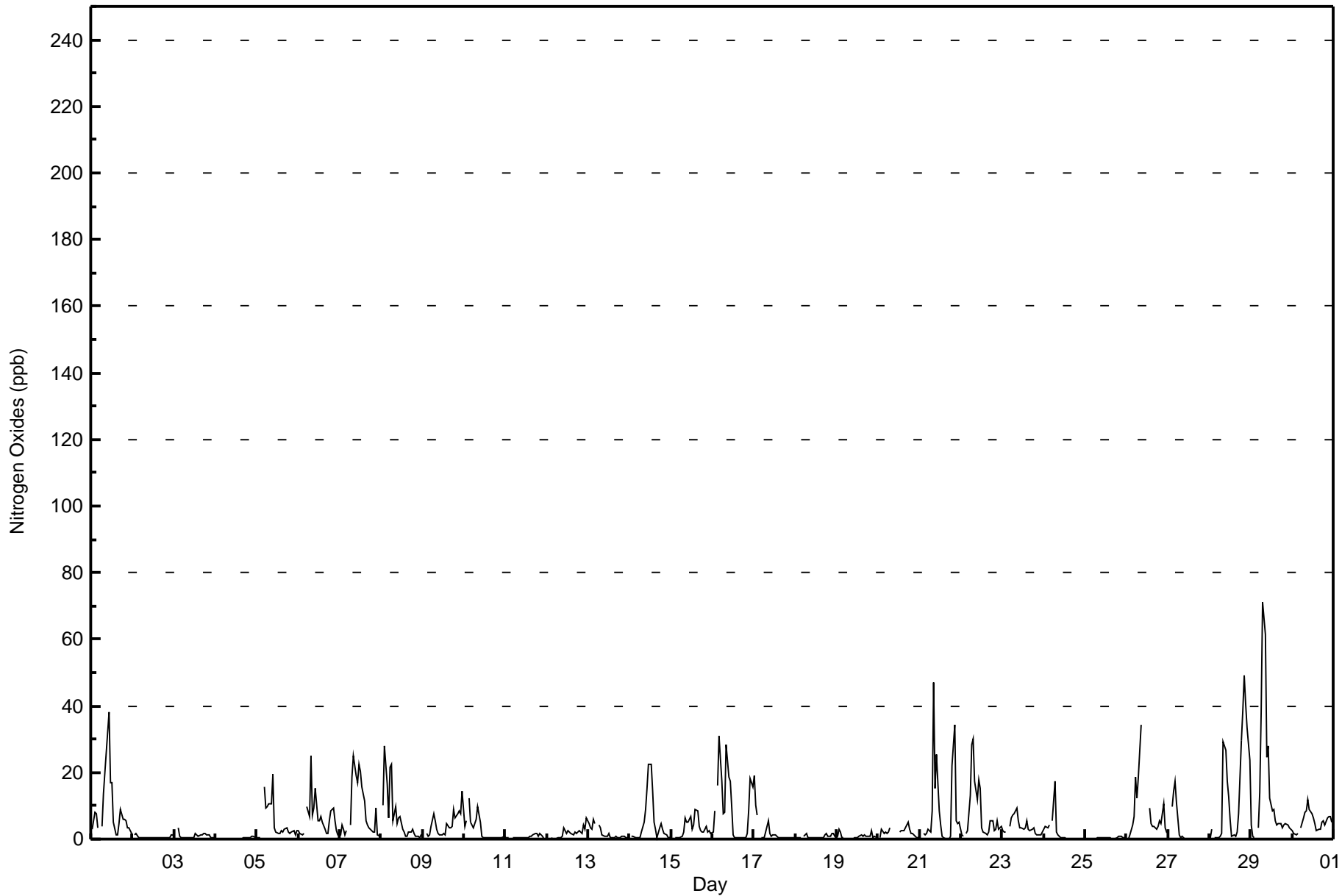
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 2.4 | 2.8 | 3.4 | 3.8 | 4.5 | 5.9 | 6.5 | 8.6 | 11.8 | 8.1 | 8.2 | 5.8 | 4.1 | 3.1 | 2.4 | 1.7 | 1.8 | 2.5 | 3.3 | 4.1 | 5.0 | 4.3 | 3.5 | 3.3 | Diurnal Average |
| 19 | 10 | 28 | 16 | 31 | 22 | 38 | 71 | 61 | 32 | 38 | 22 | 22 | 16 | 11 | 8 | 5 | 9 | 30 | 39 | 49 | 40 | 33 | 24 | Diurnal Maximum |

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 650 | 95.31 | 95.31 |
| 21 - 40 | 28 | 4.11 | 99.41 |
| 41 - 80 | 4 | 0.59 | 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
Fort McKay South - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 44 | 8 | 8 | 5 | 8 | 4 | 11 | 47 | 96 | 83 | 59 | 75 | 71 | 46 | 45 | 39 | 649 |
| 21 - 40 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 8 | 3 | 7 | 0 | 1 | 0 | 0 | 1 | 28 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 46 | 8 | 8 | 5 | 8 | 5 | 13 | 51 | 105 | 88 | 66 | 75 | 72 | 46 | 45 | 40 | 681 |

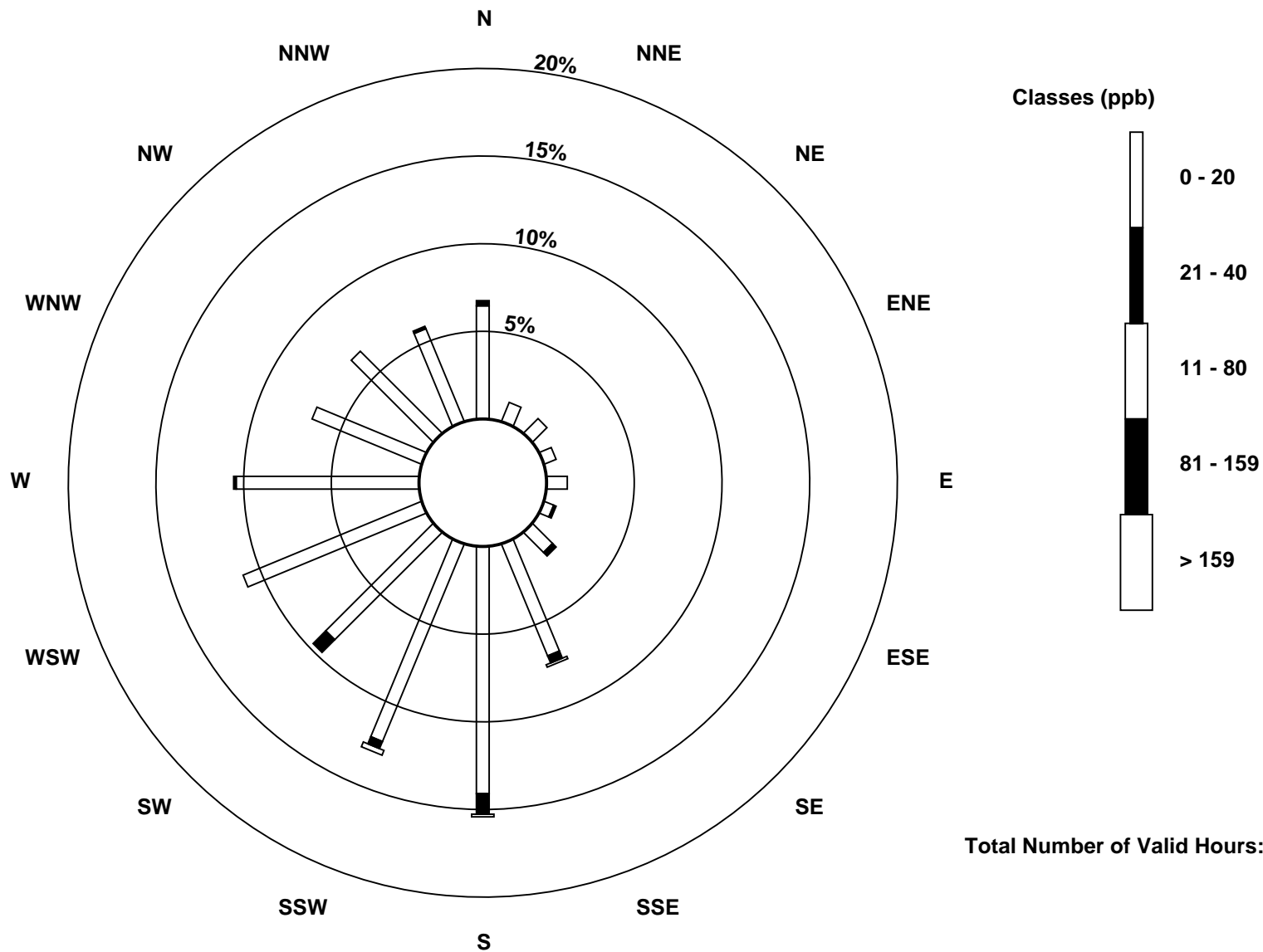
Total Number of Valid Hours: 681

Total Number of Hours: 720

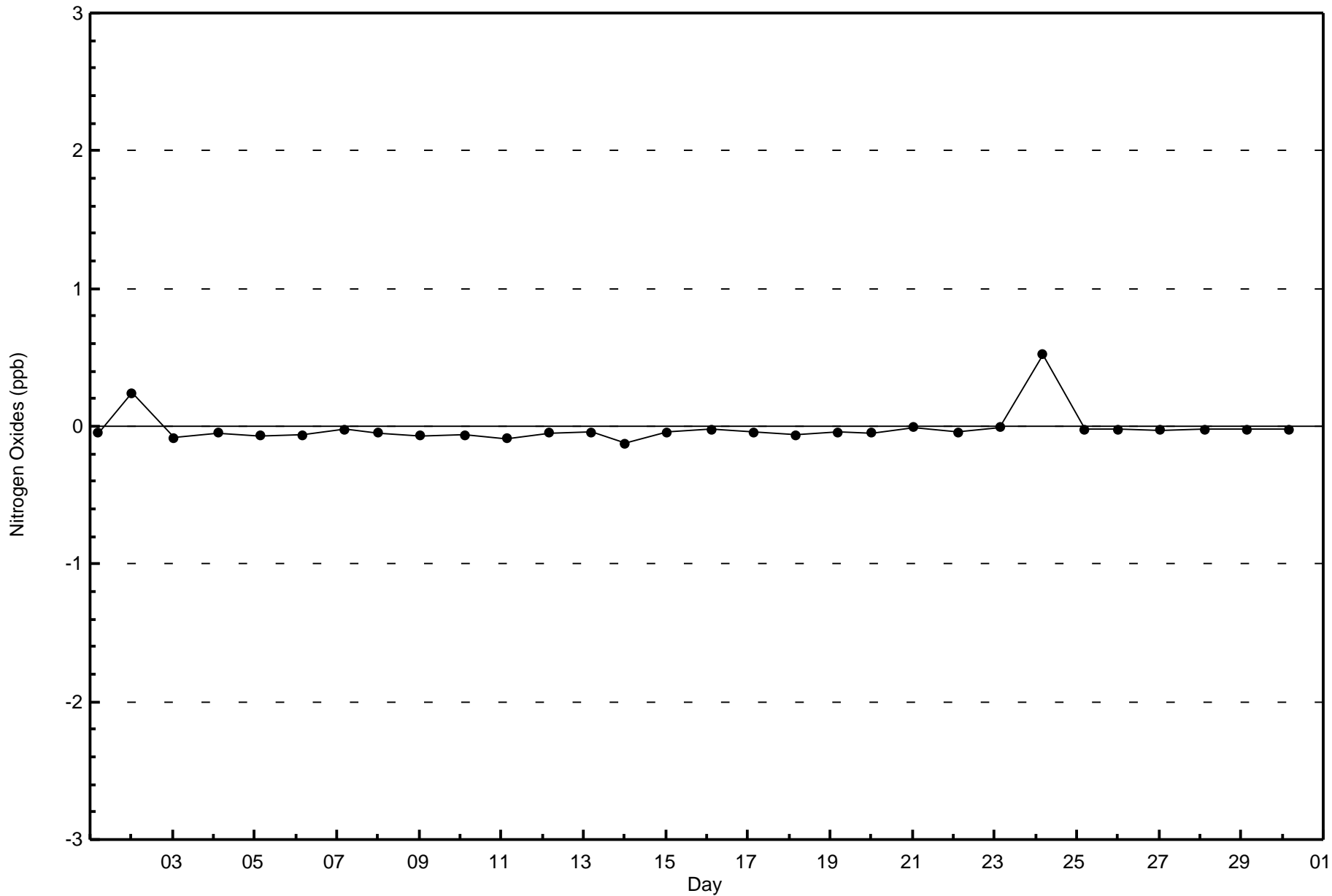


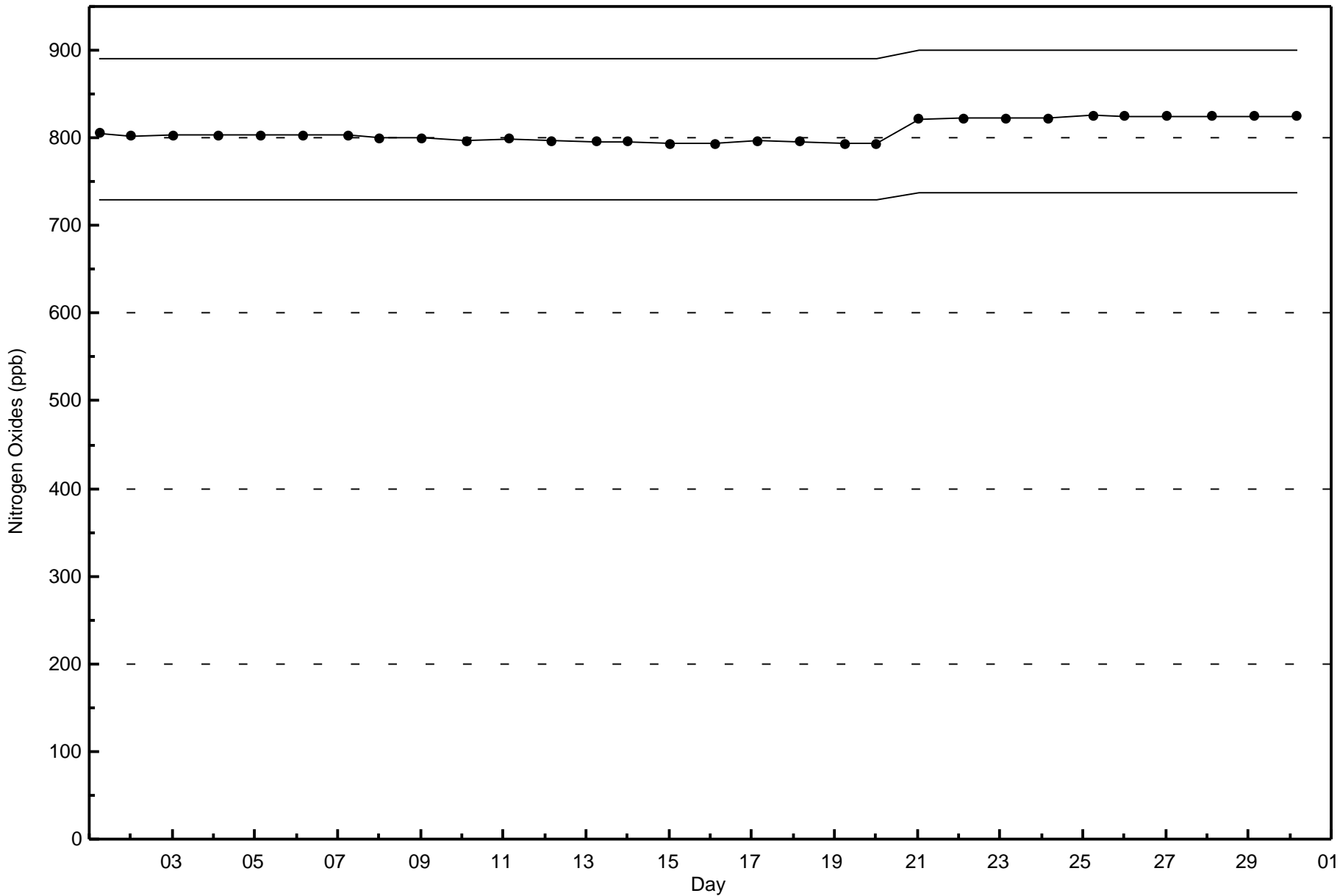
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
Fort McKay South (AMS 13)



Total Number of Valid Hours: 681







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - September 2016

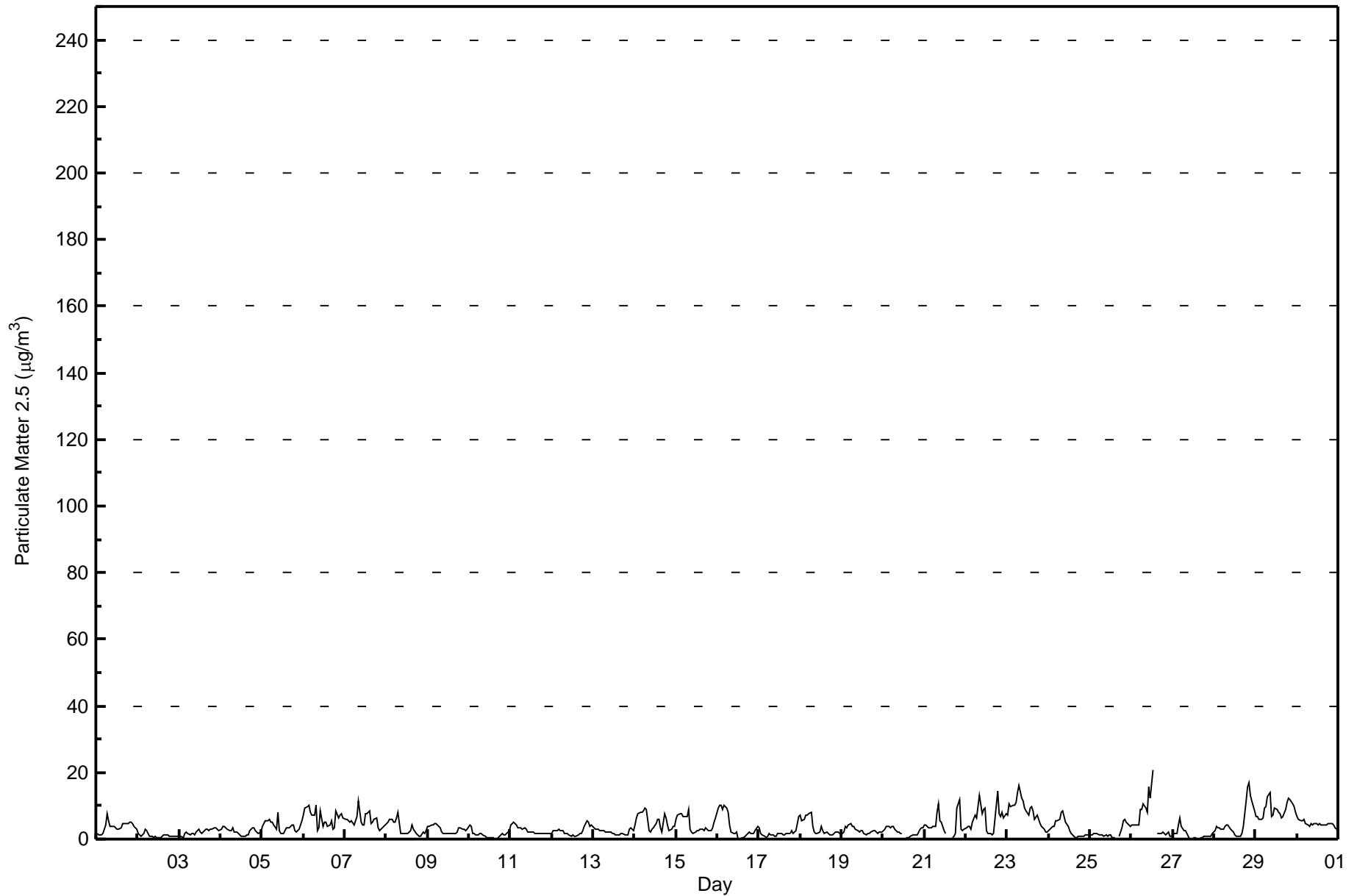
| Number of Exceedences (AAAQO): | | 24-hr: 0 | | Hours in Service: | | 720 | | | | | | | | | | | | | | | | | | | | |
|----------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|------|------|------|------|------|-----------------|---------------|---------------|
| Maximum Value: 20.6 µg/m ³ on Sep 26 13:00 | | Maximum Daily Average: 8.8 µg/m ³ on Sep 29 | | Hours of Data: | | 711 | | | | | | | | | | | | | | | | | | | | |
| Minimum Value: 0.1 µg/m ³ on Sep 27 12:00 | | Minimum Daily Average: 1.1 µg/m ³ on Sep 2 | | Hours of Missing Data: | | 9 | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 5.5 µg/m ³ at hour 8 | | Minimum Diurnal Average: 2.4 µg/m ³ at hour 17 | | Hours of Calibration: | | 3 | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 3.79 µg/m ³ | | Percentiles: P ₁ = 0.2 P ₁₀ = 1.0 Q ₁ = 1.7 Median = 3.0 Q ₃ = 5.0 P ₉₀ = 8.2 P ₉₉ = 14.0 | | Percent Operational Time: | | 99.2 | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 1.5 | 1.4 | 1.2 | 1.1 | 1.8 | 4.4 | 7.6 | 5.6 | 3.7 | 3.6 | 3.8 | 3.4 | 3.1 | 3.0 | 3.4 | 4.6 | 4.7 | 4.8 | 4.8 | 5.0 | 5.0 | 4.6 | 3.6 | 3.1 | 3.7 | 7.6 |
| 2-Sep | 1.8 | 1.3 | 1.0 | 1.5 | 3.0 | 2.4 | 1.5 | 1.0 | 0.8 | 0.6 | 0.7 | 0.6 | 0.4 | 0.5 | 0.9 | 1.3 | 1.1 | 1.1 | 1.0 | 0.9 | 0.7 | 0.6 | 0.7 | 0.8 | 1.1 | 3.0 |
| 3-Sep | 0.8 | 0.7 | 0.5 | 1.6 | 2.0 | 1.6 | 1.4 | 1.9 | 1.8 | 1.4 | 2.3 | 2.8 | 2.2 | 1.7 | 2.2 | 2.9 | 3.1 | 2.6 | 2.9 | 3.2 | 3.3 | 3.3 | 3.2 | 2.7 | 2.2 | 3.3 |
| 4-Sep | 3.1 | 3.6 | 3.9 | 3.3 | 2.9 | 2.4 | 2.7 | 3.5 | 2.3 | 2.0 | 1.6 | 1.1 | 0.8 | 0.9 | 1.0 | 1.2 | 1.4 | 2.4 | 3.6 | 3.5 | 2.6 | 2.2 | 1.6 | 1.9 | 2.3 | 3.9 |
| 5-Sep | 3.6 | 4.5 | 5.6 | 5.5 | 6.0 | 5.0 | 4.9 | 4.4 | 3.2 | 8.2 | 2.6 | 1.8 | 1.5 | 2.6 | 3.4 | 3.4 | 3.5 | 4.1 | 4.4 | 2.5 | 2.1 | 2.9 | 4.4 | 5.3 | 4.0 | 8.2 |
| 6-Sep | 7.2 | 9.4 | 9.9 | 10.3 | 8.2 | 7.1 | 7.0 | 10.3 | 2.5 | 3.3 | 8.4 | 4.0 | 5.0 | 4.9 | 4.0 | 4.1 | 5.5 | 2.8 | 3.2 | 8.7 | 6.4 | 7.4 | 7.6 | 6.5 | 6.4 | 10.3 |
| 7-Sep | 6.1 | 6.0 | 5.5 | 5.2 | 5.3 | 4.4 | 5.5 | 6.8 | 11.4 | 5.0 | 4.3 | 4.2 | 7.8 | 7.8 | 8.4 | 4.8 | 5.1 | 6.0 | 6.2 | 3.3 | 2.4 | 3.0 | 3.3 | 4.1 | 5.5 | 11.4 |
| 8-Sep | 4.6 | 5.3 | 5.9 | 6.0 | 5.1 | 5.1 | 6.2 | 8.0 | 1.8 | 1.5 | 1.5 | 1.6 | 1.9 | 2.1 | 2.5 | 4.4 | 2.8 | 1.9 | 1.4 | 0.9 | 0.9 | 2.2 | 1.7 | 2.4 | 3.2 | 8.0 |
| 9-Sep | 4.0 | 4.0 | 4.0 | 4.1 | 4.5 | 4.5 | 3.8 | 3.2 | 2.0 | 1.7 | 1.6 | 1.7 | 1.7 | 1.8 | 1.7 | 1.5 | 1.7 | 2.2 | 3.6 | 3.5 | 3.2 | 2.9 | 2.4 | 3.2 | 2.9 | 4.5 |
| 10-Sep | 4.2 | 3.9 | 1.8 | 1.7 | 1.4 | 1.4 | 1.6 | 1.8 | 1.4 | 1.0 | 0.6 | 0.5 | 0.3 | 0.3 | 0.4 | UO | 0.2 | 0.5 | 1.2 | 1.7 | 1.3 | 1.2 | 1.5 | 2.4 | 1.4 | 4.2 |
| 11-Sep | 4.3 | 4.7 | 5.2 | 4.2 | 3.5 | 3.3 | 3.3 | 2.9 | 3.4 | 2.9 | 2.3 | 2.2 | 2.1 | 2.0 | 1.8 | 1.6 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 1.7 | 1.7 | 1.6 | 2.6 | 5.2 |
| 12-Sep | 1.8 | 2.7 | 2.6 | 2.7 | 3.1 | 2.6 | 2.6 | 1.7 | 1.8 | 1.7 | 1.2 | 1.0 | 1.1 | 1.0 | 1.0 | 1.1 | 1.5 | 1.9 | 2.5 | 4.0 | 5.4 | 5.0 | 3.9 | 4.0 | 2.4 | 5.4 |
| 13-Sep | 3.5 | 3.0 | 2.8 | 2.9 | 2.4 | 2.4 | 2.5 | 2.1 | 2.0 | 2.2 | 2.1 | 1.8 | 1.7 | 1.3 | 1.2 | 1.3 | 1.8 | 1.5 | 1.3 | 1.1 | 1.2 | 2.8 | 3.2 | 2.4 | 2.1 | 3.5 |
| 14-Sep | 4.3 | 6.2 | 7.6 | 8.2 | 8.1 | 8.3 | 9.5 | 8.7 | 2.6 | 2.3 | 3.2 | 3.2 | 4.6 | 5.7 | 6.0 | 3.3 | 2.0 | 7.5 | 6.3 | 4.1 | 2.6 | 2.9 | 3.6 | 3.8 | 5.2 | 9.5 |
| 15-Sep | 5.9 | 7.3 | 7.7 | 7.6 | 6.7 | 6.8 | 6.7 | 8.8 | 3.2 | 2.0 | 1.8 | 2.3 | 2.5 | 2.4 | 3.0 | 2.9 | 2.4 | 3.5 | 3.1 | 2.6 | 2.5 | 3.2 | 5.1 | 6.5 | 4.4 | 8.8 |
| 16-Sep | 9.5 | 10.0 | 10.0 | 8.8 | 10.2 | 9.3 | 7.9 | 4.1 | 2.1 | 1.6 | 1.7 | 2.1 | 0.2 | 0.1 | 0.3 | 0.6 | 0.9 | 1.3 | 2.0 | 1.8 | 1.6 | 1.6 | 2.4 | 3.6 | 3.9 | 10.2 |
| 17-Sep | 3.5 | 1.7 | 1.4 | 1.0 | 0.5 | 0.7 | 1.7 | 1.3 | 1.2 | 0.9 | 0.8 | 1.8 | 1.9 | 1.5 | 1.2 | 1.1 | 1.9 | 1.7 | 1.9 | 2.4 | 1.8 | 2.7 | 4.9 | 6.7 | 1.9 | 6.7 |
| 18-Sep | 7.0 | 5.4 | 5.9 | 7.3 | 7.3 | 7.5 | 7.9 | 3.8 | 2.1 | 1.6 | 1.5 | 2.2 | 3.9 | 2.7 | 1.8 | 2.0 | 1.8 | 1.4 | 1.2 | 1.4 | 2.1 | 2.2 | 1.9 | 1.5 | 3.5 | 7.9 |
| 19-Sep | 1.9 | 2.3 | 3.7 | 3.6 | 4.1 | 4.7 | 3.7 | 3.9 | 3.0 | 2.6 | 2.2 | 2.3 | 2.7 | 1.7 | 1.4 | 1.6 | 1.7 | 2.2 | 2.4 | 2.7 | 2.2 | 1.8 | 2.1 | 2.2 | 2.6 | 4.7 |
| 20-Sep | 2.4 | 2.9 | 3.6 | 3.8 | 3.5 | 3.7 | 3.7 | 3.1 | 2.1 | 2.0 | 1.8 | 1.8 | C | 0.5 | 0.5 | 0.4 | 0.7 | 1.1 | 1.4 | 1.5 | 1.4 | 3.0 | 3.2 | 3.3 | 2.2 | 3.8 |
| 21-Sep | 4.1 | 4.2 | 3.4 | 3.5 | 3.3 | 4.0 | 4.0 | 8.2 | 10.7 | 5.3 | 5.0 | 2.6 | 1.7 | UO | UO | UO | 0.4 | 0.7 | 1.6 | 9.4 | 11.8 | 3.2 | 2.7 | 2.9 | 4.4 | 11.8 |
| 22-Sep | 3.2 | 3.8 | 3.6 | 3.1 | 4.9 | 7.3 | 6.2 | 9.6 | 13.1 | 7.6 | 8.9 | 9.5 | 2.7 | 1.9 | 1.6 | 1.1 | 1.9 | 6.0 | 14.4 | 7.6 | 6.8 | 8.2 | 6.1 | 7.6 | 6.1 | 14.4 |
| 23-Sep | 7.2 | 10.5 | 9.9 | 10.0 | 10.3 | 11.1 | 14.2 | 16.0 | 12.1 | 11.3 | 9.4 | 8.5 | 7.1 | 9.4 | 9.6 | 8.6 | 6.0 | 7.1 | 6.0 | 4.7 | 4.0 | 3.1 | 2.0 | 2.2 | 8.3 | 16.0 |
| 24-Sep | 2.6 | 3.0 | 4.0 | 3.7 | 5.3 | 5.4 | 5.9 | 8.1 | 8.3 | 6.8 | 5.0 | 3.7 | 2.4 | 1.8 | 1.4 | 0.5 | 0.4 | 0.7 | 0.8 | 0.8 | 1.0 | 1.1 | 1.1 | 1.1 | 3.1 | 8.3 |
| 25-Sep | 1.3 | 1.4 | 1.6 | 1.6 | 1.5 | 1.4 | 1.4 | 1.4 | 1.0 | 1.1 | 0.9 | 1.2 | 1.1 | 0.6 | 0.2 | UO | UO | 0.8 | 3.5 | 5.5 | 5.8 | 5.0 | 4.6 | 3.7 | 2.1 | 5.8 |
| 26-Sep | 4.2 | 4.1 | 4.1 | 4.1 | 4.3 | 8.9 | 8.9 | 10.6 | 9.3 | 8.3 | 15.6 | 12.2 | 20.6 | C | C | 1.5 | 1.8 | 1.5 | 1.9 | 1.9 | 1.4 | 2.2 | 1.0 | 1.0 | 5.9 | 20.6 |
| 27-Sep | 1.3 | 1.6 | 1.5 | 4.4 | 6.3 | 3.7 | 2.3 | 2.4 | 1.9 | 0.7 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.2 | 0.3 | 0.5 | 0.6 | 0.8 | 0.8 | 0.8 | 1.0 | 1.7 | 1.4 | 6.3 |
| 28-Sep | 2.6 | 3.8 | 3.4 | 3.2 | 3.0 | 3.2 | 3.9 | 4.1 | 4.2 | 3.2 | 2.7 | 2.2 | 1.4 | 0.7 | 1.0 | 1.0 | 1.6 | 3.8 | 11.3 | 15.8 | 17.0 | 13.2 | 11.3 | 8.5 | 5.3 | 17.0 |
| 29-Sep | 6.9 | 6.7 | 6.1 | 5.8 | 6.5 | 9.2 | 9.9 | 12.7 | 14.0 | 6.7 | 7.1 | 9.3 | 8.9 | 8.2 | 7.6 | 6.5 | 6.8 | 8.8 | 10.9 | 12.3 | 12.0 | 10.4 | 9.5 | 8.2 | 8.8 | 14.0 |
| 30-Sep | 6.9 | 6.1 | 5.6 | 5.5 | 5.8 | 4.8 | 4.0 | 3.8 | 4.5 | 4.2 | 4.5 | 4.5 | 4.0 | 4.8 | 4.4 | 4.4 | 4.4 | 4.4 | 4.6 | 4.6 | 4.6 | 4.2 | 3.4 | 3.1 | 4.6 | 6.9 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.0 9.5 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.4 10.5 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.4 10.0 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.5 10.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.7 10.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.9 11.1 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.1 14.2 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.5 16.0 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.5 14.0 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.4 11.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.5 15.6 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.2 12.2 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.3 20.6 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.6 9.4 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.6 9.6 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.5 8.6 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.4 6.8 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.9 8.8 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.7 14.4 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.0 15.8 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.9 17.0 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.6 13.2 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.5 11.3 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.6 8.5 | | |

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 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 486 | 68.35 | 68.35 |
| 6 - 15 | 149 | 20.96 | 89.31 |
| 16 - 25 | 5 | 0.70 | 90.01 |
| 26 - 80 | 0 | 0.00 | 90.01 |
| > 81.0 | 0 | 0.00 | 90.01 |

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 McKay South - September 2016

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|------------------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 43 | 8 | 7 | 5 | 5 | 2 | 8 | 28 | 72 | 57 | 33 | 50 | 59 | 31 | 38 | 40 | 486 |
| 6 - 15 | 3 | 1 | 1 | 0 | 0 | 2 | 5 | 24 | 34 | 28 | 21 | 15 | 3 | 3 | 5 | 3 | 148 |
| 16 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 46 | 9 | 8 | 5 | 5 | 4 | 13 | 54 | 107 | 86 | 55 | 65 | 62 | 34 | 43 | 43 | 639 |

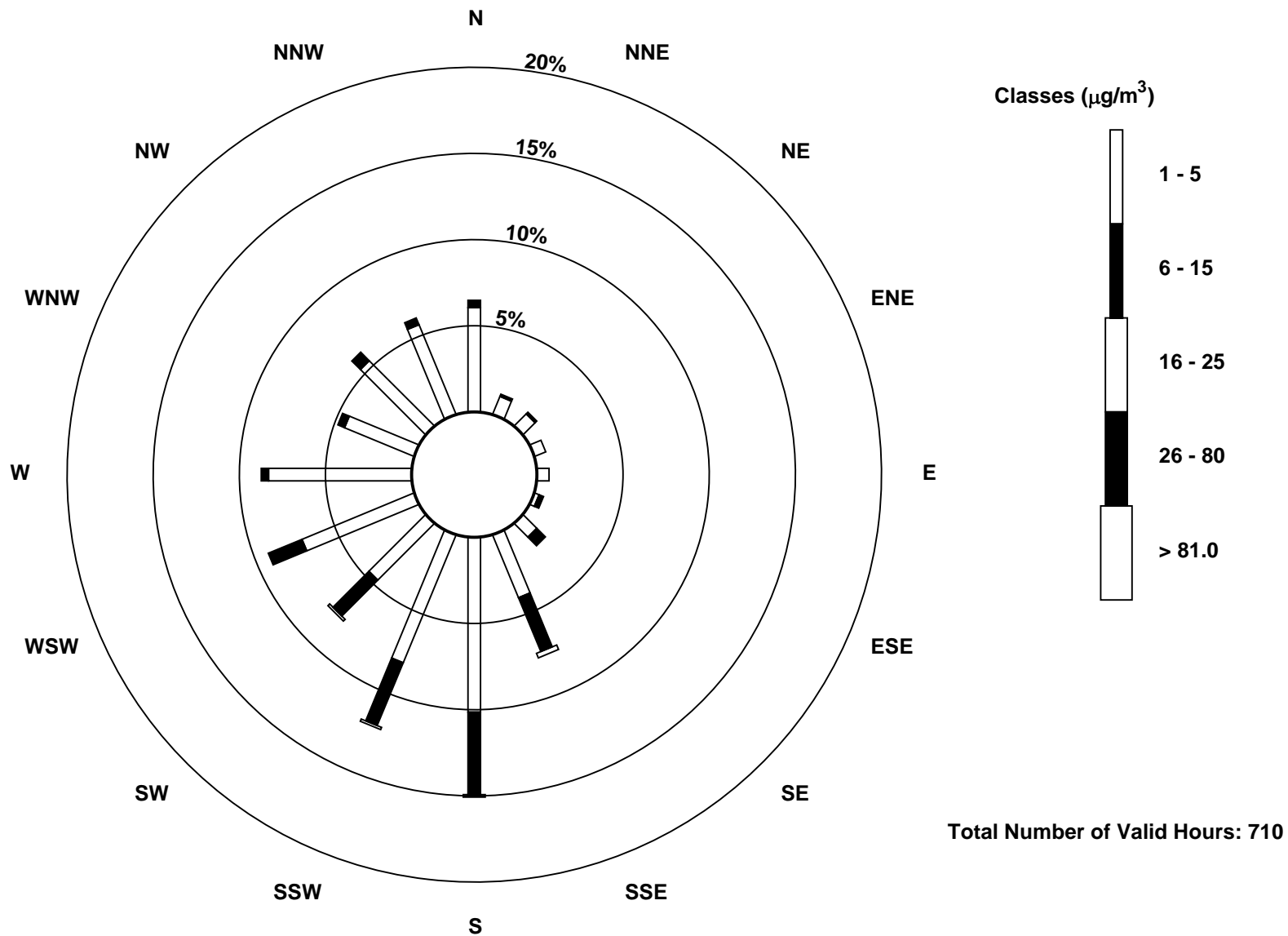
Total Number of Valid Hours: 710

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South (AMS 13)





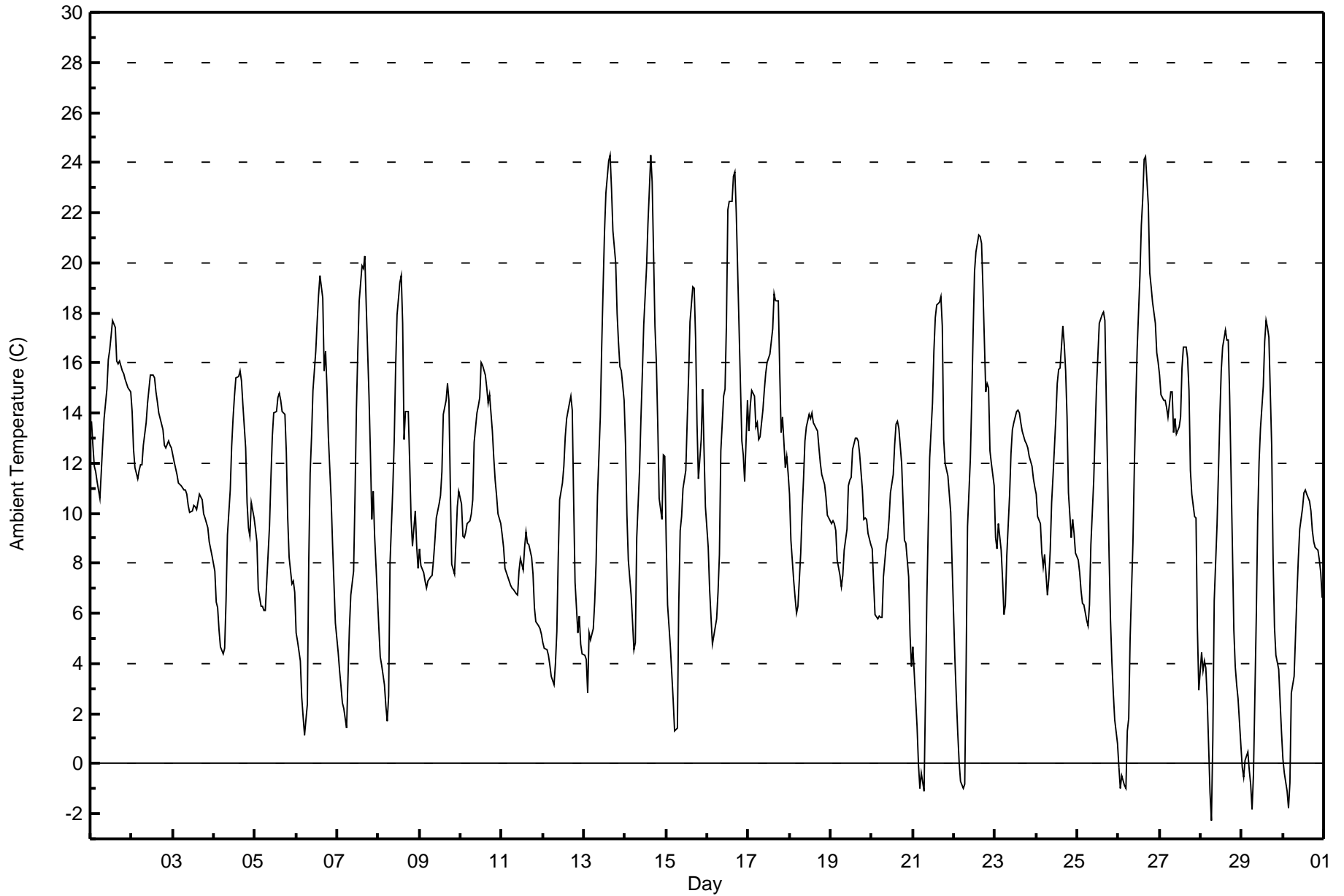
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Fort McKay South - September 2016

| Maximum Value: 24.3 C on Sep 14 16:00 | | Maximum Daily Average: 14.8 C on Sep 17 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -2.3 C on Sep 28 07:00 | | Minimum Daily Average: 6.4 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.7 C at hour 16 | | Minimum Diurnal Average: 5.4 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.72 C | | Percentiles: P ₁ = -1.0 P ₁₀ = 3.9 Q ₁ = 7.2 Median = 10.8 Q ₃ = 14.4 P ₉₀ = 17.4 P ₉₉ = 23.3 | | 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 | 13.7 | 12.7 | 11.9 | 11.7 | 11.3 | 10.6 | 11.7 | 12.8 | 13.8 | 14.9 | 16.2 | 16.5 | 17.1 | 17.7 | 17.4 | 16.1 | 16.0 | 16.0 | 15.7 | 15.6 | 15.3 | 15.2 | 15.0 | 14.8 | 14.6 | 17.7 |
| 2-Sep | 14.1 | 12.5 | 11.8 | 11.4 | 11.7 | 11.9 | 11.9 | 12.7 | 13.6 | 14.4 | 15.0 | 15.5 | 15.5 | 15.4 | 14.9 | 14.5 | 14.0 | 13.6 | 13.3 | 12.7 | 12.6 | 12.9 | 12.7 | 12.6 | 13.4 | 15.5 |
| 3-Sep | 12.3 | 12.0 | 11.5 | 11.2 | 11.1 | 11.1 | 10.9 | 10.9 | 10.8 | 10.3 | 10.0 | 10.1 | 10.3 | 10.3 | 10.1 | 10.7 | 10.7 | 10.5 | 10.0 | 9.8 | 9.4 | 8.9 | 8.6 | 8.3 | 10.4 | 12.3 |
| 4-Sep | 7.7 | 6.4 | 6.3 | 5.3 | 4.7 | 4.4 | 4.6 | 6.5 | 9.1 | 10.9 | 12.7 | 13.8 | 14.7 | 15.4 | 15.4 | 15.7 | 15.3 | 14.4 | 12.6 | 10.4 | 9.4 | 9.1 | 10.4 | 9.8 | 10.2 | 15.7 |
| 5-Sep | 9.4 | 8.9 | 6.9 | 6.3 | 6.3 | 6.1 | 6.1 | 7.2 | 9.5 | 11.4 | 13.1 | 14.0 | 14.1 | 14.6 | 14.8 | 14.5 | 14.1 | 14.0 | 12.4 | 9.8 | 8.2 | 7.2 | 7.3 | 6.8 | 10.1 | 14.8 |
| 6-Sep | 5.2 | 4.9 | 4.1 | 2.6 | 1.9 | 1.2 | 2.4 | 8.0 | 11.6 | 13.1 | 14.9 | 16.5 | 17.6 | 18.7 | 19.5 | 18.6 | 15.7 | 16.4 | 15.0 | 13.1 | 10.6 | 8.7 | 7.2 | 5.6 | 10.5 | 19.5 |
| 7-Sep | 4.4 | 3.7 | 3.1 | 2.4 | 2.2 | 1.4 | 3.4 | 5.4 | 6.7 | 7.7 | 10.7 | 14.1 | 16.5 | 18.5 | 19.9 | 19.8 | 20.3 | 18.3 | 14.7 | 12.4 | 9.7 | 10.9 | 9.1 | 6.7 | 10.1 | 20.3 |
| 8-Sep | 5.4 | 4.2 | 4.0 | 3.1 | 2.3 | 1.7 | 2.7 | 8.0 | 11.1 | 12.9 | 15.8 | 17.9 | 19.2 | 19.5 | 17.6 | 12.9 | 14.1 | 14.0 | 12.1 | 9.8 | 8.7 | 10.1 | 8.7 | 7.8 | 10.2 | 19.5 |
| 9-Sep | 8.6 | 7.9 | 7.7 | 7.3 | 7.0 | 7.3 | 7.5 | 7.5 | 8.1 | 8.9 | 9.8 | 10.4 | 10.7 | 11.7 | 14.0 | 14.5 | 15.2 | 14.5 | 11.1 | 8.0 | 7.6 | 8.8 | 10.3 | 10.9 | 9.8 | 15.2 |
| 10-Sep | 10.4 | 9.1 | 9.0 | 9.2 | 9.6 | 9.7 | 10.0 | 10.5 | 12.9 | 14.0 | 14.3 | 14.6 | 16.0 | 15.9 | 15.5 | 15.0 | 14.4 | 14.7 | 13.3 | 12.2 | 11.3 | 10.7 | 10.0 | 9.6 | 12.2 | 16.0 |
| 11-Sep | 9.2 | 8.6 | 7.8 | 7.5 | 7.3 | 7.1 | 7.0 | 6.9 | 6.8 | 6.7 | 7.7 | 8.2 | 7.8 | 8.6 | 9.2 | 8.8 | 8.8 | 8.2 | 7.6 | 6.2 | 5.7 | 5.5 | 5.4 | 5.2 | 7.4 | 9.2 |
| 12-Sep | 4.8 | 4.6 | 4.6 | 4.4 | 3.9 | 3.5 | 3.2 | 4.0 | 5.3 | 8.2 | 10.5 | 11.2 | 11.9 | 13.0 | 13.8 | 14.4 | 14.6 | 14.1 | 10.5 | 7.2 | 5.2 | 5.9 | 4.8 | 4.4 | 7.8 | 14.6 |
| 13-Sep | 4.3 | 4.2 | 2.8 | 5.2 | 5.0 | 5.4 | 6.4 | 8.0 | 10.7 | 13.8 | 16.6 | 19.0 | 21.2 | 22.8 | 24.1 | 24.3 | 23.0 | 21.3 | 20.0 | 18.0 | 16.8 | 15.9 | 15.7 | 14.5 | 14.1 | 24.3 |
| 14-Sep | 12.7 | 9.9 | 8.1 | 6.7 | 5.7 | 4.6 | 4.8 | 9.0 | 11.7 | 13.8 | 15.5 | 17.5 | 19.8 | 21.5 | 22.9 | 24.3 | 23.2 | 17.5 | 16.0 | 13.6 | 10.6 | 9.8 | 12.3 | 12.2 | 13.5 | 24.3 |
| 15-Sep | 9.0 | 6.3 | 4.7 | 3.6 | 2.5 | 1.3 | 1.4 | 6.4 | 9.3 | 9.9 | 11.0 | 11.7 | 13.6 | 15.4 | 17.7 | 19.0 | 19.0 | 17.0 | 13.5 | 11.4 | 12.9 | 14.9 | 12.6 | 10.3 | 10.6 | 19.0 |
| 16-Sep | 8.6 | 7.0 | 5.8 | 4.8 | 5.1 | 5.8 | 6.9 | 8.3 | 12.5 | 14.7 | 15.0 | 17.6 | 22.1 | 22.5 | 22.4 | 23.5 | 23.6 | 22.0 | 17.4 | 15.1 | 12.9 | 12.4 | 11.2 | 14.5 | 13.8 | 23.6 |
| 17-Sep | 13.3 | 14.3 | 14.9 | 14.6 | 13.5 | 13.6 | 13.0 | 13.1 | 14.1 | 14.9 | 15.5 | 16.0 | 16.4 | 16.8 | 17.4 | 18.7 | 18.5 | 18.5 | 15.7 | 13.2 | 13.8 | 11.8 | 12.3 | 11.6 | 14.8 | 18.7 |
| 18-Sep | 10.8 | 8.9 | 7.3 | 6.6 | 6.0 | 6.3 | 8.4 | 10.1 | 11.4 | 12.9 | 13.4 | 13.9 | 13.8 | 14.0 | 13.6 | 13.4 | 13.3 | 12.6 | 12.0 | 11.5 | 11.2 | 10.7 | 9.9 | 9.8 | 10.9 | 14.0 |
| 19-Sep | 9.6 | 9.7 | 9.6 | 9.3 | 8.1 | 7.5 | 7.1 | 7.5 | 8.5 | 9.4 | 11.1 | 11.3 | 11.4 | 12.5 | 13.0 | 13.0 | 12.9 | 12.4 | 10.9 | 9.8 | 9.8 | 9.8 | 9.2 | 8.8 | 10.1 | 13.0 |
| 20-Sep | 8.6 | 7.2 | 6.0 | 5.8 | 5.9 | 5.9 | 5.9 | 7.5 | 8.7 | 9.1 | 9.7 | 10.8 | 11.5 | 12.7 | 13.6 | 13.7 | 13.4 | 12.0 | 10.4 | 8.9 | 8.8 | 7.4 | 5.1 | 3.9 | 8.9 | 13.7 |
| 21-Sep | 4.7 | 3.6 | 1.5 | -0.1 | -1.0 | -0.4 | -1.1 | 2.7 | 6.7 | 9.5 | 12.2 | 14.4 | 16.4 | 17.8 | 18.3 | 18.4 | 18.6 | 17.5 | 13.0 | 12.0 | 11.5 | 10.8 | 10.0 | 8.0 | 9.4 | 18.6 |
| 22-Sep | 4.2 | 2.6 | 1.2 | 0.1 | -0.7 | -1.0 | -0.8 | 4.0 | 9.5 | 12.2 | 14.5 | 17.3 | 19.7 | 20.5 | 21.1 | 21.0 | 20.8 | 19.0 | 14.9 | 15.2 | 15.0 | 12.5 | 12.0 | 11.1 | 11.1 | 21.1 |
| 23-Sep | 9.1 | 8.6 | 9.6 | 8.5 | 7.3 | 6.0 | 6.3 | 8.3 | 10.7 | 12.4 | 13.3 | 13.6 | 14.1 | 14.1 | 14.0 | 13.6 | 13.3 | 12.9 | 12.8 | 12.6 | 12.3 | 11.9 | 11.4 | 11.0 | 11.1 | 14.1 |
| 24-Sep | 10.8 | 9.9 | 9.6 | 8.4 | 7.9 | 8.3 | 6.8 | 7.4 | 8.5 | 10.4 | 11.5 | 13.8 | 15.2 | 15.8 | 15.8 | 17.5 | 16.7 | 15.7 | 13.8 | 10.8 | 9.0 | 9.7 | 9.2 | 8.4 | 11.3 | 17.5 |
| 25-Sep | 8.1 | 7.6 | 6.9 | 6.4 | 6.3 | 5.7 | 5.5 | 6.3 | 8.7 | 11.3 | 13.1 | 15.0 | 16.3 | 17.6 | 17.9 | 18.1 | 17.7 | 14.5 | 8.3 | 5.7 | 4.1 | 2.8 | 1.8 | 0.8 | 9.4 | 18.1 |
| 26-Sep | -0.2 | -1.0 | -0.5 | -0.9 | -1.0 | 1.3 | 1.8 | 5.0 | 8.8 | 11.8 | 14.3 | 16.5 | 19.5 | 21.5 | 22.5 | 24.1 | 24.2 | 22.3 | 19.6 | 19.0 | 18.4 | 17.6 | 16.4 | 16.0 | 12.4 | 24.2 |
| 27-Sep | 15.5 | 14.7 | 14.5 | 14.5 | 14.3 | 13.8 | 14.8 | 14.8 | 13.2 | 13.8 | 13.2 | 13.4 | 13.9 | 15.8 | 16.6 | 16.7 | 16.2 | 14.9 | 11.7 | 10.8 | 9.9 | 9.8 | 5.4 | 2.9 | 13.1 | 16.7 |
| 28-Sep | 4.4 | 3.7 | 4.1 | 3.8 | 2.6 | -1.1 | -2.3 | 1.0 | 6.5 | 9.5 | 11.6 | 13.9 | 15.7 | 16.6 | 17.3 | 16.9 | 16.9 | 14.6 | 8.6 | 5.4 | 3.9 | 3.1 | 2.6 | 0.7 | 7.5 | 17.3 |
| 29-Sep | -0.2 | -0.5 | 0.1 | 0.5 | -0.2 | -0.8 | -1.8 | -0.4 | 5.8 | 9.7 | 12.0 | 13.4 | 15.1 | 16.8 | 17.7 | 17.4 | 17.0 | 12.7 | 8.2 | 5.5 | 4.3 | 3.8 | 2.5 | 1.2 | 6.7 | 17.7 |
| 30-Sep | 0.2 | -0.4 | -1.1 | -1.8 | -0.7 | 2.8 | 3.5 | 5.1 | 6.7 | 8.2 | 9.3 | 10.2 | 10.8 | 10.9 | 10.8 | 10.5 | 10.1 | 9.3 | 8.9 | 8.6 | 8.5 | 8.1 | 7.6 | 6.6 | 6.4 | 10.9 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort McKay South - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 24 | 3.33 | 3.33 |
| 0 - 10 | 296 | 41.11 | 44.44 |
| 10 - 20 | 373 | 51.81 | 96.25 |
| > 20 | 27 | 3.75 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

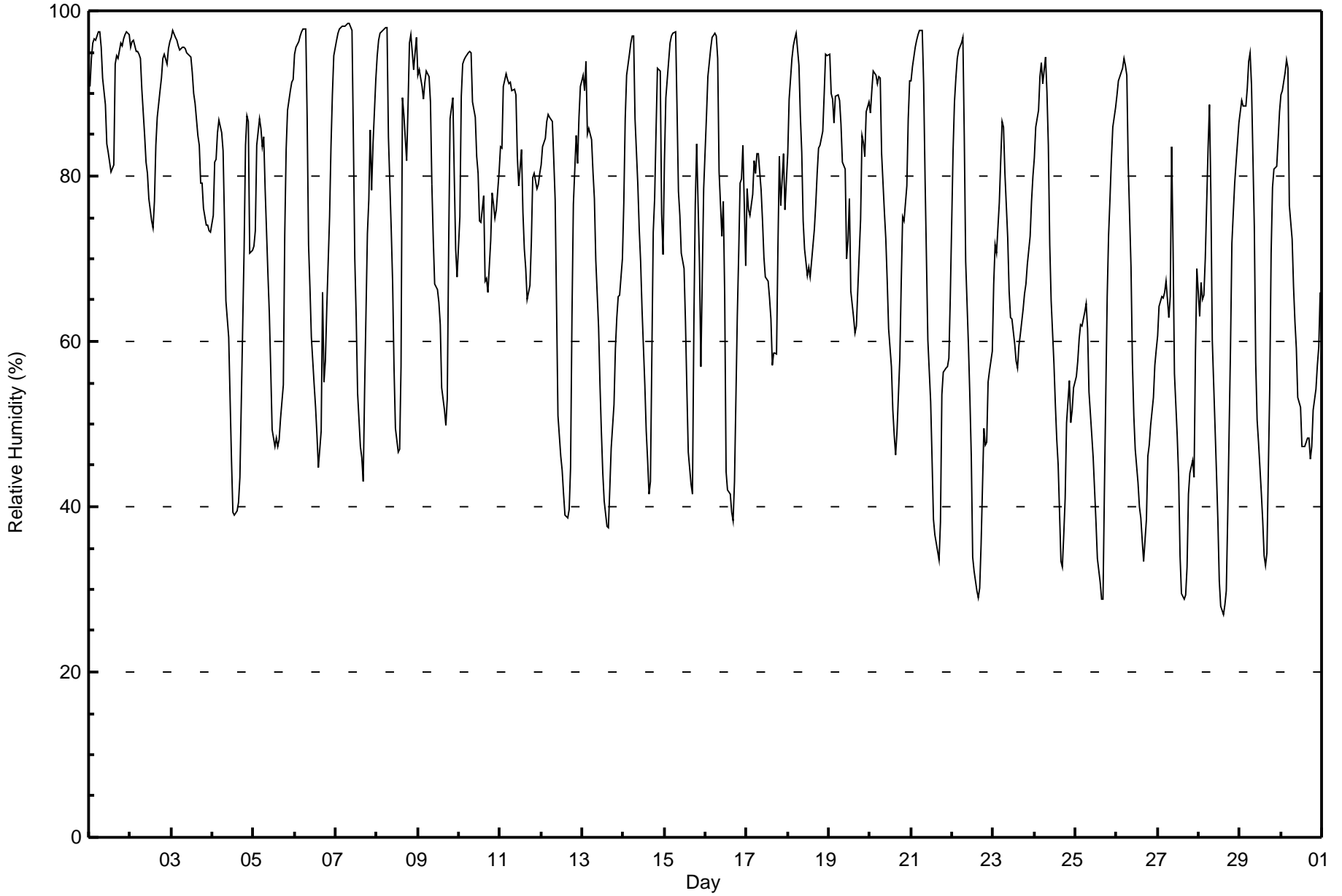
Fort McKay South - September 2016

| Maximum Value: 98 % on Sep 7 08:00 Maximum Daily Average: 92.4 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|----|
| Minimum Value: 27 % on Sep 28 15:00 Minimum Daily Average: 53.2 % on Sep 27 Maximum Diurnal Average: 90.0 % at hour 6 Minimum Diurnal Average: 50.5 % at hour 15 Monthly Average: 72.5 % Percentiles: P ₁ = 29 P ₁₀ = 44 Q ₁ = 58 Median = 76 Q ₃ = 90 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 | 91 | 94 | 96 | 97 | 96 | 97 | 98 | 96 | 92 | 89 | 84 | 83 | 82 | 81 | 81 | 94 | 95 | 94 | 96 | 96 | 97 | 97 | 97 | 97 | 97 | 92.4 | 98 |
| 2-Sep | 96 | 96 | 96 | 95 | 95 | 95 | 94 | 90 | 85 | 82 | 80 | 77 | 75 | 74 | 77 | 84 | 87 | 90 | 92 | 94 | 95 | 94 | 95 | 96 | 96 | 88.9 | 96 |
| 3-Sep | 97 | 98 | 97 | 97 | 96 | 95 | 96 | 96 | 95 | 95 | 95 | 94 | 93 | 90 | 89 | 85 | 84 | 79 | 79 | 76 | 74 | 74 | 73 | 73 | 73 | 88.3 | 98 |
| 4-Sep | 75 | 82 | 82 | 85 | 87 | 85 | 83 | 74 | 65 | 60 | 53 | 46 | 39 | 39 | 40 | 44 | 53 | 71 | 84 | 87 | 87 | 71 | 71 | 71 | 71 | 66.8 | 87 |
| 5-Sep | 71 | 73 | 84 | 87 | 86 | 84 | 85 | 78 | 68 | 63 | 57 | 49 | 47 | 48 | 47 | 48 | 51 | 55 | 73 | 83 | 88 | 90 | 91 | 92 | 70.8 | 92 | |
| 6-Sep | 95 | 96 | 96 | 97 | 98 | 98 | 98 | 87 | 72 | 67 | 61 | 55 | 52 | 49 | 45 | 49 | 66 | 55 | 58 | 64 | 75 | 83 | 90 | 95 | 74.9 | 98 | |
| 7-Sep | 96 | 97 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 84 | 70 | 63 | 54 | 47 | 46 | 43 | 54 | 73 | 77 | 86 | 78 | 84 | 92 | 80.4 | 98 | |
| 8-Sep | 95 | 96 | 97 | 98 | 98 | 98 | 98 | 85 | 74 | 67 | 57 | 50 | 47 | 47 | 57 | 89 | 87 | 82 | 89 | 96 | 97 | 93 | 95 | 97 | 82.8 | 98 | |
| 9-Sep | 92 | 93 | 91 | 89 | 91 | 93 | 92 | 89 | 79 | 72 | 67 | 66 | 65 | 62 | 54 | 52 | 50 | 53 | 71 | 87 | 89 | 80 | 71 | 68 | 75.7 | 93 | |
| 10-Sep | 75 | 90 | 94 | 94 | 94 | 95 | 95 | 95 | 89 | 87 | 82 | 80 | 75 | 74 | 78 | 67 | 68 | 66 | 72 | 78 | 77 | 75 | 76 | 80 | 81.5 | 95 | |
| 11-Sep | 84 | 83 | 91 | 92 | 92 | 91 | 91 | 90 | 91 | 90 | 82 | 79 | 83 | 76 | 71 | 69 | 65 | 67 | 72 | 80 | 80 | 78 | 79 | 80 | 81.6 | 92 | |
| 12-Sep | 81 | 84 | 85 | 87 | 87 | 87 | 87 | 82 | 77 | 64 | 51 | 46 | 44 | 42 | 39 | 39 | 40 | 45 | 63 | 77 | 85 | 82 | 87 | 91 | 68.7 | 91 | |
| 13-Sep | 92 | 90 | 94 | 85 | 86 | 84 | 80 | 77 | 70 | 62 | 55 | 49 | 44 | 41 | 38 | 37 | 42 | 47 | 52 | 59 | 63 | 65 | 66 | 70 | 64.5 | 94 | |
| 14-Sep | 77 | 87 | 92 | 95 | 96 | 97 | 97 | 87 | 79 | 74 | 70 | 64 | 55 | 49 | 46 | 41 | 43 | 73 | 77 | 85 | 93 | 93 | 75 | 71 | 75.6 | 97 | |
| 15-Sep | 82 | 90 | 94 | 96 | 97 | 97 | 98 | 88 | 78 | 75 | 71 | 69 | 62 | 54 | 47 | 43 | 42 | 62 | 77 | 84 | 69 | 57 | 68 | 78 | 74.0 | 98 | |
| 16-Sep | 87 | 92 | 94 | 95 | 97 | 97 | 97 | 94 | 80 | 73 | 77 | 66 | 44 | 42 | 42 | 39 | 38 | 43 | 63 | 71 | 79 | 80 | 84 | 69 | 72.6 | 97 | |
| 17-Sep | 79 | 76 | 75 | 78 | 82 | 80 | 83 | 83 | 78 | 75 | 70 | 68 | 67 | 65 | 63 | 57 | 59 | 58 | 71 | 82 | 76 | 83 | 76 | 79 | 73.5 | 83 | |
| 18-Sep | 83 | 89 | 94 | 96 | 97 | 97 | 93 | 87 | 83 | 75 | 71 | 68 | 69 | 68 | 70 | 74 | 77 | 80 | 83 | 84 | 85 | 90 | 95 | 95 | 83.4 | 97 | |
| 19-Sep | 95 | 90 | 89 | 87 | 90 | 90 | 89 | 86 | 82 | 81 | 70 | 72 | 77 | 66 | 63 | 61 | 62 | 66 | 75 | 85 | 84 | 82 | 88 | 89 | 79.9 | 95 | |
| 20-Sep | 88 | 90 | 93 | 92 | 91 | 92 | 92 | 83 | 76 | 72 | 67 | 62 | 57 | 52 | 49 | 46 | 49 | 58 | 67 | 75 | 75 | 79 | 87 | 91 | 74.2 | 93 | |
| 21-Sep | 92 | 93 | 96 | 96 | 97 | 98 | 98 | 91 | 80 | 70 | 60 | 53 | 46 | 38 | 37 | 35 | 34 | 38 | 54 | 56 | 57 | 57 | 58 | 65 | 66.5 | 98 | |
| 22-Sep | 83 | 89 | 92 | 94 | 95 | 96 | 97 | 85 | 70 | 59 | 53 | 46 | 34 | 32 | 30 | 29 | 30 | 35 | 49 | 47 | 48 | 55 | 57 | 59 | 61.0 | 97 | |
| 23-Sep | 67 | 72 | 71 | 77 | 82 | 87 | 86 | 80 | 73 | 66 | 63 | 63 | 60 | 58 | 57 | 59 | 61 | 64 | 66 | 67 | 69 | 73 | 77 | 80 | 69.8 | 87 | |
| 24-Sep | 82 | 86 | 88 | 92 | 94 | 91 | 94 | 90 | 84 | 72 | 65 | 57 | 52 | 48 | 45 | 33 | 33 | 37 | 41 | 50 | 55 | 50 | 52 | 54 | 64.4 | 94 | |
| 25-Sep | 56 | 58 | 60 | 62 | 62 | 64 | 65 | 62 | 54 | 49 | 46 | 42 | 38 | 34 | 31 | 29 | 29 | 42 | 65 | 73 | 77 | 82 | 86 | 88 | 56.3 | 88 | |
| 26-Sep | 90 | 92 | 92 | 93 | 94 | 93 | 92 | 82 | 69 | 58 | 51 | 47 | 43 | 40 | 39 | 36 | 33 | 38 | 46 | 47 | 50 | 53 | 57 | 59 | 62.3 | 94 | |
| 27-Sep | 61 | 64 | 65 | 65 | 66 | 67 | 63 | 65 | 84 | 71 | 56 | 48 | 44 | 34 | 30 | 29 | 29 | 33 | 41 | 44 | 46 | 44 | 59 | 69 | 53.2 | 84 | |
| 28-Sep | 63 | 67 | 65 | 66 | 70 | 83 | 89 | 78 | 60 | 49 | 44 | 38 | 31 | 28 | 27 | 28 | 30 | 39 | 59 | 72 | 76 | 79 | 82 | 86 | 58.7 | 89 | |
| 29-Sep | 88 | 89 | 89 | 88 | 91 | 94 | 95 | 91 | 74 | 57 | 51 | 48 | 42 | 38 | 34 | 33 | 34 | 54 | 71 | 79 | 81 | 81 | 84 | 88 | 69.7 | 95 | |
| 30-Sep | 90 | 90 | 93 | 94 | 93 | 76 | 72 | 67 | 62 | 59 | 53 | 52 | 47 | 47 | 47 | 48 | 48 | 46 | 47 | 52 | 54 | 57 | 59 | 66 | 63.4 | 94 | |
| 83.4 86.2 88.1 88.9 89.9 90.0 89.8 84.6 77.3 71.0 64.9 60.2 55.9 52.3 50.5 50.7 51.7 56.9 67.2 73.5 75.6 75.7 77.3 79.6 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| 97 98 98 98 98 98 98 98 98 98 98 95 94 93 90 89 94 95 94 96 96 97 97 97 97 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort McKay South - September 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Fort McKay South - September 2016

| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 26 km/h on Sep 11 07:00 | Maximum Daily Speed Average: 15.9 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 18 04:00 | Minimum Daily Speed Average: 0.6 km/h on Sep 14 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 3.5 km/h at hour 16 | Minimum Diurnal Speed Average: 1.7 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 2.8 km/h 234.5 deg | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 7 Q ₃ = 10 P ₉₀ = 14 P ₉₉ = 24 | 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 | N4 | NNW6 | NNW5 | NNW6 | NNW5 | NNW5 | N5 | N7 | N7 | N7 | N10 | N11 | N10 | NNE9 | E6 | W2 | N11 | W2 | N5 | NW4 | NNW5 | NW4 | WSW4 | W5 | N4.9 | N11 |
| 2-Sep | WSW6 | SSW6 | SW5 | WSW7 | WSW8 | WSW8 | WSW8 | SW6 | SW6 | W8 | W6 | SW7 | WSW6 | WSW6 | W4 | WSW5 | WSW5 | WSW5 | NNW2 | SW3 | W5 | WNW6 | WNW6 | NNW5 | WSW5.2 | WSW8 |
| 3-Sep | NNW6 | NW6 | NNW5 | W7 | W9 | W9 | W9 | W9 | W9 | WNW9 | WNW9 | NW10 | NW10 | NW11 | NNW12 | NNW11 | NNW11 | NNW16 | NNW12 | NNW15 | NNW15 | NW12 | NW10 | NW10 | NNW9.6 | NNW16 |
| 4-Sep | WNW8 | W8 | W8 | W9 | W10 | W11 | W7 | WNW5 | W4 | WNW6 | WNW9 | W10 | WNW8 | WNW6 | W4 | NW6 | NNE3 | NNW5 | W2 | SW3 | SW3 | SW3 | SW7 | WSW7 | W5.7 | W11 |
| 5-Sep | SW6 | SSW4 | S4 | S4 | S8 | S7 | S6 | SSW7 | SSW8 | S10 | S11 | S12 | S15 | S12 | S12 | SSE10 | SE7 | E4 | N1 | SSW1 | WNW1 | WNW2 | WSW2 | S3 | S5.8 | S15 |
| 6-Sep | SW3 | WSW1 | WSW3 | WSW3 | SSW3 | SSW3 | SSW3 | SSE2 | S10 | S11 | SSE14 | SSE15 | SSE15 | SSE11 | SSE13 | SSE16 | SSW11 | SSW13 | S11 | S9 | S5 | SSW3 | WSW2 | WSW2 | S6.9 | SSE16 |
| 7-Sep | SW2 | SW2 | SW2 | WSW1 | WSW2 | SW2 | SW3 | WSW3 | S4 | SSE6 | SE5 | SE7 | SE10 | SSE10 | SSE10 | S9 | SSW5 | WSW4 | SW2 | SW4 | W7 | W1 | SSW4 | S3.6 | SE10 | |
| 8-Sep | SSW3 | SSW3 | S2 | SW2 | SSW3 | W2 | SW4 | SSW5 | ENE1 | NE5 | E1 | NE4 | ENE4 | W2 | WNW5 | SSW5 | WSW4 | NW8 | NNW2 | W3 | WNW4 | NW6 | W3 | WNW5 | W1.4 | NW8 |
| 9-Sep | NW5 | NW6 | WNW7 | WNW5 | NNW4 | NNW6 | N8 | N8 | N8 | NNE6 | W3 | WSW5 | NE3 | E4 | SSW8 | S9 | S9 | S9 | S5 | SSW3 | S4 | SSE7 | SSE9 | SSE12 | SSW0.9 | SSE12 |
| 10-Sep | SSE14 | SSE10 | SSE11 | S11 | S14 | S11 | SSE12 | S12 | S7 | WSW3 | WSW8 | WSW7 | W8 | W9 | W8 | WNW12 | W10 | WNW9 | WNW9 | W8 | WNW12 | WNW10 | W8 | NW10 | SW5.5 | S14 |
| 11-Sep | N19 | N22 | NNW19 | NNW22 | N24 | N25 | N26 | N25 | N23 | N24 | N23 | N22 | N20 | N19 | N17 | N15 | NNW13 | NNW8 | NNW6 | NW5 | WNW4 | W5 | W7 | W7 | N15.9 | N26 |
| 12-Sep | W6 | WNW6 | WNW4 | W2 | W5 | WSW6 | WSW4 | SSW3 | S6 | SSW6 | SSW10 | S11 | S14 | S14 | SSW14 | SSW11 | S12 | S9 | S5 | SSW5 | S6 | S4 | S7 | S5 | SSW6.2 | S14 |
| 13-Sep | SSE4 | S5 | S6 | S10 | S7 | S8 | S9 | S11 | S11 | S11 | SSW12 | SSW16 | SSW16 | SSW13 | SW13 | SW11 | SSW12 | SW8 | SSW8 | SSW8 | SW7 | SW7 | W9 | W10 | SSW8.8 | SSW16 |
| 14-Sep | WNW4 | NNE2 | SW1 | WNW1 | W1 | SW2 | SW1 | NE2 | ENE2 | ESE4 | SE6 | SE7 | SE8 | ESE7 | SE8 | SW10 | W8 | NNW17 | NNW7 | W4 | S3 | WSW5 | W8 | NW8 | WSW0.6 | NNW17 |
| 15-Sep | N3 | NW1 | WSW2 | SW2 | W2 | SW2 | WSW2 | SW1 | ENE5 | NE6 | NNE3 | NE2 | SSE5 | SE9 | SSE10 | SE9 | SE6 | NNW3 | NW2 | W2 | S11 | S14 | SSW6 | SSW4 | SSE2.4 | S14 |
| 16-Sep | WSW3 | SSW3 | S4 | SSW3 | SSW3 | SSW3 | SSW3 | SSW3 | S7 | S8 | SSE8 | SSE13 | SSW17 | SW14 | SW14 | SW11 | SW9 | WSW6 | SSW4 | SW5 | WSW6 | S4 | S5 | SSW5 | SSW6.0 | SSW17 |
| 17-Sep | SSW5 | SSW8 | SSW10 | SSW10 | S8 | SSW8 | SSW10 | SSW10 | SSW10 | SSW9 | SW8 | SSW9 | SSW10 | SSW10 | SW9 | WSW9 | W6 | W4 | WSW3 | WSW5 | WSW5 | SW4 | WSW8 | WSW7 | SSW7.1 | SSW10 |
| 18-Sep | SW4 | WSW1 | SSW1 | SW0 | SSW2 | S5 | WSW5 | WSW7 | WSW5 | WNW10 | WNW9 | WNW12 | NW11 | NW11 | NW11 | NNW11 | NNW11 | N8 | NNW5 | NNW5 | NW4 | N6 | NW3 | WNW3 | NW4.8 | WNW12 |
| 19-Sep | NW3 | NW6 | WNW5 | NW5 | NW5 | W6 | WSW9 | W8 | W8 | W7 | NW6 | NW7 | NW6 | NW10 | NNW10 | NNW11 | NNW8 | N6 | NNW7 | WNW5 | WNW4 | WNW5 | NNW7 | NNW6 | NW5.8 | NNW11 |
| 20-Sep | NNW7 | NW5 | W5 | NNW4 | NW4 | NW3 | WNW4 | NNW6 | NE8 | NW5 | NNW2 | NNE8 | NE7 | E6 | E4 | E6 | ESE5 | E4 | NNE3 | NE2 | ENE3 | SSW3 | W2 | SSW3 | N2.0 | NE8 |
| 21-Sep | W2 | WNW2 | WSW2 | WSW3 | SSW3 | SSW3 | S2 | S2 | S5 | SSW7 | S11 | SSW12 | S12 | SSW11 | SW8 | WSW9 | WSW9 | SW5 | SSW6 | SSW7 | SW8 | SW8 | SW7 | SSW2 | SSW5.7 | SSW12 |
| 22-Sep | WSW2 | W2 | WSW2 | SW3 | SW3 | SW3 | SW3 | S5 | SSE6 | S9 | SSE9 | SSE11 | SSW19 | S19 | S18 | SSW15 | S14 | SSW10 | S7 | S13 | S13 | S10 | S13 | SSE11 | S8.6 | S19 |
| 23-Sep | S7 | SSE9 | S12 | S11 | S6 | S7 | S10 | S12 | M | SSE18 | SSE21 | SSE22 | SSE23 | SSE22 | SSE22 | SSE22 | SSE19 | SSE19 | SSE19 | SSE17 | S14 | S15 | SSE16 | S15 | SSE15.4 | SSE23 |
| 24-Sep | SSE13 | SSE10 | S10 | S6 | S7 | S7 | SSW5 | S7 | S8 | SW8 | WSW11 | WSW15 | W13 | W14 | W11 | WNW16 | WNW14 | WNW8 | WSW4 | WSW5 | WSW6 | WSW8 | WSW9 | WSW11 | WSW6.7 | WNW16 |
| 25-Sep | WSW12 | WSW13 | WSW14 | WSW12 | W13 | W12 | W14 | W14 | W12 | WNW7 | WNW9 | W11 | WNW8 | NW10 | NW12 | NNW11 | NW8 | NW4 | WSW3 | WSW3 | SSW3 | NW2 | W3 | SW2 | W7.9 | W14 |
| 26-Sep | SW2 | WSW3 | SW2 | SW2 | WSW2 | SSW2 | W1 | S2 | SSE7 | SE8 | SSE11 | SSE12 | SSE16 | SSE17 | SE15 | SSE14 | S18 | S12 | S10 | S11 | S13 | SSE9 | S10 | S11 | S8.1 | S18 |
| 27-Sep | S5 | S4 | S7 | S10 | S7 | SW5 | W6 | SW7 | SSW9 | W9 | WNW14 | W14 | WNW10 | W13 | W15 | WSW16 | WSW15 | SW7 | SW6 | SW6 | WSW7 | WSW6 | W2 | SW6 | WSW6.8 | WSW16 |
| 28-Sep | SW6 | SW6 | SW7 | WSW9 | WSW5 | SW2 | NW0 | S2 | SSE6 | S7 | S10 | S10 | SSW8 | SSW10 | SSW11 | SSW8 | S6 | SSW6 | SW4 | SW4 | SSW3 | SW2 | NNW3 | SSW3 | SSW5.2 | SSW11 |
| 29-Sep | SSW3 | SW3 | SSW3 | SSW3 | S4 | SW2 | SW2 | SSW2 | SSE5 | S8 | S5 | SE8 | SSE8 | S8 | SSE6 | SE4 | ESE4 | S3 | W3 | WSW4 | WNW2 | NW4 | WSW1 | NW2 | S2.9 | SSE8 |
| 30-Sep | SSW1 | NW3 | WSW1 | SSW2 | NW3 | NNW8 | N8 | N10 | NNW12 | N15 | N19 | N19 | N20 | N22 | N24 | N26 | N23 | N22 | N22 | N21 | NNE21 | N17 | N18 | N19 | N14.3 | N26 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|-------|-------|-------|-------|--------|------|--------|--------|-------|--------|--------|-----------------|-----------------|--|
| WSW2.4 | WSW2.4 | WSW2.9 | WSW3.3 | WSW2.9 | WSW3.2 | WSW3.0 | WSW2.5 | SSW2.1 | SW2.3 | SW2.6 | SSW3.2 | SSW3.5 | SW3.5 | SW3.5 | SW3.5 | SW3.5 | WSW3.0 | W2.1 | WSW1.7 | WSW2.7 | SW3.0 | WSW2.8 | WSW3.2 | WSW3.2 | Diurnal Average | |
| NNW19 | N22 | NNW19 | NNW22 | N24 | N25 | N26 | N25 | N23 | N24 | N23 | N22 | SSE23 | N22 | N24 | N26 | N23 | N22 | N22 | N21 | NNE21 | NNE17 | N18 | N19 | Diurnal Maximum | | |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort McKay South - September 2016

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

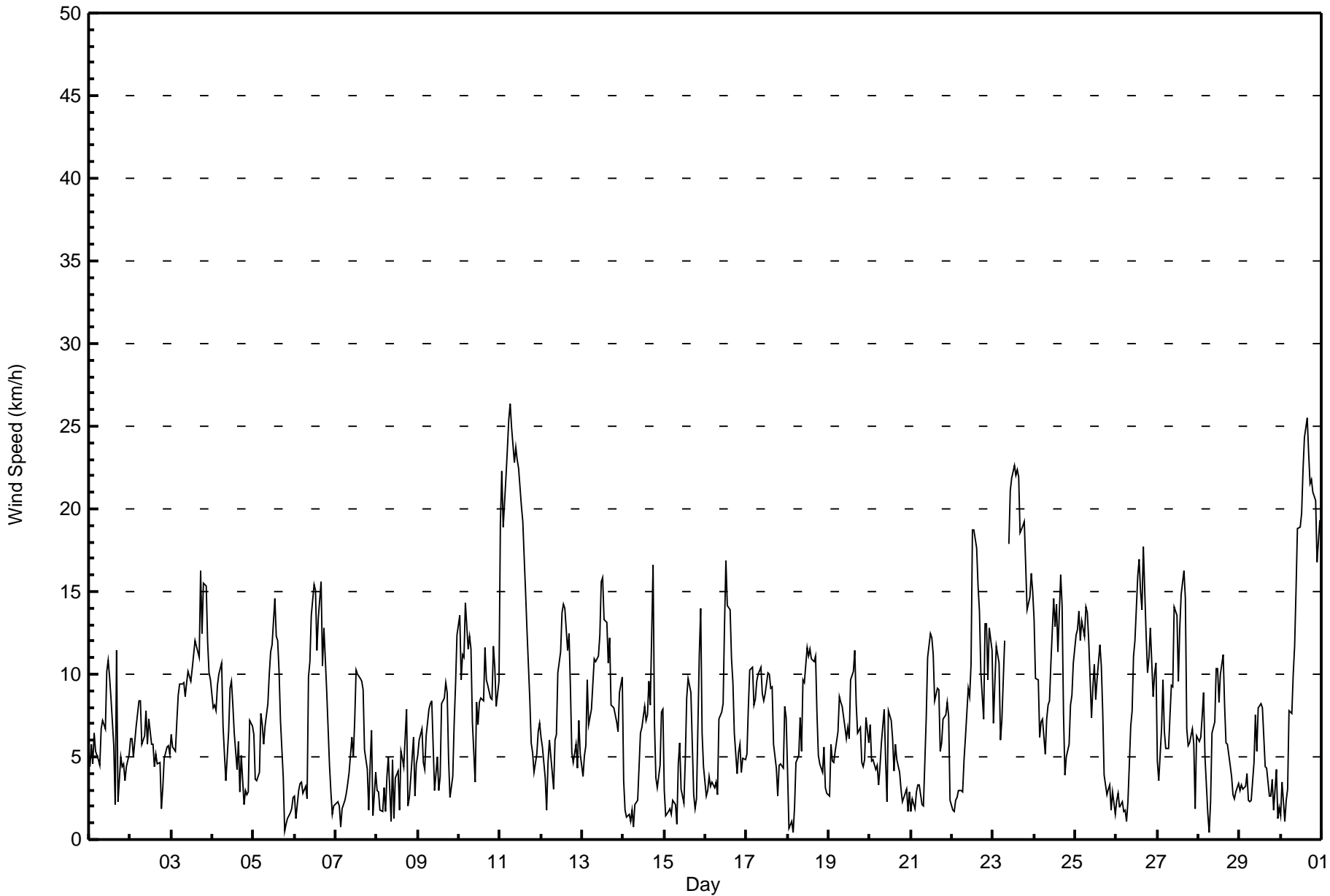
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 5 | 6 | 6 | 7 | 7 | 6 | 5 | 5 | 6 | 4 | 5 | 4 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Fort McKay South - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 277 | 38.53 | 38.53 |
| 6 - 11 | 312 | 43.39 | 81.92 |
| 12 - 19 | 104 | 14.46 | 96.38 |
| 20 - 28 | 26 | 3.62 | 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
Fort McKay South - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 5 | 4 | 6 | 5 | 5 | 3 | 2 | 5 | 27 | 46 | 40 | 42 | 29 | 21 | 24 | 13 | 277 |
| 6 - 11 | 15 | 3 | 3 | 0 | 3 | 2 | 11 | 24 | 59 | 36 | 26 | 28 | 37 | 21 | 24 | 20 | 312 |
| 12 - 19 | 8 | 1 | 0 | 0 | 0 | 0 | 1 | 20 | 25 | 11 | 3 | 7 | 10 | 6 | 2 | 10 | 104 |
| 20 - 28 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 26 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 46 | 9 | 9 | 5 | 8 | 5 | 14 | 55 | 111 | 93 | 69 | 77 | 76 | 48 | 50 | 44 | 719 |

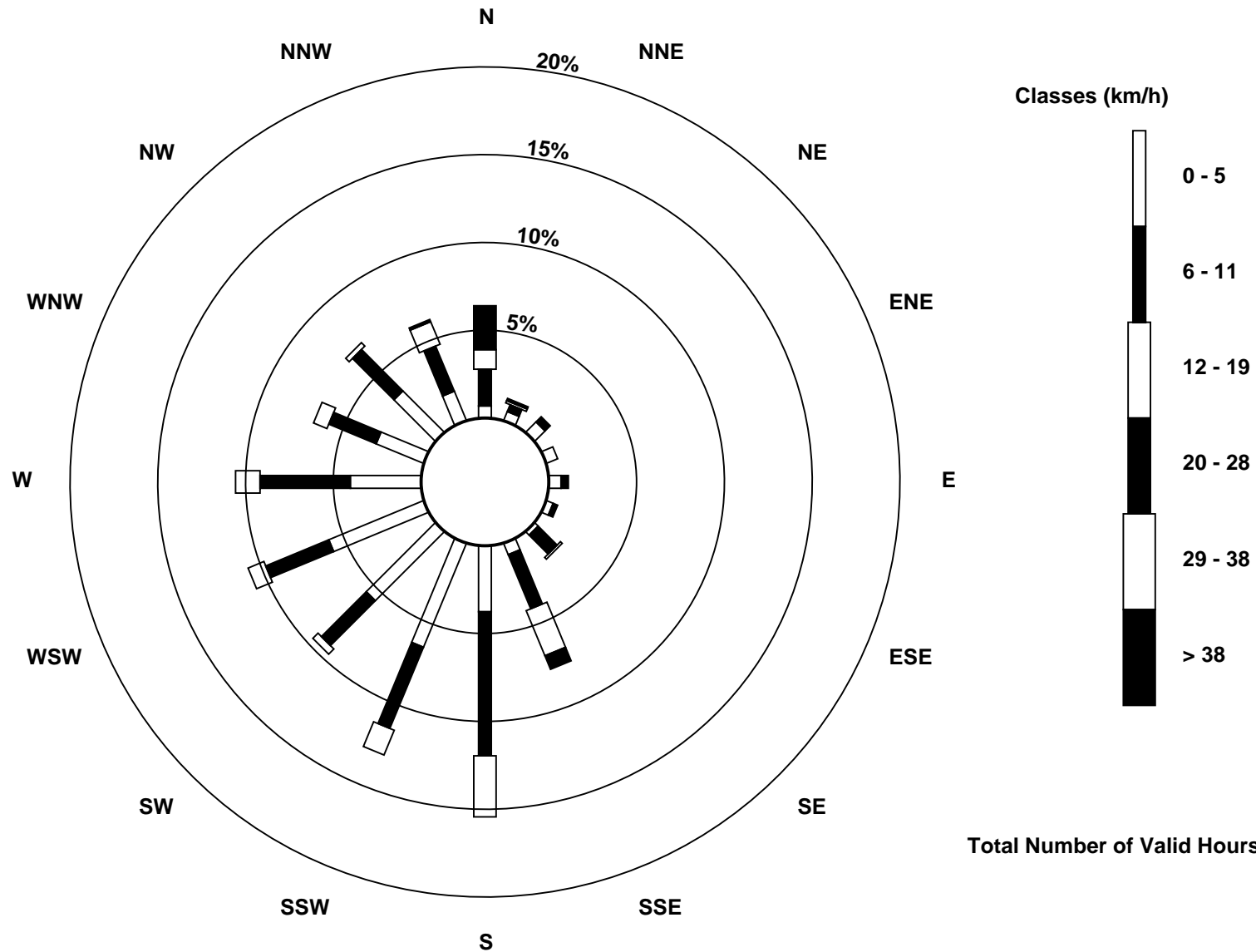
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Fort McKay South (AMS 13)



Total Number of Valid Hours: 719



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort McKay South - September 2016

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 355 deg on Sep 11 07:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 349.8 deg on Sep 11 | Hours of Data: 719 |
| Direction of Minimum Speed: 232 deg on Sep 18 04:00 | Hours of Missing Data: 1 |
| Direction of Minimum Daily Speed Average: 0.6 deg on Sep 14 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 251.9 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 | 353 | 346 | 345 | 346 | 336 | 337 | 350 | 8 | 2 | 356 | 356 | 7 | 6 | 30 | 89 | 278 | 5 | 265 | 349 | 315 | 308 | 306 | 248 | 261 | 350.1 |
| 2-Sep | 239 | 198 | 227 | 244 | 257 | 240 | 244 | 224 | 231 | 263 | 267 | 234 | 242 | 252 | 260 | 250 | 250 | 250 | 343 | 233 | 276 | 282 | 286 | 318 | 250.6 |
| 3-Sep | 347 | 314 | 301 | 280 | 280 | 278 | 271 | 278 | 289 | 303 | 310 | 317 | 326 | 324 | 328 | 331 | 327 | 339 | 338 | 332 | 332 | 322 | 320 | 313 | 315.8 |
| 4-Sep | 299 | 274 | 279 | 270 | 273 | 271 | 272 | 287 | 277 | 293 | 290 | 262 | 300 | 290 | 276 | 317 | 12 | 331 | 261 | 231 | 230 | 217 | 234 | 237 | 277.3 |
| 5-Sep | 236 | 192 | 170 | 187 | 186 | 188 | 184 | 192 | 192 | 190 | 181 | 183 | 187 | 188 | 176 | 152 | 135 | 99 | 356 | 208 | 282 | 294 | 239 | 191 | 183.5 |
| 6-Sep | 217 | 247 | 257 | 241 | 192 | 193 | 198 | 167 | 173 | 172 | 153 | 153 | 157 | 160 | 148 | 163 | 200 | 192 | 174 | 185 | 184 | 196 | 246 | 240 | 174.2 |
| 7-Sep | 229 | 228 | 236 | 244 | 246 | 234 | 227 | 238 | 181 | 168 | 134 | 139 | 135 | 150 | 153 | 168 | 174 | 192 | 251 | 236 | 224 | 270 | 265 | 205 | 182.9 |
| 8-Sep | 205 | 192 | 190 | 214 | 207 | 264 | 231 | 201 | 66 | 49 | 91 | 44 | 58 | 273 | 297 | 195 | 237 | 312 | 336 | 267 | 299 | 325 | 272 | 288 | 270.6 |
| 9-Sep | 313 | 306 | 299 | 288 | 347 | 346 | 10 | 3 | 9 | 27 | 269 | 258 | 35 | 87 | 199 | 176 | 178 | 173 | 169 | 200 | 186 | 165 | 157 | 161 | 205.6 |
| 10-Sep | 163 | 164 | 162 | 178 | 172 | 174 | 168 | 174 | 174 | 243 | 243 | 240 | 273 | 269 | 270 | 303 | 280 | 285 | 289 | 274 | 283 | 291 | 280 | 314 | 232.5 |
| 11-Sep | 349 | 349 | 345 | 345 | 351 | 354 | 355 | 358 | 356 | 0 | 359 | 355 | 3 | 359 | 4 | 351 | 344 | 329 | 335 | 322 | 298 | 281 | 276 | 270 | 349.8 |
| 12-Sep | 278 | 283 | 291 | 270 | 270 | 257 | 249 | 195 | 187 | 201 | 202 | 191 | 190 | 180 | 196 | 193 | 174 | 180 | 177 | 198 | 183 | 173 | 185 | 183 | 199.7 |
| 13-Sep | 168 | 184 | 190 | 189 | 185 | 186 | 181 | 180 | 180 | 191 | 203 | 199 | 202 | 211 | 233 | 225 | 206 | 214 | 211 | 211 | 219 | 232 | 270 | 268 | 206.1 |
| 14-Sep | 300 | 16 | 220 | 285 | 281 | 232 | 234 | 34 | 76 | 116 | 129 | 129 | 124 | 118 | 133 | 217 | 272 | 348 | 330 | 266 | 182 | 240 | 276 | 310 | 253.0 |
| 15-Sep | 353 | 318 | 238 | 214 | 272 | 219 | 247 | 217 | 70 | 54 | 17 | 50 | 147 | 137 | 151 | 143 | 137 | 340 | 309 | 269 | 184 | 175 | 195 | 198 | 162.4 |
| 16-Sep | 255 | 201 | 183 | 206 | 195 | 194 | 197 | 193 | 176 | 179 | 168 | 151 | 202 | 228 | 225 | 229 | 235 | 240 | 213 | 234 | 237 | 185 | 175 | 210 | 205.4 |
| 17-Sep | 197 | 201 | 203 | 206 | 177 | 197 | 209 | 209 | 192 | 207 | 219 | 207 | 200 | 203 | 230 | 243 | 263 | 279 | 254 | 239 | 243 | 228 | 251 | 256 | 216.1 |
| 18-Sep | 232 | 258 | 193 | 232 | 196 | 187 | 247 | 257 | 244 | 287 | 297 | 298 | 320 | 312 | 326 | 333 | 345 | 350 | 339 | 335 | 306 | 359 | 309 | 300 | 306.8 |
| 19-Sep | 306 | 307 | 290 | 320 | 305 | 266 | 256 | 259 | 263 | 274 | 315 | 314 | 312 | 323 | 329 | 335 | 347 | 355 | 343 | 302 | 294 | 286 | 333 | 330 | 308.5 |
| 20-Sep | 333 | 304 | 279 | 327 | 316 | 307 | 302 | 330 | 40 | 321 | 338 | 18 | 51 | 84 | 100 | 94 | 115 | 89 | 29 | 53 | 72 | 208 | 269 | 208 | 10.0 |
| 21-Sep | 262 | 289 | 250 | 251 | 200 | 210 | 178 | 190 | 185 | 193 | 183 | 201 | 185 | 209 | 218 | 246 | 248 | 214 | 212 | 211 | 216 | 216 | 217 | 213 | 211.5 |
| 22-Sep | 253 | 273 | 239 | 236 | 229 | 225 | 216 | 181 | 161 | 183 | 148 | 162 | 196 | 191 | 188 | 195 | 190 | 192 | 191 | 183 | 182 | 170 | 176 | 166 | 185.8 |
| 23-Sep | 174 | 165 | 174 | 186 | 180 | 180 | 178 | 170 | M | 164 | 166 | 164 | 159 | 161 | 160 | 164 | 167 | 162 | 162 | 164 | 174 | 171 | 168 | 171 | 166.8 |
| 24-Sep | 167 | 166 | 169 | 181 | 184 | 191 | 195 | 180 | 187 | 230 | 249 | 256 | 261 | 270 | 269 | 301 | 303 | 294 | 252 | 239 | 243 | 249 | 249 | 253 | 238.4 |
| 25-Sep | 256 | 258 | 254 | 258 | 265 | 268 | 265 | 259 | 259 | 283 | 282 | 271 | 295 | 313 | 317 | 316 | 325 | 314 | 244 | 241 | 208 | 322 | 267 | 218 | 274.3 |
| 26-Sep | 234 | 238 | 232 | 225 | 246 | 205 | 263 | 171 | 148 | 135 | 151 | 152 | 162 | 160 | 145 | 164 | 187 | 181 | 183 | 171 | 175 | 162 | 174 | 182 | 169.1 |
| 27-Sep | 169 | 175 | 170 | 182 | 187 | 233 | 260 | 218 | 195 | 279 | 294 | 278 | 282 | 275 | 279 | 254 | 249 | 230 | 220 | 222 | 239 | 238 | 275 | 232 | 244.9 |
| 28-Sep | 233 | 229 | 232 | 246 | 240 | 230 | 309 | 177 | 160 | 169 | 178 | 191 | 198 | 207 | 201 | 202 | 185 | 197 | 228 | 225 | 212 | 222 | 344 | 197 | 206.2 |
| 29-Sep | 207 | 219 | 205 | 197 | 187 | 226 | 228 | 201 | 156 | 179 | 171 | 142 | 166 | 174 | 162 | 127 | 110 | 183 | 263 | 246 | 284 | 318 | 252 | 322 | 182.7 |
| 30-Sep | 203 | 325 | 247 | 206 | 325 | 335 | 355 | 359 | 348 | 3 | 11 | 10 | 11 | 9 | 7 | 9 | 6 | 7 | 8 | 11 | 12 | 11 | 9 | 6 | 5.6 |

249.7 251.9 234.4 240.3 242.6 248.0 250.0 235.9 206.1 225.7 224.6 212.4 204.0 215.8 217.8 232.1 239.9 260.9 255.8 238.2 235.1 240.1 242.6 244.7

Diurnal Average

M - Maintenance

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

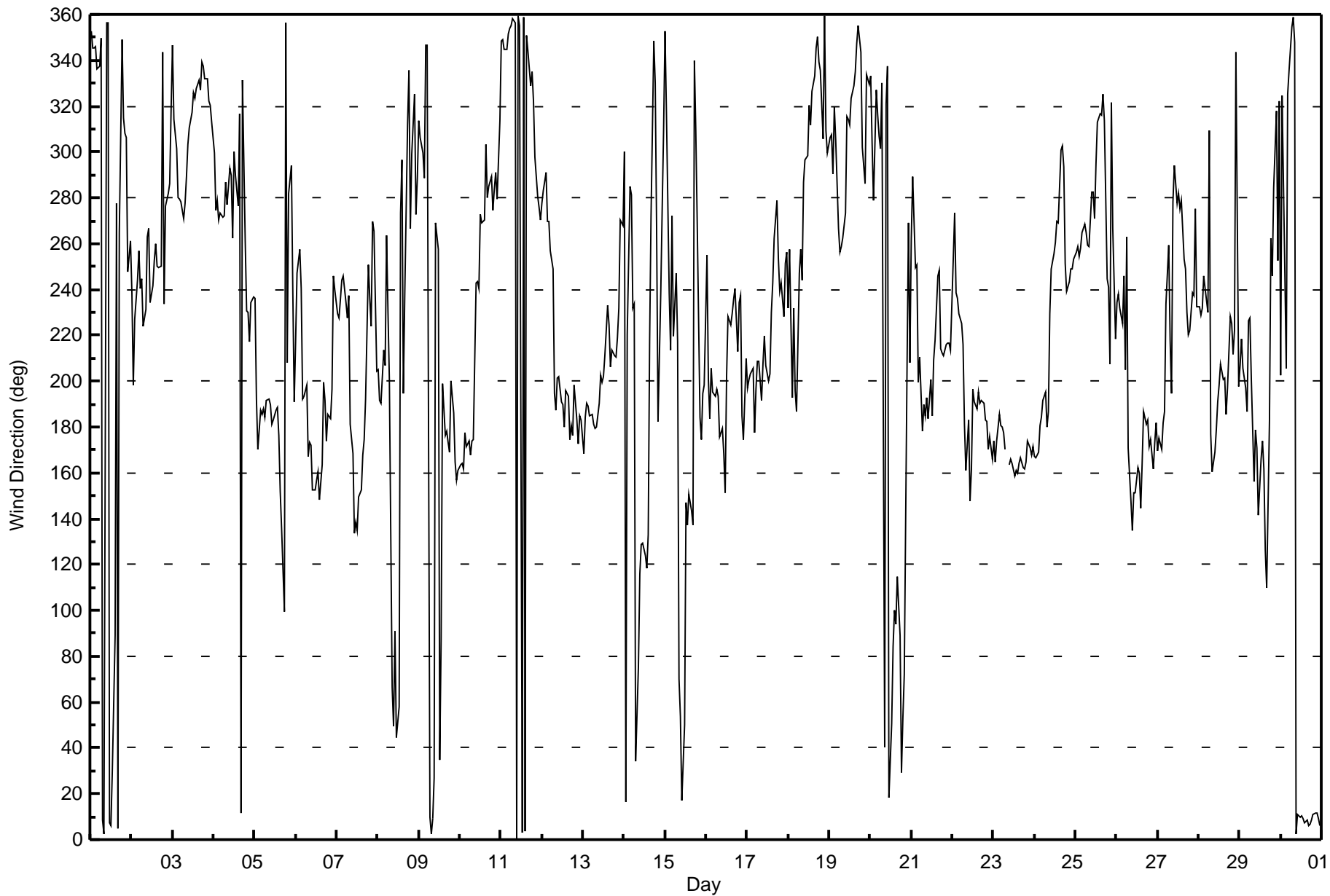
Wind Direction (WD) - deg
Fort McKay South - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 102 deg on Sep 8 14:00 | Hours of Data: 719 |
| Minimum Value: 6 deg on Sep 23 06:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 17 Median = 23 Q ₃ = 34 P ₉₀ = 50 P ₉₉ = 91 | 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 | 16 | 10 | 13 | 14 | 15 | 15 | 17 | 14 | 16 | 17 | 18 | 15 | 14 | 29 | 36 | 76 | 21 | 64 | 42 | 32 | 26 | 22 | 16 | 28 | 76 |
| 2-Sep | 23 | 17 | 35 | 29 | 19 | 18 | 19 | 32 | 40 | 37 | 40 | 33 | 44 | 39 | 28 | 28 | 26 | 30 | 70 | 45 | 29 | 26 | 28 | 24 | 70 |
| 3-Sep | 17 | 19 | 23 | 25 | 26 | 25 | 28 | 27 | 25 | 20 | 20 | 20 | 20 | 19 | 20 | 18 | 18 | 16 | 19 | 19 | 20 | 21 | 21 | 28 | |
| 4-Sep | 22 | 23 | 24 | 25 | 28 | 25 | 39 | 61 | 75 | 39 | 38 | 42 | 47 | 61 | 68 | 38 | 67 | 19 | 26 | 13 | 15 | 38 | 15 | 16 | 75 |
| 5-Sep | 19 | 44 | 14 | 18 | 9 | 9 | 10 | 19 | 25 | 30 | 23 | 25 | 16 | 24 | 22 | 24 | 17 | 21 | 74 | 70 | 19 | 27 | 42 | 22 | 74 |
| 6-Sep | 19 | 67 | 14 | 19 | 15 | 23 | 15 | 73 | 18 | 23 | 18 | 18 | 17 | 32 | 21 | 20 | 17 | 14 | 8 | 18 | 25 | 22 | 34 | 42 | 73 |
| 7-Sep | 25 | 29 | 34 | 60 | 34 | 19 | 23 | 23 | 43 | 33 | 38 | 36 | 25 | 32 | 28 | 22 | 24 | 14 | 20 | 82 | 27 | 25 | 93 | 50 | 93 |
| 8-Sep | 33 | 32 | 43 | 61 | 31 | 80 | 28 | 30 | 94 | 33 | 98 | 77 | 64 | 102 | 62 | 44 | 71 | 52 | 77 | 35 | 34 | 13 | 41 | 25 | 102 |
| 9-Sep | 22 | 16 | 19 | 24 | 28 | 17 | 22 | 20 | 22 | 43 | 76 | 67 | 76 | 56 | 38 | 38 | 23 | 17 | 18 | 19 | 24 | 10 | 12 | 16 | 76 |
| 10-Sep | 11 | 11 | 12 | 19 | 17 | 13 | 11 | 11 | 23 | 50 | 30 | 40 | 36 | 33 | 35 | 27 | 33 | 36 | 31 | 30 | 28 | 28 | 29 | 31 | 50 |
| 11-Sep | 17 | 17 | 16 | 16 | 17 | 18 | 16 | 17 | 18 | 19 | 19 | 18 | 18 | 18 | 18 | 18 | 18 | 21 | 15 | 14 | 16 | 19 | 20 | 26 | 26 |
| 12-Sep | 39 | 29 | 49 | 87 | 49 | 19 | 42 | 52 | 19 | 33 | 29 | 29 | 22 | 22 | 21 | 22 | 17 | 13 | 17 | 15 | 13 | 19 | 8 | 12 | 87 |
| 13-Sep | 18 | 16 | 13 | 8 | 15 | 17 | 11 | 14 | 13 | 18 | 25 | 21 | 23 | 25 | 27 | 29 | 19 | 20 | 20 | 18 | 18 | 21 | 22 | 20 | 29 |
| 14-Sep | 56 | 57 | 79 | 65 | 74 | 45 | 69 | 31 | 40 | 30 | 36 | 37 | 31 | 33 | 38 | 34 | 36 | 17 | 24 | 19 | 31 | 38 | 21 | 35 | 79 |
| 15-Sep | 36 | 81 | 90 | 46 | 38 | 37 | 29 | 79 | 34 | 34 | 71 | 93 | 45 | 27 | 24 | 28 | 29 | 22 | 18 | 42 | 17 | 12 | 13 | 20 | 93 |
| 16-Sep | 44 | 24 | 18 | 28 | 17 | 16 | 22 | 58 | 20 | 15 | 13 | 19 | 22 | 27 | 25 | 28 | 29 | 24 | 15 | 10 | 14 | 30 | 25 | 22 | 58 |
| 17-Sep | 15 | 13 | 15 | 18 | 11 | 19 | 18 | 19 | 15 | 23 | 25 | 23 | 20 | 20 | 28 | 31 | 30 | 30 | 30 | 9 | 18 | 17 | 14 | 19 | 31 |
| 18-Sep | 44 | 96 | 88 | 92 | 55 | 27 | 44 | 22 | 37 | 26 | 27 | 30 | 24 | 26 | 20 | 20 | 19 | 14 | 14 | 19 | 27 | 17 | 20 | 24 | 96 |
| 19-Sep | 57 | 18 | 23 | 21 | 14 | 19 | 15 | 19 | 24 | 29 | 35 | 35 | 29 | 26 | 31 | 22 | 21 | 22 | 27 | 17 | 17 | 19 | 25 | 18 | 57 |
| 20-Sep | 13 | 23 | 17 | 38 | 16 | 17 | 15 | 26 | 25 | 45 | 90 | 46 | 39 | 47 | 64 | 34 | 24 | 27 | 41 | 74 | 43 | 68 | 64 | 22 | 90 |
| 21-Sep | 40 | 34 | 31 | 34 | 29 | 43 | 37 | 38 | 34 | 24 | 24 | 24 | 23 | 30 | 36 | 33 | 31 | 23 | 10 | 11 | 15 | 16 | 17 | 89 | 89 |
| 22-Sep | 23 | 30 | 16 | 16 | 14 | 22 | 22 | 11 | 23 | 20 | 24 | 26 | 20 | 18 | 16 | 17 | 15 | 11 | 9 | 9 | 10 | 11 | 14 | 11 | 30 |
| 23-Sep | 16 | 16 | 13 | 10 | 10 | 6 | 7 | 10 | M | 12 | 12 | 13 | 12 | 12 | 11 | 11 | 13 | 11 | 11 | 12 | 11 | 11 | 10 | 16 | 16 |
| 24-Sep | 10 | 9 | 11 | 9 | 12 | 11 | 15 | 14 | 16 | 34 | 31 | 29 | 34 | 34 | 36 | 33 | 27 | 30 | 31 | 13 | 8 | 13 | 16 | 17 | 36 |
| 25-Sep | 20 | 21 | 20 | 20 | 22 | 21 | 19 | 20 | 23 | 35 | 36 | 37 | 45 | 43 | 29 | 28 | 21 | 18 | 24 | 17 | 31 | 73 | 46 | 36 | 73 |
| 26-Sep | 41 | 27 | 32 | 34 | 46 | 83 | 78 | 39 | 19 | 22 | 18 | 19 | 17 | 16 | 14 | 22 | 13 | 9 | 9 | 13 | 11 | 17 | 12 | 9 | 83 |
| 27-Sep | 51 | 62 | 30 | 12 | 17 | 40 | 41 | 36 | 18 | 50 | 30 | 32 | 39 | 32 | 33 | 29 | 27 | 27 | 21 | 21 | 23 | 25 | 61 | 12 | 62 |
| 28-Sep | 11 | 11 | 13 | 18 | 63 | 69 | 91 | 39 | 16 | 28 | 22 | 24 | 40 | 34 | 24 | 37 | 30 | 14 | 14 | 32 | 32 | 42 | 46 | 29 | 91 |
| 29-Sep | 18 | 21 | 16 | 12 | 15 | 33 | 19 | 34 | 20 | 21 | 38 | 31 | 31 | 30 | 42 | 55 | 23 | 44 | 36 | 11 | 59 | 25 | 71 | 64 | 71 |
| 30-Sep | 74 | 46 | 59 | 34 | 52 | 11 | 14 | 13 | 15 | 18 | 16 | 15 | 16 | 16 | 17 | 16 | 16 | 16 | 16 | 15 | 15 | 15 | 16 | 16 | 74 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|--|
| 74 | 96 | 90 | 92 | 74 | 83 | 91 | 79 | 94 | 50 | 98 | 93 | 76 | 102 | 68 | 76 | 71 | 64 | 77 | 82 | 59 | 73 | 93 | 89 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-----------------|
| Calibration Date | September 1, 2016 | Last Calibration | August 15, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Reason: | Routine | | |
| Start Time (MST) | 8:50 | End Time (MST) | 12:57 |
| Gas Cert Reference | LL110515 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 49.8 ppm | Cal Gas Exp Date | 9/08/18 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11041107 |
| ZAG Make/Model | API 701 | Serial Number | 5613 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 11038 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|-------------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | HVPS voltage | 548 | 524 |
| Analyzer IP address | 192.168.1.73 | | Lamp voltage | 1417 | 2845 |
| Calculated slope | 0.997849 | 0.999968 | Box temp | 31.0 | 31.0 |
| Calculated intercept | -0.665200 | -0.218957 | Pressure | 26.1 | 26.1 |
| Analyzer Background | 41.9 | 32.2 | Flow | 683 | 683 |
| Analyzer Coefficient | 0.973 | 1.013 | Lamp Ratio | 48 | 94 |
| Analyzer make | API T100 | | Analyzer serial # | 599 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 5000 | 78.9 | 785.8 | 786.6 | 0.999 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 78.9 | 785.8 | 785.8 | 1.000 |
| second point | 5000 | 39.4 | 392.4 | 393.1 | 0.998 |
| third point | 5000 | 19.7 | 196.2 | 196.7 | 0.998 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 78.9 | 785.8 | 775.9 | 1.013 |
| Average Correction Factor | | | | | 0.999 |

Corrected As found 786.8 Previous response 788.2 % change 0.2%

Notes:

UV Lamp replaced, UV lamp peaked, PMT was adjusted, zero and span adjusted, filter changed out

Calibration Performed By:

Melissa Lemay



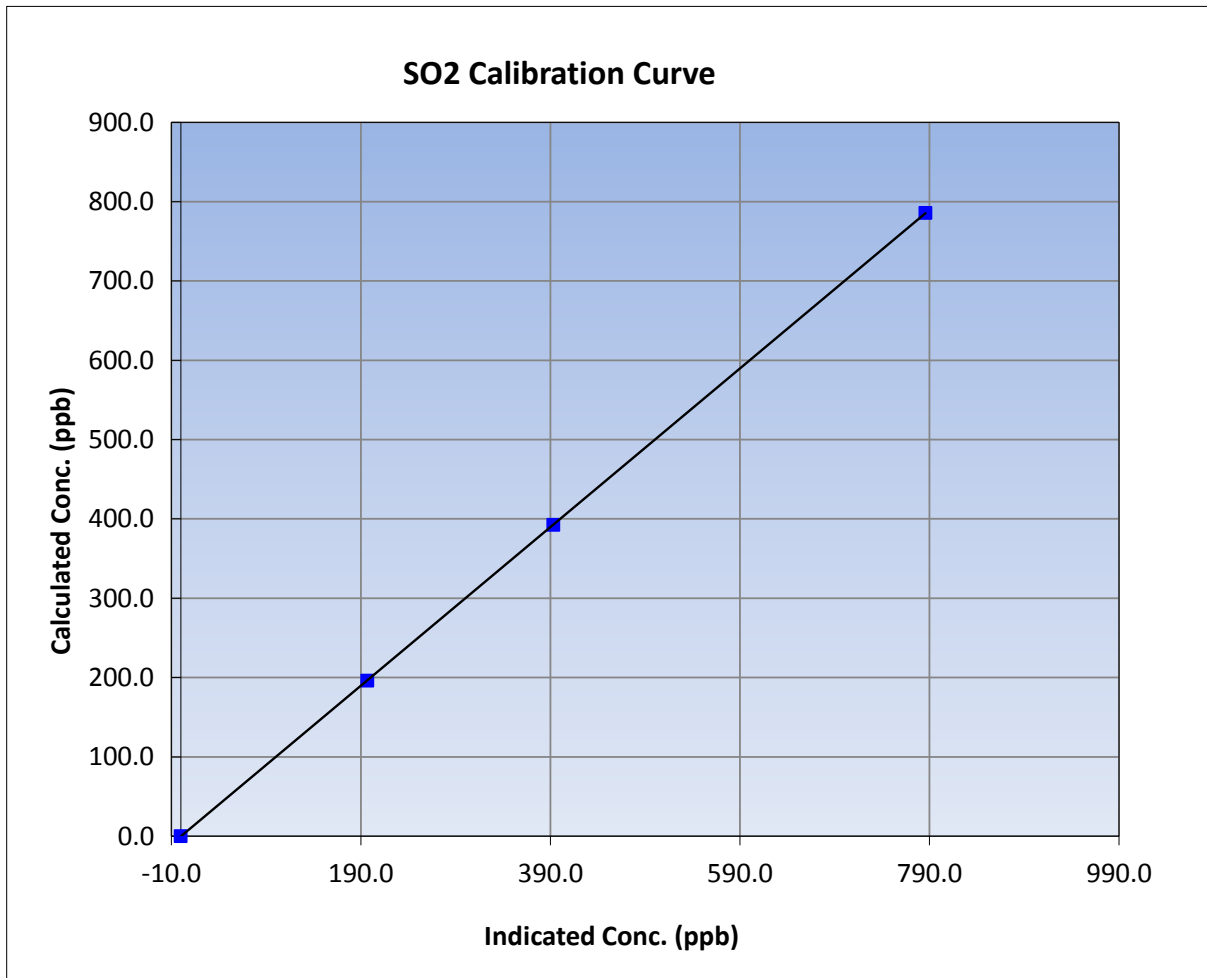
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 8:50 | End Time (MST) | 12:57 |
| Analyzer make | API T100 | Analyzer serial # | 599 |

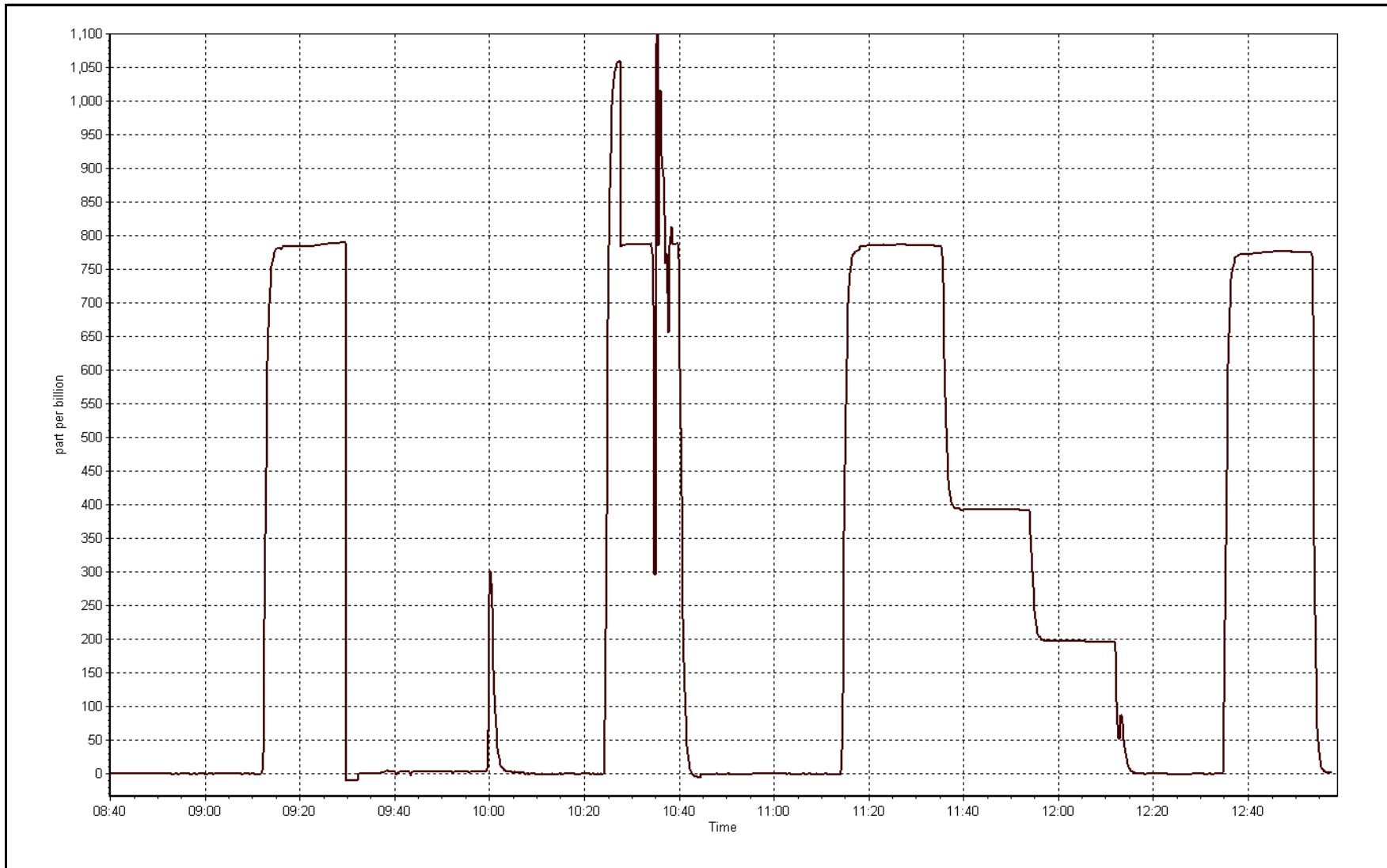
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999998 |
| 785.8 | 785.8 | 1.0001 | | |
| 392.4 | 393.1 | 0.9983 | Slope | 0.999968 |
| 196.2 | 196.7 | 0.9975 | | |
| | | | Intercept | -0.218957 |



SO2 Calibration Plot

Date: September 1, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 23, 2016 | Last Calibration | August 16, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Reason: | Routine | | |
| Start Time (MST) | 9:20 | End Time (MST) | 12:09 |
| Gas Cert Reference | CC178364 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.07 ppm | Cal Gas Exp Date | September 9, 2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11041107 |
| Dil air Make/Model | API 701 | Serial Number | 5613 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 11038 |
| SO2 gas concentration | 49.8 ppm | SO2 gas cert/exp | LL110515 8/Sep/18 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -727 | -727 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1006 | 1006 |
| Calculated slope | 0.991927 | 1.010110 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.196107 | 0.013003 | Pressure | 688.4 | 688.4 |
| Analyzer Background | 2.08 | 2.08 | Flow | 0.447 | 0.447 |
| Analyzer Coefficient | 1.016 | 1.016 | Intensity | 89 | 89 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-TLE | | Analyzer serial # | 1218153359 | |
| Converter make/model | CDN-101 | | Converter serial # | 456 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5000 | 78.9 | 80.0 | 79.4 | 1.008 |
| SO2 scrubber check | 5000 | 17.6 | 175.3 | 0.2 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 78.9 | 80.0 | 79.1 | 1.011 |
| second point | 5000 | 39.4 | 40.0 | 39.8 | 1.004 |
| third point | 5000 | 19.7 | 20.0 | 19.6 | 1.019 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 5000 | 78.9 | 80.0 | 78.7 | 1.017 |
| Average Correction Factor | | | | | 1.011 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 79.4 | Previous response | 80.5 | % change | 1.3% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Scrubber check done after as founds. Inlet filter changed. No adjustments or maintenance done.

Calibration Performed By:

Melissa Lemay



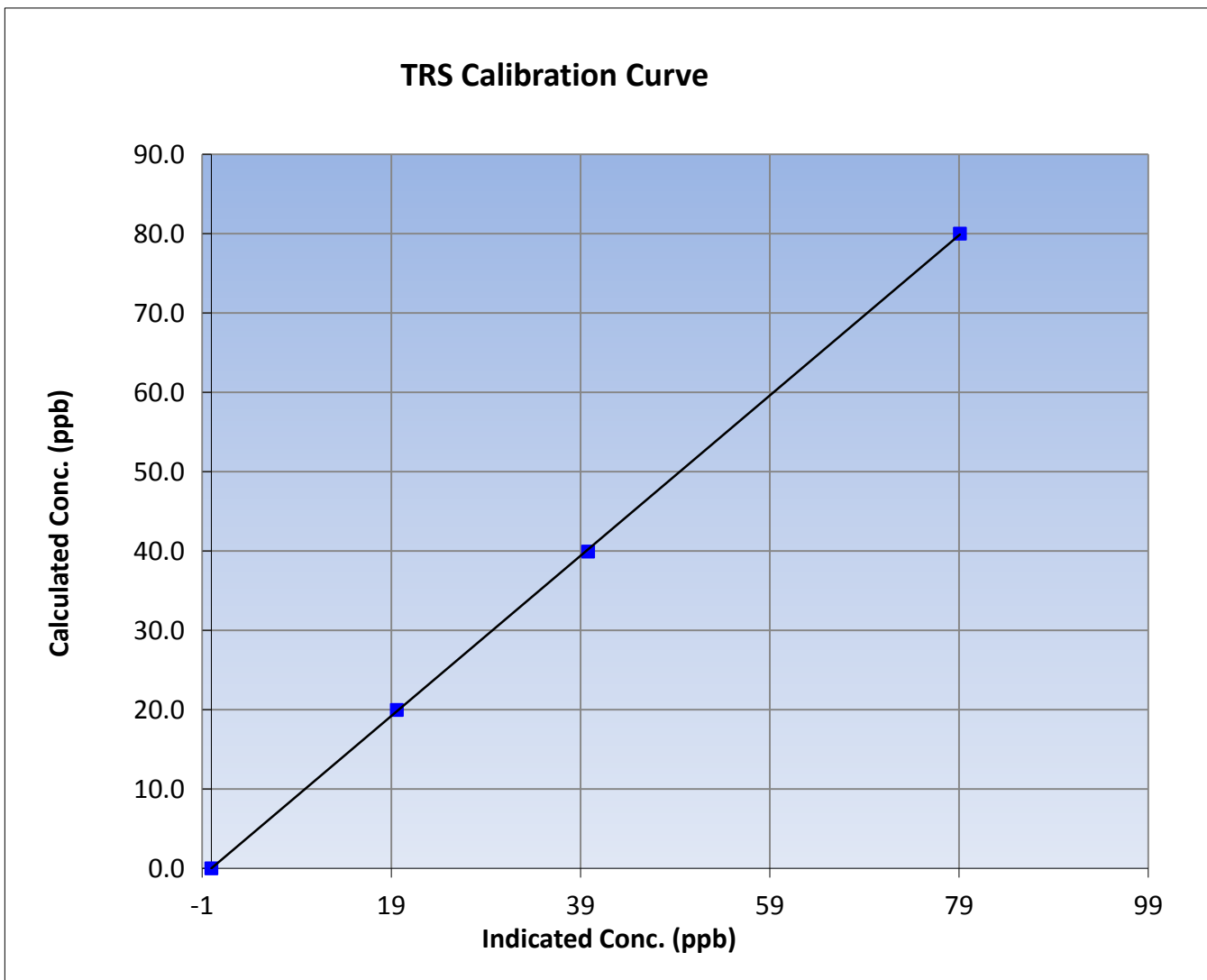
Wood Buffalo Environmental Association TRS Calibration Report

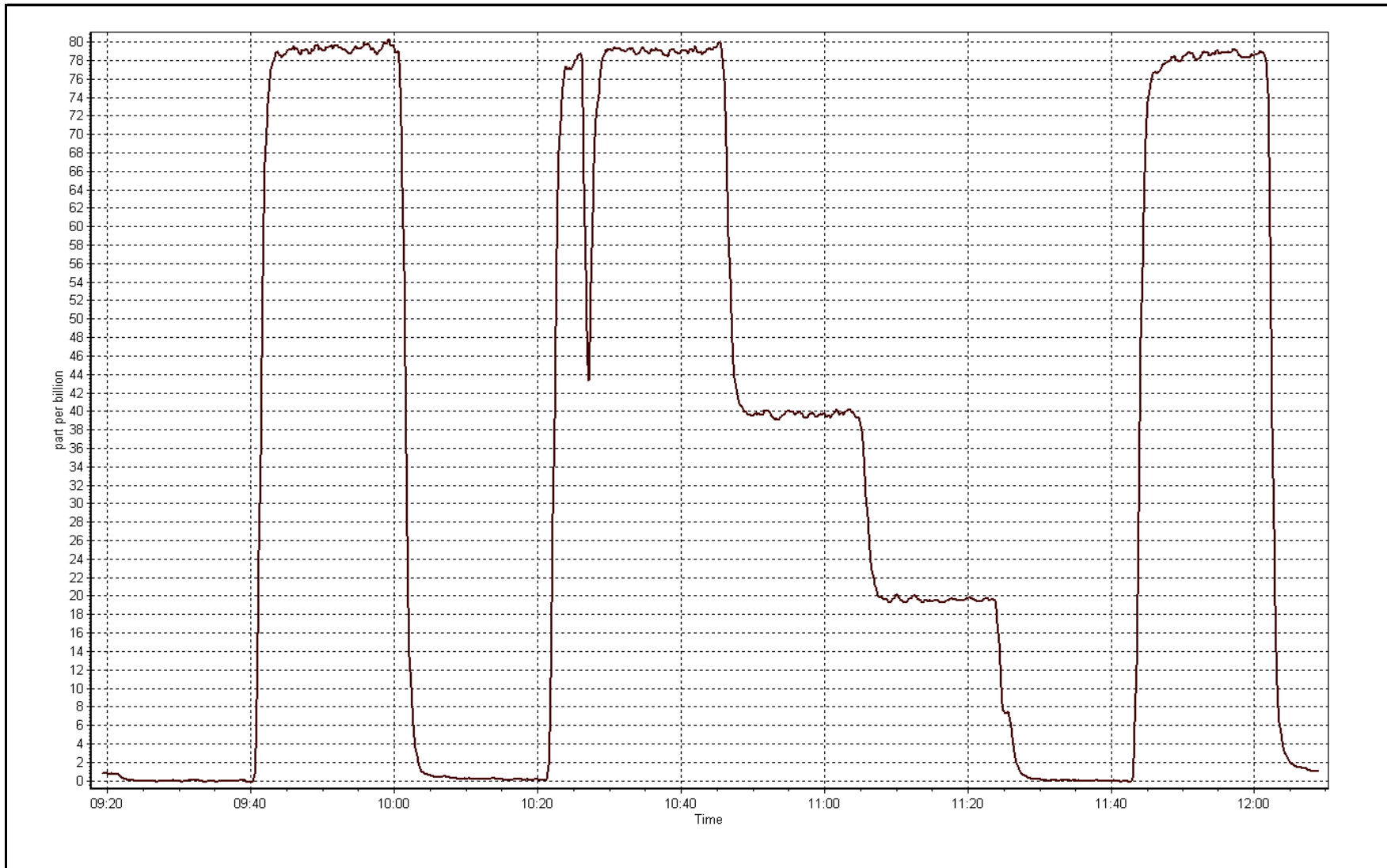
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 23, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 9:20 | End Time (MST) | 12:09 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1218153359 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999970 |
| 80.0 | 79.1 | 1.0114 | | |
| 40.0 | 39.8 | 1.0038 | Slope | 1.010110 |
| 20.0 | 19.6 | 1.0192 | | |
| | | | Intercept | 0.013003 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|-------------------|
| Calibration Date | September-20-16 | Last Calibration | August-15-16 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Reason: | Routine | | |
| Start Time (MST) | 7:45 | End Time (MST) | 11:57 |
| Gas Cert Reference | LL110515 | Cal Gas Expiry Date | September 8, 2018 |
| CH4 Cal Gas Conc. | 517 ppm | CH4 Equiv Conc. | 1067.0 ppm |
| C3H8 Cal Gas Conc. | 200 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11041107 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5613 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 11038 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|---------------------|---------------|--------------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 9.2 | 9.2 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 34.2 | 34.2 |
| Calculated slope | 1.003641 | 1.002722 | Fuel Pressure | 23.1 | 23.1 |
| Calculated intercept | -0.064958 | -0.060671 | Analyzer Coeff | 3.056 | 3.038 |
| | | | Analyzer BKG | 1.320 | 1.370 |

| | | | |
|---------------|--------|-------------------|------------|
| Analyzer make | 51i-LT | Analyzer serial # | 1505164380 |
|---------------|--------|-------------------|------------|

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.14 | ---- |
| as found span | 5000 | 78.9 | 16.84 | 17.05 | 0.988 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| high point | 5000 | 78.9 | 16.84 | 16.82 | 1.001 |
| second point | 5000 | 39.4 | 8.41 | 8.49 | 0.990 |
| third point | 5000 | 19.6 | 4.18 | 4.27 | 0.980 |
| as left zero | 5000 | 0.0 | 0.00 | 0.04 | ---- |
| as left span | 5000 | 78.9 | 16.84 | 17.05 | 0.988 |
| Average Correction Factor | | | | | 0.990 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|-------|
| Corrected As found | 16.91 | Previous response | 16.84 | % change | -0.4% |
|--------------------|-------|-------------------|-------|----------|-------|

Notes:

zero and span adjusted, hydrogen changed out, filter changed out

Calibration Performed By:

Melissa Lemay



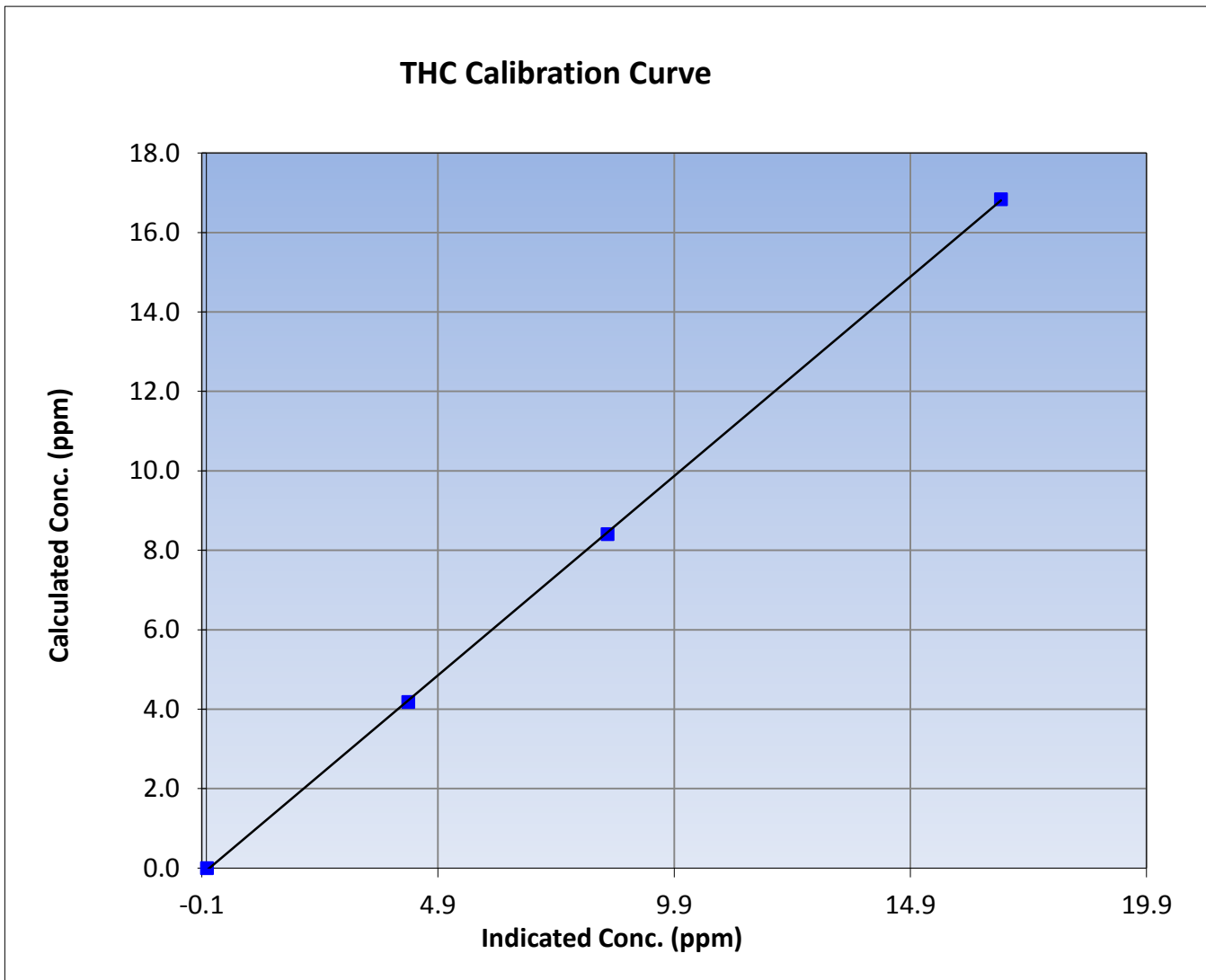
Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:45 | End Time (MST) | 11:57 |
| Analyzer make | 51i-LT | Analyzer serial # | 1505164380 |

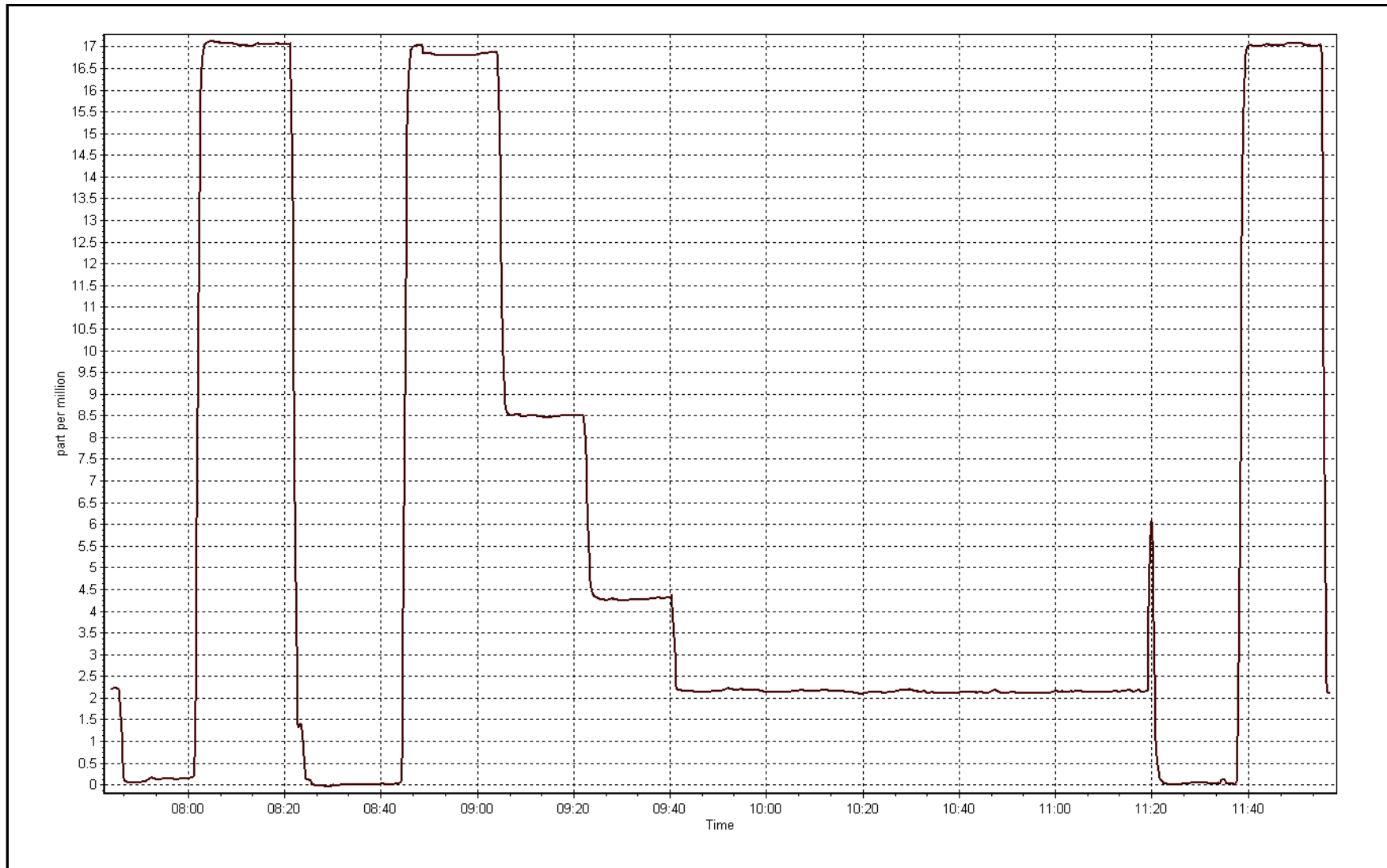
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.01 | ---- | Correlation Coefficient | 0.999955 |
| 16.84 | 16.82 | 1.0010 | | |
| 8.41 | 8.49 | 0.9903 | | |
| 4.18 | 4.27 | 0.9795 | | |
| | | | Slope | 1.002722 |
| | | | Intercept | -0.060671 |



THC Calibration Plot

Date: September 20, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Reason: | Routine | | |
| Start Time (MST) | 11:55 | End Time (MST) | 14:33 |
| NO2 GPT Ref date | September-20-16 | Transfer Standard | Nox |
| Calibrator Make/Model | Sabio 4010 | Station temp. | 22 Deg C |
| ZAG make/model | Teledyne API 701 | Serial Number | 11041107 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 5613 |
| | | Serial Number | 11038 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|------------|--------|--------|
| Analyzer Range | 0 - 500 ppb | | Box temp. | 24.1 | 24.1 |
| Analyzer IP address | 192.168.1.79 | | Lamp temp. | 58.0 | 58.0 |
| Calculated slope | 1.012836 | 1.001342 | Pressure | 26.7 | 26.7 |
| Calculated intercept | 0.054037 | -0.131818 | Flow | 759.0 | 759.0 |
| Analyzer Background | 1.2 | 1.2 | Intensity | 4358.2 | 4358.2 |
| Analyzer Coefficient | 1.002 | 1.018 | | | |

| | | | |
|---------------|----------|-------------------|-----|
| Analyzer make | API T400 | Analyzer serial # | 825 |
|---------------|----------|-------------------|-----|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp Intensity | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|---------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.00 | 0.0 | 0.3 | ---- |
| as found span | 5000 | 0.89 | 362.2 | 358.0 | 1.012 |
| calibrator zero | 5000 | 0.00 | 0.0 | 0.3 | ---- |
| high point | 5000 | 0.89 | 362.2 | 361.9 | 1.001 |
| second point | 5000 | 0.47 | 215.4 | 215.3 | 1.000 |
| third point | 5000 | 0.36 | 114.0 | 113.7 | 1.003 |
| as left zero | 5000 | 0.00 | 0.0 | 0.4 | ---- |
| as left span | 5000 | 0.89 | 362.2 | 371.0 | 0.976 |
| Average Correction Factor | | | | | 1.001 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 357.7 | Previous response | 357.6 | % change | 0.0% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

filter changed out, span adjusted, no maintenance done

Calibration Performed By:

Melissa Lemay



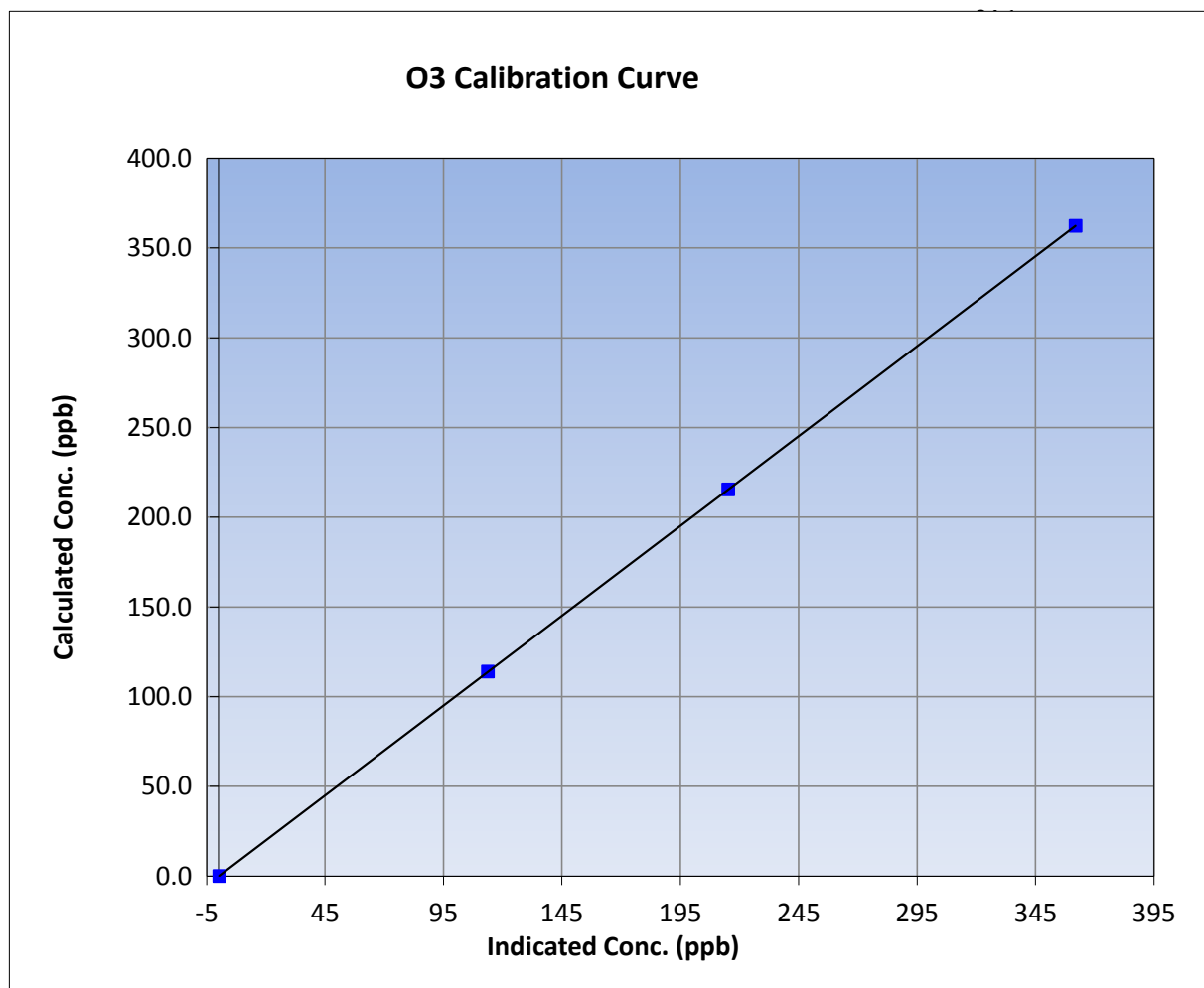
Wood Buffalo Environmental Association O3 Calibration Report

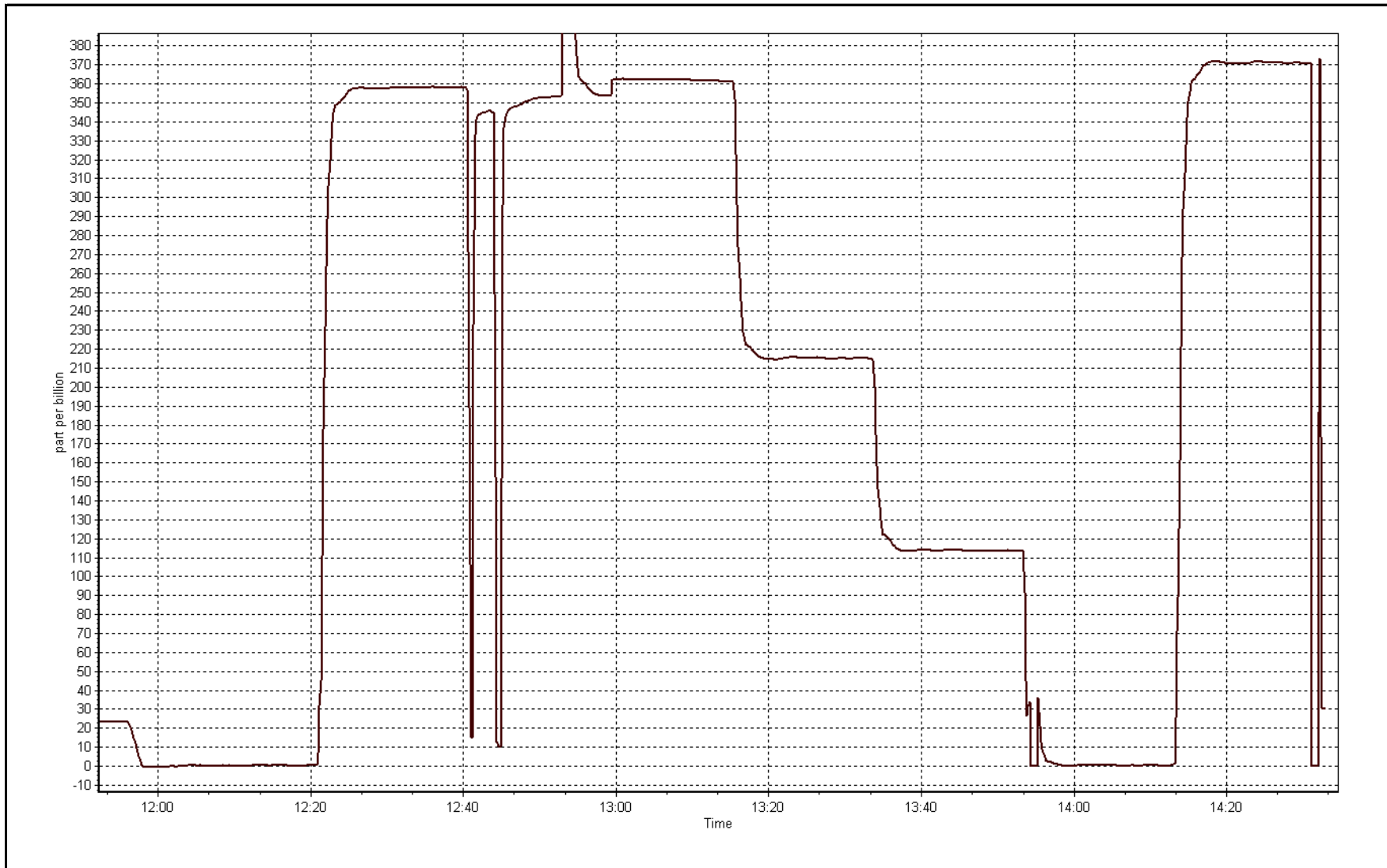
Station Information

| | | | |
|------------------|------------------|----------------------|-----------------|
| Calibration Date | September-20-16 | Previous Calibration | August 16, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 11:55 | End Time (MST) | 14:33 |
| Analyzer make | API T400 | Analyzer serial # | 825 |

Calibration Data

| Calculated concentration (ppb) (Cc) | 9/20/16 | Correction factor (Cc/lc) | Statistical Evaluation | |
|-------------------------------------|---------|---------------------------|-------------------------|-----------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 0.999998 |
| 362.2 | 361.9 | 1.0008 | | |
| 215.4 | 215.3 | 1.0005 | Slope | 1.001342 |
| 114.0 | 113.7 | 1.0026 | | |
| | | | Intercept | -0.131818 |







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Reason: | Routine | | |
| Start Time (MST) | 7:45 | End Time (MST) | 11:58 |
| NO Cal Gas Conc | 50.7 ppm | Gas Cert Reference | LL110515 |
| NOx Cal Gas Conc | 50.9 ppm | Cal Gas Expiry Date | September 8, 2018 |
| Calibrator | Sabio 4010 | Serial Number | 11041107 |
| Zero air Generator | Teledyne API T701 | Serial Number | 5613 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|-------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 11038 |
|-------------------|----------------------------|-----------------|-------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|-----------|-----------|----------|
| As Found (last calibration results) | Data Slope | 1.005388 | 1.005914 | 1.005052 |
| | Data Offset | -0.919491 | -1.052880 | 0.279040 |
| Current Calibration | Data Slope | 1.000485 | 1.000289 | 1.000695 |
| | Data Offset | -2.298807 | -2.289254 | 0.495657 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1410661329 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 1.034 | | 1.071 | |
| NOx coefficient | 1.001 | | 1.002 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 7.7 | | 7.9 | |
| NOx bkgrnd | 7.7 | | 8.0 | |
| Chamber Temp | 50.3 | Deg C | 50.3 | Deg C |
| Moly Temp | 323.9 | Deg C | 323.9 | Deg C |
| PMT voltage | -827.7 | V | -827.7 | V |
| PMT Temp | -2.9 | Deg C | -2.9 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 192.6 | mmHg | 192.6 | mmHg |
| R Cell Press Nox | 192.6 | mmHg | 192.6 | mmHg |
| NO sample flow | 0.832 | lpm | 0.832 | lpm |
| Nox sample Flow | 0.832 | lpm | 0.832 | lpm |

Notes:

Span adjusted, filter changed out, no maintenance done



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

September 20, 2016

Station Number:

AMS 13

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| as found span | 5000 | 78.9 | 803.2 | 800.0 | 3.2 | 781.6 | 778.1 | 3.5 | 1.0276 | 1.0282 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high point | 5000 | 78.9 | 803.2 | 800.0 | 3.2 | 803.4 | 800.4 | 3.0 | 0.9998 | 0.9996 |
| second point | 5000 | 39.4 | 401.1 | 399.5 | 1.6 | 405.9 | 404.3 | 1.6 | 0.9882 | 0.9882 |
| third point | 5000 | 19.7 | 200.5 | 199.8 | 0.8 | 204.1 | 203.5 | 0.7 | 0.9826 | 0.9816 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | ---- | ---- |
| as left span | 5000 | 78.9 | 803.2 | 444.1 | 359.1 | 818.2 | 446.2 | 372.1 | 0.9817 | 0.9953 |
| Average Correction Factor | | | | | | | | | 0.9902 | 0.9898 |

Corrected As found
Previous Response

NO_x= 781.7
NO_x= 799.8

NO= 778.2
NO= 796.4

Percent Change

NO_x= 2.3%

NO= 2.3%

GPT Calibration Data

Dilution Flow (total) 5000 ccm

Source Gas Flow 78.90 ccm

NOx ref calc conc = 803.2 ppb

NO ref calc conc = 800.0 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 3.2 | 809.1 | 806.3 | 0.0 | 0.9927 | 0.9922 | ---- | ---- |
| 1st NO2 (300) | 444.1 | 365.4 | 808.9 | 444.1 | 364.8 | 0.9930 | ---- | 1.0015 | 99.8% |
| 2nd NO2 (200) | 590.9 | 218.6 | 808.9 | 590.9 | 218.0 | 0.9930 | ---- | 1.0026 | 99.7% |
| 3rd NO2 (100) | 692.3 | 117.2 | 808.1 | 692.3 | 115.8 | 0.9939 | ---- | 1.0117 | 98.8% |
| 2nd NO ref point | | 3.2 | 808.7 | 804.9 | 2.5 | 0.9932 | 0.9940 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9933 | | 1.0053 | 99.5% |

Calibration Performed By:

Melissa Lemay



Wood Buffalo Environmental Association

NO_x Calibration Summary

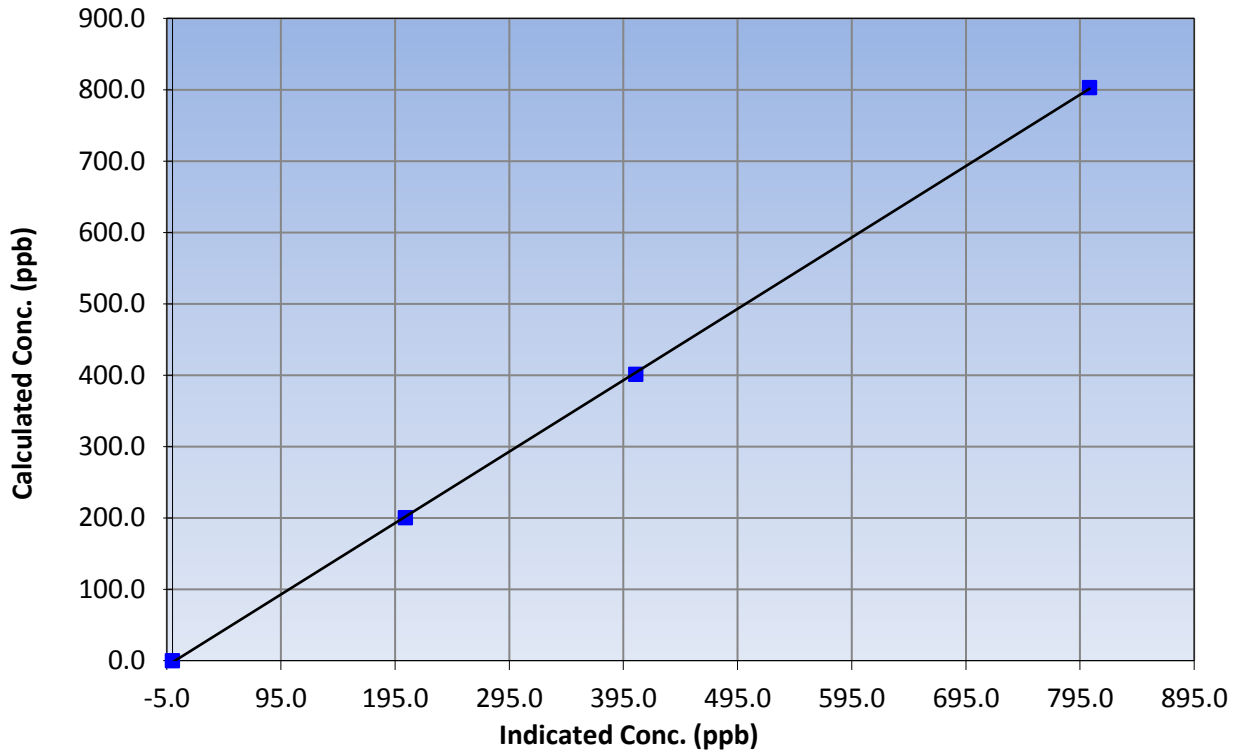
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 15, 2016 |
| 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 Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999950 |
| 803.2 | 803.4 | 0.9998 | | |
| 401.1 | 405.9 | 0.9882 | Slope | 1.000485 |
| 200.5 | 204.1 | 0.9826 | | |
| | | | Intercept | -2.298807 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

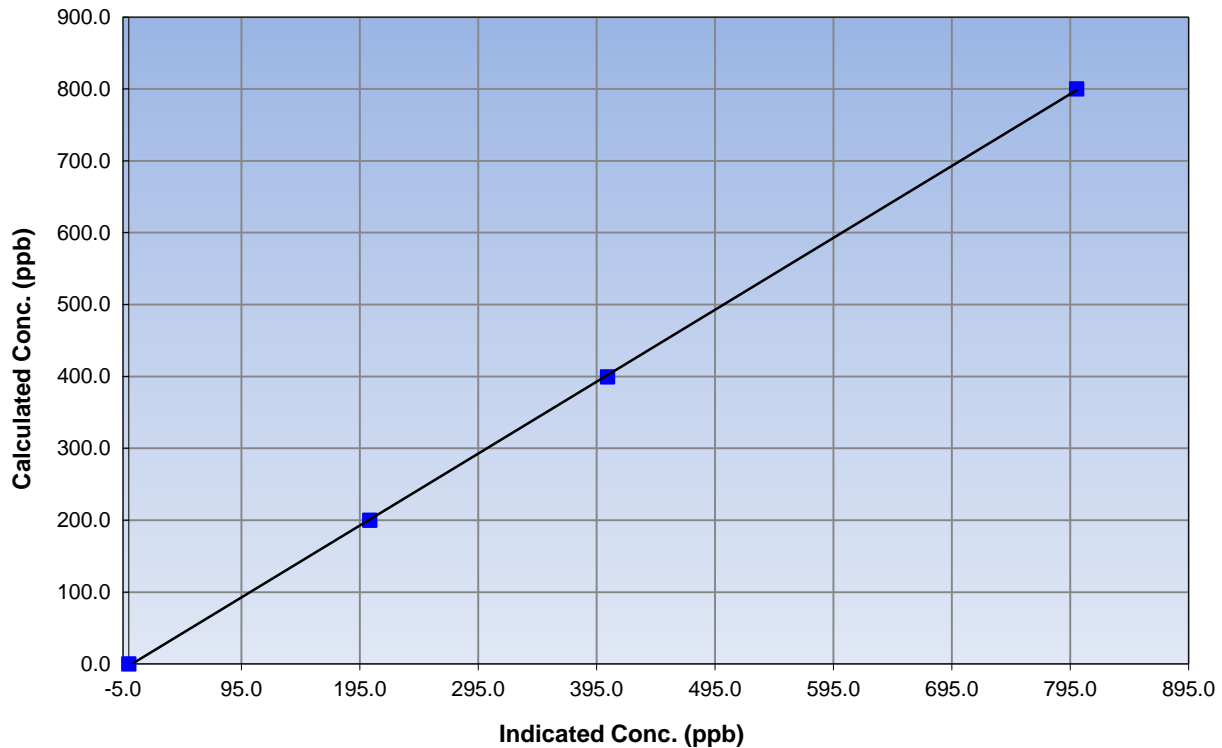
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 15, 2016 |
| 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 Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999949 |
| 800.0 | 800.4 | 0.9996 | | |
| 399.5 | 404.3 | 0.9882 | Slope | 1.000289 |
| 199.8 | 203.5 | 0.9816 | | |
| | | | Intercept | -2.289254 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

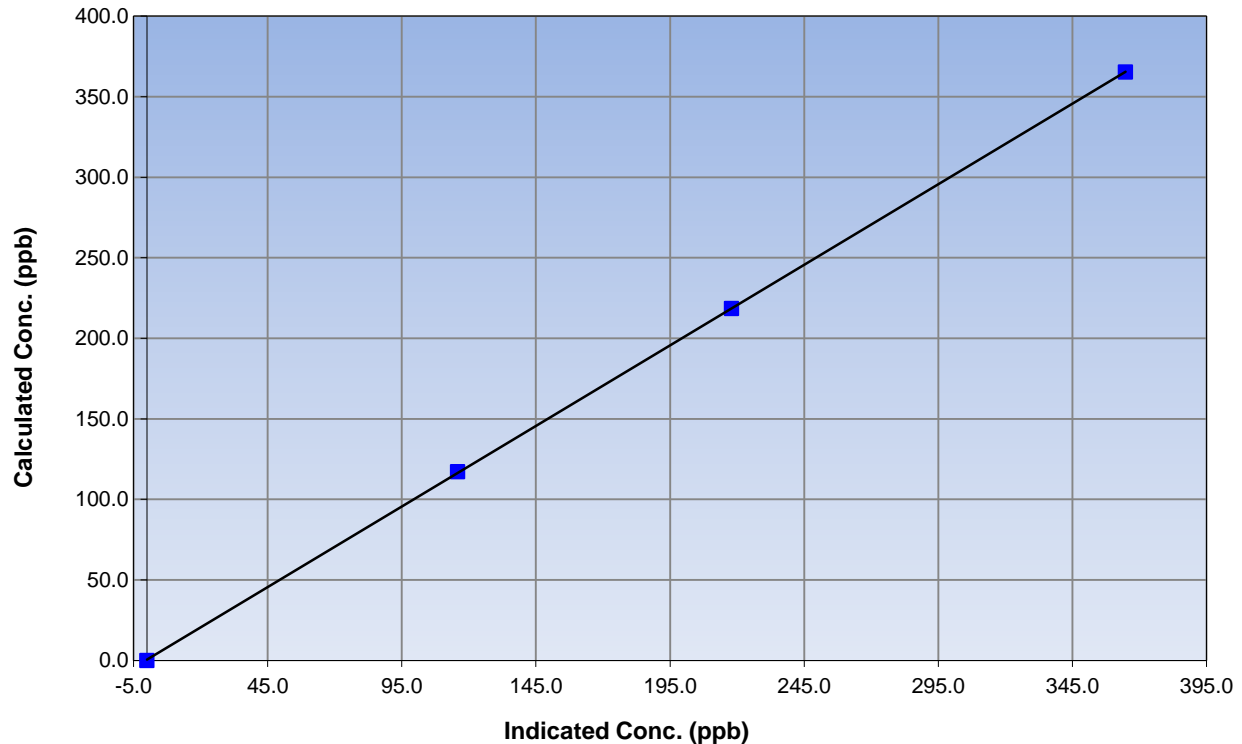
Station Information

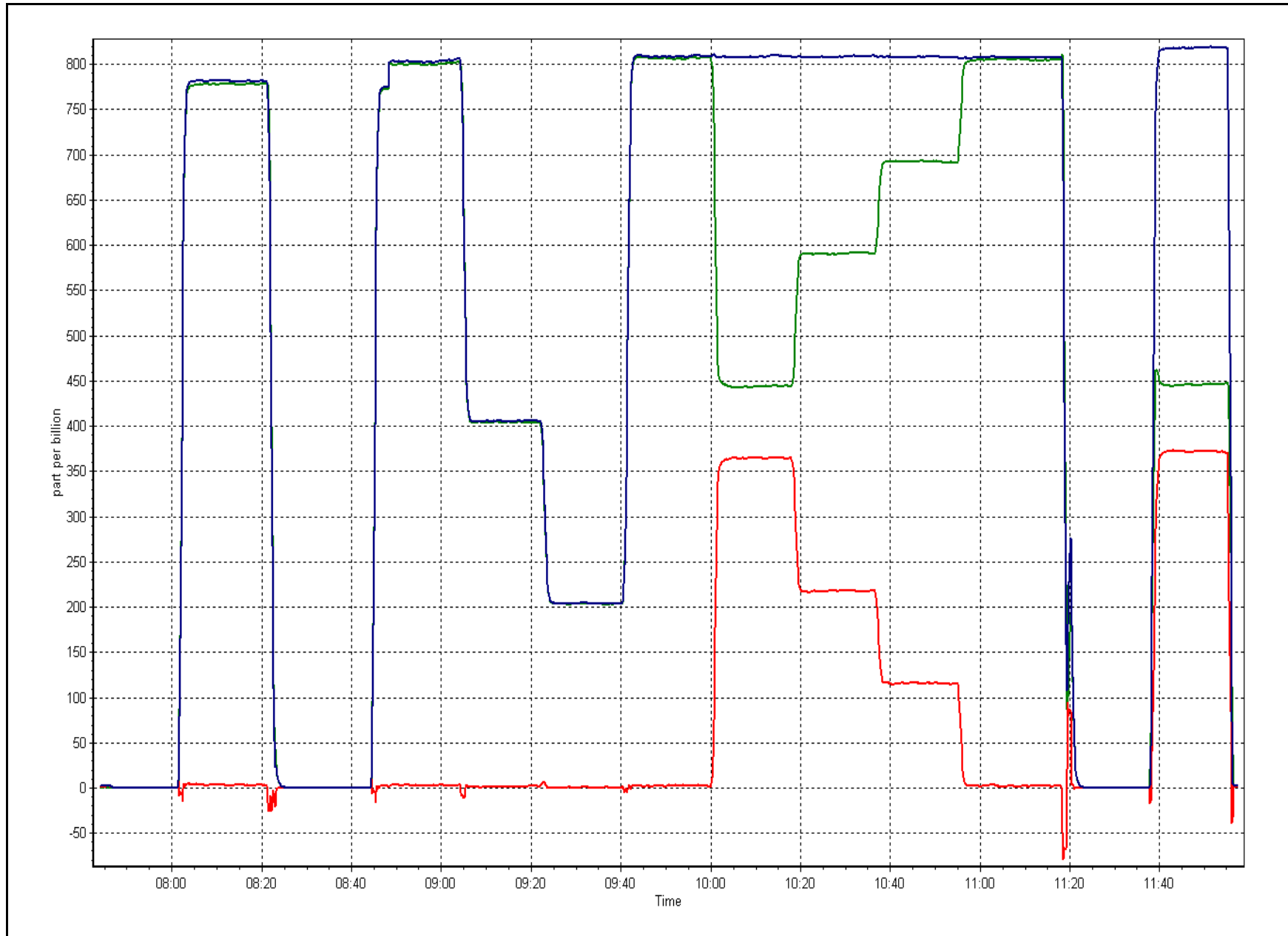
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 20, 2016 | Previous Calibration | August 15, 2016 |
| Station Number | Fort McKay South | Station Number | AMS 13 |
| Start Time (MST) | 7:45 | End Time (MST) | 11:58 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661329 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | N/A | Correlation Coefficient | 0.999988 |
| 365.4 | 364.8 | 1.0015 | | |
| 218.6 | 218.0 | 1.0026 | Slope | 1.000695 |
| 117.2 | 115.8 | 1.0117 | | |
| | | | Intercept | 0.495657 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|-----------------|
| Station Name: | Fort McKay South | Station number: | AMS 13 |
| Calibration Date: | September 20, 2016 | Last Cal Date: | August 18, 2016 |
| Start time (MST): | 12:02 | End time (MST): | 12:58 |
| Sharp Model: | 5030 | S/N: | E-803 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 4066 |
| Flow Standard Model: | Delta Cal | S/N: | 1450 |
| Temp/RH standard: | Delta Cal | S/N: | 1450 |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------|-------------------------------------|---------------|-------------------------------------|---------------|
| T1 (°C) | 10 | 11.2 | 10 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 985 | 988 | 985 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1023 | 1000 | <input checked="" type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 1 | ----- | -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"/> | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| Leak Test: | Date of check: | <u>September 20, 2016</u> | Last Cal Date: | <u>June 9, 2016</u> | Tolerance |
|------------|-------------------|---------------------------|------------------|---------------------|-----------|
| | Flow w/o adaptor: | <u>17.1</u> | Flow w/ adaptor: | <u>16.8</u> | 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|------------------------------------|-----------------------------------------|
| Foil Calibration | Foil Mass: <u>1337</u> | S/N: <u>NA</u> |
| | Date of check: <u>June 9, 2016</u> | Last Cal Date: <u>July 14, 2016</u> |
| | New Correction Factor: <u>7150</u> | Previous Correction Factor: <u>7079</u> |

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

Notes: Nephelometer and Flow adjusted, cyclone head cleaned

Calibration by: Melissa Lemay



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

| | | | |
|------------------|---------------------------------------------|---------------------------------------|----------------------------------|
| Calibration Date | September 23, 2016 | Previous Calibration | May 27, 2015 |
| Station Name | Fort McKay South | Station Number | AMS 13 |
| Reason: | <input checked="" type="checkbox"/> Routine | <input type="checkbox"/> Installation | <input type="checkbox"/> Removal |
| Start Time (MST) | 8:32 | End Time (MST) | 9:10 |
| Barometric Press | 735 | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053-120 | Serial Number | K13090 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|----------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | N14664 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 11038 |
| DACS voltage range | 5000 | DACS channel # | P2 |
| <u>Before</u> | | <u>After</u> | |
| Calculated slope | 0.991938 | Calculated slope | 0.999062 |
| Calculated intercept | 0.181139 | Calculated intercept | 0.034320 |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.1 | 1.0031 |
| 400 | 39.4 | 39.4 | 0.9990 |
| 600 | 58.6 | 58.5 | 1.0009 |
| 800 | 77.8 | 77.8 | 0.9989 |
| Average Correction Factor | | | 1.0005 |

WIND DIRECTION

| | | | |
|--------------------------------------|---------------------------|-------------------------------------|-----------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | N13744 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 11038 |
| DACS voltage range | 5000 | DACS channel # | SE 24 |
| <u>Before</u> | | <u>After</u> | |
| Calculated slope | 1.005384 | Calculated slope | 1.000451 |
| Calculated intercept | -1.733214 | Calculated intercept | -0.741194 |
| As Found Declination (west of North) | 14 | As Left Declination (west of North) | 14 |

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | 0.8 | n/a |
| 90 | 91.3 | 0.9858 |
| 180 | 180.1 | 0.9994 |
| 270 | 269.7 | 1.0011 |
| 357 | 358.4 | 0.9961 |
| Average Correction Factor | | 0.9956 |

Notes:

Bearings good
 North good before and after take down of tower

Calibration Performed By: Melissa Lemay



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAM MONTHLY REPORT

**AMS 14
ANZAC
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 676 | 38 | 44 | 99.17 | 12 | 0 | 2 | 0 |
| TRS(ppb) Average | 666 | 36 | 54 | 97.50 | 1 | 0 | 0 | 0 |
| THC(ppm) Average | 657 | 34 | 63 | 95.97 | 2.5 | - | 2 | - |
| NMHC(ppm) Average | 657 | 34 | 63 | 95.97 | 0.173 | - | 0.008 | - |
| CH4(ppm) Average | 657 | 34 | 63 | 95.97 | 2.5 | - | 2 | - |
| NO2(ppb) Average | 680 | 38 | 40 | 99.72 | 8 | 0 | 3 | - |
| NO(ppb) Average | 680 | 38 | 40 | 99.72 | 11 | - | 1 | - |
| NOX(ppb) Average | 680 | 38 | 40 | 99.72 | 19 | - | 3 | - |
| O3(ppb) Average | 684 | 35 | 36 | 99.86 | 39 | 0 | 31 | - |
| PM2.5(ug/m3) Average | 676 | 3 | 44 | 94.31 | 13.4 | - | 5 | 0 |
| AT 2m(C) Average | 720 | 0 | 0 | 100.00 | 23.1 | - | 15.7 | - |
| RH(%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 95 | - |
| Leaf Wetness (% of range) Average | 720 | 0 | 0 | 100.00 | 57 | - | 23 | - |
| WS(km/h) Average | 717 | 0 | 3 | 99.58 | 19 | - | 16 | - |
| WD(deg) Average | 717 | 0 | 3 | 99.58 | - | - | - | - |
| PC(mm) Total | 720 | 0 | 0 | 100.00 | 8.4 | - | 32 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2(ppb) Average | 676 | 0.3 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 12 |
| TRS(ppb) Average | 666 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC(ppm) Average | 657 | 1.87 | 0.1 | - | 1.7 | 1.8 | 1.8 | 1.9 | 1.9 | 2 | 2.5 |
| NMHC (ppm) Average | 657 | 0.002 | 0.009 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0.173 |
| CH4(ppm) Average | 657 | 1.87 | 0.1 | - | 1.7 | 1.8 | 1.8 | 1.9 | 1.9 | 2 | 2.5 |
| NO2(ppb) Average | 680 | 1.2 | 1 | - | 0 | 0 | 0 | 1 | 2 | 3 | 8 |
| NO(ppb) Average | 680 | 0.3 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 11 |
| NOX(ppb) Average | 680 | 1.5 | 2 | - | 0 | 0 | 1 | 1 | 2 | 3 | 19 |
| O3(ppb) Average | 684 | 20.7 | 8 | - | 4 | 11 | 15 | 20 | 27 | 31 | 39 |
| PM2.5(ug/m3) Average | 676 | 2.94 | 1.7 | - | 0.3 | 1.5 | 1.8 | 2.4 | 3.6 | 5.1 | 13.4 |
| Temperature 2 m (C) Average | 720 | 10.8 | 4.5 | - | 0.9 | 5 | 7.7 | 10.5 | 13.9 | 16.5 | 23.1 |
| Relative Humidity (%) Average | 720 | 71.2 | 18 | - | 28 | 45 | 57 | 74 | 87 | 94 | 99 |
| Leaf Wetness (% of range) Average | 720 | 4.4 | 9 | - | 0 | 0 | 0 | 0 | 2 | 15 | 57 |
| Wind Speed 20 m (km/h) Average | 717 | 9.3 | 4 | - | 0 | 5 | 6 | 9 | 12 | 16 | 19 |
| Wind Direction 20 m (deg) Average | 717 | - | - | - | - | - | - | - | - | - | - |
| Precipitation (mm) Total | 720 | - | - | 49.78 | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS 14)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|---------------------|-----------------------------------------------------|
| SO2 | 16 Sep 2016 13:00 | 16 Sep 2016 14:00 | 2 | Station power failure |
| SO2 | 19 Sep 2016 16:00 | 19 Sep 2016 16:00 | 1 | Maintenance - cleaned glass manifold |
| SO2 | 27 Sep 2016 12:00 | 27 Sep 2016 14:00 | 3 | Maintenance - replaced calibration cylinder |
| TRS | 15 Sep 2016 12:00 | 15 Sep 2016 13:00 | 2 | Maintenance - reinitiated daily QA check |
| TRS | 15 Sep 2016 14:00 | 16 Sep 2016 02:00 | 13 | Analyzer Failure - sampling through span valve |
| TRS | 16 Sep 2016 04:00 | 16 Sep 2016 04:00 | 1 | Stabilization after daily span |
| TRS | 16 Sep 2016 13:00 | 16 Sep 2016 13:00 | 1 | Station power failure |
| TRS | 19 Sep 2016 16:00 | 19 Sep 2016 16:00 | 1 | Maintenance - cleaned glass manifold |
| CH4, NMHC, THC | 14 Sep 2016 11:00 | 14 Sep 2016 20:00 | 10 | Unstable operation - excessive baseline drift |
| CH4, NMHC, THC | 16 Sep 2016 10:00 | 16 Sep 2016 13:00 | 4 | Unstable operation - excessive baseline drift |
| CH4, NMHC, THC | 16 Sep 2016 14:00 | 16 Sep 2016 14:00 | 1 | Station power failure |
| CH4, NMHC, THC | 16 Sep 2016 15:00 | 16 Sep 2016 19:00 | 5 | Unstable operation - excessive baseline drift |
| CH4, NMHC, THC | 17 Sep 2016 02:00 | 17 Sep 2016 02:00 | 1 | Unstable operation - excessive baseline drift |
| CH4, NMHC, THC | 17 Sep 2016 04:00 | 17 Sep 2016 06:00 | 3 | Unstable operation - excessive baseline drift |
| CH4, NMHC, THC | 17 Sep 2016 10:00 | 17 Sep 2016 13:00 | 4 | Unstable operation - excessive baseline drift |
| CH4, NMHC, THC | 19 Sep 2016 16:00 | 19 Sep 2016 16:00 | 1 | Maintenance - cleaned glass manifold |
| NO2, NO, NOX | 16 Sep 2016 13:00 | 16 Sep 2016 13:00 | 1 | Station power failure |
| NO2, NO, NOX | 19 Sep 2016 16:00 | 19 Sep 2016 16:00 | 1 | Maintenance - cleaned glass manifold |
| O3 | 16 Sep 2016 13:00 | 16 Sep 2016 13:00 | 1 | Station power failure |
| PM2.5 | 07 Sep 2016 10:00 | 08 Sep 2016 09:00 | 24 | Flat line in sensor output signal |
| PM2.5 | 08 Sep 2016 10:00 | 08 Sep 2016 13:00 | 4 | Maintenance - reset analyzer and verified operation |
| PM2.5 | 16 Sep 2016 13:00 | 16 Sep 2016 13:00 | 1 | Station power failure |
| PM2.5 | 27 Sep 2016 01:00 | 27 Sep 2016 12:00 | 12 | Analyzer Failure - filter tape did not advance |
| Wind Speed, Wind Direction | 08 Sep 2016 06:00 | 08 Sep 2016 06:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 14 Sep 2016 07:00 | 14 Sep 2016 07:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 29 Sep 2016 23:00 | 29 Sep 2016 23:00 | 1 | Flat line in sensor output signal |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Anzac - September 2016

| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 12 ppb on Sep 18 21:00 | Maximum Daily Average: 1.6 ppb on Sep 19 | | Hours of Data: | 676 |
| Minimum Value: 0 ppb on Sep 2 02:00 | Minimum Daily Average: 0.0 ppb on Sep 28 | | Hours of Missing Data: | 44 |
| Maximum Diurnal Average: 0.8 ppb at hour 22 | Minimum Diurnal Average: 0.2 ppb at hour 8 | | Hours of Calibration: | 38 |
| Monthly Average: 0.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 3 | | 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 | 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 | 1 | 0 | 0 | 1 | 0.2 | 1 |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 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 | 0.2 | 0 |
| 6-Sep | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 7-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 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0.4 | 1 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 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 | 0.1 | 0 |
| 11-Sep | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 13-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 | 0.2 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 2 | 1 | 1 | 0.7 | 3 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | PF | PF | 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 | 0.1 | 0 |
| 18-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | 6 | 4 | 2 | 1.2 | 12 |
| 19-Sep | 1 | 1 | 1 | 3 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 1 | M | 0 | 0 | 0 | 0 | 10 | 8 | 3 | 1.6 | 10 | |
| 20-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 0 | 1 | 1 | 1.1 | 3 |
| 21-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 | 0.2 | 1 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 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 | 0.1 | 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 | C | C | C | C | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0.3 | 1 |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | M | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | 0.0 | 0 |
| 29-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 |
| 30-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 | 0.1 | 1 |

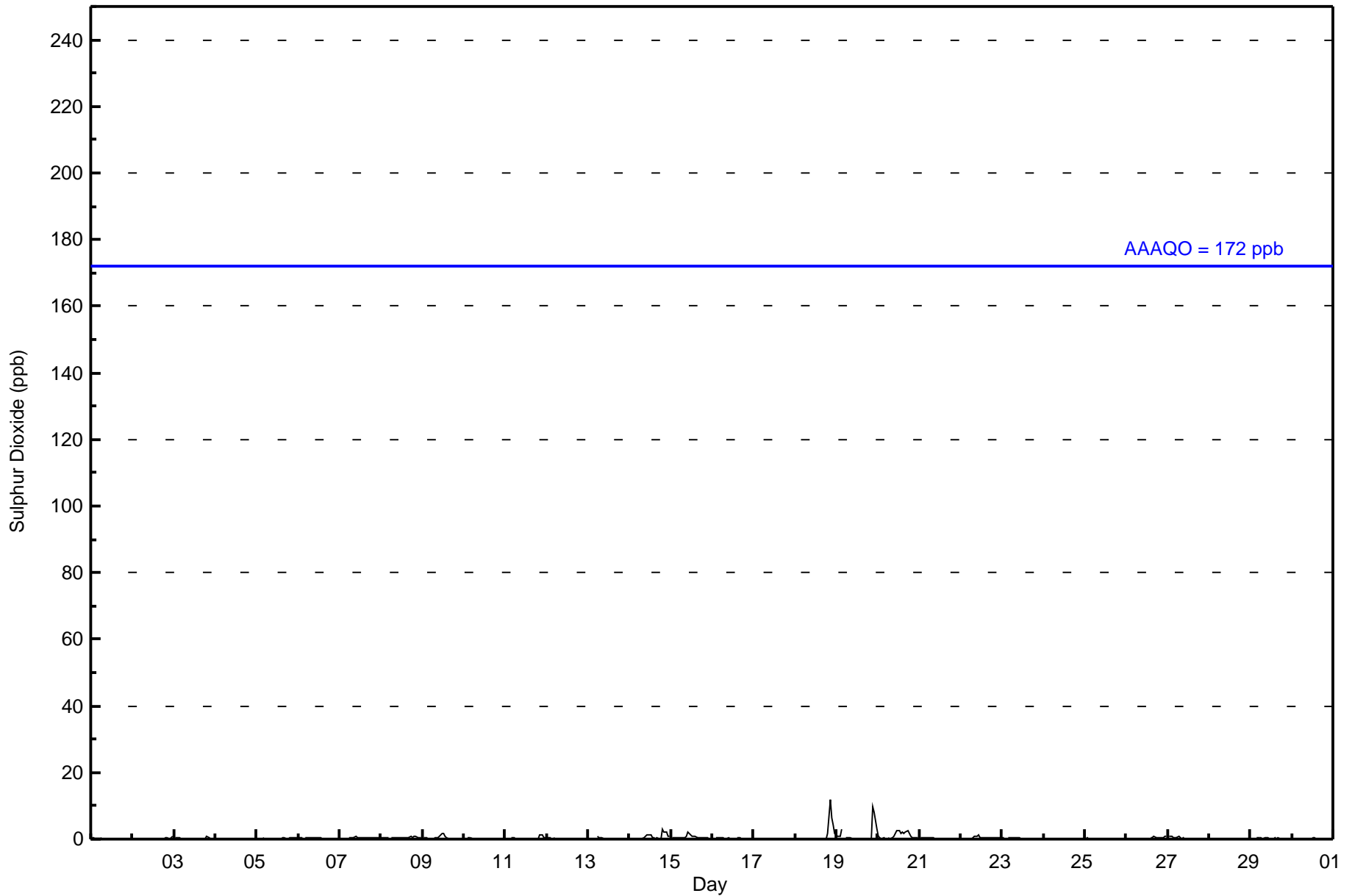
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.4 | 0.7 | 0.8 | 0.6 | 0.4 | Diurnal Average | |
| 1 | 1 | 1 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 12 | 10 | 8 | 3 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Anzac - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 675 | 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: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 23 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 59 | 47 | 144 | 70 | 50 | 673 |
| 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 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 59 | 47 | 144 | 70 | 51 | 674 |

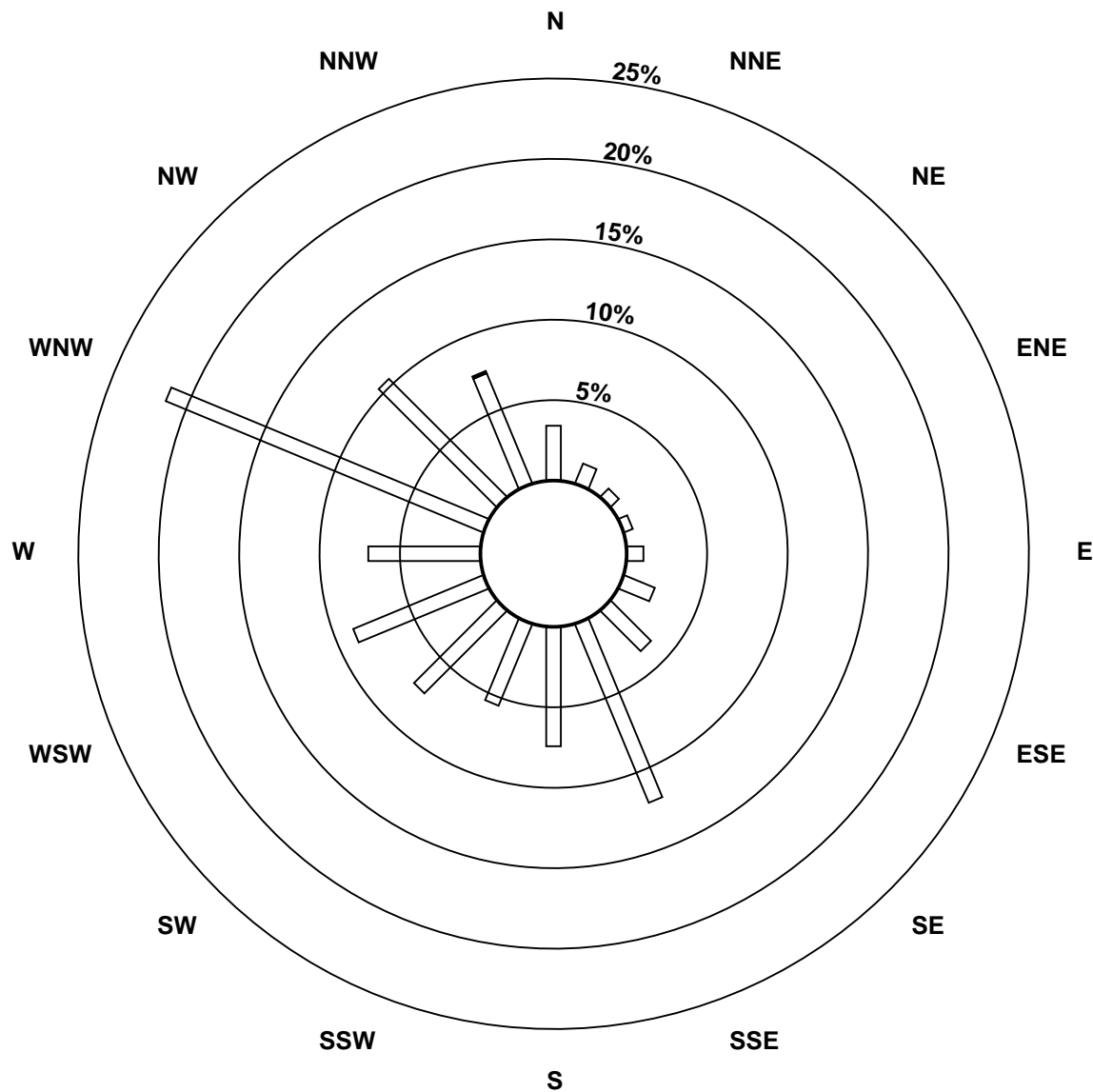
Total Number of Valid Hours: 674

Total Number of Hours: 720

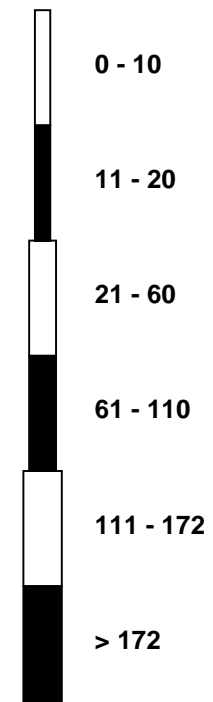


Wood Buffalo Environmental Association
Wind Rose Sep 2016

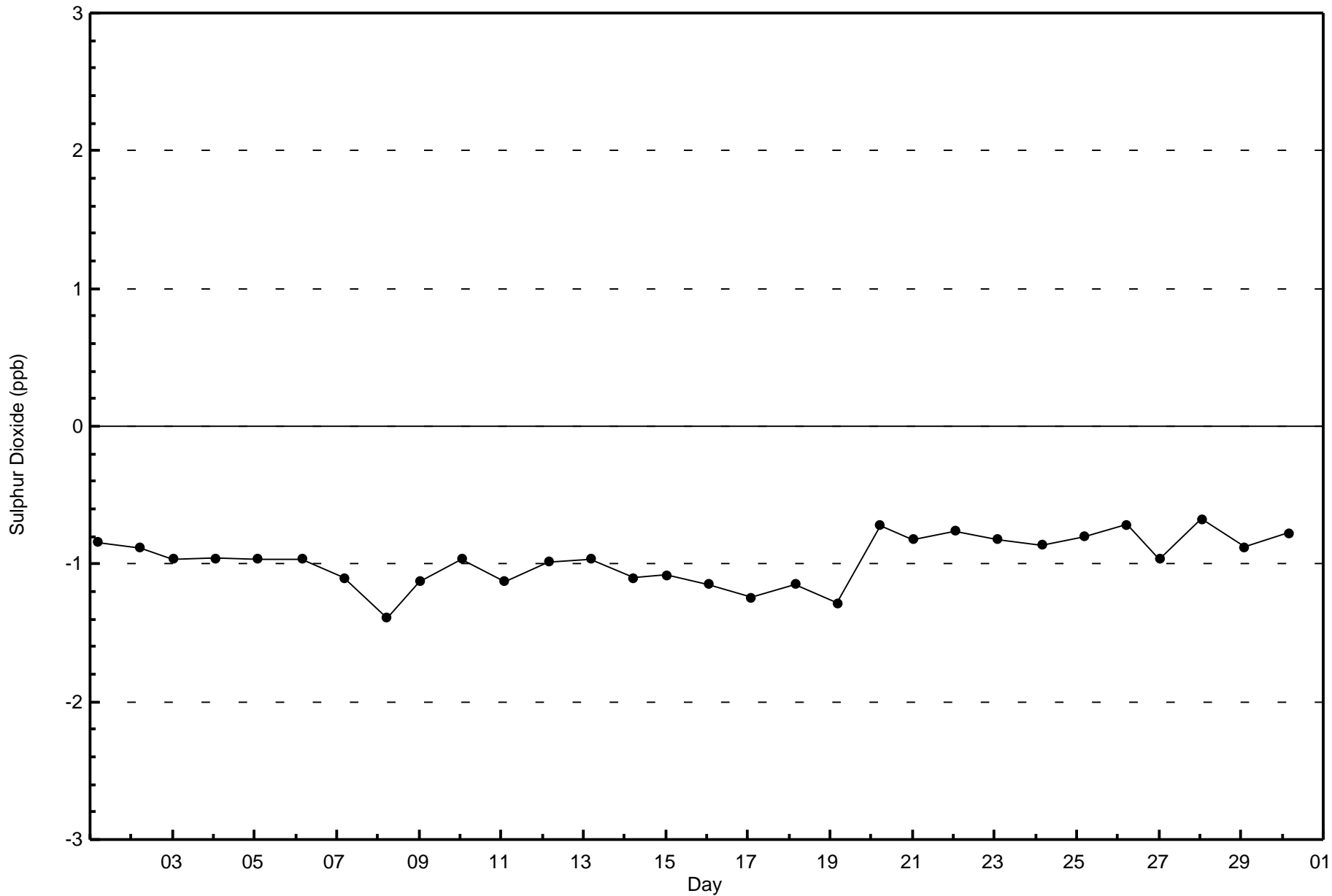
Sulphur Dioxide (SO₂) - ppb
Anzac (AMS 14)

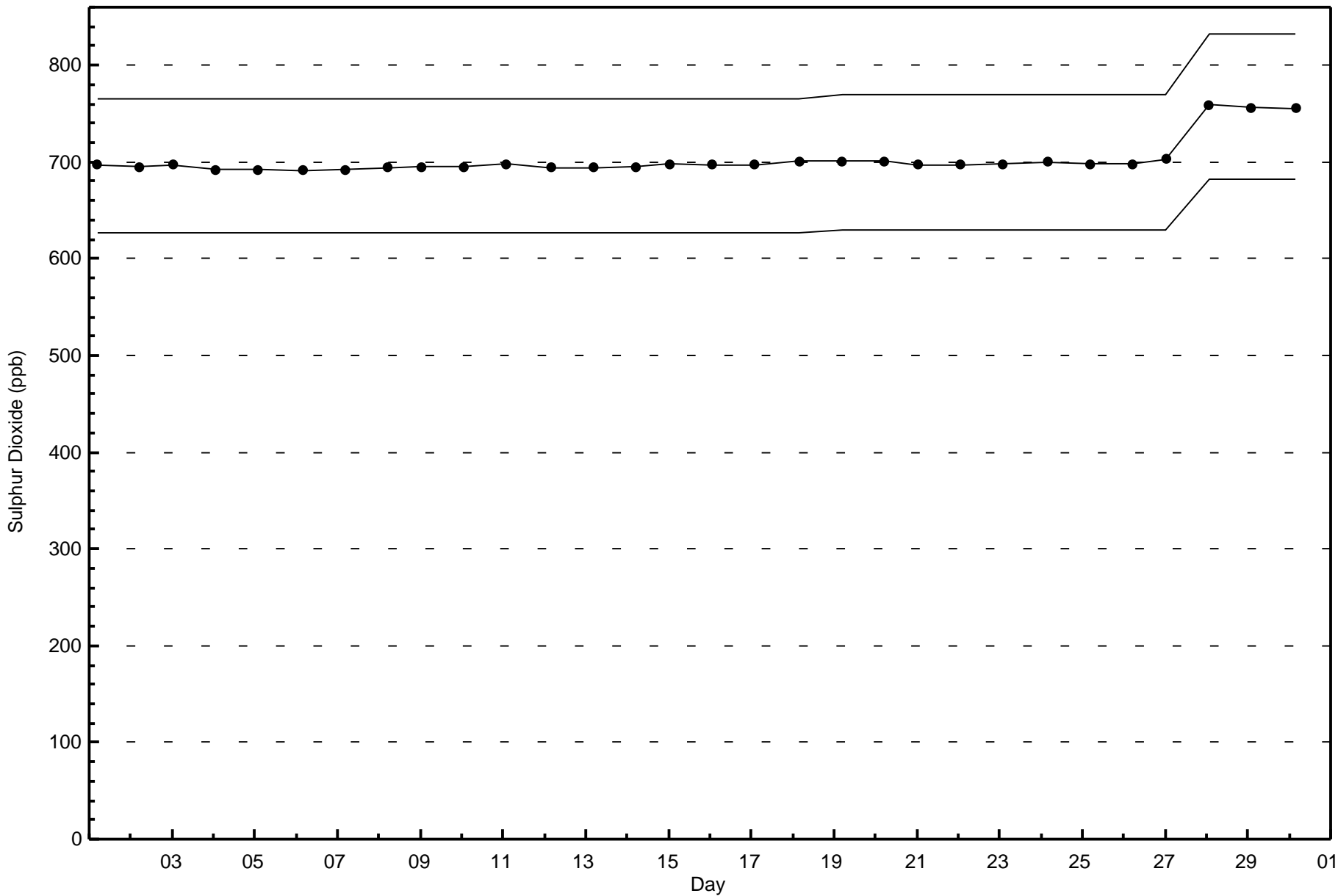


Classes (ppb)



Total Number of Valid Hours: 674







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

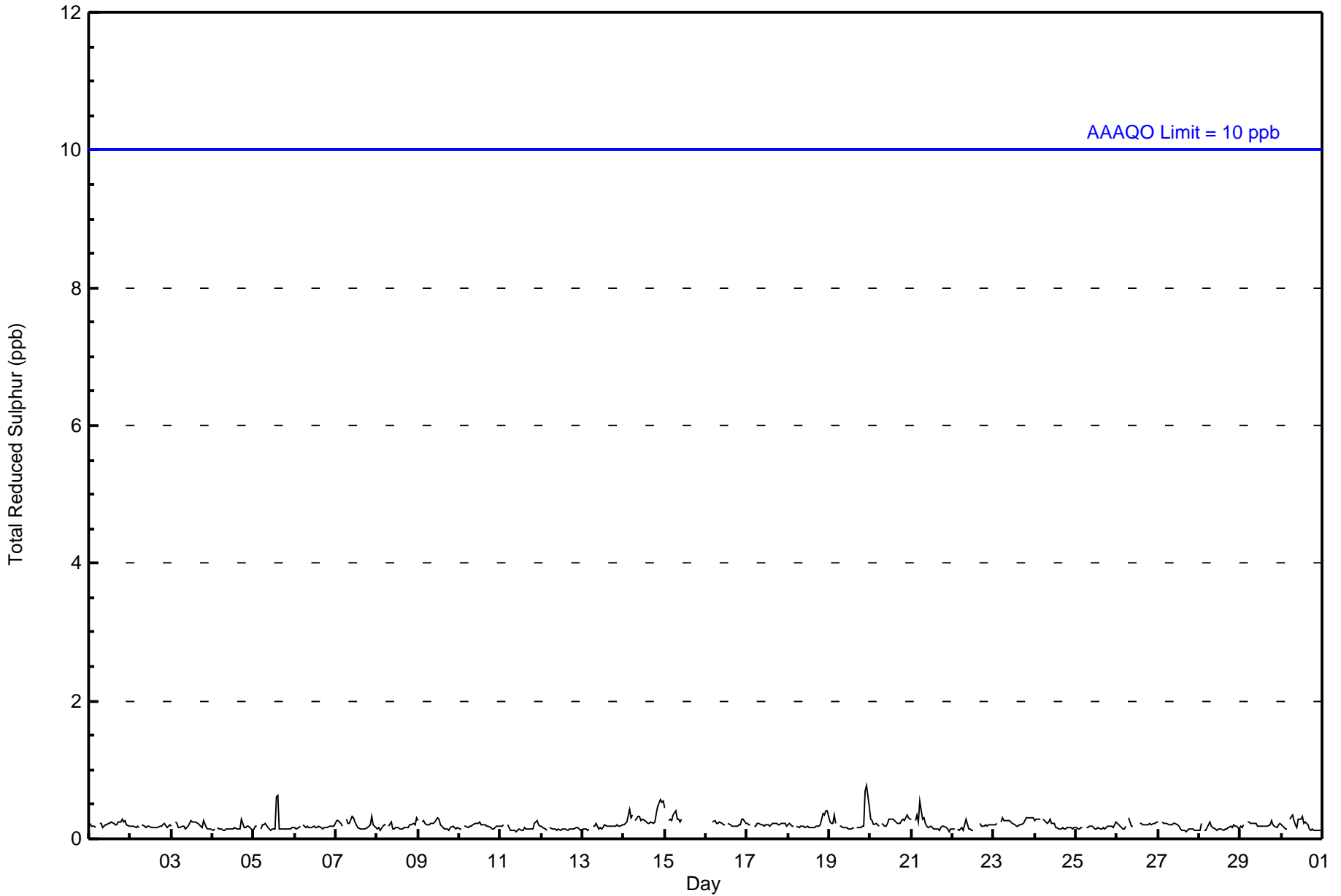
Anzac - September 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------|-------------------------------|----|---|----|---|---|---|---|---|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| Maximum Value: 1 ppb on Sep 19 23:00 | | | | | | | | | | | | | | Maximum Daily Average: 0.3 ppb on Sep 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Value: 0 ppb on Sep 11 10:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.2 ppb at hour 22 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.2 ppb at hour 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.2 ppb | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-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 | 0.2 | 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 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.2 | 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 | 0.1 | 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 | 0.2 | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | M | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | AF | AF | Z | RE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | PF | 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 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.3 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.2 | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 0.2 | 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 | 0.2 | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-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 | 0.2 | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.2 | 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 | 0.2 | 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 | 0 | 0 | 0.2 | 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 | 0.2 | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Diurnal Maximum |
| Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure PF - Power Failure RE - Recovery | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Anzac - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 666 | 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: 666

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Anzac - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 23 | 9 | 5 | 4 | 8 | 12 | 20 | 76 | 47 | 37 | 45 | 58 | 47 | 149 | 73 | 51 | 664 |
| 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 | 9 | 5 | 4 | 8 | 12 | 20 | 76 | 47 | 37 | 45 | 58 | 47 | 149 | 73 | 51 | 664 |

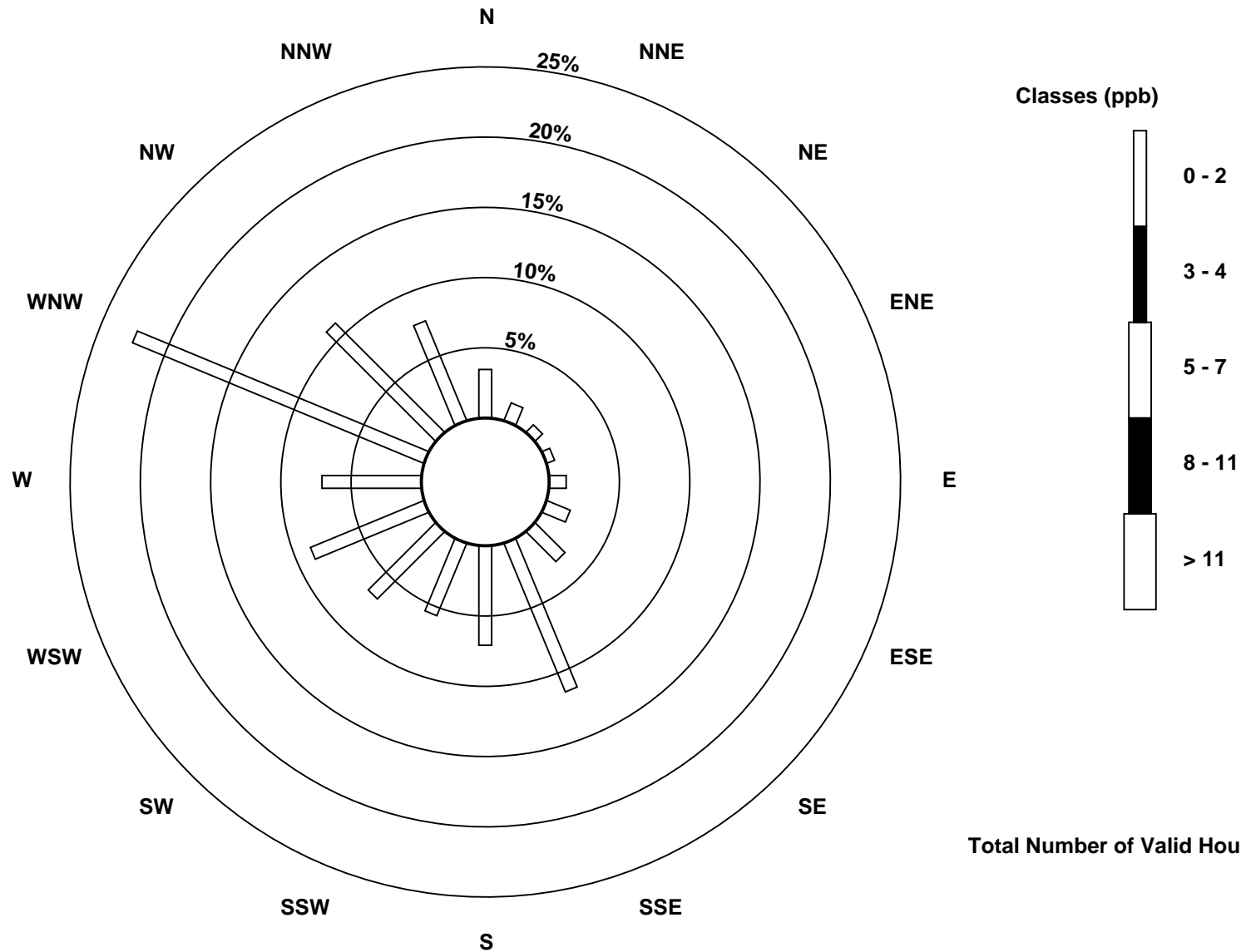
Total Number of Valid Hours: 664

Total Number of Hours: 720

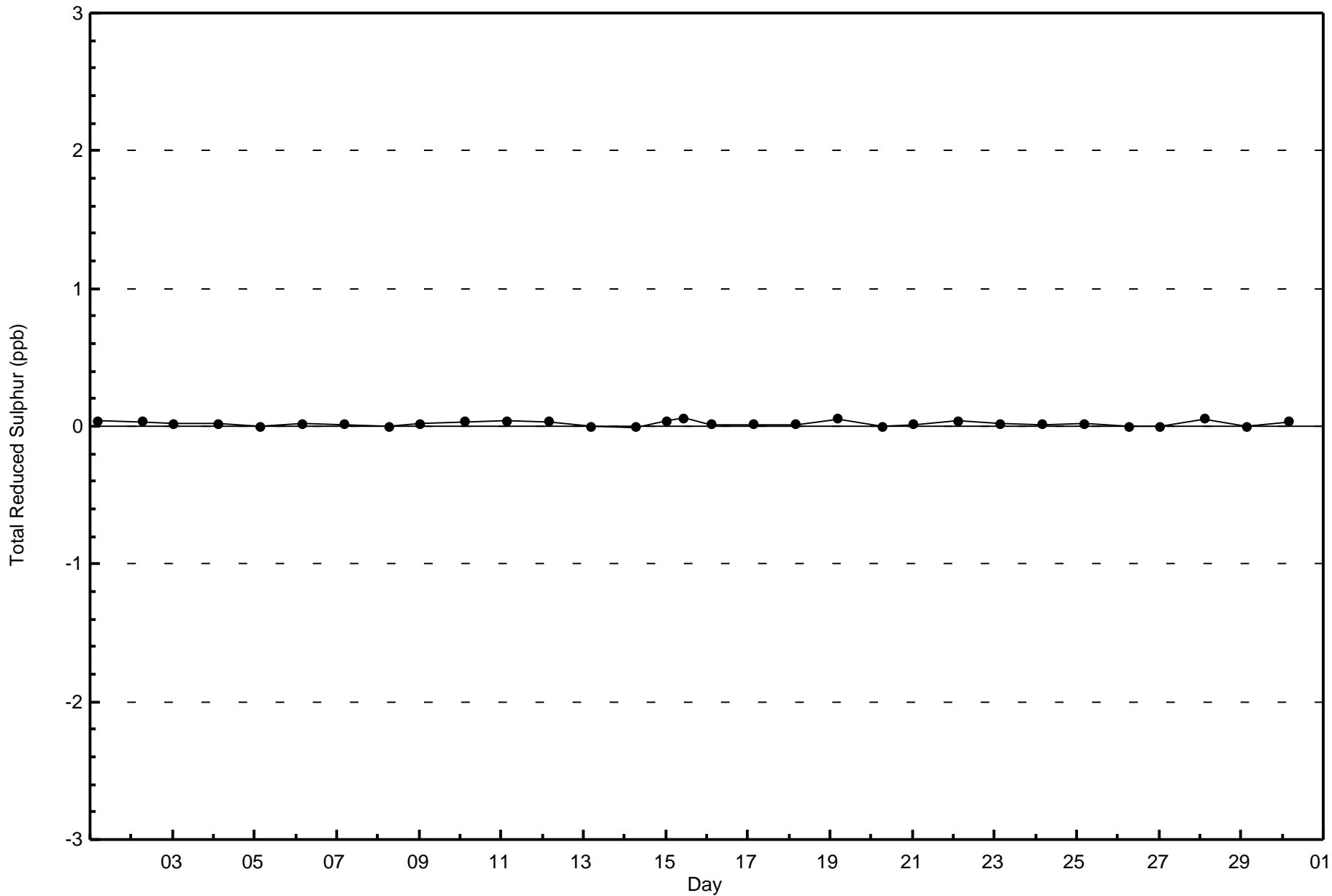


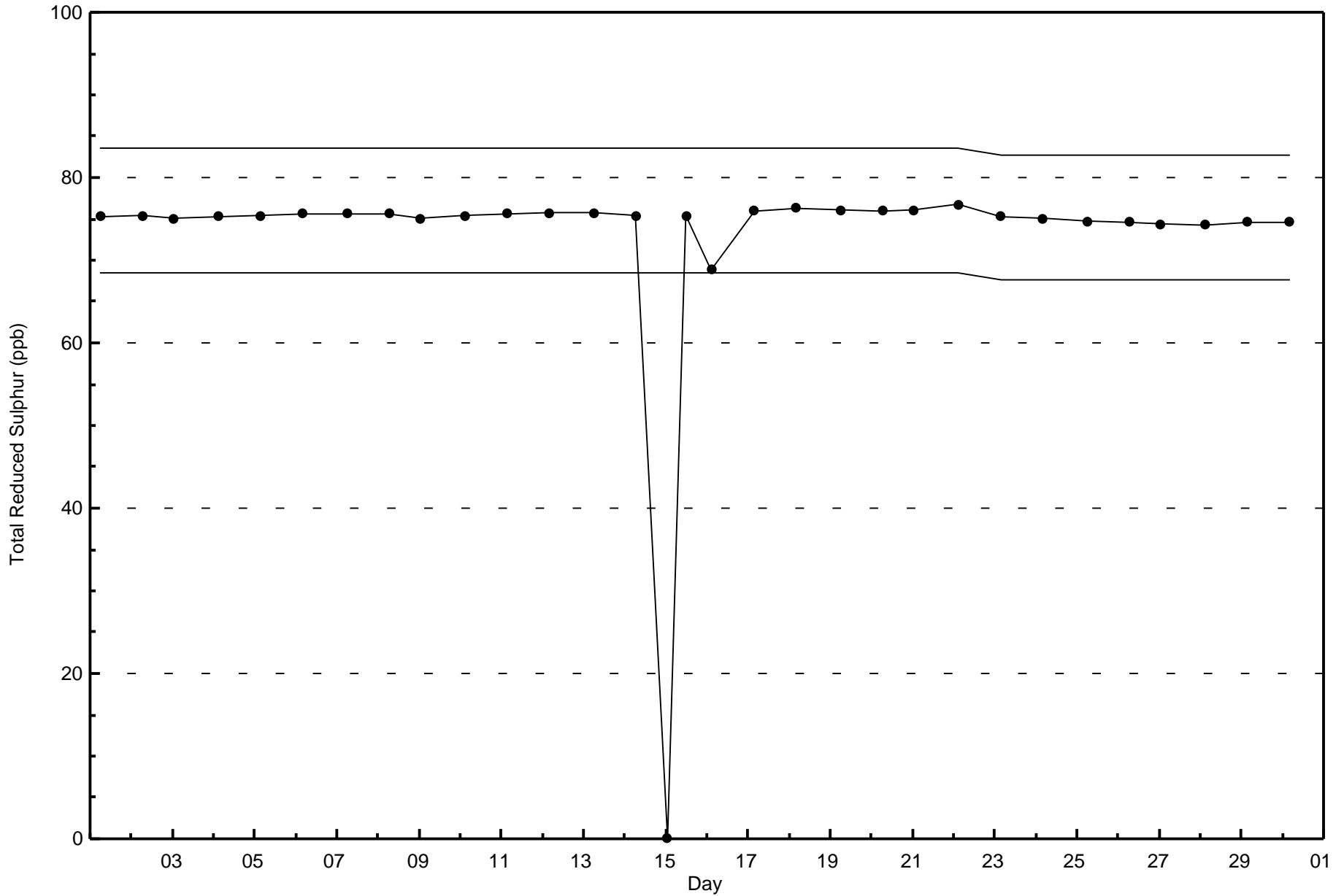
Wood Buffalo Environmental Association
Wind Rose Sep 2016

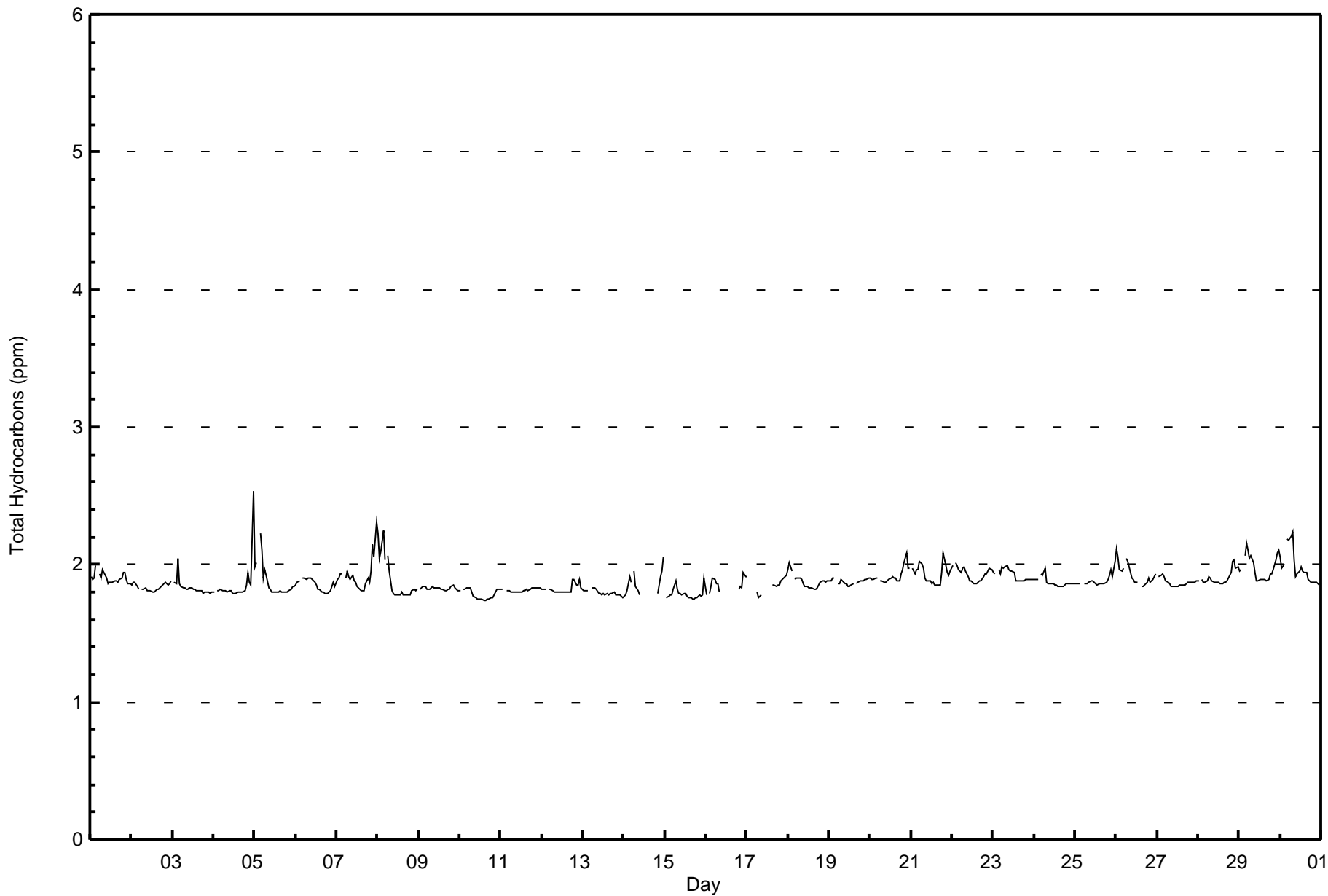
Total Reduced Sulphur (TRS) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 664









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 631 | 96.04 | 96.04 |
| 2.1 - 3.0 | 26 | 3.96 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 657

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 23 | 9 | 5 | 4 | 6 | 14 | 20 | 81 | 49 | 29 | 45 | 44 | 39 | 141 | 73 | 48 | 630 |
| 2.1 - 3.0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 8 | 3 | 5 | 3 | 0 | 0 | 2 | 25 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 9 | 5 | 4 | 7 | 14 | 22 | 81 | 50 | 37 | 48 | 49 | 42 | 141 | 73 | 50 | 655 |

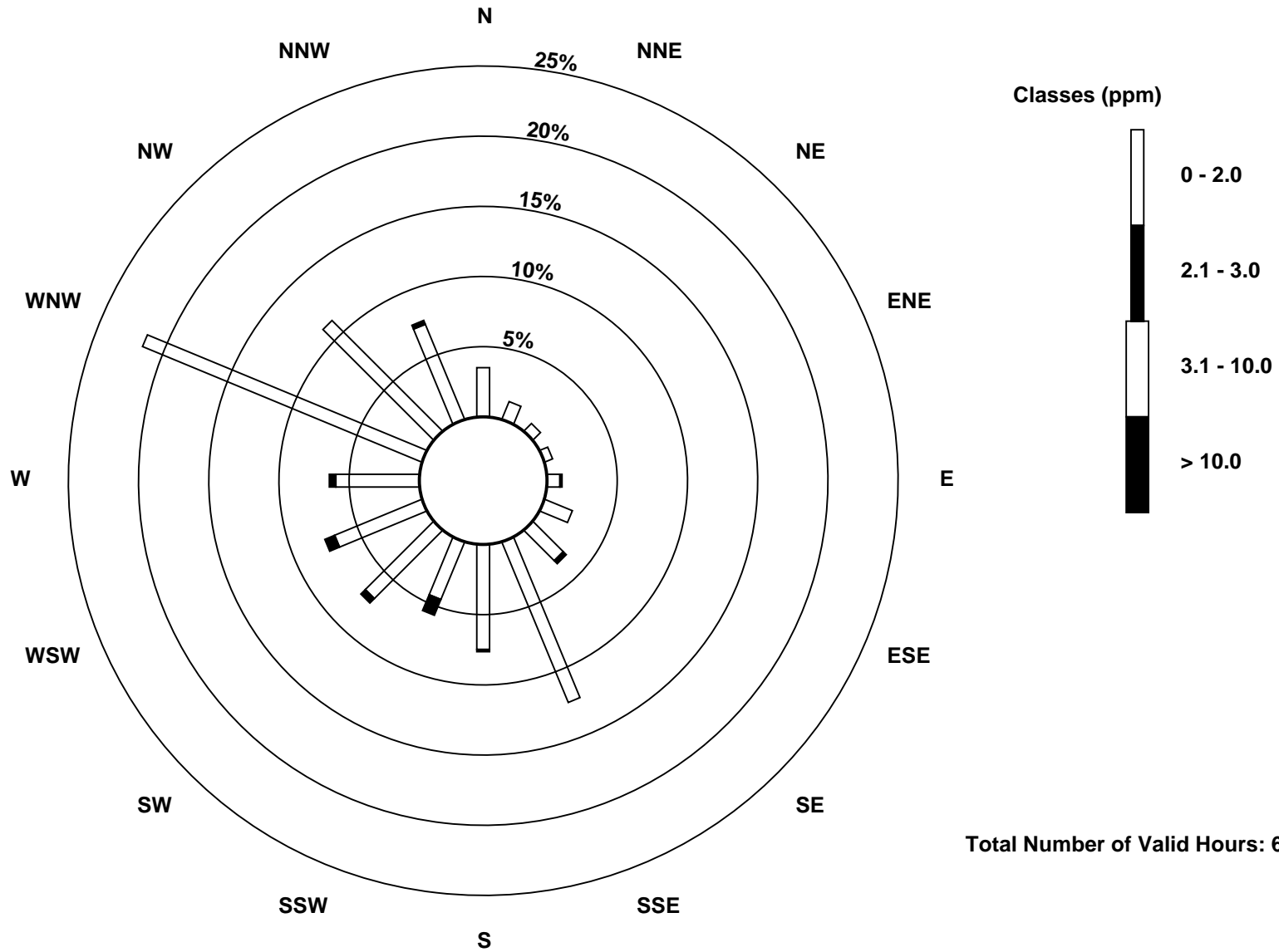
Total Number of Valid Hours: 655

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Hydrocarbons (THC) - ppm
Anzac (AMS 14)



Total Number of Valid Hours: 655

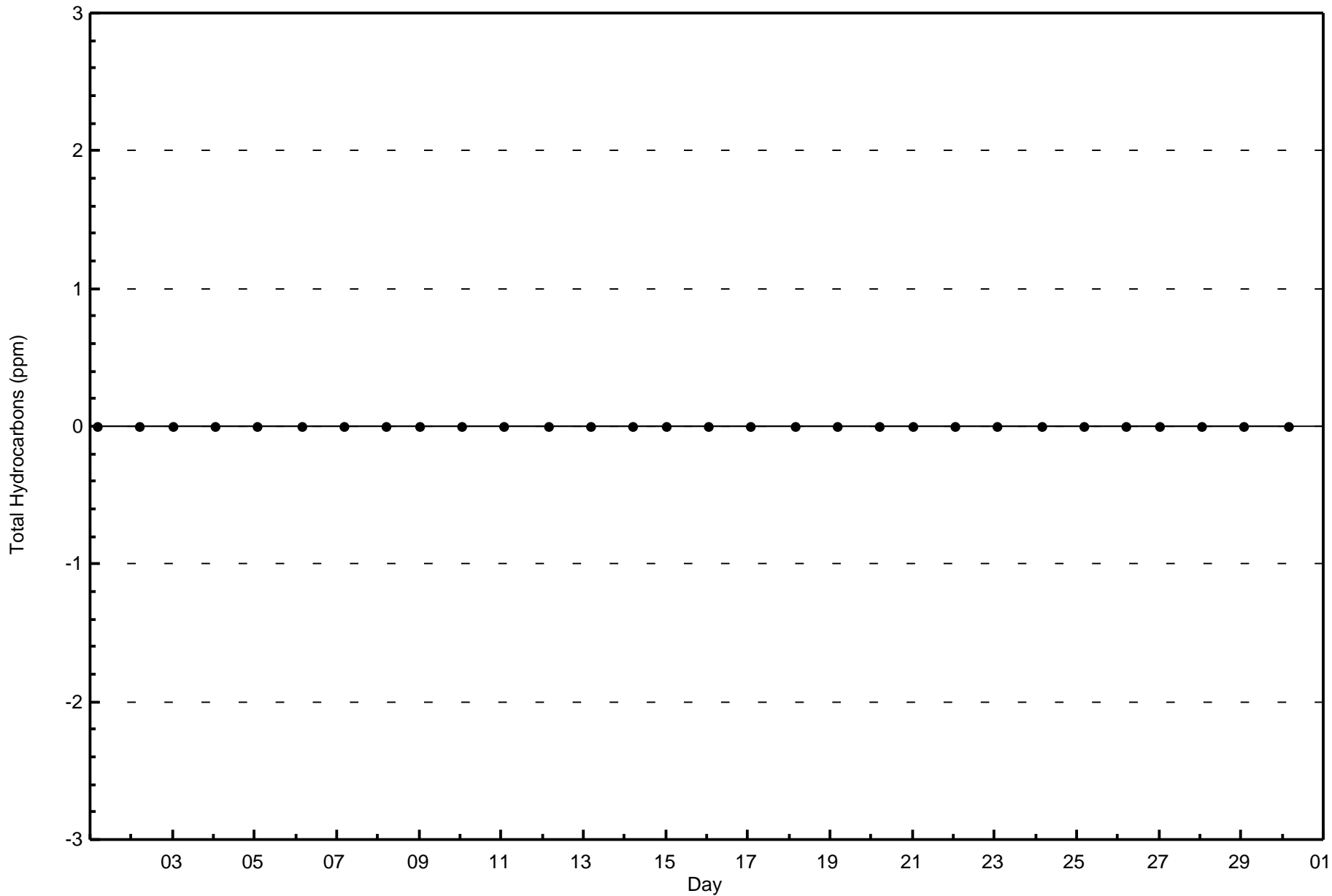


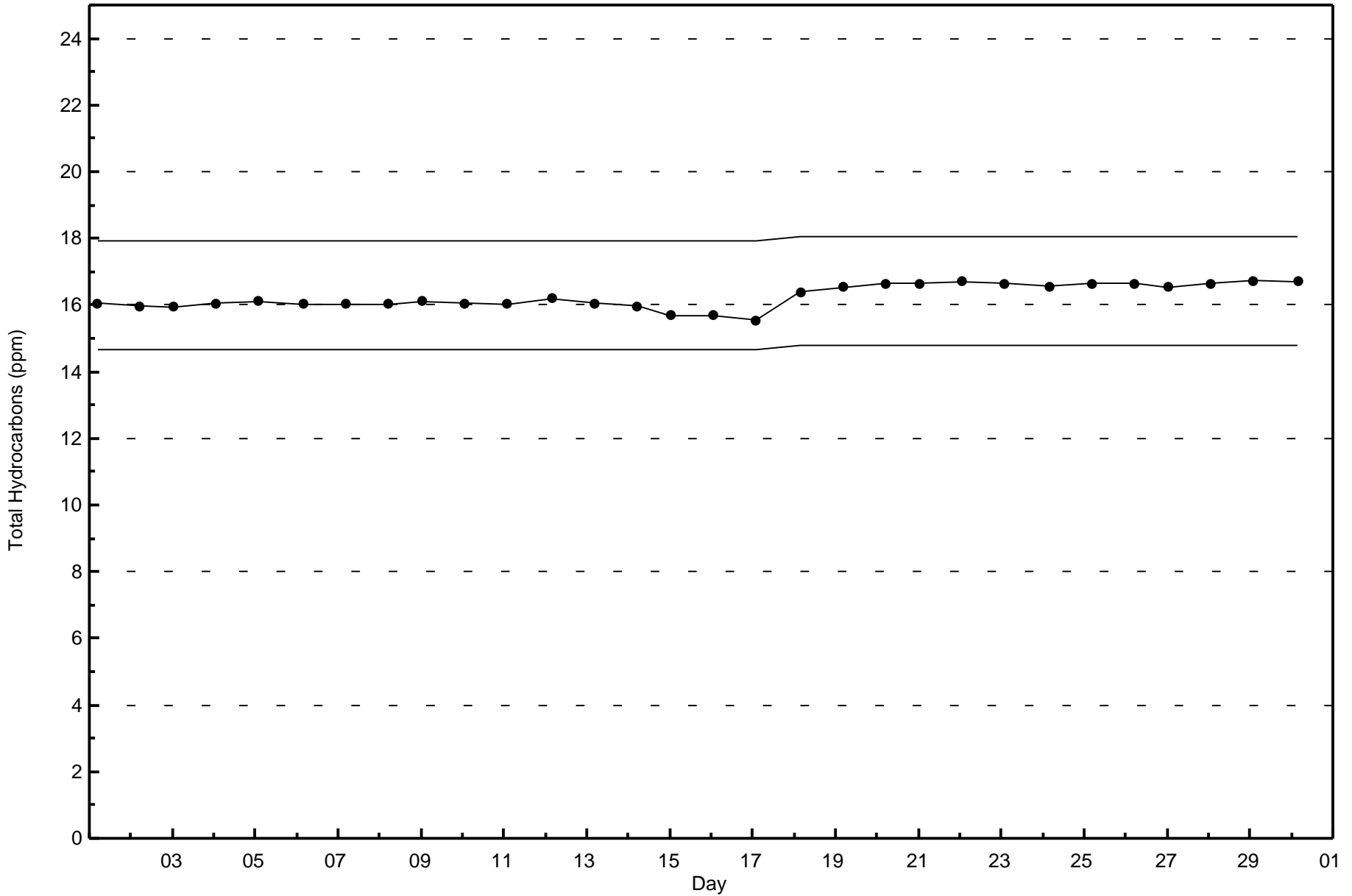
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Anzac - September 2016







Summary of Hour Averages

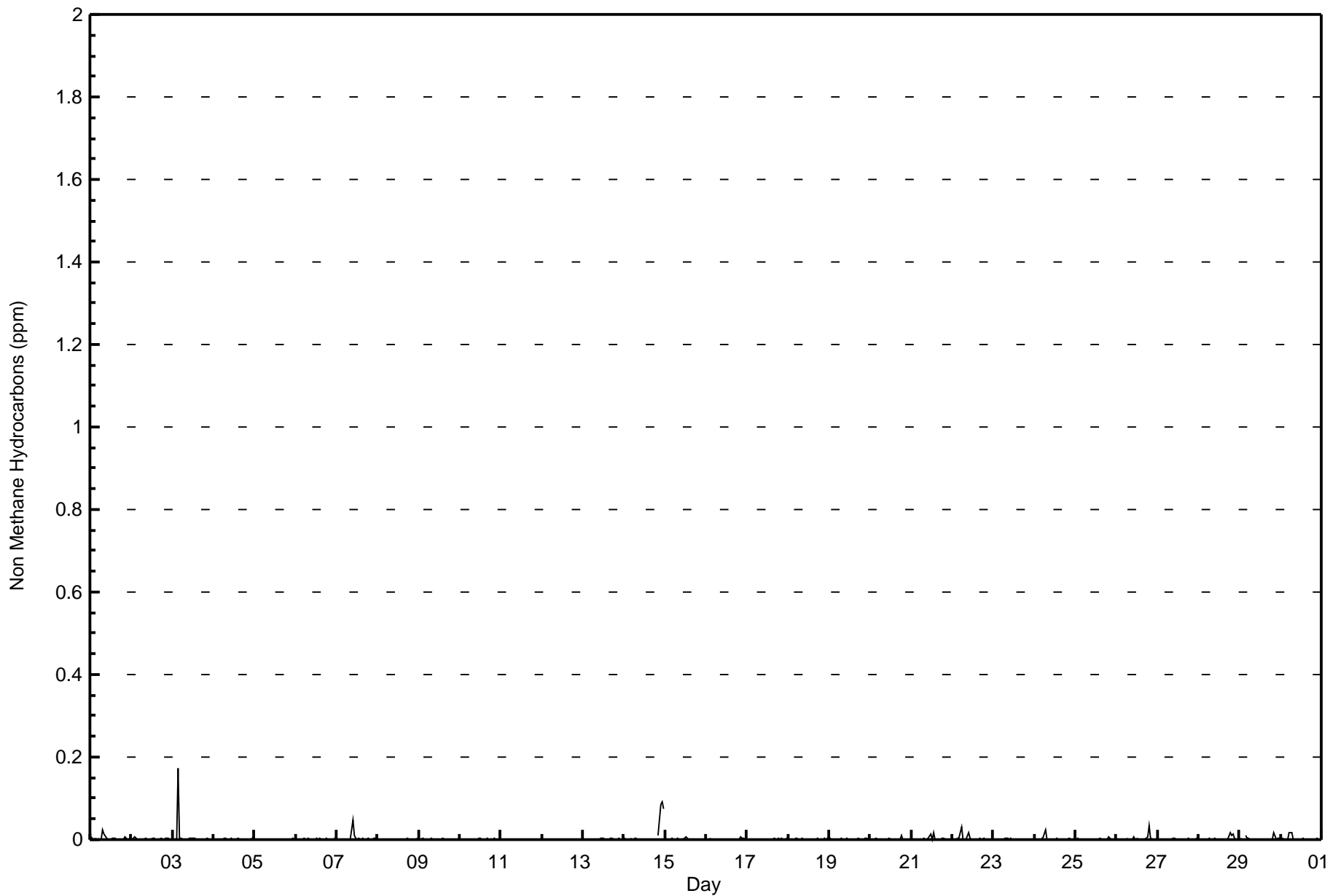
Anzac - September 2016

| | | |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 0.173 ppm on Sep 3 04:00 | Maximum Daily Average: 0.008 ppm on Sep 3 | Hours in Service: 720 |
| Minimum Value: 0.000 ppm on Sep 1 02:00 | Minimum Daily Average: 0.000 ppm on Sep 11 | Hours of Data: 657 |
| Maximum Diurnal Average: 0.008 ppm at hour 4 | Minimum Diurnal Average: 0.000 ppm at hour 16 | Hours of Missing Data: 63 |
| Monthly Average: 0.002 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: 96.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0.006 | 0.000 | 0.000 | 0.004 | Z | 0.000 | 0.002 | 0.023 | 0.012 | 0.002 | 0.000 | 0.000 | 0.000 | 0.003 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 | 0.003 | 0.000 | 0.003 | 0.003 | 0.023 |
| 2-Sep | 0.000 | 0.003 | 0.006 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.001 | 0.003 | 0.003 | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.000 | 0.005 | 0.003 | 0.000 | 0.000 | 0.001 | 0.006 |
| 3-Sep | Z | 0.000 | 0.000 | 0.173 | 0.004 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.003 | 0.002 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.008 | 0.173 |
| 4-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.002 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 | 0.001 | 0.007 |
| 5-Sep | 0.000 | 0.001 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.002 |
| 6-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.002 | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.001 | 0.004 |
| 7-Sep | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.049 | 0.011 | 0.004 | 0.000 | 0.003 | 0.000 | 0.003 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.003 | 0.002 | 0.003 | 0.049 |
| 8-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 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.003 |
| 9-Sep | Z | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.002 | 0.000 | 0.002 | 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 | 0.003 |
| 10-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.004 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 |
| 11-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 | 0.000 | 0.000 | 0.000 |
| 12-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 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| 13-Sep | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.003 | 0.002 | 0.003 | 0.000 | 0.000 | 0.000 | 0.002 | 0.004 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.001 | 0.004 |
| 14-Sep | 0.003 | 0.000 | 0.000 | 0.000 | 0.004 | Z | 0.005 | 0.003 | 0.001 | 0.000 | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | 0.010 | 0.085 | 0.092 | 0.075 | -- | 0.092 |
| 15-Sep | Z | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.002 | 0.006 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.006 |
| 16-Sep | 0.000 | Z | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | UO | UO | UO | UO | PF | UO | UO | UO | UO | 0.000 | 0.008 | 0.003 | 0.004 | 0.000 | -- | 0.008 |
| 17-Sep | 0.000 | UO | Z | UO | UO | UO | 0.000 | 0.000 | 0.000 | 0.000 | UO | UO | UO | UO | C | C | 0.000 | 0.002 | 0.000 | 0.003 | 0.000 | 0.002 | 0.000 | 0.000 | -- | 0.003 |
| 18-Sep | 0.000 | 0.000 | 0.000 | Z | 0.005 | 0.004 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.002 | 0.001 | 0.005 | 0.005 |
| 19-Sep | 0.003 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.004 | 0.000 | 0.000 | 0.002 | 0.002 | 0.000 | 0.000 | 0.000 | M | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.002 | 0.002 | 0.000 | 0.001 | 0.004 |
| 20-Sep | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | Z | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.010 |
| 21-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.003 | 0.000 | 0.000 | 0.004 | 0.014 | 0.000 | 0.018 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.018 |
| 22-Sep | 0.000 | Z | 0.000 | 0.004 | 0.002 | 0.032 | 0.000 | 0.002 | 0.000 | 0.018 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.032 |
| 23-Sep | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.001 | 0.000 | 0.003 | 0.003 | 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 |
| 24-Sep | 0.000 | 0.000 | 0.000 | Z | 0.005 | 0.003 | 0.025 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.002 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.002 | 0.025 |
| 25-Sep | 0.000 | 0.002 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.003 | 0.002 | 0.000 | 0.000 | 0.000 | 0.007 | 0.003 | 0.000 | 0.000 | 0.000 | 0.001 | 0.007 |
| 26-Sep | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | Z | 0.005 | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.005 | C | C | 0.000 | 0.000 | 0.002 | 0.008 | 0.035 | 0.003 | 0.000 | 0.000 | 0.000 | 0.003 | 0.035 |
| 27-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.003 |
| 28-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.016 | 0.010 | 0.013 | 0.003 | 0.001 | 0.000 | 0.002 | 0.016 |
| 29-Sep | 0.000 | 0.004 | Z | 0.009 | 0.004 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.016 | 0.001 | 0.003 | 0.002 | 0.002 | 0.016 |
| 30-Sep | 0.000 | 0.003 | 0.000 | Z | 0.000 | 0.016 | 0.016 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.000 | 0.002 | 0.016 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|-----------------|--|
| 0.000 | 0.001 | 0.000 | 0.008 | 0.001 | 0.003 | 0.002 | 0.002 | 0.001 | 0.003 | 0.002 | 0.001 | 0.001 | 0.002 | 0.001 | 0.000 | 0.000 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.004 | 0.004 | 0.003 | Diurnal Average | |
| 0.006 | 0.004 | 0.006 | 0.173 | 0.005 | 0.032 | 0.025 | 0.023 | 0.012 | 0.049 | 0.011 | 0.014 | 0.006 | 0.018 | 0.003 | 0.003 | 0.003 | 0.005 | 0.016 | 0.035 | 0.016 | 0.085 | 0.092 | 0.075 | Diurnal Maximum | | |

Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation PF - Power Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Anzac - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 626 | 95.28 | 95.28 |
| 0.006 - 0.05 | 27 | 4.11 | 99.39 |
| 0.06 - 0.1 | 3 | 0.46 | 99.85 |
| > 0.1 | 1 | 0.15 | 100.00 |

Total Number of Valid Hours: 657

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 23 | 9 | 5 | 3 | 6 | 12 | 17 | 81 | 48 | 34 | 43 | 47 | 37 | 138 | 73 | 48 | 624 |
| 0.006 - 0.05 | 0 | 0 | 0 | 1 | 1 | 2 | 5 | 0 | 2 | 3 | 5 | 2 | 2 | 2 | 0 | 2 | 27 |
| 0.06 - 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 3 |
| > 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Totals | 23 | 9 | 5 | 4 | 7 | 14 | 22 | 81 | 50 | 37 | 48 | 49 | 42 | 141 | 73 | 50 | 655 |

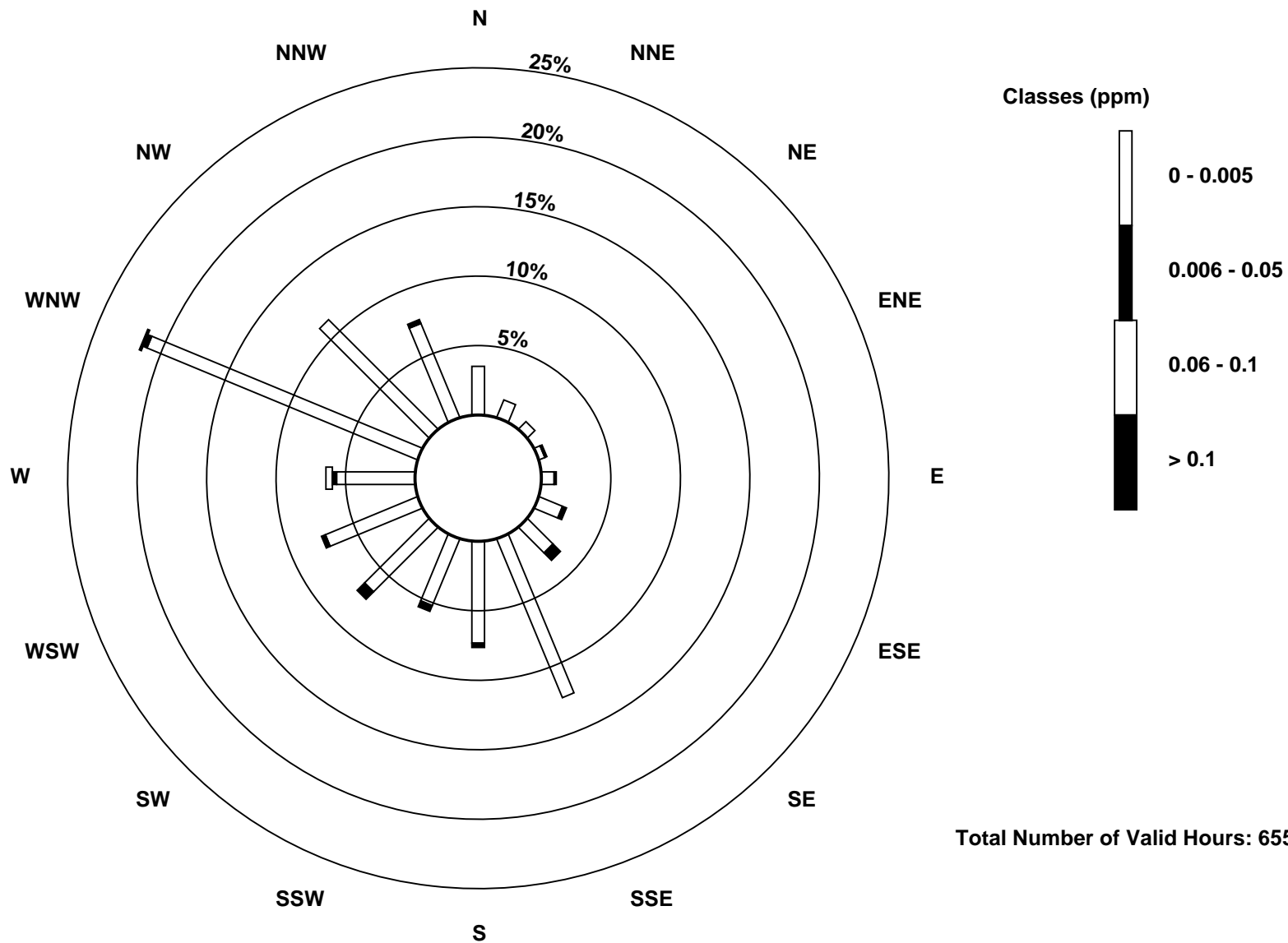
Total Number of Valid Hours: 655

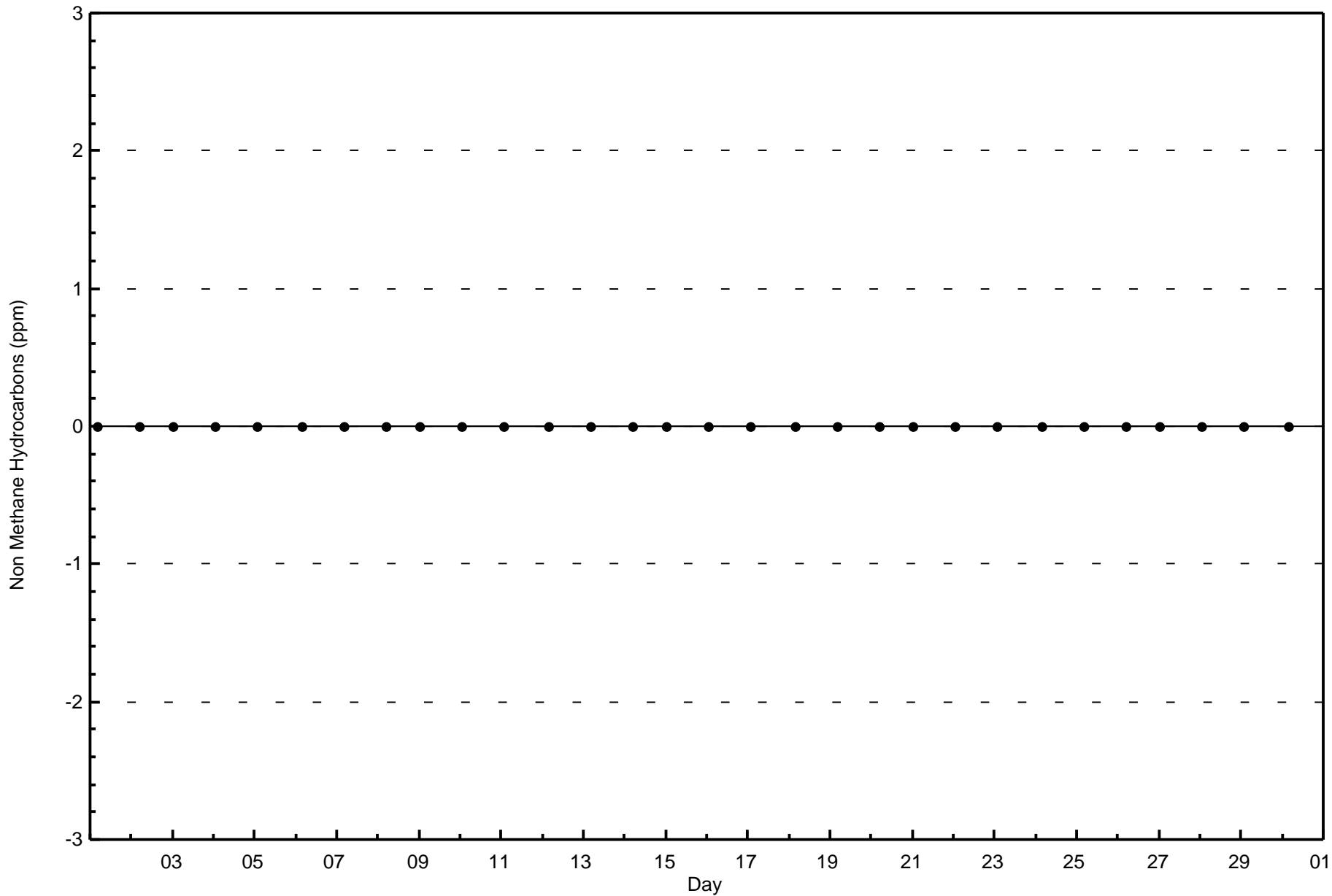
Total Number of Hours: 720

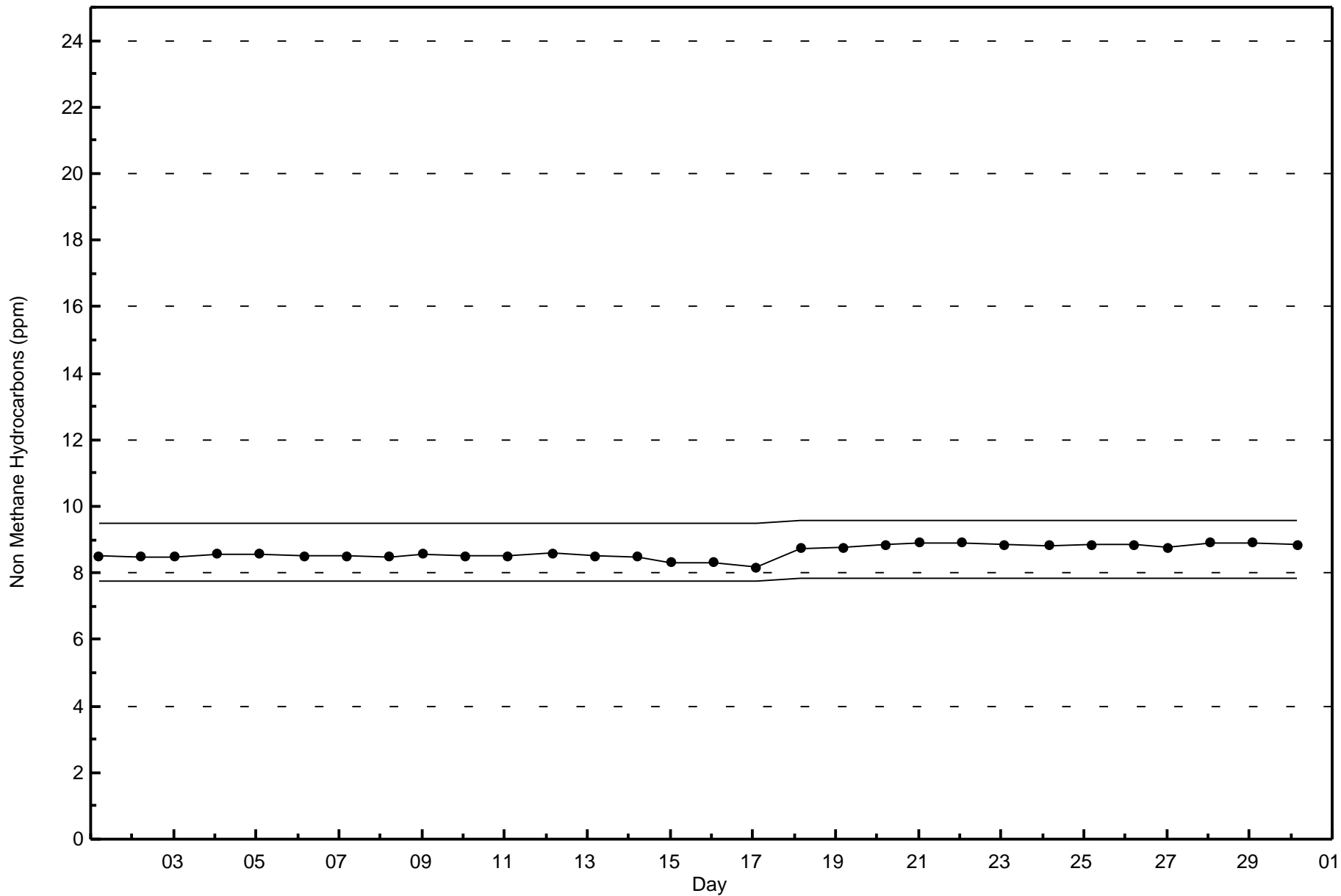


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Non Methane Hydrocarbons (NMHC) - ppm
Anzac (AMS 14)



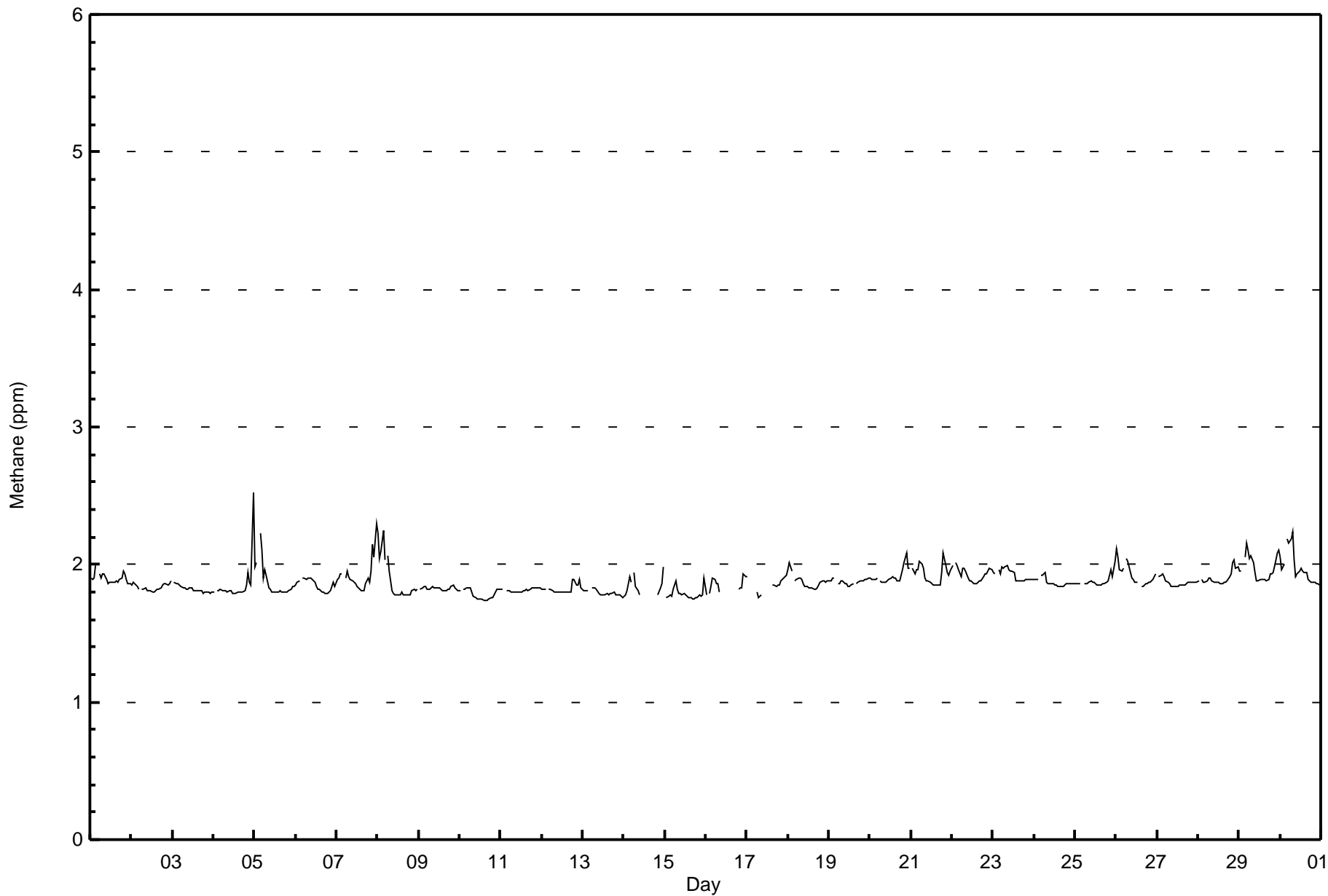






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Anzac - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Anzac - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 632 | 96.19 | 96.19 |
| 2.1 - 3.0 | 25 | 3.81 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 657

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Anzac - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 23 | 9 | 5 | 4 | 6 | 14 | 20 | 81 | 49 | 29 | 45 | 44 | 40 | 141 | 73 | 48 | 631 |
| 2.1 - 3.0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 8 | 3 | 5 | 2 | 0 | 0 | 2 | 24 |
| 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 | 9 | 5 | 4 | 7 | 14 | 22 | 81 | 50 | 37 | 48 | 49 | 42 | 141 | 73 | 50 | 655 |

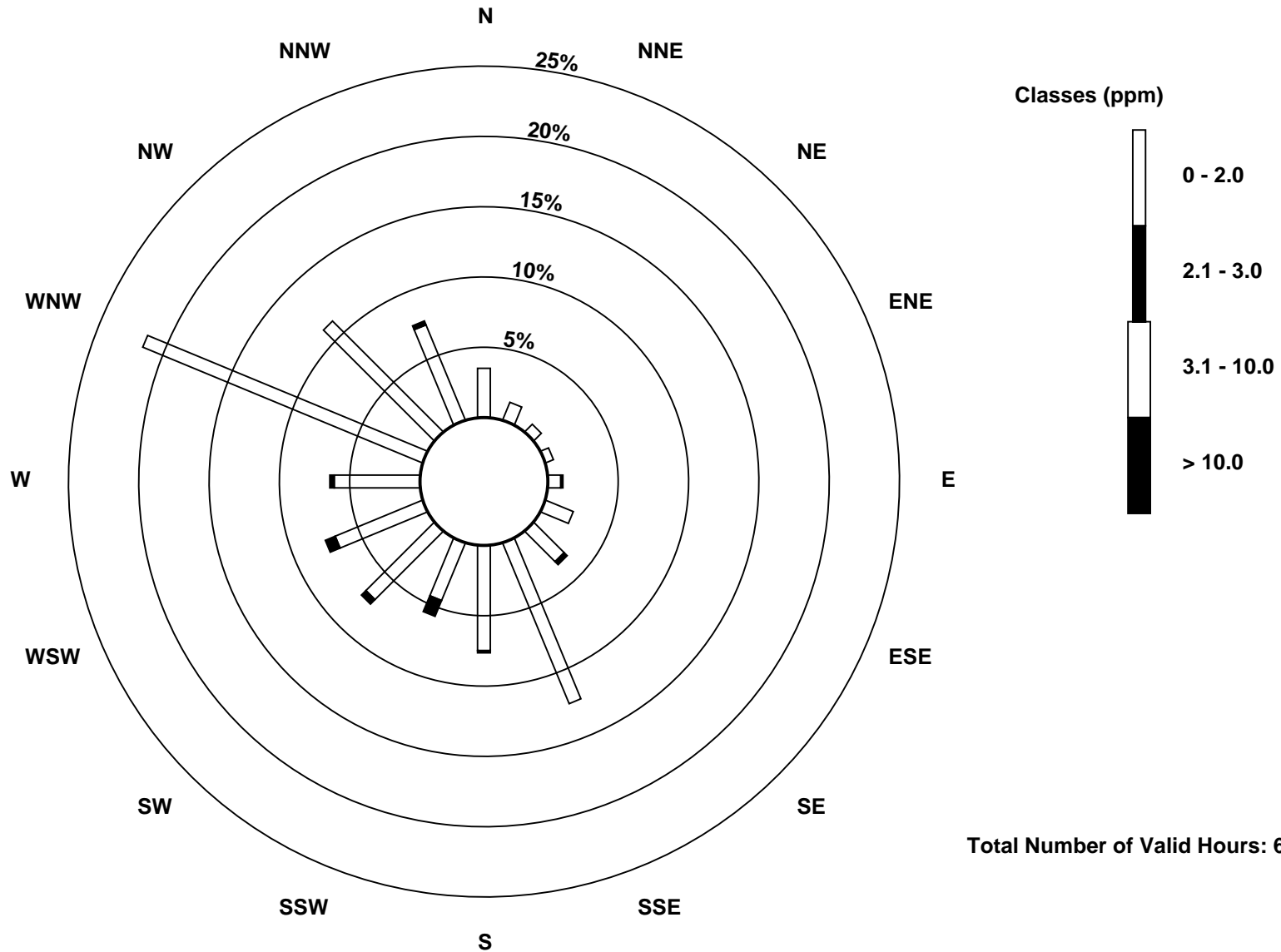
Total Number of Valid Hours: 655

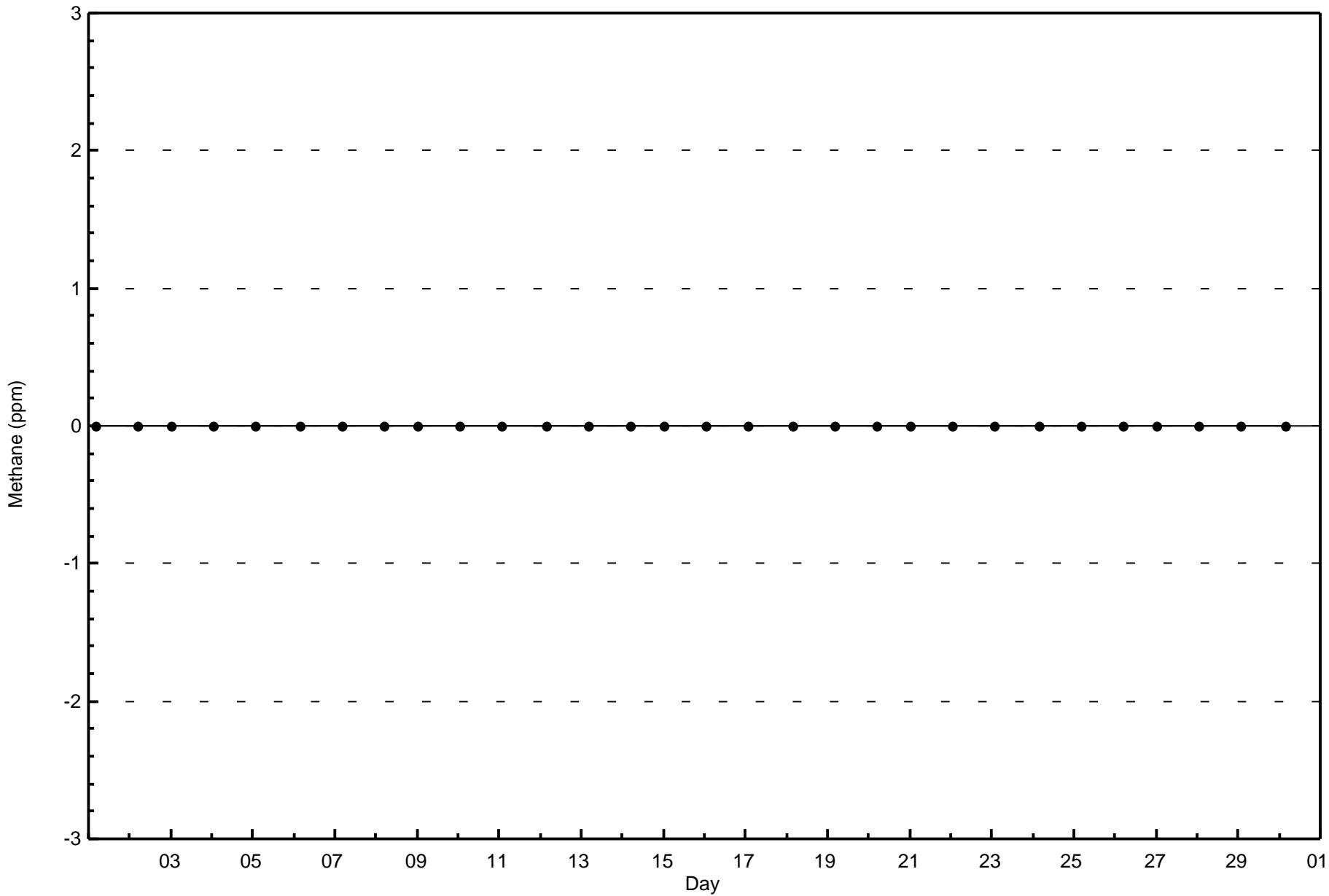
Total Number of Hours: 720

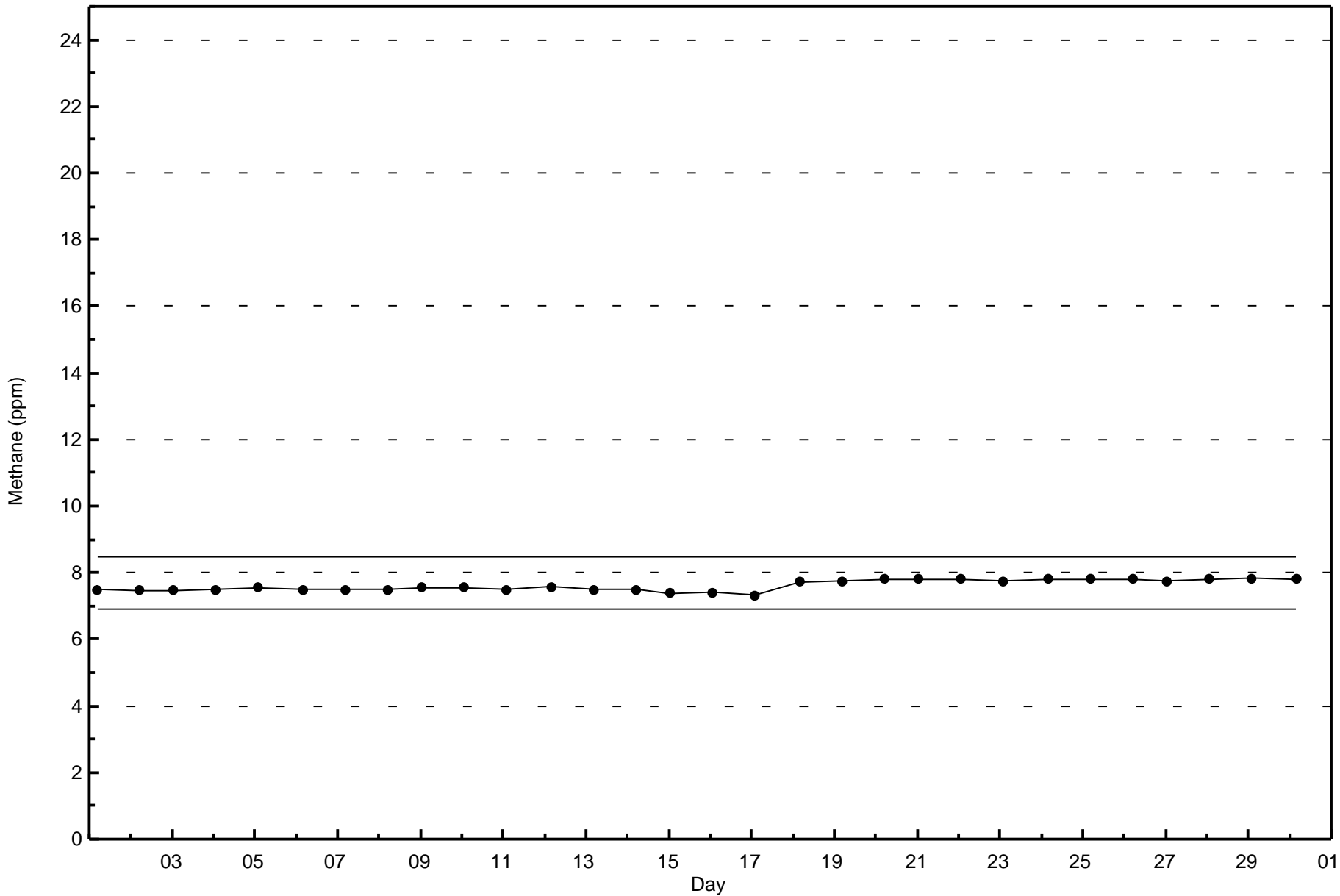


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Methane (CH₄) - ppm
Anzac (AMS 14)







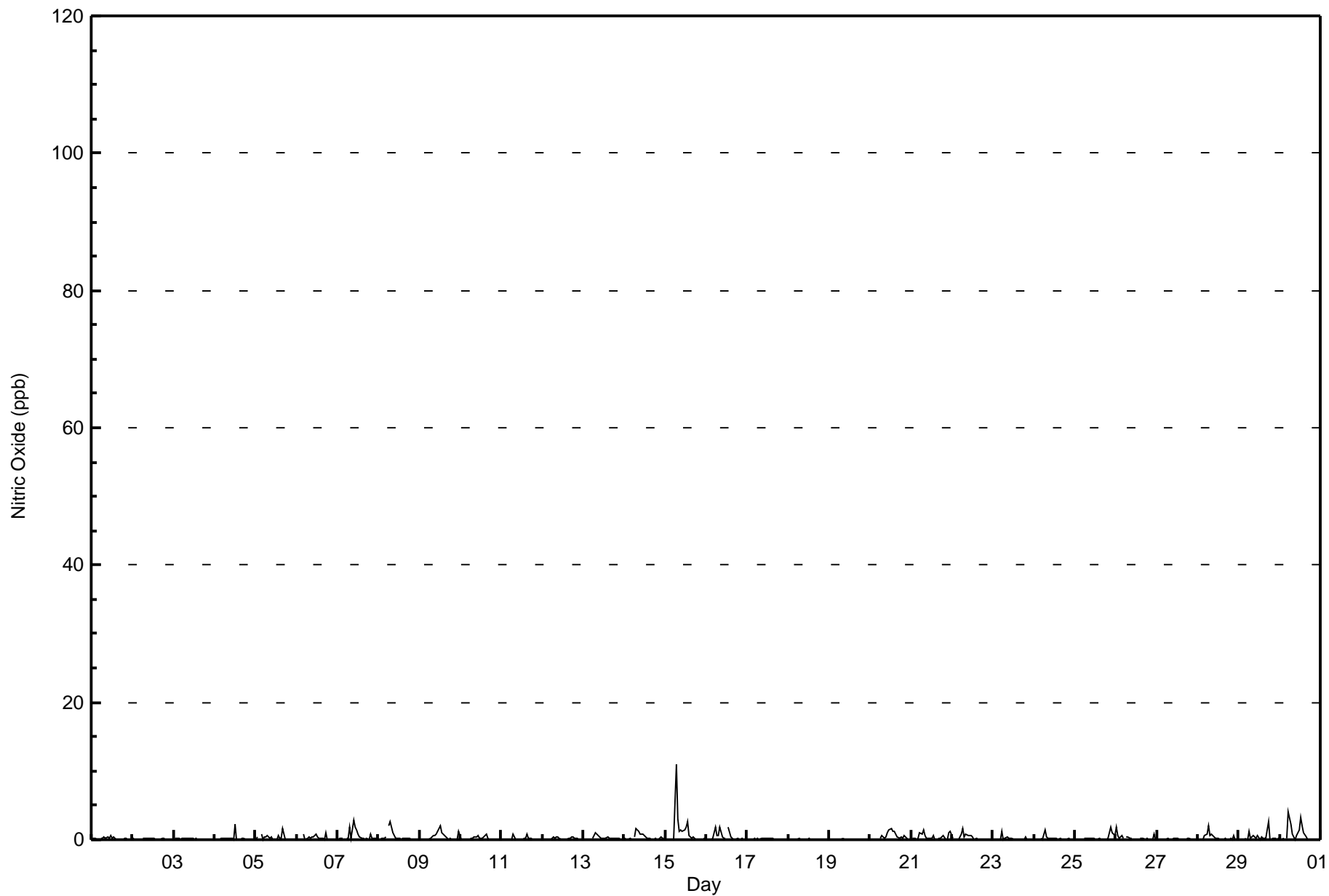


| Maximum Value: 11 ppb on Sep 15 07:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 1.1 ppb on Sep 15 | | | | | | Hours in Service: 720 | | |
|-------------------------------------------------------------------------------------------------|-------------------------------|---|---|---|---|---|----|---|---|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|--------------------------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 17 22:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 18 | | | | | | Hours of Data: 680 | | |
| Maximum Diurnal Average: 0.9 ppb at hour 7 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.1 ppb at hour 3 | | | | | | Hours of Missing Data: 40 | | |
| Monthly Average: 0.3 ppb | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 3 | | | | | | Hours of Calibration: 38 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | Z | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |
| 5-Sep | 0 | 0 | Z | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 6-Sep | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 2 | 0 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 2 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 11 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 11 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | PF | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 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 | 0.1 | 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 | 0 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.5 | 2 |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0.3 | 2 |
| 26-Sep | 2 | 1 | 0 | 1 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.4 | 2 |
| 27-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 |
| 28-Sep | 0 | Z | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | 2 |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 4 | 2 | 1 | 0 | 0 | 1 | 1 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 0.1 0.1 0.1 0.1 0.2 0.5 0.9 0.6 0.5 0.4 0.4 0.5 0.6 0.5 0.3 0.2 0.2 0.2 0.1 0.1 0.1 0.1 0.1 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 1 0 1 1 4 11 3 2 3 2 2 3 3 1 1 2 3 0 1 1 2 1 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration M - Maintenance PF - Power Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 23 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 60 | 47 | 145 | 72 | 51 | 678 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 60 | 47 | 145 | 72 | 51 | 678 |

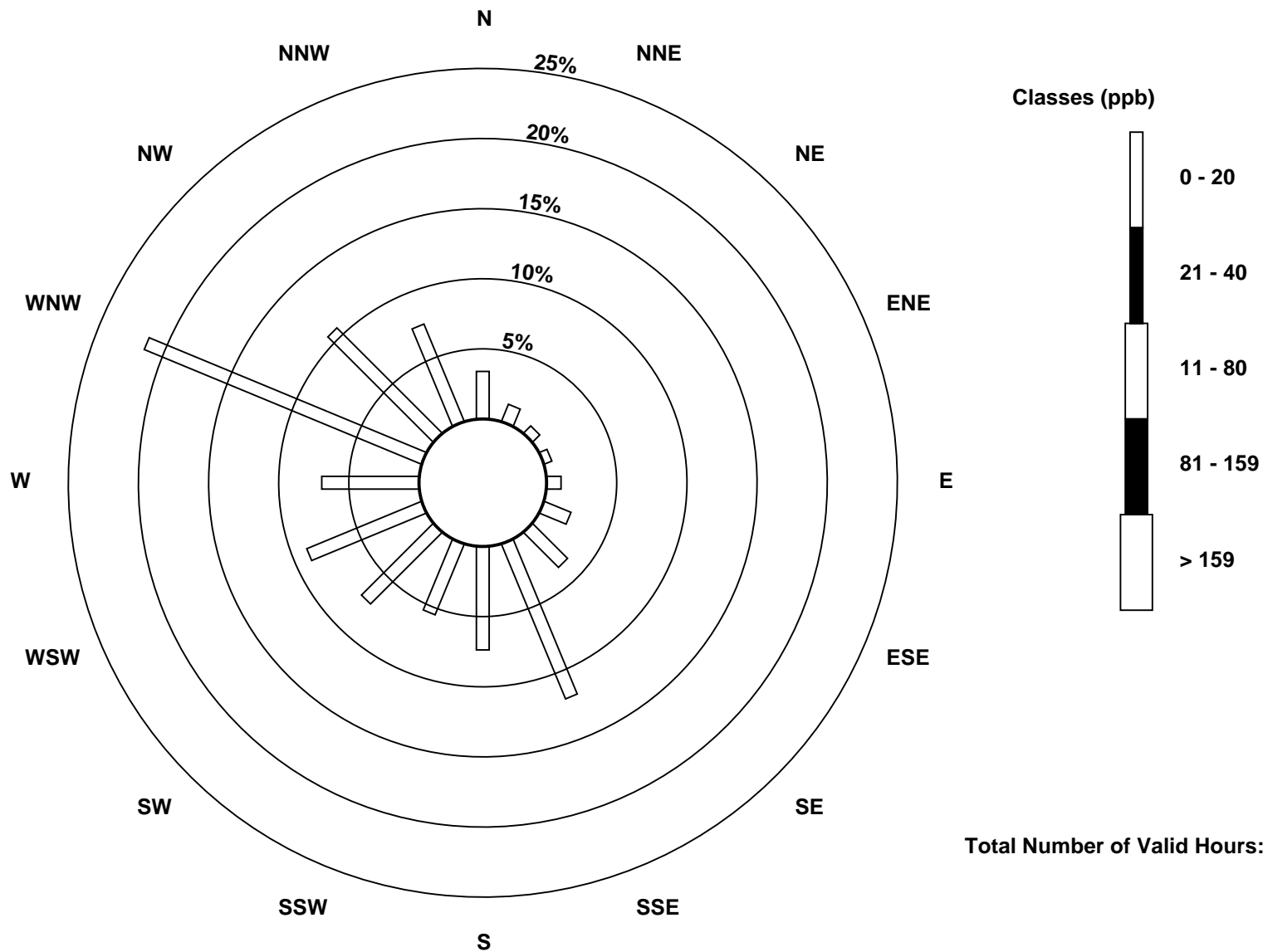
Total Number of Valid Hours: 678

Total Number of Hours: 720

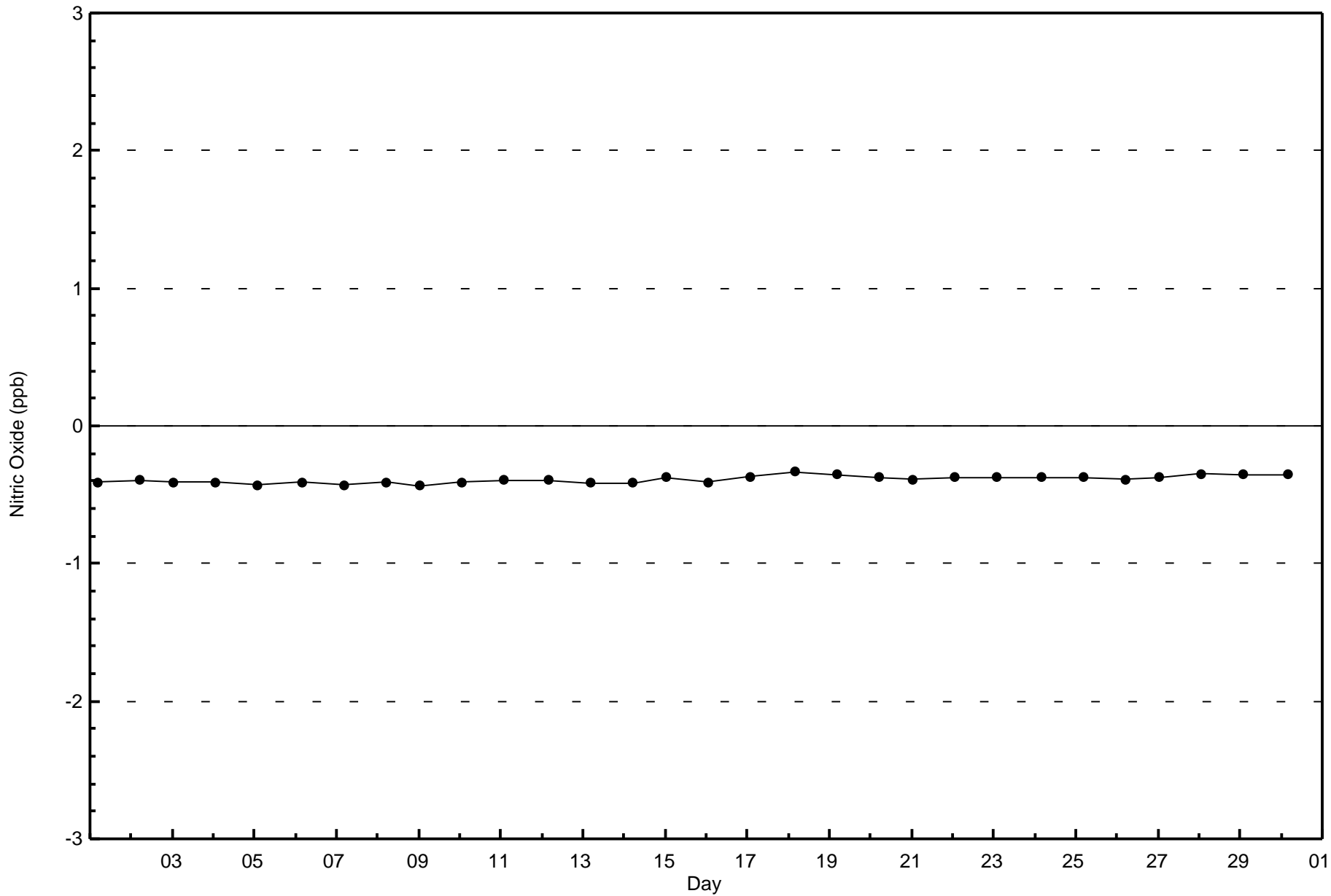


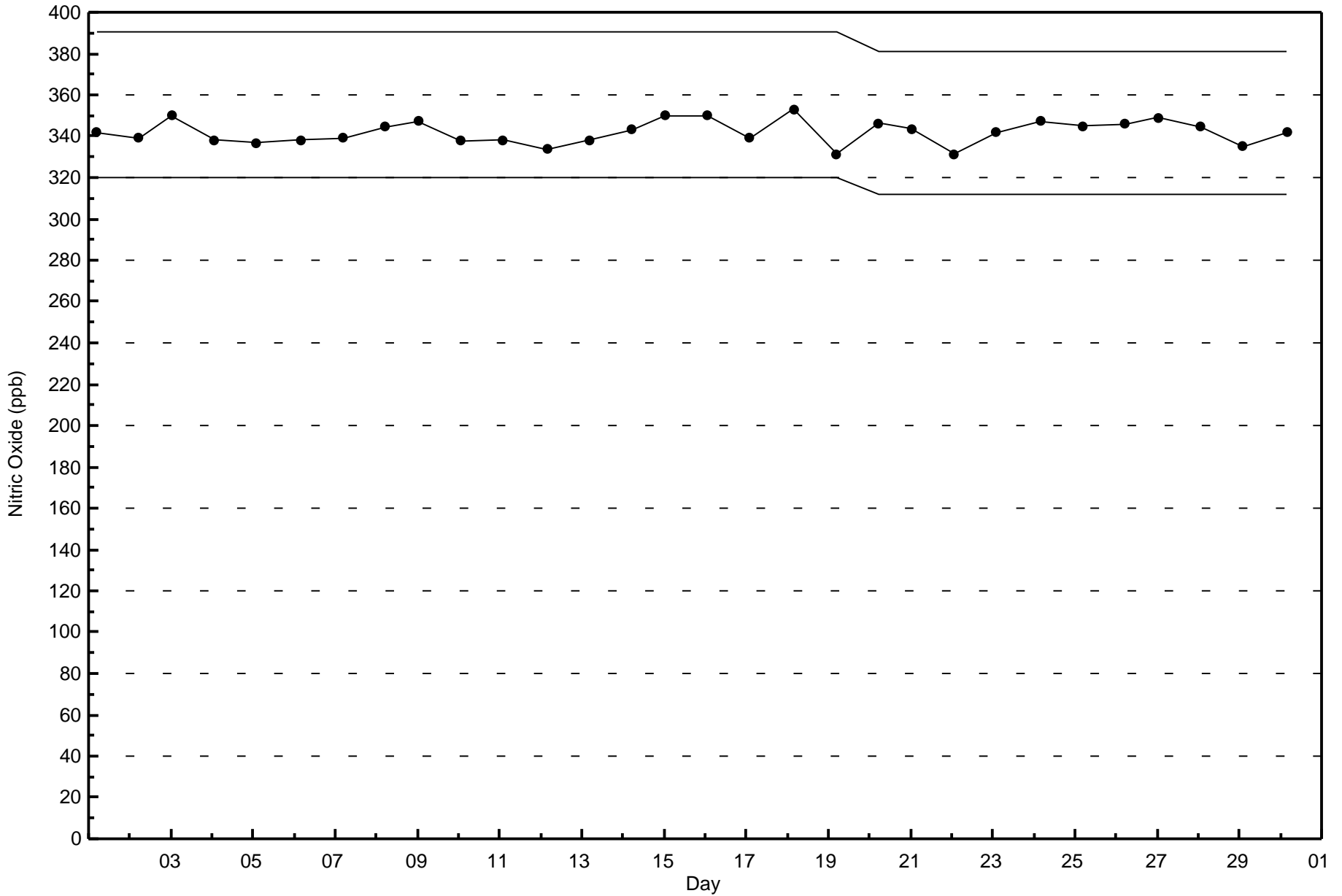
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitric Oxide (NO) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 678







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Anzac - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 8 ppb on Sep 30 13:00 | Maximum Daily Average: 2.8 ppb on Sep 20 | | Hours of Data: | 680 |
| Minimum Value: 0 ppb on Sep 3 11:00 | Minimum Daily Average: 0.3 ppb on Sep 3 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 1.8 ppb at hour 7 | Minimum Diurnal Average: 0.7 ppb at hour 17 | | Hours of Calibration: | 38 |
| Monthly Average: 1.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 7 | | 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 | 2 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 1 | 0.8 | 3 | |
| 2-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 0.6 | 2 | |
| 3-Sep | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0.3 | 2 | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.4 | 1 | |
| 5-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 2 | |
| 6-Sep | 1 | 2 | 2 | Z | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 3 | |
| 7-Sep | 1 | 1 | 1 | 1 | Z | 0 | 0 | 1 | 0 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1.2 | 3 | |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 1.3 | 4 | |
| 9-Sep | Z | 2 | 4 | 3 | 3 | 1 | 1 | 2 | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1.4 | 4 | |
| 10-Sep | 1 | Z | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 | |
| 11-Sep | 0 | 0 | Z | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 1.2 | 3 | |
| 12-Sep | 1 | 1 | 0 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0.5 | 1 | |
| 13-Sep | 0 | 1 | 1 | 1 | Z | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.9 | 3 | |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 2 | 4 | 7 | 6 | 5 | 1.9 | 7 | |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 1 | 8 | 5 | 3 | 2 | 3 | 4 | 5 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 2.0 | 8 | |
| 16-Sep | 1 | Z | 1 | 1 | 1 | 4 | 2 | 2 | 4 | 1 | 1 | 1 | PF | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 1 | 1.4 | 4 | |
| 17-Sep | 1 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0.7 | 1 | |
| 18-Sep | 1 | 0 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 4 | 3 | 2 | 1.0 | 4 | |
| 19-Sep | 1 | 2 | 6 | 6 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | M | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 3 | 1.7 | 6 | |
| 20-Sep | 2 | 2 | 3 | 3 | 3 | Z | 3 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 5 | 4 | 7 | 4 | 2 | 2 | 2.8 | 7 |
| 21-Sep | Z | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 8 | 1.5 | 8 | |
| 22-Sep | 3 | Z | 1 | 1 | 1 | 2 | 4 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1.5 | 4 | |
| 23-Sep | 1 | 1 | Z | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1.2 | 3 | |
| 24-Sep | 1 | 1 | 1 | Z | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0.7 | 2 | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 4 | 2 | 2 | 0.8 | 4 | |
| 26-Sep | 7 | 4 | 2 | 2 | 1 | Z | 2 | 1 | 1 | 1 | C | C | C | C | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1.7 | 7 | |
| 27-Sep | Z | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0.9 | 3 | |
| 28-Sep | 1 | Z | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 4 | 3 | 1.4 | 4 | |
| 29-Sep | 1 | 1 | Z | 2 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1.4 | 3 | |
| 30-Sep | 1 | 1 | 1 | Z | 1 | 3 | 5 | 2 | 2 | 1 | 3 | 5 | 8 | 7 | 7 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.3 | 8 | |

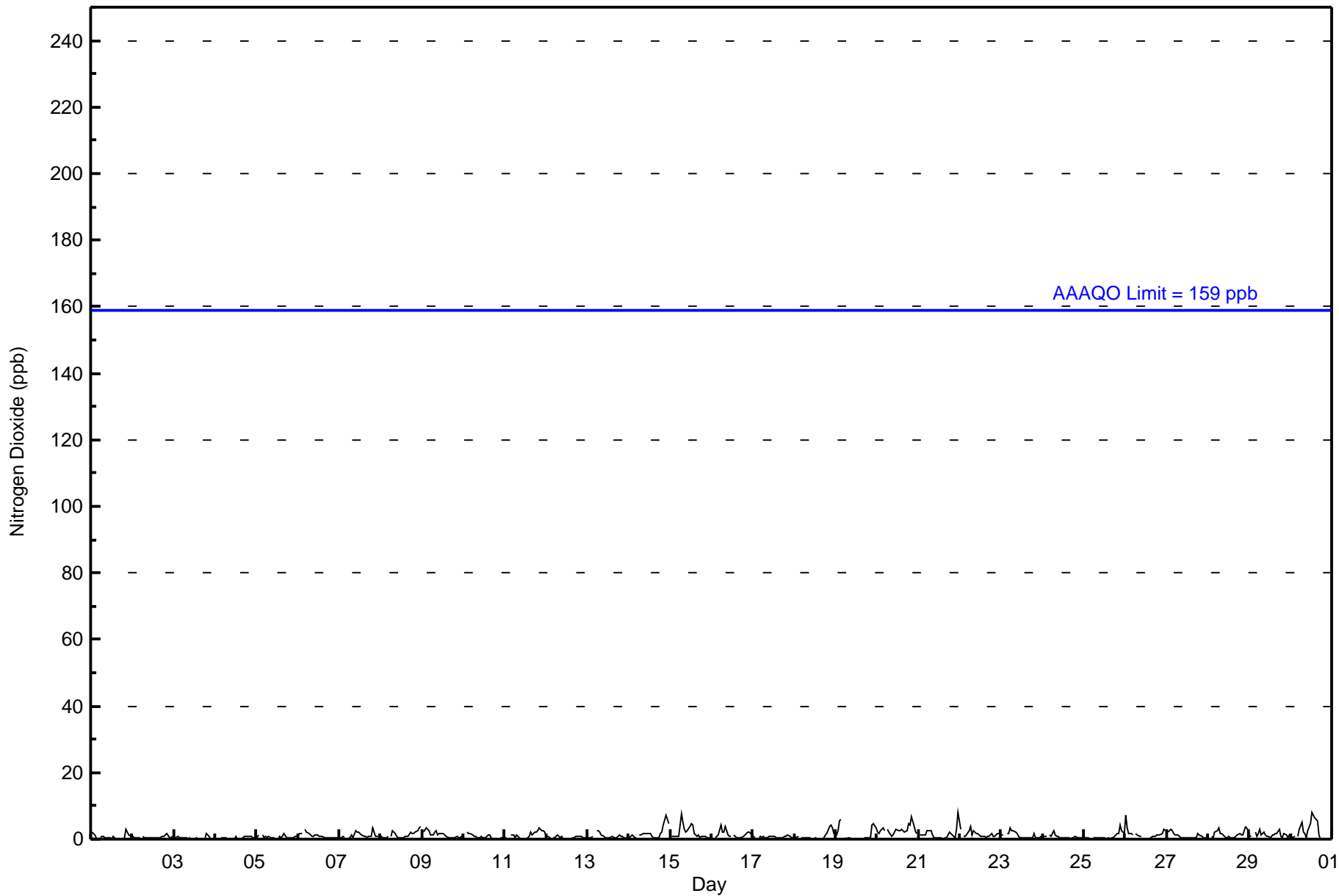
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.2 | 1.1 | 1.3 | 1.3 | 1.2 | 1.4 | 1.8 | 1.4 | 1.2 | 0.9 | 0.9 | 1.0 | 1.1 | 1.0 | 0.8 | 0.8 | 0.7 | 0.8 | 1.1 | 1.3 | 1.5 | 1.6 | 1.6 | 1.5 | Diurnal Average | |
| 7 | 4 | 6 | 6 | 3 | 4 | 8 | 5 | 4 | 3 | 3 | 5 | 8 | 7 | 7 | 5 | 2 | 3 | 5 | 4 | 7 | 7 | 6 | 8 | Diurnal Maximum | |

Z - zerospan C - Calibration M - Maintenance PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Anzac - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Anzac - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 23 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 60 | 47 | 145 | 72 | 51 | 678 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 60 | 47 | 145 | 72 | 51 | 678 |

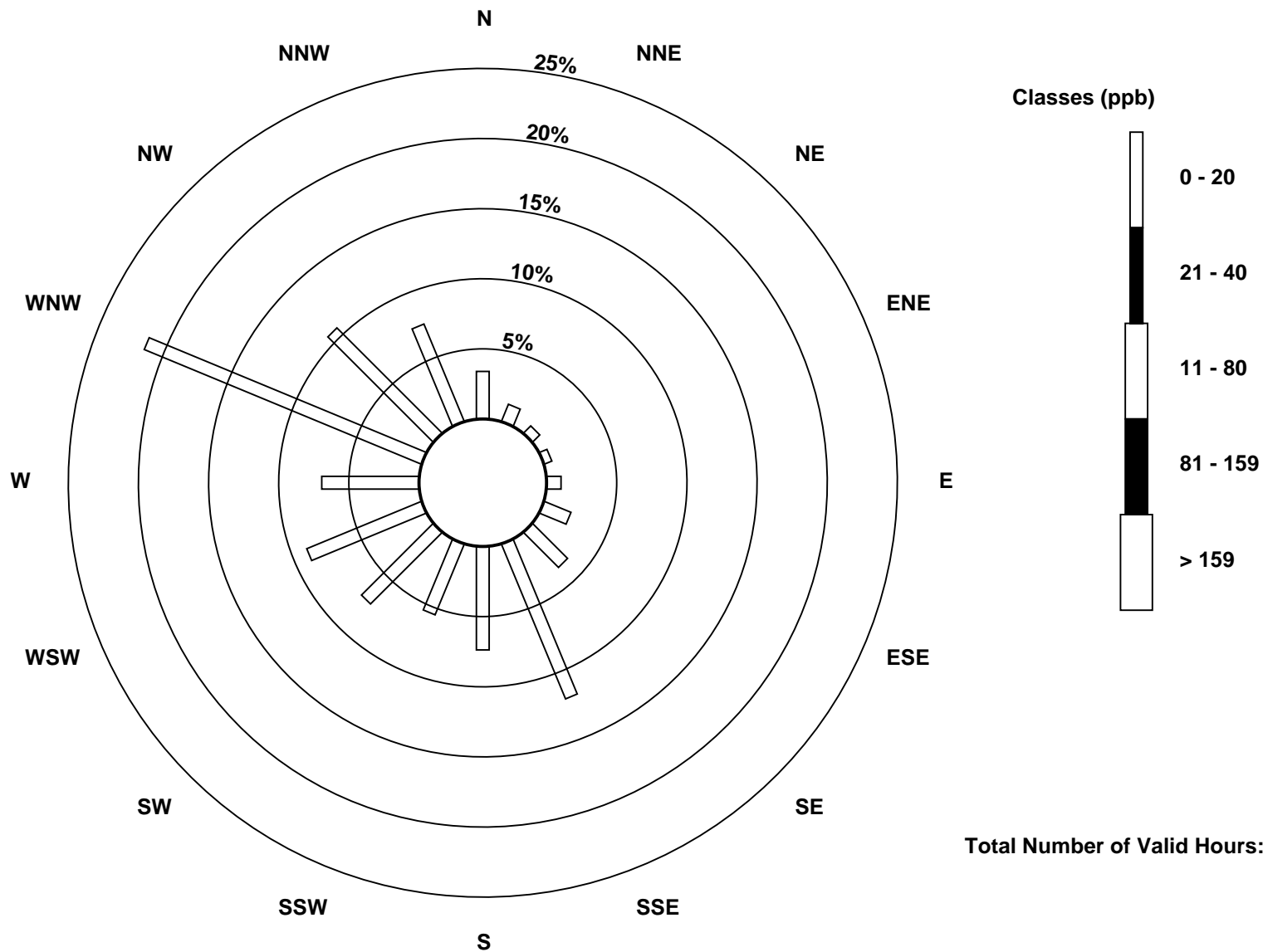
Total Number of Valid Hours: 678

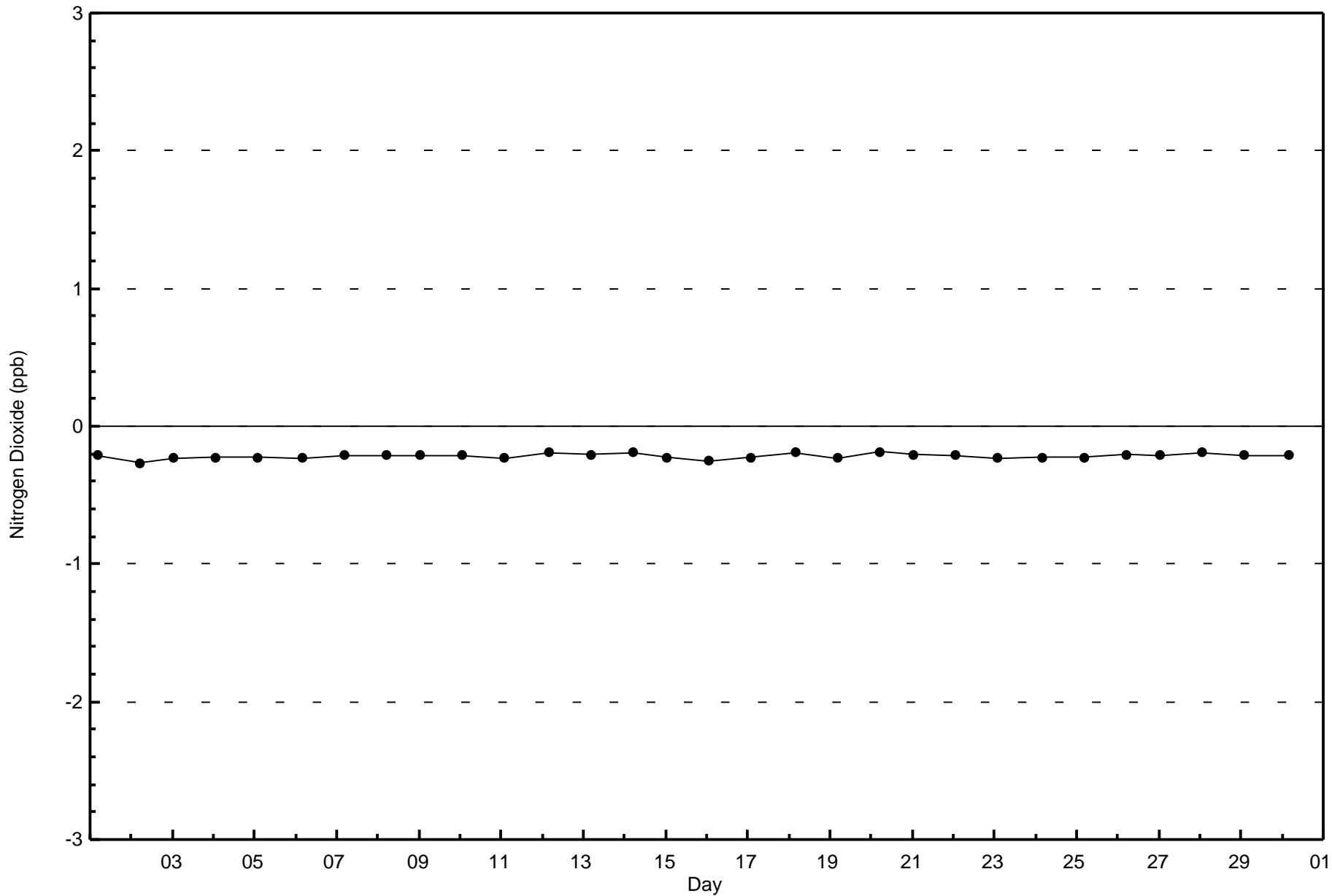
Total Number of Hours: 720

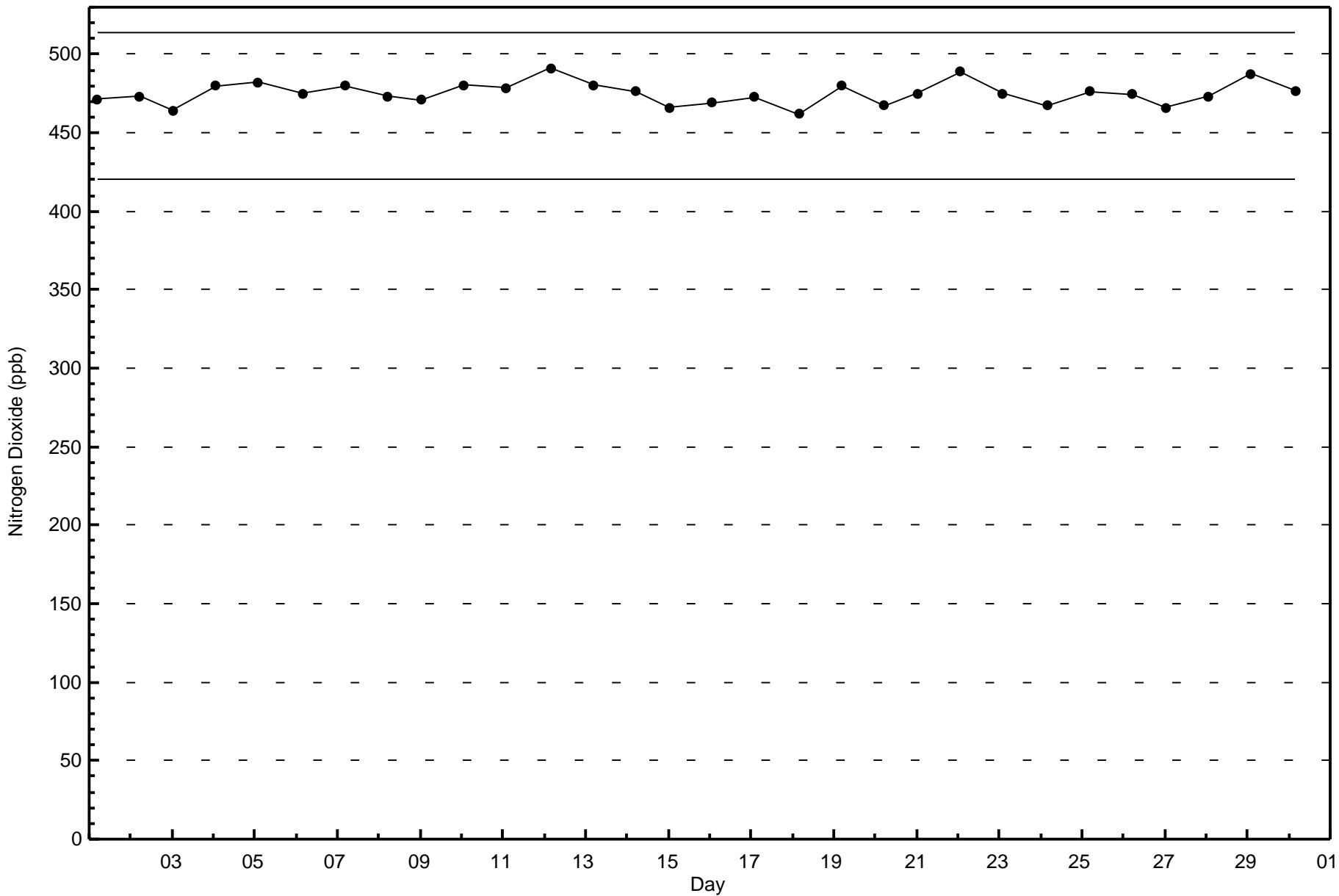


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Anzac (AMS 14)









Wood Buffalo Environmental Association
Summary of Hour Averages

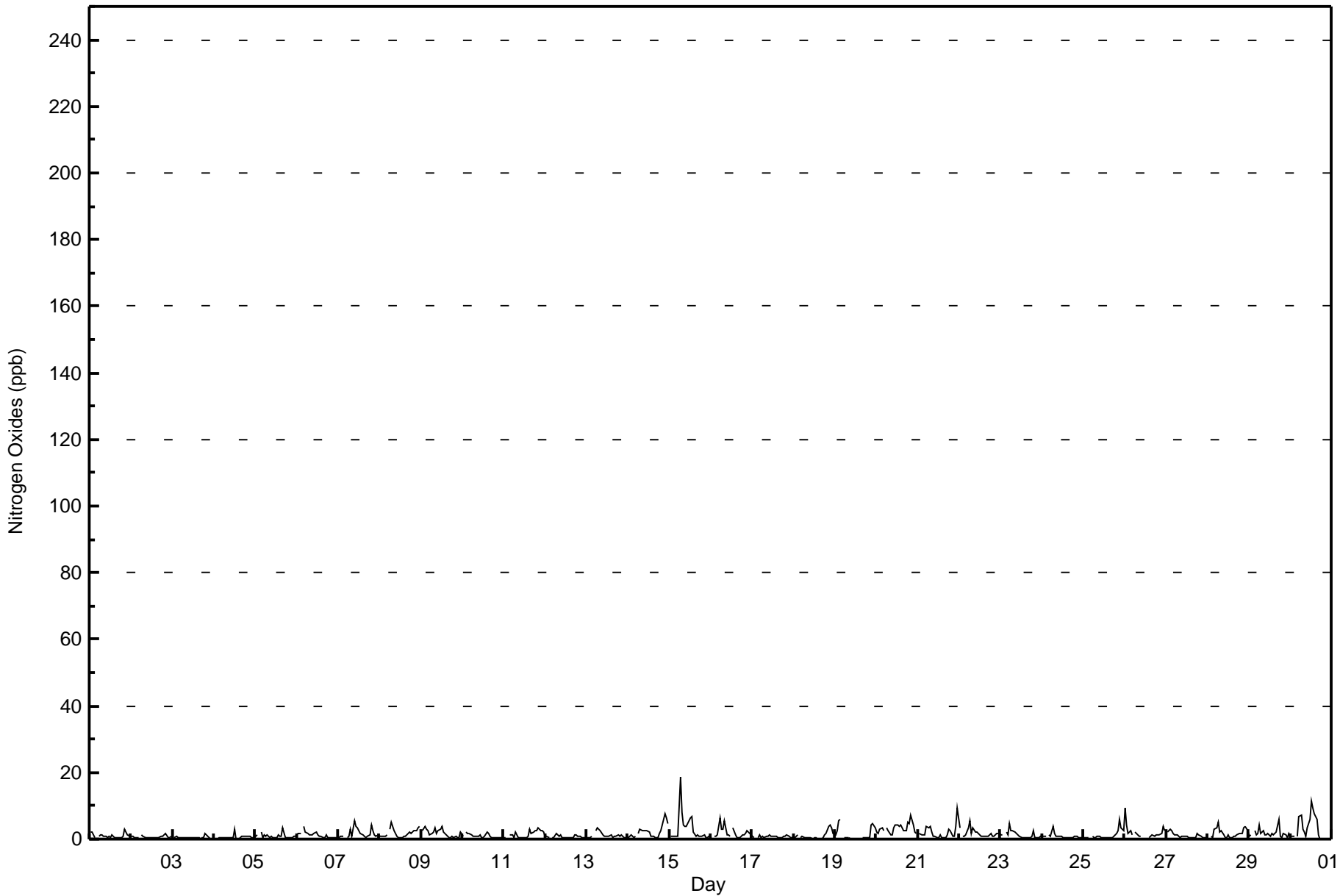
Nitrogen Oxides (NO_x) - ppb
Anzac - September 2016

| Maximum Value: 19 ppb on Sep 15 07:00 | | Maximum Daily Average: 3.2 ppb on Sep 20 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------|---|---|----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|-----|-----------------|-----|-----|-----|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Minimum Value: 0 ppb on Oct 1 00:00 | | Minimum Daily Average: 0.4 ppb on Sep 3 | | Hours of Data: 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.7 ppb at hour 7 | | Minimum Diurnal Average: 0.9 ppb at hour 17 | | Hours of Missing Data: 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.5 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 8 | | Hours of Calibration: 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 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 | 2 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 1 | 1.0 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 0.7 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | Z | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 1 | 1 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 4 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1.0 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 1 | 2 | 2 | Z | 4 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1.2 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 3 | 1 | 6 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 1 | 1 | 1.7 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 1 | 1 | 1 | 1 | 1 | Z | 3 | 5 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 1.7 | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 2 | 4 | 3 | 3 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 4 | 2 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 2 | 1.8 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 1 | Z | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0 | 0 | Z | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 1.4 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1 | 1 | 0 | Z | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0.7 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0 | 1 | 1 | 1 | Z | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.1 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | Z | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 8 | 6 | 5 | 2.2 | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 1 | 19 | 8 | 4 | 4 | 4 | 5 | 6 | 7 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 3.1 | 19 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 1 | Z | 1 | 1 | 1 | 6 | 3 | 3 | 6 | 1 | 1 | 1 | PF | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1.8 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0.7 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 1 | 0 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 4 | 3 | 2 | 1.0 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 1 | 2 | 6 | 6 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | M | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 3 | 1.7 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 2 | 2 | 3 | 3 | 3 | Z | 3 | 3 | 1 | 1 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 5 | 4 | 7 | 4 | 2 | 2 | 3.2 | 7 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 2 | 1 | 1 | 1 | 4 | 3 | 4 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 3 | 2 | 1 | 1 | 4 | 9 | 1.9 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 3 | Z | 1 | 1 | 1 | 3 | 5 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1.7 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 1 | 1 | Z | 2 | 1 | 5 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1.3 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 1 | 1 | 1 | Z | 1 | 1 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.8 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 3 | 6 | 3 | 2 | 1.1 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 9 | 4 | 2 | 2 | 1 | Z | 2 | 2 | 1 | 1 | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 3 | 2.1 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 1.0 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 0 | Z | 1 | 0 | 3 | 3 | 5 | 2 | 3 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 3 | 1.7 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 1 | 1 | Z | 2 | 1 | 2 | 4 | 2 | 3 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 6 | 1 | 1 | 2 | 1 | 1 | 1 | 1.7 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 1 | 1 | 1 | Z | 1 | 7 | 7 | 3 | 2 | 1 | 3 | 6 | 11 | 9 | 8 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.0 | 11 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 1.3 | 1.2 | 1.4 | 1.5 | 1.4 | 1.9 | 2.7 | 2.0 | 1.6 | 1.3 | 1.3 | 1.5 | 1.7 | 1.5 | 1.1 | 1.0 | 0.9 | 1.0 | 1.2 | 1.4 | 1.6 | 1.7 | 1.7 | 1.7 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 9 | 4 | 6 | 6 | 4 | 7 | 19 | 8 | 6 | 6 | 4 | 6 | 11 | 9 | 8 | 6 | 4 | 6 | 5 | 4 | 7 | 8 | 6 | 9 | Diurnal Maximum |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | M - Maintenance | | | | PF - Power Failure | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 23 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 60 | 47 | 145 | 72 | 51 | 678 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 9 | 5 | 4 | 7 | 14 | 24 | 81 | 50 | 37 | 49 | 60 | 47 | 145 | 72 | 51 | 678 |

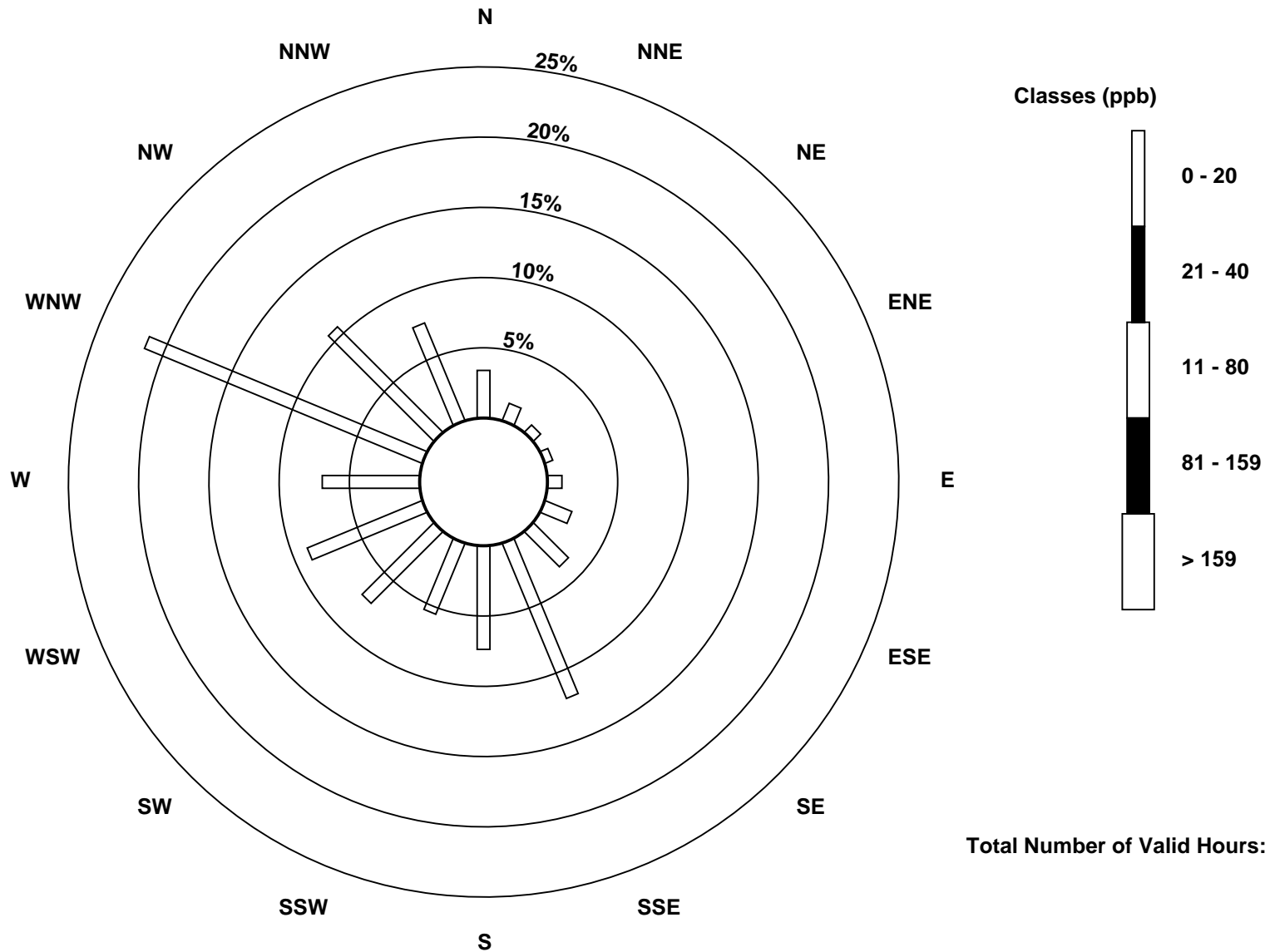
Total Number of Valid Hours: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

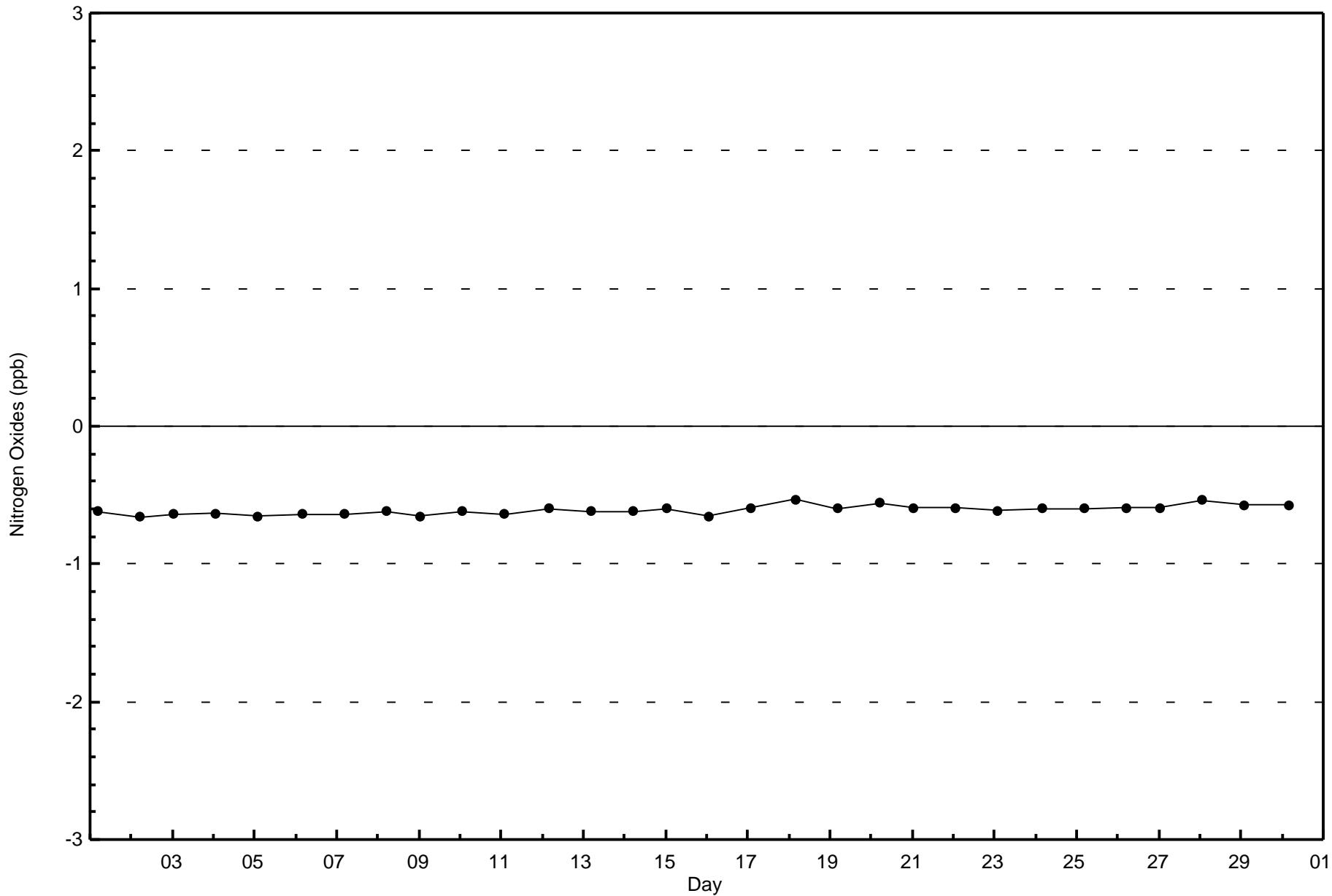
Nitrogen Oxides (NO_x) - ppb
Anzac (AMS 14)

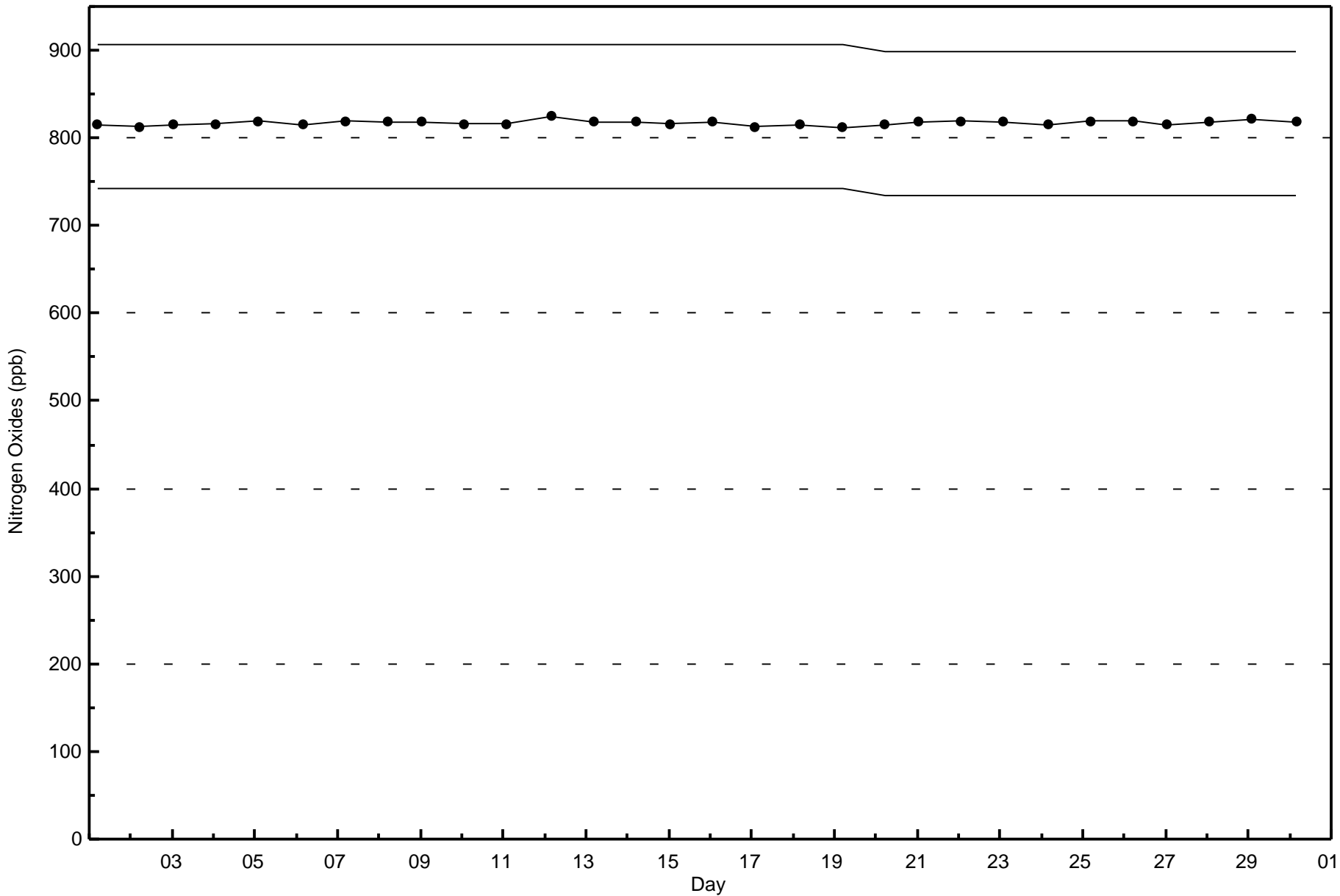




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Anzac - September 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Anzac - September 2016

| | | | | |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 39 ppb on Sep 22 17:00 | Maximum Daily Average: 30.5 ppb on Sep 27 | | Hours of Data: | 684 |
| Minimum Value: 4 ppb on Sep 7 04:00 | Minimum Daily Average: 11.3 ppb on Sep 1 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 26.9 ppb at hour 17 | Minimum Diurnal Average: 14.8 ppb at hour 7 | | Hours of Calibration: | 35 |
| Monthly Average: 20.7 ppb | Percentiles: P ₁ = 6 P ₁₀ = 11 Q ₁ = 15 Median = 20 Q ₃ = 27 P ₉₀ = 31 P ₉₉ = 37 | | Percent Operational Time: | 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 11 | 11 | 11 | 10 | 9 | 9 | Z | 9 | 10 | 11 | 12 | 12 | 14 | 14 | 13 | 12 | 12 | 12 | 11 | 9 | 7 | 13 | 14 | 13 | 11.3 | 14 |
| 2-Sep | 14 | 13 | 13 | 16 | 17 | 17 | Z | 15 | 16 | 17 | 18 | 19 | 19 | 18 | 16 | 13 | 11 | 9 | 8 | 7 | 7 | 10 | 8 | 13.8 | 19 | |
| 3-Sep | 6 | 6 | Z | 7 | 6 | 7 | 6 | 7 | 7 | 7 | 8 | 12 | 13 | 13 | 13 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 21 | 21 | 12.4 | 21 |
| 4-Sep | 22 | 20 | 18 | Z | 15 | 15 | 15 | 17 | 17 | 18 | 22 | 25 | 27 | 29 | 28 | 28 | 28 | 27 | 25 | 21 | 17 | 18 | 16 | 13 | 21.0 | 29 |
| 5-Sep | 15 | 13 | 9 | 10 | Z | 10 | 9 | 13 | 20 | 25 | 28 | 28 | 28 | 26 | 25 | 27 | 27 | 27 | 28 | 27 | 25 | 23 | 21 | 20 | 21.1 | 28 |
| 6-Sep | 20 | 20 | 19 | 17 | 15 | Z | 16 | 16 | 17 | 18 | 18 | 22 | 27 | 28 | 28 | 28 | 28 | 28 | 26 | 23 | 21 | 19 | 17 | 14 | 21.0 | 28 |
| 7-Sep | 8 | 7 | 6 | 4 | 5 | 6 | Z | 8 | 13 | 17 | 17 | 19 | 24 | 27 | 28 | 27 | 28 | 26 | 22 | 15 | 14 | 9 | 12 | 11 | 15.3 | 28 |
| 8-Sep | 13 | 15 | 12 | 7 | 6 | 5 | 5 | Z | 17 | 21 | 24 | 25 | 25 | 27 | 24 | 26 | 28 | 25 | 23 | 23 | 20 | 18 | 19 | 17 | 18.5 | 28 |
| 9-Sep | 14 | 14 | Z | 12 | 13 | 16 | 16 | 15 | 13 | 14 | 14 | 16 | 16 | 18 | 18 | 19 | 19 | 19 | 16 | 13 | 15 | 16 | 15 | 16 | 15.5 | 19 |
| 10-Sep | 16 | 16 | 15 | Z | 14 | 14 | 15 | 15 | 15 | 16 | 17 | 18 | 18 | 18 | 19 | 20 | 20 | 20 | 19 | 17 | 16 | 16 | 15 | 14 | 16.7 | 20 |
| 11-Sep | 13 | 13 | 17 | 20 | Z | 21 | 21 | 19 | 21 | 22 | 23 | 22 | 24 | 22 | 23 | 21 | 22 | 21 | 19 | 19 | 17 | 17 | 17 | 16 | 19.6 | 24 |
| 12-Sep | 18 | 20 | 19 | 18 | 20 | Z | 23 | 24 | 26 | 31 | 31 | 30 | 30 | 29 | 31 | 31 | 31 | 30 | 27 | 24 | 20 | 18 | 19 | 22 | 24.9 | 31 |
| 13-Sep | 25 | 27 | 28 | 28 | 26 | 23 | Z | 20 | 20 | 20 | 21 | 21 | 22 | 23 | 23 | 22 | 22 | 22 | 20 | 21 | 21 | 21 | 20 | 20 | 22.4 | 28 |
| 14-Sep | 18 | 17 | 14 | 10 | 11 | 8 | 6 | Z | 15 | 18 | 21 | 24 | 26 | 25 | 21 | 23 | 25 | 26 | 23 | 19 | 16 | 13 | 10 | 8 | 17.3 | 26 |
| 15-Sep | 12 | 18 | Z | 17 | 19 | 14 | 6 | 12 | 15 | 17 | 20 | 20 | 22 | 25 | 30 | 32 | 31 | 30 | 28 | 26 | 23 | 22 | 21 | 18 | 20.7 | 32 |
| 16-Sep | 19 | 18 | 19 | Z | 20 | 18 | 17 | 14 | 14 | 18 | 19 | 21 | PF | 23 | 25 | 26 | 26 | 28 | 26 | 20 | 17 | 17 | 15 | 19 | 20.0 | 28 |
| 17-Sep | 21 | 28 | 26 | 23 | Z | 21 | 19 | 17 | 16 | 18 | 22 | 23 | 23 | 22 | 22 | 23 | 24 | 26 | 25 | 27 | 27 | 30 | 28 | 29 | 23.4 | 30 |
| 18-Sep | 28 | 25 | 26 | 27 | 26 | Z | 23 | 21 | 20 | 20 | 22 | 25 | 28 | 29 | 29 | 27 | 25 | 25 | 22 | 20 | 17 | 17 | 18 | 19 | 23.5 | 29 |
| 19-Sep | 16 | 12 | 7 | 7 | 12 | 13 | Z | 12 | 14 | 15 | 16 | 21 | 22 | 22 | C | C | C | 19 | 16 | 15 | 15 | 11 | 10 | 11 | 14.3 | 22 |
| 20-Sep | 11 | 13 | 13 | 12 | 12 | 16 | 14 | Z | 20 | 22 | 22 | 22 | 24 | 26 | 27 | 29 | 30 | 29 | 18 | 12 | 8 | 8 | 14 | 15 | 18.1 | 30 |
| 21-Sep | 13 | 14 | Z | 19 | 15 | 11 | 12 | 12 | 20 | 24 | 24 | 26 | 28 | 29 | 30 | 31 | 30 | 29 | 24 | 20 | 18 | 14 | 10 | 5 | 19.9 | 31 |
| 22-Sep | 9 | 12 | 11 | Z | 12 | 14 | 12 | 18 | 24 | 31 | 35 | 37 | 38 | 39 | 39 | 39 | 39 | 38 | 36 | 35 | 34 | 33 | 32 | 30 | 28.1 | 39 |
| 23-Sep | 32 | 30 | 27 | 25 | Z | 20 | 20 | 19 | 20 | 21 | 23 | 23 | 24 | 30 | 28 | 28 | 29 | 29 | 27 | 24 | 23 | 21 | 19 | 18 | 24.4 | 32 |
| 24-Sep | 17 | 15 | 14 | 12 | 10 | Z | 11 | 23 | 27 | 27 | 27 | 27 | 28 | 30 | 33 | 33 | 33 | 34 | 33 | 31 | 32 | 32 | 31 | 30 | 25.6 | 34 |
| 25-Sep | 30 | 29 | 29 | 29 | 29 | 28 | Z | 26 | 25 | 26 | 28 | 29 | 30 | 32 | 32 | 32 | 31 | 31 | 28 | 27 | 25 | 20 | 24 | 21 | 27.9 | 32 |
| 26-Sep | 9 | 10 | 10 | 10 | 11 | 11 | 16 | Z | 22 | 27 | 29 | 32 | 30 | C | C | 33 | 33 | 32 | 30 | 29 | 28 | 29 | 28 | 29 | 23.2 | 33 |
| 27-Sep | 28 | 28 | Z | 26 | 28 | 28 | 26 | 28 | 33 | 31 | 31 | 29 | 30 | 32 | 33 | 34 | 34 | 33 | 30 | 32 | 33 | 33 | 32 | 31 | 30.5 | 34 |
| 28-Sep | 30 | 25 | 25 | Z | 28 | 26 | 18 | 22 | 26 | 29 | 31 | 31 | 31 | 33 | 33 | 34 | 34 | 31 | 25 | 21 | 14 | 13 | 13 | 11 | 25.4 | 34 |
| 29-Sep | 16 | 15 | 20 | 16 | Z | 19 | 20 | 16 | 24 | 30 | 35 | 35 | 37 | 37 | 37 | 37 | 37 | 34 | 28 | 29 | 23 | 16 | 11 | 12 | 25.4 | 37 |
| 30-Sep | 12 | 12 | 10 | 7 | 6 | Z | 8 | 8 | 17 | 23 | 22 | 21 | 16 | 17 | 17 | 19 | 24 | 25 | 26 | 25 | 24 | 25 | 25 | 26 | 18.0 | 26 |

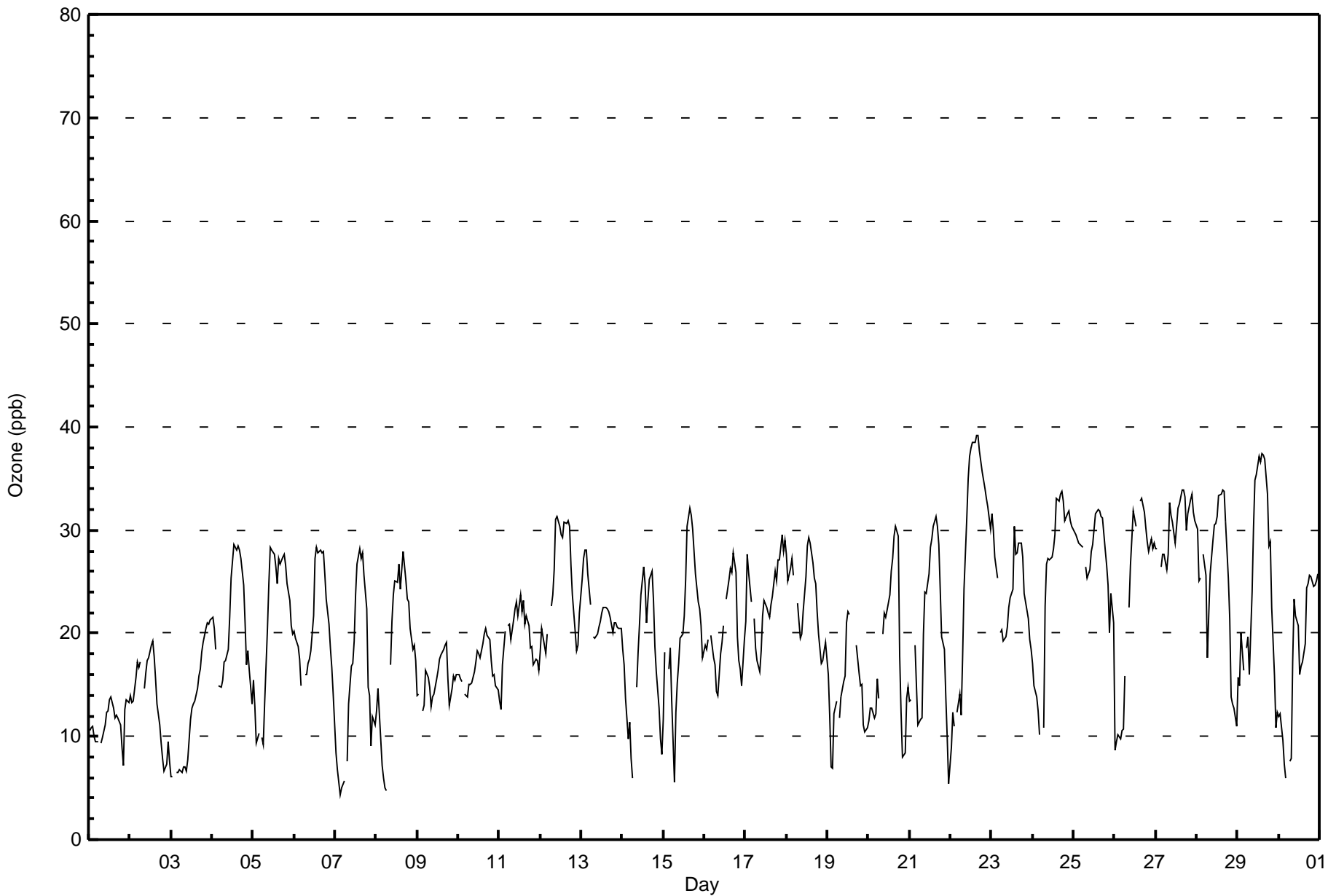
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 17.2 | 17.2 | 16.8 | 15.6 | 15.4 | 15.5 | 14.8 | 16.5 | 18.8 | 21.2 | 22.6 | 23.8 | 25.0 | 25.6 | 26.0 | 26.6 | 26.9 | 26.0 | 23.6 | 21.6 | 19.9 | 19.0 | 18.6 | 18.0 | Diurnal Average | |
| 32 | 30 | 29 | 29 | 29 | 28 | 26 | 28 | 33 | 31 | 35 | 37 | 38 | 39 | 39 | 39 | 39 | 38 | 36 | 35 | 34 | 33 | 32 | 31 | Diurnal Maximum | |

Z - zeronspan 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 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Anzac - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 349 | 51.02 | 51.02 |
| 21 - 50 | 335 | 48.98 | 100.00 |
| 51 - 82 | 0 | 0.00 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Anzac - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 14 | 0 | 1 | 3 | 4 | 9 | 16 | 41 | 25 | 27 | 25 | 23 | 14 | 58 | 49 | 37 | 346 |
| 21 - 50 | 10 | 9 | 4 | 1 | 3 | 5 | 8 | 42 | 23 | 11 | 24 | 36 | 35 | 88 | 23 | 13 | 335 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 24 | 9 | 5 | 4 | 7 | 14 | 24 | 83 | 48 | 38 | 49 | 59 | 49 | 146 | 72 | 50 | 681 |

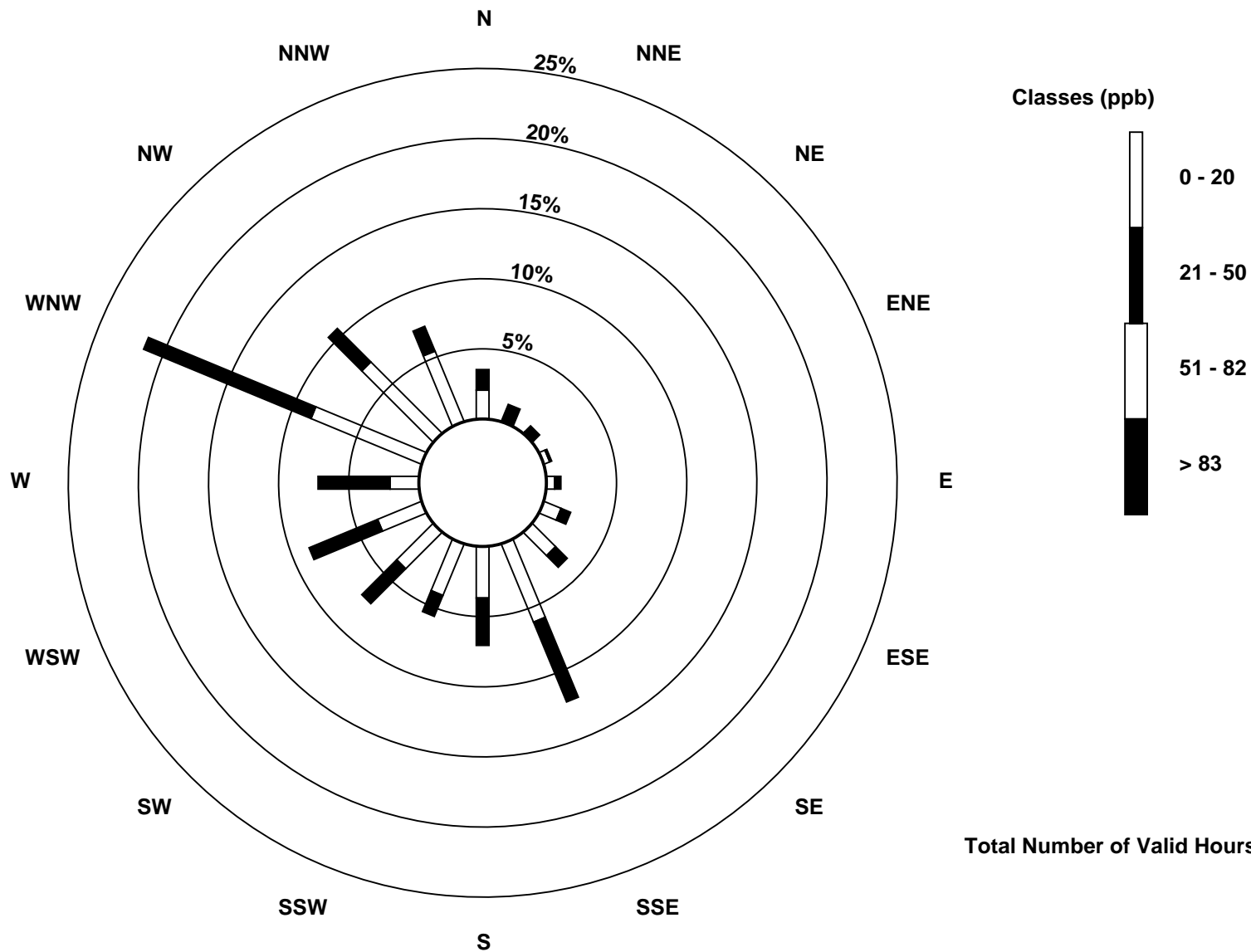
Total Number of Valid Hours: 681

Total Number of Hours: 720

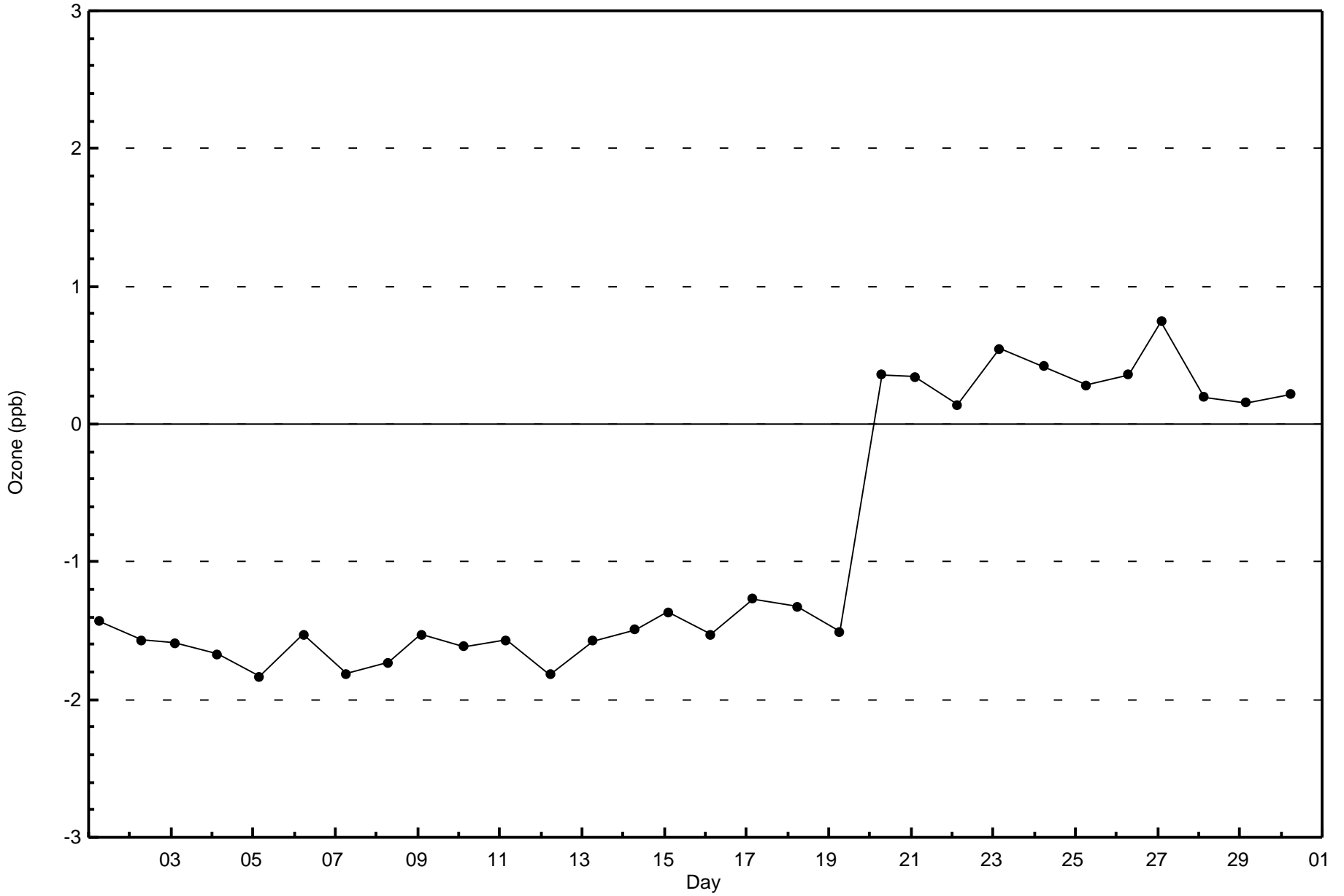


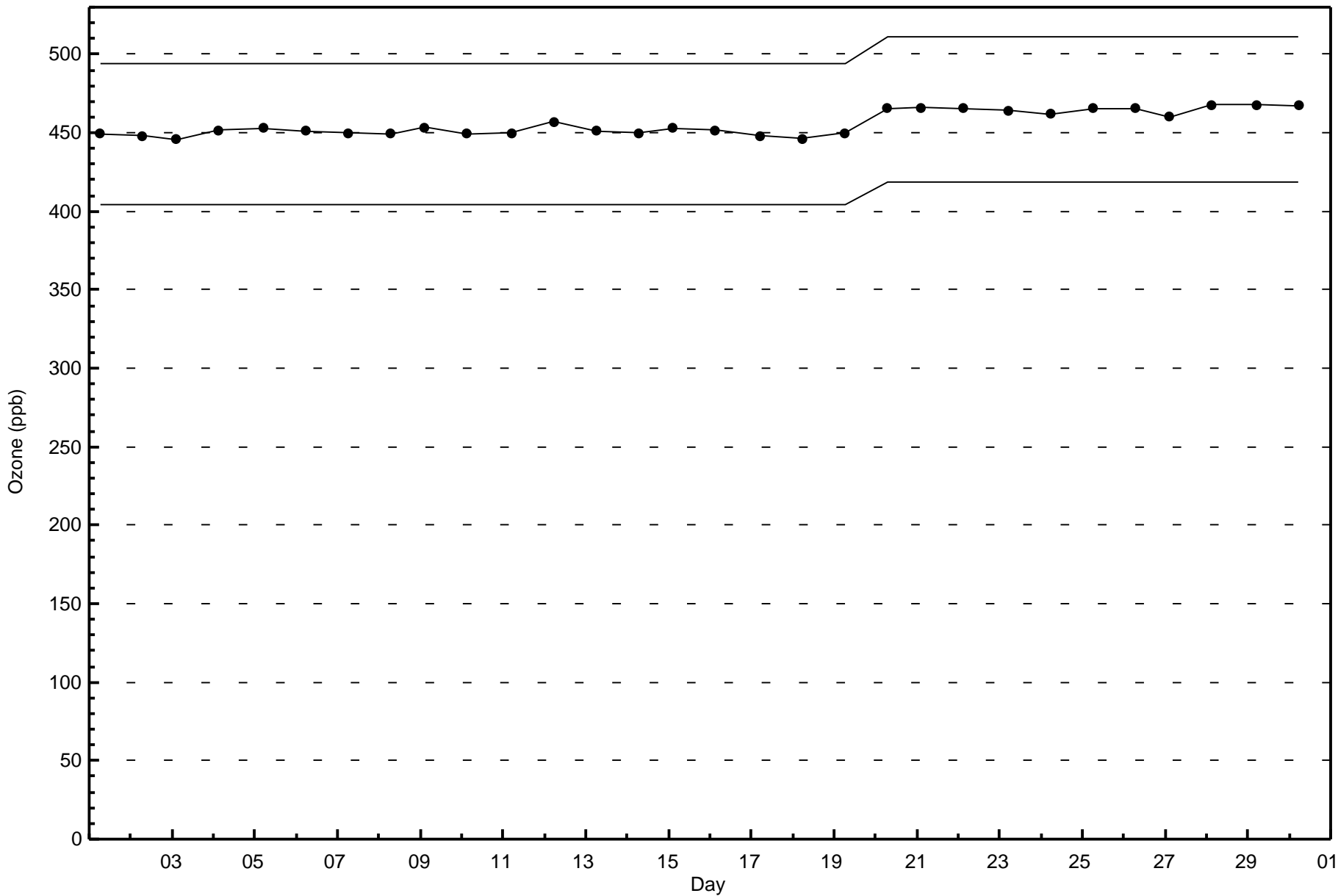
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Ozone (O₃) - ppb
Anzac (AMS 14)



Total Number of Valid Hours: 681







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Anzac - September 2016

| | | | |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 13.4 µg/m ³ on Sep 15 00:00 | Maximum Daily Average: 5.0 µg/m ³ on Sep 14 | Hours of Data: | 676 |
| Minimum Value: 0.3 µg/m ³ on Sep 26 15:00 | Minimum Daily Average: 1.8 µg/m ³ on Sep 25 | Hours of Missing Data: | 44 |
| Maximum Diurnal Average: 3.9 µg/m ³ at hour 24 | Minimum Diurnal Average: 2.1 µg/m ³ at hour 16 | Hours of Calibration: | 3 |
| Monthly Average: 2.94 µg/m ³ | Percentiles: P ₁ = 0.9 P ₁₀ = 1.5 Q ₁ = 1.8 Median = 2.4 Q ₃ = 3.6 P ₉₀ = 5.1 P ₉₉ = 8.9 | Percent Operational Time: | 94.3 |

| 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 | 2.4 | 2.4 | 2.5 | 2.4 | 2.5 | 2.5 | 2.5 | 2.1 | 2.4 | 2.8 | 3.0 | 3.3 | 3.8 | 4.8 | 5.7 | 4.0 | 7.8 | 6.4 | 4.5 | 7.3 | 2.5 | 2.8 | 4.8 | 4.8 | 3.7 | 7.8 | |
| 2-Sep | 3.4 | 4.1 | 4.1 | 2.3 | 3.4 | 4.5 | 5.3 | 5.8 | 5.5 | 5.2 | 4.4 | 2.6 | 1.7 | 2.2 | 2.9 | 1.8 | 1.8 | 1.7 | 2.2 | 3.3 | 3.1 | 1.6 | 1.7 | 1.8 | 3.2 | 5.8 | |
| 3-Sep | 1.6 | 1.5 | 1.4 | 1.5 | 1.4 | 1.4 | 1.6 | 1.7 | 1.7 | 1.6 | 1.7 | 1.7 | 1.7 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 1.8 | 2.3 | |
| 4-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.6 | 2.9 | 2.5 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.5 | 6.0 | 4.1 | 3.6 | 2.8 | 1.8 | 2.2 | 4.5 | 2.7 | 6.0 | |
| 5-Sep | 5.7 | 7.3 | 10.6 | 6.5 | 4.6 | 3.4 | 3.2 | 2.4 | 1.2 | 1.9 | 1.3 | 1.3 | 1.3 | 3.9 | 7.2 | 1.7 | 1.9 | 1.7 | 1.9 | 2.5 | 2.5 | 3.0 | 3.2 | 3.1 | 3.5 | 10.6 | |
| 6-Sep | 3.8 | 3.6 | 3.5 | 3.5 | 3.6 | 3.3 | 3.3 | 4.0 | 3.1 | 2.6 | 2.4 | 1.8 | 1.5 | 1.4 | 1.4 | 1.7 | 1.5 | 1.4 | 1.8 | 2.3 | 2.8 | 2.6 | 2.4 | 2.5 | 2.6 | 4.0 | |
| 7-Sep | 4.2 | 6.2 | 6.0 | 4.3 | 3.8 | 2.6 | 2.4 | 1.6 | 1.6 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 6.2 | |
| 8-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | M | M | M | M | 1.8 | 2.0 | 1.8 | 1.7 | 2.0 | 1.9 | 3.6 | 9.4 | 7.7 | 5.6 | 5.1 | -- | 9.4 | |
| 9-Sep | 4.2 | 3.9 | 4.2 | 4.0 | 3.0 | 2.7 | 2.5 | 2.5 | 3.1 | 2.5 | 2.9 | 2.6 | 2.2 | 2.0 | 2.0 | 1.6 | 1.5 | 1.5 | 1.8 | 2.5 | 3.0 | 2.2 | 1.7 | 1.8 | 2.6 | 4.2 | |
| 10-Sep | 1.8 | 1.9 | 1.8 | 2.1 | 1.9 | 1.9 | 1.7 | 1.8 | 1.9 | 1.8 | 1.8 | 1.7 | 2.6 | 1.6 | 1.7 | 1.7 | 1.7 | 2.9 | 3.5 | 4.1 | 4.3 | 4.2 | 3.8 | 3.7 | 2.4 | 4.3 | |
| 11-Sep | 3.7 | 2.9 | 2.8 | 2.4 | 2.1 | 2.0 | 1.8 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 3.1 | 3.4 | 3.5 | 3.1 | 2.4 | 3.7 | |
| 12-Sep | 2.7 | 2.6 | 2.4 | 2.4 | 2.1 | 2.0 | 2.3 | 2.1 | 2.0 | 1.8 | 1.5 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.9 | 3.0 | 1.9 | 2.6 | 4.1 | 3.9 | 3.4 | 3.0 | 2.3 | 4.1 | |
| 13-Sep | 2.3 | 1.8 | 1.8 | 1.9 | 2.1 | 2.1 | 2.0 | 2.0 | 2.2 | 2.0 | 1.9 | 1.8 | 1.8 | 1.9 | 2.1 | 1.9 | 1.9 | 2.9 | 3.7 | 4.6 | 4.8 | 4.5 | 5.3 | 4.3 | 2.6 | 5.3 | |
| 14-Sep | 4.8 | 5.9 | 6.1 | 5.2 | 5.3 | 5.8 | 6.2 | 4.3 | 2.2 | 2.1 | 2.2 | 2.3 | 2.3 | 2.1 | 1.8 | 1.7 | 1.8 | 1.7 | 3.4 | 6.7 | 8.3 | 12.3 | 13.3 | 13.4 | 5.0 | 13.4 | |
| 15-Sep | 10.1 | 5.8 | 5.0 | 4.8 | 4.8 | 4.0 | 4.7 | 3.1 | 2.1 | 1.7 | 1.8 | 2.0 | 2.2 | 1.8 | 1.7 | 1.8 | 1.7 | 1.7 | 2.4 | 3.2 | 4.4 | 4.5 | 5.1 | 5.2 | 3.6 | 10.1 | |
| 16-Sep | 5.1 | 4.5 | 4.0 | 3.5 | 2.7 | 2.7 | 2.5 | 2.8 | 2.4 | 2.3 | 1.7 | 1.6 | PF | 1.5 | 1.7 | 1.7 | 1.8 | 1.7 | 1.9 | 1.9 | 2.4 | 4.3 | 5.6 | 4.4 | 2.8 | 5.6 | |
| 17-Sep | 3.8 | 2.8 | 2.1 | 1.2 | 1.2 | 1.3 | 1.8 | 2.0 | 1.7 | 1.5 | 3.6 | 4.5 | 5.6 | 4.8 | 3.5 | 3.1 | 2.9 | 2.7 | 2.9 | 3.6 | 4.7 | 3.7 | 2.6 | 2.7 | 2.9 | 5.6 | |
| 18-Sep | 2.2 | 2.9 | 2.8 | 2.7 | 2.6 | 2.5 | 2.6 | 2.5 | 1.9 | 1.8 | 2.0 | 1.8 | 1.7 | 1.8 | 2.1 | 2.4 | 2.8 | 2.6 | 3.3 | 3.9 | 4.6 | 3.8 | 3.0 | 2.7 | 2.6 | 4.6 | |
| 19-Sep | 2.5 | 2.0 | 2.9 | 2.6 | 1.8 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.6 | 1.5 | 1.5 | 1.5 | 2.1 | 3.1 | 2.9 | 1.8 | 3.1 | |
| 20-Sep | 3.2 | 4.8 | 4.9 | 4.6 | 4.0 | 3.3 | 3.3 | 2.7 | 1.8 | 2.0 | 2.3 | 2.8 | 2.9 | 2.9 | 2.9 | 2.7 | 2.8 | 2.6 | 5.7 | 6.7 | 6.9 | 6.5 | 5.7 | 4.9 | 3.9 | 6.9 | |
| 21-Sep | 4.2 | 3.9 | 3.1 | 3.1 | 3.2 | 3.2 | 3.2 | 3.1 | 1.5 | 1.3 | 1.4 | 1.4 | 1.3 | 1.4 | 1.3 | 1.7 | 1.8 | 2.1 | 2.8 | 3.7 | 3.5 | 3.8 | 4.4 | 5.6 | 2.7 | 5.6 | |
| 22-Sep | 4.9 | 4.8 | 4.4 | 3.6 | 3.2 | 4.1 | 3.1 | 2.3 | 1.9 | 1.9 | 2.0 | 1.8 | 1.8 | C | C | 0.5 | 0.6 | 0.9 | 1.5 | 2.3 | 2.4 | 2.5 | 2.7 | 3.0 | 2.6 | 4.9 | |
| 23-Sep | 3.1 | 3.1 | 3.7 | 4.1 | 4.3 | 4.7 | 4.8 | 5.2 | 4.8 | 4.0 | 3.6 | 2.7 | 2.5 | 2.2 | 2.6 | 2.9 | 3.3 | 2.8 | 2.7 | 2.9 | 2.5 | 2.2 | 2.1 | 2.4 | 3.3 | 5.2 | |
| 24-Sep | 2.8 | 3.6 | 4.2 | 4.4 | 5.2 | 6.0 | 6.7 | 6.6 | 5.2 | 4.2 | 2.9 | 2.4 | 2.2 | 2.1 | 1.8 | 1.3 | 1.0 | 1.0 | 1.3 | 1.1 | 1.2 | 1.2 | 1.1 | 1.2 | 2.9 | 6.7 | |
| 25-Sep | 1.1 | 1.4 | 1.3 | 1.3 | 1.2 | 1.3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 2.0 | 1.2 | 1.2 | 1.2 | 1.5 | 1.2 | 1.7 | 2.5 | 4.9 | 3.0 | 2.1 | 3.2 | 1.8 | 4.9 | |
| 26-Sep | 3.0 | 3.6 | 2.9 | 2.5 | 2.5 | 2.8 | 2.4 | 2.2 | 1.6 | 1.6 | 1.6 | 1.4 | 0.7 | 0.4 | 0.3 | C | 0.4 | 0.8 | 1.6 | 3.8 | 2.2 | 2.4 | 2.7 | 2.7 | 2.0 | 3.8 | |
| 27-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 | 2.0 | 2.4 | 2.7 | 2.3 | 2.4 | 2.2 | 2.7 | -- | 2.7 |
| 28-Sep | 2.3 | 2.0 | 2.0 | 1.9 | 1.8 | 1.7 | 2.1 | 2.1 | 1.8 | 1.6 | 1.5 | 1.5 | 1.7 | 2.1 | 2.6 | 4.1 | 5.0 | 5.7 | 8.1 | 8.0 | 8.3 | 9.0 | 8.7 | 7.9 | 3.9 | 9.0 | |
| 29-Sep | 6.6 | 5.7 | 4.2 | 3.4 | 3.0 | 2.9 | 2.8 | 2.5 | 2.0 | 2.1 | 2.0 | 2.0 | 2.5 | 2.5 | 2.4 | 2.3 | 2.6 | 3.3 | 4.4 | 5.3 | 5.7 | 6.7 | 6.2 | 6.3 | 3.7 | 6.7 | |
| 30-Sep | 5.9 | 4.9 | 4.5 | 3.9 | 3.8 | 4.6 | 4.9 | 4.2 | 5.3 | 5.2 | 4.5 | 3.4 | 3.9 | 3.9 | 4.0 | 4.0 | 2.3 | 2.0 | 2.2 | 2.4 | 2.3 | 2.3 | 2.3 | 2.5 | 3.7 | 5.9 | |

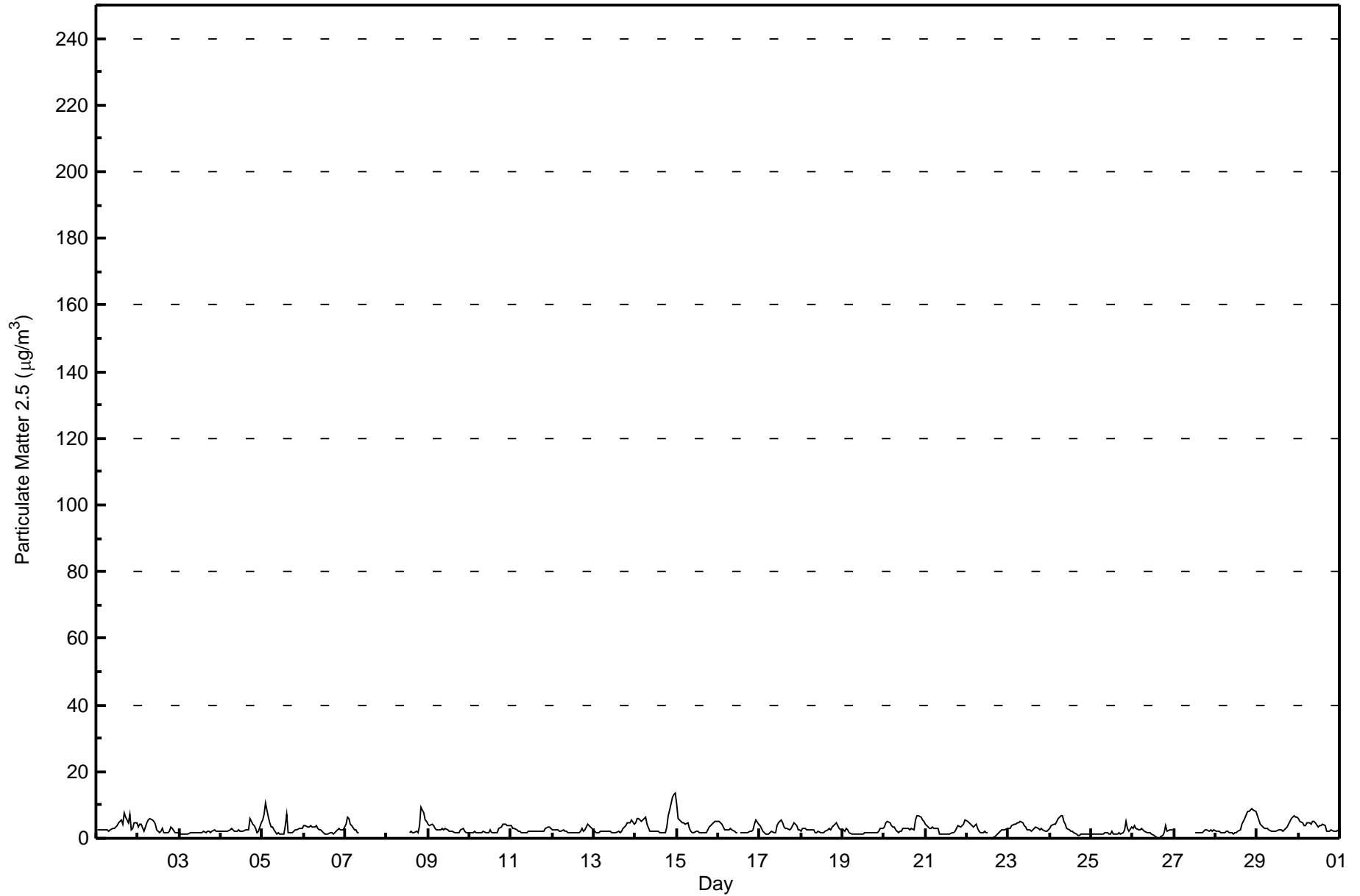
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----------------|-----------------|--|
| 3.7 | 3.6 | 3.6 | 3.1 | 3.0 | 3.0 | 3.1 | 2.8 | 2.4 | 2.3 | 2.3 | 2.1 | 2.2 | 2.2 | 2.4 | 2.1 | 2.2 | 2.4 | 2.8 | 3.5 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | Diurnal Average | |
| 10.1 | 7.3 | 10.6 | 6.5 | 5.3 | 6.0 | 6.7 | 6.6 | 5.5 | 5.2 | 4.5 | 4.5 | 5.6 | 4.8 | 7.2 | 4.1 | 7.8 | 6.4 | 8.1 | 8.0 | 9.4 | 12.3 | 13.3 | 13.4 | Diurnal Maximum | | |

C - Calibration M - Maintenance AF - Analyzer Failure 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}) - $\mu\text{g}/\text{m}^3$
Anzac - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 614 | 90.83 | 90.83 |
| 6 - 15 | 53 | 7.84 | 98.67 |
| 16 - 25 | 0 | 0.00 | 98.67 |
| 26 - 80 | 0 | 0.00 | 98.67 |
| > 81.0 | 0 | 0.00 | 98.67 |

Total Number of Valid Hours: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Anzac - September 2016

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|----------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 24 | 9 | 5 | 3 | 6 | 12 | 19 | 81 | 43 | 33 | 33 | 47 | 42 | 135 | 72 | 50 | 614 |
| 6 - 15 | 0 | 0 | 0 | 1 | 2 | 1 | 4 | 3 | 5 | 2 | 11 | 5 | 5 | 4 | 5 | 3 | 51 |
| 16 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 24 | 9 | 5 | 4 | 8 | 13 | 23 | 84 | 48 | 35 | 44 | 52 | 47 | 139 | 77 | 53 | 665 |

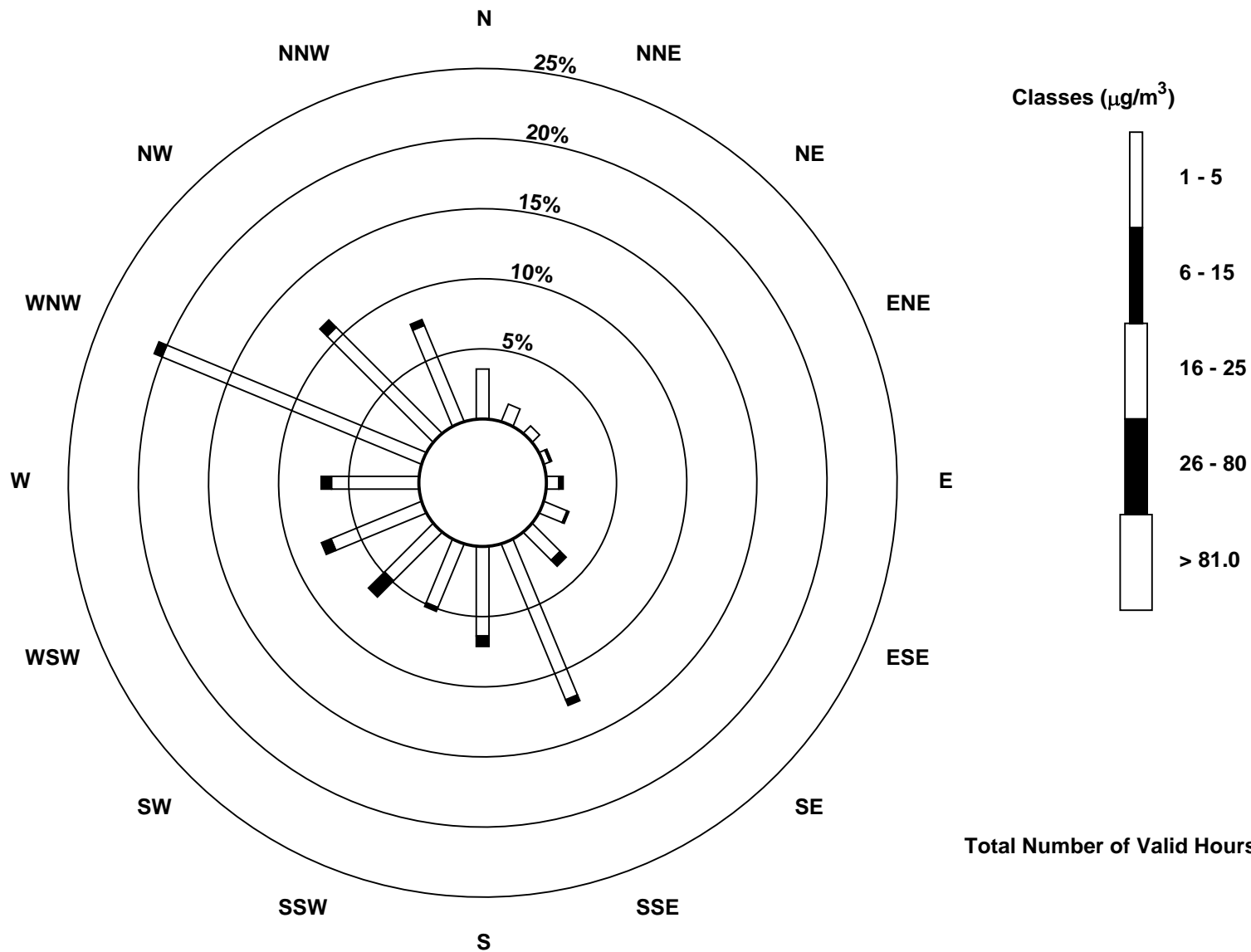
Total Number of Valid Hours: 674

Total Number of Hours: 720



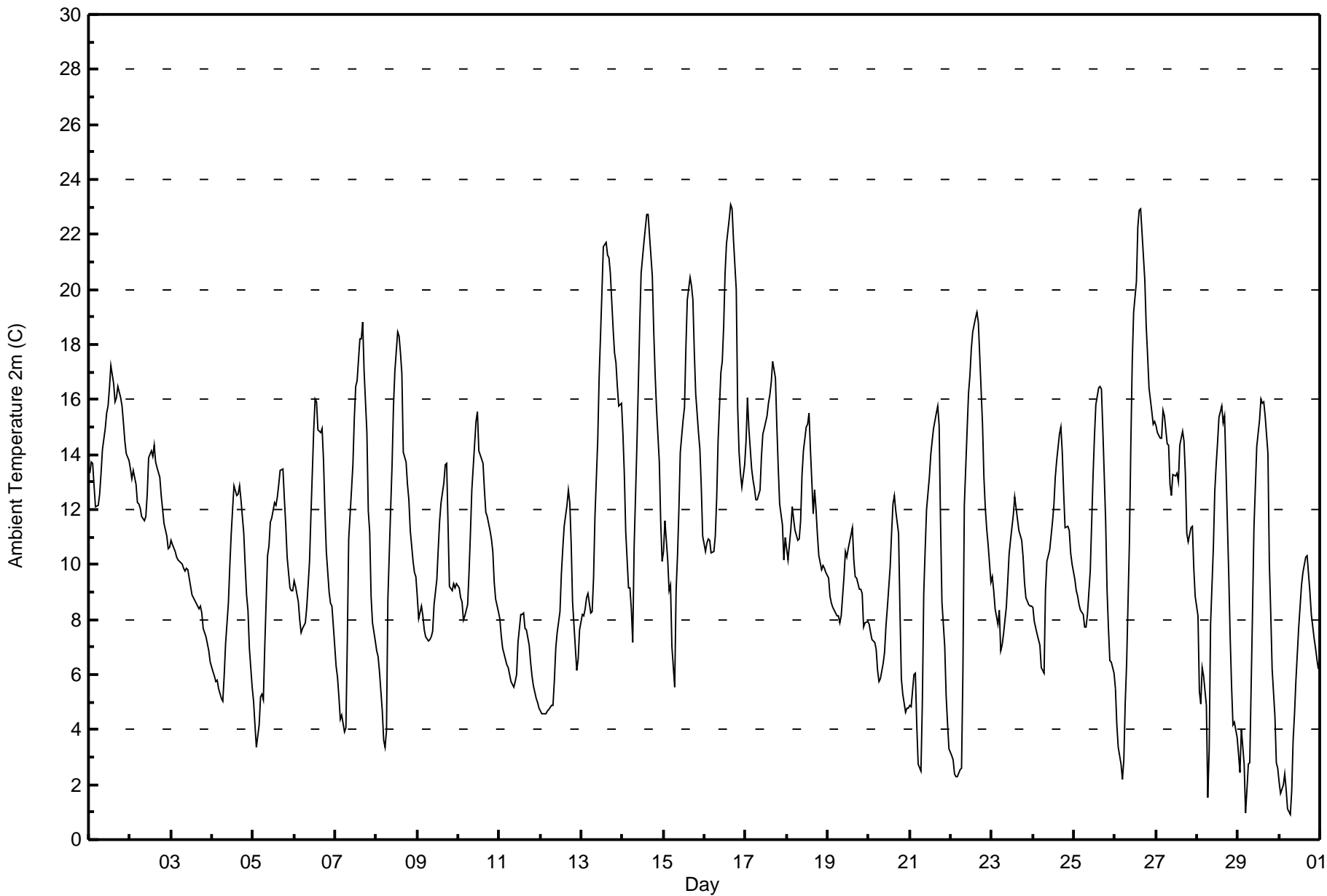
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac (AMS 14)





| Maximum Value: 23.1 C on Sep 16 16:00 | | Maximum Daily Average: 15.7 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: 0.9 C on Sep 30 07:00 | | Minimum Daily Average: 5.7 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.2 C at hour 15 | | Minimum Diurnal Average: 6.9 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.80 C | | Percentiles: P ₁ = 1.8 P ₁₀ = 5.0 Q ₁ = 7.7 Median = 10.5 Q ₃ = 13.9 P ₉₀ = 16.5 P ₉₉ = 22.5 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 13.3 | 13.7 | 13.7 | 12.9 | 12.1 | 12.2 | 12.5 | 13.3 | 14.2 | 15.0 | 15.5 | 15.7 | 16.4 | 17.3 | 16.6 | 15.9 | 16.1 | 16.5 | 16.1 | 15.8 | 15.1 | 14.5 | 14.0 | 13.8 | 14.7 | 17.3 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 13.5 | 13.1 | 13.4 | 12.9 | 12.3 | 12.2 | 12.0 | 11.7 | 11.6 | 11.8 | 12.5 | 13.9 | 14.1 | 13.9 | 14.3 | 13.8 | 13.5 | 13.2 | 12.5 | 12.0 | 11.5 | 11.1 | 10.6 | 10.6 | 12.6 | 14.3 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 10.9 | 10.7 | 10.5 | 10.3 | 10.2 | 10.1 | 10.0 | 9.9 | 9.8 | 9.8 | 9.8 | 9.2 | 8.9 | 8.8 | 8.7 | 8.5 | 8.4 | 8.5 | 8.3 | 7.7 | 7.4 | 7.1 | 6.8 | 6.5 | 9.0 | 10.9 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 6.1 | 5.9 | 5.8 | 5.8 | 5.5 | 5.1 | 5.0 | 5.9 | 7.1 | 8.6 | 9.9 | 11.1 | 12.0 | 12.9 | 12.5 | 12.9 | 12.3 | 11.2 | 9.9 | 8.9 | 8.3 | 6.9 | 5.5 | 8.7 | 12.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 5.0 | 4.2 | 3.3 | 4.2 | 5.2 | 5.3 | 5.1 | 7.0 | 10.3 | 10.7 | 11.6 | 11.7 | 12.3 | 12.1 | 12.5 | 12.9 | 13.4 | 13.5 | 12.4 | 11.4 | 10.3 | 9.2 | 9.0 | 9.0 | 9.2 | 13.5 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 9.4 | 9.2 | 8.6 | 8.0 | 7.5 | 7.7 | 7.9 | 8.5 | 9.3 | 10.1 | 11.8 | 14.9 | 16.0 | 15.9 | 14.9 | 14.8 | 15.0 | 13.8 | 12.0 | 10.5 | 9.0 | 8.6 | 8.5 | 7.8 | 10.8 | 16.0 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 6.3 | 5.9 | 5.2 | 4.4 | 4.5 | 3.9 | 4.1 | 7.2 | 10.9 | 12.7 | 13.6 | 15.3 | 16.5 | 16.7 | 18.2 | 18.2 | 18.8 | 17.0 | 14.8 | 12.0 | 11.2 | 8.9 | 7.9 | 7.2 | 10.9 | 18.8 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 6.9 | 6.6 | 6.1 | 4.7 | 3.6 | 3.4 | 4.0 | 8.8 | 12.0 | 13.6 | 15.8 | 17.0 | 18.5 | 18.3 | 17.7 | 16.9 | 14.1 | 13.7 | 12.9 | 12.3 | 11.2 | 10.1 | 9.7 | 9.5 | 11.1 | 18.5 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 8.9 | 8.0 | 8.5 | 8.1 | 7.6 | 7.4 | 7.2 | 7.3 | 7.4 | 7.6 | 8.6 | 9.5 | 10.6 | 11.6 | 12.3 | 12.9 | 13.6 | 13.7 | 11.4 | 9.2 | 9.0 | 9.3 | 9.2 | 9.3 | 9.5 | 13.7 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 9.2 | 8.8 | 8.6 | 8.0 | 8.2 | 8.6 | 9.7 | 11.1 | 12.7 | 14.4 | 15.2 | 15.6 | 14.2 | 14.0 | 13.7 | 12.7 | 11.9 | 11.8 | 11.2 | 10.9 | 10.5 | 9.4 | 8.8 | 8.3 | 11.1 | 15.6 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 8.0 | 7.4 | 7.0 | 6.5 | 6.3 | 6.2 | 6.0 | 5.7 | 5.5 | 5.8 | 6.0 | 7.2 | 8.2 | 8.2 | 8.2 | 7.7 | 7.6 | 7.0 | 6.5 | 6.0 | 5.6 | 5.1 | 5.0 | 4.8 | 6.6 | 8.2 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 4.7 | 4.6 | 4.6 | 4.6 | 4.7 | 4.7 | 4.9 | 4.9 | 5.8 | 7.0 | 7.5 | 8.3 | 9.6 | 10.6 | 11.4 | 12.1 | 12.7 | 12.3 | 10.8 | 8.7 | 7.0 | 6.2 | 6.6 | 7.6 | 7.6 | 12.7 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 8.2 | 8.1 | 8.4 | 8.8 | 9.0 | 8.2 | 8.3 | 9.5 | 11.7 | 14.5 | 16.8 | 18.3 | 20.0 | 21.6 | 21.7 | 21.3 | 21.2 | 20.6 | 18.6 | 17.7 | 17.4 | 16.5 | 15.8 | 15.9 | 14.9 | 21.7 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 14.8 | 13.3 | 11.2 | 9.2 | 9.2 | 8.4 | 7.2 | 10.6 | 14.4 | 16.6 | 18.7 | 20.6 | 21.7 | 22.2 | 22.7 | 22.7 | 22.0 | 20.5 | 18.5 | 16.9 | 15.6 | 13.7 | 11.5 | 10.1 | 15.5 | 22.7 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 10.5 | 11.6 | 10.2 | 9.1 | 9.3 | 7.0 | 5.5 | 9.0 | 10.3 | 12.0 | 14.1 | 15.2 | 15.7 | 17.9 | 19.6 | 20.4 | 20.1 | 19.6 | 17.8 | 16.2 | 14.8 | 14.2 | 12.8 | 11.0 | 13.5 | 20.4 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 10.5 | 10.8 | 10.9 | 10.9 | 10.4 | 10.5 | 11.0 | 12.4 | 14.5 | 17.0 | 17.4 | 18.7 | 20.6 | 21.7 | 22.6 | 23.1 | 23.0 | 21.8 | 20.0 | 15.7 | 14.1 | 13.3 | 12.8 | 13.6 | 15.7 | 23.1 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 14.5 | 16.1 | 15.0 | 13.5 | 13.1 | 12.7 | 12.3 | 12.3 | 12.7 | 13.9 | 14.7 | 14.9 | 15.4 | 15.8 | 16.2 | 16.6 | 17.4 | 16.8 | 15.1 | 13.5 | 12.2 | 11.5 | 10.2 | 11.0 | 14.1 | 17.4 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 10.6 | 10.2 | 11.3 | 12.1 | 11.6 | 11.2 | 10.9 | 10.9 | 11.6 | 13.3 | 14.1 | 15.0 | 15.1 | 15.5 | 14.2 | 11.9 | 12.7 | 12.0 | 11.1 | 10.3 | 9.8 | 10.0 | 9.9 | 9.7 | 11.9 | 15.5 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 9.5 | 8.8 | 8.6 | 8.4 | 8.3 | 8.1 | 8.2 | 7.9 | 8.1 | 9.6 | 10.5 | 10.3 | 10.6 | 10.8 | 11.4 | 10.2 | 9.5 | 9.5 | 9.1 | 9.1 | 8.9 | 7.8 | 7.9 | 8.0 | 9.1 | 11.4 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 7.8 | 7.5 | 7.3 | 7.2 | 6.9 | 6.2 | 5.7 | 5.8 | 6.4 | 6.8 | 7.8 | 8.5 | 9.9 | 11.1 | 12.2 | 12.5 | 12.0 | 11.1 | 8.3 | 5.9 | 5.3 | 4.6 | 4.8 | 4.8 | 7.8 | 12.5 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 4.9 | 4.8 | 6.0 | 6.1 | 4.2 | 2.7 | 2.5 | 5.0 | 9.0 | 10.5 | 12.0 | 13.2 | 14.0 | 14.5 | 14.9 | 15.5 | 15.8 | 15.0 | 11.6 | 8.6 | 7.0 | 5.2 | 4.2 | 3.3 | 8.8 | 15.8 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 3.0 | 2.9 | 2.4 | 2.3 | 2.3 | 2.6 | 2.6 | 6.1 | 12.2 | 14.9 | 16.2 | 16.9 | 17.9 | 18.4 | 19.0 | 19.2 | 18.8 | 17.6 | 15.1 | 13.2 | 12.1 | 11.3 | 10.7 | 9.4 | 11.1 | 19.2 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 9.5 | 9.0 | 8.4 | 7.8 | 8.3 | 6.9 | 7.1 | 7.5 | 8.4 | 9.4 | 10.4 | 10.9 | 11.8 | 12.5 | 12.0 | 11.6 | 11.2 | 10.9 | 10.3 | 9.3 | 8.8 | 8.5 | 8.5 | 8.5 | 9.5 | 12.5 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 8.4 | 7.9 | 7.5 | 7.3 | 7.1 | 6.2 | 6.0 | 9.0 | 10.1 | 10.3 | 10.5 | 11.5 | 12.2 | 13.2 | 13.8 | 14.7 | 15.0 | 14.1 | 12.6 | 11.4 | 11.4 | 11.2 | 10.4 | 10.0 | 10.5 | 15.0 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 9.5 | 9.0 | 8.9 | 8.5 | 8.4 | 8.2 | 7.7 | 7.7 | 8.2 | 9.7 | 11.5 | 13.2 | 14.7 | 15.8 | 16.4 | 16.5 | 16.4 | 14.9 | 11.6 | 9.1 | 7.7 | 6.5 | 6.5 | 6.0 | 10.5 | 16.5 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 5.5 | 4.2 | 3.3 | 2.7 | 2.2 | 2.9 | 5.0 | 6.4 | 10.9 | 14.3 | 17.3 | 19.2 | 20.3 | 22.3 | 22.9 | 22.9 | 22.1 | 20.3 | 18.6 | 17.6 | 16.4 | 15.6 | 15.1 | 15.2 | 13.5 | 22.9 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 15.1 | 14.8 | 14.6 | 14.6 | 15.6 | 15.4 | 14.4 | 14.3 | 12.9 | 12.5 | 13.3 | 13.2 | 13.3 | 13.0 | 14.3 | 14.9 | 14.5 | 13.3 | 11.1 | 10.8 | 11.3 | 11.4 | 9.9 | 8.8 | 13.2 | 15.6 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 8.1 | 5.4 | 4.9 | 6.2 | 5.9 | 4.9 | 1.5 | 3.3 | 7.8 | 10.6 | 12.7 | 13.6 | 14.4 | 15.4 | 15.8 | 15.2 | 15.4 | 13.5 | 9.6 | 7.4 | 5.6 | 4.2 | 4.2 | 3.7 | 8.7 | 15.8 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 3.1 | 2.5 | 4.0 | 2.8 | 1.0 | 1.8 | 2.7 | 2.8 | 8.4 | 11.3 | 12.8 | 14.3 | 15.3 | 16.0 | 15.9 | 15.9 | 15.4 | 14.0 | 10.1 | 8.2 | 6.2 | 4.5 | 2.8 | 2.6 | 8.1 | 16.0 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 2.1 | 1.7 | 2.0 | 2.4 | 1.8 | 1.1 | 0.9 | 1.8 | 3.6 | 4.6 | 5.8 | 7.7 | 8.5 | 9.2 | 9.7 | 10.3 | 10.3 | 9.6 | 9.0 | 8.2 | 7.3 | 7.0 | 6.6 | 6.2 | 5.7 | 10.3 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.6 | 8.2 | 8.0 | 7.7 | 7.4 | 7.1 | 6.9 | 8.1 | 9.9 | 11.3 | 12.5 | 13.5 | 14.3 | 14.9 | 15.2 | 15.1 | 15.0 | 14.3 | 12.6 | 11.2 | 10.3 | 9.5 | 8.9 | 8.6 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 15.1 | 16.1 | 15.0 | 14.6 | 15.6 | 15.4 | 14.4 | 14.3 | 14.5 | 17.0 | 18.7 | 20.6 | 21.7 | 22.3 | 22.9 | 23.1 | 23.0 | 21.8 | 20.0 | 17.7 | 17.4 | 16.5 | 15.8 | 15.9 | Diurnal Maximum |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Anzac - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 328 | 45.56 | 45.56 |
| 10 - 20 | 366 | 50.83 | 96.39 |
| > 20 | 26 | 3.61 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

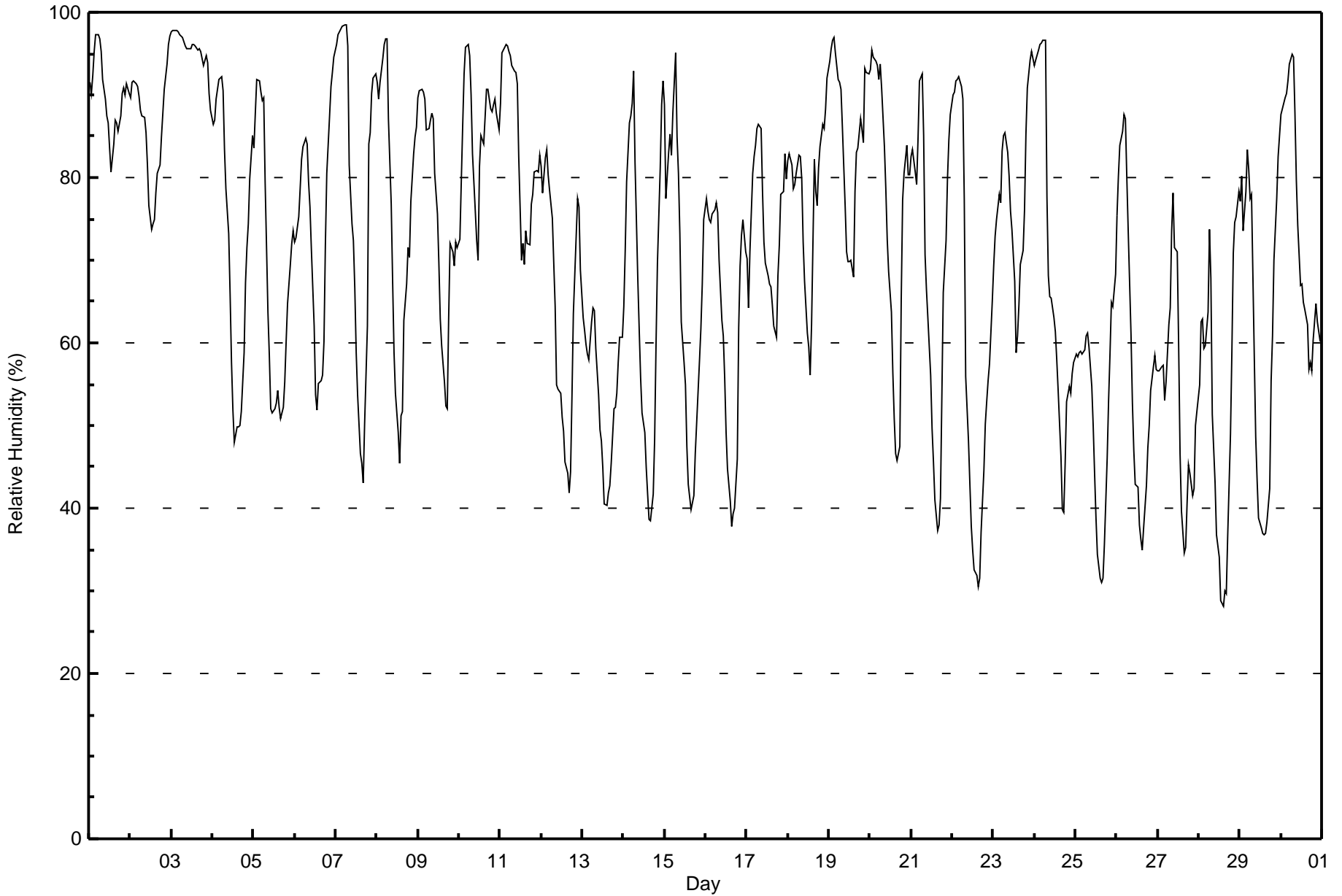
Anzac - September 2016

| Maximum Value: 99 % on Sep 7 07:00 Maximum Daily Average: 95.5 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 28 % on Sep 28 15:00 Minimum Daily Average: 51.7 % on Sep 25 Maximum Diurnal Average: 86.3 % at hour 7 Minimum Diurnal Average: 53.6 % at hour 15 Monthly Average: 71.2 % Percentiles: P ₁ = 32 P ₁₀ = 45 Q ₁ = 57 Median = 74 Q ₃ = 87 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 | 92 | 90 | 92 | 95 | 97 | 97 | 97 | 95 | 92 | 90 | 87 | 87 | 84 | 81 | 84 | 87 | 87 | 86 | 87 | 90 | 91 | 90 | 91 | 90 | 89.9 | 97 |
| 2-Sep | 90 | 92 | 92 | 91 | 91 | 90 | 88 | 88 | 87 | 85 | 82 | 77 | 74 | 74 | 75 | 78 | 81 | 82 | 85 | 88 | 91 | 94 | 96 | 97 | 86.1 | 97 |
| 3-Sep | 98 | 98 | 98 | 98 | 98 | 97 | 97 | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 95 | 96 | 95 | 94 | 94 | 95 | 94 | 90 | 88 | 95.5 | 98 | |
| 4-Sep | 87 | 87 | 89 | 91 | 92 | 92 | 90 | 83 | 79 | 73 | 66 | 58 | 52 | 48 | 50 | 50 | 50 | 52 | 59 | 67 | 71 | 74 | 80 | 85 | 71.9 | 92 |
| 5-Sep | 84 | 88 | 92 | 92 | 90 | 89 | 90 | 80 | 64 | 59 | 52 | 52 | 52 | 53 | 54 | 52 | 51 | 52 | 55 | 60 | 65 | 69 | 72 | 74 | 68.3 | 92 |
| 6-Sep | 72 | 73 | 75 | 79 | 82 | 84 | 85 | 84 | 79 | 77 | 71 | 62 | 54 | 52 | 55 | 55 | 56 | 60 | 72 | 81 | 88 | 91 | 93 | 95 | 73.9 | 95 |
| 7-Sep | 96 | 97 | 98 | 98 | 98 | 98 | 99 | 96 | 82 | 74 | 72 | 67 | 59 | 54 | 47 | 45 | 43 | 50 | 62 | 84 | 85 | 90 | 92 | 92 | 78.3 | 99 |
| 8-Sep | 91 | 90 | 92 | 94 | 96 | 97 | 97 | 87 | 77 | 67 | 59 | 54 | 49 | 45 | 51 | 52 | 63 | 67 | 72 | 70 | 77 | 83 | 85 | 86 | 75.1 | 97 |
| 9-Sep | 90 | 90 | 91 | 90 | 89 | 86 | 86 | 87 | 88 | 87 | 81 | 76 | 70 | 63 | 60 | 55 | 52 | 52 | 63 | 72 | 71 | 69 | 72 | 71 | 75.5 | 91 |
| 10-Sep | 72 | 79 | 86 | 93 | 96 | 96 | 95 | 90 | 83 | 76 | 72 | 70 | 81 | 85 | 84 | 87 | 91 | 91 | 88 | 88 | 89 | 90 | 88 | 86 | 85.7 | 96 |
| 11-Sep | 89 | 95 | 95 | 96 | 96 | 95 | 95 | 94 | 93 | 93 | 91 | 82 | 70 | 72 | 70 | 74 | 72 | 72 | 77 | 78 | 81 | 81 | 81 | 83 | 84.3 | 96 |
| 12-Sep | 81 | 78 | 82 | 83 | 80 | 78 | 75 | 70 | 64 | 55 | 54 | 54 | 51 | 49 | 46 | 44 | 42 | 44 | 54 | 63 | 73 | 77 | 77 | 69 | 64.4 | 83 |
| 13-Sep | 63 | 62 | 60 | 59 | 58 | 62 | 64 | 64 | 59 | 54 | 49 | 48 | 45 | 40 | 40 | 42 | 43 | 45 | 52 | 52 | 54 | 58 | 61 | 61 | 54.0 | 64 |
| 14-Sep | 64 | 71 | 80 | 87 | 87 | 89 | 93 | 82 | 68 | 61 | 56 | 51 | 49 | 45 | 42 | 39 | 38 | 42 | 48 | 60 | 70 | 81 | 89 | 92 | 66.0 | 93 |
| 15-Sep | 89 | 78 | 83 | 85 | 83 | 88 | 95 | 85 | 80 | 73 | 63 | 58 | 55 | 48 | 43 | 40 | 41 | 41 | 47 | 50 | 58 | 62 | 67 | 75 | 66.0 | 95 |
| 16-Sep | 77 | 76 | 75 | 75 | 76 | 76 | 77 | 76 | 70 | 63 | 61 | 56 | 49 | 45 | 41 | 38 | 39 | 40 | 46 | 62 | 69 | 73 | 75 | 71 | 62.7 | 77 |
| 17-Sep | 70 | 64 | 71 | 81 | 83 | 84 | 86 | 86 | 86 | 78 | 72 | 70 | 68 | 67 | 67 | 65 | 62 | 61 | 68 | 72 | 78 | 78 | 83 | 80 | 74.1 | 86 |
| 18-Sep | 82 | 83 | 82 | 79 | 79 | 81 | 83 | 82 | 80 | 72 | 67 | 61 | 59 | 56 | 62 | 82 | 78 | 77 | 81 | 84 | 87 | 86 | 88 | 92 | 77.6 | 92 |
| 19-Sep | 94 | 96 | 97 | 97 | 95 | 92 | 92 | 91 | 86 | 77 | 71 | 70 | 70 | 70 | 68 | 78 | 83 | 83 | 87 | 86 | 84 | 93 | 93 | 93 | 85.2 | 97 |
| 20-Sep | 93 | 95 | 95 | 94 | 94 | 92 | 94 | 91 | 84 | 79 | 72 | 69 | 64 | 56 | 51 | 47 | 46 | 47 | 65 | 77 | 81 | 84 | 80 | 80 | 76.2 | 95 |
| 21-Sep | 83 | 83 | 81 | 79 | 85 | 92 | 93 | 85 | 71 | 66 | 63 | 56 | 50 | 46 | 41 | 37 | 38 | 41 | 54 | 66 | 72 | 80 | 85 | 88 | 68.0 | 93 |
| 22-Sep | 90 | 90 | 92 | 92 | 92 | 91 | 90 | 77 | 56 | 48 | 43 | 38 | 35 | 33 | 32 | 31 | 32 | 37 | 45 | 50 | 53 | 55 | 57 | 65 | 59.3 | 92 |
| 23-Sep | 69 | 73 | 75 | 78 | 77 | 83 | 85 | 85 | 83 | 80 | 76 | 74 | 67 | 59 | 61 | 65 | 69 | 71 | 76 | 85 | 91 | 94 | 95 | 94 | 77.8 | 95 |
| 24-Sep | 94 | 94 | 95 | 96 | 96 | 97 | 97 | 78 | 68 | 66 | 65 | 63 | 61 | 58 | 54 | 46 | 40 | 39 | 45 | 53 | 55 | 54 | 56 | 58 | 67.9 | 97 |
| 25-Sep | 59 | 58 | 59 | 59 | 59 | 59 | 61 | 61 | 60 | 55 | 50 | 44 | 39 | 34 | 32 | 31 | 32 | 36 | 46 | 53 | 59 | 65 | 64 | 68 | 51.7 | 68 |
| 26-Sep | 75 | 80 | 84 | 86 | 88 | 87 | 80 | 73 | 61 | 53 | 47 | 43 | 43 | 38 | 36 | 35 | 38 | 43 | 47 | 50 | 54 | 57 | 58 | 57 | 58.9 | 88 |
| 27-Sep | 57 | 57 | 57 | 57 | 53 | 55 | 62 | 64 | 74 | 78 | 72 | 71 | 60 | 47 | 40 | 35 | 35 | 40 | 45 | 44 | 41 | 42 | 50 | 52 | 53.7 | 78 |
| 28-Sep | 55 | 63 | 63 | 59 | 60 | 64 | 74 | 68 | 51 | 43 | 37 | 35 | 34 | 29 | 28 | 30 | 30 | 37 | 49 | 59 | 71 | 75 | 75 | 78 | 52.7 | 78 |
| 29-Sep | 77 | 80 | 74 | 78 | 83 | 81 | 77 | 78 | 58 | 49 | 43 | 39 | 38 | 37 | 37 | 37 | 38 | 42 | 56 | 61 | 70 | 77 | 83 | 85 | 61.6 | 85 |
| 30-Sep | 88 | 88 | 90 | 90 | 92 | 94 | 95 | 95 | 88 | 80 | 74 | 67 | 67 | 65 | 64 | 62 | 57 | 58 | 57 | 60 | 65 | 63 | 61 | 60 | 74.1 | 95 |
| | | | | | | | | | | | | | | | | | | 80.7 81.6 83.1 84.3 84.8 85.6 86.3 82.4 75.5 70.2 65.5 61.5 58.1 54.8 53.6 53.8 54.0 56.1 62.7 68.7 72.9 76.0 77.9 78.8 | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | 98 98 98 98 98 98 99 96 96 96 96 96 96 96 96 95 96 95 94 94 95 94 96 97 | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Anzac - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 44 | 6.11 | 6.11 |
| 40 - 60 | 173 | 24.03 | 30.14 |
| 60 - 80 | 217 | 30.14 | 60.28 |
| 80 - 100 | 286 | 39.72 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (SW) - %

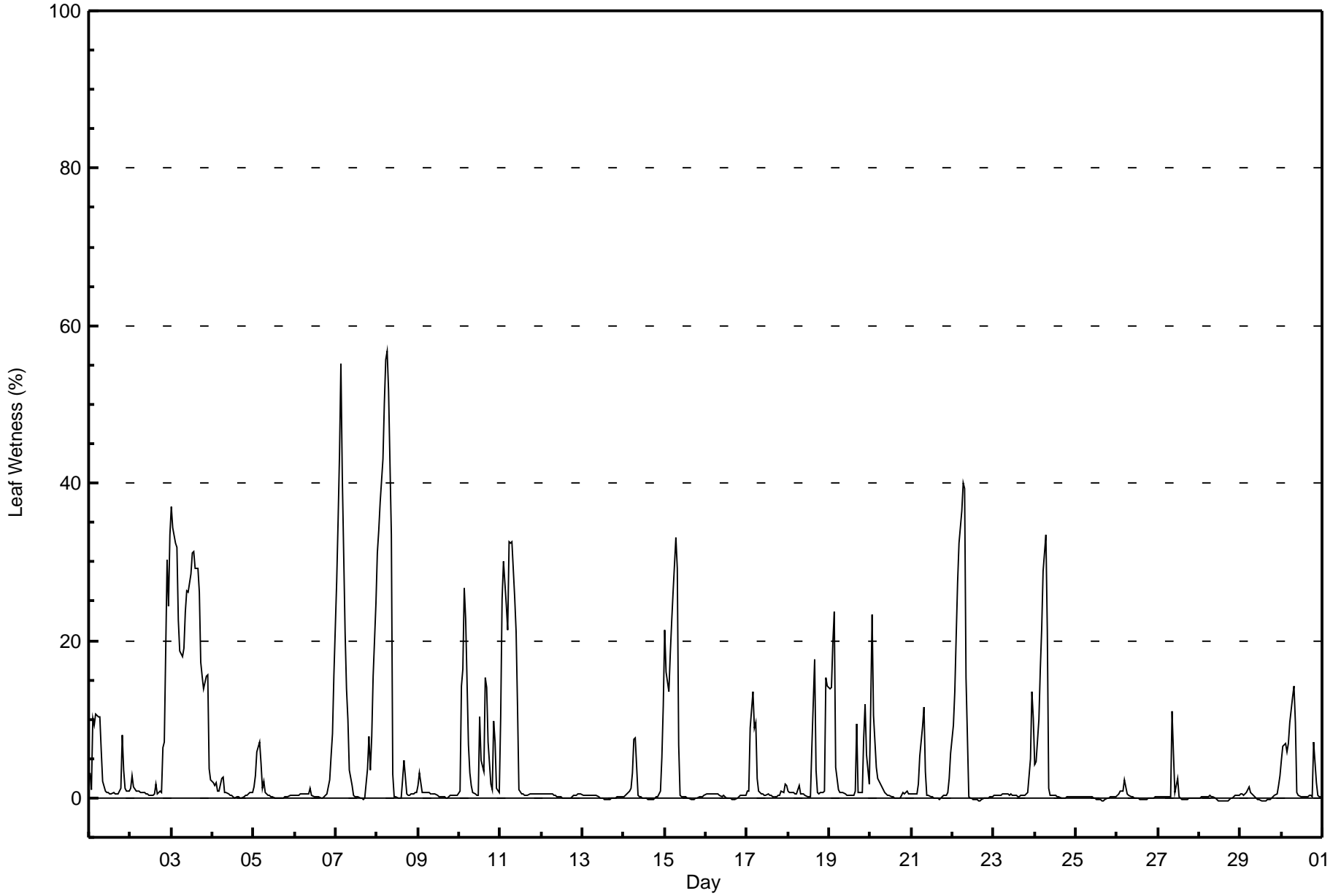
Anzac - September 2016

| Maximum Value: 57 % on Sep 8 07:00 | | | | | | | | | | | | | | Maximum Daily Average: 22.9 % on Sep 3 | | | | | | | | | | | | | | Hours in Service: 720 | |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|----|---------------|---------------|--|---------------------------------|--|
| Minimum Value: 0 % on Sep 28 15:00 | | | | | | | | | | | | | | Minimum Daily Average: 0.0 % on Sep 28 | | | | | | | | | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 10.5 % at hour 4 | | | | | | | | | | | | | | Minimum Diurnal Average: 0.9 % at hour 19 | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 4.4 % | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 2 P ₉₀ = 15 P ₉₉ = 43 | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 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 | 10 | 9 | 11 | 10 | 10 | 6 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 8 | 4 | 1 | 1 | 1 | | | | | |
| 2-Sep | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 6 | 7 | 30 | 24 | 34 | | | | | |
| 3-Sep | 37 | 34 | 32 | 32 | 23 | 19 | 18 | 19 | 24 | 26 | 26 | 29 | 31 | 31 | 29 | 29 | 26 | 17 | 15 | 14 | 15 | 16 | 4 | 2 | | | | | |
| 4-Sep | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | | | | |
| 5-Sep | 1 | 3 | 6 | 7 | 4 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | |
| 6-Sep | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 8 | 16 | | | | | |
| 7-Sep | 28 | 35 | 44 | 55 | 41 | 21 | 14 | 10 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 8 | 4 | 8 | 16 | 25 | | | | | |
| 8-Sep | 31 | 34 | 37 | 43 | 50 | 56 | 57 | 52 | 33 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | | | | | |
| 9-Sep | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | |
| 10-Sep | 1 | 14 | 16 | 27 | 23 | 7 | 3 | 2 | 1 | 1 | 0 | 0 | 10 | 5 | 3 | 15 | 14 | 7 | 2 | 1 | 10 | 7 | 1 | 1 | | | | | |
| 11-Sep | 10 | 25 | 30 | 25 | 21 | 32 | 32 | 33 | 25 | 21 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | | | | | |
| 12-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 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 | | | | | |
| 14-Sep | 0 | 0 | 1 | 1 | 1 | 3 | 7 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 12 | | | | | | |
| 15-Sep | 21 | 16 | 14 | 18 | 22 | 26 | 33 | 29 | 7 | 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 | | | | | |
| 17-Sep | 1 | 1 | 9 | 13 | 9 | 10 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | | | | | |
| 18-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 6 | 18 | 4 | 1 | 1 | 1 | 1 | 1 | 15 | 14 | | | | | |
| 19-Sep | 14 | 14 | 20 | 24 | 4 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 1 | 1 | 1 | 8 | 12 | 6 | 2 | | | | | |
| 20-Sep | 12 | 23 | 11 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | | | | | |
| 21-Sep | 1 | 1 | 1 | 1 | 2 | 5 | 9 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 6 | | | | | |
| 22-Sep | 9 | 14 | 21 | 27 | 32 | 37 | 40 | 39 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 14 | 10 | | | | | |
| 24-Sep | 4 | 5 | 10 | 16 | 21 | 29 | 33 | 21 | 1 | 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 | | | | | |
| 26-Sep | 0 | 1 | 1 | 1 | 2 | 1 | 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 | 11 | 6 | 1 | 2 | 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 | | | | | |
| 29-Sep | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | | | | | |
| 30-Sep | 5 | 7 | 7 | 6 | 7 | 10 | 13 | 14 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 2 | 0 | 0 | 0 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (SW) - %
Anzac - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (SW) - %
Anzac - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 207 | 33.28 | 33.28 |
| 0.4 - 0.5 | 108 | 17.36 | 50.64 |
| 0.6 - 0.7 | 58 | 9.32 | 59.97 |
| 0.8 - 1.4 | 49 | 7.88 | 67.85 |
| 1.5 - 10 | 94 | 15.11 | 82.96 |
| > 10 | 106 | 17.04 | 100.00 |

Total Number of Valid Hours: 622

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Anzac - September 2016

| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 19 km/h on Sep 16 15:00 | Maximum Daily Speed Average: 15.1 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 8 05:00 | Minimum Daily Speed Average: 2.4 km/h on Sep 29 | Hours of Data: 717 |
| Maximum Diurnal Speed Average: 6.5 km/h at hour 15 | Minimum Diurnal Speed Average: 2.4 km/h at hour 20 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 4.2 km/h 270.3 deg | Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 6 Median = 9 Q ₃ = 12 P ₉₀ = 16 P ₉₉ = 18 | 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 | SE10 | SE8 | ESE7 | ESE6 | SE6 | SSE7 | SE6 | SE8 | SE7 | SSE9 | SSE11 | ESE11 | ESE10 | SE8 | E7 | ENE9 | E8 | ESE9 | E5 | WSW5 | W15WNN17WNN13 | W12 | | | | SE3.5 | WNN17 |
| 2-Sep | W10 | WNN9 | WNN10 | WNN12 | WNN11 | WNN6 | WNN7 | WNN11 | NW12 | WNN9 | WNN9 | WNN9 | W8 | NW6 | NNW9 | NW8 | NNW8 | N7 | NNW7 | NW9 | NW10 | WNN12 | NW11 | NW13 | NW8.8 | NW13 | |
| 3-Sep | NW12 | NW12 | NW14 | WNN16 | WNN17 | WNN18 | WNN17 | WNN16 | WNN16 | WNN16 | WNN16 | NW16 | NW16 | NW15 | NW16 | NW17 | NW16 | NW15 | NNW17 | NNW17 | NW14 | NW15 | NW14 | NW13 | NW15.1 | WNN18 | |
| 4-Sep | NW13 | NW12 | NW10 | NW13 | NW13 | WNN11 | WNN12 | WNN12 | WNN12 | WNN10 | WNN11 | WNN11 | W11 | W10 | WNN8 | WNN8 | WNN9 | W7 | WSW6 | WSW5 | WSW4 | WSW5 | WSW4 | SSW6 | WNN8.6 | NW13 | |
| 5-Sep | SW7 | WSW6 | SW7 | SW6 | SSW3 | SSE3 | S5 | S5 | S7 | SW9 | SSW9 | SW4 | WNN4 | WNN3 | SSE2 | ESE5 | S10 | SSE12 | SSE10 | SSE10 | SSE9 | SSE9 | S10 | S12 | S5.6 | S12 | |
| 6-Sep | S14 | S12 | S11 | SSE11 | SSE8 | SSE10 | SSE9 | SSE10 | SSE11 | SSE11 | SSE10 | SSE13 | S16 | S17 | S14 | S15 | SSE13 | SSE12 | SSE10 | SSE8 | SSE6 | SSE7 | SSE7 | SSE6 | SSE10.7 | SSE17 | |
| 7-Sep | SSE5 | SSE3 | S3 | S3 | SSW5 | S5 | S4 | SSE4 | SSE5 | SE3 | ESE6 | SE7 | SSE3 | SW2 | WNN4 | NW6 | SW4 | S5 | SW6 | WSW4 | SW5 | SSW1 | WSW4 | WSW6 | SSW2.8 | SE7 | |
| 8-Sep | WSW6 | WSW6 | W6 | WSW3 | S0 | AF | WSW3 | WNN4 | WNN7 | WNN6 | WNN6 | WNN10 | WNN10 | NW10 | WNN10 | WNN10 | WNN9 | WNN9 | WNN9 | NNW10 | NW6 | NW7 | NNW8 | NNW11 | WNN6.5 | NNW11 | |
| 9-Sep | NNW11 | NNW11 | NNW8 | NNW10 | NNW9 | NNW8 | N8 | NNW8 | N6 | N6 | NNW9 | WNN9 | W11 | WNN10 | WNN9 | WNN7 | WNN5 | W3 | SSE3 | SE6 | SSE8 | SSE10 | SSE11 | SSE13 | NW3.5 | SSE13 | |
| 10-Sep | SSE10 | SE9 | SSE12 | SSE13 | SSE12 | SSE12 | S9 | SW14 | WSW13 | W16 | WNN17 | WNN15 | WNN14 | WNN12 | W11 | W14 | WNN16 | WNN15 | WNN18 | WNN14 | WNN15 | NW15 | WNN17 | WNN15 | W8.6 | WNN18 | |
| 11-Sep | WNN14 | NW14 | NNN17 | NNW17 | NNW18 | NNW18 | N17 | N18 | N17 | N17 | N16 | N17 | N17 | N16 | NNW15 | NNW17 | NNW15 | NNW15 | NNW12 | NNW10 | NNW8 | NW7 | NNW7 | NW6 | NNW13.7 | NNW18 | |
| 12-Sep | NNW7 | NW8 | NW7 | NW7 | NW8 | NW7 | W6 | WSW6 | WSW8 | W7 | NW6 | WNN5 | W8 | WNN9 | WNN9 | WNN8 | W7 | WSW9 | S7 | S8 | S8 | SSW8 | SSW10 | SW12 | W5.3 | SW12 | |
| 13-Sep | SW15 | SW15 | SW18 | SW17 | SW13 | SW13 | SW14 | SW12 | WSW14 | WSW12 | W10 | WNN11 | WNN11 | W14 | W16 | WSW15 | WSW17 | WSW12 | WSW12 | W10 | W10 | WNN9 | WNN8 | WNN10 | WSW11.7 | SW18 | |
| 14-Sep | WNN9 | WNN7 | WNN6 | NW6 | NNW5 | NW3 | AF | S5 | SSE6 | SE8 | SSE9 | SE9 | SE9 | WNN6 | WNN11 | W13 | WNN14 | WNN11 | W7 | NNW12 | NNW8 | W6 | W6 | W6 | W4.0 | WNN14 | |
| 15-Sep | WNN8 | NW8 | WNN7 | WNN7 | WNN5 | WNN5 | NW5 | N4 | NE3 | ENE2 | ESE3 | SE7 | ESE9 | ESE11 | SE13 | SSE13 | SE14 | SSE12 | SE10 | SE11 | SSE4 | SSE9 | SSE9 | S6 | SSE3.4 | SE14 | |
| 16-Sep | SSW7 | SW7 | SW6 | SW6 | SW7 | WSW8 | SW7 | SW6 | WSW5 | WNN4 | WNN6 | W5 | WSW11 | WSW14 | WSW19 | WSW18 | WSW17 | WSW15 | WSW8 | SW4 | WSW6 | WSW5 | WSW4 | W4 | WSW8.0 | WSW19 | |
| 17-Sep | WNN6 | W11 | W6 | WSW5 | WSW5 | S4 | S6 | S6 | SSW6 | SSW6 | W7 | WSW8 | WSW8 | W9 | W10 | W12 | WNN9 | WNN10 | W7 | W7 | W5 | WSW5 | WSW6 | W7 | W6.2 | W12 | |
| 18-Sep | W6 | W7 | WNN7 | WNN9 | WNN11 | WNN11 | WNN10 | WNN14 | WNN13 | WNN15 | WNN16 | WNN16 | WNN17 | NW16 | NW15 | NW13 | NW10 | NW10 | NNW8 | N6 | NW6 | NW6 | NW7 | NW8 | NW10.2 | WNN17 | |
| 19-Sep | NNW8 | NNW8 | NNW7 | NNW8 | NW11 | NW10 | NW9 | NW11 | NW12 | NW13 | NW14 | WNN15 | WNN13 | WNN12 | NW12 | NW10 | NW10 | NW10 | NW8 | WNN9 | WNN9 | NNW7 | NW6 | NW6 | NW9.7 | WNN15 | |
| 20-Sep | NNW7 | NNW8 | NNW9 | N8 | NNW8 | N8 | N8 | NNW7 | N9 | N9 | NNW9 | NNW8 | NNW7 | NNW6 | NW4 | NW4 | NNE6 | NNE6 | ENE2 | SE3 | S4 | S5 | S5 | SSW5 | NNW4.4 | N9 | |
| 21-Sep | SSW5 | SSW6 | SSW6 | S7 | S6 | SSW6 | SSW5 | SW3 | SW1 | WSW4 | WNN6 | WNN8 | WNN8 | W6 | WNN7 | WSW4 | WNN7 | WSW7 | SSW6 | SSW8 | SSW8 | SW8 | SSW5 | SW5 | SW4.5 | SSW8 | |
| 22-Sep | SW5 | SSW5 | SSW4 | SSW5 | SW5 | SSW5 | S6 | SSW6 | SSW7 | SW11 | SW14 | SW16 | SW13 | SW14 | SW14 | SSW13 | SSW13 | SSW11 | S10 | S10 | S10 | S12 | SSE10 | S9 | SSW8.8 | SW16 | |
| 23-Sep | S10 | SSE10 | SSE10 | SSE11 | SSE9 | SE8 | SSE11 | SE11 | SE12 | SE11 | SSE12 | SSE13 | SSE14 | S18 | SSE17 | SSE16 | SSE16 | SSE14 | S13 | SSE12 | SSE9 | SSE9 | SSE8 | SSE8 | SSE11.6 | S18 | |
| 24-Sep | SSE9 | SSE9 | SSE8 | SSE8 | S6 | S5 | SW6 | WSW8 | W13 | W14 | WNN15 | WNN15 | WNN17 | WNN18 | NW16 | NW18 | NW16 | NW9 | WNN8 | WNN11 | WNN15 | WNN16 | WNN16 | WNN16 | WNN9.2 | NW18 | |
| 25-Sep | WNN14 | WNN15 | WNN18 | WNN15 | WNN14 | WNN14 | WNN14 | WNN16 | WNN17 | WNN13 | WNN11 | WNN13 | NW15 | NW15 | NW15 | NW12 | WNN9 | WNN7 | W5 | WSW6 | WSW6 | WSW6 | WSW6 | WSW7 | WNN11.4 | WNN18 | |
| 26-Sep | SW5 | SSW4 | S6 | S5 | SSE6 | SSE6 | SSE6 | SSE7 | SSE9 | SSE9 | S9 | SSW8 | SSW14 | SW16 | SW15 | SSW12 | S12 | S10 | S12 | SSE11 | SSE12 | SSE13 | S13 | S8.7 | SW16 | | |
| 27-Sep | SSE12 | SSE12 | SSE11 | SSW11 | WSW15 | WNN16 | WNN18 | WNN17 | WNN16 | W11 | WNN16 | WNN14 | NW15 | NW16 | WNN18 | WNN17 | WNN16 | WNN10 | WSW8 | WSW10 | W13 | WNN16 | WNN11 | WNN11 | W10.5 | WNN18 | |
| 28-Sep | WNN8 | W6 | W8 | WNN8 | WNN7 | W7 | WSW6 | SW6 | SW5 | WSW6 | NNW2 | SSW1 | NNE1 | WSW6 | WSW7 | WSW8 | WSW8 | W5 | SW5 | SW7 | SW7 | SW6 | SW7 | SW7 | WSW5.3 | WSW8 | |
| 29-Sep | SSW7 | SSW7 | SSW6 | SSW7 | SSW5 | SW4 | SSW5 | SSW4 | SW3 | SSW3 | WNN2 | S4 | ESE3 | E5 | NE7 | NE6 | ENE6 | E6 | ESE4 | E5 | SE4 | SSE4 | AF | SE2 | SSE2.4 | NE7 | |
| 30-Sep | SE4 | ESE4 | ESE3 | E4 | W0 | E2 | NNW4 | NNW3 | N3 | N5 | N7 | NNW7 | NW8 | NNW8 | N6 | N6 | NNE11 | NNE13 | NNE12 | NNE12 | NNE10 | NNE10 | NE10 | NE10 | NNE5.5 | NNE13 | |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|------|-------|-------|-------|------|-------|------|--------|------|--------|--------|--------|--------|------|------|--------|--------|-------|-------|-------|--------|--|-----------------|
| WSW4.3 | WSW3.8 | WSW3.5 | W3.7 | W4.1 | W3.8 | W4.0 | W4.1 | W4.2 | W4.5 | WNN4.9 | W4.9 | WNN5.3 | WNN6.0 | WNN6.5 | WNN6.0 | W5.3 | W3.8 | WSW2.9 | WSW2.4 | W3.5 | W3.6 | W3.5 | WSW4.0 | | Diurnal Average |
| SW15 | WNN15 | WNN18 | SW17 | NNW18 | NNW18 | WNN18 | N18 | WNN17 | N17 | WNN17 | N17 | N17 | WNN18 | WSW19 | WSW18 | NW18 | NW16 | WNN18 | NNW17 | WNN15 | WNN17 | WNN17 | WNN16 | | 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 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 7 km/h on Sep 16 15:00 | Hours of Data: 717 |
| Minimum Value: 0 km/h on Sep 30 00:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 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 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 6 | 5 | 7 | 4 | 4 | 7 |
| 2-Sep | 3 | 3 | 3 | 4 | 4 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 4 | 4 |
| 3-Sep | 4 | 4 | 4 | 5 | 6 | 5 | 6 | 6 | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 6 |
| 4-Sep | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 4 |
| 5-Sep | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 4 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 4 |
| 6-Sep | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 5 |
| 7-Sep | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 2 |
| 8-Sep | 1 | 1 | 1 | 2 | 1 | AF | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | 3 | 5 |
| 9-Sep | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 |
| 10-Sep | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 5 | 4 | 6 | 6 | 5 | 5 | 4 | 3 | 6 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 |
| 11-Sep | 5 | 4 | 6 | 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 6 |
| 12-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 4 |
| 13-Sep | 4 | 4 | 5 | 5 | 5 | 5 | 4 | 3 | 4 | 4 | 3 | 4 | 4 | 6 | 6 | 5 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 6 |
| 14-Sep | 2 | 2 | 1 | 1 | 1 | 1 | AF | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 3 | 2 | 5 | 3 | 2 | 1 | 1 | 5 |
| 15-Sep | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 2 | 2 | 2 | 4 |
| 16-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 6 | 5 | 7 | 6 | 6 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 7 |
| 17-Sep | 3 | 3 | 3 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 2 | 2 | 1 | 2 | 1 | 2 | 4 |
| 18-Sep | 2 | 1 | 2 | 3 | 4 | 4 | 3 | 4 | 4 | 5 | 5 | 5 | 6 | 6 | 5 | 5 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 6 |
| 19-Sep | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 5 |
| 20-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 21-Sep | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 3 |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 4 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 4 | 3 | 2 | 3 | 3 | 3 | 2 | 5 |
| 23-Sep | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 6 | 5 | 5 | 5 | 4 | 5 | 3 | 3 | 2 | 2 | 2 | 6 |
| 24-Sep | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 5 | 5 | 5 | 6 | 5 | 6 | 6 | 6 | 7 | 6 | 3 | 2 | 4 | 5 | 5 | 5 | 7 |
| 25-Sep | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 5 |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 4 | 4 | 5 | 4 | 4 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 5 |
| 27-Sep | 3 | 3 | 2 | 3 | 5 | 6 | 6 | 6 | 7 | 4 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 4 | 2 | 3 | 5 | 6 | 4 | 3 | 7 |
| 28-Sep | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 4 |
| 29-Sep | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | AF | 0 | 3 |
| 30-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 4 |

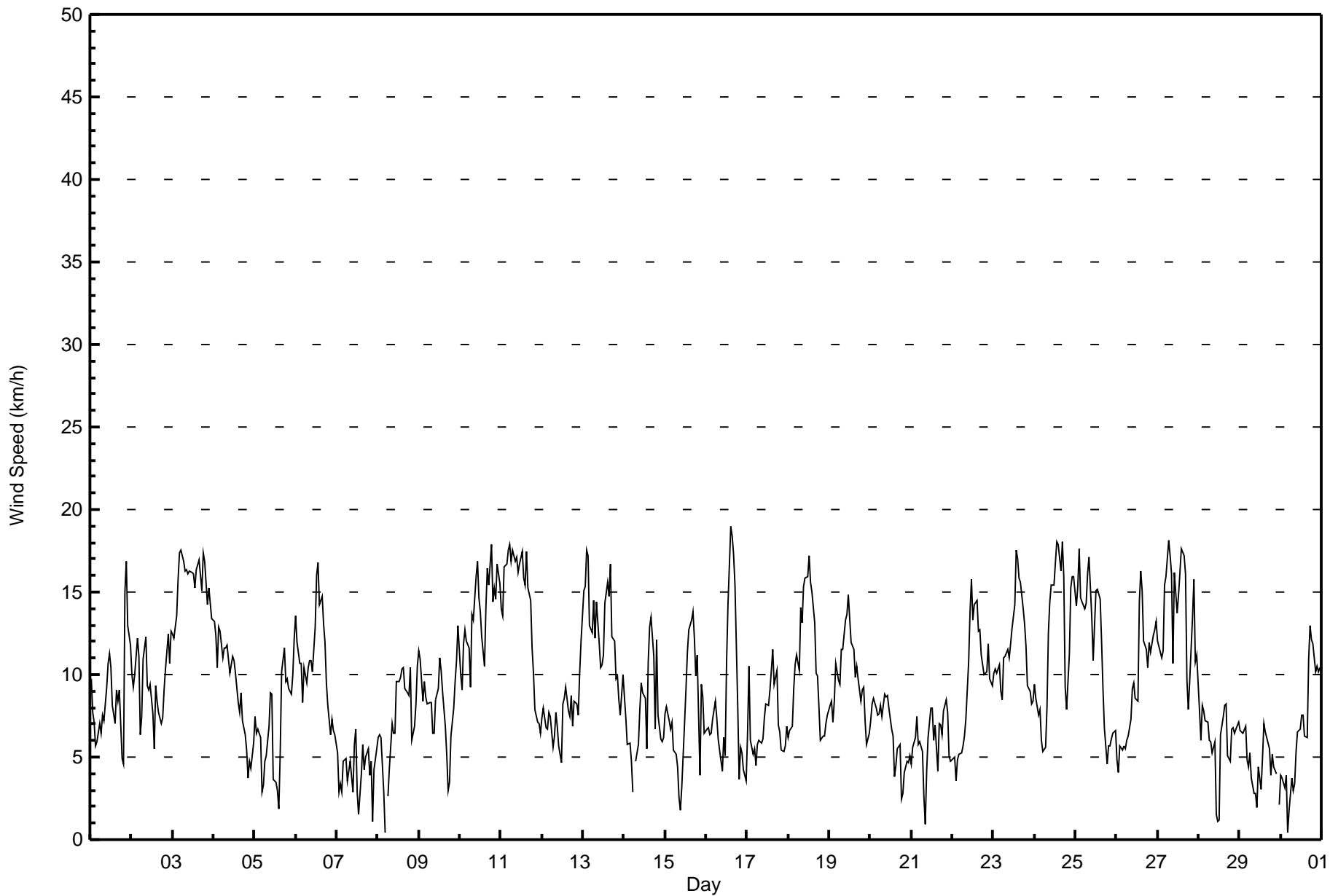
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 7 | 6 | 6 | 6 | 6 | 7 | 6 | 5 |
| Diurnal Maximum | | | | | | |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

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Anzac - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 122 | 17.02 | 17.02 |
| 6 - 11 | 384 | 53.56 | 70.57 |
| 12 - 19 | 211 | 29.43 | 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
Anzac - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 3 | 1 | 1 | 2 | 5 | 6 | 5 | 10 | 16 | 17 | 15 | 17 | 7 | 9 | 4 | 4 | 122 |
| 6 - 11 | 13 | 5 | 4 | 2 | 3 | 8 | 18 | 53 | 23 | 22 | 20 | 31 | 32 | 75 | 38 | 37 | 384 |
| 12 - 19 | 8 | 3 | 0 | 0 | 0 | 0 | 2 | 25 | 12 | 4 | 17 | 13 | 10 | 68 | 37 | 12 | 211 |
| 20 - 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 24 | 9 | 5 | 4 | 8 | 14 | 25 | 88 | 51 | 43 | 52 | 61 | 49 | 152 | 79 | 53 | 717 |

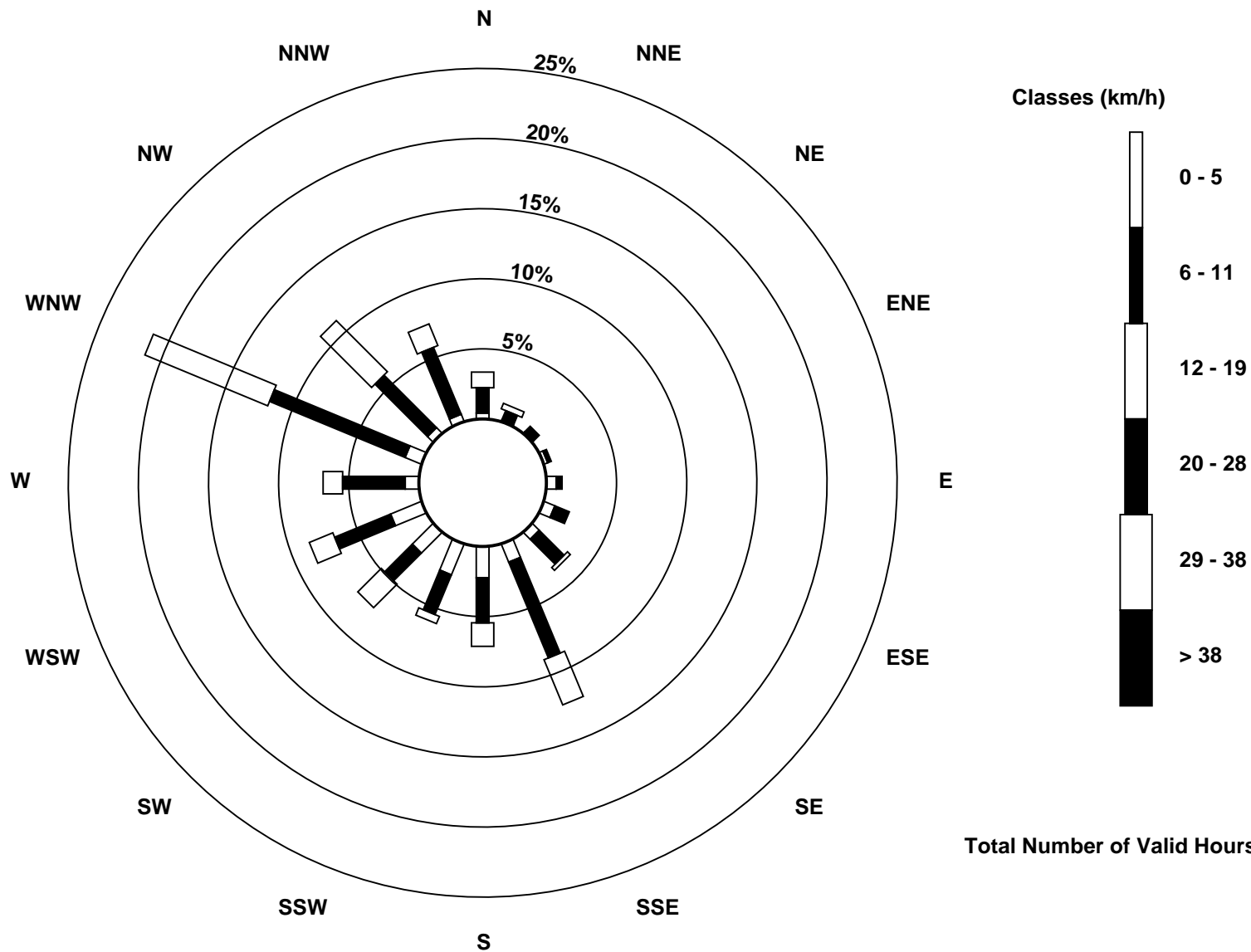
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Anzac (AMS 14)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - September 2016

| | |
|--------------------------------------------------------------|-------------------------------------------------------------|
| Direction of Maximum Speed: 248 deg on Sep 16 15:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 311.3 deg on Sep 3 | Hours of Data: 717 |
| Direction of Minimum Speed: 171 deg on Sep 8 05:00 | Direction of Minimum Daily Speed Average: 2.4 deg on Sep 29 |
| Direction of Minimum Speed: 171 deg on Sep 8 05:00 | Hours of Missing Data: 3 |
| Monthly Average Direction: 277.7 deg | Percent Operational Time: 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 142 | 137 | 120 | 122 | 138 | 149 | 141 | 127 | 125 | 147 | 152 | 121 | 106 | 125 | 91 | 64 | 88 | 111 | 100 | 256 | 277 | 295 | 298 | 281 | 133.4 |
| 2-Sep | 277 | 295 | 295 | 291 | 301 | 299 | 293 | 302 | 304 | 293 | 295 | 295 | 277 | 323 | 329 | 326 | 341 | 9 | 341 | 326 | 308 | 301 | 323 | 312 | 307.1 |
| 3-Sep | 305 | 310 | 310 | 303 | 302 | 303 | 298 | 290 | 282 | 287 | 300 | 310 | 313 | 315 | 320 | 324 | 325 | 323 | 328 | 337 | 324 | 323 | 323 | 317 | 311.3 |
| 4-Sep | 318 | 319 | 314 | 305 | 304 | 302 | 299 | 297 | 297 | 301 | 289 | 286 | 275 | 280 | 288 | 291 | 291 | 266 | 256 | 239 | 258 | 254 | 255 | 209 | 290.8 |
| 5-Sep | 234 | 245 | 225 | 234 | 210 | 167 | 174 | 176 | 177 | 215 | 193 | 234 | 287 | 289 | 148 | 109 | 177 | 150 | 155 | 155 | 161 | 166 | 170 | 181 | 184.3 |
| 6-Sep | 178 | 179 | 175 | 167 | 161 | 164 | 158 | 162 | 164 | 159 | 148 | 150 | 173 | 169 | 177 | 171 | 157 | 151 | 155 | 157 | 151 | 163 | 168 | 165 | 164.4 |
| 7-Sep | 168 | 160 | 173 | 191 | 193 | 171 | 181 | 168 | 147 | 133 | 122 | 131 | 168 | 234 | 283 | 312 | 215 | 179 | 229 | 242 | 225 | 209 | 242 | 246 | 192.2 |
| 8-Sep | 241 | 240 | 260 | 239 | 171 | AF | 258 | 295 | 296 | 282 | 302 | 286 | 294 | 323 | 284 | 303 | 292 | 293 | 303 | 335 | 319 | 317 | 329 | 339 | 298.0 |
| 9-Sep | 342 | 337 | 341 | 346 | 338 | 340 | 350 | 345 | 357 | 356 | 338 | 285 | 278 | 293 | 295 | 295 | 287 | 270 | 147 | 137 | 158 | 162 | 154 | 157 | 317.6 |
| 10-Sep | 162 | 146 | 161 | 161 | 166 | 168 | 188 | 225 | 242 | 264 | 283 | 292 | 302 | 289 | 273 | 281 | 292 | 289 | 289 | 296 | 302 | 305 | 298 | 302 | 267.0 |
| 11-Sep | 299 | 310 | 332 | 334 | 338 | 342 | 352 | 360 | 7 | 2 | 359 | 2 | 7 | 356 | 344 | 339 | 337 | 343 | 345 | 348 | 335 | 325 | 339 | 326 | 344.6 |
| 12-Sep | 328 | 323 | 310 | 312 | 313 | 306 | 271 | 243 | 248 | 267 | 319 | 282 | 272 | 294 | 286 | 286 | 263 | 238 | 185 | 181 | 186 | 195 | 208 | 220 | 263.1 |
| 13-Sep | 223 | 218 | 224 | 221 | 228 | 233 | 236 | 230 | 249 | 250 | 276 | 297 | 292 | 268 | 261 | 253 | 250 | 242 | 260 | 271 | 286 | 287 | 288 | 288 | 249.9 |
| 14-Sep | 297 | 291 | 287 | 315 | 336 | 311 | AF | 172 | 167 | 144 | 154 | 140 | 142 | 288 | 291 | 276 | 283 | 292 | 271 | 340 | 329 | 278 | 276 | 265 | 278.0 |
| 15-Sep | 295 | 305 | 296 | 293 | 296 | 295 | 310 | 349 | 38 | 63 | 118 | 131 | 123 | 123 | 137 | 149 | 145 | 148 | 141 | 143 | 154 | 163 | 167 | 185 | 154.8 |
| 16-Sep | 213 | 223 | 219 | 220 | 233 | 237 | 230 | 229 | 257 | 303 | 288 | 275 | 256 | 250 | 248 | 243 | 249 | 256 | 255 | 221 | 245 | 252 | 256 | 260 | 246.0 |
| 17-Sep | 283 | 263 | 266 | 255 | 258 | 185 | 189 | 185 | 192 | 212 | 259 | 257 | 257 | 276 | 281 | 275 | 290 | 298 | 261 | 259 | 279 | 248 | 247 | 272 | 259.0 |
| 18-Sep | 267 | 260 | 286 | 292 | 293 | 292 | 293 | 292 | 297 | 299 | 298 | 303 | 303 | 313 | 325 | 317 | 318 | 326 | 341 | 354 | 326 | 316 | 317 | 313 | 305.5 |
| 19-Sep | 328 | 341 | 345 | 341 | 323 | 322 | 315 | 315 | 323 | 325 | 311 | 300 | 293 | 298 | 309 | 311 | 311 | 305 | 307 | 302 | 322 | 345 | 314 | 320 | 315.8 |
| 20-Sep | 331 | 343 | 348 | 350 | 345 | 350 | 353 | 347 | 355 | 356 | 347 | 334 | 336 | 339 | 313 | 318 | 13 | 32 | 75 | 137 | 179 | 180 | 183 | 194 | 346.0 |
| 21-Sep | 205 | 194 | 201 | 190 | 185 | 198 | 213 | 227 | 229 | 256 | 303 | 299 | 296 | 281 | 295 | 251 | 285 | 242 | 211 | 209 | 211 | 217 | 204 | 215 | 234.0 |
| 22-Sep | 215 | 211 | 204 | 212 | 220 | 208 | 191 | 198 | 208 | 225 | 230 | 229 | 222 | 226 | 226 | 206 | 208 | 196 | 184 | 182 | 170 | 169 | 166 | 173 | 205.0 |
| 23-Sep | 181 | 166 | 161 | 161 | 167 | 140 | 147 | 141 | 146 | 146 | 154 | 151 | 148 | 170 | 163 | 161 | 166 | 168 | 173 | 159 | 156 | 152 | 151 | 154 | 158.4 |
| 24-Sep | 166 | 165 | 159 | 162 | 174 | 189 | 230 | 258 | 279 | 278 | 283 | 287 | 292 | 294 | 297 | 304 | 306 | 307 | 304 | 290 | 298 | 303 | 302 | 298 | 283.7 |
| 25-Sep | 297 | 302 | 299 | 299 | 296 | 293 | 297 | 301 | 300 | 297 | 290 | 295 | 304 | 305 | 309 | 306 | 305 | 293 | 265 | 256 | 245 | 257 | 256 | 245 | 294.3 |
| 26-Sep | 216 | 201 | 177 | 171 | 158 | 166 | 165 | 168 | 158 | 154 | 168 | 177 | 206 | 212 | 218 | 221 | 204 | 188 | 182 | 180 | 165 | 155 | 153 | 169 | 182.6 |
| 27-Sep | 165 | 162 | 159 | 193 | 242 | 283 | 291 | 292 | 294 | 280 | 286 | 295 | 314 | 304 | 300 | 301 | 294 | 284 | 246 | 255 | 269 | 290 | 302 | 303 | 279.3 |
| 28-Sep | 283 | 261 | 272 | 293 | 283 | 274 | 241 | 234 | 218 | 253 | 339 | 194 | 32 | 239 | 256 | 248 | 256 | 270 | 219 | 215 | 222 | 234 | 226 | 217 | 250.4 |
| 29-Sep | 210 | 200 | 194 | 200 | 192 | 235 | 203 | 193 | 216 | 195 | 294 | 172 | 115 | 92 | 51 | 46 | 64 | 93 | 108 | 99 | 140 | 152 | AF | 144 | 155.0 |
| 30-Sep | 134 | 115 | 112 | 92 | 275 | 81 | 340 | 341 | 351 | 351 | 349 | 340 | 318 | 348 | 354 | 359 | 22 | 25 | 19 | 32 | 31 | 33 | 38 | 40 | 19.2 |

251.9 255.9 257.1 259.6 269.9 269.6 266.6 268.6 272.9 273.6 282.7 280.9 283.0 281.3 281.7 281.6 278.2 272.0 254.6 255.3 260.0 261.9 263.3 258.3

Diurnal Average

AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Anzac - September 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 106 deg on Sep 28 12:00 | Hours of Data: 717 |
| Minimum Value: 9 deg on Sep 26 00:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 10 P ₁₀ = 15 Q ₁ = 17 Median = 20 Q ₃ = 24 P ₉₀ = 34 P ₉₉ = 88 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|-----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 19 | 23 | 31 | 22 | 19 | 19 | 19 | 17 | 18 | 24 | 21 | 27 | 27 | 32 | 36 | 20 | 25 | 21 | 39 | 100 | 22 | 22 | 21 | 24 | 100 |
| 2-Sep | 24 | 21 | 23 | 22 | 25 | 28 | 24 | 21 | 20 | 25 | 25 | 26 | 29 | 34 | 17 | 23 | 23 | 17 | 16 | 14 | 22 | 22 | 17 | 17 | 34 |
| 3-Sep | 19 | 19 | 19 | 21 | 20 | 19 | 22 | 24 | 23 | 25 | 23 | 21 | 19 | 18 | 17 | 18 | 17 | 19 | 16 | 17 | 17 | 16 | 17 | 19 | 25 |
| 4-Sep | 18 | 19 | 18 | 20 | 20 | 22 | 20 | 21 | 21 | 24 | 27 | 27 | 29 | 29 | 24 | 23 | 22 | 26 | 19 | 16 | 25 | 16 | 10 | 16 | 29 |
| 5-Sep | 13 | 10 | 11 | 10 | 29 | 33 | 17 | 22 | 24 | 33 | 34 | 62 | 79 | 59 | 89 | 50 | 25 | 19 | 18 | 16 | 15 | 17 | 16 | 18 | 89 |
| 6-Sep | 15 | 18 | 17 | 15 | 18 | 14 | 17 | 16 | 16 | 19 | 20 | 25 | 24 | 24 | 25 | 23 | 25 | 18 | 19 | 18 | 18 | 18 | 17 | 14 | 25 |
| 7-Sep | 15 | 53 | 14 | 18 | 15 | 13 | 24 | 18 | 26 | 74 | 43 | 34 | 88 | 77 | 62 | 33 | 60 | 23 | 44 | 32 | 15 | 84 | 24 | 9 | 88 |
| 8-Sep | 10 | 14 | 10 | 19 | 81 | AF | 40 | 27 | 25 | 29 | 30 | 26 | 29 | 24 | 25 | 22 | 27 | 22 | 22 | 18 | 16 | 14 | 15 | 17 | 81 |
| 9-Sep | 16 | 14 | 16 | 16 | 16 | 17 | 16 | 16 | 17 | 25 | 22 | 34 | 29 | 26 | 29 | 35 | 36 | 51 | 19 | 13 | 15 | 17 | 16 | 16 | 51 |
| 10-Sep | 18 | 18 | 18 | 18 | 18 | 17 | 25 | 20 | 21 | 25 | 25 | 25 | 23 | 25 | 23 | 25 | 23 | 23 | 23 | 23 | 21 | 21 | 21 | 20 | 25 |
| 11-Sep | 22 | 21 | 17 | 15 | 16 | 17 | 18 | 18 | 18 | 17 | 18 | 18 | 19 | 18 | 22 | 16 | 17 | 17 | 16 | 16 | 17 | 16 | 14 | 13 | 22 |
| 12-Sep | 14 | 16 | 17 | 18 | 17 | 19 | 34 | 18 | 21 | 36 | 36 | 60 | 46 | 39 | 33 | 36 | 38 | 22 | 19 | 16 | 18 | 18 | 17 | 18 | 60 |
| 13-Sep | 19 | 21 | 19 | 19 | 21 | 19 | 18 | 16 | 20 | 23 | 33 | 25 | 27 | 29 | 26 | 23 | 22 | 20 | 16 | 20 | 22 | 23 | 24 | 20 | 33 |
| 14-Sep | 21 | 18 | 18 | 17 | 13 | 47 | AF | 15 | 23 | 23 | 24 | 25 | 26 | 58 | 26 | 27 | 23 | 24 | 22 | 19 | 21 | 17 | 15 | 15 | 58 |
| 15-Sep | 20 | 17 | 16 | 17 | 17 | 16 | 14 | 23 | 55 | 82 | 57 | 30 | 20 | 24 | 23 | 23 | 19 | 19 | 16 | 17 | 95 | 17 | 16 | 20 | 95 |
| 16-Sep | 13 | 12 | 11 | 11 | 12 | 10 | 11 | 15 | 25 | 39 | 30 | 33 | 40 | 25 | 22 | 22 | 22 | 23 | 20 | 20 | 16 | 14 | 27 | 35 | 40 |
| 17-Sep | 33 | 26 | 27 | 20 | 26 | 38 | 23 | 21 | 21 | 22 | 29 | 24 | 25 | 23 | 24 | 23 | 24 | 22 | 23 | 21 | 20 | 21 | 20 | 21 | 38 |
| 18-Sep | 17 | 17 | 20 | 18 | 21 | 20 | 20 | 22 | 20 | 20 | 23 | 22 | 22 | 23 | 20 | 19 | 19 | 18 | 15 | 14 | 15 | 15 | 17 | 18 | 23 |
| 19-Sep | 22 | 14 | 16 | 16 | 16 | 17 | 18 | 17 | 18 | 19 | 22 | 21 | 23 | 24 | 20 | 22 | 20 | 19 | 18 | 21 | 23 | 16 | 17 | 15 | 24 |
| 20-Sep | 15 | 17 | 15 | 15 | 15 | 14 | 16 | 15 | 18 | 18 | 22 | 34 | 47 | 42 | 64 | 59 | 33 | 14 | 37 | 24 | 16 | 11 | 16 | 16 | 64 |
| 21-Sep | 22 | 19 | 25 | 15 | 10 | 13 | 11 | 71 | 88 | 46 | 25 | 23 | 28 | 34 | 26 | 43 | 26 | 20 | 14 | 12 | 11 | 12 | 16 | 15 | 88 |
| 22-Sep | 11 | 14 | 20 | 13 | 10 | 22 | 14 | 16 | 17 | 26 | 24 | 23 | 26 | 27 | 26 | 28 | 25 | 24 | 18 | 15 | 17 | 16 | 16 | 14 | 28 |
| 23-Sep | 16 | 15 | 15 | 15 | 18 | 22 | 18 | 19 | 18 | 19 | 20 | 20 | 19 | 24 | 20 | 20 | 19 | 20 | 20 | 18 | 19 | 19 | 18 | 20 | 24 |
| 24-Sep | 17 | 14 | 17 | 14 | 19 | 19 | 29 | 34 | 29 | 26 | 24 | 24 | 22 | 23 | 22 | 22 | 20 | 19 | 21 | 21 | 20 | 19 | 20 | 20 | 34 |
| 25-Sep | 20 | 19 | 19 | 20 | 21 | 21 | 20 | 19 | 19 | 22 | 26 | 24 | 22 | 24 | 22 | 24 | 24 | 24 | 16 | 10 | 10 | 11 | 13 | 9 | 26 |
| 26-Sep | 10 | 11 | 12 | 18 | 17 | 30 | 12 | 17 | 24 | 22 | 26 | 32 | 47 | 25 | 24 | 24 | 26 | 21 | 17 | 17 | 16 | 15 | 17 | 16 | 47 |
| 27-Sep | 14 | 15 | 14 | 29 | 21 | 25 | 24 | 23 | 25 | 26 | 24 | 24 | 21 | 21 | 22 | 22 | 23 | 26 | 18 | 20 | 23 | 24 | 21 | 20 | 29 |
| 28-Sep | 27 | 13 | 16 | 19 | 19 | 15 | 24 | 11 | 21 | 38 | 82 | 106 | 101 | 55 | 43 | 33 | 26 | 23 | 28 | 15 | 14 | 11 | 11 | 12 | 106 |
| 29-Sep | 16 | 18 | 17 | 16 | 21 | 32 | 19 | 59 | 46 | 29 | 80 | 71 | 86 | 64 | 34 | 31 | 25 | 19 | 25 | 14 | 10 | 14 | AF | 27 | 86 |
| 30-Sep | 11 | 17 | 32 | 24 | 91 | 48 | 20 | 23 | 16 | 16 | 21 | 19 | 25 | 19 | 18 | 16 | 17 | 17 | 17 | 17 | 18 | 15 | 17 | 17 | 91 |

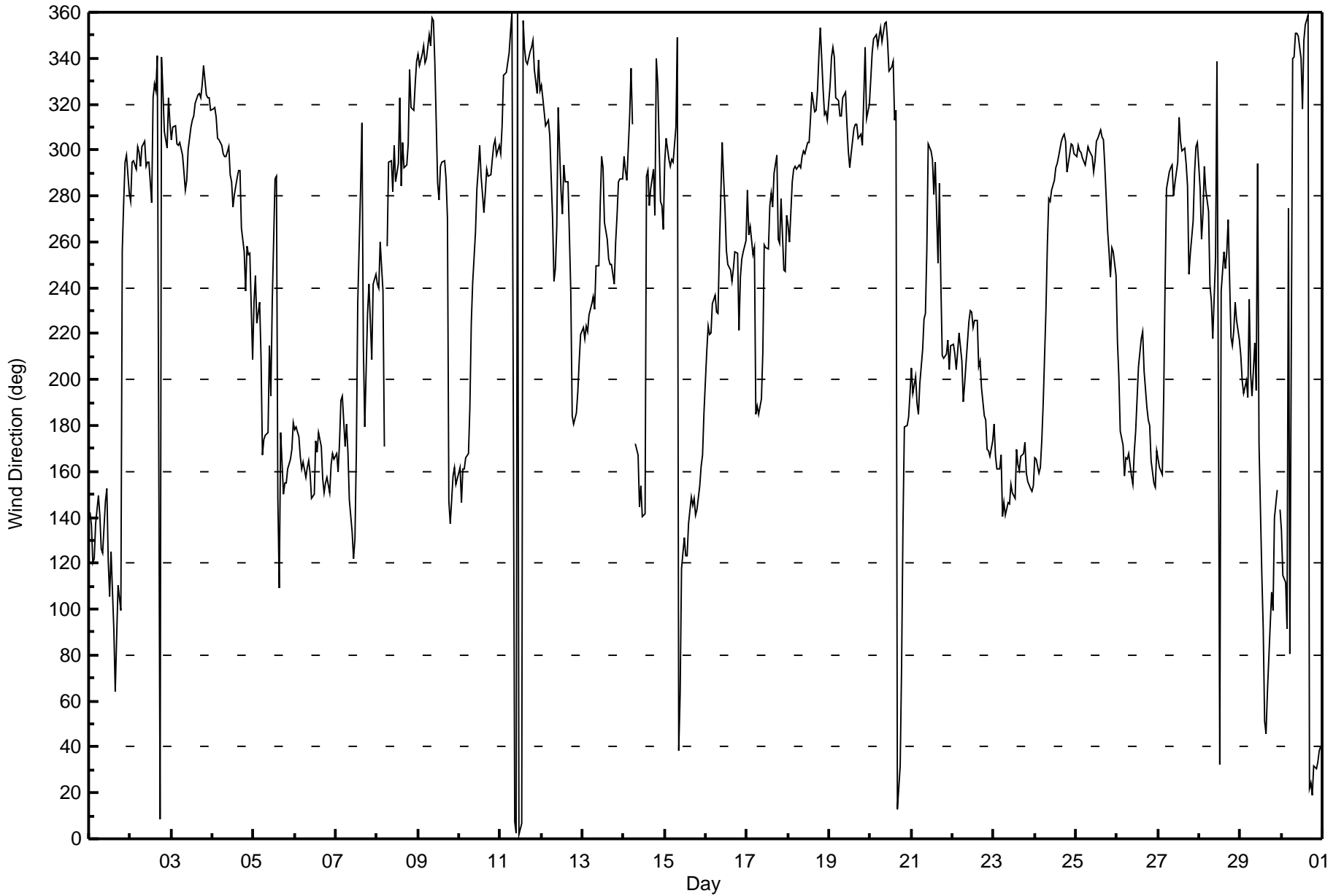
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|-----|----|----|----|----|--|
| 33 | 53 | 32 | 29 | 91 | 48 | 40 | 71 | 88 | 82 | 82 | 106 | 101 | 77 | 89 | 59 | 60 | 51 | 44 | 100 | 95 | 84 | 27 | 35 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Anzac - September 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

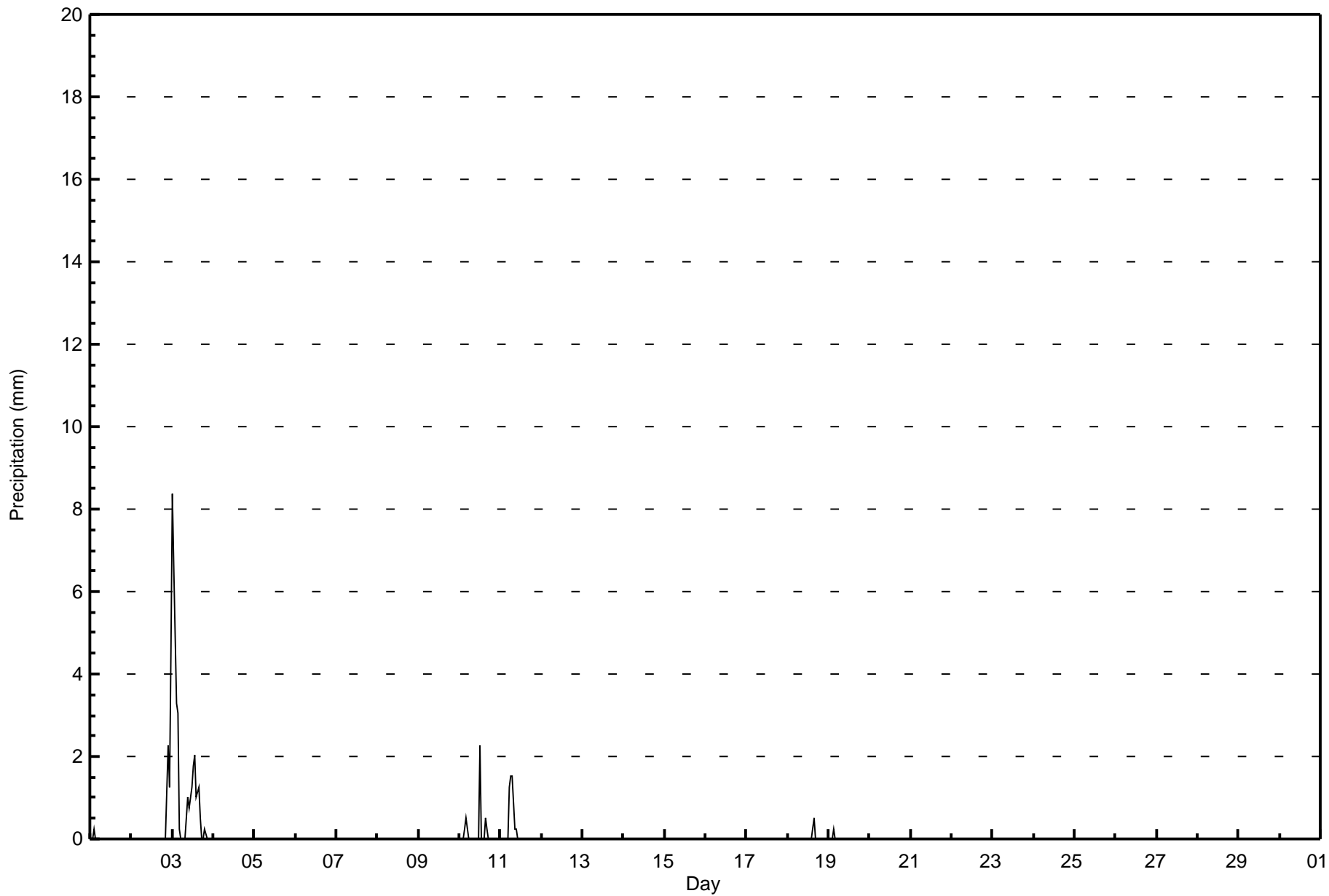
Anzac - September 2016

| Maximum Value: 8.4 mm on Sep 3 01:00 Maximum Daily Total: 32.0 mm on Sep 3 | | 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: 8.4 mm at hour 1 Monthly Total: 49.78 mm | | Minimum Daily Total: 0.0 mm on Sep 4 Minimum Diurnal Total: 0.0 mm at hour 18 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 O ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 2.3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | |
| 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 | 2.3 | 1.3 | 4.6 | 8.1 | 4.6 | |
| 3-Sep | 8.4 | 6.6 | 3.3 | 3.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.5 | 1.0 | 0.8 | 1.3 | 1.8 | 2.0 | 1.0 | 1.3 | 0.5 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 32.0 | 8.4 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 10-Sep | 0.0 | 0.0 | 0.0 | 0.3 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.3 | 0.0 | 0.0 | 0.5 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.8 | 2.3 | |
| 11-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.5 | 1.5 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.8 | 1.5 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.5 | |
| 19-Sep | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 | |
| 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 | |
| 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 | 0.0 | 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| | | 8.4 | 6.6 | 3.6 | 3.6 | 0.8 | 1.3 | 1.5 | 1.5 | 0.8 | 1.3 | 0.8 | 1.3 | 4.1 | 2.0 | 1.0 | 2.3 | 0.8 | 0.0 | 0.0 | 0.3 | 0.0 | 2.3 | 1.3 | 4.6 | Diurnal Average | |
| | | 8.4 | 6.6 | 3.3 | 3.0 | 0.5 | 1.3 | 1.5 | 1.5 | 0.5 | 1.0 | 0.8 | 1.3 | 2.3 | 2.0 | 1.0 | 1.3 | 0.5 | 0.0 | 0.0 | 0.3 | 0.0 | 2.3 | 1.3 | 4.6 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Anzac - September 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 19, 2016 | Last Calibration | August 25, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Reason: | Routine | | |
| Start Time (MST) | 10:05 | End Time (MST) | 14:07 |
| Gas Cert Reference | SA130026A | Station temp. | 22 Deg C |
| Cal Gas Concentration | 47.2 ppm | Cal Gas Exp Date | December 12, 2016 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 8400311 |
| ZAG Make/Model | API 701 | Serial Number | 4764 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2582 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -638 | -638 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 796 | 792 |
| Calculated slope | 0.997009 | 0.997248 | Chamber temp | 44.5 | 45.1 |
| Calculated intercept | 0.921498 | 1.700135 | Pressure | 705.4 | 697.5 |
| Analyzer Background | 14.2 | 13.5 | Flow | 0.437 | 0.433 |
| Analyzer Coefficient | 0.878 | 0.878 | Intensity | 85 | 84 |

Analyzer make Thermo 43i Analyzer serial # 1152430005

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 5000 | 74.9 | 707.1 | 704.8 | 1.003 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.4 | ---- |
| high point | 5000 | 74.9 | 707.1 | 708.5 | 0.998 |
| second point | 5000 | 37.5 | 354.0 | 350.9 | 1.009 |
| third point | 5000 | 18.7 | 176.5 | 175.2 | 1.008 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 5000 | 74.9 | 707.1 | 707.8 | 0.999 |
| Average Correction Factor | | | | | 1.005 |

Corrected As found 704.9 Previous response 708.3 % change 0.5%

Notes:

Sample inlet filter replaced after as founds. Adjusted zero only.

Calibration Performed By: Asad Hidayat



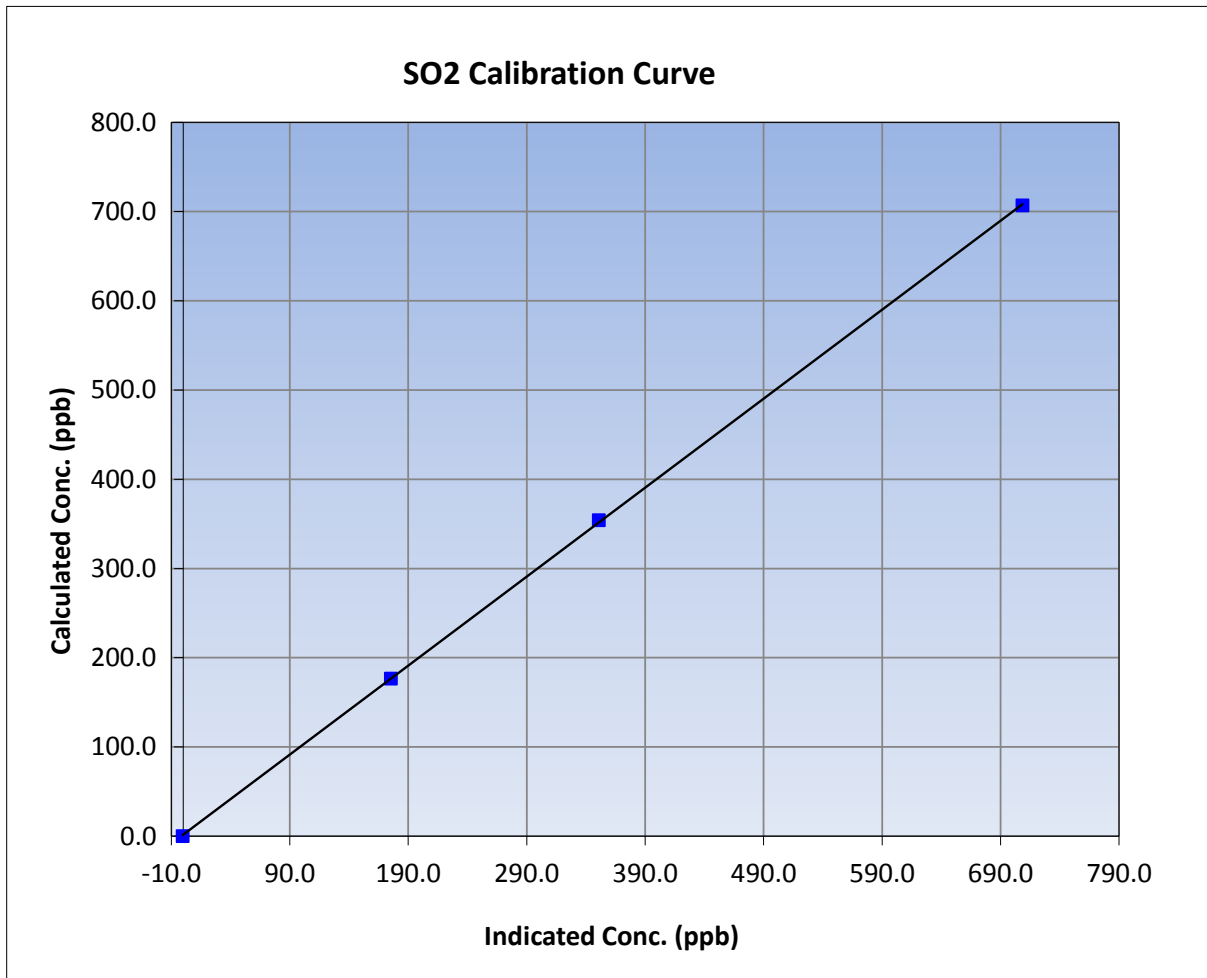
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 25, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 10:05 | End Time (MST) | 14:07 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1152430005 |

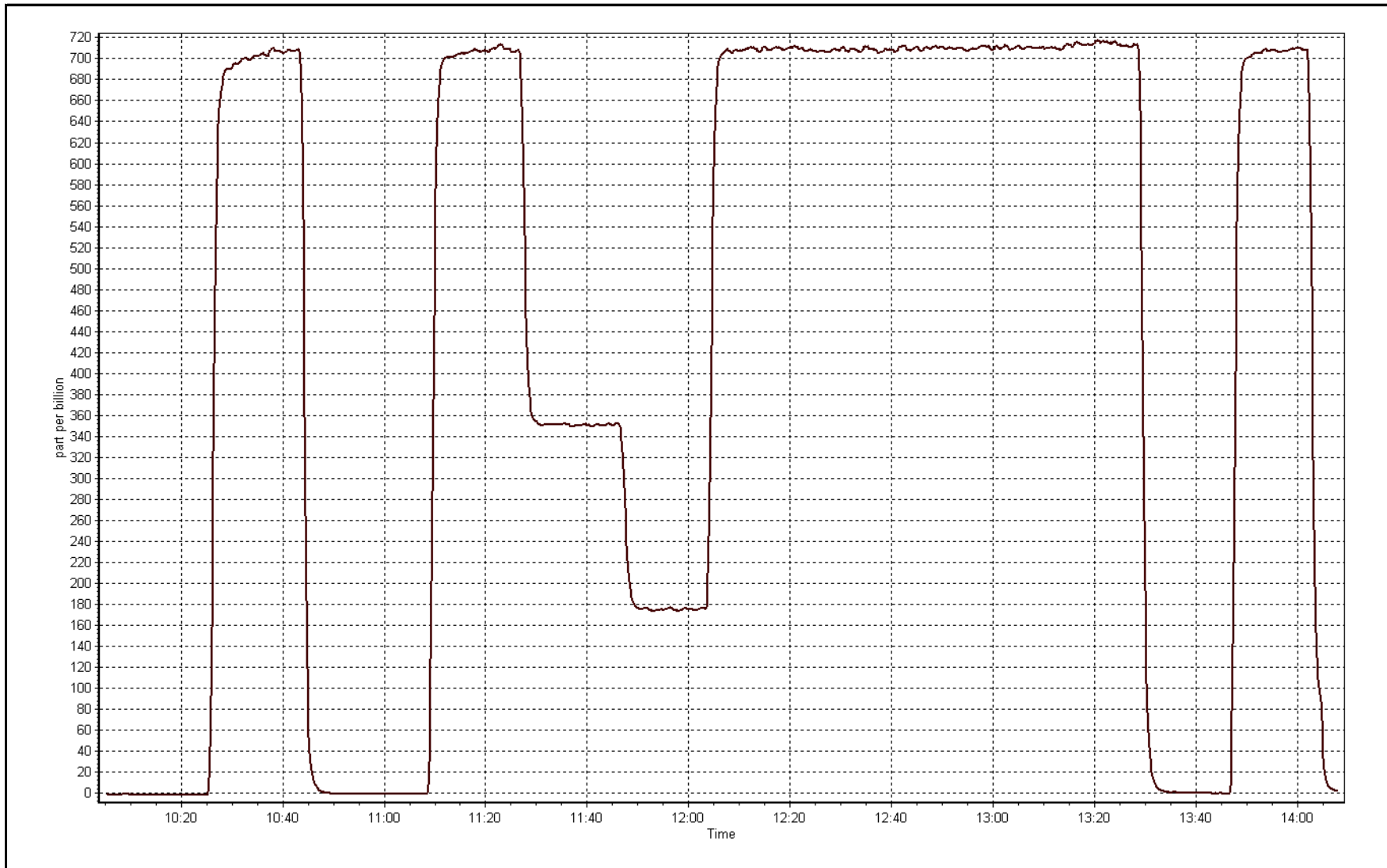
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999968 |
| 707.1 | 708.5 | 0.9979 | | |
| 354.0 | 350.9 | 1.0089 | Slope | 0.997248 |
| 176.5 | 175.2 | 1.0077 | | |
| | | | Intercept | 1.700135 |



SO2 Calibration Plot

Date: September 19, 2016





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------------|------------------|--------------------|
| Calibration Date | September 27, 2016 | Last Calibration | September 19, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Reason: | Other: Site cylinder replacement | | |
| Start Time (MST) | 10:47 | End Time (MST) | 13:55 |
| Gas Cert Reference | LL104186 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 50.1 ppm | Cal Gas Exp Date | February 6, 2019 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 8400311 |
| ZAG Make/Model | API 701 | Serial Number | 4764 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2582 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -638 | -638 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 792 | 791 |
| Calculated slope | 0.997248 | 0.996476 | Chamber temp | 44.5 | 44.8 |
| Calculated intercept | 1.700135 | 1.280104 | Pressure | 697.8 | 697.8 |
| Analyzer Background | 14.2 | 14.7 | Flow | 0.433 | 0.432 |
| Analyzer Coefficient | 0.878 | 0.950 | Intensity | 85 | 85 |

Analyzer make Thermo 43i Analyzer serial # 1152430005

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.7 | ---- |
| as found span | 5000 | 71.3 | 714.5 | 708.1 | 1.009 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.4 | ---- |
| high point | 5000 | 79.8 | 799.6 | 802.1 | 0.997 |
| second point | 5000 | 39.9 | 399.8 | 397.9 | 1.005 |
| third point | 5000 | 19.9 | 199.4 | 199.0 | 1.002 |
| as left zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as left span | 5000 | 74.9 | 750.5 | 766.5 | 0.979 |
| Average Correction Factor | | | | | 1.001 |

Corrected As found 708.8 Previous response 714.8 % change 0.8%

Notes:

As found captured by original site cylinder gas; new cylinder of SO2 added to site for calibration purposes only. Initial analyzer response to new gas 8% low; analyzer span adjusted.

Calibration Performed By: Kelly Baragar



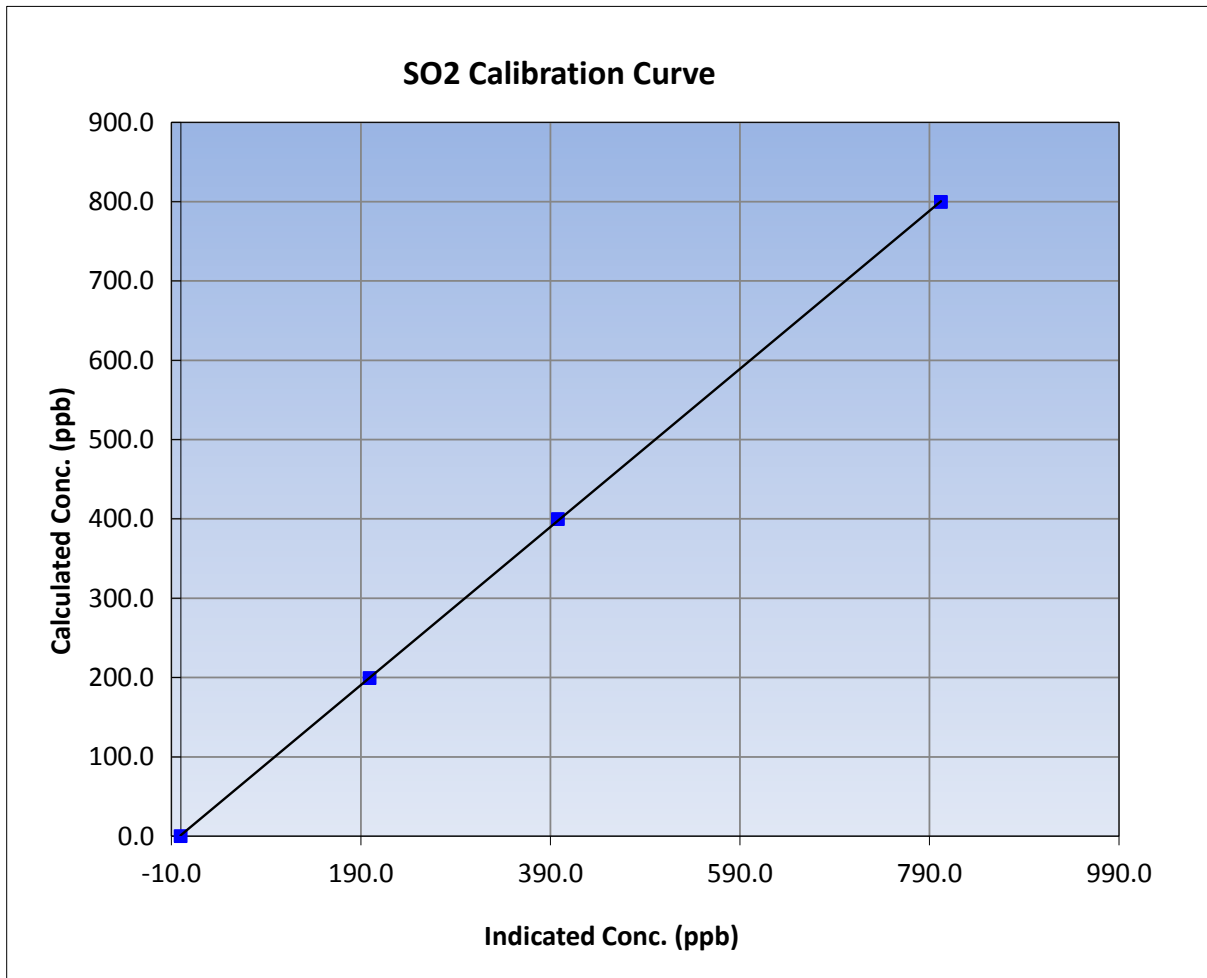
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 27, 2016 | Previous Calibration | September 19, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 10:47 | End Time (MST) | 13:55 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1152430005 |

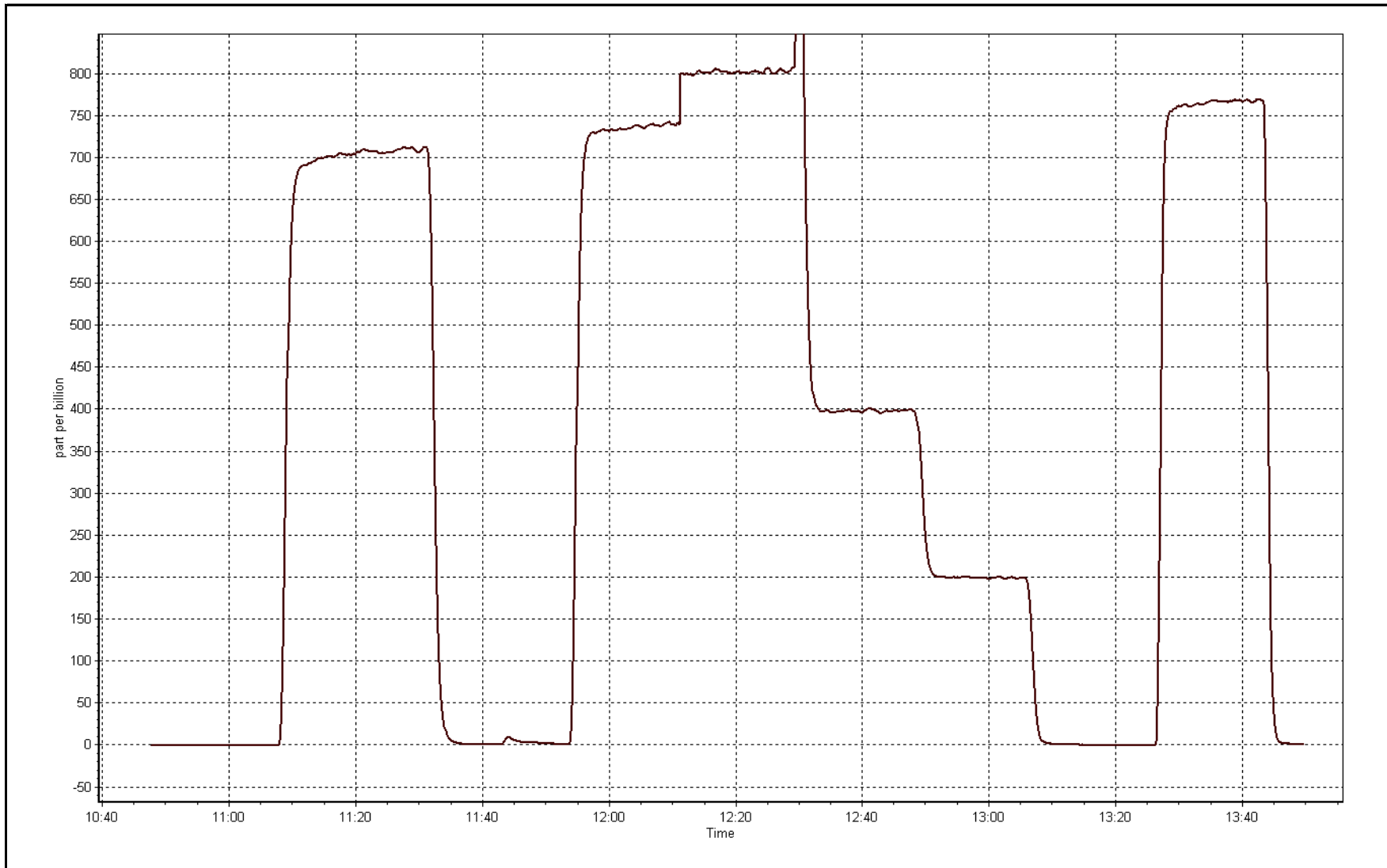
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999983 |
| 799.6 | 802.1 | 0.9969 | | |
| 399.8 | 397.9 | 1.0048 | Slope | 0.996476 |
| 199.4 | 199.0 | 1.0020 | | |
| | | | Intercept | 1.280104 |



SO2 Calibration Plot

Date: September 27, 2016





Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-----------------------------|
| Calibration Date | September 22, 2016 | Last Calibration | August 5, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Reason: | Routine | | |
| Start Time (MST) | 13:12 | End Time (MST) | 15:50 |
| Gas Cert Reference | ALM033528 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.05 ppm | Cal Gas Exp Date | September 9, 2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 8400311 |
| Dil air Make/Model | API 701 | Serial Number | 4764 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2582 |
| SO2 gas concentration | 47.2 ppm | SO2 gas cert/exp | SA130026A December 12, 2016 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -731 | -731 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 980 | 984 |
| Calculated slope | 1.000530 | 1.001241 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.033661 | 0.024939 | Pressure | 662.9 | 686.5 |
| Analyzer Background | 1.76 | 1.67 | Flow | 0.408 | 0.423 |
| Analyzer Coefficient | 1.215 | 1.182 | Intensity | 98 | 98 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-TLE | | Analyzer serial # | 1300156232 | |
| Converter make/model | CDN-101 | | Converter serial # | 510 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5000 | 74.3 | 75.0 | 76.5 | 0.981 |
| SO2 scrubber check | 5000 | 18.7 | 176.5 | 0.5 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 74.3 | 75.0 | 75.0 | 1.001 |
| second point | 5000 | 39.6 | 40.0 | 39.9 | 1.003 |
| third point | 5000 | 19.8 | 20.0 | 19.9 | 1.003 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 5000 | 74.3 | 75.0 | 74.6 | 1.005 |
| Average Correction Factor | | | | | 1.002 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 76.5 | Previous response | 75.0 | % change | -1.9% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

Sample inlet filter replaced after as founds. Adjusted span. Scrubber test done after 3rd point.

Calibration Performed By:

Asad Hidayat



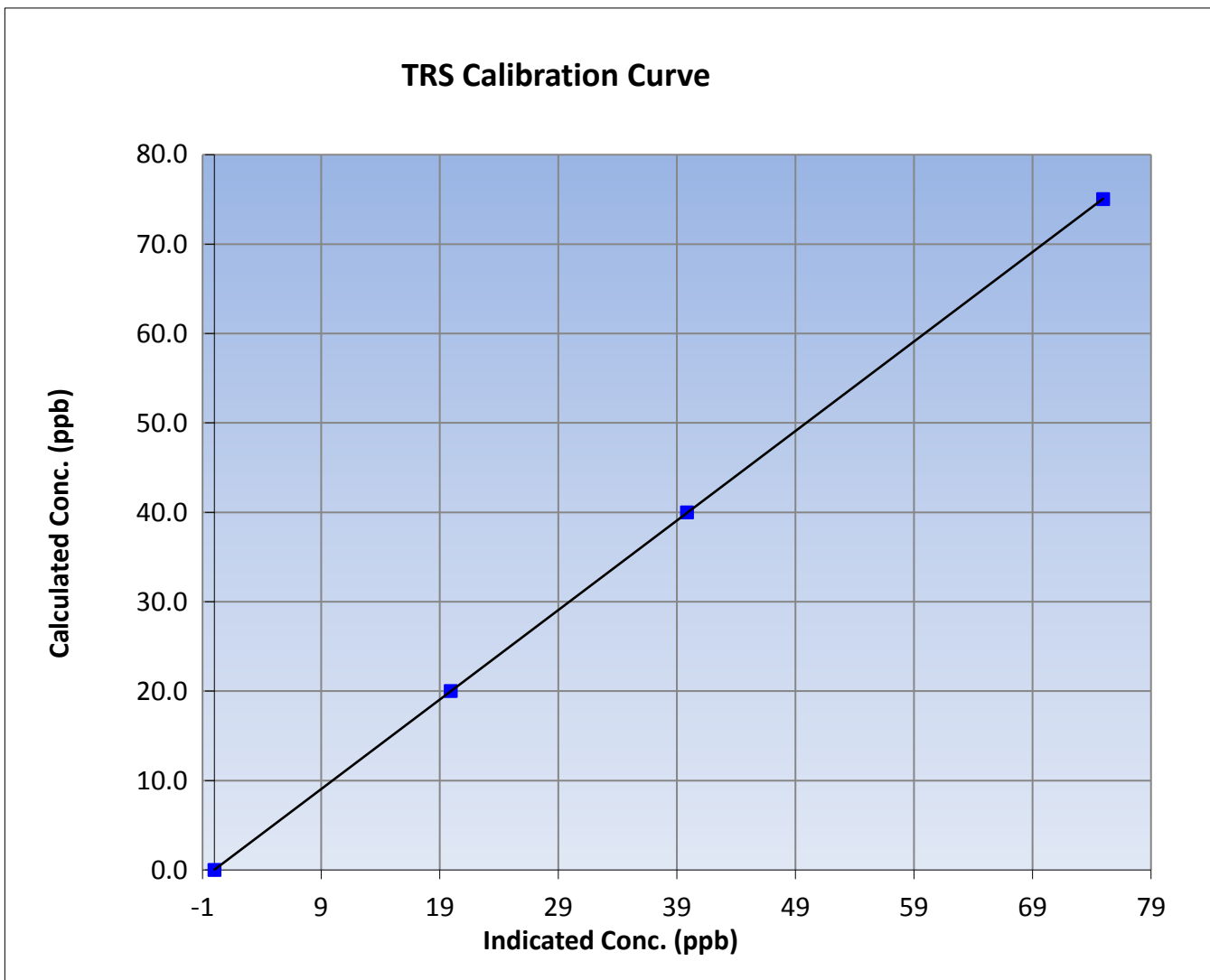
Wood Buffalo Environmental Association TRS Calibration Report

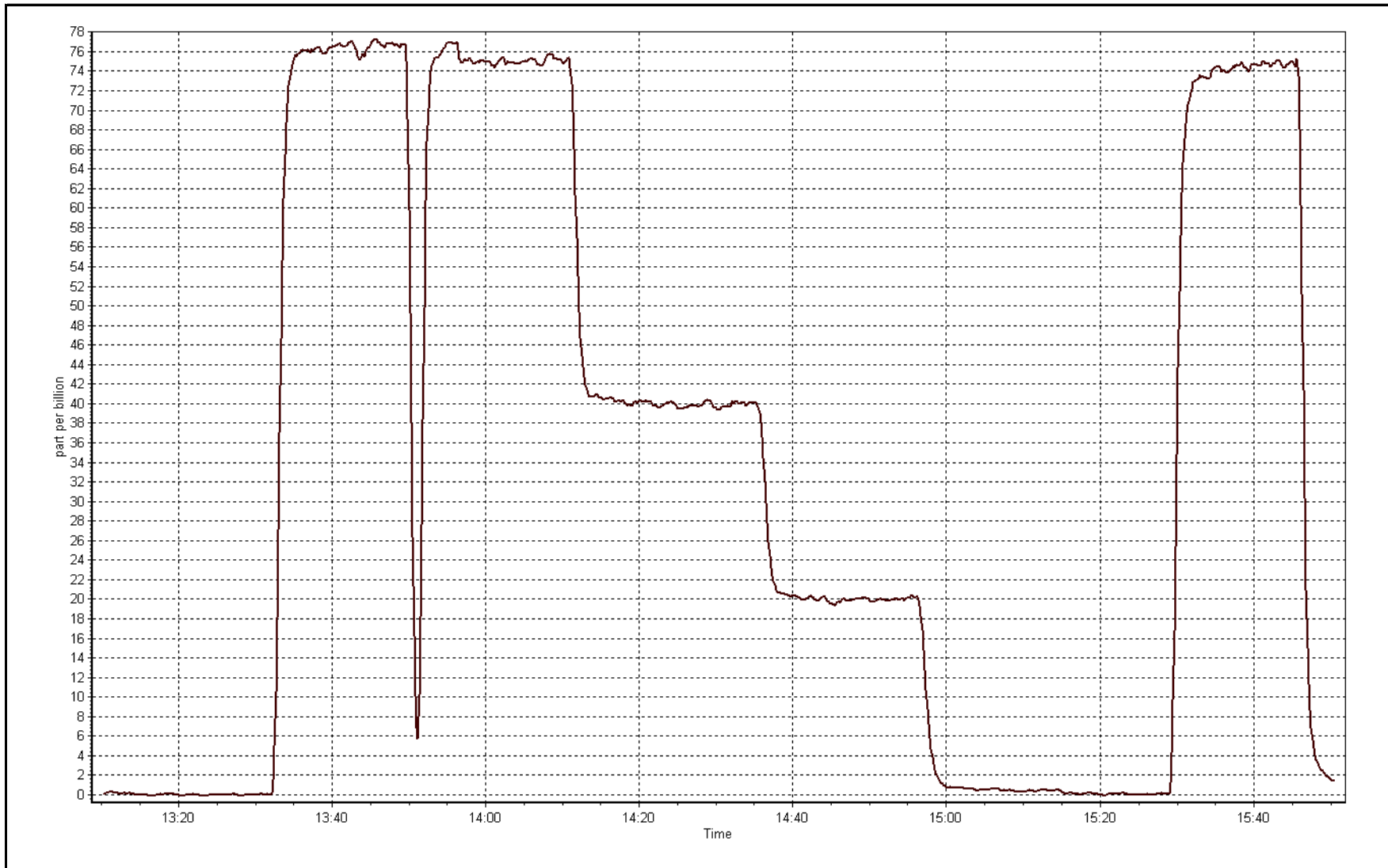
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 13:12 | End Time (MST) | 15:50 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1300156232 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999998 |
| 75.0 | 75.0 | 1.0011 | | |
| 40.0 | 39.9 | 1.0034 | Slope | 1.001241 |
| 20.0 | 19.9 | 1.0029 | | |
| | | | Intercept | 0.024939 |







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|----------------------------|---------------------|-------------------|
| Calibration Date | September 17, 2017 | Last Calibration | August 25, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Reason: | Routine | | |
| Start Time (MST) | 12:05 | End Time (MST) | 15:10 |
| Gas Cert Reference | SA130026A | Cal Gas Expiry Date | December 12, 2016 |
| CH4 Cal Gas Conc. | 512.0 ppm | CH4 Equiv Conc. | 1092.3 ppm |
| C3H8 Cal Gas Conc. | 211.0 ppm | Station temp. | 22 Deg C |
| Calibrator Model | Sabio 4010 | Serial Number | 8400311 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4764 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2682 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|-----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.0 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 405.0 | 404.8 |
| THC Calc slope | 1.000818 | 0.999729 | Carrier Pressure | 33.3 | 34.4 |
| THC Calc intercept | -0.003198 | 0.004141 | Fuel Pressure | 44.4 | 45.3 |
| NMHC Calc slope | 1.004891 | 1.002237 | Air Pressure | 32.6 | 33.6 |
| NMHC Calc intercept | -0.054855 | -0.047558 | | | |

Analyzer make Thermo 55i Analyzer serial # 1218153355

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 74.9 | 16.36 | 15.40 | 1.062 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 74.9 | 16.36 | 16.38 | 0.999 |
| second point | 5000 | 37.5 | 8.19 | 8.14 | 1.006 |
| third point | 5000 | 18.7 | 4.09 | 4.11 | 0.994 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 74.9 | 16.36 | 16.41 | 0.997 |
| Average Correction Factor | | | | | 1.000 |

Corrected As found 15.40 Previous response 16.35 % change 6.2%

Notes:

Baseline readings slightly low; replaced pump, balanced support pressures for optimum flame efficiency. Span adjustment performed.

Calibration Performed By: Kelly Baragar



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 74.9 | 8.69 | 8.12 | 1.070 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 74.9 | 8.69 | 8.70 | 0.999 |
| second point | 5000 | 37.5 | 4.35 | 4.40 | 0.989 |
| third point | 5000 | 18.7 | 2.17 | 2.27 | 0.956 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 74.9 | 8.69 | 8.70 | 0.999 |
| Average Correction Factor | | | | | 0.981 |

Corrected As found 8.12 Previous response 8.70 % change 7.2%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 74.9 | 7.67 | 7.28 | 1.054 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 74.9 | 7.67 | 7.69 | 0.997 |
| second point | 5000 | 37.5 | 3.84 | 3.75 | 1.024 |
| third point | 5000 | 18.7 | 1.91 | 1.84 | 1.041 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 74.9 | 7.67 | 7.72 | 0.993 |
| Average Correction Factor | | | | | 1.021 |

Corrected As found 7.28 Previous response 7.65 % change 5.0%



Wood Buffalo Environmental Association

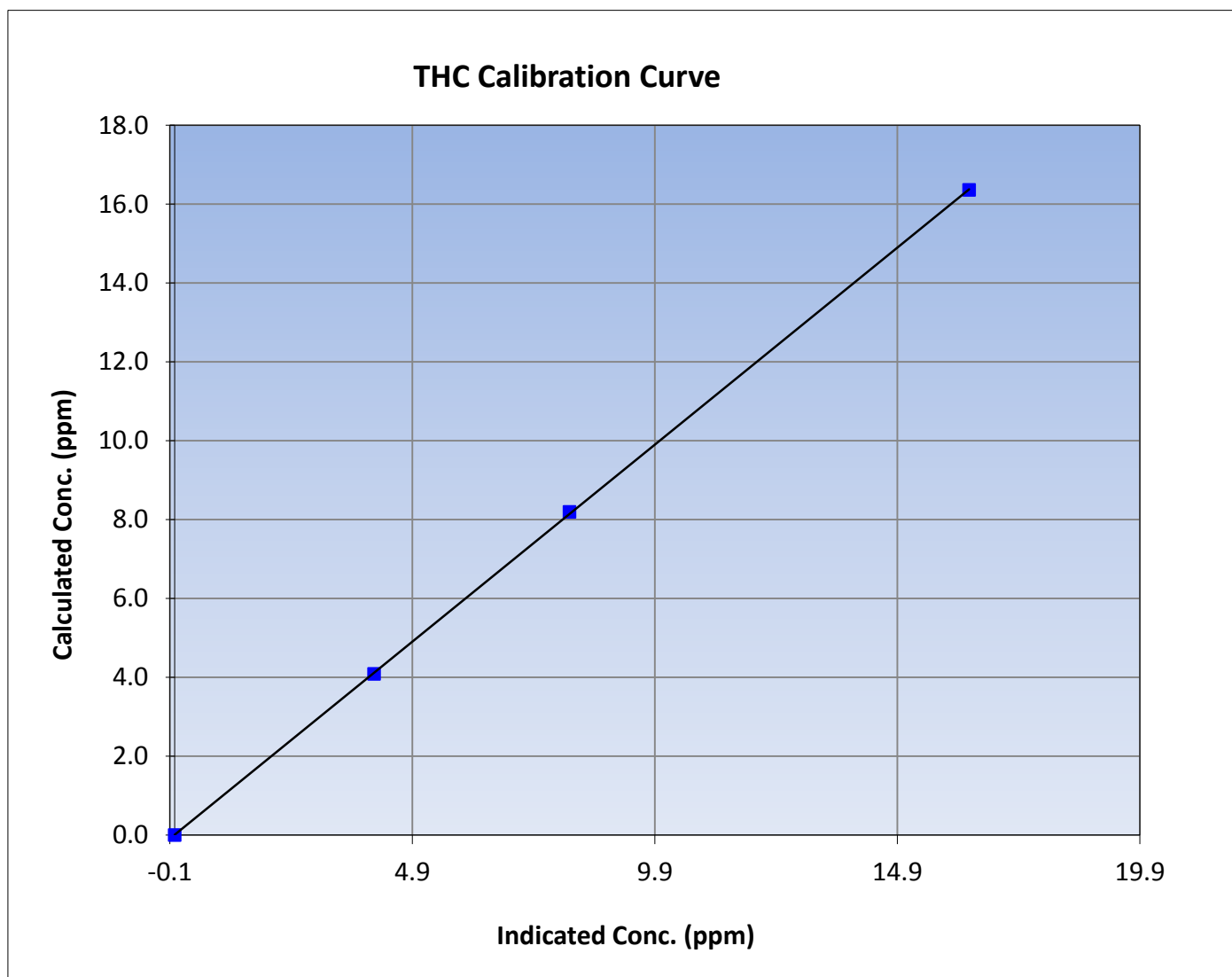
THC Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 17, 2017 | Previous Calibration | August 25, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 12:05 | End Time (MST) | 15:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999975 |
| 16.36 | 16.38 | 0.9989 | | |
| 8.19 | 8.14 | 1.0064 | Slope | 0.999729 |
| 4.09 | 4.11 | 0.9939 | | |
| | | | Intercept | 0.004141 |





Wood Buffalo Environmental Association

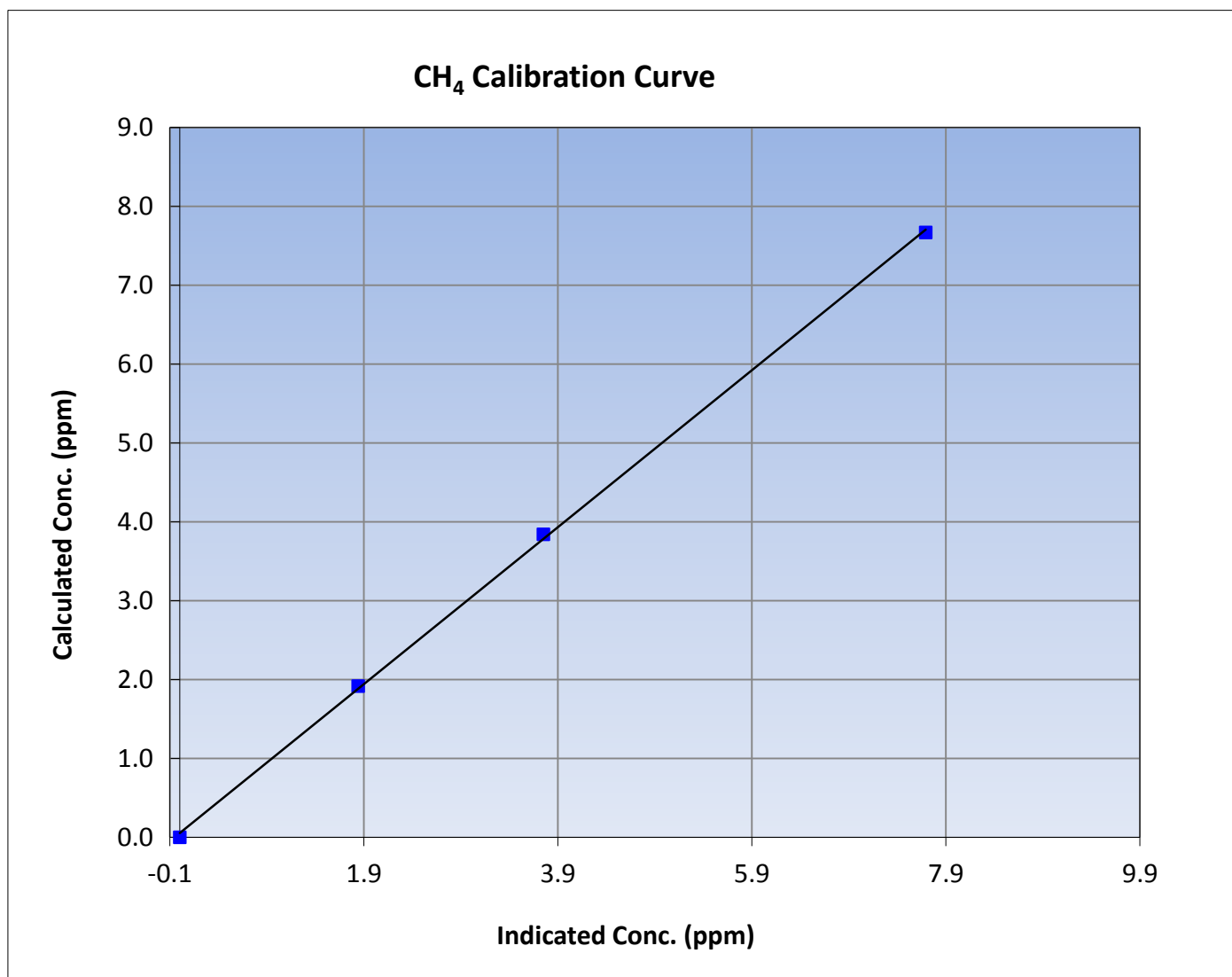
CH₄ Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 17, 2017 | Previous Calibration | August 25, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 12:05 | End Time (MST) | 15:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999749 |
| 7.67 | 7.69 | 0.9974 | | |
| 3.84 | 3.75 | 1.0240 | Slope | 0.995059 |
| 1.91 | 1.84 | 1.0407 | | |
| | | | Intercept | 0.052566 |





Wood Buffalo Environmental Association

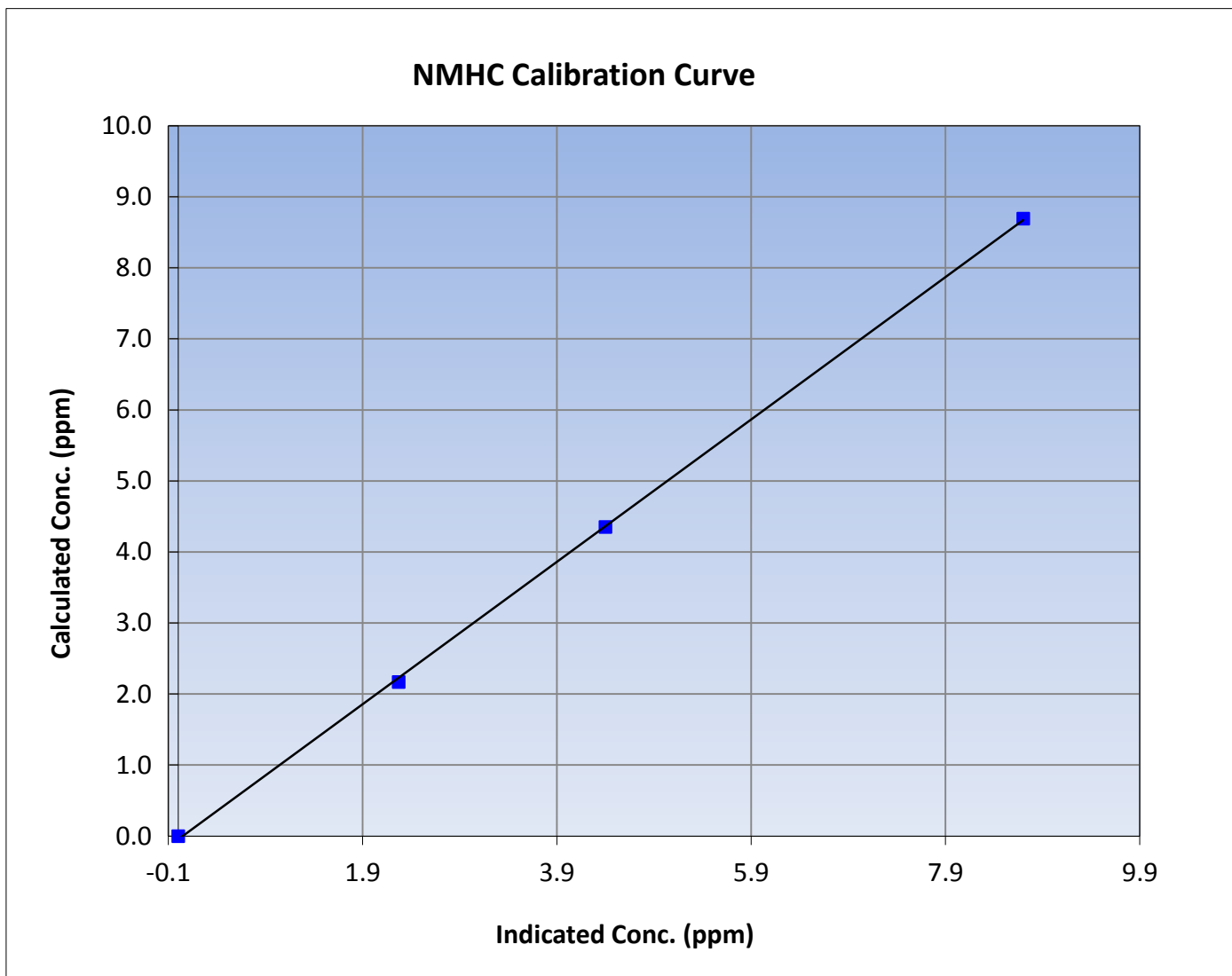
NMHC Calibration Summary

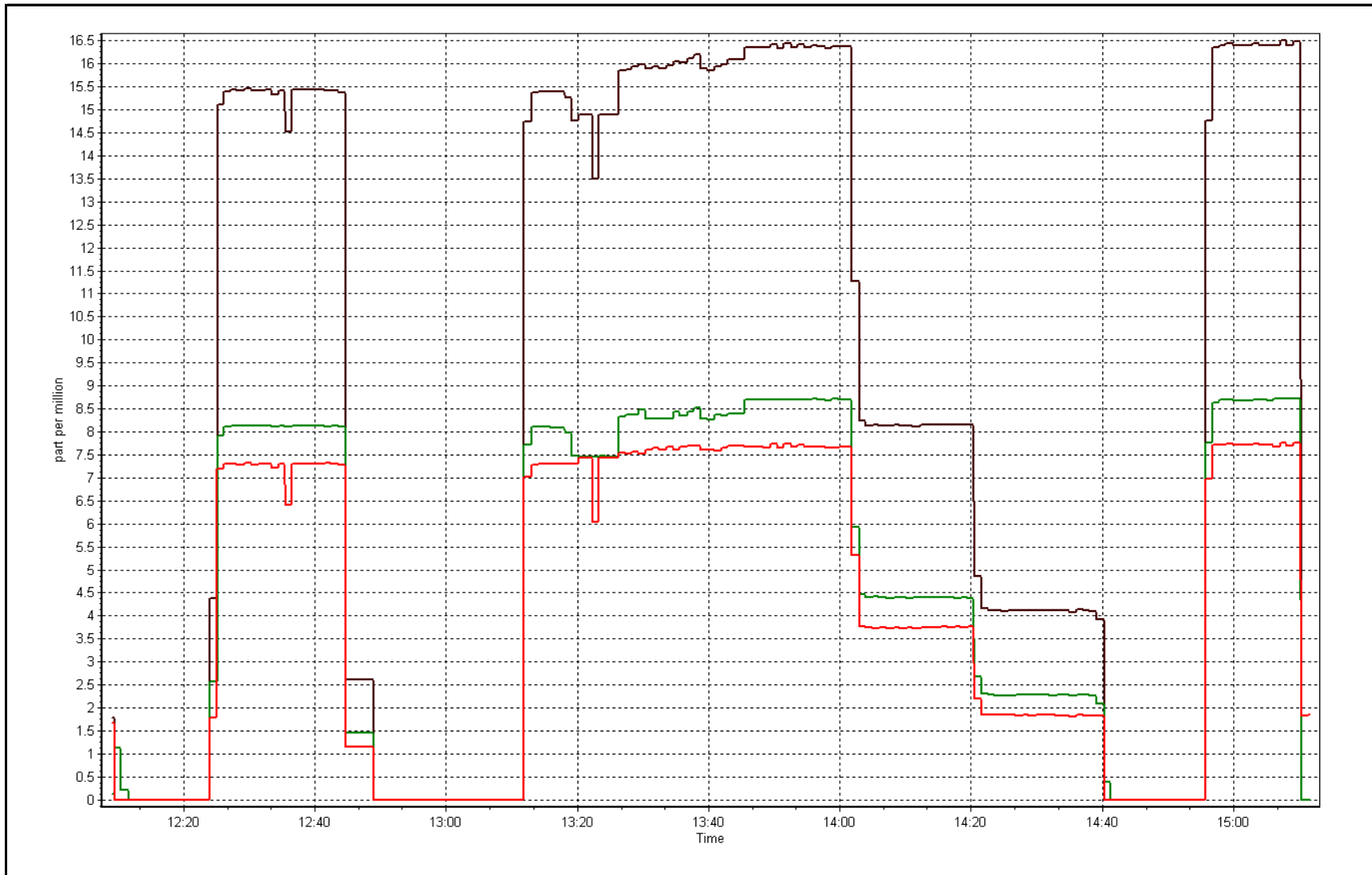
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 17, 2017 | Previous Calibration | August 25, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 12:05 | End Time (MST) | 15:10 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153355 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999853 |
| 8.69 | 8.70 | 0.9991 | | |
| 4.35 | 4.40 | 0.9891 | Slope | 1.002237 |
| 2.17 | 2.27 | 0.9560 | | |
| | | | Intercept | -0.047558 |







Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Reason: | Routine | | |
| Start Time (MST) | 14:03 | End Time (MST) | 17:00 |
| NO2 GPT Ref date | September 19, 2016 | Transfer Standard | NO2 |
| | | Station temp. | 23 Deg C |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 8400311 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4764 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2582 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|------------------|--------|--------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 26.3 | 30.2 |
| Analyzer IP address | 192.168.1.48 | | Lamp temp. | 53.8 | 53.9 |
| Calculated slope | 1.002359 | 0.999178 | Pressure | 658.0 | 662.5 |
| Calculated intercept | 0.001759 | -1.345305 | Flow cell A | 0.706 | 0.711 |
| Analyzer Background | -0.5 | -2.3 | Flow cell B | 0.718 | 0.720 |
| Analyzer Coefficient | 0.963 | 0.978 | Cell A Intensity | 100453 | 98127 |
| | | | Cell B Intensity | 110344 | 109328 |

| | | | |
|---------------|------------|-------------------|------------|
| Analyzer make | Thermo 49i | Analyzer serial # | 1426262596 |
|---------------|------------|-------------------|------------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp Intensity | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|---------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.00 | 0.0 | -1.7 | ---- |
| as found span | 5000 | 1.19 | 451.1 | 441.8 | 1.021 |
| calibrator zero | 5000 | 0.00 | 0.0 | 0.9 | ---- |
| high point | 5000 | 1.19 | 451.1 | 452.5 | 0.997 |
| second point | 5000 | 0.85 | 307.2 | 309.0 | 0.994 |
| third point | 5000 | 0.51 | 158.3 | 160.5 | 0.987 |
| as left zero | 5000 | 0.00 | 0.0 | 2.9 | ---- |
| as left span | 5000 | 1.19 | 451.1 | 461.9 | 0.977 |
| Average Correction Factor | | | | | 0.993 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 443.5 | Previous response | 450.1 | % change | 1.5% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span.

Calibration Performed By:

Asad Hidayat



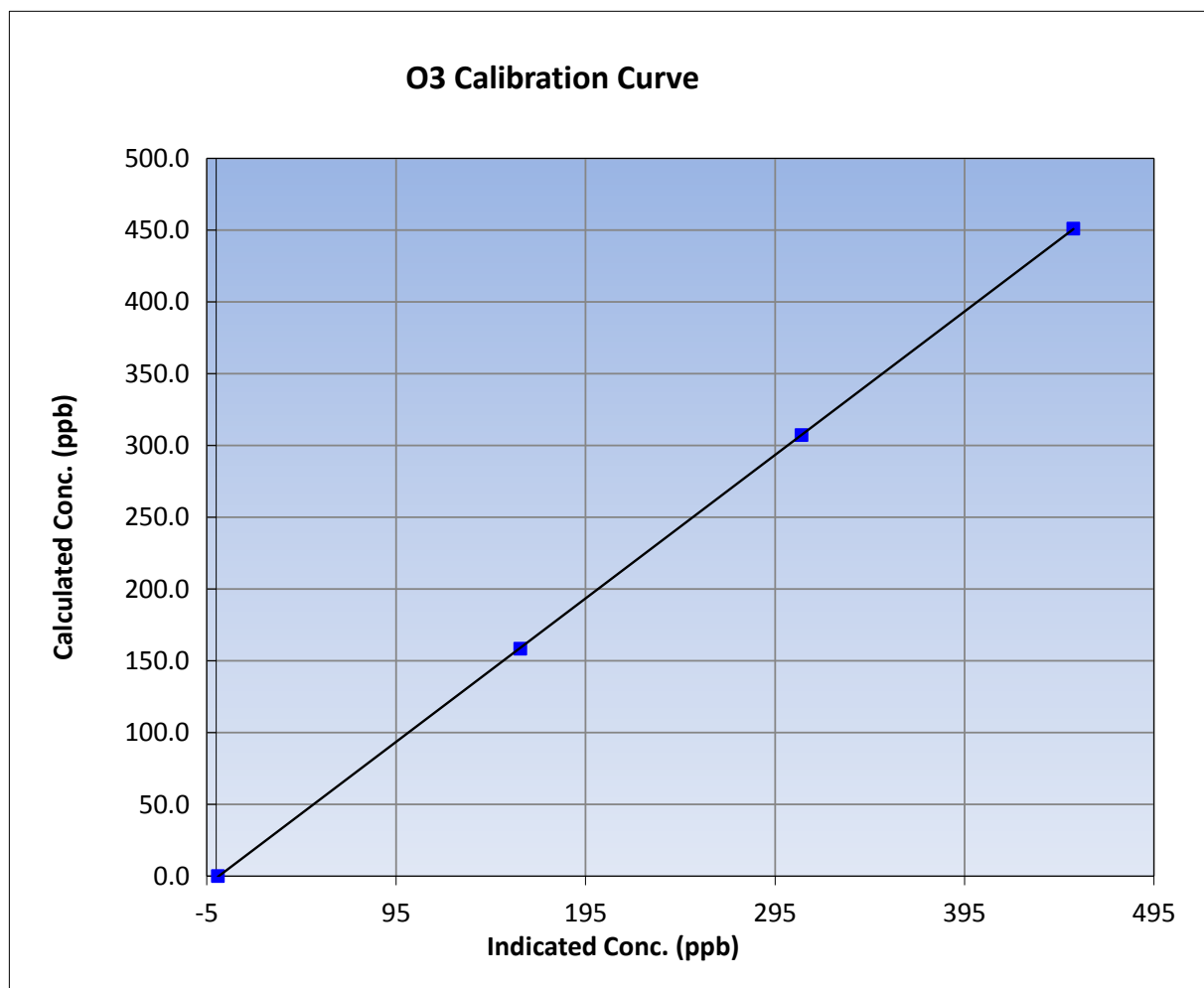
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 5, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 14:03 | End Time (MST) | 17:00 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1426262596 |

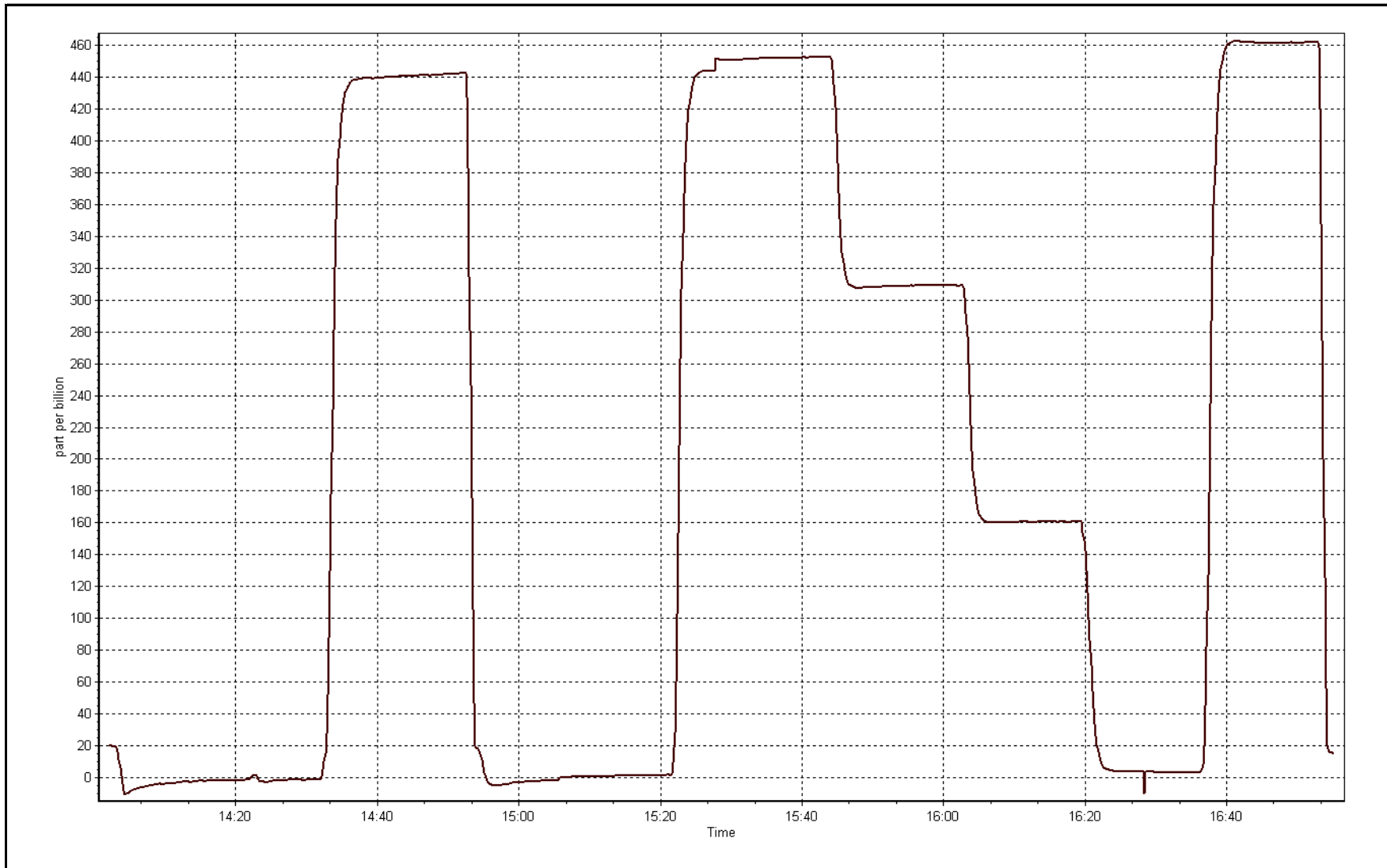
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.9 | ---- | Correlation Coefficient | 0.999993 |
| 451.1 | 452.5 | 0.9970 | | |
| 307.2 | 309.0 | 0.9943 | Slope | 0.999178 |
| 158.3 | 160.5 | 0.9866 | | |
| | | | Intercept | -1.345305 |



O3 Calibration Plot

Date: September 19, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Reason: | Routine | | |
| Start Time (MST) | 10:05 | End Time (MST) | 14:06 |
| NO Cal Gas Conc | 53.4 ppm | Gas Cert Reference | SA130026A |
| NOX Cal Gas Conc | 53.4 ppm | Cal Gas Expiry Date | December 12, 2016 |
| Calibrator | Sabio 4010 | Serial Number | 8400311 |
| Zero air Generator | Teledyne PAI T701 | Serial Number | 4764 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 2582 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.998897 | 0.998786 | 1.004203 |
| | Data Offset | 1.249481 | 1.383014 | 0.538522 |
| Current Calibration | Data Slope | 0.998167 | 0.998237 | 1.000505 |
| | Data Offset | 1.893897 | 1.619748 | -0.253227 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1426262592 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 1.046 | | 1.046 | |
| NOX coefficient | 0.999 | | 0.999 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 4.1 | | 4.0 | |
| NOX bkgrnd | 4.4 | | 4.3 | |
| Chamber Temp | 50 | Deg C | 50.1 | Deg C |
| Moly Temp | 327.1 | Deg C | 325.5 | Deg C |
| PMT voltage | -808.1 | V | -808.1 | V |
| PMT Temp | -2.8 | Deg C | -2.8 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 146 | mmHg | 172.1 | mmHg |
| R Cell Press Nox | 145.7 | mmHg | 173.1 | mmHg |
| NO sample flow | 0.799 | lpm | 0.791 | lpm |
| Nox sample Flow | 0.801 | lpm | 0.793 | lpm |

Notes:

Sample inlet filter replaced after as founds. No adjustments made.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 19, 2016 Station Number: AMS 14

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|-----------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | -0.4 | -0.2 | ---- | ---- |
| as found span | 5000 | 74.9 | 799.9 | 799.9 | 0.0 | 800.3 | 800.5 | -0.1 | 0.9995 | 0.9993 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | -0.4 | -0.2 | ---- | ---- |
| high point | 5000 | 74.9 | 799.9 | 799.9 | 0.0 | 800.3 | 800.5 | -0.1 | 0.9995 | 0.9993 |
| second point | 5000 | 37.5 | 400.5 | 400.5 | 0.0 | 398.2 | 398.6 | -0.4 | 1.0058 | 1.0048 |
| third point | 5000 | 18.8 | 200.8 | 200.8 | 0.0 | 198.3 | 198.6 | -0.3 | 1.0128 | 1.0112 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.2 | -0.2 | ---- | ---- |
| as left span | 5000 | 74.9 | 799.9 | 352.0 | 447.9 | 815.8 | 348.2 | 467.7 | 0.9805 | 1.0110 |
| | | | | | | | | | 1.0060 | 1.0051 |

Corrected As found NO_x= 800.9 NO= 800.9 Percent Change NO_x= -0.2% NO= -0.2%
 Previous Response NO_x= 799.6 NO= 799.5

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 74.90 ccm NOx ref calc conc = 799.9 ppb NO ref calc conc = 799.9 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 802.6 | 803.1 | -0.2 | 0.9967 | 0.9960 | ---- | ---- |
| 1st NO2 (300) | 352.0 | 451.1 | 802.7 | 352.0 | 450.7 | 0.9966 | ---- | 1.0009 | 99.9% |
| 2nd NO2 (200) | 495.9 | 307.2 | 803.7 | 495.9 | 307.8 | 0.9953 | ---- | 0.9983 | 100.2% |
| 3rd NO2 (100) | 644.8 | 158.3 | 803.8 | 644.8 | 158.9 | 0.9952 | ---- | 0.9962 | 100.4% |
| 2nd NO ref point | | 0.0 | 803.7 | 804.2 | -0.4 | 0.9953 | 0.9948 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9956 | | 0.9985 | 100.2% |

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

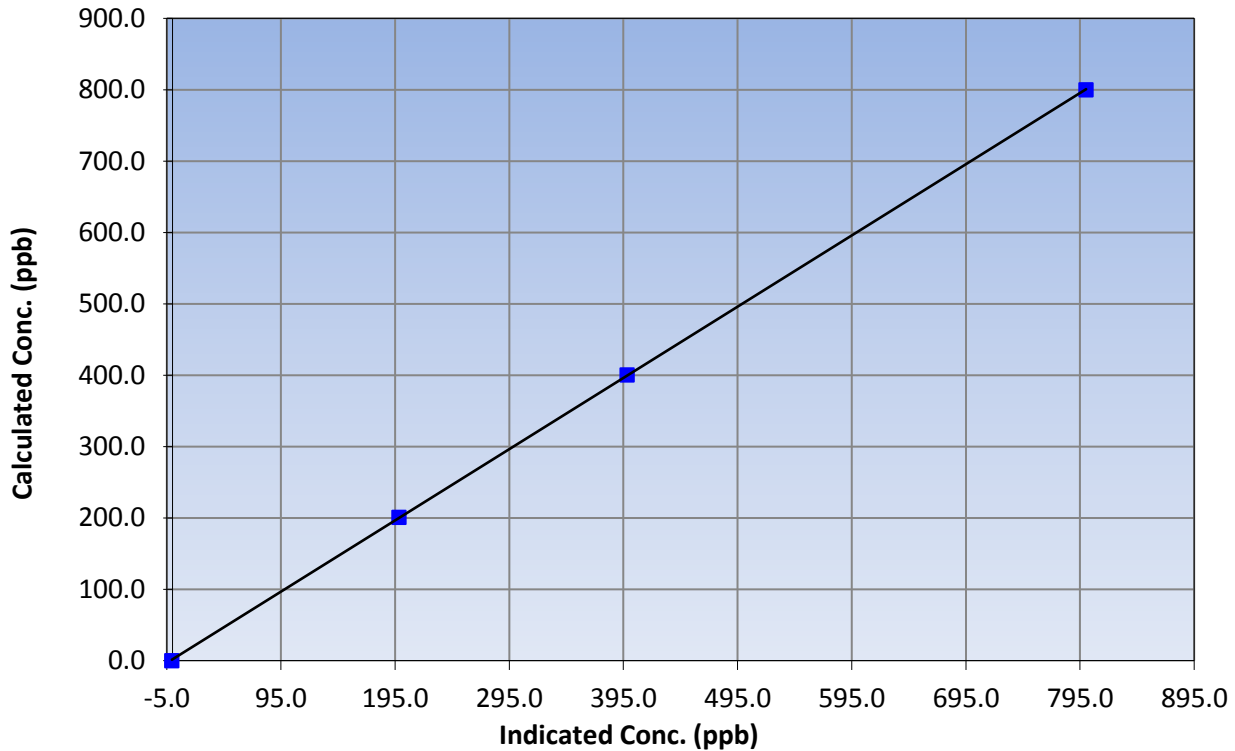
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 10:05 | End Time (MST) | 14:06 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262592 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.6 | ---- | Correlation Coefficient | 0.999986 |
| 799.9 | 800.3 | 0.9995 | | |
| 400.5 | 398.2 | 1.0058 | Slope | 0.998167 |
| 200.8 | 198.3 | 1.0128 | | |
| | | | Intercept | 1.893897 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

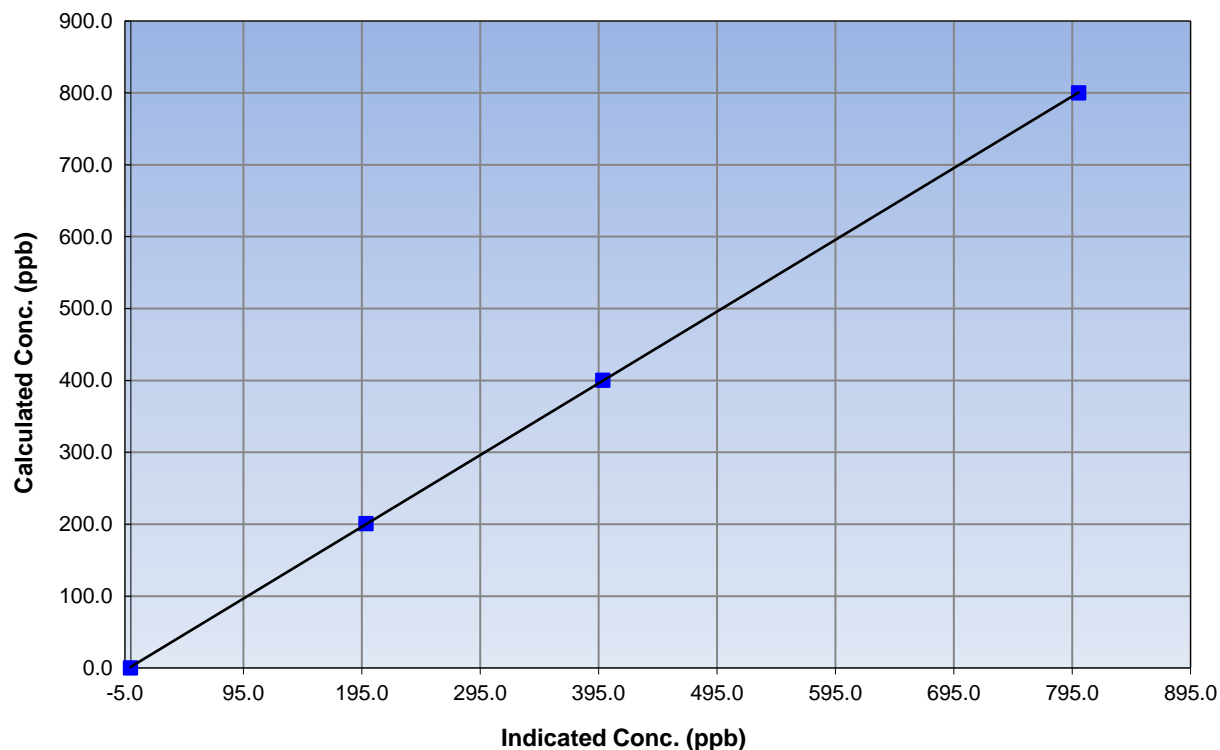
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 10:05 | End Time (MST) | 14:06 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262592 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.4 | N/A | Correlation Coefficient | 0.999989 |
| 799.9 | 800.5 | 0.9993 | | |
| 400.5 | 398.6 | 1.0048 | Slope | 0.998237 |
| 200.8 | 198.6 | 1.0112 | | |
| | | | Intercept | 1.619748 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

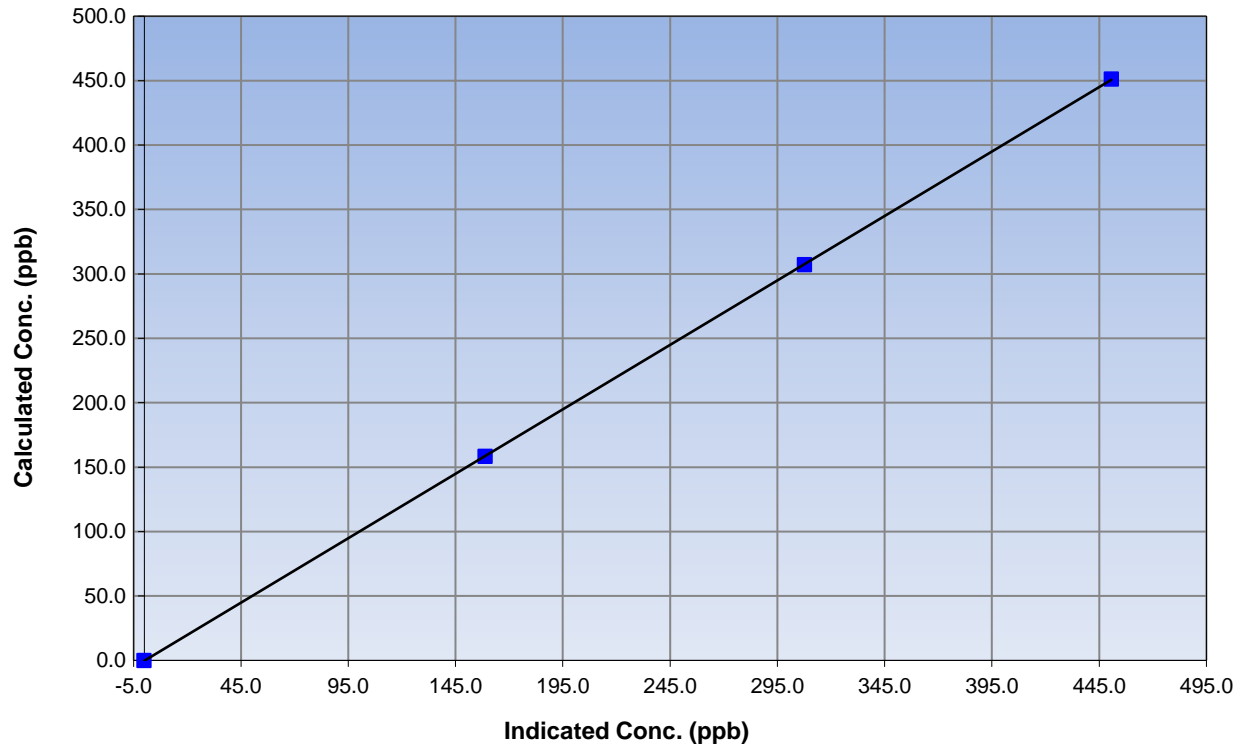
Station Information

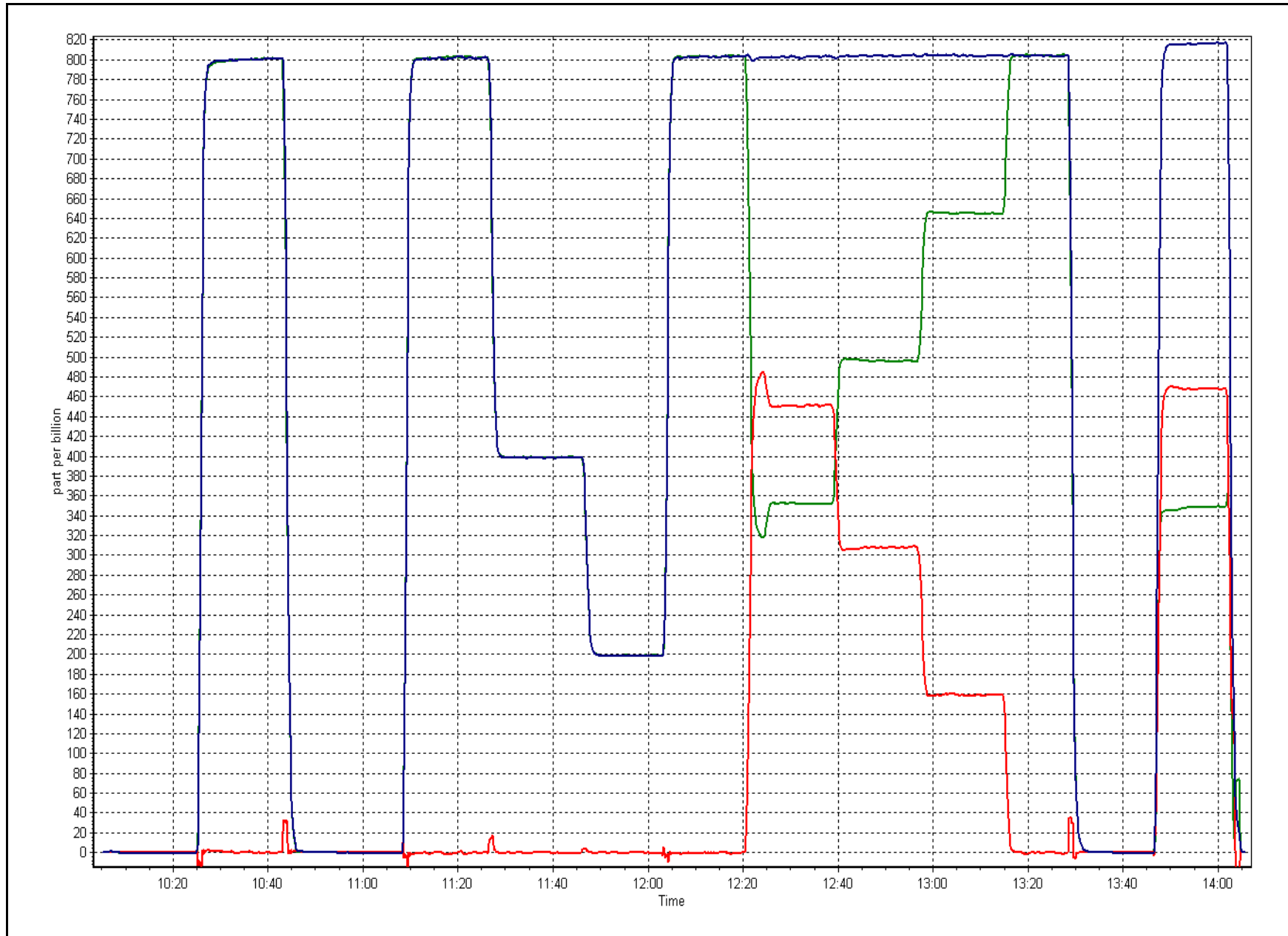
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 15, 2016 |
| Station Number | Anzac | Station Number | AMS 14 |
| Start Time (MST) | 10:05 | End Time (MST) | 14:06 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262592 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.2 | N/A | Correlation Coefficient | 0.999993 |
| 451.1 | 450.7 | 1.0009 | | |
| 307.2 | 307.8 | 0.9983 | Slope | 1.000505 |
| 158.3 | 158.9 | 0.9962 | | |
| | | | Intercept | -0.253227 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|----------------|
| Station Name: | Anzac | Station number: | AMS 14 |
| Calibration Date: | September 22, 2016 | Last Cal Date: | August 5, 2016 |
| Start time (MST): | 13:31 | End time (MST): | 15:00 |
| Sharp Model: | 5030 | S/N: | E1093 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 4933 |
| Flow Standard Model: | Delta Cal | S/N: | 1019 |
| Temp/RH standard: | Delta Cal | S/N: | 1019 |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------------------------------|----------|---------------------------------------------------|-------------------------------------|---------------|
| T1 (°C) | 19 | 19.5 | 19 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 959 | 959 | 959 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1001 | 1000 | 1001 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 1.1 | ----- | -0.2 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning : | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| Leak Test: | Date of check: | <u>September 22, 2016</u> | Last Cal Date: | <u>June 15, 2016</u> | Tolerance |
|------------|-------------------|---------------------------|------------------|----------------------|-----------|
| | Flow w/o adaptor: | <u>16.67</u> | Flow w/ adaptor: | <u>16.38</u> | 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|-------------------------------------|-----------------------------------------|
| Foil Calibration | Foil Mass: <u>1337</u> | S/N: <u>5872</u> |
| | Date of check: <u>June 15, 2016</u> | Last Cal Date: <u>March 16, 2016</u> |
| | New Correction Factor: <u>7212</u> | Previous Correction Factor: <u>7124</u> |

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|-----------|----------|----------|---------|--------------------------|-----------|
| T2 (°C) | 25 | | | <input type="checkbox"/> | +/- 2 °C |
| T3 (°C) | 24 | | | <input type="checkbox"/> | +/- 2 °C |
| T4 (°C) | 25 | | | <input type="checkbox"/> | +/- 2 °C |
| RH (%) | 22 | | | <input type="checkbox"/> | +/- 10% |

Notes: Cyclone head cleaned. Adjusted nephelometer zero.

Calibration by: Asad Hidayat



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 15
CNRL HORIZON
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 683 | 37 | 37 | 100.00 | 26 | 0 | 4 | 0 |
| TRS (ppb) Average | 683 | 36 | 37 | 99.86 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 682 | 38 | 38 | 100.00 | 3.8 | - | 2.4 | - |
| NO2 (ppb) Average | 682 | 38 | 38 | 100.00 | 22 | 0 | 8 | - |
| NO (ppb) Average | 682 | 38 | 38 | 100.00 | 24 | - | 6 | - |
| NOX (ppb) Average | 682 | 38 | 38 | 100.00 | 44 | - | 13 | - |
| PM2.5 (ug/m3) Average | 716 | 1 | 4 | 99.58 | 36.2 | - | 12.6 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 24.4 | - | 14.6 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100.00 | 29 | - | 18 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100.00 | - | - | - | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100.00 | 5.3 | - | 30 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 91 | - |
| Global Solar Radiation (W/m2) Average | 720 | 0 | 0 | 100.00 | 674 | - | 202 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|---------------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 683 | 0.8 | 3 | - | 0 | 0 | 0 | 0 | 0 | 2 | 26 |
| TRS (ppb) Average | 683 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 682 | 2.19 | 0.2 | - | 1.9 | 2 | 2.1 | 2.1 | 2.2 | 2.5 | 3.8 |
| NO2 (ppb) Average | 682 | 3 | 4 | - | 0 | 0 | 0 | 2 | 4 | 8 | 22 |
| NO (ppb) Average | 682 | 1.2 | 3 | - | 0 | 0 | 0 | 0 | 1 | 3 | 24 |
| NOX (ppb) Average | 682 | 4.2 | 6 | - | 0 | 0 | 0 | 2 | 5 | 12 | 44 |
| PM2.5 (ug/m3) Average | 716 | 4.67 | 4.9 | - | 0 | 1 | 1.6 | 2.9 | 5.7 | 10.6 | 36.2 |
| Temperature 2 m (C) Average | 720 | 10.8 | 5 | - | -1.1 | 3.8 | 7.3 | 10.9 | 14.2 | 16.8 | 24.4 |
| Wind Speed 10 m (km/h) Average | 720 | 10 | 5 | - | 1 | 4 | 7 | 9 | 13 | 17 | 29 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |
| Precipitation (mm) Total | 720 | - | - | 44.7 | - | - | - | - | - | - | - |
| Relative Humidity (%) Average | 720 | 70.7 | 19 | - | 26 | 42 | 56 | 73 | 86 | 95 | 99 |
| Global Solar Radiation (W/m2) Average | 720 | 123.9 | 178 | - | 0 | 0 | 0 | 13 | 210 | 437 | 674 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CNRL HORIZON (AMS 15)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|-----------------------------------------------|
| TRS | 13 Sep 2016 11:00 | 13 Sep 2016 11:00 | 1 | Maintenance - cleaned glass manifold |
| PM2.5 | 19 Sep 2016 11:00 | 19 Sep 2016 13:00 | 3 | Unstable operation - excessive baseline drift |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - September 2016

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 26 ppb on Sep 14 12:00 | Maximum Daily Average: 4.5 ppb on Sep 23 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 1 02:00 | Minimum Daily Average: 0.0 ppb on Sep 2 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 2.6 ppb at hour 12 | Minimum Diurnal Average: 0.2 ppb at hour 22 | | Hours of Calibration: | 37 |
| 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 = 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 | 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 | Z | 0 | 0 | 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 | Z | 0 | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0.5 | 3 |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 18 | 11 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.3 | 18 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 8-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.3 | 4 |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.2 | 1 |
| 10-Sep | 4 | 2 | Z | 2 | 4 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 |
| 11-Sep | 4 | 6 | 8 | Z | 7 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 8 |
| 12-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 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 26 | 16 | 13 | 8 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.9 | 26 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.5 | 2 |
| 16-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 | 0.1 | 1 |
| 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 | 0.0 | 0 |
| 19-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0.2 | 1 |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 1 | 1 | 0 | 0 | 4 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 18 |
| 21-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 | 0.1 | 1 |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | 0.6 | 5 |
| 23-Sep | 3 | 3 | 3 | Z | 2 | 2 | 2 | 3 | 4 | C | C | 12 | 14 | 6 | 6 | 7 | 5 | 2 | 9 | 4 | 4 | 1 | 2 | 2 | 4.5 | 14 |
| 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 | 0 | 0 | 0 | 0.1 | 0 |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 10 | 15 | 10 | 9 | 17 | 10 | 10 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 3.9 | 17 |
| 27-Sep | 1 | Z | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 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 | 1 | 2 | 4 | 1 | 1 | 0 | 0 | 0.4 | 4 |
| 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 | 0.0 | 0 |

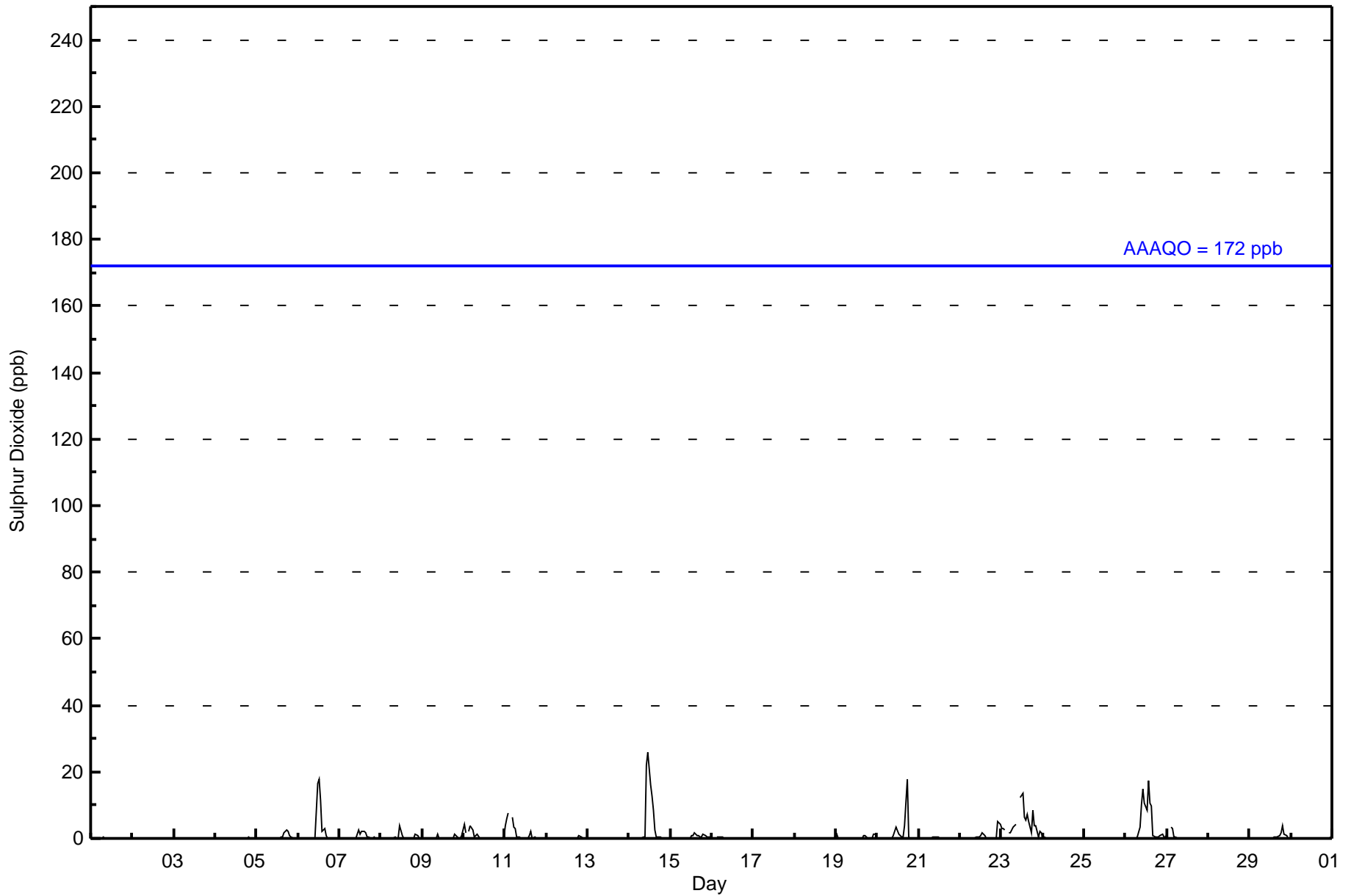
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.6 | 0.5 | 0.6 | 0.2 | 0.5 | 0.4 | 0.3 | 0.2 | 0.4 | 0.5 | 1.5 | 2.6 | 2.1 | 1.9 | 1.1 | 1.0 | 0.5 | 0.9 | 0.5 | 0.5 | 0.3 | 0.2 | 0.3 | 0.3 | Diurnal Average | |
| 4 | 6 | 8 | 3 | 7 | 3 | 3 | 3 | 4 | 10 | 22 | 26 | 18 | 17 | 10 | 10 | 5 | 18 | 9 | 4 | 4 | 1 | 5 | 4 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 671 | 98.24 | 98.24 |
| 11 - 20 | 10 | 1.46 | 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: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
CNRL Horizon - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 31 | 44 | 9 | 8 | 7 | 8 | 15 | 52 | 101 | 126 | 74 | 33 | 49 | 42 | 40 | 32 | 671 |
| 11 - 20 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 44 | 9 | 8 | 8 | 8 | 15 | 55 | 108 | 127 | 74 | 33 | 49 | 42 | 40 | 32 | 683 |

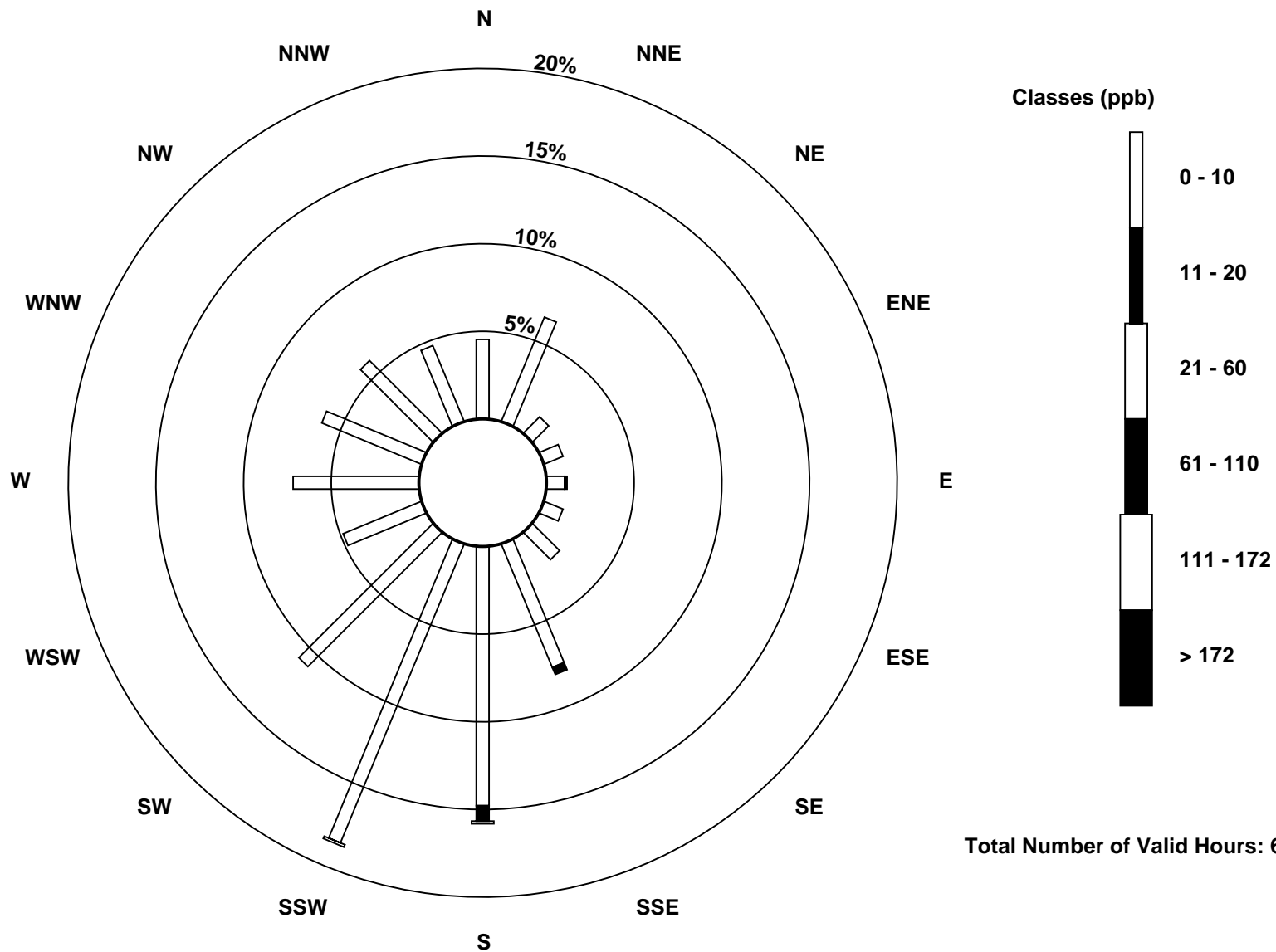
Total Number of Valid Hours: 683

Total Number of Hours: 720

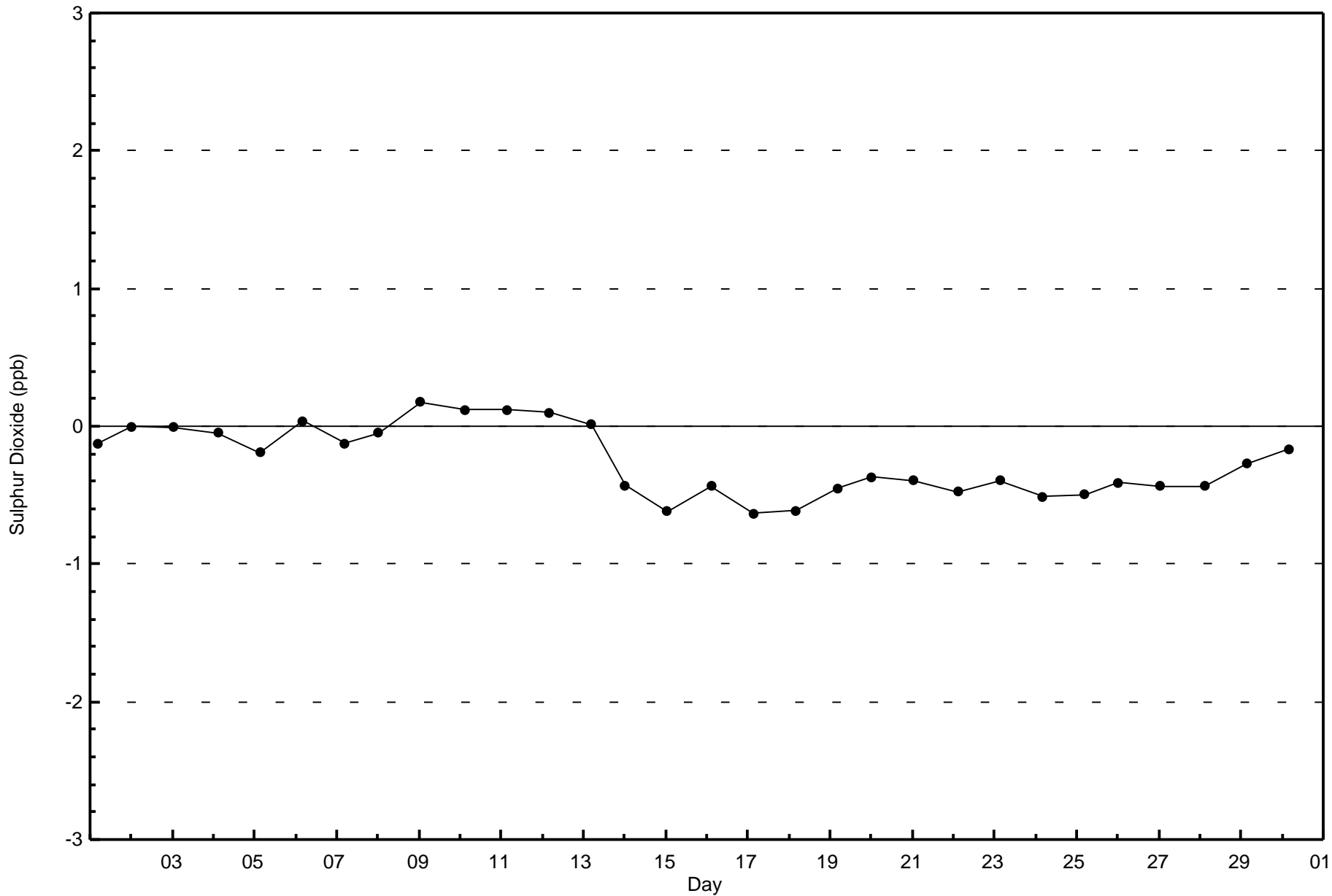


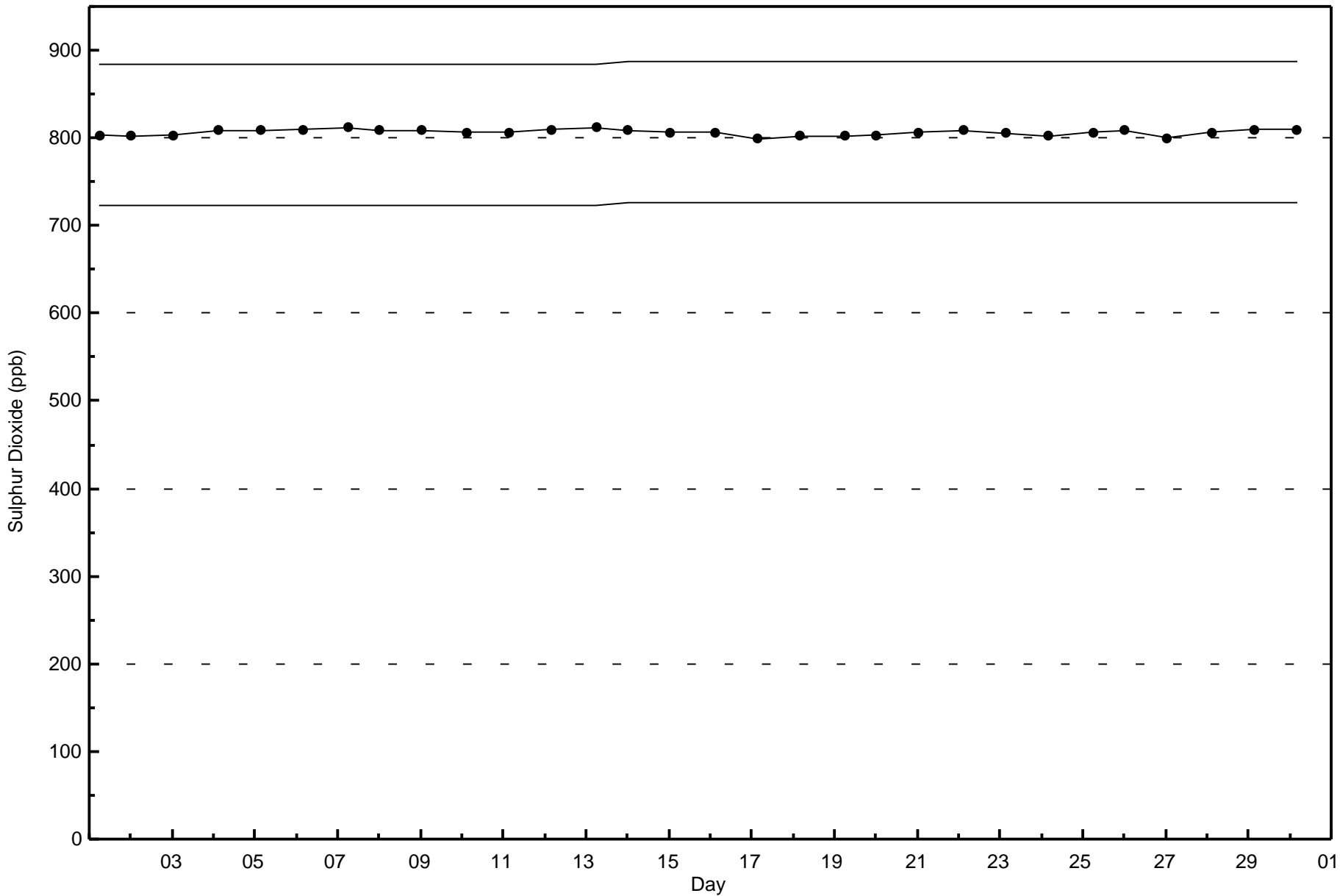
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
CNRL Horizon (AMS 15)



Total Number of Valid Hours: 683

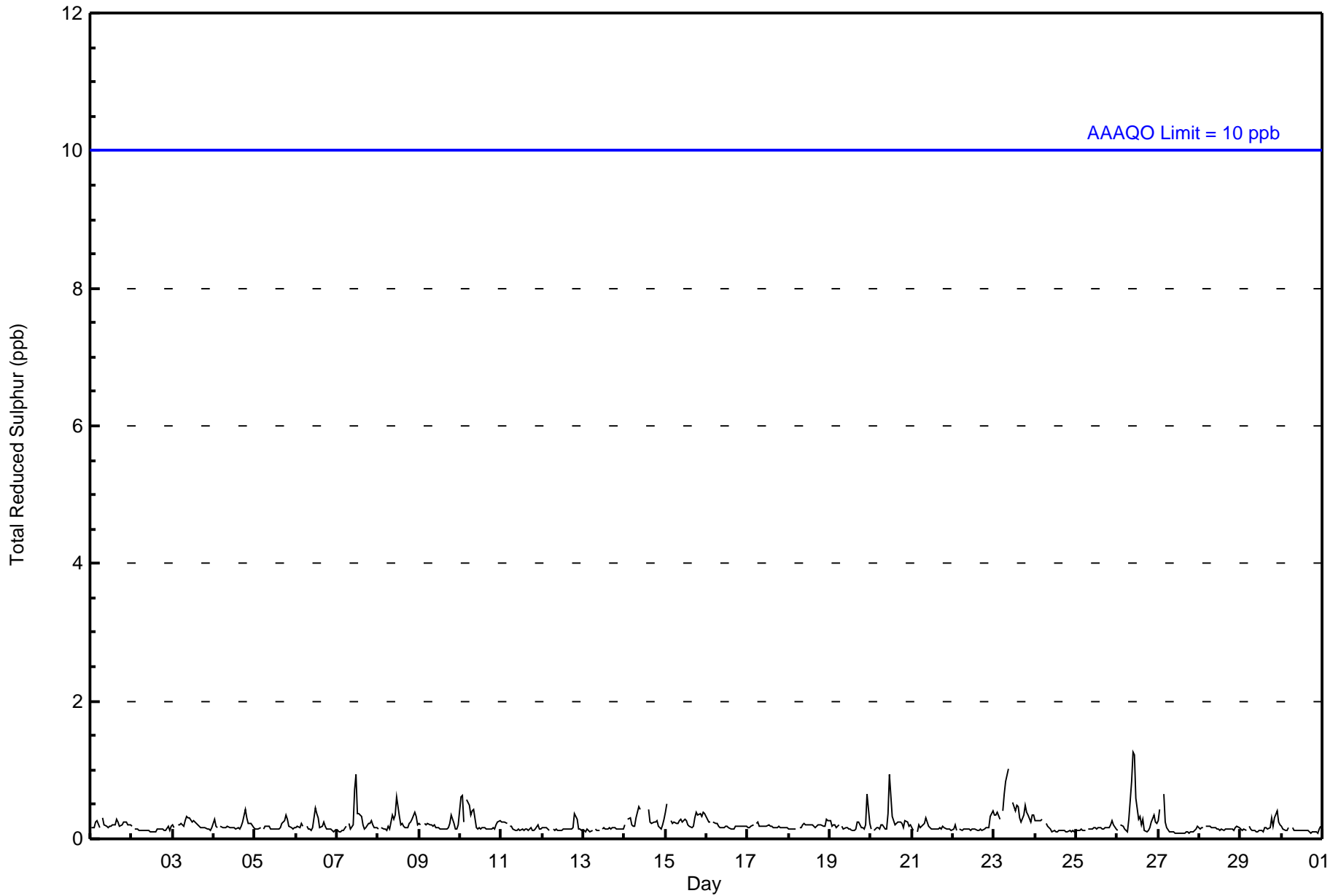






Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 683 | 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: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 32 | 45 | 8 | 8 | 8 | 8 | 16 | 53 | 102 | 134 | 71 | 34 | 50 | 41 | 40 | 33 | 683 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 32 | 45 | 8 | 8 | 8 | 8 | 16 | 53 | 102 | 134 | 71 | 34 | 50 | 41 | 40 | 33 | 683 |

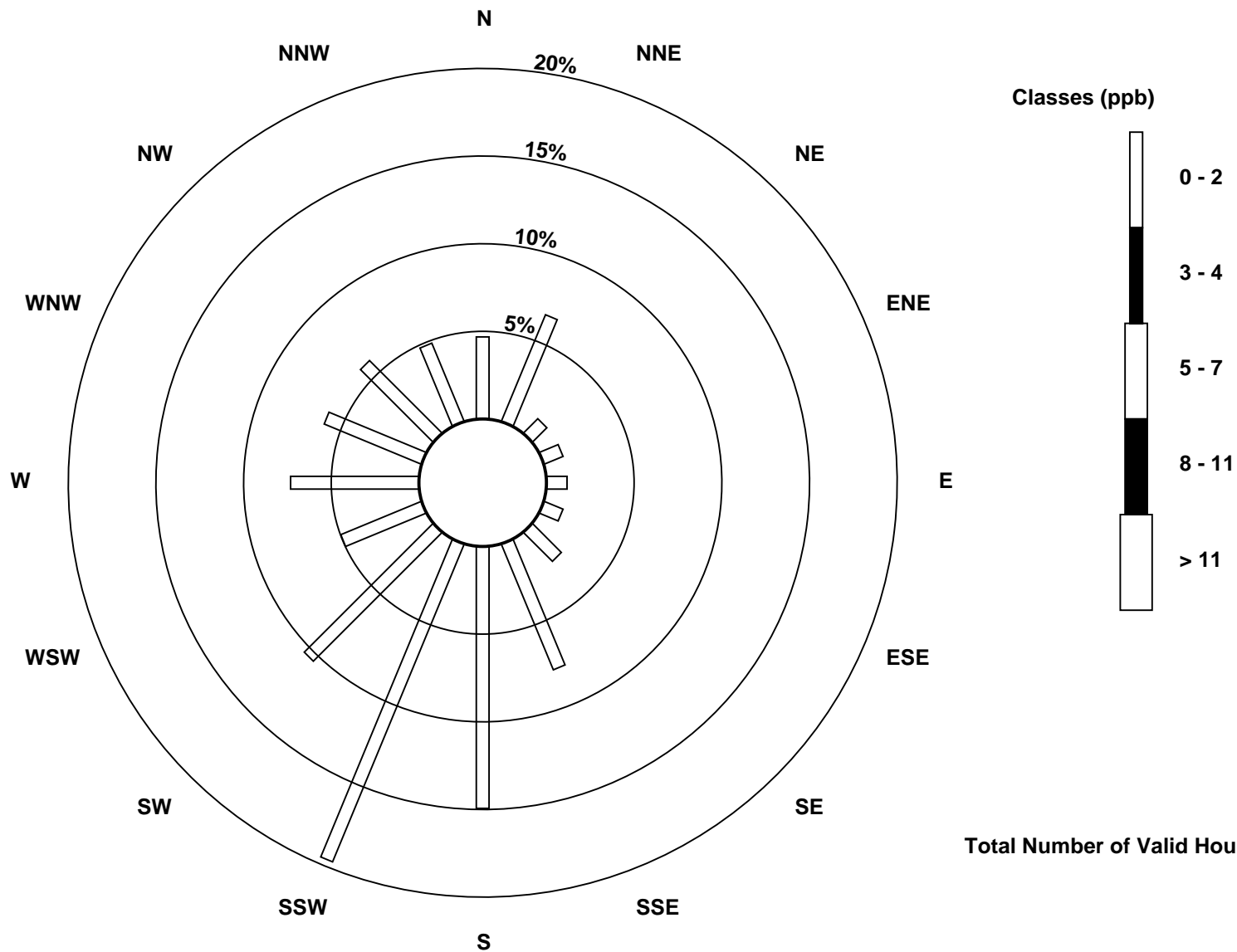
Total Number of Valid Hours: 683

Total Number of Hours: 720

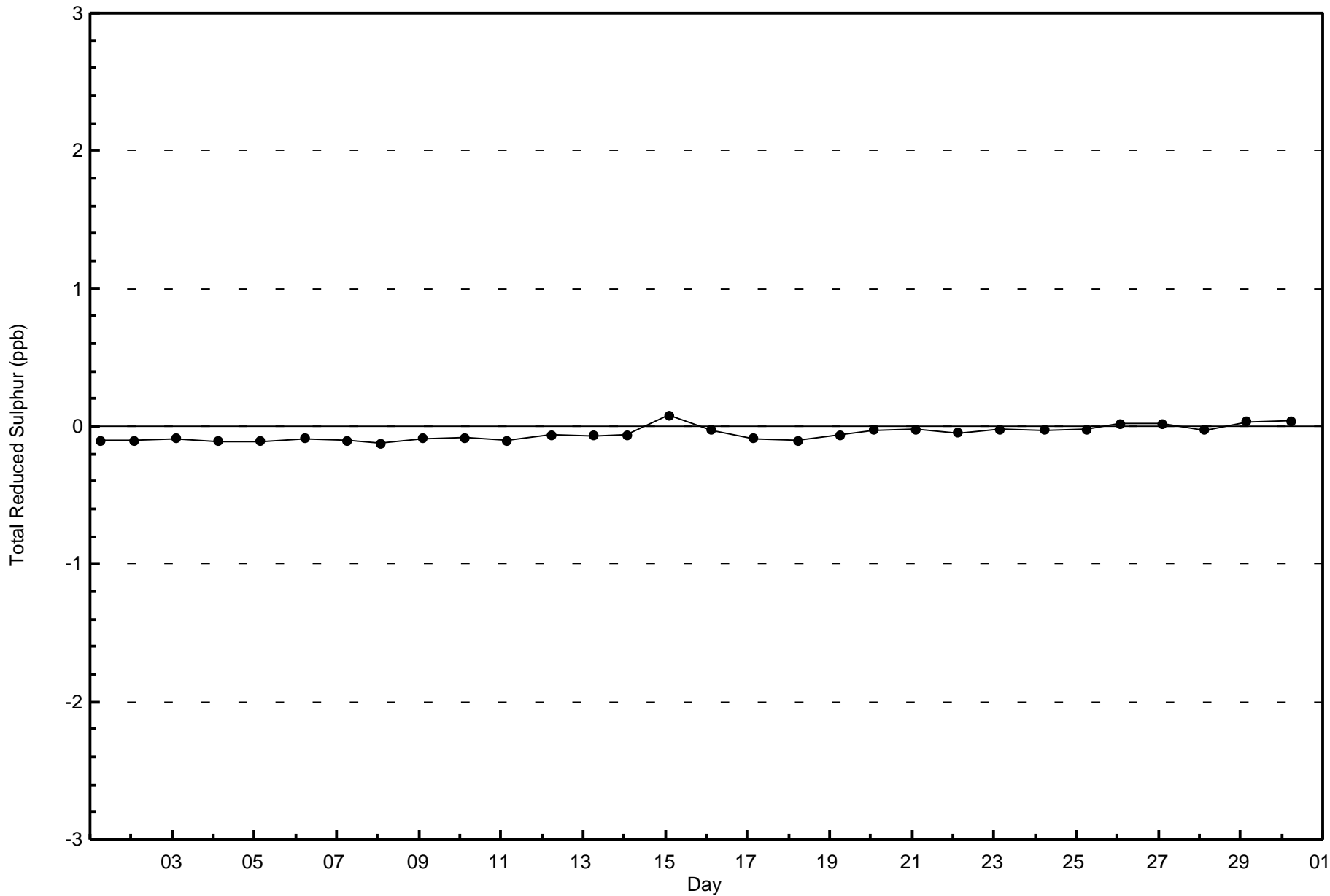


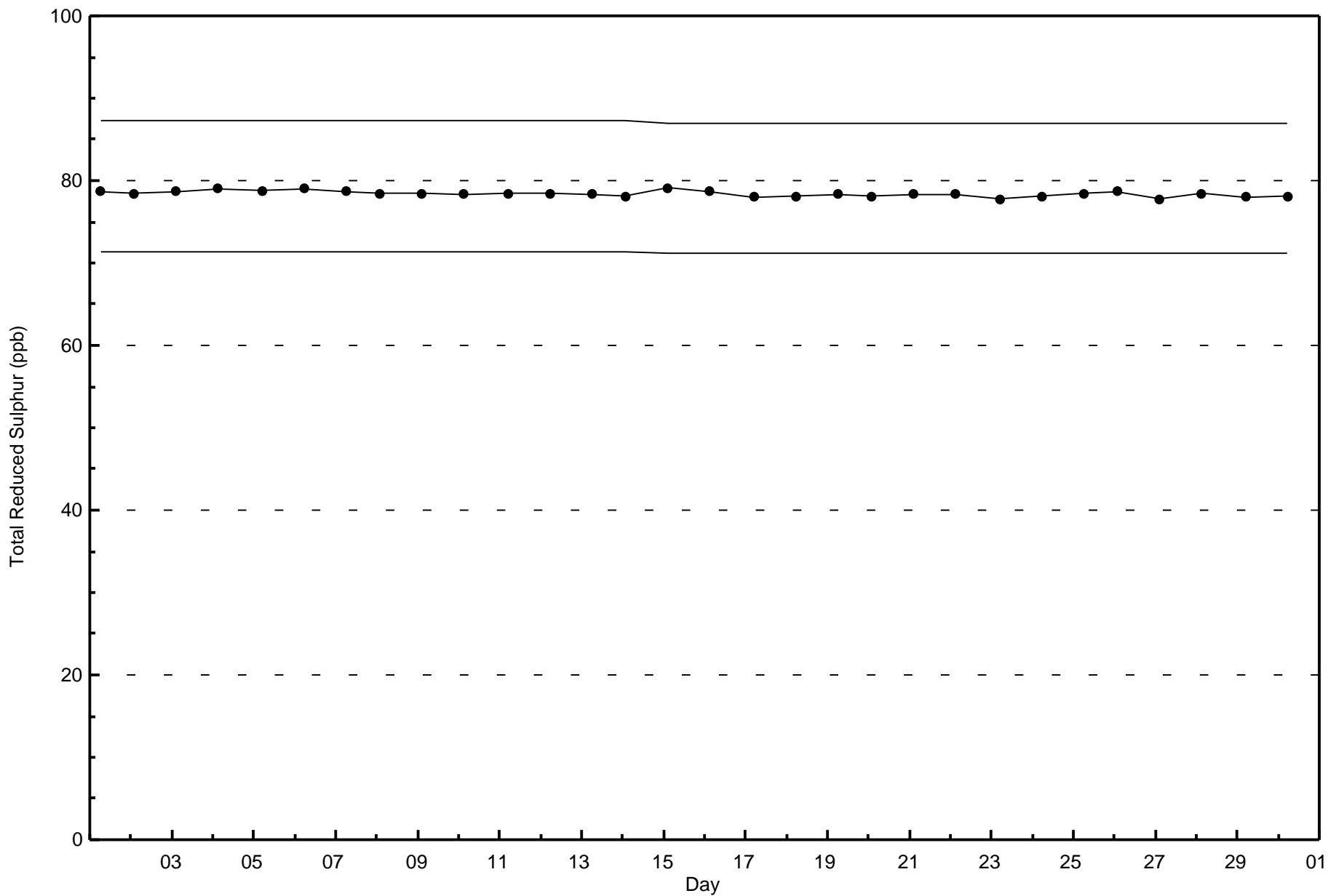
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Reduced Sulphur (TRS) - ppb
CNRL Horizon (AMS 15)



Total Number of Valid Hours: 683







Wood Buffalo Environmental Association
Summary of Hour Averages

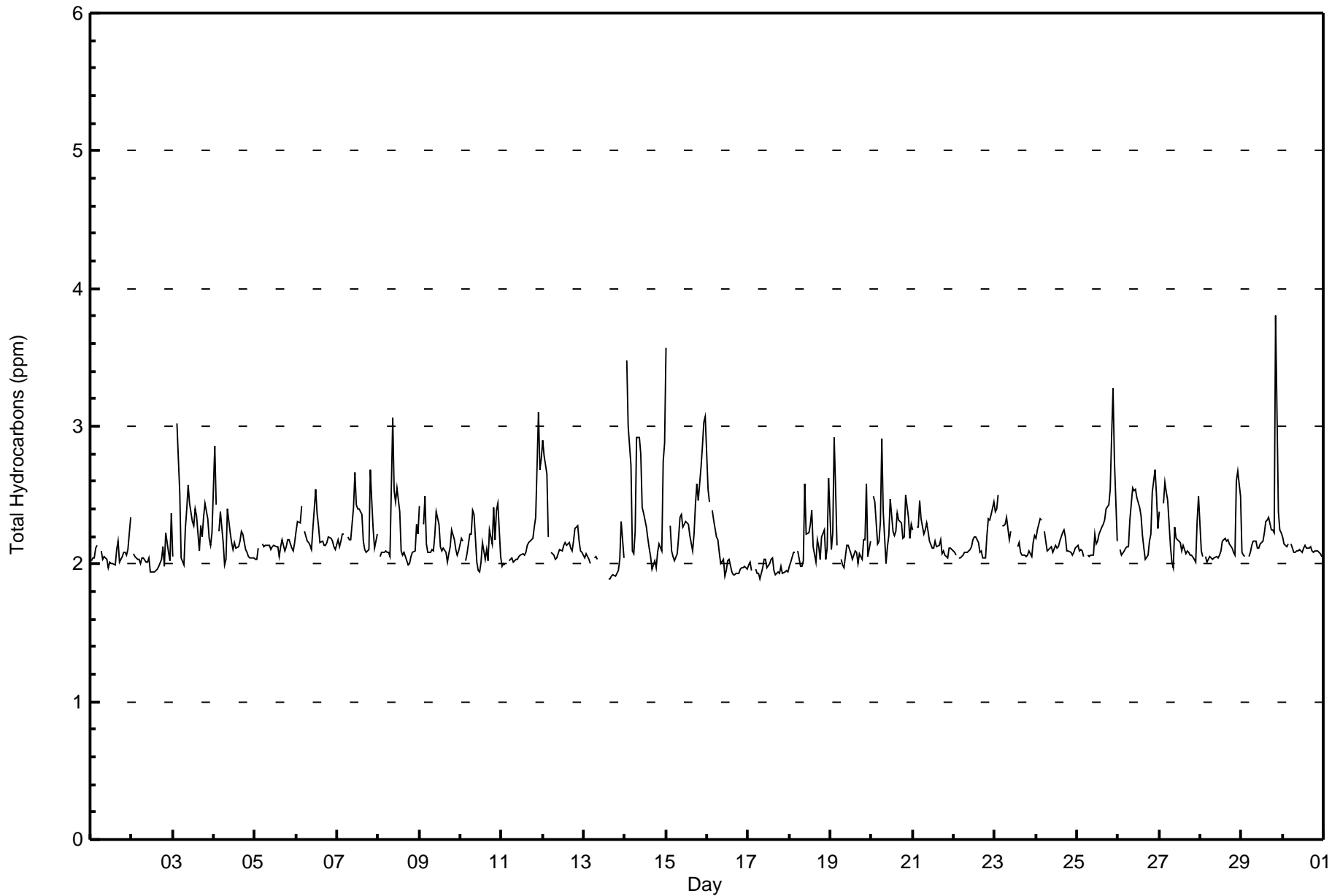
Total Hydrocarbons (THC) - ppm
CNRL Horizon - September 2016

| Maximum Value: 3.8 ppm on Sep 29 21:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.4 ppm on Sep 15 | | | | | | | | | | Hours in Service: 720 | |
|-----------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|---------------------------------|--|
| Minimum Value: 1.9 ppm on Sep 13 16:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.0 ppm on Sep 17 | | | | | | | | | | Hours of Data: 682 | |
| Maximum Diurnal Average: 2.3 ppm at hour 3 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.1 ppm at hour 16 | | | | | | | | | | Hours of Missing Data: 38 | |
| Monthly Average: 2.19 ppm | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.5 P ₉₉ = 3.1 | | | | | | | | | | Hours of Calibration: 38 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | |
| 1-Sep | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | Z | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.1 | 2.3 | | |
| 2-Sep | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.2 | 2.1 | 2.0 | 2.4 | 2.0 | 2.4 | | |
| 3-Sep | 2.1 | Z | 3.0 | 2.8 | 2.5 | 2.0 | 2.0 | 2.3 | 2.4 | 2.6 | 2.4 | 2.3 | 2.3 | 2.4 | 2.4 | 2.1 | 2.3 | 2.2 | 2.3 | 2.4 | 2.3 | 2.2 | 2.1 | 2.2 | 2.3 | 3.0 | | |
| 4-Sep | 2.9 | 2.4 | Z | 2.2 | 2.4 | 2.2 | 2.0 | 2.0 | 2.4 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.2 | 2.9 | | |
| 5-Sep | 2.0 | 2.0 | 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 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | | |
| 6-Sep | 2.2 | 2.3 | 2.3 | 2.4 | Z | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.3 | 2.5 | 2.4 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.5 | | |
| 7-Sep | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.4 | 2.7 | 2.4 | 2.4 | 2.4 | 2.4 | 2.2 | 2.1 | 2.1 | 2.1 | 2.7 | 2.5 | 2.3 | 2.1 | 2.2 | 2.3 | 2.7 | | |
| 8-Sep | Z | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 3.1 | 2.5 | 2.5 | 2.6 | 2.4 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.3 | 2.2 | 2.2 | 3.1 | | |
| 9-Sep | 2.4 | Z | 2.3 | 2.5 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.4 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.5 | | |
| 10-Sep | 2.2 | 2.2 | Z | 2.0 | 2.1 | 2.2 | 2.2 | 2.4 | 2.4 | 2.0 | 2.0 | 1.9 | 2.0 | 2.2 | 2.0 | 2.1 | 2.0 | 2.2 | 2.1 | 2.4 | 2.2 | 2.4 | 2.4 | 2.1 | 2.2 | 2.4 | | |
| 11-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 3.1 | 2.7 | 2.8 | 2.2 | 3.1 | | |
| 12-Sep | 2.9 | 2.8 | 2.7 | 2.2 | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.2 | 2.9 | | |
| 13-Sep | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.3 | 2.0 | 2.0 | 2.3 | | |
| 14-Sep | Z | 3.5 | 3.0 | 2.7 | 2.1 | 2.1 | 2.2 | 2.9 | 2.9 | 2.8 | 2.4 | 2.4 | 2.3 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.7 | 2.9 | 2.9 | 2.4 | 3.5 | | |
| 15-Sep | 3.6 | Z | 2.3 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 2.2 | 2.4 | 2.6 | 2.5 | 2.7 | 2.9 | 3.0 | 3.1 | 2.4 | 3.6 | |
| 16-Sep | 2.5 | 2.5 | Z | 2.4 | 2.3 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.5 | | |
| 17-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | |
| 18-Sep | 2.0 | 2.0 | 2.1 | 2.1 | Z | 2.1 | 2.0 | 2.0 | 2.0 | 2.6 | 2.2 | 2.2 | 2.3 | 2.4 | 2.1 | 2.0 | 2.2 | 2.1 | 2.0 | 2.2 | 2.2 | 2.0 | 2.1 | 2.6 | 2.2 | 2.6 | | |
| 19-Sep | 2.1 | 2.2 | 2.9 | 2.5 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.0 | 2.1 | 2.0 | 2.2 | 2.2 | 2.6 | 2.1 | 2.2 | 2.2 | 2.9 | | |
| 20-Sep | Z | 2.5 | 2.5 | 2.1 | 2.2 | 2.3 | 2.9 | 2.4 | 2.0 | 2.1 | 2.2 | 2.5 | 2.2 | 2.2 | 2.2 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.5 | 2.3 | 2.2 | 2.3 | 2.3 | 2.9 | | |
| 21-Sep | 2.2 | Z | 2.3 | 2.3 | 2.5 | 2.3 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.5 | | |
| 22-Sep | 2.1 | 2.1 | Z | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.2 | 2.3 | 2.3 | 2.4 | 2.5 | 2.2 | 2.5 | | |
| 23-Sep | 2.4 | 2.4 | 2.5 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | C | C | C | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.5 | | |
| 24-Sep | 2.2 | 2.2 | 2.3 | 2.3 | Z | 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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | | |
| 25-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.5 | 2.9 | 3.3 | 2.7 | 2.2 | 2.3 | 3.3 | |
| 26-Sep | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.6 | 2.5 | 2.5 | 2.5 | 2.4 | 2.3 | 2.2 | 2.1 | 2.0 | 2.1 | 2.2 | 2.2 | 2.5 | 2.7 | 2.5 | 2.3 | 2.3 | 2.7 | | |
| 27-Sep | 2.4 | Z | 2.4 | 2.6 | 2.5 | 2.5 | 2.1 | 2.0 | 2.0 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.3 | 2.5 | 2.2 | 2.6 | | |
| 28-Sep | 2.1 | 2.1 | Z | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.6 | 2.7 | 2.5 | 2.2 | 2.7 | |
| 29-Sep | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.2 | 3.8 | 2.4 | 2.2 | 2.2 | 2.3 | 3.8 | | |
| 30-Sep | 2.2 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |
| 2.3 2.2 2.3 2.2 2.2 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 2.1 2.2 2.3 2.3 2.3 2.3 | | | | | | | | | | | | | | | | | | | | | | | | 2.3 | | | | |
| 3.6 3.5 3.0 2.8 2.5 2.5 2.9 2.9 3.1 2.8 2.7 2.6 2.4 2.4 2.4 2.4 2.4 2.3 2.4 2.6 2.7 3.8 3.3 3.0 3.1 | | | | | | | | | | | | | | | | | | | | | | | | 3.1 | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
CNRL Horizon - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
CNRL Horizon - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 148 | 21.70 | 21.70 |
| 2.1 - 3.0 | 527 | 77.27 | 98.97 |
| 3.1 - 10.0 | 7 | 1.03 | 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
CNRL Horizon - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 15 | 8 | 2 | 2 | 0 | 1 | 1 | 1 | 14 | 46 | 34 | 12 | 5 | 1 | 3 | 3 | 148 |
| 2.1 - 3.0 | 16 | 36 | 6 | 6 | 8 | 7 | 14 | 53 | 94 | 80 | 40 | 20 | 42 | 40 | 36 | 29 | 527 |
| 3.1 - 10.0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 0 | 7 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 44 | 9 | 8 | 8 | 8 | 15 | 54 | 108 | 127 | 74 | 33 | 49 | 42 | 40 | 32 | 682 |

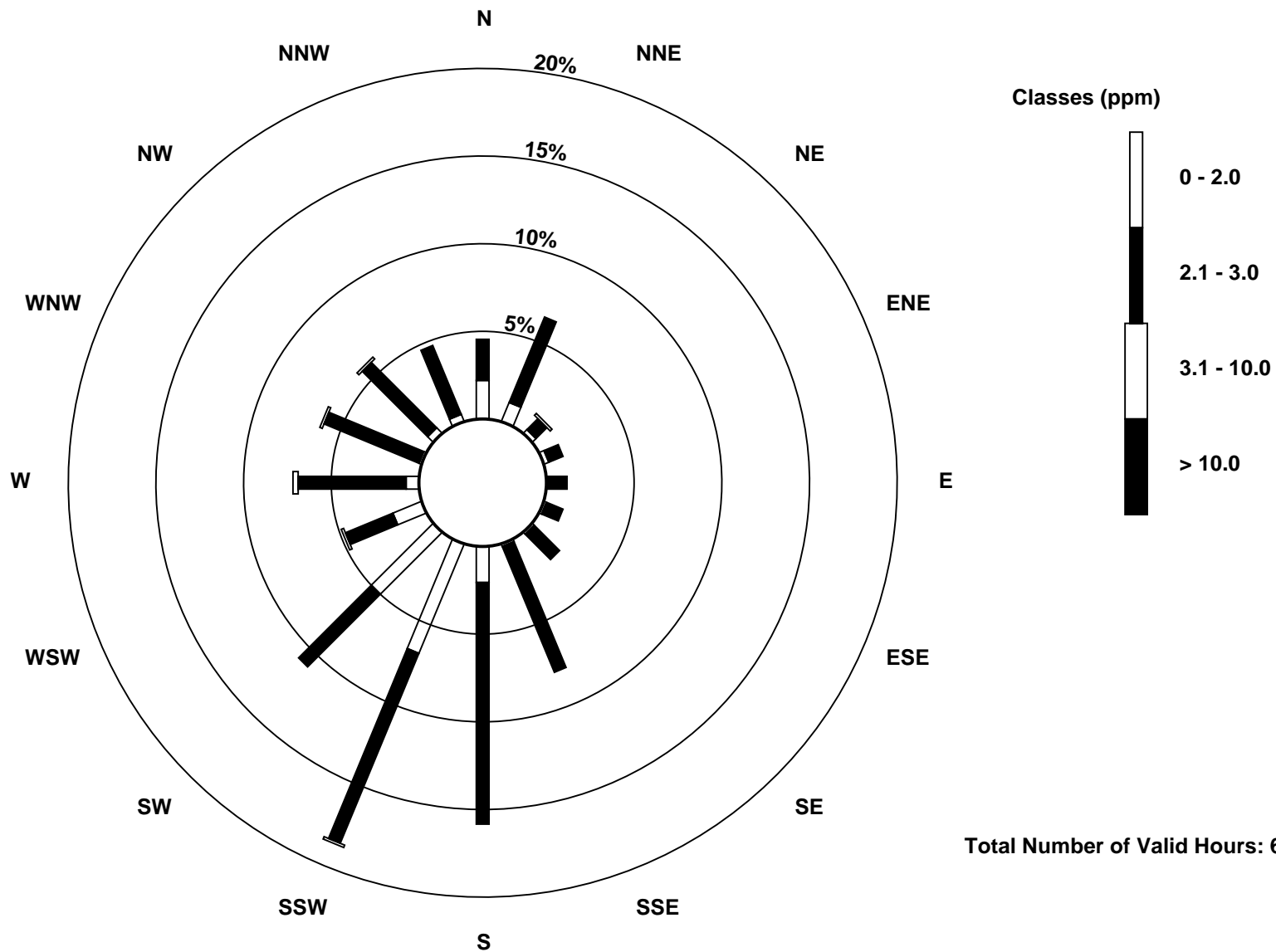
Total Number of Valid Hours: 682

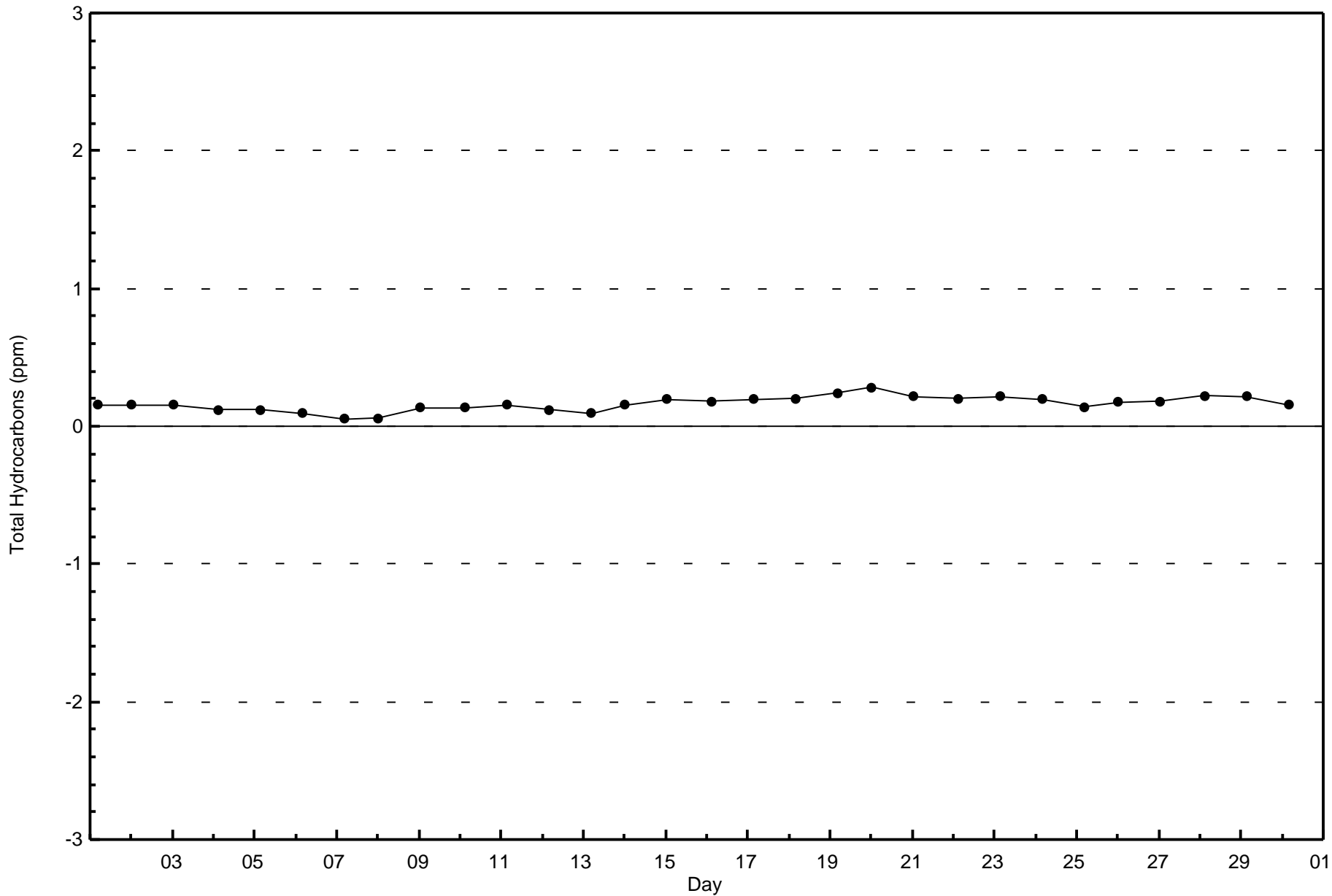
Total Number of Hours: 720

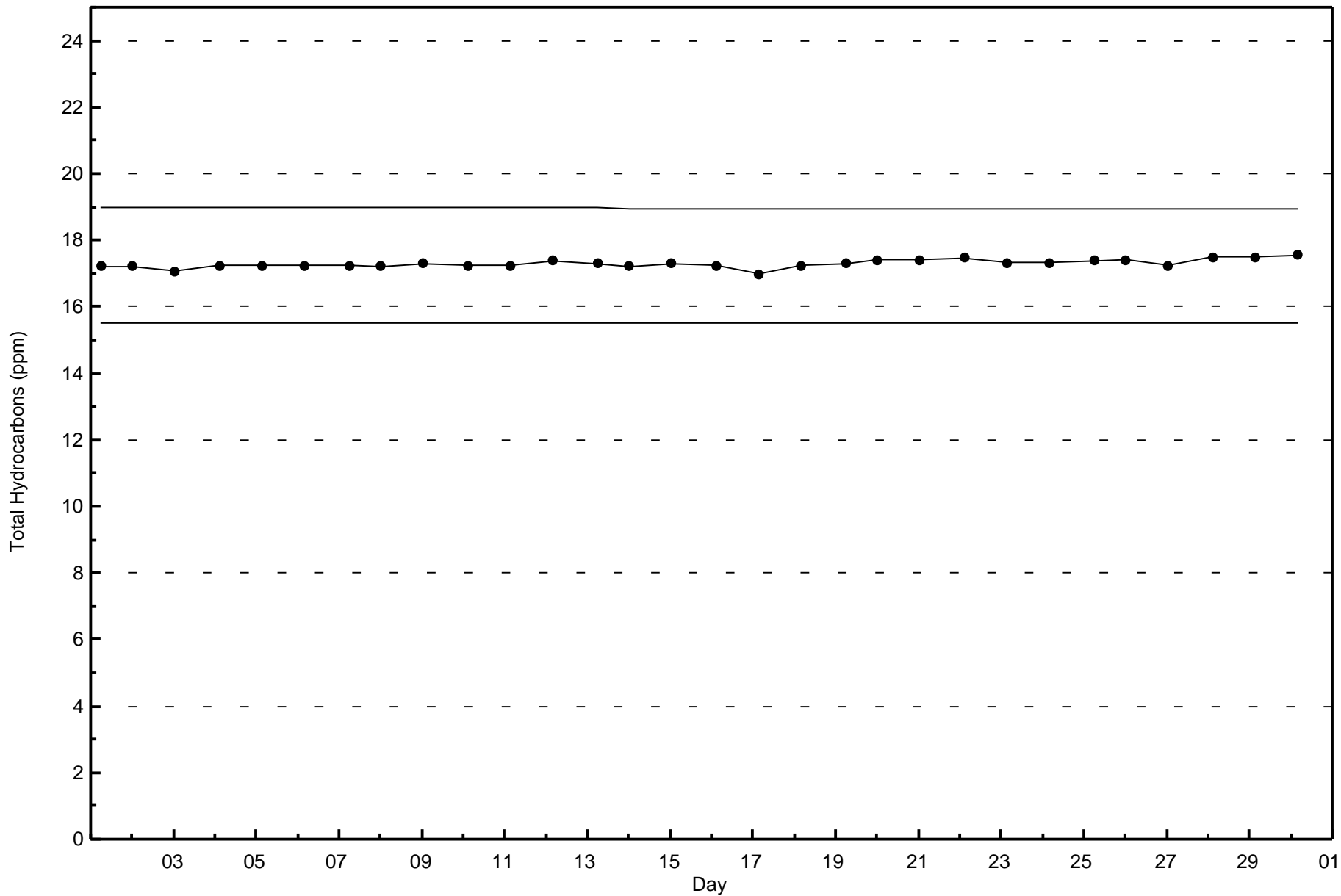


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Hydrocarbons (THC) - ppm
CNRL Horizon (AMS 15)







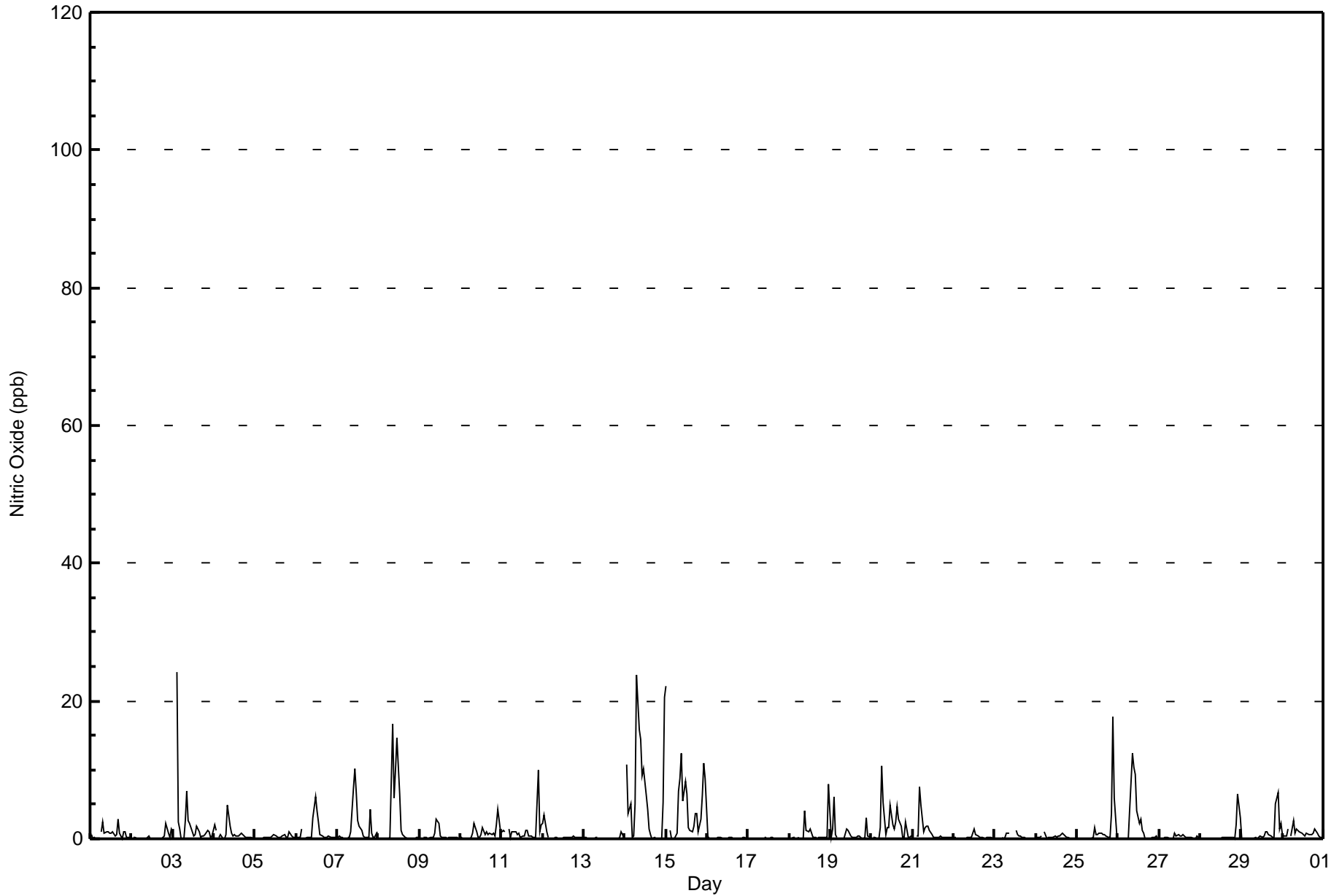


| Maximum Value: 24 ppb on Sep 3 03:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 6.0 ppb on Sep 14 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|-------------------------------------------------------------------------------------------------|-------------------------------|----|----|---|---|---|----|----|----|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|-----------------|---------------|---------------|----|--|--|--|--|--|--|---------------------------|--|
| Minimum Value: 0 ppb on Sep 1 02:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 17 | | | | | | | | | | | | | | | | | Hours of Data: 682 | |
| Maximum Diurnal Average: 2.6 ppb at hour 9 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.3 ppb at hour 19 | | | | | | | | | | | | | | | | | 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 = 16 | | | | | | | | | | | | | | | | | Hours of Calibration: 38 | |
| | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 1 | 0 | 0 | 0 | 0 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0.7 | 3 | | | | | | | | | |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 0.3 | 2 | | | | | | | | | |
| 3-Sep | 1 | Z | 24 | 2 | 1 | 0 | 0 | 3 | 7 | 3 | 2 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 2.3 | 24 | | | | | | | | | |
| 4-Sep | 2 | 1 | Z | 0 | 1 | 0 | 0 | 1 | 5 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 5 | | | | | | | | | |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0.3 | 1 | | | | | | | | | |
| 6-Sep | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 6 | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 7 | 10 | 7 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 1 | 1.7 | 10 | | | | | | | | | |
| 8-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 6 | 10 | 15 | 7 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 17 | | | | | | | | | |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | | | | | | | | | |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 2 | 4 | 1 | 0.8 | 4 | | | | | | | | | |
| 11-Sep | 1 | 1 | 1 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 10 | 1 | 2 | 1.2 | 10 | | | | | | | | | |
| 12-Sep | 2 | 3 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.1 | 1 | | | | | | | | | |
| 14-Sep | Z | 11 | 4 | 5 | 0 | 0 | 5 | 24 | 16 | 14 | 9 | 10 | 6 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 20 | 20 | 6.0 | 24 | | | | | | | | | |
| 15-Sep | 22 | Z | 1 | 0 | 0 | 0 | 1 | 7 | 9 | 12 | 5 | 8 | 6 | 2 | 1 | 1 | 2 | 4 | 4 | 1 | 3 | 6 | 11 | 9 | 5.0 | 22 | | | | | | | | | |
| 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 | 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 | 4 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0.8 | 8 | | | | | | | | | |
| 19-Sep | 0 | 1 | 6 | 1 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0.8 | 6 | | | | | | | | | |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 2 | 11 | 5 | 1 | 2 | 2 | 5 | 2 | 1 | 3 | 5 | 3 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 2.0 | 11 | | | | | | | | | |
| 21-Sep | 0 | Z | 0 | 0 | 7 | 5 | 1 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 7 | | | | | | | | | |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | C | C | C | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | |
| 24-Sep | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 4 | 18 | 6 | 0 | 1.5 | 18 | | | | | | | | |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 12 | 10 | 9 | 4 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 12 | | | | | | | | | |
| 27-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 3 | 0.6 | 6 | | | | | | | | | |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 5 | 7 | 1 | 2 | 0.9 | 7 | | | | | | | | | |
| 30-Sep | 1 | 0 | 0 | 1 | Z | 0 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.8 | 3 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | |
| 1.3 0.8 1.6 0.5 0.5 0.4 0.8 1.8 2.6 2.5 2.3 2.4 1.4 0.9 0.7 0.6 0.5 0.4 0.3 0.4 0.8 1.8 1.3 1.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 11 24 5 7 5 11 24 17 14 10 15 7 4 3 5 3 4 4 4 5 18 11 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
CNRL Horizon - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
CNRL Horizon - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 679 | 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: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
CNRL Horizon - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 31 | 44 | 9 | 8 | 8 | 8 | 15 | 54 | 108 | 126 | 74 | 33 | 47 | 42 | 40 | 32 | 679 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 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 | 31 | 44 | 9 | 8 | 8 | 8 | 15 | 54 | 108 | 127 | 74 | 33 | 49 | 42 | 40 | 32 | 682 |

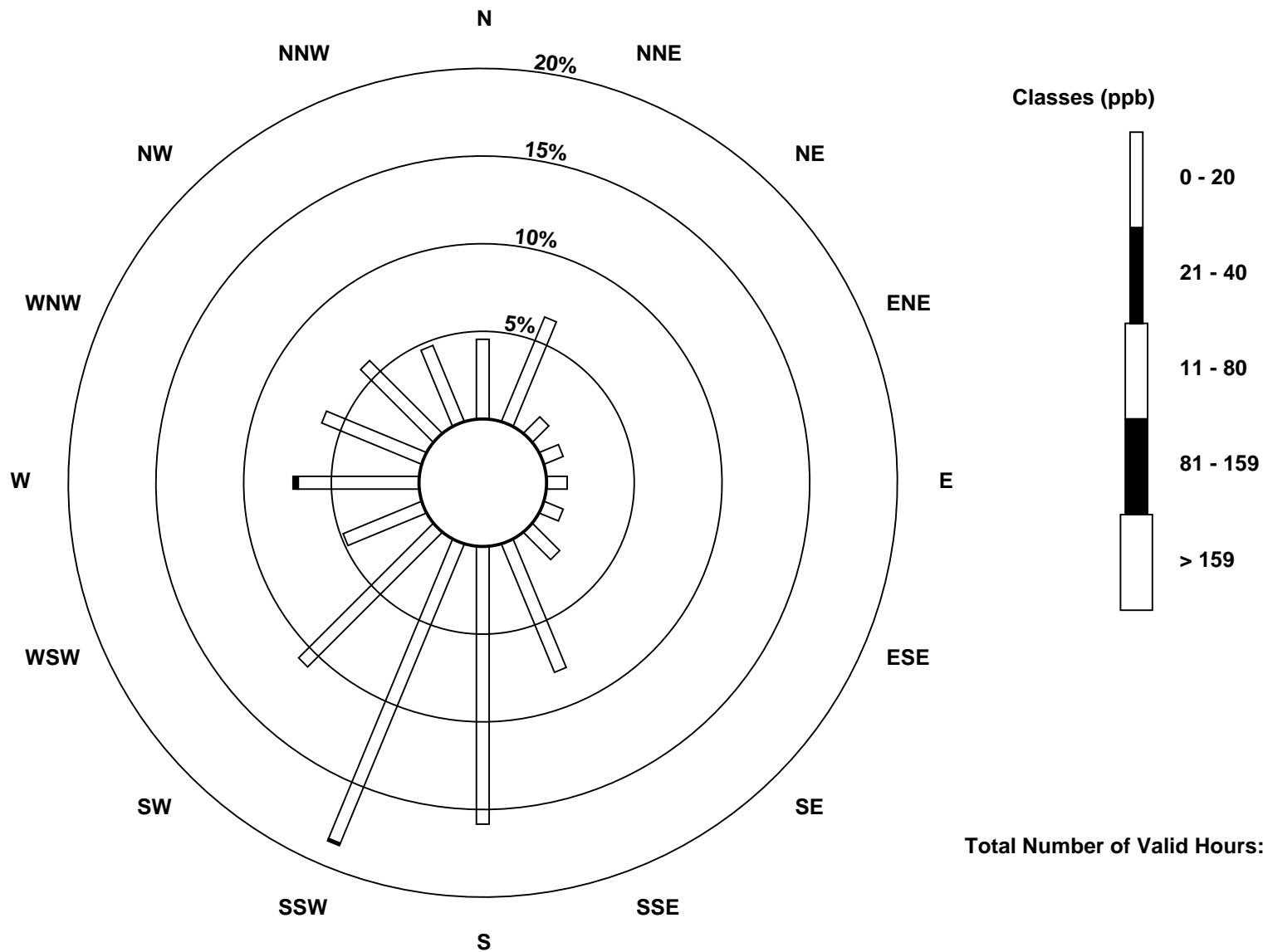
Total Number of Valid Hours: 682

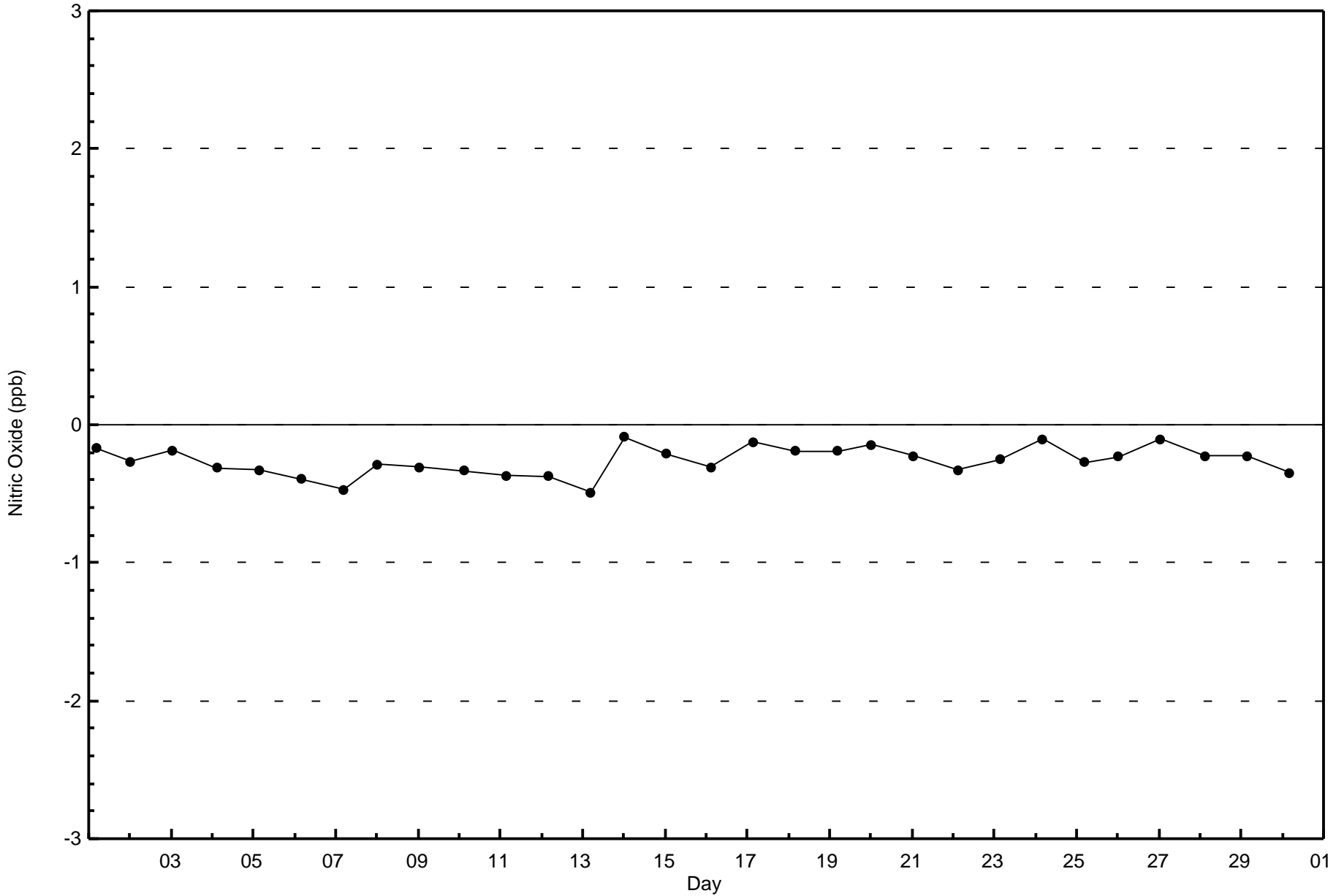
Total Number of Hours: 720

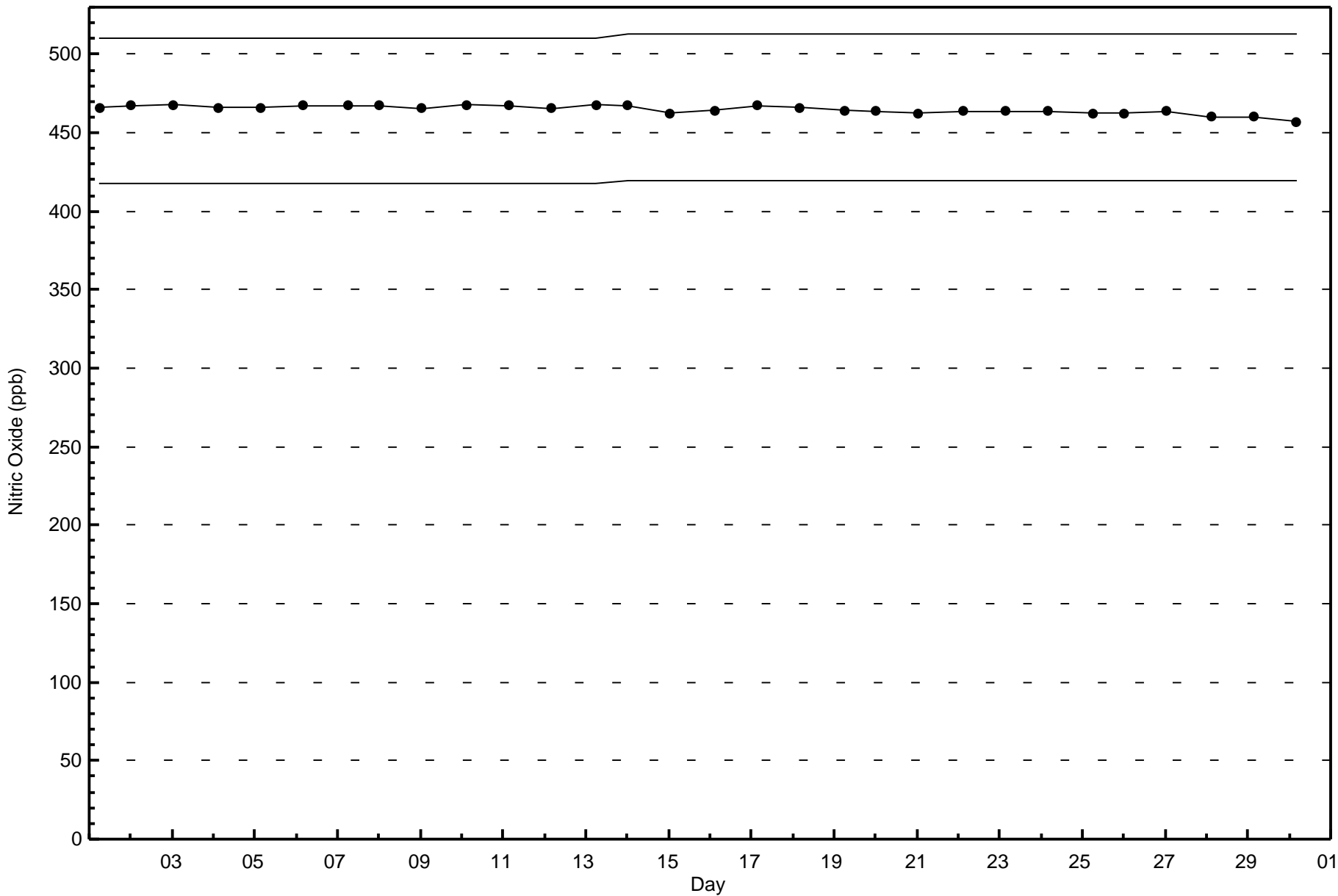


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitric Oxide (NO) - ppb
CNRL Horizon (AMS 15)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

CNRL Horizon - September 2016

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 22 ppb on Sep 15 00:00 | Maximum Daily Average: 7.5 ppb on Sep 15 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 4 07:00 | Minimum Daily Average: 0.3 ppb on Sep 17 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 5.3 ppb at hour 23 | Minimum Diurnal Average: 1.5 ppb at hour 7 | | Hours of Calibration: | 38 |
| Monthly Average: 3.0 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 4 P ₉₀ = 8 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 | 3 | 1 | 2 | 2 | 2 | Z | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 5 | 4 | 1 | 1 | 4 | 3 | 2 | 3 | 3 | 2.2 | 5 |
| 2-Sep | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 4 | 0.7 | 4 |
| 3-Sep | 3 | Z | 7 | 5 | 5 | 0 | 0 | 3 | 7 | 3 | 4 | 2 | 1 | 2 | 4 | 2 | 1 | 3 | 3 | 3 | 6 | 6 | 3 | 6 | 3.5 | 7 |
| 4-Sep | 11 | 9 | Z | 4 | 8 | 3 | 0 | 1 | 7 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 2.8 | 11 |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 3 | 3 | 4 | 7 | 4 | 3 | 2 | 1.5 | 7 |
| 6-Sep | 2 | 3 | 4 | 7 | Z | 1 | 1 | 0 | 0 | 1 | 3 | 7 | 7 | 5 | 2 | 3 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 2.5 | 7 |
| 7-Sep | 1 | 1 | 1 | 1 | 0 | Z | 0 | 0 | 1 | 4 | 5 | 5 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 10 | 8 | 4 | 1 | 4 | 2.8 | 10 |
| 8-Sep | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 7 | 4 | 9 | 13 | 10 | 3 | 4 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2.9 | 13 |
| 9-Sep | 3 | Z | 3 | 3 | 0 | 0 | 1 | 1 | 0 | 1 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 7 | 5 | 2 | 2 | 4 | 1.8 | 7 |
| 10-Sep | 9 | 5 | Z | 4 | 8 | 5 | 3 | 3 | 4 | 1 | 0 | 0 | 1 | 3 | 2 | 3 | 1 | 3 | 4 | 8 | 4 | 6 | 8 | 3 | 3.8 | 9 |
| 11-Sep | 4 | 4 | 4 | Z | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 3 | 3 | 1 | 2 | 2 | 4 | 7 | 17 | 10 | 13 | 3.7 | 17 |
| 12-Sep | 16 | 16 | 12 | 7 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 8 | 7 | 2 | 0 | 3.4 | 16 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 2 | 0.8 | 9 | |
| 14-Sep | Z | 8 | 7 | 7 | 4 | 2 | 3 | 6 | 8 | 9 | 9 | 12 | 9 | 9 | 6 | 3 | 1 | 2 | 3 | 2 | 5 | 2 | 17 | 22 | 6.8 | 22 |
| 15-Sep | 22 | Z | 5 | 2 | 1 | 1 | 2 | 4 | 7 | 8 | 6 | 8 | 7 | 3 | 2 | 2 | 6 | 13 | 17 | 12 | 12 | 13 | 10 | 7.5 | 22 | |
| 16-Sep | 5 | 5 | Z | 4 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 5 |
| 17-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.3 | 1 |
| 18-Sep | 0 | 1 | 2 | 2 | Z | 1 | 0 | 0 | 0 | 9 | 3 | 3 | 6 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 0 | 2 | 6 | 2.1 | 9 |
| 19-Sep | 2 | 2 | 8 | 5 | 2 | Z | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 0 | 0 | 1 | 2 | 2 | 1 | 2 | 2 | 8 | 4 | 3 | 2.1 | 8 |
| 20-Sep | Z | 3 | 3 | 2 | 2 | 4 | 8 | 6 | 1 | 3 | 3 | 7 | 3 | 2 | 4 | 8 | 11 | 11 | 8 | 7 | 16 | 7 | 4 | 3 | 5.5 | 16 |
| 21-Sep | 4 | Z | 4 | 2 | 5 | 5 | 3 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 5 |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 8 | 12 | 16 | 6 | 5 | 2.6 | 16 |
| 23-Sep | 3 | 4 | 3 | Z | 5 | 5 | 5 | 6 | 6 | C | C | C | 5 | 4 | 3 | 4 | 3 | 2 | 6 | 3 | 3 | 2 | 3 | 3.8 | 6 | |
| 24-Sep | 6 | 8 | 9 | 11 | Z | 6 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 11 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 19 | 21 | 16 | 1 | 3.4 | 21 |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 13 | 12 | 12 | 8 | 6 | 7 | 4 | 4 | 1 | 3 | 6 | 8 | 10 | 8 | 18 | 5 | 5.7 | 18 |
| 27-Sep | 6 | Z | 7 | 9 | 15 | 14 | 2 | 1 | 0 | 6 | 3 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 14 | 4.0 | 15 |
| 28-Sep | 2 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 17 | 12 | 1.8 | 17 |
| 29-Sep | 3 | 1 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 4 | 3 | 4 | 5 | 4 | 20 | 16 | 6 | 12 | 3.7 | 20 |
| 30-Sep | 5 | 3 | 2 | 5 | Z | 2 | 6 | 2 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 1.9 | 6 |

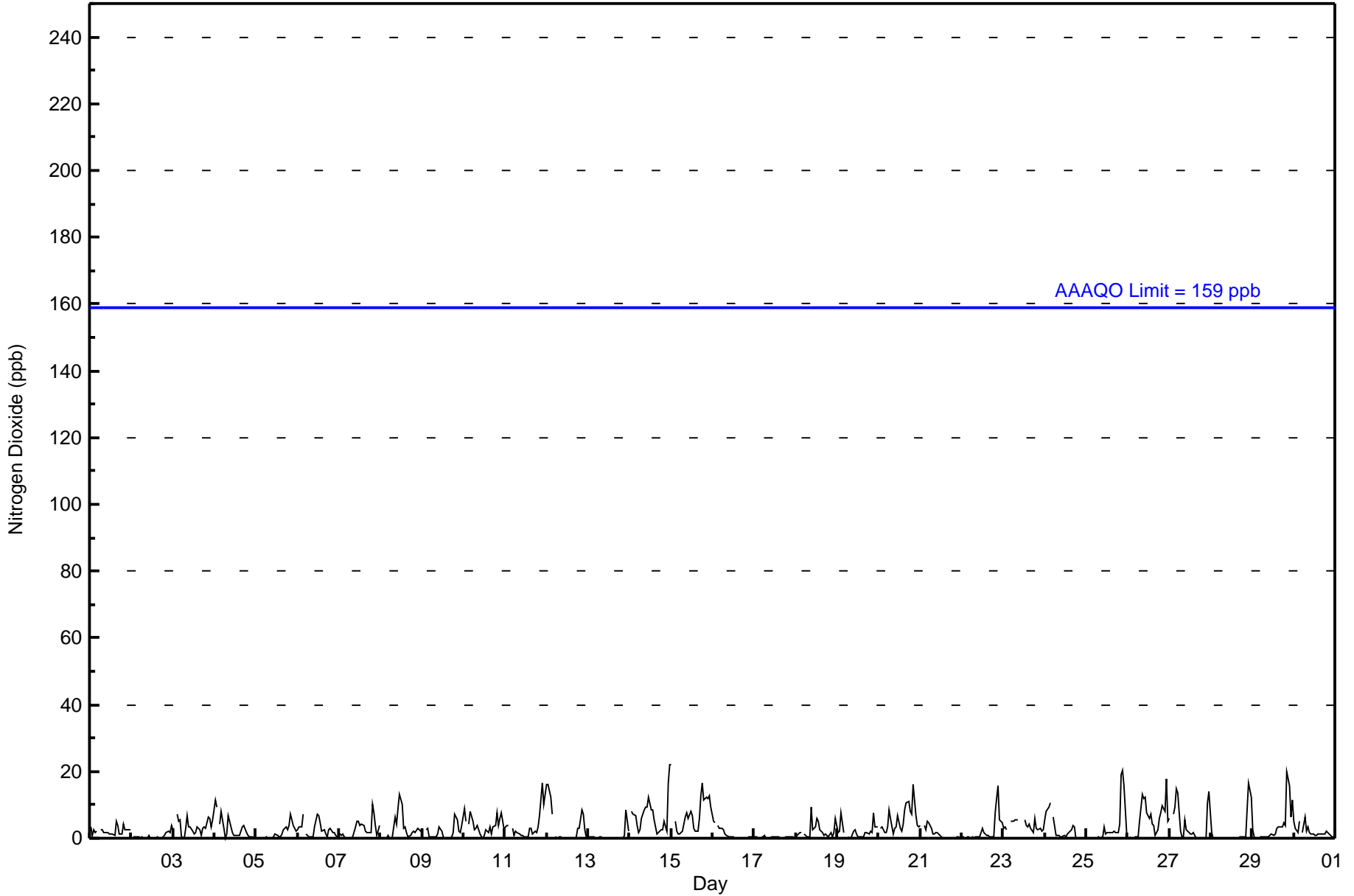
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 4.4 | 3.0 | 3.4 | 3.3 | 2.7 | 2.2 | 1.5 | 1.6 | 2.4 | 2.7 | 2.8 | 3.0 | 2.5 | 2.0 | 1.8 | 2.0 | 1.8 | 2.2 | 2.5 | 3.4 | 5.2 | 5.3 | 5.3 | 4.6 | Diurnal Average | |
| 22 | 16 | 12 | 11 | 15 | 14 | 8 | 6 | 13 | 12 | 12 | 13 | 10 | 9 | 6 | 8 | 11 | 13 | 17 | 12 | 20 | 21 | 18 | 22 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 679 | 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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 31 | 44 | 9 | 8 | 8 | 8 | 15 | 54 | 108 | 127 | 74 | 32 | 47 | 42 | 40 | 32 | 679 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 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 | 31 | 44 | 9 | 8 | 8 | 8 | 15 | 54 | 108 | 127 | 74 | 33 | 49 | 42 | 40 | 32 | 682 |

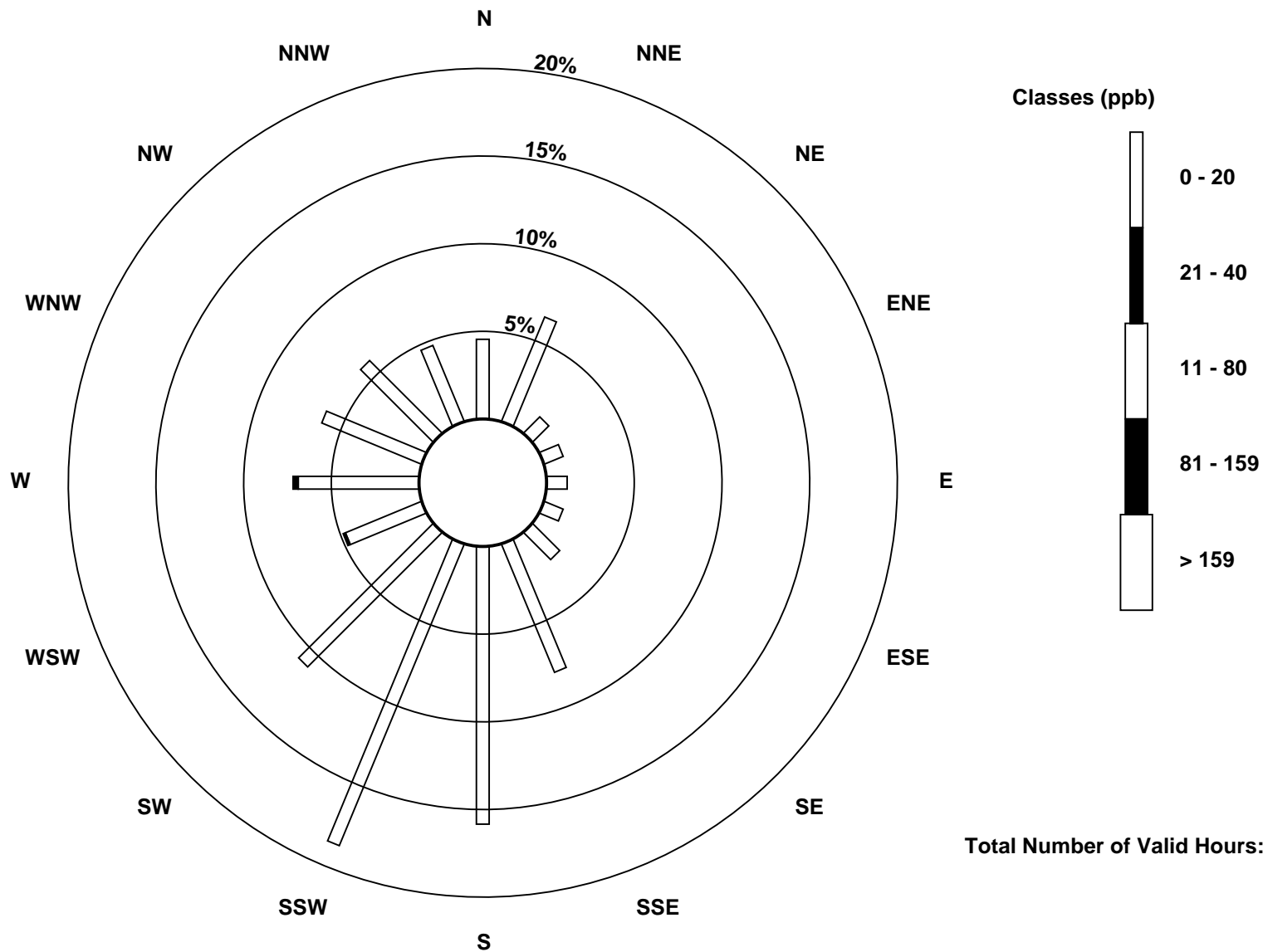
Total Number of Valid Hours: 682

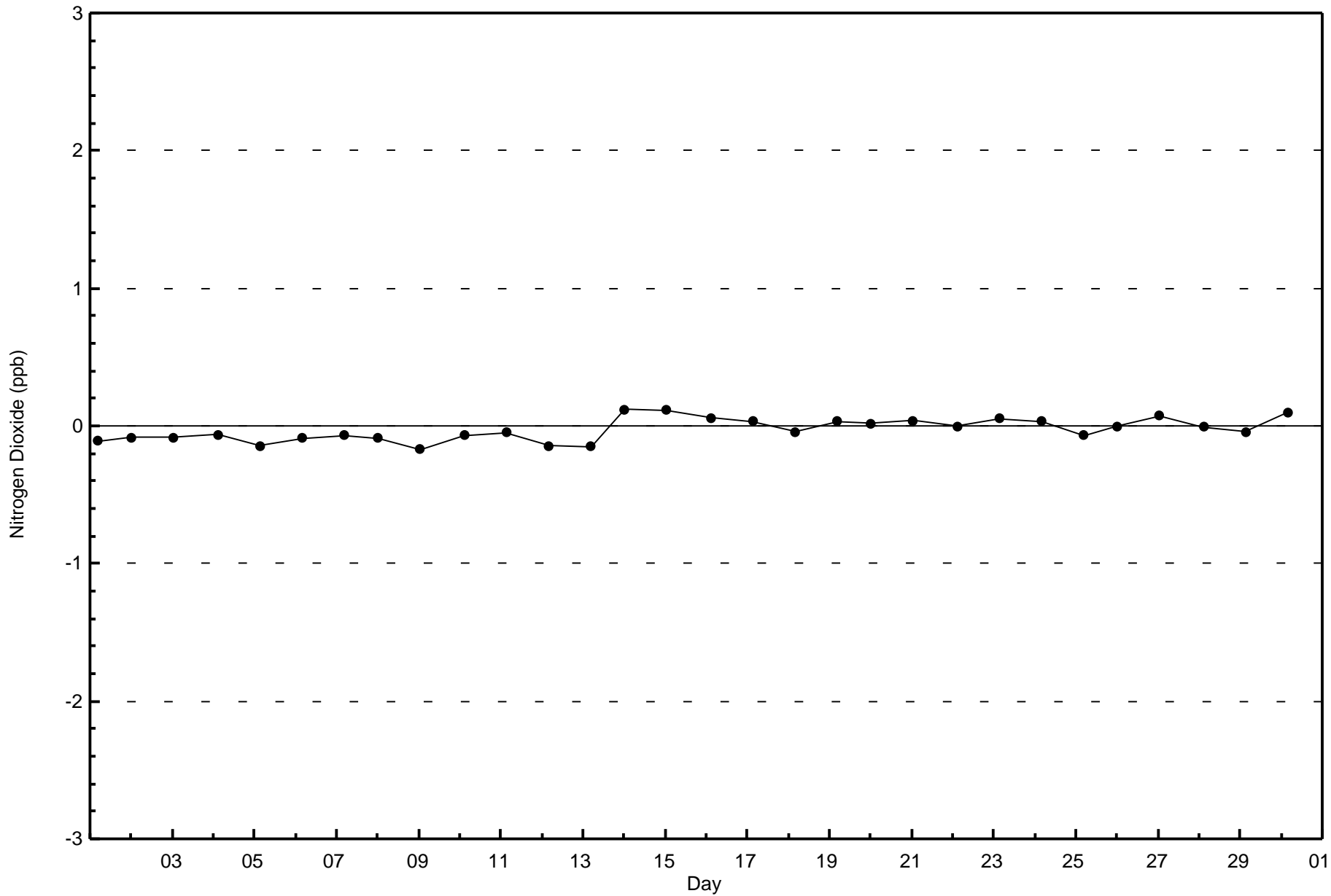
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon (AMS 15)

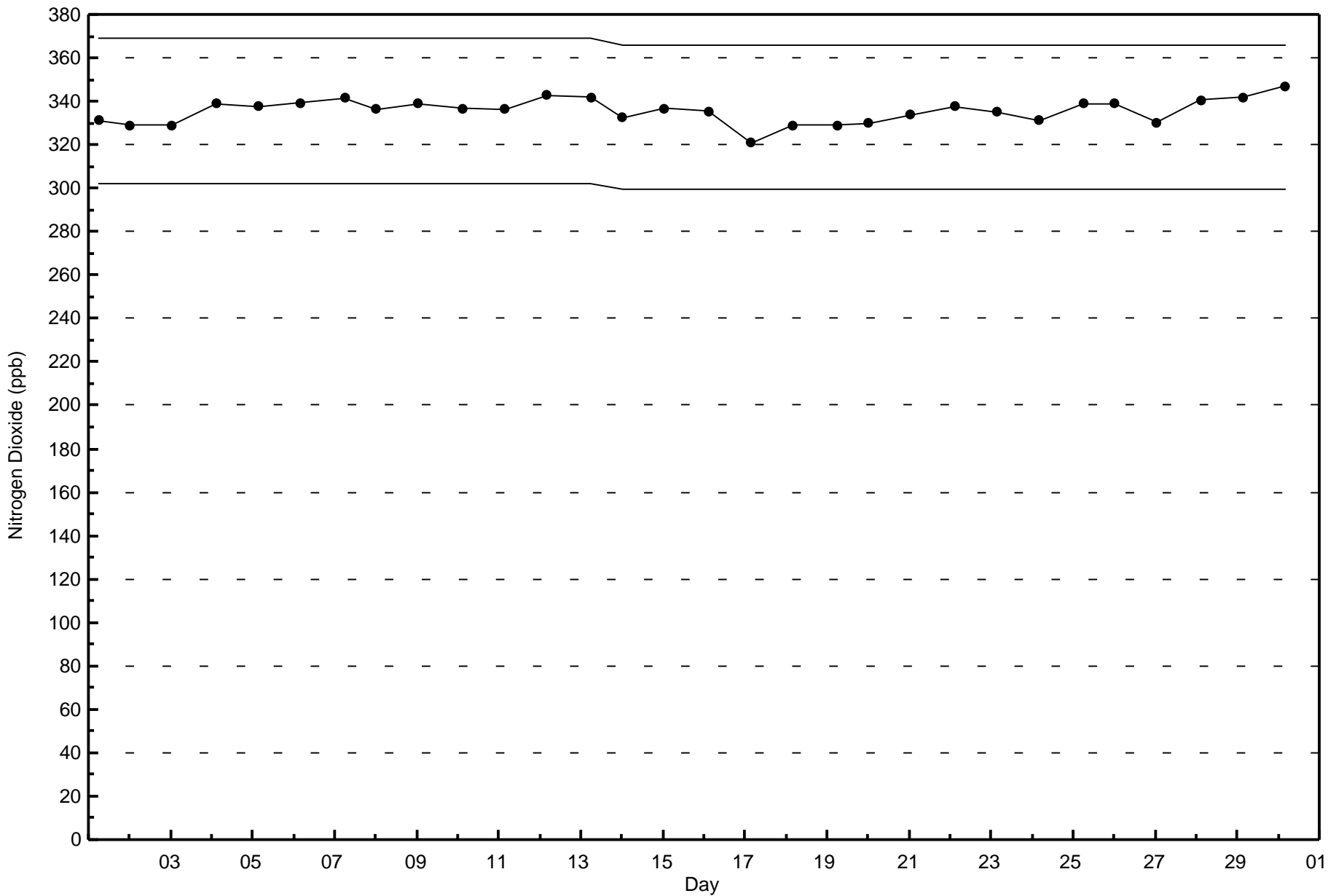






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
CNRL Horizon - September 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

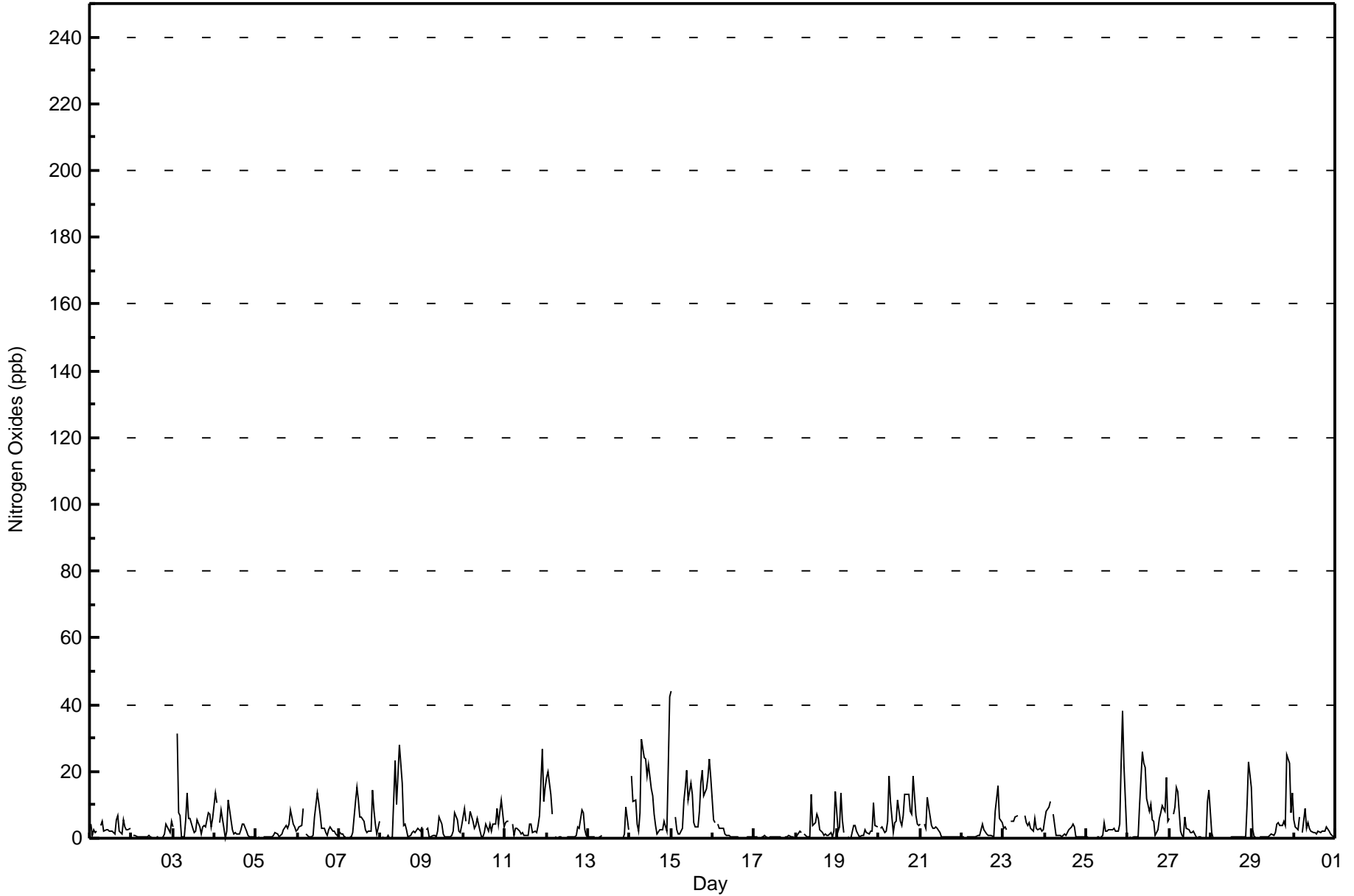
Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - September 2016

| Maximum Value: 44 ppb on Sep 15 01:00 | | Maximum Daily Average: 12.7 ppb on Sep 14 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| Minimum Value: 0 ppb on Sep 13 16:00 | | Minimum Daily Average: 0.4 ppb on Sep 17 | | Hours of Data: 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 7.0 ppb at hour 22 | | Minimum Diurnal Average: 2.3 ppb at hour 17 | | Hours of Missing Data: 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 4.2 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 2 Q ₃ = 5 P ₉₀ = 12 P ₉₉ = 26 | | Hours of Calibration: 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 4 | 1 | 3 | 2 | 2 | Z | 4 | 5 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 5 | 7 | 2 | 1 | 5 | 4 | 3 | 3 | 3 | 2.9 | 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 2 | 5 | 0.9 | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 4 | Z | 31 | 8 | 7 | 0 | 0 | 5 | 14 | 6 | 6 | 3 | 1 | 2 | 5 | 3 | 1 | 3 | 4 | 3 | 8 | 7 | 4 | 6 | 5.8 | 31 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 13 | 11 | Z | 5 | 9 | 3 | 0 | 2 | 12 | 5 | 2 | 1 | 2 | 1 | 1 | 3 | 4 | 4 | 2 | 1 | 1 | 1 | 0 | 0 | 3.6 | 13 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 1 | 3 | 4 | 3 | 4 | 8 | 4 | 3 | 2 | 1.8 | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 3 | 3 | 4 | 9 | Z | 1 | 1 | 0 | 1 | 1 | 6 | 13 | 11 | 7 | 3 | 3 | 2 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 3.5 | 13 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 1 | 1 | 1 | 1 | 0 | Z | 0 | 0 | 2 | 11 | 15 | 12 | 7 | 6 | 5 | 3 | 2 | 2 | 2 | 14 | 8 | 4 | 1 | 5 | 4.5 | 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | Z | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 23 | 10 | 19 | 28 | 17 | 4 | 4 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 5.4 | 28 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 3 | Z | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 7 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 8 | 6 | 2 | 2 | 4 | 2.2 | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 9 | 5 | Z | 4 | 8 | 5 | 3 | 4 | 6 | 2 | 1 | 0 | 2 | 4 | 2 | 4 | 2 | 4 | 4 | 9 | 4 | 8 | 12 | 3 | 4.6 | 12 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 4 | 5 | 5 | Z | 4 | 1 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 4 | 4 | 2 | 2 | 2 | 4 | 7 | 27 | 11 | 15 | 4.9 | 27 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 18 | 20 | 13 | 7 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 9 | 8 | 3 | 1 | 3.9 | 20 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 2 | 0.9 | 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | Z | 19 | 11 | 12 | 4 | 2 | 8 | 30 | 24 | 24 | 19 | 22 | 15 | 13 | 7 | 4 | 1 | 2 | 3 | 2 | 5 | 2 | 22 | 43 | 12.7 | 43 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 44 | Z | 6 | 2 | 1 | 1 | 3 | 11 | 15 | 20 | 11 | 16 | 13 | 5 | 3 | 3 | 8 | 17 | 20 | 13 | 15 | 18 | 24 | 18 | 12.6 | 44 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 5 | 5 | Z | 4 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1.3 | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0 | 1 | 2 | 2 | Z | 1 | 0 | 0 | 0 | 13 | 4 | 4 | 7 | 6 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 0 | 2 | 14 | 3.0 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 2 | 4 | 14 | 5 | 2 | Z | 0 | 0 | 0 | 4 | 4 | 2 | 1 | 0 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 11 | 4 | 3 | 2.9 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | Z | 3 | 3 | 2 | 2 | 5 | 19 | 11 | 2 | 5 | 5 | 12 | 5 | 4 | 7 | 13 | 13 | 13 | 8 | 7 | 19 | 7 | 4 | 4 | 7.5 | 19 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 4 | Z | 4 | 3 | 12 | 9 | 4 | 3 | 3 | 3 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2.4 | 12 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 8 | 12 | 16 | 6 | 5 | 2.8 | 16 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 3 | 4 | 3 | Z | 5 | 5 | 5 | 6 | 7 | C | C | C | 7 | 4 | 4 | 5 | 3 | 2 | 6 | 3 | 2 | 3 | 2 | 2 | 4.0 | 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 6 | 8 | 9 | 11 | Z | 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 5 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 4 | 23 | 38 | 21 | 1 | 4.9 | 38 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 26 | 22 | 21 | 12 | 8 | 10 | 6 | 5 | 1 | 3 | 6 | 8 | 10 | 8 | 18 | 5 | 7.8 | 26 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 6 | Z | 7 | 9 | 15 | 14 | 2 | 1 | 0 | 6 | 3 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 14 | 4.3 | 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 2 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 10 | 23 | 15 | 2.4 | 23 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 3 | 1 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 4 | 4 | 4 | 5 | 4 | 25 | 22 | 8 | 14 | 4.6 | 25 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 6 | 3 | 2 | 6 | Z | 2 | 9 | 3 | 5 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 2 | 1 | 1 | 0 | 2.8 | 9 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.7 | 3.8 | 5.0 | 3.8 | 3.2 | 2.6 | 2.3 | 3.4 | 5.0 | 5.2 | 5.1 | 5.3 | 3.9 | 2.9 | 2.5 | 2.6 | 2.3 | 2.6 | 2.8 | 3.9 | 6.0 | 7.0 | 6.7 | 6.4 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 44 | 20 | 31 | 12 | 15 | 14 | 19 | 30 | 26 | 24 | 21 | 28 | 17 | 13 | 7 | 13 | 13 | 17 | 20 | 14 | 25 | 38 | 24 | 43 | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 661 | 96.92 | 96.92 |
| 21 - 40 | 19 | 2.79 | 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: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 30 | 43 | 8 | 8 | 8 | 8 | 15 | 54 | 104 | 125 | 73 | 31 | 43 | 41 | 39 | 31 | 661 |
| 21 - 40 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 1 | 2 | 4 | 1 | 1 | 1 | 19 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 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 | 31 | 44 | 9 | 8 | 8 | 8 | 15 | 54 | 108 | 127 | 74 | 33 | 49 | 42 | 40 | 32 | 682 |

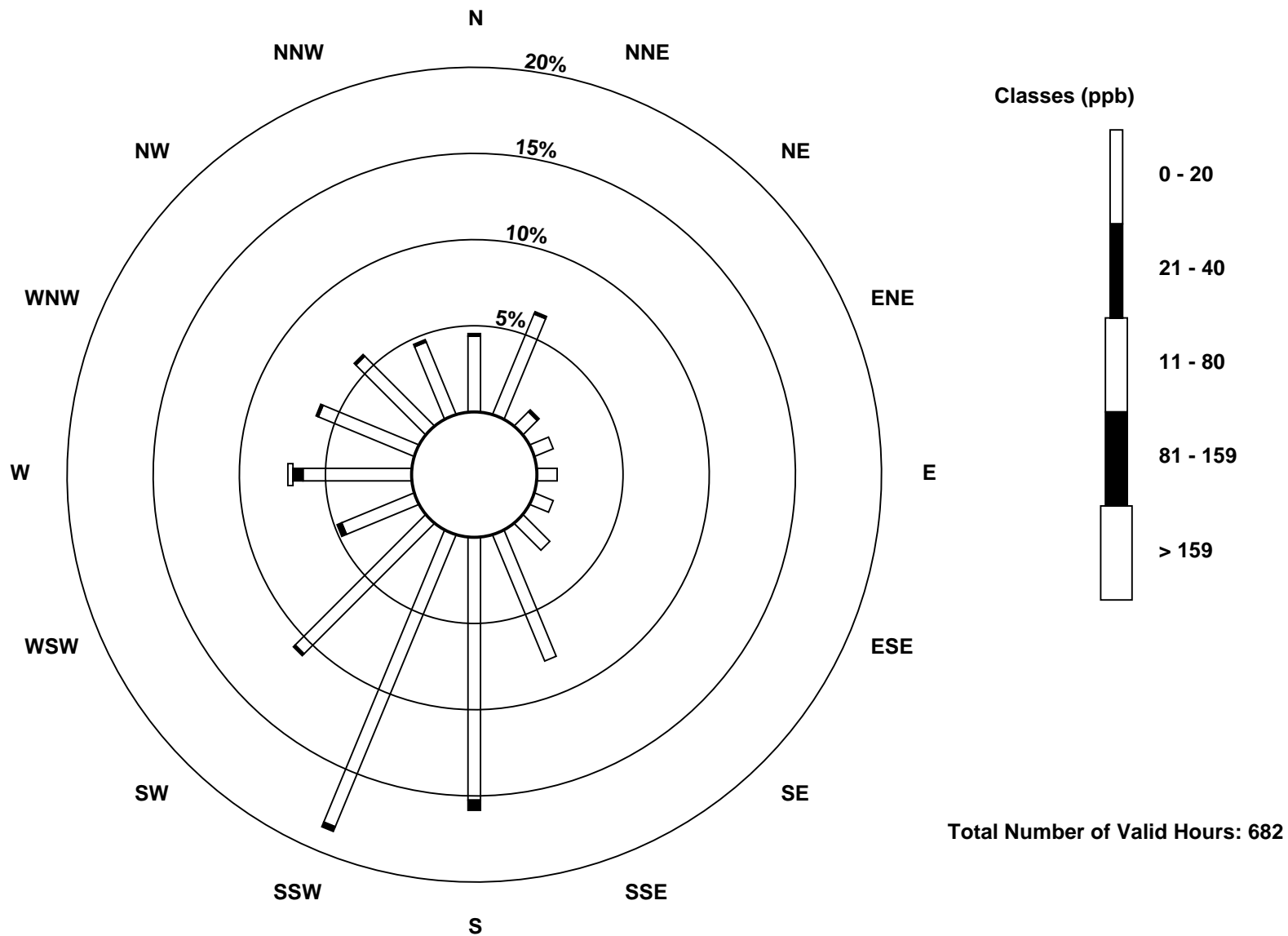
Total Number of Valid Hours: 682

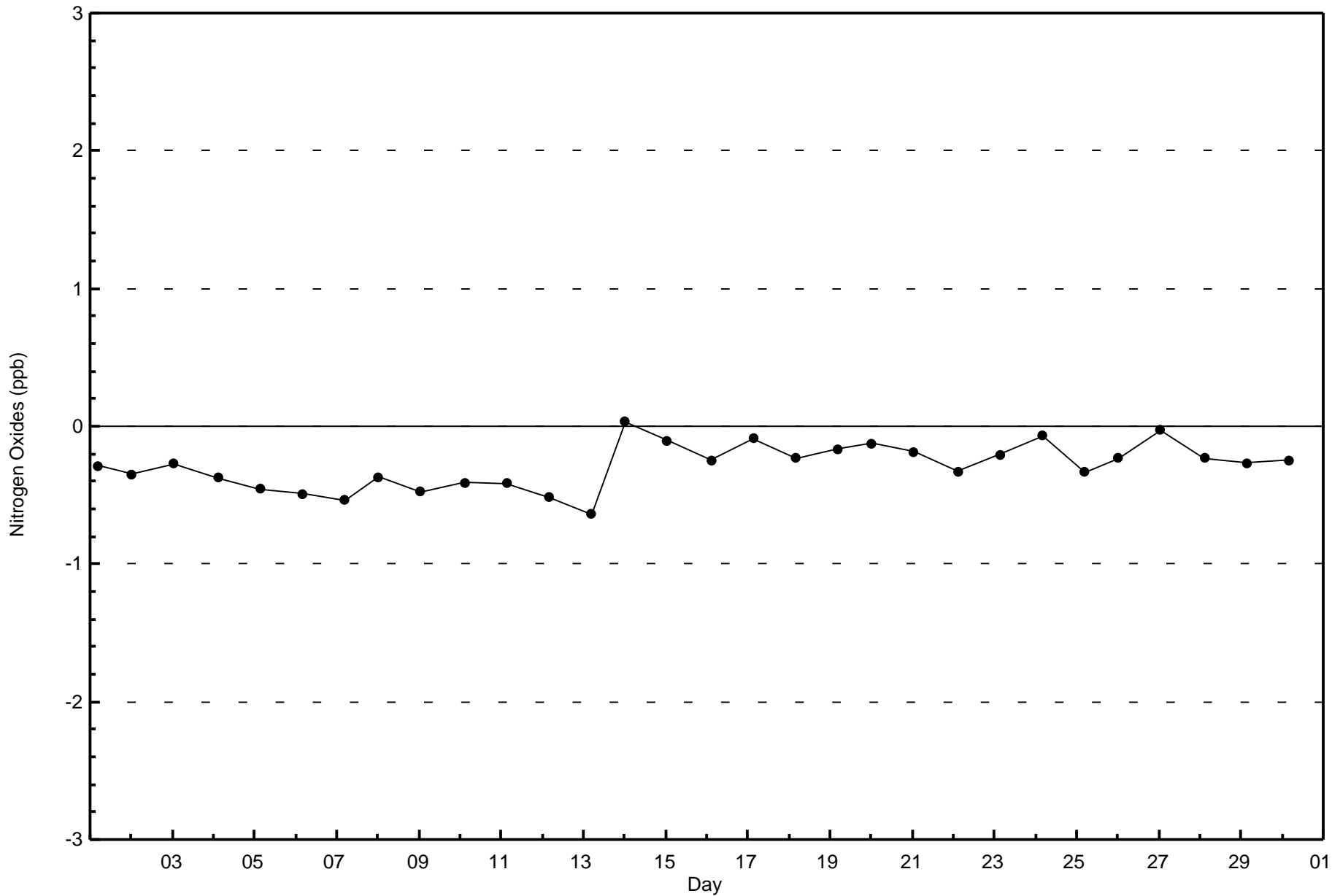
Total Number of Hours: 720

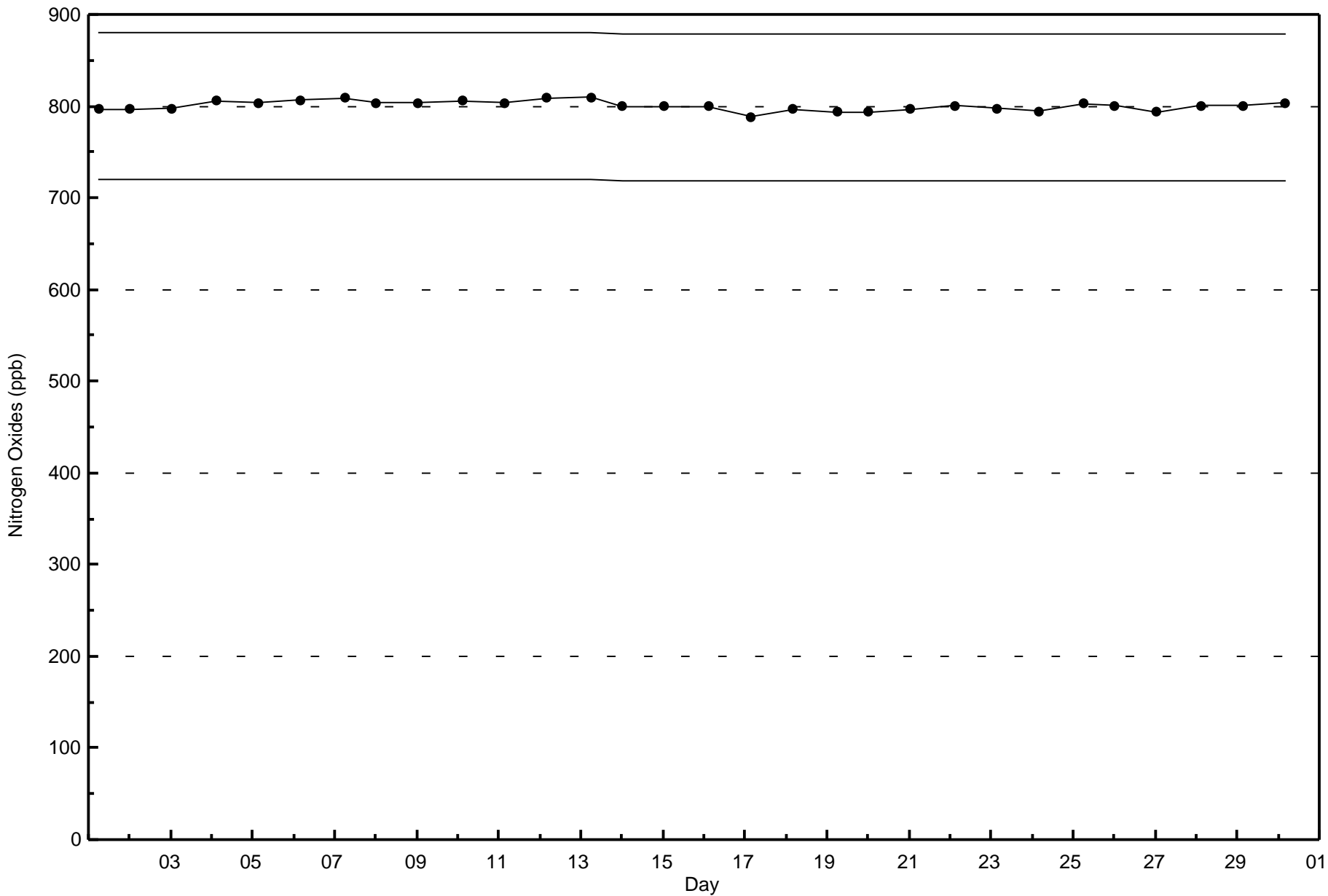


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
CNRL Horizon (AMS 15)









| | | | |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 36.2 µg/m ³ on Sep 26 10:00 | Maximum Daily Average: 12.6 µg/m ³ on Sep 23 | Hours of Data: | 716 |
| Minimum Value: 0.0 µg/m ³ on Sep 18 18:00 | Minimum Daily Average: 0.8 µg/m ³ on Sep 19 | Hours of Missing Data: | 4 |
| Maximum Diurnal Average: 5.7 µg/m ³ at hour 21 | Minimum Diurnal Average: 3.7 µg/m ³ at hour 4 | Hours of Calibration: | 1 |
| Monthly Average: 4.67 µg/m ³ | Percentiles: P ₁ = 0.2 P ₁₀ = 1.0 Q ₁ = 1.6 Median = 2.9 Q ₃ = 5.7 P ₉₀ = 10.6 P ₉₉ = 25.8 | 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 | 3.5 | 4.0 | 4.1 | 4.0 | 3.9 | 4.2 | 4.5 | 4.1 | 3.9 | 3.6 | 3.9 | 3.6 | 3.0 | 2.7 | 3.1 | 5.8 | 2.7 | 2.2 | 2.3 | 3.9 | 2.5 | 1.5 | 1.3 | 2.3 | 3.4 | 5.8 |
| 2-Sep | 1.6 | 1.5 | 2.4 | 2.6 | 2.3 | 2.2 | 2.3 | 2.6 | 1.6 | 1.4 | 1.5 | 2.0 | 2.1 | 2.2 | 2.0 | 2.4 | 1.7 | 1.5 | 1.5 | 1.6 | 1.7 | 2.5 | 2.6 | 2.7 | 2.0 | 2.7 |
| 3-Sep | 3.4 | 4.4 | 5.7 | 4.0 | 3.8 | 3.0 | 2.7 | 2.5 | 3.1 | 2.5 | 2.2 | 1.9 | 1.8 | 2.0 | 2.3 | 2.1 | 2.1 | 2.3 | 2.8 | 1.9 | 2.2 | 2.1 | 1.7 | 1.8 | 2.7 | 5.7 |
| 4-Sep | 2.4 | 2.2 | 1.6 | 2.0 | 2.5 | 1.8 | 1.7 | 1.9 | 2.4 | 2.1 | 2.6 | 3.7 | 3.2 | 3.0 | 3.1 | 3.3 | 3.8 | 4.2 | 3.9 | 3.8 | 4.2 | 2.7 | 2.8 | 2.8 | 2.8 | 4.2 |
| 5-Sep | 2.4 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.5 | 3.2 | 2.7 | 2.4 | 2.2 | 2.3 | 6.6 | 7.7 | 8.0 | 10.3 | 12.5 | 13.0 | 9.6 | 6.1 | 5.9 | 6.5 | 5.0 | 13.0 |
| 6-Sep | 8.1 | 10.7 | 10.0 | 10.6 | 10.8 | 9.8 | 9.2 | 6.6 | 4.9 | 3.8 | 3.6 | 17.7 | 13.1 | 8.7 | 5.9 | 7.8 | 6.5 | 5.3 | 3.6 | 4.6 | 5.3 | 5.5 | 4.8 | 4.9 | 7.6 | 17.7 |
| 7-Sep | 6.3 | 6.2 | 6.7 | 5.1 | 4.1 | 4.3 | 5.0 | 4.4 | 3.0 | 7.3 | 24.6 | 13.3 | 8.6 | 6.9 | 5.9 | 4.4 | 3.8 | 4.0 | 4.8 | 7.0 | 6.9 | 5.3 | 2.5 | 2.9 | 6.4 | 24.6 |
| 8-Sep | 2.2 | 2.2 | 2.4 | 2.3 | 2.7 | 2.3 | 2.4 | 2.4 | 5.0 | 2.7 | 3.0 | 3.0 | 2.5 | 3.1 | 4.5 | 4.0 | 3.0 | 3.9 | 7.1 | 5.1 | 3.0 | 2.5 | 1.5 | 1.2 | 3.1 | 7.1 |
| 9-Sep | 1.5 | 0.9 | 1.4 | 1.6 | 0.9 | 0.7 | 0.8 | 0.8 | 1.1 | 1.5 | 3.9 | 3.3 | 1.8 | 1.5 | 1.4 | 1.4 | 1.4 | 1.5 | 2.4 | 7.0 | 6.6 | 4.0 | 3.4 | 4.0 | 2.3 | 7.0 |
| 10-Sep | 5.8 | 6.3 | 3.2 | 3.1 | 9.7 | 14.1 | 5.6 | 6.6 | 7.6 | 1.5 | 1.0 | 0.9 | 0.9 | 1.1 | 1.1 | 1.6 | 1.4 | 1.3 | 1.9 | 2.5 | 1.9 | 1.0 | 1.0 | 0.5 | 3.4 | 14.1 |
| 11-Sep | 0.4 | 0.6 | 0.5 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.9 | 1.1 | 1.2 | 1.4 | 1.0 | 1.0 | 1.0 | 1.1 | 1.0 | 1.1 | 1.2 | 1.3 | 2.5 | 1.9 | 2.0 | 1.1 | 2.5 |
| 12-Sep | 2.5 | 2.7 | 2.3 | 1.8 | 1.5 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.7 | 3.0 | 2.6 | 2.4 | 2.3 | 2.0 | 3.1 | 4.7 | 7.1 | 7.7 | 5.4 | 3.3 | 2.7 | 2.8 | 7.7 |
| 13-Sep | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 3.3 | 2.7 | 2.5 | 2.5 | 2.8 | 1.9 | 1.6 | 1.9 | 2.9 | 3.1 | 4.2 | 5.0 | 5.1 | 6.1 | 5.7 | 3.2 | 6.1 |
| 14-Sep | 10.6 | 11.7 | 7.4 | 5.8 | 4.0 | 3.3 | 5.9 | 9.7 | 9.0 | 8.0 | 9.8 | C | 21.3 | 15.9 | 12.1 | 8.1 | 4.4 | 4.6 | 4.0 | 3.4 | 2.3 | 1.2 | 2.5 | 4.6 | 7.4 | 21.3 |
| 15-Sep | 5.1 | 4.5 | 1.6 | 0.8 | 0.5 | 1.2 | 1.1 | 1.4 | 1.3 | 2.9 | 2.3 | 3.1 | 4.8 | 4.5 | 3.3 | 5.2 | 13.1 | 23.1 | 16.3 | 11.4 | 14.8 | 17.5 | 17.7 | 15.2 | 7.2 | 23.1 |
| 16-Sep | 12.7 | 14.0 | 14.9 | 13.6 | 12.2 | 13.1 | 12.8 | 8.0 | 4.7 | 3.6 | 3.0 | 2.2 | 2.1 | 2.6 | 2.4 | 2.4 | 2.5 | 2.1 | 2.4 | 2.5 | 2.5 | 2.1 | 1.6 | 1.5 | 5.9 | 14.9 |
| 17-Sep | 1.5 | 1.3 | 1.5 | 1.4 | 1.2 | 0.8 | 0.3 | 0.2 | 0.4 | 0.7 | 1.4 | 2.8 | 2.7 | 3.1 | 3.0 | 2.9 | 2.6 | 2.3 | 2.4 | 2.3 | 1.6 | 1.2 | 1.1 | 1.0 | 1.6 | 3.1 |
| 18-Sep | 1.0 | 1.0 | 1.1 | 1.1 | 2.4 | 2.0 | 1.8 | 2.2 | 2.3 | 8.1 | 3.2 | 5.3 | 4.3 | 2.4 | 1.2 | 0.6 | 0.0 | 0.0 | 0.1 | 0.6 | 1.3 | 0.7 | 1.3 | 2.2 | 1.9 | 8.1 |
| 19-Sep | 0.9 | 1.2 | 2.1 | 1.3 | 0.5 | 1.2 | 0.4 | 0.2 | 0.1 | 0.8 | UO | UO | UO | 0.2 | 0.4 | 0.6 | 0.9 | 0.6 | 0.1 | 0.1 | 0.4 | 1.8 | 1.2 | 0.9 | 0.8 | 2.1 |
| 20-Sep | 0.8 | 1.2 | 1.3 | 1.1 | 1.1 | 1.7 | 3.2 | 2.1 | 0.7 | 1.6 | 2.5 | 5.3 | 2.8 | 4.4 | 7.7 | 8.0 | 12.9 | 18.4 | 24.5 | 8.0 | 6.0 | 3.1 | 4.1 | 3.4 | 5.2 | 24.5 |
| 21-Sep | 3.0 | 3.1 | 2.2 | 2.4 | 4.3 | 4.1 | 4.1 | 3.5 | 5.0 | 4.6 | 3.8 | 2.5 | 1.6 | 2.9 | 2.9 | 2.7 | 2.7 | 2.5 | 3.9 | 2.1 | 1.4 | 1.6 | 1.7 | 1.7 | 2.9 | 5.0 |
| 22-Sep | 1.5 | 1.5 | 1.5 | 1.6 | 1.7 | 1.7 | 2.5 | 2.0 | 2.2 | 2.5 | 2.8 | 3.7 | 5.4 | 4.3 | 4.1 | 5.5 | 6.0 | 5.3 | 8.9 | 10.2 | 11.1 | 13.1 | 14.3 | 16.2 | 5.4 | 16.2 |
| 23-Sep | 11.0 | 11.8 | 10.4 | 10.2 | 17.8 | 20.0 | 17.7 | 21.8 | 13.5 | 15.2 | 12.2 | 12.7 | 21.0 | 28.6 | 20.1 | 9.8 | 8.8 | 6.0 | 5.9 | 7.5 | 6.0 | 5.3 | 4.7 | 4.6 | 12.6 | 28.6 |
| 24-Sep | 5.3 | 5.6 | 6.1 | 5.7 | 6.4 | 7.4 | 11.9 | 13.5 | 12.5 | 8.2 | 6.9 | 4.2 | 3.6 | 4.1 | 3.6 | 5.7 | 6.5 | 5.1 | 1.4 | 1.3 | 1.2 | 1.1 | 1.2 | 1.3 | 5.4 | 13.5 |
| 25-Sep | 1.2 | 1.1 | 1.0 | 1.0 | 1.1 | 1.1 | 1.7 | 2.0 | 1.4 | 1.4 | 3.1 | 2.6 | 2.7 | 3.2 | 2.7 | 2.7 | 2.7 | 4.3 | 7.8 | 9.5 | 26.1 | 27.6 | 10.5 | 2.4 | 5.0 | 27.6 |
| 26-Sep | 1.9 | 1.6 | 1.5 | 1.4 | 1.4 | 1.6 | 10.8 | 17.9 | 15.1 | 36.2 | 34.6 | 21.9 | 11.1 | 16.2 | 10.3 | 9.3 | 3.0 | 4.1 | 6.5 | 5.7 | 7.3 | 6.2 | 8.6 | 5.6 | 10.0 | 36.2 |
| 27-Sep | 7.7 | 8.0 | 10.2 | 10.1 | 5.7 | 4.8 | 2.7 | 2.6 | 0.7 | 1.6 | 0.9 | 2.1 | 1.3 | 3.6 | 5.0 | 2.5 | 2.2 | 2.5 | 2.3 | 0.8 | 0.6 | 0.5 | 4.5 | 5.8 | 3.7 | 10.2 |
| 28-Sep | 0.8 | 0.6 | 0.4 | 0.3 | 0.2 | 0.1 | 1.1 | 0.6 | 0.7 | 1.2 | 0.9 | 1.0 | 0.7 | 2.5 | 3.5 | 3.7 | 4.5 | 5.9 | 10.1 | 7.9 | 6.0 | 25.6 | 29.5 | 19.6 | 5.3 | 29.5 |
| 29-Sep | 8.2 | 4.8 | 4.5 | 5.1 | 6.2 | 7.5 | 11.2 | 9.5 | 7.8 | 6.2 | 5.2 | 4.8 | 4.1 | 5.1 | 6.1 | 6.9 | 13.7 | 25.9 | 12.7 | 12.9 | 19.8 | 9.2 | 5.6 | 6.6 | 8.7 | 25.9 |
| 30-Sep | 5.1 | 5.8 | 5.3 | 5.3 | 4.6 | 13.1 | 3.9 | 3.1 | 3.9 | 4.4 | 4.6 | 4.4 | 5.1 | 4.4 | 4.0 | 4.8 | 4.7 | 6.0 | 5.9 | 4.9 | 5.0 | 3.8 | 2.8 | 2.9 | 4.9 | 13.1 |

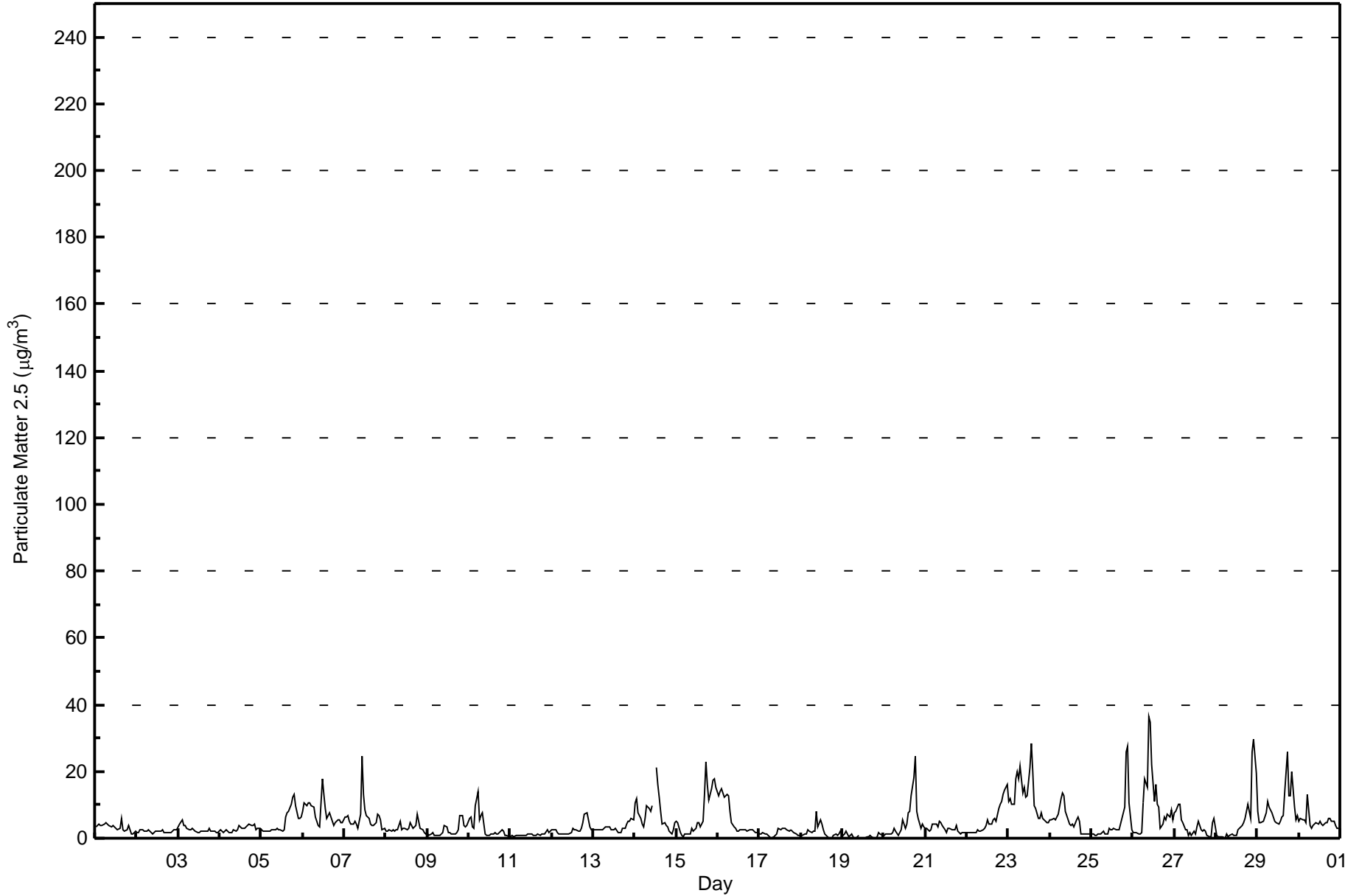
| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|------|------|-----------------|
| 4.0 | 4.2 | 3.9 | 3.7 | 4.0 | 4.5 | 4.5 | 4.7 | 4.1 | 4.7 | 5.2 | 4.8 | 4.9 | 4.9 | 4.4 | 4.2 | 4.4 | 5.4 | 5.6 | 5.1 | 5.7 | 5.6 | 5.1 | 4.5 | Diurnal Average |
| 12.7 | 14.0 | 14.9 | 13.6 | 17.8 | 20.0 | 17.7 | 21.8 | 15.1 | 36.2 | 34.6 | 21.9 | 21.3 | 28.6 | 20.1 | 9.8 | 13.7 | 25.9 | 24.5 | 13.0 | 26.1 | 27.6 | 29.5 | 19.6 | 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}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon - September 2016**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 462 | 64.53 | 64.53 |
| 6 - 15 | 154 | 21.51 | 86.03 |
| 16 - 25 | 22 | 3.07 | 89.11 |
| 26 - 80 | 8 | 1.12 | 90.22 |
| > 81.0 | 0 | 0.00 | 90.22 |

Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
CNRL Horizon - September 2016

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|----------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 21 | 33 | 6 | 4 | 3 | 3 | 6 | 16 | 69 | 94 | 63 | 24 | 41 | 35 | 25 | 19 | 462 |
| 6 - 15 | 2 | 5 | 2 | 2 | 4 | 4 | 9 | 34 | 31 | 35 | 4 | 4 | 7 | 3 | 4 | 4 | 154 |
| 16 - 25 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 6 | 7 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 22 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 8 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 23 | 39 | 9 | 7 | 8 | 8 | 16 | 57 | 109 | 130 | 69 | 30 | 50 | 38 | 30 | 23 | 646 |

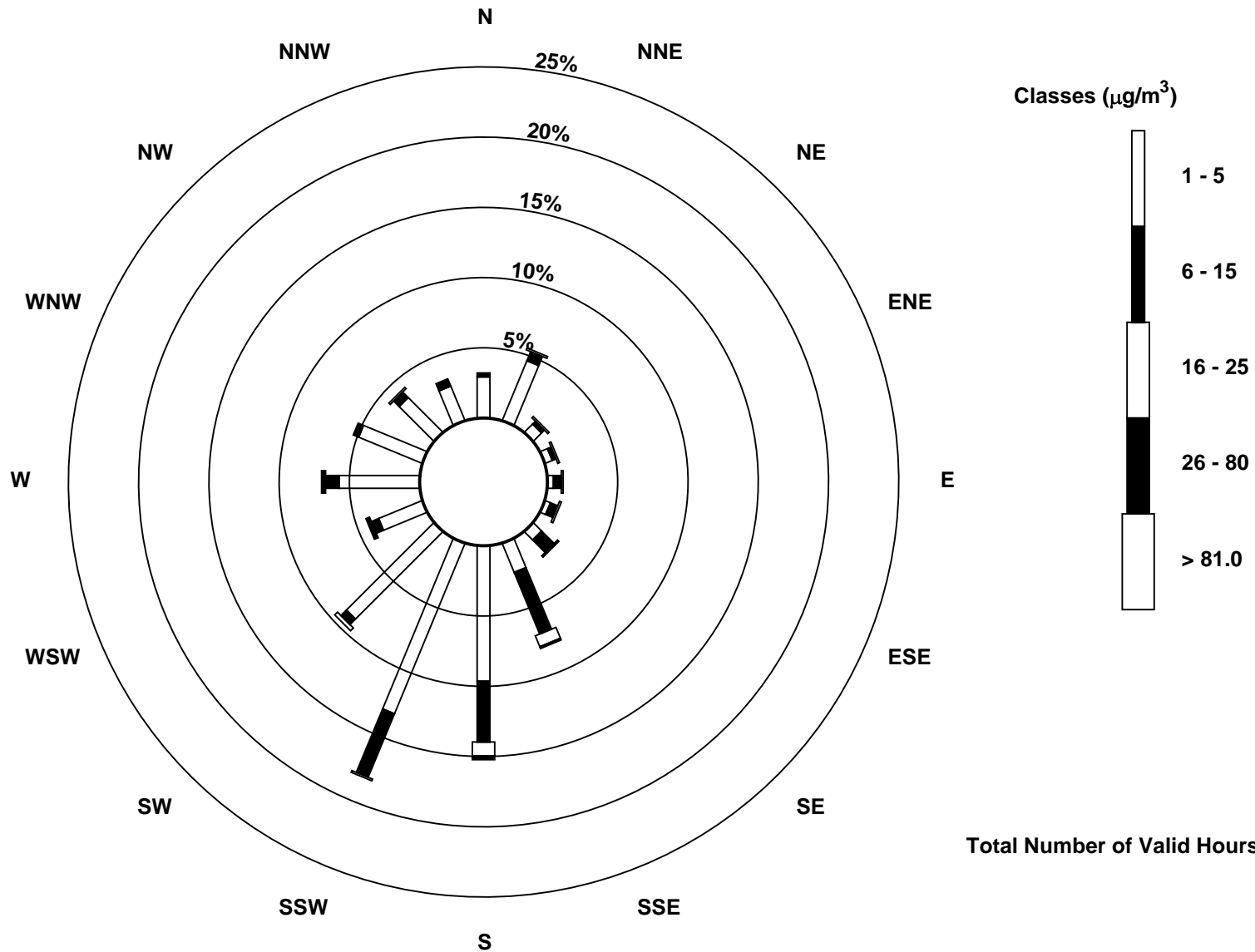
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
CNRL Horizon (AMS 15)



Total Number of Valid Hours: 716



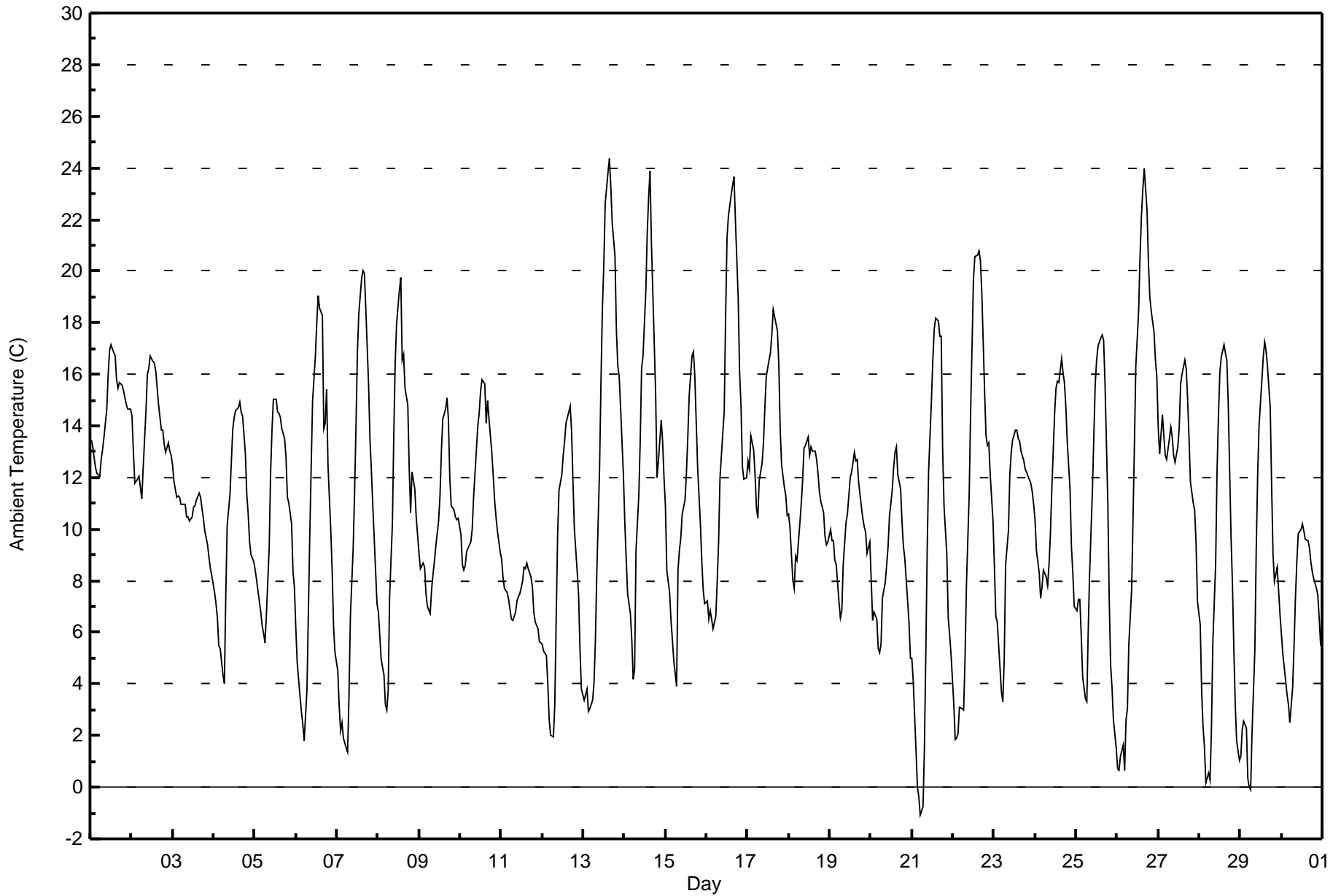
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

CNRL Horizon - September 2016

| Maximum Value: 24.4 C on Sep 13 16:00 | | Maximum Daily Average: 14.6 C on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -1.1 C on Sep 21 06:00 | | Minimum Daily Average: 7.1 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.5 C at hour 16 | | Minimum Diurnal Average: 5.4 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.80 C | | Percentiles: P ₁ = 0.3 P ₁₀ = 3.8 Q ₁ = 7.3 Median = 10.9 Q ₃ = 14.2 P ₉₀ = 16.8 P ₉₉ = 23.3 | | 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 | 13.4 | 13.2 | 12.7 | 12.4 | 12.2 | 12.0 | 12.7 | 13.1 | 13.5 | 14.6 | 16.0 | 17.0 | 17.1 | 17.0 | 16.7 | 15.8 | 15.4 | 15.7 | 15.6 | 15.4 | 15.1 | 14.8 | 14.6 | 14.7 | 14.6 | 17.1 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 14.4 | 13.0 | 11.8 | 11.9 | 12.1 | 11.6 | 11.2 | 12.4 | 14.6 | 16.0 | 16.2 | 16.7 | 16.5 | 16.5 | 16.1 | 15.4 | 14.8 | 13.8 | 13.8 | 13.3 | 13.0 | 13.3 | 13.0 | 12.8 | 13.9 | 16.7 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 12.5 | 11.8 | 11.2 | 11.3 | 11.2 | 11.0 | 11.0 | 11.0 | 10.5 | 10.5 | 10.3 | 10.5 | 10.9 | 10.9 | 11.1 | 11.4 | 11.2 | 10.8 | 10.4 | 9.9 | 9.4 | 8.9 | 8.5 | 8.2 | 10.6 | 12.5 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 7.6 | 7.1 | 6.5 | 5.5 | 5.4 | 4.4 | 4.0 | 7.4 | 10.1 | 11.3 | 12.7 | 13.9 | 14.3 | 14.6 | 14.7 | 14.9 | 14.6 | 14.4 | 12.9 | 11.3 | 10.6 | 9.5 | 9.0 | 8.8 | 10.2 | 14.9 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 8.4 | 8.0 | 7.6 | 6.8 | 6.3 | 6.0 | 5.6 | 6.7 | 9.3 | 12.2 | 13.9 | 15.0 | 15.0 | 14.6 | 14.5 | 14.3 | 13.9 | 13.5 | 12.8 | 11.2 | 11.0 | 10.2 | 8.4 | 7.8 | 10.5 | 15.0 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 6.2 | 4.9 | 3.5 | 2.9 | 2.5 | 1.8 | 3.8 | 6.8 | 9.8 | 12.4 | 15.0 | 16.7 | 18.0 | 19.0 | 18.5 | 18.3 | 13.9 | 14.1 | 15.4 | 12.5 | 9.9 | 8.4 | 6.2 | 5.2 | 10.2 | 19.0 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 4.5 | 3.2 | 2.2 | 2.5 | 1.9 | 1.5 | 1.4 | 3.5 | 6.6 | 9.3 | 11.4 | 13.9 | 16.8 | 18.3 | 19.7 | 20.0 | 19.9 | 18.6 | 15.6 | 13.5 | 12.3 | 10.9 | 9.7 | 7.1 | 10.2 | 20.0 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 6.8 | 5.9 | 5.0 | 4.3 | 3.2 | 3.0 | 3.7 | 7.4 | 10.2 | 13.7 | 16.5 | 18.0 | 19.2 | 19.7 | 16.5 | 16.7 | 15.4 | 14.8 | 12.4 | 10.6 | 12.2 | 11.6 | 10.5 | 9.8 | 11.1 | 19.7 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 9.1 | 8.5 | 8.7 | 8.5 | 7.5 | 7.0 | 6.7 | 7.7 | 8.2 | 8.7 | 9.3 | 10.3 | 11.3 | 13.0 | 14.3 | 14.7 | 15.1 | 14.3 | 12.0 | 10.9 | 10.7 | 10.5 | 10.4 | 10.4 | 10.3 | 15.1 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 9.8 | 8.6 | 8.4 | 8.6 | 9.1 | 9.4 | 9.5 | 10.0 | 11.2 | 13.1 | 14.0 | 14.5 | 15.4 | 15.8 | 15.6 | 14.1 | 15.0 | 14.2 | 13.0 | 12.1 | 11.1 | 10.5 | 9.9 | 9.1 | 11.8 | 15.8 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 8.8 | 8.1 | 7.7 | 7.6 | 7.3 | 6.9 | 6.5 | 6.4 | 6.8 | 7.2 | 7.4 | 7.5 | 8.0 | 8.5 | 8.5 | 8.7 | 8.4 | 8.2 | 7.8 | 6.8 | 6.4 | 6.1 | 5.6 | 5.6 | 7.4 | 8.8 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 5.5 | 5.3 | 5.1 | 4.0 | 2.6 | 2.0 | 1.9 | 3.2 | 6.5 | 9.7 | 11.5 | 12.1 | 12.8 | 13.4 | 14.1 | 14.5 | 14.8 | 13.8 | 11.8 | 10.0 | 8.4 | 7.5 | 5.3 | 3.8 | 8.3 | 14.8 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 3.3 | 3.6 | 3.8 | 2.9 | 3.0 | 3.3 | 4.0 | 5.7 | 8.3 | 12.4 | 15.8 | 18.5 | 20.2 | 22.6 | 23.8 | 24.4 | 23.3 | 21.9 | 20.6 | 17.7 | 16.3 | 15.9 | 14.7 | 12.1 | 13.3 | 24.4 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 10.3 | 8.9 | 7.5 | 6.7 | 5.7 | 4.2 | 4.6 | 9.2 | 11.3 | 13.4 | 16.2 | 16.7 | 19.2 | 21.4 | 22.8 | 23.9 | 21.1 | 17.2 | 15.3 | 12.0 | 12.6 | 14.2 | 13.4 | 12.0 | 13.3 | 23.9 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 10.9 | 8.4 | 7.5 | 6.5 | 5.7 | 4.9 | 3.9 | 8.4 | 9.2 | 9.7 | 10.6 | 11.1 | 12.2 | 13.6 | 15.2 | 16.7 | 16.9 | 16.0 | 14.2 | 12.5 | 10.2 | 8.7 | 7.7 | 7.1 | 10.3 | 16.9 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 7.2 | 6.5 | 6.8 | 6.5 | 6.1 | 6.6 | 8.0 | 9.5 | 12.0 | 13.7 | 14.5 | 18.2 | 21.3 | 22.2 | 23.0 | 23.3 | 23.7 | 22.0 | 19.0 | 16.1 | 14.8 | 12.4 | 11.9 | 12.0 | 14.1 | 23.7 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 12.6 | 12.3 | 13.6 | 13.1 | 12.1 | 10.8 | 10.4 | 11.9 | 12.5 | 13.3 | 14.7 | 15.9 | 16.6 | 16.8 | 17.5 | 18.5 | 18.3 | 17.7 | 16.4 | 13.8 | 12.5 | 11.6 | 11.3 | 10.5 | 14.0 | 18.5 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 10.6 | 10.0 | 8.0 | 7.7 | 9.0 | 8.8 | 10.2 | 11.0 | 11.9 | 13.2 | 13.2 | 13.6 | 12.8 | 13.2 | 13.0 | 13.0 | 12.7 | 12.1 | 11.4 | 11.1 | 10.6 | 9.7 | 9.4 | 9.5 | 11.1 | 13.6 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 10.0 | 9.6 | 9.6 | 8.8 | 8.6 | 7.1 | 6.6 | 6.8 | 8.6 | 10.2 | 10.6 | 11.3 | 12.0 | 12.2 | 13.0 | 12.6 | 12.7 | 11.8 | 10.9 | 10.4 | 10.1 | 9.9 | 9.1 | 9.5 | 10.1 | 13.0 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 8.0 | 6.4 | 6.8 | 6.5 | 5.4 | 5.2 | 5.5 | 7.3 | 7.9 | 8.6 | 9.3 | 10.5 | 11.5 | 12.4 | 13.0 | 13.2 | 12.1 | 11.5 | 10.2 | 9.4 | 8.8 | 7.2 | 6.4 | 5.0 | 8.7 | 13.2 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 5.0 | 4.1 | 1.4 | 0.0 | -0.4 | -1.1 | -0.7 | 1.5 | 5.2 | 9.3 | 12.2 | 15.0 | 16.5 | 17.7 | 18.2 | 18.1 | 17.5 | 17.5 | 13.1 | 10.9 | 9.0 | 6.6 | 5.9 | 5.2 | 8.7 | 18.2 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 3.2 | 1.8 | 1.9 | 2.1 | 3.1 | 3.0 | 3.0 | 5.0 | 7.8 | 11.4 | 14.5 | 17.0 | 19.6 | 20.6 | 20.6 | 20.8 | 20.4 | 19.2 | 15.3 | 13.6 | 13.3 | 13.3 | 12.1 | 10.3 | 11.4 | 20.8 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 8.5 | 6.6 | 6.4 | 4.6 | 3.7 | 3.3 | 5.0 | 8.6 | 9.9 | 12.1 | 13.0 | 13.4 | 13.8 | 13.9 | 13.5 | 13.4 | 13.0 | 12.6 | 12.3 | 12.2 | 12.1 | 11.8 | 11.4 | 10.9 | 10.3 | 13.9 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 10.4 | 9.1 | 8.3 | 7.3 | 7.8 | 8.4 | 8.2 | 7.8 | 8.7 | 9.8 | 11.6 | 14.5 | 15.5 | 15.7 | 15.7 | 16.6 | 16.1 | 15.7 | 14.8 | 13.4 | 11.5 | 9.3 | 8.3 | 7.0 | 11.3 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 6.9 | 7.3 | 7.3 | 5.9 | 4.3 | 3.4 | 3.3 | 6.1 | 8.3 | 11.5 | 13.5 | 15.6 | 16.6 | 17.1 | 17.4 | 17.5 | 17.3 | 15.6 | 11.0 | 7.3 | 4.7 | 3.9 | 2.6 | 1.5 | 9.4 | 17.5 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 0.7 | 0.6 | 1.2 | 1.6 | 0.6 | 2.6 | 3.1 | 5.5 | 7.7 | 10.4 | 13.3 | 16.3 | 18.4 | 20.5 | 22.1 | 23.1 | 24.0 | 22.4 | 20.4 | 19.0 | 18.5 | 17.6 | 16.5 | 15.9 | 12.6 | 24.0 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 13.9 | 12.9 | 14.4 | 13.6 | 12.9 | 12.7 | 13.5 | 13.9 | 13.6 | 12.9 | 12.6 | 13.2 | 14.0 | 15.6 | 16.0 | 16.6 | 16.2 | 15.0 | 13.5 | 11.8 | 11.0 | 10.7 | 9.5 | 7.2 | 13.2 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 6.3 | 3.8 | 2.3 | 1.6 | 0.1 | 0.5 | 0.3 | 2.2 | 5.6 | 8.6 | 12.2 | 14.4 | 16.1 | 16.7 | 17.2 | 16.8 | 16.6 | 14.9 | 9.7 | 7.9 | 5.4 | 3.2 | 1.8 | 1.1 | 7.7 | 17.2 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 1.2 | 2.2 | 2.5 | 2.3 | 0.3 | 0.0 | -0.1 | 2.1 | 5.3 | 9.2 | 12.0 | 14.0 | 15.7 | 16.7 | 17.3 | 16.9 | 16.3 | 14.7 | 11.7 | 9.0 | 8.0 | 8.5 | 7.6 | 6.7 | 8.3 | 17.3 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 5.9 | 5.2 | 4.1 | 3.6 | 3.2 | 2.5 | 3.9 | 5.5 | 7.3 | 8.7 | 9.8 | 10.0 | 10.2 | 9.9 | 9.6 | 9.5 | 9.3 | 8.7 | 8.4 | 8.1 | 7.7 | 7.4 | 6.5 | 5.5 | 7.1 | 10.2 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.1 | 7.2 | 6.8 | 6.3 | 5.8 | 5.4 | 5.7 | 7.5 | 9.3 | 11.2 | 12.8 | 14.2 | 15.2 | 16.0 | 16.3 | 16.5 | 16.0 | 15.1 | 13.4 | 11.8 | 10.9 | 10.1 | 9.2 | 8.4 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 14.4 | 13.2 | 14.4 | 13.6 | 12.9 | 12.7 | 13.5 | 13.9 | 14.6 | 16.0 | 16.5 | 18.5 | 21.3 | 22.6 | 23.8 | 24.4 | 24.0 | 22.4 | 20.6 | 19.0 | 18.5 | 17.6 | 16.5 | 15.9 | Diurnal Maximum |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
CNRL Horizon - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 4 | 0.56 | 0.56 |
| 0 - 10 | 310 | 43.06 | 43.61 |
| 10 - 20 | 378 | 52.50 | 96.11 |
| > 20 | 28 | 3.89 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

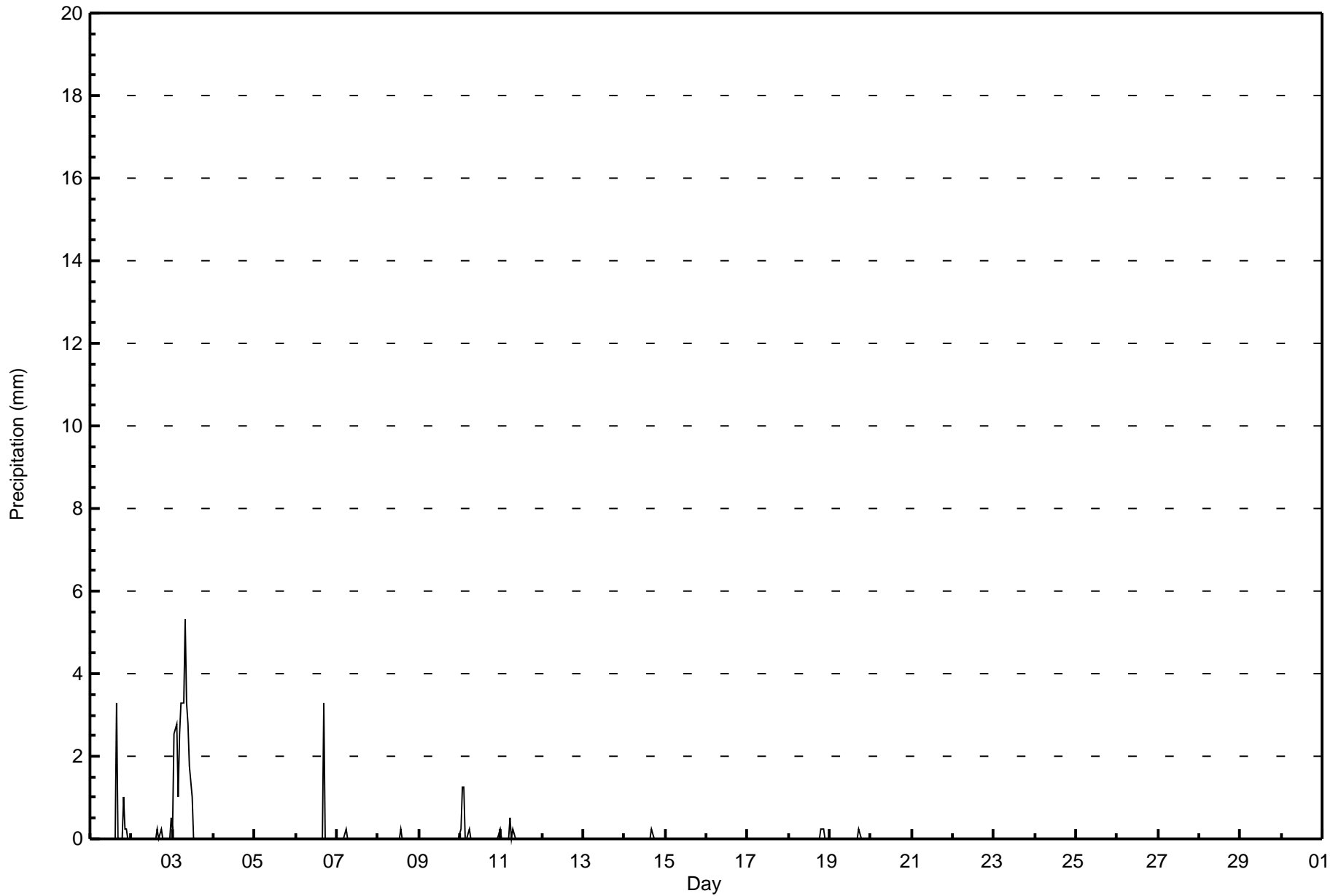
CNRL Horizon - September 2016

| Maximum Value: 5.3 mm on Sep 3 08:00 Maximum Daily Total: 30.0 mm on Sep 3 | | | | | | | | | | | | | | | | | | | 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 4 Maximum Diurnal Total: 5.6 mm at hour 8 Minimum Diurnal Total: 0.0 mm at hour 13 Monthly Total: 44.70 mm Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 O ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 2.4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 0.0 | 0.0 | 0.0 | 1.0 | 0.3 | 0.3 | 0.0 | 0.0 | 4.8 | 3.3 |
| 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 | 0.3 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 1.0 | 0.5 |
| 3-Sep | 0.3 | 2.5 | 2.8 | 1.0 | 2.5 | 3.3 | 3.3 | 5.3 | 3.3 | 2.8 | 1.8 | 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 | 30.0 | 5.3 |
| 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 |
| 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 |
| 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 | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 3.3 |
| 7-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 |
| 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 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10-Sep | 0.3 | 1.3 | 1.3 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 3.3 | 1.3 |
| 11-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.5 |
| 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 |
| 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 |
| 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 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 |
| 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 |
| 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 |
| 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 |
| 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 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.5 | 0.3 |
| 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 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 |
| 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 |
| 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 | 0.0 | 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | |
| | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
CNRL Horizon - September 2016





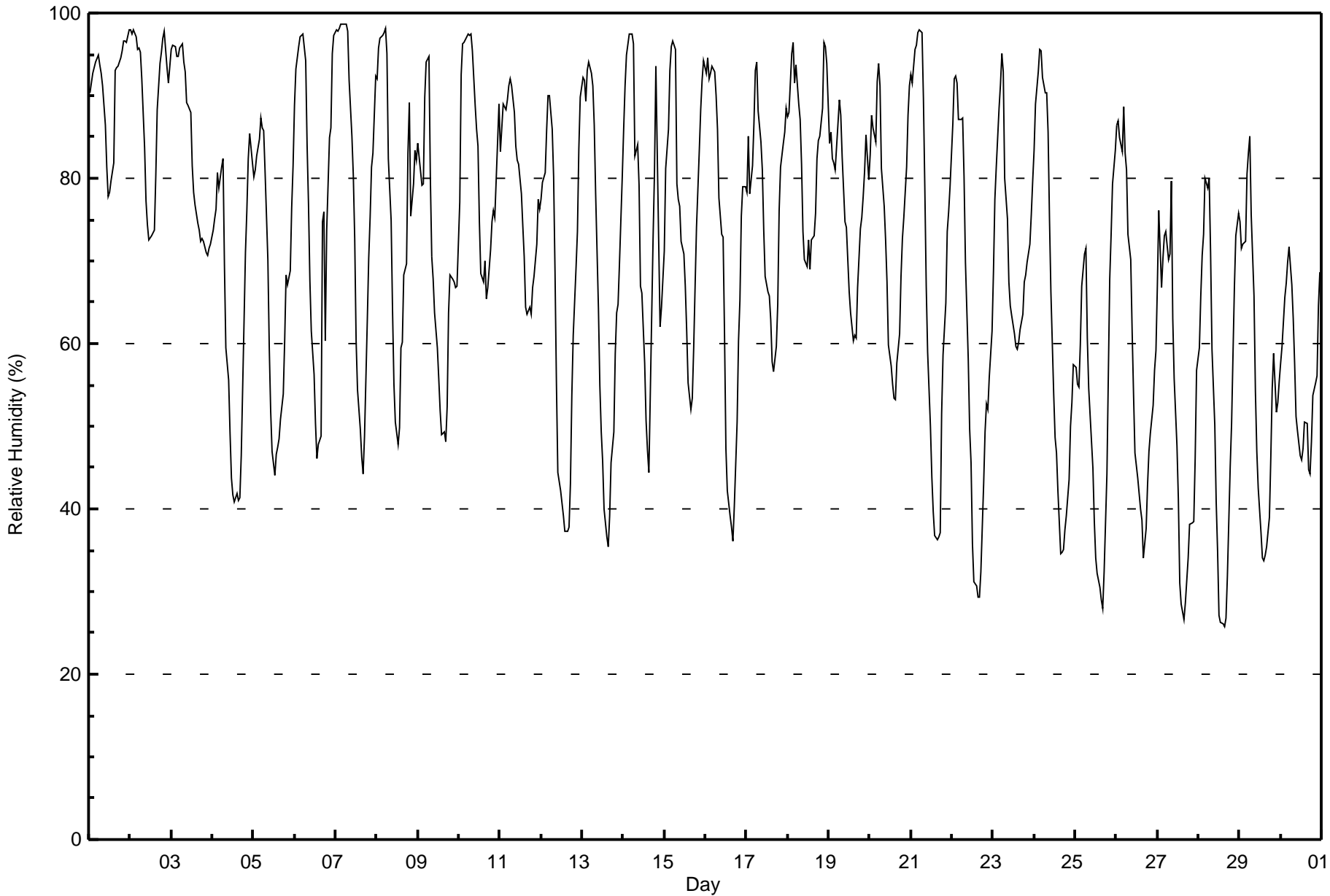
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

CNRL Horizon - September 2016

| Maximum Value: 99 % on Sep 7 04:00 Maximum Daily Average: 90.7 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 26 % on Sep 28 16:00 Minimum Daily Average: 52.2 % on Sep 27 Maximum Diurnal Average: 90.0 % at hour 6 Minimum Diurnal Average: 49.8 % at hour 16 Monthly Average: 70.7 % Percentiles: P ₁ = 28 P ₁₀ = 42 Q ₁ = 56 Median = 73 Q ₃ = 86 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 | 90 | 91 | 93 | 93 | 94 | 95 | 94 | 93 | 91 | 86 | 81 | 78 | 78 | 80 | 82 | 93 | 93 | 94 | 95 | 96 | 97 | 97 | 97 | 98 | 90.7 | 98 |
| 2-Sep | 98 | 97 | 98 | 97 | 96 | 96 | 95 | 92 | 84 | 77 | 74 | 73 | 73 | 73 | 74 | 80 | 88 | 94 | 95 | 97 | 98 | 93 | 92 | 94 | 88.7 | 98 |
| 3-Sep | 96 | 96 | 96 | 95 | 95 | 96 | 96 | 94 | 93 | 89 | 89 | 88 | 81 | 78 | 77 | 75 | 74 | 72 | 73 | 72 | 71 | 71 | 71 | 72 | 83.7 | 96 |
| 4-Sep | 74 | 75 | 76 | 81 | 79 | 81 | 82 | 69 | 59 | 56 | 49 | 44 | 42 | 41 | 42 | 41 | 41 | 46 | 63 | 71 | 76 | 82 | 85 | 82 | 64.1 | 85 |
| 5-Sep | 80 | 81 | 83 | 85 | 87 | 86 | 86 | 81 | 70 | 59 | 52 | 47 | 44 | 47 | 47 | 48 | 51 | 54 | 60 | 68 | 67 | 69 | 76 | 81 | 67.1 | 87 |
| 6-Sep | 89 | 93 | 96 | 97 | 97 | 98 | 94 | 84 | 77 | 68 | 61 | 56 | 50 | 46 | 48 | 49 | 75 | 76 | 60 | 74 | 85 | 86 | 95 | 97 | 77.1 | 98 |
| 7-Sep | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 98 | 92 | 85 | 80 | 73 | 60 | 54 | 50 | 46 | 44 | 49 | 63 | 70 | 75 | 81 | 83 | 92 | 78.5 | 99 |
| 8-Sep | 92 | 96 | 97 | 97 | 98 | 98 | 95 | 82 | 75 | 64 | 55 | 50 | 48 | 50 | 59 | 60 | 68 | 70 | 83 | 89 | 75 | 79 | 83 | 82 | 77.0 | 98 |
| 9-Sep | 84 | 83 | 79 | 79 | 90 | 94 | 95 | 80 | 71 | 68 | 64 | 59 | 56 | 52 | 49 | 49 | 48 | 52 | 64 | 68 | 68 | 67 | 67 | 67 | 68.9 | 95 |
| 10-Sep | 77 | 93 | 96 | 97 | 97 | 97 | 97 | 97 | 95 | 89 | 86 | 84 | 75 | 69 | 67 | 70 | 65 | 67 | 71 | 75 | 76 | 75 | 80 | 89 | 82.7 | 97 |
| 11-Sep | 83 | 86 | 89 | 88 | 90 | 91 | 92 | 91 | 88 | 84 | 82 | 82 | 78 | 74 | 70 | 64 | 64 | 64 | 64 | 67 | 68 | 72 | 77 | 76 | 78.6 | 92 |
| 12-Sep | 77 | 79 | 81 | 86 | 90 | 90 | 86 | 80 | 69 | 55 | 44 | 42 | 41 | 39 | 37 | 37 | 38 | 43 | 54 | 61 | 69 | 74 | 83 | 90 | 64.4 | 90 |
| 13-Sep | 92 | 92 | 89 | 93 | 94 | 93 | 91 | 86 | 78 | 64 | 55 | 49 | 46 | 40 | 37 | 35 | 39 | 46 | 49 | 59 | 64 | 65 | 70 | 80 | 66.9 | 94 |
| 14-Sep | 86 | 91 | 95 | 97 | 97 | 96 | 96 | 83 | 84 | 79 | 67 | 66 | 58 | 51 | 47 | 44 | 54 | 73 | 81 | 94 | 83 | 62 | 64 | 68 | 75.7 | 97 |
| 15-Sep | 71 | 81 | 86 | 93 | 96 | 97 | 96 | 79 | 78 | 77 | 72 | 71 | 67 | 61 | 55 | 52 | 53 | 59 | 67 | 74 | 83 | 88 | 92 | 94 | 76.8 | 97 |
| 16-Sep | 93 | 95 | 92 | 93 | 94 | 93 | 90 | 86 | 78 | 73 | 73 | 61 | 47 | 42 | 39 | 38 | 36 | 40 | 51 | 60 | 65 | 75 | 79 | 79 | 69.7 | 95 |
| 17-Sep | 78 | 85 | 78 | 82 | 87 | 93 | 94 | 88 | 84 | 81 | 74 | 68 | 66 | 66 | 63 | 58 | 57 | 60 | 65 | 76 | 81 | 84 | 86 | 89 | 76.7 | 94 |
| 18-Sep | 87 | 88 | 95 | 96 | 91 | 94 | 89 | 87 | 82 | 74 | 70 | 69 | 73 | 69 | 73 | 73 | 76 | 82 | 85 | 85 | 89 | 96 | 96 | 94 | 83.9 | 96 |
| 19-Sep | 84 | 86 | 82 | 82 | 81 | 87 | 90 | 88 | 83 | 75 | 74 | 70 | 66 | 64 | 60 | 61 | 61 | 67 | 74 | 75 | 78 | 81 | 85 | 80 | 76.3 | 90 |
| 20-Sep | 83 | 88 | 86 | 84 | 92 | 94 | 91 | 81 | 77 | 73 | 68 | 60 | 57 | 55 | 53 | 53 | 58 | 61 | 68 | 73 | 75 | 81 | 88 | 91 | 74.6 | 94 |
| 21-Sep | 93 | 91 | 96 | 96 | 98 | 98 | 98 | 90 | 79 | 67 | 59 | 50 | 44 | 40 | 37 | 36 | 37 | 37 | 52 | 59 | 65 | 74 | 76 | 79 | 68.6 | 98 |
| 22-Sep | 87 | 92 | 92 | 91 | 87 | 87 | 87 | 80 | 70 | 58 | 50 | 46 | 36 | 31 | 31 | 29 | 29 | 32 | 43 | 49 | 53 | 52 | 56 | 62 | 59.6 | 92 |
| 23-Sep | 69 | 78 | 81 | 89 | 91 | 95 | 93 | 80 | 75 | 67 | 65 | 63 | 61 | 60 | 59 | 60 | 62 | 64 | 67 | 68 | 70 | 72 | 76 | 80 | 72.7 | 95 |
| 24-Sep | 83 | 89 | 93 | 96 | 95 | 92 | 90 | 90 | 86 | 75 | 66 | 54 | 49 | 47 | 42 | 35 | 35 | 35 | 37 | 39 | 43 | 50 | 53 | 58 | 63.9 | 96 |
| 25-Sep | 57 | 55 | 55 | 60 | 67 | 71 | 72 | 61 | 55 | 48 | 45 | 38 | 34 | 32 | 30 | 29 | 28 | 32 | 44 | 56 | 68 | 73 | 79 | 83 | 53.1 | 83 |
| 26-Sep | 86 | 87 | 85 | 83 | 89 | 83 | 81 | 73 | 70 | 62 | 54 | 47 | 44 | 42 | 40 | 39 | 34 | 38 | 43 | 47 | 49 | 52 | 57 | 59 | 60.1 | 89 |
| 27-Sep | 67 | 76 | 67 | 70 | 73 | 74 | 70 | 71 | 80 | 63 | 56 | 48 | 41 | 31 | 29 | 27 | 29 | 31 | 34 | 38 | 38 | 38 | 46 | 57 | 52.2 | 80 |
| 28-Sep | 60 | 66 | 71 | 73 | 80 | 79 | 80 | 71 | 59 | 50 | 41 | 35 | 27 | 26 | 26 | 26 | 27 | 32 | 45 | 50 | 59 | 67 | 73 | 76 | 54.1 | 80 |
| 29-Sep | 75 | 72 | 72 | 72 | 80 | 83 | 85 | 76 | 66 | 54 | 47 | 42 | 37 | 34 | 34 | 34 | 35 | 39 | 46 | 55 | 59 | 52 | 53 | 55 | 56.6 | 85 |
| 30-Sep | 58 | 60 | 66 | 67 | 70 | 72 | 67 | 63 | 58 | 51 | 50 | 46 | 46 | 47 | 50 | 50 | 45 | 44 | 48 | 54 | 55 | 56 | 65 | 69 | 56.5 | 72 |
| 81.6 84.6 85.4 87.1 89.1 90.0 89.0 82.5 76.8 69.1 63.4 58.7 54.2 51.4 50.3 49.8 51.4 55.1 61.4 67.3 70.1 72.2 76.1 79.1 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 98 98 98 99 99 99 99 98 95 89 89 88 81 80 82 93 93 94 95 97 98 97 97 98 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
CNRL Horizon - September 2016

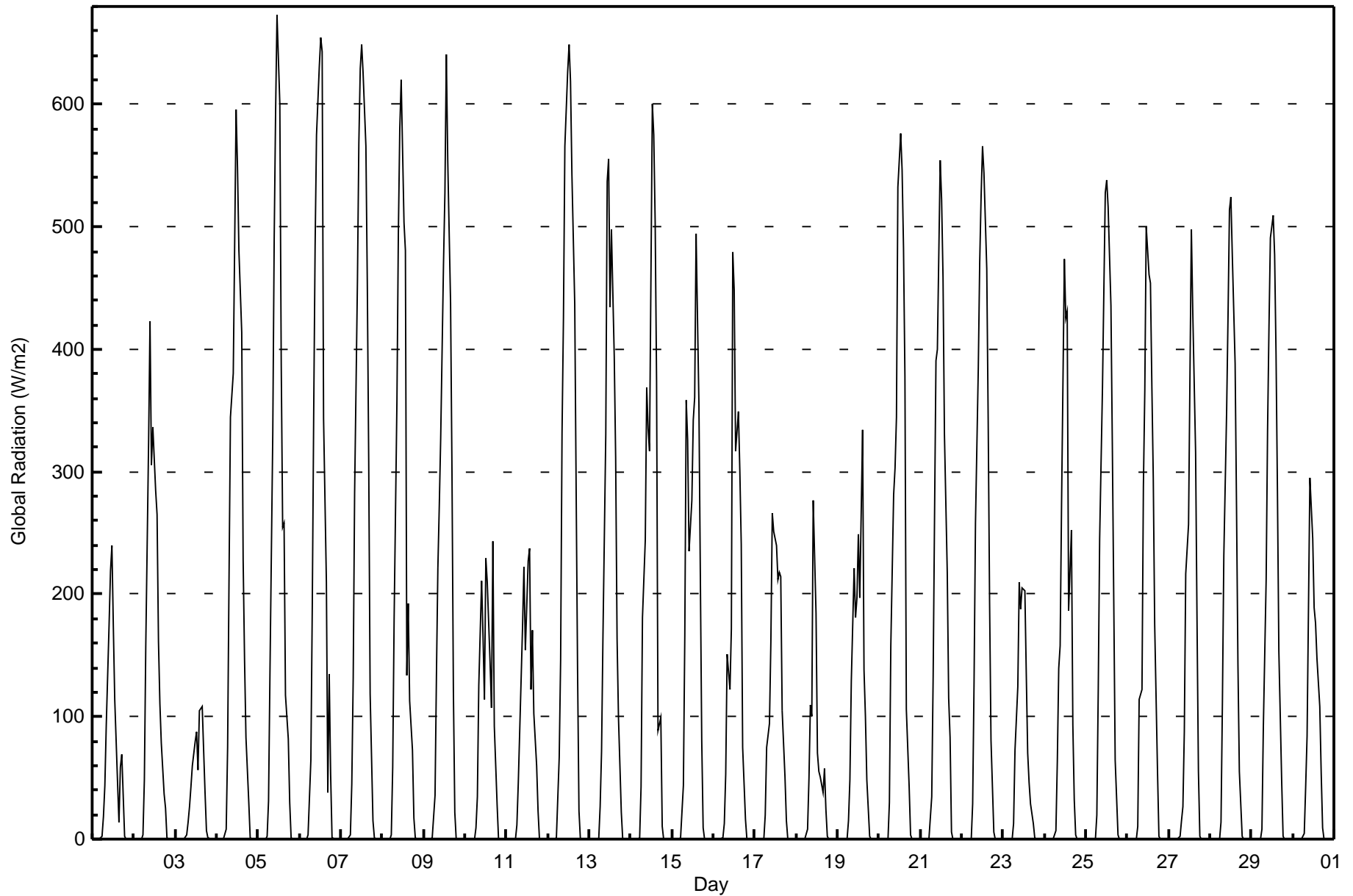
| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 59 | 8.19 | 8.19 |
| 40 - 60 | 155 | 21.53 | 29.72 |
| 60 - 80 | 231 | 32.08 | 61.81 |
| 80 - 100 | 275 | 38.19 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| Maximum Value: 674 W/m2 on Sep 5 12:00 | | Maximum Daily Average: 202.5 W/m2 on Sep 12 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------|-----|-----|-----|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|-----|-----|-----|---------------|-----------------|
| Minimum Value: 0 W/m2 on Sep 1 01:00 | | Minimum Daily Average: 29.2 W/m2 on Sep 3 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 413.7 W/m2 at hour 13 | | Minimum Diurnal Average: 0.0 W/m2 at hour 1 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 123.9 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 13 Q ₃ = 210 P ₉₀ = 437 P ₉₉ = 624 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 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 | 2 | 19 | 44 | 93 | 176 | 219 | 239 | 174 | 115 | 46 | 14 | 59 | 69 | 2 | 0 | 0 | 0 | 0 | 0 | 53.0 | 239 |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 49 | 158 | 323 | 422 | 306 | 336 | 285 | 265 | 161 | 110 | 79 | 37 | 25 | 1 | 0 | 0 | 0 | 0 | 106.8 | 422 |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 27 | 43 | 60 | 79 | 88 | 57 | 104 | 108 | 73 | 38 | 7 | 1 | 0 | 0 | 0 | 0 | 29.2 | 108 |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 8 | 75 | 213 | 345 | 381 | 486 | 596 | 548 | 480 | 414 | 228 | 147 | 83 | 30 | 2 | 0 | 0 | 0 | 0 | 168.2 | 596 |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 31 | 134 | 331 | 490 | 594 | 674 | 600 | 388 | 255 | 258 | 118 | 81 | 30 | 2 | 0 | 0 | 0 | 0 | 166.2 | 674 |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 65 | 190 | 346 | 484 | 575 | 631 | 654 | 643 | 343 | 210 | 38 | 134 | 53 | 2 | 0 | 0 | 0 | 0 | 182.2 | 654 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 45 | 131 | 283 | 455 | 569 | 630 | 649 | 626 | 566 | 453 | 308 | 119 | 15 | 1 | 0 | 0 | 0 | 0 | 202.1 | 649 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 58 | 180 | 358 | 495 | 580 | 620 | 504 | 480 | 134 | 192 | 113 | 72 | 18 | 1 | 0 | 0 | 0 | 0 | 158.7 | 620 |
| 9-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 36 | 135 | 221 | 272 | 327 | 470 | 527 | 641 | 554 | 438 | 301 | 121 | 22 | 0 | 0 | 0 | 0 | 0 | 169.4 | 641 |
| 10-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 35 | 126 | 211 | 166 | 114 | 229 | 210 | 144 | 108 | 243 | 92 | 28 | 0 | 0 | 0 | 0 | 0 | 71.4 | 243 |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 46 | 130 | 173 | 223 | 154 | 226 | 238 | 123 | 170 | 103 | 60 | 23 | 0 | 0 | 0 | 0 | 0 | 70.1 | 238 |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 66 | 147 | 332 | 425 | 566 | 627 | 648 | 619 | 543 | 437 | 285 | 139 | 23 | 0 | 0 | 0 | 0 | 0 | 202.5 | 648 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 71 | 165 | 330 | 537 | 556 | 434 | 498 | 394 | 311 | 164 | 99 | 22 | 0 | 0 | 0 | 0 | 0 | 150.4 | 556 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 43 | 181 | 244 | 369 | 335 | 317 | 600 | 575 | 504 | 373 | 89 | 100 | 11 | 0 | 0 | 0 | 0 | 0 | 155.9 | 600 |
| 15-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 43 | 167 | 359 | 326 | 235 | 276 | 343 | 361 | 494 | 356 | 217 | 81 | 10 | 0 | 0 | 0 | 0 | 0 | 136.2 | 494 |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 12 | 53 | 152 | 122 | 172 | 479 | 448 | 317 | 349 | 301 | 241 | 75 | 16 | 0 | 0 | 0 | 0 | 0 | 114.0 | 479 |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 75 | 95 | 162 | 266 | 251 | 240 | 212 | 218 | 215 | 105 | 50 | 15 | 0 | 0 | 0 | 0 | 0 | 80.1 | 266 |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 49 | 110 | 100 | 277 | 184 | 71 | 55 | 51 | 38 | 58 | 25 | 2 | 0 | 0 | 0 | 0 | 0 | 42.8 | 277 |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 49 | 129 | 221 | 181 | 197 | 249 | 197 | 334 | 138 | 100 | 48 | 3 | 0 | 0 | 0 | 0 | 0 | 77.5 | 334 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 157 | 281 | 303 | 344 | 533 | 576 | 546 | 483 | 378 | 106 | 42 | 3 | 0 | 0 | 0 | 0 | 0 | 157.6 | 576 |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 133 | 266 | 391 | 400 | 555 | 522 | 459 | 330 | 218 | 116 | 83 | 6 | 0 | 0 | 0 | 0 | 0 | 146.3 | 555 |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 129 | 258 | 385 | 472 | 526 | 566 | 544 | 466 | 343 | 194 | 80 | 5 | 0 | 0 | 0 | 0 | 0 | 166.5 | 566 |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 73 | 125 | 210 | 188 | 205 | 203 | 134 | 70 | 46 | 29 | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 54.6 | 210 |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 63 | 140 | 158 | 273 | 474 | 425 | 431 | 187 | 253 | 93 | 32 | 4 | 0 | 0 | 0 | 0 | 0 | 105.7 | 474 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 121 | 245 | 369 | 450 | 528 | 538 | 516 | 436 | 321 | 194 | 65 | 3 | 0 | 0 | 0 | 0 | 0 | 158.6 | 538 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 114 | 122 | 288 | 367 | 500 | 460 | 454 | 370 | 295 | 176 | 56 | 2 | 0 | 0 | 0 | 0 | 0 | 133.9 | 500 |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 15 | 27 | 88 | 217 | 257 | 378 | 497 | 430 | 315 | 179 | 56 | 2 | 0 | 0 | 0 | 0 | 0 | 102.7 | 497 |
| 28-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 112 | 231 | 351 | 429 | 514 | 525 | 477 | 388 | 271 | 143 | 55 | 2 | 0 | 0 | 0 | 0 | 0 | 146.3 | 525 |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 91 | 213 | 334 | 419 | 491 | 509 | 478 | 397 | 283 | 153 | 47 | 2 | 0 | 0 | 0 | 0 | 0 | 142.7 | 509 |
| 30-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 43 | 84 | 189 | 296 | 246 | 189 | 176 | 147 | 109 | 54 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 64.4 | 296 |
| | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 26.9 | 104.1 | 205.4 | 290.7 | 350.9 | 408.6 | 413.7 | 389.6 | 314.5 | 243.0 | 142.5 | 68.7 | 12.9 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | Diurnal Average |
| | | 0 | 0 | 0 | 0 | 0 | 8 | 75 | 213 | 359 | 495 | 594 | 674 | 654 | 643 | 566 | 453 | 308 | 139 | 53 | 2 | 0 | 0 | 0 | 0 | Diurnal Maximum |





| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Speed: 29 km/h on Sep 27 15:00 | Maximum Daily Speed Average: 16.4 km/h on Sep 11 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 21 03:00 | Minimum Daily Speed Average: 0.4 km/h on Sep 9 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 5.7 km/h at hour 15 | Minimum Diurnal Speed Average: 2.0 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 4.1 km/h 235.3 deg | Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 7 Median = 9 Q ₃ = 13 P ₉₀ = 17 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 | NNE7 | N7 | N7 | N6 | N6 | N4 | N6 | NNE7 | NNE7 | N9 | NNE10 | NNE11 | NNE13 | NNE15 | NE10 | NW3 | NNE11 | ENE5 | N3 | NNW7 | N5 | NNW4 | WNW2 | SSW5 | NNE6.2 | NNE15 |
| 2-Sep | SSW10 | SW7 | SW9 | WSW10 | SW8 | SW9 | SW10 | SW10 | SW10 | SW10 | WSW5 | S9 | SSW11 | S9 | SSW6 | SSW5 | SSW6 | SW8 | W1 | SE2 | WNW3 | N11 | N6 | NNW7 | SW5.4 | N11 |
| 3-Sep | N6 | WNW5 | W8 | W11 | W11 | W10 | W13 | WNW13 | WNW12 | NW18 | NW18 | NNW18 | NNW21 | NW21 | NW21 | NNW23 | NNW25 | NNW24 | NW20 | NW26 | NW27 | NW24 | NW21 | NW19 | NW16.2 | NW27 |
| 4-Sep | WNW19 | W12 | W11 | W13 | W14 | SW9 | SW9 | SW7 | WNW15 | W16 | WNW17 | W15 | WNW14 | WNW13 | WNW12 | WNW11 | W9 | W3 | S3 | S5 | SSW6 | SSW6 | SW7 | SSW8 | W9.0 | WNW19 |
| 5-Sep | SSW10 | SSW8 | SSW9 | SSW11 | S9 | S11 | S9 | S7 | S8 | S10 | S11 | S13 | S14 | S13 | S12 | S10 | SSE8 | SE4 | E4 | ESE4 | SE6 | SE5 | ESE3 | N2 | S7.4 | S14 |
| 6-Sep | NW2 | NNE1 | SSE3 | SSW8 | SSW9 | SSW9 | SSW9 | SSW8 | S10 | S7 | S10 | S11 | S12 | S11 | SSE10 | S10 | SSE9 | S10 | S12 | SW6 | S7 | SSW3 | SSW5 | S4 | S7.3 | S12 |
| 7-Sep | S4 | WSW2 | S5 | SSW6 | S7 | SSW7 | S7 | S7 | SSE7 | SE8 | ESE8 | ESE8 | SSE9 | SSE8 | S8 | S10 | S9 | SSE7 | WSW3 | NNW3 | NW4 | SSW8 | WSW7 | SW5 | S5.1 | S10 |
| 8-Sep | SSW7 | S9 | SSW9 | SSW7 | SSE4 | S7 | S5 | S5 | NE3 | ESE5 | NE5 | NNE4 | SSE3 | SSW5 | NE6 | S8 | SSW11 | N8 | ESE2 | N2 | N8 | NNW6 | NNW6 | WNW11 | SSW1.4 | SSW11 |
| 9-Sep | NW6 | NW11 | NW10 | WNW9 | NNE8 | NNE7 | NNE8 | NNE9 | NNE9 | NNW7 | NW10 | WNW8 | WNW7 | SSE5 | SSW9 | S9 | S10 | S9 | SSE7 | SE8 | SE8 | SE9 | SSE9 | SSE9 | WSW0.4 | NW11 |
| 10-Sep | SSE9 | SSE10 | SE11 | SSE11 | SSE12 | S12 | S10 | SSE8 | S7 | SSW10 | SSW12 | SW10 | W14 | WNW17 | W17 | W19 | W15 | WNW21 | W17 | W15 | W17 | WNW18 | WNW15 | N11 | WSW7.9 | WNW21 |
| 11-Sep | N20 | N23 | N25 | N26 | N26 | N24 | N25 | N23 | N23 | N23 | N21 | NNE15 | NNE17 | N15 | NNW16 | NNW15 | NW17 | NNW13 | NW14 | NW13 | WNW11 | W9 | WSW9 | W9 | NNW16.4 | N26 |
| 12-Sep | W10 | W9 | WSW4 | SW4 | SSW4 | SW8 | SSW8 | SSW8 | S8 | SSW8 | SW11 | SSW11 | SSW11 | SSW13 | SSW14 | SSW12 | SSW13 | S9 | SSE7 | SSE9 | S10 | S9 | SSW6 | SSW7 | SSW7.9 | SSW14 |
| 13-Sep | SSW7 | SSW8 | S10 | S7 | S8 | S8 | S10 | SSW12 | SSW16 | SSW17 | SSW18 | SSW21 | SSW22 | SW21 | WSW16 | SW15 | SSW16 | SSW12 | SW10 | SSW11 | SW12 | WSW12 | WSW10 | WSW7 | SSW12.1 | SSW22 |
| 14-Sep | W6 | WNW4 | WNW2 | SSW6 | SSW5 | W4 | WSW2 | SSW1 | N3 | WNW2 | SSW7 | S7 | S8 | S9 | S11 | SSW10 | WNW12 | N13 | NNE3 | SW6 | WSW10 | WSW11 | W12 | W11 | WSW4.1 | N13 |
| 15-Sep | W7 | NE2 | NE4 | ENE4 | NNE5 | ENE4 | ESE3 | S2 | ENE6 | ENE4 | SSE3 | SE4 | SE5 | SE5 | ESE3 | E3 | ENE5 | NE5 | NNE5 | NNW3 | W2 | SW2 | SW3 | SSW4 | E1.6 | W7 |
| 16-Sep | SSW9 | SSW11 | SSW15 | SSW13 | SSW13 | S10 | S10 | SSW13 | SSW12 | SSW11 | SSW13 | SSW14 | SW16 | WSW16 | SW17 | SW15 | WSW14 | SW10 | SSW7 | SSW9 | SSW9 | SW7 | SSW7 | SSW7 | SSW11.2 | SW17 |
| 17-Sep | S8 | SSW11 | SSW12 | SSW7 | S6 | S3 | SSW7 | SSW10 | SSW9 | SSW12 | SW13 | SW12 | SSW12 | SSW13 | SSW12 | SW12 | WSW10 | SW9 | SW7 | SW7 | SW6 | SW9 | SW11 | SW11 | SSW9.2 | SW13 |
| 18-Sep | WSW11 | W5 | SW5 | SW6 | W4 | SW7 | SW7 | SSW6 | SW8 | W8 | WNW17 | WNW20 | WNW18 | WNW18 | NW15 | NW14 | NW14 | NW7 | NNE6 | NNW7 | NNW7 | NE3 | NW3 | NW4 | WNW6.9 | WNW20 |
| 19-Sep | NNW8 | WNW7 | WNW10 | WNW12 | WNW12 | WSW4 | SW9 | SW11 | SW9 | WSW8 | NW11 | NW10 | NW13 | NW15 | NW18 | NW14 | NNW10 | NNW15 | NW11 | WNW10 | WNW8 | NW9 | NNW12 | NNW11 | NW9.1 | NW18 |
| 20-Sep | NNW6 | WNW10 | NW8 | NNW5 | NW2 | W3 | W3 | NNW3 | NNW4 | N4 | NW1 | N4 | E6 | E8 | E7 | E8 | E7 | E7 | ENE7 | NE6 | NE5 | NNW5 | NNE4 | NW2 | NNE2.8 | WNW10 |
| 21-Sep | NNE3 | N2 | SSW1 | WNW3 | SSW5 | SSW5 | S6 | S8 | S8 | S10 | S11 | SSW14 | SSW14 | SSW14 | SW13 | SW11 | SW8 | SW8 | SSW7 | SSW9 | SW8 | SW6 | SW7 | SSW6 | SSW7.0 | SSW14 |
| 22-Sep | S4 | SSE5 | S7 | SSW8 | S9 | S11 | S11 | S12 | S12 | S11 | S12 | S9 | SSW13 | SSW20 | S20 | SSW19 | S16 | S14 | S8 | S10 | S13 | SSE12 | SSE10 | S9 | S11.4 | S20 |
| 23-Sep | S7 | S8 | S8 | S6 | S6 | S7 | SSE9 | SSE10 | SSE12 | SSE15 | SSE16 | SSE19 | SSE17 | SSE16 | SSE14 | SSE16 | SSE16 | SSE15 | SSE13 | SSE14 | SSE13 | S13 | SSE15 | S14 | SSE12.2 | SSE19 |
| 24-Sep | S11 | S9 | S8 | SSW7 | SSW8 | SSW9 | SSW13 | SSW11 | SSW13 | SW15 | SW15 | W20 | W21 | W22 | W19 | W25 | W24 | W14 | WSW10 | WSW8 | SW9 | SW9 | SW10 | SW12 | WSW11.5 | W25 |
| 25-Sep | WSW13 | WSW15 | WSW16 | WSW15 | SW15 | SW14 | SW13 | SW12 | SW14 | WSW13 | W18 | WNW16 | WNW19 | WNW16 | WNW17 | WNW17 | NW15 | NNW9 | NNW3 | SSW4 | W3 | WSW4 | SSW5 | SSW5 | W10.4 | WNW19 |
| 26-Sep | SSW3 | SSW6 | S7 | SSW7 | S3 | SSW5 | S4 | SSE3 | S5 | S8 | S6 | S8 | S10 | SSE12 | SSE11 | SE13 | S17 | SSE11 | SSE11 | SSE11 | SSE13 | SSE11 | S8 | SSE4 | S8.0 | S17 |
| 27-Sep | SSE2 | SSW5 | SSE8 | SW6 | SSW8 | SSW9 | SW10 | SSW10 | SSW14 | W25 | W22 | W23 | W19 | W26 | W29 | WSW23 | WSW17 | SW14 | SW14 | SW12 | WSW13 | WSW13 | WNW10 | W8 | WSW12.5 | W29 |
| 28-Sep | SW10 | SSW12 | SSW13 | SSW11 | SSW9 | SSW12 | SSW12 | SSW8 | SSW9 | S12 | SSW14 | SSW15 | SSW15 | SW13 | SW11 | SW10 | SSW8 | SSW7 | SSW6 | SSW8 | SW7 | W5 | WSW5 | SSW5 | SSW9.5 | SSW15 |
| 29-Sep | SSW7 | SSW6 | S6 | SSW8 | SSW7 | S7 | SSW9 | SSW9 | SSW11 | S7 | S6 | SSE6 | S4 | SSE5 | SSE6 | SE7 | SE7 | SE7 | SSE6 | SSE5 | NW8 | NNW7 | N7 | NNW7 | S4.0 | SSW11 |
| 30-Sep | N7 | NNE6 | NNE7 | NNE7 | NNE7 | NE6 | NNE8 | NNE12 | NNE14 | NNE18 | NNE22 | NNE21 | NNE21 | NNE23 | N24 | NNE24 | NNE22 | NNE20 | NNE18 | NNE15 | NNE15 | NNE19 | NNE21 | NNE19 | NNE15.6 | N24 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|-------|-------|-------|--------|--------|--------|--------|-------|--------|-------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--------|--------|--------|-----------------|
| WSW3.4 | WSW3.6 | SW3.9 | SW4.4 | SW3.8 | SSW4.7 | SSW5.1 | SSW4.5 | SSW4.4 | SW4.4 | WSW5.2 | SW5.0 | WSW5.5 | WSW5.6 | WSW5.7 | WSW5.7 | WSW4.8 | WSW2.6 | SW2.0 | SW2.7 | WSW3.6 | WSW3.8 | WSW3.5 | WSW3.6 | Diurnal Average |
| N20 | N23 | NNW25 | N26 | N26 | N24 | N25 | N23 | N23 | W25 | W22 | W23 | SSW22 | W26 | W29 | W25 | NNW25 | NNW24 | NW20 | NW26 | NW27 | NW24 | NW21 | NW19 | Diurnal Maximum |

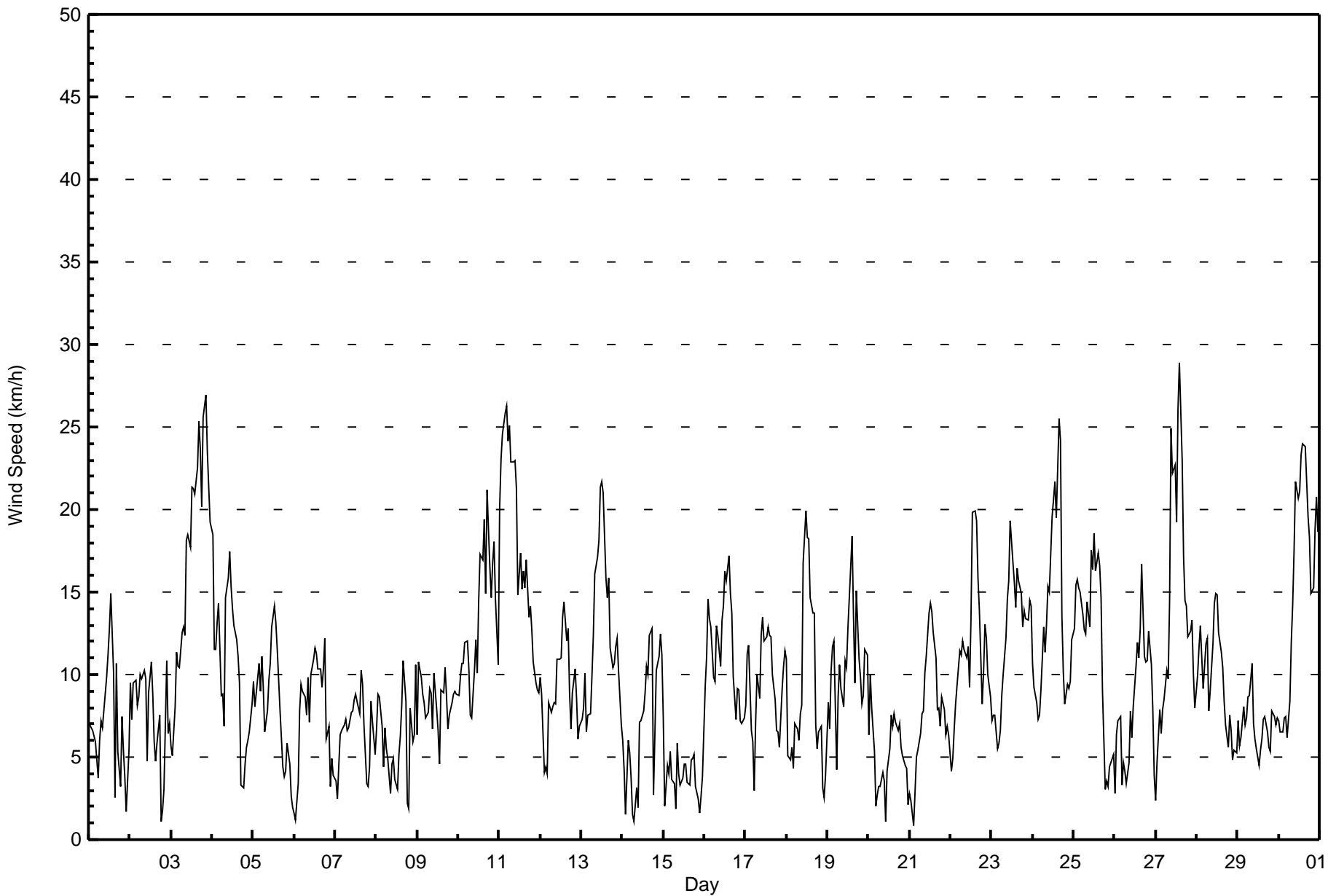
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
CNRL Horizon - September 2016

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
CNRL Horizon - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 132 | 18.33 | 18.33 |
| 6 - 11 | 358 | 49.72 | 68.06 |
| 12 - 19 | 181 | 25.14 | 93.19 |
| 20 - 28 | 48 | 6.67 | 99.86 |
| 29 - 38 | 1 | 0.14 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
CNRL Horizon - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 7 | 8 | 7 | 5 | 2 | 6 | 6 | 11 | 13 | 20 | 5 | 8 | 10 | 7 | 8 | 9 | 132 |
| 6 - 11 | 14 | 17 | 3 | 3 | 6 | 2 | 9 | 28 | 80 | 82 | 50 | 13 | 14 | 12 | 12 | 13 | 358 |
| 12 - 19 | 2 | 12 | 0 | 0 | 0 | 0 | 1 | 18 | 17 | 39 | 20 | 12 | 18 | 22 | 14 | 6 | 181 |
| 20 - 28 | 11 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 1 | 9 | 2 | 7 | 5 | 48 |
| 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 | 34 | 45 | 10 | 8 | 8 | 8 | 16 | 57 | 111 | 144 | 76 | 34 | 52 | 43 | 41 | 33 | 720 |

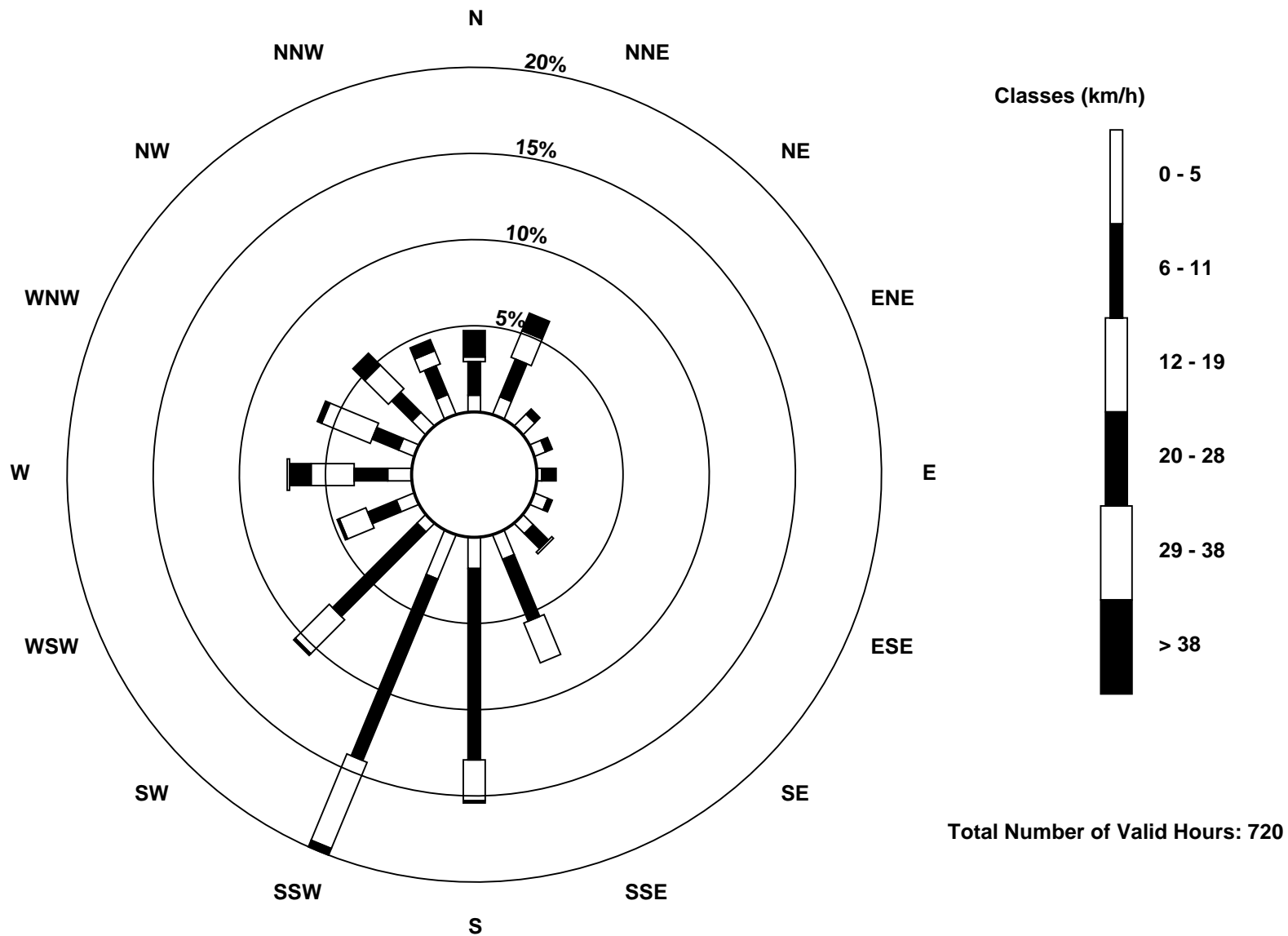
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
CNRL Horizon (AMS 15)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
CNRL Horizon - September 2016

| | |
|---------------------------------------------------------------|---------------------------------|
| Direction of Maximum Speed: 270 deg on Sep 27 15:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 344.9 deg on Sep 11 | Hours of Data: 720 |
| Direction of Minimum Speed: 204 deg on Sep 21 03:00 | Hours of Missing Data: 0 |
| Direction of Minimum Daily Speed Average: 0.4 deg on Sep 9 | Percent Operational Time: 100.0 |
| Monthly Average Direction: 237.5 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 | 13 | 7 | 8 | 358 | 350 | 8 | 0 | 30 | 19 | 10 | 16 | 26 | 20 | 19 | 37 | 313 | 12 | 68 | 355 | 346 | 356 | 331 | 288 | 211 | 11.4 |
| 2-Sep | 211 | 218 | 225 | 245 | 232 | 216 | 226 | 215 | 218 | 225 | 258 | 180 | 192 | 191 | 212 | 213 | 206 | 216 | 274 | 133 | 291 | 357 | 8 | 331 | 223.8 |
| 3-Sep | 1 | 303 | 278 | 271 | 266 | 259 | 260 | 282 | 291 | 317 | 319 | 327 | 327 | 322 | 320 | 331 | 327 | 327 | 324 | 321 | 317 | 313 | 308 | 304 | 312.4 |
| 4-Sep | 300 | 275 | 261 | 273 | 274 | 234 | 214 | 215 | 283 | 279 | 282 | 276 | 294 | 294 | 283 | 280 | 280 | 182 | 183 | 202 | 209 | 214 | 203 | | 268.1 |
| 5-Sep | 209 | 210 | 207 | 204 | 186 | 182 | 187 | 181 | 183 | 178 | 186 | 172 | 170 | 177 | 186 | 180 | 163 | 134 | 98 | 115 | 136 | 140 | 110 | 11 | 178.2 |
| 6-Sep | 313 | 12 | 162 | 193 | 201 | 204 | 213 | 193 | 190 | 188 | 182 | 176 | 173 | 177 | 164 | 174 | 167 | 170 | 173 | 215 | 180 | 200 | 199 | 191 | 184.3 |
| 7-Sep | 187 | 243 | 190 | 195 | 189 | 194 | 190 | 179 | 166 | 136 | 123 | 123 | 160 | 164 | 176 | 176 | 175 | 161 | 248 | 343 | 317 | 211 | 243 | 228 | 180.1 |
| 8-Sep | 195 | 189 | 199 | 199 | 163 | 188 | 181 | 183 | 51 | 123 | 38 | 24 | 150 | 192 | 54 | 184 | 212 | 2 | 104 | 360 | 360 | 346 | 336 | 302 | 196.3 |
| 9-Sep | 309 | 307 | 313 | 299 | 29 | 22 | 30 | 14 | 25 | 345 | 306 | 303 | 300 | 168 | 200 | 176 | 178 | 177 | 152 | 144 | 140 | 143 | 148 | 157 | 251.4 |
| 10-Sep | 157 | 148 | 136 | 151 | 161 | 172 | 172 | 168 | 183 | 200 | 210 | 221 | 268 | 282 | 270 | 275 | 263 | 282 | 269 | 268 | 273 | 284 | 286 | 349 | 243.9 |
| 11-Sep | 353 | 350 | 349 | 350 | 349 | 353 | 354 | 355 | 358 | 360 | 357 | 13 | 13 | 11 | 338 | 344 | 324 | 328 | 315 | 315 | 303 | 278 | 251 | 263 | 344.9 |
| 12-Sep | 276 | 272 | 247 | 218 | 196 | 217 | 212 | 194 | 191 | 196 | 215 | 205 | 204 | 198 | 209 | 203 | 197 | 170 | 147 | 157 | 178 | 179 | 198 | 193 | 201.8 |
| 13-Sep | 204 | 192 | 187 | 174 | 178 | 181 | 188 | 198 | 208 | 207 | 208 | 196 | 202 | 216 | 241 | 222 | 212 | 210 | 221 | 207 | 217 | 240 | 246 | 244 | 209.5 |
| 14-Sep | 276 | 285 | 301 | 197 | 211 | 267 | 244 | 197 | 6 | 284 | 194 | 184 | 171 | 184 | 188 | 205 | 301 | 8 | 12 | 230 | 238 | 256 | 271 | 275 | 242.3 |
| 15-Sep | 267 | 52 | 49 | 66 | 28 | 76 | 106 | 175 | 71 | 59 | 160 | 124 | 131 | 140 | 117 | 88 | 58 | 47 | 13 | 347 | 263 | 233 | 230 | 195 | 80.5 |
| 16-Sep | 201 | 203 | 204 | 198 | 199 | 187 | 188 | 198 | 202 | 204 | 196 | 195 | 218 | 240 | 220 | 234 | 239 | 223 | 209 | 202 | 203 | 219 | 201 | 195 | 208.7 |
| 17-Sep | 188 | 196 | 205 | 210 | 180 | 178 | 193 | 198 | 198 | 202 | 220 | 214 | 198 | 204 | 212 | 228 | 237 | 228 | 221 | 219 | 236 | 234 | 226 | 226 | 211.6 |
| 18-Sep | 237 | 267 | 231 | 214 | 261 | 217 | 218 | 204 | 225 | 280 | 293 | 285 | 290 | 300 | 310 | 313 | 325 | 318 | 15 | 331 | 341 | 37 | 314 | 309 | 288.0 |
| 19-Sep | 342 | 286 | 302 | 302 | 296 | 250 | 233 | 229 | 233 | 256 | 310 | 305 | 310 | 314 | 307 | 321 | 342 | 337 | 316 | 298 | 287 | 306 | 347 | 336 | 304.3 |
| 20-Sep | 346 | 302 | 307 | 333 | 317 | 277 | 278 | 347 | 337 | 349 | 316 | 11 | 82 | 81 | 95 | 89 | 86 | 85 | 62 | 56 | 44 | 339 | 16 | 326 | 22.0 |
| 21-Sep | 32 | 357 | 204 | 289 | 201 | 198 | 191 | 183 | 186 | 184 | 189 | 203 | 203 | 210 | 219 | 235 | 236 | 226 | 198 | 201 | 217 | 232 | 223 | 200 | 208.3 |
| 22-Sep | 183 | 154 | 186 | 195 | 189 | 189 | 186 | 184 | 183 | 190 | 188 | 185 | 198 | 193 | 185 | 192 | 186 | 184 | 171 | 171 | 180 | 168 | 162 | 179 | 184.1 |
| 23-Sep | 173 | 178 | 169 | 191 | 186 | 169 | 167 | 155 | 154 | 160 | 166 | 166 | 163 | 155 | 152 | 154 | 157 | 157 | 153 | 159 | 166 | 169 | 168 | 172 | 163.0 |
| 24-Sep | 174 | 178 | 184 | 195 | 193 | 200 | 203 | 202 | 206 | 225 | 229 | 262 | 260 | 265 | 264 | 271 | 281 | 267 | 245 | 241 | 235 | 224 | 225 | 230 | 237.8 |
| 25-Sep | 242 | 242 | 247 | 244 | 236 | 225 | 218 | 236 | 234 | 258 | 269 | 282 | 287 | 292 | 299 | 298 | 306 | 310 | 316 | 210 | 270 | 250 | 211 | 195 | 261.1 |
| 26-Sep | 209 | 195 | 185 | 193 | 188 | 192 | 173 | 167 | 184 | 182 | 183 | 169 | 174 | 166 | 151 | 146 | 175 | 163 | 161 | 159 | 162 | 164 | 175 | 159 | 170.2 |
| 27-Sep | 164 | 195 | 153 | 222 | 198 | 211 | 220 | 204 | 207 | 280 | 274 | 269 | 268 | 268 | 270 | 249 | 250 | 233 | 235 | 230 | 241 | 255 | 284 | 262 | 249.3 |
| 28-Sep | 223 | 202 | 199 | 199 | 209 | 207 | 209 | 207 | 193 | 184 | 199 | 196 | 211 | 216 | 220 | 214 | 210 | 200 | 205 | 193 | 223 | 280 | 238 | 209 | 207.3 |
| 29-Sep | 201 | 197 | 186 | 208 | 206 | 190 | 193 | 200 | 195 | 189 | 183 | 163 | 175 | 148 | 152 | 131 | 127 | 138 | 154 | 163 | 317 | 341 | 0 | 348 | 182.2 |
| 30-Sep | 355 | 20 | 27 | 23 | 23 | 36 | 22 | 15 | 18 | 19 | 19 | 19 | 16 | 14 | 10 | 12 | 14 | 18 | 19 | 21 | 18 | 17 | 15 | 13 | 16.6 |

247.2 238.7 224.9 232.4 224.2 208.6 208.9 206.8 212.8 233.1 242.2 231.7 236.7 240.6 247.2 242.4 250.2 251.6 235.6 231.3 246.7 256.6 256.8 252.3

Diurnal Average

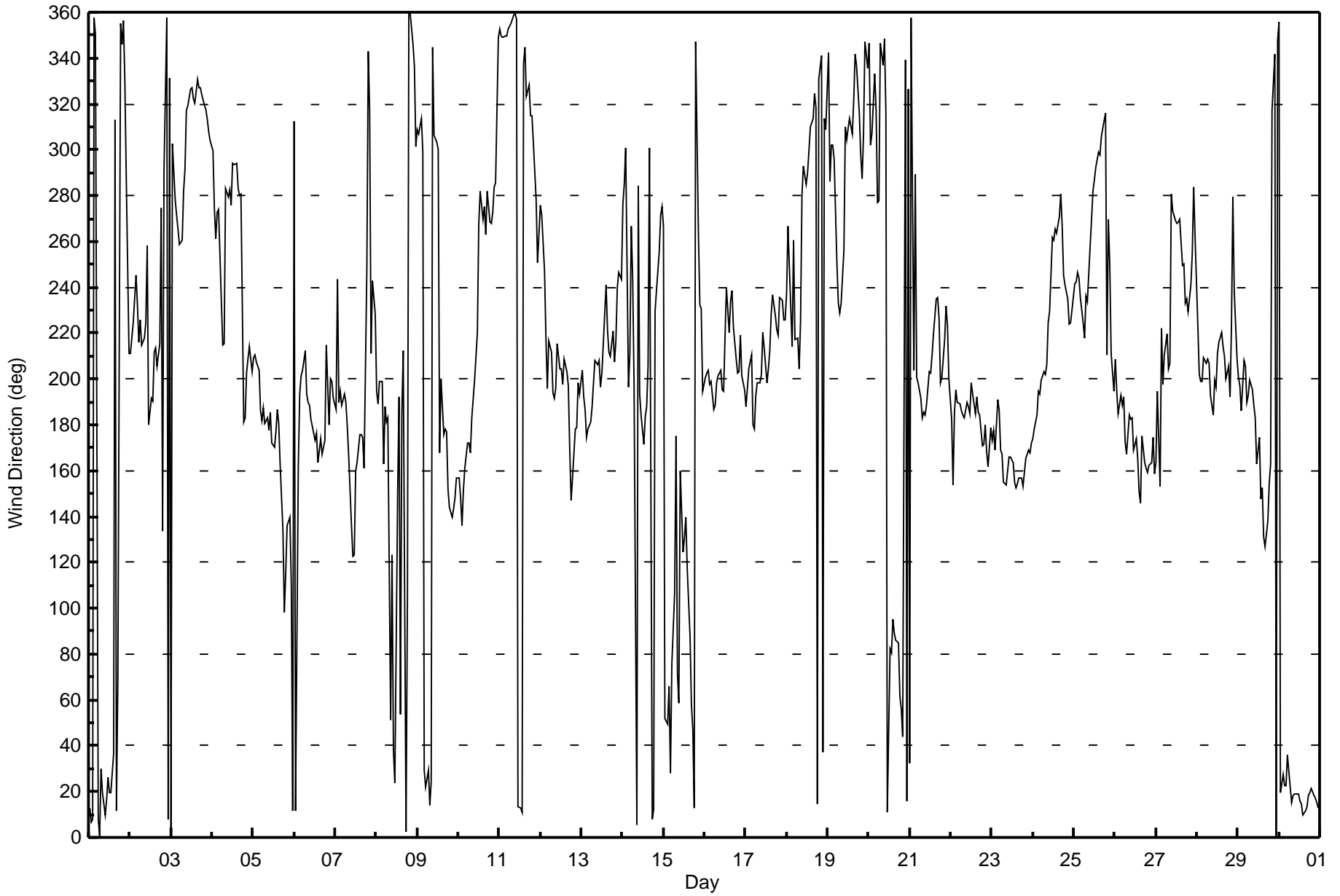
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
CNRL Horizon - September 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 93 deg on Sep 1 16:00 Minimum Value: 6 deg on Sep 4 22:00 Percentiles: P ₁ = 9 P ₁₀ = 12 Q ₁ = 14 Median = 19 Q ₃ = 25 P ₉₀ = 41 P ₉₉ = 76 | | | | | | | | | | | | | | | | | | 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 | 20 | 18 | 19 | 18 | 13 | 24 | 25 | 18 | 21 | 22 | 21 | 20 | 21 | 21 | 17 | 93 | 40 | 57 | 58 | 29 | 26 | 37 | 65 | 17 | 93 |
| 2-Sep | 15 | 22 | 13 | 14 | 16 | 14 | 14 | 16 | 20 | 22 | 48 | 29 | 19 | 22 | 30 | 24 | 17 | 21 | 69 | 65 | 35 | 21 | 21 | 23 | 69 |
| 3-Sep | 19 | 37 | 12 | 13 | 15 | 15 | 14 | 19 | 15 | 10 | 10 | 15 | 13 | 13 | 12 | 14 | 13 | 15 | 15 | 12 | 10 | 9 | 10 | 8 | 37 |
| 4-Sep | 9 | 14 | 15 | 12 | 12 | 23 | 13 | 27 | 16 | 14 | 17 | 22 | 22 | 21 | 16 | 23 | 20 | 31 | 12 | 7 | 11 | 6 | 12 | 9 | 31 |
| 5-Sep | 10 | 12 | 12 | 11 | 17 | 17 | 30 | 23 | 21 | 22 | 27 | 29 | 24 | 25 | 25 | 25 | 22 | 25 | 9 | 15 | 13 | 16 | 78 | 60 | 78 |
| 6-Sep | 34 | 58 | 31 | 9 | 11 | 9 | 16 | 19 | 20 | 28 | 23 | 29 | 28 | 31 | 30 | 26 | 23 | 13 | 17 | 26 | 22 | 45 | 15 | 23 | 58 |
| 7-Sep | 16 | 48 | 27 | 11 | 13 | 15 | 15 | 22 | 22 | 28 | 29 | 27 | 31 | 36 | 41 | 26 | 22 | 18 | 54 | 58 | 43 | 21 | 19 | 27 | 58 |
| 8-Sep | 36 | 13 | 15 | 23 | 46 | 12 | 19 | 21 | 72 | 47 | 34 | 62 | 73 | 50 | 44 | 31 | 20 | 65 | 76 | 64 | 21 | 27 | 31 | 16 | 76 |
| 9-Sep | 26 | 8 | 13 | 15 | 18 | 21 | 22 | 21 | 25 | 33 | 17 | 33 | 36 | 70 | 36 | 29 | 25 | 23 | 17 | 20 | 20 | 21 | 22 | 26 | 70 |
| 10-Sep | 19 | 23 | 21 | 21 | 18 | 18 | 15 | 17 | 21 | 19 | 16 | 18 | 24 | 13 | 20 | 17 | 18 | 16 | 14 | 14 | 14 | 14 | 16 | 28 | 28 |
| 11-Sep | 22 | 21 | 21 | 21 | 22 | 21 | 21 | 22 | 22 | 23 | 22 | 21 | 21 | 20 | 18 | 22 | 15 | 15 | 19 | 11 | 9 | 20 | 13 | 14 | 23 |
| 12-Sep | 11 | 12 | 61 | 29 | 36 | 10 | 14 | 16 | 20 | 25 | 30 | 27 | 29 | 28 | 24 | 25 | 20 | 22 | 18 | 18 | 12 | 13 | 14 | 12 | 61 |
| 13-Sep | 9 | 13 | 13 | 17 | 16 | 12 | 16 | 15 | 15 | 17 | 19 | 17 | 17 | 19 | 19 | 20 | 17 | 16 | 14 | 12 | 16 | 19 | 14 | 24 | 24 |
| 14-Sep | 19 | 52 | 76 | 14 | 9 | 29 | 77 | 62 | 37 | 69 | 29 | 28 | 41 | 31 | 29 | 26 | 46 | 20 | 85 | 11 | 15 | 13 | 13 | 11 | 85 |
| 15-Sep | 21 | 75 | 40 | 38 | 13 | 44 | 31 | 42 | 31 | 50 | 55 | 55 | 47 | 51 | 64 | 76 | 30 | 15 | 19 | 27 | 59 | 40 | 32 | 62 | 76 |
| 16-Sep | 11 | 11 | 10 | 13 | 13 | 15 | 14 | 14 | 17 | 19 | 17 | 21 | 23 | 21 | 20 | 20 | 19 | 15 | 14 | 9 | 10 | 12 | 13 | 12 | 23 |
| 17-Sep | 13 | 14 | 13 | 19 | 18 | 18 | 16 | 14 | 17 | 17 | 19 | 22 | 18 | 18 | 16 | 19 | 20 | 14 | 13 | 11 | 19 | 11 | 11 | 11 | 22 |
| 18-Sep | 13 | 33 | 15 | 25 | 40 | 20 | 15 | 18 | 19 | 28 | 16 | 13 | 12 | 9 | 12 | 9 | 12 | 28 | 18 | 42 | 40 | 23 | 52 | 66 | 66 |
| 19-Sep | 20 | 24 | 16 | 10 | 16 | 62 | 11 | 12 | 14 | 24 | 19 | 21 | 19 | 16 | 16 | 14 | 25 | 21 | 9 | 10 | 10 | 32 | 19 | 18 | 62 |
| 20-Sep | 34 | 7 | 11 | 37 | 50 | 32 | 23 | 40 | 36 | 57 | 86 | 52 | 50 | 41 | 42 | 29 | 17 | 16 | 14 | 12 | 22 | 32 | 43 | 59 | 86 |
| 21-Sep | 62 | 56 | 70 | 47 | 21 | 13 | 14 | 17 | 18 | 21 | 25 | 20 | 22 | 23 | 23 | 21 | 19 | 15 | 10 | 9 | 13 | 13 | 17 | 12 | 70 |
| 22-Sep | 15 | 9 | 12 | 9 | 11 | 13 | 13 | 14 | 17 | 19 | 21 | 26 | 32 | 21 | 20 | 18 | 18 | 16 | 10 | 13 | 13 | 16 | 14 | 17 | 32 |
| 23-Sep | 13 | 11 | 11 | 16 | 12 | 13 | 12 | 18 | 18 | 20 | 19 | 19 | 20 | 21 | 22 | 21 | 20 | 20 | 20 | 18 | 18 | 16 | 18 | 15 | 22 |
| 24-Sep | 15 | 14 | 11 | 11 | 15 | 15 | 14 | 15 | 17 | 16 | 17 | 23 | 19 | 21 | 19 | 17 | 14 | 19 | 15 | 16 | 12 | 11 | 11 | 10 | 23 |
| 25-Sep | 12 | 13 | 13 | 12 | 12 | 10 | 12 | 12 | 15 | 22 | 15 | 21 | 15 | 19 | 16 | 15 | 12 | 9 | 36 | 17 | 52 | 34 | 28 | 35 | 52 |
| 26-Sep | 56 | 8 | 10 | 13 | 61 | 18 | 24 | 38 | 27 | 22 | 38 | 32 | 27 | 25 | 27 | 23 | 18 | 16 | 14 | 15 | 15 | 16 | 13 | 24 | 61 |
| 27-Sep | 46 | 39 | 40 | 28 | 16 | 16 | 13 | 28 | 16 | 15 | 16 | 17 | 19 | 18 | 18 | 19 | 20 | 15 | 15 | 13 | 17 | 18 | 18 | 23 | 46 |
| 28-Sep | 15 | 11 | 11 | 13 | 12 | 12 | 11 | 18 | 18 | 16 | 19 | 19 | 21 | 27 | 27 | 34 | 21 | 14 | 10 | 6 | 24 | 41 | 38 | 39 | 41 |
| 29-Sep | 18 | 23 | 19 | 13 | 12 | 11 | 9 | 15 | 17 | 23 | 32 | 39 | 58 | 46 | 52 | 35 | 21 | 15 | 11 | 21 | 15 | 13 | 16 | 11 | 58 |
| 30-Sep | 17 | 21 | 13 | 12 | 17 | 12 | 15 | 17 | 18 | 19 | 19 | 19 | 20 | 21 | 21 | 20 | 21 | 19 | 19 | 20 | 19 | 20 | 20 | 20 | 21 |
| | | | | | | | | | | | | | | | | | | 62 75 76 47 61 62 77 62 72 69 86 62 73 70 64 93 46 65 85 65 59 45 78 66 | | | | | | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | September 13, 2016 | Last Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Reason: | Routine | | |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| Gas Cert Reference | S0002488 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 50 ppm | Cal Gas Exp Date | September 26, 2017 |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 1223 |
| ZAG Make/Model | Teledyne API 701 | Serial Number | 1004 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 11040 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -623 | -623 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 856 | 857 |
| Calculated slope | 0.992762 | 1.000357 | Chamber temp | 44.9 | 44.9 |
| Calculated intercept | 1.344917 | 0.633264 | Pressure | 703.3 | 697.2 |
| Analyzer Background | 18.5 | 19.2 | Flow | 0.426 | 0.422 |
| Analyzer Coefficient | 0.993 | 0.993 | Intensity | 91 | 90 |

Analyzer make Thermo 43i Analyzer serial # 710321322

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 5000 | 81.5 | 815.0 | 815.3 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 81.5 | 815.0 | 814.3 | 1.001 |
| second point | 5000 | 40.7 | 407.0 | 406.1 | 1.002 |
| third point | 5000 | 20.3 | 203.0 | 201.8 | 1.006 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 81.5 | 815.0 | 818.3 | 0.996 |
| Average Correction Factor | | | | | 1.003 |

Corrected As found 814.7 Previous response 819.6 % change 0.6%

Notes:

Sample inlet filter replaced after as founds. Adjusted Zero.

Calibration Performed By: Jayne Rycroft



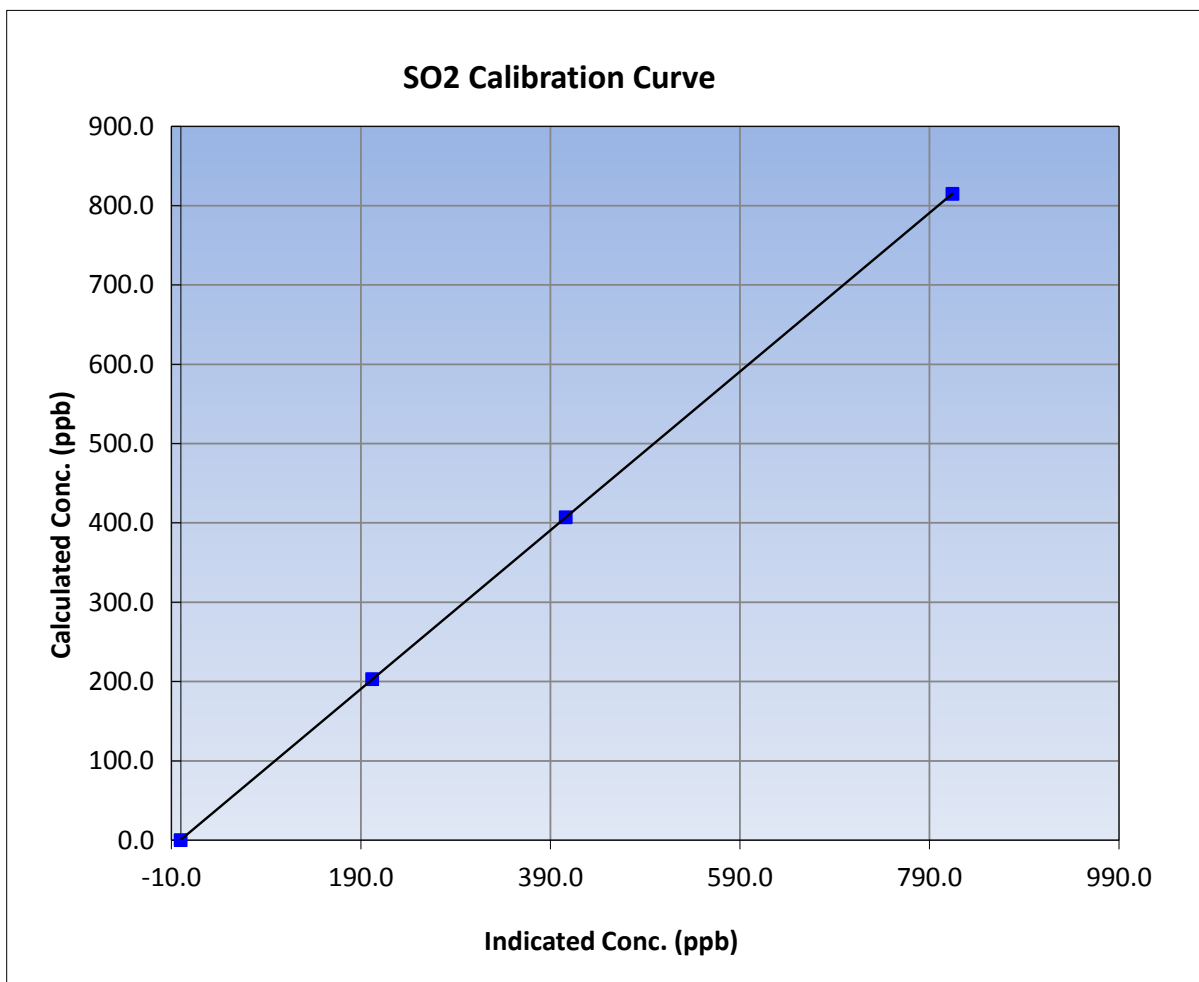
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| Analyzer make | Thermo 43i | Analyzer serial # | 710321322 |

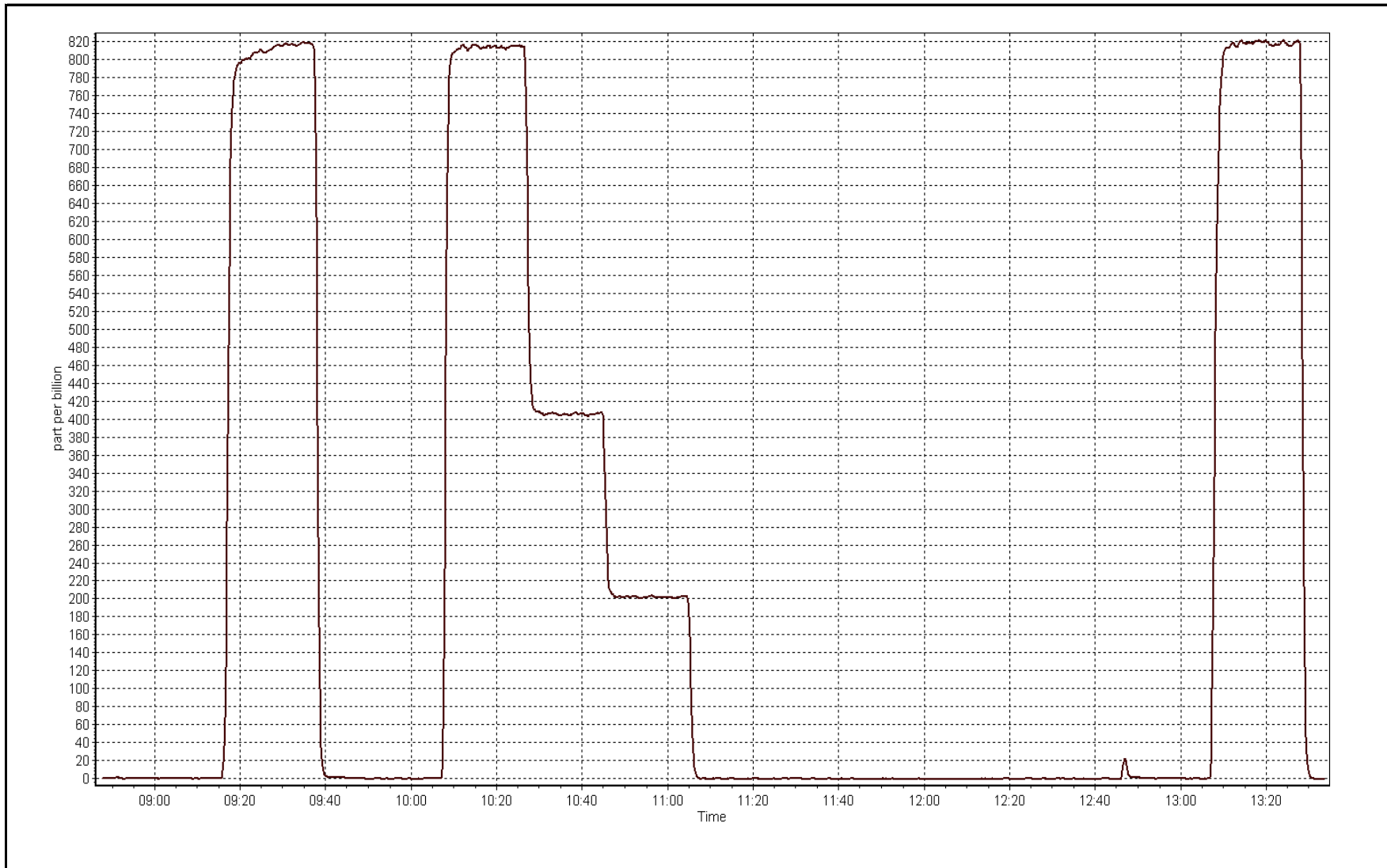
Calibration Data

| Calculated concentration (ppb) (Cc) | S0002488 | Correction factor (Cc/lc) | Statistical Evaluation | |
|-------------------------------------|----------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999999 |
| 815.0 | 814.3 | 1.0009 | | |
| 407.0 | 406.1 | 1.0022 | Slope | 1.000357 |
| 203.0 | 201.8 | 1.0059 | | |
| | | | Intercept | 0.633264 |



SO2 Calibration Plot

Date: September 13, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | September 14, 2016 | Last Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Reason: | Routine | | |
| Start Time (MST) | 9:55 | End Time (MST) | 13:36 |
| Gas Cert Reference | LL82745 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 9.6 ppm | Cal Gas Exp Date | February 22, 2016 |
| Calibrator Make/Model | API T700 | Serial Number | 1223 |
| Dil air Make/Model | API 701 | Serial Number | 1004 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 11040 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S0002486 26-Sep-17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -684 | -684 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 982 | 982 |
| Calculated slope | 0.998769 | 1.000560 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.130571 | -0.273090 | Pressure | 633.1 | 633.7 |
| Analyzer Background | 2.04 | 2.05 | Flow | 0.398 | 0.399 |
| Analyzer Coefficient | 1.161 | 1.166 | Intensity | 91 | 91 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i TLE | | Analyzer serial # | 1151680032 | |
| Converter make/model | CDN-101 | | Converter serial # | 531 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as found span | 5000 | 41.4 | 79.5 | 78.7 | 1.010 |
| SO2 scrubber check | 5000 | 20.4 | 204.0 | 0.5 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 41.5 | 79.7 | 79.7 | 1.000 |
| second point | 5000 | 20.6 | 39.6 | 40.1 | 0.986 |
| third point | 5000 | 10.2 | 19.6 | 20.0 | 0.979 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 5000 | 41.5 | 79.7 | 80.3 | 0.992 |
| Average Correction Factor | | | | | 0.988 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 78.7 | Previous response | 79.7 | % change | 1.3% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Sample filter changed and scrubber check done after as founds. Adjusted span. Pressed the home screen button twice and interrupted as left span. Corrected it and repeated the as left span.

Calibration Performed By:

Jayme Marcoux



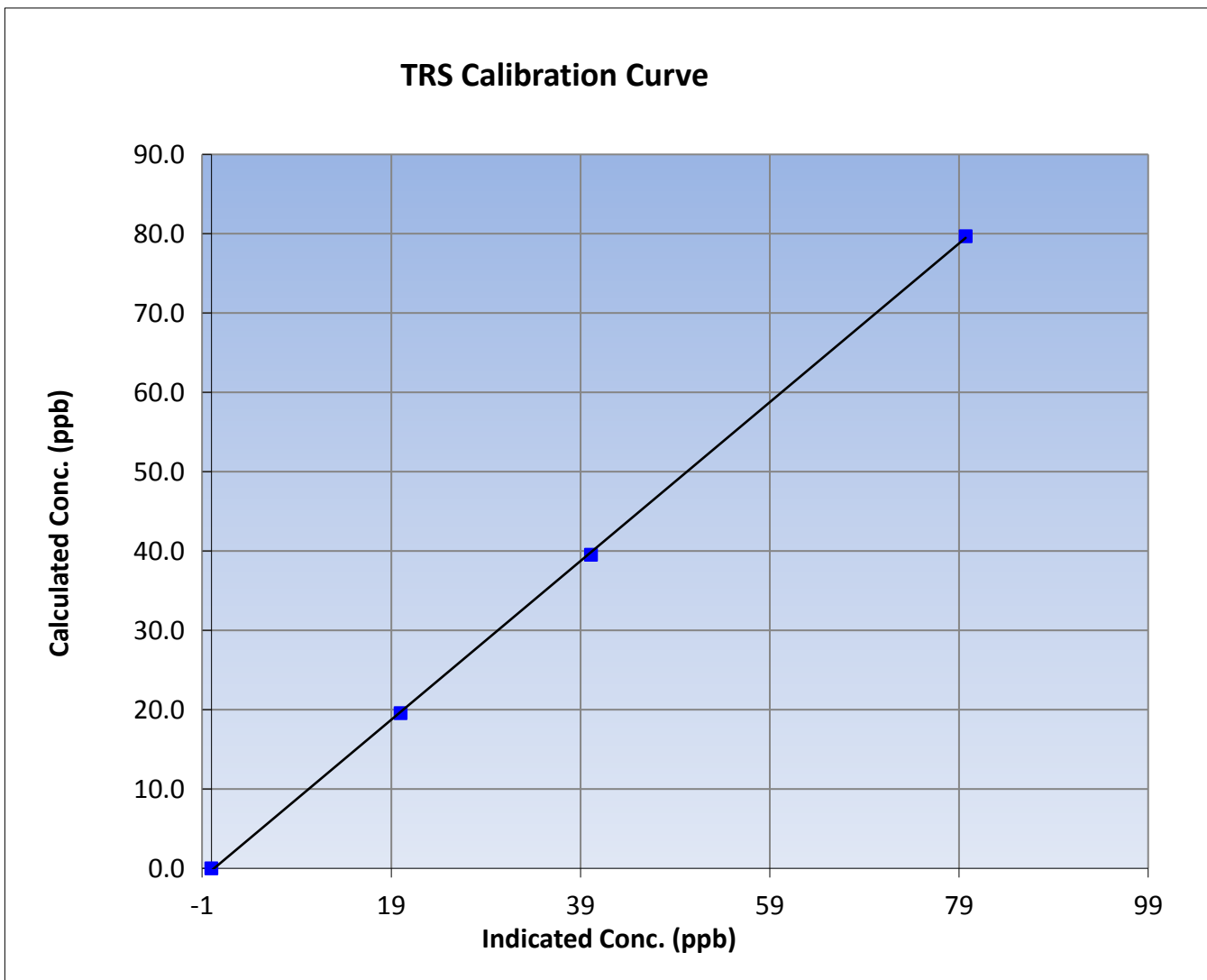
Wood Buffalo Environmental Association TRS Calibration Report

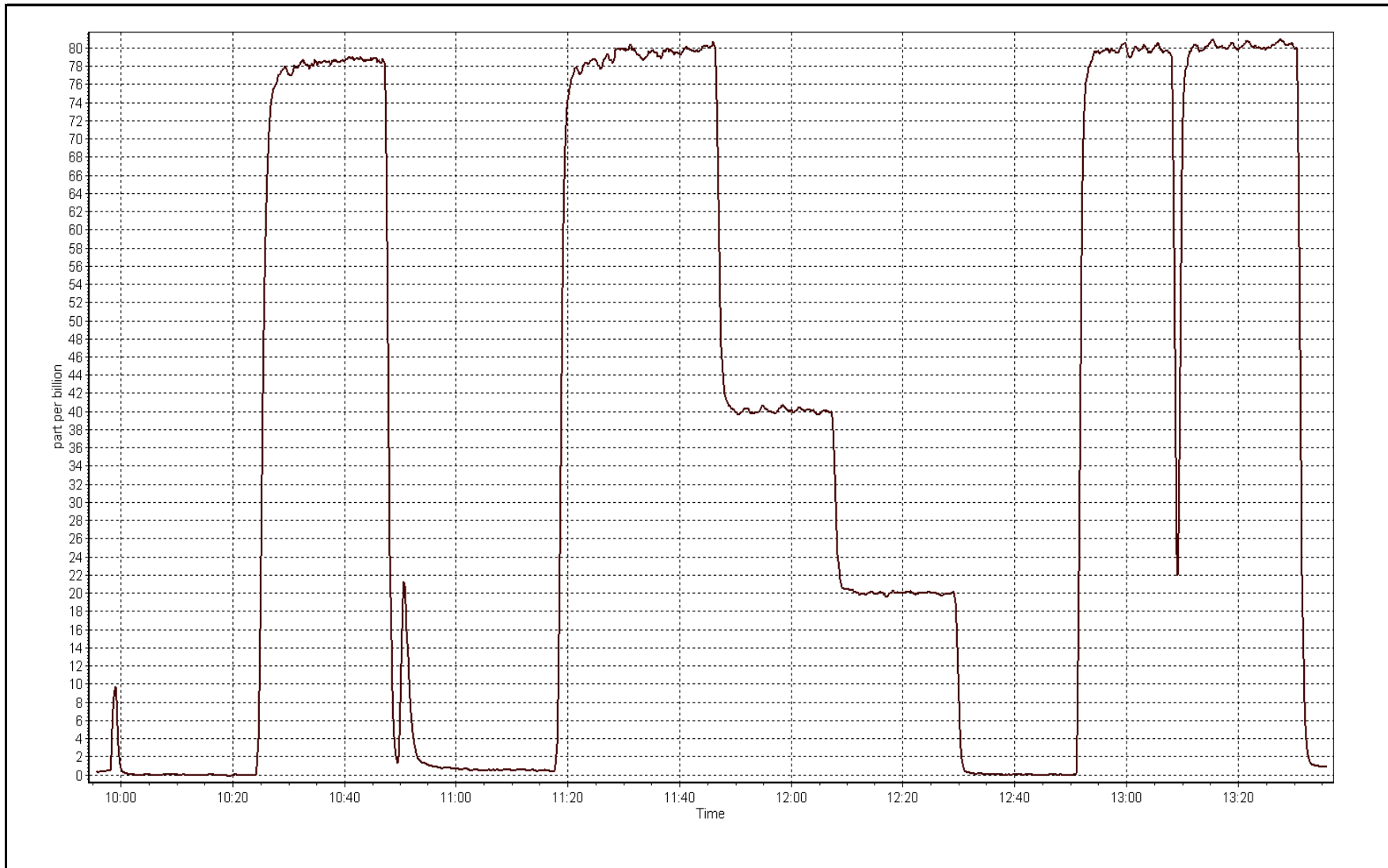
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 14, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Start Time (MST) | 9:55 | End Time (MST) | 13:36 |
| Analyzer make | Thermo 43i TLE | Analyzer serial # | 1151680032 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999931 |
| 79.7 | 79.7 | 0.9996 | | |
| 39.6 | 40.1 | 0.9858 | Slope | 1.000560 |
| 19.6 | 20.0 | 0.9792 | | |
| | | | Intercept | -0.273090 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|--------------------|
| Calibration Date | September 13, 2016 | Last Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Reason: | Routine | | |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| Gas Cert Reference | S0002488 | Cal Gas Expiry Date | September 26, 2017 |
| CH4 Cal Gas Conc. | 505 ppm | CH4 Equiv Conc. | 1046.8 ppm |
| C3H8 Cal Gas Conc. | 197 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | Teledyne API T700 | Serial Number | 1223 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1004 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 11040 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 8.7 | 8.8 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 38.0 | 38.0 |
| Calculated slope | 1.002679 | 0.999661 | Fuel Pressure | 26.3 | 26.3 |
| Calculated intercept | -0.044453 | -0.104344 | Analyzer Coeff | 3.135 | 3.135 |
| | | | Analyzer BKG | 1.940 | 1.940 |

Analyzer make: Thermo 51i-LT Analyzer serial #: 1327059295

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.10 | ---- |
| as found span | 5000 | 81.5 | 17.06 | 17.17 | 0.994 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.10 | ---- |
| high point | 5000 | 81.5 | 17.06 | 17.17 | 0.994 |
| second point | 5000 | 40.7 | 8.52 | 8.63 | 0.987 |
| third point | 5000 | 20.3 | 4.25 | 4.36 | 0.975 |
| as left zero | 5000 | 0.0 | 0.00 | 0.06 | ---- |
| as left span | 5000 | 81.5 | 17.06 | 17.11 | 0.997 |
| Average Correction Factor | | | | | 0.985 |

Corrected As found: 17.07 Previous response: 17.06 % change: -0.1%

Notes:

Sample inlet filter replaced after as founds. No adjustments made. During high point accidentally generated too high of a concentration. Corrected as soon as it was generated.

Calibration Performed By:

Jayne Rycroft



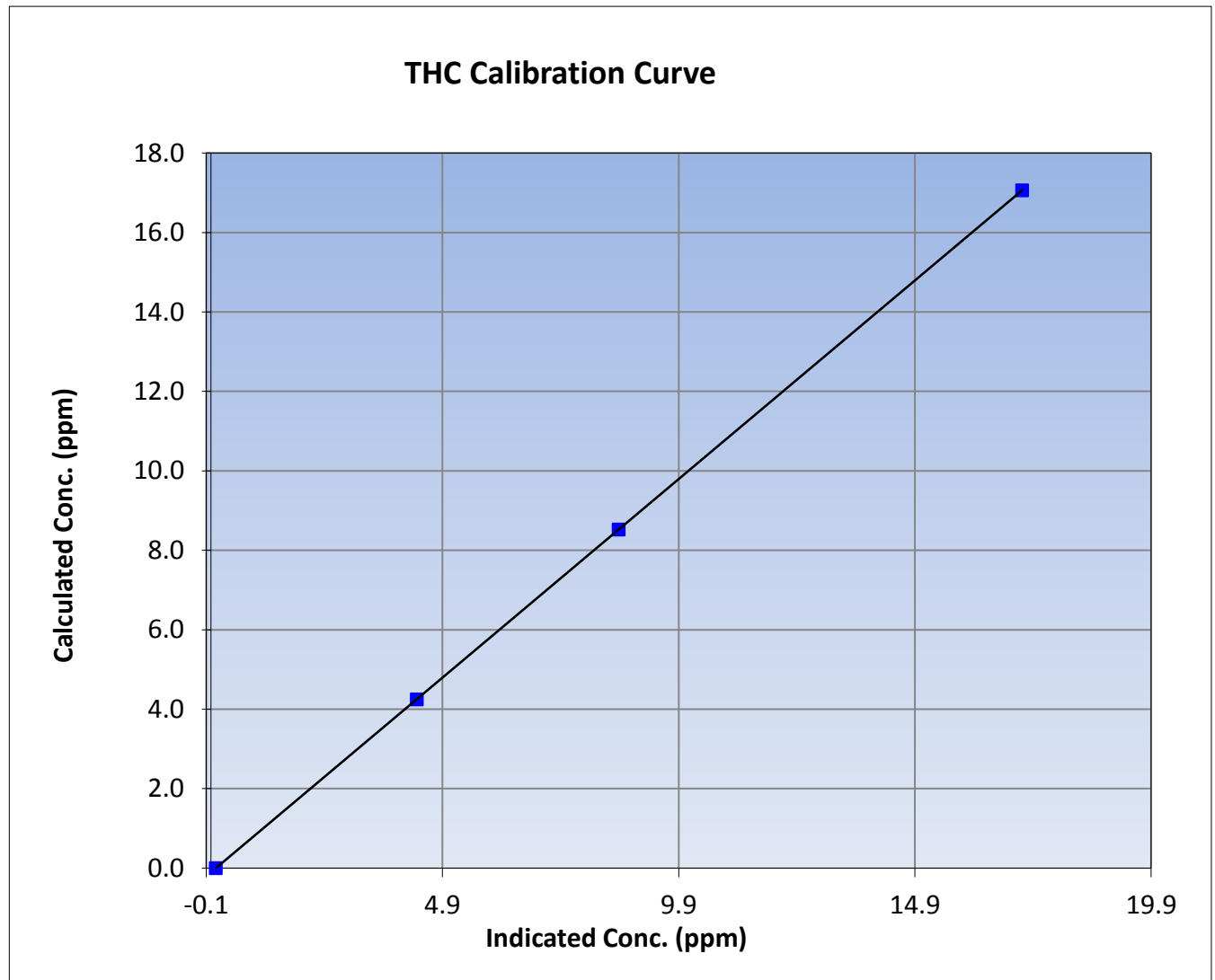
Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1327059295 |

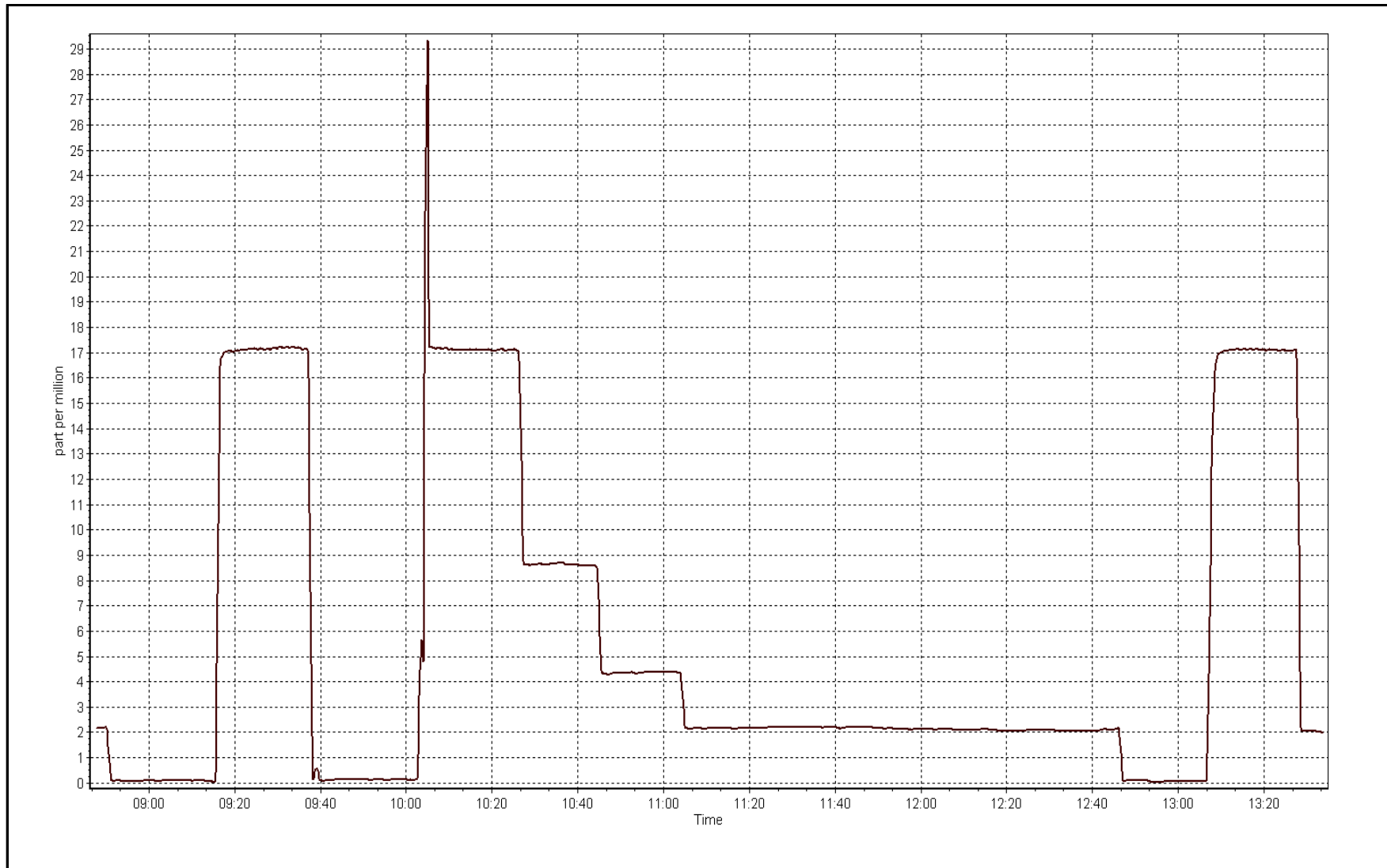
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.10 | ---- | Correlation Coefficient | 1.000000 |
| 17.06 | 17.17 | 0.9937 | | |
| 8.52 | 8.63 | 0.9873 | Slope | 0.999661 |
| 4.25 | 4.36 | 0.9747 | | |
| | | | Intercept | -0.104344 |



THC Calibration Plot

Date: September 13, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Reason: | Routine | | |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| NO Cal Gas Conc | 48.9 ppm | Gas Cert Reference | S0002488 |
| NOX Cal Gas Conc | 48.9 ppm | Cal Gas Expiry Date | September 26, 2017 |
| Calibrator | Teledyne API T700 | Serial Number | 1223 |
| Zero air Generator | Teledyne API T701 | Serial Number | 1004 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|-------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 11040 |
|-------------------|----------------------------|-----------------|-------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.997864 | 0.998329 | 0.995506 |
| | Data Offset | 0.397559 | 0.549876 | -0.371308 |
| Current Calibration | Data Slope | 0.993435 | 0.993757 | 1.012937 |
| | Data Offset | 0.541358 | 0.808882 | -1.314453 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|-----------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 710321429 |
|---------------------|------------|-------------------|-----------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 0.979 | | 0.976 | |
| NOX coefficient | 1.000 | | 1.001 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 11.4 | | 11.7 | |
| NOX bkgrnd | 12.4 | | 11.8 | |
| Chamber Temp | 49.7 | Deg C | 49.7 | Deg C |
| Moly Temp | 323.4 | Deg C | 325.8 | Deg C |
| PMT voltage | -779.2 | V | -779.2 | V |
| PMT Temp | -2.7 | Deg C | -3 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 172.5 | mmHg | 171.3 | mmHg |
| R Cell Press Nox | 172.8 | mmHg | 171.3 | mmHg |
| NO sample flow | 0.658 | lpm | 0.642 | lpm |
| Nox sample Flow | 0.656 | lpm | 0.644 | lpm |

Notes:

Sample inlet filter replaced after as founds. Adjusted zero and span. During span adjustment accidentally generated 1400ppb of NO. Corrected as soon as it was generated. Second GPT reference used for calculations.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

September 13, 2016

Station Number:

AMS 15

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.4 | -0.1 | ---- | ---- |
| as found span | 5000 | 81.5 | 797.1 | 797.1 | 0.0 | 811.2 | 810.8 | 0.4 | 0.9825 | 0.9830 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.2 | 0.0 | ---- | ---- |
| high point | 5000 | 81.5 | 797.1 | 797.1 | 0.0 | 802.0 | 801.6 | 0.2 | 0.9939 | 0.9943 |
| second point | 5000 | 40.7 | 398.0 | 398.0 | 0.0 | 400.0 | 399.3 | 0.8 | 0.9951 | 0.9970 |
| third point | 5000 | 20.3 | 198.5 | 198.5 | 0.0 | 198.9 | 198.5 | 0.4 | 0.9982 | 1.0004 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | ---- | ---- |
| as left span | 5000 | 81.5 | 797.1 | 471.1 | 326.0 | 797.5 | 469.0 | 328.5 | 0.9995 | 1.0044 |
| Average Correction Factor | | | | | | | | | 0.9957 | 0.9972 |

Corrected As found
Previous Response

NO_x= 811.8
NO_x= 798.4

NO= 811.3
NO= 797.9

Percent Change

NO_x= -1.6%

NO= -1.7%

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 81.50 ccm NOx ref calc conc = 797.1 ppb NO ref calc conc = 797.1 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 797.5 | 794.7 | 0.0 | 0.9995 | 1.0029 | ---- | ---- |
| 1st NO2 (300) | 471.1 | 323.7 | 790.9 | 471.1 | 319.9 | 1.0078 | ---- | 1.0118 | 98.8% |
| 2nd NO2 (200) | 570.8 | 223.9 | 793.6 | 570.8 | 222.7 | 1.0044 | ---- | 1.0053 | 99.5% |
| 3rd NO2 (100) | 676.8 | 118.0 | 796.4 | 676.8 | 119.6 | 1.0009 | ---- | 0.9864 | 101.4% |
| 2nd NO ref point | | 0.0 | 792.9 | 790.3 | 2.7 | 1.0052 | 1.0086 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0046 | | 1.0012 | 99.9% |

Calibration Performed By:

Jayne Rycroft



Wood Buffalo Environmental Association

NO_x Calibration Summary

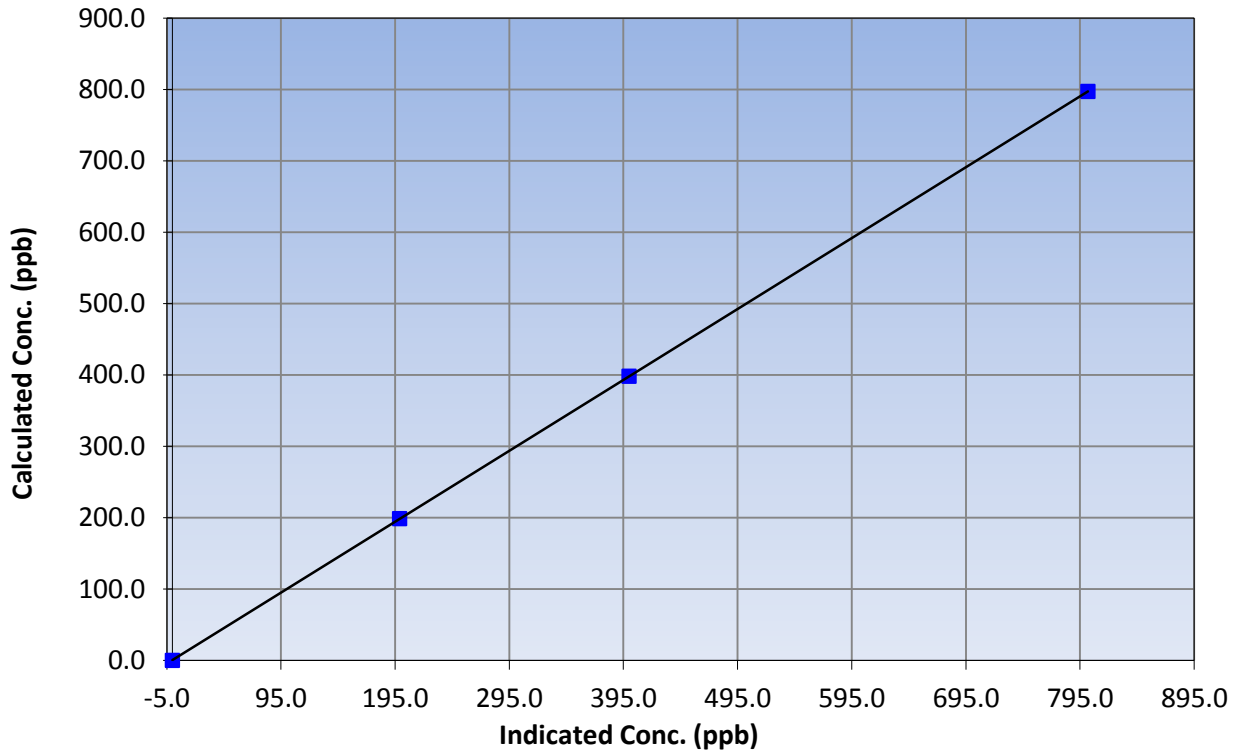
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| Analyzer make | Thermo 42i | Analyzer serial # | 710321429 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999999 |
| 797.1 | 802.0 | 0.9939 | | |
| 398.0 | 400.0 | 0.9951 | Slope | 0.993435 |
| 198.5 | 198.9 | 0.9982 | | |
| | | | Intercept | 0.541358 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

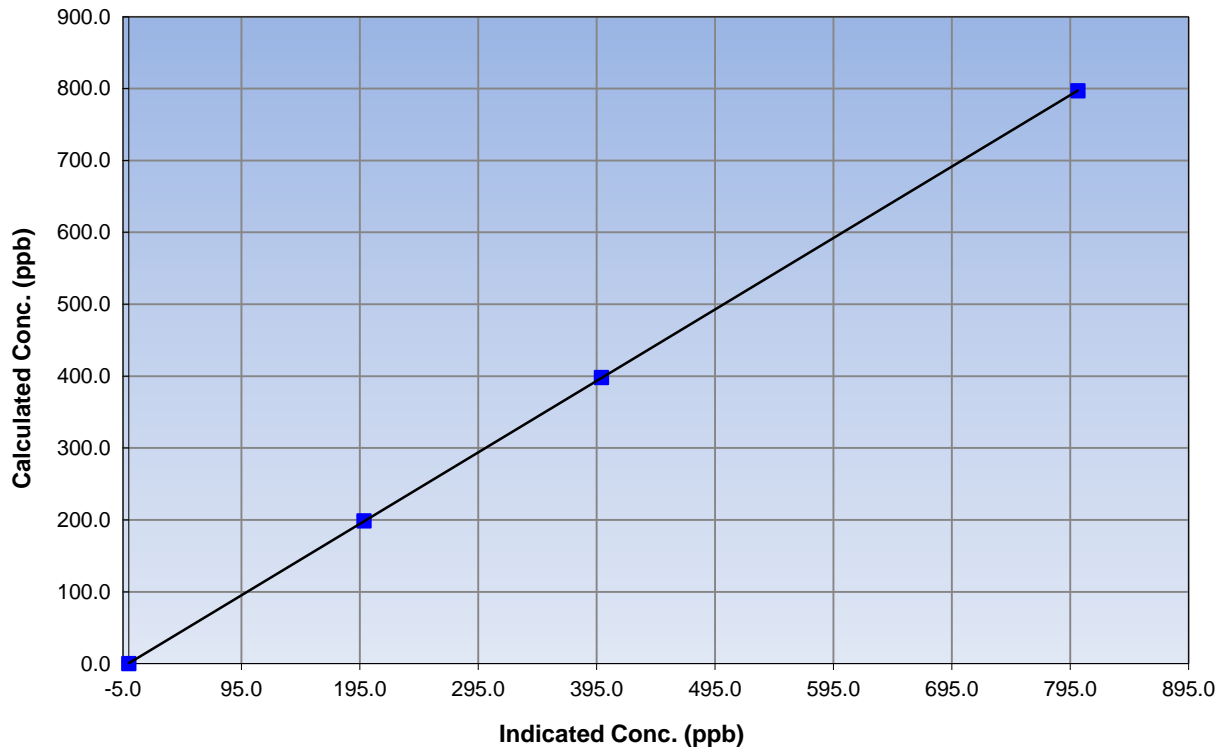
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 11, 2016 |
| Station Name | CNRL Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| Analyzer make | Thermo 42i | Analyzer serial # | 710321429 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | N/A | Correlation Coefficient | 0.999997 |
| 797.1 | 801.6 | 0.9943 | | |
| 398.0 | 399.3 | 0.9970 | Slope | 0.993757 |
| 198.5 | 198.5 | 1.0004 | | |
| | | | Intercept | 0.808882 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

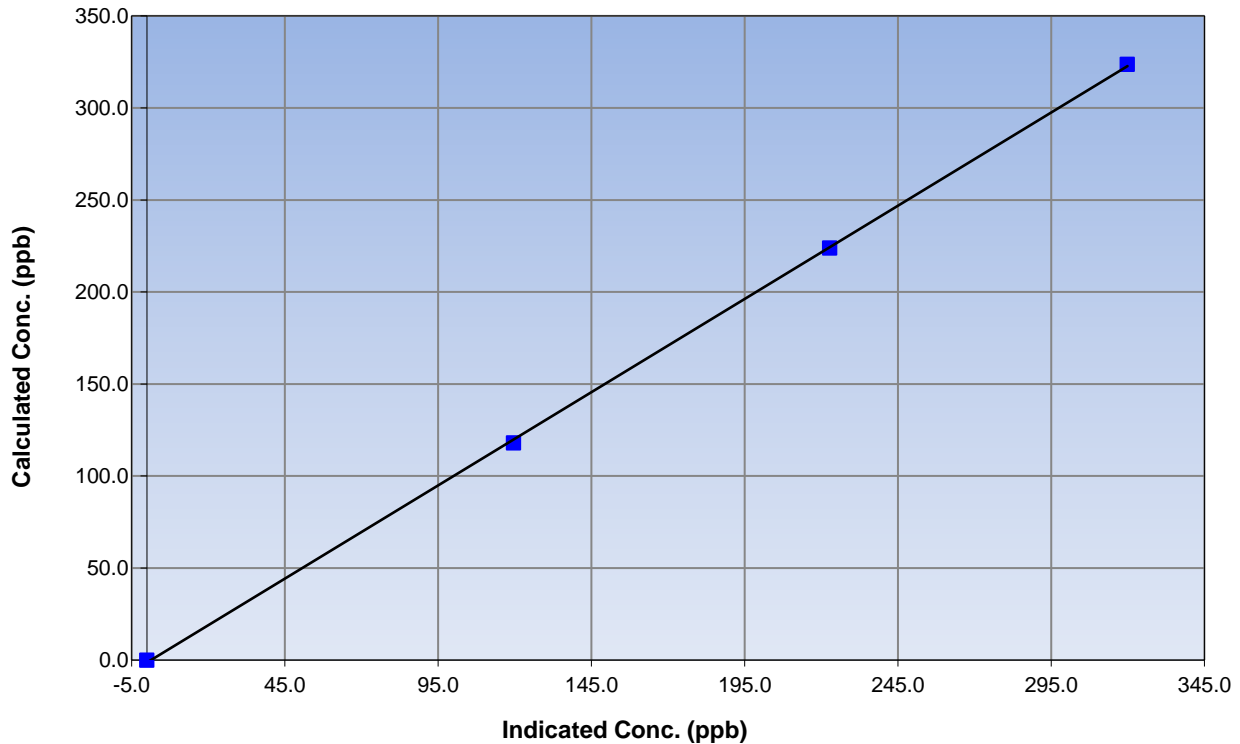
Station Information

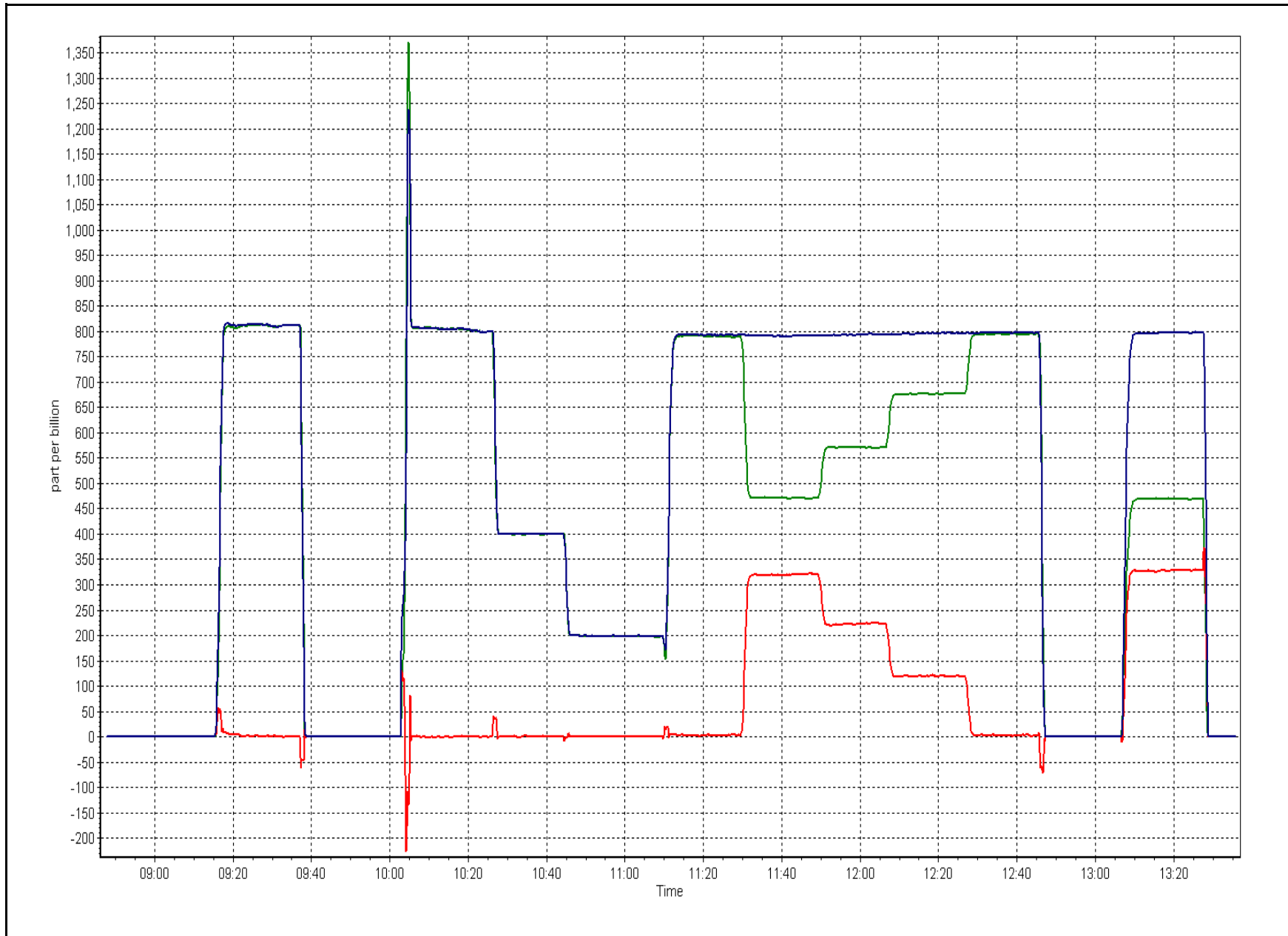
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 11, 2016 |
| Station Number | CNRL Horizon | Station Number | AMS 15 |
| Start Time (MST) | 8:47 | End Time (MST) | 13:33 |
| Analyzer make | Thermo 42i | Analyzer serial # | 710321429 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | N/A | Correlation Coefficient | 0.999893 |
| 323.7 | 319.9 | 1.0118 | | |
| 223.9 | 222.7 | 1.0053 | Slope | 1.012937 |
| 118.0 | 119.6 | 0.9864 | | |
| | | | Intercept | -1.314453 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|-----------------|
| Station Name: | CNRL Horizon | Station number: | AMS 15 |
| Calibration Date: | September 14, 2016 | Last Cal Date: | August 11, 2016 |
| Start time (MST): | 10:57 | End time (MST): | 11:45 |
| Sharp Model: | 5030 | S/N: | E-2020 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 7409 |
| Flow Standard Model: | DeltaCal | S/N: | 628 |
| Temp/RH standard: | NA | S/N: | NA |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------------------------------|----------|---------------------------------------------------|-------------------------------------|---------------|
| T1 (°C) | 15.2 | 16.5 | 15.2 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 969 | 970 | 969 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 1008 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 1.1 | ----- | 0 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | Tolerance |
|------------|-------------------|-----------|------------------|----------------------|
| Leak Test: | Date of check: | <u>NA</u> | Last Cal Date: | <u>June 24, 2016</u> |
| | Flow w/o adaptor: | <u>NA</u> | Flow w/ adaptor: | <u>NA</u> 0.4 LPM |

Annual Calibration Test

| | | | | |
|------------------|------------------------|-----------|-----------------------------|----------------------|
| Foil Calibration | Foil Mass: | <u>NA</u> | S/N: | <u>NA</u> |
| | Date of check: | <u>NA</u> | Last Cal Date: | <u>June 24, 2016</u> |
| | New Correction Factor: | <u>NA</u> | Previous Correction Factor: | <u>NA</u> |

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

Notes: Cyclone head cleaned. Nephelometer zeroed.

Calibration by: Jayme Marcoux



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 16
SHELL MUSKEG RIVER
SEPTEMBER 2016

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 681 | 39 | 39 | 100.00 | 45 | 0 | 6 | 0 |
| THC (ppm) Average | 677 | 39 | 43 | 99.44 | 8.4 | - | 2.9 | - |
| NO2 (ppb) Average | 680 | 40 | 40 | 100.00 | 32 | 0 | 15 | - |
| NO (ppb) Average | 680 | 40 | 40 | 100.00 | 190 | - | 19 | - |
| NOX (ppb) Average | 680 | 40 | 40 | 100.00 | 207 | - | 35 | - |
| PM2.5 (ug/m3) Average | 716 | 4 | 4 | 100.00 | 32.8 | - | 12 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 23.6 | - | 14.8 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 100 | - | 90 | - |
| Barometric Pressure (inHg) Average | 720 | 0 | 0 | 100.00 | 29.3 | - | 29.2 | - |
| Wind Speed 10 m (km/h) Average | 720 | 0 | 0 | 100.00 | 31 | - | 19 | - |
| Wind Direction 10 m (deg) Average | 720 | 0 | 0 | 100.00 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|------------------------------------|--------|-------|--------|-------|------------|------|------|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 681 | 1 | 4 | - | 0 | 0 | 0 | 0 | 0 | 2 | 45 |
| THC (ppm) Average | 677 | 2.43 | 0.5 | - | 1.8 | 2.1 | 2.2 | 2.3 | 2.5 | 2.9 | 8.4 |
| NO2 (ppb) Average | 680 | 6.2 | 5 | - | 0 | 1 | 2 | 5 | 9 | 14 | 32 |
| NO (ppb) Average | 680 | 5.1 | 12 | - | 0 | 0 | 0 | 1 | 6 | 15 | 190 |
| NOX (ppb) Average | 680 | 11.3 | 15 | - | 0 | 1 | 3 | 6 | 14 | 27 | 207 |
| PM2.5 (ug/m3) Average | 716 | 5 | 3.7 | - | 0.5 | 1.8 | 2.6 | 4 | 6.4 | 9.2 | 32.8 |
| Temperature 2 m (C) Average | 720 | 10.73 | 4.8 | - | 0.1 | 4.6 | 7.4 | 10.5 | 13.9 | 16.9 | 23.6 |
| Relative Humidity (%) Average | 720 | 73 | 18 | - | 28 | 45 | 59 | 77 | 87 | 95 | 100 |
| Barometric Pressure (inHg) Average | 720 | 28.81 | 0.2 | - | 28.3 | 28.5 | 28.6 | 28.8 | 29 | 29.1 | 29.3 |
| Wind Speed 10 m (km/h) Average | 720 | 10.7 | 5 | - | 1 | 5 | 7 | 9 | 14 | 18 | 31 |
| Wind Direction 10 m (deg) Average | 720 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SHELL MUSKEG RIVER (AMS 16)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|---------------------|-----------------------------------------------|
| THC | 19 Sep 2016 10:00 | 19 Sep 2016 11:00 | 2 | Unstable operation - excessive baseline drift |
| THC | 21 Sep 2016 10:00 | 21 Sep 2016 11:00 | 2 | Maintenance - replaced fuel cylinder |



| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 45 ppb on Sep 29 13:00 | Maximum Daily Average: 5.8 ppb on Sep 22 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.0 ppb on Sep 3 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 3.4 ppb at hour 13 | Minimum Diurnal Average: 0.2 ppb at hour 5 | | Hours of Calibration: | 39 |
| Monthly Average: 1.0 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 2 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 | 0 | 0 | 0 | 0 | 1 | Z | 0 | 0 | C | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 | |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 5 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 6 | |
| 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 | 0 | |
| 4-Sep | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 0 | 2 | 17 | 4 | 3 | 3 | 5 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 17 | |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 4 | 11 | 20 | 1 | 1 | 4 | 6 | 5 | 2 | 2 | 4 | 2 | 2 | 0 | 0 | 0 | 2.8 | 20 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 10 | 5 | 3 | 13 | 17 | 13 | 10 | 9 | 7 | 5 | 3 | 1 | 1 | 0 | 0 | 0 | 4.3 | 17 | |
| 8-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 | |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0.3 | 2 | |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 4 | |
| 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 | 0.1 | 0 | |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 0.2 | 2 | |
| 13-Sep | 1 | 1 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 | 3 | 12 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1.1 | 12 | |
| 15-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 | 0.2 | 1 | |
| 16-Sep | 0 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | |
| 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 | 0.0 | 0 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 6 | |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 2 |
| 22-Sep | 0 | 0 | Z | 0 | 1 | 0 | 1 | 1 | 13 | 22 | 30 | 33 | C | C | 3 | 4 | 2 | 0 | 1 | 2 | 3 | 3 | 1 | 0 | 5.8 | 33 | |
| 23-Sep | 2 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 2 | |
| 24-Sep | 6 | 5 | 4 | 3 | Z | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 6 | |
| 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 23 | 21 | 10 | 9 | 3 | 4 | 1 | 2 | 3 | 1 | 3 | 0 | 1 | 3.9 | 23 | |
| 27-Sep | 1 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.3 | 1 | |
| 29-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 8 | 45 | 19 | 4 | 3 | 3 | 3 | 7 | 7 | 5 | 3 | 2 | 2 | 5.1 | 45 | |
| 30-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 | 0.3 | 1 | |

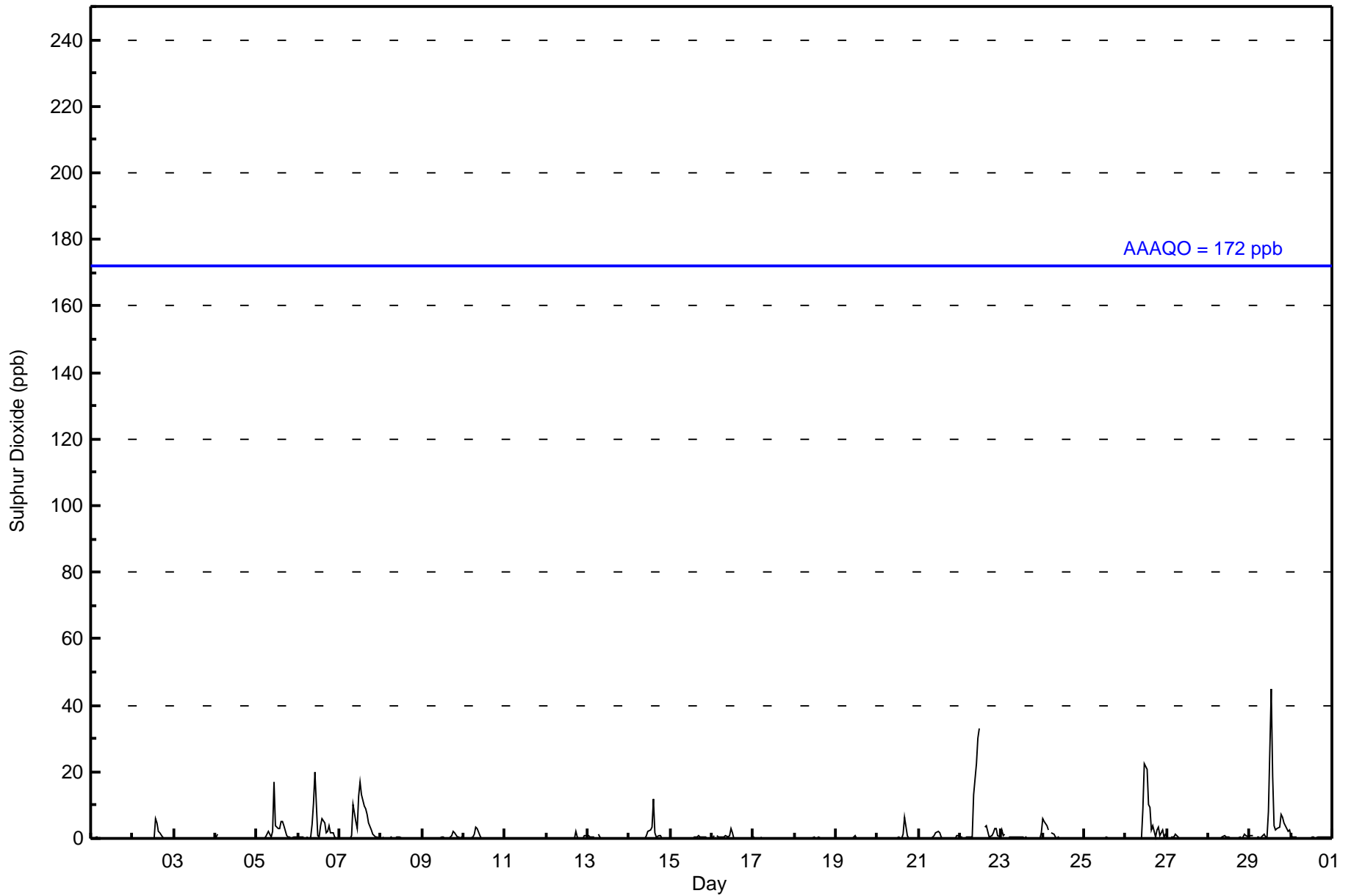
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.5 | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 1.2 | 1.6 | 2.9 | 3.2 | 3.4 | 2.2 | 1.9 | 1.1 | 1.1 | 0.6 | 0.7 | 0.6 | 0.4 | 0.4 | 0.3 | 0.3 | Diurnal Average |
| 6 | 5 | 4 | 3 | 1 | 2 | 1 | 4 | 13 | 22 | 30 | 33 | 45 | 19 | 12 | 9 | 7 | 5 | 7 | 7 | 5 | 3 | 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
Shell Muskeg River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 666 | 97.80 | 97.80 |
| 11 - 20 | 9 | 1.32 | 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: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 31 | 35 | 8 | 17 | 5 | 6 | 19 | 60 | 132 | 96 | 61 | 48 | 39 | 31 | 26 | 52 | 666 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 9 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 35 | 8 | 17 | 5 | 6 | 19 | 60 | 138 | 104 | 62 | 48 | 39 | 31 | 26 | 52 | 681 |

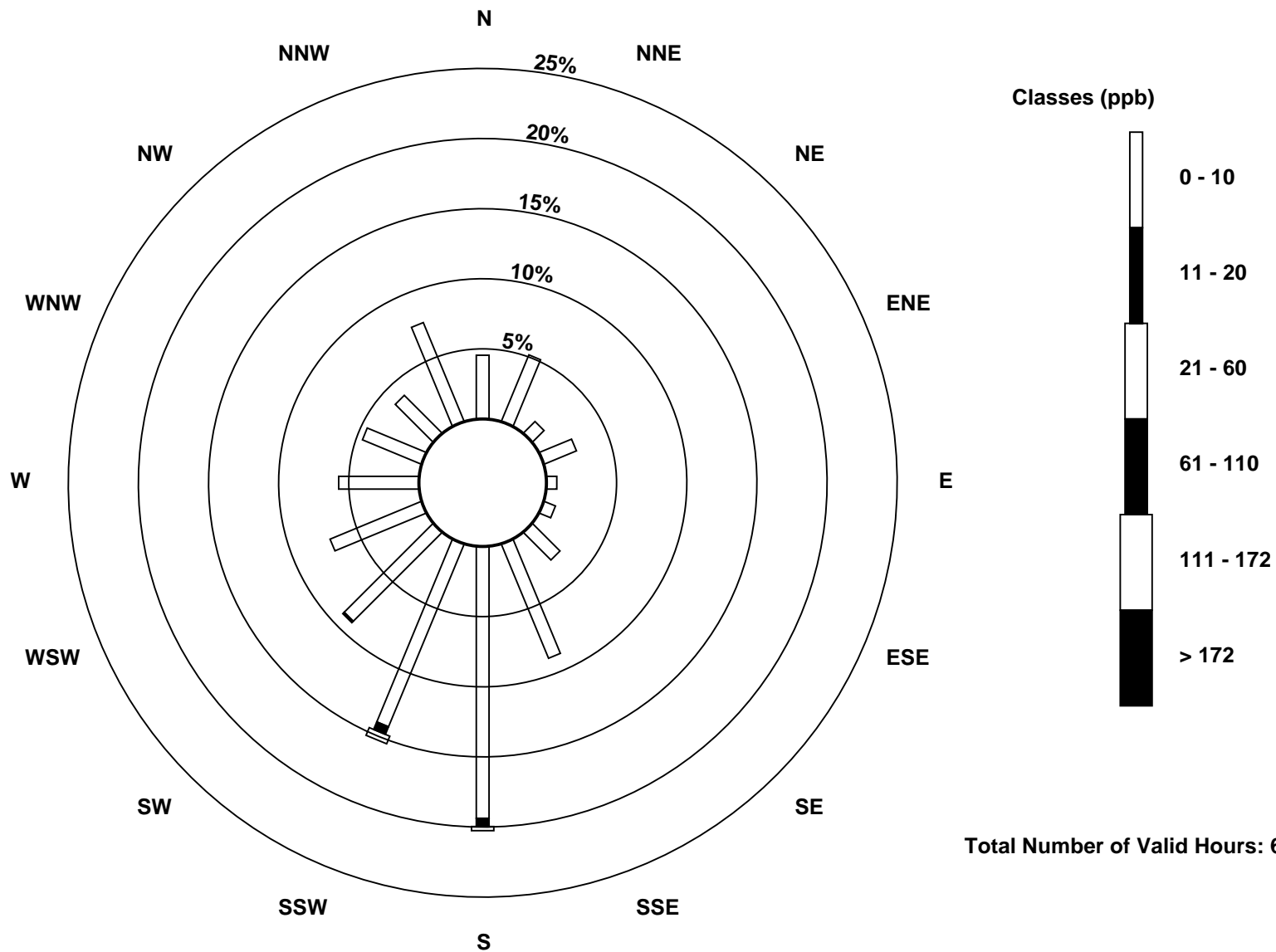
Total Number of Valid Hours: 681

Total Number of Hours: 720

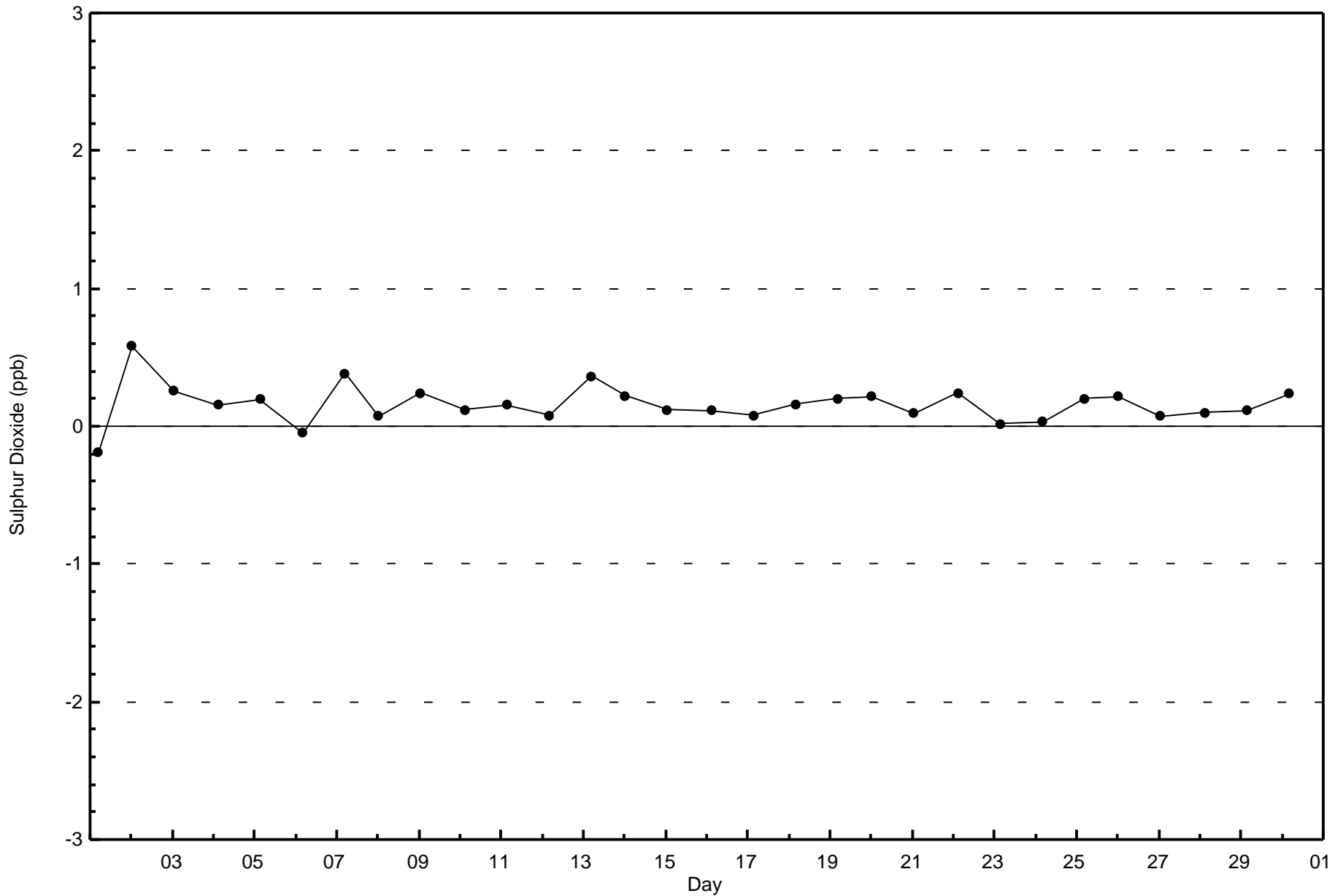


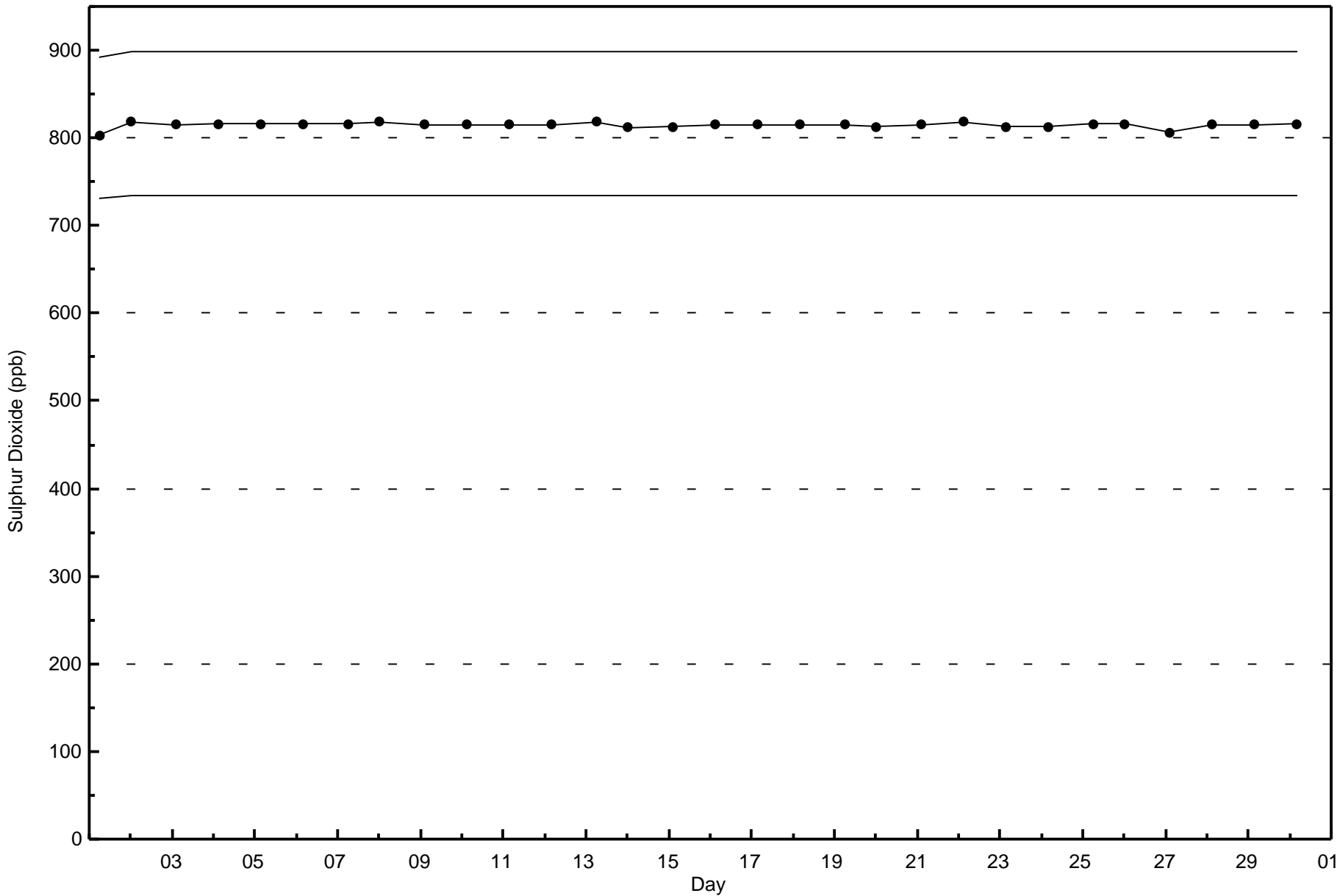
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
Shell Muskeg River (AMS 16)



Total Number of Valid Hours: 681





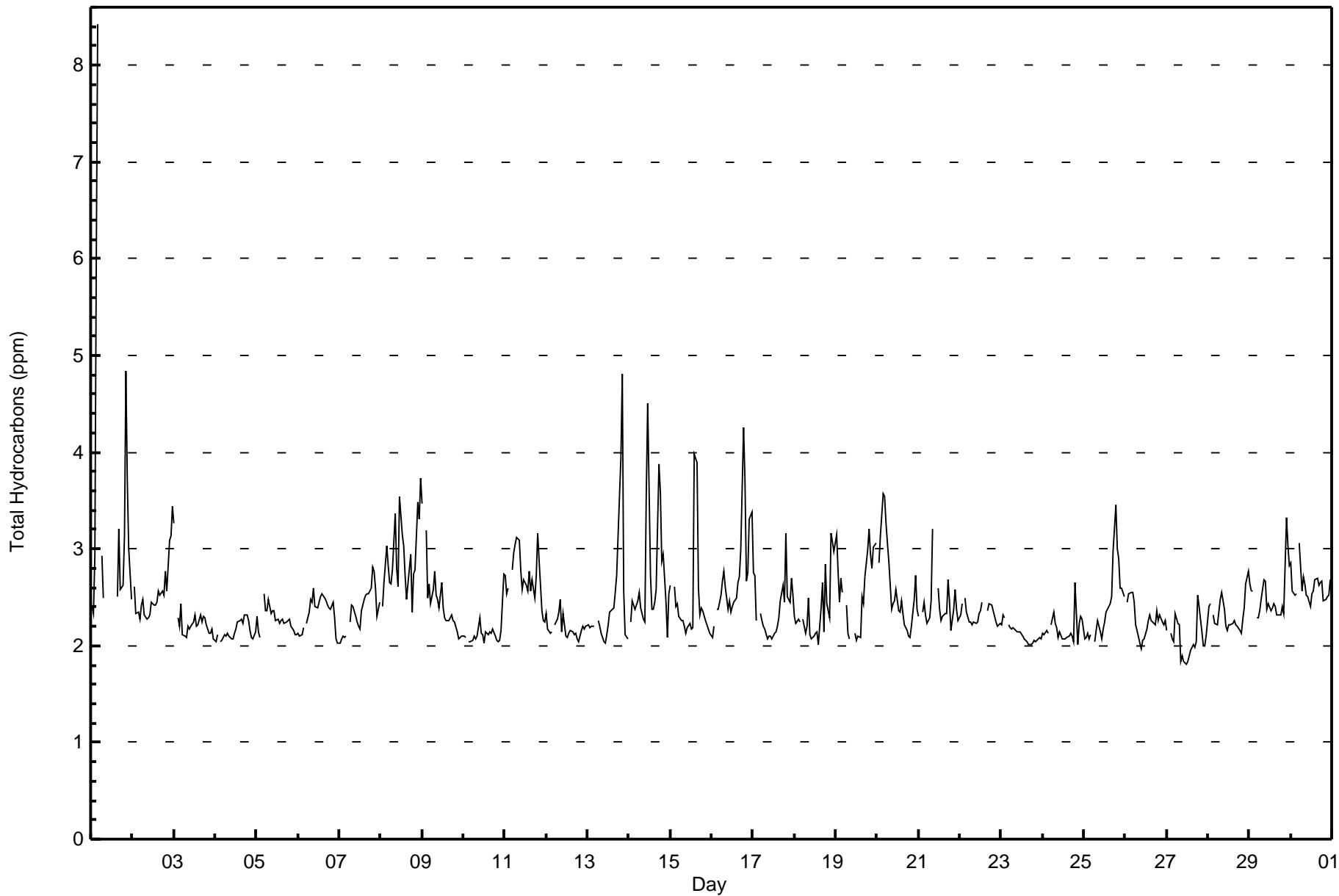


| Maximum Value: 8.4 ppm on Sep 1 05:00 | | Maximum Daily Average: 2.9 ppm on Sep 8 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------|-----|-----------------|-----|-----|-----|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|
| Minimum Value: 1.8 ppm on Sep 27 12:00 | | Minimum Daily Average: 2.1 ppm on Sep 27 | | Hours of Data: 677 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.6 ppm at hour 5 | | Minimum Diurnal Average: 2.3 ppm at hour 10 | | Hours of Missing Data: 43 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.43 ppm | | Percentiles: P ₁ = 1.9 P ₁₀ = 2.1 Q ₁ = 2.2 Median = 2.3 Q ₃ = 2.5 P ₉₀ = 2.9 P ₉₉ = 3.9 | | Hours of Calibration: 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 | 2.4 | 2.3 | 2.9 | 6.0 | 8.4 | Z | 2.9 | 2.5 | C | C | C | C | C | C | 2.5 | 3.2 | 2.6 | 2.6 | 3.1 | 4.8 | 3.7 | 3.0 | 2.5 | -- | 8.4 | |
| 2-Sep | Z | 2.6 | 2.3 | 2.4 | 2.3 | 2.4 | 2.5 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.6 | 2.5 | 2.6 | 2.5 | 2.8 | 2.6 | 3.1 | 3.1 | 3.4 | 2.5 | 3.4 | |
| 3-Sep | 3.3 | Z | 2.3 | 2.2 | 2.4 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.3 | 3.3 | |
| 4-Sep | 2.0 | 2.1 | Z | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | |
| 5-Sep | 2.3 | 2.1 | 2.1 | Z | 2.5 | 2.4 | 2.4 | 2.5 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.3 | |
| 6-Sep | 2.1 | 2.1 | 2.1 | 2.2 | Z | 2.2 | 2.3 | 2.5 | 2.5 | 2.6 | 2.4 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.4 | 2.5 | 2.3 | 2.1 | 2.0 | 2.3 | |
| 7-Sep | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.4 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 2.8 | 2.8 | 2.6 | 2.3 | 2.4 | 2.4 | |
| 8-Sep | Z | 2.4 | 2.7 | 3.0 | 2.8 | 2.7 | 2.6 | 2.8 | 3.4 | 2.8 | 2.6 | 3.5 | 3.1 | 3.0 | 2.7 | 2.5 | 2.6 | 2.9 | 2.3 | 2.7 | 2.8 | 3.5 | 3.3 | 3.7 | 2.9 | |
| 9-Sep | 3.5 | Z | 3.2 | 2.5 | 2.6 | 2.4 | 2.6 | 2.8 | 2.5 | 2.5 | 2.4 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.4 | 3.5 | |
| 10-Sep | 2.1 | 2.1 | Z | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.7 | 2.1 | |
| 11-Sep | 2.7 | 2.5 | 2.6 | Z | 2.8 | 3.0 | 3.0 | 3.1 | 3.1 | 2.8 | 2.6 | 2.7 | 2.6 | 2.6 | 2.8 | 2.6 | 2.7 | 2.5 | 2.7 | 3.2 | 2.9 | 2.4 | 2.3 | 2.3 | 2.7 | |
| 12-Sep | 2.3 | 2.2 | 2.1 | 2.1 | Z | 2.2 | 2.3 | 2.3 | 2.5 | 2.1 | 2.3 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | |
| 13-Sep | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 2.4 | 2.5 | 2.7 | 3.5 | 3.9 | 4.8 | 2.6 | 2.1 | 2.1 | 2.5 | |
| 14-Sep | Z | 2.2 | 2.5 | 2.4 | 2.4 | 2.5 | 2.6 | 2.4 | 2.3 | 2.2 | 3.6 | 4.5 | 2.7 | 2.4 | 2.4 | 2.5 | 2.6 | 3.9 | 3.6 | 2.9 | 2.9 | 2.5 | 2.1 | 2.5 | 2.7 | |
| 15-Sep | 2.6 | Z | 2.6 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 4.0 | 3.9 | 2.6 | 2.3 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.1 | 2.4 | |
| 16-Sep | 2.1 | 2.2 | Z | 2.4 | 2.4 | 2.5 | 2.7 | 2.8 | 2.6 | 2.4 | 2.5 | 2.3 | 2.4 | 2.5 | 2.5 | 2.6 | 2.7 | 3.0 | 4.3 | 3.7 | 2.7 | 2.7 | 3.3 | 3.4 | 2.7 | |
| 17-Sep | 2.8 | 2.7 | 2.3 | Z | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.5 | 2.6 | 2.5 | 3.2 | 2.5 | 2.4 | 2.7 | 2.5 | 2.4 | 3.2 | |
| 18-Sep | 2.3 | 2.2 | 2.3 | 2.2 | Z | 2.3 | 2.1 | 2.2 | 2.5 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.4 | 2.7 | 2.1 | 2.8 | 2.4 | 2.3 | 3.2 | 3.1 | 3.0 | 2.4 | |
| 19-Sep | 3.1 | 2.8 | 2.4 | 2.7 | 2.6 | Z | 2.4 | 2.1 | 2.1 | UO | UO | 2.1 | 2.1 | 2.1 | 2.1 | 2.5 | 2.4 | 2.7 | 3.0 | 3.2 | 2.9 | 2.8 | 3.0 | 3.1 | 2.6 | |
| 20-Sep | Z | 2.9 | 3.1 | 3.6 | 3.5 | 3.3 | 3.1 | 2.9 | 2.4 | 2.4 | 2.5 | 2.6 | 2.4 | 2.3 | 2.5 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.5 | 2.7 | 2.4 | 2.6 | |
| 21-Sep | 2.3 | Z | 2.3 | 2.5 | 2.3 | 2.2 | 2.3 | 2.5 | 3.2 | M | M | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 | 2.3 | 2.7 | 2.5 | 2.2 | 2.4 | 2.6 | 2.4 | 2.3 | 2.4 | |
| 22-Sep | 2.3 | 2.4 | Z | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 | 2.5 | C | C | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | |
| 23-Sep | 2.2 | 2.3 | 2.3 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | |
| 24-Sep | 2.1 | 2.1 | 2.2 | 2.1 | Z | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.2 | 2.3 | 2.3 | 2.2 | 2.6 | |
| 25-Sep | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.0 | 2.2 | 2.3 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | 2.4 | 2.4 | 2.5 | 3.0 | 3.5 | 3.0 | 2.9 | 2.6 | 2.6 | 2.5 | 2.4 | |
| 26-Sep | Z | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.2 | 2.2 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | 2.3 | |
| 27-Sep | 2.2 | Z | 2.1 | 2.1 | 2.0 | 2.3 | 2.2 | 2.2 | 1.8 | 1.9 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.5 | 2.4 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | |
| 28-Sep | 2.4 | 2.4 | Z | 2.3 | 2.2 | 2.2 | 2.3 | 2.5 | 2.6 | 2.4 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.3 | 2.4 | 2.6 | 2.8 | 2.3 | |
| 29-Sep | 2.6 | 2.6 | 2.6 | Z | 2.3 | 2.3 | 2.4 | 2.5 | 2.7 | 2.7 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 3.3 | 3.0 | 2.8 | 2.5 | |
| 30-Sep | 2.9 | 2.6 | 2.5 | 2.5 | Z | 3.1 | 2.6 | 2.7 | 2.6 | 2.5 | 2.5 | 2.4 | 2.5 | 2.6 | 2.7 | 2.7 | 2.6 | 2.7 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.7 | 2.6 | |
| | 2.4 | 2.4 | 2.4 | 2.5 | 2.6 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.5 | 2.6 | 2.6 | 2.6 | 2.5 | 2.5 | 2.5 | Diurnal Average | |
| | 3.5 | 2.9 | 3.2 | 6.0 | 8.4 | 3.3 | 3.1 | 3.1 | 3.4 | 2.8 | 3.6 | 4.5 | 3.1 | 3.0 | 4.0 | 3.9 | 3.2 | 3.9 | 4.3 | 3.9 | 4.8 | 3.7 | 3.3 | 3.7 | Diurnal Maximum | |
| Z - zerspan | | C - Calibration | | | | M - Maintenance | | | | UO - Unstable Operation | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 35 | 5.17 | 5.17 |
| 2.1 - 3.0 | 593 | 87.59 | 92.76 |
| 3.1 - 10.0 | 49 | 7.24 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 677

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Shell Muskeg River - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 5 | 4 | 0 | 2 | 13 | 3 | 1 | 0 | 35 |
| 2.1 - 3.0 | 16 | 30 | 8 | 16 | 5 | 6 | 19 | 53 | 132 | 93 | 58 | 45 | 25 | 26 | 25 | 36 | 593 |
| 3.1 - 10.0 | 15 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 | 4 | 1 | 0 | 1 | 0 | 16 | 49 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 35 | 8 | 17 | 5 | 6 | 19 | 60 | 137 | 103 | 62 | 48 | 38 | 30 | 26 | 52 | 677 |

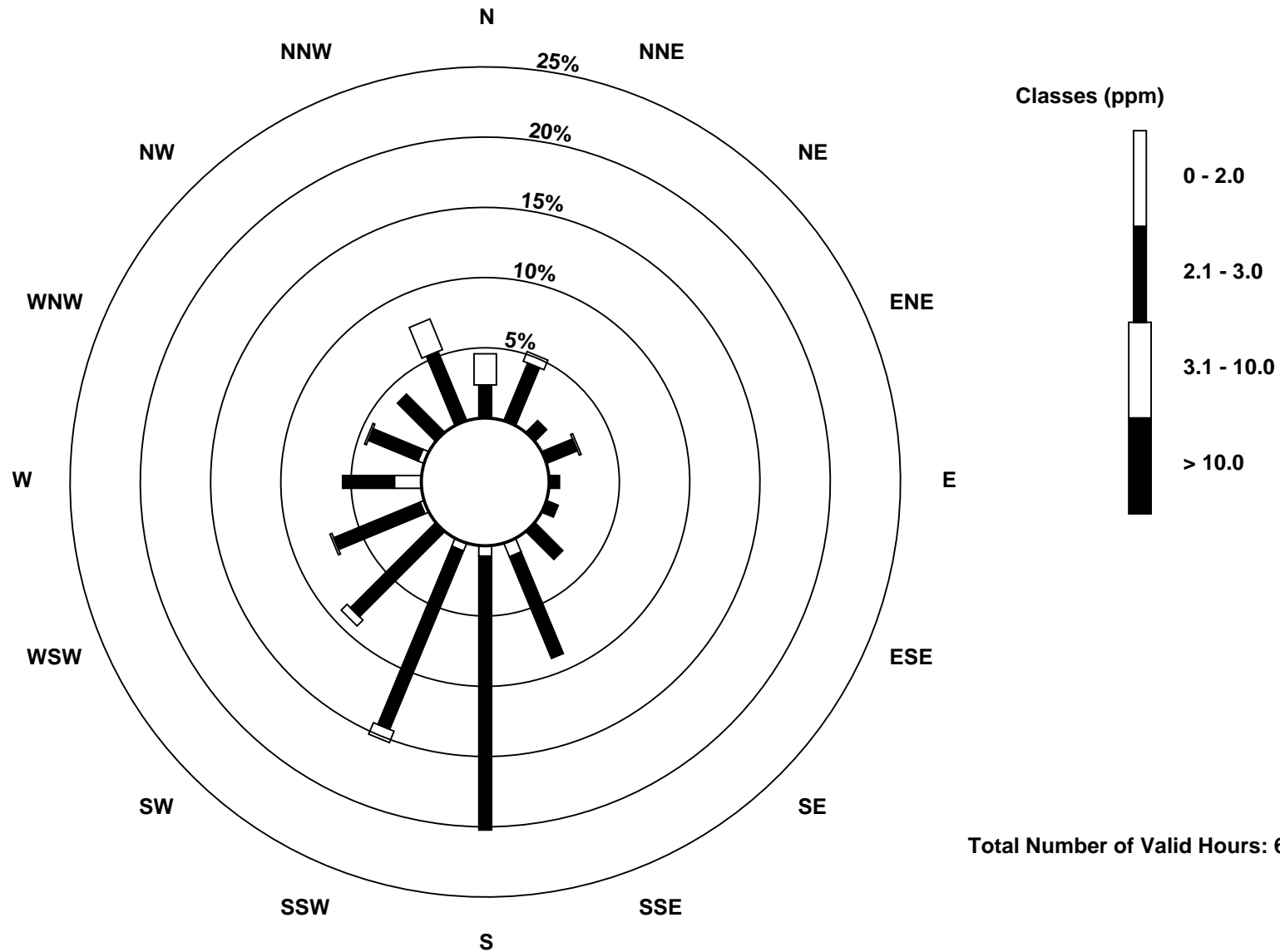
Total Number of Valid Hours: 677

Total Number of Hours: 720

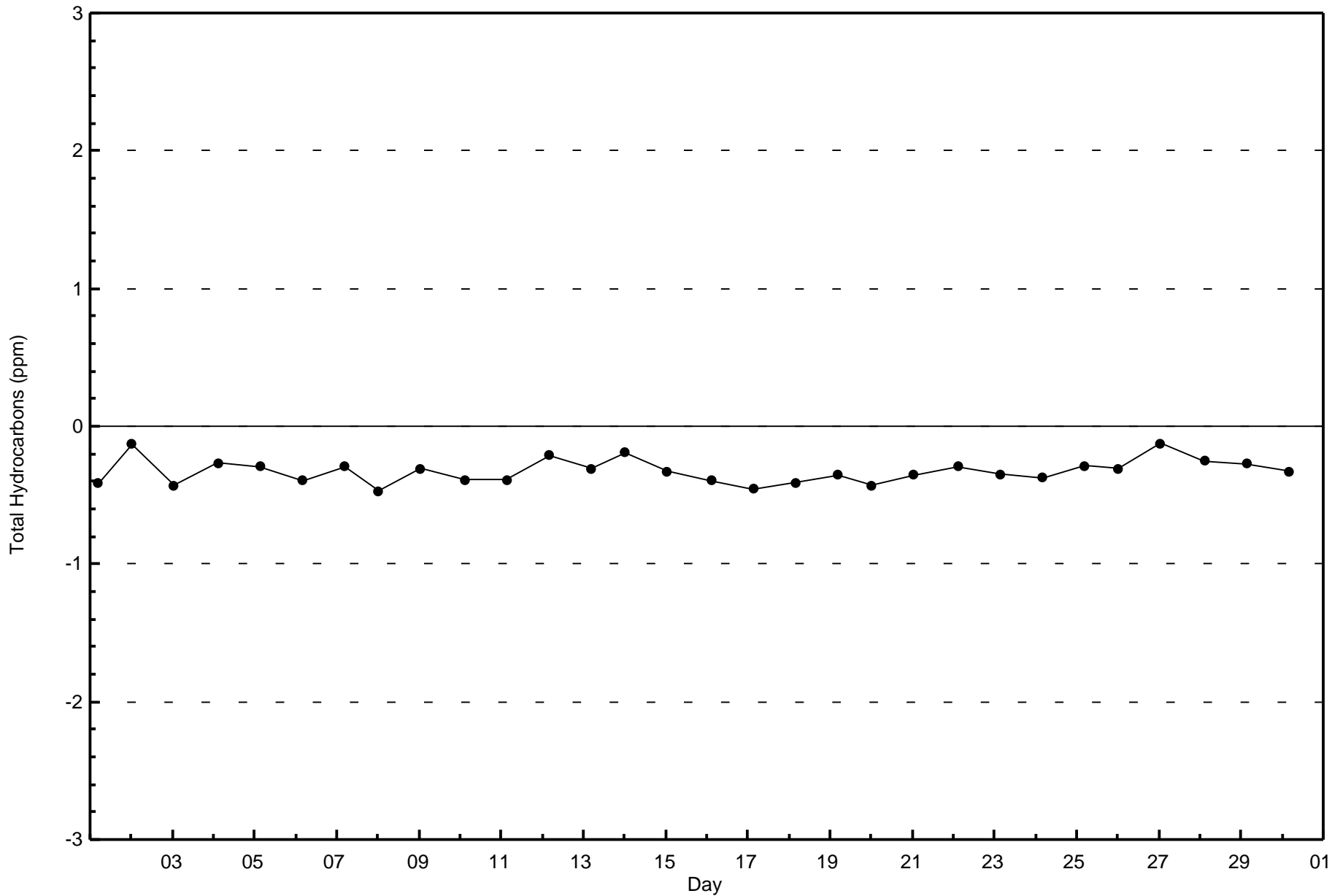


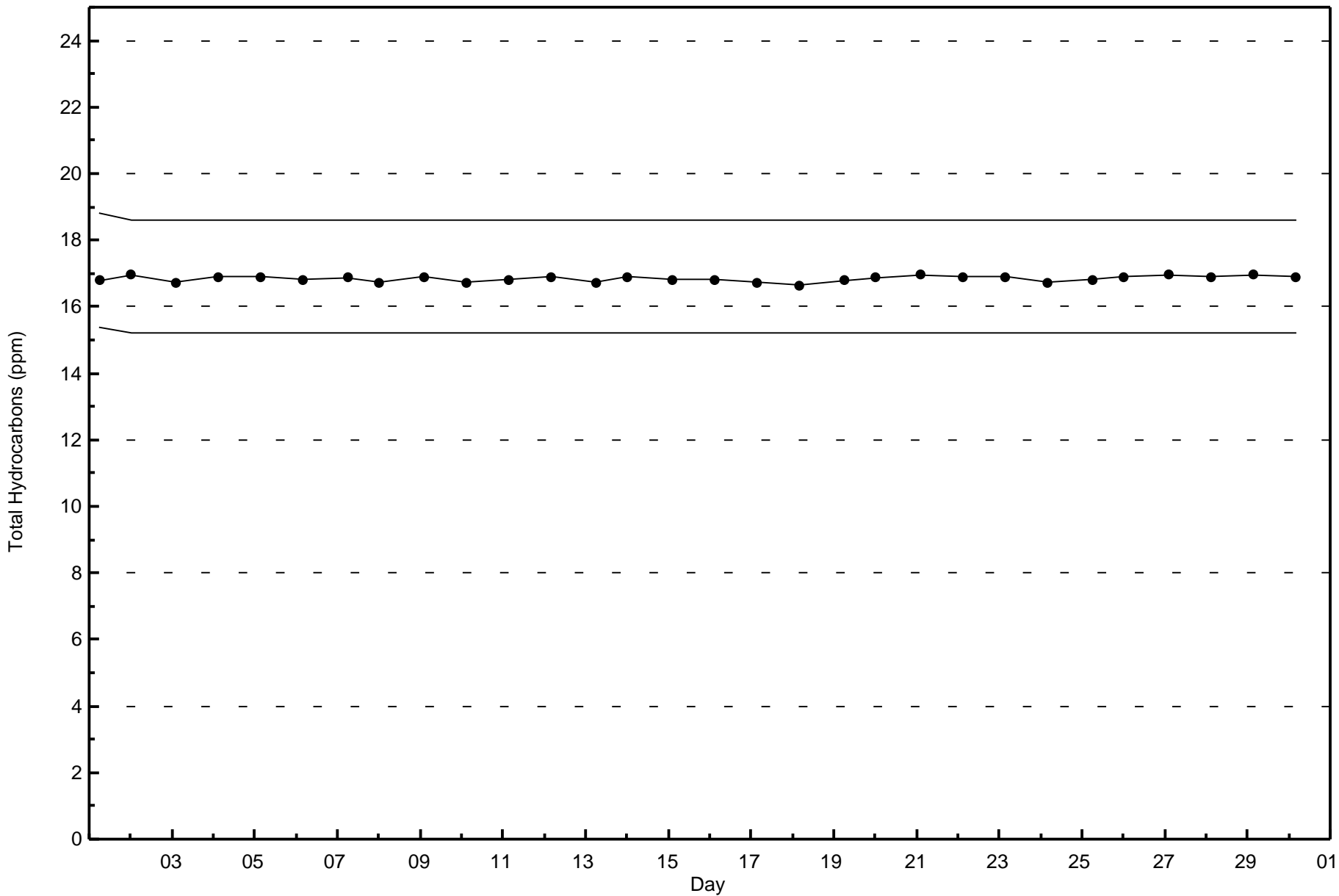
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Hydrocarbons (THC) - ppm
Shell Muskeg River (AMS 16)



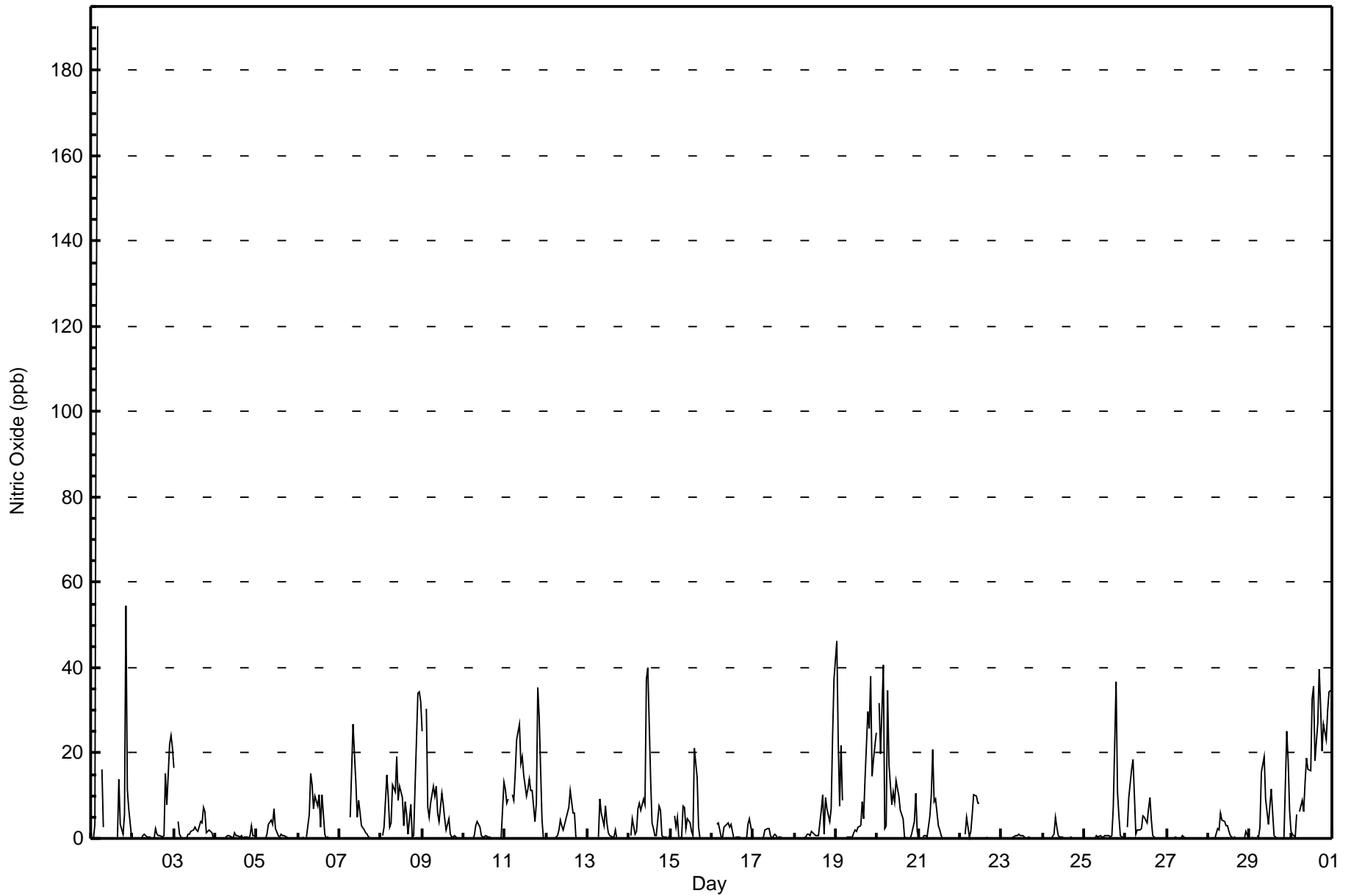
Total Number of Valid Hours: 677







| Maximum Value: 190 ppb on Sep 1 05:00 Maximum Daily Average: 19.5 ppb on Sep 30 | | Hours in Service: 720 Hours of Data: 680 Hours of Missing Data: 40 Hours of Calibration: 40 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|---|
| Minimum Value: 0 ppb on Sep 1 01:00 Maximum Diurnal Average: 10.5 ppb at hour 5 Monthly Average: 5.1 ppb | | Minimum Daily Average: 0.1 ppb on Sep 27 Minimum Diurnal Average: 2.0 ppb at hour 6 Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 6 P ₉₀ = 15 P ₉₉ = 40 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 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 | 3 | 123 | 190 | Z | 16 | 3 | C | C | C | C | C | C | 0 | 14 | 3 | 1 | 6 | 55 | 11 | 7 | 0 | -- | 190 | | |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 1 | 15 | 8 | 22 | 24 | 21 | 4.3 | 24 | |
| 3-Sep | 17 | Z | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 4 | 4 | 7 | 6 | 1 | 2 | 2 | 1 | 0 | 2.7 | 17 | |
| 4-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 1 | 0.5 | 3 | |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 3 | 4 | 3 | 7 | 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 7 | |
| 6-Sep | 0 | 0 | 0 | 0 | Z | 0 | 6 | 15 | 12 | 7 | 10 | 8 | 10 | 3 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.6 | 15 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 5 | 15 | 27 | 13 | 5 | 9 | 6 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.9 | 27 | |
| 8-Sep | Z | 1 | 3 | 15 | 10 | 3 | 4 | 12 | 11 | 19 | 9 | 12 | 9 | 3 | 9 | 5 | 1 | 8 | 0 | 1 | 12 | 34 | 34 | 32 | 10.7 | 34 | |
| 9-Sep | 25 | Z | 30 | 7 | 5 | 8 | 12 | 10 | 12 | 6 | 4 | 10 | 8 | 5 | 2 | 5 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 6.6 | 30 | |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 4 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 1.2 | 13 | |
| 11-Sep | 12 | 8 | 9 | Z | 10 | 9 | 15 | 23 | 27 | 18 | 19 | 15 | 10 | 12 | 14 | 11 | 11 | 4 | 8 | 35 | 28 | 4 | 0 | 0 | 13.2 | 35 | |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 4 | 3 | 2 | 5 | 6 | 7 | 11 | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.4 | 11 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 9 | 6 | 3 | 8 | 4 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 9 | |
| 14-Sep | Z | 1 | 5 | 1 | 2 | 7 | 8 | 6 | 9 | 8 | 37 | 40 | 14 | 4 | 2 | 1 | 1 | 8 | 7 | 1 | 0 | 0 | 0 | 0 | 7.0 | 40 | |
| 15-Sep | 1 | Z | 5 | 3 | 5 | 0 | 0 | 7 | 7 | 2 | 5 | 4 | 2 | 1 | 21 | 14 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 | 21 | |
| 16-Sep | 0 | 0 | Z | 3 | 4 | 0 | 0 | 3 | 3 | 4 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 1 | 1.5 | 5 |
| 17-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 18-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 7 | 10 | 1 | 10 | 7 | 4 | 7 | 24 | 37 | 5.0 | 37 | |
| 19-Sep | 46 | 23 | 8 | 22 | 9 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 3 | 9 | 5 | 14 | 30 | 26 | 38 | 15 | 19 | 25 | 12.9 | 46 | |
| 20-Sep | Z | 32 | 20 | 41 | 2 | 3 | 35 | 17 | 8 | 11 | 9 | 13 | 10 | 7 | 6 | 5 | 0 | 0 | 0 | 0 | 1 | 4 | 11 | 2 | 10.2 | 41 | |
| 21-Sep | 0 | Z | 0 | 1 | 1 | 0 | 5 | 10 | 21 | 8 | 9 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.7 | 21 | |
| 22-Sep | 0 | 0 | Z | 1 | 5 | 0 | 2 | 6 | 10 | 10 | 8 | 8 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.6 | 10 | |
| 23-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 | 0.2 | 1 | |
| 24-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 5 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 5 | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 7 | 37 | 11 | 5 | 1 | 0 | 2.9 | 37 | |
| 26-Sep | Z | 3 | 10 | 16 | 19 | 10 | 1 | 2 | 2 | 2 | 5 | 5 | 4 | 7 | 10 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.3 | 19 | |
| 27-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 | 0.1 | 1 | |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 2 | 2 | 6 | 4 | 4 | 3 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1.3 | 6 | |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 3 | 16 | 19 | 9 | 6 | 3 | 12 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 18 | 6 | 5.5 | 25 | |
| 30-Sep | 2 | 1 | 0 | 6 | Z | 6 | 9 | 6 | 13 | 19 | 16 | 16 | 33 | 36 | 18 | 27 | 40 | 31 | 20 | 27 | 23 | 30 | 34 | 35 | 19.5 | 40 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| 4.1 2.7 3.9 9.5 10.5 2.0 4.3 6.2 7.4 5.5 6.0 5.9 5.0 3.7 4.1 3.5 3.4 2.9 4.0 4.4 5.9 5.4 6.0 5.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 46 32 30 123 190 10 35 23 27 19 37 40 33 36 21 27 40 31 37 35 55 34 34 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Shell Muskeg River - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 636 | 93.53 | 93.53 |
| 21 - 40 | 39 | 5.74 | 99.26 |
| 41 - 80 | 3 | 0.44 | 99.71 |
| 81 - 159 | 1 | 0.15 | 99.85 |
| > 159 | 1 | 0.15 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Shell Muskeg River - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 23 | 25 | 8 | 16 | 5 | 6 | 19 | 60 | 137 | 101 | 62 | 48 | 39 | 30 | 22 | 35 | 636 |
| 21 - 40 | 7 | 10 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 4 | 13 | 39 |
| 11 - 80 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 |
| 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 | 0 | 1 | 1 |
| Totals | 31 | 35 | 8 | 17 | 5 | 6 | 19 | 60 | 138 | 103 | 62 | 48 | 39 | 31 | 26 | 52 | 680 |

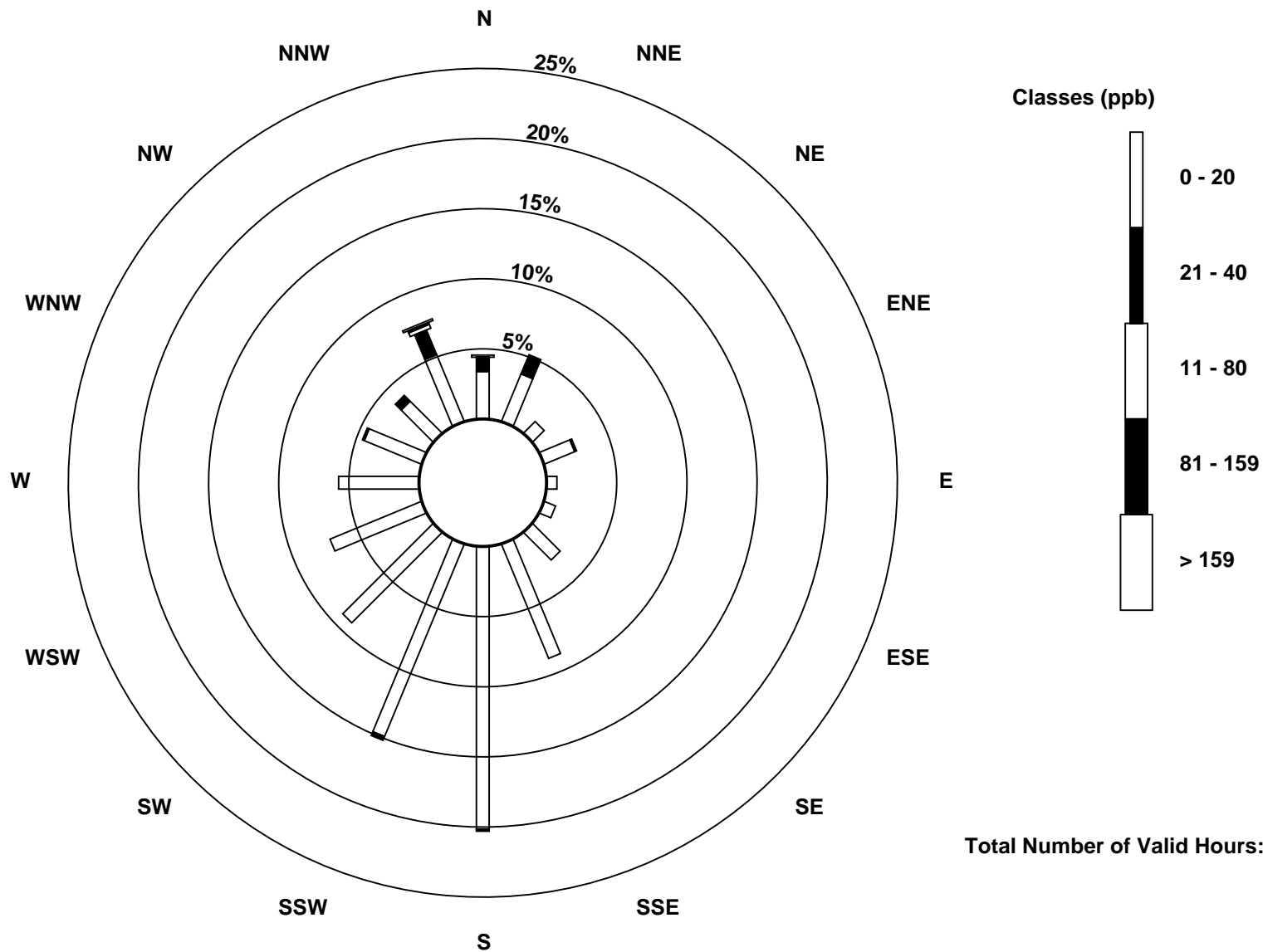
Total Number of Valid Hours: 680

Total Number of Hours: 720

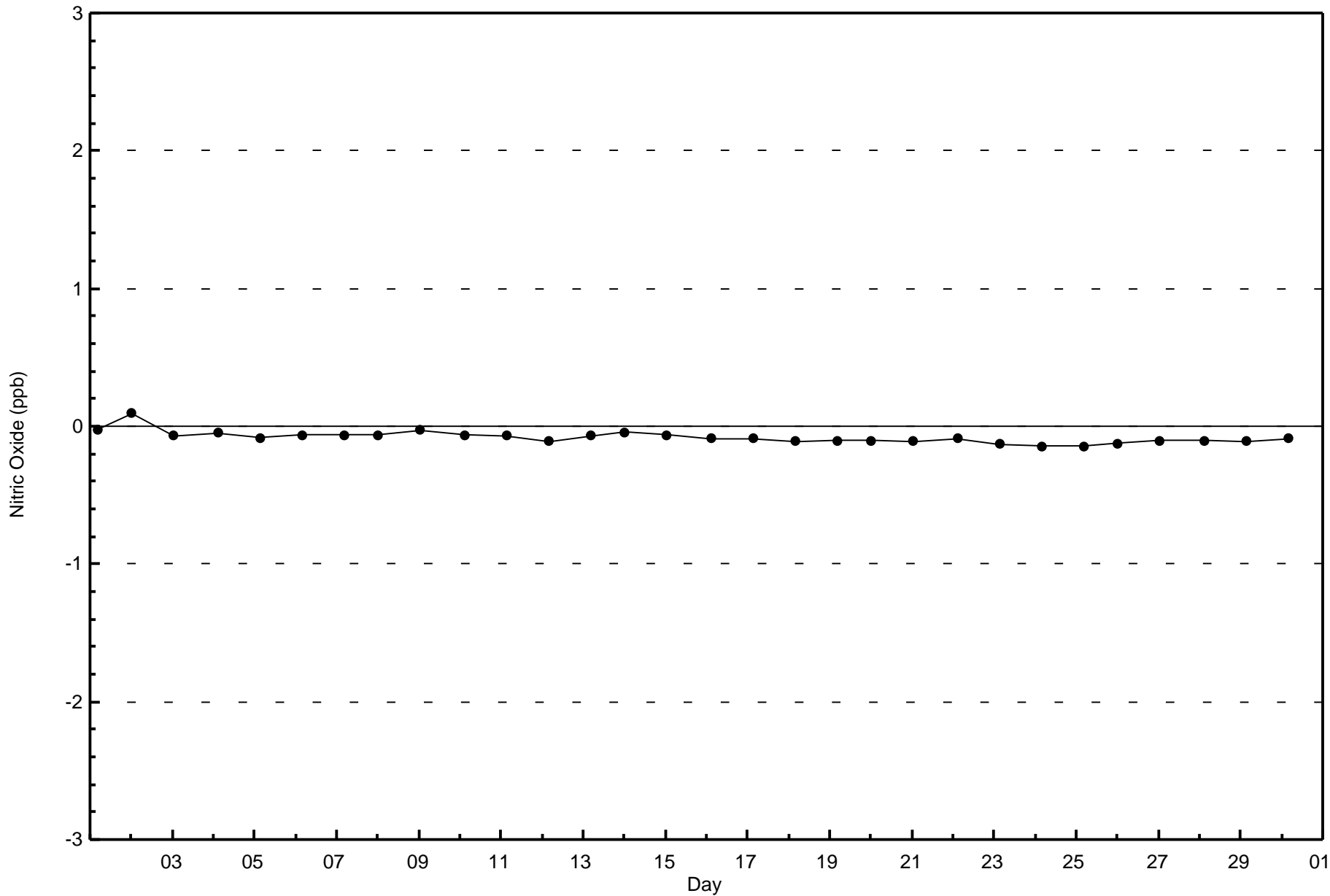


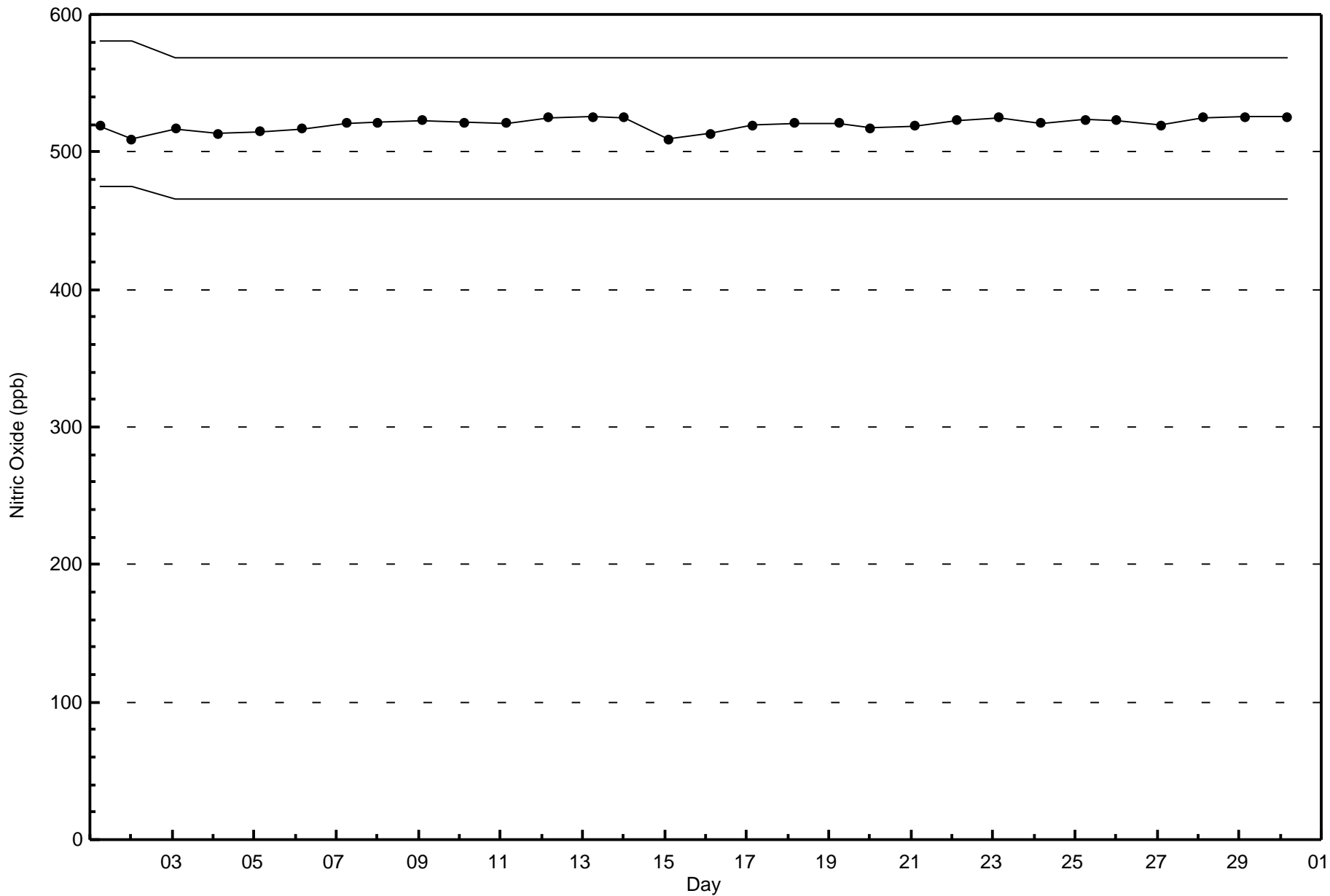
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitric Oxide (NO) - ppb
Shell Muskeg River (AMS 16)



Total Number of Valid Hours: 680







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Shell Muskeg River - September 2016

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 32 ppb on Sep 25 19:00 | Maximum Daily Average: 15.1 ppb on Sep 30 |
| Minimum Value: 0 ppb on Sep 13 23:00 | Hours of Data: 680 |
| Maximum Diurnal Average: 8.2 ppb at hour 22 | Hours of Missing Data: 40 |
| Monthly Average: 6.2 ppb | Hours of Calibration: 40 |
| Minimum Daily Average: 2.2 ppb on Sep 13 | Percent Operational Time: 100.0 |
| Minimum Diurnal Average: 4.1 ppb at hour 14 | |
| Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 5 Q ₃ = 9 P ₉₀ = 14 P ₉₉ = 22 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 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 | 4 | 14 | 17 | Z | 3 | 3 | C | C | C | C | C | C | C | 2 | 10 | 5 | 7 | 9 | 15 | 9 | 7 | 3 | -- | 17 | |
| 2-Sep | Z | 3 | 3 | 2 | 3 | 2 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 6 | 5 | 4 | 4 | 3 | 2 | 6 | 6 | 8 | 10 | 9 | 4.0 | 10 | |
| 3-Sep | 7 | Z | 5 | 4 | 4 | 2 | 2 | 2 | 4 | 3 | 4 | 4 | 5 | 5 | 5 | 7 | 7 | 13 | 14 | 8 | 10 | 10 | 8 | 3 | 5.8 | 14 | |
| 4-Sep | 2 | 4 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 5 | 3 | 4 | 11 | 9 | 9 | 3.4 | 11 | |
| 5-Sep | 4 | 4 | 4 | Z | 6 | 4 | 6 | 6 | 5 | 4 | 8 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 3.5 | 8 | |
| 6-Sep | 2 | 2 | 5 | 6 | Z | 4 | 7 | 9 | 9 | 7 | 9 | 4 | 4 | 4 | 7 | 4 | 2 | 3 | 3 | 3 | 3 | 4 | 2 | 2 | 4.4 | 9 | |
| 7-Sep | 2 | 2 | 2 | 3 | 2 | Z | 5 | 8 | 10 | 8 | 4 | 7 | 8 | 5 | 4 | 4 | 4 | 3 | 3 | 6 | 5 | 3 | 2 | 5 | 4.5 | 10 | |
| 8-Sep | Z | 8 | 10 | 12 | 10 | 8 | 6 | 7 | 7 | 10 | 9 | 13 | 13 | 7 | 9 | 6 | 4 | 9 | 2 | 8 | 15 | 21 | 19 | 17 | 10.0 | 21 | |
| 9-Sep | 17 | Z | 16 | 6 | 6 | 6 | 10 | 10 | 10 | 8 | 6 | 9 | 6 | 1 | 1 | 3 | 2 | 2 | 4 | 8 | 4 | 2 | 2 | 1 | 6.0 | 17 | |
| 10-Sep | 1 | 1 | Z | 1 | 1 | 3 | 6 | 7 | 6 | 4 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 13 | 2.6 | 13 | |
| 11-Sep | 16 | 16 | 18 | Z | 13 | 11 | 14 | 13 | 13 | 11 | 12 | 11 | 11 | 10 | 10 | 10 | 13 | 12 | 18 | 27 | 22 | 17 | 7 | 4 | 13.4 | 27 | |
| 12-Sep | 8 | 3 | 2 | 3 | Z | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 3 | 3 | 6 | 4 | 3 | 2 | 2 | 6 | 14 | 14 | 14 | 6 | 4.5 | 14 | |
| 13-Sep | 4 | 3 | 3 | 3 | 3 | Z | 4 | 6 | 6 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 2.2 | 6 | |
| 14-Sep | Z | 8 | 6 | 4 | 4 | 6 | 3 | 3 | 5 | 5 | 14 | 20 | 10 | 6 | 5 | 3 | 3 | 13 | 13 | 10 | 11 | 8 | 2 | 12 | 7.5 | 20 | |
| 15-Sep | 13 | Z | 7 | 5 | 6 | 3 | 3 | 6 | 6 | 2 | 4 | 5 | 3 | 2 | 14 | 14 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4.5 | 14 | |
| 16-Sep | 2 | 10 | Z | 14 | 12 | 9 | 7 | 9 | 6 | 7 | 6 | 5 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 9 | 17 | 19 | 16 | 6.9 | 19 | |
| 17-Sep | 7 | 9 | 8 | Z | 4 | 6 | 7 | 8 | 6 | 5 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 5 | 4 | 3 | 2 | 3.9 | 9 | |
| 18-Sep | 2 | 2 | 2 | 3 | Z | 3 | 2 | 5 | 3 | 2 | 4 | 4 | 4 | 5 | 4 | 15 | 19 | 9 | 23 | 16 | 4 | 8 | 14 | 14 | 7.1 | 23 | |
| 19-Sep | 14 | 13 | 6 | 11 | 11 | Z | 4 | 2 | 2 | 1 | 3 | 4 | 3 | 4 | 4 | 11 | 8 | 13 | 18 | 14 | 17 | 11 | 15 | 18 | 9.0 | 18 | |
| 20-Sep | Z | 20 | 18 | 18 | 5 | 6 | 21 | 11 | 6 | 11 | 11 | 13 | 10 | 6 | 7 | 5 | 2 | 2 | 1 | 1 | 10 | 9 | 12 | 9 | 9.2 | 21 | |
| 21-Sep | 7 | Z | 6 | 6 | 5 | 6 | 6 | 6 | 9 | 7 | 8 | 5 | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 4 | 13 | 9 | 7 | 7 | 5.2 | 13 | |
| 22-Sep | 5 | 3 | Z | 10 | 15 | 12 | 12 | 9 | 10 | 10 | 11 | 11 | C | C | C | 3 | 2 | 1 | 2 | 3 | 7 | 8 | 10 | 10 | 7.7 | 15 | |
| 23-Sep | 9 | 12 | 10 | Z | 6 | 5 | 3 | 3 | 3 | 3 | 5 | 3 | 3 | 2 | 1 | 2 | 4 | 2 | 1 | 3 | 4 | 7 | 7 | 6 | 4.4 | 12 | |
| 24-Sep | 9 | 9 | 7 | 8 | Z | 5 | 7 | 6 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 4 | 2 | 3 | 3.4 | 9 |
| 25-Sep | 1 | 1 | 3 | 2 | 2 | Z | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 3 | 22 | 32 | 27 | 17 | 9 | 6 | 7 | 6.4 | 32 | |
| 26-Sep | Z | 12 | 15 | 16 | 15 | 11 | 6 | 5 | 2 | 2 | 8 | 8 | 6 | 5 | 8 | 5 | 2 | 0 | 2 | 5 | 10 | 7 | 7 | 11 | 7.3 | 16 | |
| 27-Sep | 6 | Z | 3 | 1 | 3 | 16 | 5 | 4 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 3 | 1 | 1 | 4 | 2.6 | 16 | |
| 28-Sep | 5 | 3 | Z | 6 | 7 | 7 | 11 | 13 | 8 | 7 | 5 | 5 | 3 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 5 | 6 | 11 | 10 | 5.3 | 13 | |
| 29-Sep | 11 | 11 | 12 | Z | 13 | 14 | 16 | 14 | 15 | 11 | 7 | 6 | 15 | 11 | 4 | 3 | 3 | 3 | 7 | 8 | 8 | 20 | 22 | 21 | 11.0 | 22 | |
| 30-Sep | 13 | 12 | 11 | 12 | Z | 14 | 12 | 12 | 13 | 14 | 12 | 12 | 17 | 17 | 12 | 16 | 22 | 21 | 15 | 19 | 18 | 17 | 18 | 20 | 15.1 | 22 | |

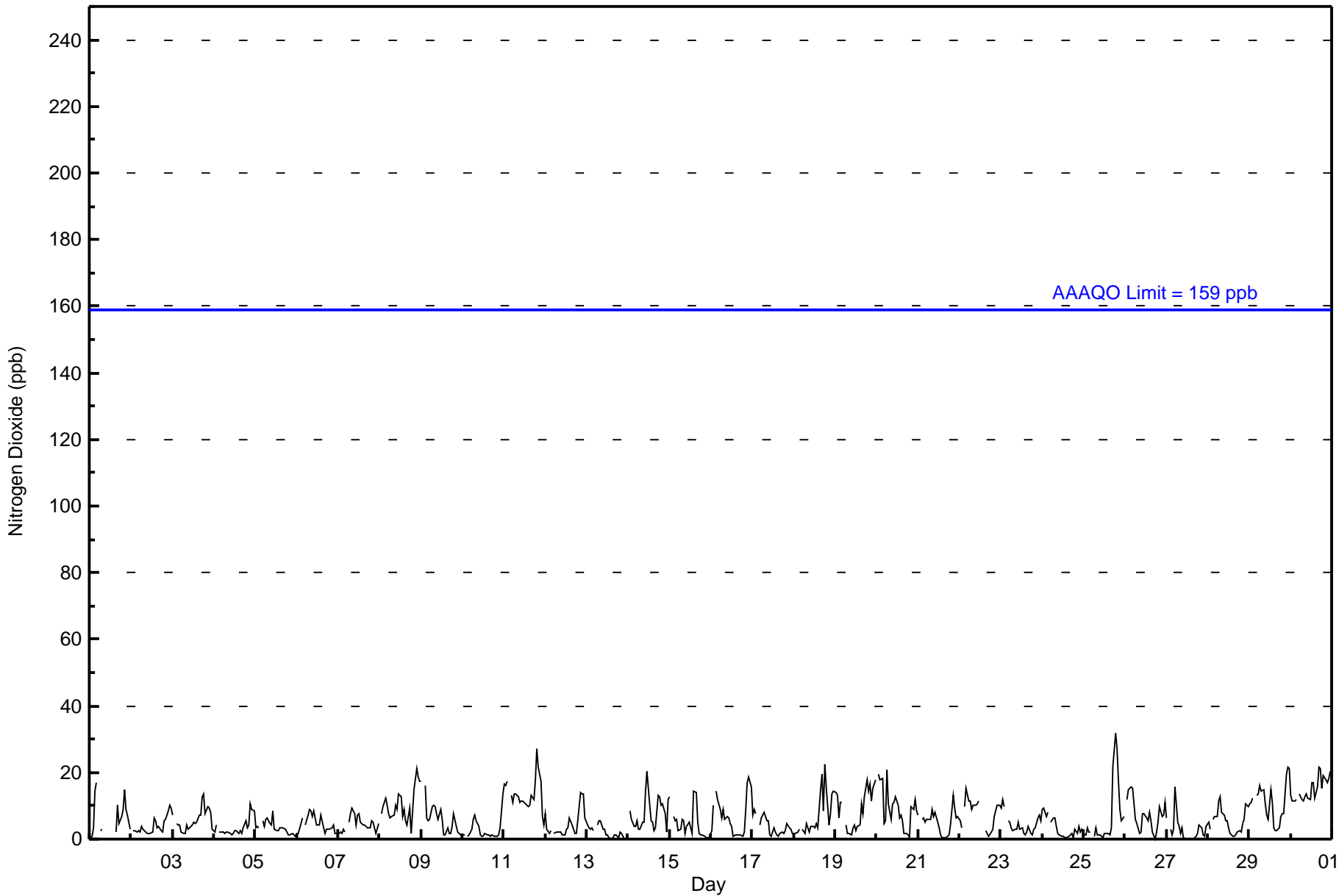
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 6.7 | 6.9 | 7.3 | 7.0 | 7.0 | 6.6 | 6.5 | 6.5 | 6.0 | 5.4 | 5.6 | 5.6 | 5.2 | 4.1 | 4.3 | 4.4 | 4.5 | 5.2 | 6.2 | 7.1 | 8.0 | 8.2 | 7.9 | 8.0 | Diurnal Average |
| 17 | 20 | 18 | 18 | 17 | 16 | 21 | 14 | 15 | 14 | 14 | 20 | 17 | 17 | 14 | 16 | 22 | 22 | 32 | 27 | 22 | 21 | 22 | 21 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 668 | 98.24 | 98.24 |
| 21 - 40 | 12 | 1.76 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 30 | 33 | 8 | 16 | 5 | 6 | 19 | 60 | 138 | 102 | 62 | 48 | 39 | 30 | 25 | 47 | 668 |
| 21 - 40 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 5 | 12 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 35 | 8 | 17 | 5 | 6 | 19 | 60 | 138 | 103 | 62 | 48 | 39 | 31 | 26 | 52 | 680 |

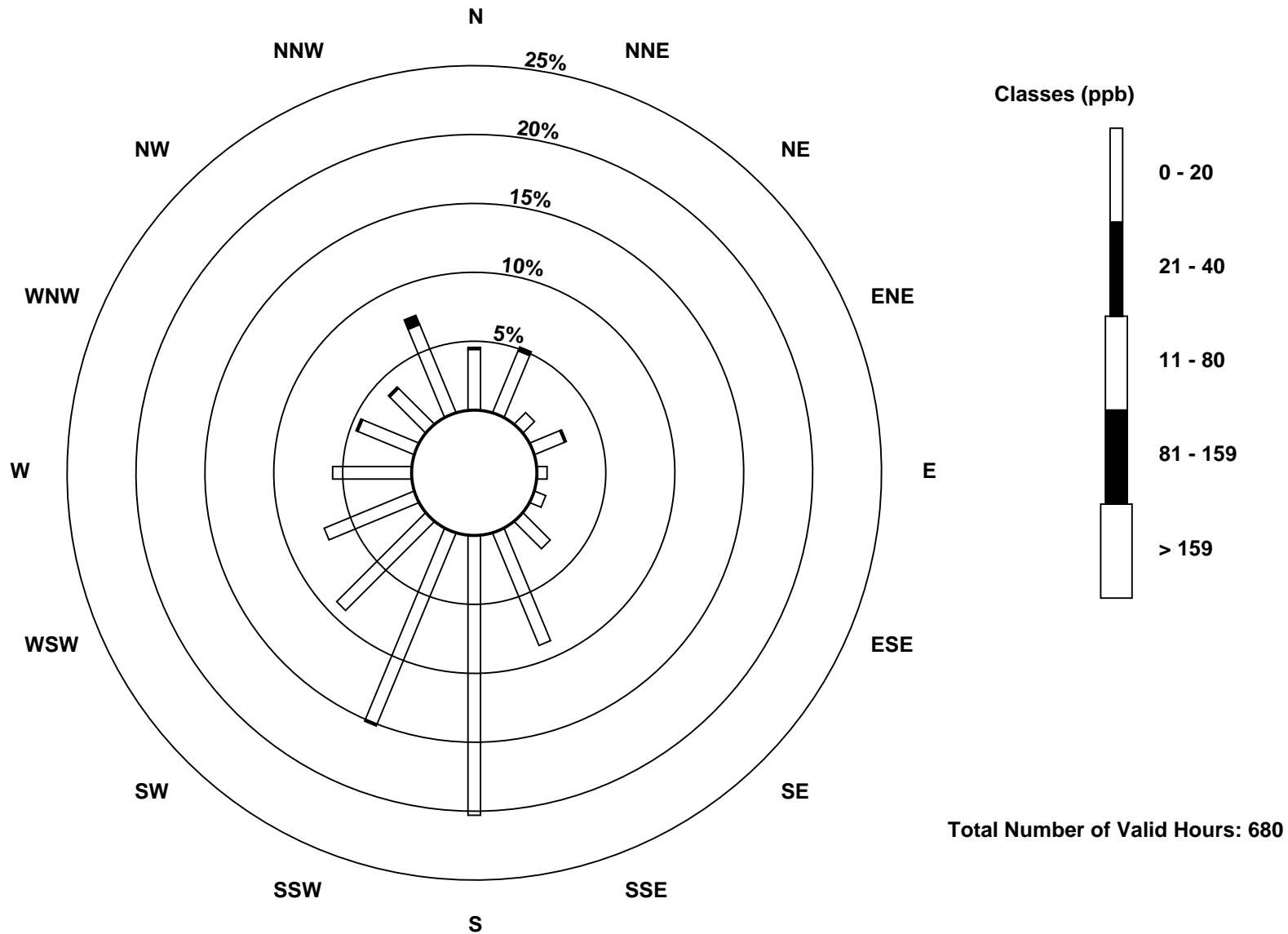
Total Number of Valid Hours: 680

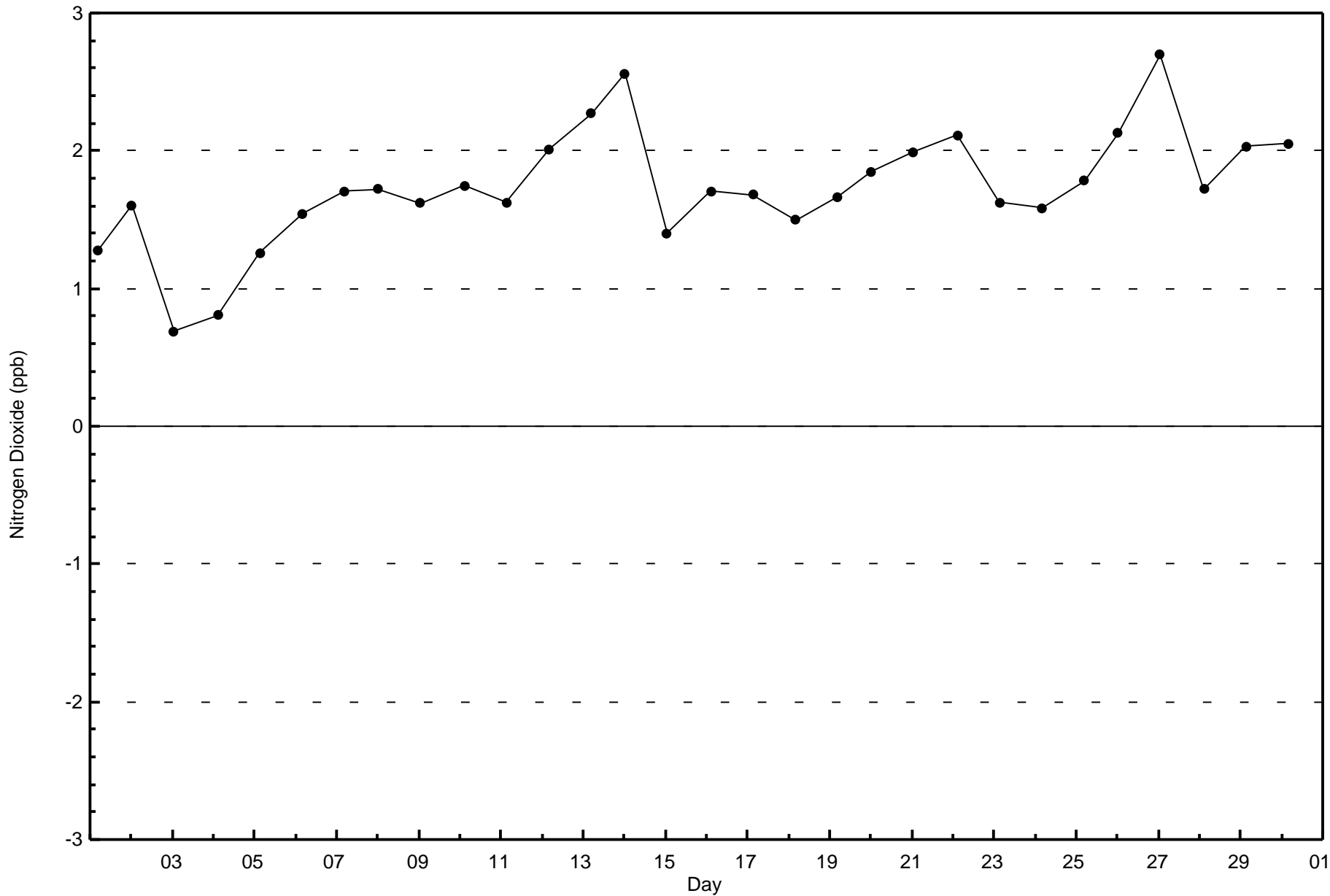
Total Number of Hours: 720

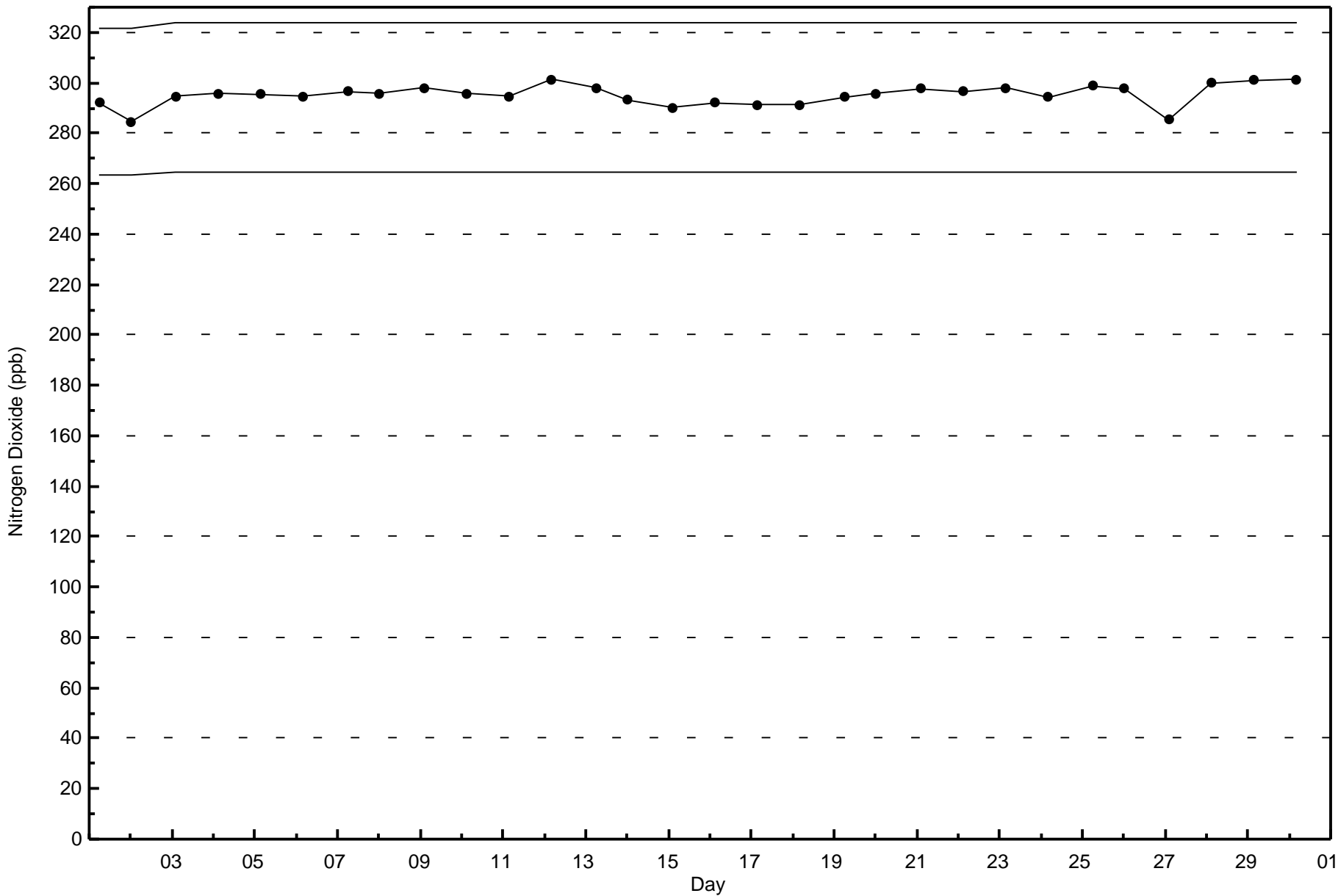


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Shell Muskeg River (AMS 16)









Wood Buffalo Environmental Association
Summary of Hour Averages

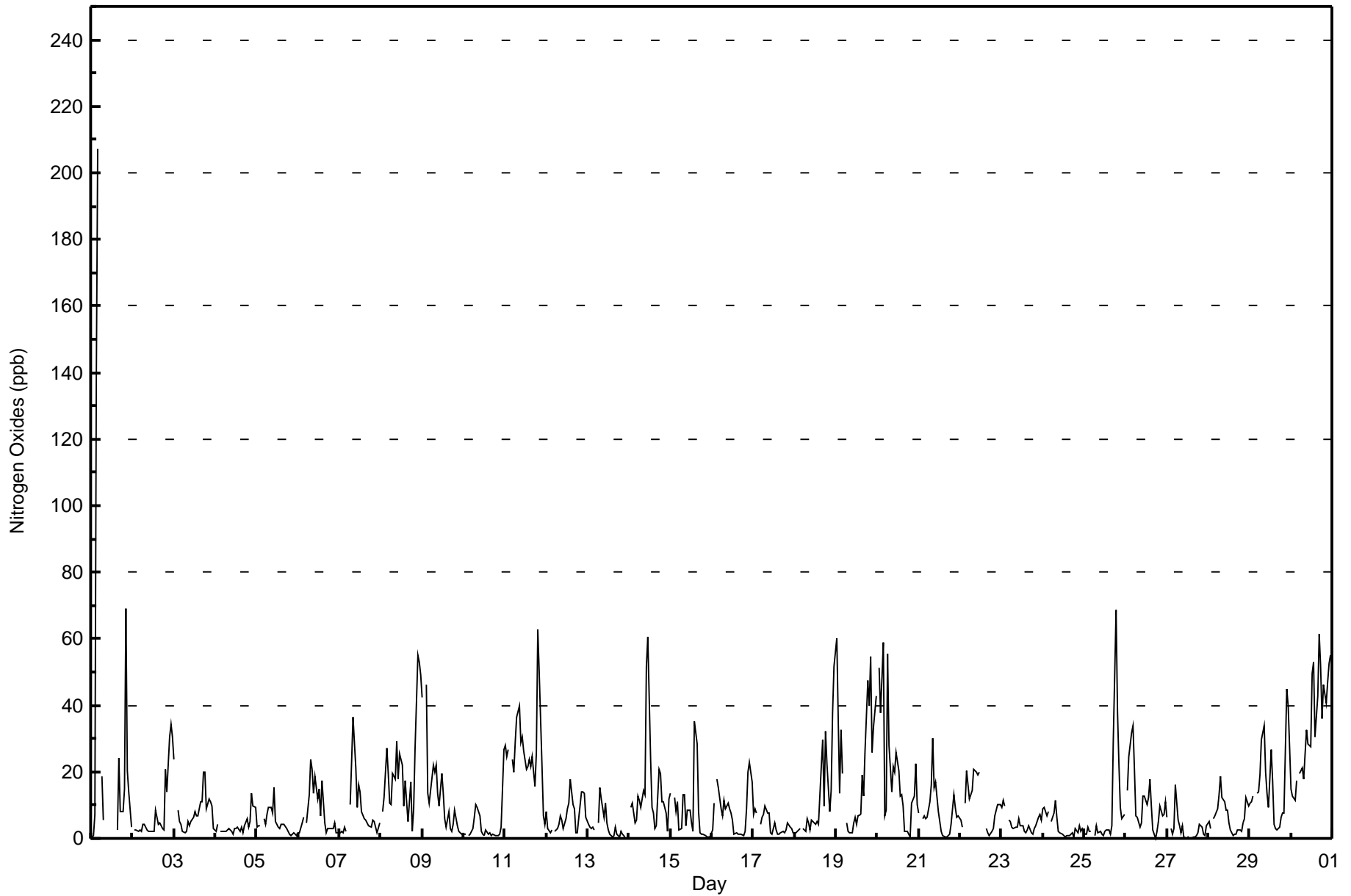
Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - September 2016

| Maximum Value: 207 ppb on Sep 1 05:00 | | Maximum Daily Average: 34.6 ppb on Sep 30 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|------|------|-----|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|------|------|------|------|------|------|-----------------|--|
| Minimum Value: 0 ppb on Sep 13 23:00 | | Minimum Daily Average: 2.7 ppb on Sep 27 | | Hours of Data: 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 17.4 ppb at hour 5 | | Minimum Diurnal Average: 7.8 ppb at hour 14 | | Hours of Missing Data: 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 11.3 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 6 Q ₃ = 14 P ₉₀ = 27 P ₉₉ = 60 | | Hours of Calibration: 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 1 | 1 | 7 | 137 | 207 | Z | 19 | 6 | C | C | C | C | C | C | 2 | 24 | 8 | 8 | 15 | 69 | 20 | 14 | 3 | -- | 207 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | Z | 3 | 3 | 2 | 3 | 2 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 9 | 6 | 4 | 5 | 3 | 3 | 21 | 14 | 30 | 34 | 31 | 8.3 | 34 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 24 | Z | 8 | 5 | 4 | 2 | 2 | 2 | 5 | 4 | 5 | 6 | 8 | 7 | 7 | 11 | 11 | 20 | 20 | 9 | 12 | 11 | 10 | 3 | 8.5 | 24 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 2 | 4 | Z | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 3 | 3 | 3 | 2 | 3 | 2 | 4 | 6 | 3 | 5 | 14 | 10 | 9 | 3.9 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 4 | 4 | 4 | Z | 6 | 4 | 7 | 9 | 9 | 8 | 15 | 5 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 4.6 | 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 2 | 2 | 5 | 6 | Z | 5 | 13 | 24 | 21 | 14 | 19 | 12 | 15 | 7 | 17 | 5 | 2 | 3 | 3 | 3 | 3 | 4 | 2 | 2 | 8.1 | 24 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 2 | 2 | 2 | 3 | 2 | Z | 10 | 23 | 36 | 21 | 9 | 16 | 14 | 8 | 6 | 6 | 5 | 4 | 3 | 6 | 5 | 4 | 2 | 5 | 8.4 | 36 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | Z | 8 | 12 | 27 | 20 | 10 | 10 | 19 | 18 | 29 | 18 | 26 | 22 | 10 | 17 | 11 | 5 | 17 | 2 | 9 | 27 | 55 | 53 | 49 | 20.7 | 55 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 42 | Z | 46 | 14 | 10 | 14 | 22 | 20 | 22 | 14 | 10 | 19 | 14 | 6 | 3 | 8 | 3 | 2 | 4 | 8 | 4 | 2 | 2 | 1 | 12.7 | 46 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 1 | 1 | Z | 1 | 1 | 3 | 6 | 10 | 10 | 7 | 2 | 1 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 27 | 3.8 | 27 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 28 | 25 | 27 | Z | 24 | 20 | 29 | 36 | 40 | 29 | 31 | 26 | 21 | 22 | 24 | 21 | 24 | 16 | 26 | 63 | 50 | 21 | 7 | 4 | 26.6 | 63 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 8 | 3 | 2 | 3 | Z | 2 | 3 | 4 | 7 | 5 | 3 | 6 | 9 | 10 | 18 | 10 | 9 | 2 | 2 | 6 | 14 | 14 | 14 | 6 | 6.9 | 18 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 4 | 3 | 3 | 3 | 3 | Z | 5 | 15 | 12 | 6 | 11 | 5 | 3 | 1 | 0 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 3.7 | 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | Z | 9 | 11 | 5 | 5 | 13 | 11 | 9 | 15 | 13 | 52 | 60 | 24 | 9 | 8 | 3 | 4 | 21 | 19 | 11 | 11 | 8 | 2 | 12 | 14.6 | 60 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 14 | Z | 12 | 8 | 11 | 3 | 3 | 13 | 13 | 4 | 8 | 8 | 5 | 2 | 35 | 28 | 8 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 8.0 | 35 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2 | 10 | Z | 18 | 15 | 9 | 7 | 11 | 9 | 11 | 9 | 8 | 6 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 9 | 20 | 23 | 17 | 8.4 | 23 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 7 | 9 | 8 | Z | 4 | 6 | 7 | 10 | 8 | 8 | 2 | 1 | 4 | 3 | 1 | 1 | 2 | 2 | 2 | 3 | 5 | 4 | 3 | 2 | 4.4 | 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 2 | 2 | 2 | 3 | Z | 3 | 2 | 6 | 4 | 3 | 6 | 5 | 4 | 5 | 4 | 21 | 29 | 10 | 32 | 23 | 8 | 15 | 38 | 52 | 12.1 | 52 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 60 | 36 | 14 | 33 | 20 | Z | 4 | 2 | 2 | 2 | 5 | 6 | 4 | 7 | 7 | 19 | 13 | 26 | 47 | 40 | 54 | 26 | 34 | 43 | 21.9 | 60 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | Z | 51 | 38 | 59 | 7 | 9 | 56 | 28 | 14 | 22 | 20 | 26 | 20 | 13 | 13 | 10 | 2 | 2 | 1 | 1 | 11 | 13 | 23 | 10 | 19.4 | 59 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 8 | Z | 6 | 7 | 6 | 6 | 11 | 16 | 30 | 15 | 17 | 8 | 5 | 2 | 1 | 0 | 1 | 1 | 1 | 4 | 13 | 9 | 6 | 7 | 7.9 | 30 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 5 | 3 | Z | 11 | 20 | 12 | 13 | 15 | 21 | 20 | 19 | 20 | C | C | C | 3 | 2 | 1 | 2 | 3 | 7 | 8 | 10 | 10 | 10.2 | 21 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 9 | 12 | 10 | Z | 6 | 5 | 3 | 3 | 3 | 4 | 6 | 4 | 4 | 2 | 2 | 2 | 4 | 2 | 1 | 3 | 4 | 7 | 7 | 6 | 4.6 | 12 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 9 | 9 | 7 | 8 | Z | 5 | 8 | 11 | 6 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 4 | 2 | 3 | 3.8 | 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 1 | 1 | 3 | 2 | 2 | Z | 1 | 4 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 1 | 4 | 29 | 69 | 38 | 23 | 9 | 6 | 7 | 9.3 | 69 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | Z | 15 | 24 | 32 | 34 | 21 | 7 | 6 | 3 | 5 | 13 | 13 | 10 | 12 | 18 | 10 | 3 | 0 | 2 | 5 | 10 | 7 | 7 | 11 | 11.6 | 34 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 6 | Z | 3 | 1 | 3 | 16 | 5 | 4 | 2 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 | 3 | 1 | 1 | 4 | 2.7 | 16 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 5 | 3 | Z | 6 | 7 | 9 | 13 | 19 | 12 | 11 | 8 | 8 | 5 | 2 | 1 | 1 | 1 | 2 | 3 | 2 | 4 | 6 | 12 | 10 | 6.6 | 19 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 11 | 11 | 13 | Z | 13 | 14 | 19 | 30 | 34 | 20 | 14 | 10 | 27 | 17 | 4 | 3 | 3 | 3 | 7 | 8 | 7 | 45 | 40 | 28 | 16.5 | 45 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 15 | 13 | 12 | 17 | Z | 20 | 21 | 18 | 26 | 32 | 29 | 28 | 50 | 53 | 30 | 43 | 62 | 52 | 36 | 46 | 41 | 47 | 53 | 55 | 34.6 | 62 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 10.9 | 9.6 | 11.2 | 16.5 | 17.4 | 8.5 | 10.8 | 12.7 | 13.4 | 10.9 | 11.6 | 11.5 | 10.2 | 7.8 | 8.4 | 7.9 | 7.9 | 8.0 | 10.2 | 11.4 | 14.0 | 13.6 | 13.9 | 13.9 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 60 | 51 | 46 | 137 | 207 | 21 | 56 | 36 | 40 | 32 | 52 | 60 | 50 | 53 | 35 | 43 | 62 | 52 | 69 | 63 | 69 | 55 | 53 | 55 | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 570 | 83.82 | 83.82 |
| 21 - 40 | 78 | 11.47 | 95.29 |
| 41 - 80 | 30 | 4.41 | 99.71 |
| 81 - 159 | 1 | 0.15 | 99.85 |
| > 159 | 1 | 0.15 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|------------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 7 | 15 | 8 | 14 | 5 | 5 | 19 | 58 | 130 | 93 | 61 | 48 | 39 | 30 | 21 | 17 | 570 |
| 21 - 40 | 19 | 10 | 0 | 2 | 0 | 1 | 0 | 2 | 8 | 9 | 1 | 0 | 0 | 0 | 3 | 23 | 78 |
| 11 - 80 | 5 | 10 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 10 | 30 |
| 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 | 0 | 1 | 1 |
| Totals | 31 | 35 | 8 | 17 | 5 | 6 | 19 | 60 | 138 | 103 | 62 | 48 | 39 | 31 | 26 | 52 | 680 |

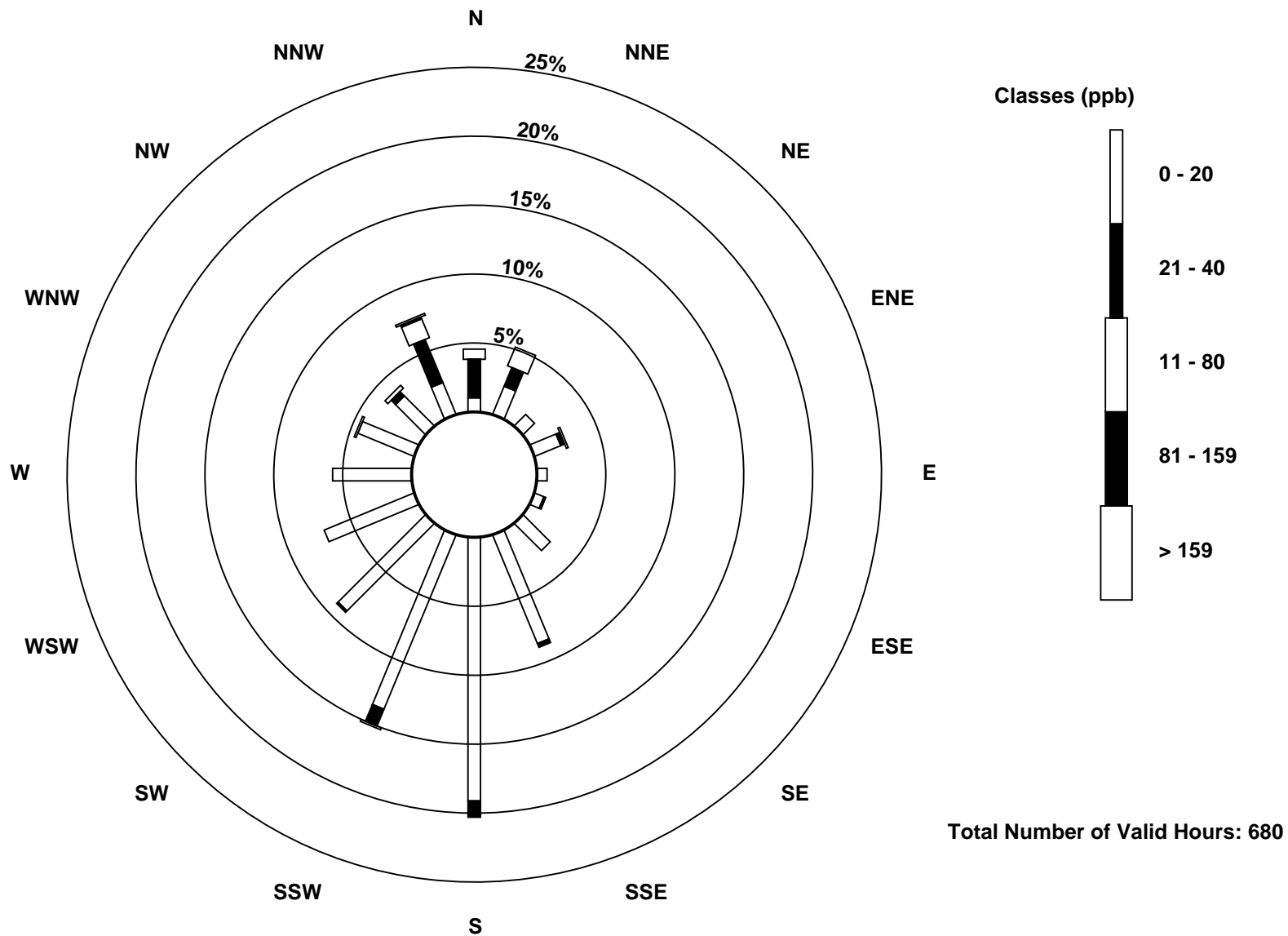
Total Number of Valid Hours: 680

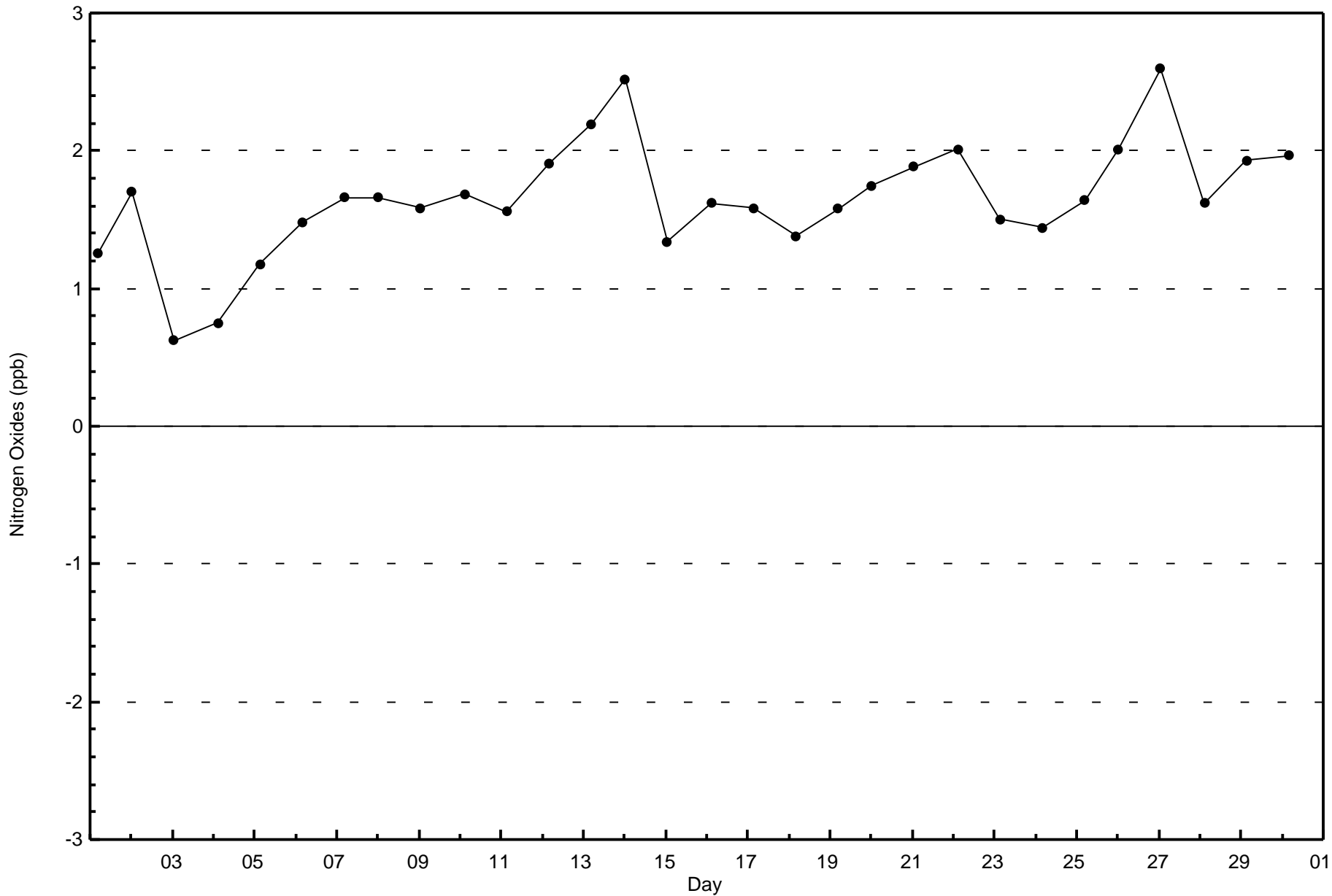
Total Number of Hours: 720

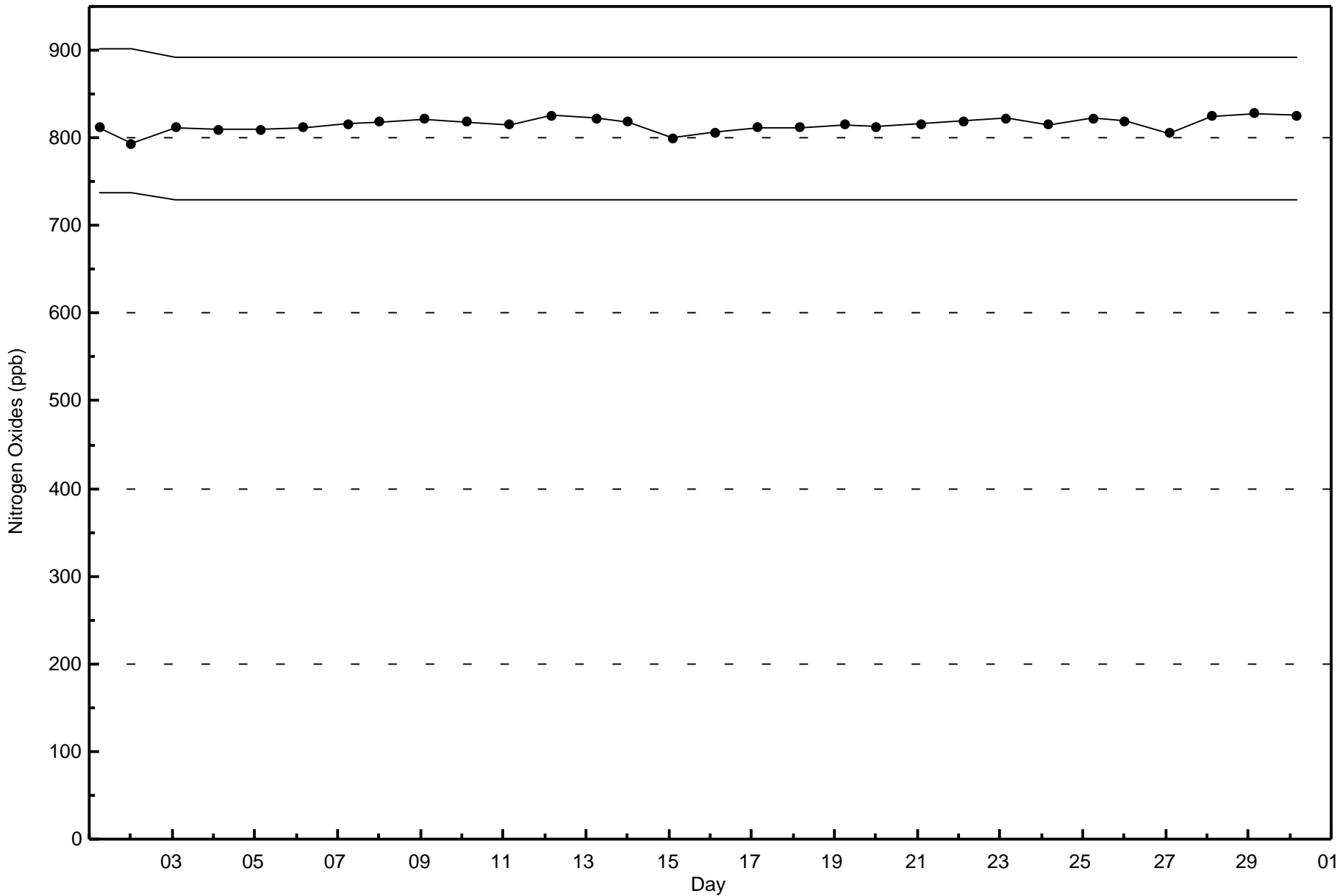


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
Shell Muskeg River (AMS 16)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Shell Muskeg River - September 2016

| | | | |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 32.8 µg/m ³ on Sep 7 20:00 | Maximum Daily Average: 12.0 µg/m ³ on Sep 29 | Hours of Data: | 716 |
| Minimum Value: 0.5 µg/m ³ on Sep 27 11:00 | Minimum Daily Average: 2.0 µg/m ³ on Sep 3 | Hours of Missing Data: | 4 |
| Maximum Diurnal Average: 7.4 µg/m ³ at hour 20 | Minimum Diurnal Average: 3.0 µg/m ³ at hour 10 | Hours of Calibration: | 4 |
| Monthly Average: 5.00 µg/m ³ | Percentiles: P ₁ = 0.8 P ₁₀ = 1.8 Q ₁ = 2.6 Median = 4.0 Q ₃ = 6.4 P ₉₀ = 9.2 P ₉₉ = 21.1 | Percent Operational Time: | 100.0 |

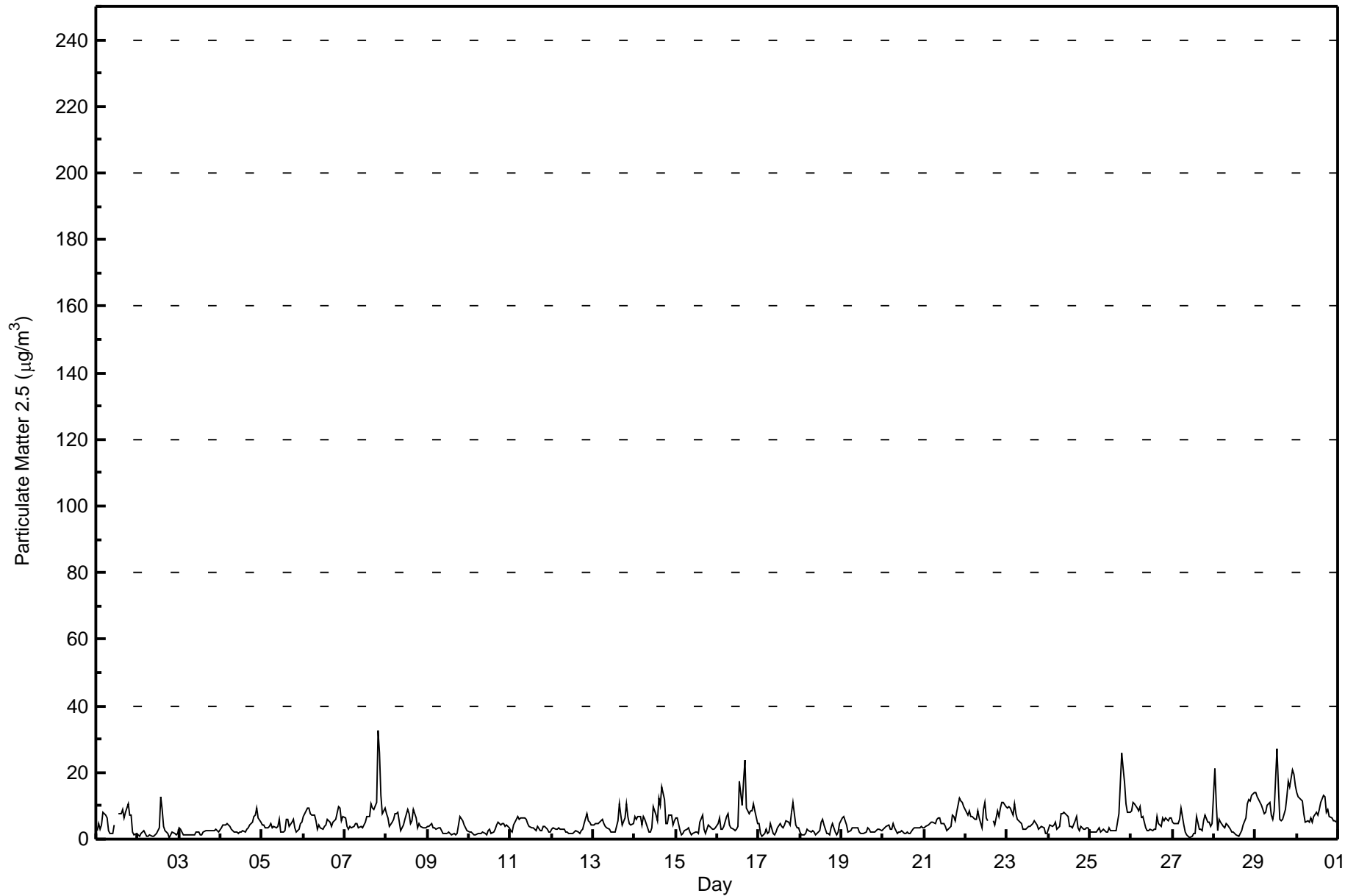
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|------|------|------|------|-----|-----|------|------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|-----|-----|------|------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| | 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 | 2.4 | 4.6 | 3.0 | 4.4 | 8.1 | 7.4 | 6.4 | 2.7 | 1.8 | 1.7 | 4.3 | C | C | 7.8 | 7.4 | 9.0 | 6.5 | 8.0 | 10.5 | 7.1 | 7.3 | 2.1 | 1.2 | 1.8 | 5.2 | 10.5 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 1.3 | 1.0 | 1.8 | 2.6 | 1.8 | 0.7 | 0.8 | 1.1 | 0.8 | 0.7 | 1.1 | 1.8 | 3.3 | 12.9 | 8.8 | 3.8 | 2.7 | 1.6 | 0.5 | 1.1 | 2.2 | 1.8 | 1.4 | 1.9 | 2.4 | 12.9 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 3.5 | 3.2 | 1.4 | 1.1 | 1.4 | 1.2 | 1.2 | 1.3 | 1.2 | 1.1 | 2.1 | 2.2 | 1.4 | 1.4 | 1.9 | 2.5 | 2.6 | 2.6 | 2.4 | 2.4 | 2.4 | 2.9 | 2.7 | 2.2 | 2.0 | 3.5 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 3.4 | 4.3 | 4.1 | 4.4 | 4.6 | 3.7 | 2.8 | 2.4 | 2.2 | 2.1 | 1.9 | 1.9 | 2.2 | 2.4 | 2.1 | 2.8 | 3.2 | 4.3 | 5.2 | 6.9 | 7.4 | 9.2 | 6.4 | 5.2 | 4.0 | 9.2 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 4.0 | 4.2 | 3.3 | 3.6 | 3.8 | 4.6 | 3.5 | 3.8 | 3.2 | 3.7 | 6.1 | 2.0 | 2.2 | 2.6 | 5.8 | 6.0 | 3.6 | 5.2 | 5.9 | 3.4 | 2.1 | 3.1 | 4.5 | 5.1 | 4.0 | 6.1 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 7.0 | 7.7 | 9.3 | 9.2 | 7.5 | 7.3 | 7.3 | 5.6 | 3.1 | 4.2 | 3.3 | 3.0 | 3.7 | 4.3 | 5.7 | 5.2 | 3.8 | 5.0 | 5.5 | 6.1 | 9.7 | 9.2 | 5.3 | 6.7 | 6.0 | 9.7 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 6.3 | 3.9 | 3.1 | 3.7 | 3.4 | 3.6 | 4.6 | 4.7 | 3.2 | 4.0 | 3.6 | 4.3 | 5.1 | 6.7 | 6.8 | 10.5 | 9.1 | 8.8 | 10.8 | 32.8 | 26.0 | 13.0 | 7.7 | 9.2 | 8.1 | 32.8 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 7.8 | 6.3 | 3.9 | 5.1 | 6.0 | 7.6 | 7.6 | 7.9 | 2.6 | 3.3 | 4.3 | 6.0 | 8.8 | 7.7 | 4.8 | 5.6 | 8.8 | 6.3 | 3.3 | 4.5 | 3.9 | 3.2 | 3.4 | 3.6 | 5.5 | 8.8 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 3.8 | 3.7 | 4.6 | 3.4 | 3.6 | 3.1 | 3.3 | 3.2 | 2.7 | 1.7 | 1.5 | 1.9 | 2.2 | 1.6 | 1.5 | 1.6 | 1.4 | 1.7 | 4.4 | 6.9 | 5.3 | 4.0 | 3.2 | 2.6 | 3.0 | 6.9 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 2.2 | 2.0 | 1.6 | 1.4 | 1.4 | 1.7 | 1.7 | 1.8 | 2.3 | 1.7 | 1.1 | 2.4 | 2.9 | 1.5 | 2.3 | 3.0 | 4.2 | 4.9 | 4.2 | 4.7 | 4.6 | 4.0 | 4.0 | 3.3 | 2.7 | 4.9 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 2.4 | 2.2 | 4.4 | 6.1 | 6.6 | 6.1 | 6.4 | 6.4 | 6.2 | 5.8 | 4.7 | 3.9 | 3.2 | 3.5 | 3.2 | 2.6 | 3.6 | 2.6 | 2.6 | 3.7 | 4.0 | 2.8 | 2.2 | 2.0 | 4.1 | 6.6 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 2.8 | 3.3 | 3.0 | 3.1 | 3.3 | 3.1 | 2.8 | 3.0 | 2.0 | 2.1 | 1.8 | 1.6 | 1.9 | 2.0 | 2.4 | 2.0 | 1.8 | 2.5 | 3.1 | 4.8 | 7.6 | 5.6 | 4.9 | 4.4 | 3.1 | 7.6 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 4.1 | 4.5 | 4.6 | 4.7 | 5.3 | 6.1 | 4.8 | 3.8 | 3.3 | 2.9 | 2.2 | 2.1 | 1.9 | 2.0 | 5.4 | 10.5 | 7.2 | 4.3 | 6.2 | 10.7 | 6.8 | 4.7 | 4.3 | 4.7 | 4.9 | 10.7 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 6.7 | 6.1 | 7.0 | 6.8 | 4.2 | 6.9 | 5.8 | 4.5 | 2.2 | 1.9 | 3.4 | 9.9 | 7.4 | 5.6 | 12.5 | 10.3 | 15.7 | 12.0 | 4.5 | 4.8 | 7.3 | 7.4 | 4.2 | 5.6 | 6.8 | 15.7 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 6.2 | 6.6 | 2.4 | 1.3 | 1.8 | 2.6 | 2.9 | 3.2 | 2.0 | 1.4 | 1.7 | 2.0 | 2.0 | 1.8 | 5.0 | 7.1 | 2.8 | 1.7 | 2.8 | 4.0 | 3.3 | 2.9 | 2.9 | 3.2 | 3.1 | 7.1 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 4.5 | 6.4 | 3.1 | 2.8 | 3.9 | 6.8 | 7.5 | 4.4 | 3.4 | 3.0 | 2.6 | 2.8 | 3.9 | 17.2 | 10.0 | 17.6 | 23.9 | 9.4 | 7.6 | 8.4 | 8.6 | 10.6 | 8.4 | 4.8 | 7.6 | 23.9 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 4.6 | 1.8 | 0.7 | 1.5 | 3.1 | 1.9 | 1.9 | 4.7 | 1.9 | 1.2 | 2.0 | 3.3 | 4.7 | 3.9 | 3.6 | 4.3 | 5.5 | 4.9 | 4.3 | 7.9 | 11.0 | 4.1 | 3.4 | 3.5 | 3.7 | 11.0 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 2.3 | 1.2 | 1.2 | 1.7 | 2.9 | 2.6 | 2.0 | 2.4 | 2.0 | 1.4 | 1.7 | 2.6 | 5.1 | 6.0 | 4.3 | 1.8 | 1.6 | 1.3 | 3.3 | 4.6 | 1.9 | 1.4 | 2.2 | 4.7 | 2.6 | 6.0 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 6.3 | 6.6 | 5.5 | 4.3 | 2.1 | 2.7 | 3.6 | 3.6 | 3.4 | 3.3 | 2.3 | 1.8 | 1.5 | 1.7 | 2.3 | 3.4 | 2.8 | 2.2 | 2.2 | 1.9 | 2.4 | 3.0 | 3.0 | 2.5 | 3.1 | 6.6 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 2.8 | 3.3 | 3.8 | 4.4 | 2.8 | 3.1 | 4.5 | 3.3 | 1.8 | 2.0 | 2.1 | 2.6 | 1.8 | 1.8 | 1.9 | 1.7 | 1.6 | 2.8 | 3.4 | 3.5 | 3.3 | 3.3 | 3.8 | 3.3 | 2.9 | 4.5 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 3.5 | 4.0 | 4.3 | 4.5 | 5.1 | 5.2 | 4.8 | 6.0 | 6.5 | 6.2 | 4.6 | 4.5 | 3.9 | 2.6 | 2.9 | 3.8 | 7.1 | 6.8 | 5.7 | 8.1 | 12.4 | 11.3 | 10.9 | 9.8 | 6.0 | 12.4 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 7.9 | 7.3 | 8.4 | 6.8 | 7.0 | 5.9 | 6.0 | 8.6 | 6.2 | 3.6 | 8.9 | 11.2 | 6.1 | 5.3 | C | C | 5.4 | 4.3 | 8.7 | 6.9 | 9.4 | 11.2 | 11.0 | 9.9 | 7.5 | 11.2 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 9.2 | 9.6 | 9.2 | 7.3 | 10.7 | 7.5 | 6.1 | 5.4 | 4.9 | 3.0 | 2.9 | 3.1 | 3.6 | 3.7 | 4.2 | 4.9 | 5.3 | 4.4 | 2.9 | 3.3 | 3.8 | 3.4 | 1.6 | 1.5 | 5.1 | 10.7 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 3.0 | 4.3 | 3.7 | 4.1 | 4.9 | 3.1 | 3.9 | 7.7 | 7.6 | 8.0 | 7.8 | 6.7 | 3.8 | 3.7 | 3.2 | 5.7 | 7.0 | 3.5 | 2.6 | 3.9 | 2.9 | 2.9 | 3.3 | 3.5 | 4.6 | 8.0 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 2.3 | 1.9 | 2.1 | 2.0 | 2.3 | 3.5 | 2.2 | 2.6 | 2.8 | 2.3 | 2.1 | 3.3 | 2.5 | 2.6 | 2.7 | 2.6 | 5.1 | 7.8 | 25.7 | 21.1 | 17.2 | 10.7 | 8.0 | 8.0 | 6.0 | 25.7 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 8.5 | 10.9 | 10.7 | 9.1 | 8.6 | 9.6 | 6.4 | 6.7 | 3.4 | 2.5 | 2.6 | 2.9 | 2.6 | 3.1 | 3.0 | 6.6 | 4.8 | 4.0 | 6.3 | 5.4 | 6.2 | 5.6 | 6.2 | 6.2 | 5.9 | 10.9 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 5.3 | 4.7 | 4.8 | 4.7 | 6.1 | 9.4 | 4.4 | 1.9 | 1.3 | 0.9 | 0.5 | 0.8 | 1.6 | 1.8 | 6.9 | 3.1 | 2.9 | 2.8 | 5.5 | 7.2 | 5.3 | 5.2 | 4.0 | 4.8 | 4.0 | 9.4 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 21.1 | 10.8 | 2.6 | 6.0 | 5.0 | 3.8 | 3.4 | 4.5 | 4.4 | 3.0 | 2.1 | 1.9 | 1.6 | 1.2 | 1.0 | 1.6 | 2.7 | 4.2 | 6.4 | 10.6 | 11.8 | 11.5 | 13.0 | 13.9 | 6.2 | 21.1 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 13.9 | 12.7 | 11.7 | 10.1 | 8.9 | 7.7 | 7.9 | 10.4 | 10.9 | 7.2 | 5.9 | 8.5 | 27.2 | 16.1 | 5.9 | 5.6 | 6.0 | 8.7 | 12.8 | 17.3 | 15.8 | 20.9 | 19.6 | 16.0 | 12.0 | 27.2 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 14.0 | 12.5 | 11.9 | 11.4 | 7.6 | 5.0 | 5.6 | 5.2 | 6.4 | 5.2 | 6.7 | 8.0 | 7.3 | 8.9 | 11.0 | 12.9 | 12.8 | 8.1 | 9.1 | 6.9 | 6.3 | 5.5 | 5.5 | 4.9 | 8.3 | 14.0 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 5.8 | 5.4 | 4.7 | 4.7 | 4.8 | 4.8 | 4.4 | 4.4 | 3.5 | 3.0 | 3.3 | 3.8 | 4.3 | 4.8 | 4.8 | 5.4 | 5.7 | 4.9 | 6.0 | 7.4 | 7.3 | 6.2 | 5.4 | 5.3 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 21.1 | 12.7 | 11.9 | 11.4 | 10.7 | 9.6 | 7.9 | 10.4 | 10.9 | 8.0 | 8.9 | 11.2 | 27.2 | 17.2 | 12.5 | 17.6 | 23.9 | 12.0 | 25.7 | 32.8 | 26.0 | 20.9 | 19.6 | 16.0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River - September 2016**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 472 | 65.92 | 65.92 |
| 6 - 15 | 217 | 30.31 | 96.23 |
| 16 - 25 | 13 | 1.82 | 98.04 |
| 26 - 80 | 4 | 0.56 | 98.60 |
| > 81.0 | 0 | 0.00 | 98.60 |

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Shell Muskeg River - September 2016**

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|----------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 21 | 16 | 10 | 11 | 5 | 4 | 11 | 43 | 84 | 63 | 36 | 37 | 37 | 24 | 23 | 47 | 472 |
| 6 - 15 | 13 | 20 | 2 | 6 | 0 | 2 | 6 | 22 | 58 | 43 | 20 | 10 | 1 | 4 | 4 | 6 | 217 |
| 16 - 25 | 1 | 1 | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 1 | 4 | 1 | 0 | 1 | 0 | 0 | 13 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 4 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 37 | 12 | 18 | 5 | 6 | 20 | 66 | 142 | 108 | 60 | 48 | 39 | 30 | 27 | 53 | 706 |

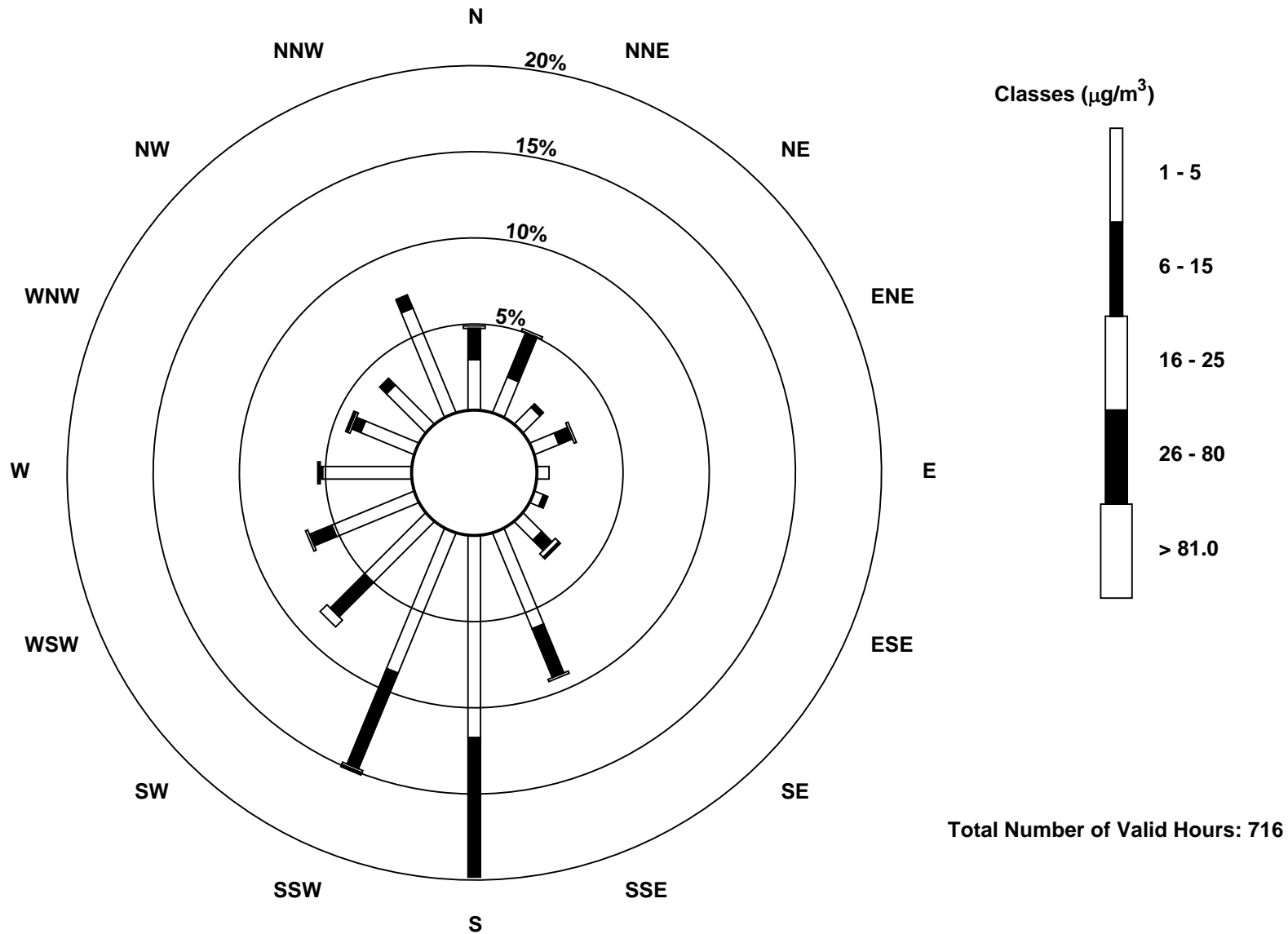
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Shell Muskeg River (AMS 16)





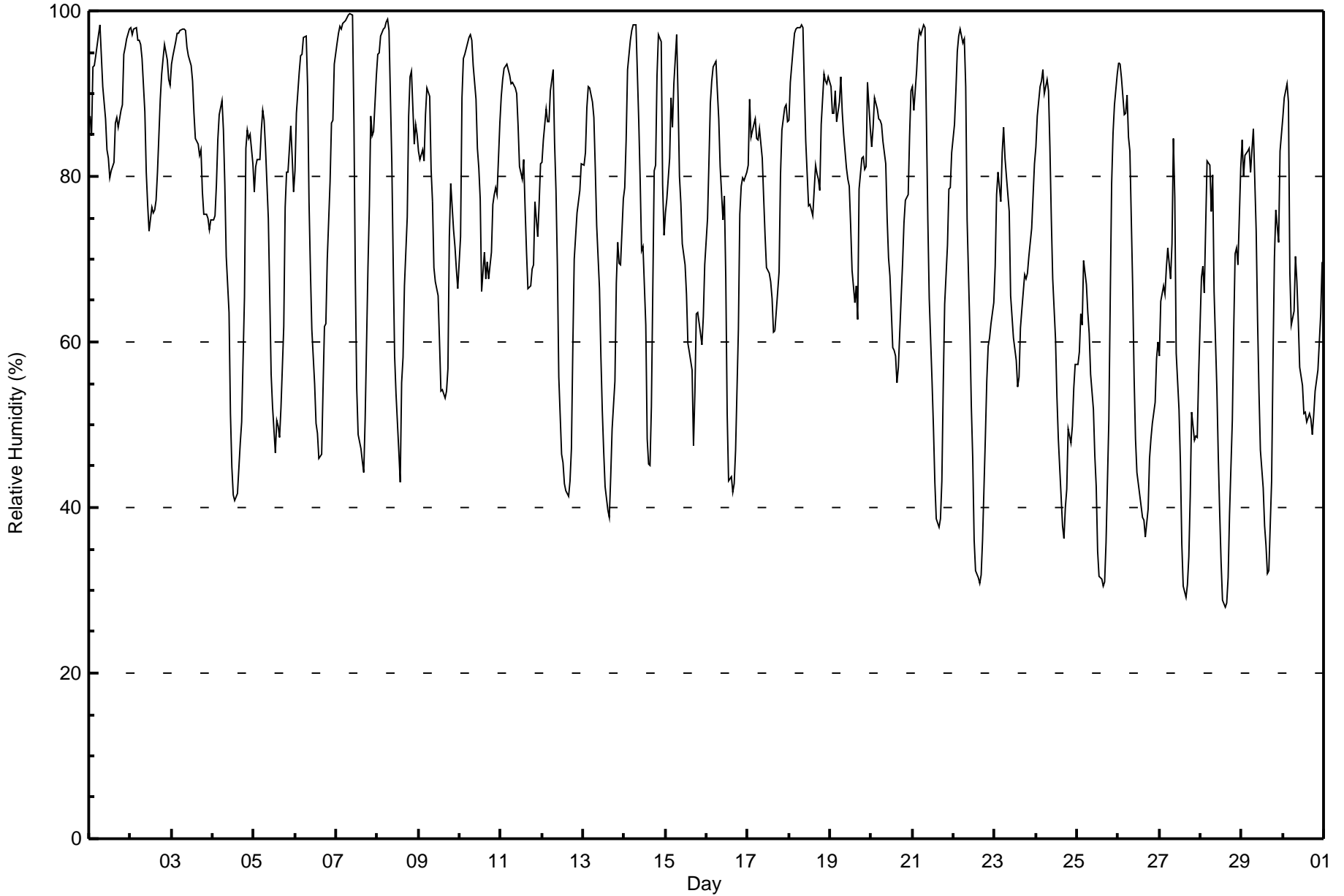
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Shell Muskeg River - September 2016

| Maximum Value: 100 % on Sep 7 09:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 89.6 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|---------------|---------------|--|--|--|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: 28 % on Sep 28 15:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 54.5 % on Sep 27 | | | | | | | | | | | | | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 89.5 % at hour 6 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 51.6 % at hour 16 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 73.0 % | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 31 P ₁₀ = 45 Q ₁ = 59 Median = 77 O ₃ = 87 P ₉₀ = 95 P ₉₉ = 98 | | | | | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | |
| 1-Sep | 87 | 85 | 93 | 93 | 95 | 97 | 98 | 95 | 91 | 87 | 83 | 82 | 80 | 81 | 82 | 87 | 87 | 86 | 88 | 89 | 95 | 96 | 97 | 98 | 89.6 | 98 | | | | | | | | | | | |
| 2-Sep | 98 | 97 | 98 | 98 | 97 | 96 | 96 | 94 | 88 | 81 | 77 | 73 | 76 | 76 | 76 | 77 | 80 | 89 | 92 | 94 | 96 | 94 | 92 | 91 | 88.6 | 98 | | | | | | | | | | | |
| 3-Sep | 94 | 95 | 96 | 97 | 97 | 98 | 98 | 98 | 98 | 96 | 95 | 93 | 91 | 88 | 85 | 84 | 82 | 83 | 78 | 75 | 75 | 75 | 74 | 75 | 88.3 | 98 | | | | | | | | | | | |
| 4-Sep | 75 | 75 | 79 | 84 | 87 | 89 | 86 | 79 | 70 | 63 | 51 | 45 | 42 | 41 | 42 | 45 | 48 | 50 | 65 | 83 | 86 | 85 | 85 | 82 | 68.2 | 89 | | | | | | | | | | | |
| 5-Sep | 78 | 81 | 82 | 82 | 86 | 88 | 87 | 83 | 75 | 66 | 56 | 52 | 47 | 50 | 50 | 48 | 52 | 62 | 76 | 80 | 81 | 86 | 82 | 78 | 71.2 | 88 | | | | | | | | | | | |
| 6-Sep | 81 | 88 | 93 | 95 | 95 | 97 | 97 | 91 | 77 | 69 | 61 | 55 | 50 | 49 | 46 | 46 | 54 | 62 | 62 | 70 | 79 | 86 | 87 | 93 | 74.3 | 97 | | | | | | | | | | | |
| 7-Sep | 96 | 97 | 98 | 98 | 98 | 99 | 99 | 99 | 100 | 100 | 87 | 68 | 54 | 49 | 47 | 46 | 44 | 51 | 69 | 76 | 87 | 85 | 85 | 92 | 80.2 | 100 | | | | | | | | | | | |
| 8-Sep | 95 | 95 | 97 | 98 | 98 | 99 | 99 | 98 | 82 | 69 | 58 | 54 | 47 | 43 | 55 | 58 | 67 | 75 | 87 | 92 | 93 | 84 | 86 | 85 | 79.7 | 99 | | | | | | | | | | | |
| 9-Sep | 83 | 82 | 83 | 82 | 87 | 91 | 90 | 81 | 77 | 69 | 67 | 66 | 60 | 54 | 54 | 53 | 54 | 57 | 73 | 79 | 74 | 71 | 69 | 67 | 71.8 | 91 | | | | | | | | | | | |
| 10-Sep | 73 | 90 | 94 | 95 | 95 | 97 | 97 | 96 | 93 | 89 | 83 | 81 | 77 | 66 | 71 | 68 | 70 | 68 | 71 | 77 | 78 | 79 | 78 | 86 | 82.1 | 97 | | | | | | | | | | | |
| 11-Sep | 90 | 92 | 93 | 94 | 93 | 92 | 91 | 91 | 91 | 90 | 86 | 81 | 80 | 82 | 76 | 71 | 67 | 67 | 69 | 69 | 77 | 73 | 77 | 82 | 82.2 | 94 | | | | | | | | | | | |
| 12-Sep | 82 | 84 | 88 | 87 | 87 | 90 | 93 | 84 | 78 | 69 | 56 | 46 | 45 | 43 | 42 | 41 | 43 | 47 | 59 | 70 | 76 | 77 | 78 | 82 | 68.7 | 93 | | | | | | | | | | | |
| 13-Sep | 81 | 83 | 88 | 91 | 91 | 89 | 87 | 81 | 74 | 67 | 58 | 52 | 47 | 43 | 40 | 39 | 44 | 50 | 55 | 67 | 72 | 70 | 69 | 77 | 67.2 | 91 | | | | | | | | | | | |
| 14-Sep | 79 | 84 | 93 | 97 | 98 | 98 | 98 | 98 | 87 | 79 | 71 | 72 | 62 | 48 | 45 | 45 | 52 | 81 | 81 | 92 | 97 | 96 | 79 | 73 | 79.4 | 98 | | | | | | | | | | | |
| 15-Sep | 76 | 77 | 82 | 90 | 86 | 91 | 97 | 90 | 80 | 77 | 72 | 69 | 66 | 60 | 59 | 57 | 47 | 54 | 63 | 63 | 61 | 60 | 63 | 69 | 71.2 | 97 | | | | | | | | | | | |
| 16-Sep | 75 | 82 | 89 | 92 | 93 | 94 | 90 | 87 | 81 | 75 | 78 | 68 | 51 | 43 | 44 | 42 | 43 | 47 | 61 | 75 | 79 | 80 | 80 | 81 | 72.0 | 94 | | | | | | | | | | | |
| 17-Sep | 81 | 89 | 85 | 86 | 87 | 85 | 84 | 86 | 82 | 77 | 73 | 69 | 68 | 67 | 65 | 61 | 61 | 66 | 68 | 80 | 86 | 88 | 89 | 87 | 78.0 | 89 | | | | | | | | | | | |
| 18-Sep | 87 | 91 | 95 | 97 | 98 | 98 | 98 | 98 | 98 | 91 | 84 | 76 | 77 | 76 | 75 | 81 | 80 | 80 | 78 | 86 | 92 | 92 | 91 | 92 | 88.1 | 98 | | | | | | | | | | | |
| 19-Sep | 91 | 88 | 88 | 90 | 87 | 89 | 92 | 88 | 85 | 81 | 80 | 79 | 74 | 69 | 65 | 67 | 63 | 78 | 82 | 82 | 81 | 81 | 91 | 86 | 81.5 | 92 | | | | | | | | | | | |
| 20-Sep | 84 | 86 | 89 | 88 | 87 | 87 | 86 | 84 | 82 | 75 | 70 | 68 | 59 | 59 | 58 | 55 | 57 | 66 | 69 | 74 | 77 | 78 | 85 | 90 | 75.6 | 90 | | | | | | | | | | | |
| 21-Sep | 91 | 88 | 93 | 96 | 98 | 97 | 98 | 98 | 87 | 75 | 65 | 55 | 50 | 43 | 39 | 38 | 39 | 43 | 55 | 65 | 72 | 79 | 79 | 83 | 71.8 | 98 | | | | | | | | | | | |
| 22-Sep | 86 | 90 | 95 | 97 | 98 | 96 | 97 | 91 | 75 | 61 | 52 | 46 | 36 | 32 | 31 | 31 | 32 | 36 | 49 | 55 | 60 | 61 | 62 | 65 | 63.9 | 98 | | | | | | | | | | | |
| 23-Sep | 69 | 78 | 80 | 77 | 83 | 86 | 82 | 80 | 76 | 66 | 63 | 60 | 58 | 54 | 56 | 62 | 64 | 68 | 68 | 68 | 70 | 74 | 78 | 81 | 70.9 | 86 | | | | | | | | | | | |
| 24-Sep | 84 | 87 | 91 | 92 | 93 | 90 | 92 | 90 | 84 | 75 | 68 | 60 | 53 | 48 | 45 | 38 | 36 | 40 | 42 | 49 | 48 | 50 | 54 | 57 | 65.3 | 93 | | | | | | | | | | | |
| 25-Sep | 57 | 59 | 63 | 62 | 70 | 67 | 64 | 61 | 56 | 52 | 46 | 43 | 35 | 32 | 31 | 30 | 31 | 36 | 51 | 65 | 79 | 85 | 89 | 92 | 56.5 | 92 | | | | | | | | | | | |
| 26-Sep | 94 | 94 | 92 | 87 | 88 | 90 | 85 | 83 | 67 | 56 | 48 | 44 | 41 | 40 | 39 | 39 | 36 | 40 | 46 | 48 | 50 | 53 | 58 | 60 | 61.5 | 94 | | | | | | | | | | | |
| 27-Sep | 58 | 65 | 67 | 66 | 69 | 71 | 68 | 72 | 85 | 78 | 59 | 52 | 45 | 36 | 31 | 29 | 31 | 34 | 41 | 52 | 48 | 49 | 48 | 56 | 54.5 | 85 | | | | | | | | | | | |
| 28-Sep | 68 | 69 | 66 | 74 | 82 | 81 | 76 | 80 | 66 | 54 | 46 | 39 | 33 | 29 | 28 | 28 | 32 | 39 | 50 | 61 | 71 | 71 | 69 | 81 | 58.1 | 82 | | | | | | | | | | | |
| 29-Sep | 84 | 80 | 83 | 83 | 83 | 81 | 83 | 86 | 73 | 62 | 54 | 47 | 42 | 38 | 35 | 32 | 32 | 43 | 58 | 70 | 76 | 72 | 83 | 85 | 65.3 | 86 | | | | | | | | | | | |
| 30-Sep | 87 | 90 | 91 | 89 | 68 | 62 | 64 | 70 | 67 | 62 | 57 | 55 | 51 | 51 | 50 | 51 | 51 | 49 | 51 | 54 | 57 | 60 | 63 | 70 | 63.4 | 91 | | | | | | | | | | | |
| 82.1 | | | | | | | | | | | | | | | | | | 84.7 | | | | | | | | | | | | | | | | | | Diurnal Average | |
| 98 | | | | | | | | | | | | | | | | | | 97 | | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| 87.5 | | | | | | | | | | | | | | | | | | 88.5 | | | | | | | | | | | | | | | | | | | |
| 89.1 | | | | | | | | | | | | | | | | | | 89.5 | | | | | | | | | | | | | | | | | | | |
| 89.1 | | | | | | | | | | | | | | | | | | 87.1 | | | | | | | | | | | | | | | | | | | |
| 80.7 | | | | | | | | | | | | | | | | | | 73.7 | | | | | | | | | | | | | | | | | | | |
| 66.8 | | | | | | | | | | | | | | | | | | 61.7 | | | | | | | | | | | | | | | | | | | |
| 56.6 | | | | | | | | | | | | | | | | | | 53.0 | | | | | | | | | | | | | | | | | | | |
| 52.0 | | | | | | | | | | | | | | | | | | 51.6 | | | | | | | | | | | | | | | | | | | |
| 52.7 | | | | | | | | | | | | | | | | | | 58.2 | | | | | | | | | | | | | | | | | | | |
| 65.4 | | | | | | | | | | | | | | | | | | 72.2 | | | | | | | | | | | | | | | | | | | |
| 75.7 | | | | | | | | | | | | | | | | | | 76.2 | | | | | | | | | | | | | | | | | | | |
| 77.3 | | | | | | | | | | | | | | | | | | 79.9 | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Shell Muskeg River - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 39 | 5.42 | 5.42 |
| 40 - 60 | 145 | 20.14 | 25.56 |
| 60 - 80 | 215 | 29.86 | 55.42 |
| 80 - 100 | 321 | 44.58 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



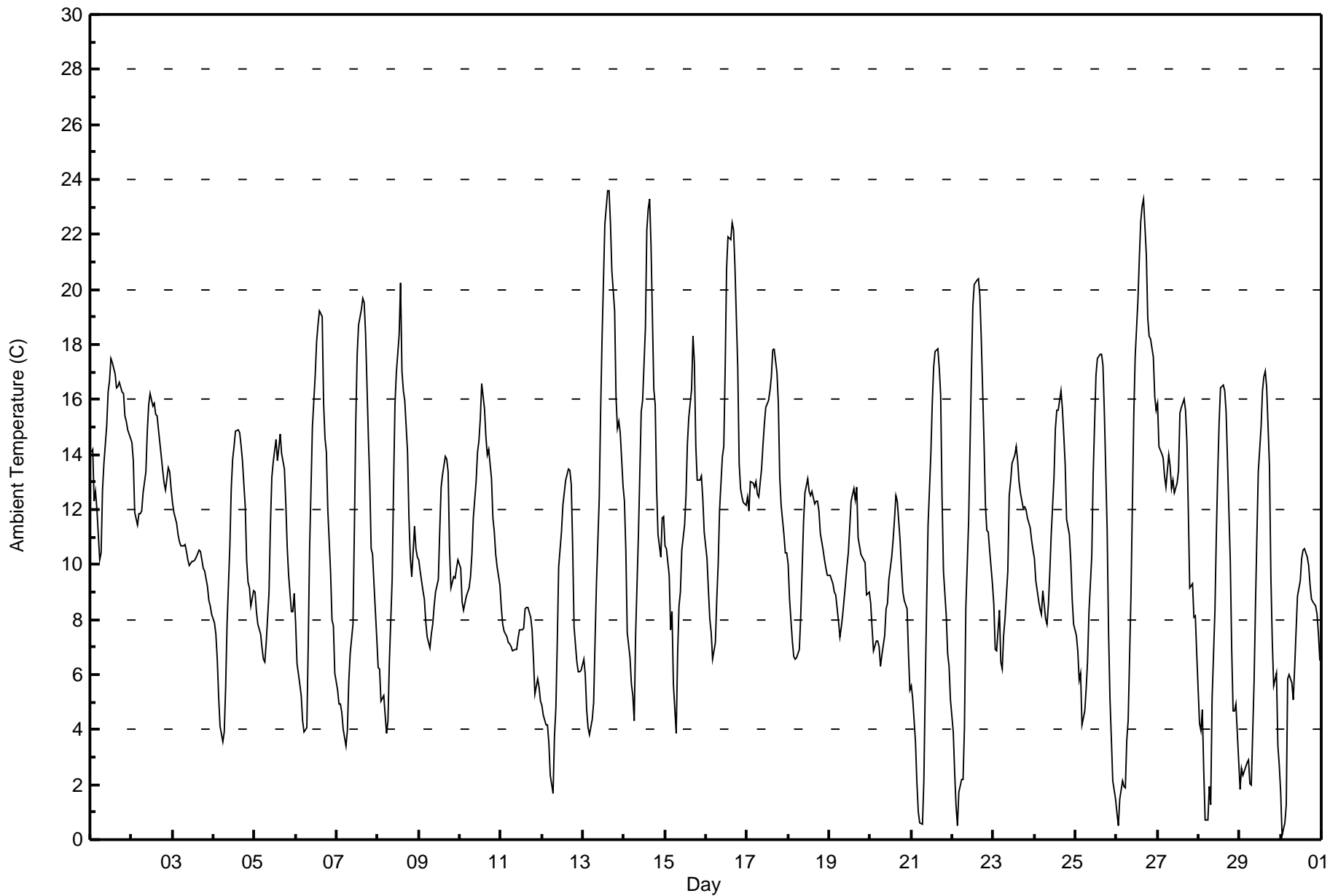
Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

Shell Muskeg River - September 2016

| Maximum Value: 23.6 C on Sep 13 15:00 | | Maximum Daily Average: 14.8 C on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: 0.1 C on Sep 30 02:00 | | Minimum Daily Average: 7.0 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 16.2 C at hour 16 | | Minimum Diurnal Average: 6.1 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.73 C | | Percentiles: P ₁ = 0.7 P ₁₀ = 4.6 Q ₁ = 7.4 Median = 10.5 Q ₃ = 13.9 P ₉₀ = 16.9 P ₉₉ = 22.2 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 14.1 | 14.2 | 12.3 | 12.6 | 12.0 | 10.1 | 10.4 | 12.7 | 13.7 | 15.0 | 16.3 | 16.7 | 17.5 | 17.3 | 17.0 | 16.4 | 16.5 | 16.6 | 16.3 | 16.2 | 15.4 | 15.2 | 14.9 | 14.6 | 14.8 | 17.5 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 14.4 | 13.8 | 11.9 | 11.4 | 11.9 | 11.9 | 12.0 | 12.6 | 13.4 | 14.8 | 15.8 | 16.2 | 15.7 | 15.9 | 15.5 | 15.4 | 14.9 | 13.9 | 13.4 | 13.0 | 12.7 | 13.5 | 13.3 | 12.7 | 13.8 | 16.2 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 12.2 | 11.9 | 11.5 | 11.1 | 10.8 | 10.7 | 10.7 | 10.7 | 10.5 | 10.2 | 10.0 | 10.1 | 10.1 | 10.2 | 10.2 | 10.5 | 10.5 | 10.2 | 9.9 | 9.8 | 9.2 | 8.7 | 8.5 | 8.2 | 10.3 | 12.2 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 7.9 | 7.5 | 6.5 | 5.2 | 4.1 | 3.6 | 3.9 | 5.5 | 7.8 | 10.7 | 12.8 | 13.8 | 14.3 | 14.9 | 14.9 | 14.8 | 14.4 | 13.8 | 12.1 | 10.2 | 9.3 | 9.2 | 8.5 | 9.1 | 9.8 | 14.9 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 9.0 | 8.3 | 7.8 | 7.5 | 7.0 | 6.5 | 6.5 | 7.2 | 9.0 | 11.5 | 13.2 | 13.7 | 14.6 | 13.8 | 14.2 | 14.8 | 14.0 | 13.5 | 12.2 | 10.6 | 9.6 | 8.3 | 8.3 | 8.9 | 10.4 | 14.8 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 7.9 | 6.4 | 5.7 | 5.2 | 4.3 | 3.9 | 4.1 | 7.0 | 10.6 | 12.7 | 15.0 | 16.9 | 18.1 | 18.7 | 19.2 | 19.0 | 15.8 | 14.6 | 14.1 | 12.0 | 9.7 | 8.0 | 7.8 | 6.1 | 10.9 | 19.2 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 5.4 | 4.9 | 4.9 | 4.6 | 4.0 | 3.4 | 4.0 | 5.7 | 6.8 | 7.8 | 11.3 | 15.2 | 17.6 | 18.7 | 19.3 | 19.7 | 19.5 | 18.4 | 14.6 | 13.0 | 10.6 | 10.4 | 9.3 | 7.3 | 10.7 | 19.7 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 6.2 | 6.2 | 5.0 | 5.2 | 4.5 | 3.9 | 4.3 | 6.4 | 9.5 | 12.9 | 15.8 | 17.0 | 18.3 | 20.2 | 17.1 | 16.3 | 16.0 | 14.1 | 11.7 | 10.2 | 9.6 | 11.4 | 10.6 | 10.3 | 10.9 | 20.2 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 10.2 | 9.8 | 9.0 | 8.7 | 7.9 | 7.3 | 7.0 | 7.5 | 7.8 | 8.5 | 9.0 | 9.5 | 11.2 | 12.8 | 13.3 | 13.9 | 13.9 | 13.4 | 10.6 | 9.1 | 9.6 | 9.5 | 9.9 | 10.2 | 10.0 | 13.9 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 9.9 | 8.6 | 8.3 | 8.6 | 8.8 | 9.2 | 9.6 | 10.4 | 11.7 | 13.0 | 14.1 | 14.5 | 15.3 | 16.6 | 15.6 | 14.7 | 14.0 | 14.2 | 13.1 | 11.7 | 11.2 | 10.4 | 9.9 | 9.3 | 11.8 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 8.4 | 7.8 | 7.6 | 7.4 | 7.2 | 7.1 | 7.0 | 6.9 | 6.9 | 6.9 | 7.3 | 7.6 | 7.6 | 7.7 | 8.4 | 8.4 | 8.5 | 8.1 | 7.6 | 6.6 | 5.3 | 5.9 | 5.5 | 5.1 | 7.2 | 8.5 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 4.9 | 4.5 | 4.2 | 4.2 | 3.5 | 2.4 | 1.7 | 3.8 | 4.8 | 7.2 | 9.9 | 11.2 | 12.1 | 12.6 | 13.1 | 13.5 | 13.4 | 12.9 | 10.7 | 7.7 | 6.5 | 6.1 | 6.1 | 6.2 | 7.6 | 13.5 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 6.6 | 6.0 | 4.7 | 4.0 | 3.8 | 4.4 | 5.0 | 7.2 | 9.3 | 12.4 | 15.6 | 18.2 | 20.3 | 22.4 | 23.6 | 23.6 | 22.4 | 20.7 | 19.2 | 16.1 | 15.0 | 15.2 | 14.8 | 12.9 | 13.5 | 23.6 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 12.3 | 10.5 | 7.5 | 6.6 | 5.6 | 5.2 | 4.3 | 7.5 | 11.1 | 13.3 | 15.6 | 16.0 | 18.6 | 22.1 | 22.9 | 23.3 | 21.6 | 16.4 | 15.8 | 12.8 | 11.1 | 10.3 | 11.7 | 11.8 | 13.1 | 23.3 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 10.7 | 10.6 | 9.6 | 7.6 | 8.3 | 5.6 | 3.9 | 6.7 | 8.5 | 9.0 | 10.5 | 11.4 | 12.5 | 14.4 | 15.3 | 16.4 | 18.3 | 17.3 | 14.4 | 13.1 | 13.0 | 13.2 | 12.4 | 11.2 | 11.4 | 18.3 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 10.2 | 9.1 | 8.0 | 7.5 | 6.6 | 7.2 | 8.7 | 10.0 | 12.0 | 13.9 | 14.3 | 17.1 | 20.7 | 21.9 | 21.8 | 22.4 | 22.2 | 20.8 | 17.1 | 13.7 | 12.8 | 12.5 | 12.2 | 12.1 | 14.0 | 22.4 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 12.5 | 11.9 | 13.0 | 13.0 | 12.8 | 13.0 | 12.6 | 12.5 | 13.5 | 14.3 | 15.1 | 15.7 | 16.0 | 16.3 | 16.8 | 17.8 | 17.9 | 17.0 | 15.9 | 13.2 | 12.2 | 11.1 | 10.4 | 10.4 | 14.0 | 17.9 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 10.0 | 8.7 | 7.2 | 6.7 | 6.6 | 6.6 | 6.9 | 8.2 | 9.8 | 11.5 | 12.6 | 13.1 | 12.7 | 12.5 | 12.7 | 12.2 | 12.3 | 12.3 | 11.9 | 11.1 | 10.5 | 10.1 | 9.9 | 9.6 | 10.2 | 13.1 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 9.6 | 9.5 | 9.3 | 9.0 | 8.9 | 8.0 | 7.4 | 7.7 | 8.2 | 9.3 | 9.9 | 10.4 | 11.3 | 12.3 | 12.8 | 12.4 | 12.8 | 11.0 | 10.4 | 10.3 | 10.1 | 10.0 | 8.9 | 9.0 | 9.9 | 12.8 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 8.6 | 7.7 | 6.9 | 7.2 | 7.2 | 7.0 | 6.3 | 6.7 | 7.4 | 8.4 | 8.6 | 9.5 | 10.3 | 10.9 | 11.6 | 12.5 | 12.3 | 10.9 | 9.9 | 9.0 | 8.7 | 8.4 | 6.8 | 5.5 | 8.7 | 12.5 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 5.6 | 5.2 | 3.6 | 2.1 | 1.0 | 0.6 | 0.6 | 2.2 | 5.6 | 8.6 | 11.5 | 14.0 | 15.8 | 17.2 | 17.7 | 17.9 | 17.2 | 16.2 | 12.4 | 9.8 | 8.1 | 6.8 | 6.3 | 5.1 | 8.8 | 17.9 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 3.9 | 2.4 | 1.2 | 0.5 | 1.7 | 2.2 | 2.2 | 4.1 | 8.5 | 11.6 | 14.3 | 17.0 | 19.4 | 20.2 | 20.3 | 20.4 | 19.8 | 18.3 | 14.4 | 12.2 | 11.2 | 11.2 | 10.5 | 9.3 | 10.7 | 20.4 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 8.6 | 6.9 | 6.9 | 8.4 | 6.5 | 6.2 | 7.4 | 8.1 | 9.8 | 12.5 | 13.0 | 13.7 | 14.0 | 14.3 | 13.8 | 13.0 | 12.6 | 12.1 | 12.1 | 12.0 | 11.7 | 11.3 | 10.9 | 10.5 | 10.7 | 14.3 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 10.2 | 9.4 | 8.7 | 8.4 | 8.2 | 9.0 | 8.0 | 7.8 | 8.5 | 9.7 | 11.1 | 13.2 | 14.9 | 15.6 | 15.6 | 16.3 | 15.6 | 16.3 | 15.6 | 14.7 | 13.7 | 11.6 | 11.1 | 10.1 | 11.2 | 16.3 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 7.4 | 6.8 | 5.8 | 6.0 | 4.2 | 4.7 | 5.5 | 6.5 | 8.3 | 10.3 | 13.3 | 15.1 | 16.9 | 17.5 | 17.6 | 17.6 | 17.2 | 15.5 | 11.2 | 7.5 | 5.1 | 3.6 | 2.1 | 1.5 | 9.5 | 17.6 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 1.0 | 0.5 | 1.5 | 2.2 | 1.9 | 1.9 | 3.6 | 4.3 | 8.8 | 12.1 | 15.3 | 17.6 | 19.6 | 21.2 | 22.5 | 23.0 | 23.3 | 21.2 | 19.0 | 18.3 | 18.2 | 17.5 | 16.1 | 15.6 | 12.8 | 23.3 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 15.8 | 14.3 | 14.0 | 13.9 | 13.2 | 12.8 | 14.0 | 13.6 | 12.8 | 13.0 | 12.6 | 13.0 | 13.4 | 15.5 | 15.7 | 16.0 | 15.6 | 14.4 | 12.0 | 9.1 | 9.3 | 8.1 | 8.1 | 6.8 | 12.8 | 16.0 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 4.2 | 4.0 | 4.7 | 2.6 | 0.7 | 0.7 | 1.9 | 1.3 | 5.1 | 8.3 | 11.0 | 13.3 | 15.2 | 16.4 | 16.5 | 16.3 | 15.6 | 13.8 | 10.1 | 6.9 | 4.7 | 4.7 | 4.9 | 2.8 | 7.7 | 16.5 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 1.8 | 2.6 | 2.4 | 2.7 | 2.8 | 2.9 | 2.1 | 2.0 | 5.7 | 8.5 | 11.0 | 13.4 | 15.0 | 16.3 | 16.8 | 17.0 | 16.4 | 13.6 | 9.6 | 7.2 | 5.6 | 6.1 | 3.4 | 2.7 | 7.8 | 17.0 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 1.7 | 0.1 | 0.6 | 1.3 | 5.8 | 6.0 | 5.7 | 5.1 | 6.3 | 7.6 | 8.8 | 9.4 | 10.2 | 10.5 | 10.6 | 10.3 | 10.0 | 9.3 | 8.8 | 8.6 | 8.5 | 8.2 | 7.5 | 6.5 | 7.0 | 10.6 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.4 | 7.7 | 7.0 | 6.7 | 6.4 | 6.1 | 6.2 | 7.3 | 9.1 | 10.9 | 12.5 | 13.8 | 15.0 | 15.9 | 16.1 | 16.2 | 15.8 | 14.6 | 12.8 | 11.1 | 10.2 | 9.8 | 9.3 | 8.6 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 15.8 | 14.3 | 14.0 | 13.9 | 13.2 | 13.0 | 14.0 | 13.6 | 13.7 | 15.0 | 16.3 | 18.2 | 20.7 | 22.4 | 23.6 | 23.6 | 23.3 | 21.2 | 19.2 | 18.3 | 18.2 | 17.5 | 16.1 | 15.6 | Diurnal Maximum |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Shell Muskeg River - September 2016

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 325 | 45.14 | 45.14 |
| 10 - 20 | 370 | 51.39 | 96.53 |
| > 20 | 25 | 3.47 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

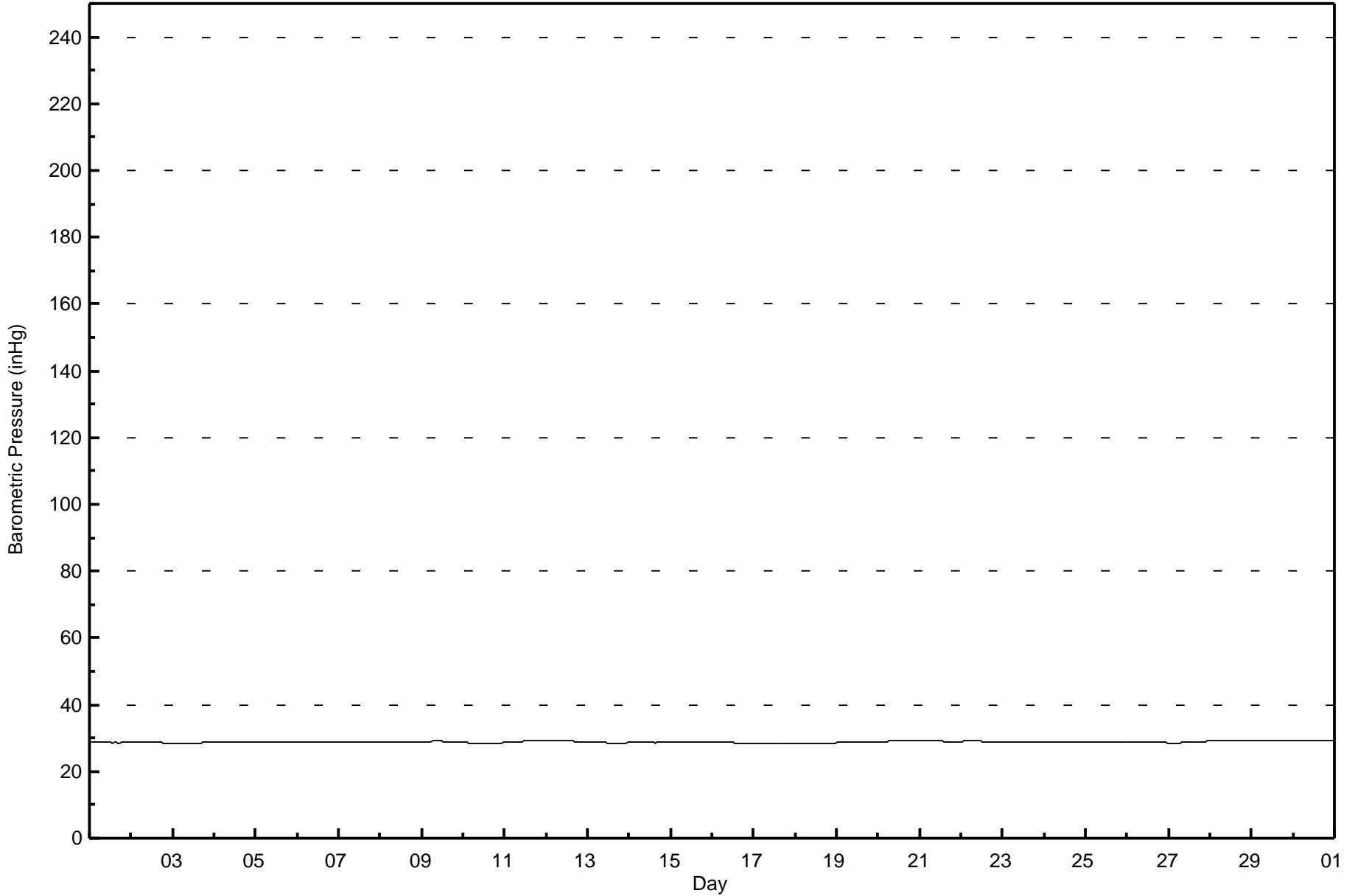
**Barometric Pressure (BP) - inHg
Shell Muskeg River - September 2016**

| Maximum Value: 29.3 inHg on Oct 1 00:00 Maximum Daily Average: 29.2 inHg on Sep 30 | | | | | | | | | | | | | | | | | | | | | | Hours in Service: | 720 | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------|-------|------|---------------|---------------|------|
| Minimum Value: 28.3 inHg on Sep 17 22:00 Minimum Daily Average: 28.4 inHg on Sep 17 | | | | | | | | | | | | | | | | | | | | | | Hours of Data: | 720 | | | | |
| Maximum Diurnal Average: 28.8 inHg at hour 9 Minimum Diurnal Average: 28.8 inHg at hour 17 | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: | 0 | | | | |
| Monthly Average: 28.81 inHg Percentiles: P ₁ = 28.3 P ₁₀ = 28.5 Q ₁ = 28.6 Median = 28.8 Q ₃ = 29.0 P ₉₀ = 29.1 P ₉₉ = 29.2 | | | | | | | | | | | | | | | | | | | | | | Hours of Calibration: | 0 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: | 100.0 | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.8 |
| 2-Sep | 28.6 | 28.6 | 28.7 | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.5 | 28.6 | 28.7 |
| 3-Sep | 28.5 | 28.5 | 28.5 | 28.5 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.5 | 28.5 | 28.5 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.5 | 28.8 |
| 4-Sep | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 |
| 5-Sep | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 |
| 6-Sep | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.8 |
| 7-Sep | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.8 |
| 8-Sep | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.7 | 28.9 |
| 9-Sep | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.7 | 28.9 | 29.0 | |
| 10-Sep | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.5 | 28.7 | |
| 11-Sep | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.0 | 29.2 | |
| 12-Sep | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.1 | 29.2 | |
| 13-Sep | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.8 | |
| 14-Sep | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.7 | 28.8 | |
| 15-Sep | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.9 | 29.0 | |
| 16-Sep | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.6 | 28.7 | |
| 17-Sep | 28.5 | 28.5 | 28.5 | 28.5 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.4 | 28.5 | | |
| 18-Sep | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.3 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.4 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.5 | 28.6 | 28.6 | 28.6 | 28.6 | 28.4 | 28.6 | |
| 19-Sep | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.9 | |
| 20-Sep | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | |
| 21-Sep | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | |
| 22-Sep | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.1 | |
| 23-Sep | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.9 | |
| 24-Sep | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.9 | |
| 25-Sep | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | |
| 26-Sep | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.8 | 29.0 | |
| 27-Sep | 28.6 | 28.6 | 28.5 | 28.5 | 28.5 | 28.6 | 28.6 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 28.8 | 29.1 | |
| 28-Sep | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | |
| 29-Sep | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 | |
| 30-Sep | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.3 | 29.2 | 29.3 | 29.3 | 29.2 | 29.3 | |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Shell Muskeg River - September 2016





| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Speed: 31 km/h on Sep 27 15:00 | Maximum Daily Speed Average: 18.9 km/h on Sep 30 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 14 12:00 | Minimum Daily Speed Average: 0.7 km/h on Sep 8 | Hours of Data: 720 |
| Maximum Diurnal Speed Average: 6.4 km/h at hour 15 | Minimum Diurnal Speed Average: 1.6 km/h at hour 19 | Hours of Missing Data: 0 |
| Monthly Average Velocity: 3.5 km/h 233.5 deg | Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 9 Q ₃ = 14 P ₉₀ = 18 P ₉₉ = 27 | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | ENE10 | ENE7 | NNE4 | NNW6 | NNW3 | NE4 | ENE3 | ENE6 | NE10 | NE10 | NNE11 | NNE16 | NE19 | NE19 | ENE11 | ENE2 | NNE15 | ENE8 | ENE5 | NNE9 | NNW6 | N5 | WSW2 | W7 | NE6.8 | NE19 |
| 2-Sep | WSW9 | SSW7 | SW9 | WSW8 | WSW7 | SW7 | SW6 | SSW7 | SW13 | WSW12 | WSW8 | SW8 | SW9 | SSW7 | SW6 | SW7 | WSW6 | SW9 | WSW2 | SW3 | NNW6 | NNW9 | NNW13 | N14 | WSW5.7 | N14 |
| 3-Sep | N13 | NNW11 | NW10 | NNW11 | W10 | W11 | W14 | W14 | NNW13 | NNW16 | NNW16 | NNW15 | NNW15 | NNW16 | NNW16 | NNW16 | NNW17 | NNW15 | NNW18 | NNW16 | NNW18 | NW15 | NW16 | NW16 | NW13.2 | NNW18 |
| 4-Sep | WNN15 | WNN16 | W13 | WNN13 | W11 | WSW12 | WSW14 | SW7 | SW6 | WSW10 | W15 | WNN14 | NW12 | NW11 | WNN10 | WNN9 | W9 | NW8 | WNN4 | S4 | SSW5 | SSW6 | SSW5 | SSW7 | W8.2 | WNN16 |
| 5-Sep | SSW7 | S6 | SSW7 | SSW8 | SSW9 | S8 | SSE9 | S8 | SSW8 | SSW9 | SSW11 | S12 | SSW14 | SSW10 | SSW12 | S9 | SSE9 | SSE4 | SE5 | SE7 | SE6 | SE7 | SSE6 | SSE9 | S7.7 | SSW14 |
| 6-Sep | SSE12 | S8 | S6 | S6 | S7 | S7 | S6 | SSW5 | SSW9 | SSW10 | S12 | S14 | S15 | S13 | S10 | S13 | S15 | S10 | S10 | S10 | S8 | SSE11 | SSE9 | SSE6 | S9.5 | S15 |
| 7-Sep | S7 | S5 | SSW7 | S7 | S6 | S7 | S7 | S9 | S10 | S8 | SSW6 | S7 | S9 | SSW10 | SSW8 | SSW9 | SSW9 | SSW7 | S5 | W3 | SE5 | WSW9 | WSW5 | SSE6 | SSW6.5 | SSW10 |
| 8-Sep | SSW7 | SSW8 | S7 | S7 | S6 | SSE7 | SSW6 | SSW6 | SSW3 | SSE3 | SE3 | NNW4 | N1 | SW5 | NE10 | S6 | SW9 | NNE11 | E4 | NW4 | NNW7 | NNW13 | NNW13 | N12 | WSW0.7 | NNW13 |
| 9-Sep | N15 | N14 | N13 | NNE17 | N16 | NNE16 | NNE16 | N14 | N12 | NNW10 | NW8 | NNW4 | SSE2 | WSW9 | SSW8 | S9 | S9 | S8 | SSE9 | SE10 | SE11 | SSE11 | SSE13 | SSE15 | NNE2.4 | NNE17 |
| 10-Sep | S14 | SSE16 | SSE15 | SSE15 | S13 | S14 | S12 | S11 | S8 | SW10 | WSW17 | WSW18 | W12 | WNN16 | W15 | WNN23 | W16 | WNN16 | W17 | W15 | W16 | W16 | WNN14 | NNW15 | WSW8.7 | WNN23 |
| 11-Sep | N22 | NNW24 | N23 | N25 | N25 | N28 | N29 | N27 | N27 | N22 | N23 | NNW23 | NNW20 | N22 | N20 | N18 | NNW14 | NNW13 | NNW13 | NNW11 | NW8 | NW8 | W8 | W9 | N18.3 | N29 |
| 12-Sep | WNN9 | W6 | WSW4 | SW7 | SW4 | SW4 | SW7 | SW8 | SW10 | SSW8 | SW13 | SW11 | SSW13 | SSW14 | SSW13 | SSW12 | S11 | S11 | SSE11 | S9 | S10 | S11 | S11 | S12 | SSW8.5 | SSW14 |
| 13-Sep | S12 | SSW9 | S9 | SSE7 | SSE8 | S9 | S9 | S10 | SSW11 | SSW11 | SSW12 | SSW16 | SSW18 | SW20 | WSW20 | WSW18 | SW17 | SW17 | SW16 | SW15 | WSW15 | WSW16 | W13 | W9 | SW11.7 | WSW20 |
| 14-Sep | NW8 | WNN5 | ESE1 | S2 | SSE4 | SW1 | SSE5 | S2 | S2 | SW3 | SSW2 | ENE1 | ESE4 | SSW7 | SSW10 | SW11 | WNN12 | N19 | NNE12 | S5 | SSW7 | SW8 | WNN15 | NW12 | W2.5 | N19 |
| 15-Sep | NW11 | N14 | NE9 | NE5 | NNE13 | ENE6 | E6 | ESE6 | ENE6 | ENE8 | ENE3 | E3 | ESE4 | ENE2 | NW5 | N5 | SE5 | SE5 | ESE6 | S7 | S10 | S12 | S9 | S8 | E2.7 | N14 |
| 16-Sep | SSW8 | SSW10 | SSE5 | SSE7 | S8 | S9 | S9 | SSW7 | S8 | SSW8 | S10 | S14 | SSW15 | WSW27 | WSW24 | SW21 | SW17 | WSW12 | SW7 | SSW6 | SSW6 | S7 | SSW7 | SSW7 | SSW9.8 | WSW27 |
| 17-Sep | S7 | S7 | S9 | SSE8 | S9 | SSW9 | SSW9 | SSW8 | S8 | SSW11 | SW15 | SW11 | SSW11 | SSW11 | SW14 | SW16 | SW13 | WSW10 | WSW10 | SW6 | SW5 | SSW7 | SSW6 | SSW6 | SSW8.8 | SW16 |
| 18-Sep | SW3 | S3 | SSW4 | SSW5 | SSW5 | S8 | SW5 | SSW5 | SSW5 | WNN6 | WNN8 | WNN13 | W15 | WNN17 | NW15 | NW10 | NNW7 | NW8 | NNW10 | N2 | NNE8 | N12 | NNW10 | NNW8 | WNN4.8 | WNN17 |
| 19-Sep | NNW8 | NW8 | NNW7 | NW6 | NW8 | W8 | WSW9 | W11 | W11 | W9 | WNN6 | NW10 | NW9 | NW11 | NW13 | NNW13 | NNW14 | NNE12 | NNW8 | NNW7 | NW7 | NNW9 | NNW10 | NNW12 | NW8.1 | NNW14 |
| 20-Sep | N14 | NNW9 | NNW7 | N11 | N11 | N11 | NNW9 | NNE10 | NNE10 | NNW7 | NNW6 | NNW6 | NE7 | NE10 | NE6 | NE6 | E7 | ENE8 | ENE12 | ENE10 | ESE8 | NNE2 | ENE2 | S5 | NNE5.9 | N14 |
| 21-Sep | SSE3 | SE4 | E5 | SE5 | SSE6 | S7 | S6 | SSW6 | SSW7 | SSW9 | S11 | SSW11 | SSW14 | SSW13 | SW15 | SW15 | WSW13 | SW10 | SW8 | SSW8 | SSW8 | S7 | S7 | SSE5 | SSW7.5 | SW15 |
| 22-Sep | SSE5 | SSE5 | S5 | S7 | S7 | S7 | S7 | S6 | S6 | SSW8 | SSW10 | SSW12 | SSW17 | SSW17 | SSW17 | SSW14 | S15 | S13 | S8 | S11 | S10 | S11 | S8 | S10 | S9.7 | SSW17 |
| 23-Sep | SSE12 | SSE7 | SSE14 | SSE15 | S9 | SSE12 | SSE15 | SSE14 | SSE14 | SSE21 | SSE22 | SSE23 | SSE25 | SSE25 | SSE24 | SSE21 | SSE16 | SSE16 | SSE19 | SSE16 | S17 | SSE16 | S14 | SSE16.8 | SSE25 | |
| 24-Sep | S12 | S9 | S10 | S9 | S9 | SSW8 | SW11 | SSW10 | SSW13 | SW15 | WSW19 | WSW17 | WSW20 | W25 | W22 | WNN23 | WNN25 | W15 | W11 | WSW13 | W15 | WSW15 | WSW16 | WSW15 | WSW12.4 | WNN25 |
| 25-Sep | WSW18 | WSW15 | WSW13 | WSW16 | SSE3 | WSW8 | W20 | SW5 | WSW13 | WSW13 | WSW16 | WSW18 | WNN17 | WNN14 | WNN13 | WNN16 | NW10 | NNW7 | WNN2 | SSW3 | SSE4 | SE4 | SSE5 | W8.6 | W20 | |
| 26-Sep | SSW4 | S7 | SSW7 | SSW6 | S5 | S5 | S6 | S6 | S9 | S12 | S13 | S14 | S17 | S17 | SSE17 | S15 | S13 | SSE13 | S13 | S14 | S13 | S12 | SSE12 | S10.5 | SSE17 | |
| 27-Sep | SSE8 | SSE4 | SE10 | S9 | SSW7 | SW9 | WSW13 | SW11 | SSW12 | W18 | WNN24 | W24 | W20 | W26 | W31 | W25 | WSW22 | WSW18 | SW15 | SW12 | WSW14 | W9 | W12 | WSW9 | WSW12.6 | W31 |
| 28-Sep | SW10 | SW16 | SW15 | SW7 | S7 | SSW8 | SSW8 | SE4 | S8 | SSW10 | SSW12 | SW14 | SSW10 | SW9 | SW10 | SW7 | SSW7 | S6 | S6 | S6 | S8 | SSW6 | WSW3 | S5 | SSW7.8 | SW16 |
| 29-Sep | SSW7 | S6 | S6 | S7 | S7 | S8 | S7 | S6 | SSW6 | SSW8 | S8 | S8 | SSW8 | SW8 | SSW5 | S6 | SSE5 | SE7 | SE8 | SE6 | SE3 | NNE4 | ENE4 | N3 | S5.1 | S8 |
| 30-Sep | NNE7 | SE3 | NNE3 | NNE9 | NNE15 | NNE18 | NNE14 | NNE11 | NNE15 | NNE22 | NNE22 | NNE24 | NNE25 | NNE24 | N25 | N23 | NNE23 | NNE21 | NNE22 | NNE26 | NNE27 | NNE26 | NNE28 | NNE27 | NNE18.9 | NNE28 |

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| WSW2.4 SW2.3SSW2.6SSW2.6SSW2.0SSW2.8 SW3.6SSW3.0SSW3.4 SW4.3WSW5.6WSW5.5 SW5.2WSW6.4WSW6.4WSW5.9WSW5.1WSW2.6 SW1.6SSW2.6 SW3.0WSW2.7WSW2.7WSW2.2 | Diurnal Average |
| NNW22 NNW24 N23 N25 N25 N28 N29 N27 N27 NNE22 WNN24 W24 NNE25 WSW27 W31 W25WNN25 NNE21 NNE22 NNE26 NNE27 NNE26 NNE28 NNE27 | Diurnal Maximum |

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



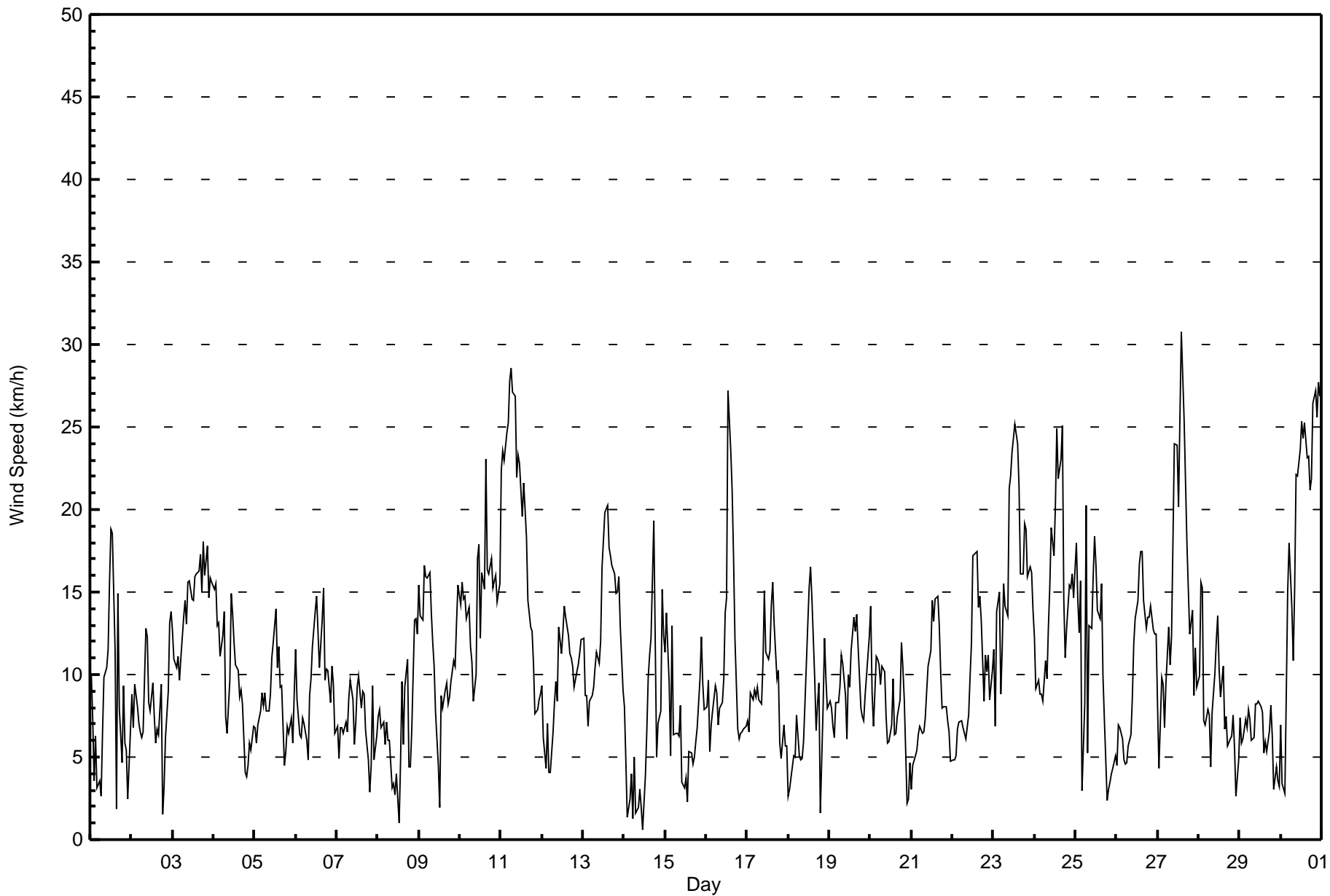
Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Shell Muskeg River - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Sep 30 04:00 | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 |
| Minimum Value: 1 km/h on Sep 22 03:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7 | |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| 7 | 6 | 6 | 8 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 7 | 6 | 8 | 8 | 8 | 7 | 7 | 7 | 6 | 6 | 6 | 6 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Shell Muskeg River - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 103 | 14.31 | 14.31 |
| 6 - 11 | 351 | 48.75 | 63.06 |
| 12 - 19 | 210 | 29.17 | 92.22 |
| 20 - 28 | 54 | 7.50 | 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
Shell Muskeg River - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 5 | 4 | 2 | 8 | 3 | 3 | 11 | 17 | 13 | 13 | 10 | 5 | 1 | 3 | 1 | 4 | 103 |
| 6 - 11 | 3 | 9 | 9 | 9 | 2 | 3 | 9 | 19 | 101 | 76 | 33 | 13 | 15 | 8 | 17 | 25 | 351 |
| 12 - 19 | 14 | 12 | 2 | 1 | 0 | 0 | 0 | 23 | 29 | 21 | 19 | 27 | 17 | 16 | 9 | 20 | 210 |
| 20 - 28 | 12 | 13 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 2 | 5 | 7 | 4 | 0 | 4 | 54 |
| 29 - 38 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 35 | 38 | 13 | 18 | 5 | 6 | 20 | 66 | 143 | 110 | 64 | 50 | 41 | 31 | 27 | 53 | 720 |

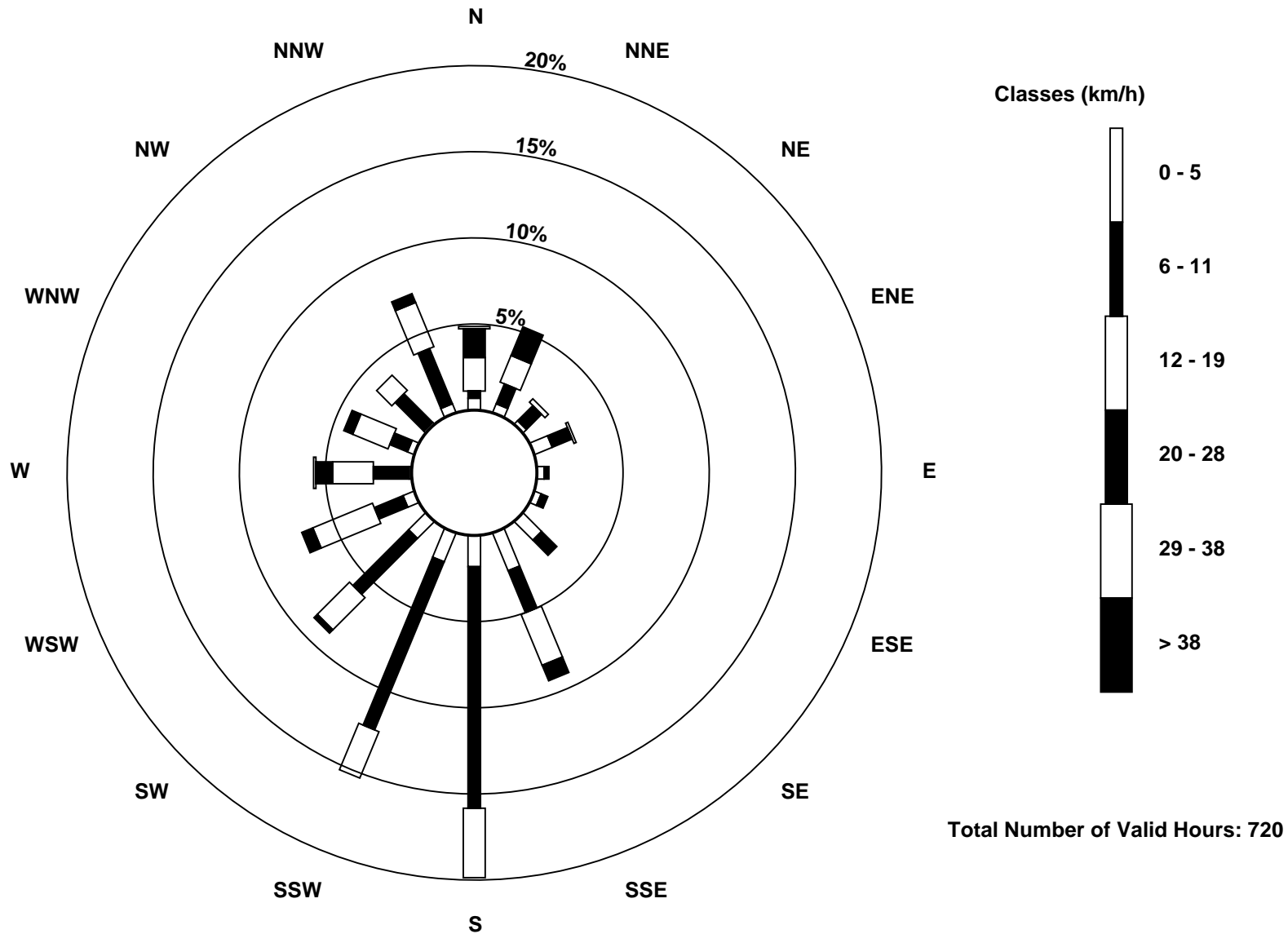
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Shell Muskeg River (AMS 16)





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Shell Muskeg River - September 2016

| | | | |
|--------------------------------------------------------------|--|---------------------------|-------|
| Direction of Maximum Speed: 277 deg on Sep 27 15:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 22.3 deg on Sep 30 | | Hours of Data: | 720 |
| Direction of Minimum Speed: 73 deg on Sep 14 12:00 | | Hours of Missing Data: | 0 |
| Direction of Minimum Daily Speed Average: 0.7 deg on Sep 8 | | Percent Operational Time: | 100.0 |
| Monthly Average Direction: 233.9 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 | 72 | 73 | 26 | 329 | 337 | 53 | 78 | 57 | 38 | 38 | 15 | 23 | 38 | 45 | 73 | 78 | 20 | 77 | 60 | 20 | 345 | 1 | 251 | 268 | 35.0 |
| 2-Sep | 240 | 202 | 217 | 242 | 239 | 220 | 229 | 213 | 227 | 240 | 249 | 231 | 222 | 202 | 221 | 221 | 253 | 235 | 240 | 225 | 290 | 327 | 347 | 360 | 243.9 |
| 3-Sep | 357 | 341 | 312 | 284 | 279 | 276 | 268 | 279 | 290 | 319 | 326 | 331 | 335 | 330 | 330 | 341 | 345 | 346 | 347 | 333 | 328 | 322 | 321 | 308 | 321.5 |
| 4-Sep | 298 | 296 | 281 | 282 | 260 | 247 | 256 | 232 | 224 | 238 | 270 | 297 | 310 | 304 | 287 | 297 | 274 | 307 | 299 | 187 | 193 | 195 | 202 | 194 | 271.0 |
| 5-Sep | 196 | 179 | 196 | 192 | 192 | 173 | 167 | 181 | 204 | 196 | 199 | 191 | 198 | 201 | 210 | 187 | 158 | 153 | 134 | 127 | 134 | 144 | 162 | 164 | 180.9 |
| 6-Sep | 164 | 169 | 184 | 189 | 191 | 191 | 182 | 194 | 192 | 209 | 188 | 183 | 178 | 179 | 184 | 179 | 182 | 183 | 182 | 179 | 179 | 147 | 162 | 168 | 180.1 |
| 7-Sep | 176 | 186 | 196 | 183 | 183 | 183 | 191 | 179 | 173 | 176 | 193 | 191 | 184 | 213 | 200 | 196 | 195 | 201 | 173 | 270 | 134 | 240 | 251 | 162 | 191.3 |
| 8-Sep | 199 | 192 | 182 | 188 | 184 | 167 | 193 | 201 | 195 | 155 | 133 | 335 | 6 | 222 | 39 | 177 | 222 | 20 | 88 | 321 | 328 | 348 | 347 | 350 | 245.9 |
| 9-Sep | 354 | 358 | 4 | 17 | 7 | 13 | 16 | 11 | 1 | 344 | 323 | 346 | 168 | 246 | 205 | 185 | 186 | 187 | 155 | 144 | 145 | 151 | 154 | 160 | 26.7 |
| 10-Sep | 171 | 152 | 149 | 159 | 171 | 169 | 169 | 171 | 185 | 233 | 237 | 239 | 263 | 289 | 279 | 288 | 272 | 289 | 278 | 273 | 272 | 280 | 285 | 334 | 243.7 |
| 11-Sep | 349 | 347 | 352 | 352 | 360 | 5 | 4 | 3 | 4 | 353 | 349 | 348 | 341 | 351 | 355 | 354 | 348 | 332 | 343 | 341 | 317 | 316 | 280 | 274 | 349.8 |
| 12-Sep | 285 | 271 | 249 | 236 | 225 | 216 | 230 | 222 | 218 | 209 | 228 | 218 | 194 | 197 | 198 | 199 | 189 | 179 | 157 | 179 | 179 | 177 | 182 | 180 | 203.1 |
| 13-Sep | 185 | 192 | 180 | 164 | 166 | 180 | 173 | 187 | 195 | 198 | 202 | 204 | 209 | 217 | 247 | 245 | 219 | 223 | 232 | 225 | 238 | 253 | 273 | 273 | 216.8 |
| 14-Sep | 312 | 302 | 117 | 172 | 154 | 221 | 157 | 178 | 170 | 227 | 196 | 73 | 103 | 197 | 201 | 220 | 282 | 358 | 14 | 185 | 195 | 235 | 283 | 312 | 262.6 |
| 15-Sep | 319 | 6 | 38 | 43 | 32 | 66 | 93 | 107 | 76 | 52 | 65 | 99 | 120 | 76 | 347 | 10 | 137 | 133 | 121 | 169 | 185 | 179 | 183 | 187 | 84.9 |
| 16-Sep | 201 | 209 | 160 | 168 | 175 | 183 | 189 | 196 | 183 | 195 | 190 | 183 | 198 | 238 | 238 | 234 | 236 | 240 | 217 | 197 | 196 | 190 | 194 | 194 | 209.0 |
| 17-Sep | 186 | 181 | 188 | 168 | 190 | 192 | 196 | 200 | 183 | 209 | 222 | 215 | 209 | 207 | 221 | 230 | 234 | 245 | 251 | 223 | 214 | 210 | 200 | 196 | 210.0 |
| 18-Sep | 215 | 188 | 195 | 194 | 210 | 181 | 222 | 198 | 205 | 285 | 295 | 298 | 280 | 291 | 307 | 326 | 328 | 316 | 334 | 350 | 31 | 359 | 347 | 330 | 298.0 |
| 19-Sep | 334 | 325 | 339 | 312 | 321 | 281 | 252 | 261 | 262 | 269 | 293 | 309 | 312 | 314 | 322 | 340 | 342 | 13 | 342 | 344 | 320 | 336 | 344 | 347 | 318.6 |
| 20-Sep | 349 | 338 | 328 | 353 | 360 | 3 | 338 | 15 | 24 | 334 | 332 | 337 | 40 | 46 | 36 | 53 | 87 | 75 | 66 | 72 | 117 | 15 | 71 | 174 | 21.7 |
| 21-Sep | 151 | 141 | 100 | 138 | 168 | 186 | 185 | 200 | 196 | 205 | 183 | 201 | 211 | 206 | 230 | 232 | 240 | 233 | 214 | 202 | 199 | 185 | 171 | 150 | 200.5 |
| 22-Sep | 161 | 164 | 169 | 180 | 187 | 185 | 183 | 185 | 188 | 204 | 207 | 205 | 197 | 205 | 206 | 201 | 186 | 178 | 175 | 170 | 184 | 184 | 184 | 176 | 189.0 |
| 23-Sep | 161 | 161 | 167 | 167 | 180 | 160 | 157 | 155 | 155 | 164 | 166 | 165 | 165 | 164 | 162 | 164 | 163 | 166 | 160 | 162 | 165 | 170 | 168 | 174 | 164.2 |
| 24-Sep | 176 | 186 | 177 | 182 | 190 | 195 | 215 | 202 | 212 | 230 | 241 | 238 | 251 | 268 | 274 | 287 | 290 | 280 | 269 | 250 | 264 | 255 | 249 | 251 | 245.6 |
| 25-Sep | 254 | 254 | 247 | 255 | 152 | 249 | 267 | 236 | 241 | 237 | 256 | 243 | 294 | 301 | 300 | 288 | 306 | 335 | 303 | 197 | 166 | 163 | 146 | 159 | 261.0 |
| 26-Sep | 192 | 175 | 198 | 195 | 186 | 189 | 191 | 175 | 177 | 171 | 189 | 182 | 188 | 176 | 171 | 156 | 182 | 175 | 168 | 171 | 175 | 174 | 169 | 161 | 176.1 |
| 27-Sep | 155 | 158 | 144 | 172 | 210 | 219 | 250 | 217 | 207 | 269 | 285 | 276 | 272 | 266 | 277 | 278 | 258 | 245 | 236 | 231 | 249 | 263 | 275 | 257 | 253.3 |
| 28-Sep | 219 | 232 | 235 | 224 | 188 | 197 | 196 | 142 | 172 | 192 | 213 | 220 | 212 | 217 | 220 | 219 | 195 | 175 | 186 | 186 | 176 | 192 | 238 | 189 | 206.4 |
| 29-Sep | 192 | 189 | 181 | 170 | 181 | 190 | 191 | 188 | 192 | 200 | 185 | 190 | 211 | 219 | 193 | 170 | 168 | 138 | 144 | 141 | 127 | 33 | 60 | 8 | 179.0 |
| 30-Sep | 25 | 140 | 20 | 29 | 30 | 12 | 30 | 31 | 27 | 26 | 27 | 29 | 24 | 19 | 8 | 9 | 16 | 18 | 16 | 25 | 26 | 23 | 24 | 23 | 22.3 |

240.2 231.2 208.9 213.2 205.7 205.2 218.6 202.1 208.6 233.8 243.0 239.6 233.8 246.0 253.4 250.5 247.4 255.7 223.6 201.7 215.1 236.9 252.6 243.6

Diurnal Average

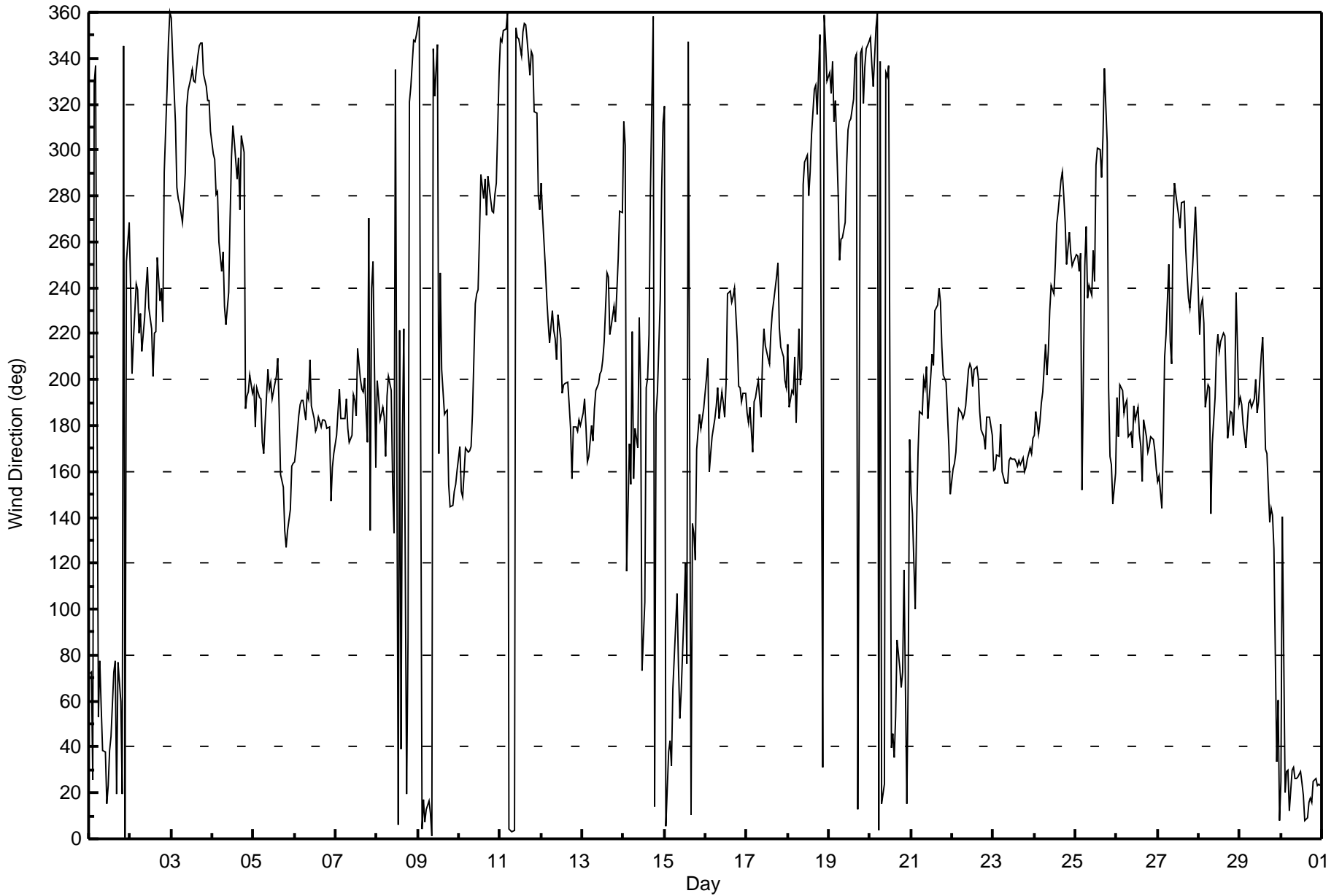
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Shell Muskeg River - September 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 112 deg on Sep 14 11:00 Minimum Value: 5 deg on Sep 29 19:00 Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 15 Median = 19 Q ₃ = 26 P ₉₀ = 38 P ₉₉ = 84 | | | | | | | | | | | | | | | | | | | 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 | 9 | 19 | 37 | 22 | 60 | 39 | 56 | 24 | 9 | 12 | 22 | 17 | 11 | 12 | 16 | 92 | 33 | 40 | 52 | 25 | 53 | 68 | 71 | 15 | 92 |
| 2-Sep | 14 | 20 | 15 | 24 | 35 | 19 | 22 | 23 | 15 | 18 | 27 | 31 | 20 | 28 | 26 | 24 | 20 | 15 | 87 | 44 | 37 | 26 | 20 | 16 | 87 |
| 3-Sep | 20 | 21 | 15 | 14 | 15 | 14 | 12 | 14 | 16 | 23 | 24 | 25 | 27 | 27 | 27 | 23 | 21 | 22 | 21 | 26 | 27 | 29 | 24 | 15 | 29 |
| 4-Sep | 14 | 13 | 12 | 10 | 15 | 14 | 15 | 22 | 31 | 29 | 17 | 24 | 23 | 29 | 26 | 32 | 24 | 16 | 16 | 30 | 11 | 16 | 16 | 15 | 32 |
| 5-Sep | 21 | 24 | 19 | 17 | 15 | 12 | 16 | 22 | 26 | 28 | 28 | 26 | 28 | 26 | 26 | 32 | 17 | 16 | 8 | 11 | 16 | 9 | 16 | 10 | 32 |
| 6-Sep | 8 | 14 | 16 | 17 | 16 | 15 | 15 | 27 | 28 | 26 | 25 | 25 | 22 | 26 | 31 | 25 | 19 | 17 | 16 | 15 | 17 | 13 | 19 | 22 | 31 |
| 7-Sep | 19 | 30 | 15 | 19 | 18 | 17 | 21 | 23 | 20 | 23 | 48 | 37 | 30 | 30 | 35 | 30 | 28 | 22 | 13 | 86 | 32 | 34 | 46 | 29 | 86 |
| 8-Sep | 19 | 17 | 16 | 17 | 25 | 12 | 18 | 22 | 70 | 57 | 73 | 54 | 100 | 74 | 74 | 38 | 28 | 66 | 70 | 47 | 29 | 16 | 17 | 21 | 100 |
| 9-Sep | 16 | 16 | 23 | 16 | 17 | 18 | 19 | 19 | 24 | 27 | 29 | 74 | 96 | 35 | 39 | 27 | 24 | 22 | 11 | 10 | 11 | 17 | 13 | 14 | 96 |
| 10-Sep | 16 | 11 | 14 | 22 | 23 | 15 | 14 | 14 | 23 | 24 | 13 | 12 | 16 | 17 | 17 | 14 | 14 | 19 | 14 | 14 | 12 | 14 | 15 | 25 | 25 |
| 11-Sep | 19 | 18 | 19 | 18 | 18 | 17 | 17 | 16 | 18 | 18 | 18 | 19 | 22 | 18 | 20 | 18 | 23 | 27 | 25 | 21 | 21 | 16 | 16 | 12 | 27 |
| 12-Sep | 11 | 15 | 21 | 13 | 44 | 38 | 26 | 18 | 18 | 27 | 22 | 28 | 29 | 24 | 26 | 27 | 24 | 18 | 9 | 15 | 15 | 15 | 18 | 16 | 44 |
| 13-Sep | 19 | 19 | 17 | 10 | 14 | 18 | 15 | 20 | 22 | 26 | 27 | 24 | 22 | 21 | 15 | 13 | 16 | 12 | 11 | 8 | 6 | 11 | 13 | 34 | 34 |
| 14-Sep | 19 | 35 | 78 | 74 | 20 | 63 | 20 | 34 | 59 | 79 | 112 | 101 | 61 | 48 | 31 | 25 | 31 | 16 | 21 | 35 | 16 | 37 | 15 | 14 | 112 |
| 15-Sep | 18 | 24 | 63 | 78 | 17 | 37 | 21 | 32 | 42 | 28 | 73 | 62 | 52 | 77 | 33 | 28 | 41 | 18 | 11 | 21 | 19 | 17 | 19 | 18 | 78 |
| 16-Sep | 17 | 16 | 31 | 17 | 16 | 16 | 15 | 23 | 22 | 26 | 23 | 20 | 27 | 16 | 12 | 12 | 10 | 9 | 17 | 17 | 17 | 17 | 17 | 19 | 31 |
| 17-Sep | 17 | 18 | 20 | 16 | 21 | 21 | 21 | 25 | 25 | 24 | 16 | 23 | 25 | 24 | 19 | 15 | 11 | 10 | 10 | 14 | 18 | 15 | 32 | 31 | 32 |
| 18-Sep | 75 | 37 | 40 | 16 | 33 | 15 | 29 | 37 | 29 | 22 | 17 | 17 | 13 | 12 | 15 | 32 | 28 | 20 | 28 | 94 | 49 | 15 | 18 | 20 | 94 |
| 19-Sep | 17 | 22 | 30 | 20 | 24 | 20 | 10 | 11 | 11 | 14 | 21 | 18 | 25 | 25 | 27 | 24 | 26 | 28 | 19 | 23 | 21 | 27 | 22 | 17 | 30 |
| 20-Sep | 17 | 18 | 18 | 22 | 19 | 19 | 20 | 23 | 28 | 32 | 26 | 47 | 27 | 22 | 44 | 39 | 26 | 14 | 9 | 14 | 31 | 77 | 61 | 61 | 77 |
| 21-Sep | 63 | 70 | 18 | 23 | 17 | 13 | 17 | 22 | 25 | 25 | 25 | 26 | 28 | 25 | 22 | 15 | 14 | 12 | 14 | 17 | 16 | 13 | 15 | 11 | 70 |
| 22-Sep | 10 | 8 | 11 | 8 | 11 | 11 | 12 | 21 | 29 | 27 | 24 | 25 | 24 | 25 | 23 | 26 | 21 | 17 | 15 | 12 | 16 | 17 | 19 | 15 | 29 |
| 23-Sep | 14 | 11 | 10 | 11 | 16 | 10 | 9 | 11 | 13 | 14 | 15 | 16 | 14 | 15 | 14 | 13 | 14 | 16 | 12 | 12 | 13 | 15 | 14 | 16 | 16 |
| 24-Sep | 18 | 20 | 16 | 17 | 18 | 21 | 17 | 24 | 22 | 21 | 12 | 19 | 18 | 15 | 18 | 16 | 13 | 13 | 14 | 11 | 9 | 8 | 7 | 9 | 24 |
| 25-Sep | 9 | 12 | 13 | 12 | 68 | 57 | 12 | 82 | 20 | 15 | 15 | 17 | 24 | 27 | 21 | 18 | 24 | 20 | 69 | 17 | 40 | 24 | 29 | 16 | 82 |
| 26-Sep | 15 | 13 | 18 | 19 | 31 | 45 | 26 | 18 | 24 | 22 | 25 | 24 | 26 | 22 | 18 | 18 | 23 | 16 | 13 | 13 | 18 | 18 | 10 | 9 | 45 |
| 27-Sep | 20 | 33 | 17 | 24 | 21 | 17 | 10 | 17 | 22 | 34 | 14 | 14 | 16 | 15 | 15 | 14 | 14 | 10 | 6 | 9 | 8 | 16 | 11 | 20 | 34 |
| 28-Sep | 11 | 7 | 8 | 20 | 28 | 19 | 41 | 30 | 19 | 25 | 24 | 20 | 31 | 38 | 33 | 49 | 24 | 15 | 13 | 11 | 10 | 56 | 61 | 17 | 61 |
| 29-Sep | 15 | 14 | 13 | 13 | 16 | 16 | 16 | 17 | 29 | 27 | 26 | 29 | 26 | 29 | 56 | 40 | 20 | 7 | 5 | 11 | 50 | 43 | 44 | 37 | 56 |
| 30-Sep | 16 | 46 | 31 | 25 | 12 | 15 | 16 | 17 | 15 | 10 | 13 | 10 | 12 | 15 | 17 | 19 | 16 | 15 | 16 | 10 | 9 | 10 | 12 | 11 | 46 |
| | | | | | | | | | | | | | | | | | | | 75 70 78 78 68 63 56 82 70 79 112 101 100 77 74 92 41 66 87 94 53 77 71 61 | | | | | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 1, 2016 | Last Calibration | August 3, 2016 |
| Station Name | Shell Muskeg River | Station Number | AMS 16 |
| Reason: | Routine | | |
| Start Time (MST) | 8:38 | End Time (MST) | 14:40 |
| Gas Cert Reference | LL104193 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 48.3 ppm | Cal Gas Exp Date | 12-Feb-18 |
| Calibrator Make/Model | API T700 | Serial Number | 493 |
| ZAG Make/Model | API 701 | Serial Number | 2155 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2632 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|--------------|---------------|--------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -710 | -710 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 802 | 801 |
| Calculated slope | 0.993905 | 0.994715 | Chamber temp | 45.0 | 45.0 |
| Calculated intercept | 2.845520 | 1.017253 | Pressure | 702.7 | 699.1 |
| Analyzer Background | 8.9 | 8.9 | Flow | 0.445 | 0.443 |
| Analyzer Coefficient | 1.059 | 1.059 | Intensity | 108 | 108 |

Analyzer make Thermo 43i Analyzer serial # 1118148498

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as found span | 5000 | 83.6 | 807.6 | 811.0 | 0.996 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| high point | 5000 | 83.6 | 807.6 | 811.0 | 0.996 |
| second point | 5000 | 42.0 | 405.7 | 407.7 | 0.995 |
| third point | 5000 | 21.1 | 203.8 | 201.5 | 1.012 |
| as left zero | 5000 | 0.0 | 0.0 | 0.5 | ---- |
| as left span | 5000 | 83.6 | 807.6 | 814.6 | 0.991 |
| Average Correction Factor | | | | | 1.001 |

Corrected As found 811.3 Previous response 809.7 % change -0.2%

Notes:

Inlet filter changed after as founds. Adjusted Zero.

Calibration Performed By: Jayne Rycroft



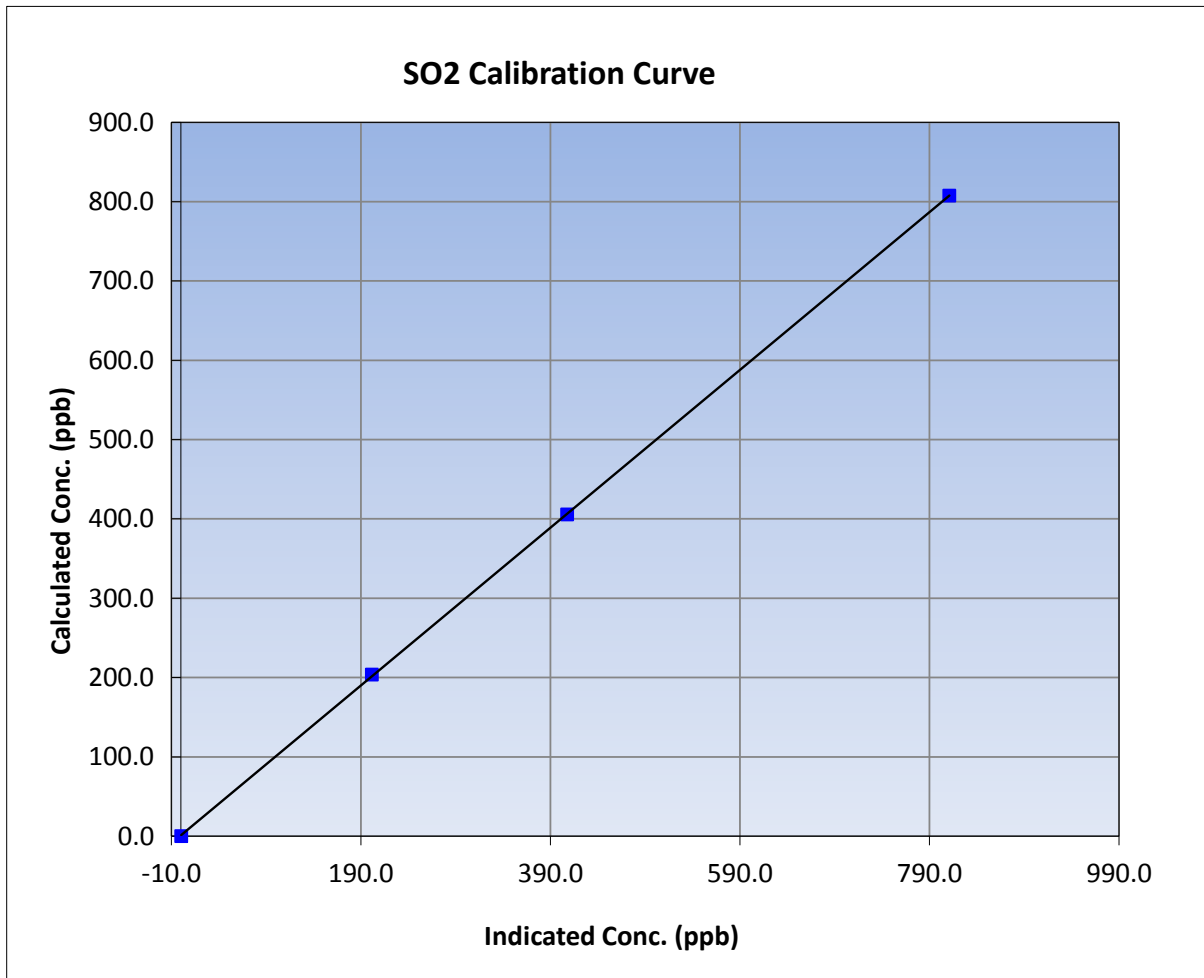
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Shell Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 8:38 | End Time (MST) | 14:40 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1118148498 |

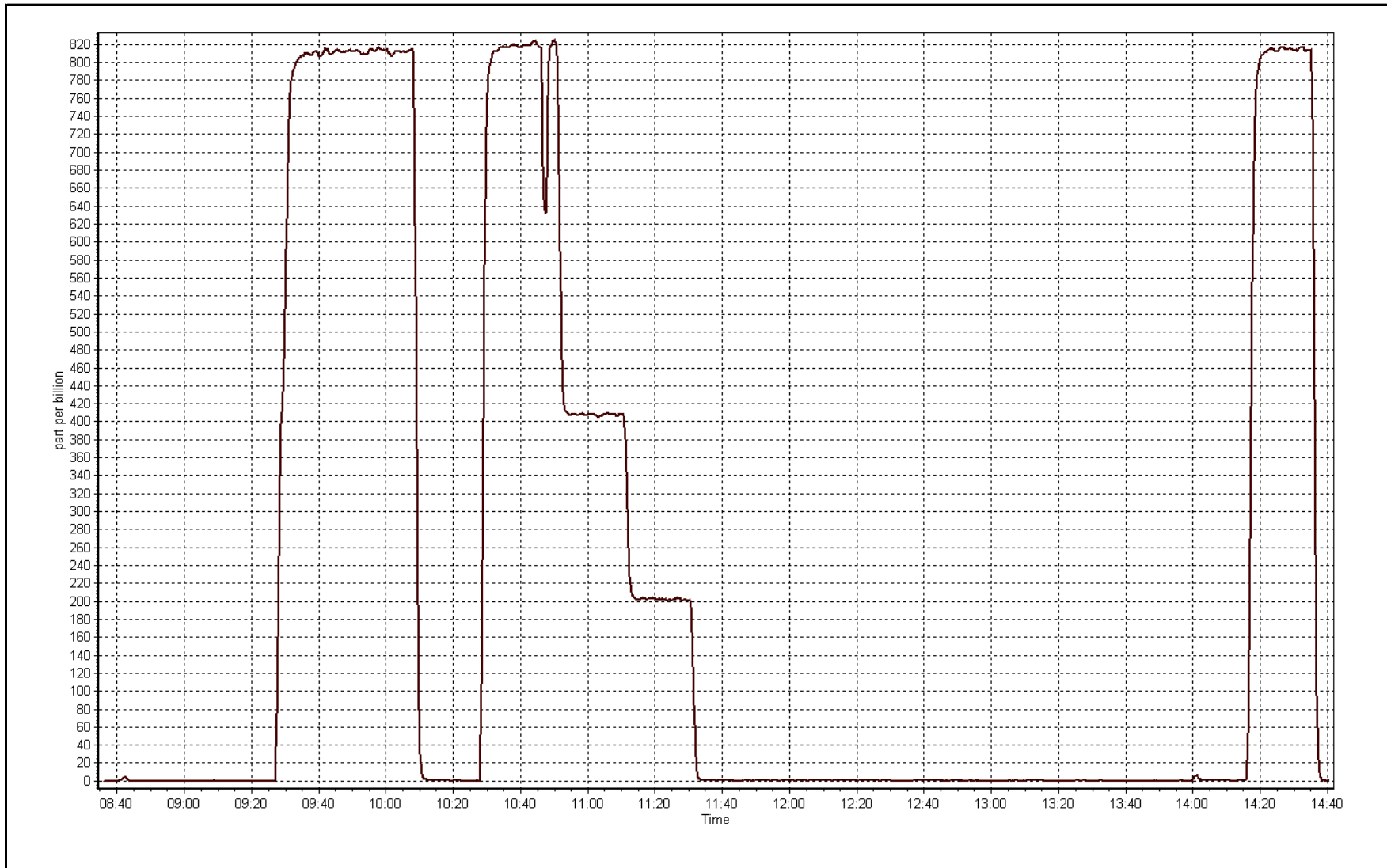
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 0.999977 |
| 807.6 | 811.0 | 0.9958 | | |
| 405.7 | 407.7 | 0.9951 | Slope | 0.994715 |
| 203.8 | 201.5 | 1.0115 | | |
| | | | Intercept | 1.017253 |



SO2 Calibration Plot

Date: September 1, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|--------------|
| Calibration Date | September-01-16 | Last Calibration | August-03-16 |
| Station Name | Shell Muskeg River | Station Number | AMS 16 |
| Reason: | Routine | | |
| Start Time (MST) | 8:35 | End Time (MST) | 14:05 |
| Gas Cert Reference | LL104193 | Cal Gas Expiry Date | 12-Feb-18 |
| CH4 Cal Gas Conc. | 487 ppm | CH4 Equiv Conc. | 1017.8 ppm |
| C3H8 Cal Gas Conc. | 193 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 493 |
| ZAG make/model | Teledyne API 701 | Serial Number | 2155 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2632 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 8.2 | 8.2 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 34.9 | 34.9 |
| Calculated slope | 0.999019 | 0.996084 | Fuel Pressure | 24.2 | 24.2 |
| Calculated intercept | -0.057416 | 0.203743 | Analyzer Coeff | 4.470 | 4.470 |
| | | | Analyzer BKG | 2.78 | 2.78 |

Analyzer make Thermo 51i-LT Analyzer serial # 1218153458

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | -0.20 | ---- |
| as found span | 5000 | 83.6 | 17.02 | 16.89 | 1.008 |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.20 | ---- |
| high point | 5000 | 83.6 | 17.02 | 16.89 | 1.008 |
| second point | 5000 | 42.0 | 8.55 | 8.35 | 1.024 |
| third point | 5000 | 21.1 | 4.29 | 4.12 | 1.042 |
| as left zero | 5000 | 0.0 | 0.00 | 0.01 | ---- |
| as left span | 5000 | 83.6 | 17.02 | 17.03 | 0.999 |
| Average Correction Factor | | | | | 1.025 |

Corrected As found 17.09 Previous response 17.09 % change 0.0%

Notes:

Inlet filter changed. Adjusted span when there was not enough pressure to the THC cal line. So had to revert coefficient and background to before calibration and recapture zero and span. Did not adjust zero or span after correcting the flow

Calibration Performed By:

Jayne Rycroft



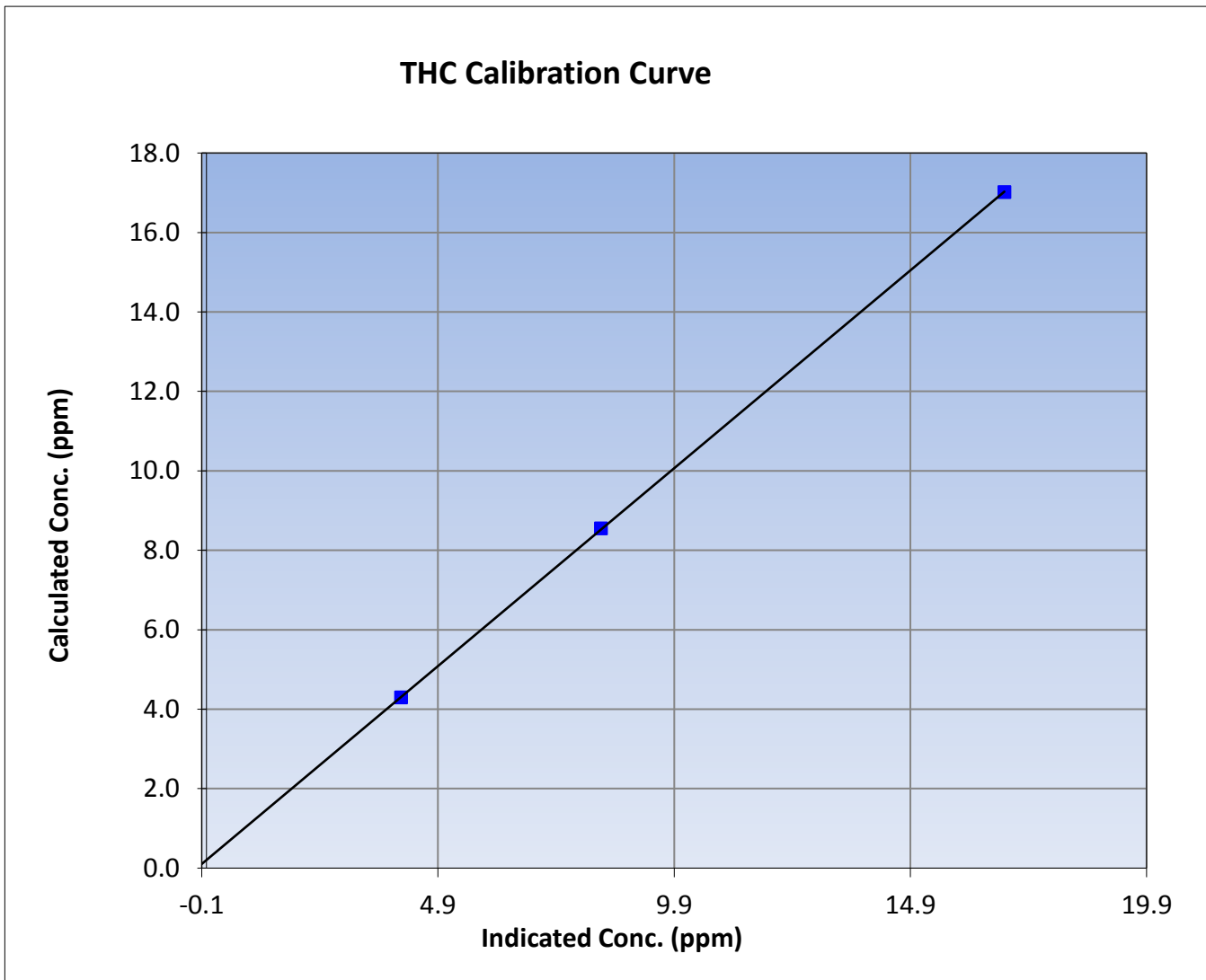
Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Shell Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 8:35 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1218153458 |

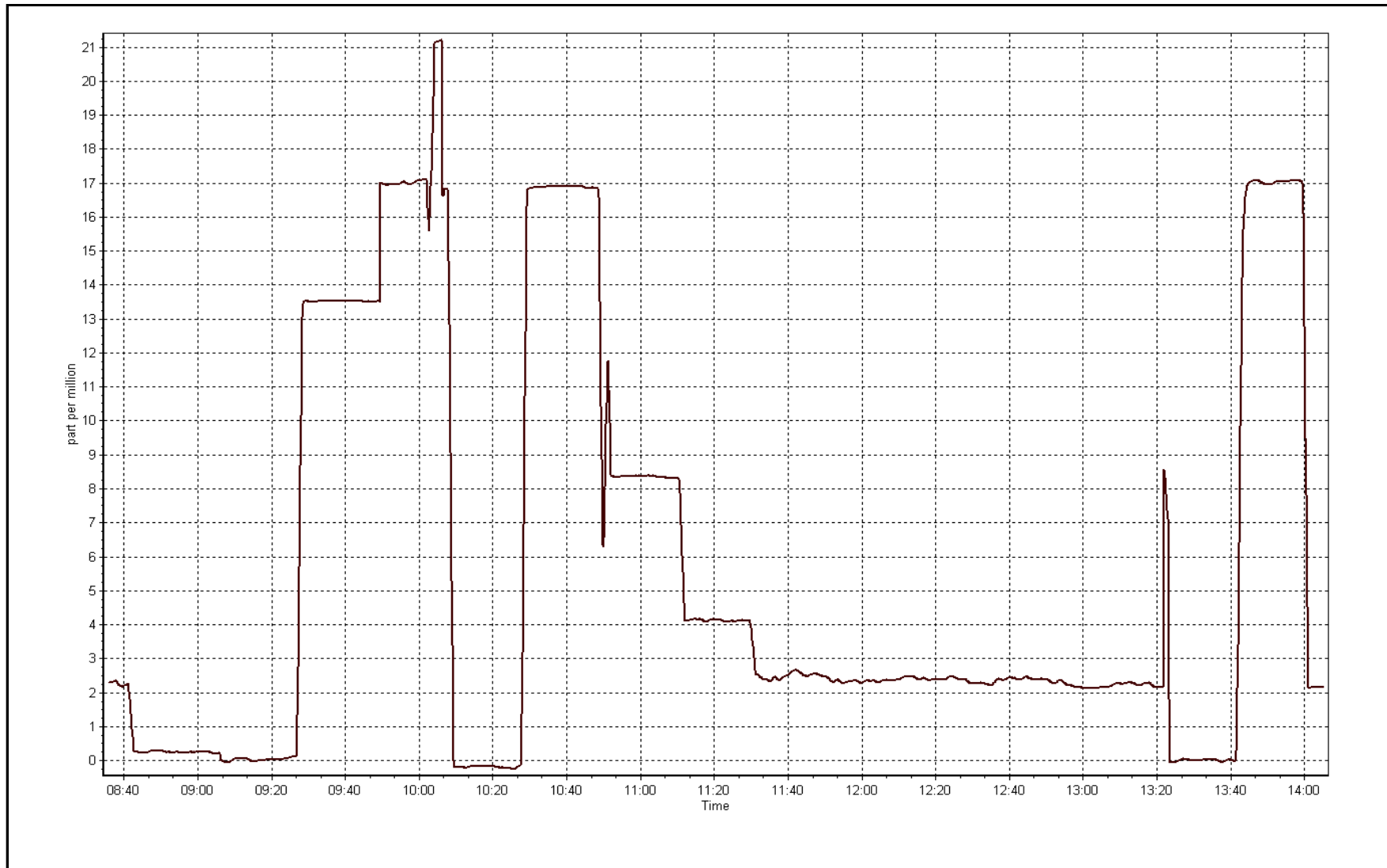
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | -0.20 | ---- | Correlation Coefficient | 0.999993 |
| 17.02 | 16.89 | 1.0075 | | |
| 8.55 | 8.35 | 1.0238 | Slope | 0.996084 |
| 4.29 | 4.12 | 1.0425 | | |
| | | | Intercept | 0.203743 |



THC Calibration Plot

Date: September 1, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Shell Muskeg River | Station Number | AMS 16 |
| Reason: | Routine | | |
| Start Time (MST) | 8:35 | End Time (MST) | 14:05 |
| NO Cal Gas Conc | 48 ppm | Gas Cert Reference | LL104193 |
| NOX Cal Gas Conc | 48 ppm | Cal Gas Expiry Date | February 12, 2018 |
| Calibrator | API T700 | Serial Number | 493 |
| Zero air Generator | Teledyne API T701 | Serial Number | 2155 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 2632 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.998706 | 0.999346 | 0.987933 |
| | Data Offset | 2.083552 | 2.666125 | -0.918886 |
| Current Calibration | Data Slope | 1.003037 | 1.006148 | 0.991345 |
| | Data Offset | 2.990673 | 3.379247 | 0.129074 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1426262593 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.43 | | 192.168.1.43 | |
| NO coefficient | 1.040 | | 1.040 | |
| NOX coefficient | 1.000 | | 1.000 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 8.6 | | 8.7 | |
| NOX bkgrnd | 8.7 | | 8.8 | |
| Chamber Temp | 50.5 | Deg C | 50.1 | Deg C |
| Moly Temp | 326.8 | Deg C | 223.9 | Deg C |
| PMT voltage | -744.8 | V | -744.4 | V |
| PMT Temp | -2.8 | Deg C | -3.1 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 166.5 | mmHg | 167.4 | mmHg |
| R Cell Press Nox | 166.2 | mmHg | 167.1 | mmHg |
| NO sample flow | 0.89 | lpm | 0.898 | lpm |
| Nox sample Flow | 0.892 | lpm | 0.903 | lpm |

Notes:

Inlet filter changes. No other changes made.



Wood Buffalo Environmental Association

NO_x Calibration Summary

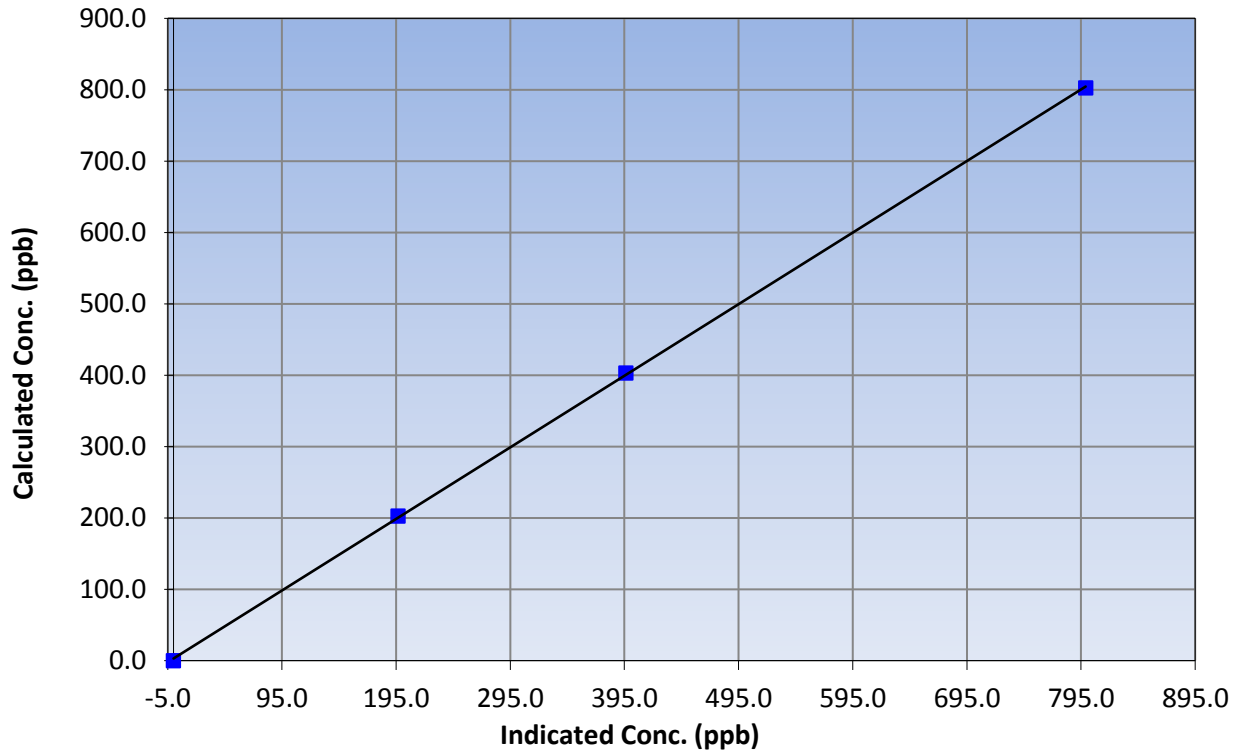
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Shell Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 8:35 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262593 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999930 |
| 802.6 | 799.0 | 1.0044 | | |
| 403.2 | 396.3 | 1.0174 | Slope | 1.003037 |
| 202.6 | 196.8 | 1.0293 | | |
| | | | Intercept | 2.990673 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

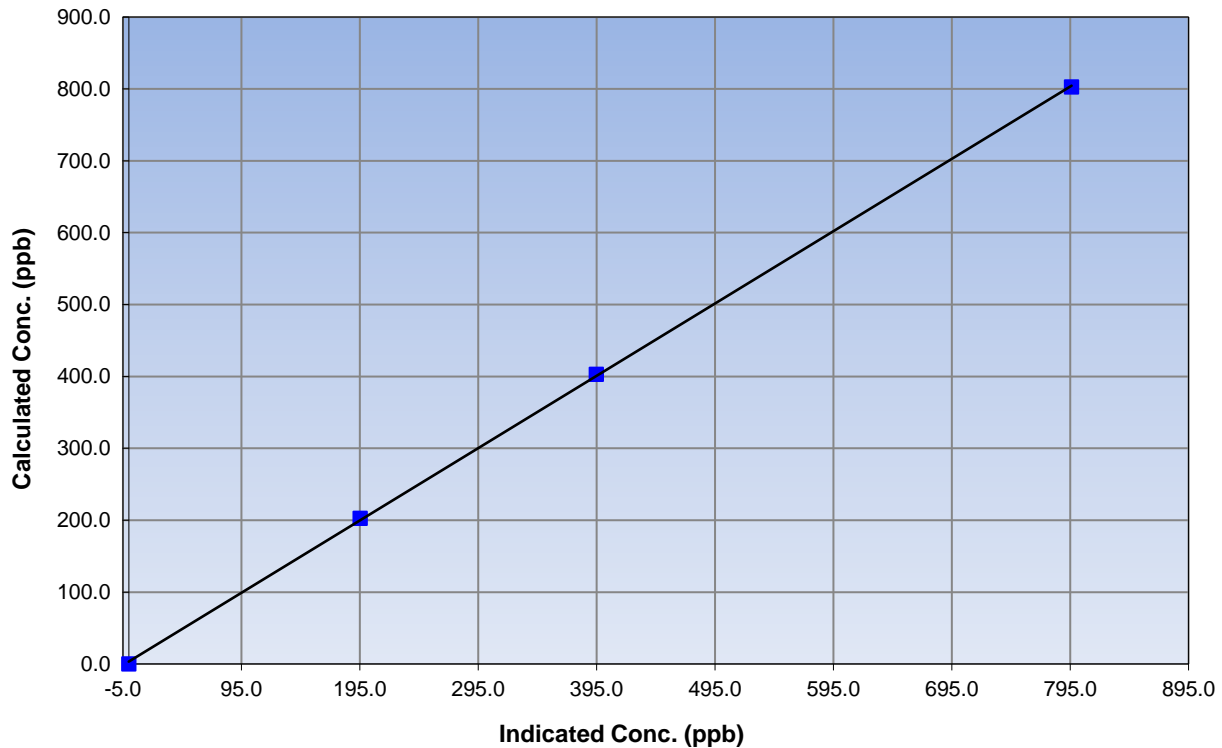
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Shell Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 8:35 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262593 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999921 |
| 802.6 | 796.2 | 1.0080 | | |
| 403.2 | 394.9 | 1.0210 | Slope | 1.006148 |
| 202.6 | 195.3 | 1.0372 | | |
| | | | Intercept | 3.379247 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

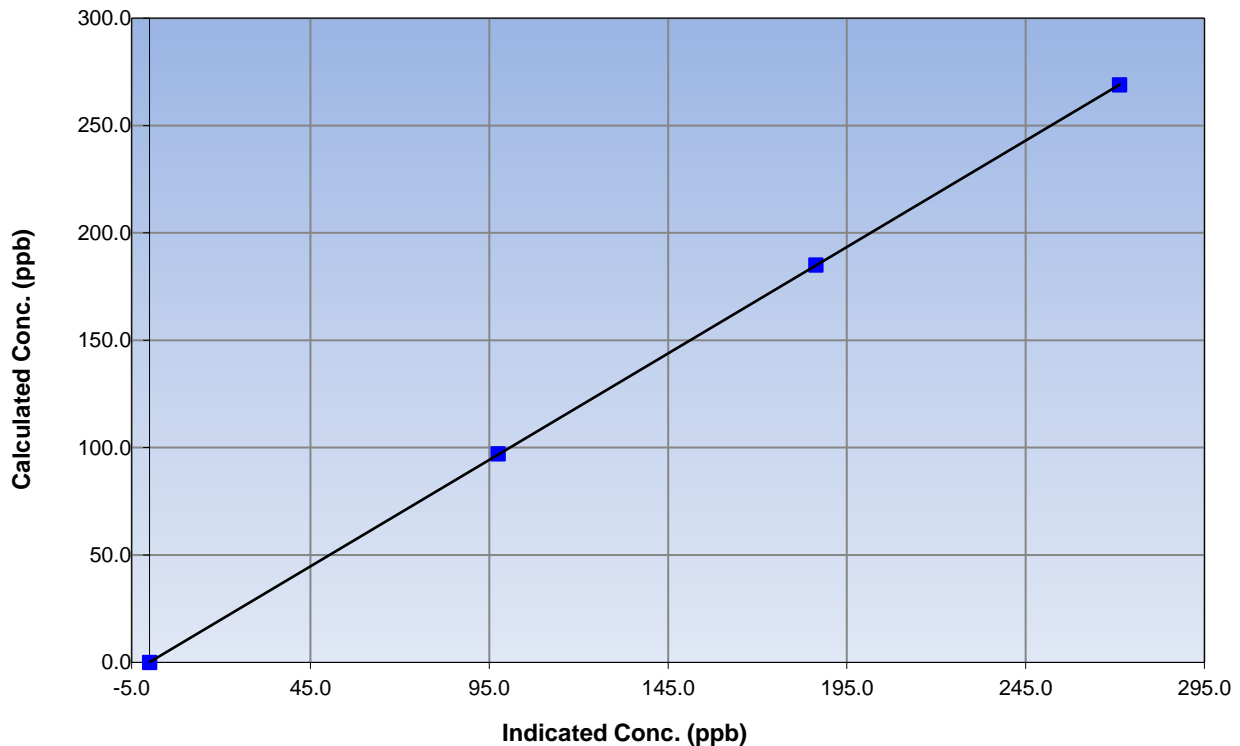
Station Information

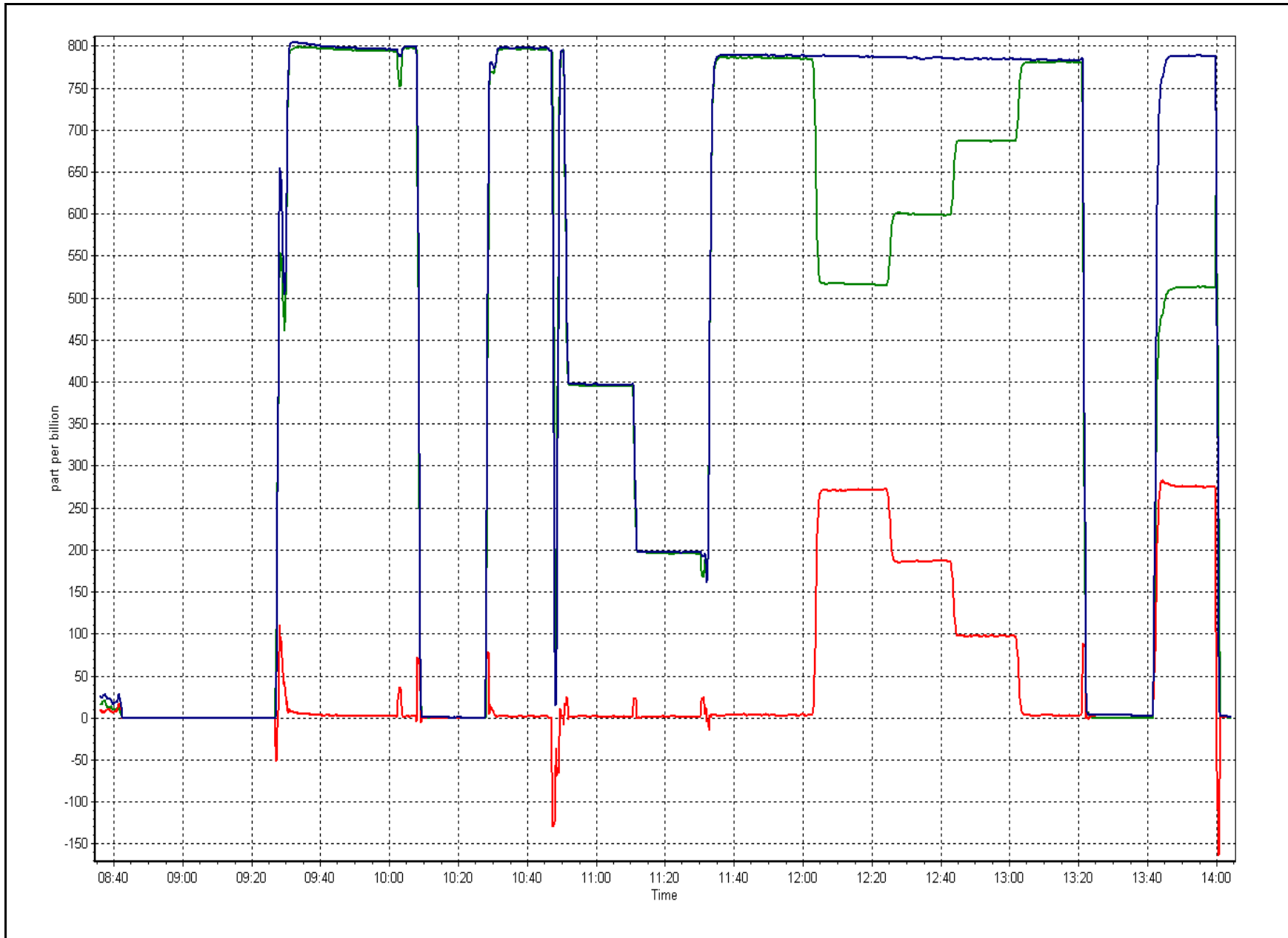
| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 1, 2016 | Previous Calibration | August 3, 2016 |
| Station Number | Shell Muskeg River | Station Number | AMS 16 |
| Start Time (MST) | 8:35 | End Time (MST) | 14:05 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1426262593 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | N/A | Correlation Coefficient | 0.999996 |
| 268.9 | 271.3 | 0.9912 | | |
| 185.1 | 186.4 | 0.9927 | Slope | 0.991345 |
| 97.1 | 97.5 | 0.9956 | | |
| | | | Intercept | 0.129074 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|---------------------|-----------------|----------------|
| Station Name: | Shell Muskeg River | Station number: | AMS 16 |
| Calibration Date: | September 1, 2016 | Last Cal Date: | August 3, 2016 |
| Start time (MST): | 11:33 | End time (MST): | 12:05 |
| Sharp Model: | Thermo / SHARP 5030 | S/N: | E-798 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 4142 |
| Flow Standard Model: | DeltaCal | S/N: | 628 |
| Temp/RH standard: | NA | S/N: | NA |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------------------------------|----------|---------------------------------------------------|-------------------------------------|---------------|
| T1 (°C) | 17.1 | 18.5 | 17.1 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 971 | 971.9 | 971 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 999 | 1008 | 999 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 2.2 | ----- | -0.2 | <input checked="" type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | Tolerance |
|------------|-------------------|-----------|------------------|----------------------|
| Leak Test: | Date of check: | <u>NA</u> | Last Cal Date: | <u>June 24, 2016</u> |
| | Flow w/o adaptor: | <u>NA</u> | Flow w/ adaptor: | <u>NA</u> 0.4 LPM |

Annual Calibration Test

| | | | | |
|------------------|------------------------|-----------|-----------------------------|----------------------|
| Foil Calibration | Foil Mass: | <u>NA</u> | S/N: | <u>NA</u> |
| | Date of check: | <u>NA</u> | Last Cal Date: | <u>June 24, 2016</u> |
| | New Correction Factor: | <u>NA</u> | Previous Correction Factor: | <u>NA</u> |

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

Notes: Clean cyclone head. Adjusted nephelometer.

Calibration by: Jayme Rycroft



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 17
WAPASU
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 682 | 38 | 38 | 100.00 | 29 | 0 | 5 | 0 |
| H2S (ppb) Average | 683 | 36 | 37 | 99.86 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 682 | 38 | 38 | 100.00 | 2.7 | - | 2.3 | - |
| O3 (ppb) Average | 684 | 35 | 36 | 99.86 | 40 | 0 | 30 | - |
| NO2 (ppb) Average | 680 | 40 | 40 | 100.00 | 15 | 0 | 5 | - |
| NO (ppb) Average | 680 | 40 | 40 | 100.00 | 23 | - | 2 | - |
| NOX (ppb) Average | 680 | 40 | 40 | 100.00 | 38 | - | 6 | - |
| PM2.5 (ug/m3) Average | 670 | 2 | 50 | 93.33 | 20.8 | - | 6.8 | 0 |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 21.7 | - | 14.6 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 98 | - |
| Precipitation (mm) Total | 710 | 0 | 10 | 98.61 | 10.5 | - | 51.4 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 23 | - | 17 | - |
| 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 - WAPASU (AMS 17)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 682 | 1 | 3 | - | 0 | 0 | 0 | 0 | 1 | 2 | 29 |
| H2S (ppb) Average | 683 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 682 | 2.16 | 0.1 | - | 2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.7 |
| O3 (ppb) Average | 684 | 18.8 | 8 | - | 1 | 8 | 12 | 19 | 25 | 29 | 40 |
| NO2 (ppb) Average | 680 | 1.5 | 2 | - | 0 | 0 | 0 | 1 | 2 | 4 | 15 |
| NO (ppb) Average | 680 | 0.7 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 23 |
| NOX (ppb) Average | 680 | 2.2 | 3 | - | 0 | 0 | 0 | 1 | 3 | 5 | 38 |
| PM2.5 (ug/m3) Average | 670 | 3.48 | 2.9 | - | 0 | 0.7 | 1.4 | 2.8 | 4.8 | 7.1 | 20.8 |
| Temperature 2 m (C) Average | 720 | 9.85 | 4.4 | - | -1.2 | 4.7 | 6.6 | 9.4 | 12.9 | 15.7 | 21.7 |
| Relative Humidity (%) Average | 720 | 74.2 | 19 | - | 31 | 47 | 58 | 76 | 92 | 98 | 99 |
| Precipitation (mm) Total | 710 | - | - | 96.16 | - | - | - | - | - | - | - |
| Wind Speed 10 m (km/h) Average | 719 | 9.3 | 4 | - | 0 | 5 | 6 | 9 | 12 | 15 | 23 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS 17)
 SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|-----------------------------------------------|
| H2S | 26 Sep 2016 13:00 | 26 Sep 2016 13:00 | 1 | Maintenance - cleaned glass manifold |
| O3 | 26 Sep 2016 13:00 | 26 Sep 2016 13:00 | 1 | Maintenance - cleaned glass manifold |
| PM2.5 | 03 Sep 2016 09:00 | 03 Sep 2016 16:00 | 8 | Unstable operation - excessive baseline drift |
| PM2.5 | 04 Sep 2016 02:00 | 04 Sep 2016 09:00 | 8 | Unstable operation - excessive baseline drift |
| PM2.5 | 09 Sep 2016 08:00 | 09 Sep 2016 08:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 11 Sep 2016 07:00 | 11 Sep 2016 09:00 | 3 | Unstable operation - excessive baseline drift |
| PM2.5 | 15 Sep 2016 05:00 | 15 Sep 2016 08:00 | 4 | Unstable operation - excessive baseline drift |
| PM2.5 | 18 Sep 2016 10:00 | 19 Sep 2016 09:00 | 24 | Flat line in sensor output signal |
| Precipitation Collector | 07 Sep 2016 14:00 | 07 Sep 2016 14:00 | 1 | Maintenance - operational check |
| Precipitation Collector | 08 Sep 2016 12:00 | 08 Sep 2016 12:00 | 1 | Maintenance - operational check |
| Precipitation Collector | 21 Sep 2016 09:00 | 21 Sep 2016 09:00 | 1 | Maintenance - communications check |
| Precipitation Collector | 21 Sep 2016 16:00 | 21 Sep 2016 16:00 | 1 | Maintenance - communications check |
| Precipitation Collector | 24 Sep 2016 20:00 | 24 Sep 2016 20:00 | 1 | Unstable Operation |
| Precipitation Collector | 26 Sep 2016 14:00 | 26 Sep 2016 14:00 | 1 | Unstable Operation |
| Precipitation Collector | 26 Sep 2016 19:00 | 26 Sep 2016 19:00 | 1 | Unstable Operation |
| Precipitation Collector | 28 Sep 2016 03:00 | 28 Sep 2016 03:00 | 1 | Unstable Operation |
| Precipitation Collector | 28 Sep 2016 08:00 | 28 Sep 2016 08:00 | 1 | Unstable Operation |
| Precipitation Collector | 28 Sep 2016 13:00 | 28 Sep 2016 13:00 | 1 | Unstable Operation |
| Wind Speed, Wind Direction | 08 Sep 2016 12:00 | 08 Sep 2016 12:00 | 1 | Maintenance - sensor calibration |



| | | | | |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 29 ppb on Sep 8 09:00 | Maximum Daily Average: 5.2 ppb on Sep 28 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 3 08:00 | Minimum Daily Average: 0.1 ppb on Sep 3 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 3.2 ppb at hour 9 | Minimum Diurnal Average: 0.3 ppb at hour 3 | | Hours of Calibration: | 38 |
| Monthly Average: 1.0 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 14 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-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 |
| 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 4-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 | 0.2 | 1 |
| 5-Sep | 1 | 1 | Z | 2 | 3 | 2 | 1 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 |
| 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 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 8-Sep | 0 | 0 | 0 | 1 | 1 | Z | 1 | 12 | 29 | 8 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 29 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 2 | 1 | 0 | 1 | 0.7 | 3 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 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 | 1 | 1 | 0 | 0 | 3 | 8 | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 8 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 4 | 6 | 7 | 6 | 4 | 3 | 0 | 0 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 1.9 | 7 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 16-Sep | 0 | Z | 1 | 1 | 1 | 1 | 3 | 6 | 14 | 12 | 10 | 7 | 3 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 4 | 3.2 | 14 |
| 17-Sep | 7 | 7 | Z | 3 | 1 | 1 | 1 | 1 | 3 | 9 | 14 | 17 | 16 | 6 | 7 | 5 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 4.5 | 17 |
| 18-Sep | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 16 | C | C | 8 | 2 | 3 | 5 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2.2 | 16 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 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 | 0.3 | 0 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 2 | 6 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 7 |
| 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 | 1 | 1 | Z | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 2 | 5 | 9 | 12 | 18 | 14 | 14 | 10 | 9 | 7 | 7 | 5 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 5.2 | 18 |
| 29-Sep | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 3 | 11 | 12 | 3 | 2 | 1 | 1 | 1 | 5 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 2.3 | 12 |
| 30-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 | 0.4 | 1 |

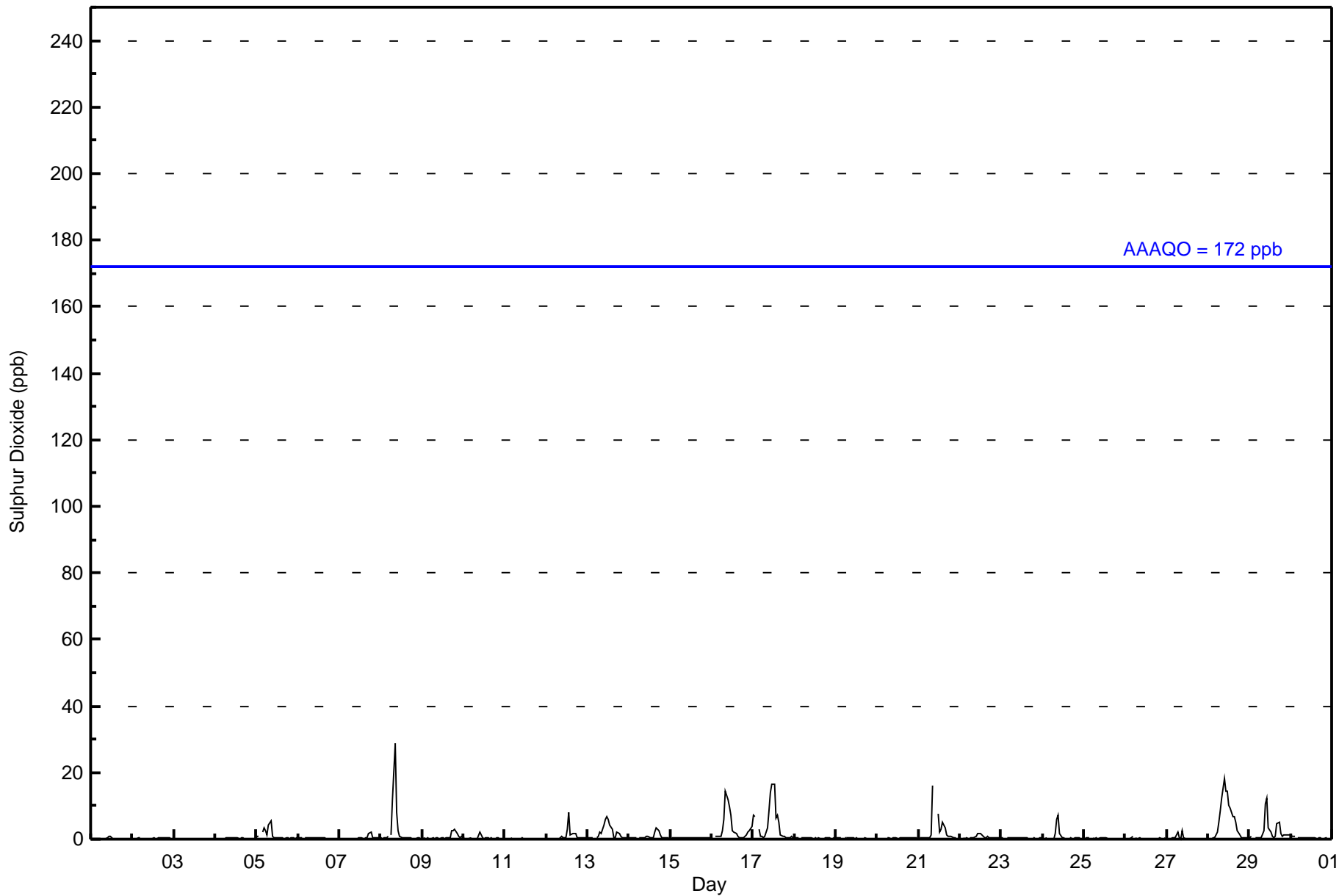
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.6 | 0.5 | 0.3 | 0.5 | 0.5 | 0.4 | 0.6 | 1.4 | 3.2 | 2.8 | 2.5 | 2.2 | 1.7 | 1.4 | 1.1 | 0.9 | 0.8 | 0.8 | 0.6 | 0.4 | 0.4 | 0.3 | 0.3 | 0.4 | Diurnal Average | |
| 7 | 7 | 1 | 3 | 3 | 2 | 5 | 12 | 29 | 18 | 14 | 17 | 16 | 9 | 7 | 7 | 5 | 5 | 2 | 3 | 2 | 2 | 2 | 4 | 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 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 668 | 97.95 | 97.95 |
| 11 - 20 | 13 | 1.91 | 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: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 62 | 50 | 69 | 45 | 38 | 30 | 41 | 54 | 667 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 13 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 56 | 73 | 46 | 38 | 30 | 41 | 54 | 681 |

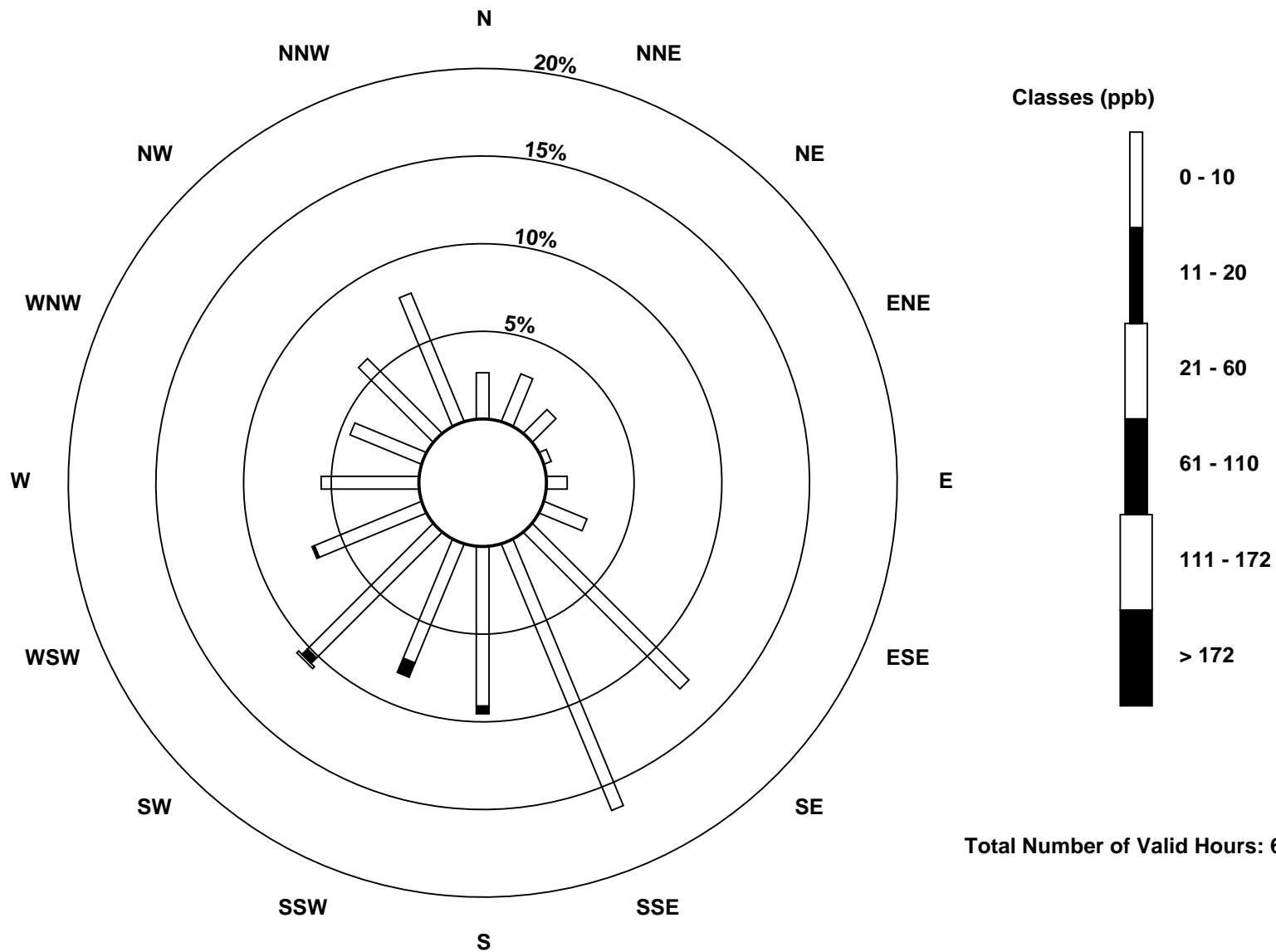
Total Number of Valid Hours: 681

Total Number of Hours: 720

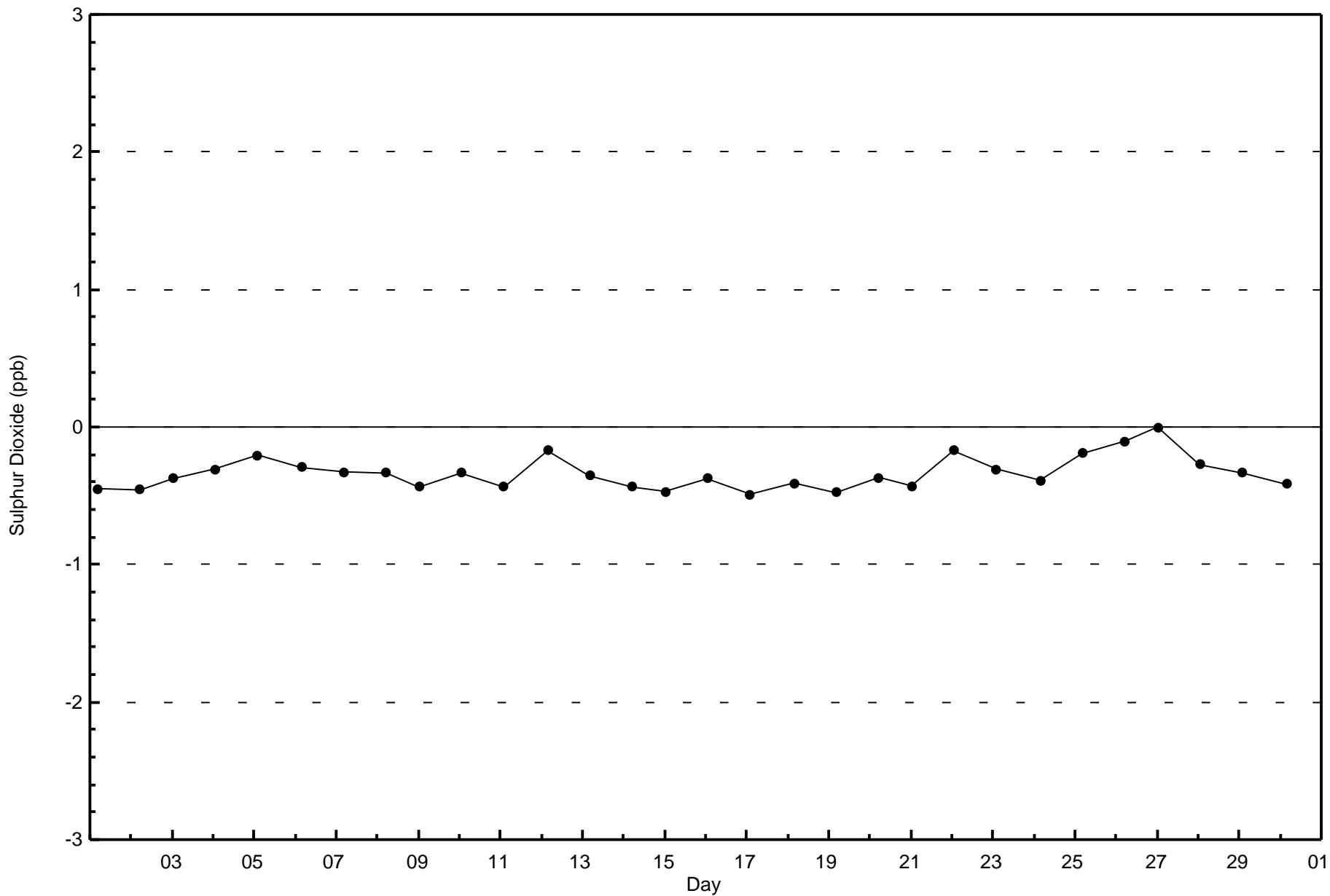


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
Wapasu (AMS 17)



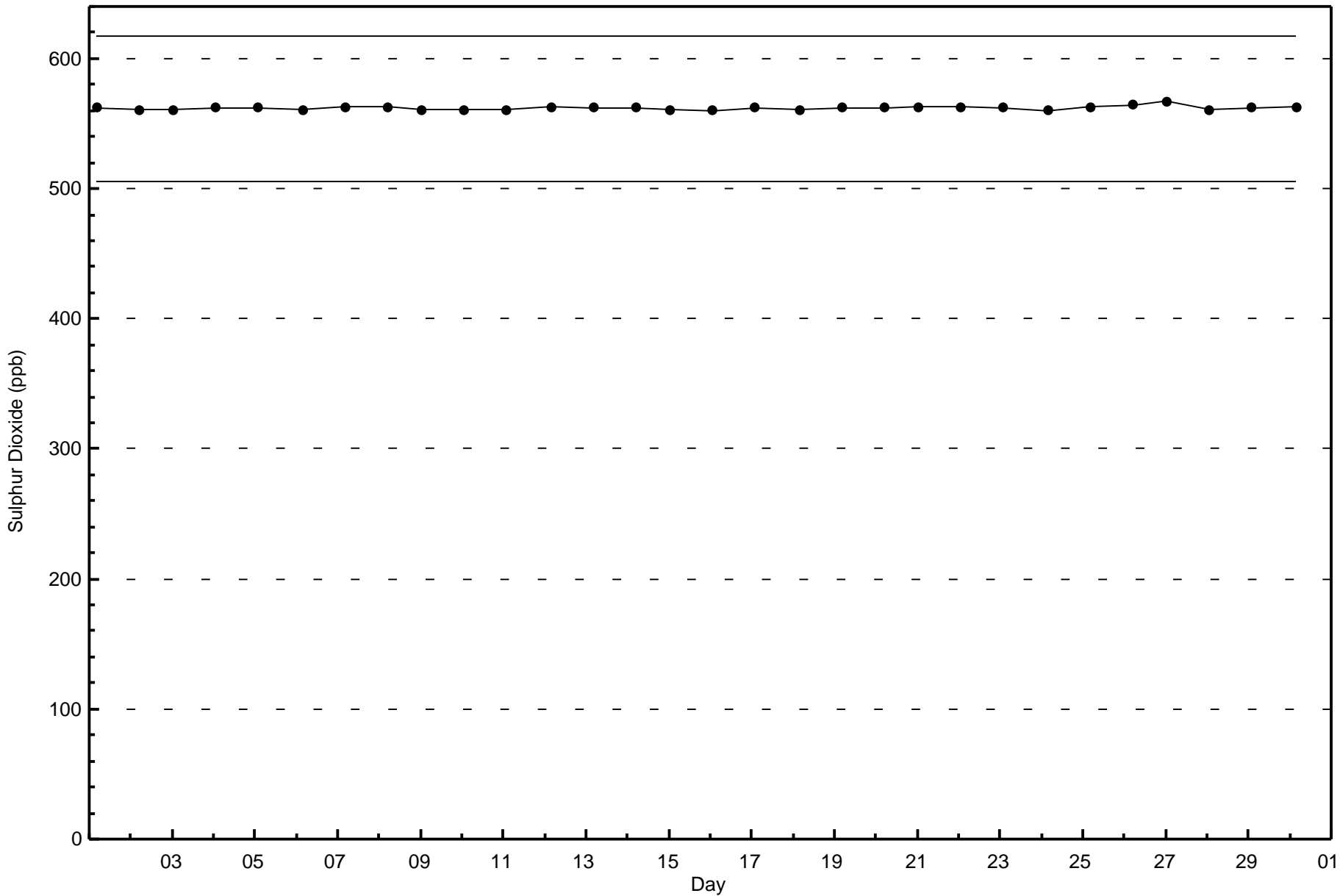
Total Number of Valid Hours: 681





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Wapasu - September 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

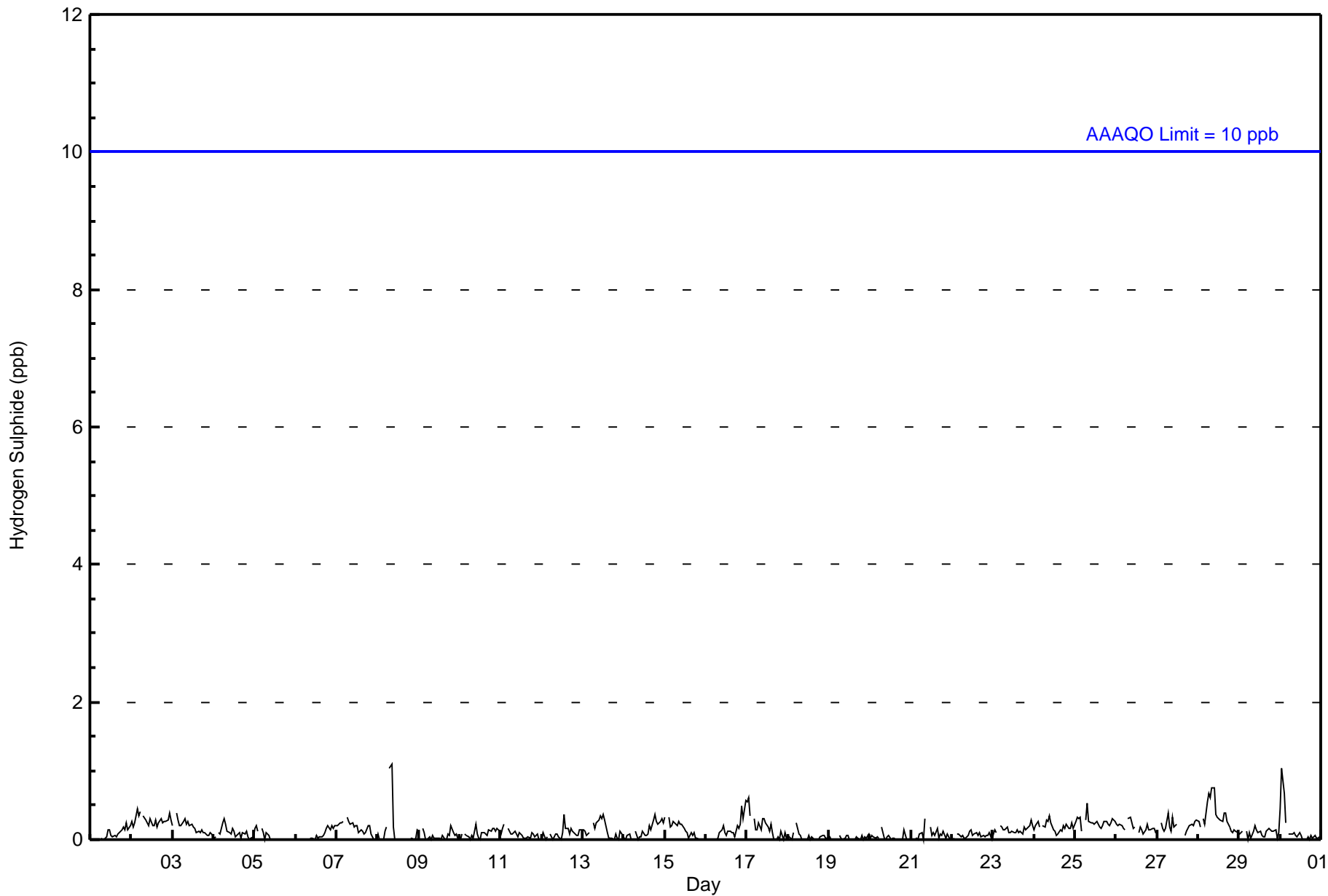
Wapasu - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 8 09:00 | Maximum Daily Average: 0.3 ppb on Sep 28 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.0 ppb on Sep 19 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 0.2 ppb at hour 8 | Minimum Diurnal Average: 0.1 ppb at hour 17 | | Hours of Calibration: | 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 | | 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 | 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 | 0.3 | 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 | 0.2 | 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 | 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 | 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 | 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 | 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 | 0 | Z | 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 | 0 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 | 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 | 0.1 | 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 | 0.1 | 0 |
| 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 | 0.1 | 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 | 1 | 0.1 | 1 |
| 17-Sep | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 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 | 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 | 0.0 | 0 |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | 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 | 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 | 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 | 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 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 27-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | 0.1 | 0 |
| 30-Sep | 0 | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Diurnal Average | |
| 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 683 | 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: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 17 | 19 | 12 | 4 | 8 | 18 | 85 | 115 | 68 | 57 | 74 | 45 | 35 | 27 | 43 | 55 | 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 | 17 | 19 | 12 | 4 | 8 | 18 | 85 | 115 | 68 | 57 | 74 | 45 | 35 | 27 | 43 | 55 | 682 |

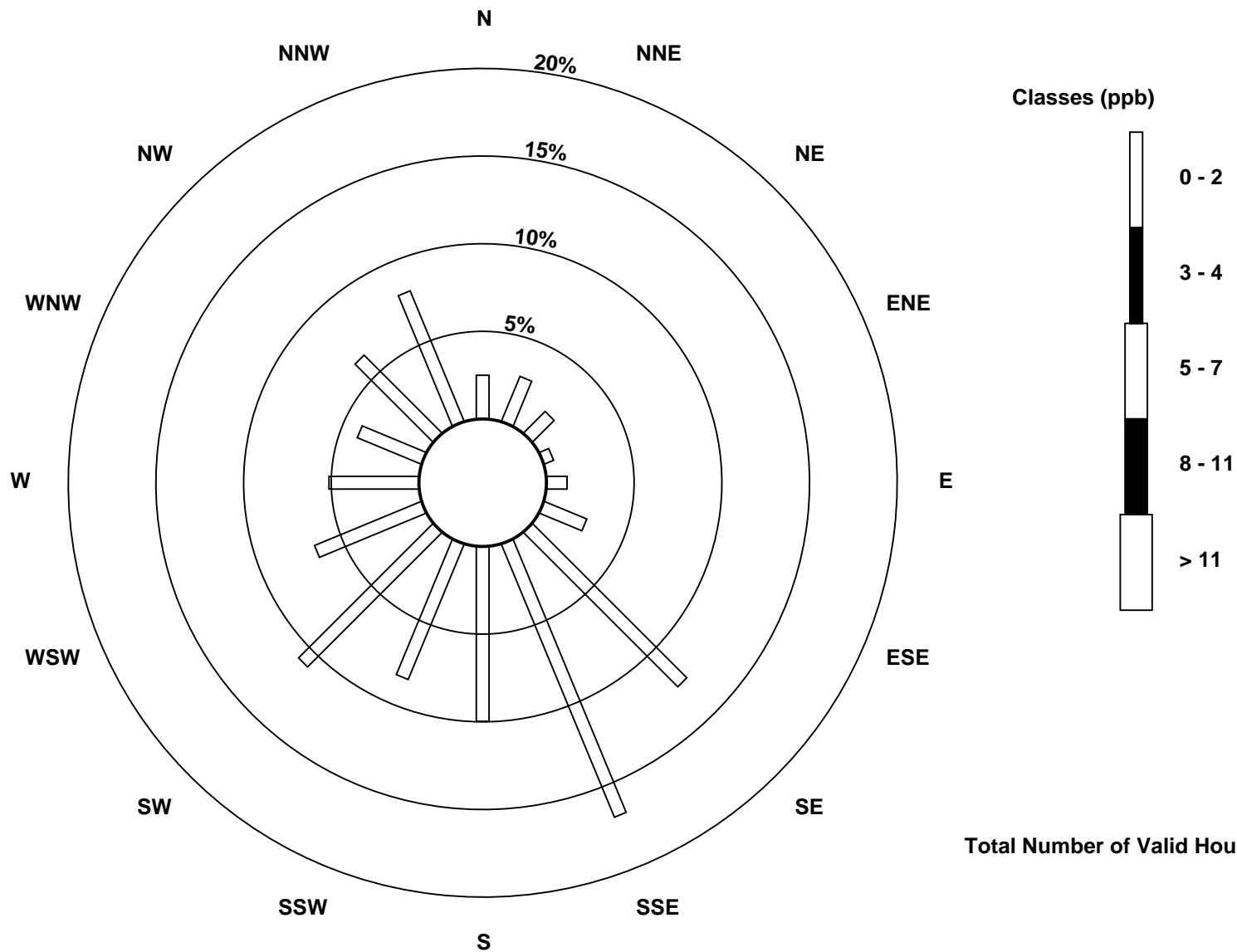
Total Number of Valid Hours: 682

Total Number of Hours: 720

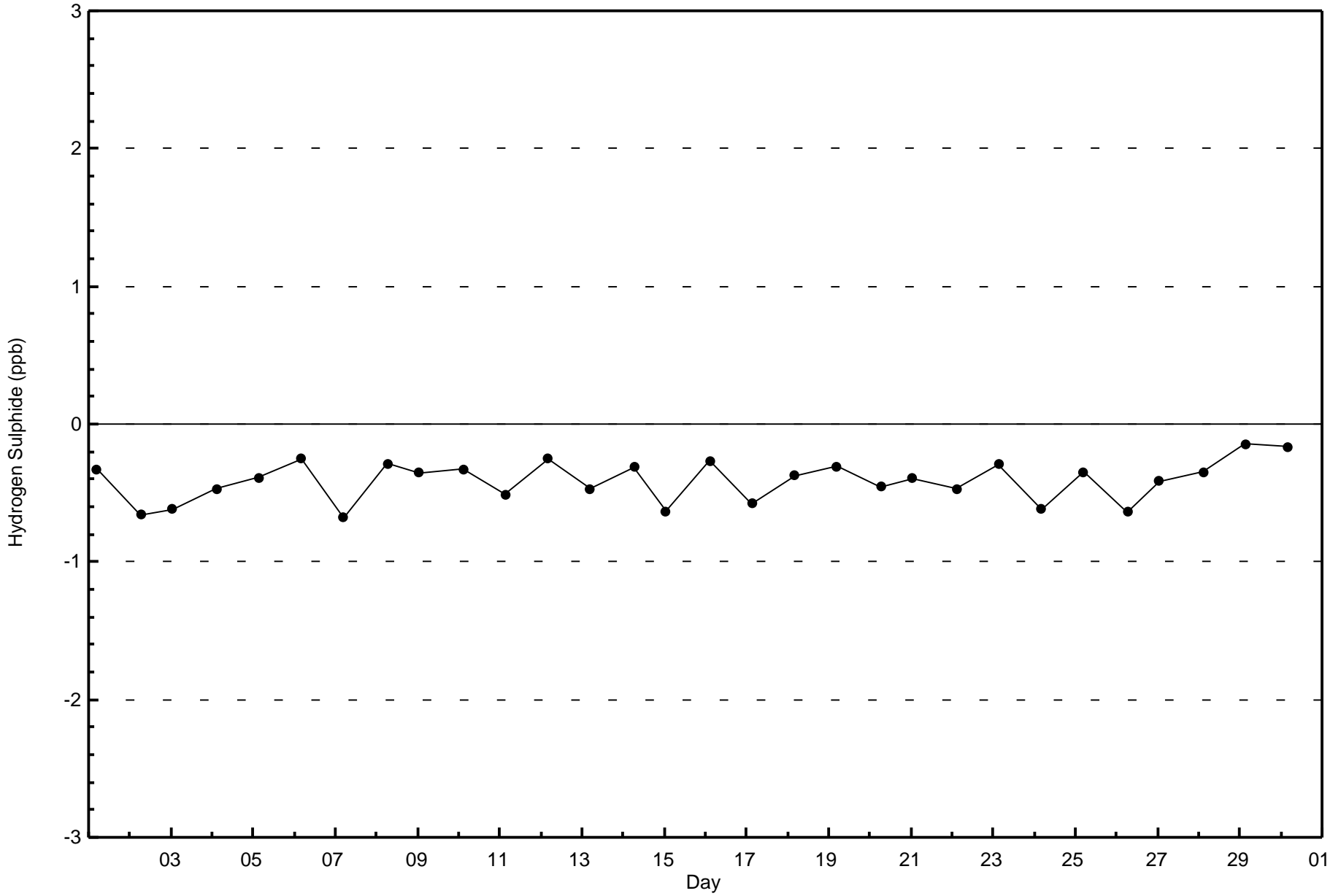


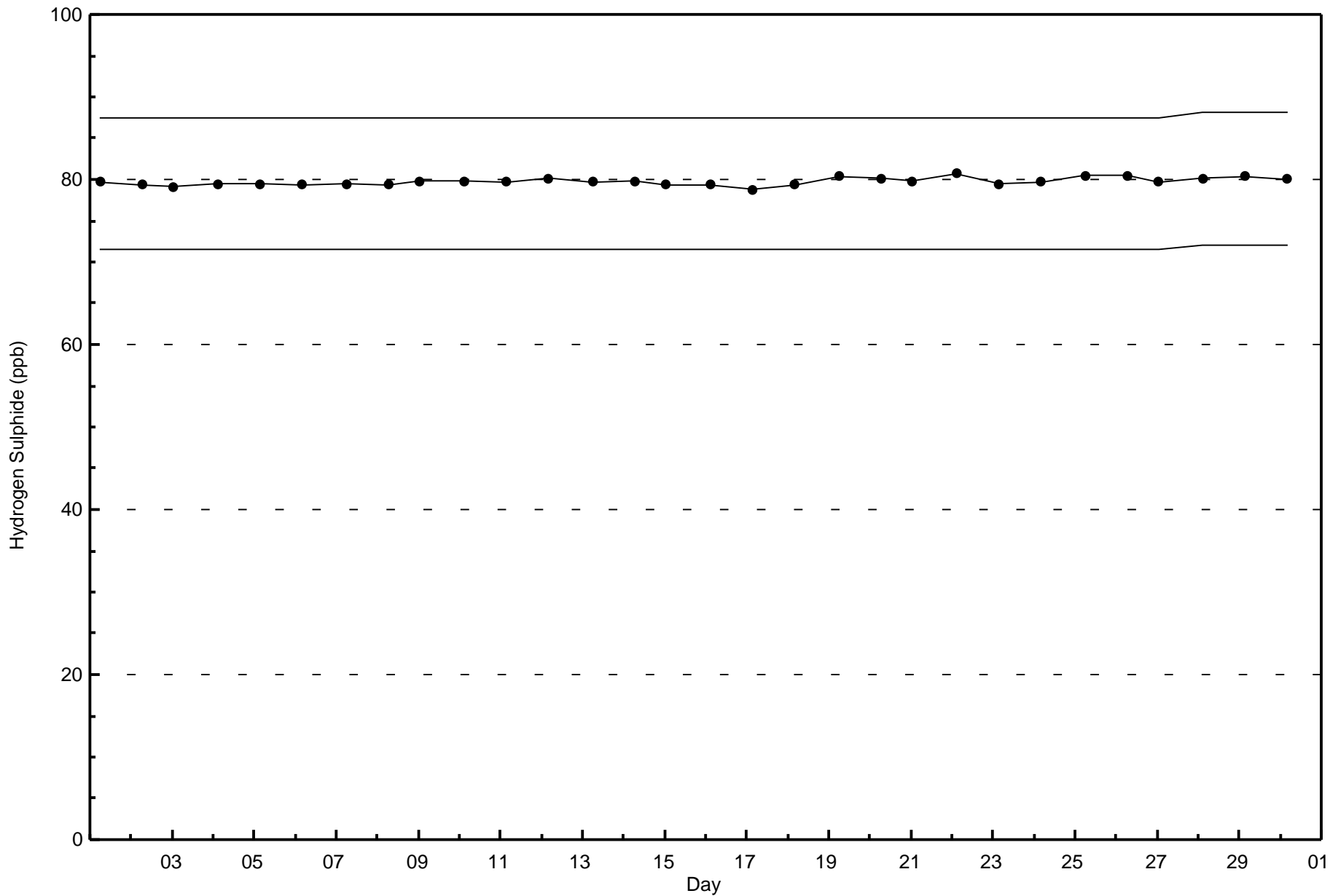
Wood Buffalo Environmental Association
Wind Rose Sep 2016

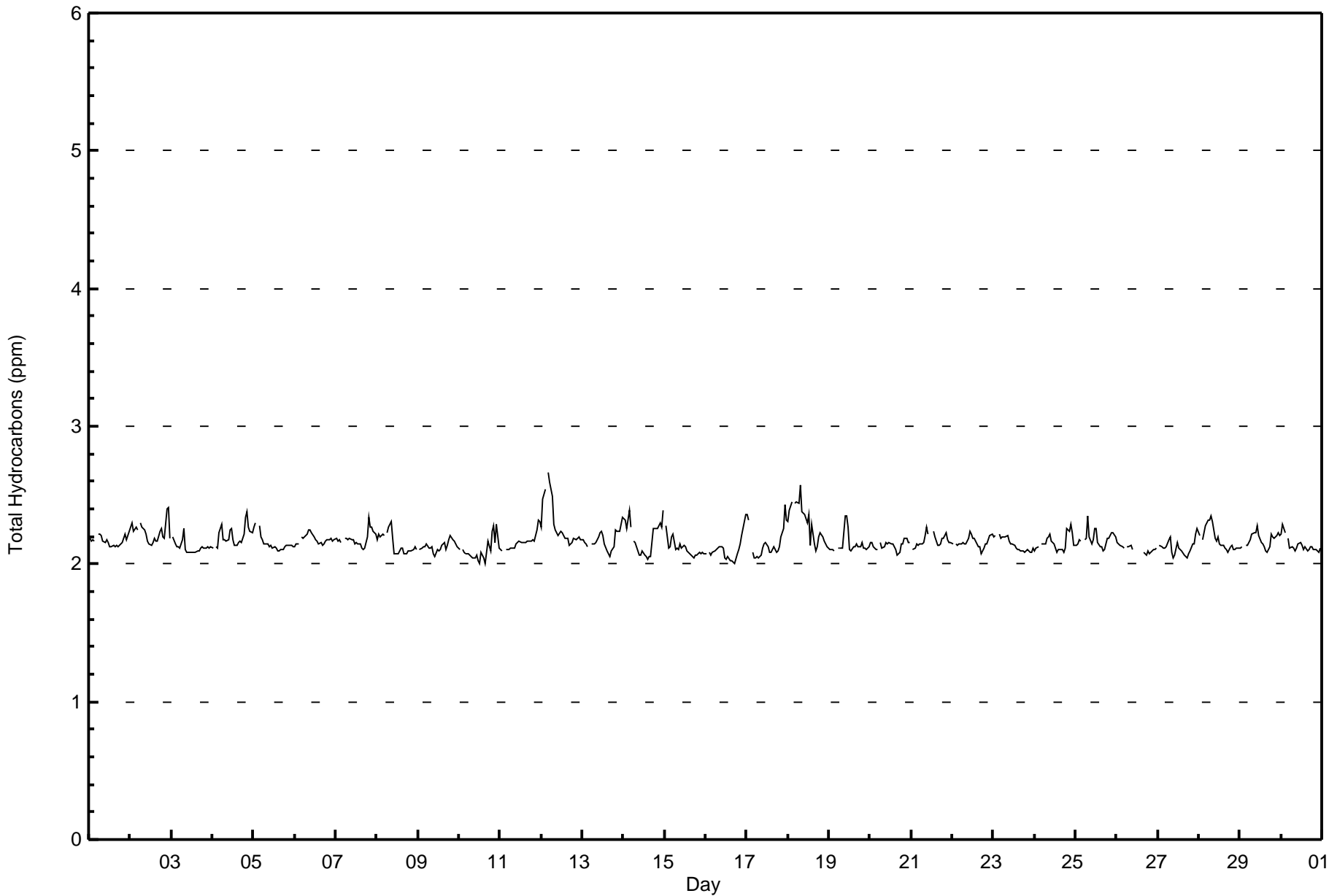
Hydrogen Sulphide (H₂S) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 682









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 20 | 2.93 | 2.93 |
| 2.1 - 3.0 | 662 | 97.07 | 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
Wapasu - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 3 | 6 | 3 | 0 | 1 | 1 | 0 | 20 |
| 2.1 - 3.0 | 18 | 20 | 13 | 3 | 8 | 18 | 85 | 111 | 61 | 53 | 67 | 43 | 38 | 29 | 40 | 54 | 661 |
| 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 | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 56 | 73 | 46 | 38 | 30 | 41 | 54 | 681 |

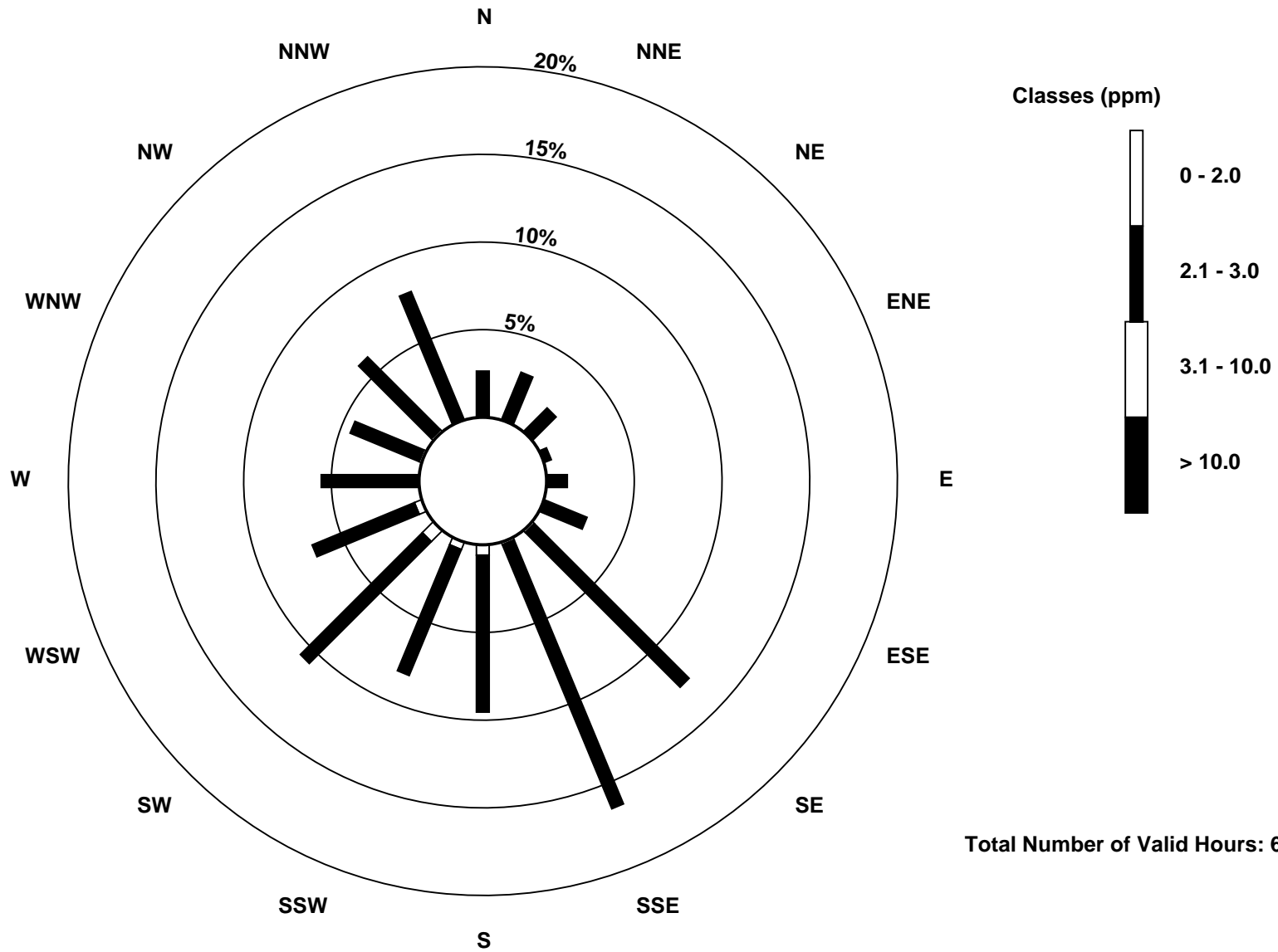
Total Number of Valid Hours: 681

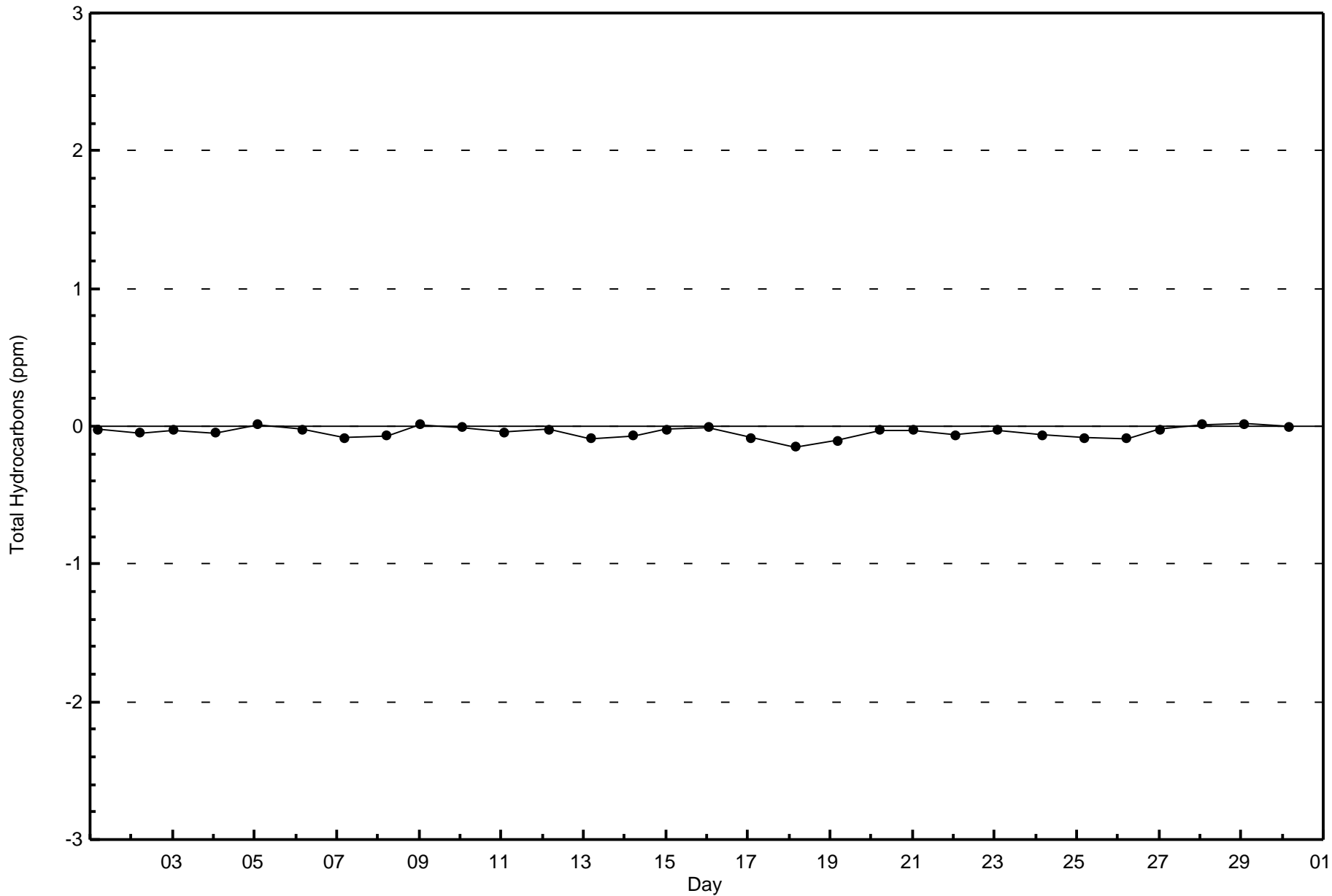
Total Number of Hours: 720

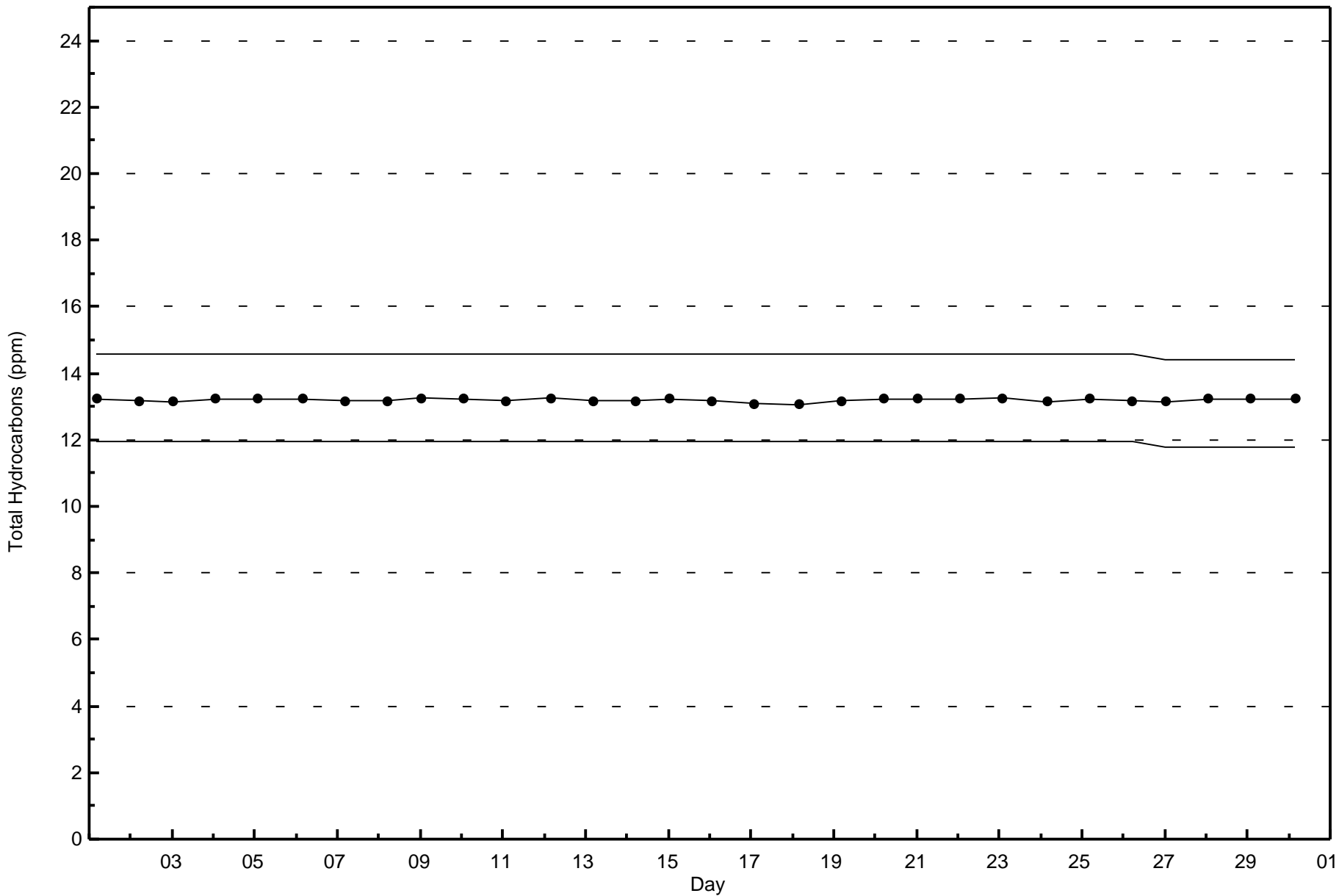


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Hydrocarbons (THC) - ppm
Wapasu (AMS 17)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Wapasu - September 2016

| | | | | |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 40 ppb on Sep 22 16:00 | Maximum Daily Average: 30.0 ppb on Sep 22 | | Hours of Data: | 684 |
| Minimum Value: 1 ppb on Sep 12 03:00 | Minimum Daily Average: 10.0 ppb on Sep 2 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 25.3 ppb at hour 16 | Minimum Diurnal Average: 13.6 ppb at hour 6 | | Hours of Calibration: | 35 |
| Monthly Average: 18.8 ppb | Percentiles: P ₁ = 2 P ₁₀ = 8 Q ₁ = 12 Median = 19 Q ₃ = 25 P ₉₀ = 29 P ₉₉ = 36 | | Percent Operational Time: | 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 15 | 15 | 14 | 14 | 12 | 6 | 5 | Z | 12 | 13 | 11 | 11 | 12 | 14 | 14 | 14 | 13 | 11 | 10 | 9 | 7 | 4 | 6 | 4 | 10.7 | 15 |
| 2-Sep | 4 | 4 | 10 | 8 | 8 | 8 | 9 | 11 | Z | 12 | 14 | 16 | 17 | 16 | 18 | 18 | 16 | 10 | 7 | 8 | 6 | 2 | 2 | 7 | 10.0 | 18 |
| 3-Sep | 5 | 5 | 4 | Z | 6 | 8 | 8 | 7 | 8 | 10 | 11 | 12 | 13 | 14 | 16 | 17 | 18 | 20 | 21 | 21 | 21 | 22 | 21 | 20 | 13.4 | 22 |
| 4-Sep | 19 | 16 | 16 | 13 | Z | 6 | 9 | 10 | 15 | 17 | 19 | 23 | 27 | 28 | 29 | 28 | 26 | 23 | 13 | 5 | 6 | 9 | 12 | 12 | 16.5 | 29 |
| 5-Sep | 10 | 8 | 8 | 8 | 10 | Z | 12 | 15 | 18 | 27 | 26 | 26 | 28 | 29 | 29 | 29 | 28 | 26 | 21 | 20 | 22 | 23 | 23 | 24 | 20.6 | 29 |
| 6-Sep | 23 | 21 | 19 | 17 | 16 | 15 | Z | 17 | 19 | 22 | 24 | 26 | 27 | 28 | 29 | 27 | 24 | 23 | 21 | 21 | 22 | 21 | 20 | 18 | 21.8 | 29 |
| 7-Sep | 17 | 14 | 13 | 12 | 11 | 11 | 10 | Z | 14 | 17 | 20 | 25 | 27 | 28 | 30 | 31 | 29 | 27 | 21 | 9 | 8 | 14 | 16 | 15 | 18.3 | 31 |
| 8-Sep | 15 | 14 | 10 | 9 | 8 | 6 | 10 | 10 | Z | 17 | 23 | 26 | 29 | 31 | 28 | 29 | 30 | 24 | 17 | 15 | 20 | 17 | 11 | 14 | 17.9 | 31 |
| 9-Sep | 13 | 15 | 15 | Z | 16 | 16 | 17 | 18 | 17 | 21 | 21 | 21 | 20 | 19 | 18 | 19 | 20 | 17 | 11 | 10 | 13 | 16 | 17 | 18 | 16.9 | 21 |
| 10-Sep | 17 | 16 | 16 | 17 | Z | 15 | 14 | 14 | 13 | 9 | 9 | 11 | 11 | 11 | 15 | 15 | 15 | 14 | 16 | 9 | 8 | 11 | 6 | 15 | 12.9 | 17 |
| 11-Sep | 18 | 18 | 22 | 23 | 23 | Z | 22 | 24 | 22 | 21 | 23 | 19 | 23 | 23 | 20 | 20 | 21 | 22 | 21 | 19 | 14 | 9 | 4 | 5 | 18.9 | 24 |
| 12-Sep | 6 | 2 | 1 | 1 | 1 | 3 | Z | 10 | 15 | 20 | 26 | 29 | 30 | 30 | 32 | 30 | 29 | 27 | 25 | 24 | 25 | 25 | 23 | 21 | 19.0 | 32 |
| 13-Sep | 20 | 20 | 22 | 23 | 23 | 23 | 21 | Z | 18 | 15 | 15 | 16 | 19 | 21 | 21 | 20 | 19 | 19 | 19 | 18 | 18 | 15 | 13 | 6 | 18.4 | 23 |
| 14-Sep | 9 | 6 | 2 | 1 | 2 | 5 | 6 | 9 | Z | 18 | 19 | 21 | 18 | 24 | 25 | 23 | 20 | 14 | 13 | 6 | 4 | 3 | 9 | 4 | 11.4 | 25 |
| 15-Sep | 4 | 5 | 11 | Z | 3 | 6 | 10 | 11 | 14 | 15 | 19 | 19 | 20 | 24 | 28 | 26 | 27 | 27 | 26 | 26 | 26 | 27 | 26 | 24 | 18.6 | 28 |
| 16-Sep | 23 | 21 | 19 | 19 | Z | 17 | 15 | 14 | 12 | 11 | 10 | 13 | 21 | 22 | 22 | 26 | 27 | 27 | 22 | 20 | 19 | 17 | 15 | 11 | 18.5 | 27 |
| 17-Sep | 11 | 10 | 12 | 16 | 18 | Z | 17 | 16 | 14 | 12 | 11 | 10 | 13 | 16 | 16 | 17 | 20 | 18 | 16 | 16 | 15 | 14 | 16 | 20 | 15.0 | 20 |
| 18-Sep | 17 | 11 | 5 | 10 | 6 | 6 | Z | 9 | 9 | 8 | 10 | 11 | 11 | 18 | 10 | 16 | 18 | 15 | 12 | 10 | 10 | 8 | 11 | 11 | 10.9 | 18 |
| 19-Sep | 11 | 11 | 11 | 12 | 10 | 8 | 8 | Z | 10 | 5 | 6 | 7 | 11 | 13 | 12 | 12 | 10 | 11 | 12 | 10 | 10 | 10 | 11 | 12 | 10.2 | 13 |
| 20-Sep | 10 | 9 | 11 | 13 | 13 | 14 | 13 | 13 | Z | 16 | 19 | 20 | 23 | 24 | 25 | 25 | 24 | 20 | 13 | 14 | 14 | 16 | 18 | 11 | 16.4 | 25 |
| 21-Sep | 16 | 19 | 18 | Z | 16 | 16 | 14 | 13 | 11 | 17 | 21 | 20 | C | C | 27 | 28 | 27 | 26 | 21 | 20 | 16 | 19 | 21 | 21 | 19.3 | 28 |
| 22-Sep | 21 | 21 | 20 | 21 | Z | 22 | 22 | 23 | 24 | 27 | 29 | 34 | 36 | 37 | 39 | 40 | 39 | 36 | 33 | 33 | 33 | 34 | 33 | 33 | 30.0 | 40 |
| 23-Sep | 32 | 31 | 30 | 29 | 27 | Z | 24 | 24 | 25 | 27 | 29 | 30 | 30 | 29 | 28 | 27 | 26 | 26 | 26 | 27 | 26 | 24 | 23 | 21 | 27.0 | 32 |
| 24-Sep | 20 | 18 | 18 | 16 | 15 | 14 | Z | 9 | 8 | 14 | 22 | 23 | 23 | 25 | 31 | 30 | 31 | 30 | 25 | 16 | 22 | 18 | 23 | 26 | 20.7 | 31 |
| 25-Sep | 25 | 24 | 22 | 22 | 23 | 20 | 19 | Z | 22 | 25 | 28 | 28 | 29 | 34 | 34 | 34 | 34 | 31 | 19 | 10 | 7 | 7 | 11 | 18 | 22.9 | 34 |
| 26-Sep | 24 | 26 | 26 | 26 | 26 | 27 | 27 | 29 | Z | 30 | 32 | 31 | M | 32 | 32 | 32 | 32 | 30 | 27 | 28 | 28 | 29 | 30 | 30 | 28.8 | 32 |
| 27-Sep | 30 | 30 | 29 | Z | 29 | 27 | 22 | 20 | 25 | C | C | C | 28 | 30 | 32 | 33 | 33 | 33 | 32 | 30 | 28 | 26 | 21 | 17 | 27.7 | 33 |
| 28-Sep | 20 | 26 | 23 | 22 | Z | 14 | 11 | 11 | 16 | 21 | 24 | 24 | 29 | 30 | 31 | 31 | 31 | 28 | 21 | 22 | 23 | 24 | 20 | 21 | 22.8 | 31 |
| 29-Sep | 22 | 20 | 22 | 24 | 24 | Z | 23 | 22 | 19 | 22 | 22 | 27 | 33 | 35 | 36 | 37 | 37 | 26 | 15 | 10 | 13 | 17 | 20 | 27 | 24.1 | 37 |
| 30-Sep | 27 | 24 | 25 | 22 | 21 | 26 | Z | 25 | 28 | 27 | 23 | 23 | 24 | 27 | 27 | 27 | 26 | 27 | 27 | 27 | 27 | 25 | 24 | 22 | 25.2 | 28 |

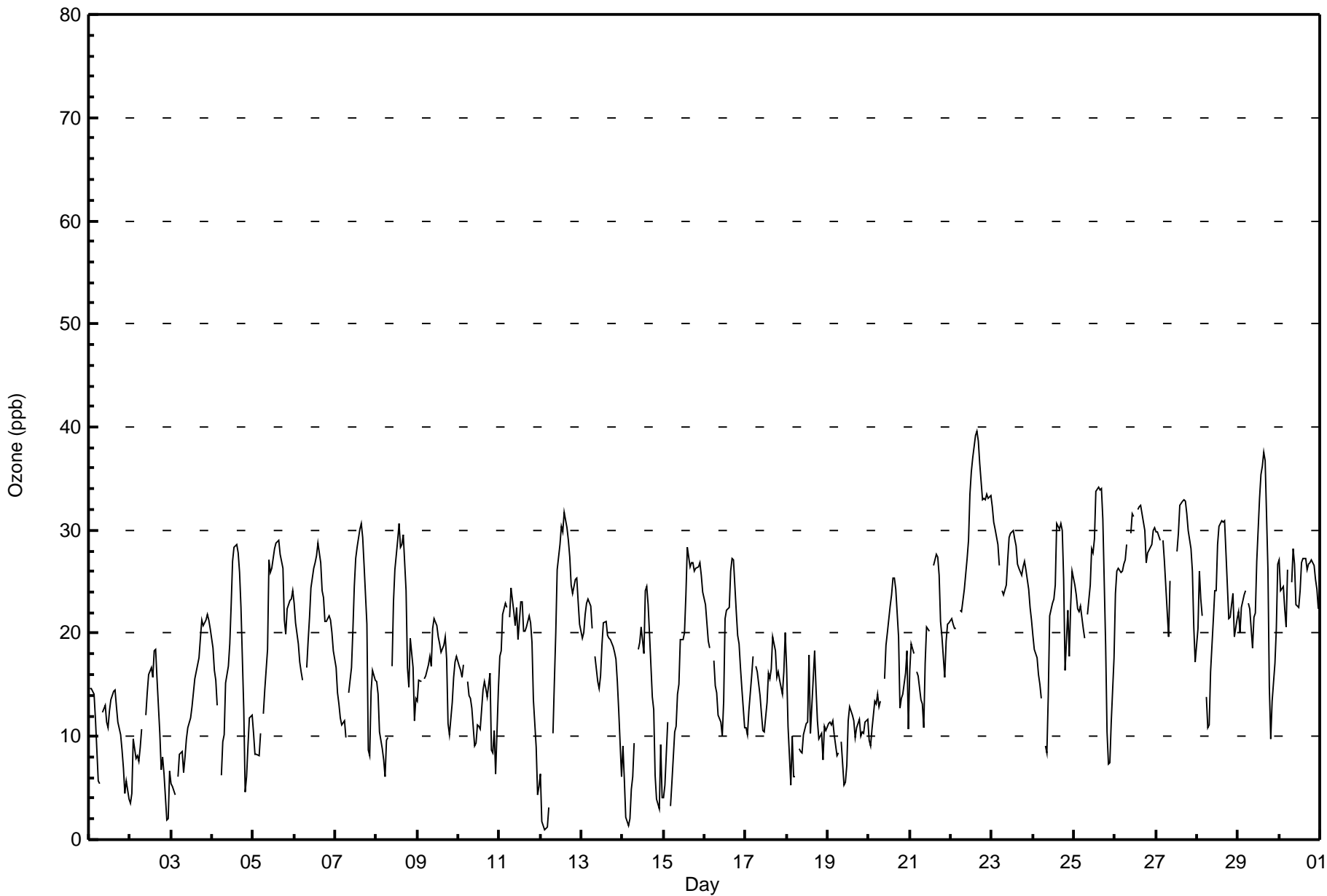
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| 16.8 | 16.1 | 15.9 | 15.9 | 14.7 | 13.6 | 14.8 | 15.4 | 16.3 | 17.8 | 19.5 | 20.8 | 22.6 | 24.5 | 25.2 | 25.3 | 24.9 | 22.9 | 19.4 | 17.1 | 17.1 | 16.9 | 16.9 | 16.9 | 16.9 | 16.9 | Diurnal Average |
| 32 | 31 | 30 | 29 | 29 | 27 | 27 | 29 | 28 | 30 | 32 | 34 | 36 | 37 | 39 | 40 | 39 | 36 | 33 | 33 | 33 | 34 | 33 | 33 | 33 | 33 | 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 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Wapasu - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 385 | 56.29 | 56.29 |
| 21 - 50 | 299 | 43.71 | 100.00 |
| 51 - 82 | 0 | 0.00 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 7 | 6 | 6 | 2 | 7 | 16 | 66 | 38 | 36 | 28 | 37 | 21 | 22 | 15 | 33 | 45 | 385 |
| 21 - 50 | 10 | 14 | 5 | 1 | 1 | 3 | 21 | 74 | 33 | 28 | 33 | 26 | 15 | 13 | 10 | 11 | 298 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 17 | 20 | 11 | 3 | 8 | 19 | 87 | 112 | 69 | 56 | 70 | 47 | 37 | 28 | 43 | 56 | 683 |

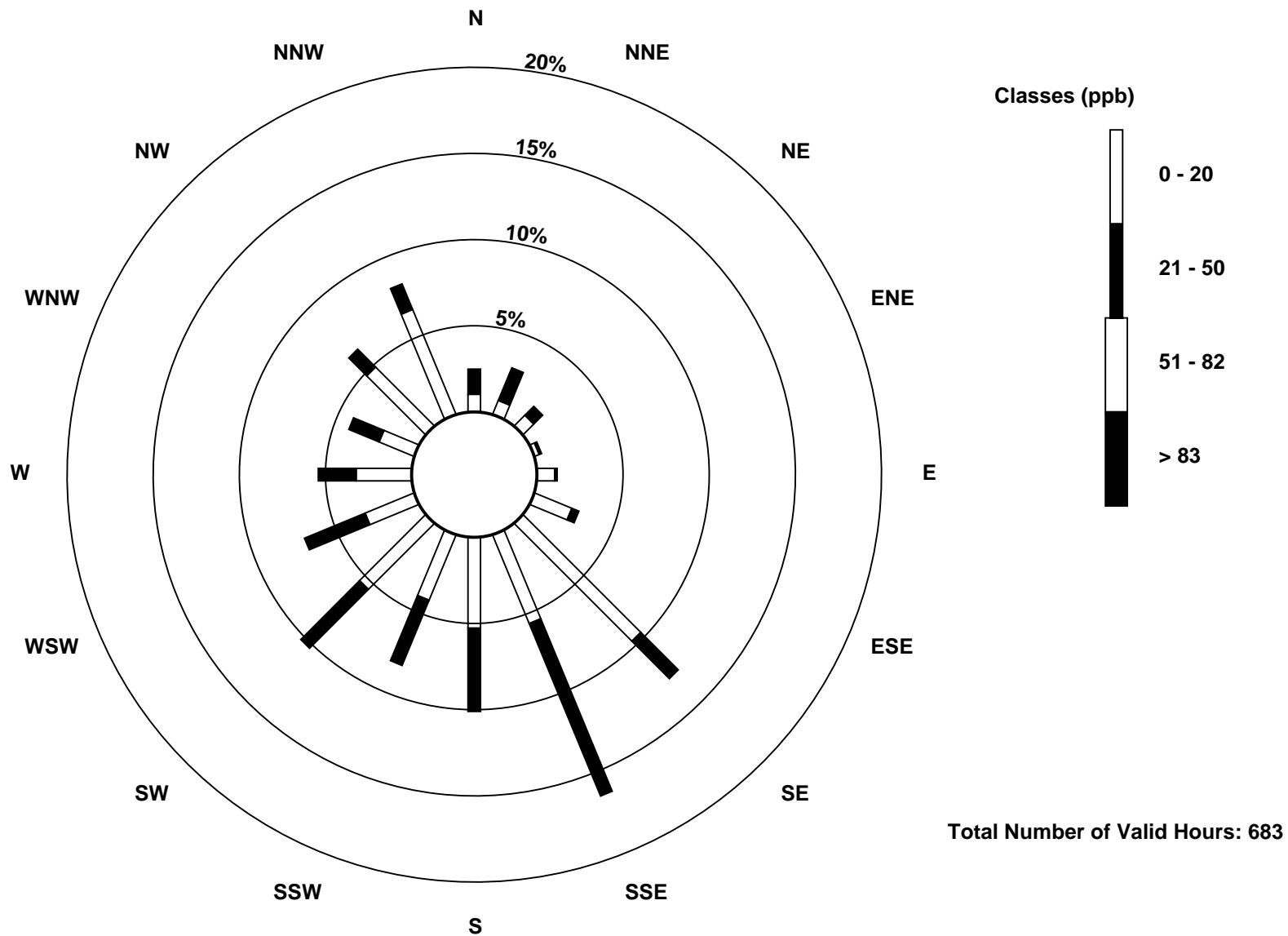
Total Number of Valid Hours: 683

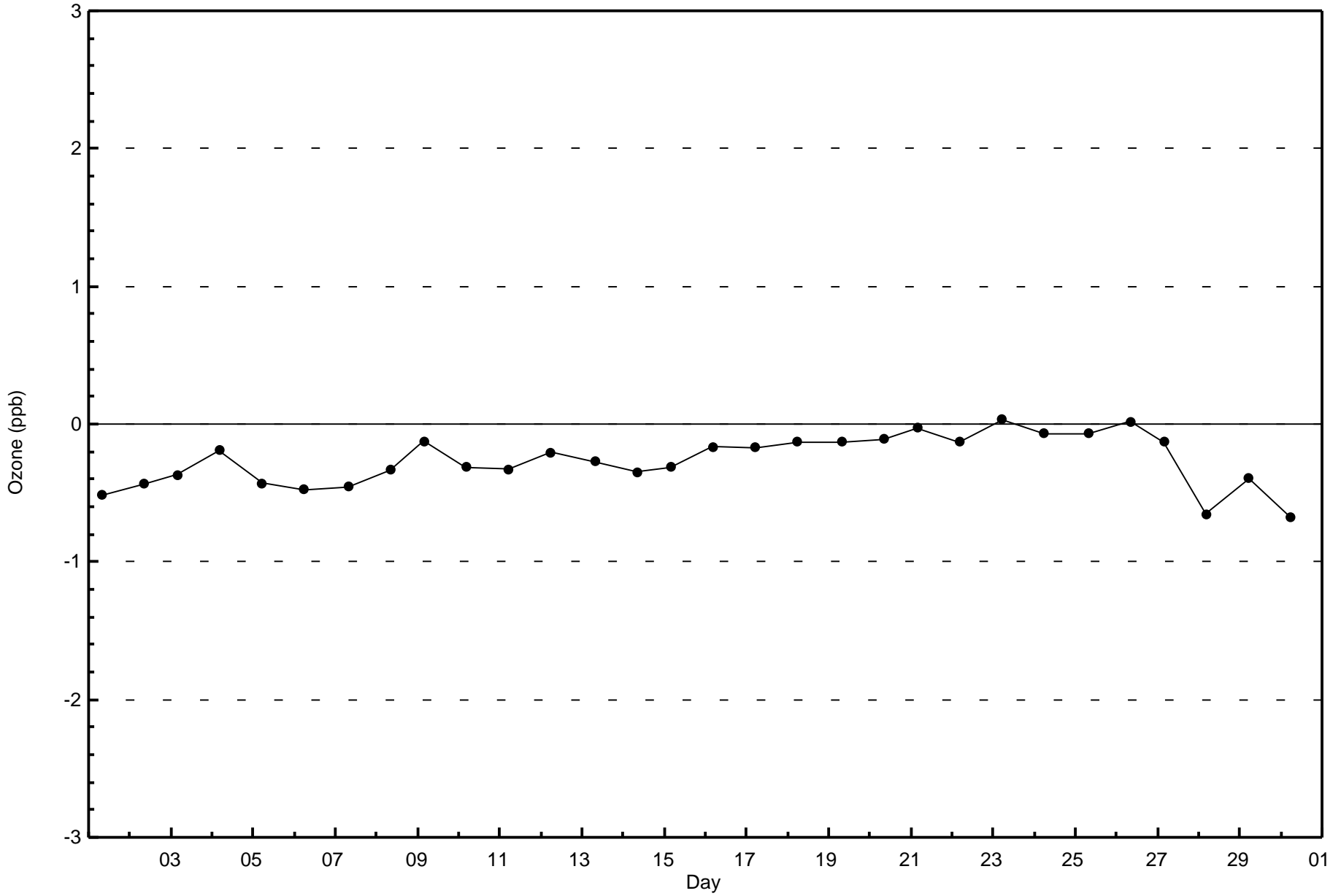
Total Number of Hours: 720

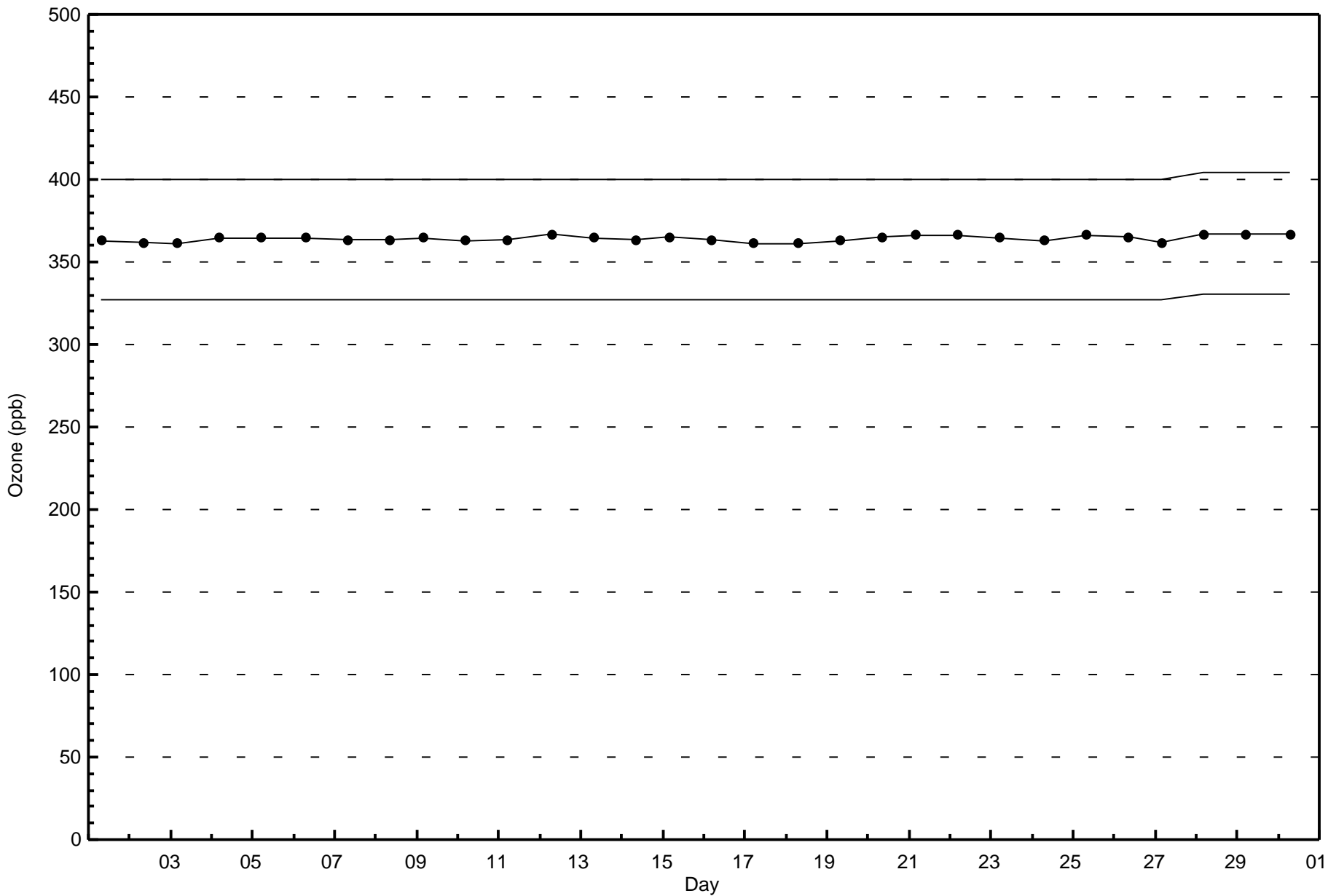


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Ozone (O₃) - ppb
Wapasu (AMS 17)

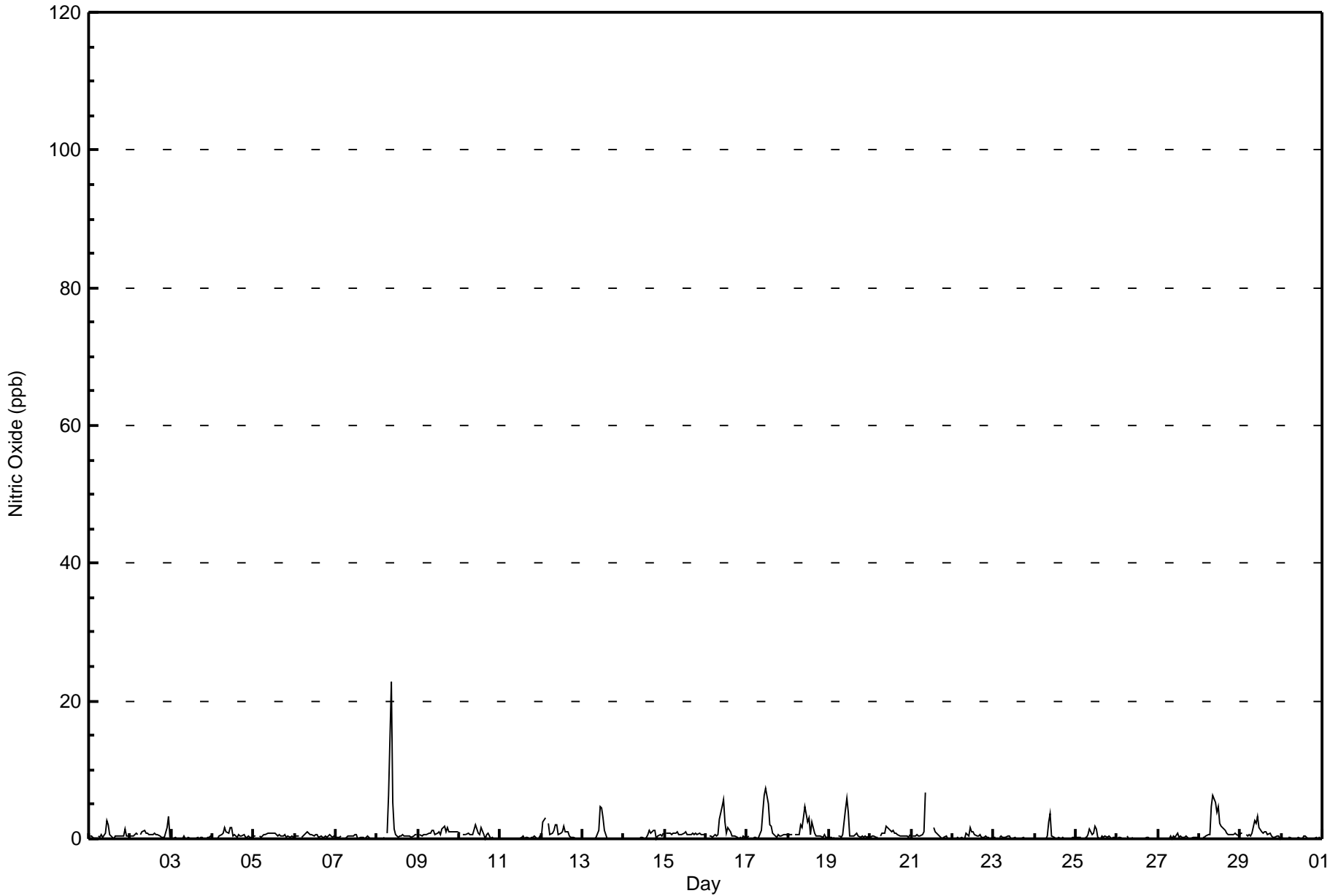








| Maximum Value: 23 ppb on Sep 8 09:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 1.8 ppb on Sep 8 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--------------------------------------------|-------------------------------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|-----------------|---------------|---------------|--|--|--|--|--|--|--|---------------------------|--|
| Minimum Value: 0 ppb on Sep 1 04:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 30 | | | | | | | | | | | | | | | | | Hours of Data: 680 | |
| Maximum Diurnal Average: 2.0 ppb at hour 9 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.2 ppb at hour 1 | | | | | | | | | | | | | | | | | Hours of Missing Data: 40 | |
| Monthly Average: 0.7 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 6 | | | | | | | | | | | | | | | | | Hours of Calibration: 40 | |
| | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0.6 | 3 | | | | | | | | | |
| 2-Sep | 0 | 1 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 0.7 | 3 | | | | | | | | | |
| 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 | 0 | | | | | | | | | |
| 4-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | | | | | | | | | |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | | | | | | | | | |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.5 | 1 | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 6 | 23 | 5 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1.8 | 23 | | | | | | | | | |
| 9-Sep | Z | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 | | | | | | | | | |
| 10-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | | | | | | | | | |
| 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 | 2 | 3 | Z | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 3 | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 5 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 5 | | | | | | | | | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0.3 | 1 | | | | | | | | | |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 | | | | | | | | | |
| 16-Sep | 1 | Z | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 5 | 6 | 2 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 6 | | | | | | | | | |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 6 | 7 | 5 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1.5 | 7 | | | | | | | | | |
| 18-Sep | 0 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 3 | 5 | 3 | 3 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1.2 | 5 | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 4 | 6 | 4 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 6 | | | | | | | | | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.7 | 2 | | | | | | | | | |
| 21-Sep | Z | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 7 | C | C | C | C | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 7 | | | | | | | | | |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | |
| 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 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 4 | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 | | | | | | | | | |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | | | | | | | | | |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 5 | 6 | 5 | 4 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1.7 | 6 | | | | | | | | | |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 1 | 0 | 1 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 3 | | | | | | | | | |
| 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 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 679 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 55 | 71 | 46 | 38 | 30 | 41 | 54 | 678 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 55 | 72 | 46 | 38 | 30 | 41 | 54 | 679 |

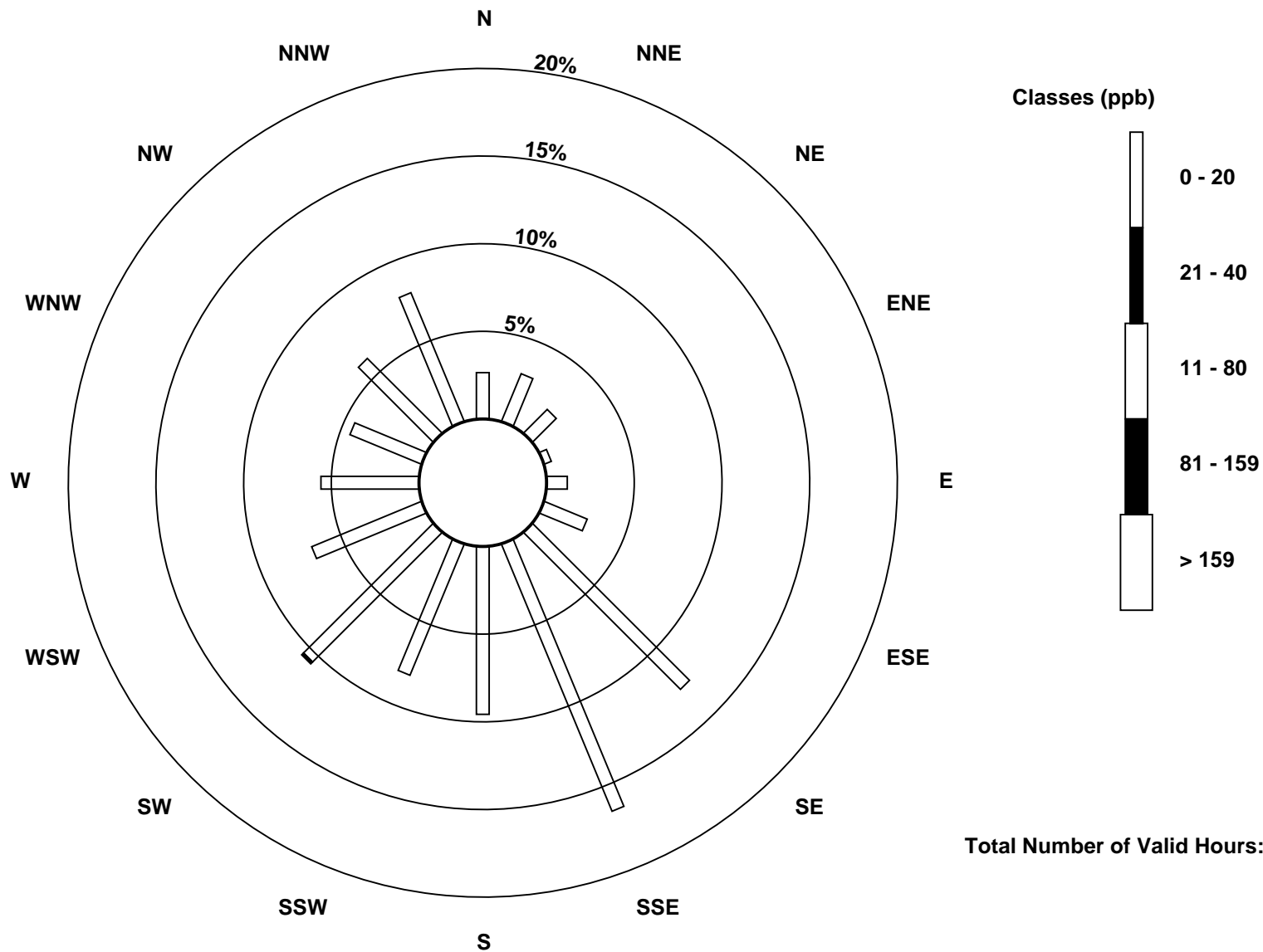
Total Number of Valid Hours: 679

Total Number of Hours: 720

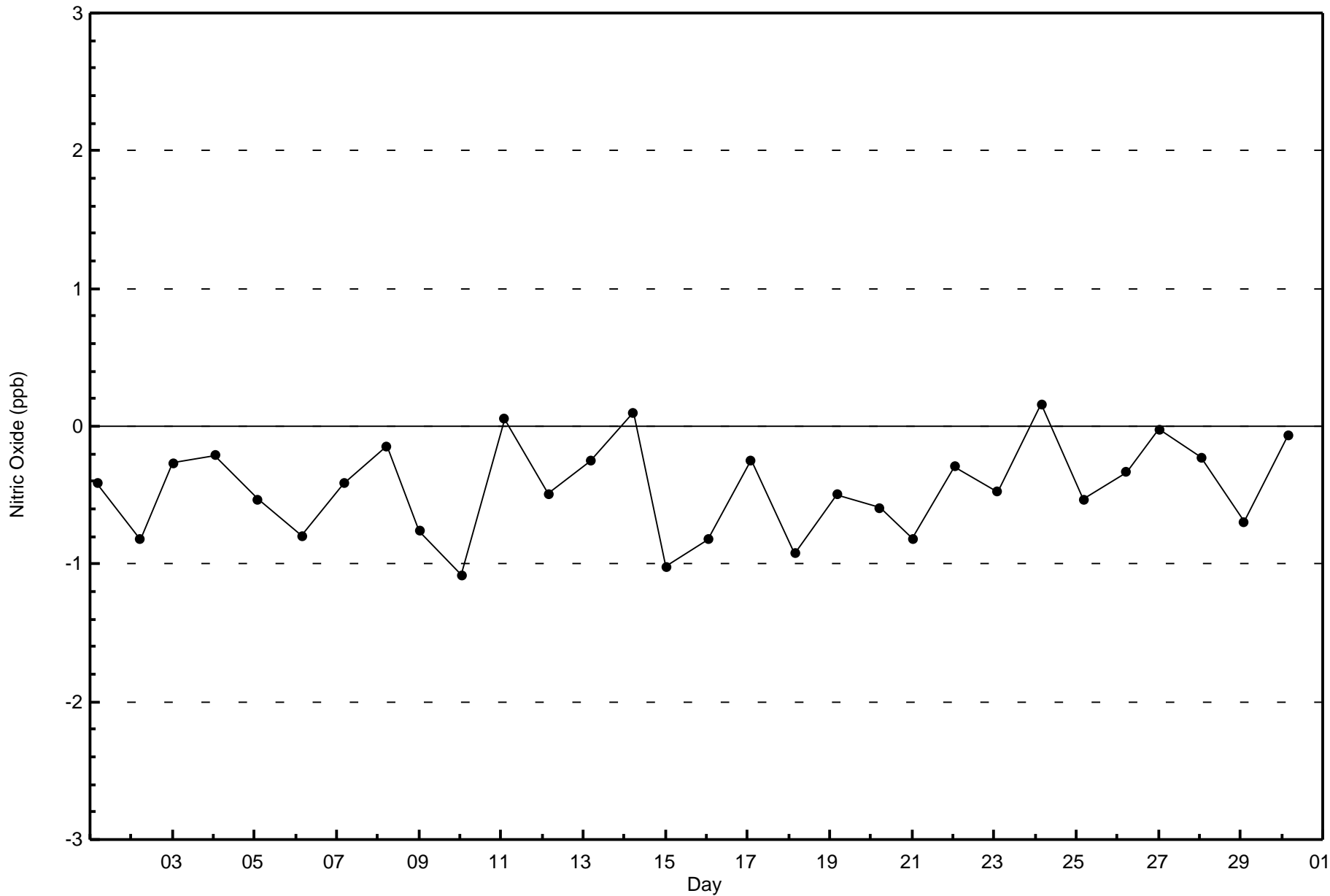


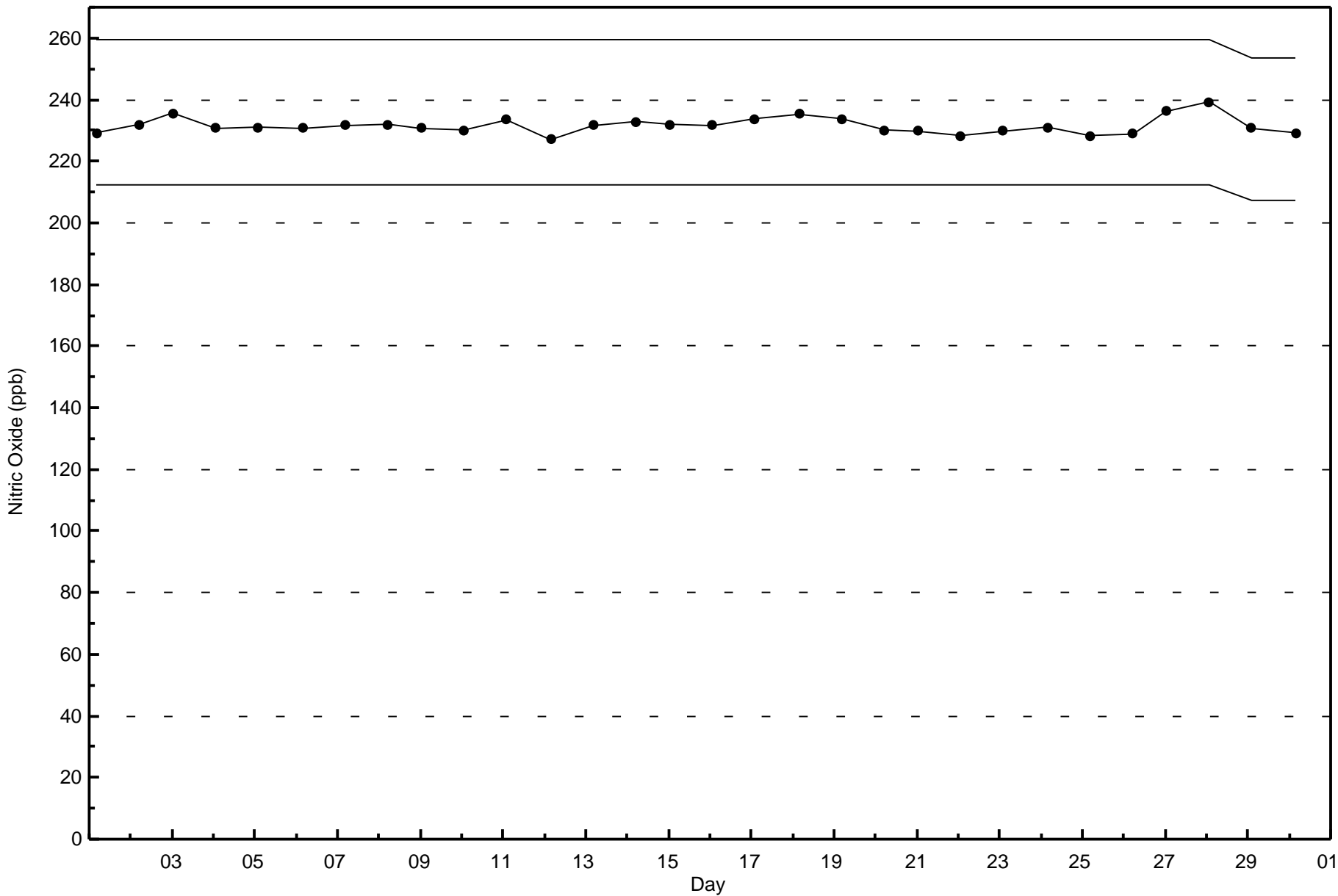
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitric Oxide (NO) - ppb
Wapasu (AMS 17)



Total Number of Valid Hours: 679







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Wapasu - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 15 ppb on Sep 8 09:00 | Maximum Daily Average: 4.8 ppb on Sep 28 | | Hours of Data: | 680 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.1 ppb on Sep 6 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 2.4 ppb at hour 9 | Minimum Diurnal Average: 0.7 ppb at hour 17 | | Hours of Calibration: | 40 |
| 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 = 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 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0.4 | 4 |
| 2-Sep | 1 | 2 | 1 | 2 | 1 | Z | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 8 | 8 | 1 | 1.7 | 8 |
| 3-Sep | Z | 2 | 3 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 |
| 4-Sep | 0 | Z | 0 | 1 | 4 | 4 | 3 | 2 | 1 | 1 | 2 | 3 | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 1 | 2 | 1 | 2 | 1.4 | 4 |
| 5-Sep | 5 | 6 | Z | 7 | 5 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 7 |
| 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 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 0.4 | 2 |
| 8-Sep | 2 | 2 | 4 | 4 | 5 | Z | 4 | 7 | 15 | 7 | 2 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 3 | 0 | 2.7 | 15 |
| 9-Sep | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 2 | 4 | 2 | 1 | 0 | 0 | 0.7 | 4 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 2 | 1 | 0 | 1 | 3 | 1 | 7 | 6 | 2 | 6 | 0 | 1.5 | 7 |
| 11-Sep | 1 | 2 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0.3 | 2 |
| 12-Sep | 3 | 8 | 2 | Z | 7 | 5 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 | 8 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 3 | 5 | 5 | 4 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1.6 | 5 |
| 14-Sep | 4 | 2 | 6 | 3 | 2 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 9 | 8 | 3 | 1 | 0 | 4 | 6 | 2.3 | 9 |
| 15-Sep | Z | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 5 |
| 16-Sep | 0 | Z | 1 | 1 | 1 | 1 | 2 | 4 | 5 | 7 | 9 | 4 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 5 | 9 | 2.7 | 9 |
| 17-Sep | 11 | 13 | Z | 3 | 0 | 0 | 0 | 1 | 2 | 6 | 8 | 9 | 7 | 4 | 4 | 2 | 1 | 0 | 1 | 1 | 0 | 2 | 4 | 3 | 3.6 | 13 |
| 18-Sep | 3 | 2 | 1 | Z | 5 | 7 | 4 | 4 | 5 | 5 | 5 | 4 | 6 | 1 | 6 | 2 | 0 | 2 | 2 | 1 | 1 | 5 | 1 | 2 | 3.2 | 7 |
| 19-Sep | 0 | 0 | 1 | 1 | Z | 2 | 2 | 1 | 1 | 6 | 7 | 5 | 1 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1.5 | 7 |
| 20-Sep | 4 | 6 | 4 | 1 | 2 | Z | 3 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 6 |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 6 | C | C | C | C | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 5 | 3 | 2 | 1 | 1.5 | 6 |
| 22-Sep | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.9 | 3 |
| 23-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 | 0.3 | 1 |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 4 | 5 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 7 | 5 | 9 | 5 | 1 | 2.1 | 9 |
| 25-Sep | 1 | 1 | 2 | 2 | Z | 2 | 2 | 3 | 3 | 1 | 1 | 3 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 4 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | C | C | C | C | C | C | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | -- | 1 |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 2 | 4 | 5 | 1 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 3 | 3 | 4 | 8 | 2.2 | 8 |
| 28-Sep | 5 | Z | 3 | 3 | 4 | 9 | 10 | 13 | 11 | 9 | 6 | 7 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 5 | 3 | 4.8 | 13 |
| 29-Sep | 1 | 4 | Z | 0 | 0 | 0 | 1 | 1 | 5 | 4 | 5 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1.8 | 5 |
| 30-Sep | 2 | 2 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |

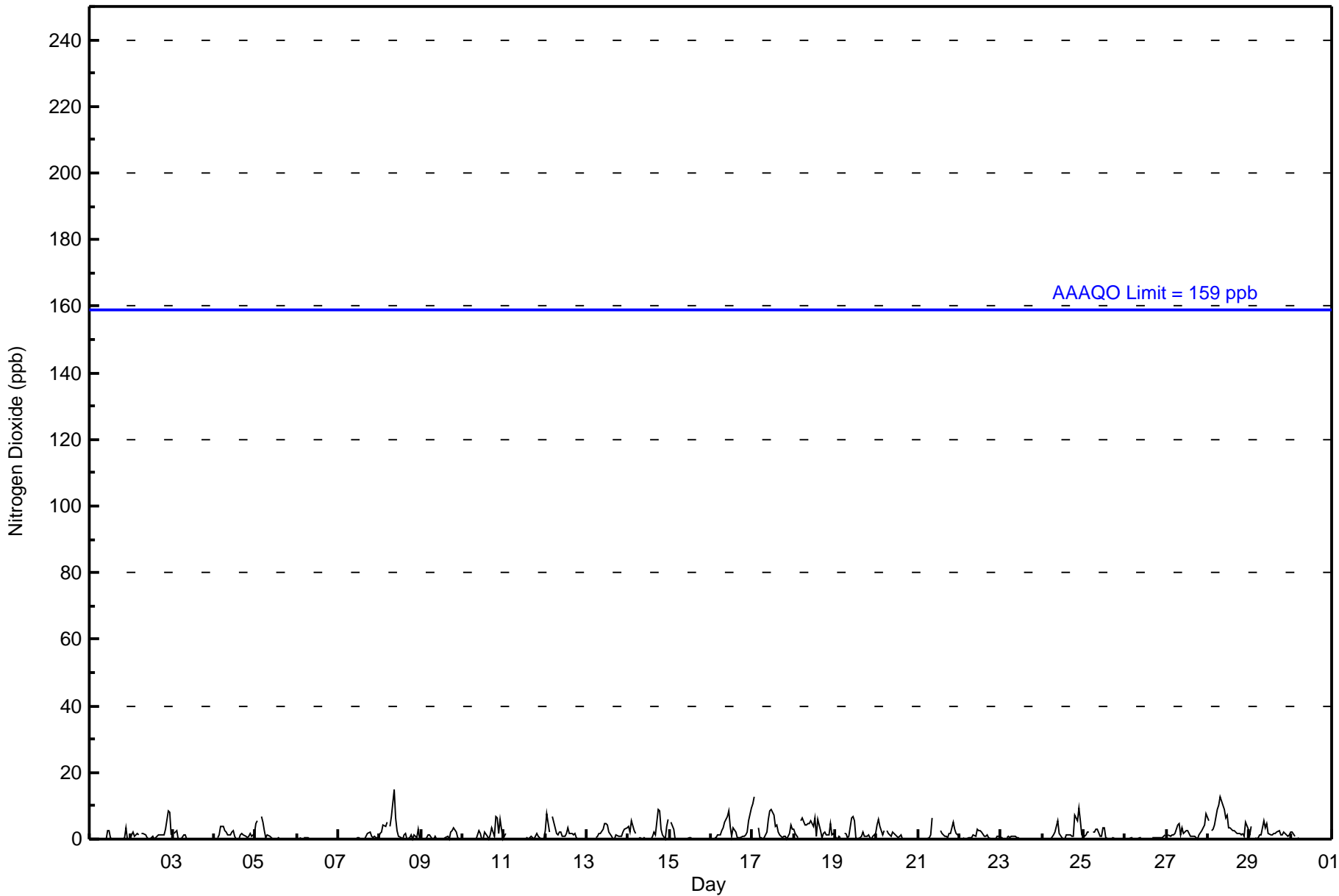
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.8 | 2.3 | 1.3 | 1.2 | 1.7 | 1.5 | 1.5 | 1.8 | 2.4 | 2.3 | 2.3 | 2.0 | 1.4 | 1.0 | 1.0 | 0.8 | 0.7 | 1.1 | 1.0 | 1.2 | 1.3 | 1.5 | 1.9 | 1.5 | Diurnal Average | |
| 11 | 13 | 6 | 7 | 7 | 9 | 10 | 13 | 15 | 9 | 9 | 9 | 7 | 4 | 6 | 3 | 2 | 9 | 8 | 7 | 6 | 9 | 8 | 9 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Wapasu - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 55 | 72 | 46 | 38 | 30 | 41 | 54 | 679 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 55 | 72 | 46 | 38 | 30 | 41 | 54 | 679 |

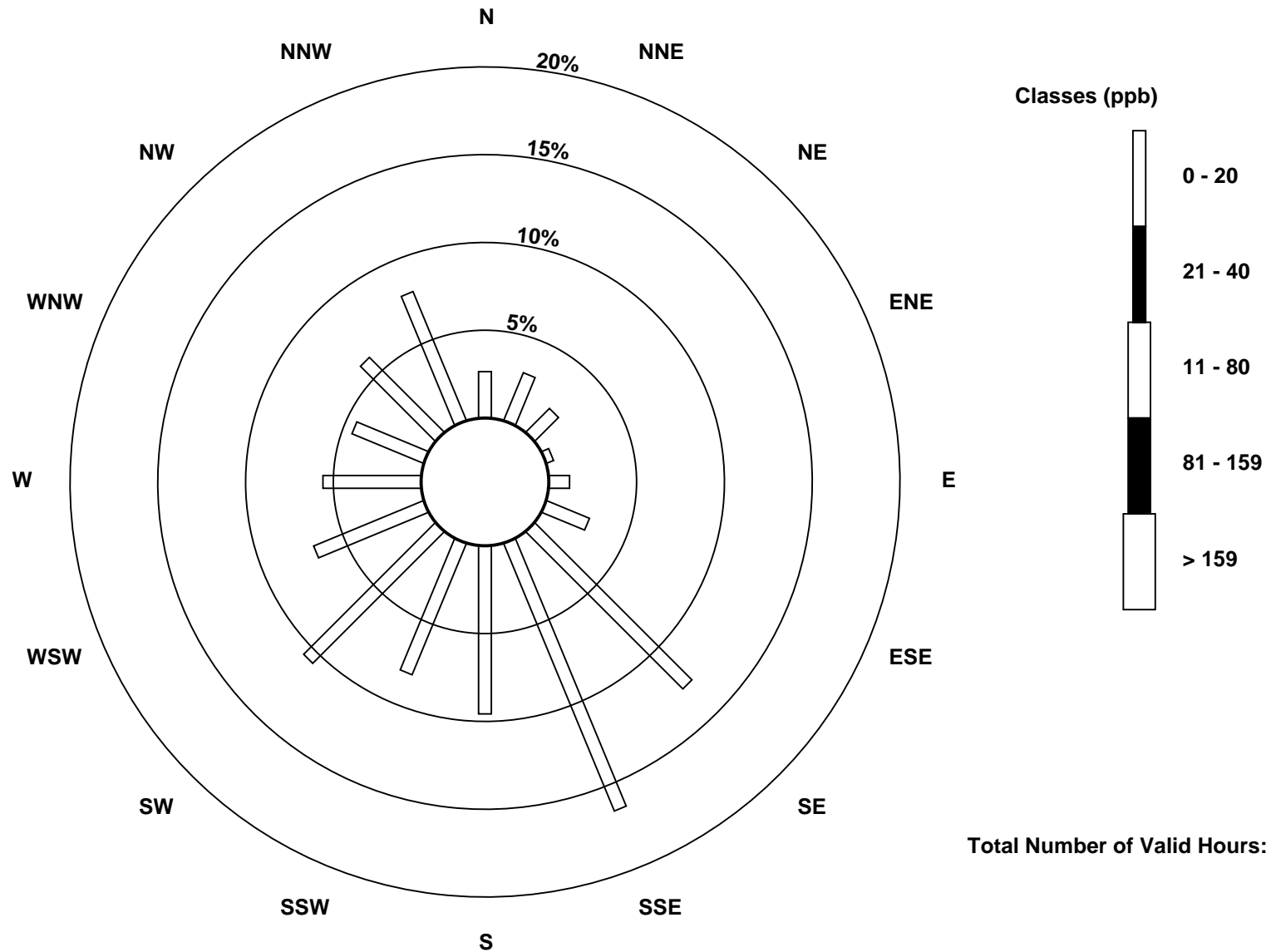
Total Number of Valid Hours: 679

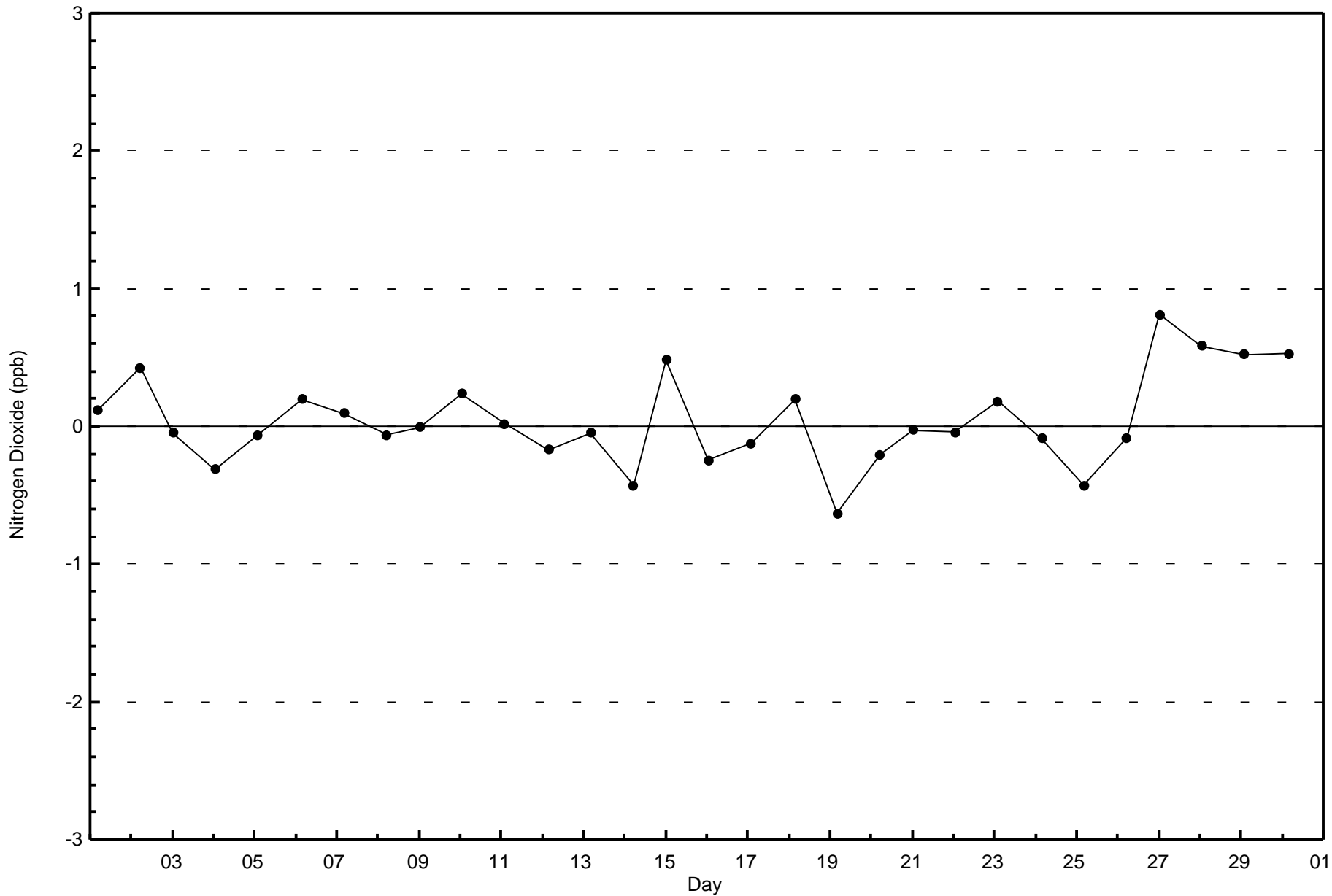
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Wapasu (AMS 17)

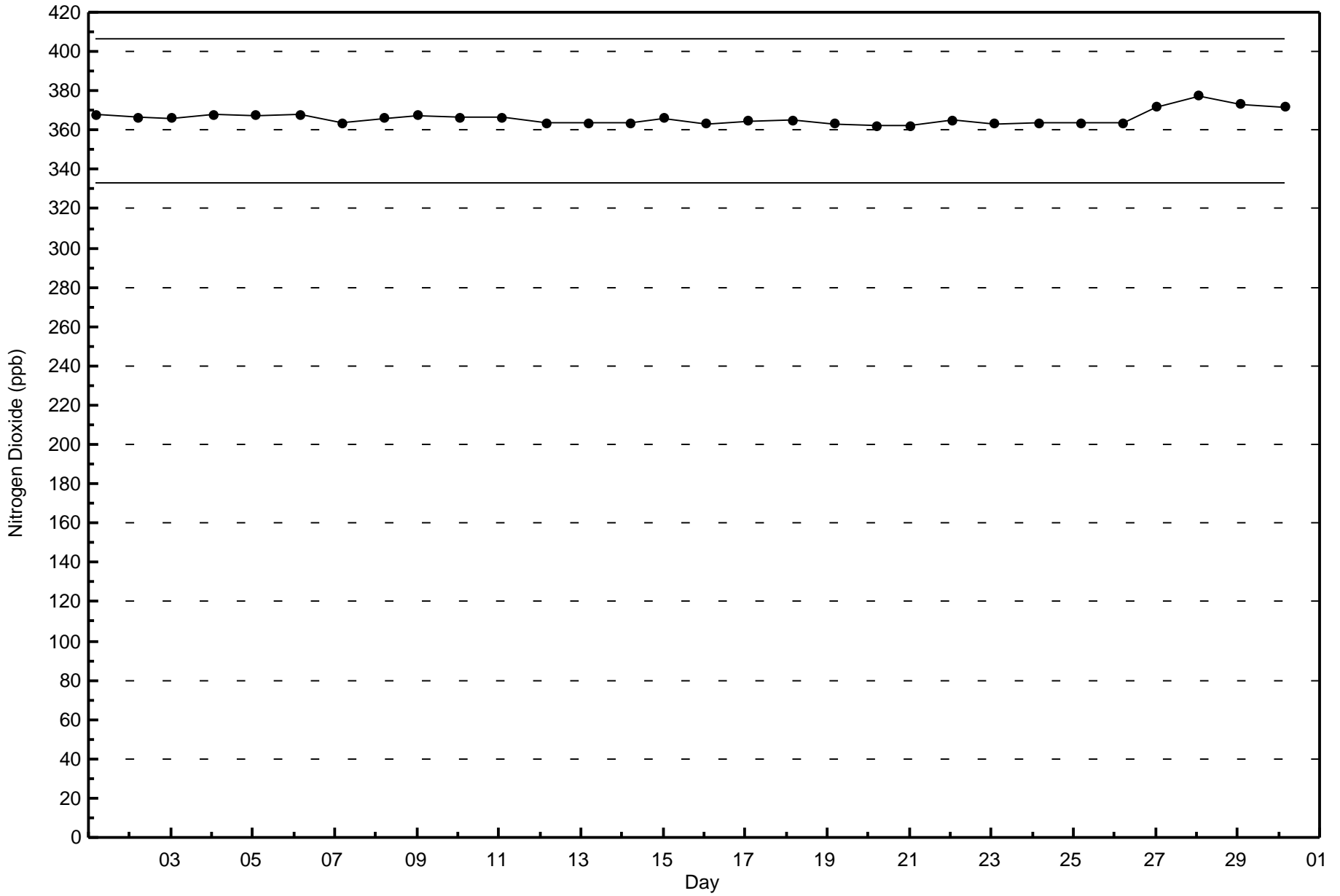






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Wapasu - September 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Wapasu - September 2016

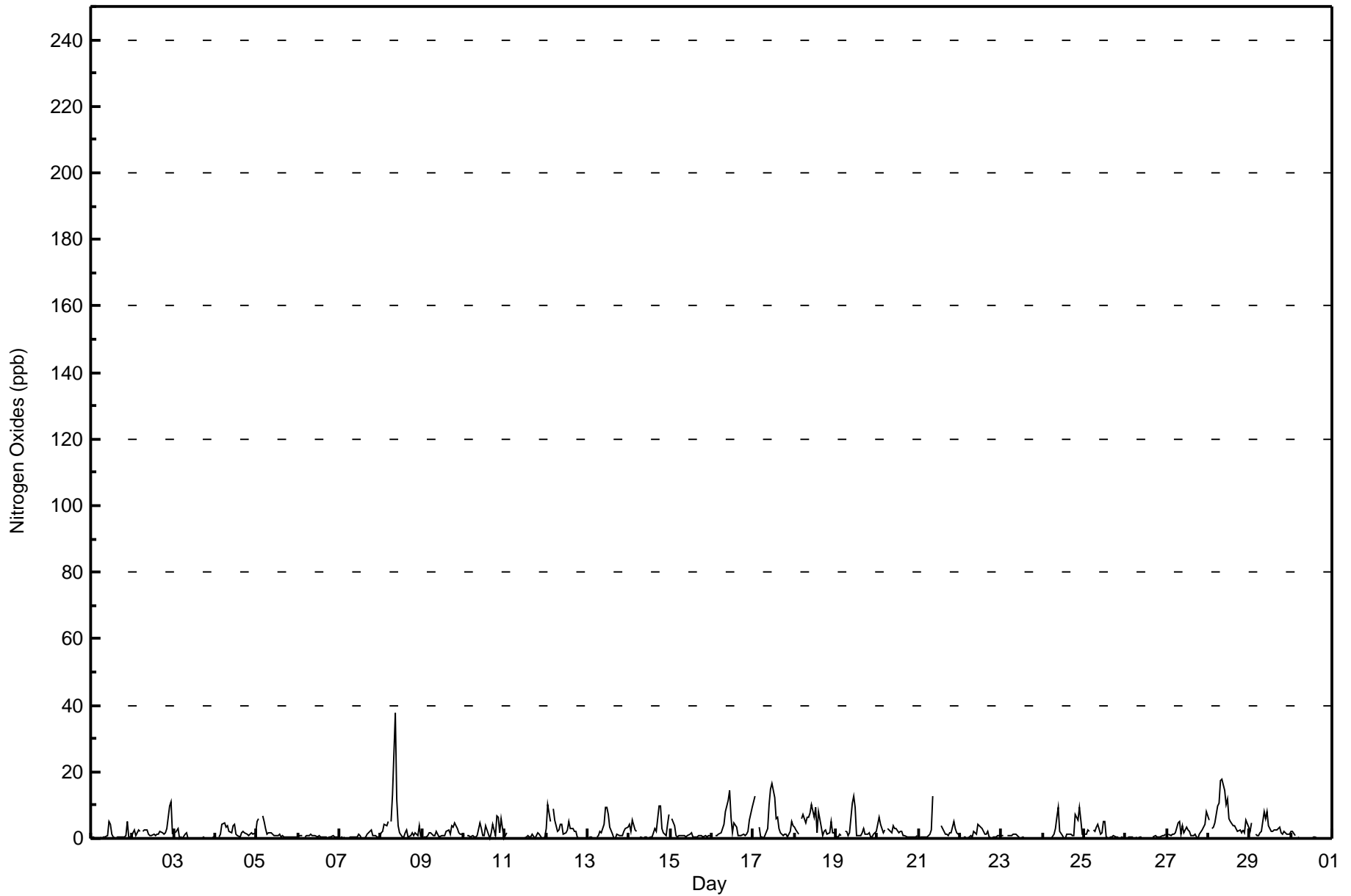
| Maximum Value: 38 ppb on Sep 8 09:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 6.5 ppb on Sep 28 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|--------------------------------------------|-------------------------------|----|---|---|---|----|----|----|----|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------|----|-----------------|----|----|----|----|----|---------------|---------------|--|--|--|--|--|--|--|---------------------------------|--|
| Minimum Value: 0 ppb on Sep 1 04:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.3 ppb on Sep 30 | | | | | | | | | | | | | | | | | Hours of Data: 680 | |
| Maximum Diurnal Average: 4.3 ppb at hour 9 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 1.2 ppb at hour 17 | | | | | | | | | | | | | | | | | Hours of Missing Data: 40 | |
| Monthly Average: 2.2 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 14 | | | | | | | | | | | | | | | | | Hours of Calibration: 40 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 1 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 1.0 | 5 | | | | | | | | | |
| 2-Sep | 2 | 3 | 1 | 3 | 2 | Z | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 10 | 11 | 1 | 2.5 | 11 | | | | | | | | | |
| 3-Sep | Z | 2 | 3 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 | | | | | | | | | |
| 4-Sep | 0 | Z | 0 | 1 | 4 | 5 | 3 | 4 | 2 | 2 | 4 | 4 | 1 | 1 | 0 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2.0 | 5 | | | | | | | | | |
| 5-Sep | 5 | 6 | Z | 7 | 5 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1.7 | 7 | | | | | | | | | |
| 6-Sep | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.6 | 1 | | | | | | | | | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 0.6 | 2 | | | | | | | | | |
| 8-Sep | 2 | 2 | 4 | 4 | 5 | Z | 5 | 13 | 38 | 12 | 4 | 2 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 4 | 1 | 4.6 | 38 | | | | | | | | | |
| 9-Sep | Z | 1 | 0 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 4 | 3 | 5 | 3 | 2 | 1 | 1 | 1.7 | 5 | | | | | | | | | |
| 10-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 3 | 1 | 1 | 4 | 1 | 0 | 2 | 4 | 1 | 7 | 6 | 2 | 6 | 0 | 2.1 | 7 | | | | | | | | | |
| 11-Sep | 1 | 2 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | |
| 12-Sep | 3 | 10 | 5 | Z | 9 | 6 | 2 | 3 | 4 | 4 | 1 | 2 | 2 | 5 | 3 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 2.9 | 10 | | | | | | | | | |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 4 | 9 | 9 | 7 | 3 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 2.3 | 9 | | | | | | | | | |
| 14-Sep | 4 | 2 | 6 | 3 | 2 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 10 | 10 | 3 | 2 | 1 | 4 | 7 | 2.7 | 10 | | | | | | | | | |
| 15-Sep | Z | 6 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 6 | | | | | | | | | |
| 16-Sep | 1 | Z | 1 | 1 | 1 | 2 | 3 | 4 | 8 | 12 | 14 | 6 | 2 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 9 | 3.7 | 14 | | | | | | | | | |
| 17-Sep | 11 | 13 | Z | 3 | 1 | 1 | 0 | 1 | 3 | 10 | 15 | 16 | 12 | 6 | 6 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 5 | 4 | 5.1 | 16 | | | | | | | | | |
| 18-Sep | 3 | 2 | 1 | Z | 6 | 7 | 5 | 6 | 6 | 8 | 10 | 6 | 9 | 2 | 8 | 3 | 1 | 2 | 2 | 1 | 2 | 5 | 2 | 2 | 4.4 | 10 | | | | | | | | | |
| 19-Sep | 1 | 1 | 1 | 1 | Z | 2 | 2 | 1 | 2 | 11 | 13 | 9 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 1 | 0 | 1 | 2 | 2.5 | 13 | | | | | | | | | |
| 20-Sep | 4 | 6 | 4 | 2 | 3 | Z | 3 | 2 | 2 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2.0 | 6 | | | | | | | | | |
| 21-Sep | Z | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 13 | C | C | C | C | 4 | 3 | 1 | 1 | 1 | 2 | 2 | 5 | 3 | 2 | 1 | 2.3 | 13 | | | | | | | | | |
| 22-Sep | 1 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 4 | 4 | 3 | 3 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1.3 | 4 | | | | | | | | | |
| 23-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 | 0.4 | 1 | | | | | | | | | |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 3 | 6 | 9 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 7 | 5 | 9 | 5 | 1 | 2.4 | 9 | | | | | | | | | |
| 25-Sep | 1 | 1 | 2 | 2 | Z | 2 | 2 | 3 | 4 | 1 | 2 | 5 | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 5 | | | | | | | | | |
| 26-Sep | 0 | 0 | 0 | 1 | 0 | Z | 0 | 0 | 1 | 0 | C | C | C | C | C | C | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | -- | 1 | | | | | | | | | |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 2 | 4 | 5 | 1 | 4 | 2 | 4 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 3 | 3 | 4 | 8 | 2.4 | 8 | | | | | | | | | |
| 28-Sep | 5 | Z | 3 | 3 | 5 | 10 | 11 | 17 | 18 | 14 | 10 | 12 | 6 | 5 | 4 | 4 | 3 | 2 | 3 | 2 | 2 | 2 | 6 | 3 | 6.5 | 18 | | | | | | | | | |
| 29-Sep | 2 | 5 | Z | 1 | 1 | 1 | 2 | 2 | 8 | 6 | 8 | 4 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 2.7 | 8 | | | | | | | | | |
| 30-Sep | 2 | 2 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | Diurnal Average | | Diurnal Maximum | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.0 | | 11 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.7 | | 13 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.6 | | 6 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.5 | | 7 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.0 | | 9 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.9 | | 10 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.9 | | 11 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.7 | | 17 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 4.3 | | 38 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 4.0 | | 14 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 4.1 | | 15 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 3.5 | | 16 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.4 | | 12 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.7 | | 6 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.7 | | 8 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.3 | | 4 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.2 | | 3 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.5 | | 10 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.4 | | 10 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.4 | | 7 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.5 | | 6 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.9 | | 10 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 2.2 | | 11 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 1.8 | | 9 | | | | | | | | | | | | | | | | |

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 679 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 55 | 71 | 46 | 38 | 30 | 41 | 54 | 678 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 18 | 20 | 13 | 3 | 8 | 18 | 86 | 112 | 65 | 55 | 72 | 46 | 38 | 30 | 41 | 54 | 679 |

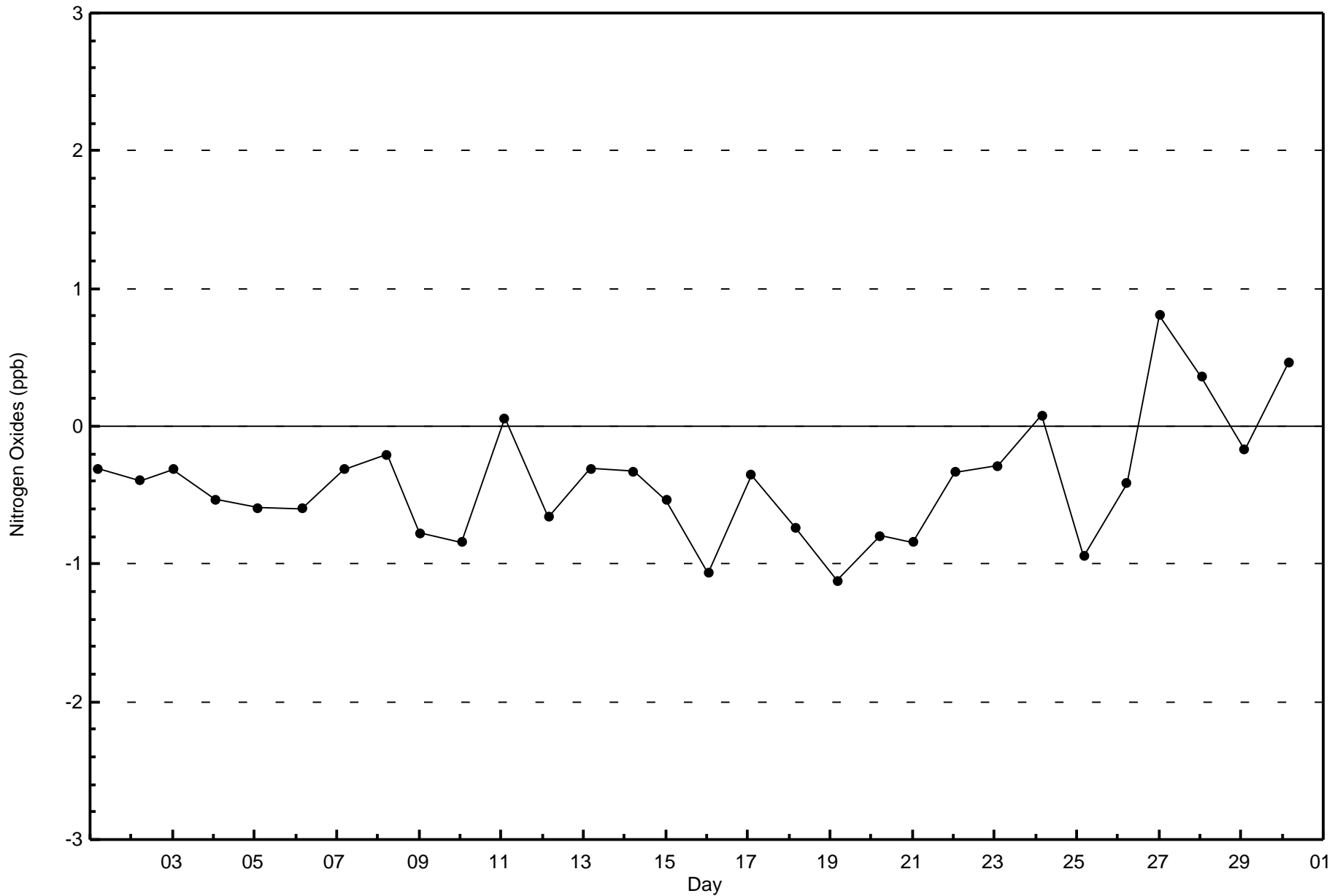
Total Number of Valid Hours: 679

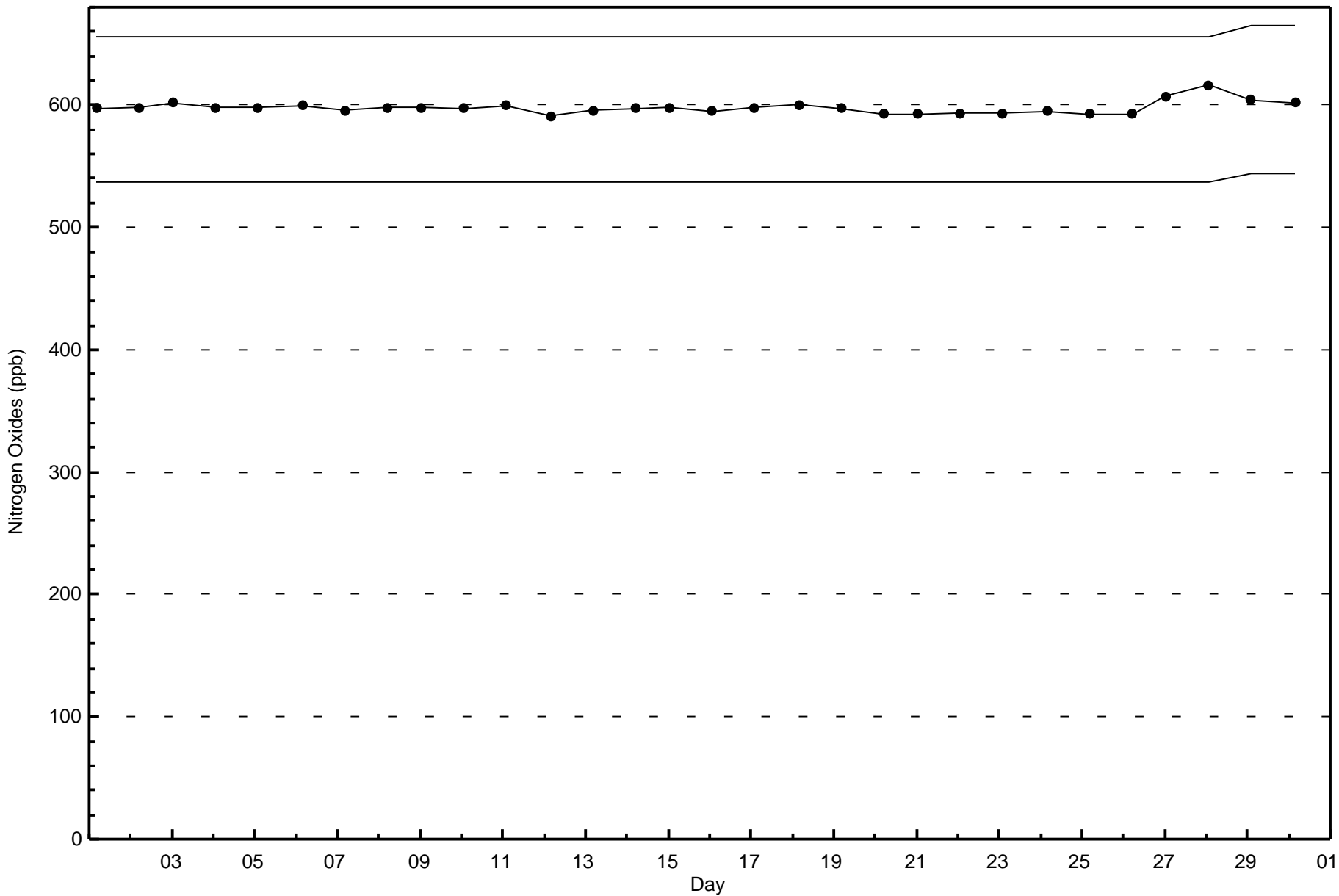
Total Number of Hours: 720



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Wapasu - September 2016







| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Number of Exceedences (AAAQO): 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 20.8 µg/m ³ on Sep 7 21:00 | Maximum Daily Average: 6.8 µg/m ³ on Sep 1 |
| Minimum Value: 0.0 µg/m ³ on Sep 3 17:00 | Hours of Data: 670 |
| Maximum Diurnal Average: 4.4 µg/m ³ at hour 21 | Hours of Missing Data: 50 |
| Monthly Average: 3.48 µg/m ³ | Hours of Calibration: 2 |
| Minimum Daily Average: 0.7 µg/m ³ on Sep 11 | Percent Operational Time: 93.3 |
| Minimum Diurnal Average: 2.8 µg/m ³ at hour 1 | |
| Percentiles: P ₁ = 0.0 P ₁₀ = 0.7 Q ₁ = 1.4 Median = 2.8 Q ₃ = 4.8 P ₉₀ = 7.1 P ₉₉ = 14.0 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|-----|-----|------|------|-----|-----|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|-----|-----|---------------|---------------|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 3.0 | 3.1 | 3.3 | 3.4 | 3.6 | 3.2 | 3.5 | 4.5 | 5.2 | 6.2 | 7.7 | 13.5 | 15.8 | 13.2 | 12.0 | 10.8 | 9.9 | 8.6 | 7.9 | 7.1 | 7.4 | 5.2 | 2.2 | 2.0 | 6.8 | 15.8 | |
| 2-Sep | 1.6 | 0.7 | 1.2 | 5.6 | 2.1 | 2.3 | 1.7 | 1.6 | 1.6 | 1.5 | 1.5 | 1.9 | 1.9 | 2.6 | 5.8 | 5.4 | 7.3 | 10.4 | 9.6 | 7.9 | 6.6 | 8.0 | 4.1 | 0.8 | 3.9 | 10.4 | |
| 3-Sep | 0.8 | 0.7 | 0.8 | 0.3 | 0.2 | 0.0 | 0.2 | 0.3 | UO | UO | UO | UO | UO | UO | UO | UO | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | -- | 0.8 | |
| 4-Sep | 0.0 | UO | UO | UO | UO | UO | UO | UO | UO | UO | 0.4 | 0.6 | 0.6 | 0.5 | 0.4 | 0.5 | 0.9 | 1.0 | 0.8 | 0.9 | 1.2 | 1.2 | 1.3 | 1.3 | -- | 1.3 | |
| 5-Sep | 1.8 | 2.3 | 3.3 | 2.6 | 5.6 | 2.7 | 1.5 | 3.5 | 1.0 | 0.5 | 1.2 | 1.0 | 0.7 | 1.0 | 1.1 | 1.2 | 1.2 | 1.0 | 0.9 | 1.0 | 1.7 | 2.9 | 3.0 | 3.6 | 1.9 | 5.6 | |
| 6-Sep | 4.1 | 3.8 | 4.5 | 4.8 | 4.9 | 4.8 | 4.4 | 3.3 | 2.0 | 1.6 | 1.7 | 1.6 | 1.9 | 1.9 | 2.0 | 2.6 | 2.8 | 3.2 | 3.2 | 3.0 | 2.9 | 2.1 | 1.5 | 1.3 | 2.9 | 4.9 | |
| 7-Sep | 1.8 | 2.1 | 2.2 | 1.4 | 1.8 | 0.8 | 0.6 | 1.2 | 2.4 | 2.7 | 2.3 | 2.6 | 2.8 | 2.8 | 2.8 | 3.4 | 4.0 | 4.9 | 5.9 | 8.0 | 20.8 | 11.5 | 5.1 | 4.4 | 4.1 | 20.8 | |
| 8-Sep | 4.3 | 4.3 | 4.5 | 13.2 | 11.5 | 7.5 | 5.8 | 10.2 | 18.1 | 6.6 | 2.7 | 1.6 | 1.4 | 1.6 | 2.4 | 1.5 | 0.6 | 1.2 | 1.4 | 0.9 | 0.8 | 0.6 | 0.6 | 0.2 | 4.3 | 18.1 | |
| 9-Sep | 0.3 | 0.4 | 0.4 | 0.3 | 0.2 | 0.2 | 0.2 | UO | 0.3 | 0.2 | 0.0 | 0.2 | 0.1 | 0.3 | 0.8 | 0.8 | 0.6 | 3.6 | 5.1 | 4.6 | 3.2 | 2.9 | 2.9 | 3.0 | 1.3 | 5.1 | |
| 10-Sep | 1.5 | 1.5 | 1.7 | 1.5 | 1.4 | 0.9 | 0.5 | 0.7 | 0.8 | 2.8 | 2.9 | 1.0 | 0.8 | 1.0 | 1.0 | 0.8 | 0.6 | 0.8 | 0.5 | 0.9 | 0.7 | 0.4 | 0.5 | 0.1 | 1.1 | 2.9 | |
| 11-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | UO | UO | UO | 0.3 | 1.0 | 1.2 | 1.2 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.5 | 1.3 | 0.6 | 0.4 | 0.3 | 0.2 | 0.7 | 1.5 | |
| 12-Sep | 0.5 | 0.9 | 0.8 | 1.2 | 1.3 | 1.7 | 1.1 | 0.7 | 1.1 | 1.5 | 1.4 | 1.5 | 4.6 | 3.1 | 2.0 | 2.1 | 2.9 | 2.9 | 2.3 | 1.9 | 1.5 | 1.5 | 1.7 | 1.8 | 1.8 | 4.6 | |
| 13-Sep | 1.8 | 1.7 | 1.1 | 1.2 | 1.3 | 1.4 | 1.6 | 1.9 | 2.5 | 4.9 | 4.5 | 4.8 | 5.0 | 5.2 | 7.3 | 4.4 | 3.4 | 6.1 | 7.0 | 7.9 | 5.4 | 4.6 | 4.4 | 4.4 | 3.9 | 7.9 | |
| 14-Sep | 3.7 | 3.2 | 3.4 | 3.1 | 1.8 | 0.9 | 0.6 | 0.7 | 1.9 | 2.8 | 2.5 | 2.8 | 3.7 | 3.0 | 5.4 | 6.9 | 9.0 | 17.1 | 10.7 | 7.3 | 6.7 | 6.3 | 7.4 | 6.1 | 4.9 | 17.1 | |
| 15-Sep | 5.6 | 5.3 | 3.5 | 2.0 | UO | UO | UO | UO | 1.0 | 1.3 | 1.8 | 2.1 | 2.4 | 1.7 | 1.7 | 2.0 | 2.4 | 2.7 | 3.0 | 2.8 | 2.6 | 2.9 | 3.1 | 3.5 | 2.7 | 5.6 | |
| 16-Sep | 4.0 | 4.2 | 5.3 | 6.1 | 5.7 | 6.2 | 8.6 | 8.8 | 8.9 | 9.7 | 12.5 | 7.5 | 2.8 | 3.5 | 4.9 | 4.5 | 3.8 | 2.8 | 3.9 | 4.9 | 7.8 | 7.0 | 6.7 | 8.6 | 6.2 | 12.5 | |
| 17-Sep | 6.4 | 9.5 | 4.0 | 2.4 | 1.8 | 1.7 | 1.6 | 1.7 | 2.6 | 5.5 | 6.2 | 11.1 | 3.5 | 2.8 | 4.0 | 3.8 | 3.5 | 2.1 | 2.0 | 2.0 | 2.1 | 2.7 | 4.0 | 3.2 | 3.8 | 11.1 | |
| 18-Sep | 3.0 | 3.0 | 3.0 | 4.9 | 5.1 | 4.6 | 4.3 | 3.0 | 2.5 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 5.1 | |
| 19-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 1.8 | 1.6 | 1.4 | 1.1 | 1.1 | 1.1 | 1.1 | 1.2 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.1 | 1.3 | -- | 1.8 |
| 20-Sep | 1.5 | 1.5 | 1.5 | 1.3 | 1.2 | 0.7 | 0.9 | 0.9 | 0.9 | 1.3 | 1.4 | 1.4 | 1.3 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.2 | 0.9 | 0.9 | 0.8 | 0.7 | 0.7 | 1.2 | 1.5 | |
| 21-Sep | 0.7 | 0.7 | 0.7 | 0.9 | 1.3 | 1.4 | 1.5 | 1.8 | 4.2 | 5.3 | 8.8 | 5.3 | 2.6 | C | 5.3 | 5.4 | 4.5 | 4.2 | 4.8 | 6.3 | 6.5 | 4.9 | 4.0 | 2.2 | 3.6 | 8.8 | |
| 22-Sep | 1.8 | 1.7 | 1.7 | 1.7 | 1.8 | 2.1 | 2.3 | 2.5 | 4.1 | 4.8 | 5.2 | 6.4 | 8.0 | 8.0 | 5.9 | 5.8 | 6.4 | 5.7 | 4.7 | 4.3 | 4.5 | 4.9 | 5.1 | 5.6 | 4.4 | 8.0 | |
| 23-Sep | 5.9 | 6.3 | 6.6 | 6.8 | 7.6 | 7.8 | 7.1 | 7.6 | 6.5 | 5.8 | 4.9 | 4.8 | 4.8 | 4.8 | 4.6 | 4.8 | 5.0 | 4.7 | 4.9 | 4.8 | 4.3 | 3.1 | 2.7 | 2.6 | 5.4 | 7.8 | |
| 24-Sep | 2.6 | 2.7 | 3.0 | 3.2 | 3.7 | 4.4 | 5.4 | 7.2 | 8.0 | 11.7 | 8.5 | 5.5 | 4.5 | 3.8 | 3.8 | 2.9 | 2.9 | 3.5 | 3.5 | 4.5 | 2.9 | 3.0 | 2.7 | 2.4 | 4.4 | 11.7 | |
| 25-Sep | 2.0 | 1.5 | 1.5 | 1.5 | 1.2 | 1.3 | 1.6 | 2.0 | 2.2 | 2.0 | 2.4 | 4.4 | 5.1 | 2.7 | 2.7 | 3.0 | 2.8 | 5.0 | 5.5 | 5.4 | 3.4 | 2.6 | 2.4 | 2.2 | 2.8 | 5.5 | |
| 26-Sep | 2.1 | 2.2 | 2.6 | 3.4 | 4.1 | 2.7 | 1.8 | 2.9 | 2.8 | 2.7 | 2.7 | 2.8 | C | 2.3 | 2.6 | 2.7 | 2.8 | 3.5 | 4.3 | 2.8 | 2.9 | 2.7 | 3.3 | 4.0 | 2.9 | 4.3 | |
| 27-Sep | 4.0 | 4.0 | 4.1 | 4.3 | 4.4 | 4.7 | 7.1 | 5.8 | 4.1 | 13.1 | 3.9 | 2.7 | 2.8 | 2.8 | 3.0 | 3.1 | 2.5 | 2.6 | 3.0 | 4.8 | 3.4 | 2.8 | 3.1 | 1.9 | 4.1 | 13.1 | |
| 28-Sep | 1.4 | 0.4 | 0.9 | 1.4 | 1.9 | 6.4 | 9.0 | 7.7 | 11.9 | 15.7 | 8.2 | 5.9 | 4.4 | 5.1 | 3.9 | 3.0 | 2.8 | 2.9 | 4.9 | 6.2 | 5.8 | 4.6 | 4.8 | 6.0 | 5.2 | 15.7 | |
| 29-Sep | 7.1 | 8.5 | 8.1 | 6.8 | 6.3 | 6.1 | 5.3 | 4.8 | 4.5 | 4.8 | 5.3 | 3.9 | 5.6 | 4.7 | 4.1 | 4.6 | 5.0 | 5.8 | 7.0 | 14.2 | 15.4 | 9.0 | 6.9 | 6.8 | 6.7 | 15.4 | |
| 30-Sep | 7.3 | 7.8 | 6.7 | 6.1 | 6.2 | 6.6 | 6.4 | 6.5 | 5.0 | 4.2 | 3.8 | 2.8 | 2.6 | 2.9 | 3.0 | 2.5 | 2.1 | 2.1 | 3.0 | 3.8 | 3.9 | 3.1 | 2.6 | 2.1 | 4.3 | 7.8 | |

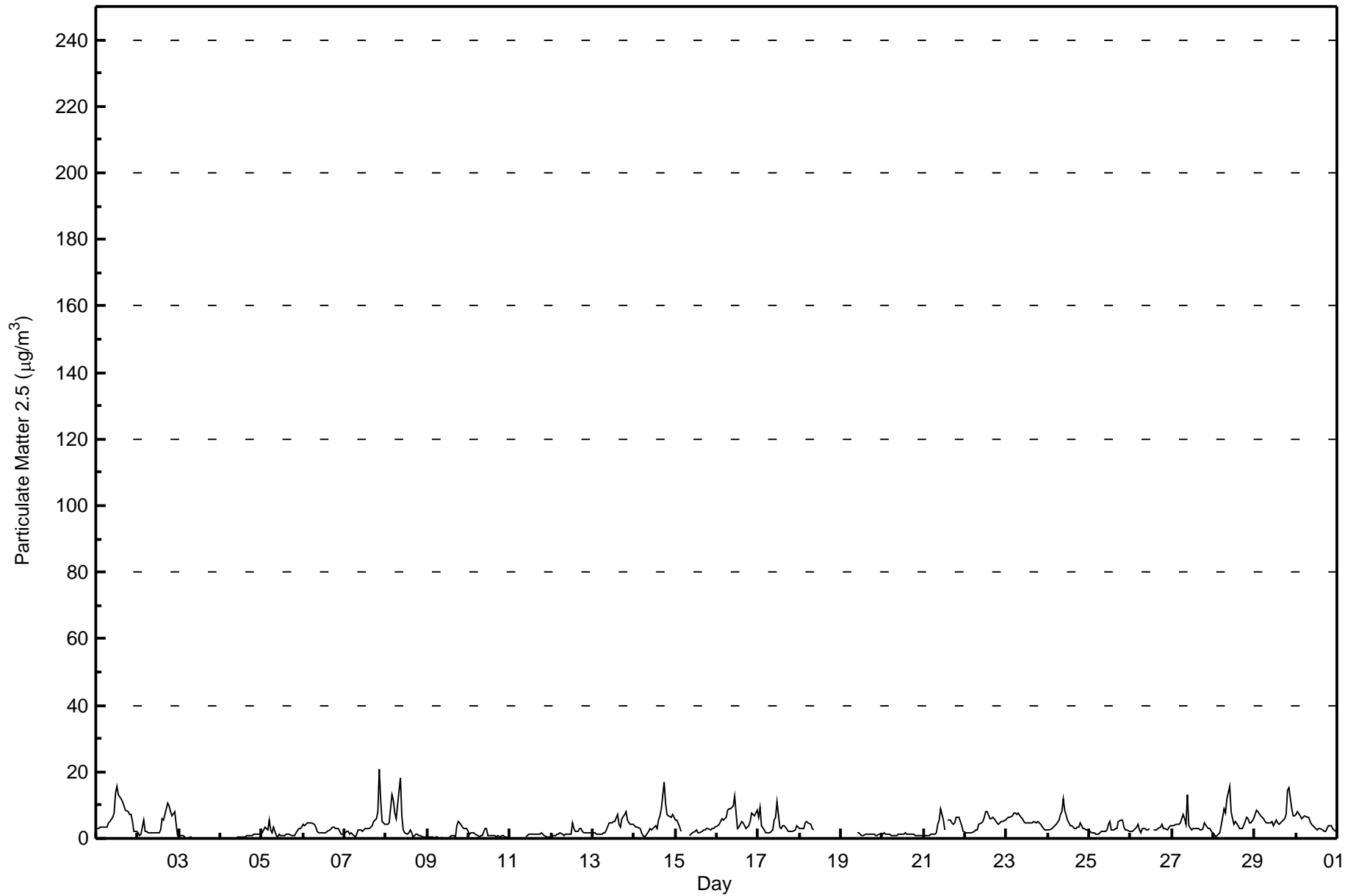
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|------|------|-----|-----|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|-----|-----|-----------------|--|
| 2.8 | 3.0 | 2.9 | 3.3 | 3.2 | 3.1 | 3.3 | 3.7 | 4.1 | 4.3 | 3.8 | 3.6 | 3.4 | 3.1 | 3.4 | 3.3 | 3.2 | 3.9 | 3.9 | 4.2 | 4.4 | 3.5 | 3.0 | 2.8 | Diurnal Average | |
| 7.3 | 9.5 | 8.1 | 13.2 | 11.5 | 7.8 | 9.0 | 10.2 | 18.1 | 15.7 | 12.5 | 13.5 | 15.8 | 13.2 | 12.0 | 10.8 | 9.9 | 17.1 | 10.7 | 14.2 | 20.8 | 11.5 | 7.4 | 8.6 | Diurnal Maximum | |

C - Calibration AF - Analyzer Failure 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 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - September 2016

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 433 | 64.63 | 64.63 |
| 6 - 15 | 120 | 17.91 | 82.54 |
| 16 - 25 | 5 | 0.75 | 83.28 |
| 26 - 80 | 0 | 0.00 | 83.28 |
| > 81.0 | 0 | 0.00 | 83.28 |

Total Number of Valid Hours: 670

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Wapasu - September 2016

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|----------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 7 | 16 | 6 | 2 | 1 | 6 | 71 | 85 | 57 | 38 | 49 | 30 | 16 | 15 | 9 | 24 | 432 |
| 6 - 15 | 2 | 1 | 5 | 2 | 5 | 9 | 10 | 31 | 11 | 13 | 16 | 7 | 1 | 1 | 2 | 4 | 120 |
| 16 - 25 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 5 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 9 | 17 | 11 | 4 | 7 | 15 | 81 | 117 | 68 | 51 | 67 | 37 | 17 | 16 | 11 | 29 | 557 |

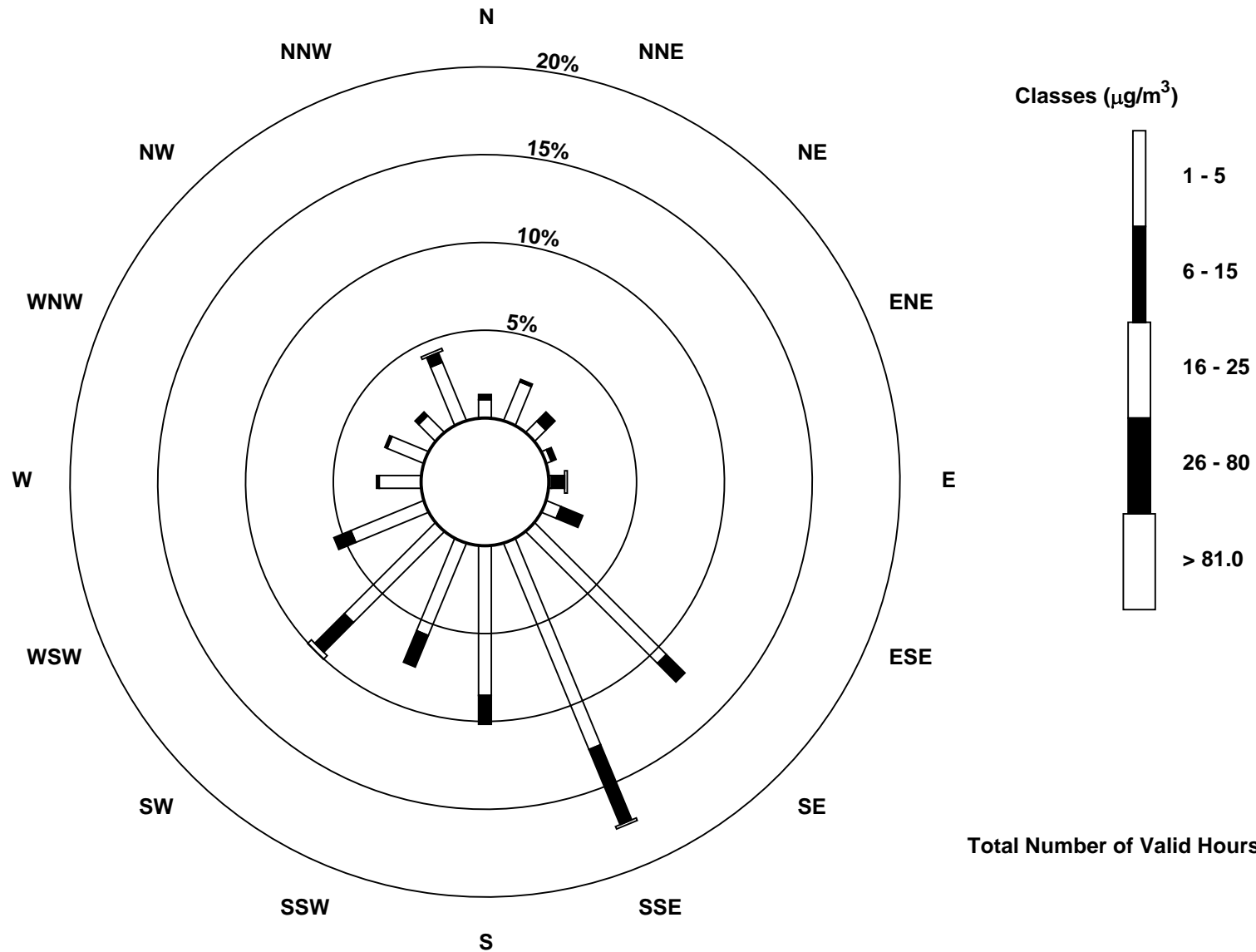
Total Number of Valid Hours: 669

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu (AMS 17)



Total Number of Valid Hours: 669



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

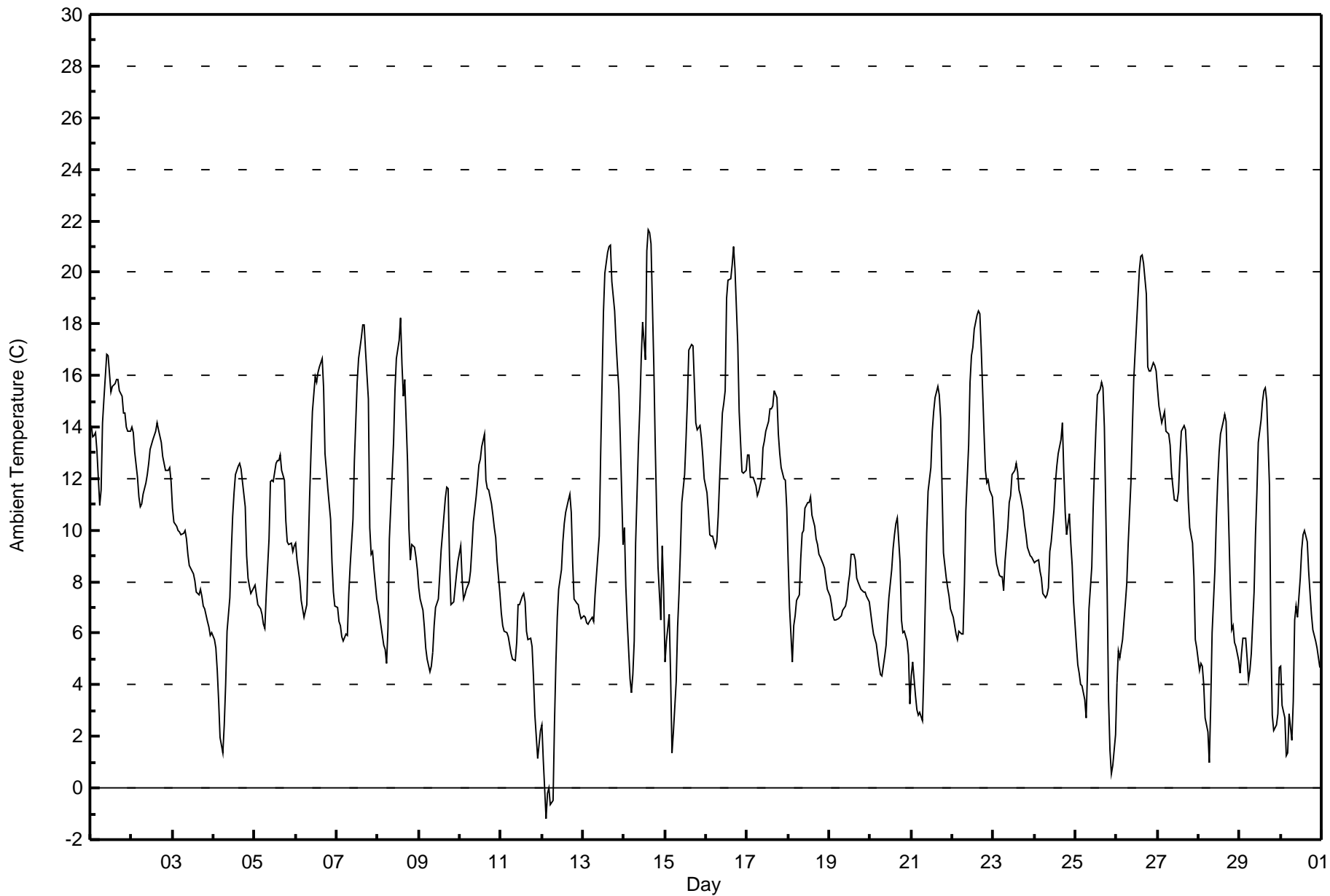
Wapasu - September 2016

| Maximum Value: 21.7 C on Sep 14 15:00 | | Maximum Daily Average: 14.6 C on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -1.2 C on Sep 12 03:00 | | Minimum Daily Average: 5.4 C on Sep 11 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 14.2 C at hour 16 | | Minimum Diurnal Average: 6.2 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 9.85 C | | Percentiles: P ₁ = 1.0 P ₁₀ = 4.7 Q ₁ = 6.6 Median = 9.4 Q ₃ = 12.9 P ₉₀ = 15.7 P ₉₉ = 20.7 | | 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 | 14.1 | 13.6 | 13.7 | 13.8 | 13.1 | 11.0 | 11.5 | 14.2 | 15.1 | 16.8 | 16.7 | 16.1 | 15.3 | 15.6 | 15.7 | 15.9 | 15.8 | 15.4 | 15.2 | 14.5 | 14.5 | 14.0 | 13.8 | 13.8 | 14.6 | 16.8 | |
| 2-Sep | 14.0 | 13.8 | 13.0 | 12.1 | 11.3 | 10.9 | 11.0 | 11.4 | 11.8 | 12.2 | 12.6 | 13.1 | 13.5 | 13.7 | 13.9 | 14.2 | 13.9 | 13.4 | 12.9 | 12.6 | 12.3 | 12.3 | 12.4 | 11.9 | 12.7 | 14.2 | |
| 3-Sep | 10.8 | 10.3 | 10.2 | 10.0 | 9.9 | 9.8 | 9.9 | 10.0 | 9.6 | 9.1 | 8.6 | 8.4 | 8.3 | 8.0 | 7.6 | 7.5 | 7.7 | 7.4 | 7.1 | 7.0 | 6.5 | 6.2 | 5.9 | 6.0 | 8.4 | 10.8 | |
| 4-Sep | 5.8 | 5.4 | 4.6 | 3.4 | 2.0 | 1.4 | 2.4 | 4.0 | 6.1 | 7.4 | 9.1 | 10.6 | 11.4 | 12.2 | 12.5 | 12.6 | 12.4 | 11.9 | 10.9 | 9.0 | 8.2 | 7.8 | 7.6 | 7.8 | 7.8 | 12.6 | |
| 5-Sep | 7.9 | 7.5 | 7.1 | 7.0 | 6.7 | 6.4 | 6.2 | 7.5 | 9.7 | 11.9 | 11.9 | 11.9 | 12.6 | 12.7 | 12.7 | 12.9 | 12.3 | 12.0 | 10.3 | 9.5 | 9.4 | 9.5 | 9.2 | 9.4 | 9.8 | 12.9 | |
| 6-Sep | 9.5 | 8.8 | 8.0 | 7.3 | 6.9 | 6.6 | 7.1 | 9.2 | 11.3 | 13.0 | 14.6 | 16.0 | 15.7 | 16.1 | 16.3 | 16.6 | 15.5 | 13.0 | 12.3 | 11.6 | 10.4 | 8.7 | 7.6 | 7.0 | 11.2 | 16.6 | |
| 7-Sep | 7.0 | 6.5 | 6.3 | 5.9 | 5.7 | 6.0 | 5.9 | 7.6 | 8.6 | 10.4 | 12.7 | 14.2 | 15.7 | 16.6 | 17.5 | 17.9 | 17.9 | 16.9 | 15.1 | 10.1 | 9.1 | 9.2 | 8.5 | 7.3 | 10.8 | 17.9 | |
| 8-Sep | 7.1 | 6.7 | 6.3 | 5.6 | 5.4 | 4.8 | 6.2 | 9.7 | 12.1 | 13.4 | 15.4 | 16.6 | 17.4 | 18.2 | 16.4 | 15.2 | 15.8 | 12.7 | 10.1 | 8.9 | 9.4 | 9.4 | 9.0 | 8.5 | 10.8 | 18.2 | |
| 9-Sep | 7.7 | 7.3 | 6.9 | 6.3 | 5.4 | 5.0 | 4.5 | 4.7 | 5.3 | 6.3 | 7.0 | 7.4 | 8.2 | 9.2 | 9.9 | 11.2 | 11.7 | 11.6 | 8.9 | 7.1 | 7.2 | 7.8 | 8.3 | 8.8 | 7.7 | 11.7 | |
| 10-Sep | 9.4 | 8.1 | 7.3 | 7.5 | 7.7 | 8.0 | 8.4 | 9.3 | 10.3 | 11.3 | 11.9 | 12.5 | 12.7 | 13.2 | 13.7 | 11.9 | 11.6 | 11.5 | 11.0 | 10.6 | 10.1 | 9.7 | 8.8 | 7.6 | 10.2 | 13.7 | |
| 11-Sep | 6.8 | 6.3 | 6.1 | 6.0 | 5.9 | 5.5 | 5.2 | 5.0 | 4.9 | 5.7 | 7.1 | 7.1 | 7.4 | 7.6 | 7.2 | 6.1 | 5.8 | 5.8 | 5.5 | 4.3 | 2.8 | 1.1 | 1.7 | 2.3 | 5.4 | 7.6 | |
| 12-Sep | 2.5 | 1.1 | -1.2 | -0.2 | 0.0 | -0.6 | -0.5 | 2.5 | 4.8 | 6.6 | 7.7 | 8.5 | 9.6 | 10.3 | 10.7 | 11.2 | 11.4 | 10.7 | 8.7 | 7.3 | 7.1 | 7.1 | 6.8 | 6.5 | 5.8 | 11.4 | |
| 13-Sep | 6.7 | 6.6 | 6.4 | 6.3 | 6.5 | 6.6 | 6.5 | 7.5 | 8.2 | 9.8 | 12.9 | 15.7 | 18.4 | 20.0 | 20.8 | 21.0 | 21.0 | 19.6 | 18.5 | 17.3 | 16.3 | 15.5 | 13.6 | 9.4 | 13.0 | 21.0 | |
| 14-Sep | 10.1 | 7.8 | 6.5 | 4.2 | 3.7 | 4.4 | 5.7 | 9.5 | 13.3 | 14.7 | 16.7 | 18.1 | 16.6 | 20.8 | 21.7 | 21.5 | 21.1 | 16.4 | 13.4 | 10.8 | 8.6 | 6.5 | 9.4 | 7.7 | 12.0 | 21.7 | |
| 15-Sep | 4.9 | 5.7 | 6.7 | 4.3 | 1.4 | 2.2 | 4.1 | 6.3 | 7.6 | 9.2 | 11.1 | 12.2 | 13.5 | 15.0 | 17.0 | 17.2 | 17.2 | 15.7 | 14.2 | 13.9 | 14.1 | 13.6 | 12.9 | 12.0 | 10.5 | 17.2 | |
| 16-Sep | 11.5 | 10.7 | 9.8 | 9.8 | 9.8 | 9.3 | 9.6 | 10.5 | 12.0 | 14.5 | 14.9 | 15.4 | 19.0 | 19.7 | 19.8 | 20.3 | 21.0 | 20.2 | 17.2 | 14.6 | 13.4 | 12.3 | 12.2 | 12.3 | 14.2 | 21.0 | |
| 17-Sep | 12.9 | 12.9 | 12.0 | 12.0 | 11.9 | 11.7 | 11.3 | 11.5 | 12.0 | 13.2 | 13.5 | 13.9 | 14.2 | 14.7 | 14.7 | 14.8 | 15.4 | 15.2 | 13.7 | 12.9 | 12.4 | 12.0 | 12.0 | 10.8 | 13.0 | 15.4 | |
| 18-Sep | 8.8 | 7.0 | 4.9 | 6.3 | 6.7 | 7.3 | 7.5 | 8.9 | 9.9 | 10.0 | 10.8 | 11.1 | 11.1 | 11.3 | 10.6 | 10.1 | 9.7 | 9.4 | 9.1 | 9.0 | 8.7 | 8.5 | 8.1 | 7.7 | 8.8 | 11.3 | |
| 19-Sep | 7.5 | 7.1 | 6.7 | 6.5 | 6.5 | 6.6 | 6.7 | 6.7 | 6.9 | 7.1 | 7.3 | 7.9 | 8.3 | 9.1 | 9.1 | 8.8 | 8.2 | 8.0 | 7.7 | 7.7 | 7.6 | 7.6 | 7.5 | 7.2 | 7.5 | 9.1 | |
| 20-Sep | 6.8 | 6.3 | 6.0 | 5.6 | 5.2 | 4.8 | 4.4 | 4.3 | 5.1 | 5.5 | 6.6 | 7.4 | 8.5 | 9.3 | 9.8 | 10.3 | 10.5 | 8.8 | 6.5 | 6.1 | 6.1 | 5.7 | 5.2 | 3.2 | 6.6 | 10.5 | |
| 21-Sep | 4.3 | 4.9 | 3.6 | 3.0 | 2.8 | 2.9 | 2.6 | 4.5 | 7.1 | 9.9 | 11.5 | 12.5 | 13.8 | 14.6 | 15.1 | 15.6 | 15.3 | 14.3 | 11.6 | 9.1 | 8.1 | 7.7 | 7.4 | 6.9 | 8.7 | 15.6 | |
| 22-Sep | 6.6 | 6.3 | 6.0 | 5.8 | 6.1 | 6.0 | 6.0 | 7.9 | 10.7 | 13.3 | 15.7 | 16.8 | 17.1 | 17.8 | 18.3 | 18.5 | 18.4 | 17.0 | 13.8 | 12.3 | 11.8 | 11.9 | 11.5 | 11.3 | 12.0 | 18.5 | |
| 23-Sep | 10.4 | 9.2 | 8.7 | 8.2 | 8.2 | 8.2 | 7.7 | 8.8 | 10.1 | 11.1 | 11.4 | 12.1 | 12.3 | 12.6 | 12.3 | 11.6 | 11.3 | 10.8 | 10.2 | 9.8 | 9.3 | 9.0 | 8.9 | 8.9 | 10.0 | 12.6 | |
| 24-Sep | 8.7 | 8.8 | 8.8 | 8.4 | 8.1 | 7.6 | 7.4 | 7.5 | 7.7 | 9.2 | 9.5 | 10.8 | 11.8 | 12.5 | 13.0 | 13.5 | 14.1 | 12.3 | 10.7 | 9.8 | 10.7 | 9.5 | 8.6 | 7.2 | 9.8 | 14.1 | |
| 25-Sep | 5.5 | 4.8 | 4.4 | 4.0 | 4.0 | 3.4 | 2.7 | 4.6 | 6.9 | 8.6 | 10.8 | 12.5 | 14.0 | 15.3 | 15.5 | 15.7 | 15.5 | 14.0 | 7.6 | 3.4 | 1.5 | 0.5 | 0.9 | 2.1 | 7.4 | 15.7 | |
| 26-Sep | 4.1 | 5.3 | 5.1 | 5.7 | 6.5 | 7.1 | 7.9 | 9.5 | 11.9 | 13.9 | 15.9 | 17.0 | 19.1 | 20.1 | 20.6 | 20.7 | 20.3 | 19.1 | 16.3 | 16.2 | 16.2 | 16.5 | 16.4 | 16.2 | 13.6 | 20.7 | |
| 27-Sep | 15.5 | 14.8 | 14.1 | 14.4 | 14.6 | 13.8 | 13.7 | 13.3 | 12.2 | 11.7 | 11.2 | 11.1 | 11.5 | 12.9 | 13.8 | 14.1 | 13.9 | 12.8 | 11.1 | 10.1 | 9.5 | 8.2 | 5.8 | 5.4 | 12.1 | 15.5 | |
| 28-Sep | 4.5 | 4.8 | 4.7 | 4.0 | 2.7 | 2.2 | 1.0 | 3.2 | 6.1 | 8.5 | 10.4 | 11.9 | 13.0 | 13.7 | 14.2 | 14.5 | 14.2 | 12.1 | 7.8 | 6.1 | 6.3 | 5.7 | 5.5 | 4.9 | 7.6 | 14.5 | |
| 29-Sep | 4.5 | 5.2 | 5.8 | 5.8 | 5.1 | 4.2 | 4.5 | 5.2 | 7.6 | 9.8 | 11.5 | 13.4 | 14.3 | 15.0 | 15.4 | 15.5 | 15.0 | 11.7 | 5.9 | 2.8 | 2.2 | 2.4 | 2.9 | 4.7 | 7.9 | 15.5 | |
| 30-Sep | 4.7 | 3.2 | 2.7 | 1.3 | 1.4 | 2.9 | 1.8 | 3.4 | 6.5 | 7.1 | 6.6 | 8.1 | 9.2 | 9.8 | 10.0 | 9.5 | 8.4 | 7.5 | 6.7 | 6.1 | 5.7 | 5.4 | 5.1 | 4.7 | 5.7 | 10.0 | |
| | | 8.0 | 7.6 | 7.0 | 6.7 | 6.4 | 6.2 | 6.3 | 7.6 | 9.1 | 10.4 | 11.5 | 12.3 | 13.1 | 13.9 | 14.2 | 14.2 | 14.1 | 12.9 | 11.0 | 9.7 | 9.2 | 8.7 | 8.4 | 8.0 | Diurnal Average | |
| | | 15.5 | 14.8 | 14.1 | 14.4 | 14.6 | 13.8 | 13.7 | 14.2 | 15.1 | 16.8 | 16.7 | 18.1 | 19.1 | 20.8 | 21.7 | 21.5 | 21.1 | 20.2 | 18.5 | 17.3 | 16.3 | 16.5 | 16.4 | 16.2 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Wapasu - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 4 | 0.56 | 0.56 |
| 0 - 10 | 392 | 54.44 | 55.00 |
| 10 - 20 | 310 | 43.06 | 98.06 |
| > 20 | 14 | 1.94 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

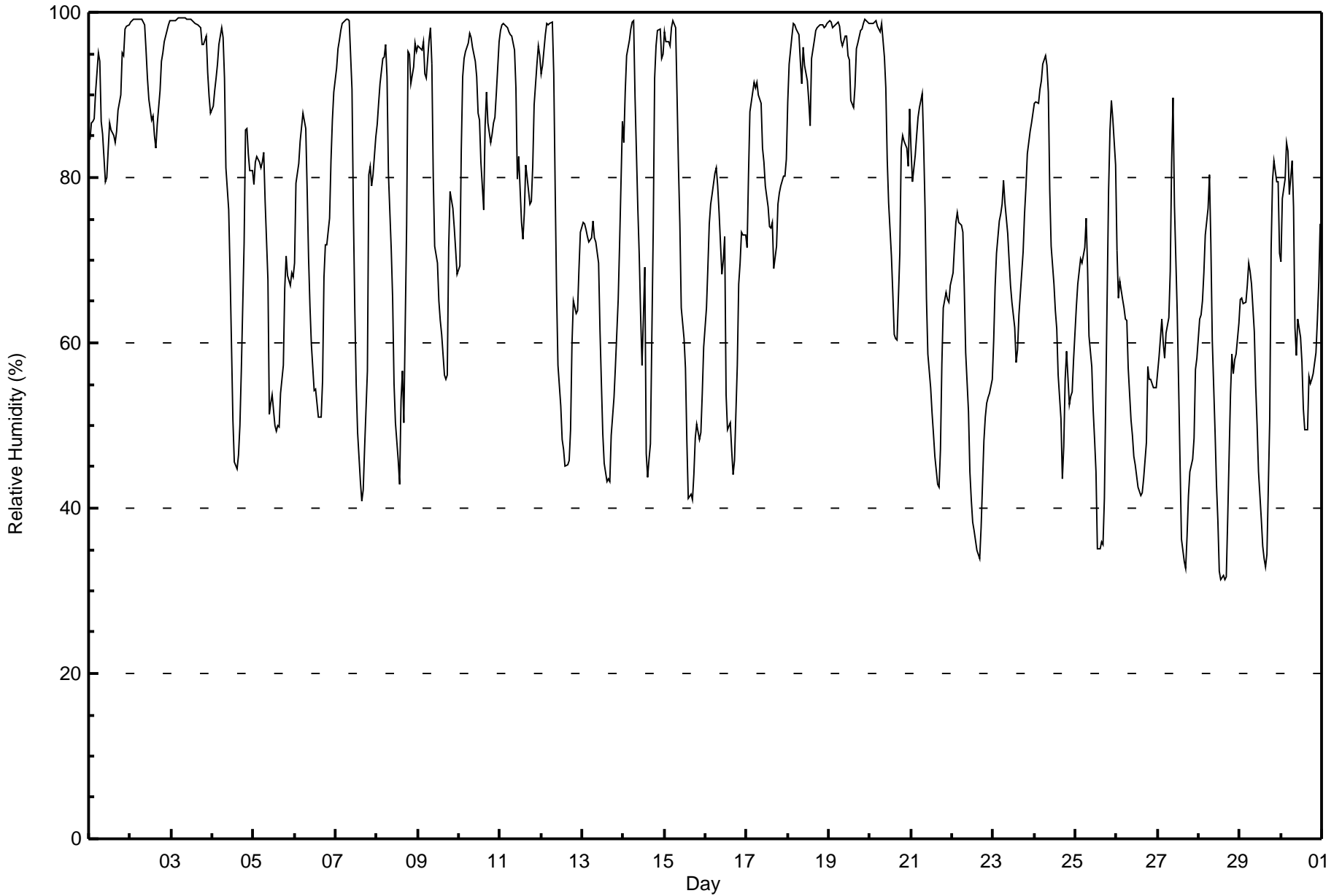
Relative Humidity (RH) - %
Wapasu - September 2016

| Maximum Value: 99 % on Sep 3 07:00 Maximum Daily Average: 97.6 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 31 % on Sep 28 14:00 Minimum Daily Average: 54.1 % on Sep 28 Maximum Diurnal Average: 88.3 % at hour 7 Minimum Diurnal Average: 56.3 % at hour 15 Monthly Average: 74.2 % Percentiles: P ₁ = 33 P ₁₀ = 47 Q ₁ = 58 Median = 76 Q ₃ = 92 P ₉₀ = 98 P ₉₉ = 99 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 85 | 87 | 87 | 87 | 90 | 95 | 94 | 87 | 85 | 80 | 80 | 83 | 87 | 86 | 85 | 84 | 86 | 88 | 90 | 95 | 95 | 98 | 98 | 98 | 88.7 | 98 |
| 2-Sep | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 95 | 92 | 89 | 87 | 87 | 85 | 84 | 86 | 91 | 94 | 95 | 97 | 98 | 98 | 99 | 94.6 | 99 |
| 3-Sep | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 98 | 98 | 96 | 96 | 97 | 93 | 90 | 88 | 97.6 | 99 | |
| 4-Sep | 89 | 91 | 92 | 94 | 96 | 98 | 97 | 92 | 81 | 76 | 68 | 60 | 51 | 46 | 45 | 46 | 50 | 57 | 72 | 86 | 86 | 83 | 81 | 81 | 75.7 | 98 |
| 5-Sep | 79 | 82 | 83 | 82 | 81 | 82 | 83 | 77 | 68 | 51 | 53 | 54 | 50 | 49 | 50 | 50 | 54 | 57 | 67 | 70 | 68 | 67 | 68 | 68 | 66.4 | 83 |
| 6-Sep | 70 | 79 | 82 | 84 | 86 | 88 | 86 | 78 | 70 | 64 | 60 | 54 | 54 | 53 | 51 | 51 | 55 | 68 | 72 | 72 | 75 | 82 | 87 | 90 | 71.4 | 90 |
| 7-Sep | 93 | 96 | 97 | 98 | 99 | 99 | 99 | 99 | 99 | 91 | 76 | 64 | 55 | 49 | 43 | 41 | 42 | 47 | 57 | 80 | 81 | 79 | 80 | 85 | 77.0 | 99 |
| 8-Sep | 86 | 89 | 91 | 94 | 95 | 96 | 92 | 80 | 71 | 65 | 55 | 50 | 46 | 43 | 53 | 57 | 50 | 74 | 95 | 95 | 91 | 93 | 96 | 95 | 77.3 | 96 |
| 9-Sep | 96 | 96 | 95 | 97 | 93 | 92 | 97 | 98 | 94 | 80 | 72 | 70 | 65 | 63 | 61 | 56 | 56 | 56 | 71 | 78 | 76 | 74 | 71 | 68 | 78.1 | 98 |
| 10-Sep | 69 | 83 | 92 | 94 | 95 | 96 | 97 | 97 | 96 | 94 | 92 | 88 | 87 | 82 | 76 | 86 | 90 | 87 | 84 | 85 | 87 | 87 | 90 | 96 | 88.9 | 97 |
| 11-Sep | 98 | 99 | 99 | 98 | 98 | 98 | 97 | 97 | 95 | 91 | 80 | 82 | 75 | 73 | 76 | 82 | 80 | 77 | 77 | 81 | 89 | 94 | 96 | 95 | 88.5 | 99 |
| 12-Sep | 93 | 94 | 97 | 99 | 99 | 99 | 99 | 92 | 79 | 66 | 57 | 52 | 48 | 47 | 45 | 45 | 46 | 49 | 60 | 65 | 64 | 64 | 69 | 73 | 70.9 | 99 |
| 13-Sep | 75 | 74 | 74 | 73 | 72 | 73 | 75 | 73 | 72 | 70 | 62 | 55 | 49 | 45 | 43 | 44 | 43 | 49 | 53 | 57 | 61 | 65 | 72 | 87 | 63.2 | 87 |
| 14-Sep | 84 | 90 | 95 | 97 | 98 | 99 | 99 | 90 | 76 | 71 | 63 | 57 | 69 | 47 | 44 | 46 | 48 | 74 | 92 | 96 | 98 | 98 | 94 | 95 | 80.0 | 99 |
| 15-Sep | 98 | 96 | 96 | 96 | 98 | 99 | 98 | 90 | 81 | 74 | 64 | 60 | 57 | 48 | 41 | 42 | 41 | 44 | 48 | 50 | 48 | 49 | 54 | 59 | 68.1 | 99 |
| 16-Sep | 64 | 69 | 74 | 77 | 78 | 81 | 81 | 79 | 76 | 68 | 70 | 73 | 54 | 50 | 50 | 47 | 44 | 46 | 57 | 67 | 70 | 73 | 73 | 73 | 66.4 | 81 |
| 17-Sep | 71 | 80 | 88 | 90 | 92 | 91 | 91 | 90 | 89 | 84 | 82 | 79 | 76 | 74 | 74 | 75 | 69 | 72 | 77 | 78 | 79 | 80 | 80 | 82 | 81.0 | 92 |
| 18-Sep | 89 | 94 | 97 | 99 | 98 | 98 | 97 | 94 | 91 | 96 | 93 | 92 | 89 | 86 | 94 | 97 | 98 | 98 | 98 | 99 | 99 | 98 | 98 | 99 | 95.5 | 99 |
| 19-Sep | 99 | 99 | 98 | 98 | 99 | 99 | 98 | 97 | 96 | 97 | 97 | 95 | 94 | 89 | 88 | 91 | 96 | 96 | 98 | 98 | 99 | 99 | 99 | 99 | 96.6 | 99 |
| 20-Sep | 99 | 99 | 99 | 99 | 98 | 98 | 98 | 99 | 95 | 91 | 82 | 77 | 70 | 66 | 61 | 61 | 60 | 71 | 83 | 85 | 84 | 84 | 81 | 88 | 84.5 | 99 |
| 21-Sep | 83 | 79 | 83 | 85 | 87 | 88 | 90 | 84 | 76 | 65 | 59 | 55 | 52 | 49 | 46 | 43 | 43 | 47 | 57 | 64 | 66 | 65 | 65 | 67 | 66.7 | 90 |
| 22-Sep | 69 | 72 | 75 | 76 | 75 | 74 | 73 | 67 | 59 | 52 | 44 | 41 | 38 | 37 | 35 | 34 | 34 | 38 | 48 | 51 | 53 | 53 | 54 | 56 | 54.4 | 76 |
| 23-Sep | 60 | 67 | 71 | 75 | 76 | 77 | 80 | 77 | 73 | 70 | 67 | 65 | 62 | 58 | 59 | 63 | 66 | 71 | 76 | 79 | 83 | 86 | 87 | 88 | 72.2 | 88 |
| 24-Sep | 89 | 89 | 89 | 91 | 92 | 94 | 95 | 94 | 90 | 79 | 72 | 67 | 64 | 62 | 56 | 51 | 44 | 47 | 56 | 59 | 52 | 54 | 54 | 58 | 70.7 | 95 |
| 25-Sep | 64 | 67 | 69 | 70 | 70 | 71 | 75 | 69 | 61 | 57 | 52 | 48 | 44 | 35 | 35 | 36 | 36 | 41 | 66 | 78 | 86 | 89 | 87 | 82 | 62.0 | 89 |
| 26-Sep | 71 | 65 | 67 | 65 | 64 | 63 | 63 | 57 | 51 | 49 | 46 | 45 | 42 | 42 | 41 | 42 | 44 | 48 | 57 | 56 | 56 | 55 | 55 | 55 | 54.1 | 71 |
| 27-Sep | 57 | 58 | 63 | 60 | 58 | 61 | 63 | 69 | 82 | 90 | 77 | 64 | 55 | 45 | 36 | 33 | 33 | 37 | 42 | 44 | 46 | 48 | 57 | 58 | 55.6 | 90 |
| 28-Sep | 63 | 63 | 65 | 68 | 73 | 76 | 80 | 72 | 60 | 49 | 43 | 38 | 32 | 31 | 32 | 31 | 32 | 39 | 54 | 59 | 56 | 58 | 59 | 62 | 54.1 | 80 |
| 29-Sep | 65 | 65 | 65 | 65 | 67 | 70 | 69 | 67 | 61 | 55 | 50 | 44 | 39 | 35 | 34 | 33 | 34 | 51 | 71 | 80 | 82 | 79 | 79 | 71 | 59.7 | 82 |
| 30-Sep | 70 | 77 | 80 | 84 | 83 | 78 | 82 | 76 | 62 | 58 | 63 | 61 | 58 | 52 | 49 | 50 | 56 | 55 | 56 | 56 | 59 | 63 | 67 | 74 | 65.4 | 84 |
| | 80.8 | 83.3 | 85.3 | 86.4 | 86.9 | 87.7 | 88.3 | 84.6 | 79.6 | 74.2 | 69.0 | 65.4 | 61.6 | 57.6 | 56.3 | 56.6 | 57.1 | 62.4 | 70.8 | 75.2 | 76.1 | 77.0 | 78.1 | 79.7 | Diurnal Average | |
| | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Wapasu - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Wapasu - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 26 | 3.61 | 3.61 |
| 40 - 60 | 168 | 23.33 | 26.94 |
| 60 - 80 | 206 | 28.61 | 55.56 |
| 80 - 100 | 320 | 44.44 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

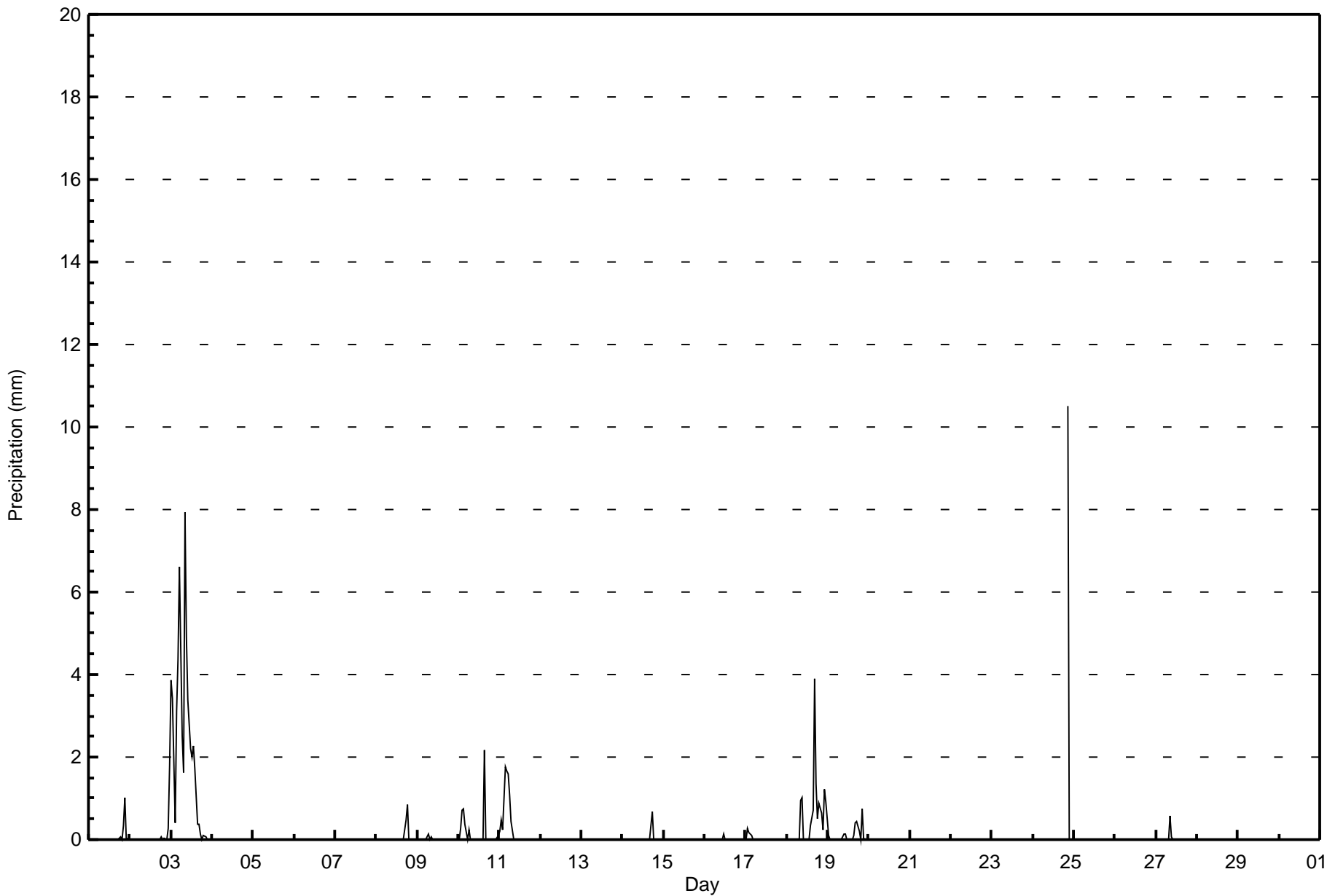
Wapasu - September 2016

| Maximum Value: 10.5 mm on Sep 24 21:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Total: 51.4 mm on Sep 3 | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|-------------------------|--------------------------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----------------|--|
| Minimum Value: 0.0 mm on Sep 1 01:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Total: 0.0 mm on Sep 4 | | | | | Hours of Data: 710 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Total: 12.4 mm at hour 21 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Total: 1.0 mm at hour 20 | | | | | Hours of Missing Data: 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Total: 96.16 mm | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 3.8 | | | | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 1.0 | 0.1 | 0.0 | 1.5 | 1.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.1 | 0.0 | 0.1 | 0.0 | 0.3 | 1.8 | 2.2 | 1.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 3.9 | 3.4 | 0.4 | 3.1 | 4.4 | 6.6 | 2.5 | 1.6 | 7.9 | 4.9 | 3.4 | 2.2 | 2.0 | 2.3 | 1.7 | 0.4 | 0.4 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 51.4 | 7.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | M | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | M | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0.0 | 0.3 | 0.7 | 0.8 | 0.4 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 4.6 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0.2 | 0.5 | 0.2 | 1.8 | 1.7 | 1.6 | 1.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.5 | 1.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 0.0 | 0.3 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 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 | 0.3 | 0.7 | 3.9 | 1.4 | 0.5 | 0.9 | 0.7 | 0.2 | 1.2 | 0.9 | 12.7 | 3.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0.1 | 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 | 0.1 | 0.4 | 0.4 | 0.2 | 0.0 | 0.8 | 0.1 | 0.0 | 0.0 | 2.3 | 0.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | M | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | M | 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | UO | 10.5 | 0.0 | 0.0 | 10.5 | 10.5 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | UO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | UO | 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 | 0.6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 0.0 | 0.0 | UO | 0.0 | 0.0 | 0.0 | 0.0 | UO | 0.0 | 0.0 | 0.0 | 0.0 | UO | 0.0 | 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4.2 | 4.5 | 1.5 | 5.7 | 6.4 | 8.2 | 4.0 | 2.1 | 9.6 | 6.1 | 3.5 | 2.4 | 2.0 | 2.3 | 2.1 | 3.3 | 4.7 | 3.1 | 1.7 | 1.0 | 12.4 | 1.3 | 1.5 | 2.8 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 3.9 | 3.4 | 0.7 | 3.1 | 4.4 | 6.6 | 2.5 | 1.6 | 7.9 | 4.9 | 3.4 | 2.2 | 2.0 | 2.3 | 1.7 | 2.2 | 3.9 | 1.4 | 0.8 | 0.9 | 10.5 | 1.0 | 1.2 | 1.8 | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | UO - Unstable Operation | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Wapasu - September 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

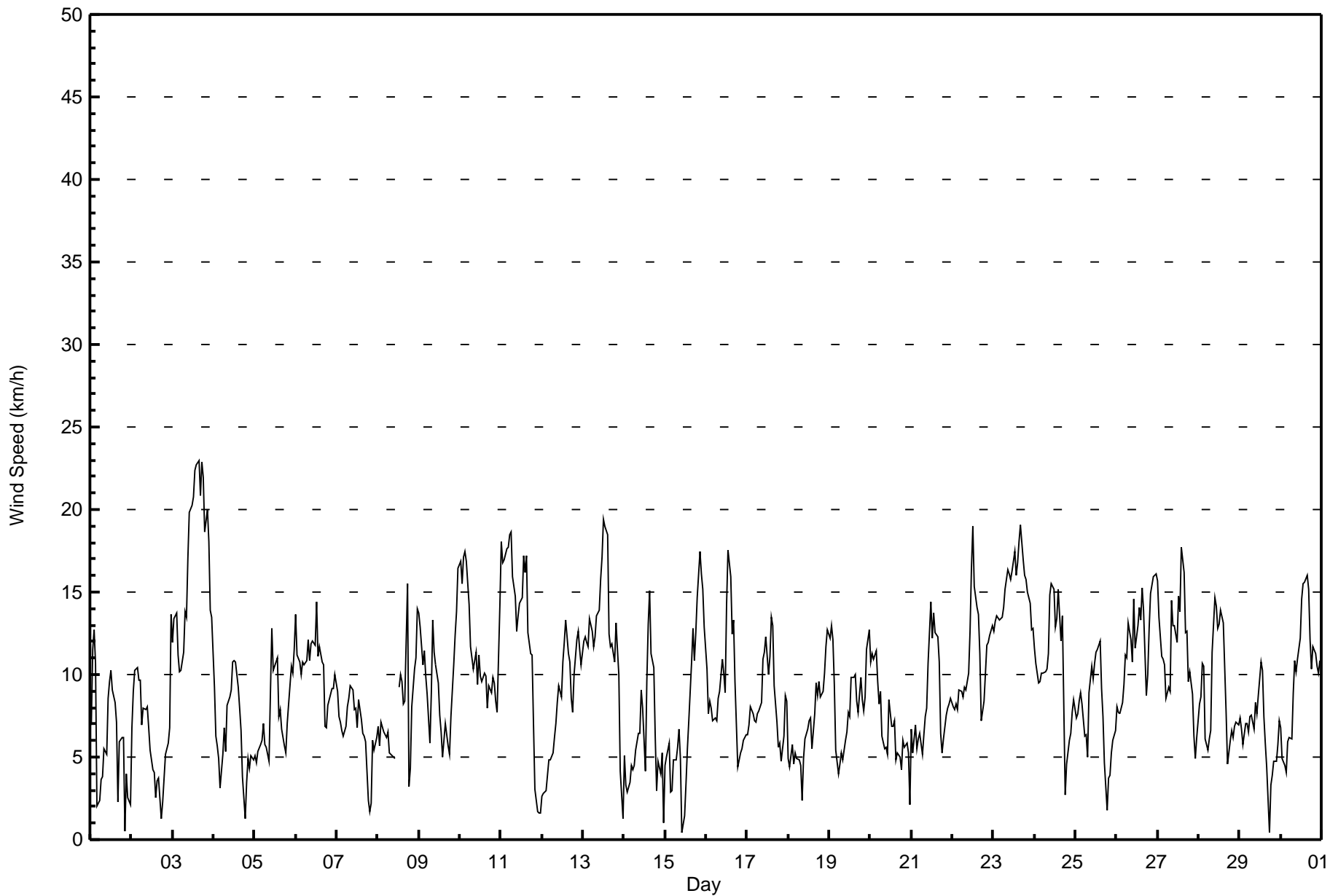
Wind Speed (WS) - km/h
Wapasu - September 2016

| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 23 km/h on Sep 3 16:00 | Maximum Daily Speed Average: 16.4 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 29 18:00 | Minimum Daily Speed Average: 2.5 km/h on Sep 8 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 6.1 km/h at hour 14 | Minimum Diurnal Speed Average: 1.3 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 3.2 km/h 206.3 deg | Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 6 Median = 9 Q ₃ = 12 P ₉₀ = 15 P ₉₉ = 21 | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | SE7 | SE12 | SE13 | SE11 | SE2 | NNE2 | NE4 | ENE4 | ESE6 | E5 | E9 | ESE10 | E10 | ENE9 | E8 | ESE7 | NNW2 | NE6 | E6 | E6 | SSE1 | NE4 | ESE3 | SSW2 | ESE5.2 | SE13 |
| 2-Sep | SW7 | SW9 | SW10 | SW10 | SW10 | SW10 | SW7 | SW8 | SW8 | SW8 | WSW7 | SW5 | SSW4 | S4 | SW3 | W4 | NW4 | W1 | NNE2 | N4 | NNW5 | NW6 | NNW7 | NNW14 | WSW4.2 | NNW14 |
| 3-Sep | NNW12 | NNW13 | NNW14 | NW11 | NNW10 | NNW10 | W11 | NNW14 | NNW13 | NW17 | NW20 | NW20 | NW21 | NW22 | NW23 | NW23 | NW21 | NW23 | NW22 | NW19 | NW20 | NW18 | NW14 | NW13 | NW16.4 | NW23 |
| 4-Sep | NW9 | NW6 | WNW6 | WNW5 | SW3 | S5 | SSW7 | S5 | SW8 | SW9 | WSW9 | W11 | W11 | W11 | WNW9 | W8 | W7 | W4 | SW1 | SE3 | SE5 | SE4 | SE5 | SSE5 | WSW4.2 | W11 |
| 5-Sep | S5 | SSE5 | S5 | S6 | SSE6 | SSE7 | SE6 | SSE6 | S5 | SW9 | SW13 | SSW10 | SSW11 | SSW11 | S7 | SSW8 | S7 | SSE6 | SE5 | SE7 | SE8 | SE10 | SE10 | SSE12 | S6.7 | SW13 |
| 6-Sep | SE14 | SE11 | SE11 | SE10 | SE11 | SSE11 | SSE11 | SSE12 | S11 | SSE12 | SSE12 | SSE12 | SSE14 | SSE11 | SSE12 | SSE11 | S11 | S7 | S7 | SE8 | SSE9 | SE9 | SE9 | SE10 | SSE10.3 | SSE14 |
| 7-Sep | SE9 | SE7 | SE7 | SE7 | SE6 | SE7 | SE8 | SE9 | SE9 | SSE9 | S8 | SSW8 | SSW7 | SW9 | SW7 | SSW6 | SSW6 | SW6 | S2 | ESE2 | SSE2 | SE6 | SSE5 | SE6 | SSE5.6 | SE9 |
| 8-Sep | SE7 | SSE6 | SE7 | SE7 | SE6 | SE6 | SE6 | S5 | SW5 | WNW5 | NNW5 | M | WNW9 | WNW10 | NNW10 | WSW8 | W8 | NW16 | ESE3 | N4 | NNW8 | NNW10 | NNW11 | NNW14 | WNW2.5 | NW16 |
| 9-Sep | NNW14 | NW13 | NW11 | NNW11 | NNW10 | NNW9 | N6 | NNW9 | NNW13 | NW11 | NNW11 | NW9 | WNW8 | WNW7 | WSW5 | W7 | SW6 | SSW6 | SE5 | SE7 | SE11 | SE12 | SE14 | SE16 | NW3.0 | SE16 |
| 10-Sep | SE17 | SE16 | SE17 | SE17 | SE17 | SE14 | SSE12 | SSE11 | S10 | SW11 | WSW9 | WSW11 | WSW10 | W10 | NNW10 | NW10 | W8 | WSW9 | W9 | WSW10 | W10 | W8 | W8 | NW14 | SSW5.4 | SE17 |
| 11-Sep | NNW18 | NNW17 | NNW17 | NNW18 | N18 | N18 | N19 | N16 | N15 | N13 | N14 | NNW14 | NNW15 | NNW17 | NNW16 | NNW17 | NNW13 | NNW11 | NNW11 | NW7 | WNW3 | WSW2 | SSW2 | SW2 | NNW12.3 | N19 |
| 12-Sep | WSW3 | SSW3 | SE3 | SE4 | SE5 | SSE5 | SE5 | SSW6 | SSW7 | SSW8 | SW9 | WSW9 | SSW11 | SSW12 | SSW13 | SSW11 | SSW11 | S9 | SSE8 | SSE10 | SSE12 | SSE13 | SSE12 | S11 | S7.1 | SSW13 |
| 13-Sep | S12 | S12 | S12 | S12 | S13 | S13 | S12 | S12 | S14 | S14 | SSW16 | SW17 | SW19 | SW19 | SW19 | WSW12 | SW12 | SW12 | SW11 | SW13 | SW11 | WSW10 | W4 | SSW1 | SSW11.5 | SW19 |
| 14-Sep | NW5 | N3 | NNE3 | SE3 | ESE5 | ESE4 | ESE4 | SE5 | SE6 | S6 | SSW9 | S8 | SSE4 | S10 | SSW13 | SSW15 | SW11 | NNW10 | N6 | ESE3 | SE5 | SSE4 | WSW5 | WSW1 | S2.8 | SSW15 |
| 15-Sep | NNW5 | N5 | N6 | NE3 | NNE3 | NNE5 | NE5 | NE6 | NNE7 | NE5 | W0 | W1 | SE3 | SSE6 | SSE7 | SE11 | SE13 | SE11 | SE13 | SE15 | SE17 | SE16 | SE15 | SE13 | ESE5.3 | SE17 |
| 16-Sep | SSE10 | SSE8 | SE8 | SSE8 | SSE7 | SSE7 | SSE7 | SSE9 | S9 | SSW11 | SSW10 | S9 | SSW14 | SSW18 | SW16 | SW12 | SW13 | SW10 | S4 | SSE5 | SSE5 | SSE6 | SSE6 | SSE6 | S7.9 | SSW18 |
| 17-Sep | S6 | S7 | S8 | S8 | SSE7 | S7 | S8 | S8 | S8 | SSW11 | SSW11 | SSW12 | SSW10 | SSW11 | SW13 | SW13 | SW9 | SW7 | SW6 | SSW6 | SSW5 | SW6 | SW9 | SW8 | SSW8.0 | SW13 |
| 18-Sep | SSE5 | SE4 | SE6 | SSE5 | SE5 | SSE5 | SE5 | SSW4 | WSW2 | W5 | W6 | WSW7 | W7 | W7 | W6 | W8 | NW9 | NNW9 | NNW10 | NNW9 | NNW9 | NNW10 | NNW12 | NNW13 | WNW3.2 | NNW13 |
| 19-Sep | NW12 | NW13 | NW12 | NW9 | NW5 | WNW4 | WNW5 | WNW5 | W5 | W6 | W7 | WNW8 | NW7 | NW10 | NNW10 | NNW10 | NNW8 | NW8 | NNW10 | NNW9 | NW8 | NW9 | NNW12 | NNW13 | NW8.1 | NW13 |
| 20-Sep | NNW11 | NNW11 | NNW11 | NNW11 | NW10 | NW8 | NNW9 | NNW6 | NNW5 | NW6 | NW5 | NNW8 | N7 | NNW7 | N7 | N5 | N5 | ENE5 | E4 | E6 | ESE6 | ESE6 | SE5 | SE2 | NNW4.7 | NNW11 |
| 21-Sep | SE7 | SE5 | SE7 | SE6 | SSE6 | SSE6 | SSE5 | SSE6 | S7 | SSW8 | SW11 | SW14 | SSW12 | SW14 | WSW13 | SW12 | WSW11 | SW6 | S5 | S6 | SSE8 | S8 | S8 | SSE9 | SSW6.8 | SW14 |
| 22-Sep | SSE8 | SSE8 | SSE8 | SSE8 | SSE9 | S9 | S9 | S9 | S9 | SSW10 | SSW13 | SW16 | SW19 | SW15 | SSW14 | SSW14 | SSW11 | S7 | SSE8 | SSE10 | SSE12 | S12 | SSE12 | SSE13 | S10.2 | SW19 |
| 23-Sep | SSE13 | SSE13 | SSE14 | SSE13 | SSE13 | SSE13 | SSE14 | SSE15 | S16 | S16 | S16 | SSE16 | SSE17 | SSE16 | SSE17 | SSE18 | SSE19 | SSE17 | SSE16 | SSE16 | SSE15 | SSE14 | SSE13 | SSE13 | SSE15.1 | SSE19 |
| 24-Sep | S12 | S11 | S9 | S10 | S10 | S10 | S10 | SSW10 | SSW11 | SW15 | WSW15 | WSW15 | WSW13 | WSW13 | W15 | W12 | WNW14 | WNW8 | W3 | WSW5 | WSW6 | WSW6 | WSW8 | SW8 | SW8.2 | WSW15 |
| 25-Sep | SW7 | SW8 | SW8 | SW9 | SW8 | WSW6 | S16 | SSW5 | SW9 | WSW11 | WNW10 | WNW11 | NNW12 | NW12 | WNW9 | WNW7 | WNW5 | ESE2 | ESE4 | SE4 | SSE5 | SE6 | SE7 | SE7 | WSW4.5 | NW12 |
| 26-Sep | SE8 | SE8 | SSE8 | SE8 | SSE9 | SSE11 | SSE11 | SSE13 | SSE12 | SSE11 | S15 | S12 | S13 | SSW14 | S13 | SSE15 | SSE14 | SSE9 | SE10 | SSE13 | SSE15 | SSE16 | SSE16 | SSE16 | SSE11.7 | SSE16 |
| 27-Sep | SSE16 | SSE14 | SSE11 | SSE11 | S11 | S9 | WSW9 | WSW9 | WSW14 | SW13 | WNW13 | W12 | W15 | W14 | W18 | WNW16 | W13 | WSW13 | SW10 | SW10 | WSW9 | WSW6 | WSW5 | WSW6 | WSW8.2 | W18 |
| 28-Sep | SW8 | SW9 | WSW11 | WSW10 | SW6 | SSW5 | S6 | SSW7 | SW11 | SW15 | SW14 | SW13 | WSW13 | WSW14 | SW13 | SW10 | SW8 | SSW5 | SE6 | SSE7 | SSE6 | SSE7 | SSE7 | SSE7 | SW7.8 | SW15 |
| 29-Sep | SSE7 | SSE7 | SSE6 | SSE7 | SSE7 | SSE7 | S7 | S8 | S7 | SSW8 | SSW8 | SSW9 | SW11 | WSW10 | WSW7 | W6 | W4 | NNW0 | SE3 | ESE4 | SE5 | SE5 | SE6 | ESE7 | S4.8 | SW11 |
| 30-Sep | ESE7 | E5 | ESE4 | ENE4 | NE6 | NE6 | NE6 | NE9 | NE11 | NNE10 | NNE11 | NNE12 | NNE15 | NNE16 | NNE16 | NNE16 | NNE15 | NNE12 | NNE10 | NNE12 | NNE11 | NE10 | NE10 | NNE11 | NNE9.6 | NNE16 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|--------|--------|--------|--------|------|------|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|------|--------|--------|--------|--------|--------|-----------------|
| S3.0 | S2.7 | SSE3.0 | SSE3.3 | SSE3.7 | SSE3.7 | S3.6 | S3.9 | SSW4.3 | SW5.3 | SW5.5 | SW6.0 | SW5.8 | WSW6.1 | WSW6.0 | WSW5.3 | WSW4.8 | WSW2.6 | S1.3 | SSE2.4 | SSE2.7 | SSE2.9 | SSE2.9 | SSE2.3 | Diurnal Average |
| NNW18 | NNW17 | SE17 | NNW18 | N18 | N18 | N19 | N16 | S16 | NW17 | NW20 | NW20 | NW21 | NW22 | NW23 | NW23 | NW21 | NW23 | NW22 | NW19 | NW20 | NW18 | SSE16 | SE16 | 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
Wapasu - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 134 | 18.64 | 18.64 |
| 6 - 11 | 382 | 53.13 | 71.77 |
| 12 - 19 | 193 | 26.84 | 98.61 |
| 20 - 28 | 10 | 1.39 | 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
Wapasu - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 6 | 5 | 5 | 3 | 3 | 11 | 25 | 15 | 10 | 10 | 6 | 8 | 10 | 8 | 3 | 6 | 134 |
| 6 - 11 | 5 | 7 | 8 | 1 | 5 | 8 | 49 | 59 | 44 | 34 | 47 | 28 | 21 | 17 | 18 | 31 | 382 |
| 12 - 19 | 7 | 8 | 0 | 0 | 0 | 0 | 19 | 46 | 19 | 14 | 23 | 11 | 7 | 5 | 13 | 21 | 193 |
| 20 - 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 10 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 18 | 20 | 13 | 4 | 8 | 19 | 93 | 120 | 73 | 58 | 76 | 47 | 38 | 30 | 44 | 58 | 719 |

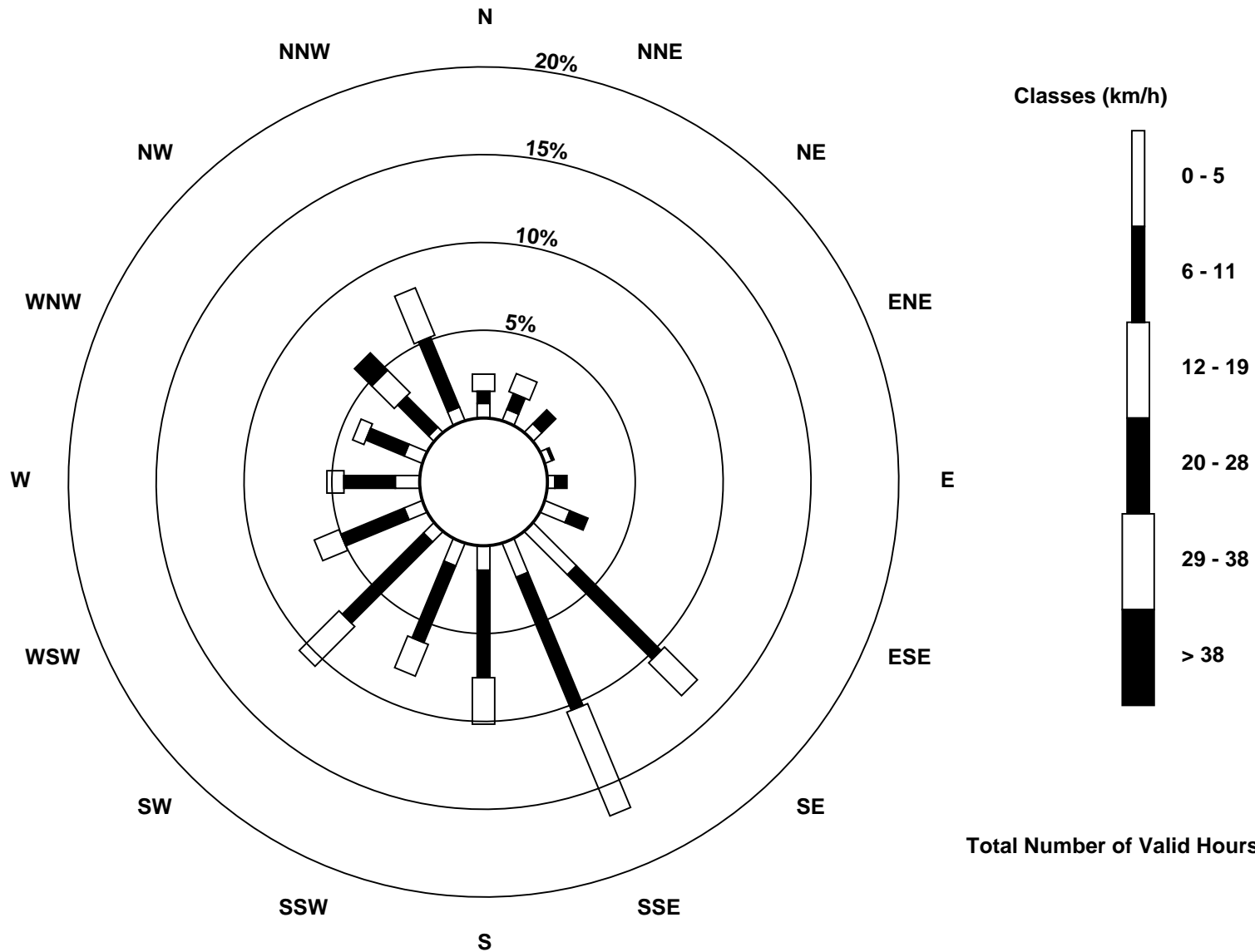
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Wapasu (AMS 17)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Wapasu - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 9 km/h on Sep 8 18:00 | Hours of Data: 719 |
| Minimum Value: 1 km/h on Sep 25 22:00 | Hours of Missing Data: 1 |
| 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: 99.9 |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 6 | 6 | 6 | 6 | 7 | 6 | 6 | 9 | 6 | 5 | 5 | 5 | 5 | 5 | 5 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Wapasu - September 2016

| | |
|--------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 326 deg on Sep 3 16:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 320.0 deg on Sep 3 | Hours of Data: 719 |
| Direction of Minimum Speed: 340 deg on Sep 29 18:00 | Hours of Missing Data: 1 |
| Direction of Minimum Daily Speed Average: 2.5 deg on Sep 8 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 234.0 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 | 129 | 131 | 132 | 127 | 138 | 18 | 53 | 60 | 104 | 83 | 101 | 108 | 99 | 72 | 101 | 120 | 329 | 54 | 93 | 93 | 150 | 34 | 107 | 193 | 102.4 |
| 2-Sep | 227 | 220 | 223 | 217 | 216 | 215 | 224 | 230 | 233 | 233 | 245 | 224 | 196 | 171 | 222 | 270 | 309 | 269 | 19 | 353 | 334 | 321 | 337 | 338 | 244.9 |
| 3-Sep | 339 | 344 | 329 | 312 | 293 | 297 | 275 | 282 | 301 | 319 | 324 | 324 | 324 | 323 | 325 | 326 | 326 | 324 | 326 | 321 | 323 | 326 | 323 | 320 | 320.0 |
| 4-Sep | 312 | 305 | 302 | 297 | 227 | 179 | 202 | 191 | 222 | 232 | 257 | 263 | 279 | 272 | 283 | 271 | 265 | 259 | 236 | 135 | 134 | 125 | 134 | 163 | 250.7 |
| 5-Sep | 173 | 167 | 173 | 173 | 164 | 159 | 142 | 159 | 170 | 216 | 215 | 194 | 192 | 205 | 190 | 195 | 180 | 151 | 137 | 136 | 136 | 133 | 128 | 133 | 169.5 |
| 6-Sep | 141 | 143 | 142 | 139 | 142 | 150 | 150 | 159 | 175 | 167 | 155 | 166 | 153 | 152 | 163 | 162 | 178 | 174 | 171 | 146 | 147 | 139 | 134 | 137 | 153.5 |
| 7-Sep | 138 | 136 | 140 | 136 | 135 | 141 | 134 | 145 | 137 | 147 | 176 | 193 | 213 | 215 | 219 | 206 | 211 | 223 | 173 | 122 | 152 | 133 | 154 | 141 | 162.6 |
| 8-Sep | 140 | 157 | 142 | 138 | 142 | 143 | 145 | 170 | 219 | 297 | 344 | M | 295 | 296 | 297 | 246 | 262 | 323 | 121 | 351 | 330 | 329 | 329 | 327 | 292.4 |
| 9-Sep | 327 | 325 | 325 | 331 | 341 | 348 | 4 | 338 | 333 | 322 | 329 | 307 | 300 | 284 | 256 | 276 | 217 | 204 | 140 | 130 | 133 | 134 | 133 | 135 | 322.7 |
| 10-Sep | 143 | 145 | 138 | 141 | 144 | 146 | 155 | 162 | 183 | 219 | 250 | 241 | 255 | 262 | 283 | 319 | 273 | 257 | 265 | 254 | 270 | 279 | 276 | 324 | 209.2 |
| 11-Sep | 329 | 333 | 341 | 346 | 350 | 353 | 356 | 1 | 0 | 4 | 355 | 343 | 337 | 330 | 331 | 329 | 332 | 328 | 327 | 323 | 293 | 238 | 193 | 228 | 340.8 |
| 12-Sep | 237 | 199 | 139 | 129 | 136 | 149 | 139 | 193 | 197 | 213 | 225 | 245 | 209 | 202 | 200 | 199 | 194 | 182 | 151 | 148 | 147 | 148 | 160 | 170 | 181.3 |
| 13-Sep | 176 | 173 | 174 | 180 | 179 | 178 | 179 | 180 | 188 | 190 | 201 | 214 | 214 | 217 | 229 | 237 | 228 | 220 | 227 | 223 | 229 | 239 | 279 | 202 | 205.0 |
| 14-Sep | 321 | 351 | 21 | 125 | 106 | 115 | 122 | 130 | 132 | 173 | 195 | 189 | 152 | 171 | 209 | 213 | 235 | 338 | 4 | 109 | 143 | 163 | 251 | 252 | 184.2 |
| 15-Sep | 344 | 352 | 11 | 49 | 26 | 31 | 52 | 50 | 32 | 55 | 259 | 267 | 133 | 150 | 150 | 145 | 139 | 134 | 131 | 137 | 141 | 146 | 143 | 148 | 123.5 |
| 16-Sep | 155 | 149 | 141 | 148 | 164 | 166 | 163 | 165 | 177 | 201 | 201 | 173 | 194 | 206 | 217 | 236 | 232 | 232 | 186 | 167 | 164 | 149 | 155 | 151 | 185.6 |
| 17-Sep | 170 | 184 | 170 | 170 | 167 | 170 | 172 | 173 | 187 | 205 | 209 | 209 | 195 | 200 | 216 | 218 | 228 | 224 | 214 | 209 | 210 | 216 | 218 | 218 | 199.7 |
| 18-Sep | 165 | 143 | 136 | 155 | 138 | 148 | 143 | 204 | 252 | 263 | 262 | 253 | 278 | 273 | 275 | 276 | 314 | 335 | 339 | 343 | 342 | 335 | 328 | 328 | 298.3 |
| 19-Sep | 325 | 326 | 323 | 318 | 314 | 288 | 283 | 299 | 271 | 273 | 277 | 288 | 305 | 313 | 332 | 337 | 337 | 323 | 327 | 327 | 319 | 316 | 328 | 332 | 316.7 |
| 20-Sep | 331 | 335 | 329 | 327 | 326 | 321 | 330 | 342 | 327 | 315 | 304 | 328 | 351 | 342 | 353 | 352 | 4 | 62 | 82 | 95 | 107 | 111 | 134 | 129 | 345.6 |
| 21-Sep | 138 | 130 | 126 | 143 | 151 | 149 | 167 | 168 | 169 | 205 | 222 | 215 | 212 | 232 | 239 | 236 | 239 | 218 | 185 | 170 | 168 | 170 | 172 | 167 | 192.8 |
| 22-Sep | 163 | 165 | 164 | 164 | 168 | 171 | 176 | 177 | 186 | 202 | 212 | 219 | 220 | 214 | 210 | 211 | 206 | 190 | 161 | 163 | 168 | 175 | 165 | 166 | 188.1 |
| 23-Sep | 160 | 156 | 157 | 155 | 161 | 166 | 158 | 163 | 169 | 169 | 169 | 163 | 158 | 163 | 167 | 161 | 156 | 155 | 158 | 161 | 158 | 160 | 168 | 167 | 161.5 |
| 24-Sep | 175 | 175 | 178 | 175 | 180 | 191 | 191 | 196 | 202 | 228 | 242 | 237 | 243 | 251 | 272 | 279 | 293 | 293 | 266 | 252 | 258 | 254 | 245 | 233 | 229.1 |
| 25-Sep | 220 | 222 | 221 | 228 | 234 | 243 | 226 | 202 | 228 | 245 | 291 | 300 | 282 | 311 | 318 | 302 | 297 | 294 | 111 | 115 | 127 | 147 | 139 | 141 | 252.9 |
| 26-Sep | 142 | 139 | 147 | 146 | 151 | 149 | 151 | 153 | 161 | 162 | 178 | 184 | 187 | 192 | 182 | 163 | 152 | 153 | 146 | 158 | 155 | 157 | 164 | 161 | 161.4 |
| 27-Sep | 154 | 154 | 155 | 157 | 170 | 191 | 243 | 247 | 237 | 231 | 282 | 274 | 270 | 275 | 276 | 283 | 276 | 247 | 235 | 236 | 249 | 250 | 247 | 252 | 238.6 |
| 28-Sep | 227 | 236 | 244 | 238 | 219 | 193 | 184 | 200 | 223 | 227 | 236 | 234 | 245 | 246 | 232 | 232 | 219 | 204 | 145 | 149 | 150 | 157 | 165 | 157 | 217.4 |
| 29-Sep | 162 | 166 | 163 | 165 | 165 | 160 | 169 | 173 | 185 | 203 | 207 | 213 | 231 | 238 | 244 | 259 | 267 | 340 | 136 | 118 | 127 | 138 | 128 | 116 | 184.3 |
| 30-Sep | 104 | 93 | 109 | 63 | 42 | 46 | 36 | 50 | 43 | 31 | 26 | 20 | 14 | 19 | 18 | 19 | 15 | 23 | 19 | 28 | 30 | 34 | 34 | 30 | 31.0 |

171.7 170.2 165.1 167.9 168.3 168.7 170.7 179.2 199.1 219.2 234.2 234.6 236.2 242.2 247.0 247.1 247.5 256.8 178.1 162.2 167.4 165.1 168.6 167.9

Diurnal Average

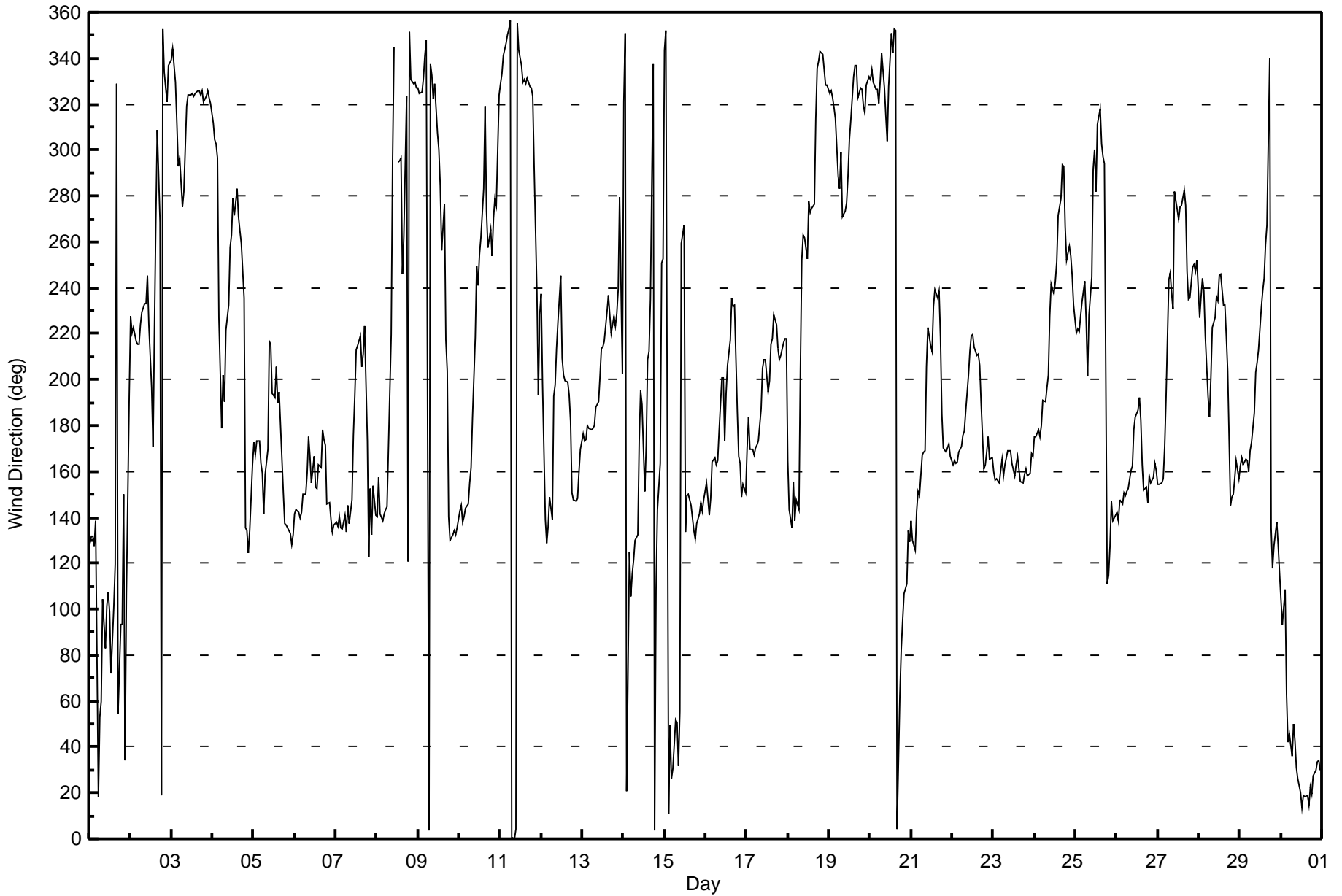
M - Maintenance

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Wapasu - September 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Wapasu - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 101 deg on Sep 15 11:00 | Hours of Data: 719 |
| Minimum Value: 4 deg on Sep 28 19:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 8 P ₁₀ = 15 Q ₁ = 18 Median = 24 Q ₃ = 29 P ₉₀ = 36 P ₉₉ = 80 | 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 | 21 | 19 | 20 | 20 | 91 | 56 | 19 | 34 | 40 | 46 | 31 | 28 | 26 | 28 | 29 | 39 | 85 | 51 | 26 | 25 | 91 | 38 | 44 | 73 | 91 |
| 2-Sep | 19 | 18 | 17 | 17 | 18 | 16 | 19 | 18 | 21 | 21 | 28 | 33 | 37 | 29 | 57 | 60 | 37 | 74 | 71 | 25 | 21 | 18 | 20 | 19 | 74 |
| 3-Sep | 23 | 23 | 17 | 21 | 27 | 26 | 28 | 29 | 24 | 20 | 18 | 17 | 18 | 18 | 19 | 18 | 18 | 18 | 17 | 17 | 18 | 18 | 17 | 17 | 29 |
| 4-Sep | 20 | 26 | 24 | 24 | 40 | 23 | 24 | 29 | 23 | 22 | 31 | 28 | 33 | 33 | 32 | 35 | 28 | 23 | 55 | 9 | 6 | 11 | 12 | 17 | 55 |
| 5-Sep | 21 | 18 | 23 | 26 | 22 | 21 | 17 | 25 | 38 | 30 | 23 | 29 | 32 | 27 | 40 | 48 | 30 | 29 | 15 | 13 | 14 | 17 | 17 | 17 | 48 |
| 6-Sep | 20 | 18 | 17 | 16 | 17 | 22 | 23 | 25 | 33 | 32 | 32 | 33 | 28 | 29 | 32 | 32 | 30 | 33 | 29 | 18 | 20 | 19 | 18 | 15 | 33 |
| 7-Sep | 15 | 16 | 16 | 14 | 15 | 17 | 17 | 23 | 25 | 32 | 37 | 33 | 49 | 42 | 44 | 44 | 40 | 20 | 53 | 50 | 60 | 14 | 15 | 8 | 60 |
| 8-Sep | 9 | 17 | 11 | 9 | 10 | 10 | 12 | 26 | 43 | 47 | 53 | M | 31 | 31 | 34 | 31 | 29 | 24 | 60 | 24 | 20 | 15 | 17 | 16 | 60 |
| 9-Sep | 16 | 17 | 18 | 22 | 23 | 27 | 30 | 21 | 20 | 24 | 29 | 31 | 45 | 54 | 67 | 46 | 41 | 29 | 13 | 12 | 14 | 16 | 16 | 18 | 67 |
| 10-Sep | 19 | 20 | 18 | 20 | 22 | 21 | 24 | 29 | 29 | 25 | 27 | 23 | 28 | 31 | 30 | 25 | 31 | 27 | 26 | 28 | 29 | 29 | 30 | 21 | 31 |
| 11-Sep | 17 | 18 | 23 | 26 | 28 | 29 | 30 | 33 | 30 | 31 | 29 | 24 | 24 | 19 | 19 | 18 | 17 | 20 | 16 | 31 | 28 | 56 | 45 | 49 | 56 |
| 12-Sep | 35 | 29 | 24 | 32 | 11 | 15 | 9 | 26 | 26 | 27 | 33 | 33 | 31 | 28 | 28 | 30 | 28 | 30 | 20 | 19 | 21 | 21 | 25 | 28 | 35 |
| 13-Sep | 29 | 28 | 29 | 30 | 29 | 29 | 29 | 31 | 28 | 27 | 26 | 20 | 18 | 19 | 23 | 23 | 21 | 16 | 16 | 15 | 17 | 23 | 68 | 67 | 68 |
| 14-Sep | 21 | 24 | 47 | 17 | 23 | 15 | 18 | 14 | 27 | 33 | 31 | 30 | 44 | 40 | 26 | 21 | 27 | 42 | 29 | 36 | 10 | 29 | 35 | 85 | 85 |
| 15-Sep | 18 | 25 | 20 | 30 | 43 | 22 | 28 | 26 | 33 | 56 | 101 | 82 | 68 | 37 | 29 | 23 | 21 | 18 | 17 | 18 | 19 | 22 | 19 | 22 | 101 |
| 16-Sep | 20 | 20 | 15 | 15 | 25 | 27 | 24 | 26 | 30 | 25 | 27 | 32 | 27 | 23 | 18 | 24 | 21 | 20 | 21 | 14 | 17 | 9 | 12 | 11 | 32 |
| 17-Sep | 23 | 26 | 27 | 26 | 25 | 26 | 28 | 28 | 28 | 23 | 22 | 23 | 25 | 24 | 18 | 18 | 20 | 14 | 13 | 14 | 16 | 15 | 13 | 14 | 28 |
| 18-Sep | 24 | 17 | 7 | 15 | 11 | 18 | 20 | 25 | 62 | 51 | 31 | 26 | 31 | 27 | 31 | 29 | 26 | 20 | 23 | 25 | 23 | 21 | 17 | 18 | 62 |
| 19-Sep | 16 | 18 | 16 | 19 | 18 | 31 | 32 | 24 | 28 | 30 | 27 | 30 | 24 | 22 | 21 | 19 | 20 | 18 | 17 | 17 | 18 | 21 | 17 | 17 | 32 |
| 20-Sep | 16 | 19 | 17 | 16 | 16 | 17 | 16 | 28 | 34 | 39 | 50 | 31 | 42 | 42 | 33 | 52 | 42 | 23 | 20 | 15 | 18 | 19 | 18 | 70 | 70 |
| 21-Sep | 18 | 16 | 11 | 19 | 18 | 19 | 20 | 26 | 26 | 29 | 26 | 19 | 32 | 22 | 28 | 26 | 22 | 20 | 16 | 14 | 12 | 14 | 15 | 16 | 32 |
| 22-Sep | 16 | 17 | 18 | 19 | 21 | 21 | 24 | 27 | 29 | 28 | 25 | 23 | 23 | 25 | 27 | 28 | 30 | 26 | 16 | 20 | 22 | 27 | 21 | 23 | 30 |
| 23-Sep | 21 | 18 | 18 | 19 | 20 | 24 | 21 | 23 | 25 | 26 | 27 | 25 | 25 | 24 | 28 | 23 | 21 | 22 | 22 | 21 | 22 | 22 | 25 | 24 | 28 |
| 24-Sep | 28 | 27 | 29 | 27 | 29 | 31 | 28 | 29 | 29 | 20 | 19 | 20 | 26 | 24 | 27 | 30 | 28 | 30 | 47 | 23 | 29 | 22 | 18 | 18 | 47 |
| 25-Sep | 17 | 16 | 23 | 24 | 15 | 25 | 24 | 28 | 17 | 24 | 33 | 31 | 34 | 35 | 35 | 38 | 34 | 27 | 57 | 16 | 13 | 5 | 8 | 7 | 57 |
| 26-Sep | 6 | 10 | 9 | 13 | 17 | 16 | 18 | 19 | 23 | 25 | 31 | 32 | 33 | 28 | 31 | 27 | 21 | 20 | 16 | 18 | 18 | 20 | 24 | 23 | 33 |
| 27-Sep | 19 | 19 | 26 | 27 | 27 | 30 | 26 | 25 | 18 | 19 | 30 | 31 | 27 | 31 | 30 | 30 | 29 | 21 | 15 | 14 | 21 | 20 | 23 | 27 | 31 |
| 28-Sep | 14 | 13 | 17 | 16 | 20 | 37 | 30 | 25 | 19 | 16 | 21 | 25 | 25 | 25 | 25 | 29 | 26 | 34 | 4 | 6 | 8 | 9 | 11 | 10 | 37 |
| 29-Sep | 12 | 14 | 14 | 16 | 16 | 13 | 19 | 22 | 28 | 28 | 29 | 32 | 23 | 26 | 40 | 50 | 31 | 81 | 15 | 14 | 9 | 11 | 9 | 13 | 81 |
| 30-Sep | 13 | 23 | 26 | 33 | 31 | 27 | 24 | 19 | 25 | 30 | 31 | 30 | 30 | 30 | 31 | 32 | 31 | 31 | 30 | 27 | 29 | 27 | 28 | 27 | 33 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 35 | 29 | 47 | 33 | 91 | 56 | 32 | 34 | 62 | 56 | 101 | 82 | 68 | 54 | 67 | 60 | 85 | 81 | 71 | 50 | 91 | 56 | 68 | 85 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 26, 2016 | Last Calibration | August 16, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Reason: | Routine | | |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| Gas Cert Reference | SA130010A | Station temp. | 22 Deg C |
| Cal Gas Concentration | 47.8 ppm | Cal Gas Exp Date | December 12, 2016 |
| Calibrator Make/Model | API T700 | Serial Number | 997 |
| ZAG Make/Model | API 701 | Serial Number | 4427 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2633 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -654 | -654 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 973 | 975 |
| Calculated slope | 1.001412 | 0.999739 | Chamber temp | 45.0 | 45.2 |
| Calculated intercept | 1.776632 | 1.761539 | Pressure | 692.8 | 689.2 |
| Analyzer Background | 9.0 | 9.1 | Flow | 0.456 | 0.454 |
| Analyzer Coefficient | 1.022 | 1.024 | Intensity | 93 | 91 |

Analyzer make Thermo 43i Analyzer serial # 1218153459

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 5000 | 60.5 | 578.4 | 574.4 | 1.007 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 60.5 | 578.4 | 577.4 | 1.002 |
| second point | 5000 | 30.2 | 288.7 | 286.7 | 1.007 |
| third point | 5000 | 15.2 | 145.3 | 141.8 | 1.025 |
| as left zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| as left span | 5000 | 60.5 | 578.4 | 579.3 | 0.998 |
| Average Correction Factor | | | | | 1.011 |

Corrected As found 574.6 Previous response 575.8 % change 0.2%

Notes:

Inlet filter changed after as founds. Adjusted Span. During as left span calibrator was bumped into standby mode.

Calibration Performed By: Jayne Marcoux



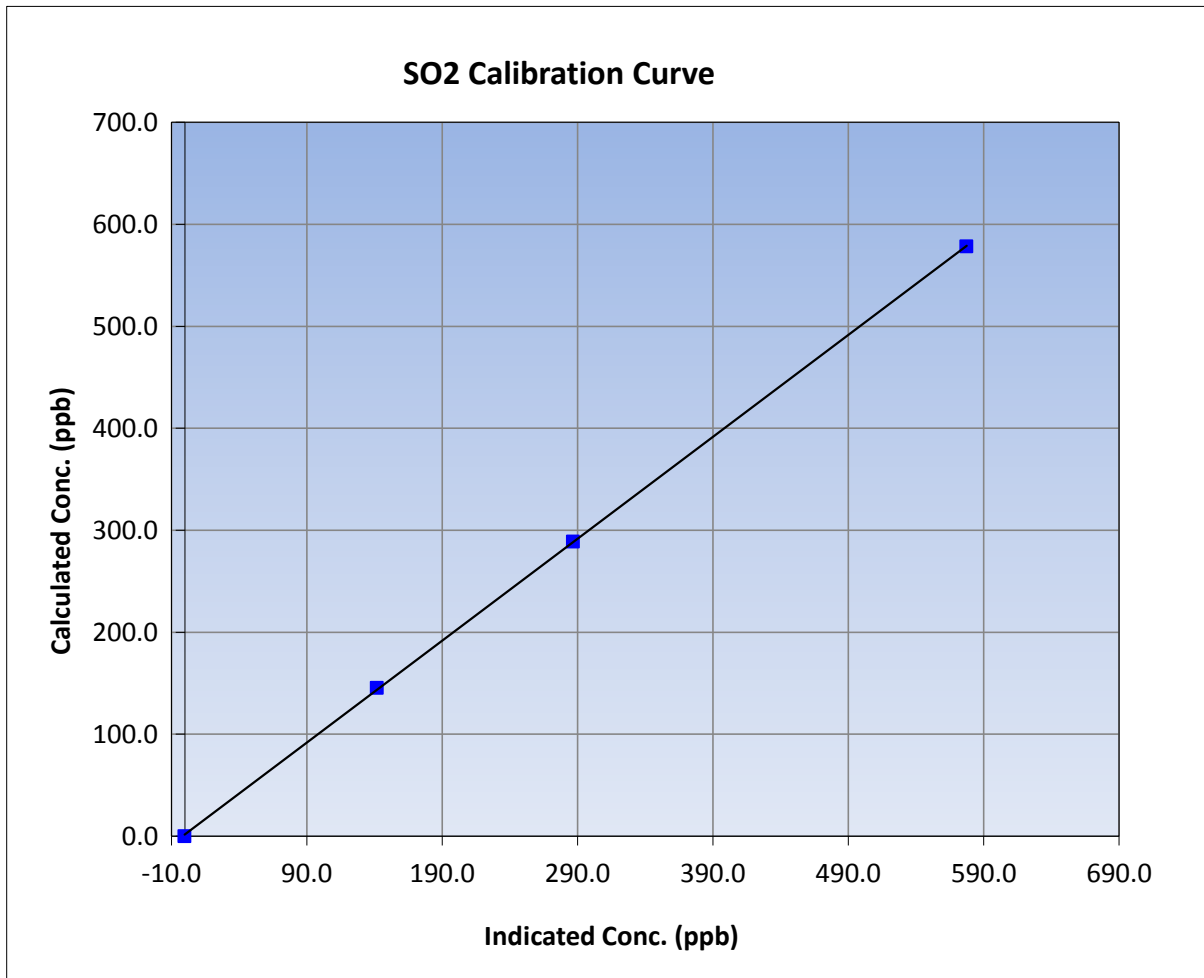
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1218153459 |

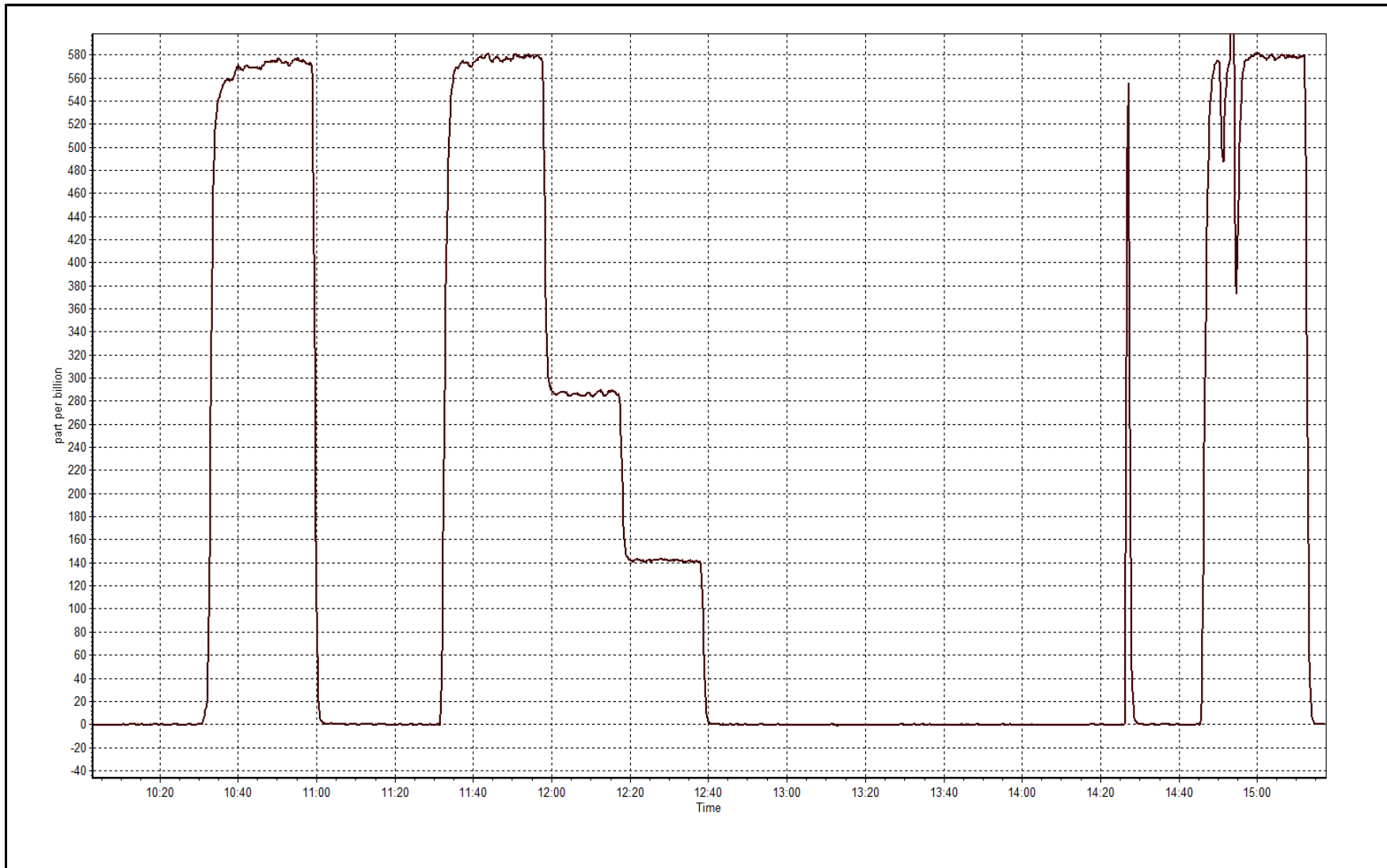
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999967 |
| 578.4 | 577.4 | 1.0017 | | |
| 288.7 | 286.7 | 1.0072 | Slope | 0.999739 |
| 145.3 | 141.8 | 1.0246 | | |
| | | | Intercept | 1.761539 |



SO2 Calibration Plot

Date: September 26, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------------|
| Calibration Date | September 27, 2016 | Last Calibration | August 15, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Reason: | Routine | | |
| Start Time (MST) | 11:51 | End Time (MST) | 15:07 |
| Gas Cert Reference | CC107167 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 5.1 ppm | Cal Gas Exp Date | September-09-17 |
| Calibrator Make/Model | API T700 | Serial Number | 997 |
| ZAG air Make/Model | API 701 | Serial Number | 4227 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2633 |
| SO2 gas concentration | 47.8 ppm | SO2 gas cert/exp | SA130010A December-12-16 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -651 | -652 |
| Analyzer IP address | 192.168.1.45 | | Lamp voltage | 786 | 787 |
| Calculated slope | 0.996192 | 0.991306 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.312238 | 0.294198 | Pressure | 552.5 | 556.4 |
| Analyzer Background | 14.7 | 14.4 | Flow | 0.979 | 0.985 |
| Analyzer Coefficient | 1.225 | 1.225 | Intensity | 113 | 113 |
| | | | Converter temp. | 338 | 342 |

| | | | |
|----------------------|-------------|--------------------|------------|
| Analyzer make/model | Thermo 450i | Analyzer serial # | 1218153583 |
| Converter make/model | na | Converter serial # | na |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.6 | ---- |
| as found span | 5000 | 78.4 | 80.0 | 80.4 | 0.995 |
| SO2 scrubber check | 5000 | 20.9 | 199.8 | 1.3 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 5000 | 78.4 | 80.0 | 80.4 | 0.995 |
| second point | 5000 | 39.3 | 40.1 | 40.2 | 0.996 |
| third point | 5000 | 19.7 | 20.1 | 19.7 | 1.021 |
| as left zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 78.5 | 80.1 | 80.5 | 0.995 |
| Average Correction Factor | | | | | 1.004 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 81.0 | Previous response | 80.0 | % change | -1.3% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

Changed inlet filter after as found. Completed scrubber check (1.33ppb). Adjusted zero.

Calibration Performed By: Jayme Marcoux



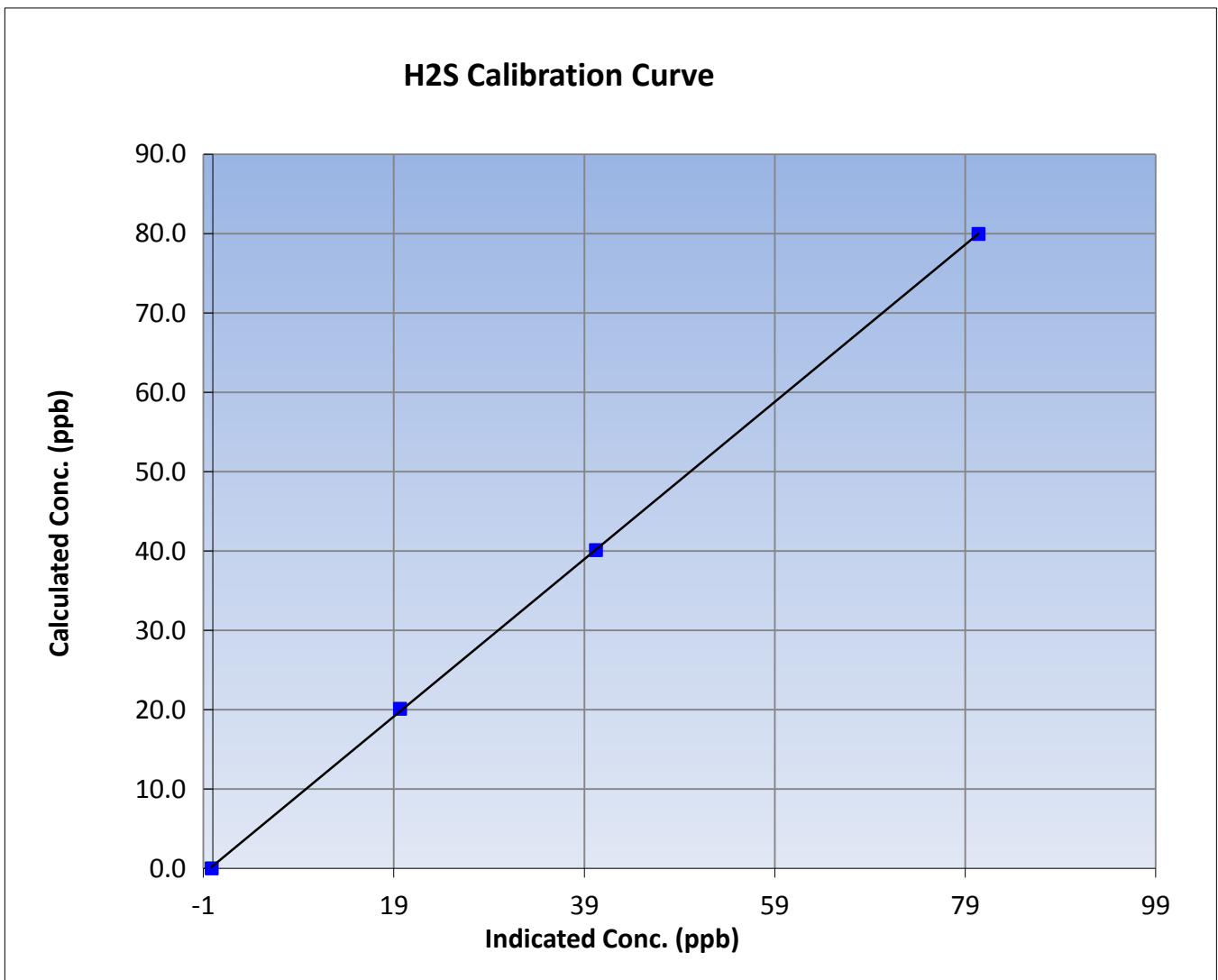
Wood Buffalo Environmental Association H2S Calibration Report

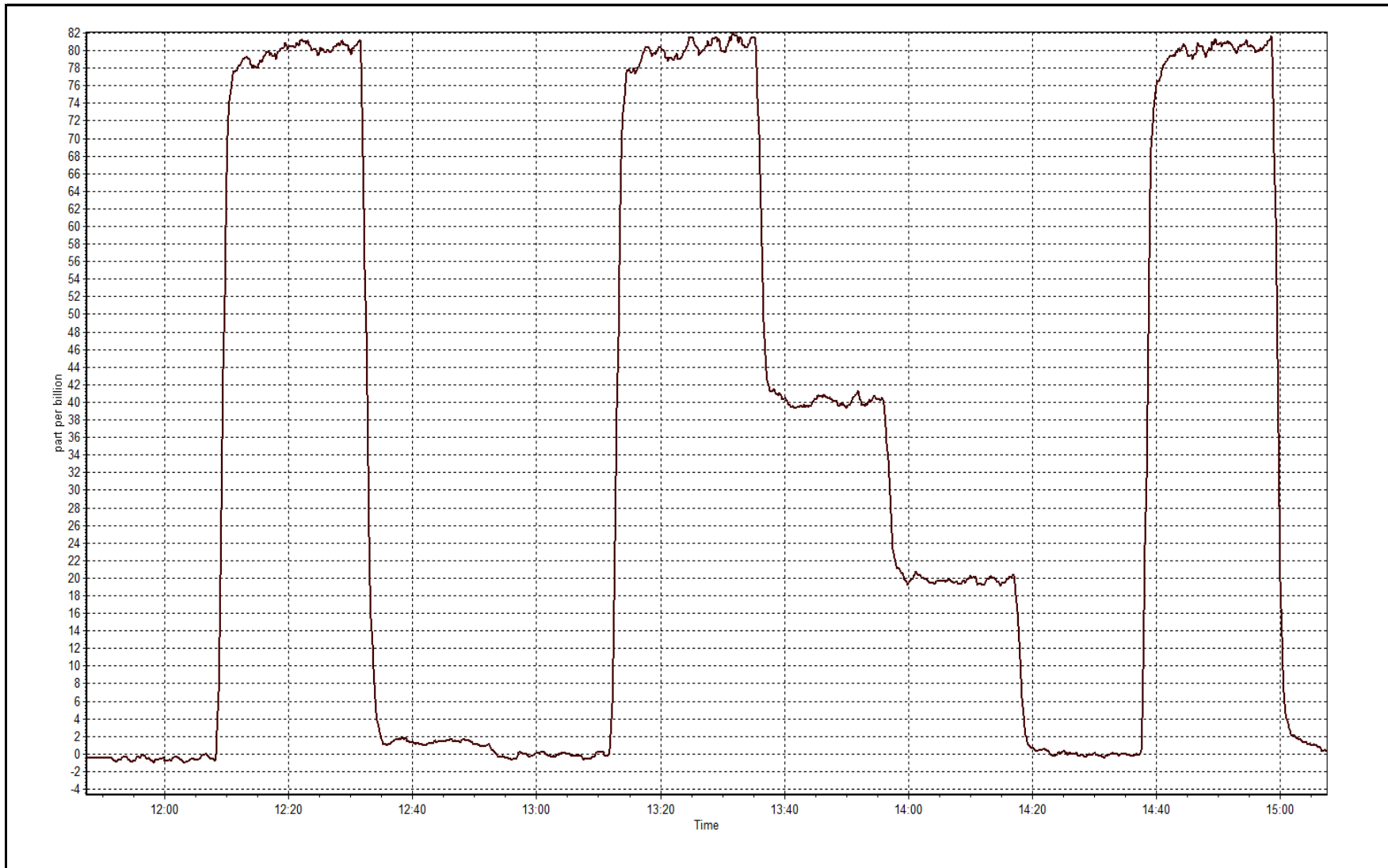
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 11:51 | End Time (MST) | 15:07 |
| Analyzer make | Thermo 450i | Analyzer serial # | 1218153583 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999965 |
| 80.0 | 80.4 | 0.9946 | | |
| 40.1 | 40.2 | 0.9964 | Slope | 0.991306 |
| 20.1 | 19.7 | 1.0210 | | |
| | | | Intercept | 0.294198 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|-------------------|
| Calibration Date | September 26, 2016 | Last Calibration | August 16, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Reason: | Routine | | |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| Gas Cert Reference | SA130010A | Cal Gas Expiry Date | December 12, 2016 |
| CH4 Cal Gas Conc. | 512 ppm | CH4 Equiv Conc. | 1092.3 ppm |
| C3H8 Cal Gas Conc. | 211 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 997 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4427 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2633 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 8.5 | 8.5 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 41.0 | 41.0 |
| Calculated slope | 0.998536 | 0.995108 | Fuel Pressure | 24.8 | 24.8 |
| Calculated intercept | 0.014424 | 0.024276 | Analyzer Coeff | 4.370 | 4.370 |
| | | | Analyzer BKG | 3.020 | 3.020 |

| | | | |
|---------------|---------------|-------------------|------------|
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1218153352 |
|---------------|---------------|-------------------|------------|

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | -0.05 | ---- |
| as found span | 5000 | 60.5 | 13.22 | 13.25 | 0.997 |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.02 | ---- |
| high point | 5000 | 60.5 | 13.22 | 13.26 | 0.997 |
| second point | 5000 | 30.2 | 6.60 | 6.60 | 1.000 |
| third point | 5000 | 15.2 | 3.32 | 3.31 | 1.003 |
| as left zero | 5000 | 0.0 | 0.00 | -0.04 | ---- |
| as left span | 5000 | 60.5 | 13.22 | 13.15 | 1.005 |
| Average Correction Factor | | | | | 1.000 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|-------|
| Corrected As found | 13.30 | Previous response | 13.22 | % change | -0.6% |
|--------------------|-------|-------------------|-------|----------|-------|

Notes:

Inlet filter changed after as founds. Adjusted zero. During as left span calibrator was bumped into standby mode.

Calibration Performed By:

Jayme Marcoux



Wood Buffalo Environmental Association THC Calibration Report

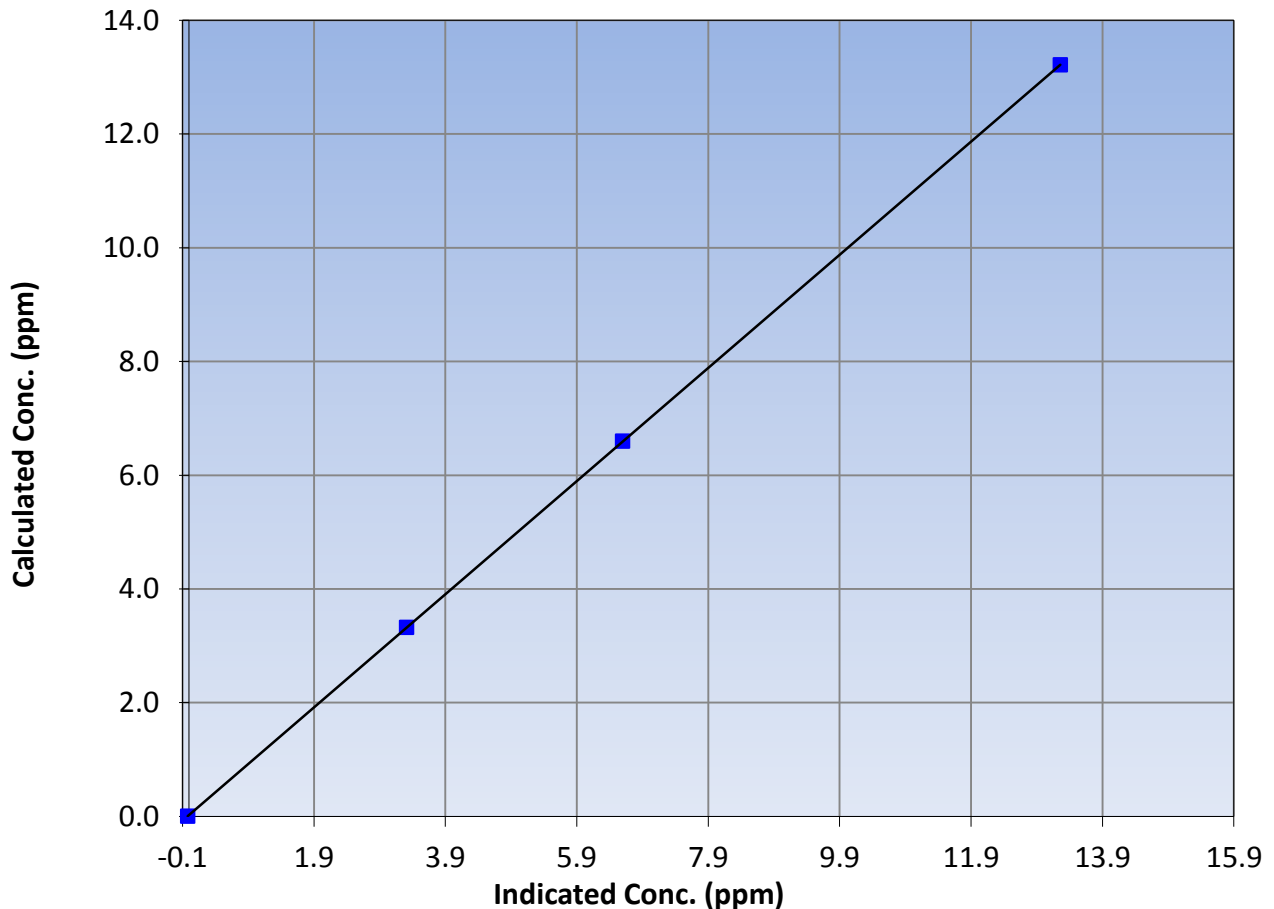
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1218153352 |

Calibration Data

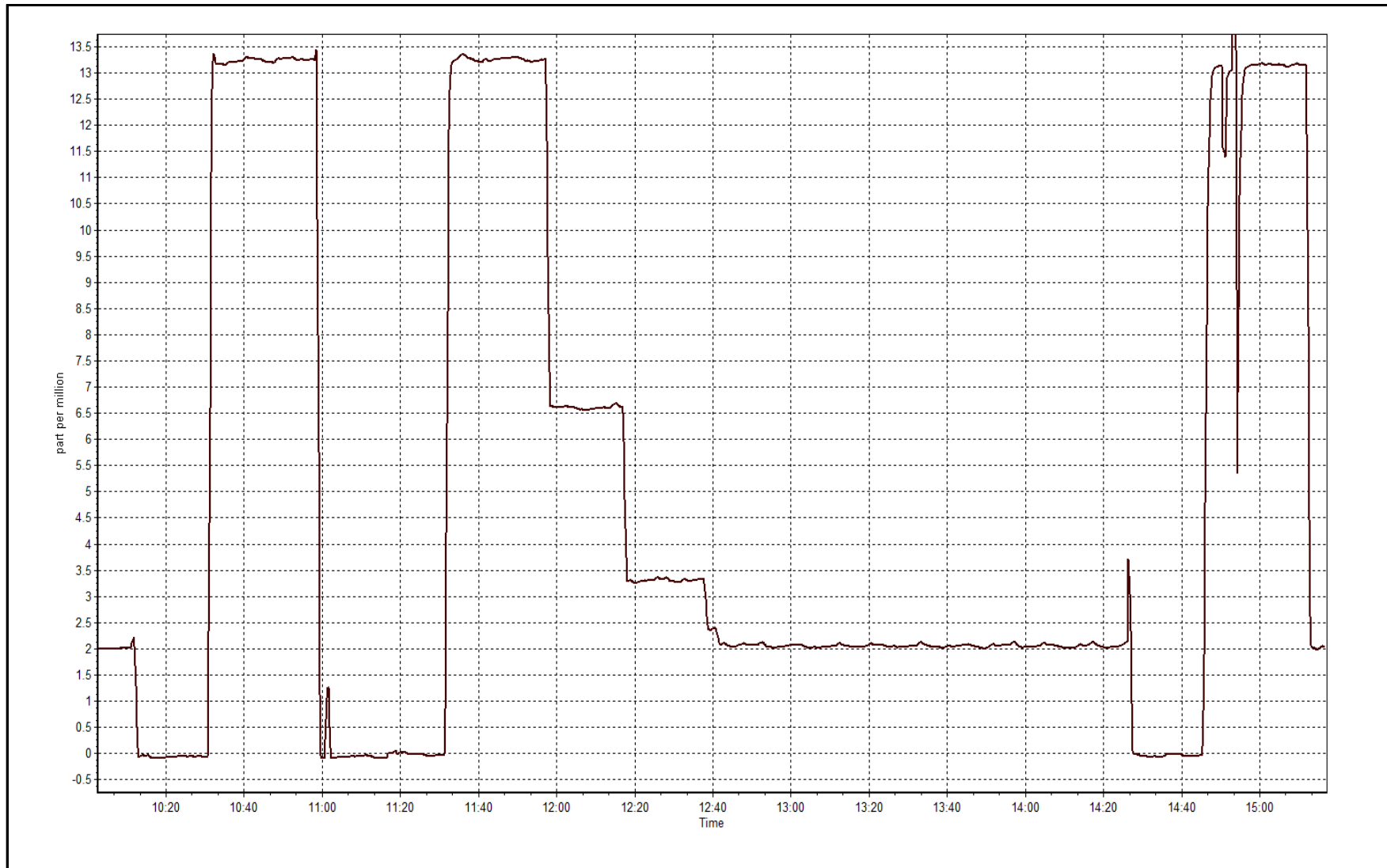
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | -0.02 | ---- | Correlation Coefficient | 0.999999 |
| 13.22 | 13.26 | 0.9967 | | |
| 6.60 | 6.60 | 0.9996 | Slope | 0.995108 |
| 3.32 | 3.31 | 1.0032 | | |
| | | | Intercept | 0.024276 |

THC Calibration Curve



THC Calibration Plot

Date: September 26, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 25, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Reason: | Routine | | |
| Start Time (MST) | 9:00 | End Time (MST) | 12:02 |
| NO2 GPT Ref date | September 26, 2016 | Transfer Standard | GPT |
| | | Station temp. | 23 Deg C |
| Calibrator Make/Model | Teledyne API 700 | Serial Number | 997 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4427 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2633 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|--------------|--------|--------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 27.2 | 27.2 |
| Analyzer IP address | 192.168.1.72 | | Lamp temp. | 58.0 | 58.0 |
| Calculated slope | 0.998669 | 0.998487 | Pressure | 26.4 | 26.7 |
| Calculated intercept | 0.460812 | -0.461125 | Flow cell A | 702 | 742.0 |
| Analyzer Background | 4.549 | 5.125 | Flow cell B | 719 | 751.0 |
| Analyzer Coefficient | 0.977 | 0.979 | O3 measure | 4716.9 | 4699.0 |
| | | | O3 reference | 4717.1 | 4699.0 |

| | | | |
|---------------|---------------|-------------------|-----|
| Analyzer make | Teledyne T400 | Analyzer serial # | 824 |
|---------------|---------------|-------------------|-----|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp Intensity | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|---------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 196.3/800 | 0.0 | 0.2 | ---- |
| as found span | 5000 | 713.4/1084.9 | 360.4 | 361.1 | 0.998 |
| calibrator zero | 5000 | 196.3/800 | 0.0 | 0.1 | ---- |
| high point | 5000 | 713.4/1084.9 | 360.4 | 361.1 | 0.998 |
| second point | 5000 | 495.4/972.5 | 243.1 | 244.2 | 0.996 |
| third point | 5000 | 260.9/844.3 | 124.1 | 125.2 | 0.991 |
| as left zero | 5000 | 196.3/800 | 0.0 | -0.4 | ---- |
| as left span | 5000 | 713.4/1084.9 | 360.4 | 363.9 | 0.990 |
| Average Correction Factor | | | | | 0.995 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|-------|
| Corrected As found | 360.8 | Previous response | 360.4 | % change | -0.1% |
|--------------------|-------|-------------------|-------|----------|-------|

Notes:

Generated the wrong concentration for the as found span. Corrected and generated correct value. Changed inlet filter after as found. Adjusted zero.

Calibration Performed By:

Jayme Marcoux



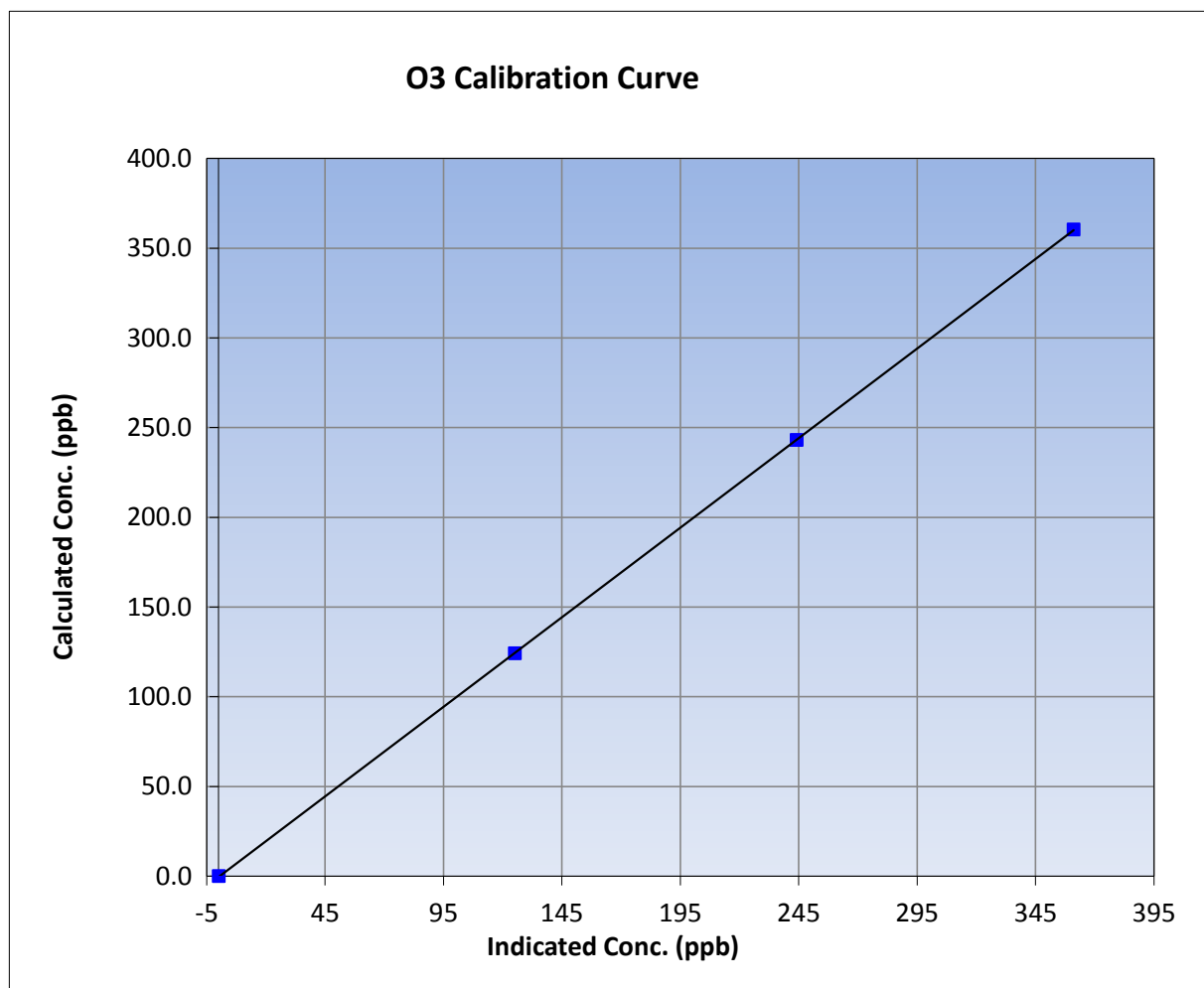
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

| | | | |
|------------------|-----------------|----------------------|-----------------|
| Calibration Date | September-27-16 | Previous Calibration | August 25, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 9:00 | End Time (MST) | 12:02 |
| Analyzer make | Teledyne T400 | Analyzer serial # | 824 |

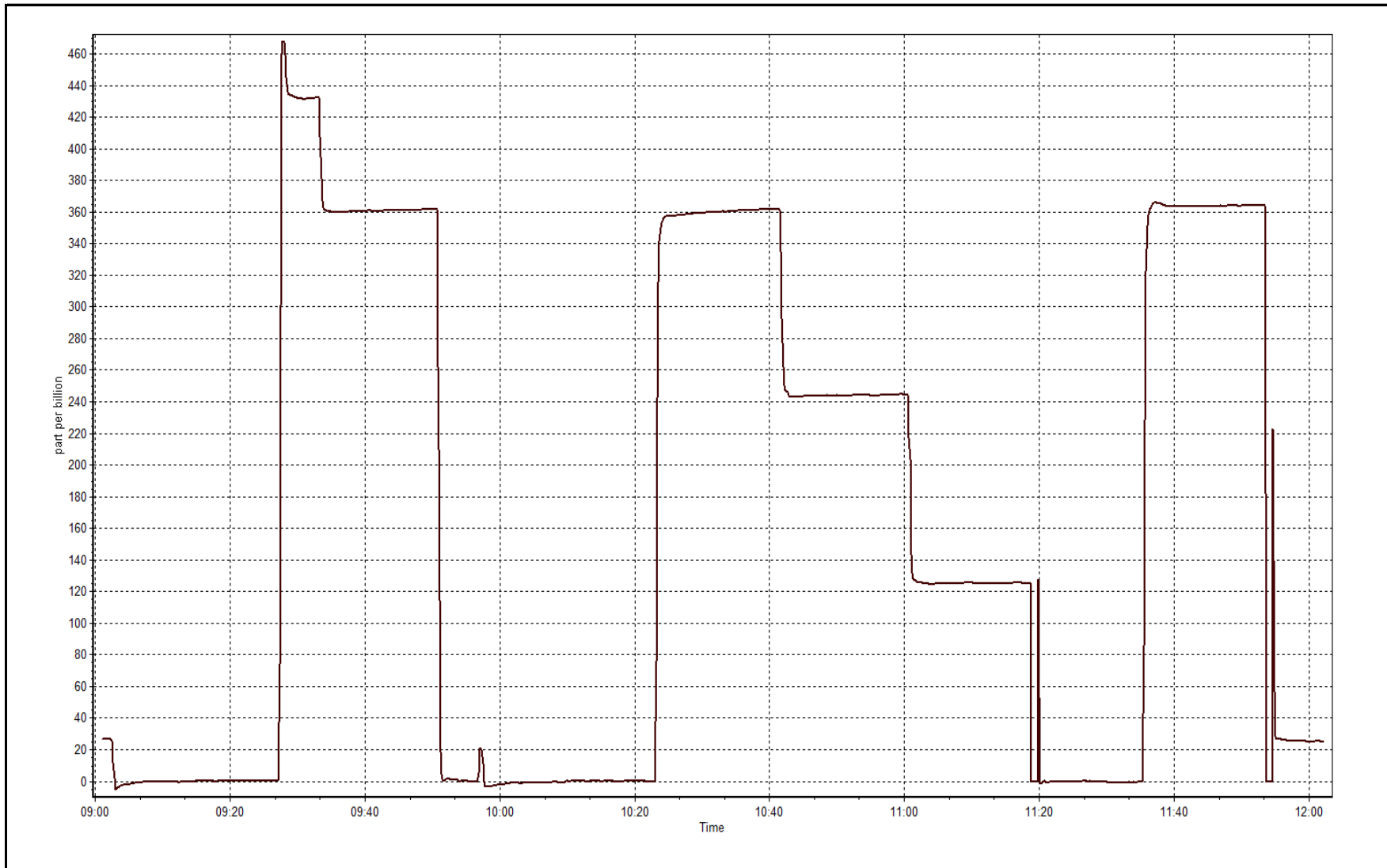
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999993 |
| 360.4 | 361.1 | 0.9981 | | |
| 243.1 | 244.2 | 0.9957 | Slope | 0.998487 |
| 124.1 | 125.2 | 0.9911 | | |
| | | | Intercept | -0.461125 |



O3 Calibration Plot

Date: September 27, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 26, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Reason: | Routine | | |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| NO Cal Gas Conc | 49.7 ppm | Gas Cert Reference | SA130010A |
| NOx Cal Gas Conc | 49.7 ppm | Cal Gas Expiry Date | December 12, 2016 |
| Calibrator | API T700 | Serial Number | 997 |
| Zero air Generator | Teledyne API T701 | Serial Number | 4427 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 2633 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.997781 | 0.998233 | 1.001548 |
| | Data Offset | 2.191891 | 2.048741 | 0.331090 |
| Current Calibration | Data Slope | 0.999325 | 0.997735 | 0.991781 |
| | Data Offset | 1.440678 | 2.792490 | -1.592018 |

Analyzer Information

| | | | |
|---------------------|----------|-------------------|-----|
| Analyzer make/model | API T200 | Analyzer serial # | 722 |
|---------------------|----------|-------------------|-----|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.72 | | 192.168.1.72 | |
| NO coefficient | 1.055 | | 1.064 | |
| NOx coefficient | 1.053 | | 1.079 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 0.7 | | 0.3 | |
| NOx bkgrnd | 1.4 | | 0.3 | |
| Chamber Temp | 50 | Deg C | 50 | Deg C |
| Moly Temp | 315.5 | Deg C | 316 | Deg C |
| PMT voltage | 781 | V | 781 | V |
| PMT Temp | 7 | Deg C | 7 | Deg C |
| O3 flow | 72 | ccm | 71 | ccm |
| R Cell press NO | 7.4 | mmHg | 7 | mmHg |
| R Cell Press Nox | 7.5 | mmHg | 7 | mmHg |
| NO sample flow | 448 | lpm | 443 | lpm |
| Nox sample Flow | 444 | lpm | 440 | lpm |

Notes:

Inlet filter changed after as founds. Zero and Span adjusted. Generated first ozone point before first GPT point, corrected mistake. During as left span calibrator was bumped into standby mode.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 26, 2016 Station Number: AMS 17

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.5 | 0.1 | ---- | ---- |
| as found span | 5000.00 | 60.5 | 601.4 | 601.4 | 0.0 | 591.8 | 592.9 | -1.1 | 1.0162 | 1.014 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | ---- | ---- |
| high point | 5000 | 60.5 | 601.4 | 601.4 | 0.0 | 600.9 | 601.2 | -0.4 | 1.0009 | 1.000 |
| second point | 5000 | 30.2 | 300.2 | 300.2 | 0.0 | 298.9 | 296.8 | 2.1 | 1.0043 | 1.011 |
| third point | 5000 | 15.2 | 151.1 | 151.1 | 0.0 | 147.8 | 145.8 | 2.0 | 1.0225 | 1.037 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | 0.0 | 0.0 | ---- | ---- |
| as left span | 5000 | 60.5 | 601.4 | 232.8 | 368.6 | 597.7 | 234.5 | 364.2 | 1.0062 | 0.993 |
| Average Correction Factor | | | | | | | | | 1.0092 | 1.0160 |

Corrected As found NO_x= 592.2 NO= 593.4 Percent Change NO_x= 1.4% NO= 1.2%
 Previous Response NO_x= 600.5 NO= 600.4

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.50 ccm NOx ref calc conc = 601.4 ppb NO ref calc conc = 601.4 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 600.3 | 593.2 | 0.1 | 1.0018 | 1.0138 | ---- | ---- |
| 1st NO2 (300) | 232.8 | 360.4 | 596.9 | 232.8 | 364.1 | 1.0074 | ---- | 0.9897 | 101.0% |
| 2nd NO2 (200) | 350.1 | 243.1 | 596.8 | 350.1 | 246.8 | 1.0076 | ---- | 0.9852 | 101.5% |
| 3rd NO2 (100) | 469.1 | 124.1 | 598.2 | 469.1 | 129.0 | 1.0052 | ---- | 0.9614 | 104.0% |
| 2nd NO ref point | ---- | 0.0 | 597.9 | 594.1 | 3.8 | 1.0059 | 1.0122 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0065 | | 0.9788 | 102.2% |

Calibration Performed By: Jayne Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

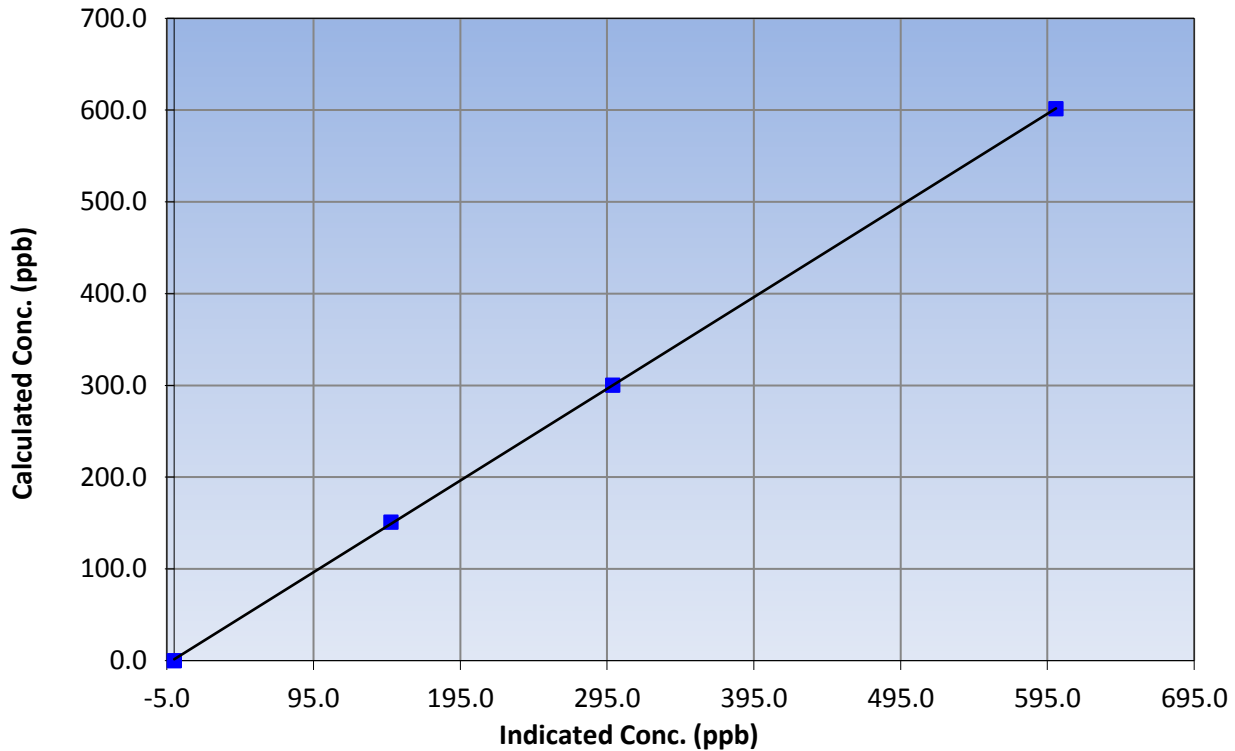
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999967 |
| 601.4 | 600.9 | 1.0009 | | |
| 300.2 | 298.9 | 1.0043 | Slope | 0.999325 |
| 151.1 | 147.8 | 1.0225 | | |
| | | | Intercept | 1.440678 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

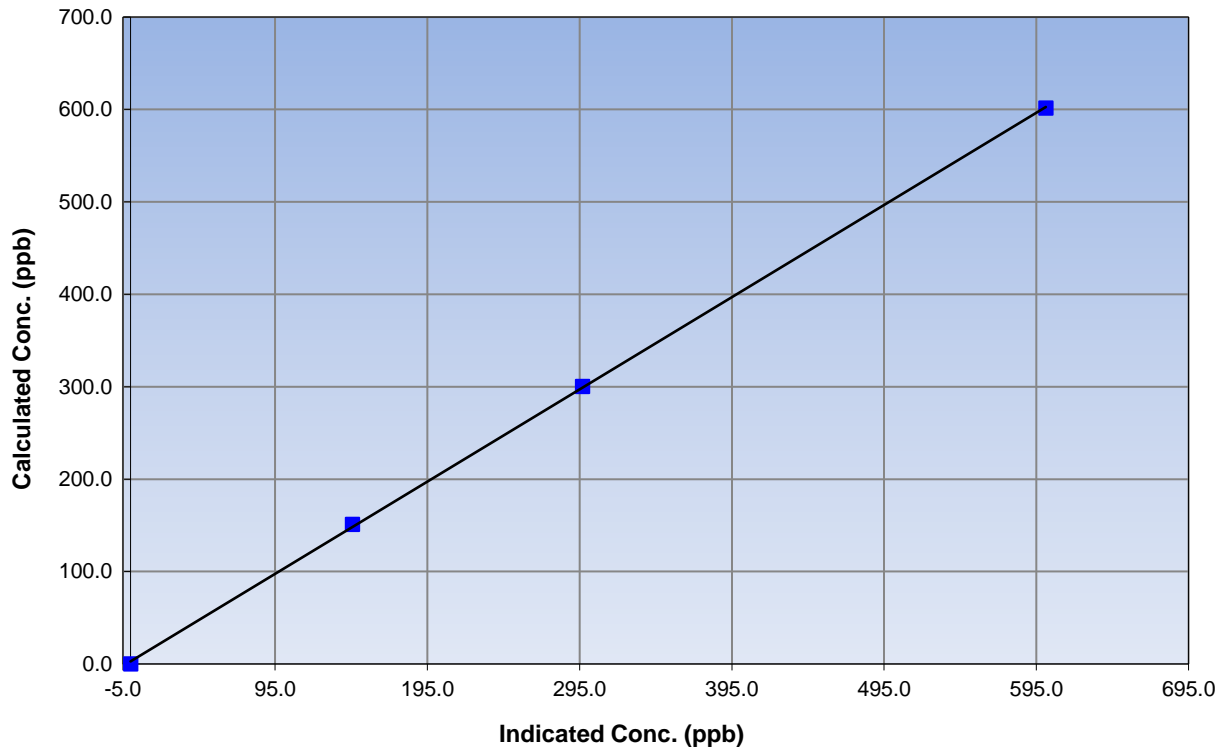
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | N/A | Correlation Coefficient | 0.999903 |
| 601.4 | 601.2 | 1.0002 | | |
| 300.2 | 296.8 | 1.0113 | Slope | 0.997735 |
| 151.1 | 145.8 | 1.0366 | | |
| | | | Intercept | 2.792490 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

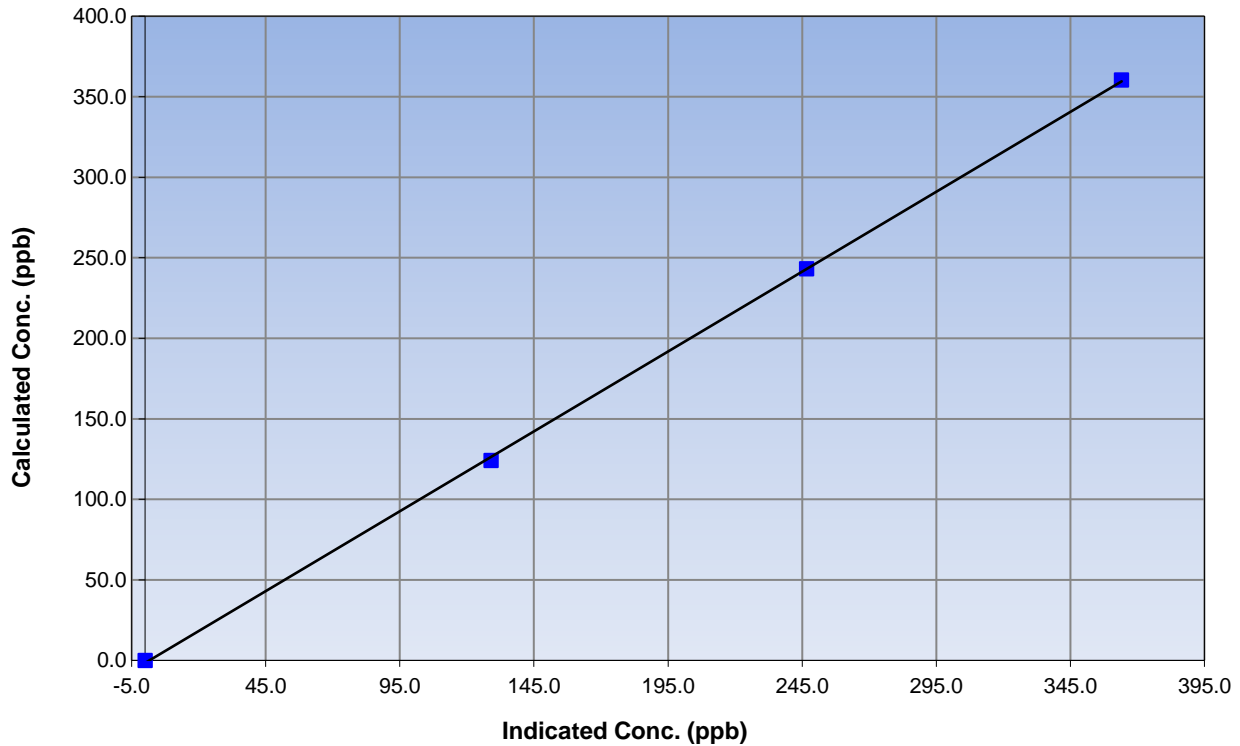
Station Information

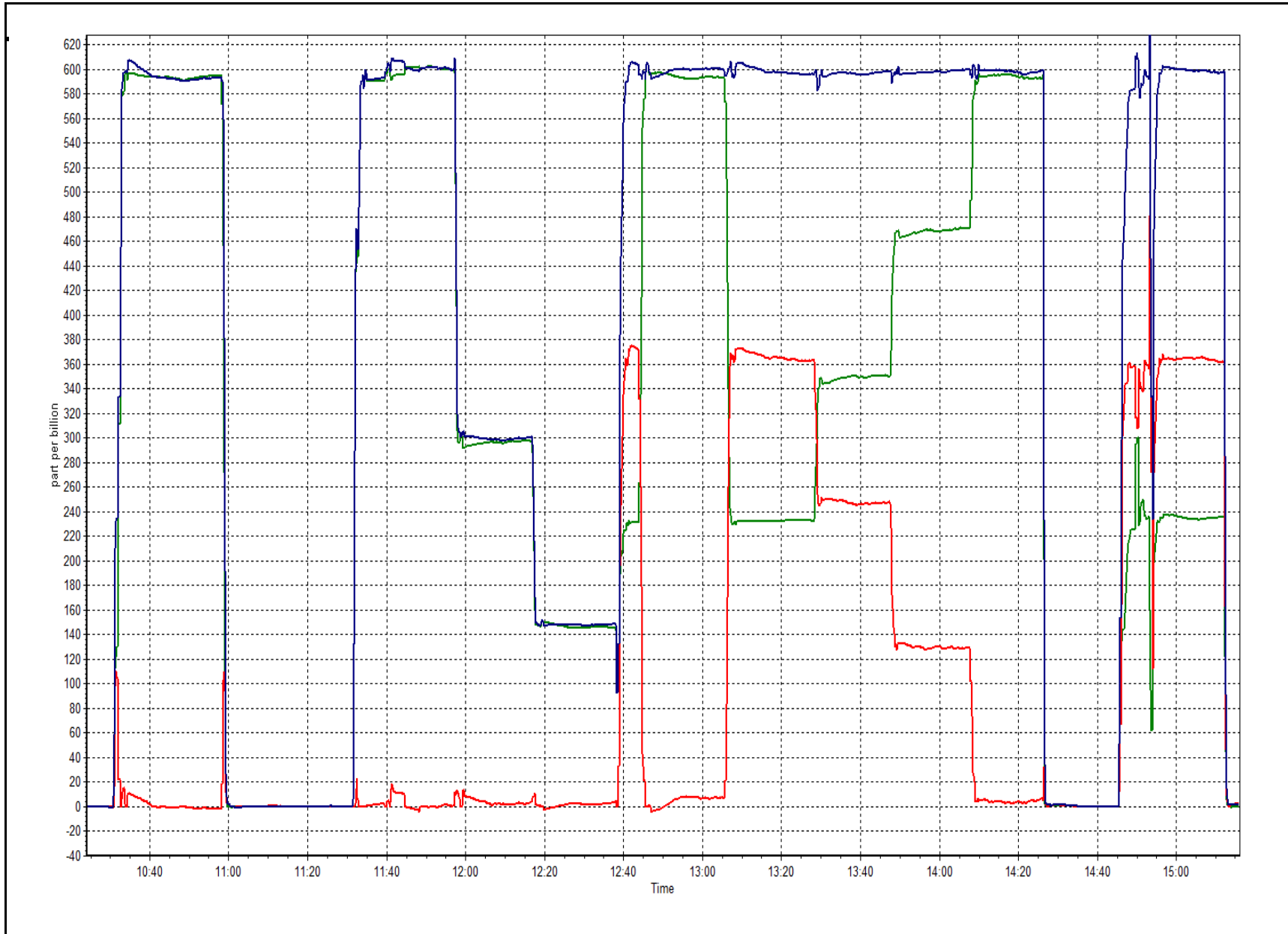
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 26, 2016 | Previous Calibration | August 16, 2016 |
| Station Number | Wapasu | Station Number | AMS 17 |
| Start Time (MST) | 10:08 | End Time (MST) | 15:16 |
| Analyzer make | API T200 | Analyzer serial # | 722 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.1 | N/A | Correlation Coefficient | 0.999883 |
| 360.4 | 364.1 | 0.9897 | | |
| 243.1 | 246.8 | 0.9852 | Slope | 0.991781 |
| 124.1 | 129.0 | 0.9614 | | |
| | | | Intercept | -1.592018 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|-----------------|
| Station Name: | Wapasu | Station number: | AMS 17 |
| Calibration Date: | September 26, 2016 | Last Cal Date: | August 28, 2016 |
| Start time (MST): | 11:45 | End time (MST): | 12:20 |
| Sharp Model: | 5030 | S/N: | CM-2390 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | 10391 |
| Flow Standard Model: | DeltaCal | S/N: | 628 |
| Temp/RH standard: | NA | S/N: | NA |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------------------------------|----------|---------------------------------------------------|--------------------------|---------------|
| T1 (°C) | 17.6 | 18 | 17.6 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 950 | 953.25 | 950 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1000 | 106.8 | 1000 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.0 | ----- | 0.0 | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning: | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | Tolerance |
|------------|-------------------|-----------|------------------|-------------------|
| Leak Test: | Date of check: | <u>NA</u> | Last Cal Date: | <u>NA</u> |
| | Flow w/o adaptor: | <u>NA</u> | Flow w/ adaptor: | <u>NA</u> 0.4 LPM |

Annual Calibration Test

| | | | | |
|------------------|------------------------|-----------|-----------------------------|-----------|
| Foil Calibration | Foil Mass: | <u>NA</u> | S/N: | <u>NA</u> |
| | Date of check: | <u>NA</u> | Last Cal Date: | <u>NA</u> |
| | New Correction Factor: | <u>NA</u> | Previous Correction Factor: | <u>NA</u> |

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

Notes: Cyclone head cleaned. No adjustments needed.

Calibration by: Jayme Marcoux



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

| | | | |
|------------------|---------------------------------------|----------------------|----------------------------|
| Calibration Date | Thursday, September 08, 2016 | Previous Calibration | Wednesday, August 17, 2016 |
| Station Name | Wapasu | Station Number | AMS 17 |
| Reason: | Routine Installation Removal | | |
| Start Time (MST) | 11:28 | End Time (MST) | 11:57 |
| Barometric Press | n/a | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053 | Serial Number | J6774 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | P10039 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 2633 |
| DACS voltage range | 5000 | DACS channel # | P2 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 0.99959357 | Calculated slope | #DIV/0! |
| Calculated intercept | -0.028064035 | Calculated intercept | #DIV/0! |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | NA | n/a |
| 200 | 20.2 | NA | #VALUE! |
| 400 | 39.4 | NA | #VALUE! |
| 600 | 58.6 | NA | #VALUE! |
| 800 | 77.8 | NA | #VALUE! |
| 1000 | 96.9 | NA | #VALUE! |
| Average Correction Factor | | | #VALUE! |

WIND DIRECTION

| | | | |
|--------------------------------------|---------------------------|-------------------------------------|--------------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | P19942 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 6894 |
| DACS voltage range | 5000 | DACS channel # | SE 24 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 0.994895756 | Calculated slope | 0.991394 |
| Calculated intercept | -0.990916808 | Calculated intercept | -0.940498 |
| As Found Declination (west of North) | 17 | As Left Declination (west of North) | 17.000000 |

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | 1.8 | n/a |
| 90 | 91.7 | 0.9815 |
| 180 | 181.6 | 0.9912 |
| 270 | 271.7 | 0.9937 |
| 357 | 362.7 | 0.9843 |
| Average Correction Factor | | 0.9877 |

Notes:

WD done WS done in Aug 17,2016

Calibration Performed By:

Devin Russell and Melissa Lemay



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 18
STONY MOUNTAIN
SEPTEMBER 2016

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|---------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 626 | 38 | 94 | 92.22 | 2 | 0 | 1 | 0 |
| TRS(ppb) Average | 627 | 37 | 93 | 92.22 | 0 | 0 | 0 | 0 |
| THC(ppm) Average | 625 | 37 | 95 | 91.94 | 2.2 | - | 2.1 | - |
| NMHC(ppm) Average | 625 | 37 | 95 | 91.94 | 0.153 | - | 0.099 | - |
| CH4(ppm) Average | 625 | 37 | 95 | 91.94 | 2.1 | - | 2 | - |
| O3 (ppb) Average | 629 | 36 | 91 | 92.36 | 46 | 0 | 39 | - |
| NO2 (ppb) Average | 626 | 38 | 94 | 92.22 | 8 | 0 | 2 | - |
| NO (ppb) Average | 626 | 38 | 94 | 92.22 | 1 | - | 0 | - |
| NOX (ppb) Average | 626 | 38 | 94 | 92.22 | 8 | - | 2 | - |
| PM2.5 (ug/m3) Average | 719 | 1 | 1 | 100.00 | 16 | - | 5.7 | 0 |
| Wind Speed 10 m (km/h) Average | 641 | 1 | 79 | 89.17 | 18 | - | 14 | - |
| Wind Direction 10 m (deg) Average | 641 | 1 | 79 | 89.17 | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 22.4 | - | 16.2 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 96.0 | - |
| Precipitation (mm) Total | 720 | 0 | 0 | 100.00 | 3.9 | - | 17.2 | - |
| Leaf Wetness (% of range) Average | 720 | 0 | 0 | 100.00 | 61 | - | 23.0 | - |
| Global Solar Radiation (W/m2) Average | 720 | 0 | 0 | 100.00 | 797 | - | 209.0 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | | |
|---------------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max | |
| SO2 (ppb) Average | 626 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| TRS (ppb) Average | 627 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| THC (ppm) Average | 625 | 1.96 | 0.1 | - | 1.9 | 1.9 | 1.9 | 1.9 | 2 | 2 | 2 | 2.2 |
| NMHC(ppm) Average | 625 | 0.014 | 0.024 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.153 |
| CH4(ppm) Average | 625 | 1.94 | 0 | - | 1.9 | 1.9 | 1.9 | 1.9 | 2 | 2 | 2 | 2.1 |
| O3 (ppb) Average | 629 | 27.6 | 8 | - | 9 | 17 | 21 | 28 | 33 | 38 | 46 | 46 |
| NO2 (ppb) Average | 626 | 0.7 | 1 | - | 0 | 0 | 0 | 1 | 1 | 1 | 8 | 8 |
| NO (ppb) Average | 626 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| NOX (ppb) Average | 626 | 0.7 | 1 | - | 0 | 0 | 0 | 1 | 1 | 2 | 8 | 8 |
| PM2.5 (ug/m3) Average | 719 | 2.71 | 1.8 | - | 0.5 | 1.1 | 1.5 | 2.4 | 3.5 | 4.6 | 16 | 16 |
| Wind Speed 10 m (km/h) Average | 641 | 7.6 | 3 | - | 0 | 4 | 5 | 7 | 10 | 12 | 18 | 18 |
| Wind Direction 10 m (deg) Average | 641 | - | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 10.22 | 4.2 | - | 1.8 | 5.1 | 7.1 | 9.8 | 12.9 | 15.7 | 22.4 | 22.4 |
| Relative Humidity (%) Average | 720 | 73.1 | 18 | - | 29 | 46 | 58 | 76 | 89 | 96 | 99 | 99 |
| Precipitation (mm) Total | 720 | - | - | 50.51 | - | - | - | - | - | - | - | - |
| Surface Wetness (% of range) Average | 720 | 5.7 | 9 | - | 0 | 1 | 1 | 2 | 4 | 19 | 61 | 61 |
| Global Solar Radiation (W/m2) Average | 720 | 132.2 | 194 | - | 0 | 0 | 0 | 12 | 227 | 480 | 797 | 797 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS 18)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|---------------------------------------------------|
| AIR QUALITY ANALYZERS | 14 Sep 2016 10:00 | 16 Sep 2016 15:00 | 54 | Analyzer Failure - cracked sample manifold |
| AIR QUALITY ANALYZERS | 16 Sep 2016 16:00 | 16 Sep 2016 16:00 | 1 | Maintenance - manifold repair |
| SO2, TRS, THC, NO2 | 13 Sep 2016 16:00 | 13 Sep 2016 16:00 | 1 | Maintenance - manifold cleaning |
| NMHC, CH4, THC | 26 Sep 2016 15:00 | 26 Sep 2016 16:00 | 2 | Maintenance - replaced carrier gas cylinder |
| Wind Speed, Wind Direction | 09 Sep 2016 11:00 | 09 Sep 2016 11:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 09 Sep 2016 13:00 | 09 Sep 2016 15:00 | 3 | Maintenance - sensor check |
| Wind Speed, Wind Direction | 09 Sep 2016 16:00 | 10 Sep 2016 13:00 | 22 | Analyzer Failure - sensor removed for replacement |
| Wind Speed, Wind Direction | 12 Sep 2016 13:00 | 12 Sep 2016 22:00 | 10 | Analyzer Failure - signal cable |
| Wind Speed, Wind Direction | 20 Sep 2016 12:00 | 20 Sep 2016 15:00 | 4 | Analyzer Failure - signal cable |
| Wind Speed, Wind Direction | 22 Sep 2016 21:00 | 23 Sep 2016 00:00 | 4 | Analyzer Failure - signal cable |
| Wind Speed, Wind Direction | 23 Sep 2016 14:00 | 23 Sep 2016 15:00 | 2 | Maintenance - replaced signal cable |
| Wind Speed, Wind Direction | 25 Sep 2016 04:00 | 26 Sep 2016 08:00 | 29 | Analyzer Failure - signal cable |
| Wind Speed, Wind Direction | 26 Sep 2016 13:00 | 26 Sep 2016 15:00 | 3 | Maintenance - re-wired signal cable |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Stony Mountain - September 2016

| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 26 11:00 | Maximum Daily Average: 0.6 ppb on Sep 26 | | Hours of Data: | 626 |
| Minimum Value: 0 ppb on Sep 12 07:00 | Minimum Daily Average: 0.0 ppb on Sep 17 | | Hours of Missing Data: | 94 |
| Maximum Diurnal Average: 0.3 ppb at hour 11 | Minimum Diurnal Average: 0.2 ppb at hour 4 | | Hours of Calibration: | 38 |
| 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: | 92.2 |

| 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 | 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 | Z | 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 | 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 | 0.1 | 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 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 9-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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 0 | |
| 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 | M | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | -- | 1 |
| 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 | 0.0 | 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 | 0.1 | 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 | 0.1 | 0 | |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.3 | 1 | |
| 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 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.4 | 1 | |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 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 | 0.2 | 0 | |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 2 | |
| 27-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 | |
| 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 | 0.1 | 0 | |
| 29-Sep | 0 | 1 | 1 | Z | 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 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |

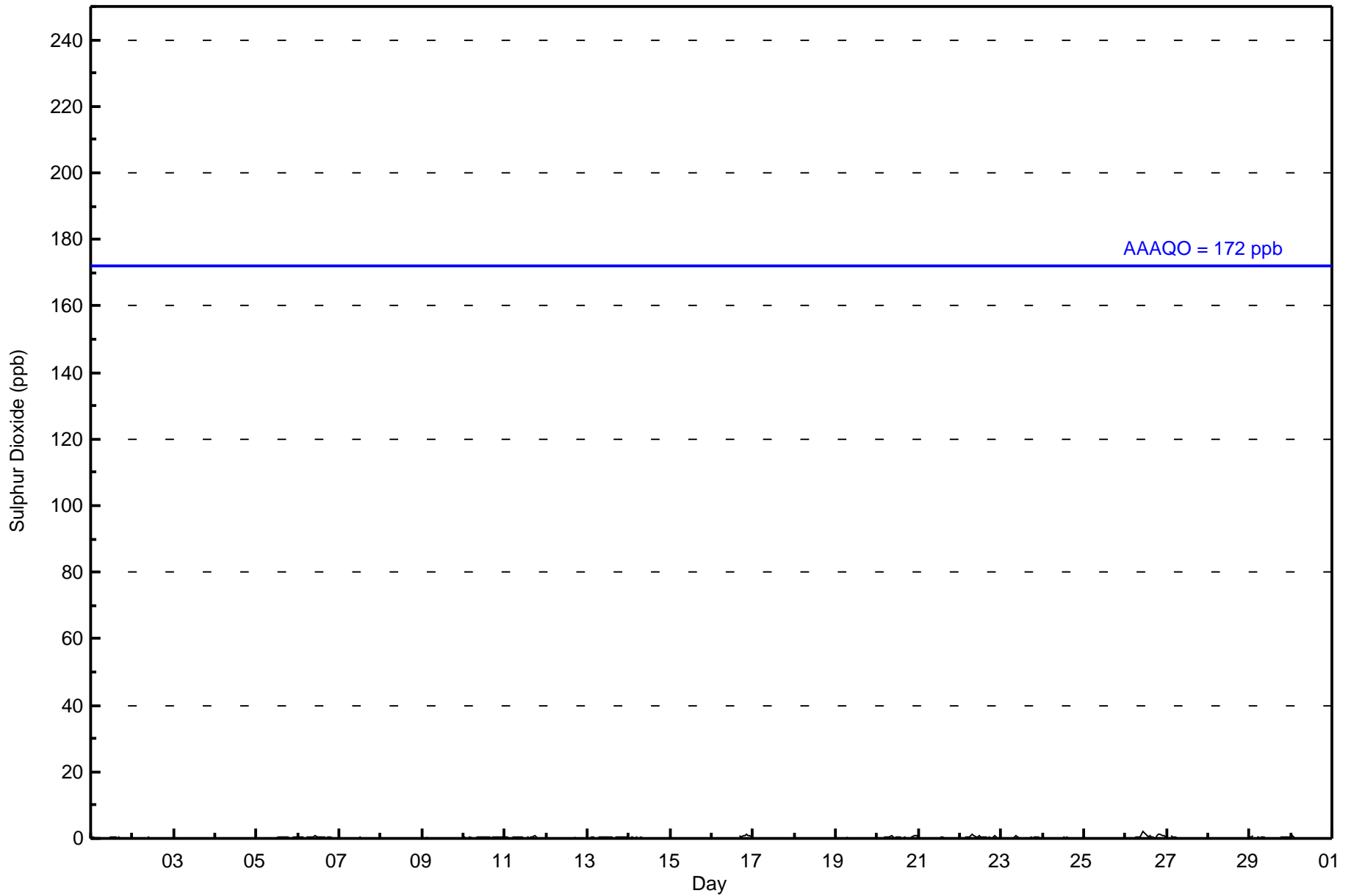
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3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

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Stony Mountain - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 626 | 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: 626

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Stony Mountain - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |
| 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 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |

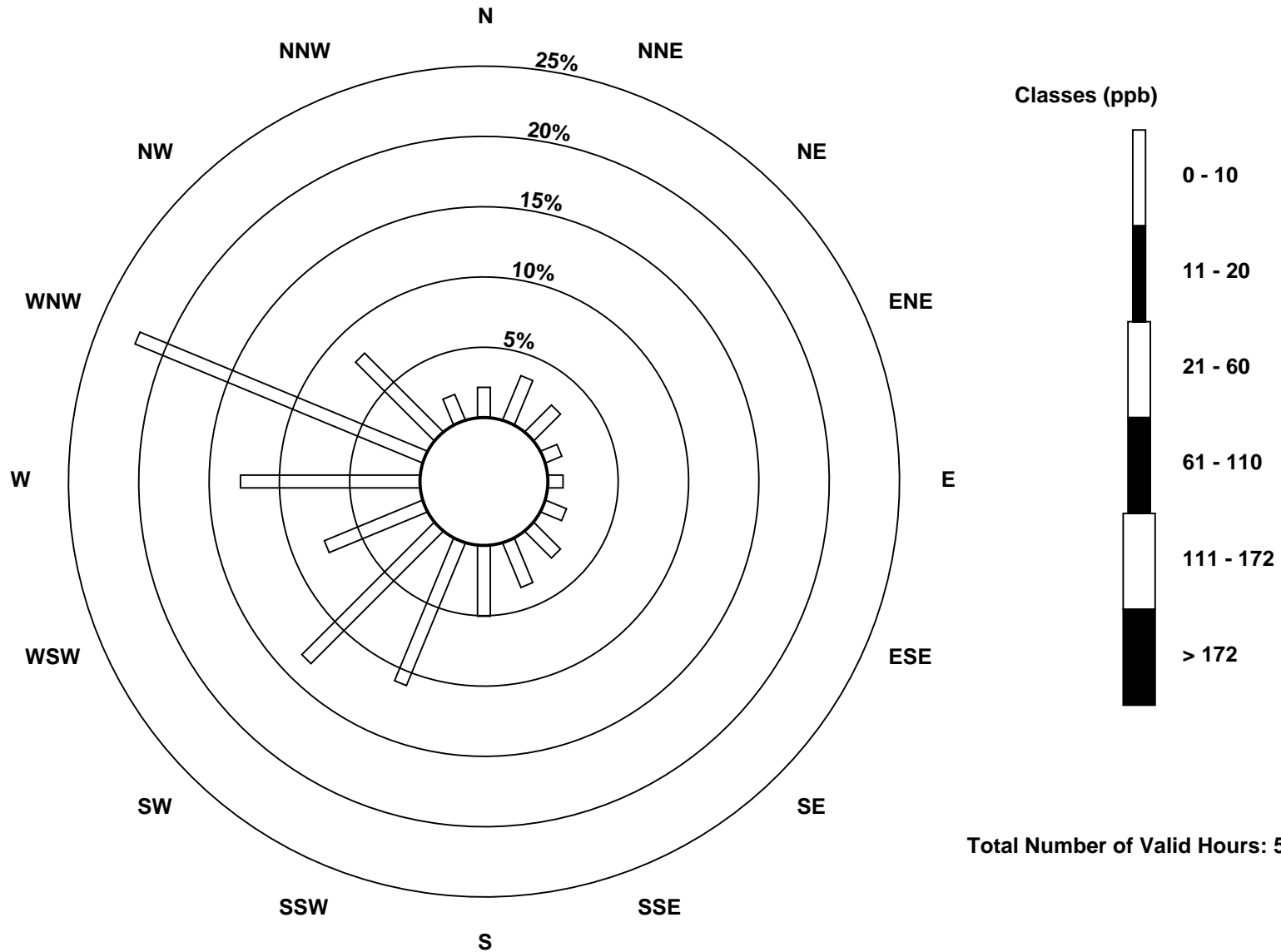
Total Number of Valid Hours: 556

Total Number of Hours: 720

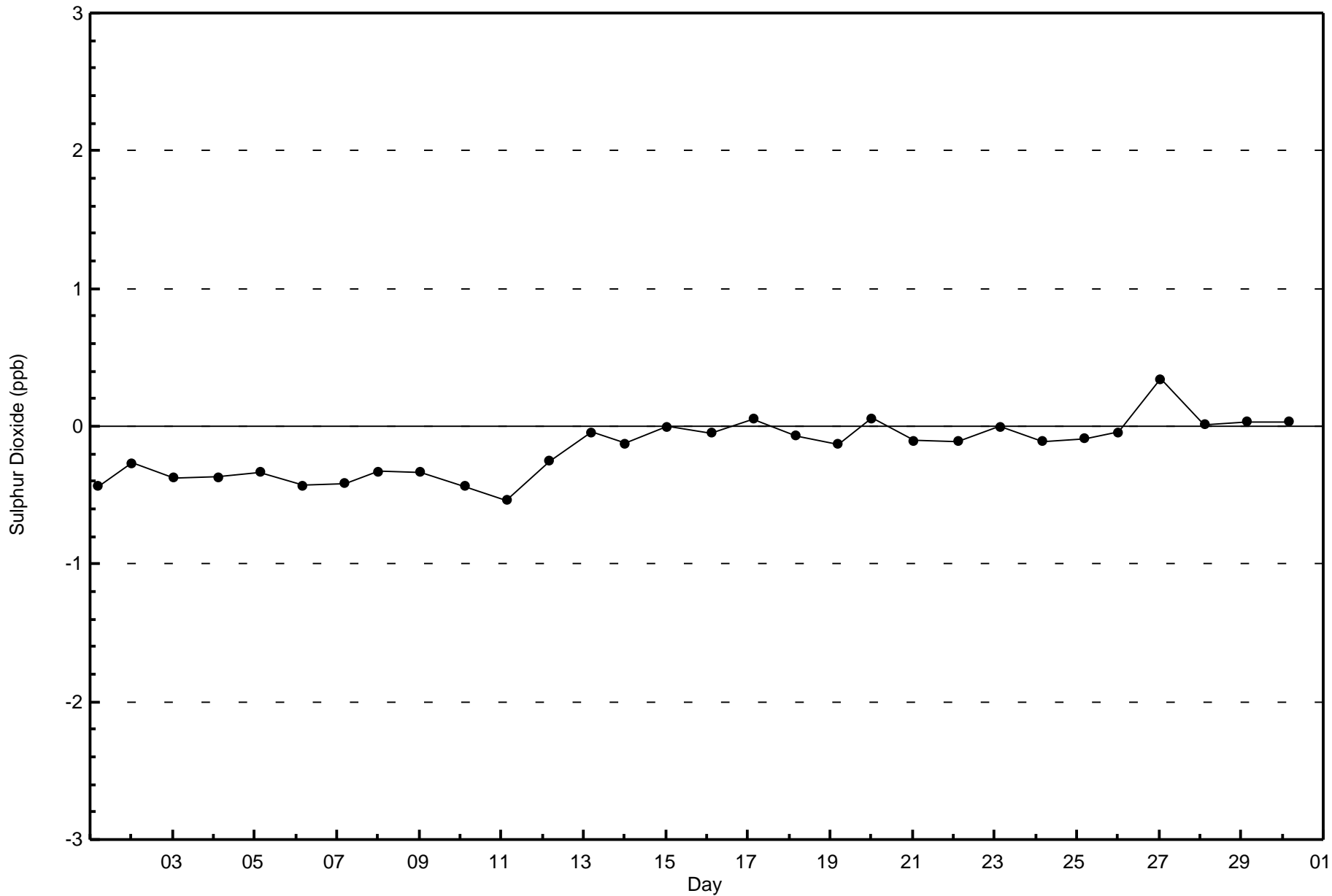


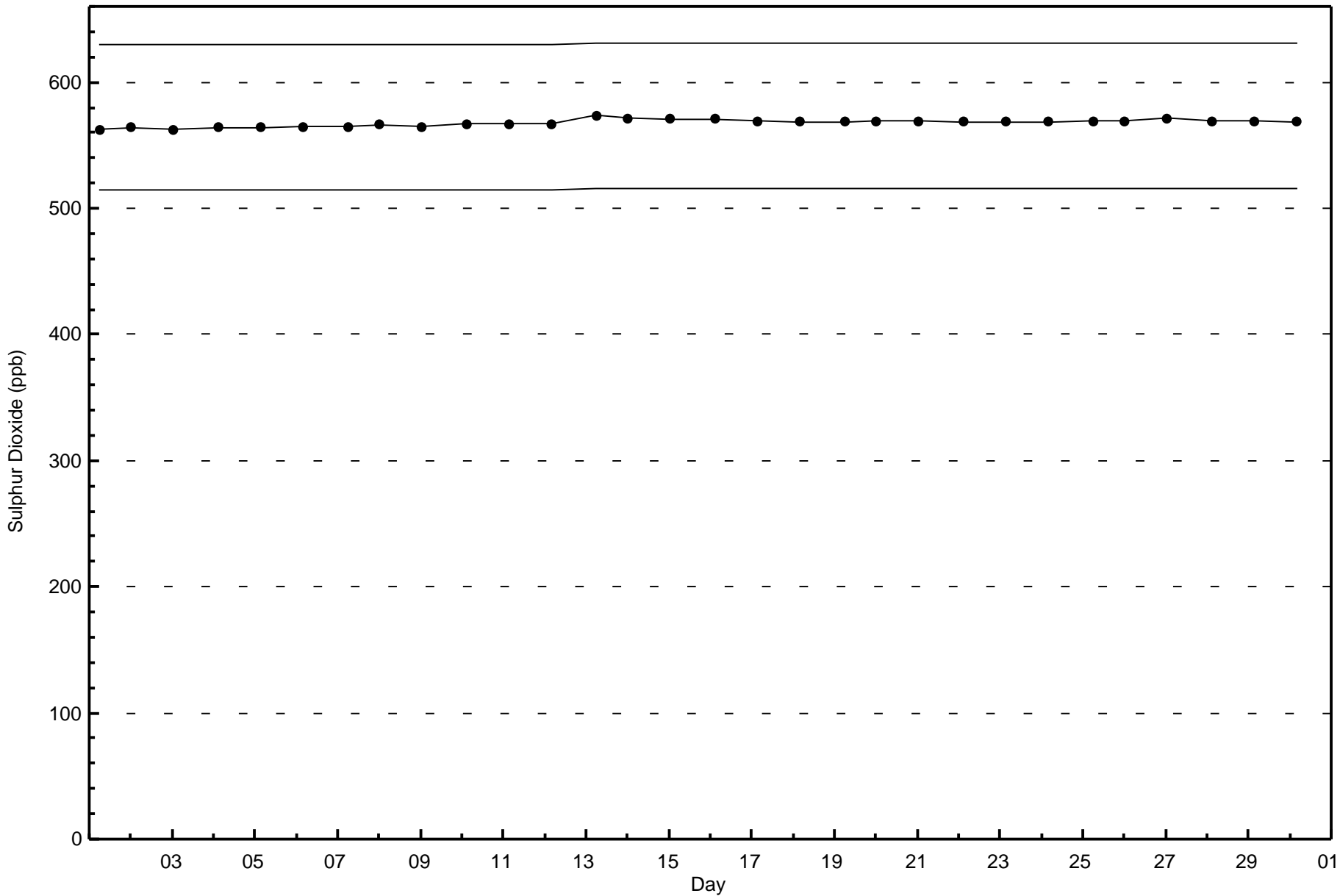
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 556

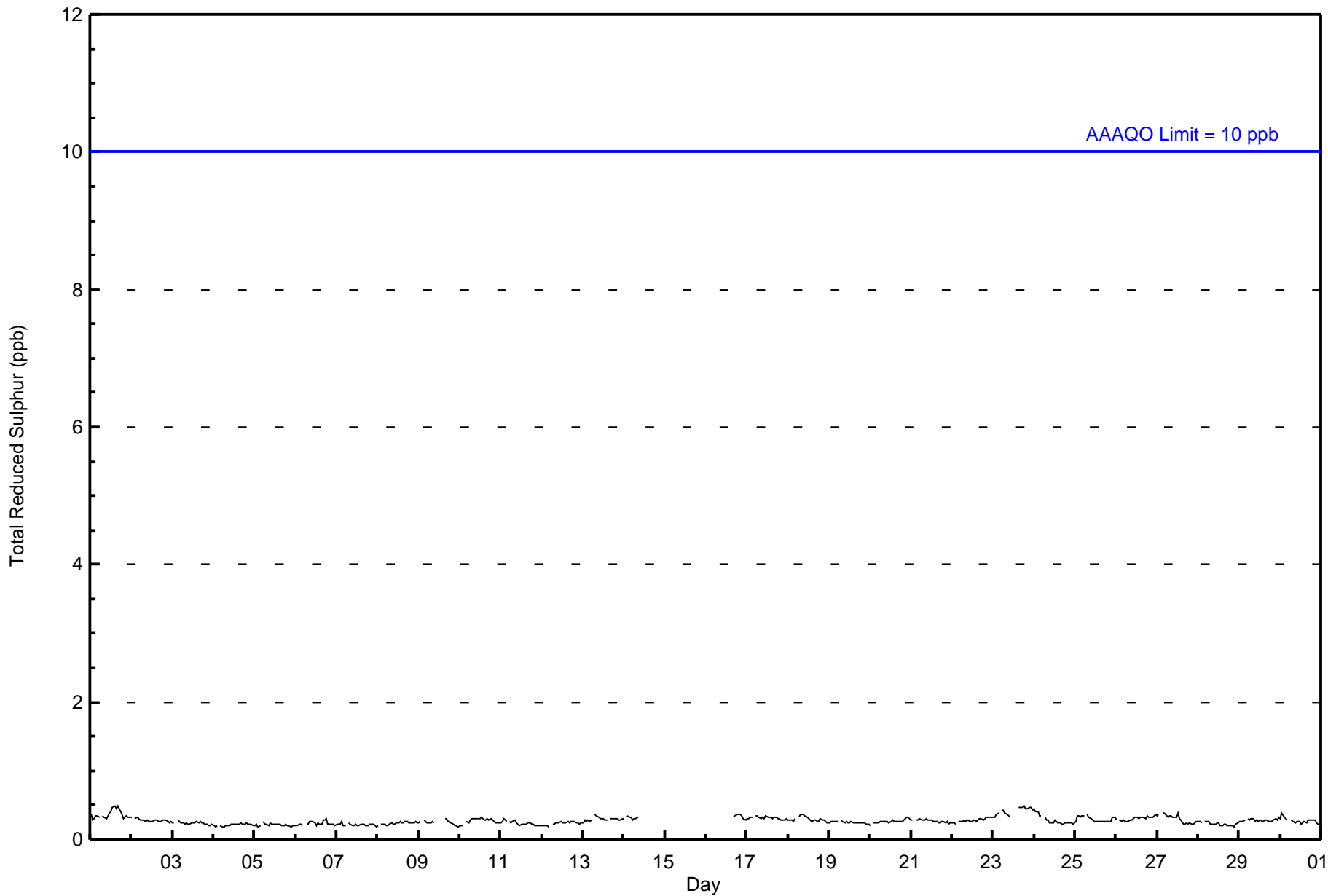






Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Stony Mountain - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 627 | 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: 627

Total Number of Hours: 720



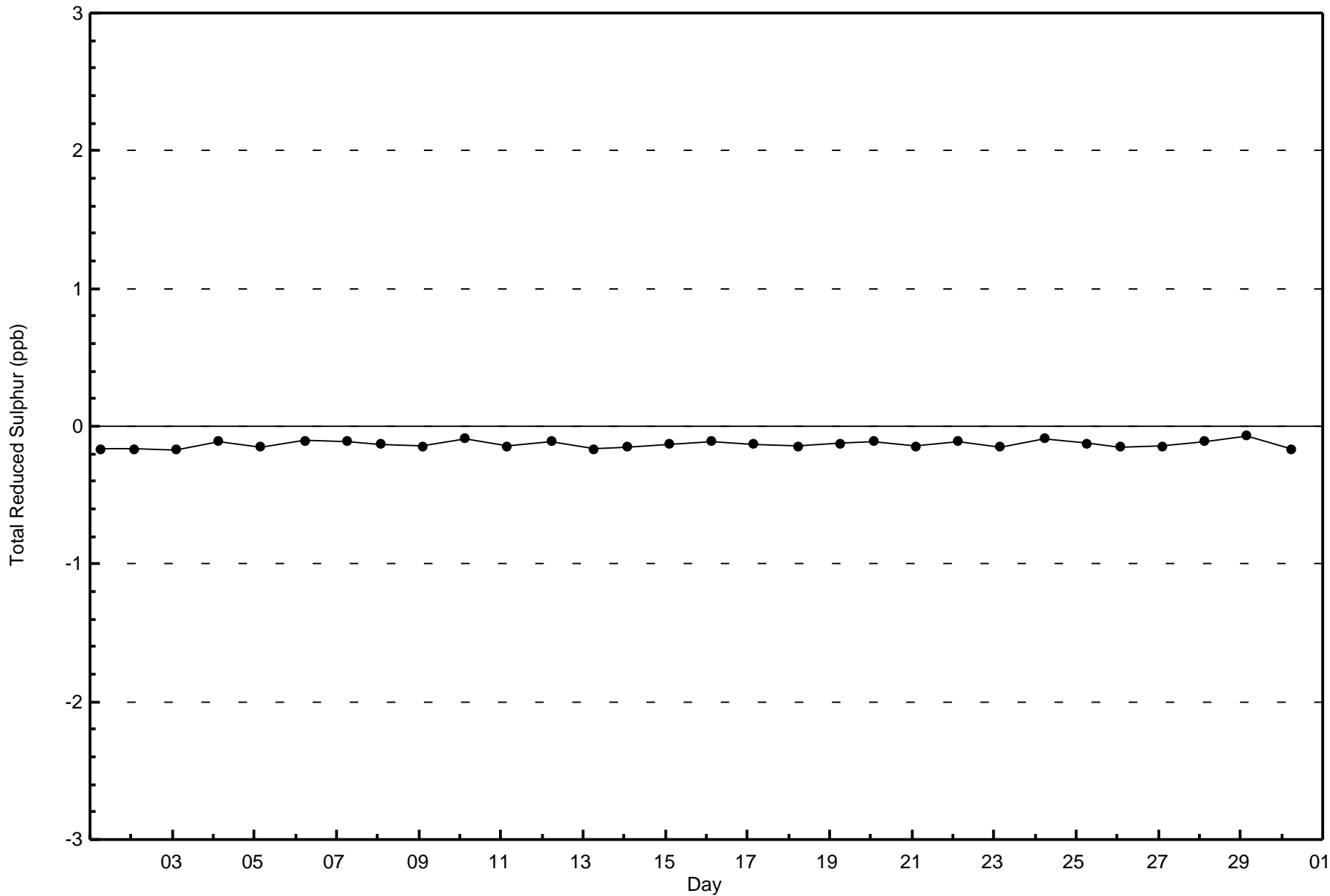
**Wood Buffalo Environmental Association
Frequency Distribution**

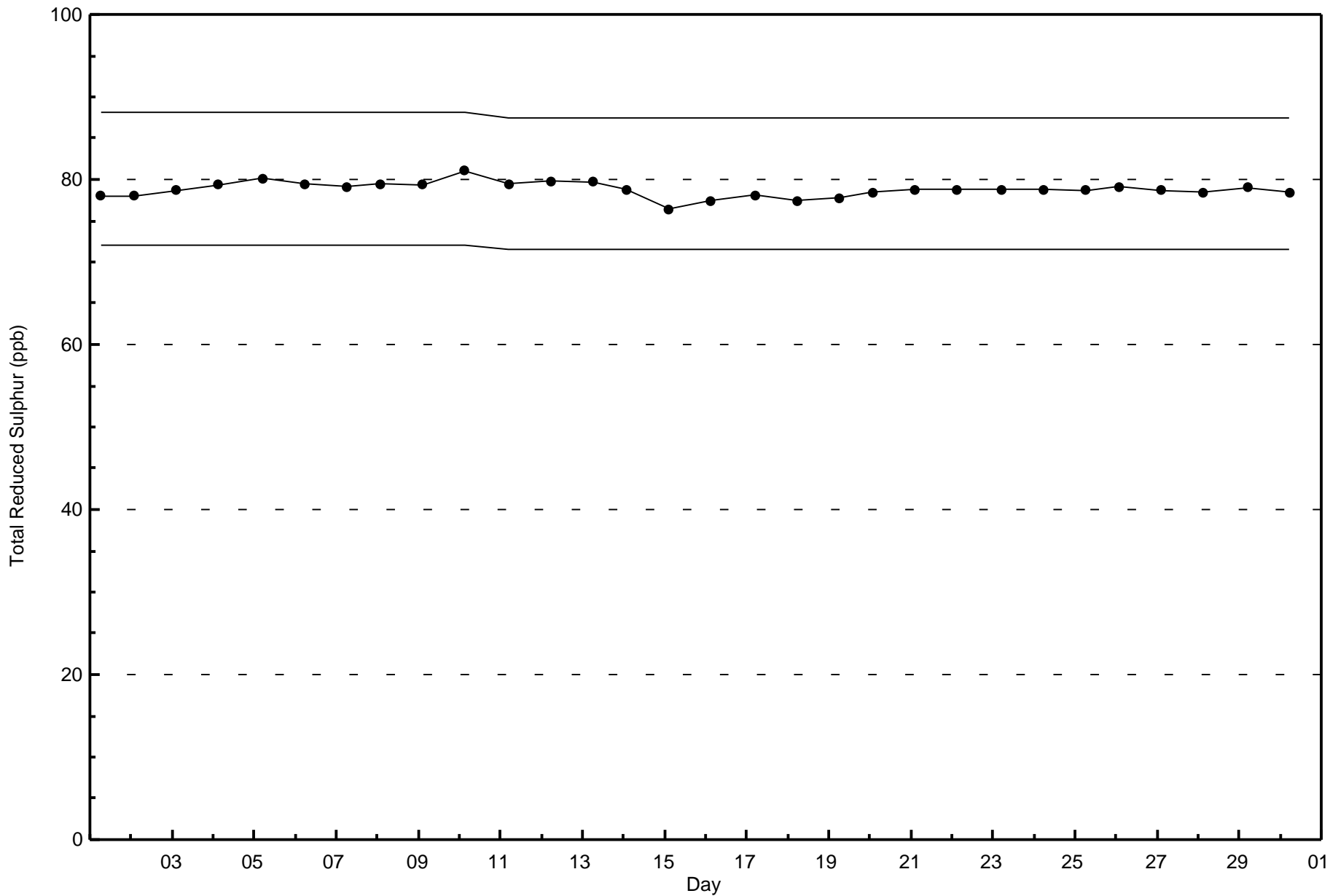
**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 60 | 75 | 45 | 69 | 123 | 44 | 11 | 557 |
| 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 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 60 | 75 | 45 | 69 | 123 | 44 | 11 | 557 |

Total Number of Valid Hours: 557

Total Number of Hours: 720







Wood Buffalo Environmental Association
Summary of Hour Averages

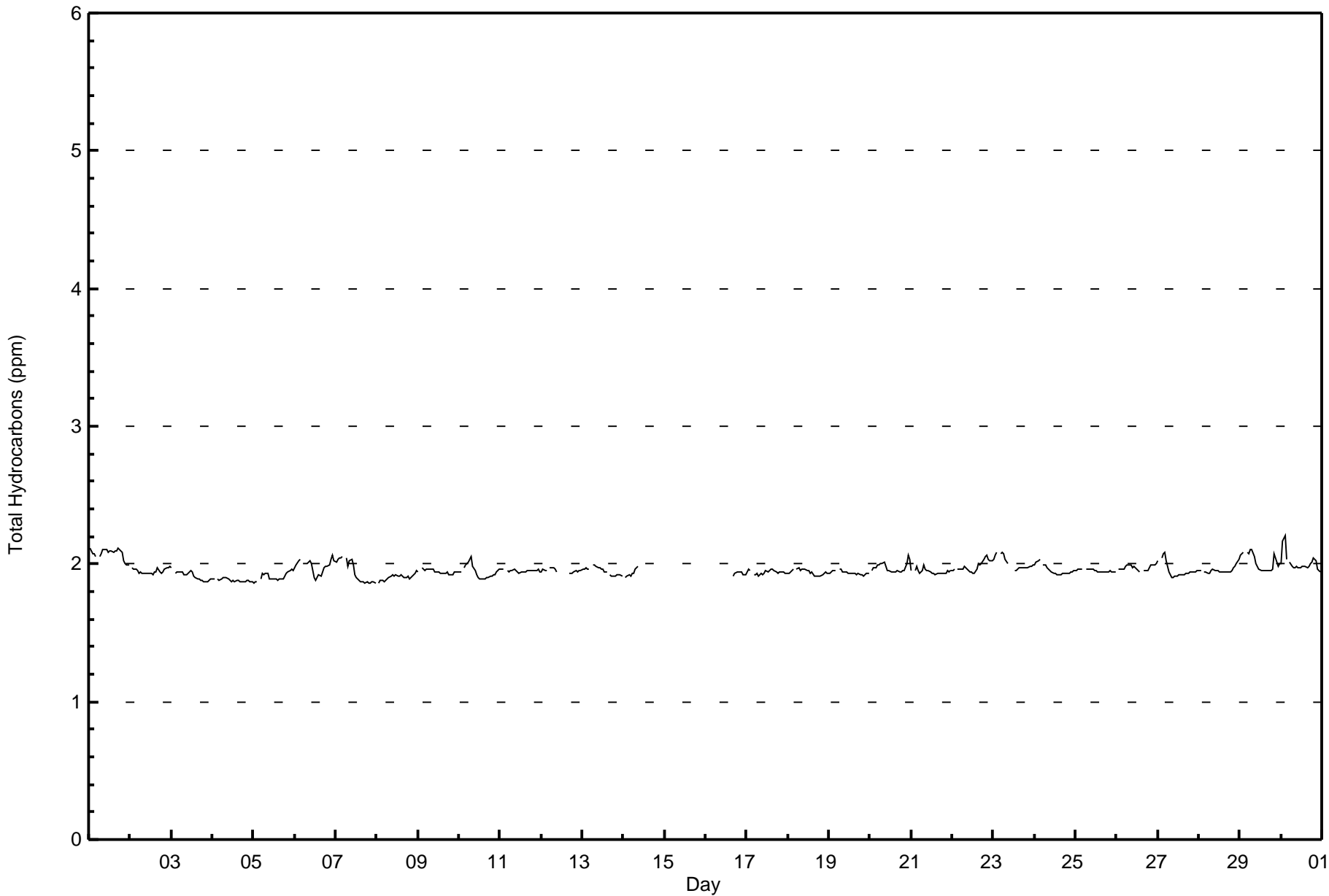
Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2016

| Maximum Value: 2.2 ppm on Sep 30 03:00 | | Maximum Daily Average: 2.1 ppm on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|-----|
| Minimum Value: 1.9 ppm on Sep 8 02:00 | | Minimum Daily Average: 1.9 ppm on Sep 4 | | Hours of Data: 625 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.0 ppm at hour 3 | | Minimum Diurnal Average: 1.9 ppm at hour 14 | | Hours of Missing Data: 95 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.96 ppm | | Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.1 | | Hours of Calibration: 37 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 91.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 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 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | |
| 2-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | |
| 3-Sep | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 4-Sep | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | |
| 5-Sep | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | |
| 6-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | |
| 7-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | |
| 8-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | |
| 9-Sep | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 10-Sep | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.1 | |
| 11-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | |
| 12-Sep | 1.9 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | C | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | -- | 2.0 | |
| 13-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 14-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 2.0 |
| 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 | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 17-Sep | 1.9 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| 18-Sep | 1.9 | 1.9 | 1.9 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 19-Sep | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 20-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | |
| 21-Sep | 2.0 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | |
| 22-Sep | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | |
| 23-Sep | 2.0 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | C | C | C | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | |
| 24-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 25-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| 26-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | M | M | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| 27-Sep | 2.0 | Z | 2.0 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | |
| 28-Sep | 2.0 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| 29-Sep | 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 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | |
| 30-Sep | 2.0 | 2.2 | 2.2 | 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 | 1.9 | 2.0 | 2.2 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 584 | 93.44 | 93.44 |
| 2.1 - 3.0 | 41 | 6.56 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 625

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 10 | 17 | 13 | 3 | 2 | 7 | 12 | 16 | 24 | 54 | 69 | 41 | 69 | 123 | 44 | 11 | 515 |
| 2.1 - 3.0 | 2 | 2 | 2 | 4 | 4 | 2 | 3 | 2 | 4 | 6 | 5 | 1 | 2 | 0 | 0 | 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 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 18 | 28 | 60 | 74 | 42 | 71 | 123 | 44 | 11 | 554 |

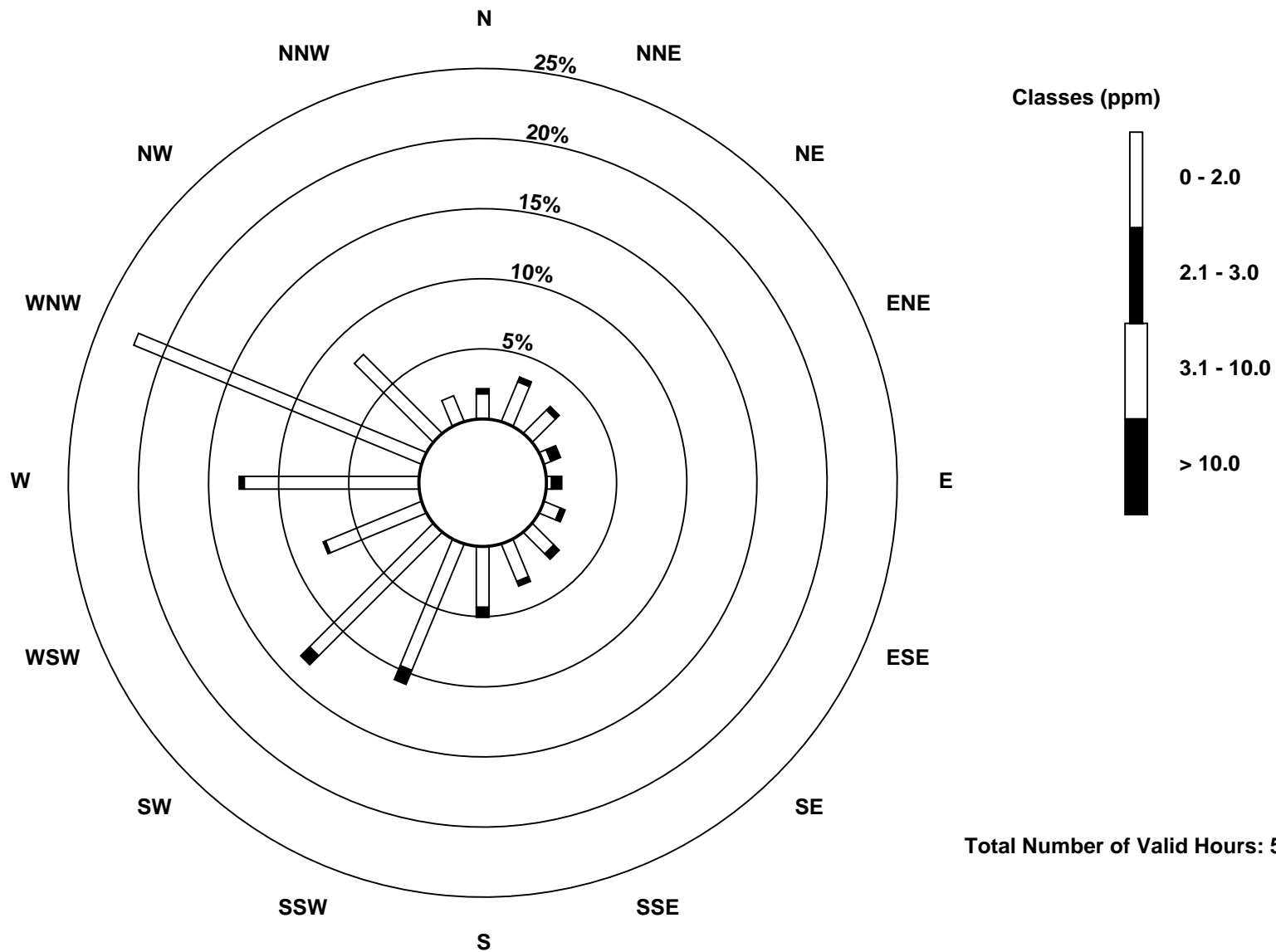
Total Number of Valid Hours: 554

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

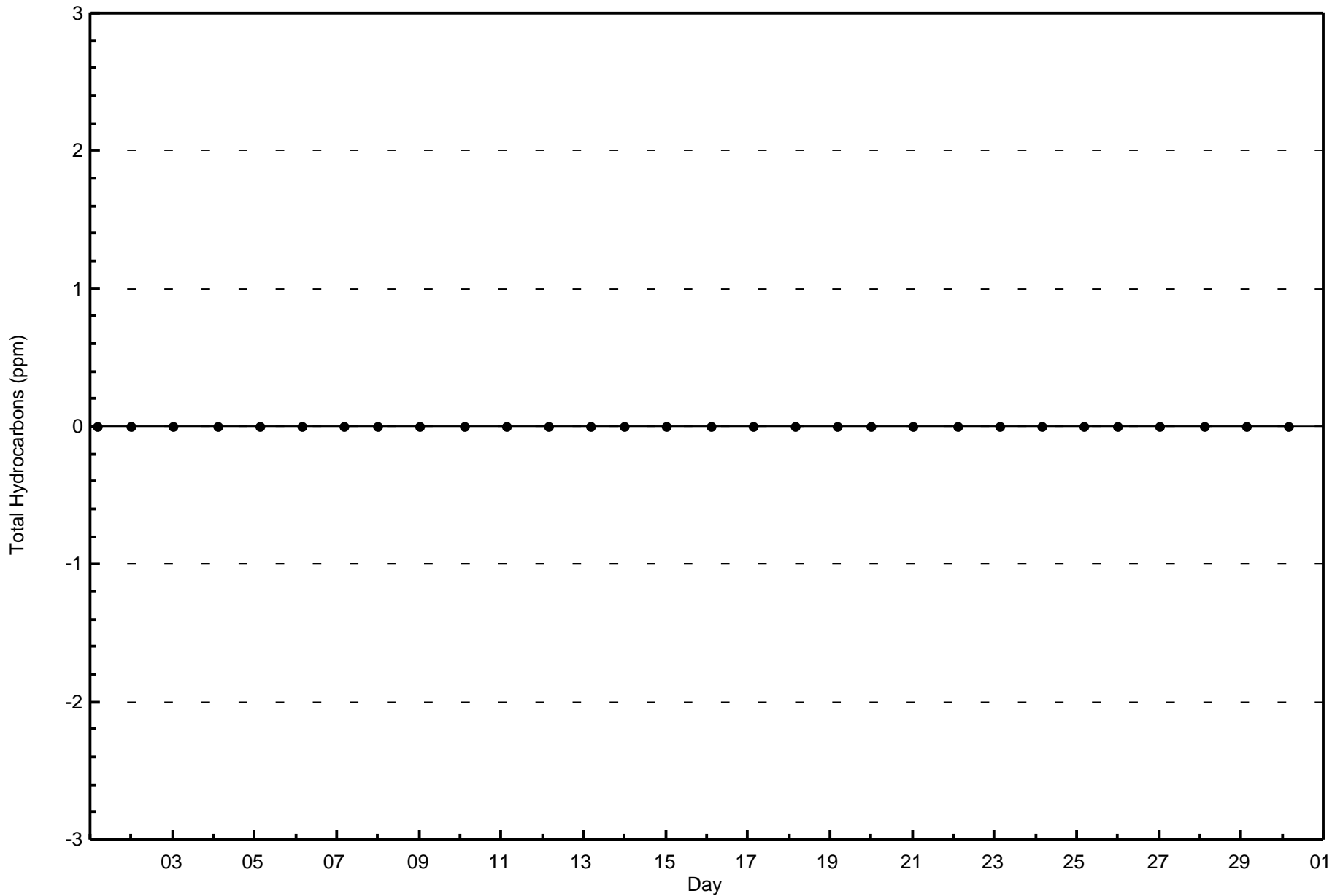
Total Hydrocarbons (THC) - ppm
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Zero Responses

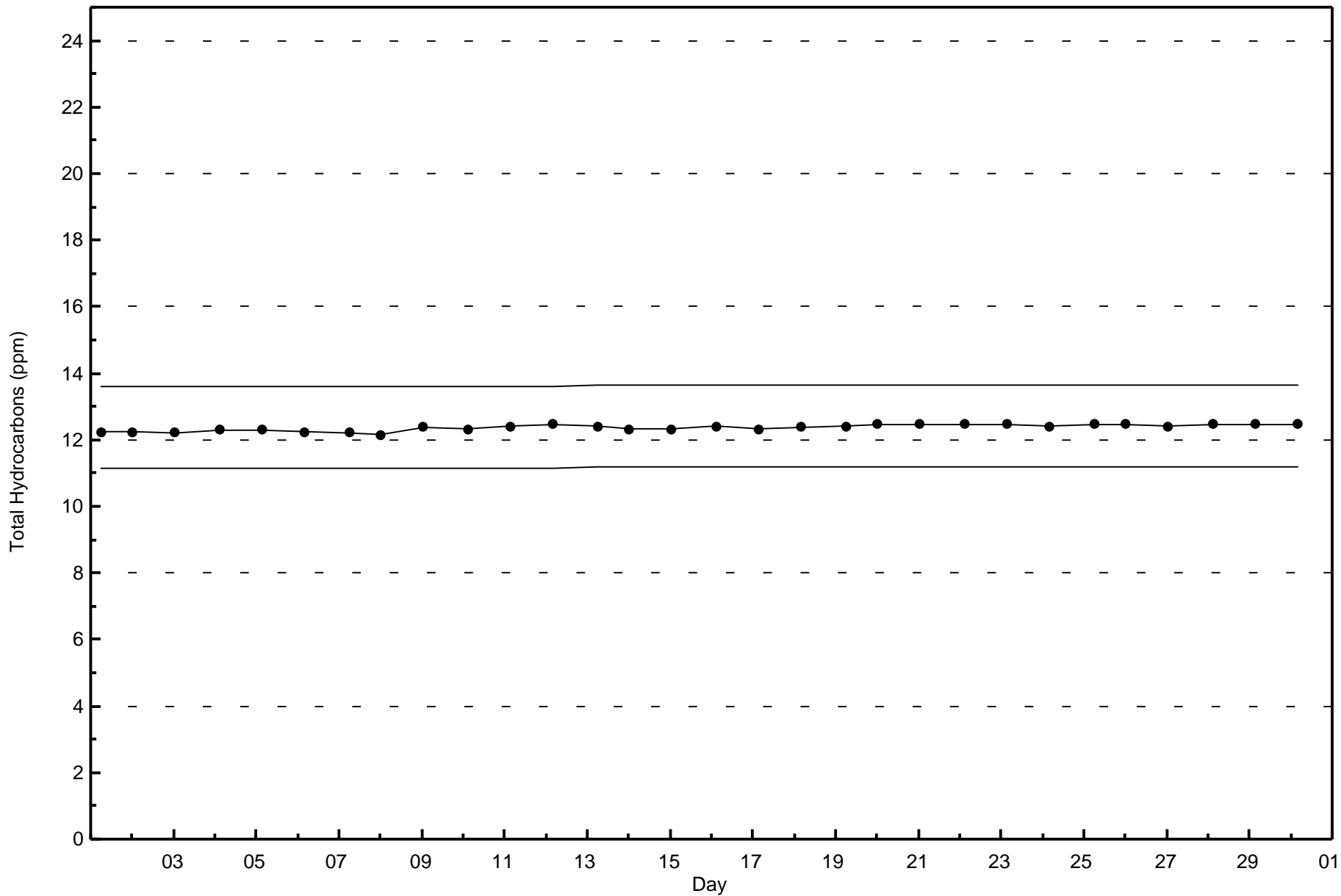
Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2016





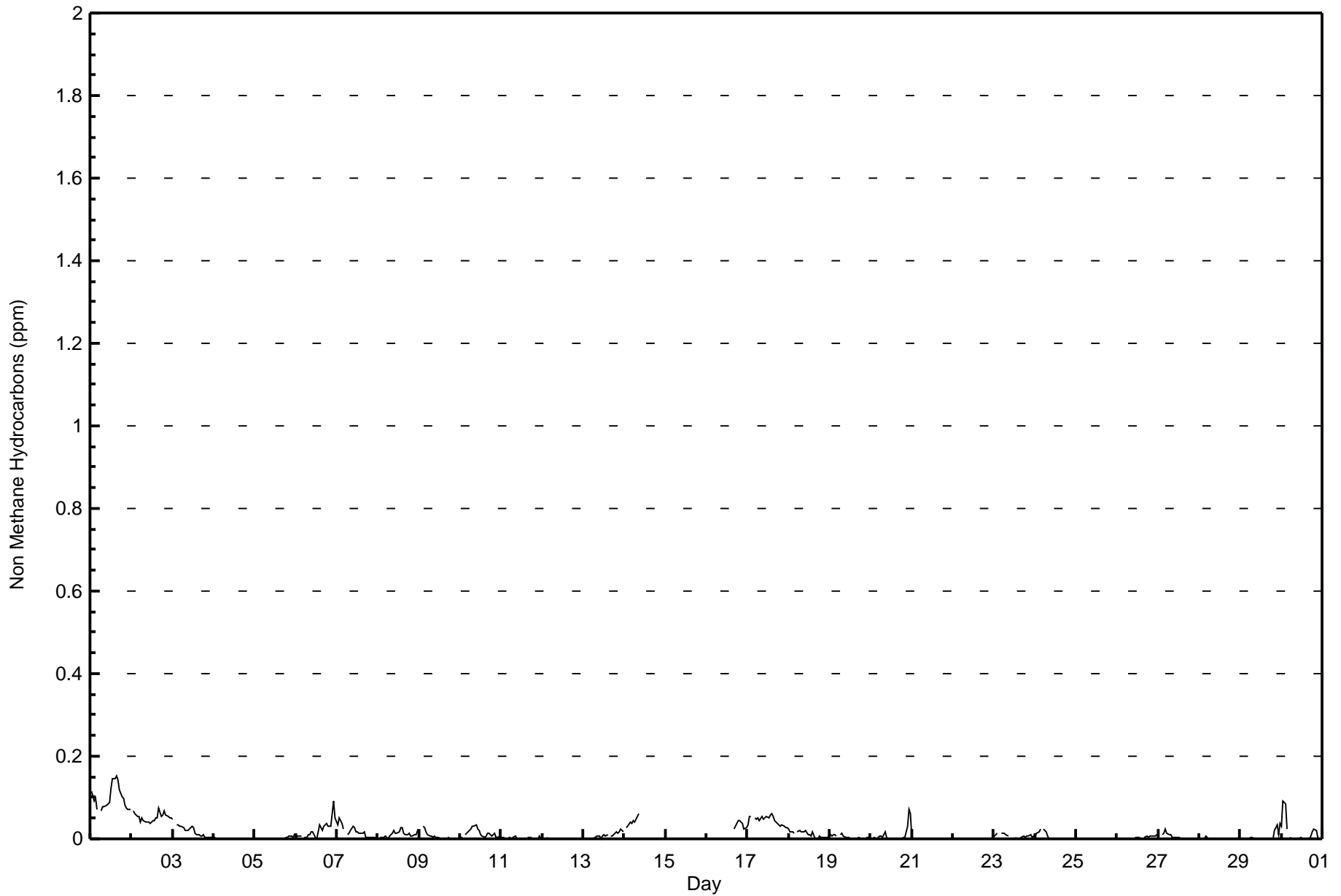
Wood Buffalo Environmental Association
Span Responses

Total Hydrocarbons (THC) - ppm
Stony Mountain - September 2016





| Maximum Value: 0.153 ppm on Sep 1 16:00 | | Maximum Daily Average: 0.099 ppm on Sep 1 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|---------------|---------------|-------|-----------------|-------|-------|-------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------------|--|
| Minimum Value: 0.000 ppm on Sep 4 13:00 | | Minimum Daily Average: 0.000 ppm on Sep 25 | | Hours of Data: 625 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.021 ppm at hour 3 | | Minimum Diurnal Average: 0.012 ppm at hour 12 | | Hours of Missing Data: 95 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.014 ppm | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.1 | | Hours of Calibration: 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 91.9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.117 | 0.105 | 0.091 | 0.098 | 0.071 | Z | 0.069 | 0.077 | 0.078 | 0.080 | 0.085 | 0.089 | 0.122 | 0.145 | 0.145 | 0.153 | 0.142 | 0.118 | 0.101 | 0.097 | 0.083 | 0.074 | 0.072 | 0.070 | 0.099 | 0.153 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | Z | 0.066 | 0.060 | 0.054 | 0.054 | 0.041 | 0.050 | 0.043 | 0.041 | 0.041 | 0.039 | 0.037 | 0.044 | 0.044 | 0.051 | 0.050 | 0.074 | 0.055 | 0.058 | 0.067 | 0.057 | 0.055 | 0.051 | 0.051 | 0.051 | 0.074 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 0.048 | Z | 0.035 | 0.034 | 0.032 | 0.029 | 0.027 | 0.021 | 0.021 | 0.020 | 0.024 | 0.031 | 0.028 | 0.014 | 0.011 | 0.009 | 0.008 | 0.005 | 0.009 | 0.005 | 0.004 | 0.004 | 0.003 | 0.003 | 0.018 | 0.048 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 0.004 | 0.000 | Z | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.002 | 0.004 | 0.007 | 0.007 | 0.004 | 0.009 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 0.004 | 0.005 | 0.008 | 0.008 | Z | 0.004 | 0.003 | 0.009 | 0.009 | 0.019 | 0.018 | 0.002 | 0.002 | 0.017 | 0.033 | 0.021 | 0.029 | 0.033 | 0.037 | 0.032 | 0.030 | 0.060 | 0.093 | 0.052 | 0.023 | 0.093 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 0.034 | 0.049 | 0.043 | 0.037 | 0.024 | Z | 0.010 | 0.013 | 0.022 | 0.032 | 0.027 | 0.019 | 0.015 | 0.012 | 0.012 | 0.013 | 0.016 | 0.005 | 0.003 | 0.002 | 0.003 | 0.002 | 0.003 | 0.002 | 0.017 | 0.049 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | Z | 0.005 | 0.004 | 0.004 | 0.006 | 0.003 | 0.001 | 0.007 | 0.013 | 0.020 | 0.012 | 0.014 | 0.016 | 0.027 | 0.028 | 0.015 | 0.010 | 0.011 | 0.013 | 0.008 | 0.008 | 0.010 | 0.011 | 0.019 | 0.011 | 0.028 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 0.012 | Z | 0.030 | 0.027 | 0.016 | 0.010 | 0.007 | 0.007 | 0.005 | 0.006 | 0.004 | 0.002 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.006 | 0.030 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 0.002 | 0.004 | Z | 0.011 | 0.014 | 0.019 | 0.024 | 0.032 | 0.031 | 0.033 | 0.025 | 0.019 | 0.009 | 0.005 | 0.004 | 0.008 | 0.012 | 0.012 | 0.008 | 0.010 | 0.013 | 0.004 | 0.003 | 0.006 | 0.013 | 0.033 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0.005 | 0.003 | 0.004 | Z | 0.002 | 0.003 | 0.001 | 0.003 | 0.006 | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.002 | 0.004 | 0.001 | 0.000 | 0.000 | 0.001 | 0.006 | 0.000 | 0.002 | 0.006 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0.001 | 0.001 | 0.000 | 0.002 | Z | 0.001 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | C | C | C | C | C | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | -- | 0.002 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.002 | 0.004 | 0.006 | 0.005 | 0.002 | 0.008 | 0.011 | 0.008 | 0.012 | M | 0.008 | 0.008 | 0.013 | 0.016 | 0.015 | 0.018 | 0.025 | 0.018 | 0.008 | 0.025 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | Z | 0.026 | 0.030 | 0.039 | 0.036 | 0.043 | 0.039 | 0.047 | 0.062 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 0.062 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | M | 0.025 | 0.032 | 0.045 | 0.044 | 0.042 | 0.038 | 0.025 | 0.025 | -- | 0.045 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 0.035 | 0.053 | 0.054 | Z | 0.050 | 0.049 | 0.049 | 0.046 | 0.053 | 0.048 | 0.052 | 0.055 | 0.052 | 0.059 | 0.061 | 0.054 | 0.045 | 0.038 | 0.033 | 0.031 | 0.035 | 0.031 | 0.026 | 0.026 | 0.045 | 0.061 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0.023 | 0.018 | 0.018 | 0.014 | Z | 0.016 | 0.022 | 0.017 | 0.016 | 0.017 | 0.020 | 0.011 | 0.009 | 0.006 | 0.016 | 0.001 | 0.001 | 0.001 | 0.006 | 0.002 | 0.002 | 0.003 | 0.004 | 0.002 | 0.011 | 0.023 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0.009 | 0.008 | 0.009 | 0.011 | 0.008 | Z | 0.009 | 0.013 | 0.008 | 0.005 | 0.004 | 0.002 | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 | 0.002 | 0.000 | 0.001 | 0.003 | 0.002 | 0.004 | 0.013 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | Z | 0.000 | 0.003 | 0.001 | 0.004 | 0.007 | 0.007 | 0.004 | 0.018 | 0.004 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.004 | 0.003 | 0.030 | 0.072 | 0.061 | 0.010 | 0.072 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0.003 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.002 | 0.001 | 0.002 | 0.000 | 0.002 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 0.006 | 0.011 | 0.015 | Z | 0.014 | 0.014 | 0.012 | 0.009 | 0.005 | C | C | C | 0.002 | 0.000 | 0.000 | 0.002 | 0.004 | 0.005 | 0.005 | 0.005 | 0.008 | 0.011 | 0.004 | 0.008 | 0.007 | 0.015 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 0.007 | 0.014 | 0.017 | 0.025 | Z | 0.023 | 0.017 | 0.008 | 0.001 | 0.001 | 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 | 0.005 | 0.025 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-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 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.002 | 0.003 | 0.002 | 0.002 | M | M | 0.004 | 0.005 | 0.005 | 0.008 | 0.007 | 0.008 | 0.008 | 0.009 | 0.003 | 0.009 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 0.012 | Z | 0.010 | 0.013 | 0.024 | 0.014 | 0.012 | 0.010 | 0.004 | 0.003 | 0.004 | 0.002 | 0.002 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.024 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 0.000 | 0.000 | Z | 0.001 | 0.008 | 0.002 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.008 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.002 | 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 | 0.022 | 0.034 | 0.011 | 0.038 | 0.005 | 0.038 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 0.031 | 0.091 | 0.086 | 0.022 | Z | 0.003 | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 | 0.006 | 0.016 | 0.024 | 0.021 | 0.003 | 0.000 | 0.000 | 0.014 | 0.091 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.015 | 0.019 | 0.021 | 0.018 | 0.016 | 0.012 | 0.013 | 0.013 | 0.014 | 0.013 | 0.013 | 0.012 | 0.012 | 0.013 | 0.015 | 0.014 | 0.014 | 0.012 | 0.013 | 0.013 | 0.013 | 0.014 | 0.015 | 0.014 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.117 | 0.105 | 0.091 | 0.098 | 0.071 | 0.049 | 0.069 | 0.077 | 0.078 | 0.080 | 0.085 | 0.089 | 0.122 | 0.145 | 0.145 | 0.153 | 0.142 | 0.118 | 0.101 | 0.097 | 0.083 | 0.074 | 0.093 | 0.070 | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | M - Maintenance | | | | AF - Analyzer Failure | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 358 | 57.28 | 57.28 |
| 0.006 - 0.05 | 226 | 36.16 | 93.44 |
| 0.06 - 0.1 | 40 | 6.40 | 99.84 |
| > 0.1 | 1 | 0.16 | 100.00 |

Total Number of Valid Hours: 625

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 7 | 12 | 6 | 1 | 0 | 2 | 4 | 11 | 16 | 46 | 48 | 17 | 31 | 67 | 25 | 4 | 297 |
| 0.006 - 0.05 | 2 | 2 | 6 | 2 | 1 | 5 | 9 | 7 | 12 | 13 | 25 | 23 | 30 | 55 | 17 | 7 | 216 |
| 0.06 - 0.1 | 2 | 5 | 3 | 4 | 5 | 2 | 2 | 0 | 0 | 1 | 1 | 2 | 10 | 1 | 2 | 0 | 40 |
| > 0.1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Totals | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 18 | 28 | 60 | 74 | 42 | 71 | 123 | 44 | 11 | 554 |

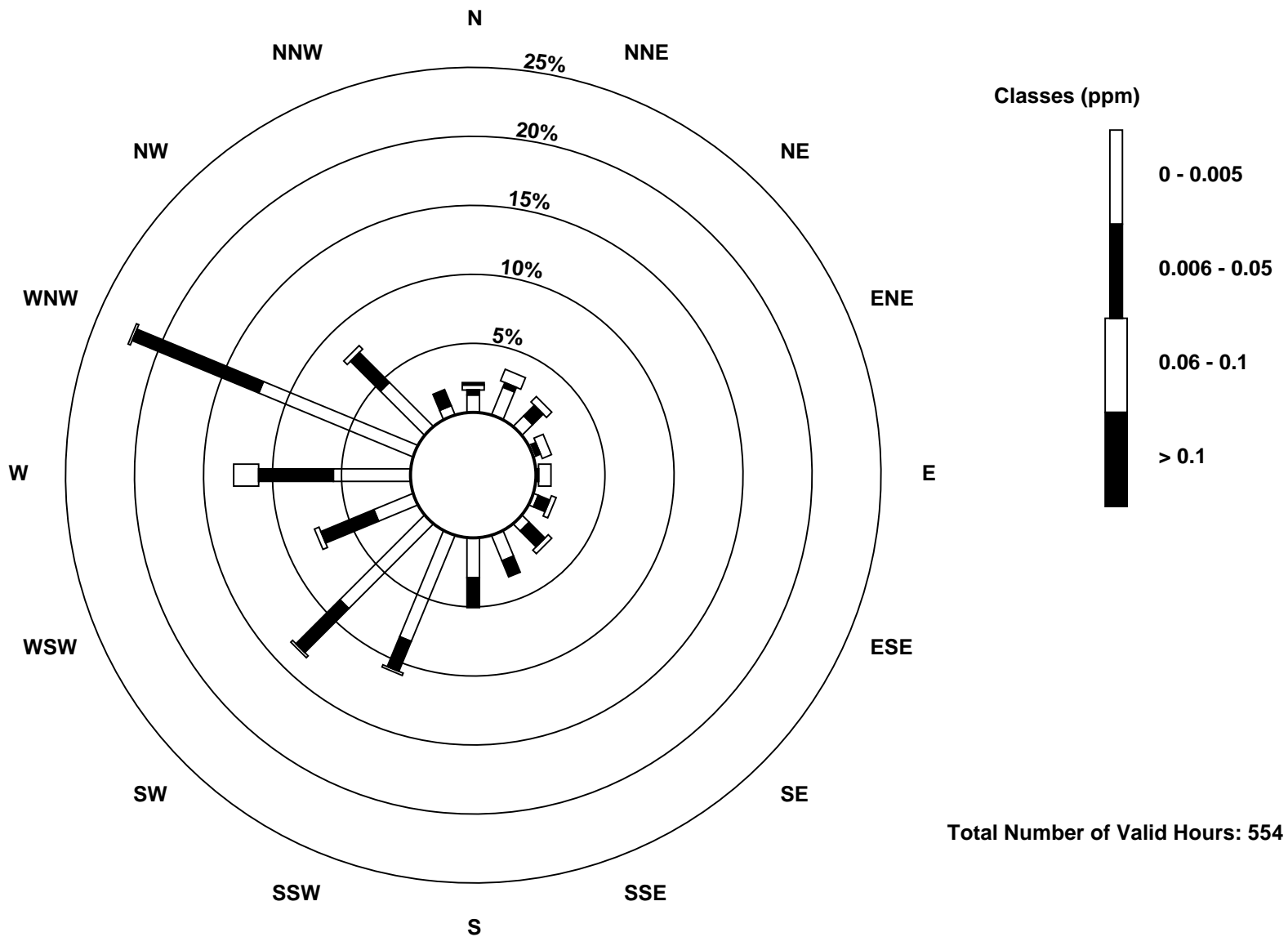
Total Number of Valid Hours: 554

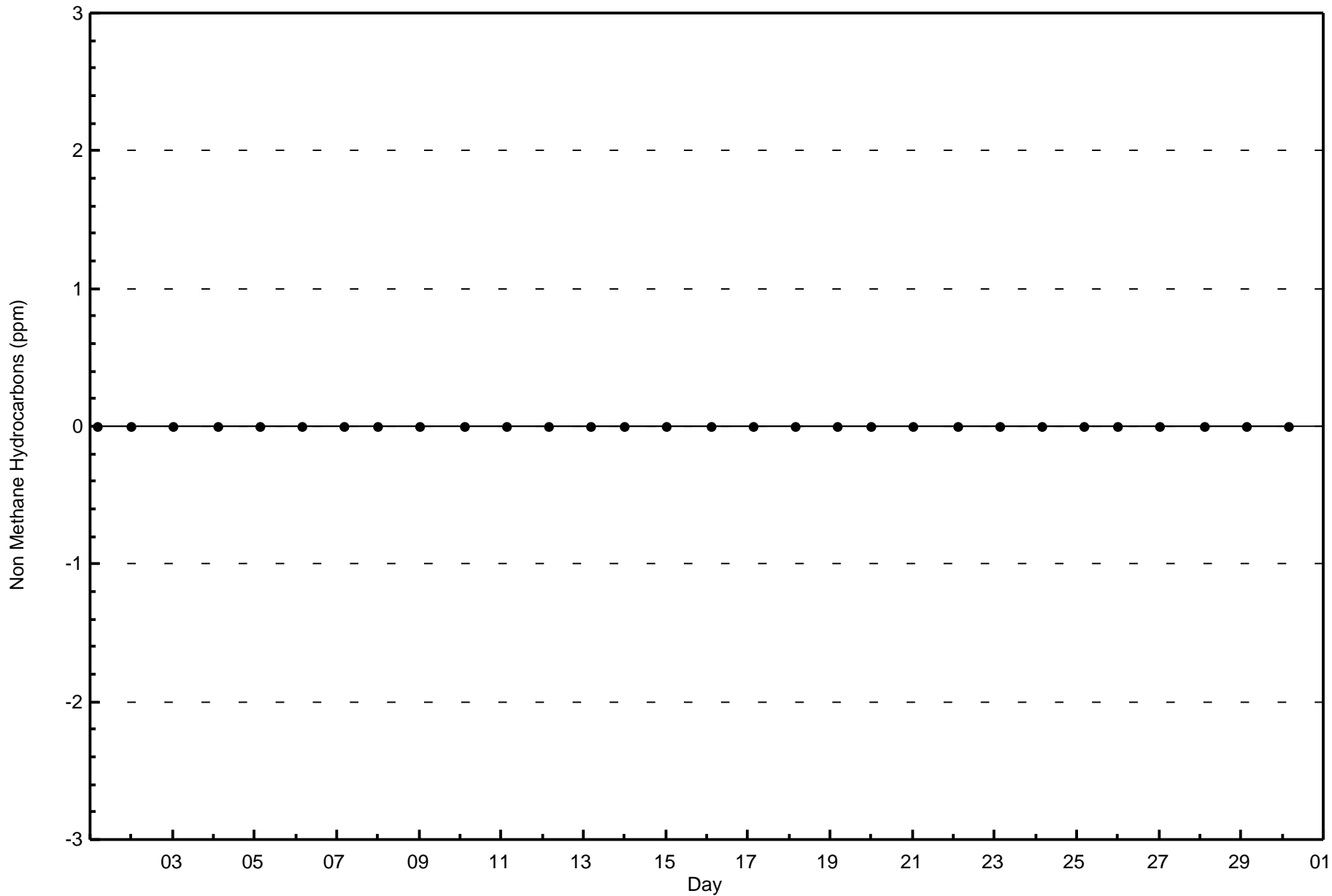
Total Number of Hours: 720

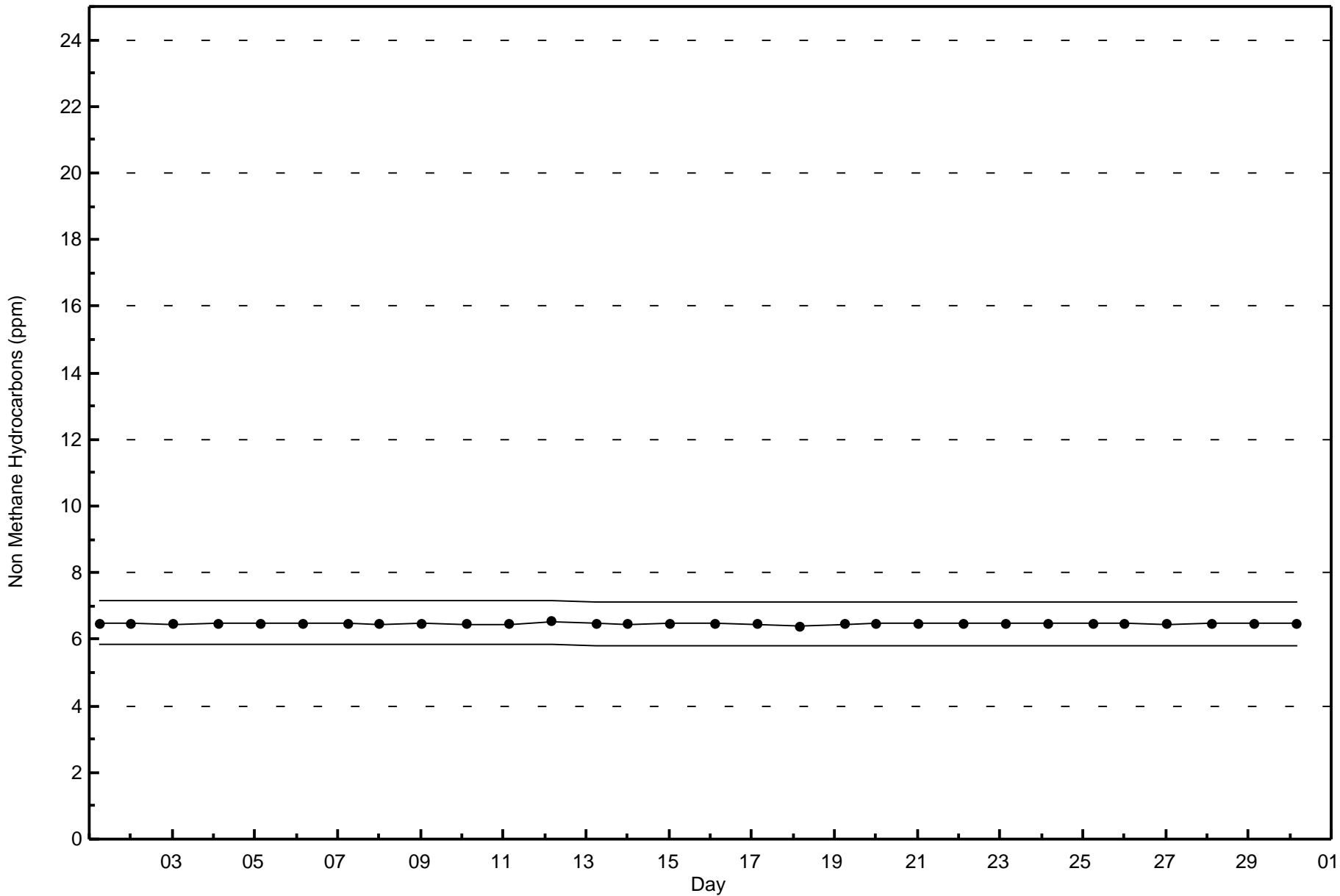


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain (AMS 18)









Wood Buffalo Environmental Association

Methane (CH₄) - ppm

Summary of Hour Averages

Stony Mountain - September 2016

| | | | | |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2.1 ppm on Sep 30 03:00 | Maximum Daily Average: 2.0 ppm on Sep 29 | | Hours of Data: | 625 |
| Minimum Value: 1.9 ppm on Sep 8 02:00 | Minimum Daily Average: 1.9 ppm on Sep 4 | | Hours of Missing Data: | 95 |
| Maximum Diurnal Average: 2.0 ppm at hour 3 | Minimum Diurnal Average: 1.9 ppm at hour 15 | | Hours of Calibration: | 37 |
| Monthly Average: 1.94 ppm | Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.0 P ₉₉ = 2.1 | | Percent Operational Time: | 91.9 |

| 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 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 2-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 3-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 4-Sep | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 5-Sep | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 |
| 6-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 7-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 8-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 9-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 10-Sep | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 |
| 11-Sep | 2.0 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 |
| 12-Sep | 1.9 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | C | C | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | |
| 13-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 14-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | AF | AF | AF | AF | AF | AF | AF | AF | 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 | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 17-Sep | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 18-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 19-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 20-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 |
| 21-Sep | 1.9 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 |
| 22-Sep | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 |
| 23-Sep | 2.0 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | C | C | C | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 |
| 24-Sep | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 |
| 25-Sep | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 26-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | M | M | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 27-Sep | 2.0 | Z | 2.0 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 |
| 28-Sep | 2.0 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 29-Sep | 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 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 |
| 30-Sep | 2.0 | 2.1 | 2.1 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 |

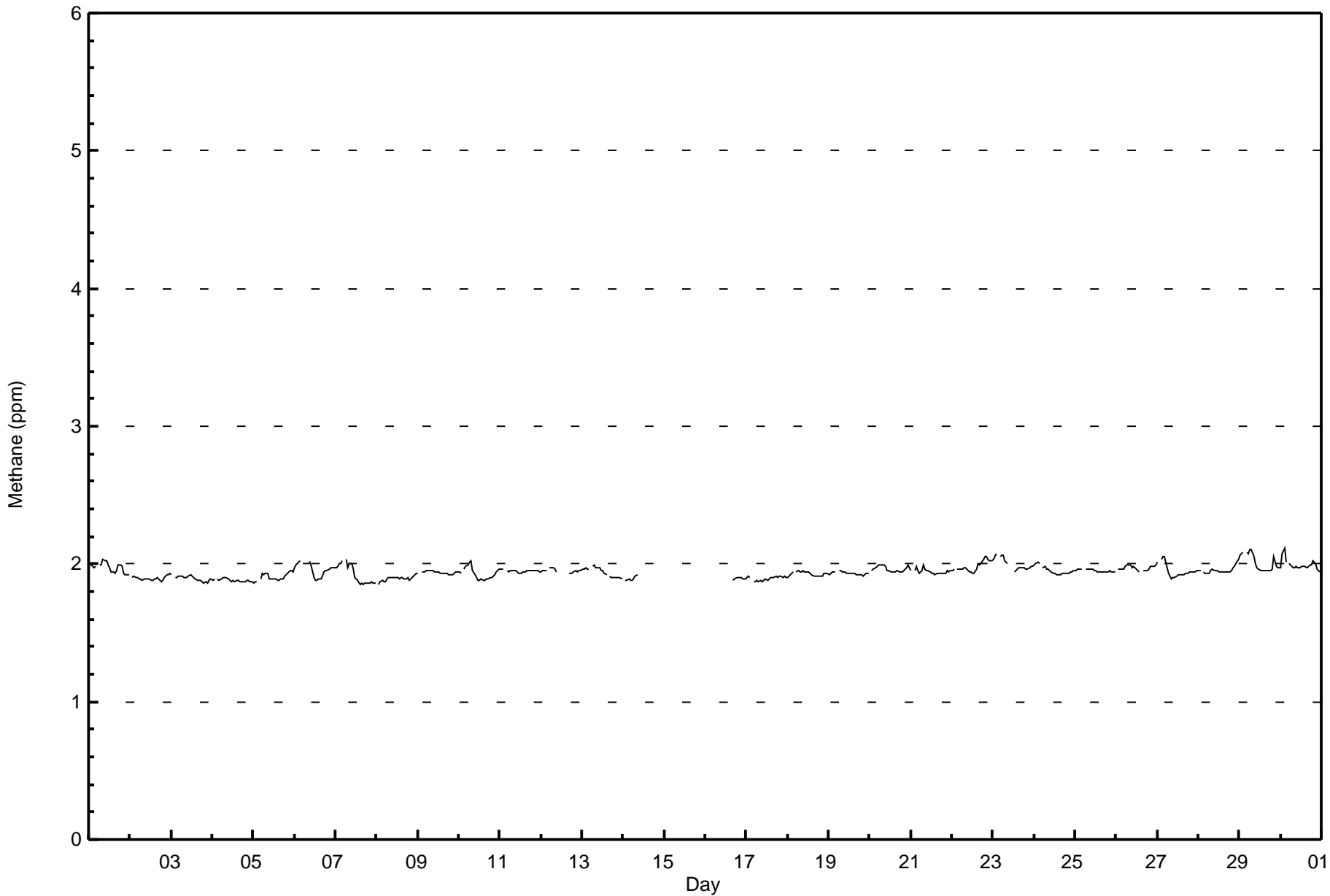
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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 |
| 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

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



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Stony Mountain - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Stony Mountain - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 606 | 96.96 | 96.96 |
| 2.1 - 3.0 | 19 | 3.04 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 625

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 12 | 18 | 15 | 6 | 6 | 9 | 14 | 16 | 24 | 55 | 70 | 42 | 71 | 123 | 44 | 11 | 536 |
| 2.1 - 3.0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 2 | 4 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 18 |
| 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 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 18 | 28 | 60 | 74 | 42 | 71 | 123 | 44 | 11 | 554 |

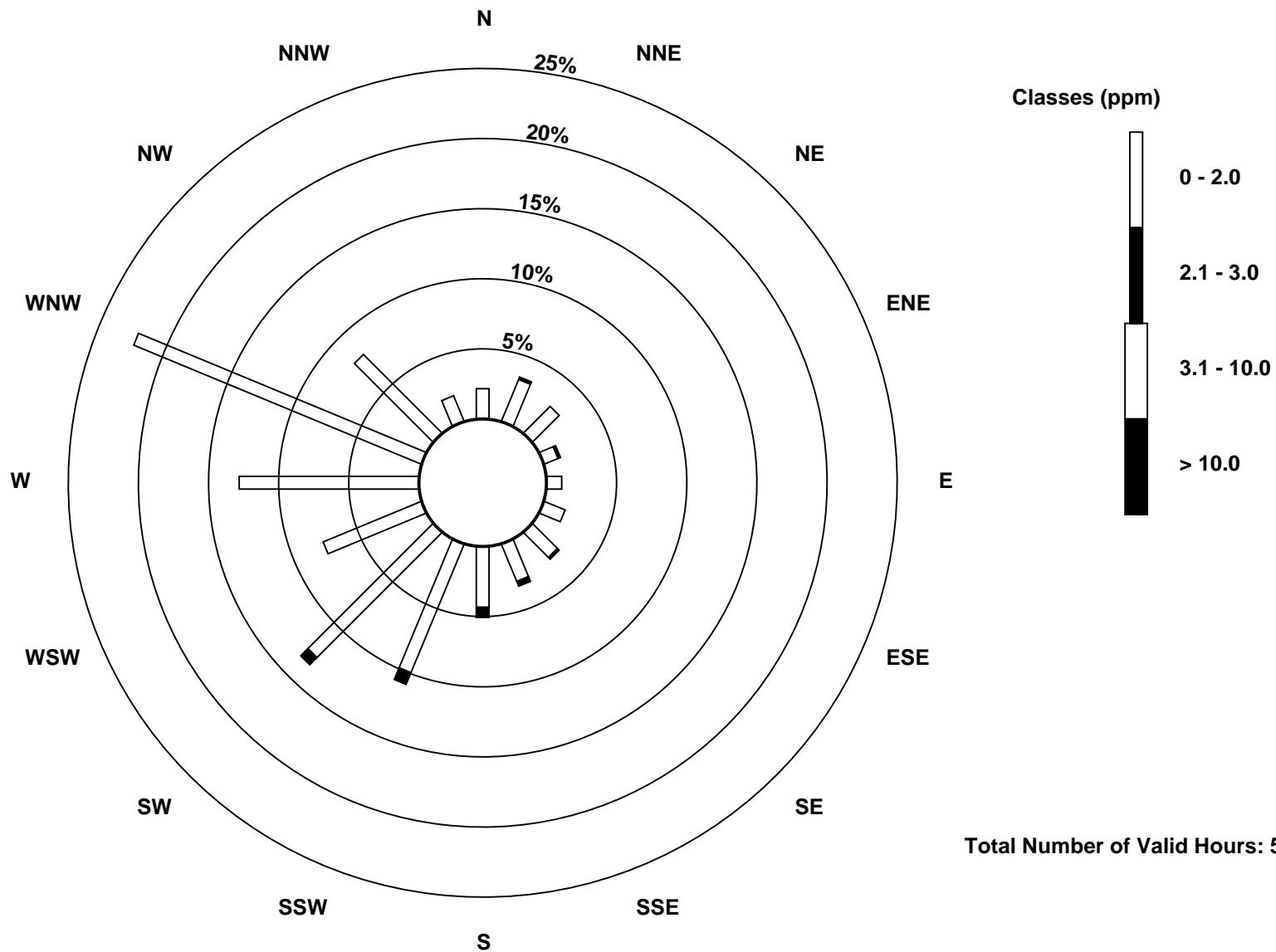
Total Number of Valid Hours: 554

Total Number of Hours: 720

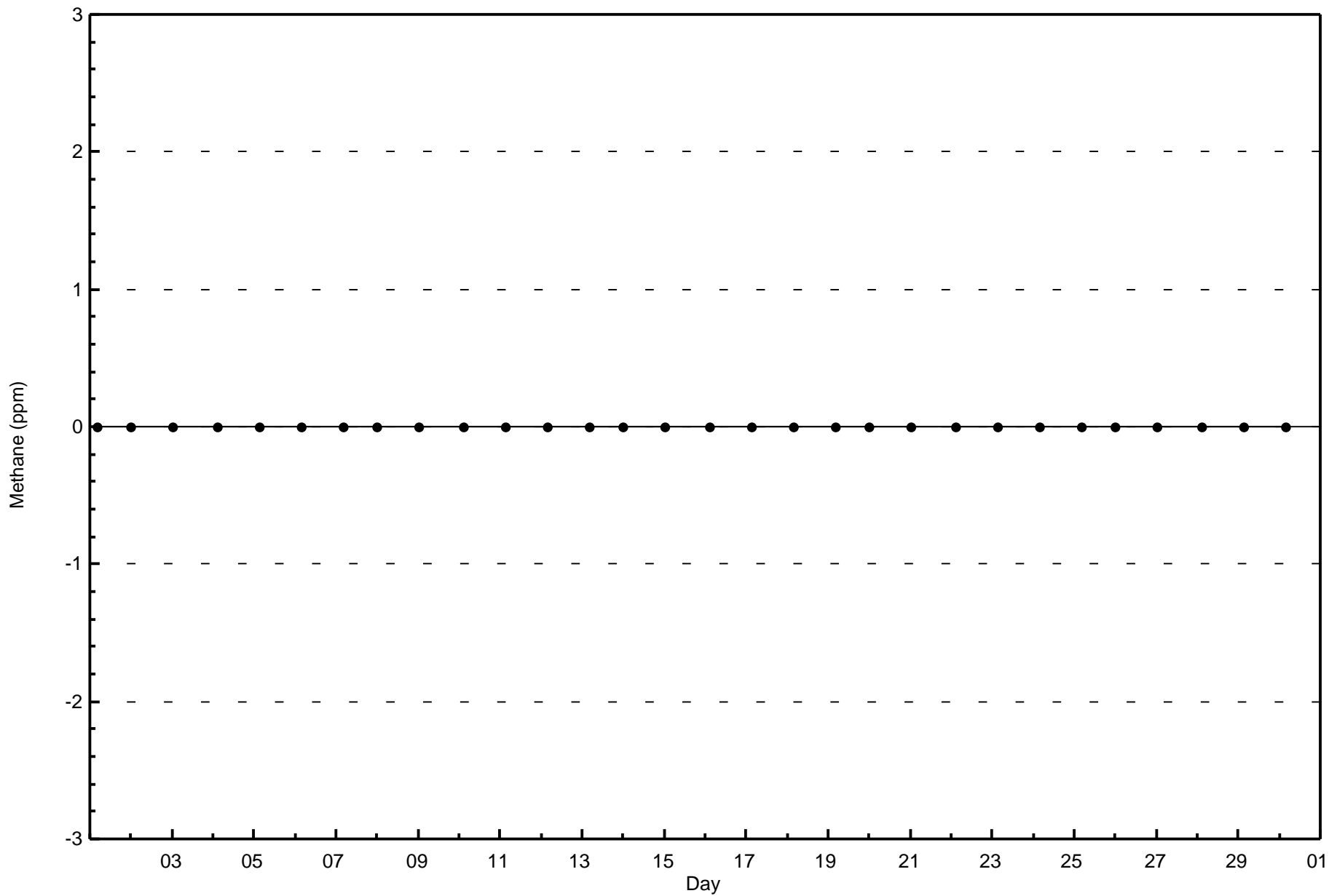


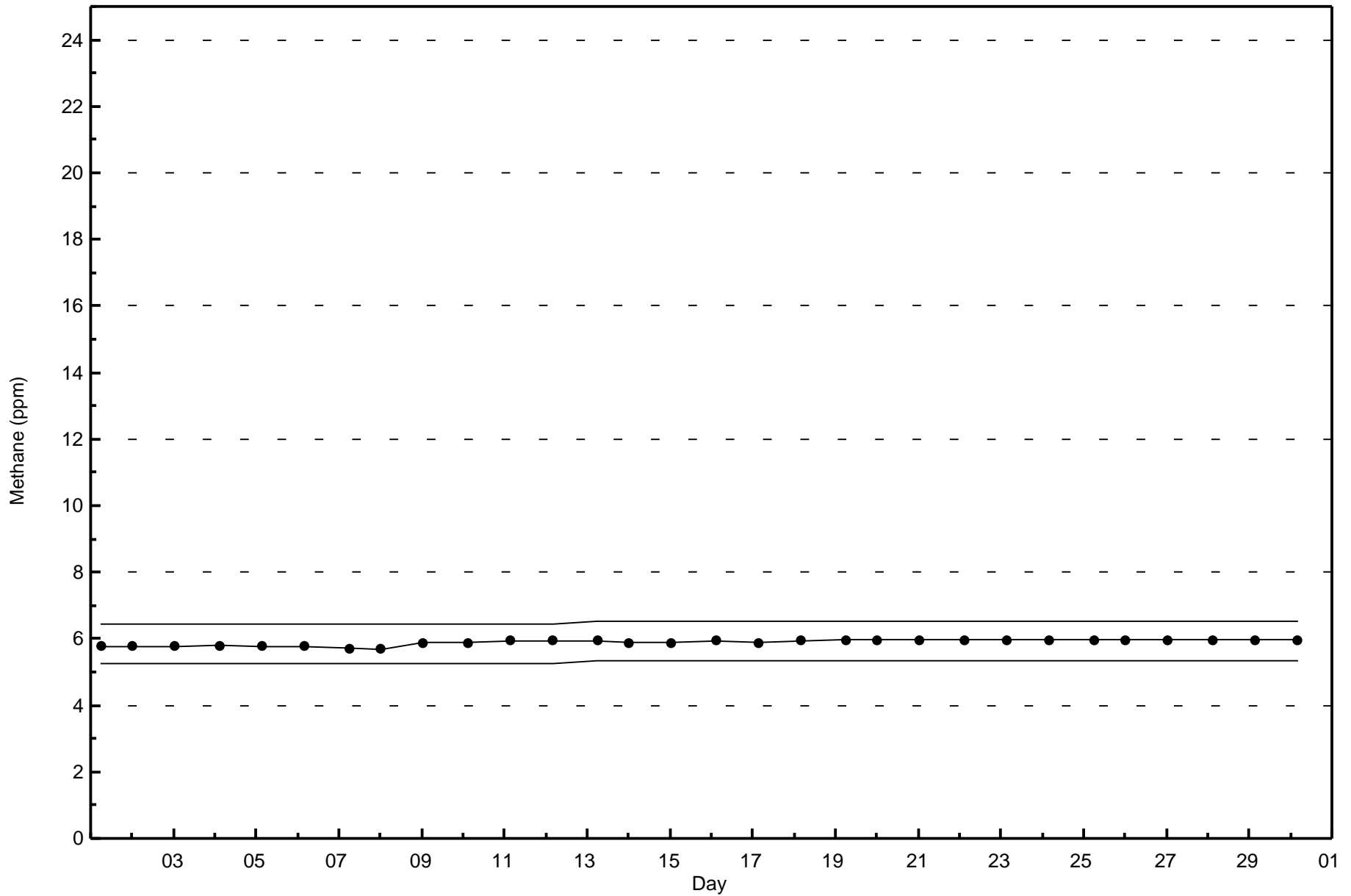
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Methane (CH₄) - ppm
Stony Mountain (AMS 18)



Total Number of Valid Hours: 554







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

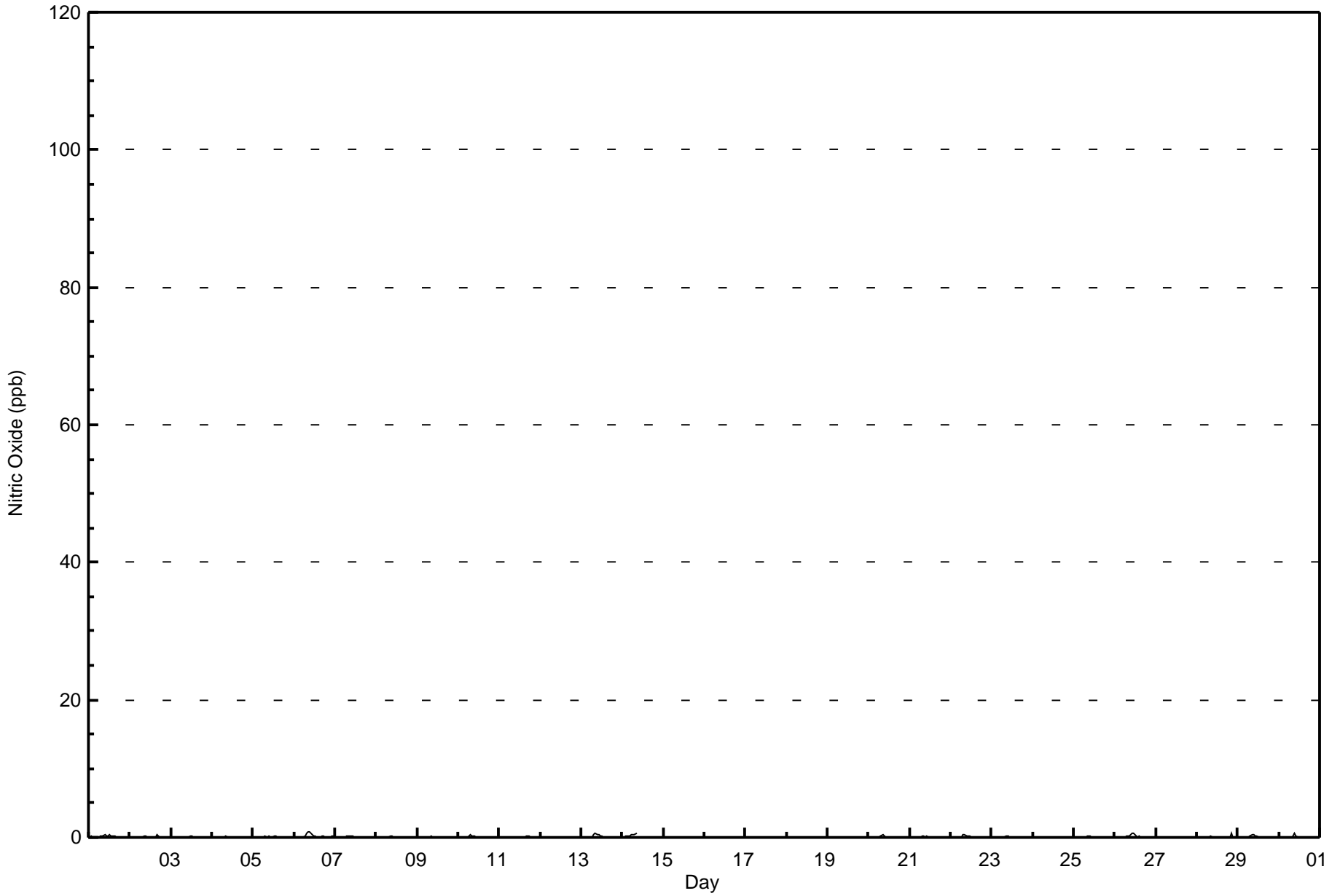
Stony Mountain - September 2016

| Maximum Value: 1 ppb on Sep 6 09:00 Maximum Daily Average: 0.2 ppb on Sep 6 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 626 Hours of Missing Data: 94 Hours of Calibration: 38 Percent Operational Time: 92.2 | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|-----------------|---------------|---------------|----|
| Minimum Value: 0 ppb on Sep 1 23:00 Minimum Daily Average: 0.0 ppb on Sep 24 Maximum Diurnal Average: 0.2 ppb at hour 9 Minimum Diurnal Average: 0.0 ppb at hour 20 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 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 | Z | 0 | 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 | Z | 0 | 0 | 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 | Z | 0 | 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 | 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 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 7-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 |
| 8-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 |
| 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 | 0.0 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 1 |
| 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 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 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 | 0.0 | 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 | 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 | 0 |
| 20-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 |
| 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 | 0.0 | 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 | 0.1 | 0 |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 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 | 0.0 | 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 | 0 |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 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 | 0.0 | 0 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.1 | 1 |
| 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 | 0.1 | 0 |
| 30-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 | 0.1 | 1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Stony Mountain - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Stony Mountain - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 626 | 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: 626

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Stony Mountain - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |

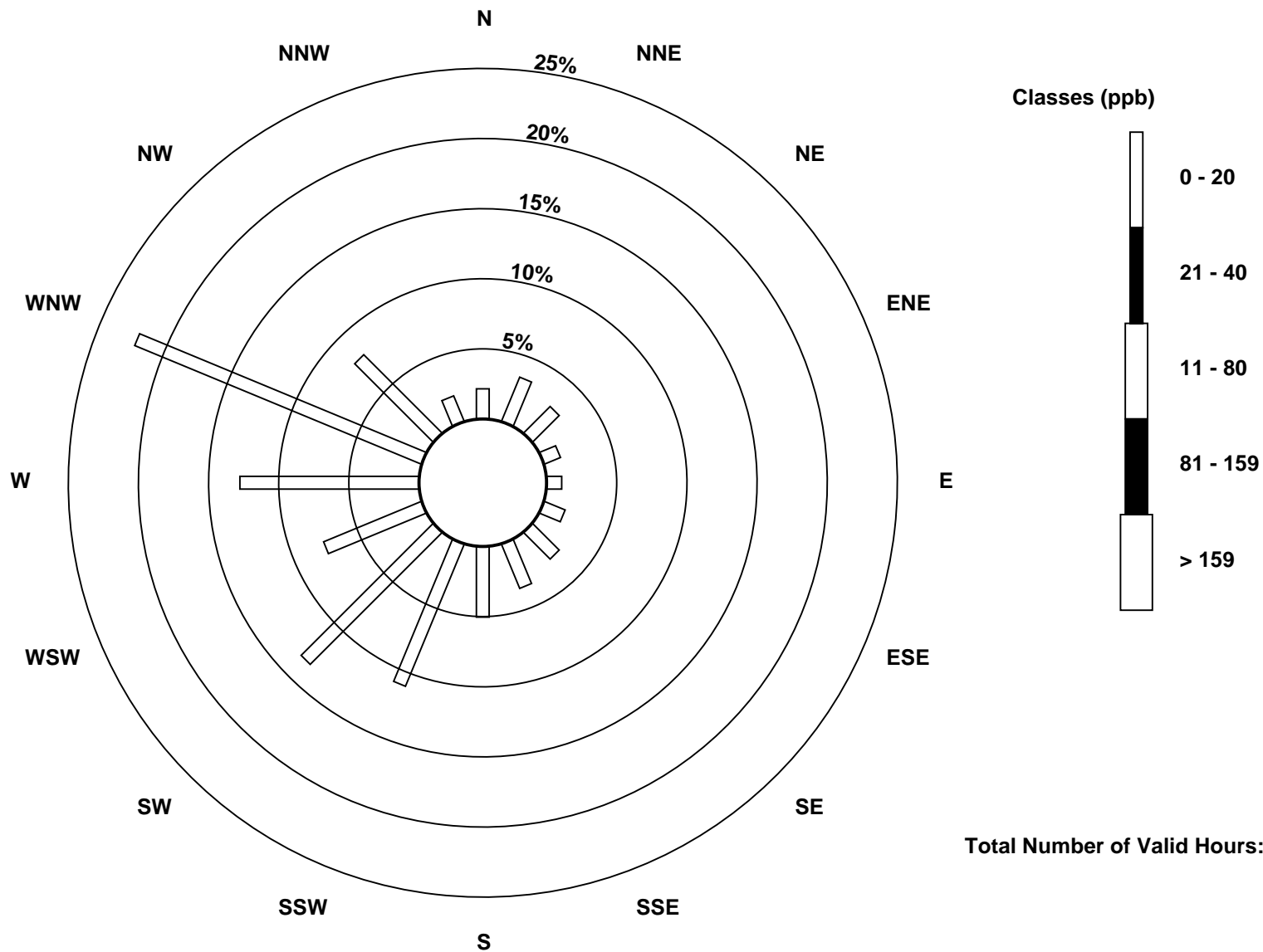
Total Number of Valid Hours: 556

Total Number of Hours: 720

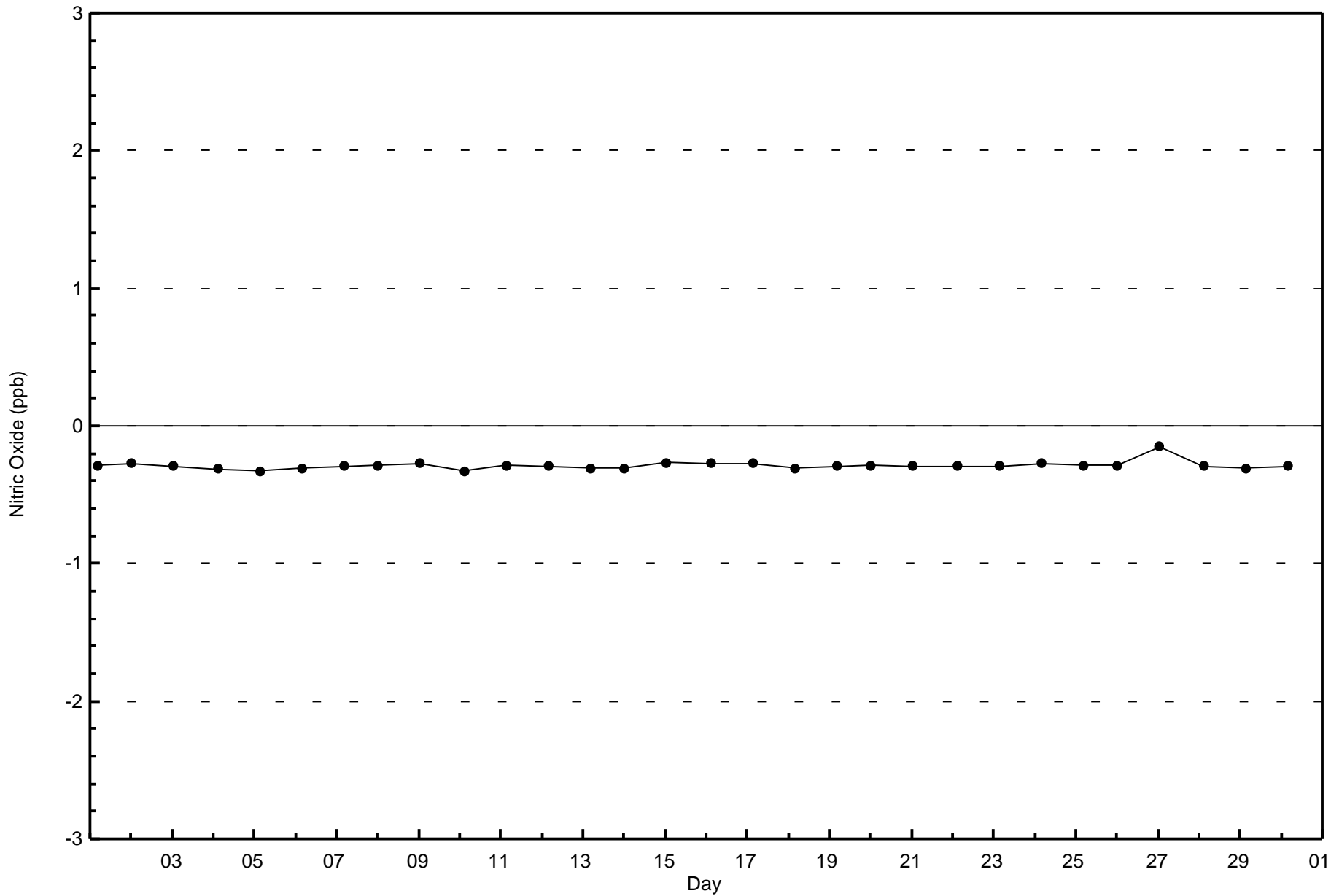


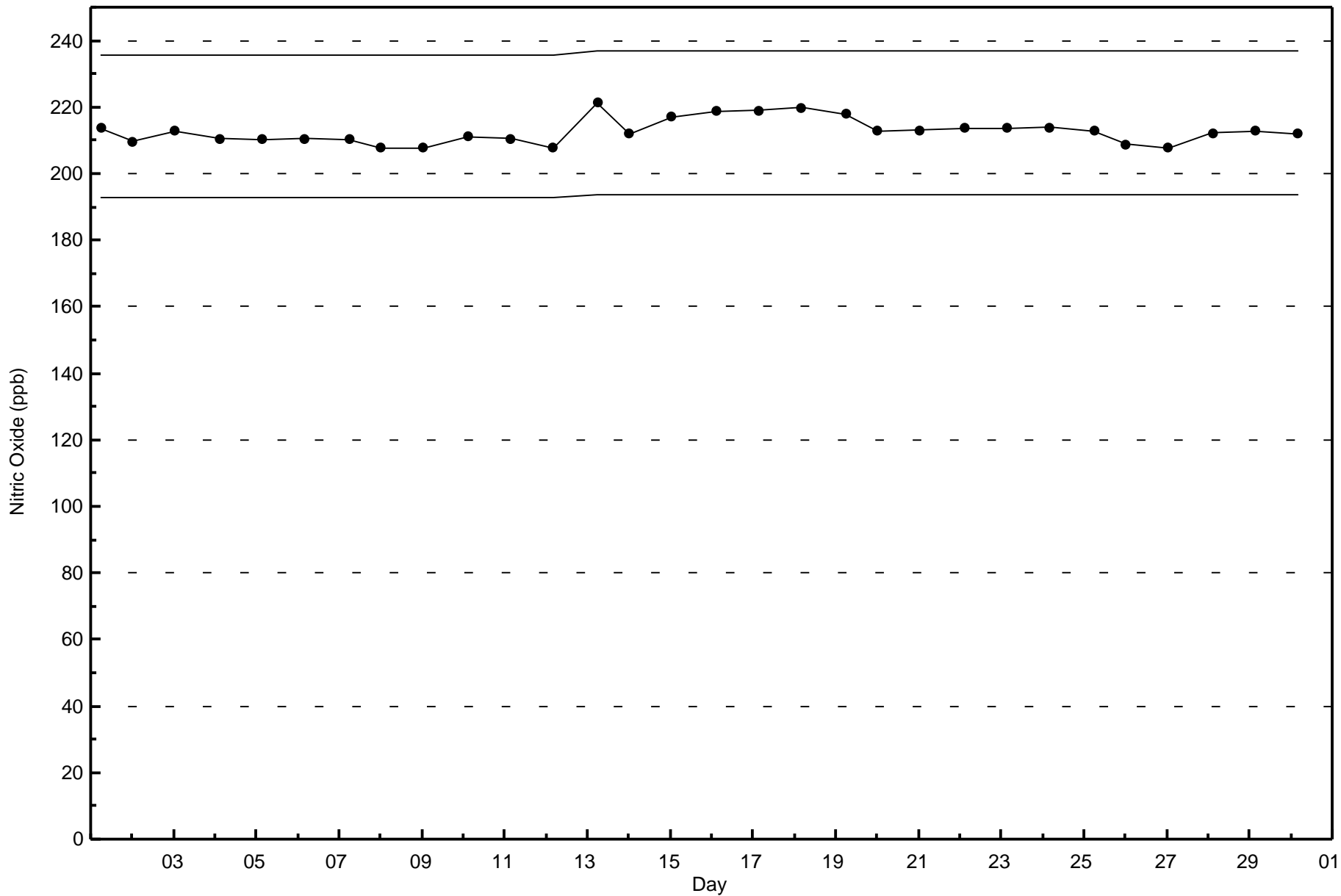
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitric Oxide (NO) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 556







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Stony Mountain - September 2016

| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 8 ppb on Sep 28 21:00 | Maximum Daily Average: 1.6 ppb on Sep 30 | | Hours of Data: | 626 |
| Minimum Value: 0 ppb on Sep 4 06:00 | Minimum Daily Average: 0.1 ppb on Sep 4 | | Hours of Missing Data: | 94 |
| Maximum Diurnal Average: 1.0 ppb at hour 21 | Minimum Diurnal Average: 0.3 ppb at hour 14 | | Hours of Calibration: | 38 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 3 | | Percent Operational Time: | 92.2 |

| 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 | 1 | 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 |
| 2-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.6 | 1 |
| 3-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 |
| 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 | 0.1 | 0 |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0.5 | 2 |
| 6-Sep | 2 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 |
| 7-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 8-Sep | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 1 |
| 9-Sep | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.4 | 1 |
| 10-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 11-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | -- | 1 |
| 13-Sep | 1 | 1 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | M | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 |
| 14-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 2 |
| 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 | M | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | -- | 2 |
| 17-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 | 0.4 | 1 |
| 18-Sep | 0 | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 19-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 |
| 20-Sep | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0.7 | 2 |
| 21-Sep | 1 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.4 | 1 |
| 22-Sep | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 1.2 | 2 |
| 23-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 1 | 2 | 2 | 1 | C | C | C | C | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1.5 | 2 |
| 24-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 25-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 1 |
| 26-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1.4 | 2 |
| 27-Sep | 2 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0.8 | 2 |
| 28-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 2 | 2 | 2 | 1.0 | 8 |
| 29-Sep | 2 | 2 | 3 | Z | 3 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1.5 | 3 |
| 30-Sep | 1 | 2 | 2 | 2 | Z | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 3 | 1 | 0 | 0 | 1.6 | 4 |

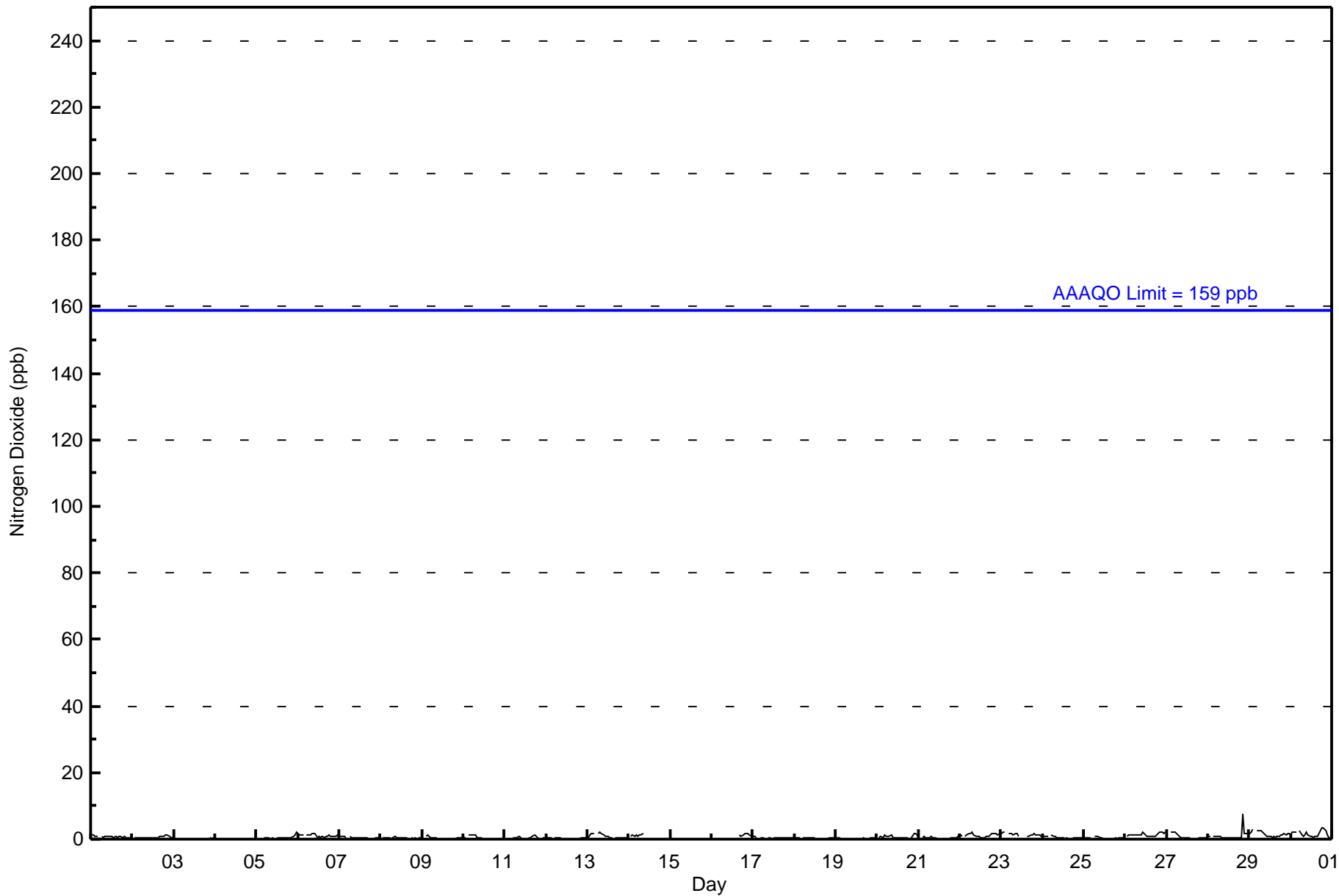
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.9 | 0.8 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.7 | 0.6 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 1.0 | 0.8 | 0.7 | 0.8 | Diurnal Average | |
| 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 8 | 2 | 2 | 2 | Diurnal Maximum | |

Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 626 | 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: 626

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 41 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |

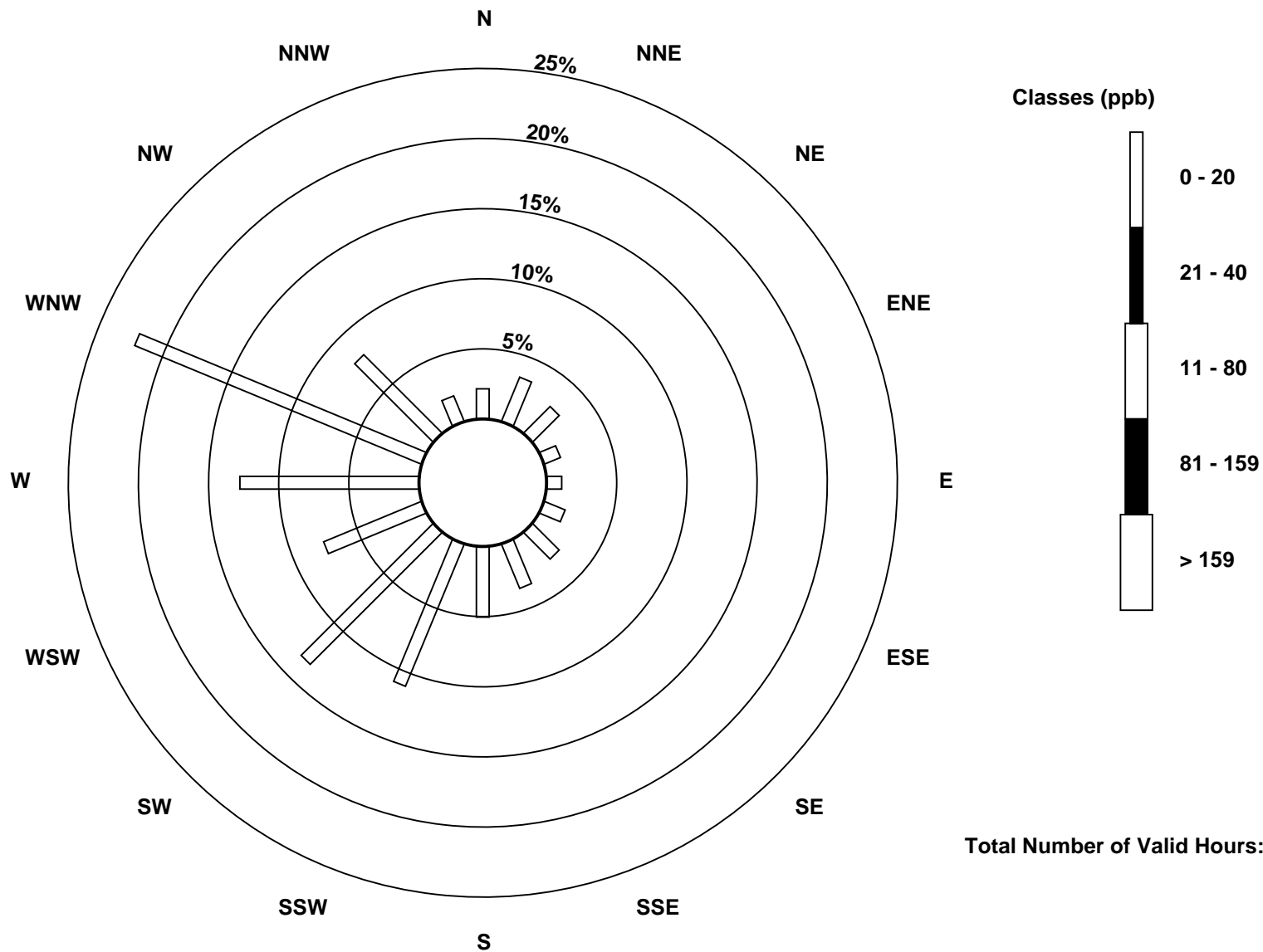
Total Number of Valid Hours: 556

Total Number of Hours: 720

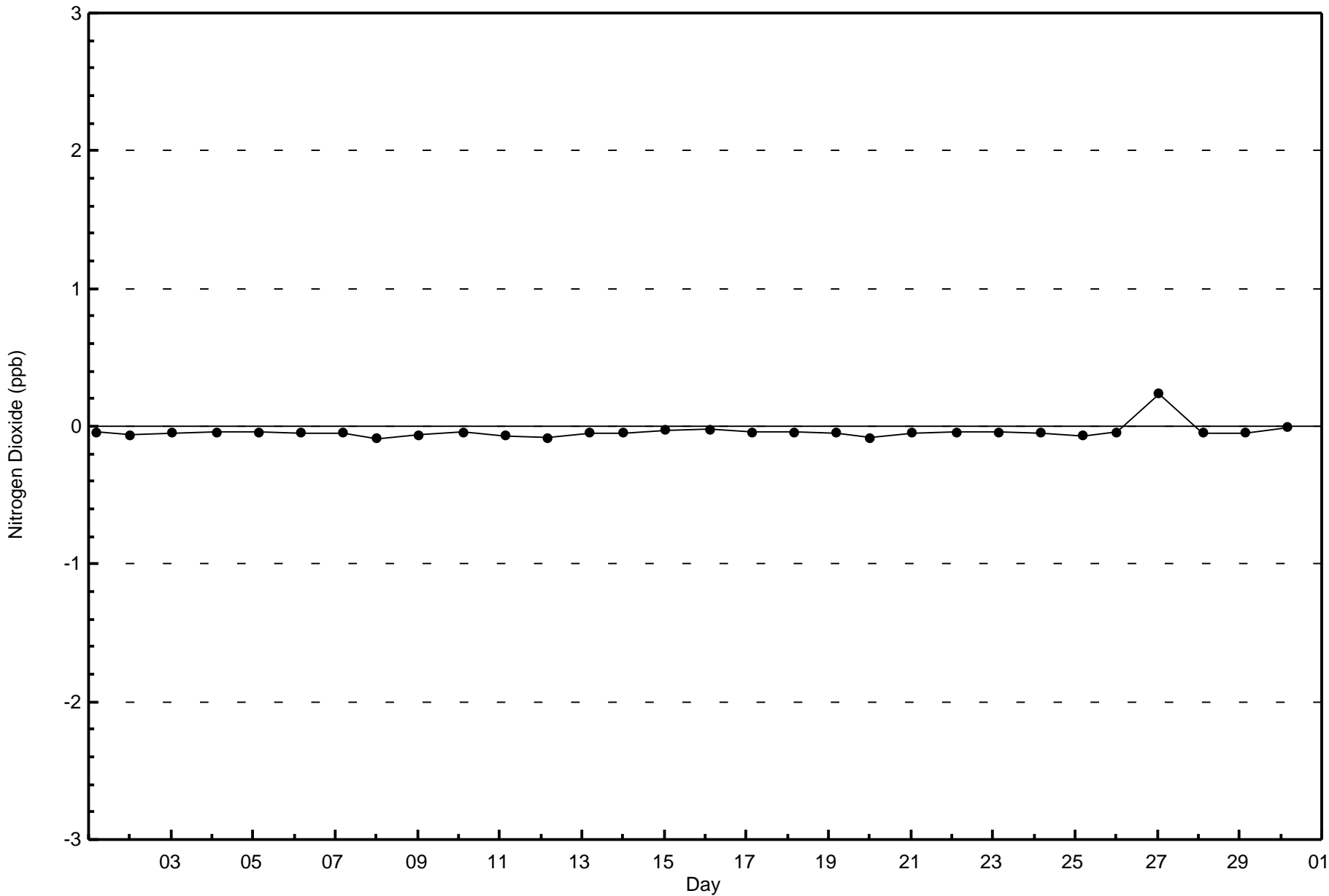


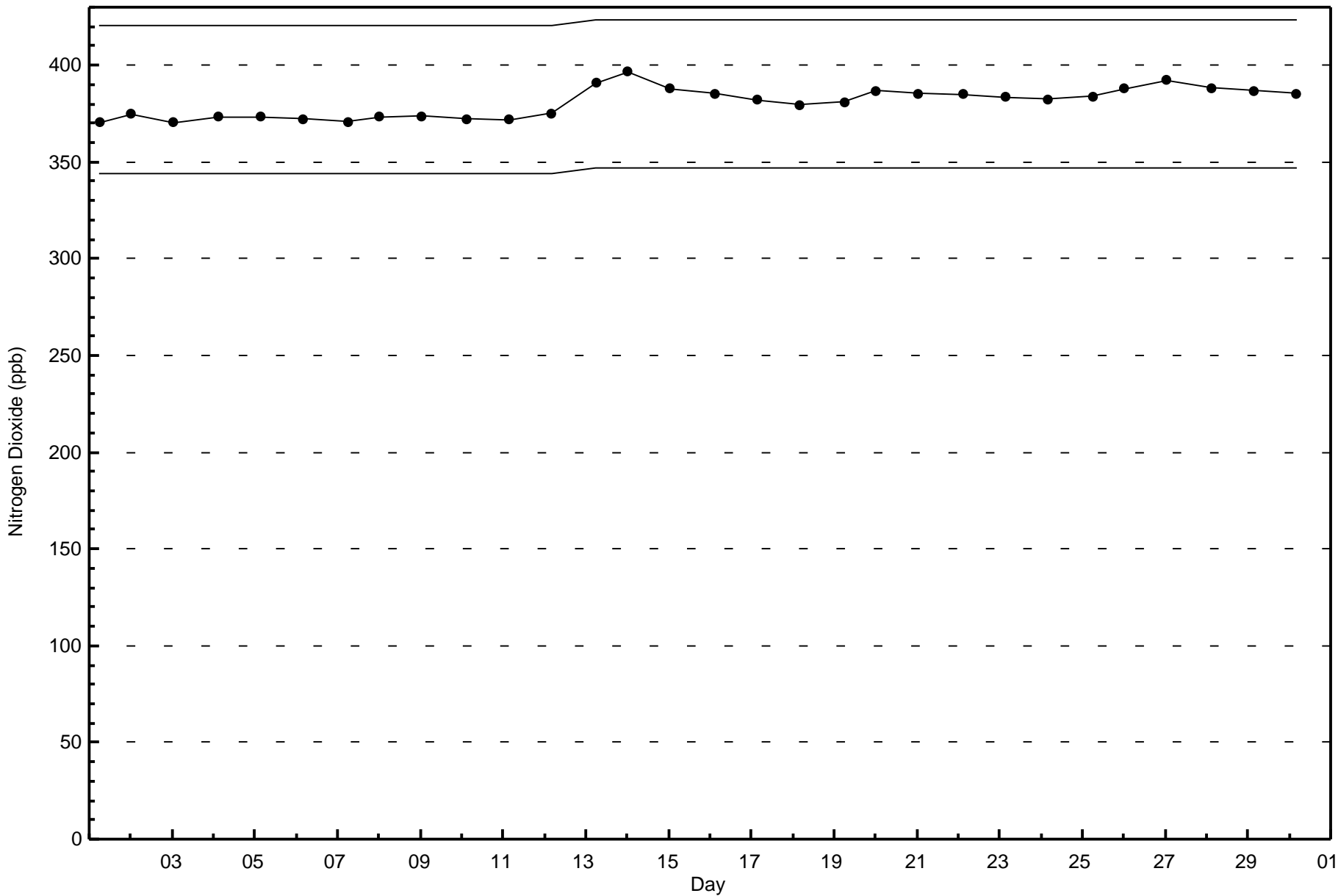
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 556







Wood Buffalo Environmental Association
Summary of Hour Averages

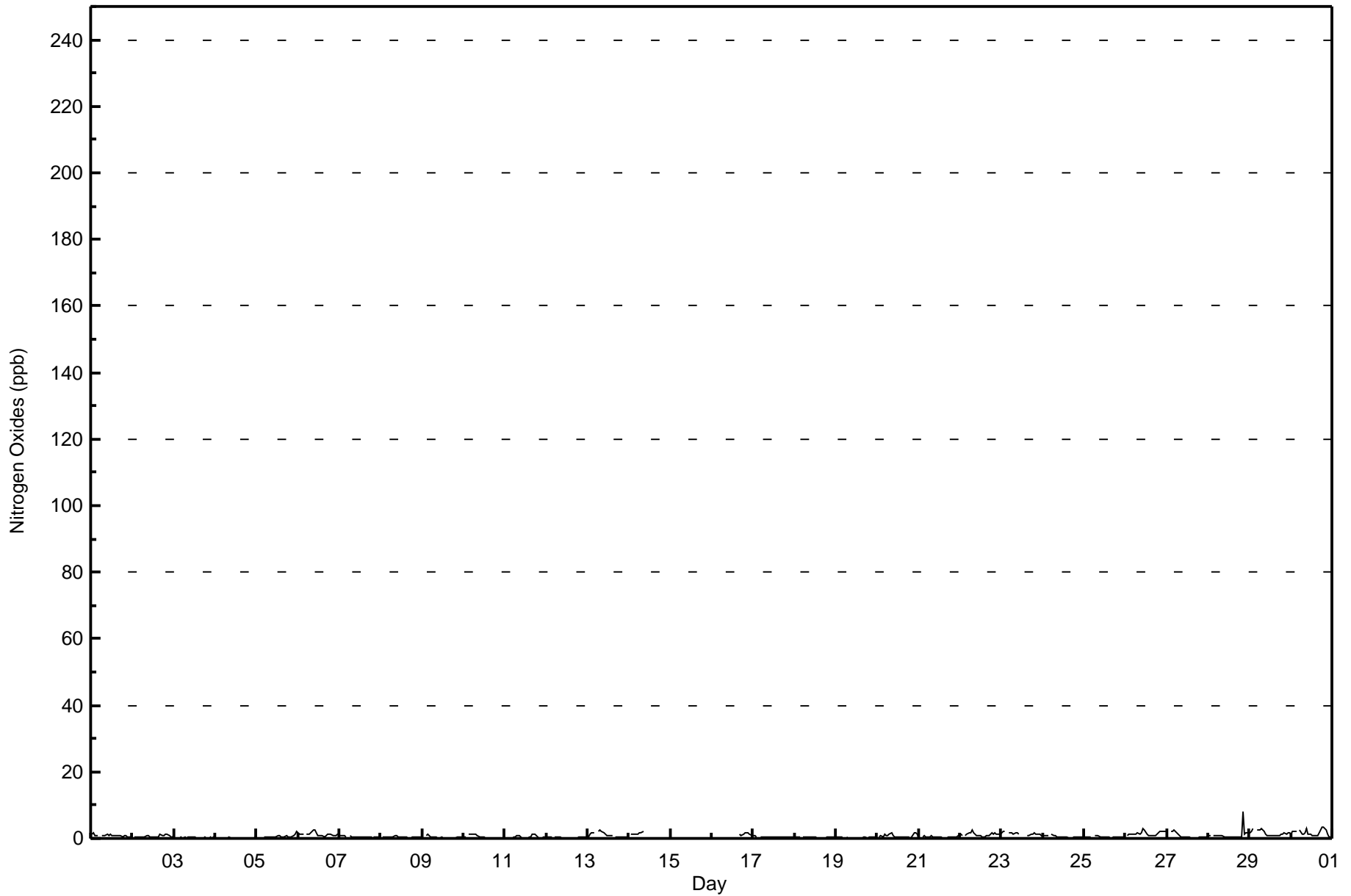
Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2016

| Maximum Value: 8 ppb on Sep 28 21:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 1.7 ppb on Sep 30 | | | | | | | | | | | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|-----------------|---------------|---------------|-----|-----------------|-----|-----|-----|-----------------------|-----|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Minimum Value: 0 ppb on Sep 19 12:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.1 ppb on Sep 4 | | | | | | | | | | | | | | | | | Hours of Data: 626 | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 1.0 ppb at hour 21 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.4 ppb at hour 14 | | | | | | | | | | | | | | | | | Hours of Missing Data: 94 | | | | | | | | | | | | | | |
| Monthly Average: 0.7 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 3 | | | | | | | | | | | | | | | | | Hours of Calibration: 38 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 92.2 | | | | | | | | | | | | | | |
| 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 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0.9 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.6 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 3-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 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 0.1 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 0.6 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 2 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 7-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 | 0.5 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 8-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 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 1 | Z | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 10-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 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0.5 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | -- | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 1 | 1 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | M | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1.1 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | Z | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 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 | M | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | -- | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 17-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 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0 | 0 | 1 | 1 | Z | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | 1 | 1 | 0.2 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0.7 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 0 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 1 | 1 | Z | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1.2 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 1 | 2 | 2 | 1 | C | C | C | C | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1.5 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.5 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 1 | 1 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1.5 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 2 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0.8 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 1 | 2 | 2 | 1.0 | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 2 | 2 | 3 | Z | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1.5 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 1 | 2 | 2 | 2 | Z | 2 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 3 | 1 | 0 | 0 | 1.7 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.9 | 0.8 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 0.8 | 0.7 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.6 | 0.7 | 1.0 | 0.7 | 0.7 | 0.8 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | 8 | 2 | 2 | 2 | Diurnal Maximum |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | M - Maintenance | | | | AF - Analyzer Failure | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 626 | 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: 626

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |
| 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 | 12 | 19 | 15 | 7 | 6 | 9 | 15 | 19 | 28 | 61 | 74 | 42 | 71 | 123 | 44 | 11 | 556 |

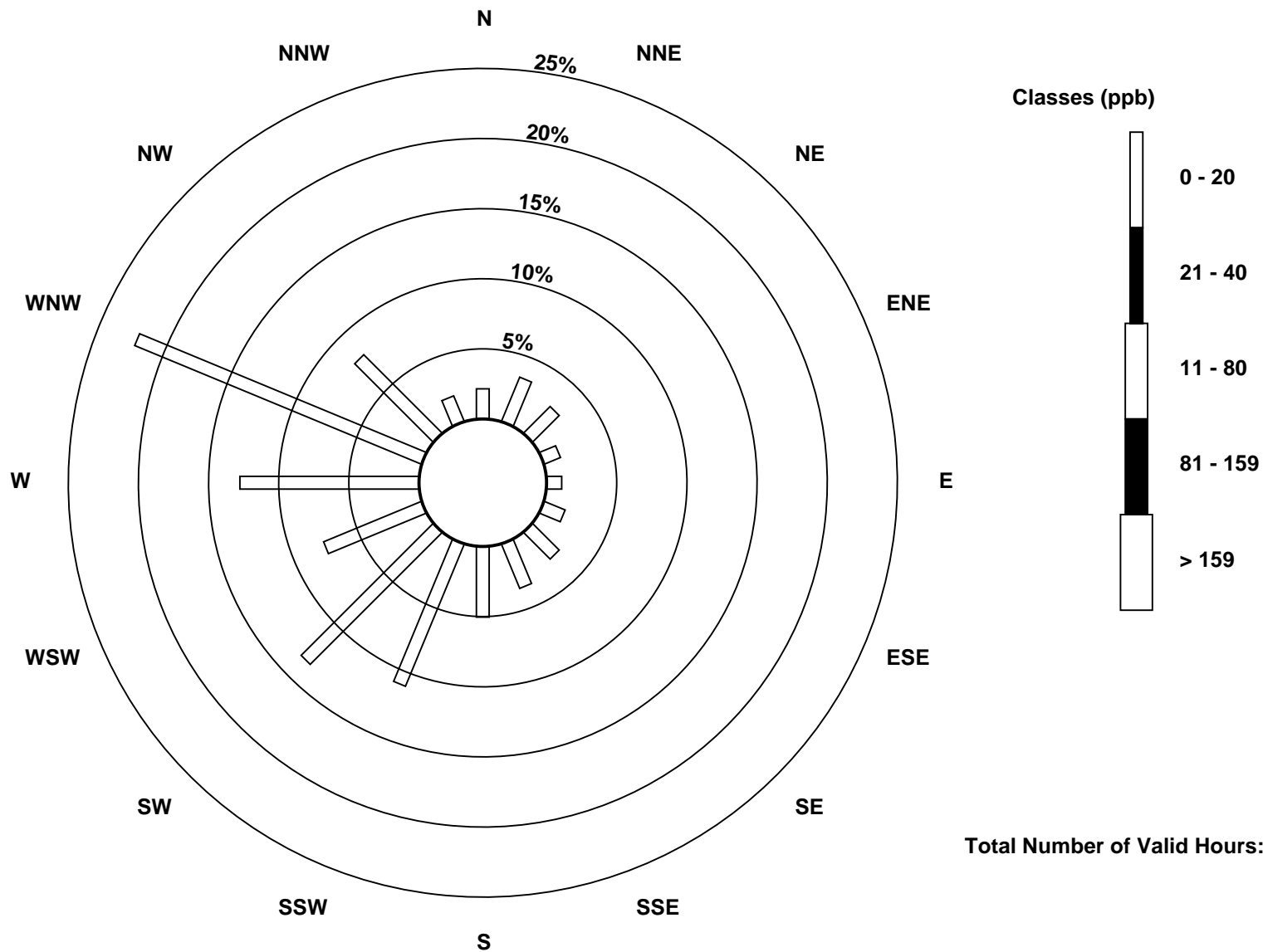
Total Number of Valid Hours: 556

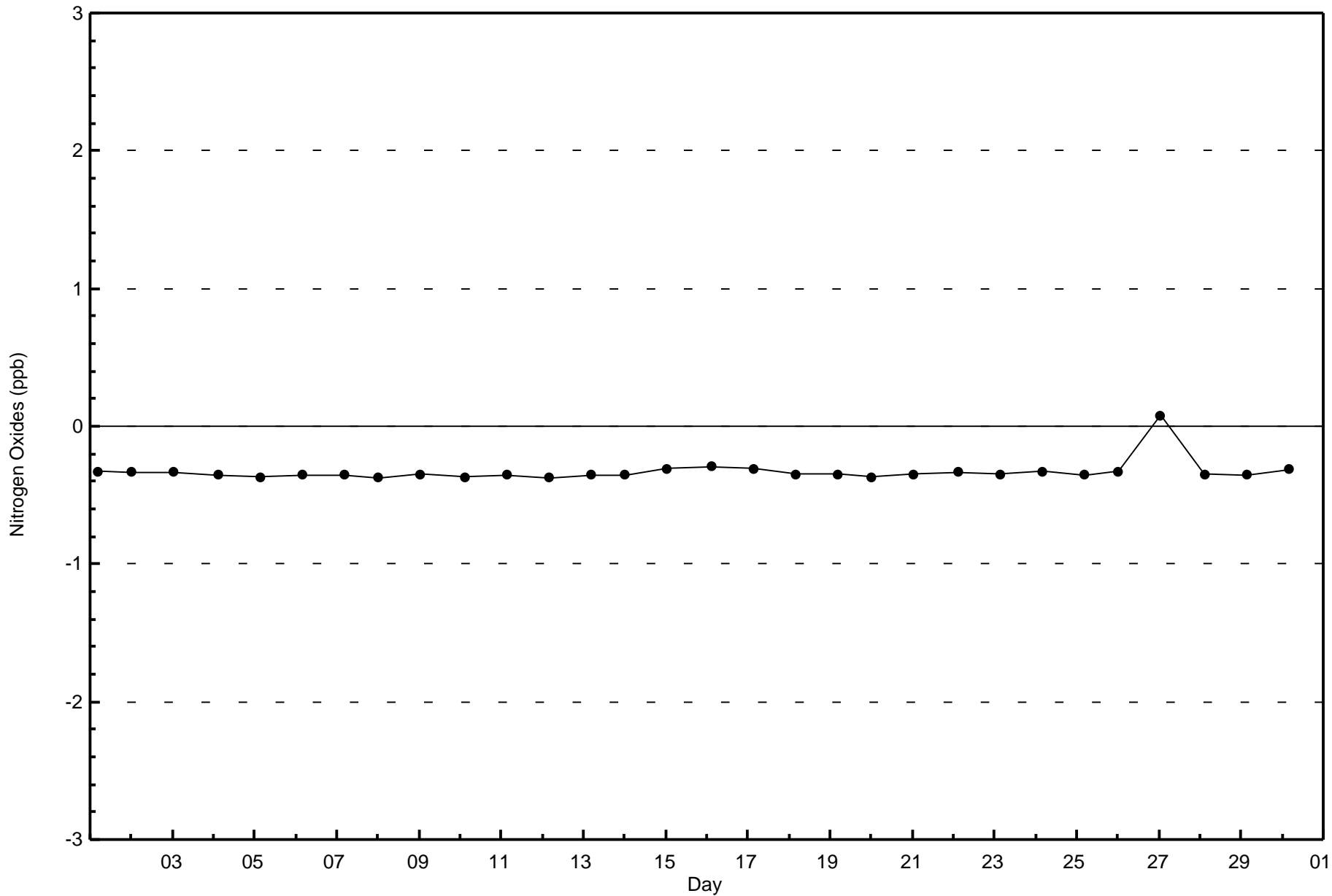
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
Stony Mountain (AMS 18)

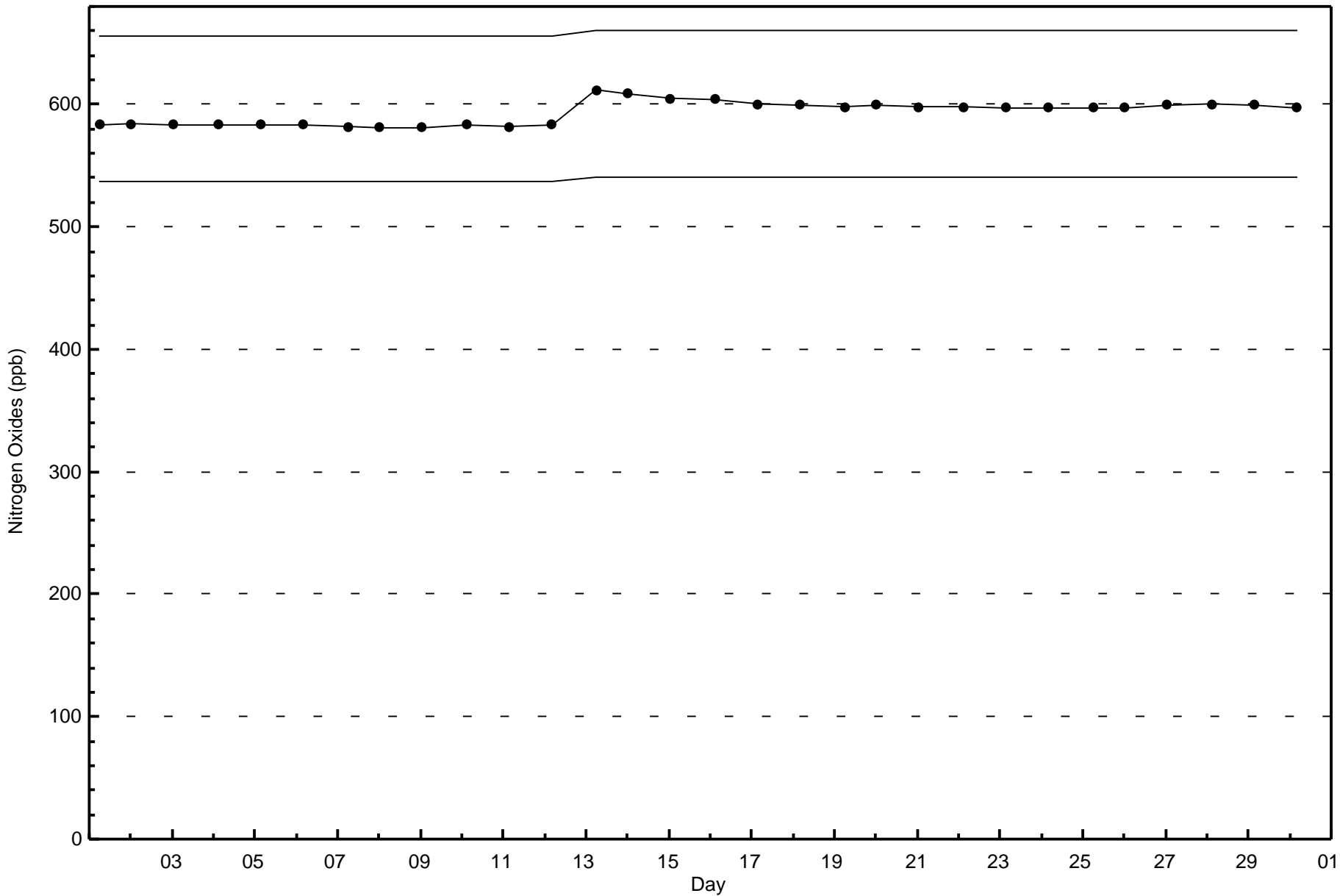






Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - September 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Stony Mountain - September 2016

| | | | | |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 46 ppb on Sep 16 20:00 | Maximum Daily Average: 38.7 ppb on Sep 29 | | Hours of Data: | 629 |
| Minimum Value: 9 ppb on Sep 1 02:00 | Minimum Daily Average: 16.2 ppb on Sep 3 | | Hours of Missing Data: | 91 |
| Maximum Diurnal Average: 32.3 ppb at hour 17 | Minimum Diurnal Average: 21.5 ppb at hour 7 | | Hours of Calibration: | 36 |
| Monthly Average: 27.6 ppb | Percentiles: P ₁ = 11 P ₁₀ = 17 Q ₁ = 21 Median = 28 Q ₃ = 33 P ₉₀ = 38 P ₉₉ = 45 | | Percent Operational Time: | 92.4 |

| 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 | 14 | 9 | 11 | 13 | 14 | 14 | 11 | Z | 11 | 11 | 11 | 14 | 16 | 21 | 21 | 19 | 27 | 23 | 18 | 18 | 23 | 24 | 23 | 23 | 16.8 | 27 |
| 2-Sep | 25 | 25 | Z | 23 | 22 | 22 | 21 | 22 | 23 | 24 | 24 | 24 | 22 | 23 | 22 | 20 | 19 | 19 | 19 | 17 | 13 | 11 | 11 | 11 | 20.1 | 25 |
| 3-Sep | 11 | 12 | 13 | Z | 12 | 12 | 12 | 13 | 13 | 12 | 12 | 10 | 12 | 17 | 18 | 18 | 19 | 19 | 20 | 23 | 24 | 25 | 23 | 23 | 16.2 | 25 |
| 4-Sep | 23 | 23 | 21 | 19 | Z | 18 | 18 | 17 | 19 | 24 | 28 | 30 | 31 | 32 | 32 | 32 | 30 | 26 | 23 | 24 | 24 | 23 | 25 | 26 | 24.7 | 32 |
| 5-Sep | 26 | 26 | 19 | 19 | 17 | Z | 19 | 20 | 22 | 28 | 26 | 28 | 30 | 32 | 33 | 32 | 31 | 30 | 26 | 21 | 21 | 21 | 21 | 21 | 24.8 | 33 |
| 6-Sep | 23 | 23 | 22 | 23 | 22 | 22 | Z | 16 | 20 | 20 | 23 | 30 | 31 | 27 | 23 | 22 | 18 | 16 | 15 | 11 | 10 | 10 | 10 | 10 | 19.5 | 31 |
| 7-Sep | 12 | 12 | 14 | 18 | 13 | 14 | 15 | Z | 17 | 18 | 23 | 28 | 29 | 29 | 29 | 29 | 26 | 27 | 27 | 30 | 29 | 28 | 27 | 26 | 22.7 | 30 |
| 8-Sep | 25 | 24 | Z | 19 | 22 | 15 | 14 | 18 | 21 | 22 | 27 | 28 | 28 | 26 | 25 | 27 | 29 | 27 | 26 | 27 | 28 | 25 | 23 | 19 | 23.8 | 29 |
| 9-Sep | 20 | 19 | 17 | Z | 17 | 16 | 15 | 15 | 16 | 18 | 21 | 22 | 24 | 28 | 30 | 28 | 28 | 23 | 18 | 21 | 21 | 20 | 19 | 21 | 20.8 | 30 |
| 10-Sep | 22 | 22 | 21 | 21 | Z | 19 | 18 | 18 | 20 | 21 | 25 | 27 | 31 | 34 | 34 | 35 | 32 | 28 | 27 | 25 | 23 | 20 | 19 | 19 | 24.3 | 35 |
| 11-Sep | 17 | 17 | 18 | 17 | 19 | Z | 22 | 23 | 21 | 23 | 25 | 27 | 26 | 27 | 27 | 26 | 25 | 24 | 23 | 21 | 22 | 21 | 18 | 18 | 22.0 | 27 |
| 12-Sep | 19 | 19 | 19 | 18 | 17 | 18 | Z | 19 | 23 | 31 | 33 | 34 | 34 | 35 | 35 | 35 | 33 | 31 | 28 | 27 | 26 | 26 | 26 | 26 | 26.5 | 35 |
| 13-Sep | 26 | 25 | 25 | 24 | 24 | 24 | 24 | Z | 23 | 24 | 25 | C | C | C | C | C | 31 | 30 | 29 | 29 | 29 | 29 | 28 | 28 | 26.6 | 31 |
| 14-Sep | 26 | 25 | Z | 24 | 23 | 15 | 19 | 18 | 19 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 26 |
| 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 | M | 40 | 42 | 44 | 46 | 46 | 44 | 40 | 36 | -- | 46 |
| 17-Sep | 33 | 32 | 30 | 26 | 22 | Z | 18 | 23 | 23 | 30 | 30 | 26 | 26 | 27 | 27 | 30 | 31 | 33 | 34 | 32 | 32 | 34 | 35 | 34 | 29.0 | 35 |
| 18-Sep | 35 | 37 | 34 | 33 | 32 | 31 | Z | 29 | 30 | 30 | 30 | 31 | 32 | 35 | 34 | 40 | 40 | 39 | 35 | 33 | 32 | 31 | 29 | 28 | 33.0 | 40 |
| 19-Sep | 28 | 26 | 24 | 23 | 21 | 18 | 17 | Z | 20 | 22 | 25 | 27 | 31 | 31 | 30 | 31 | 32 | 31 | 31 | 28 | 25 | 26 | 23 | 21 | 25.6 | 32 |
| 20-Sep | 21 | 23 | Z | 21 | 19 | 17 | 16 | 15 | 16 | 21 | 29 | 32 | 34 | 35 | 35 | 34 | 35 | 33 | 29 | 32 | 30 | 30 | 29 | 28 | 26.8 | 35 |
| 21-Sep | 30 | 28 | 28 | Z | 30 | 30 | 25 | 20 | 24 | 27 | 29 | 32 | 35 | 35 | 36 | 35 | 35 | 34 | 33 | 32 | 31 | 31 | 30 | 30 | 30.5 | 36 |
| 22-Sep | 31 | 31 | 31 | 31 | Z | 30 | 28 | 27 | 29 | 33 | 36 | 42 | 44 | 44 | 45 | 45 | 44 | 45 | 42 | 41 | 40 | 39 | 37 | 35 | 36.9 | 45 |
| 23-Sep | 34 | 32 | 30 | 28 | 27 | Z | 29 | 32 | 33 | C | C | C | 35 | 34 | 33 | 31 | 30 | 30 | 28 | 27 | 26 | 25 | 23 | 21 | 29.5 | 35 |
| 24-Sep | 19 | 18 | 18 | 17 | 19 | 20 | Z | 26 | 28 | 30 | 35 | 36 | 37 | 39 | 40 | 39 | 40 | 40 | 39 | 37 | 37 | 37 | 36 | 35 | 31.4 | 40 |
| 25-Sep | 35 | 34 | 33 | 33 | 32 | 31 | 30 | Z | 31 | 32 | 34 | 37 | 38 | 38 | 38 | 38 | 38 | 38 | 37 | 37 | 37 | 38 | 39 | 36 | 35.5 | 39 |
| 26-Sep | 34 | 33 | Z | 32 | 31 | 30 | 29 | 29 | 29 | 33 | 35 | 38 | 40 | 40 | 40 | 38 | 39 | 38 | 37 | 38 | 39 | 38 | 37 | 36 | 35.4 | 40 |
| 27-Sep | 35 | 33 | 32 | Z | 30 | 29 | 31 | 31 | 39 | 42 | 40 | 39 | 38 | 38 | 39 | 40 | 41 | 41 | 39 | 39 | 38 | 35 | 36 | 37 | 36.5 | 42 |
| 28-Sep | 36 | 35 | 34 | 33 | Z | 33 | 32 | 28 | 27 | 30 | 34 | 36 | 38 | 39 | 39 | 39 | 40 | 40 | 39 | 37 | 28 | 34 | 33 | 33 | 34.6 | 40 |
| 29-Sep | 33 | 32 | 30 | 29 | 29 | Z | 30 | 32 | 34 | 36 | 39 | 41 | 43 | 44 | 45 | 45 | 44 | 43 | 43 | 44 | 42 | 43 | 44 | 42 | 38.7 | 45 |
| 30-Sep | 41 | 36 | 32 | 33 | 33 | 29 | Z | 32 | 31 | 27 | 28 | 28 | 27 | 28 | 30 | 29 | 29 | 26 | 25 | 23 | 23 | 25 | 27 | 28 | 29.1 | 41 |

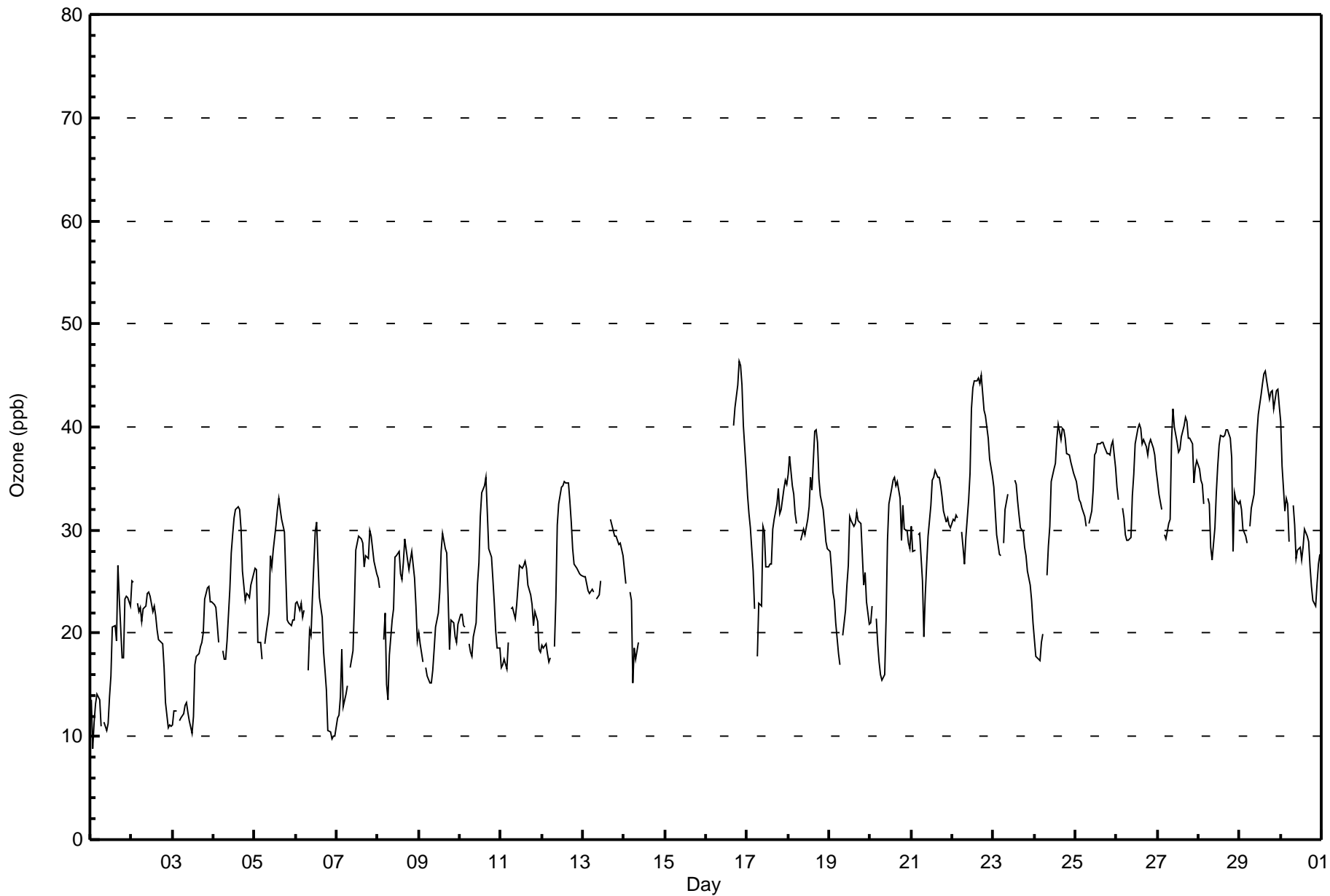
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 26.2 | 25.4 | 24.2 | 24.1 | 22.7 | 22.0 | 21.5 | 22.7 | 23.7 | 25.8 | 27.9 | 29.9 | 31.3 | 32.2 | 32.3 | 32.2 | 32.3 | 31.3 | 29.8 | 29.3 | 28.6 | 28.2 | 27.5 | 26.8 | Diurnal Average | |
| 41 | 37 | 34 | 33 | 33 | 33 | 32 | 32 | 39 | 42 | 40 | 42 | 44 | 44 | 45 | 45 | 44 | 45 | 44 | 46 | 46 | 44 | 44 | 42 | Diurnal Maximum | |

Z - zerspan C - Calibration M - Maintenance AF - Analyzer Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 82 ppb



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Stony Mountain - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 130 | 20.67 | 20.67 |
| 21 - 50 | 499 | 79.33 | 100.00 |
| 51 - 82 | 0 | 0.00 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 629

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 3 | 4 | 5 | 3 | 5 | 1 | 5 | 2 | 1 | 5 | 13 | 6 | 14 | 40 | 15 | 1 | 123 |
| 21 - 50 | 10 | 14 | 11 | 3 | 1 | 8 | 10 | 16 | 26 | 54 | 58 | 39 | 58 | 83 | 29 | 10 | 430 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 18 | 16 | 6 | 6 | 9 | 15 | 18 | 27 | 59 | 71 | 45 | 72 | 123 | 44 | 11 | 553 |

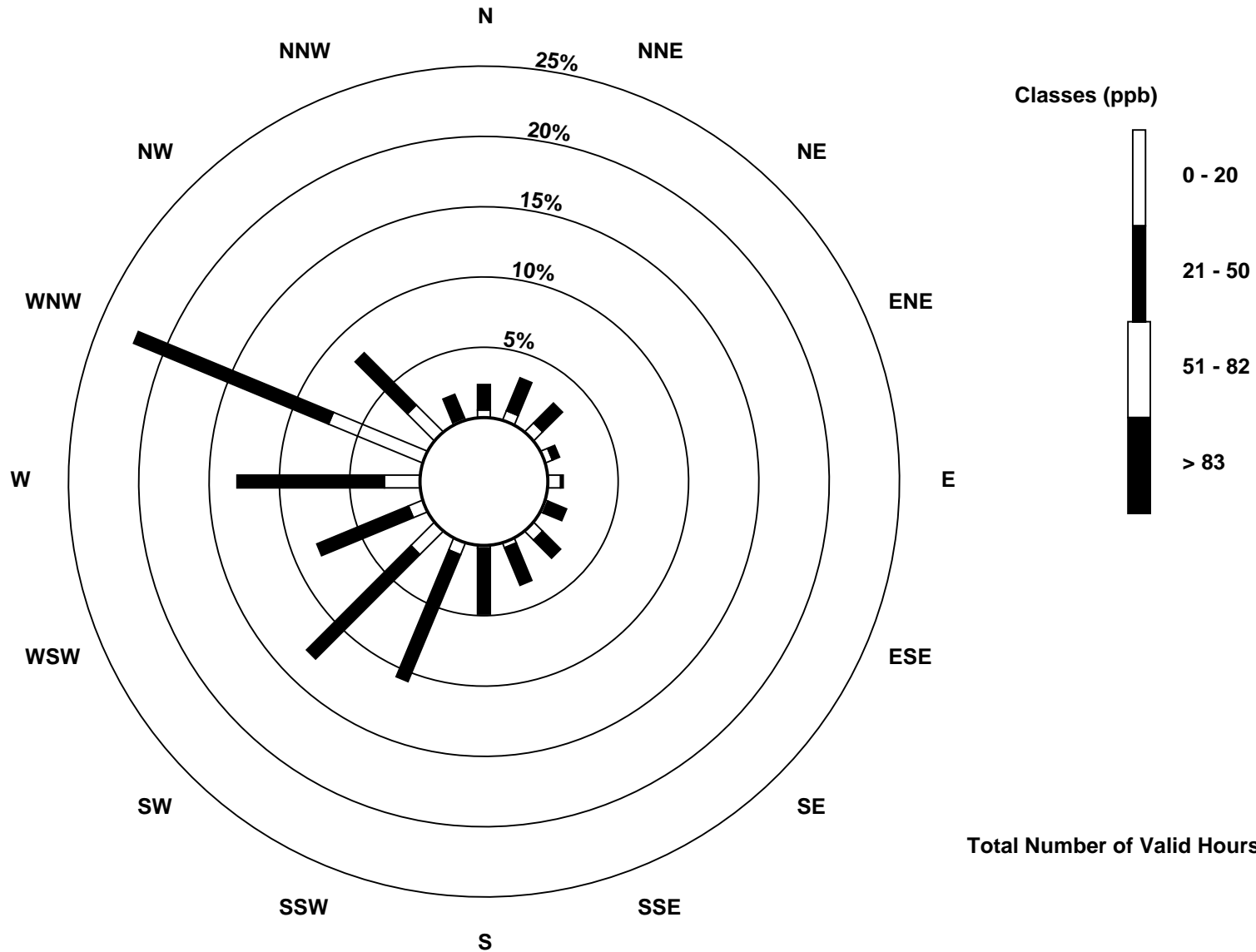
Total Number of Valid Hours: 553

Total Number of Hours: 720

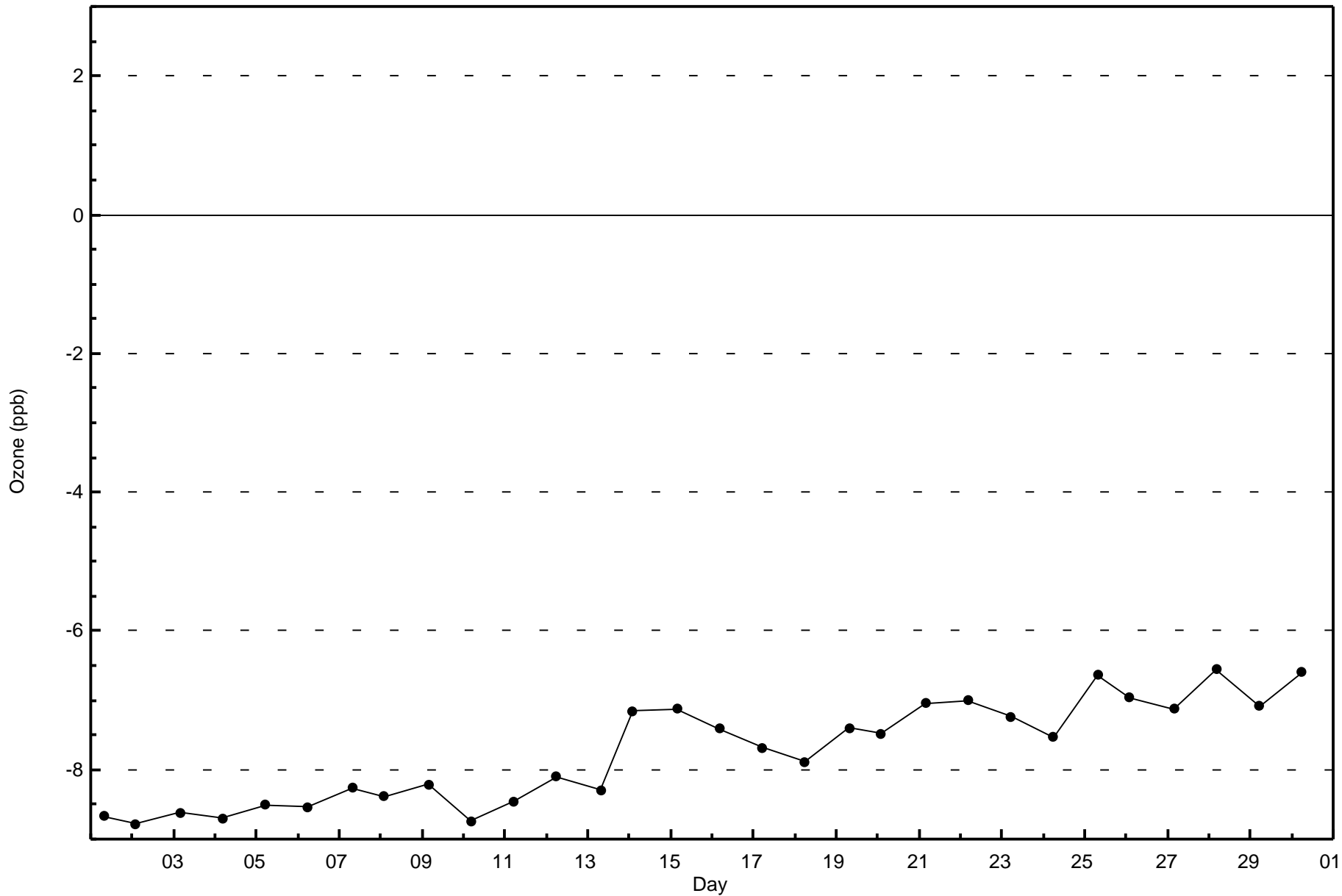


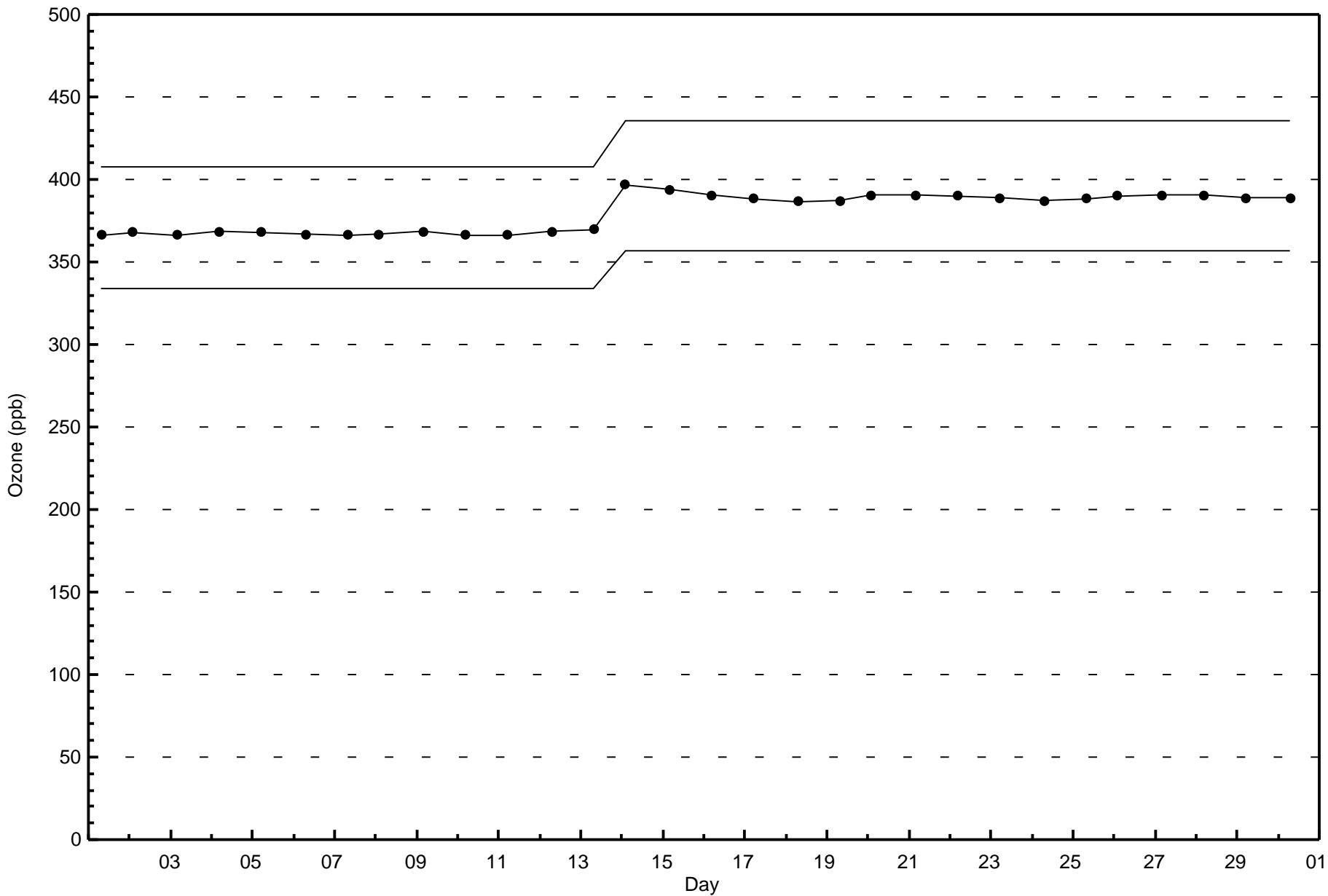
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Ozone (O₃) - ppb
Stony Mountain (AMS 18)



Total Number of Valid Hours: 553







| Number of Exceedences (AAAQO): 24-hr: 0 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------|-----|----------------------------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|-----|-----|-----|-----|-----------------|---------------|---------------|
| Maximum Value: 16.0 µg/m ³ on Sep 1 16:00 | | Maximum Daily Average: 5.7 µg/m ³ on Sep 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Value: 0.5 µg/m ³ on Sep 25 14:00 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 3.1 µg/m ³ at hour 6 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.71 µg/m ³ | | Hours of Calibration: 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Daily Average: 0.9 µg/m ³ on Sep 25 | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Diurnal Average: 2.0 µg/m ³ at hour 12 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentiles: P ₁ = 0.6 P ₁₀ = 1.1 Q ₁ = 1.5 Median = 2.4 Q ₃ = 3.5 P ₉₀ = 4.6 P ₉₉ = 8.6 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 3.8 | 3.6 | 4.4 | 4.0 | 2.9 | 2.7 | 1.8 | 3.0 | 2.7 | 3.2 | 3.7 | 3.6 | 4.6 | 7.4 | 15.4 | 16.0 | 14.6 | 15.9 | 9.2 | 4.1 | 4.2 | 3.5 | 1.5 | 1.4 | 5.7 | 16.0 |
| 2-Sep | 1.3 | 1.3 | 1.2 | 1.5 | 1.4 | 1.4 | 1.7 | 1.6 | 1.7 | 1.1 | 1.0 | 1.0 | 1.2 | 1.2 | 1.2 | 1.2 | 1.5 | 1.6 | 1.6 | 1.6 | 1.4 | 1.4 | 1.7 | 1.7 | 1.4 | 1.7 |
| 3-Sep | 1.6 | 1.6 | 1.5 | 1.5 | 1.7 | 1.9 | 2.0 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.1 | 1.2 | 1.2 | 1.2 | 1.3 | 1.2 | 1.1 | 1.4 | 2.0 | |
| 4-Sep | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.3 | 1.4 | 1.1 | 0.8 | 0.7 | 0.6 | 0.7 | 0.7 | 0.8 | 1.0 | 1.3 | 1.5 | 1.4 | 1.4 | 1.3 | 1.3 | 1.1 | 1.5 | |
| 5-Sep | 1.3 | 1.3 | 1.3 | 1.1 | 1.3 | 1.4 | 1.4 | 1.7 | 1.6 | 1.3 | 1.2 | 1.1 | 2.9 | 3.5 | 3.5 | 3.3 | 3.4 | 4.0 | 5.6 | 6.4 | 6.2 | 5.3 | 4.8 | 3.8 | 2.9 | 6.4 |
| 6-Sep | 3.5 | 3.7 | 3.7 | 3.7 | 3.8 | 3.7 | 3.6 | 3.8 | 3.1 | 2.7 | 2.8 | 1.9 | 1.7 | 2.0 | 2.5 | 2.4 | 3.9 | 4.5 | 4.7 | 4.6 | 4.6 | 4.5 | 4.1 | 2.9 | 3.4 | 4.7 |
| 7-Sep | 4.2 | 4.4 | 3.1 | 2.5 | 1.7 | 1.3 | 1.1 | 1.3 | 1.6 | 2.1 | 1.9 | 2.1 | 2.3 | 3.2 | 3.9 | 3.1 | 3.1 | 2.8 | 3.1 | 3.1 | 3.0 | 2.9 | 2.8 | 2.7 | 2.6 | 4.4 |
| 8-Sep | 3.1 | 3.7 | 3.6 | 3.4 | 3.2 | 2.8 | 2.9 | 2.6 | 2.6 | 2.4 | 1.8 | 1.4 | 2.4 | 4.1 | 3.3 | 3.4 | 2.3 | 2.4 | 3.0 | 2.9 | 2.6 | 2.5 | 2.6 | 2.7 | 2.8 | 4.1 |
| 9-Sep | 3.1 | 3.9 | 3.7 | 3.5 | 2.8 | 2.5 | 2.3 | 2.2 | 2.2 | 2.0 | 1.6 | 1.7 | 1.5 | 1.1 | 1.1 | 1.1 | 1.2 | 1.6 | 2.1 | 2.0 | 2.2 | 2.0 | 2.1 | 1.9 | 2.1 | 3.9 |
| 10-Sep | 2.0 | 2.3 | 2.5 | 3.0 | 3.1 | 3.1 | 4.0 | 4.1 | 3.3 | 3.0 | 2.8 | 2.6 | 2.5 | 2.2 | 2.2 | 2.7 | 2.5 | 2.6 | 2.4 | 2.6 | 2.5 | 2.4 | 2.2 | 2.0 | 2.7 | 4.1 |
| 11-Sep | 2.0 | 1.9 | 1.8 | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 | 1.7 | 1.4 | 1.3 | 1.4 | 1.6 | 1.5 | 1.6 | 1.8 | 2.5 | 3.5 | 2.0 | 1.7 | 1.5 | 1.6 | 1.6 | 1.5 | 1.7 | 3.5 |
| 12-Sep | 1.3 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 0.7 | 0.6 | 0.5 | 0.6 | 0.6 | 0.8 | 0.8 | 1.1 | 1.4 | 1.6 | 1.7 | 1.8 | 1.8 | 1.9 | 1.7 | 1.2 | 1.9 |
| 13-Sep | 1.8 | 2.3 | 2.9 | 3.5 | 3.9 | 3.6 | 3.4 | 3.4 | 3.2 | 2.9 | 2.9 | 3.0 | 3.7 | 4.2 | C | 3.1 | 4.0 | 4.5 | 5.2 | 5.3 | 4.8 | 4.5 | 4.3 | 4.1 | 3.7 | 5.3 |
| 14-Sep | 4.0 | 4.1 | 4.1 | 3.7 | 3.6 | 4.2 | 4.2 | 4.4 | 4.4 | 2.7 | 2.2 | 1.9 | 1.9 | 1.3 | 0.9 | 0.9 | 1.1 | 0.8 | 1.4 | 1.6 | 1.6 | 1.8 | 2.0 | 2.3 | 2.5 | 4.4 |
| 15-Sep | 3.3 | 4.6 | 4.3 | 3.9 | 4.3 | 4.4 | 4.4 | 4.1 | 4.2 | 3.5 | 2.9 | 1.8 | 1.0 | 1.0 | 1.4 | 1.6 | 1.5 | 1.8 | 2.7 | 2.9 | 3.0 | 3.3 | 3.3 | 3.2 | 3.0 | 4.6 |
| 16-Sep | 3.5 | 3.5 | 3.0 | 4.5 | 4.7 | 4.6 | 5.1 | 5.6 | 4.6 | 4.4 | 3.0 | 3.7 | 3.1 | 2.5 | 2.0 | 2.1 | 2.9 | 3.7 | 5.9 | 6.6 | 6.2 | 5.9 | 4.9 | 3.5 | 4.2 | 6.6 |
| 17-Sep | 4.2 | 5.3 | 5.2 | 4.8 | 4.2 | 4.1 | 3.9 | 3.5 | 3.7 | 3.4 | 2.4 | 2.6 | 2.8 | 3.0 | 3.1 | 2.9 | 2.7 | 2.5 | 2.5 | 2.6 | 2.4 | 2.4 | 2.3 | 2.2 | 3.3 | 5.3 |
| 18-Sep | 2.7 | 3.2 | 3.2 | 2.8 | 2.6 | 2.8 | 2.7 | 2.8 | 2.9 | 2.5 | 2.5 | 2.4 | 2.6 | 2.7 | 3.5 | 2.2 | 2.2 | 2.6 | 4.0 | 3.5 | 2.8 | 3.1 | 2.7 | 2.4 | 2.8 | 4.0 |
| 19-Sep | 2.6 | 3.1 | 3.2 | 2.8 | 2.5 | 2.1 | 2.0 | 2.0 | 2.3 | 2.6 | 2.3 | 1.9 | 1.9 | 1.9 | 2.1 | 2.1 | 1.9 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.0 | 2.2 | 3.2 |
| 20-Sep | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 2.2 | 3.3 | 4.1 | 4.7 | 3.1 | 1.7 | 1.3 | 1.1 | 1.0 | 0.9 | 1.1 | 1.0 | 1.1 | 1.3 | 1.2 | 2.0 | 3.9 | 3.9 | 3.1 | 2.1 | 4.7 |
| 21-Sep | 1.4 | 1.4 | 1.4 | 1.6 | 1.7 | 1.7 | 1.8 | 2.0 | 2.1 | 1.8 | 1.7 | 1.6 | 1.2 | 1.3 | 1.1 | 1.4 | 1.4 | 1.6 | 1.7 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 1.7 | 2.1 |
| 22-Sep | 2.2 | 2.3 | 2.8 | 3.3 | 4.1 | 4.4 | 4.5 | 5.0 | 3.0 | 1.8 | 1.6 | 1.5 | 1.3 | 1.3 | 1.6 | 1.8 | 1.9 | 2.0 | 2.5 | 2.7 | 2.8 | 3.1 | 3.6 | 4.3 | 2.7 | 5.0 |
| 23-Sep | 4.0 | 4.0 | 4.6 | 5.4 | 5.6 | 5.7 | 5.6 | 4.4 | 3.6 | 3.0 | 2.7 | 3.2 | 3.8 | 3.9 | 4.2 | 3.8 | 3.3 | 3.0 | 3.1 | 3.3 | 2.8 | 2.8 | 2.4 | 2.2 | 3.8 | 5.7 |
| 24-Sep | 2.4 | 2.7 | 4.7 | 6.0 | 10.2 | 10.8 | 8.4 | 5.0 | 3.6 | 2.8 | 2.0 | 1.9 | 1.8 | 1.9 | 1.9 | 1.3 | 1.0 | 1.1 | 1.3 | 1.2 | 1.2 | 1.2 | 1.1 | 3.2 | 10.8 | |
| 25-Sep | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.1 | 0.9 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 | 1.0 | 1.0 | 0.9 | 1.3 |
| 26-Sep | 1.0 | 1.1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.2 | 1.4 | 1.3 | 1.1 | 0.8 | 0.6 | 0.7 | 0.9 | 1.4 | 1.8 | 2.0 | 2.2 | 2.2 | 2.1 | 2.2 | 1.4 | 2.2 |
| 27-Sep | 3.7 | 5.1 | 5.4 | 5.6 | 5.7 | 5.6 | 4.7 | 3.4 | 2.3 | 2.3 | 2.7 | 2.7 | 2.2 | 2.0 | 1.3 | 0.7 | 0.6 | 0.6 | 0.9 | 0.9 | 1.0 | 1.2 | 1.3 | 1.3 | 2.6 | 5.7 |
| 28-Sep | 1.5 | 1.8 | 1.9 | 2.0 | 2.2 | 2.3 | 2.5 | 2.5 | 2.4 | 2.1 | 2.7 | 3.6 | 5.8 | 6.5 | 6.8 | 7.4 | 6.7 | 7.0 | 7.7 | 6.9 | 6.4 | 5.5 | 4.4 | 3.8 | 4.3 | 7.7 |
| 29-Sep | 2.9 | 2.7 | 2.8 | 3.0 | 3.1 | 3.4 | 3.7 | 4.0 | 3.3 | 2.9 | 3.2 | 2.7 | 2.7 | 3.1 | 3.1 | 3.7 | 3.8 | 4.1 | 4.5 | 4.0 | 4.0 | 3.7 | 3.3 | 3.4 | 3.4 | 4.5 |
| 30-Sep | 4.2 | 4.7 | 5.5 | 5.5 | 5.5 | 5.2 | 5.0 | 4.6 | 4.2 | 4.1 | 4.2 | 4.2 | 4.4 | 4.2 | 4.0 | 4.3 | 4.5 | 5.0 | 5.4 | 5.9 | 5.7 | 3.6 | 2.6 | 2.5 | 4.5 | 5.9 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alberta Ambient Air Quality Objectives (AAAQO): | | | | 24-hr 30 µg/m ³ | | | | | | | | | | | | | | | | | | | | | | |

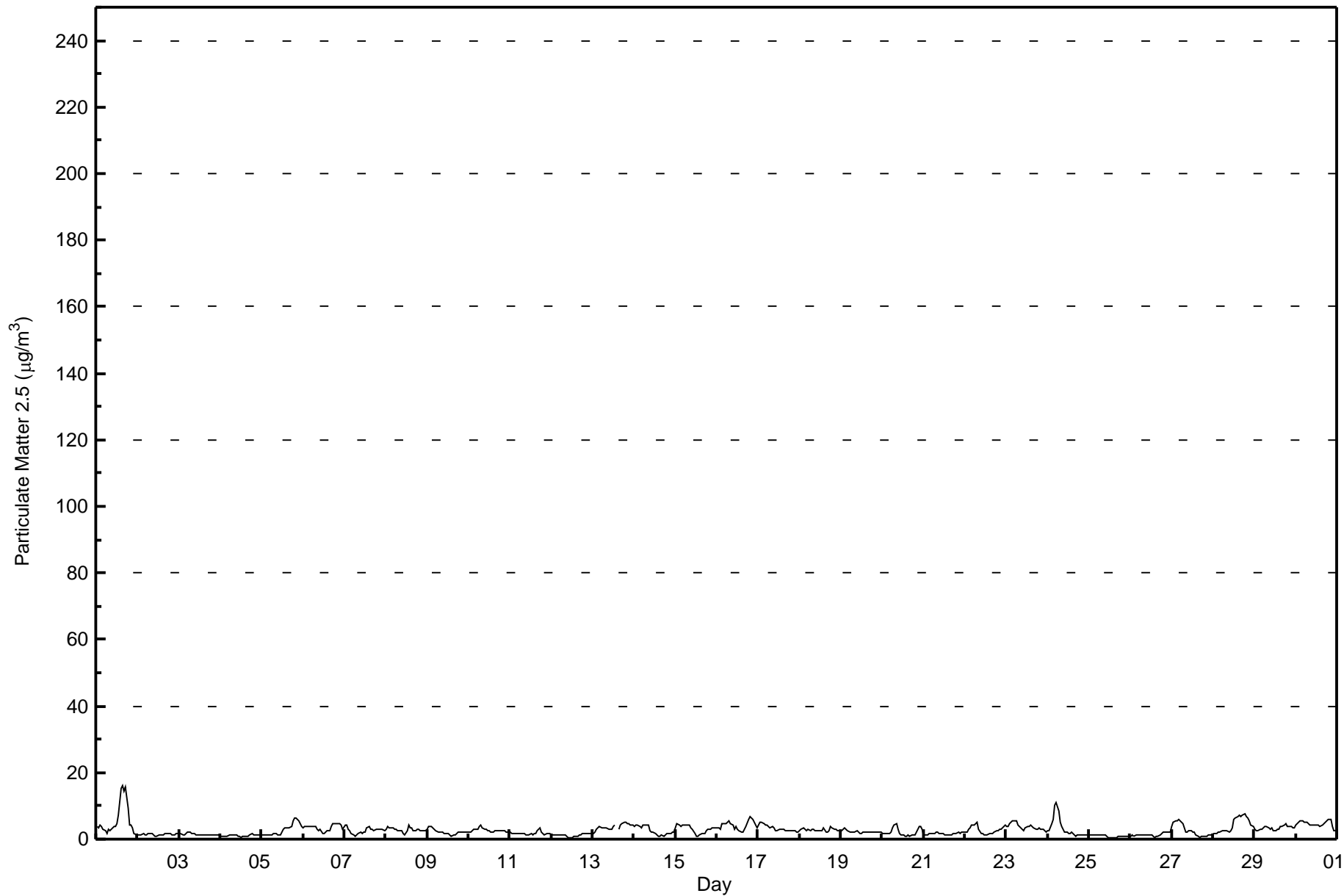


Wood Buffalo Environmental Association

Hourly Averages

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

Stony Mountain - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - September 2016

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 637 | 88.60 | 88.60 |
| 6 - 15 | 35 | 4.87 | 93.46 |
| 16 - 25 | 2 | 0.28 | 93.74 |
| 26 - 80 | 0 | 0.00 | 93.74 |
| > 81.0 | 0 | 0.00 | 93.74 |

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
Stony Mountain - September 2016

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|----------------------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 12 | 17 | 14 | 7 | 6 | 9 | 13 | 22 | 26 | 60 | 88 | 43 | 77 | 129 | 47 | 10 | 580 |
| 6 - 15 | 0 | 2 | 2 | 0 | 0 | 1 | 4 | 1 | 2 | 7 | 11 | 4 | 1 | 0 | 0 | 0 | 35 |
| 16 - 25 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| 26 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 19 | 16 | 7 | 6 | 10 | 17 | 23 | 28 | 67 | 99 | 48 | 78 | 129 | 47 | 10 | 617 |

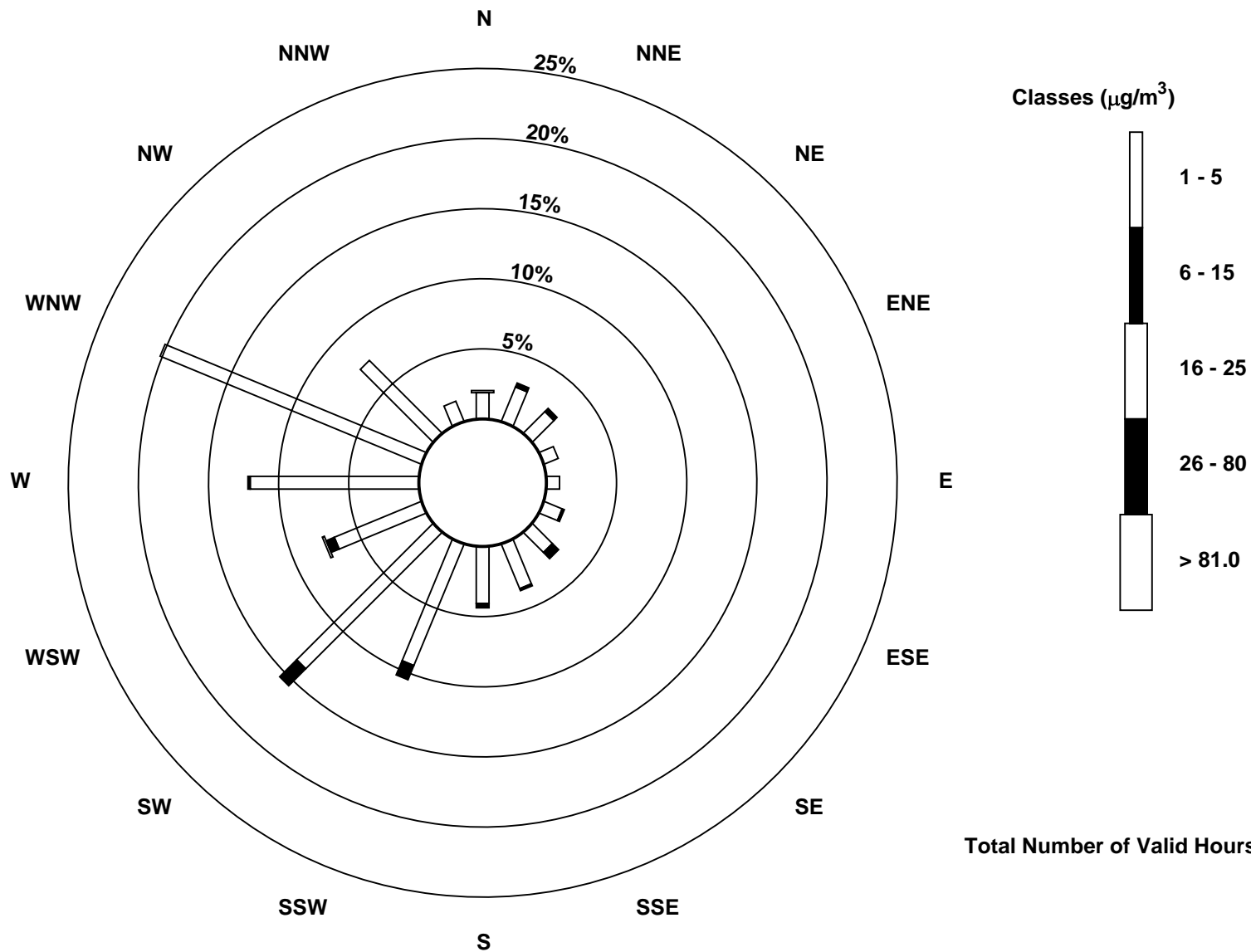
Total Number of Valid Hours: 640

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain (AMS 18)



Total Number of Valid Hours: 640

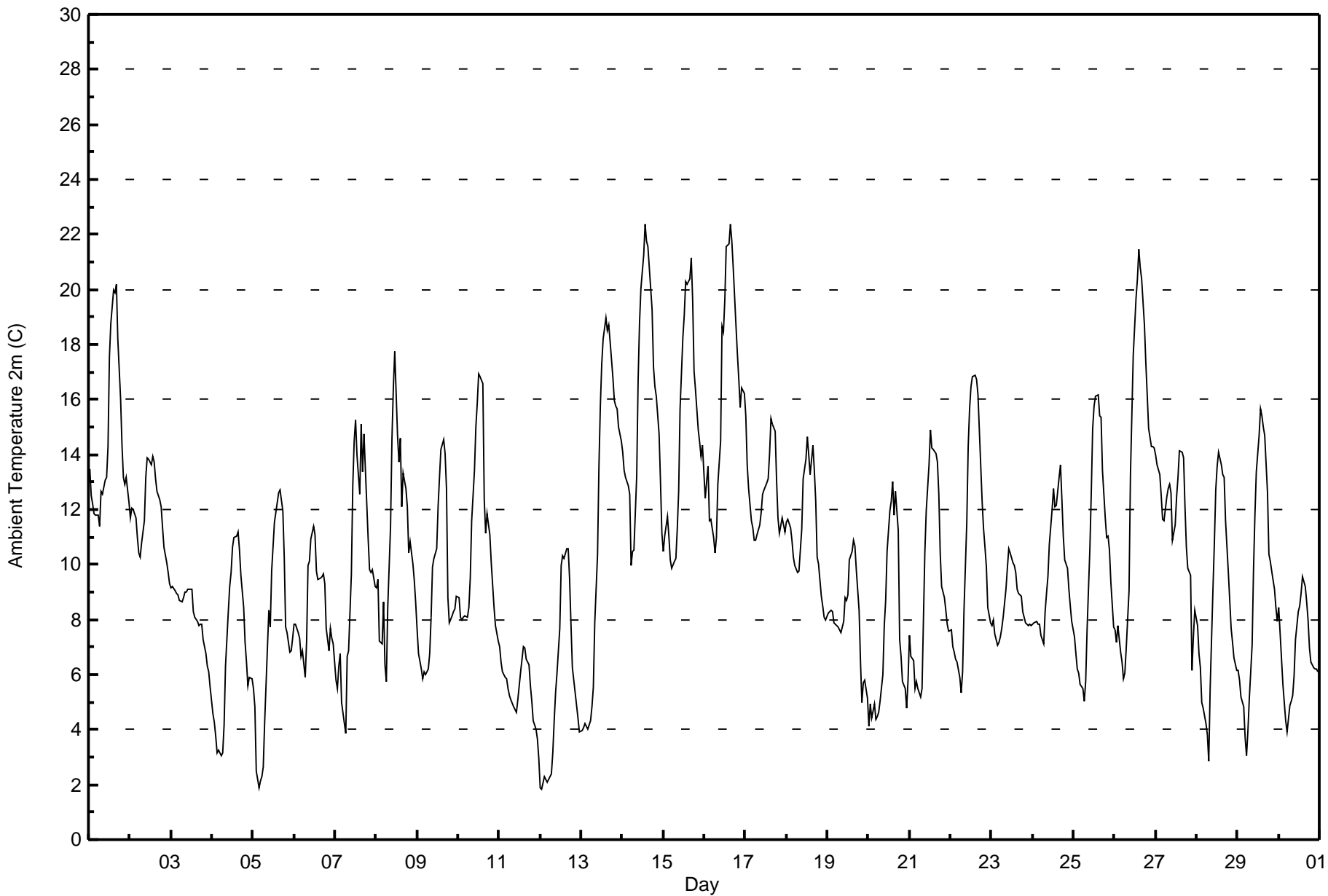


| Maximum Value: 22.4 C on Sep 14 14:00 | | Maximum Daily Average: 16.2 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: 1.8 C on Sep 12 02:00 | | Minimum Daily Average: 5.5 C on Sep 11 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 14.2 C at hour 15 | | Minimum Diurnal Average: 6.8 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.22 C | | Percentiles: P ₁ = 2.3 P ₁₀ = 5.1 Q ₁ = 7.1 Median = 9.8 Q ₃ = 12.9 P ₉₀ = 15.7 P ₉₉ = 21.5 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 13.5 | 12.5 | 12.2 | 11.9 | 11.8 | 11.8 | 11.4 | 12.7 | 12.5 | 13.1 | 13.2 | 14.3 | 17.6 | 18.8 | 20.0 | 19.9 | 20.2 | 18.2 | 16.0 | 14.3 | 13.2 | 12.9 | 13.2 | 12.2 | 14.5 | 20.2 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 11.7 | 12.1 | 12.0 | 11.7 | 11.0 | 10.4 | 10.3 | 10.8 | 11.6 | 13.2 | 13.9 | 13.8 | 13.6 | 13.9 | 13.7 | 13.1 | 12.7 | 12.4 | 12.1 | 11.3 | 10.6 | 10.1 | 9.7 | 9.3 | 11.9 | 13.9 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 9.2 | 9.2 | 9.0 | 8.9 | 8.9 | 8.7 | 8.6 | 8.8 | 9.0 | 9.0 | 9.1 | 9.1 | 9.1 | 8.3 | 8.1 | 7.9 | 7.8 | 7.8 | 7.8 | 7.3 | 6.8 | 6.3 | 6.1 | 5.5 | 8.2 | 9.2 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 4.6 | 4.3 | 3.8 | 3.2 | 3.3 | 3.0 | 3.2 | 4.2 | 6.3 | 8.3 | 9.2 | 9.7 | 10.6 | 11.0 | 11.1 | 11.2 | 10.5 | 9.6 | 8.4 | 7.2 | 6.5 | 5.6 | 5.9 | 5.8 | 6.9 | 11.2 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 5.5 | 4.8 | 2.5 | 1.9 | 2.1 | 2.3 | 2.7 | 4.3 | 7.0 | 8.3 | 7.7 | 9.7 | 11.6 | 11.9 | 12.2 | 12.6 | 12.7 | 11.9 | 10.3 | 7.7 | 7.5 | 6.8 | 6.9 | 7.3 | 7.4 | 12.7 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 7.9 | 7.8 | 7.5 | 7.3 | 6.7 | 6.9 | 5.9 | 7.2 | 10.0 | 10.1 | 10.9 | 11.4 | 11.1 | 9.8 | 9.5 | 9.5 | 9.5 | 9.7 | 9.3 | 7.7 | 6.8 | 7.7 | 7.3 | 7.1 | 8.5 | 11.4 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 5.8 | 5.5 | 6.3 | 6.8 | 5.0 | 4.2 | 3.9 | 6.7 | 6.9 | 9.6 | 12.9 | 14.5 | 15.3 | 14.0 | 12.5 | 15.1 | 13.4 | 14.8 | 12.2 | 10.9 | 9.8 | 9.7 | 9.8 | 9.2 | 9.8 | 15.3 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 9.1 | 9.5 | 7.2 | 7.1 | 8.6 | 6.3 | 5.7 | 8.5 | 11.4 | 14.6 | 16.4 | 17.7 | 14.7 | 13.7 | 14.6 | 12.1 | 13.3 | 12.8 | 12.1 | 10.4 | 10.8 | 10.0 | 9.4 | 8.6 | 11.0 | 17.7 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 7.6 | 6.8 | 6.2 | 5.9 | 6.1 | 6.0 | 6.2 | 6.8 | 8.1 | 9.9 | 10.2 | 10.6 | 12.1 | 13.2 | 14.2 | 14.5 | 14.0 | 12.8 | 8.8 | 7.9 | 8.1 | 8.3 | 8.4 | 8.9 | 9.2 | 14.5 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 8.8 | 8.1 | 8.0 | 8.1 | 8.1 | 8.1 | 8.5 | 9.5 | 11.6 | 13.4 | 15.0 | 15.9 | 17.0 | 16.8 | 16.6 | 12.4 | 11.1 | 11.8 | 11.1 | 10.1 | 9.3 | 8.4 | 7.8 | 7.2 | 10.9 | 17.0 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 7.0 | 6.4 | 6.1 | 5.9 | 5.8 | 5.5 | 5.3 | 5.1 | 4.9 | 4.7 | 4.6 | 5.1 | 6.1 | 6.6 | 7.0 | 7.0 | 6.6 | 6.4 | 5.6 | 5.0 | 4.3 | 4.0 | 3.7 | 2.9 | 5.5 | 7.0 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1.9 | 1.8 | 2.3 | 2.2 | 2.1 | 2.2 | 2.4 | 3.2 | 4.3 | 5.4 | 6.1 | 7.7 | 10.0 | 10.3 | 10.2 | 10.6 | 10.6 | 9.5 | 7.9 | 6.3 | 5.3 | 4.9 | 4.4 | 3.9 | 5.6 | 10.6 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 4.0 | 4.0 | 4.2 | 4.1 | 4.0 | 4.3 | 4.8 | 5.5 | 7.9 | 10.4 | 13.6 | 15.8 | 17.3 | 18.2 | 19.0 | 18.5 | 18.7 | 18.1 | 16.8 | 16.0 | 15.8 | 15.7 | 15.0 | 14.5 | 11.9 | 19.0 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 14.1 | 13.4 | 13.2 | 12.9 | 12.6 | 10.0 | 10.5 | 10.5 | 13.2 | 16.7 | 18.7 | 20.0 | 21.3 | 22.4 | 21.8 | 21.6 | 20.8 | 19.3 | 17.2 | 16.4 | 16.1 | 14.7 | 13.0 | 11.1 | 15.9 | 22.4 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 10.5 | 11.1 | 11.7 | 11.1 | 10.1 | 9.9 | 10.1 | 10.2 | 11.3 | 12.6 | 15.7 | 18.2 | 19.1 | 20.3 | 20.2 | 20.4 | 21.2 | 19.6 | 17.0 | 16.4 | 14.9 | 14.5 | 13.9 | 14.3 | 14.8 | 21.2 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 12.4 | 13.0 | 13.6 | 11.6 | 11.7 | 11.0 | 10.4 | 11.0 | 12.9 | 14.5 | 18.7 | 18.4 | 19.6 | 21.6 | 21.7 | 22.4 | 21.8 | 20.8 | 18.7 | 17.6 | 16.7 | 15.7 | 16.4 | 16.2 | 16.2 | 22.4 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 15.4 | 13.6 | 12.8 | 11.6 | 11.3 | 10.9 | 10.9 | 11.1 | 11.5 | 11.9 | 12.6 | 12.7 | 12.9 | 13.1 | 14.0 | 15.3 | 15.1 | 14.9 | 13.1 | 11.7 | 11.1 | 11.7 | 11.4 | 11.2 | 12.6 | 15.4 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 11.5 | 11.7 | 11.3 | 10.9 | 10.3 | 10.0 | 9.7 | 9.8 | 10.6 | 11.3 | 13.1 | 13.8 | 14.6 | 14.0 | 13.3 | 14.3 | 13.4 | 12.3 | 10.3 | 10.0 | 8.9 | 8.5 | 8.1 | 8.0 | 11.2 | 14.6 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 8.2 | 8.3 | 8.4 | 8.3 | 7.9 | 7.8 | 7.7 | 7.6 | 7.5 | 7.9 | 8.8 | 8.7 | 8.9 | 10.2 | 10.5 | 10.9 | 10.7 | 9.8 | 8.3 | 6.4 | 5.0 | 5.7 | 5.8 | 5.1 | 8.1 | 10.9 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 4.1 | 4.9 | 4.4 | 4.9 | 4.4 | 4.5 | 4.6 | 5.0 | 6.0 | 7.8 | 8.7 | 10.5 | 12.0 | 12.3 | 13.0 | 11.8 | 12.7 | 11.2 | 7.3 | 6.6 | 5.8 | 5.5 | 4.8 | 5.8 | 7.4 | 13.0 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 7.4 | 6.7 | 6.5 | 5.5 | 5.7 | 5.5 | 5.2 | 5.5 | 8.0 | 10.4 | 11.9 | 13.6 | 14.9 | 14.2 | 14.2 | 14.0 | 13.7 | 12.6 | 10.4 | 9.2 | 8.8 | 8.3 | 7.8 | 7.6 | 9.5 | 14.9 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 7.6 | 7.0 | 6.8 | 6.6 | 6.5 | 5.9 | 5.3 | 6.1 | 8.3 | 11.5 | 14.3 | 15.7 | 16.5 | 16.8 | 16.9 | 16.7 | 16.2 | 14.9 | 12.3 | 11.3 | 10.6 | 9.9 | 8.5 | 7.9 | 10.8 | 16.9 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 7.8 | 8.0 | 7.5 | 7.1 | 7.2 | 7.4 | 7.7 | 8.1 | 9.1 | 9.9 | 10.6 | 10.4 | 10.1 | 10.0 | 9.7 | 9.1 | 8.9 | 8.8 | 8.3 | 8.1 | 7.9 | 7.8 | 7.8 | 7.8 | 8.5 | 10.6 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 7.8 | 7.9 | 7.9 | 7.8 | 7.8 | 7.4 | 7.1 | 8.3 | 8.9 | 9.5 | 10.7 | 12.0 | 12.7 | 12.1 | 12.1 | 13.2 | 13.6 | 12.4 | 11.0 | 10.2 | 9.9 | 9.1 | 8.5 | 7.9 | 9.8 | 13.6 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 7.4 | 6.7 | 6.2 | 6.0 | 5.7 | 5.5 | 5.0 | 5.7 | 7.6 | 10.6 | 12.6 | 15.0 | 15.8 | 16.1 | 16.2 | 15.4 | 15.3 | 13.4 | 11.7 | 11.0 | 11.0 | 10.5 | 9.4 | 7.7 | 10.3 | 16.2 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 7.6 | 7.2 | 7.8 | 6.8 | 6.5 | 5.8 | 6.0 | 7.0 | 9.1 | 13.2 | 15.4 | 17.6 | 19.7 | 20.4 | 21.4 | 20.8 | 20.4 | 18.7 | 17.3 | 16.2 | 15.0 | 14.3 | 14.3 | 14.3 | 13.4 | 21.4 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 14.0 | 13.6 | 13.3 | 12.5 | 11.6 | 11.6 | 12.5 | 12.8 | 12.9 | 12.6 | 10.9 | 11.5 | 12.5 | 13.1 | 14.2 | 14.1 | 13.9 | 12.1 | 10.6 | 9.9 | 9.6 | 6.1 | 7.4 | 8.4 | 11.7 | 14.2 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 7.8 | 6.8 | 6.3 | 5.0 | 4.8 | 4.2 | 3.8 | 2.8 | 5.5 | 9.1 | 10.8 | 12.7 | 13.6 | 14.1 | 13.6 | 13.3 | 13.2 | 11.6 | 9.7 | 8.7 | 7.7 | 7.2 | 6.6 | 6.2 | 8.5 | 14.1 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 6.2 | 5.8 | 5.2 | 4.9 | 3.7 | 3.0 | 4.0 | 5.1 | 7.1 | 9.8 | 11.8 | 13.4 | 14.7 | 15.7 | 15.4 | 15.0 | 14.7 | 12.6 | 10.4 | 10.1 | 9.8 | 9.1 | 8.4 | 7.9 | 9.3 | 15.7 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 8.4 | 7.5 | 5.7 | 5.0 | 4.3 | 3.9 | 4.9 | 5.0 | 5.2 | 5.9 | 7.3 | 8.3 | 8.5 | 8.9 | 9.6 | 9.2 | 8.6 | 8.0 | 7.0 | 6.4 | 6.2 | 6.2 | 6.2 | 6.1 | 6.8 | 9.6 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.5 | 8.2 | 7.9 | 7.4 | 7.2 | 6.8 | 6.8 | 7.5 | 8.9 | 10.5 | 11.8 | 12.9 | 13.8 | 14.1 | 14.2 | 14.1 | 13.8 | 13.0 | 11.3 | 10.3 | 9.7 | 9.2 | 8.9 | 8.5 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 15.4 | 13.6 | 13.6 | 12.9 | 12.6 | 11.8 | 12.5 | 12.8 | 13.2 | 16.7 | 18.7 | 20.0 | 21.3 | 22.4 | 21.8 | 22.4 | 21.8 | 20.8 | 18.7 | 17.6 | 16.7 | 15.7 | 16.4 | 16.2 | Diurnal Maximum |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Stony Mountain - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 374 | 51.94 | 51.94 |
| 10 - 20 | 325 | 45.14 | 97.08 |
| > 20 | 21 | 2.92 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



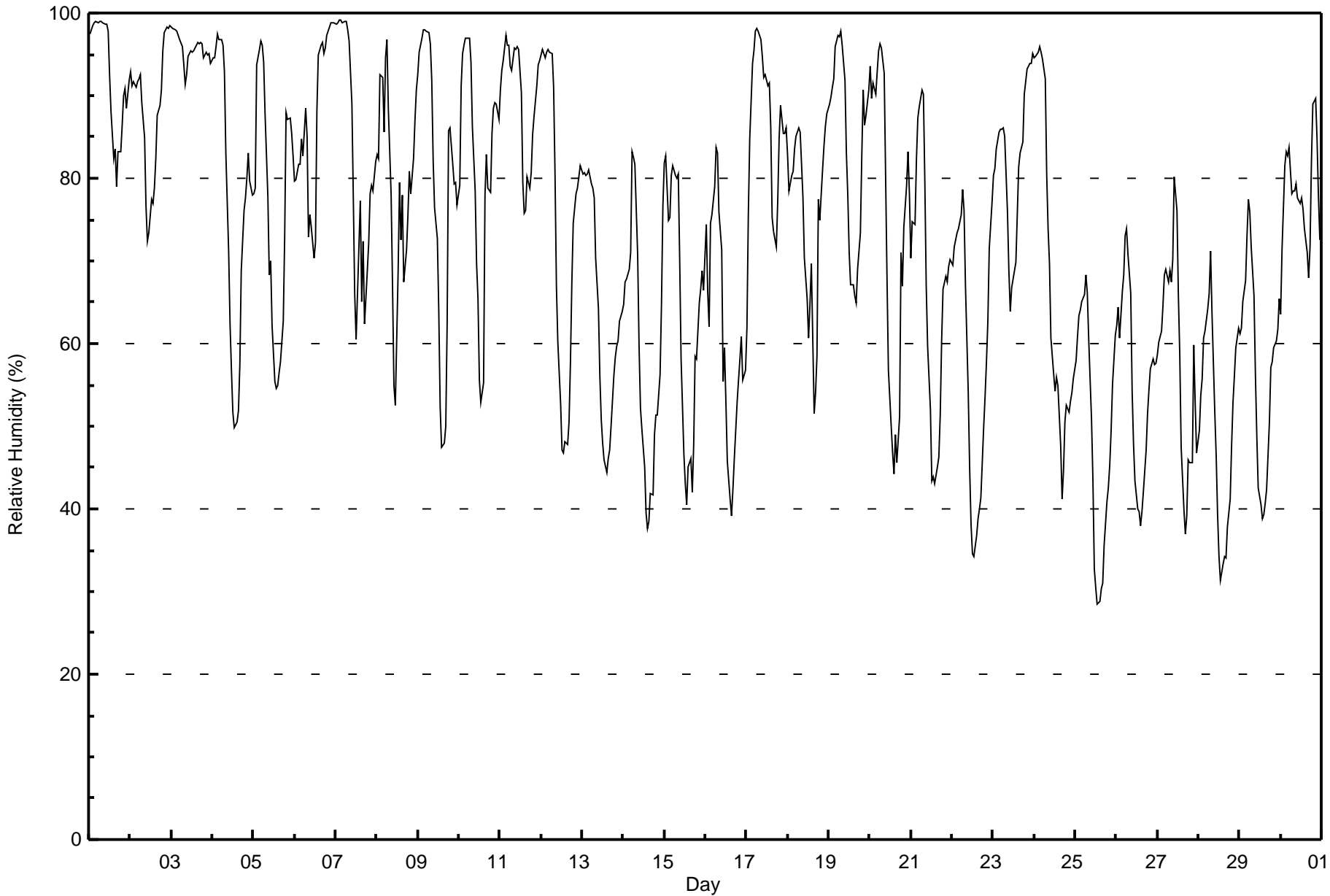
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Stony Mountain - September 2016

| Maximum Value: 99 % on Sep 7 04:00 Maximum Daily Average: 95.7 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|---------------|---------------|
| Minimum Value: 29 % on Sep 25 14:00 Minimum Daily Average: 49.1 % on Sep 25 Maximum Diurnal Average: 87.5 % at hour 7 Minimum Diurnal Average: 58.0 % at hour 16 Monthly Average: 73.1 % Percentiles: P ₁ = 33 P ₁₀ = 46 Q ₁ = 58 Median = 76 Q 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 | 98 | 98 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 93 | 88 | 82 | 84 | 79 | 83 | 83 | 86 | 90 | 91 | 88 | 92 | 92.6 | 99 |
| 2-Sep | 93 | 91 | 92 | 91 | 92 | 92 | 93 | 89 | 85 | 77 | 72 | 73 | 77 | 77 | 79 | 82 | 88 | 89 | 91 | 95 | 98 | 98 | 98 | 98 | 87.9 | 98 |
| 3-Sep | 98 | 98 | 98 | 98 | 97 | 97 | 96 | 94 | 91 | 93 | 95 | 95 | 95 | 95 | 96 | 96 | 96 | 96 | 96 | 95 | 95 | 95 | 95 | 94 | 95.7 | 98 |
| 4-Sep | 95 | 95 | 96 | 97 | 97 | 97 | 96 | 93 | 83 | 71 | 62 | 57 | 52 | 50 | 51 | 52 | 58 | 69 | 76 | 78 | 80 | 83 | 80 | 78 | 76.8 | 97 |
| 5-Sep | 78 | 79 | 94 | 96 | 97 | 96 | 94 | 88 | 78 | 68 | 70 | 62 | 55 | 55 | 55 | 57 | 58 | 63 | 73 | 88 | 87 | 87 | 85 | 83 | 76.9 | 97 |
| 6-Sep | 80 | 80 | 82 | 82 | 85 | 83 | 89 | 85 | 73 | 76 | 74 | 70 | 72 | 88 | 95 | 96 | 96 | 95 | 96 | 97 | 98 | 99 | 99 | 99 | 87.0 | 99 |
| 7-Sep | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 97 | 89 | 78 | 66 | 61 | 66 | 77 | 65 | 72 | 62 | 69 | 72 | 78 | 79 | 79 | 82 | 82.6 | 99 |
| 8-Sep | 83 | 82 | 93 | 92 | 86 | 95 | 97 | 89 | 78 | 67 | 55 | 53 | 69 | 80 | 73 | 78 | 67 | 71 | 76 | 81 | 78 | 82 | 87 | 91 | 79.2 | 97 |
| 9-Sep | 92 | 95 | 97 | 98 | 98 | 98 | 98 | 96 | 92 | 82 | 77 | 73 | 64 | 52 | 47 | 48 | 50 | 63 | 86 | 86 | 82 | 79 | 79 | 77 | 79.5 | 98 |
| 10-Sep | 79 | 91 | 95 | 96 | 97 | 97 | 97 | 94 | 86 | 79 | 70 | 65 | 56 | 53 | 55 | 78 | 83 | 79 | 78 | 85 | 88 | 89 | 89 | 87 | 82.0 | 97 |
| 11-Sep | 91 | 93 | 94 | 97 | 96 | 96 | 94 | 93 | 96 | 96 | 96 | 96 | 90 | 80 | 76 | 76 | 80 | 79 | 81 | 85 | 88 | 91 | 94 | 94 | 89.6 | 97 |
| 12-Sep | 95 | 96 | 95 | 95 | 96 | 95 | 95 | 91 | 81 | 67 | 60 | 53 | 47 | 47 | 48 | 48 | 51 | 58 | 67 | 75 | 78 | 79 | 80 | 82 | 74.0 | 96 |
| 13-Sep | 81 | 81 | 80 | 80 | 81 | 79 | 79 | 78 | 70 | 64 | 56 | 51 | 48 | 46 | 44 | 46 | 47 | 50 | 56 | 58 | 60 | 60 | 63 | 64 | 63.5 | 81 |
| 14-Sep | 65 | 67 | 68 | 69 | 71 | 83 | 83 | 82 | 71 | 60 | 52 | 50 | 45 | 40 | 38 | 39 | 42 | 42 | 49 | 51 | 51 | 56 | 65 | 77 | 58.9 | 83 |
| 15-Sep | 82 | 83 | 75 | 75 | 80 | 82 | 80 | 80 | 81 | 70 | 58 | 47 | 43 | 41 | 45 | 46 | 42 | 48 | 58 | 58 | 65 | 67 | 69 | 66 | 64.2 | 83 |
| 16-Sep | 74 | 66 | 62 | 75 | 76 | 79 | 84 | 83 | 76 | 71 | 55 | 59 | 53 | 46 | 41 | 39 | 42 | 46 | 53 | 56 | 58 | 61 | 56 | 57 | 61.2 | 84 |
| 17-Sep | 62 | 76 | 85 | 94 | 96 | 98 | 98 | 98 | 97 | 95 | 92 | 93 | 91 | 92 | 86 | 75 | 74 | 72 | 77 | 85 | 89 | 85 | 85 | 86 | 86.6 | 98 |
| 18-Sep | 83 | 78 | 80 | 81 | 84 | 85 | 86 | 86 | 82 | 78 | 70 | 65 | 61 | 65 | 70 | 52 | 54 | 58 | 78 | 75 | 81 | 84 | 86 | 88 | 75.4 | 88 |
| 19-Sep | 89 | 90 | 91 | 92 | 96 | 97 | 97 | 98 | 96 | 92 | 83 | 78 | 71 | 67 | 67 | 66 | 65 | 69 | 73 | 83 | 91 | 86 | 88 | 91 | 84.0 | 98 |
| 20-Sep | 94 | 90 | 91 | 90 | 93 | 95 | 96 | 96 | 93 | 80 | 68 | 57 | 50 | 47 | 44 | 49 | 46 | 51 | 71 | 67 | 74 | 79 | 83 | 78 | 74.3 | 96 |
| 21-Sep | 70 | 75 | 74 | 82 | 87 | 89 | 91 | 90 | 80 | 67 | 60 | 52 | 43 | 44 | 43 | 45 | 46 | 51 | 60 | 67 | 68 | 68 | 69 | 70 | 66.3 | 91 |
| 22-Sep | 69 | 72 | 73 | 73 | 74 | 76 | 79 | 76 | 67 | 54 | 45 | 38 | 35 | 34 | 37 | 39 | 40 | 41 | 50 | 54 | 58 | 63 | 72 | 77 | 58.1 | 79 |
| 23-Sep | 80 | 81 | 84 | 86 | 86 | 86 | 86 | 85 | 76 | 69 | 64 | 67 | 69 | 70 | 76 | 81 | 83 | 84 | 90 | 92 | 93 | 94 | 94 | 95 | 82.1 | 95 |
| 24-Sep | 95 | 95 | 95 | 96 | 95 | 94 | 92 | 81 | 74 | 70 | 61 | 56 | 54 | 56 | 55 | 48 | 41 | 45 | 50 | 53 | 52 | 53 | 54 | 56 | 67.5 | 96 |
| 25-Sep | 58 | 61 | 63 | 64 | 65 | 66 | 68 | 66 | 60 | 51 | 44 | 33 | 31 | 29 | 29 | 30 | 31 | 36 | 41 | 43 | 45 | 50 | 55 | 61 | 49.1 | 68 |
| 26-Sep | 62 | 64 | 61 | 66 | 68 | 73 | 74 | 71 | 66 | 54 | 48 | 43 | 40 | 40 | 38 | 40 | 42 | 47 | 52 | 54 | 57 | 58 | 58 | 58 | 55.6 | 74 |
| 27-Sep | 59 | 60 | 62 | 65 | 68 | 69 | 68 | 69 | 67 | 70 | 80 | 76 | 66 | 59 | 47 | 40 | 37 | 39 | 46 | 46 | 46 | 60 | 53 | 47 | 58.2 | 80 |
| 28-Sep | 49 | 54 | 56 | 61 | 61 | 64 | 66 | 71 | 64 | 52 | 46 | 39 | 34 | 31 | 33 | 34 | 34 | 38 | 41 | 48 | 53 | 56 | 60 | 62 | 50.3 | 71 |
| 29-Sep | 61 | 62 | 65 | 68 | 73 | 77 | 76 | 72 | 66 | 56 | 49 | 42 | 40 | 39 | 39 | 41 | 42 | 50 | 57 | 58 | 59 | 60 | 62 | 65 | 57.6 | 77 |
| 30-Sep | 63 | 71 | 82 | 83 | 83 | 84 | 78 | 79 | 78 | 79 | 78 | 77 | 78 | 76 | 74 | 71 | 68 | 72 | 82 | 89 | 90 | 85 | 78 | 73 | 77.9 | 90 |
| 79.2 80.7 82.6 84.7 85.8 87.3 87.5 85.6 80.0 73.1 67.2 62.8 59.4 58.3 58.0 58.0 58.5 61.5 68.5 71.9 74.3 75.9 76.7 77.5 | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | |
| 99 99 99 99 99 99 99 99 99 99 99 99 98 95 95 96 96 96 96 96 96 97 98 99 99 99 | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | |





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

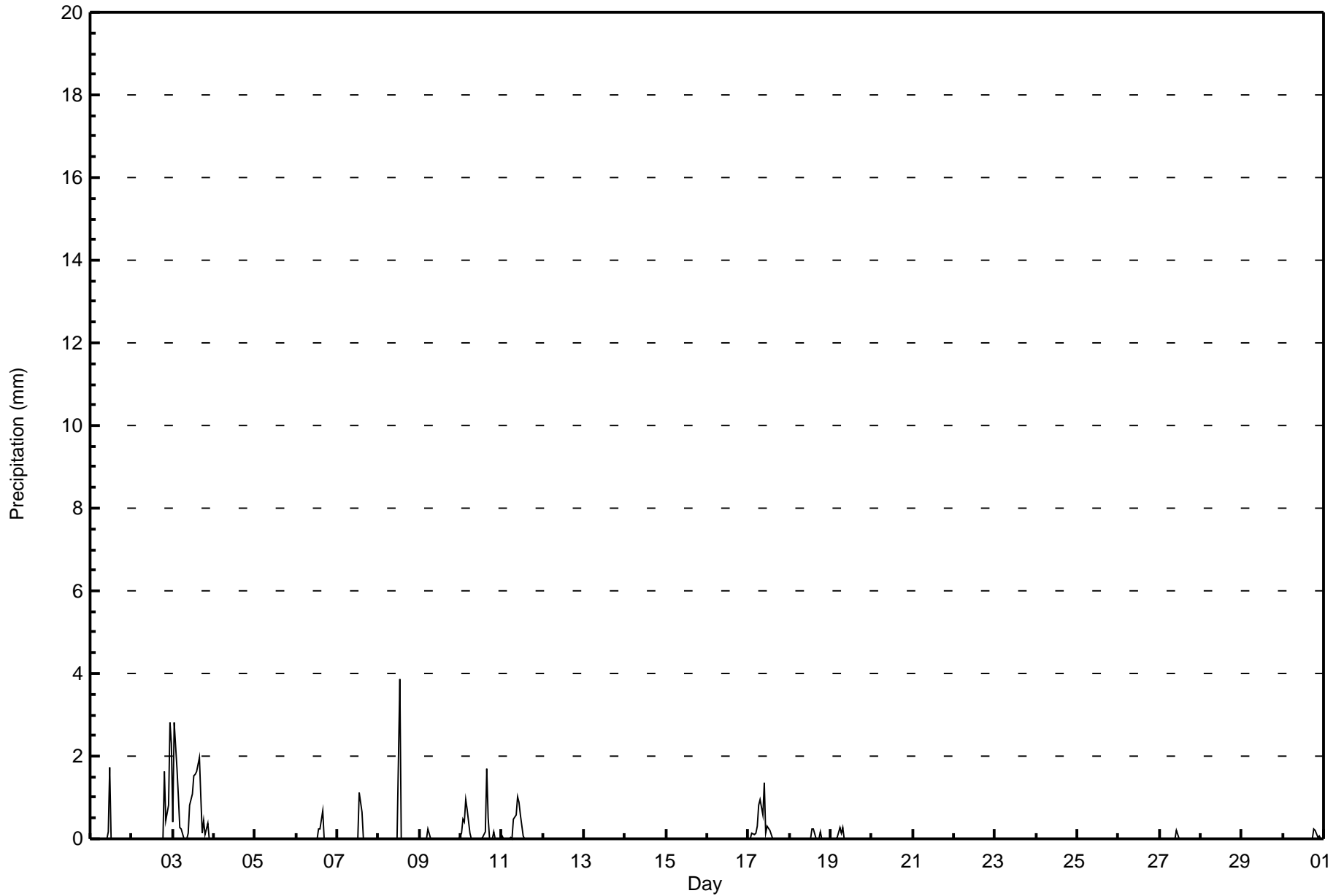
Stony Mountain - September 2016

| Maximum Value: 3.9 mm on Sep 8 13:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Total: 17.2 mm on Sep 3 | | | | | | Hours in Service: 720 | |
|------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----------------|---------------------------------|---------------|
| Minimum Value: 0.0 mm on Sep 1 01:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Total: 0.0 mm on Sep 4 | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Total: 5.6 mm at hour 13 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Total: 0.1 mm at hour 18 | | | | | | Hours of Missing Data: 0 | |
| Monthly Total: 50.51 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 | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 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 | 0.2 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 1.7 |
| 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 | 1.6 | 0.4 | 0.8 | 2.8 | 2.3 | 8.0 | 2.8 |
| 3-Sep | 0.4 | 2.8 | 1.7 | 1.0 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.8 | 1.1 | 1.5 | 1.6 | 1.6 | 2.0 | 1.0 | 0.1 | 0.4 | 0.1 | 0.4 | 0.0 | 0.0 | 0.0 | 17.2 | 2.8 |
| 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 |
| 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 |
| 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 | 0.3 | 0.3 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 0.7 |
| 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 | 1.1 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 1.1 |
| 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 | 3.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.9 | 3.9 |
| 9-Sep | 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 | 0.2 | 0.2 |
| 10-Sep | 0.1 | 0.5 | 0.4 | 1.0 | 0.7 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.7 | 0.5 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 5.4 | 1.7 |
| 11-Sep | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.5 | 0.6 | 1.0 | 0.9 | 0.6 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 1.0 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 17-Sep | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.3 | 0.8 | 1.0 | 0.6 | 1.4 | 0.1 | 0.3 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.1 | 1.4 |
| 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 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.3 |
| 19-Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.3 |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 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 |
| 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 |
| 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 | 0.0 | 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 |
| 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 |
| 27-Sep | 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 | 0.2 | 0.2 |
| 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 |
| 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 |
| 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 | 0.2 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.5 | 0.2 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Stony Mountain - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Stony Mountain - September 2016

| Concentration Ranges (mm) | Number of Hours | % | Cumulative % |
|----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 682 | 94.72 | 94.72 |
| 0.4 - 0.5 | 8 | 1.11 | 95.83 |
| 0.6 - 0.7 | 6 | 0.83 | 96.67 |
| 0.8 - 1.4 | 12 | 1.67 | 98.33 |
| 1.5 - 10 | 12 | 1.67 | 100.00 |
| > 10 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



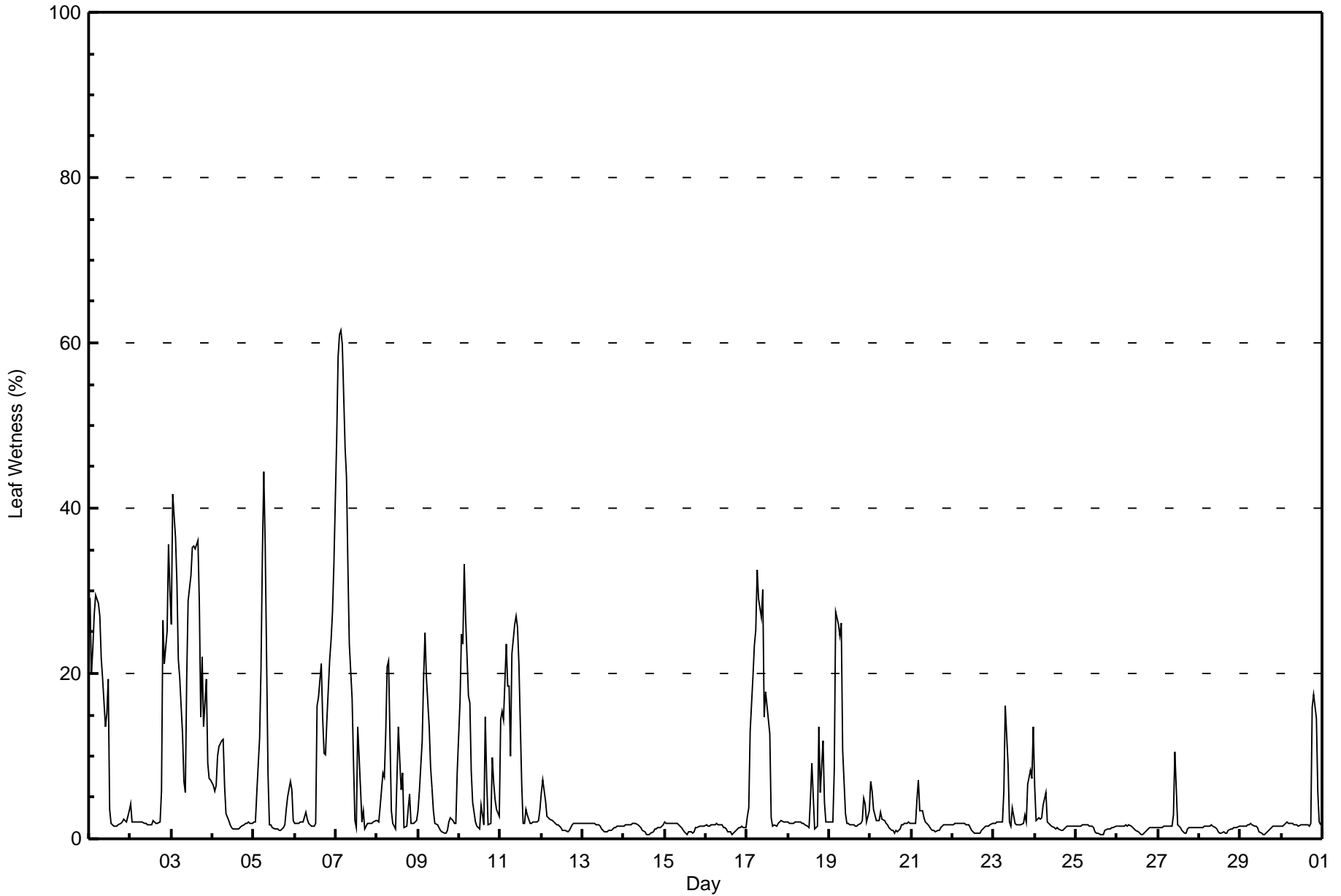
Wood Buffalo Environmental Association

Summary of Hour Averages

Leaf Wetness (LW) - %

Stony Mountain - September 2016

| Maximum Value: 61 % on Sep 7 04:00 | | | | | | | | | | | | | | Maximum Daily Average: 22.7 % on Sep 3 | | | | | | | | | | | | | | Hours in Service: 720 | |
|-------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|----|---------------|---------------|--|---------------------------------|--|
| Minimum Value: 0 % on Sep 26 15:00 | | | | | | | | | | | | | | Minimum Daily Average: 1.2 % on Sep 28 | | | | | | | | | | | | | | Hours of Data: 720 | |
| Maximum Diurnal Average: 10.4 % at hour 5 | | | | | | | | | | | | | | Minimum Diurnal Average: 2.1 % at hour 18 | | | | | | | | | | | | | | Hours of Missing Data: 0 | |
| Monthly Average: 5.7 % | | | | | | | | | | | | | | Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 19 P ₉₉ = 42 | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | |
| 1-Sep | 29 | 20 | 23 | 27 | 30 | 29 | 27 | 22 | 19 | 14 | 15 | 19 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 12.4 | 30 | | | |
| 2-Sep | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 6 | 26 | 21 | 25 | 36 | 30 | 7.6 | 36 | | | |
| 3-Sep | 26 | 42 | 36 | 31 | 22 | 20 | 13 | 7 | 6 | 20 | 29 | 32 | 35 | 35 | 35 | 36 | 29 | 15 | 22 | 14 | 19 | 9 | 7 | 7 | 22.7 | 42 | | | |
| 4-Sep | 6 | 6 | 6 | 10 | 11 | 12 | 12 | 7 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4.1 | 12 | | | |
| 5-Sep | 2 | 2 | 6 | 12 | 21 | 35 | 44 | 35 | 8 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 5 | 7 | 6 | 2 | 8.4 | 44 | | | |
| 6-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 16 | 17 | 21 | 15 | 10 | 10 | 14 | 22 | 24 | 28 | 33 | 9.9 | 33 | | | |
| 7-Sep | 48 | 58 | 61 | 61 | 60 | 47 | 44 | 33 | 23 | 17 | 9 | 2 | 1 | 14 | 6 | 2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 21.0 | 61 | | | |
| 8-Sep | 2 | 2 | 4 | 8 | 7 | 13 | 21 | 22 | 3 | 2 | 2 | 1 | 14 | 9 | 6 | 8 | 1 | 2 | 4 | 5 | 2 | 2 | 2 | 2 | 6.0 | 22 | | | |
| 9-Sep | 3 | 6 | 12 | 19 | 25 | 20 | 14 | 9 | 6 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 8 | 6.0 | 25 | | | |
| 10-Sep | 17 | 25 | 24 | 33 | 27 | 17 | 16 | 8 | 4 | 2 | 2 | 1 | 1 | 4 | 2 | 15 | 7 | 2 | 2 | 10 | 7 | 5 | 4 | 3 | 9.8 | 33 | | | |
| 11-Sep | 14 | 15 | 14 | 24 | 19 | 18 | 10 | 22 | 26 | 27 | 26 | 21 | 7 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 11.2 | 27 | | | |
| 12-Sep | 6 | 7 | 5 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 7 | | | |
| 13-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.5 | 2 | | | |
| 14-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1.3 | 2 | | | |
| 15-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.4 | 2 | | | |
| 16-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.4 | 2 | | | |
| 17-Sep | 3 | 4 | 13 | 20 | 23 | 25 | 33 | 29 | 27 | 30 | 15 | 18 | 14 | 13 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 11.9 | 33 | | | |
| 18-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 5 | 9 | 1 | 1 | 1 | 14 | 6 | 12 | 4 | 2 | 2 | 3.4 | 14 | | | |
| 19-Sep | 2 | 2 | 2 | 8 | 27 | 26 | 25 | 26 | 11 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 5 | 4 | 2 | 3 | 6.8 | 27 | | | |
| 20-Sep | 7 | 6 | 4 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2.2 | 7 | | | |
| 21-Sep | 2 | 2 | 2 | 5 | 7 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2.1 | 7 | | | |
| 22-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1.4 | 2 | | | |
| 23-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 6 | 16 | 9 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 7 | 8 | 7 | 14 | 4.2 | 16 | | | |
| 24-Sep | 6 | 2 | 3 | 2 | 2 | 4 | 6 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2.1 | 6 | | | |
| 25-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1.3 | 2 | | | |
| 26-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.2 | 2 | | | |
| 27-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 3 | 10 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.8 | 10 | | | |
| 28-Sep | 1 | 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 | 2 | | | |
| 29-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1.3 | 2 | | | |
| 30-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 16 | 17 | 15 | 6 | 2 | 2 | 3.7 | 17 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Stony Mountain - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 0 | 0.00 | 0.00 |
| 0.4 - 0.5 | 7 | 0.97 | 0.97 |
| 0.6 - 0.7 | 26 | 3.61 | 4.58 |
| 0.8 - 1.4 | 147 | 20.42 | 25.00 |
| 1.5 - 10 | 397 | 55.14 | 80.14 |
| > 10 | 121 | 16.81 | 96.94 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



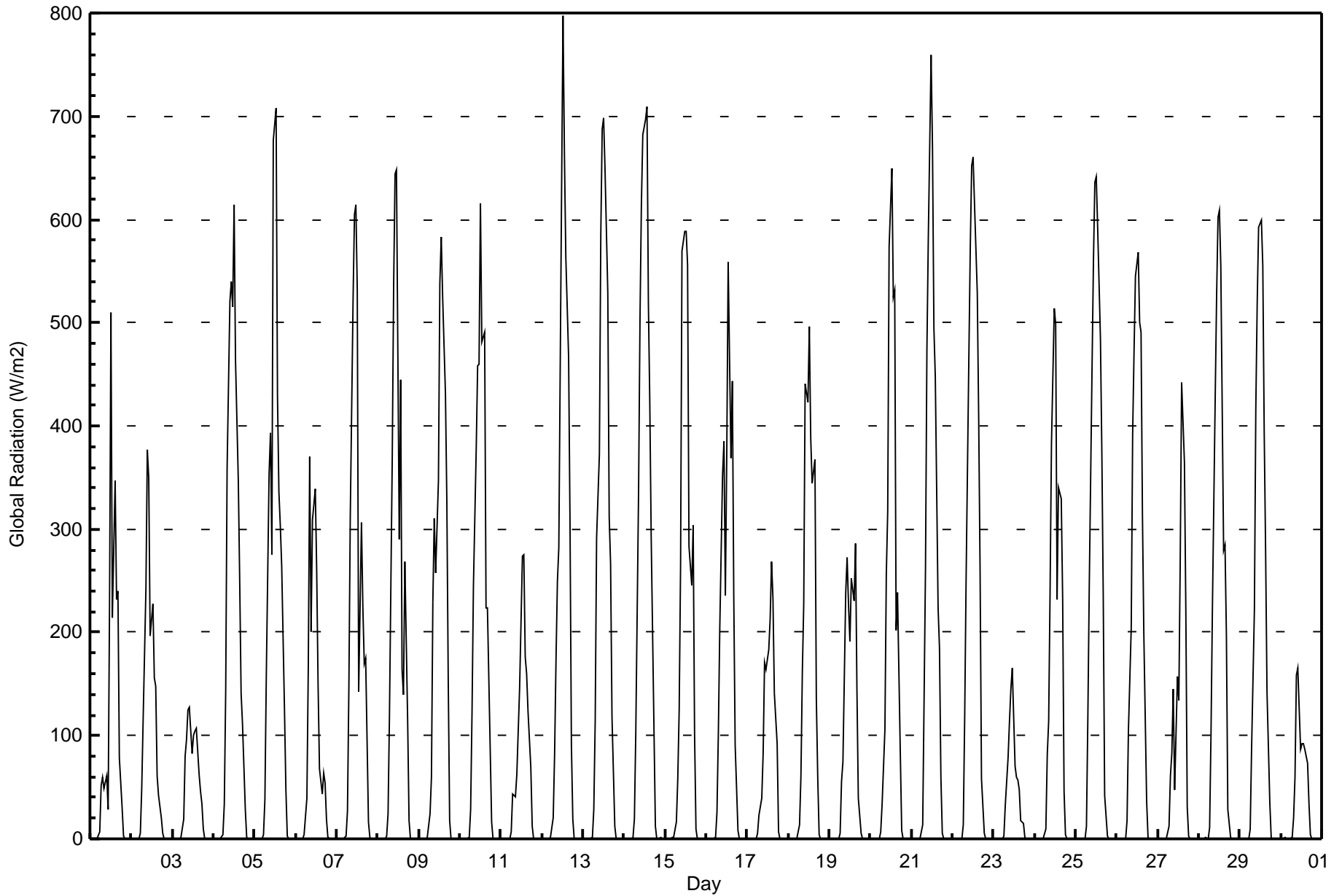
Wood Buffalo Environmental Association

Summary of Hour Averages

Global Radiation (GR) - W/m2

Stony Mountain - September 2016

| Maximum Value: 797 W/m2 on Sep 12 13:00 | | Maximum Daily Average: 209.3 W/m2 on Sep 14 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------|-----|-----|-----|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|-----|-----|-----|-----|---------------|-----------------|--|
| Minimum Value: 0 W/m2 on Sep 1 01:00 | | Minimum Daily Average: 33.7 W/m2 on Sep 23 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 462.7 W/m2 at hour 13 | | Minimum Diurnal Average: 0.1 W/m2 at hour 4 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 132.2 W/m2 | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 12 Q ₃ = 227 P ₉₀ = 480 P ₉₉ = 681 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 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 | 7 | 52 | 60 | 49 | 60 | 29 | 226 | 510 | 214 | 347 | 232 | 240 | 78 | 30 | 3 | 0 | 0 | 0 | 1 | 89.1 | 510 | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | 5 | 49 | 115 | 242 | 376 | 349 | 196 | 227 | 156 | 148 | 60 | 43 | 20 | 6 | 0 | 0 | 0 | 0 | 0 | 83.1 | 376 | |
| 3-Sep | 0 | 0 | 0 | 0 | 0 | 2 | 18 | 80 | 96 | 125 | 128 | 83 | 101 | 105 | 107 | 62 | 46 | 34 | 10 | 1 | 0 | 0 | 0 | 0 | 41.5 | 128 | |
| 4-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 33 | 143 | 359 | 521 | 539 | 515 | 614 | 464 | 347 | 249 | 142 | 111 | 28 | 2 | 0 | 0 | 0 | 0 | 169.6 | 614 | |
| 5-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 38 | 157 | 354 | 394 | 275 | 677 | 707 | 428 | 337 | 304 | 265 | 125 | 48 | 3 | 0 | 0 | 0 | 0 | 171.4 | 707 | |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | 4 | 39 | 166 | 371 | 201 | 309 | 339 | 261 | 150 | 68 | 44 | 63 | 54 | 20 | 1 | 0 | 0 | 0 | 0 | 87.1 | 371 | |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 27 | 147 | 312 | 522 | 605 | 614 | 531 | 143 | 306 | 224 | 169 | 175 | 17 | 1 | 0 | 0 | 0 | 0 | 158.1 | 614 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | 3 | 24 | 120 | 370 | 537 | 645 | 648 | 290 | 444 | 164 | 139 | 268 | 114 | 17 | 0 | 0 | 1 | 0 | 1 | 157.7 | 648 | |
| 9-Sep | 1 | 0 | 0 | 0 | 0 | 2 | 24 | 60 | 229 | 311 | 257 | 347 | 538 | 583 | 525 | 431 | 326 | 153 | 18 | 0 | 0 | 0 | 0 | 0 | 158.6 | 583 | |
| 10-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 28 | 123 | 246 | 378 | 459 | 459 | 616 | 482 | 491 | 224 | 223 | 155 | 16 | 1 | 0 | 0 | 0 | 0 | 162.6 | 616 | |
| 11-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 43 | 41 | 62 | 105 | 147 | 274 | 275 | 177 | 160 | 124 | 69 | 12 | 0 | 0 | 0 | 0 | 0 | 62.3 | 275 | |
| 12-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 20 | 83 | 173 | 250 | 282 | 630 | 797 | 664 | 564 | 466 | 307 | 91 | 18 | 0 | 0 | 0 | 0 | 0 | 181.1 | 797 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 28 | 114 | 291 | 373 | 586 | 687 | 698 | 649 | 529 | 312 | 265 | 118 | 13 | 0 | 0 | 0 | 0 | 0 | 194.4 | 698 | |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 19 | 103 | 338 | 503 | 614 | 682 | 697 | 709 | 519 | 424 | 292 | 106 | 12 | 0 | 1 | 1 | 1 | 1 | 209.3 | 709 | |
| 15-Sep | 0 | 0 | 0 | 0 | 1 | 1 | 16 | 59 | 125 | 264 | 569 | 589 | 588 | 556 | 284 | 246 | 304 | 102 | 10 | 0 | 0 | 0 | 0 | 0 | 154.7 | 589 | |
| 16-Sep | 0 | 0 | 0 | 0 | 0 | 1 | 26 | 102 | 204 | 353 | 385 | 235 | 372 | 558 | 369 | 443 | 235 | 91 | 8 | 0 | 0 | 0 | 0 | 0 | 141.0 | 558 | |
| 17-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 22 | 39 | 82 | 171 | 164 | 183 | 212 | 268 | 233 | 141 | 92 | 7 | 0 | 0 | 0 | 0 | 0 | 67.6 | 268 | |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 62 | 162 | 227 | 441 | 423 | 496 | 388 | 345 | 368 | 135 | 59 | 4 | 0 | 0 | 0 | 0 | 0 | 130.2 | 496 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 56 | 74 | 238 | 273 | 227 | 192 | 252 | 231 | 286 | 145 | 39 | 5 | 1 | 0 | 0 | 0 | 0 | 84.4 | 286 | |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 34 | 105 | 257 | 318 | 574 | 650 | 524 | 531 | 202 | 238 | 82 | 8 | 1 | 0 | 0 | 0 | 0 | 147.1 | 650 | |
| 21-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 137 | 263 | 473 | 581 | 759 | 669 | 496 | 448 | 224 | 184 | 59 | 5 | 0 | 0 | 0 | 0 | 0 | 179.7 | 759 | |
| 22-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 118 | 251 | 469 | 574 | 652 | 660 | 616 | 528 | 408 | 259 | 59 | 5 | 0 | 0 | 0 | 0 | 0 | 192.1 | 660 | |
| 23-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 33 | 79 | 113 | 145 | 165 | 71 | 60 | 58 | 48 | 18 | 14 | 1 | 0 | 0 | 0 | 0 | 0 | 33.7 | 165 | |
| 24-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 82 | 114 | 239 | 383 | 514 | 499 | 232 | 340 | 329 | 231 | 46 | 4 | 1 | 0 | 1 | 1 | 1 | 126.0 | 514 | |
| 25-Sep | 1 | 1 | 1 | 1 | 0 | 0 | 12 | 117 | 243 | 457 | 561 | 636 | 641 | 593 | 484 | 375 | 235 | 41 | 3 | 0 | 0 | 0 | 1 | 0 | 183.4 | 641 | |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 106 | 205 | 392 | 471 | 545 | 569 | 500 | 491 | 314 | 198 | 36 | 2 | 0 | 0 | 0 | 0 | 0 | 160.3 | 569 | |
| 27-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 61 | 83 | 145 | 48 | 157 | 134 | 269 | 442 | 364 | 223 | 32 | 2 | 1 | 0 | 0 | 0 | 0 | 82.3 | 442 | |
| 28-Sep | 1 | 1 | 0 | 1 | 1 | 1 | 11 | 103 | 223 | 428 | 526 | 603 | 609 | 554 | 280 | 284 | 196 | 29 | 1 | 0 | 0 | 0 | 0 | 0 | 160.5 | 609 | |
| 29-Sep | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 88 | 223 | 416 | 519 | 592 | 599 | 555 | 394 | 279 | 143 | 35 | 2 | 0 | 0 | 0 | 0 | 0 | 160.6 | 599 | |
| 30-Sep | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 21 | 60 | 158 | 166 | 87 | 92 | 92 | 86 | 73 | 34 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 36.5 | 166 | |
| | | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 1.4 | 19.6 | 90.5 | 197.5 | 310.9 | 377.0 | 439.1 | 462.7 | 397.4 | 340.2 | 260.2 | 189.7 | 74.1 | 11.1 | 0.5 | 0.1 | 0.1 | 0.1 | 0.2 | Diurnal Average | |
| | | 1 | 1 | 1 | 1 | 1 | 7 | 52 | 166 | 371 | 537 | 645 | 759 | 797 | 709 | 564 | 466 | 326 | 175 | 48 | 3 | 1 | 1 | 1 | 1 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Stony Mountain - September 2016

| Concentration Ranges (W/m2) | Number of Hours | % | Cumulative % |
|------------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 380 | 52.78 | 52.78 |
| 21 - 100 | 78 | 10.83 | 63.61 |
| 101 - 300 | 129 | 17.92 | 81.53 |
| 301 - 600 | 105 | 14.58 | 96.11 |
| 601 - 900 | 28 | 3.89 | 100.00 |
| > 900 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



| | | |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 18 km/h on Sep 13 12:00 | Maximum Daily Speed Average: 13.8 km/h on Sep 13 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 5 01:00 | Minimum Daily Speed Average: 0.7 km/h on Sep 1 | Hours of Data: 641 |
| Maximum Diurnal Speed Average: 5.2 km/h at hour 5 | Minimum Diurnal Speed Average: 3.7 km/h at hour 19 | Hours of Missing Data: 79 |
| Monthly Average Velocity: 4.6 km/h 254.1 deg | Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 12 P ₉₉ = 16 | Percent Operational Time: 89.2 |

| 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 | E3 | NNE2 | NE2 | ENE3 | E4 | NE3 | NE3 | ENE4 | ENE4 | E4 | E6 | E3 | ESE5 | ESE5 | SE2 | N2 | SSW7 | WSW12 | W13 | W11 | W8 | W8 | WNW8 | W7 | W0.7 | W13 | |
| 2-Sep | W10 | W7 | W5 | WNW6 | WNW6 | WNW6 | NW3 | NNW4 | NNW3 | NW4 | NNW4 | ENE2 | NE3 | NNE3 | N3 | NE6 | NE6 | NNE4 | NNE4 | N3 | NNE6 | NW4 | NNW5 | NW7 | NNW3.4 | W10 | |
| 3-Sep | NW8 | WNW10 | WNW10 | WNW11 | W11 | W12 | W13 | W13 | W13 | W13 | WSW14 | W14 | W14 | WNW13 | WNW13 | WNW12 | WNW11 | WNW11 | NW9 | NW7 | NW9 | NW6 | WNW8 | NW8 | WNW10.4 | WSW14 | |
| 4-Sep | WNW8 | WNW8 | WNW5 | WNW7 | WNW8 | WNW8 | WNW8 | WNW7 | WNW6 | WNW7 | WNW6 | WNW6 | NNW3 | W4 | WNW1 | WNW2 | SW3 | SSW5 | SW6 | SW7 | SW8 | SW8 | WSW8 | W6 | W5.1 | WSW8 | |
| 5-Sep | W0 | W4 | WSW4 | SW4 | WSW5 | SSW6 | SSW6 | SSW7 | S7 | SSW9 | SSW9 | SSW8 | SSW8 | S6 | S5 | SSE6 | SE5 | SSE5 | SE5 | SE4 | SE5 | SE5 | S6 | S8 | S4.9 | SSW9 | |
| 6-Sep | SSW9 | S8 | S7 | SSW8 | SSW6 | SSW7 | S3 | SE4 | SE5 | SE5 | SE7 | SSE9 | SE10 | ESE8 | ESE5 | ESE4 | SE4 | SSE4 | SE3 | SSE3 | ENE1 | NW2 | N2 | NW2 | SSE4.0 | SE10 | |
| 7-Sep | NW1 | WNW2 | W4 | W4 | SW5 | SW5 | SW5 | SW6 | SW6 | SSW5 | SSW4 | SW5 | SW7 | WSW6 | WSW5 | W4 | SW4 | WSW5 | WSW7 | SW8 | SW7 | SW7 | WSW7 | SW6 | SW5.0 | SW8 | |
| 8-Sep | SW6 | W6 | SSW6 | SW6 | W5 | WSW4 | WSW4 | W5 | WNW7 | NNW4 | WNW4 | NNW4 | N4 | SSW3 | WNW5 | W10 | W8 | WNW7 | NW5 | WNW6 | W9 | WNW7 | WNW8 | NW5 | W4.9 | W10 | |
| 9-Sep | WNW5 | WNW5 | NW5 | WNW3 | WNW5 | WNW5 | WNW4 | WNW6 | WNW7 | NW5 | AF | WNW8 | M | M | M | AF | AF | AF | AF | AF | AF | AF | AF | AF | --- | WNW8 | |
| 10-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | W13 | W13 | WNW12 | WNW13 | WNW9 | W7 | WNW10 | WNW11 | WNW10 | WNW10 | --- | W13 | |
| 11-Sep | WNW8 | WNW10 | WNW9 | WNW10 | WNW10 | NW9 | NW10 | NW9 | NNW8 | N8 | NNE9 | NNE9 | NNE11 | NNE12 | N9 | N7 | N7 | N5 | NNW4 | NW6 | NW5 | NW3 | NW2 | WNW1 | NNW6.2 | NNE12 | |
| 12-Sep | WNW1 | WNW4 | WNW5 | WNW4 | WNW5 | WNW5 | WNW4 | WNW2 | WNW5 | WNW3 | WSW4 | WSW6 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | SSW11 | SSW11 | --- | SSW11 | |
| 13-Sep | SW14 | SSW15 | SSW16 | SSW15 | SSW14 | SW16 | SW17 | SW18 | SW17 | SW16 | SW15 | SW18 | SW17 | SW15 | SW15 | SW12 | SW11 | SW10 | WSW11 | WSW10 | WSW10 | WSW9 | W8 | SW13.8 | SW18 | | |
| 14-Sep | W7 | W7 | W7 | WNW7 | WNW6 | SW4 | WSW4 | SSW8 | SW6 | SW6 | SSW8 | SW9 | WSW10 | W10 | W11 | W10 | W12 | WNW11 | W7 | W10 | W12 | WNW10 | NW5 | WNW4 | W7.1 | W12 | |
| 15-Sep | W4 | W5 | WNW7 | WNW6 | WNW6 | NW5 | NW4 | WNW3 | SSE2 | SE5 | SE5 | ESE6 | SSE6 | S5 | SSW7 | WSW7 | WSW10 | SW7 | WSW5 | SW6 | SW7 | SW8 | SW8 | SW10 | SW3.9 | WSW10 | |
| 16-Sep | SW7 | WSW9 | SW8 | SW10 | SW10 | SW12 | SW11 | SW10 | SW10 | W8 | SSW5 | SSW9 | SW11 | SW15 | SW13 | SW11 | SW9 | SW6 | WSW6 | SW6 | SW6 | W7 | WNW8 | SW8.6 | SW15 | | |
| 17-Sep | WNW7 | NW5 | NW5 | NW2 | W2 | SSW2 | W2 | WSW2 | SW3 | WSW6 | W6 | W6 | W8 | W8 | W8 | WSW8 | WSW7 | W6 | WSW7 | WSW7 | WSW8 | WSW8 | WSW9 | W5.4 | WSW9 | | |
| 18-Sep | WSW9 | W10 | WNW10 | WNW11 | WNW10 | WNW10 | WNW11 | WNW11 | WNW12 | WNW11 | WNW11 | WNW12 | WNW12 | WNW10 | WNW10 | WNW13 | WNW12 | WNW9 | W8 | WNW8 | WNW9 | W10 | WNW10 | W9 | WNW10.2 | WNW13 | |
| 19-Sep | W9 | WNW9 | WNW9 | WNW9 | WNW9 | WNW9 | WNW8 | WNW7 | WNW9 | WNW9 | NW9 | WNW10 | NW9 | NW7 | NW9 | NW8 | NW6 | NNW5 | NW4 | WNW4 | W4 | WNW6 | NW4 | WNW4 | WNW7.0 | WNW10 | |
| 20-Sep | WNW6 | WNW7 | WNW7 | NW7 | NW6 | NW5 | NW4 | WNW5 | NW5 | NW5 | NW6 | AF | AF | AF | AF | N2 | NNW3 | WNW3 | WNW2 | WNW3 | NE1 | ESE4 | SE3 | WSW4 | NW3.3 | WNW7 | |
| 21-Sep | W4 | WSW5 | SW6 | SW7 | SW8 | SW7 | SW8 | SW9 | WSW6 | W7 | W7 | W9 | W8 | WSW10 | SW8 | W9 | W8 | WSW5 | WSW5 | SW6 | SW6 | SSW7 | SW8 | SW8 | WSW6.6 | WSW10 | |
| 22-Sep | SW9 | SW9 | SW9 | SW9 | SW10 | SW10 | SW11 | SSW10 | SW10 | SSW10 | SSW13 | SSW13 | SSW13 | SSW14 | SSW12 | SSW11 | SSW9 | S5 | SSE7 | AF | AF | AF | AF | SSW9.8 | SSW14 | | |
| 23-Sep | SSW8 | S9 | S6 | S8 | S7 | S9 | SSE10 | SSE9 | SSE10 | SSE10 | SSE13 | SSE12 | M | M | SSE12 | SSE7 | S9 | SSE9 | SSE8 | SSE6 | SSE6 | S6 | S5 | SSE8.5 | SSE13 | | |
| 24-Sep | S6 | SSW5 | SW7 | SW8 | SW10 | WSW9 | WSW9 | WSW10 | WSW10 | W11 | W13 | WNW16 | WNW14 | WNW15 | WNW15 | NW12 | WNW14 | WNW11 | W11 | W11 | W13 | W13 | W13 | W13 | WNW13 | W9.9 | WNW16 |
| 25-Sep | WNW13 | WNW12 | W10 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | --- | WNW13 | |
| 26-Sep | AF | AF | AF | AF | AF | AF | AF | AF | SSW10 | SSW12 | SSW13 | SW11 | M | M | M | SSW12 | S9 | S5 | SSE4 | S4 | S4 | S7 | S9 | SSW11 | --- | SSW13 | |
| 27-Sep | SSW12 | SSW10 | SSW13 | SSW13 | SW13 | WSW10 | WNW13 | WNW12 | WNW14 | WNW13 | WSW10 | WSW9 | WNW12 | WNW14 | NW12 | NW12 | WNW13 | WNW9 | W7 | W8 | WSW8 | SW7 | W9 | W12 | W8.9 | WNW14 | |
| 28-Sep | W11 | W10 | W9 | W6 | WNW6 | WNW5 | W5 | SW5 | SW5 | SSW5 | SSW8 | SW9 | SW10 | SW9 | SW9 | SSW10 | SW9 | SSW7 | SSW7 | SSW7 | SSW9 | SSW9 | SSW8 | SSW8 | SW6.9 | W11 | |
| 29-Sep | SSW7 | SSW8 | SSW8 | SW7 | SSW5 | SW6 | SW6 | SW8 | SW8 | SW7 | SSW7 | S7 | S5 | WSW5 | S6 | S6 | SSW4 | S2 | ESE3 | ESE4 | SE4 | S3 | SE2 | ESE4 | SSW4.6 | SW8 | |
| 30-Sep | E4 | E3 | NNE3 | NE4 | N4 | N5 | NNE8 | NE10 | NE8 | NE8 | NNE4 | NNE3 | NNE6 | NNE8 | ENE10 | NE10 | NE12 | NE7 | NE5 | NE8 | NNE7 | NNE9 | NNE10 | NNE11 | NE6.5 | NE12 | |

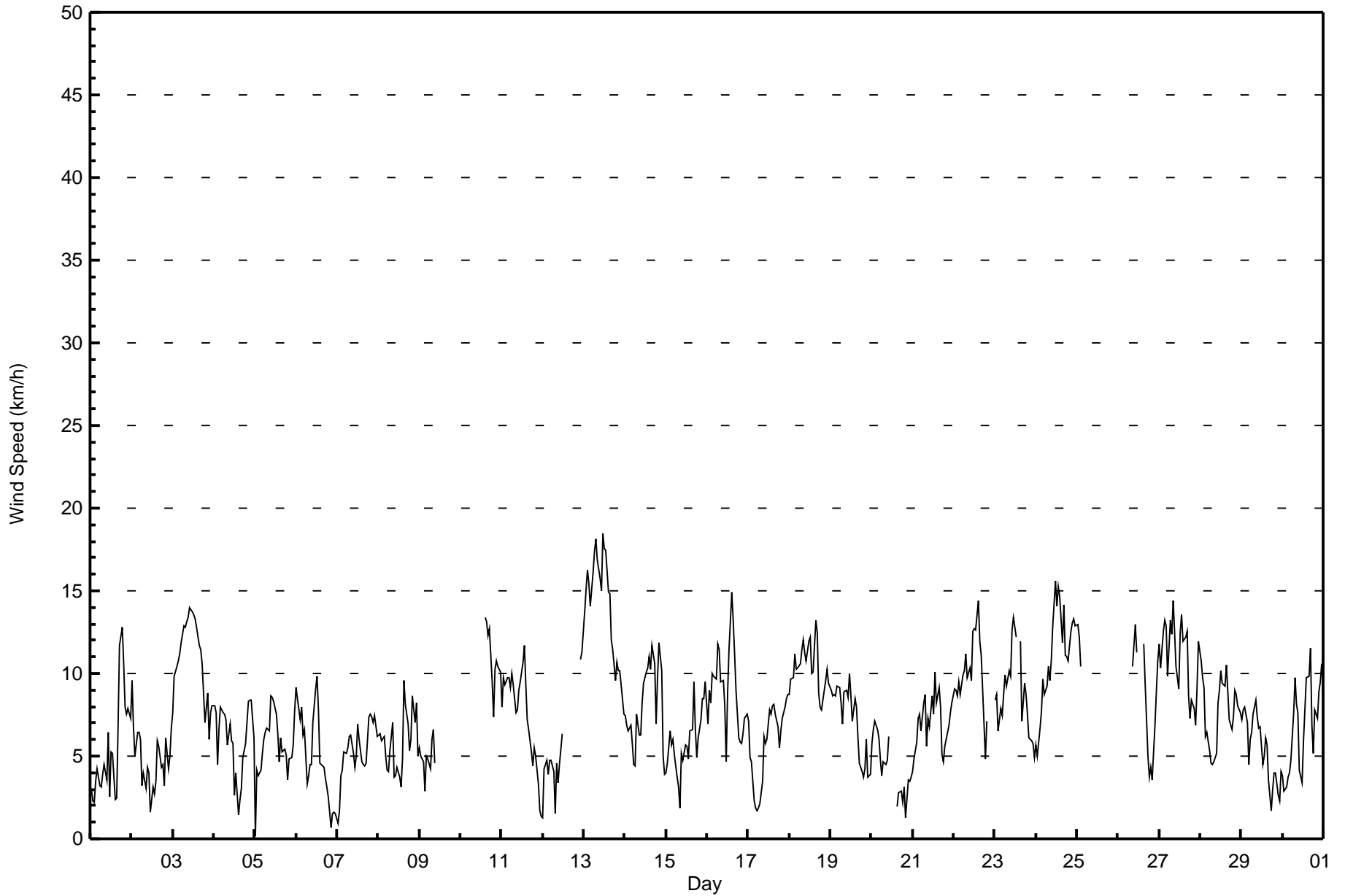
| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------|------|--------|--------|--------|--------|--------|--------|--------|-------|-----------------|
| WSW5.0 | WSW5.2 | WSW5.2 | WSW5.1 | WSW5.2 | WSW5.0 | WSW4.9 | WSW4.8 | WSW4.5 | WSW4.3 | WSW4.2 | WSW4.8 | WSW4.2 | WSW4.7 | W5.2 | W4.5 | WSW4.6 | WSW4.2 | WSW3.7 | WSW3.8 | WSW4.3 | WSW4.6 | WSW4.7 | W4.9 | Diurnal Average |
| SSW14 | SSW15 | SSW16 | SSW15 | SSW14 | SW16 | SW17 | SW18 | SW17 | SW16 | SW15 | SW18 | SW18 | SW17 | SW15 | SW15 | WNW14 | WNW13 | W13 | W11 | W13 | W13 | W13 | WNW13 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Stony Mountain - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Stony Mountain - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 193 | 30.11 | 30.11 |
| 6 - 11 | 363 | 56.63 | 86.74 |
| 12 - 19 | 85 | 13.26 | 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: 641

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Stony Mountain - September 2016

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 9 | 7 | 7 | 6 | 5 | 8 | 15 | 6 | 11 | 10 | 12 | 14 | 16 | 32 | 25 | 10 | 193 |
| 6 - 11 | 4 | 11 | 8 | 1 | 1 | 2 | 2 | 13 | 19 | 43 | 71 | 35 | 52 | 80 | 20 | 1 | 363 |
| 12 - 19 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 15 | 17 | 2 | 15 | 27 | 3 | 0 | 85 |
| 20 - 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 19 | 16 | 7 | 6 | 10 | 17 | 23 | 30 | 68 | 100 | 51 | 83 | 139 | 48 | 11 | 641 |

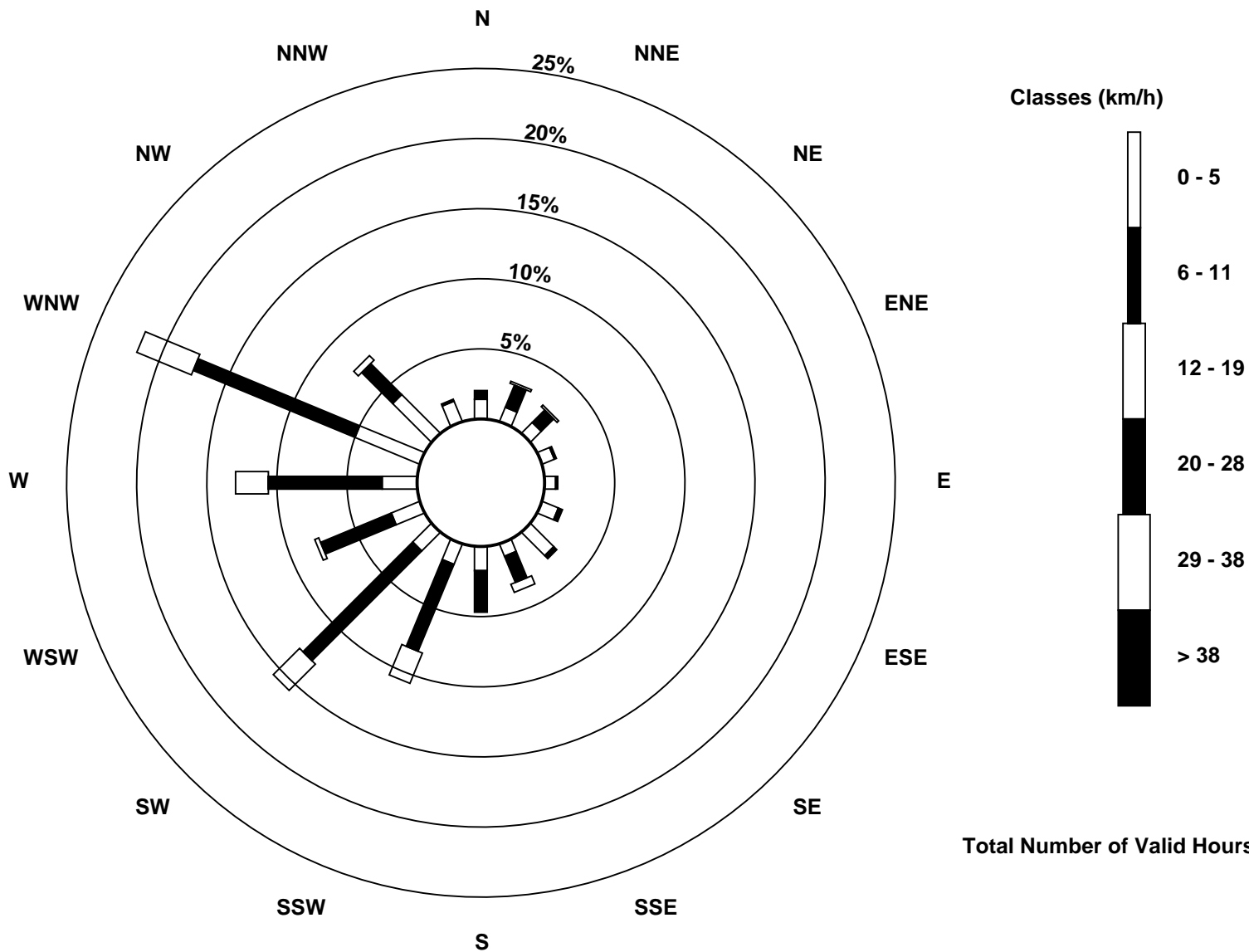
Total Number of Valid Hours: 641

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Stony Mountain (AMS 18)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Stony Mountain - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 7 km/h on Sep 10 16:00 | Hours of Data: 641 |
| Minimum Value: 1 km/h on Sep 29 22:00 | Hours of Missing Data: 79 |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 4 P ₉₉ = 6 | Hours of Calibration: 1 |
| | Percent Operational Time: 89.2 |

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

C - Calibration M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Stony Mountain - September 2016

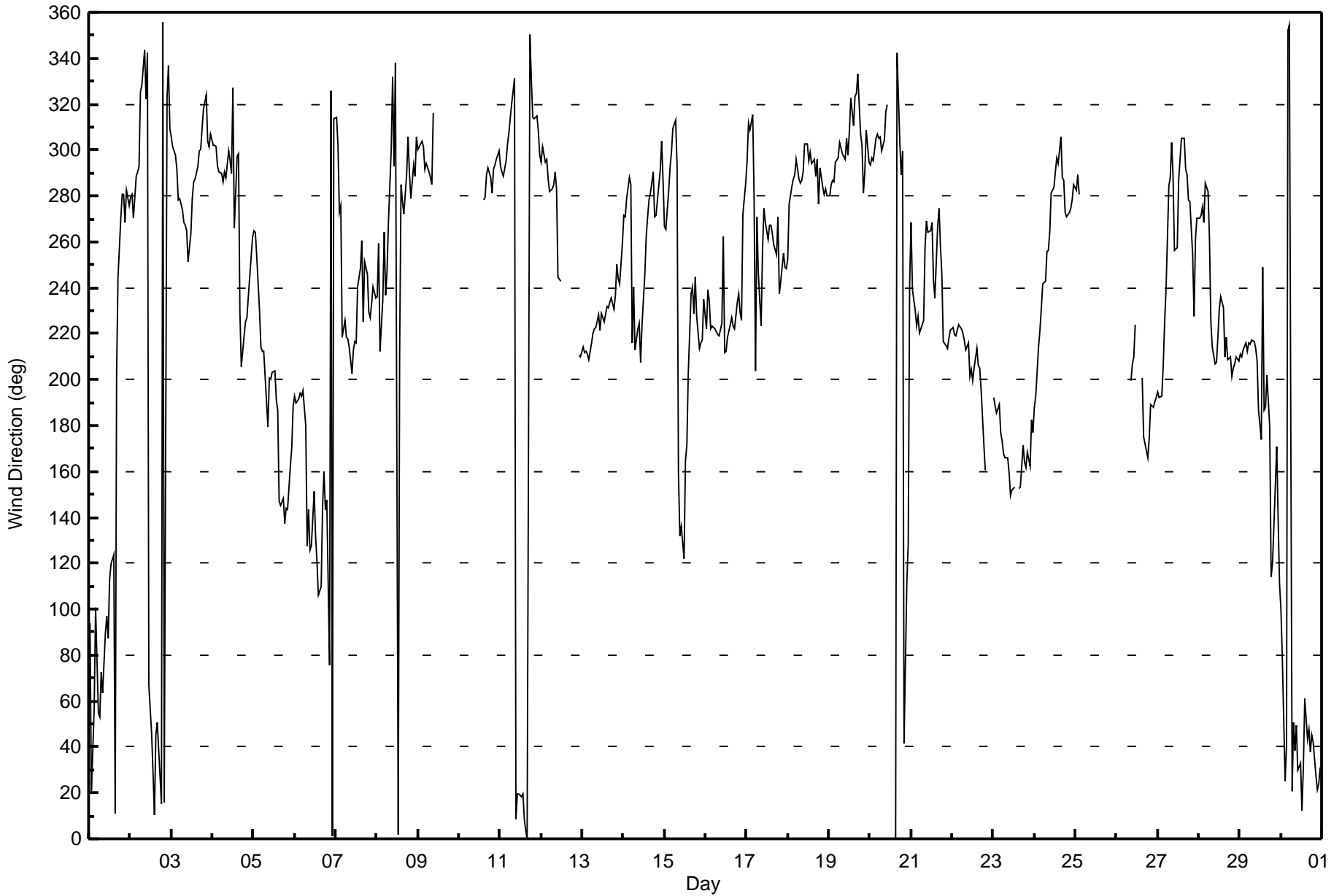
| | |
|---------------------------------------------------------------|------------------------------------------------------------|
| Direction of Maximum Speed: 229 deg on Sep 13 12:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 225.7 deg on Sep 13 | Hours of Data: 641 |
| Direction of Minimum Speed: 265 deg on Sep 5 01:00 | Direction of Minimum Daily Speed Average: 0.7 deg on Sep 1 |
| Direction of Minimum Daily Speed Average: 0.7 deg on Sep 1 | Hours of Missing Data: 79 |
| Monthly Average Direction: 262.7 deg | Percent Operational Time: 89.2 |

| 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 | 94 | 21 | 38 | 57 | 101 | 55 | 53 | 73 | 63 | 89 | 97 | 87 | 113 | 120 | 124 | 11 | 203 | 245 | 270 | 281 | 281 | 268 | 283 | 276 | 276.9 |
| 2-Sep | 280 | 281 | 271 | 288 | 291 | 293 | 325 | 328 | 344 | 322 | 343 | 67 | 46 | 29 | 10 | 45 | 50 | 28 | 15 | 356 | 16 | 323 | 337 | 309 | 331.8 |
| 3-Sep | 306 | 302 | 298 | 292 | 278 | 279 | 274 | 268 | 267 | 265 | 251 | 264 | 279 | 286 | 287 | 293 | 300 | 300 | 309 | 318 | 324 | 304 | 302 | 307 | 286.3 |
| 4-Sep | 302 | 302 | 301 | 293 | 290 | 290 | 286 | 291 | 288 | 300 | 295 | 290 | 327 | 266 | 297 | 298 | 229 | 206 | 219 | 225 | 227 | 236 | 245 | 262 | 272.8 |
| 5-Sep | 265 | 264 | 254 | 230 | 214 | 212 | 212 | 201 | 179 | 201 | 200 | 203 | 204 | 191 | 187 | 147 | 146 | 148 | 137 | 144 | 143 | 162 | 170 | 188 | 189.0 |
| 6-Sep | 193 | 190 | 191 | 194 | 193 | 195 | 180 | 128 | 143 | 126 | 128 | 152 | 132 | 121 | 106 | 110 | 145 | 160 | 143 | 147 | 76 | 326 | 1 | 314 | 157.2 |
| 7-Sep | 315 | 302 | 273 | 276 | 219 | 226 | 219 | 218 | 214 | 202 | 213 | 216 | 216 | 240 | 249 | 261 | 225 | 251 | 246 | 229 | 227 | 233 | 241 | 235 | 232.9 |
| 8-Sep | 236 | 259 | 213 | 235 | 264 | 237 | 247 | 269 | 300 | 332 | 293 | 338 | 2 | 210 | 285 | 278 | 272 | 289 | 306 | 290 | 279 | 294 | 289 | 306 | 277.6 |
| 9-Sep | 300 | 301 | 304 | 302 | 292 | 294 | 290 | 288 | 285 | 316 | AF | 290 | M | M | M | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- |
| 10-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | 278 | 280 | 289 | 293 | 288 | 281 | 292 | 294 | 296 | 300 | -- |
| 11-Sep | 293 | 290 | 289 | 295 | 303 | 308 | 314 | 320 | 331 | 9 | 19 | 20 | 19 | 19 | 8 | 3 | 0 | 350 | 331 | 314 | 314 | 315 | 308 | 298 | 334.1 |
| 12-Sep | 295 | 301 | 295 | 296 | 287 | 282 | 283 | 285 | 291 | 283 | 244 | 243 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 210 | 210 | -- |
| 13-Sep | 214 | 211 | 212 | 211 | 209 | 216 | 221 | 222 | 223 | 228 | 222 | 229 | 227 | 225 | 232 | 231 | 233 | 235 | 230 | 237 | 250 | 244 | 241 | 259 | 225.7 |
| 14-Sep | 271 | 271 | 279 | 288 | 285 | 216 | 241 | 213 | 222 | 225 | 207 | 224 | 246 | 263 | 271 | 278 | 281 | 290 | 271 | 278 | 291 | 304 | 287 | 263.8 | |
| 15-Sep | 266 | 266 | 282 | 292 | 299 | 309 | 313 | 293 | 159 | 132 | 136 | 122 | 165 | 171 | 203 | 238 | 241 | 229 | 245 | 228 | 214 | 216 | 217 | 235 | 230.9 |
| 16-Sep | 222 | 239 | 235 | 222 | 223 | 222 | 221 | 220 | 219 | 225 | 263 | 212 | 212 | 219 | 224 | 227 | 223 | 222 | 234 | 237 | 229 | 226 | 272 | 285 | 228.7 |
| 17-Sep | 295 | 312 | 309 | 316 | 279 | 204 | 271 | 247 | 223 | 256 | 275 | 269 | 261 | 267 | 267 | 264 | 258 | 255 | 271 | 237 | 243 | 255 | 249 | 248 | 262.9 |
| 18-Sep | 253 | 276 | 284 | 288 | 289 | 296 | 287 | 286 | 287 | 291 | 303 | 303 | 295 | 299 | 294 | 296 | 289 | 296 | 277 | 292 | 284 | 280 | 283 | 280 | 288.5 |
| 19-Sep | 280 | 285 | 287 | 286 | 294 | 296 | 303 | 301 | 298 | 296 | 305 | 298 | 308 | 323 | 311 | 323 | 325 | 333 | 307 | 302 | 281 | 291 | 309 | 295 | 300.5 |
| 20-Sep | 294 | 296 | 295 | 305 | 307 | 305 | 306 | 299 | 304 | 317 | 320 | AF | AF | AF | AF | 0 | 342 | 303 | 289 | 300 | 41 | 112 | 129 | 241 | 304.9 |
| 21-Sep | 269 | 239 | 230 | 223 | 228 | 220 | 224 | 226 | 257 | 269 | 264 | 265 | 269 | 243 | 236 | 266 | 274 | 258 | 246 | 216 | 215 | 213 | 218 | 222 | 241.0 |
| 22-Sep | 223 | 220 | 219 | 222 | 224 | 222 | 220 | 218 | 213 | 216 | 201 | 205 | 199 | 205 | 213 | 207 | 205 | 196 | 172 | 161 | AF | AF | AF | AF | 209.5 |
| 23-Sep | 192 | 189 | 185 | 189 | 177 | 174 | 168 | 166 | 166 | 159 | 150 | 152 | 153 | M | M | 152 | 153 | 172 | 164 | 162 | 168 | 162 | 177 | 166.8 | |
| 24-Sep | 188 | 193 | 214 | 221 | 231 | 242 | 243 | 255 | 256 | 264 | 281 | 284 | 290 | 296 | 294 | 306 | 288 | 287 | 273 | 271 | 272 | 275 | 278 | 285 | 270.9 |
| 25-Sep | 282 | 289 | 281 | 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 | 199 | 207 | 210 | 224 | M | M | M | 201 | 175 | 169 | 166 | 174 | 189 | 188 | 190 | 192 | -- |
| 27-Sep | 194 | 192 | 193 | 206 | 225 | 239 | 284 | 288 | 303 | 289 | 256 | 257 | 287 | 296 | 305 | 305 | 291 | 289 | 278 | 278 | 255 | 228 | 261 | 270 | 264.5 |
| 28-Sep | 270 | 272 | 275 | 269 | 286 | 282 | 261 | 225 | 214 | 207 | 208 | 218 | 231 | 236 | 232 | 210 | 219 | 209 | 210 | 201 | 205 | 207 | 210 | 208 | 230.7 |
| 29-Sep | 211 | 210 | 213 | 216 | 212 | 216 | 216 | 217 | 216 | 214 | 208 | 187 | 174 | 249 | 187 | 188 | 202 | 179 | 114 | 120 | 137 | 171 | 140 | 111 | 198.8 |
| 30-Sep | 100 | 79 | 25 | 41 | 352 | 354 | 21 | 50 | 38 | 50 | 30 | 33 | 12 | 31 | 61 | 44 | 48 | 38 | 45 | 42 | 27 | 21 | 24 | 31 | 36.6 |

251.8 257.5 255.2 252.6 255.0 252.8 255.9 250.8 250.6 249.9 240.9 241.7 246.5 258.0 262.7 261.5 258.2 257.9 257.3 252.0 258.2 254.5 256.1 258.9

Diurnal Average

C - Calibration 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
Stony Mountain - September 2016

| | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 93 deg on Sep 4 15:00 | | Hours of Data: | 641 |
| Minimum Value: 10 deg on Sep 29 19:00 | | Hours of Missing Data: | 79 |
| | | Hours of Calibration: | 1 |
| | | Percent Operational Time: | 89.2 |
| Percentiles: P ₁ = 14 P ₁₀ = 19 Q ₁ = 24 Median = 30 Q ₃ = 35 P ₉₀ = 48 P ₉₉ = 79 | | | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 32 | 57 | 51 | 17 | 24 | 43 | 45 | 24 | 28 | 45 | 32 | 78 | 42 | 37 | 73 | 72 | 52 | 35 | 32 | 33 | 30 | 36 | 28 | 28 | 78 | |
| 2-Sep | 29 | 29 | 33 | 28 | 33 | 36 | 55 | 61 | 69 | 49 | 58 | 86 | 61 | 66 | 58 | 23 | 23 | 27 | 33 | 37 | 44 | 63 | 52 | 35 | 86 | |
| 3-Sep | 40 | 39 | 33 | 32 | 35 | 31 | 32 | 32 | 33 | 32 | 33 | 33 | 31 | 31 | 32 | 31 | 33 | 33 | 44 | 53 | 53 | 36 | 31 | 38 | 53 | |
| 4-Sep | 35 | 34 | 29 | 29 | 28 | 28 | 30 | 31 | 30 | 42 | 49 | 48 | 84 | 53 | 93 | 51 | 35 | 23 | 20 | 21 | 23 | 22 | 32 | 27 | 93 | |
| 5-Sep | 17 | 24 | 19 | 21 | 13 | 13 | 14 | 29 | 34 | 37 | 27 | 40 | 49 | 48 | 56 | 38 | 45 | 31 | 20 | 22 | 22 | 33 | 37 | 27 | 56 | |
| 6-Sep | 22 | 22 | 20 | 17 | 19 | 18 | 32 | 32 | 46 | 34 | 35 | 37 | 33 | 27 | 29 | 32 | 33 | 34 | 21 | 20 | 61 | 48 | 27 | 33 | 61 | |
| 7-Sep | 33 | 50 | 31 | 24 | 20 | 25 | 20 | 21 | 26 | 31 | 74 | 52 | 38 | 43 | 30 | 30 | 38 | 27 | 27 | 18 | 17 | 22 | 24 | 23 | 74 | |
| 8-Sep | 23 | 30 | 23 | 24 | 26 | 27 | 28 | 36 | 28 | 56 | 59 | 67 | 80 | 49 | 53 | 28 | 29 | 27 | 39 | 27 | 29 | 28 | 28 | 26 | 80 | |
| 9-Sep | 24 | 22 | 23 | 23 | 35 | 31 | 24 | 25 | 30 | 49 | AF | 35 | M | M | M | AF | AF | AF | AF | AF | AF | AF | AF | AF | 49 | |
| 10-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | 35 | 37 | 34 | 30 | 34 | 28 | 33 | 32 | 31 | 30 | 37 | |
| 11-Sep | 32 | 30 | 31 | 28 | 32 | 38 | 39 | 45 | 56 | 60 | 44 | 44 | 41 | 43 | 52 | 60 | 62 | 60 | 60 | 44 | 41 | 36 | 24 | 17 | 62 | |
| 12-Sep | 24 | 25 | 27 | 20 | 27 | 32 | 26 | 31 | 37 | 70 | 57 | 53 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 20 | 19 | 70 | |
| 13-Sep | 21 | 21 | 21 | 21 | 21 | 22 | 22 | 22 | 22 | 25 | 26 | 26 | 26 | 26 | 30 | 27 | 29 | 27 | 24 | 25 | 29 | 27 | 27 | 29 | 30 | |
| 14-Sep | 31 | 34 | 27 | 20 | 25 | 24 | 23 | 15 | 42 | 37 | 36 | 34 | 37 | 38 | 35 | 35 | 32 | 33 | 30 | 31 | 29 | 28 | 44 | 26 | 44 | |
| 15-Sep | 23 | 26 | 28 | 26 | 20 | 16 | 15 | 46 | 50 | 26 | 46 | 35 | 52 | 59 | 43 | 38 | 31 | 23 | 20 | 23 | 16 | 18 | 20 | 22 | 59 | |
| 16-Sep | 20 | 23 | 25 | 18 | 18 | 18 | 18 | 19 | 19 | 22 | 35 | 32 | 26 | 32 | 28 | 29 | 27 | 23 | 22 | 21 | 18 | 15 | 33 | 29 | 35 | |
| 17-Sep | 27 | 23 | 32 | 42 | 33 | 24 | 33 | 31 | 36 | 31 | 37 | 33 | 34 | 35 | 32 | 33 | 30 | 32 | 25 | 23 | 24 | 29 | 30 | 28 | 42 | |
| 18-Sep | 32 | 31 | 32 | 26 | 28 | 26 | 30 | 30 | 31 | 31 | 33 | 35 | 34 | 34 | 35 | 34 | 32 | 30 | 30 | 35 | 28 | 30 | 26 | 30 | 35 | |
| 19-Sep | 29 | 32 | 27 | 31 | 29 | 27 | 32 | 39 | 32 | 30 | 33 | 33 | 37 | 44 | 41 | 41 | 52 | 56 | 34 | 26 | 23 | 26 | 34 | 34 | 56 | |
| 20-Sep | 20 | 25 | 25 | 28 | 23 | 23 | 30 | 27 | 37 | 58 | 51 | AF | AF | AF | AF | 89 | 65 | 42 | 19 | 24 | 81 | 15 | 19 | 38 | 89 | |
| 21-Sep | 23 | 21 | 18 | 21 | 20 | 18 | 22 | 23 | 38 | 34 | 46 | 47 | 54 | 34 | 39 | 37 | 33 | 26 | 18 | 12 | 15 | 16 | 17 | 19 | 54 | |
| 22-Sep | 19 | 19 | 19 | 20 | 20 | 21 | 20 | 21 | 23 | 24 | 36 | 32 | 35 | 35 | 27 | 34 | 27 | 33 | 44 | 35 | AF | AF | AF | AF | 44 | |
| 23-Sep | 26 | 31 | 34 | 31 | 40 | 36 | 37 | 39 | 37 | 34 | 30 | 31 | 31 | M | M | 29 | 38 | 36 | 35 | 34 | 38 | 37 | 36 | 34 | 40 | |
| 24-Sep | 28 | 29 | 23 | 22 | 25 | 25 | 28 | 30 | 32 | 33 | 32 | 32 | 32 | 33 | 29 | 30 | 34 | 29 | 28 | 28 | 29 | 31 | 28 | 27 | 26 | 34 |
| 25-Sep | 29 | 27 | 28 | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | 29 | |
| 26-Sep | AF | AF | AF | AF | AF | AF | AF | AF | 22 | 23 | 25 | 25 | M | M | M | 31 | 35 | 27 | 25 | 29 | 18 | 24 | 24 | 24 | 35 | |
| 27-Sep | 23 | 26 | 23 | 20 | 23 | 30 | 26 | 26 | 25 | 32 | 32 | 34 | 30 | 28 | 30 | 29 | 32 | 28 | 24 | 23 | 29 | 19 | 29 | 28 | 34 | |
| 28-Sep | 29 | 24 | 25 | 26 | 19 | 21 | 34 | 30 | 18 | 33 | 36 | 33 | 36 | 43 | 32 | 32 | 27 | 23 | 16 | 17 | 19 | 18 | 17 | 18 | 43 | |
| 29-Sep | 15 | 17 | 17 | 16 | 13 | 15 | 14 | 19 | 20 | 25 | 37 | 41 | 73 | 53 | 49 | 43 | 40 | 20 | 10 | 14 | 12 | 23 | 29 | 16 | 73 | |
| 30-Sep | 25 | 32 | 23 | 29 | 24 | 20 | 18 | 17 | 22 | 21 | 46 | 44 | 28 | 26 | 20 | 22 | 19 | 24 | 25 | 21 | 25 | 21 | 22 | 20 | 46 | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 40 | 57 | 51 | 42 | 40 | 43 | 55 | 61 | 69 | 70 | 74 | 86 | 84 | 66 | 93 | 89 | 65 | 60 | 60 | 53 | 81 | 63 | 52 | 38 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

C - Calibration M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 12, 2016 | Last Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Reason: | Routine | | |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Gas Cert Reference | LL110090 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 49.4 ppm | Cal Gas Exp Date | February 16, 2019 |
| Calibrator Make/Model | API T700 | Serial Number | 1222 |
| ZAG Make/Model | API 701 | Serial Number | 5610 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9035 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -602 | -601 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 891 | 889 |
| Calculated slope | 1.004324 | 1.013945 | Chamber temp | 45.3 | 45.0 |
| Calculated intercept | 1.592475 | 0.106164 | Pressure | 660.2 | 662.5 |
| Analyzer Background | 21.1 | 20.7 | Flow | 0.379 | 0.382 |
| Analyzer Coefficient | 0.887 | 0.887 | Intensity | 86 | 86 |

Analyzer make Thermo 43i Analyzer serial # JC1501301453

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.4 | ---- |
| as found span | 5000 | 58.9 | 581.9 | 573.9 | 1.014 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 5000 | 58.9 | 581.9 | 573.9 | 1.014 |
| second point | 5000 | 29.5 | 291.5 | 287.5 | 1.014 |
| third point | 5000 | 14.7 | 145.2 | 142.7 | 1.018 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 5000 | 58.9 | 581.9 | 579.3 | 1.005 |
| Average Correction Factor | | | | | 1.015 |

Corrected As found 574.3 Previous response 577.8 % change 0.6%

Notes:

Inlet filter changed after as founds. Adjusted zero

Calibration Performed By: Evan Magill



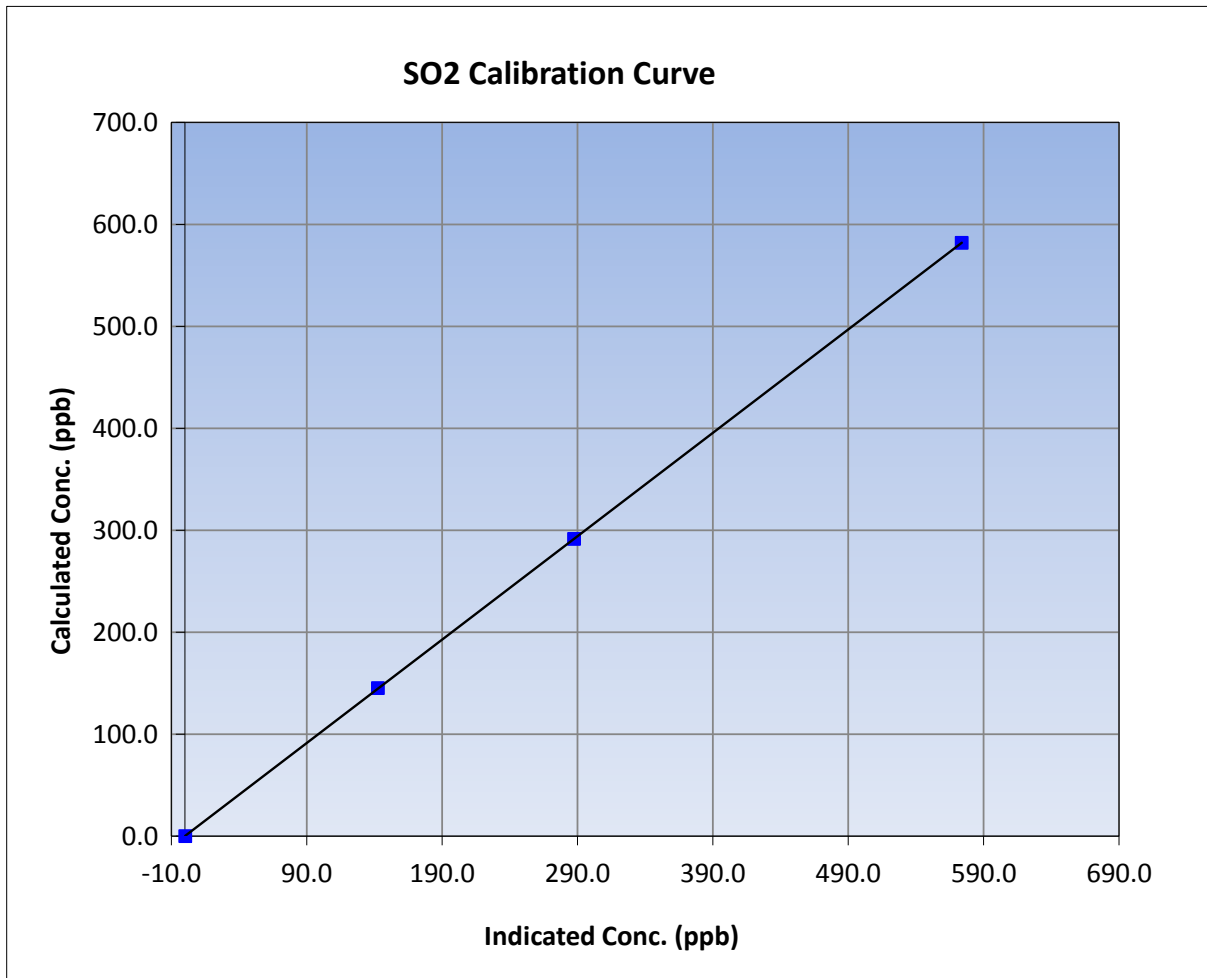
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Analyzer make | Thermo 43i | Analyzer serial # | JC1501301453 |

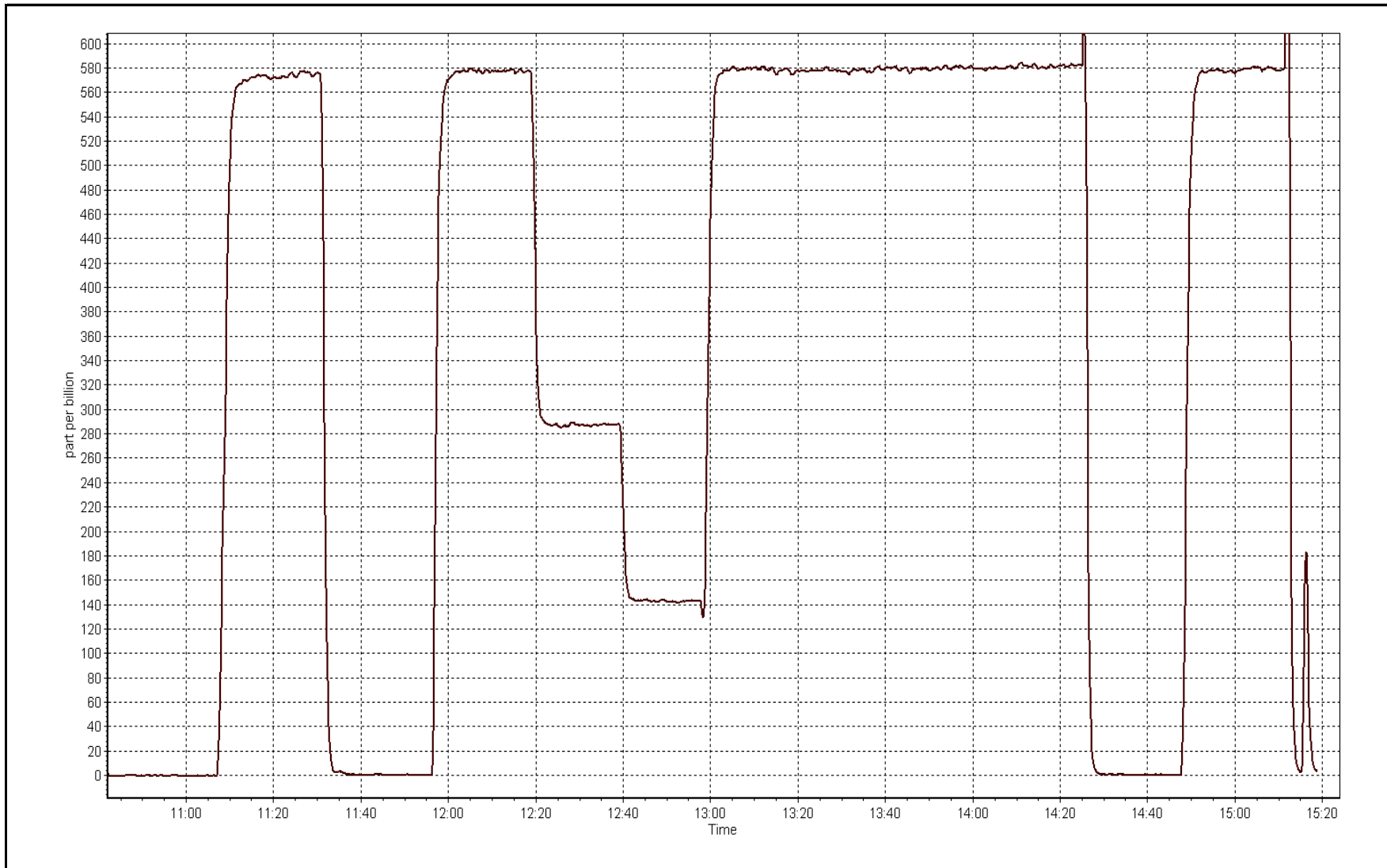
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999998 |
| 581.9 | 573.9 | 1.0140 | | |
| 291.5 | 287.5 | 1.0139 | Slope | 1.013945 |
| 145.2 | 142.7 | 1.0181 | | |
| | | | Intercept | 0.106164 |



SO2 Calibration Plot

Date: September 12, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|---------------------|
| Calibration Date | September 9, 2016 | Last Calibration | August 24, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Reason: | Routine | | |
| Start Time (MST) | 10:29 | End Time (MST) | 13:46 |
| Gas Cert Reference | CC233389 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 4.88 ppm | Cal Gas Exp Date | 10/6/2014 |
| Calibrator Make/Model | API 700 | Serial Number | 1222 |
| Dil air Make/Model | API 701 | Serial Number | 5610 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9035 |
| SO2 gas concentration | 49 ppm | SO2 gas cert/exp | EY0000368 10/Jun/15 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -699 | -699 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1003 | 1005 |
| Calculated slope | 0.984372 | 0.995316 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.117603 | -0.042009 | Pressure | 639.9 | 639.3 |
| Analyzer Background | 2.84 | 2.8 | Flow | 0.414 | 0.413 |
| Analyzer Coefficient | 1.086 | 1.067 | Intensity | 90 | 91 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-TLE | | Analyzer serial # | 1336160090 | |
| Converter make/model | CDN-101 | | Converter serial # | 522 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 5000 | 82.0 | 80.0 | 81.1 | 0.987 |
| SO2 scrubber check | 5000 | 15.2 | 149.0 | 0.8 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 5000 | 82.0 | 80.0 | 80.3 | 0.996 |
| second point | 5000 | 41.1 | 40.1 | 40.5 | 0.990 |
| third point | 5000 | 20.6 | 20.1 | 20.3 | 0.990 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 5000 | 82.0 | 80.0 | 81.4 | 0.983 |
| Average Correction Factor | | | | | 0.992 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 81.2 | Previous response | 81.2 | % change | 0.0% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Inlet filter changed and scrubber check done after as founds. Adjusted span. During the initial span, calibrator continued to initiate the zero randomly. Re-set the datalogger which fixed the issue.

Calibration Performed By:

Evan Magill



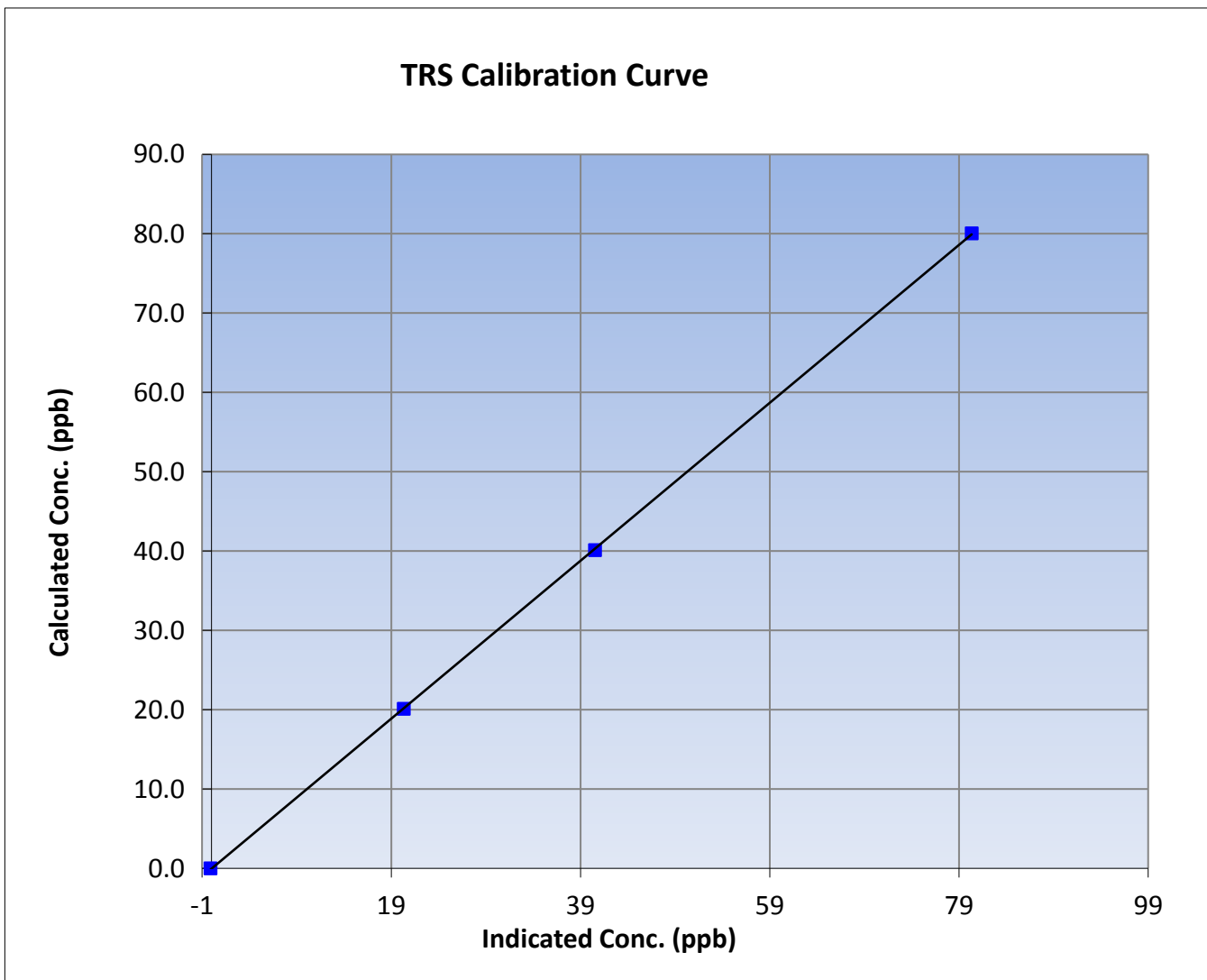
Wood Buffalo Environmental Association TRS Calibration Report

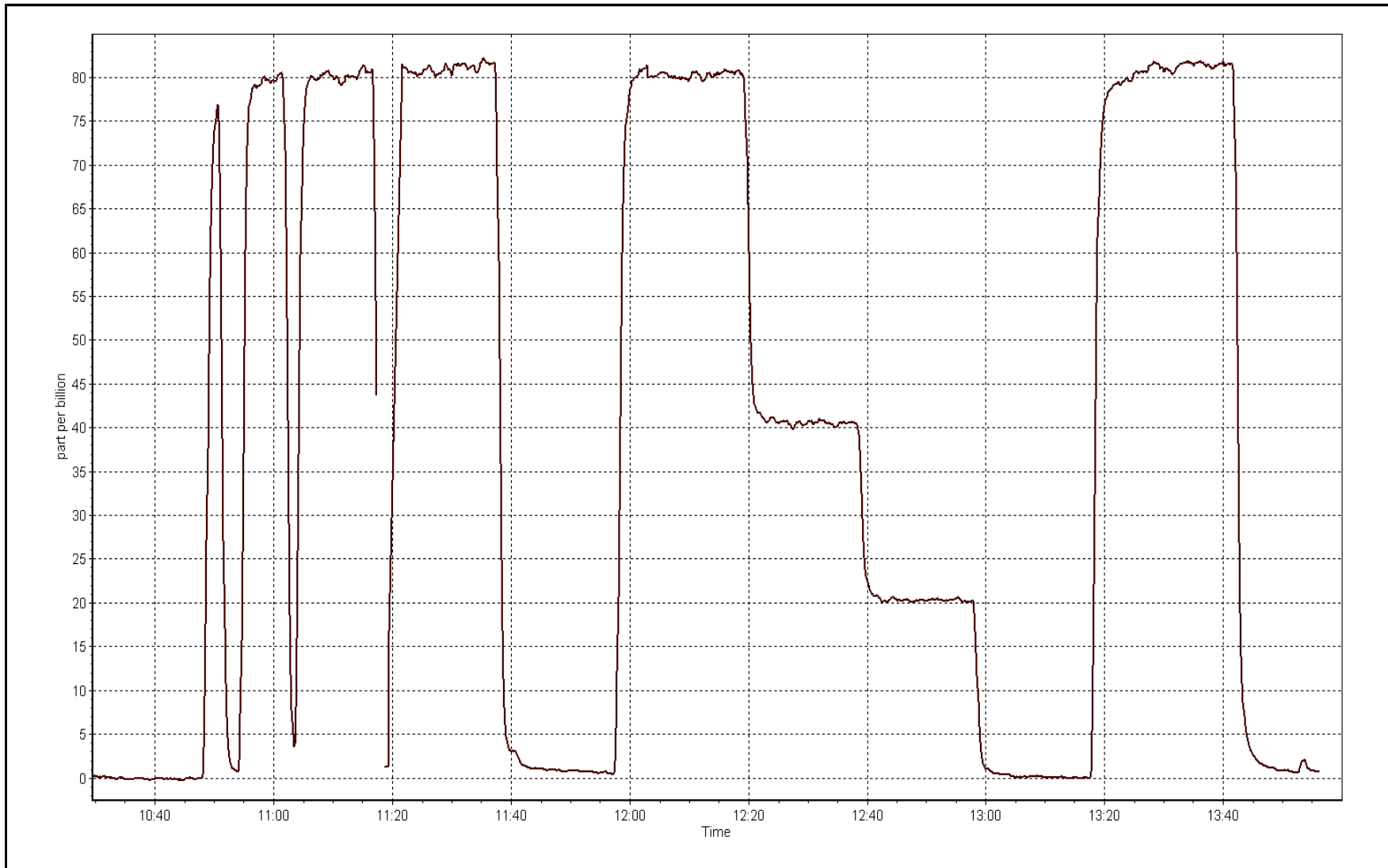
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 9, 2016 | Previous Calibration | August 24, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:29 | End Time (MST) | 13:46 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1336160090 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999980 |
| 80.0 | 80.3 | 0.9962 | | |
| 40.1 | 40.5 | 0.9897 | Slope | 0.995316 |
| 20.1 | 20.3 | 0.9899 | | |
| | | | Intercept | -0.042009 |







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|----------------------------|---------------------|-------------------|
| Calibration Date | September 12, 2016 | Last Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Reason: | Routine | | |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Gas Cert Reference | LL110090 | Cal Gas Expiry Date | February 16, 2019 |
| CH4 Cal Gas Conc. | 491.0 ppm | CH4 Equiv Conc. | 1041.0 ppm |
| C3H8 Cal Gas Conc. | 200.0 ppm | Station temp. | 22 Deg C |
| Calibrator Model | API T700 | Serial Number | 1222 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5610 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 9035 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.4 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 405.0 | 405.0 |
| THC Calc slope | 0.998568 | 0.995149 | Carrier Pressure | 30.9 | 30.9 |
| THC Calc intercept | 0.014033 | 0.009966 | Fuel Pressure | 44.3 | 44.3 |
| NMHC Calc slope | 0.998502 | 1.007371 | Air Pressure | 34.5 | 34.4 |
| NMHC Calc intercept | 0.002001 | 0.002018 | | | |

Analyzer make Thermo 55i Analyzer serial # 1218153354

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 58.9 | 12.26 | 12.32 | 0.995 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 58.9 | 12.26 | 12.32 | 0.995 |
| second point | 5000 | 29.5 | 6.14 | 6.15 | 0.999 |
| third point | 5000 | 14.7 | 3.06 | 3.06 | 1.000 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 58.9 | 12.26 | 12.43 | 0.987 |
| Average Correction Factor | | | | | 0.998 |

Corrected As found 12.32 Previous response 12.27 % change -0.4%

Notes:

Inlet filter changed after as founds. No adjustments.

Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 58.9 | 6.48 | 6.43 | 1.008 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 58.9 | 6.48 | 6.43 | 1.008 |
| second point | 5000 | 29.5 | 3.25 | 3.22 | 1.008 |
| third point | 5000 | 14.7 | 1.62 | 1.60 | 1.011 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 58.9 | 6.48 | 6.48 | 1.000 |
| Average Correction Factor | | | | | 1.009 |

Corrected As found 6.43 Previous response 6.49 % change 0.9%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 58.9 | 5.78 | 5.89 | 0.982 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 58.9 | 5.78 | 5.89 | 0.982 |
| second point | 5000 | 29.5 | 2.90 | 2.94 | 0.985 |
| third point | 5000 | 14.7 | 1.44 | 1.45 | 0.996 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 58.9 | 5.78 | 5.95 | 0.972 |
| Average Correction Factor | | | | | 0.988 |

Corrected As found 5.89 Previous response 5.78 % change -1.9%



Wood Buffalo Environmental Association

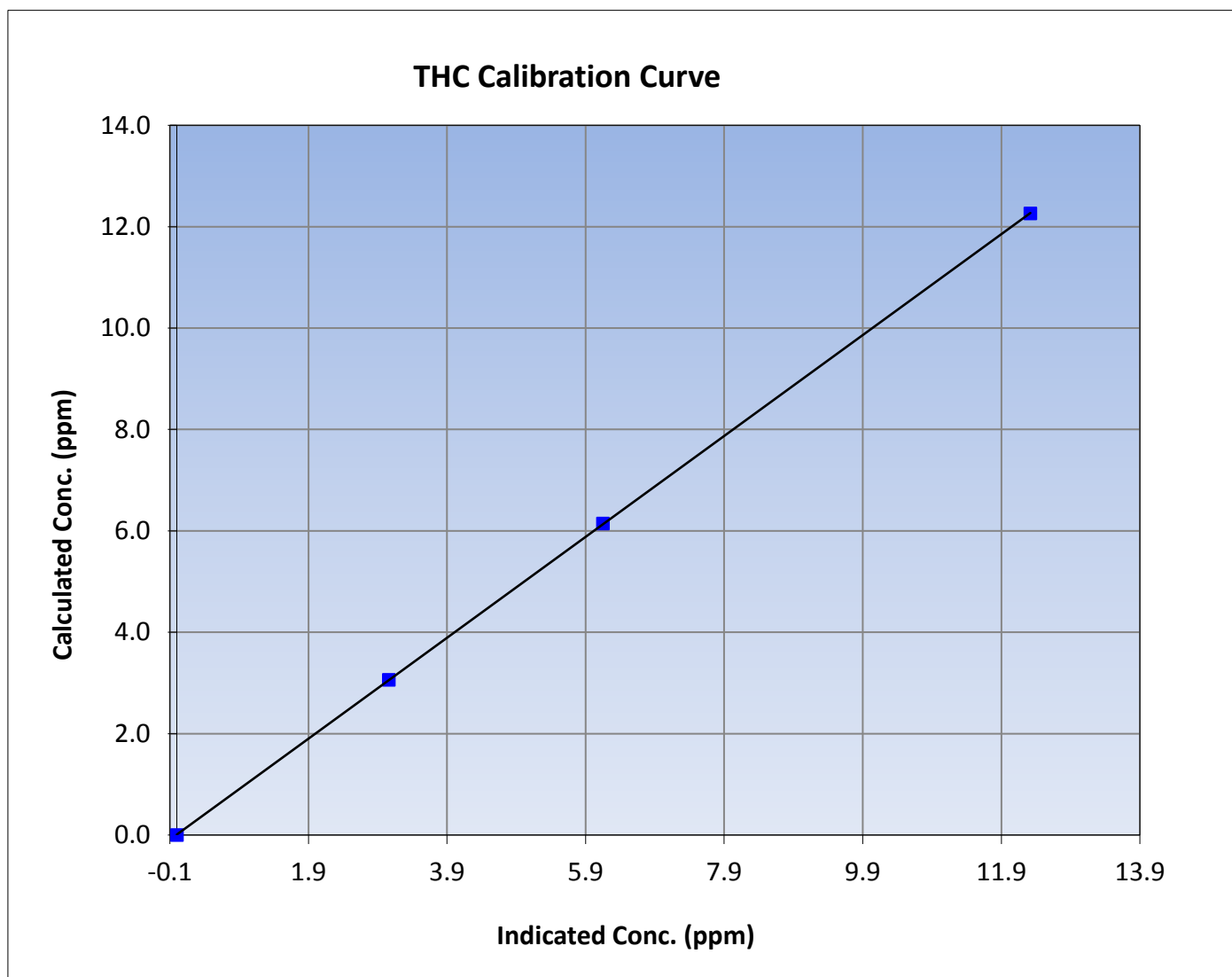
THC Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153354 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999996 |
| 12.26 | 12.32 | 0.9954 | | |
| 6.14 | 6.15 | 0.9987 | Slope | 0.995149 |
| 3.06 | 3.06 | 1.0002 | | |
| | | | Intercept | 0.009966 |





Wood Buffalo Environmental Association

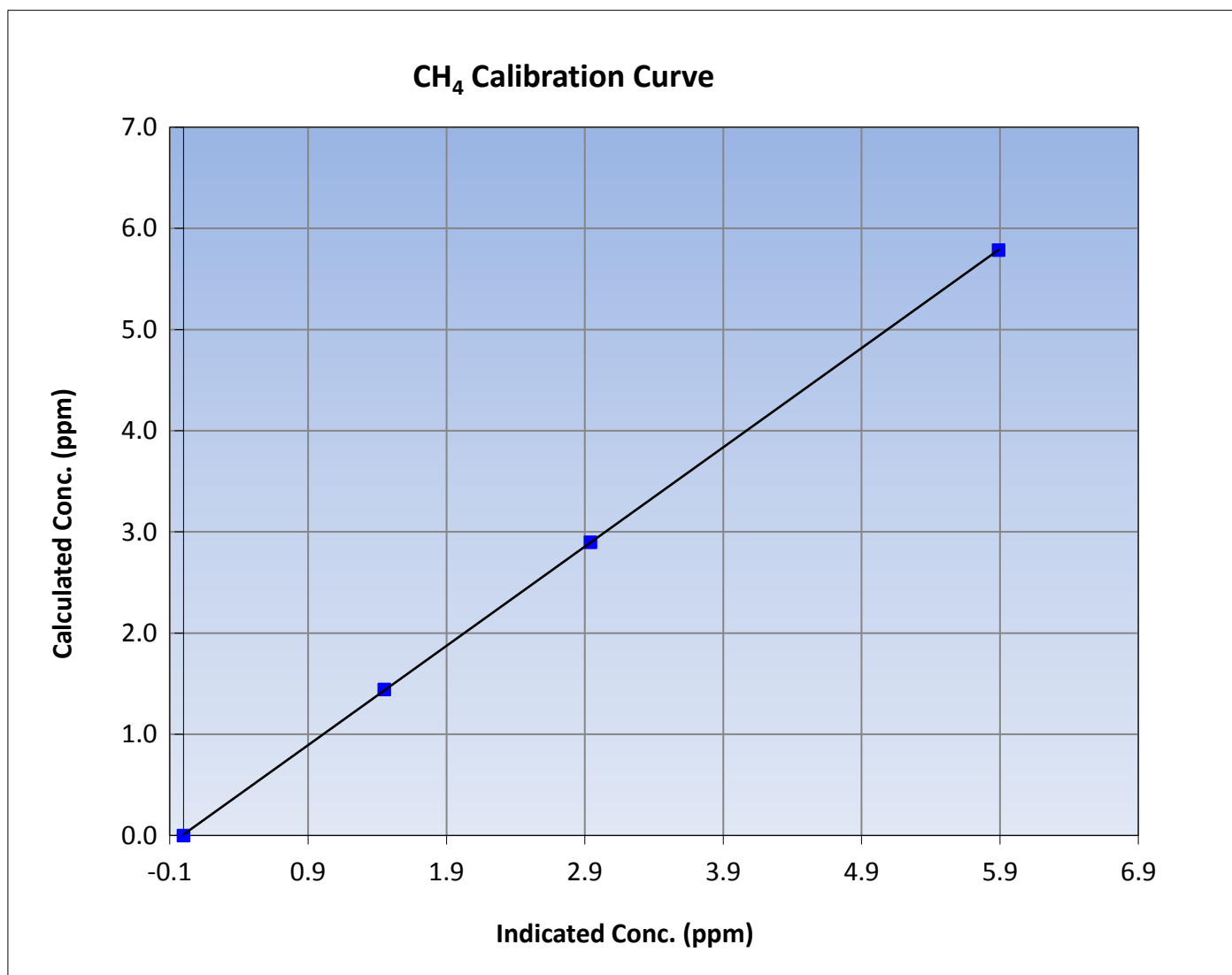
CH₄ Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153354 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999986 |
| 5.78 | 5.89 | 0.9820 | | |
| 2.90 | 2.94 | 0.9853 | Slope | 0.981034 |
| 1.44 | 1.45 | 0.9955 | | |
| | | | Intercept | 0.009846 |





Wood Buffalo Environmental Association

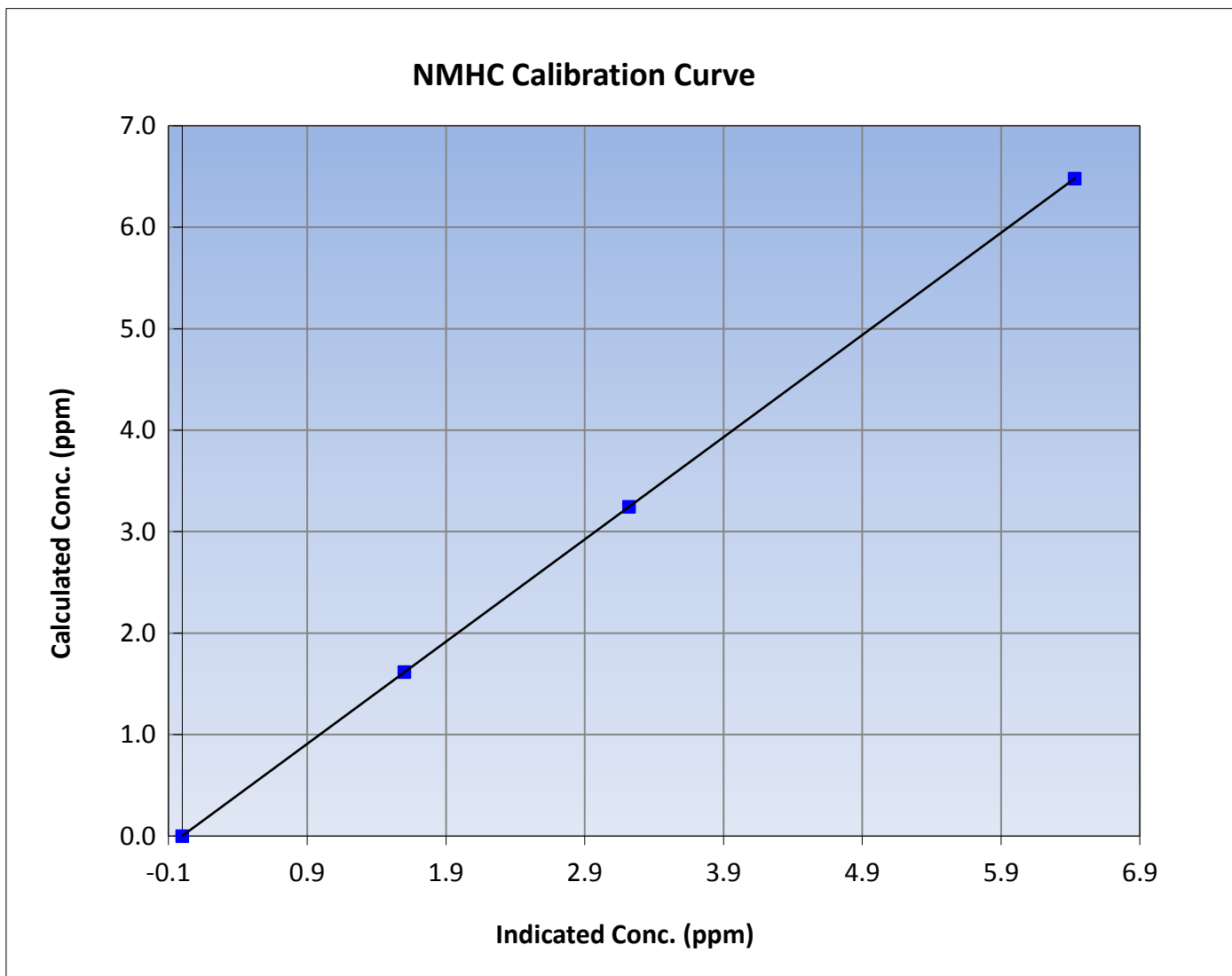
NMHC Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1218153354 |

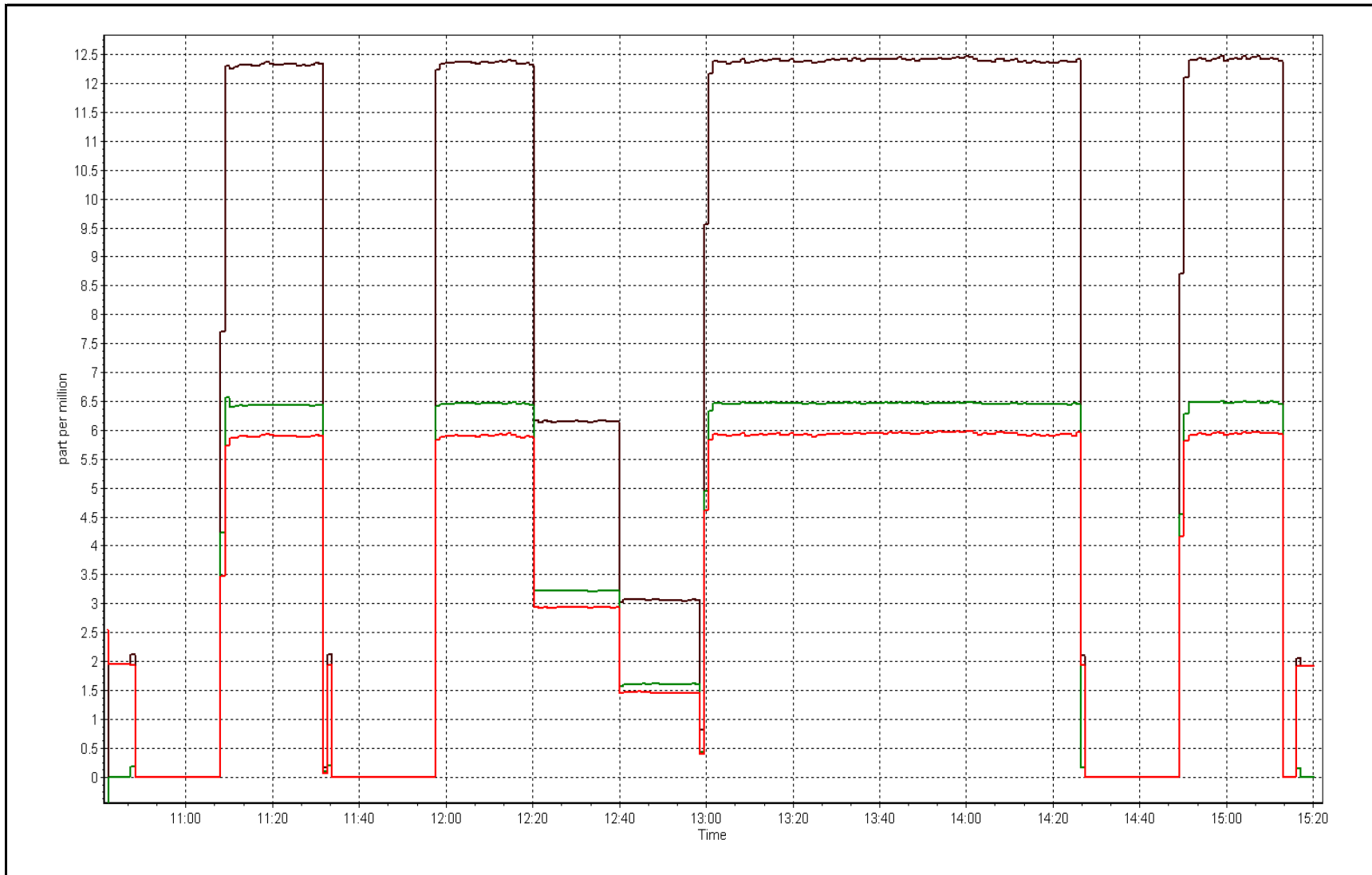
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999999 |
| 6.48 | 6.43 | 1.0076 | | |
| 3.25 | 3.22 | 1.0078 | Slope | 1.007371 |
| 1.62 | 1.60 | 1.0106 | | |
| | | | Intercept | 0.002018 |



THC Calibration Plot

Date: September 12, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|-----------------|
| Calibration Date | September 13, 2016 | Previous Calibration | August 24, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Reason: | Routine | | |
| Start Time (MST) | 11:32 | End Time (MST) | 15:55 |
| NO2 GPT Ref date | September 12, 2016 | Transfer Standard | GPT |
| | | Station temp. | 22 Deg C |
| Calibrator Make/Model | Teledyne API 700 | Serial Number | 1222 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5610 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 9305 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|------------------|--------|-------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 28.8 | 27.9 |
| Analyzer IP address | 192.168.1.48 | | Lamp temp. | 53.3 | 53.3 |
| Calculated slope | 0.998621 | 1.001146 | Pressure | 615.8 | 607.4 |
| Calculated intercept | 0.991599 | -0.241307 | Flow cell A | 0.691 | 0.684 |
| Analyzer Background | -1.4 | -2.8 | Flow cell B | 0.691 | 0.684 |
| Analyzer Coefficient | 1.322 | 1.392 | Cell A Intensity | 59590 | 57342 |
| | | | Cell B Intensity | 58654 | 56376 |

| | | | |
|---------------|------------|-------------------|------------|
| Analyzer make | Thermo 49i | Analyzer serial # | 1501663733 |
|---------------|------------|-------------------|------------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp O3 Gen Drive | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.00 | 0.0 | -1.3 | ---- |
| as found span | 5000 | 755 | 397.1 | 370.7 | 1.071 |
| calibrator zero | 5000 | 0.00 | 0.0 | 0.2 | ---- |
| high point | 5000 | 755 | 397.1 | 397.3 | 0.999 |
| second point | 5000 | 521 | 270.7 | 269.7 | 1.004 |
| third point | 5000 | 271 | 139.2 | 139.8 | 0.996 |
| as left zero | 5000 | 0.00 | 0.0 | -0.1 | ---- |
| as left span | 5000 | 755 | 397.1 | 400.1 | 0.992 |
| Average Correction Factor | | | | | 1.000 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 372.0 | Previous response | 396.7 | % change | 6.6% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

Inlet filter changed after as founds. Initial As Found span was high because incorrect O3 value was inputted. As Found span was also interrupted because the calibrator switched to zero by itself. Reset datalogger which fixed the issue. Adjusted zero and span.

Calibration Performed By:

Evan Magill



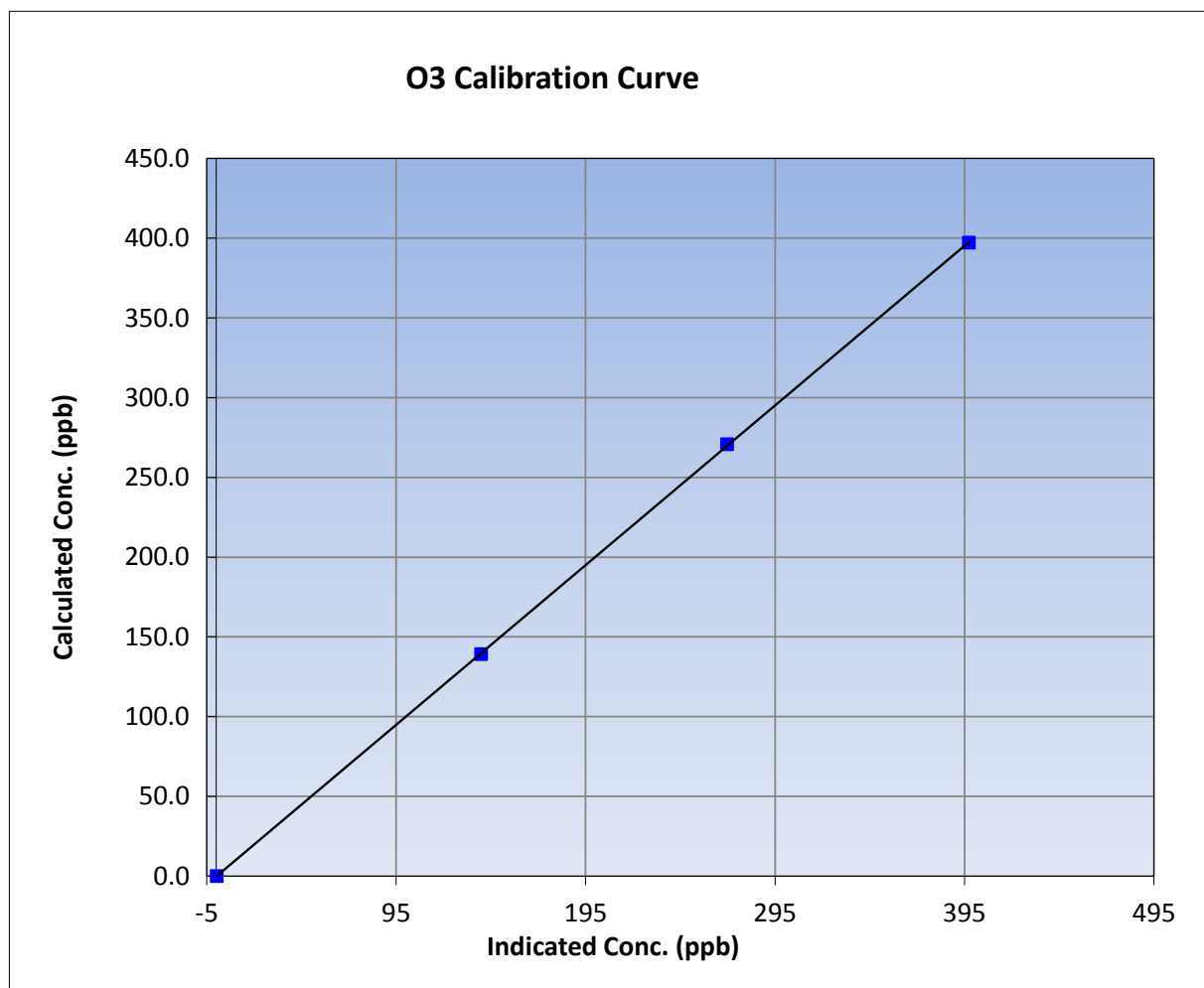
Wood Buffalo Environmental Association O3 Calibration Report

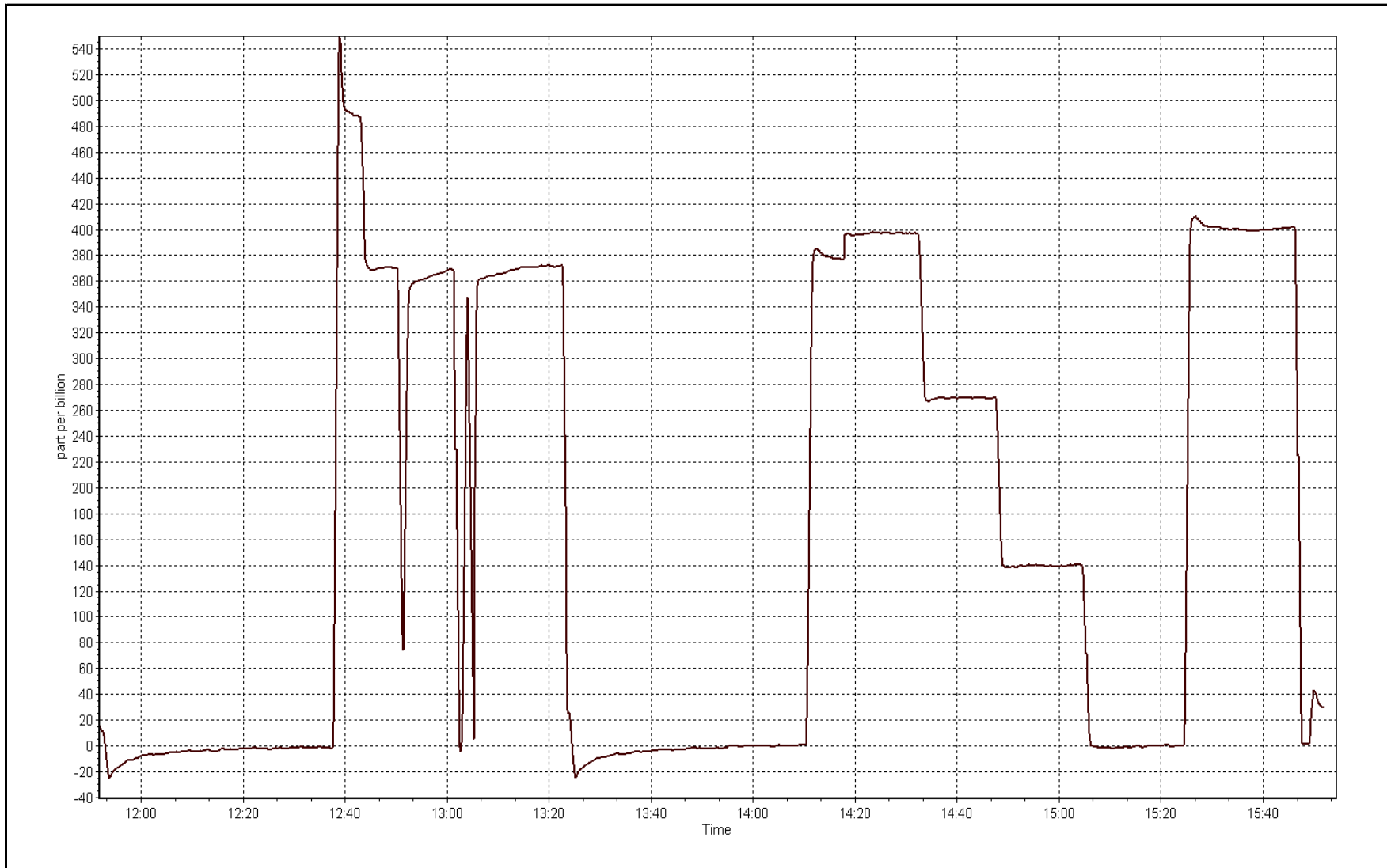
Station Information

| | | | |
|------------------|-----------------------------|----------------------|-----------------|
| Calibration Date | Tuesday, September 13, 2016 | Previous Calibration | August 24, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 11:32 | End Time (MST) | 15:55 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1501663733 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999986 |
| 397.1 | 397.3 | 0.9994 | | |
| 270.7 | 269.7 | 1.0036 | Slope | 1.001146 |
| 139.2 | 139.8 | 0.9961 | | |
| | | | Intercept | -0.241307 |







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Reason: | Routine | | |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| NO Cal Gas Conc | 50.9 ppm | Gas Cert Reference | LL110090 |
| NOx Cal Gas Conc | 50.9 ppm | Cal Gas Expiry Date | February 16, 2019 |
| Calibrator | API T700 | Serial Number | 1222 |
| Zero air Generator | Teledyne API T701 | Serial Number | 5610 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 9035 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | NOx | NO | NO2 | |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 1.000453 | 0.999096 | 1.001602 |
| | Data Offset | 0.620993 | 0.901069 | 0.866168 |
| Current Calibration | Data Slope | 1.001303 | 1.001558 | 1.012876 |
| | Data Offset | 0.558902 | 0.850238 | -0.270540 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1336160088 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| Concentration range | 0-1000 | ppb | 0-1000 | ppb |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 0.991 | | 1.014 | |
| NOx coefficient | 0.997 | | 0.998 | |
| NO2 coefficient | 0.999 | | 0.999 | |
| NO bkgrnd | 1.8 | | 1.8 | |
| NOx bkgrnd | 1.9 | | 1.9 | |
| Chamber Temp | 50 | Deg C | 50.4 | Deg C |
| Moly Temp | 324.2 | Deg C | 327.6 | Deg C |
| PMT voltage | -813.6 | V | -814 | V |
| PMT Temp | -3 | Deg C | -3.1 | Deg C |
| O3 flow | Ok | ccm | ok | ccm |
| R Cell press NO | 153.6 | mmHg | 153 | mmHg |
| R Cell Press Nox | 153.6 | mmHg | 153 | mmHg |
| NO sample flow | 0.969 | lpm | 0.971 | lpm |
| Nox sample Flow | 0.969 | lpm | 0.969 | lpm |

Notes:

Inlet filter changed after as founds. Adjusted span. 2nd GPT points were used.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

September 12, 2016

Station Number:

AMS 18

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.3 | -0.1 | ---- | ---- |
| as found span | 5000 | 58.9 | 599.6 | 599.6 | 0.0 | 583.7 | 584.0 | -0.3 | 1.0273 | 1.0268 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.4 | -0.3 | -0.1 | ---- | ---- |
| high point | 5000 | 58.9 | 599.6 | 599.6 | 0.0 | 598.5 | 598.2 | 0.3 | 1.0018 | 1.0024 |
| second point | 5000 | 29.5 | 300.3 | 300.3 | 0.0 | 298.8 | 298.4 | 0.3 | 1.0052 | 1.0063 |
| third point | 5000 | 14.7 | 149.6 | 149.6 | 0.0 | 149.1 | 148.2 | 0.8 | 1.0040 | 1.0097 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.2 | 0.0 | ---- | ---- |
| as left span | 5000 | 58.9 | 599.6 | 210.8 | 388.8 | 612.1 | 214.0 | 398.0 | 0.9796 | 0.9850 |
| Average Correction Factor | | | | | | | | | 1.0037 | 1.0061 |

Corrcted As found
Previous Response

NO_x= 584.1
NO_x= 598.7

NO= 584.3
NO= 599.2

Percent Change

NO_x= 2.5%

NO= 2.6%

GPT Calibration Data

Dilution Flow (total) 5000 ccm

Source Gas Flow 58.90 ccm

NOX ref calc conc = 599.6 ppb

NO ref calc conc = 599.6 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 609.5 | 607.9 | -0.1 | 0.9837 | 0.9863 | ---- | ---- |
| 1st NO2 (300) | 210.8 | 397.1 | 603.1 | 210.8 | 392.3 | 0.9942 | ---- | 1.0123 | 98.8% |
| 2nd NO2 (200) | 337.3 | 270.7 | 604.5 | 337.3 | 267.2 | 0.9920 | ---- | 1.0131 | 98.7% |
| 3rd NO2 (100) | 468.8 | 139.2 | 607.1 | 468.8 | 138.4 | 0.9876 | ---- | 1.0059 | 99.4% |
| 2nd NO ref point | | 0.0 | 609.5 | 607.9 | 1.6 | 0.9837 | 0.9863 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9894 | | 1.0104 | 99.0% |

Calibration Performed By:

Evan Magill



Wood Buffalo Environmental Association

NO_x Calibration Summary

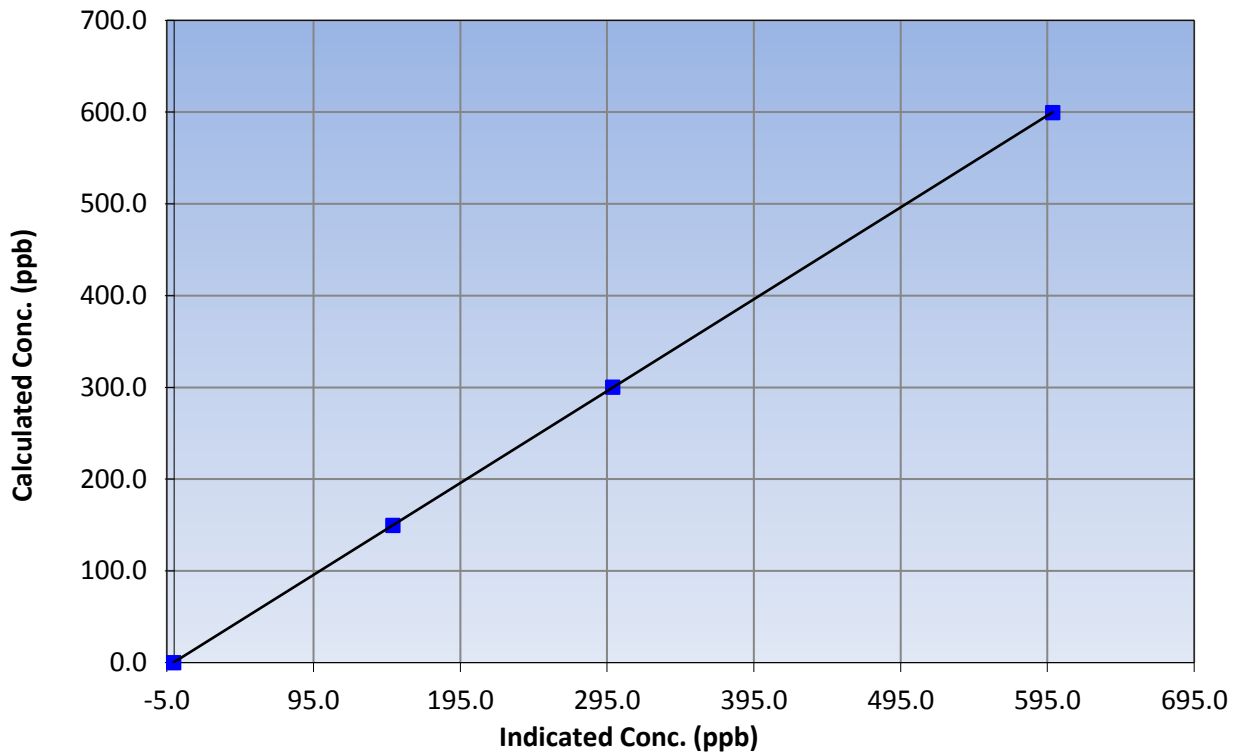
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.4 | ---- | Correlation Coefficient | 0.999998 |
| 599.6 | 598.5 | 1.0018 | | |
| 300.3 | 298.8 | 1.0052 | Slope | 1.001303 |
| 149.6 | 149.1 | 1.0040 | | |
| | | | Intercept | 0.558902 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

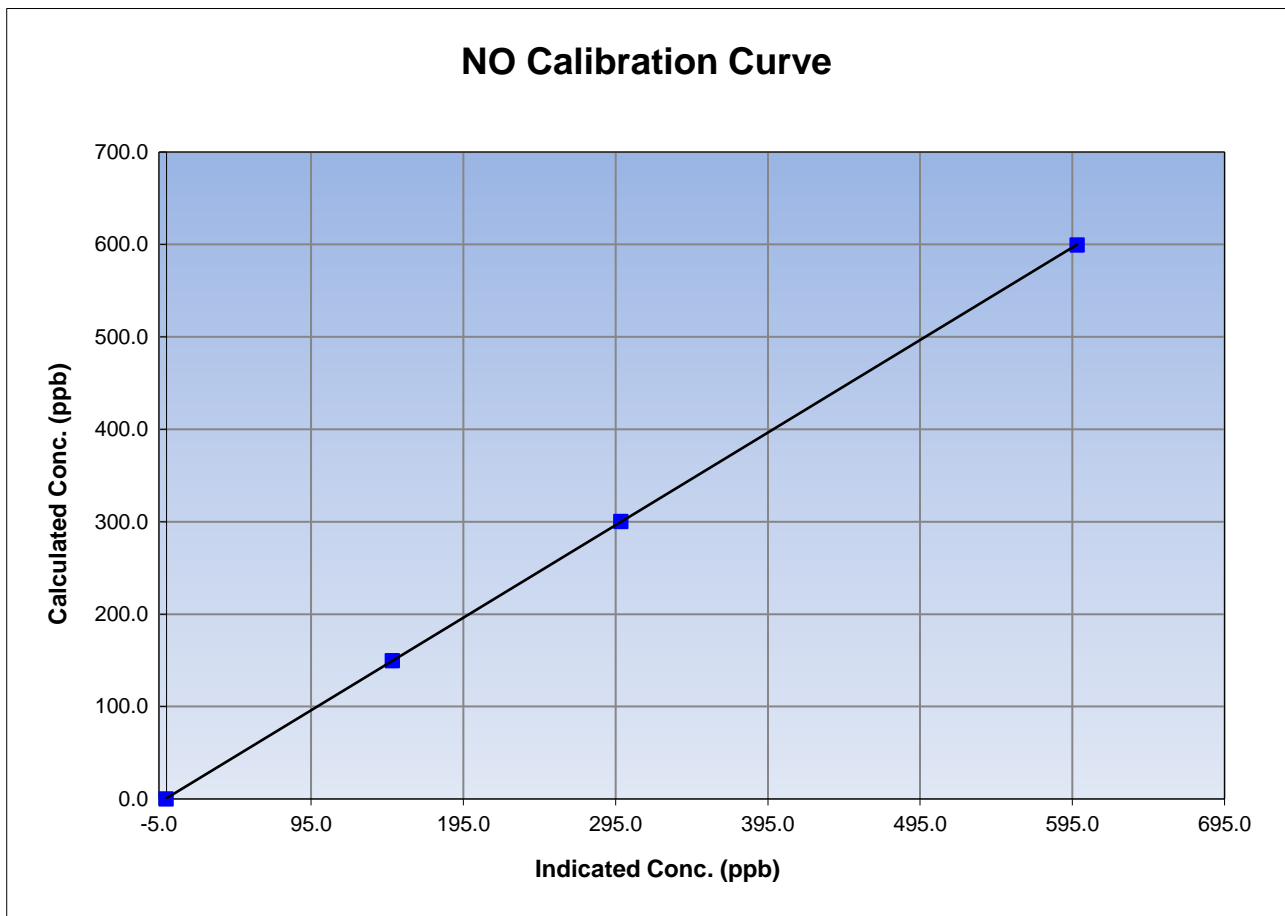
NO Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Name | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.3 | N/A | Correlation Coefficient | 0.999996 |
| 599.6 | 598.2 | 1.0024 | | |
| 300.3 | 298.4 | 1.0063 | Slope | 1.001558 |
| 149.6 | 148.2 | 1.0097 | | |
| | | | Intercept | 0.850238 |





Wood Buffalo Environmental Association

NO₂ Calibration Summary

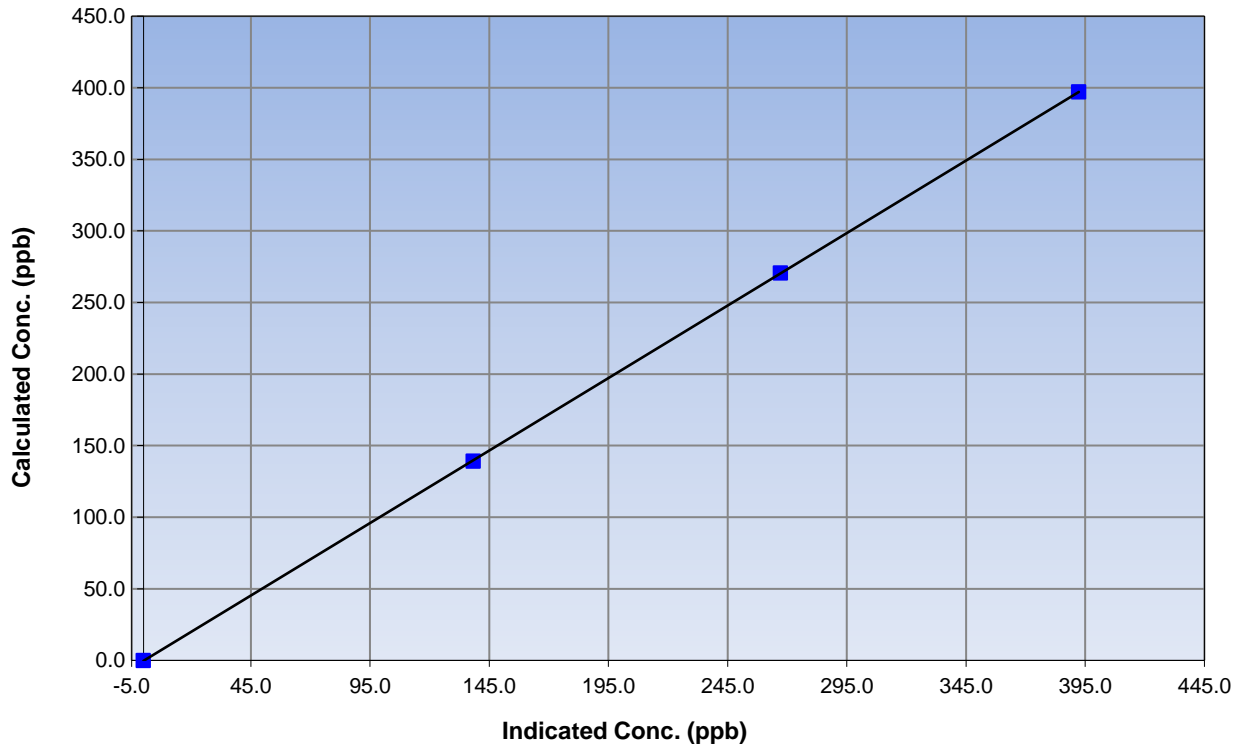
Station Information

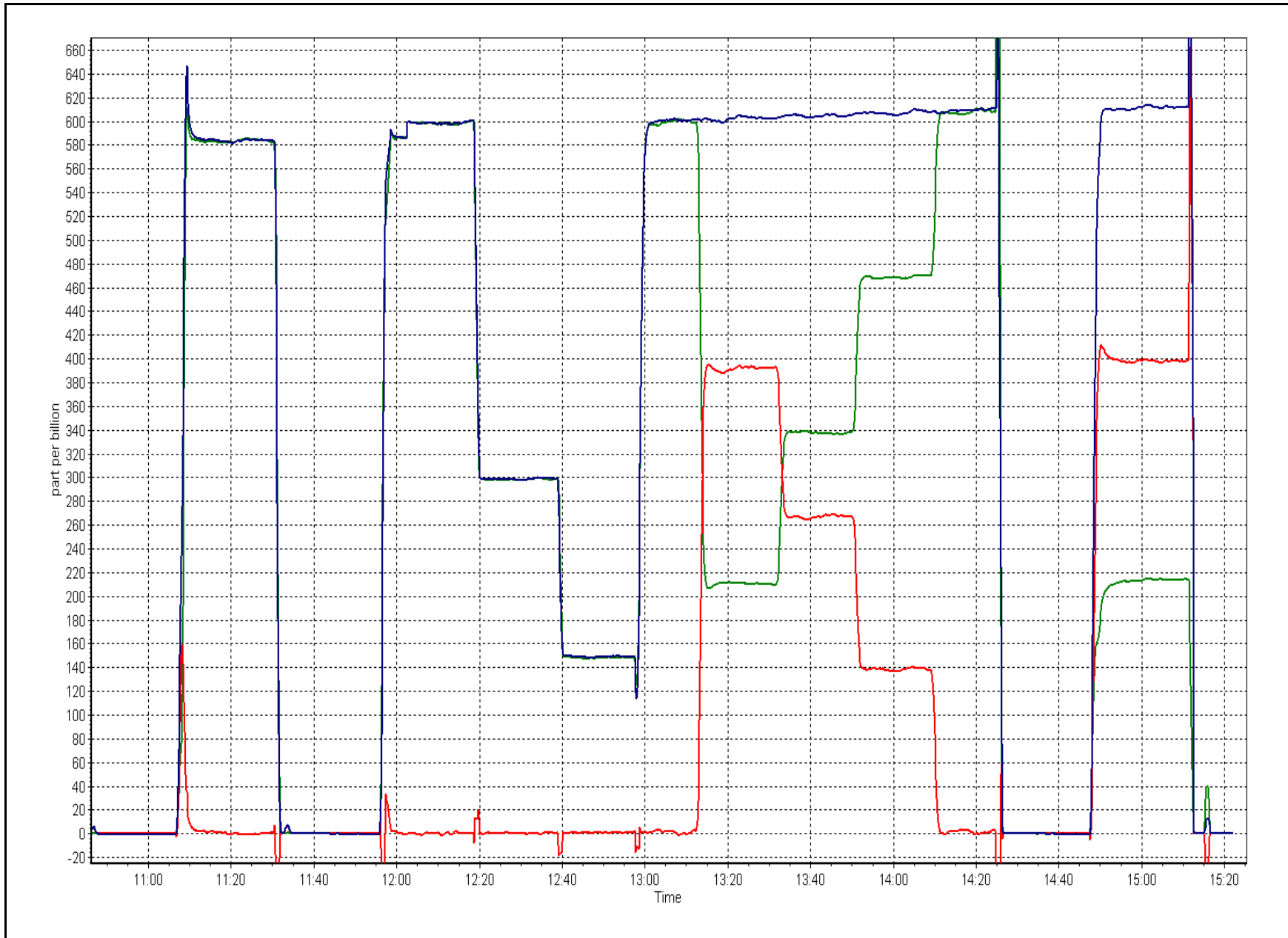
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 12, 2016 | Previous Calibration | August 23, 2016 |
| Station Number | Stony Mountain | Station Number | AMS 18 |
| Start Time (MST) | 10:45 | End Time (MST) | 15:25 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1336160088 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999992 |
| 397.1 | 392.3 | 1.0123 | | |
| 270.7 | 267.2 | 1.0131 | Slope | 1.012876 |
| 139.2 | 138.4 | 1.0059 | | |
| | | | Intercept | -0.270540 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|-----------------|
| Station Name: | Stony Mountain | Station number: | AMS 18 |
| Calibration Date: | September 13, 2016 | Last Cal Date: | August 24, 2016 |
| Start time (MST): | 14:04 | End time (MST): | 14:52 |
| Sharp Model: | SHARP 5030 | S/N: | E-781 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | |
| Flow Standard Model: | Delta Cal | S/N: | 1102 |
| Temp/RH standard: | Delta Cal | S/N: | 1102 |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------------------------------|----------|----------------------------------------|-------------------------------------|---------------|
| T1 (°C) | 17.6 | 18.8 | 17.6 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 933 | 927.3 | 933 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 998 | 1000 | 998 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | -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 type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | Tolerance |
|------------|-------------------|----------------------|------------------|-----------------------|
| Leak Test: | Date of check: | <u>June 22, 2016</u> | Last Cal Date: | <u>March 13, 2016</u> |
| | Flow w/o adaptor: | <u>16.99</u> | Flow w/ adaptor: | <u>16.9</u> 0.4 LPM |

Annual Calibration Test

| | | | | |
|------------------|------------------------|----------------------|-----------------------------|-----------------------|
| Foil Calibration | Foil Mass: | <u>1337</u> | S/N: | <u>5872</u> |
| | Date of check: | <u>June 22, 2016</u> | Last Cal Date: | <u>March 13, 2016</u> |
| | New Correction Factor: | <u>6985</u> | Previous Correction Factor: | <u>7027</u> |

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

Notes: Adjusted zero, cyclone head cleaned at station.

Calibration by: Evan Magill



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

| | | | |
|------------------|----------------------------------------|----------------------|---------------|
| Calibration Date | September 10, 2016 | Previous Calibration | June 30, 2015 |
| Station Name | Conklin Lookout | Station Number | AMS 18 |
| Reason: | Routine Installation Removal | | |
| Start Time (MST) | 13:28 | End Time (MST) | 13:50 |
| Barometric Press | n/a | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053 | Serial Number | K13090 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | M8126 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 11041 |
| DACS voltage range | 5000 | DACS channel # | P2 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | N/A | Calculated slope | 0.998126 |
| Calculated intercept | N/A | Calculated intercept | 0.003132 |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.1 | 1.0026 |
| 400 | 39.4 | 39.5 | 0.9954 |
| 600 | 58.6 | 58.7 | 0.9977 |
| 800 | 77.8 | 77.8 | 0.9989 |
| Average Correction Factor | | | 0.9986 |

WIND DIRECTION

| | | | |
|--------------------------------------|---------------------------|-------------------------------------|--------------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | R14654 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 11041 |
| DACS voltage range | 5000 | DACS channel # | SE 24 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | N/A | Calculated slope | 0.997526 |
| Calculated intercept | N/A | Calculated intercept | -0.254347 |
| As Found Declination (west of North) | 14 | As Left Declination (west of North) | 14 |

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | 0.1 | n/a |
| 90 | 90.6 | 0.9939 |
| 180 | 180.5 | 0.9971 |
| 270 | 271.7 | 0.9937 |
| 357 | 357.6 | 0.9983 |
| Average Correction Factor | | 0.9957 |

Notes:

Annual audit. Declination captured using solar noon at 12:23 MST, looked good.
 Replaced WS sensor, could not get the old WS to work after disconnecting to conduct the audit.
 Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

| | | | |
|------------------|---------------------------|----------------------|---------------|
| Calibration Date | September 26, 2016 | Previous Calibration | Sept 10, 2016 |
| Station Name | Stony Mountain ▼ | Station Number | AMS 18 ▼ |
| Reason: | Routine Installation | Removal | REPAIR |
| Start Time (MST) | 12:10 | End Time (MST) | 13:46 |
| Barometric Press | n/a | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053 | Serial Number | P15103 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | M8126 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 11041 |
| DACS voltage range | 5000 | DACS channel # | P2 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 0.998126 | Calculated slope | 0.999361 |
| Calculated intercept | 0.003132 | Calculated intercept | -0.013359 |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.2 | 0.9976 |
| 400 | 39.4 | 39.4 | 0.9985 |
| 600 | 58.6 | 58.6 | 1.0001 |
| 800 | 77.8 | 77.8 | 0.9989 |
| Average Correction Factor | | | 0.9988 |

WIND DIRECTION

| | | | |
|--------------------------------------|---------------------------|-------------------------------------|--------------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | R14654 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 11041 |
| DACS voltage range | 5000 | DACS channel # | SE 24 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | N/A | Calculated slope | 0.995776 |
| Calculated intercept | N/A | Calculated intercept | -0.098646 |
| As Found Declination (west of North) | 14 | As Left Declination (west of North) | 14 |

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | 0.4 | n/a |
| 90 | 90.4 | 0.9956 |
| 180 | 180.5 | 0.9972 |
| 270 | 271.0 | 0.9963 |
| 357 | 359.0 | 0.9944 |
| Average Correction Factor | | 0.9959 |

Notes:

No issues noted with this audit, instruments appear to be functioning well.

Calibration Performed By: Zach Eastman



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 19
SUNCOR FIREBAG
SEPTEMBER 2016

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 677 | 42 | 43 | 99.86 | 16 | 0 | 4 | 0 |
| H2S (ppb) Average | 679 | 39 | 41 | 99.72 | 1 | 0 | 0 | 0 |
| THC (ppm) Average | 547 | 37 | 173 | 81.11 | 2.8 | - | 2.3 | - |
| NO2 (ppb) Average | 677 | 42 | 43 | 99.86 | 15 | 0 | 4 | - |
| NO (ppb) Average | 677 | 42 | 43 | 99.86 | 10 | - | 3 | - |
| NOX (ppb) Average | 677 | 42 | 43 | 99.86 | 21 | - | 7 | - |
| Temperature 2 m (C) Average | 719 | 0 | 1 | 99.86 | 20.9 | - | 14 | - |
| Relative Humidity (%) Average | 719 | 0 | 1 | 99.86 | 100 | - | 99 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 36 | - | 26 | - |
| 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 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 677 | 0.9 | 2 | - | 0 | 0 | 0 | 0 | 1 | 2 | 16 |
| H2S (ppb) Average | 679 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 547 | 2.23 | 0.1 | - | 2.1 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.8 |
| NO2 (ppb) Average | 677 | 2 | 2 | - | 0 | 0 | 1 | 1 | 2 | 5 | 15 |
| NO (ppb) Average | 677 | 0.5 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 10 |
| NOX (ppb) Average | 677 | 2.4 | 3 | - | 0 | 0 | 1 | 1 | 3 | 6 | 21 |
| Temperature 2 m (C) Average | 719 | 9.64 | 3.9 | - | 0.6 | 5 | 6.8 | 9.2 | 12.4 | 14.6 | 20.9 |
| Relative Humidity (%) Average | 719 | 74.4 | 19 | - | 32 | 48 | 58 | 74 | 93 | 99 | 100 |
| Wind Speed 10 m (km/h) Average | 719 | 14.5 | 6 | - | 1 | 7 | 10 | 14 | 18 | 23 | 36 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS 19)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------|-------------------|-------------------|------------------|----------------------------------------|
| ALL PARAMETERS | 09 Sep 2016 08:00 | 09 Sep 2016 08:00 | 1 | Maintenance - reset comms |
| H2S | 15 Sep 2016 14:00 | 15 Sep 2016 14:00 | 1 | Maintenance - manifold cleaning |
| THC | 15 Sep 2016 17:00 | 20 Sep 2016 10:00 | 114 | Analyzer Failure - component failure |
| THC | 20 Sep 2016 18:00 | 21 Sep 2016 12:00 | 19 | Analyzer Failure - component failure |
| THC | 21 Sep 2016 13:00 | 21 Sep 2016 14:00 | 2 | Maintenance - repair and recalibration |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Firebag - September 2016

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 16 ppb on Sep 28 10:00 | Maximum Daily Average: 3.8 ppb on Sep 17 | | Hours of Data: | 677 |
| Minimum Value: 0 ppb on Sep 1 01:00 | Minimum Daily Average: 0.1 ppb on Sep 11 | | Hours of Missing Data: | 43 |
| Maximum Diurnal Average: 2.4 ppb at hour 11 | Minimum Diurnal Average: 0.3 ppb at hour 23 | | Hours of Calibration: | 42 |
| Monthly Average: 0.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 11 | | 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 | 2 | 1 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.5 | 2 |
| 2-Sep | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | 0.2 | 0 |
| 4-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 | 0.2 | 1 |
| 5-Sep | 1 | 1 | 3 | Z | 5 | 7 | 3 | 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1.6 | 8 |
| 6-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 | 0.3 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0.3 | 1 |
| 8-Sep | Z | 0 | 0 | 2 | 3 | 11 | 5 | 6 | 6 | 8 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 11 |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 5 | 2 | 0 | 0 | 1 | 0.7 | 5 |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 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 | 0.1 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 4 | 5 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 3 | 4 | 5 | 4 | 4 | 3 | 1 | 0 | 2 | 1 | 4 | 5 | 2 | 0 | 0 | 1.8 | 5 |
| 14-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 |
| 16-Sep | 0 | 0 | Z | 0 | 0 | 0 | 3 | 6 | 12 | 9 | 9 | 6 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2.6 | 12 |
| 17-Sep | 11 | 7 | 2 | Z | 0 | 0 | 0 | 0 | 2 | 8 | 13 | 8 | 12 | 4 | 4 | 7 | 4 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 3.8 | 13 |
| 18-Sep | 0 | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 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 | 0.2 | 0 |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 4 | 10 | 6 | 0 | 0 | 4 | 4 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 2.0 | 11 |
| 22-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 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 | 0 | 2 | 6 | 8 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 8 |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 26-Sep | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.4 | 1 |
| 27-Sep | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0.7 | 4 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 2 | 3 | 11 | 10 | 16 | 11 | 6 | 5 | 6 | 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3.6 | 16 |
| 29-Sep | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 0.9 | 2 |
| 30-Sep | 1 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |

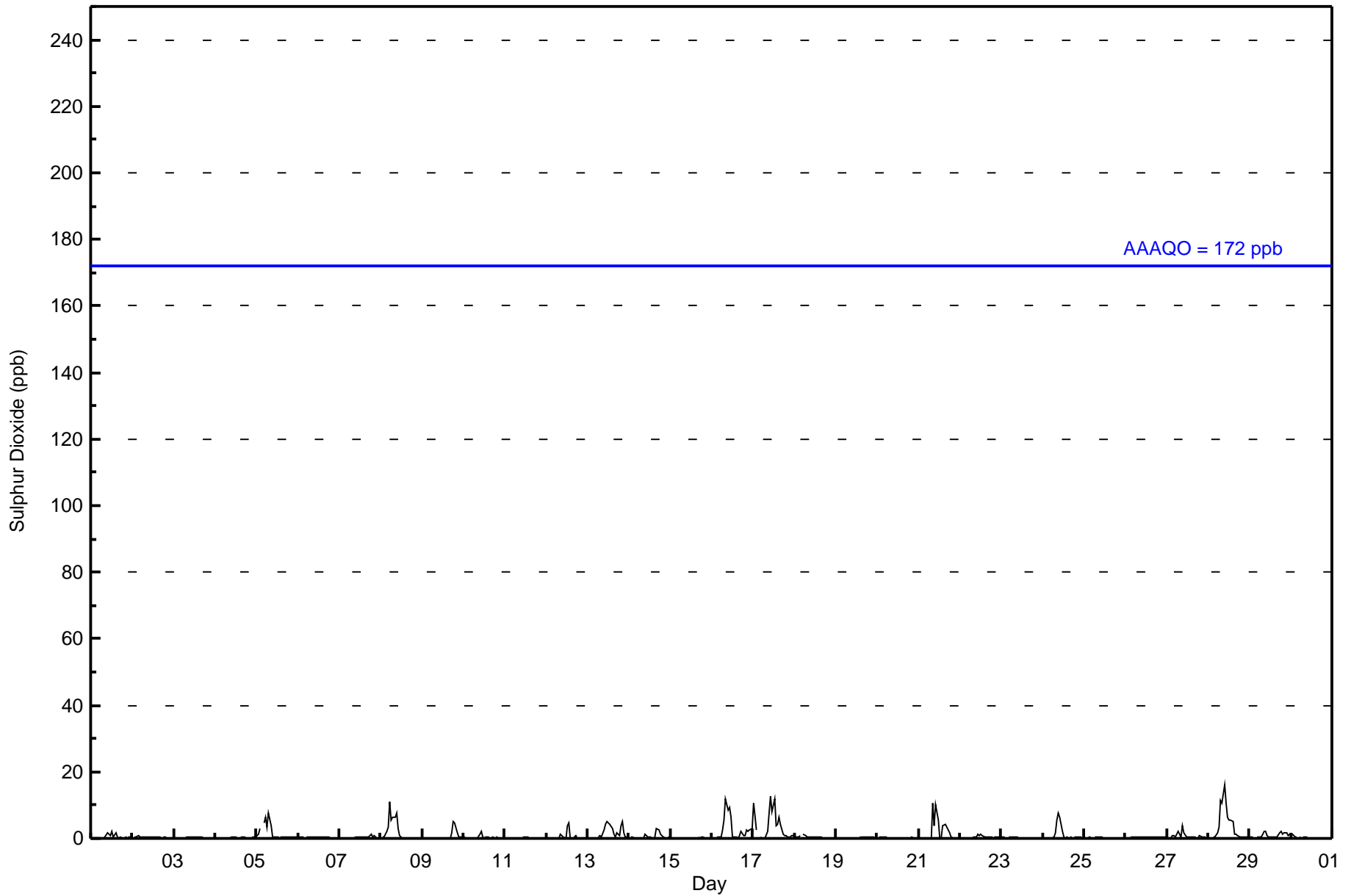
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.7 | 0.5 | 0.4 | 0.4 | 0.5 | 1.0 | 0.7 | 1.3 | 2.0 | 2.3 | 2.4 | 1.5 | 1.2 | 0.9 | 0.8 | 0.7 | 0.6 | 0.7 | 0.6 | 0.6 | 0.6 | 0.4 | 0.3 | 0.4 | Diurnal Average | | |
| 11 | 7 | 3 | 2 | 5 | 11 | 5 | 11 | 12 | 16 | 13 | 8 | 12 | 6 | 5 | 7 | 4 | 3 | 5 | 5 | 5 | 5 | 2 | 2 | 3 | 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 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 668 | 98.67 | 98.67 |
| 11 - 20 | 9 | 1.33 | 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: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Firebag - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 66 | 77 | 79 | 75 | 70 | 52 | 47 | 33 | 66 | 668 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 1 | 0 | 0 | 0 | 0 | 9 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 66 | 77 | 80 | 82 | 71 | 52 | 47 | 33 | 66 | 677 |

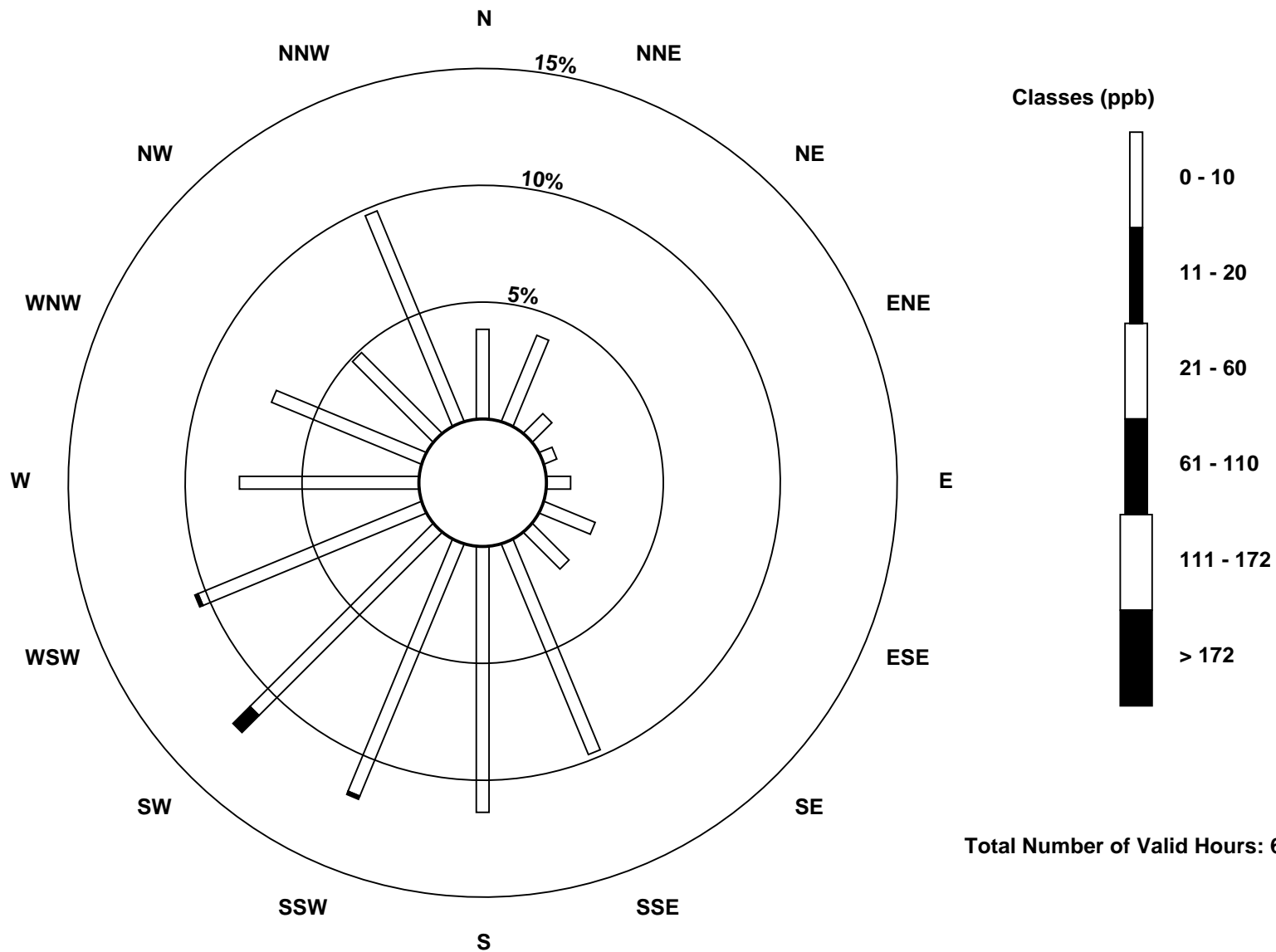
Total Number of Valid Hours: 677

Total Number of Hours: 720

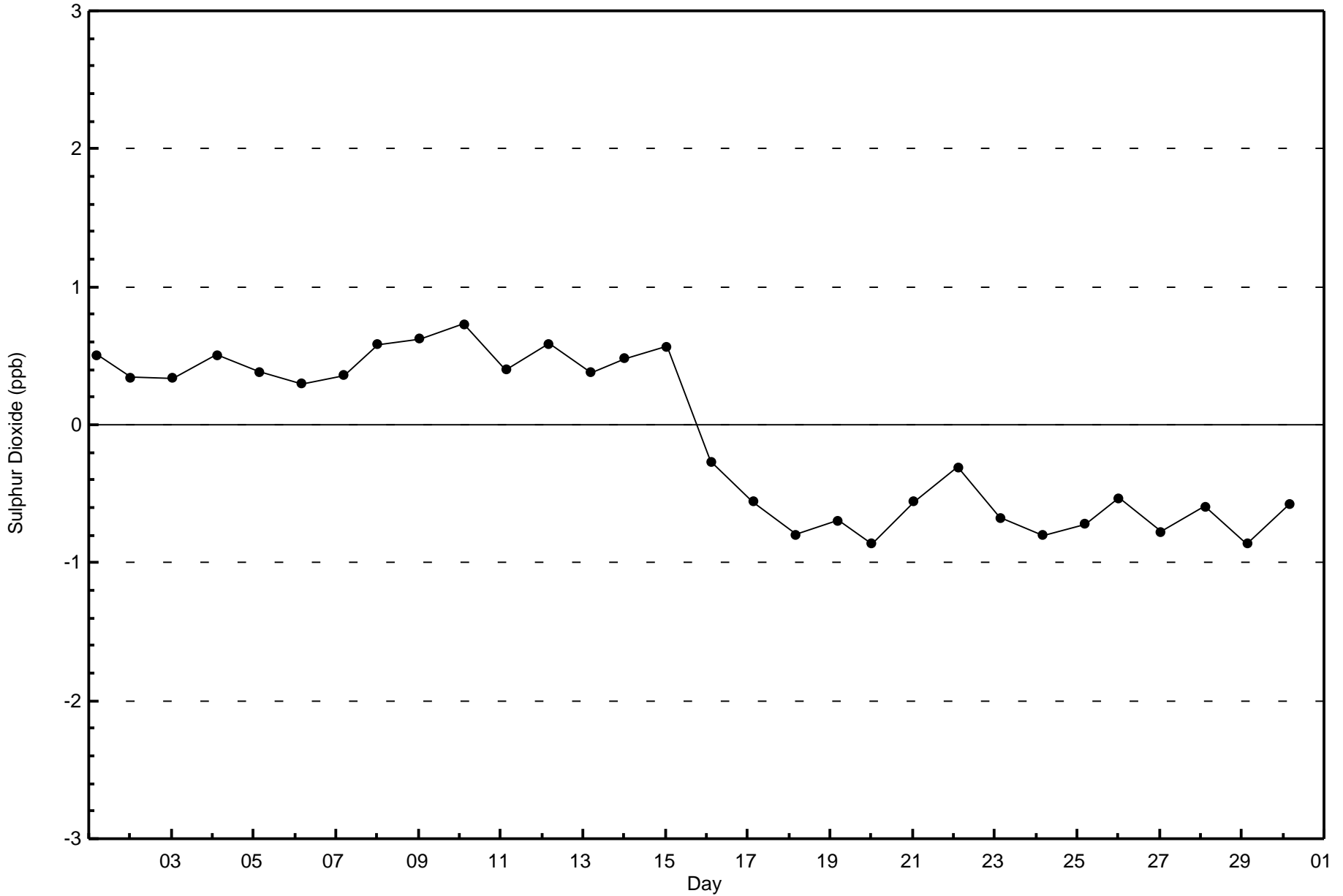


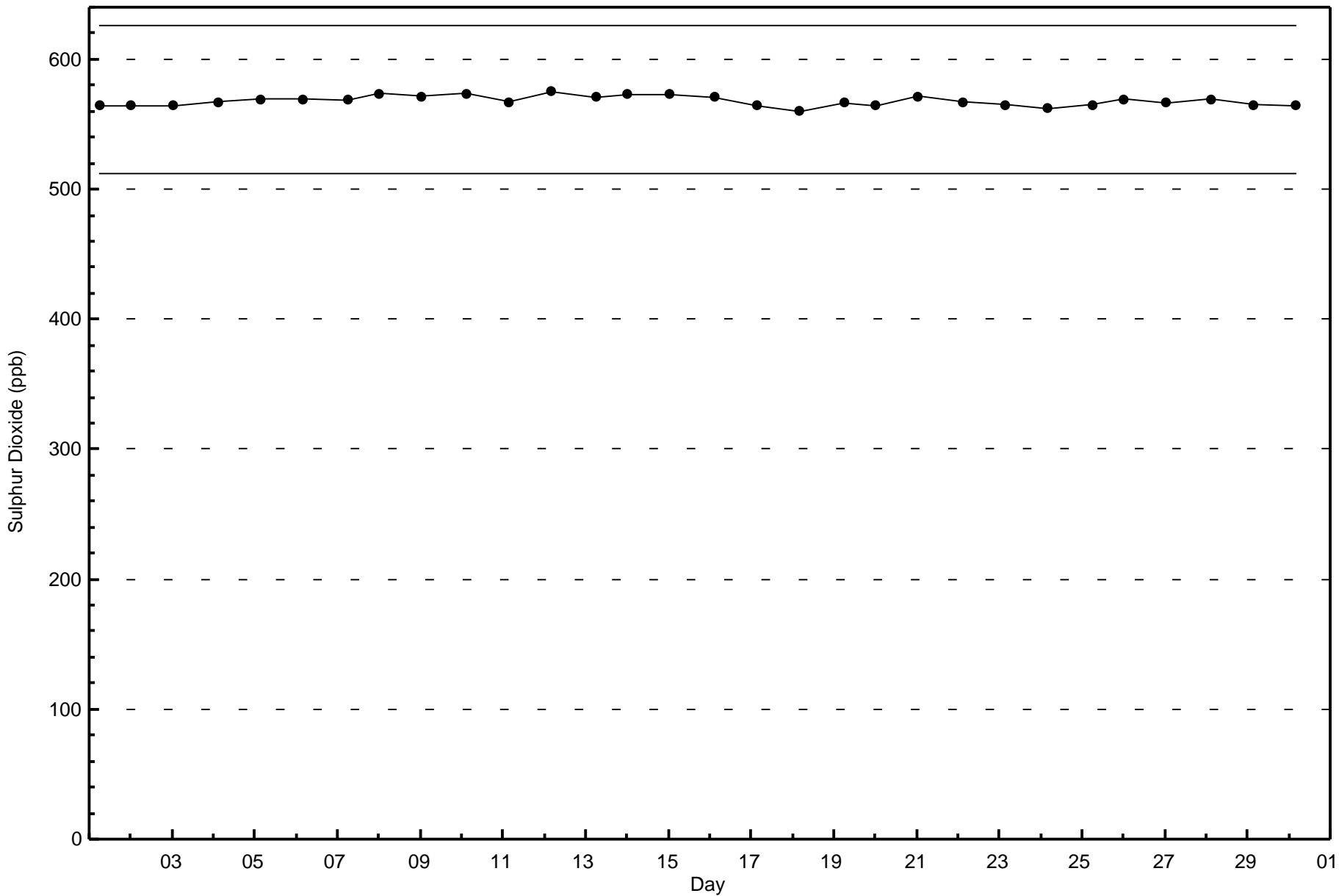
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
Firebag (AMS 19)



Total Number of Valid Hours: 677







| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 30 04:00 | Maximum Daily Average: 0.4 ppb on Sep 8 | | Hours of Data: | 679 |
| Minimum Value: 0 ppb on Sep 29 13:00 | Minimum Daily Average: 0.1 ppb on Sep 29 | | Hours of Missing Data: | 41 |
| Maximum Diurnal Average: 0.3 ppb at hour 5 | Minimum Diurnal Average: 0.1 ppb at hour 16 | | Hours of Calibration: | 39 |
| 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 | 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 | Z | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 4-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 |
| 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 | 0.2 | 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 | 0.1 | 0 |
| 7-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 |
| 8-Sep | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 9-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 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 | 0.2 | 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 | 0.2 | 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 | 0 | 0 | 0 | 0.2 | 0 |
| 13-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 | 0.2 | 0 |
| 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 | 0.2 | 0 |
| 15-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 0.3 | 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 | 0.2 | 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 | 0 | 0 | 0 | 0.2 | 0 |
| 19-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 | 0.3 | 0 |
| 20-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 |
| 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 | 0.2 | 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 | 0.2 | 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 | 0.3 | 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 | 0.2 | 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 | 0.2 | 1 |
| 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 | 0.2 | 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 | 0.2 | 0 |
| 28-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 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 | 0.1 | 0 |
| 30-Sep | 0 | 0 | 0 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |

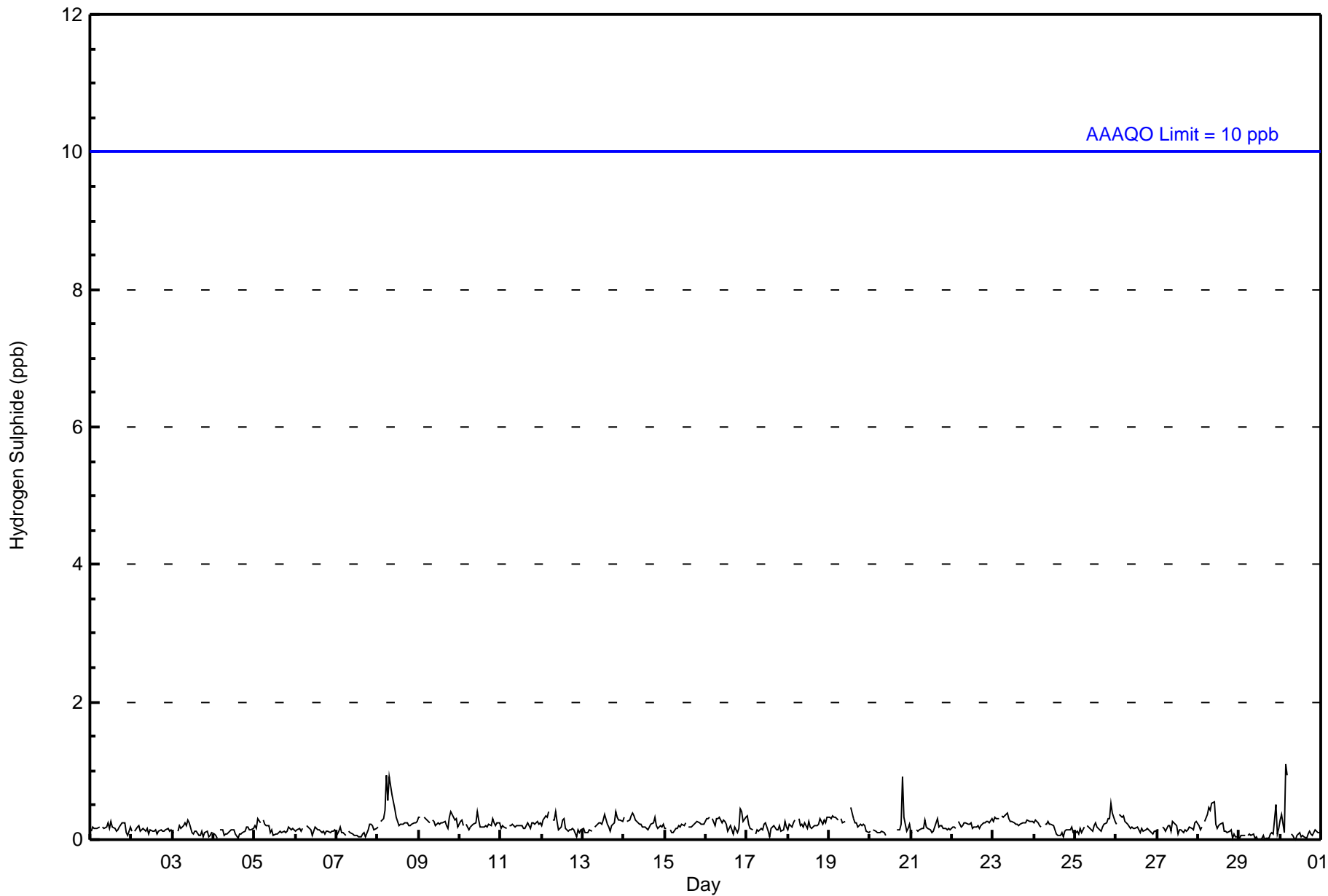
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Firebag - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - September 2016**

| 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**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 26 | 27 | 7 | 5 | 7 | 15 | 16 | 70 | 79 | 79 | 81 | 71 | 53 | 46 | 32 | 65 | 679 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 27 | 7 | 5 | 7 | 15 | 16 | 70 | 79 | 79 | 81 | 71 | 53 | 46 | 32 | 65 | 679 |

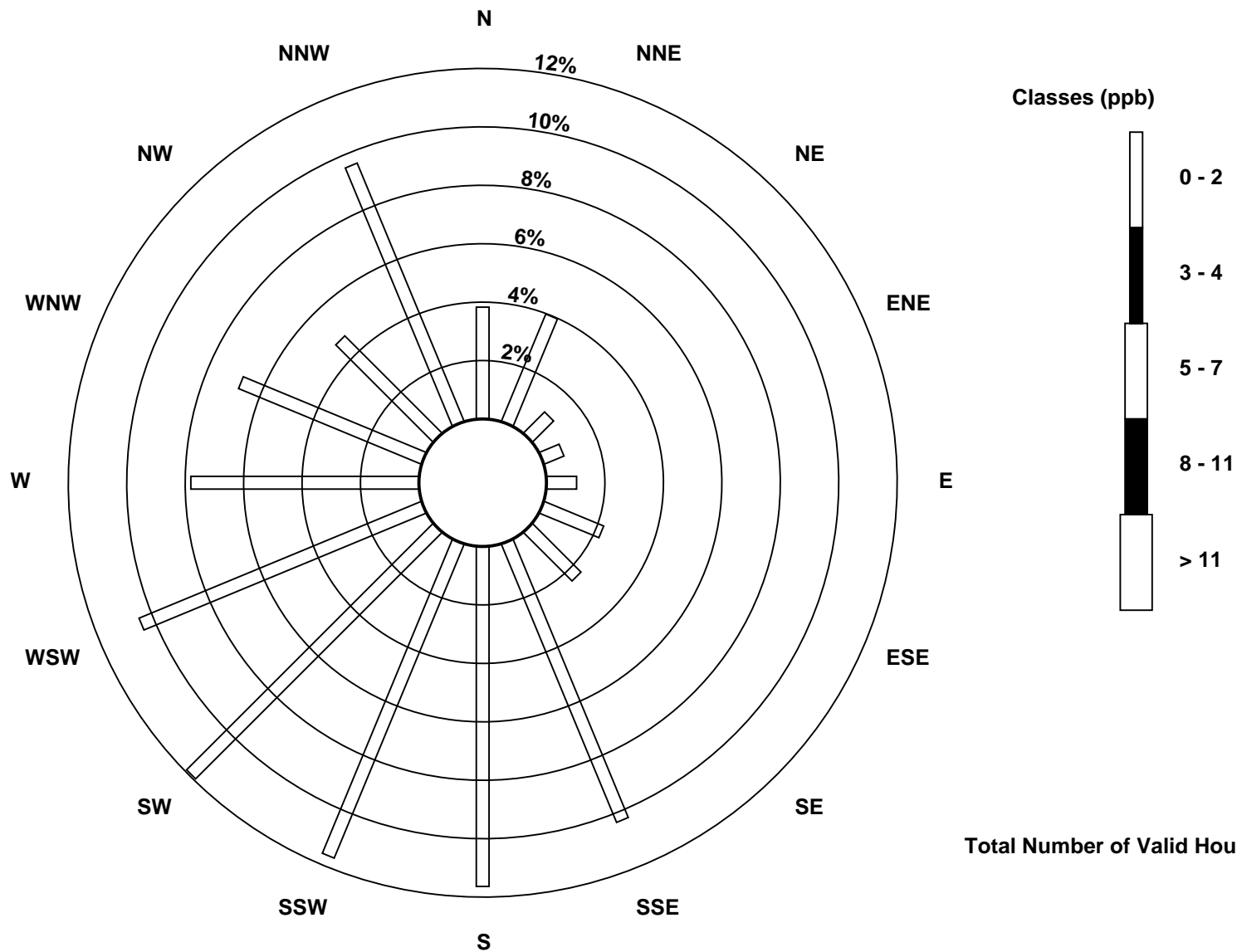
Total Number of Valid Hours: 679

Total Number of Hours: 720

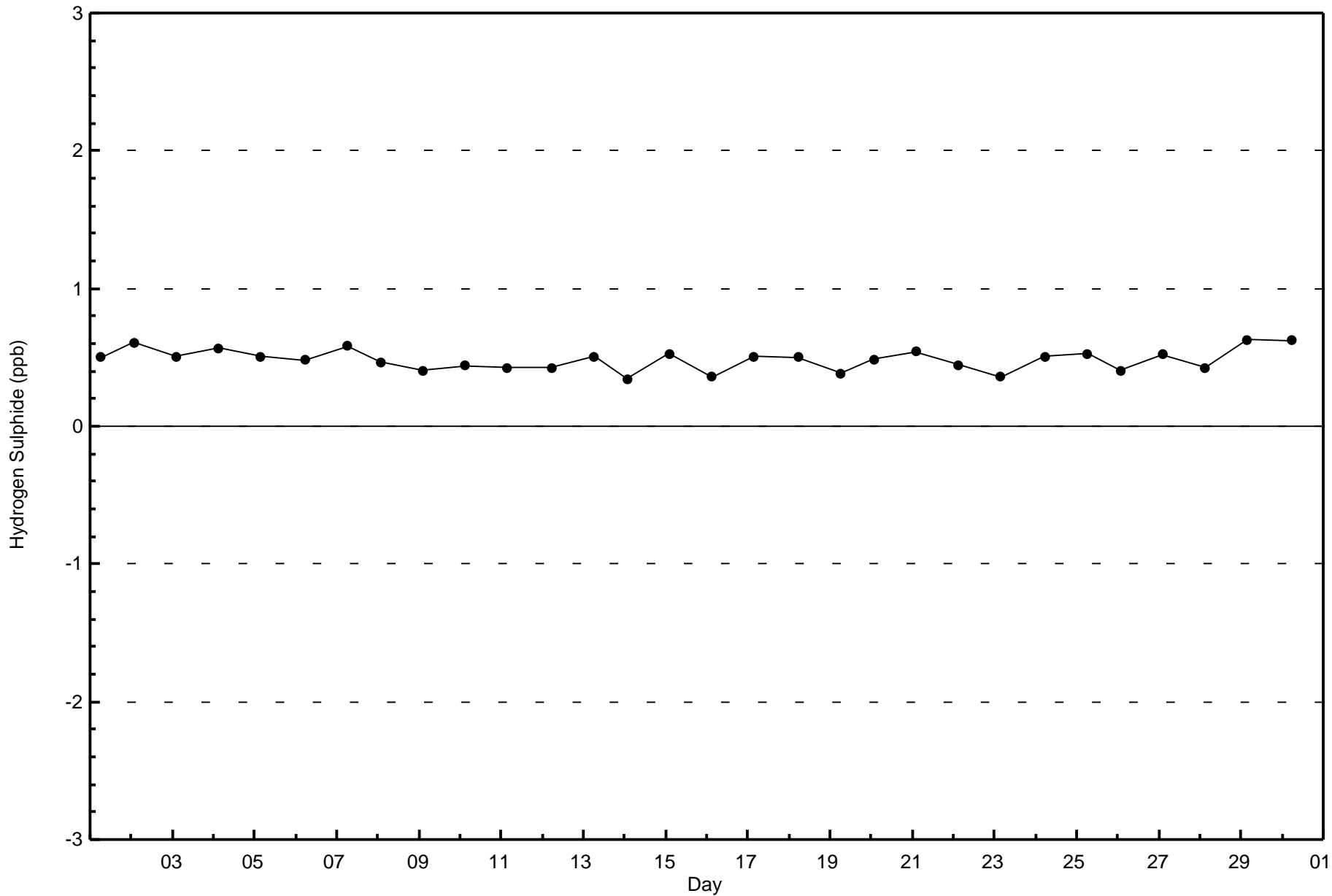


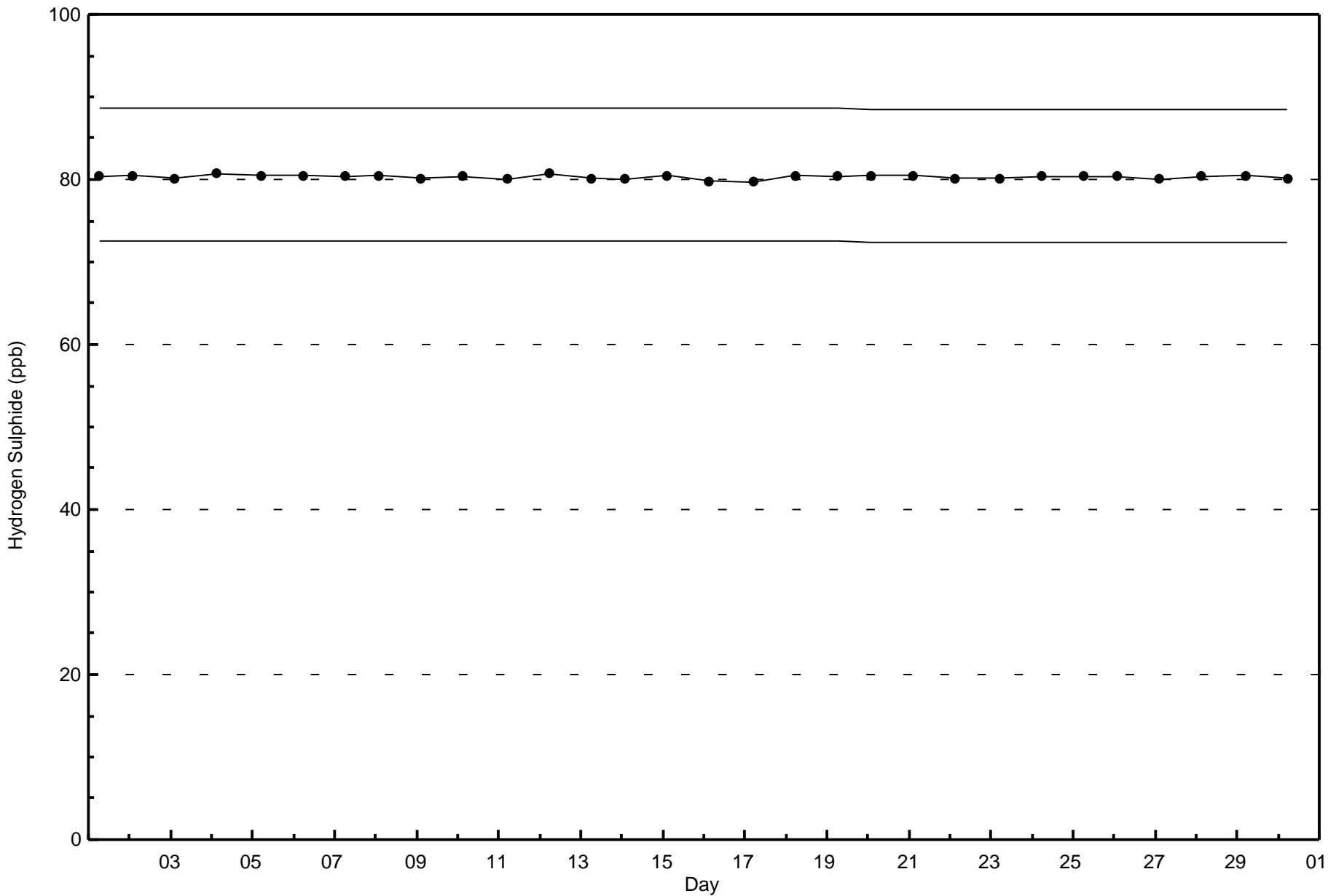
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Hydrogen Sulphide (H₂S) - ppb
Firebag (AMS 19)



Total Number of Valid Hours: 679







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

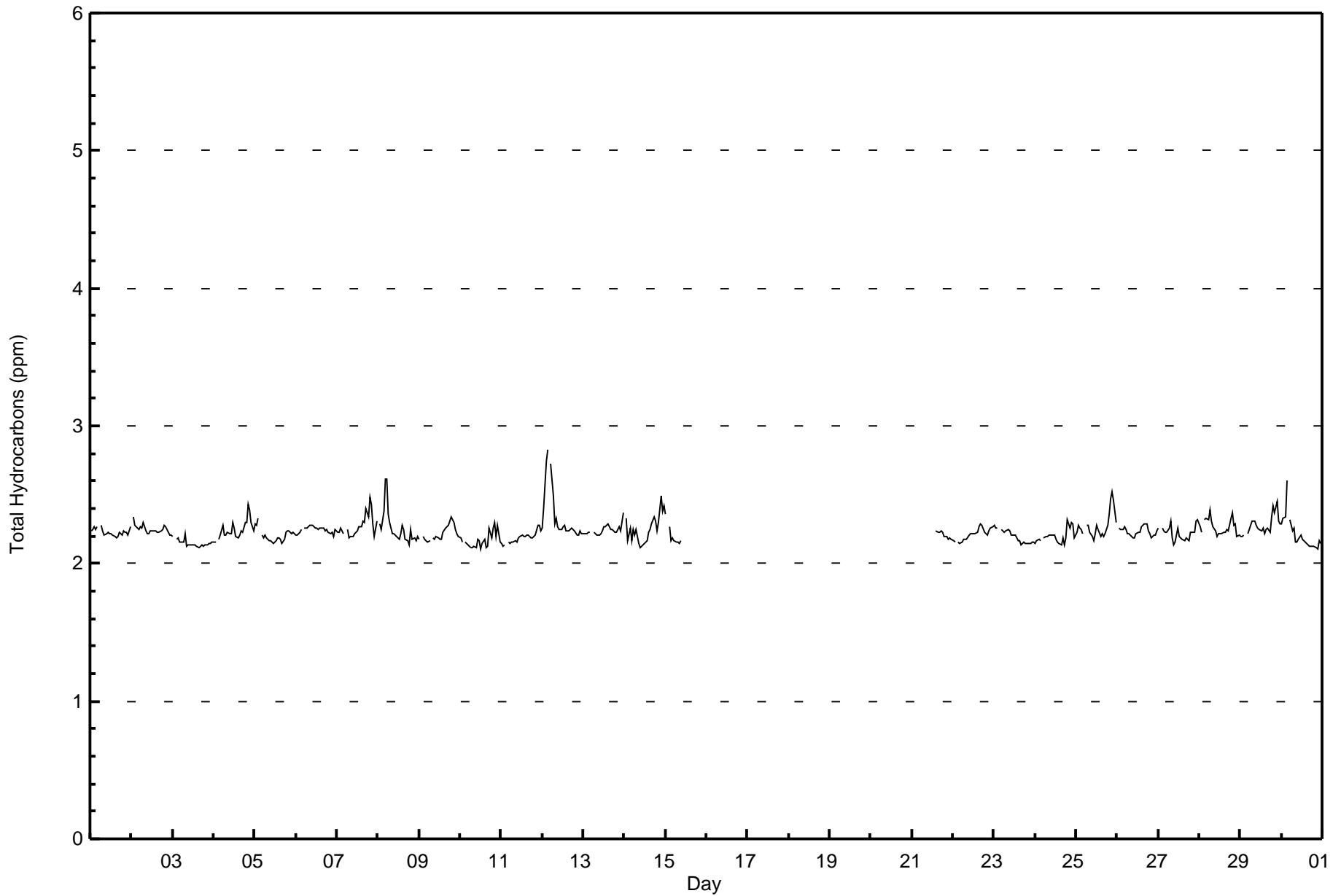
Firebag - September 2016

| Maximum Value: 2.8 ppm on Sep 12 04:00 | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.3 ppm on Sep 12 | | | | | | Hours in Service: 720 | |
|-----------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----------------|--------------------------------|---------------|
| Minimum Value: 2.1 ppm on Sep 10 13:00 | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 2.1 ppm on Sep 3 | | | | | | Hours of Data: 547 | |
| Maximum Diurnal Average: 2.3 ppm at hour 4 | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 2.2 ppm at hour 10 | | | | | | Hours of Missing Data: 173 | |
| Monthly Average: 2.23 ppm | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 2.1 P ₁₀ = 2.2 Q ₁ = 2.2 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.3 P ₉₉ = 2.6 | | | | | | Hours of Calibration: 37 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 81.1 | |
| 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 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 |
| 2-Sep | Z | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 |
| 3-Sep | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | |
| 4-Sep | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.4 | 2.4 | 2.3 | 2.2 | 2.4 | |
| 5-Sep | 2.3 | 2.3 | 2.3 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | |
| 6-Sep | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | |
| 7-Sep | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.5 | 2.4 | 2.3 | 2.2 | 2.3 | 2.5 | |
| 8-Sep | Z | 2.3 | 2.2 | 2.4 | 2.6 | 2.6 | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.6 | |
| 9-Sep | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | M | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | | |
| 10-Sep | 2.2 | 2.2 | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.3 | 2.2 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | | |
| 11-Sep | 2.1 | 2.1 | 2.1 | Z | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | | |
| 12-Sep | 2.3 | 2.4 | 2.7 | 2.8 | Z | 2.7 | 2.5 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.8 | | |
| 13-Sep | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.4 | | |
| 14-Sep | Z | 2.3 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.5 | 2.2 | 2.5 | | |
| 15-Sep | 2.4 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | C | C | C | C | C | C | AF | AF | AF | AF | AF | AF | -- | 2.4 | | |
| 16-Sep | 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 | -- | -- | | |
| 18-Sep | 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 | -- | -- | | |
| 20-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | C | C | C | C | C | C | C | AF | AF | AF | AF | AF | -- | -- | | |
| 21-Sep | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | M | M | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | -- | 2.2 | | |
| 22-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 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | | |
| 23-Sep | 2.3 | 2.3 | 2.3 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.3 | | |
| 24-Sep | 2.1 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.3 | | |
| 25-Sep | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | Z | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 | 2.5 | 2.5 | 2.3 | 2.5 | | |
| 26-Sep | Z | 2.3 | 2.2 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | | |
| 27-Sep | 2.3 | Z | 2.3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | | |
| 28-Sep | 2.3 | 2.2 | Z | 2.3 | 2.3 | 2.3 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 | 2.3 | 2.2 | 2.3 | 2.4 | | |
| 29-Sep | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.4 | | |
| 30-Sep | 2.3 | 2.3 | 2.3 | 2.6 | Z | 2.3 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.6 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance AF - Analyzer Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Firebag - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 0 | 0.00 | 0.00 |
| 2.1 - 3.0 | 547 | 100.00 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 547

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.1 - 3.0 | 17 | 27 | 6 | 4 | 6 | 15 | 13 | 57 | 73 | 62 | 53 | 56 | 51 | 41 | 19 | 47 | 547 |
| 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 | 17 | 27 | 6 | 4 | 6 | 15 | 13 | 57 | 73 | 62 | 53 | 56 | 51 | 41 | 19 | 47 | 547 |

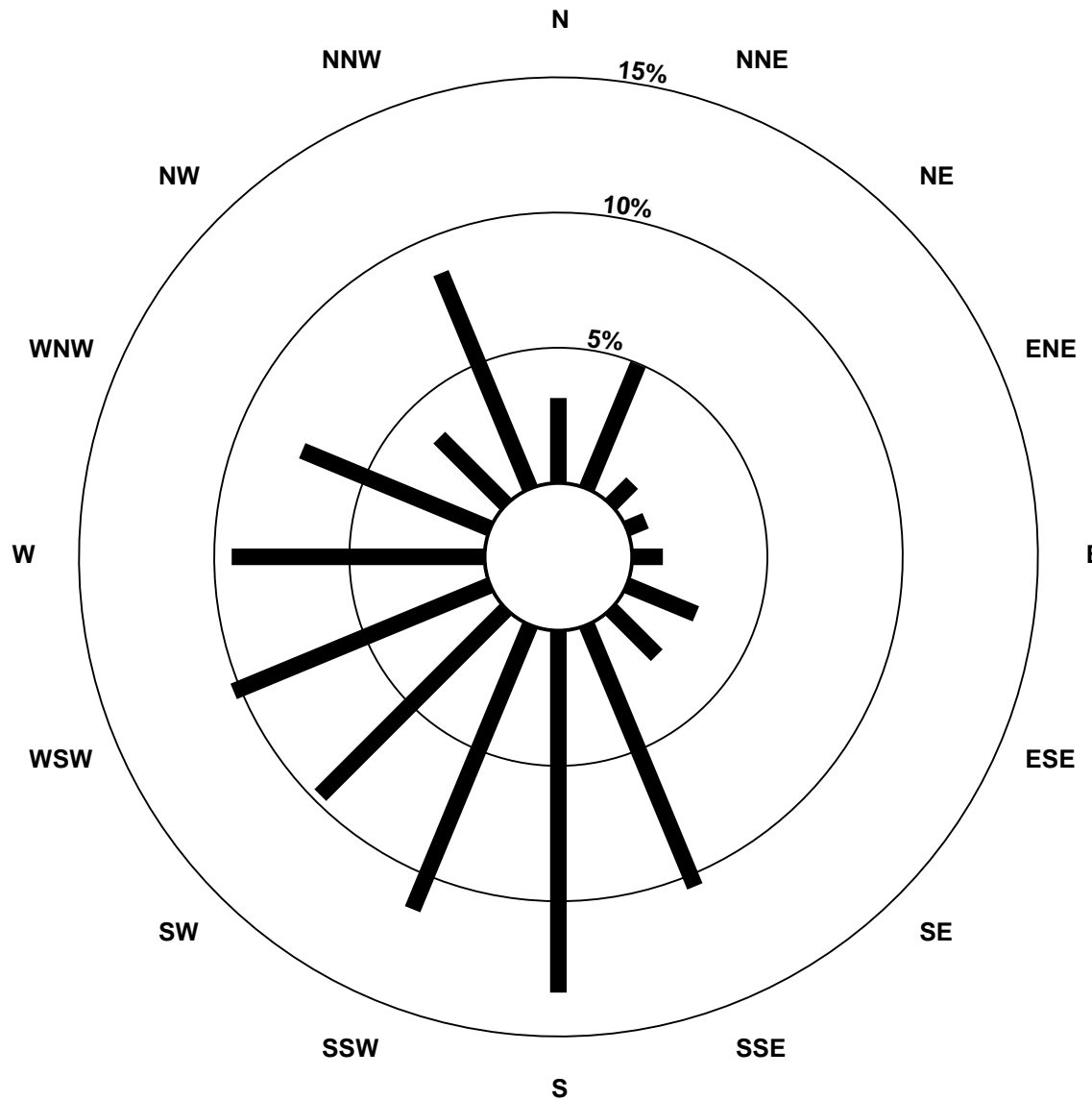
Total Number of Valid Hours: 547

Total Number of Hours: 720

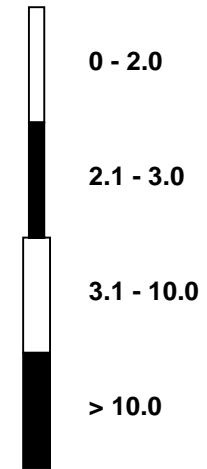


Wood Buffalo Environmental Association
Wind Rose Sep 2016

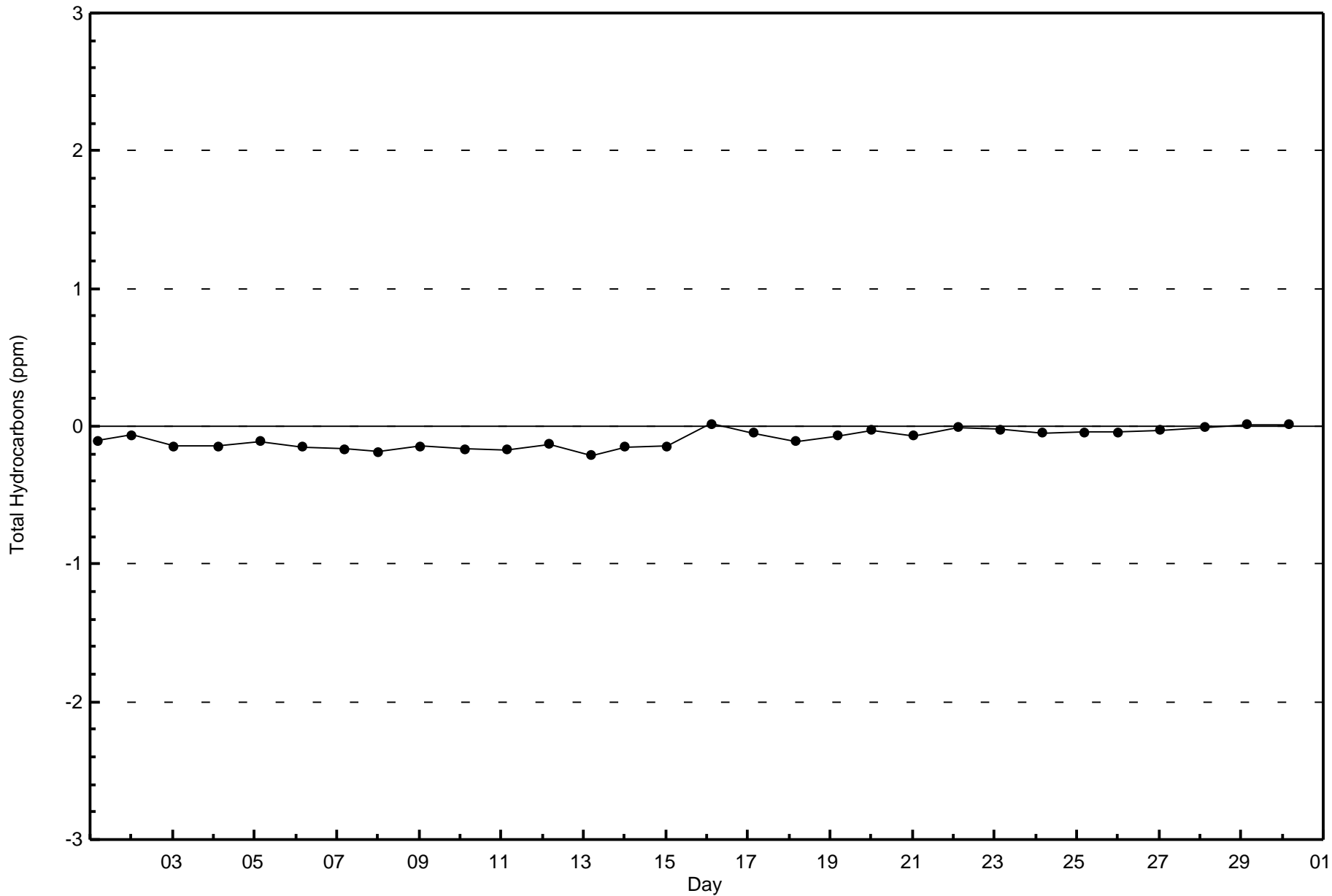
Total Hydrocarbons (THC) - ppm
Firebag (AMS 19)

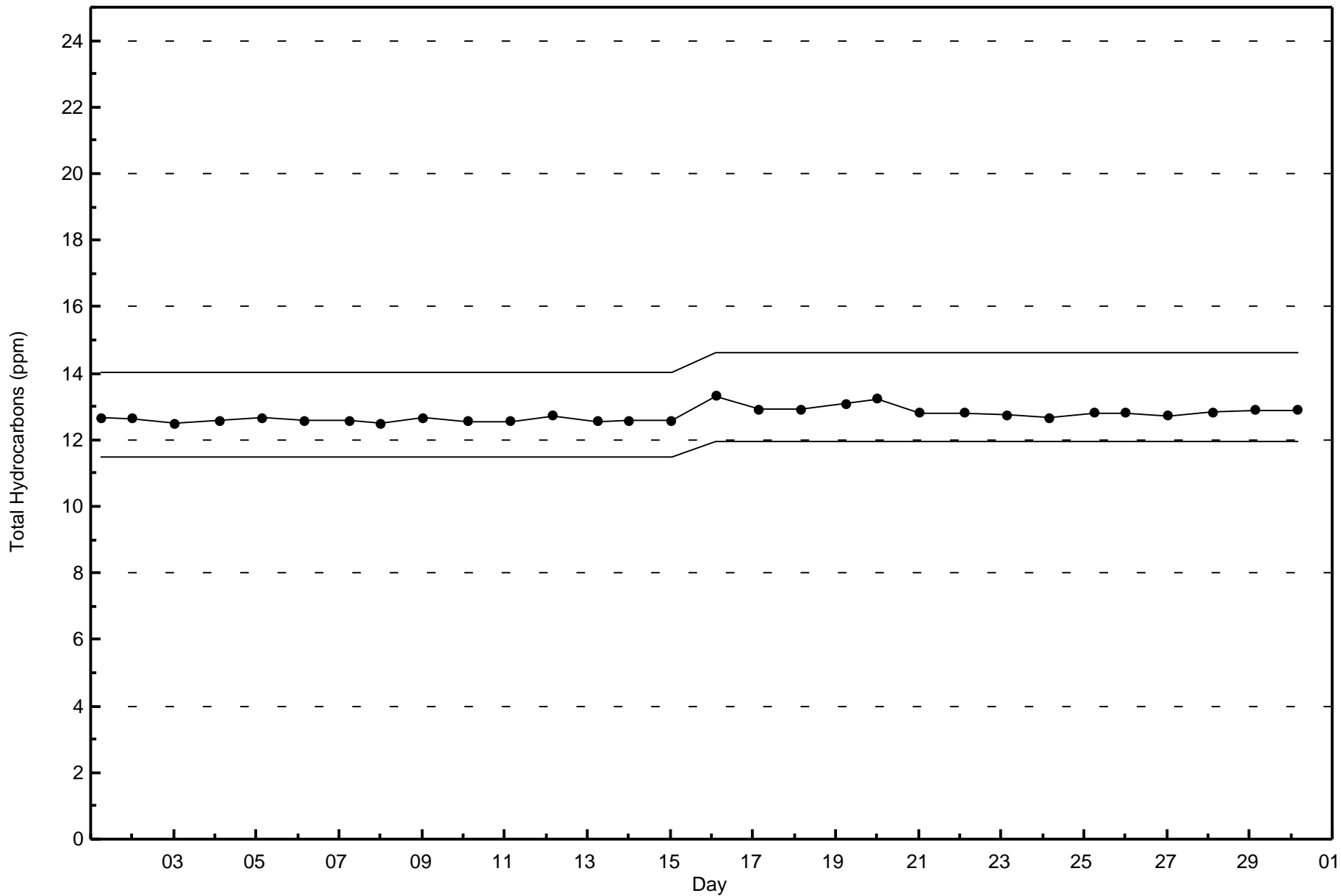


Classes (ppm)



Total Number of Valid Hours: 547







Wood Buffalo Environmental Association
Summary of Hour Averages

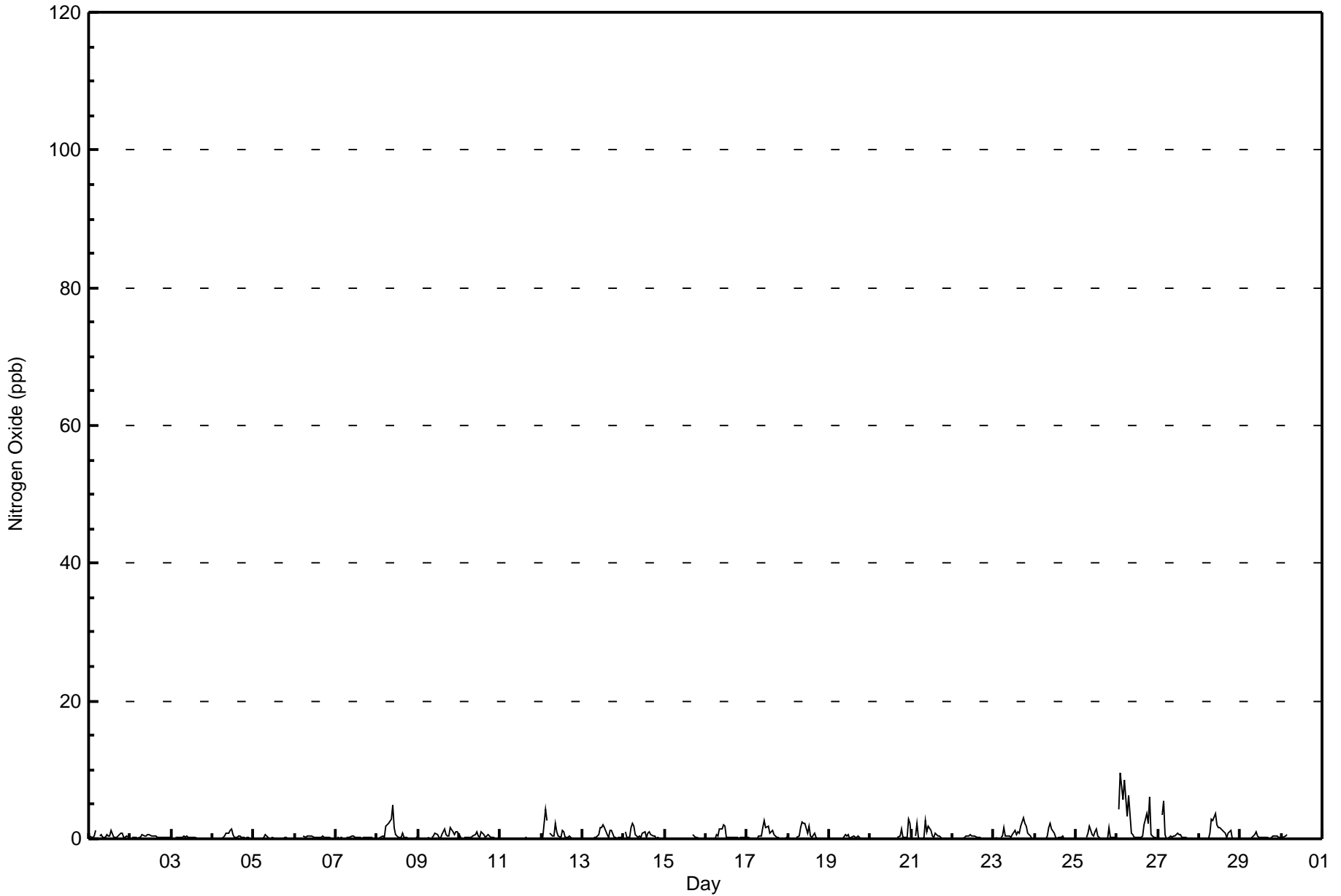
Nitrogen Oxide (NO) - ppb
Firebag - September 2016

| Maximum Value: 10 ppb on Sep 26 03:00 | | Maximum Daily Average: 2.7 ppb on Sep 26 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------------------------------------------------------------------------------------------------|---------------|-----------------|---|
| Minimum Value: 0 ppb on Sep 30 20:00 | | Minimum Daily Average: 0.1 ppb on Sep 11 | | Hours of Data: 677 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 0.9 ppb at hour 10 | | Minimum Diurnal Average: 0.1 ppb at hour 1 | | Hours of Missing Data: 43 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 0.5 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 1 P ₉₉ = 5 | | Hours of Calibration: 42 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 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 | 1 | Z | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 2-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 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 | 0.1 | 1 | |
| 6-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 | |
| 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 | 0.2 | 0 | |
| 8-Sep | Z | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 3 | 5 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 5 | |
| 9-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0.5 | 2 | |
| 10-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 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 | 0.1 | 0 | |
| 12-Sep | 0 | 0 | 4 | 3 | Z | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 | |
| 13-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 14-Sep | Z | 1 | 0 | 0 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | C | 1 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 | |
| 16-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 17-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 | |
| 18-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 19-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | C | 0 | 0 | 2 | 0 | 0 | 0 | 3 | 2 | -- | 3 |
| 21-Sep | 0 | Z | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 | |
| 22-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 | 0.2 | 1 | |
| 23-Sep | 0 | 0 | 0 | Z | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0.8 | 3 | |
| 24-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 25-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0.4 | 2 | |
| 26-Sep | Z | 4 | 10 | 6 | 9 | 6 | 3 | 6 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 2 | 6 | 1 | 0 | 0 | 0 | 2.7 | 10 | |
| 27-Sep | 0 | Z | 3 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 | |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 3 | 4 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.9 | 4 | |
| 29-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 30-Sep | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.1 0.3 0.8 0.8 0.6 0.5 0.5 0.8 0.8 0.9 0.9 0.7 0.6 0.4 0.4 0.4 0.4 0.5 0.4 0.5 0.2 0.1 0.2 0.2 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0 4 10 6 9 6 3 6 3 5 3 2 2 2 1 1 2 4 2 6 1 1 3 2 | | | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | M - Maintenance | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Firebag - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 677 | 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: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Firebag - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 66 | 77 | 80 | 82 | 71 | 52 | 47 | 33 | 66 | 677 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 66 | 77 | 80 | 82 | 71 | 52 | 47 | 33 | 66 | 677 |

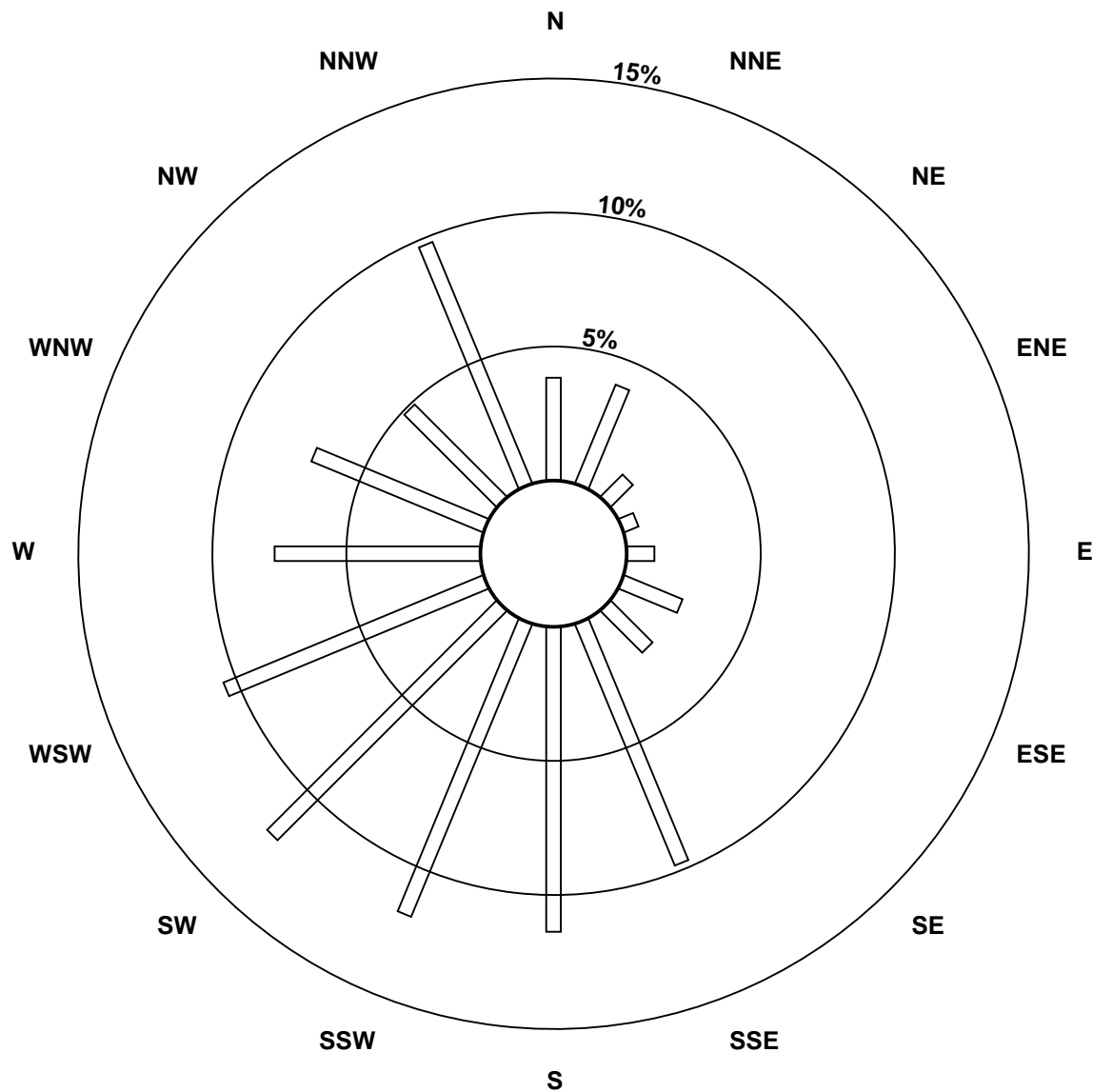
Total Number of Valid Hours: 677

Total Number of Hours: 720

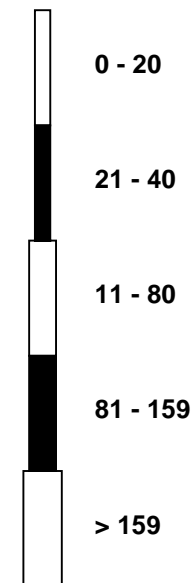


Wood Buffalo Environmental Association
Wind Rose Sep 2016

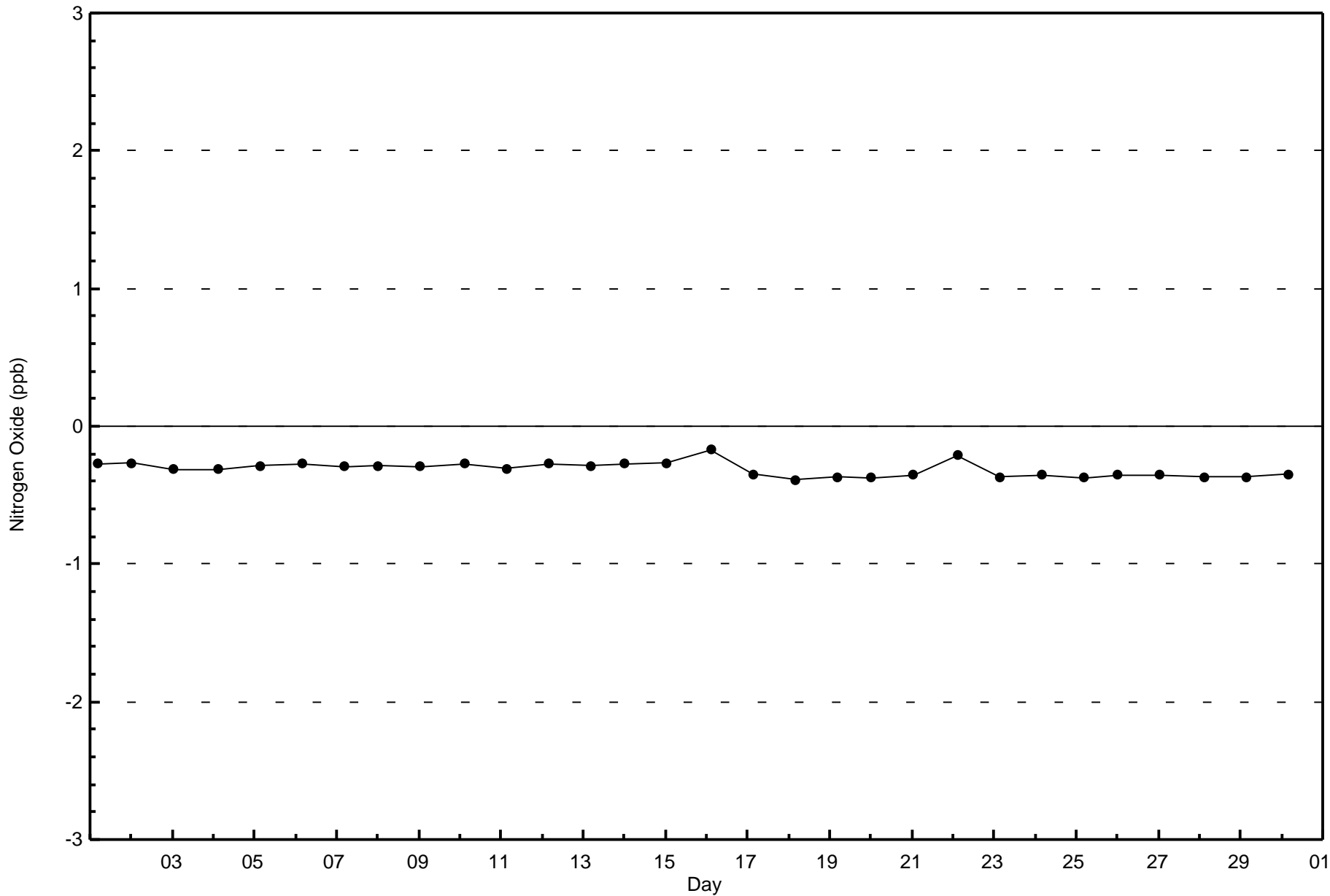
Nitrogen Oxide (NO) - ppb
Firebag (AMS 19)

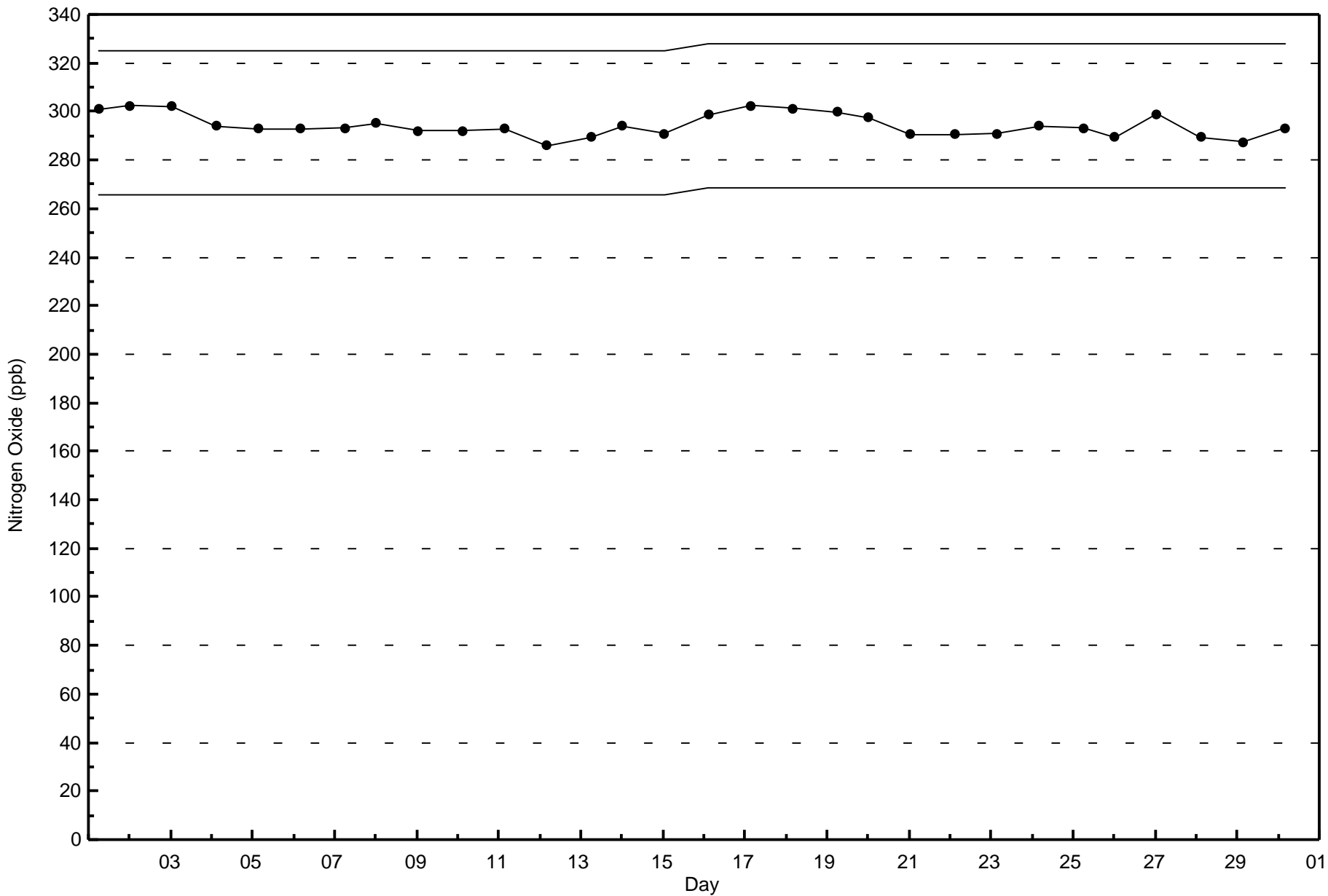


Classes (ppb)



Total Number of Valid Hours: 677







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Firebag - September 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 15 ppb on Sep 12 03:00 | Maximum Daily Average: 4.3 ppb on Sep 26 |
| Minimum Value: 0 ppb on Sep 9 06:00 | Hours of Data: 677 |
| Maximum Diurnal Average: 3.1 ppb at hour 3 | Hours of Missing Data: 43 |
| Monthly Average: 2.0 ppb | Hours of Calibration: 42 |
| Minimum Daily Average: 0.4 ppb on Sep 11 | Percent Operational Time: 99.9 |
| Minimum Diurnal Average: 1.0 ppb at hour 15 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 5 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 | 1 | 0 | 0 | 1 | 3 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0.8 | 3 |
| 2-Sep | Z | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 4 | 3 | 1 | 0 | 0 | 1.7 | 4 |
| 3-Sep | 0 | Z | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.6 | 2 |
| 4-Sep | 1 | 0 | Z | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 5 | 3 | 2 | 2 | 1.5 | 5 |
| 5-Sep | 4 | 4 | 7 | Z | 5 | 4 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1.6 | 7 |
| 6-Sep | 1 | 1 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 7-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 0.8 | 3 |
| 8-Sep | Z | 3 | 5 | 8 | 9 | 14 | 8 | 4 | 5 | 6 | 3 | 1 | 1 | 1 | 2 | 4 | 1 | 1 | 0 | 0 | 2 | 2 | 0 | 2 | 3.6 | 14 |
| 9-Sep | 1 | Z | 2 | 1 | 0 | 0 | 0 | M | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 2 | 5 | 8 | 5 | 3 | 3 | 3 | 1.8 | 8 |
| 10-Sep | 2 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 4 | 2 | 6 | 7 | 2 | 4 | 1 | 1.9 | 7 |
| 11-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 0.4 | 5 |
| 12-Sep | 0 | 8 | 15 | 15 | Z | 12 | 3 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 3.0 | 15 |
| 13-Sep | 1 | 0 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 3 | 4 | 1.6 | 4 |
| 14-Sep | Z | 11 | 4 | 2 | 2 | 5 | 4 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 6 | 7 | 4 | 3 | 2 | 3 | 9 | 3.0 | 11 |
| 15-Sep | 6 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | -- | 6 |
| 16-Sep | 0 | 0 | Z | 1 | 1 | 1 | 3 | 4 | 4 | 3 | 4 | 3 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 5 | 9 | 11 | 2.6 | 11 |
| 17-Sep | 11 | 9 | 4 | Z | 1 | 0 | 0 | 1 | 1 | 3 | 4 | 3 | 4 | 2 | 3 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 2.8 | 11 |
| 18-Sep | 3 | 3 | 3 | 4 | Z | 8 | 5 | 5 | 5 | 4 | 4 | 3 | 6 | 2 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2.8 | 8 |
| 19-Sep | 1 | 1 | 2 | 2 | 3 | Z | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 1 | 0 | 1 | 3 | 0 | 0 | 1.1 | 3 |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 1 | 2 | 2 | 1 | 1 | 4 | 5 | -- | 5 |
| 21-Sep | 0 | Z | 1 | 3 | 1 | 1 | 1 | 1 | 4 | 2 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 1 | 1 | 1 | 1.6 | 4 |
| 22-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 |
| 23-Sep | 1 | 1 | 2 | Z | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 4 | 3 | 3 | 1 | 1 | 0 | 1 | 1.7 | 4 |
| 24-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 3 | 4 | 3 | 2 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 5 | 4 | 7 | 5 | 1 | 2.0 | 7 |
| 25-Sep | 1 | 2 | 2 | 2 | 2 | Z | 5 | 4 | 4 | 1 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 10 | 5 | 3 | 4 | 2 | 2.3 | 10 |
| 26-Sep | Z | 7 | 12 | 8 | 11 | 9 | 5 | 8 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 8 | 6 | 10 | 1 | 1 | 1 | 1 | 4.3 | 12 |
| 27-Sep | 2 | Z | 7 | 11 | 2 | 2 | 4 | 5 | 2 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 4 | 6 | 6 | 3.1 | 11 |
| 28-Sep | 4 | 1 | Z | 2 | 2 | 4 | 12 | 10 | 6 | 6 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 11 | 3 | 2 | 1 | 1 | 1 | 3.7 | 12 |
| 29-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 6 | 11 | 7 | 8 | 5 | 6 | 2.9 | 11 |
| 30-Sep | 5 | 6 | 5 | 7 | Z | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.2 | 7 |

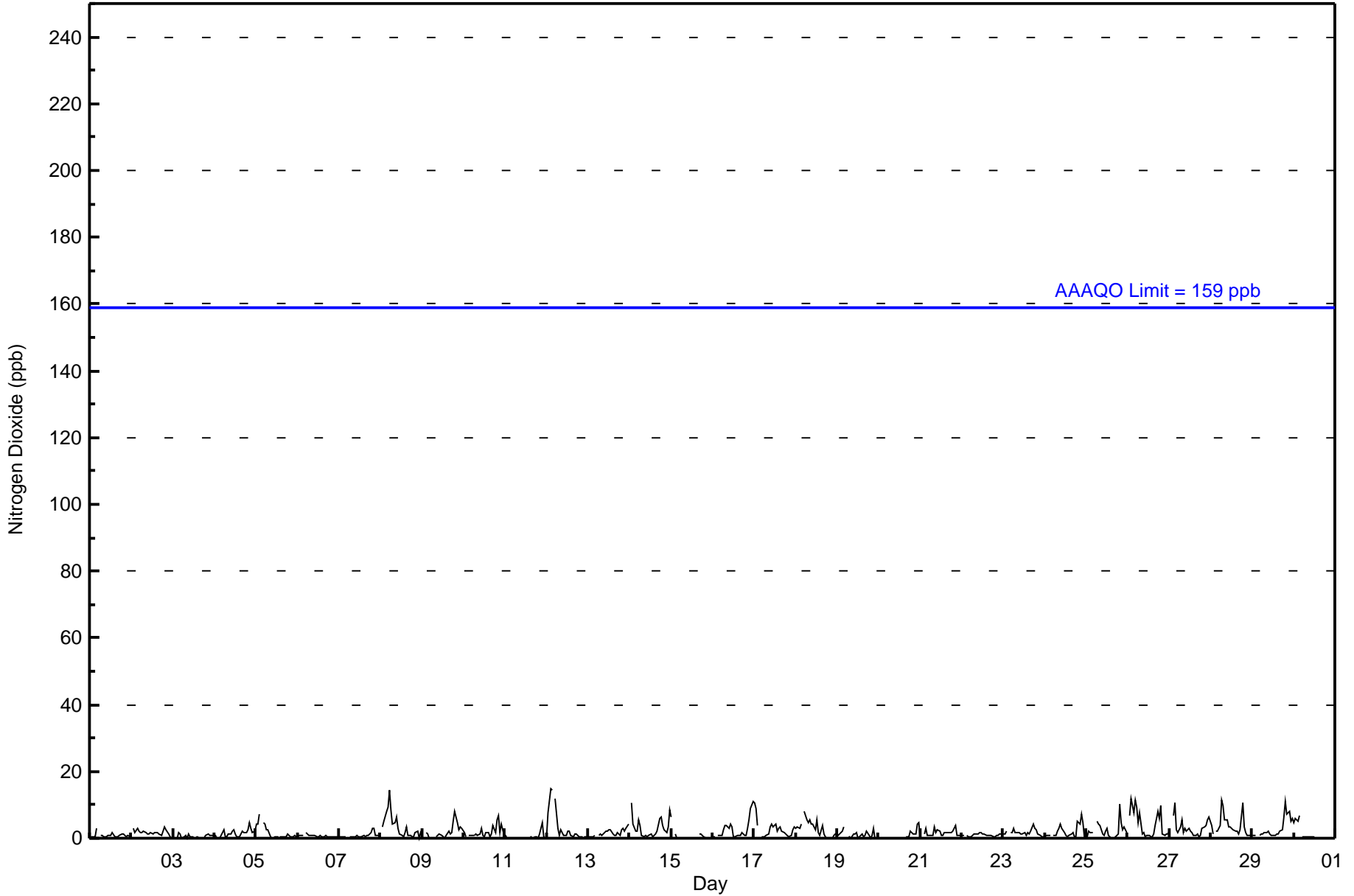
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.9 | 2.6 | 3.1 | 3.1 | 2.1 | 2.9 | 2.2 | 2.1 | 1.7 | 1.8 | 1.7 | 1.5 | 1.3 | 1.0 | 1.0 | 1.2 | 1.2 | 1.7 | 2.0 | 2.8 | 2.3 | 2.0 | 2.0 | 2.2 | Diurnal Average | |
| 11 | 11 | 15 | 15 | 11 | 14 | 12 | 10 | 6 | 6 | 4 | 3 | 6 | 3 | 3 | 4 | 4 | 8 | 11 | 11 | 7 | 8 | 9 | 11 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Firebag - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Firebag - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 677 | 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: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 66 | 77 | 80 | 82 | 71 | 52 | 47 | 33 | 66 | 677 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 66 | 77 | 80 | 82 | 71 | 52 | 47 | 33 | 66 | 677 |

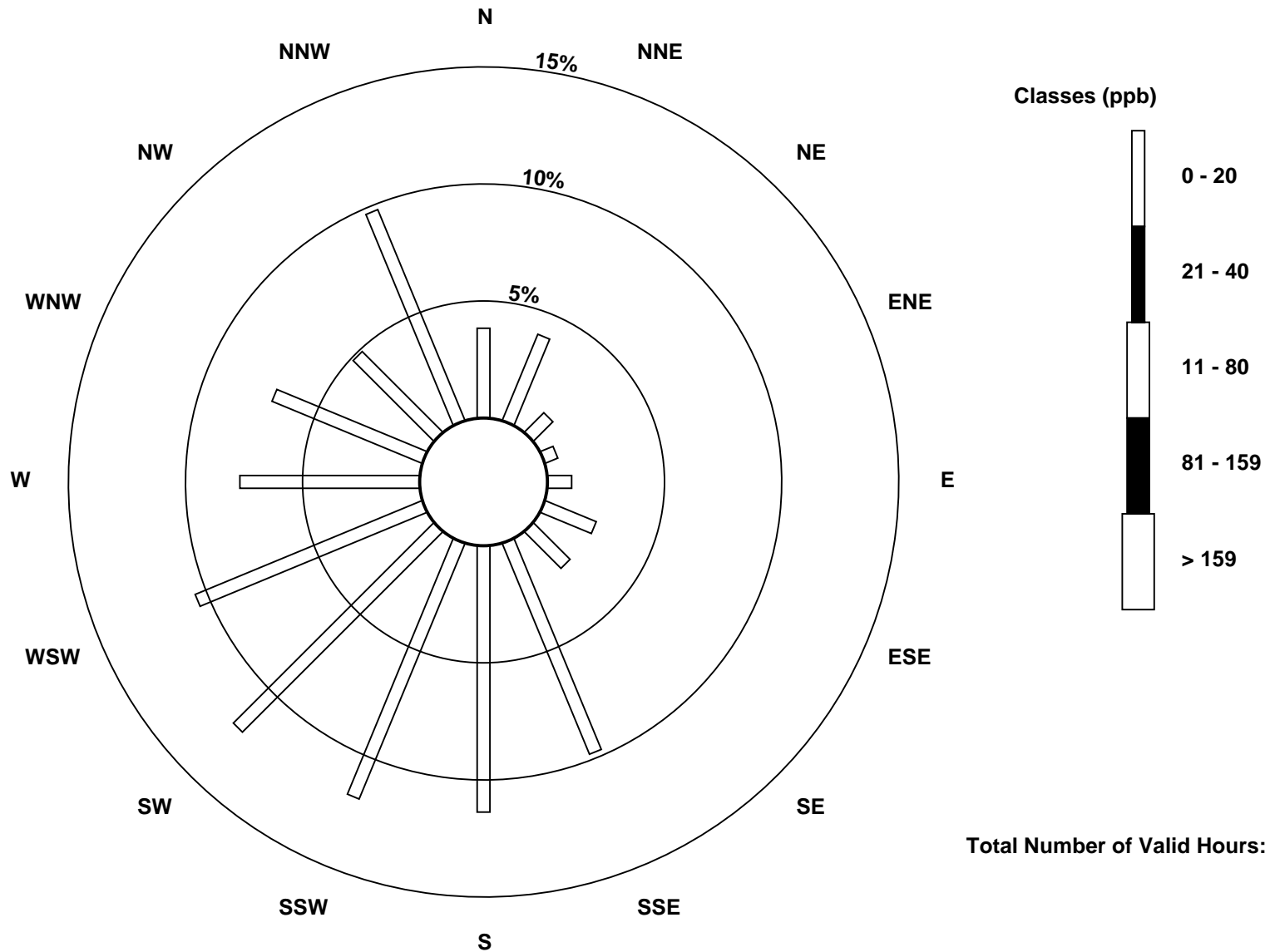
Total Number of Valid Hours: 677

Total Number of Hours: 720

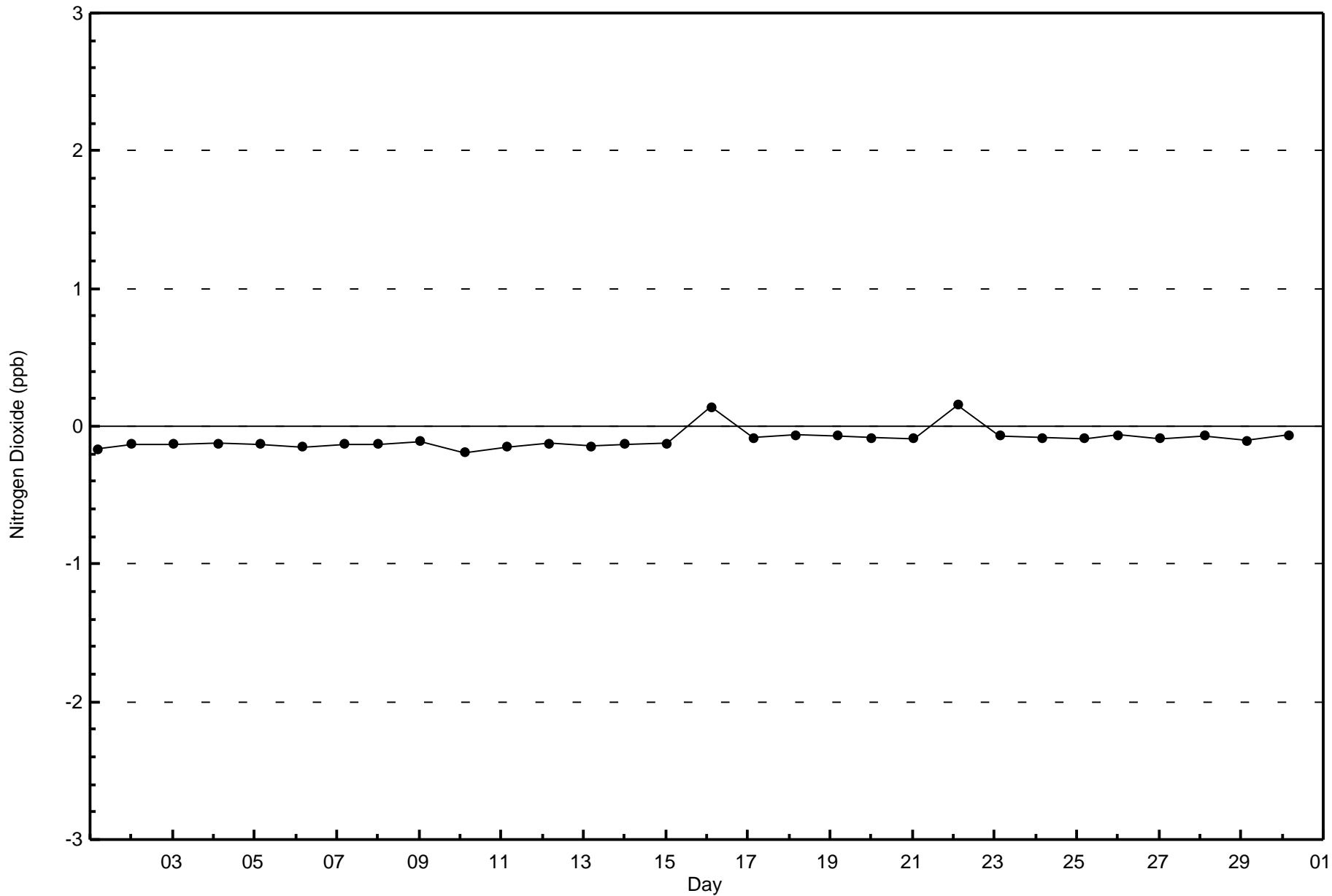


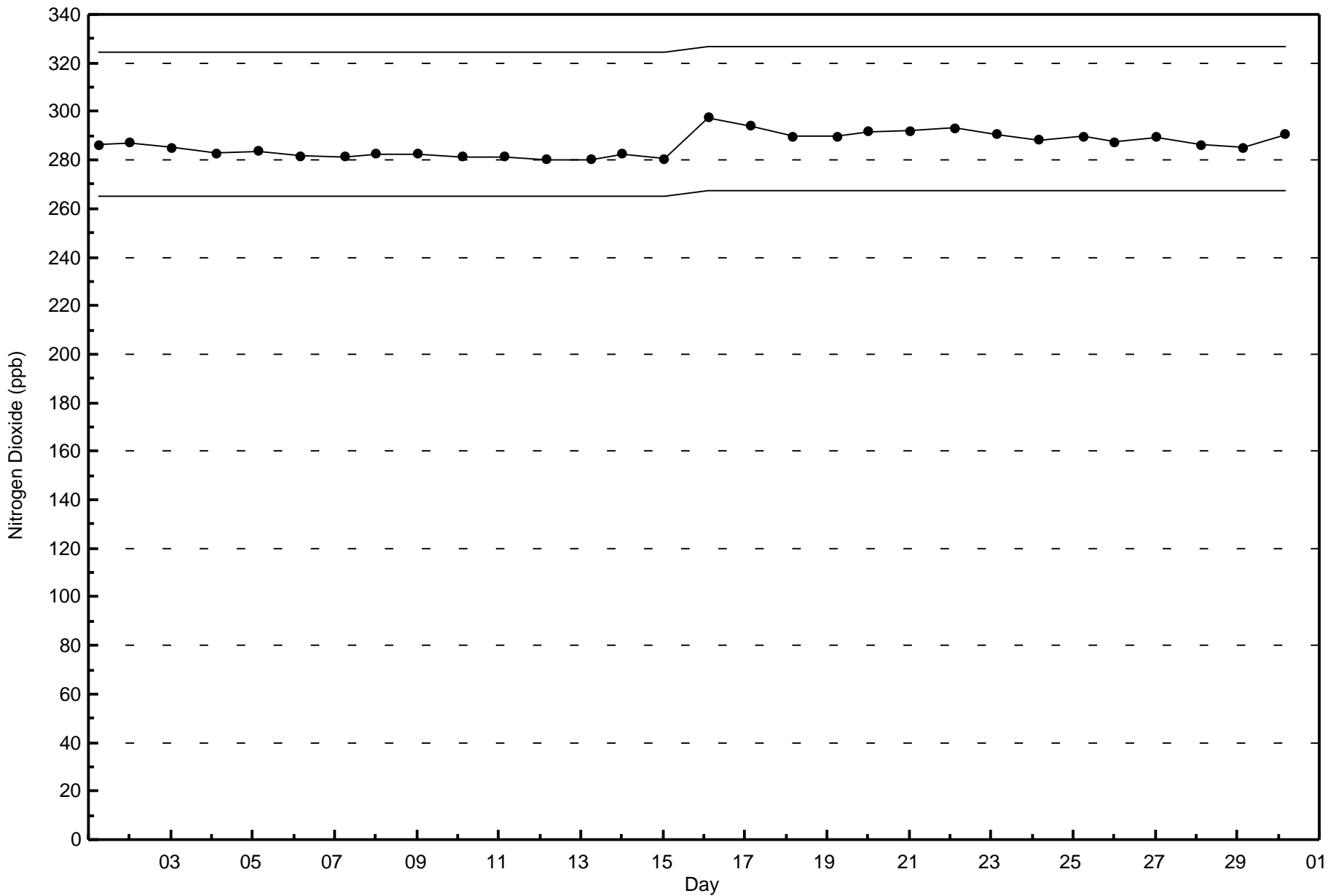
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Firebag (AMS 19)



Total Number of Valid Hours: 677







Wood Buffalo Environmental Association
Summary of Hour Averages

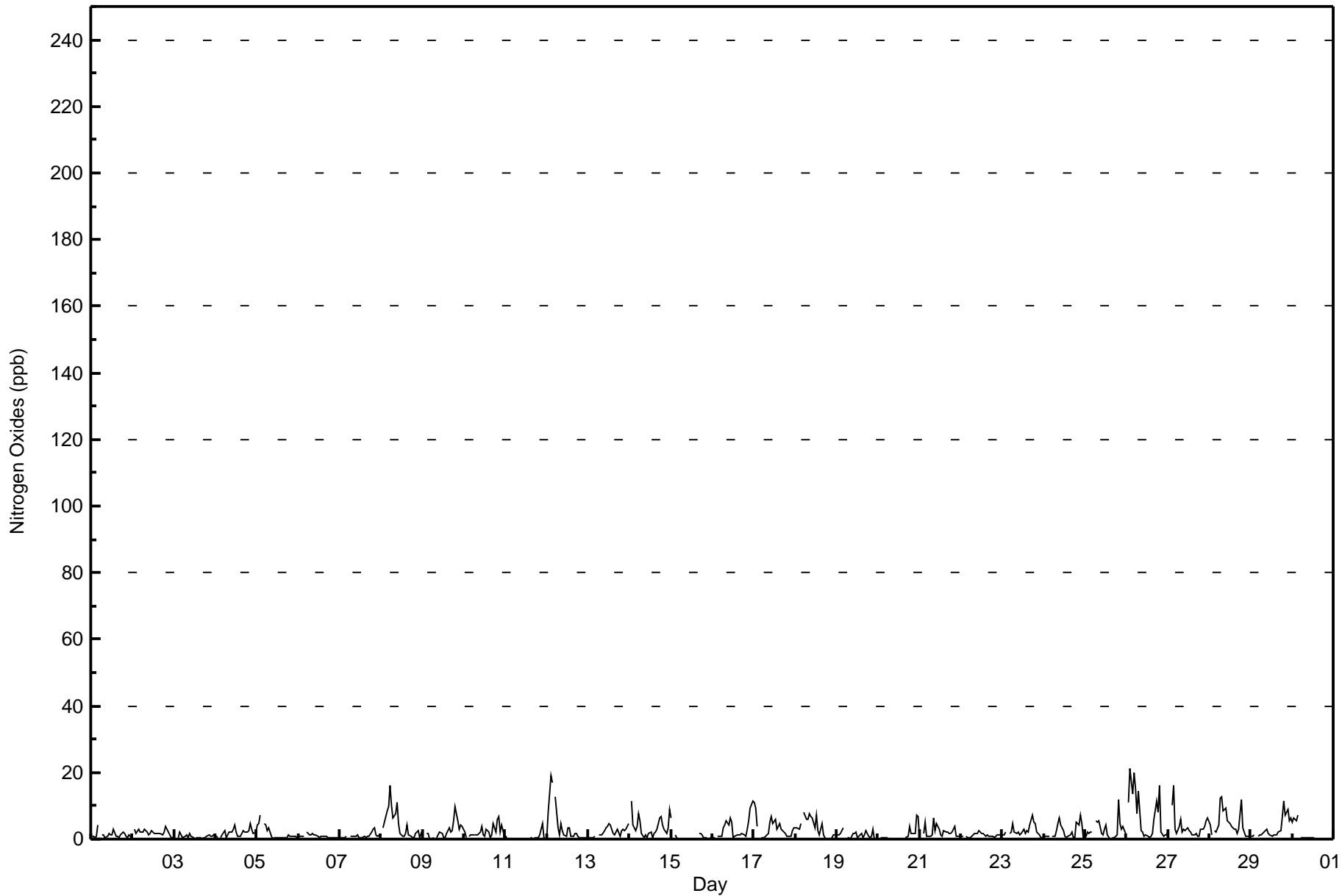
Nitrogen Oxides (NO_x) - ppb
Firebag - September 2016

| Maximum Value: 21 ppb on Sep 26 03:00 | | Maximum Daily Average: 7.0 ppb on Sep 26 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------------|----|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 15 07:00 | | Minimum Daily Average: 0.5 ppb on Sep 11 | | Hours of Data: 677 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 3.9 ppb at hour 3 | | Minimum Diurnal Average: 1.4 ppb at hour 15 | | Hours of Missing Data: 43 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.4 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 Q ₃ = 3 P ₉₀ = 6 P ₉₉ = 16 | | Hours of Calibration: 42 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 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 | 1 | 4 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 1 | 1 | 0 | 1 | 2 | 2 | 1 | 0 | 1 | 1 | | |
| 2-Sep | Z | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 4 | 3 | 1 | 0 | 0 | | |
| 3-Sep | 0 | Z | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| 4-Sep | 1 | 0 | Z | 0 | 1 | 2 | 0 | 1 | 2 | 2 | 3 | 4 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 5 | 3 | 2 | 2 | | |
| 5-Sep | 4 | 5 | 7 | Z | 5 | 4 | 3 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| 6-Sep | 1 | 1 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | | |
| 7-Sep | 0 | 0 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | | |
| 8-Sep | Z | 3 | 5 | 8 | 10 | 16 | 10 | 6 | 8 | 11 | 5 | 2 | 1 | 1 | 2 | 4 | 1 | 1 | 0 | 0 | 2 | 2 | 0 | 2 | | |
| 9-Sep | 1 | Z | 2 | 1 | 0 | 0 | 0 | M | 1 | 1 | 2 | 2 | 0 | 0 | 2 | 4 | 2 | 2 | 6 | 10 | 6 | 3 | 4 | 4 | | |
| 10-Sep | 2 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 1 | 1 | 3 | 2 | 1 | 1 | 5 | 2 | 6 | 7 | 2 | 4 | 1 | | |
| 11-Sep | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 5 | 0 | 0 | | |
| 12-Sep | 0 | 8 | 19 | 17 | Z | 13 | 3 | 1 | 5 | 3 | 1 | 1 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | | |
| 13-Sep | 0 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 4 | 4 | 5 | 4 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 2 | 3 | 4 | | |
| 14-Sep | Z | 12 | 4 | 2 | 4 | 8 | 6 | 2 | 1 | 1 | 1 | 2 | 2 | 0 | 2 | 2 | 3 | 6 | 7 | 4 | 3 | 2 | 4 | 9 | | |
| 15-Sep | 6 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | | |
| 16-Sep | 1 | 1 | Z | 1 | 1 | 1 | 3 | 4 | 5 | 4 | 6 | 5 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | 6 | 9 | 11 | | |
| 17-Sep | 11 | 9 | 4 | Z | 1 | 0 | 0 | 1 | 2 | 5 | 7 | 5 | 6 | 3 | 4 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 3 | 3 | | |
| 18-Sep | 3 | 4 | 3 | 4 | Z | 8 | 6 | 6 | 8 | 7 | 6 | 4 | 7 | 2 | 1 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | | |
| 19-Sep | 1 | 1 | 2 | 2 | 4 | Z | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 3 | 1 | 0 | 1 | 3 | 0 | 0 | | |
| 20-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | C | 0 | 1 | 4 | 2 | 1 | 2 | 7 | 7 | | |
| 21-Sep | 0 | Z | 2 | 5 | 1 | 1 | 1 | 1 | 6 | 3 | 4 | 3 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 4 | 1 | 1 | 1 | | |
| 22-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| 23-Sep | 1 | 1 | 2 | Z | 2 | 2 | 5 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 3 | 2 | 4 | 7 | 5 | 5 | 2 | 1 | 0 | 1 | | |
| 24-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 5 | 6 | 4 | 3 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 5 | 4 | 7 | 5 | 1 | | |
| 25-Sep | 1 | 2 | 2 | 2 | 2 | Z | 6 | 5 | 5 | 2 | 1 | 3 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 12 | 5 | 3 | 4 | 2 | | |
| 26-Sep | Z | 11 | 21 | 13 | 20 | 15 | 8 | 14 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 6 | 11 | 8 | 16 | 2 | 1 | 1 | 1 | | |
| 27-Sep | 3 | Z | 10 | 16 | 3 | 2 | 4 | 6 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 3 | 4 | 6 | 6 | | |
| 28-Sep | 4 | 1 | Z | 2 | 2 | 4 | 12 | 13 | 8 | 9 | 5 | 5 | 5 | 4 | 3 | 3 | 2 | 3 | 12 | 3 | 2 | 1 | 1 | 1 | | |
| 29-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 7 | 11 | 7 | 9 | 5 | 6 | | |
| 30-Sep | 5 | 6 | 6 | 7 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Firebag - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 676 | 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: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 65 | 77 | 80 | 82 | 71 | 52 | 47 | 33 | 66 | 676 |
| 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 | 26 | 27 | 8 | 4 | 7 | 16 | 15 | 66 | 77 | 80 | 82 | 71 | 52 | 47 | 33 | 66 | 677 |

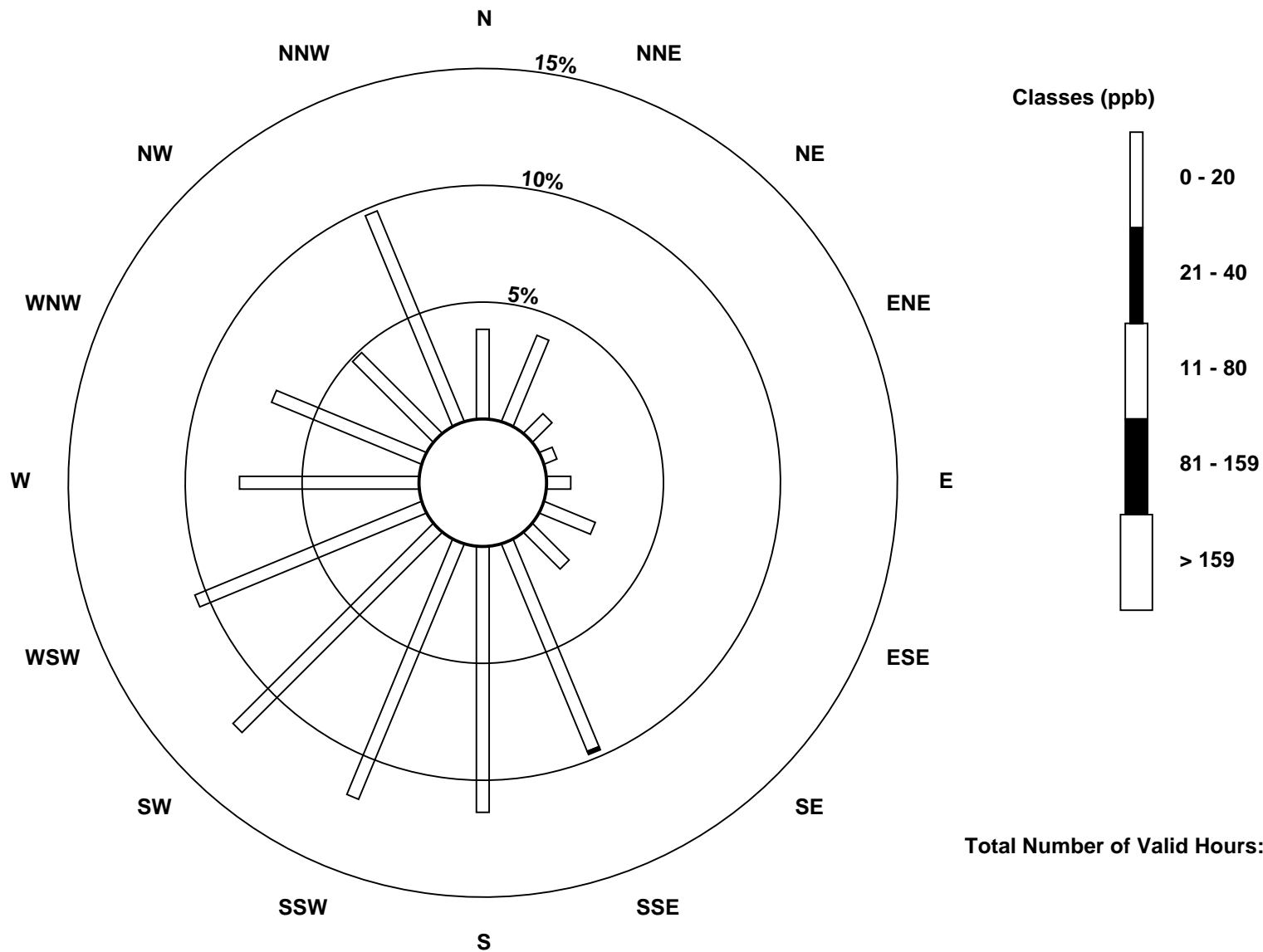
Total Number of Valid Hours: 677

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

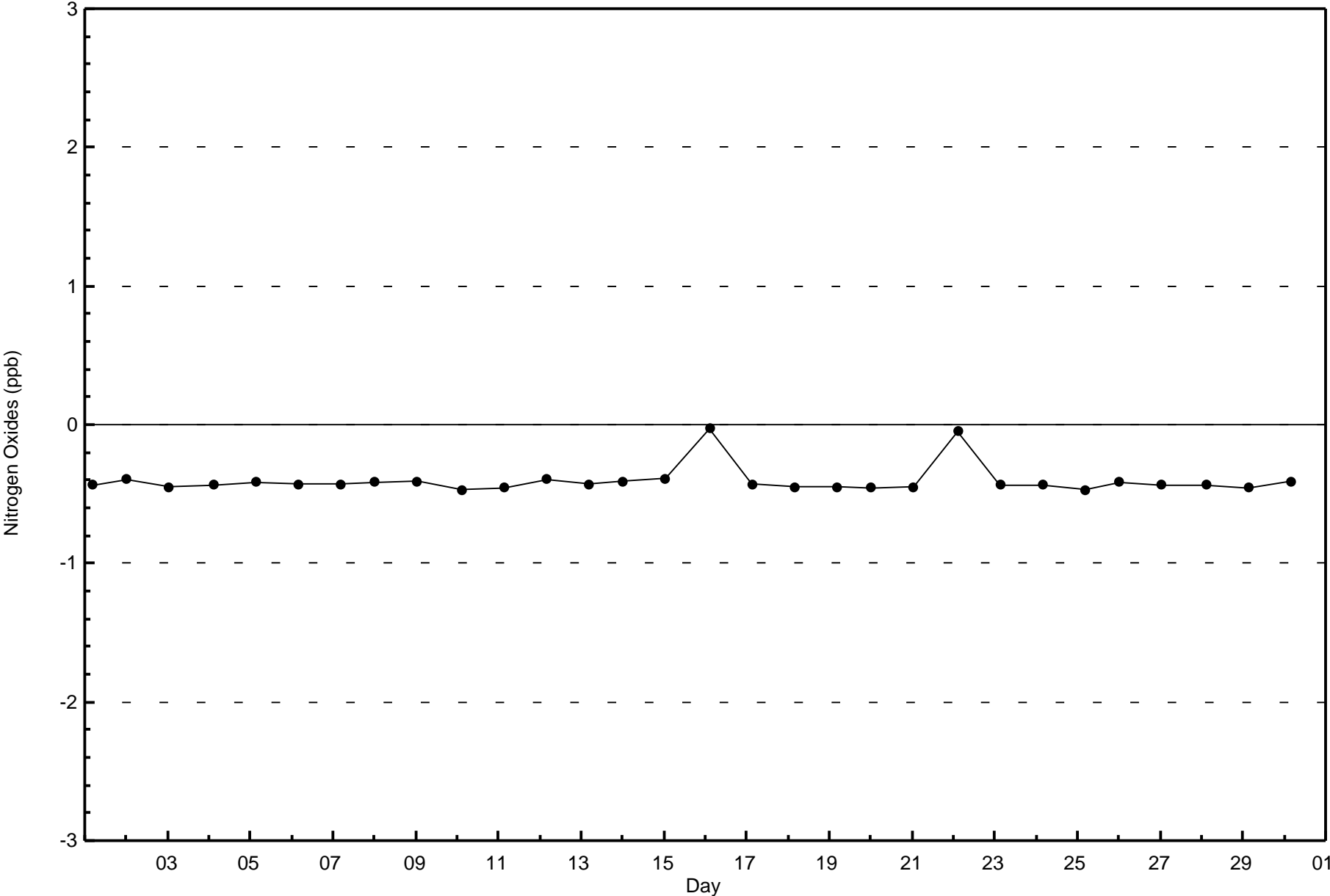
Nitrogen Oxides (NO_x) - ppb
Firebag (AMS 19)

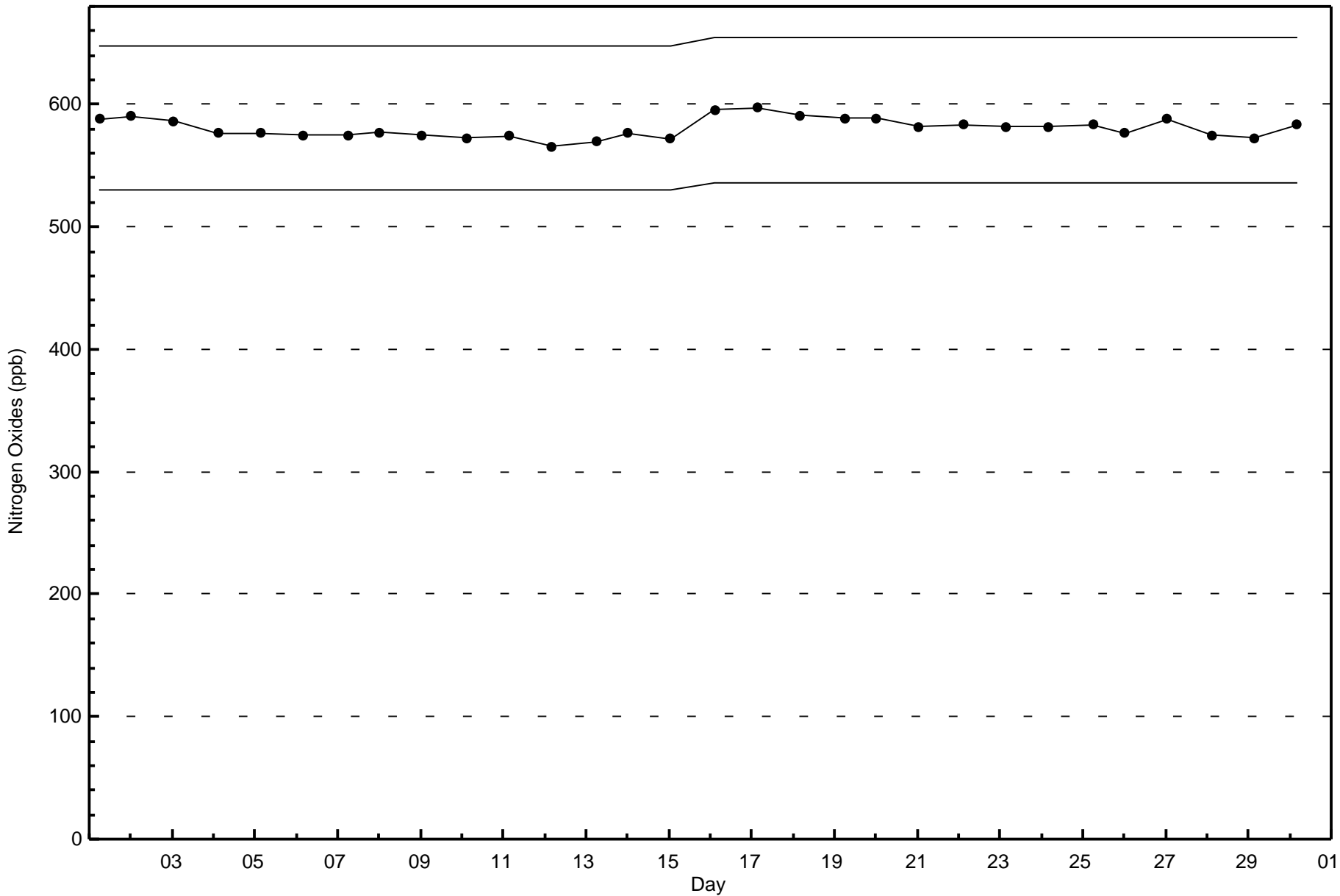




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Firebag - September 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

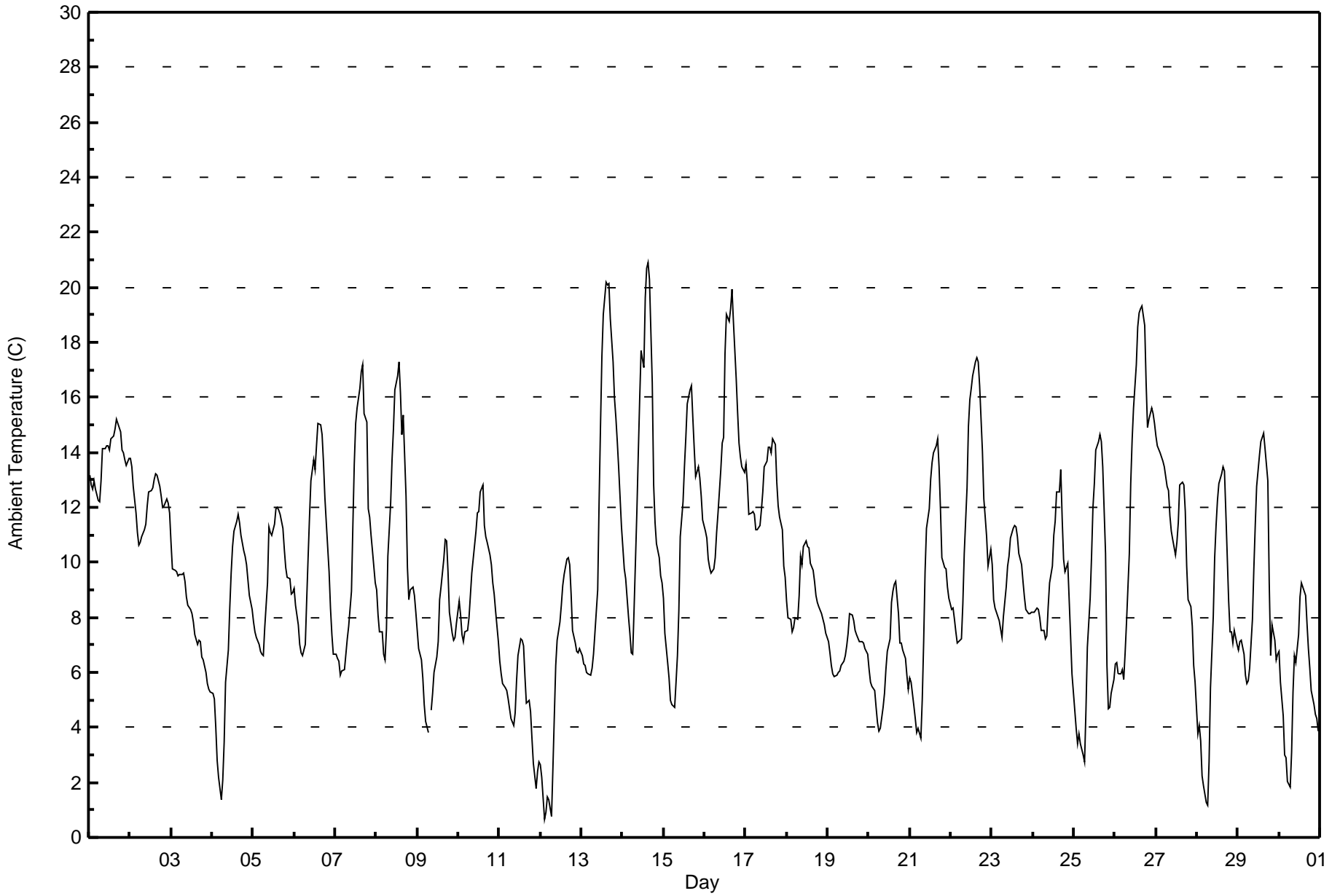
Firebag - September 2016

| Maximum Value: 20.9 C on Sep 14 16:00 | | Maximum Daily Average: 14.0 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: 0.6 C on Sep 12 03:00 | | Minimum Daily Average: 4.9 C on Sep 11 | | Hours of Data: 719 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 13.3 C at hour 15 | | Minimum Diurnal Average: 6.4 C at hour 6 | | Hours of Missing Data: 1 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 9.64 C | | Percentiles: P ₁ = 1.4 P ₁₀ = 5.0 Q ₁ = 6.8 Median = 9.2 Q ₃ = 12.4 P ₉₀ = 14.6 P ₉₉ = 19.8 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 99.9 | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Sep | 13.2 | 12.8 | 12.7 | 13.0 | 12.7 | 12.2 | 12.2 | 12.9 | 14.1 | 14.1 | 14.3 | 14.2 | 14.1 | 14.5 | 14.6 | 14.8 | 15.2 | 15.0 | 14.7 | 14.1 | 14.0 | 13.7 | 13.5 | 13.8 | 13.8 | 15.2 | |
| 2-Sep | 13.8 | 13.5 | 12.8 | 11.8 | 11.1 | 10.6 | 10.7 | 10.9 | 11.2 | 11.4 | 12.1 | 12.5 | 12.6 | 12.7 | 13.0 | 13.2 | 13.2 | 12.8 | 12.4 | 12.0 | 12.1 | 12.3 | 12.2 | 11.8 | 12.2 | 13.8 | |
| 3-Sep | 10.8 | 9.7 | 9.7 | 9.7 | 9.5 | 9.6 | 9.6 | 9.6 | 9.3 | 8.8 | 8.4 | 8.3 | 8.1 | 7.8 | 7.4 | 7.0 | 7.2 | 7.1 | 6.6 | 6.4 | 6.0 | 5.6 | 5.4 | 5.3 | 8.0 | 10.8 | |
| 4-Sep | 5.2 | 5.0 | 4.0 | 2.8 | 2.2 | 1.4 | 2.1 | 3.5 | 5.6 | 6.8 | 8.4 | 9.6 | 10.6 | 11.1 | 11.5 | 11.8 | 11.4 | 11.0 | 10.4 | 10.2 | 9.9 | 9.3 | 8.8 | 8.3 | 7.5 | 11.8 | |
| 5-Sep | 7.8 | 7.5 | 7.3 | 7.0 | 6.8 | 6.7 | 6.6 | 7.6 | 9.2 | 11.3 | 11.1 | 11.0 | 11.4 | 12.0 | 12.0 | 11.9 | 11.8 | 11.3 | 10.5 | 9.8 | 9.4 | 9.4 | 8.9 | 8.9 | 9.5 | 12.0 | |
| 6-Sep | 9.1 | 8.5 | 7.7 | 7.0 | 6.7 | 6.6 | 7.0 | 8.6 | 10.2 | 11.6 | 13.0 | 13.7 | 13.4 | 14.2 | 15.1 | 15.0 | 14.7 | 13.6 | 12.3 | 11.4 | 9.7 | 8.3 | 7.4 | 6.7 | 10.5 | 15.1 | |
| 7-Sep | 6.7 | 6.5 | 6.4 | 5.9 | 6.1 | 6.1 | 6.6 | 7.2 | 7.7 | 9.0 | 11.3 | 13.6 | 15.0 | 15.6 | 16.3 | 16.9 | 17.2 | 15.4 | 15.1 | 12.0 | 11.7 | 11.0 | 10.4 | 9.3 | 10.8 | 17.2 | |
| 8-Sep | 9.0 | 8.1 | 7.5 | 7.5 | 6.7 | 6.5 | 7.6 | 10.2 | 12.1 | 13.7 | 14.8 | 16.3 | 16.8 | 17.3 | 16.2 | 14.6 | 15.4 | 12.4 | 9.8 | 8.7 | 9.0 | 9.1 | 8.8 | 8.2 | 11.1 | 17.3 | |
| 9-Sep | 7.5 | 6.9 | 6.4 | 5.8 | 4.8 | 4.2 | 3.8 | M | 4.6 | 5.3 | 6.0 | 6.5 | 7.1 | 8.6 | 9.1 | 10.1 | 10.8 | 10.8 | 9.7 | 8.2 | 7.4 | 7.2 | 7.3 | 7.8 | 7.2 | 10.8 | |
| 10-Sep | 8.6 | 8.1 | 7.3 | 7.1 | 7.5 | 7.5 | 8.0 | 8.8 | 9.6 | 10.6 | 11.2 | 11.8 | 11.9 | 12.6 | 12.8 | 11.4 | 10.9 | 10.7 | 10.3 | 9.9 | 9.2 | 8.9 | 8.2 | 7.1 | 9.6 | 12.8 | |
| 11-Sep | 6.4 | 6.0 | 5.6 | 5.5 | 5.4 | 5.0 | 4.7 | 4.3 | 4.1 | 4.5 | 5.7 | 6.6 | 7.2 | 7.1 | 6.9 | 5.8 | 4.9 | 5.0 | 4.6 | 3.6 | 2.7 | 1.8 | 2.4 | 2.8 | 4.9 | 7.2 | |
| 12-Sep | 2.6 | 2.2 | 0.6 | 0.9 | 1.5 | 1.4 | 0.8 | 2.6 | 4.4 | 6.3 | 7.2 | 7.8 | 8.4 | 9.1 | 9.6 | 10.1 | 10.2 | 9.9 | 8.8 | 7.6 | 7.0 | 6.8 | 6.7 | 6.9 | 5.8 | 10.2 | |
| 13-Sep | 6.6 | 6.3 | 6.2 | 6.0 | 6.0 | 5.9 | 6.2 | 6.7 | 7.4 | 9.0 | 12.2 | 15.0 | 17.5 | 19.0 | 20.2 | 20.1 | 20.1 | 18.9 | 17.3 | 16.0 | 15.2 | 14.4 | 13.4 | 11.3 | 12.4 | 20.2 | |
| 14-Sep | 10.5 | 9.7 | 9.4 | 8.0 | 7.4 | 6.7 | 6.7 | 8.3 | 11.9 | 14.0 | 15.9 | 17.7 | 17.1 | 19.7 | 20.7 | 20.9 | 20.3 | 16.5 | 12.8 | 11.5 | 10.7 | 10.1 | 9.5 | 9.2 | 12.7 | 20.9 | |
| 15-Sep | 8.7 | 7.4 | 6.4 | 5.8 | 5.0 | 4.8 | 4.7 | 5.6 | 6.6 | 8.2 | 11.0 | 12.2 | 13.5 | 14.6 | 15.8 | 16.3 | 16.4 | 15.2 | 14.2 | 13.1 | 13.5 | 13.1 | 12.4 | 11.5 | 10.7 | 16.4 | |
| 16-Sep | 11.2 | 10.9 | 10.1 | 9.8 | 9.6 | 9.8 | 10.2 | 11.1 | 11.8 | 13.3 | 14.3 | 14.5 | 17.6 | 19.0 | 18.8 | 19.2 | 19.9 | 18.7 | 16.7 | 15.5 | 14.3 | 13.8 | 13.5 | 13.3 | 14.0 | 19.9 | |
| 17-Sep | 13.6 | 12.8 | 11.7 | 11.8 | 11.8 | 11.7 | 11.2 | 11.2 | 11.4 | 11.9 | 12.6 | 13.5 | 13.7 | 14.2 | 14.2 | 14.0 | 14.5 | 14.3 | 12.9 | 12.0 | 11.7 | 11.2 | 9.9 | 9.4 | 12.4 | 14.5 | |
| 18-Sep | 8.6 | 8.0 | 7.9 | 7.5 | 7.6 | 8.0 | 7.9 | 8.8 | 10.2 | 9.9 | 10.6 | 10.8 | 10.6 | 10.5 | 10.0 | 9.7 | 9.3 | 8.8 | 8.6 | 8.4 | 8.2 | 7.9 | 7.7 | 7.4 | 8.9 | 10.8 | |
| 19-Sep | 7.1 | 6.7 | 6.3 | 5.9 | 5.8 | 5.9 | 6.0 | 6.1 | 6.2 | 6.4 | 6.6 | 6.9 | 7.4 | 8.1 | 8.1 | 7.9 | 7.5 | 7.4 | 7.1 | 7.1 | 7.1 | 7.1 | 6.9 | 6.7 | 6.9 | 8.1 | |
| 20-Sep | 6.1 | 5.7 | 5.5 | 5.3 | 4.7 | 4.2 | 3.9 | 4.0 | 4.7 | 5.2 | 6.1 | 6.7 | 7.2 | 8.5 | 9.0 | 9.2 | 9.3 | 8.2 | 7.1 | 7.1 | 6.8 | 6.5 | 5.9 | 5.4 | 6.3 | 9.3 | |
| 21-Sep | 5.8 | 5.6 | 4.8 | 4.3 | 3.8 | 4.0 | 3.6 | 5.0 | 7.1 | 9.6 | 11.2 | 12.0 | 13.0 | 13.7 | 14.0 | 14.2 | 14.5 | 13.5 | 11.9 | 10.2 | 9.8 | 9.7 | 9.1 | 8.7 | 9.1 | 14.5 | |
| 22-Sep | 8.3 | 8.3 | 7.9 | 7.5 | 7.1 | 7.2 | 7.2 | 8.5 | 10.3 | 12.7 | 14.9 | 15.9 | 16.3 | 16.8 | 17.3 | 17.4 | 17.3 | 16.4 | 14.1 | 12.3 | 11.6 | 10.9 | 9.9 | 10.5 | 11.9 | 17.4 | |
| 23-Sep | 9.9 | 8.7 | 8.3 | 8.0 | 7.9 | 7.6 | 7.2 | 8.0 | 9.1 | 9.9 | 10.2 | 10.9 | 11.2 | 11.4 | 11.3 | 10.9 | 10.3 | 9.9 | 9.3 | 8.8 | 8.3 | 8.1 | 8.1 | 8.2 | 9.2 | 11.4 | |
| 24-Sep | 8.2 | 8.2 | 8.3 | 8.3 | 8.0 | 7.5 | 7.5 | 7.2 | 7.3 | 8.4 | 9.3 | 9.9 | 11.0 | 11.5 | 12.6 | 12.6 | 13.4 | 11.6 | 10.1 | 9.6 | 10.0 | 8.7 | 7.3 | 5.9 | 9.3 | 13.4 | |
| 25-Sep | 4.6 | 4.0 | 3.4 | 3.7 | 3.4 | 3.0 | 2.7 | 4.6 | 6.9 | 8.7 | 10.2 | 12.0 | 12.9 | 14.1 | 14.4 | 14.6 | 14.4 | 13.5 | 10.3 | 6.3 | 4.7 | 4.7 | 5.2 | 5.7 | 7.8 | 14.6 | |
| 26-Sep | 6.3 | 6.4 | 5.9 | 5.9 | 6.1 | 5.8 | 6.7 | 7.8 | 10.3 | 12.9 | 14.5 | 15.6 | 17.2 | 18.6 | 19.0 | 19.2 | 19.3 | 18.6 | 16.5 | 14.9 | 15.2 | 15.6 | 15.4 | 15.1 | 12.9 | 19.3 | |
| 27-Sep | 14.6 | 14.3 | 14.0 | 13.8 | 13.7 | 13.5 | 12.8 | 12.6 | 11.7 | 11.1 | 10.8 | 10.3 | 10.7 | 11.4 | 12.8 | 12.9 | 12.8 | 11.8 | 9.9 | 8.6 | 8.4 | 7.7 | 6.3 | 5.7 | 11.3 | 14.6 | |
| 28-Sep | 3.8 | 4.0 | 3.5 | 2.2 | 1.9 | 1.3 | 1.1 | 2.8 | 5.4 | 8.0 | 10.2 | 11.4 | 12.3 | 12.8 | 13.2 | 13.5 | 13.3 | 11.8 | 8.6 | 7.5 | 7.5 | 7.1 | 7.5 | 7.0 | 7.4 | 13.5 | |
| 29-Sep | 6.8 | 7.1 | 7.2 | 6.7 | 5.9 | 5.6 | 5.7 | 6.2 | 7.9 | 9.8 | 11.3 | 12.7 | 13.9 | 14.4 | 14.5 | 14.7 | 14.1 | 12.9 | 9.2 | 6.6 | 7.7 | 7.2 | 6.5 | 6.7 | 9.2 | 14.7 | |
| 30-Sep | 6.8 | 5.7 | 4.4 | 3.0 | 2.9 | 2.0 | 1.9 | 3.1 | 5.3 | 6.6 | 6.3 | 7.3 | 8.7 | 9.2 | 9.1 | 8.8 | 7.8 | 6.9 | 6.2 | 5.4 | 4.9 | 4.5 | 4.3 | 3.9 | 5.6 | 9.2 | |
| | | 8.3 | 7.8 | 7.3 | 6.9 | 6.6 | 6.4 | 6.4 | 7.4 | 8.5 | 9.6 | 10.7 | 11.6 | 12.3 | 13.0 | 13.3 | 13.3 | 13.2 | 12.3 | 10.9 | 9.8 | 9.5 | 9.1 | 8.6 | 8.3 | Diurnal Average | |
| | | 14.6 | 14.3 | 14.0 | 13.8 | 13.7 | 13.5 | 12.8 | 12.9 | 14.1 | 14.1 | 15.9 | 17.7 | 17.6 | 19.7 | 20.7 | 20.9 | 20.3 | 18.9 | 17.3 | 16.0 | 15.2 | 15.6 | 15.4 | 15.1 | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Firebag - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Firebag - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 412 | 57.30 | 57.30 |
| 10 - 20 | 301 | 41.86 | 99.17 |
| > 20 | 6 | 0.83 | 100.00 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

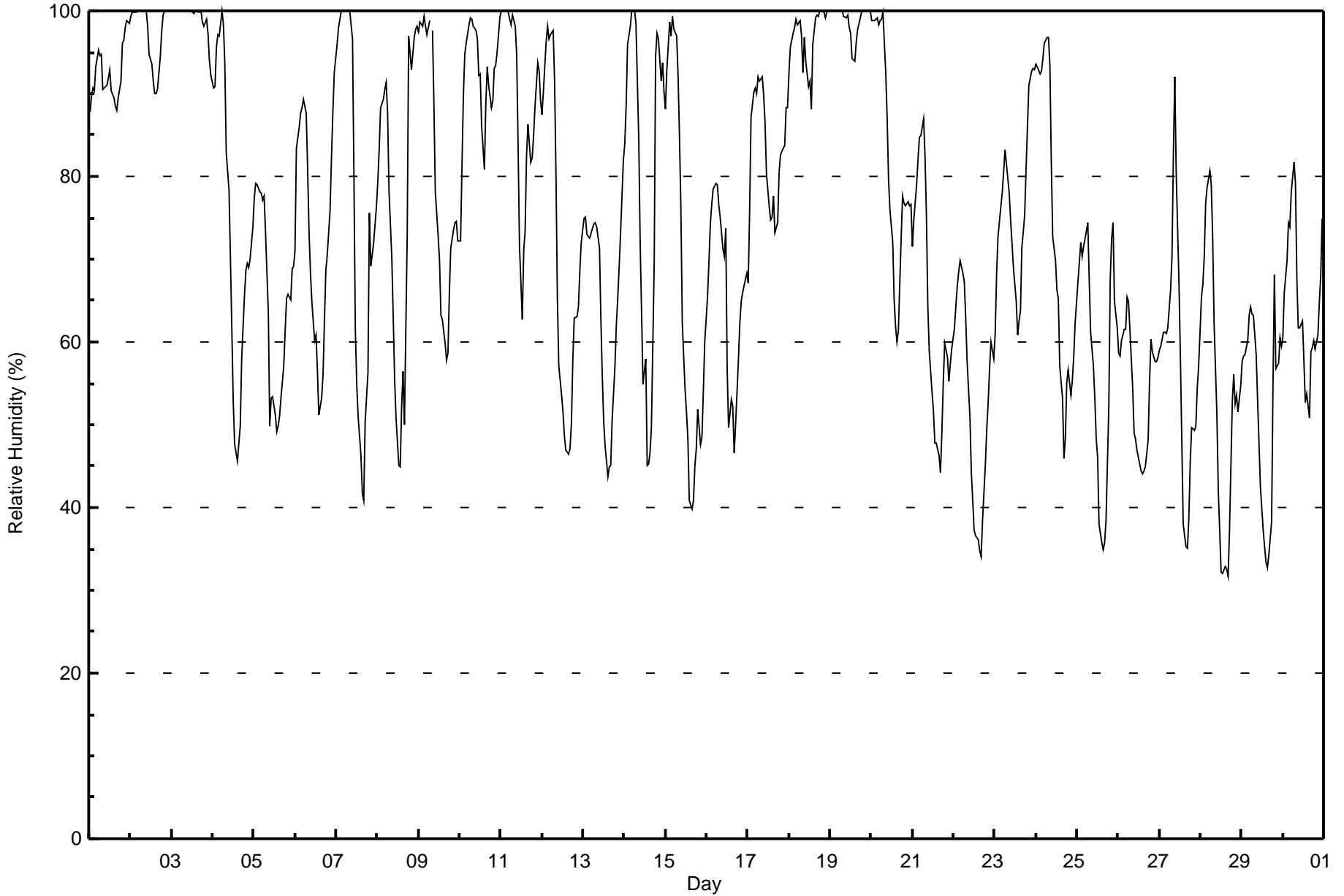
Firebag - September 2016

| Maximum Value: 100 % on Sep 2 05:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 99.1 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|-------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----------------|---------------|---------------|--|--|--|--|--|--|--|--|--|--------------------------------|--|
| Minimum Value: 32 % on Sep 28 17:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 52.5 % on Sep 29 | | | | | | | | | | | | | | | | | | Hours of Data: 719 | |
| Maximum Diurnal Average: 88.1 % at hour 7 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 58.0 % at hour 15 | | | | | | | | | | | | | | | | | | Hours of Missing Data: 1 | |
| Monthly Average: 74.4 % | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 34 P ₁₀ = 48 Q ₁ = 58 Median = 74 Q ₃ = 93 P ₉₀ = 99 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 | 88 | 90 | 91 | 90 | 93 | 95 | 95 | 95 | 91 | 91 | 91 | 92 | 93 | 90 | 89 | 88 | 88 | 90 | 91 | 96 | 96 | 98 | 99 | 99 | 92.4 | 99 | | | | | | | | | | | |
| 2-Sep | 99 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 95 | 94 | 92 | 90 | 90 | 91 | 94 | 98 | 99 | 100 | 100 | 100 | 97.5 | 100 | | | | | | | | | | | |
| 3-Sep | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 98 | 99 | 97 | 94 | 92 | 99.1 | 100 | | | | | | | | | | | |
| 4-Sep | 91 | 91 | 96 | 97 | 97 | 100 | 98 | 94 | 83 | 78 | 70 | 61 | 53 | 48 | 46 | 48 | 50 | 58 | 66 | 69 | 69 | 69 | 70 | 74 | 73.9 | 100 | | | | | | | | | | | |
| 5-Sep | 77 | 79 | 79 | 78 | 78 | 77 | 78 | 73 | 64 | 50 | 53 | 53 | 51 | 49 | 50 | 51 | 53 | 57 | 61 | 65 | 66 | 65 | 69 | 69 | 64.4 | 79 | | | | | | | | | | | |
| 6-Sep | 71 | 83 | 86 | 88 | 88 | 89 | 88 | 81 | 73 | 69 | 65 | 60 | 61 | 56 | 51 | 53 | 56 | 63 | 69 | 71 | 76 | 82 | 88 | 93 | 73.3 | 93 | | | | | | | | | | | |
| 7-Sep | 96 | 98 | 99 | 100 | 100 | 100 | 100 | 100 | 100 | 97 | 80 | 62 | 55 | 51 | 46 | 42 | 41 | 50 | 56 | 76 | 69 | 71 | 72 | 76 | 76.5 | 100 | | | | | | | | | | | |
| 8-Sep | 79 | 83 | 88 | 89 | 91 | 91 | 88 | 78 | 70 | 63 | 56 | 51 | 45 | 45 | 52 | 57 | 50 | 73 | 97 | 95 | 93 | 97 | 98 | 98 | 76.1 | 98 | | | | | | | | | | | |
| 9-Sep | 97 | 99 | 98 | 99 | 98 | 97 | 99 | M | 98 | 89 | 78 | 73 | 70 | 63 | 63 | 60 | 58 | 59 | 66 | 71 | 74 | 74 | 75 | 72 | 79.5 | 99 | | | | | | | | | | | |
| 10-Sep | 72 | 81 | 90 | 95 | 96 | 98 | 99 | 99 | 98 | 98 | 97 | 92 | 92 | 86 | 81 | 89 | 93 | 91 | 88 | 89 | 93 | 93 | 95 | 99 | 91.9 | 99 | | | | | | | | | | | |
| 11-Sep | 100 | 100 | 100 | 100 | 100 | 99 | 98 | 99 | 98 | 95 | 84 | 72 | 63 | 71 | 73 | 82 | 86 | 82 | 82 | 85 | 88 | 94 | 93 | 89 | 88.9 | 100 | | | | | | | | | | | |
| 12-Sep | 87 | 90 | 96 | 98 | 97 | 97 | 98 | 92 | 80 | 65 | 57 | 54 | 52 | 49 | 47 | 46 | 47 | 50 | 58 | 63 | 63 | 64 | 69 | 72 | 70.4 | 98 | | | | | | | | | | | |
| 13-Sep | 75 | 75 | 73 | 73 | 73 | 74 | 74 | 74 | 74 | 71 | 63 | 56 | 50 | 47 | 44 | 45 | 45 | 51 | 57 | 62 | 65 | 69 | 73 | 82 | 64.4 | 82 | | | | | | | | | | | |
| 14-Sep | 84 | 89 | 96 | 98 | 100 | 100 | 100 | 99 | 84 | 72 | 64 | 55 | 58 | 45 | 45 | 47 | 50 | 69 | 95 | 97 | 97 | 92 | 94 | 90 | 79.9 | 100 | | | | | | | | | | | |
| 15-Sep | 88 | 93 | 99 | 97 | 99 | 98 | 97 | 92 | 85 | 76 | 62 | 54 | 51 | 48 | 41 | 40 | 41 | 45 | 47 | 52 | 48 | 49 | 54 | 60 | 67.3 | 99 | | | | | | | | | | | |
| 16-Sep | 65 | 70 | 74 | 77 | 79 | 79 | 79 | 77 | 75 | 71 | 70 | 74 | 57 | 50 | 53 | 52 | 47 | 50 | 58 | 62 | 65 | 66 | 67 | 68 | 66.0 | 79 | | | | | | | | | | | |
| 17-Sep | 67 | 76 | 87 | 90 | 91 | 90 | 92 | 92 | 92 | 90 | 87 | 80 | 76 | 75 | 75 | 78 | 73 | 74 | 80 | 82 | 83 | 84 | 88 | 88 | 83.0 | 92 | | | | | | | | | | | |
| 18-Sep | 92 | 96 | 97 | 98 | 99 | 98 | 99 | 97 | 93 | 97 | 94 | 91 | 92 | 88 | 96 | 99 | 100 | 99 | 100 | 100 | 100 | 99 | 100 | 100 | 96.8 | 100 | | | | | | | | | | | |
| 19-Sep | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 99 | 99 | 98 | 97 | 94 | 94 | 96 | 98 | 98 | 100 | 100 | 100 | 100 | 100 | 100 | 98.9 | 100 | | | | | | | | | | | |
| 20-Sep | 99 | 99 | 99 | 99 | 98 | 99 | 99 | 100 | 92 | 87 | 80 | 76 | 72 | 65 | 62 | 60 | 61 | 73 | 78 | 77 | 76 | 77 | 76 | 77 | 82.5 | 100 | | | | | | | | | | | |
| 21-Sep | 72 | 75 | 79 | 82 | 85 | 85 | 87 | 82 | 75 | 64 | 59 | 54 | 52 | 48 | 48 | 46 | 44 | 49 | 55 | 60 | 58 | 55 | 57 | 59 | 63.8 | 87 | | | | | | | | | | | |
| 22-Sep | 62 | 64 | 67 | 68 | 70 | 68 | 67 | 63 | 58 | 51 | 44 | 41 | 37 | 37 | 36 | 35 | 34 | 39 | 45 | 50 | 53 | 57 | 60 | 58 | 52.6 | 70 | | | | | | | | | | | |
| 23-Sep | 61 | 68 | 73 | 76 | 78 | 81 | 83 | 82 | 78 | 75 | 72 | 69 | 65 | 61 | 63 | 64 | 71 | 75 | 81 | 86 | 91 | 93 | 93 | 93 | 76.3 | 93 | | | | | | | | | | | |
| 24-Sep | 94 | 93 | 92 | 93 | 94 | 96 | 97 | 97 | 93 | 82 | 73 | 70 | 66 | 65 | 57 | 53 | 46 | 48 | 55 | 57 | 54 | 55 | 58 | 62 | 73.0 | 97 | | | | | | | | | | | |
| 25-Sep | 67 | 70 | 72 | 70 | 72 | 73 | 74 | 68 | 61 | 57 | 53 | 48 | 46 | 38 | 36 | 35 | 36 | 39 | 52 | 68 | 72 | 74 | 65 | 62 | 58.7 | 74 | | | | | | | | | | | |
| 26-Sep | 59 | 58 | 60 | 61 | 62 | 65 | 65 | 62 | 54 | 49 | 48 | 47 | 45 | 44 | 44 | 44 | 45 | 48 | 55 | 60 | 59 | 58 | 58 | 58 | 54.6 | 65 | | | | | | | | | | | |
| 27-Sep | 59 | 59 | 61 | 61 | 61 | 62 | 66 | 70 | 83 | 92 | 81 | 67 | 58 | 48 | 38 | 35 | 35 | 39 | 45 | 50 | 49 | 50 | 54 | 57 | 57.5 | 92 | | | | | | | | | | | |
| 28-Sep | 65 | 67 | 70 | 77 | 79 | 81 | 79 | 73 | 62 | 51 | 42 | 37 | 32 | 32 | 33 | 32 | 32 | 37 | 53 | 56 | 52 | 54 | 52 | 55 | 54.3 | 81 | | | | | | | | | | | |
| 29-Sep | 58 | 58 | 58 | 60 | 63 | 64 | 63 | 63 | 58 | 53 | 48 | 43 | 37 | 35 | 33 | 33 | 34 | 38 | 55 | 68 | 57 | 57 | 61 | 60 | 52.5 | 68 | | | | | | | | | | | |
| 30-Sep | 61 | 66 | 70 | 74 | 74 | 78 | 82 | 79 | 68 | 62 | 62 | 63 | 58 | 53 | 54 | 51 | 59 | 59 | 60 | 59 | 61 | 65 | 68 | 75 | 64.9 | 82 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | | | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Firebag - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Firebag - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 29 | 4.03 | 4.03 |
| 40 - 60 | 169 | 23.50 | 27.54 |
| 60 - 80 | 218 | 30.32 | 57.86 |
| 80 - 100 | 251 | 34.91 | 92.77 |

Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Summary of Hour Averages

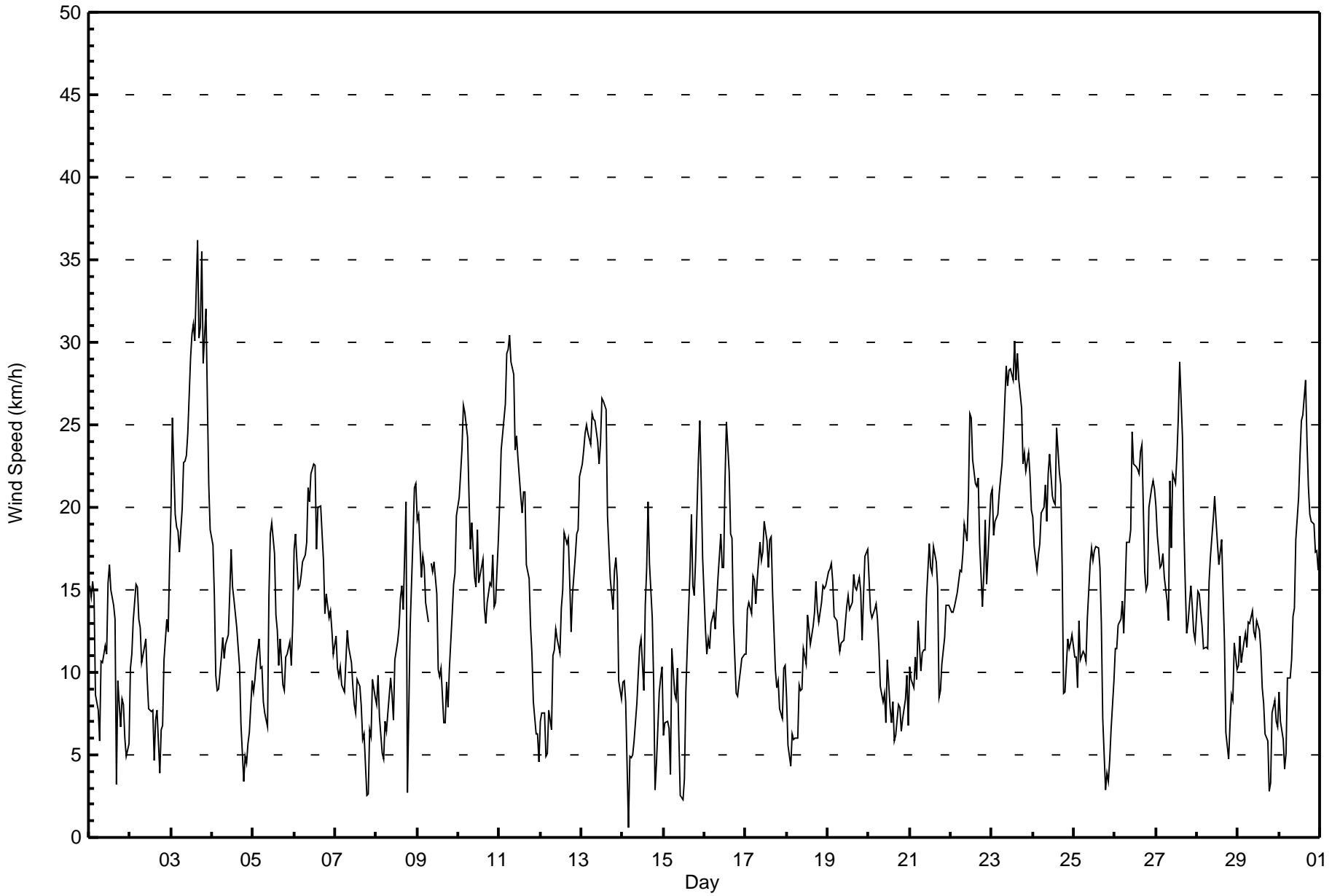
Wind Speed (WS) - km/h
Firebag - September 2016

| | | |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 36 km/h on Sep 3 16:00 | Maximum Daily Speed Average: 24.7 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 14 04:00 | Minimum Daily Speed Average: 4.4 km/h on Sep 14 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 9.1 km/h at hour 14 | Minimum Diurnal Speed Average: 1.8 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 5.7 km/h 235.3 deg | Percentiles: P ₁ = 3 P ₁₀ = 7 Q ₁ = 10 Median = 14 Q ₃ = 18 P ₉₀ = 23 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 | SE15 | SE15 | SE16 | SE15 | SE9 | SE8 | ESE6 | SE11 | ESE11 | ESE12 | ESE11 | ESE15 | ESE17 | E15 | ESE14 | SE13 | S3 | E10 | ENE7 | E8 | SE8 | NNW6 | E5 | SSW6 | ESE9.4 | ESE17 |
| 2-Sep | WSW10 | WSW11 | WSW13 | WSW15 | WSW15 | WSW13 | WSW13 | WSW11 | W12 | W12 | W10 | W8 | WSW8 | SW8 | W5 | NW7 | NW8 | NNW4 | NNE7 | NNE7 | N11 | N13 | NNE12 | N17 | WNW6.6 | N17 |
| 3-Sep | N20 | N25 | NNW20 | NNW19 | NW19 | NW17 | WNW20 | WNW23 | NW23 | NW23 | NNW25 | NNW29 | NNW31 | NNW31 | NNW30 | NNW36 | NNW30 | NNW31 | NNW36 | NNW29 | NNW32 | NNW27 | NNW21 | NNW19 | NNW24.7 | NNW36 |
| 4-Sep | NW18 | NW15 | WNW10 | WNW9 | WNW9 | WSW11 | WSW12 | WSW11 | W12 | W12 | WNW15 | WNW17 | WNW15 | WNW14 | WNW13 | WNW11 | WNW10 | WNW7 | W3 | SW5 | S5 | SSE6 | S6 | SW9 | W8.9 | NW18 |
| 5-Sep | SW9 | SW10 | SW11 | SW12 | SSW10 | SSW10 | SSW8 | SSW8 | SW7 | SW15 | SSW18 | SSW19 | SSW17 | SSW13 | SSW13 | SSW10 | SSW12 | S9 | SSE9 | SSE11 | SSE11 | SSE12 | SE10 | SSE13 | SSW10.7 | SSW19 |
| 6-Sep | SSE17 | SSE18 | SSE15 | SSE15 | SSE16 | S17 | S17 | S18 | S21 | S20 | S22 | S23 | S23 | S17 | S20 | SSE20 | S18 | S17 | S14 | S15 | S13 | SSE14 | SSE13 | SSE11 | S17.1 | S23 |
| 7-Sep | SSE12 | S10 | SSE10 | S10 | S9 | SSE9 | SSE11 | S13 | S11 | S11 | S9 | SSW8 | SW8 | WSW10 | SW9 | SW8 | WSW6 | WSW6 | WSW3 | SSE3 | SSE7 | S6 | SSW10 | SSW9 | S7.4 | S13 |
| 8-Sep | SSW8 | SSW10 | SW7 | S5 | SSW5 | SSW7 | SW6 | SW8 | WSW10 | NW9 | NNW7 | NW11 | NW12 | NW13 | NW14 | WNW15 | WNW14 | NNW20 | W3 | NNW8 | NNW13 | NNW18 | NNW21 | NNW21 | WNW7.5 | NNW21 |
| 9-Sep | NNW19 | NNW20 | NNW16 | NNW17 | NNW16 | N14 | N13 | M | NNW17 | NNW16 | NNW17 | NNW15 | WNW10 | WNW10 | WNW10 | WNW7 | W7 | SW9 | S8 | SSE10 | SSE14 | SSE15 | SSE16 | SSE20 | NW5.4 | NNW20 |
| 10-Sep | SSE21 | SSE22 | SSE24 | SSE26 | SSE26 | S24 | S21 | SSW17 | SSW19 | SW16 | W15 | W19 | W15 | WNW16 | WNW17 | NW14 | WNW13 | W14 | WNW15 | W15 | WNW17 | WNW14 | WNW14 | NNW18 | SW9.5 | SSE26 |
| 11-Sep | NNW20 | NNW24 | N24 | N26 | N29 | NNE30 | NNE30 | NNE29 | NNE28 | NNE24 | N24 | N23 | N21 | NNW20 | NNW21 | NNW21 | NNW17 | NNW16 | NNW13 | NNW11 | NW8 | WNW6 | WNW6 | WNW5 | N18.6 | NNE30 |
| 12-Sep | W7 | W8 | W8 | WSW5 | SW5 | SW8 | SW7 | SW11 | SW11 | WSW13 | WSW12 | W11 | WSW14 | SW15 | SSW18 | SW18 | SW18 | SSW16 | S12 | S15 | S17 | S18 | S19 | SSW22 | SW11.3 | SSW22 |
| 13-Sep | SSW23 | SSW23 | SSW25 | SSW25 | SSW24 | SSW24 | SW26 | SW25 | SW25 | SW24 | SW23 | SW24 | SW27 | WSW26 | WSW26 | W19 | WSW18 | WSW16 | WSW14 | WSW16 | WSW17 | W16 | WNW9 | W8 | SW19.6 | SW27 |
| 14-Sep | NW9 | NNW9 | N8 | NE1 | ENE5 | SE5 | SE5 | SSE6 | SSE8 | S10 | SSW12 | SW12 | SSW9 | SSW14 | SW16 | SW20 | WSW17 | NNW13 | NNE9 | N3 | SW4 | WSW9 | W10 | WNW10 | WSW4.4 | SW20 |
| 15-Sep | NNW6 | NNW7 | N7 | N7 | N4 | N11 | NNE9 | NE8 | NE10 | ENE6 | S3 | SSE2 | S4 | SSE9 | SSE11 | SSE16 | SSE20 | SSE15 | SSE15 | SSE17 | SSE23 | S25 | S21 | S17 | SE6.0 | S25 |
| 16-Sep | SSW13 | SSW11 | SSW12 | SSW11 | SSW13 | SSW14 | SSW13 | SW14 | SW16 | SW18 | SW16 | SSW16 | SSW22 | SW25 | SW22 | SW18 | WSW18 | WSW13 | WSW9 | SSW9 | SSW9 | SSW10 | SW11 | SSW11 | SW13.8 | SW25 |
| 17-Sep | SW11 | SW14 | SW14 | SSW14 | SSW16 | SSW16 | SSW14 | SSW16 | SW18 | SW17 | SW17 | SW19 | SW18 | SW16 | SW18 | WSW18 | WSW15 | WSW10 | WSW9 | WSW9 | WSW8 | WSW7 | WSW10 | WSW10 | SW13.5 | SW19 |
| 18-Sep | SW8 | WSW6 | SW4 | SW6 | WSW6 | SW6 | SW6 | W9 | WNW9 | NW9 | NW11 | NW10 | WNW13 | WNW13 | WNW12 | WNW13 | NW14 | N16 | N14 | NNW13 | N14 | NNW15 | NNW15 | NNW15 | NW8.4 | N16 |
| 19-Sep | NNW16 | NNW16 | NNW17 | NW15 | NW13 | NW13 | WNW12 | NW11 | NW12 | NW12 | NW13 | NW14 | NW15 | NW14 | NNW14 | NNW16 | NNW15 | NW15 | NNW16 | NNW15 | NNW12 | NNW15 | N17 | N17 | NW14.0 | N17 |
| 20-Sep | N16 | N14 | NNW13 | NNW14 | NNW14 | NNW13 | NNW12 | N9 | N8 | N9 | NNW7 | NNW11 | NNW8 | NW7 | N8 | N6 | NE6 | NE8 | E8 | ESE6 | SE7 | SE8 | SSE10 | SSE7 | N6.0 | N16 |
| 21-Sep | S10 | SSE10 | SSE9 | SSE11 | SSW10 | SSW13 | SSW10 | SW11 | SW11 | SW11 | WSW15 | SW18 | SW16 | WSW16 | WSW18 | WSW17 | WSW15 | SW9 | SSW9 | SSW11 | SSW12 | SSW14 | SSW14 | SSW14 | SW11.4 | SW18 |
| 22-Sep | SW14 | SSW14 | SSW14 | SSW14 | SSW15 | SSW16 | SSW16 | SSW17 | SSW19 | SW18 | SW21 | SW26 | SW25 | SW23 | SW21 | SSW21 | SSW22 | S18 | S14 | S16 | S19 | S15 | S17 | S21 | SSW17.4 | SW26 |
| 23-Sep | S21 | S18 | S19 | S20 | S21 | S22 | SSE23 | S24 | S29 | S27 | S28 | S28 | SSE28 | S30 | SSE28 | SSE29 | SSE28 | SSE26 | SSE23 | SSE23 | SSE22 | S23 | S22 | S20 | S24.1 | SSE30 |
| 24-Sep | S19 | S18 | SSW16 | S17 | S18 | SSW20 | SSW20 | SW21 | SW19 | WSW22 | WSW23 | WSW21 | W20 | WSW20 | W25 | W22 | WNW21 | WNW16 | W9 | W9 | W12 | W11 | W12 | WSW12 | WSW14.3 | W25 |
| 25-Sep | WSW11 | WSW11 | W9 | W13 | W11 | W11 | W11 | W11 | W13 | W17 | WNW18 | NW17 | WNW17 | NW18 | NW18 | NW16 | WNW13 | NW7 | NNW3 | ENE4 | E3 | SE5 | SE7 | SSE9 | WNW8.5 | NW18 |
| 26-Sep | SSE11 | SSE11 | SSE13 | SSE13 | SSE14 | SSE12 | SSE15 | SSE18 | S18 | SSE19 | S25 | S23 | S22 | SSW22 | S22 | S23 | SSE24 | SSE16 | SSE15 | SSE15 | SSE20 | S21 | S22 | S21 | S17.8 | S25 |
| 27-Sep | SSE20 | SSE18 | SSE16 | SSE17 | S17 | SSW16 | WSW14 | W13 | WSW22 | WSW18 | WNW22 | W21 | W23 | W25 | W29 | W24 | W19 | WSW15 | WSW12 | WSW13 | W15 | W14 | W12 | W12 | WSW13.3 | W29 |
| 28-Sep | WSW15 | W15 | W14 | WSW13 | WSW11 | SW12 | SW11 | SW16 | SW17 | SW19 | WSW21 | WSW19 | W18 | WSW16 | WSW18 | WSW15 | WSW12 | SW6 | S5 | S7 | S9 | S8 | SSW12 | SSW10 | SW12.2 | WSW21 |
| 29-Sep | SSW10 | SSW12 | SSW11 | SSW12 | SSW12 | SSW12 | SSW13 | SW13 | SW14 | SW12 | SW12 | SW13 | SW13 | WSW11 | W9 | WNW8 | WNW6 | WNW6 | NE3 | ESE3 | ESE8 | ESE8 | ESE7 | ESE7 | SSW7.1 | SW14 |
| 30-Sep | ESE9 | ESE7 | ESE6 | E4 | ENE5 | NE10 | NE10 | NE11 | NE13 | NNE14 | NNE18 | NNE21 | NNE23 | NNE25 | NNE26 | NNE28 | NNE24 | NNE21 | NNE20 | NNE19 | NNE19 | NNE17 | NNE17 | NNE16 | NNE14.7 | NNE28 |

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| SW5.1 SW4.6SSW4.7SSW5.4SSW5.6SSW6.2 SW6.2 SW7.5 SW7.7WSW8.1WSW8.5WSW8.7WSW8.9WSW9.1WSW8.9 W7.9 W7.2 W4.3WSW1.8SSW2.6SSW3.6 SW3.7SSW3.7 SW4.3 | Diurnal Average |
| SSW23 N25 SSW25 N26 N29 NNE30 NNE30 NNE29 S29 S27 S28 NNW29 NNW31 NNW31 NNW30 NNW36 NNW30 NNW31 NNW36 NNW29 NNW32 NNW27 S22 SSW22 | 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 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 35 | 4.87 | 4.87 |
| 6 - 11 | 221 | 30.74 | 35.61 |
| 12 - 19 | 315 | 43.81 | 79.42 |
| 20 - 28 | 130 | 18.08 | 97.50 |
| 29 - 38 | 18 | 2.50 | 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 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 2 | 1 | 1 | 3 | 3 | 1 | 3 | 2 | 6 | 1 | 4 | 2 | 3 | 1 | 0 | 2 | 35 |
| 6 - 11 | 10 | 4 | 7 | 2 | 3 | 11 | 8 | 22 | 14 | 26 | 29 | 26 | 18 | 19 | 12 | 10 | 221 |
| 12 - 19 | 11 | 9 | 0 | 0 | 1 | 4 | 5 | 30 | 30 | 46 | 35 | 37 | 25 | 24 | 22 | 36 | 315 |
| 20 - 28 | 7 | 10 | 0 | 0 | 0 | 0 | 0 | 20 | 30 | 13 | 16 | 8 | 7 | 4 | 2 | 13 | 130 |
| 29 - 38 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 10 | 18 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 31 | 27 | 8 | 5 | 7 | 16 | 16 | 76 | 81 | 86 | 84 | 73 | 54 | 48 | 36 | 71 | 719 |

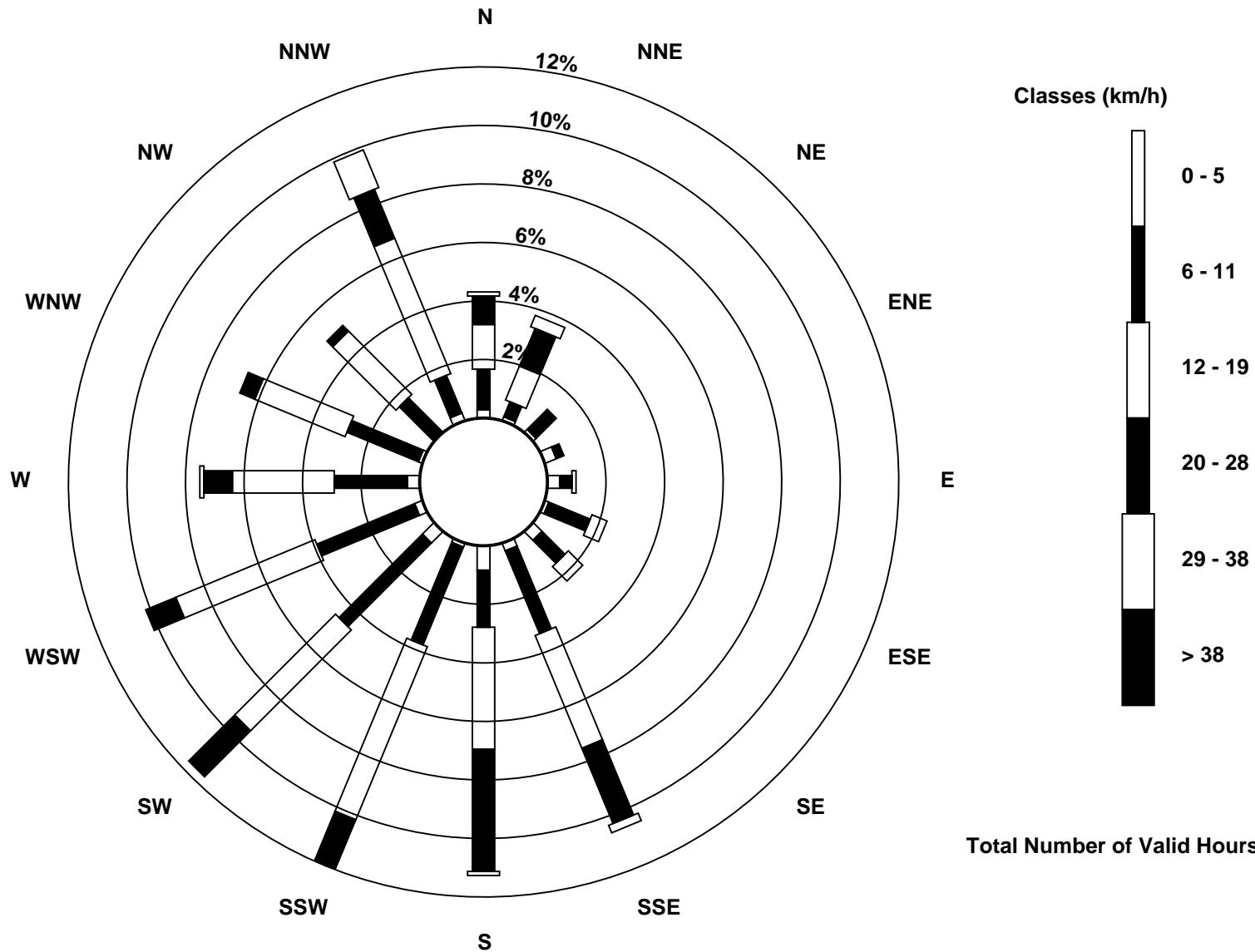
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Firebag (AMS 19)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Sep 8 18:00 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9 |
| Minimum Value: 1 km/h on Sep 29 18:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7 | |

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

M - Maintenance



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Firebag - September 2016

| | |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Direction of Maximum Speed: 341 deg on Sep 3 16:00 Direction of Maximum Daily Speed Average: 332.2 deg on Sep 3 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 |
| Direction of Minimum Speed: 34 deg on Sep 14 04:00 Direction of Minimum Daily Speed Average: 4.4 deg on Sep 14 | Percent Operational Time: 99.9 |
| Monthly Average Direction: 252.6 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 | 136 | 134 | 135 | 137 | 144 | 137 | 120 | 137 | 123 | 121 | 120 | 118 | 109 | 86 | 116 | 130 | 189 | 96 | 73 | 85 | 129 | 344 | 97 | 192 | 121.4 |
| 2-Sep | 246 | 247 | 254 | 250 | 249 | 248 | 253 | 254 | 263 | 262 | 278 | 266 | 252 | 220 | 273 | 315 | 318 | 334 | 23 | 20 | 7 | 1 | 16 | 357 | 282.4 |
| 3-Sep | 356 | 356 | 343 | 328 | 315 | 310 | 298 | 293 | 306 | 322 | 329 | 334 | 340 | 341 | 337 | 341 | 342 | 341 | 340 | 335 | 332 | 333 | 330 | 327 | 332.2 |
| 4-Sep | 322 | 320 | 289 | 294 | 282 | 244 | 244 | 245 | 261 | 265 | 285 | 284 | 295 | 286 | 290 | 293 | 292 | 289 | 269 | 220 | 189 | 168 | 191 | 217 | 276.1 |
| 5-Sep | 222 | 222 | 217 | 215 | 211 | 202 | 193 | 201 | 215 | 217 | 203 | 197 | 206 | 199 | 205 | 202 | 206 | 187 | 168 | 165 | 162 | 157 | 146 | 156 | 195.4 |
| 6-Sep | 167 | 166 | 159 | 161 | 167 | 175 | 176 | 184 | 186 | 184 | 175 | 175 | 176 | 180 | 178 | 168 | 173 | 172 | 172 | 170 | 171 | 160 | 152 | 164 | 172.3 |
| 7-Sep | 167 | 169 | 168 | 177 | 171 | 161 | 163 | 171 | 172 | 175 | 191 | 213 | 234 | 248 | 229 | 235 | 248 | 250 | 237 | 162 | 153 | 185 | 196 | 213 | 190.6 |
| 8-Sep | 199 | 196 | 214 | 189 | 197 | 213 | 216 | 236 | 258 | 321 | 327 | 306 | 305 | 317 | 322 | 287 | 286 | 328 | 267 | 338 | 339 | 339 | 344 | 339 | 303.5 |
| 9-Sep | 340 | 336 | 338 | 343 | 345 | 349 | 5 | M | 338 | 328 | 331 | 327 | 301 | 284 | 293 | 294 | 262 | 227 | 183 | 151 | 156 | 158 | 148 | 151 | 322.4 |
| 10-Sep | 157 | 167 | 162 | 161 | 166 | 170 | 184 | 193 | 203 | 234 | 263 | 264 | 275 | 284 | 295 | 326 | 296 | 274 | 283 | 274 | 285 | 292 | 300 | 327 | 232.9 |
| 11-Sep | 336 | 345 | 358 | 4 | 9 | 13 | 18 | 16 | 16 | 15 | 5 | 4 | 3 | 344 | 340 | 336 | 341 | 336 | 337 | 332 | 318 | 297 | 284 | 288 | 356.1 |
| 12-Sep | 277 | 270 | 265 | 250 | 226 | 221 | 225 | 230 | 230 | 253 | 252 | 268 | 238 | 235 | 209 | 224 | 222 | 207 | 184 | 181 | 181 | 180 | 190 | 202 | 218.7 |
| 13-Sep | 206 | 202 | 203 | 210 | 210 | 208 | 218 | 219 | 216 | 223 | 223 | 233 | 235 | 241 | 248 | 262 | 247 | 240 | 247 | 245 | 253 | 261 | 294 | 271 | 229.1 |
| 14-Sep | 311 | 334 | 351 | 34 | 67 | 136 | 145 | 147 | 156 | 189 | 203 | 222 | 206 | 198 | 217 | 231 | 249 | 335 | 16 | 1 | 236 | 249 | 270 | 300 | 239.8 |
| 15-Sep | 330 | 348 | 6 | 9 | 10 | 10 | 29 | 38 | 37 | 63 | 174 | 167 | 178 | 159 | 149 | 159 | 152 | 150 | 148 | 152 | 164 | 170 | 176 | 181 | 245.8 |
| 16-Sep | 194 | 195 | 195 | 193 | 200 | 206 | 207 | 217 | 219 | 230 | 228 | 206 | 213 | 224 | 230 | 228 | 257 | 253 | 238 | 212 | 215 | 213 | 216 | 208 | 218.1 |
| 17-Sep | 216 | 222 | 217 | 212 | 204 | 207 | 210 | 209 | 222 | 224 | 225 | 226 | 220 | 221 | 230 | 243 | 253 | 252 | 243 | 243 | 250 | 241 | 242 | 240 | 226.1 |
| 18-Sep | 232 | 237 | 224 | 232 | 239 | 230 | 232 | 271 | 298 | 310 | 307 | 312 | 292 | 294 | 297 | 292 | 320 | 351 | 349 | 344 | 350 | 344 | 338 | 334 | 308.8 |
| 19-Sep | 336 | 332 | 327 | 321 | 322 | 317 | 302 | 308 | 306 | 307 | 313 | 311 | 312 | 313 | 327 | 339 | 329 | 325 | 333 | 341 | 333 | 334 | 350 | 354 | 326.0 |
| 20-Sep | 351 | 353 | 345 | 342 | 340 | 344 | 347 | 359 | 2 | 350 | 336 | 329 | 340 | 322 | 359 | 0 | 35 | 55 | 79 | 115 | 126 | 142 | 150 | 166 | 0.4 |
| 21-Sep | 172 | 164 | 150 | 162 | 192 | 198 | 201 | 217 | 222 | 235 | 248 | 231 | 224 | 242 | 245 | 244 | 240 | 229 | 204 | 199 | 204 | 210 | 211 | 211 | 215.4 |
| 22-Sep | 214 | 206 | 199 | 196 | 199 | 199 | 200 | 203 | 211 | 217 | 217 | 221 | 226 | 221 | 224 | 199 | 198 | 187 | 176 | 177 | 186 | 175 | 171 | 179 | 201.6 |
| 23-Sep | 181 | 174 | 172 | 173 | 174 | 175 | 167 | 170 | 176 | 173 | 175 | 170 | 166 | 169 | 167 | 168 | 163 | 156 | 163 | 164 | 167 | 169 | 174 | 179 | 169.8 |
| 24-Sep | 180 | 186 | 194 | 186 | 189 | 199 | 207 | 220 | 218 | 238 | 246 | 248 | 261 | 254 | 276 | 280 | 288 | 294 | 281 | 270 | 269 | 273 | 265 | 258 | 239.5 |
| 25-Sep | 255 | 255 | 263 | 261 | 281 | 280 | 276 | 268 | 263 | 266 | 293 | 308 | 289 | 313 | 321 | 304 | 303 | 310 | 338 | 57 | 95 | 134 | 143 | 149 | 284.3 |
| 26-Sep | 149 | 153 | 155 | 163 | 161 | 160 | 164 | 160 | 169 | 168 | 179 | 184 | 188 | 198 | 188 | 172 | 161 | 158 | 149 | 160 | 166 | 172 | 175 | 174 | 170.0 |
| 27-Sep | 168 | 160 | 164 | 157 | 178 | 210 | 253 | 267 | 254 | 242 | 283 | 281 | 277 | 280 | 279 | 279 | 274 | 258 | 240 | 245 | 268 | 276 | 276 | 278 | 251.1 |
| 28-Sep | 252 | 263 | 261 | 253 | 254 | 220 | 222 | 231 | 229 | 234 | 245 | 251 | 262 | 245 | 242 | 247 | 238 | 221 | 172 | 186 | 169 | 184 | 205 | 205 | 236.0 |
| 29-Sep | 199 | 202 | 204 | 201 | 197 | 199 | 204 | 214 | 214 | 215 | 220 | 216 | 233 | 250 | 262 | 287 | 301 | 300 | 41 | 119 | 121 | 120 | 119 | 113 | 209.9 |
| 30-Sep | 115 | 114 | 109 | 89 | 64 | 43 | 54 | 46 | 34 | 29 | 25 | 19 | 18 | 19 | 18 | 18 | 12 | 17 | 17 | 19 | 24 | 31 | 27 | 24 | 27.9 |

215.7 218.3 212.8 209.1 211.6 212.4 216.4 220.0 229.7 238.6 248.5 251.0 251.4 253.9 258.4 260.5 260.2 269.6 250.0 210.3 210.1 214.7 213.3 223.7

Diurnal Average

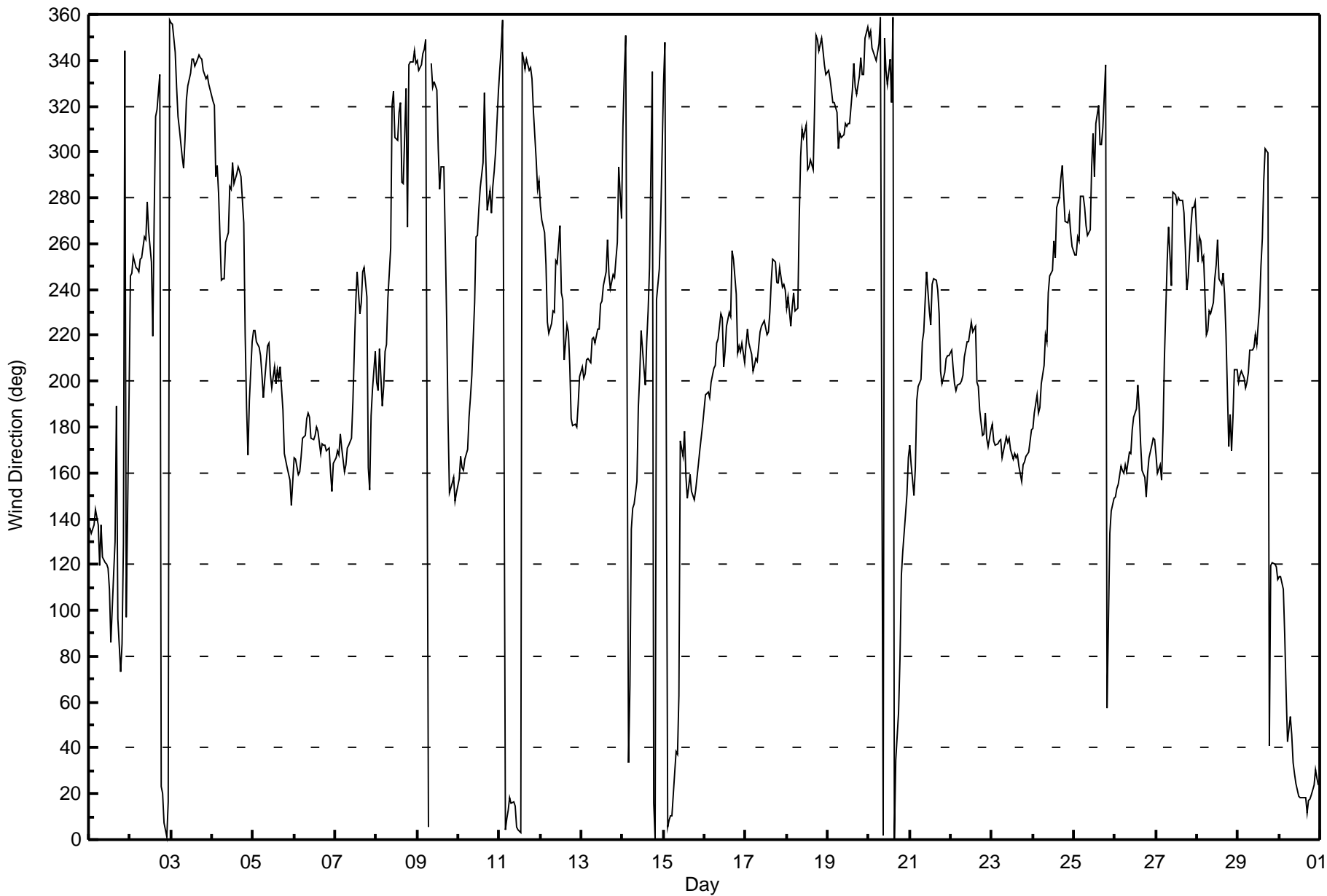
M - Maintenance

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Firebag - September 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - September 2016

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 82 deg on Sep 15 12:00 | Hours of Data: 719 |
| Minimum Value: 5 deg on Sep 29 05:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 6 P ₁₀ = 8 Q ₁ = 9 Median = 12 Q ₃ = 15 P ₉₀ = 22 P ₉₉ = 47 | 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 | 11 | 11 | 11 | 13 | 15 | 18 | 21 | 16 | 17 | 14 | 17 | 13 | 13 | 21 | 16 | 24 | 77 | 29 | 16 | 18 | 38 | 36 | 43 | 27 | 77 |
| 2-Sep | 11 | 10 | 11 | 10 | 11 | 11 | 12 | 15 | 13 | 14 | 16 | 17 | 23 | 15 | 37 | 16 | 18 | 33 | 20 | 11 | 13 | 14 | 13 | 15 | 37 |
| 3-Sep | 15 | 15 | 13 | 12 | 12 | 12 | 12 | 13 | 12 | 12 | 12 | 12 | 12 | 13 | 13 | 12 | 12 | 13 | 13 | 12 | 12 | 13 | 11 | 11 | 15 |
| 4-Sep | 11 | 11 | 11 | 9 | 17 | 7 | 8 | 10 | 13 | 14 | 14 | 15 | 19 | 21 | 21 | 21 | 17 | 13 | 23 | 12 | 14 | 8 | 18 | 10 | 23 |
| 5-Sep | 7 | 7 | 8 | 8 | 9 | 7 | 9 | 11 | 19 | 18 | 16 | 15 | 17 | 22 | 24 | 24 | 14 | 15 | 17 | 8 | 9 | 14 | 10 | 10 | 24 |
| 6-Sep | 10 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 13 | 12 | 12 | 10 | 13 | 17 | 14 | 16 | 8 | 9 | 8 | 9 | 9 | 11 | 8 | 17 |
| 7-Sep | 8 | 8 | 8 | 9 | 11 | 12 | 8 | 11 | 15 | 16 | 21 | 32 | 42 | 31 | 30 | 32 | 47 | 11 | 52 | 19 | 13 | 14 | 7 | 15 | 52 |
| 8-Sep | 16 | 18 | 16 | 15 | 16 | 15 | 11 | 12 | 18 | 28 | 41 | 25 | 23 | 30 | 17 | 13 | 13 | 23 | 61 | 24 | 10 | 14 | 13 | 12 | 61 |
| 9-Sep | 12 | 14 | 15 | 16 | 12 | 14 | 14 | M | 14 | 13 | 15 | 21 | 29 | 33 | 28 | 37 | 42 | 12 | 17 | 9 | 10 | 10 | 10 | 10 | 42 |
| 10-Sep | 10 | 8 | 8 | 9 | 11 | 9 | 9 | 10 | 13 | 13 | 14 | 12 | 15 | 13 | 15 | 16 | 21 | 12 | 12 | 11 | 11 | 12 | 16 | 14 | 21 |
| 11-Sep | 13 | 12 | 15 | 16 | 15 | 14 | 14 | 13 | 14 | 13 | 15 | 16 | 17 | 19 | 13 | 14 | 12 | 11 | 12 | 14 | 12 | 12 | 10 | 13 | 19 |
| 12-Sep | 11 | 10 | 7 | 28 | 16 | 9 | 13 | 9 | 13 | 20 | 26 | 29 | 28 | 24 | 16 | 17 | 16 | 13 | 8 | 8 | 8 | 8 | 10 | 8 | 29 |
| 13-Sep | 10 | 7 | 8 | 10 | 9 | 10 | 9 | 10 | 12 | 10 | 11 | 11 | 12 | 12 | 13 | 14 | 14 | 9 | 9 | 11 | 9 | 11 | 18 | 17 | 18 |
| 14-Sep | 13 | 10 | 11 | 74 | 22 | 23 | 27 | 12 | 16 | 14 | 17 | 20 | 25 | 21 | 23 | 15 | 19 | 40 | 11 | 43 | 16 | 7 | 16 | 14 | 74 |
| 15-Sep | 16 | 21 | 10 | 11 | 16 | 13 | 14 | 14 | 16 | 36 | 61 | 82 | 64 | 23 | 20 | 14 | 14 | 10 | 12 | 11 | 9 | 9 | 8 | 9 | 82 |
| 16-Sep | 8 | 8 | 7 | 9 | 6 | 7 | 8 | 9 | 10 | 10 | 10 | 10 | 14 | 14 | 12 | 12 | 15 | 10 | 12 | 9 | 9 | 9 | 8 | 7 | 15 |
| 17-Sep | 10 | 10 | 8 | 11 | 8 | 10 | 9 | 9 | 10 | 11 | 10 | 11 | 12 | 12 | 12 | 11 | 10 | 9 | 7 | 7 | 7 | 6 | 8 | 7 | 12 |
| 18-Sep | 7 | 15 | 17 | 9 | 20 | 17 | 13 | 11 | 19 | 22 | 20 | 16 | 14 | 14 | 13 | 13 | 15 | 15 | 12 | 13 | 13 | 13 | 13 | 12 | 22 |
| 19-Sep | 12 | 13 | 11 | 13 | 12 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 16 | 13 | 13 | 12 | 11 | 12 | 13 | 11 | 13 | 13 | 13 | 16 |
| 20-Sep | 12 | 12 | 12 | 12 | 12 | 11 | 16 | 15 | 22 | 20 | 37 | 22 | 51 | 48 | 39 | 43 | 35 | 13 | 12 | 15 | 12 | 11 | 9 | 12 | 51 |
| 21-Sep | 8 | 11 | 7 | 12 | 13 | 6 | 11 | 9 | 11 | 18 | 16 | 15 | 18 | 23 | 16 | 19 | 16 | 11 | 7 | 6 | 8 | 9 | 8 | 10 | 23 |
| 22-Sep | 9 | 9 | 7 | 6 | 6 | 6 | 7 | 8 | 9 | 11 | 12 | 13 | 13 | 15 | 14 | 12 | 12 | 9 | 7 | 8 | 8 | 9 | 8 | 9 | 15 |
| 23-Sep | 8 | 8 | 9 | 8 | 8 | 8 | 9 | 9 | 9 | 10 | 9 | 10 | 10 | 10 | 10 | 10 | 9 | 11 | 10 | 9 | 9 | 10 | 10 | 9 | 11 |
| 24-Sep | 9 | 8 | 8 | 9 | 9 | 7 | 11 | 10 | 11 | 12 | 11 | 13 | 15 | 13 | 13 | 13 | 15 | 11 | 20 | 8 | 9 | 8 | 8 | 8 | 20 |
| 25-Sep | 7 | 8 | 14 | 12 | 15 | 10 | 11 | 14 | 12 | 13 | 15 | 17 | 18 | 21 | 22 | 21 | 17 | 11 | 28 | 14 | 23 | 8 | 6 | 5 | 28 |
| 26-Sep | 6 | 7 | 8 | 7 | 8 | 9 | 9 | 8 | 9 | 9 | 11 | 10 | 11 | 12 | 15 | 11 | 11 | 10 | 10 | 9 | 8 | 8 | 10 | 9 | 15 |
| 27-Sep | 9 | 9 | 10 | 9 | 13 | 14 | 21 | 16 | 10 | 10 | 18 | 15 | 13 | 14 | 14 | 13 | 14 | 16 | 7 | 9 | 11 | 9 | 8 | 15 | 21 |
| 28-Sep | 7 | 9 | 9 | 8 | 10 | 9 | 9 | 8 | 9 | 11 | 14 | 14 | 16 | 20 | 18 | 18 | 20 | 16 | 12 | 6 | 11 | 9 | 8 | 8 | 20 |
| 29-Sep | 5 | 7 | 7 | 6 | 5 | 6 | 7 | 8 | 10 | 12 | 17 | 17 | 22 | 23 | 44 | 31 | 21 | 8 | 42 | 32 | 8 | 8 | 11 | 14 | 44 |
| 30-Sep | 8 | 20 | 17 | 29 | 26 | 7 | 5 | 8 | 9 | 10 | 12 | 12 | 14 | 14 | 12 | 12 | 13 | 12 | 11 | 11 | 11 | 11 | 10 | 11 | 29 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 16 | 21 | 17 | 74 | 26 | 23 | 27 | 16 | 22 | 36 | 61 | 82 | 64 | 48 | 44 | 43 | 77 | 40 | 61 | 43 | 38 | 36 | 43 | 27 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 15, 2016 | Last Calibration | August 18, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Reason: | Routine | | |
| Start Time (MST) | 10:05 | End Time (MST) | 15:28 |
| Gas Cert Reference | SA130123A | Station temp. | 22 Deg C |
| Cal Gas Concentration | 49.3 ppm | Cal Gas Exp Date | December 12, 2016 |
| Calibrator Make/Model | API T700 | Serial Number | 996 |
| ZAG Make/Model | API 701 | Serial Number | 4891 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 6466 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -606 | -605 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 791 | 791 |
| Calculated slope | 1.000002 | 0.999679 | Chamber temp | 45.0 | 44.9 |
| Calculated intercept | -1.491041 | 0.040504 | Pressure | 689.5 | 684.4 |
| Analyzer Background | 7.7 | 8.7 | Flow | 0.415 | 0.412 |
| Analyzer Coefficient | 0.989 | 0.979 | Intensity | 90 | 90 |

Analyzer make Thermo 43i Analyzer serial # 1410661308

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 5000 | 58.3 | 574.8 | 583.8 | 0.985 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 58.3 | 574.8 | 575.2 | 0.999 |
| second point | 5000 | 29.3 | 288.9 | 288.1 | 1.003 |
| third point | 5000 | 14.7 | 144.9 | 145.7 | 0.995 |
| as left zero | 5000 | 0.0 | 0.0 | -0.4 | ---- |
| as left span | 5000 | 58.3 | 574.8 | 573.4 | 1.002 |
| Average Correction Factor | | | | | 0.999 |

Corrected As found 583.3 Previous response 576.3 % change -1.2%

Notes:

Inlet filter changed after as founds. Zero and span adjusted.

Calibration Performed By: Jayne Marcoux



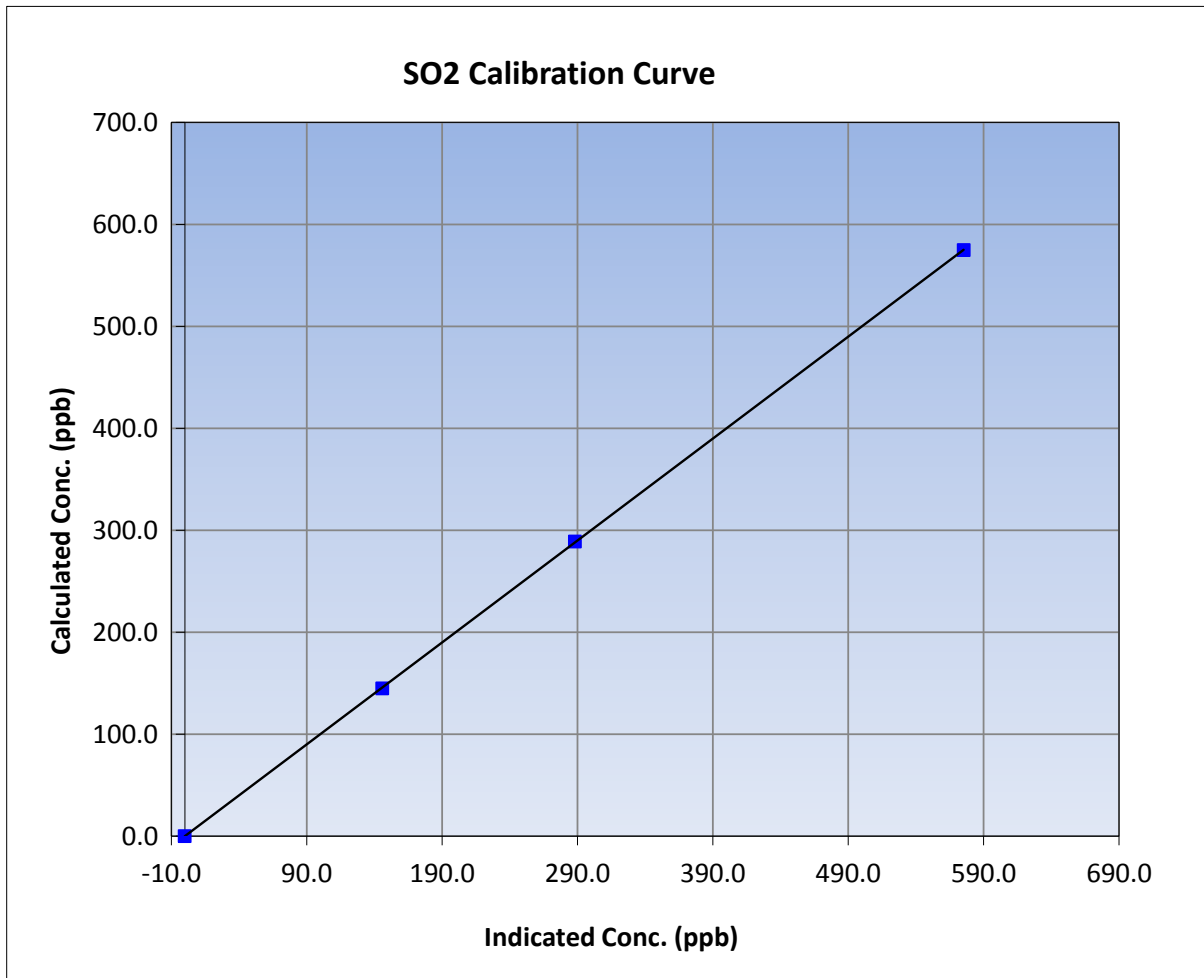
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 18, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:28 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1410661308 |

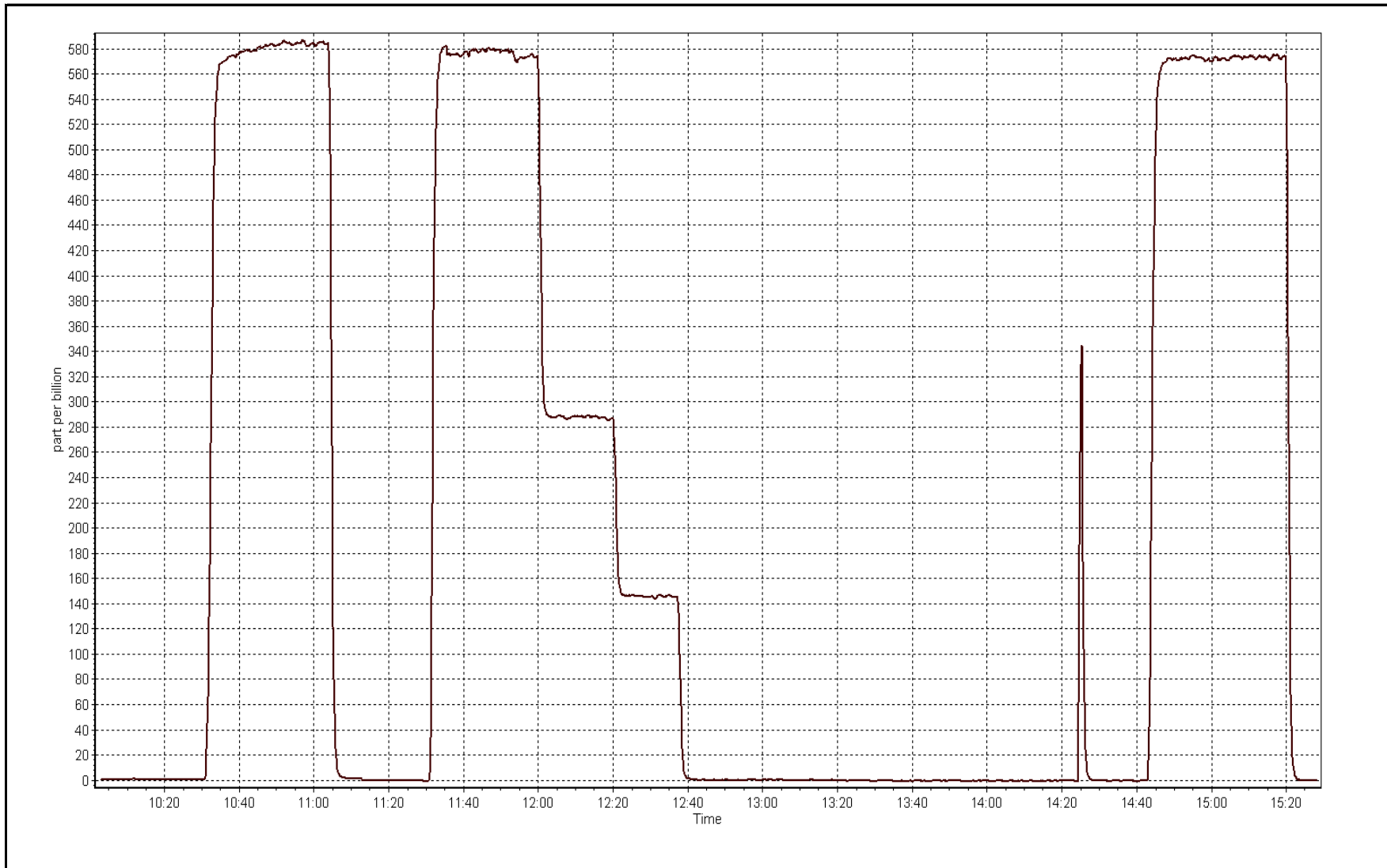
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999993 |
| 574.8 | 575.2 | 0.9994 | | |
| 288.9 | 288.1 | 1.0027 | Slope | 0.999679 |
| 144.9 | 145.7 | 0.9947 | | |
| | | | Intercept | 0.040504 |



SO2 Calibration Plot

Date: September 15, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-----------------------------|
| Calibration Date | September 19, 2016 | Last Calibration | August 19, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Reason: | Routine | | |
| Start Time (MST) | 10:05 | End Time (MST) | 13:10 |
| Gas Cert Reference | ALM066720 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 4.85 ppm | Cal Gas Exp Date | June 10, 2014 |
| Calibrator Make/Model | API T700 | Serial Number | 996 |
| ZAG air Make/Model | API 701 | Serial Number | 4891 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 6466 |
| SO2 gas concentration | 49.3 ppm | SO2 gas cert/exp | SA130123A December 12, 2016 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -574 | -574 |
| Analyzer IP address | 192.168.1.45 | | Lamp voltage | 934 | 931 |
| Calculated slope | 1.005086 | 1.002364 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.728721 | -0.623268 | Pressure | 531.3 | 532.2 |
| Analyzer Background | 13.1 | 13.1 | Flow | 0.946 | 0.946 |
| Analyzer Coefficient | 1.149 | 1.149 | Intensity | 85 | 86 |
| | | | Converter temp. | 337 | 336 |

| | | | |
|----------------------|-------------|--------------------|-----------|
| Analyzer make/model | Thermo 450i | Analyzer serial # | 815129098 |
| Converter make/model | NA | Converter serial # | NA |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 5000 | 83.3 | 80.8 | 81.1 | 0.996 |
| SO2 scrubber check | 5000 | 15.2 | 149.9 | 1.6 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 5000 | 83.3 | 80.8 | 81.1 | 0.996 |
| second point | 5000 | 41.8 | 40.5 | 41.2 | 0.984 |
| third point | 5000 | 21.0 | 20.4 | 21.1 | 0.965 |
| as left zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as left span | 5000 | 83.4 | 80.9 | 84.5 | 0.957 |
| Average Correction Factor | | | | | 0.982 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 80.7 | Previous response | 81.1 | % change | 0.5% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Inlet filter changed after as founds. Scrubber check completed after as founds. No adjustments made.

Calibration Performed By: Jayme Marcoux



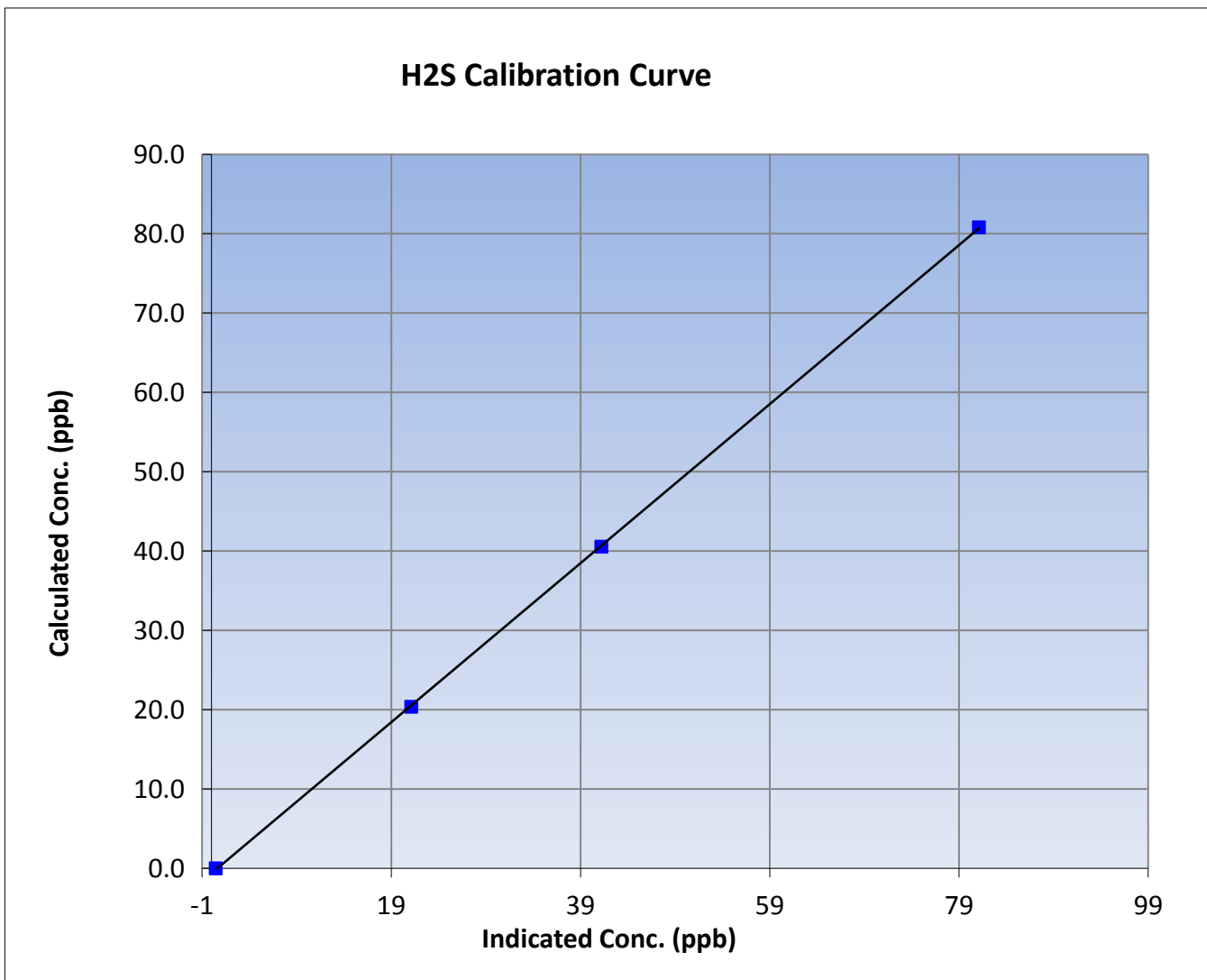
Wood Buffalo Environmental Association H2S Calibration Report

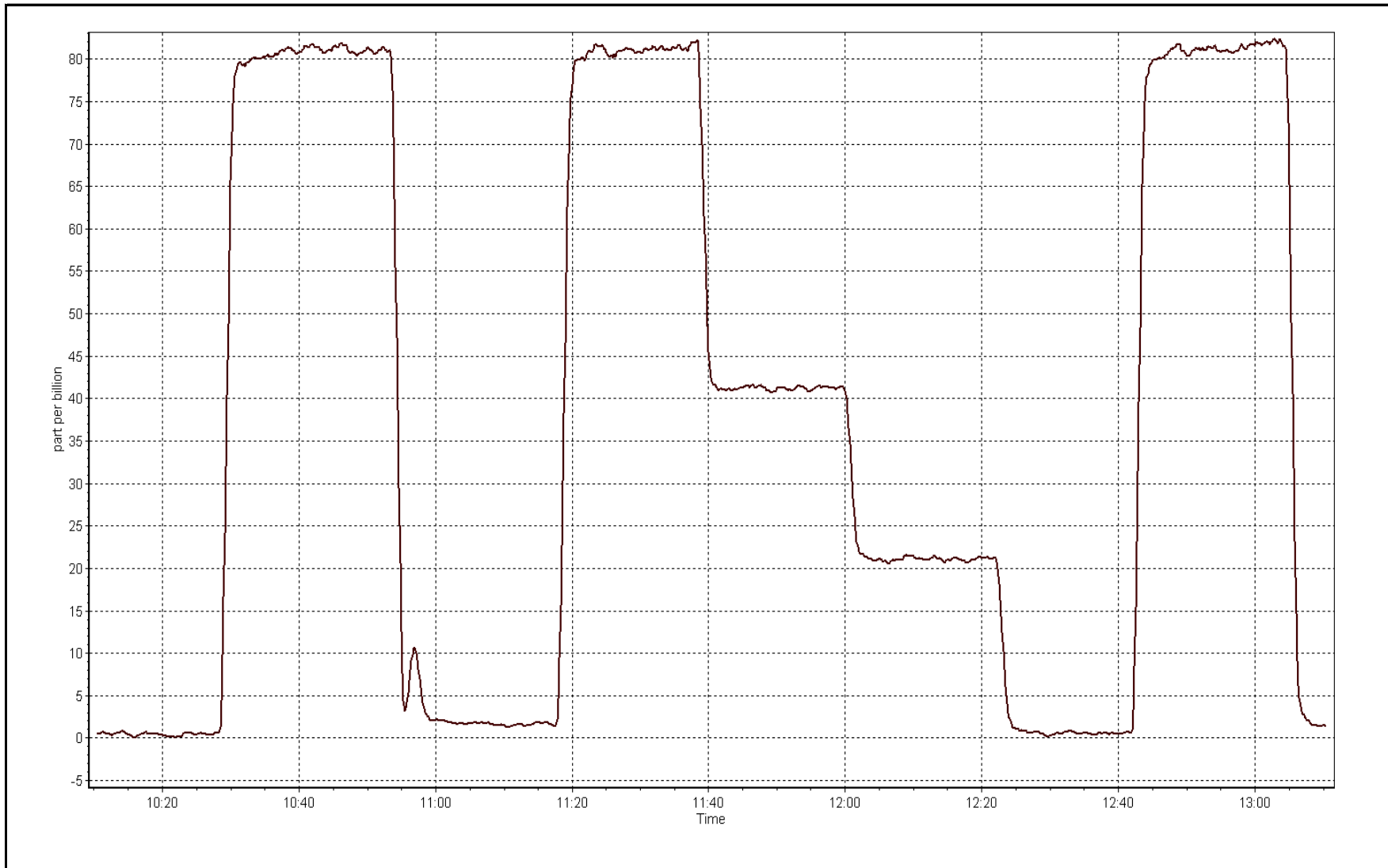
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 19, 2016 | Previous Calibration | August 19, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 10:05 | End Time (MST) | 13:10 |
| Analyzer make | Thermo 450i | Analyzer serial # | 815129098 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999973 |
| 80.8 | 81.1 | 0.9961 | | |
| 40.5 | 41.2 | 0.9839 | Slope | 1.002364 |
| 20.4 | 21.1 | 0.9649 | | |
| | | | Intercept | -0.623268 |







Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|-------------------|
| Calibration Date | September 15, 2016 | Last Calibration | August 18, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Reason: | Routine | | |
| Start Time (MST) | 10:05 | End Time (MST) | 15:30 |
| Gas Cert Reference | SA130123A | Cal Gas Expiry Date | December 12, 2016 |
| CH4 Cal Gas Conc. | 512 ppm | CH4 Equiv Conc. | 1092.3 ppm |
| C3H8 Cal Gas Conc. | 211 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 996 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4891 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 6466 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 8.6 | 8.6 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 34.9 | 29.5 |
| Calculated slope | 1.000695 | 1.001398 | Fuel Pressure | 23.0 | 23.0 |
| Calculated intercept | -0.004525 | -0.068539 | Analyzer Coeff | 3.586 | 3.582 |
| | | | Analyzer BKG | 4.860 | 4.720 |

Analyzer make Thermo 51i-LT Analyzer serial # 1336160089

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | -0.13 | ---- |
| as found span | 5000 | 58.3 | 12.74 | 12.62 | 1.009 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.05 | ---- |
| high point | 5000 | 58.3 | 12.74 | 12.78 | 0.997 |
| second point | 5000 | 29.3 | 6.40 | 6.46 | 0.991 |
| third point | 5000 | 14.7 | 3.21 | 3.30 | 0.973 |
| as left zero | 5000 | 0.0 | 0.00 | 0.14 | ---- |
| as left span | 5000 | 58.3 | 12.74 | 13.13 | 0.970 |
| Average Correction Factor | | | | | 0.987 |

Corrected As found 12.75 Previous response 12.73 % change -0.1%

Notes:

Installed new Hydrogen cylinder after as founds. Zero and span adjusted. For a few minutes, the door was open during the high point and appears to have affected the point. During as lefts, air pressure dropped and then rose slightly. Still lower than expected value.

Calibration Performed By:

Jayne Marcoux



Wood Buffalo Environmental Association THC Calibration Report

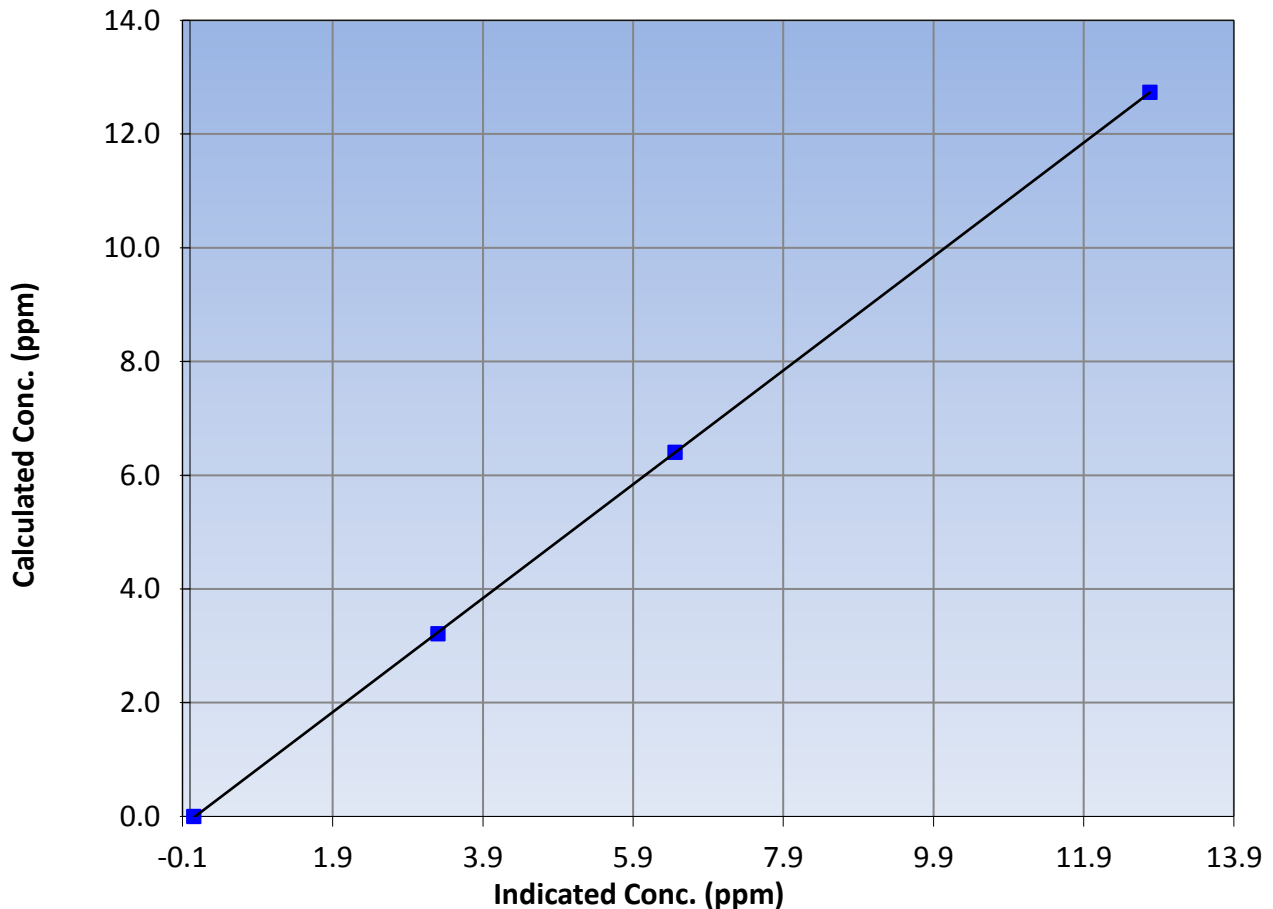
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 18, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:30 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1336160089 |

Calibration Data

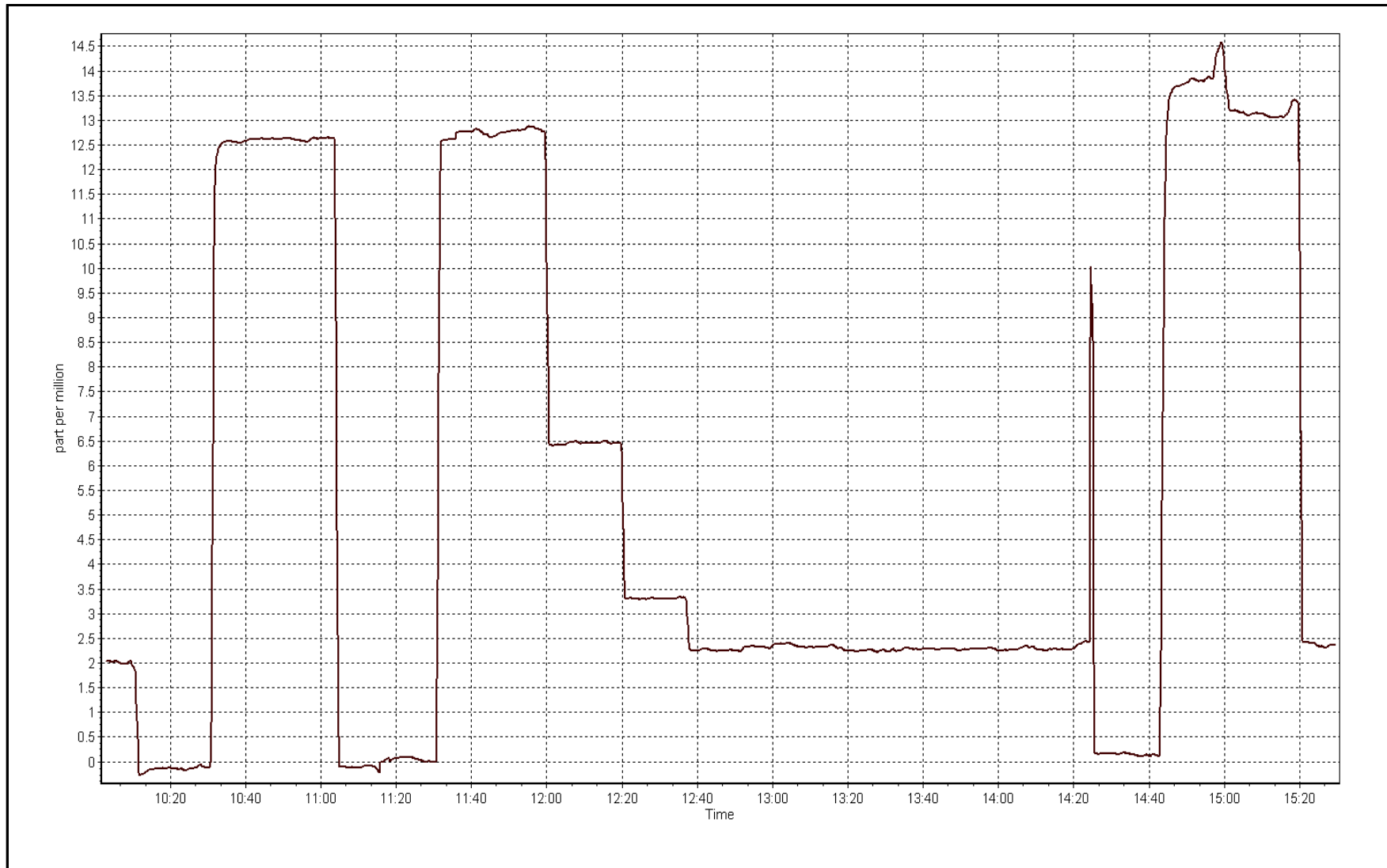
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.05 | ---- | Correlation Coefficient | 0.999989 |
| 12.74 | 12.78 | 0.9965 | | |
| 6.40 | 6.46 | 0.9908 | Slope | 1.001398 |
| 3.21 | 3.30 | 0.9731 | | |
| | | | Intercept | -0.068539 |

THC Calibration Curve



THC Calibration Plot

Date: September 15, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|--------------------|
| Calibration Date | September 21, 2016 | Last Calibration | September 15, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Reason: | Routine | | |
| Start Time (MST) | 11:43 | End Time (MST) | 13:46 |
| Gas Cert Reference | SA130123A | Cal Gas Expiry Date | December 12, 2016 |
| CH4 Cal Gas Conc. | 512 ppm | CH4 Equiv Conc. | 1092.3 ppm |
| C3H8 Cal Gas Conc. | 211 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 996 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4891 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 6466 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 8.6 | 8.6 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 34.9 | 29.5 |
| Calculated slope | 1.000695 | 0.999672 | Fuel Pressure | 23.0 | 23.0 |
| Calculated intercept | -0.004525 | -0.026298 | Analyzer Coeff | 3.582 | 3.582 |
| | | | Analyzer BKG | 4.720 | 4.720 |

Analyzer make Thermo 51i-LT Analyzer serial # 1336160089

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 58.3 | 12.74 | 12.76 | 0.998 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 58.3 | 12.74 | 12.76 | 0.998 |
| second point | 5000 | 29.3 | 6.40 | 6.42 | 0.997 |
| third point | 5000 | 14.7 | 3.21 | 3.28 | 0.979 |
| as left zero | 5000 | 0.0 | 0.00 | 0.06 | ---- |
| as left span | 5000 | 58.3 | 12.74 | 12.90 | 0.987 |
| Average Correction Factor | | | | | 0.991 |

Corrected As found 12.76 Previous response 12.73 % change -0.2%

Notes:

No adjustments made. Air pressure remained stable throughout calibration.

Calibration Performed By:

Jayne Marcoux



Wood Buffalo Environmental Association THC Calibration Report

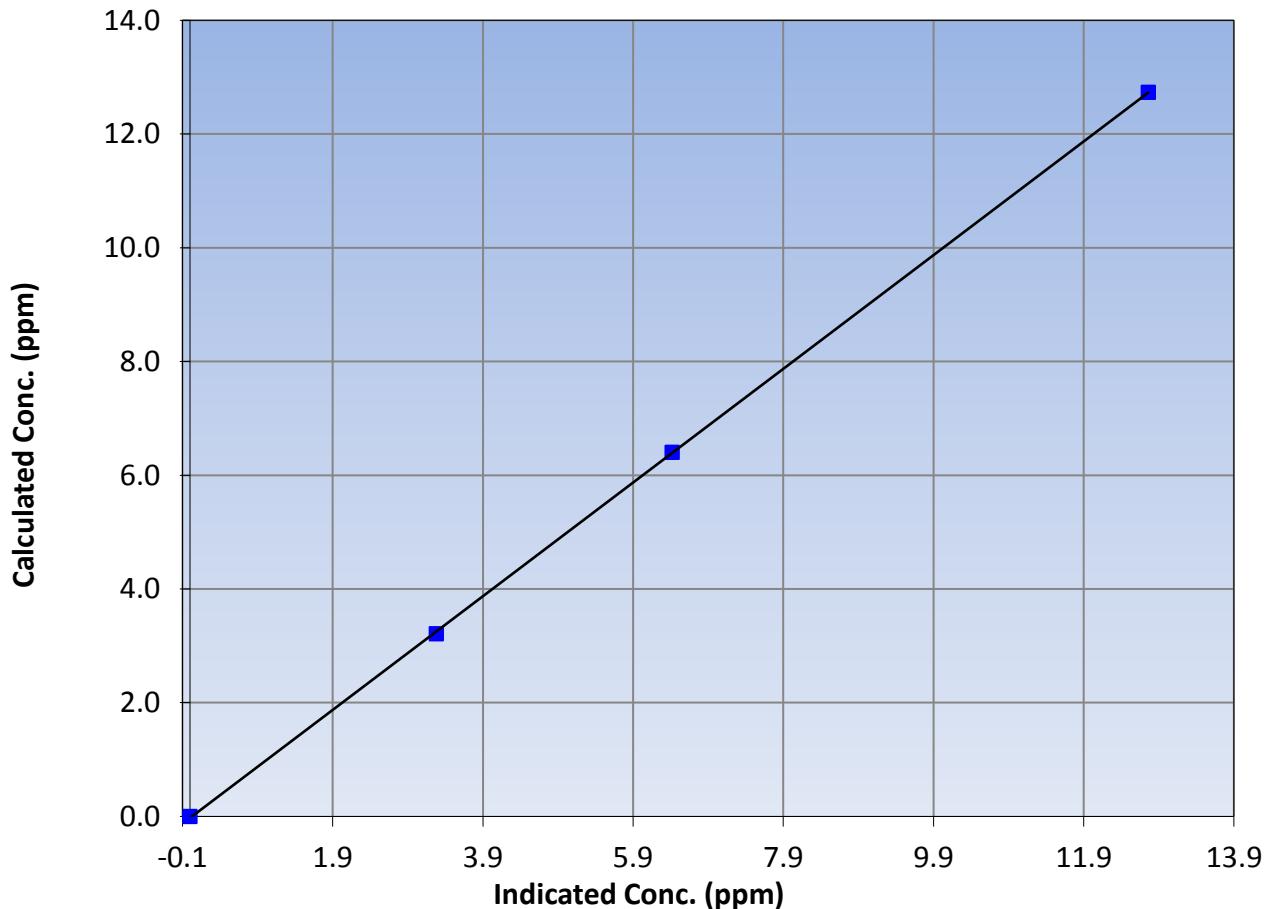
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 15, 2016 | Previous Calibration | September 15, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 11:43 | End Time (MST) | 13:46 |
| Analyzer make | Thermo 51i-LT | Analyzer serial # | 1336160089 |

Calibration Data

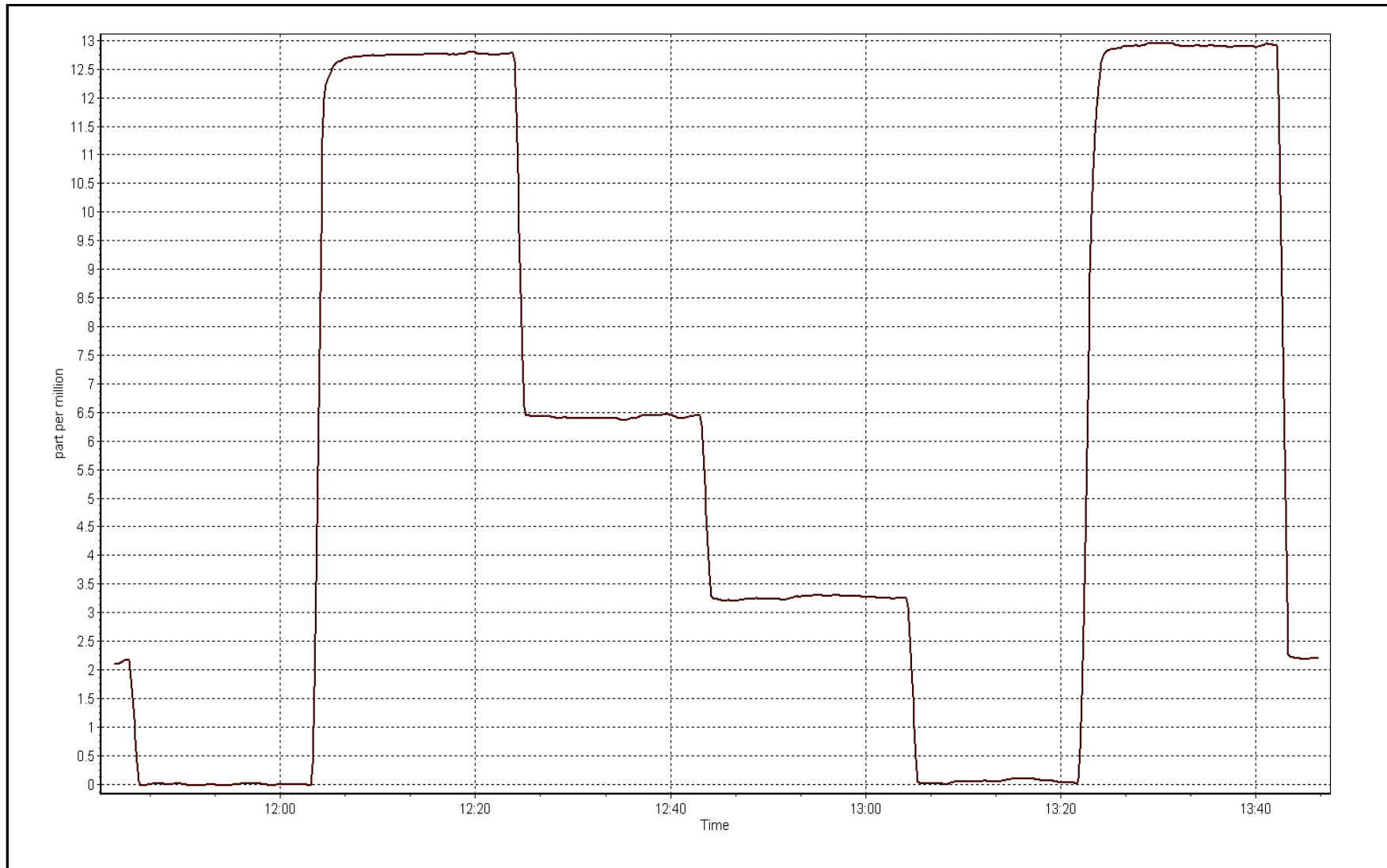
| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999972 |
| 12.74 | 12.76 | 0.9981 | | |
| 6.40 | 6.42 | 0.9970 | Slope | 0.999672 |
| 3.21 | 3.28 | 0.9790 | | |
| | | | Intercept | -0.026298 |

THC Calibration Curve



THC Calibration Plot

Date: September 21, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 18, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Reason: | Routine | | |
| Start Time (MST) | 10:05 | End Time (MST) | 15:28 |
| NO Cal Gas Conc | 51.5 ppm | Gas Cert Reference | SA130123A |
| NOx Cal Gas Conc | 51.5 ppm | Cal Gas Expiry Date | December 12, 2016 |
| Calibrator | API T700 | Serial Number | 996 |
| Zero air Generator | Teledyne API T701 | Serial Number | 4891 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 6466 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|-----------|-----------|-----------|
| As Found (last calibration results) | Data Slope | 1.000592 | 1.000618 | 1.001018 |
| | Data Offset | -0.881408 | -0.985720 | -0.316202 |
| Current Calibration | Data Slope | 0.999208 | 0.998603 | 0.995433 |
| | Data Offset | -1.077960 | -0.955208 | -1.779824 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1410661309 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.43 | | 192.168.1.43 | |
| NO coefficient | 1.126 | | 1.168 | |
| NOx coefficient | 1.000 | | 1.000 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 5.1 | | 5.3 | |
| NOx bkgrnd | 5.2 | | 5.4 | |
| Chamber Temp | 50.6 | Deg C | 50.5 | Deg C |
| Moly Temp | 326.8 | Deg C | 327.6 | Deg C |
| PMT voltage | -780.3 | V | -780.3 | V |
| PMT Temp | -2.9 | Deg C | -2.7 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 199.1 | mmHg | 194.5 | mmHg |
| R Cell Press Nox | 198.8 | mmHg | 194.5 | mmHg |
| NO sample flow | 0.502 | lpm | 0.505 | lpm |
| Nox sample Flow | 0.501 | lpm | 0.505 | lpm |

Notes:

Inlet filter changed after as founds. Adjusted zero and span. Had the door open for a bit to move hydrogen cylinder outside. Appeared to affect the high point.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

September 15, 2016

Station Number:

AMS 19

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.3 | -0.1 | ---- | ---- |
| as found span | 5000 | 58.3 | 600.5 | 600.5 | 0.0 | 577.8 | 577.4 | 0.5 | 1.0392 | 1.0400 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.3 | -0.1 | ---- | ---- |
| high point | 5000 | 58.3 | 600.5 | 600.5 | 0.0 | 601.3 | 601.7 | -0.4 | 0.9986 | 0.9981 |
| second point | 5000 | 29.3 | 301.8 | 301.8 | 0.0 | 303.9 | 303.8 | 0.0 | 0.9932 | 0.9933 |
| third point | 5000 | 14.7 | 151.4 | 151.4 | 0.0 | 154.0 | 153.8 | 0.2 | 0.9832 | 0.9847 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.2 | 0.0 | ---- | ---- |
| as left span | 5000 | 58.3 | 600.5 | 306.2 | 294.3 | 605.5 | 304.1 | 301.4 | 0.9918 | 1.0066 |
| Average Correction Factor | | | | | | | | | 0.9917 | 0.9920 |

Corrected As found
Previous Response

NO_x= 578.3
NO_x= 601.0

NO= 577.7
NO= 601.1

Percent Change

NO_x= 3.9%

NO= 4.0%

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 58.30 ccm NOx ref calc conc = 600.5 ppb NO ref calc conc = 600.5 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 599.1 | 598.1 | -0.1 | 1.0023 | 1.0040 | ---- | ---- |
| 1st NO2 (300) | 306.2 | 292.0 | 599.6 | 306.2 | 293.4 | 1.0015 | ---- | 0.9950 | 100.5% |
| 2nd NO2 (200) | 402.3 | 195.8 | 602.0 | 402.3 | 199.8 | 0.9975 | ---- | 0.9801 | 102.0% |
| 3rd NO2 (100) | 500.1 | 98.1 | 602.6 | 500.1 | 102.5 | 0.9965 | ---- | 0.9565 | 104.5% |
| 2nd NO ref point | ---- | 0.0 | 603.9 | 603.1 | 0.8 | 0.9944 | 0.9957 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9975 | | 0.9772 | 102.4% |

Calibration Performed By: Jayne Marcoux



Wood Buffalo Environmental Association

NO_x Calibration Summary

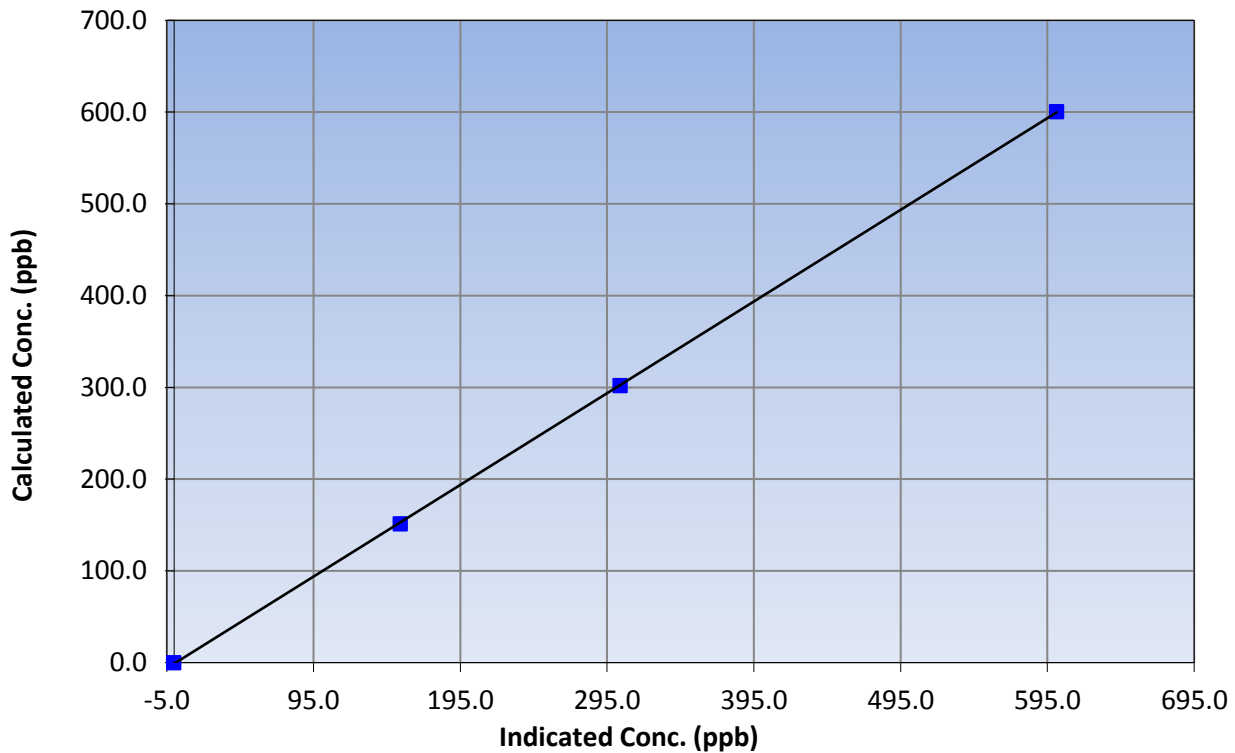
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 18, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:28 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661309 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | 0.999975 |
| 600.5 | 601.3 | 0.9986 | | |
| 301.8 | 303.9 | 0.9932 | Slope | 0.999208 |
| 151.4 | 154.0 | 0.9832 | | |
| | | | Intercept | -1.077960 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

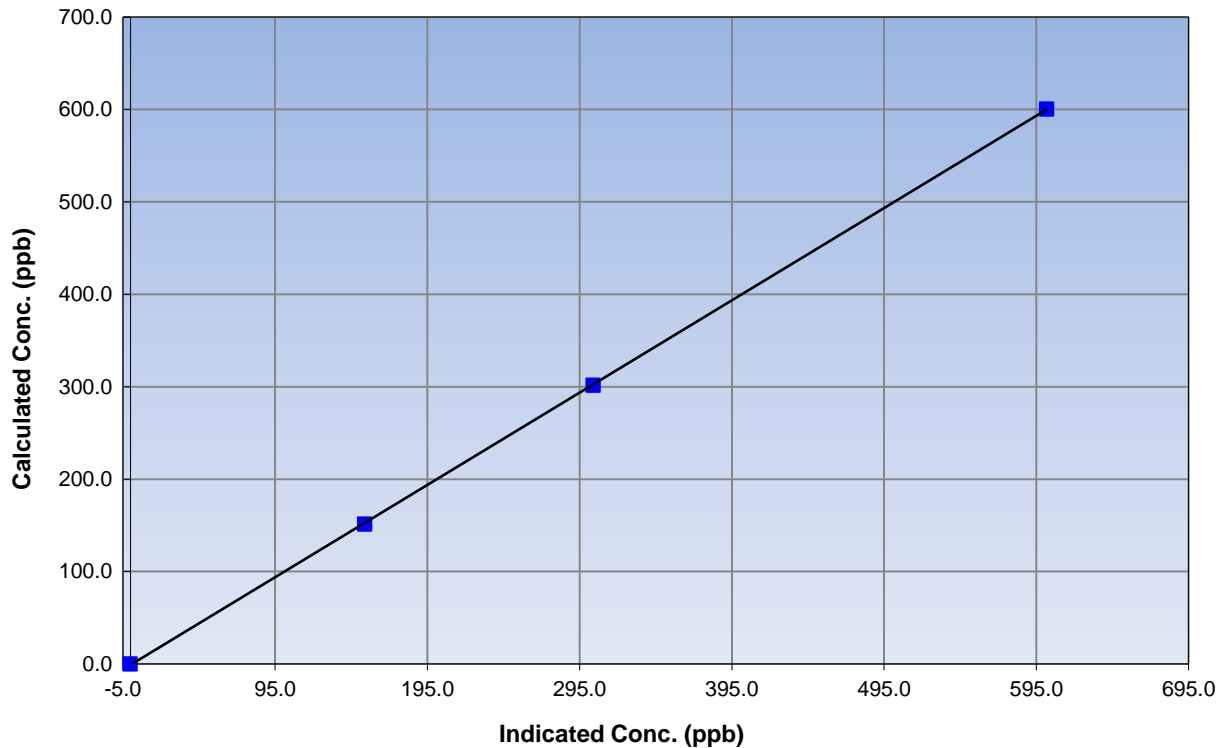
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 18, 2016 |
| Station Name | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:28 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661309 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.3 | N/A | Correlation Coefficient | 0.999981 |
| 600.5 | 601.7 | 0.9981 | | |
| 301.8 | 303.8 | 0.9933 | Slope | 0.998603 |
| 151.4 | 153.8 | 0.9847 | | |
| | | | Intercept | -0.955208 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

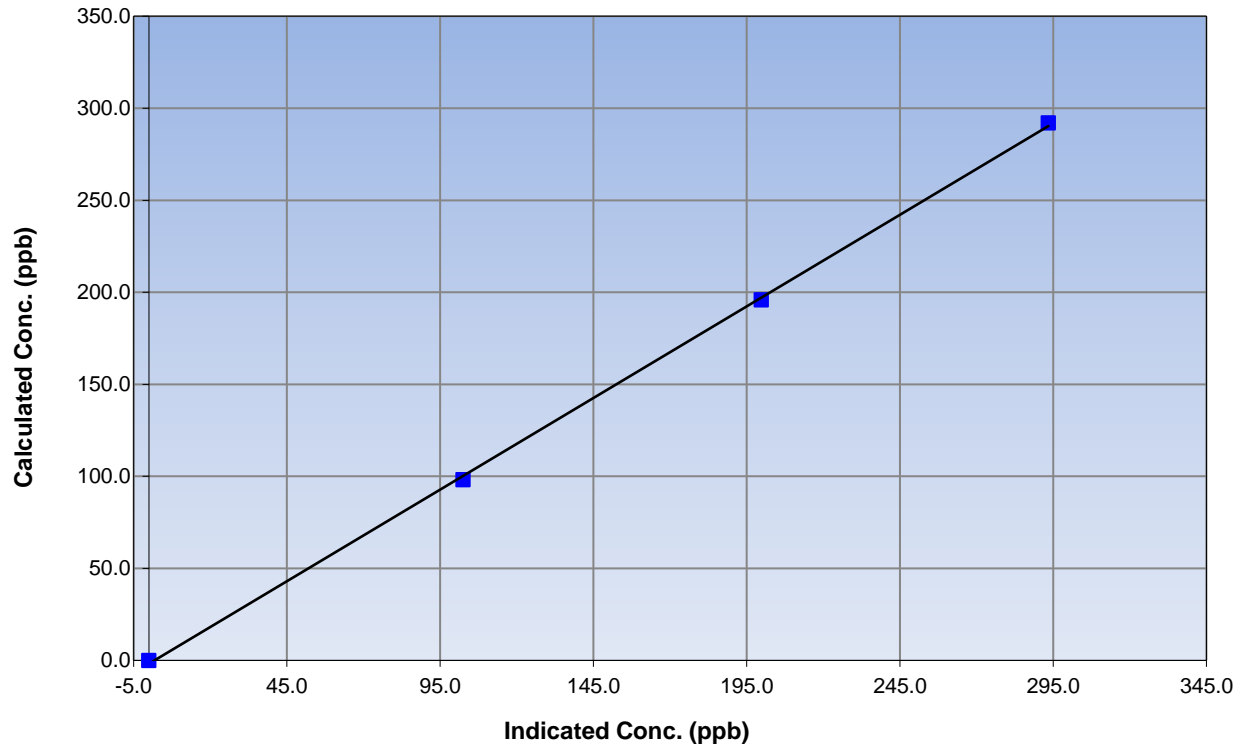
Station Information

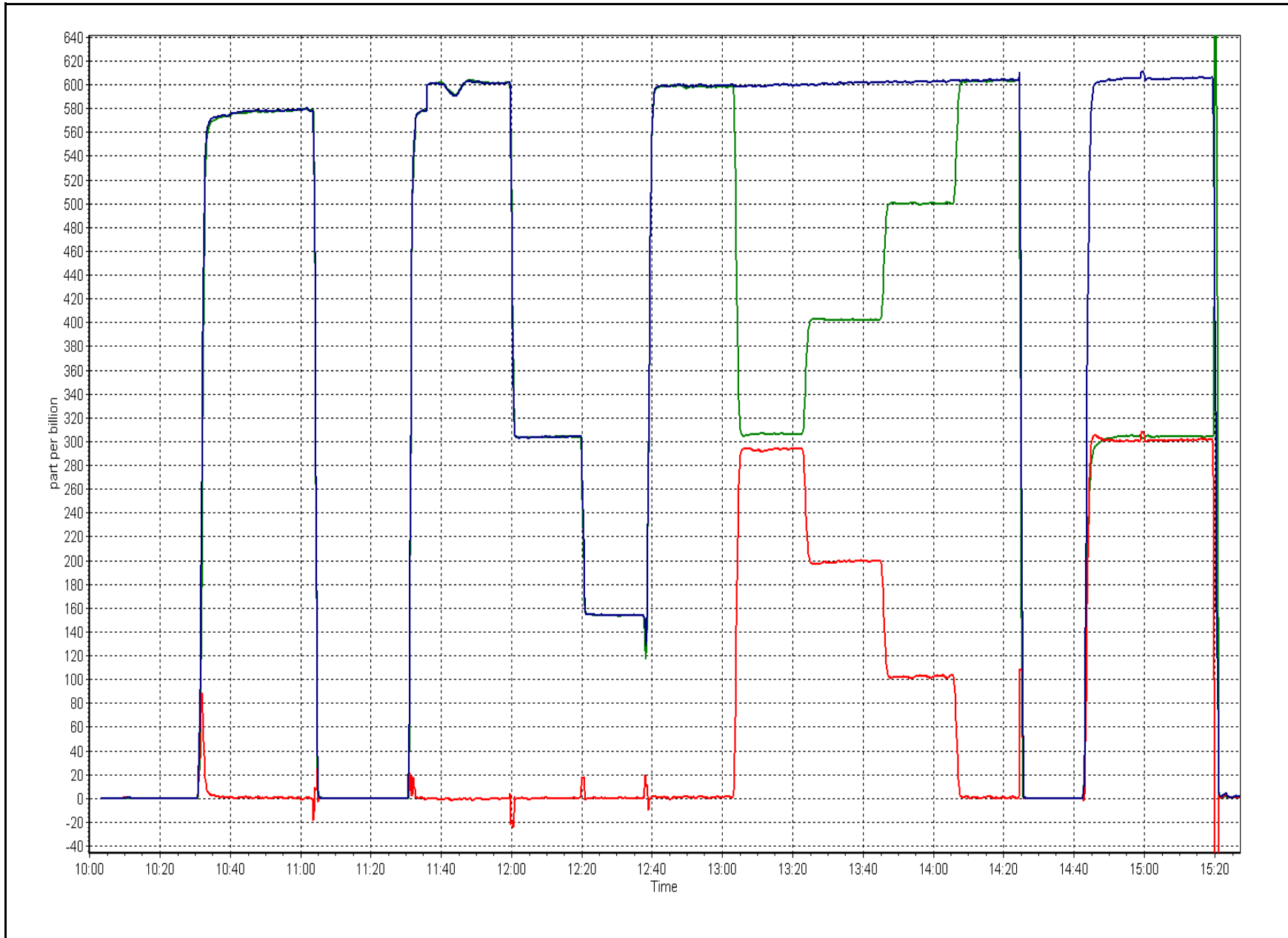
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 18, 2016 |
| Station Number | Firebag | Station Number | AMS 19 |
| Start Time (MST) | 10:05 | End Time (MST) | 15:28 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1410661309 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999732 |
| 292.0 | 293.4 | 0.9950 | | |
| 195.8 | 199.8 | 0.9801 | Slope | 0.995433 |
| 98.1 | 102.5 | 0.9565 | | |
| | | | Intercept | -1.779824 |

NO₂ Calibration Curve







WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 20
BRION MACKAY RIVER
SEPTEMBER 2016

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 680 | 40 | 40 | 100.00 | 6 | 0 | 1 | 0 |
| H2S (ppb) Average | 684 | 36 | 36 | 100.00 | 0 | 0 | 0 | 0 |
| THC (ppm) Average | 683 | 37 | 37 | 100.00 | 2.5 | - | 2.3 | - |
| NO2 (ppb) Average | 681 | 39 | 39 | 100.00 | 15 | 0 | 4 | - |
| NO (ppb) Average | 681 | 39 | 39 | 100.00 | 5 | - | 1 | - |
| NOX (ppb) Average | 681 | 39 | 39 | 100.00 | 15 | - | 5 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 22.8 | - | 14.1 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 97 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 19 | - | 12 | - |
| 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 - BRION MACKAY RIVER (AMS 20)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|-----|--------|------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max | |
| SO2 (ppb) Average | 680 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| H2S (ppb) Average | 684 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| THC (ppm) Average | 683 | 2.14 | 0.1 | - | 1.9 | 2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.5 |
| NO2 (ppb) Average | 681 | 0.7 | 1 | - | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 15 |
| NO (ppb) Average | 681 | 0.1 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| NOX (ppb) Average | 681 | 0.8 | 2 | - | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 15 |
| Temperature 2 m (C) Average | 720 | 9.7 | 4.9 | - | -2.3 | 3.5 | 6.1 | 9.5 | 13.2 | 15.8 | 15.8 | 22.8 |
| Relative Humidity (%) Average | 720 | 73.9 | 20 | - | 27 | 44 | 59 | 78 | 92 | 96 | 96 | 99 |
| Wind Speed 10 m (km/h) Average | 719 | 7.1 | 3 | - | 0 | 3 | 5 | 6 | 9 | 12 | 12 | 19 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BRION MACKAY RIVER (AMS 20)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|-----------------------------------|
| Wind Speed, Wind Direction | 14 Sep 2016 03:00 | 14 Sep 2016 03:00 | 1 | Flat line in sensor output signal |



| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 6 ppb on Sep 20 20:00 | Maximum Daily Average: 0.9 ppb on Sep 20 | | Hours of Data: | 680 |
| Minimum Value: 0 ppb on Sep 1 21:00 | Minimum Daily Average: 0.0 ppb on Sep 7 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 0.3 ppb at hour 10 | Minimum Diurnal Average: 0.0 ppb at hour 7 | | Hours of Calibration: | 40 |
| Monthly Average: 0.1 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 2 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 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 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 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 | 0.1 | 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 | 0.0 | 0 |
| 5-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 | 0.2 | 1 |
| 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 | 0.0 | 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 | 0.0 | 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 | 0.0 | 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 | 0.0 | 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 | 0.1 | 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 | 0.1 | 0 |
| 14-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 | 0.1 | 1 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 2 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 |
| 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 | 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 | 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 | 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 | 5 | 6 | 4 | 2 | 2 | 1 | 0.9 | 6 | |
| 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 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 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 | 0.0 | 0 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 27-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 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 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 | 0.1 | 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 | 0.1 | 0 |

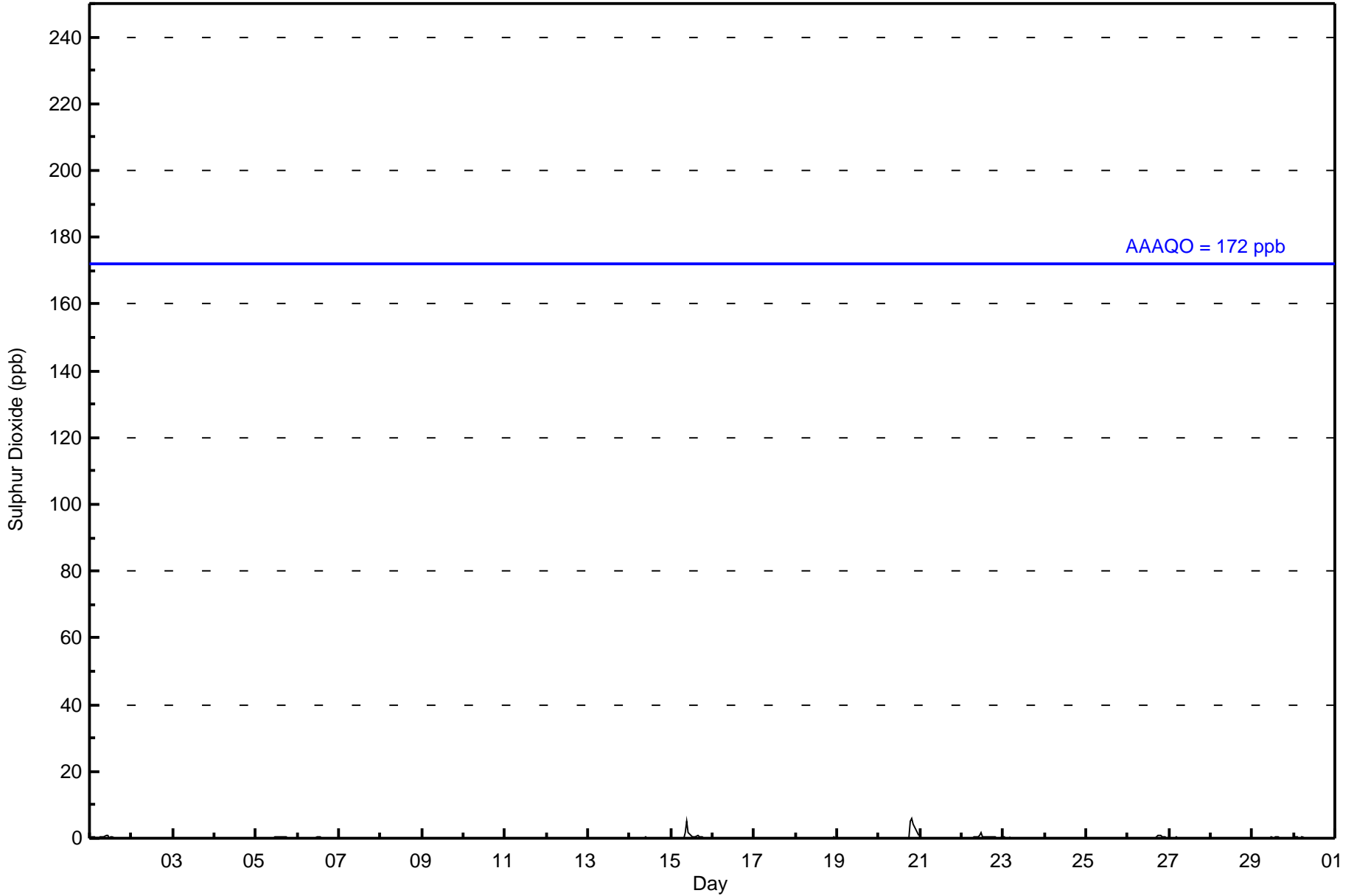
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | Diurnal Average | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 5 | 6 | 4 | 2 | 2 | 1 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 680 | 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: 680

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Brion MacKay River - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 70 | 41 | 25 | 679 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 70 | 41 | 25 | 679 |

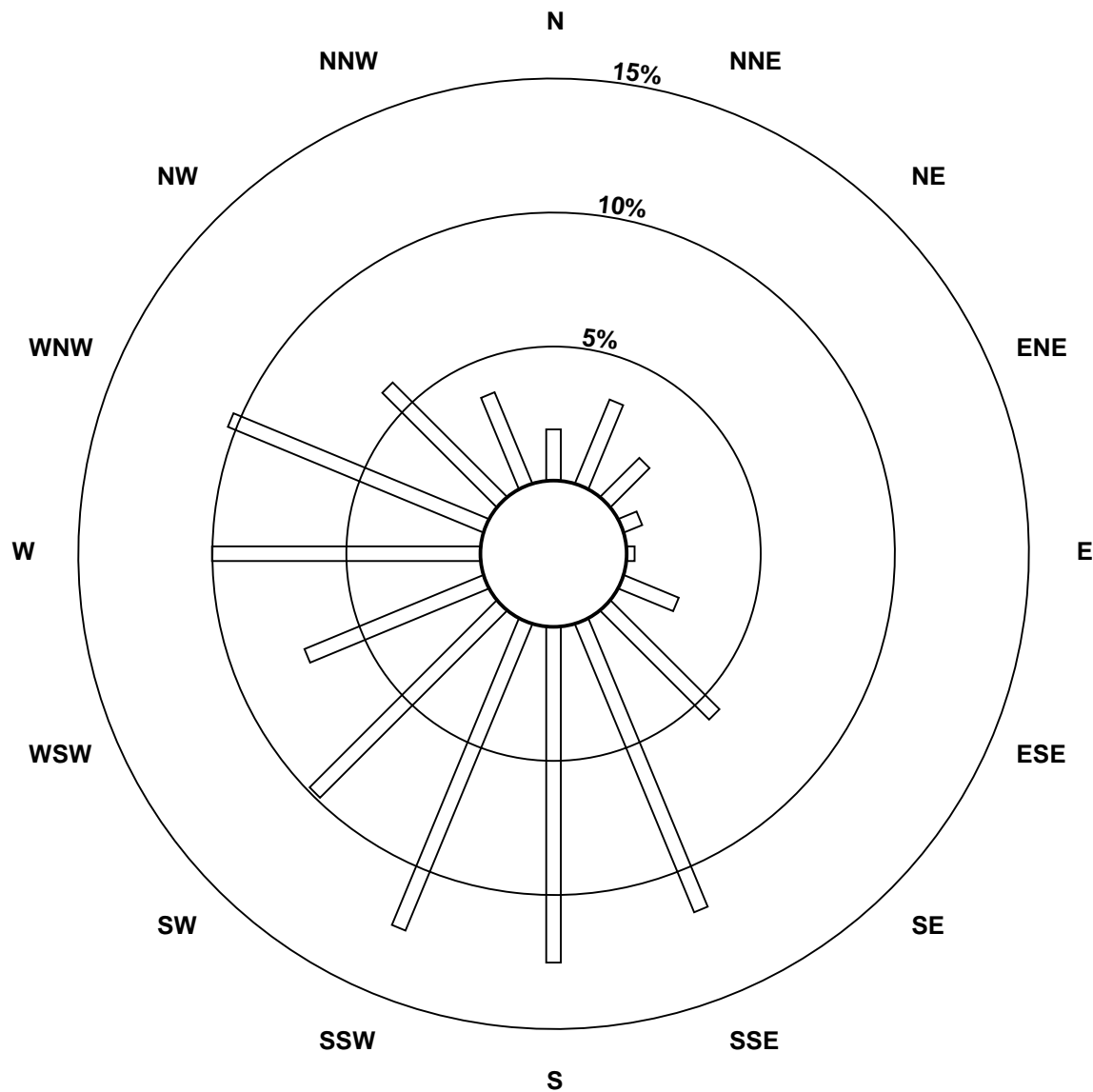
Total Number of Valid Hours: 679

Total Number of Hours: 720

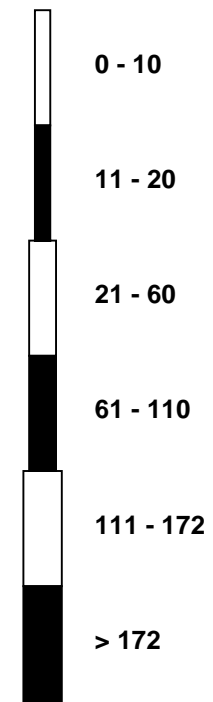


Wood Buffalo Environmental Association
Wind Rose Sep 2016

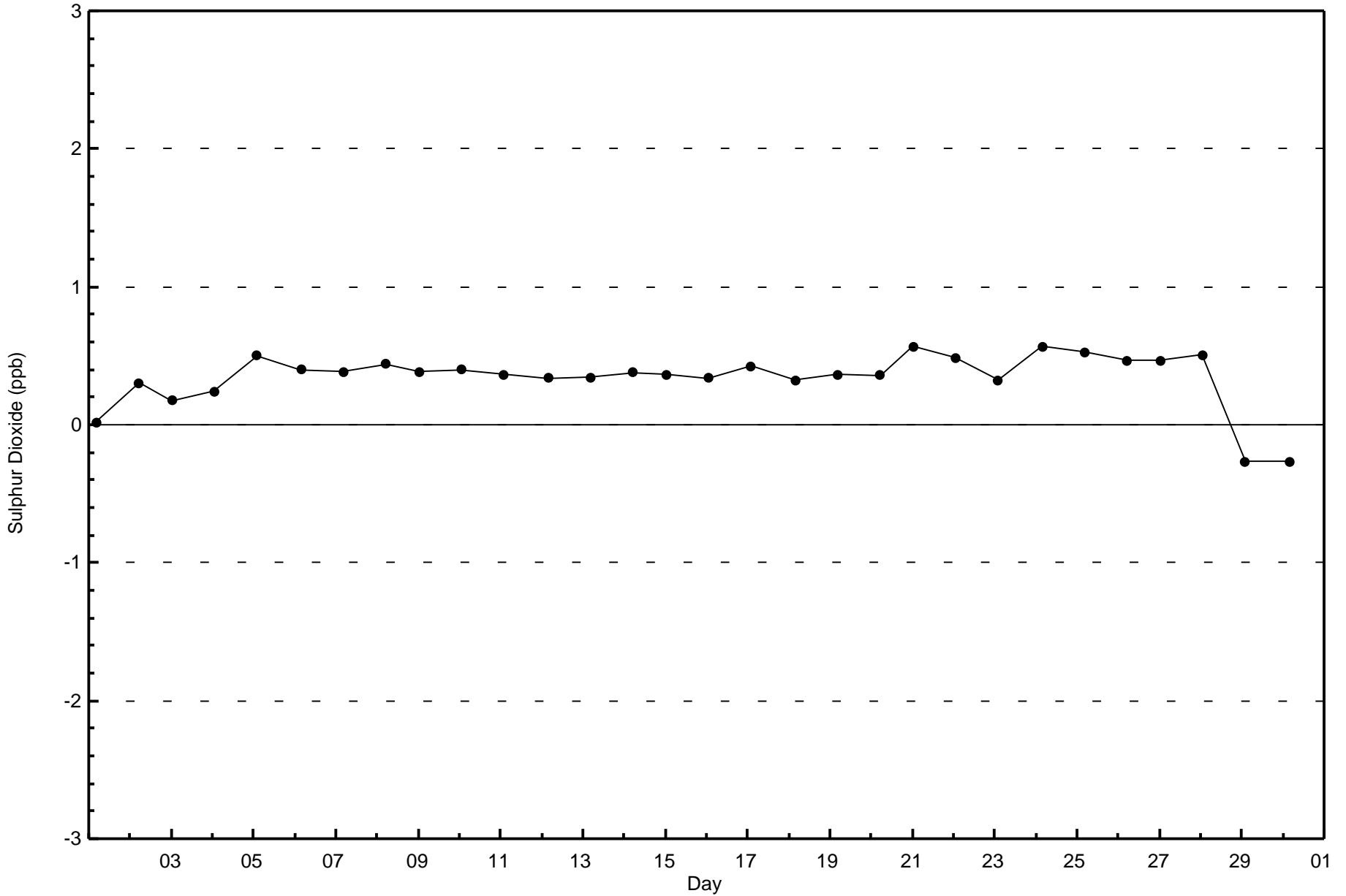
Sulphur Dioxide (SO₂) - ppb
Brion MacKay River (AMS 20)

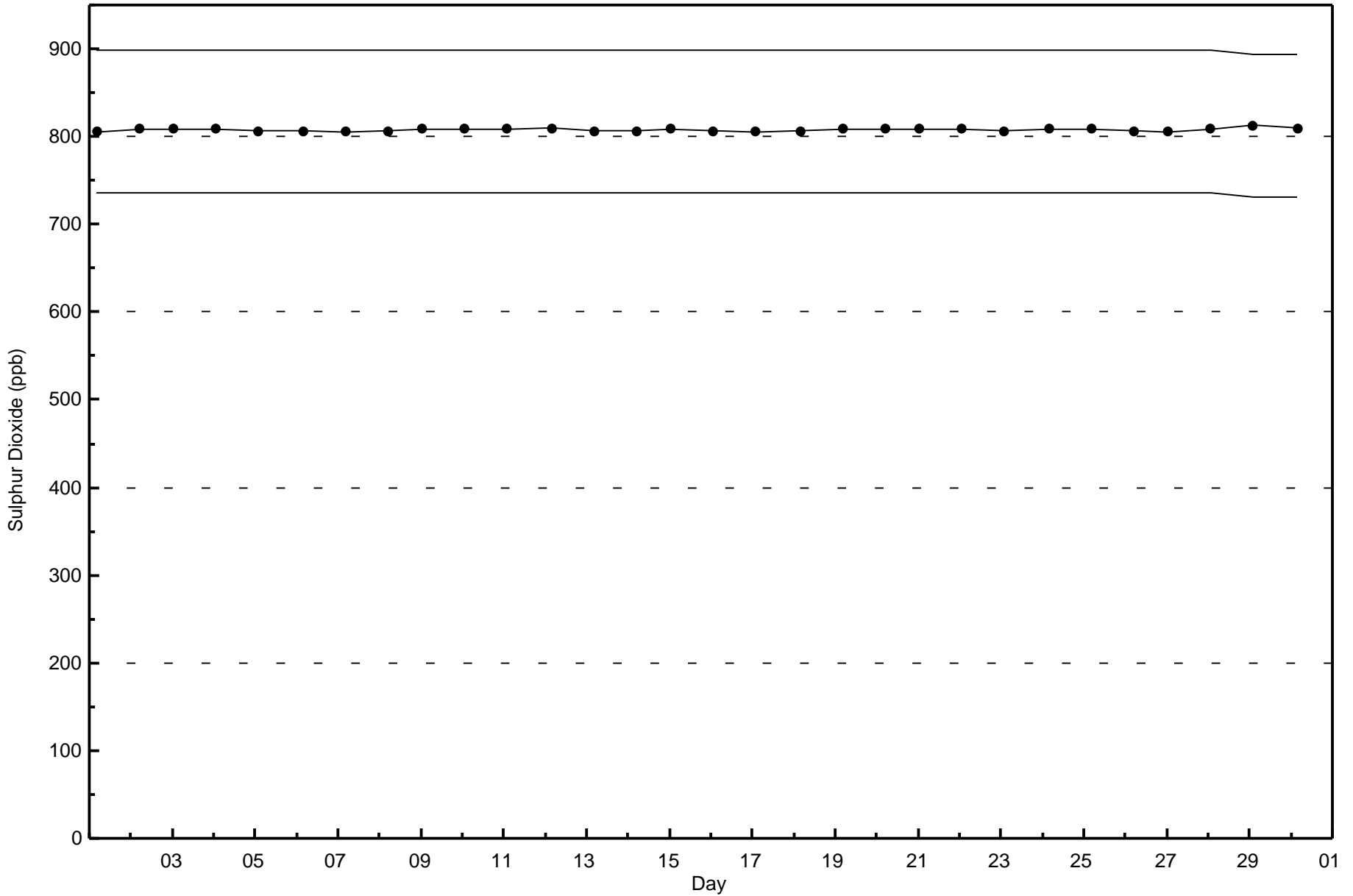


Classes (ppb)



Total Number of Valid Hours: 679







| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 0 ppb on Sep 1 14:00 | Maximum Daily Average: 0.4 ppb on Sep 6 | | Hours of Data: | 684 |
| Minimum Value: 0 ppb on Sep 11 15:00 | Minimum Daily Average: 0.1 ppb on Sep 9 | | Hours of Missing Data: | 36 |
| Maximum Diurnal Average: 0.2 ppb at hour 9 | Minimum Diurnal Average: 0.2 ppb at hour 24 | | Hours of Calibration: | 36 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 0 P ₉₉ = 0 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 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 | 0.3 | 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 | 0.2 | 0 |
| 6-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 | 0.4 | 0 |
| 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 | 0.2 | 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 | 0.1 | 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 | 0.3 | 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 | 0.1 | 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 | 0.1 | 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 | 0.2 | 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 | 0 | 0 | 0.2 | 0 |
| 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 | 0.2 | 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 | 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 | 0.2 | 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 | 0 | 0 | 0.2 | 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 | 0.2 | 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 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 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 | 0.2 | 0 |
| 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 | 0.2 | 0 |
| 28-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | 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 | 0 | 0 | 0.2 | 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 |

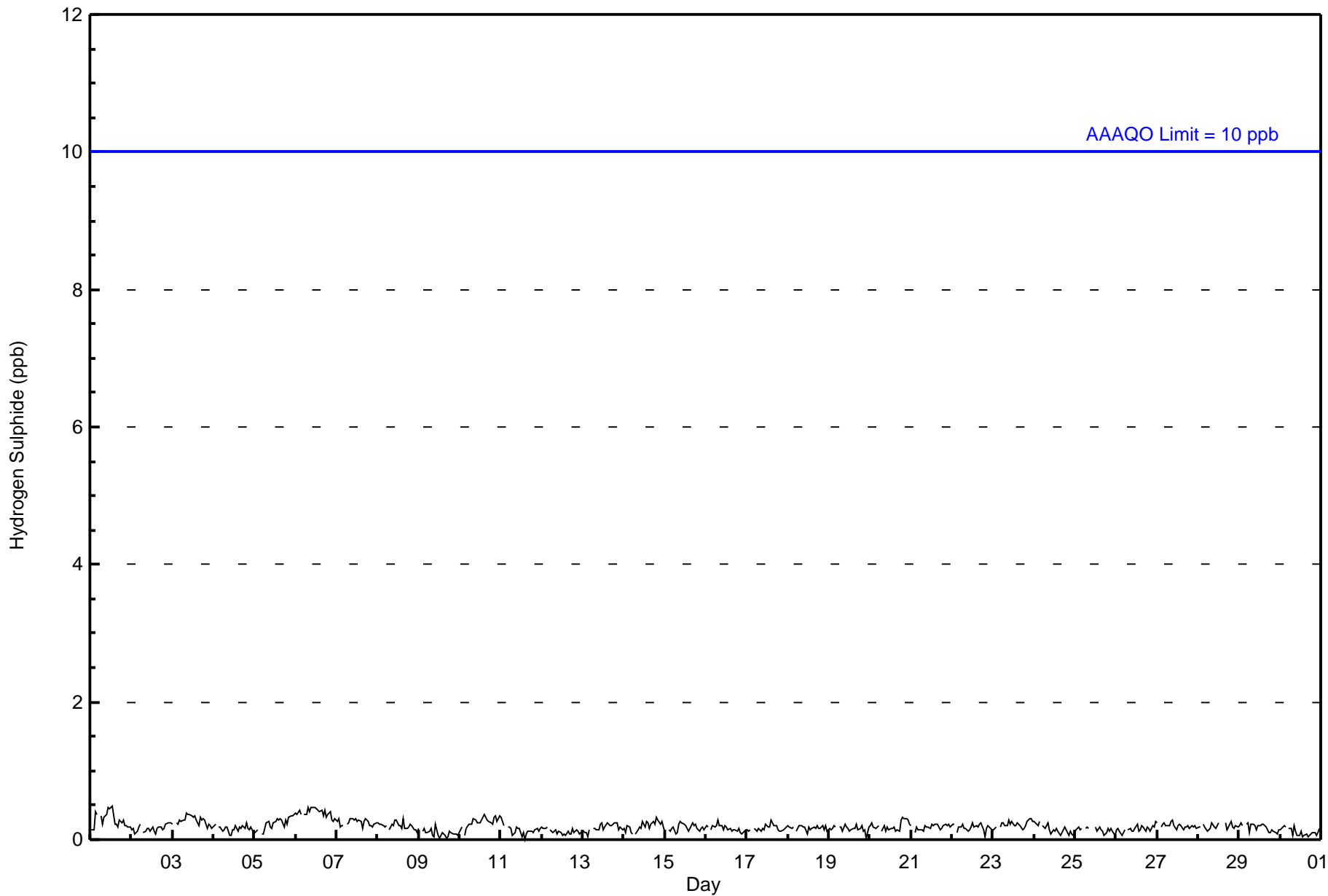
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 684 | 100.00 | 100.00 |
| 3 - 4 | 0 | 0.00 | 100.00 |
| 5 - 7 | 0 | 0.00 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 13 | 23 | 15 | 5 | 2 | 15 | 37 | 80 | 87 | 84 | 66 | 50 | 69 | 72 | 42 | 23 | 683 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 13 | 23 | 15 | 5 | 2 | 15 | 37 | 80 | 87 | 84 | 66 | 50 | 69 | 72 | 42 | 23 | 683 |

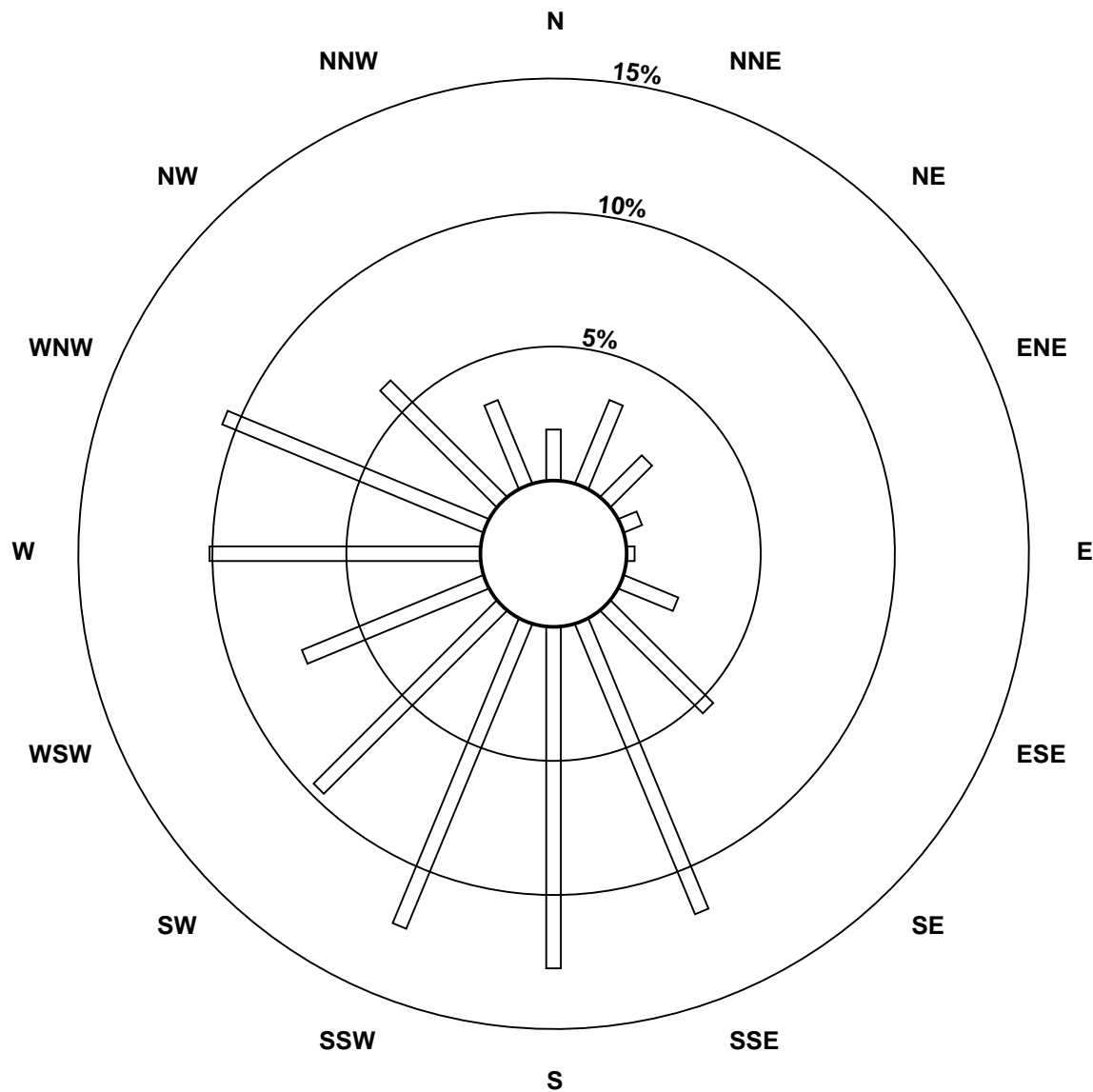
Total Number of Valid Hours: 683

Total Number of Hours: 720

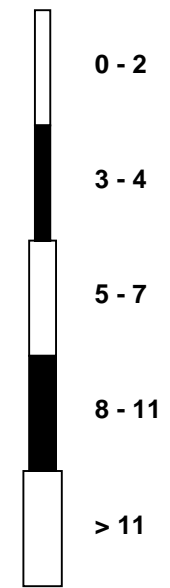


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River (AMS 20)



Classes (ppb)

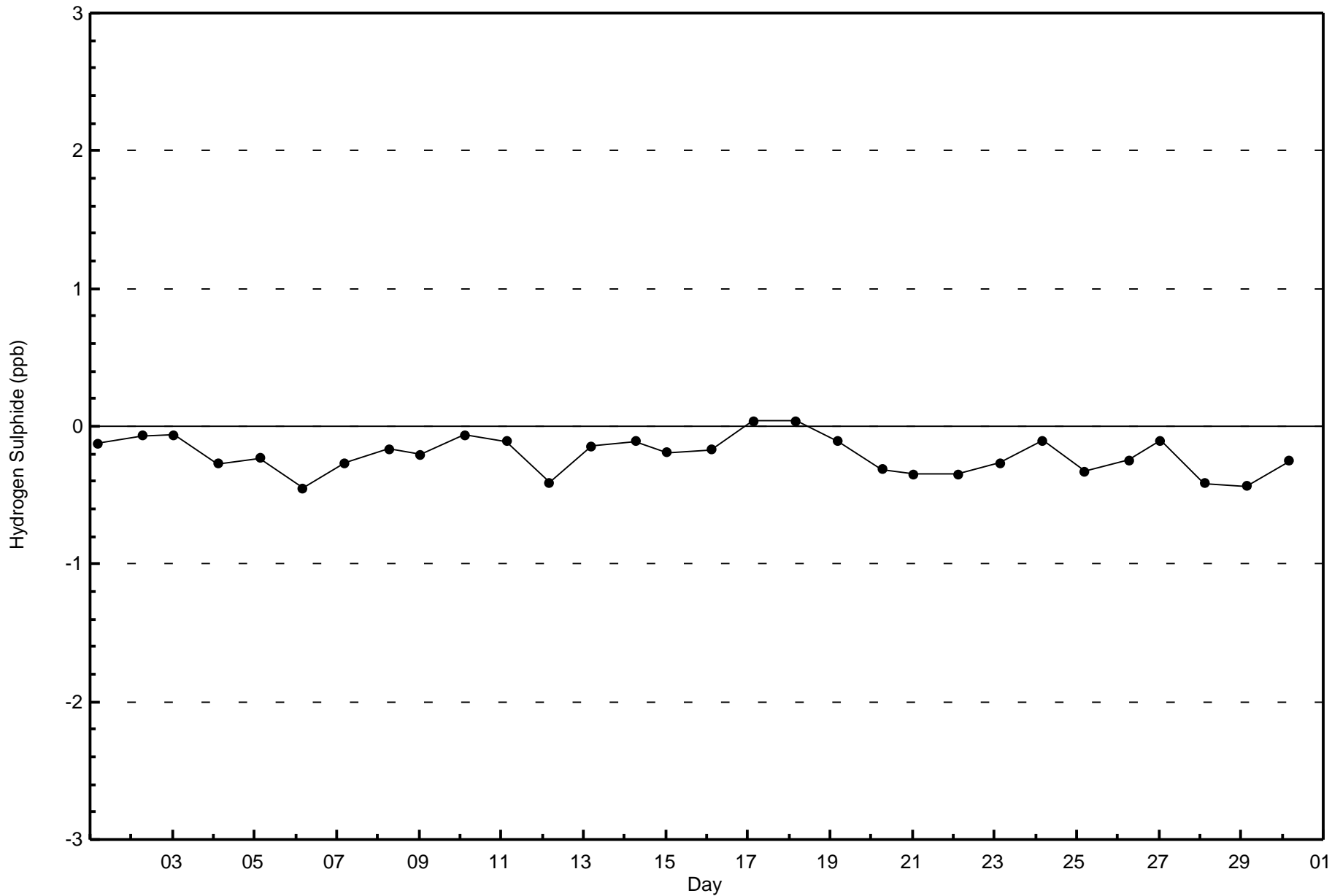


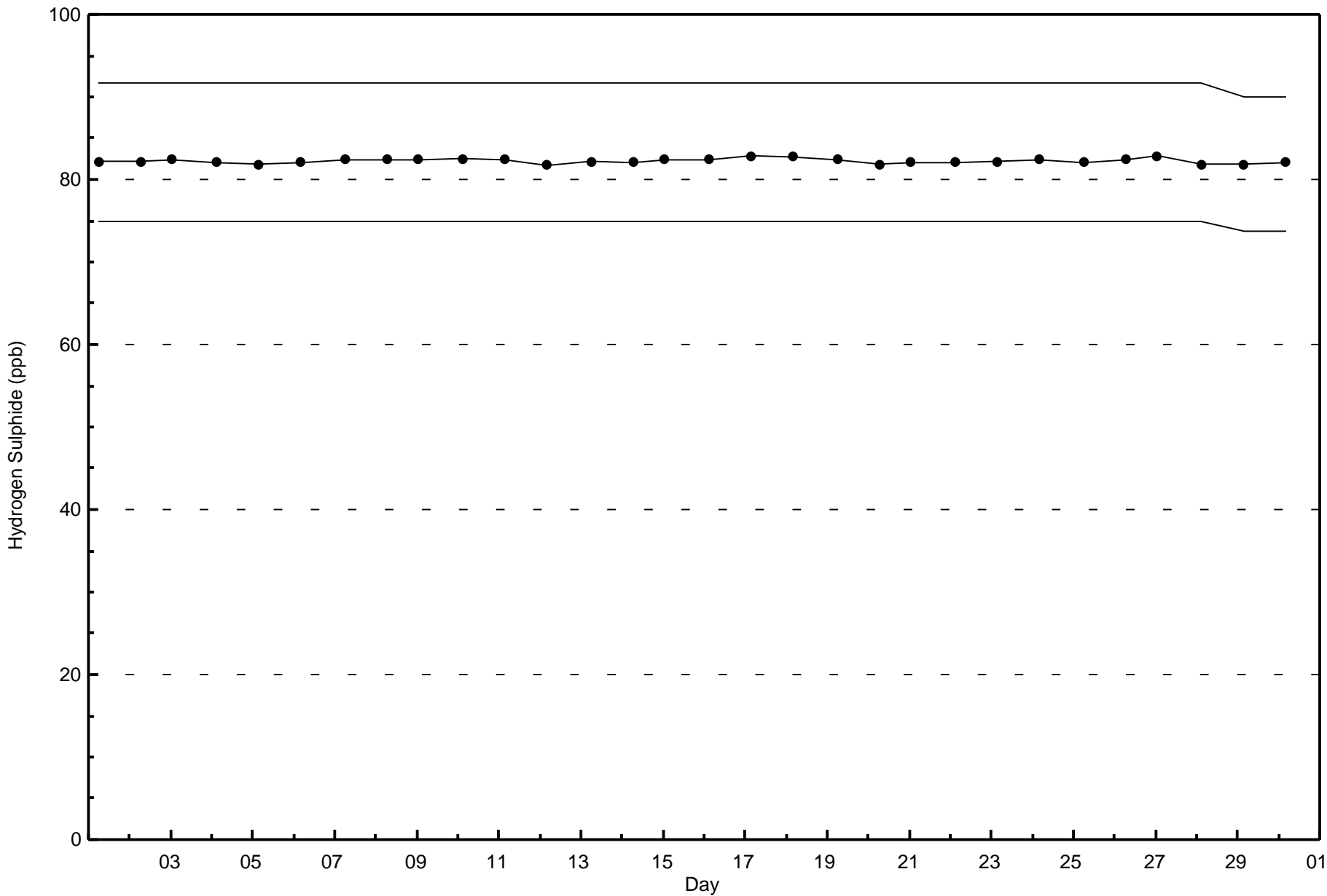
Total Number of Valid Hours: 683



Wood Buffalo Environmental Association
Zero Responses

Hydrogen Sulphide (H₂S) - ppb
Brion MacKay River - September 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

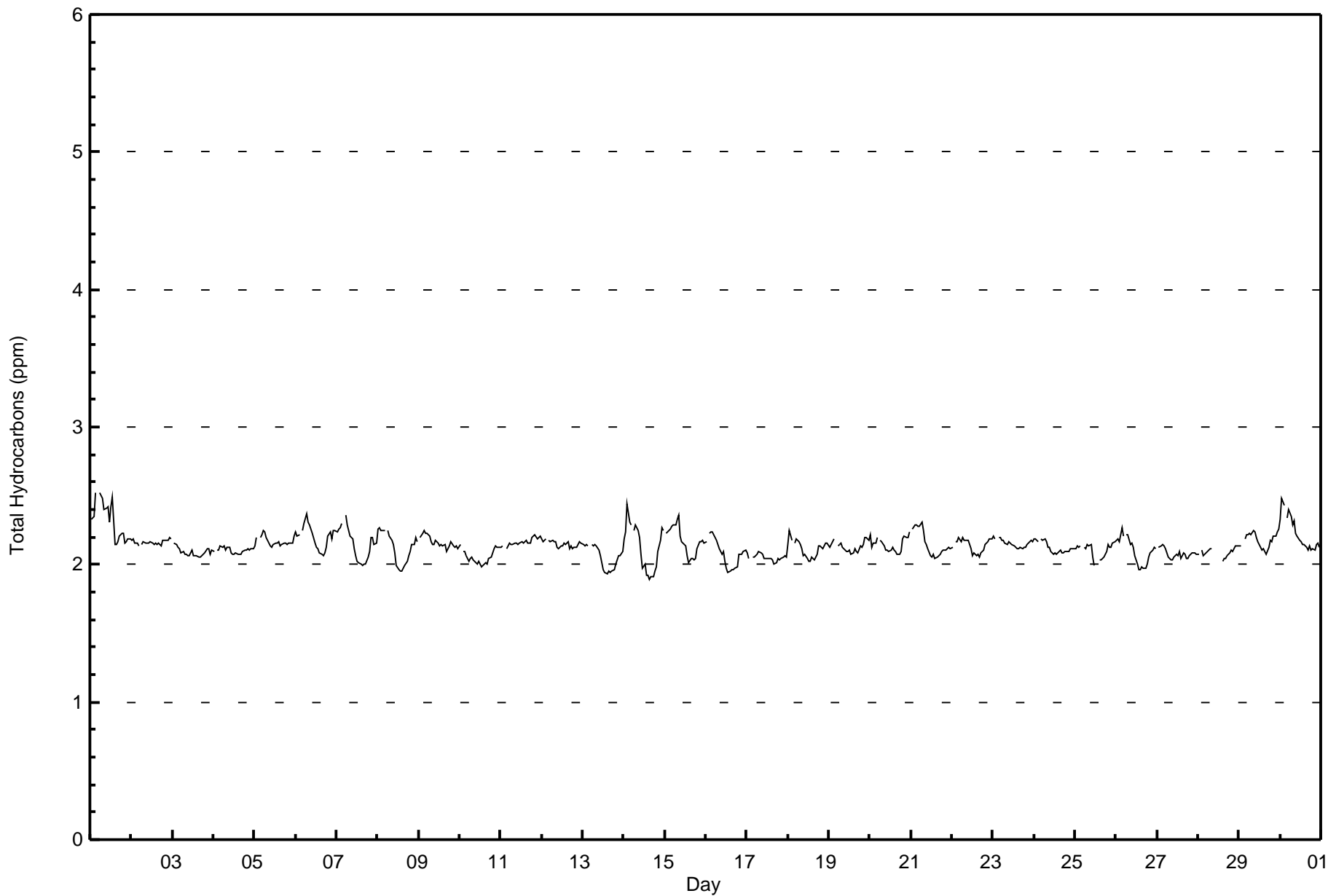
Total Hydrocarbons (THC) - ppm
Brion MacKay River - September 2016

| Maximum Value: 2.5 ppm on Sep 1 06:00 Maximum Daily Average: 2.3 ppm on Sep 1 | | Hours in Service: 720 Hours of Data: 683 Hours of Missing Data: 37 Hours of Calibration: 37 Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|-----|
| Minimum Value: 1.9 ppm on Sep 14 16:00 Minimum Daily Average: 2.1 ppm on Sep 13 Maximum Diurnal Average: 2.2 ppm at hour 3 Minimum Diurnal Average: 2.1 ppm at hour 17 Monthly Average: 2.14 ppm Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.2 P ₉₉ = 2.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 2.3 | 2.3 | 2.3 | 2.5 | Z | 2.5 | 2.5 | 2.5 | 2.4 | 2.4 | 2.4 | 2.3 | 2.4 | 2.5 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.5 |
| 2-Sep | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | Z | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 3-Sep | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| 4-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 | 2.1 |
| 5-Sep | 2.1 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 6-Sep | 2.2 | 2.2 | 2.2 | Z | 2.3 | 2.3 | 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 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 |
| 7-Sep | 2.2 | 2.3 | 2.3 | 2.3 | Z | 2.4 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.1 | 2.4 |
| 8-Sep | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.3 |
| 9-Sep | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 |
| 10-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 11-Sep | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 12-Sep | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 13-Sep | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 14-Sep | 2.2 | 2.2 | 2.4 | 2.3 | 2.3 | Z | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.3 | 2.3 | 2.3 | 2.1 | 2.4 |
| 15-Sep | Z | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.4 |
| 16-Sep | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| 17-Sep | 2.1 | 2.0 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 18-Sep | 2.1 | 2.3 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.1 | 2.3 |
| 19-Sep | 2.1 | 2.1 | 2.2 | 2.2 | 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 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 |
| 20-Sep | 2.2 | 2.1 | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 |
| 21-Sep | Z | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 |
| 22-Sep | 2.1 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 |
| 23-Sep | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| 24-Sep | 2.2 | 2.2 | 2.2 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 |
| 25-Sep | 2.1 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | C | C | 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 |
| 26-Sep | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | Z | 2.2 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 |
| 27-Sep | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 28-Sep | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | C | C | C | C | C | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| 29-Sep | 2.1 | 2.1 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 |
| 30-Sep | 2.3 | 2.5 | 2.4 | Z | 2.3 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Brion MacKay River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Brion MacKay River - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 96 | 14.06 | 14.06 |
| 2.1 - 3.0 | 587 | 85.94 | 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
Brion MacKay River - September 2016

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 1 | 0 | 0 | 0 | 0 | 4 | 1 | 2 | 8 | 13 | 21 | 15 | 17 | 9 | 3 | 2 | 96 |
| 2.1 - 3.0 | 12 | 23 | 14 | 5 | 2 | 11 | 38 | 77 | 77 | 71 | 46 | 34 | 52 | 63 | 38 | 23 | 586 |
| 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 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 69 | 72 | 41 | 25 | 682 |

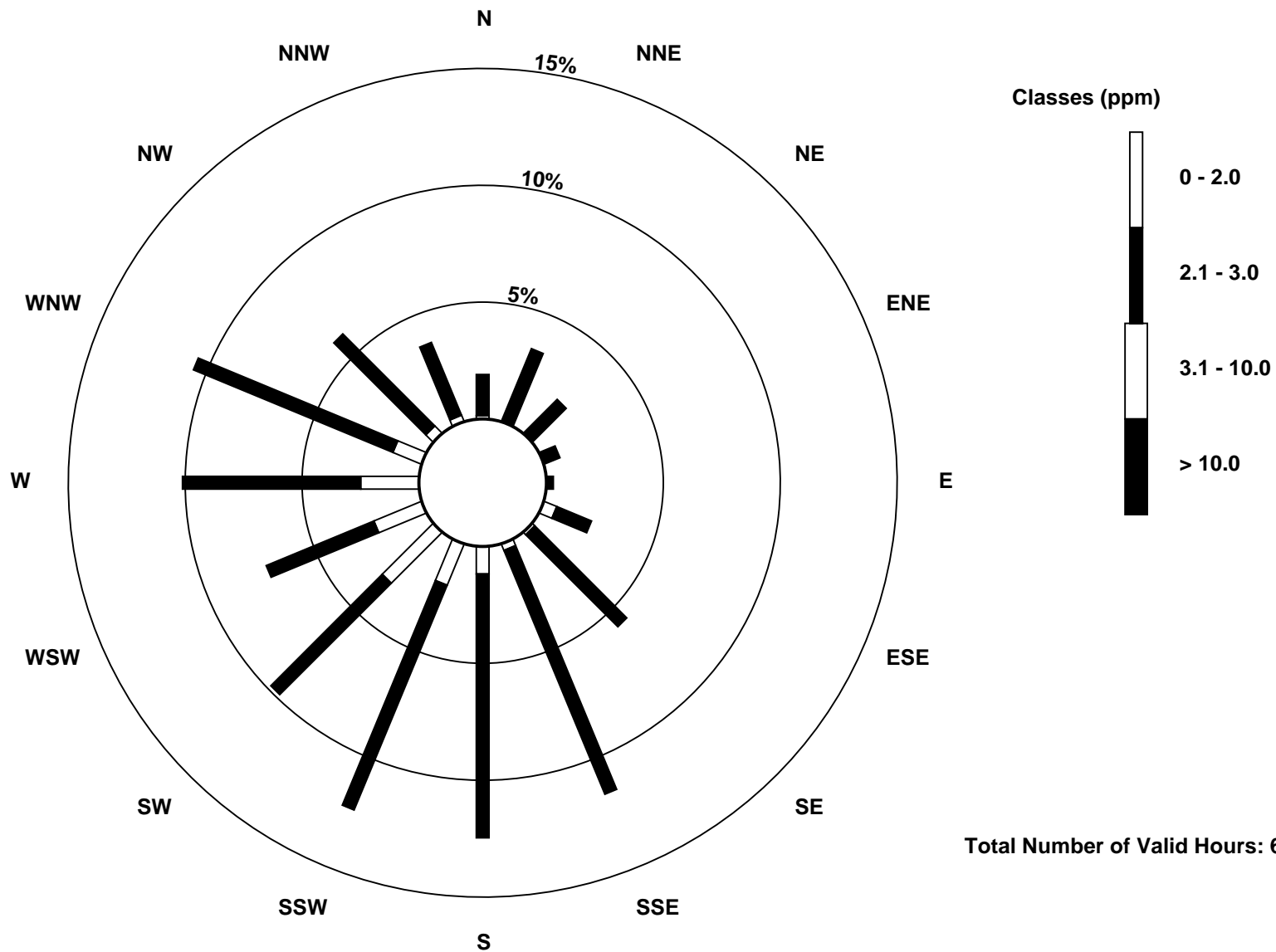
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

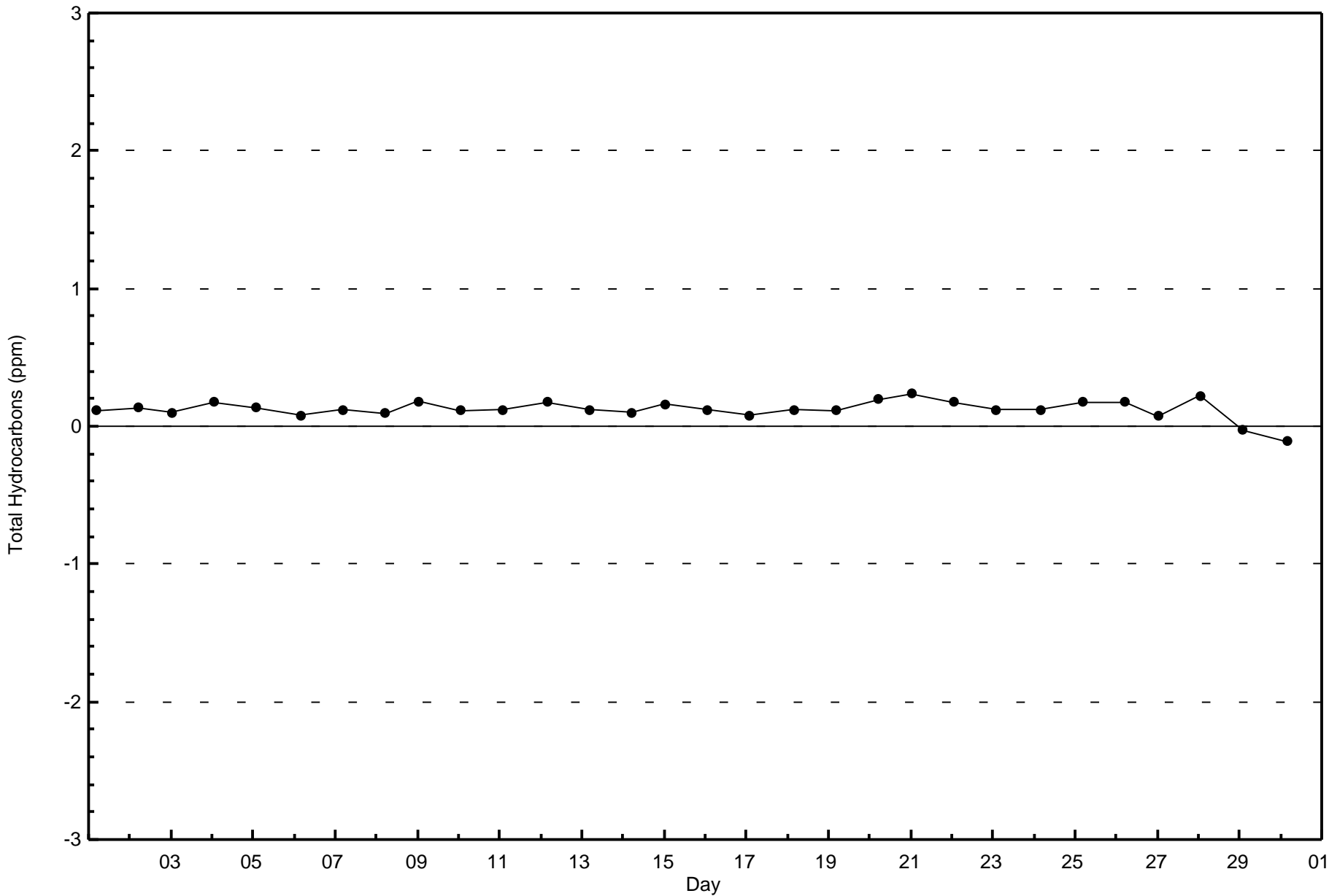
Total Hydrocarbons (THC) - ppm
Brion MacKay River (AMS 20)

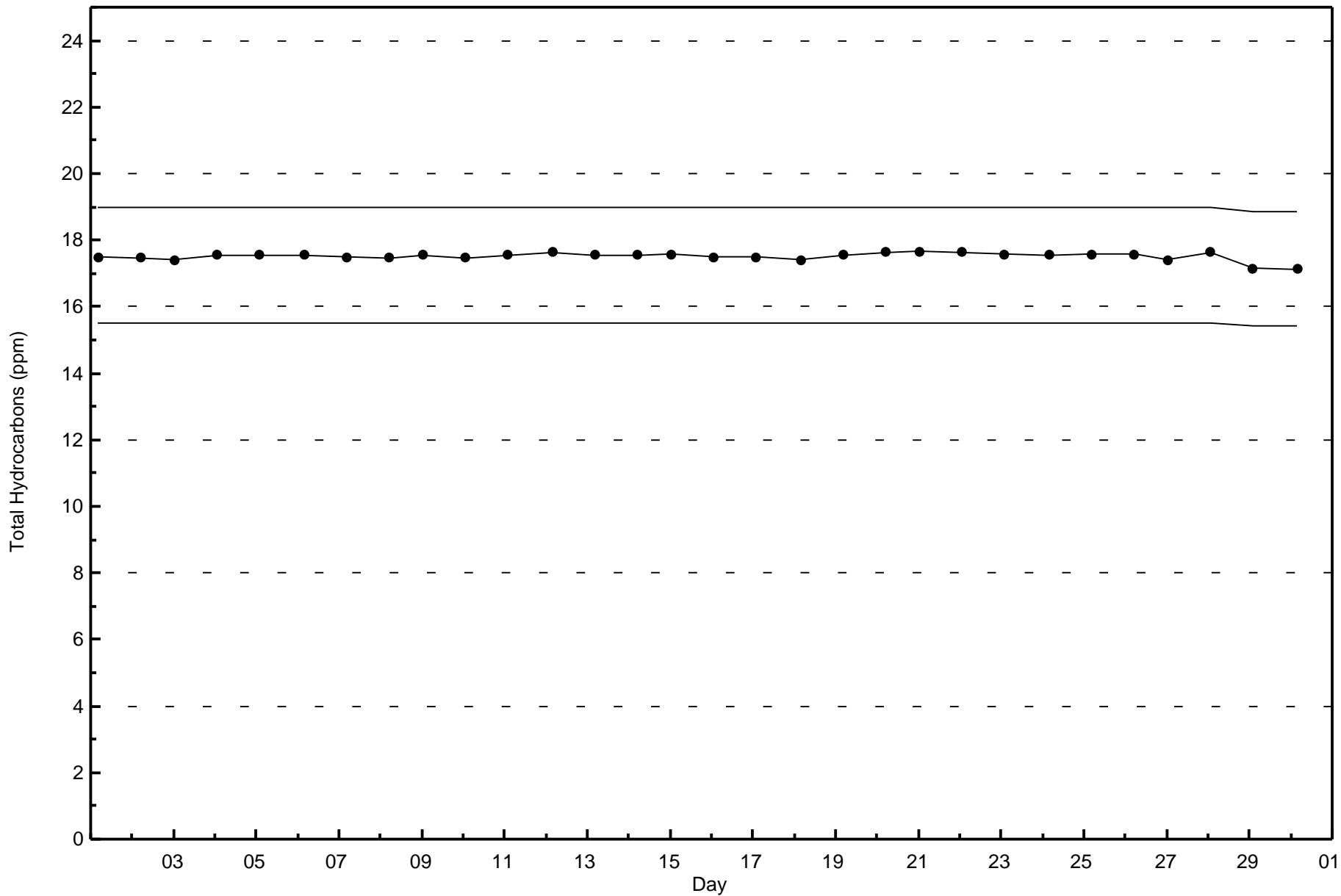




Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Brion MacKay River - September 2016





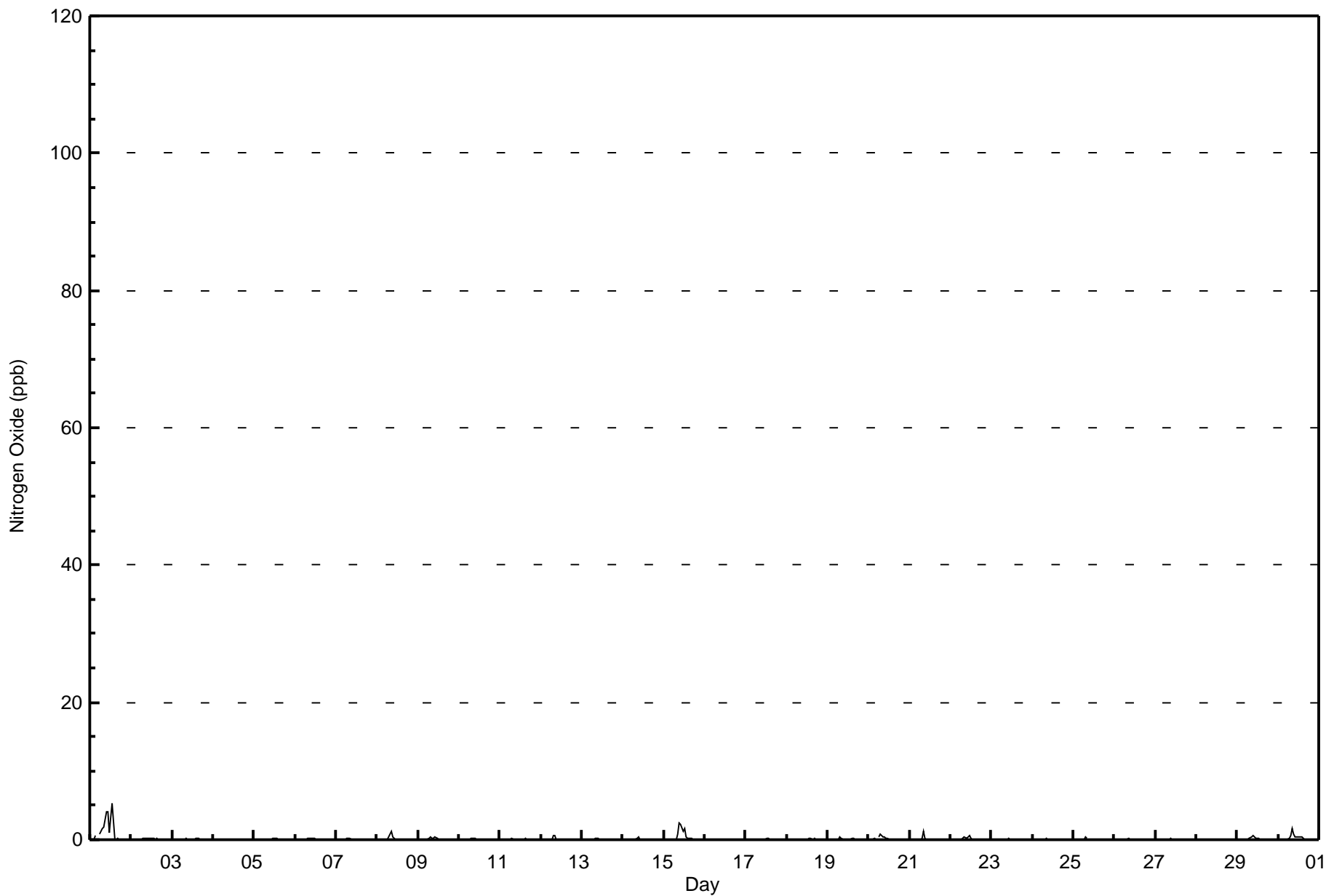


| Maximum Value: 5 ppb on Sep 1 14:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 1.1 ppb on Sep 1 | | | | | | | | | | | | | | | | | Hours in Service: 720 | |
|---------------------------------------------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|-----------------|---------------|---------------|--|--|--|--|--|--|--|---------------------------|--|
| Minimum Value: 0 ppb on Sep 1 01:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 27 | | | | | | | | | | | | | | | | | Hours of Data: 681 | |
| Maximum Diurnal Average: 0.4 ppb at hour 10 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.0 ppb at hour 1 | | | | | | | | | | | | | | | | | Hours of Missing Data: 39 | |
| Monthly Average: 0.1 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 O ₃ = 0 P ₉₀ = 0 P ₉₉ = 2 | | | | | | | | | | | | | | | | | Hours of Calibration: 39 | |
| | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Sep | 0 | 0 | 0 | 1 | Z | 1 | 1 | 2 | 2 | 4 | 4 | 1 | 3 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 5 | | | | | | | | | |
| 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 | 0.0 | 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 | 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 | 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | |
| 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 | 0.1 | 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 | 0.0 | 0 | | | | | | | | | |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 | 0.0 | 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 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | | | | | | | | | |
| 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 | 0.1 | 0 | | | | | | | | | |
| 20-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 | 0.1 | 1 | | | | | | | | | |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 | | | | | | | | | |
| 22-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 | 0.1 | 1 | | | | | | | | | |
| 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 | 0.0 | 0 | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 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 | | | | | | | | | |
| 27-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 | | | | | | | | | |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | | | | | | | | | |
| 29-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 | 0.1 | 1 | | | | | | | | | |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Brion MacKay River - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Brion MacKay River - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 681 | 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: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 71 | 41 | 25 | 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 | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 71 | 41 | 25 | 680 |

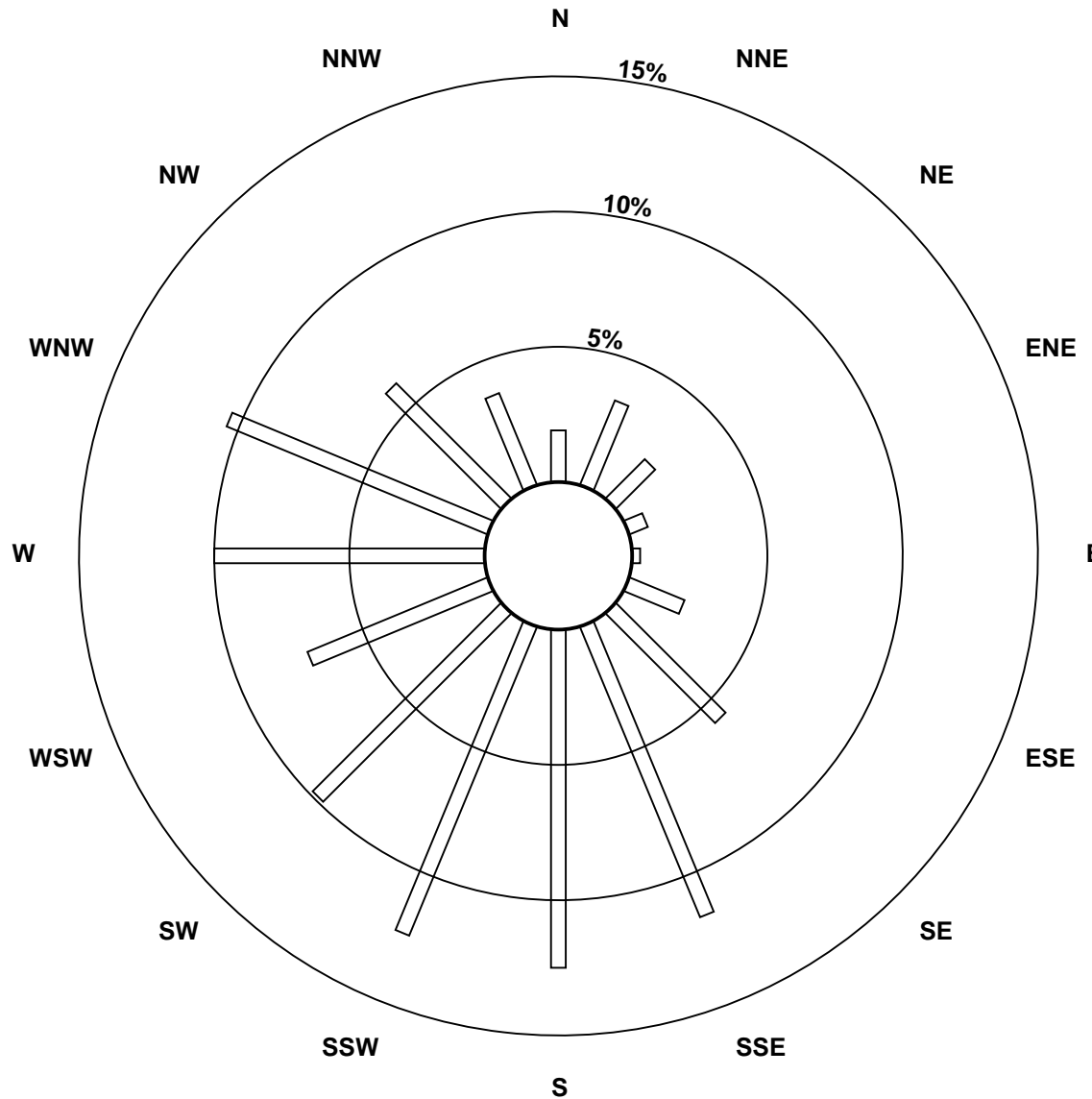
Total Number of Valid Hours: 680

Total Number of Hours: 720

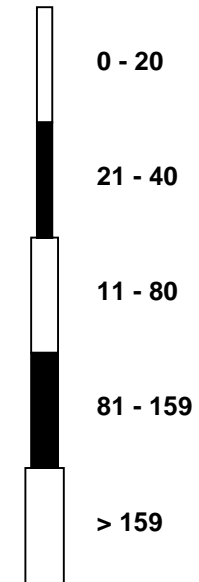


Wood Buffalo Environmental Association
Wind Rose Sep 2016

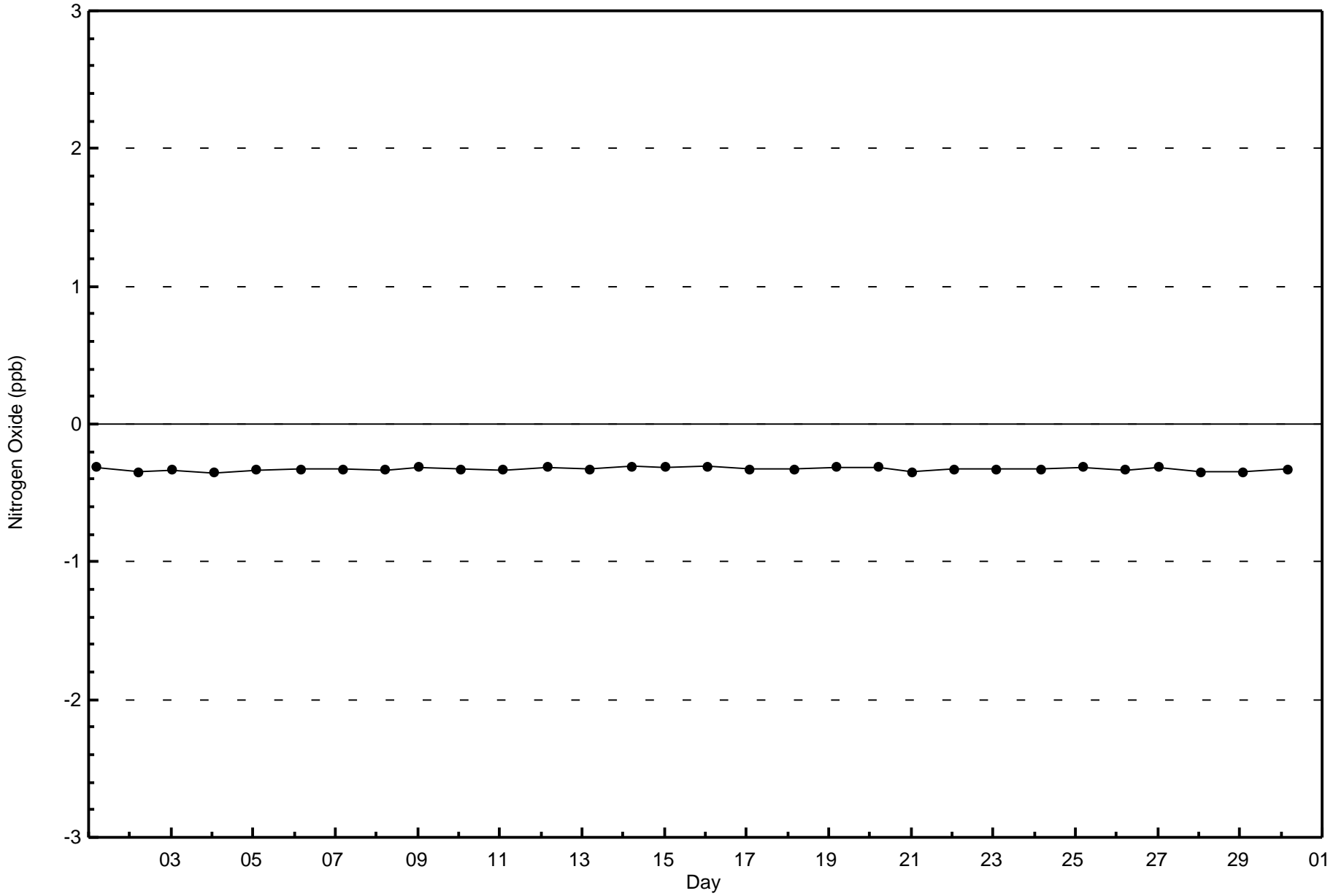
Nitrogen Oxide (NO) - ppb
Brion MacKay River (AMS 20)

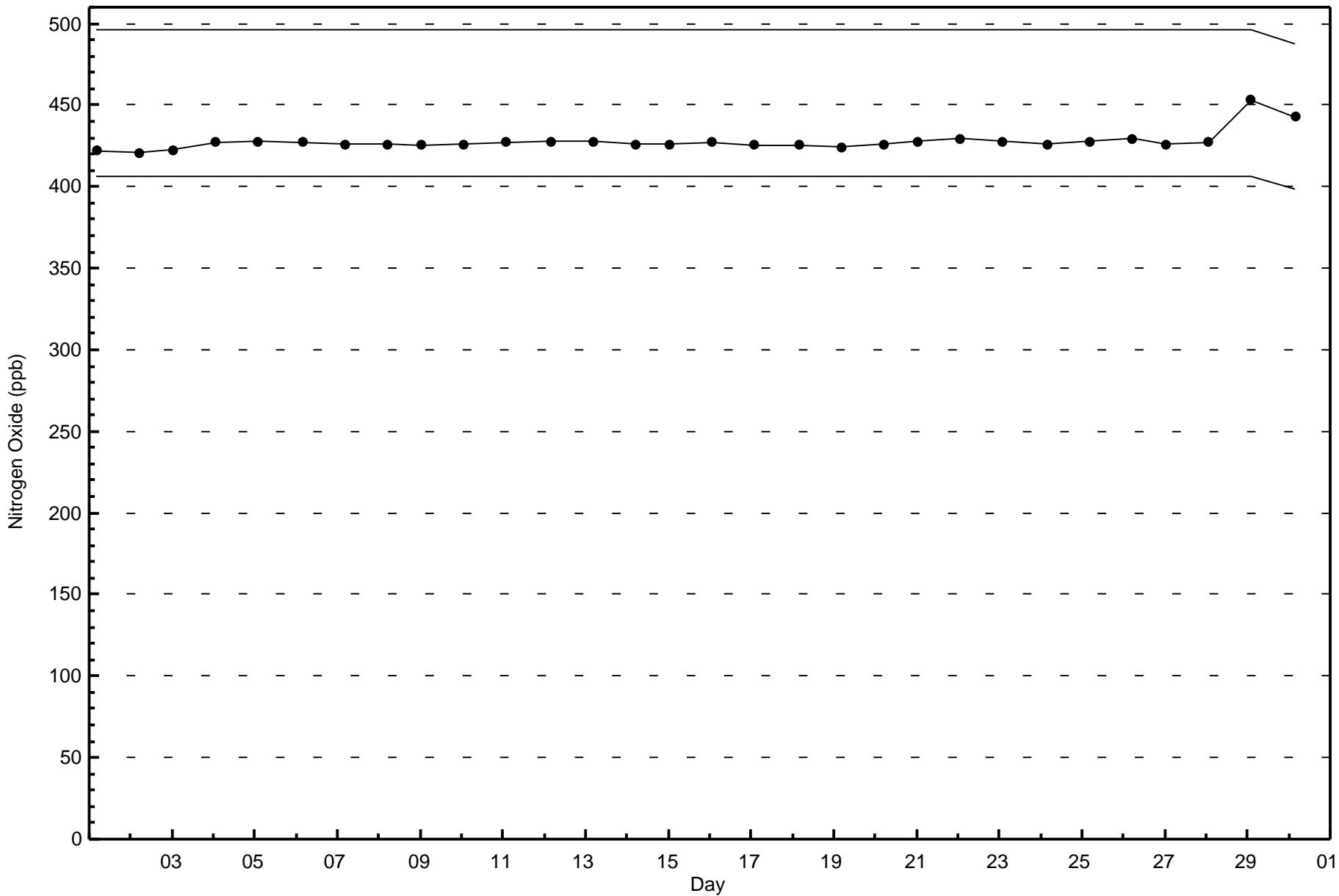


Classes (ppb)



Total Number of Valid Hours: 680







| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 15 ppb on Sep 30 06:00 | Maximum Daily Average: 4.4 ppb on Sep 30 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 15 05:00 | Minimum Daily Average: 0.1 ppb on Sep 4 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 1.2 ppb at hour 6 | Minimum Diurnal Average: 0.4 ppb at hour 1 | | Hours of Calibration: | 39 |
| Monthly Average: 0.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 1 P ₉₉ = 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 | 4 | Z | 5 | 4 | 3 | 3 | 5 | 5 | 3 | 6 | 7 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 2.3 | 7 |
| 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 | 0.3 | 1 |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 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 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0.4 | 1 |
| 6-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 10-Sep | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.3 | 1 |
| 12-Sep | 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 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0.4 | 1 |
| 14-Sep | 1 | 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 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.0 | 4 |
| 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 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 18-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 19-Sep | 0 | 0 | 1 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0.4 | 1 |
| 20-Sep | 0 | 0 | 0 | 2 | 0 | Z | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 7 | 7 | 6 | 4 | 3 | 1.8 | 7 |
| 21-Sep | Z | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 22-Sep | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 |
| 23-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.7 | 1 |
| 24-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 | 0.4 | 1 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 1 | C | C | C | C | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0.6 | 2 |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.8 | 2 |
| 30-Sep | 2 | 9 | 8 | Z | 9 | 15 | 13 | 8 | 9 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 3 | 4.4 | 15 |

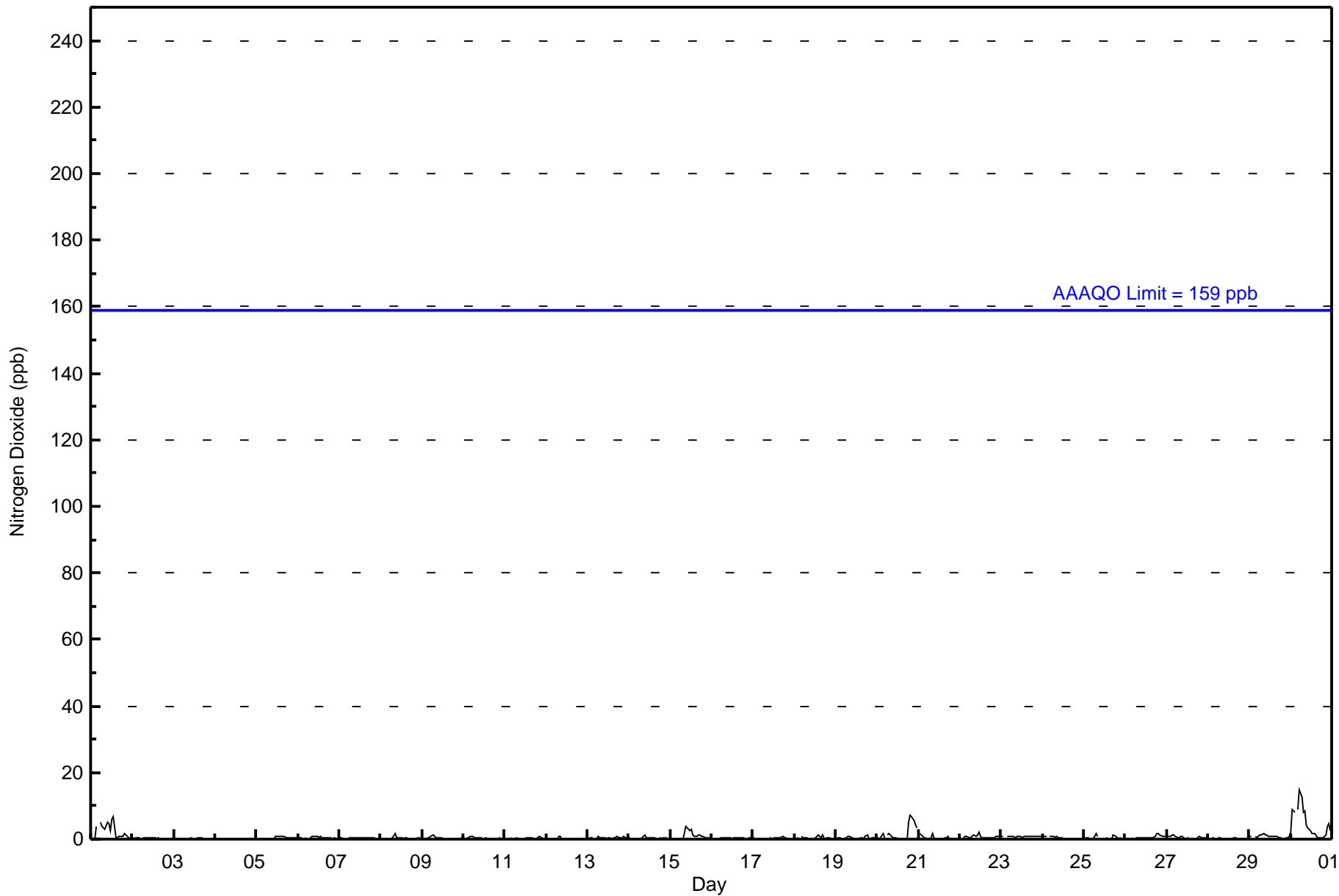
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.4 | 0.7 | 0.6 | 0.6 | 0.7 | 1.2 | 1.0 | 0.9 | 1.0 | 0.9 | 0.8 | 0.7 | 0.7 | 0.7 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.6 | 0.5 | Diurnal Average | |
| 2 | 9 | 8 | 4 | 9 | 15 | 13 | 8 | 9 | 5 | 5 | 3 | 6 | 7 | 2 | 1 | 1 | 1 | 5 | 7 | 7 | 6 | 5 | 3 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 681 | 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: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 71 | 41 | 25 | 680 |
| 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 | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 71 | 41 | 25 | 680 |

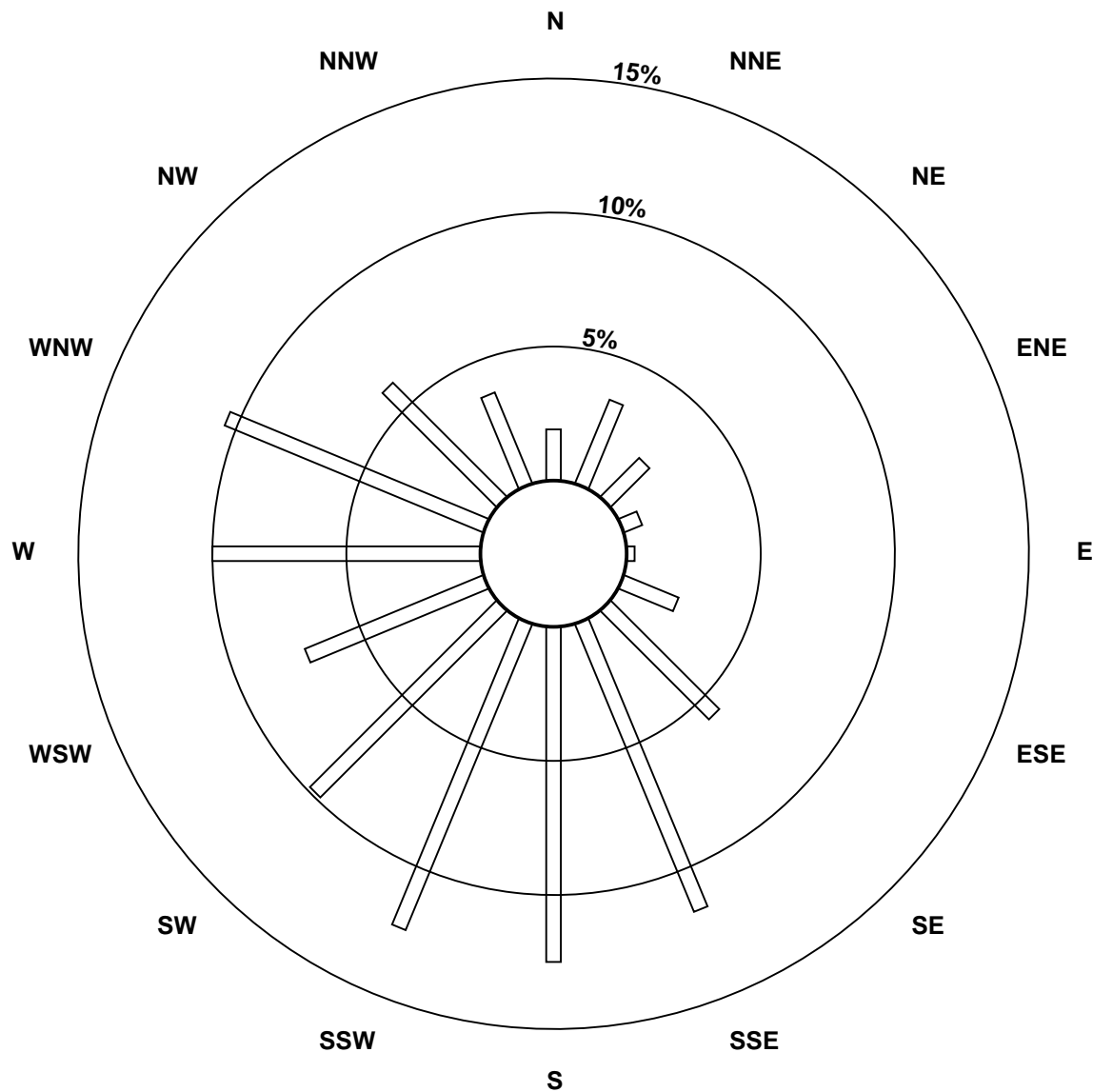
Total Number of Valid Hours: 680

Total Number of Hours: 720

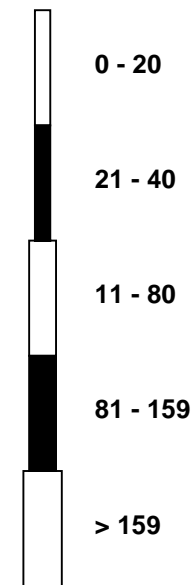


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River (AMS 20)



Classes (ppb)

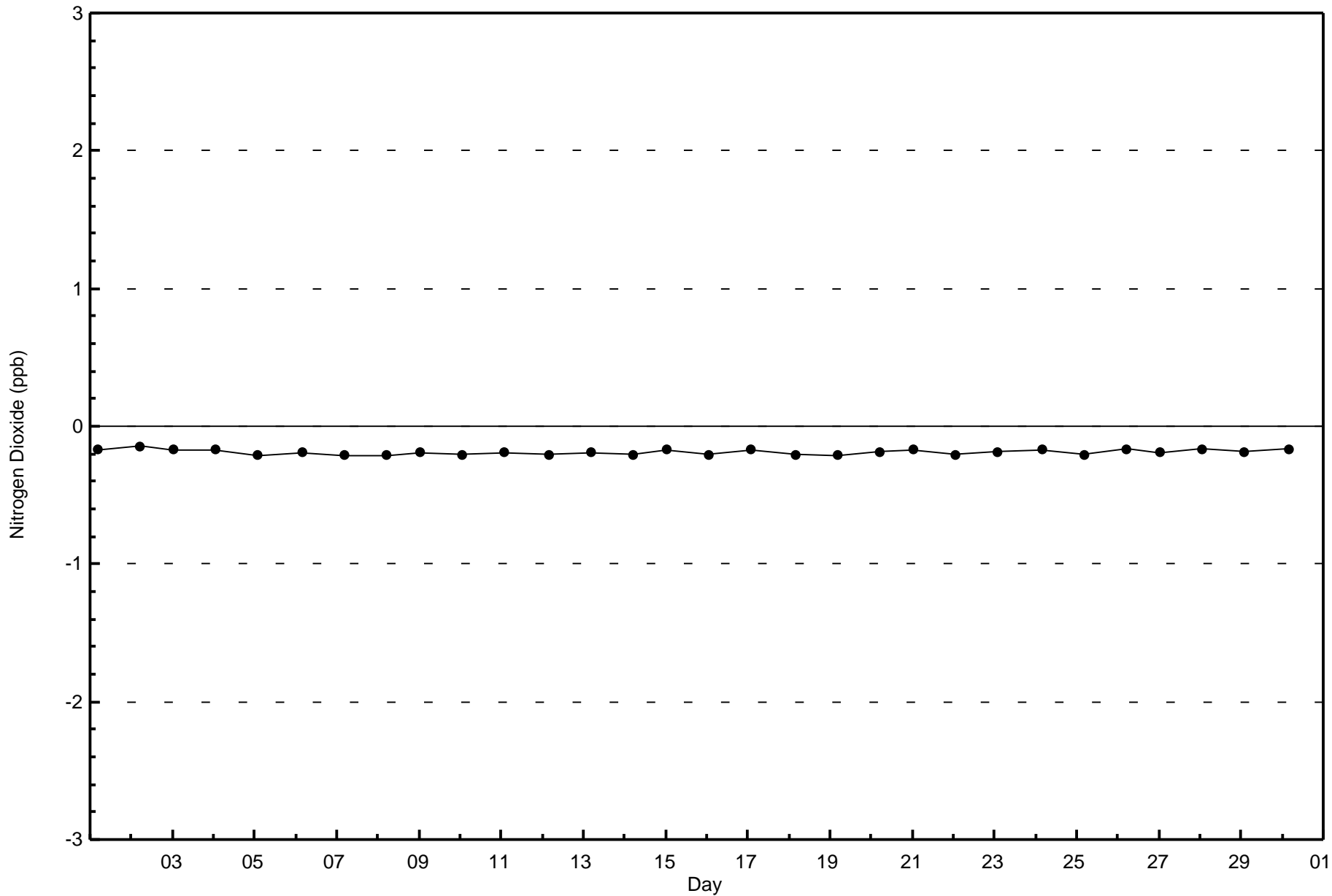


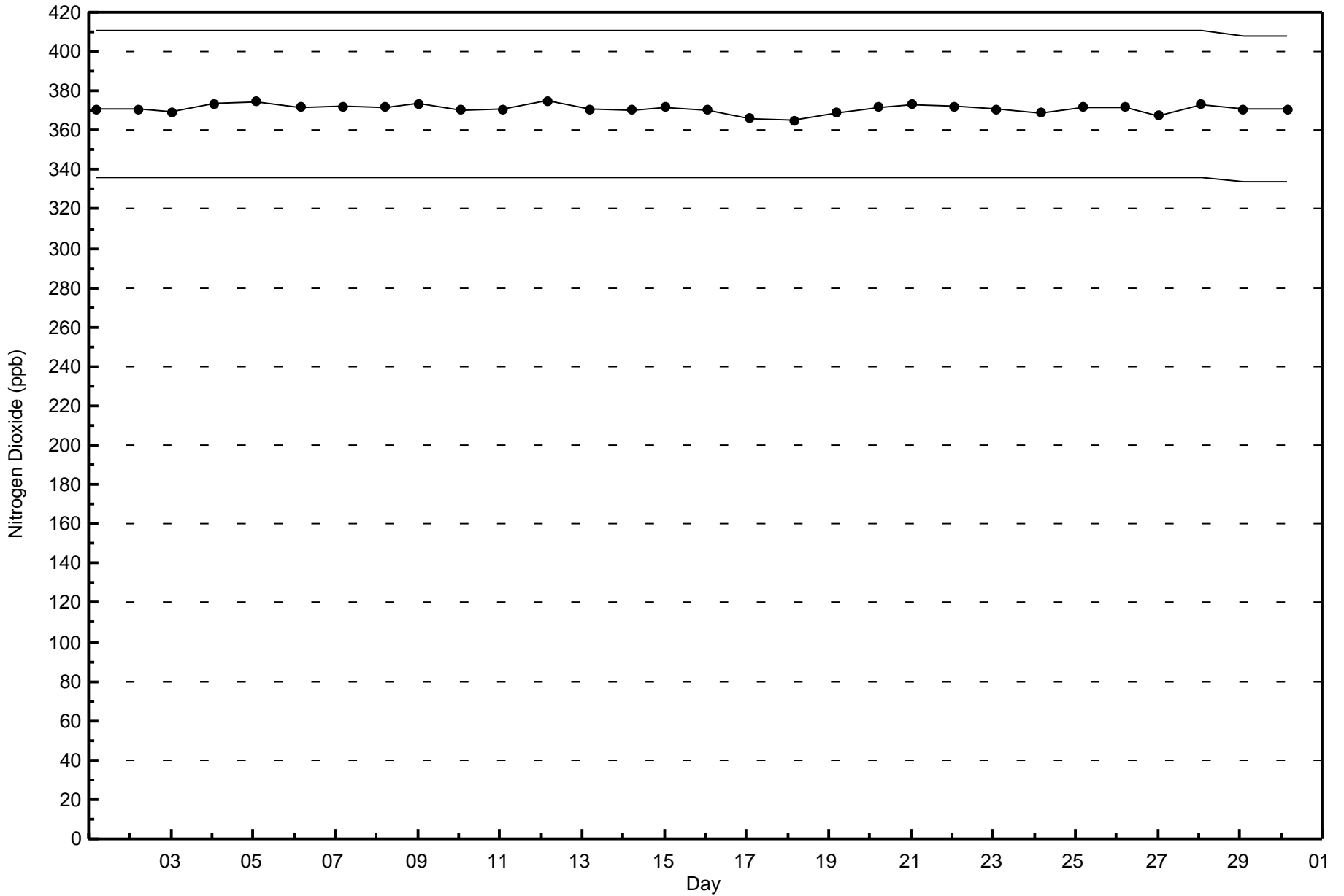
Total Number of Valid Hours: 680



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Dioxide (NO₂) - ppb
Brion MacKay River - September 2016







| | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Value: 15 ppb on Sep 30 06:00 | Maximum Daily Average: 4.6 ppb on Sep 30 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 15 05:00 | Minimum Daily Average: 0.1 ppb on Sep 4 | Hours of Data: 681 |
| Maximum Diurnal Average: 1.4 ppb at hour 9 | Minimum Diurnal Average: 0.4 ppb at hour 1 | Hours of Missing Data: 39 |
| 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 | Hours of Calibration: 39 |
| | | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 5 | Z | 6 | 5 | 5 | 5 | 9 | 9 | 4 | 9 | 12 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 3.4 | 12 |
| 2-Sep | 0 | 0 | 0 | 0 | 1 | Z | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 6-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 3 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 10-Sep | 0 | Z | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0.3 | 1 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0.5 | 1 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 5 | 4 | 5 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.4 | 6 |
| 16-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 |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 18-Sep | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0.5 | 1 |
| 20-Sep | 0 | 0 | 0 | 2 | 0 | Z | 2 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 7 | 7 | 6 | 4 | 3 | 1.9 | 7 |
| 21-Sep | Z | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 22-Sep | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 3 |
| 23-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 1 |
| 24-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 | 0.4 | 1 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 1 | C | C | C | C | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0.6 | 2 |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.9 | 2 |
| 30-Sep | 2 | 9 | 8 | Z | 9 | 15 | 13 | 9 | 10 | 5 | 4 | 3 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 3 | 4.6 | 15 |

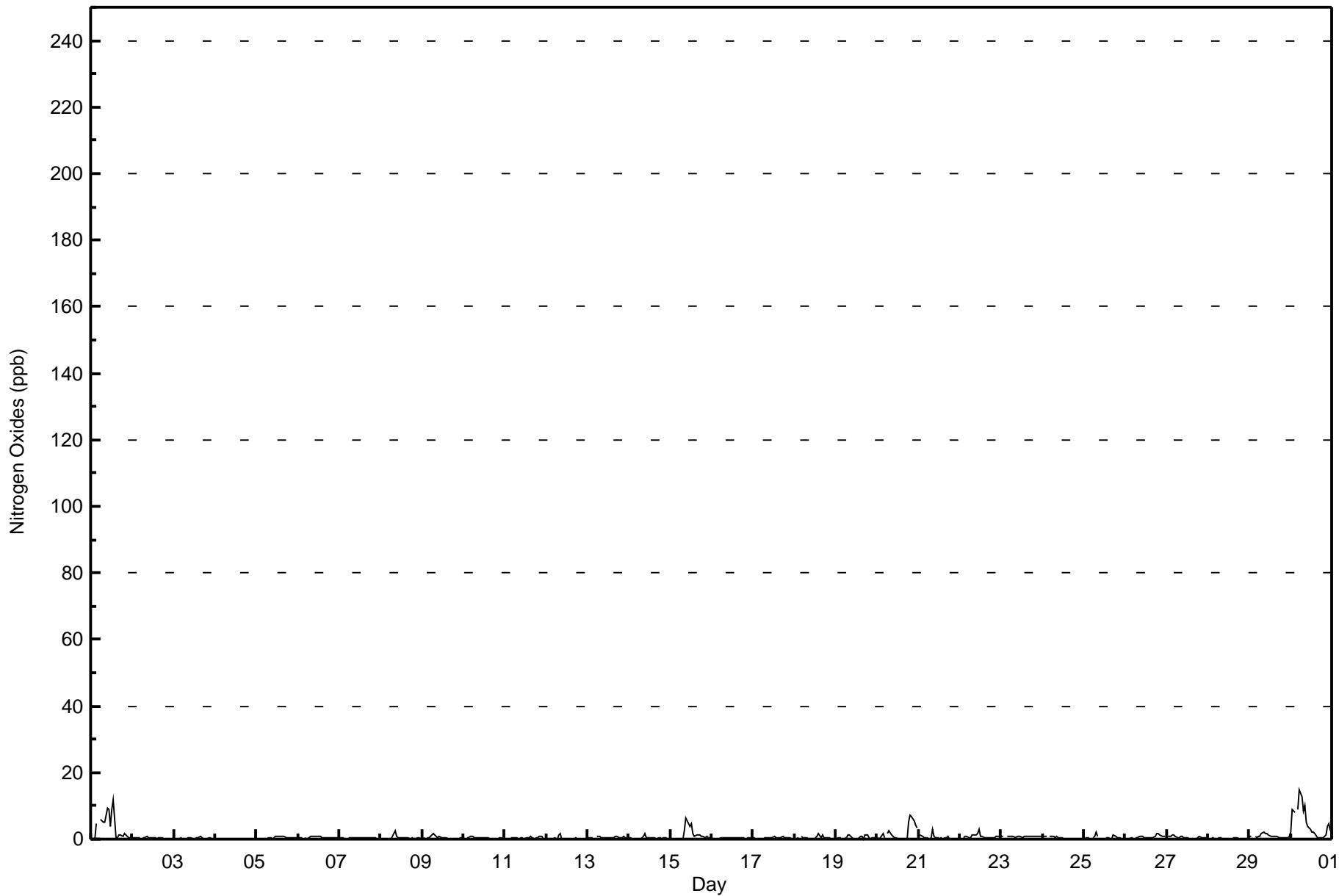
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----------------|
| 0.4 | 0.7 | 0.6 | 0.6 | 0.7 | 1.2 | 1.1 | 1.1 | 1.4 | 1.3 | 1.1 | 0.8 | 0.9 | 0.9 | 0.5 | 0.4 | 0.4 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.6 | 0.5 | | Diurnal Average |
| 2 | 9 | 8 | 5 | 9 | 15 | 13 | 9 | 10 | 9 | 9 | 4 | 9 | 12 | 2 | 1 | 1 | 1 | 5 | 7 | 7 | 6 | 5 | 3 | | Diurnal Maximum |

Z - zerspan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 681 | 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: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 71 | 41 | 25 | 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 | 13 | 23 | 14 | 5 | 2 | 15 | 39 | 79 | 85 | 84 | 67 | 49 | 68 | 71 | 41 | 25 | 680 |

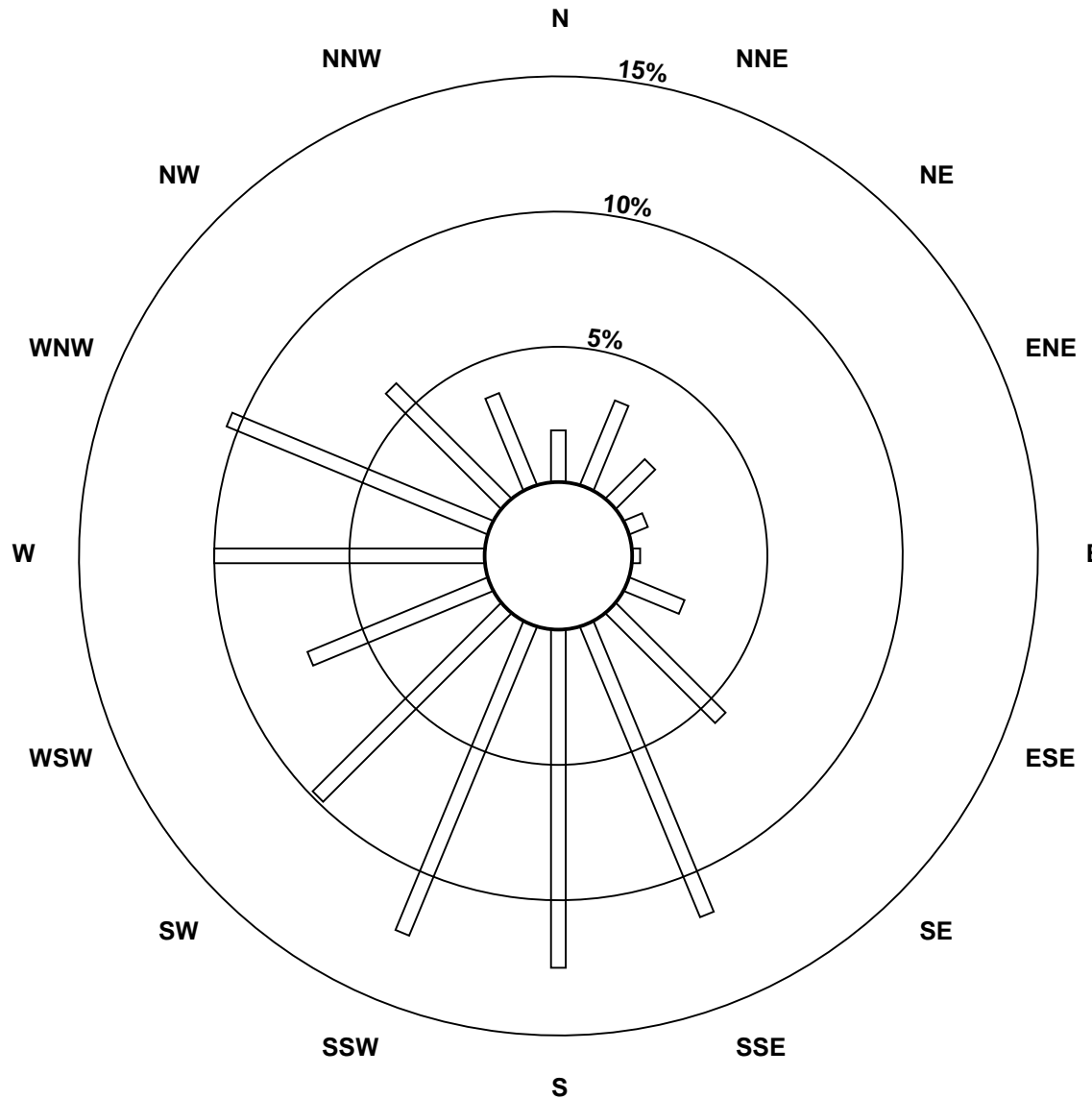
Total Number of Valid Hours: 680

Total Number of Hours: 720

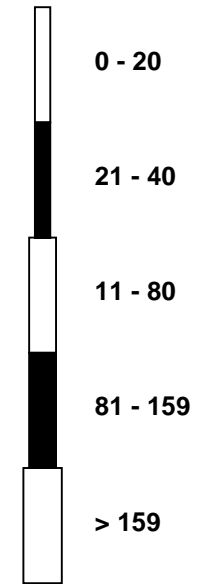


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River (AMS 20)



Classes (ppb)

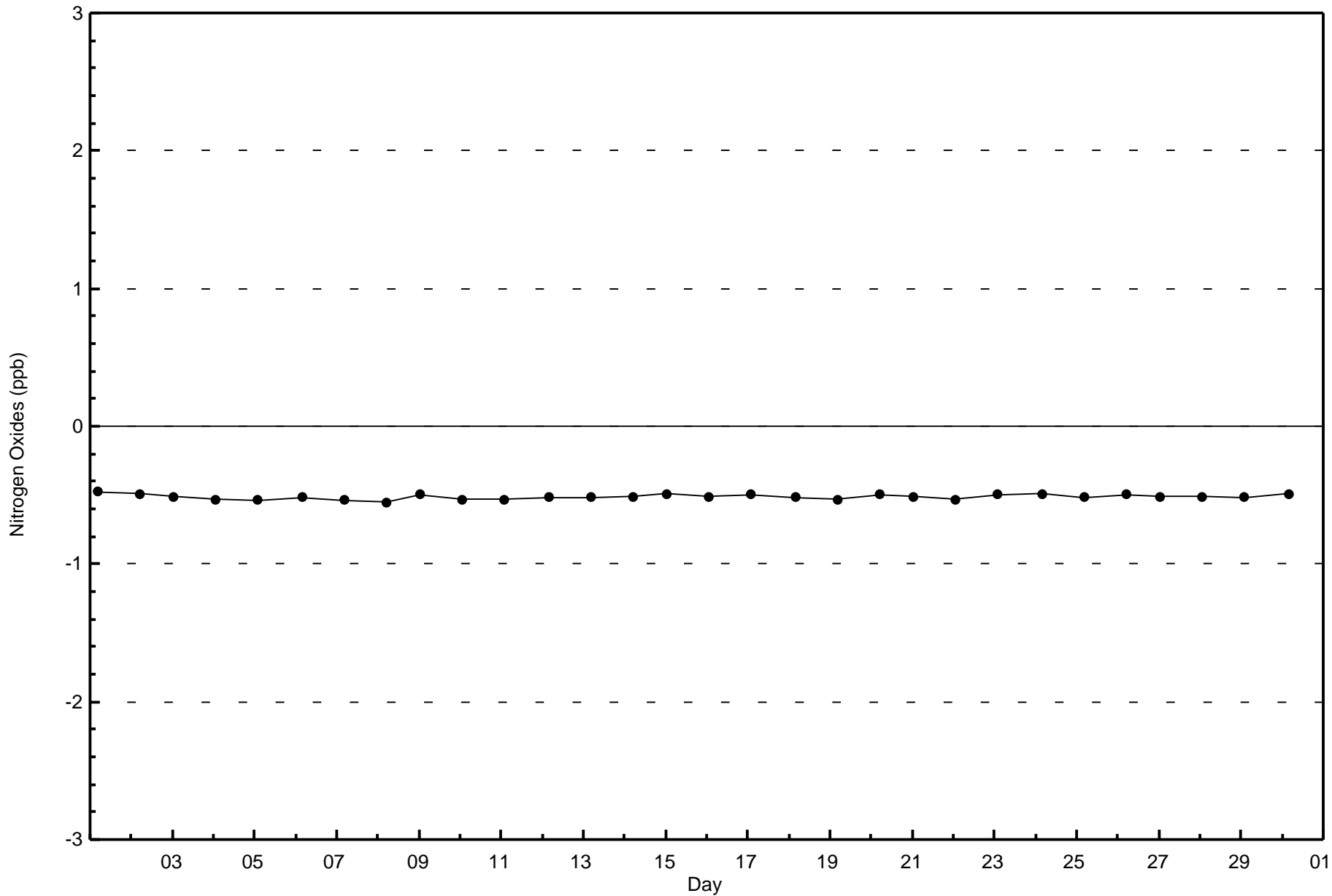


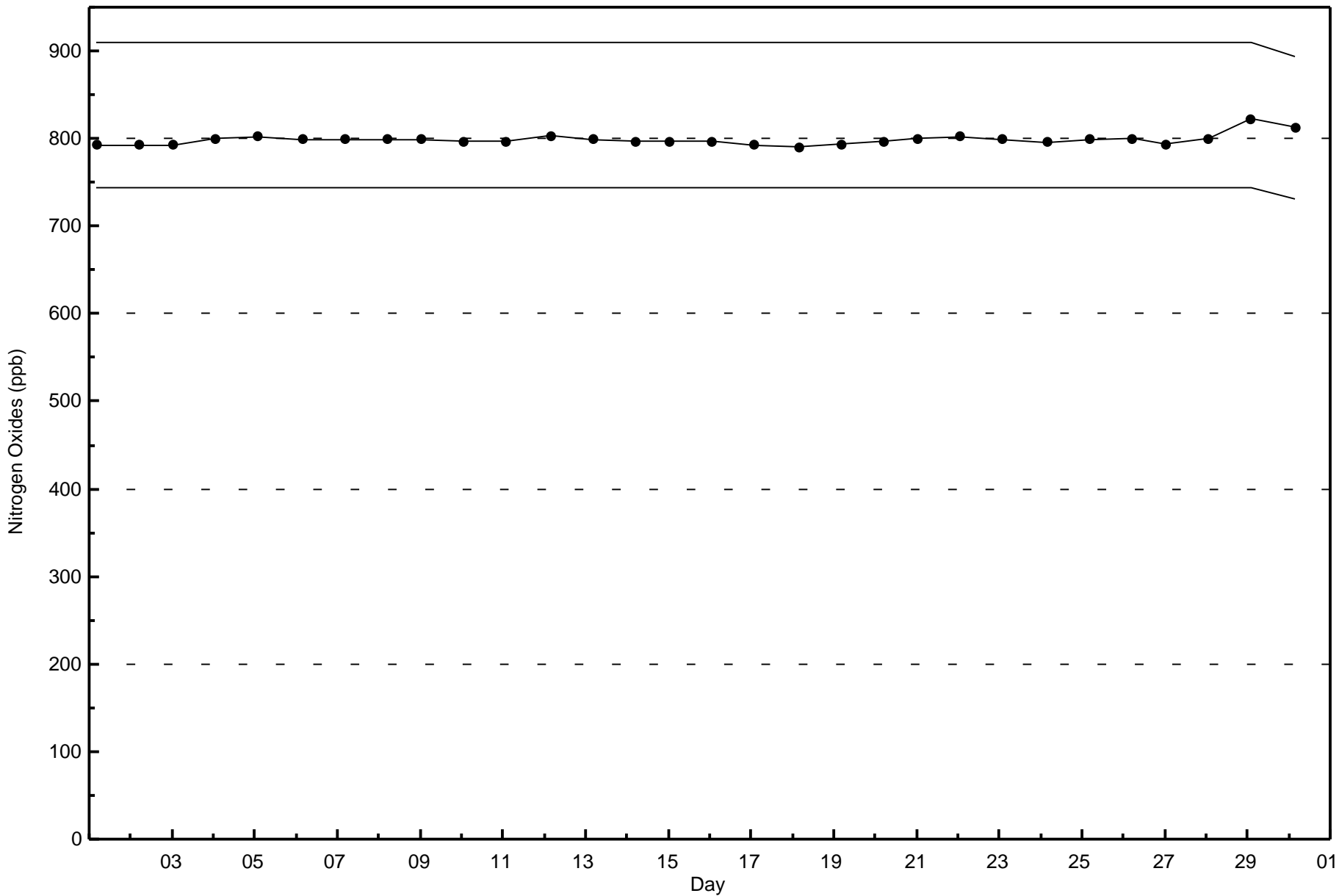
Total Number of Valid Hours: 680



Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Brion MacKay River - September 2016



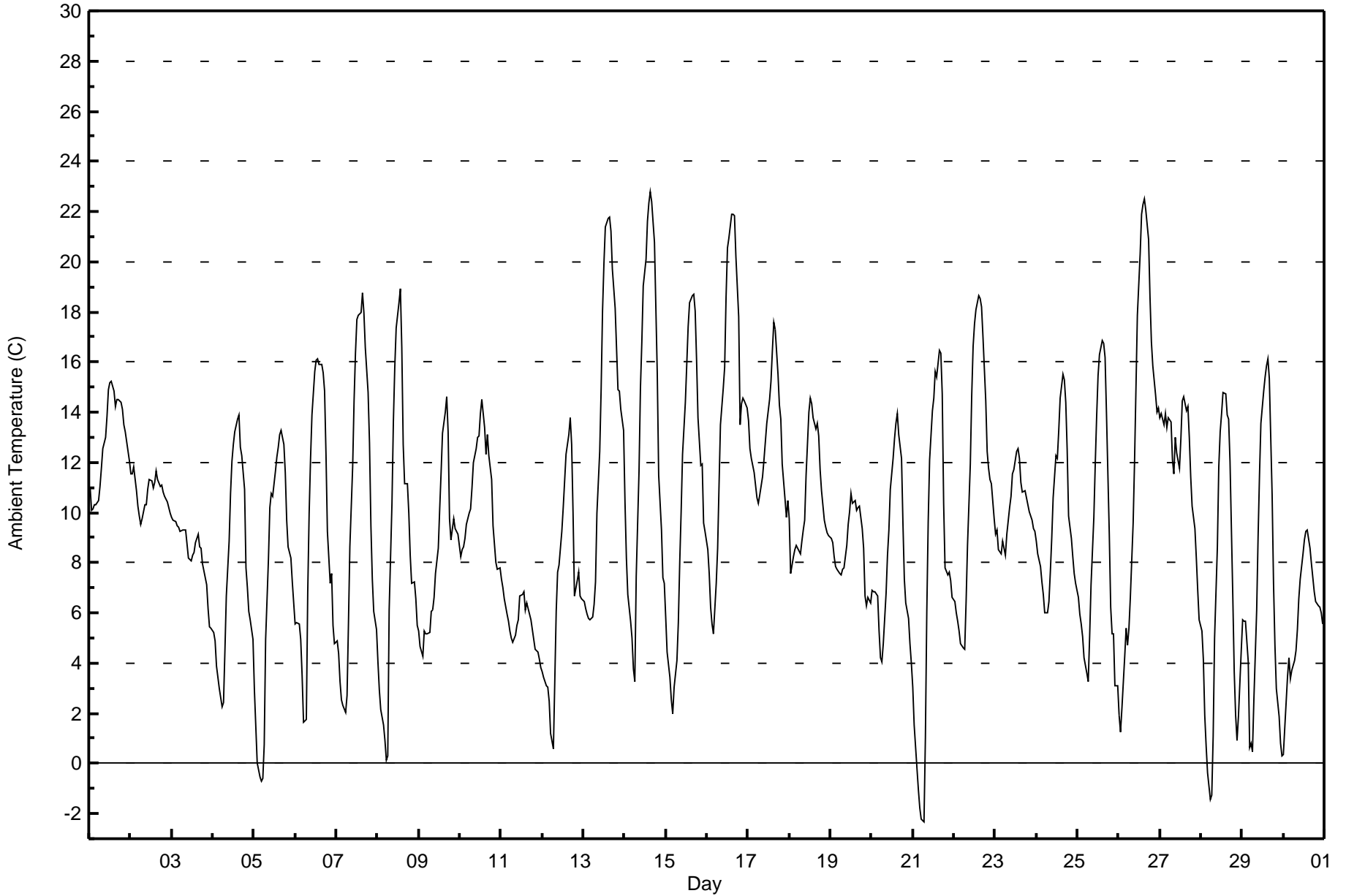




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Brion MacKay River - September 2016

| Maximum Value: 22.8 C on Sep 14 16:00 | | Maximum Daily Average: 14.1 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: -2.3 C on Sep 21 07:00 | | Minimum Daily Average: 5.7 C on Sep 11 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 15.0 C at hour 15 | | Minimum Diurnal Average: 5.0 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 9.70 C | | Percentiles: P ₁ = -0.6 P ₁₀ = 3.5 Q ₁ = 6.1 Median = 9.5 Q ₃ = 13.2 P ₉₀ = 15.8 P ₉₉ = 21.8 | | 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 | 11.0 | 10.1 | 10.1 | 10.3 | 10.3 | 10.5 | 11.0 | 11.8 | 12.5 | 13.0 | 13.8 | 14.9 | 15.2 | 15.2 | 14.8 | 14.2 | 14.5 | 14.5 | 14.4 | 14.1 | 13.5 | 13.2 | 12.8 | 12.1 | 12.8 | 15.2 |
| 2-Sep | 11.5 | 11.5 | 11.8 | 10.9 | 10.2 | 9.9 | 9.5 | 9.8 | 10.3 | 10.3 | 10.9 | 11.3 | 11.3 | 11.0 | 11.2 | 11.7 | 11.3 | 11.0 | 11.1 | 10.8 | 10.6 | 10.4 | 10.2 | 10.0 | 10.8 | 11.8 |
| 3-Sep | 9.8 | 9.7 | 9.6 | 9.5 | 9.4 | 9.2 | 9.3 | 9.3 | 9.3 | 8.8 | 8.2 | 8.1 | 8.3 | 8.4 | 8.8 | 9.1 | 8.6 | 8.6 | 7.9 | 7.7 | 7.1 | 6.2 | 5.5 | 5.4 | 8.4 | 9.8 |
| 4-Sep | 5.2 | 4.9 | 3.9 | 3.4 | 3.0 | 2.2 | 2.4 | 4.5 | 6.7 | 8.9 | 10.7 | 12.0 | 12.7 | 13.2 | 13.7 | 13.9 | 12.6 | 12.3 | 10.9 | 7.8 | 7.0 | 6.1 | 5.7 | 5.0 | 7.9 | 13.9 |
| 5-Sep | 2.9 | 1.5 | 0.0 | -0.5 | -0.7 | -0.6 | 0.8 | 5.0 | 8.1 | 10.2 | 10.8 | 10.6 | 11.6 | 12.2 | 12.6 | 13.1 | 13.3 | 12.7 | 11.6 | 9.7 | 8.6 | 8.2 | 7.2 | 6.4 | 7.3 | 13.3 |
| 6-Sep | 5.6 | 5.6 | 5.6 | 5.0 | 3.5 | 1.6 | 1.8 | 6.9 | 10.0 | 12.1 | 13.9 | 15.6 | 16.1 | 16.1 | 15.9 | 15.9 | 15.6 | 14.8 | 12.4 | 9.3 | 7.2 | 7.5 | 5.5 | 4.8 | 9.5 | 16.1 |
| 7-Sep | 4.9 | 4.4 | 3.2 | 2.6 | 2.3 | 2.0 | 2.7 | 5.6 | 8.6 | 11.8 | 14.4 | 16.3 | 17.7 | 17.9 | 18.0 | 18.8 | 18.0 | 16.6 | 14.8 | 12.8 | 9.5 | 7.4 | 6.1 | 5.3 | 10.1 | 18.8 |
| 8-Sep | 4.1 | 3.0 | 2.1 | 1.5 | 0.9 | 0.2 | 0.3 | 6.1 | 10.4 | 13.6 | 15.8 | 17.3 | 18.4 | 18.9 | 16.6 | 12.7 | 11.2 | 11.2 | 10.0 | 8.3 | 7.2 | 7.3 | 6.5 | 5.5 | 8.7 | 18.9 |
| 9-Sep | 5.3 | 4.7 | 4.3 | 5.3 | 5.2 | 5.2 | 5.2 | 6.1 | 6.1 | 6.6 | 7.6 | 8.6 | 10.2 | 11.6 | 13.2 | 14.0 | 14.6 | 13.2 | 9.8 | 8.9 | 9.8 | 9.4 | 9.2 | 9.1 | 8.5 | 14.6 |
| 10-Sep | 8.2 | 8.5 | 8.6 | 9.0 | 9.6 | 10.0 | 10.1 | 11.0 | 12.0 | 12.5 | 13.0 | 13.0 | 13.9 | 14.5 | 13.4 | 12.3 | 13.1 | 12.3 | 11.3 | 9.5 | 8.7 | 8.0 | 7.7 | 7.8 | 10.8 | 14.5 |
| 11-Sep | 7.4 | 7.0 | 6.5 | 6.0 | 5.6 | 5.3 | 5.0 | 4.8 | 5.1 | 5.5 | 5.7 | 6.7 | 6.7 | 6.9 | 6.1 | 6.4 | 6.2 | 5.7 | 5.3 | 4.9 | 4.5 | 4.4 | 4.1 | 3.8 | 5.7 | 7.4 |
| 12-Sep | 3.7 | 3.4 | 3.1 | 3.1 | 2.5 | 1.2 | 0.6 | 3.3 | 6.1 | 7.6 | 7.9 | 9.2 | 10.2 | 11.2 | 12.3 | 13.1 | 13.8 | 12.7 | 10.0 | 6.7 | 7.3 | 7.6 | 6.7 | 6.5 | 7.1 | 13.8 |
| 13-Sep | 6.4 | 6.2 | 5.9 | 5.8 | 5.7 | 5.8 | 6.3 | 7.3 | 10.0 | 12.5 | 14.9 | 18.0 | 19.9 | 21.4 | 21.7 | 21.8 | 21.2 | 19.7 | 18.2 | 16.5 | 14.9 | 14.8 | 14.1 | 13.3 | 13.4 | 21.8 |
| 14-Sep | 10.4 | 8.2 | 6.8 | 5.7 | 5.0 | 3.8 | 3.2 | 7.4 | 11.7 | 15.0 | 16.8 | 19.0 | 20.1 | 21.6 | 22.4 | 22.8 | 22.4 | 20.8 | 18.2 | 15.5 | 11.5 | 9.3 | 7.4 | 7.2 | 13.0 | 22.8 |
| 15-Sep | 5.8 | 4.4 | 3.4 | 2.6 | 2.0 | 3.0 | 4.1 | 5.6 | 8.0 | 10.1 | 12.3 | 14.4 | 15.9 | 17.4 | 18.4 | 18.6 | 18.7 | 18.0 | 16.1 | 13.8 | 11.9 | 11.9 | 9.6 | 9.2 | 10.6 | 18.7 |
| 16-Sep | 8.5 | 7.6 | 6.2 | 5.5 | 5.2 | 7.2 | 8.6 | 11.1 | 13.5 | 15.0 | 15.8 | 18.6 | 20.5 | 21.0 | 21.9 | 21.9 | 21.8 | 20.2 | 17.8 | 13.5 | 14.3 | 14.6 | 14.5 | 14.2 | 14.1 | 21.9 |
| 17-Sep | 13.7 | 12.6 | 12.2 | 11.6 | 11.1 | 10.6 | 10.4 | 10.7 | 11.4 | 12.1 | 12.8 | 13.6 | 14.5 | 15.3 | 16.4 | 17.6 | 17.3 | 15.5 | 14.3 | 13.7 | 11.9 | 10.5 | 9.8 | 10.5 | 12.9 | 17.6 |
| 18-Sep | 9.7 | 7.6 | 8.2 | 8.5 | 8.7 | 8.6 | 8.4 | 8.9 | 9.3 | 9.7 | 11.5 | 14.0 | 14.6 | 14.3 | 13.8 | 13.4 | 13.6 | 13.1 | 11.7 | 10.9 | 9.7 | 9.4 | 9.2 | 9.1 | 10.7 | 14.6 |
| 19-Sep | 9.0 | 8.8 | 8.3 | 7.9 | 7.7 | 7.6 | 7.5 | 7.7 | 7.8 | 8.7 | 9.5 | 10.0 | 10.8 | 10.4 | 10.5 | 10.1 | 10.2 | 10.3 | 9.4 | 8.6 | 6.7 | 6.3 | 6.6 | 6.4 | 8.6 | 10.8 |
| 20-Sep | 6.9 | 6.8 | 6.9 | 6.7 | 5.3 | 4.2 | 4.0 | 4.8 | 6.8 | 8.3 | 9.3 | 10.9 | 12.2 | 12.9 | 13.6 | 14.0 | 13.1 | 12.2 | 9.6 | 7.4 | 6.4 | 5.8 | 4.8 | 4.0 | 8.2 | 14.0 |
| 21-Sep | 3.0 | 1.6 | -0.2 | -1.0 | -1.7 | -2.2 | -2.3 | 1.0 | 6.0 | 9.6 | 12.1 | 14.0 | 14.6 | 15.6 | 15.4 | 16.5 | 16.4 | 14.7 | 10.4 | 7.8 | 7.5 | 7.6 | 7.3 | 6.6 | 7.5 | 16.5 |
| 22-Sep | 6.4 | 6.0 | 5.7 | 5.3 | 4.8 | 4.6 | 4.5 | 6.4 | 8.7 | 12.0 | 14.7 | 16.6 | 17.5 | 18.1 | 18.6 | 18.5 | 18.2 | 17.0 | 14.5 | 12.4 | 11.8 | 11.3 | 11.1 | 9.8 | 11.4 | 18.6 |
| 23-Sep | 9.2 | 9.3 | 8.5 | 8.4 | 8.8 | 8.6 | 8.3 | 9.1 | 10.2 | 10.6 | 11.5 | 11.7 | 12.4 | 12.5 | 12.2 | 11.2 | 10.8 | 10.9 | 10.6 | 10.3 | 10.0 | 9.7 | 9.4 | 9.3 | 10.2 | 12.5 |
| 24-Sep | 8.8 | 8.3 | 7.8 | 7.3 | 6.7 | 6.0 | 6.0 | 6.5 | 7.6 | 9.0 | 10.6 | 12.3 | 12.1 | 13.3 | 14.6 | 15.5 | 15.3 | 14.4 | 12.5 | 9.9 | 9.0 | 8.3 | 7.6 | 7.2 | 9.8 | 15.5 |
| 25-Sep | 6.6 | 6.0 | 5.6 | 5.0 | 4.2 | 3.6 | 3.2 | 5.1 | 7.1 | 9.8 | 11.9 | 13.8 | 15.5 | 16.3 | 16.8 | 16.8 | 16.2 | 14.0 | 9.2 | 6.2 | 5.2 | 5.2 | 3.1 | 3.1 | 8.7 | 16.8 |
| 26-Sep | 1.9 | 1.3 | 2.2 | 4.3 | 5.4 | 4.7 | 5.4 | 6.6 | 9.6 | 12.1 | 15.0 | 17.8 | 20.3 | 21.9 | 22.3 | 22.5 | 22.1 | 20.9 | 18.6 | 16.8 | 15.8 | 14.7 | 14.0 | 14.2 | 12.9 | 22.5 |
| 27-Sep | 13.8 | 13.9 | 13.5 | 13.9 | 13.4 | 13.8 | 13.6 | 12.1 | 11.6 | 13.0 | 12.4 | 11.8 | 12.9 | 14.5 | 14.6 | 14.1 | 14.2 | 13.0 | 11.4 | 10.2 | 9.4 | 8.2 | 6.9 | 5.7 | 12.2 | 14.6 |
| 28-Sep | 5.3 | 4.1 | 1.9 | 0.7 | -0.4 | -1.4 | -1.2 | 1.1 | 5.0 | 8.6 | 11.8 | 13.2 | 14.0 | 14.8 | 14.7 | 13.9 | 13.7 | 12.0 | 6.6 | 3.6 | 1.9 | 0.9 | 1.9 | 4.5 | 6.3 | 14.8 |
| 29-Sep | 5.7 | 5.7 | 5.7 | 4.0 | 0.7 | 0.8 | 0.5 | 2.5 | 6.1 | 9.0 | 11.5 | 13.6 | 14.9 | 15.4 | 15.8 | 16.1 | 15.3 | 10.7 | 7.2 | 4.7 | 3.0 | 1.8 | 0.8 | 0.3 | 7.2 | 16.1 |
| 30-Sep | 0.4 | 1.4 | 3.5 | 4.2 | 3.4 | 3.7 | 4.1 | 4.5 | 5.3 | 6.6 | 7.4 | 8.3 | 8.9 | 9.2 | 9.3 | 8.6 | 8.0 | 7.4 | 6.8 | 6.4 | 6.3 | 6.2 | 6.0 | 5.5 | 5.9 | 9.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Brion MacKay River - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 11 | 1.53 | 1.53 |
| 0 - 10 | 380 | 52.78 | 54.31 |
| 10 - 20 | 307 | 42.64 | 96.94 |
| > 20 | 22 | 3.06 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



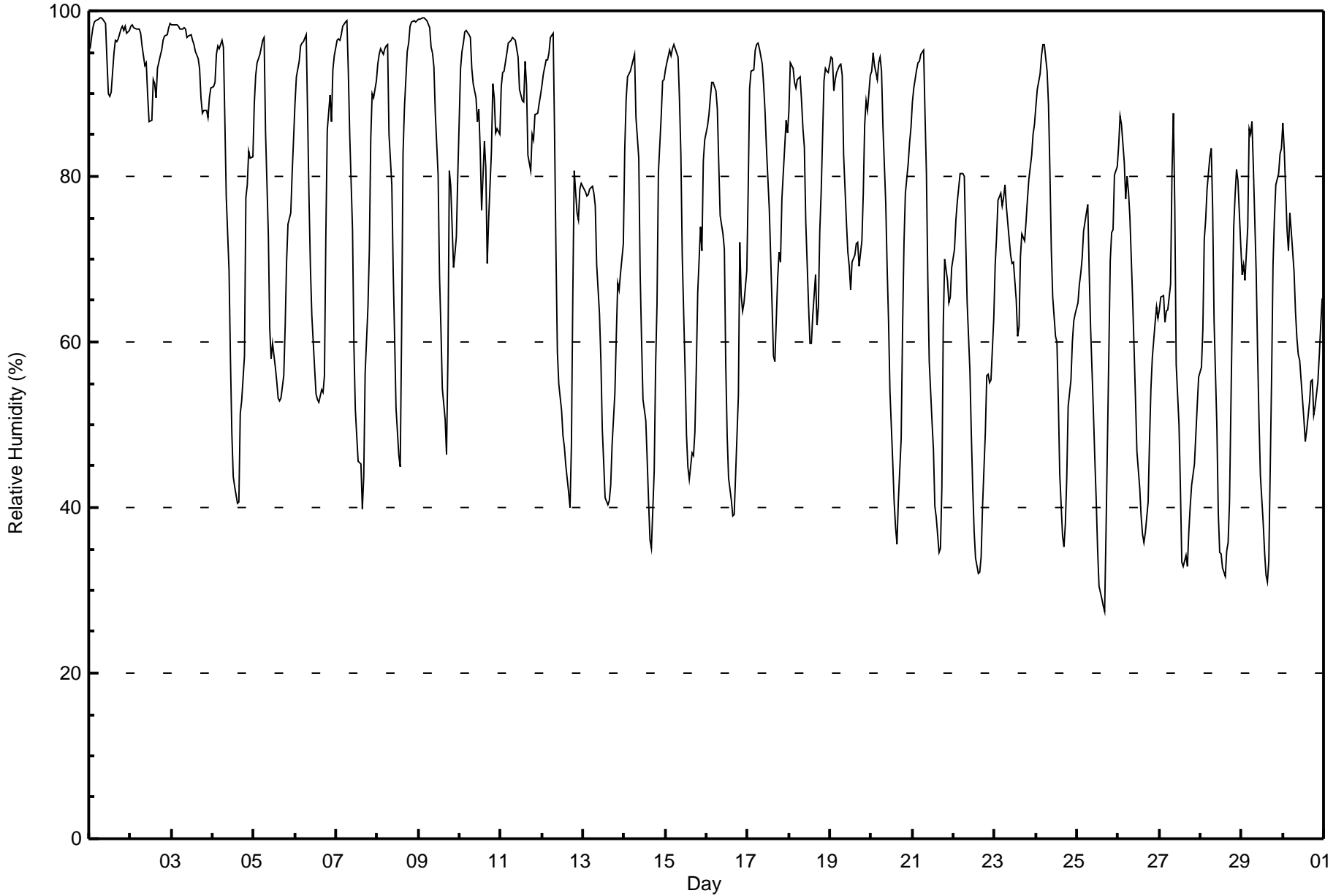
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Brion MacKay River - September 2016

| Maximum Value: 99 % on Sep 9 03:00 Maximum Daily Average: 96.5 % on Sep 1 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 27 % on Sep 25 17:00 Minimum Daily Average: 54.2 % on Sep 27 Maximum Diurnal Average: 90.3 % at hour 6 Minimum Diurnal Average: 53.4 % at hour 15 Monthly Average: 73.9 % Percentiles: P ₁ = 32 P ₁₀ = 44 Q ₁ = 59 Median = 78 Q ₃ = 92 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 | 95 | 97 | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 94 | 90 | 90 | 90 | 95 | 96 | 96 | 97 | 98 | 98 | 98 | 98 | 97 | 98 | 96.5 | 99 |
| 2-Sep | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 96 | 93 | 94 | 90 | 87 | 87 | 92 | 91 | 89 | 93 | 95 | 95 | 96 | 97 | 97 | 98 | 98 | 94.7 | 98 |
| 3-Sep | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 97 | 97 | 97 | 97 | 96 | 95 | 94 | 93 | 90 | 88 | 88 | 88 | 87 | 90 | 91 | 94.5 | 98 |
| 4-Sep | 91 | 91 | 95 | 96 | 95 | 96 | 96 | 96 | 87 | 78 | 69 | 58 | 49 | 44 | 43 | 41 | 51 | 53 | 58 | 77 | 79 | 83 | 82 | 82 | 72.3 | 96 |
| 5-Sep | 89 | 92 | 94 | 95 | 96 | 97 | 97 | 85 | 73 | 62 | 58 | 60 | 57 | 55 | 53 | 53 | 53 | 56 | 62 | 70 | 74 | 76 | 81 | 85 | 73.8 | 97 |
| 6-Sep | 89 | 92 | 94 | 96 | 96 | 96 | 97 | 87 | 77 | 69 | 63 | 57 | 54 | 53 | 53 | 54 | 54 | 56 | 73 | 86 | 90 | 87 | 93 | 95 | 77.5 | 97 |
| 7-Sep | 96 | 97 | 96 | 97 | 98 | 99 | 99 | 93 | 85 | 73 | 59 | 52 | 49 | 46 | 45 | 40 | 44 | 56 | 64 | 71 | 85 | 90 | 90 | 91 | 75.6 | 99 |
| 8-Sep | 94 | 95 | 95 | 95 | 95 | 96 | 96 | 85 | 79 | 69 | 61 | 52 | 46 | 45 | 61 | 83 | 88 | 95 | 96 | 98 | 99 | 99 | 99 | 99 | 84.1 | 99 |
| 9-Sep | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 96 | 95 | 93 | 88 | 80 | 68 | 62 | 54 | 51 | 47 | 58 | 81 | 79 | 69 | 71 | 73 | 80 | 80.6 | 99 |
| 10-Sep | 93 | 95 | 96 | 97 | 98 | 97 | 97 | 93 | 91 | 90 | 87 | 88 | 83 | 76 | 84 | 81 | 70 | 75 | 83 | 91 | 90 | 85 | 86 | 85 | 87.9 | 98 |
| 11-Sep | 91 | 92 | 93 | 95 | 96 | 96 | 96 | 97 | 96 | 95 | 94 | 90 | 89 | 89 | 94 | 91 | 83 | 81 | 85 | 84 | 87 | 88 | 89 | 90 | 90.9 | 97 |
| 12-Sep | 91 | 92 | 94 | 94 | 95 | 97 | 97 | 85 | 71 | 59 | 55 | 52 | 49 | 47 | 45 | 42 | 40 | 47 | 66 | 81 | 76 | 75 | 79 | 79 | 71.1 | 97 |
| 13-Sep | 78 | 78 | 78 | 78 | 78 | 79 | 78 | 76 | 69 | 63 | 58 | 49 | 45 | 41 | 40 | 41 | 43 | 48 | 54 | 61 | 67 | 66 | 68 | 72 | 62.9 | 79 |
| 14-Sep | 83 | 89 | 92 | 93 | 93 | 94 | 95 | 87 | 82 | 68 | 60 | 53 | 50 | 46 | 41 | 36 | 35 | 44 | 57 | 65 | 80 | 87 | 92 | 92 | 71.5 | 95 |
| 15-Sep | 93 | 94 | 95 | 95 | 95 | 96 | 95 | 94 | 89 | 83 | 70 | 57 | 49 | 45 | 43 | 47 | 46 | 49 | 57 | 66 | 74 | 71 | 82 | 84 | 73.7 | 96 |
| 16-Sep | 86 | 87 | 90 | 91 | 91 | 90 | 88 | 82 | 75 | 73 | 71 | 57 | 49 | 44 | 41 | 39 | 39 | 44 | 54 | 72 | 66 | 64 | 65 | 69 | 67.7 | 91 |
| 17-Sep | 79 | 91 | 93 | 93 | 95 | 96 | 96 | 95 | 94 | 91 | 88 | 83 | 76 | 70 | 64 | 58 | 58 | 68 | 71 | 70 | 77 | 83 | 87 | 85 | 81.7 | 96 |
| 18-Sep | 88 | 94 | 93 | 91 | 91 | 92 | 92 | 89 | 86 | 84 | 75 | 64 | 60 | 60 | 63 | 68 | 62 | 64 | 73 | 78 | 92 | 93 | 93 | 93 | 80.7 | 94 |
| 19-Sep | 94 | 94 | 90 | 92 | 93 | 93 | 94 | 92 | 83 | 74 | 71 | 69 | 66 | 70 | 71 | 72 | 72 | 69 | 72 | 78 | 86 | 89 | 88 | 92 | 81.9 | 94 |
| 20-Sep | 93 | 95 | 93 | 92 | 94 | 94 | 93 | 86 | 77 | 69 | 63 | 54 | 45 | 41 | 38 | 36 | 41 | 48 | 62 | 72 | 78 | 81 | 84 | 86 | 71.4 | 95 |
| 21-Sep | 89 | 91 | 93 | 94 | 94 | 95 | 95 | 88 | 80 | 67 | 58 | 50 | 47 | 40 | 39 | 35 | 35 | 42 | 62 | 70 | 67 | 65 | 65 | 69 | 67.9 | 95 |
| 22-Sep | 71 | 75 | 77 | 79 | 80 | 80 | 80 | 72 | 65 | 56 | 49 | 42 | 37 | 34 | 32 | 32 | 34 | 40 | 49 | 56 | 56 | 55 | 55 | 63 | 57.1 | 80 |
| 23-Sep | 69 | 73 | 77 | 78 | 76 | 77 | 79 | 76 | 72 | 71 | 69 | 70 | 65 | 61 | 62 | 70 | 73 | 72 | 75 | 77 | 80 | 82 | 85 | 86 | 74.0 | 86 |
| 24-Sep | 88 | 91 | 92 | 95 | 96 | 96 | 93 | 89 | 81 | 71 | 65 | 61 | 60 | 53 | 44 | 37 | 35 | 38 | 44 | 52 | 56 | 60 | 63 | 63 | 67.6 | 96 |
| 25-Sep | 65 | 67 | 68 | 70 | 73 | 76 | 77 | 68 | 62 | 52 | 46 | 41 | 35 | 31 | 29 | 28 | 27 | 37 | 59 | 70 | 73 | 74 | 80 | 81 | 57.8 | 81 |
| 26-Sep | 84 | 87 | 86 | 82 | 77 | 80 | 78 | 75 | 65 | 59 | 53 | 47 | 42 | 39 | 37 | 36 | 37 | 41 | 48 | 54 | 58 | 62 | 64 | 63 | 60.6 | 87 |
| 27-Sep | 64 | 65 | 66 | 62 | 64 | 64 | 67 | 80 | 88 | 76 | 57 | 50 | 42 | 33 | 33 | 34 | 33 | 37 | 40 | 43 | 45 | 49 | 52 | 56 | 54.2 | 88 |
| 28-Sep | 57 | 62 | 72 | 75 | 78 | 82 | 83 | 76 | 63 | 50 | 39 | 35 | 34 | 33 | 32 | 35 | 36 | 41 | 64 | 74 | 78 | 81 | 79 | 72 | 59.6 | 83 |
| 29-Sep | 68 | 69 | 67 | 74 | 86 | 85 | 87 | 81 | 69 | 59 | 51 | 44 | 38 | 35 | 32 | 31 | 34 | 56 | 69 | 75 | 79 | 80 | 83 | 83 | 63.9 | 87 |
| 30-Sep | 87 | 83 | 74 | 71 | 76 | 73 | 68 | 64 | 61 | 59 | 58 | 53 | 51 | 48 | 49 | 53 | 55 | 55 | 51 | 52 | 55 | 59 | 62 | 65 | 61.7 | 87 |
| 85.3 87.5 88.3 88.7 89.8 90.3 90.1 85.8 79.8 73.1 66.8 61.1 56.8 53.8 53.4 53.4 53.6 58.4 67.0 73.5 76.6 77.9 80.1 81.6 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 99 99 99 99 99 99 99 99 99 99 98 97 97 97 96 95 96 96 97 98 98 99 99 99 99 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Brion MacKay River - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 46 | 6.39 | 6.39 |
| 40 - 60 | 145 | 20.14 | 26.53 |
| 60 - 80 | 196 | 27.22 | 53.75 |
| 80 - 100 | 333 | 46.25 | 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

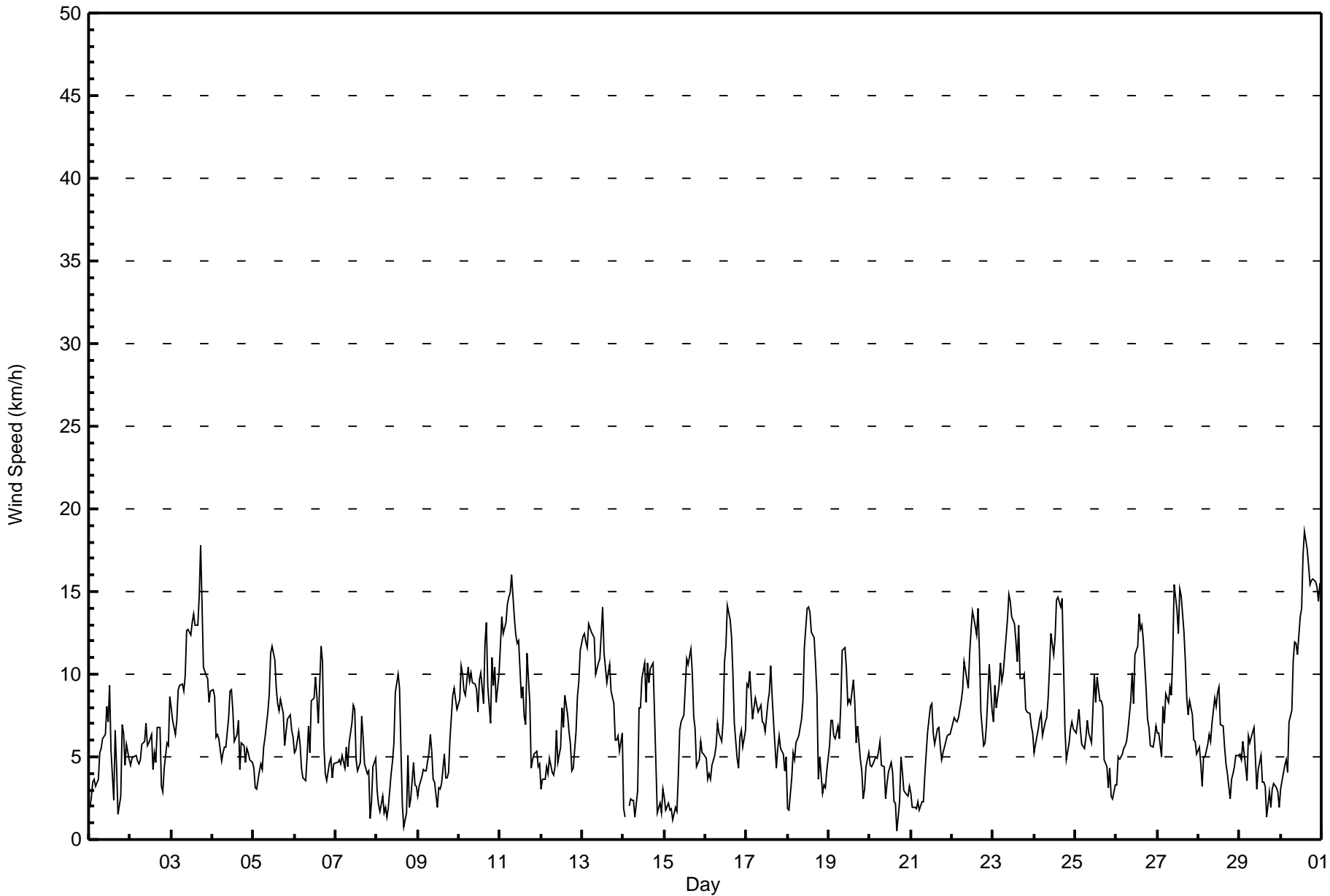
Brion MacKay River - September 2016

| | | |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 19 km/h on Sep 30 15:00 | Maximum Daily Speed Average: 11.9 km/h on Sep 30 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 20 17:00 | Minimum Daily Speed Average: 0.8 km/h on Sep 9 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 4.3 km/h at hour 13 | Minimum Diurnal Speed Average: 1.4 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 2.9 km/h 231.8 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 6 Q ₃ = 9 P ₉₀ = 12 P ₉₉ = 16 | 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 | NNE2 | NNE3 | N3 | NNE4 | NNE3 | NNW4 | N5 | NNE5 | NE6 | NE6 | NE8 | NE7 | NE9 | ENE5 | ENE2 | NE7 | NE4 | N2 | NW3 | W7 | WNW6 | W4 | WSW6 | WSW5 | NNE2.9 | NE9 | |
| 2-Sep | SW4 | SW5 | WSW5 | SW5 | SW5 | WSW5 | WSW5 | W6 | W6 | WNW7 | WSW6 | W6 | NW6 | SW4 | SW5 | W5 | WNW7 | NW7 | N3 | WSW3 | W4 | W6 | WNW6 | WNW9 | W4.5 | WNW9 | |
| 3-Sep | WNW8 | WNW7 | WNW6 | W7 | W9 | W9 | WNW9 | W9 | WNW10 | WNW13 | WNW13 | WNW12 | NW13 | NW14 | NW13 | NW13 | NW15 | NNW18 | NNW14 | NW10 | NW10 | NW10 | WNW8 | WNW9 | WNW10.4 | NNW18 | |
| 4-Sep | WNW9 | WNW9 | W6 | W6 | W6 | WSW5 | WSW5 | W6 | W6 | WNW7 | W9 | WNW9 | W8 | W6 | WSW6 | SW7 | SW4 | SSW6 | SW6 | SSW5 | SSW6 | SSW5 | SW5 | SW5 | WSW5.4 | WNW9 | |
| 5-Sep | SSW4 | S3 | SSE3 | SSE4 | SSE5 | SSE4 | S6 | S6 | S8 | SSW9 | S11 | S12 | S11 | SSE9 | SSE8 | SSE8 | SE8 | ESE8 | ESE6 | ESE7 | SE7 | SE8 | SE7 | SE6 | SSE6.3 | S12 | |
| 6-Sep | SSE5 | S5 | S7 | S6 | S4 | S4 | SSE4 | S5 | S7 | S5 | SSE8 | SE9 | SSE10 | S9 | S7 | SSE12 | SE11 | S6 | WNW4 | ESE4 | SE5 | SE5 | SSE4 | SSE5 | SSE5.6 | SSE12 | |
| 7-Sep | SSE5 | SSE5 | SSE5 | SSE5 | SSE5 | SSE4 | S6 | SSE4 | S6 | S7 | S8 | S8 | SW5 | W4 | SW5 | S7 | SSW6 | W5 | SW4 | W4 | SW1 | WSW2 | SSE4 | S5 | S4.1 | S8 | |
| 8-Sep | SE3 | SE2 | SSE2 | SSE3 | SSE2 | SSE2 | SE1 | W2 | W4 | WNW5 | WNW6 | WNW9 | WNW10 | WNW9 | N5 | SSW2 | S1 | SSW2 | N5 | WSW2 | WNW2 | NW5 | WNW3 | W3 | WNW2.2 | WNW10 | |
| 9-Sep | W3 | WNW3 | WNW4 | NNW4 | WNW4 | WNW4 | NW5 | NNW6 | NNW5 | N4 | NNW3 | NE2 | SW3 | SSW3 | W3 | SW5 | SW4 | S4 | SE4 | SE6 | SE9 | SE9 | SE9 | SSE8 | SW0.8 | SE9 | |
| 10-Sep | SE8 | SSE11 | SSE10 | SSE9 | S9 | S10 | SSW10 | SSW10 | SW9 | WSW9 | W9 | W8 | W10 | W10 | W8 | W12 | WNW13 | W9 | W7 | WNW11 | WNW9 | WNW10 | WNW8 | WNW10 | WSW6.2 | WNW13 | |
| 11-Sep | NW12 | NW13 | NW12 | NW13 | NNW14 | NNW15 | NNW15 | NNW16 | NNW13 | NNW12 | NNW12 | N12 | NNE9 | N9 | N7 | N7 | NNW11 | NNW8 | NW4 | NW5 | NW5 | NW5 | WNW4 | WNW5 | NNW9.5 | NNW16 | |
| 12-Sep | WNW3 | WSW4 | WSW4 | WSW4 | SW4 | SW5 | SW4 | SW4 | SW4 | SSW7 | SW5 | SW6 | SW8 | SW7 | SSW9 | SSW8 | SW7 | SSW6 | S4 | S4 | S7 | SSW9 | S10 | SSW11 | SSW5.5 | SSW11 | |
| 13-Sep | SSW12 | SSW12 | SSW12 | SSW12 | SSW13 | SSW13 | SSW12 | SSW12 | SSW10 | SW11 | SW11 | SW12 | SSW14 | SW11 | WSW9 | WSW10 | WSW11 | WSW9 | SW8 | SW6 | SW6 | SW6 | WSW5 | W6 | SW9.6 | SSW14 | |
| 14-Sep | W2 | S1 | AF | SE2 | SSE2 | SE2 | SSE2 | ENE1 | E3 | SE8 | SSE8 | SSE10 | SSW11 | WSW8 | W11 | WSW10 | W10 | WNW11 | NNW8 | NNW5 | S2 | SSW2 | WSW2 | W3 | SW2.6 | WNW11 | |
| 15-Sep | WSW3 | SSW2 | WSW2 | SSW2 | SE2 | SSE1 | SE2 | ESE2 | ESE4 | ESE7 | ESE7 | ESE8 | ESE9 | ESE11 | ESE11 | ESE10 | ESE7 | SE7 | SSE4 | SSE5 | SSE6 | S5 | S5 | SE4.8 | ESE11 | | |
| 16-Sep | SSW5 | S4 | S4 | S4 | S4 | SSW5 | SSW6 | SW7 | SW6 | SSW6 | SSW7 | SW11 | SW12 | SW14 | SW13 | WSW12 | WSW10 | WSW7 | SW5 | S4 | SSW6 | SSW7 | SSW6 | SSW7 | SW6.7 | SW14 | |
| 17-Sep | SSW9 | SSW9 | SSW10 | SSW7 | S8 | SSW9 | SSW8 | SSW8 | SSW8 | SW7 | SW7 | SW7 | SW8 | WSW9 | WSW11 | W9 | W7 | SW4 | SW6 | SW6 | SSW5 | SSW5 | SSW4 | SSW5 | SW6.9 | WSW11 | |
| 18-Sep | SSW2 | WSW2 | W4 | W5 | W5 | W6 | W6 | W7 | W7 | WNW8 | WNW12 | WNW14 | NW14 | NW14 | NW13 | WNW12 | NW11 | NW9 | NW4 | NW5 | W3 | WNW3 | WNW3 | WNW4 | WNW6.8 | NW14 | |
| 19-Sep | WNW6 | NW7 | NW7 | WNW6 | WNW6 | WNW7 | WNW6 | NW8 | NW11 | NW12 | WNW10 | WNW8 | WNW8 | WNW8 | WNW8 | WNW10 | WNW8 | WNW6 | NW7 | NW5 | WNW4 | W2 | WNW3 | NNW4 | NW5 | WNW6.8 | NW12 |
| 20-Sep | N4 | NNW4 | NW5 | NW5 | NW5 | NW5 | NNW6 | NW5 | NNW4 | NW2 | WNW3 | NNW4 | NNW5 | N4 | N2 | NNE2 | E0 | ENE2 | SE5 | S4 | SSE3 | SSE3 | SSE3 | SSE3 | NNW1.8 | NNW6 | |
| 21-Sep | SSE3 | SE2 | SSE2 | S2 | SE2 | SE2 | SE2 | SSW2 | SW4 | SW5 | SSW7 | SSW8 | SSW8 | WSW6 | WSW6 | SW7 | SW7 | SW6 | S5 | S5 | S6 | S6 | S6 | S6 | SSW4.2 | SSW8 | |
| 22-Sep | S7 | S7 | S7 | S7 | S7 | S8 | S9 | SSW11 | S10 | SSW9 | SSW11 | SSW13 | SSW14 | SSW13 | SSW12 | SSW14 | SSW11 | S8 | SSE6 | SSE6 | SSE7 | SSE9 | SSE11 | SSE8 | S9.1 | SSW14 | |
| 23-Sep | SSE7 | S9 | SSE8 | SSE9 | S11 | SSE10 | SSE10 | SSE11 | SSE13 | SSE15 | SSE14 | SSE13 | SSE13 | SSE12 | SSE11 | SSE13 | SE10 | SE10 | SE10 | SSE10 | SSE8 | SSE8 | SSE8 | SSE7 | S6 | SSE10.2 | SSE15 |
| 24-Sep | S5 | S6 | S7 | S7 | SSW8 | SSW6 | SW7 | SSW7 | SW8 | WSW10 | W12 | W11 | W12 | WNW14 | WNW15 | WNW14 | WNW15 | WNW11 | W7 | WSW5 | WSW6 | W7 | W7 | WSW7 | WSW7.1 | WNW15 | |
| 25-Sep | WSW6 | WSW7 | W8 | W7 | W6 | WSW5 | SW6 | WSW7 | WSW6 | W6 | WNW8 | WNW10 | WNW8 | W8 | W8 | SW5 | SSW4 | SW3 | SW4 | SW3 | SSE2 | SE3 | SE3 | SE3 | W5.3 | WNW10 | |
| 26-Sep | SE3 | S5 | SSE5 | SSE5 | SSE6 | SSE6 | SE6 | SSE7 | S8 | S10 | S8 | S11 | S12 | S14 | S13 | SSW13 | S12 | S9 | SSE7 | SE7 | SSE6 | SSE6 | SSE6 | SSE7 | S7.6 | S14 | |
| 27-Sep | SSE6 | SSE6 | S5 | SSW8 | SW7 | W9 | W8 | SW9 | SW9 | W11 | WNW15 | WNW14 | WNW12 | W15 | W15 | W13 | W11 | WSW9 | WSW8 | WSW8 | WSW8 | WSW6 | W6 | WSW5 | WSW7.6 | WNW15 | |
| 28-Sep | W6 | WSW5 | WSW3 | SW5 | SSW5 | S6 | S6 | S6 | S7 | SSW9 | SSW8 | SSW9 | SSW9 | SW7 | SSW7 | SSW6 | SSW5 | SSW4 | SSE2 | SSE4 | SSE4 | S4 | S5 | S5 | SSW5.1 | SSW9 | |
| 29-Sep | S5 | S5 | S6 | S4 | S4 | S6 | S6 | SSW6 | SSW7 | SSW5 | SSW3 | SW4 | SSW5 | S4 | WSW3 | NW3 | S1 | SE3 | SE2 | SE3 | SE3 | SE3 | SE3 | ENE2 | S3.3 | SSW7 | |
| 30-Sep | NNE3 | NNE4 | NE5 | NE5 | NNE4 | NE7 | NE8 | NNE11 | NNE12 | NNE12 | NNE11 | NNE13 | NNE14 | NNE17 | NNE19 | NNE18 | NNE17 | NNE15 | NNE16 | NNE16 | NNE16 | NE15 | NE14 | NE15 | NNE11.9 | NNE19 | |

| | |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| SW2.6SSW2.6 SW2.8SSW2.9 SW2.9 SW3.1 SW2.9 SW3.2 SW3.4WSW3.6WSW3.6WSW3.7WSW4.3WSW4.2WSW4.2WSW3.9WSW3.5 W2.7WSW1.4 SW1.8SSW2.1SSW2.4SSW2.4 SW2.6 | Diurnal Average |
| SSW12 NW13 NW12 NW13NNW14 NNW15 NNW15 NNW16 NNW13 SSE15WNW15WNW14 SSW14 NNE17 NNE19 NNE18 NNE17 NNW18 NNE16 NNE16 NNE16 NE15 NE14 NE15 | Diurnal Maximum |

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Brion MacKay River - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 271 | 37.69 | 37.69 |
| 6 - 11 | 357 | 49.65 | 87.34 |
| 12 - 19 | 91 | 12.66 | 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: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Brion MacKay River - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 9 | 9 | 4 | 5 | 2 | 3 | 23 | 38 | 34 | 25 | 32 | 23 | 17 | 18 | 18 | 11 | 271 |
| 6 - 11 | 3 | 3 | 8 | 0 | 0 | 12 | 17 | 41 | 51 | 50 | 32 | 29 | 49 | 45 | 12 | 5 | 357 |
| 12 - 19 | 1 | 12 | 3 | 0 | 0 | 0 | 0 | 8 | 5 | 15 | 4 | 1 | 6 | 14 | 13 | 9 | 91 |
| 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 | 13 | 24 | 15 | 5 | 2 | 15 | 40 | 87 | 90 | 90 | 68 | 53 | 72 | 77 | 43 | 25 | 719 |

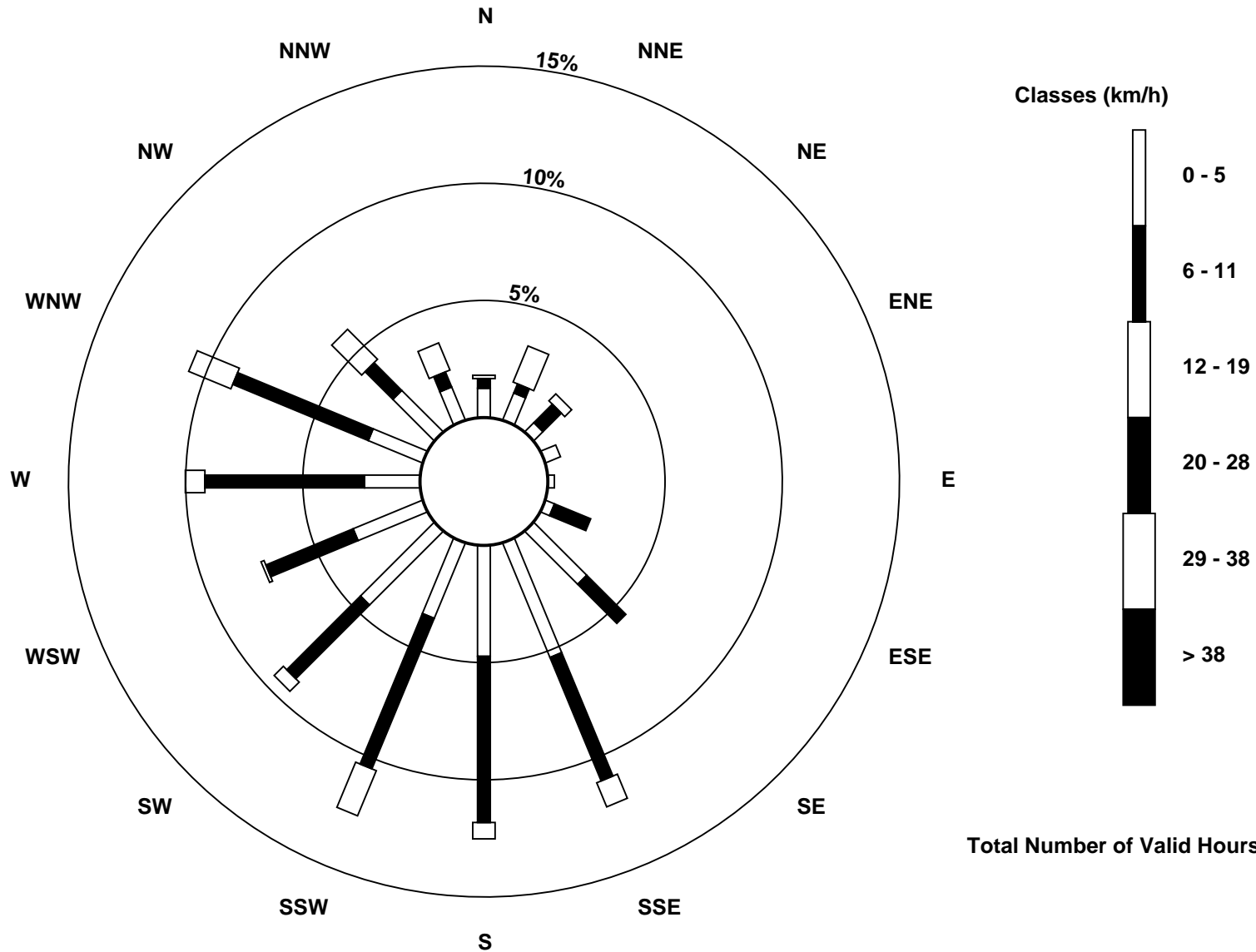
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Brion MacKay River (AMS 20)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Brion MacKay River - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 6 km/h on Sep 27 15:00 | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9 |
| Minimum Value: 0 km/h on Sep 14 04:00 | |
| 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 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 3 | 3 | 2 | 2 | 2 | 3 |
| 2-Sep | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 3 |
| 3-Sep | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 6 | 5 | 4 | 4 | 3 | 3 | 3 | 6 |
| 4-Sep | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 4 |
| 5-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 4 |
| 6-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 4 |
| 7-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 3 |
| 8-Sep | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 3 | 4 | 1 | 6 | 1 | 2 | 1 | 1 | 1 | 6 |
| 9-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 |
| 10-Sep | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 5 | 4 | 5 | 5 | 5 | 3 | 4 | 3 | 4 | 3 | 4 | 5 |
| 11-Sep | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 3 | 4 | 2 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 5 |
| 12-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 3 |
| 13-Sep | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 5 |
| 14-Sep | 1 | 1 | AF | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 4 | 3 | 5 | 4 | 5 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 5 |
| 15-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 4 |
| 16-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 5 | 5 | 3 | 2 | 1 | 2 | 2 | 1 | 2 | 6 |
| 17-Sep | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 4 |
| 18-Sep | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 4 | 4 | 5 | 4 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 5 |
| 19-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 4 |
| 20-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 3 |
| 21-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 |
| 22-Sep | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 5 | 4 | 3 | 2 | 2 | 2 | 3 | 4 | 2 | 5 |
| 23-Sep | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 5 |
| 24-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 5 | 4 | 2 | 2 | 2 | 3 | 2 | 6 |
| 25-Sep | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 4 |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 5 |
| 27-Sep | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 3 | 6 | 6 | 5 | 5 | 6 | 6 | 5 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 6 |
| 28-Sep | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 29-Sep | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 |
| 30-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 5 | 6 |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 6 | 6 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 6 | 5 | 5 | | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | |

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Brion MacKay River - September 2016

| | |
|--------------------------------------------------------------|------------------------------------------------------------|
| Direction of Maximum Speed: 30 deg on Sep 30 15:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 30.2 deg on Sep 30 | Hours of Data: 719 |
| Direction of Minimum Speed: 96 deg on Sep 20 17:00 | Direction of Minimum Daily Speed Average: 0.8 deg on Sep 9 |
| Direction of Minimum Speed: 96 deg on Sep 20 17:00 | Hours of Missing Data: 1 |
| Monthly Average Direction: 243.0 deg | Percent Operational Time: 99.9 |

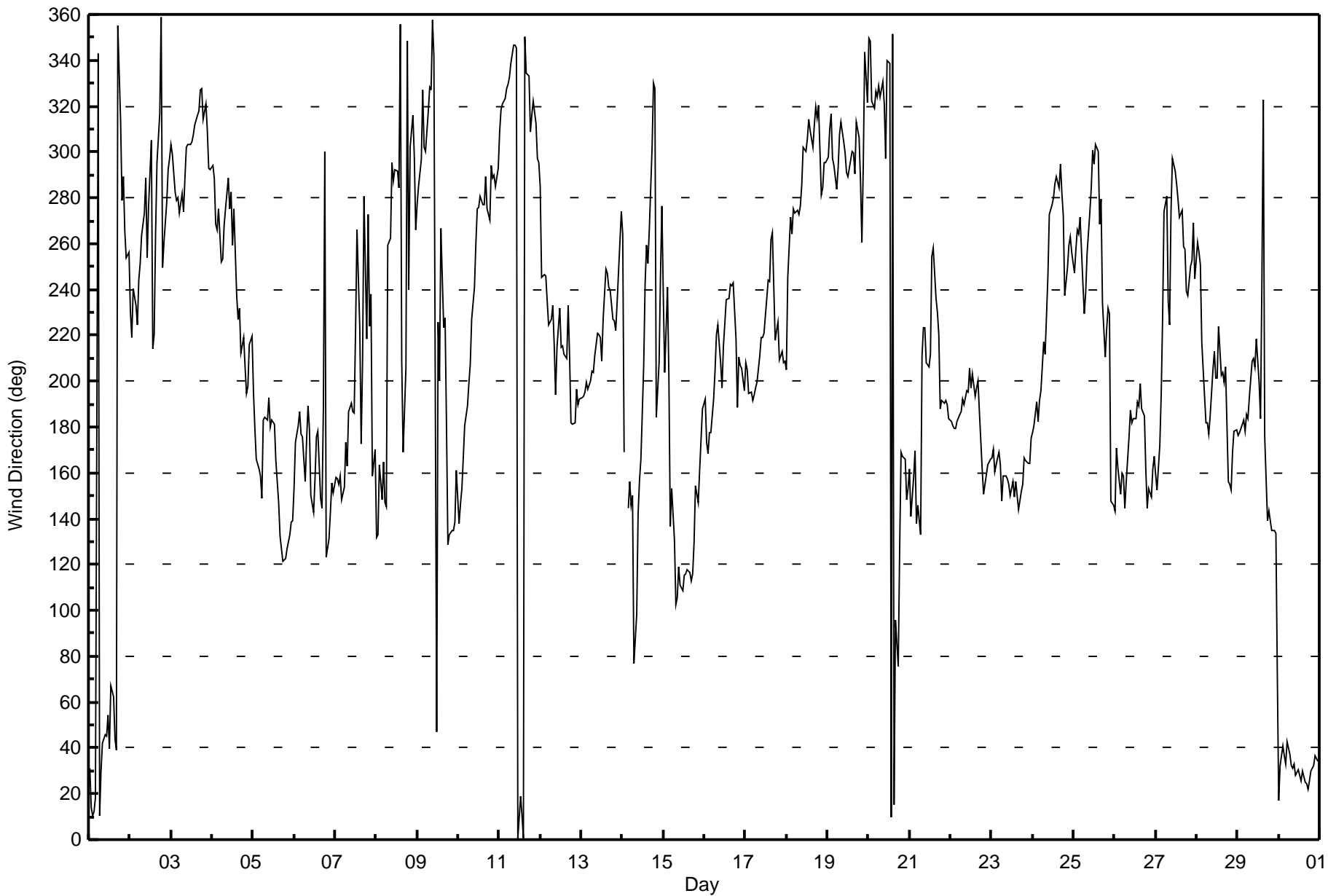
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 31 | 14 | 10 | 12 | 18 | 343 | 10 | 30 | 42 | 46 | 45 | 54 | 40 | 67 | 62 | 44 | 39 | 355 | 314 | 279 | 289 | 265 | 254 | 256 | 14.4 |
| 2-Sep | 231 | 219 | 241 | 233 | 225 | 244 | 251 | 263 | 273 | 289 | 254 | 276 | 305 | 214 | 220 | 264 | 296 | 317 | 359 | 250 | 261 | 278 | 293 | 297 | 266.8 |
| 3-Sep | 303 | 299 | 282 | 279 | 280 | 273 | 282 | 274 | 289 | 302 | 303 | 303 | 304 | 307 | 312 | 316 | 318 | 327 | 328 | 314 | 321 | 309 | 293 | 292 | 303.5 |
| 4-Sep | 294 | 289 | 269 | 266 | 275 | 252 | 253 | 268 | 275 | 288 | 275 | 282 | 259 | 275 | 237 | 227 | 232 | 212 | 219 | 206 | 195 | 197 | 216 | 219 | 254.7 |
| 5-Sep | 195 | 179 | 166 | 162 | 158 | 149 | 183 | 184 | 183 | 193 | 180 | 183 | 181 | 165 | 156 | 147 | 133 | 121 | 122 | 122 | 127 | 133 | 139 | 139 | 159.4 |
| 6-Sep | 153 | 174 | 181 | 187 | 177 | 176 | 156 | 175 | 189 | 179 | 150 | 143 | 157 | 176 | 178 | 149 | 145 | 189 | 300 | 123 | 131 | 143 | 156 | 151 | 163.2 |
| 7-Sep | 158 | 158 | 155 | 158 | 148 | 154 | 173 | 163 | 187 | 190 | 187 | 186 | 222 | 266 | 223 | 173 | 209 | 281 | 218 | 273 | 224 | 238 | 159 | 170 | 188.3 |
| 8-Sep | 132 | 133 | 164 | 148 | 165 | 147 | 145 | 259 | 262 | 295 | 288 | 292 | 292 | 284 | 355 | 209 | 169 | 206 | 349 | 240 | 302 | 316 | 298 | 266 | 283.4 |
| 9-Sep | 277 | 285 | 296 | 327 | 302 | 300 | 318 | 328 | 327 | 358 | 342 | 47 | 226 | 200 | 266 | 223 | 228 | 181 | 129 | 133 | 135 | 135 | 139 | 161 | 218.9 |
| 10-Sep | 138 | 147 | 153 | 167 | 180 | 189 | 199 | 208 | 227 | 241 | 260 | 275 | 276 | 280 | 277 | 277 | 289 | 275 | 270 | 294 | 288 | 290 | 285 | 293 | 248.4 |
| 11-Sep | 309 | 318 | 321 | 323 | 327 | 330 | 333 | 339 | 347 | 346 | 345 | 0 | 19 | 10 | 1 | 350 | 334 | 333 | 309 | 316 | 322 | 312 | 297 | 295 | 334.7 |
| 12-Sep | 285 | 245 | 247 | 246 | 235 | 225 | 227 | 233 | 216 | 194 | 215 | 232 | 215 | 215 | 212 | 210 | 233 | 211 | 182 | 182 | 182 | 197 | 190 | 192 | 212.1 |
| 13-Sep | 193 | 194 | 195 | 199 | 196 | 200 | 204 | 204 | 211 | 221 | 220 | 219 | 209 | 227 | 249 | 247 | 241 | 240 | 227 | 227 | 222 | 234 | 248 | 274 | 217.0 |
| 14-Sep | 264 | 169 | AF | 145 | 156 | 146 | 150 | 77 | 98 | 142 | 157 | 166 | 207 | 242 | 260 | 251 | 266 | 302 | 330 | 327 | 184 | 208 | 246 | 276 | 229.2 |
| 15-Sep | 238 | 204 | 241 | 203 | 137 | 153 | 131 | 103 | 105 | 119 | 111 | 109 | 115 | 116 | 118 | 116 | 113 | 116 | 129 | 154 | 147 | 161 | 174 | 188 | 129.8 |
| 16-Sep | 192 | 173 | 169 | 178 | 177 | 192 | 204 | 220 | 224 | 208 | 197 | 215 | 225 | 236 | 236 | 242 | 242 | 243 | 218 | 188 | 211 | 207 | 205 | 196 | 215.9 |
| 17-Sep | 208 | 205 | 195 | 195 | 191 | 194 | 197 | 199 | 211 | 219 | 219 | 221 | 236 | 244 | 244 | 262 | 265 | 218 | 222 | 226 | 209 | 213 | 208 | 209 | 217.0 |
| 18-Sep | 205 | 245 | 272 | 264 | 275 | 273 | 274 | 273 | 277 | 286 | 302 | 300 | 305 | 314 | 309 | 302 | 312 | 320 | 315 | 320 | 281 | 284 | 295 | 295 | 296.2 |
| 19-Sep | 297 | 310 | 317 | 297 | 294 | 284 | 293 | 307 | 313 | 305 | 300 | 291 | 289 | 293 | 300 | 299 | 291 | 313 | 306 | 287 | 261 | 294 | 344 | 321 | 301.2 |
| 20-Sep | 350 | 348 | 322 | 319 | 326 | 324 | 329 | 324 | 331 | 321 | 297 | 340 | 338 | 10 | 352 | 15 | 96 | 76 | 127 | 169 | 167 | 166 | 149 | 153 | 337.4 |
| 21-Sep | 162 | 141 | 158 | 169 | 138 | 146 | 133 | 211 | 224 | 224 | 208 | 206 | 212 | 254 | 258 | 236 | 230 | 220 | 188 | 191 | 190 | 191 | 189 | 184 | 205.2 |
| 22-Sep | 183 | 181 | 180 | 179 | 182 | 186 | 187 | 192 | 190 | 196 | 196 | 206 | 197 | 203 | 194 | 197 | 200 | 187 | 162 | 150 | 155 | 159 | 163 | 166 | 186.1 |
| 23-Sep | 166 | 170 | 160 | 166 | 169 | 164 | 148 | 159 | 158 | 157 | 155 | 150 | 156 | 149 | 156 | 150 | 144 | 152 | 155 | 167 | 165 | 164 | 164 | 175 | 158.2 |
| 24-Sep | 178 | 180 | 191 | 183 | 192 | 196 | 217 | 212 | 229 | 246 | 273 | 277 | 280 | 286 | 289 | 284 | 294 | 282 | 272 | 237 | 250 | 259 | 263 | 257 | 255.3 |
| 25-Sep | 247 | 257 | 266 | 264 | 272 | 243 | 230 | 238 | 256 | 274 | 284 | 301 | 295 | 303 | 300 | 269 | 280 | 234 | 210 | 222 | 232 | 229 | 148 | 146 | 264.0 |
| 26-Sep | 143 | 171 | 162 | 150 | 160 | 159 | 144 | 156 | 175 | 188 | 182 | 184 | 184 | 191 | 189 | 199 | 188 | 185 | 161 | 144 | 153 | 149 | 162 | 167 | 174.2 |
| 27-Sep | 159 | 153 | 172 | 194 | 228 | 274 | 281 | 235 | 225 | 274 | 297 | 292 | 286 | 279 | 272 | 275 | 259 | 257 | 239 | 237 | 250 | 253 | 269 | 244 | 258.3 |
| 28-Sep | 261 | 256 | 251 | 217 | 205 | 182 | 182 | 177 | 185 | 205 | 213 | 201 | 201 | 224 | 203 | 204 | 199 | 206 | 156 | 155 | 153 | 169 | 178 | 179 | 199.4 |
| 29-Sep | 176 | 177 | 180 | 183 | 178 | 185 | 184 | 193 | 209 | 210 | 207 | 218 | 199 | 184 | 244 | 323 | 176 | 139 | 143 | 139 | 135 | 135 | 134 | 73 | 183.6 |
| 30-Sep | 17 | 32 | 41 | 37 | 33 | 43 | 37 | 33 | 31 | 33 | 28 | 30 | 28 | 26 | 30 | 25 | 24 | 22 | 26 | 30 | 33 | 37 | 35 | 34 | 30.2 |

214.2 211.1 214.1 213.6 214.6 218.5 222.0 227.3 231.1 237.7 243.1 243.4 241.4 253.6 253.9 245.7 256.8 259.5 238.0 222.0 205.1 211.1 207.5 218.2

Diurnal Average

AF - Analyzer Failure

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Brion MacKay River - September 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 111 deg on Sep 20 17:00 Minimum Value: 8 deg on Sep 28 20:00 Percentiles: P ₁ = 12 P ₁₀ = 17 Q ₁ = 21 Median = 27 O ₃ = 41 P ₉₀ = 49 P ₉₉ = 82 | | Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9 | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|---------------|--|
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 32 | 23 | 27 | 25 | 25 | 32 | 24 | 28 | 30 | 31 | 26 | 30 | 24 | 43 | 83 | 37 | 34 | 76 | 60 | 44 | 36 | 44 | 41 | 46 | 83 | |
| 2-Sep | 30 | 24 | 39 | 32 | 38 | 42 | 44 | 45 | 44 | 34 | 46 | 42 | 62 | 63 | 37 | 42 | 34 | 28 | 65 | 40 | 45 | 42 | 25 | 25 | 65 | |
| 3-Sep | 24 | 23 | 38 | 44 | 37 | 46 | 39 | 41 | 32 | 26 | 24 | 23 | 25 | 24 | 22 | 21 | 20 | 19 | 21 | 20 | 23 | 22 | 25 | 28 | 46 | |
| 4-Sep | 28 | 31 | 46 | 46 | 42 | 52 | 47 | 46 | 48 | 36 | 42 | 43 | 48 | 60 | 55 | 39 | 25 | 33 | 19 | 17 | 14 | 14 | 19 | 20 | 60 | |
| 5-Sep | 21 | 25 | 25 | 19 | 22 | 17 | 22 | 23 | 25 | 31 | 29 | 29 | 29 | 33 | 36 | 44 | 27 | 20 | 16 | 16 | 18 | 17 | 18 | 20 | 44 | |
| 6-Sep | 21 | 22 | 18 | 16 | 12 | 12 | 15 | 22 | 29 | 50 | 37 | 36 | 32 | 31 | 29 | 39 | 34 | 56 | 79 | 15 | 12 | 29 | 20 | 17 | 79 | |
| 7-Sep | 18 | 15 | 12 | 20 | 11 | 18 | 23 | 27 | 29 | 32 | 35 | 43 | 80 | 70 | 57 | 33 | 30 | 47 | 29 | 41 | 59 | 37 | 25 | 25 | 80 | |
| 8-Sep | 20 | 32 | 54 | 19 | 42 | 11 | 60 | 54 | 54 | 46 | 46 | 41 | 41 | 46 | 51 | 74 | 84 | 54 | 60 | 45 | 46 | 20 | 22 | 22 | 84 | |
| 9-Sep | 29 | 25 | 20 | 34 | 21 | 18 | 19 | 22 | 21 | 52 | 51 | 85 | 77 | 78 | 75 | 47 | 54 | 43 | 18 | 14 | 18 | 18 | 21 | 28 | 85 | |
| 10-Sep | 22 | 23 | 26 | 27 | 28 | 23 | 25 | 25 | 31 | 39 | 43 | 43 | 47 | 42 | 43 | 42 | 34 | 49 | 49 | 29 | 32 | 31 | 34 | 31 | 49 | |
| 11-Sep | 22 | 18 | 20 | 19 | 20 | 20 | 21 | 22 | 23 | 23 | 23 | 27 | 28 | 29 | 27 | 25 | 21 | 20 | 26 | 20 | 20 | 20 | 28 | 29 | 29 | |
| 12-Sep | 44 | 38 | 48 | 49 | 29 | 19 | 20 | 32 | 40 | 36 | 60 | 61 | 41 | 56 | 42 | 43 | 41 | 27 | 12 | 14 | 19 | 20 | 20 | 22 | 61 | |
| 13-Sep | 21 | 21 | 22 | 22 | 20 | 20 | 22 | 25 | 27 | 31 | 33 | 32 | 27 | 38 | 47 | 47 | 36 | 37 | 28 | 26 | 23 | 31 | 43 | 36 | 47 | |
| 14-Sep | 55 | 36 | AF | 17 | 17 | 22 | 34 | 36 | 47 | 25 | 30 | 33 | 33 | 48 | 47 | 49 | 51 | 37 | 18 | 22 | 48 | 35 | 59 | 32 | 59 | |
| 15-Sep | 19 | 43 | 47 | 47 | 27 | 56 | 31 | 40 | 29 | 25 | 30 | 26 | 27 | 24 | 29 | 23 | 22 | 22 | 17 | 40 | 16 | 19 | 24 | 15 | 56 | |
| 16-Sep | 17 | 15 | 20 | 27 | 19 | 18 | 22 | 24 | 28 | 24 | 25 | 30 | 34 | 38 | 44 | 42 | 48 | 47 | 26 | 16 | 19 | 20 | 20 | 18 | 48 | |
| 17-Sep | 22 | 22 | 20 | 18 | 20 | 19 | 19 | 20 | 24 | 28 | 28 | 36 | 39 | 42 | 45 | 54 | 54 | 26 | 24 | 26 | 20 | 21 | 19 | 18 | 54 | |
| 18-Sep | 51 | 49 | 41 | 48 | 47 | 45 | 43 | 46 | 45 | 36 | 31 | 28 | 27 | 22 | 25 | 27 | 22 | 19 | 16 | 16 | 44 | 30 | 23 | 23 | 51 | |
| 19-Sep | 24 | 21 | 18 | 23 | 26 | 31 | 27 | 24 | 22 | 28 | 29 | 37 | 36 | 31 | 30 | 35 | 36 | 23 | 19 | 22 | 19 | 28 | 18 | 16 | 37 | |
| 20-Sep | 31 | 27 | 16 | 16 | 14 | 16 | 18 | 29 | 46 | 89 | 73 | 74 | 67 | 82 | 90 | 92 | 111 | 40 | 17 | 35 | 23 | 22 | 17 | 16 | 111 | |
| 21-Sep | 28 | 22 | 39 | 38 | 18 | 42 | 18 | 43 | 40 | 38 | 40 | 37 | 38 | 49 | 51 | 45 | 40 | 28 | 13 | 13 | 13 | 15 | 15 | 13 | 51 | |
| 22-Sep | 15 | 16 | 18 | 19 | 17 | 18 | 18 | 21 | 21 | 27 | 26 | 31 | 29 | 30 | 29 | 24 | 26 | 25 | 26 | 24 | 26 | 26 | 26 | 27 | 31 | |
| 23-Sep | 27 | 29 | 28 | 27 | 26 | 27 | 25 | 27 | 27 | 26 | 29 | 28 | 28 | 26 | 27 | 25 | 23 | 26 | 26 | 28 | 26 | 24 | 26 | 26 | 29 | |
| 24-Sep | 25 | 24 | 21 | 24 | 23 | 19 | 24 | 24 | 35 | 45 | 47 | 49 | 44 | 41 | 36 | 40 | 31 | 36 | 39 | 34 | 42 | 49 | 51 | 45 | 51 | |
| 25-Sep | 49 | 48 | 47 | 49 | 45 | 41 | 27 | 33 | 47 | 46 | 40 | 35 | 49 | 34 | 49 | 41 | 42 | 31 | 16 | 21 | 19 | 41 | 16 | 14 | 49 | |
| 26-Sep | 8 | 17 | 17 | 15 | 19 | 19 | 20 | 23 | 28 | 22 | 28 | 26 | 28 | 28 | 25 | 26 | 24 | 21 | 26 | 23 | 22 | 21 | 24 | 26 | 28 | |
| 27-Sep | 28 | 28 | 31 | 21 | 36 | 44 | 41 | 41 | 31 | 45 | 29 | 30 | 39 | 39 | 44 | 40 | 48 | 53 | 39 | 36 | 48 | 48 | 43 | 39 | 53 | |
| 28-Sep | 41 | 37 | 24 | 16 | 19 | 17 | 19 | 16 | 22 | 22 | 34 | 35 | 38 | 55 | 48 | 31 | 26 | 27 | 21 | 8 | 9 | 12 | 11 | 14 | 55 | |
| 29-Sep | 16 | 19 | 17 | 36 | 16 | 13 | 13 | 16 | 26 | 35 | 70 | 74 | 55 | 81 | 68 | 65 | 81 | 17 | 10 | 17 | 15 | 12 | 14 | 54 | 81 | |
| 30-Sep | 19 | 21 | 20 | 25 | 18 | 25 | 24 | 22 | 24 | 25 | 25 | 25 | 26 | 25 | 25 | 25 | 25 | 24 | 26 | 24 | 23 | 25 | 23 | 24 | 26 | |
| | | 55 | 49 | 54 | 49 | 47 | 56 | 60 | 54 | 54 | 89 | 73 | 85 | 80 | 82 | 90 | 92 | 111 | 76 | 79 | 45 | 59 | 49 | 59 | 54 | |
| | | Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |
| AF - Analyzer Failure | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 28, 2016 | Last Calibration | August 9, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Reason: | Routine | | |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| Gas Cert Reference | EY0000372 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 50.7 ppm | Cal Gas Exp Date | June 10, 2016 |
| Calibrator Make/Model | API T700 | Serial Number | 1220 |
| ZAG Make/Model | API 701 | Serial Number | 4766 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9627 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-------------------|------------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -633 | -634 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 826 | 832 |
| Calculated slope | 0.995179 | 0.991670 | Chamber temp | 45 | 44.9 |
| Calculated intercept | 0.456667 | 2.089059 | Pressure | 666.5 | 675.9 |
| Analyzer Background | 11.9 | 12.6 | Flow | 0.480 | 0.488 |
| Analyzer Coefficient | 0.945 | 0.935 | Intensity | 88 | 88 |
| Analyzer make | Thermo 43i | | Analyzer serial # | 1501301450 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 5000 | 79.9 | 810.2 | 817.5 | 0.991 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.3 | ---- |
| high point | 5000 | 79.9 | 810.2 | 816.0 | 0.993 |
| second point | 5000 | 40.1 | 406.6 | 406.5 | 1.000 |
| third point | 5000 | 20.1 | 203.8 | 201.9 | 1.009 |
| as left zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as left span | 5000 | 79.9 | 810.2 | 816.3 | 0.992 |
| Average Correction Factor | | | | | 1.001 |

Corrected As found 816.9 Previous response 813.7 % change -0.4%

Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span. As left began at 12:47 MST.

Calibration Performed By:

Asad Hidayat



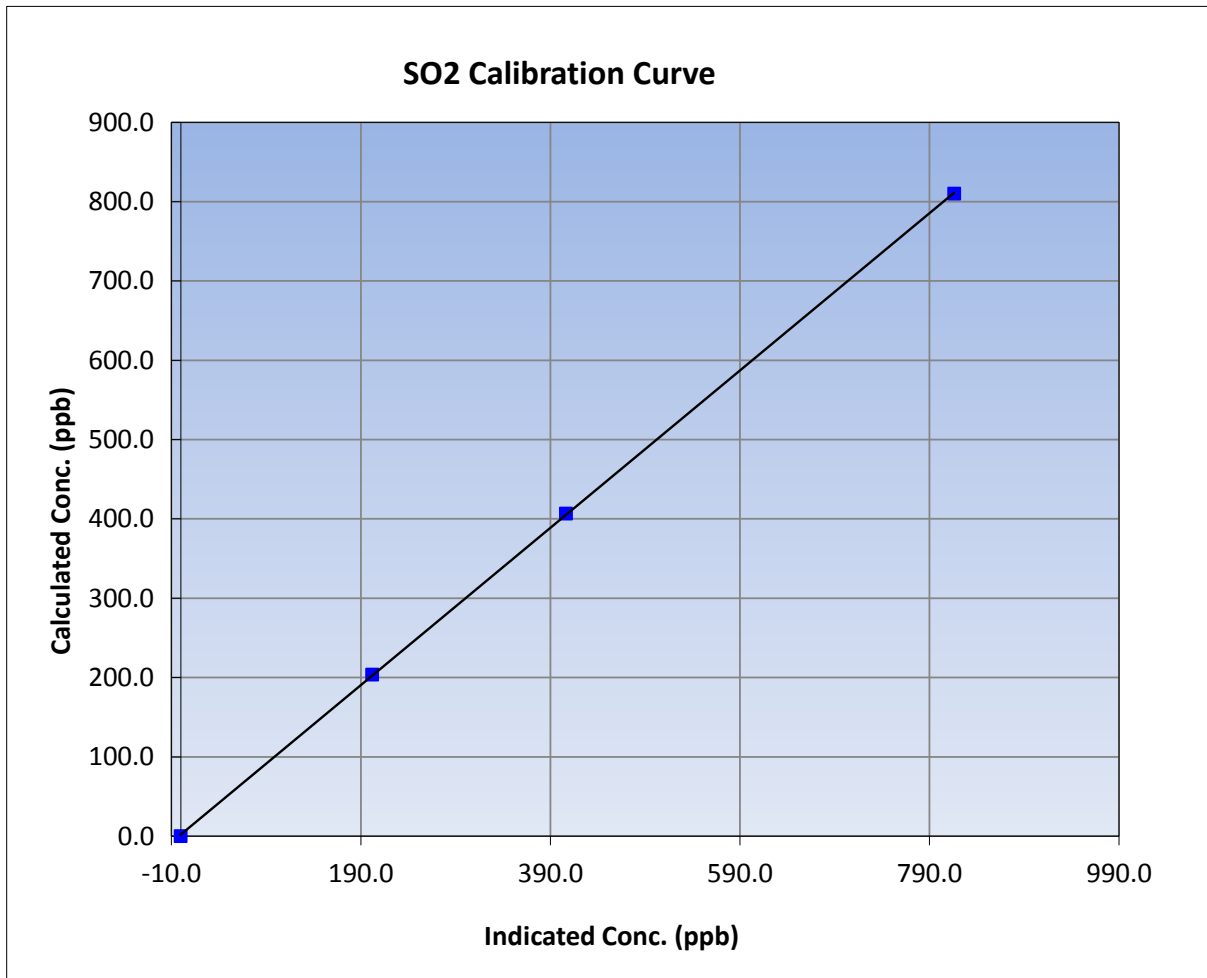
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 28, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1501301450 |

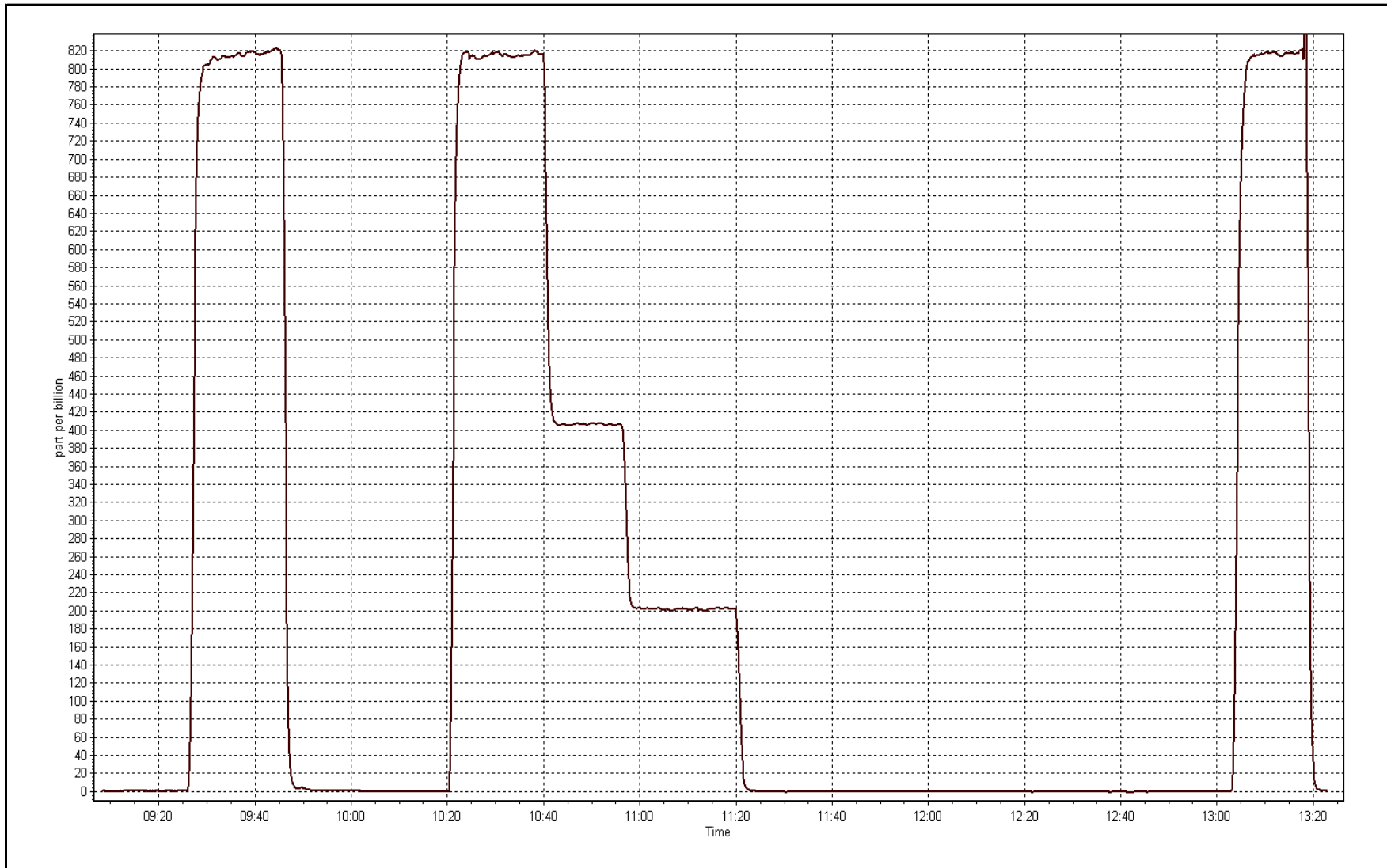
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.3 | ---- | Correlation Coefficient | 0.999976 |
| 810.2 | 816.0 | 0.9929 | | |
| 406.6 | 406.5 | 1.0003 | Slope | 0.991670 |
| 203.8 | 201.9 | 1.0094 | | |
| | | | Intercept | 2.089059 |



SO2 Calibration Plot

Date: September 28, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------------|
| Calibration Date | September 28, 2016 | Last Calibration | August 10, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Reason: | Routine | | |
| Start Time (MST) | 13:18 | End Time (MST) | 15:55 |
| Gas Cert Reference | LL119508 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.35 ppm | Cal Gas Exp Date | February 13, 2018 |
| Calibrator Make/Model | API 700 | Serial Number | 1220 |
| ZAG air Make/Model | API 701 | Serial Number | 4766 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 9627 |
| SO2 gas concentration | 50.7 ppm | SO2 gas cert/exp | EY0000372 June 10, 2016 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | 504 | 504 |
| Analyzer IP address | 192.168.1.75 | | Lamp voltage | 2768 | 2680 |
| Calculated slope | 0.982566 | 0.994010 | Chamber temp | 50 | 50 |
| Calculated intercept | 0.204034 | 0.332821 | Pressure | 23.4 | 23.7 |
| Analyzer Background | 25.2 | 25.2 | Flow | 0.627 | 0.635 |
| Analyzer Coefficient | 1.024 | 1.01 | Intensity | 68 | 66 |
| | | | Converter temp. | 317 | 315 |

| | | | |
|----------------------|----------|--------------------|-----|
| Analyzer make/model | API T101 | Analyzer serial # | 196 |
| Converter make/model | NA | Converter serial # | NA |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 5000 | 75.6 | 80.9 | 82.2 | 0.984 |
| SO2 scrubber check | 5000 | 19.8 | 200.8 | 3.2 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 75.6 | 80.9 | 81.1 | 0.998 |
| second point | 5000 | 37.9 | 40.6 | 40.5 | 1.003 |
| third point | 5000 | 19.0 | 20.3 | 20.0 | 1.019 |
| as left zero | 5000 | 0.0 | 0.0 | -0.4 | ---- |
| as left span | 5000 | 75.6 | 80.9 | 80.9 | 1.000 |
| Average Correction Factor | | | | | 1.006 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 82.4 | Previous response | 82.1 | % change | -0.4% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

Sample inlet filter replaced after as founds. Adjusted span. Scrubber check done after 3rd point.

Calibration Performed By: Asad Hidayat



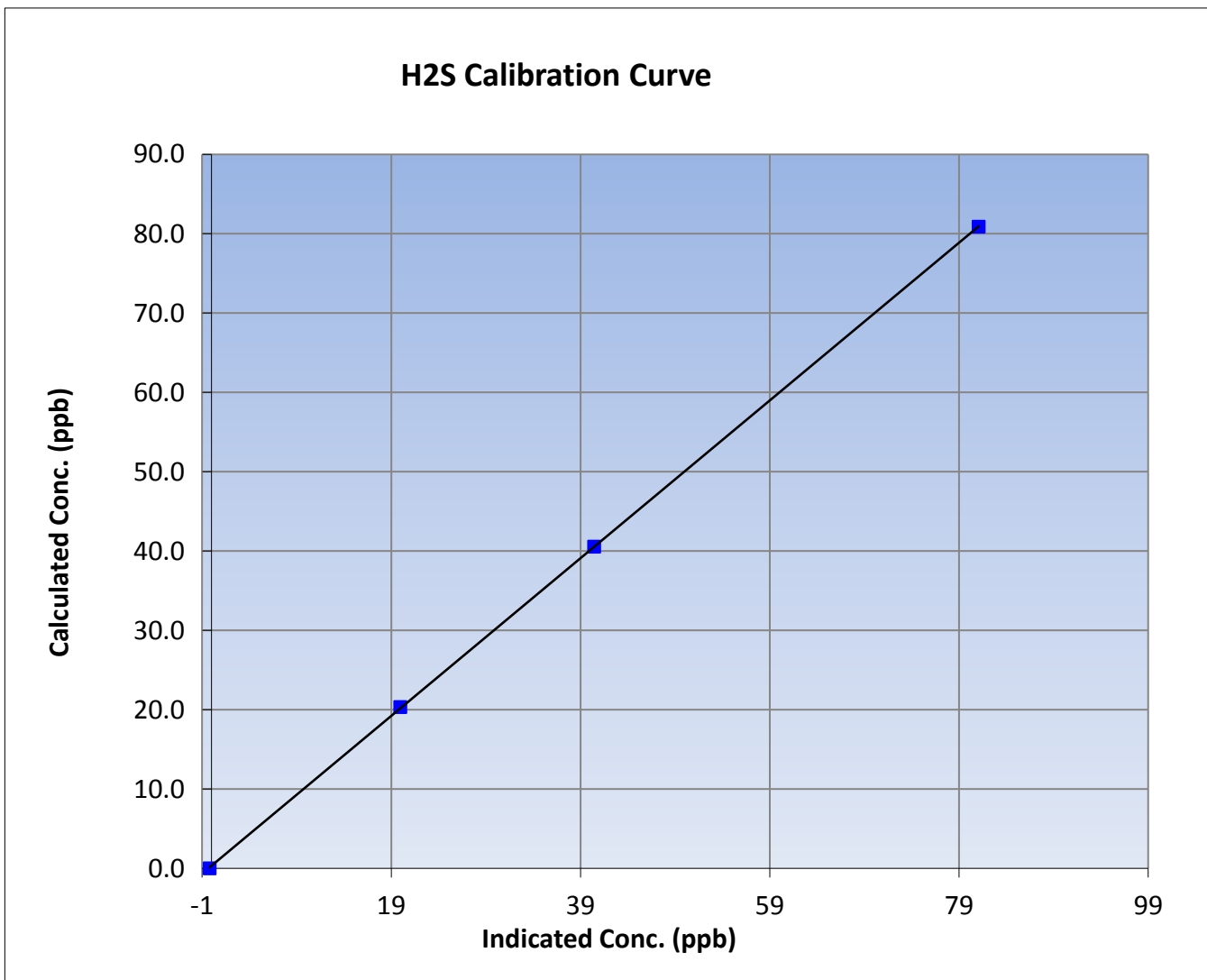
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 28, 2016 | Previous Calibration | August 10, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 13:18 | End Time (MST) | 15:55 |
| Analyzer make | API T101 | Analyzer serial # | 196 |

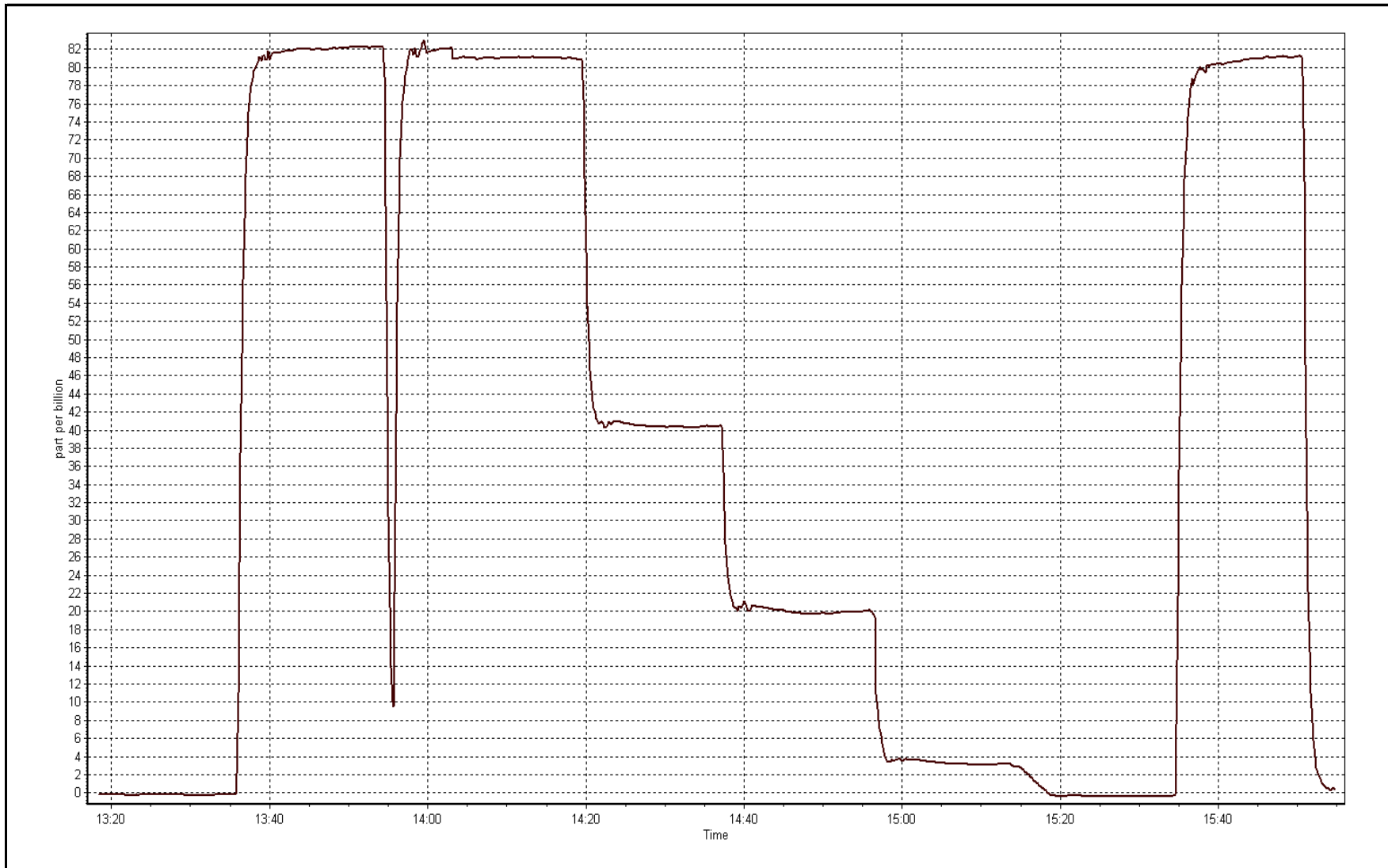
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999988 |
| 80.9 | 81.1 | 0.9976 | | |
| 40.6 | 40.5 | 1.0025 | Slope | 0.994010 |
| 20.3 | 20.0 | 1.0185 | | |
| | | | Intercept | 0.332821 |



H2S Calibration Plot

Date: September 28, 2016





Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|---------------------|----------------|
| Calibration Date | September 28, 2016 | Last Calibration | August 9, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Reason: | Routine | | |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| Gas Cert Reference | EY0000372 | Cal Gas Expiry Date | June 10, 2016 |
| CH4 Cal Gas Conc. | 517 ppm | CH4 Equiv Conc. | 1072.5 ppm |
| C3H8 Cal Gas Conc. | 202 ppm | Station temp. | 22 Deg C |
| Calibrator Make/Model | API T700 | Serial Number | 1220 |
| ZAG make/model | Teledyne API 701 | Serial Number | 4766 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 9627 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|---------------------|--------|-------|
| Analyzer Range | 0 - 50 ppm | | Sample Pressure | 8.6 | 8.6 |
| Analyzer IP address | 192.168.1.51 | | Air or Bypass Press | 34.3 | 34.3 |
| Calculated slope | 0.999292 | 1.000823 | Fuel Pressure | 23.9 | 23.9 |
| Calculated intercept | 0.033164 | 0.069243 | Analyzer Coeff | 4.4 | 4.4 |
| | | | Analyzer BKG | 2.040 | 2.260 |

| | | | |
|---------------|--------|-------------------|------------|
| Analyzer make | 51i-LT | Analyzer serial # | 1501663727 |
|---------------|--------|-------------------|------------|

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.17 | ---- |
| as found span | 5000 | 79.9 | 17.14 | 17.53 | 0.978 |
| calibrator zero | 5000 | 0.0 | 0.00 | -0.04 | ---- |
| high point | 5000 | 79.9 | 17.14 | 17.07 | 1.004 |
| second point | 5000 | 40.1 | 8.60 | 8.51 | 1.011 |
| third point | 5000 | 20.1 | 4.31 | 4.21 | 1.024 |
| as left zero | 5000 | 0.0 | 0.00 | -0.06 | ---- |
| as left span | 5000 | 79.9 | 17.14 | 17.07 | 1.004 |
| Average Correction Factor | | | | | 1.013 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|-------|
| Corrected As found | 17.36 | Previous response | 17.12 | % change | -1.4% |
|--------------------|-------|-------------------|-------|----------|-------|

Notes:

Sample inlet filter replaced after as founds. Adjusted both zero and span.

Calibration Performed By: Asad Hidayat



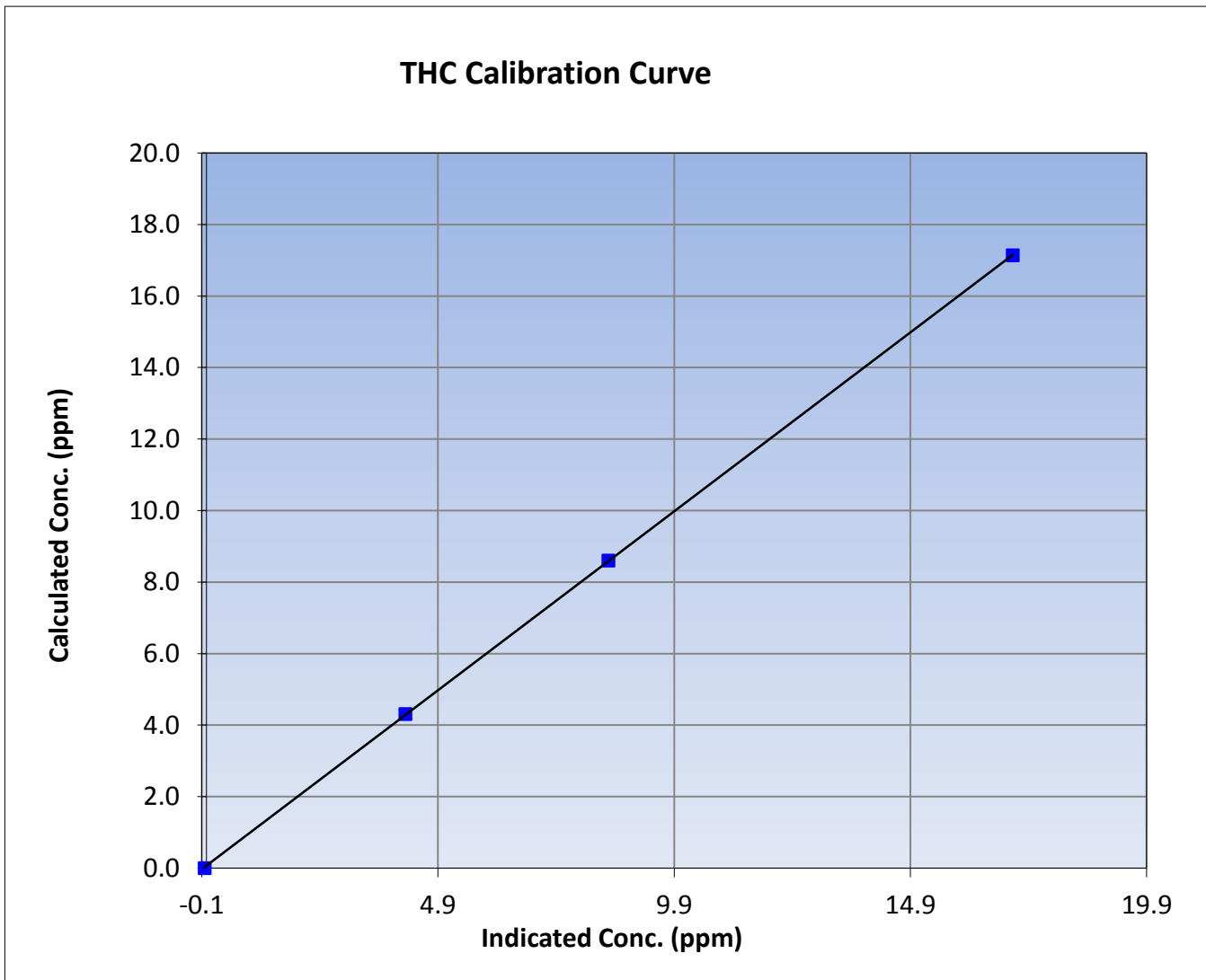
Wood Buffalo Environmental Association THC Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 28, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| Analyzer make | 51i-LT | Analyzer serial # | 1501663727 |

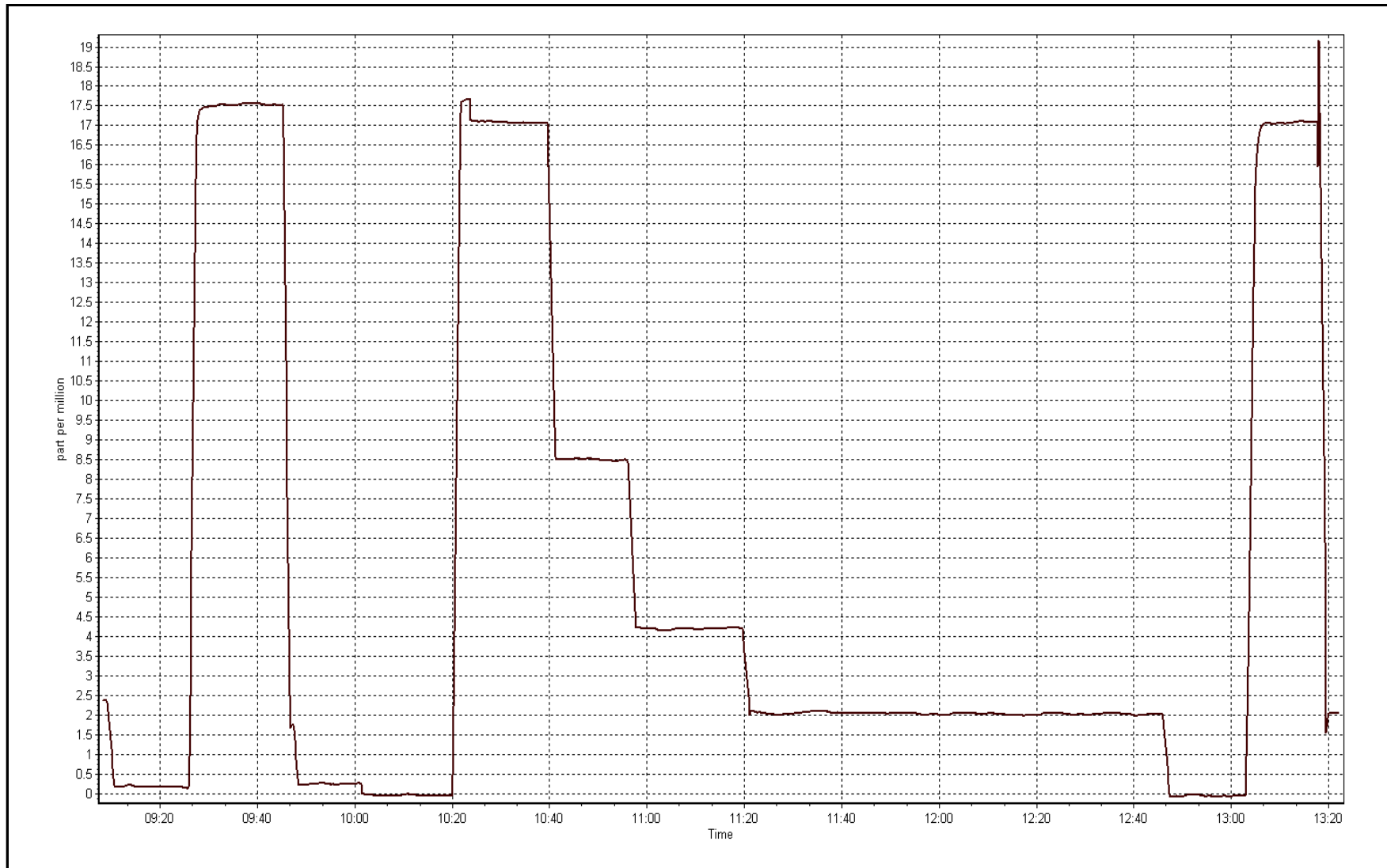
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | -0.04 | ---- | Correlation Coefficient | 0.999987 |
| 17.14 | 17.07 | 1.0040 | | |
| 8.60 | 8.51 | 1.0107 | Slope | 1.000823 |
| 4.31 | 4.21 | 1.0241 | | |
| | | | Intercept | 0.069243 |



THC Calibration Plot

Date: September 28, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|----------------|
| Calibration Date | September 28, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Reason: | Routine | | |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| NO Cal Gas Conc | 50.1 ppm | Gas Cert Reference | EY0000372 |
| NOX Cal Gas Conc | 50.4 ppm | Cal Gas Expiry Date | June 10, 2016 |
| Calibrator | API T700 | Serial Number | 1220 |
| Zero air Generator | Teledyne API T701 | Serial Number | 4766 |

DACS Information

| | | | |
|-------------------|---------------------------|-----------------|------|
| DACS make & model | Cambell Scientific CR3000 | DACS serial No. | 9627 |
|-------------------|---------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|-----------|-----------|-----------|
| As Found (last calibration results) | Data Slope | 0.996361 | 0.994454 | 0.993906 |
| | Data Offset | -0.521672 | -0.332903 | -0.082909 |
| Current Calibration | Data Slope | 0.997771 | 0.996321 | 0.994241 |
| | Data Offset | 0.272692 | 0.340163 | -0.547660 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1505164379 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 1.105 | | 1.095 | |
| NOX coefficient | 1.003 | | 1.003 | |
| NO2 coefficient | 0.995 | | 0.995 | |
| NO bkgnd | 3.4 | | 3.3 | |
| NOX bkgnd | 3.6 | | 3.5 | |
| Chamber Temp | 50.6 | Deg C | 50.5 | Deg C |
| Moly Temp | 327.4 | Deg C | 324.7 | Deg C |
| PMT voltage | -767.4 | V | -767.4 | V |
| PMT Temp | -2.7 | Deg C | -3.1 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 172.1 | mmHg | 173.8 | mmHg |
| R Cell Press Nox | 171.7 | mmHg | 173.8 | mmHg |
| NO sample flow | 0.806 | lpm | 0.814 | lpm |
| Nox sample Flow | 0.807 | lpm | 0.814 | lpm |

Notes:

Sample inlet filter replaced after as founds. Adjusted span. Nox drifted during GPT; used second high GPT point for the reference.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 28, 2016 Station Number: AMS 20

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.3 | -0.2 | ---- | ---- |
| as found span | 5000 | 79.9 | 805.4 | 800.6 | 4.8 | 804.9 | 801.3 | 3.6 | 1.0006 | 0.9992 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.3 | -0.2 | ---- | ---- |
| high point | 5000 | 79.9 | 805.4 | 800.6 | 4.8 | 806.7 | 803.0 | 3.7 | 0.9984 | 0.9970 |
| second point | 5000 | 40.1 | 404.2 | 401.8 | 2.4 | 405.3 | 403.5 | 1.8 | 0.9972 | 0.9958 |
| third point | 5000 | 20.1 | 202.6 | 201.4 | 1.2 | 202.8 | 201.4 | 1.4 | 0.9992 | 1.0000 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | -0.2 | -0.2 | ---- | ---- |
| as left span | 5000 | 79.9 | 805.4 | 455.5 | 349.9 | 827.4 | 456.7 | 370.7 | 0.9734 | 0.9974 |
| Average Correction Factor | | | | | | | | | 0.9983 | 0.9976 |

Corrected As found NO_x= 805.4 NO= 801.6 Percent Change NO_x= 0.4% NO= 0.5%
 Previous Response NO_x= 808.9 NO= 805.4

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 79.90 ccm NOx ref calc conc = 805.4 ppb NO ref calc conc = 800.6 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 4.8 | 822.8 | 817.3 | -0.2 | 0.9789 | 0.9796 | ---- | ---- |
| 1st NO2 (300) | 455.5 | 366.6 | 824.0 | 455.5 | 368.5 | 0.9774 | ---- | 0.9947 | 100.5% |
| 2nd NO2 (200) | 571.6 | 250.5 | 824.7 | 571.6 | 253.1 | 0.9766 | ---- | 0.9896 | 101.1% |
| 3rd NO2 (100) | 692.5 | 129.6 | 824.2 | 692.5 | 131.7 | 0.9771 | ---- | 0.9837 | 101.7% |
| 2nd NO ref point | | 4.8 | 822.8 | 817.3 | 5.5 | 0.9789 | 0.9796 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9775 | | 0.9893 | 101.1% |

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

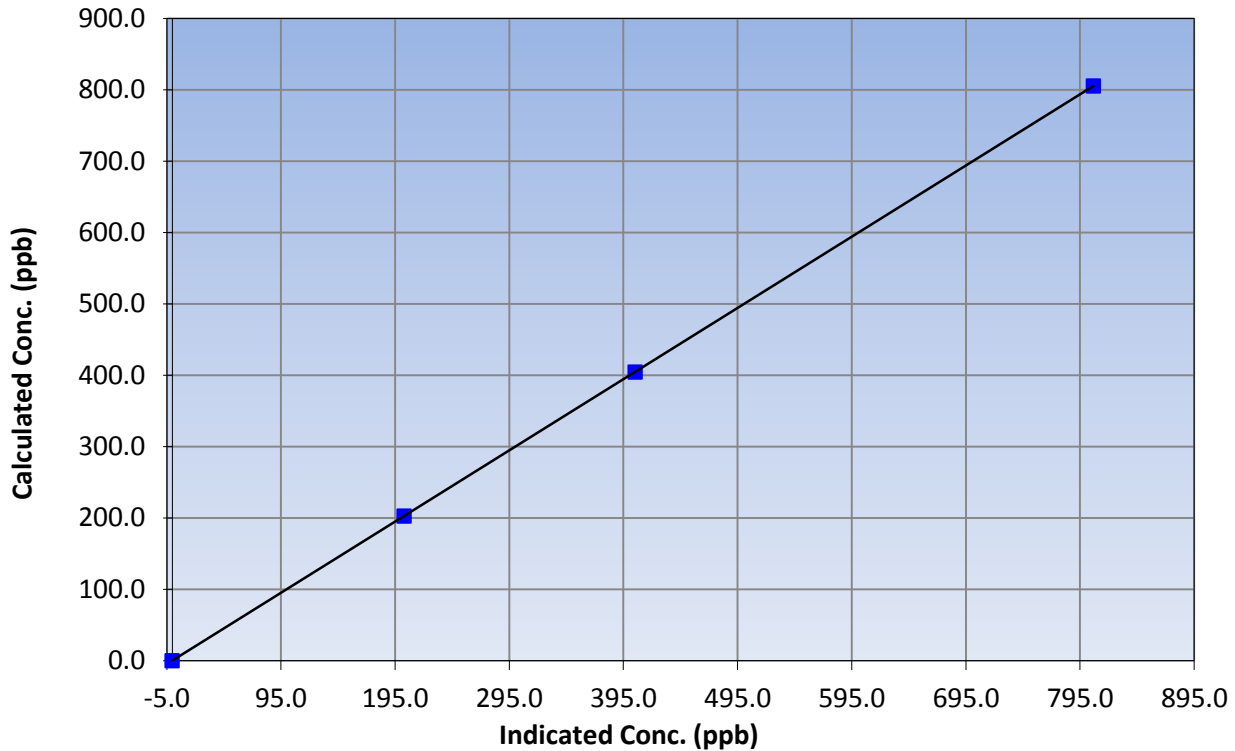
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 28, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1505164379 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.5 | ---- | Correlation Coefficient | 0.999999 |
| 805.4 | 806.7 | 0.9984 | | |
| 404.2 | 405.3 | 0.9972 | Slope | 0.997771 |
| 202.6 | 202.8 | 0.9992 | | |
| | | | Intercept | 0.272692 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

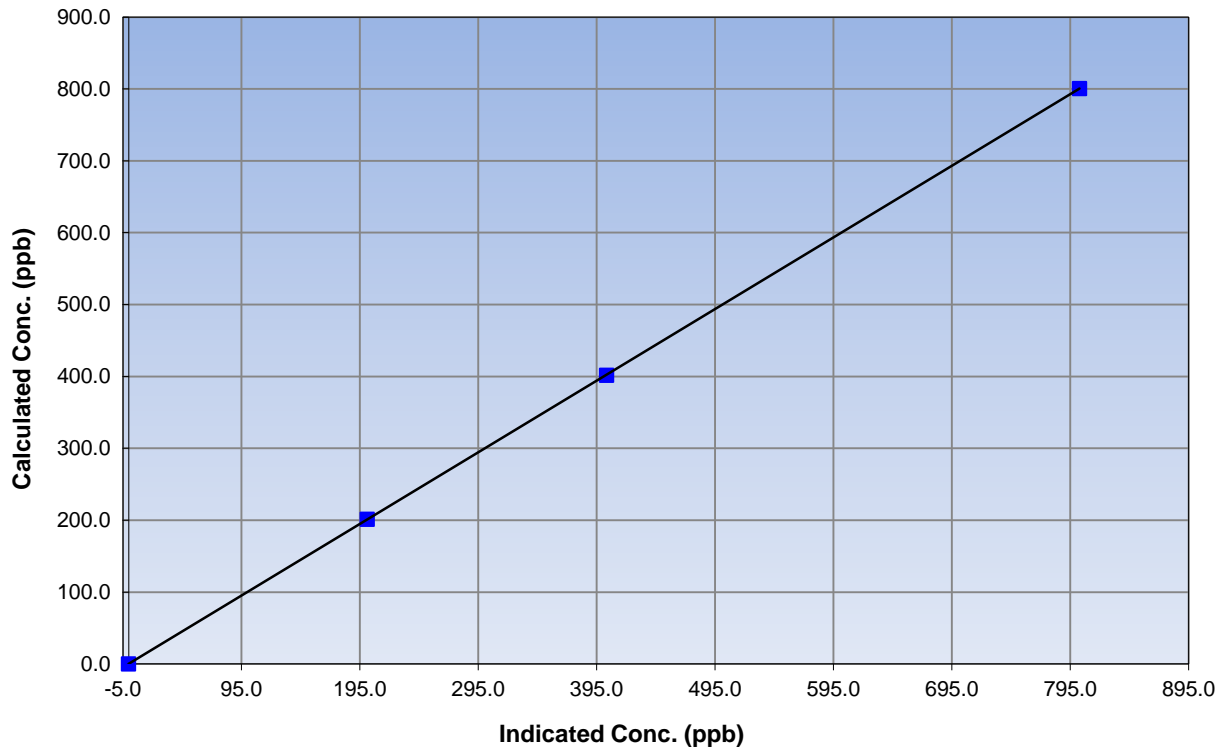
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 28, 2016 | Previous Calibration | August 9, 2016 |
| Station Name | Brion Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1505164379 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.3 | N/A | Correlation Coefficient | 0.999999 |
| 800.6 | 803.0 | 0.9970 | | |
| 401.8 | 403.5 | 0.9958 | Slope | 0.996321 |
| 201.4 | 201.4 | 1.0000 | | |
| | | | Intercept | 0.340163 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

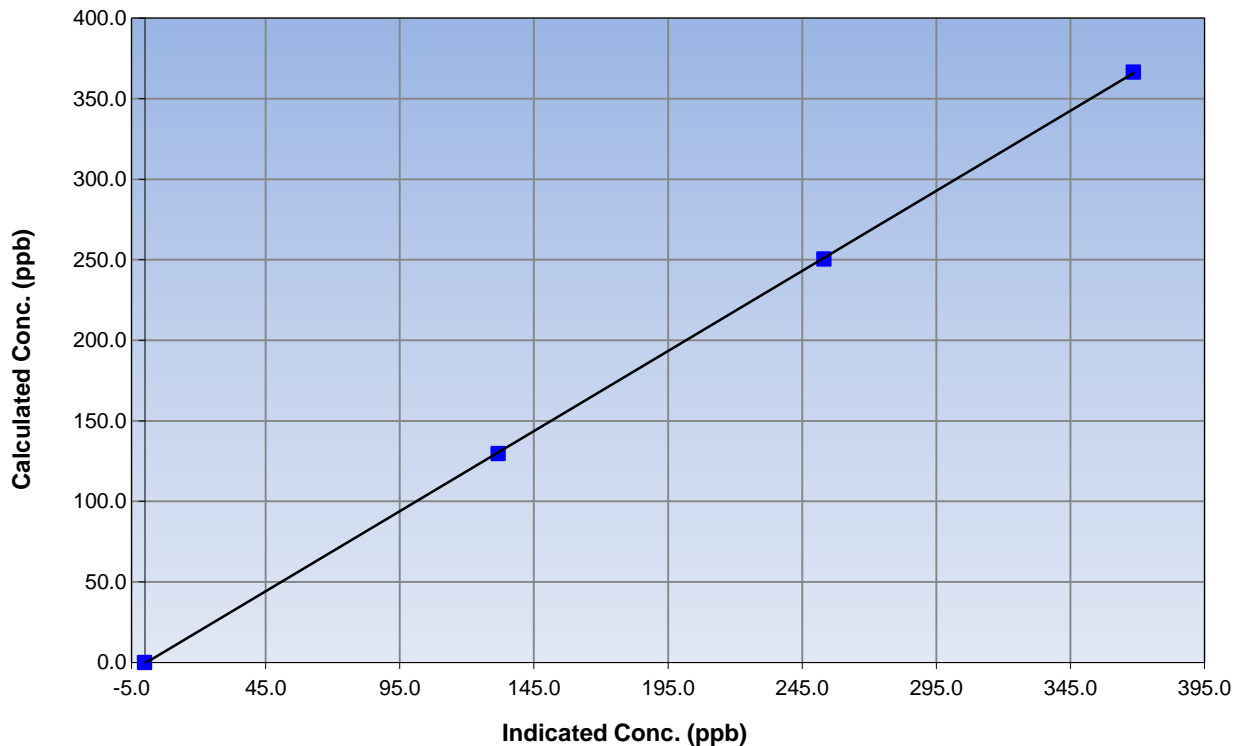
Station Information

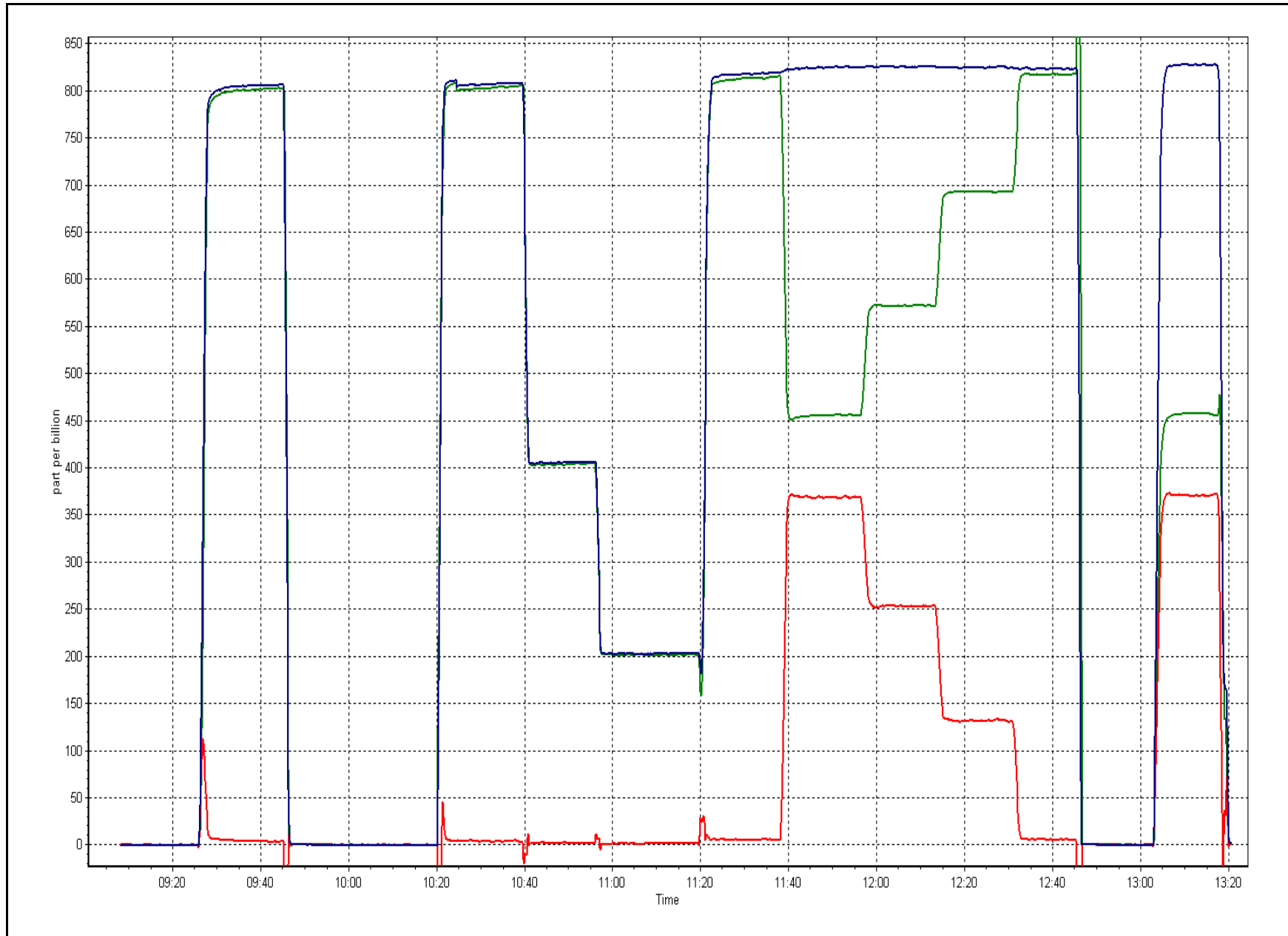
| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 28, 2016 | Previous Calibration | August 9, 2016 |
| Station Number | Brion Mackay River | Station Number | AMS 20 |
| Start Time (MST) | 9:07 | End Time (MST) | 13:22 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1505164379 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.2 | N/A | Correlation Coefficient | 0.999971 |
| 366.6 | 368.5 | 0.9947 | | |
| 250.5 | 253.1 | 0.9896 | Slope | 0.994241 |
| 129.6 | 131.7 | 0.9837 | | |
| | | | Intercept | -0.547660 |

NO₂ Calibration Curve







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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 21
CONKLIN COMMUNITY
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2(ppb) Average | 680 | 39 | 40 | 99.86 | 3 | 0 | 1 | 0 |
| TRS(ppb) Average | 683 | 36 | 37 | 99.86 | 1 | 0 | 0 | 0 |
| THC(ppm) Average | 680 | 38 | 40 | 99.72 | 3.1 | - | 2.2 | - |
| NMHC(ppm) Average | 680 | 38 | 40 | 99.72 | 0.128 | - | 0.006 | - |
| CH4(ppm) Average | 680 | 38 | 40 | 99.72 | 3.1 | - | 2.2 | - |
| O3 (ppb) Average | 685 | 35 | 35 | 100.00 | 44 | 0 | 34 | - |
| NO2 (ppb) Average | 677 | 39 | 43 | 99.44 | 14 | 0 | 2 | - |
| NO (ppb) Average | 677 | 39 | 43 | 99.44 | 21 | - | 2 | - |
| NOX (ppb) Average | 677 | 39 | 43 | 99.44 | 34 | - | 4 | - |
| PM2.5 (ug/m3) Average | 719 | 1 | 1 | 100.00 | 37.1 | - | 7 | 0 |
| Wind Speed 10 m (km/h) Average | 715 | 0 | 5 | 99.31 | 19 | - | 12 | - |
| Wind Direction 10 m (deg) Average | 715 | 0 | 5 | 99.31 | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 23.4 | - | 15.0 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 93.0 | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | | |
|-----------------------------------|--------|------|--------|-------|------------|-----|-----|--------|------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max | |
| SO2 (ppb) Average | 680 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| TRS (ppb) Average | 683 | 0.3 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| THC (ppm) Average | 680 | 1.99 | 0.2 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.2 | 2.2 | 3.1 |
| NMHC(ppm) Average | 680 | 0 | 0.005 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.128 |
| CH4(ppm) Average | 680 | 1.99 | 0.2 | - | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.2 | 2.2 | 3.1 |
| O3 (ppb) Average | 685 | 22.9 | 9 | - | 5 | 11 | 16 | 23 | 30 | 36 | 36 | 44 |
| NO2 (ppb) Average | 677 | 0.9 | 1 | - | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 14 |
| NO (ppb) Average | 677 | 0.4 | 1 | - | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 21 |
| NOX (ppb) Average | 677 | 1.3 | 2 | - | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 34 |
| PM2.5 (ug/m3) Average | 719 | 2.26 | 3.3 | - | 0 | 0.6 | 0.9 | 1.5 | 2.3 | 4.3 | 4.3 | 37.1 |
| Wind Speed 10 m (km/h) Average | 715 | 6.6 | 4 | - | 0 | 2 | 4 | 6 | 9 | 12 | 12 | 19 |
| Wind Direction 10 m (deg) Average | 715 | - | - | - | - | - | - | - | - | - | - | - |
| Temperature 2 m (C) Average | 720 | 9.72 | 5.1 | - | -3.1 | 3.1 | 6.1 | 9.7 | 13.1 | 16.2 | 16.2 | 23.4 |
| Relative Humidity (%) Average | 720 | 75.6 | 19 | - | 30 | 46 | 61 | 81 | 92 | 96 | 96 | 99 |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN COMMUNITY (AMS 21)
 SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|------------------------------------------------------|
| AIR QUALITY ANALYZERS | 21 Sep 2016 15:00 | 21 Sep 2016 15:00 | 1 | Maintenance - manifold cleaning |
| NMHC, CH4, THC | 21 Sep 2016 11:00 | 21 Sep 2016 11:00 | 1 | Maintenance - replaced fuel and carrier cylinders |
| NO2, NO, NOX | 21 Sep 2016 11:00 | 21 Sep 2016 13:00 | 3 | Maintenance - confirmed calibration points for Ozone |
| Wind Speed, Wind Direction | 01 Sep 2016 05:00 | 01 Sep 2016 05:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 20 Sep 2016 19:00 | 20 Sep 2016 19:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 29 Sep 2016 19:00 | 29 Sep 2016 20:00 | 2 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 30 Sep 2016 04:00 | 30 Sep 2016 04:00 | 1 | Flat line in sensor output signal |



| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 3 ppb on Sep 15 11:00 | Maximum Daily Average: 0.6 ppb on Sep 26 | | Hours of Data: | 680 |
| Minimum Value: 0 ppb on Sep 1 03:00 | Minimum Daily Average: 0.1 ppb on Sep 1 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 0.4 ppb at hour 11 | Minimum Diurnal Average: 0.2 ppb at hour 1 | | Hours of Calibration: | 39 |
| 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 | 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 | 0.2 | 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 | 0.2 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 | 0.2 | 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 | Z | 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 | 0.1 | 0 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 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 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 3 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 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 | 0.1 | 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 | 0.1 | 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 | 1 | 1 | 0 | C | C | C | 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 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 |
| 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 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 2 |
| 27-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 | 0.2 | 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 | 0.1 | 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 |

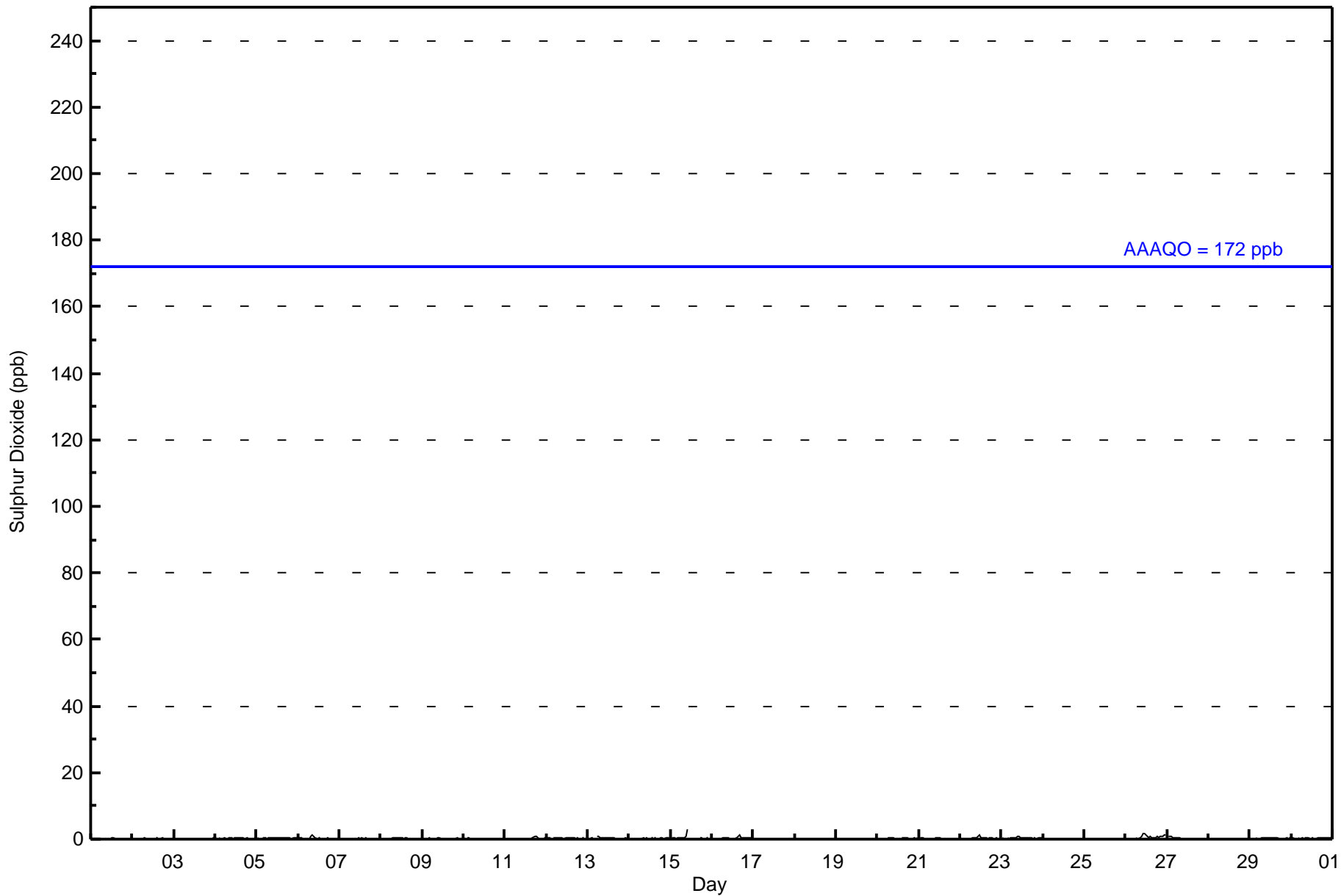
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 43 | 51 | 65 | 105 | 51 | 677 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 43 | 51 | 65 | 105 | 51 | 677 |

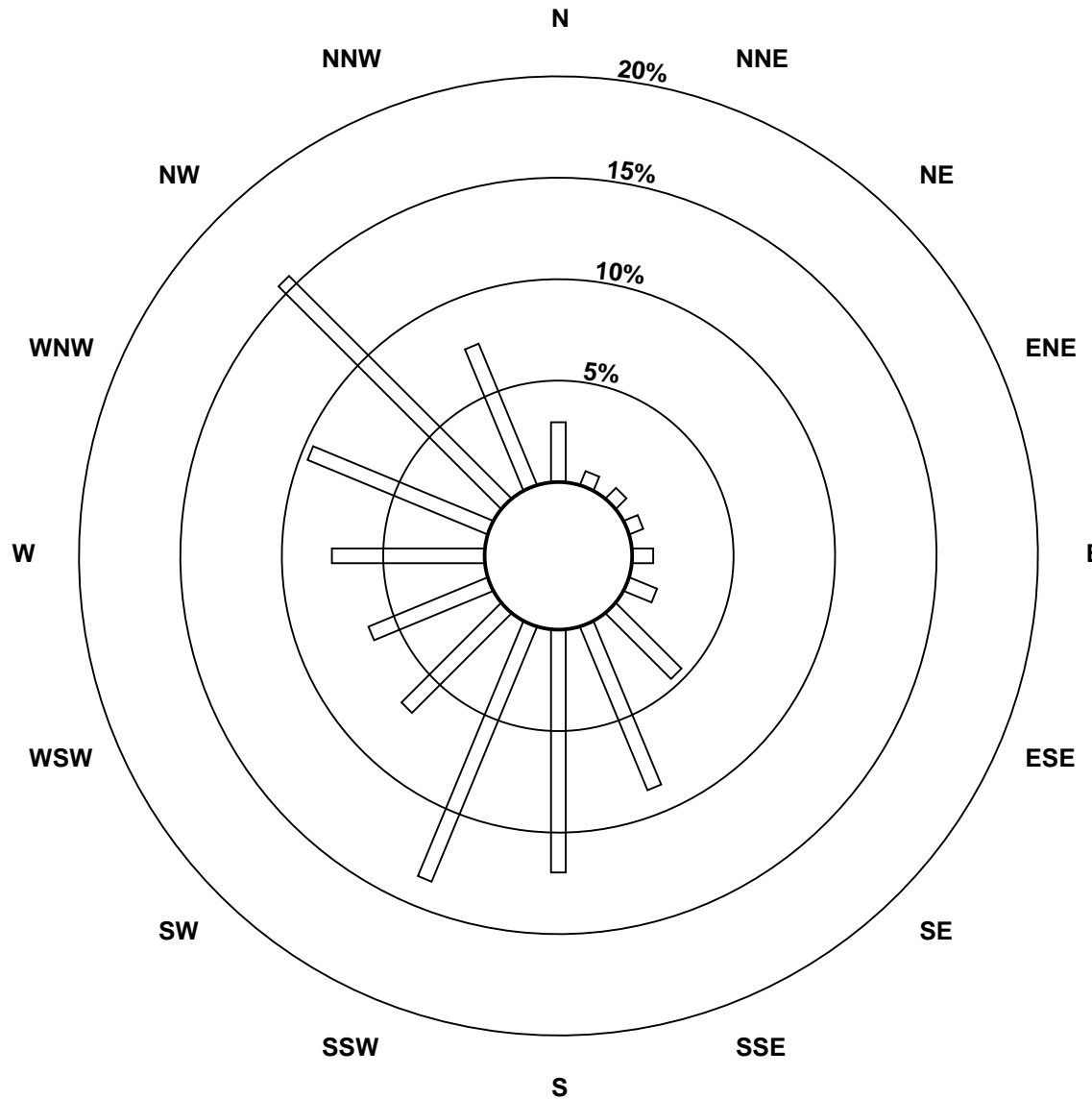
Total Number of Valid Hours: 677

Total Number of Hours: 720

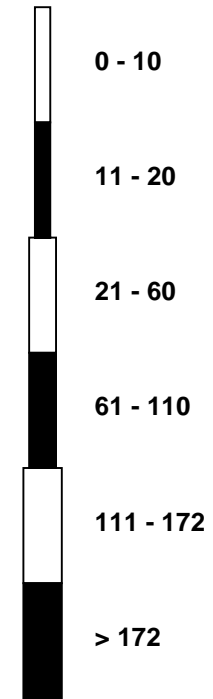


Wood Buffalo Environmental Association
Wind Rose Sep 2016

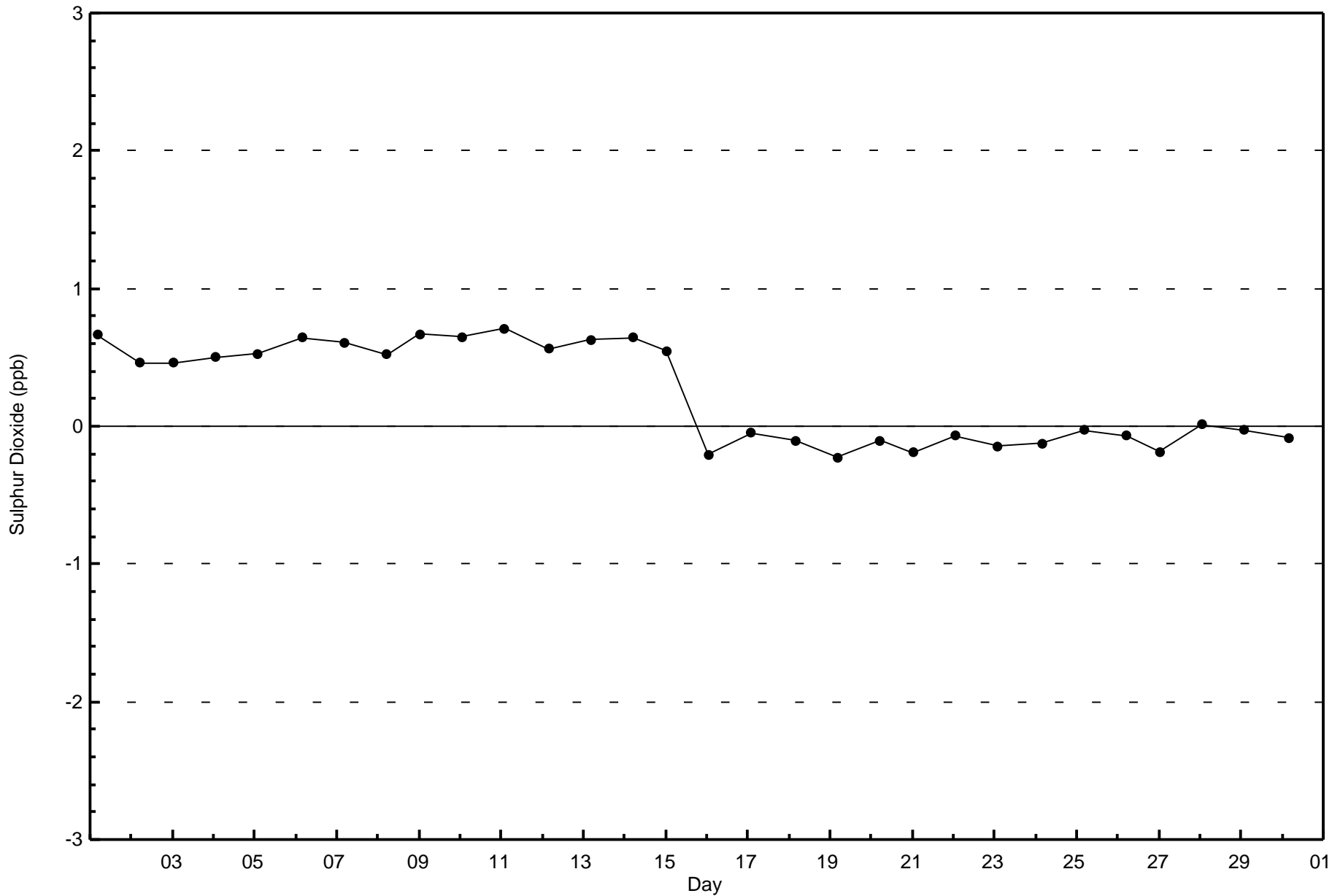
Sulphur Dioxide (SO₂) - ppb
Conklin Community (AMS 21)

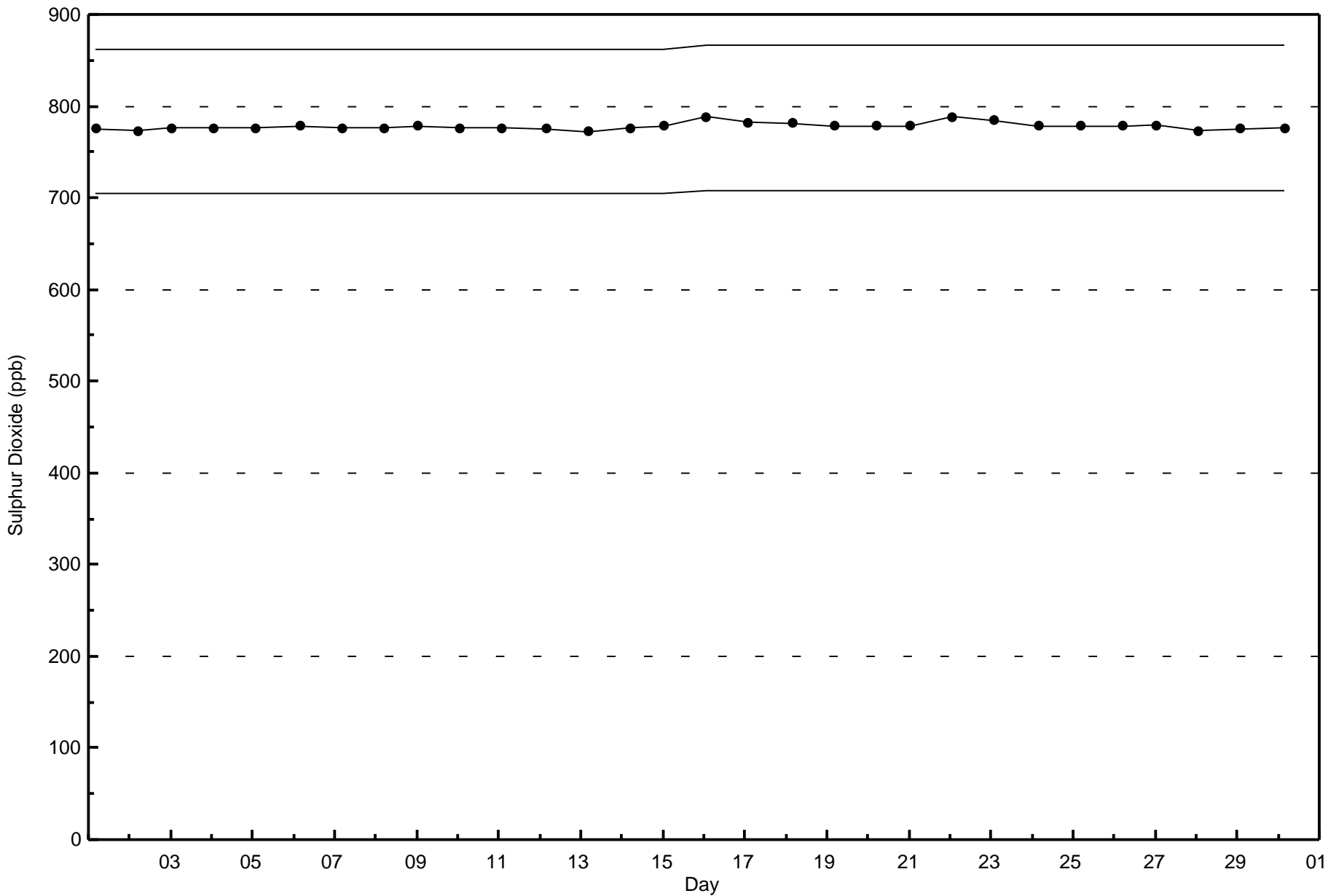


Classes (ppb)



Total Number of Valid Hours: 677







| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 1 ppb on Sep 12 17:00 | Maximum Daily Average: 0.4 ppb on Sep 23 |
| Minimum Value: 0 ppb on Sep 22 06:00 | Hours of Data: 683 |
| Maximum Diurnal Average: 0.3 ppb at hour 17 | Hours of Missing Data: 37 |
| Monthly Average: 0.3 ppb | Hours of Calibration: 36 |
| Minimum Daily Average: 0.2 ppb on Sep 21 | Percent Operational Time: 99.9 |
| Minimum Diurnal Average: 0.3 ppb at hour 6 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 0 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|
| | 1 | 2 | 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 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | 0.3 | 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 | 0.2 | 0 |
| 6-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 |
| 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 | 0.3 | 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 | 0.3 | 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 | 0.3 | 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 | 0.3 | 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 | 0.3 | 0 |
| 12-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 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 | 0.3 | 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 | 0.3 | 0 |
| 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 | 0.3 | 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 | 0.4 | 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 | 0.3 | 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 | 0.3 | 0 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 |
| 21-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 22-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 | 0.3 | 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 | 0.4 | 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 | 0.3 | 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 | 0.3 | 0 |
| 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 | 0.3 | 0 |
| 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 | 0.3 | 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 | 0.3 | 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 | 0.3 | 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 | 0.3 | 0 |

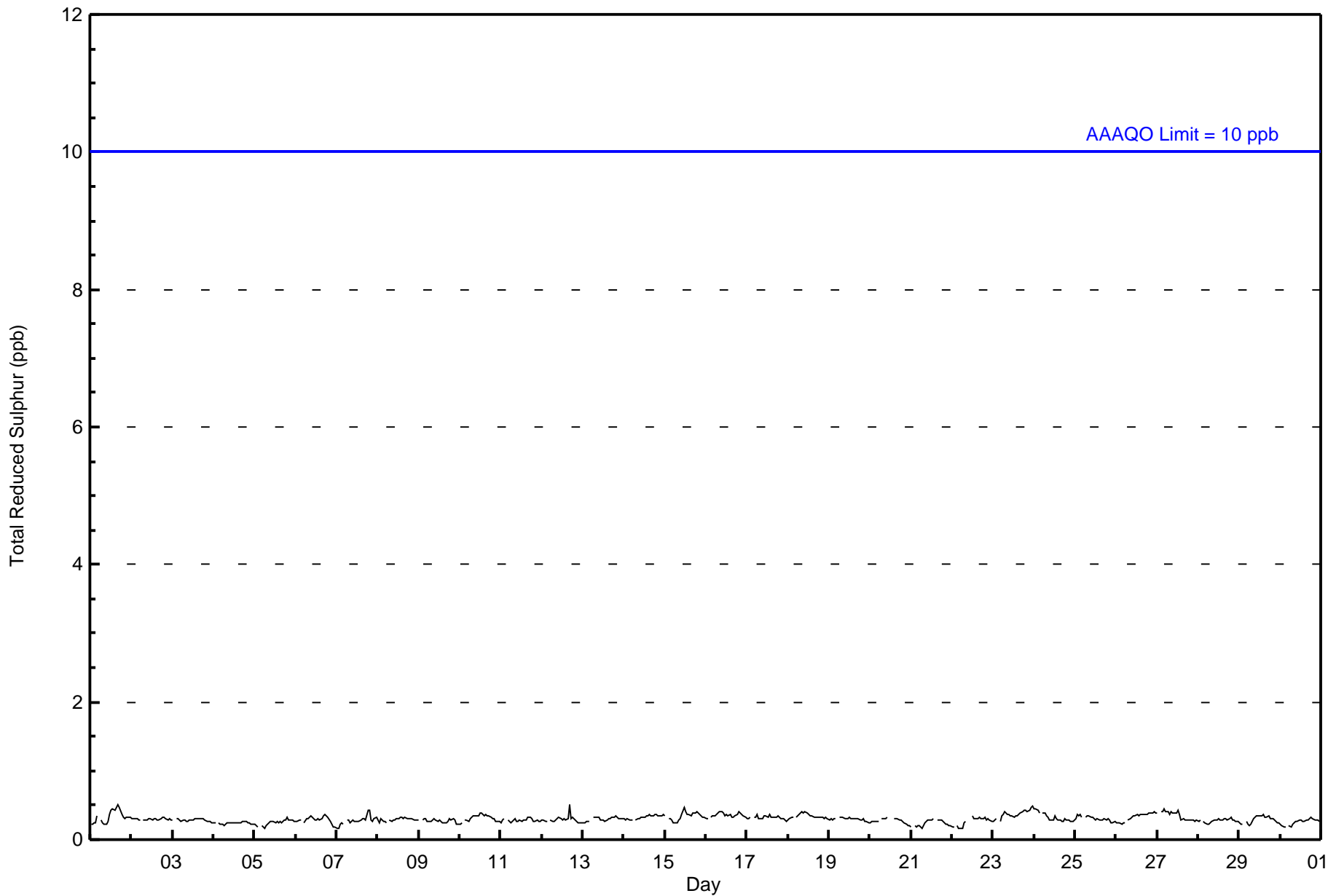
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | Diurnal Average |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 683 | 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: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 20 | 5 | 5 | 4 | 9 | 12 | 29 | 57 | 81 | 92 | 49 | 44 | 52 | 66 | 103 | 50 | 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 | 20 | 5 | 5 | 4 | 9 | 12 | 29 | 57 | 81 | 92 | 49 | 44 | 52 | 66 | 103 | 50 | 678 |

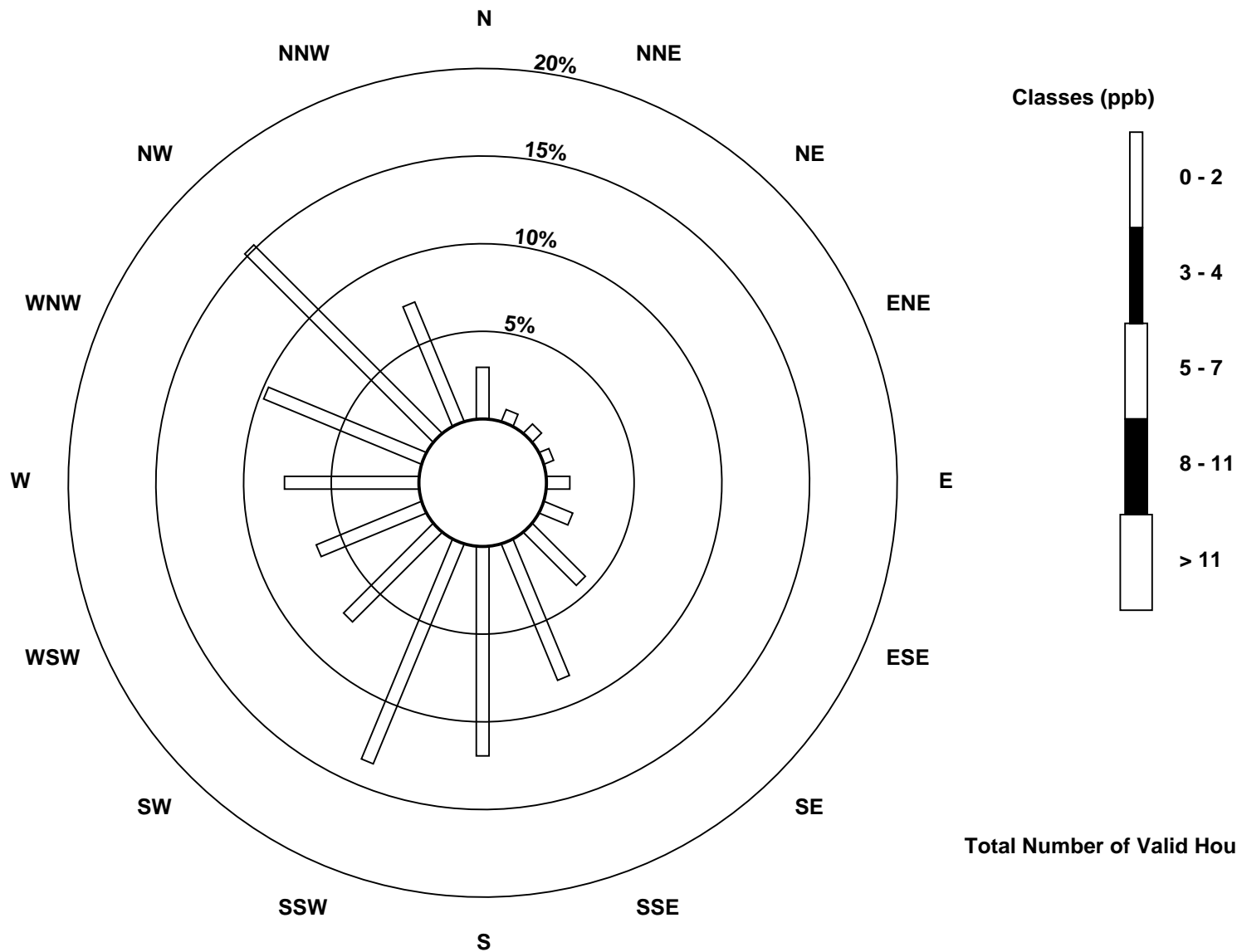
Total Number of Valid Hours: 678

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Total Reduced Sulphur (TRS) - ppb
Conklin Community (AMS 21)

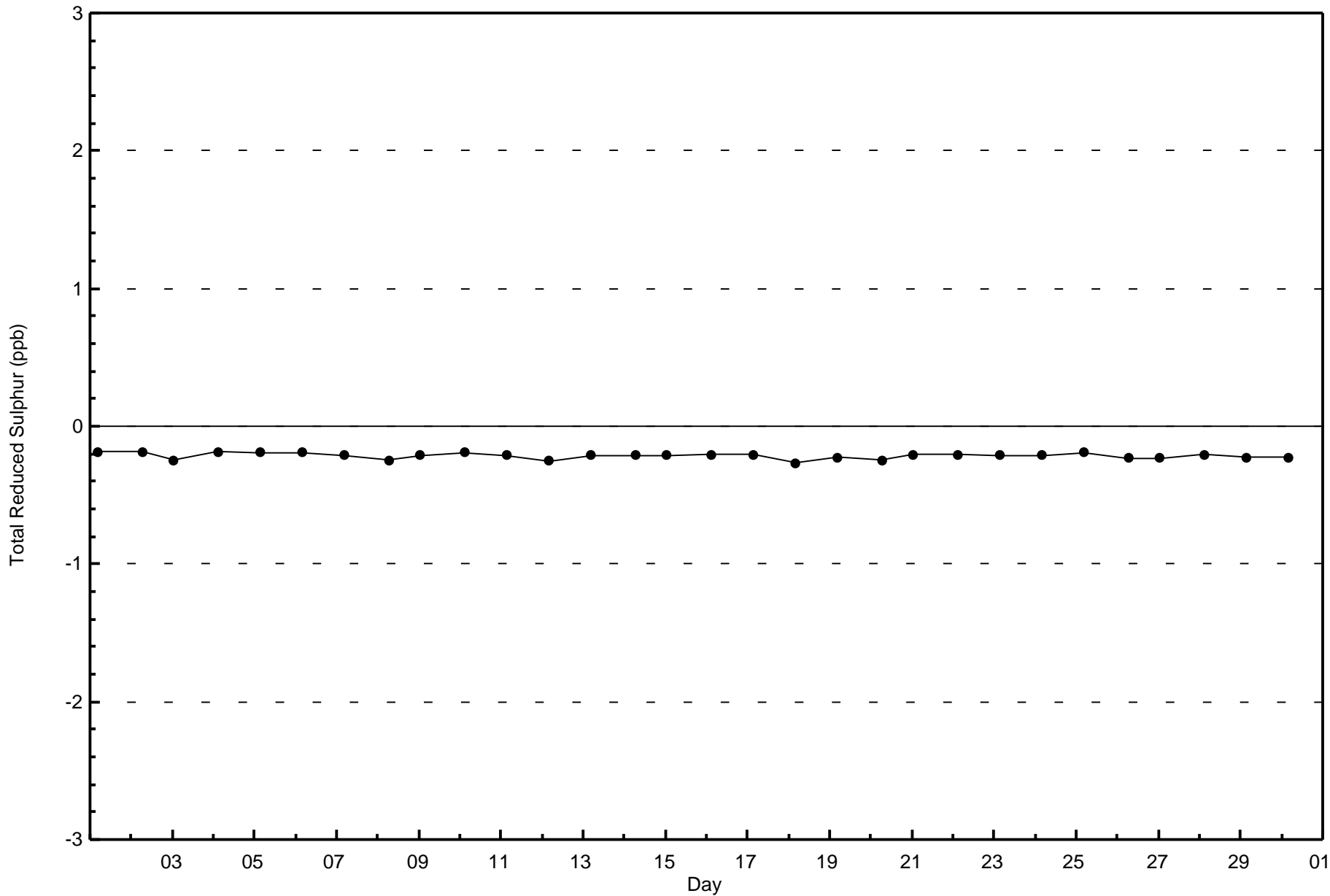


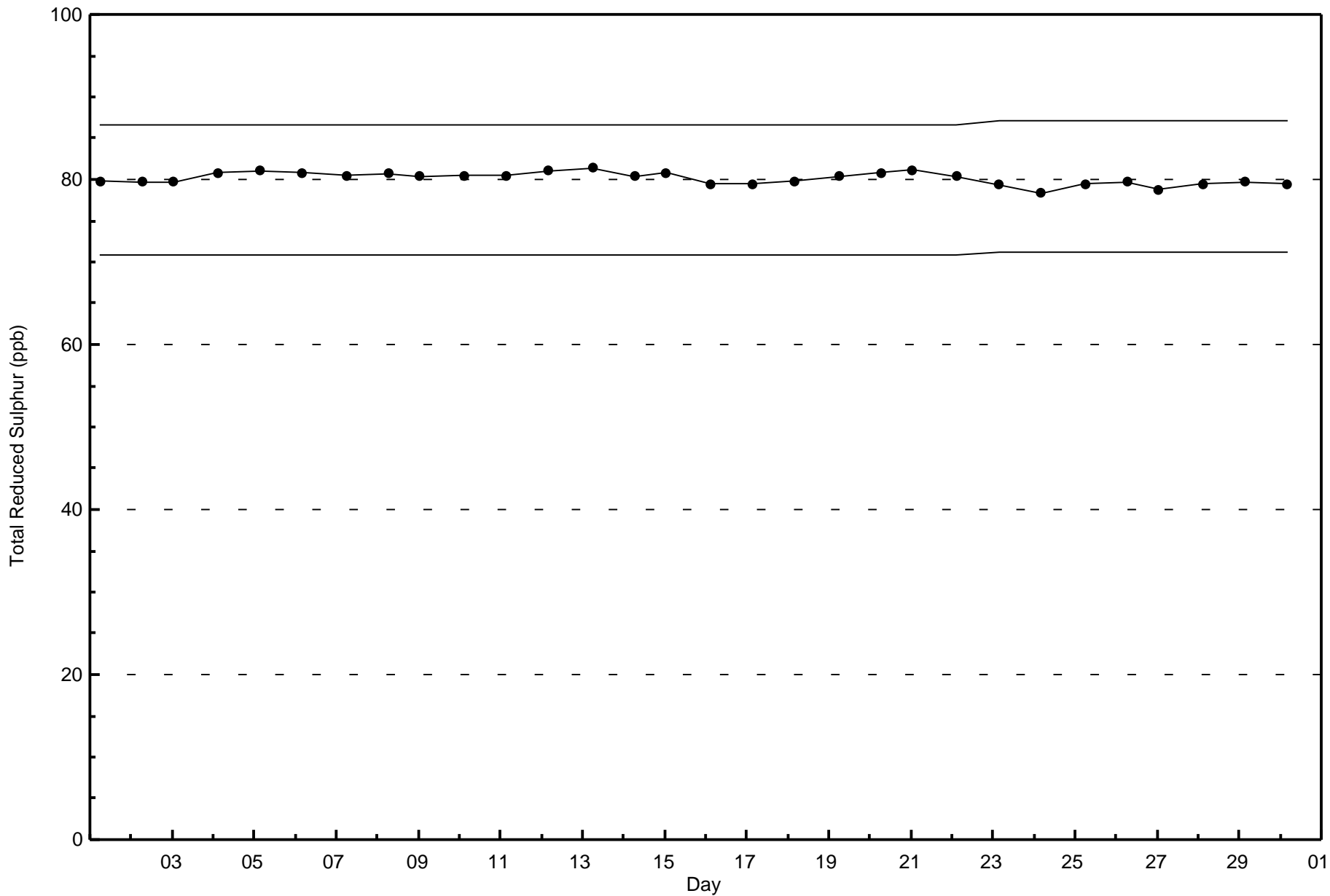
Total Number of Valid Hours: 678



Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Conklin Community - September 2016







Wood Buffalo Environmental Association
Summary of Hour Averages

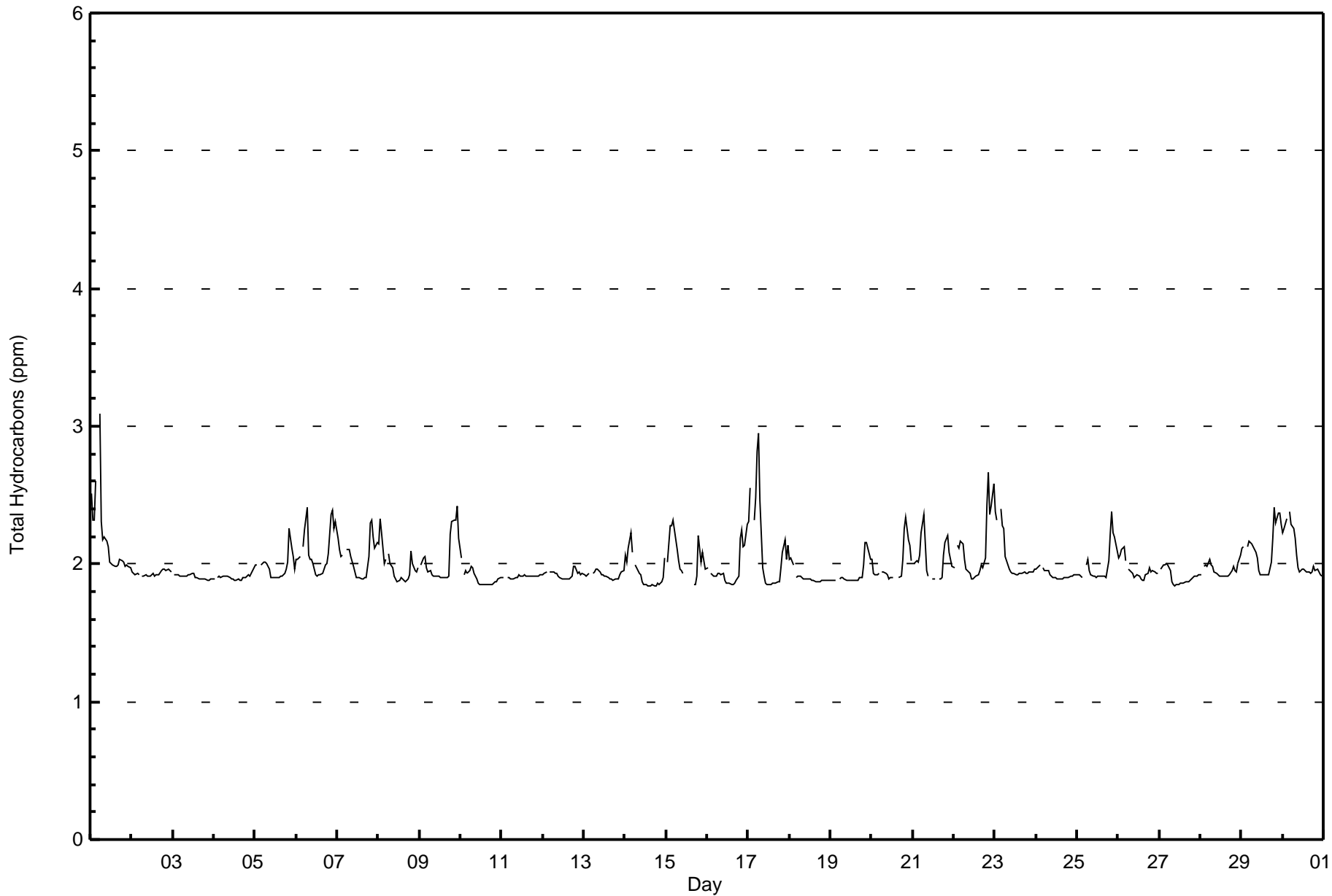
Total Hydrocarbons (THC) - ppm
Conklin Community - September 2016

| Maximum Value: 3.1 ppm on Sep 1 06:00 | | Maximum Daily Average: 2.2 ppm on Sep 1 | | Hours in Service: | 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------------------------------------------------|---------------|---------------|-----|
| Minimum Value: 1.8 ppm on Sep 14 14:00 | | Minimum Daily Average: 1.9 ppm on Sep 10 | | Hours of Data: | 680 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.1 ppm at hour 6 | | Minimum Diurnal Average: 1.9 ppm at hour 15 | | Hours of Missing Data: | 40 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.99 ppm | | Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.2 P ₉₉ = 2.5 | | Hours of Calibration: | 38 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 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 | 2.5 | 2.3 | 2.3 | 2.6 | Z | 3.1 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 3.1 | |
| 2-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | |
| 3-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | |
| 4-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | |
| 5-Sep | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.3 | 2.1 | 2.1 | 2.0 | 2.0 | 2.3 |
| 6-Sep | 2.0 | 2.0 | 2.1 | Z | 2.1 | 2.2 | 2.4 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.4 | 2.4 | 2.3 | 2.3 | 2.1 | 2.4 | |
| 7-Sep | 2.2 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 2.0 | 2.3 |
| 8-Sep | 2.2 | 2.3 | 2.2 | 2.0 | 2.0 | Z | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.3 | |
| 9-Sep | Z | 2.0 | 2.0 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.2 | 2.0 | 2.4 | |
| 10-Sep | 2.0 | Z | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 11-Sep | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 12-Sep | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 13-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | |
| 14-Sep | 2.1 | 2.0 | 2.1 | 2.2 | 2.1 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 2.0 | 1.9 | 2.2 | |
| 15-Sep | Z | 2.0 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 2.2 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.3 | |
| 16-Sep | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 2.2 | 2.2 | 2.1 | 2.1 | 2.3 | 2.0 | 2.3 | |
| 17-Sep | 2.3 | 2.6 | Z | 2.3 | 2.5 | 2.8 | 3.0 | 2.5 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.2 | 2.0 | 2.1 | 2.1 | 3.0 | |
| 18-Sep | 2.0 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 19-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 2.2 | |
| 20-Sep | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | C | C | C | 1.9 | 1.9 | 2.0 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.3 | |
| 21-Sep | Z | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.4 | 2.2 | 2.0 | 1.9 | M | 1.9 | 1.9 | 1.9 | M | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.4 | |
| 22-Sep | 2.0 | Z | 2.1 | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.4 | 2.7 | 2.4 | 2.4 | 2.6 | 2.1 | 2.7 | |
| 23-Sep | 2.4 | 2.3 | Z | 2.4 | 2.3 | 2.3 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.4 | |
| 24-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 25-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.4 | 2.2 | 2.2 | 2.1 | 2.0 | 2.4 | |
| 26-Sep | 2.0 | 2.1 | 2.1 | 2.1 | 2.0 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | |
| 27-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 28-Sep | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | 2.1 | |
| 29-Sep | 2.1 | 2.1 | Z | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.4 | 2.3 | 2.4 | 2.4 | 2.3 | 2.1 | 2.4 | |
| 30-Sep | 2.2 | 2.3 | 2.3 | Z | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.1 | 2.4 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Z - zerospan C - Calibration M - Maintenance | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Conklin Community - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin Community - September 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 544 | 80.00 | 80.00 |
| 2.1 - 3.0 | 135 | 19.85 | 99.85 |
| 3.1 - 10.0 | 1 | 0.15 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Conklin Community - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 18 | 4 | 5 | 1 | 4 | 6 | 19 | 30 | 55 | 74 | 43 | 43 | 50 | 61 | 93 | 37 | 543 |
| 2.1 - 3.0 | 2 | 1 | 0 | 4 | 3 | 4 | 12 | 29 | 26 | 18 | 4 | 1 | 1 | 3 | 11 | 14 | 133 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 44 | 51 | 64 | 104 | 52 | 677 |

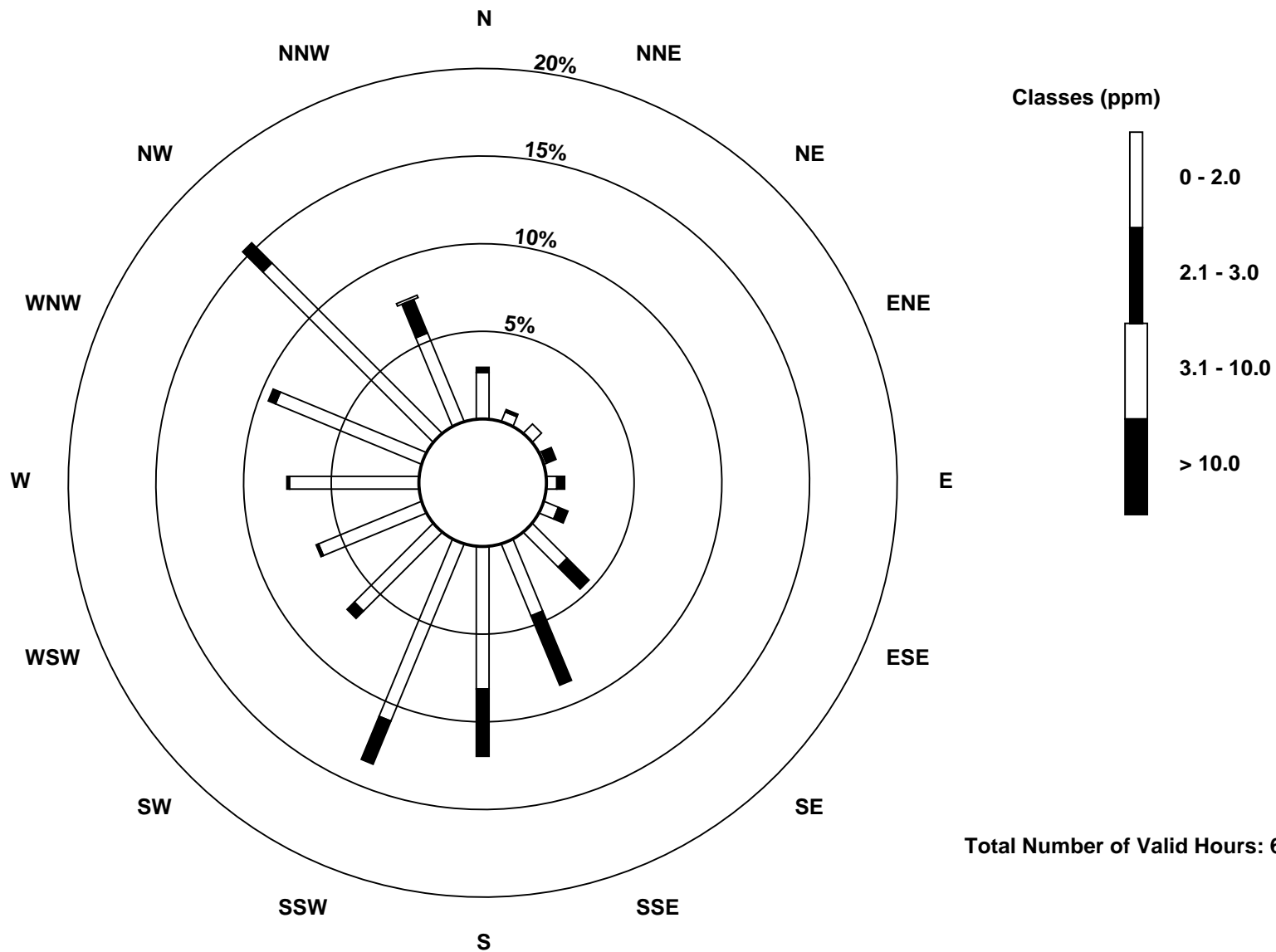
Total Number of Valid Hours: 677

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

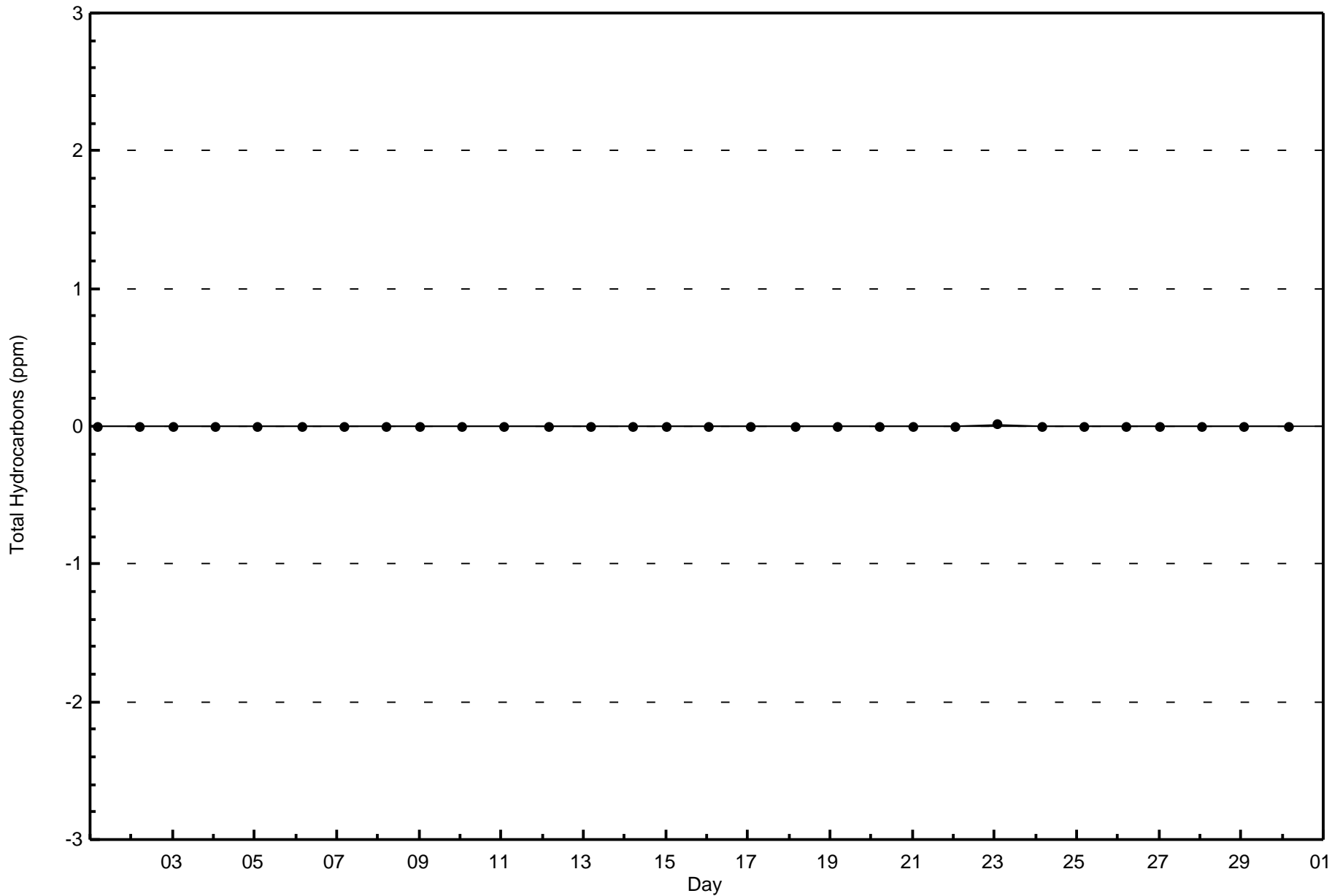
Total Hydrocarbons (THC) - ppm
Conklin Community (AMS 21)

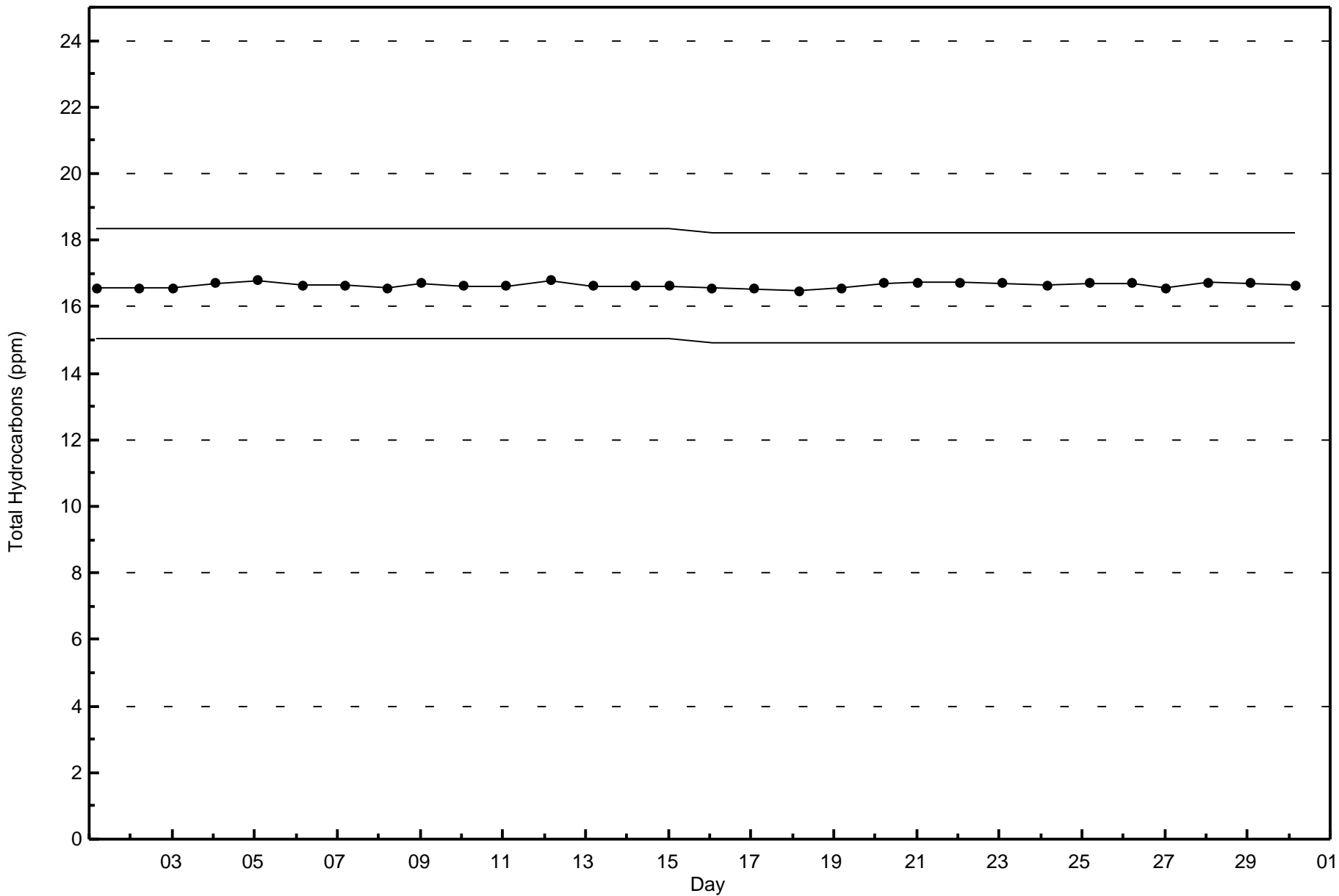




Wood Buffalo Environmental Association
Zero Responses

Total Hydrocarbons (THC) - ppm
Conklin Community - September 2016





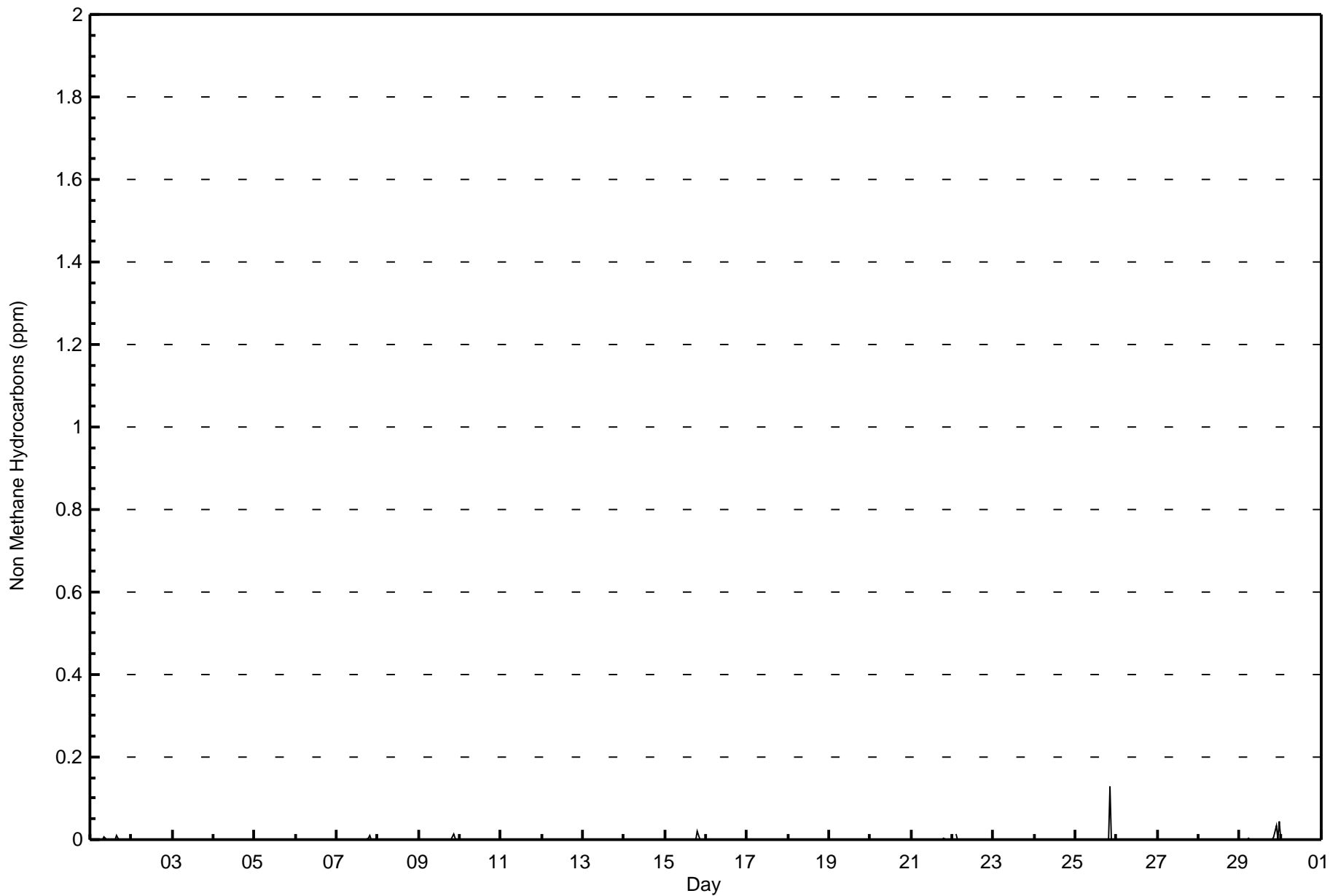


| Maximum Value: 0.128 ppm on Sep 25 21:00 | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 0.006 ppm on Sep 25 | | | | | Hours in Service: | 720 |
|-----------------------------------------------|-------------------------------|-----------------|-------|-------|-------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|---------------------------|---------------|
| Minimum Value: 0.000 ppm on Sep 1 01:00 | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.000 ppm on Sep 6 | | | | | Hours of Data: | 680 |
| Maximum Diurnal Average: 0.005 ppm at hour 21 | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.000 ppm at hour 2 | | | | | Hours of Missing Data: | 40 |
| Monthly Average: 0.000 ppm | | | | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0 | | | | | Hours of Calibration: | 38 |
| | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: | 99.7 |
| 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 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.001 | 0.001 | 0.000 | 0.006 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.009 |
| 2-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 |
| 3-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 |
| 4-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 |
| 5-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 | 0.000 | 0.000 | 0.000 |
| 6-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 |
| 7-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 | 0.003 | 0.010 | 0.000 | 0.000 | 0.000 | 0.001 | 0.010 |
| 8-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 |
| 9-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 | 0.013 | 0.003 | 0.000 | 0.001 | 0.013 |
| 10-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 |
| 11-Sep | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 |
| 12-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 |
| 13-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 |
| 14-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 |
| 15-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | C | C | C | C | C | 0.000 | 0.000 | 0.002 | 0.022 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 | 0.022 |
| 16-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 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 |
| 17-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 | 0.000 | 0.000 | 0.000 |
| 18-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 |
| 19-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 |
| 20-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 | C | C | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 21-Sep | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | M | 0.000 | 0.000 | M | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 |
| 22-Sep | 0.000 | Z | 0.012 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.012 |
| 23-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 | 0.002 | 0.000 | 0.002 |
| 24-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 |
| 25-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 | 0.128 | 0.000 | 0.000 | 0.000 | 0.006 | 0.128 |
| 26-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 |
| 27-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 |
| 28-Sep | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 |
| 29-Sep | 0.000 | 0.000 | Z | 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 | 0.007 | 0.035 | 0.000 | 0.044 | 0.004 | 0.044 |
| 30-Sep | 0.003 | 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 | 0.003 |
| | | | | | | | | | | | | | | | | | | | | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.001 0.005 0.001 0.000 0.002 | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | 0.003 0.000 0.012 0.000 0.000 0.003 0.001 0.001 0.006 0.002 0.000 0.000 0.000 0.000 0.000 0.009 0.005 0.000 0.003 0.022 0.128 0.035 0.001 0.044 | | | | | Diurnal Maximum | |
| Z - zerospan | | C - Calibration | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 670 | 98.53 | 98.53 |
| 0.006 - 0.05 | 9 | 1.32 | 99.85 |
| 0.06 - 0.1 | 1 | 0.15 | 100.00 |
| > 0.1 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 55 | 78 | 91 | 47 | 44 | 51 | 64 | 102 | 52 | 667 |
| 0.006 - 0.05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 9 |
| 0.06 - 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| > 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 44 | 51 | 64 | 104 | 52 | 677 |

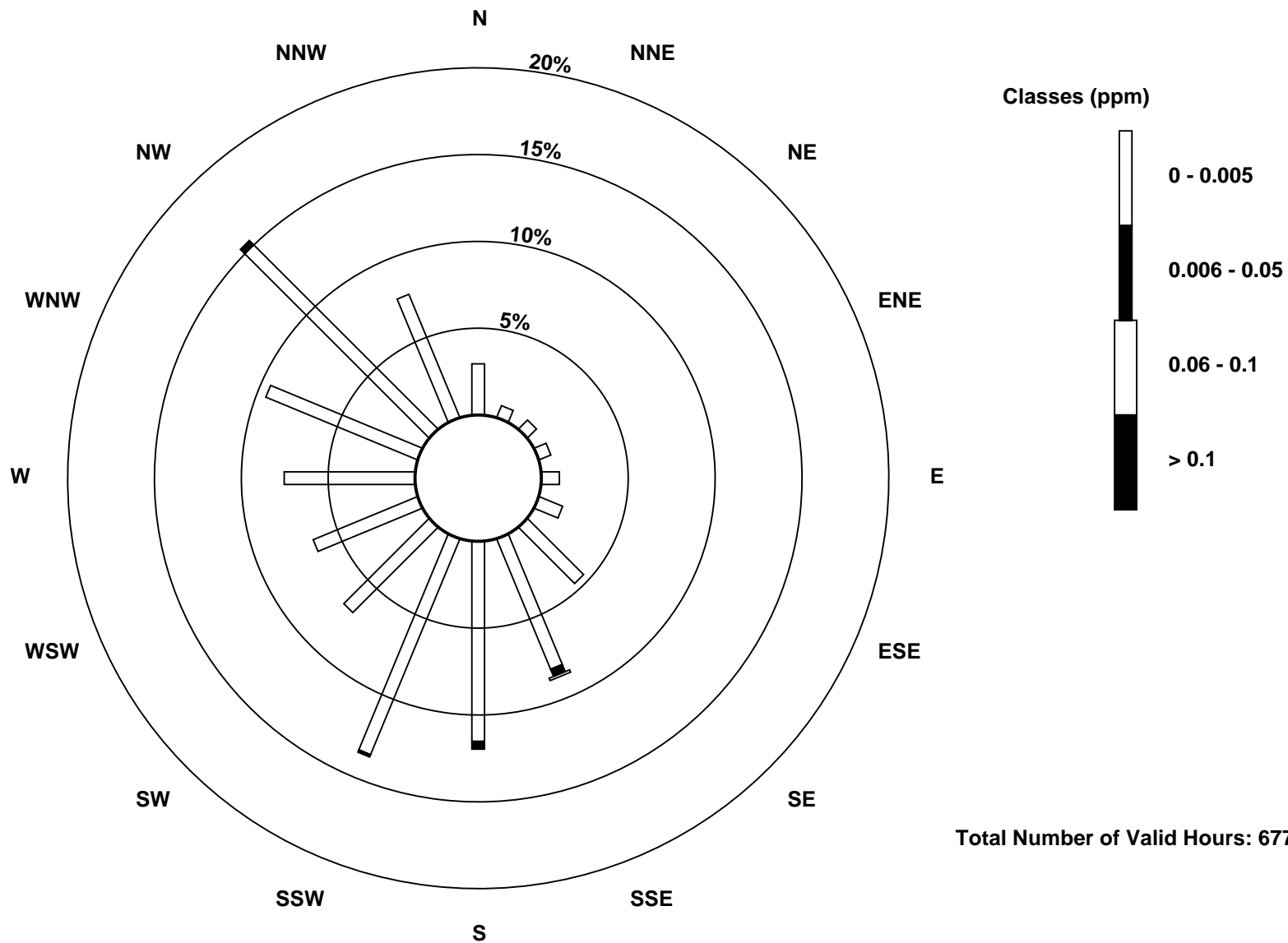
Total Number of Valid Hours: 677

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

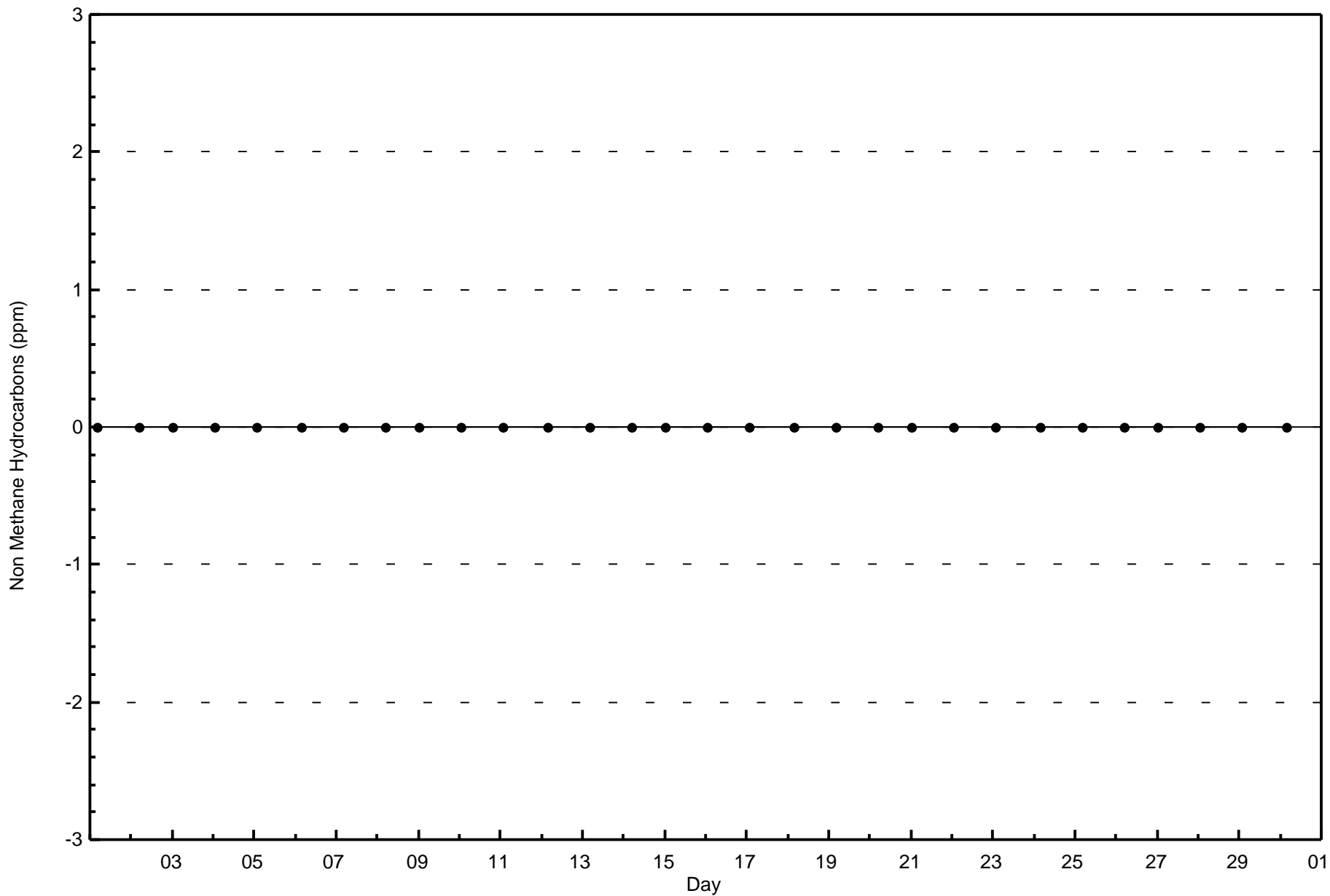
Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community (AMS 21)

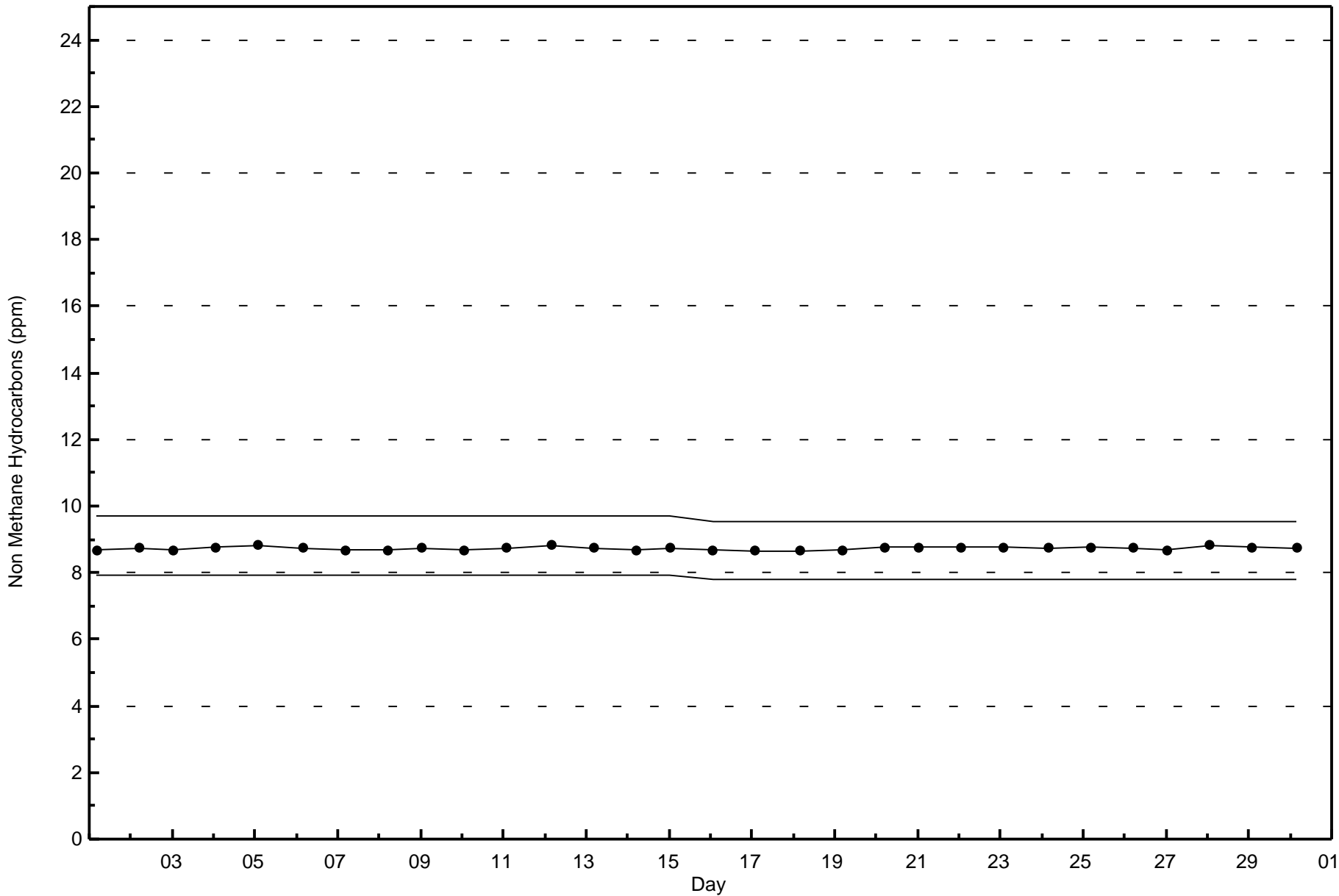




Wood Buffalo Environmental Association
Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm
Conklin Community - September 2016



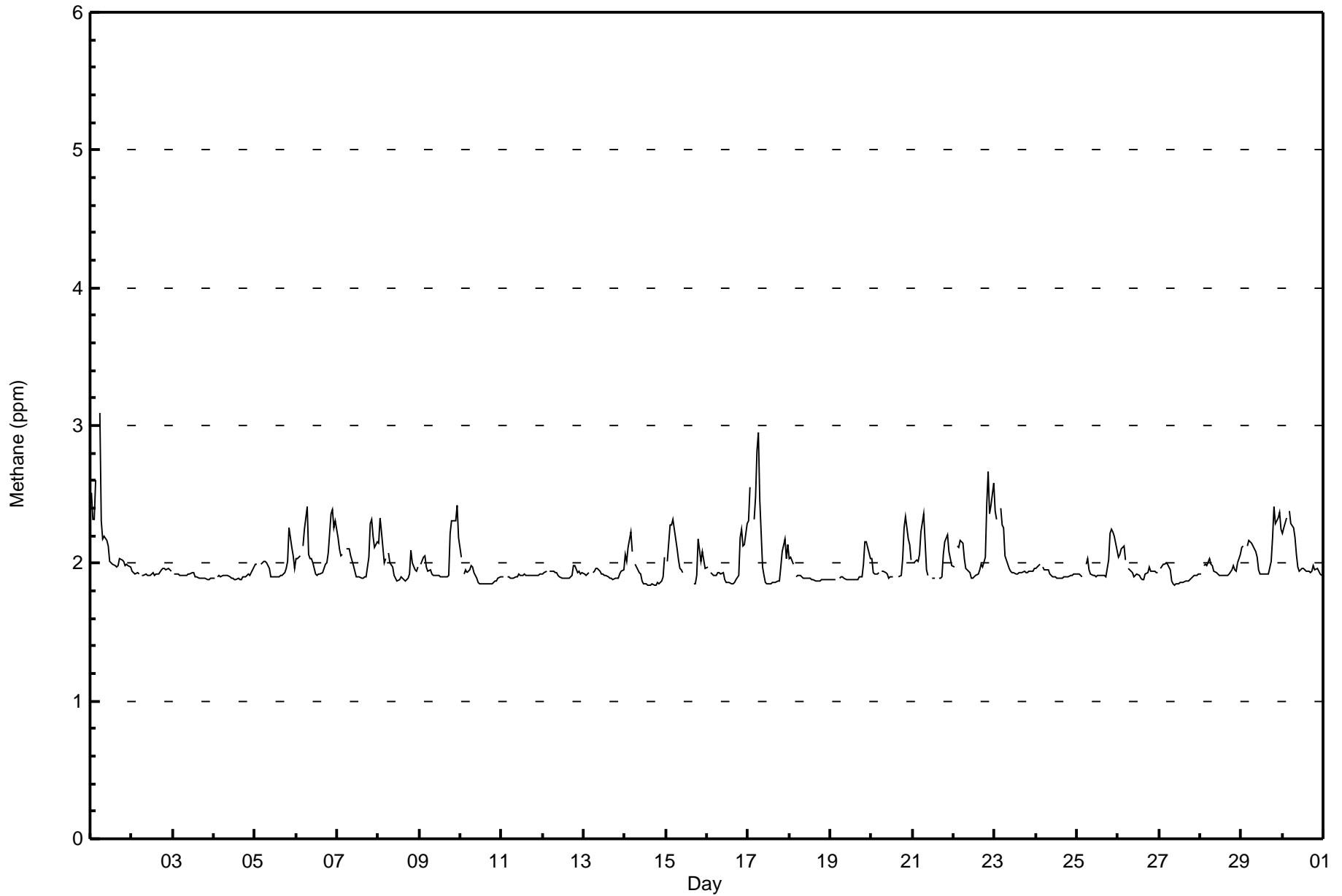




| | | | | |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 3.1 ppm on Sep 1 06:00 | Maximum Daily Average: 2.2 ppm on Sep 1 | | Hours of Data: | 680 |
| Minimum Value: 1.8 ppm on Sep 14 14:00 | Minimum Daily Average: 1.9 ppm on Sep 10 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 2.1 ppm at hour 6 | Minimum Diurnal Average: 1.9 ppm at hour 16 | | Hours of Calibration: | 38 |
| Monthly Average: 1.99 ppm | Percentiles: P ₁ = 1.8 P ₁₀ = 1.9 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.2 P ₉₉ = 2.5 | | Percent Operational Time: | 99.7 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 2.5 | 2.3 | 2.3 | 2.6 | Z | 3.1 | 2.3 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 3.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.3 | 2.1 | 2.1 | 2.0 | 2.0 | 2.3 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 2.0 | 2.0 | 2.1 | Z | 2.1 | 2.2 | 2.4 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.4 | 2.4 | 2.3 | 2.3 | 2.1 | 2.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 2.2 | 2.1 | 2.1 | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.3 | 2.3 | 2.2 | 2.1 | 2.2 | 2.0 | 2.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 2.2 | 2.3 | 2.2 | 2.0 | 2.0 | Z | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 2.0 | 2.0 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.2 | 2.0 | 2.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 2.0 | Z | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 2.1 | 2.0 | 2.1 | 2.2 | 2.1 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 2.0 | 1.9 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 2.0 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 2.2 | 2.0 | 2.1 | 2.0 | 2.0 | 2.1 | 2.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 2.2 | 2.2 | 2.1 | 2.1 | 2.3 | 2.0 | 2.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 2.3 | 2.6 | Z | 2.3 | 2.5 | 2.8 | 3.0 | 2.5 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.2 | 2.0 | 2.1 | 2.1 | 3.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 2.0 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 2.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | C | C | C | 1.9 | 1.9 | 2.0 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 2.0 | 2.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.4 | 2.2 | 2.0 | 1.9 | M | 1.9 | 1.9 | 1.9 | M | 1.9 | 1.9 | 1.9 | 2.1 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 2.0 | Z | 2.1 | 2.1 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.4 | 2.7 | 2.4 | 2.4 | 2.6 | 2.1 | 2.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 2.4 | 2.3 | Z | 2.4 | 2.3 | 2.3 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 2.0 | 2.0 | 2.0 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 1.9 | 1.9 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.0 | 2.3 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 2.0 | 2.1 | 2.1 | 2.1 | 2.0 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | 2.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 2.1 | 2.1 | Z | 2.1 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.2 | 2.4 | 2.3 | 2.3 | 2.4 | 2.2 | 2.4 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 2.2 | 2.3 | 2.3 | Z | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.0 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 2.1 | 2.4 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 2.5 | 2.6 | 2.3 | 2.6 | 2.5 | 3.1 | 3.0 | 2.5 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.4 | 2.7 | 2.4 | 2.4 | 2.6 | Diurnal Maximum | |

Z - zerspan C - Calibration M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Conklin Community - September 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 545 | 80.15 | 80.15 |
| 2.1 - 3.0 | 134 | 19.71 | 99.85 |
| 3.1 - 10.0 | 1 | 0.15 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Conklin Community - September 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 18 | 4 | 5 | 1 | 4 | 6 | 19 | 30 | 55 | 75 | 43 | 43 | 50 | 61 | 93 | 37 | 544 |
| 2.1 - 3.0 | 2 | 1 | 0 | 4 | 3 | 4 | 12 | 29 | 26 | 17 | 4 | 1 | 1 | 3 | 11 | 14 | 132 |
| 3.1 - 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| > 10.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 44 | 51 | 64 | 104 | 52 | 677 |

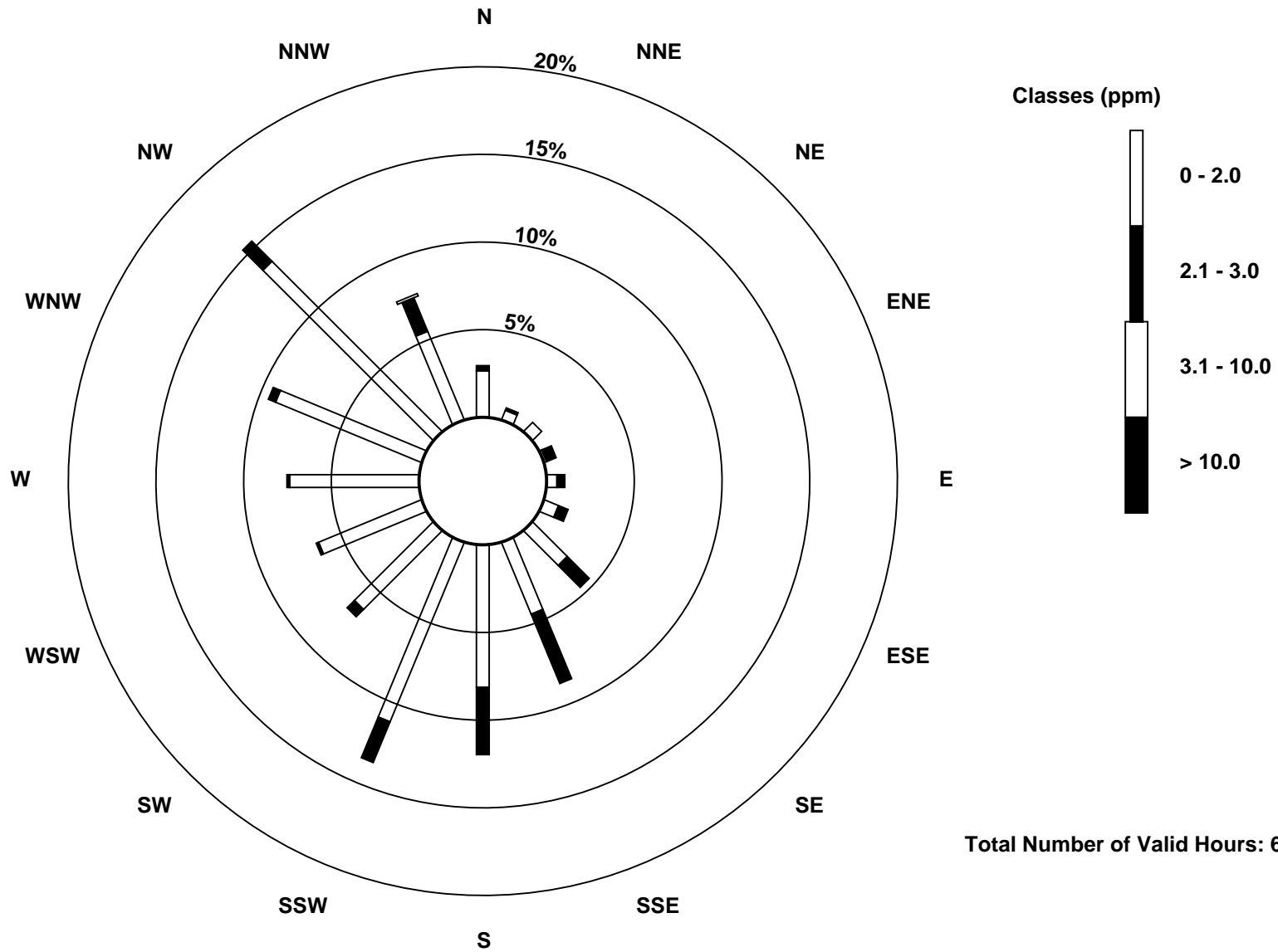
Total Number of Valid Hours: 677

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Methane (CH₄) - ppm
Conklin Community (AMS 21)



Total Number of Valid Hours: 677

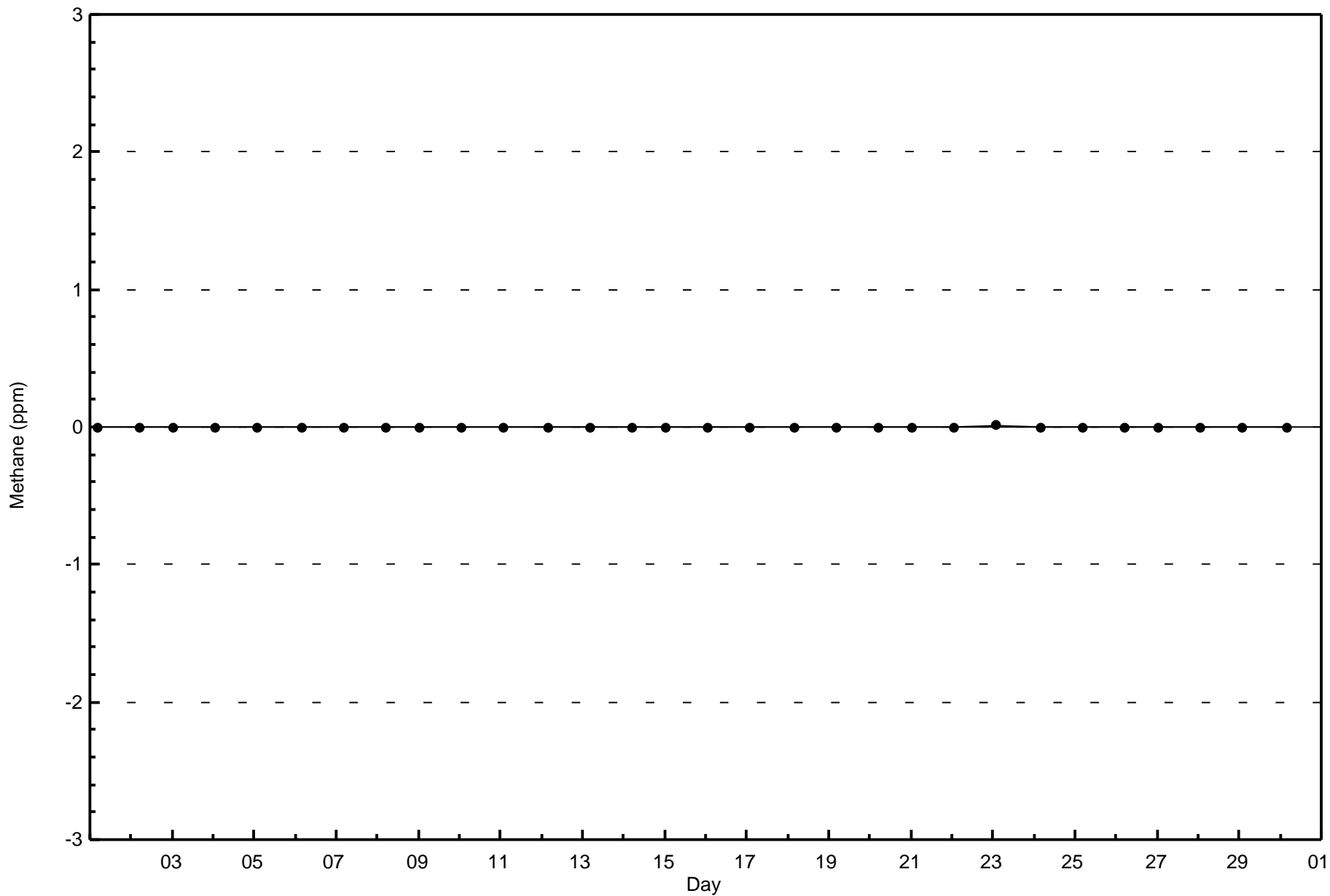


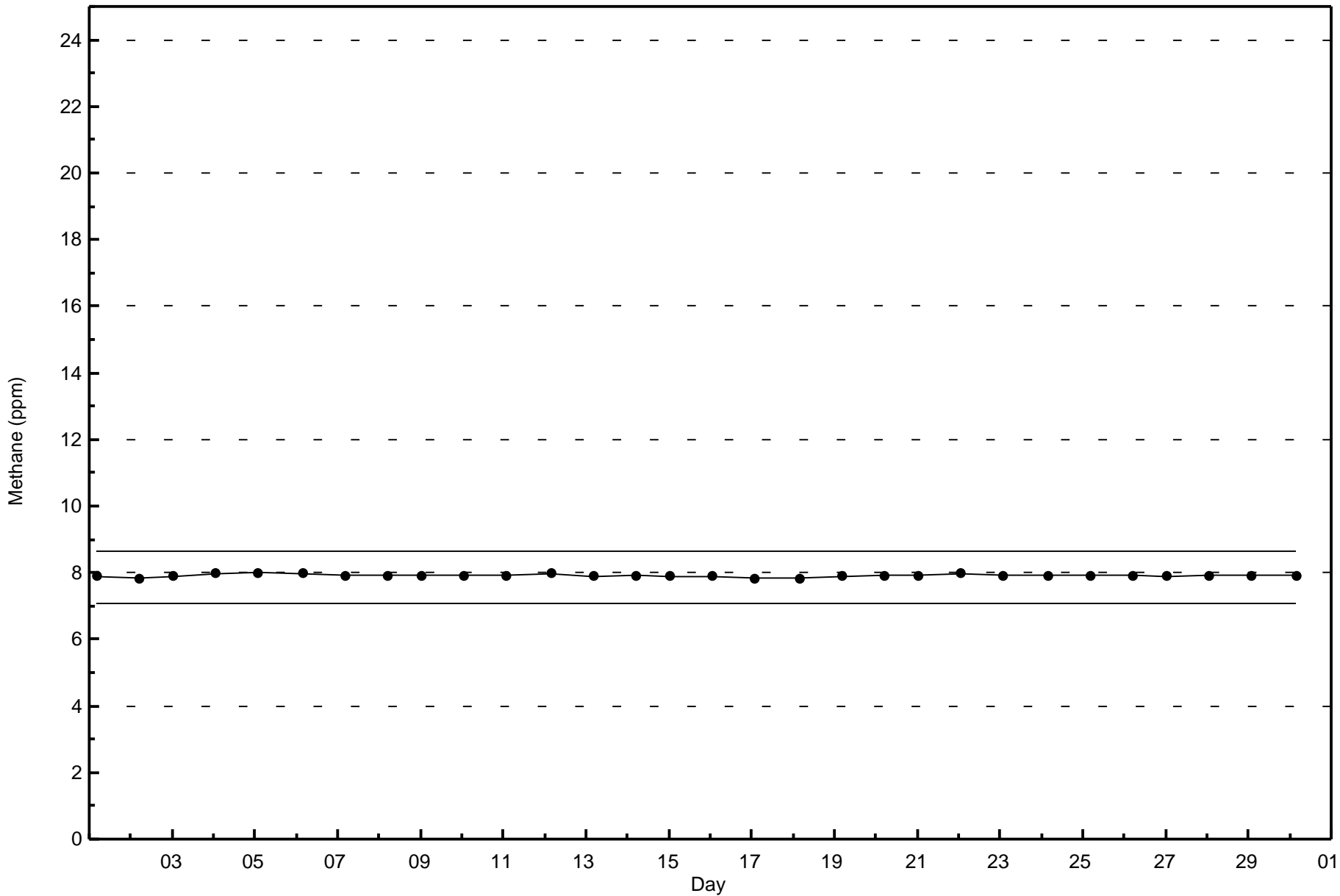
Wood Buffalo Environmental Association

Zero Responses

Methane (CH₄) - ppm

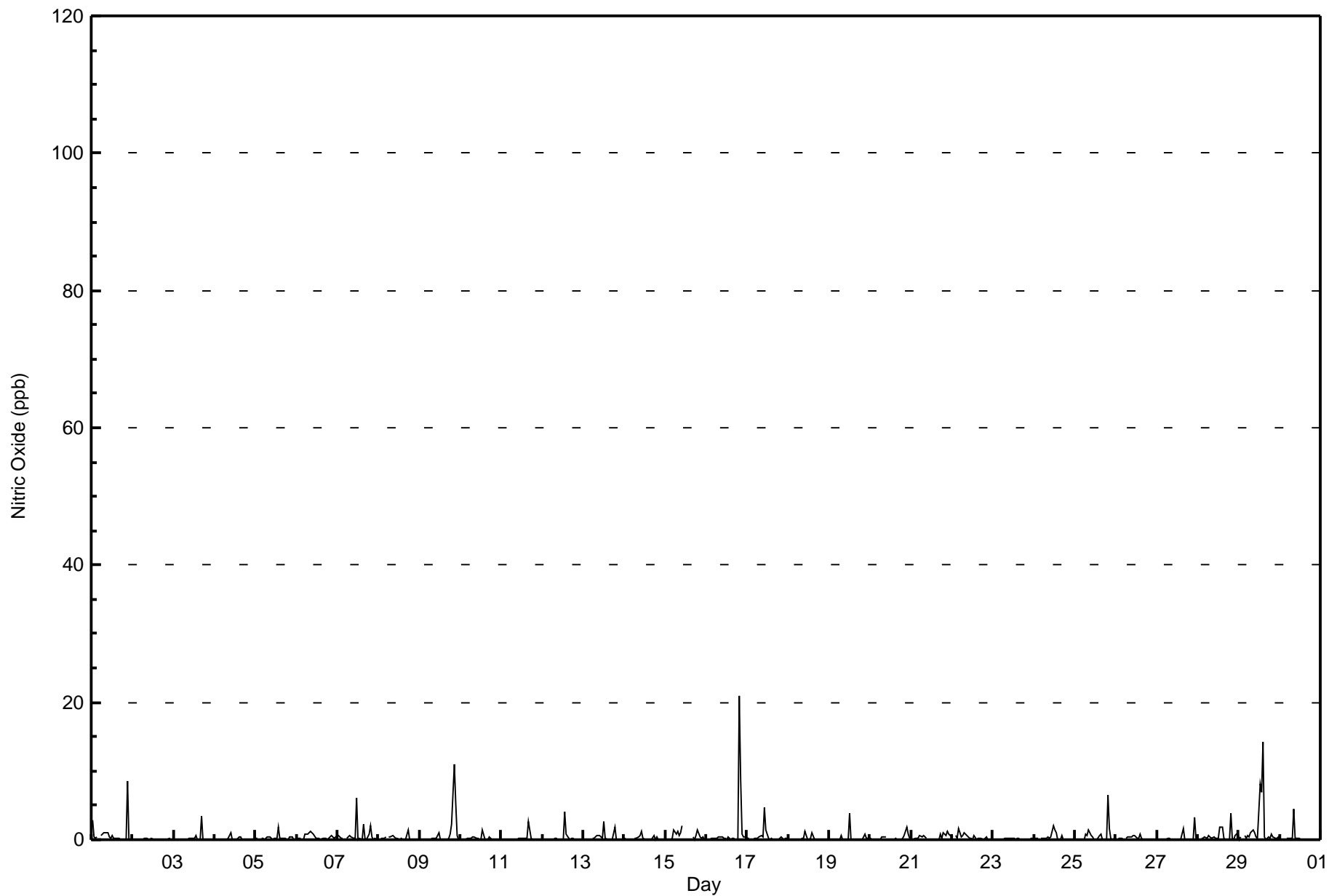
Conklin Community - September 2016







| Maximum Value: 21 ppb on Sep 16 20:00 | | | | | | | | | | | | | | | | | | Maximum Daily Average: 1.7 ppb on Sep 29 | | | | | | Hours in Service: 720 | | |
|-------------------------------------------------------------------------------------------------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|--------------------------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 3 00:00 | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.0 ppb on Sep 2 | | | | | | Hours of Data: 677 | | |
| Maximum Diurnal Average: 1.4 ppb at hour 20 | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.1 ppb at hour 3 | | | | | | Hours of Missing Data: 43 | | |
| 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 = 7 | | | | | | Hours of Calibration: 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 | 3 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0.8 | 9 |
| 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 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 3 |
| 4-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 | 0.1 | 1 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 6-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 1 |
| 7-Sep | 1 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0.7 | 6 |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 9-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 11 | 5 | 1 | 0 | 1.0 | 11 |
| 10-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 3 |
| 12-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 4 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 |
| 14-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | C | C | C | C | C | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0.6 | 2 |
| 16-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 9 | 1 | 0 | 0 | 1.5 | 21 |
| 17-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.4 | 5 |
| 18-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 | 0.1 | 1 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | 4 |
| 20-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0.3 | 2 |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | M | M | M | 0 | M | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 22-Sep | 0 | Z | 1 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| 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 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 7 | 2 | 0 | 0 | 0 | 0.6 | 7 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0.3 | 3 |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 1 | 0.6 | 4 |
| 29-Sep | 0 | 0 | Z | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 8 | 7 | 14 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1.7 | 14 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 0.2 0.1 0.1 0.1 0.2 0.3 0.3 0.4 0.6 0.4 0.5 0.5 0.7 0.7 0.8 0.3 0.3 0.2 0.2 1.4 0.9 0.7 0.3 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 0 1 1 2 1 1 1 5 1 5 6 8 7 14 2 3 1 2 21 11 9 3 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 676 | 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: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 91 | 47 | 44 | 51 | 64 | 102 | 51 | 673 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 44 | 51 | 64 | 102 | 51 | 674 |

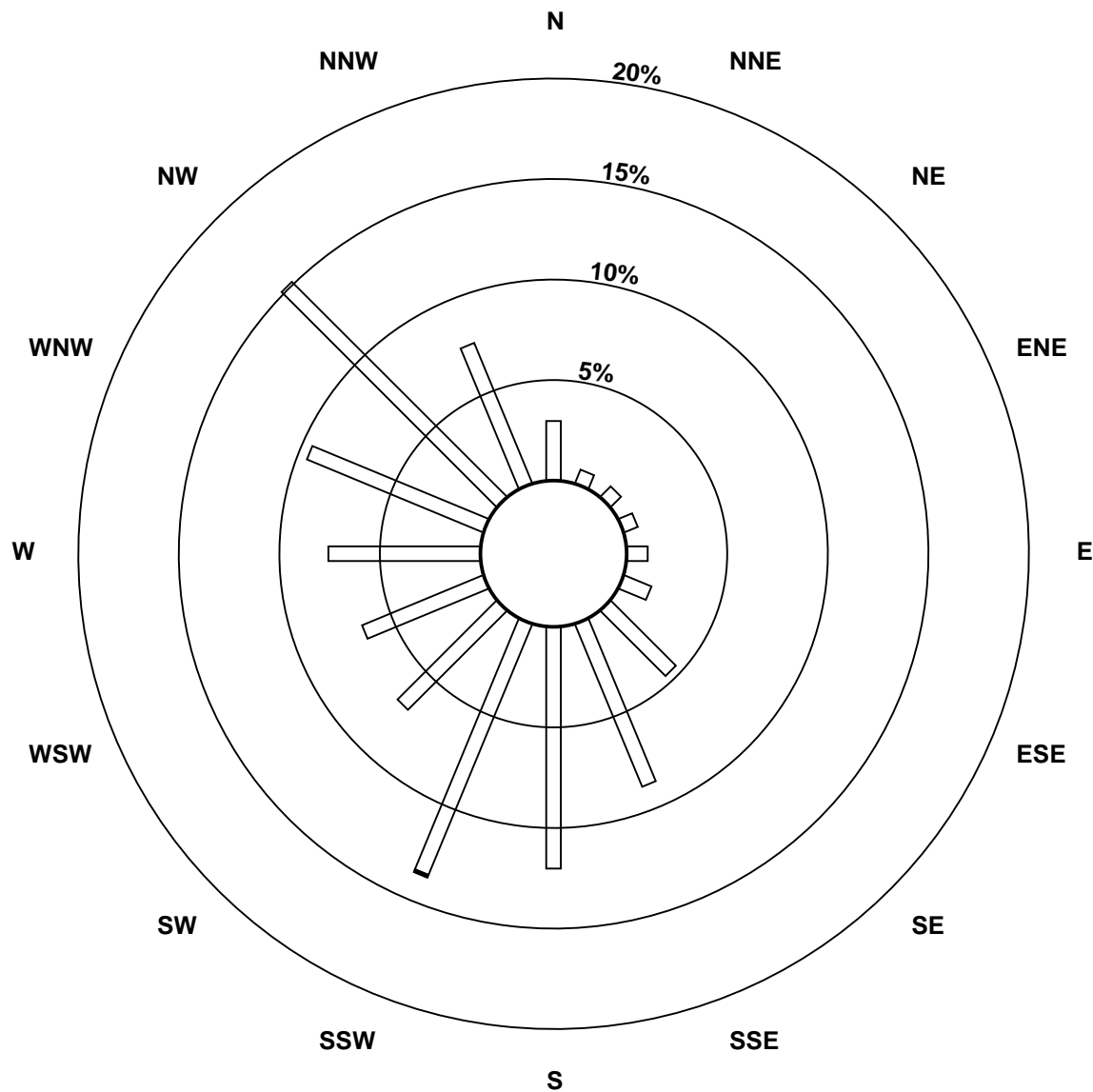
Total Number of Valid Hours: 674

Total Number of Hours: 720

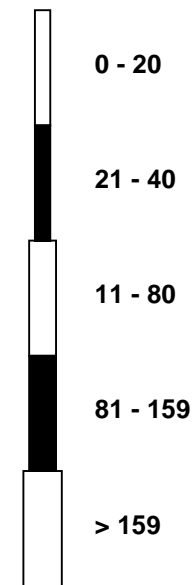


Wood Buffalo Environmental Association
Wind Rose Sep 2016

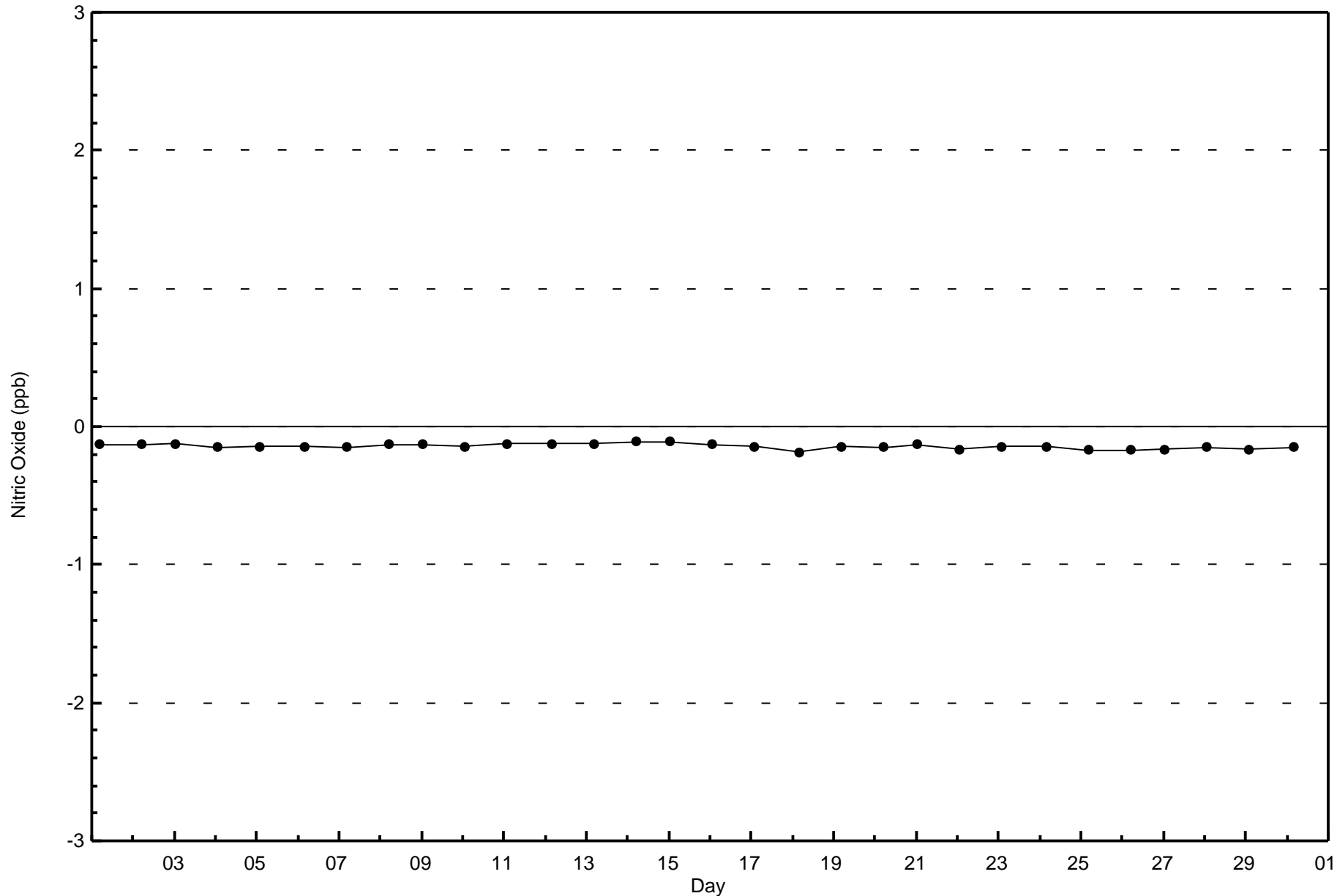
Nitric Oxide (NO) - ppb
Conklin Community (AMS 21)

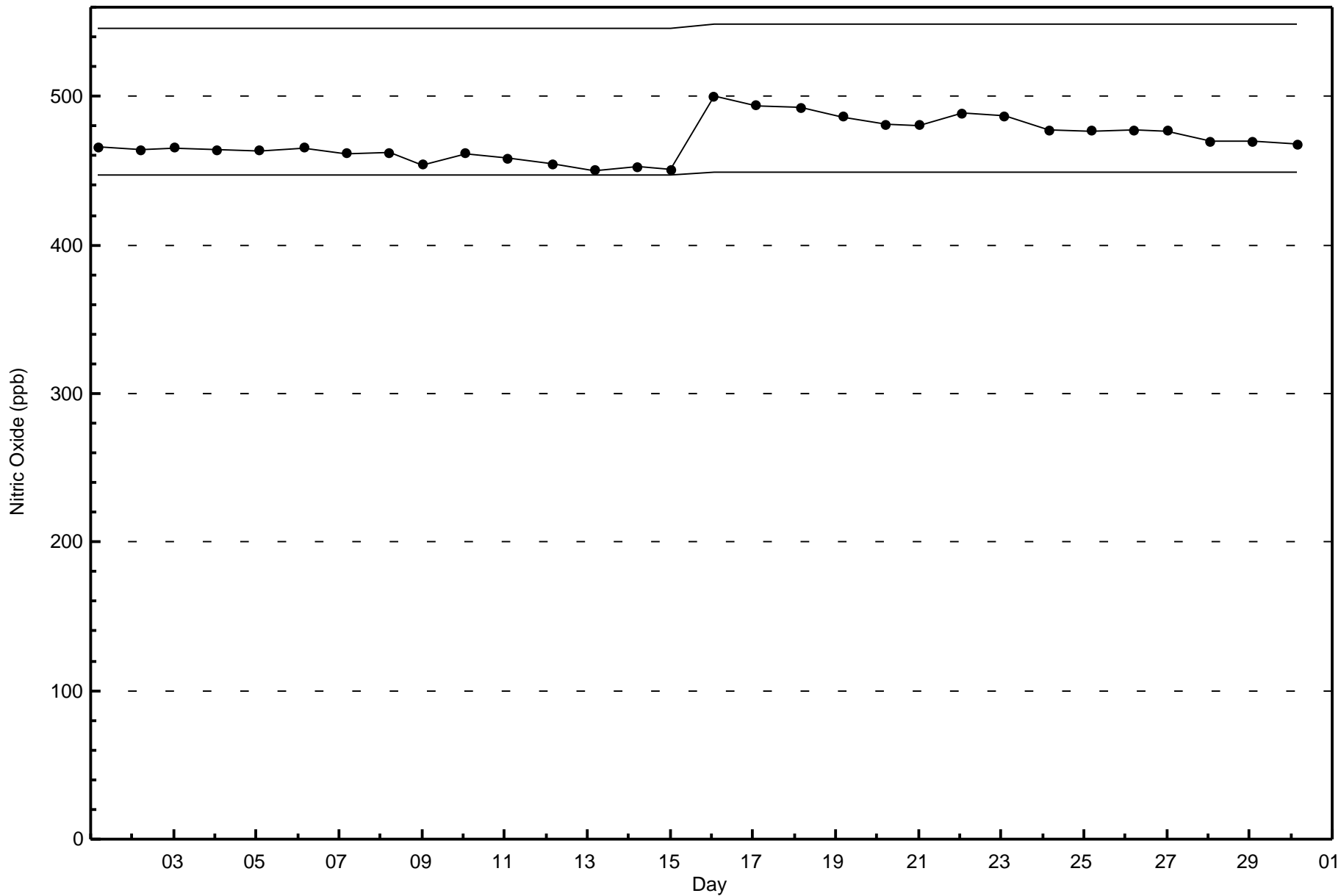


Classes (ppb)



Total Number of Valid Hours: 674







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Conklin Community - September 2016

| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 14 ppb on Sep 16 21:00 | Maximum Daily Average: 2.4 ppb on Sep 16 | | Hours of Data: | 677 |
| Minimum Value: 0 ppb on Sep 10 14:00 | Minimum Daily Average: 0.3 ppb on Sep 3 | | Hours of Missing Data: | 43 |
| Maximum Diurnal Average: 2.0 ppb at hour 20 | Minimum Diurnal Average: 0.5 ppb at hour 14 | | Hours of Calibration: | 39 |
| Monthly Average: 0.9 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 1 P ₉₀ = 2 P ₉₉ = 5 | | 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 | 2 | 1 | 1 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0.5 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 | |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 0.8 | 2 | |
| 6-Sep | 2 | 2 | 2 | Z | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 2 | |
| 7-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 2 | 2 | 1 | 0 | 1 | 0 | 0.7 | 2 | |
| 8-Sep | 0 | 0 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0.5 | 1 | |
| 9-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 4 | 3 | 1 | 1 | 1.0 | 4 | |
| 10-Sep | 1 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0.6 | 1 | |
| 12-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 | |
| 13-Sep | 1 | 1 | 1 | 2 | Z | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.0 | 2 | |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0.6 | 1 | |
| 15-Sep | Z | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 3 | C | C | C | C | C | 1 | 1 | 3 | 3 | 2 | 1 | 2 | 1 | 1.2 | 3 | |
| 16-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 13 | 14 | 7 | 3 | 2 | 2.4 | 14 | |
| 17-Sep | 2 | 1 | Z | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.6 | 2 | |
| 18-Sep | 1 | 1 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0.5 | 1 | |
| 20-Sep | 1 | 1 | 1 | 1 | 1 | Z | 2 | 1 | 1 | 1 | C | C | C | C | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 0.8 | 2 | |
| 21-Sep | Z | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | M | M | M | 0 | M | 0 | 0 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1.0 | 3 | |
| 22-Sep | 1 | Z | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 1.1 | 3 |
| 23-Sep | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.3 | 2 | |
| 24-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 | |
| 25-Sep | 1 | 1 | 0 | 0 | Z | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 4 | 6 | 3 | 1 | 1 | 1.1 | 6 | |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 1.2 | 3 | |
| 27-Sep | Z | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 3 | 1 | 1.2 | 3 | |
| 28-Sep | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | 5 | 2 | 4 | 5 | 1.5 | 8 | |
| 29-Sep | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 3 | 2 | 1 | 4 | 2 | 4 | 3 | 2 | 2 | 2 | 1.6 | 4 | |
| 30-Sep | 1 | 1 | 1 | Z | 1 | 3 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 0 | 1.3 | 3 | |

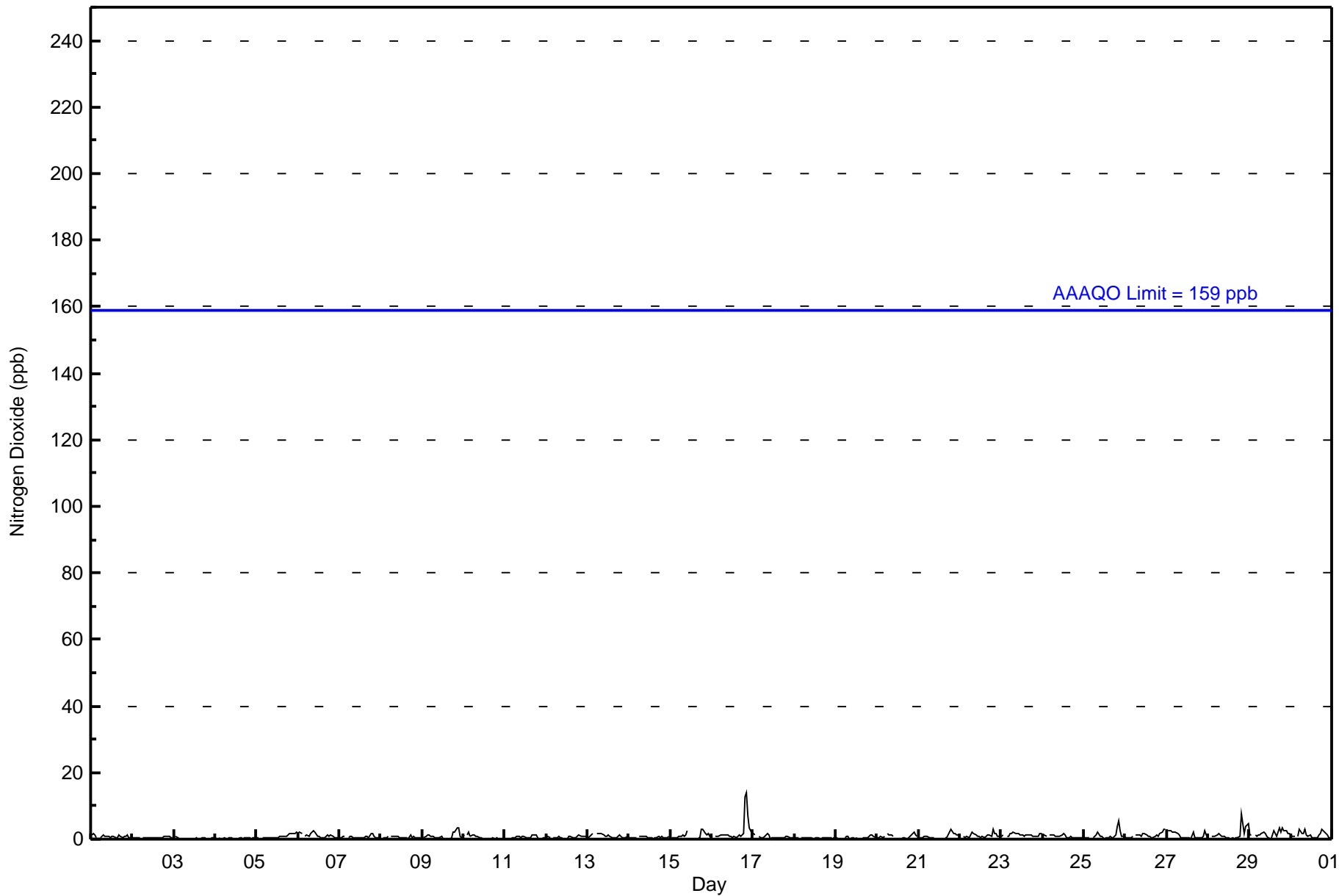
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.7 | 0.8 | 0.8 | 0.7 | 0.7 | 1.0 | 1.0 | 1.1 | 1.0 | 0.8 | 0.8 | 0.6 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.8 | 1.1 | 2.0 | 1.7 | 1.3 | 1.1 | 1.0 | Diurnal Average | |
| 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 1 | 3 | 2 | 1 | 4 | 3 | 13 | 14 | 7 | 4 | 5 | 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
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 677 | 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: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 44 | 51 | 64 | 102 | 51 | 674 |
| 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 | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 44 | 51 | 64 | 102 | 51 | 674 |

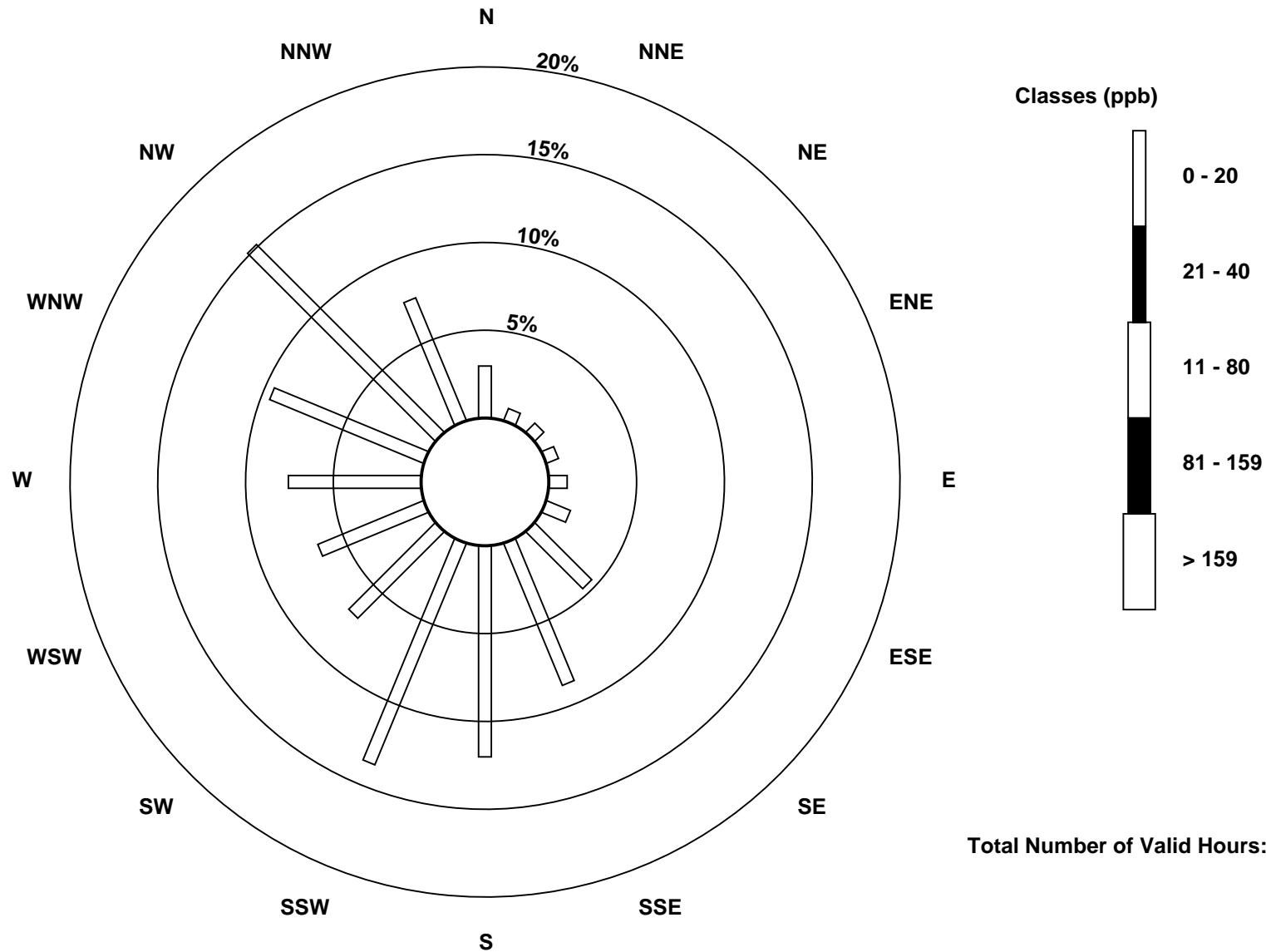
Total Number of Valid Hours: 674

Total Number of Hours: 720

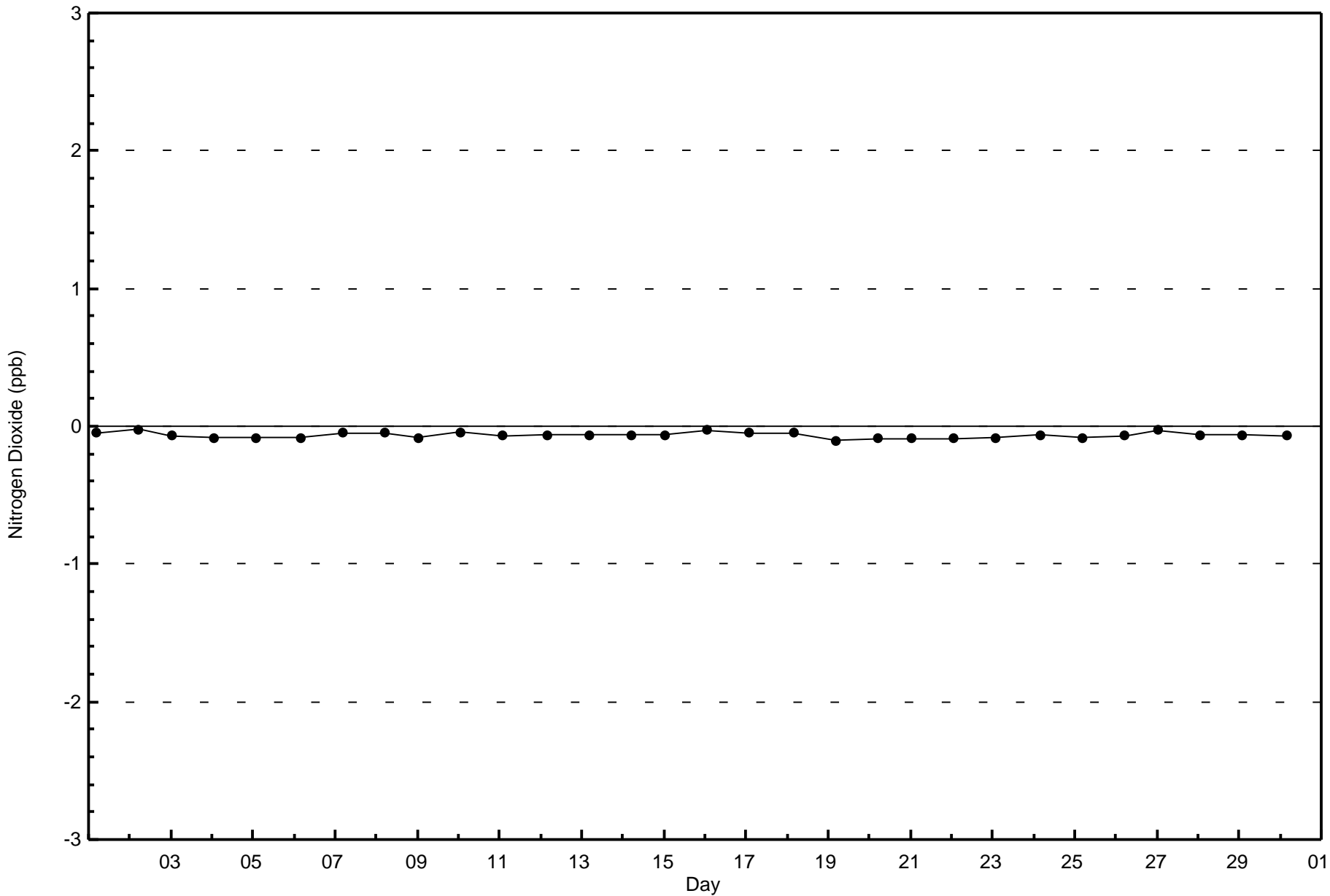


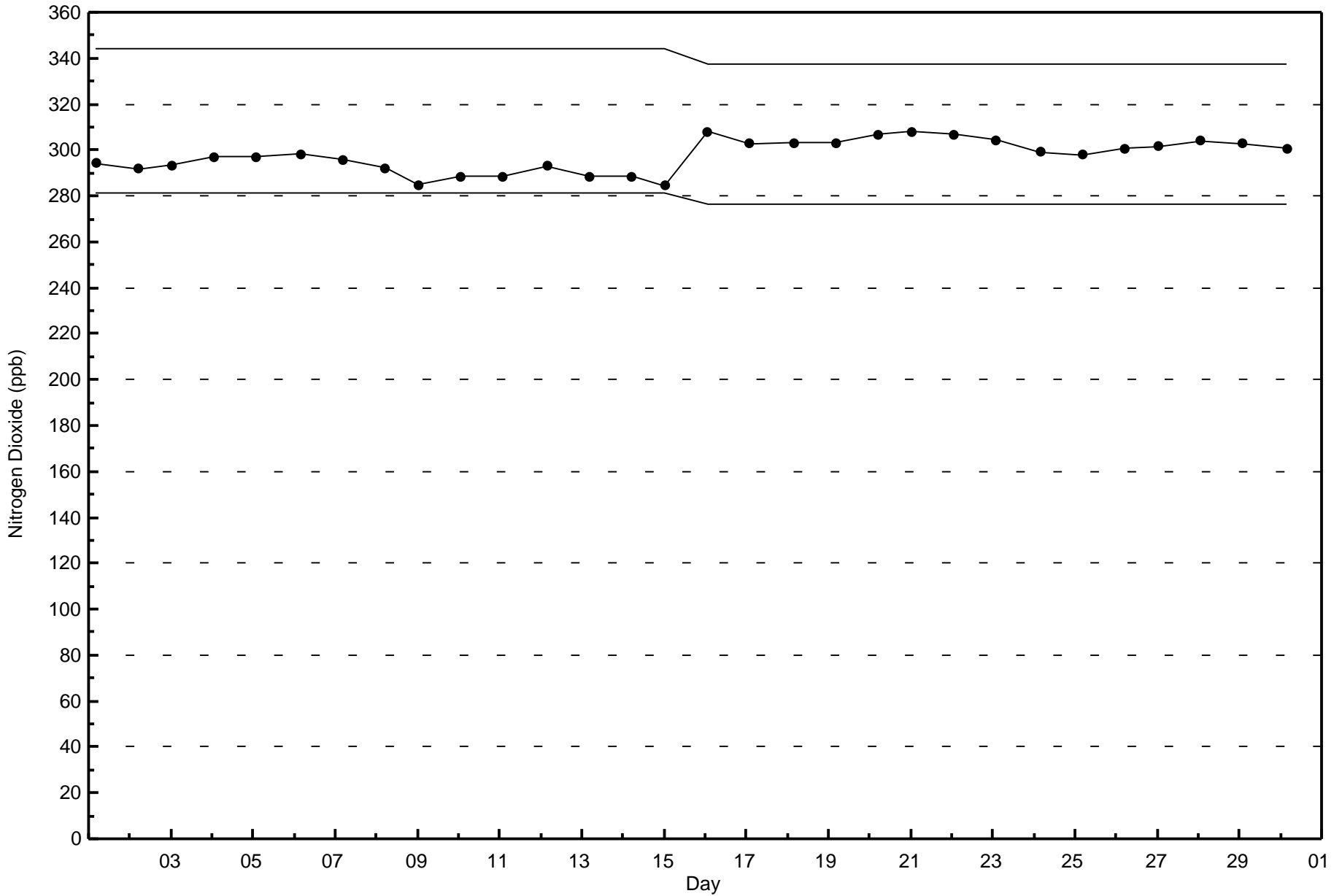
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Conklin Community (AMS 21)



Total Number of Valid Hours: 674







| | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 34 ppb on Sep 16 20:00 | Maximum Daily Average: 3.9 ppb on Sep 16 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 3 21:00 | Minimum Daily Average: 0.5 ppb on Sep 4 | Hours of Data: 677 |
| Maximum Diurnal Average: 3.3 ppb at hour 20 | Minimum Diurnal Average: 0.8 ppb at hour 16 | Hours of Missing Data: 43 |
| Monthly Average: 1.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 2 P ₉₉ = 9 | Hours of Calibration: 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 | 4 | 2 | 2 | 1 | Z | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 | 0 | 0 | 1.6 | 10 | |
| 2-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0.5 | 1 |
| 3-Sep | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 4 |
| 4-Sep | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0.5 | 2 |
| 5-Sep | 1 | 1 | Z | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1.1 | 3 |
| 6-Sep | 2 | 2 | 2 | Z | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1.5 | 3 |
| 7-Sep | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 0 | 7 | 0 | 1 | 1 | 3 | 1 | 0 | 3 | 4 | 1 | 0 | 1 | 0 | 1 | 1.4 | 7 |
| 8-Sep | 0 | 0 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |
| 9-Sep | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 5 | 14 | 9 | 2 | 1 | 1.9 | 14 |
| 10-Sep | 1 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 11-Sep | 0 | 0 | Z | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 |
| 12-Sep | 1 | 1 | 1 | Z | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 5 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 5 |
| 13-Sep | 1 | 1 | 1 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 4 | 1 | 1 | 1 | 1 | 0 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 4 |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0.8 | 2 |
| 15-Sep | Z | 1 | 0 | 0 | 0 | 2 | 2 | 3 | 2 | 2 | 5 | C | C | C | C | C | 1 | 1 | 4 | 5 | 2 | 2 | 2 | 1 | 1.8 | 5 | |
| 16-Sep | 1 | Z | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 2 | 34 | 23 | 8 | 4 | 2 | 3.9 | 34 | |
| 17-Sep | 2 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 5 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1.1 | 5 |
| 18-Sep | 1 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 | 1 | 1 | 0.8 | 4 |
| 20-Sep | 1 | 1 | 1 | 1 | 1 | Z | 2 | 1 | 2 | 1 | C | C | C | C | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 4 | 2 | 1 | 1.1 | 4 | |
| 21-Sep | Z | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | M | M | M | 0 | M | 0 | 0 | 2 | 2 | 4 | 2 | 3 | 2 | 2 | 1.4 | 4 | |
| 22-Sep | 1 | Z | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 1.5 | 3 |
| 23-Sep | 1 | 1 | Z | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1.4 | 2 | |
| 24-Sep | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1.2 | 3 |
| 25-Sep | 1 | 0 | 0 | 0 | Z | 1 | 2 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 11 | 7 | 3 | 1 | 1 | 1.7 | 11 | |
| 26-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 1.4 | 3 | |
| 27-Sep | Z | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 1 | 6 | 1 | 1.4 | 6 | |
| 28-Sep | 1 | Z | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 2 | 2 | 0 | 0 | 1 | 1 | 12 | 5 | 2 | 4 | 6 | 2.1 | 12 | |
| 29-Sep | 1 | 2 | Z | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 8 | 8 | 17 | 2 | 1 | 4 | 3 | 4 | 3 | 3 | 2 | 2 | 3.3 | 17 | |
| 30-Sep | 1 | 1 | 1 | Z | 1 | 3 | 2 | 2 | 7 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 0 | 1.6 | 7 | |

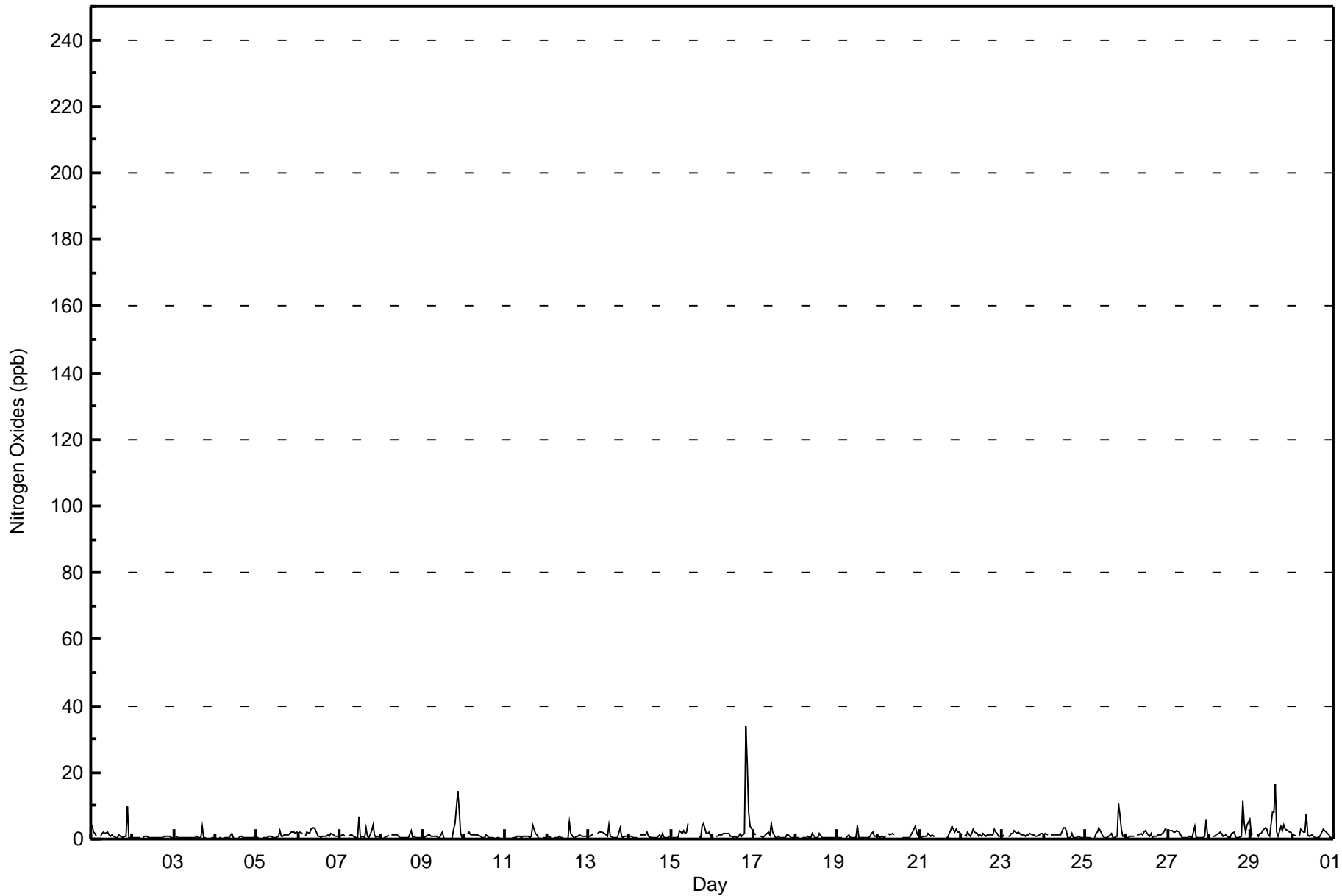
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|--|-----------------|
| 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 1.2 | 1.2 | 1.5 | 1.6 | 1.2 | 1.3 | 1.1 | 1.2 | 1.2 | 1.3 | 0.8 | 0.9 | 0.9 | 1.3 | 3.3 | 2.6 | 2.0 | 1.4 | 1.1 | | | Diurnal Average |
| 4 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 7 | 3 | 5 | 7 | 8 | 8 | 17 | 4 | 4 | 4 | 4 | 4 | 34 | 23 | 10 | 6 | 6 | | Diurnal Maximum |

Z - zerospan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 675 | 99.70 | 99.70 |
| 21 - 40 | 2 | 0.30 | 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: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 90 | 47 | 44 | 51 | 64 | 102 | 51 | 672 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 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 | 20 | 5 | 5 | 5 | 7 | 10 | 31 | 59 | 81 | 92 | 47 | 44 | 51 | 64 | 102 | 51 | 674 |

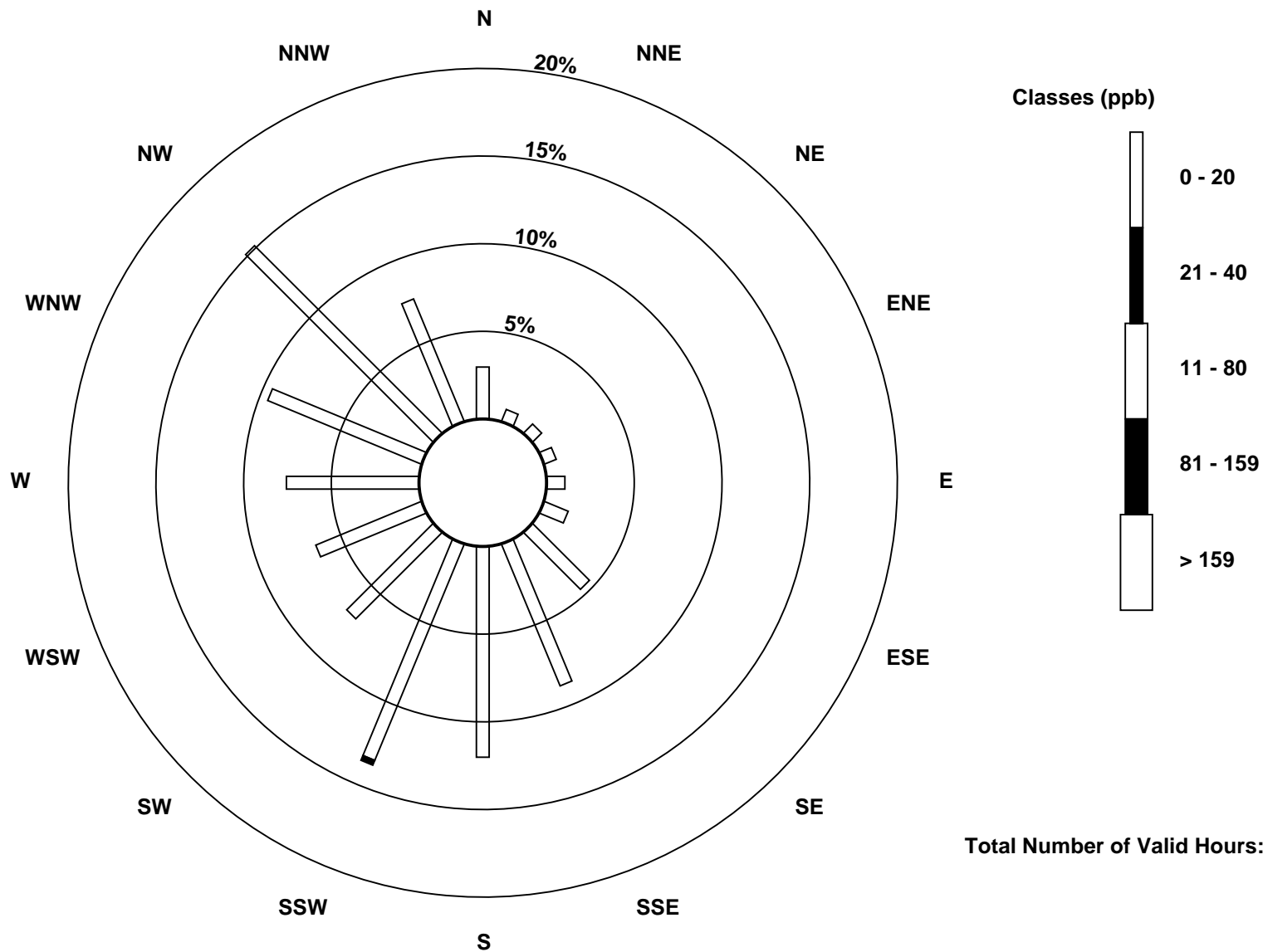
Total Number of Valid Hours: 674

Total Number of Hours: 720

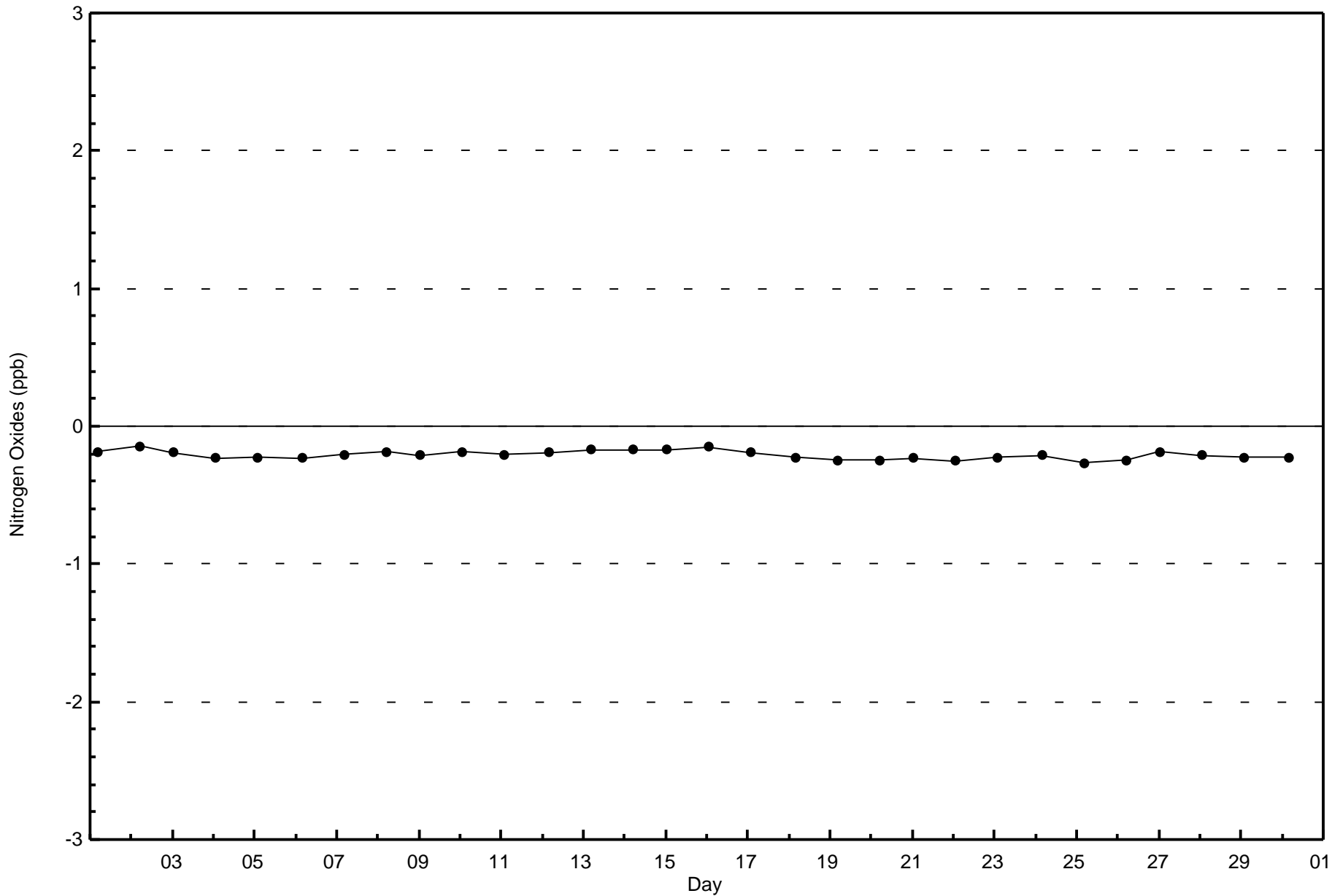


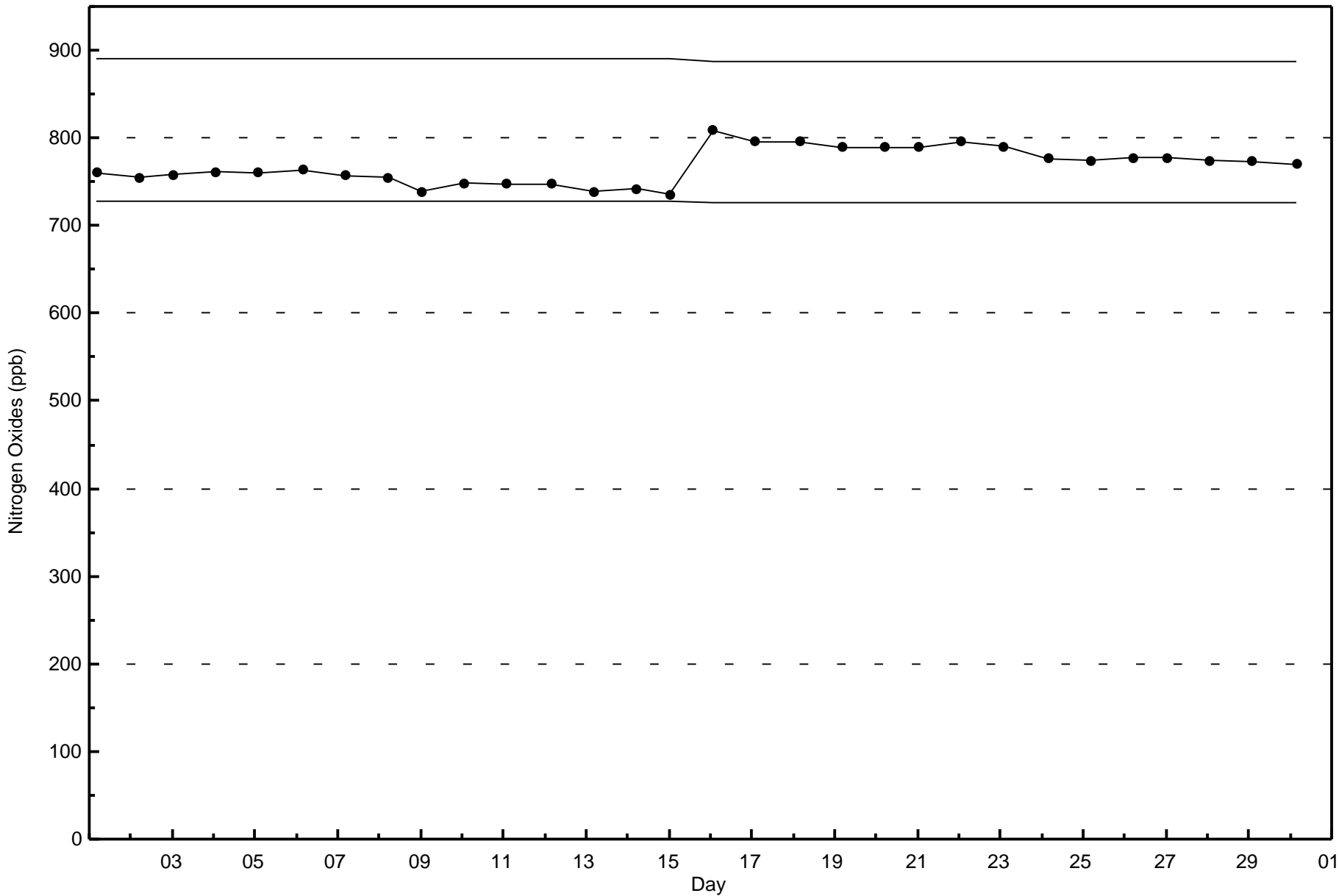
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
Conklin Community (AMS 21)



Total Number of Valid Hours: 674







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Conklin Community - September 2016

| | | | | |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 44 ppb on Sep 22 16:00 | Maximum Daily Average: 34.2 ppb on Sep 27 | | Hours of Data: | 685 |
| Minimum Value: 5 ppb on Sep 1 05:00 | Minimum Daily Average: 14.5 ppb on Sep 1 | | Hours of Missing Data: | 35 |
| Maximum Diurnal Average: 32.2 ppb at hour 17 | Minimum Diurnal Average: 14.9 ppb at hour 6 | | Hours of Calibration: | 35 |
| Monthly Average: 22.9 ppb | Percentiles: P ₁ = 5 P ₁₀ = 11 O ₁ = 16 Median = 23 O ₃ = 30 P ₉₀ = 36 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 | 6 | 6 | 6 | 5 | 5 | 5 | Z | 7 | 7 | 7 | 9 | 14 | 18 | 21 | 21 | 21 | 31 | 27 | 18 | 17 | 21 | 19 | 22 | 20 | 14.5 | 31 |
| 2-Sep | 23 | 24 | 25 | 24 | 23 | 23 | 22 | Z | 24 | 25 | 25 | 26 | 24 | 25 | 24 | 22 | 21 | 21 | 19 | 17 | 15 | 11 | 10 | 11 | 20.9 | 26 |
| 3-Sep | 11 | 11 | Z | 11 | 11 | 11 | 12 | 13 | 13 | 12 | 11 | 10 | 11 | 16 | 17 | 18 | 18 | 19 | 20 | 24 | 25 | 24 | 23 | 22 | 15.9 | 25 |
| 4-Sep | 22 | 22 | 20 | Z | 19 | 18 | 17 | 17 | 19 | 24 | 28 | 30 | 33 | 34 | 33 | 33 | 32 | 29 | 26 | 25 | 21 | 21 | 19 | 15 | 24.2 | 34 |
| 5-Sep | 13 | 11 | 11 | 11 | Z | 11 | 12 | 15 | 22 | 29 | 29 | 29 | 31 | 32 | 34 | 34 | 34 | 31 | 27 | 20 | 12 | 14 | 19 | 23 | 21.9 | 34 |
| 6-Sep | 18 | 20 | 23 | 20 | 14 | Z | 9 | 18 | 22 | 21 | 24 | 31 | 32 | 30 | 27 | 25 | 19 | 17 | 15 | 11 | 7 | 6 | 6 | 6 | 18.3 | 32 |
| 7-Sep | 5 | 6 | 7 | 9 | 11 | 11 | Z | 13 | 15 | 22 | 27 | 30 | 30 | 30 | 31 | 31 | 31 | 30 | 17 | 10 | 11 | 11 | 17 | 14 | 18.3 | 31 |
| 8-Sep | 14 | 8 | 9 | 12 | 10 | 8 | 10 | Z | 14 | 21 | 27 | 30 | 30 | 28 | 28 | 26 | 30 | 27 | 26 | 23 | 26 | 23 | 22 | 18 | 20.4 | 30 |
| 9-Sep | 17 | 17 | Z | 14 | 15 | 14 | 14 | 16 | 17 | 19 | 21 | 20 | 24 | 28 | 30 | 30 | 29 | 27 | 14 | 9 | 7 | 7 | 8 | 11 | 17.6 | 30 |
| 10-Sep | 19 | 21 | 21 | Z | 21 | 19 | 18 | 18 | 18 | 20 | 24 | 27 | 31 | 33 | 34 | 35 | 32 | 28 | 28 | 25 | 23 | 21 | 18 | 17 | 24.0 | 35 |
| 11-Sep | 17 | 16 | 17 | 17 | Z | 20 | 22 | 23 | 22 | 23 | 26 | 27 | 27 | 28 | 28 | 29 | 26 | 25 | 23 | 22 | 22 | 22 | 19 | 18 | 22.4 | 29 |
| 12-Sep | 19 | 18 | 17 | 17 | 18 | Z | 17 | 18 | 23 | 30 | 33 | 35 | 36 | 35 | 35 | 36 | 35 | 32 | 27 | 24 | 26 | 25 | 25 | 24 | 26.2 | 36 |
| 13-Sep | 25 | 25 | 25 | 24 | 24 | 25 | Z | 24 | 24 | 24 | 25 | 27 | 28 | 30 | 31 | 30 | 30 | 30 | 27 | 26 | 26 | 24 | 22 | 21 | 26.0 | 31 |
| 14-Sep | 16 | 17 | 14 | 11 | 12 | 12 | 14 | Z | 17 | 20 | 24 | 25 | 25 | 27 | 29 | 31 | 30 | 32 | 32 | 29 | 32 | 29 | 26 | 18 | 22.8 | 32 |
| 15-Sep | 17 | 17 | Z | 8 | 6 | 6 | 7 | 9 | 12 | 14 | 21 | 26 | 32 | 36 | 35 | 32 | 33 | 33 | 22 | 13 | 17 | 15 | 15 | 20 | 19.3 | 36 |
| 16-Sep | 18 | 20 | 20 | Z | 20 | 20 | 19 | 20 | 21 | 22 | 24 | 24 | 25 | 28 | 32 | 36 | 39 | 40 | 36 | 14 | 9 | 18 | 22 | 16 | 23.6 | 40 |
| 17-Sep | 14 | 11 | 18 | 15 | Z | 8 | 7 | 8 | 12 | 15 | 20 | 24 | 24 | 24 | 24 | 28 | 29 | 30 | 31 | 23 | 17 | 15 | 15 | 14 | 18.4 | 31 |
| 18-Sep | 17 | 15 | 24 | 30 | 28 | Z | 27 | 26 | 27 | 28 | 27 | 29 | 30 | 32 | 31 | 37 | 37 | 36 | 34 | 30 | 28 | 28 | 27 | 26 | 28.5 | 37 |
| 19-Sep | 26 | 25 | 22 | 21 | 20 | 17 | Z | 15 | 16 | 20 | 22 | 23 | 29 | 29 | 30 | 29 | 31 | 29 | 27 | 19 | 11 | 10 | 10 | 11 | 21.3 | 31 |
| 20-Sep | 11 | 18 | 18 | 18 | 17 | 15 | 14 | Z | 13 | 20 | C | C | 33 | 34 | 35 | 35 | 35 | 32 | 19 | 10 | 8 | 8 | 8 | 11 | 19.6 | 35 |
| 21-Sep | 11 | 13 | Z | 15 | 13 | 8 | 7 | 10 | 17 | 24 | 28 | 30 | C | C | C | 34 | 33 | 32 | 18 | 14 | 12 | 13 | 14 | 15 | 18.1 | 34 |
| 22-Sep | 15 | 13 | 10 | Z | 7 | 9 | 16 | 21 | 24 | 29 | 36 | 40 | 42 | 42 | 43 | 44 | 43 | 43 | 36 | 18 | 12 | 24 | 17 | 12 | 25.8 | 44 |
| 23-Sep | 13 | 17 | 13 | 12 | Z | 17 | 23 | 24 | 30 | 32 | 33 | 32 | 33 | 32 | 31 | 30 | 29 | 28 | 28 | 27 | 25 | 23 | 22 | 20 | 25.0 | 33 |
| 24-Sep | 18 | 16 | 16 | 16 | 17 | Z | 17 | 18 | 26 | 29 | 32 | 33 | 33 | 35 | 37 | 37 | 38 | 37 | 37 | 37 | 35 | 37 | 36 | 35 | 29.2 | 38 |
| 25-Sep | 34 | 33 | 32 | 32 | 28 | 23 | Z | 27 | 29 | 31 | 33 | 36 | 37 | 37 | 37 | 37 | 37 | 37 | 27 | 13 | 9 | 11 | 12 | 17 | 28.1 | 37 |
| 26-Sep | 19 | 16 | 12 | 13 | 18 | 20 | 23 | Z | 26 | 34 | 36 | 36 | 38 | 39 | 38 | 36 | 38 | 37 | 34 | 38 | 38 | 37 | 36 | 34 | 30.3 | 39 |
| 27-Sep | 33 | 32 | Z | 30 | 28 | 26 | 27 | 31 | 36 | 40 | 39 | 37 | 36 | 36 | 38 | 38 | 39 | 39 | 38 | 38 | 35 | 33 | 30 | 29 | 34.2 | 40 |
| 28-Sep | 29 | 25 | 24 | Z | 21 | 16 | 19 | 21 | 25 | 26 | 31 | 36 | 38 | 38 | 38 | 38 | 39 | 39 | 34 | 24 | 27 | 29 | 24 | 18 | 28.6 | 39 |
| 29-Sep | 17 | 12 | 11 | 11 | Z | 9 | 9 | 11 | 18 | 26 | 36 | 40 | 41 | 42 | 41 | 43 | 42 | 27 | 19 | 11 | 10 | 9 | 8 | 8 | 21.8 | 43 |
| 30-Sep | 8 | 7 | 6 | 6 | 5 | Z | 7 | 16 | 19 | 25 | 27 | 26 | 25 | 27 | 28 | 28 | 27 | 26 | 22 | 23 | 22 | 23 | 24 | 27 | 19.8 | 28 |

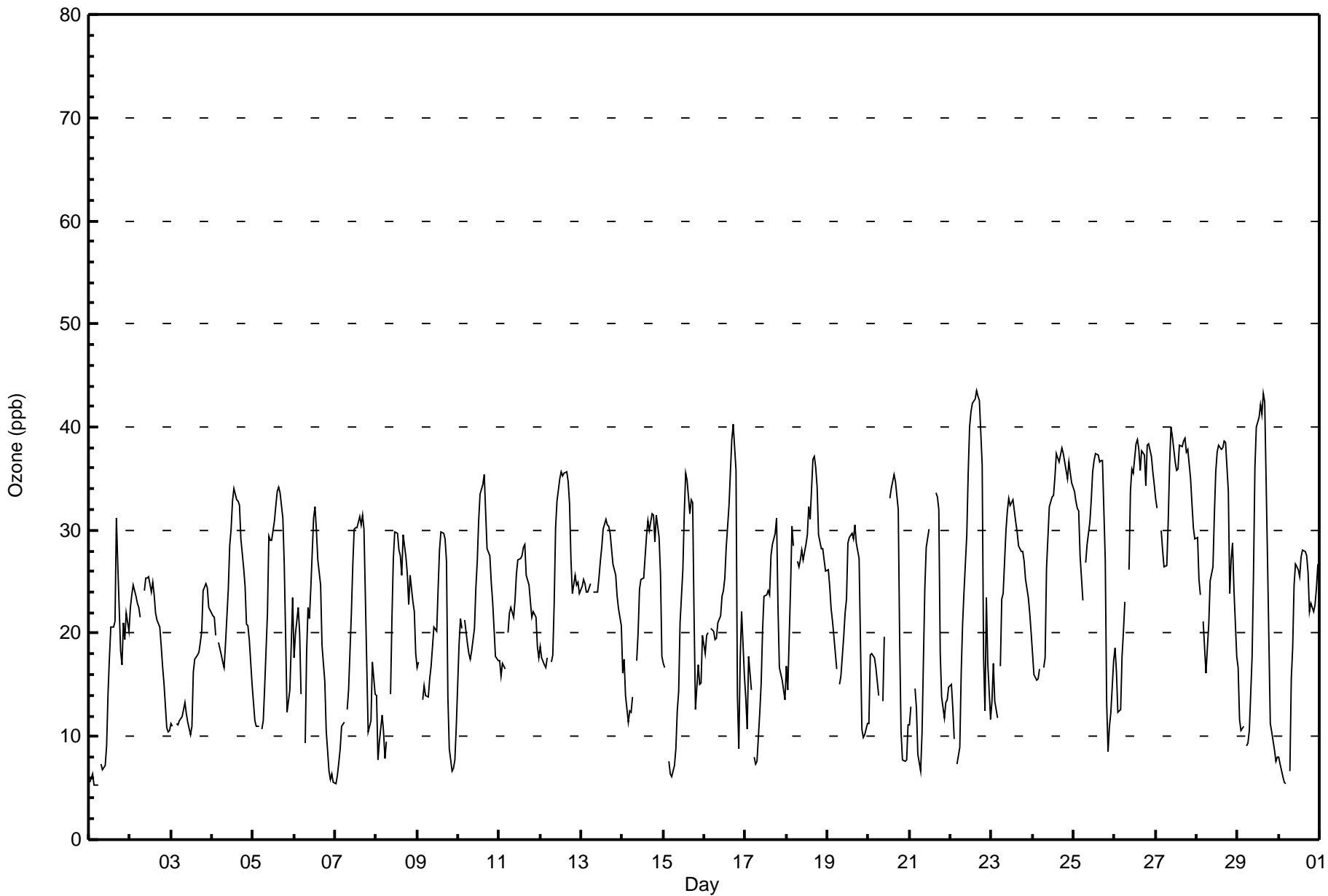
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| 17.4 | 17.0 | 16.8 | 15.9 | 16.5 | 14.9 | 15.5 | 17.4 | 20.3 | 23.8 | 26.9 | 28.7 | 30.2 | 31.4 | 31.8 | 32.0 | 32.2 | 30.6 | 26.1 | 21.0 | 19.6 | 19.6 | 19.2 | 18.3 | Diurnal Average | |
| 34 | 33 | 32 | 32 | 28 | 26 | 27 | 31 | 36 | 40 | 39 | 40 | 42 | 42 | 43 | 44 | 43 | 43 | 38 | 38 | 38 | 37 | 36 | 35 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Conklin Community - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 283 | 41.31 | 41.31 |
| 21 - 50 | 402 | 58.69 | 100.00 |
| 51 - 82 | 0 | 0.00 | 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 Community - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 1 | 1 | 0 | 4 | 6 | 5 | 14 | 38 | 50 | 41 | 9 | 13 | 9 | 12 | 49 | 26 | 278 |
| 21 - 50 | 17 | 4 | 5 | 1 | 4 | 6 | 16 | 20 | 30 | 54 | 40 | 31 | 43 | 54 | 51 | 26 | 402 |
| 51 - 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 18 | 5 | 5 | 5 | 10 | 11 | 30 | 58 | 80 | 95 | 49 | 44 | 52 | 66 | 100 | 52 | 680 |

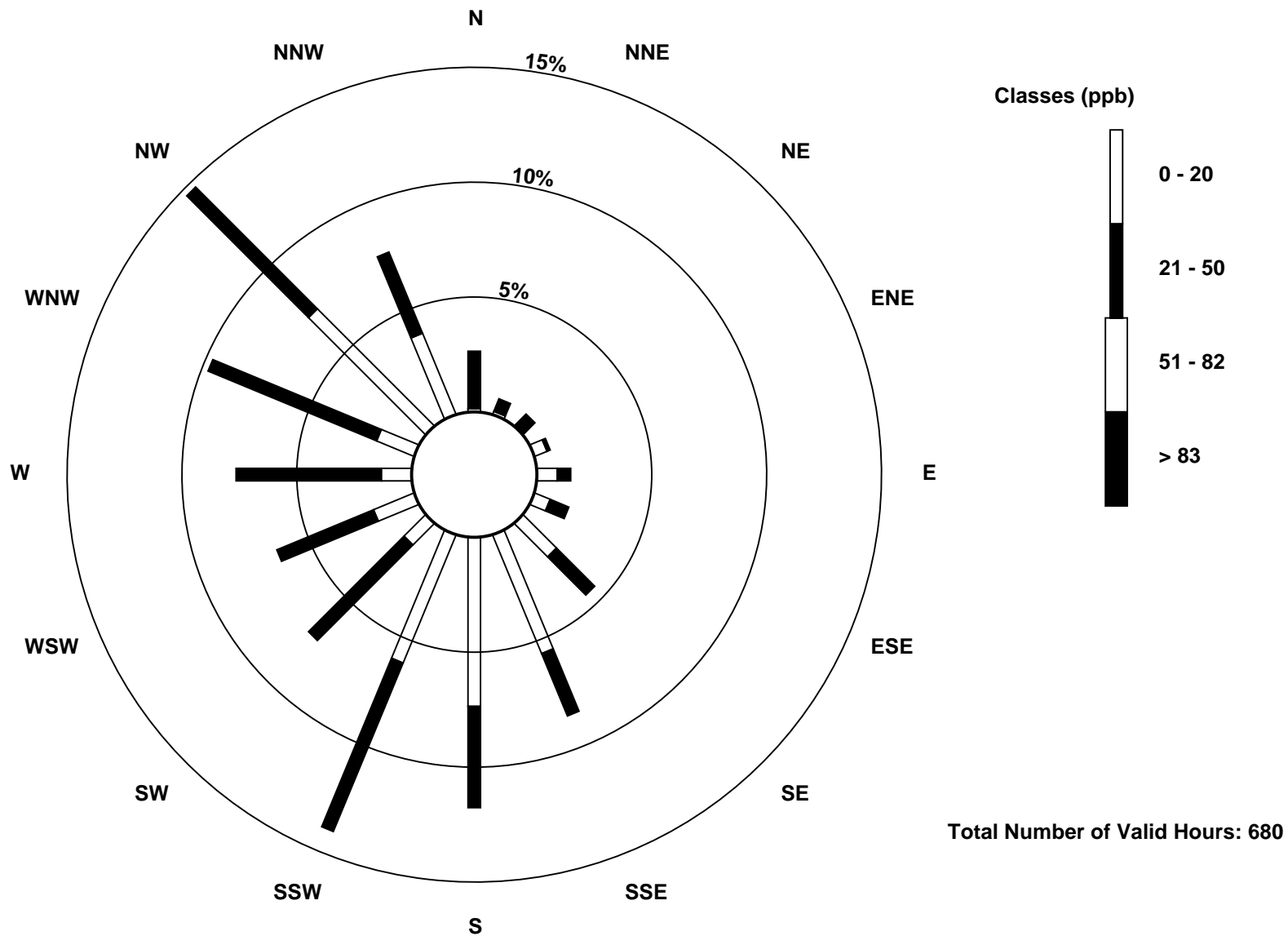
Total Number of Valid Hours: 680

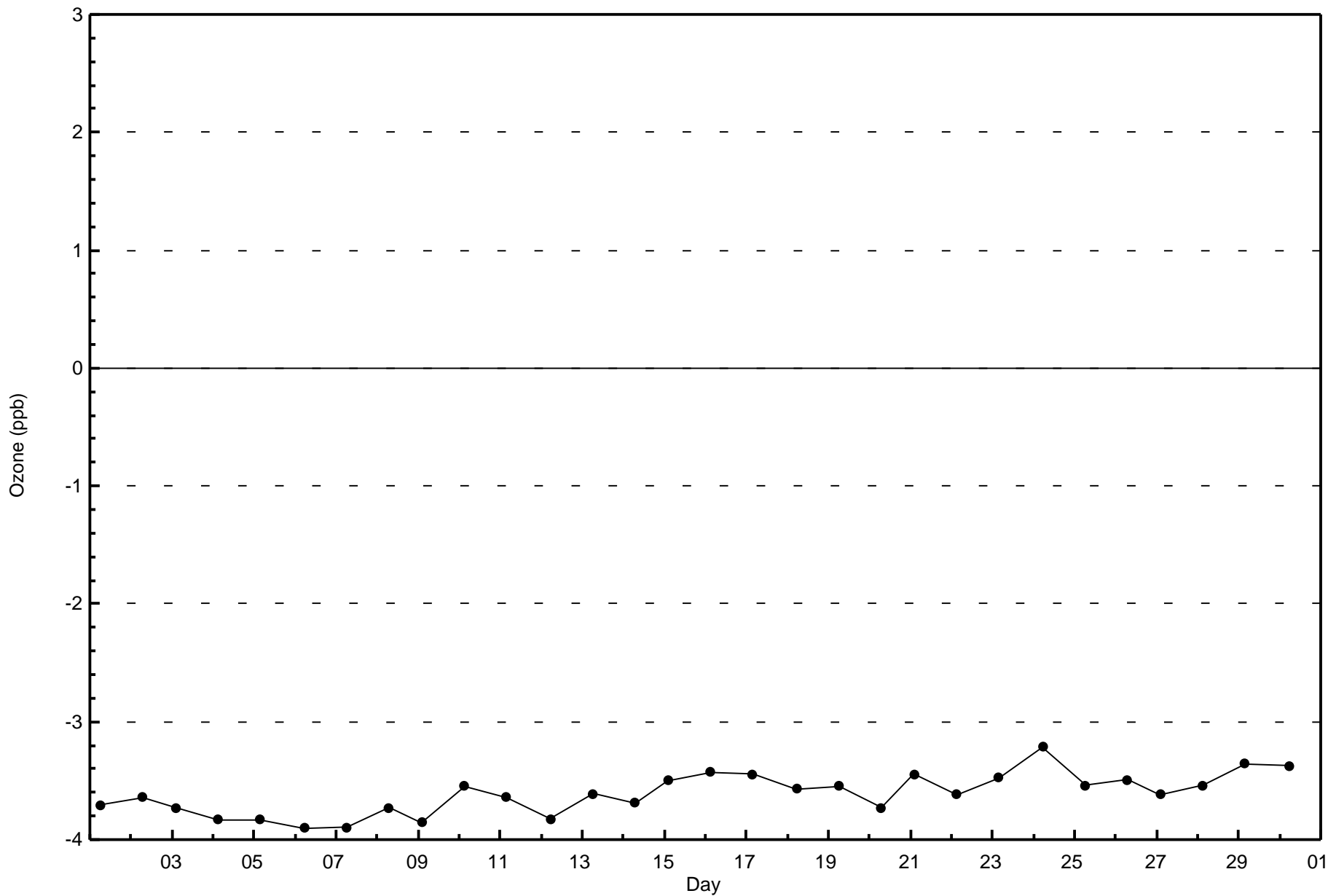
Total Number of Hours: 720

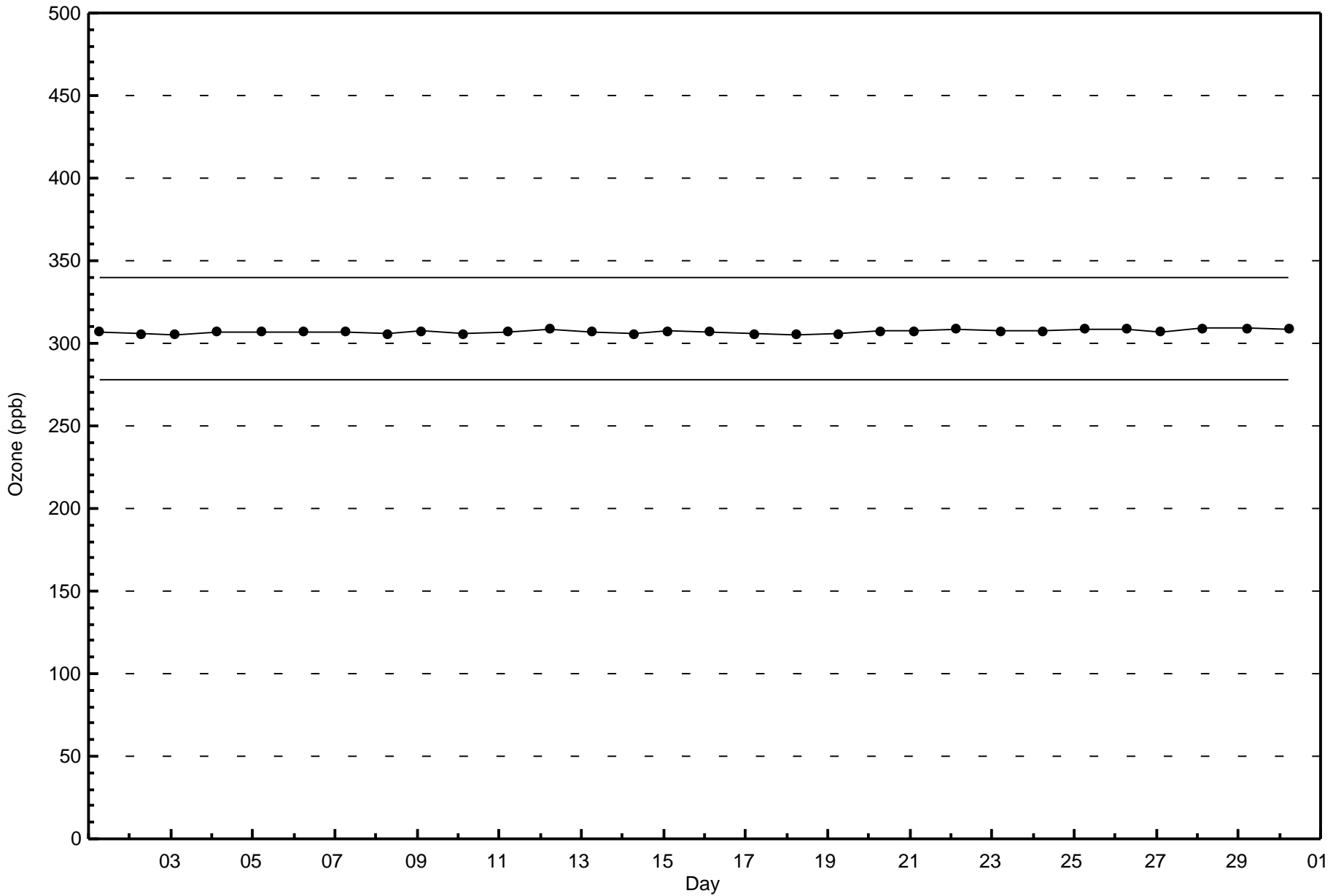


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Ozone (O₃) - ppb
Conklin Community (AMS 21)









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Conklin Community - September 2016

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Number of Exceedences (AAAQO): 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 37.1 µg/m ³ on Sep 22 20:00 | Maximum Daily Average: 7.0 µg/m ³ on Sep 29 |
| Minimum Value: 0.0 µg/m ³ on Sep 3 18:00 | Hours of Data: 719 |
| Maximum Diurnal Average: 7.3 µg/m ³ at hour 20 | Hours of Missing Data: 1 |
| Monthly Average: 2.26 µg/m ³ | Hours of Calibration: 1 |
| Minimum Daily Average: 0.2 µg/m ³ on Sep 3 | Percent Operational Time: 100.0 |
| Minimum Diurnal Average: 1.3 µg/m ³ at hour 11 | |
| Percentiles: P ₁ = 0.1 P ₁₀ = 0.6 Q ₁ = 0.9 Median = 1.5 Q ₃ = 2.3 P ₉₀ = 4.3 P ₉₉ = 21.1 | |

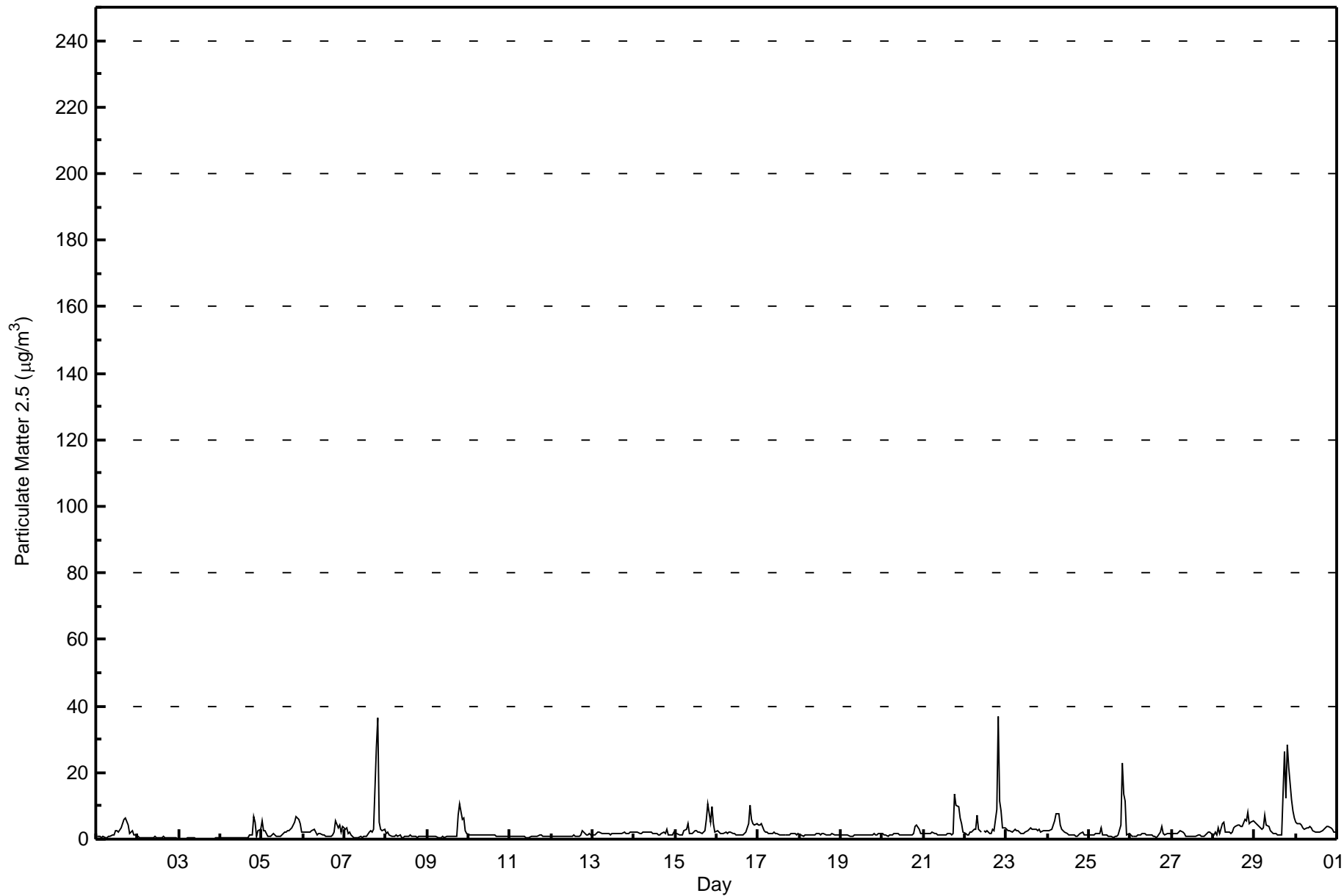
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|-----|-----------------|---------------|---------------|
| | 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 | 0.7 | 0.7 | 0.7 | 0.4 | 0.9 | 0.5 | 0.5 | 0.8 | 0.8 | 1.2 | 1.4 | 2.5 | 2.5 | 2.1 | 3.4 | 4.5 | 5.8 | 6.5 | 4.2 | 1.9 | 2.1 | 2.6 | 1.3 | 1.4 | 2.1 | 6.5 |
| 2-Sep | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.6 | 0.5 | 0.5 | 0.8 | 0.4 | 0.5 | 0.5 | 0.5 | 0.7 | 0.5 | 0.6 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.2 | 0.5 | 0.8 |
| 3-Sep | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.4 | 0.3 | 0.2 | 0.4 |
| 4-Sep | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.4 | 0.4 | 0.5 | 0.6 | 0.6 | 0.6 | 1.4 | 1.1 | 6.6 | 5.2 | 1.0 | 2.4 | 3.2 | 1.2 | 6.6 | |
| 5-Sep | 5.6 | 2.4 | 2.7 | 0.9 | 0.8 | 0.8 | 1.2 | 1.9 | 1.0 | 1.0 | 0.9 | 1.0 | 1.9 | 2.3 | 2.2 | 2.4 | 2.7 | 3.4 | 4.2 | 5.1 | 6.8 | 5.8 | 4.7 | 2.2 | 2.7 | 6.8 |
| 6-Sep | 2.1 | 2.0 | 2.2 | 2.1 | 2.3 | 2.7 | 3.1 | 2.1 | 1.4 | 1.6 | 1.8 | 1.4 | 1.1 | 0.9 | 0.8 | 0.7 | 0.9 | 1.1 | 2.2 | 5.3 | 3.6 | 4.1 | 2.1 | 4.0 | 2.1 | 5.3 |
| 7-Sep | 3.1 | 3.4 | 1.6 | 2.0 | 1.1 | 0.6 | 0.3 | 0.3 | 0.4 | 0.8 | 0.6 | 0.9 | 0.8 | 0.9 | 2.1 | 2.5 | 2.0 | 3.0 | 27.7 | 36.3 | 5.3 | 2.9 | 2.7 | 2.9 | 4.3 | 36.3 |
| 8-Sep | 1.5 | 2.3 | 1.2 | 1.0 | 1.0 | 1.0 | 1.1 | 1.0 | 1.1 | 0.6 | 0.6 | 0.7 | 0.9 | 1.0 | 1.3 | 0.9 | 0.7 | 0.7 | 0.6 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 1.0 | 2.3 |
| 9-Sep | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 1.0 | 7.0 | 10.7 | 6.0 | 6.5 | 2.6 | 1.7 | 2.0 | 10.7 |
| 10-Sep | 1.4 | 1.1 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.5 | 1.5 | 1.4 | 1.2 | 1.2 | 1.2 | 1.4 | 1.1 | 1.1 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 1.1 | 1.5 |
| 11-Sep | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.9 | 1.3 | 1.2 | 0.9 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 1.3 |
| 12-Sep | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.7 | 0.8 | 0.8 | 0.9 | 1.1 | 1.0 | 1.0 | 1.0 | 1.3 | 2.3 | 2.1 | 1.4 | 1.5 | 1.8 | 1.3 | 1.1 | 2.3 |
| 13-Sep | 1.4 | 1.4 | 1.7 | 2.1 | 2.1 | 1.8 | 1.7 | 1.9 | 1.6 | 1.5 | 1.5 | 1.6 | 1.7 | 1.6 | 1.5 | 1.6 | 1.7 | 1.6 | 2.3 | 1.9 | 1.7 | 1.8 | 2.1 | 2.0 | 1.7 | 2.3 |
| 14-Sep | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 2.2 | 2.3 | 2.2 | 2.1 | 2.0 | 2.2 | 1.9 | 1.8 | 1.6 | 1.5 | 1.5 | 2.0 | 1.5 | 2.9 | 1.4 | 1.4 | 1.5 | 1.9 | 1.9 | 1.9 | 2.9 |
| 15-Sep | 1.7 | 1.6 | 1.4 | 1.3 | 1.3 | 2.5 | 2.9 | 4.6 | 1.8 | 1.8 | 1.8 | 2.3 | 2.4 | 2.1 | 2.0 | 1.8 | 1.9 | 2.4 | 6.0 | 10.7 | 5.2 | 9.7 | 4.6 | 2.1 | 3.2 | 10.7 |
| 16-Sep | 2.6 | 2.0 | 1.9 | 1.9 | 1.8 | 1.9 | 1.9 | 2.1 | 2.0 | 1.8 | 1.5 | 1.4 | 1.4 | 1.5 | 1.4 | 1.4 | 1.7 | 2.0 | 4.8 | 10.3 | 6.0 | 4.7 | 4.4 | 4.5 | 2.8 | 10.3 |
| 17-Sep | 4.1 | 4.4 | 4.5 | 2.4 | 2.3 | 2.1 | 1.7 | 1.7 | 1.6 | 1.9 | 1.7 | 1.7 | 1.1 | 1.3 | 1.3 | 1.2 | 1.3 | 1.2 | 1.3 | 1.6 | 1.8 | 1.6 | 1.5 | 1.6 | 2.0 | 4.5 |
| 18-Sep | 1.3 | 1.2 | 1.0 | 1.2 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.6 | 1.5 | 1.5 | 1.5 | 1.6 | 1.3 | 1.3 | 1.3 | 1.4 | 1.5 | 1.4 | 1.4 | 1.3 | 1.3 | 1.4 | 1.6 |
| 19-Sep | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.0 | 1.0 | 1.1 | 1.1 | 1.3 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.4 | 1.3 | 1.3 | 1.4 | 1.5 | 1.4 | 1.5 | 1.5 | 1.7 | 1.3 | 1.7 |
| 20-Sep | 1.7 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.3 | 1.6 | 1.7 | 1.6 | 1.2 | 1.2 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.9 | 3.7 | 4.1 | 2.9 | 1.8 | 1.7 | 1.6 | 4.1 |
| 21-Sep | 1.7 | 1.6 | 1.6 | 1.6 | 1.7 | 2.2 | 1.7 | 1.6 | 1.4 | 1.5 | 1.4 | 1.5 | 1.4 | 1.4 | 1.6 | 1.6 | 1.5 | 1.9 | 13.8 | 10.3 | 9.7 | 6.2 | 4.8 | 2.1 | 3.1 | 13.8 |
| 22-Sep | 1.6 | 1.3 | 1.5 | 2.1 | 2.0 | 3.1 | 3.2 | 7.4 | 2.8 | 2.1 | C | 2.6 | 2.3 | 2.5 | 1.8 | 1.9 | 3.1 | 2.5 | 8.9 | 37.1 | 11.4 | 8.6 | 3.5 | 3.3 | 5.1 | 37.1 |
| 23-Sep | 2.8 | 2.6 | 2.4 | 2.3 | 2.4 | 2.9 | 2.6 | 2.6 | 1.8 | 1.7 | 1.8 | 2.2 | 2.7 | 2.9 | 3.4 | 3.2 | 2.8 | 2.8 | 2.6 | 2.8 | 2.2 | 2.5 | 2.6 | 2.4 | 2.5 | 3.4 |
| 24-Sep | 2.7 | 2.7 | 3.0 | 4.1 | 5.7 | 7.8 | 7.6 | 4.1 | 3.1 | 2.6 | 2.0 | 1.6 | 1.5 | 1.4 | 1.3 | 1.1 | 1.0 | 1.0 | 1.3 | 1.6 | 2.3 | 1.4 | 1.3 | 1.2 | 2.6 | 7.8 |
| 25-Sep | 1.3 | 1.2 | 1.1 | 1.1 | 1.5 | 1.7 | 1.8 | 3.4 | 1.4 | 1.3 | 1.2 | 1.0 | 1.0 | 0.8 | 0.5 | 0.7 | 1.0 | 1.2 | 4.2 | 22.9 | 13.7 | 11.2 | 1.3 | 1.5 | 3.3 | 22.9 |
| 26-Sep | 1.1 | 0.9 | 0.8 | 0.8 | 1.2 | 1.5 | 1.4 | 1.7 | 1.5 | 1.1 | 1.1 | 1.5 | 1.1 | 0.7 | 0.7 | 0.5 | 0.8 | 2.1 | 3.6 | 1.6 | 1.4 | 1.7 | 1.5 | 1.6 | 1.3 | 3.6 |
| 27-Sep | 1.4 | 1.7 | 1.7 | 1.8 | 1.9 | 2.6 | 2.2 | 1.5 | 0.8 | 0.7 | 0.8 | 0.9 | 0.8 | 0.9 | 0.9 | 1.1 | 1.2 | 0.8 | 0.9 | 0.9 | 1.7 | 2.0 | 2.2 | 1.6 | 1.4 | 2.6 |
| 28-Sep | 1.4 | 2.1 | 1.4 | 3.2 | 1.7 | 4.9 | 5.2 | 2.3 | 2.2 | 2.0 | 1.9 | 2.2 | 3.6 | 3.9 | 4.1 | 4.4 | 4.0 | 3.9 | 5.9 | 5.7 | 8.1 | 4.8 | 4.9 | 5.5 | 3.7 | 8.1 |
| 29-Sep | 4.9 | 4.8 | 4.1 | 3.4 | 3.0 | 3.5 | 7.0 | 4.3 | 3.8 | 2.4 | 2.0 | 1.6 | 1.8 | 1.5 | 1.5 | 1.2 | 1.3 | 26.2 | 12.4 | 28.2 | 21.8 | 12.0 | 8.5 | 6.5 | 7.0 | 28.2 |
| 30-Sep | 5.1 | 4.7 | 4.6 | 4.3 | 3.5 | 2.9 | 3.4 | 3.4 | 3.7 | 3.4 | 2.5 | 2.0 | 2.3 | 2.0 | 2.1 | 2.7 | 2.9 | 3.2 | 3.7 | 3.7 | 3.4 | 2.8 | 2.1 | 2.1 | 3.2 | 5.1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 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}) - $\mu\text{g}/\text{m}^3$
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community - September 2016**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 481 | 66.90 | 66.90 |
| 6 - 15 | 37 | 5.15 | 72.04 |
| 16 - 25 | 2 | 0.28 | 72.32 |
| 26 - 80 | 5 | 0.70 | 73.02 |
| > 81.0 | 0 | 0.00 | 73.02 |

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
Conklin Community - September 2016

| Concentration Ranges (μg/m ³) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|----------------------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 11 | 4 | 1 | 5 | 10 | 8 | 28 | 47 | 74 | 75 | 42 | 29 | 38 | 41 | 41 | 25 | 479 |
| 6 - 15 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 8 | 16 | 2 | 3 | 0 | 0 | 0 | 0 | 36 |
| 16 - 25 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 26 - 80 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 11 | 4 | 2 | 5 | 10 | 8 | 30 | 55 | 83 | 92 | 44 | 32 | 38 | 41 | 41 | 25 | 521 |

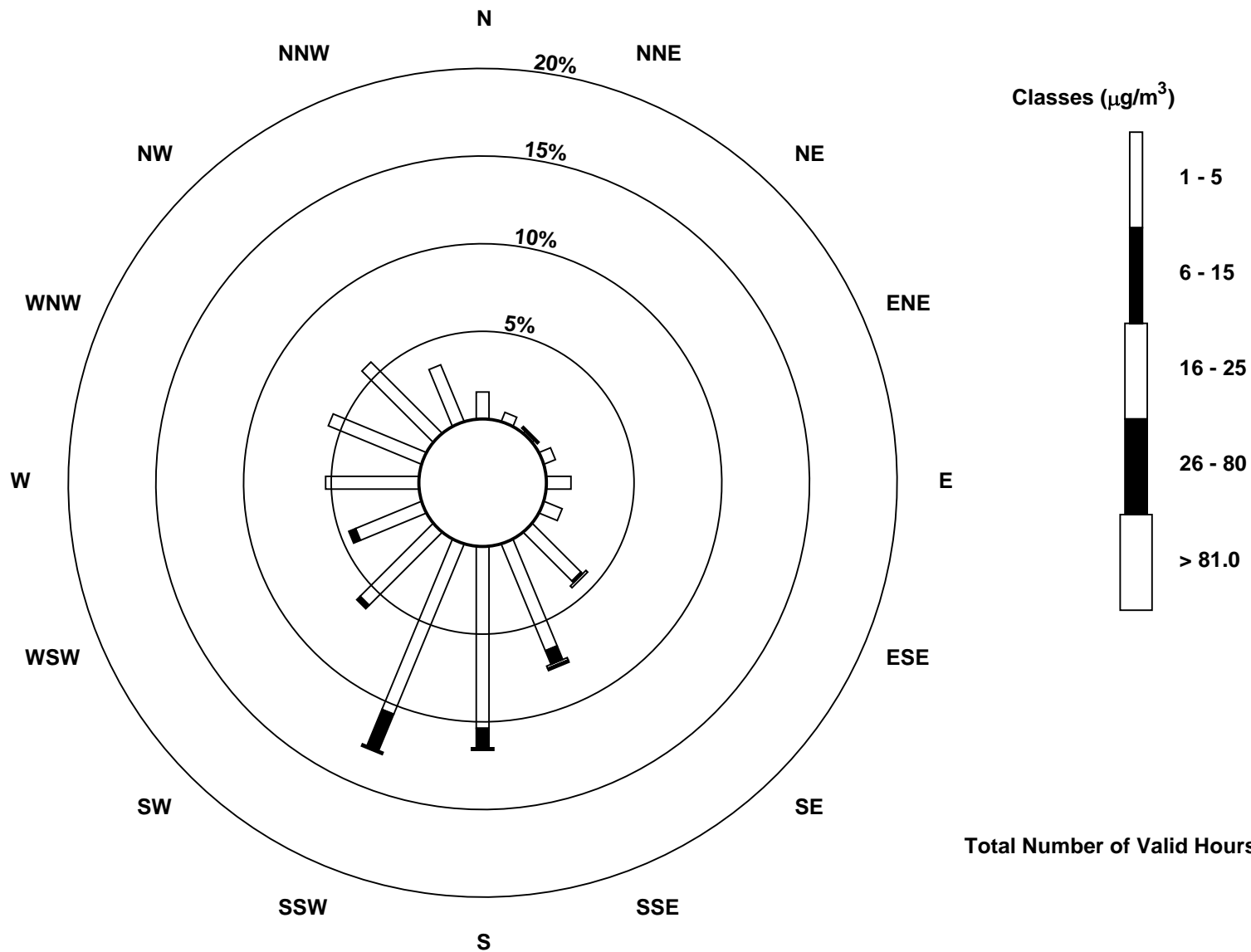
Total Number of Valid Hours: 714

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin Community (AMS 21)





Wood Buffalo Environmental Association
Summary of Hour Averages

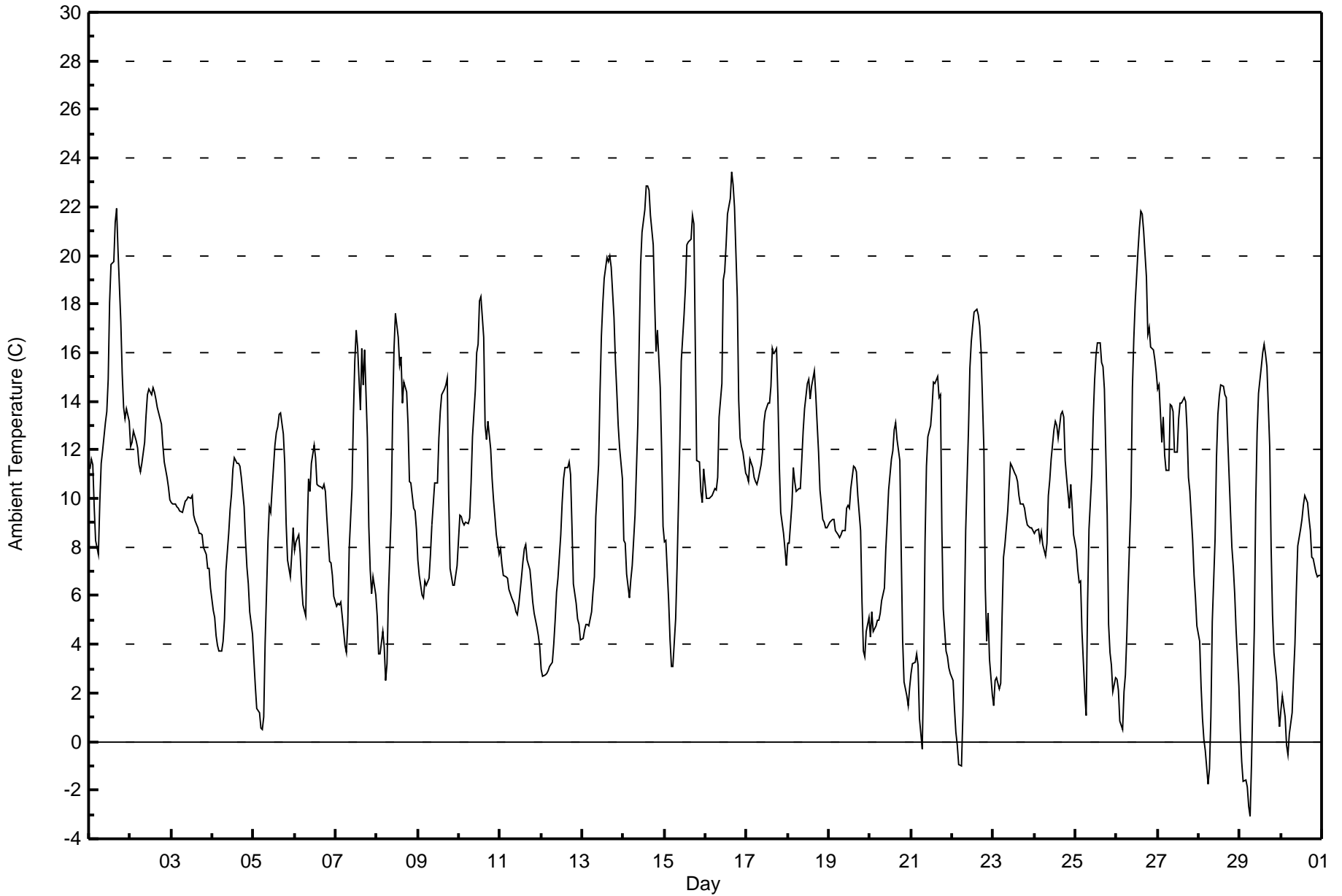
Ambient Temperature (AT) - C
Conklin Community - September 2016

| Maximum Value: 23.4 C on Sep 16 16:00 | | Maximum Daily Average: 15.0 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|-----------------|--|
| Minimum Value: -3.1 C on Sep 29 07:00 | | Minimum Daily Average: 5.6 C on Sep 30 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 14.9 C at hour 16 | | Minimum Diurnal Average: 5.2 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 9.72 C | | Percentiles: P ₁ = -1.0 P ₁₀ = 3.1 Q ₁ = 6.1 Median = 9.7 Q ₃ = 13.1 P ₉₀ = 16.2 P ₉₉ = 21.7 | | 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 | 11.2 | 11.6 | 11.4 | 9.7 | 8.3 | 7.7 | 9.9 | 11.4 | 12.0 | 13.1 | 13.6 | 14.9 | 18.1 | 19.6 | 19.8 | 21.4 | 21.9 | 20.2 | 17.2 | 15.1 | 13.7 | 13.3 | 13.7 | 13.2 | 14.2 | 21.9 | |
| 2-Sep | 12.1 | 12.3 | 12.8 | 12.4 | 12.1 | 11.4 | 11.1 | 11.5 | 12.3 | 13.4 | 14.3 | 14.5 | 14.3 | 14.6 | 14.4 | 14.1 | 13.8 | 13.3 | 13.1 | 12.2 | 11.5 | 10.9 | 10.5 | 10.0 | 12.6 | 14.6 | |
| 3-Sep | 9.8 | 9.8 | 9.8 | 9.7 | 9.6 | 9.5 | 9.4 | 9.7 | 9.9 | 9.9 | 10.1 | 10.0 | 10.1 | 9.3 | 9.1 | 8.8 | 8.6 | 8.6 | 8.5 | 8.0 | 7.7 | 7.1 | 7.1 | 6.3 | 9.0 | 10.1 | |
| 4-Sep | 5.4 | 5.1 | 4.3 | 3.9 | 3.7 | 3.7 | 4.1 | 5.1 | 7.0 | 8.6 | 9.6 | 10.2 | 11.2 | 11.7 | 11.5 | 11.4 | 10.9 | 9.6 | 8.3 | 7.2 | 6.5 | 5.3 | 4.4 | 7.5 | 11.7 | | |
| 5-Sep | 3.3 | 2.3 | 1.4 | 1.2 | 0.6 | 0.5 | 1.0 | 4.1 | 8.2 | 9.6 | 9.5 | 10.4 | 12.2 | 12.7 | 12.9 | 13.5 | 13.5 | 12.7 | 11.4 | 8.9 | 7.4 | 6.8 | 7.7 | 8.8 | 7.5 | 13.5 | |
| 6-Sep | 7.9 | 8.2 | 8.5 | 7.7 | 6.5 | 5.6 | 5.1 | 8.6 | 10.8 | 10.3 | 11.4 | 12.2 | 11.7 | 10.6 | 10.5 | 10.5 | 10.4 | 10.6 | 10.3 | 9.2 | 7.4 | 7.3 | 6.8 | 6.0 | 8.9 | 12.2 | |
| 7-Sep | 5.5 | 5.7 | 5.6 | 5.8 | 5.2 | 3.9 | 3.6 | 4.9 | 7.9 | 10.4 | 13.4 | 15.6 | 16.9 | 16.2 | 13.6 | 16.1 | 14.7 | 16.1 | 12.5 | 8.8 | 7.1 | 6.1 | 6.8 | 6.0 | 9.5 | 16.9 | |
| 8-Sep | 5.2 | 3.6 | 3.6 | 4.5 | 3.9 | 2.5 | 3.2 | 6.0 | 9.5 | 13.5 | 16.2 | 17.6 | 16.7 | 15.5 | 15.8 | 13.9 | 14.8 | 14.4 | 13.1 | 10.7 | 10.6 | 9.6 | 9.5 | 8.7 | 10.1 | 17.6 | |
| 9-Sep | 7.5 | 6.8 | 6.0 | 5.9 | 6.6 | 6.4 | 6.7 | 7.7 | 8.9 | 9.8 | 10.6 | 10.6 | 12.5 | 13.6 | 14.2 | 14.5 | 14.7 | 15.0 | 10.2 | 7.1 | 6.4 | 6.4 | 6.8 | 7.2 | 9.3 | 15.0 | |
| 10-Sep | 9.3 | 9.3 | 9.0 | 8.9 | 9.0 | 9.0 | 9.2 | 10.6 | 12.5 | 14.4 | 16.0 | 16.3 | 18.1 | 18.3 | 16.7 | 13.0 | 12.4 | 13.2 | 12.0 | 10.8 | 9.9 | 9.3 | 8.5 | 7.7 | 11.8 | 18.3 | |
| 11-Sep | 7.9 | 7.3 | 6.9 | 6.8 | 6.7 | 6.3 | 6.1 | 5.9 | 5.6 | 5.4 | 5.2 | 5.6 | 6.8 | 7.4 | 7.9 | 8.1 | 7.5 | 7.1 | 6.4 | 5.7 | 5.3 | 4.7 | 4.3 | 3.9 | 6.3 | 8.1 | |
| 12-Sep | 3.0 | 2.7 | 2.8 | 2.8 | 2.9 | 3.1 | 3.3 | 4.0 | 5.0 | 6.1 | 6.7 | 8.5 | 9.8 | 10.8 | 11.3 | 11.3 | 11.5 | 11.0 | 8.8 | 6.5 | 5.7 | 5.1 | 4.8 | 4.2 | 6.3 | 11.5 | |
| 13-Sep | 4.3 | 4.6 | 4.8 | 4.8 | 4.8 | 5.3 | 6.2 | 6.8 | 9.3 | 11.4 | 14.3 | 16.7 | 18.0 | 19.0 | 19.9 | 19.7 | 20.0 | 19.5 | 17.4 | 15.6 | 14.4 | 13.0 | 12.1 | 10.8 | 12.2 | 20.0 | |
| 14-Sep | 8.3 | 8.2 | 6.9 | 5.9 | 6.7 | 7.3 | 8.3 | 9.3 | 13.0 | 16.5 | 19.7 | 20.9 | 21.9 | 22.9 | 22.8 | 22.7 | 21.7 | 20.4 | 18.1 | 16.1 | 16.9 | 14.6 | 12.0 | 8.8 | 14.6 | 22.9 | |
| 15-Sep | 8.2 | 8.3 | 5.8 | 4.2 | 3.1 | 3.1 | 5.0 | 7.2 | 9.8 | 12.4 | 15.6 | 17.6 | 18.7 | 20.5 | 20.5 | 20.7 | 21.6 | 21.3 | 16.4 | 11.6 | 11.5 | 10.3 | 9.8 | 11.2 | 12.3 | 21.6 | |
| 16-Sep | 10.0 | 10.0 | 10.0 | 10.1 | 10.1 | 10.4 | 10.3 | 10.9 | 13.3 | 14.8 | 19.0 | 19.3 | 20.4 | 21.7 | 22.4 | 23.4 | 22.9 | 22.0 | 18.2 | 14.0 | 12.5 | 12.1 | 11.9 | 11.0 | 15.0 | 23.4 | |
| 17-Sep | 11.0 | 10.7 | 11.6 | 11.3 | 10.8 | 10.7 | 10.6 | 10.8 | 11.4 | 11.9 | 13.1 | 13.6 | 13.9 | 13.9 | 14.6 | 16.2 | 16.0 | 16.2 | 14.2 | 11.3 | 9.4 | 8.6 | 7.9 | 7.2 | 12.0 | 16.2 | |
| 18-Sep | 8.2 | 8.1 | 9.8 | 11.3 | 10.7 | 10.3 | 10.4 | 10.4 | 11.6 | 12.8 | 13.7 | 14.7 | 14.9 | 14.1 | 14.6 | 15.3 | 14.3 | 13.1 | 11.9 | 10.3 | 9.1 | 9.0 | 8.8 | 8.8 | 11.5 | 15.3 | |
| 19-Sep | 9.0 | 9.1 | 9.1 | 9.1 | 8.7 | 8.5 | 8.4 | 8.5 | 8.7 | 8.7 | 9.6 | 9.7 | 9.6 | 10.4 | 11.3 | 11.3 | 11.1 | 10.1 | 8.7 | 5.8 | 3.7 | 3.5 | 4.5 | 5.1 | 8.4 | 11.3 | |
| 20-Sep | 4.3 | 5.3 | 4.5 | 4.8 | 5.0 | 5.0 | 5.3 | 5.8 | 6.3 | 7.9 | 9.1 | 10.3 | 11.6 | 11.9 | 12.8 | 13.1 | 12.4 | 11.6 | 7.8 | 4.2 | 2.4 | 1.9 | 1.5 | 2.2 | 7.0 | 13.1 | |
| 21-Sep | 2.8 | 3.2 | 3.3 | 3.6 | 3.2 | 1.0 | -0.3 | 3.0 | 8.2 | 11.3 | 12.6 | 13.0 | 13.7 | 14.8 | 14.7 | 15.0 | 14.2 | 14.2 | 8.7 | 5.4 | 3.7 | 3.5 | 3.0 | 2.8 | 7.4 | 15.0 | |
| 22-Sep | 2.5 | 1.3 | 0.4 | -0.1 | -0.9 | -1.0 | 1.1 | 4.8 | 8.7 | 12.8 | 15.4 | 16.5 | 17.1 | 17.7 | 17.8 | 17.6 | 17.1 | 16.1 | 12.0 | 6.3 | 4.2 | 5.3 | 3.4 | 1.9 | 8.2 | 17.8 | |
| 23-Sep | 1.5 | 2.5 | 2.6 | 2.2 | 2.4 | 5.2 | 7.6 | 8.1 | 9.5 | 10.5 | 11.4 | 11.3 | 11.0 | 10.9 | 10.7 | 10.1 | 9.8 | 9.7 | 9.6 | 9.2 | 8.9 | 8.8 | 8.8 | 8.7 | 8.0 | 11.4 | |
| 24-Sep | 8.6 | 8.7 | 8.7 | 8.3 | 8.6 | 8.1 | 7.6 | 8.2 | 10.1 | 10.8 | 11.6 | 12.8 | 13.1 | 13.0 | 12.5 | 13.5 | 13.6 | 13.3 | 11.6 | 10.9 | 9.6 | 10.6 | 9.6 | 8.5 | 10.5 | 13.6 | |
| 25-Sep | 7.9 | 7.1 | 6.5 | 6.6 | 4.5 | 2.0 | 1.1 | 5.7 | 8.7 | 11.0 | 13.3 | 14.9 | 15.9 | 16.4 | 16.4 | 15.6 | 15.4 | 14.5 | 9.3 | 4.8 | 3.6 | 3.1 | 2.1 | 2.6 | 8.7 | 16.4 | |
| 26-Sep | 2.6 | 2.1 | 0.8 | 0.5 | 2.1 | 2.7 | 4.4 | 6.4 | 10.0 | 14.5 | 16.6 | 18.1 | 20.2 | 21.1 | 21.8 | 21.7 | 21.0 | 19.1 | 16.7 | 17.1 | 16.3 | 16.1 | 15.7 | 15.2 | 12.6 | 21.8 | |
| 27-Sep | 14.5 | 14.7 | 12.3 | 13.3 | 11.8 | 11.2 | 11.1 | 13.9 | 13.8 | 13.6 | 11.9 | 11.9 | 13.3 | 13.9 | 13.9 | 14.2 | 14.0 | 12.8 | 10.9 | 10.3 | 8.3 | 6.8 | 5.9 | 4.7 | 11.8 | 14.7 | |
| 28-Sep | 4.1 | 2.3 | 1.0 | 0.1 | -0.3 | -1.7 | -1.1 | 1.0 | 4.9 | 8.3 | 11.7 | 13.5 | 14.2 | 14.7 | 14.6 | 14.3 | 14.1 | 12.5 | 9.4 | 8.0 | 7.2 | 6.1 | 4.6 | 2.3 | 6.9 | 14.7 | |
| 29-Sep | 0.5 | -0.9 | -1.7 | -1.6 | -1.9 | -2.7 | -3.1 | -0.9 | 4.7 | 9.8 | 12.7 | 14.3 | 15.4 | 16.0 | 16.3 | 15.9 | 15.4 | 12.2 | 8.0 | 5.2 | 3.7 | 2.5 | 1.4 | 0.6 | 5.9 | 16.3 | |
| 30-Sep | 1.3 | 1.9 | 1.0 | -0.1 | -0.6 | 0.3 | 1.2 | 2.7 | 4.0 | 6.2 | 8.1 | 8.7 | 9.1 | 9.7 | 10.1 | 9.8 | 9.2 | 8.7 | 7.6 | 7.5 | 7.0 | 6.8 | 6.8 | 6.8 | 5.6 | 10.1 | |
| | | 6.6 | 6.4 | 6.0 | 5.8 | 5.5 | 5.2 | 5.6 | 7.1 | 9.2 | 11.0 | 12.5 | 13.5 | 14.3 | 14.8 | 14.8 | 14.9 | 14.6 | 14.0 | 11.7 | 9.5 | 8.4 | 7.9 | 7.4 | 6.9 | Diurnal Average | |
| | | 14.5 | 14.7 | 12.8 | 13.3 | 12.1 | 11.4 | 11.1 | 13.9 | 13.8 | 16.5 | 19.7 | 20.9 | 21.9 | 22.9 | 22.8 | 23.4 | 22.9 | 22.0 | 18.2 | 17.1 | 16.9 | 16.1 | 15.7 | 15.2 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Conklin Community - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Conklin Community - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 16 | 2.22 | 2.22 |
| 0 - 10 | 367 | 50.97 | 53.19 |
| 10 - 20 | 311 | 43.19 | 96.39 |
| > 20 | 26 | 3.61 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

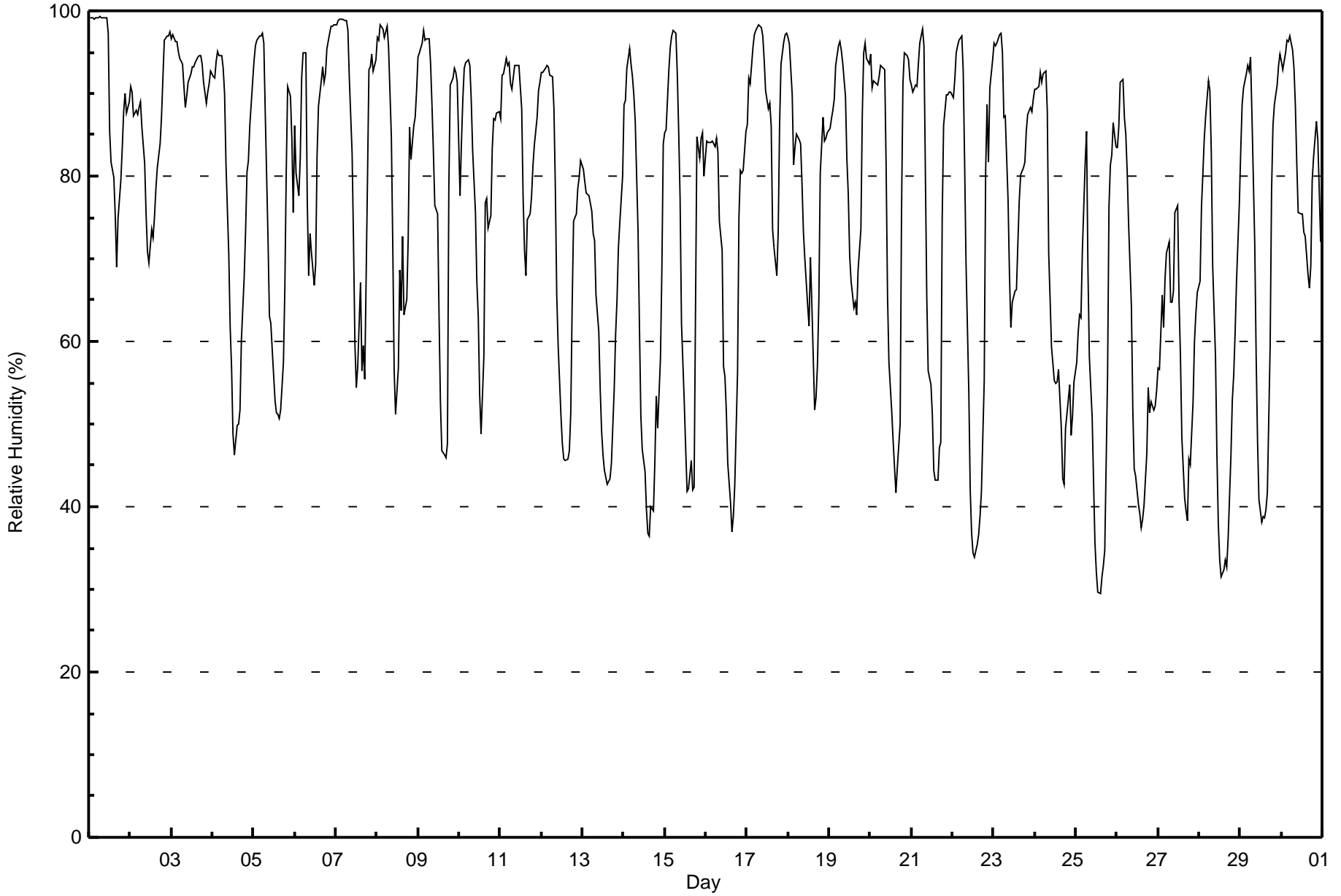
Conklin Community - September 2016

| Maximum Value: 99 % on Sep 1 07:00 Maximum Daily Average: 93.0 % on Sep 3 | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------|------|-----------------|-----------------|--|
| Minimum Value: 30 % on Sep 25 15:00 Minimum Daily Average: 58.1 % on Sep 25 Maximum Diurnal Average: 92.0 % at hour 6 Minimum Diurnal Average: 55.3 % at hour 16 Monthly Average: 75.6 % Percentiles: P ₁ = 33 P ₁₀ = 46 Q ₁ = 61 Median = 81 Q ₃ = 92 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 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 97 | 85 | 82 | 80 | 75 | 69 | 75 | 80 | 83 | 88 | 90 | 88 | 89 | 90.5 | 99 | |
| 2-Sep | 91 | 90 | 87 | 88 | 87 | 88 | 89 | 86 | 82 | 75 | 71 | 69 | 73 | 72 | 75 | 78 | 81 | 84 | 87 | 92 | 96 | 97 | 97 | 97 | 84.8 | 97 | |
| 3-Sep | 97 | 97 | 96 | 96 | 95 | 94 | 93 | 91 | 88 | 90 | 91 | 92 | 93 | 93 | 94 | 94 | 95 | 95 | 94 | 91 | 89 | 90 | 91 | 93 | 93.0 | 97 | |
| 4-Sep | 92 | 92 | 94 | 95 | 95 | 95 | 93 | 90 | 81 | 71 | 62 | 57 | 49 | 46 | 50 | 50 | 52 | 60 | 68 | 73 | 80 | 82 | 86 | 91 | 75.1 | 95 | |
| 5-Sep | 94 | 96 | 96 | 97 | 97 | 97 | 96 | 88 | 72 | 63 | 62 | 59 | 53 | 51 | 51 | 51 | 52 | 57 | 66 | 81 | 91 | 90 | 85 | 76 | 75.9 | 97 | |
| 6-Sep | 86 | 80 | 78 | 82 | 92 | 95 | 95 | 77 | 68 | 73 | 71 | 67 | 69 | 83 | 89 | 91 | 93 | 91 | 92 | 95 | 97 | 98 | 98 | 98 | 85.8 | 98 | |
| 7-Sep | 98 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 92 | 83 | 72 | 60 | 54 | 57 | 67 | 56 | 59 | 55 | 80 | 93 | 93 | 95 | 93 | 94 | 83.0 | 99 | |
| 8-Sep | 97 | 96 | 98 | 98 | 97 | 97 | 98 | 96 | 85 | 72 | 57 | 51 | 57 | 69 | 64 | 73 | 63 | 65 | 72 | 86 | 82 | 86 | 87 | 90 | 80.6 | 98 | |
| 9-Sep | 94 | 95 | 96 | 98 | 96 | 97 | 97 | 94 | 89 | 83 | 77 | 75 | 63 | 53 | 47 | 46 | 46 | 48 | 78 | 91 | 92 | 93 | 93 | 91 | 80.4 | 98 | |
| 10-Sep | 78 | 84 | 89 | 93 | 94 | 94 | 93 | 89 | 83 | 76 | 67 | 63 | 54 | 49 | 58 | 77 | 77 | 74 | 75 | 83 | 87 | 87 | 88 | 88 | 79.1 | 94 | |
| 11-Sep | 87 | 92 | 92 | 94 | 93 | 94 | 91 | 90 | 93 | 93 | 93 | 93 | 88 | 77 | 71 | 68 | 75 | 75 | 77 | 81 | 84 | 87 | 90 | 91 | 86.4 | 94 | |
| 12-Sep | 93 | 92 | 93 | 93 | 93 | 92 | 92 | 88 | 78 | 66 | 60 | 51 | 48 | 46 | 46 | 46 | 47 | 51 | 64 | 75 | 75 | 78 | 80 | 82 | 72.1 | 93 | |
| 13-Sep | 81 | 79 | 78 | 78 | 78 | 76 | 73 | 72 | 66 | 61 | 54 | 49 | 46 | 44 | 43 | 43 | 43 | 45 | 54 | 61 | 65 | 71 | 74 | 80 | 63.2 | 81 | |
| 14-Sep | 89 | 89 | 93 | 95 | 94 | 92 | 90 | 87 | 73 | 62 | 51 | 47 | 44 | 40 | 37 | 36 | 40 | 39 | 45 | 53 | 49 | 58 | 69 | 84 | 64.9 | 95 | |
| 15-Sep | 85 | 86 | 93 | 96 | 97 | 98 | 97 | 92 | 85 | 77 | 62 | 52 | 47 | 42 | 42 | 46 | 42 | 42 | 64 | 85 | 82 | 85 | 85 | 80 | 73.4 | 98 | |
| 16-Sep | 84 | 84 | 84 | 84 | 84 | 84 | 85 | 83 | 75 | 71 | 57 | 56 | 52 | 45 | 41 | 37 | 39 | 42 | 56 | 75 | 81 | 80 | 81 | 85 | 68.5 | 85 | |
| 17-Sep | 86 | 92 | 91 | 96 | 97 | 98 | 98 | 98 | 98 | 97 | 94 | 90 | 88 | 89 | 86 | 74 | 71 | 68 | 73 | 86 | 94 | 96 | 97 | 97 | 89.8 | 98 | |
| 18-Sep | 97 | 96 | 90 | 81 | 84 | 85 | 84 | 84 | 79 | 73 | 70 | 64 | 62 | 70 | 65 | 52 | 53 | 57 | 65 | 80 | 87 | 84 | 85 | 85 | 76.4 | 97 | |
| 19-Sep | 86 | 87 | 88 | 89 | 93 | 96 | 96 | 95 | 94 | 90 | 82 | 78 | 70 | 67 | 64 | 65 | 63 | 69 | 74 | 88 | 95 | 96 | 94 | 94 | 83.8 | 96 | |
| 20-Sep | 95 | 91 | 92 | 91 | 91 | 92 | 93 | 93 | 93 | 81 | 66 | 57 | 52 | 48 | 45 | 42 | 45 | 50 | 76 | 91 | 95 | 95 | 94 | 92 | 77.4 | 95 | |
| 21-Sep | 91 | 90 | 91 | 91 | 94 | 96 | 98 | 96 | 80 | 65 | 57 | 55 | 51 | 44 | 43 | 43 | 47 | 48 | 75 | 86 | 90 | 90 | 90 | 90 | 75.0 | 98 | |
| 22-Sep | 90 | 92 | 95 | 96 | 96 | 97 | 93 | 82 | 70 | 54 | 42 | 37 | 34 | 34 | 35 | 37 | 39 | 42 | 55 | 81 | 89 | 82 | 91 | 94 | 68.9 | 97 | |
| 23-Sep | 96 | 96 | 96 | 97 | 97 | 95 | 87 | 87 | 77 | 68 | 62 | 65 | 66 | 66 | 72 | 77 | 80 | 81 | 82 | 85 | 88 | 88 | 88 | 89 | 82.7 | 97 | |
| 24-Sep | 91 | 91 | 91 | 92 | 91 | 92 | 93 | 88 | 71 | 65 | 59 | 55 | 55 | 55 | 57 | 49 | 43 | 43 | 49 | 51 | 55 | 49 | 51 | 55 | 66.3 | 93 | |
| 25-Sep | 58 | 61 | 63 | 63 | 71 | 82 | 85 | 69 | 58 | 51 | 43 | 36 | 32 | 30 | 30 | 32 | 33 | 35 | 56 | 76 | 81 | 83 | 86 | 84 | 58.1 | 86 | |
| 26-Sep | 83 | 86 | 91 | 92 | 87 | 85 | 81 | 74 | 64 | 52 | 45 | 44 | 40 | 39 | 38 | 38 | 40 | 47 | 54 | 51 | 53 | 52 | 52 | 54 | 60.1 | 92 | |
| 27-Sep | 57 | 57 | 66 | 62 | 68 | 71 | 72 | 65 | 65 | 66 | 76 | 76 | 65 | 58 | 48 | 41 | 40 | 38 | 46 | 45 | 53 | 60 | 63 | 66 | 59.2 | 76 | |
| 28-Sep | 67 | 76 | 80 | 85 | 87 | 92 | 90 | 83 | 69 | 58 | 46 | 38 | 33 | 31 | 32 | 34 | 33 | 36 | 46 | 53 | 56 | 61 | 67 | 77 | 59.7 | 92 | |
| 29-Sep | 83 | 89 | 91 | 92 | 93 | 93 | 94 | 88 | 72 | 58 | 48 | 41 | 38 | 39 | 39 | 40 | 42 | 59 | 78 | 86 | 89 | 91 | 93 | 95 | 72.1 | 95 | |
| 30-Sep | 94 | 93 | 95 | 96 | 96 | 97 | 95 | 93 | 89 | 82 | 76 | 75 | 75 | 73 | 73 | 68 | 66 | 69 | 80 | 82 | 87 | 84 | 79 | 72 | 82.9 | 97 | |
| | 87.2 | 88.2 | 89.5 | 90.3 | 91.2 | 92.0 | 91.4 | 87.1 | 79.6 | 72.5 | 65.7 | 61.7 | 57.9 | 56.4 | 55.9 | 55.3 | 55.6 | 58.1 | 68.8 | 78.1 | 81.4 | 82.6 | 83.8 | 85.1 | Diurnal Average | | |
| | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 97 | 93 | 93 | 94 | 94 | 95 | 95 | 94 | 95 | 97 | 98 | 98 | 98 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Conklin Community - September 2016



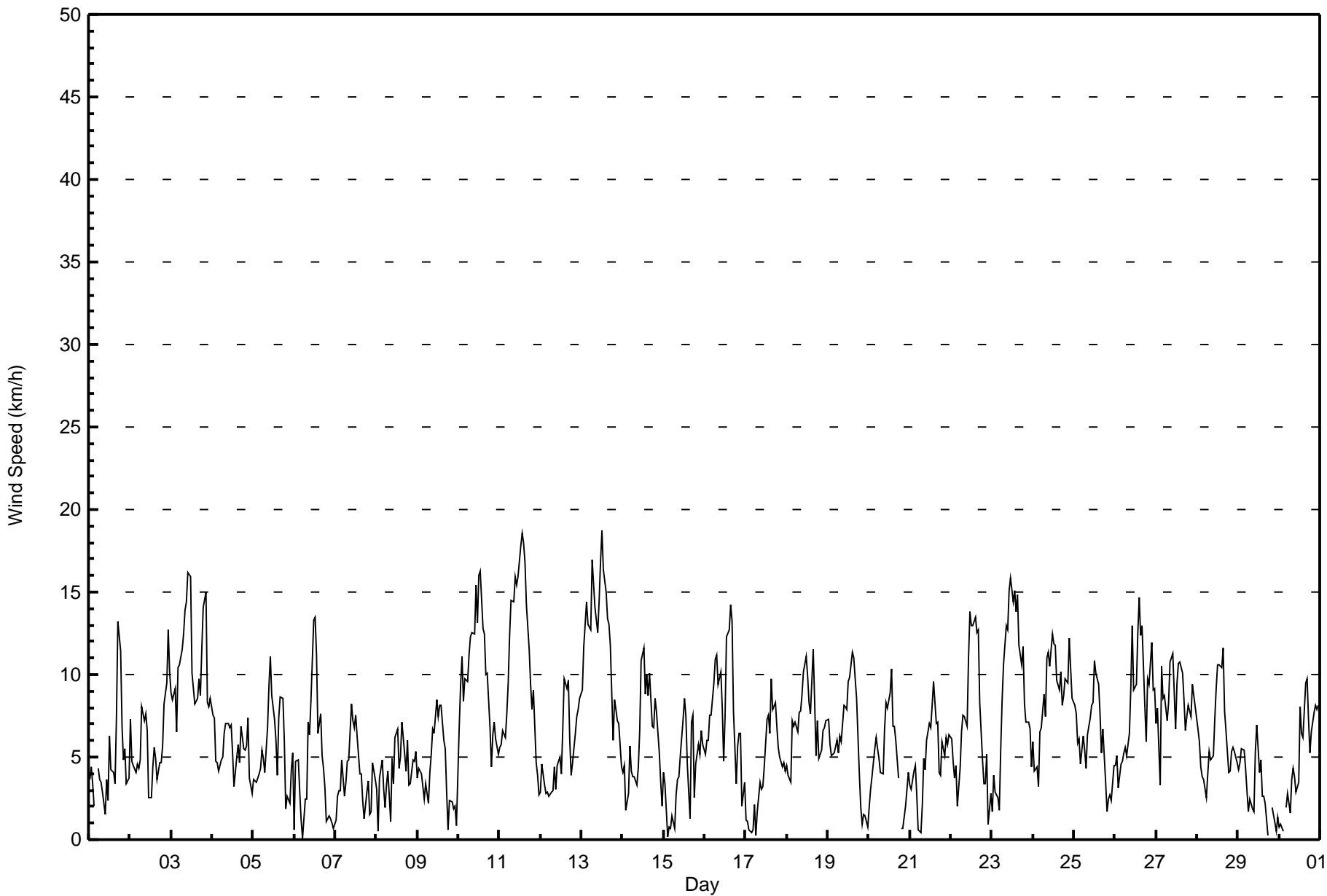


| | | |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 19 km/h on Sep 13 13:00 | Maximum Daily Speed Average: 11.9 km/h on Sep 13 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 6 06:00 | Minimum Daily Speed Average: 2.0 km/h on Sep 1 | Hours of Data: 715 |
| Maximum Diurnal Speed Average: 4.6 km/h at hour 11 | Minimum Diurnal Speed Average: 1.8 km/h at hour 3 | Hours of Missing Data: 5 |
| Monthly Average Velocity: 3.0 km/h 248.1 deg | Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 9 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 | NNW4 | NNW4 | NW3 | NNW2 | AF | NNW4 | NNW4 | NNW3 | NW3 | WNW2 | ENE4 | E2 | ESE6 | E4 | ENE4 | NW3 | SSW7 | WSW13 | WSW11 | WNW7 | W5 | WSW6 | NW3 | WSW4 | WNW2.0 | WSW13 |
| 2-Sep | WSW7 | W5 | W4 | NW4 | W5 | NW4 | NW5 | NNW8 | NNW7 | NNW8 | NNW7 | NE3 | NE3 | N4 | N6 | NE5 | NNE4 | N5 | N5 | NNW6 | N8 | NNW10 | NNW13 | NW10 | NNW4.9 | NNW13 |
| 3-Sep | NW9 | NW8 | NW9 | NW7 | W10 | W11 | W12 | W12 | W14 | WSW14 | WSW16 | WSW16 | W10 | WNW9 | WNW8 | NW9 | NW10 | NW9 | NW12 | NNW14 | NW15 | NW8 | NW8 | NW9 | WNW9.6 | WSW16 |
| 4-Sep | NW8 | NW7 | NW5 | NW5 | NW4 | NW5 | NW5 | NW6 | NW7 | NW7 | NW7 | WNW7 | W5 | NNW3 | WNW5 | WSW6 | WSW5 | SSW7 | SW6 | SSW5 | SSW6 | SW7 | SSW4 | SSE3 | WNW3.9 | NW8 |
| 5-Sep | S4 | SSE4 | SSW3 | SSE4 | SSE4 | SSE5 | S5 | S4 | SSE7 | SSW9 | SSW11 | S9 | SSW7 | SSW6 | SE4 | ESE7 | SE9 | SE9 | SE6 | SE2 | S3 | SSW2 | S4 | S5 | S5.0 | SSW11 |
| 6-Sep | WSW1 | SSE5 | S5 | S3 | ENE1 | N0 | SE2 | SSE2 | SSE7 | SE6 | SE8 | SSE13 | SE14 | ESE11 | ESE6 | ESE8 | ESE5 | SE4 | E3 | E1 | NW1 | NNW1 | NW1 | WSW1 | SE3.9 | SE14 |
| 7-Sep | W1 | SW3 | SW3 | SSW3 | SW5 | SSW3 | S4 | SSE5 | SW5 | SW8 | WSW7 | SW7 | SW8 | WSW6 | SW4 | WSW4 | SSW2 | NNW1 | SSW3 | S4 | SSW2 | ESE2 | S5 | SSE4 | SW3.4 | SW8 |
| 8-Sep | S3 | SSE1 | SSE4 | SSW5 | SSW3 | SSE2 | SSW3 | SSW4 | S1 | NW5 | NW3 | W6 | NW7 | WSW4 | W5 | W7 | WNW6 | WNW4 | NW6 | NW3 | NW3 | NNW5 | NW5 | NNW5 | WNW2.6 | W7 |
| 9-Sep | NNW4 | NNW4 | NNW4 | NNW3 | NW2 | NW3 | NW2 | NW4 | NW5 | NW7 | NW6 | NNW9 | NW7 | WNW8 | NW8 | WNW6 | WNW5 | NW3 | S1 | SSE2 | S2 | S2 | SE2 | NW1 | NW3.5 | NNW9 |
| 10-Sep | S7 | S9 | SSE11 | S8 | S10 | S10 | SSW11 | SSW12 | SW13 | WSW12 | WSW15 | W13 | W16 | W16 | W13 | W12 | WNW10 | WNW10 | WNW7 | WNW4 | WNW6 | WNW7 | NW6 | NW5 | WSW7.4 | W16 |
| 11-Sep | WNW6 | WNW6 | WNW7 | WNW6 | NW8 | NW9 | NW12 | NW14 | NNW14 | NNW16 | N15 | N16 | N18 | N19 | N18 | NNW17 | NNW14 | NNW12 | NNW9 | NW8 | NW9 | NNW5 | NW4 | NW3 | NNW10.5 | N19 |
| 12-Sep | NW3 | NNW5 | NW3 | NW3 | NW3 | NW3 | NW3 | NW3 | NW4 | NW3 | WNW4 | WSW5 | WSW4 | W7 | WSW10 | WSW9 | SW10 | SSW6 | SSW4 | SSW5 | SSW6 | SSW7 | SSW8 | SSW9 | WSW3.6 | WSW10 |
| 13-Sep | SSW9 | SSW12 | SSW13 | SSW14 | SSW13 | SSW13 | SSW17 | SSW16 | SW14 | SW13 | SW15 | SW17 | SW19 | SW16 | SW15 | WSW13 | WSW13 | WSW12 | SW6 | SW8 | SW8 | SSW7 | SSW7 | S4 | SW11.9 | SW19 |
| 14-Sep | SSE4 | S4 | SSE2 | SSE3 | SSE6 | S4 | S4 | S4 | SSW3 | W4 | SSW7 | SW11 | WSW12 | W9 | W10 | WNW9 | WNW10 | WNW7 | W7 | WSW9 | W8 | NW5 | NNW3 | SSW2 | WSW4.2 | WSW12 |
| 15-Sep | S4 | S3 | NW0 | ENE1 | S1 | SSE1 | SSW1 | SSE3 | S4 | SE4 | E5 | ESE7 | ESE9 | E7 | E5 | W1 | WSW7 | WSW8 | SW3 | SSW5 | SSW6 | SSW5 | SSW7 | SSW6 | S2.4 | ESE9 |
| 16-Sep | S5 | SSW6 | S6 | SSW8 | SSW8 | SSW9 | SSW11 | SSW11 | SW9 | SW10 | WSW8 | WSW5 | SSW7 | SSW12 | SW13 | SW14 | SW13 | SW8 | SW3 | SSW6 | SSW6 | SSW6 | S2 | SE3 | SSW7.6 | SW14 |
| 17-Sep | SSE1 | S1 | WSW1 | S0 | S1 | ESE2 | NW0 | SSW2 | SSW3 | SSW3 | WSW3 | W4 | WSW7 | WSW8 | W6 | W10 | WSW8 | WSW8 | W7 | SSW6 | S5 | SSE4 | S5 | S4 | SW3.3 | W10 |
| 18-Sep | SSW5 | SE4 | NW4 | NW7 | NW7 | NW7 | WNW7 | WNW8 | WNW8 | WNW9 | NW10 | NW11 | NW10 | WNW8 | WNW8 | WNW11 | NW8 | WNW5 | W7 | NW5 | W5 | WNW7 | WNW7 | W7 | WNW6.5 | WNW11 |
| 19-Sep | W7 | WNW6 | WNW5 | WNW5 | WNW5 | NW6 | NW5 | NW6 | WNW6 | NW8 | WNW8 | NW8 | NW10 | NW10 | NW11 | NW11 | NNW10 | NNW9 | NW4 | NW2 | E1 | SSE1 | SE1 | W1 | NW5.6 | NW11 |
| 20-Sep | S2 | NNW3 | NW4 | NNW5 | NW6 | NNW5 | NW5 | NW4 | NW4 | NW7 | NW8 | NNW8 | NNW9 | NNW10 | NW7 | NNW7 | NNW6 | NNW4 | AF | WNW1 | WNW1 | S2 | S3 | SSE4 | NNW4.0 | NNW10 |
| 21-Sep | S3 | SSE3 | S4 | S4 | S3 | NW1 | ENE0 | SW2 | WSW5 | WNW4 | WNW6 | NW7 | NW7 | WNW8 | SW10 | W7 | W7 | W4 | SSW4 | SSW6 | SSW5 | SSW6 | SSW6 | SSW6 | WSW3.3 | SW10 |
| 22-Sep | SSW6 | SSW5 | SSE4 | SSE4 | ESE2 | SSE4 | S7 | SSW8 | SSW7 | SSW7 | SSW11 | SSW14 | SSW13 | S13 | S13 | SSW13 | S13 | S8 | SSE5 | SSE3 | SSE3 | SE5 | NNE1 | NNW3 | S6.5 | SSW14 |
| 23-Sep | NNW2 | SE4 | E3 | E3 | ESE2 | SE5 | SSE8 | SE11 | SSE13 | SSE13 | SSE15 | SE16 | SSE14 | SE15 | SE14 | SE15 | SE12 | SSE11 | SSE12 | SSE8 | SSE7 | SSE7 | SSE7 | S4 | SSE8.8 | SE16 |
| 24-Sep | S6 | S4 | S4 | SW3 | WSW7 | WSW7 | SW9 | SW7 | WSW11 | W11 | W10 | W12 | WNW12 | WNW12 | WNW10 | WNW9 | NW10 | WNW8 | W9 | WSW10 | WSW9 | W12 | W10 | WNW9 | W7.6 | W12 |
| 25-Sep | WNW8 | WNW8 | WNW6 | W6 | SSW5 | SE6 | SSE5 | SW4 | WNW6 | WNW7 | W8 | NW8 | NNW11 | NW10 | NW9 | WNW8 | WNW5 | W7 | W3 | SE2 | SSE2 | SSE3 | SE2 | SSE4 | W3.9 | NW11 |
| 26-Sep | S4 | SSE5 | SE3 | SSE5 | SSE5 | S5 | S6 | S5 | S6 | S9 | SSW13 | SSW9 | SSW9 | SSW13 | S15 | S12 | S13 | SSE8 | SSE6 | SSE10 | SSE9 | S12 | S9 | S9 | S8.0 | S15 |
| 27-Sep | SSW7 | S8 | S3 | SSW11 | SSW9 | SW9 | WSW7 | WNW8 | NNW11 | NNW11 | WSW11 | SW7 | W10 | WNW11 | NW11 | WNW10 | WNW8 | WNW7 | W7 | W8 | SW7 | SW9 | SW9 | SSW8 | WSW6.5 | WSW11 |
| 28-Sep | SSW7 | S6 | S4 | S4 | S4 | S3 | S4 | S5 | S5 | S5 | S7 | SW9 | SW11 | SW11 | SW10 | S12 | SSW8 | SSW7 | SSW4 | SSW4 | SSW5 | SW6 | SSW5 | SSW5 | SSW5.9 | S12 |
| 29-Sep | S4 | SSE5 | SSE6 | SE5 | SE4 | SSE3 | S2 | S2 | S2 | SE2 | SSW5 | SSW7 | S4 | SW5 | SW3 | SW3 | W2 | NE0 | AF | AF | SSE2 | S1 | S1 | SSE1 | S2.6 | SSW7 |
| 30-Sep | NNW1 | NNW1 | NW1 | AF | NNW2 | N3 | NNW2 | NNW4 | NW4 | N4 | NNW3 | NNW4 | N8 | NNE6 | NE6 | NNE9 | NNE10 | N7 | N5 | N7 | N8 | N8 | N8 | N8 | N4.9 | NNE10 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|--------|--------|------|------|------|-------|-------|--------|--------|--------|--------|-------|--------|-------|-----------------|
| SW2.5 | SW2.1 | SW1.8 | SW2.2 | SW2.4 | SW2.2 | SW2.9 | WSW3.2 | WSW3.7 | W4.1 | WSW4.6 | WSW4.4 | W4.2 | W4.2 | W4.0 | W4.4 | W3.9 | WSW3.3 | WSW2.9 | WSW2.4 | WSW2.6 | SW2.6 | WSW2.2 | SW2.1 | Diurnal Average |
| SSW9 | SSW12 | SSW13 | SSW14 | SSW13 | SSW13 | SSW17 | SSW16 | NNW14 | NNW16 | WSW16 | SW17 | SW19 | N19 | N18 | NNW17 | NNW14 | WSW13 | SSE12 | NNW14 | NW15 | W12 | NNW13 | NW10 | Diurnal Maximum |

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin Community - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 324 | 45.31 | 45.31 |
| 6 - 11 | 308 | 43.08 | 88.39 |
| 12 - 19 | 83 | 11.61 | 100.00 |
| 20 - 28 | 0 | 0.00 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 715

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin Community - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 7 | 2 | 4 | 5 | 9 | 5 | 18 | 40 | 62 | 34 | 13 | 12 | 15 | 14 | 53 | 31 | 324 |
| 6 - 11 | 8 | 3 | 1 | 0 | 1 | 7 | 7 | 15 | 18 | 50 | 26 | 23 | 27 | 51 | 53 | 18 | 308 |
| 12 - 19 | 5 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 8 | 14 | 11 | 10 | 10 | 2 | 4 | 7 | 83 |
| 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 | 20 | 5 | 5 | 5 | 10 | 12 | 31 | 61 | 88 | 98 | 50 | 45 | 52 | 67 | 110 | 56 | 715 |

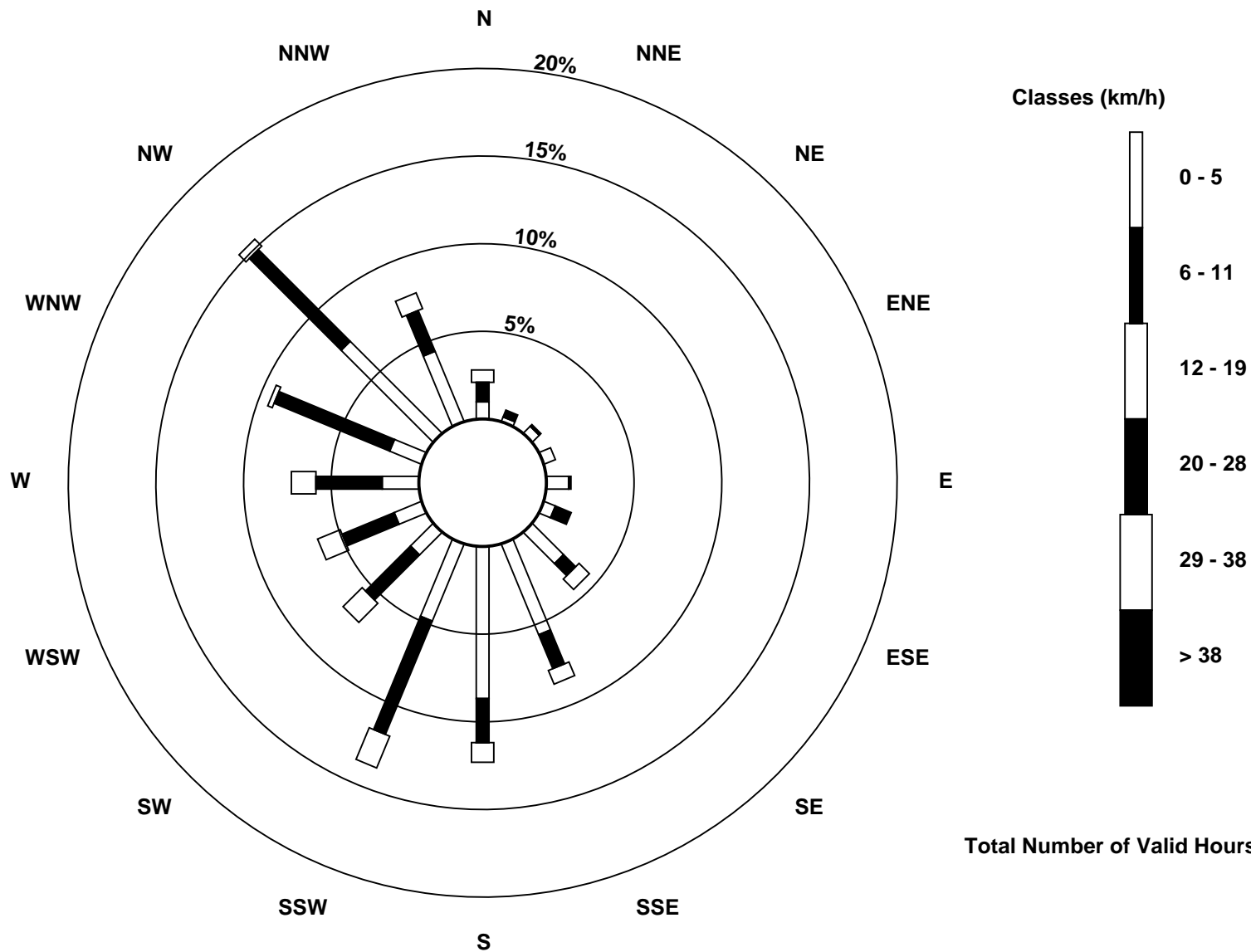
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Conklin Community (AMS 21)



Total Number of Valid Hours: 715



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Conklin Community - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Sep 10 14:00 | Hours in Service: 720 Hours of Data: 715 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3 |
| Minimum Value: 0 km/h on Sep 25 21:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 5 | |

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

Diurnal Maximum

AF - Analyzer Failure



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Conklin Community - September 2016

| | | | |
|---------------------------------------------------------------|--|---------------------------|------|
| Direction of Maximum Speed: 227 deg on Sep 13 13:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 218.2 deg on Sep 13 | | Hours of Data: | 715 |
| Direction of Minimum Speed: 359 deg on Sep 6 06:00 | | Hours of Missing Data: | 5 |
| Direction of Minimum Daily Speed Average: 2.0 deg on Sep 1 | | Percent Operational Time: | 99.3 |
| Monthly Average Direction: 267.8 deg | | | |

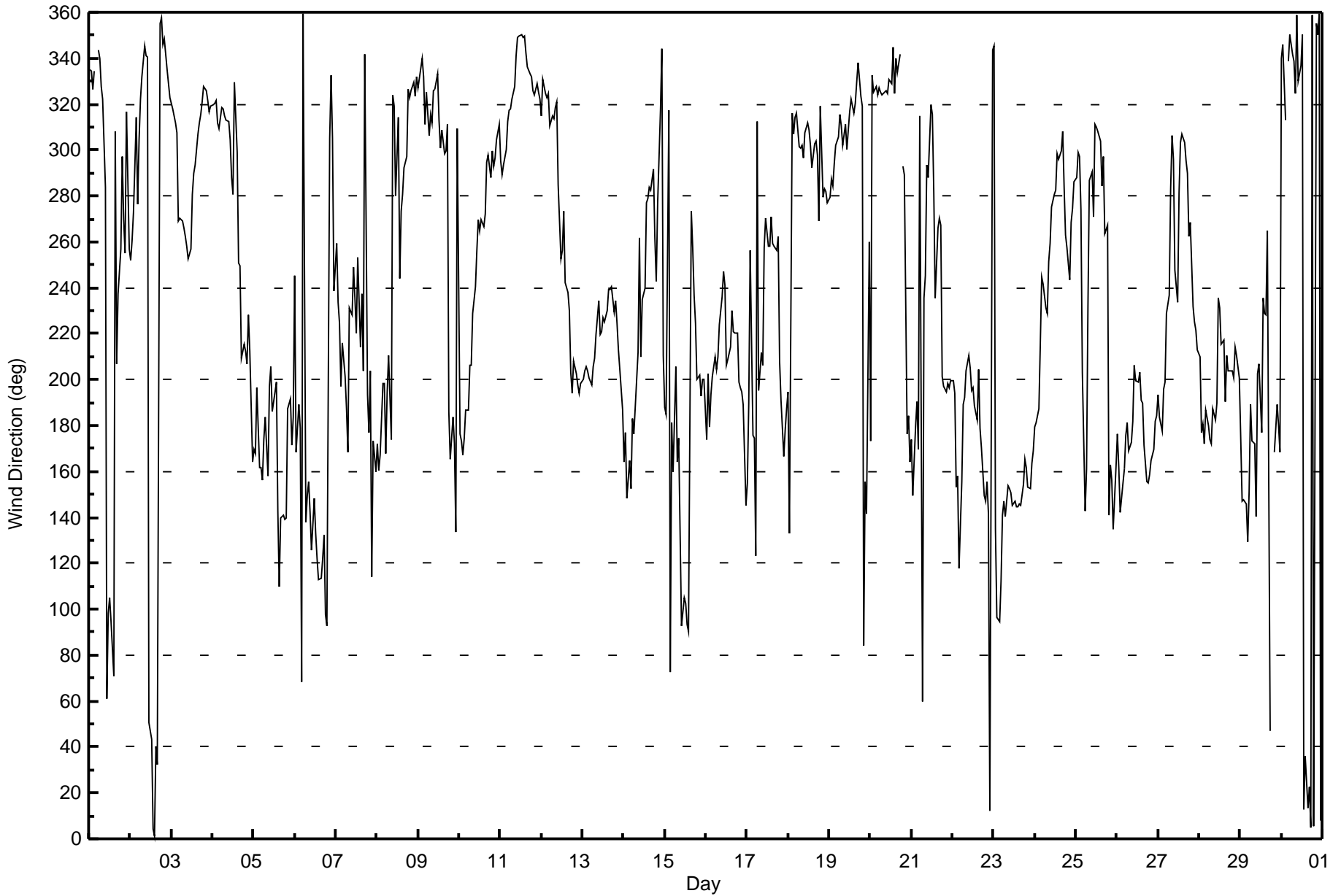
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 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 | 335 | 334 | 326 | 334 | AF | 343 | 340 | 328 | 322 | 283 | 61 | 98 | 105 | 95 | 71 | 308 | 207 | 237 | 257 | 297 | 270 | 255 | 317 | 257 | 288.4 |
| 2-Sep | 252 | 261 | 272 | 314 | 276 | 304 | 322 | 332 | 346 | 341 | 341 | 51 | 44 | 4 | 1 | 40 | 32 | 355 | 358 | 346 | 349 | 335 | 329 | 323 | 333.9 |
| 3-Sep | 320 | 318 | 312 | 308 | 269 | 270 | 269 | 266 | 262 | 258 | 253 | 257 | 281 | 290 | 293 | 307 | 312 | 315 | 321 | 328 | 326 | 321 | 317 | 319 | 292.2 |
| 4-Sep | 320 | 320 | 321 | 312 | 309 | 319 | 318 | 315 | 313 | 313 | 305 | 288 | 281 | 330 | 299 | 251 | 249 | 210 | 215 | 212 | 207 | 228 | 212 | 164 | 282.2 |
| 5-Sep | 170 | 168 | 196 | 162 | 162 | 156 | 174 | 184 | 158 | 197 | 206 | 186 | 195 | 199 | 143 | 110 | 139 | 141 | 139 | 140 | 187 | 192 | 172 | 183 | 170.1 |
| 6-Sep | 246 | 168 | 189 | 179 | 68 | 359 | 138 | 150 | 156 | 142 | 126 | 148 | 133 | 122 | 113 | 113 | 122 | 132 | 98 | 93 | 305 | 333 | 305 | 238 | 136.3 |
| 7-Sep | 259 | 234 | 225 | 197 | 216 | 201 | 188 | 168 | 231 | 228 | 249 | 235 | 221 | 253 | 214 | 237 | 204 | 342 | 193 | 177 | 204 | 114 | 173 | 160 | 215.3 |
| 8-Sep | 172 | 161 | 167 | 198 | 198 | 168 | 194 | 211 | 174 | 324 | 319 | 280 | 314 | 244 | 273 | 281 | 293 | 297 | 326 | 323 | 326 | 329 | 323 | 332 | 284.1 |
| 9-Sep | 327 | 331 | 340 | 332 | 311 | 325 | 306 | 315 | 312 | 326 | 326 | 333 | 313 | 301 | 308 | 298 | 300 | 311 | 186 | 165 | 184 | 172 | 134 | 309 | 314.0 |
| 10-Sep | 176 | 173 | 167 | 174 | 187 | 187 | 207 | 206 | 229 | 241 | 256 | 270 | 265 | 270 | 266 | 272 | 295 | 297 | 288 | 300 | 293 | 296 | 304 | 311 | 246.8 |
| 11-Sep | 295 | 289 | 293 | 300 | 313 | 317 | 318 | 322 | 327 | 341 | 349 | 350 | 350 | 349 | 350 | 342 | 336 | 333 | 332 | 326 | 324 | 329 | 325 | 322 | 332.7 |
| 12-Sep | 315 | 331 | 325 | 323 | 325 | 311 | 315 | 313 | 319 | 321 | 285 | 252 | 256 | 273 | 242 | 238 | 230 | 203 | 194 | 208 | 203 | 198 | 194 | 198 | 246.7 |
| 13-Sep | 200 | 204 | 206 | 204 | 201 | 198 | 206 | 209 | 220 | 235 | 220 | 221 | 227 | 225 | 230 | 239 | 239 | 240 | 229 | 234 | 224 | 213 | 205 | 187 | 218.2 |
| 14-Sep | 164 | 177 | 148 | 165 | 152 | 183 | 176 | 188 | 212 | 262 | 210 | 235 | 240 | 277 | 279 | 283 | 283 | 292 | 262 | 243 | 277 | 317 | 344 | 210 | 247.1 |
| 15-Sep | 188 | 185 | 317 | 73 | 181 | 160 | 205 | 164 | 174 | 134 | 93 | 105 | 102 | 94 | 90 | 273 | 258 | 237 | 225 | 200 | 202 | 193 | 200 | 200 | 169.2 |
| 16-Sep | 174 | 203 | 179 | 193 | 201 | 210 | 205 | 210 | 224 | 236 | 247 | 241 | 206 | 209 | 214 | 230 | 221 | 220 | 220 | 199 | 197 | 194 | 189 | 145 | 211.3 |
| 17-Sep | 155 | 190 | 256 | 176 | 175 | 123 | 312 | 195 | 212 | 206 | 257 | 271 | 258 | 258 | 271 | 260 | 258 | 256 | 262 | 208 | 191 | 166 | 178 | 187 | 236.0 |
| 18-Sep | 195 | 133 | 316 | 307 | 314 | 316 | 302 | 301 | 302 | 297 | 307 | 312 | 309 | 302 | 292 | 303 | 304 | 298 | 269 | 319 | 279 | 283 | 282 | 277 | 298.1 |
| 19-Sep | 279 | 288 | 284 | 294 | 302 | 306 | 315 | 311 | 302 | 311 | 300 | 309 | 317 | 322 | 316 | 320 | 329 | 338 | 324 | 319 | 84 | 156 | 142 | 260 | 310.7 |
| 20-Sep | 174 | 333 | 325 | 328 | 324 | 327 | 325 | 324 | 325 | 326 | 325 | 330 | 329 | 345 | 325 | 340 | 334 | 342 | AF | 293 | 289 | 176 | 184 | 164 | 327.1 |
| 21-Sep | 174 | 149 | 179 | 190 | 170 | 315 | 60 | 235 | 245 | 294 | 288 | 320 | 315 | 282 | 235 | 266 | 270 | 268 | 202 | 197 | 194 | 198 | 197 | 199 | 238.2 |
| 22-Sep | 200 | 194 | 153 | 158 | 118 | 156 | 189 | 192 | 204 | 210 | 205 | 195 | 196 | 189 | 183 | 204 | 179 | 170 | 149 | 147 | 155 | 141 | 12 | 344 | 185.6 |
| 23-Sep | 346 | 135 | 96 | 94 | 113 | 141 | 147 | 140 | 154 | 153 | 151 | 145 | 147 | 145 | 145 | 146 | 145 | 154 | 165 | 162 | 153 | 153 | 164 | 169 | 148.4 |
| 24-Sep | 179 | 181 | 187 | 216 | 245 | 242 | 231 | 229 | 251 | 259 | 275 | 281 | 282 | 299 | 296 | 300 | 308 | 284 | 263 | 257 | 244 | 268 | 275 | 286 | 265.2 |
| 25-Sep | 288 | 299 | 297 | 274 | 203 | 143 | 161 | 232 | 287 | 290 | 271 | 311 | 310 | 308 | 304 | 285 | 297 | 263 | 267 | 141 | 163 | 156 | 135 | 162 | 277.3 |
| 26-Sep | 177 | 162 | 142 | 155 | 161 | 176 | 181 | 169 | 173 | 182 | 206 | 199 | 199 | 203 | 191 | 190 | 172 | 155 | 155 | 159 | 165 | 170 | 182 | 185 | 179.3 |
| 27-Sep | 193 | 184 | 178 | 196 | 199 | 229 | 237 | 283 | 306 | 296 | 247 | 234 | 281 | 303 | 307 | 303 | 295 | 290 | 262 | 268 | 232 | 225 | 222 | 213 | 254.5 |
| 28-Sep | 210 | 177 | 181 | 172 | 187 | 180 | 174 | 172 | 187 | 183 | 190 | 235 | 231 | 215 | 217 | 191 | 211 | 204 | 204 | 204 | 201 | 214 | 211 | 201 | 202.2 |
| 29-Sep | 174 | 147 | 148 | 146 | 129 | 151 | 189 | 173 | 172 | 141 | 203 | 207 | 177 | 236 | 229 | 228 | 265 | 47 | AF | AF | 168 | 189 | 180 | 168 | 179.3 |
| 30-Sep | 340 | 346 | 313 | AF | 338 | 351 | 342 | 339 | 325 | 359 | 330 | 337 | 350 | 13 | 36 | 13 | 22 | 5 | 359 | 6 | 355 | 351 | 359 | 8 | 0.3 |

225.1 216.3 223.6 221.3 225.4 231.5 230.3 240.4 251.3 262.8 253.4 252.8 260.1 267.2 263.2 267.5 263.1 258.7 253.7 246.1 241.5 234.3 238.4 230.8

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
Conklin Community - September 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Sep 15 03:00 | | Hours in Service: 720 Hours of Data: 715 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3 | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| Minimum Value: 7 deg on Sep 21 20:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentiles: P ₁ = 10 P ₁₀ = 18 Q ₁ = 21 Median = 31 Q ₃ = 42 P ₉₀ = 63 P ₉₉ = 95 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 20 | 26 | 32 | 14 | AF | 8 | 15 | 17 | 36 | 75 | 58 | 90 | 46 | 56 | 50 | 36 | 42 | 25 | 23 | 46 | 34 | 36 | 50 | 40 | 90 |
| 2-Sep | 19 | 41 | 37 | 39 | 46 | 44 | 31 | 25 | 23 | 26 | 47 | 63 | 66 | 41 | 26 | 33 | 38 | 19 | 16 | 21 | 21 | 27 | 17 | 21 | 66 |
| 3-Sep | 22 | 27 | 38 | 47 | 32 | 30 | 30 | 28 | 27 | 22 | 20 | 20 | 45 | 50 | 48 | 43 | 36 | 35 | 25 | 19 | 21 | 26 | 28 | 29 | 50 |
| 4-Sep | 23 | 23 | 24 | 39 | 51 | 38 | 39 | 38 | 37 | 38 | 42 | 47 | 60 | 77 | 47 | 30 | 29 | 21 | 20 | 24 | 23 | 23 | 42 | 40 | 77 |
| 5-Sep | 22 | 27 | 37 | 22 | 16 | 13 | 25 | 38 | 38 | 29 | 23 | 31 | 54 | 65 | 62 | 28 | 25 | 15 | 14 | 80 | 50 | 56 | 49 | 31 | 80 |
| 6-Sep | 87 | 18 | 26 | 39 | 50 | 74 | 39 | 63 | 31 | 21 | 27 | 20 | 20 | 21 | 25 | 25 | 25 | 29 | 34 | 79 | 58 | 74 | 46 | 71 | 87 |
| 7-Sep | 48 | 42 | 43 | 65 | 23 | 46 | 33 | 24 | 42 | 25 | 30 | 43 | 47 | 39 | 75 | 54 | 91 | 32 | 38 | 23 | 96 | 66 | 29 | 25 | 96 |
| 8-Sep | 35 | 94 | 35 | 41 | 60 | 69 | 33 | 34 | 87 | 43 | 55 | 43 | 58 | 74 | 52 | 40 | 41 | 41 | 35 | 35 | 40 | 31 | 31 | 19 | 94 |
| 9-Sep | 24 | 23 | 22 | 28 | 51 | 33 | 55 | 44 | 44 | 31 | 37 | 21 | 42 | 40 | 40 | 45 | 38 | 47 | 92 | 38 | 51 | 66 | 46 | 60 | 92 |
| 10-Sep | 32 | 19 | 19 | 19 | 19 | 19 | 19 | 21 | 24 | 25 | 28 | 37 | 34 | 34 | 34 | 36 | 43 | 43 | 44 | 44 | 45 | 46 | 45 | 44 | 46 |
| 11-Sep | 41 | 47 | 42 | 47 | 34 | 26 | 24 | 22 | 20 | 20 | 19 | 20 | 19 | 20 | 22 | 22 | 20 | 20 | 17 | 17 | 20 | 18 | 17 | 31 | 47 |
| 12-Sep | 40 | 27 | 29 | 33 | 39 | 47 | 41 | 36 | 33 | 64 | 53 | 72 | 75 | 51 | 39 | 31 | 27 | 21 | 21 | 23 | 24 | 21 | 20 | 21 | 75 |
| 13-Sep | 21 | 18 | 19 | 18 | 18 | 19 | 17 | 19 | 23 | 27 | 25 | 25 | 24 | 25 | 24 | 25 | 20 | 18 | 19 | 18 | 19 | 16 | 21 | 55 | 55 |
| 14-Sep | 26 | 25 | 81 | 54 | 19 | 37 | 34 | 57 | 69 | 52 | 59 | 26 | 31 | 46 | 42 | 41 | 39 | 43 | 27 | 15 | 40 | 38 | 34 | 69 | 81 |
| 15-Sep | 37 | 34 | 104 | 67 | 79 | 67 | 78 | 51 | 34 | 41 | 41 | 34 | 31 | 38 | 60 | 86 | 53 | 18 | 43 | 16 | 14 | 11 | 12 | 29 | 104 |
| 16-Sep | 26 | 23 | 23 | 20 | 23 | 22 | 18 | 19 | 25 | 21 | 31 | 27 | 25 | 26 | 27 | 25 | 27 | 23 | 31 | 12 | 8 | 10 | 85 | 15 | 85 |
| 17-Sep | 99 | 77 | 82 | 96 | 97 | 31 | 42 | 54 | 23 | 38 | 40 | 31 | 25 | 26 | 32 | 21 | 18 | 20 | 18 | 22 | 15 | 20 | 19 | 20 | 99 |
| 18-Sep | 28 | 25 | 84 | 38 | 31 | 26 | 40 | 41 | 40 | 41 | 40 | 33 | 35 | 42 | 40 | 38 | 38 | 44 | 28 | 31 | 37 | 39 | 41 | 34 | 84 |
| 19-Sep | 35 | 43 | 38 | 41 | 42 | 34 | 33 | 35 | 42 | 31 | 42 | 35 | 30 | 27 | 30 | 28 | 20 | 20 | 34 | 35 | 67 | 74 | 57 | 97 | 97 |
| 20-Sep | 63 | 44 | 23 | 18 | 19 | 19 | 21 | 26 | 27 | 31 | 31 | 39 | 41 | 27 | 52 | 55 | 37 | 22 | AF | 76 | 79 | 61 | 30 | 46 | 79 |
| 21-Sep | 30 | 39 | 17 | 29 | 71 | 87 | 93 | 80 | 50 | 72 | 48 | 38 | 29 | 46 | 27 | 32 | 31 | 30 | 17 | 7 | 10 | 10 | 11 | 11 | 93 |
| 22-Sep | 11 | 10 | 17 | 14 | 56 | 16 | 14 | 19 | 20 | 35 | 29 | 28 | 32 | 33 | 25 | 27 | 22 | 20 | 12 | 14 | 73 | 23 | 51 | 13 | 73 |
| 23-Sep | 74 | 36 | 41 | 55 | 79 | 10 | 13 | 16 | 16 | 17 | 18 | 20 | 18 | 17 | 17 | 18 | 17 | 19 | 17 | 18 | 17 | 19 | 18 | 31 | 79 |
| 24-Sep | 17 | 23 | 29 | 47 | 29 | 23 | 20 | 22 | 24 | 27 | 36 | 39 | 37 | 35 | 38 | 39 | 34 | 37 | 20 | 19 | 20 | 27 | 34 | 38 | 47 |
| 25-Sep | 39 | 37 | 42 | 37 | 52 | 17 | 18 | 46 | 38 | 37 | 35 | 34 | 32 | 36 | 34 | 38 | 37 | 18 | 49 | 55 | 25 | 36 | 37 | 16 | 55 |
| 26-Sep | 21 | 17 | 35 | 20 | 17 | 16 | 24 | 19 | 19 | 24 | 24 | 28 | 34 | 28 | 21 | 22 | 18 | 14 | 11 | 15 | 17 | 19 | 20 | 20 | 35 |
| 27-Sep | 27 | 28 | 89 | 20 | 20 | 20 | 34 | 37 | 30 | 36 | 27 | 37 | 34 | 34 | 35 | 35 | 38 | 35 | 18 | 22 | 23 | 18 | 20 | 18 | 89 |
| 28-Sep | 22 | 21 | 18 | 31 | 34 | 75 | 23 | 26 | 35 | 34 | 38 | 35 | 28 | 32 | 31 | 22 | 28 | 22 | 22 | 23 | 20 | 19 | 19 | 16 | 75 |
| 29-Sep | 21 | 10 | 10 | 8 | 11 | 43 | 84 | 63 | 99 | 78 | 44 | 42 | 82 | 66 | 83 | 82 | 50 | 47 | AF | AF | 70 | 83 | 99 | 79 | 99 |
| 30-Sep | 91 | 80 | 80 | AF | 72 | 30 | 63 | 25 | 17 | 34 | 46 | 25 | 19 | 26 | 31 | 21 | 24 | 24 | 22 | 20 | 18 | 16 | 20 | 21 | 91 |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF - Analyzer Failure | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------|
| Calibration Date | September 15, 2016 | Last Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Reason: | Routine | | |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Gas Cert Reference | EY0000359 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 51.4 ppm | Cal Gas Exp Date | Feb-09-2018 |
| Calibrator Make/Model | API T700 | Serial Number | 1221 |
| ZAG Make/Model | API 701 | Serial Number | 5611 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9628 |

Analyzer Information

| | <i>Before</i> | <i>After</i> | | <i>Before</i> | <i>After</i> |
|----------------------|---------------|--------------|--------------|---------------|--------------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -655 | -655 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 843 | 843 |
| Calculated slope | 0.996367 | 0.995675 | Chamber temp | 45.2 | 45.1 |
| Calculated intercept | 0.242037 | 0.955977 | Pressure | 656.4 | 659.0 |
| Analyzer Background | 20.4 | 21.2 | Flow | 0.483 | 0.486 |
| Analyzer Coefficient | 0.904 | 0.904 | Intensity | 91 | 92 |

Analyzer make Thermo 43i Analyzer serial # JC1428701363

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.6 | ---- |
| as found span | 5000 | 76.5 | 786.4 | 783.0 | 1.004 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 5000 | 76.5 | 786.4 | 789.1 | 0.997 |
| second point | 5000 | 38.2 | 392.7 | 393.7 | 0.998 |
| third point | 5000 | 19.2 | 197.4 | 195.9 | 1.007 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 5000 | 76.5 | 786.4 | 794.2 | 0.990 |
| Average Correction Factor | | | | | 1.001 |

Corrected As found 782.3 Previous response 789.0 % change 0.9%

Notes:

Sample inlet filter replaced after as founds. Adjusted zero.

Calibration Performed By: Evan Magill



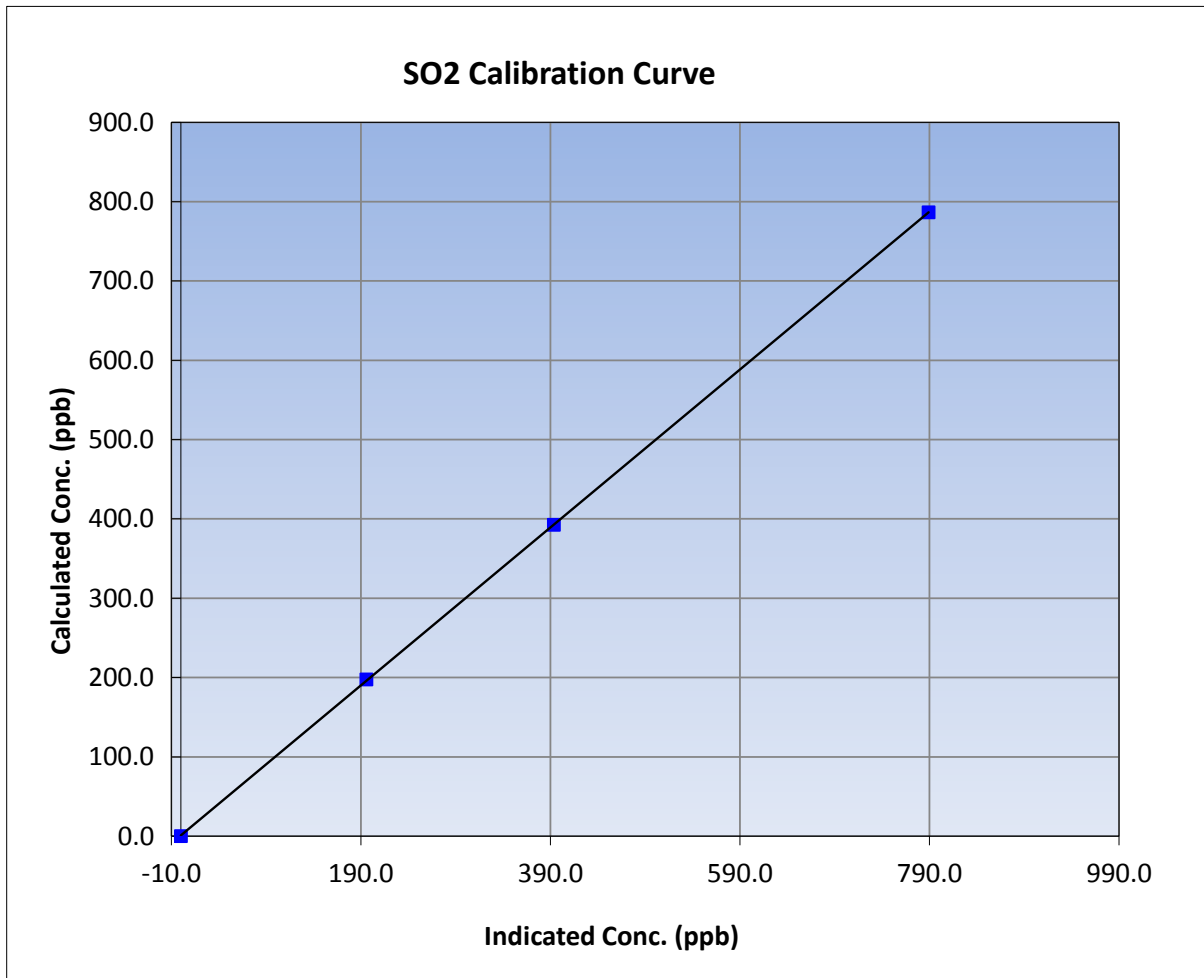
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Analyzer make | Thermo 43i | Analyzer serial # | JC1428701363 |

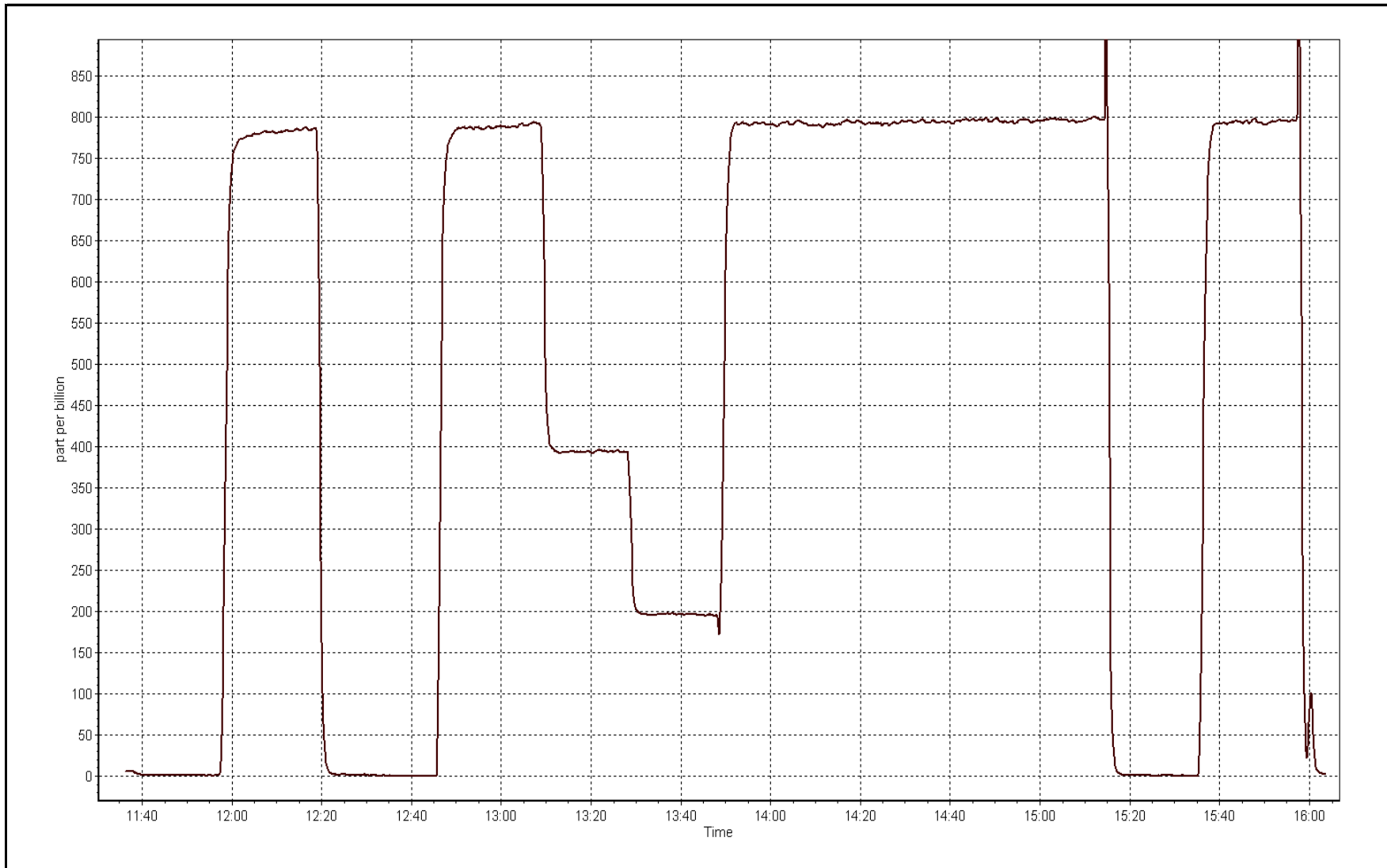
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999992 |
| 786.4 | 789.1 | 0.9966 | | |
| 392.7 | 393.7 | 0.9975 | Slope | 0.995675 |
| 197.4 | 195.9 | 1.0075 | | |
| | | | Intercept | 0.955977 |



SO2 Calibration Plot

Date: September 15, 2016





Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------------------|
| Calibration Date | September 22, 2016 | Last Calibration | August 4, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Reason: | Routine | | |
| Start Time (MST) | 9:22 | End Time (MST) | 11:50 |
| Gas Cert Reference | LL119411 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 4.97 ppm | Cal Gas Exp Date | February 12, 2019 |
| Calibrator Make/Model | API T700 | Serial Number | 1221 |
| Dil air Make/Model | API 701 | Serial Number | 5611 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9628 |
| SO2 gas concentration | 51.4 ppm | SO2 gas cert/exp | EY0000359 February 9, 2018 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -732 | -732 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1002 | 1013 |
| Calculated slope | 0.985082 | 0.994892 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.221014 | 0.326698 | Pressure | 669.0 | 669.9 |
| Analyzer Background | 1.71 | 1.67 | Flow | 0.429 | 0.431 |
| Analyzer Coefficient | 1.027 | 1.002 | Intensity | 92 | 92 |
| | | | Converter temp. | 800 | 800 |

| | | | |
|----------------------|----------------|--------------------|------------|
| Analyzer make/model | Thermo 43i-TLE | Analyzer serial # | 1236656116 |
| Converter make/model | CDN-101 | Converter serial # | NA |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 5000 | 80.6 | 80.1 | 81.4 | 0.984 |
| SO2 scrubber check | 5000 | 19.5 | 200.5 | 0.4 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 80.6 | 80.1 | 80.2 | 0.998 |
| second point | 5000 | 40.3 | 40.1 | 39.9 | 1.003 |
| third point | 5000 | 20.2 | 20.1 | 19.7 | 1.020 |
| as left zero | 6000 | 0.0 | 0.0 | -0.2 | ---- |
| as left span | 5000 | 80.6 | 80.1 | 80.0 | 1.002 |
| Average Correction Factor | | | | | 1.007 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 81.6 | Previous response | 81.1 | % change | -0.7% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

Sample inlet filter replaced after as founds. Adjusted span. Scrubber test done after 3rd point.

Calibration Performed By:

Asad Hidayat



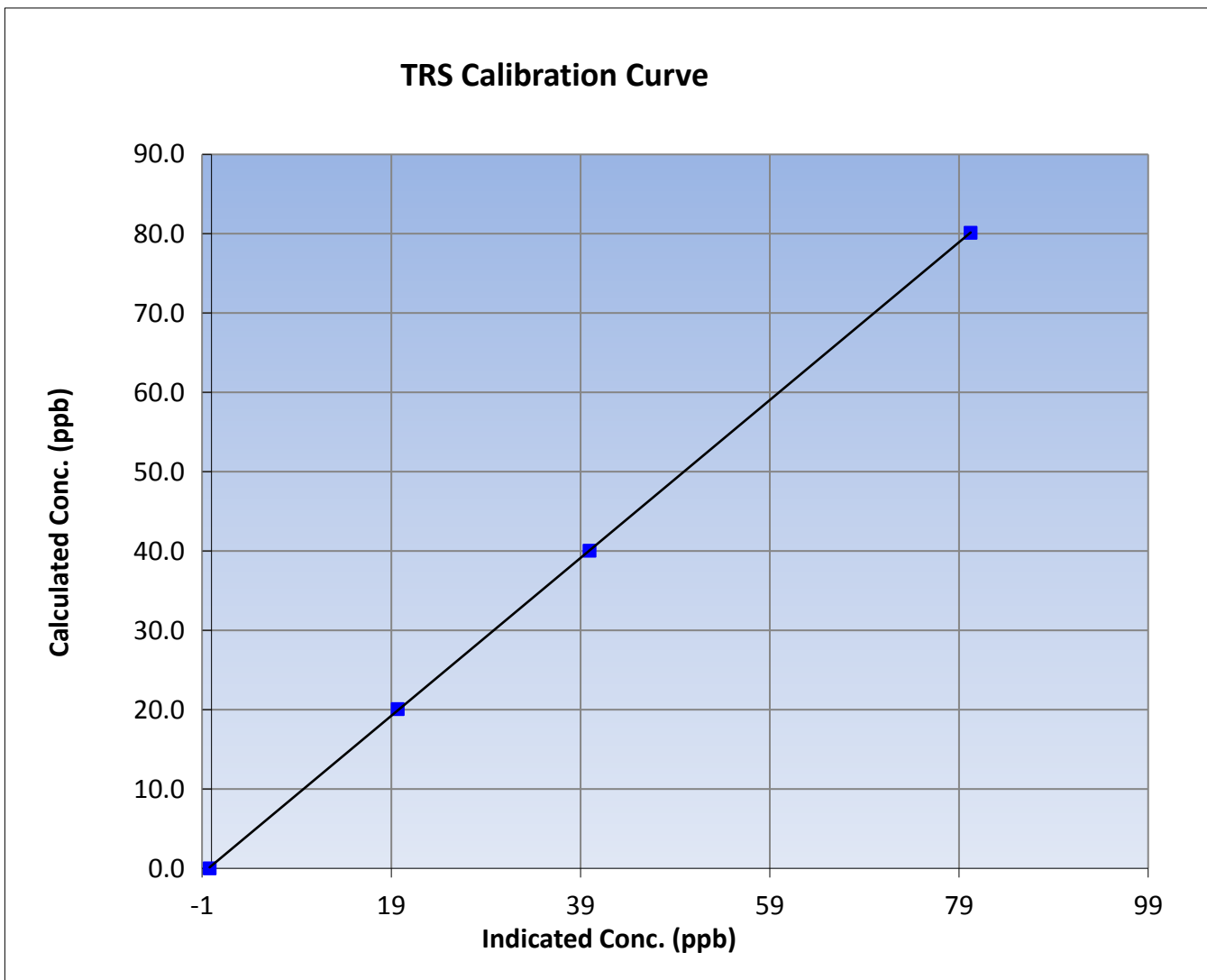
Wood Buffalo Environmental Association TRS Calibration Report

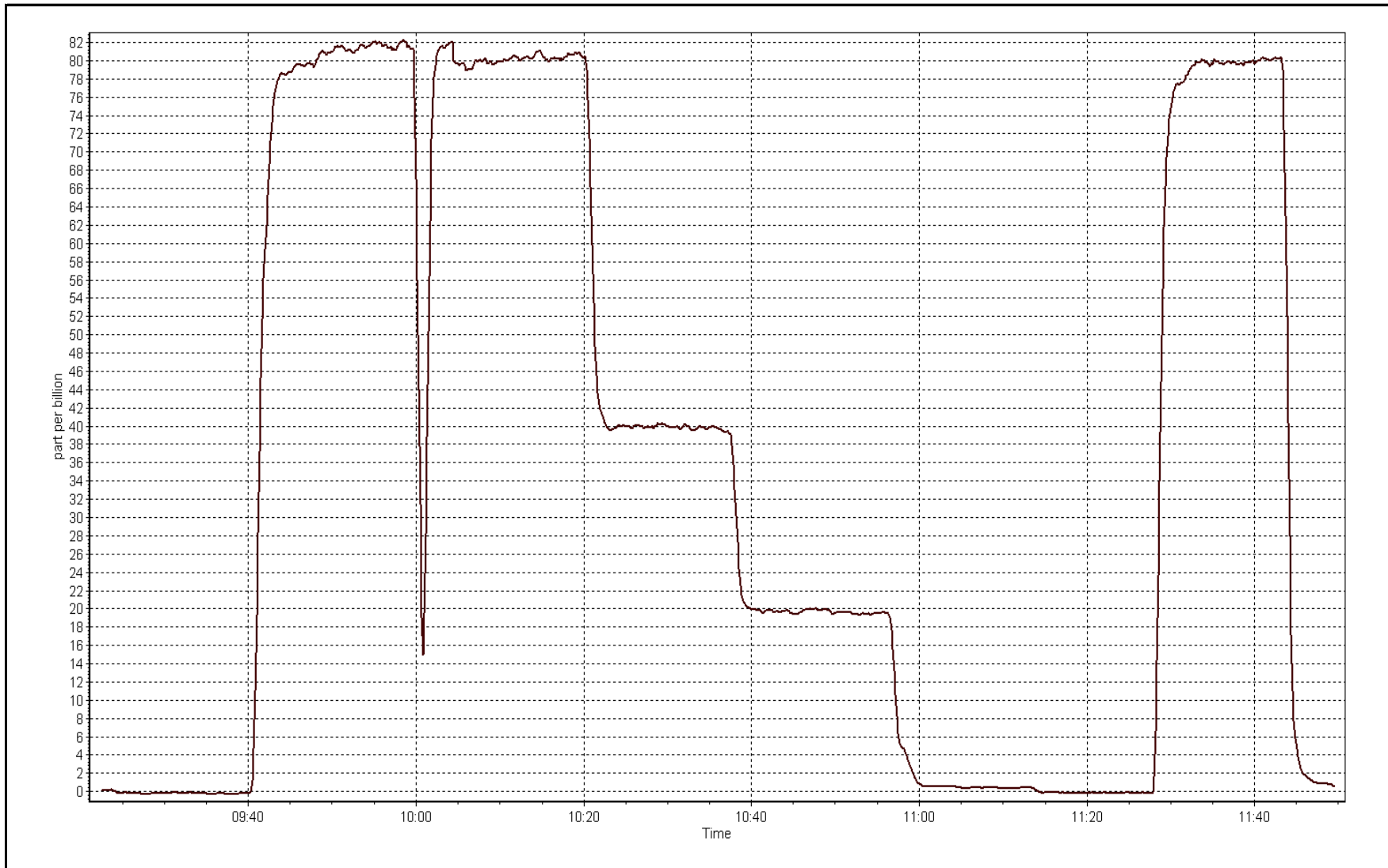
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 22, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 9:22 | End Time (MST) | 11:50 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1236656116 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999986 |
| 80.1 | 80.2 | 0.9985 | | |
| 40.1 | 39.9 | 1.0030 | Slope | 0.994892 |
| 20.1 | 19.7 | 1.0203 | | |
| | | | Intercept | 0.326698 |







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|------------------------------|---------------------|----------------------------|
| Calibration Date | Thursday, September 15, 2016 | Last Calibration | Wednesday, August 03, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Reason: | Routine | | |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Gas Cert Reference | EY0000359 | Cal Gas Expiry Date | Feb-09-2018 |
| CH4 Cal Gas Conc. | 512.0 ppm | CH4 Equiv Conc. | 1084.0 ppm |
| C3H8 Cal Gas Conc. | 208.0 ppm | Station temp. | 21 Deg C |
| Calibrator Model | API T700 | Serial Number | 1221 |
| ZAG make/model | Teledyne API 701 | Serial Number | 5611 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 9628 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.0 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 405.0 | 403.6 |
| THC Calc slope | 0.995107 | 0.994082 | Carrier Pressure | 37.0 | 37.0 |
| THC Calc intercept | 0.059823 | 0.059780 | Fuel Pressure | 49.7 | 49.7 |
| NMHC Calc slope | 0.996428 | 0.998620 | Air Pressure | 34.3 | 34.3 |
| NMHC Calc intercept | 0.027797 | 0.031923 | | | |

Analyzer make Thermo 55i Analyzer serial # 1152430011

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 76.5 | 16.59 | 16.65 | 0.996 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 76.5 | 16.59 | 16.66 | 0.996 |
| second point | 5000 | 38.2 | 8.28 | 8.22 | 1.008 |
| third point | 5000 | 19.1 | 4.14 | 4.06 | 1.020 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 76.5 | 16.59 | 16.64 | 0.997 |
| Average Correction Factor | | | | | 1.008 |

Corrected As found 16.65 Previous response 16.61 % change -0.3%

Notes:

Sample inlet filter replaced after as founds. No adjustments.

Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 76.5 | 8.75 | 8.75 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 76.5 | 8.75 | 8.75 | 1.000 |
| second point | 5000 | 38.2 | 4.37 | 4.32 | 1.012 |
| third point | 5000 | 19.1 | 2.19 | 2.13 | 1.026 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 76.5 | 8.75 | 8.72 | 1.004 |
| Average Correction Factor | | | | | 1.013 |

Corrected As found 8.75 Previous response 8.76 % change 0.1%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 76.5 | 7.83 | 7.91 | 0.990 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 76.5 | 7.83 | 7.91 | 0.990 |
| second point | 5000 | 38.2 | 3.91 | 3.90 | 1.003 |
| third point | 5000 | 19.1 | 1.96 | 1.93 | 1.013 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 76.5 | 7.83 | 7.92 | 0.989 |
| Average Correction Factor | | | | | 1.002 |

Corrected As found 7.91 Previous response 7.85 % change -0.7%



Wood Buffalo Environmental Association

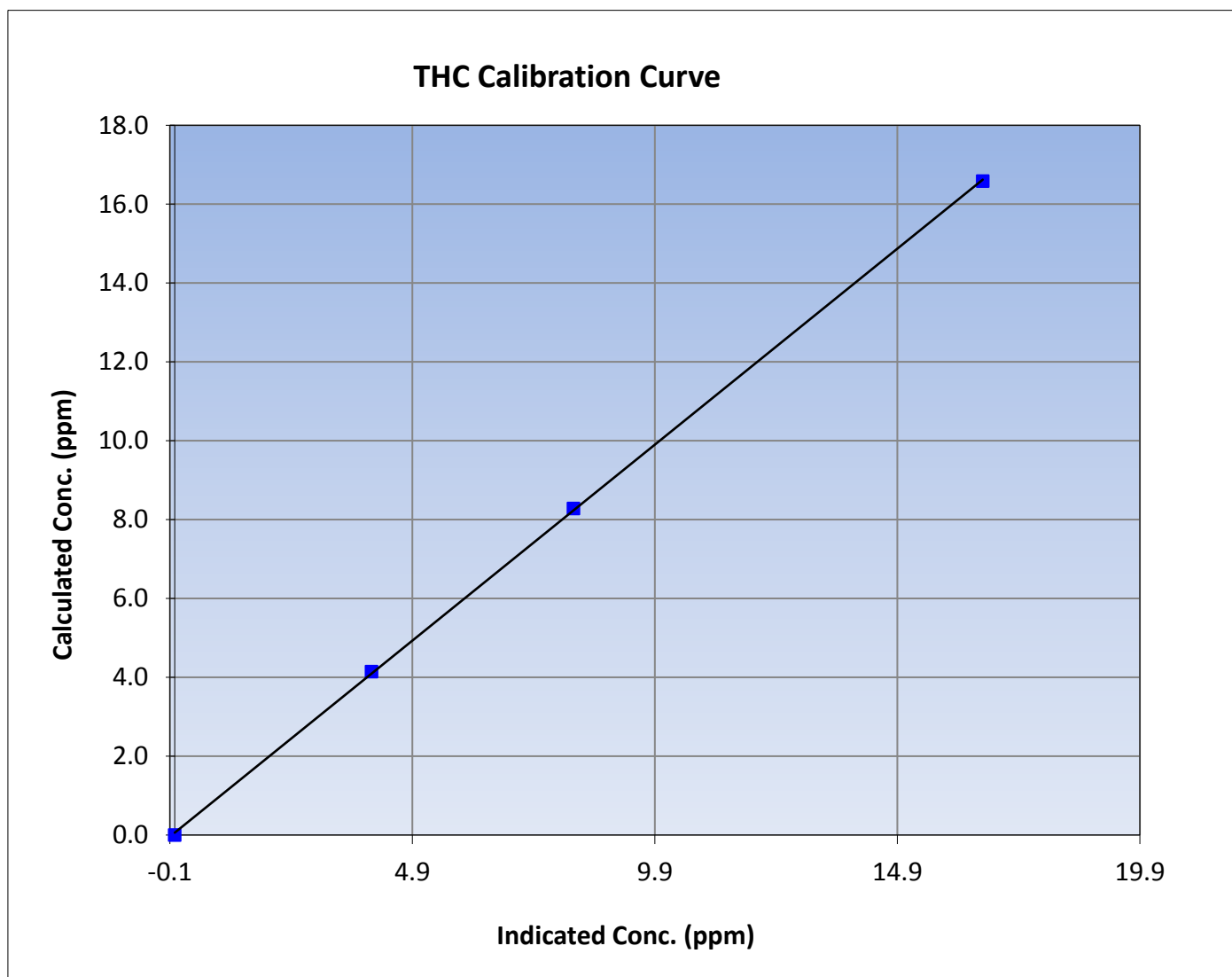
THC Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999937 |
| 16.59 | 16.66 | 0.9955 | | |
| 8.28 | 8.22 | 1.0075 | Slope | 0.994082 |
| 4.14 | 4.06 | 1.0199 | | |
| | | | Intercept | 0.059780 |





Wood Buffalo Environmental Association

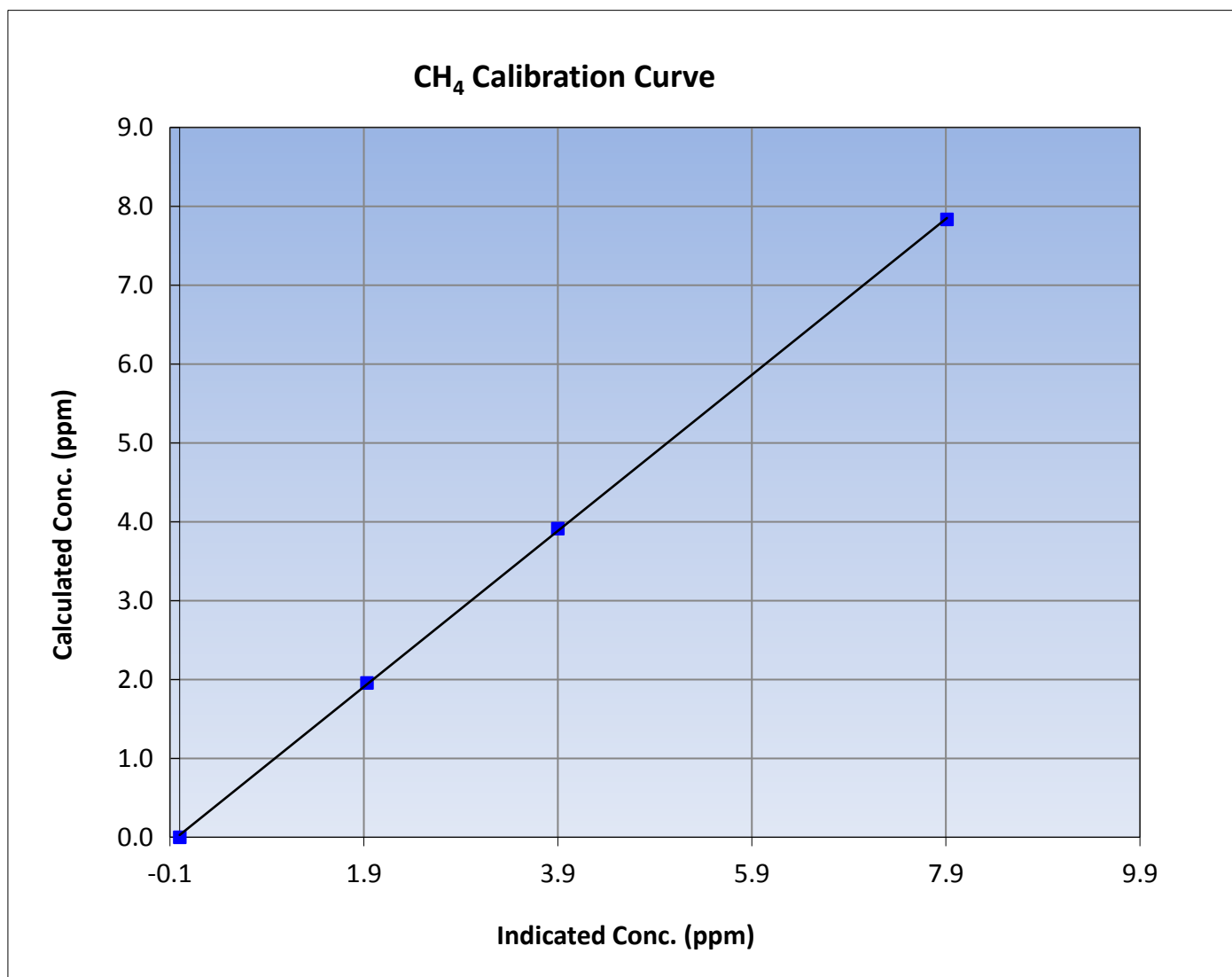
CH₄ Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999936 |
| 7.83 | 7.91 | 0.9903 | | |
| 3.91 | 3.90 | 1.0030 | Slope | 0.989059 |
| 1.96 | 1.93 | 1.0134 | | |
| | | | Intercept | 0.027863 |





Wood Buffalo Environmental Association

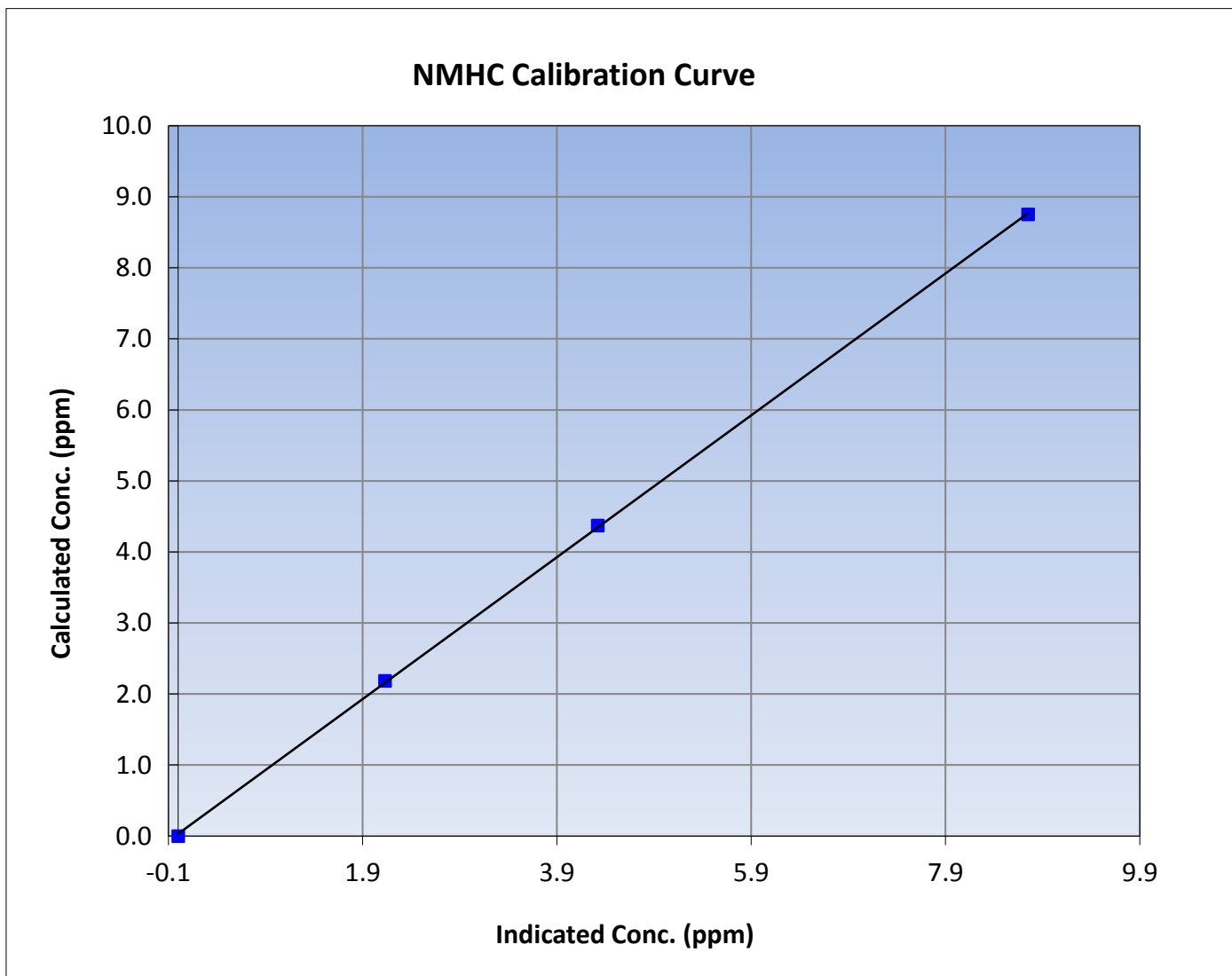
NMHC Calibration Summary

Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1152430011 |

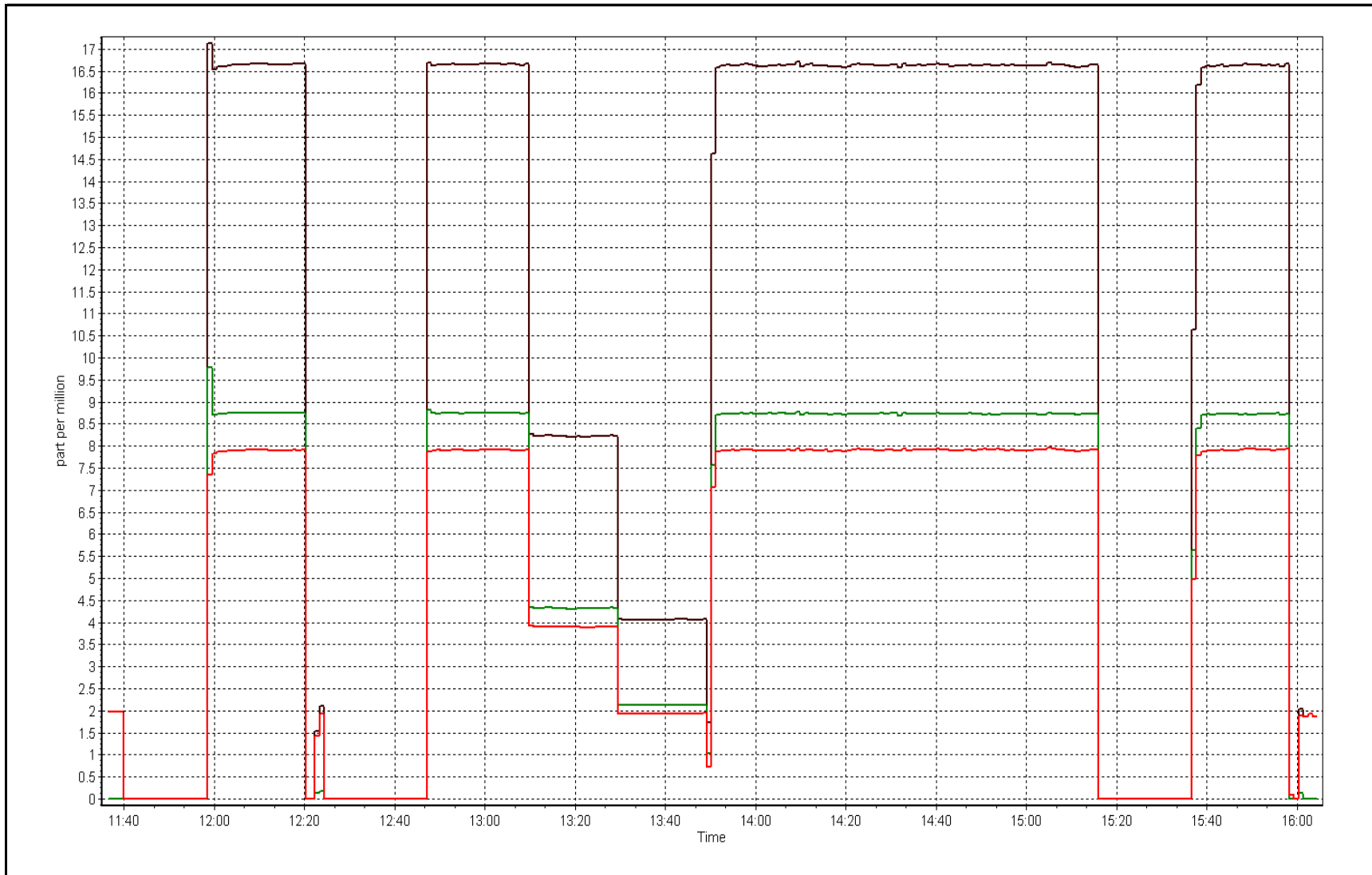
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999938 |
| 8.75 | 8.75 | 1.0002 | | |
| 4.37 | 4.32 | 1.0116 | Slope | 0.998620 |
| 2.19 | 2.13 | 1.0258 | | |
| | | | Intercept | 0.031923 |



THC Calibration Plot

Date: September 15, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|-------------------------------|----------------------|----------------|
| Calibration Date | September 21, 2016 | Previous Calibration | August 4, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Reason: | Routine | | |
| Start Time (MST) | 12:18 | End Time (MST) | 14:50 |
| NO2 GPT Ref date | Wednesday, September 21, 2016 | Transfer Standard | 23 |
| Calibrator Make/Model | Teledyne API 700 | Station temp. | 21 Deg C |
| ZAG make/model | Teledyne API 701 | Serial Number | 1221 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 5611 |
| | | Serial Number | 9628 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-----------|------------------|--------|-------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 28.0 | 28.1 |
| Analyzer IP address | 192.168.1.48 | | Lamp temp. | 53.4 | 53.5 |
| Calculated slope | 0.993375 | 0.992130 | Pressure | 653.1 | 648.9 |
| Calculated intercept | -0.335239 | -0.300317 | Flow cell A | 0.737 | 0.738 |
| Analyzer Background | -1.3 | -1.4 | Flow cell B | 0.733 | 0.730 |
| Analyzer Coefficient | 1.034 | 1.036 | Cell A Intensity | 72107 | 71930 |
| | | | Cell B Intensity | 72076 | 70497 |

| | | | |
|---------------|------------|-------------------|------------|
| Analyzer make | Thermo 49i | Analyzer serial # | 1501663734 |
|---------------|------------|-------------------|------------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp Intensity | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|---------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 186.2/800 | 0.0 | -0.5 | ---- |
| as found span | 5000 | 567.8/1001.8 | 306.5 | 307.5 | 0.997 |
| calibrator zero | 5000 | 185.2/800 | 0.0 | -0.5 | ---- |
| high point | 5000 | 567.8/1001.8 | 306.5 | 308.3 | 0.994 |
| second point | 5000 | 383.6/913.1 | 202.1 | 205.0 | 0.986 |
| third point | 5000 | 189.9/803.0 | 101.4 | 103.2 | 0.983 |
| as left zero | 6000 | 186.2/800 | 0.0 | -0.8 | ---- |
| as left span | 5000 | 567.8/1001.8 | 306.5 | 310.5 | 0.987 |
| Average Correction Factor | | | | | 0.987 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|------|
| Corrected As found | 308.0 | Previous response | 308.9 | % change | 0.3% |
|--------------------|-------|-------------------|-------|----------|------|

Notes:

Sample inlet filter replaced after as founds. Slightly adjusted span.

Calibration Performed By: Asad Hidayat



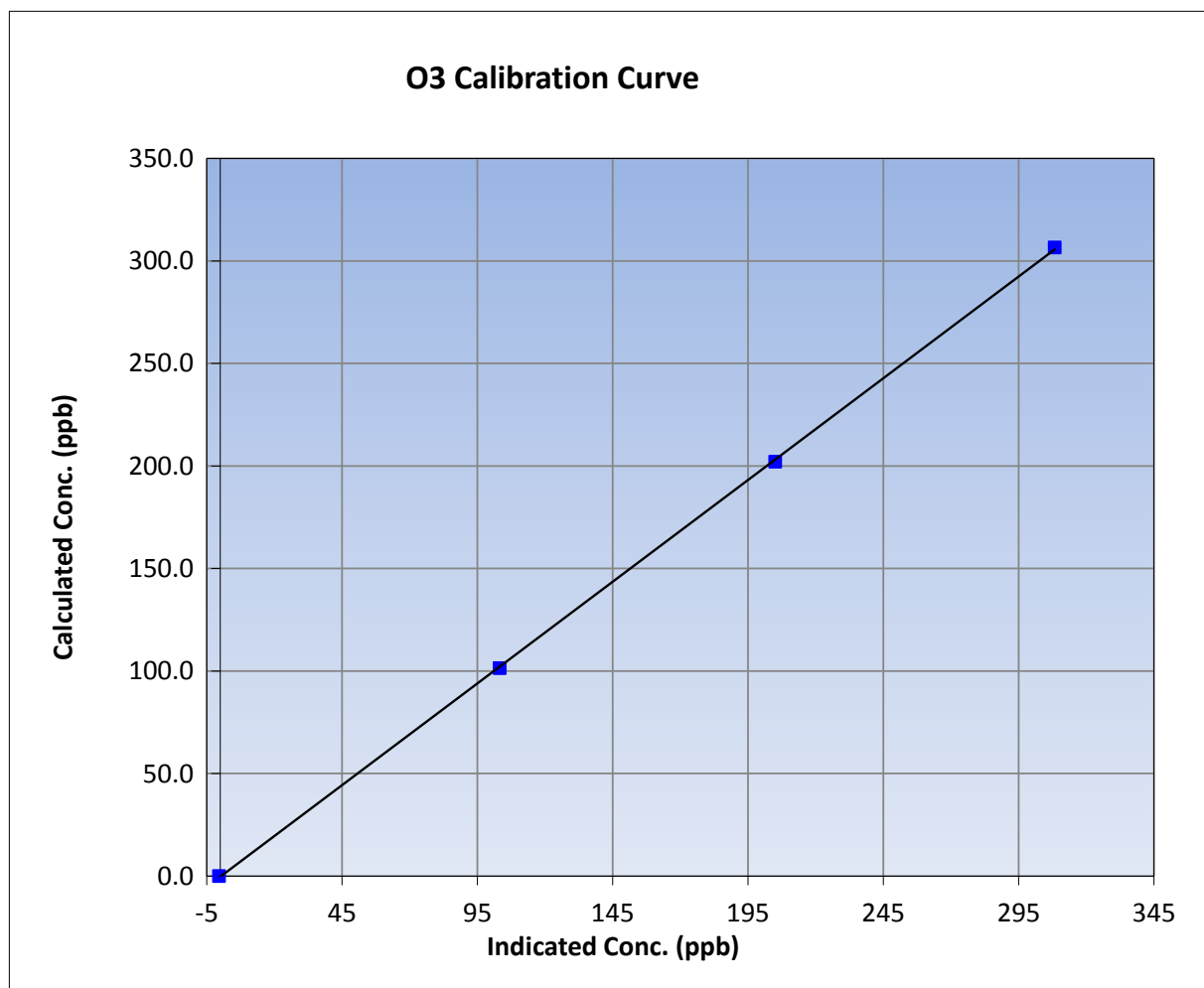
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

| | | | |
|------------------|-------------------------------|----------------------|---------------------------|
| Calibration Date | Wednesday, September 21, 2016 | Previous Calibration | Thursday, August 04, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 12:18 | End Time (MST) | 14:50 |
| Analyzer make | Thermo 49i | Analyzer serial # | 1501663734 |

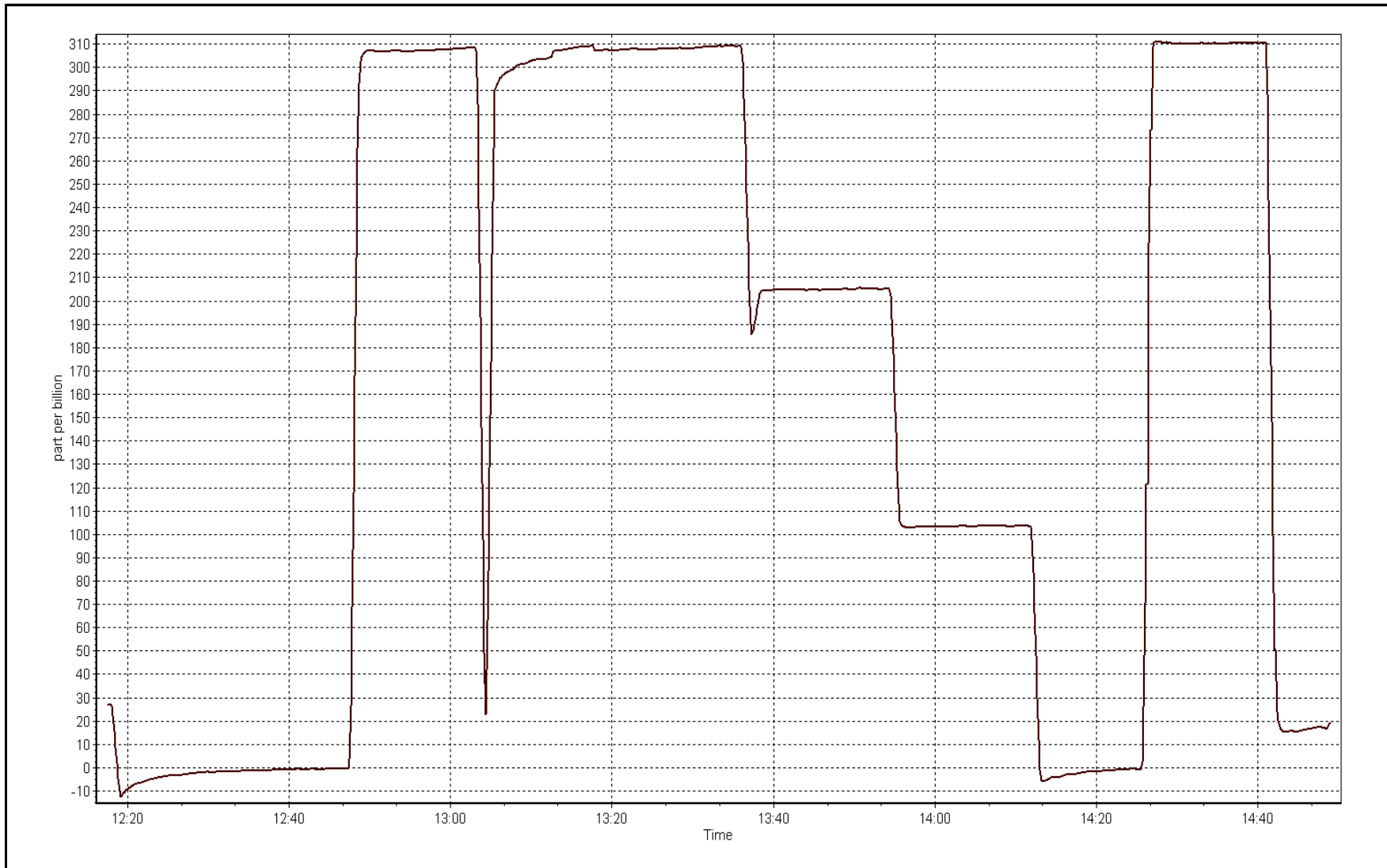
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.5 | ---- | Correlation Coefficient | 0.999944 |
| 306.5 | 308.3 | 0.9941 | | |
| 202.1 | 205.0 | 0.9858 | Slope | 0.992130 |
| 101.4 | 103.2 | 0.9827 | | |
| | | | Intercept | -0.300317 |



O3 Calibration Plot

Date: September 21, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Reason: | Routine | | |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| NO Cal Gas Conc | 52.4 ppm | Gas Cert Reference | EY0000359 |
| NOX Cal Gas Conc | 52.4 ppm | Cal Gas Expiry Date | Feb-09-2018 |
| Calibrator | API T700 | Serial Number | 1221 |
| Zero air Generator | API 701 | Serial Number | 5611 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 9628 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.997186 | 0.996313 | 0.995374 |
| | Data Offset | 0.070428 | 0.437304 | -0.983848 |
| Current Calibration | Data Slope | 0.999596 | 0.998679 | 1.001486 |
| | Data Offset | 0.054744 | 0.446341 | -0.435864 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1501663731 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 ppb | | 0-1000 ppb | |
| Analyzer IP | 192.168.1.43 | | 192.168.1.43 | |
| NO coefficient | 0.957 | | 1.040 | |
| NOX coefficient | 0.998 | | 0.998 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 6.3 | | 6.8 | |
| NOX bkgrnd | 6.3 | | 6.9 | |
| Chamber Temp | 49.8 | Deg C | 49.8 | Deg C |
| Moly Temp | 325.5 | Deg C | 322.9 | Deg C |
| PMT voltage | -840.6 | V | -840 | V |
| PMT Temp | -2.7 | Deg C | -2.8 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 138.2 | mmHg | 138.1 | mmHg |
| R Cell Press Nox | 138.1 | mmHg | 138.1 | mmHg |
| NO sample flow | 0.842 | lpm | 0.843 | lpm |
| Nox sample Flow | 0.842 | lpm | 0.841 | lpm |

Notes:

Inlet filter changed after as founds. Adjusted span. 2nd GPT reference points used.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 15, 2016 Station Number: AMS 21

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| as found span | 5000 | 76.5 | 801.7 | 801.7 | 0.0 | 735.0 | 734.8 | 0.2 | 1.0908 | 1.0911 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 | 0.0 | ---- | ---- |
| high point | 5000 | 76.5 | 801.7 | 801.7 | 0.0 | 801.5 | 802.1 | -0.6 | 1.0002 | 0.9995 |
| second point | 5000 | 38.2 | 400.3 | 400.3 | 0.0 | 401.7 | 401.4 | 0.3 | 0.9966 | 0.9973 |
| third point | 5000 | 19.2 | 201.2 | 201.2 | 0.0 | 200.5 | 199.9 | 0.6 | 1.0035 | 1.0066 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ---- | ---- |
| as left span | 5000 | 76.5 | 801.7 | 499.7 | 302.0 | 808.7 | 500.9 | 307.8 | 0.9914 | 0.9977 |
| Average Correction Factor | | | | | | | | | 1.0001 | 1.0011 |

Corrcted As found NO_x= 735.1 NO= 734.9 Percent Change NO_x= 9.4% NO= 9.4%
 Previous Response NO_x= 803.9 NO= 804.2

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 76.50 ccm NOx ref calc conc = 801.7 ppb NO ref calc conc = 801.7 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 808.5 | 807.6 | 0.0 | 0.9916 | 0.9927 | ---- | ---- |
| 1st NO2 (300) | 499.7 | 307.9 | 807.3 | 499.7 | 307.6 | 0.9931 | ---- | 1.0009 | 99.9% |
| 2nd NO2 (200) | 603.8 | 203.8 | 807.8 | 603.8 | 204.0 | 0.9925 | ---- | 0.9993 | 100.1% |
| 3rd NO2 (100) | 705.4 | 102.2 | 808.6 | 705.4 | 103.2 | 0.9915 | ---- | 0.9904 | 101.0% |
| 2nd NO ref point | | 0.0 | 808.5 | 807.6 | 0.9 | 0.9916 | 0.9927 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9922 | | 0.9968 | 100.3% |

Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association

NO_x Calibration Summary

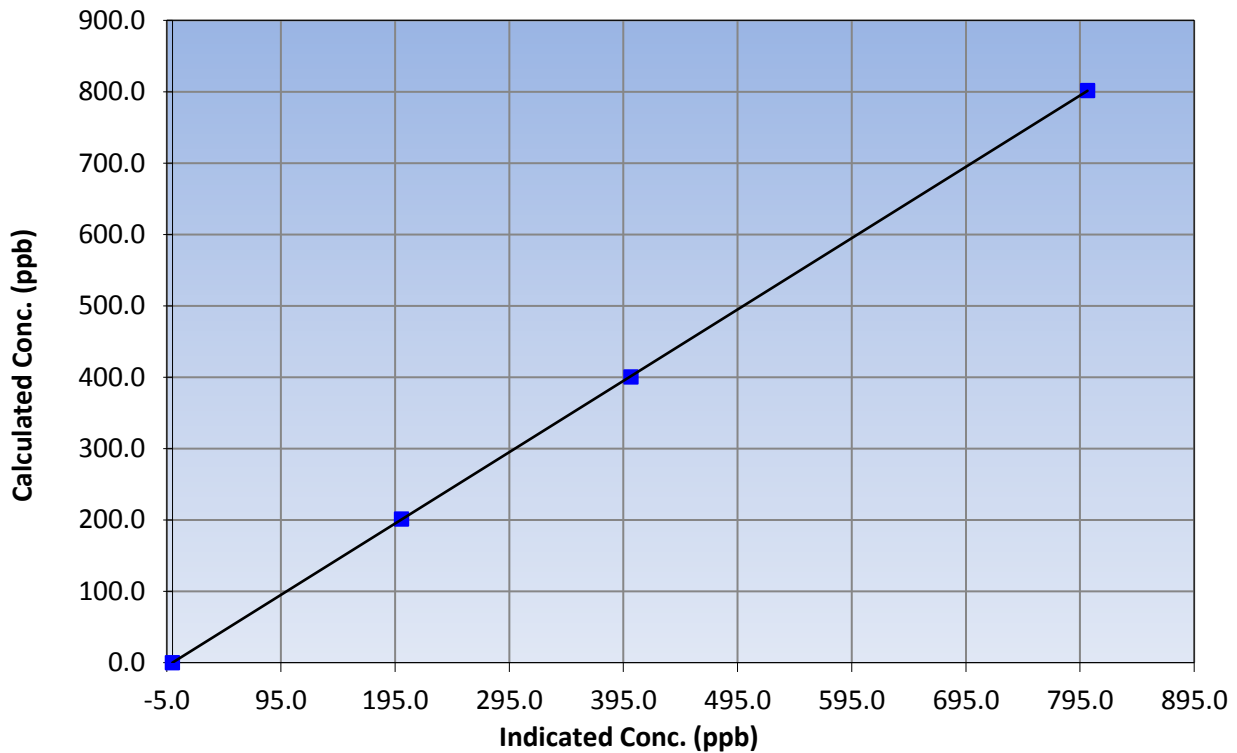
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999993 |
| 801.7 | 801.5 | 1.0002 | | |
| 400.3 | 401.7 | 0.9966 | Slope | 0.999596 |
| 201.2 | 200.5 | 1.0035 | | |
| | | | Intercept | 0.054744 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

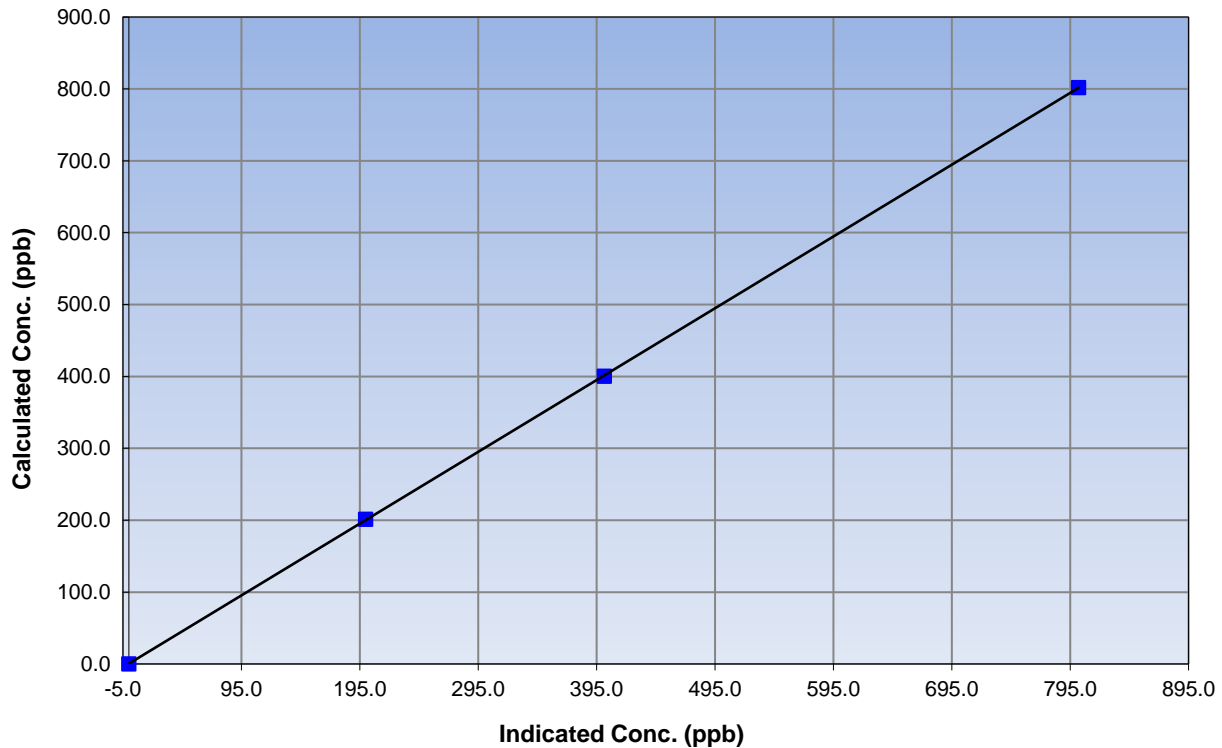
Station Information

| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999993 |
| 801.7 | 802.1 | 0.9995 | | |
| 400.3 | 401.4 | 0.9973 | Slope | 0.998679 |
| 201.2 | 199.9 | 1.0066 | | |
| | | | Intercept | 0.446341 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

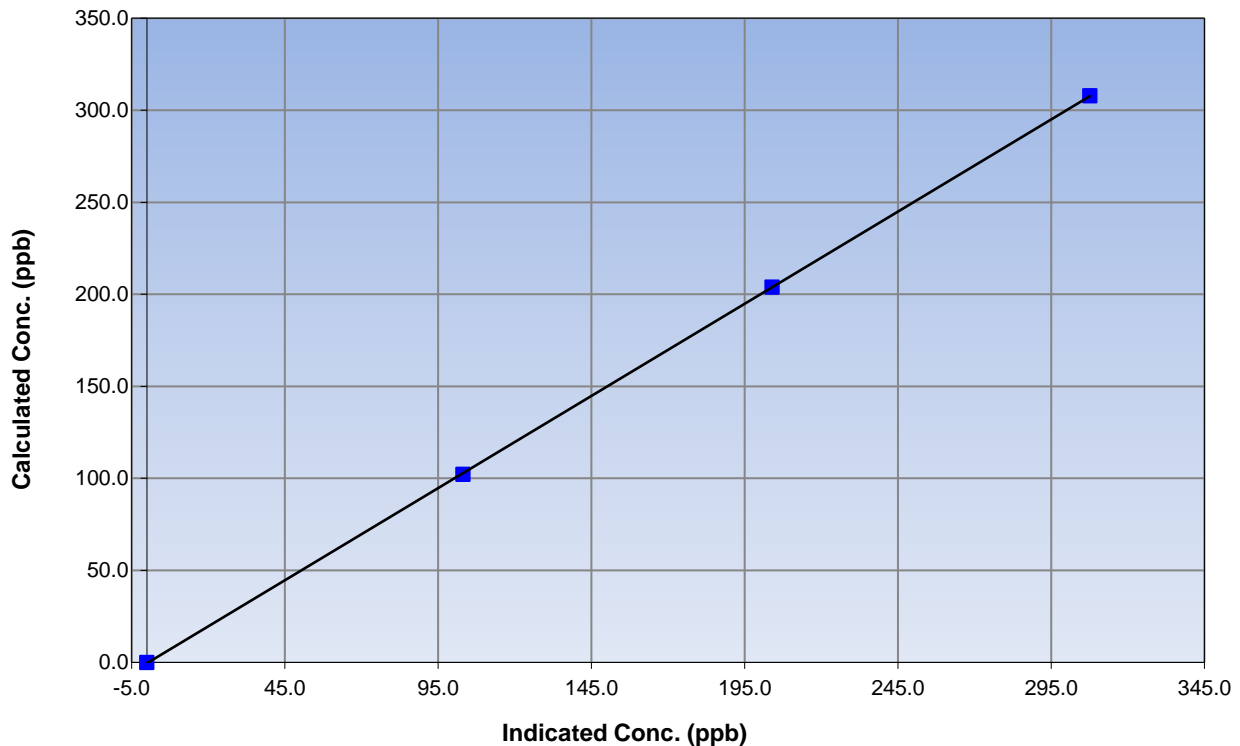
Station Information

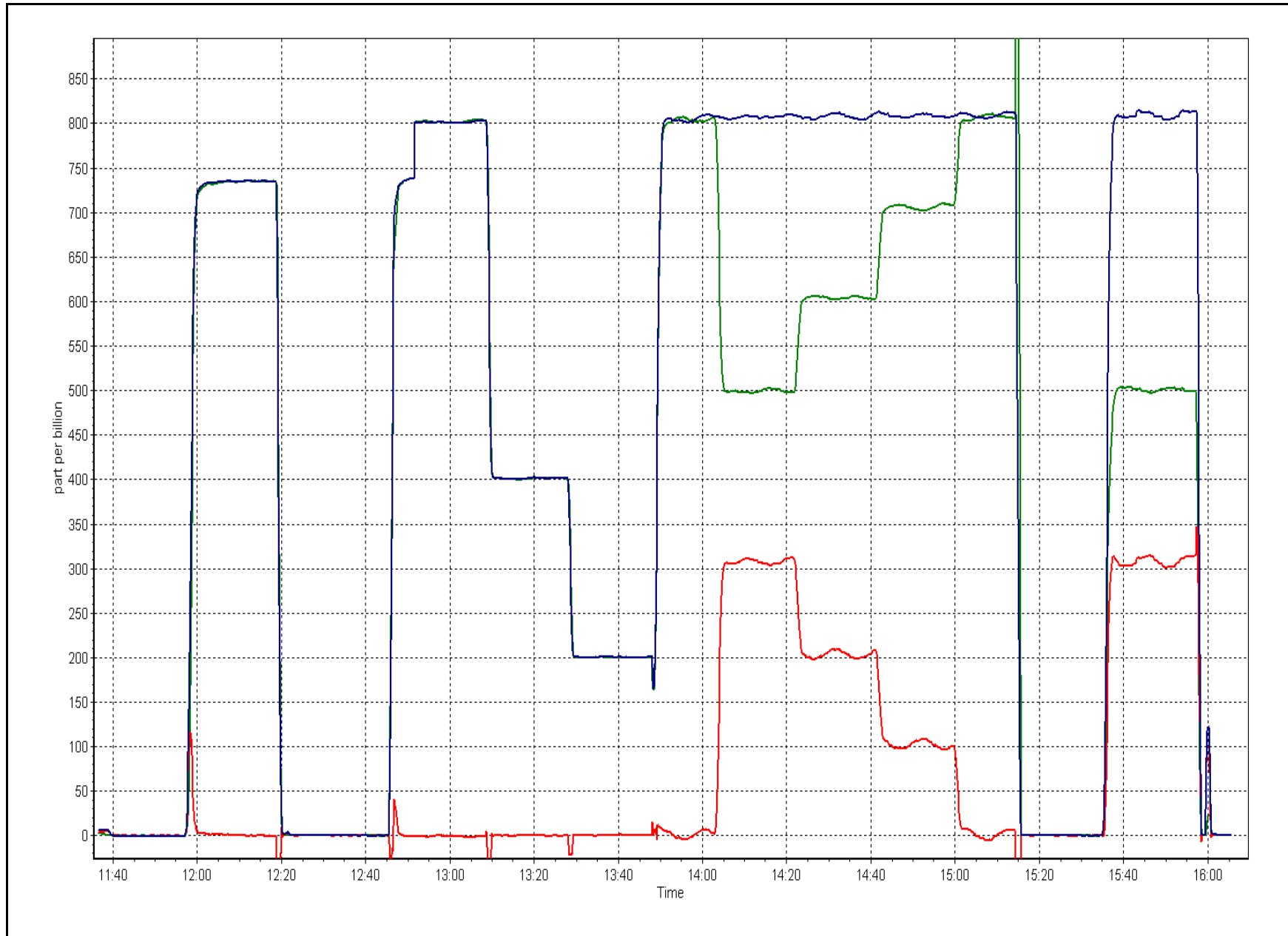
| | | | |
|------------------|--------------------|----------------------|----------------|
| Calibration Date | September 15, 2016 | Previous Calibration | August 3, 2016 |
| Station Number | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 11:40 | End Time (MST) | 16:06 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.0 | N/A | Correlation Coefficient | 0.999985 |
| 307.9 | 307.6 | 1.0009 | | |
| 203.8 | 204.0 | 0.9993 | Slope | 1.001486 |
| 102.2 | 103.2 | 0.9904 | | |
| | | | Intercept | -0.435864 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 21, 2016 | Previous Calibration | September 15, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Reason: | Routine | | |
| Start Time (MST) | 10:02 | End Time (MST) | 12:18 |
| NO Cal Gas Conc | 52.4 ppm | Gas Cert Reference | EY0000359 |
| NOX Cal Gas Conc | 52.4 ppm | Cal Gas Expiry Date | Feb-09-2018 |
| Calibrator | API T700 | Serial Number | 1221 |
| Zero air Generator | API 701 | Serial Number | 5611 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 9628 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.999596 | 0.998679 | 1.001486 |
| | Data Offset | 0.054744 | 0.446341 | -0.435864 |
| Current Calibration | Data Slope | 1.016934 | 1.016637 | 1.011624 |
| | Data Offset | 0.213556 | 0.121996 | -0.708069 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1501663731 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 ppb | | 0-1000 ppb | |
| Analyzer IP | 192.168.1.43 | | 192.168.1.43 | |
| NO coefficient | 1.040 | | 1.040 | |
| NOX coefficient | 0.998 | | 0.998 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 6.8 | | 6.8 | |
| NOX bkgrnd | 6.9 | | 6.9 | |
| Chamber Temp | 49.8 | Deg C | 50.3 | Deg C |
| Moly Temp | 322.9 | Deg C | 324.2 | Deg C |
| PMT voltage | -840 | V | -840 | V |
| PMT Temp | -2.8 | Deg C | -3.1 | Deg C |
| O3 flow | ok | | ok | |
| R Cell press NO | 138.1 | mmHg | 139.3 | mmHg |
| R Cell Press Nox | 138.1 | mmHg | 139.3 | mmHg |
| NO sample flow | 0.843 | lpm | 0.851 | lpm |
| Nox sample Flow | 0.841 | lpm | 0.851 | lpm |

Notes:

GPT reference for O3 cal. Used 2nd high point.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

September 21, 2016

Station Number:

AMS 21

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.1 | -0.1 | ---- | ---- |
| as found span | 5000 | 76.5 | 801.7 | 801.7 | 0.0 | 788.2 | 788.5 | -0.3 | 1.0172 | 1.0168 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.2 | -0.1 | -0.1 | ---- | ---- |
| high point | 5000 | 76.5 | 801.7 | 801.7 | 0.0 | 788.2 | 788.5 | -0.3 | 1.0172 | 1.0168 |
| second point | | | | | | | | | | |
| third point | | | | | | | | | | |
| as left zero | | | | | | | | | | |
| as left span | | | | | | | | | | |
| Average Correction Factor | | | | | | | | | 1.0172 | 1.0168 |

Corrected As found

NO_x= 788.4

NO= 788.6

Percent Change

NO_x= 1.7%

NO= 1.7%

Previous Response

NO_x= 802.0

NO= 802.3

GPT Calibration Data

Dilution Flow (total) 5000 ccm

Source Gas Flow 76.50 ccm

NOx ref calc conc = 801.7 ppb

NO ref calc conc = 801.7 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 795.5 | 794.8 | -0.1 | 1.0079 | 1.0087 | ---- | ---- |
| 1st NO2 (300) | 488.3 | 306.5 | 791.3 | 488.3 | 303.0 | 1.0131 | ---- | 1.0115 | 98.9% |
| 2nd NO2 (200) | 592.7 | 202.1 | 793.7 | 592.7 | 201.0 | 1.0102 | ---- | 1.0056 | 99.4% |
| 3rd NO2 (100) | 693.3 | 101.4 | 795.2 | 693.3 | 101.9 | 1.0082 | ---- | 0.9954 | 100.5% |
| 2nd NO ref point | | 0.0 | 795.5 | 794.8 | 0.8 | 1.0079 | 1.0087 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0098 | | 1.0041 | 99.6% |

Calibration Performed By:

Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

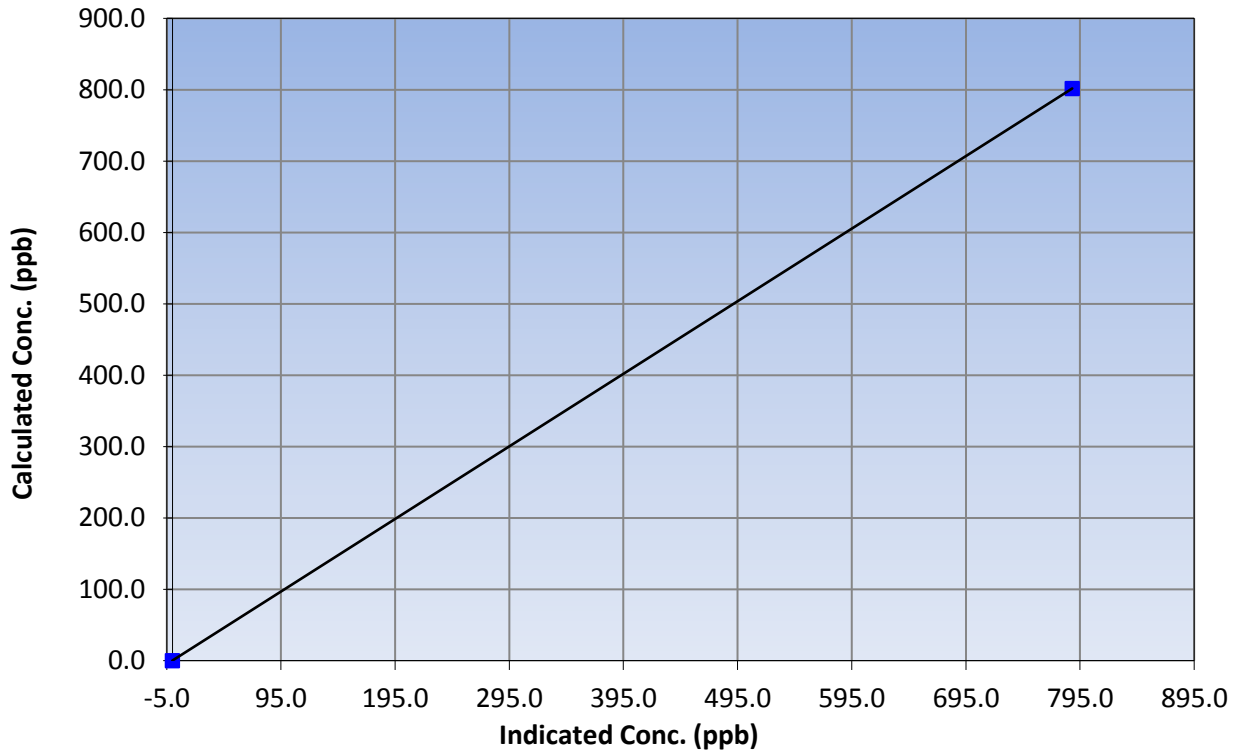
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 21, 2016 | Previous Calibration | September 15, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 10:02 | End Time (MST) | 12:18 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 1.000000 |
| 801.7 | 788.2 | 1.0172 | | |
| | | | Slope | 1.016934 |
| | | | Intercept | 0.213556 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

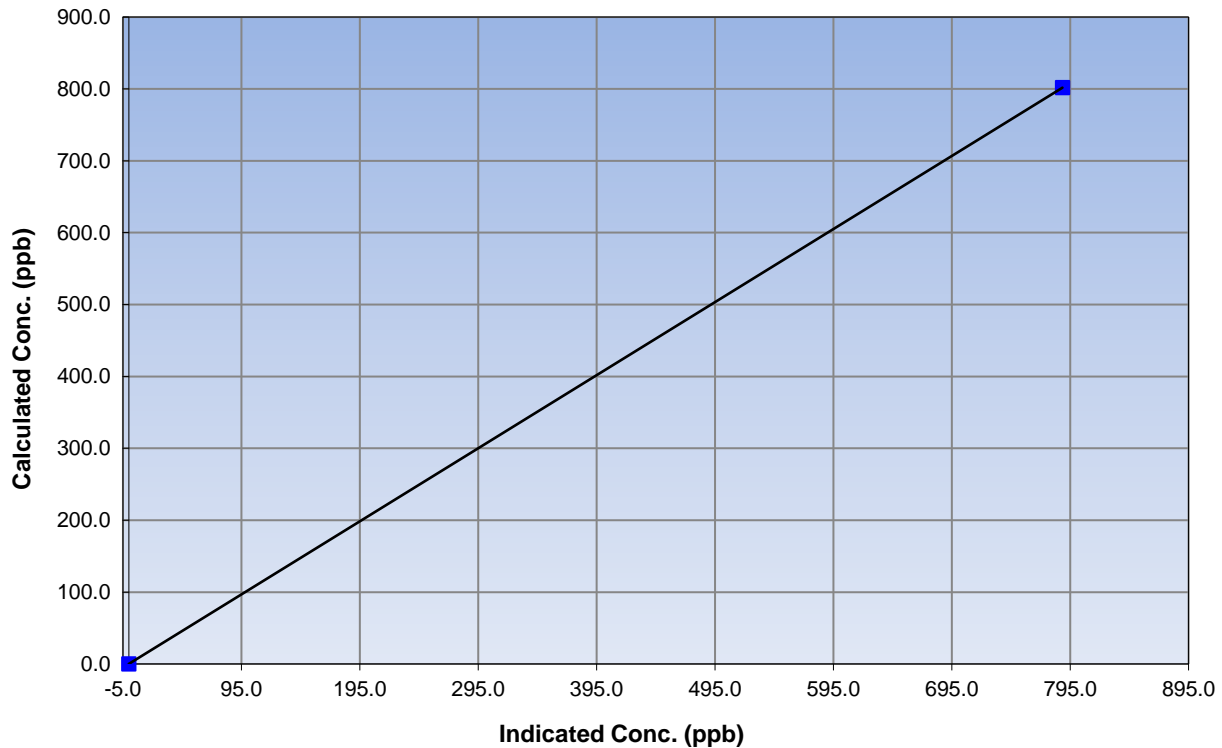
Station Information

| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 21, 2016 | Previous Calibration | September 15, 2016 |
| Station Name | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 10:02 | End Time (MST) | 12:18 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 1.000000 |
| 801.7 | 788.5 | 1.0168 | | |
| | | | Slope | 1.016637 |
| | | | Intercept | 0.121996 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

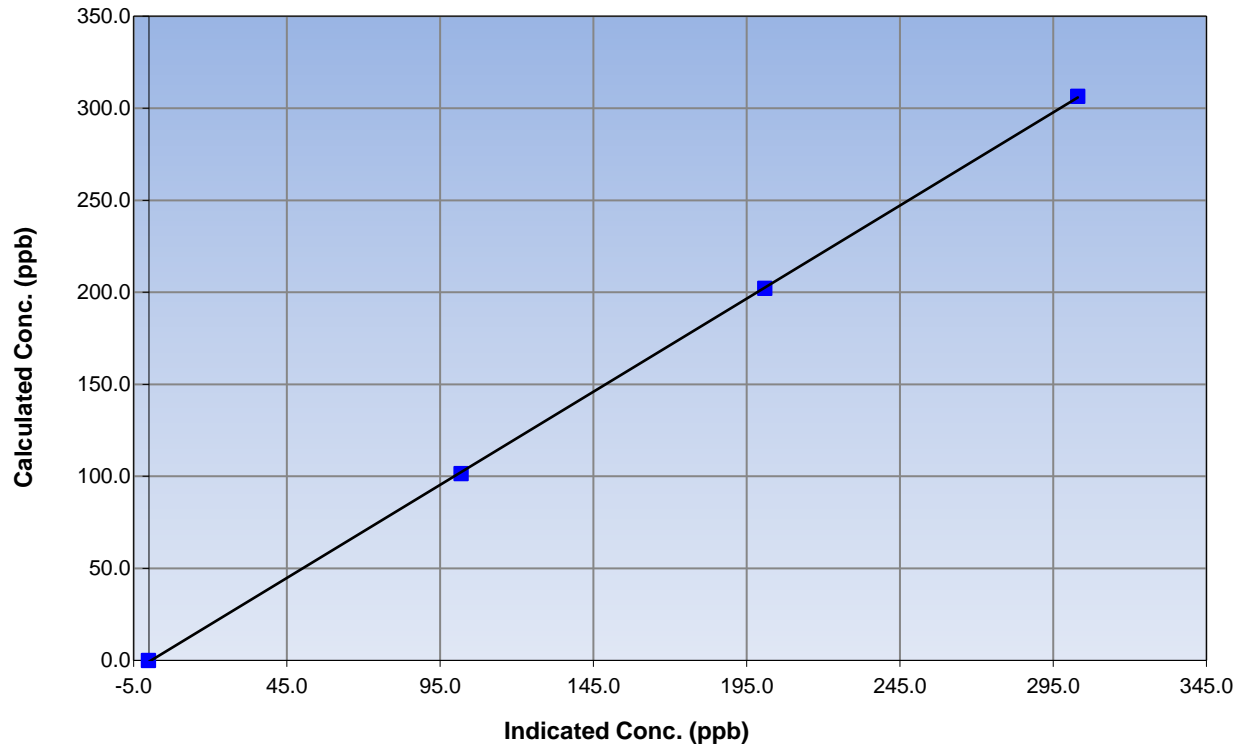
Station Information

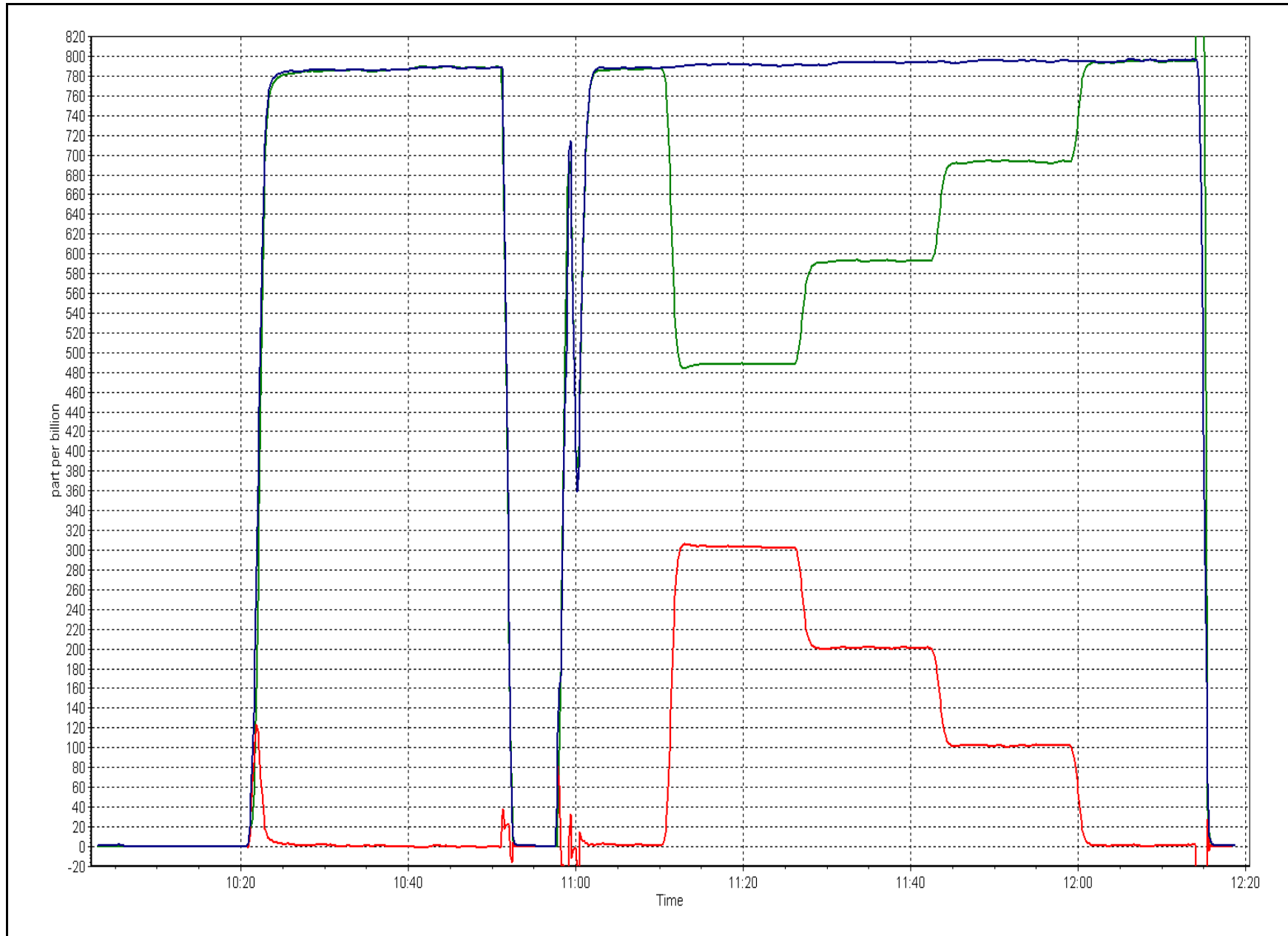
| | | | |
|------------------|--------------------|----------------------|--------------------|
| Calibration Date | September 21, 2016 | Previous Calibration | September 15, 2016 |
| Station Number | Conklin Community | Station Number | AMS 21 |
| Start Time (MST) | 10:02 | End Time (MST) | 12:18 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1501663731 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999957 |
| 306.5 | 303.0 | 1.0115 | | |
| 202.1 | 201.0 | 1.0056 | Slope | 1.011624 |
| 101.4 | 101.9 | 0.9954 | | |
| | | | Intercept | -0.708069 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP PM_{2.5} CALIBRATION

Version-08-2016

Station Information

| | | | |
|-----------------------|--------------------|-----------------|----------------|
| Station Name: | Conklin Community | Station number: | AMS 21 |
| Calibration Date: | September 22, 2016 | Last Cal Date: | August 4, 2016 |
| Start time (MST): | 9:40 | End time (MST): | 10:45 |
| Sharp Model: | 5030 | S/N: | 7494 |
| Particulate Fraction: | PM2.5 | C14 Source S/N: | CM-0404 |
| Flow Standard Model: | Delta Cal | S/N: | 1019 |
| Temp/RH standard: | Delta Cal | S/N: | 1019 |

Monthly Calibration Test

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|------------------------|--------------------------------------------------|----------|---------------------------------------------------|--------------------------|---------------|
| T1 (°C) | 15 | 15.4 | 15 | <input type="checkbox"/> | +/- 2 °C |
| P3 (hPa) | 954 | 953 | 954 | <input type="checkbox"/> | +/- 13 hPa |
| flow (LPH) | 1005 | 1020 | 1005 | <input type="checkbox"/> | +/- 50 LPH |
| Nephelometer zero | 0.3 | ----- | 0.3 | <input type="checkbox"/> | +/- 0.5 ug/m3 |
| Instrument Clock: | Verified <input checked="" type="checkbox"/> | | | | |
| Cyclone cleaning : | PM10 Cyclone <input checked="" type="checkbox"/> | | PM2.5 Cyclone <input checked="" type="checkbox"/> | | |
| Filter Tape Installed: | <input type="checkbox"/> | | | | |

Quarterly Calibration Test

| | | | | Tolerance |
|------------|-------------------|---------------------------|------------------|----------------------|
| Leak Test: | Date of check: | <u>September 22, 2016</u> | Last Cal Date: | <u>June 14, 2016</u> |
| | Flow w/o adaptor: | <u>17.01</u> | Flow w/ adaptor: | <u>16.95</u> 0.4 LPM |

Annual Calibration Test

| | | |
|------------------|-------------------------------------|-----------------------------------------|
| Foil Calibration | Foil Mass: <u>2805</u> | S/N: <u>2598</u> |
| | Date of check: <u>June 14, 2016</u> | Last Cal Date: <u>March 24, 2016</u> |
| | New Correction Factor: <u>5603</u> | Previous Correction Factor: <u>7056</u> |

| Parameter | As found | Measured | As left | Adjusted | Tolerance |
|-----------|----------|----------|---------|--------------------------|-----------|
| T2 (°C) | 21 | | | <input type="checkbox"/> | +/- 2 °C |
| T3 (°C) | 22 | | | <input type="checkbox"/> | +/- 2 °C |
| T4 (°C) | 24 | | | <input type="checkbox"/> | +/- 2 °C |
| RH (%) | 52 | | | <input type="checkbox"/> | +/- 10% |

Notes: Cyclone head cleaned. No adjustments made.

Calibration by: Asad Hidayat



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 500
CENOVUS
CHRISTINA LAKE
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 681 | 38 | 39 | 99.86 | 19 | 0 | 3 | 0 |
| H2S (ppb) Average | 683 | 37 | 37 | 100 | 1 | 0 | 0 | 0 |
| NO2 (ppb) Average | 680 | 39 | 40 | 99.86 | 15 | 0 | 4 | - |
| NO (ppb) Average | 680 | 39 | 40 | 99.86 | 18 | - | 5 | - |
| NOX (ppb) Average | 680 | 39 | 40 | 99.86 | 29 | - | 8 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100 | 23.5 | - | 16.6 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100 | 99 | - | 91 | - |
| Wind Speed 10 m (km/h) Average | 716 | 0 | 4 | 99.44 | 23 | - | 17 | - |
| Wind Direction 10 m (deg) Average | 716 | 0 | 4 | 99.44 | - | - | - | - |

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|-----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 681 | 1 | 2 | - | 0 | 0 | 0 | 0 | 1 | 3 | 19 |
| H2S (ppb) Average | 683 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| NO2 (ppb) Average | 680 | 2.1 | 2 | - | 0 | 0 | 1 | 2 | 3 | 5 | 15 |
| NO (ppb) Average | 680 | 1.5 | 3 | - | 0 | 0 | 0 | 1 | 2 | 4 | 18 |
| NOX (ppb) Average | 680 | 3.6 | 4 | - | 0 | 1 | 1 | 2 | 4 | 8 | 29 |
| Temperature 2 m (C) Average | 720 | 10.46 | 4.7 | - | -0.6 | 4.4 | 7.4 | 10.1 | 13.7 | 16.4 | 23.5 |
| Relative Humidity (%) Average | 720 | 72.6 | 17 | - | 30 | 46 | 59 | 76 | 88 | 93 | 99 |
| Wind Speed 10 m (km/h) Average | 716 | 9.5 | 5 | - | 0 | 3 | 6 | 9 | 13 | 17 | 23 |
| Wind Direction 10 m (deg) Average | 716 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CENOVUS CHRISTINA LAKE (AMS 500)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|---------------------------------------|
| SO2 | 07 Sep 2016 10:00 | 07 Sep 2016 10:00 | 1 | Maintenance - sample manifold cleaned |
| NO2, NO, NOX | 07 Sep 2016 10:00 | 07 Sep 2016 10:00 | 1 | Maintenance - sample manifold cleaned |
| Wind Speed, Wind Direction | 07 Sep 2016 11:00 | 07 Sep 2016 12:00 | 2 | Maintenance - sensor calibration |
| Wind Speed, Wind Direction | 07 Sep 2016 23:00 | 07 Sep 2016 23:00 | 1 | Flat line in sensor output signal |
| Wind Speed, Wind Direction | 08 Sep 2016 02:00 | 08 Sep 2016 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: 19 ppb on Sep 14 23:00 | Maximum Daily Average: 2.8 ppb on Sep 27 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 2 18:00 | Minimum Daily Average: 0.0 ppb on Sep 30 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 1.7 ppb at hour 2 | Minimum Diurnal Average: 0.3 ppb at hour 21 | | Hours of Calibration: | 38 |
| 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 | | 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 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 |
| 2-Sep | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 3-Sep | 6 | 7 | Z | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 9 | 5 | 1 | 1 | 8 | 13 | 2.6 | 13 |
| 4-Sep | 10 | 12 | 5 | Z | 1 | 0 | 2 | 7 | 5 | 4 | 3 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.4 | 12 |
| 5-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 6 |
| 6-Sep | 0 | 3 | 4 | 1 | 5 | Z | 0 | 0 | 1 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 |
| 7-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3 |
| 8-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 4 | 5 | 3 | 0.9 | 5 |
| 9-Sep | 9 | 4 | Z | 0 | 2 | 2 | 4 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 6 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 9 |
| 10-Sep | 0 | 6 | 1 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 2 | 1 | 1 | 0.8 | 6 |
| 11-Sep | 1 | 0 | 1 | 0 | Z | 11 | 10 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1.3 | 11 |
| 12-Sep | 1 | 1 | 2 | 4 | 4 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 |
| 13-Sep | Z | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.7 | 1 |
| 14-Sep | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 19 | 3 | 1.5 | 19 | |
| 15-Sep | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.6 | 2 | |
| 16-Sep | 1 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0.6 | 1 | |
| 17-Sep | 0 | 2 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 2 | |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 5 | 3 | 5 | 5 | 1 | 6 | 4 | 2 | 0 | 4 | 0 | 0 | 0 | 1.7 | 6 | |
| 19-Sep | Z | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 5 | 5 | 6 | 5 | 6 | 8 | 4 | 3 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 2.3 | 8 | |
| 20-Sep | 1 | Z | 1 | 1 | 6 | 14 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 14 | |
| 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 | 0 | |
| 22-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 1 | C | C | C | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 0.6 | 2 | |
| 23-Sep | 0 | 1 | 1 | 1 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 24-Sep | 1 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 7 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 1.1 | 7 | |
| 25-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 10 | 5 | 7 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 10 | |
| 26-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0.6 | 3 | |
| 27-Sep | 7 | 3 | Z | 3 | 1 | 1 | 0 | 1 | 10 | 7 | 0 | 0 | 1 | 1 | 11 | 9 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 11 | |
| 28-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 4 | |
| 29-Sep | 1 | 0 | 1 | 1 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 3 | |
| 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 | 0 | |

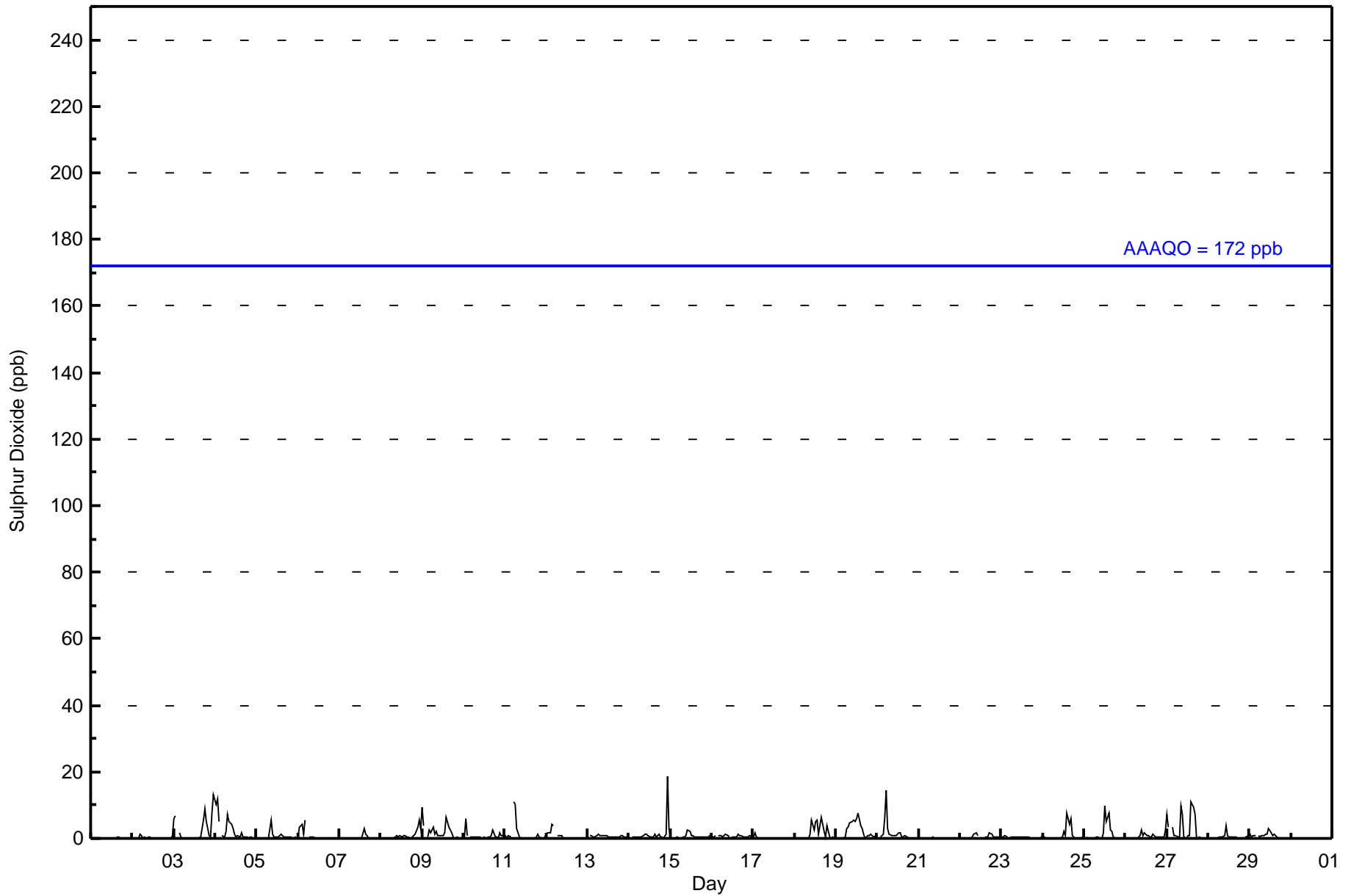
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.6 | 1.7 | 0.7 | 0.6 | 1.0 | 1.4 | 0.9 | 0.8 | 1.3 | 1.2 | 1.0 | 0.8 | 1.2 | 1.1 | 1.7 | 1.4 | 1.2 | 0.7 | 0.6 | 0.5 | 0.3 | 0.4 | 1.3 | 1.0 | Diurnal Average | |
| 10 | 12 | 5 | 4 | 6 | 14 | 10 | 7 | 10 | 7 | 6 | 5 | 10 | 8 | 11 | 9 | 7 | 5 | 9 | 5 | 1 | 4 | 19 | 13 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 675 | 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: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 68 | 86 | 62 | 76 | 91 | 51 | 52 | 54 | 14 | 672 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 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 | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 68 | 86 | 62 | 76 | 91 | 51 | 55 | 57 | 14 | 678 |

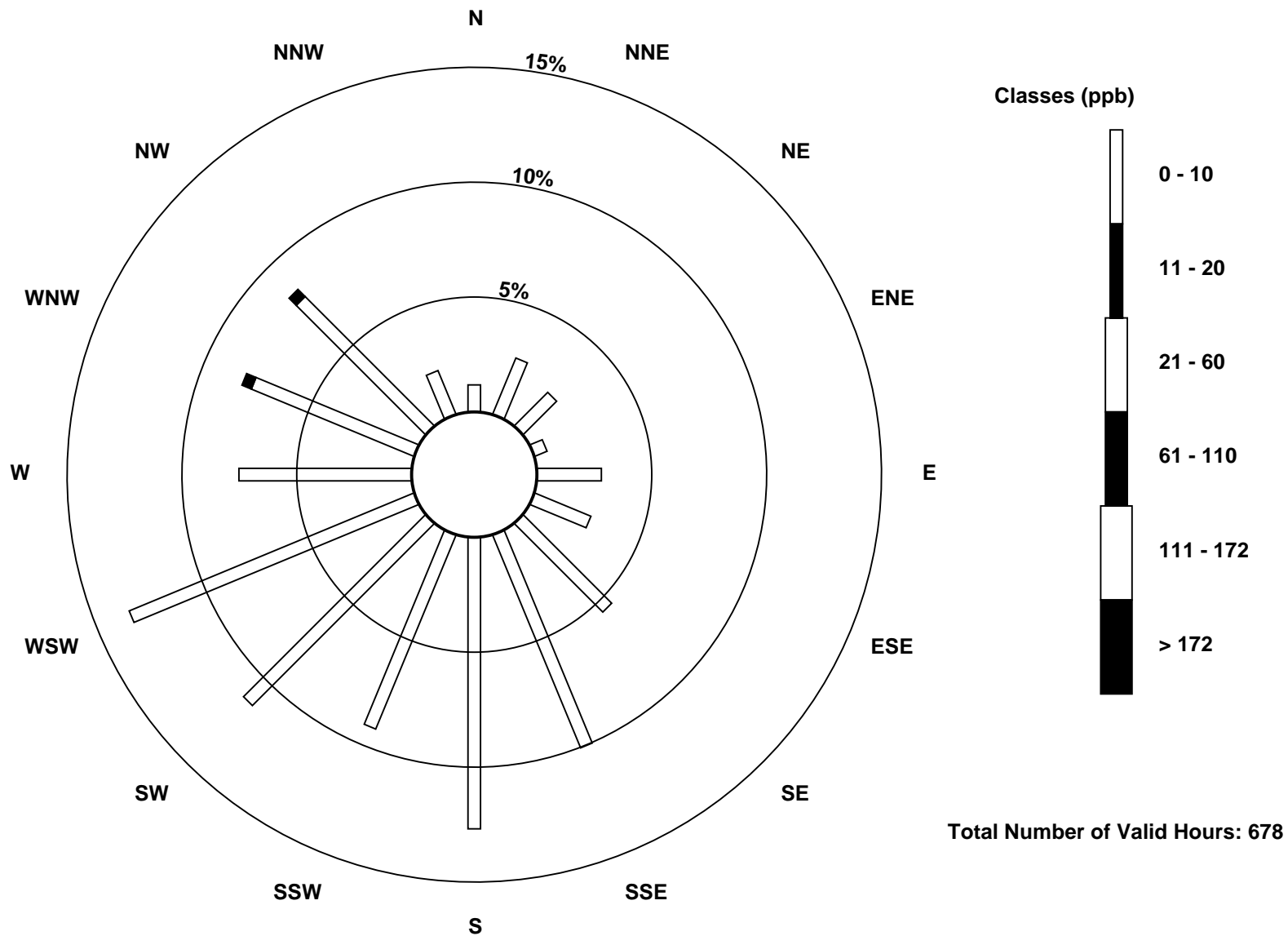
Total Number of Valid Hours: 678

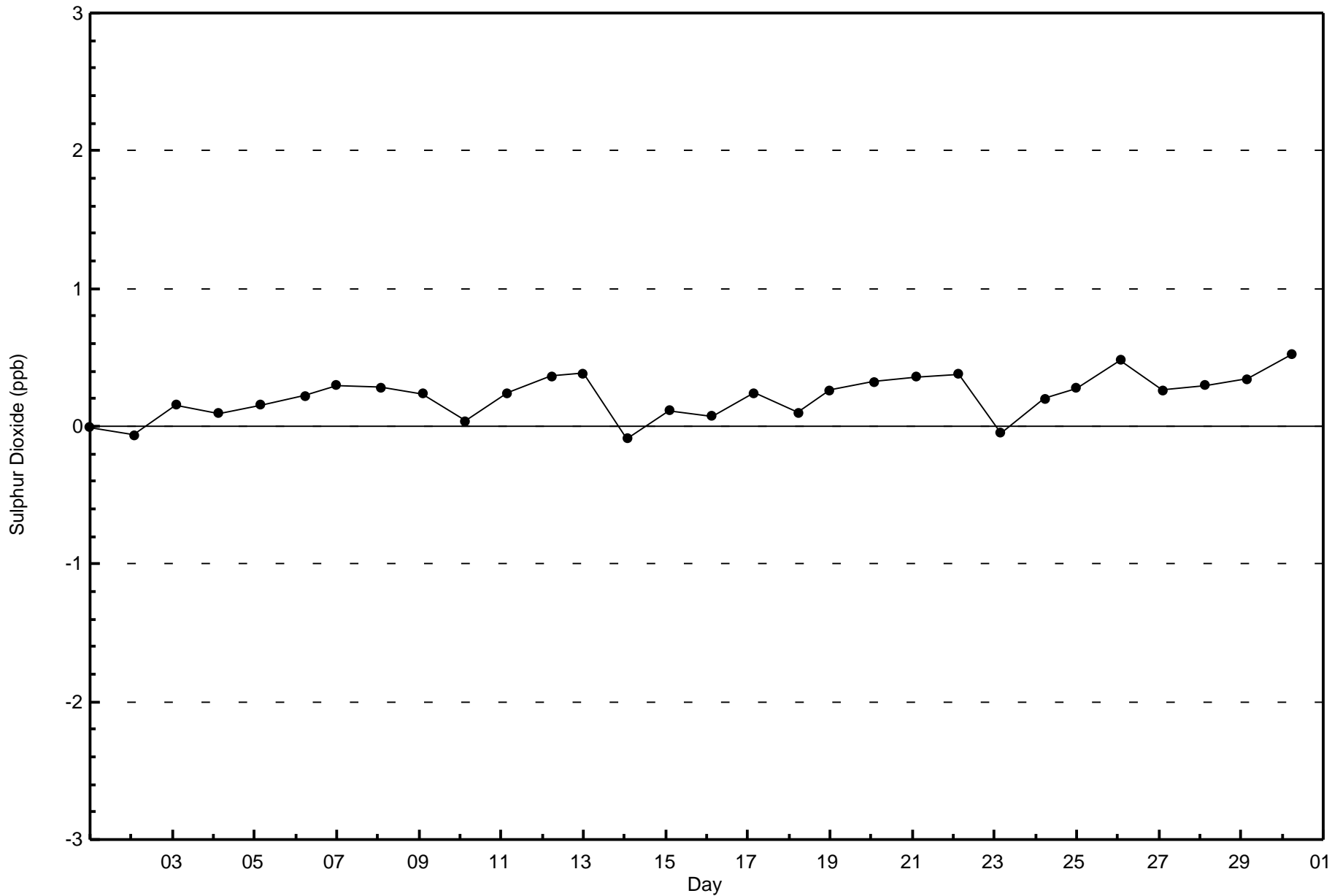
Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
Cenovus - Christina Lake (AMS500)





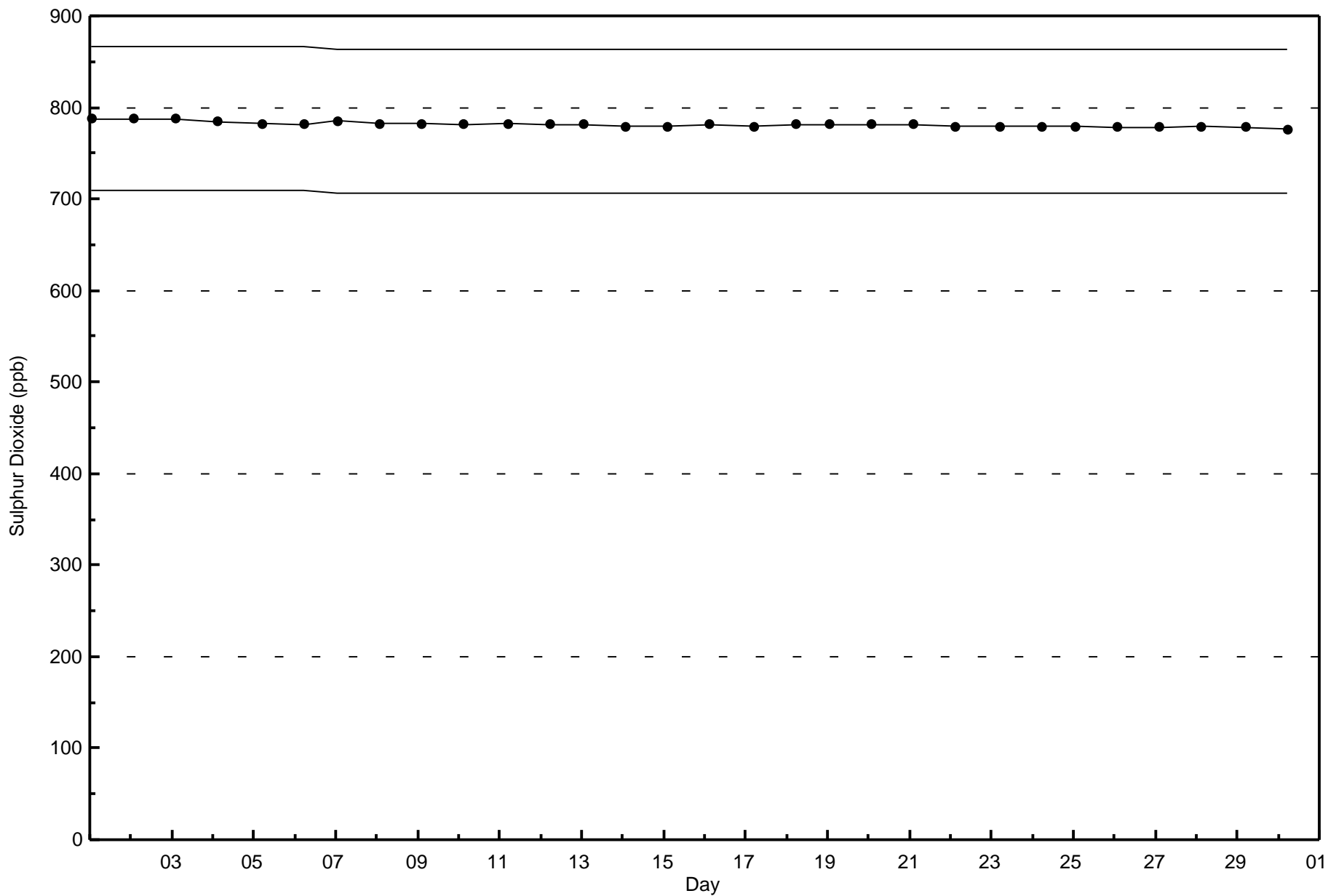


Wood Buffalo Environmental Association

Span Responses

Sulphur Dioxide (SO₂) - ppb

Cenovus - Christina Lake - September 2016





| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 1 ppb on Sep 14 02:00 | Maximum Daily Average: 0.3 ppb on Sep 19 | | Hours of Data: | 683 |
| Minimum Value: 0 ppb on Sep 14 15:00 | Minimum Daily Average: 0.1 ppb on Sep 2 | | Hours of Missing Data: | 37 |
| Maximum Diurnal Average: 0.2 ppb at hour 2 | Minimum Diurnal Average: 0.1 ppb at hour 22 | | Hours of Calibration: | 37 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | Percent Operational Time: | 100.0 |

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

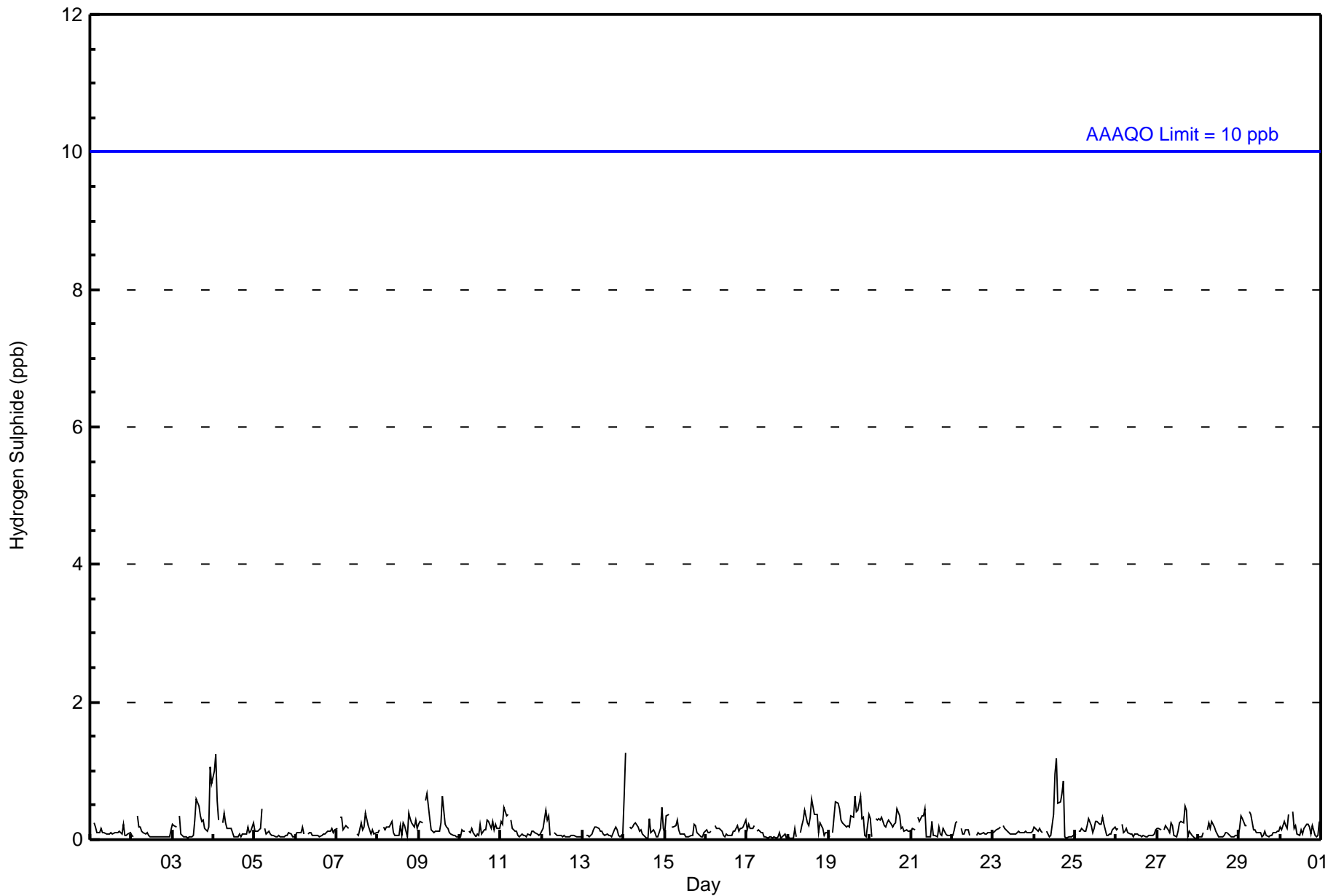
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Diurnal Average |
| 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 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
Cenovus - Christina Lake - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 683 | 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: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 8 | 18 | 13 | 4 | 16 | 25 | 40 | 65 | 85 | 63 | 76 | 91 | 52 | 57 | 54 | 14 | 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 | 8 | 18 | 13 | 4 | 16 | 25 | 40 | 65 | 85 | 63 | 76 | 91 | 52 | 57 | 54 | 14 | 681 |

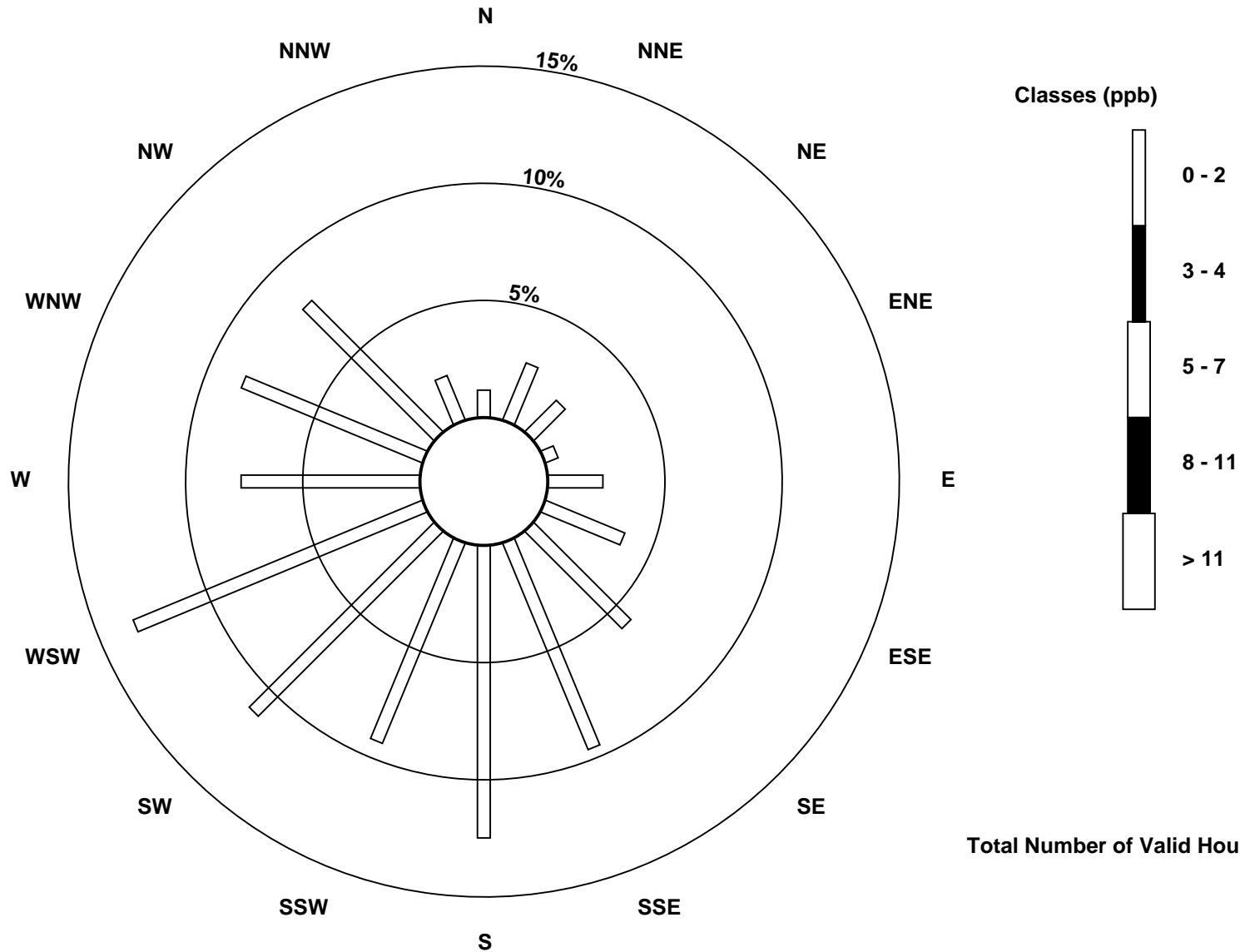
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

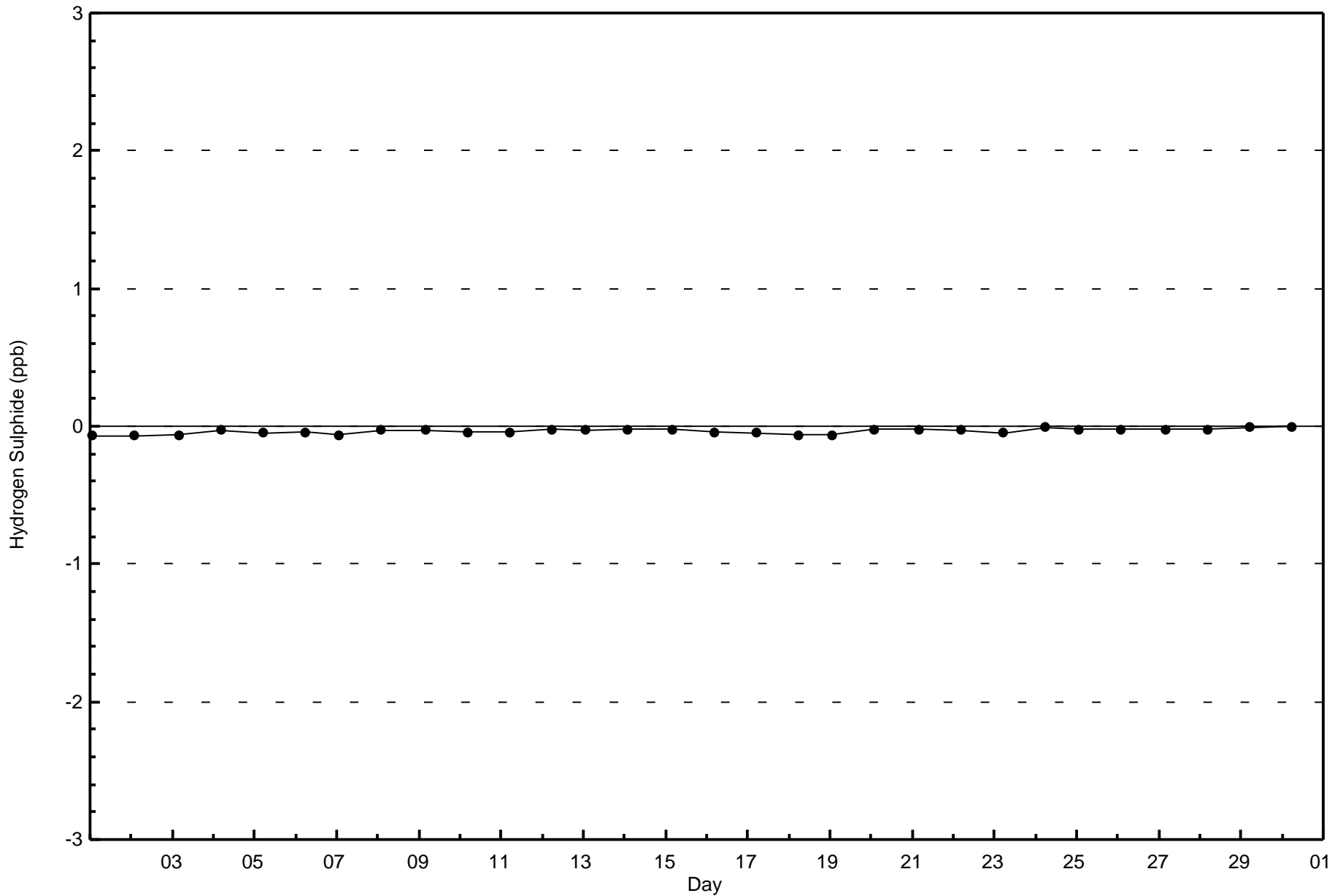
Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake (AMS500)

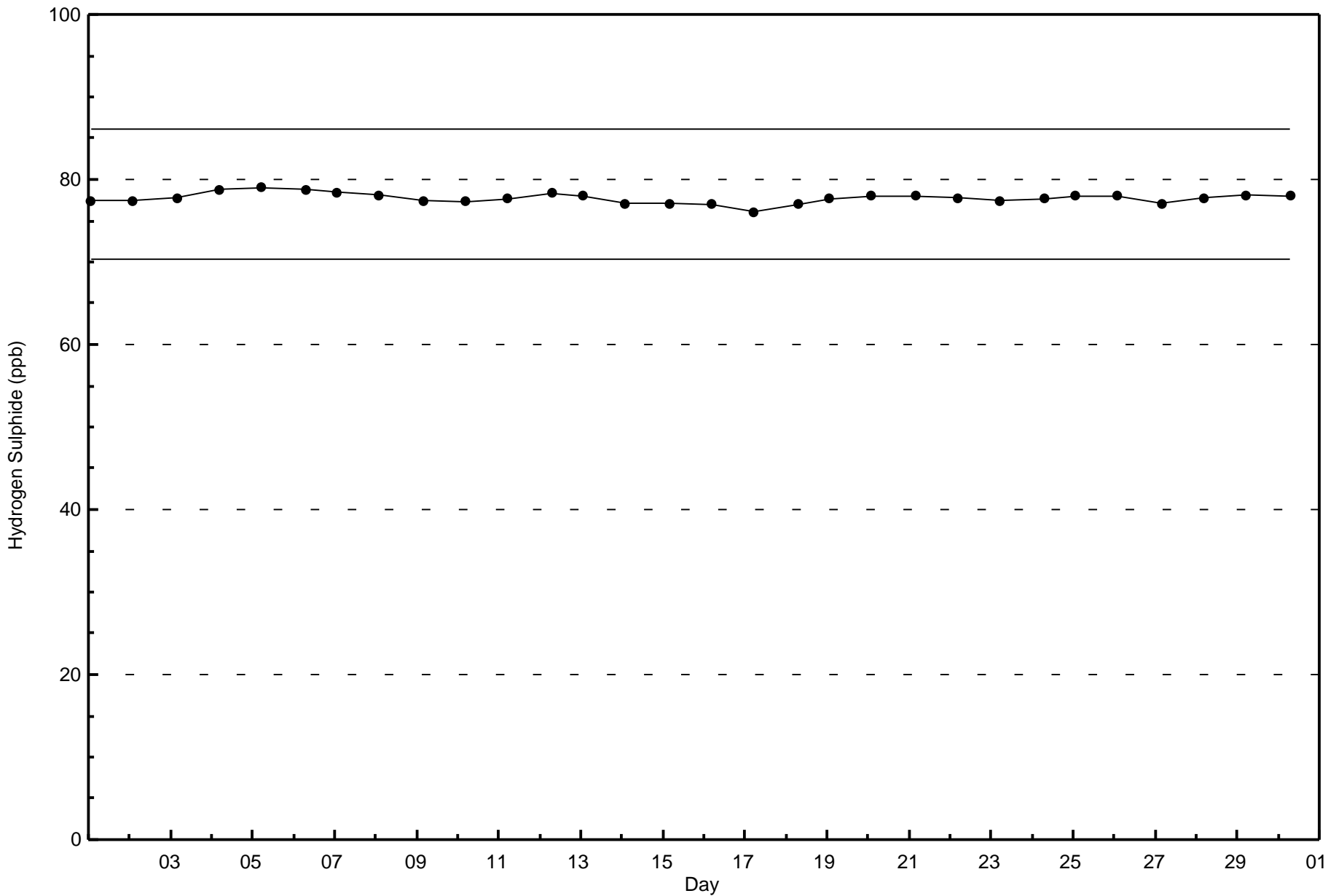




Wood Buffalo Environmental Association
Zero Responses

Hydrogen Sulphide (H₂S) - ppb
Cenovus - Christina Lake - September 2016







| | | |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 18 ppb on Sep 20 06:00 | Maximum Daily Average: 5.2 ppb on Sep 3 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 6 01:00 | Minimum Daily Average: 0.2 ppb on Sep 6 | Hours of Data: 680 |
| Maximum Diurnal Average: 3.0 ppb at hour 8 | Minimum Diurnal Average: 0.5 ppb at hour 21 | Hours of Missing Data: 40 |
| 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 = 13 | Hours of Calibration: 39 |
| | | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|----|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | Z | 1 | 1 | 1 | 0 | 2 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0.9 | 3 |
| 2-Sep | 1 | Z | 1 | 1 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 1.2 | 7 |
| 3-Sep | 14 | 13 | Z | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 5 | 10 | 13 | 16 | 10 | 2 | 2 | 10 | 15 | 5.2 | 16 | |
| 4-Sep | 9 | 12 | 4 | Z | 1 | 1 | 3 | 9 | 7 | 6 | 4 | 2 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.0 | 12 | |
| 5-Sep | 0 | 0 | 0 | 0 | Z | 2 | 2 | 1 | 3 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 | |
| 6-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 1 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 | |
| 7-Sep | Z | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | M | 0 | 0 | 0 | 0 | 4 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 | |
| 8-Sep | 0 | Z | 0 | 0 | 0 | 1 | 2 | 3 | 2 | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 4 | 6 | 5 | 1.8 | 6 |
| 9-Sep | 13 | 5 | Z | 0 | 3 | 3 | 7 | 3 | 4 | 3 | 2 | 3 | 2 | 3 | 9 | 6 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 3.1 | 13 | |
| 10-Sep | 0 | 1 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 3 | 1 | 1 | 0 | 3 | 2 | 2 | 1.0 | 3 |
| 11-Sep | 2 | 0 | 3 | 2 | Z | 13 | 10 | 4 | 4 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 3 | 3 | 3 | 1 | 0 | 2.4 | 13 | |
| 12-Sep | 1 | 1 | 1 | 4 | 3 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 | |
| 13-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 1 | |
| 14-Sep | 0 | Z | 1 | 0 | 1 | 4 | 3 | 7 | 4 | 2 | 2 | 1 | 1 | 1 | 0 | 2 | 1 | 2 | 1 | 0 | 0 | 1 | 13 | 2 | 2.0 | 13 |
| 15-Sep | 0 | 0 | Z | 0 | 0 | 4 | 4 | 15 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 15 | |
| 16-Sep | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 17-Sep | 0 | 1 | 0 | 0 | Z | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 18-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 3 | 8 | 4 | 6 | 7 | 3 | 8 | 4 | 2 | 0 | 4 | 1 | 0 | 0 | 2.3 | 8 | |
| 19-Sep | Z | 0 | 0 | 0 | 1 | 2 | 5 | 5 | 7 | 11 | 8 | 8 | 8 | 7 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 3.2 | 11 | |
| 20-Sep | 1 | Z | 1 | 2 | 8 | 18 | 4 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.1 | 18 | |
| 21-Sep | 0 | 0 | Z | 0 | 0 | 2 | 5 | 4 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 5 | |
| 22-Sep | 0 | 0 | 0 | Z | 1 | 2 | 1 | 1 | 1 | 1 | 0 | C | C | C | C | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 23-Sep | 0 | 0 | 0 | 0 | Z | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | |
| 24-Sep | 1 | 1 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 1 | 1 | 4 | 2 | 8 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 1.4 | 8 | |
| 25-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 9 | 6 | 6 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1.5 | 9 | |
| 26-Sep | 0 | Z | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 | |
| 27-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 10 | 6 | 0 | 0 | 1 | 2 | 11 | 9 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 2.1 | 11 | |
| 28-Sep | 0 | 0 | 0 | Z | 0 | 4 | 5 | 4 | 4 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 5 | |
| 29-Sep | 0 | 1 | 0 | 0 | Z | 5 | 8 | 12 | 3 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1.7 | 12 | |
| 30-Sep | 0 | 1 | 0 | 0 | 1 | Z | 3 | 3 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 | |

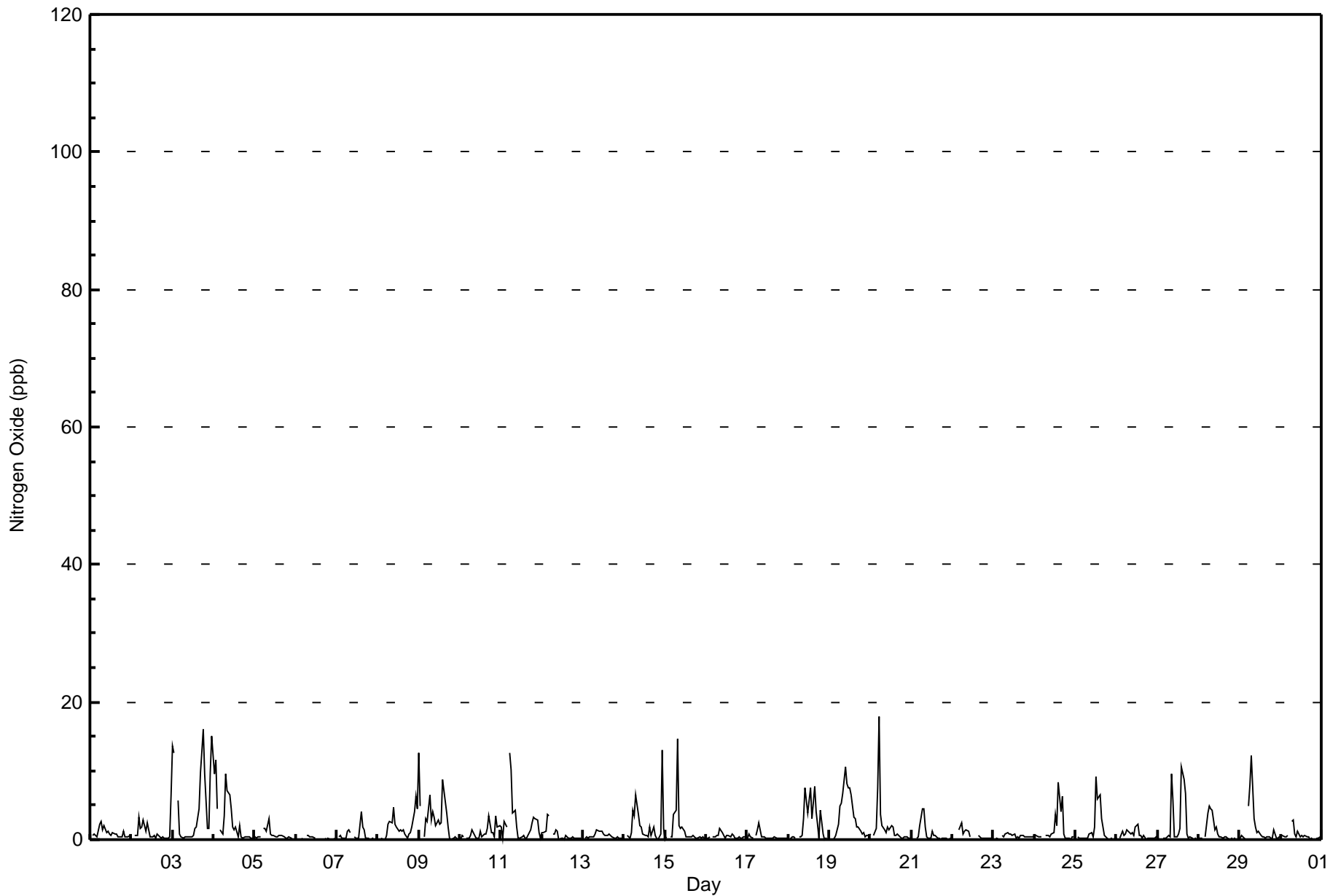
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 1.7 | 1.5 | 0.7 | 0.8 | 1.1 | 2.7 | 2.5 | 3.0 | 2.4 | 2.0 | 1.5 | 1.2 | 1.7 | 1.5 | 2.0 | 1.8 | 1.6 | 1.1 | 0.9 | 0.9 | 0.5 | 0.6 | 1.3 | 1.2 | Diurnal Average | |
| 14 | 13 | 4 | 6 | 8 | 18 | 10 | 15 | 10 | 11 | 8 | 8 | 9 | 7 | 11 | 9 | 10 | 13 | 16 | 10 | 3 | 4 | 13 | 15 | Diurnal Maximum | |

Z - zerospan C - Calibration M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 68 | 86 | 61 | 76 | 91 | 51 | 55 | 57 | 14 | 677 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 68 | 86 | 61 | 76 | 91 | 51 | 55 | 57 | 14 | 677 |

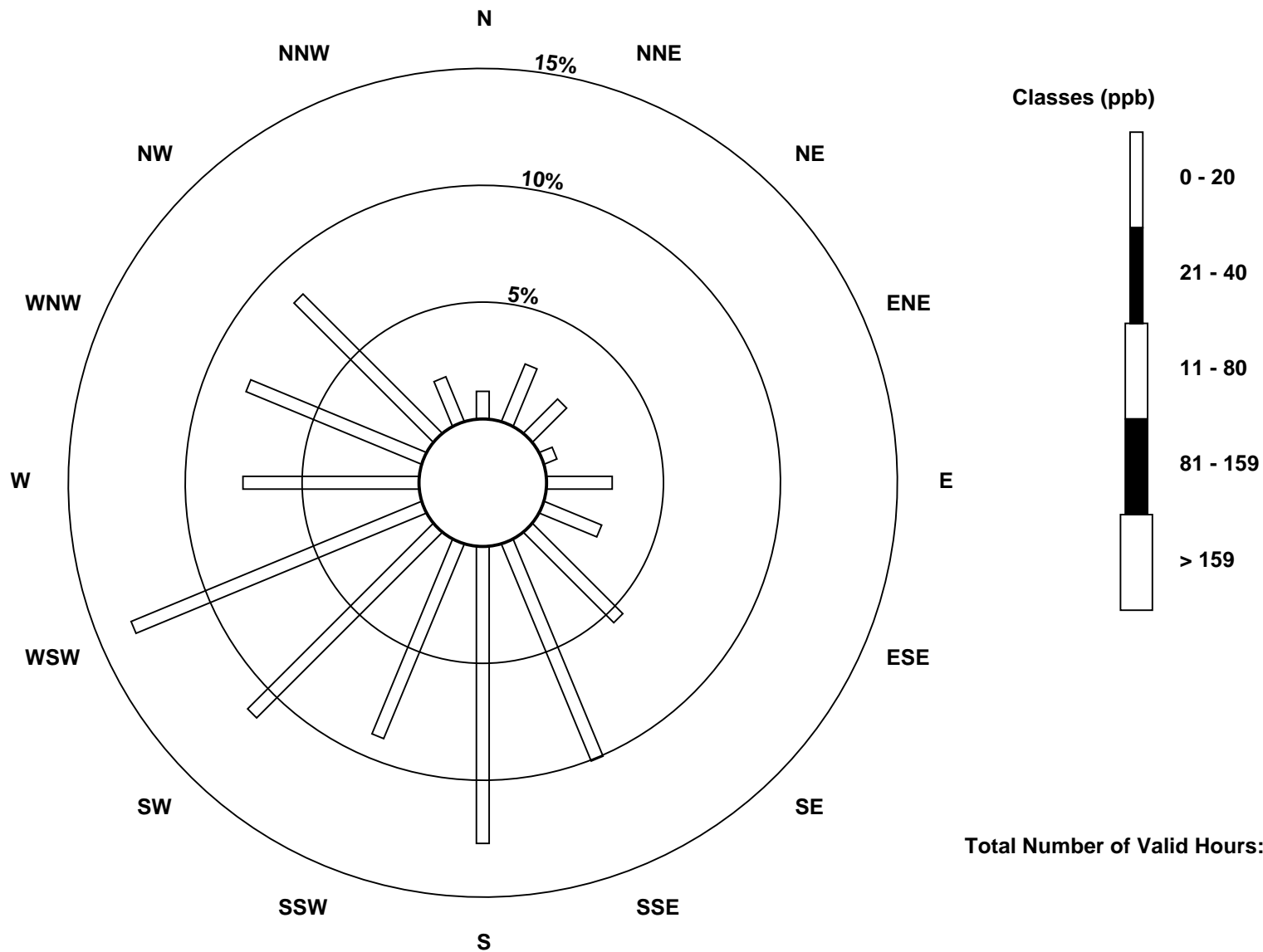
Total Number of Valid Hours: 677

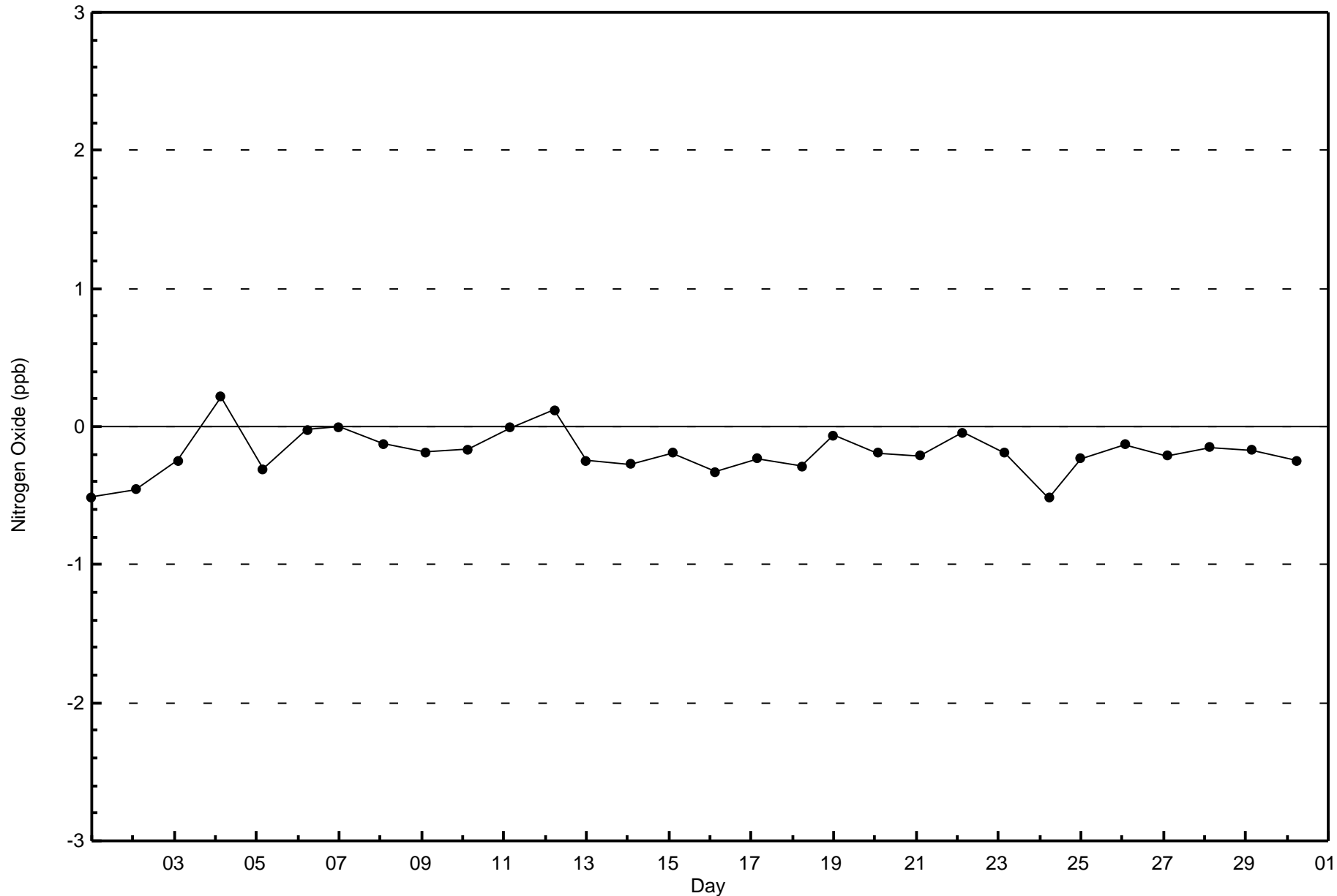
Total Number of Hours: 720

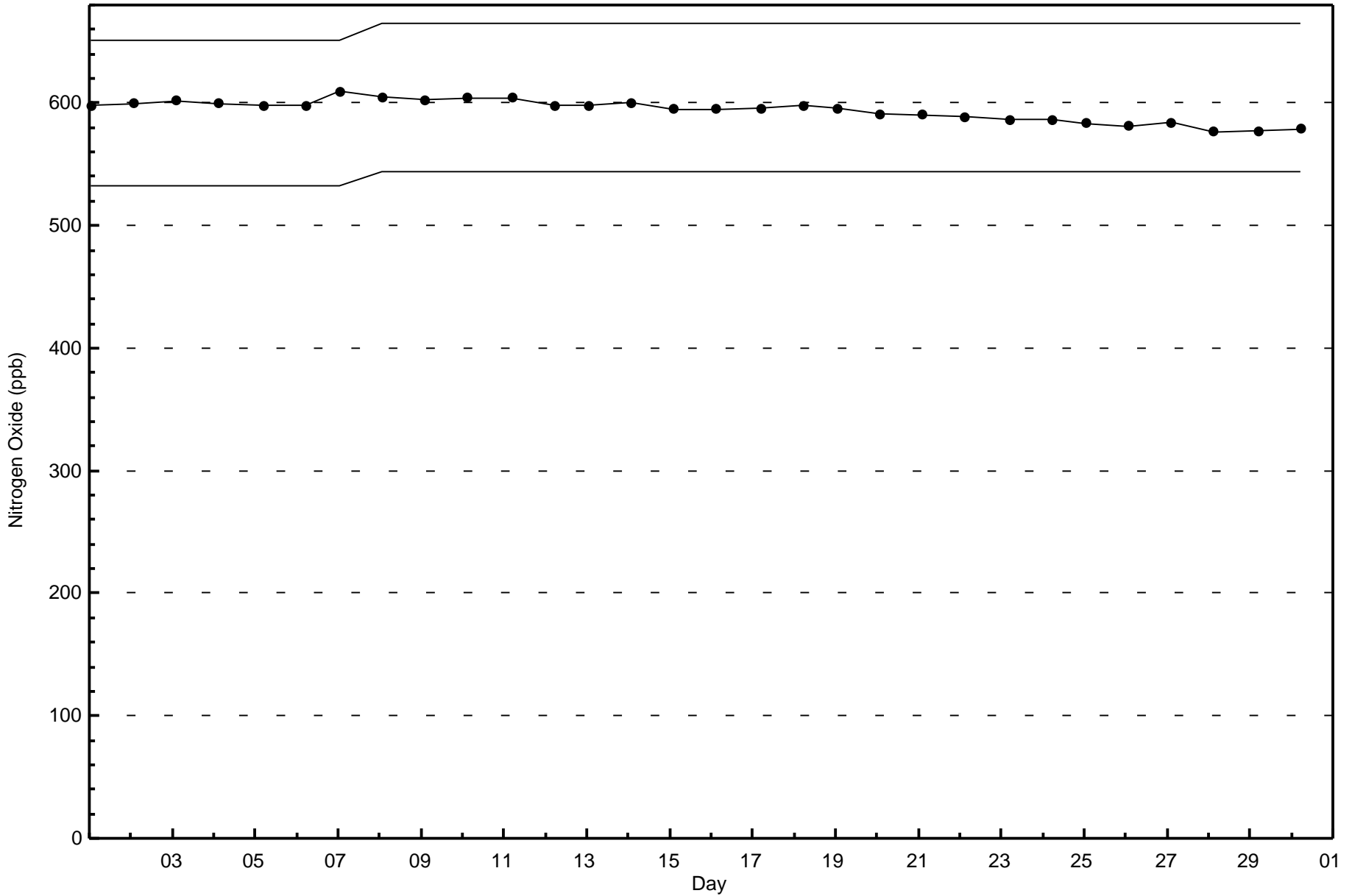


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxide (NO) - ppb
Cenovus - Christina Lake (AMS500)









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Cenovus - Christina Lake - September 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 15 ppb on Sep 14 23:00 | Maximum Daily Average: 4.1 ppb on Sep 27 | | Hours of Data: | 680 |
| Minimum Value: 0 ppb on Sep 7 22:00 | Minimum Daily Average: 0.9 ppb on Sep 1 | | Hours of Missing Data: | 40 |
| Maximum Diurnal Average: 3.2 ppb at hour 6 | Minimum Diurnal Average: 1.5 ppb at hour 22 | | Hours of Calibration: | 39 |
| Monthly Average: 2.1 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 9 | | Percent Operational Time: | 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|---|---|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | Z | 1 | 0 | 1 | 1 | 2 | 3 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0.9 | 3 |
| 2-Sep | 0 | Z | 0 | 1 | 3 | 2 | 2 | 3 | 1 | 3 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 1.3 | 4 |
| 3-Sep | 5 | 5 | Z | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 5 | 7 | 9 | 6 | 2 | 2 | 9 | 10 | 3.0 | 10 | |
| 4-Sep | 7 | 9 | 4 | Z | 2 | 1 | 3 | 5 | 4 | 4 | 4 | 2 | 2 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2.5 | 9 | |
| 5-Sep | 1 | 1 | 1 | 1 | Z | 2 | 2 | 1 | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 6 | 5 | 2 | 1.8 | 6 | |
| 6-Sep | 1 | 5 | 6 | 3 | 7 | Z | 3 | 2 | 2 | 2 | 1 | 1 | C | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2.1 | 7 |
| 7-Sep | Z | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | M | 1 | 1 | 0 | 0 | 5 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 5 |
| 8-Sep | 0 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 2 | 3 | 4 | 7 | 3 | 1.6 | 7 |
| 9-Sep | 7 | 3 | Z | 1 | 3 | 2 | 4 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 6 | 4 | 4 | 2 | 1 | 0 | 0 | 2 | 4 | 1 | 2.4 | 7 |
| 10-Sep | 1 | 6 | 3 | Z | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 2 | 4 | 2 | 3 | 1 | 4 | 2 | 2 | 1.8 | 6 |
| 11-Sep | 2 | 1 | 2 | 2 | Z | 8 | 7 | 4 | 4 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 3 | 5 | 7 | 5 | 4 | 2 | 1 | 2.7 | 8 |
| 12-Sep | 2 | 3 | 3 | 5 | 5 | Z | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1.9 | 5 |
| 13-Sep | Z | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1.7 | 3 |
| 14-Sep | 2 | Z | 3 | 1 | 1 | 3 | 3 | 4 | 3 | 2 | 3 | 1 | 1 | 1 | 0 | 3 | 1 | 3 | 1 | 1 | 0 | 2 | 15 | 4 | 2.5 | 15 |
| 15-Sep | 1 | 1 | Z | 1 | 1 | 3 | 3 | 8 | 4 | 3 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.9 | 8 |
| 16-Sep | 2 | 1 | 2 | Z | 3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1.8 | 3 |
| 17-Sep | 2 | 4 | 2 | 1 | Z | 3 | 3 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1.4 | 4 |
| 18-Sep | 1 | 1 | 1 | 1 | 1 | Z | 2 | 2 | 2 | 4 | 6 | 4 | 5 | 7 | 4 | 8 | 6 | 5 | 1 | 7 | 2 | 0 | 1 | 0 | 3.0 | 8 |
| 19-Sep | Z | 0 | 1 | 1 | 1 | 3 | 4 | 4 | 5 | 6 | 5 | 5 | 7 | 7 | 4 | 4 | 3 | 4 | 3 | 2 | 3 | 2 | 2 | 2 | 3.4 | 7 |
| 20-Sep | 2 | Z | 2 | 3 | 6 | 11 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2.7 | 11 |
| 21-Sep | 1 | 1 | Z | 1 | 1 | 4 | 4 | 5 | 2 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1.1 | 5 |
| 22-Sep | 0 | 1 | 4 | Z | 3 | 5 | 3 | 2 | 3 | 2 | 1 | C | C | C | C | 1 | 1 | 1 | 2 | 4 | 1 | 1 | 1 | 1 | 1.9 | 5 |
| 23-Sep | 1 | 1 | 2 | 2 | Z | 2 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0.9 | 3 |
| 24-Sep | 2 | 0 | 0 | 1 | 1 | Z | 2 | 1 | 0 | 0 | 0 | 1 | 3 | 3 | 9 | 6 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1.6 | 9 |
| 25-Sep | Z | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 8 | 5 | 7 | 5 | 5 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2.2 | 8 |
| 26-Sep | 2 | Z | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 1 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 1.9 | 3 |
| 27-Sep | 8 | 5 | Z | 5 | 2 | 4 | 4 | 2 | 11 | 8 | 1 | 2 | 2 | 3 | 11 | 9 | 9 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 4.1 | 11 |
| 28-Sep | 1 | 1 | 1 | Z | 3 | 5 | 7 | 6 | 7 | 3 | 4 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2.5 | 7 |
| 29-Sep | 6 | 5 | 4 | 4 | Z | 9 | 9 | 10 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 4 | 4 | 1 | 1 | 1 | 3.8 | 10 |
| 30-Sep | 3 | 3 | 3 | 2 | 2 | Z | 6 | 5 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1.7 | 6 |

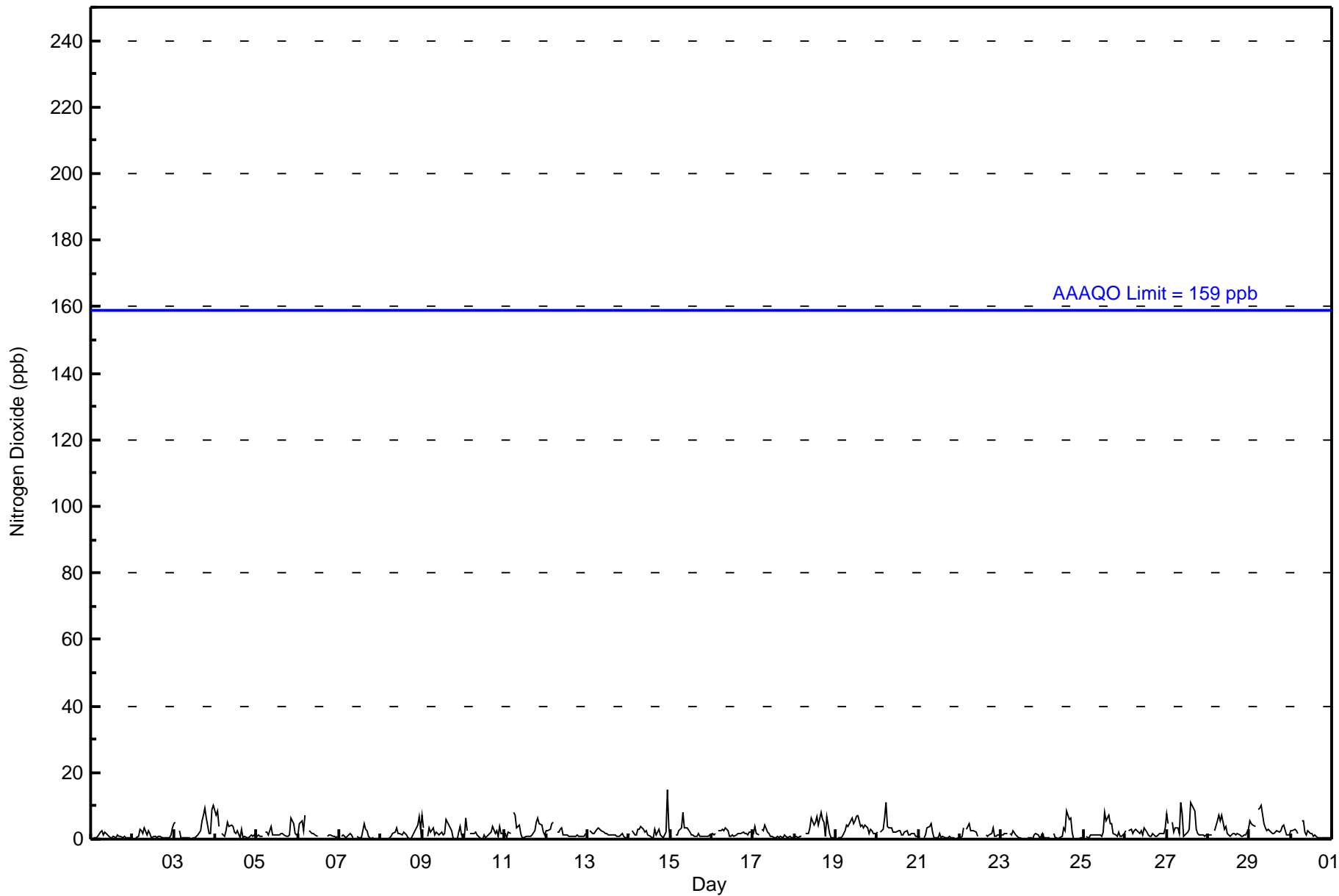
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 2.3 | 2.4 | 1.9 | 1.7 | 2.1 | 3.2 | 3.1 | 3.1 | 2.8 | 2.4 | 1.7 | 1.5 | 1.9 | 1.8 | 2.4 | 2.3 | 2.3 | 1.8 | 1.5 | 1.7 | 1.5 | 1.5 | 1.9 | 1.7 | Diurnal Average |
| 8 | 9 | 6 | 5 | 7 | 11 | 9 | 10 | 11 | 8 | 6 | 5 | 8 | 7 | 11 | 9 | 9 | 7 | 9 | 7 | 6 | 5 | 15 | 10 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 680 | 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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 68 | 86 | 61 | 76 | 91 | 51 | 55 | 57 | 14 | 677 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 68 | 86 | 61 | 76 | 91 | 51 | 55 | 57 | 14 | 677 |

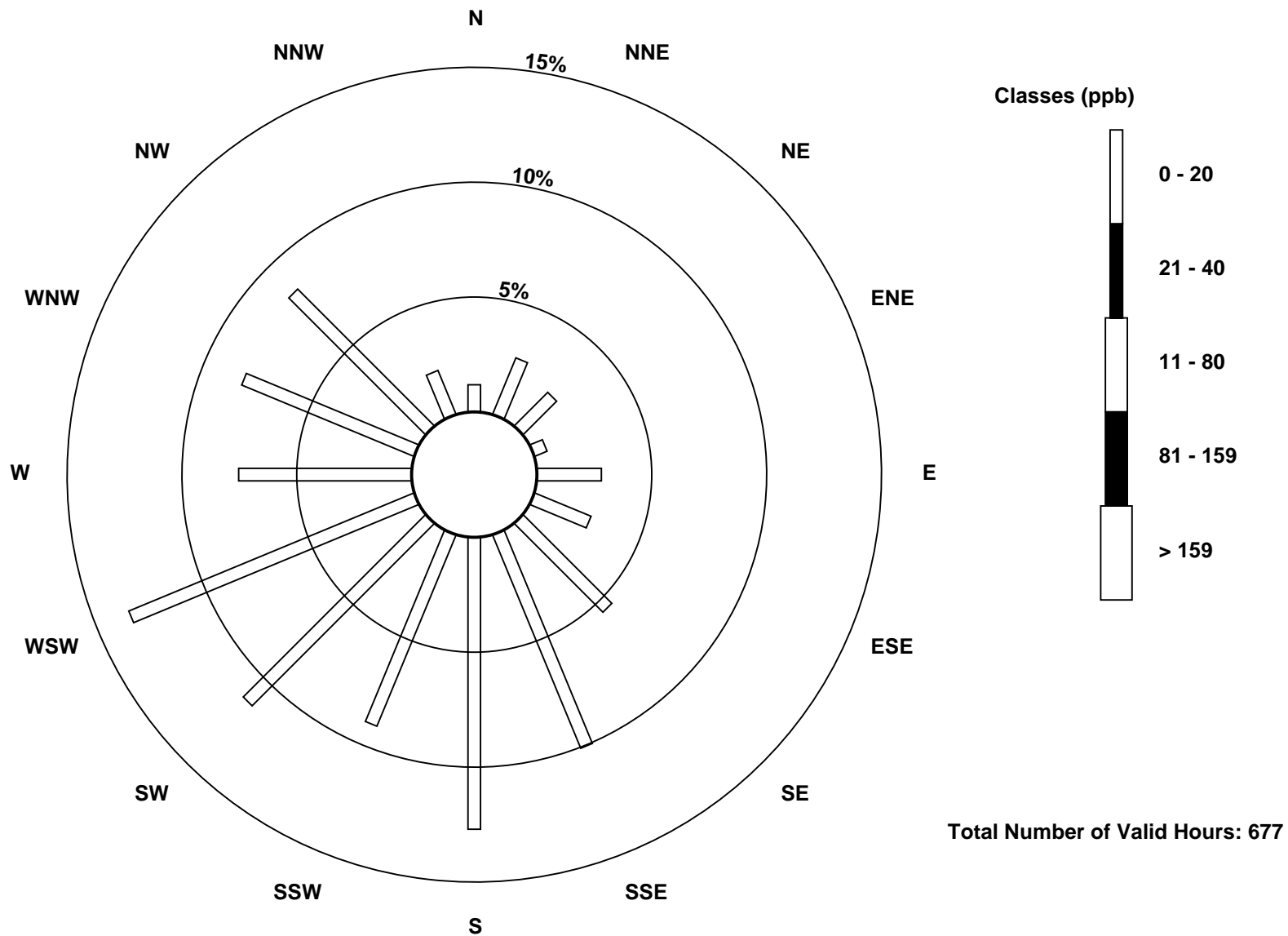
Total Number of Valid Hours: 677

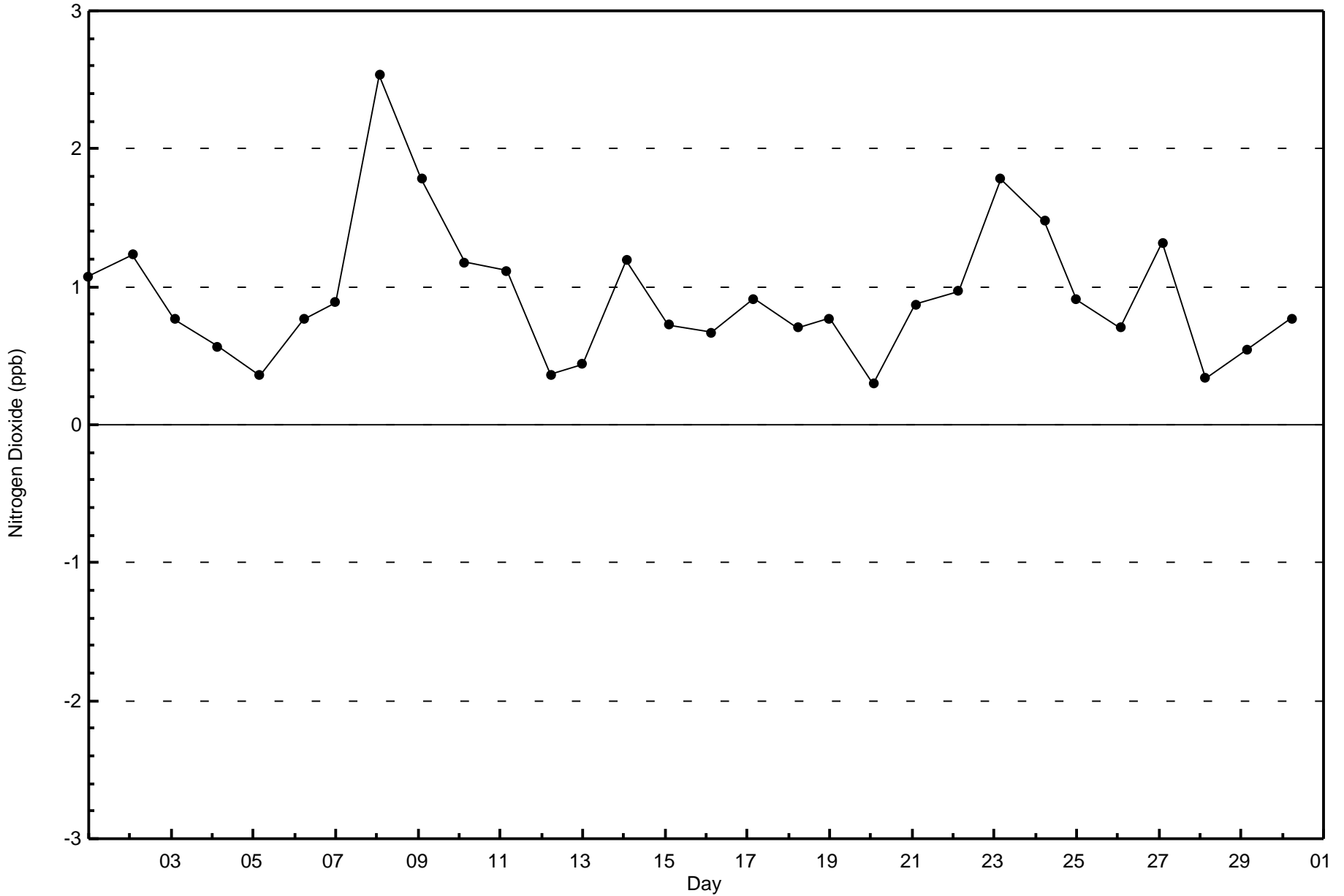
Total Number of Hours: 720

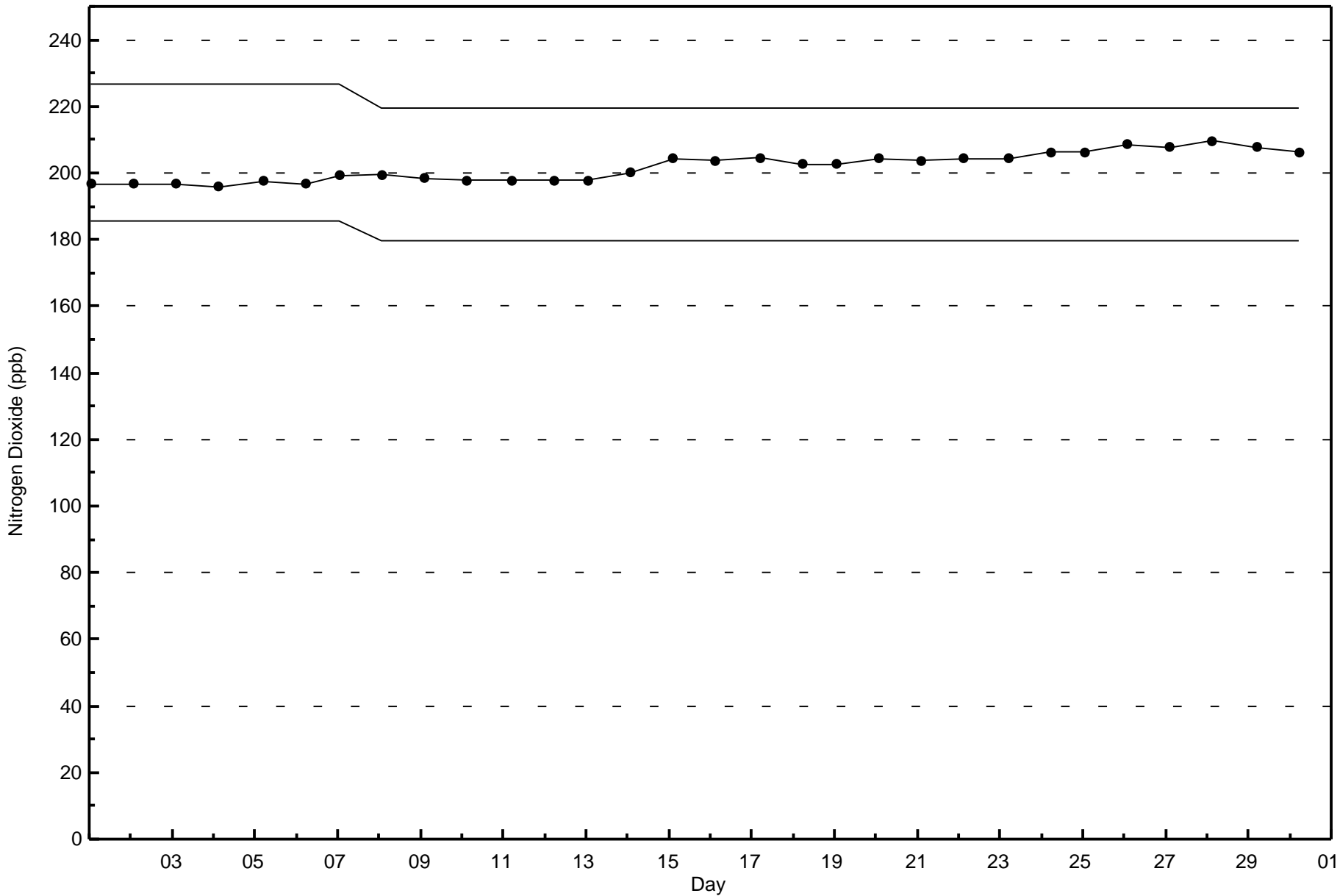


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
Cenovus - Christina Lake (AMS500)









Wood Buffalo Environmental Association
Summary of Hour Averages

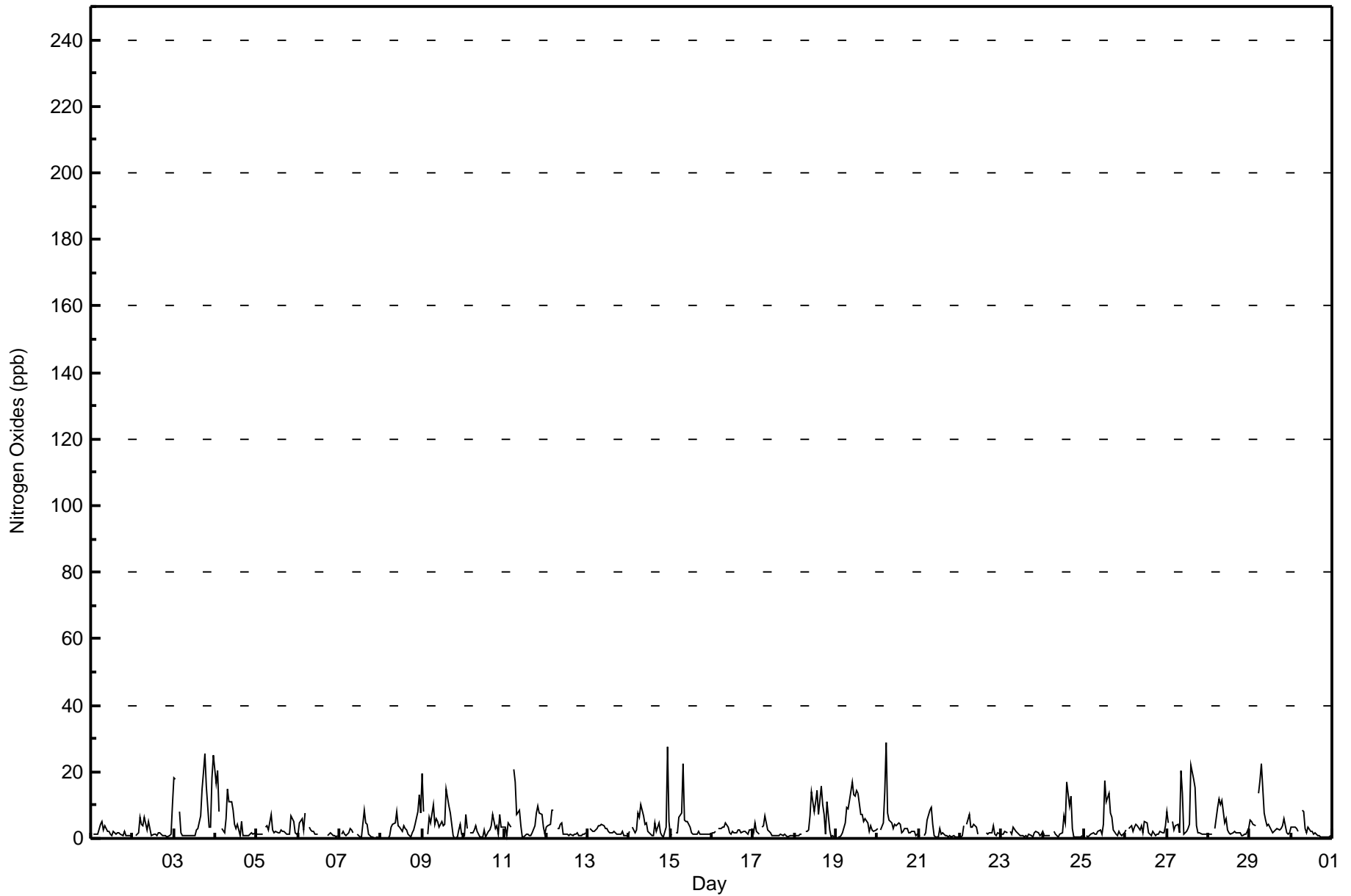
Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - September 2016

| Maximum Value: 29 ppb on Sep 20 06:00 Maximum Daily Average: 8.3 ppb on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 680 Hours of Missing Data: 40 Hours of Calibration: 39 Percent Operational Time: 99.9 | | | | | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|-----------------|---------------|---------------|
| Minimum Value: 0 ppb on Sep 8 05:00 Minimum Daily Average: 1.4 ppb on Sep 23 Maximum Diurnal Average: 6.1 ppb at hour 8 Minimum Diurnal Average: 2.0 ppb at hour 21 Monthly Average: 3.6 ppb Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 4 P ₉₀ = 8 P ₉₉ = 22 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | Z | 1 | 1 | 1 | 1 | 4 | 5 | 3 | 4 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1.8 | 5 |
| 2-Sep | 1 | Z | 1 | 2 | 6 | 4 | 4 | 6 | 2 | 5 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 10 | 2.5 | 10 |
| 3-Sep | 18 | 18 | Z | 8 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 7 | 15 | 20 | 25 | 16 | 3 | 3 | 18 | 25 | 8.3 | 25 |
| 4-Sep | 17 | 20 | 8 | Z | 3 | 2 | 6 | 15 | 11 | 11 | 8 | 4 | 3 | 4 | 1 | 5 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 5.5 | 20 |
| 5-Sep | 1 | 1 | 1 | 1 | Z | 4 | 4 | 3 | 7 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 7 | 5 | 2 | 1 | 2.5 | 7 | |
| 6-Sep | 1 | 5 | 6 | 3 | 7 | Z | 3 | 3 | 2 | 2 | 1 | 1 | C | C | C | C | C | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2.3 | 7 |
| 7-Sep | Z | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 2 | M | 1 | 1 | 1 | 0 | 9 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 | 9 |
| 8-Sep | 0 | Z | 0 | 0 | 0 | 1 | 3 | 4 | 5 | 8 | 4 | 4 | 2 | 4 | 3 | 3 | 1 | 0 | 2 | 3 | 4 | 8 | 13 | 8 | 3.5 | 13 |
| 9-Sep | 20 | 8 | Z | 1 | 7 | 5 | 10 | 4 | 6 | 5 | 3 | 5 | 4 | 4 | 15 | 10 | 7 | 4 | 1 | 0 | 0 | 2 | 4 | 1 | 5.5 | 20 |
| 10-Sep | 1 | 7 | 3 | Z | 2 | 2 | 2 | 4 | 2 | 1 | 0 | 0 | 2 | 1 | 2 | 2 | 4 | 7 | 3 | 4 | 1 | 7 | 3 | 4 | 2.8 | 7 |
| 11-Sep | 4 | 1 | 5 | 3 | Z | 21 | 17 | 7 | 8 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 7 | 10 | 7 | 7 | 3 | 1 | 5.1 | 21 |
| 12-Sep | 3 | 4 | 4 | 8 | 8 | Z | 3 | 3 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2.6 | 8 |
| 13-Sep | Z | 3 | 3 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2.3 | 4 |
| 14-Sep | 2 | Z | 3 | 2 | 2 | 7 | 6 | 10 | 7 | 4 | 4 | 2 | 1 | 1 | 1 | 5 | 2 | 5 | 2 | 1 | 0 | 3 | 28 | 5 | 4.6 | 28 |
| 15-Sep | 1 | 1 | Z | 1 | 2 | 6 | 8 | 23 | 6 | 5 | 5 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3.4 | 23 |
| 16-Sep | 2 | 2 | 2 | Z | 3 | 3 | 3 | 3 | 5 | 4 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2.3 | 5 |
| 17-Sep | 2 | 5 | 2 | 1 | Z | 4 | 4 | 7 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.8 | 7 |
| 18-Sep | 1 | 1 | 1 | 1 | 1 | Z | 2 | 2 | 3 | 7 | 14 | 8 | 11 | 14 | 7 | 16 | 10 | 7 | 1 | 11 | 3 | 0 | 1 | 0 | 5.3 | 16 |
| 19-Sep | Z | 1 | 0 | 1 | 2 | 5 | 9 | 9 | 11 | 17 | 13 | 13 | 14 | 14 | 7 | 7 | 5 | 6 | 4 | 2 | 4 | 3 | 2 | 2 | 6.6 | 17 |
| 20-Sep | 3 | Z | 3 | 4 | 14 | 29 | 8 | 5 | 5 | 3 | 4 | 4 | 4 | 4 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 4.8 | 29 |
| 21-Sep | 1 | 1 | Z | 1 | 2 | 6 | 8 | 9 | 4 | 1 | 1 | 0 | 3 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1.9 | 9 |
| 22-Sep | 0 | 1 | 4 | Z | 4 | 7 | 3 | 4 | 4 | 3 | 1 | C | C | C | C | 2 | 1 | 2 | 2 | 4 | 1 | 1 | 1 | 1 | 2.5 | 7 |
| 23-Sep | 1 | 1 | 2 | 2 | Z | 2 | 1 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1.4 | 3 |
| 24-Sep | 2 | 1 | 1 | 1 | 1 | Z | 2 | 1 | 1 | 1 | 1 | 2 | 7 | 5 | 17 | 10 | 13 | 3 | 0 | 1 | 0 | 0 | 1 | 1 | 3.1 | 17 |
| 25-Sep | Z | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 4 | 17 | 11 | 14 | 8 | 6 | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 3.7 | 17 |
| 26-Sep | 3 | Z | 3 | 4 | 2 | 3 | 4 | 4 | 3 | 4 | 2 | 5 | 4 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 4 | 2.6 | 5 |
| 27-Sep | 8 | 5 | Z | 5 | 2 | 4 | 4 | 2 | 21 | 13 | 1 | 2 | 3 | 4 | 22 | 18 | 15 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 6.2 | 22 |
| 28-Sep | 1 | 1 | 1 | Z | 3 | 9 | 12 | 10 | 11 | 4 | 6 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 3.6 | 12 |
| 29-Sep | 6 | 5 | 4 | 4 | Z | 14 | 17 | 23 | 8 | 5 | 4 | 4 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 4 | 6 | 2 | 1 | 2 | 5.4 | 23 |
| 30-Sep | 3 | 3 | 3 | 3 | 2 | Z | 8 | 8 | 3 | 2 | 4 | 2 | 2 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2.3 | 8 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 4.1 3.9 2.6 2.5 3.2 5.9 5.6 6.1 5.2 4.4 3.2 2.7 3.5 3.2 4.4 4.2 3.9 2.9 2.4 2.6 2.0 2.1 3.2 2.9 2.9 2.5 16 7 8 28 25 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 671 | 98.68 | 98.68 |
| 21 - 40 | 9 | 1.32 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 67 | 85 | 61 | 76 | 91 | 51 | 51 | 54 | 14 | 668 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 9 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 8 | 18 | 14 | 4 | 19 | 18 | 37 | 68 | 86 | 61 | 76 | 91 | 51 | 55 | 57 | 14 | 677 |

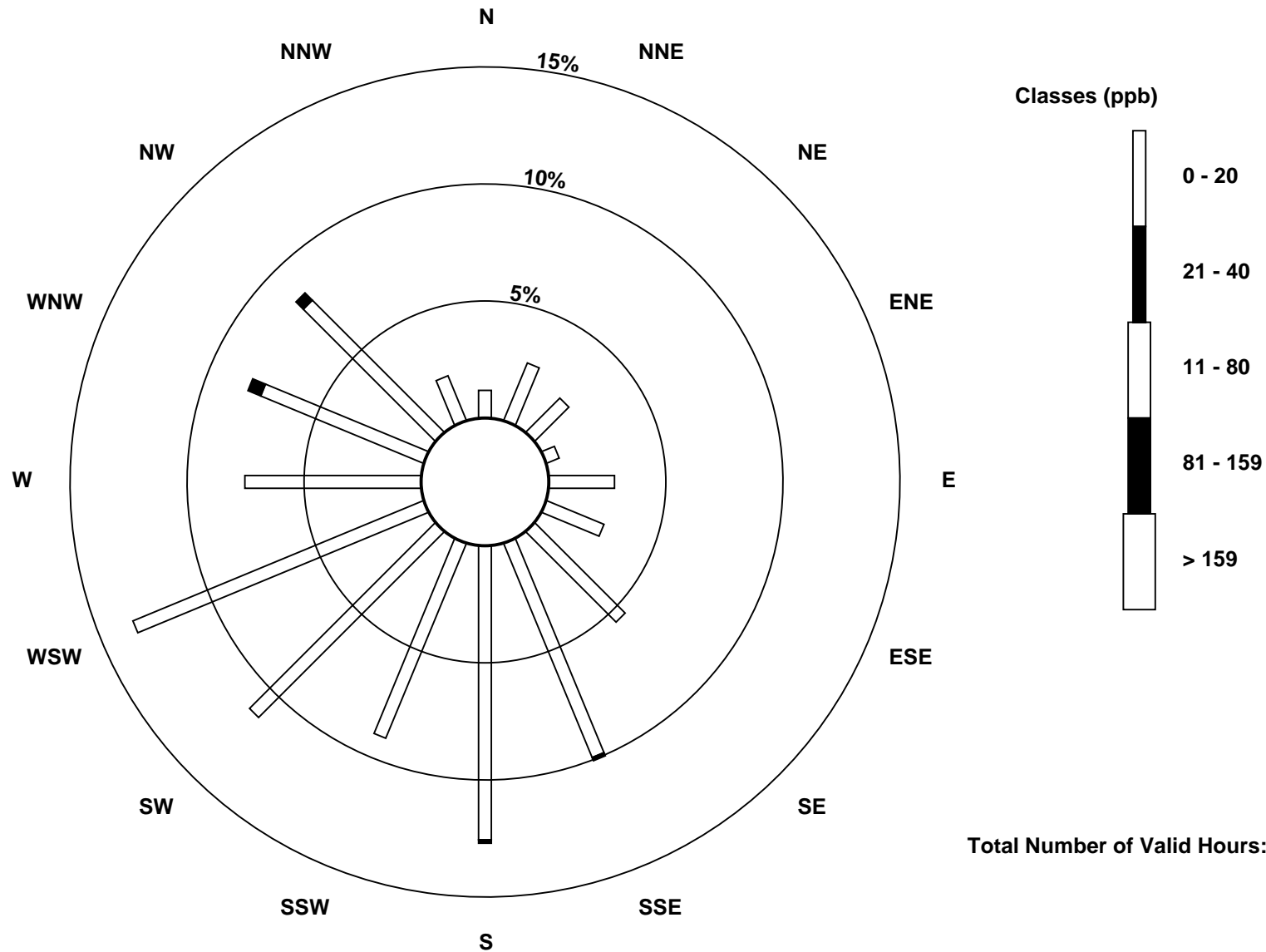
Total Number of Valid Hours: 677

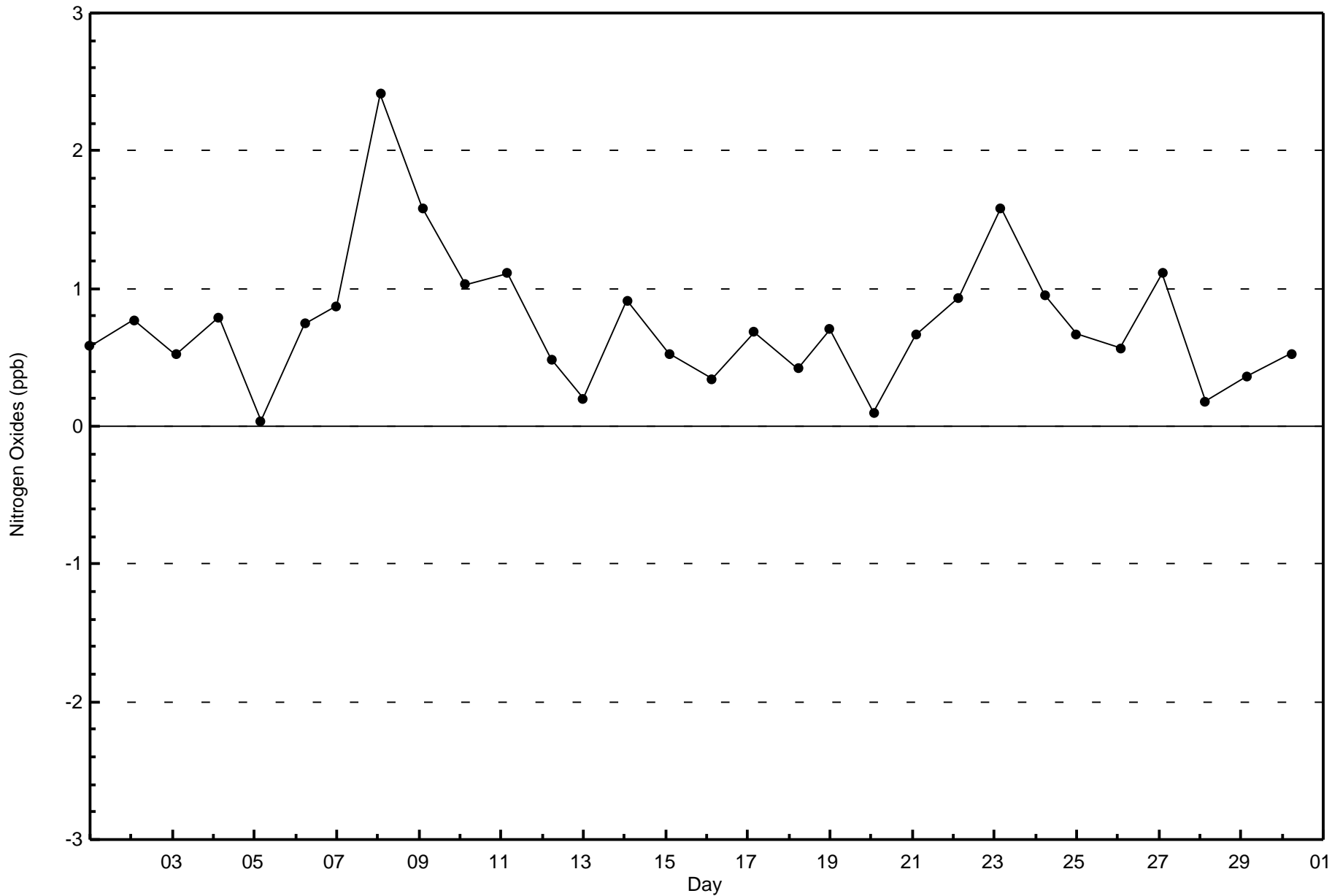
Total Number of Hours: 720

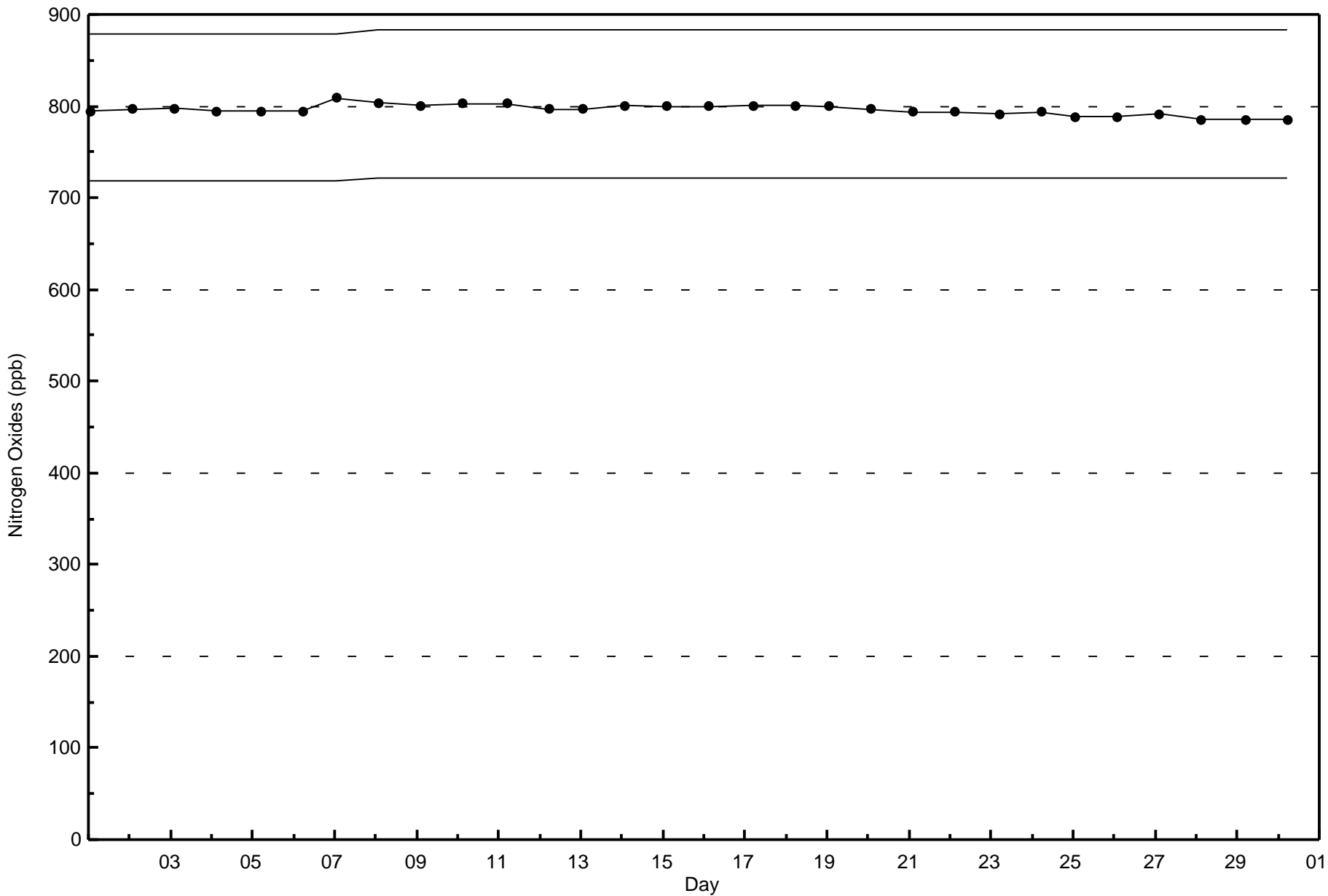


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
Cenovus - Christina Lake (AMS500)

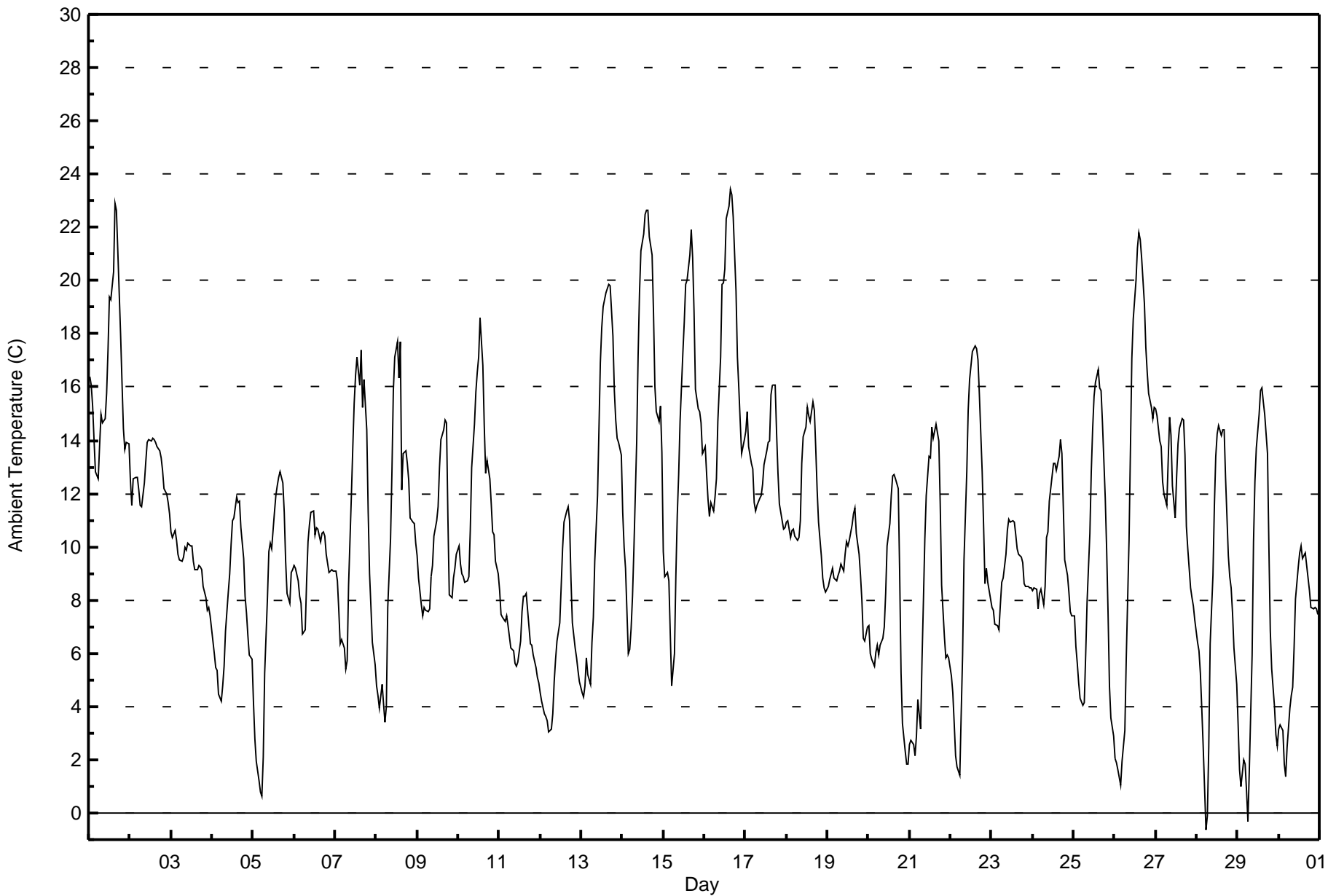








| Maximum Value: 23.5 C on Sep 16 16:00 | | Maximum Daily Average: 16.6 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: -0.6 C on Sep 28 06:00 | | Minimum Daily Average: 6.5 C on Sep 12 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 14.9 C at hour 16 | | Minimum Diurnal Average: 6.3 C at hour 6 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.46 C | | Percentiles: P ₁ = 1.0 P ₁₀ = 4.4 Q ₁ = 7.4 Median = 10.1 Q ₃ = 13.7 P ₉₀ = 16.4 P ₉₉ = 22.6 | | Hours of Calibration: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 16.4 | 16.1 | 15.3 | 14.0 | 12.8 | 12.5 | 13.8 | 15.0 | 14.6 | 14.8 | 15.8 | 17.4 | 19.4 | 19.3 | 20.3 | 22.9 | 22.6 | 21.1 | 18.0 | 16.2 | 14.4 | 13.7 | 13.9 | 13.9 | 16.4 | 22.9 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 12.5 | 11.6 | 12.5 | 12.6 | 12.6 | 12.2 | 11.6 | 11.5 | 12.4 | 13.2 | 13.9 | 14.0 | 14.0 | 14.1 | 14.0 | 13.9 | 13.8 | 13.6 | 13.4 | 12.9 | 12.2 | 12.0 | 11.6 | 11.2 | 12.8 | 14.1 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | 10.6 | 10.3 | 10.6 | 10.2 | 9.7 | 9.5 | 9.5 | 9.6 | 10.0 | 9.9 | 10.1 | 10.0 | 10.1 | 9.4 | 9.1 | 9.1 | 9.3 | 9.2 | 9.1 | 8.5 | 8.1 | 7.6 | 7.7 | 7.4 | 9.4 | 10.6 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 6.4 | 6.0 | 5.4 | 5.3 | 4.5 | 4.2 | 4.8 | 5.5 | 6.8 | 8.3 | 9.0 | 10.1 | 11.0 | 11.1 | 11.9 | 11.7 | 11.7 | 10.7 | 9.5 | 8.1 | 7.5 | 6.7 | 5.9 | 5.8 | 7.8 | 11.9 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 4.1 | 2.8 | 2.0 | 1.2 | 0.8 | 0.6 | 2.1 | 5.3 | 8.1 | 9.8 | 10.1 | 9.9 | 11.3 | 11.9 | 12.3 | 12.6 | 12.8 | 12.4 | 11.3 | 9.5 | 8.2 | 7.9 | 9.0 | 9.1 | 7.7 | 12.8 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 9.3 | 9.2 | 8.7 | 8.1 | 7.9 | 6.7 | 6.9 | 8.7 | 10.2 | 10.8 | 11.3 | 11.3 | 10.5 | 10.7 | 10.7 | 10.2 | 10.5 | 10.5 | 10.4 | 9.7 | 9.0 | 9.1 | 9.2 | 9.1 | 9.5 | 11.3 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 9.1 | 8.7 | 7.6 | 6.4 | 6.5 | 6.2 | 5.4 | 5.7 | 8.6 | 11.9 | 13.7 | 15.4 | 16.4 | 17.1 | 16.1 | 17.4 | 15.2 | 16.3 | 14.4 | 11.4 | 9.0 | 7.7 | 6.4 | 5.6 | 10.8 | 17.4 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 4.8 | 4.4 | 4.0 | 4.8 | 4.1 | 3.4 | 4.0 | 7.7 | 10.3 | 12.8 | 15.9 | 17.1 | 17.7 | 16.3 | 17.7 | 12.1 | 13.5 | 13.6 | 13.1 | 12.5 | 11.1 | 10.9 | 10.9 | 10.1 | 10.5 | 17.7 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | 9.7 | 8.8 | 7.8 | 7.4 | 7.7 | 7.6 | 7.6 | 7.7 | 8.9 | 9.3 | 10.4 | 11.0 | 11.5 | 13.0 | 14.0 | 14.4 | 14.8 | 14.7 | 11.1 | 8.2 | 8.1 | 8.8 | 9.2 | 9.7 | 10.1 | 14.8 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 10.0 | 9.3 | 9.0 | 8.9 | 8.7 | 8.7 | 8.9 | 10.6 | 13.0 | 14.6 | 15.8 | 16.5 | 17.1 | 18.6 | 16.8 | 14.5 | 12.7 | 13.2 | 12.6 | 11.6 | 10.6 | 10.4 | 9.4 | 9.0 | 12.1 | 18.6 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 8.3 | 7.5 | 7.4 | 7.2 | 7.4 | 7.0 | 6.6 | 6.2 | 6.1 | 5.6 | 5.5 | 5.7 | 6.5 | 7.5 | 8.1 | 8.1 | 8.3 | 7.0 | 6.3 | 6.3 | 5.9 | 5.5 | 5.1 | 4.9 | 6.7 | 8.3 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 4.5 | 4.2 | 3.7 | 3.6 | 3.5 | 3.1 | 3.1 | 3.7 | 5.0 | 5.8 | 6.5 | 7.1 | 8.5 | 9.9 | 10.9 | 11.4 | 11.5 | 11.0 | 8.8 | 7.1 | 6.2 | 5.8 | 5.4 | 4.9 | 6.5 | 11.5 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 4.5 | 4.4 | 4.8 | 5.8 | 5.2 | 4.8 | 6.4 | 7.3 | 9.4 | 11.9 | 14.4 | 16.9 | 18.3 | 19.0 | 19.5 | 19.7 | 19.9 | 19.8 | 17.9 | 15.9 | 14.7 | 14.1 | 13.9 | 13.4 | 12.6 | 19.9 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 11.3 | 10.0 | 9.2 | 6.0 | 6.1 | 6.9 | 8.1 | 9.9 | 14.0 | 17.2 | 19.5 | 21.1 | 21.7 | 22.5 | 22.7 | 22.6 | 21.6 | 21.0 | 18.8 | 16.0 | 15.1 | 14.7 | 15.3 | 13.5 | 15.2 | 22.7 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | 9.8 | 8.9 | 9.0 | 8.7 | 6.7 | 4.8 | 6.0 | 8.9 | 11.2 | 12.7 | 14.7 | 17.3 | 18.4 | 19.9 | 20.0 | 21.0 | 21.9 | 20.9 | 18.8 | 15.9 | 15.2 | 15.1 | 14.7 | 13.5 | 13.9 | 21.9 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 13.8 | 12.7 | 11.8 | 11.1 | 11.6 | 11.4 | 11.9 | 12.5 | 14.7 | 17.1 | 19.9 | 19.9 | 20.4 | 22.3 | 22.8 | 23.5 | 23.2 | 22.4 | 19.6 | 17.1 | 16.0 | 14.7 | 13.5 | 14.0 | 16.6 | 23.5 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 14.4 | 15.1 | 13.7 | 13.1 | 12.9 | 11.7 | 11.3 | 11.6 | 11.8 | 11.9 | 12.3 | 13.1 | 13.6 | 13.9 | 14.0 | 15.7 | 16.1 | 16.1 | 14.3 | 12.7 | 11.6 | 11.0 | 10.6 | 10.7 | 13.1 | 16.1 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 10.9 | 11.0 | 10.4 | 10.6 | 10.7 | 10.4 | 10.2 | 10.4 | 11.0 | 13.1 | 14.1 | 14.5 | 15.2 | 14.9 | 14.7 | 15.4 | 15.1 | 13.7 | 12.2 | 10.9 | 9.7 | 8.8 | 8.4 | 8.3 | 11.9 | 15.4 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 8.5 | 8.8 | 9.0 | 9.2 | 8.8 | 8.7 | 8.9 | 9.1 | 9.4 | 9.1 | 9.7 | 10.2 | 10.0 | 10.2 | 10.8 | 11.2 | 11.5 | 10.5 | 9.7 | 8.9 | 8.0 | 6.6 | 6.5 | 7.0 | 9.2 | 11.5 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 7.0 | 6.0 | 5.8 | 5.5 | 6.0 | 6.3 | 5.9 | 6.3 | 6.6 | 7.0 | 8.3 | 10.0 | 10.9 | 11.9 | 12.7 | 12.7 | 12.6 | 12.2 | 9.0 | 5.2 | 3.4 | 2.3 | 1.9 | 1.8 | 7.4 | 12.7 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | 2.6 | 2.7 | 2.6 | 2.1 | 2.9 | 4.3 | 3.2 | 5.8 | 8.0 | 10.3 | 11.9 | 13.4 | 13.3 | 14.5 | 14.1 | 14.6 | 14.3 | 14.0 | 11.6 | 8.5 | 6.6 | 5.8 | 5.9 | 5.9 | 8.3 | 14.6 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 5.1 | 4.5 | 3.4 | 2.2 | 1.7 | 1.4 | 3.8 | 6.0 | 9.5 | 12.8 | 15.1 | 16.3 | 16.8 | 17.3 | 17.5 | 17.4 | 17.0 | 15.7 | 12.8 | 10.8 | 8.6 | 9.2 | 8.7 | 8.0 | 10.1 | 17.5 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 7.7 | 7.6 | 7.1 | 7.0 | 6.9 | 7.8 | 8.7 | 8.8 | 9.7 | 10.6 | 11.0 | 10.9 | 11.0 | 10.9 | 10.5 | 9.9 | 9.7 | 9.6 | 9.4 | 8.6 | 8.5 | 8.5 | 8.5 | 8.5 | 9.1 | 11.0 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 8.3 | 8.5 | 8.4 | 7.7 | 8.2 | 8.4 | 7.8 | 8.5 | 10.3 | 10.5 | 11.7 | 12.6 | 13.1 | 13.1 | 12.9 | 13.4 | 14.0 | 13.5 | 11.5 | 9.5 | 9.0 | 8.3 | 7.6 | 7.4 | 10.2 | 14.0 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 7.4 | 6.2 | 5.6 | 4.9 | 4.3 | 4.1 | 4.2 | 5.9 | 7.9 | 10.5 | 12.8 | 14.4 | 15.7 | 16.2 | 16.6 | 16.0 | 15.8 | 14.7 | 11.8 | 9.9 | 7.5 | 4.8 | 3.6 | 2.9 | 9.3 | 16.6 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 2.0 | 1.9 | 1.6 | 1.0 | 1.9 | 2.5 | 3.1 | 5.8 | 10.2 | 13.6 | 17.1 | 18.5 | 20.0 | 21.2 | 21.8 | 21.5 | 20.9 | 19.1 | 17.5 | 16.6 | 15.7 | 15.2 | 14.8 | 15.2 | 12.5 | 21.8 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | 15.2 | 14.9 | 14.0 | 13.8 | 12.5 | 12.0 | 11.5 | 13.2 | 14.9 | 14.2 | 12.3 | 11.1 | 12.6 | 13.9 | 14.5 | 14.8 | 14.8 | 13.5 | 10.8 | 9.9 | 8.5 | 8.1 | 7.7 | 7.2 | 12.3 | 15.2 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 6.4 | 6.1 | 5.2 | 3.9 | 2.5 | -0.6 | -0.1 | 2.4 | 6.3 | 8.9 | 11.5 | 13.4 | 14.2 | 14.5 | 14.2 | 14.4 | 14.4 | 12.6 | 9.6 | 8.9 | 8.5 | 7.5 | 6.2 | 4.8 | 8.2 | 14.5 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 3.3 | 1.6 | 1.0 | 2.0 | 1.8 | 0.8 | -0.3 | 1.7 | 6.0 | 10.2 | 12.5 | 13.7 | 15.0 | 15.9 | 16.0 | 15.5 | 15.0 | 13.5 | 10.0 | 6.8 | 5.4 | 4.0 | 2.9 | 2.5 | 7.4 | 16.0 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 3.2 | 3.3 | 3.1 | 1.8 | 1.4 | 2.5 | 3.9 | 4.4 | 4.7 | 6.2 | 8.0 | 9.2 | 9.8 | 10.1 | 9.6 | 9.8 | 9.3 | 8.8 | 8.4 | 7.7 | 7.7 | 7.7 | 7.7 | 7.5 | 6.5 | 10.1 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 8.2 | 7.8 | 7.3 | 6.9 | 6.6 | 6.3 | 6.6 | 7.9 | 9.6 | 11.2 | 12.5 | 13.4 | 14.1 | 14.7 | 14.9 | 14.9 | 14.8 | 14.2 | 12.4 | 10.7 | 9.7 | 9.1 | 8.7 | 8.4 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 16.4 | 16.1 | 15.3 | 14.0 | 12.9 | 12.5 | 13.8 | 15.0 | 14.9 | 17.2 | 19.9 | 21.1 | 21.7 | 22.5 | 22.8 | 23.5 | 23.2 | 22.4 | 19.6 | 17.1 | 16.0 | 15.2 | 15.3 | 15.2 | Diurnal Maximum |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Cenovus - Christina Lake - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 3 | 0.42 | 0.42 |
| 0 - 10 | 349 | 48.47 | 48.89 |
| 10 - 20 | 342 | 47.50 | 96.39 |
| > 20 | 26 | 3.61 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

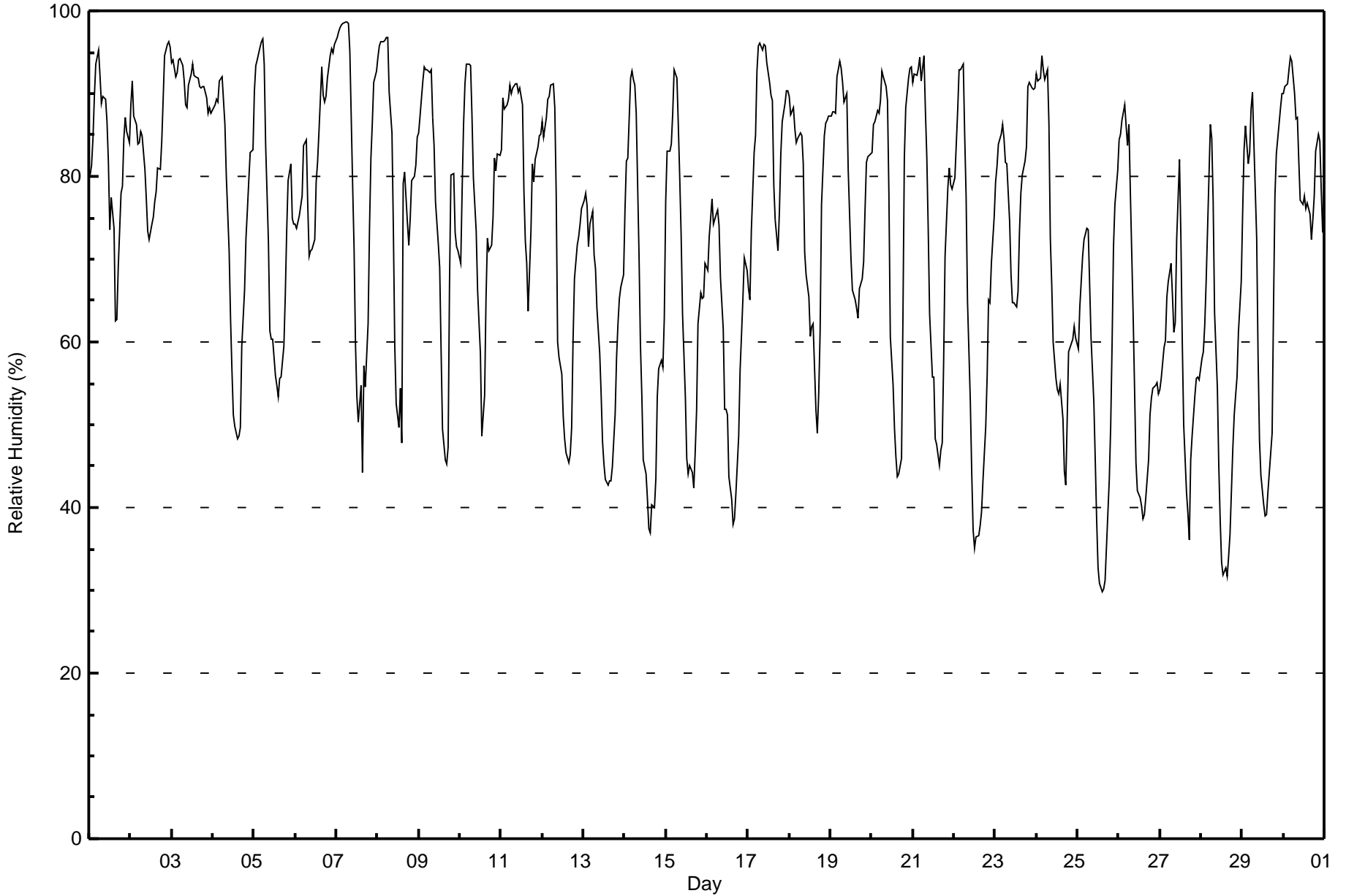
Cenovus - Christina Lake - September 2016

| Maximum Value: 99 % on Sep 7 07:00 Maximum Daily Average: 91.3 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 30 % on Sep 25 15:00 Minimum Daily Average: 54.4 % on Sep 28 Maximum Diurnal Average: 88.7 % at hour 6 Minimum Diurnal Average: 55.1 % at hour 16 Monthly Average: 72.6 % Percentiles: P ₁ = 33 P ₁₀ = 46 Q ₁ = 59 Median = 76 Q ₃ = 88 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 | 80 | 81 | 85 | 90 | 94 | 95 | 92 | 89 | 90 | 89 | 87 | 82 | 74 | 78 | 74 | 63 | 63 | 69 | 78 | 79 | 85 | 87 | 85 | 84 | 82.1 | 95 |
| 2-Sep | 89 | 91 | 87 | 86 | 84 | 84 | 85 | 85 | 81 | 77 | 73 | 72 | 74 | 75 | 77 | 78 | 81 | 81 | 84 | 89 | 95 | 96 | 96 | 96 | 84.1 | 96 |
| 3-Sep | 94 | 94 | 92 | 93 | 94 | 94 | 93 | 92 | 89 | 88 | 91 | 92 | 94 | 92 | 92 | 91 | 91 | 91 | 91 | 91 | 89 | 88 | 88 | 88 | 91.3 | 94 |
| 4-Sep | 88 | 89 | 89 | 89 | 92 | 92 | 89 | 86 | 80 | 71 | 63 | 57 | 51 | 50 | 48 | 49 | 50 | 59 | 66 | 73 | 76 | 80 | 83 | 83 | 73.0 | 92 |
| 5-Sep | 90 | 93 | 94 | 96 | 96 | 97 | 94 | 84 | 72 | 61 | 60 | 60 | 56 | 55 | 53 | 56 | 56 | 60 | 66 | 73 | 79 | 82 | 75 | 74 | 74.3 | 97 |
| 6-Sep | 74 | 74 | 75 | 76 | 78 | 84 | 84 | 77 | 70 | 71 | 71 | 72 | 79 | 82 | 85 | 93 | 90 | 89 | 90 | 92 | 95 | 95 | 95 | 96 | 82.8 | 96 |
| 7-Sep | 97 | 97 | 98 | 98 | 99 | 99 | 99 | 99 | 95 | 79 | 71 | 60 | 53 | 50 | 55 | 44 | 57 | 55 | 62 | 74 | 82 | 86 | 91 | 93 | 78.9 | 99 |
| 8-Sep | 94 | 96 | 96 | 96 | 96 | 97 | 97 | 90 | 85 | 74 | 59 | 53 | 50 | 54 | 48 | 79 | 81 | 74 | 72 | 75 | 79 | 80 | 81 | 85 | 78.8 | 97 |
| 9-Sep | 85 | 87 | 92 | 93 | 93 | 93 | 93 | 93 | 87 | 84 | 77 | 72 | 69 | 59 | 50 | 46 | 45 | 47 | 67 | 80 | 80 | 73 | 72 | 71 | 75.3 | 93 |
| 10-Sep | 69 | 78 | 86 | 91 | 94 | 94 | 93 | 87 | 80 | 73 | 66 | 62 | 59 | 49 | 53 | 65 | 73 | 71 | 72 | 75 | 82 | 81 | 83 | 83 | 75.8 | 94 |
| 11-Sep | 83 | 90 | 88 | 89 | 89 | 91 | 90 | 91 | 91 | 91 | 90 | 91 | 89 | 78 | 72 | 70 | 64 | 73 | 81 | 79 | 82 | 84 | 85 | 85 | 84.0 | 91 |
| 12-Sep | 87 | 85 | 87 | 89 | 90 | 91 | 91 | 88 | 78 | 60 | 58 | 56 | 51 | 48 | 47 | 45 | 47 | 50 | 60 | 68 | 72 | 73 | 74 | 76 | 69.6 | 91 |
| 13-Sep | 77 | 78 | 76 | 72 | 74 | 76 | 70 | 69 | 64 | 59 | 54 | 48 | 45 | 43 | 43 | 43 | 43 | 45 | 51 | 58 | 62 | 65 | 67 | 68 | 60.5 | 78 |
| 14-Sep | 76 | 82 | 82 | 92 | 93 | 92 | 91 | 88 | 71 | 60 | 53 | 46 | 44 | 41 | 38 | 37 | 40 | 40 | 44 | 53 | 57 | 58 | 57 | 63 | 62.3 | 93 |
| 15-Sep | 77 | 83 | 83 | 84 | 88 | 93 | 92 | 86 | 80 | 73 | 63 | 53 | 46 | 44 | 45 | 44 | 42 | 47 | 52 | 62 | 66 | 65 | 65 | 70 | 66.8 | 93 |
| 16-Sep | 69 | 73 | 75 | 77 | 74 | 75 | 76 | 74 | 68 | 61 | 52 | 52 | 51 | 44 | 41 | 38 | 39 | 42 | 49 | 57 | 61 | 65 | 70 | 69 | 60.4 | 77 |
| 17-Sep | 66 | 65 | 73 | 83 | 85 | 93 | 96 | 96 | 95 | 96 | 96 | 94 | 91 | 90 | 89 | 79 | 75 | 71 | 76 | 83 | 87 | 89 | 90 | 90 | 85.3 | 96 |
| 18-Sep | 90 | 88 | 88 | 86 | 84 | 85 | 85 | 85 | 82 | 71 | 68 | 65 | 61 | 62 | 62 | 52 | 49 | 54 | 61 | 77 | 85 | 87 | 87 | 87 | 75.0 | 90 |
| 19-Sep | 87 | 88 | 88 | 88 | 92 | 94 | 93 | 91 | 89 | 90 | 81 | 75 | 70 | 66 | 65 | 64 | 63 | 66 | 68 | 70 | 76 | 82 | 82 | 83 | 79.6 | 94 |
| 20-Sep | 83 | 86 | 87 | 88 | 88 | 89 | 93 | 92 | 91 | 89 | 78 | 61 | 55 | 49 | 46 | 44 | 44 | 46 | 63 | 82 | 88 | 92 | 93 | 93 | 75.8 | 93 |
| 21-Sep | 91 | 92 | 92 | 93 | 94 | 92 | 95 | 88 | 82 | 74 | 63 | 56 | 56 | 48 | 48 | 45 | 47 | 48 | 58 | 70 | 79 | 81 | 79 | 78 | 72.9 | 95 |
| 22-Sep | 80 | 84 | 88 | 93 | 93 | 93 | 85 | 78 | 65 | 53 | 44 | 37 | 35 | 36 | 37 | 38 | 39 | 43 | 50 | 56 | 65 | 65 | 70 | 75 | 62.6 | 93 |
| 23-Sep | 79 | 81 | 84 | 85 | 86 | 85 | 82 | 81 | 75 | 68 | 65 | 65 | 64 | 66 | 73 | 78 | 80 | 82 | 83 | 91 | 91 | 91 | 90 | 91 | 79.9 | 91 |
| 24-Sep | 92 | 92 | 92 | 95 | 93 | 92 | 93 | 86 | 73 | 67 | 60 | 56 | 54 | 54 | 55 | 51 | 44 | 43 | 50 | 59 | 60 | 60 | 62 | 60 | 68.4 | 95 |
| 25-Sep | 59 | 64 | 67 | 70 | 72 | 74 | 74 | 67 | 60 | 53 | 46 | 38 | 33 | 31 | 30 | 30 | 31 | 35 | 43 | 50 | 60 | 72 | 77 | 81 | 54.9 | 81 |
| 26-Sep | 84 | 85 | 87 | 89 | 86 | 84 | 86 | 78 | 63 | 54 | 46 | 42 | 41 | 40 | 39 | 39 | 41 | 46 | 51 | 53 | 54 | 55 | 55 | 54 | 60.5 | 89 |
| 27-Sep | 54 | 56 | 59 | 60 | 65 | 67 | 70 | 66 | 61 | 62 | 72 | 82 | 73 | 60 | 50 | 42 | 39 | 36 | 46 | 49 | 54 | 56 | 56 | 55 | 57.9 | 82 |
| 28-Sep | 58 | 59 | 62 | 67 | 73 | 86 | 85 | 77 | 64 | 54 | 45 | 39 | 33 | 32 | 33 | 32 | 34 | 37 | 47 | 51 | 54 | 56 | 61 | 67 | 54.4 | 86 |
| 29-Sep | 76 | 83 | 86 | 82 | 83 | 88 | 90 | 84 | 72 | 58 | 48 | 44 | 40 | 39 | 39 | 42 | 44 | 49 | 64 | 78 | 83 | 86 | 88 | 90 | 68.2 | 90 |
| 30-Sep | 90 | 91 | 91 | 93 | 94 | 94 | 90 | 87 | 87 | 82 | 77 | 77 | 78 | 76 | 77 | 75 | 72 | 75 | 78 | 83 | 85 | 84 | 78 | 73 | 82.8 | 94 |
| | 80.7 | 82.8 | 84.4 | 86.1 | 87.2 | 88.7 | 88.1 | 84.4 | 78.0 | 71.5 | 66.0 | 62.0 | 59.0 | 56.4 | 55.4 | 55.1 | 55.5 | 57.4 | 64.1 | 71.0 | 75.4 | 77.0 | 77.9 | 78.7 | Diurnal Average | |
| | 97 | 97 | 98 | 98 | 99 | 99 | 99 | 99 | 95 | 96 | 96 | 94 | 94 | 92 | 92 | 93 | 91 | 91 | 91 | 92 | 95 | 96 | 96 | 96 | Diurnal Maximum | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Cenovus - Christina Lake - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Cenovus - Christina Lake - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 31 | 4.31 | 4.31 |
| 40 - 60 | 157 | 21.81 | 26.11 |
| 60 - 80 | 223 | 30.97 | 57.08 |
| 80 - 100 | 309 | 42.92 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

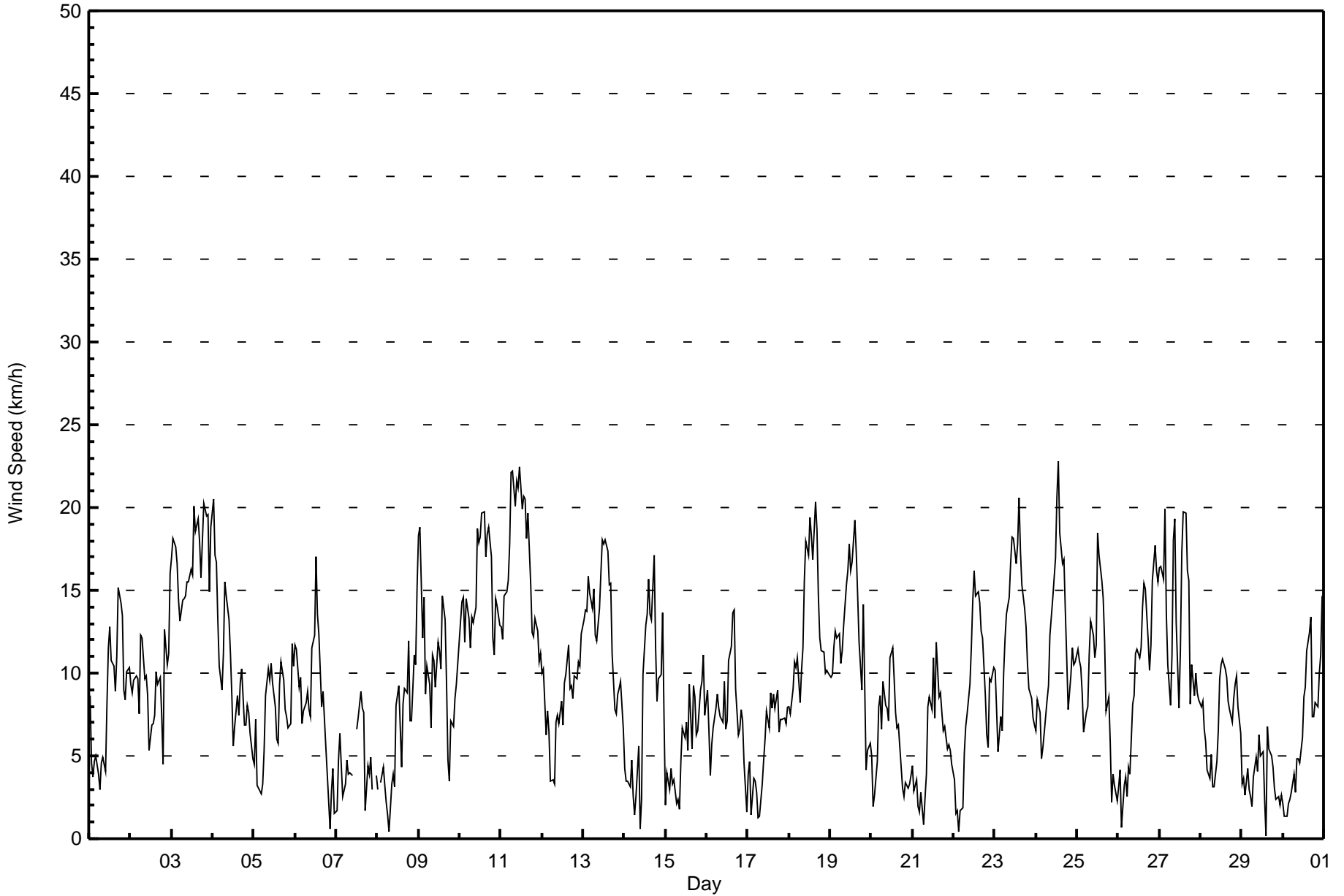


| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 23 km/h on Sep 24 14:00 | Maximum Daily Speed Average: 15.5 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 0 km/h on Sep 29 15:00 | Minimum Daily Speed Average: 2.2 km/h on Sep 1 | Hours of Data: 716 |
| Maximum Diurnal Speed Average: 6.4 km/h at hour 17 | Minimum Diurnal Speed Average: 3.6 km/h at hour 7 | Hours of Missing Data: 4 |
| Monthly Average Velocity: 4.6 km/h 239.8 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 17 P ₉₉ = 20 | 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 | SE9 | E5 | ENE4 | NE5 | E5 | E4 | NE3 | ENE5 | ENE5 | E4 | NE8 | E12 | E13 | ESE11 | SSE10 | SW9 | SW11 | SW15 | WSW14 | WSW13 | WSW9 | SW8 | WSW10 | WSW10 | S2.2 | SW15 |
| 2-Sep | WSW9 | WSW9 | WSW10 | WSW10 | W10 | WNW8 | NW12 | NNW12 | N10 | NNW10 | NNW9 | E5 | NE7 | NNE7 | NE7 | NE10 | NE9 | NNE10 | NE7 | NNE5 | NNE13 | N11 | N11 | WNW16 | NNW5.3 | WNW16 |
| 3-Sep | NW17 | NW18 | W18 | W17 | WSW14 | WSW13 | WSW14 | WSW15 | WSW15 | WSW15 | WSW16 | WSW16 | WSW16 | W20 | W19 | W19 | WNW18 | WNW16 | NW18 | NW20 | NW19 | NW20 | NW15 | NW19 | W15.5 | NW20 |
| 4-Sep | NW20 | NW17 | NW17 | WNW13 | WSW10 | WSW9 | WNW11 | NW15 | NW15 | NW13 | WNW11 | W9 | W6 | WNW7 | SW9 | W7 | SW9 | SSW10 | SSW7 | SSW7 | SSW8 | SSW8 | SW6 | WSW5 | W8.1 | NW20 |
| 5-Sep | SSE4 | S7 | SSE3 | SSE3 | ESE3 | S3 | S5 | S9 | S10 | S10 | SSW11 | SSW9 | SSE8 | SSE6 | SE6 | E9 | ESE11 | SE10 | ESE8 | SE7 | SE7 | SE7 | SSE12 | SSE10 | SSE6.4 | SSE12 |
| 6-Sep | SSE12 | S11 | S9 | S10 | SSE7 | SE8 | SE8 | SE9 | SSE8 | SE7 | SE12 | SE12 | SE17 | ESE14 | ESE12 | ESE8 | ESE9 | ESE7 | ESE5 | ESE4 | E1 | NE3 | NE4 | WNW1 | SE7.2 | SE17 |
| 7-Sep | WNW2 | W5 | WSW6 | SW4 | S3 | SE3 | SW5 | S4 | S4 | SSW4 | M | M | SW7 | SW7 | W9 | WNW8 | WNW8 | SSW2 | SSW4 | S4 | S5 | S3 | AF | S4 | SW3.4 | W9 |
| 8-Sep | S3 | AF | SSE3 | S4 | S3 | S2 | SSW1 | SSE0 | W3 | NW4 | NNW3 | WNW8 | NW9 | W7 | NW4 | SW8 | WSW9 | WSW9 | WNW12 | WNW7 | WSW7 | WNW11 | NW11 | NW15 | W4.6 | NW15 |
| 9-Sep | NW18 | NW19 | NW12 | NW15 | WNW9 | WNW10 | WNW9 | WNW7 | NW11 | NW11 | WNW9 | NW12 | NW11 | WNW10 | WNW15 | WNW13 | W9 | W5 | SE3 | SSE7 | SSE7 | SSE8 | SSE9 | SSE11 | WNW6.9 | WNW19 |
| 10-Sep | SSE13 | SSE14 | SSE15 | S12 | S14 | S13 | S12 | SSW13 | SW13 | SW14 | WSW19 | WSW18 | W18 | WSW20 | W20 | W17 | W18 | W19 | W17 | WSW12 | WSW11 | W15 | W14 | W13 | WSW12.0 | W20 |
| 11-Sep | W13 | WSW12 | W15 | W15 | W16 | NW18 | NW22 | NW22 | NW20 | NNW22 | NNW21 | NNW22 | NNW20 | NNW21 | N20 | NNW18 | NNW20 | NNW15 | NW12 | NW12 | NW13 | NW13 | NW11 | NW11 | NW14.8 | NNW22 |
| 12-Sep | NW10 | NW10 | NW6 | NW8 | WNW6 | WNW3 | NW4 | WNW3 | NW7 | WNW7 | SW7 | SW8 | SSW7 | SW9 | SW10 | SW12 | SW9 | SSW9 | S8 | S10 | S10 | S11 | S10 | S12 | SW5.5 | S12 |
| 13-Sep | S13 | S14 | S14 | SSW16 | S15 | S14 | SSW15 | SSW12 | SSW12 | SW14 | SW16 | SW18 | SW18 | SW18 | SW17 | SW15 | SW15 | SW11 | SSW8 | SW8 | SSW9 | SW9 | SW9 | SW7 | SSW12.8 | SW18 |
| 14-Sep | S4 | SSW4 | SSE3 | SE3 | S5 | S3 | SE1 | SSE3 | S6 | NE1 | SW2 | SW10 | SW13 | WSW14 | WSW16 | W14 | WSW13 | W17 | WSW12 | WSW8 | WSW10 | WSW10 | WNW14 | WSW7 | WSW6.5 | W17 |
| 15-Sep | SSW2 | SSW4 | SSW3 | SSW4 | S3 | S4 | SE2 | S2 | ESE2 | ESE5 | ESE7 | E6 | ESE7 | ESE5 | E9 | E5 | SW9 | SSW9 | SSW6 | SSW7 | S9 | S9 | S11 | SSW7 | SSE4.1 | S11 |
| 16-Sep | SSW9 | SSW7 | SSE4 | S6 | SSW7 | SSW8 | SSW9 | SSW8 | SSW7 | SW7 | SW9 | WSW7 | SSW7 | SSW11 | SW12 | SW14 | SSW14 | SW9 | SSW6 | S7 | SSW8 | S7 | SW5 | SSE2 | SSW7.4 | SSW14 |
| 17-Sep | SSE4 | WNW5 | SW1 | NW4 | WSW3 | SSE3 | SSE1 | SW1 | SW3 | SSW5 | SW6 | SW8 | WSW7 | WSW9 | WSW8 | WSW9 | WSW8 | WSW9 | SW6 | SW7 | SW7 | SSW7 | SW7 | SW8 | SW5.1 | WSW9 |
| 18-Sep | SW8 | WSW8 | WSW9 | WSW11 | WSW10 | WSW11 | WSW8 | WSW10 | WSW11 | W16 | WNW18 | WNW17 | WNW19 | WNW18 | W17 | W20 | W19 | W15 | WSW12 | W11 | WSW11 | WSW10 | WSW10 | WSW10 | W12.3 | W20 |
| 19-Sep | WSW10 | WSW10 | WSW12 | WSW13 | WSW12 | W12 | WNW11 | WNW11 | WNW13 | W15 | WNW16 | WNW18 | WNW16 | NW17 | NW19 | NW17 | NW15 | NNW12 | WNW9 | NW14 | WNW9 | SSW4 | SW5 | W6 | WNW10.9 | NW19 |
| 20-Sep | W5 | SW2 | WNW3 | W5 | WNW8 | WNW9 | WNW7 | NW10 | NW8 | NW8 | NW7 | NW11 | NW12 | WNW10 | WNW8 | NW7 | WNW7 | NW4 | E3 | ESE3 | S3 | SSE3 | SSE3 | S4 | WNW4.6 | NW12 |
| 21-Sep | S4 | SSE3 | SSE4 | SSE2 | SE2 | SSE3 | SE1 | SE2 | SW4 | SW8 | WSW9 | WSW8 | NNW11 | SSW7 | SSW12 | WSW9 | WSW9 | WSW8 | SSW6 | S7 | S5 | S6 | S5 | SSW4 | SW4.3 | SSW12 |
| 22-Sep | SSW4 | S2 | S2 | S0 | E2 | SSE2 | S5 | S7 | SSW8 | SSW9 | S11 | SSW14 | S16 | S15 | SSW15 | SSW14 | SSW13 | S12 | SSE9 | SE6 | SE6 | SSE10 | SSE10 | S7.9 | S16 | |
| 23-Sep | SSE10 | SSE8 | SSE5 | SE7 | ESE7 | SSE10 | SSE12 | SE14 | SSE15 | SE17 | SE18 | SE18 | SE17 | SE15 | SE14 | SE13 | SE11 | SE9 | SE8 | SSE7 | SSE7 | SSE7 | SSE7 | SE12.3 | SE21 | |
| 24-Sep | S7 | S8 | S8 | S5 | SSW6 | SW6 | SW8 | SW9 | WSW12 | WSW13 | WSW15 | W17 | W21 | W23 | W18 | WNW17 | W17 | W14 | WSW11 | WSW8 | WSW10 | WSW12 | WSW11 | WSW11 | WSW10.6 | W23 |
| 25-Sep | WSW11 | WSW11 | SW10 | WSW9 | SW6 | WSW8 | WSW8 | WSW11 | WSW13 | WSW12 | WSW11 | W12 | WNW18 | WNW17 | WNW16 | W14 | W12 | WSW8 | SW9 | SW6 | ESE2 | SSE4 | SSE3 | SSE2 | WSW8.4 | WNW18 |
| 26-Sep | S3 | ESE4 | E1 | E3 | S4 | SE3 | E4 | SSE4 | SSE8 | S9 | S11 | SSW11 | SSW11 | SSW12 | SSW14 | S15 | S15 | SSE12 | SSE10 | SSE12 | SSE16 | SSE18 | SSE16 | SSE15 | S8.9 | SSE18 |
| 27-Sep | S16 | S16 | SSE16 | S20 | SSW13 | SSW10 | SW8 | WSW11 | WNW18 | WNW19 | WSW13 | SW8 | WSW11 | W17 | WNW20 | WNW20 | W16 | W16 | SW8 | WSW11 | SW9 | SW10 | SW9 | SW8 | WSW10.0 | S20 |
| 28-Sep | SW8 | WSW8 | SW7 | SSW6 | SW4 | S4 | S5 | SSE3 | SSE3 | SSE5 | S7 | SSW10 | SW10 | SW11 | SW10 | SW10 | SW8 | SSW8 | S7 | S8 | S9 | S10 | S8 | S6 | SSW6.6 | SW11 |
| 29-Sep | ESE3 | E4 | ESE3 | SSE4 | SE3 | NE3 | ESE2 | S4 | S5 | S4 | S6 | SSE5 | SSE5 | ESE2 | NNE0 | NNE7 | NE5 | E5 | SE4 | S3 | SSW2 | S3 | SSE2 | SSE3 | SE2.4 | NNE7 |
| 30-Sep | ESE2 | NE1 | SSW1 | SSE2 | S2 | W3 | NW4 | NNE3 | NNE5 | NNE5 | ENE5 | N6 | NNE9 | NNE9 | NNE11 | NNE12 | NNE13 | NNE7 | N7 | NNE8 | N8 | N10 | NNE11 | NNE15 | NNE5.8 | NNE15 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-----------------|------|-------|------|-----------------|--|
| SW4.3 SW4.4 SW4.2 SW4.6 SW4.4 SW3.9 | WSW3.8 | WSW3.9 | WSW4.4 | WSW4.9 | WSW5.5 | WSW5.7 | WSW5.2 | WSW6.3 | WSW6.2 | W6.3 | WSW6.4 | WSW5.5 | SW4.1 | SW3.7 | SW4.0 | SW4.0 | SW4.0 | SW4.0 | SW4.3 | Diurnal Average | | | | | |
| NW20 | WNW19 | W18 | S20 | W16 | NW18 | NW22 | NW22 | NW20 | NNW22 | NNW21 | NNW22 | W21 | W23 | SE21 | W20 | NNW20 | W19 | NW18 | NW20 | NW19 | NW20 | SSE16 | NW19 | 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
Cenovus - Christina Lake - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 175 | 24.44 | 24.44 |
| 6 - 11 | 318 | 44.41 | 68.85 |
| 12 - 19 | 200 | 27.93 | 96.79 |
| 20 - 28 | 23 | 3.21 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Cenovus - Christina Lake - September 2016

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 0 | 5 | 8 | 4 | 14 | 14 | 11 | 34 | 38 | 15 | 11 | 2 | 6 | 6 | 6 | 1 | 175 |
| 6 - 11 | 7 | 9 | 6 | 0 | 3 | 9 | 16 | 22 | 36 | 38 | 53 | 62 | 9 | 27 | 18 | 3 | 318 |
| 12 - 19 | 0 | 4 | 0 | 0 | 2 | 2 | 13 | 14 | 17 | 14 | 14 | 31 | 34 | 23 | 28 | 4 | 200 |
| 20 - 28 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 5 | 2 | 6 | 6 | 23 |
| 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 | 8 | 18 | 14 | 4 | 19 | 25 | 41 | 70 | 92 | 67 | 78 | 96 | 54 | 58 | 58 | 14 | 716 |

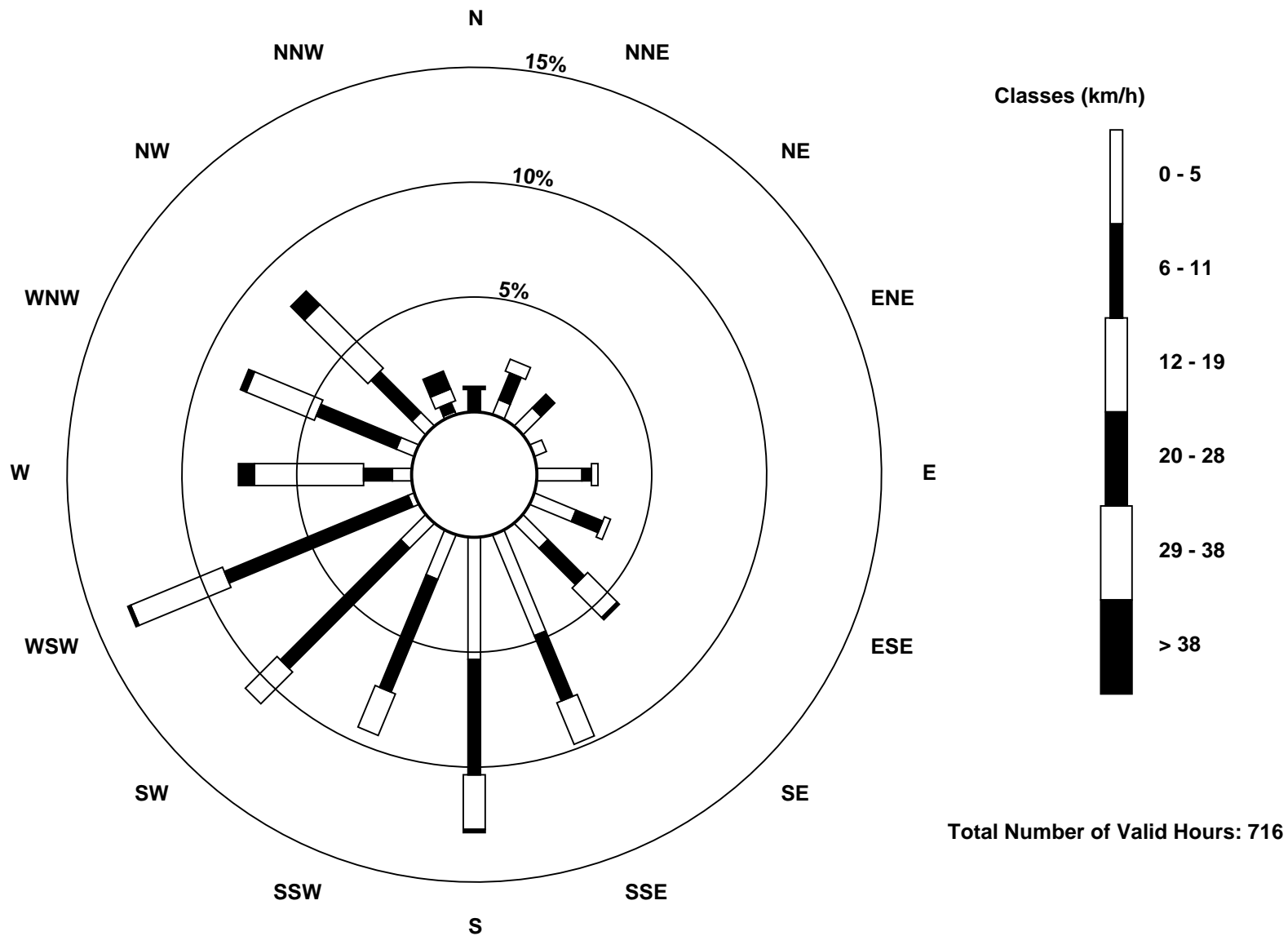
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
Cenovus - Christina Lake (AMS500)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Cenovus - Christina Lake - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 11 km/h on Sep 10 16:00 | Hours of Data: 716 |
| Minimum Value: 0 km/h on Sep 29 18:00 | Hours of Missing Data: 4 |
| 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: 99.4 |

| 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 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 2 | 3 | 2 | 3 | 4 | 4 | 5 | 5 | 4 | 2 | 2 | 3 | 2 | 5 |
| 2-Sep | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 6 | 3 | 4 | 5 | 6 |
| 3-Sep | 4 | 4 | 5 | 4 | 4 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 5 | 6 |
| 4-Sep | 5 | 3 | 3 | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 1 | 5 |
| 5-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 |
| 6-Sep | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 5 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 5 |
| 7-Sep | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | M | M | 3 | 3 | 5 | 3 | 7 | 2 | 1 | 2 | 2 | 2 | AF | 2 | 7 |
| 8-Sep | 2 | AF | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 4 | 4 | 3 | 5 | 6 | 3 | 2 | 4 | 4 | 3 | 4 | 4 | 3 | 6 |
| 9-Sep | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 5 | 5 | 4 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 5 |
| 10-Sep | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 6 | 6 | 5 | 6 | 9 | 11 | 8 | 5 | 5 | 3 | 4 | 4 | 4 | 4 | 11 |
| 11-Sep | 4 | 3 | 4 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 6 |
| 12-Sep | 4 | 3 | 4 | 3 | 2 | 1 | 2 | 2 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 4 |
| 13-Sep | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 6 | 6 | 6 | 6 | 5 | 5 | 4 | 2 | 1 | 2 | 2 | 3 | 2 | 6 |
| 14-Sep | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 3 | 4 | 5 | 5 | 4 | 4 | 5 | 4 | 2 | 2 | 3 | 3 | 2 | 5 |
| 15-Sep | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 4 |
| 16-Sep | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 4 | 5 | 4 | 3 | 1 | 1 | 1 | 1 | 2 | 1 | 5 |
| 17-Sep | 1 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 3 |
| 18-Sep | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 6 | 6 | 5 | 6 | 7 | 5 | 6 | 5 | 5 | 3 | 5 | 3 | 2 | 3 | 2 | 7 |
| 19-Sep | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 4 | 2 | 2 | 3 | 5 |
| 20-Sep | 3 | 2 | 1 | 2 | 3 | 3 | 4 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 4 |
| 21-Sep | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 4 |
| 22-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 5 |
| 23-Sep | 2 | 2 | 1 | 2 | 1 | 3 | 3 | 3 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 5 | 4 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 5 |
| 24-Sep | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 6 | 5 | 6 | 5 | 3 | 2 | 3 | 3 | 3 | 3 | 6 |
| 25-Sep | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 4 | 4 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 5 |
| 26-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 4 | 4 | 3 | 3 | 4 |
| 27-Sep | 4 | 3 | 3 | 5 | 4 | 2 | 2 | 4 | 6 | 8 | 4 | 2 | 5 | 5 | 6 | 5 | 4 | 5 | 2 | 3 | 2 | 2 | 2 | 2 | 8 |
| 28-Sep | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 4 |
| 29-Sep | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| 30-Sep | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|--|
| 5 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 6 | 8 | 6 | 6 | 6 | 7 | 9 | 11 | 8 | 5 | 5 | 5 | 6 | 4 | 5 | 5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Cenovus - Christina Lake - September 2016

| | |
|--------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 271 deg on Sep 24 14:00 | Hours in Service: 720 |
| Direction of Maximum Daily Speed Average: 278.3 deg on Sep 3 | Hours of Data: 716 |
| Direction of Minimum Speed: 15 deg on Sep 29 15:00 | Hours of Missing Data: 4 |
| Direction of Minimum Daily Speed Average: 2.2 deg on Sep 1 | Percent Operational Time: 99.4 |
| Monthly Average Direction: 239.9 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 | 124 | 94 | 64 | 53 | 86 | 84 | 47 | 69 | 77 | 96 | 43 | 89 | 101 | 103 | 149 | 219 | 232 | 232 | 249 | 256 | 242 | 233 | 247 | 248 | 177.5 |
| 2-Sep | 237 | 238 | 246 | 249 | 264 | 286 | 321 | 329 | 351 | 333 | 348 | 82 | 45 | 25 | 37 | 48 | 40 | 27 | 39 | 26 | 30 | 2 | 9 | 303 | 344.0 |
| 3-Sep | 307 | 307 | 279 | 271 | 258 | 257 | 256 | 250 | 251 | 250 | 241 | 245 | 253 | 265 | 266 | 273 | 282 | 286 | 304 | 309 | 308 | 310 | 305 | 304 | 278.3 |
| 4-Sep | 312 | 313 | 315 | 299 | 257 | 256 | 282 | 308 | 312 | 305 | 297 | 269 | 276 | 283 | 236 | 260 | 235 | 213 | 199 | 195 | 213 | 208 | 214 | 241 | 276.1 |
| 5-Sep | 165 | 183 | 154 | 161 | 120 | 170 | 176 | 177 | 171 | 184 | 206 | 192 | 162 | 167 | 128 | 80 | 112 | 128 | 120 | 124 | 130 | 141 | 158 | 150 | 153.6 |
| 6-Sep | 160 | 178 | 181 | 179 | 152 | 137 | 142 | 142 | 147 | 131 | 144 | 128 | 124 | 111 | 102 | 108 | 120 | 119 | 120 | 117 | 100 | 46 | 48 | 295 | 134.6 |
| 7-Sep | 296 | 266 | 258 | 227 | 181 | 137 | 215 | 176 | 186 | 194 | M | M | 215 | 233 | 271 | 290 | 287 | 210 | 211 | 178 | 173 | 179 | AF | 172 | 226.3 |
| 8-Sep | 182 | AF | 162 | 191 | 178 | 188 | 198 | 166 | 278 | 304 | 347 | 299 | 318 | 276 | 325 | 228 | 243 | 237 | 303 | 300 | 258 | 302 | 304 | 310 | 280.1 |
| 9-Sep | 307 | 304 | 307 | 307 | 296 | 294 | 297 | 297 | 316 | 324 | 290 | 313 | 310 | 284 | 302 | 287 | 275 | 272 | 142 | 160 | 156 | 154 | 150 | 157 | 292.1 |
| 10-Sep | 157 | 168 | 165 | 178 | 178 | 181 | 191 | 203 | 221 | 236 | 254 | 249 | 261 | 250 | 263 | 263 | 266 | 272 | 265 | 258 | 252 | 273 | 265 | 260 | 236.9 |
| 11-Sep | 259 | 252 | 267 | 263 | 278 | 305 | 309 | 310 | 323 | 336 | 346 | 346 | 344 | 344 | 349 | 348 | 338 | 344 | 325 | 320 | 317 | 321 | 314 | 309 | 320.1 |
| 12-Sep | 315 | 309 | 306 | 306 | 294 | 285 | 310 | 300 | 319 | 285 | 228 | 227 | 212 | 226 | 229 | 236 | 229 | 210 | 183 | 185 | 187 | 190 | 190 | 186 | 236.0 |
| 13-Sep | 186 | 187 | 190 | 197 | 188 | 190 | 201 | 208 | 210 | 224 | 220 | 224 | 228 | 226 | 221 | 223 | 224 | 226 | 207 | 215 | 212 | 221 | 226 | 234 | 211.9 |
| 14-Sep | 186 | 196 | 154 | 129 | 180 | 182 | 129 | 164 | 185 | 53 | 222 | 216 | 227 | 238 | 242 | 267 | 257 | 268 | 249 | 238 | 241 | 256 | 300 | 240 | 239.9 |
| 15-Sep | 203 | 202 | 193 | 209 | 170 | 172 | 129 | 184 | 113 | 106 | 111 | 91 | 109 | 102 | 98 | 96 | 228 | 210 | 197 | 193 | 181 | 183 | 186 | 198 | 166.0 |
| 16-Sep | 203 | 195 | 158 | 180 | 196 | 194 | 198 | 205 | 203 | 227 | 232 | 238 | 212 | 205 | 220 | 227 | 210 | 222 | 199 | 191 | 192 | 190 | 218 | 158 | 207.2 |
| 17-Sep | 153 | 284 | 229 | 319 | 254 | 168 | 153 | 222 | 228 | 196 | 235 | 234 | 244 | 250 | 244 | 242 | 241 | 243 | 227 | 220 | 217 | 213 | 218 | 223 | 231.9 |
| 18-Sep | 218 | 244 | 240 | 240 | 242 | 245 | 239 | 245 | 250 | 271 | 285 | 286 | 285 | 282 | 268 | 280 | 275 | 266 | 251 | 277 | 251 | 244 | 249 | 244 | 262.5 |
| 19-Sep | 245 | 246 | 249 | 253 | 253 | 264 | 299 | 297 | 301 | 278 | 284 | 287 | 286 | 308 | 313 | 313 | 323 | 328 | 303 | 315 | 302 | 200 | 217 | 279 | 288.1 |
| 20-Sep | 261 | 221 | 284 | 279 | 295 | 299 | 294 | 313 | 309 | 312 | 304 | 311 | 314 | 303 | 298 | 315 | 293 | 306 | 89 | 111 | 188 | 148 | 158 | 181 | 297.5 |
| 21-Sep | 172 | 147 | 167 | 149 | 127 | 149 | 146 | 143 | 236 | 236 | 237 | 244 | 330 | 213 | 213 | 240 | 249 | 239 | 202 | 190 | 190 | 179 | 182 | 196 | 215.2 |
| 22-Sep | 194 | 190 | 190 | 176 | 100 | 157 | 187 | 190 | 196 | 198 | 188 | 196 | 176 | 181 | 193 | 196 | 192 | 172 | 155 | 135 | 144 | 151 | 155 | 156 | 178.4 |
| 23-Sep | 158 | 152 | 156 | 139 | 114 | 149 | 153 | 145 | 151 | 141 | 146 | 142 | 139 | 143 | 139 | 140 | 145 | 146 | 138 | 139 | 135 | 151 | 161 | 144.0 | |
| 24-Sep | 177 | 191 | 185 | 191 | 208 | 217 | 220 | 231 | 248 | 253 | 261 | 266 | 271 | 279 | 284 | 274 | 259 | 248 | 242 | 248 | 245 | 246 | 244 | 250.5 | |
| 25-Sep | 247 | 239 | 236 | 242 | 216 | 239 | 241 | 252 | 258 | 258 | 248 | 271 | 297 | 296 | 286 | 267 | 273 | 251 | 234 | 221 | 111 | 157 | 159 | 167 | 256.6 |
| 26-Sep | 179 | 118 | 90 | 100 | 170 | 145 | 98 | 162 | 168 | 170 | 185 | 204 | 204 | 204 | 196 | 187 | 171 | 154 | 149 | 151 | 158 | 160 | 159 | 167 | 169.8 |
| 27-Sep | 177 | 170 | 166 | 179 | 194 | 202 | 218 | 252 | 287 | 290 | 248 | 222 | 252 | 265 | 289 | 291 | 278 | 260 | 230 | 246 | 218 | 217 | 225 | 228 | 238.0 |
| 28-Sep | 227 | 241 | 231 | 199 | 215 | 174 | 172 | 160 | 159 | 163 | 175 | 213 | 224 | 231 | 235 | 219 | 222 | 204 | 180 | 181 | 180 | 178 | 177 | 174 | 202.5 |
| 29-Sep | 123 | 79 | 107 | 154 | 138 | 54 | 105 | 169 | 180 | 175 | 181 | 157 | 165 | 116 | 15 | 31 | 56 | 88 | 125 | 173 | 195 | 174 | 163 | 161 | 135.7 |
| 30-Sep | 120 | 36 | 193 | 168 | 191 | 265 | 315 | 17 | 31 | 26 | 65 | 4 | 21 | 14 | 20 | 22 | 21 | 17 | 1 | 21 | 6 | 9 | 13 | 24 | 17.6 |

221.0 229.6 227.1 226.7 221.4 225.5 238.9 243.0 252.7 256.5 244.3 244.9 253.6 253.5 255.6 262.9 255.4 243.2 230.3 228.5 220.1 218.0 223.7 231.9

Diurnal Average

M - Maintenance

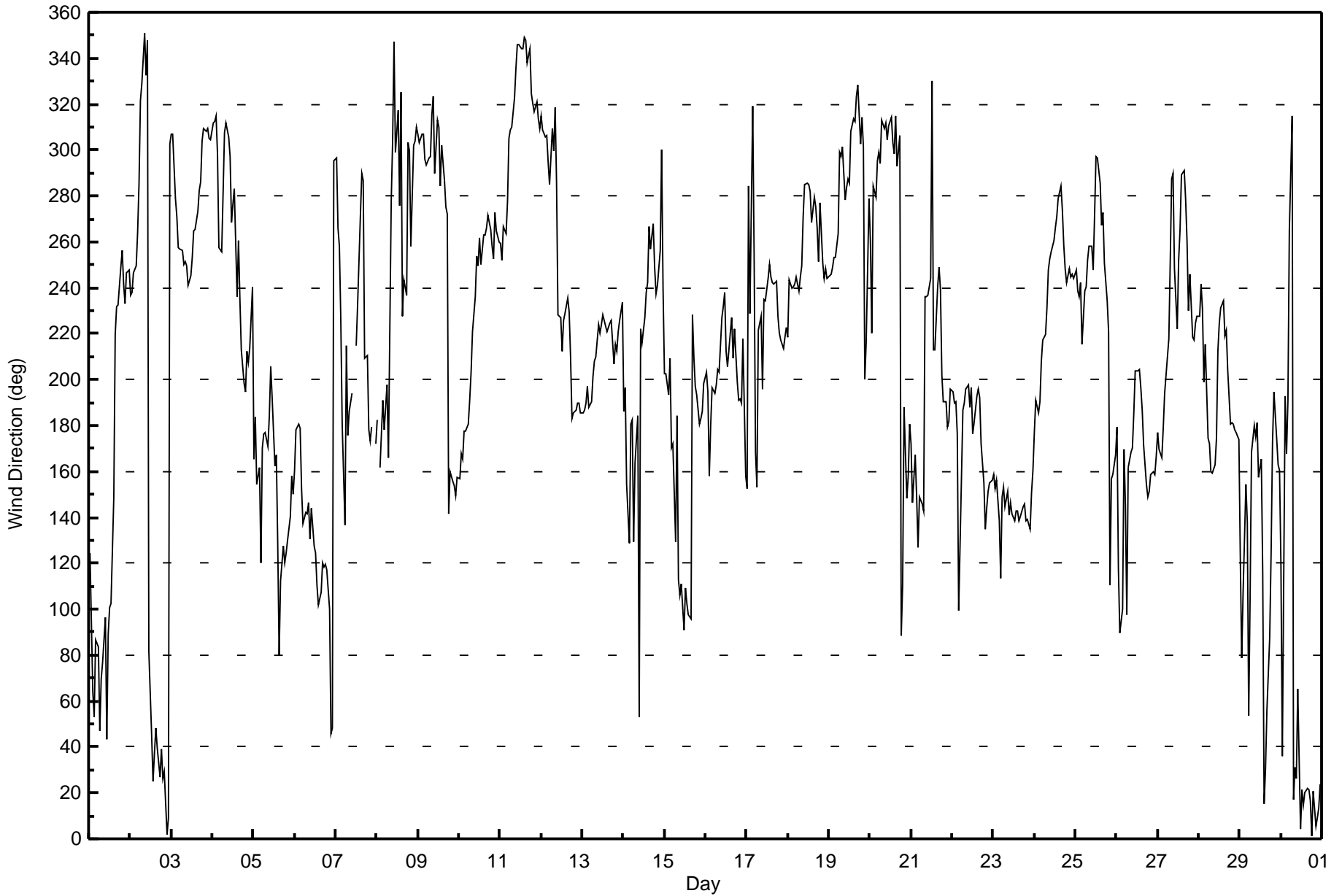
AF - Analyzer Failure

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Cenovus - Christina Lake - September 2016





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Cenovus - Christina Lake - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 104 deg on Sep 29 15:00 | Hours of Data: 716 |
| Minimum Value: 7 deg on Sep 16 22:00 | Hours of Missing Data: 4 |
| Percentiles: P ₁ = 8 P ₁₀ = 12 Q ₁ = 15 Median = 20 Q ₃ = 29 P ₉₀ = 47 P ₉₉ = 86 | 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 | 14 | 44 | 27 | 17 | 9 | 12 | 22 | 25 | 27 | 57 | 25 | 20 | 21 | 18 | 26 | 39 | 25 | 23 | 21 | 19 | 19 | 20 | 18 | 18 | 57 |
| 2-Sep | 18 | 17 | 19 | 22 | 29 | 28 | 20 | 17 | 23 | 24 | 35 | 37 | 31 | 31 | 17 | 17 | 15 | 13 | 16 | 77 | 19 | 19 | 30 | 26 | 77 |
| 3-Sep | 14 | 16 | 18 | 18 | 17 | 18 | 18 | 20 | 20 | 21 | 21 | 20 | 19 | 16 | 17 | 17 | 19 | 15 | 15 | 12 | 12 | 15 | 16 | 21 | |
| 4-Sep | 11 | 12 | 12 | 25 | 20 | 22 | 26 | 17 | 20 | 21 | 32 | 48 | 63 | 57 | 35 | 44 | 24 | 20 | 15 | 13 | 16 | 18 | 17 | 18 | 63 |
| 5-Sep | 24 | 11 | 22 | 32 | 20 | 18 | 10 | 14 | 19 | 29 | 27 | 35 | 44 | 40 | 39 | 16 | 30 | 14 | 12 | 9 | 7 | 12 | 10 | 12 | 44 |
| 6-Sep | 11 | 13 | 13 | 13 | 18 | 14 | 13 | 15 | 24 | 21 | 21 | 18 | 16 | 16 | 15 | 13 | 14 | 12 | 19 | 19 | 69 | 18 | 24 | 79 | 79 |
| 7-Sep | 67 | 31 | 21 | 39 | 28 | 29 | 17 | 30 | 32 | 63 | M | M | 45 | 34 | 33 | 37 | 58 | 40 | 24 | 19 | 13 | 46 | AF | 53 | 67 |
| 8-Sep | 22 | AF | 28 | 16 | 54 | 48 | 59 | 89 | 56 | 38 | 55 | 38 | 40 | 41 | 71 | 60 | 22 | 18 | 24 | 28 | 35 | 32 | 20 | 13 | 89 |
| 9-Sep | 10 | 9 | 11 | 10 | 28 | 29 | 29 | 44 | 16 | 27 | 32 | 25 | 30 | 37 | 24 | 29 | 27 | 49 | 41 | 7 | 9 | 8 | 10 | 11 | 49 |
| 10-Sep | 13 | 13 | 12 | 16 | 12 | 14 | 16 | 18 | 24 | 23 | 21 | 22 | 21 | 23 | 19 | 22 | 18 | 18 | 17 | 19 | 19 | 20 | 19 | 22 | 24 |
| 11-Sep | 22 | 18 | 18 | 17 | 20 | 14 | 12 | 12 | 16 | 19 | 19 | 16 | 18 | 18 | 21 | 18 | 17 | 23 | 16 | 14 | 14 | 14 | 14 | 14 | 23 |
| 12-Sep | 24 | 19 | 65 | 29 | 36 | 64 | 62 | 65 | 30 | 38 | 34 | 34 | 61 | 33 | 35 | 25 | 27 | 22 | 9 | 12 | 12 | 13 | 13 | 13 | 65 |
| 13-Sep | 13 | 13 | 14 | 15 | 15 | 15 | 17 | 19 | 21 | 24 | 21 | 23 | 22 | 24 | 22 | 22 | 20 | 19 | 15 | 13 | 13 | 16 | 19 | 23 | 24 |
| 14-Sep | 29 | 33 | 28 | 39 | 29 | 29 | 77 | 48 | 18 | 91 | 89 | 27 | 25 | 25 | 24 | 22 | 19 | 19 | 16 | 16 | 27 | 17 | 28 | 91 | |
| 15-Sep | 76 | 18 | 33 | 44 | 51 | 37 | 47 | 40 | 60 | 33 | 22 | 42 | 32 | 61 | 28 | 53 | 23 | 17 | 11 | 9 | 9 | 12 | 13 | 13 | 76 |
| 16-Sep | 14 | 14 | 29 | 14 | 12 | 13 | 15 | 28 | 18 | 24 | 26 | 28 | 22 | 23 | 26 | 24 | 20 | 20 | 18 | 10 | 9 | 7 | 42 | 74 | 74 |
| 17-Sep | 27 | 70 | 102 | 69 | 43 | 34 | 83 | 86 | 25 | 26 | 23 | 15 | 21 | 20 | 20 | 27 | 23 | 20 | 19 | 18 | 13 | 14 | 19 | 16 | 102 |
| 18-Sep | 18 | 20 | 15 | 15 | 16 | 17 | 17 | 17 | 18 | 20 | 20 | 22 | 23 | 23 | 19 | 19 | 19 | 19 | 17 | 28 | 18 | 16 | 17 | 17 | 28 |
| 19-Sep | 18 | 16 | 16 | 16 | 17 | 20 | 25 | 25 | 18 | 21 | 21 | 21 | 20 | 16 | 13 | 17 | 18 | 16 | 29 | 11 | 40 | 62 | 41 | 50 | 62 |
| 20-Sep | 56 | 82 | 78 | 37 | 41 | 23 | 42 | 14 | 16 | 20 | 51 | 24 | 28 | 39 | 46 | 42 | 33 | 52 | 50 | 37 | 42 | 34 | 21 | 20 | 82 |
| 21-Sep | 15 | 25 | 44 | 57 | 77 | 54 | 82 | 39 | 43 | 26 | 30 | 50 | 38 | 48 | 24 | 31 | 21 | 21 | 11 | 8 | 7 | 7 | 9 | 12 | 82 |
| 22-Sep | 14 | 50 | 30 | 82 | 39 | 45 | 11 | 15 | 20 | 22 | 23 | 23 | 20 | 21 | 25 | 22 | 20 | 13 | 9 | 12 | 29 | 8 | 9 | 9 | 82 |
| 23-Sep | 8 | 11 | 11 | 11 | 15 | 14 | 15 | 15 | 14 | 15 | 14 | 15 | 14 | 15 | 15 | 14 | 14 | 14 | 12 | 12 | 12 | 12 | 15 | 15 | 15 |
| 24-Sep | 18 | 14 | 13 | 12 | 24 | 22 | 19 | 22 | 22 | 21 | 21 | 19 | 18 | 20 | 25 | 21 | 19 | 17 | 18 | 19 | 17 | 18 | 17 | 17 | 25 |
| 25-Sep | 17 | 14 | 14 | 15 | 13 | 21 | 18 | 18 | 17 | 19 | 24 | 32 | 22 | 26 | 23 | 21 | 22 | 23 | 11 | 58 | 62 | 18 | 19 | 32 | 62 |
| 26-Sep | 19 | 23 | 64 | 28 | 23 | 43 | 14 | 25 | 13 | 18 | 21 | 21 | 29 | 24 | 21 | 18 | 16 | 11 | 10 | 10 | 9 | 10 | 10 | 12 | 64 |
| 27-Sep | 13 | 13 | 12 | 14 | 16 | 16 | 19 | 20 | 21 | 24 | 21 | 23 | 26 | 19 | 18 | 19 | 21 | 18 | 15 | 18 | 13 | 14 | 18 | 18 | 26 |
| 28-Sep | 16 | 17 | 21 | 15 | 29 | 18 | 21 | 20 | 34 | 36 | 41 | 32 | 30 | 31 | 25 | 25 | 25 | 17 | 9 | 11 | 11 | 11 | 9 | 9 | 41 |
| 29-Sep | 30 | 13 | 31 | 13 | 29 | 31 | 62 | 14 | 26 | 37 | 37 | 51 | 55 | 87 | 104 | 20 | 17 | 8 | 23 | 24 | 24 | 28 | 51 | 53 | 104 |
| 30-Sep | 40 | 55 | 65 | 25 | 24 | 61 | 52 | 72 | 23 | 21 | 23 | 23 | 16 | 22 | 12 | 12 | 11 | 20 | 18 | 13 | 17 | 14 | 15 | 12 | 72 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|-----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|--|
| 76 | 82 | 102 | 82 | 77 | 64 | 83 | 89 | 60 | 91 | 89 | 51 | 63 | 87 | 104 | 60 | 58 | 52 | 50 | 77 | 69 | 62 | 51 | 79 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance AF - Analyzer Failure



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-----------------|
| Calibration Date | September 6, 2016 | Last Calibration | August 15, 2016 |
| Station Name | Cenovus - Christina Lake | Station Number | AMS 500 |
| Reason: | Routine | | |
| Start Time (MST) | 12:07 | End Time (MST) | 16:10 |
| Gas Cert Reference | LL107928 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 50 ppm | Cal Gas Exp Date | Sep-8-2018 |
| Calibrator Make/Model | API T700 | Serial Number | 451 |
| ZAG Make/Model | API 701 | Serial Number | 404 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 2575 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -698 | -698 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 834 | 837 |
| Calculated slope | 1.004570 | 1.005640 | Chamber temp | 45.0 | 44.9 |
| Calculated intercept | 0.614268 | 0.695442 | Pressure | 679.7 | 673.5 |
| Analyzer Background | 12.1 | 12.2 | Flow | 0.592 | 0.589 |
| Analyzer Coefficient | 1.004 | 1.004 | Intensity | 91 | 90 |

Analyzer make Thermo 43i Analyzer serial # 118148497

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 5000 | 79.3 | 793.0 | 788.3 | 1.006 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 79.3 | 793.0 | 788.3 | 1.006 |
| second point | 5000 | 39.7 | 397.0 | 393.7 | 1.008 |
| third point | 5000 | 19.8 | 198.0 | 195.4 | 1.013 |
| as left zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as left span | 5000 | 79.3 | 793.0 | 790.6 | 1.003 |
| Average Correction Factor | | | | | 1.009 |

Corrected As found 788.2 Previous response 788.8 % change 0.1%

Notes:

Changed inlet filter after as founds. No adjustments.

Calibration Performed By: Evan Magill



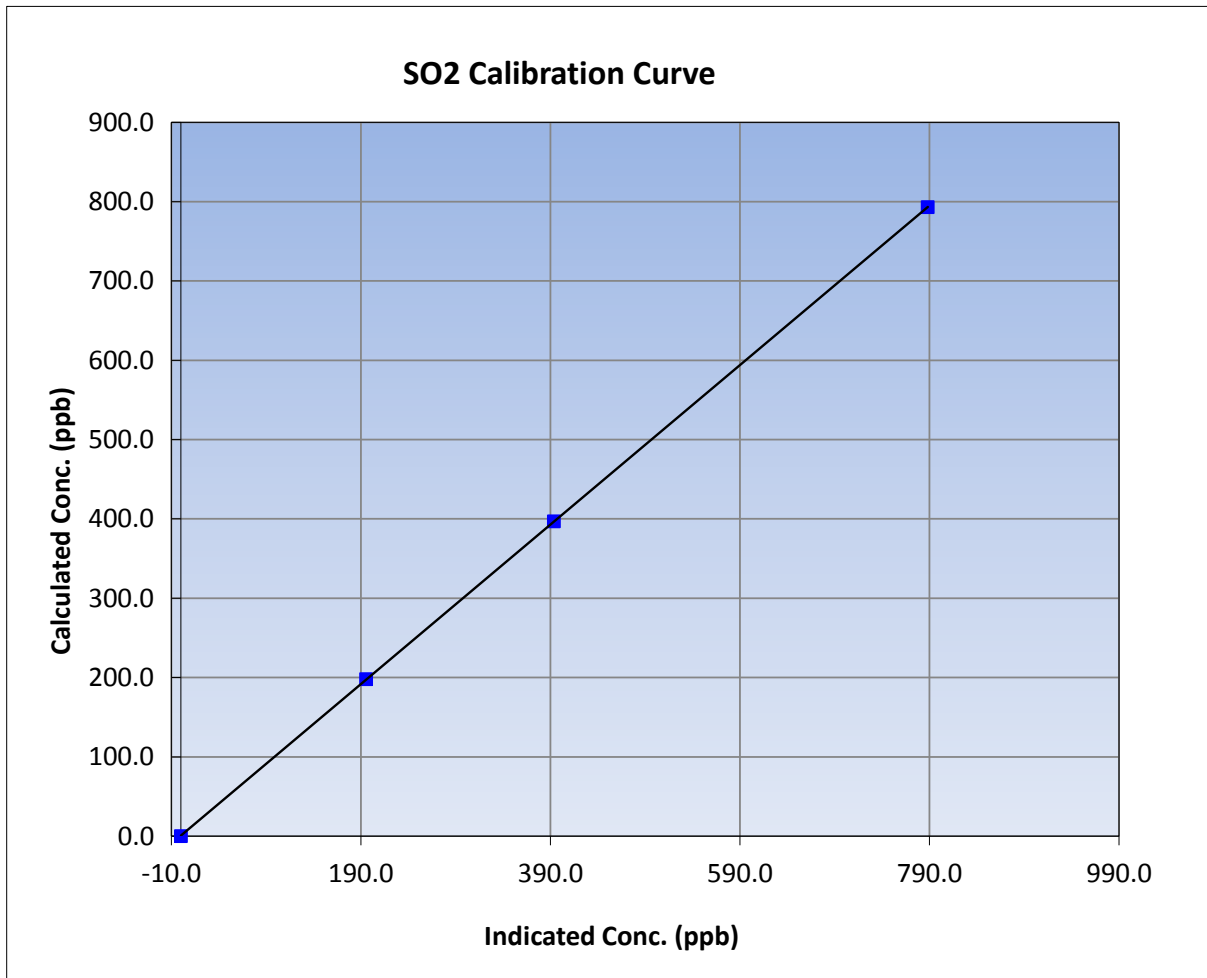
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------------|----------------------|-----------------|
| Calibration Date | September 6, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Cenovus - Christina Lake | Station Number | AMS 500 |
| Start Time (MST) | 12:07 | End Time (MST) | 16:10 |
| Analyzer make | Thermo 43i | Analyzer serial # | 118148497 |

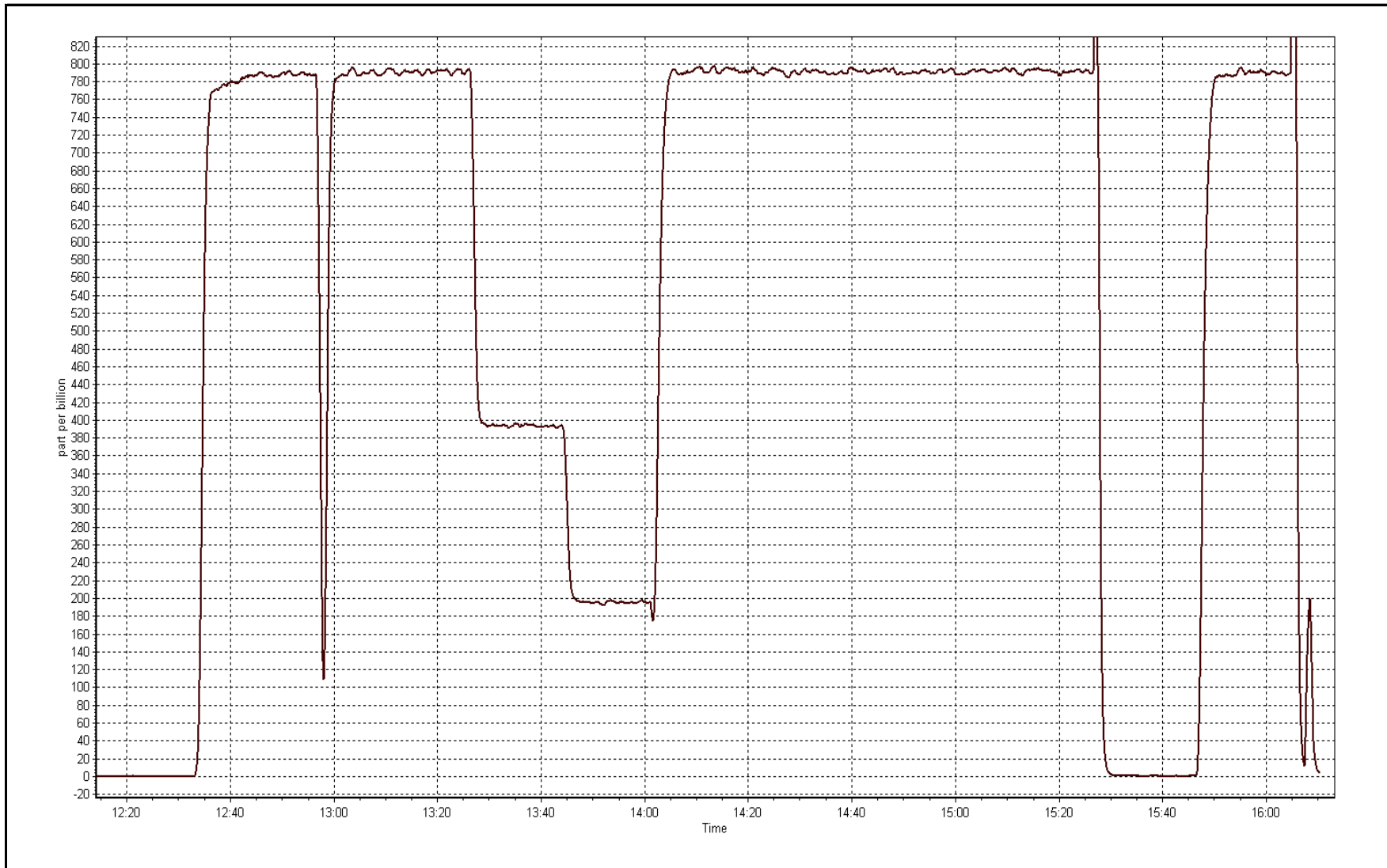
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999996 |
| 793.0 | 788.3 | 1.0060 | | |
| 397.0 | 393.7 | 1.0084 | Slope | 1.005640 |
| 198.0 | 195.4 | 1.0132 | | |
| | | | Intercept | 0.695442 |



SO2 Calibration Plot

Date: September 6, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 7, 2016 | Last Calibration | August 16, 2016 |
| Station Name | Cenovus | Station Number | AMS 500 |
| Reason: | Routine | | |
| Start Time (MST) | 8:03 | End Time (MST) | 11:08 |
| Gas Cert Reference | LL30650 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.1 ppm | Cal Gas Exp Date | 2/12/2019 |
| Calibrator Make/Model | API 700 | Serial Number | 2445 |
| ZAG air Make/Model | API 701 | Serial Number | 404 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 2575 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | LL107928 9-Aug-18 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -681 | -681 |
| Analyzer IP address | 192.168.1.42 | | Lamp voltage | 967 | 969 |
| Calculated slope | 0.991409 | 0.994492 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.146836 | 0.085573 | Pressure | 653.8 | 652.3 |
| Analyzer Background | 1.49 | 1.49 | Flow | 0.438 | 0.437 |
| Analyzer Coefficient | 0.844 | 0.835 | Intensity | 92 | 91 |
| | | | Converter temp. | 310 | 310 |

| | | | |
|----------------------|----------------|--------------------|------------|
| Analyzer make/model | Thermo 43i-TLE | Analyzer serial # | 1008841400 |
| Converter make/model | Thermo 340 | Converter serial # | 328702539 |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 5000 | 78.5 | 80.1 | 80.9 | 0.989 |
| SO2 scrubber check | 5000 | 19.8 | 198.0 | 1.4 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 5000 | 78.5 | 80.1 | 80.4 | 0.995 |
| second point | 5000 | 39.3 | 40.1 | 40.2 | 0.997 |
| third point | 5000 | 19.6 | 20.0 | 20.0 | 1.001 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 5000 | 78.5 | 80.1 | 80.2 | 0.999 |
| Average Correction Factor | | | | | 0.998 |

| | | | | | |
|--------------------|------|-------------------|------|----------|-------|
| Corrected As found | 81.0 | Previous response | 80.6 | % change | -0.4% |
|--------------------|------|-------------------|------|----------|-------|

Notes:

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

Calibration Performed By: Evan Magill



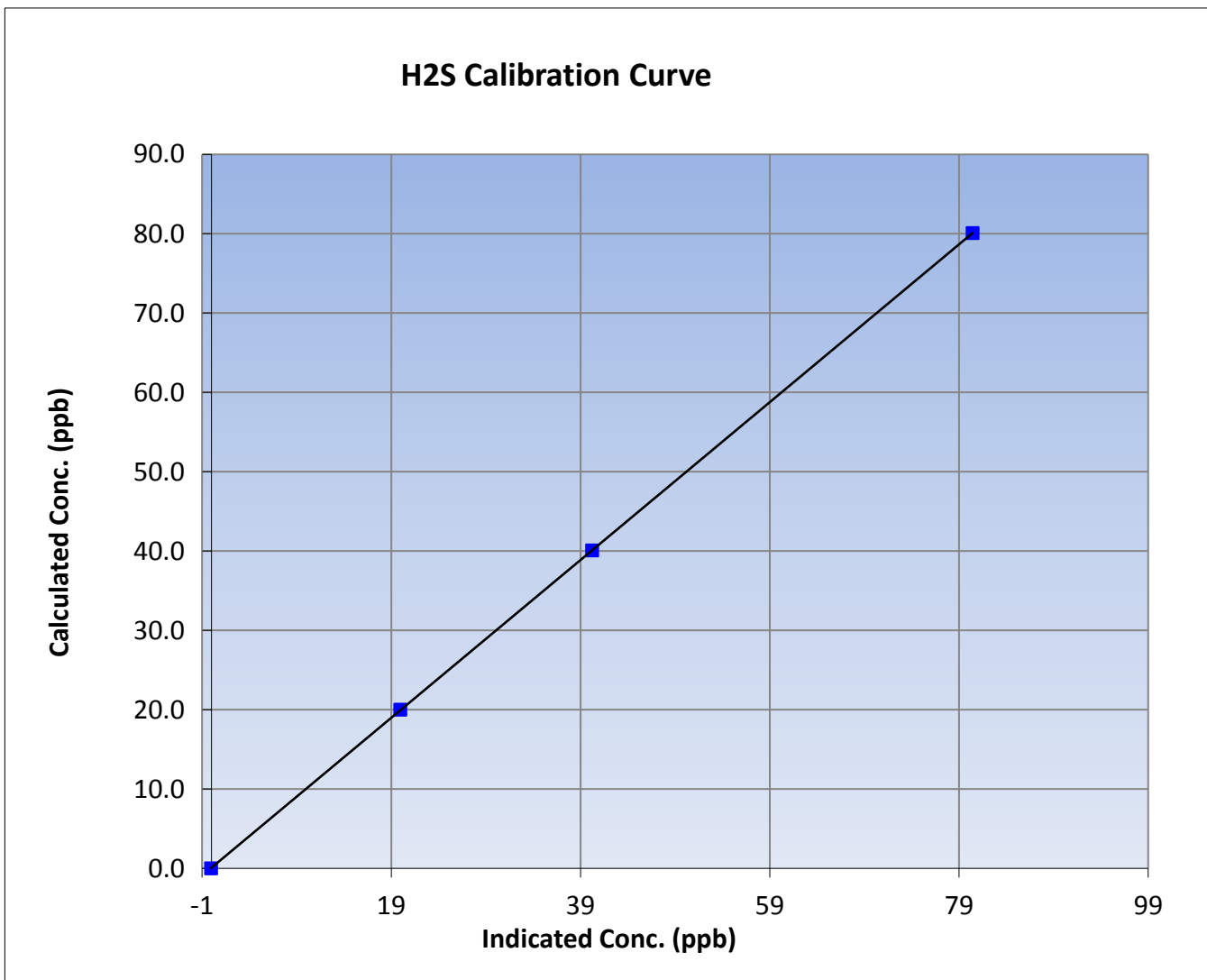
Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 7, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | Cenovus | Station Number | AMS 500 |
| Start Time (MST) | 8:03 | End Time (MST) | 11:08 |
| Analyzer make | Thermo 43i-TLE | Analyzer serial # | 1008841400 |

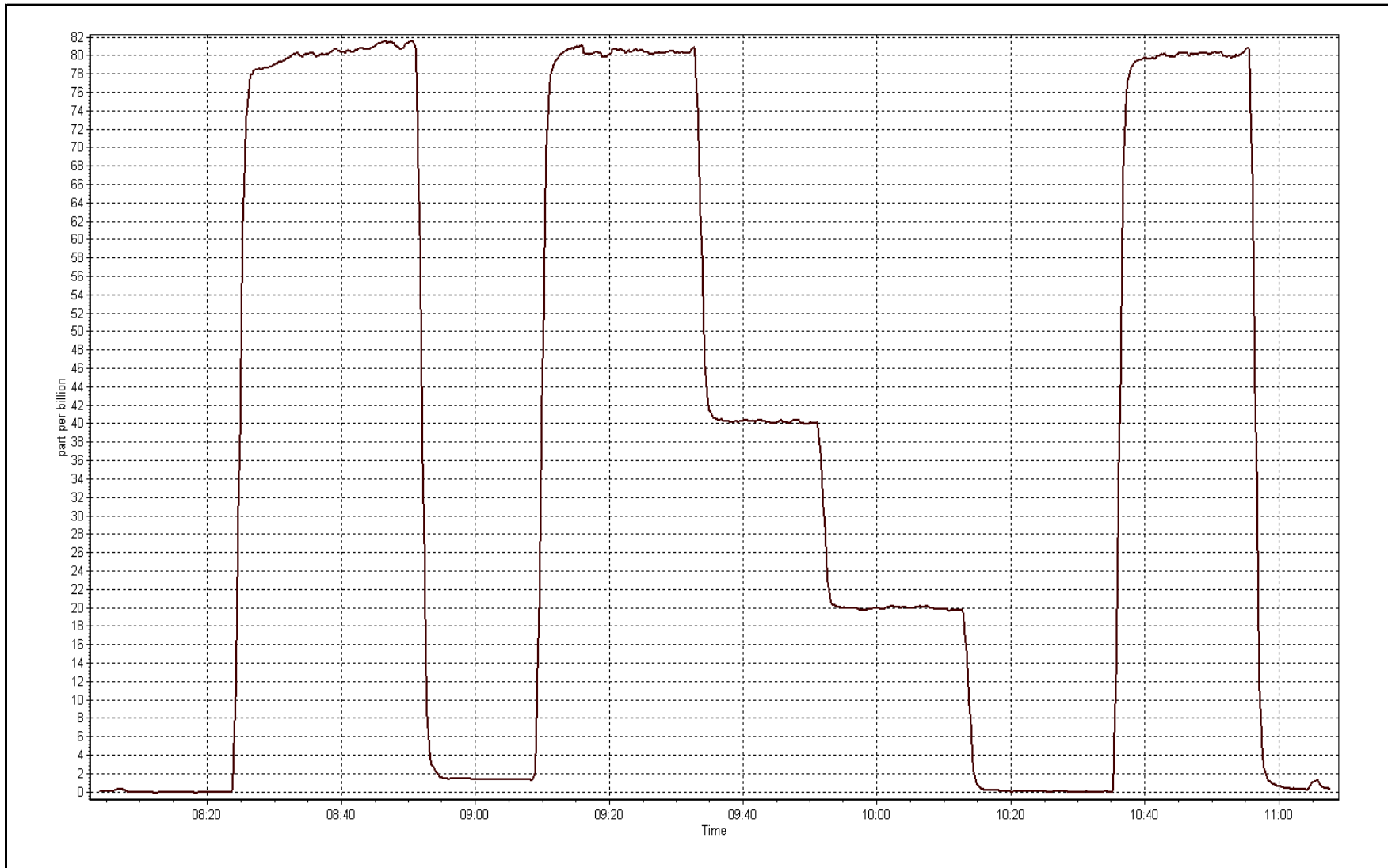
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999999 |
| 80.1 | 80.4 | 0.9954 | | |
| 40.1 | 40.2 | 0.9967 | Slope | 0.994492 |
| 20.0 | 20.0 | 1.0011 | | |
| | | | Intercept | 0.085573 |



H2S Calibration Plot

Date: September 7, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Cenovus | Station Number | AMS 500 |
| Reason: | Routine | | |
| Start Time (MST) | 12:07 | End Time (MST) | 16:10 |
| NO Cal Gas Conc | 50.5 ppm | Gas Cert Reference | LL107928 |
| NOx Cal Gas Conc | 50.8 ppm | Cal Gas Expiry Date | Sep-8-2018 |
| Calibrator | API T700 | Serial Number | 451 |
| Zero air Generator | Teledyne API T701 | Serial Number | 4604 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 2575 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.997028 | 0.995805 | 0.994659 |
| | Data Offset | 1.042526 | 1.424460 | -0.449166 |
| Current Calibration | Data Slope | 0.999676 | 0.997768 | 0.987067 |
| | Data Offset | 1.866596 | 2.091103 | -0.485337 |

Analyzer Information

| | | | |
|---------------------|----------|-------------------|-----|
| Analyzer make/model | API T200 | Analyzer serial # | 723 |
|---------------------|----------|-------------------|-----|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.72 | | 192.168.1.72 | |
| NO coefficient | 0.930 | | 0.941 | |
| NOx coefficient | 0.933 | | 0.944 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 0.4 | | 0.4 | |
| NOx bkgrnd | 1.4 | | 1.4 | |
| Chamber Temp | 50 | Deg C | 50 | Deg C |
| Moly Temp | 314.1 | Deg C | 315.8 | Deg C |
| PMT voltage | 826 | V | 826 | V |
| PMT Temp | 6.9 | Deg C | 6.9 | Deg C |
| O3 flow | 85 | ccm | 86 | ccm |
| R Cell press NO | 4 | mmHg | 4.5 | mmHg |
| R Cell Press Nox | 4 | mmHg | 4.2 | mmHg |
| NO sample flow | 0.486 | lpm | 0.489 | lpm |
| Nox sample Flow | 0.481 | lpm | 0.486 | lpm |

Notes:

Inlet filter changed after as founds. Adjusted span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date: September 6, 2016 Station Number: AMS 500

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.4 | 0.3 | ---- | ---- |
| as found span | 5000 | 79.3 | 805.7 | 800.9 | 4.8 | 795.7 | 792.2 | 3.5 | 1.0126 | 1.0110 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.4 | 0.3 | ---- | ---- |
| high point | 5000 | 79.3 | 805.7 | 800.9 | 4.8 | 804.8 | 801.6 | 3.2 | 1.0011 | 0.9992 |
| second point | 5000 | 39.6 | 402.3 | 400.0 | 2.4 | 400.2 | 397.6 | 2.6 | 1.0053 | 1.0060 |
| third point | 5000 | 19.8 | 201.2 | 200.0 | 1.2 | 197.3 | 196.9 | 0.5 | 1.0194 | 1.0158 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.3 | 0.2 | -0.5 | ---- | ---- |
| as left span | 5000 | 79.3 | 805.7 | 608.2 | 197.5 | 802.9 | 607.4 | 195.6 | 1.0034 | 1.0013 |
| Average Correction Factor | | | | | | | | | 1.0086 | 1.0070 |

Corrected As found NO_x= 795.8 NO= 792.6 Percent Change NO_x= 1.4% NO= 1.3%
 Previous Response NO_x= 807.0 NO= 802.9

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 79.30 ccm NOx ref calc conc = 805.7 ppb NO ref calc conc = 800.9 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 4.8 | 805.5 | 799.4 | 0.3 | 1.0003 | 1.0019 | ---- | ---- |
| 1st NO2 (600) | 608.2 | 196.0 | 807.0 | 608.2 | 198.9 | 0.9983 | ---- | 0.9855 | 101.5% |
| 2nd NO2 (400) | 674.2 | 130.0 | 806.4 | 674.2 | 132.3 | 0.9991 | ---- | 0.9827 | 101.8% |
| 3rd NO2 (200) | 733.3 | 70.9 | 805.9 | 733.3 | 72.6 | 0.9998 | ---- | 0.9766 | 102.4% |
| 2nd NO ref point | | 4.8 | 805.1 | 798.6 | 6.5 | 1.0008 | 1.0029 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9995 | | 0.9816 | 101.9% |

Calibration Performed By: Evan Magill



Wood Buffalo Environmental Association

NO_x Calibration Summary

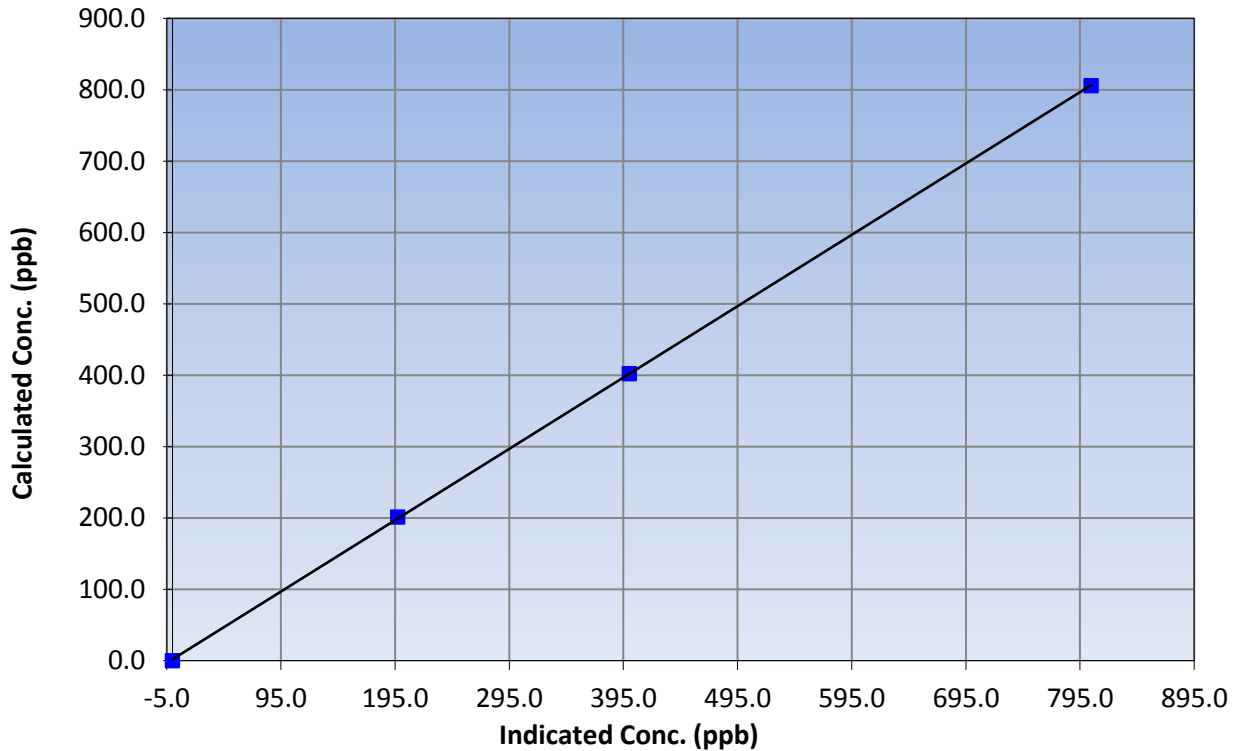
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Cenovus | Station Number | AMS 500 |
| Start Time (MST) | 12:07 | End Time (MST) | 16:10 |
| Analyzer make | API T200 | Analyzer serial # | 723 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999978 |
| 805.7 | 804.8 | 1.0011 | | |
| 402.3 | 400.2 | 1.0053 | Slope | 0.999676 |
| 201.2 | 197.3 | 1.0194 | | |
| | | | Intercept | 1.866596 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

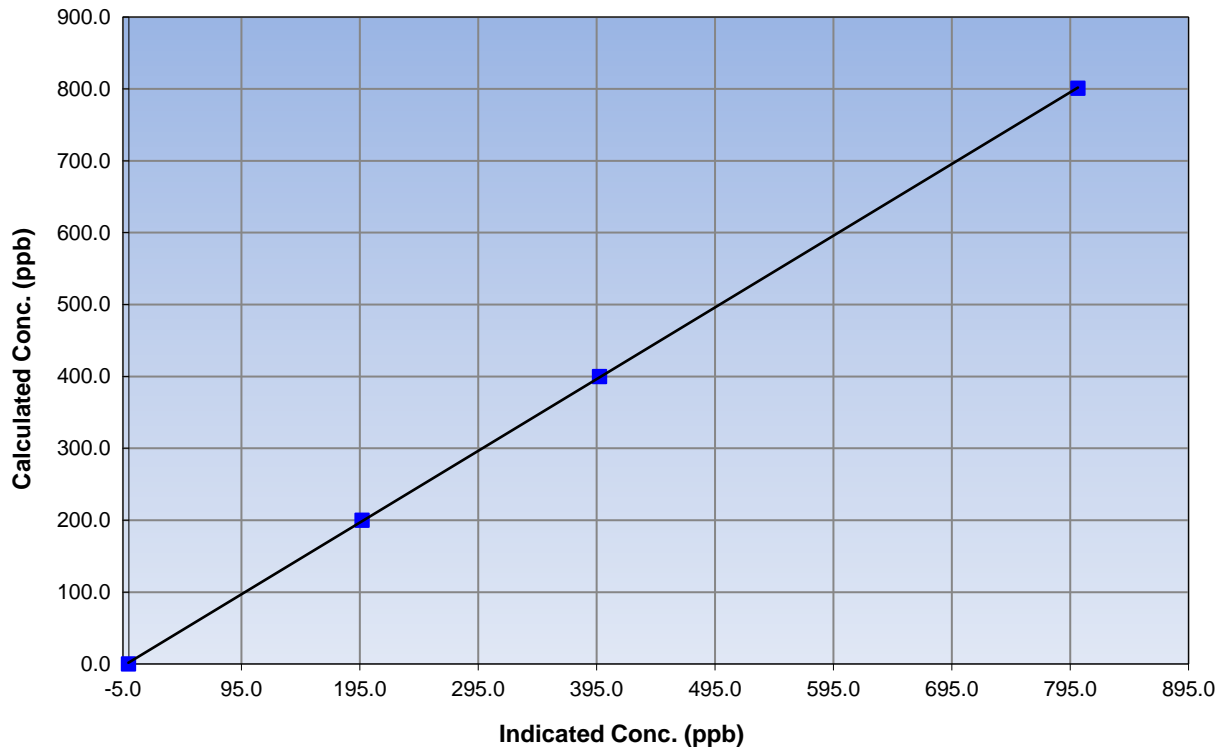
Station Information

| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2016 | Previous Calibration | August 15, 2016 |
| Station Name | Cenovus | Station Number | AMS 500 |
| Start Time (MST) | 12:07 | End Time (MST) | 16:10 |
| Analyzer make | API T200 | Analyzer serial # | 723 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.4 | N/A | Correlation Coefficient | 0.999979 |
| 800.9 | 801.6 | 0.9992 | | |
| 400.0 | 397.6 | 1.0060 | Slope | 0.997768 |
| 200.0 | 196.9 | 1.0158 | | |
| | | | Intercept | 2.091103 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

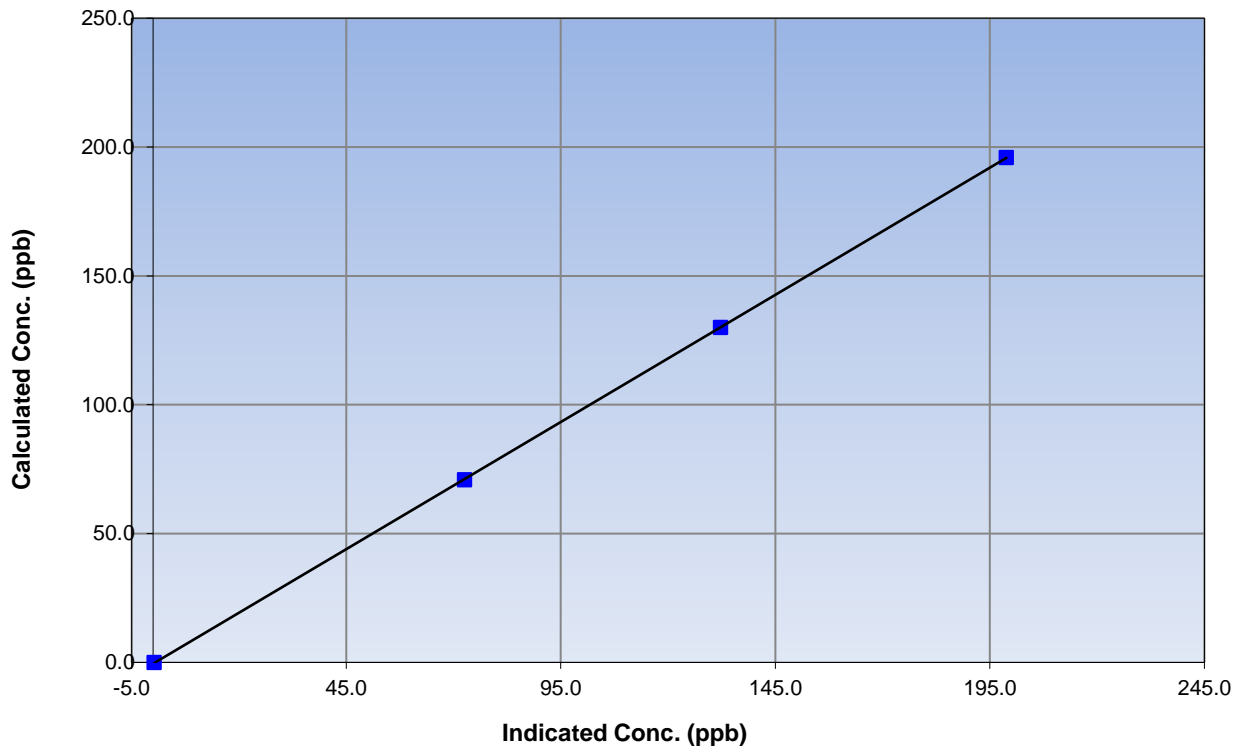
Station Information

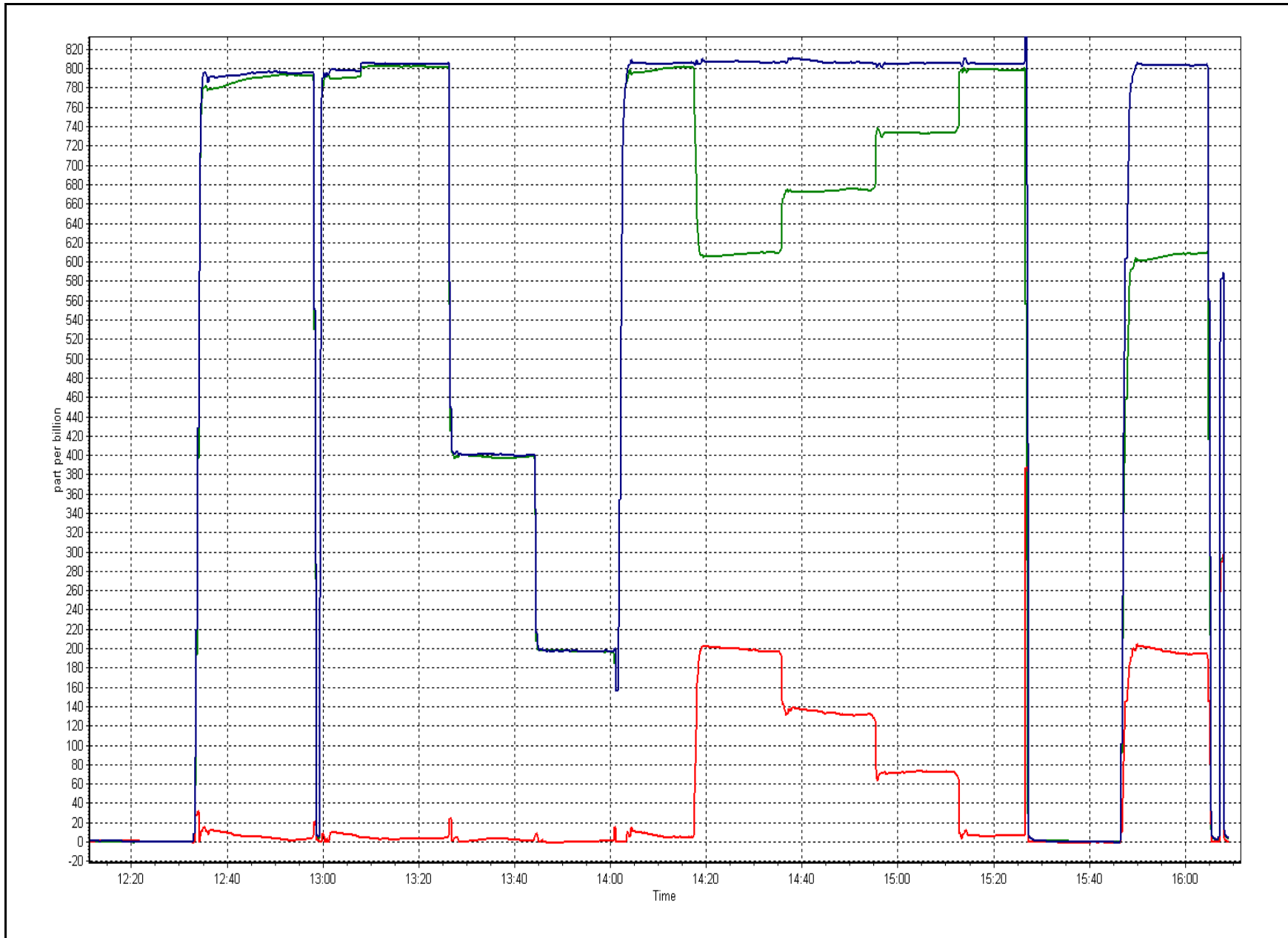
| | | | |
|------------------|-------------------|----------------------|-----------------|
| Calibration Date | September 6, 2016 | Previous Calibration | August 15, 2016 |
| Station Number | Cenovus | Station Number | AMS 500 |
| Start Time (MST) | 12:07 | End Time (MST) | 16:10 |
| Analyzer make | API T200 | Analyzer serial # | 723 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.3 | N/A | Correlation Coefficient | 0.999992 |
| 196.0 | 198.9 | 0.9855 | | |
| 130.0 | 132.3 | 0.9827 | Slope | 0.987067 |
| 70.9 | 72.6 | 0.9766 | | |
| | | | Intercept | -0.485337 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

Install WS/WD Calibration Report

Station Information

| | | | |
|------------------|---------------------------------------------|---------------------------------------|----------------------------------|
| Calibration Date | September 7, 2016 | Previous Calibration | December 16, 2015 |
| Station Name | Cenovus | Station Number | AMS 500 |
| Reason: | <input checked="" type="checkbox"/> Routine | <input type="checkbox"/> Installation | <input type="checkbox"/> Removal |
| Start Time (MST) | 10:17 | End Time (MST) | 11:28 |
| Barometric Press | n/a | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053 | Serial Number | K13090 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | P22393 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 2575 |
| DACS voltage range | 5000 | DACS channel # | P2 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 0.999613745 | Calculated slope | 0.999615 |
| Calculated intercept | -0.029254935 | Calculated intercept | -0.025296 |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.3 | 0.9957 |
| 400 | 39.4 | 39.4 | 0.9990 |
| 600 | 58.6 | 58.5 | 1.0003 |
| 800 | 77.8 | 77.8 | 0.9989 |
| Average Correction Factor | | | 0.9984 |

WIND DIRECTION

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | P10614 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 2575 |
| DACS voltage range | 5000 | DACS channel # | SE 24 |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 1.008412222 | Calculated slope | 1.002986 |
| Calculated intercept | -0.011665737 | Calculated intercept | -0.114200 |

As Found Declination (west of North) 14 As Left Declination (west of North) 14

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | 0.2 | n/a |
| 90 | 89.7 | 1.0038 |
| 180 | 179.7 | 1.0015 |
| 270 | 269.3 | 1.0026 |
| 360 | 359.0 | 1.0027 |
| Average Correction Factor | | 1.0027 |

Notes:

Annual audit. Compass method used to capture declinations.

Calibration Performed By: Evan Magill



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS 502
CONOCOPHILLIPS
SURMONT
SEPTEMBER 2016**

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

October 28, 2016



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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
 SEPTEMBER 2016

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|-----------------------------------|------------------|-------------------------|-----------------------|---------------------|-------------------------|-----------------------|--------------------------|------------------------|
| SO2 (ppb) Average | 682 | 38 | 38 | 100.00 | 20 | 0 | 6 | 0 |
| H2S (ppb) Average | 682 | 37 | 38 | 99.86 | 2 | 0 | 1 | 0 |
| NO2 (ppb) Average | 681 | 39 | 39 | 100.00 | 8 | 0 | 3 | - |
| NO (ppb) Average | 681 | 39 | 39 | 100.00 | 24 | - | 7 | - |
| NOX (ppb) Average | 681 | 39 | 39 | 100.00 | 30 | - | 9 | - |
| Temperature 2 m (C) Average | 720 | 0 | 0 | 100.00 | 22.1 | - | 16.4 | - |
| Relative Humidity (%) Average | 720 | 0 | 0 | 100.00 | 99 | - | 94 | - |
| Wind Speed 10 m (km/h) Average | 719 | 0 | 1 | 99.86 | 34 | - | 23 | - |
| 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 - CONOCOPHILLIPS SURMONT (AMS 502)
 SEPTEMBER 2016

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|-----------------------------------|--------|-------|--------|-------|------------|-----|----|--------|------|------|------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 682 | 1.2 | 2 | - | 0 | 0 | 0 | 1 | 1 | 2 | 20 |
| H2S (ppb) Average | 682 | 0.2 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| NO2 (ppb) Average | 681 | 1.3 | 1 | - | 0 | 0 | 0 | 1 | 2 | 3 | 8 |
| NO (ppb) Average | 681 | 1.3 | 3 | - | 0 | 0 | 0 | 0 | 1 | 3 | 24 |
| NOX (ppb) Average | 681 | 2.6 | 4 | - | 0 | 0 | 1 | 1 | 3 | 6 | 30 |
| Temperature 2 m (C) Average | 720 | 10.71 | 3.7 | - | 3.1 | 6.5 | 8 | 10 | 13.2 | 15.7 | 22.1 |
| Relative Humidity (%) Average | 720 | 70.4 | 18 | - | 30 | 46 | 57 | 70 | 86 | 94 | 99 |
| Wind Speed 10 m (km/h) Average | 719 | 13.8 | 6 | - | 1 | 7 | 10 | 13 | 18 | 22 | 34 |
| Wind Direction 10 m (deg) Average | 719 | - | - | - | - | - | - | - | - | - | - |

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONOCOPHILLIPS SURMONT (AMS 502)
SEPTEMBER 2016

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------------------|-------------------|-------------------|------------------|---------------------------------------|
| H2S | 27 Sep 2016 11:00 | 27 Sep 2016 11:00 | 1 | Maintenance - sample manifold cleaned |
| Wind Speed, Wind Direction | 27 Sep 2016 13:00 | 27 Sep 2016 13:00 | 1 | Maintenance - sensor calibration |



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

ConocoPhillips - Surmont - September 2016

| | | | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 20 ppb on Sep 3 19:00 | Maximum Daily Average: 6.0 ppb on Sep 3 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 27 09:00 | Minimum Daily Average: 0.4 ppb on Sep 28 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 1.9 ppb at hour 17 | Minimum Diurnal Average: 0.6 ppb at hour 8 | | Hours of Calibration: | 38 |
| Monthly Average: 1.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 O ₃ = 1 P ₉₀ = 2 P ₉₉ = 12 | | Percent Operational Time: | 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|----|----|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 |
| 2-Sep | 0 | 0 | 0 | 0 | 3 | Z | 1 | 1 | 4 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 4 | 5 | 5 | 1.7 | 5 |
| 3-Sep | Z | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 9 | 16 | 19 | 20 | 19 | 16 | 12 | 10 | 7 | 6.0 | 20 | |
| 4-Sep | 5 | Z | 2 | 1 | 0 | 1 | 0 | 0 | 2 | 6 | 1 | 1 | 2 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.6 | 6 |
| 5-Sep | 0 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0.5 | 1 | |
| 6-Sep | 1 | 1 | 1 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.5 | 1 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 1 | 0 | 0 | 2 | 3 | 3 | 4 | 12 | 8 | 1 | 9 | 2 | 1 | 1 | 4 | 2 | 4 | 2.8 | 12 | |
| 9-Sep | Z | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 6 | 3 | 8 | 8 | 2 | 3 | 6 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 2.4 | 8 | |
| 10-Sep | 1 | Z | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0.9 | 4 | |
| 11-Sep | 1 | 0 | Z | 11 | 11 | 8 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 7 | 12 | 7 | 15 | 9 | 3 | 6 | 5 | 3 | 4.5 | 15 | |
| 12-Sep | 2 | 3 | 1 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.6 | 3 | |
| 13-Sep | 0 | 0 | 0 | 2 | Z | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.8 | 2 | |
| 14-Sep | 1 | 0 | 0 | 0 | 1 | Z | 0 | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 5 | 4 | 3 | 1.5 | 5 | |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.4 | 3 | |
| 16-Sep | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 | |
| 17-Sep | 1 | 1 | Z | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0.5 | 1 | |
| 18-Sep | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 1 | 0 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 20-Sep | 1 | 1 | 1 | 0 | 0 | Z | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.3 | 3 | |
| 21-Sep | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 | |
| 23-Sep | 1 | 1 | Z | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.6 | 2 | |
| 24-Sep | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 26-Sep | 0 | 0 | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 | |
| 27-Sep | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.6 | 1 | |
| 28-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 29-Sep | 0 | 0 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0.6 | 1 | |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | |

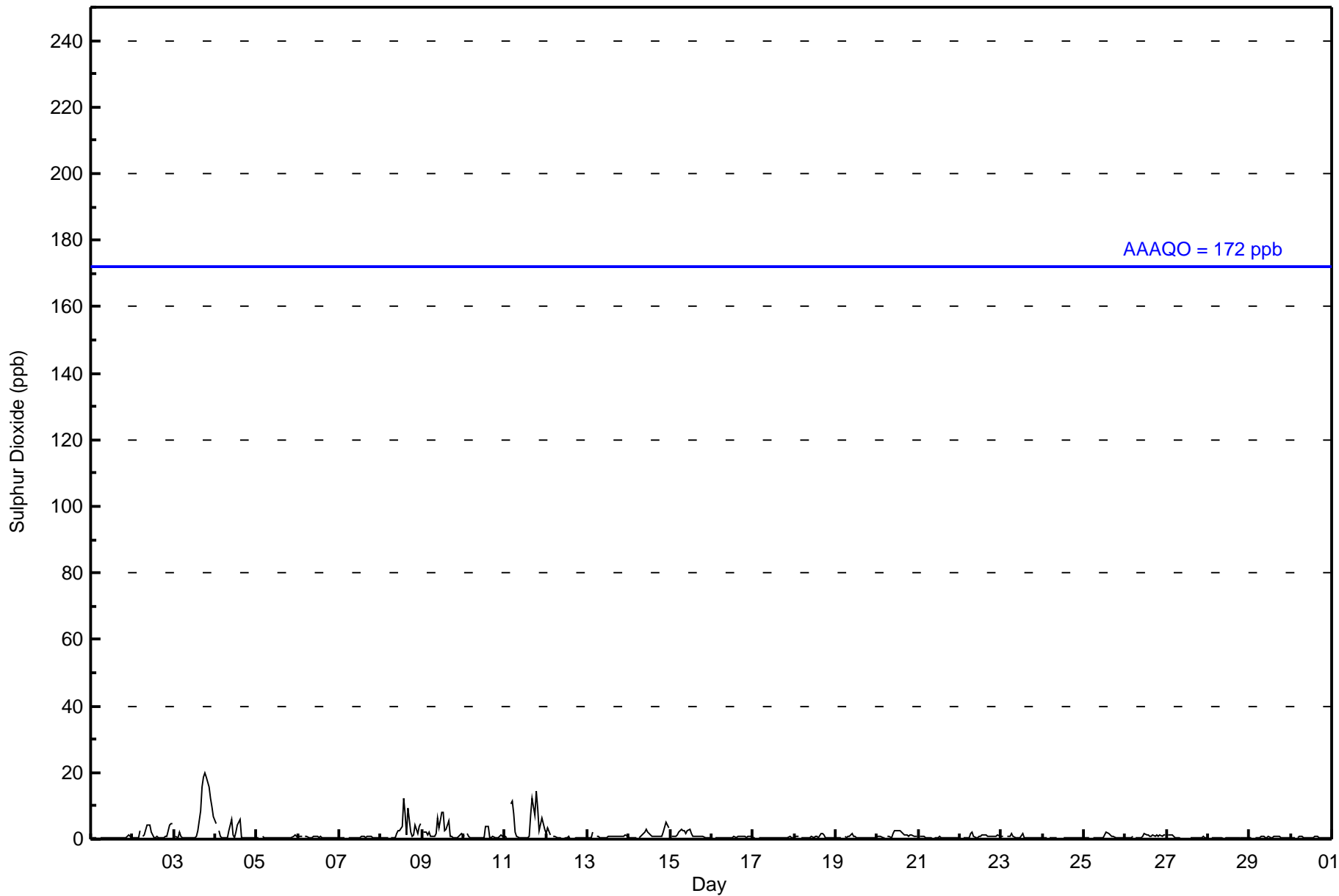
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.7 | 0.7 | 0.7 | 1.1 | 1.2 | 0.9 | 0.7 | 0.6 | 0.8 | 1.2 | 1.1 | 1.2 | 1.2 | 1.2 | 1.5 | 1.4 | 1.4 | 1.9 | 1.5 | 1.7 | 1.5 | 1.3 | 1.5 | 1.5 | 1.2 | Diurnal Average | |
| 5 | 3 | 2 | 11 | 11 | 8 | 3 | 3 | 4 | 6 | 4 | 8 | 8 | 12 | 8 | 9 | 16 | 19 | 20 | 19 | 16 | 12 | 10 | 7 | Diurnal Maximum | | |

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surrmont - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 671 | 98.39 | 98.39 |
| 11 - 20 | 11 | 1.61 | 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: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - September 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 121 | 22 | 40 | 671 |
| 11 - 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1 | 11 |
| 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 | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 121 | 32 | 41 | 682 |

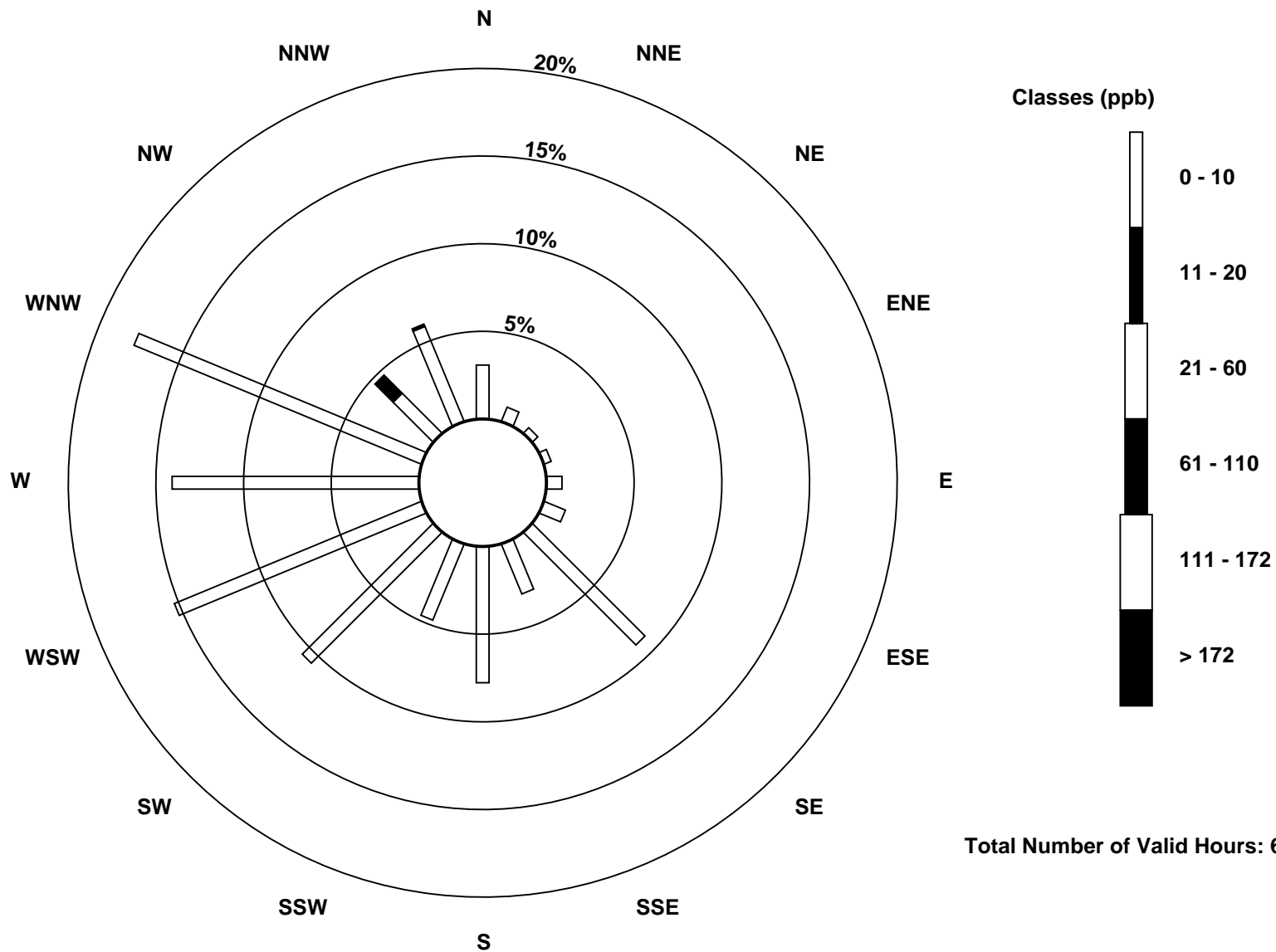
Total Number of Valid Hours: 682

Total Number of Hours: 720

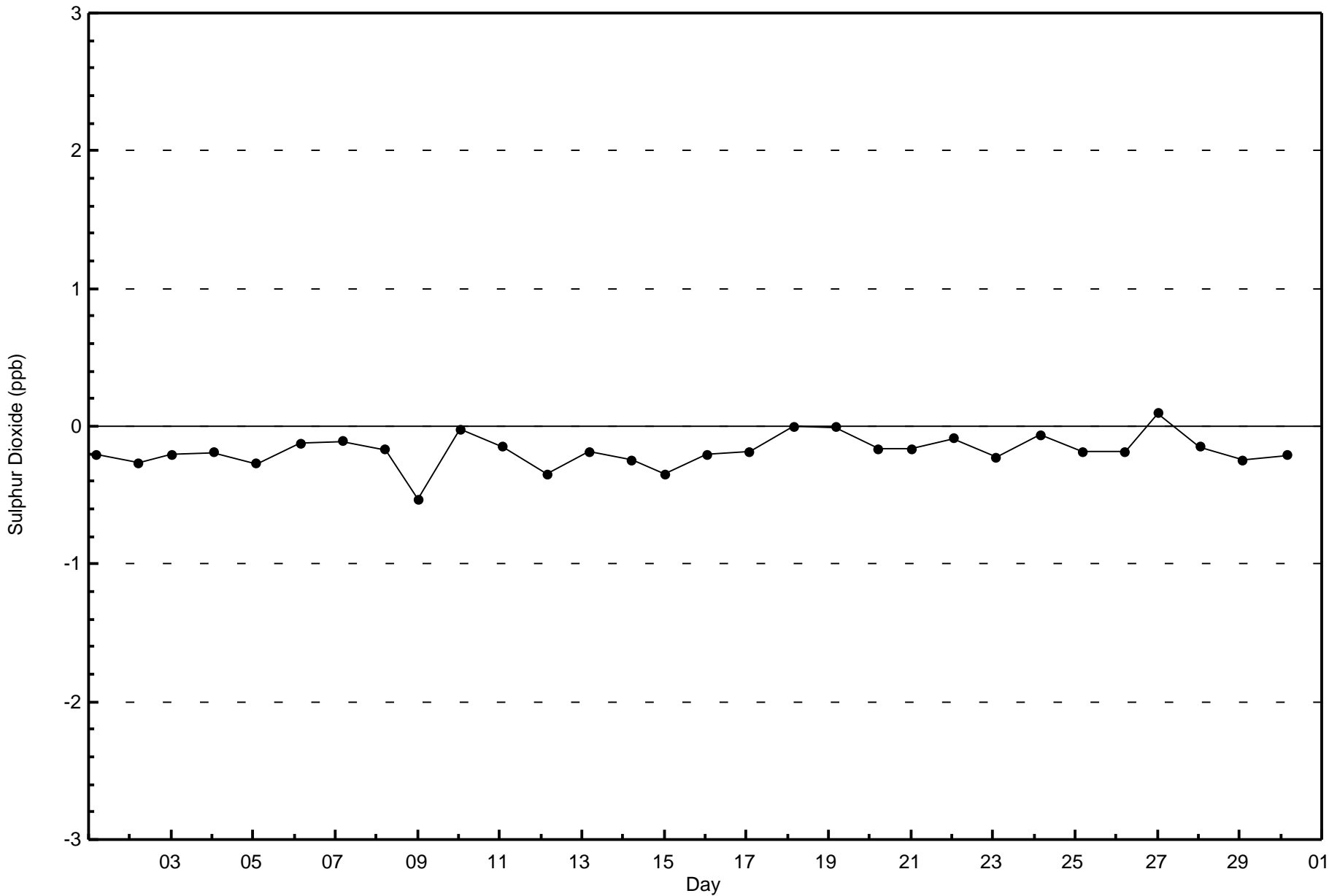


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont (AMS502)



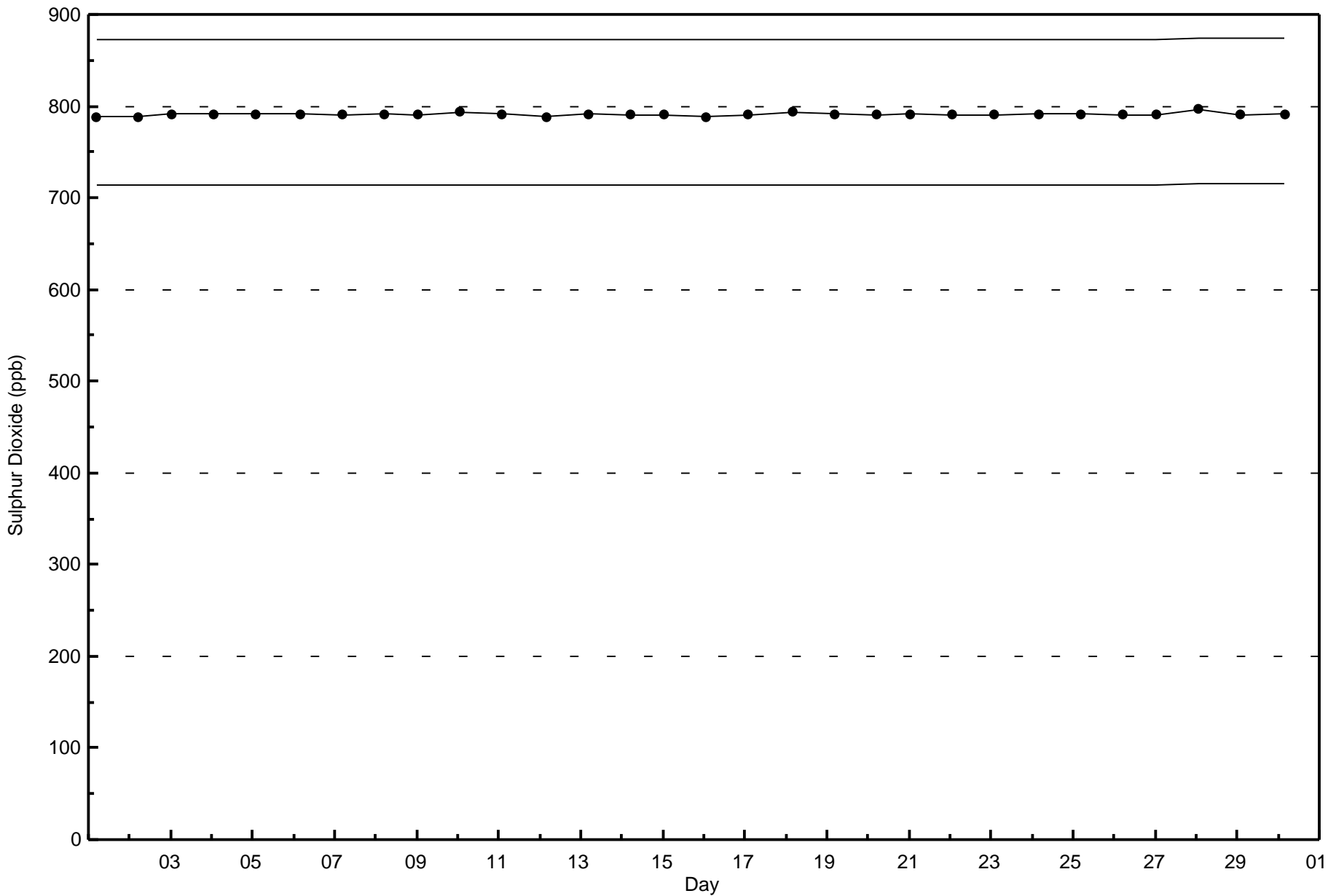
Total Number of Valid Hours: 682





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
ConocoPhillips - Surmont - September 2016





| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 2 ppb on Sep 22 19:00 | Maximum Daily Average: 0.7 ppb on Sep 30 | | Hours of Data: | 682 |
| Minimum Value: 0 ppb on Sep 12 12:00 | Minimum Daily Average: 0.1 ppb on Sep 28 | | Hours of Missing Data: | 38 |
| Maximum Diurnal Average: 0.3 ppb at hour 19 | Minimum Diurnal Average: 0.2 ppb at hour 22 | | Hours of Calibration: | 37 |
| Monthly Average: 0.2 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 0 P ₉₀ = 0 P ₉₉ = 1 | | Percent Operational Time: | 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 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0.5 | 1 |
| 3-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0.4 | 1 |
| 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 | 0.1 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| 7-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 |
| 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 | 1 | 0.2 | 1 |
| 9-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 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 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0.6 | 2 |
| 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 | 0.1 | 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 | 0.2 | 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 | 0 | 0 | 0.2 | 0 |
| 15-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 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 | 0.2 | 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 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.1 | 1 |
| 20-Sep | 0 | 1 | 0 | 1 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 |
| 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 | 2 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |
| 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 | 0 | 0 | 0 | C | C | C | 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 | 0 | 0 | 0 | 0.1 | 0 |
| 26-Sep | 0 | 0 | 0 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 27-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | 0 | 0 | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 | 0.1 | 0 |
| 29-Sep | 0 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 1 |
| 30-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |

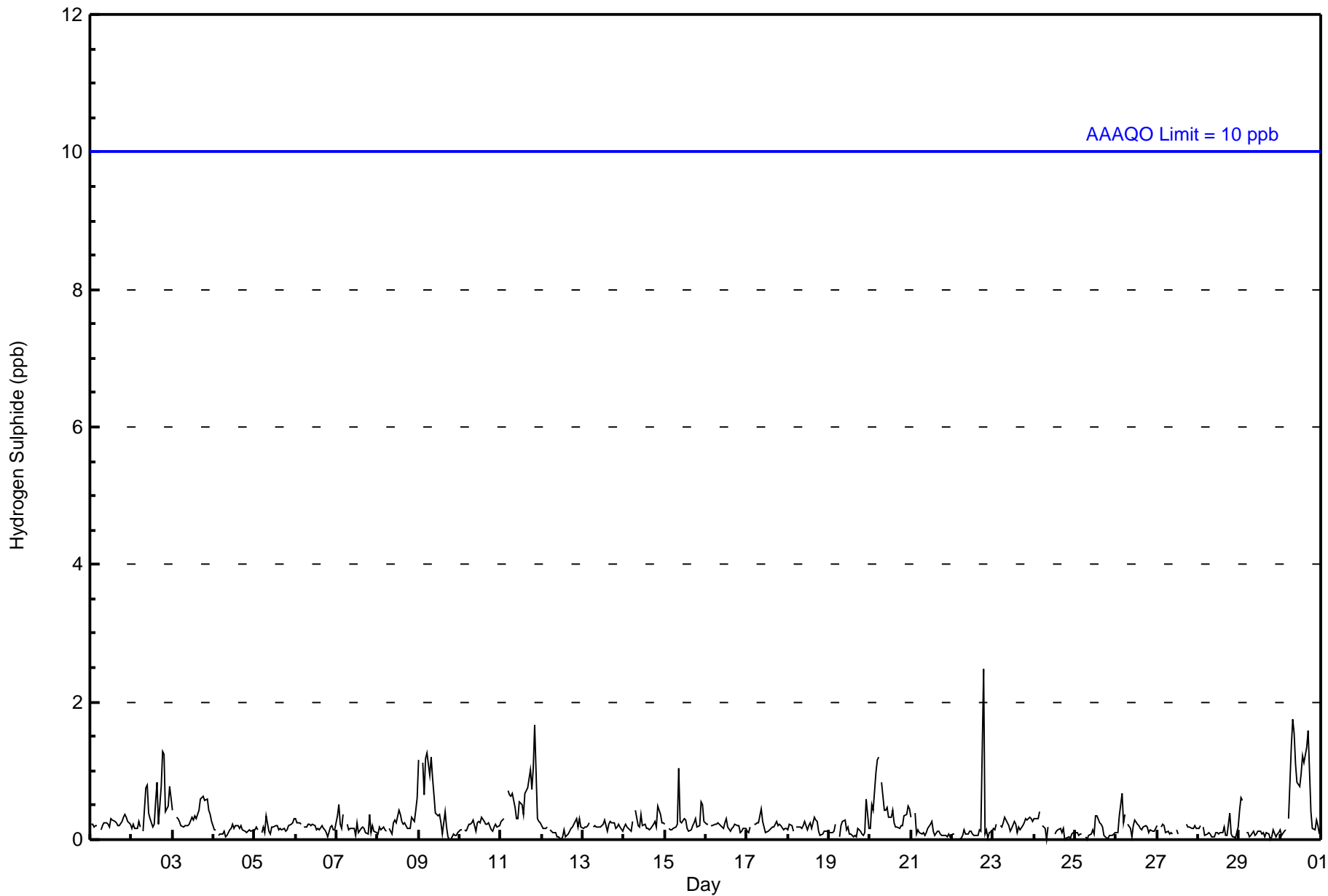
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.2 | 0.2 | 0.3 | 0.2 | 0.3 | 0.3 | 0.2 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Diurnal Average |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - September 2016**

| 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**

**Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 21 | 6 | 4 | 3 | 6 | 10 | 61 | 21 | 51 | 35 | 73 | 102 | 100 | 117 | 30 | 41 | 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 | 21 | 6 | 4 | 3 | 6 | 10 | 61 | 21 | 51 | 35 | 73 | 102 | 100 | 117 | 30 | 41 | 681 |

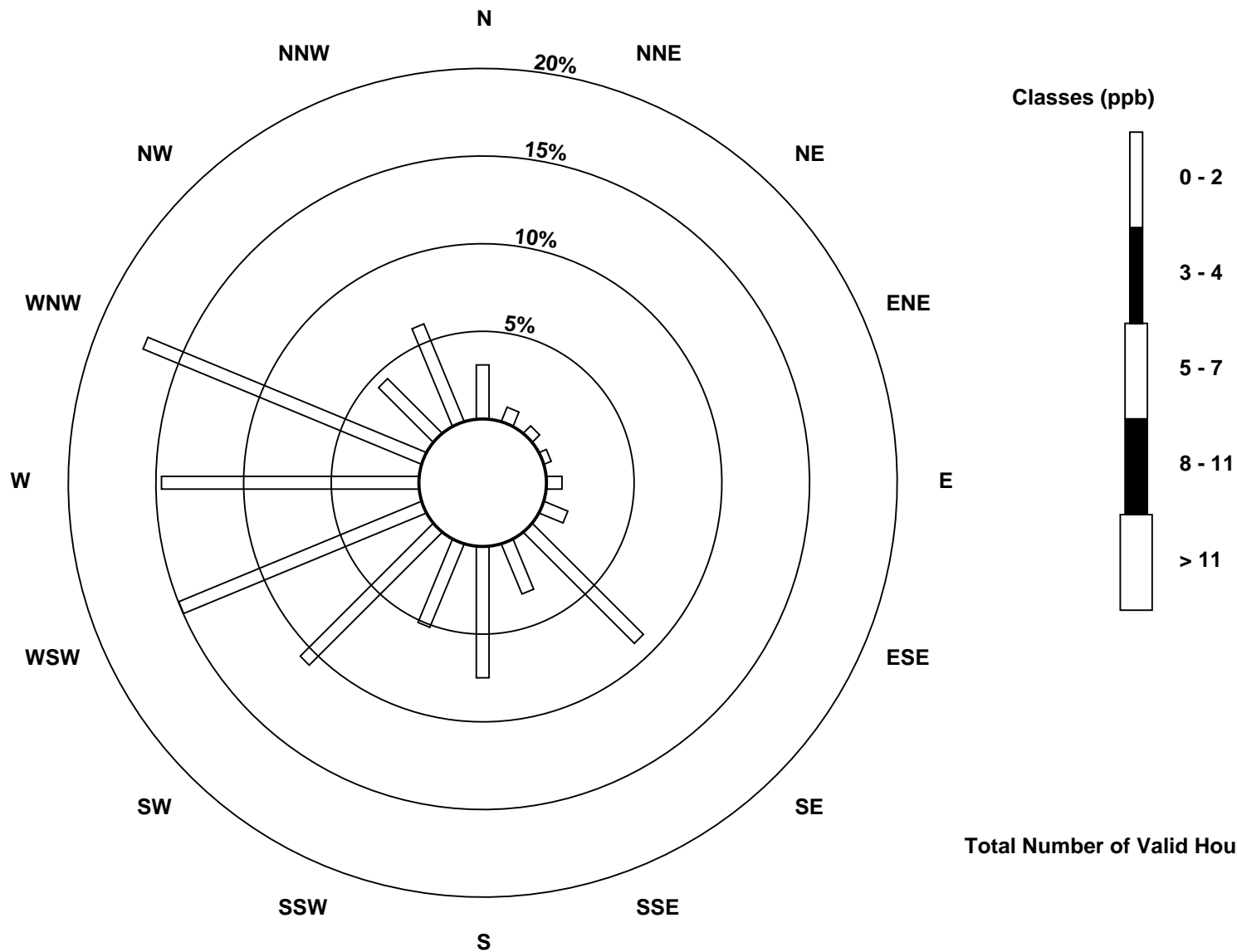
Total Number of Valid Hours: 681

Total Number of Hours: 720

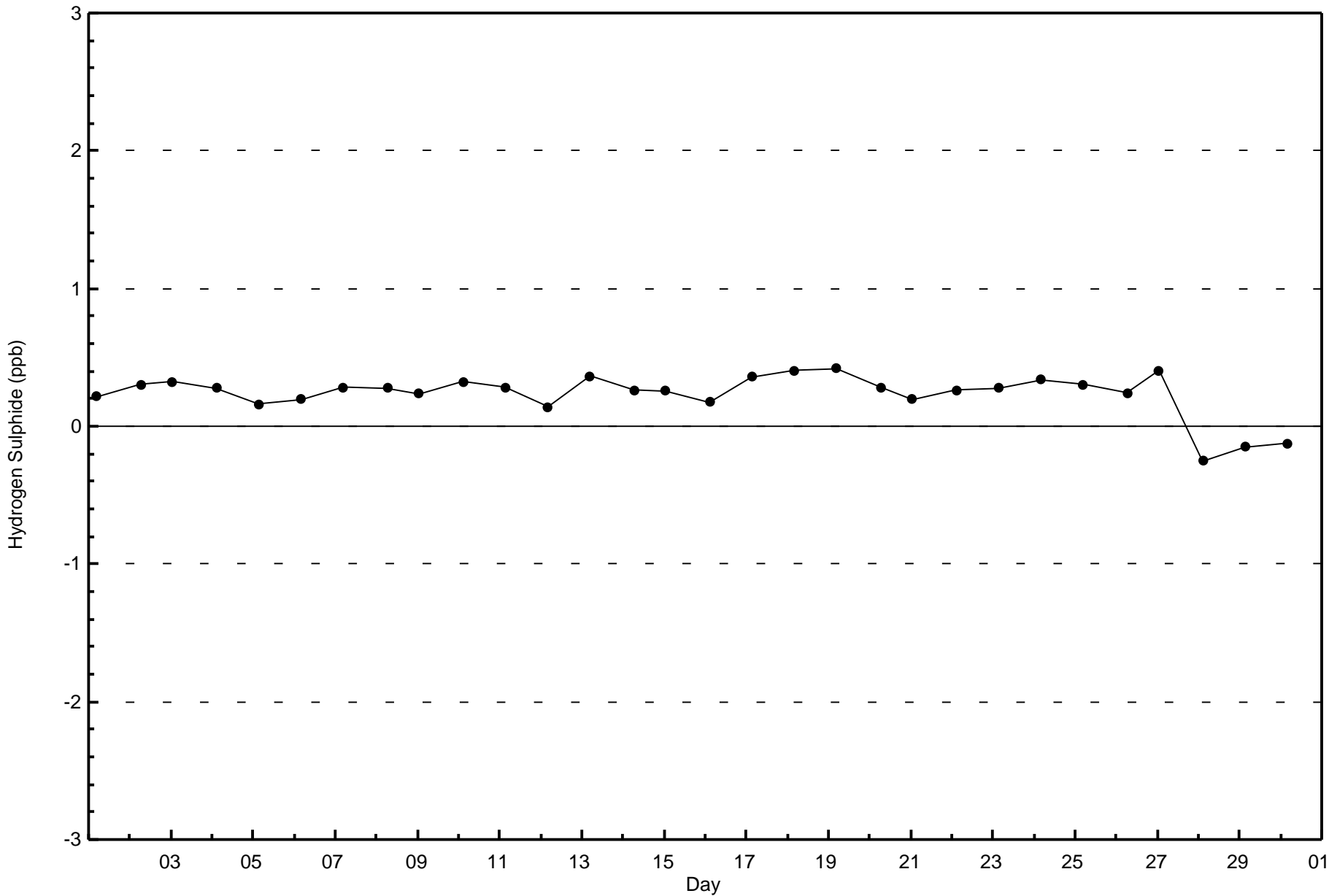


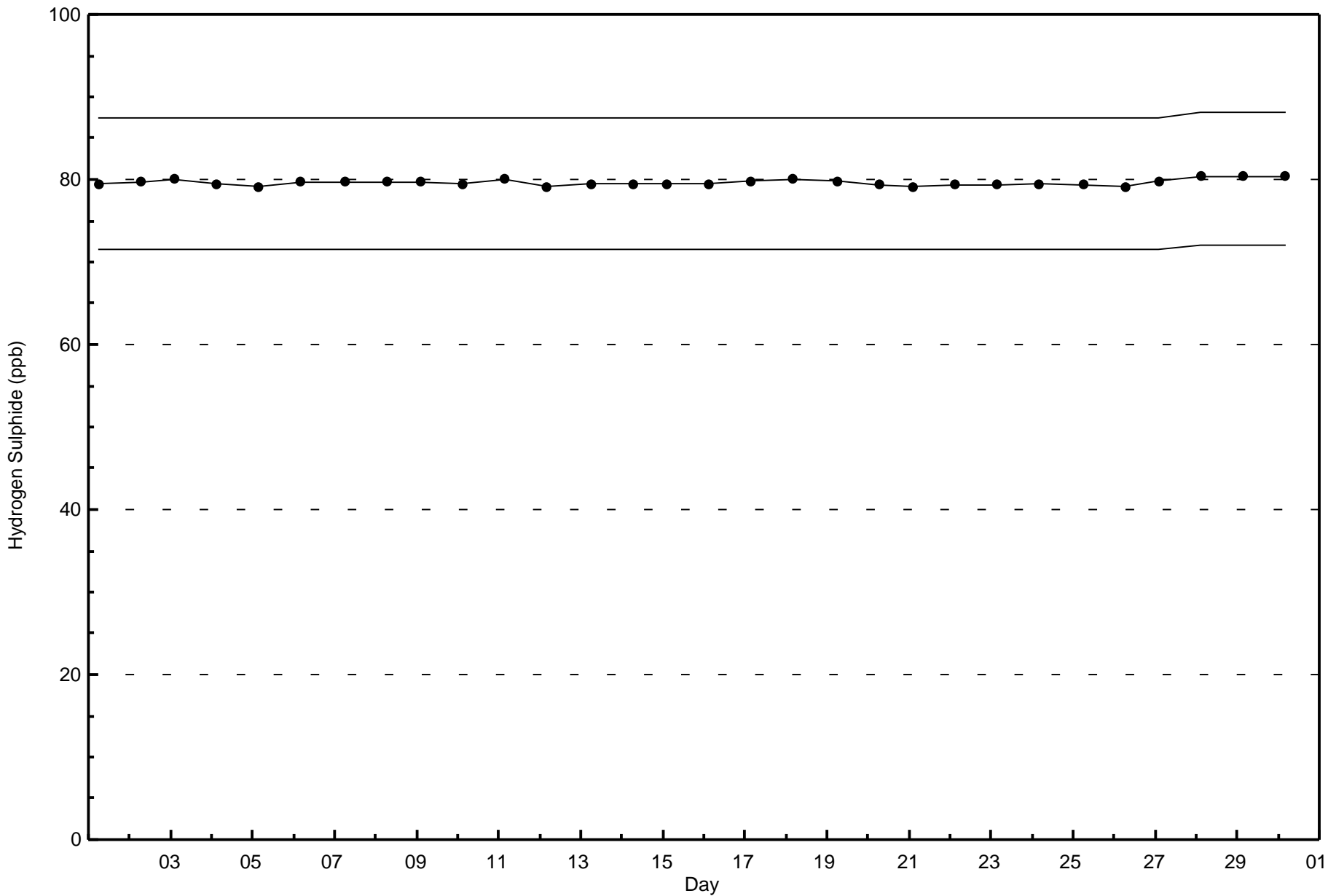
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Hydrogen Sulphide (H₂S) - ppb
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 681







| | | |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Maximum Value: 24 ppb on Sep 3 19:00 | Maximum Daily Average: 7.4 ppb on Sep 3 | Hours in Service: 720 |
| Minimum Value: 0 ppb on Sep 1 04:00 | Minimum Daily Average: 0.2 ppb on Sep 17 | Hours of Data: 681 |
| Maximum Diurnal Average: 2.3 ppb at hour 17 | Minimum Diurnal Average: 0.4 ppb at hour 2 | Hours of Missing Data: 39 |
| Monthly Average: 1.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 15 | Hours of Calibration: 39 |
| | | Percent Operational Time: 100.0 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|---|---|----|----|----|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | 0 | 0 | 0 | 0 | Z | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.6 | 2 |
| 2-Sep | 0 | 0 | 0 | 0 | 2 | Z | 1 | 1 | 3 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 7 | 7 | 7 | 1.8 | 7 |
| 3-Sep | Z | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 5 | 14 | 22 | 22 | 24 | 21 | 20 | 15 | 12 | 8 | 7.4 | 24 |
| 4-Sep | 6 | Z | 2 | 1 | 1 | 1 | 1 | 0 | 2 | 5 | 3 | 3 | 1 | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 6 |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 1 | 1 | 2 | 1 | 1 | 0.6 | 2 |
| 6-Sep | 0 | 0 | 0 | Z | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0.8 | 2 |
| 7-Sep | 0 | 0 | 0 | 0 | Z | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 3 | 3 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0.7 | 3 |
| 8-Sep | 0 | 1 | 0 | 0 | 1 | Z | 0 | 0 | 1 | 2 | 3 | 2 | 3 | 10 | 5 | 0 | 6 | 1 | 0 | 1 | 3 | 2 | 3 | 4 | 2.1 | 10 |
| 9-Sep | Z | 2 | 2 | 1 | 2 | 0 | 0 | 0 | 1 | 5 | 3 | 6 | 7 | 2 | 2 | 5 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 3 | 2.0 | 7 |
| 10-Sep | 1 | Z | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0.7 | 3 |
| 11-Sep | 1 | 0 | Z | 16 | 18 | 10 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 11 | 5 | 10 | 6 | 2 | 5 | 3 | 2 | 4.3 | 18 | |
| 12-Sep | 0 | 2 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 2 |
| 13-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 | |
| 14-Sep | 0 | 0 | 1 | 0 | 0 | Z | 1 | 2 | 2 | 2 | 5 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 1.1 | 5 | |
| 15-Sep | Z | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 4 | 2 | 1 | 0 | 1 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0.7 | 4 |
| 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 | 0 | 1 | 1 | 0 | 1 | 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 | 5 | 2 | 6 | 5 | 1 | 9 | 11 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 11 |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 7 | 2 | 6 | 7 | 11 | 4 | 5 | 0 | 2 | 0 | 3 | 2 | 5 | 1 | 0 | 0 | 1 | 1 | 0 | 2.5 | 11 |
| 20-Sep | 0 | 3 | 6 | 1 | 0 | Z | 0 | 2 | 2 | 3 | 5 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 1.7 | 6 | |
| 21-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 5 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 5 |
| 22-Sep | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 1 |
| 23-Sep | 0 | 0 | Z | 0 | 0 | 1 | 3 | 3 | 2 | 2 | 4 | 1 | 6 | 2 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1.5 | 6 |
| 24-Sep | 1 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | C | C | C | C | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 15 | 13 | 5 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 15 |
| 26-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 2 | 2 | 4 | 4 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.9 | 4 |
| 27-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | C | C | C | C | C | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 28-Sep | 2 | Z | 2 | 2 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 29-Sep | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0.5 | 2 |
| 30-Sep | 0 | 0 | 0 | Z | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |

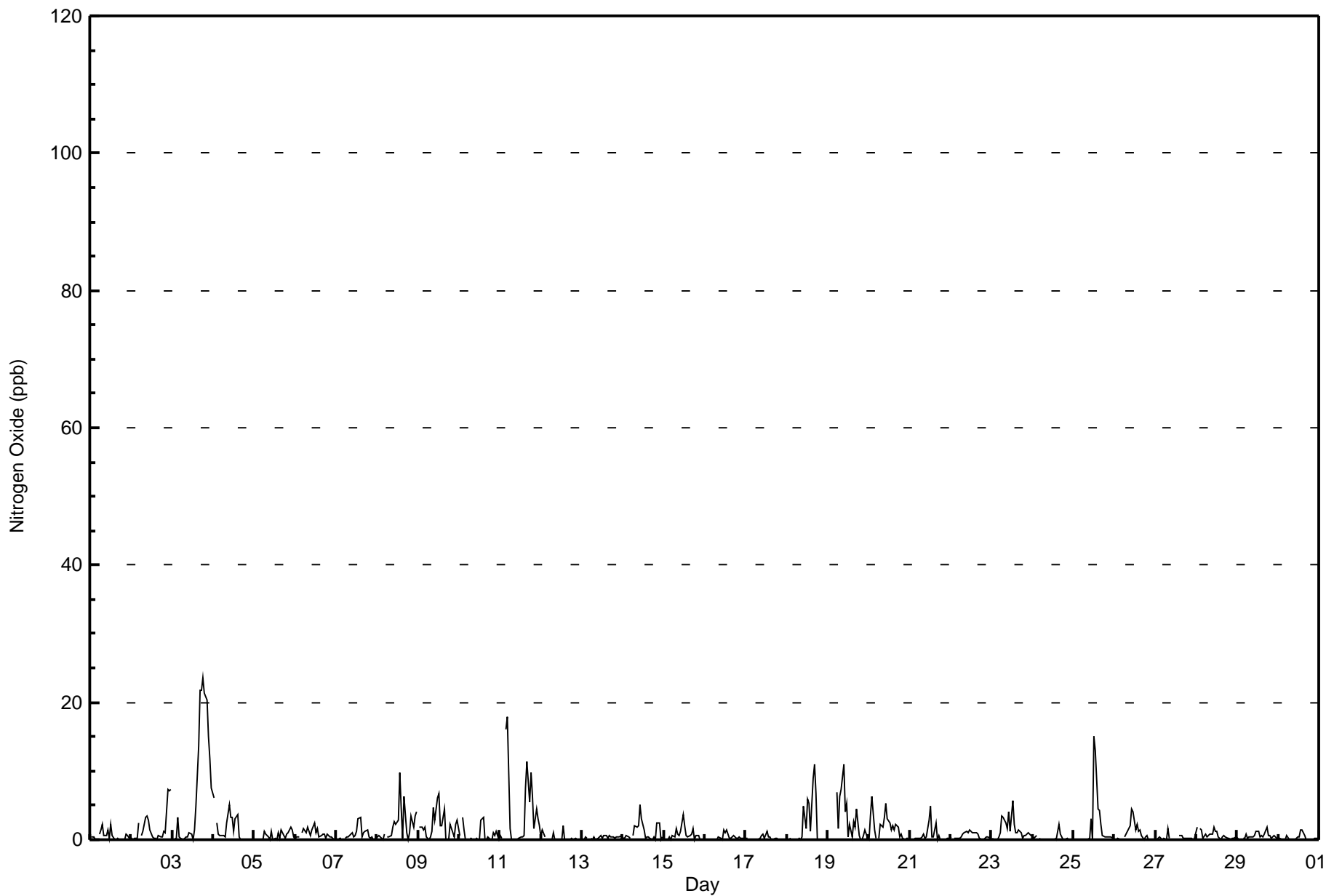
| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.5 | 0.4 | 0.8 | 1.1 | 1.1 | 1.0 | 0.5 | 1.0 | 1.0 | 1.5 | 2.0 | 1.7 | 2.2 | 2.1 | 1.4 | 1.9 | 2.3 | 1.7 | 1.3 | 1.3 | 1.2 | 1.3 | 1.2 | 0.9 | Diurnal Average |
| 6 | 3 | 6 | 16 | 18 | 10 | 3 | 6 | 7 | 11 | 5 | 6 | 15 | 13 | 5 | 14 | 22 | 22 | 24 | 21 | 20 | 15 | 12 | 8 | Diurnal Maximum |

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - September 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - September 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 677 | 99.41 | 99.41 |
| 21 - 40 | 4 | 0.59 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 120 | 28 | 41 | 677 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 120 | 32 | 41 | 681 |

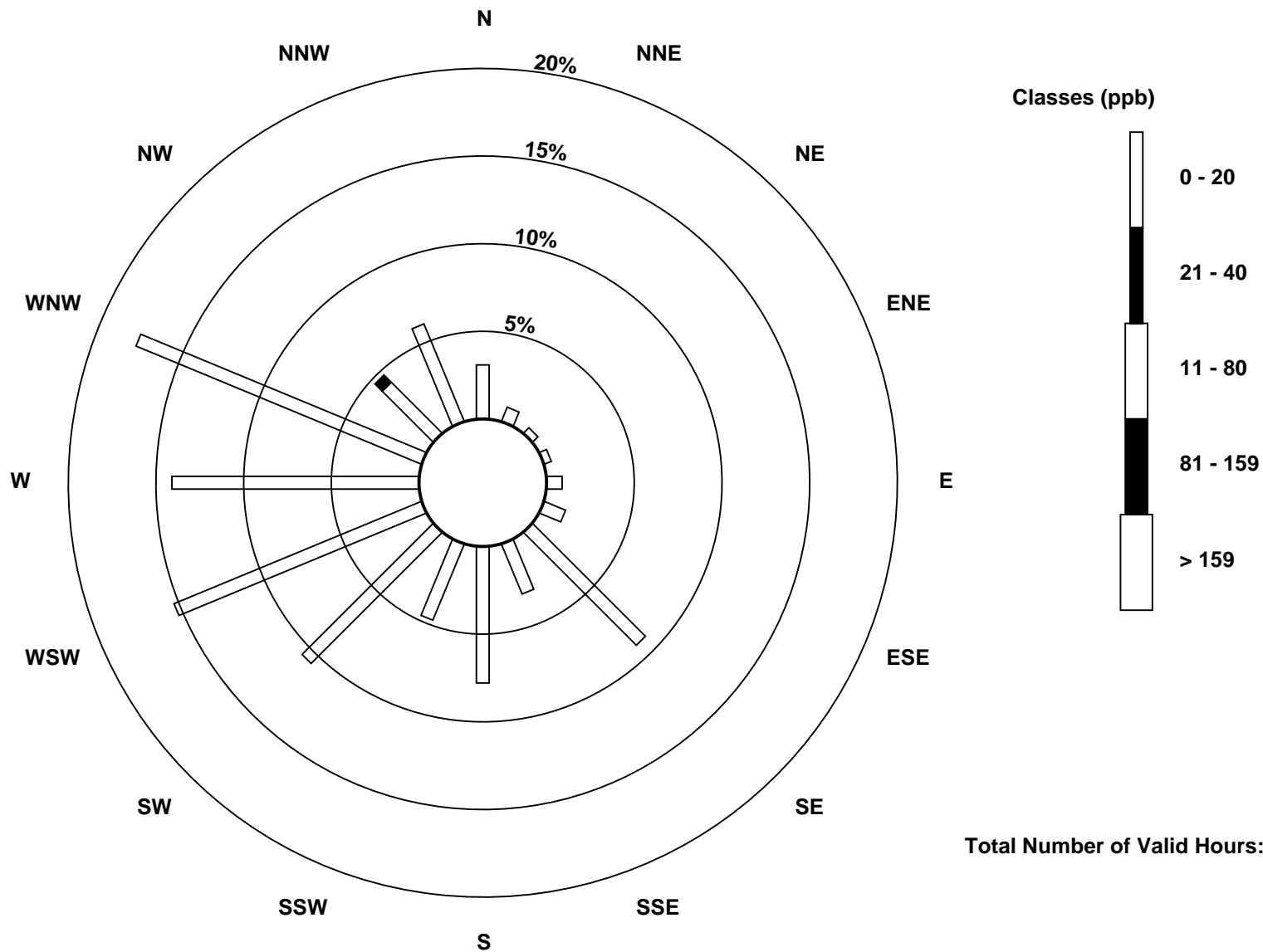
Total Number of Valid Hours: 681

Total Number of Hours: 720

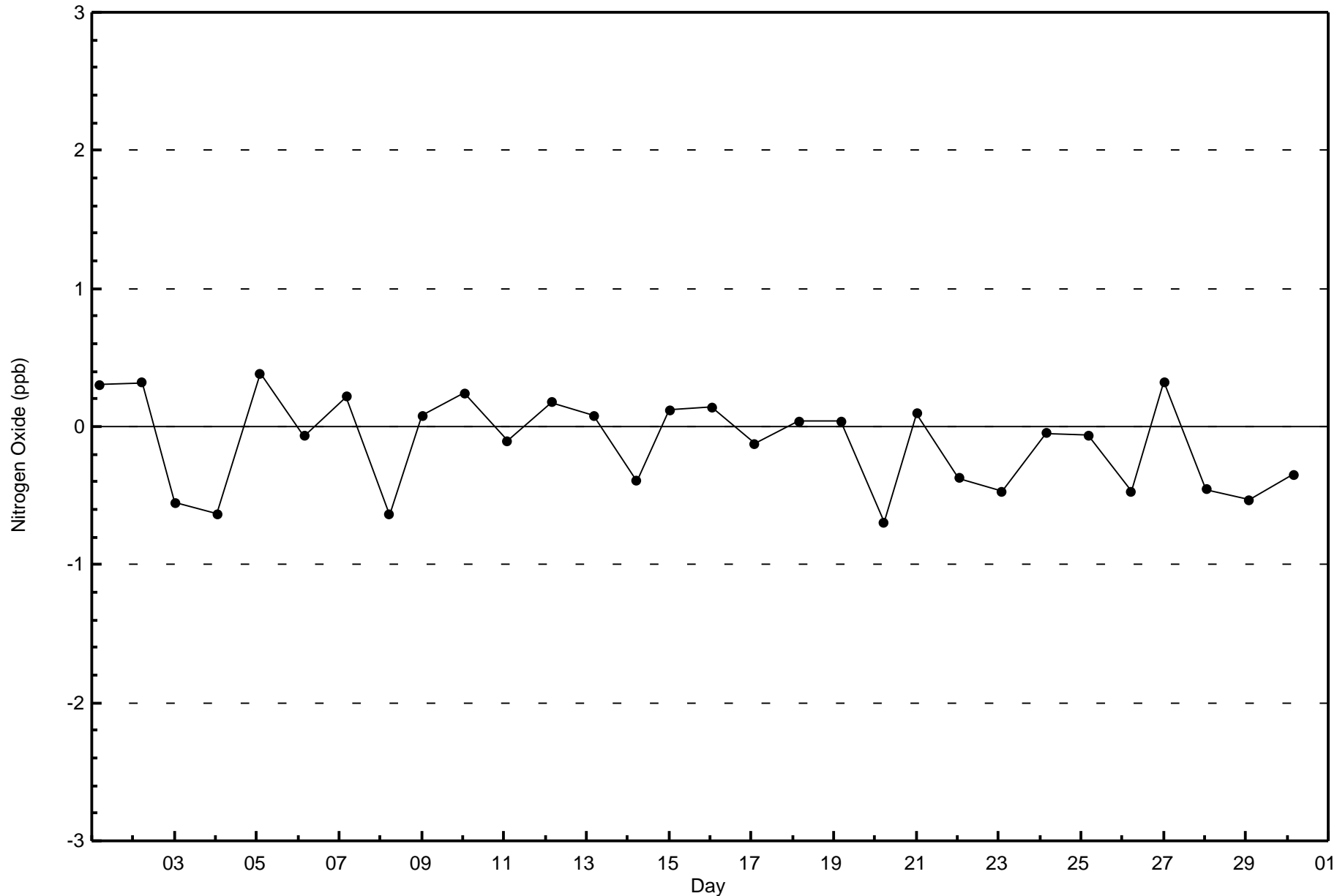


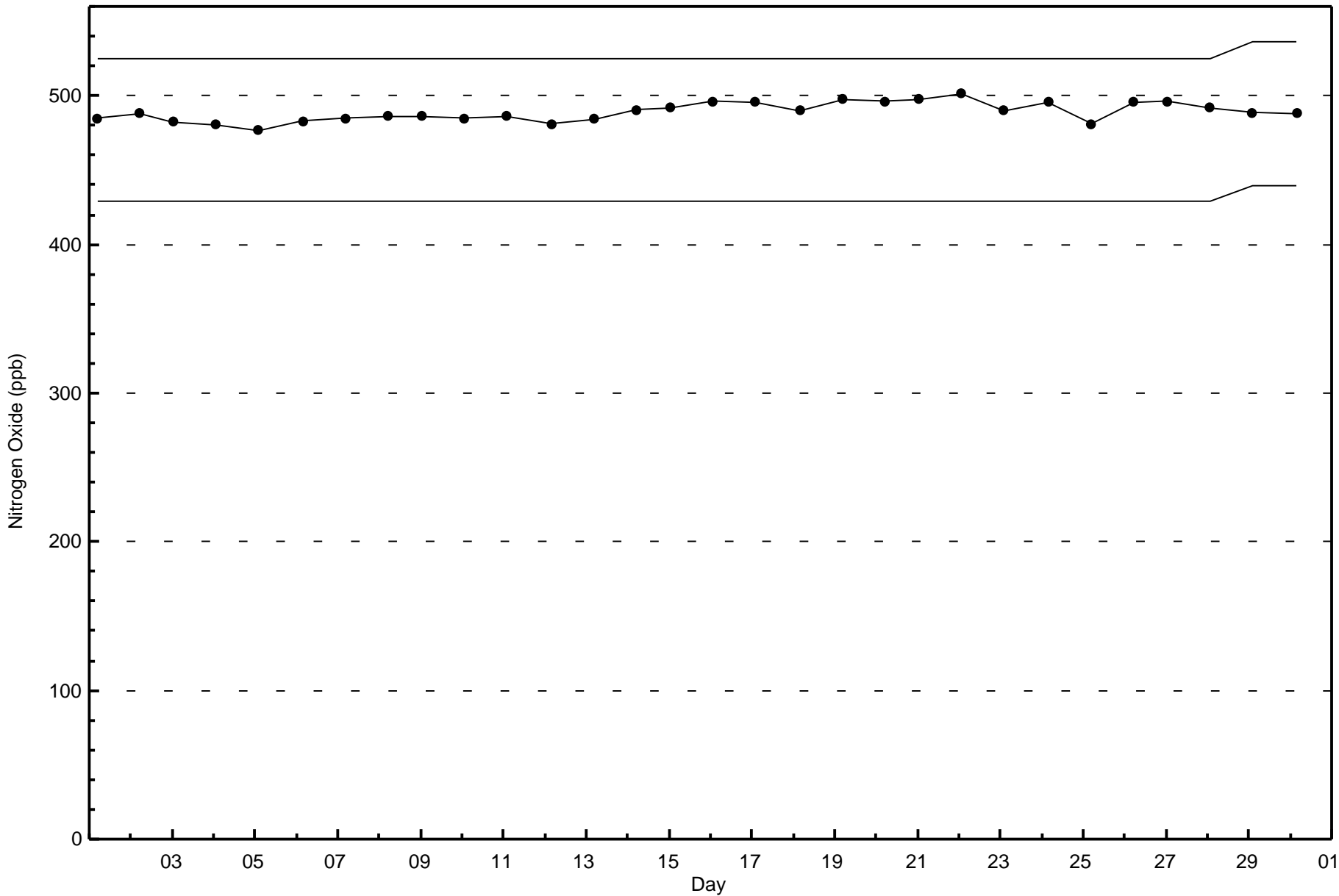
Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxide (NO) - ppb
ConocoPhillips - Surmont (AMS502)



Total Number of Valid Hours: 681







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

ConocoPhillips - Surmont - September 2016

| | | | | |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|-------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 720 |
| Maximum Value: 8 ppb on Sep 30 15:00 | Maximum Daily Average: 2.8 ppb on Sep 11 | | Hours of Data: | 681 |
| Minimum Value: 0 ppb on Sep 1 19:00 | Minimum Daily Average: 0.3 ppb on Sep 17 | | Hours of Missing Data: | 39 |
| Maximum Diurnal Average: 1.7 ppb at hour 13 | Minimum Diurnal Average: 0.8 ppb at hour 1 | | Hours of Calibration: | 39 |
| Monthly Average: 1.3 ppb | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 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 | 0 | Z | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 0.6 | 3 | |
| 2-Sep | 0 | 0 | 0 | 0 | 2 | Z | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 2 | 2 | 0.9 | 2 |
| 3-Sep | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 7 | 7 | 7 | 5 | 5 | 4 | 3 | 2.0 | 7 | |
| 4-Sep | 0 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 0.8 | 2 | |
| 6-Sep | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1.3 | 2 | |
| 7-Sep | 1 | 0 | 1 | 1 | Z | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0.7 | 2 | |
| 8-Sep | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 5 | 3 | 1 | 4 | 1 | 0 | 0 | 2 | 2 | 3 | 4 | 1.4 | 5 | |
| 9-Sep | Z | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 4 | 1.8 | 4 | |
| 10-Sep | 2 | Z | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 | |
| 11-Sep | 0 | 0 | Z | 7 | 7 | 5 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 3 | 6 | 5 | 8 | 6 | 3 | 4 | 3 | 2 | 2.8 | 8 | |
| 12-Sep | 2 | 2 | 1 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 | |
| 13-Sep | 0 | 0 | 1 | 3 | Z | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.7 | 3 | |
| 14-Sep | 0 | 0 | 0 | 0 | 1 | Z | 1 | 2 | 2 | 2 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 3 | 3 | 3 | 1.3 | 4 | |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 1.5 | 3 | |
| 16-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0.7 | 2 | |
| 17-Sep | 1 | 1 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 18-Sep | 0 | 0 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 3 | 2 | 1 | 5 | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 5 | |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 3 | 1 | 3 | 1 | 3 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 0.9 | 3 | |
| 20-Sep | 1 | 1 | 2 | 2 | 2 | Z | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 2 | 2 | 2 | 3 | 5 | 4 | 7 | 4 | 2 | 1 | 1 | 2.7 | 7 | |
| 21-Sep | Z | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 | |
| 22-Sep | 0 | Z | 0 | 1 | 0 | 1 | 3 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1.7 | 4 | |
| 23-Sep | 2 | 2 | Z | 2 | 3 | 3 | 6 | 5 | 3 | 2 | 2 | 1 | 5 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2.2 | 6 | |
| 24-Sep | 1 | 1 | 2 | Z | 1 | 1 | 1 | 1 | 1 | 1 | C | C | C | C | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 7 | 6 | 4 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1.2 | 7 | |
| 26-Sep | 0 | 0 | 1 | 1 | 1 | Z | 1 | 2 | 4 | 4 | 6 | 6 | 3 | 4 | 3 | 2 | 2 | 1 | 3 | 2 | 3 | 2 | 3 | 3 | 2.5 | 6 | |
| 27-Sep | Z | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 0 | C | C | C | C | C | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1.2 | 3 | |
| 28-Sep | 2 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 0.8 | 2 | |
| 29-Sep | 1 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 4 | 3 | 3 | 3 | 2 | 1 | 2 | 1.8 | 4 | |
| 30-Sep | 2 | 2 | 2 | Z | 2 | 5 | 4 | 1 | 2 | 2 | 2 | 2 | 3 | 8 | 8 | 7 | 6 | 3 | 1 | 0 | 0 | 1 | 1 | 0 | 2.7 | 8 | |

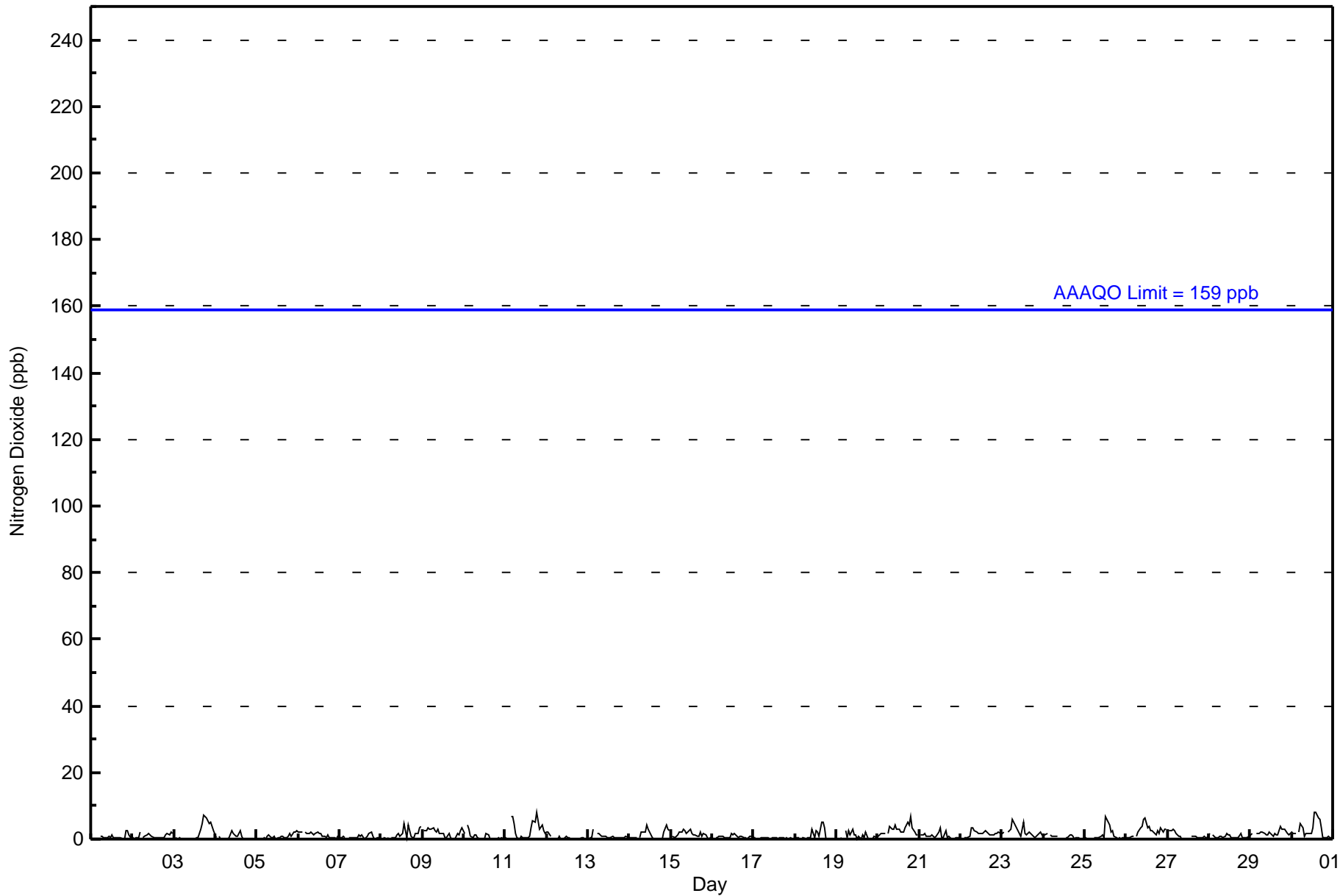
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|--|
| 0.8 | 0.9 | 1.0 | 1.3 | 1.3 | 1.4 | 1.3 | 1.4 | 1.2 | 1.4 | 1.6 | 1.4 | 1.7 | 1.6 | 1.3 | 1.5 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 | 1.2 | 1.3 | 1.2 | 1.1 | Diurnal Average | |
| 2 | 3 | 4 | 7 | 7 | 5 | 6 | 5 | 4 | 4 | 6 | 6 | 7 | 8 | 8 | 7 | 6 | 7 | 8 | 7 | 5 | 5 | 4 | 4 | Diurnal Maximum | | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 681 | 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: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 120 | 32 | 41 | 681 |
| 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 | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 120 | 32 | 41 | 681 |

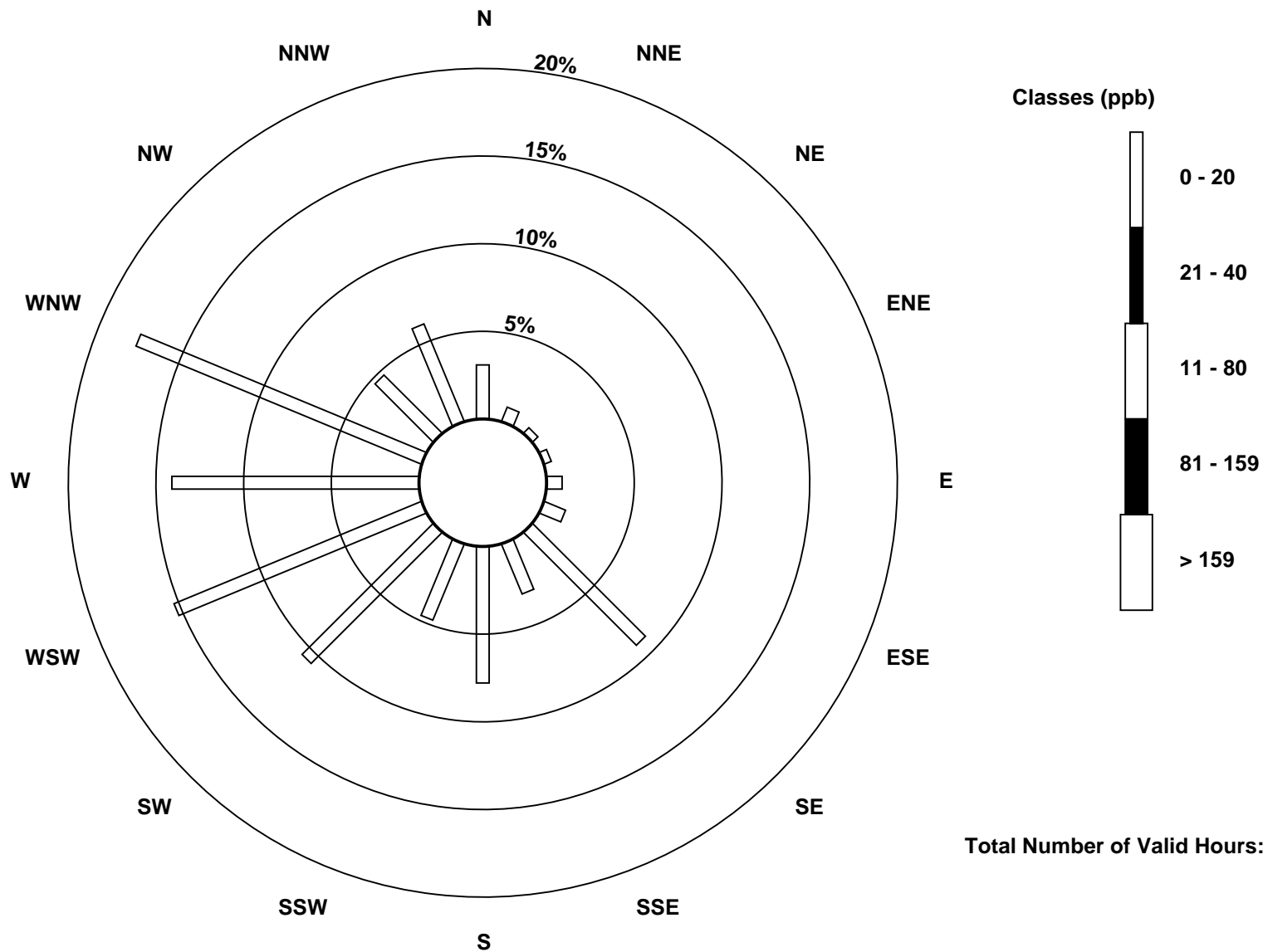
Total Number of Valid Hours: 681

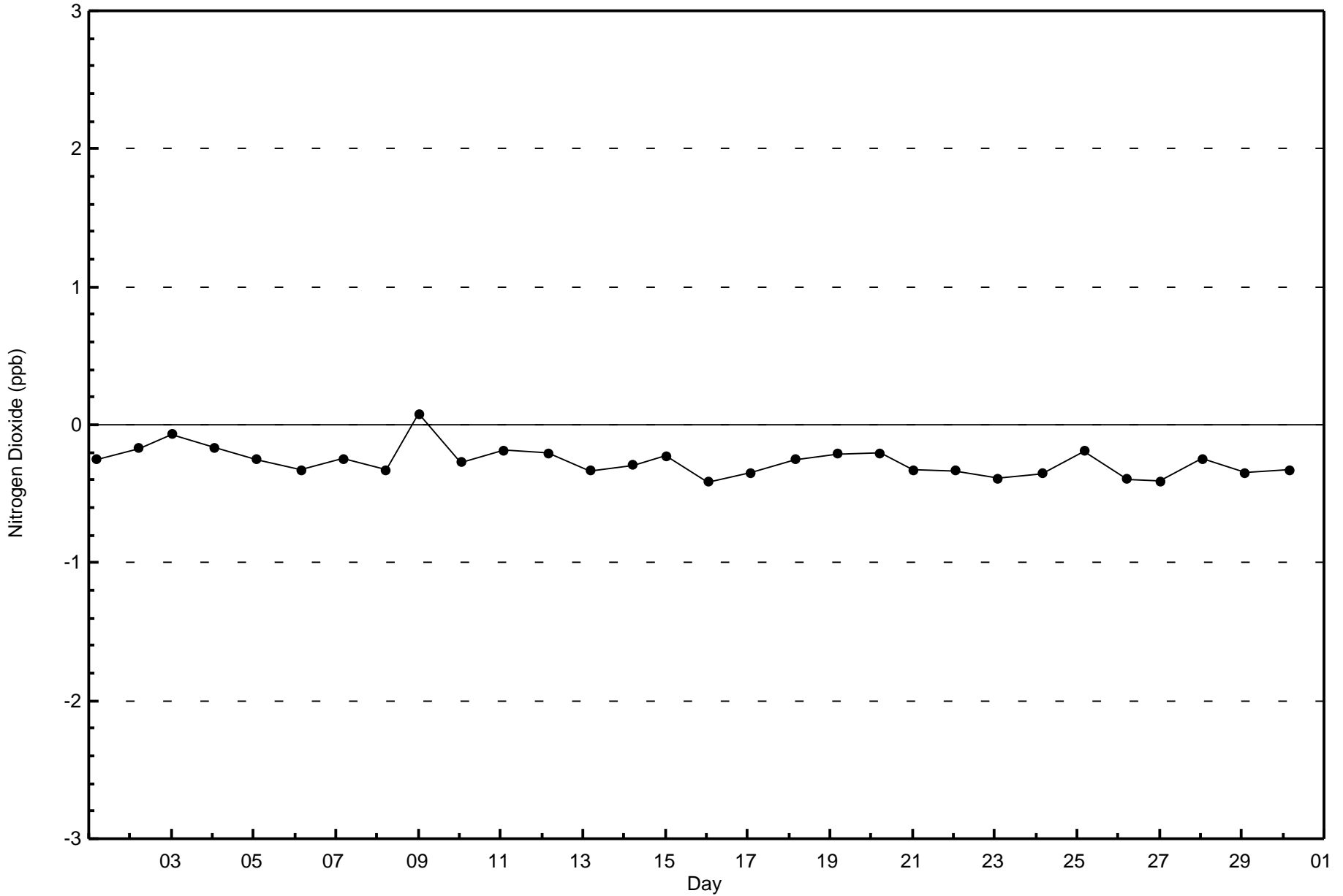
Total Number of Hours: 720

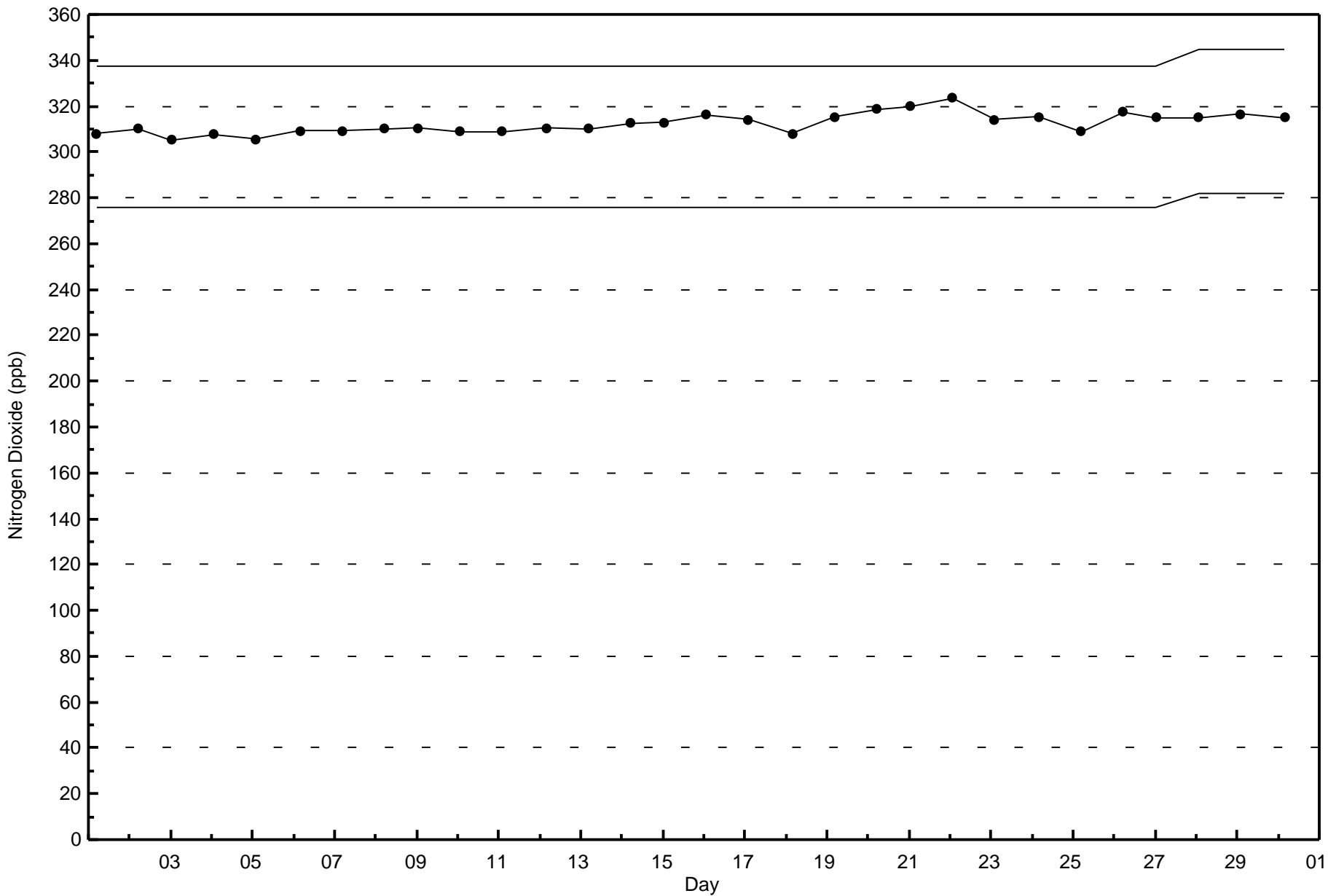


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Dioxide (NO₂) - ppb
ConocoPhillips - Surmont (AMS502)







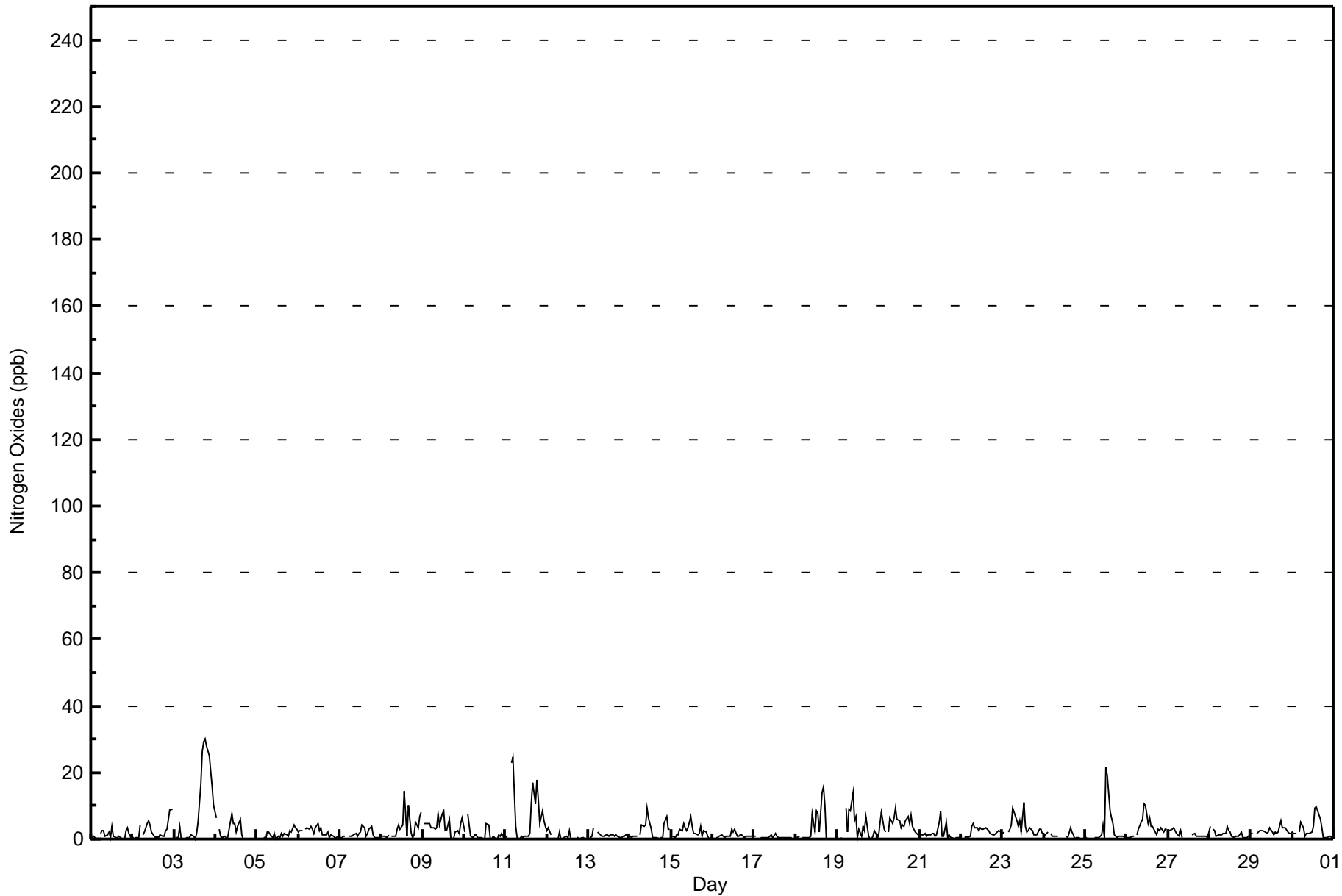


| Maximum Value: 30 ppb on Sep 3 19:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 9.4 ppb on Sep 3 | | | | | | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------|-------------------------------|---|---|----|----|----|---|---|---|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|---------------------------|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| Minimum Value: 0 ppb on Sep 1 19:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.5 ppb on Sep 17 | | | | | | | Hours of Data: 681 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 3.9 ppb at hour 13 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 1.3 ppb at hour 1 | | | | | | | Hours of Missing Data: 39 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 2.6 ppb | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 1 Median = 1 O ₃ = 3 P ₉₀ = 6 P ₉₉ = 22 | | | | | | | Hours of Calibration: 39 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | Percent Operational Time: 100.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Sep | 1 | 1 | 1 | 0 | Z | 2 | 2 | 3 | 1 | 1 | 2 | 1 | 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 3 | 2 | 0 | 1.2 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Sep | 0 | 0 | 0 | 0 | 4 | Z | 1 | 2 | 5 | 5 | 4 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 3 | 9 | 9 | 9 | 2.8 | 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Sep | Z | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 5 | 16 | 26 | 29 | 30 | 28 | 25 | 20 | 16 | 10 | 9.4 | 30 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Sep | 6 | Z | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 8 | 5 | 4 | 2 | 4 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Sep | 0 | 0 | Z | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 2 | 0 | 1 | 0 | 2 | 1 | 2 | 1 | 1 | 3 | 2 | 4 | 3 | 3 | 1.4 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Sep | 2 | 2 | 2 | Z | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 5 | 3 | 3 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 2.2 | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Sep | 0 | 0 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 4 | 3 | 1 | 2 | 3 | 4 | 1 | 0 | 1 | 0 | 1 | 1.4 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Sep | 1 | 1 | 1 | 0 | 1 | Z | 1 | 1 | 1 | 3 | 4 | 3 | 4 | 14 | 7 | 1 | 10 | 2 | 0 | 1 | 5 | 3 | 7 | 8 | 3.5 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Sep | Z | 5 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 8 | 4 | 8 | 8 | 3 | 3 | 6 | 0 | 0 | 0 | 2 | 3 | 2 | 5 | 6 | 3.9 | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Sep | 2 | Z | 8 | 4 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 5 | 4 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 0 | 1.4 | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Sep | 1 | 0 | Z | 23 | 25 | 14 | 4 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 11 | 17 | 11 | 18 | 12 | 5 | 9 | 6 | 4 | 7.1 | 25 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Sep | 2 | 4 | 1 | Z | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.7 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Sep | 0 | 0 | 1 | 3 | Z | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.1 | 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Sep | 1 | 1 | 1 | 1 | 1 | Z | 1 | 4 | 4 | 4 | 9 | 6 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 5 | 7 | 3 | 3 | 2.4 | 9 | | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Sep | Z | 1 | 1 | 1 | 1 | 3 | 3 | 5 | 3 | 3 | 3 | 7 | 4 | 2 | 2 | 1 | 2 | 4 | 1 | 3 | 2 | 1 | 0 | 0 | 2.2 | 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Sep | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1.0 | 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Sep | 1 | 1 | Z | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Sep | 0 | 1 | 1 | Z | 0 | 1 | 0 | 0 | 0 | 1 | 8 | 2 | 8 | 8 | 2 | 14 | 16 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 3.2 | 16 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Sep | 0 | 0 | 0 | 0 | Z | 9 | 2 | 9 | 9 | 14 | 5 | 7 | 1 | 3 | 1 | 4 | 2 | 7 | 1 | 0 | 0 | 1 | 2 | 1 | 3.4 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Sep | 1 | 5 | 8 | 3 | 2 | Z | 2 | 6 | 5 | 6 | 9 | 6 | 5 | 3 | 4 | 4 | 5 | 7 | 5 | 7 | 4 | 2 | 1 | 1 | 4.5 | 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Sep | Z | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 5 | 8 | 1 | 1 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1.6 | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Sep | 1 | Z | 1 | 1 | 1 | 1 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2.2 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Sep | 2 | 2 | Z | 2 | 3 | 4 | 9 | 8 | 6 | 4 | 6 | 2 | 11 | 4 | 2 | 2 | 3 | 3 | 1 | 1 | 1 | 3 | 3 | 2 | 3.7 | 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Sep | 2 | 1 | 2 | Z | 2 | 1 | 1 | 1 | 1 | 1 | C | C | C | C | 1 | 0 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 1.0 | 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Sep | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 22 | 19 | 9 | 7 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3.2 | 22 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Sep | 0 | 0 | 1 | 1 | 1 | Z | 1 | 3 | 5 | 6 | 10 | 10 | 5 | 6 | 4 | 4 | 3 | 1 | 3 | 2 | 3 | 2 | 3 | 3 | 3.4 | 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Sep | Z | 3 | 3 | 3 | 2 | 2 | 1 | 3 | 1 | C | C | C | C | C | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.4 | 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Sep | 4 | Z | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 2 | 2 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 1 | 1 | 1 | 1.5 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Sep | 1 | 2 | Z | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 5 | 4 | 4 | 3 | 2 | 2 | 2 | 2.4 | 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Sep | 2 | 2 | 2 | Z | 2 | 5 | 3 | 1 | 2 | 1 | 2 | 2 | 4 | 9 | 10 | 7 | 6 | 3 | 1 | 0 | 0 | 1 | 1 | 0 | 2.9 | 10 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 1.3 | 1.3 | 1.8 | 2.4 | 2.4 | 2.4 | 1.8 | 2.4 | 2.2 | 2.9 | 3.5 | 3.1 | 3.9 | 3.7 | 2.6 | 3.3 | 3.8 | 3.3 | 2.6 | 2.5 | 2.4 | 2.6 | 2.4 | 2.0 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 6 | 5 | 8 | 23 | 25 | 14 | 9 | 9 | 9 | 14 | 10 | 10 | 22 | 19 | 10 | 16 | 26 | 29 | 30 | 28 | 25 | 20 | 16 | 10 | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surrmont - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - September 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 673 | 98.83 | 98.83 |
| 21 - 40 | 8 | 1.17 | 100.00 |
| 41 - 80 | 0 | 0.00 | 100.00 |
| 81 - 159 | 0 | 0.00 | 100.00 |
| > 159 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont - September 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 120 | 24 | 41 | 673 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 8 |
| 11 - 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 81 - 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 21 | 6 | 3 | 3 | 6 | 9 | 62 | 21 | 53 | 32 | 72 | 104 | 96 | 120 | 32 | 41 | 681 |

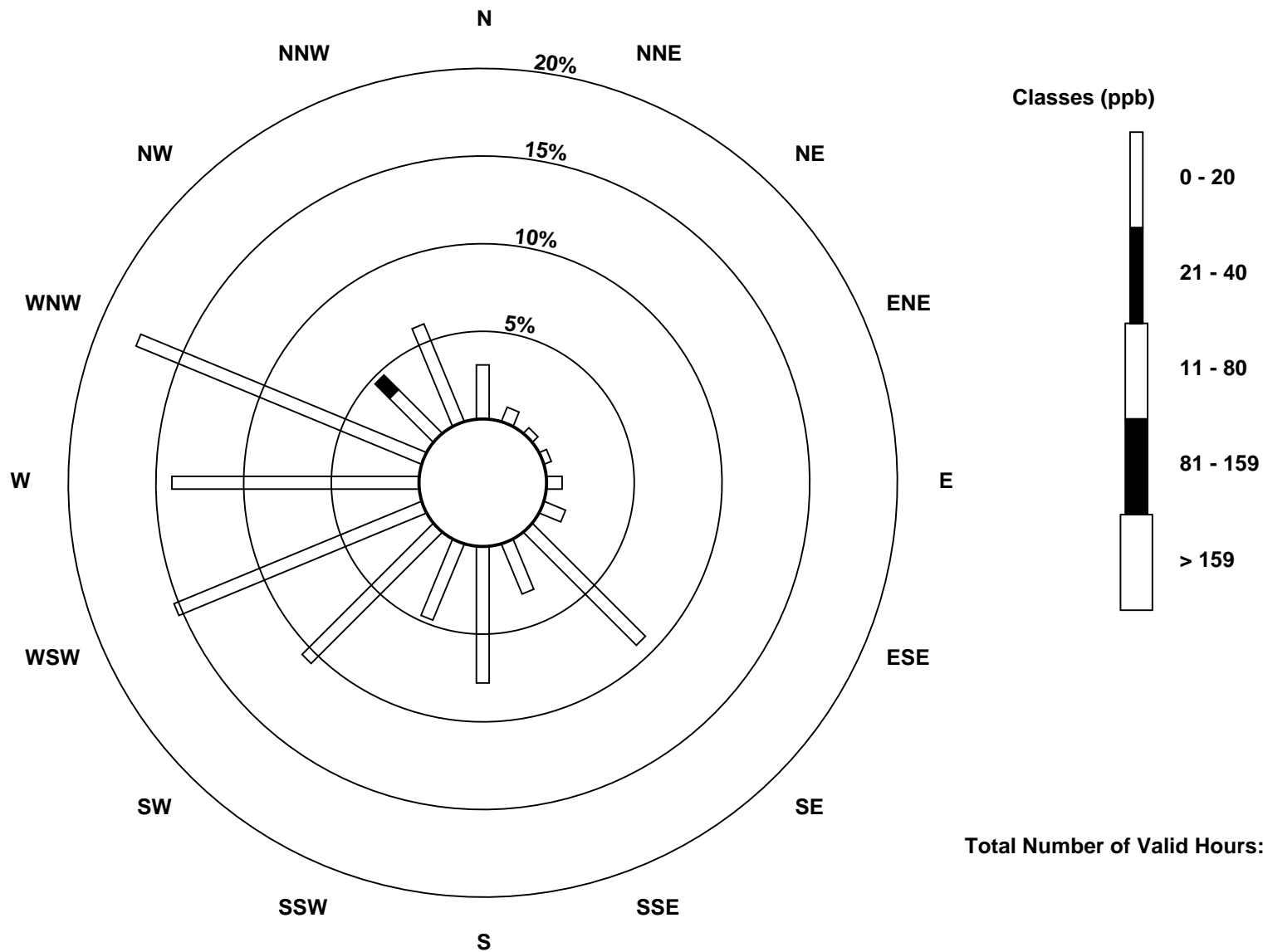
Total Number of Valid Hours: 681

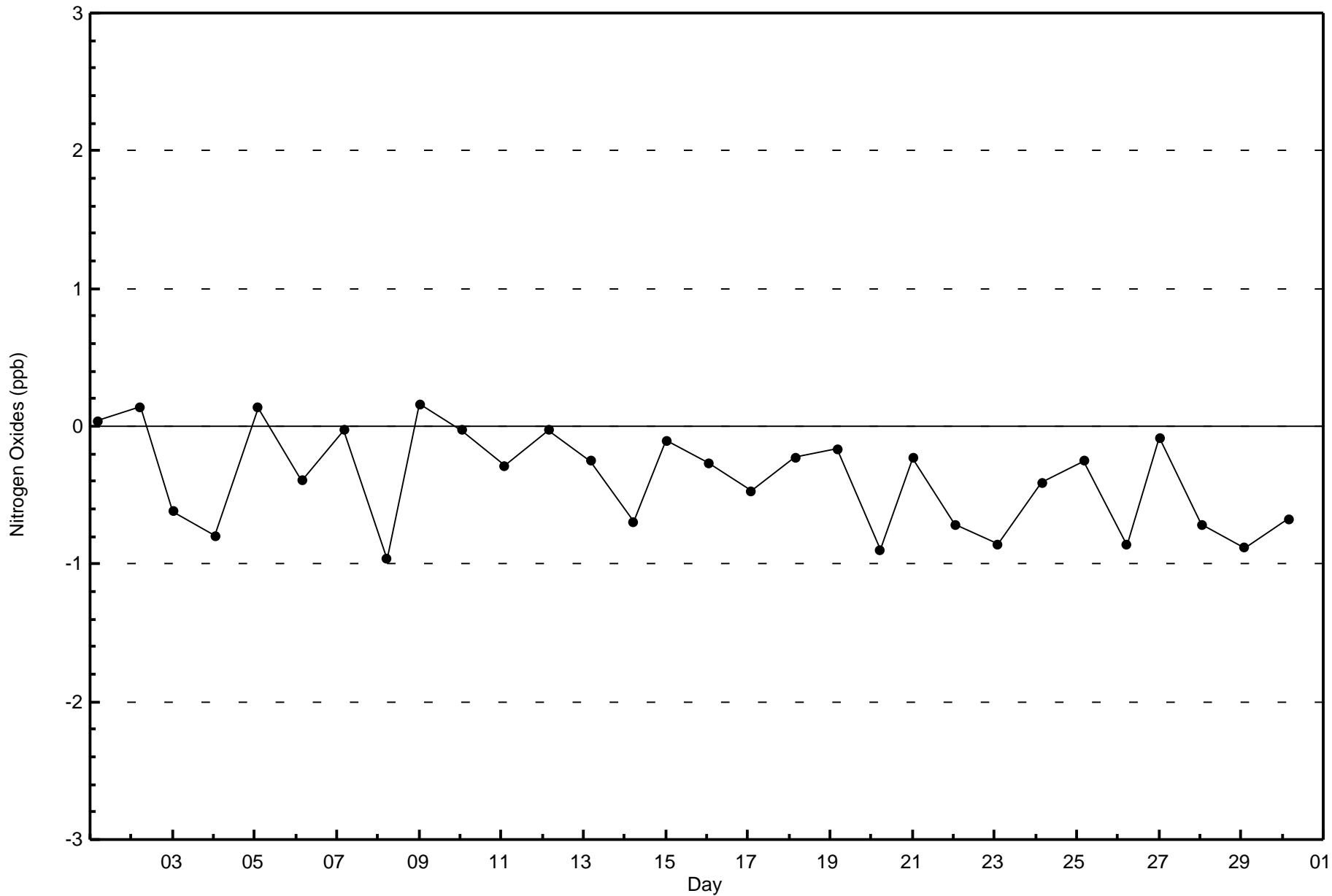
Total Number of Hours: 720

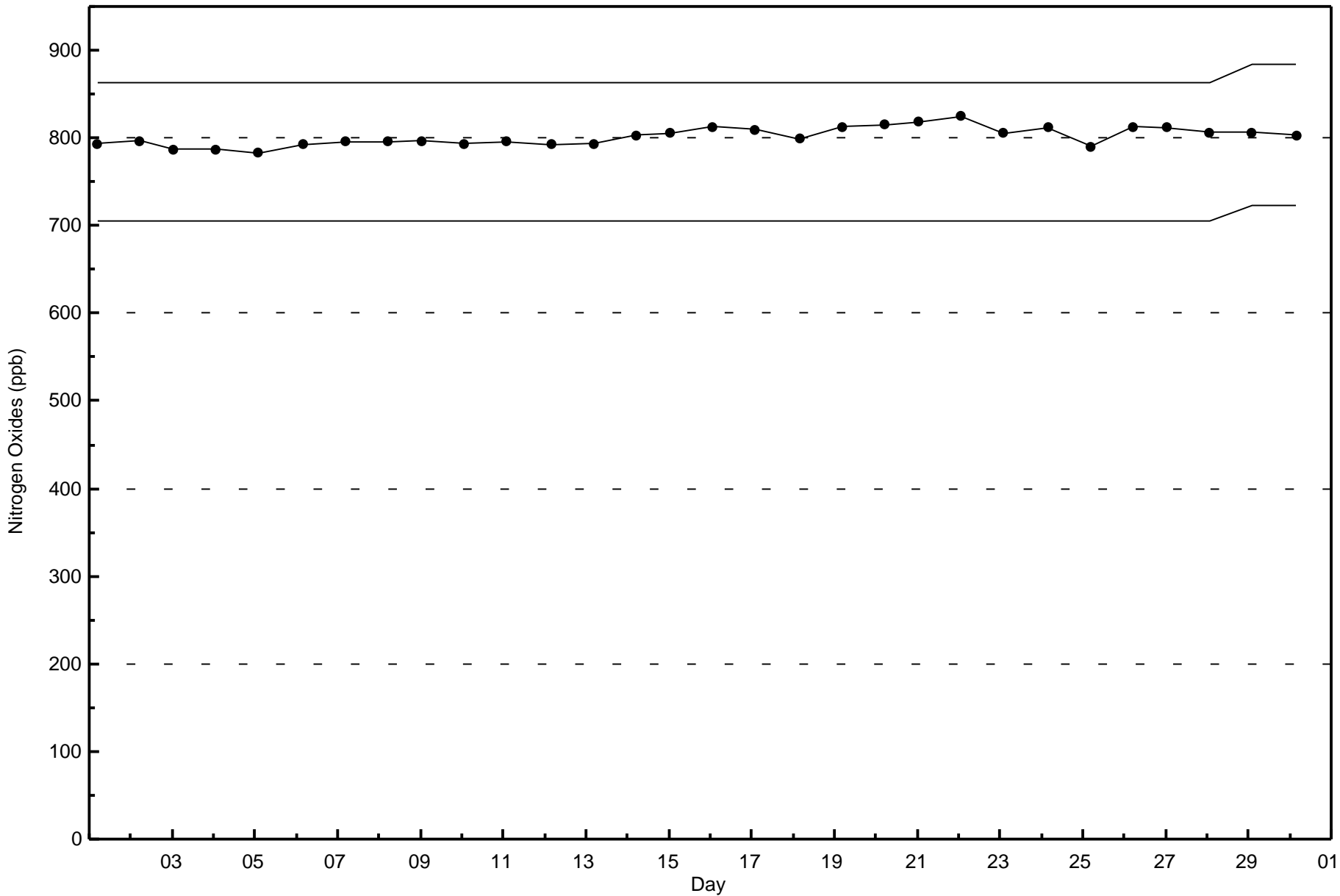


Wood Buffalo Environmental Association
Wind Rose Sep 2016

Nitrogen Oxides (NO_x) - ppb
ConocoPhillips - Surmont (AMS502)









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

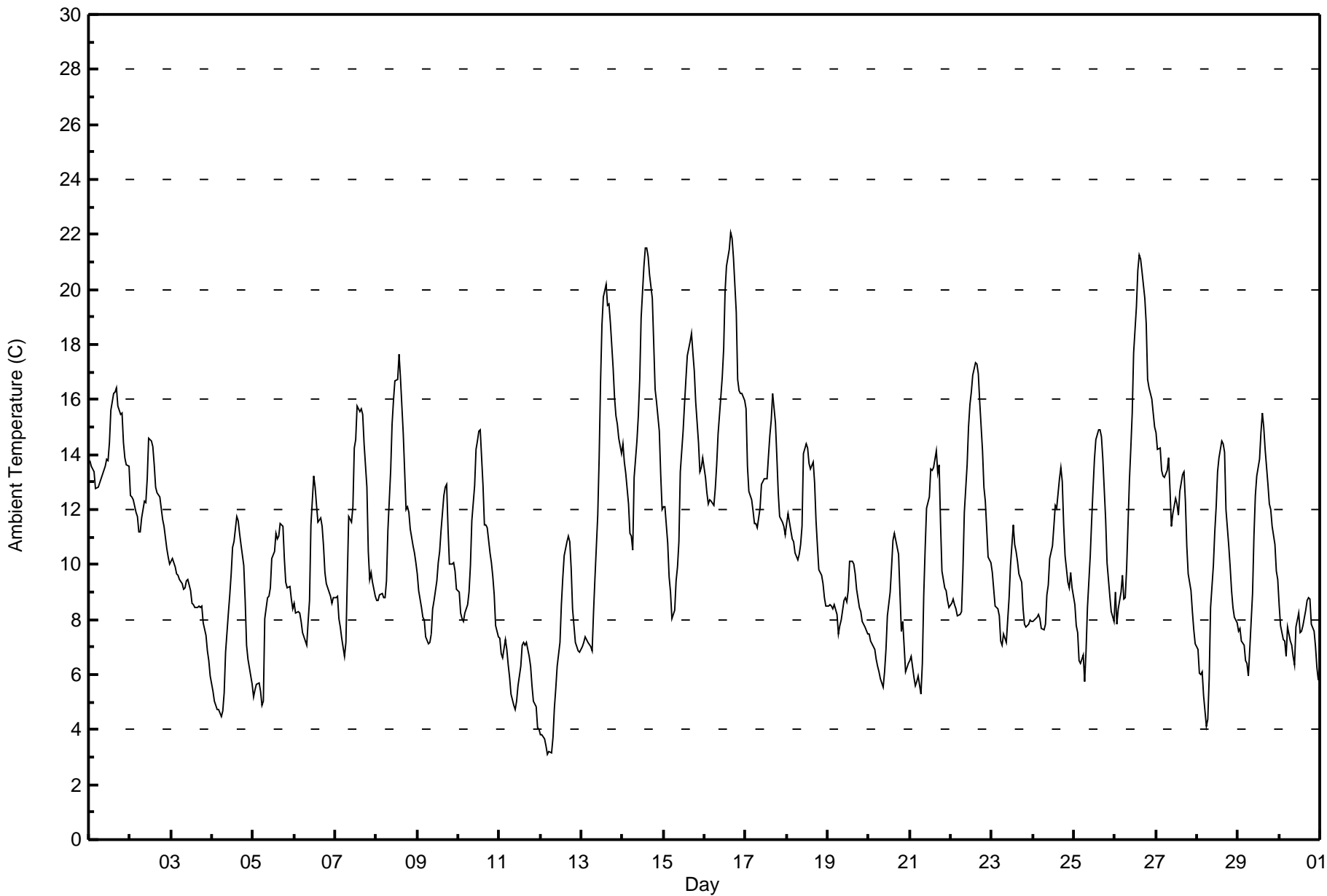
ConocoPhillips - Surmont - September 2016

| Maximum Value: 22.1 C on Sep 16 16:00 | | Maximum Daily Average: 16.4 C on Sep 16 | | Hours in Service: 720 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Minimum Value: 3.1 C on Sep 12 05:00 | | Minimum Daily Average: 6.0 C on Sep 11 | | Hours of Data: 720 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 13.9 C at hour 16 | | Minimum Diurnal Average: 8.0 C at hour 7 | | Hours of Missing Data: 0 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 10.71 C | | Percentiles: P ₁ = 3.8 P ₁₀ = 6.5 Q ₁ = 8.0 Median = 10.0 Q ₃ = 13.2 P ₉₀ = 15.7 P ₉₉ = 21.1 | | 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 | 13.8 | 13.6 | 13.5 | 13.4 | 12.8 | 12.8 | 12.9 | 13.1 | 13.3 | 13.6 | 13.8 | 13.8 | 14.5 | 15.6 | 16.2 | 16.3 | 16.4 | 15.8 | 15.5 | 15.5 | 14.5 | 13.9 | 13.6 | 13.6 | 14.2 | 16.4 |
| 2-Sep | 12.5 | 12.5 | 12.4 | 11.9 | 11.7 | 11.2 | 11.2 | 11.7 | 12.3 | 12.2 | 13.1 | 14.6 | 14.5 | 14.3 | 13.6 | 12.8 | 12.6 | 12.4 | 12.1 | 11.6 | 11.4 | 10.6 | 10.3 | 10.0 | 12.2 | 14.6 |
| 3-Sep | 10.1 | 10.2 | 9.9 | 9.7 | 9.6 | 9.5 | 9.3 | 9.1 | 9.1 | 9.4 | 9.5 | 9.1 | 8.6 | 8.6 | 8.4 | 8.4 | 8.5 | 8.4 | 8.5 | 7.9 | 7.4 | 6.8 | 6.5 | 6.0 | 8.7 | 10.2 |
| 4-Sep | 5.4 | 5.0 | 4.9 | 4.7 | 4.7 | 4.5 | 4.7 | 5.4 | 6.8 | 8.2 | 8.9 | 9.6 | 10.6 | 10.8 | 11.8 | 11.6 | 11.2 | 10.7 | 10.0 | 8.7 | 7.0 | 6.6 | 6.3 | 5.7 | 7.7 | 11.8 |
| 5-Sep | 5.2 | 5.5 | 5.6 | 5.7 | 5.4 | 4.9 | 5.0 | 8.0 | 8.8 | 8.8 | 9.1 | 10.2 | 10.5 | 11.1 | 10.9 | 11.0 | 11.5 | 11.4 | 10.2 | 9.4 | 9.2 | 9.2 | 8.7 | 8.4 | 8.5 | 11.5 |
| 6-Sep | 8.6 | 8.3 | 8.3 | 8.2 | 7.9 | 7.5 | 7.2 | 7.1 | 7.9 | 8.7 | 11.5 | 13.2 | 12.8 | 12.2 | 11.5 | 11.7 | 11.4 | 10.7 | 9.7 | 9.3 | 9.0 | 8.8 | 8.6 | 8.8 | 9.5 | 13.2 |
| 7-Sep | 8.8 | 8.8 | 8.0 | 7.7 | 7.3 | 6.7 | 7.2 | 9.5 | 11.7 | 11.5 | 12.1 | 14.2 | 14.6 | 15.8 | 15.6 | 15.7 | 15.4 | 14.4 | 12.8 | 10.5 | 9.5 | 9.7 | 9.4 | 8.9 | 11.1 | 15.8 |
| 8-Sep | 8.7 | 8.7 | 8.9 | 8.9 | 8.8 | 8.8 | 9.4 | 11.2 | 13.4 | 15.1 | 16.0 | 16.7 | 16.7 | 17.7 | 16.8 | 15.8 | 14.8 | 12.0 | 12.1 | 11.9 | 11.3 | 10.7 | 10.4 | 10.1 | 12.3 | 17.7 |
| 9-Sep | 9.7 | 9.1 | 8.5 | 8.1 | 8.0 | 7.4 | 7.1 | 7.2 | 7.5 | 8.4 | 8.7 | 9.4 | 10.1 | 10.5 | 11.2 | 12.5 | 12.8 | 12.9 | 11.3 | 10.0 | 10.0 | 10.0 | 9.8 | 9.1 | 9.5 | 12.9 |
| 10-Sep | 9.0 | 8.2 | 8.0 | 8.0 | 8.2 | 8.6 | 9.0 | 10.0 | 11.6 | 12.9 | 14.2 | 14.5 | 14.8 | 14.9 | 12.9 | 11.4 | 11.4 | 11.3 | 10.4 | 10.0 | 9.5 | 8.9 | 7.8 | 7.4 | 10.5 | 14.9 |
| 11-Sep | 7.3 | 6.8 | 6.6 | 7.3 | 6.9 | 6.4 | 5.9 | 5.3 | 4.9 | 4.7 | 5.0 | 5.6 | 6.3 | 7.1 | 7.2 | 7.1 | 7.2 | 6.6 | 6.3 | 5.6 | 5.0 | 4.8 | 4.1 | 4.0 | 6.0 | 7.3 |
| 12-Sep | 3.8 | 3.8 | 3.6 | 3.4 | 3.1 | 3.2 | 3.1 | 3.7 | 4.8 | 5.5 | 6.3 | 7.1 | 8.5 | 9.5 | 10.3 | 10.9 | 11.0 | 10.8 | 9.9 | 8.4 | 7.1 | 7.0 | 6.9 | 6.8 | 6.6 | 11.0 |
| 13-Sep | 7.0 | 7.2 | 7.4 | 7.3 | 7.2 | 7.0 | 6.9 | 8.3 | 9.5 | 11.8 | 13.9 | 16.6 | 18.7 | 19.7 | 20.2 | 19.4 | 19.5 | 18.8 | 17.1 | 16.1 | 15.4 | 15.1 | 14.6 | 14.0 | 13.3 | 20.2 |
| 14-Sep | 14.4 | 13.7 | 13.3 | 12.2 | 11.1 | 11.1 | 10.5 | 13.2 | 14.5 | 15.4 | 16.7 | 18.9 | 20.8 | 21.5 | 21.5 | 21.2 | 20.6 | 19.7 | 18.0 | 16.4 | 15.9 | 14.9 | 13.3 | 12.0 | 15.9 | 21.5 |
| 15-Sep | 12.1 | 12.1 | 10.8 | 9.5 | 9.0 | 8.0 | 8.3 | 9.4 | 9.9 | 10.8 | 13.4 | 14.9 | 15.8 | 16.7 | 17.6 | 18.1 | 18.4 | 17.7 | 17.0 | 15.9 | 14.4 | 13.3 | 13.5 | 13.9 | 13.4 | 18.4 |
| 16-Sep | 13.2 | 12.6 | 12.2 | 12.4 | 12.3 | 12.1 | 12.8 | 13.6 | 14.7 | 16.1 | 16.8 | 17.9 | 19.9 | 20.9 | 21.4 | 22.1 | 21.9 | 21.2 | 19.2 | 16.7 | 16.3 | 16.2 | 16.2 | 16.0 | 16.4 | 22.1 |
| 17-Sep | 15.7 | 13.6 | 12.7 | 12.4 | 11.9 | 11.5 | 11.5 | 11.3 | 12.0 | 12.9 | 13.0 | 13.1 | 13.1 | 13.9 | 14.7 | 15.3 | 16.2 | 15.1 | 13.9 | 12.6 | 11.7 | 11.5 | 11.4 | 11.1 | 13.0 | 16.2 |
| 18-Sep | 11.5 | 11.8 | 11.2 | 10.9 | 10.8 | 10.4 | 10.2 | 10.4 | 10.7 | 11.4 | 14.0 | 14.4 | 14.2 | 13.7 | 13.5 | 13.7 | 13.0 | 11.6 | 10.7 | 9.8 | 9.6 | 9.3 | 8.8 | 8.5 | 11.4 | 14.4 |
| 19-Sep | 8.5 | 8.6 | 8.5 | 8.4 | 8.5 | 8.2 | 7.5 | 7.8 | 8.0 | 8.7 | 8.8 | 8.6 | 9.1 | 10.1 | 10.1 | 10.0 | 9.7 | 9.1 | 8.4 | 8.3 | 7.9 | 7.8 | 7.7 | 7.5 | 8.6 | 10.1 |
| 20-Sep | 7.5 | 7.2 | 7.1 | 6.9 | 6.6 | 6.3 | 6.1 | 5.8 | 5.5 | 6.1 | 6.9 | 8.1 | 9.0 | 9.9 | 10.9 | 11.1 | 10.9 | 10.4 | 8.9 | 7.6 | 7.9 | 6.1 | 6.2 | 6.4 | 7.7 | 11.1 |
| 21-Sep | 6.5 | 6.7 | 5.9 | 5.6 | 5.7 | 5.9 | 5.3 | 6.4 | 8.9 | 10.6 | 12.0 | 12.5 | 13.5 | 13.4 | 13.5 | 14.1 | 13.3 | 13.6 | 11.5 | 9.8 | 9.2 | 9.0 | 8.7 | 8.4 | 9.6 | 14.1 |
| 22-Sep | 8.6 | 8.7 | 8.5 | 8.4 | 8.2 | 8.2 | 8.3 | 9.8 | 11.9 | 13.6 | 15.0 | 15.8 | 16.3 | 16.9 | 17.3 | 17.3 | 16.9 | 15.9 | 14.2 | 12.8 | 12.3 | 11.3 | 10.3 | 10.1 | 12.4 | 17.3 |
| 23-Sep | 9.7 | 9.1 | 8.5 | 8.4 | 8.1 | 7.2 | 7.1 | 7.5 | 7.2 | 8.0 | 8.8 | 10.0 | 11.4 | 10.7 | 10.4 | 10.1 | 9.7 | 9.4 | 8.4 | 7.8 | 7.7 | 7.9 | 8.0 | 7.9 | 8.7 | 11.4 |
| 24-Sep | 7.9 | 8.0 | 8.1 | 8.2 | 8.1 | 7.7 | 7.6 | 7.8 | 8.9 | 9.3 | 10.2 | 10.7 | 11.4 | 12.2 | 12.1 | 13.1 | 13.5 | 13.0 | 11.5 | 10.3 | 9.4 | 9.1 | 9.7 | 9.2 | 9.9 | 13.5 |
| 25-Sep | 8.6 | 7.8 | 7.5 | 6.5 | 6.4 | 6.7 | 5.8 | 6.8 | 8.4 | 10.3 | 11.6 | 12.7 | 13.8 | 14.6 | 14.9 | 14.9 | 14.6 | 13.8 | 11.7 | 10.1 | 9.4 | 8.8 | 8.3 | 7.9 | 10.1 | 14.9 |
| 26-Sep | 9.0 | 7.9 | 8.4 | 9.0 | 9.6 | 8.8 | 8.8 | 9.9 | 13.1 | 14.2 | 15.5 | 17.7 | 19.4 | 20.7 | 21.3 | 21.1 | 20.6 | 19.7 | 18.8 | 16.7 | 16.4 | 16.0 | 15.5 | 15.0 | 14.7 | 21.3 |
| 27-Sep | 14.8 | 14.2 | 14.3 | 13.4 | 13.2 | 13.2 | 13.4 | 13.9 | 12.7 | 11.4 | 11.9 | 12.4 | 12.2 | 11.8 | 12.7 | 13.3 | 13.4 | 12.3 | 10.7 | 9.7 | 9.0 | 8.3 | 7.6 | 7.1 | 11.9 | 14.8 |
| 28-Sep | 6.9 | 6.0 | 6.0 | 6.1 | 5.3 | 4.1 | 4.3 | 5.9 | 8.4 | 10.0 | 11.2 | 12.1 | 13.4 | 13.9 | 14.5 | 14.4 | 14.1 | 12.0 | 10.7 | 9.9 | 9.1 | 8.4 | 8.1 | 7.9 | 9.3 | 14.5 |
| 29-Sep | 7.6 | 7.7 | 7.2 | 7.1 | 6.5 | 6.4 | 6.0 | 6.9 | 9.0 | 11.0 | 12.5 | 13.2 | 13.8 | 14.8 | 15.5 | 15.0 | 14.2 | 12.9 | 12.2 | 12.0 | 11.4 | 10.7 | 9.7 | 9.5 | 10.5 | 15.5 |
| 30-Sep | 8.5 | 7.8 | 7.3 | 7.2 | 6.7 | 7.7 | 7.2 | 7.1 | 6.7 | 6.4 | 7.7 | 8.2 | 7.5 | 7.6 | 7.8 | 8.3 | 8.7 | 8.8 | 8.7 | 7.8 | 7.6 | 7.0 | 6.2 | 5.8 | 7.5 | 8.8 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
ConocoPhillips - Surmont - September 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
ConocoPhillips - Surmont - September 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 355 | 49.31 | 49.31 |
| 10 - 20 | 350 | 48.61 | 97.92 |
| > 20 | 15 | 2.08 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720



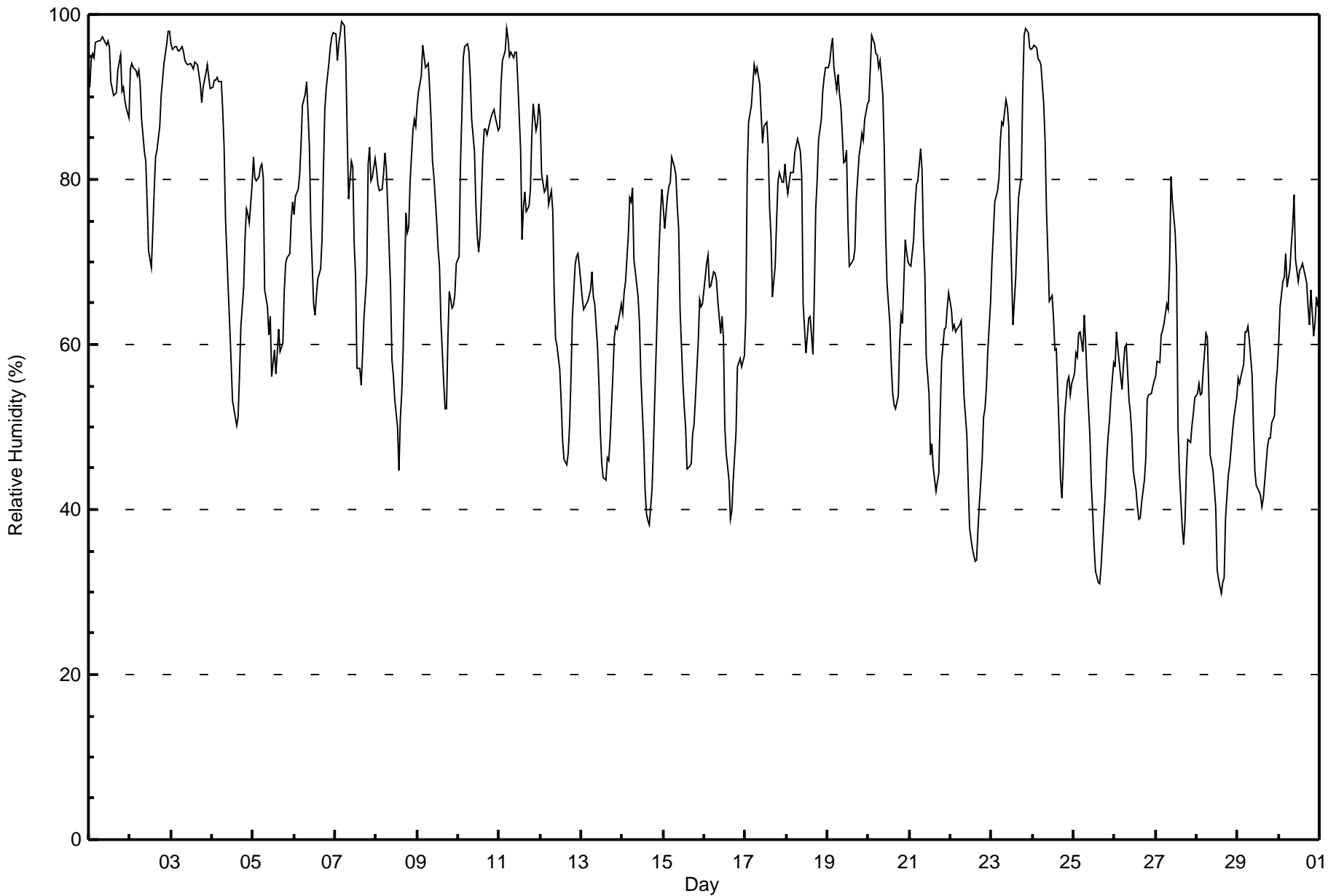
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

ConocoPhillips - Surmont - September 2016

| Maximum Value: 99 % on Sep 7 05:00 Maximum Daily Average: 93.9 % on Sep 3 | | | | | | | | | | | | | | | | | | Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0 | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------|-----------------|---------------|
| Minimum Value: 30 % on Sep 28 15:00 Minimum Daily Average: 46.4 % on Sep 28 Maximum Diurnal Average: 81.6 % at hour 7 Minimum Diurnal Average: 56.5 % at hour 16 Monthly Average: 70.4 % Percentiles: P ₁ = 33 P ₁₀ = 46 Q ₁ = 57 Median = 70 Q 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 | 91 | 95 | 95 | 95 | 97 | 97 | 97 | 97 | 97 | 97 | 96 | 97 | 96 | 92 | 90 | 90 | 90 | 93 | 95 | 91 | 91 | 90 | 89 | 87 | 93.5 | 97 |
| 2-Sep | 93 | 94 | 94 | 93 | 93 | 93 | 92 | 87 | 83 | 82 | 77 | 71 | 69 | 74 | 79 | 83 | 84 | 86 | 90 | 92 | 94 | 96 | 98 | 98 | 87.3 | 98 |
| 3-Sep | 96 | 96 | 96 | 96 | 96 | 96 | 96 | 95 | 94 | 94 | 94 | 94 | 93 | 94 | 94 | 93 | 92 | 89 | 91 | 93 | 94 | 92 | 91 | 93.9 | 96 | |
| 4-Sep | 91 | 92 | 92 | 92 | 92 | 92 | 88 | 84 | 75 | 66 | 62 | 58 | 53 | 52 | 50 | 51 | 56 | 62 | 67 | 73 | 76 | 76 | 75 | 79 | 73.2 | 92 |
| 5-Sep | 83 | 80 | 80 | 80 | 82 | 82 | 80 | 67 | 65 | 61 | 63 | 56 | 59 | 56 | 59 | 62 | 59 | 60 | 66 | 70 | 71 | 71 | 75 | 77 | 69.4 | 83 |
| 6-Sep | 76 | 78 | 79 | 80 | 84 | 89 | 90 | 92 | 88 | 84 | 74 | 65 | 64 | 66 | 68 | 69 | 73 | 81 | 88 | 91 | 94 | 96 | 97 | 98 | 81.9 | 98 |
| 7-Sep | 98 | 94 | 96 | 98 | 99 | 99 | 95 | 86 | 78 | 82 | 82 | 72 | 68 | 57 | 57 | 55 | 59 | 63 | 68 | 82 | 84 | 80 | 80 | 83 | 79.8 | 99 |
| 8-Sep | 81 | 79 | 79 | 79 | 81 | 83 | 81 | 77 | 67 | 58 | 56 | 53 | 50 | 45 | 51 | 54 | 59 | 76 | 74 | 74 | 80 | 86 | 87 | 87 | 70.7 | 87 |
| 9-Sep | 89 | 91 | 93 | 96 | 95 | 94 | 94 | 91 | 87 | 82 | 80 | 75 | 71 | 69 | 63 | 55 | 52 | 52 | 61 | 66 | 64 | 65 | 66 | 70 | 75.9 | 96 |
| 10-Sep | 71 | 82 | 88 | 95 | 96 | 96 | 96 | 92 | 87 | 83 | 77 | 73 | 71 | 73 | 83 | 86 | 86 | 86 | 87 | 88 | 88 | 89 | 87 | 86 | 85.3 | 96 |
| 11-Sep | 86 | 92 | 94 | 96 | 98 | 97 | 95 | 95 | 95 | 95 | 95 | 92 | 84 | 73 | 77 | 78 | 76 | 77 | 79 | 85 | 89 | 86 | 87 | 89 | 87.9 | 98 |
| 12-Sep | 88 | 81 | 79 | 79 | 80 | 77 | 79 | 76 | 66 | 61 | 60 | 57 | 53 | 48 | 46 | 45 | 47 | 50 | 56 | 63 | 70 | 71 | 71 | 69 | 65.5 | 88 |
| 13-Sep | 66 | 64 | 65 | 65 | 65 | 67 | 69 | 66 | 65 | 60 | 55 | 49 | 46 | 44 | 44 | 46 | 46 | 49 | 56 | 61 | 62 | 62 | 63 | 65 | 58.3 | 69 |
| 14-Sep | 64 | 66 | 68 | 73 | 78 | 77 | 79 | 70 | 67 | 66 | 63 | 56 | 48 | 42 | 40 | 39 | 38 | 43 | 48 | 54 | 60 | 72 | 76 | 79 | 61.0 | 79 |
| 15-Sep | 77 | 74 | 78 | 79 | 80 | 83 | 81 | 80 | 77 | 74 | 64 | 55 | 52 | 50 | 45 | 45 | 46 | 49 | 50 | 54 | 60 | 65 | 65 | 65 | 64.6 | 83 |
| 16-Sep | 68 | 70 | 71 | 67 | 67 | 69 | 69 | 68 | 65 | 61 | 63 | 61 | 50 | 47 | 44 | 39 | 40 | 44 | 49 | 57 | 58 | 58 | 57 | 59 | 58.3 | 71 |
| 17-Sep | 63 | 81 | 87 | 89 | 91 | 94 | 93 | 94 | 92 | 88 | 84 | 86 | 87 | 84 | 77 | 73 | 66 | 69 | 75 | 80 | 81 | 80 | 80 | 82 | 82.3 | 94 |
| 18-Sep | 80 | 78 | 81 | 81 | 81 | 83 | 85 | 84 | 83 | 80 | 65 | 59 | 61 | 63 | 63 | 59 | 66 | 76 | 80 | 85 | 87 | 91 | 92 | 93 | 77.4 | 93 |
| 19-Sep | 94 | 94 | 96 | 97 | 94 | 91 | 93 | 90 | 89 | 82 | 82 | 84 | 75 | 70 | 70 | 70 | 72 | 78 | 83 | 84 | 86 | 85 | 87 | 89 | 84.7 | 97 |
| 20-Sep | 90 | 93 | 98 | 96 | 95 | 95 | 94 | 94 | 90 | 84 | 73 | 67 | 63 | 58 | 54 | 53 | 52 | 54 | 60 | 64 | 63 | 73 | 71 | 70 | 75.1 | 98 |
| 21-Sep | 70 | 70 | 73 | 77 | 79 | 80 | 84 | 81 | 73 | 69 | 58 | 54 | 47 | 48 | 45 | 42 | 43 | 44 | 52 | 58 | 62 | 62 | 64 | 66 | 62.5 | 84 |
| 22-Sep | 64 | 62 | 62 | 61 | 62 | 62 | 63 | 58 | 54 | 49 | 43 | 38 | 36 | 35 | 34 | 34 | 38 | 41 | 46 | 51 | 52 | 55 | 59 | 65 | 51.1 | 65 |
| 23-Sep | 70 | 74 | 77 | 79 | 80 | 85 | 87 | 87 | 90 | 89 | 87 | 76 | 62 | 65 | 68 | 73 | 78 | 80 | 91 | 97 | 98 | 98 | 96 | 96 | 82.6 | 98 |
| 24-Sep | 96 | 96 | 96 | 95 | 94 | 94 | 89 | 85 | 76 | 71 | 65 | 66 | 63 | 59 | 50 | 44 | 41 | 46 | 52 | 56 | 56 | 54 | 55 | 55 | 69.1 | 96 |
| 25-Sep | 56 | 59 | 59 | 61 | 62 | 59 | 64 | 60 | 56 | 49 | 43 | 40 | 36 | 33 | 31 | 31 | 33 | 36 | 42 | 46 | 49 | 51 | 54 | 58 | 48.6 | 64 |
| 26-Sep | 57 | 62 | 60 | 56 | 55 | 58 | 60 | 60 | 53 | 52 | 49 | 45 | 42 | 40 | 39 | 39 | 41 | 44 | 46 | 53 | 54 | 54 | 55 | 56 | 51.2 | 62 |
| 27-Sep | 56 | 58 | 58 | 61 | 62 | 63 | 65 | 64 | 70 | 80 | 77 | 74 | 69 | 50 | 45 | 38 | 36 | 38 | 45 | 48 | 48 | 50 | 52 | 54 | 56.7 | 80 |
| 28-Sep | 54 | 55 | 54 | 54 | 57 | 61 | 61 | 55 | 47 | 45 | 43 | 40 | 33 | 32 | 30 | 31 | 32 | 39 | 44 | 45 | 47 | 50 | 51 | 54 | 46.4 | 61 |
| 29-Sep | 56 | 55 | 56 | 58 | 62 | 61 | 62 | 60 | 56 | 50 | 45 | 43 | 42 | 42 | 40 | 41 | 43 | 48 | 49 | 49 | 51 | 51 | 55 | 57 | 51.3 | 62 |
| 30-Sep | 60 | 65 | 68 | 68 | 71 | 67 | 69 | 72 | 74 | 78 | 70 | 68 | 69 | 69 | 70 | 68 | 67 | 65 | 62 | 67 | 61 | 63 | 66 | 65 | 67.6 | 78 |
| | 76.1 | 77.7 | 78.9 | 79.9 | 80.9 | 81.4 | 81.6 | 78.9 | 75.3 | 72.4 | 68.3 | 64.1 | 60.5 | 57.7 | 57.1 | 56.5 | 57.1 | 60.5 | 64.8 | 69.0 | 71.0 | 72.4 | 73.4 | 74.7 | Diurnal Average | |
| | 98 | 96 | 98 | 98 | 99 | 99 | 97 | 97 | 97 | 97 | 96 | 97 | 96 | 93 | 94 | 94 | 93 | 93 | 95 | 97 | 98 | 98 | 98 | 98 | Diurnal Maximum | |





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
ConocoPhillips - Surmont - September 2016

| Concentration Ranges (%) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 0 | 0.00 | 0.00 |
| 20 - 40 | 29 | 4.03 | 4.03 |
| 40 - 60 | 191 | 26.53 | 30.56 |
| 60 - 80 | 249 | 34.58 | 65.14 |
| 80 - 100 | 251 | 34.86 | 100.00 |

Total Number of Valid Hours: 720

Total Number of Hours: 720

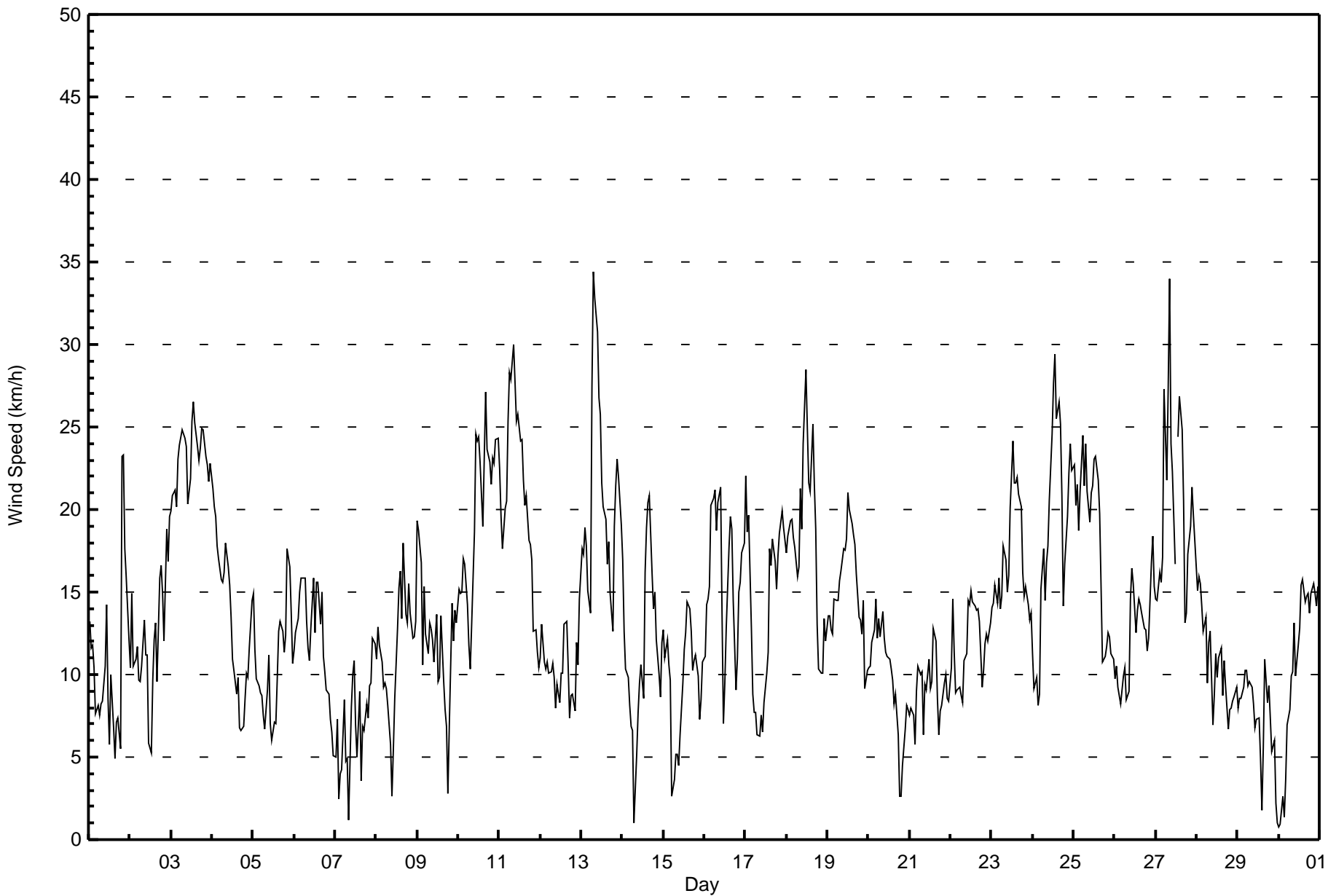


| | | |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 34 km/h on Sep 13 08:00 | Maximum Daily Speed Average: 22.3 km/h on Sep 3 | Hours in Service: 720 |
| Minimum Speed Value: 1 km/h on Sep 30 01:00 | Minimum Daily Speed Average: 3.0 km/h on Sep 1 | Hours of Data: 719 |
| Maximum Diurnal Speed Average: 9.9 km/h at hour 2 | Minimum Diurnal Speed Average: 5.7 km/h at hour 19 | Hours of Missing Data: 1 |
| Monthly Average Velocity: 8.0 km/h 262.5 deg | Percentiles: P ₁ = 2 P ₁₀ = 7 Q ₁ = 10 Median = 13 Q ₃ = 18 P ₉₀ = 22 P ₉₉ = 28 | Percent Operational Time: 99.9 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|------------------------------------------------------------------------|-----------|---------------------|------------------------------------------------------------------|--------------------|---------------------------------------------|------------------------------|-------------------------------|------------------------------------|----------------------------------------------|----------------------|----------------------|--------------------|---------------------------|-------------------------|--------|--------------------|-----------|----------------------|----------|---------------|----------------|--------|--------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Sep | SE13 | SE12 | SE12 | SE10 | SE8 | SE8 | SE8 | SE8 | SE8 | SE10 | SE14 | E9 | NE6 | SE10 | E7 | ENE5 | E7 | E7 | SW6 | W23 | W23WNW18WNW16 | W12 | SSE3.0 | W23 | | |
| 2-Sep | W10 | W15 | W10 | W11WNW12 | W10WNW10WNW11 | NW13WNW11 | W11 | NW6 | ENE5 | N10NNW12 | N13 | N10NNW16 | NNW17 | NNW15WNW12WNW19 | NW17WNW20 | NW10.3 | WNW20 | | | | | | | | | |
| 3-Sep | WNW20WNW21WNW21WNW20WNW23 | W24 | W25 | W25 | W24 | W24 | W20WNW22WNW25WNW27WNW25WNW24 | NW23 | NW24 | NW25 | NW25 | NW23 | NW23WNW22WNW23 | WNW22.3 | WNW27 | | | | | | | | | | | |
| 4-Sep | WNW21WNW20WNW20WNW18WNW17WNW16WNW16WNW16WNW18WNW17WNW15WNW13WNW11WNW10 | WNW9WNW10 | W7 | W7 | W7 | WSW9WSW10WSW10WSW12WSW14 | WNW12.7 | WNW21 | | | | | | | | | | | | | | | | | | |
| 5-Sep | WSW15WSW12WSW10 | WSW9 | WSW9 | SW9 | SW8 | SSW7 | SSW9 | S11 | SSW7 | SSW6 | SSW7 | SW7 | SSE10 | SE13 | SE13 | SE11 | SE12 | SE18 | SSE17 | S14 | SSW11 | S7.6 | SE18 | | | |
| 6-Sep | S11 | S13 | S13 | S15 | S16 | SSE16 | SE16 | SE13 | SE12 | S11 | S13 | SSE16 | SSE13 | SSE16 | SE16 | SE13 | SE15 | SE11 | ESE10 | SE9 | ESE9 | ESE7 | ESE7 | SE5 | SSE11.3 | S16 |
| 7-Sep | SSW5 | SW7 | WSW2 | SE4 | SW4 | WSW9 | SW5 | WSW5 | SW1 | ESE8 | ESE10 | E11 | ENE7 | SSE5 | S9 | SSW4 | E7 | SE7 | SSW8 | SSW7 | SW9 | SW10WSW12WSW12 | SSW4.0 | WSW12 | | |
| 8-Sep | WSW11WSW13WSW12WSW11 | WSW9WSW10 | WSW9 | W8 | WNW6 | WSW3 | NW5 | N9 | NNW13 | NW15WNW16WNW13WNW18WNW14WNW13WNW15WNW14WNW12 | NW12 | NW13 | WNW10.0 | WNW18 | | | | | | | | | | | | |
| 9-Sep | NNW19 | NNW19 | NNW17 | NW11 | NNW15 | N12 | N11 | NNW13 | NNW13 | NW12 | NNW11 | NW14 | NNW10 | NW10WNW14 | NW10 | WNW8 | W7 | SW3 | SE7 | SE14 | SSE12 | SSE14 | SSE13 | NNW6.3 | NNW19 | |
| 10-Sep | S15 | S15 | S15 | S17 | S17 | S14 | SSW12 | SSW10 | SW13 | WSW19 | W25 | W24 | W24WNW23WNW19 | W23WNW27WNW24 | W23 | W22 | W23WNW23WNW24WNW24 | W15.0 | WNW27 | | | | | | | |
| 11-Sep | WNW22WNW20WNW18 | NW20 | NW20 | NNW25 | NNW28 | NNW28 | NNW30 | N28 | N25 | NNW26 | NNW24 | N24 | NNW22 | NNW20 | NNW21 | NNW18 | NW18 | NNW17 | NNW13WNW13WNW11WNW10 | NNW19.6 | NNW30 | | | | | |
| 12-Sep | WNW11WNW13WNW11 | W10 | W11 | W10WSW10WSW11 | W10 | W8 | WSW9 | WSW8WSW10WSW10WSW13WSW13WSW11 | SW7 | S9 | SSW9 | SSW8 | SW12 | SW11 | SW15 | WSW9.2 | SW15 | | | | | | | | | |
| 13-Sep | SW18 | SW17 | SW19 | SW18 | SSW15 | SW14WSW27WSW34WSW33WSW31WSW27WSW26WSW22 | SW20WSW19 | SW17 | SW18WSW15WSW13WSW19WSW21WSW23WSW22 | W19 | WSW20.5 | WSW34 | | | | | | | | | | | | | | |
| 14-Sep | W17WNW13 | W10WSW10 | WSW8 | SW7 | WSW7 | SE1 | SE5 | SSE8 | SSE9 | S11 | SSW9 | W16WSW19 | W20 | W21 | W16 | W14 | W15 | NW12WNW10 | W9WSW12 | WSW9.2 | W21 | | | | | |
| 15-Sep | W13WNW11WNW12 | W11 | W10 | SW3 | WSW4 | WNW5 | NNW5 | NNE5 | ESE6 | SE9 | SE12 | SE13 | SE14 | SE14 | SE13 | SE10 | SSE11 | SE10 | SSW7 | SW8WSW11 | S3.9 | SE14 | | | | |
| 16-Sep | WSW11WSW14WSW15WSW15WSW20WSW21WSW21WSW19WSW20WSW21WSW14 | SSW7 | SSW10 | SW13 | SW18 | SW20 | SW19WSW14 | WSW9WSW11WSW15WSW16 | W17 | W18 | WSW15.4 | WSW21 | | | | | | | | | | | | | | |
| 17-Sep | W22 | W19 | W20 | W13 | WSW9 | SW8 | SSW8 | SSW6 | SW6 | SW8 | SW7 | W8WSW10WSW11WSW18 | W17 | W18 | W17WSW15WSW17WSW19WSW20 | W19 | W18 | WSW13.2 | W22 | | | | | | | |
| 18-Sep | W17 | W18 | W19 | W19 | W18WNW18WNW16 | W17WNW21WNW19WNW24WNW28WNW25WNW22WNW21WNW25 | NW21WNW19WNW13 | W10WNW10 | W10WNW13WNW12 | WNW17.8 | WNW28 | | | | | | | | | | | | | | | |
| 19-Sep | WNW14WNW14WNW13WNW12 | NW15 | NW14WNW14WNW16WNW16 | NW18WNW18WNW18WNW21WNW20WNW19WNW18WNW18WNW16WNW13WNW13WNW12WNW14 | NW9WNW10 | WNW15.1 | WNW21 | | | | | | | | | | | | | | | | | | | |
| 20-Sep | WNW10 | NW11 | NW12 | NNW13 | NNW15 | N12 | NNW13 | N12 | N14 | NNW12 | NNW11 | NNW11 | N11 | N10 | N10 | NNE8 | NE9 | NNE6 | NNE3 | SE3 | S4 | SW7 | SW8 | SSW8 | NNW7.0 | NNW15 |
| 21-Sep | SW8 | SW8 | SW8 | WSW6 | SW9WSW11WSW10WSW10 | WSW6 | W9 | W9 | W11 | WNW9 | W10 | W13 | W12 | W9 | WSW6 | SW8 | SW8 | WSW9WSW10 | SW9 | SW8 | WSW8.3 | W13 | | | | |
| 22-Sep | WSW10WSW15WSW11 | SW9 | SW9 | SW9 | SW9 | SW8WSW11 | SW11 | SW15 | SSW14 | SSW15 | S14 | S14 | S14 | S14 | S13 | S9 | SSW10 | SSW12 | S12 | S12 | S13 | SSW11.0 | SSW15 | | | |
| 23-Sep | S14 | S14 | S15 | S14 | S16 | S14 | SSE15 | SSE18 | SE17 | SE15 | SE16 | SE20 | SSE24 | SSE22 | SE22 | SSE22 | SE21 | SE20 | SE16 | SE15 | SE15 | SSE14 | S13 | S14 | SSE16.2 | SSE24 |
| 24-Sep | S11 | S9 | S10 | SSW8 | S9WSW15WSW18 | W15 | W17 | W18 | W21 | W25 | W28 | W29 | W25WNW27WNW25WNW21 | W14 | W17 | W20 | W22 | W24 | W22 | W16.5 | W29 | | | | | |
| 25-Sep | W23 | W20 | W22 | W19 | W21 | W24 | W21 | W24 | W21WNW19WNW21WNW21 | NNW23 | NNW23 | WNW22WNW20WNW15WNW11 | W11 | WSW12WSW13WSW12WSW11WSW11 | W17.5 | W24 | | | | | | | | | | |
| 26-Sep | WSW10 | SW10 | SW9 | SW8 | SSW9 | SW10 | SW10 | SW8 | SSW9 | S15 | S16 | S16 | SSW13 | SSW14 | SSW15 | SSW14 | S14 | S13 | S13 | SSE11 | S12 | S17 | S18 | S15 | SSW11.6 | S18 |
| 27-Sep | SSW15 | S14 | S16 | S16 | SW17 | W27WNW22WNW27WNW34 | W24 | W22 | W17 | M | WNW24WNW27WNW25WNW20 | W13WSW14WSW17WSW19 | W21 | W20 | W18 | W17.6 | WNW34 | | | | | | | | | |
| 28-Sep | W15 | W16 | W16 | W14 | W13WSW13 | W9WSW12WSW13 | S7 | SE9 | SE11 | SSW10 | SW11 | SW12 | SW9 | SW11 | SW9 | SW7 | SW8 | WSW8 | SW8 | SW9 | SW9 | WSW8.9 | W16 | | | |
| 29-Sep | SW8 | SW9 | SW9 | SW9WSW10WSW10 | SW9 | SW10 | WSW9 | SW8 | S7 | SSE7 | ESE7 | S5 | SW2 | SE6 | SE11 | SE8 | SE9 | SE7 | SE5 | SE6 | ESE2 | NE1 | S5.0 | SE11 | | |
| 30-Sep | SE1 | NNW1 | WNW3 | NE1 | NW4 | NW7 | NNW8 | NNW10 | NNW10 | NNW13 | N10 | N12 | NNW13 | NNW15 | NNW16 | NNW14 | NNW15 | N15 | N14 | N15 | NNE15 | N15 | N14 | N15 | N10.3 | NNW16 |

| | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|---------------|----------|------------|-------|-----------------|--------------------|------|------|------|--------------------|-----------------|------|------|--------|--------|--------|--------|--------|--------|-----------------|
| WSW9.8WSW9.9WSW9.2WSW8.2WSW8.7 | W9.3 | W9.0 | W8.8 | W8.7 | W7.9 | W7.2 | W6.5 | W6.4 | W8.1 | W8.7 | W8.1 | W7.0 | W5.7 | WSW5.7 | WSW6.8 | WSW7.2 | WSW8.8 | WSW9.1 | WSW9.7 | Diurnal Average |
| W23WNW21 | W22WNW20WNW23 | W27NNW28 | WSW34WNW34 | WSW31 | WSW27WNW28WNW28 | W29WNW27WNW27WNW27 | NW24 | NW25 | NW25 | W23WSW23WNW24WNW24 | 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
ConocoPhillips - Surmont - September 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 35 | 4.87 | 4.87 |
| 6 - 11 | 257 | 35.74 | 40.61 |
| 12 - 19 | 291 | 40.47 | 81.08 |
| 20 - 28 | 130 | 18.08 | 99.17 |
| 29 - 38 | 6 | 0.83 | 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
ConocoPhillips - Surmont - September 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 0 | 2 | 2 | 2 | 0 | 1 | 7 | 1 | 2 | 2 | 6 | 4 | 0 | 2 | 2 | 2 | 35 |
| 6 - 11 | 7 | 3 | 2 | 1 | 6 | 9 | 24 | 6 | 13 | 23 | 53 | 47 | 29 | 20 | 7 | 7 | 257 |
| 12 - 19 | 11 | 1 | 0 | 0 | 0 | 0 | 27 | 11 | 41 | 10 | 16 | 41 | 40 | 55 | 13 | 25 | 291 |
| 20 - 28 | 3 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 0 | 0 | 2 | 13 | 39 | 47 | 11 | 8 | 130 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 0 | 1 | 6 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 21 | 6 | 4 | 3 | 6 | 10 | 62 | 21 | 56 | 35 | 77 | 108 | 109 | 125 | 33 | 43 | 719 |

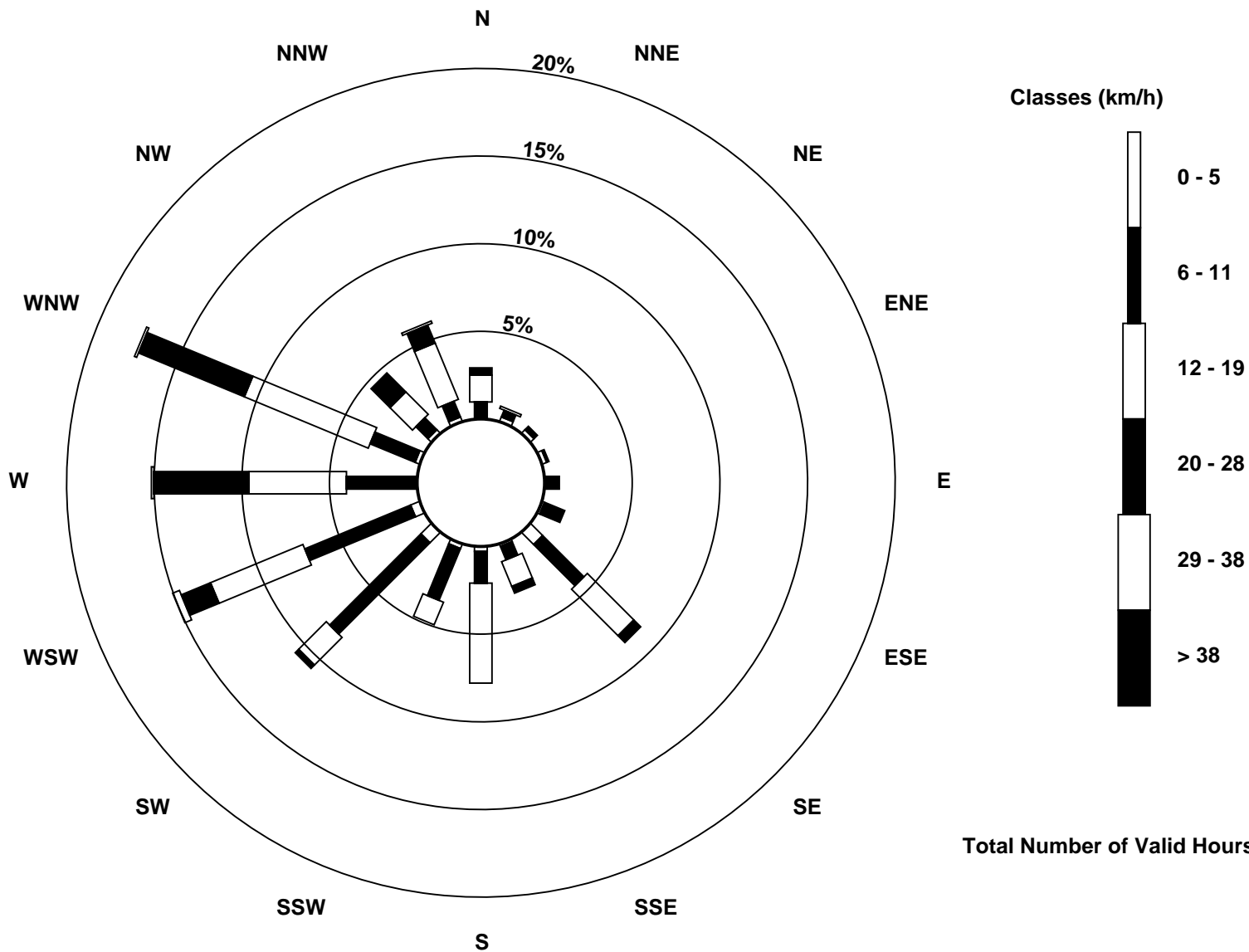
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association
Wind Rose Sep 2016

Wind Speed (WS) - km/h
ConocoPhillips - Surmont (AMS502)





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
ConocoPhillips - Surmont - September 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 8 km/h on Sep 7 19:00 | Hours of Data: 719 |
| Minimum Value: 1 km/h on Sep 8 07:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 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 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 6 | 5 | 5 | 4 | 4 | 4 | 6 |
| 2-Sep | 2 | 4 | 3 | 5 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 4 | 2 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 5 |
| 3-Sep | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 6 | 5 | 4 | 4 | 4 | 6 |
| 4-Sep | 4 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 4 |
| 5-Sep | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 4 | 4 | 3 | 4 |
| 6-Sep | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 5 |
| 7-Sep | 2 | 1 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 8 | 2 | 1 | 1 | 2 | 2 | 8 |
| 8-Sep | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 5 | 3 | 5 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 5 |
| 9-Sep | 4 | 4 | 4 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 4 |
| 10-Sep | 3 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 5 | 5 | 6 | 6 | 7 | 6 | 5 | 6 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 7 |
| 11-Sep | 4 | 4 | 3 | 5 | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 6 |
| 12-Sep | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 |
| 13-Sep | 4 | 5 | 5 | 5 | 5 | 5 | 7 | 6 | 5 | 5 | 6 | 6 | 5 | 6 | 5 | 5 | 5 | 5 | 3 | 2 | 3 | 3 | 3 | 3 | 7 |
| 14-Sep | 3 | 2 | 1 | 2 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 5 | 5 | 4 | 5 | 5 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 5 |
| 15-Sep | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| 16-Sep | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 2 | 4 | 5 | 6 | 6 | 6 | 4 | 2 | 1 | 2 | 2 | 2 | 3 | 6 |
| 17-Sep | 4 | 4 | 4 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 4 |
| 18-Sep | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 5 | 5 | 5 | 4 | 5 | 6 | 5 | 4 | 2 | 1 | 1 | 2 | 2 | 2 | 6 |
| 19-Sep | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 3 | 5 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 1 | 5 |
| 20-Sep | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 4 |
| 21-Sep | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 4 |
| 22-Sep | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | 4 | 4 | 2 | 3 | 3 | 3 | 3 | 3 | 5 |
| 23-Sep | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 5 |
| 24-Sep | 3 | 2 | 3 | 2 | 3 | 7 | 3 | 3 | 4 | 4 | 5 | 5 | 7 | 7 | 6 | 7 | 7 | 4 | 2 | 3 | 3 | 3 | 4 | 4 | 7 |
| 25-Sep | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 3 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 5 |
| 26-Sep | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 5 |
| 27-Sep | 4 | 3 | 4 | 4 | 7 | 6 | 5 | 6 | 7 | 6 | 4 | 3 | M | 6 | 5 | 6 | 5 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 7 |
| 28-Sep | 2 | 2 | 2 | 3 | 2 | 2 | 4 | 4 | 3 | 2 | 2 | 3 | 4 | 4 | 3 | 3 | 3 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 4 |
| 29-Sep | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 4 | 3 | 1 | 2 | 1 | 4 |
| 30-Sep | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| 4 | 5 | 5 | 5 | 7 | 7 | 7 | 6 | 7 | 6 | 6 | 6 | 7 | 7 | 6 | 7 | 7 | 5 | 8 | 6 | 5 | 4 | 4 | 5 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

ConocoPhillips - Surmont - September 2016

| | | | |
|--------------------------------------------------------------|--|---------------------------|------|
| Direction of Maximum Speed: 247 deg on Sep 13 08:00 | | Hours in Service: | 720 |
| Direction of Maximum Daily Speed Average: 294.0 deg on Sep 3 | | Hours of Data: | 719 |
| Direction of Minimum Speed: 129 deg on Sep 30 01:00 | | Hours of Missing Data: | 1 |
| Direction of Minimum Daily Speed Average: 3.0 deg on Sep 1 | | Percent Operational Time: | 99.9 |
| Monthly Average Direction: 265.4 deg | | | |

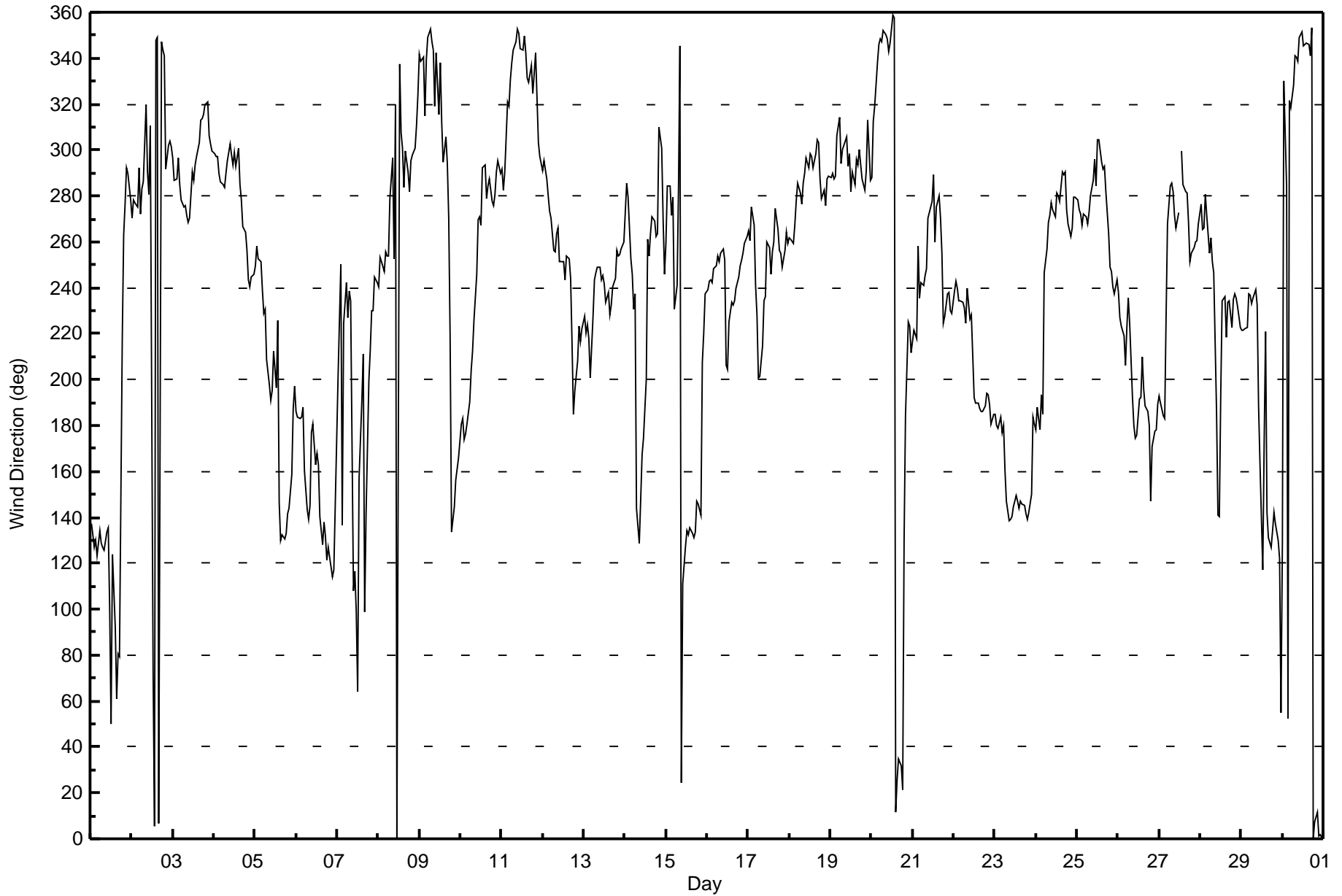
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Sep | 137 | 132 | 127 | 130 | 124 | 134 | 129 | 127 | 126 | 133 | 136 | 101 | 50 | 124 | 92 | 61 | 80 | 80 | 218 | 263 | 276 | 292 | 290 | 278 | 149.1 |
| 2-Sep | 271 | 278 | 277 | 275 | 292 | 272 | 283 | 286 | 320 | 291 | 281 | 311 | 73 | 5 | 348 | 349 | 6 | 347 | 344 | 341 | 292 | 302 | 304 | 301 | 310.0 |
| 3-Sep | 297 | 287 | 287 | 297 | 285 | 278 | 275 | 276 | 272 | 269 | 270 | 290 | 287 | 294 | 297 | 303 | 313 | 314 | 316 | 320 | 321 | 306 | 303 | 300 | 294.0 |
| 4-Sep | 298 | 297 | 297 | 290 | 286 | 285 | 284 | 290 | 296 | 303 | 298 | 294 | 299 | 293 | 301 | 285 | 278 | 267 | 264 | 256 | 243 | 240 | 245 | 246 | 284.4 |
| 5-Sep | 249 | 258 | 253 | 251 | 239 | 229 | 231 | 209 | 198 | 191 | 195 | 212 | 197 | 226 | 147 | 130 | 132 | 130 | 133 | 142 | 144 | 158 | 188 | 197 | 186.8 |
| 6-Sep | 186 | 183 | 183 | 184 | 188 | 160 | 143 | 139 | 145 | 177 | 181 | 163 | 168 | 163 | 140 | 128 | 138 | 132 | 121 | 127 | 119 | 114 | 117 | 145 | 155.0 |
| 7-Sep | 200 | 226 | 250 | 136 | 225 | 242 | 227 | 238 | 234 | 108 | 117 | 99 | 64 | 157 | 191 | 211 | 99 | 142 | 200 | 213 | 230 | 230 | 245 | 242 | 195.5 |
| 8-Sep | 240 | 253 | 251 | 247 | 255 | 254 | 254 | 279 | 297 | 252 | 320 | 0 | 337 | 307 | 301 | 284 | 300 | 290 | 282 | 295 | 298 | 301 | 311 | 324 | 288.9 |
| 9-Sep | 341 | 339 | 340 | 315 | 339 | 349 | 353 | 347 | 344 | 319 | 343 | 316 | 338 | 312 | 294 | 305 | 294 | 270 | 218 | 133 | 144 | 156 | 161 | 166 | 326.4 |
| 10-Sep | 181 | 183 | 174 | 176 | 181 | 191 | 204 | 212 | 225 | 246 | 270 | 271 | 268 | 292 | 294 | 279 | 284 | 287 | 278 | 276 | 281 | 290 | 295 | 290 | 260.4 |
| 11-Sep | 291 | 283 | 290 | 321 | 319 | 331 | 338 | 344 | 347 | 353 | 351 | 344 | 344 | 349 | 342 | 332 | 329 | 337 | 325 | 333 | 342 | 303 | 297 | 294 | 330.5 |
| 12-Sep | 291 | 295 | 287 | 280 | 273 | 270 | 257 | 256 | 263 | 266 | 251 | 251 | 251 | 244 | 254 | 253 | 244 | 216 | 185 | 195 | 208 | 223 | 217 | 222 | 250.0 |
| 13-Sep | 227 | 220 | 224 | 218 | 201 | 228 | 243 | 247 | 249 | 249 | 243 | 245 | 242 | 234 | 238 | 228 | 232 | 241 | 244 | 256 | 254 | 254 | 257 | 260 | 240.9 |
| 14-Sep | 273 | 286 | 279 | 252 | 246 | 231 | 237 | 144 | 129 | 148 | 167 | 174 | 200 | 261 | 254 | 263 | 271 | 269 | 262 | 263 | 310 | 301 | 270 | 246 | 256.4 |
| 15-Sep | 259 | 284 | 285 | 271 | 279 | 231 | 241 | 284 | 345 | 25 | 111 | 127 | 135 | 132 | 136 | 133 | 131 | 133 | 147 | 146 | 141 | 207 | 221 | 238 | 177.4 |
| 16-Sep | 239 | 243 | 244 | 243 | 248 | 250 | 254 | 251 | 255 | 257 | 252 | 206 | 205 | 225 | 234 | 233 | 234 | 240 | 244 | 249 | 252 | 255 | 259 | 262 | 245.4 |
| 17-Sep | 265 | 261 | 275 | 268 | 241 | 228 | 201 | 202 | 215 | 234 | 236 | 260 | 257 | 246 | 256 | 260 | 274 | 265 | 256 | 255 | 249 | 256 | 264 | 259 | 255.5 |
| 18-Sep | 261 | 261 | 259 | 267 | 277 | 286 | 282 | 276 | 286 | 290 | 297 | 292 | 298 | 297 | 293 | 299 | 304 | 303 | 287 | 279 | 282 | 276 | 287 | 289 | 285.9 |
| 19-Sep | 288 | 290 | 287 | 288 | 306 | 315 | 294 | 300 | 302 | 306 | 293 | 298 | 282 | 290 | 285 | 296 | 293 | 300 | 287 | 285 | 283 | 291 | 313 | 287 | 294.0 |
| 20-Sep | 288 | 312 | 319 | 338 | 346 | 349 | 347 | 352 | 350 | 348 | 343 | 346 | 359 | 358 | 11 | 26 | 35 | 31 | 21 | 130 | 185 | 225 | 224 | 212 | 342.5 |
| 21-Sep | 217 | 222 | 218 | 258 | 235 | 242 | 241 | 245 | 248 | 271 | 273 | 278 | 289 | 260 | 275 | 280 | 271 | 255 | 225 | 227 | 237 | 238 | 230 | 229 | 250.2 |
| 22-Sep | 239 | 243 | 240 | 234 | 234 | 233 | 231 | 225 | 240 | 226 | 228 | 211 | 192 | 190 | 190 | 187 | 186 | 186 | 188 | 194 | 194 | 189 | 181 | 185 | 208.1 |
| 23-Sep | 185 | 180 | 179 | 184 | 177 | 180 | 161 | 147 | 139 | 139 | 140 | 145 | 150 | 147 | 144 | 147 | 146 | 145 | 142 | 139 | 142 | 150 | 183 | 181 | 155.2 |
| 24-Sep | 178 | 188 | 178 | 194 | 185 | 247 | 257 | 268 | 271 | 277 | 274 | 271 | 281 | 280 | 278 | 290 | 289 | 291 | 274 | 268 | 263 | 266 | 280 | 280 | 268.5 |
| 25-Sep | 278 | 274 | 272 | 267 | 272 | 271 | 268 | 272 | 280 | 287 | 296 | 285 | 304 | 305 | 295 | 292 | 293 | 282 | 264 | 249 | 247 | 240 | 237 | 244 | 277.2 |
| 26-Sep | 238 | 227 | 223 | 219 | 206 | 223 | 235 | 225 | 192 | 180 | 175 | 176 | 192 | 192 | 210 | 196 | 189 | 186 | 180 | 147 | 171 | 178 | 178 | 189 | 193.5 |
| 27-Sep | 193 | 190 | 184 | 183 | 228 | 268 | 285 | 286 | 282 | 272 | 266 | 273 | M | 300 | 285 | 282 | 282 | 268 | 252 | 255 | 258 | 260 | 261 | 268 | 263.6 |
| 28-Sep | 276 | 266 | 266 | 280 | 272 | 255 | 262 | 251 | 247 | 186 | 141 | 140 | 193 | 234 | 236 | 218 | 234 | 235 | 223 | 235 | 237 | 236 | 232 | 223 | 240.4 |
| 29-Sep | 222 | 221 | 222 | 223 | 237 | 237 | 233 | 236 | 239 | 233 | 188 | 163 | 117 | 173 | 221 | 142 | 131 | 127 | 134 | 142 | 137 | 130 | 122 | 55 | 190.8 |
| 30-Sep | 129 | 330 | 284 | 52 | 321 | 319 | 328 | 341 | 341 | 339 | 349 | 351 | 345 | 346 | 346 | 346 | 341 | 354 | 0 | 7 | 12 | 1 | 2 | 1 | 350.1 |

255.0 255.9 255.0 253.0 256.8 260.2 262.7 268.0 273.9 267.5 263.5 266.9 271.4 273.6 270.7 271.9 272.8 271.5 256.9 257.1 253.4 255.9 258.0 257.6

Diurnal Average

M - Maintenance

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
ConocoPhillips - Surmont - September 2016

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 720 |
| Maximum Value: 98 deg on Sep 29 15:00 | Hours of Data: 719 |
| Minimum Value: 5 deg on Sep 25 19:00 | Hours of Missing Data: 1 |
| Percentiles: P ₁ = 7 P ₁₀ = 9 Q ₁ = 10 Median = 14 Q ₃ = 20 P ₉₀ = 30 P ₉₉ = 71 | 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 | 10 | 12 | 12 | 11 | 11 | 12 | 14 | 14 | 14 | 14 | 12 | 36 | 58 | 17 | 33 | 24 | 18 | 17 | 59 | 13 | 13 | 12 | 13 | 13 | 59 |
| 2-Sep | 7 | 11 | 12 | 23 | 18 | 16 | 12 | 13 | 24 | 19 | 20 | 73 | 29 | 24 | 24 | 16 | 18 | 14 | 11 | 13 | 12 | 10 | 10 | 9 | 73 |
| 3-Sep | 10 | 11 | 10 | 10 | 11 | 10 | 10 | 10 | 10 | 10 | 12 | 12 | 10 | 10 | 10 | 12 | 14 | 14 | 15 | 14 | 14 | 12 | 10 | 9 | 15 |
| 4-Sep | 9 | 10 | 9 | 10 | 11 | 10 | 10 | 10 | 10 | 16 | 20 | 23 | 30 | 30 | 35 | 21 | 23 | 26 | 8 | 11 | 9 | 9 | 6 | 8 | 35 |
| 5-Sep | 7 | 9 | 7 | 7 | 11 | 11 | 34 | 24 | 26 | 28 | 40 | 55 | 38 | 34 | 28 | 14 | 13 | 12 | 10 | 10 | 8 | 21 | 18 | 20 | 55 |
| 6-Sep | 18 | 16 | 15 | 16 | 17 | 21 | 9 | 10 | 16 | 19 | 21 | 23 | 25 | 24 | 14 | 15 | 13 | 15 | 12 | 12 | 11 | 12 | 19 | 31 | 31 |
| 7-Sep | 37 | 19 | 71 | 35 | 34 | 12 | 22 | 22 | 92 | 29 | 19 | 23 | 42 | 59 | 32 | 63 | 23 | 27 | 45 | 26 | 10 | 10 | 9 | 10 | 92 |
| 8-Sep | 11 | 10 | 8 | 8 | 7 | 5 | 6 | 8 | 32 | 67 | 63 | 40 | 27 | 24 | 21 | 11 | 21 | 12 | 9 | 13 | 15 | 14 | 14 | 18 | 67 |
| 9-Sep | 12 | 14 | 14 | 23 | 16 | 17 | 15 | 13 | 17 | 22 | 30 | 24 | 41 | 40 | 16 | 36 | 43 | 14 | 49 | 17 | 9 | 17 | 18 | 18 | 49 |
| 10-Sep | 15 | 16 | 17 | 18 | 15 | 19 | 22 | 24 | 20 | 18 | 14 | 15 | 14 | 14 | 12 | 12 | 11 | 13 | 11 | 10 | 10 | 11 | 11 | 10 | 24 |
| 11-Sep | 11 | 10 | 12 | 15 | 14 | 14 | 13 | 14 | 16 | 18 | 17 | 14 | 13 | 16 | 14 | 17 | 15 | 16 | 14 | 16 | 16 | 12 | 10 | 10 | 18 |
| 12-Sep | 9 | 10 | 9 | 9 | 9 | 10 | 8 | 9 | 18 | 24 | 33 | 39 | 40 | 33 | 23 | 21 | 22 | 25 | 19 | 20 | 21 | 18 | 19 | 21 | 40 |
| 13-Sep | 18 | 20 | 20 | 21 | 26 | 23 | 12 | 9 | 9 | 10 | 12 | 12 | 15 | 19 | 18 | 19 | 19 | 15 | 14 | 8 | 8 | 8 | 7 | 8 | 26 |
| 14-Sep | 11 | 9 | 12 | 10 | 29 | 42 | 16 | 68 | 25 | 22 | 25 | 22 | 53 | 20 | 15 | 13 | 13 | 10 | 8 | 17 | 19 | 14 | 12 | 10 | 68 |
| 15-Sep | 8 | 11 | 7 | 8 | 6 | 87 | 65 | 21 | 34 | 48 | 25 | 21 | 17 | 18 | 15 | 15 | 13 | 10 | 9 | 12 | 9 | 26 | 13 | 13 | 87 |
| 16-Sep | 12 | 10 | 9 | 11 | 8 | 8 | 8 | 9 | 9 | 9 | 14 | 27 | 31 | 31 | 22 | 21 | 19 | 16 | 11 | 7 | 7 | 8 | 8 | 8 | 31 |
| 17-Sep | 10 | 11 | 8 | 11 | 21 | 26 | 21 | 24 | 21 | 20 | 26 | 14 | 14 | 15 | 10 | 12 | 11 | 8 | 7 | 7 | 7 | 10 | 8 | 8 | 26 |
| 18-Sep | 9 | 8 | 9 | 9 | 11 | 11 | 11 | 11 | 11 | 10 | 13 | 12 | 14 | 13 | 14 | 15 | 12 | 13 | 9 | 9 | 10 | 8 | 10 | 9 | 15 |
| 19-Sep | 9 | 9 | 9 | 10 | 13 | 16 | 9 | 10 | 11 | 13 | 16 | 15 | 12 | 14 | 13 | 11 | 12 | 11 | 11 | 10 | 10 | 10 | 19 | 9 | 19 |
| 20-Sep | 9 | 21 | 17 | 18 | 11 | 14 | 13 | 15 | 15 | 22 | 25 | 39 | 36 | 26 | 27 | 32 | 23 | 16 | 76 | 23 | 38 | 14 | 14 | 19 | 76 |
| 21-Sep | 19 | 15 | 17 | 22 | 11 | 10 | 11 | 8 | 16 | 20 | 32 | 22 | 36 | 23 | 16 | 18 | 7 | 17 | 9 | 12 | 14 | 13 | 15 | 16 | 36 |
| 22-Sep | 14 | 10 | 13 | 16 | 14 | 15 | 16 | 18 | 17 | 24 | 25 | 29 | 30 | 26 | 27 | 25 | 21 | 20 | 18 | 19 | 20 | 18 | 16 | 19 | 30 |
| 23-Sep | 18 | 15 | 15 | 18 | 15 | 20 | 19 | 13 | 10 | 11 | 12 | 11 | 13 | 12 | 12 | 12 | 11 | 11 | 11 | 11 | 11 | 17 | 18 | 15 | 20 |
| 24-Sep | 16 | 20 | 18 | 23 | 22 | 19 | 10 | 12 | 13 | 13 | 14 | 12 | 13 | 13 | 12 | 13 | 12 | 11 | 9 | 8 | 8 | 8 | 9 | 9 | 23 |
| 25-Sep | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 10 | 12 | 13 | 12 | 15 | 15 | 17 | 17 | 12 | 12 | 5 | 9 | 6 | 10 | 9 | 11 | 17 |
| 26-Sep | 12 | 9 | 10 | 11 | 20 | 18 | 14 | 16 | 22 | 17 | 14 | 16 | 27 | 26 | 28 | 24 | 20 | 19 | 19 | 14 | 20 | 14 | 14 | 18 | 28 |
| 27-Sep | 19 | 18 | 16 | 16 | 25 | 15 | 13 | 13 | 10 | 12 | 13 | 13 | M | 13 | 14 | 13 | 14 | 11 | 9 | 9 | 8 | 8 | 8 | 9 | 25 |
| 28-Sep | 8 | 8 | 10 | 10 | 9 | 7 | 31 | 8 | 15 | 30 | 27 | 24 | 51 | 31 | 27 | 33 | 22 | 16 | 13 | 15 | 13 | 15 | 15 | 14 | 51 |
| 29-Sep | 14 | 14 | 14 | 13 | 13 | 13 | 13 | 14 | 16 | 28 | 32 | 42 | 46 | 75 | 98 | 61 | 12 | 9 | 7 | 42 | 41 | 10 | 65 | 92 | 98 |
| 30-Sep | 70 | 71 | 50 | 67 | 55 | 13 | 17 | 10 | 11 | 7 | 20 | 14 | 10 | 11 | 12 | 11 | 8 | 18 | 18 | 16 | 15 | 16 | 15 | 16 | 71 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 70 | 71 | 71 | 67 | 55 | 87 | 65 | 68 | 92 | 67 | 63 | 73 | 58 | 75 | 98 | 63 | 43 | 27 | 76 | 42 | 41 | 26 | 65 | 92 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|-------------------|
| Calibration Date | September 27, 2016 | Last Calibration | August 16, 2016 |
| Station Name | ConocoPhillips - Surmont | Station Number | AMS 502 |
| Reason: | Routine | | |
| Start Time (MST) | 9:31 | End Time (MST) | 13:30 |
| Gas Cert Reference | LL104215 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 48.3 ppm | Cal Gas Exp Date | February 12, 2018 |
| Calibrator Make/Model | API T700 | Serial Number | 622 |
| ZAG Make/Model | API 701 | Serial Number | 4865 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 9035 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-------------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | 518 | 518 |
| Analyzer IP address | 192.168.1.43 | | Lamp voltage | 1715 | 1656 |
| Calculated slope | 0.993816 | 0.995257 | Chamber temp | 50.0 | 50.0 |
| Calculated intercept | 1.020693 | 0.522044 | Pressure | 21.4 | 21.1 |
| Analyzer Background | 24.2 | 24.2 | Flow | 0.527 | 0.520 |
| Analyzer Coefficient | 1.016 | 1.016 | Intensity | 42 | 41 |
| Analyzer make | API T100 | | Analyzer serial # | 598 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| as found span | 5000 | 83.2 | 803.7 | 806.8 | 0.996 |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.2 | ---- |
| high point | 5000 | 83.2 | 803.7 | 806.8 | 0.996 |
| second point | 5000 | 41.6 | 401.9 | 404.3 | 0.994 |
| third point | 5000 | 20.8 | 200.9 | 200.2 | 1.003 |
| as left zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 5000 | 83.2 | 803.7 | 802.2 | 1.002 |
| Average Correction Factor | | | | | 0.998 |

Corrected As found 807.0 Previous response 807.7 % change 0.1%

Notes:

Sample inlet filter replaced after as founds. No adjustments made.

Calibration Performed By:

Asad Hidayat



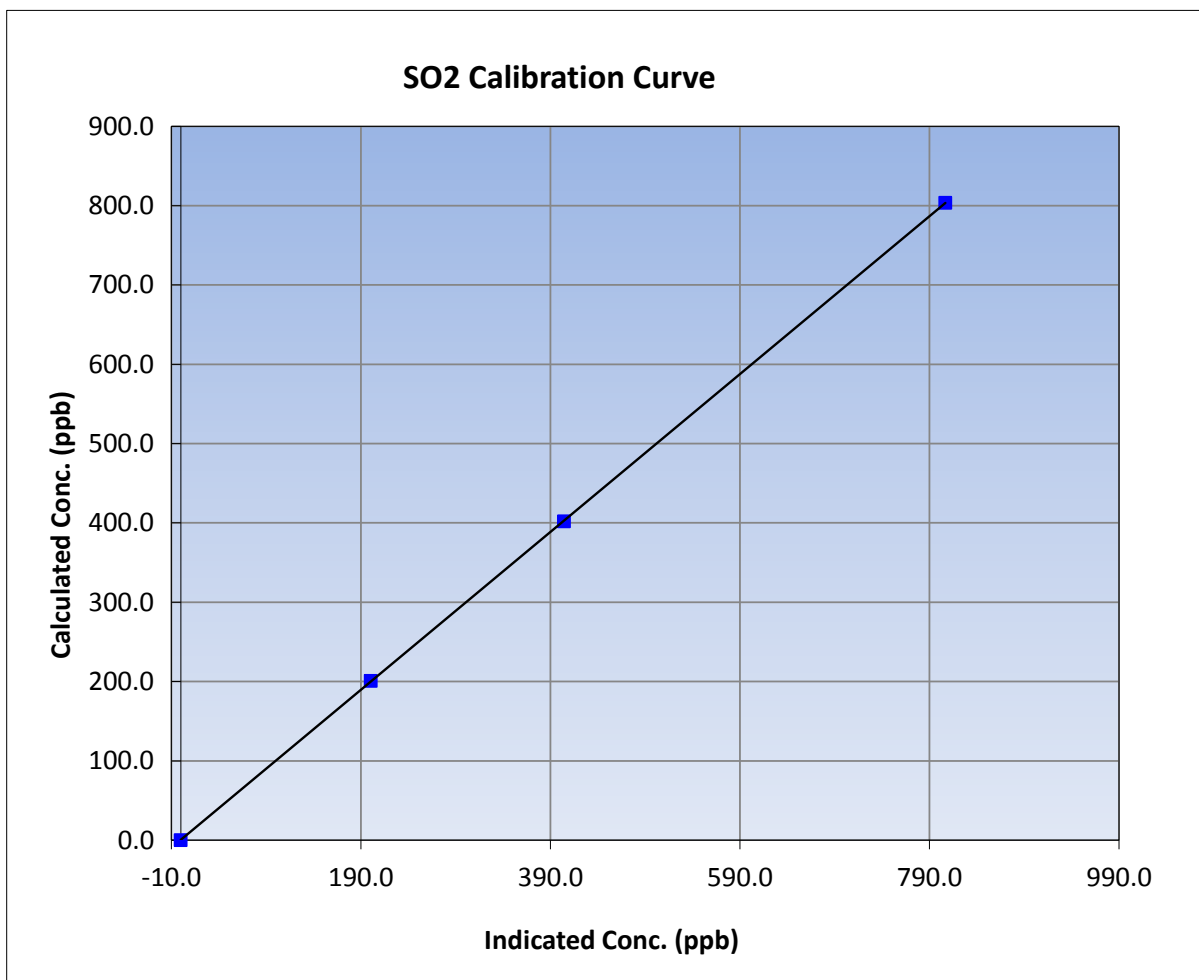
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|--------------------------|----------------------|-----------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | ConocoPhillips - Surmont | Station Number | AMS 502 |
| Start Time (MST) | 9:31 | End Time (MST) | 13:30 |
| Analyzer make | API T100 | Analyzer serial # | 598 |

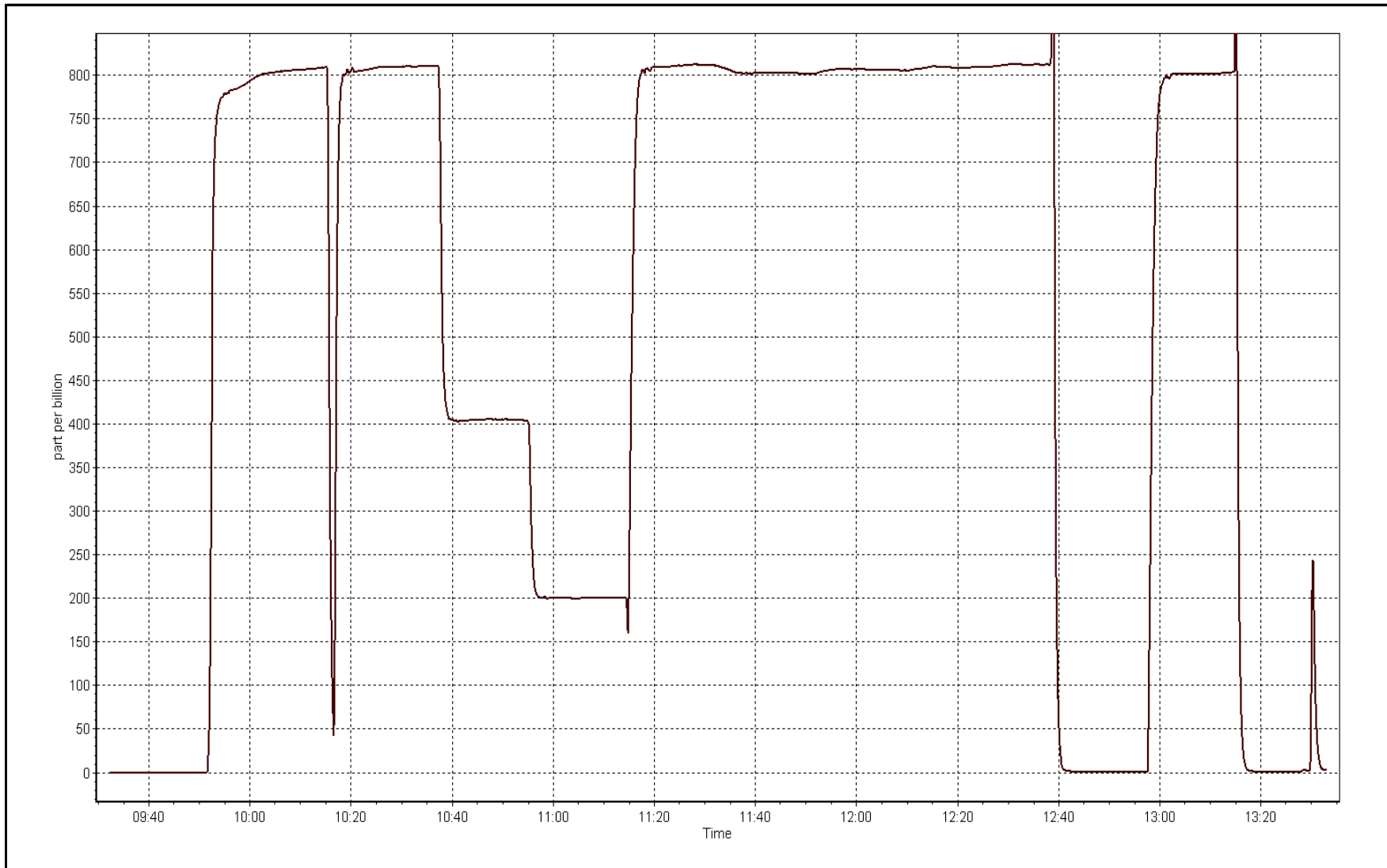
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.2 | ---- | Correlation Coefficient | 0.999993 |
| 803.7 | 806.8 | 0.9962 | | |
| 401.9 | 404.3 | 0.9940 | Slope | 0.995257 |
| 200.9 | 200.2 | 1.0035 | | |
| | | | Intercept | 0.522044 |



SO2 Calibration Plot

Date: September 27, 2016





Wood Buffalo Environmental Association H2S Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|----------------------------|
| Calibration Date | September 27, 2016 | Last Calibration | August 17, 2016 |
| Station Name | ConocoPhillips | Station Number | AMS 502 |
| Reason: | Routine | | |
| Start Time (MST) | 13:40 | End Time (MST) | 16:30 |
| Gas Cert Reference | LL34303 | Station temp. | 21 Deg C |
| Cal Gas Concentration | 10.4 ppm | Cal Gas Exp Date | May 30, 2016 |
| Calibrator Make/Model | API T700 | Serial Number | 622 |
| ZAG air Make/Model | API 701 | Serial Number | 4865 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 9035 |
| SO2 gas concentration | 48.3 ppm | SO2 gas cert/exp | LL104215 February 12, 2018 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|-----------------|--------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | 497 | 497 |
| Analyzer IP address | 192.168.1.75 | | Lamp voltage | 2393 | 2368 |
| Calculated slope | 1.004478 | 0.989472 | Chamber temp | 50.0 | 50.0 |
| Calculated intercept | 0.121498 | 0.239690 | Pressure | 23.3 | 23.4 |
| Analyzer Background | 19.7 | 20.6 | Flow (SLPM) | 0.621 | 0.618 |
| Analyzer Coefficient | 0.954 | 0.972 | Intensity | 53 | 53 |
| | | | Converter temp. | 315 | 317 |

| | | | |
|----------------------|----------|--------------------|-----|
| Analyzer make/model | API T101 | Analyzer serial # | 197 |
| Converter make/model | N/A | Converter serial # | N/A |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| as found span | 5000 | 38.5 | 80.1 | 79.8 | 1.004 |
| SO2 scrubber check | 5000 | 20.7 | 200.0 | 3.6 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 5000 | 38.5 | 80.1 | 80.8 | 0.991 |
| second point | 5000 | 19.3 | 40.1 | 40.2 | 0.999 |
| third point | 5000 | 12.1 | 25.2 | 25.1 | 1.002 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 5000 | 38.5 | 80.1 | 80.4 | 0.996 |
| Average Correction Factor | | | | | 0.998 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 79.3 | Previous response | 79.6 | % change | 0.3% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Sample inlet filter replaced after as founds. Sox scrubber test done after as founds. Adjusted zero and span.

Calibration Performed By: Asad Hidayat



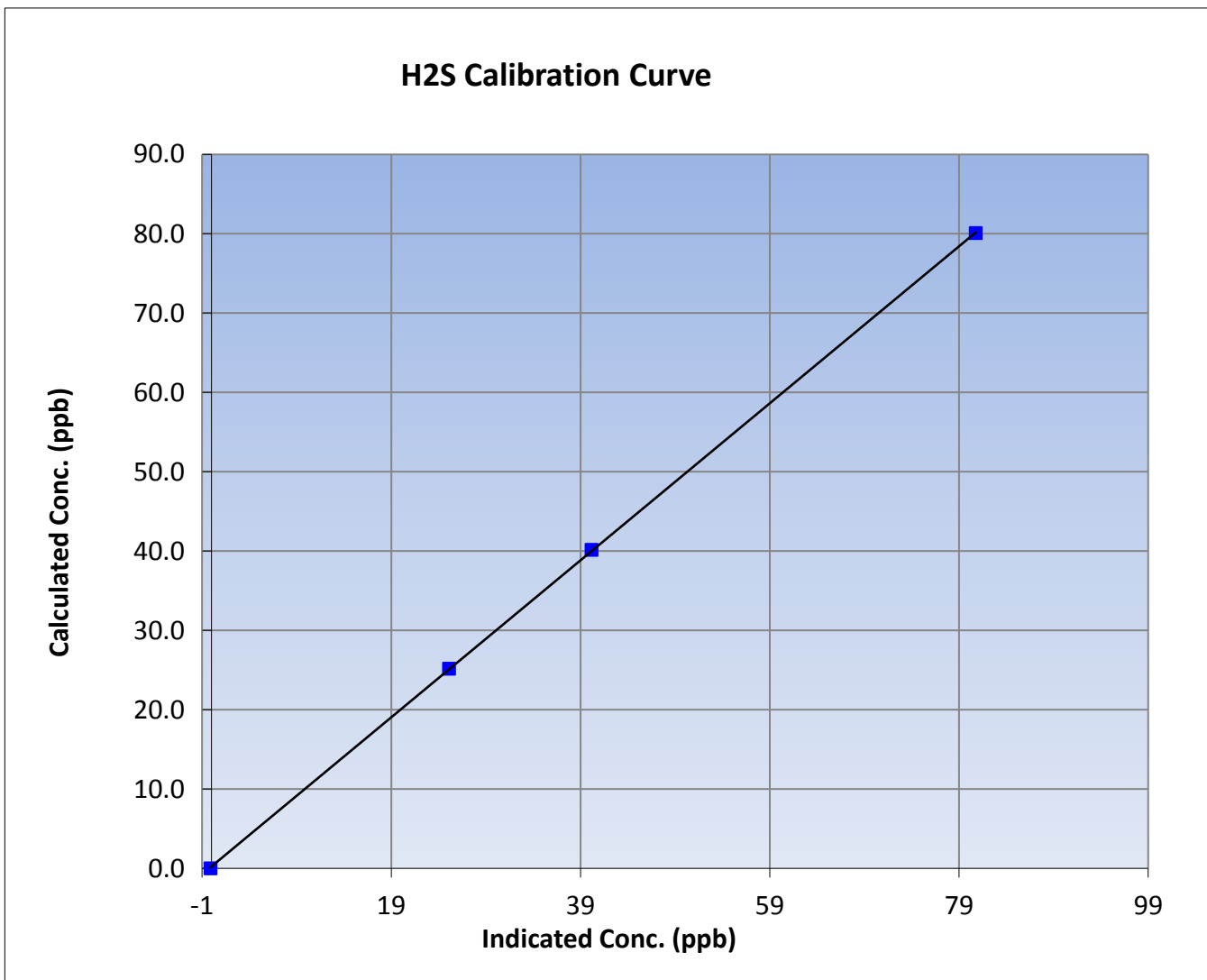
Wood Buffalo Environmental Association H2S Calibration Report

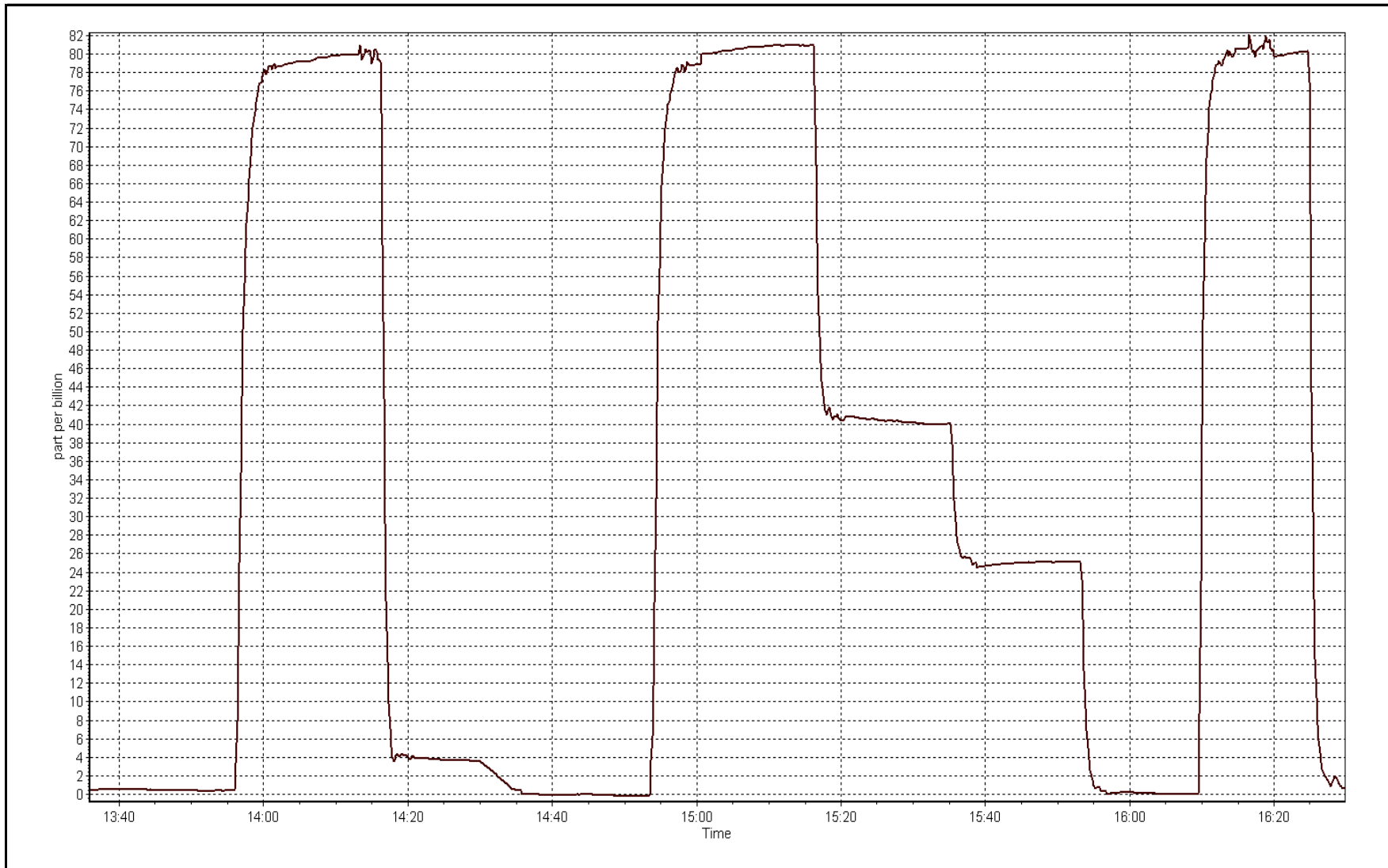
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 17, 2016 |
| Station Name | ConocoPhillips | Station Number | AMS 502 |
| Start Time (MST) | 13:40 | End Time (MST) | 16:30 |
| Analyzer make | API T101 | Analyzer serial # | 197 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999984 |
| 80.1 | 80.8 | 0.9912 | | |
| 40.1 | 40.2 | 0.9991 | Slope | 0.989472 |
| 25.2 | 25.1 | 1.0023 | | |
| | | | Intercept | 0.239690 |







Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------|----------------------|-------------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | ConocoPhillips | Station Number | AMS 502 |
| Reason: | Routine | | |
| Start Time (MST) | 9:31 | End Time (MST) | 13:30 |
| NO Cal Gas Conc | 48.1 ppm | Gas Cert Reference | LL104215 |
| NOX Cal Gas Conc | 48.1 ppm | Cal Gas Expiry Date | February 12, 2018 |
| Calibrator | API T700 | Serial Number | 622 |
| Zero air Generator | Teledyne API T701 | Serial Number | 4865 |

DACs Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACs make & model | Campbell Scientific CR3000 | DACs serial No. | 9035 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.996354 | 0.995325 | 1.001334 |
| | Data Offset | 1.217515 | 1.087727 | 0.280690 |
| Current Calibration | Data Slope | 0.999386 | 0.998911 | 0.999885 |
| | Data Offset | 1.257479 | 1.485724 | -0.071751 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|------------|
| Analyzer make/model | Thermo 42i | Analyzer serial # | 1218153356 |
|---------------------|------------|-------------------|------------|

| Test Point | before | | after | |
|---------------------|--------------|-------|--------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.42 | | 192.168.1.42 | |
| NO coefficient | 1.009 | | 0.997 | |
| NOX coefficient | 1.000 | | 1.000 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 5.4 | | 5.4 | |
| NOX bkgrnd | 5.9 | | 5.8 | |
| Chamber Temp | 50.5 | Deg C | 50.4 | Deg C |
| Moly Temp | 327.4 | Deg C | 323.7 | Deg C |
| PMT voltage | -866.6 | V | -866.6 | V |
| PMT Temp | -3.1 | Deg C | -3 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 163.5 | mmHg | 161.2 | mmHg |
| R Cell Press Nox | 163.8 | mmHg | 161.2 | mmHg |
| NO sample flow | 0.663 | lpm | 0.655 | lpm |
| Nox sample Flow | 0.661 | lpm | 0.654 | lpm |

Notes:

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



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

September 27, 2016

Station Number:

AMS 502

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.3 | 0.5 | ---- | ---- |
| as found span | 5000 | 83.2 | 800.4 | 800.4 | 0.0 | 809.9 | 809.2 | 0.7 | 0.9883 | 0.9891 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | -0.3 | 0.5 | ---- | ---- |
| high point | 5000 | 83.2 | 800.4 | 800.4 | 0.0 | 800.1 | 800.0 | 0.1 | 1.0004 | 1.0005 |
| second point | 5000 | 41.6 | 400.2 | 400.2 | 0.0 | 399.3 | 399.6 | -0.4 | 1.0024 | 1.0014 |
| third point | 5000 | 20.8 | 200.1 | 200.1 | 0.0 | 197.0 | 196.9 | 0.1 | 1.0158 | 1.0161 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.5 | -0.3 | -0.3 | ---- | ---- |
| as left span | 5000 | 83.2 | 800.4 | 492.5 | 307.9 | 802.8 | 492.8 | 310.0 | 0.9970 | 0.9992 |
| Average Correction Factor | | | | | | | | | 1.0062 | 1.0060 |

Corrced As found NO_x= 809.7 NO= 809.5 Percent Change NO_x= -0.9% NO= -0.8%
 Previous Response NO_x= 802.1 NO= 803.1

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 83.20 ccm NOx ref calc conc = 800.4 ppb NO ref calc conc = 800.4 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 800.3 | 799.6 | 0.5 | 1.0001 | 1.0010 | ---- | ---- |
| 1st NO2 (300) | 492.5 | 307.1 | 800.1 | 492.5 | 307.7 | 1.0003 | ---- | 0.9981 | 100.2% |
| 2nd NO2 (200) | 587.1 | 212.5 | 799.2 | 587.1 | 212.2 | 1.0015 | ---- | 1.0016 | 99.8% |
| 3rd NO2 (100) | 687.0 | 112.6 | 799.2 | 687.0 | 112.2 | 1.0015 | ---- | 1.0034 | 99.7% |
| 2nd NO ref point | | 0.0 | 799.5 | 799.1 | 0.4 | 1.0012 | 1.0016 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0011 | | 1.0010 | 99.9% |

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

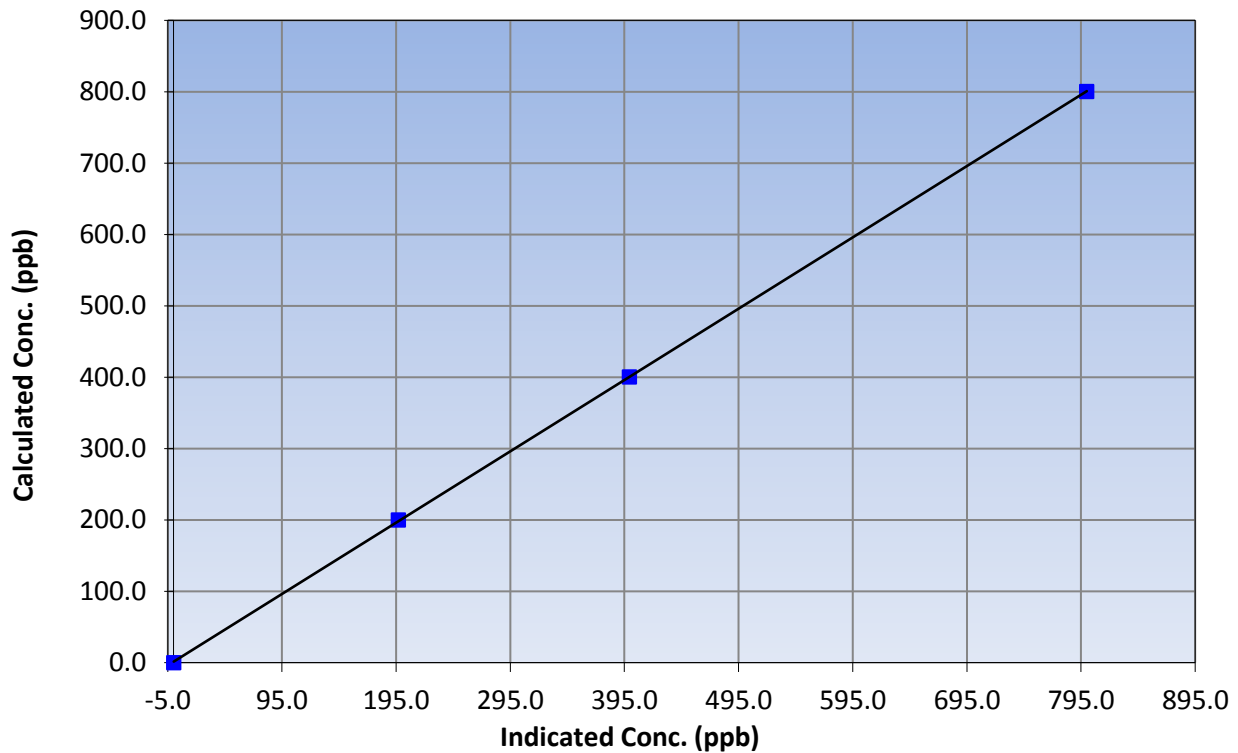
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | ConocoPhillips | Station Number | AMS 502 |
| Start Time (MST) | 9:31 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153356 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999982 |
| 800.4 | 800.1 | 1.0004 | | |
| 400.2 | 399.3 | 1.0024 | Slope | 0.999386 |
| 200.1 | 197.0 | 1.0158 | | |
| | | | Intercept | 1.257479 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

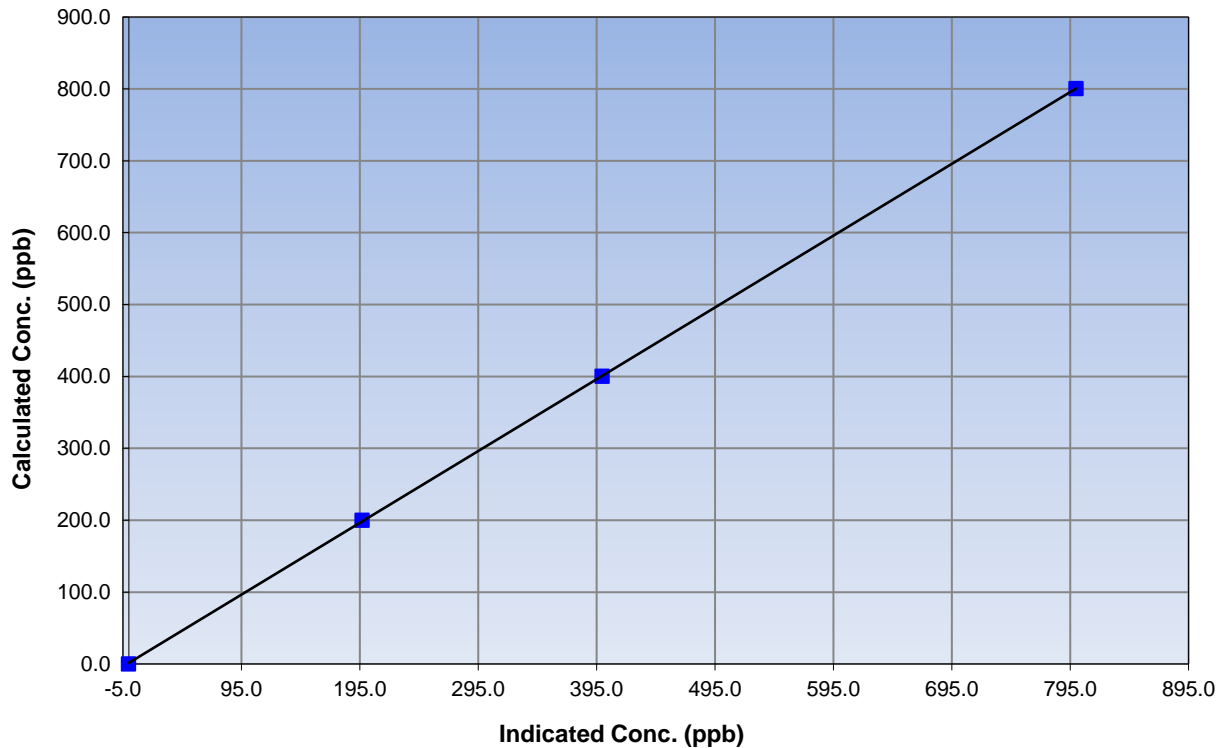
Station Information

| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 16, 2016 |
| Station Name | ConocoPhillips | Station Number | AMS 502 |
| Start Time (MST) | 9:31 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153356 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.3 | N/A | Correlation Coefficient | 0.999985 |
| 800.4 | 800.0 | 1.0005 | | |
| 400.2 | 399.6 | 1.0014 | Slope | 0.998911 |
| 200.1 | 196.9 | 1.0161 | | |
| | | | Intercept | 1.485724 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

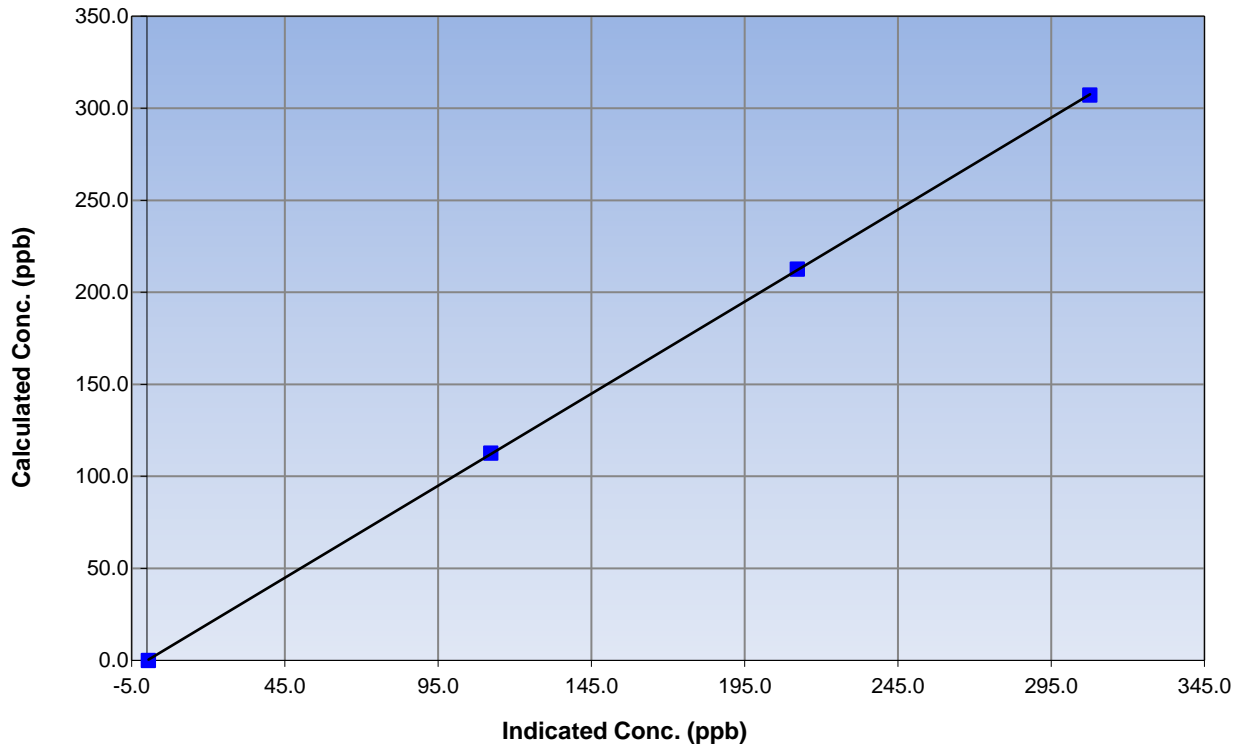
Station Information

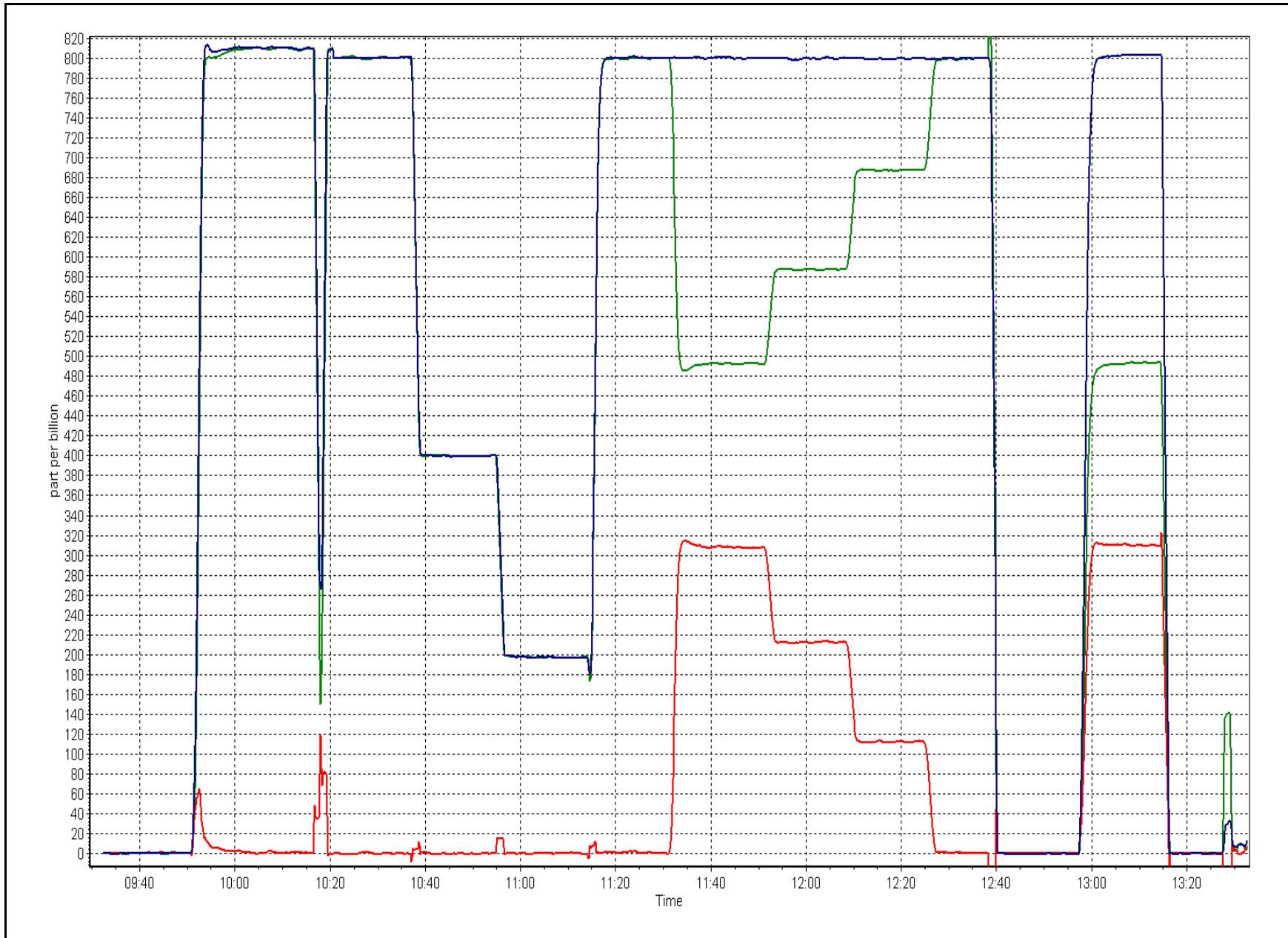
| | | | |
|------------------|--------------------|----------------------|-----------------|
| Calibration Date | September 27, 2016 | Previous Calibration | August 16, 2016 |
| Station Number | ConocoPhillips | Station Number | AMS 502 |
| Start Time (MST) | 9:31 | End Time (MST) | 13:30 |
| Analyzer make | Thermo 42i | Analyzer serial # | 1218153356 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.5 | N/A | Correlation Coefficient | 0.999985 |
| 307.1 | 307.7 | 0.9981 | | |
| 212.5 | 212.2 | 1.0016 | Slope | 0.999885 |
| 112.6 | 112.2 | 1.0034 | | |
| | | | Intercept | -0.071751 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

WS/WD Calibration Report

Station Information

| | | | |
|------------------|--------------------|----------------------|------------------|
| Calibration Date | September 27, 2016 | Previous Calibration | November 5, 2015 |
| Station Name | ConocoPhillips ▼ | Station Number | AMS 502 ▼ |
| Reason: | Routine | Removal | |
| Start Time (MST) | 11:45 | End Time (MST) | 13:15 |
| Barometric Press | n/a | Station Temp | 22 Deg C |
| WS Calibrator | MetOne 053 | Serial Number | P15103 |

WIND SPEED

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 010C-1 | Sensor serial # | na |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 9035 |
| DACS voltage range | 5000 | DACS channel # | NA |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 0.998176667 | Calculated slope | 0.998909 |
| Calculated intercept | 0.003136636 | Calculated intercept | 0.030357 |

Wind Speed Calibration Data

| Shaft RPM | Actual Speed (K/hr) | Indicated Speed (K/hr) | Correction factor |
|---------------------------|---------------------|------------------------|-------------------|
| 0 | 0.0 | 0.0 | n/a |
| 200 | 20.2 | 20.1 | 1.0026 |
| 400 | 39.4 | 39.4 | 0.9990 |
| 600 | 58.6 | 58.5 | 1.0003 |
| 800 | 77.8 | 77.8 | 0.9989 |
| Average Correction Factor | | | 1.0002 |

WIND DIRECTION

| | | | |
|----------------------|---------------------------|----------------------|--------------|
| Sensor make/model | Met One 020C-1 | Sensor serial # | G3835 |
| DACS make | Campbel Scientific CR3000 | DACS serial No. | 7882 |
| DACS voltage range | 5000 | DACS channel # | NA |
| | <u>Before</u> | | <u>After</u> |
| Calculated slope | 1.003187226 | Calculated slope | 1.000862 |
| Calculated intercept | -1.476663228 | Calculated intercept | -0.829290 |

As Found Declination (west of North) 14 As Left Declination (west of North) 14

Wind Direction Calibration Data

| Physical Direction (Degrees) | Indicated Direction (Degrees) | Correction factor |
|------------------------------|-------------------------------|-------------------|
| 0 | na | n/a |
| 90 | 91.4 | 0.9852 |
| 180 | 180.3 | 0.9986 |
| 270 | 269.7 | 1.0013 |
| 359 | 360.3 | 0.9964 |
| Average Correction Factor | | 0.9954 |

Notes:

Bearings for WS sensor seems fine. Cal passed.

Calibration Performed By: Asad Hidayat

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

JULY 2016
page 1 of 2

Prepared: Oct 26 2016 16:33

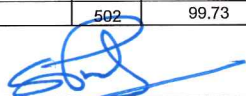
| APPROVAL NUMBERS | REPORT DATE | | | | | | |
|------------------|-------------------------------|----------|--------------------|-----------------------|---------------------------|-----------------------|---------------------------|
| | MONTH | YEAR | | | | | |
| 289664-00-00 | 7 | 2016 | | | | | |
| 254465-00-00 | CONTINUOUS AMBIENT MONITORING | | | | | | |
| 149968-00-01 | | | | | | | |
| 48522-01-00 | | | | | | | |
| 240008-00-03 | | | | | | | |
| 48263-00-00 | | | | | | | |
| 224816-00-03 | | | | | | | |
| 189942-00-02 | | | | | | | |
| 206355-00-00 | | | | | | | |
| 46586-00-00 | | | | | | | |
| 216466-00-04 | | | | | | | |
| 137467-00-00 | | | | | | | |
| 20809-01-00 | | | | | | | |
| 241311-00-00 | | | | | | | |
| 094-02-00 | | | | | | | |
| 305529-00-00 | | | | | | | |
| 026-02-00 | | | | | | | |
| 228044-00-00 | | | | | | | |
| 73203-01-00 | | | | | | | |
| | | | ONE-HOUR AVERAGE | | 24-HOUR AVERAGE | | |
| | PARAMETER | STN. NO. | % TIME OPERATIONAL | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION |
| | SO2(ppm) | 1 | 99.60 | 0.059 | 0 | 0.005 | 0 |
| | SO2(ppm) | 2 | 100.00 | 0.058 | 0 | 0.008 | 0 |
| | SO2(ppm) | 4 | 99.06 | 0.113 | 0 | 0.011 | 0 |
| | SO2(ppm) | 5 | 99.33 | 0.150 | 0 | 0.016 | 0 |
| | SO2(ppm) | 6 | 100.00 | 0.056 | 0 | 0.009 | 0 |
| | SO2(ppm) | 7 | 98.52 | 0.025 | 0 | 0.006 | 0 |
| | SO2(ppm) | 8 | 99.73 | 0.013 | 0 | 0.002 | 0 |
| | SO2(ppm) | 11 | 99.73 | 0.095 | 0 | 0.014 | 0 |
| | SO2(ppm) | 13 | 99.87 | 0.037 | 0 | 0.004 | 0 |
| | SO2(ppm) | 14 | 98.12 | 0.007 | 0 | 0.002 | 0 |
| | SO2(ppm) | 15 | 99.73 | 0.023 | 0 | 0.004 | 0 |
| | SO2(ppm) | 16 | 97.45 | 0.027 | 0 | 0.005 | 0 |
| | SO2(ppm) | 17 | 99.73 | 0.018 | 0 | 0.003 | 0 |
| | SO2(ppm) | 18 | 99.87 | 0.003 | 0 | 0.001 | 0 |
| | SO2(ppm) | 19 | 99.73 | 0.030 | 0 | 0.003 | 0 |
| | SO2(ppm) | 20 | 99.46 | 0.011 | 0 | 0.004 | 0 |
| | SO2(ppm) | 21 | 99.73 | 0.002 | 0 | 0.001 | 0 |
| | SO2(ppm) | 500 | 99.19 | 0.006 | 0 | 0.002 | 0 |
| | SO2(ppm) | 502 | 99.73 | 0.019 | 0 | 0.005 | 0 |
| | H2S(ppm) | 2 | 99.87 | 0.004 | 0 | 0.001 | 0 |
| | H2S(ppm) | 4 | 98.92 | 0.007 | 0 | 0.001 | 0 |
| | H2S(ppm) | 5 | 99.19 | 0.012 | 2 | 0.002 | 0 |
| | H2S(ppm) | 11 | 99.73 | 0.009 | 0 | 0.002 | 0 |
| | H2S(ppm) | 17 | 99.73 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 19 | 99.73 | 0.002 | 0 | 0.000 | 0 |
| | H2S(ppm) | 20 | 99.33 | 0.002 | 0 | 0.000 | 0 |
| | H2S(ppm) | 500 | 99.06 | 0.001 | 0 | 0.000 | 0 |
| | H2S(ppm) | 502 | 99.73 | 0.003 | 0 | 0.001 | 0 |
| | TRS(ppm) | 1 | 99.60 | 0.004 | 0 | 0.001 | 0 |
| | TRS(ppm) | 6 | 100.00 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 7 | 83.60 | 0.002 | 0 | 0.001 | 0 |
| | TRS(ppm) | 9 | 99.87 | 0.006 | 0 | 0.001 | 0 |
| | TRS(ppm) | 13 | 99.73 | 0.003 | 0 | 0.000 | 0 |
| | TRS(ppm) | 14 | 99.33 | 0.002 | 0 | 0.000 | 0 |
| | TRS(ppm) | 15 | 99.60 | 0.020 | 4 | 0.003 | 0 |
| | TRS(ppm) | 18 | 99.87 | 0.000 | 0 | 0.000 | 0 |
| | TRS(ppm) | 21 | 100.00 | 0.001 | 0 | 0.001 | 0 |
| | THC(ppm) | 1 | 99.60 | 3.2 | - | 2.2 | - |
| | THC(ppm) | 2 | 100.00 | 4.9 | - | 2.6 | - |
| | THC(ppm) | 4 | 99.06 | 3.5 | - | 2.6 | - |
| | THC(ppm) | 5 | 99.06 | 6.2 | - | 2.7 | - |
| | THC(ppm) | 6 | 99.87 | 3.1 | - | 2.2 | - |
| | THC(ppm) | 7 | 97.45 | 2.5 | - | 2.0 | - |
| | THC(ppm) | 9 | 99.73 | 3.4 | - | 2.4 | - |
| | THC(ppm) | 11 | 99.46 | 5.6 | - | 2.7 | - |
| | THC(ppm) | 13 | 99.87 | 3.9 | - | 2.6 | - |
| | THC(ppm) | 14 | 99.33 | 2.5 | - | 2.1 | - |
| | THC(ppm) | 15 | 99.73 | 3.3 | - | 2.4 | - |
| | THC(ppm) | 16 | 97.45 | 13.2 | - | 3.1 | - |
| | THC(ppm) | 17 | 98.39 | 3.4 | - | 2.3 | - |
| | THC(ppm) | 18 | 99.73 | 2.2 | - | 2.1 | - |
| | THC(ppm) | 19 | 96.91 | 3.4 | - | 2.4 | - |
| | THC(ppm) | 20 | 99.33 | 2.6 | - | 2.2 | - |
| | THC(ppm) | 21 | 99.46 | 3.0 | - | 2.1 | - |
| | O3(ppm) | 1 | 96.91 | 0.054 | 0 | 0.032 | - |
| | O3(ppm) | 6 | 100.00 | 0.053 | 0 | 0.038 | - |
| | O3(ppm) | 7 | 98.39 | 0.058 | 0 | 0.035 | - |

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

JULY 2016

page 2 of 2

Prepared: Oct 26 2016 16:33

| APPROVAL NUMBERS | REPORT DATE | | | | | | |
|-------------------------------------------------------------------------------------|-------------------------------|----------|--------------------|----------------------------------|---------------------------|-----------------------|---------------------------|
| | MONTH | YEAR | | | | | |
| 289664-00-00 | 7 | 2016 | | | | | |
| 254465-00-00 | CONTINUOUS AMBIENT MONITORING | | | | | | |
| 149968-00-01 | | | | | | | |
| 48522-01-00 | | | | | | | |
| 240008-00-03 | | | | | | | |
| 48263-00-00 | | | | | | | |
| 224816-00-03 | | | | | | | |
| 189942-00-02 | | | | | | | |
| 206355-00-00 | | | | | | | |
| 46586-00-00 | | | | | | | |
| 216466-00-04 | | | | | | | |
| 137467-00-00 | | | | | | | |
| 20809-01-00 | | | | | | | |
| 241311-00-02 | | | | | | | |
| 094-02-00 | | | | | | | |
| 305529-00-00 | | | | | | | |
| 026-02-00 | | | | | | | |
| 228044-00-00 | | | | | | | |
| 73203-01-00 | | | | | | | |
| | | | ONE-HOUR AVERAGE | | 24-HOUR AVERAGE | | |
| | PARAMETER | STN. NO. | % TIME OPERATIONAL | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION | MAXIMUM CONCENTRATION | NO. READINGS > REGULATION |
| | O3(ppm) | 8 | 98.66 | 0.050 | 0 | 0.041 | - |
| | O3(ppm) | 13 | 99.73 | 0.051 | 0 | 0.029 | - |
| | O3(ppm) | 14 | 99.60 | 0.050 | 0 | 0.036 | - |
| | O3(ppm) | 17 | 95.03 | 0.055 | 0 | 0.036 | - |
| | O3(ppm) | 18 | 99.87 | 0.054 | 0 | 0.044 | - |
| | O3(ppm) | 21 | 99.73 | 0.054 | 0 | 0.036 | - |
| | NO2(ppm) | 1 | 99.73 | 0.015 | 0 | 0.005 | - |
| | NO2(ppm) | 6 | 100.00 | 0.012 | 0 | 0.006 | - |
| | NO2(ppm) | 7 | 98.52 | 0.019 | 0 | 0.006 | - |
| | NO2(ppm) | 8 | 99.60 | 0.005 | 0 | 0.001 | - |
| | NO2(ppm) | 13 | 99.87 | 0.024 | 0 | 0.005 | - |
| | NO2(ppm) | 14 | 99.19 | 0.012 | 0 | 0.003 | - |
| | NO2(ppm) | 15 | 99.73 | 0.020 | 0 | 0.006 | - |
| | NO2(ppm) | 16 | 97.58 | 0.029 | 0 | 0.013 | - |
| | NO2(ppm) | 17 | 99.60 | 0.014 | 0 | 0.003 | - |
| | NO2(ppm) | 18 | 99.87 | 0.005 | 0 | 0.001 | - |
| | NO2(ppm) | 19 | 99.73 | 0.013 | 0 | 0.003 | - |
| | NO2(ppm) | 20 | 99.46 | 0.016 | 0 | 0.004 | - |
| | NO2(ppm) | 21 | 99.73 | 0.008 | 0 | 0.001 | - |
| | NO2(ppm) | 500 | 99.19 | 0.011 | 0 | 0.003 | - |
| | NO2(ppm) | 502 | 99.73 | 0.010 | 0 | 0.004 | - |
| | CO(ppm) | 7 | 96.24 | 0.4 | 0 | 0.2 | - |
| | NH3(ppm) | 1 | 88.71 | 0.000 | 0 | 0.000 | - |
| | NH3(ppm) | 6 | 90.46 | 0.019 | 0 | 0.002 | - |
| | PM2.5(ug/m3) | 1 | 99.73 | 63.6 | - | 27.4 | 0 |
| | PM2.5(ug/m3) | 6 | 100.00 | 55.5 | - | 22.1 | 0 |
| | PM2.5(ug/m3) | 7 | 93.01 | 52.4 | - | 20.6 | 0 |
| | PM2.5(ug/m3) | 8 | 88.58 | 117.9 | - | 27.3 | 0 |
| | PM2.5(ug/m3) | 13 | 99.87 | 53.6 | - | 23.6 | 0 |
| | PM2.5(ug/m3) | 14 | 99.60 | 38.8 | - | 15.7 | 0 |
| | PM2.5(ug/m3) | 15 | 99.73 | 102.3 | - | 39.5 | 1 |
| | PM2.5(ug/m3) | 16 | 97.04 | 61.7 | - | 27.7 | 0 |
| | PM2.5(ug/m3) | 17 | 99.46 | 45.8 | - | 17.2 | 0 |
| | PM2.5(ug/m3) | 18 | 99.60 | 38.0 | - | 12.6 | 0 |
| | PM2.5(ug/m3) | 21 | 100.00 | 44.3 | - | 9.1 | 0 |
| | WIND | 1 | 99.73 | - | - | - | - |
| | WIND | 2 | 100.00 | - | - | - | - |
| | WIND | 4 | 100.00 | - | - | - | - |
| | WIND | 5 | 100.00 | - | - | - | - |
| | WIND | 6 | 100.00 | - | - | - | - |
| | WIND | 7 | 99.60 | - | - | - | - |
| | WIND | 8 | 99.73 | - | - | - | - |
| | WIND | 9 | 99.87 | - | - | - | - |
| | WIND | 11 | 99.73 | - | - | - | - |
| | WIND | 13 | 99.87 | - | - | - | - |
| | WIND | 14 | 99.46 | - | - | - | - |
| | WIND | 15 | 99.73 | - | - | - | - |
| | WIND | 16 | 100.00 | - | - | - | - |
| | WIND | 17 | 99.87 | - | - | - | - |
| | WIND | 18 | 99.73 | - | - | - | - |
| | WIND | 19 | 99.46 | - | - | - | - |
| | WIND | 20 | 99.60 | - | - | - | - |
| | WIND | 21 | 99.46 | - | - | - | - |
| | WIND | 500 | 100.00 | - | - | - | - |
| | WIND | 502 | 99.73 | - | - | - | - |
|  | | | | | | | |
| SIGNATURE OF ASSOCIATION REPRESENTATIVE | | | | FOR ALBERTA ENVIRONMENT USE ONLY | | | |



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS 7
ATHABASCA VALLEY
JULY 2016

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

August 29, 2016
Revision 1 – October 28, 2016



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

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

| Parameter | Hours of Data | Hours of Calibration | Hours without Data | Operational Time | Maximum 1-Hour Value | 1-Hour Exceedances | Maximum 24-Hour Value | 24-Hour Exceedances |
|------------------------------------|---------------|----------------------|--------------------|------------------|----------------------|--------------------|-----------------------|---------------------|
| SO2 (ppb) Average | 690 | 43 | 54 | 98.52 | 25 | 0 | 6 | 0 |
| TRS (ppb) Average | 592 | 30 | 152 | 83.60 | 2 | 0 | 1 | 0 |
| THC (ppm) Average | 684 | 41 | 60 | 97.45 | 2.5 | - | 2 | - |
| NMHC (ppm) Average | 684 | 41 | 60 | 97.45 | 0.413 | - | 0.072 | - |
| CH4(ppm) Average | 684 | 41 | 60 | 97.45 | 2.4 | - | 2 | - |
| O3 (ppb) Average | 698 | 34 | 46 | 98.39 | 58 | 0 | 35 | - |
| NO2 (ppb) Average | 688 | 45 | 56 | 98.52 | 19 | 0 | 6 | - |
| NO (ppb) Average | 688 | 45 | 56 | 98.52 | 21 | - | 3 | - |
| NOX (ppb) Average | 688 | 45 | 56 | 98.52 | 28 | - | 8 | - |
| PM2.5 (ug/m3) Average | 689 | 3 | 55 | 93.01 | 52.4 | - | 20.6 | 0 |
| CO(ppm) Average | 685 | 31 | 59 | 96.24 | 0.4 | 0 | 0.2 | - |
| Temperature 2 m (C) Average | 741 | 0 | 3 | 99.60 | 30.5 | - | 24.1 | - |
| Barometric Pressure (inHg) Average | 741 | 0 | 3 | 99.60 | 29.2 | - | 29.2 | - |
| Relative Humidity (%) Average | 741 | 0 | 3 | 99.60 | 97 | - | 88 | - |
| Wind Speed 10 m (km/h) Average | 741 | 0 | 3 | 99.60 | 24 | - | 16 | - |
| Wind Direction 10 m (deg) Average | 741 | 0 | 3 | 99.60 | - | - | - | - |

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

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

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

| Parameter | Number | Mean | StnDev | Total | Percentile | | | | | | |
|------------------------------------|--------|-------|--------|-------|------------|------|------|--------|------|------|-------|
| | | | | | Min | P10 | Q1 | Median | Q3 | P90 | Max |
| SO2 (ppb) Average | 690 | 1.4 | 3 | - | 0 | 0 | 0 | 0 | 1 | 4 | 25 |
| TRS (ppb) Average | 592 | 0.4 | 0 | - | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| THC (ppm) Average | 684 | 1.94 | 0.1 | - | 1.8 | 1.8 | 1.9 | 1.9 | 2 | 2.1 | 2.5 |
| NMHC (ppm) Average | 684 | 0.022 | 0.056 | - | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.413 |
| CH4(ppm) Average | 684 | 1.91 | 0.1 | - | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 2 | 2.4 |
| O3 (ppb) Average | 698 | 24.5 | 10 | - | 0 | 11 | 17 | 24 | 31 | 38 | 58 |
| NO2 (ppb) Average | 688 | 3.7 | 3 | - | 0 | 1 | 2 | 3 | 5 | 8 | 19 |
| NO (ppb) Average | 688 | 1 | 2 | - | 0 | 0 | 0 | 0 | 1 | 3 | 21 |
| NOX (ppb) Average | 688 | 4.7 | 4 | - | 0 | 1 | 2 | 4 | 6 | 10 | 28 |
| PM2.5 (ug/m3) Average | 689 | 8.5 | 7.1 | - | 0 | 2.2 | 3.9 | 6.6 | 10.8 | 17.5 | 52.4 |
| CO(ppm) Average | 685 | 0.11 | 0 | - | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.4 |
| Temperature 2 m (C) Average | 741 | 19.54 | 4.2 | - | 5.7 | 14.9 | 16.6 | 18.9 | 22.8 | 25.3 | 30.5 |
| Barometric Pressure (inHg) Average | 741 | 28.86 | 0.1 | - | 28.6 | 28.7 | 28.8 | 28.8 | 29 | 29.1 | 29.2 |
| Relative Humidity (%) Average | 741 | 66.4 | 18 | - | 17 | 41 | 52 | 69 | 81 | 88 | 97 |
| Wind Speed 10 m (km/h) Average | 741 | 8.6 | 4 | - | 0 | 3 | 5 | 8 | 11 | 15 | 24 |
| Wind Direction 10 m (deg) Average | 741 | - | - | - | - | - | - | - | - | - | - |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|----------------|-------------------|-------------------|------------------|------------------------------------------------------|
| ALL PARAMETERS | 17 Jul 2016 17:00 | 17 Jul 2016 19:00 | 3 | Maintenance - wiring/data logger upgrades |
| SO2 | 04 Jul 2016 11:00 | 04 Jul 2016 11:00 | 1 | Maintenance - zero air generator serviced |
| SO2 | 07 Jul 2016 08:00 | 07 Jul 2016 08:00 | 1 | Maintenance - sample manifold cleaned |
| SO2 | 26 Jul 2016 09:00 | 26 Jul 2016 14:00 | 6 | Maintenance - new calibrator installed |
| TRS | 04 Jul 2016 10:00 | 04 Jul 2016 10:00 | 1 | Maintenance - zero air generator serviced |
| TRS | 20 Jul 2016 06:00 | 21 Jul 2016 10:00 | 29 | Analyzer failure - operation outside of AMD criteria |
| TRS | 21 Jul 2016 11:00 | 21 Jul 2016 12:00 | 2 | Maintenance - troubleshooting |
| TRS | 25 Jul 2016 20:00 | 26 Jul 2016 11:00 | 16 | Analyzer failure - sample pump failed |
| TRS | 26 Jul 2016 12:00 | 26 Jul 2016 18:00 | 7 | Maintenance - replace sample pump |
| TRS | 29 Jul 2016 09:00 | 29 Jul 2016 13:00 | 5 | Maintenance - repair and recalibrate |
| TRS | 29 Jul 2016 14:00 | 01 Aug 2016 00:00 | 59 | Analyzer Failure |
| THC | 04 Jul 2016 11:00 | 04 Jul 2016 12:00 | 2 | Maintenance - zero air generator serviced |
| THC | 07 Jul 2016 08:00 | 07 Jul 2016 08:00 | 1 | Maintenance - sample manifold cleaned |
| THC | 08 Jul 2016 02:00 | 08 Jul 2016 03:00 | 2 | Unstable Operation |
| THC | 08 Jul 2016 11:00 | 08 Jul 2016 13:00 | 3 | Maintenance - diagnostics collected |
| THC | 09 Jul 2016 12:00 | 09 Jul 2016 12:00 | 1 | Unstable Operation |
| THC | 26 Jul 2016 09:00 | 26 Jul 2016 14:00 | 6 | Maintenance - new calibrator installed |
| THC | 27 Jul 2016 10:00 | 27 Jul 2016 10:00 | 1 | Maintenance - replaced carrier gas |
| O3 | 04 Jul 2016 10:00 | 04 Jul 2016 10:00 | 1 | Maintenance - zero air generator serviced |
| O3 | 07 Jul 2016 08:00 | 07 Jul 2016 08:00 | 1 | Maintenance - sample manifold cleaned |
| O3 | 26 Jul 2016 09:00 | 26 Jul 2016 15:00 | 7 | Maintenance - new calibrator installed |
| NO2 | 04 Jul 2016 11:00 | 04 Jul 2016 11:00 | 1 | Maintenance - zero air generator serviced |
| NO2 | 07 Jul 2016 08:00 | 07 Jul 2016 08:00 | 1 | Maintenance - sample manifold cleaned |
| NO2 | 26 Jul 2016 09:00 | 26 Jul 2016 14:00 | 6 | Maintenance - new calibrator installed |
| PM2.5 | 01 Jul 2016 14:00 | 01 Jul 2016 18:00 | 5 | Unstable operation - excessive baseline drift |
| PM2.5 | 20 Jul 2016 21:00 | 20 Jul 2016 21:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 21 Jul 2016 08:00 | 21 Jul 2016 11:00 | 4 | Unstable operation - excessive baseline drift |
| PM2.5 | 21 Jul 2016 16:00 | 21 Jul 2016 17:00 | 2 | Unstable operation - excessive baseline drift |
| PM2.5 | 22 Jul 2016 00:00 | 22 Jul 2016 09:00 | 10 | Analyzer Failure - debris in chamber |
| PM2.5 | 22 Jul 2016 10:00 | 22 Jul 2016 12:00 | 3 | Maintenance - chamber/inlet cleaning |
| PM2.5 | 22 Jul 2016 13:00 | 23 Jul 2016 07:00 | 19 | Unstable operation following maintenance |
| PM2.5 | 23 Jul 2016 16:00 | 23 Jul 2016 16:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 23 Jul 2016 19:00 | 23 Jul 2016 20:00 | 2 | Unstable operation - excessive baseline drift |

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

OPERATIONAL NOTES

| Parameter | Period Start | Period End | Duration (Hours) | Notes |
|-----------|-------------------|-------------------|------------------|-----------------------------------------------|
| PM2.5 | 28 Jul 2016 07:00 | 28 Jul 2016 07:00 | 1 | Unstable operation - excessive baseline drift |
| PM2.5 | 30 Jul 2016 12:00 | 30 Jul 2016 12:00 | 1 | Unstable operation - excessive baseline drift |
| CO | 04 Jul 2016 10:00 | 04 Jul 2016 11:00 | 2 | Maintenance - zero air generator serviced |
| CO | 07 Jul 2016 08:00 | 07 Jul 2016 08:00 | 1 | Maintenance - sample manifold cleaned |
| CO | 18 Jul 2016 18:00 | 19 Jul 2016 08:00 | 15 | Maintenance - new datalogger program |
| CO | 26 Jul 2016 09:00 | 26 Jul 2016 15:00 | 7 | Maintenance - new calibrator installed |



Wood Buffalo Environmental Association
Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 744 |
| Maximum Value: 25 ppb on Jul 5 14:00 | Maximum Daily Average: 5.9 ppb on Jul 7 |
| Minimum Value: 0 ppb on Jul 6 03:00 | Hours of Data: 690 |
| Maximum Diurnal Average: 3.1 ppb at hour 9 | Hours of Missing Data: 54 |
| Monthly Average: 1.4 ppb | Hours of Calibration: 43 |
| Minimum Daily Average: 0.1 ppb on Jul 4 | Percent Operational Time: 98.5 |
| Minimum Diurnal Average: 0.4 ppb at hour 2 | |
| Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 4 P ₉₉ = 16 | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Jul | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 2-Jul | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 3-Jul | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 4-Jul | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 5-Jul | Z | 0 | 0 | 0 | 0 | 3 | 8 | C | C | C | C | C | 0 | 25 | 19 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.2 | 25 | |
| 6-Jul | 0 | Z | 0 | 0 | 0 | 0 | 1 | 10 | 6 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 10 | |
| 7-Jul | 0 | 0 | Z | 1 | 1 | 1 | 5 | M | 20 | 23 | 11 | 16 | 5 | 10 | 4 | 3 | 25 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 5.9 | 25 | |
| 8-Jul | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 3 | 1 | 11 | 8 | 5 | 1 | 1 | 1 | 1 | 1 | 5 | 10 | 12 | 2 | 0 | 0 | 2.7 | 12 | |
| 9-Jul | 0 | 0 | 0 | 0 | Z | 2 | 3 | 4 | 5 | 9 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.3 | 9 | |
| 10-Jul | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0.5 | 1 | |
| 11-Jul | Z | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 14 | 11 | 5 | 1 | 1 | 1 | 3 | 7 | 3 | 5 | 2 | 0 | 0 | 0 | 0 | 2 | 2.6 | 14 | |
| 12-Jul | 2 | Z | 4 | 3 | 3 | 3 | 3 | 2 | 4 | 1 | 1 | 4 | 4 | 6 | 5 | 6 | 4 | 3 | 2 | 6 | 10 | 6 | 1 | 2 | 3.8 | 10 | |
| 13-Jul | 4 | 3 | Z | 1 | 2 | 3 | 6 | 16 | 16 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2.9 | 16 | |
| 14-Jul | 0 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 2 | 1 | 9 | 17 | 7 | 14 | 8 | 5 | 10 | 3 | 0 | 2 | 1 | 1 | 1 | 1 | 3.7 | 17 | |
| 15-Jul | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 5 | |
| 16-Jul | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 3 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 4 | 3 | 0.9 | 4 | |
| 17-Jul | Z | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 7 | 5 | 1 | 3 | 6 | 6 | 6 | 6 | M | M | M | 5 | 4 | 2 | 1 | 1 | 3.3 | 7 | |
| 18-Jul | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 19-Jul | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 | |
| 20-Jul | 0 | 0 | 0 | Z | 0 | 1 | 2 | 6 | 4 | 9 | 8 | 6 | 9 | 8 | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 9 | |
| 21-Jul | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 3 | 1 | 0 | 0 | 0 | 0.5 | 4 | |
| 22-Jul | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 0.6 | 3 | |
| 23-Jul | Z | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 4 | |
| 24-Jul | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | |
| 25-Jul | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 6 | 5 | 4 | 3 | 2 | 1 | 1.2 | 6 |
| 26-Jul | 1 | 1 | 0 | Z | 0 | 0 | 0 | 0 | M | M | M | M | M | M | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 1 | |
| 27-Jul | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | C | C | C | C | C | C | C | C | 4 | 6 | 9 | 1 | 0 | 0 | 0 | -- | 9 | |
| 28-Jul | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 3 | 5 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 1.0 | 5 | |
| 29-Jul | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 30-Jul | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0.3 | 1 | |
| 31-Jul | 0 | 0 | Z | 0 | 0 | 0 | 3 | 4 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 0 | 0 | 1 | 1 | 4 | 10 | 2 | 0 | 0 | 1.6 | 10 | |

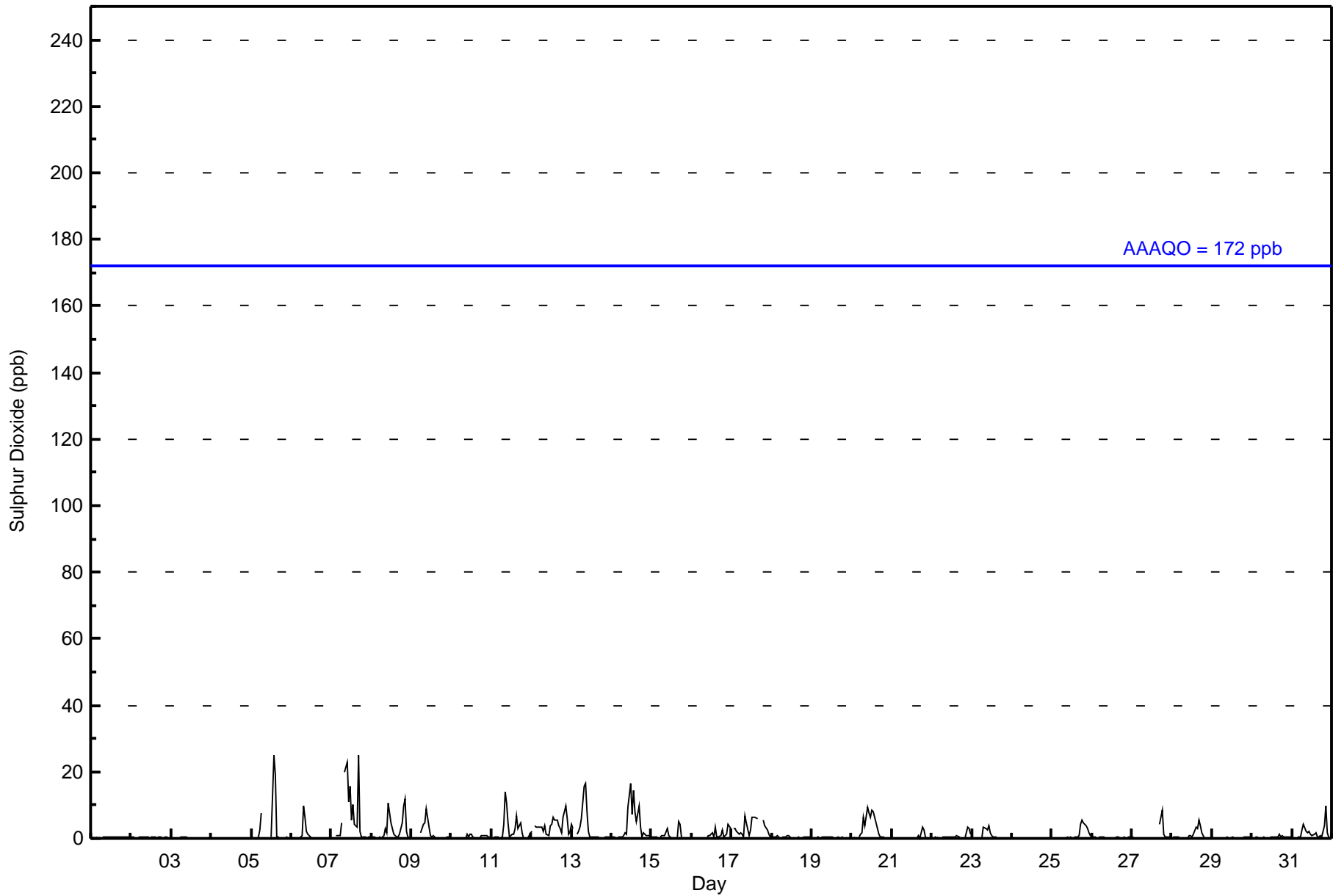
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.7 | 1.1 | 1.9 | 3.1 | 3.0 | 2.4 | 2.3 | 1.6 | 2.8 | 2.1 | 1.3 | 2.2 | 1.3 | 1.2 | 1.3 | 1.5 | 0.9 | 0.6 | 0.5 | Diurnal Average | |
| 4 | 3 | 4 | 3 | 3 | 3 | 8 | 16 | 20 | 23 | 11 | 17 | 9 | 25 | 19 | 7 | 25 | 6 | 9 | 10 | 12 | 6 | 4 | 3 | 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
Athabasca Valley - July 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 10 | 675 | 97.83 | 97.83 |
| 11 - 20 | 12 | 1.74 | 99.57 |
| 21 - 60 | 3 | 0.43 | 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: 690

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 10 | 83 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 154 | 675 |
| 11 - 20 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 12 |
| 21 - 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| 61 - 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111 - 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 172 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 87 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 165 | 690 |

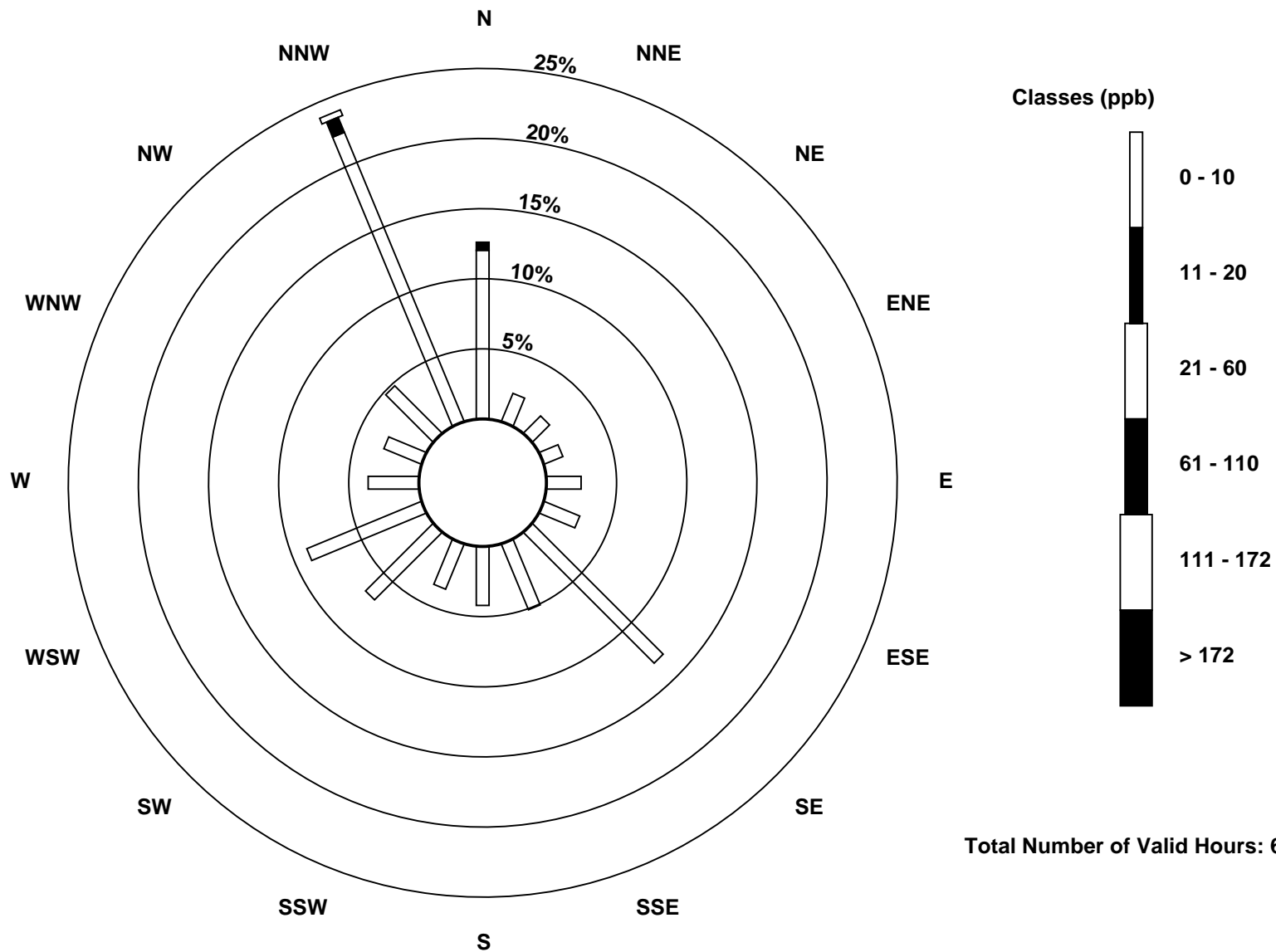
Total Number of Valid Hours: 690

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2016

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

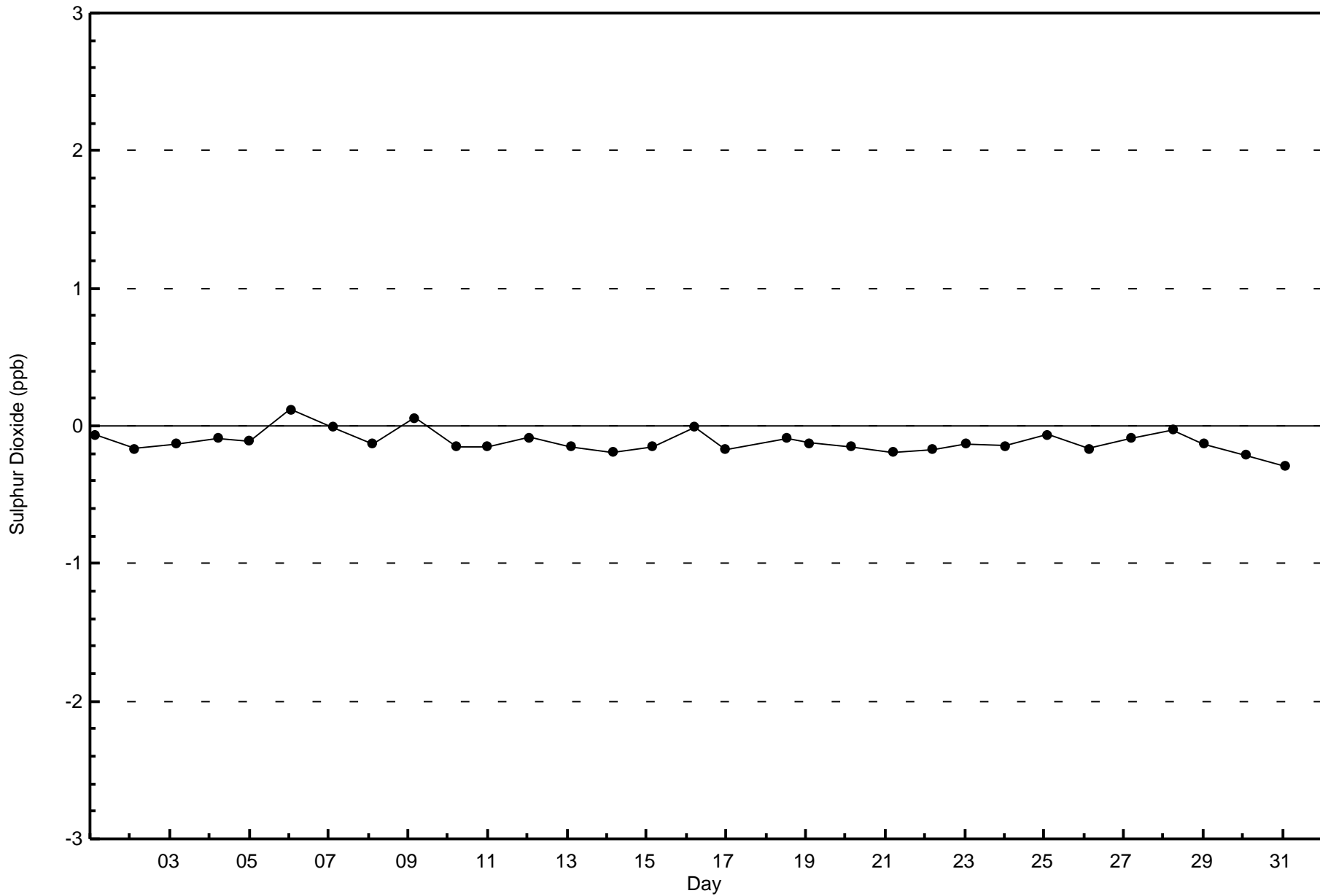


Total Number of Valid Hours: 690



Wood Buffalo Environmental Association
Zero Responses

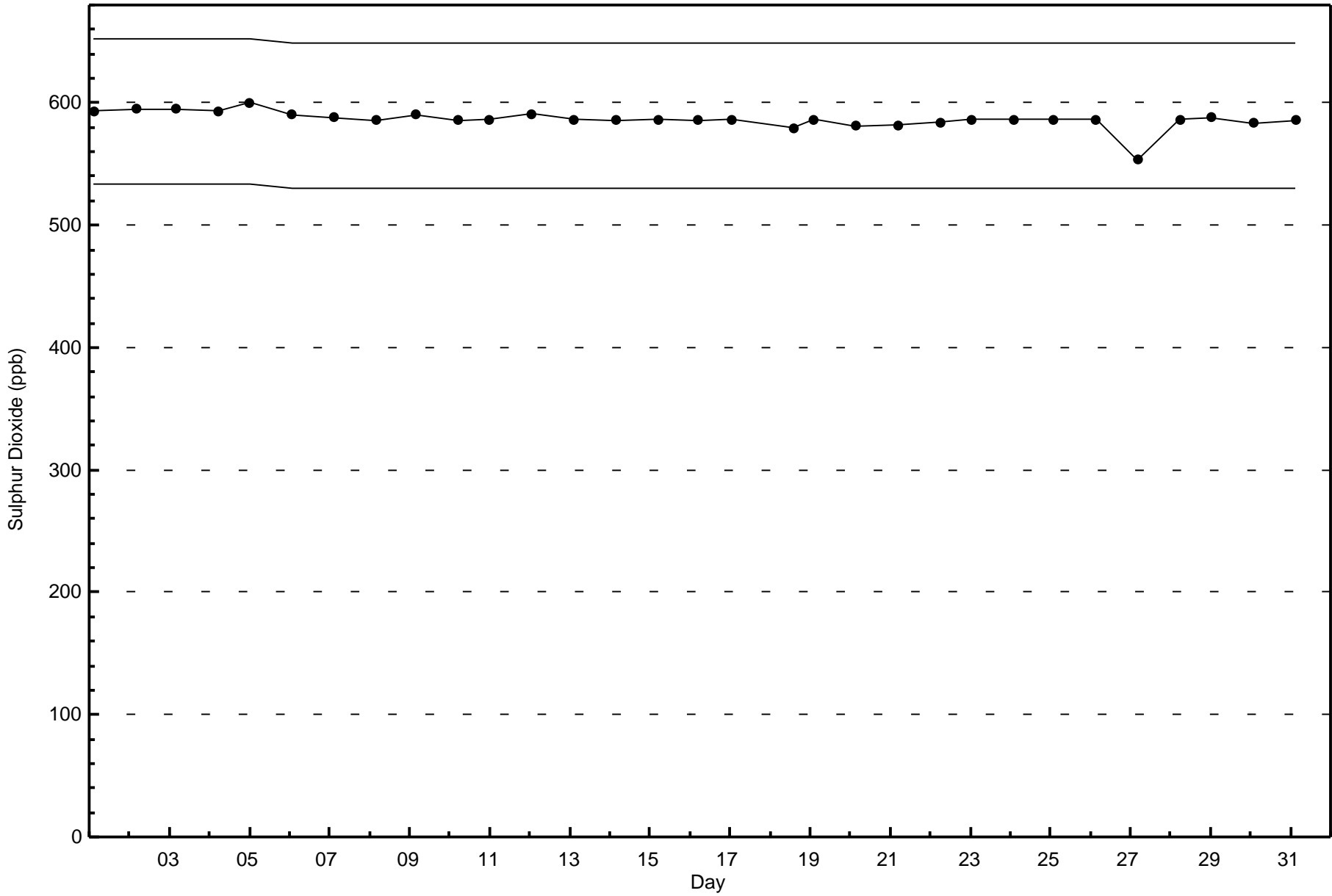
Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - July 2016





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Athabasca Valley - July 2016

| | | | | |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 744 |
| Maximum Value: 2 ppb on Jul 5 07:00 | Maximum Daily Average: 0.6 ppb on Jul 9 | | Hours of Data: | 592 |
| Minimum Value: 0 ppb on Jul 29 08:00 | Minimum Daily Average: 0.2 ppb on Jul 24 | | Hours of Missing Data: | 152 |
| Maximum Diurnal Average: 0.5 ppb at hour 7 | Minimum Diurnal Average: 0.3 ppb at hour 19 | | Hours of Calibration: | 30 |
| 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 = 1 | | Percent Operational Time: | 83.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Jul | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 2-Jul | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0 | |
| 3-Jul | 0 | 0 | 0 | 1 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 4-Jul | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 5-Jul | 0 | Z | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 6-Jul | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 1 | |
| 7-Jul | 0 | 0 | 1 | Z | 1 | 1 | 1 | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.4 | 1 | |
| 8-Jul | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0.4 | 1 | |
| 9-Jul | 0 | 1 | 1 | 1 | 1 | Z | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 2 | |
| 10-Jul | 0 | 1 | 1 | 0 | 0 | 0 | Z | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 11-Jul | 0 | Z | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 1 | |
| 12-Jul | 1 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0.6 | 1 | |
| 13-Jul | 1 | 1 | 1 | Z | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.5 | 1 | |
| 14-Jul | 1 | 0 | 1 | 0 | Z | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.4 | 1 | |
| 15-Jul | 1 | 1 | 1 | 0 | 0 | Z | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1 | |
| 16-Jul | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.4 | 1 | |
| 17-Jul | 0 | Z | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | M | M | M | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | |
| 18-Jul | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 19-Jul | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 20-Jul | 0 | 0 | 1 | 1 | Z | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 1 | |
| 21-Jul | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | M | M | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | -- | 1 | |
| 22-Jul | 0 | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0.3 | 1 | |
| 23-Jul | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | |
| 24-Jul | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | |
| 25-Jul | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | AF | AF | AF | AF | AF | 0.3 | 0 |
| 26-Jul | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | M | M | M | M | M | M | M | M | 0 | 0 | 0 | 0 | 0 | 0 | -- | 0 | |
| 27-Jul | 0 | 0 | 0 | 0 | 0 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0.4 | 1 | |
| 28-Jul | 1 | 1 | 1 | 1 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | |
| 29-Jul | 0 | Z | 0 | 0 | 0 | 0 | 0 | 0 | M | M | M | M | M | M | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | 0 | |
| 30-Jul | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | -- | |
| 31-Jul | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | AF | -- | -- | |

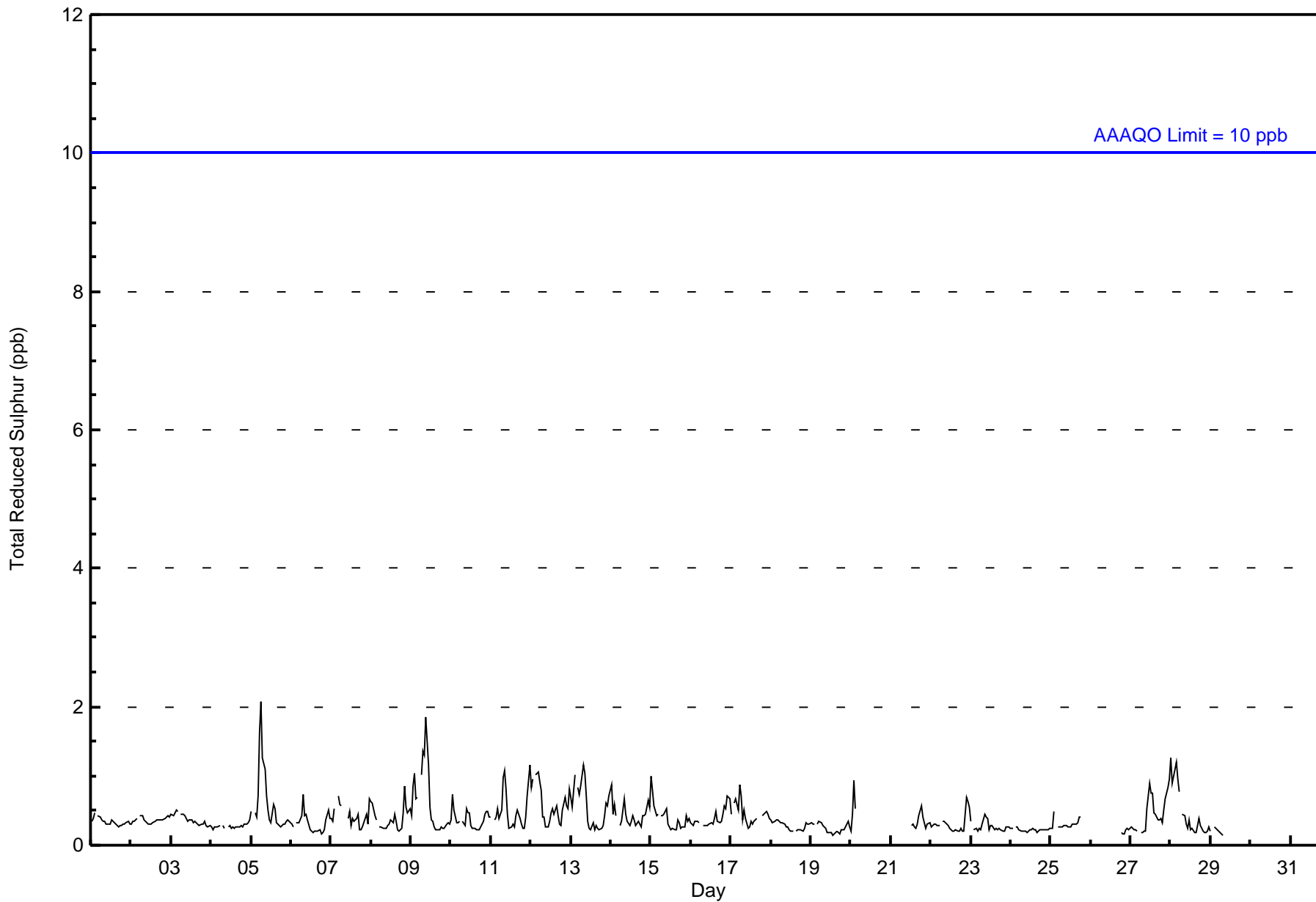
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 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 | 0.5 | Diurnal Average |
| 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - July 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2 | 592 | 100.00 | 100.00 |
| 3 - 4 | 0 | 0.00 | 100.00 |
| 5 - 7 | 0 | 0.00 | 100.00 |
| 8 - 11 | 0 | 0.00 | 100.00 |
| > 11 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 592

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - July 2016

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------------|-----------------------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|----------|------------|-----------|------------|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2 | 84 | 13 | 11 | 10 | 17 | 12 | 71 | 31 | 26 | 20 | 41 | 40 | 20 | 17 | 21 | 158 | 592 |
| 3 - 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 - 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 - 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 84 | 13 | 11 | 10 | 17 | 12 | 71 | 31 | 26 | 20 | 41 | 40 | 20 | 17 | 21 | 158 | 592 |

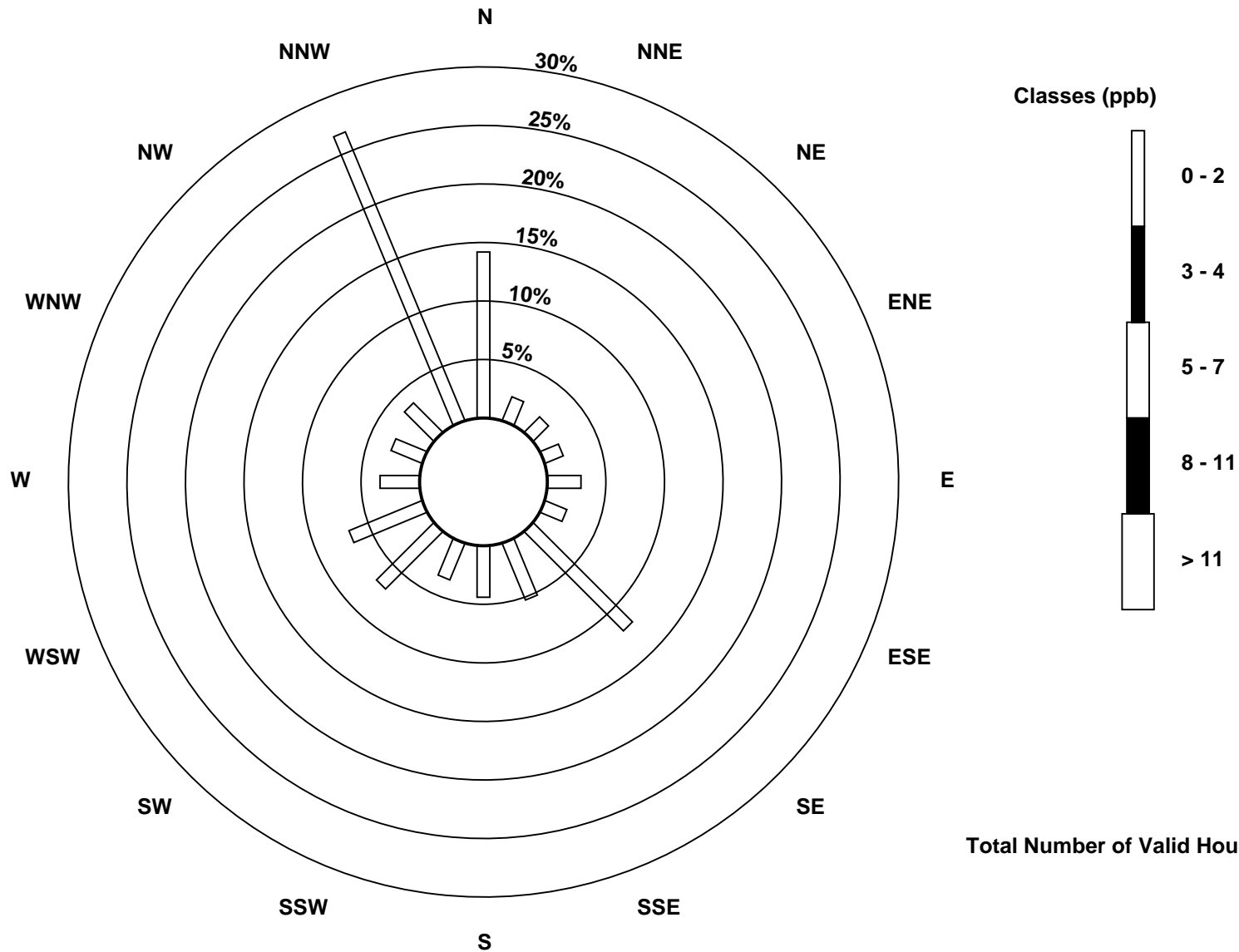
Total Number of Valid Hours: 592

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2016

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

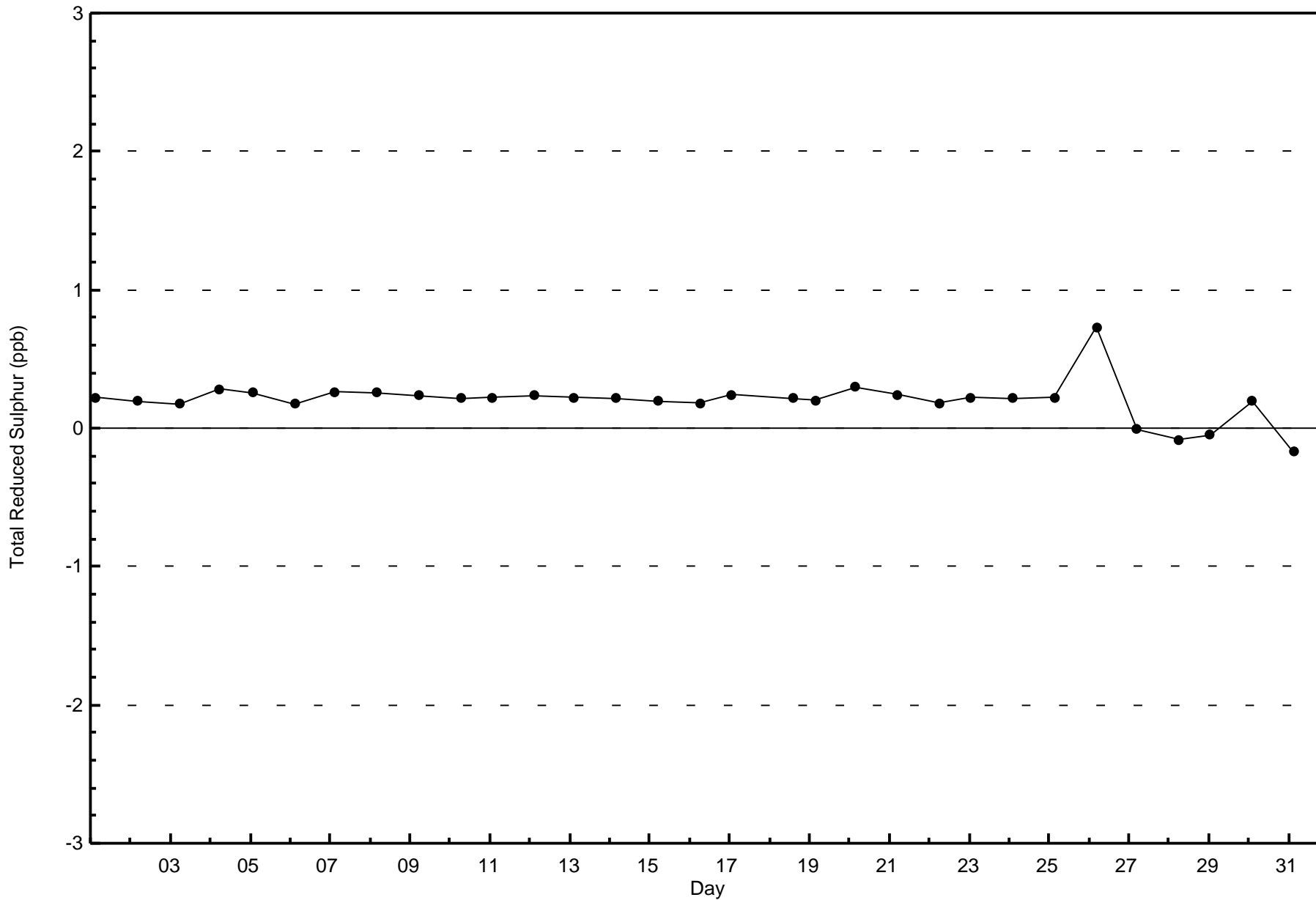


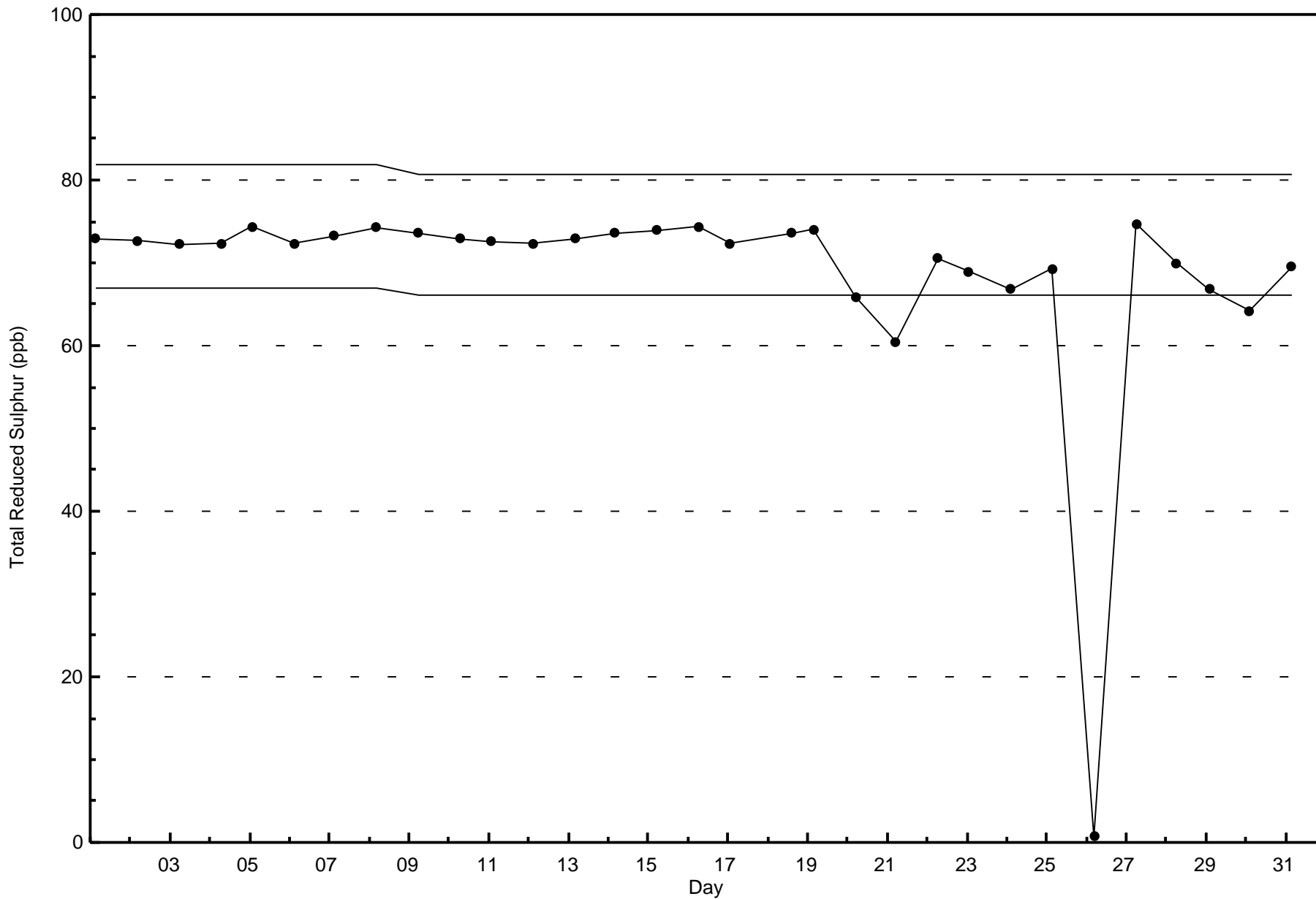
Total Number of Valid Hours: 592



Wood Buffalo Environmental Association
Zero Responses

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - July 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

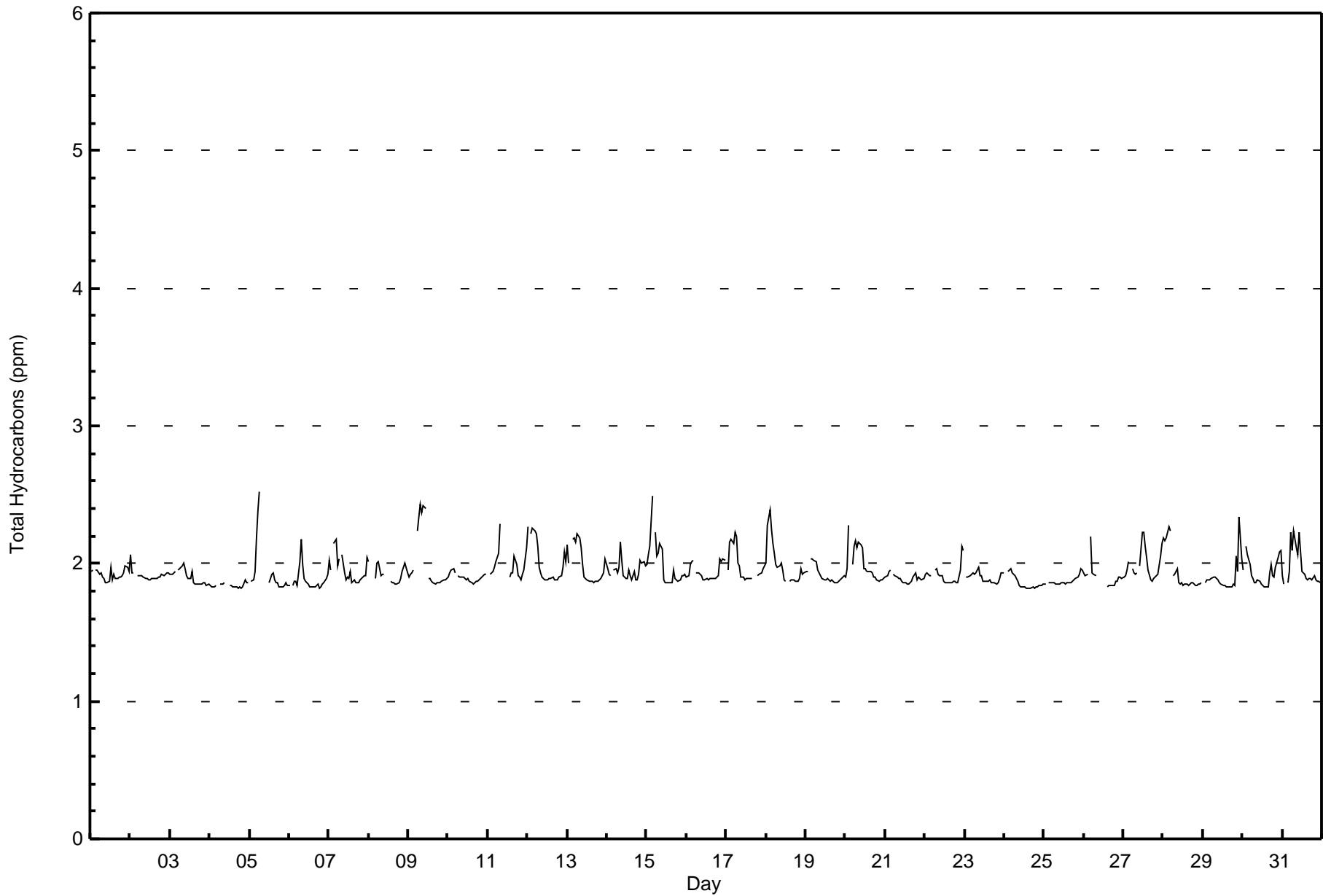
Athabasca Valley - July 2016

| Maximum Value: 2.5 ppm on Jul 5 07:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 2.0 ppm on Jul 9 | | | | | | | | | | Hours in Service: 744 | |
|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|--------------------------------|--|
| Minimum Value: 1.8 ppm on Jul 6 19:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 1.8 ppm on Jul 4 | | | | | | | | | | Hours of Data: 684 | |
| Maximum Diurnal Average: 2.0 ppm at hour 6 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 1.9 ppm at hour 59 | | | | | | | | | | Hours of Missing Data: 60 | |
| Monthly Average: 1.94 ppm | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 2.0 P ₉₀ = 2.1 P ₉₉ = 2.4 | | | | | | | | | | Hours of Calibration: 41 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 97.5 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | |
| 1-Jul | 1.9 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | | | |
| 2-Jul | 2.1 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 3-Jul | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 4-Jul | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | Z | 1.8 | 1.8 | 1.9 | 1.9 | M | M | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 5-Jul | Z | 1.9 | 1.9 | 1.9 | 2.2 | 2.4 | 2.5 | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.9 | 1.8 | 2.0 | | | |
| 6-Jul | 1.8 | Z | 1.8 | 1.9 | 1.9 | 1.8 | 2.0 | 2.2 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 7-Jul | 2.0 | 2.0 | Z | 2.1 | 2.2 | 2.0 | 2.0 | M | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | | | |
| 8-Jul | 2.0 | UO | UO | Z | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | M | M | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | | | |
| 9-Jul | 1.9 | 1.9 | 1.9 | 2.0 | Z | 2.2 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | UO | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 10-Jul | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 11-Jul | Z | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.3 | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | | | |
| 12-Jul | 2.3 | Z | 2.2 | 2.3 | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | 2.0 | | | |
| 13-Jul | 2.1 | 2.0 | Z | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | | | |
| 14-Jul | 2.0 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 1.9 | 2.0 | 2.2 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | | |
| 15-Jul | 2.0 | 2.1 | 2.1 | 2.5 | Z | 2.2 | 2.1 | 2.1 | 2.1 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | |
| 16-Jul | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | | | |
| 17-Jul | Z | 2.0 | 2.2 | 2.2 | 2.1 | 2.2 | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | M | M | M | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | | | |
| 18-Jul | 2.0 | 2.3 | 2.4 | 2.3 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | | | |
| 19-Jul | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 20-Jul | 1.9 | 2.0 | 2.3 | Z | 2.0 | 2.1 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | |
| 21-Jul | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 22-Jul | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | 1.9 | | | |
| 23-Jul | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | | | |
| 24-Jul | 1.9 | Z | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | | | |
| 25-Jul | 1.8 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | | | |
| 26-Jul | 1.9 | 1.9 | 1.9 | Z | 2.2 | 1.9 | 1.9 | 1.9 | M | M | M | M | M | M | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | -- | | | |
| 27-Jul | 1.9 | 1.9 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | M | M | 2.0 | 2.2 | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.0 | | | |
| 28-Jul | 2.2 | 2.2 | 2.2 | 2.3 | 2.2 | Z | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | | | |
| 29-Jul | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 2.1 | 1.9 | 2.3 | 2.0 | 1.9 | | | |
| 30-Jul | 2.0 | Z | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | 2.1 | | | |
| 31-Jul | 1.9 | 1.9 | Z | 1.9 | 1.9 | 2.2 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |
| Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - July 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 601 | 87.87 | 87.87 |
| 2.1 - 3.0 | 83 | 12.13 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Athabasca Valley - July 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 75 | 14 | 12 | 6 | 15 | 16 | 82 | 32 | 29 | 24 | 46 | 59 | 24 | 17 | 25 | 125 | 601 |
| 2.1 - 3.0 | 13 | 0 | 0 | 4 | 2 | 3 | 9 | 3 | 0 | 0 | 0 | 2 | 1 | 3 | 8 | 35 | 83 |
| 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 | 88 | 14 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 46 | 61 | 25 | 20 | 33 | 160 | 684 |

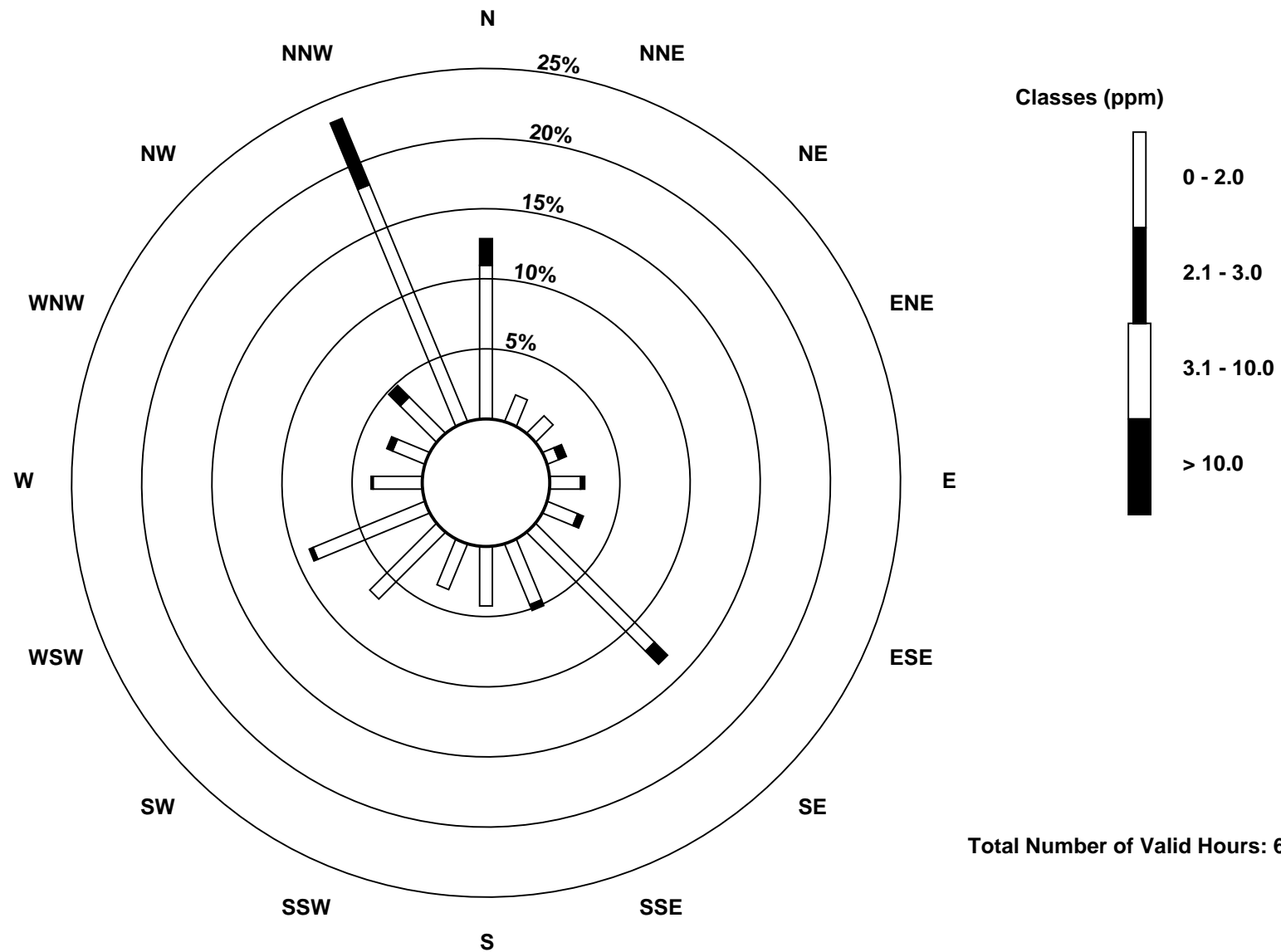
Total Number of Valid Hours: 684

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2016

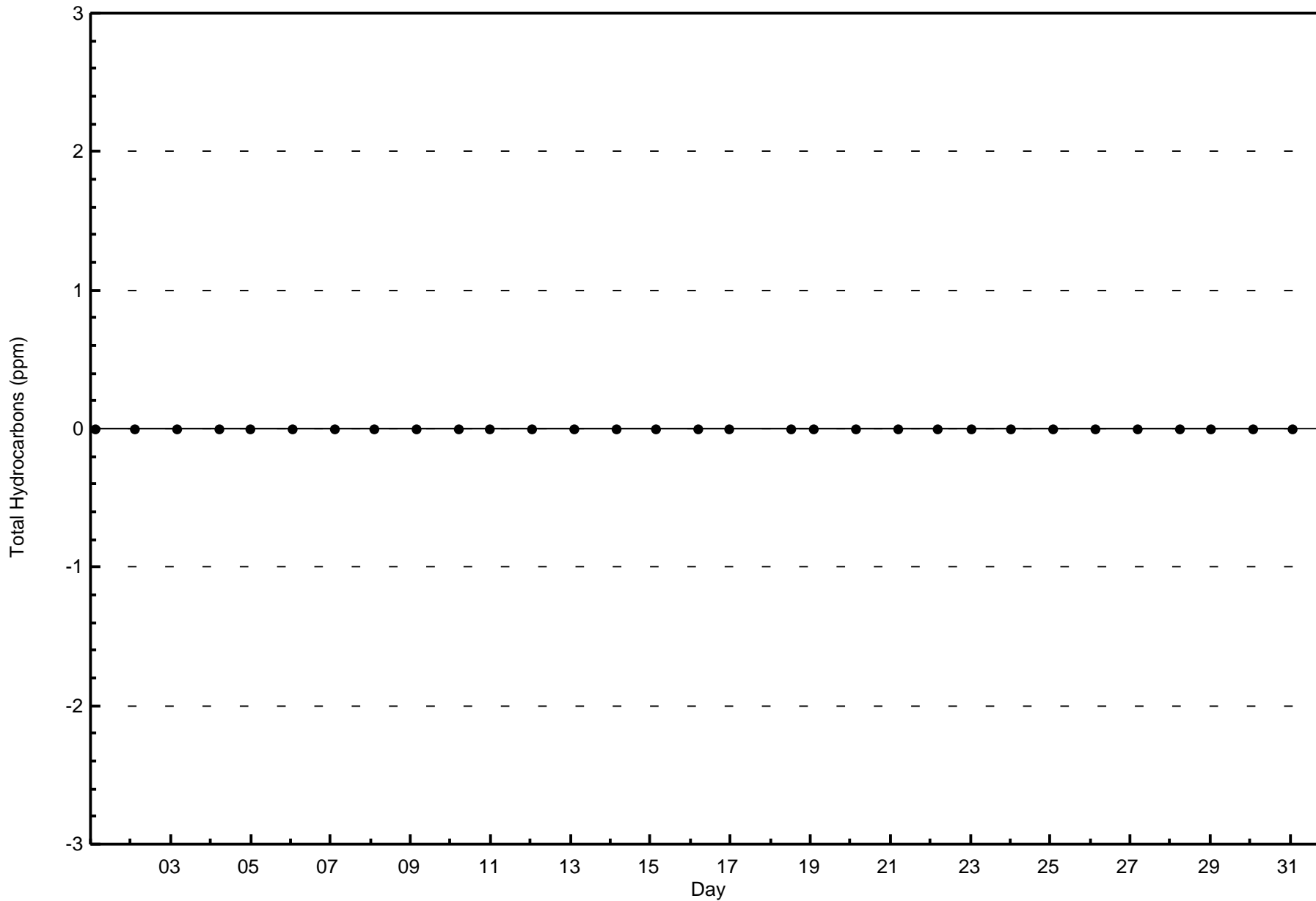
Total Hydrocarbons (THC) - ppm
Athabasca Valley (AMS 7)

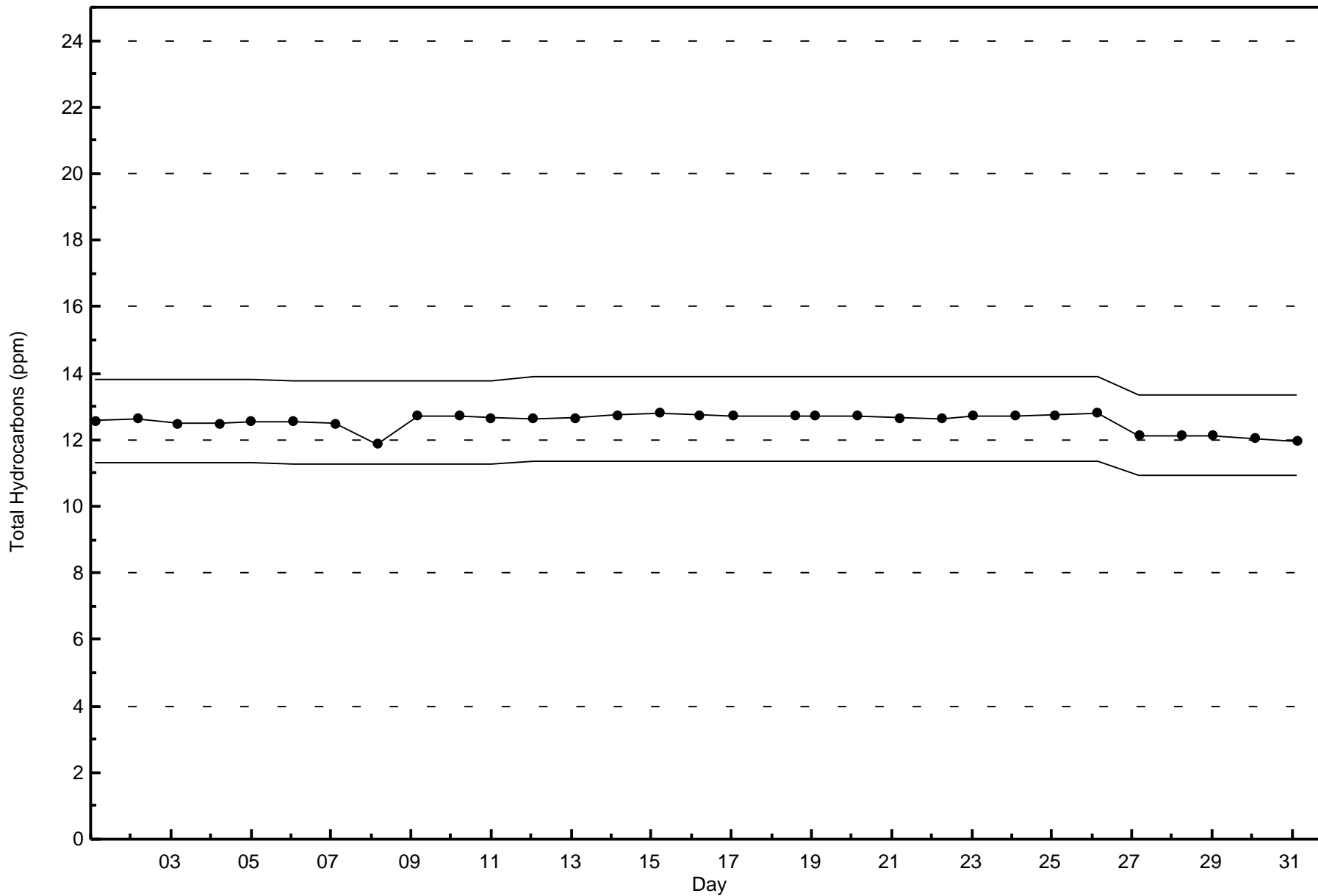




Wood Buffalo Environmental Association
Zero Responses

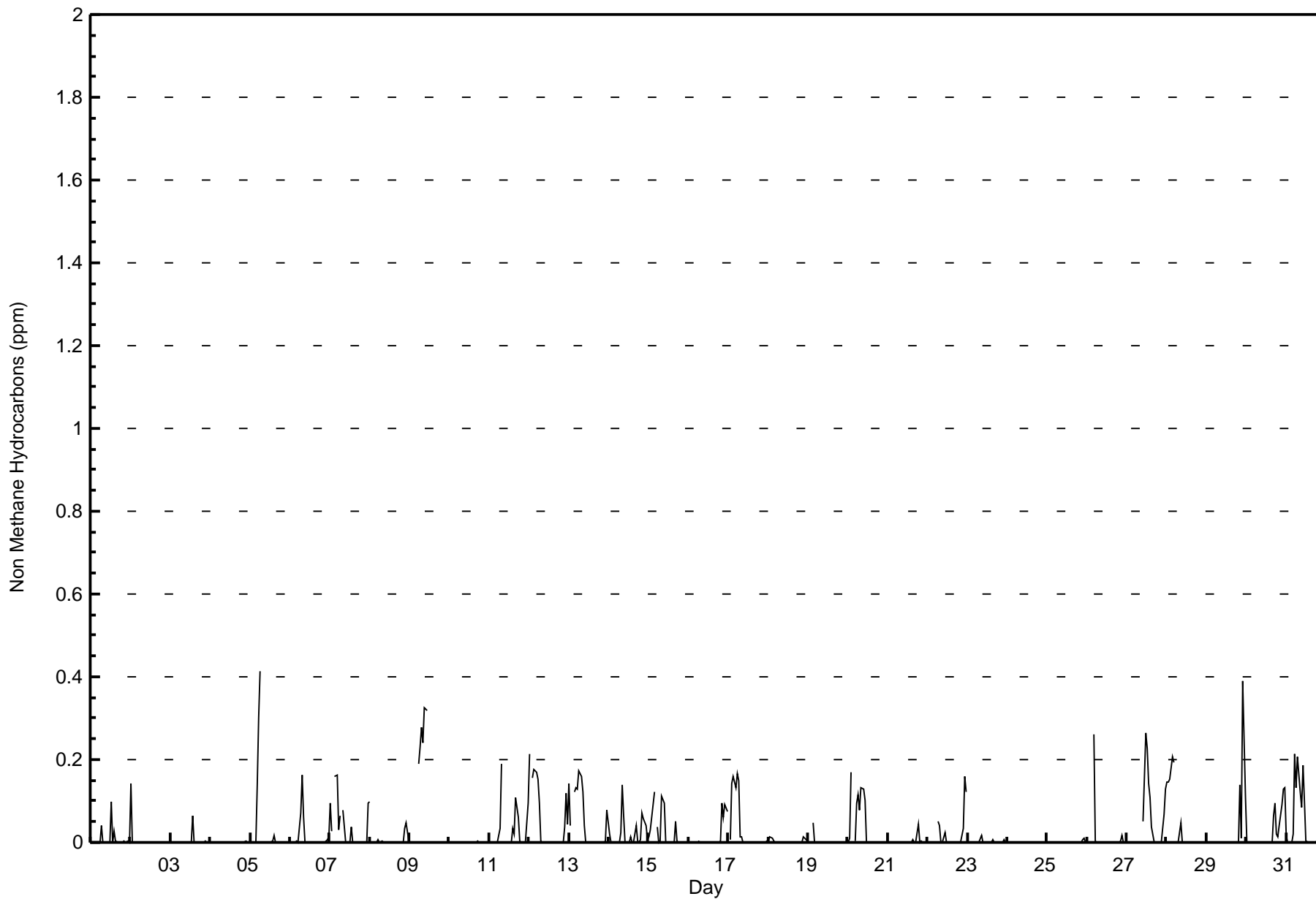
Total Hydrocarbons (THC) - ppm
Athabasca Valley - July 2016







| Maximum Value: 0.413 ppm on Jul 5 07:00 | | | | | | | | | | | | | | | | | | | | | | | | Maximum Daily Average: 0.072 ppm on Jul 9 | | | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 744 | |
|----------------------------------------------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|-------|-------|-------|-----------------|-------|-------|-------|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------------|--|
| Minimum Value: 0.000 ppm on Jul 1 01:00 | | | | | | | | | | | | | | | | | | | | | | | | Minimum Daily Average: 0.000 ppm on Jul 24 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Data: 684 | |
| Maximum Diurnal Average: 0.051 ppm at hour 6 | | | | | | | | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 0.001 ppm at hour 20 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 60 | |
| Monthly Average: 0.022 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 = 0.3 | | | | | | | | | | | | | | | | | | | | | | | | Hours of Calibration: 41 | |
| Percent Operational Time: 97.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Jul | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.039 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.098 | 0.000 | 0.027 | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.003 | 0.000 | 0.007 | 0.098 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Jul | 0.142 | 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 | 0.006 | 0.142 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.065 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.003 | 0.065 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Jul | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | M | M | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.003 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jul | Z | 0.000 | 0.000 | 0.000 | 0.140 | 0.300 | 0.413 | C | C | C | C | C | 0.000 | 0.003 | 0.017 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.048 | 0.413 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Jul | 0.000 | Z | 0.000 | 0.000 | 0.003 | 0.000 | 0.073 | 0.162 | 0.061 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 | 0.013 | 0.014 | 0.162 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Jul | 0.096 | 0.026 | Z | 0.160 | 0.164 | 0.030 | 0.064 | M | 0.079 | 0.000 | 0.000 | 0.001 | 0.000 | 0.038 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.095 | 0.034 | 0.164 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Jul | 0.098 | UO | UO | Z | 0.000 | 0.007 | 0.001 | 0.002 | 0.000 | 0.000 | M | M | M | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.035 | 0.049 | 0.004 | 0.011 | 0.098 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Jul | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.189 | 0.231 | 0.277 | 0.240 | 0.326 | 0.318 | UO | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.072 | 0.326 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Jul | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.035 | 0.189 | C | C | C | C | C | 0.000 | 0.033 | 0.022 | 0.107 | 0.062 | 0.005 | 0.000 | 0.000 | 0.000 | 0.000 | 0.094 | 0.030 | 0.189 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jul | 0.214 | Z | 0.156 | 0.178 | 0.170 | 0.152 | 0.094 | 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 | 0.038 | 0.118 | 0.045 | 0.051 | 0.214 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Jul | 0.143 | 0.042 | Z | 0.124 | 0.132 | 0.127 | 0.173 | 0.161 | 0.122 | 0.041 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.078 | 0.050 | 0.173 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Jul | 0.021 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.023 | 0.141 | 0.065 | 0.000 | 0.000 | 0.000 | 0.013 | 0.000 | 0.000 | 0.040 | 0.002 | 0.001 | 0.006 | 0.071 | 0.057 | 0.040 | 0.007 | 0.021 | 0.141 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Jul | 0.014 | 0.031 | 0.059 | 0.123 | Z | 0.038 | 0.000 | 0.003 | 0.113 | 0.094 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.050 | 0.004 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.023 | 0.123 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.096 | 0.061 | 0.092 | 0.074 | 0.014 | 0.096 | | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul | Z | 0.008 | 0.141 | 0.159 | 0.133 | 0.165 | 0.151 | 0.015 | 0.013 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | M | M | M | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.039 | 0.165 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Jul | 0.005 | 0.012 | 0.011 | 0.002 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.012 | 0.009 | 0.007 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jul | 0.000 | 0.000 | Z | 0.047 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.047 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Jul | 0.000 | 0.011 | 0.170 | Z | 0.004 | 0.097 | 0.115 | 0.077 | 0.133 | 0.128 | 0.101 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.036 | 0.170 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Jul | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 | 0.000 | 0.001 | 0.043 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.002 | 0.043 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Jul | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.051 | 0.039 | 0.000 | 0.000 | 0.023 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.034 | 0.159 | 0.121 | 0.019 | 0.159 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jul | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.016 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 | 0.000 | 0.001 | 0.016 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Jul | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.007 | 0.011 | 0.000 | 0.001 | 0.011 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jul | 0.000 | 0.000 | 0.000 | Z | 0.263 | 0.002 | 0.000 | 0.000 | M | M | M | M | M | M | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.003 | 0.018 | 0.002 | 0.000 | -- | 0.263 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Jul | 0.000 | 0.000 | 0.000 | 0.000 | Z | 0.000 | 0.000 | 0.000 | 0.000 | M | M | 0.052 | 0.265 | 0.227 | 0.142 | 0.107 | 0.037 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.068 | 0.130 | 0.047 | 0.265 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Jul | 0.146 | 0.147 | 0.151 | 0.205 | 0.195 | Z | 0.000 | 0.000 | 0.048 | 0.000 | 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 | 0.039 | 0.205 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Jul | Z | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.141 | 0.010 | 0.389 | 0.108 | 0.389 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Jul | 0.001 | Z | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.063 | 0.094 | 0.020 | 0.014 | 0.042 | 0.092 | 0.129 | 0.134 | 0.026 | 0.134 | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul | 0.017 | 0.000 | Z | 0.000 | 0.019 | 0.213 | 0.131 | 0.208 | 0.122 | 0.085 | 0.186 | 0.100 | 0.002 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.002 | 0.000 | 0.000 | 0.000 | 0.048 | 0.213 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.035 | 0.011 | 0.029 | 0.038 | 0.047 | 0.051 | 0.051 | 0.040 | 0.039 | 0.027 | 0.026 | 0.015 | 0.012 | 0.009 | 0.006 | 0.002 | 0.009 | 0.006 | 0.002 | 0.001 | 0.012 | 0.012 | 0.035 | 0.029 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0.214 | 0.147 | 0.170 | 0.205 | 0.263 | 0.300 | 0.413 | 0.277 | 0.240 | 0.326 | 0.318 | 0.265 | 0.227 | 0.142 | 0.107 | 0.037 | 0.107 | 0.094 | 0.043 | 0.014 | 0.141 | 0.092 | 0.389 | 0.134 | Diurnal Maximum | |
| Z - zerospan | | | | | | | | | | | | | | | | | | | | | | | | C - Calibration | | | | | | M - Maintenance | | | | UO - Unstable Operation | | | | | | | | | | | | | | | |





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - July 2016**

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.005 | 529 | 77.34 | 77.34 |
| 0.006 - 0.05 | 61 | 8.92 | 86.26 |
| 0.06 - 0.1 | 60 | 8.77 | 95.03 |
| > 0.1 | 34 | 4.97 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - July 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.005 | 63 | 12 | 9 | 7 | 14 | 16 | 81 | 29 | 24 | 22 | 46 | 59 | 23 | 16 | 21 | 87 | 529 |
| 0.006 - 0.05 | 8 | 2 | 3 | 1 | 1 | 2 | 7 | 3 | 3 | 2 | 0 | 0 | 0 | 1 | 3 | 25 | 61 |
| 0.06 - 0.1 | 11 | 0 | 0 | 2 | 2 | 1 | 1 | 2 | 2 | 0 | 0 | 2 | 2 | 1 | 7 | 27 | 60 |
| > 0.1 | 6 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 21 | 34 |
| Totals | 88 | 14 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 46 | 61 | 25 | 20 | 33 | 160 | 684 |

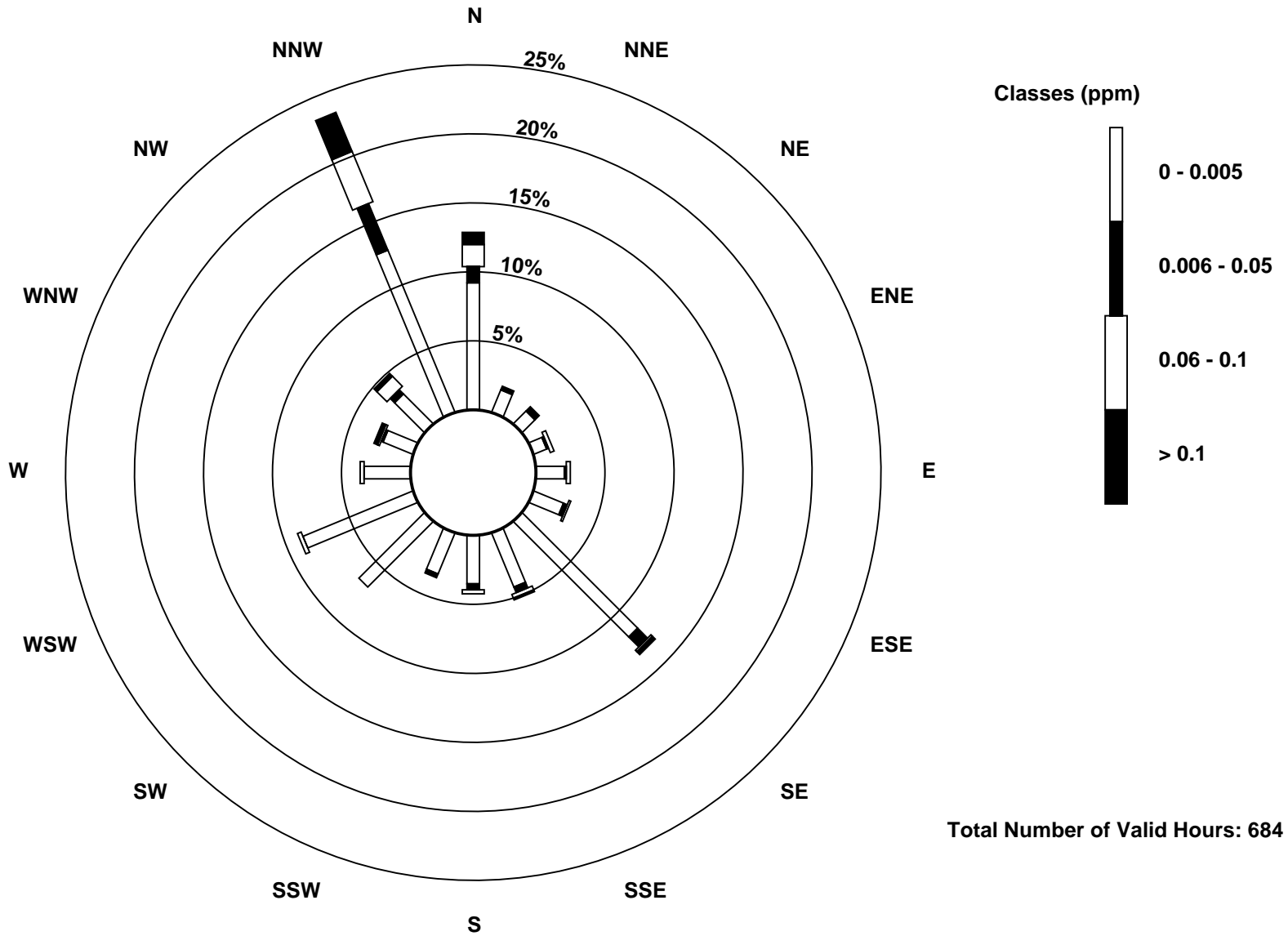
Total Number of Valid Hours: 684

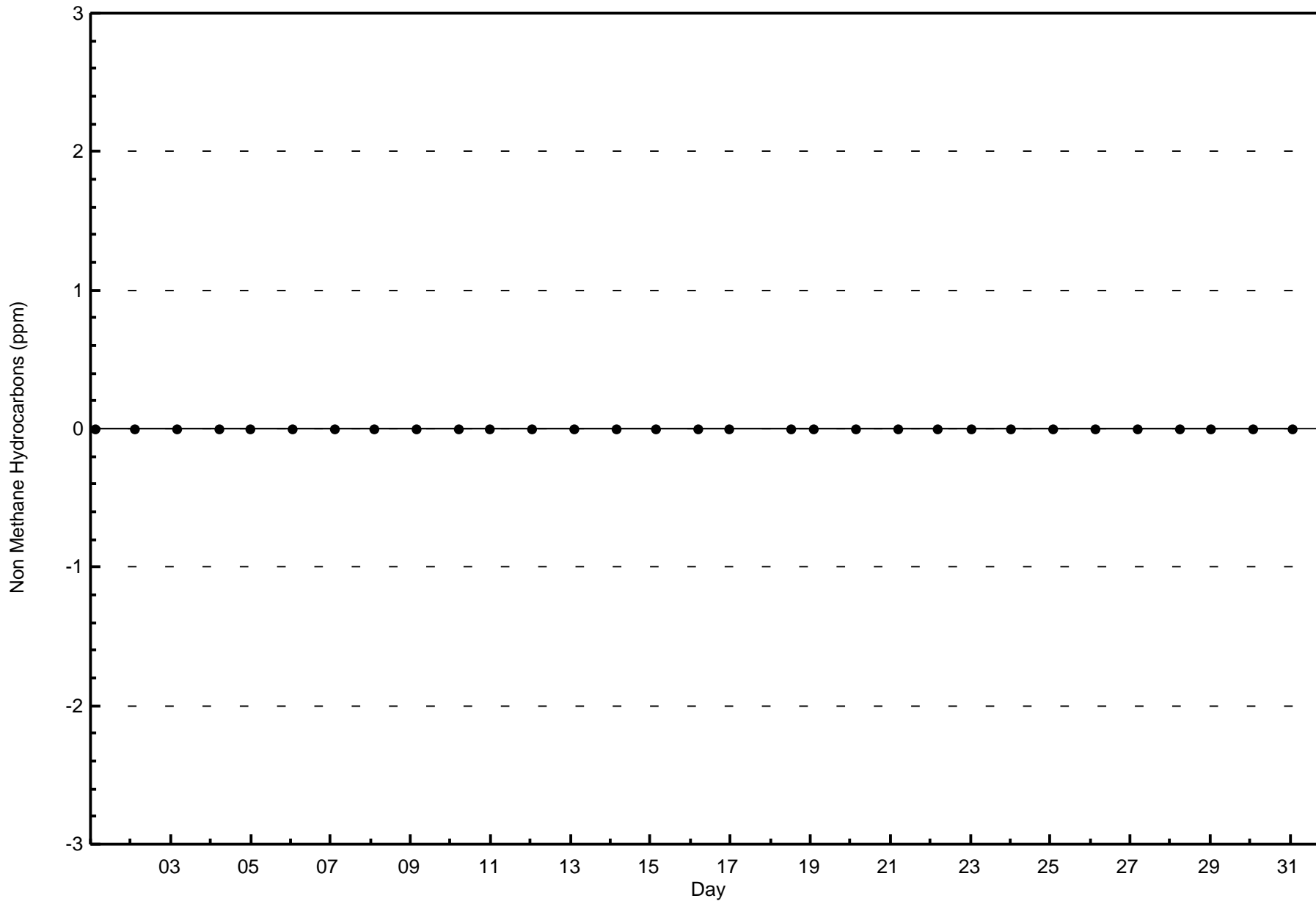
Total Number of Hours: 744

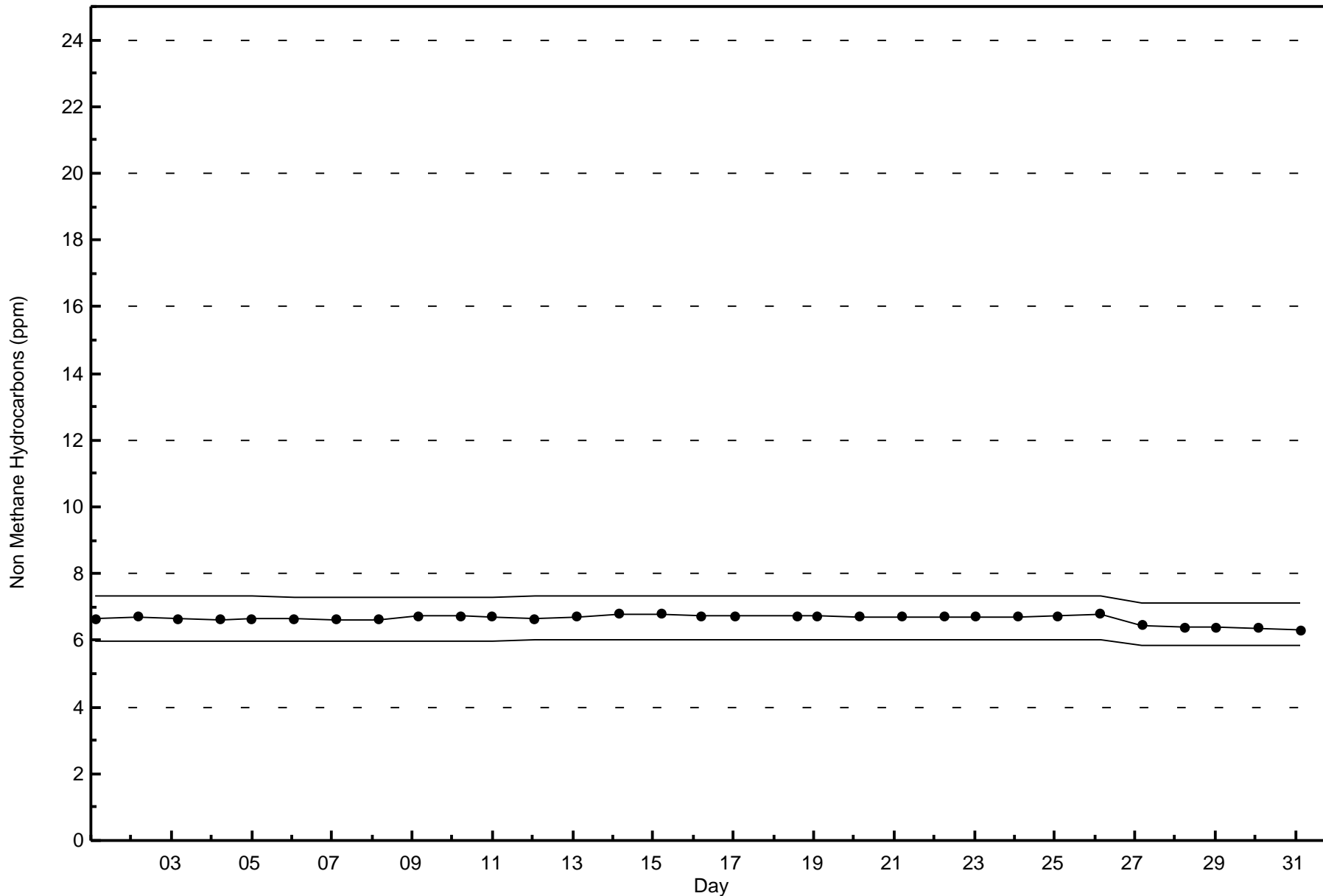


Wood Buffalo Environmental Association
Wind Rose Jul 2016

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









Wood Buffalo Environmental Association
Summary of Hour Averages

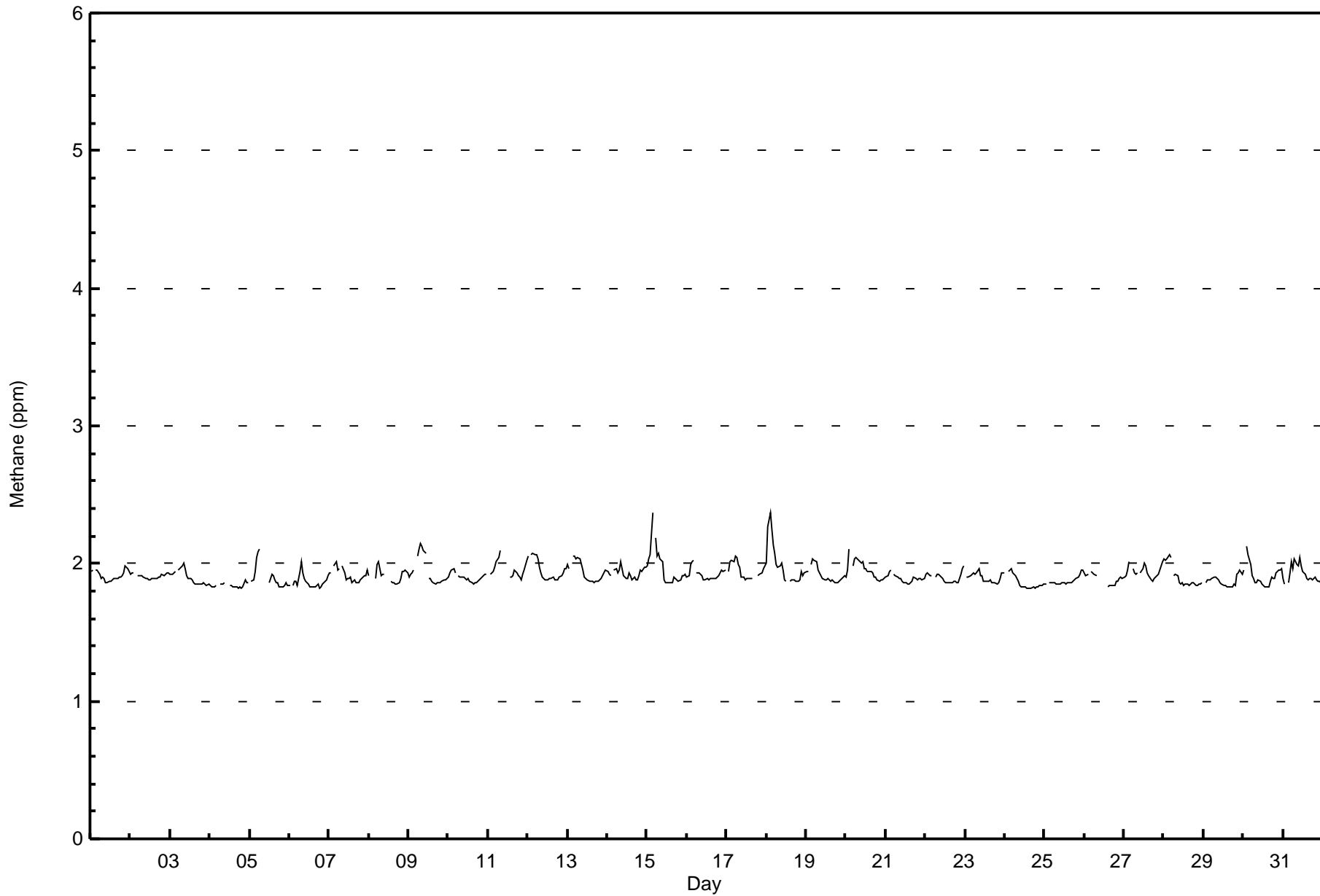
Methane (CH₄) - ppm
Athabasca Valley - July 2016

| Number of Exceedences (AAAQO): | | 1-hr: 0 24-hr: 0 | | Hours in Service: | | 744 | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------------|---------------|
| Maximum Value: 2.4 ppm on Jul 18 03:00 | | Maximum Daily Average: 2.0 ppm on Jul 18 | | Hours of Data: | | 684 | | | | | | | | | | | | | | | | | | | | |
| Minimum Value: 1.8 ppm on Jul 6 19:00 | | Minimum Daily Average: 1.8 ppm on Jul 4 | | Hours of Missing Data: | | 60 | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.0 ppm at hour 4 | | Minimum Diurnal Average: 1.9 ppm at hour 19 | | Hours of Calibration: | | 41 | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.91 ppm | | Percentiles: P ₁ = 1.8 P ₁₀ = 1.8 Q ₁ = 1.9 Median = 1.9 Q ₃ = 1.9 P ₉₀ = 2.0 P ₉₉ = 2.1 | | Percent Operational Time: | | 97.5 | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Jul | 1.9 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 | |
| 2-Jul | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 3-Jul | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 2.0 |
| 4-Jul | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | Z | 1.8 | 1.8 | 1.9 | 1.9 | M | M | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| 5-Jul | Z | 1.9 | 1.9 | 1.9 | 2.0 | 2.1 | 2.1 | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.8 | 2.1 | |
| 6-Jul | 1.8 | Z | 1.8 | 1.9 | 1.9 | 1.8 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 7-Jul | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | M | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | |
| 8-Jul | 1.9 | UO | UO | Z | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | M | M | M | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | |
| 9-Jul | 1.9 | 1.9 | 1.9 | 2.0 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | UO | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | |
| 10-Jul | 1.9 | 1.9 | 2.0 | 2.0 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 11-Jul | Z | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | C | C | C | C | C | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | |
| 12-Jul | 2.1 | Z | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | |
| 13-Jul | 2.0 | 2.0 | Z | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | |
| 14-Jul | 1.9 | 1.9 | 1.9 | Z | 2.0 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | 2.0 | |
| 15-Jul | 2.0 | 2.0 | 2.1 | 2.4 | Z | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.4 | |
| 16-Jul | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | |
| 17-Jul | Z | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | M | M | M | 1.9 | 1.9 | 2.0 | 2.0 | 2.1 | |
| 18-Jul | 2.0 | 2.3 | 2.4 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.4 | |
| 19-Jul | 1.9 | 1.9 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 20-Jul | 1.9 | 1.9 | 2.1 | Z | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.1 | |
| 21-Jul | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | |
| 22-Jul | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | |
| 23-Jul | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| 24-Jul | 1.9 | Z | 1.9 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | |
| 25-Jul | 1.8 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | |
| 26-Jul | 1.9 | 1.9 | 1.9 | Z | 1.9 | 1.9 | 1.9 | 1.9 | M | M | M | M | M | M | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | |
| 27-Jul | 1.9 | 1.9 | 2.0 | 2.0 | Z | 2.0 | 1.9 | 1.9 | 1.9 | M | M | 1.9 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | |
| 28-Jul | 2.0 | 2.0 | 2.0 | 2.1 | 2.0 | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.8 | 1.8 | 1.9 | 1.9 | 2.1 | |
| 29-Jul | Z | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | |
| 30-Jul | 1.9 | Z | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.1 | |
| 31-Jul | 1.9 | 1.9 | Z | 1.9 | 1.9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - July 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 2.0 | 653 | 95.47 | 95.47 |
| 2.1 - 3.0 | 31 | 4.53 | 100.00 |
| 3.1 - 10.0 | 0 | 0.00 | 100.00 |
| > 10.0 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 684

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Athabasca Valley - July 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 2.0 | 85 | 14 | 12 | 9 | 16 | 16 | 84 | 35 | 29 | 24 | 46 | 61 | 25 | 20 | 33 | 144 | 653 |
| 2.1 - 3.0 | 3 | 0 | 0 | 1 | 1 | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 31 |
| 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 | 88 | 14 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 46 | 61 | 25 | 20 | 33 | 160 | 684 |

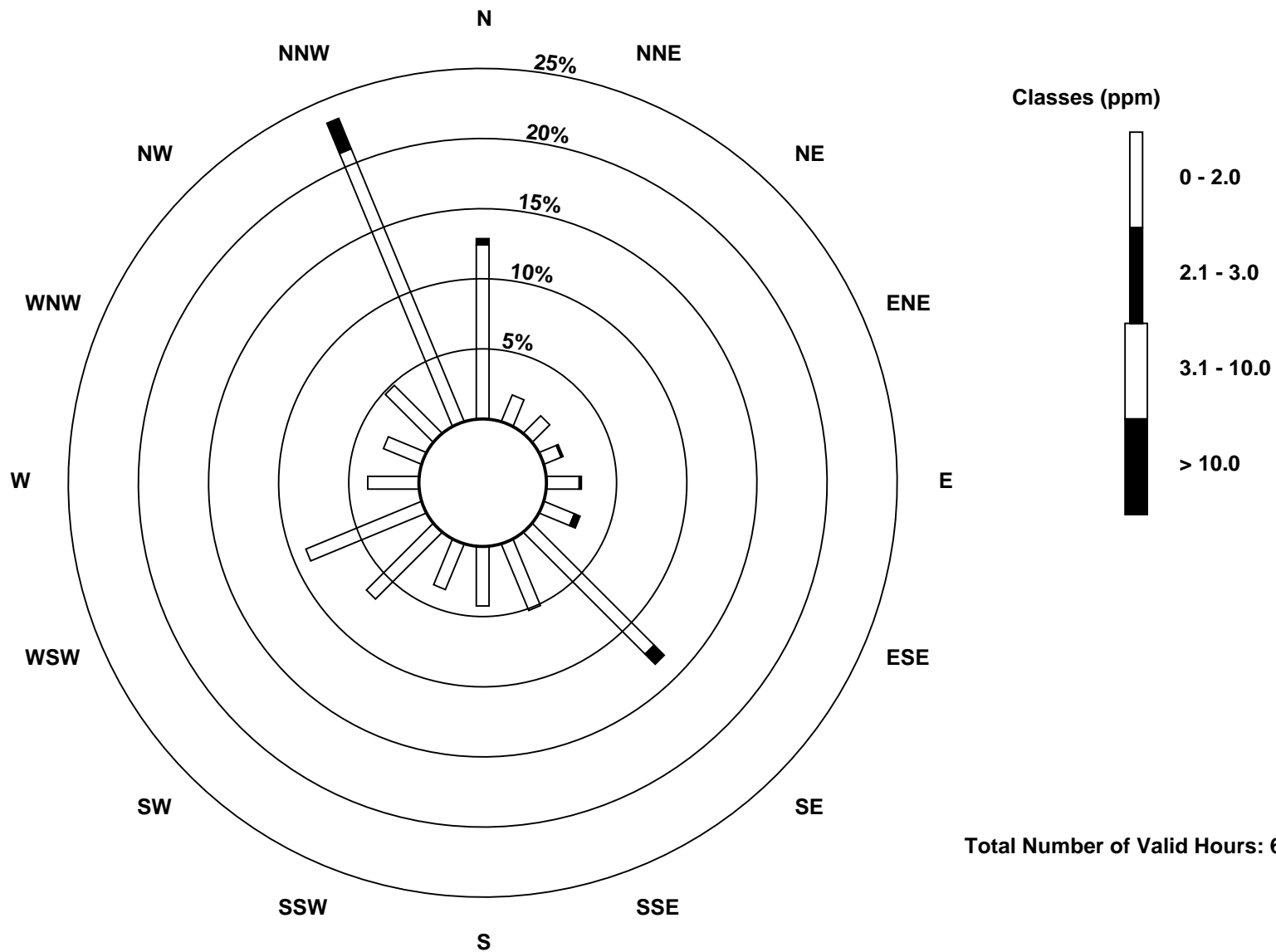
Total Number of Valid Hours: 684

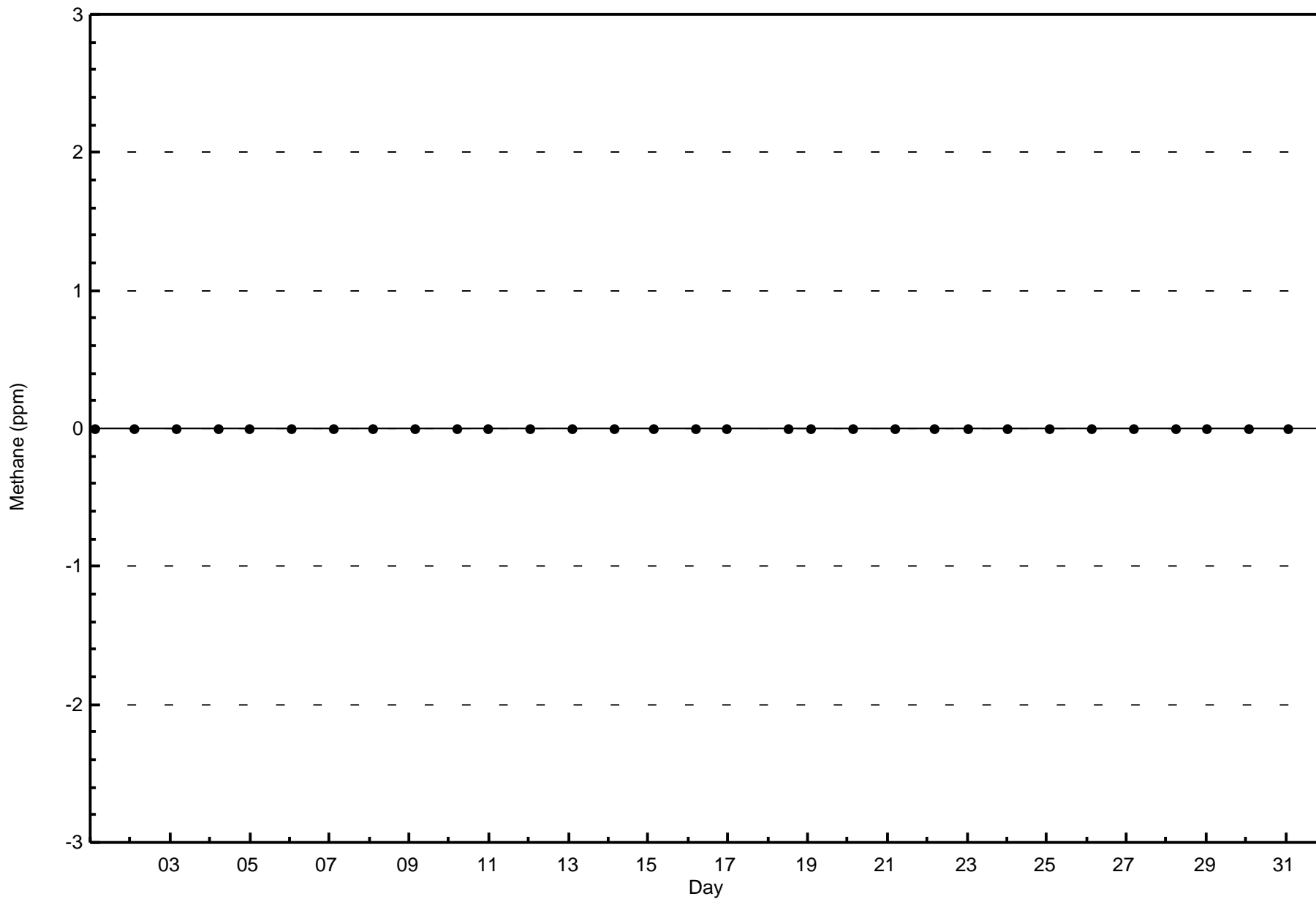
Total Number of Hours: 744

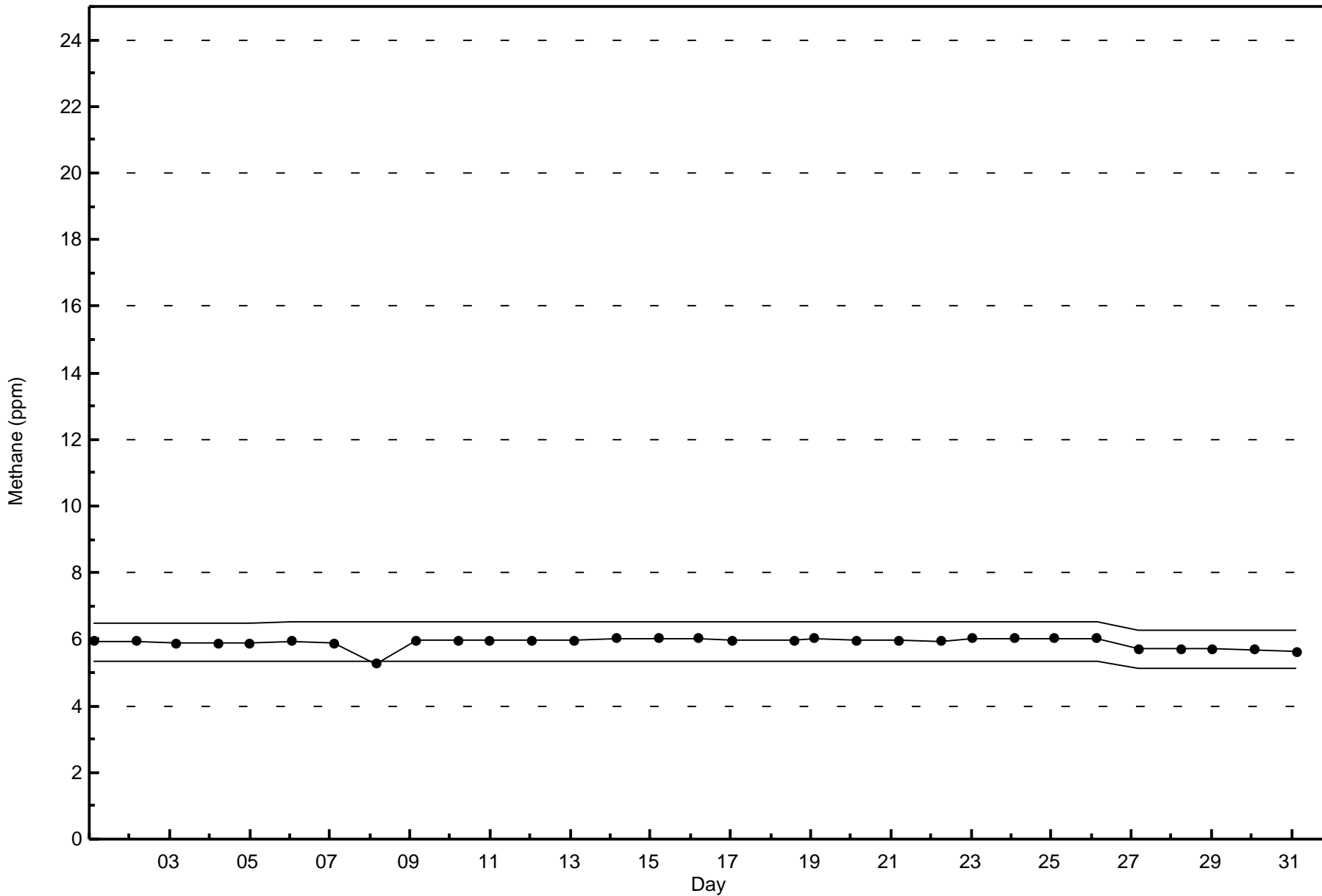


Wood Buffalo Environmental Association
Wind Rose Jul 2016

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

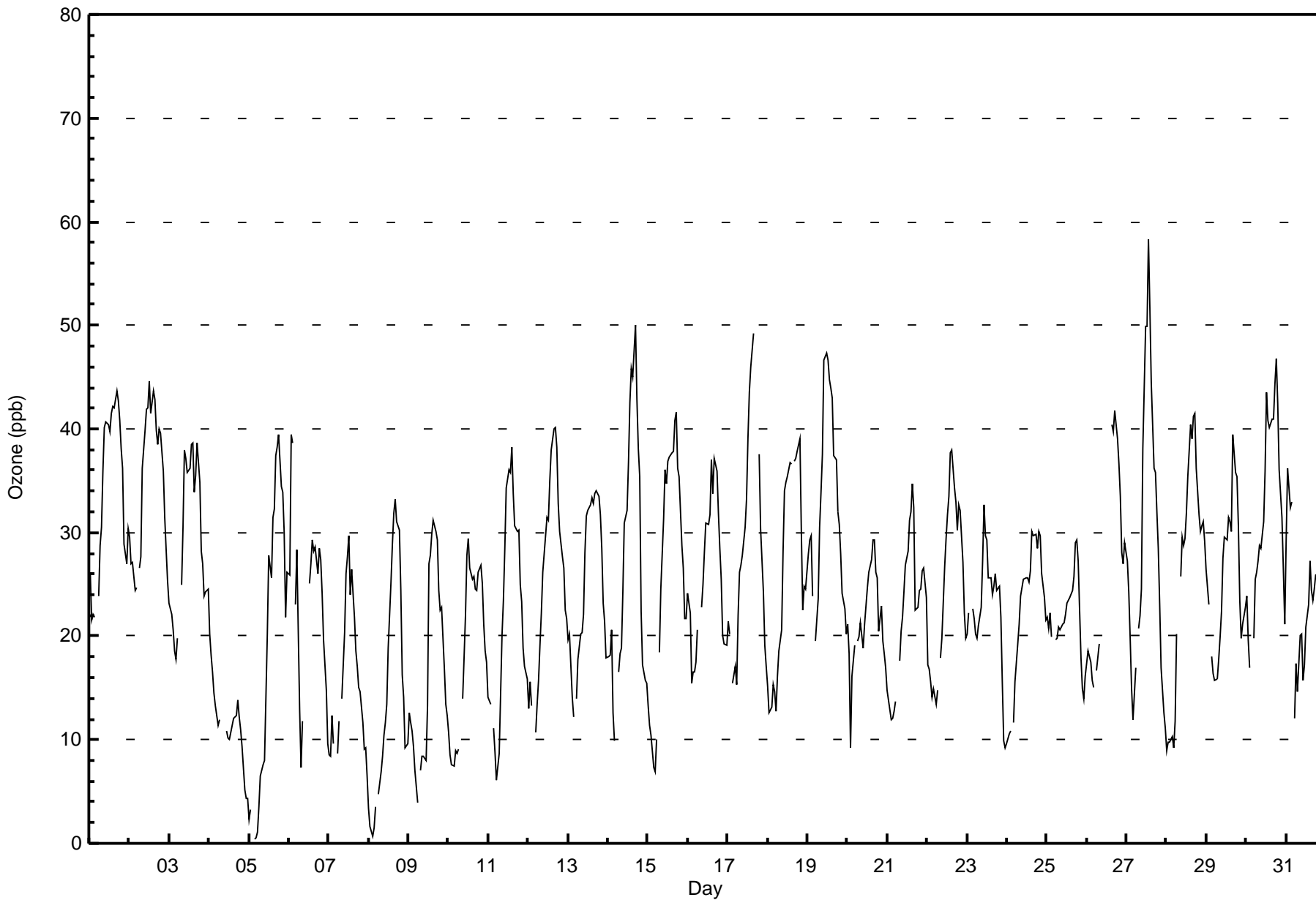
Athabasca Valley - July 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | | | | | | | | | | Hours in Service: 744 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|--------------------------------|----|----|----|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|--|
| Maximum Value: 58 ppb on Jul 27 14:00 | | | | | | | | | | Maximum Daily Average: 34.7 ppb on Jul 2 | | | | | | | | | | Hours of Data: 698 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Minimum Value: 0 ppb on Jul 5 04:00 | | | | | | | | | | Minimum Daily Average: 11.6 ppb on Jul 4 | | | | | | | | | | Hours of Missing Data: 46 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 34.2 ppb at hour 15 | | | | | | | | | | Minimum Diurnal Average: 13.4 ppb at hour 5 | | | | | | | | | | Hours of Calibration: 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 24.5 ppb | | | | | | | | | | Percentiles: P ₁ = 3 P ₁₀ = 11 Q ₁ = 17 Median = 24 Q ₃ = 31 P ₉₀ = 38 P ₉₉ = 46 | | | | | | | | | | Percent Operational Time: 98.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Jul | 26 | 22 | 22 | 22 | Z | 24 | 29 | 31 | 36 | 40 | 41 | 40 | 40 | 42 | 42 | 42 | 44 | 43 | 41 | 38 | 36 | 29 | 27 | 30 | 34.1 | 44 | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Jul | 30 | 27 | 27 | 24 | 25 | Z | 27 | 28 | 36 | 40 | 42 | 42 | 45 | 42 | 44 | 43 | 40 | 38 | 40 | 40 | 36 | 31 | 28 | 25 | 34.7 | 45 | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul | 23 | 22 | 21 | 19 | 18 | 20 | Z | 25 | 30 | 38 | 37 | 36 | 36 | 39 | 39 | 34 | 36 | 39 | 35 | 28 | 27 | 24 | 24 | 25 | 29.2 | 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Jul | 20 | 18 | 17 | 15 | 13 | 11 | 12 | Z | 12 | M | 11 | 10 | 10 | 11 | 11 | 12 | 12 | 14 | 12 | 11 | 9 | 5 | 4 | 4 | 11.6 | 20 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jul | 2 | 3 | Z | 0 | 0 | 1 | 3 | 6 | 8 | 8 | 14 | 20 | 28 | 26 | 31 | 32 | 37 | 38 | 39 | 34 | 34 | 30 | 22 | 26 | 19.4 | 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Jul | 26 | 39 | 39 | Z | 23 | 28 | 13 | 7 | 12 | C | C | C | 25 | 27 | 29 | 28 | 29 | 26 | 28 | 27 | 24 | 20 | 15 | 10 | 23.8 | 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Jul | 9 | 8 | 12 | 10 | Z | 9 | 12 | M | 14 | 20 | 26 | 28 | 30 | 24 | 26 | 22 | 19 | 17 | 15 | 15 | 12 | 9 | 9 | 7 | 16.0 | 30 | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Jul | 3 | 2 | 1 | 1 | 3 | Z | 5 | 7 | 8 | 10 | 12 | 13 | 19 | 25 | 29 | 32 | 33 | 31 | 30 | 24 | 16 | 14 | 9 | 10 | 14.7 | 33 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Jul | 13 | 12 | 11 | 9 | 7 | 4 | Z | 7 | 8 | 8 | 8 | 13 | 27 | 28 | 30 | 31 | 30 | 29 | 24 | 22 | 23 | 17 | 13 | 12 | 16.9 | 31 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul | 11 | 9 | 8 | 7 | 9 | 9 | 9 | Z | 14 | 18 | 22 | 28 | 29 | 27 | 26 | 26 | 24 | 24 | 26 | 27 | 25 | 21 | 19 | 17 | 18.9 | 29 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Jul | 14 | 13 | Z | 11 | 9 | 6 | 9 | 14 | 20 | 23 | 28 | 34 | 36 | 36 | 38 | 34 | 31 | 30 | 30 | 25 | 23 | 19 | 17 | 16 | 22.5 | 38 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jul | 13 | 16 | 13 | Z | 11 | 13 | 16 | 19 | 22 | 26 | 30 | 31 | 31 | 35 | 38 | 40 | 40 | 38 | 33 | 30 | 28 | 27 | 23 | 22 | 25.8 | 40 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Jul | 20 | 20 | 14 | 12 | Z | 14 | 18 | 20 | 20 | 22 | 28 | 32 | 32 | 33 | 33 | 33 | 34 | 34 | 33 | 32 | 28 | 23 | 21 | 18 | 25.0 | 34 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Jul | 18 | 18 | 21 | 13 | 10 | Z | 16 | 18 | 19 | 24 | 31 | 32 | 37 | 43 | 46 | 45 | 50 | 43 | 38 | 35 | 22 | 17 | 16 | 15 | 27.3 | 50 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Jul | 13 | 11 | 10 | 7 | 7 | 10 | Z | 18 | 25 | 31 | 36 | 35 | 37 | 37 | 38 | 38 | 41 | 42 | 36 | 35 | 29 | 27 | 22 | 22 | 26.4 | 42 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Jul | 24 | 22 | 15 | 17 | 17 | 18 | 21 | Z | 23 | 25 | 28 | 31 | 31 | 32 | 37 | 34 | 37 | 36 | 32 | 29 | 26 | 20 | 19 | 19 | 25.7 | 37 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul | 21 | 20 | Z | 16 | 17 | 15 | 22 | 26 | 27 | 28 | 31 | 33 | 39 | 44 | 46 | 49 | M | M | M | 38 | 30 | 24 | 19 | 17 | 28.1 | 49 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Jul | 15 | 13 | 13 | 15 | 15 | 13 | 16 | 19 | 21 | 28 | 34 | 35 | 35 | 37 | 37 | Z | 37 | 37 | 38 | 39 | 30 | 23 | 25 | 25 | 26.0 | 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jul | 28 | 29 | 30 | 24 | Z | 20 | 24 | 30 | 34 | 38 | 47 | 47 | 47 | 45 | 44 | 43 | 37 | 37 | 32 | 31 | 28 | 24 | 23 | 20 | 33.1 | 47 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Jul | 21 | 18 | 9 | 16 | 19 | Z | 20 | 20 | 21 | 19 | 21 | 23 | 25 | 26 | 27 | 29 | 29 | 26 | 26 | 20 | 23 | 20 | 18 | 17 | 21.5 | 29 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Jul | 15 | 13 | 12 | 12 | 13 | 14 | Z | 18 | 20 | 22 | 24 | 27 | 28 | 31 | 32 | 35 | 32 | 23 | 23 | 24 | 25 | 26 | 27 | 24 | 22.5 | 35 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Jul | 17 | 17 | 16 | 14 | 15 | 13 | 15 | Z | 18 | 20 | 27 | 29 | 32 | 33 | 38 | 38 | 34 | 33 | 30 | 33 | 32 | 27 | 22 | 20 | 24.9 | 38 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jul | 20 | 22 | Z | 23 | 22 | 20 | 20 | 21 | 23 | 27 | 33 | 30 | 29 | 26 | 26 | 24 | 25 | 26 | 24 | 25 | 22 | 16 | 10 | 9 | 22.7 | 33 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul | 10 | 11 | 11 | Z | 12 | 16 | 19 | 21 | 24 | 25 | 25 | 26 | 26 | 25 | 26 | 30 | 30 | 30 | 28 | 30 | 30 | 26 | 24 | 22 | 22.8 | 30 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Jul | 22 | 21 | 22 | 20 | Z | 20 | 20 | 21 | 21 | 21 | 21 | 22 | 23 | 23 | 24 | 24 | 26 | 29 | 29 | 27 | 18 | 15 | 14 | 16 | 21.7 | 29 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jul | 17 | 19 | 17 | 16 | 15 | Z | 17 | 19 | M | M | M | M | M | M | M | M | 40 | 40 | 42 | 39 | 37 | 33 | 28 | 27 | 29 | -- | 42 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Jul | 27 | 24 | 20 | 15 | 12 | 17 | Z | 21 | 22 | 24 | 38 | 50 | 50 | 58 | 52 | 44 | 36 | 36 | 32 | 29 | 23 | 17 | 13 | 11 | 29.2 | 58 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Jul | 9 | 10 | 10 | 10 | 9 | 12 | 20 | Z | 26 | 30 | 29 | 29 | 32 | 35 | 40 | 39 | 41 | 41 | 36 | 32 | 30 | 31 | 31 | 29 | 26.6 | 41 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Jul | 26 | 23 | Z | 18 | 16 | 16 | 16 | 18 | 20 | 22 | 28 | 30 | 29 | 31 | 31 | 30 | 39 | 36 | 35 | 31 | 23 | 20 | 21 | 23 | 25.4 | 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Jul | 24 | 20 | 17 | Z | 20 | 25 | 26 | 27 | 29 | 28 | 31 | 36 | 44 | 41 | 40 | 41 | 41 | 44 | 47 | 42 | 36 | 31 | 26 | 21 | 32.1 | 47 | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul | 29 | 36 | 32 | 33 | Z | 12 | 17 | 15 | 20 | 20 | 16 | 17 | 21 | 23 | 27 | 24 | 24 | 25 | 26 | 26 | 26 | 30 | 29 | 29 | 24.3 | 36 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 18.3 | 18.0 | 16.9 | 14.8 | 13.4 | 14.6 | 16.9 | 19.1 | 21.1 | 24.5 | 27.5 | 29.7 | 31.7 | 32.8 | 34.2 | 33.9 | 33.6 | 32.9 | 31.3 | 29.6 | 26.1 | 22.3 | 19.9 | 19.0 | Diurnal Average | |
| | | | | | | | | | | | | | | | | | | | | | | | | 30 | 39 | 39 | 33 | 25 | 28 | 29 | 31 | 36 | 40 | 47 | 50 | 50 | 58 | 52 | 49 | 50 | 44 | 47 | 42 | 36 | 31 | 31 | 30 | 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
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - July 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 252 | 36.10 | 36.10 |
| 21 - 50 | 444 | 63.61 | 99.71 |
| 51 - 82 | 2 | 0.29 | 100.00 |
| > 83 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 698

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 33 | 4 | 6 | 2 | 6 | 11 | 45 | 14 | 6 | 6 | 15 | 18 | 4 | 6 | 10 | 66 | 252 |
| 21 - 50 | 55 | 9 | 7 | 8 | 10 | 7 | 46 | 24 | 22 | 18 | 34 | 38 | 21 | 18 | 22 | 105 | 444 |
| 51 - 82 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| > 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 89 | 13 | 13 | 10 | 16 | 18 | 91 | 38 | 28 | 24 | 49 | 56 | 25 | 24 | 32 | 172 | 698 |

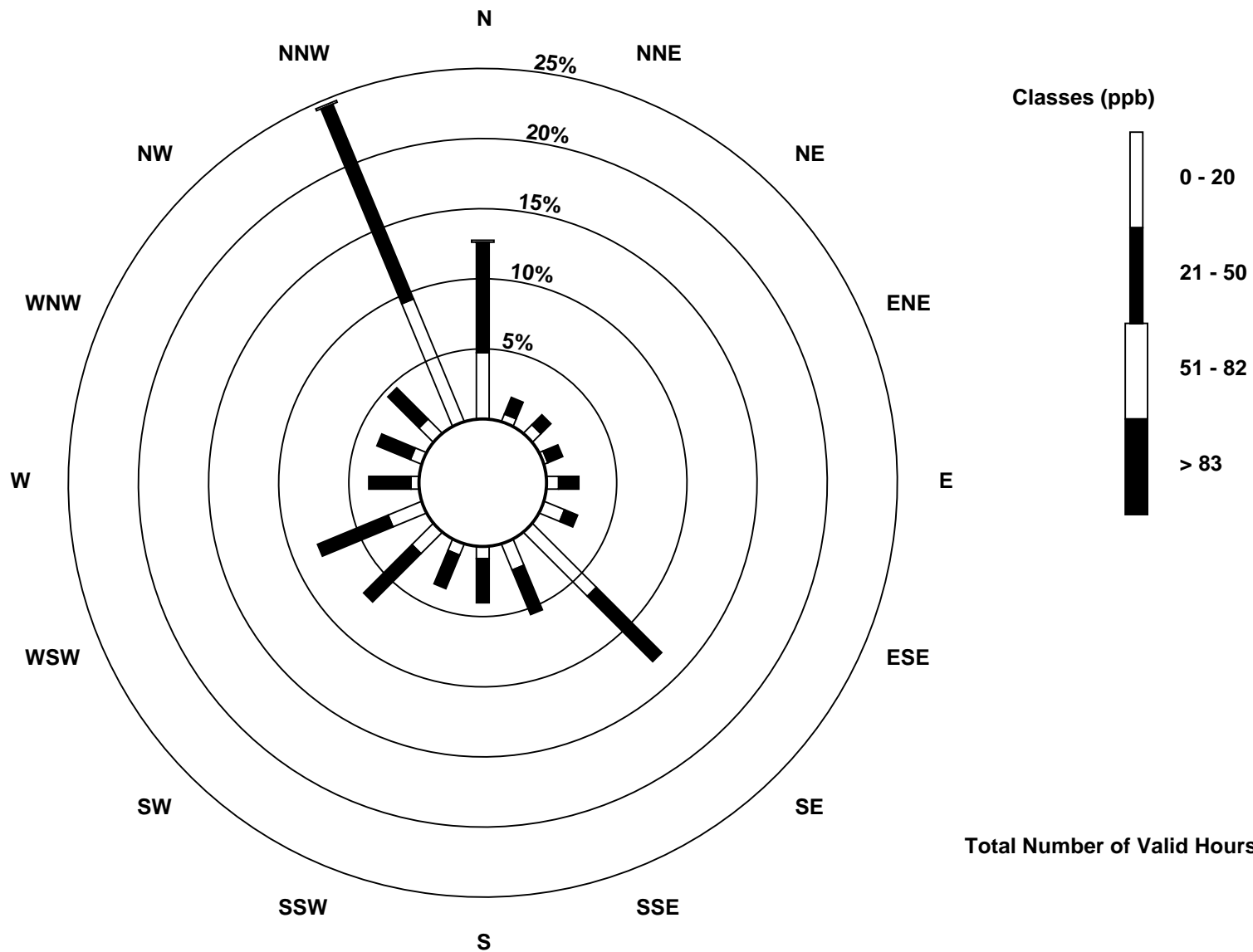
Total Number of Valid Hours: 698

Total Number of Hours: 744

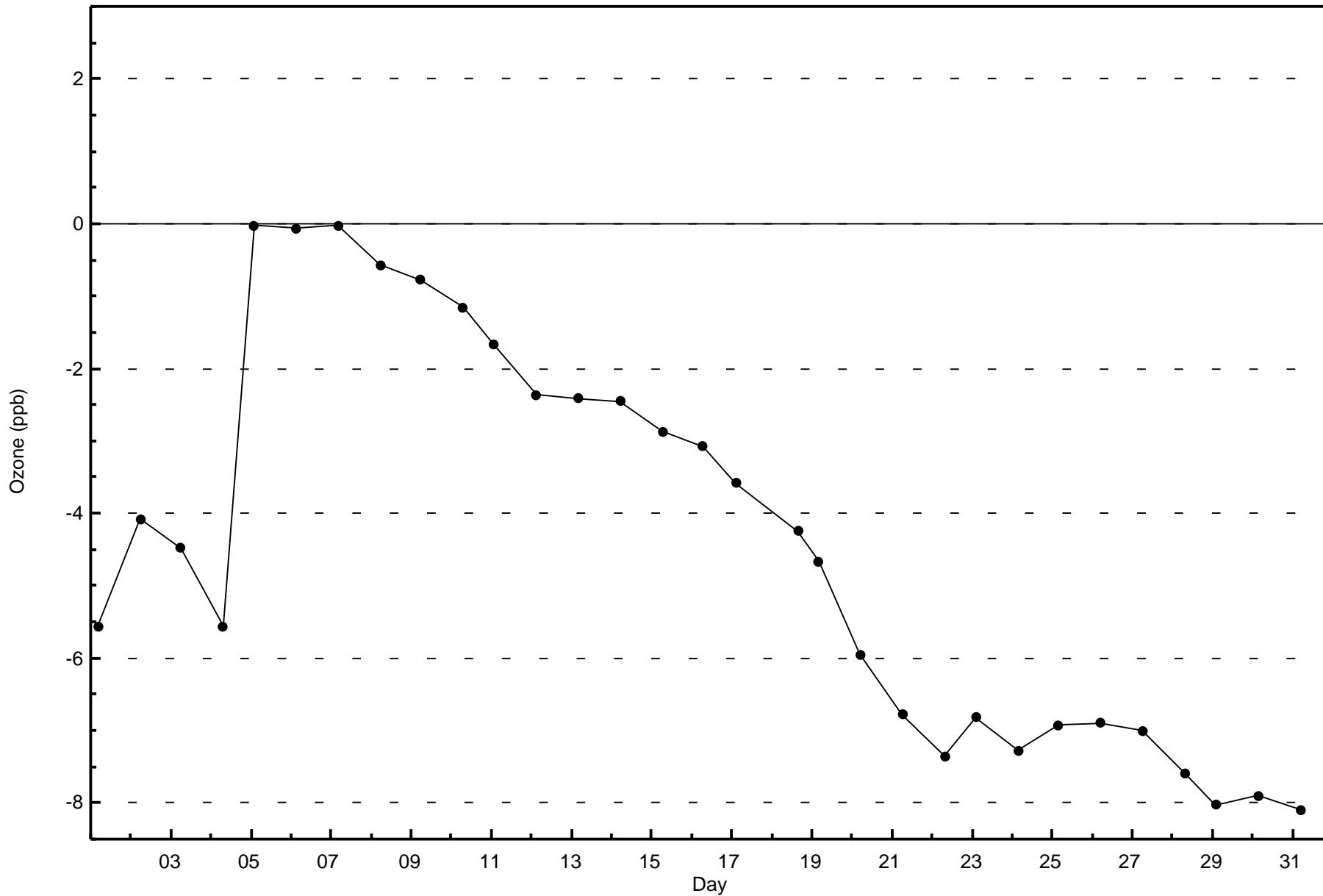


Wood Buffalo Environmental Association
Wind Rose Jul 2016

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



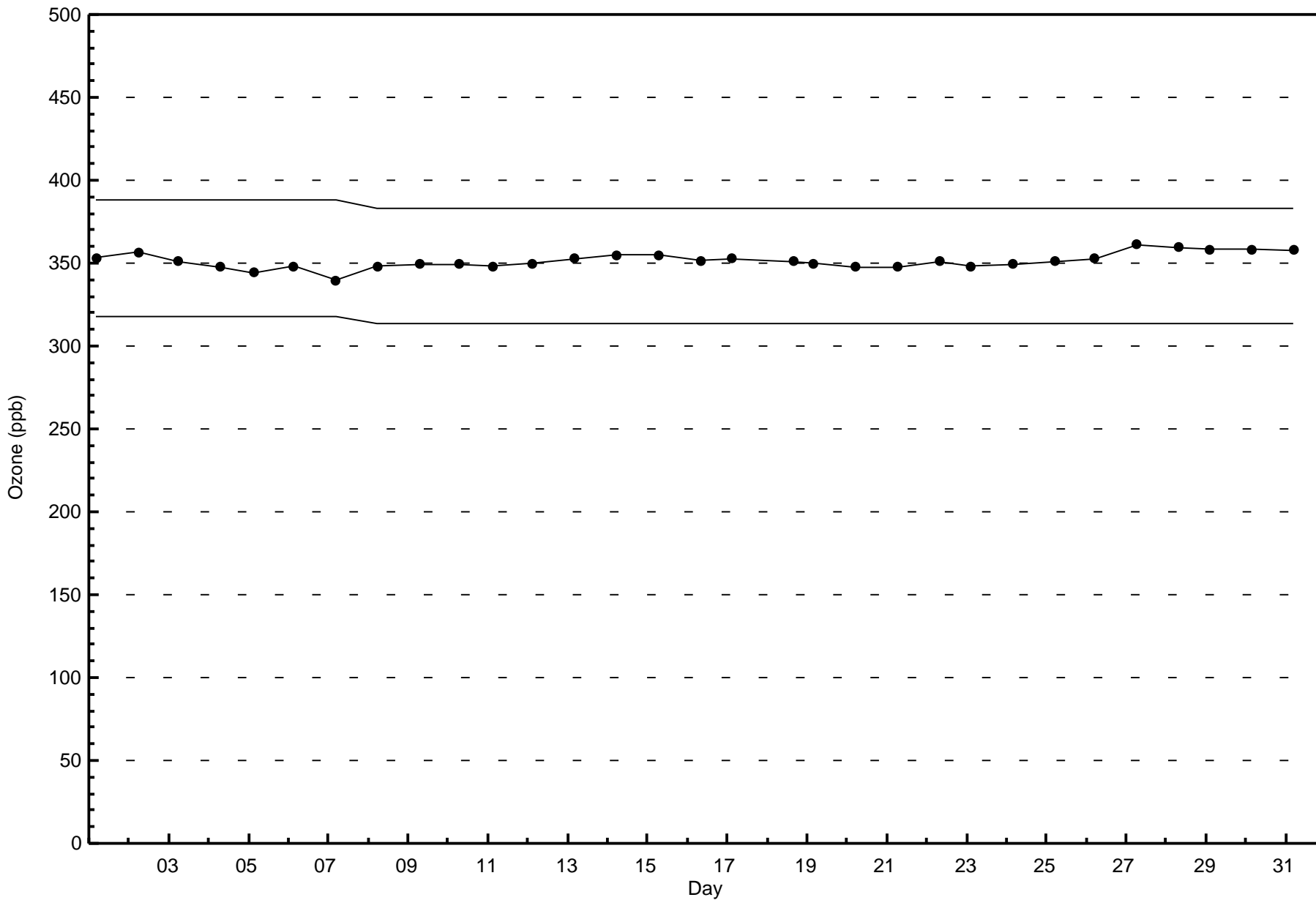
Total Number of Valid Hours: 698





Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

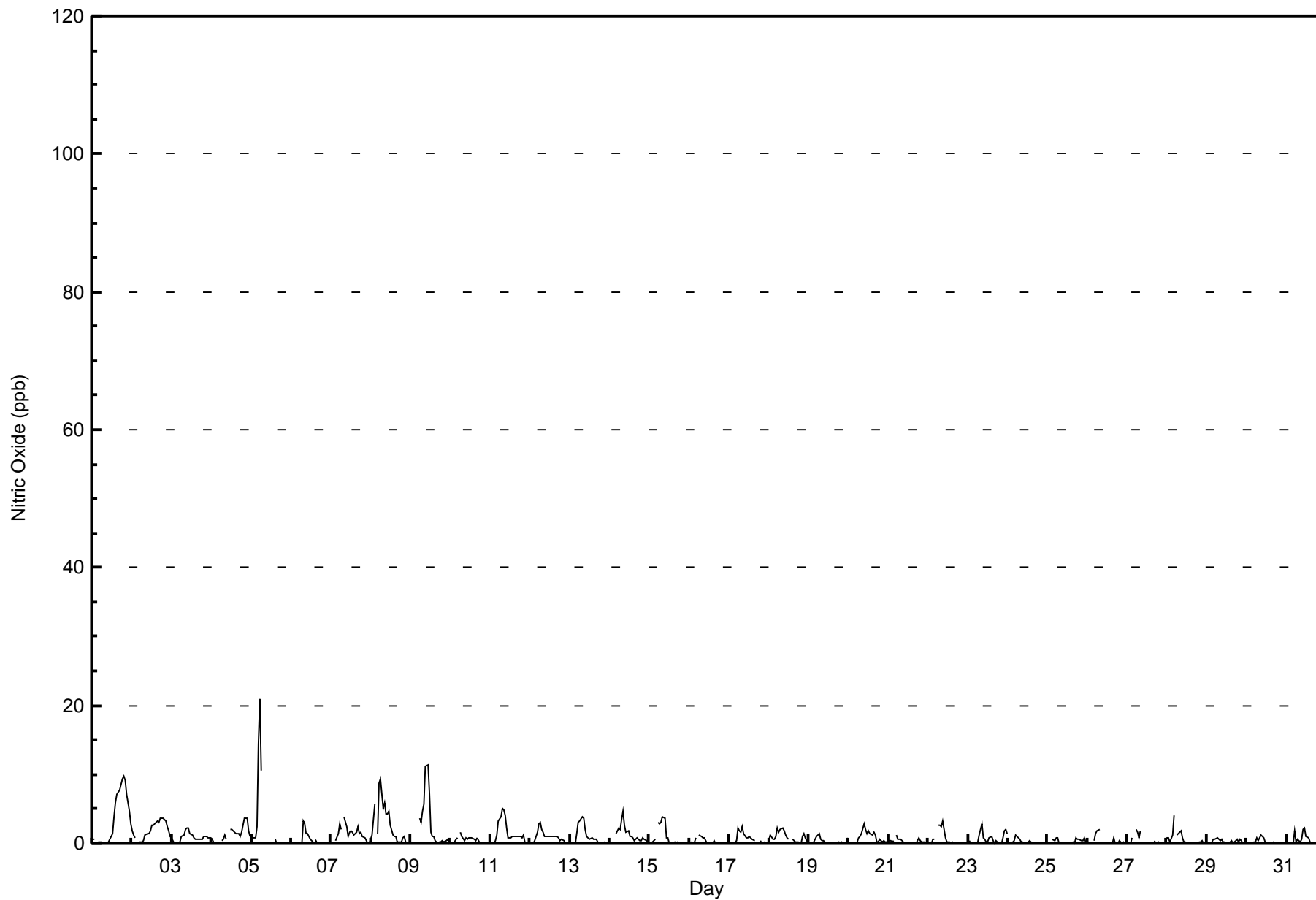
Nitric Oxide (NO) - ppb
Athabasca Valley - July 2016

| Maximum Value: 21 ppb on Jul 5 06:00 | | Maximum Daily Average: 3.5 ppb on Jul 1 | | Hours in Service: 744 | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------|-----|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|-----------------|
| Minimum Value: 0 ppb on Jul 1 04:00 | | Minimum Daily Average: 0.2 ppb on Jul 30 | | Hours of Data: 688 | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 2.6 ppb at hour 6 | | Minimum Diurnal Average: 0.3 ppb at hour 2 | | Hours of Missing Data: 56 | | | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 1.0 ppb | | Percentiles: P ₁ = 0 P ₁₀ = 0 Q ₁ = 0 Median = 0 Q ₃ = 1 P ₉₀ = 3 P ₉₉ = 9 | | Hours of Calibration: 45 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Percent Operational Time: 98.5 | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Jul | 1 | 1 | Z | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 6 | 7 | 8 | 8 | 9 | 10 | 9 | 7 | 5 | 3 | 3.5 | 10 |
| 2-Jul | 2 | 1 | 1 | Z | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 1 | 2.0 | 4 |
| 3-Jul | 1 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0.9 | 2 |
| 4-Jul | 1 | 0 | 0 | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | M | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | 2 | 1.3 | 4 |
| 5-Jul | Z | 1 | 1 | 3 | 15 | 21 | 11 | C | C | C | C | C | C | C | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 21 |
| 6-Jul | 0 | Z | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 |
| 7-Jul | 0 | 0 | Z | 0 | 1 | 3 | 2 | M | 4 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1.4 | 4 |
| 8-Jul | 1 | 1 | 6 | Z | 1 | 9 | 9 | 5 | 6 | 4 | 4 | 5 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2.6 | 9 |
| 9-Jul | 0 | 0 | 0 | 0 | Z | 4 | 3 | 5 | 6 | 11 | 11 | 7 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2.3 | 11 |
| 10-Jul | 0 | 0 | 0 | 1 | 1 | Z | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 |
| 11-Jul | Z | 0 | 0 | 0 | 1 | 3 | 4 | 5 | 5 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1.5 | 5 |
| 12-Jul | 0 | Z | 0 | 0 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0.9 | 3 |
| 13-Jul | 0 | 0 | Z | 0 | 1 | 3 | 3 | 4 | 4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4 |
| 14-Jul | 0 | 0 | 0 | Z | 1 | 2 | 2 | 3 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1.2 | 5 |
| 15-Jul | 0 | 0 | 0 | 1 | Z | 3 | 3 | 3 | 4 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.9 | 4 |
| 16-Jul | 0 | 0 | 0 | 0 | 1 | Z | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 17-Jul | Z | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | M | M | M | 0 | 0 | 0 | 0 | 0 | 0.7 | 2 |
| 18-Jul | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | Z | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0.9 | 2 |
| 19-Jul | 0 | 0 | Z | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 1 |
| 20-Jul | 0 | 0 | 0 | Z | 0 | 0 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.8 | 3 |
| 21-Jul | 0 | 0 | 0 | 0 | Z | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1 |
| 22-Jul | 0 | 0 | 0 | 1 | 1 | Z | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 3 |
| 23-Jul | Z | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0.6 | 3 |
| 24-Jul | 2 | Z | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 2 |
| 25-Jul | 0 | 0 | Z | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0.3 | 1 |
| 26-Jul | 0 | 0 | 0 | Z | 0 | 2 | 2 | 2 | M | M | M | M | M | M | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 2 |
| 27-Jul | 0 | 0 | 0 | 1 | Z | 2 | 2 | 1 | 2 | C | C | C | C | C | C | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | 2 |
| 28-Jul | 1 | 1 | 0 | 1 | 4 | Z | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 4 |
| 29-Jul | Z | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0.3 | 1 |
| 30-Jul | 0 | Z | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 1 |
| 31-Jul | 0 | 0 | Z | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 2 |
| | | 0.3 | 0.3 | 0.4 | 0.4 | 1.3 | 2.6 | 2.0 | 1.8 | 2.1 | 1.9 | 1.4 | 1.2 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.8 | 0.8 | 0.7 | 0.5 | 0.3 | Diurnal Average |
| | | 2 | 1 | 6 | 3 | 15 | 21 | 11 | 5 | 6 | 11 | 11 | 7 | 3 | 4 | 6 | 7 | 8 | 8 | 9 | 10 | 9 | 7 | 5 | 3 | Diurnal Maximum |
| Z - zerospan | | C - Calibration | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Athabasca Valley - July 2016

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 687 | 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: 688

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 87 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 162 | 687 |
| 21 - 40 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 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 | 87 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 163 | 688 |

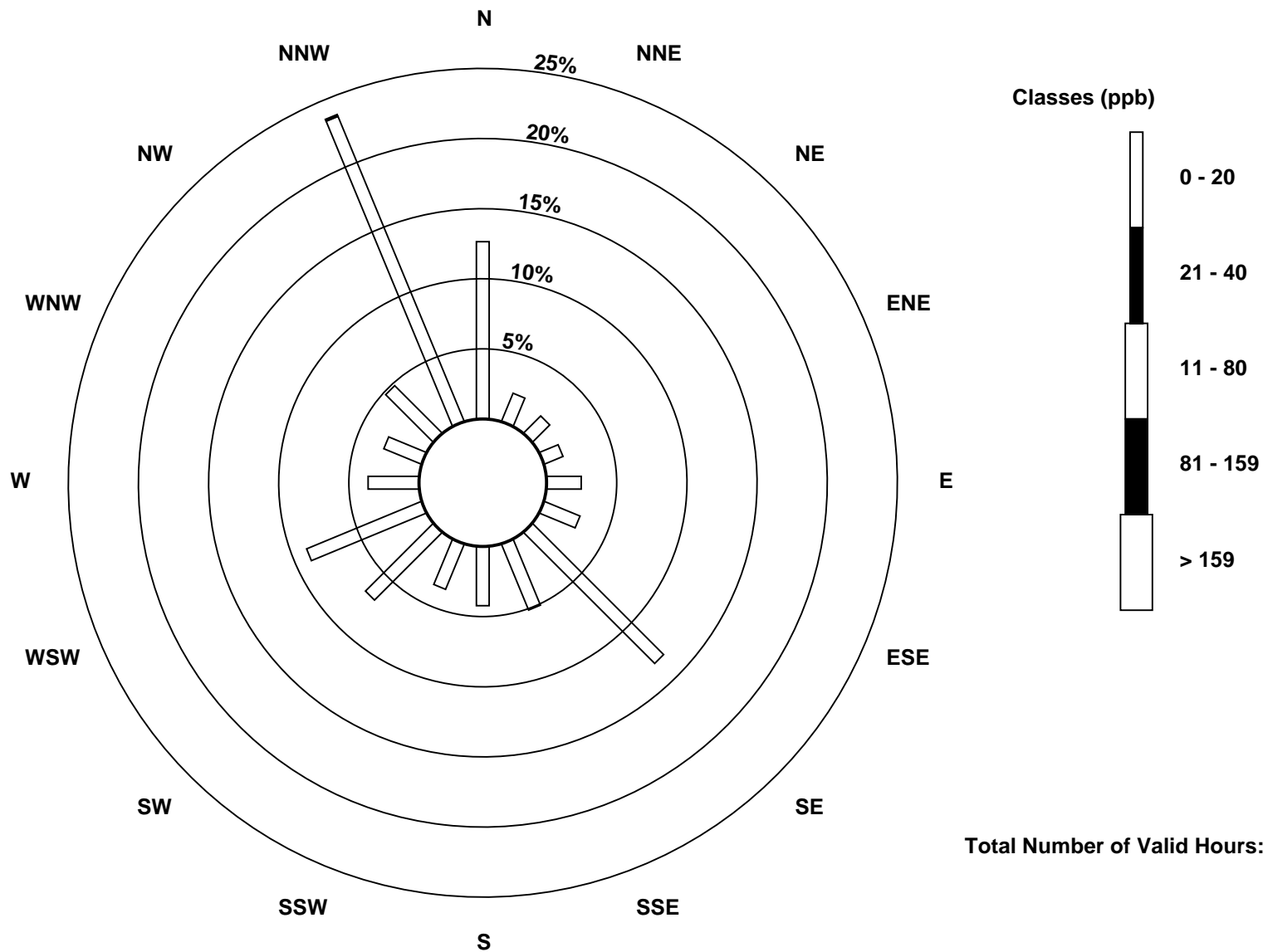
Total Number of Valid Hours: 688

Total Number of Hours: 744

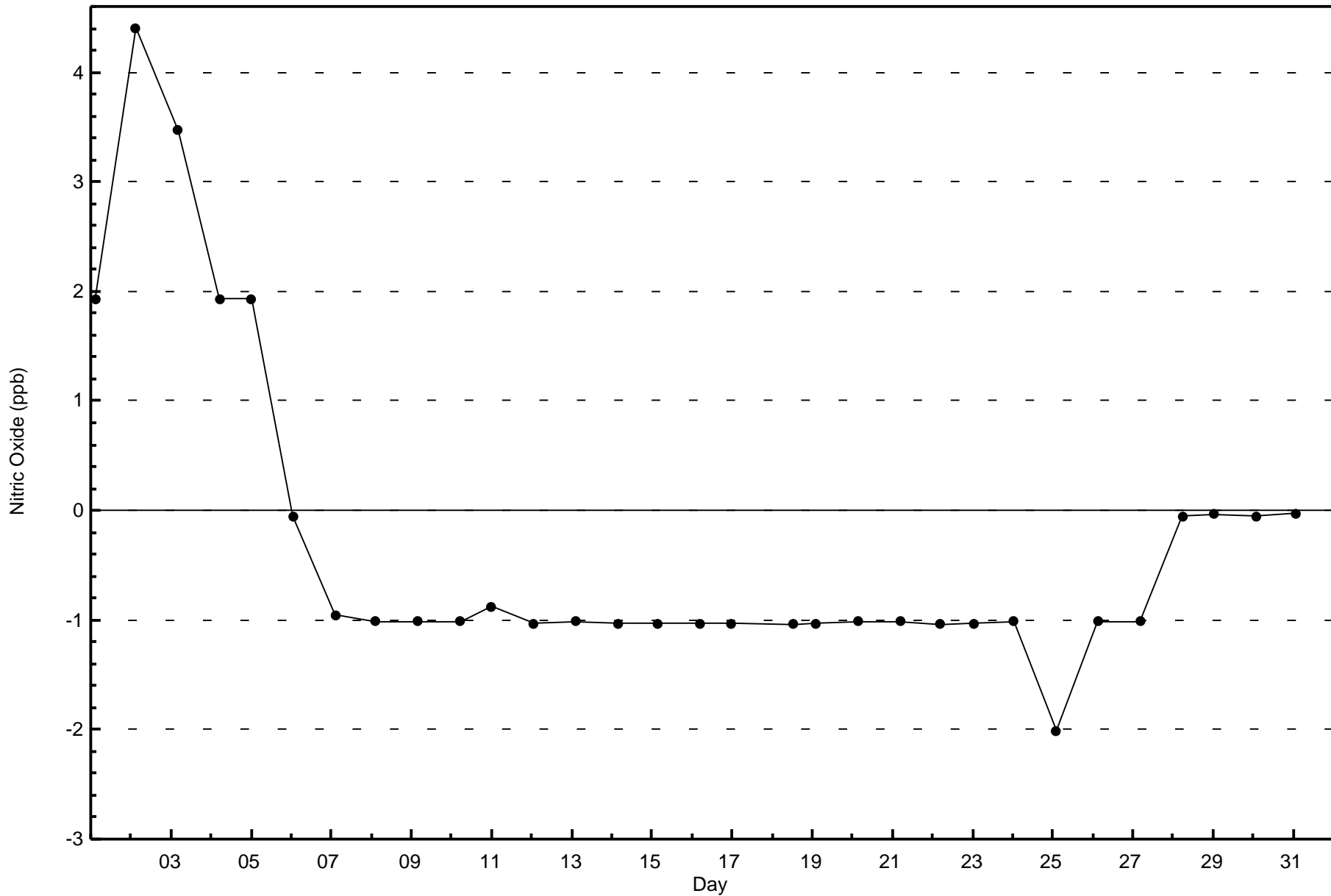


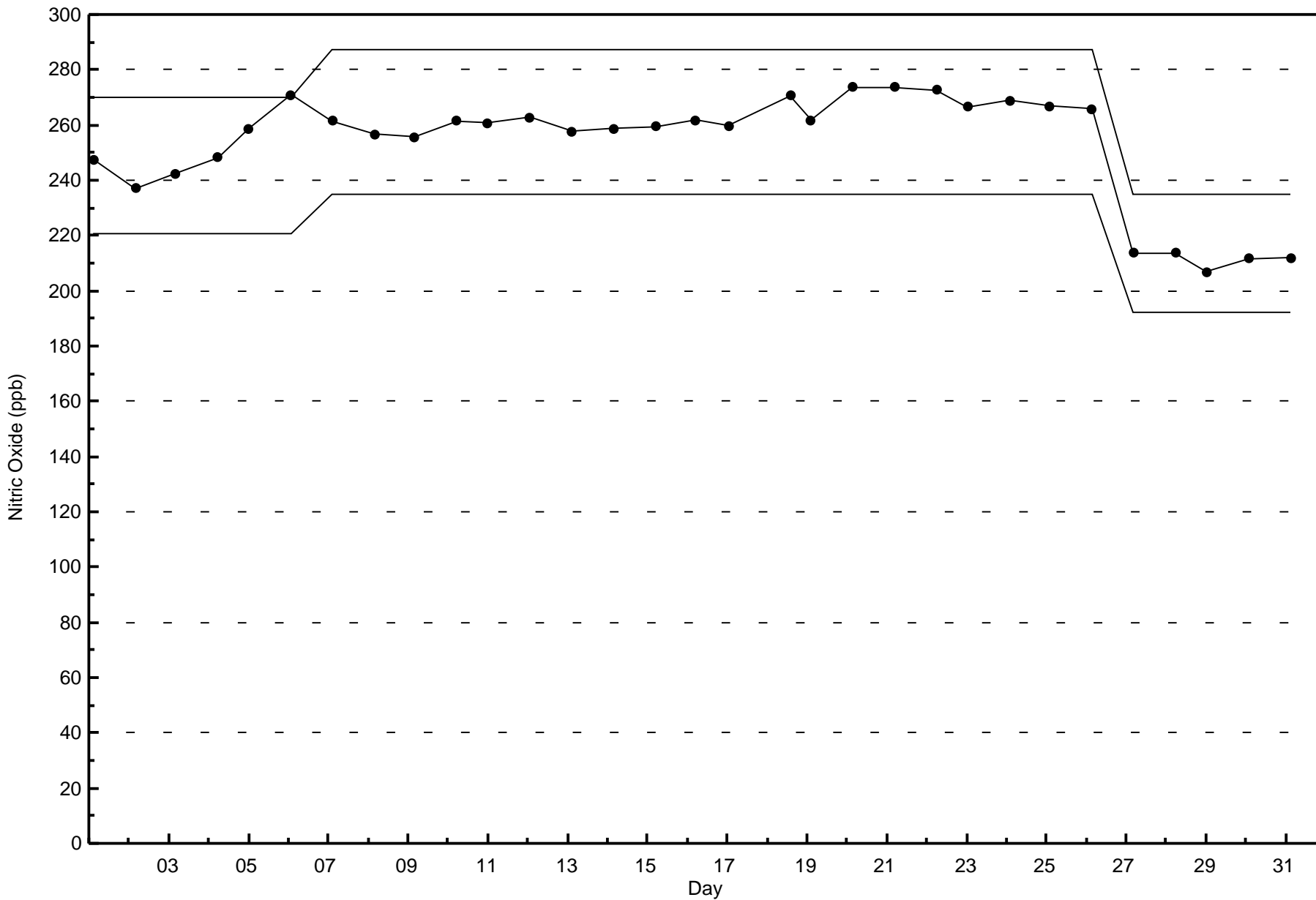
Wood Buffalo Environmental Association
Wind Rose Jul 2016

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



Total Number of Valid Hours: 688







Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 2016

| | | | | |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------|------|
| Number of Exceedences (AAAQO): | 1-hr: 0 | 24-hr: 0 | Hours in Service: | 744 |
| Maximum Value: 19 ppb on Jul 31 06:00 | Maximum Daily Average: 5.7 ppb on Jul 17 | | Hours of Data: | 688 |
| Minimum Value: 0 ppb on Jul 6 13:00 | Minimum Daily Average: 1.5 ppb on Jul 24 | | Hours of Missing Data: | 56 |
| Maximum Diurnal Average: 6.1 ppb at hour 6 | Minimum Diurnal Average: 1.8 ppb at hour 13 | | Hours of Calibration: | 45 |
| Monthly Average: 3.7 ppb | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 3 O ₃ = 5 P ₉₀ = 8 P ₉₉ = 13 | | Percent Operational Time: | 98.5 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | |
|--------|-------------------------------|----|----|----|----|----|---|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|---------------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | |
| 1-Jul | 4 | 4 | Z | 3 | 3 | 3 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 6 | 7 | 6 | 4 | 2.8 | 7 | |
| 2-Jul | 4 | 3 | 3 | Z | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 4 | 3 | 2 | 2.0 | 4 | |
| 3-Jul | 2 | 2 | 2 | 3 | Z | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 4 | 2 | 6 | 4 | 2 | 2 | 7 | 5 | 4 | 2 | 1 | 2.9 | 7 | |
| 4-Jul | 2 | 2 | 2 | 2 | 2 | Z | 2 | 2 | 2 | 2 | M | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 5 | 4 | 2 | 2.1 | 5 | |
| 5-Jul | Z | 1 | 1 | 4 | 6 | 7 | 7 | C | C | C | C | C | C | C | 6 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 9 | 2 | -- | 9 | |
| 6-Jul | 2 | Z | 1 | 2 | 5 | 5 | 7 | 9 | 7 | 5 | 2 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 5 | 6 | 7 | 10 | 3.4 | 10 | |
| 7-Jul | 13 | 12 | Z | 8 | 10 | 10 | 8 | M | 8 | 5 | 2 | 4 | 4 | 4 | 2 | 3 | 3 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 5.2 | 13 | |
| 8-Jul | 7 | 8 | 9 | Z | 5 | 8 | 7 | 5 | 4 | 2 | 3 | 4 | 4 | 2 | 2 | 1 | 1 | 2 | 3 | 6 | 12 | 11 | 14 | 9 | 5.6 | 14 | |
| 9-Jul | 4 | 4 | 5 | 6 | Z | 11 | 9 | 10 | 9 | 13 | 14 | 10 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 5 | 3 | 5.1 | 14 | |
| 10-Jul | 2 | 3 | 4 | 4 | 2 | Z | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 3 | 3 | 2.0 | 4 | |
| 11-Jul | Z | 1 | 1 | 1 | 3 | 5 | 4 | 7 | 8 | 6 | 5 | 2 | 1 | 2 | 2 | 3 | 3 | 4 | 2 | 1 | 2 | 5 | 6 | 6 | 3.5 | 8 | |
| 12-Jul | 8 | Z | 8 | 10 | 10 | 8 | 5 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 5 | 5 | 6 | 4 | 3.9 | 10 | |
| 13-Jul | 5 | 4 | Z | 11 | 13 | 11 | 8 | 7 | 7 | 4 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 5 | 7 | 7 | 7 | 7 | 4.8 | 13 | |
| 14-Jul | 4 | 4 | 1 | Z | 6 | 6 | 3 | 6 | 8 | 6 | 4 | 4 | 3 | 5 | 3 | 2 | 4 | 3 | 3 | 6 | 13 | 14 | 9 | 6 | 5.3 | 14 | |
| 15-Jul | 6 | 5 | 5 | 9 | Z | 7 | 5 | 5 | 8 | 10 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 6 | 5 | 4 | 3 | 4.1 | 10 | |
| 16-Jul | 2 | 3 | 5 | 6 | 5 | Z | 4 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 3 | 4 | 2 | 2 | 3 | 6 | 6 | 4 | 6 | 6 | 3.5 | 6 | |
| 17-Jul | Z | 5 | 9 | 9 | 8 | 12 | 8 | 5 | 6 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | M | M | M | 5 | 10 | 9 | 7 | 5 | 5.7 | 12 | |
| 18-Jul | 7 | 9 | 8 | 8 | 7 | 7 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | Z | 2 | 2 | 2 | 2 | 2 | 3 | 12 | 14 | 10 | 7 | 5.5 | 14 | |
| 19-Jul | 3 | 3 | Z | 6 | 8 | 6 | 5 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 4 | 3 | 3 | 4 | 3 | 4 | 3.1 | 8 | |
| 20-Jul | 3 | 3 | 12 | Z | 5 | 6 | 6 | 9 | 8 | 9 | 7 | 6 | 6 | 6 | 6 | 5 | 4 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 5.0 | 12 | |
| 21-Jul | 3 | 4 | 4 | 4 | Z | 4 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 3 | 2 | 1 | 1 | 2.0 | 4 | |
| 22-Jul | 5 | 7 | 5 | 5 | 3 | Z | 3 | 3 | 3 | 4 | 2 | 1 | 2 | 2 | 2 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 5 | 5 | 3.0 | 7 | |
| 23-Jul | Z | 3 | 1 | 1 | 1 | 1 | 2 | 3 | 5 | 3 | 3 | 2 | 1 | 4 | 4 | 3 | 4 | 3 | 4 | 2 | 3 | 6 | 10 | 7 | 3.2 | 10 | |
| 24-Jul | 6 | Z | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.5 | 6 | |
| 25-Jul | 1 | 1 | Z | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 12 | 12 | 9 | 3 | 2.6 | 12 |
| 26-Jul | 4 | 2 | 2 | Z | 4 | 4 | 3 | 3 | M | M | M | M | M | M | 2 | 3 | 5 | 3 | 3 | 6 | 9 | 10 | 9 | 4 | -- | 10 | |
| 27-Jul | 3 | 4 | 6 | 11 | Z | 8 | 5 | 2 | 4 | C | C | C | C | C | C | C | C | 3 | 3 | 4 | 3 | 4 | 9 | 11 | 10 | -- | 11 |
| 28-Jul | 11 | 10 | 8 | 8 | 8 | Z | 6 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 2 | 3 | 3 | 2 | 2 | 3.8 | 11 | |
| 29-Jul | Z | 1 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 8 | 6 | 3 | 3 | 2.2 | 8 | |
| 30-Jul | 3 | Z | 3 | 4 | 4 | 3 | 8 | 6 | 4 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 3 | 5 | 4 | 6 | 7 | 7 | 8 | 9 | 3.9 | 9 | |
| 31-Jul | 3 | 1 | Z | 1 | 10 | 19 | 8 | 11 | 8 | 9 | 10 | 8 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 5 | 9 | 2 | 1 | 1 | 5.0 | 19 | |

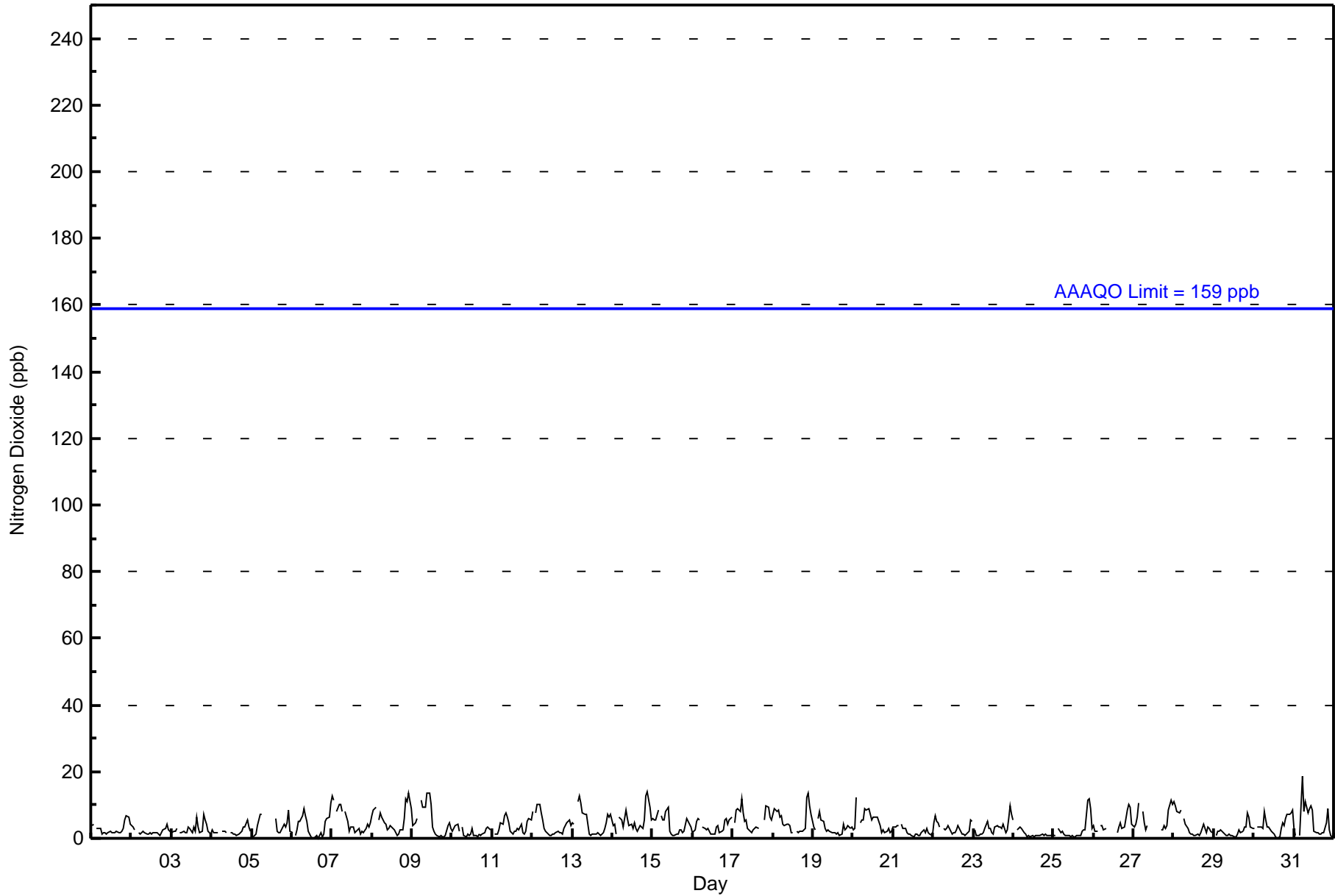
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|-----------------|
| 4.4 | 3.9 | 4.4 | 5.1 | 5.3 | 6.1 | 4.5 | 4.2 | 4.2 | 3.8 | 3.0 | 2.4 | 1.8 | 1.9 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 2.3 | 3.1 | 5.4 | 6.0 | 5.6 | 4.4 | Diurnal Average |
| 13 | 12 | 12 | 11 | 13 | 19 | 9 | 11 | 9 | 13 | 14 | 10 | 6 | 6 | 6 | 6 | 5 | 5 | 4 | 7 | 13 | 14 | 14 | 10 | Diurnal Maximum | |

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 688 | 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: 688

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 87 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 163 | 688 |
| 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 | 87 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 163 | 688 |

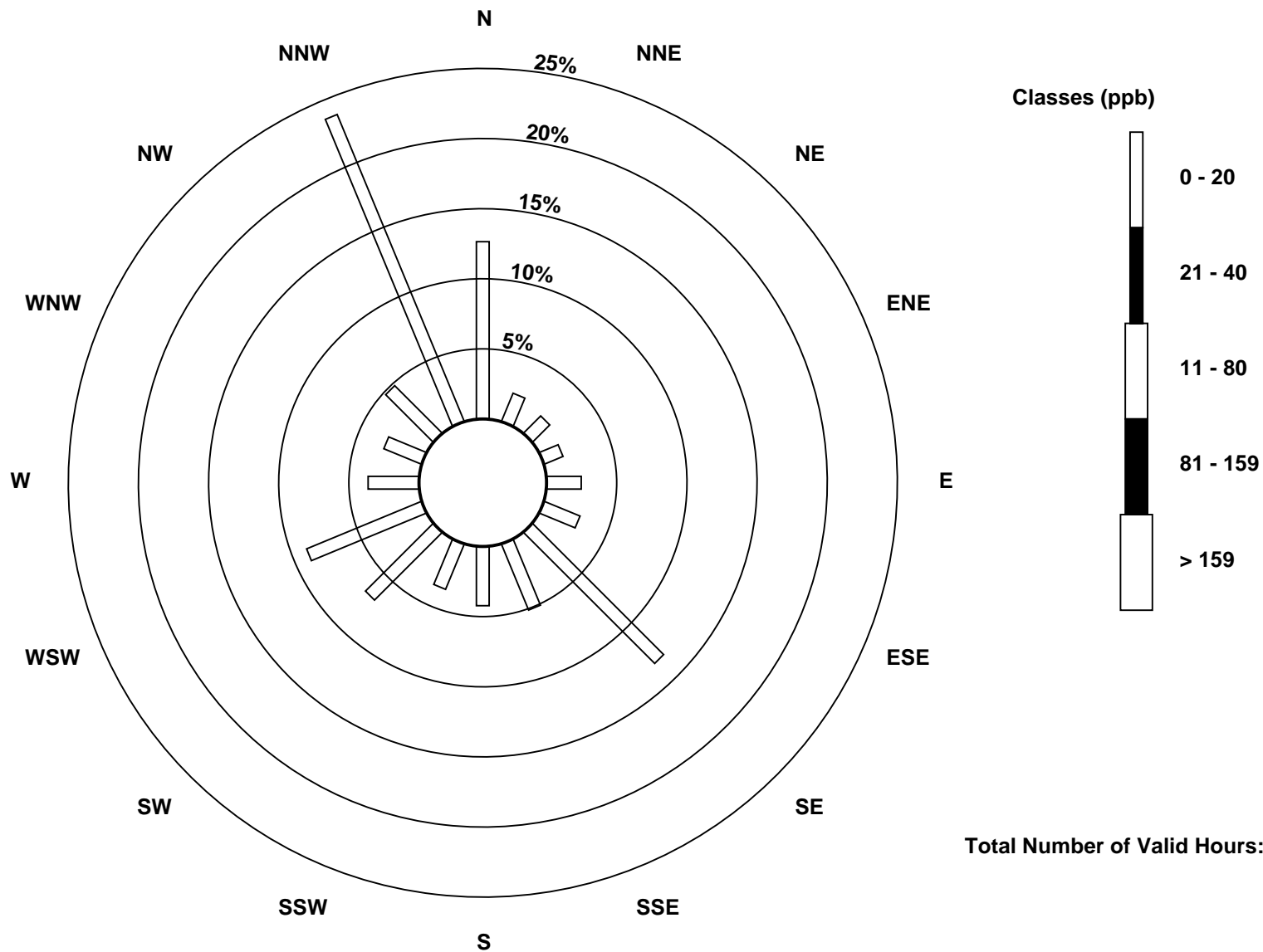
Total Number of Valid Hours: 688

Total Number of Hours: 744

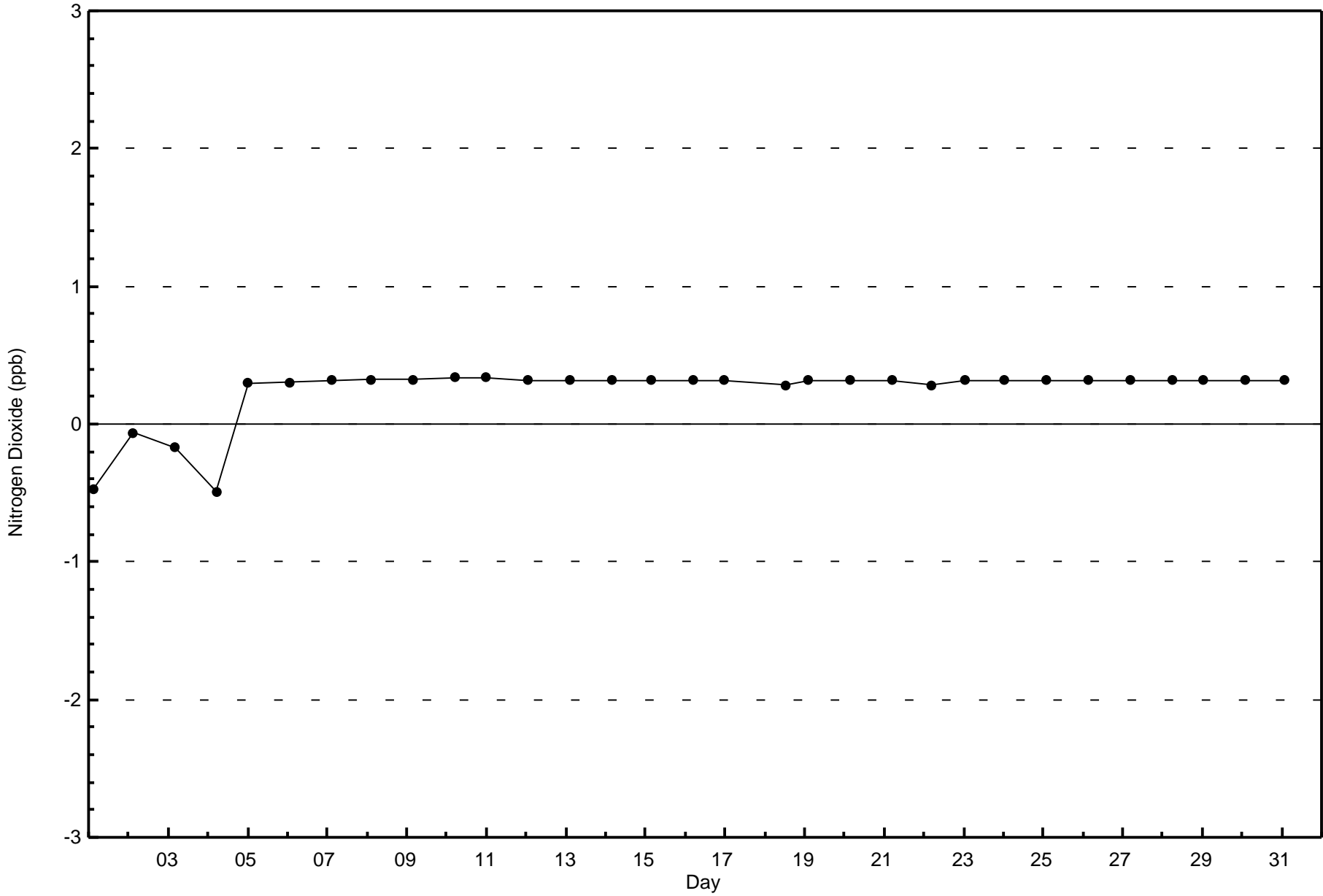


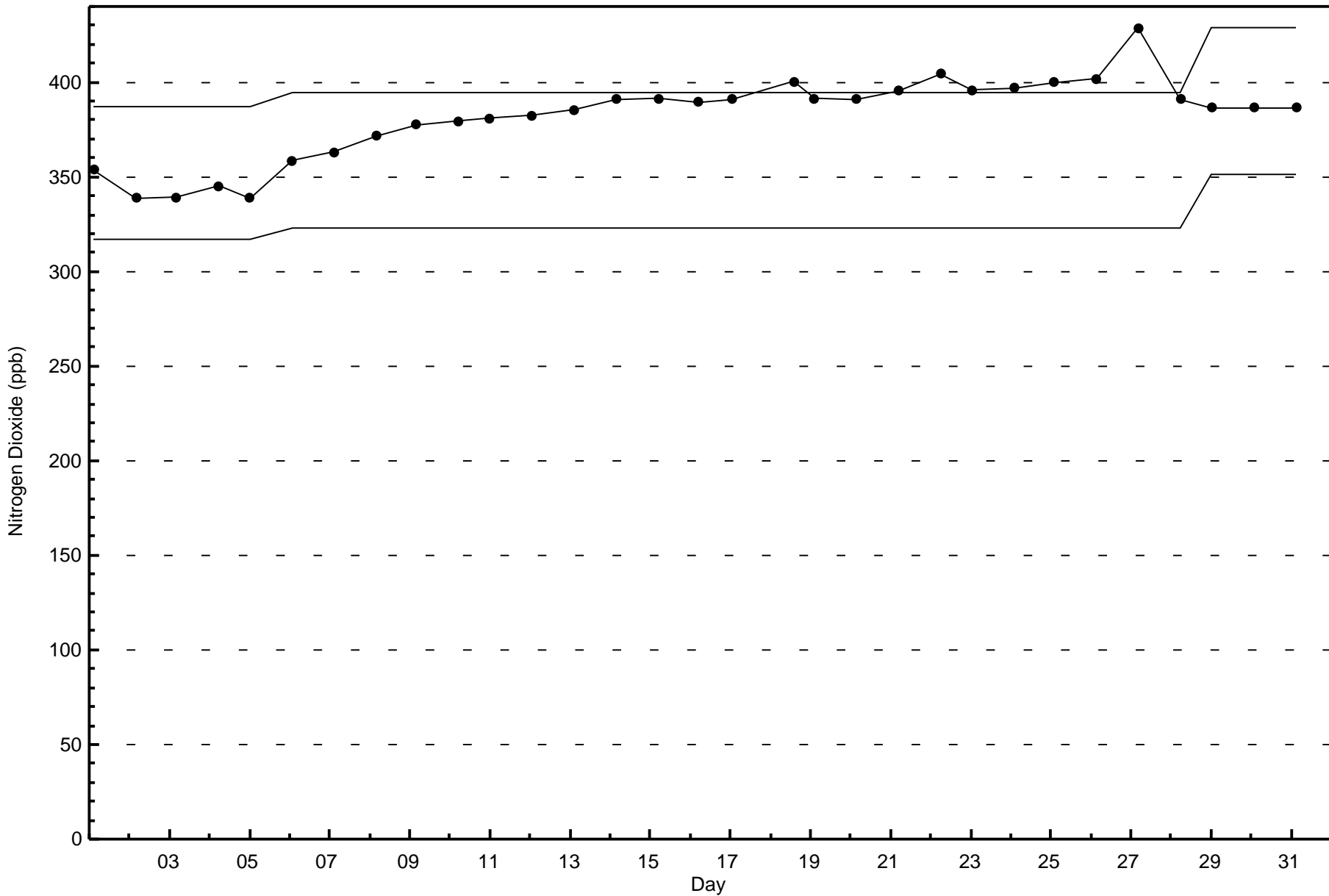
Wood Buffalo Environmental Association
Wind Rose Jul 2016

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



Total Number of Valid Hours: 688







Wood Buffalo Environmental Association
Summary of Hour Averages

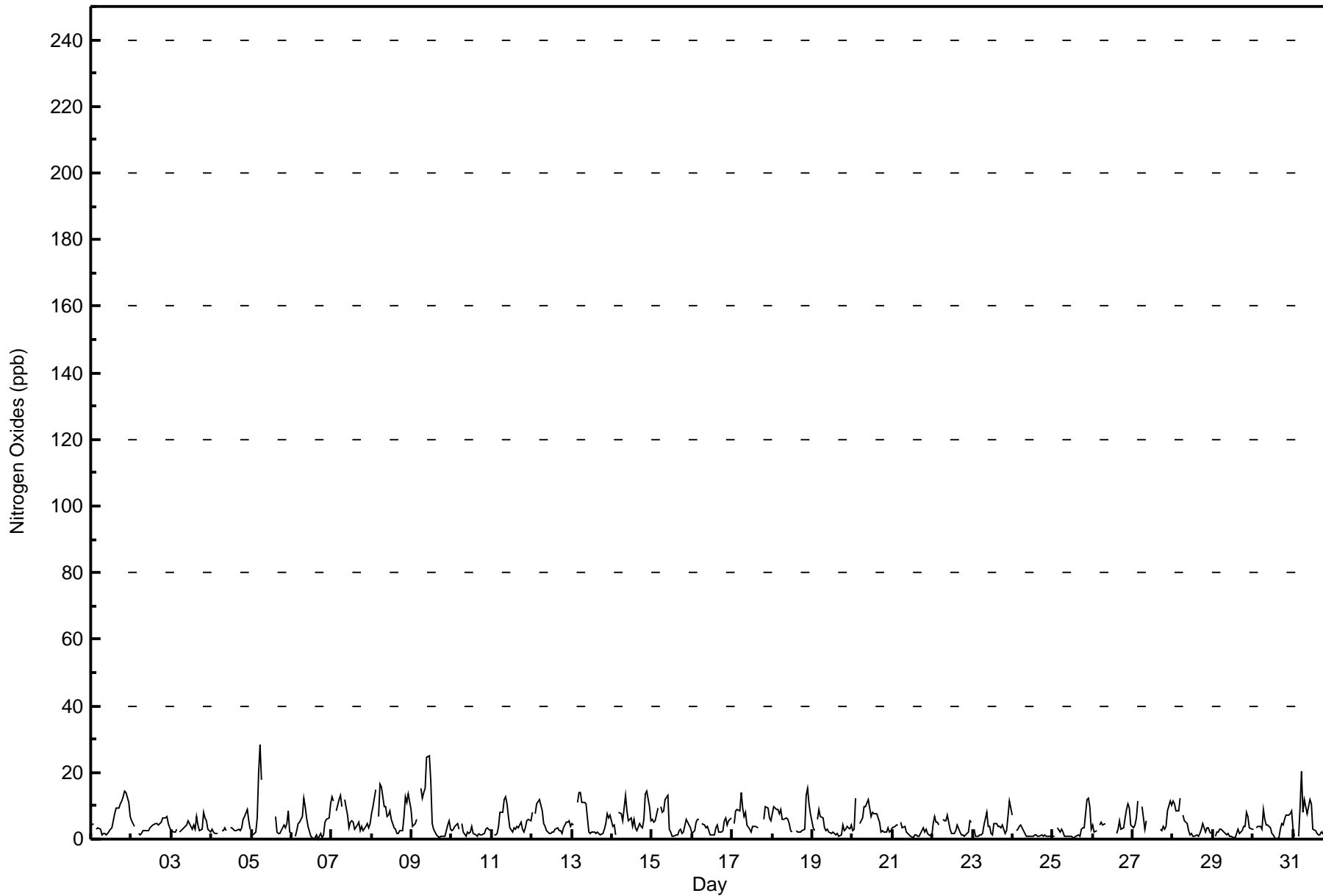
Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2016

| Maximum Value: 28 ppb on Jul 5 06:00 | | | | | | | | | | | | | | Maximum Daily Average: 8.2 ppb on Jul 8 | | | | | | | | | | | | | | Hours in Service: 744 | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------------|-------------------------------|----|-----------------|----|----|----|-----------------|----|----|----|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|----|-----|---------------|---------------|-----|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|--|
| Minimum Value: 0 ppb on Jul 6 17:00 | | | | | | | | | | | | | | Minimum Daily Average: 1.8 ppb on Jul 24 | | | | | | | | | | | | | | Hours of Data: 688 | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 8.6 ppb at hour 6 | | | | | | | | | | | | | | Minimum Diurnal Average: 2.6 ppb at hour 13 | | | | | | | | | | | | | | Hours of Missing Data: 56 | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 4.7 ppb | | | | | | | | | | | | | | Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 4 Q ₃ = 6 P ₉₀ = 10 P ₉₉ = 17 | | | | | | | | | | | | | | Hours of Calibration: 45 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 98.5 | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Jul | 4 | 5 | Z | 3 | 3 | 3 | 1 | 2 | 2 | 1 | 2 | 3 | 3 | 5 | 8 | 9 | 9 | 10 | 11 | 13 | 15 | 14 | 11 | 7 | 6.3 | 15 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Jul | 6 | 5 | 4 | Z | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 5 | 5 | 7 | 6 | 7 | 5 | 3 | 4.0 | 7 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul | 2 | 2 | 2 | 3 | Z | 2 | 2 | 3 | 4 | 4 | 6 | 4 | 3 | 4 | 3 | 7 | 4 | 2 | 3 | 8 | 6 | 5 | 3 | 2 | 3.8 | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Jul | 3 | 2 | 2 | 2 | 2 | Z | 2 | 3 | 3 | 2 | M | 4 | 4 | 3 | 3 | 2 | 3 | 4 | 6 | 7 | 9 | 5 | 3 | 3.4 | 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jul | Z | 1 | 2 | 6 | 20 | 28 | 18 | C | C | C | C | C | C | C | 7 | 2 | 2 | 2 | 3 | 4 | 3 | 5 | 9 | 2 | -- | 28 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Jul | 2 | Z | 1 | 2 | 5 | 5 | 7 | 12 | 10 | 6 | 4 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 5 | 6 | 6 | 10 | 3.8 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Jul | 13 | 12 | Z | 8 | 12 | 13 | 10 | M | 12 | 7 | 3 | 5 | 5 | 5 | 3 | 4 | 5 | 3 | 4 | 3 | 4 | 5 | 3 | 5 | 6.6 | 13 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Jul | 7 | 10 | 15 | Z | 7 | 16 | 16 | 10 | 10 | 7 | 7 | 9 | 6 | 4 | 3 | 2 | 2 | 3 | 3 | 7 | 13 | 11 | 13 | 9 | 8.2 | 16 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Jul | 4 | 4 | 5 | 6 | Z | 15 | 12 | 14 | 15 | 25 | 25 | 17 | 5 | 3 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 4 | 5 | 3 | 7.4 | 25 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul | 2 | 3 | 4 | 5 | 3 | Z | 5 | 2 | 1 | 2 | 2 | 2 | 4 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 4 | 3 | 3 | 2.4 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Jul | Z | 1 | 1 | 2 | 4 | 8 | 8 | 12 | 13 | 10 | 7 | 3 | 2 | 3 | 3 | 4 | 4 | 5 | 3 | 2 | 3 | 5 | 6 | 5 | 5.0 | 13 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jul | 8 | Z | 8 | 11 | 12 | 10 | 8 | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 5 | 5 | 6 | 4 | 4.9 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Jul | 5 | 4 | Z | 11 | 14 | 14 | 11 | 11 | 11 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 5 | 8 | 7 | 7 | 5.8 | 14 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Jul | 4 | 4 | 1 | Z | 8 | 8 | 5 | 9 | 13 | 8 | 6 | 6 | 4 | 6 | 4 | 3 | 5 | 4 | 3 | 6 | 13 | 14 | 10 | 6 | 6.5 | 14 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Jul | 6 | 5 | 6 | 9 | Z | 10 | 8 | 8 | 12 | 13 | 3 | 2 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 6 | 5 | 4 | 4 | 5.0 | 13 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Jul | 2 | 3 | 5 | 6 | 6 | Z | 5 | 4 | 3 | 4 | 2 | 1 | 1 | 1 | 3 | 4 | 2 | 2 | 3 | 6 | 6 | 4 | 6 | 6 | 3.7 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul | Z | 5 | 9 | 9 | 8 | 14 | 9 | 7 | 8 | 4 | 3 | 2 | 4 | 4 | 4 | 3 | M | M | M | 6 | 10 | 10 | 6 | 5 | 6.5 | 14 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Jul | 8 | 10 | 9 | 9 | 8 | 9 | 6 | 6 | 7 | 6 | 5 | 3 | 2 | Z | 3 | 2 | 2 | 2 | 2 | 3 | 13 | 15 | 11 | 7 | 6.4 | 15 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jul | 4 | 3 | Z | 6 | 9 | 7 | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 4 | 3 | 3 | 4 | 3 | 4 | 3.3 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Jul | 3 | 3 | 12 | Z | 4 | 6 | 6 | 10 | 10 | 12 | 9 | 7 | 8 | 8 | 8 | 7 | 5 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 5.8 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Jul | 4 | 4 | 4 | 4 | Z | 5 | 3 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 4 | 2 | 3 | 2 | 1 | 1 | 2.3 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Jul | 5 | 7 | 5 | 5 | 4 | Z | 6 | 5 | 5 | 7 | 3 | 2 | 2 | 2 | 3 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 5 | 5 | 3.6 | 7 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jul | Z | 3 | 1 | 1 | 1 | 1 | 2 | 4 | 8 | 4 | 4 | 2 | 1 | 4 | 5 | 4 | 4 | 4 | 4 | 2 | 3 | 7 | 12 | 9 | 3.8 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul | 7 | Z | 2 | 3 | 4 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1.8 | 7 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Jul | 1 | 1 | Z | 4 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 3 | 3 | 3 | 12 | 12 | 10 | 3 | 2.9 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jul | 4 | 2 | 2 | Z | 4 | 5 | 4 | 5 | M | M | M | M | M | M | 2 | 3 | 5 | 3 | 3 | 7 | 9 | 10 | 10 | 4 | -- | 10 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Jul | 3 | 4 | 6 | 12 | Z | 10 | 6 | 3 | 6 | C | C | C | C | C | C | C | C | 3 | 3 | 4 | 3 | 4 | 9 | 11 | 10 | -- | 12 | | | | | | | | | | | | | | | | | | | | | |
| 28-Jul | 12 | 11 | 8 | 9 | 12 | Z | 7 | 5 | 5 | 3 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 5 | 2 | 4 | 3 | 2 | 2 | 4.4 | 12 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Jul | Z | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 4 | 4 | 8 | 7 | 3 | 3 | 2.5 | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Jul | 3 | Z | 3 | 4 | 4 | 3 | 9 | 6 | 4 | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 3 | 4 | 4 | 6 | 7 | 7 | 8 | 9 | 4.2 | 9 | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul | 3 | 1 | Z | 1 | 10 | 20 | 8 | 12 | 8 | 10 | 12 | 11 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 5 | 9 | 2 | 1 | 1 | 5.5 | 20 | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 | | | | | | | | | | | | | | | | | | | | | | | | 4.2 | 4.8 | 5.5 | 6.6 | 8.6 | 6.5 | 5.9 | 6.3 | 5.7 | 4.4 | 3.6 | 2.6 | 2.7 | 2.8 | 2.9 | 2.7 | 2.7 | 3.1 | 3.9 | 6.2 | 6.7 | 6.1 | 4.7 | Diurnal Average | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | 12 | 15 | 12 | 20 | 28 | 18 | 14 | 15 | 25 | 25 | 17 | 8 | 8 | 8 | 9 | 9 | 10 | 11 | 13 | 15 | 15 | 13 | 10 | Diurnal Maximum | |
| Z - zerospan | | | C - Calibration | | | | M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 20 | 685 | 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: 688

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2016**

| Concentration Ranges (ppb) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 20 | 86 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 161 | 685 |
| 21 - 40 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 87 | 15 | 12 | 10 | 17 | 19 | 91 | 35 | 29 | 24 | 47 | 61 | 25 | 20 | 33 | 163 | 688 |

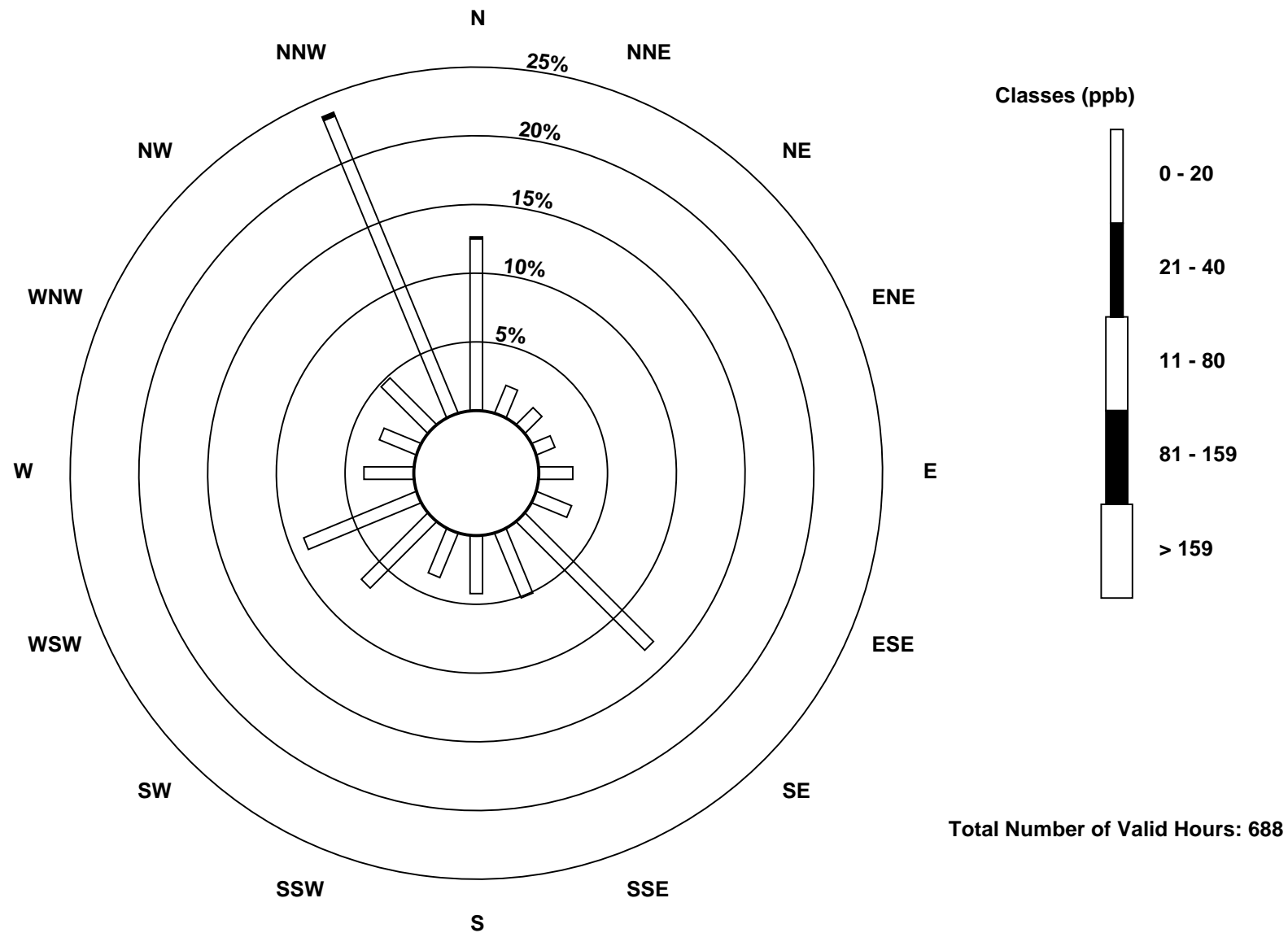
Total Number of Valid Hours: 688

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2016

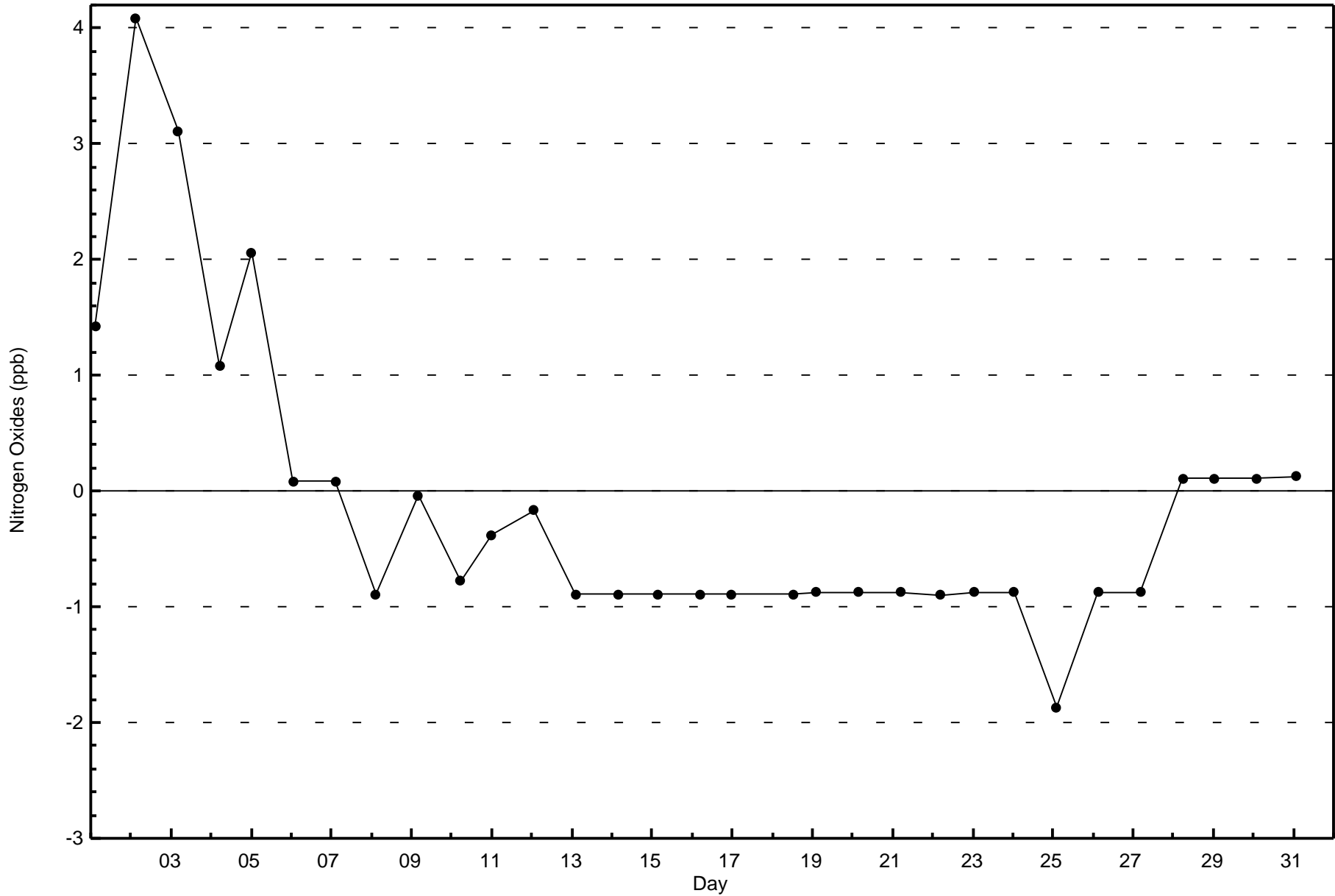
Nitrogen Oxides (NO_x) - ppb
Athabasca Valley (AMS 7)

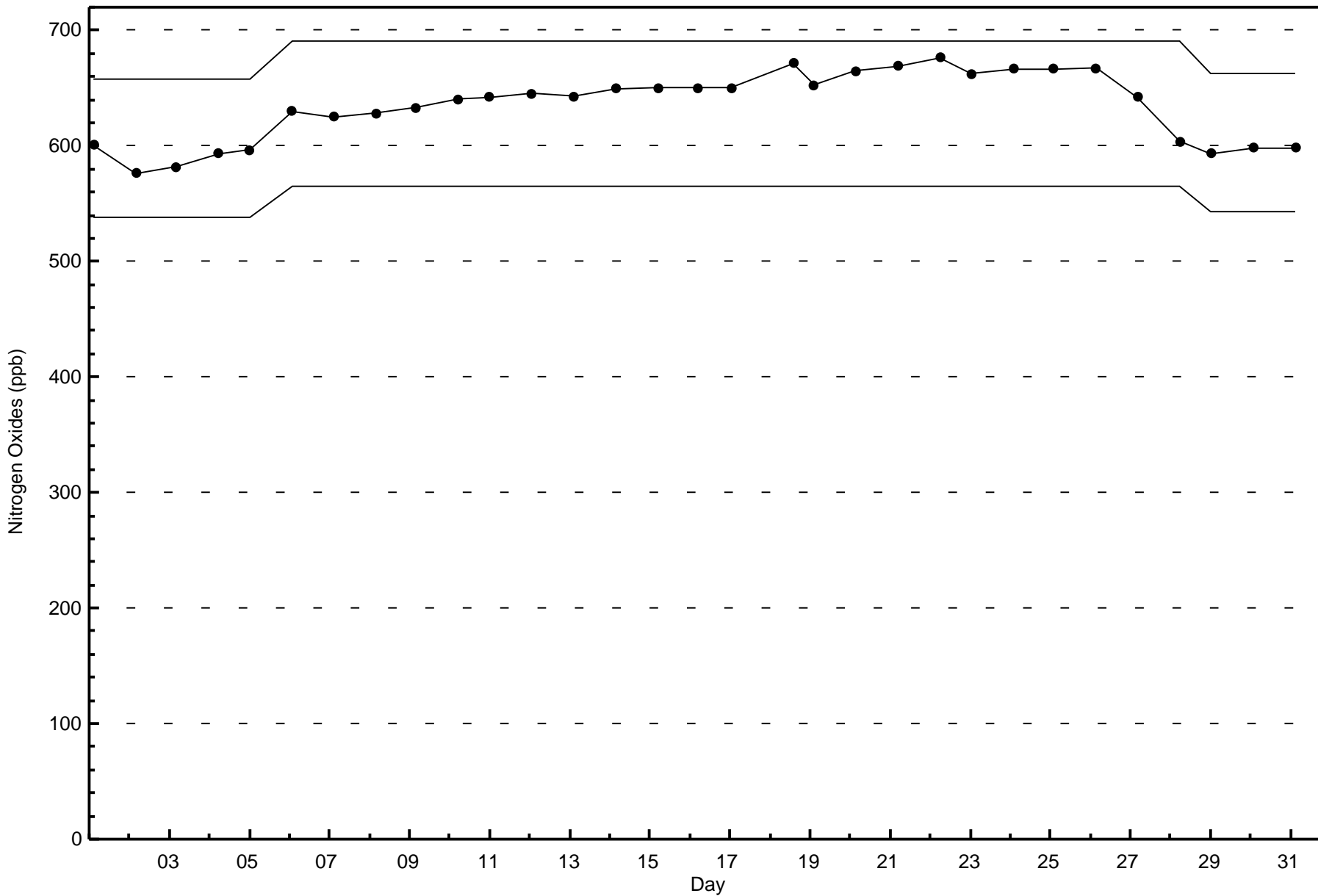




Wood Buffalo Environmental Association
Zero Responses

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - July 2016







Wood Buffalo Environmental Association

Summary of Hour Averages

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

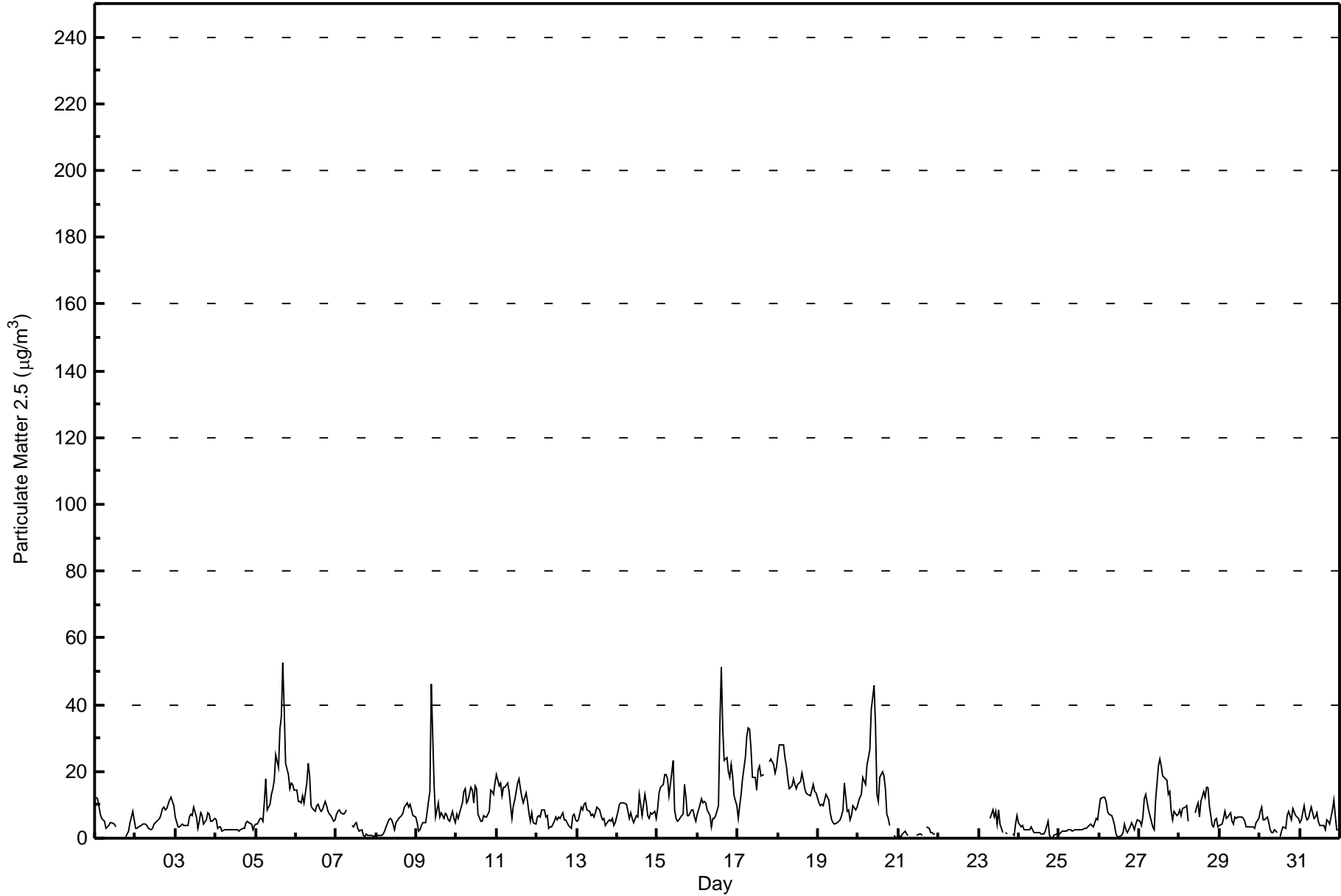
Athabasca Valley - July 2016

| Number of Exceedences (AAAQO): | | 24-hr: 0 | | Hours in Service: | | 744 | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|---------------|---------------|
| Maximum Value: 52.4 µg/m ³ on Jul 5 17:00 | | Maximum Daily Average: 20.6 µg/m ³ on Jul 17 | | Hours of Data: | | 689 | | | | | | | | | | | | | | | | | | | | |
| Minimum Value: 0.0 µg/m ³ on Jul 24 20:00 | | Minimum Daily Average: 2.1 µg/m ³ on Jul 24 | | Hours of Missing Data: | | 55 | | | | | | | | | | | | | | | | | | | | |
| Maximum Diurnal Average: 10.3 µg/m ³ at hour 17 | | Minimum Diurnal Average: 6.8 µg/m ³ at hour 23 | | Hours of Calibration: | | 3 | | | | | | | | | | | | | | | | | | | | |
| Monthly Average: 8.50 µg/m ³ | | Percentiles: P ₁ = 0.6 P ₁₀ = 2.2 Q ₁ = 3.9 Median = 6.6 Q ₃ = 10.8 P ₉₀ = 17.5 P ₉₉ = 35.5 | | Percent Operational Time: | | 93.0 | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Jul | 12.1 | 11.8 | 9.9 | 7.3 | 6.0 | 4.9 | 3.2 | 3.4 | 3.6 | 4.5 | 4.6 | 4.2 | 3.4 | UO | UO | UO | UO | UO | 0.3 | 1.4 | 2.0 | 4.7 | 8.0 | 5.3 | 5.3 | 12.1 |
| 2-Jul | 3.0 | 3.2 | 3.5 | 3.8 | 4.1 | 4.2 | 4.2 | 4.0 | 3.2 | 2.5 | 2.9 | 4.1 | 4.6 | 5.2 | 6.1 | 7.4 | 8.7 | 9.3 | 8.3 | 9.0 | 11.3 | 12.1 | 11.0 | 9.9 | 6.1 | 12.1 |
| 3-Jul | 6.5 | 3.4 | 3.6 | 3.9 | 4.0 | 4.0 | 3.8 | 3.9 | 6.4 | 7.1 | 6.8 | 9.3 | 6.5 | 3.1 | 4.9 | 7.5 | 6.8 | 4.3 | 5.6 | 7.7 | 7.2 | 5.0 | 5.0 | 5.9 | 5.5 | 9.3 |
| 4-Jul | 5.3 | 3.1 | 3.3 | 3.3 | 2.1 | 2.4 | 2.6 | 2.5 | 2.6 | 2.6 | 2.7 | 2.6 | 2.5 | 2.2 | 2.7 | 2.8 | 3.0 | 4.7 | 5.0 | 4.5 | 4.4 | 2.7 | 3.8 | 3.2 | 5.3 | 5.3 |
| 5-Jul | 4.4 | 4.1 | 5.9 | 5.9 | 5.1 | 11.1 | 17.8 | 8.5 | 10.1 | 13.1 | 14.8 | 17.5 | 25.2 | 21.3 | 32.5 | 36.3 | 52.4 | 38.8 | 22.6 | 18.9 | 14.8 | 16.7 | 16.1 | 14.6 | 17.9 | 52.4 |
| 6-Jul | 14.5 | 10.8 | 10.8 | 10.8 | 12.7 | 10.5 | 16.6 | 22.5 | 18.5 | 9.6 | 8.8 | 8.2 | 9.8 | 10.0 | 9.1 | 8.2 | 8.6 | 10.9 | 9.8 | 8.2 | 7.1 | 6.6 | 5.2 | 5.7 | 10.6 | 22.5 |
| 7-Jul | 7.1 | 7.9 | 8.4 | 7.7 | 7.4 | 7.8 | 8.5 | C | C | 3.9 | 3.4 | 4.3 | 4.8 | 3.2 | 2.2 | 2.7 | 0.9 | 0.6 | 1.1 | 0.9 | 1.0 | 0.9 | 0.6 | 0.9 | 3.9 | 8.5 |
| 8-Jul | 0.7 | 0.7 | 0.9 | 0.9 | 1.4 | 2.2 | 3.3 | 5.4 | 5.8 | 5.3 | 4.3 | 2.6 | 4.8 | 5.9 | 6.2 | 6.6 | 7.5 | 9.5 | 10.6 | 9.1 | 10.2 | 8.3 | 6.7 | 6.6 | 5.2 | 10.6 |
| 9-Jul | 4.8 | 2.1 | 2.5 | 3.8 | 4.8 | 4.5 | 7.5 | 10.9 | 13.9 | 46.4 | 15.6 | 6.2 | 8.6 | 10.4 | 6.3 | 7.7 | 5.9 | 7.6 | 6.6 | 5.6 | 4.9 | 8.2 | 5.8 | 4.8 | 8.6 | 46.4 |
| 10-Jul | 7.1 | 6.1 | 7.7 | 10.7 | 13.9 | 14.6 | 10.7 | 11.3 | 15.2 | 14.4 | 10.8 | 15.9 | 14.9 | 7.4 | 5.0 | 4.9 | 6.8 | 6.5 | 6.2 | 8.0 | 14.6 | 13.9 | 13.2 | 16.6 | 10.7 | 16.6 |
| 11-Jul | 19.3 | 15.7 | 16.5 | 12.9 | 15.1 | 15.3 | 16.5 | 13.8 | 9.8 | 6.1 | 9.6 | 11.6 | 16.4 | 18.0 | 14.9 | 12.2 | 10.4 | 13.7 | 11.0 | 7.4 | 5.2 | 7.6 | 4.7 | 4.1 | 12.0 | 19.3 |
| 12-Jul | 6.3 | 6.7 | 6.3 | 8.3 | 8.5 | 6.3 | 6.8 | 3.1 | 3.3 | 3.3 | 5.1 | 6.2 | 5.5 | 6.4 | 5.8 | 7.5 | 5.7 | 5.6 | 4.8 | 3.9 | 3.0 | 6.8 | 7.2 | 5.6 | 5.7 | 8.5 |
| 13-Jul | 5.1 | 5.5 | 9.2 | 8.6 | 10.1 | 10.7 | 8.5 | 8.0 | 7.0 | 7.2 | 6.2 | 7.8 | 9.2 | 8.5 | 6.9 | 5.4 | 6.0 | 3.7 | 5.0 | 5.4 | 5.1 | 5.8 | 3.7 | 4.5 | 6.8 | 10.7 |
| 14-Jul | 7.9 | 10.1 | 10.4 | 10.8 | 10.6 | 10.3 | 8.3 | 5.7 | 7.5 | 6.0 | 4.6 | 7.0 | 6.4 | 13.0 | 10.1 | 6.8 | 13.3 | 10.8 | 6.7 | 5.8 | 7.8 | 7.0 | 8.0 | 6.0 | 8.4 | 13.3 |
| 15-Jul | 8.7 | 13.5 | 15.3 | 16.0 | 19.0 | 19.1 | 17.9 | 12.7 | 16.2 | 23.3 | 8.5 | 5.8 | 5.0 | 5.4 | 6.8 | 7.1 | 16.2 | 12.5 | 6.7 | 6.7 | 8.4 | 8.4 | 6.4 | 5.0 | 11.3 | 23.3 |
| 16-Jul | 7.1 | 10.2 | 11.9 | 10.8 | 11.1 | 10.7 | 8.6 | 6.8 | 3.6 | 6.1 | 5.9 | 6.9 | 9.8 | 34.2 | 51.4 | 32.9 | 23.5 | 24.0 | 20.0 | 18.4 | 22.0 | 18.8 | 12.6 | 9.9 | 15.7 | 51.4 |
| 17-Jul | 6.0 | 9.8 | 13.0 | 17.7 | 24.3 | 30.6 | 33.2 | 32.4 | 26.7 | 18.1 | 18.2 | 14.3 | 20.4 | 21.7 | 18.6 | 19.2 | M | M | M | 23.0 | 23.5 | 22.0 | 19.6 | 21.1 | 20.6 | 33.2 |
| 18-Jul | 25.0 | 27.9 | 27.8 | 27.9 | 24.3 | 21.7 | 17.6 | 14.7 | 15.5 | 17.7 | 16.1 | 14.7 | 16.1 | 17.0 | 19.6 | 17.5 | 14.7 | 13.4 | 13.2 | 12.7 | 14.5 | 16.1 | 14.0 | 13.5 | 18.0 | 27.9 |
| 19-Jul | 10.6 | 9.9 | 10.1 | 9.7 | 11.6 | 13.3 | 11.3 | 7.7 | 5.5 | 4.9 | 4.1 | 4.7 | 5.2 | 5.6 | 6.9 | 8.3 | 16.3 | 8.2 | 8.7 | 5.6 | 6.7 | 9.8 | 8.5 | 9.5 | 8.4 | 16.3 |
| 20-Jul | 11.2 | 12.4 | 13.2 | 18.0 | 16.2 | 22.2 | 24.2 | 26.8 | 38.5 | 45.6 | 33.7 | 13.0 | 11.1 | 18.3 | 19.9 | 18.5 | 15.0 | 7.3 | 5.9 | 4.0 | UO | 0.9 | 0.4 | 0.2 | 16.4 | 45.6 |
| 21-Jul | 1.0 | 0.6 | 1.5 | 1.9 | 2.0 | 1.2 | 0.7 | UO | UO | UO | UO | 0.7 | 1.1 | 1.5 | 0.8 | UO | UO | 3.5 | 2.9 | 1.6 | 1.8 | 1.4 | 1.5 | UO | -- | 3.5 |
| 22-Jul | AF | AF | AF | AF | AF | AF | AF | AF | AF | M | M | M | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | UO | -- | -- |
| 23-Jul | UO | UO | UO | UO | UO | UO | UO | 5.8 | 8.6 | 6.5 | 8.2 | 4.0 | 8.4 | 4.2 | 1.5 | UO | 1.8 | 1.2 | UO | UO | 1.2 | 0.9 | 4.2 | 6.9 | -- | 8.6 |
| 24-Jul | 4.7 | 3.5 | 3.6 | 2.7 | 2.5 | 2.4 | 2.7 | 3.2 | 2.7 | 1.9 | 1.7 | 1.7 | 1.6 | 1.4 | 1.4 | 1.4 | 1.9 | 5.2 | 0.7 | 0.0 | 0.2 | 0.9 | 1.3 | 1.5 | 2.1 | 5.2 |
| 25-Jul | 1.3 | 1.7 | 2.1 | 2.3 | 2.3 | 2.4 | 2.6 | 2.4 | 2.3 | 2.7 | 2.4 | 2.7 | 2.4 | 2.4 | 2.6 | 3.0 | 2.8 | 3.5 | 3.9 | 4.2 | 3.5 | 4.6 | 6.0 | 5.5 | 3.0 | 6.0 |
| 26-Jul | 9.0 | 11.8 | 12.3 | 12.4 | 10.9 | 8.1 | 7.2 | 6.6 | 5.3 | 3.9 | 1.1 | 0.4 | 0.4 | 0.8 | 1.5 | 4.4 | 2.7 | 1.9 | 3.5 | 4.8 | 3.6 | 2.4 | 4.3 | 5.7 | 5.2 | 12.4 |
| 27-Jul | 5.3 | 3.9 | 6.5 | 12.0 | 13.1 | 8.5 | 6.7 | 5.0 | 3.3 | 2.3 | 11.3 | 21.6 | 23.9 | 21.6 | 18.8 | 18.4 | 17.2 | 13.2 | 14.0 | 8.1 | 5.6 | 8.1 | 6.8 | 7.2 | 10.9 | 23.9 |
| 28-Jul | 8.5 | 6.8 | 8.9 | 9.3 | 9.6 | 5.1 | UO | 2.5 | C | 7.7 | 9.3 | 10.7 | 6.5 | 11.1 | 14.0 | 12.4 | 15.1 | 15.4 | 9.9 | 3.7 | 3.6 | 5.7 | 6.0 | 3.3 | 8.4 | 15.4 |
| 29-Jul | 3.9 | 4.4 | 6.1 | 8.2 | 6.1 | 6.4 | 7.7 | 5.2 | 4.2 | 6.3 | 5.8 | 6.2 | 6.3 | 6.2 | 5.9 | 5.0 | 3.5 | 3.4 | 3.3 | 3.4 | 3.5 | 3.0 | 4.6 | 5.9 | 5.2 | 8.2 |
| 30-Jul | 8.2 | 9.4 | 5.6 | 5.6 | 6.6 | 4.5 | 2.3 | 1.9 | 1.5 | 2.7 | 1.7 | UO | 0.6 | 1.9 | 3.2 | 2.8 | 6.6 | 8.2 | 6.8 | 5.5 | 8.9 | 6.8 | 6.2 | 5.7 | 4.9 | 9.4 |
| 31-Jul | 4.5 | 5.4 | 9.5 | 6.6 | 5.4 | 5.9 | 7.7 | 9.4 | 6.0 | 6.4 | 7.5 | 5.2 | 3.9 | 3.9 | 3.8 | 2.6 | 5.7 | 5.1 | 4.2 | 8.3 | 11.5 | 6.8 | 2.5 | 2.7 | 5.8 | 11.5 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| 7.6 7.7 8.5 9.0 9.3 9.3 9.6 8.8 9.1 9.9 8.1 7.6 8.2 9.4 10.0 10.0 10.3 8.9 7.4 7.1 7.5 7.5 6.8 6.8 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | |
| 25.0 27.9 27.8 27.9 24.3 30.6 33.2 32.4 38.5 46.4 33.7 21.6 25.2 34.2 51.4 36.3 52.4 38.8 22.6 23.0 23.5 22.0 19.6 21.1 | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | |
| C - Calibration M - Maintenance AF - Analyzer Failure UO - Unstable Operation | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alberta Ambient Air Quality Objectives (AAAQO): 24-hr 30 µg/m ³ | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - July 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - July 2016**

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Number of Hours | % | Cumulative % |
|-------------------------------------------------------------------|------------------------|----------|---------------------|
| 1 - 5 | 239 | 34.69 | 34.69 |
| 6 - 15 | 332 | 48.19 | 82.87 |
| 16 - 25 | 71 | 10.30 | 93.18 |
| 26 - 80 | 19 | 2.76 | 95.94 |
| > 81.0 | 0 | 0.00 | 95.94 |

Total Number of Valid Hours: 689

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - July 2016

| Concentration Ranges ($\mu\text{g}/\text{m}^3$) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|------------------------------------------------------|----------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 1 - 5 | 25 | 8 | 7 | 2 | 6 | 4 | 43 | 14 | 12 | 10 | 24 | 28 | 4 | 6 | 12 | 34 | 239 |
| 6 - 15 | 52 | 4 | 5 | 6 | 9 | 8 | 39 | 16 | 12 | 7 | 17 | 21 | 12 | 12 | 14 | 98 | 332 |
| 16 - 25 | 10 | 1 | 0 | 3 | 1 | 3 | 7 | 1 | 0 | 4 | 1 | 6 | 4 | 0 | 3 | 27 | 71 |
| 26 - 80 | 1 | 1 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 11 | 19 |
| > 81.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 88 | 14 | 13 | 11 | 16 | 16 | 91 | 31 | 24 | 21 | 42 | 56 | 20 | 18 | 30 | 170 | 661 |

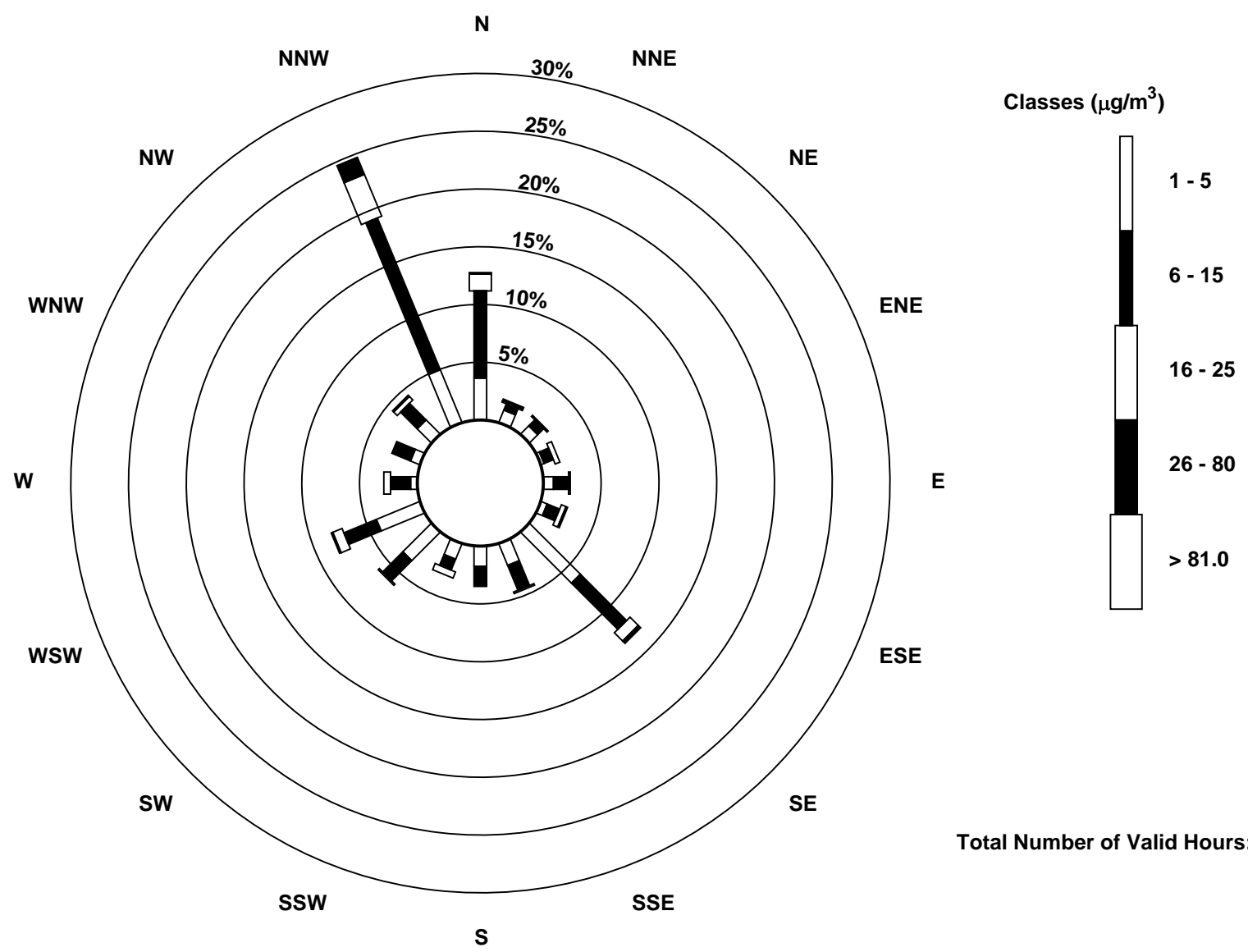
Total Number of Valid Hours: 689

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

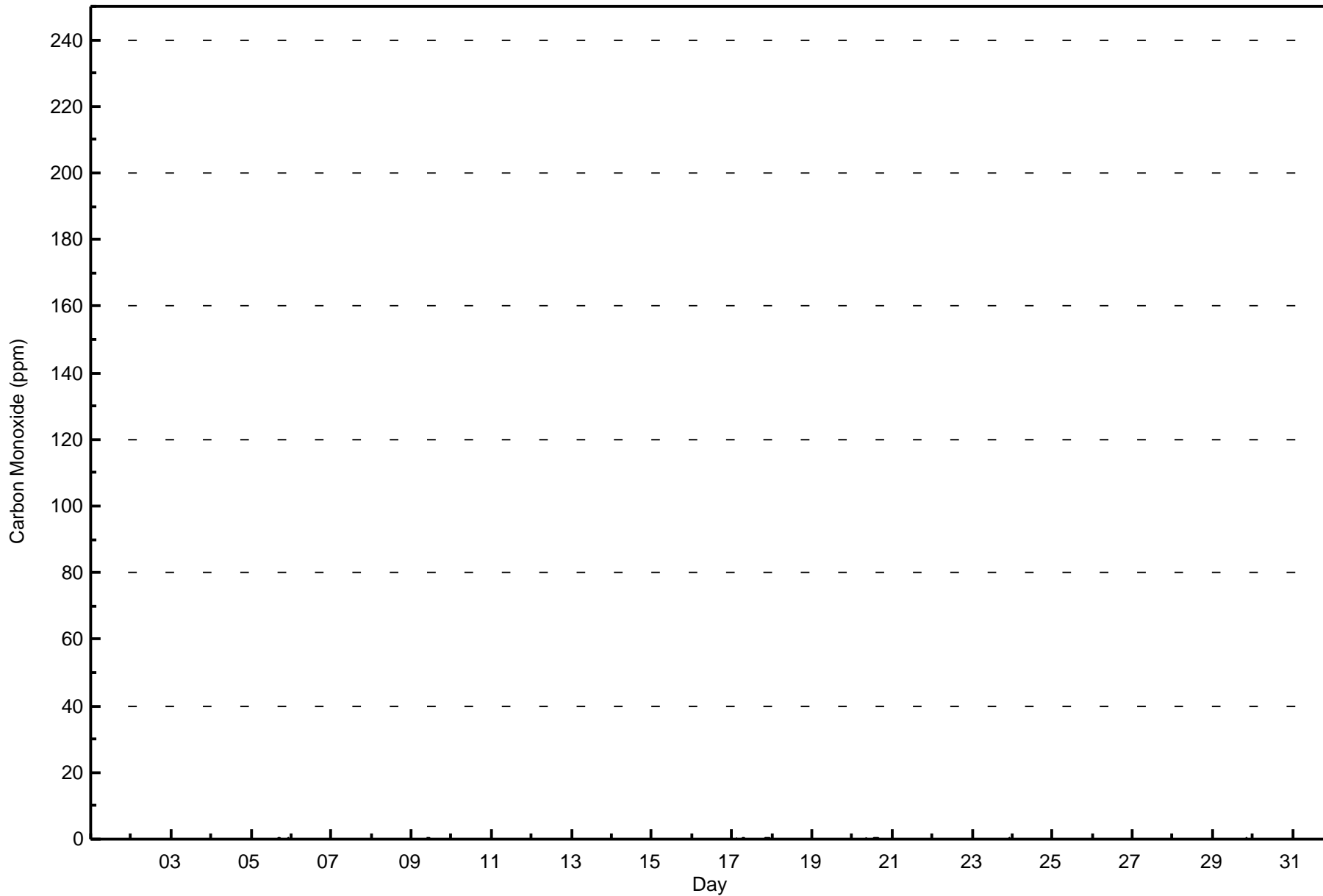
Carbon Monoxide (CO) - ppm
Athabasca Valley - July 2016

| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | | | | | | | | | | Hours in Service: 744 | | | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------------------------|-----|-----|-----|-----------------|---------------|---------------|-----|-----|
| Maximum Value: 0.4 ppm on Jul 9 10:00 | | | | | | | | | | Maximum Daily Average: 0.2 ppm on Jul 17 | | | | | | | | | | Hours of Data: 685 | | | | | | | | |
| Minimum Value: 0.0 ppm on Jul 1 19:00 | | | | | | | | | | Minimum Daily Average: 0.1 ppm on Jul 4 | | | | | | | | | | Hours of Missing Data: 59 | | | | | | | | |
| Maximum Diurnal Average: 0.1 ppm at hour 22 | | | | | | | | | | Minimum Diurnal Average: 0.1 ppm at hour 18 | | | | | | | | | | Hours of Calibration: 31 | | | | | | | | |
| Monthly Average: 0.11 ppm | | | | | | | | | | Percentiles: P ₁ = 0.1 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 0.2 | | | | | | | | | | Percent Operational Time: 96.2 | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | |
| 1-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | | |
| 2-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 3-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 4-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | M | M | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 5-Jul | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| 6-Jul | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | Z | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 7-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | M | 0.1 | 0.1 | C | C | C | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 8-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 9-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.4 | 0.4 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 10-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 11-Jul | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 12-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 13-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 14-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 15-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| 16-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 |
| 17-Jul | 0.2 | 0.2 | 0.1 | 0.2 | Z | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | M | M | M | 0.2 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| 18-Jul | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | M | M | M | M | M | M | M | M | M | M |
| 19-Jul | M | M | M | M | M | M | M | M | M | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 20-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | Z | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| 21-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 22-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 23-Jul | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.1 |
| 24-Jul | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 25-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 |
| 26-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | M | M | M | M | M | M | M | M | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| 27-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 28-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 29-Jul | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| 30-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 31-Jul | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | Z | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Average | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | Diurnal Maximum | | | | |
| Z - zerospan C - Calibration M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - July 2016

| Concentration Ranges (ppm) | Number of Hours | % | Cumulative % |
|-----------------------------------|------------------------|----------|---------------------|
| 0 - 0.3 | 683 | 99.71 | 99.71 |
| 0.4 - 0.5 | 2 | 0.29 | 100.00 |
| 0.6 - 0.7 | 0 | 0.00 | 100.00 |
| 0.8 - 1.4 | 0 | 0.00 | 100.00 |
| 1.5 - 10 | 0 | 0.00 | 100.00 |
| > 10 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 685

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - July 2016**

| Concentration Ranges (ppm) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|---------------------------------------|-----------------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---------------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 0.3 | 86 | 15 | 14 | 9 | 17 | 18 | 92 | 38 | 26 | 20 | 46 | 54 | 23 | 23 | 32 | 170 | 683 |
| 0.4 - 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| 0.6 - 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0.8 - 1.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.5 - 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 87 | 15 | 14 | 9 | 17 | 18 | 92 | 38 | 26 | 20 | 46 | 54 | 23 | 23 | 32 | 171 | 685 |

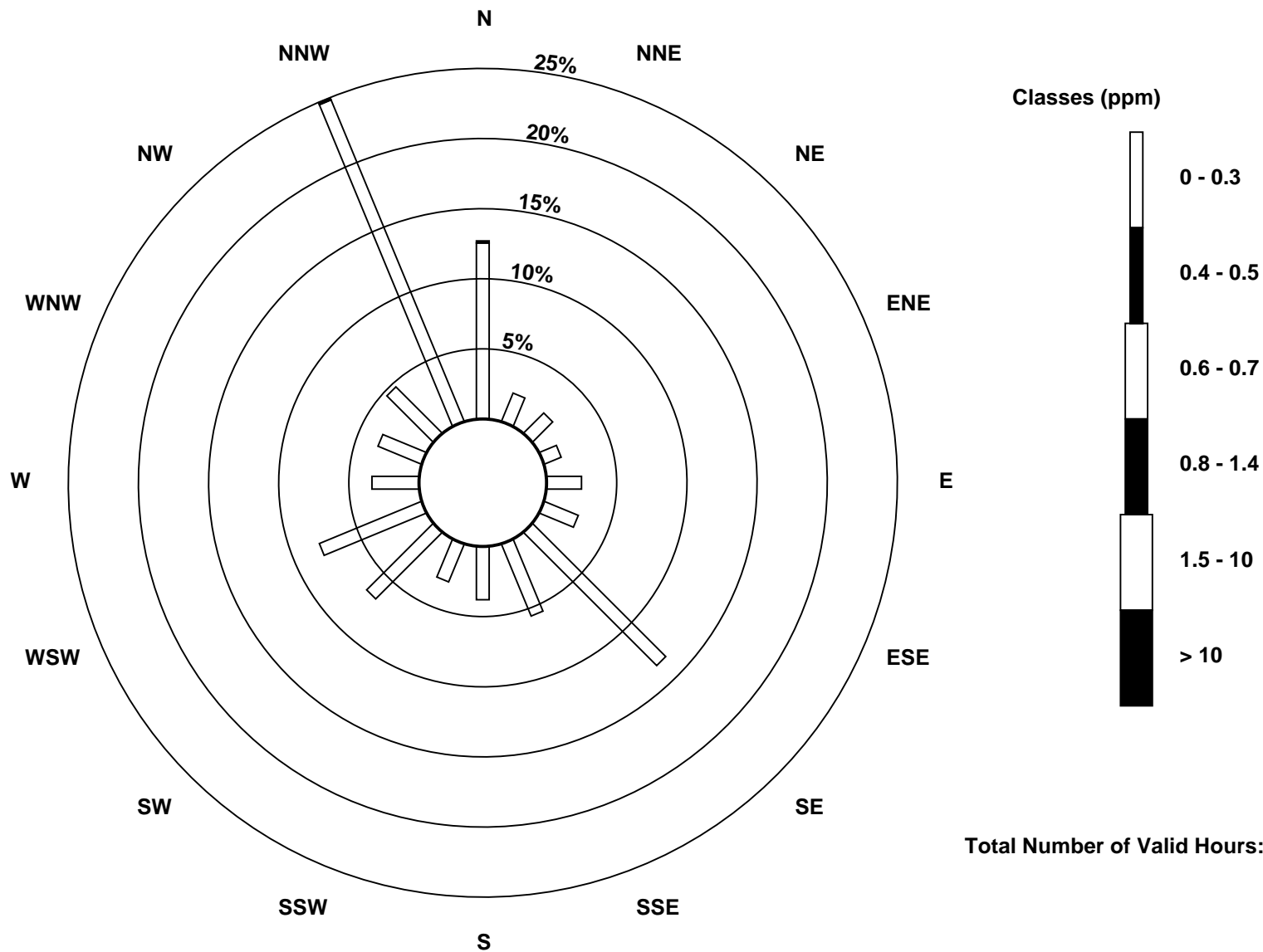
Total Number of Valid Hours: 685

Total Number of Hours: 744

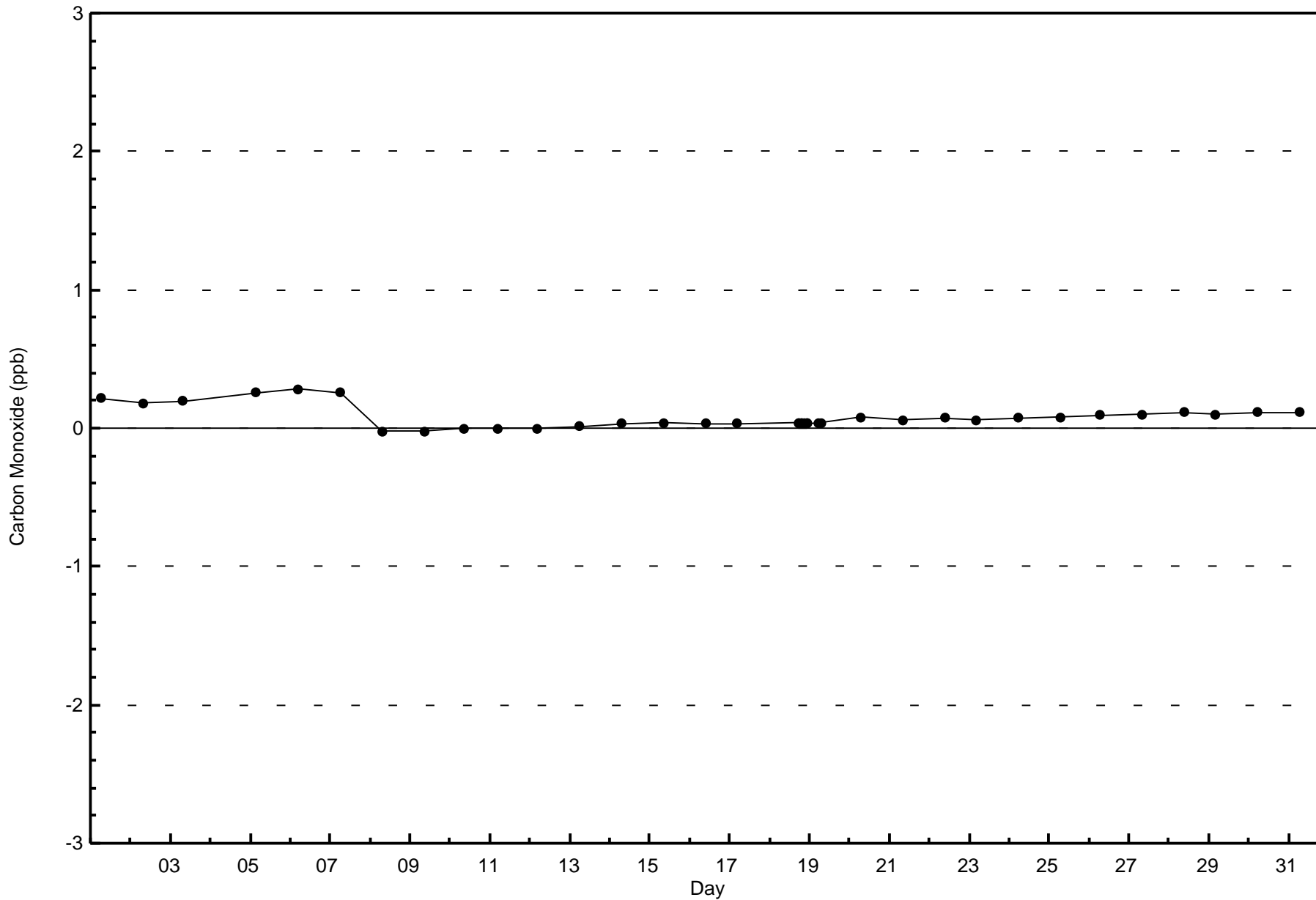


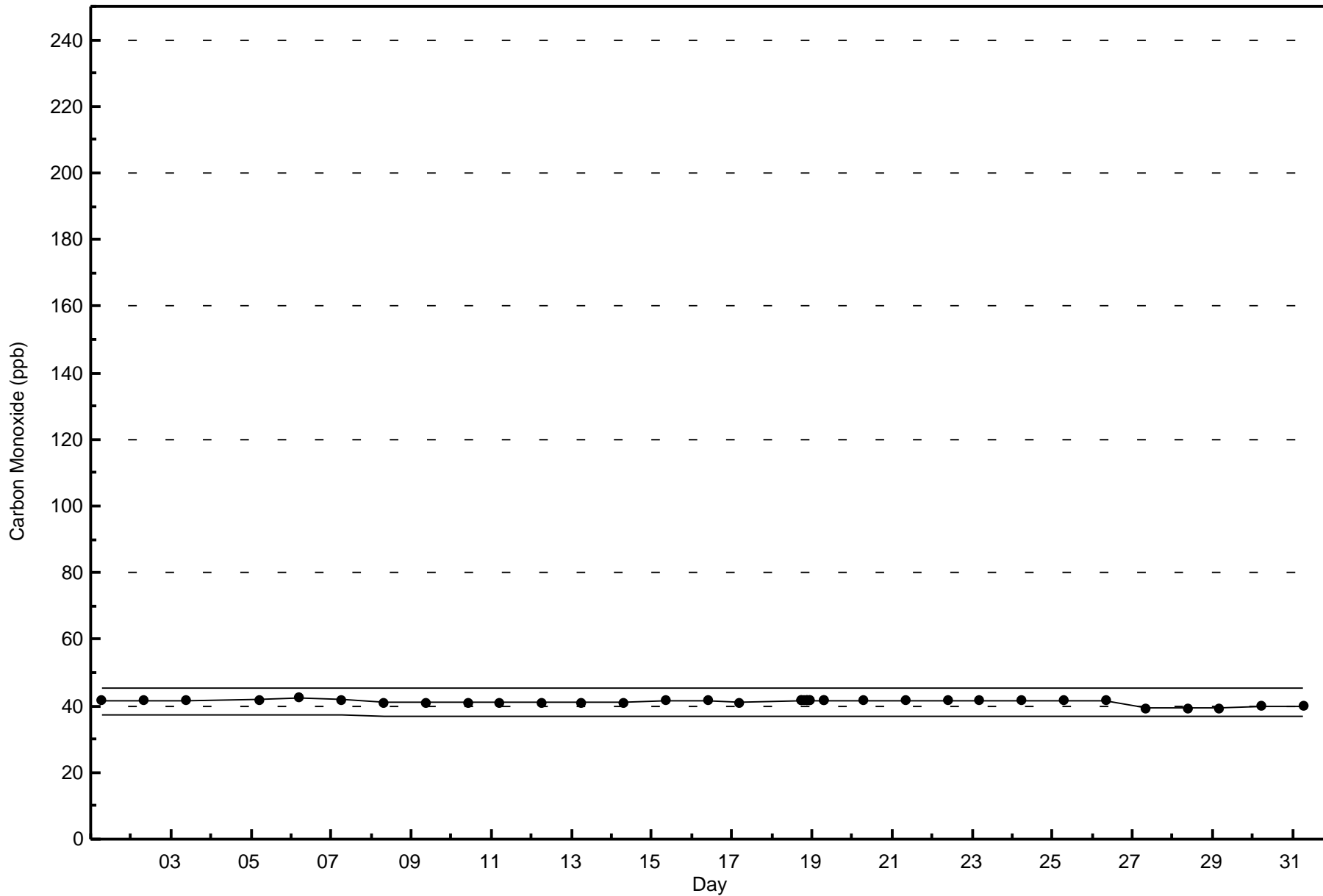
Wood Buffalo Environmental Association
Wind Rose Jul 2016

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



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association
Summary of Hour Averages

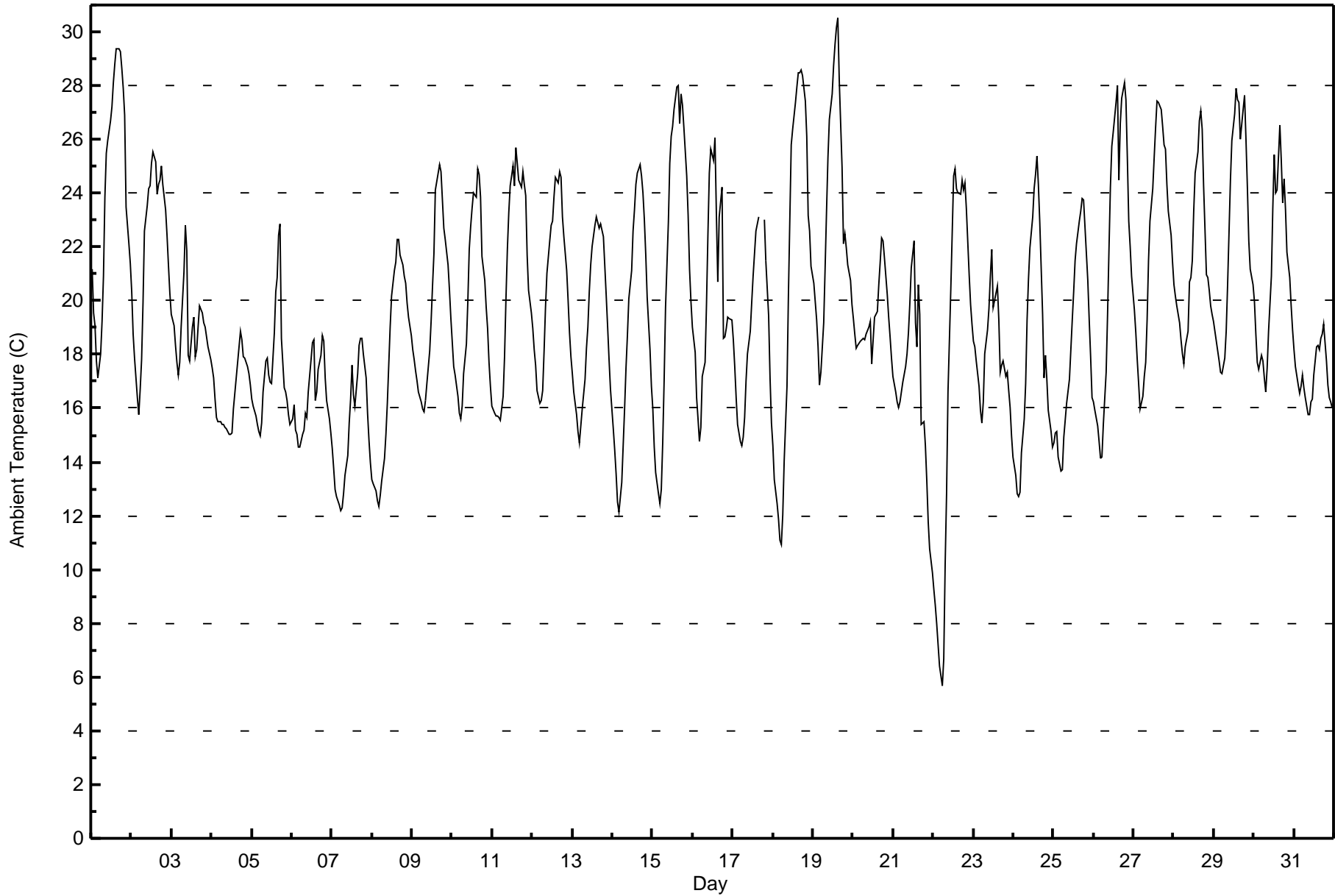
Ambient Temperature (AT) - C
Athabasca Valley - July 2016

| Maximum Value: 30.5 C on Jul 19 16:00 Maximum Daily Average: 24.1 C on Jul 1 | | | | | | | | | | | | | | | | | | | | | | Hours in Service: 744 Hours of Data: 741 | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------------------------------------------------------------------------------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------------|
| Minimum Value: 5.7 C on Jul 22 06:00 Minimum Daily Average: 15.2 C on Jul 7 Maximum Diurnal Average: 23.5 C at hour 17 Minimum Diurnal Average: 15.0 C at hour 5 Monthly Average: 19.54 C Percentiles: P ₁ = 9.8 P ₁₀ = 14.9 Q ₁ = 16.6 Median = 18.9 Q ₃ = 22.8 P ₉₀ = 25.3 P ₉₉ = 28.4 | | | | | | | | | | | | | | | | | | | | | | Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Jul | 21.2 | 19.5 | 19.1 | 17.8 | 17.1 | 18.0 | 19.2 | 20.9 | 23.9 | 25.5 | 26.0 | 26.7 | 27.2 | 28.1 | 28.8 | 29.4 | 29.4 | 29.3 | 28.7 | 27.9 | 26.9 | 23.5 | 22.1 | 21.4 | 24.1 | 29.4 | | | | | | | | | | | | | | | | | | | | | | |
| 2-Jul | 20.3 | 18.8 | 17.8 | 16.4 | 15.8 | 16.7 | 17.8 | 19.9 | 22.6 | 23.5 | 24.1 | 24.3 | 25.1 | 25.5 | 25.2 | 24.0 | 24.3 | 24.5 | 25.0 | 24.3 | 23.4 | 22.4 | 21.3 | 20.3 | 21.8 | 25.5 | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul | 19.5 | 19.1 | 18.3 | 17.7 | 17.2 | 17.7 | 19.0 | 21.1 | 22.8 | 21.8 | 18.0 | 17.8 | 19.0 | 19.4 | 17.9 | 18.2 | 19.0 | 19.8 | 19.6 | 19.2 | 19.0 | 18.7 | 18.3 | 17.8 | 19.0 | 22.8 | | | | | | | | | | | | | | | | | | | | | | |
| 4-Jul | 17.5 | 17.1 | 16.4 | 15.7 | 15.5 | 15.5 | 15.4 | 15.4 | 15.3 | 15.2 | 15.0 | 15.0 | 15.1 | 16.0 | 16.5 | 17.1 | 18.3 | 18.8 | 18.5 | 17.9 | 17.9 | 17.6 | 17.3 | 16.8 | 16.5 | 18.8 | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jul | 16.4 | 16.1 | 15.7 | 15.4 | 15.1 | 15.0 | 15.4 | 16.6 | 17.7 | 17.9 | 17.3 | 17.0 | 16.9 | 18.8 | 20.3 | 20.9 | 22.4 | 22.9 | 18.6 | 16.8 | 16.6 | 16.3 | 15.8 | 15.4 | 17.4 | 22.9 | | | | | | | | | | | | | | | | | | | | | | |
| 6-Jul | 15.6 | 16.1 | 15.2 | 15.0 | 14.6 | 14.6 | 15.0 | 15.2 | 15.8 | 15.7 | 16.6 | 17.8 | 18.4 | 18.5 | 16.3 | 16.6 | 17.4 | 18.0 | 18.7 | 18.5 | 17.1 | 16.3 | 15.6 | 15.1 | 16.4 | 18.7 | | | | | | | | | | | | | | | | | | | | | | |
| 7-Jul | 14.5 | 13.8 | 13.0 | 12.7 | 12.4 | 12.2 | 12.3 | 12.8 | 13.5 | 14.2 | 15.4 | 16.3 | 17.6 | 16.5 | 16.1 | 17.3 | 18.3 | 18.6 | 18.6 | 18.0 | 17.1 | 15.8 | 14.8 | 14.0 | 15.2 | 18.6 | | | | | | | | | | | | | | | | | | | | | | |
| 8-Jul | 13.3 | 13.2 | 12.9 | 12.6 | 12.3 | 12.7 | 13.3 | 14.1 | 15.0 | 16.2 | 17.6 | 19.0 | 20.2 | 21.1 | 21.4 | 22.3 | 22.3 | 21.7 | 21.3 | 20.9 | 20.7 | 19.9 | 19.4 | 18.7 | 17.6 | 22.3 | | | | | | | | | | | | | | | | | | | | | | |
| 9-Jul | 18.2 | 17.8 | 17.4 | 17.0 | 16.6 | 16.3 | 16.0 | 15.9 | 16.3 | 16.9 | 18.1 | 19.2 | 20.5 | 21.8 | 24.1 | 24.4 | 25.1 | 24.8 | 23.8 | 22.7 | 22.3 | 21.3 | 20.4 | 19.3 | 19.8 | 25.1 | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul | 18.4 | 17.6 | 17.2 | 16.4 | 15.8 | 15.6 | 16.1 | 17.3 | 18.4 | 20.0 | 21.9 | 22.8 | 23.5 | 24.0 | 23.8 | 24.9 | 24.7 | 23.9 | 21.6 | 20.7 | 19.8 | 19.0 | 17.7 | 16.8 | 19.9 | 24.9 | | | | | | | | | | | | | | | | | | | | | | |
| 11-Jul | 16.1 | 15.8 | 15.7 | 15.7 | 15.7 | 15.5 | 16.5 | 17.9 | 20.0 | 21.9 | 23.3 | 24.2 | 25.0 | 24.3 | 25.7 | 25.1 | 24.5 | 24.2 | 24.8 | 24.3 | 23.9 | 21.7 | 20.4 | 19.5 | 20.9 | 25.7 | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jul | 19.0 | 18.2 | 17.6 | 16.7 | 16.2 | 16.3 | 16.7 | 18.1 | 19.8 | 21.0 | 22.2 | 22.8 | 23.0 | 23.9 | 24.6 | 24.4 | 24.8 | 24.6 | 23.1 | 22.4 | 21.1 | 20.0 | 18.8 | 17.9 | 20.5 | 24.8 | | | | | | | | | | | | | | | | | | | | | | |
| 13-Jul | 17.3 | 16.6 | 15.8 | 15.1 | 14.7 | 15.3 | 16.0 | 17.1 | 18.2 | 19.0 | 20.3 | 21.3 | 22.0 | 22.8 | 23.1 | 22.9 | 22.7 | 22.9 | 22.4 | 21.3 | 20.2 | 19.0 | 17.8 | 16.7 | 19.2 | 23.1 | | | | | | | | | | | | | | | | | | | | | | |
| 14-Jul | 15.2 | 14.5 | 13.6 | 12.5 | 12.1 | 13.2 | 14.6 | 16.0 | 17.5 | 18.7 | 20.1 | 21.1 | 22.6 | 23.4 | 24.3 | 24.8 | 25.0 | 24.7 | 24.0 | 23.0 | 21.7 | 20.1 | 18.2 | 16.8 | 19.1 | 25.0 | | | | | | | | | | | | | | | | | | | | | | |
| 15-Jul | 16.0 | 14.6 | 13.6 | 12.8 | 12.4 | 13.0 | 14.7 | 17.0 | 19.8 | 22.9 | 25.1 | 26.1 | 26.5 | 27.1 | 27.9 | 28.0 | 26.6 | 27.7 | 27.3 | 26.4 | 24.6 | 23.2 | 21.2 | 20.0 | 21.4 | 28.0 | | | | | | | | | | | | | | | | | | | | | | |
| 16-Jul | 19.0 | 18.1 | 16.4 | 15.6 | 14.7 | 15.3 | 17.2 | 17.7 | 19.9 | 22.4 | 24.7 | 25.6 | 25.2 | 26.1 | 23.2 | 20.7 | 23.1 | 24.2 | 18.6 | 18.7 | 19.0 | 19.4 | 19.4 | 19.3 | 20.1 | 26.1 | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul | 18.5 | 17.5 | 16.4 | 15.4 | 14.8 | 14.6 | 14.9 | 15.7 | 17.0 | 18.0 | 18.9 | 19.9 | 20.9 | 21.8 | 22.6 | 23.1 | M | M | M | 23.0 | 21.5 | 19.4 | 17.1 | 15.5 | 18.4 | 23.1 | | | | | | | | | | | | | | | | | | | | | | |
| 18-Jul | 14.6 | 13.3 | 12.5 | 11.9 | 11.1 | 10.9 | 12.0 | 14.0 | 16.8 | 20.2 | 23.0 | 25.8 | 26.4 | 27.4 | 27.9 | 28.5 | 28.5 | 28.6 | 28.4 | 27.5 | 26.1 | 23.2 | 22.6 | 21.3 | 20.9 | 28.6 | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jul | 20.7 | 20.0 | 19.3 | 18.3 | 16.9 | 17.4 | 19.2 | 21.2 | 23.4 | 25.3 | 26.7 | 27.7 | 28.7 | 29.5 | 30.2 | 30.5 | 28.2 | 24.9 | 22.1 | 22.5 | 22.0 | 21.4 | 20.8 | 19.9 | 23.2 | 30.5 | | | | | | | | | | | | | | | | | | | | | | |
| 20-Jul | 19.3 | 18.8 | 18.2 | 18.3 | 18.5 | 18.6 | 18.6 | 18.5 | 18.8 | 19.0 | 19.2 | 17.7 | 18.6 | 19.4 | 19.6 | 20.6 | 21.4 | 22.3 | 22.2 | 21.6 | 20.2 | 19.4 | 18.7 | 17.9 | 19.4 | 22.3 | | | | | | | | | | | | | | | | | | | | | | |
| 21-Jul | 17.2 | 16.6 | 16.2 | 16.1 | 16.2 | 16.6 | 17.0 | 17.6 | 18.0 | 18.8 | 19.9 | 21.2 | 22.2 | 19.2 | 18.3 | 20.6 | 19.5 | 15.4 | 15.5 | 14.6 | 13.3 | 11.8 | 10.8 | 9.9 | 16.8 | 22.2 | | | | | | | | | | | | | | | | | | | | | | |
| 22-Jul | 9.2 | 8.7 | 8.0 | 7.2 | 6.4 | 5.7 | 6.7 | 10.2 | 12.8 | 16.6 | 20.5 | 22.6 | 24.6 | 24.9 | 24.2 | 24.0 | 23.9 | 24.5 | 24.1 | 24.4 | 23.4 | 21.0 | 19.8 | 19.1 | 17.2 | 24.9 | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jul | 18.5 | 18.3 | 17.8 | 16.8 | 15.9 | 15.4 | 16.2 | 18.0 | 18.9 | 19.7 | 20.9 | 21.9 | 19.8 | 20.0 | 20.5 | 19.3 | 17.3 | 17.6 | 17.8 | 17.2 | 17.4 | 16.6 | 16.0 | 15.0 | 18.0 | 21.9 | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul | 14.2 | 13.5 | 12.8 | 12.7 | 12.9 | 14.3 | 15.6 | 16.9 | 19.3 | 20.8 | 22.0 | 23.1 | 24.2 | 24.7 | 25.4 | 24.3 | 22.9 | 19.5 | 17.1 | 18.0 | 17.1 | 15.9 | 15.1 | 14.6 | 18.2 | 25.4 | | | | | | | | | | | | | | | | | | | | | | |
| 25-Jul | 14.7 | 15.1 | 15.1 | 14.2 | 13.7 | 13.7 | 14.9 | 15.5 | 16.2 | 17.1 | 18.2 | 19.3 | 20.3 | 21.5 | 22.1 | 23.0 | 23.4 | 23.8 | 23.8 | 22.8 | 20.8 | 19.3 | 17.9 | 16.4 | 18.4 | 23.8 | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jul | 16.3 | 15.9 | 15.3 | 14.8 | 14.1 | 14.2 | 15.4 | 17.4 | 19.5 | 21.9 | 24.2 | 25.7 | 26.3 | 27.4 | 28.0 | 24.5 | 26.6 | 27.6 | 28.1 | 27.5 | 25.3 | 23.0 | 22.0 | 20.9 | 21.7 | 28.1 | | | | | | | | | | | | | | | | | | | | | | |
| 27-Jul | 19.6 | 18.8 | 17.8 | 16.9 | 16.0 | 16.5 | 17.2 | 17.7 | 19.3 | 21.5 | 23.0 | 24.2 | 25.3 | 26.4 | 27.4 | 27.4 | 27.1 | 26.5 | 25.8 | 25.7 | 24.3 | 23.4 | 22.5 | 21.5 | 22.2 | 27.4 | | | | | | | | | | | | | | | | | | | | | | |
| 28-Jul | 20.6 | 20.2 | 19.8 | 19.2 | 18.6 | 18.0 | 17.7 | 18.3 | 18.9 | 20.7 | 20.9 | 21.5 | 23.3 | 24.8 | 25.5 | 26.7 | 27.1 | 26.4 | 24.3 | 20.9 | 20.9 | 20.4 | 19.8 | 19.5 | 21.4 | 27.1 | | | | | | | | | | | | | | | | | | | | | | |
| 29-Jul | 19.2 | 18.5 | 18.1 | 17.8 | 17.3 | 17.3 | 17.8 | 18.9 | 20.6 | 22.6 | 24.5 | 25.9 | 27.0 | 27.9 | 27.5 | 27.4 | 26.0 | 27.1 | 27.6 | 26.0 | 24.2 | 22.2 | 21.2 | 20.6 | 22.6 | 27.9 | | | | | | | | | | | | | | | | | | | | | | |
| 30-Jul | 20.0 | 18.8 | 17.7 | 17.5 | 18.0 | 17.8 | 17.1 | 16.6 | 17.5 | 18.9 | 20.9 | 23.4 | 25.4 | 24.0 | 24.1 | 26.6 | 25.2 | 23.7 | 24.5 | 23.4 | 21.8 | 20.9 | 19.8 | 18.9 | 20.9 | 26.6 | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul | 18.2 | 17.6 | 16.9 | 16.6 | 16.8 | 17.2 | 16.8 | 16.4 | 15.8 | 15.8 | 16.2 | 16.3 | 17.2 | 18.3 | 18.3 | 18.2 | 18.6 | 18.8 | 19.1 | 17.8 | 16.9 | 16.4 | 16.2 | 16.0 | 17.2 | 19.1 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 17.4 | 16.7 | 16.1 | 15.4 | 15.0 | 15.2 | 15.9 | 17.0 | 18.4 | 19.7 | 20.8 | 21.7 | 22.5 | 23.0 | 23.3 | 23.4 | 23.5 | 23.2 | 22.5 | 21.8 | 20.9 | 19.6 | 18.7 | 17.8 | Diurnal Average |
| | | | | | | | | | | | | | | | | | | | | | | | | 21.2 | 20.2 | 19.8 | 19.2 | 18.6 | 18.6 | 19.2 | 21.2 | 23.9 | 25.5 | 26.7 | 27.7 | 28.7 | 29.5 | 30.2 | 30.5 | 29.4 | 29.3 | 28.7 | 27.9 | 26.9 | 23.5 | 22.6 | 21.5 | Diurnal Maximum |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - July 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Athabasca Valley - July 2016**

| Concentration Ranges (C) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| -50 - -20 | 0 | 0.00 | 0.00 |
| -20 - 0 | 0 | 0.00 | 0.00 |
| 0 - 10 | 8 | 1.08 | 1.08 |
| 10 - 20 | 436 | 58.84 | 59.92 |
| > 20 | 297 | 40.08 | 100.00 |

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Barometric Pressure (BP) - %
Athabasca Valley - July 2016

| | | |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Value: 29.2 % on Jul 14 07:00 | Maximum Daily Average: 29.2 % on Jul 14 | Hours in Service: 744 |
| Minimum Value: 28.6 % on Jul 19 16:00 | Minimum Daily Average: 28.7 % on Jul 31 | Hours of Data: 741 |
| Maximum Diurnal Average: 28.9 % at hour 7 | Minimum Diurnal Average: 28.8 % at hour 18 | Hours of Missing Data: 3 |
| Monthly Average: 28.86 % | Percentiles: P ₁ = 28.6 P ₁₀ = 28.7 Q ₁ = 28.8 Median = 28.8 Q ₃ = 29.0 P ₉₀ = 29.1 P ₉₉ = 29.2 | Hours of Calibration: 0 |
| | | Percent Operational Time: 99.6 |

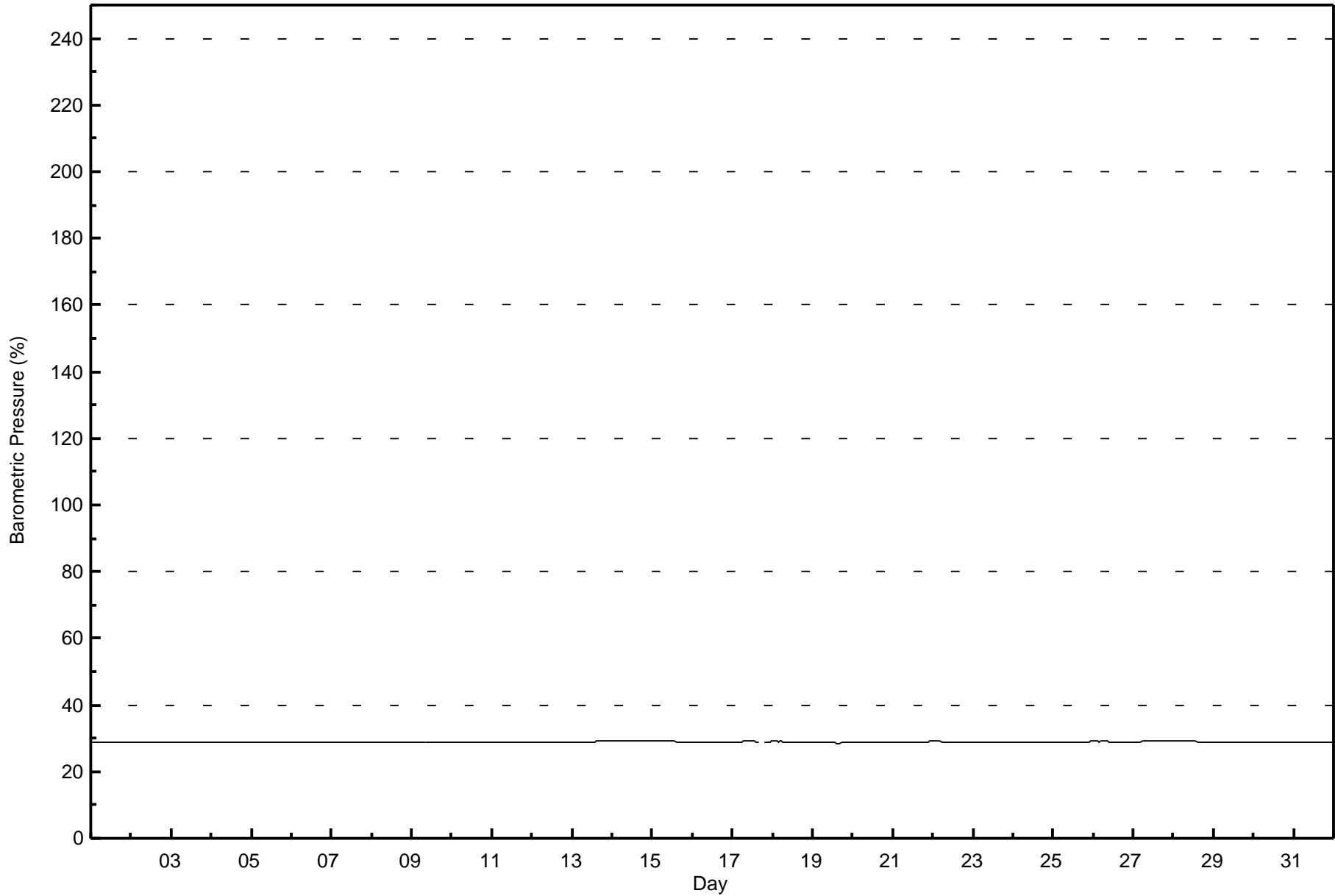
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---------------|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-Jul | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Jul | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | | |
| 3-Jul | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4-Jul | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 6-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | | |
| 8-Jul | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 9-Jul | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10-Jul | 28.9 | 28.9 | 28.9 | 28.8 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 11-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 12-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 13-Jul | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 14-Jul | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 15-Jul | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.1 | 29.1 | 29.1 | 29.2 | | | | | | | | | | | | | | | | | | | | | | | |
| 16-Jul | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 17-Jul | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | M | M | M | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 18-Jul | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 19-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | | | | | | | | | | | | | | | | | | | | | | | |
| 20-Jul | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 21-Jul | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 22-Jul | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 23-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 24-Jul | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | | | | | | | | | | | | | | | | | | | | | | | |
| 25-Jul | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 26-Jul | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 28.9 | 28.9 | 28.9 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | | | | | | | | | | | | | | | | | | | | | | | |
| 27-Jul | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 28-Jul | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.0 | 29.1 | | | | | | | | | | | | | | | | | | | | | | | |
| 29-Jul | 29.0 | 29.0 | 28.9 | 28.9 | 29.0 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.9 | | | | | | | | | | | | | | | | | | | | | | | |
| 30-Jul | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | | | | | | | | | | | | | | | | | | | | | | | |
| 31-Jul | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | 28.7 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.9 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.8 | 28.9 | |
| | | | | | | | | | | | | | | | | | | | | | | | | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.2 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.2 |

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - %
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

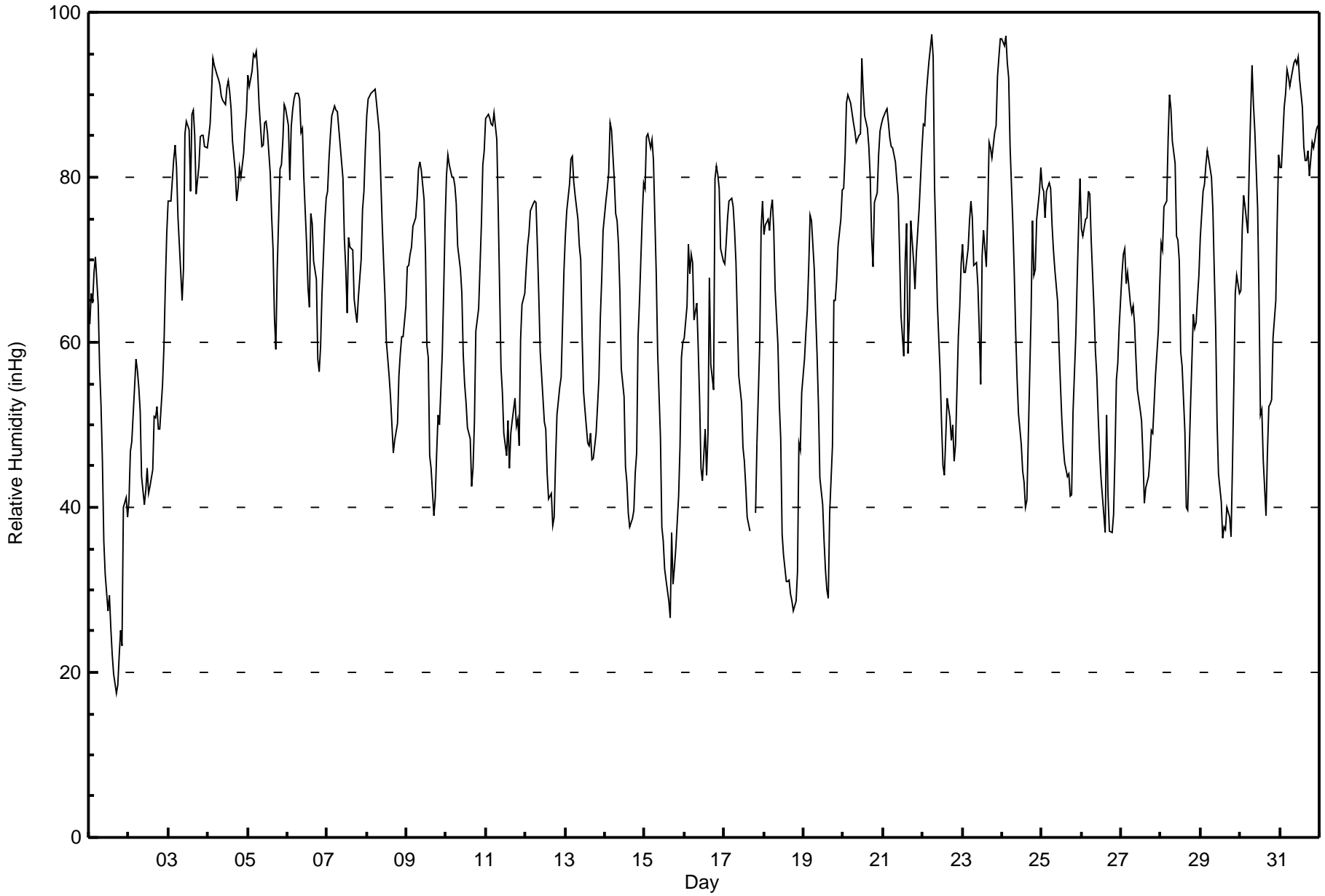
Relative Humidity (RH) - inHg
Athabasca Valley - July 2016

| Maximum Value: 97 inHg on Jul 22 06:00 | | | | | | | | | | | | | | | | | Maximum Daily Average: 87.6 inHg on Jul 31 | | | | | | | | | | | | | | | | | Hours in Service: 744 | |
|----------------------------------------------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|---------------|---------------|--|--|--|--|--|--|--|--------------------------------|--|
| Minimum Value: 17 inHg on Jul 1 17:00 | | | | | | | | | | | | | | | | | Minimum Daily Average: 40.4 inHg on Jul 1 | | | | | | | | | | | | | | | | | Hours of Data: 741 | |
| Maximum Diurnal Average: 81.7 inHg at hour 5 | | | | | | | | | | | | | | | | | Minimum Diurnal Average: 52.1 inHg at hour 16 | | | | | | | | | | | | | | | | | Hours of Missing Data: 3 | |
| Monthly Average: 66.4 inHg | | | | | | | | | | | | | | | | | Percentiles: P ₁ = 25 P ₁₀ = 41 Q ₁ = 52 Median = 69 Q ₃ = 81 P ₉₀ = 88 P ₉₉ = 95 | | | | | | | | | | | | | | | | | Hours of Calibration: 0 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Percent Operational Time: 99.6 | |
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | | | | | | | | | | |
| 1-Jul | 62 | 66 | 65 | 69 | 70 | 65 | 57 | 52 | 46 | 36 | 32 | 27 | 29 | 25 | 22 | 20 | 17 | 19 | 22 | 25 | 23 | 40 | 41 | 39 | 40.4 | 70 | | | | | | | | | |
| 2-Jul | 41 | 47 | 48 | 54 | 58 | 57 | 55 | 52 | 44 | 40 | 42 | 45 | 42 | 43 | 45 | 51 | 51 | 52 | 49 | 49 | 55 | 59 | 67 | 73 | 50.7 | 73 | | | | | | | | | |
| 3-Jul | 77 | 77 | 80 | 82 | 84 | 81 | 75 | 69 | 65 | 69 | 85 | 87 | 86 | 78 | 88 | 88 | 85 | 78 | 81 | 85 | 85 | 85 | 84 | 84 | 80.7 | 88 | | | | | | | | | |
| 4-Jul | 85 | 86 | 90 | 94 | 94 | 92 | 92 | 91 | 90 | 89 | 89 | 91 | 92 | 90 | 88 | 84 | 81 | 77 | 79 | 81 | 80 | 83 | 86 | 88 | 87.2 | 94 | | | | | | | | | |
| 5-Jul | 92 | 91 | 93 | 95 | 95 | 95 | 93 | 89 | 84 | 84 | 87 | 87 | 86 | 80 | 75 | 71 | 63 | 59 | 69 | 81 | 82 | 84 | 89 | 88 | 83.8 | 95 | | | | | | | | | |
| 6-Jul | 86 | 80 | 86 | 88 | 90 | 90 | 90 | 90 | 85 | 86 | 80 | 72 | 67 | 64 | 76 | 74 | 70 | 68 | 58 | 56 | 59 | 66 | 75 | 78 | 76.4 | 90 | | | | | | | | | |
| 7-Jul | 78 | 82 | 85 | 88 | 89 | 88 | 88 | 86 | 84 | 80 | 73 | 69 | 64 | 73 | 72 | 71 | 65 | 64 | 62 | 65 | 70 | 76 | 78 | 83 | 76.3 | 89 | | | | | | | | | |
| 8-Jul | 88 | 90 | 90 | 90 | 90 | 91 | 89 | 85 | 80 | 75 | 70 | 66 | 60 | 56 | 53 | 50 | 47 | 48 | 50 | 56 | 59 | 61 | 61 | 64 | 69.5 | 91 | | | | | | | | | |
| 9-Jul | 69 | 69 | 71 | 72 | 74 | 75 | 77 | 81 | 82 | 81 | 77 | 71 | 60 | 58 | 46 | 45 | 39 | 41 | 47 | 51 | 50 | 59 | 66 | 74 | 63.9 | 82 | | | | | | | | | |
| 10-Jul | 80 | 83 | 81 | 80 | 80 | 79 | 77 | 72 | 69 | 66 | 58 | 55 | 53 | 50 | 48 | 42 | 45 | 50 | 61 | 64 | 69 | 74 | 81 | 83 | 66.8 | 83 | | | | | | | | | |
| 11-Jul | 87 | 88 | 87 | 86 | 86 | 88 | 85 | 76 | 67 | 57 | 54 | 49 | 46 | 50 | 45 | 49 | 50 | 53 | 50 | 51 | 48 | 60 | 65 | 66 | 64.3 | 88 | | | | | | | | | |
| 12-Jul | 69 | 72 | 73 | 76 | 77 | 77 | 77 | 72 | 66 | 59 | 53 | 50 | 49 | 44 | 41 | 42 | 38 | 39 | 46 | 51 | 55 | 56 | 62 | 69 | 58.8 | 77 | | | | | | | | | |
| 13-Jul | 73 | 76 | 79 | 82 | 82 | 79 | 78 | 75 | 72 | 70 | 61 | 54 | 52 | 48 | 48 | 49 | 46 | 46 | 49 | 52 | 56 | 63 | 68 | 74 | 63.7 | 82 | | | | | | | | | |
| 14-Jul | 77 | 79 | 81 | 87 | 86 | 80 | 76 | 75 | 72 | 66 | 57 | 53 | 45 | 43 | 39 | 38 | 39 | 40 | 44 | 47 | 61 | 65 | 75 | 79 | 62.5 | 87 | | | | | | | | | |
| 15-Jul | 79 | 85 | 85 | 83 | 85 | 82 | 75 | 68 | 59 | 48 | 38 | 36 | 33 | 31 | 29 | 27 | 37 | 31 | 33 | 35 | 41 | 47 | 58 | 60 | 53.5 | 85 | | | | | | | | | |
| 16-Jul | 61 | 64 | 72 | 68 | 71 | 70 | 63 | 65 | 59 | 53 | 45 | 43 | 49 | 44 | 49 | 68 | 57 | 54 | 80 | 81 | 80 | 79 | 71 | 70 | 63.2 | 81 | | | | | | | | | |
| 17-Jul | 70 | 72 | 75 | 77 | 77 | 76 | 74 | 70 | 63 | 56 | 53 | 47 | 46 | 43 | 39 | 37 | M | M | M | 39 | 48 | 60 | 74 | 77 | 60.6 | 77 | | | | | | | | | |
| 18-Jul | 73 | 74 | 75 | 73 | 76 | 77 | 74 | 66 | 60 | 53 | 48 | 37 | 34 | 31 | 31 | 31 | 30 | 29 | 28 | 29 | 32 | 48 | 47 | 54 | 50.4 | 77 | | | | | | | | | |
| 19-Jul | 58 | 61 | 64 | 69 | 75 | 75 | 69 | 63 | 59 | 52 | 44 | 40 | 36 | 32 | 30 | 29 | 39 | 47 | 65 | 65 | 68 | 72 | 75 | 78 | 56.9 | 78 | | | | | | | | | |
| 20-Jul | 79 | 83 | 89 | 90 | 89 | 88 | 87 | 86 | 84 | 85 | 85 | 94 | 90 | 87 | 86 | 84 | 80 | 73 | 69 | 77 | 78 | 83 | 86 | 86 | 84.0 | 94 | | | | | | | | | |
| 21-Jul | 87 | 88 | 88 | 87 | 85 | 84 | 84 | 82 | 80 | 78 | 71 | 63 | 58 | 70 | 74 | 59 | 63 | 75 | 70 | 66 | 71 | 74 | 76 | 84 | 75.6 | 88 | | | | | | | | | |
| 22-Jul | 87 | 86 | 90 | 92 | 94 | 97 | 95 | 79 | 72 | 65 | 56 | 50 | 45 | 44 | 48 | 53 | 51 | 48 | 50 | 46 | 48 | 61 | 64 | 69 | 66.3 | 97 | | | | | | | | | |
| 23-Jul | 72 | 68 | 69 | 71 | 75 | 77 | 75 | 69 | 70 | 67 | 61 | 55 | 70 | 74 | 69 | 76 | 84 | 84 | 82 | 85 | 86 | 92 | 95 | 97 | 76.0 | 97 | | | | | | | | | |
| 24-Jul | 97 | 96 | 97 | 94 | 92 | 84 | 74 | 68 | 61 | 56 | 51 | 48 | 44 | 43 | 40 | 41 | 48 | 63 | 75 | 68 | 69 | 75 | 78 | 81 | 68.5 | 97 | | | | | | | | | |
| 25-Jul | 79 | 78 | 75 | 78 | 79 | 79 | 74 | 71 | 69 | 65 | 60 | 55 | 51 | 47 | 45 | 44 | 44 | 41 | 42 | 51 | 61 | 68 | 74 | 80 | 62.9 | 80 | | | | | | | | | |
| 26-Jul | 74 | 73 | 75 | 75 | 78 | 78 | 72 | 64 | 59 | 56 | 51 | 47 | 44 | 39 | 37 | 51 | 42 | 37 | 37 | 39 | 46 | 55 | 57 | 62 | 56.2 | 78 | | | | | | | | | |
| 27-Jul | 68 | 71 | 71 | 67 | 68 | 65 | 64 | 64 | 62 | 58 | 54 | 52 | 50 | 46 | 40 | 42 | 44 | 46 | 49 | 49 | 53 | 56 | 61 | 67 | 57.1 | 71 | | | | | | | | | |
| 28-Jul | 72 | 71 | 76 | 77 | 85 | 90 | 88 | 84 | 82 | 73 | 72 | 70 | 59 | 57 | 49 | 40 | 40 | 46 | 52 | 63 | 62 | 62 | 65 | 68 | 66.9 | 90 | | | | | | | | | |
| 29-Jul | 73 | 78 | 79 | 81 | 83 | 82 | 80 | 76 | 69 | 62 | 50 | 44 | 41 | 36 | 38 | 37 | 40 | 39 | 37 | 45 | 55 | 66 | 68 | 66 | 59.4 | 83 | | | | | | | | | |
| 30-Jul | 66 | 74 | 78 | 76 | 73 | 81 | 88 | 93 | 89 | 86 | 76 | 65 | 51 | 52 | 46 | 39 | 47 | 52 | 53 | 53 | 60 | 65 | 75 | 83 | 67.5 | 93 | | | | | | | | | |
| 31-Jul | 81 | 81 | 88 | 90 | 93 | 92 | 91 | 92 | 94 | 94 | 94 | 95 | 92 | 89 | 84 | 82 | 82 | 83 | 80 | 84 | 83 | 85 | 86 | 86 | 87.6 | 95 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 75.4 77.1 79.2 80.5 81.7 81.1 78.5 75.0 70.7 66.5 62.2 58.6 55.6 53.8 52.3 52.1 52.1 52.7 55.6 57.8 61.0 67.0 71.2 74.5 | | | | | | | | | | | | | | | | | Diurnal Average | |
| | | | | | | | | | | | | | | | | | 97 96 97 95 95 97 95 93 94 94 94 95 92 90 88 88 85 84 82 85 86 92 95 97 | | | | | | | | | | | | | | | | | Diurnal Maximum | |
| M - Maintenance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - inHg
Athabasca Valley - July 2016





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Athabasca Valley - July 2016

| | | |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Maximum Speed: 24 km/h on Jul 21 16:00 | Maximum Daily Speed Average: 15.5 km/h on Jul 12 | Hours in Service: 744 |
| Minimum Speed Value: 0 km/h on Jul 14 23:00 | Minimum Daily Speed Average: 1.1 km/h on Jul 10 | Hours of Data: 741 |
| Maximum Diurnal Speed Average: 5.9 km/h at hour 18 | Minimum Diurnal Speed Average: 0.2 km/h at hour 24 | Hours of Missing Data: 3 |
| Monthly Average Velocity: 2.3 km/h 320.3 deg | Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 5 Median = 8 Q ₃ = 11 P ₉₀ = 15 P ₉₉ = 21 | Percent Operational Time: 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average | Daily Maximum |
|--------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | | |
| 1-Jul | SSE3 | ESE5 | SE5 | SE7 | SE6 | SE8 | SE11 | SE9 | SE11 | SSE20 | SE17 | SSE14 | S11 | SSE10 | SSE10 | SSE12 | S14 | S13 | S15 | S15 | SSE8 | SE5 | SE6 | SE7 | SSE9.7 | SSE20 |
| 2-Jul | SSE7 | SE10 | SE9 | SE10 | SE9 | SE7 | SE10 | SE12 | SE16 | SSE17 | SSE16 | S16 | SSE14 | SSE15 | SSE19 | SSE20 | SE18 | ESE14 | SE10 | S11 | SE9 | SE9 | SE9 | SE7 | SE11.8 | SSE20 |
| 3-Jul | SE7 | SSE8 | SE7 | SE6 | SE7 | SE8 | SE9 | SSE7 | W2 | W5 | WSW8 | SSW5 | ESE6 | S6 | E2 | WSW4 | W3 | NNE3 | N2 | S4 | SSE4 | S5 | SW6 | WSW6 | S3.3 | SE9 |
| 4-Jul | SW5 | WSW10 | WSW8 | WSW10 | WSW11 | SW6 | WSW9 | WSW8 | SW9 | WSW11 | SW10 | SW8 | SW9 | SW10 | SW12 | SW13 | WSW7 | SE2 | S4 | SSW6 | S5 | SE5 | NW0 | N3 | SW6.9 | SW13 |
| 5-Jul | N4 | NE3 | N4 | WNW4 | NW6 | NNW8 | NNW10 | N5 | N12 | NNW10 | NE6 | NNW8 | NNW10 | NNW9 | NNW11 | NNW9 | NNW10 | NE8 | ENE9 | W6 | WNW4 | SSW3 | SE3 | SW5 | NNW5.0 | N12 |
| 6-Jul | SW7 | NNW13 | NW3 | SE5 | S6 | SSW4 | NNW6 | NNW10 | N11 | NNW15 | NNW16 | N14 | N12 | NNW12 | N14 | NE8 | N7 | NNW11 | NE9 | N10 | N8 | N5 | N6 | N7 | N6.9 | NNW16 |
| 7-Jul | NNW8 | NNW11 | NNW10 | NNW13 | NNW14 | NNW12 | NNW10 | NNW11 | N11 | NNW9 | NNW7 | N6 | N10 | NNW16 | NNW14 | N10 | NNW15 | N15 | N12 | NNW14 | NNW13 | NNW11 | NNW11 | NNW9 | NNW11.2 | NNW16 |
| 8-Jul | N6 | NNW7 | NNE3 | NE6 | NE5 | NE7 | NNE7 | N8 | N10 | NNW10 | NNW9 | NNW13 | NNW15 | NNW14 | NNW13 | NNW12 | N10 | N8 | N7 | NNW4 | NNW6 | NNW9 | NNW10 | N7 | N8.3 | NNW15 |
| 9-Jul | N8 | N6 | NNW7 | NNW9 | NNW6 | NNW8 | NNW10 | NNW9 | NNW9 | NNW6 | N4 | NNW2 | NW3 | W5 | WSW6 | WNW5 | ENE6 | ENE8 | ENE14 | E9 | E4 | SW3 | WSW2 | W2 | N3.7 | ENE14 |
| 10-Jul | WSW3 | N1 | NNE3 | SE6 | SE7 | SE5 | SE3 | NNE1 | NW4 | NNW8 | NNW9 | NNW9 | N8 | E14 | ESE12 | E7 | SE12 | W6 | WNW17 | NNW10 | NNW5 | W4 | SW4 | WSW7 | N1.1 | WNW17 |
| 11-Jul | SSE2 | SSW7 | SSW4 | SW5 | SW2 | ESE5 | N3 | N8 | NNW10 | NNW13 | NNW15 | NNW16 | NNW19 | N15 | NNW16 | NNW19 | N14 | NNW11 | NNW13 | N9 | NE6 | NNW6 | NNW8 | NNW8 | NNW7.7 | NNW19 |
| 12-Jul | NNW12 | NNW11 | NNW12 | N10 | NNW13 | NNW17 | NNW16 | N15 | NNW17 | NNW18 | NNW15 | N17 | NNW19 | NNW17 | NNW17 | NNW19 | N18 | NNW21 | NNW24 | NNW22 | NNW19 | NNW11 | NNW5 | NNW7 | NNW15.5 | NNW24 |
| 13-Jul | NW8 | NNW8 | NNW9 | NNW9 | NNW7 | NNW9 | N11 | N11 | N12 | NNW15 | NNW19 | NNW18 | N15 | NNW16 | NNW18 | NNW20 | NNE16 | N12 | NNW14 | NNW15 | NNW8 | N6 | N5 | N5 | NNW11.8 | NNW20 |
| 14-Jul | NE4 | N4 | E4 | E4 | ESE3 | E4 | E5 | NNW5 | N6 | NNW7 | NNW8 | NNW8 | N8 | NNW7 | NNW7 | NNW10 | NNW10 | N12 | N10 | NNW5 | NW3 | W3 | NNE0 | E1 | N4.6 | N12 |
| 15-Jul | NE0 | ENE4 | E3 | ESE3 | SE4 | SE8 | ESE5 | ENE5 | ENE4 | ENE4 | SW3 | WSW3 | NNW5 | NW6 | N3 | W3 | NNW11 | N9 | NNW11 | NNW12 | WNW6 | NNW5 | W5 | WSW5 | N1.9 | NW12 |
| 16-Jul | SW9 | SW7 | SSE3 | SE6 | SE7 | SE5 | SE5 | E6 | S1 | SSE3 | WSW4 | N6 | N9 | NNW11 | NNE17 | NNW8 | N6 | NNW8 | N15 | NW8 | NNW3 | NNW11 | NNW16 | NNW15 | NNW3.9 | NNE17 |
| 17-Jul | NNW12 | NNW12 | NNW9 | NNW8 | NNW9 | NNW12 | NNW14 | N12 | NNW11 | NNW15 | NNW15 | NNW15 | N12 | N12 | N12 | NNW12 | M | M | M | NNW6 | NNW3 | W4 | W1 | ESE3 | NNW9.5 | NNW15 |
| 18-Jul | SE2 | ESE4 | SE5 | SE7 | SE11 | SE13 | SE11 | SE9 | SE8 | E6 | NNE2 | WSW4 | W9 | SW10 | WSW12 | WSW11 | WSW12 | WSW12 | SW14 | WSW10 | SSW4 | SSW4 | SSW6 | S6 | SSW4.7 | SW14 |
| 19-Jul | S8 | S8 | SSE9 | SE5 | SE7 | ESE9 | SE5 | SW8 | SW8 | WSW8 | SW14 | WSW16 | SW17 | SW15 | WSW13 | W14 | NNW22 | NW22 | WSW4 | SSW6 | SW3 | NW3 | WSW1 | S3 | SW5.4 | NNW22 |
| 20-Jul | S3 | NW7 | NNW8 | NNW7 | NW7 | NW9 | NNW8 | NNW8 | NW5 | WSW3 | NNW8 | NNW6 | NW5 | W3 | WSW4 | WSW4 | SW6 | WSW3 | WSW5 | SW14 | SW10 | SSE4 | SSE5 | ESE3 | WNW3.4 | WSW14 |
| 21-Jul | SSE4 | SE5 | SE6 | SE9 | SE8 | SE4 | S4 | SW4 | WSW13 | WSW14 | W12 | W14 | W20 | NNW22 | W17 | NNW24 | NNW17 | N21 | N19 | N14 | N11 | NE9 | E6 | E3 | WNW4.9 | WNW24 |
| 22-Jul | SE4 | SSE5 | SE8 | SE8 | SE9 | SSE8 | SSE9 | SSE9 | SE10 | SE8 | S12 | S13 | SSW15 | SW15 | SSW12 | SSW6 | SW9 | NNW12 | NW11 | W13 | NNW13 | NNW12 | NW7 | E1 | SSW4.3 | SSW15 |
| 23-Jul | WNW6 | SW3 | SW6 | SW6 | WSW7 | WSW9 | WSW7 | N4 | N7 | N5 | NW4 | W5 | ENE5 | SE8 | SSE7 | SE4 | SW4 | ESE5 | SW5 | SSW6 | S2 | ESE3 | SE6 | SE5 | SW2.0 | WSW9 |
| 24-Jul | SE7 | SE8 | ESE10 | SE11 | SE8 | SSW6 | SSW10 | SSW9 | SW11 | SW14 | SW20 | WSW21 | WSW20 | WSW15 | WSW16 | NNW14 | NW15 | NW21 | NNW18 | W8 | WSW14 | W19 | W7 | SW9 | WSW8.4 | WSW21 |
| 25-Jul | SW11 | SW3 | WNW4 | SW4 | WSW8 | WSW8 | WNW7 | NNW19 | NNW14 | N10 | NNW11 | NNW10 | NNW13 | N12 | N10 | NNE10 | N8 | NE8 | NNE6 | NNW5 | NW4 | NW2 | ESE3 | E4 | NNW5.3 | NW19 |
| 26-Jul | SE6 | ESE6 | SE5 | SE5 | SE5 | SE6 | SE10 | SE12 | SE8 | ENE5 | WSW7 | WSW6 | WSW5 | SW8 | WSW8 | NNW7 | SSW11 | SW9 | WSW4 | SE9 | SE8 | S3 | SE6 | SE12 | SSE4.4 | SE12 |
| 27-Jul | SE12 | SE9 | SE8 | SSE7 | SSE6 | SSE4 | S4 | SW6 | E3 | WNW4 | NNW10 | NNW12 | NNW11 | NNW11 | N12 | NNW15 | NNW15 | NNW12 | N7 | N6 | N7 | NNW7 | NNW8 | N7 | N3.9 | NNW15 |
| 28-Jul | N5 | NW5 | N1 | NNW3 | SSE3 | N4 | N5 | NNE2 | NW6 | N8 | NNW10 | NNW10 | NNW9 | NNW8 | NNW9 | NNW8 | NNW8 | NW8 | WSW17 | SW12 | SSW6 | SSE9 | SSE6 | E2 | NW3.4 | WSW17 |
| 29-Jul | SSW3 | SSW4 | SSE6 | S4 | S5 | SSW5 | SSW6 | WSW7 | SW6 | W4 | WSW5 | WSW7 | SW7 | SW7 | WSW8 | SW8 | WSW14 | SSW7 | S9 | S9 | SSE5 | SE3 | SE7 | SE10 | SSW5.0 | WSW14 |
| 30-Jul | SE8 | S4 | SE6 | SE11 | SSE6 | WSW6 | SSE6 | SSW1 | SE7 | SE8 | SE10 | ESE10 | SE11 | N10 | NNE7 | ESE9 | N11 | NNW9 | N7 | N9 | NNW11 | NNW11 | NNW6 | NW1 | ENE2.0 | SE11 |
| 31-Jul | NNE3 | NE6 | NNW9 | N9 | NNW12 | NW9 | W9 | WNW7 | NNW5 | WNW7 | WNW4 | WSW5 | NW9 | N9 | NW13 | WNW8 | WNW7 | NW8 | NNW4 | NNW13 | W6 | WNW6 | WSW7 | WSW8 | NNW6.2 | NNW13 |

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| SSW0.8 W0.4 E0.6 SE1.4 SE1.2 S0.2 NW0.3 NNW1.8 NNW2.5 NW3.2 NW3.8 NW4.3 NW4.7 NW4.7 NW4.5 NW5.1 NNW5.3 NNW5.9 NNW4.6 NW3.7 NW2.4 NW2.3 NW1.1 W0.2 | Diurnal Average |
| SE12 WNW13 NNW12 NNW13 NNW14 NNW17 NNW16 NW19 NNW17 SSE20 SW20 WSW21 WSW20 NNW22 SSE19 NNW24 NNW22 NNW22 NNW24 NNW22 NNW19 W19 NNW16 NNW15 | Diurnal Maximum |

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Athabasca Valley - July 2016

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 13 km/h on Jul 28 19:00 | Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6 |
| Minimum Value: 0 km/h on Jul 14 21:00 | |
| Percentiles: P ₁ = 1 P ₁₀ = 1 O ₁ = 2 Median = 2 O ₃ = 3 P ₉₀ = 4 P ₉₉ = 10 | |

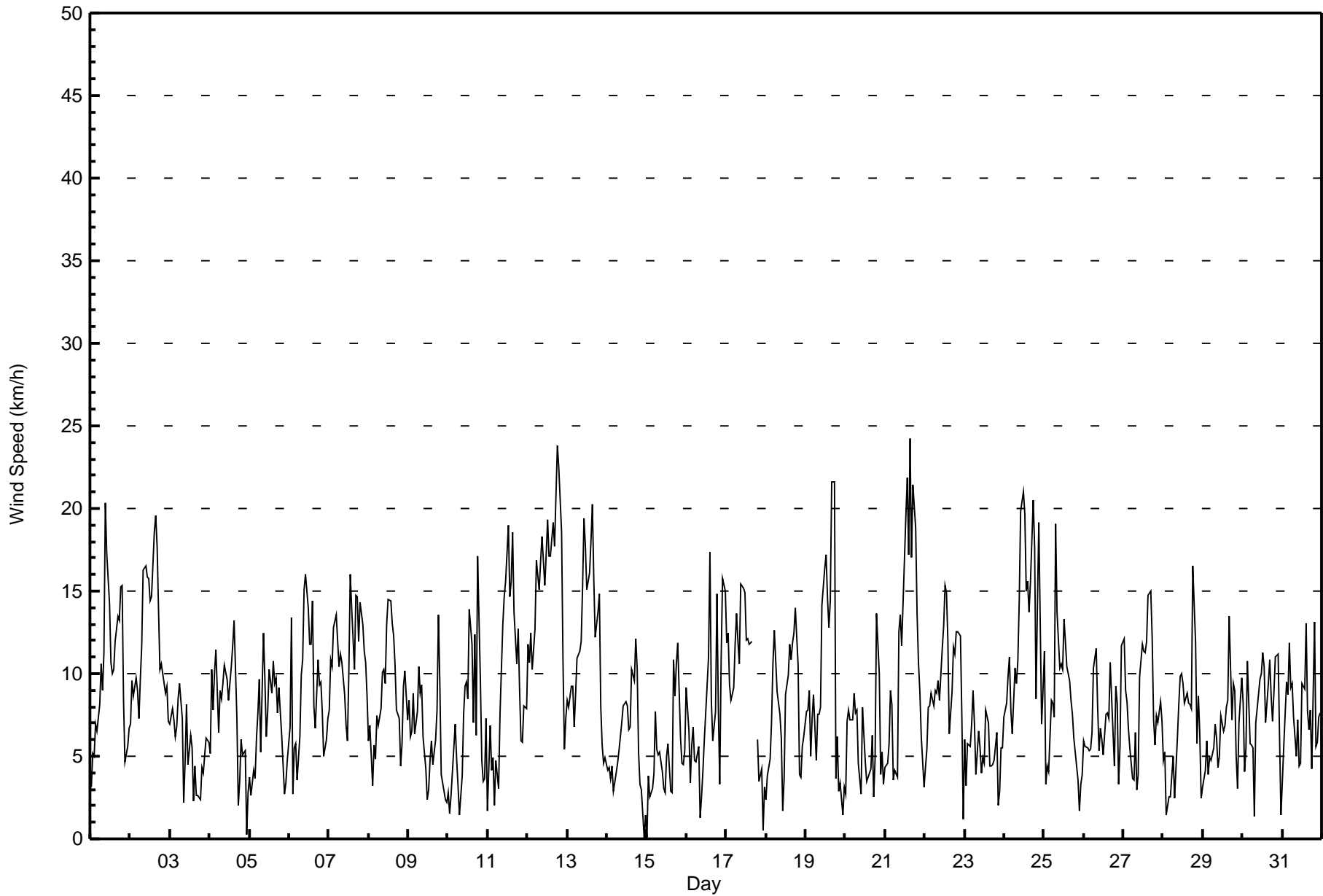
| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|------------------------------------------------------|-------------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|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

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Athabasca Valley - July 2016





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - July 2016**

| Wind Speed Ranges (km/h) | Number of Hours | % | Cumulative % |
|---------------------------------|------------------------|----------|---------------------|
| 0 - 5 | 200 | 26.99 | 26.99 |
| 6 - 11 | 369 | 49.80 | 76.79 |
| 12 - 19 | 156 | 21.05 | 97.84 |
| 20 - 28 | 16 | 2.16 | 100.00 |
| 29 - 38 | 0 | 0.00 | 100.00 |
| > 38 | 0 | 0.00 | 100.00 |

Total Number of Valid Hours: 741

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - July 2016**

| Wind Speed Ranges (km/h) | Wind Direction | | | | | | | | | | | | | | | | Totals |
|-----------------------------|----------------|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|----|-----|----|-----|--------|
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | |
| 0 - 5 | 19 | 8 | 4 | 6 | 13 | 11 | 23 | 13 | 14 | 10 | 14 | 18 | 13 | 7 | 13 | 14 | 200 |
| 6 - 11 | 48 | 5 | 10 | 4 | 4 | 6 | 68 | 18 | 9 | 13 | 27 | 31 | 6 | 8 | 14 | 98 | 369 |
| 12 - 19 | 24 | 2 | 0 | 1 | 1 | 2 | 9 | 7 | 7 | 2 | 9 | 13 | 5 | 7 | 4 | 63 | 156 |
| 20 - 28 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 5 | 16 |
| 29 - 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| > 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 92 | 15 | 14 | 11 | 18 | 19 | 100 | 40 | 30 | 25 | 51 | 64 | 25 | 24 | 33 | 180 | 741 |

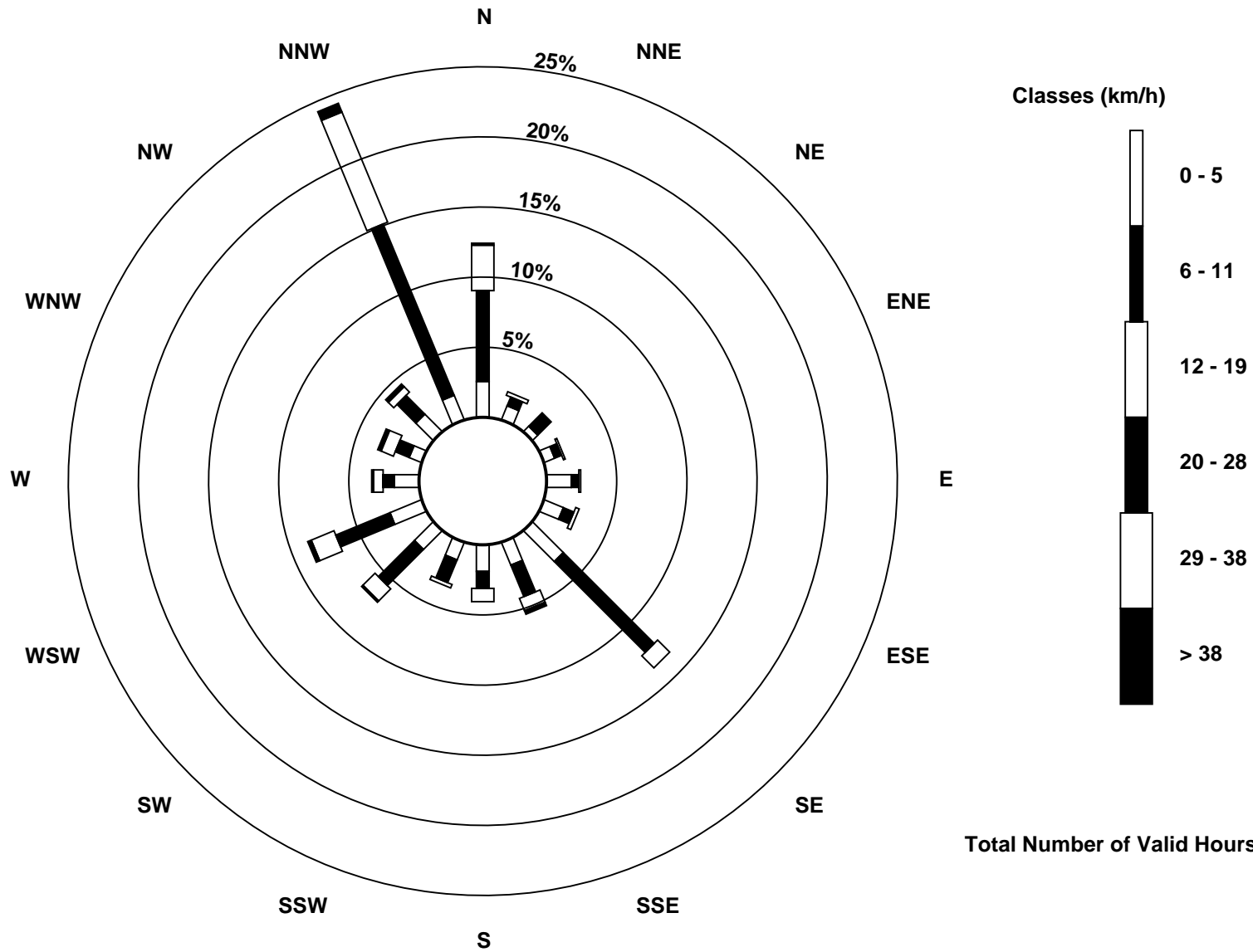
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Jul 2016

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





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - July 2016

| | |
|---------------------------------------------------------------|--------------------------------|
| Direction of Maximum Speed: 299 deg on Jul 21 16:00 | Hours in Service: 744 |
| Direction of Maximum Daily Speed Average: 344.0 deg on Jul 12 | Hours of Data: 741 |
| Direction of Minimum Speed: 33 deg on Jul 14 23:00 | Hours of Missing Data: 3 |
| Direction of Minimum Daily Speed Average: 1.1 deg on Jul 10 | Percent Operational Time: 99.6 |
| Monthly Average Direction: 314.6 deg | |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Average |
|--------|-------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Jul | 154 | 123 | 134 | 133 | 133 | 141 | 131 | 135 | 130 | 150 | 145 | 164 | 179 | 167 | 154 | 162 | 173 | 174 | 180 | 170 | 160 | 136 | 139 | 143 | 154.3 |
| 2-Jul | 152 | 141 | 142 | 138 | 136 | 128 | 141 | 141 | 136 | 164 | 156 | 170 | 159 | 156 | 150 | 149 | 134 | 118 | 145 | 176 | 132 | 138 | 138 | 130 | 146.1 |
| 3-Jul | 130 | 148 | 144 | 140 | 142 | 136 | 143 | 160 | 278 | 279 | 254 | 205 | 114 | 171 | 88 | 240 | 265 | 30 | 7 | 176 | 153 | 187 | 233 | 237 | 169.1 |
| 4-Jul | 215 | 242 | 242 | 241 | 237 | 230 | 241 | 242 | 228 | 241 | 229 | 231 | 232 | 220 | 228 | 236 | 249 | 125 | 175 | 198 | 185 | 145 | 304 | 359 | 229.4 |
| 5-Jul | 355 | 49 | 2 | 291 | 324 | 329 | 335 | 359 | 3 | 336 | 56 | 348 | 341 | 331 | 340 | 339 | 337 | 48 | 63 | 261 | 294 | 209 | 146 | 216 | 345.3 |
| 6-Jul | 227 | 294 | 314 | 131 | 174 | 199 | 329 | 336 | 1 | 339 | 337 | 350 | 357 | 348 | 7 | 39 | 6 | 345 | 34 | 353 | 359 | 1 | 351 | 2 | 348.9 |
| 7-Jul | 338 | 335 | 340 | 340 | 337 | 329 | 326 | 335 | 352 | 343 | 344 | 357 | 6 | 342 | 348 | 349 | 344 | 350 | 355 | 340 | 337 | 331 | 334 | 346 | 342.1 |
| 8-Jul | 349 | 345 | 13 | 39 | 39 | 34 | 30 | 4 | 353 | 343 | 337 | 340 | 334 | 339 | 343 | 343 | 352 | 359 | 0 | 348 | 347 | 338 | 338 | 351 | 351.0 |
| 9-Jul | 6 | 352 | 348 | 346 | 344 | 340 | 342 | 344 | 334 | 333 | 354 | 327 | 318 | 281 | 239 | 295 | 73 | 64 | 77 | 88 | 99 | 221 | 246 | 271 | 356.7 |
| 10-Jul | 242 | 0 | 21 | 130 | 133 | 133 | 132 | 30 | 311 | 348 | 335 | 348 | 351 | 90 | 103 | 79 | 137 | 263 | 291 | 327 | 330 | 271 | 225 | 237 | 3.3 |
| 11-Jul | 158 | 206 | 201 | 216 | 235 | 121 | 5 | 350 | 344 | 341 | 341 | 343 | 342 | 351 | 347 | 345 | 351 | 345 | 348 | 359 | 44 | 346 | 336 | 339 | 344.4 |
| 12-Jul | 332 | 343 | 342 | 350 | 343 | 338 | 345 | 352 | 346 | 344 | 348 | 349 | 346 | 346 | 348 | 345 | 350 | 347 | 342 | 342 | 339 | 331 | 335 | 334 | 344.0 |
| 13-Jul | 326 | 338 | 339 | 339 | 336 | 343 | 352 | 350 | 355 | 345 | 344 | 343 | 356 | 348 | 346 | 345 | 14 | 358 | 348 | 343 | 343 | 354 | 359 | 8 | 348.0 |
| 14-Jul | 49 | 6 | 79 | 83 | 113 | 91 | 81 | 344 | 360 | 347 | 346 | 344 | 4 | 339 | 342 | 341 | 340 | 2 | 352 | 346 | 312 | 263 | 33 | 97 | 359.3 |
| 15-Jul | 50 | 76 | 98 | 102 | 125 | 129 | 111 | 74 | 74 | 72 | 216 | 244 | 346 | 320 | 353 | 277 | 344 | 5 | 335 | 321 | 299 | 335 | 262 | 243 | 353.1 |
| 16-Jul | 234 | 221 | 149 | 140 | 142 | 125 | 133 | 92 | 177 | 156 | 245 | 349 | 354 | 332 | 13 | 348 | 353 | 341 | 8 | 322 | 347 | 337 | 341 | 338 | 348.7 |
| 17-Jul | 327 | 333 | 334 | 333 | 334 | 337 | 339 | 349 | 344 | 345 | 343 | 347 | 353 | 359 | 358 | 347 | M | M | M | 337 | 333 | 269 | 271 | 104 | 342.2 |
| 18-Jul | 131 | 122 | 136 | 131 | 140 | 143 | 136 | 137 | 130 | 86 | 17 | 245 | 259 | 229 | 239 | 246 | 256 | 243 | 227 | 239 | 209 | 203 | 192 | 189 | 196.6 |
| 19-Jul | 184 | 177 | 168 | 136 | 126 | 121 | 124 | 219 | 228 | 243 | 234 | 237 | 222 | 234 | 257 | 261 | 333 | 315 | 250 | 213 | 216 | 304 | 243 | 175 | 235.6 |
| 20-Jul | 185 | 313 | 330 | 328 | 312 | 314 | 336 | 335 | 321 | 240 | 346 | 341 | 321 | 271 | 244 | 237 | 226 | 249 | 237 | 236 | 230 | 148 | 160 | 108 | 287.6 |
| 21-Jul | 156 | 141 | 130 | 136 | 135 | 137 | 185 | 221 | 242 | 245 | 281 | 271 | 273 | 290 | 263 | 299 | 332 | 9 | 353 | 352 | 11 | 36 | 84 | 95 | 302.2 |
| 22-Jul | 130 | 155 | 143 | 145 | 141 | 148 | 150 | 151 | 145 | 146 | 170 | 171 | 201 | 225 | 211 | 203 | 234 | 302 | 325 | 281 | 291 | 335 | 310 | 82 | 199.4 |
| 23-Jul | 282 | 230 | 224 | 232 | 247 | 245 | 241 | 2 | 355 | 353 | 314 | 266 | 61 | 133 | 158 | 138 | 235 | 110 | 221 | 210 | 184 | 122 | 140 | 141 | 215.6 |
| 24-Jul | 146 | 132 | 120 | 136 | 125 | 199 | 211 | 213 | 234 | 228 | 224 | 242 | 238 | 244 | 257 | 298 | 313 | 326 | 288 | 259 | 256 | 263 | 278 | 230 | 245.1 |
| 25-Jul | 236 | 219 | 287 | 226 | 240 | 256 | 300 | 323 | 343 | 354 | 341 | 345 | 337 | 353 | 9 | 16 | 5 | 45 | 25 | 348 | 322 | 311 | 107 | 94 | 335.0 |
| 26-Jul | 131 | 119 | 129 | 146 | 134 | 138 | 138 | 144 | 132 | 78 | 251 | 239 | 239 | 220 | 239 | 331 | 210 | 227 | 241 | 143 | 146 | 182 | 143 | 142 | 167.0 |
| 27-Jul | 142 | 142 | 143 | 150 | 156 | 157 | 176 | 223 | 95 | 294 | 343 | 342 | 348 | 347 | 352 | 348 | 348 | 347 | 352 | 8 | 350 | 348 | 339 | 354 | 354.7 |
| 28-Jul | 5 | 320 | 359 | 328 | 156 | 5 | 353 | 17 | 325 | 355 | 344 | 346 | 339 | 334 | 340 | 338 | 330 | 310 | 244 | 226 | 211 | 155 | 164 | 99 | 319.4 |
| 29-Jul | 202 | 207 | 156 | 184 | 170 | 196 | 213 | 239 | 236 | 268 | 247 | 241 | 236 | 235 | 252 | 234 | 239 | 203 | 179 | 180 | 158 | 141 | 124 | 139 | 206.7 |
| 30-Jul | 145 | 180 | 130 | 139 | 149 | 245 | 164 | 201 | 137 | 132 | 129 | 115 | 133 | 5 | 22 | 107 | 354 | 345 | 349 | 353 | 344 | 335 | 335 | 317 | 75.8 |
| 31-Jul | 12 | 44 | 340 | 353 | 348 | 316 | 269 | 295 | 338 | 302 | 294 | 245 | 321 | 358 | 319 | 288 | 297 | 325 | 342 | 330 | 262 | 292 | 254 | 241 | 314.5 |

212.1 266.6 94.7 126.2 144.1 172.2 324.1 331.8 343.0 323.0 309.7 306.5 314.8 313.7 319.6 320.2 327.6 342.4 330.9 305.2 311.6 314.9 311.5 277.3
 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 (WD) - deg
Athabasca Valley - July 2016

| | |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 | Hours in Service: 744 |
| Maximum Value: 96 deg on Jul 17 23:00 | Hours of Data: 741 |
| Minimum Value: 7 deg on Jul 28 13:00 | Hours of Missing Data: 3 |
| Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 16 Median = 22 Q ₃ = 34 P ₉₀ = 58 P ₉₉ = 87 | Hours of Calibration: 0 |
| | Percent Operational Time: 99.6 |

| Day | Hourly Period Ending At (MST) | | | | | | | | | | | | | | | | | | | | | | | | Daily Maximum |
|--------|-------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | |
| 1-Jul | 53 | 33 | 33 | 16 | 20 | 22 | 20 | 19 | 24 | 20 | 24 | 29 | 44 | 46 | 53 | 35 | 32 | 25 | 24 | 17 | 20 | 32 | 18 | 35 | 53 |
| 2-Jul | 20 | 14 | 14 | 15 | 18 | 26 | 19 | 15 | 21 | 20 | 23 | 22 | 25 | 24 | 19 | 17 | 21 | 22 | 35 | 19 | 20 | 18 | 16 | 21 | 35 |
| 3-Jul | 23 | 16 | 16 | 23 | 16 | 15 | 18 | 25 | 78 | 89 | 53 | 61 | 40 | 50 | 81 | 21 | 60 | 29 | 56 | 30 | 27 | 28 | 42 | 26 | 89 |
| 4-Jul | 18 | 14 | 24 | 15 | 12 | 24 | 13 | 15 | 19 | 15 | 15 | 16 | 23 | 16 | 17 | 14 | 21 | 80 | 57 | 28 | 26 | 33 | 95 | 54 | 95 |
| 5-Jul | 48 | 34 | 30 | 58 | 17 | 13 | 13 | 36 | 30 | 16 | 36 | 30 | 15 | 13 | 12 | 14 | 17 | 45 | 76 | 59 | 69 | 63 | 45 | 50 | 76 |
| 6-Jul | 26 | 27 | 68 | 64 | 27 | 44 | 34 | 17 | 24 | 12 | 12 | 21 | 22 | 21 | 24 | 30 | 34 | 17 | 25 | 32 | 28 | 26 | 27 | 23 | 68 |
| 7-Jul | 25 | 11 | 12 | 11 | 10 | 10 | 16 | 15 | 19 | 20 | 32 | 52 | 25 | 14 | 17 | 20 | 14 | 18 | 21 | 10 | 11 | 10 | 11 | 21 | 52 |
| 8-Jul | 24 | 27 | 58 | 19 | 22 | 20 | 28 | 24 | 19 | 12 | 16 | 11 | 13 | 12 | 12 | 12 | 18 | 19 | 15 | 22 | 19 | 12 | 9 | 27 | 58 |
| 9-Jul | 15 | 19 | 18 | 12 | 22 | 14 | 11 | 14 | 11 | 13 | 22 | 35 | 23 | 18 | 40 | 52 | 59 | 45 | 13 | 13 | 22 | 52 | 57 | 41 | 59 |
| 10-Jul | 69 | 66 | 43 | 23 | 16 | 32 | 42 | 67 | 20 | 14 | 13 | 18 | 16 | 39 | 27 | 29 | 28 | 87 | 17 | 27 | 27 | 32 | 61 | 11 | 87 |
| 11-Jul | 77 | 29 | 36 | 17 | 80 | 29 | 56 | 15 | 10 | 10 | 10 | 10 | 13 | 16 | 16 | 15 | 18 | 14 | 17 | 26 | 31 | 16 | 22 | 21 | 80 |
| 12-Jul | 11 | 15 | 12 | 25 | 16 | 10 | 14 | 18 | 15 | 13 | 16 | 16 | 16 | 15 | 16 | 14 | 17 | 17 | 12 | 12 | 9 | 13 | 21 | 16 | 25 |
| 13-Jul | 13 | 19 | 11 | 12 | 16 | 16 | 15 | 16 | 17 | 15 | 14 | 13 | 22 | 28 | 18 | 15 | 21 | 25 | 17 | 13 | 15 | 18 | 26 | 30 | 30 |
| 14-Jul | 38 | 34 | 13 | 11 | 42 | 19 | 20 | 28 | 23 | 14 | 14 | 15 | 30 | 20 | 23 | 13 | 18 | 20 | 18 | 14 | 16 | 51 | 94 | 82 | 94 |
| 15-Jul | 94 | 14 | 60 | 26 | 23 | 10 | 28 | 17 | 16 | 46 | 61 | 87 | 51 | 60 | 79 | 69 | 15 | 20 | 18 | 9 | 31 | 29 | 23 | 53 | 94 |
| 16-Jul | 11 | 52 | 56 | 21 | 16 | 26 | 27 | 19 | 94 | 78 | 54 | 42 | 18 | 19 | 28 | 43 | 24 | 15 | 28 | 15 | 35 | 11 | 10 | 10 | 94 |
| 17-Jul | 9 | 9 | 11 | 11 | 12 | 11 | 13 | 18 | 16 | 13 | 14 | 17 | 20 | 21 | 22 | 17 | M | M | M | 22 | 22 | 18 | 96 | 57 | 96 |
| 18-Jul | 55 | 29 | 23 | 18 | 14 | 10 | 11 | 14 | 18 | 30 | 75 | 75 | 32 | 20 | 16 | 27 | 17 | 21 | 16 | 13 | 27 | 30 | 17 | 19 | 75 |
| 19-Jul | 20 | 19 | 13 | 26 | 24 | 21 | 61 | 46 | 24 | 19 | 17 | 16 | 13 | 25 | 30 | 30 | 28 | 22 | 77 | 36 | 79 | 66 | 82 | 64 | 82 |
| 20-Jul | 54 | 23 | 12 | 13 | 15 | 20 | 17 | 16 | 25 | 55 | 30 | 31 | 20 | 46 | 35 | 50 | 20 | 60 | 28 | 10 | 43 | 49 | 39 | 65 | 65 |
| 21-Jul | 37 | 23 | 22 | 11 | 17 | 37 | 66 | 44 | 14 | 15 | 19 | 26 | 18 | 21 | 22 | 24 | 37 | 19 | 21 | 22 | 27 | 23 | 21 | 29 | 66 |
| 22-Jul | 20 | 23 | 15 | 16 | 14 | 17 | 20 | 19 | 17 | 22 | 30 | 27 | 29 | 29 | 37 | 48 | 23 | 24 | 20 | 17 | 14 | 15 | 17 | 73 | 73 |
| 23-Jul | 51 | 51 | 24 | 24 | 22 | 12 | 30 | 37 | 29 | 35 | 22 | 30 | 69 | 26 | 34 | 62 | 60 | 70 | 34 | 23 | 63 | 42 | 13 | 22 | 70 |
| 24-Jul | 13 | 15 | 15 | 11 | 28 | 63 | 27 | 24 | 25 | 23 | 14 | 18 | 15 | 19 | 21 | 48 | 32 | 24 | 26 | 22 | 15 | 11 | 46 | 21 | 63 |
| 25-Jul | 18 | 64 | 66 | 31 | 15 | 19 | 53 | 11 | 21 | 22 | 36 | 32 | 21 | 23 | 26 | 23 | 32 | 33 | 32 | 21 | 42 | 70 | 53 | 29 | 70 |
| 26-Jul | 25 | 23 | 25 | 25 | 23 | 17 | 15 | 15 | 20 | 38 | 40 | 47 | 35 | 21 | 31 | 60 | 28 | 28 | 40 | 23 | 30 | 66 | 29 | 13 | 66 |
| 27-Jul | 12 | 12 | 12 | 14 | 15 | 50 | 52 | 18 | 53 | 28 | 13 | 9 | 16 | 17 | 20 | 17 | 18 | 15 | 16 | 26 | 11 | 11 | 11 | 32 | 53 |
| 28-Jul | 61 | 62 | 77 | 81 | 56 | 52 | 45 | 66 | 21 | 31 | 14 | 11 | 7 | 8 | 10 | 11 | 17 | 11 | 24 | 37 | 35 | 23 | 23 | 75 | 81 |
| 29-Jul | 44 | 63 | 29 | 46 | 31 | 50 | 40 | 15 | 22 | 35 | 35 | 25 | 34 | 39 | 28 | 16 | 32 | 38 | 22 | 14 | 35 | 60 | 25 | 17 | 63 |
| 30-Jul | 20 | 55 | 37 | 16 | 37 | 53 | 33 | 91 | 20 | 17 | 18 | 24 | 32 | 61 | 50 | 29 | 61 | 24 | 23 | 21 | 16 | 14 | 58 | 88 | 91 |
| 31-Jul | 71 | 75 | 34 | 43 | 22 | 42 | 43 | 45 | 84 | 45 | 53 | 64 | 37 | 21 | 27 | 26 | 21 | 18 | 47 | 14 | 69 | 30 | 19 | 12 | 84 |

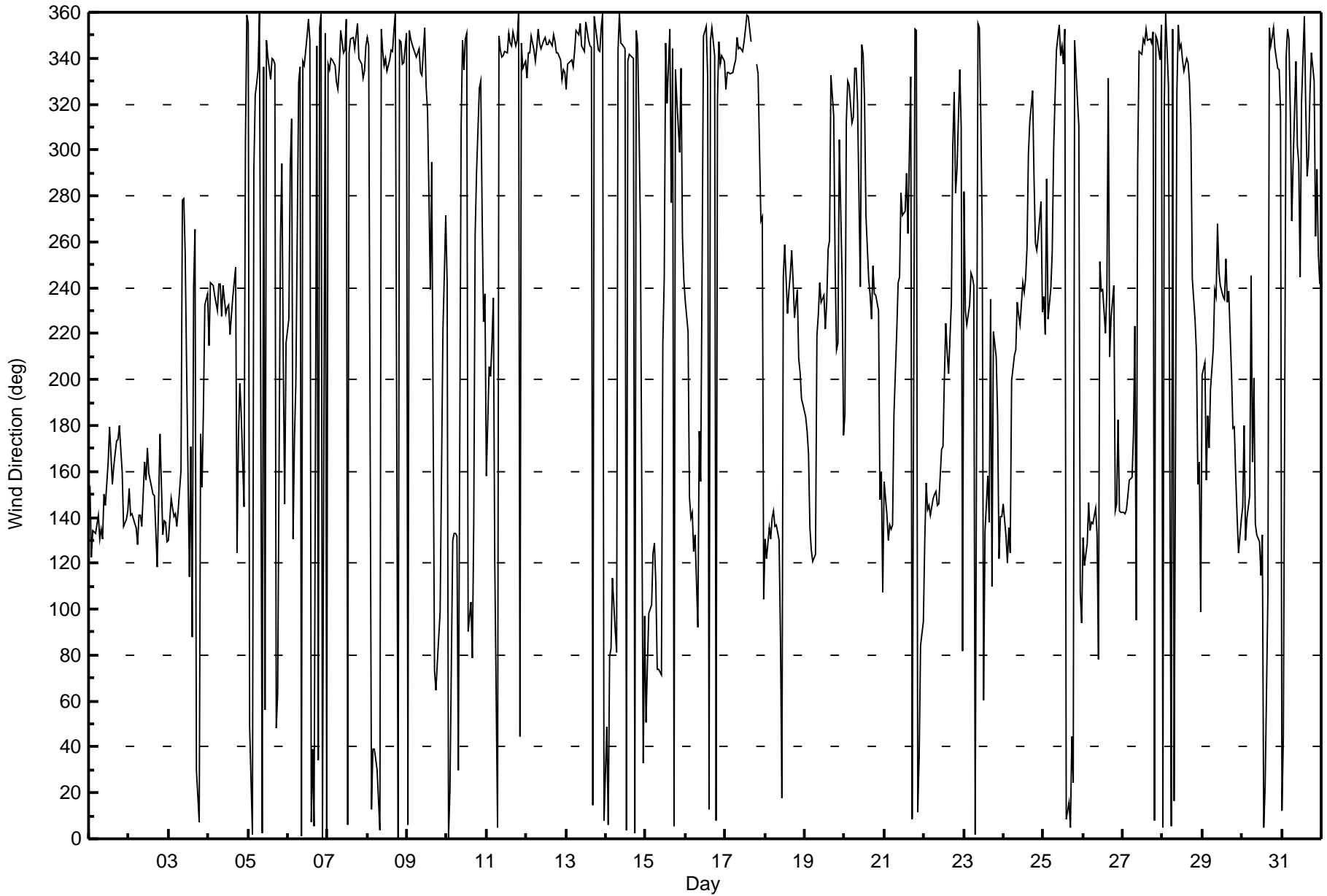
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|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 94 | 75 | 77 | 81 | 80 | 63 | 66 | 91 | 94 | 89 | 75 | 87 | 69 | 61 | 81 | 69 | 61 | 87 | 77 | 59 | 79 | 70 | 96 | 88 | |
| Diurnal Maximum | | | | | | | | | | | | | | | | | | | | | | | | |

M - Maintenance



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Athabasca Valley - July 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------|
| Calibration Date | July 5, 2016 | Last Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 6:48 | End Time (MST) | 11:23 |
| Gas Cert Reference | S970259A | Station temp. | 22 Deg C |
| Cal Gas Concentration | 50 ppm | Cal Gas Exp Date | 26/09/2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11021107 |
| ZAG Make/Model | API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 5564 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|---------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -619 | -619 |
| Analyzer IP address | 192.168.1.103 | | Lamp voltage | 802 | 802 |
| Calculated slope | 0.996126 | 1.000049 | Chamber temp | 44.4 | 44.4 |
| Calculated intercept | 1.587468 | 2.037014 | Pressure | 689.9 | 689.9 |
| Analyzer Background | 18.4 | 18.1 | Flow | 0.477 | 0.477 |
| Analyzer Coefficient | 1.065 | 1.045 | Intensity | 43489 | 43489 |

Analyzer make Thermo 45C Analyzer serial # 630718530

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.4 | ---- |
| as found span | 5000 | 60.7 | 607.0 | 612.3 | 0.991 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 5000 | 60.7 | 607.0 | 606.4 | 1.001 |
| second point | 5000 | 30.4 | 304.0 | 299.7 | 1.014 |
| third point | 5000 | 15.2 | 152.0 | 148.5 | 1.024 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 5000 | 60.7 | 607.0 | 604.3 | 1.004 |
| Average Correction Factor | | | | | 1.013 |

Corrected As found 612.7 Previous response 607.8 % change -0.8%

Notes:

no maintenance done, filter changed out, span adjusted

Calibration Performed By: Melissa Lemay



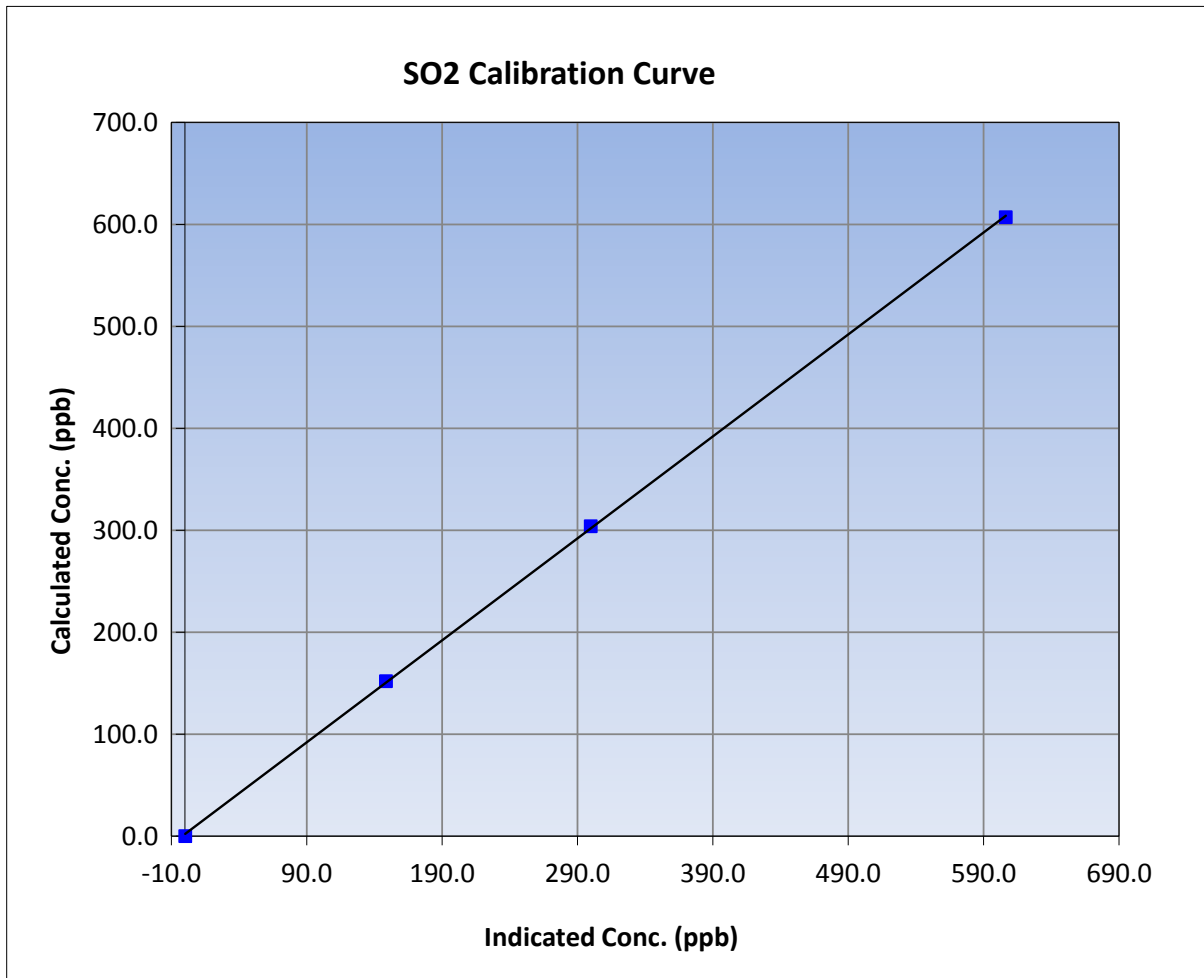
Wood Buffalo Environmental Association SO2 Calibration Report

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 6:48 | End Time (MST) | 11:23 |
| Analyzer make | Thermo 45C | Analyzer serial # | 630718530 |

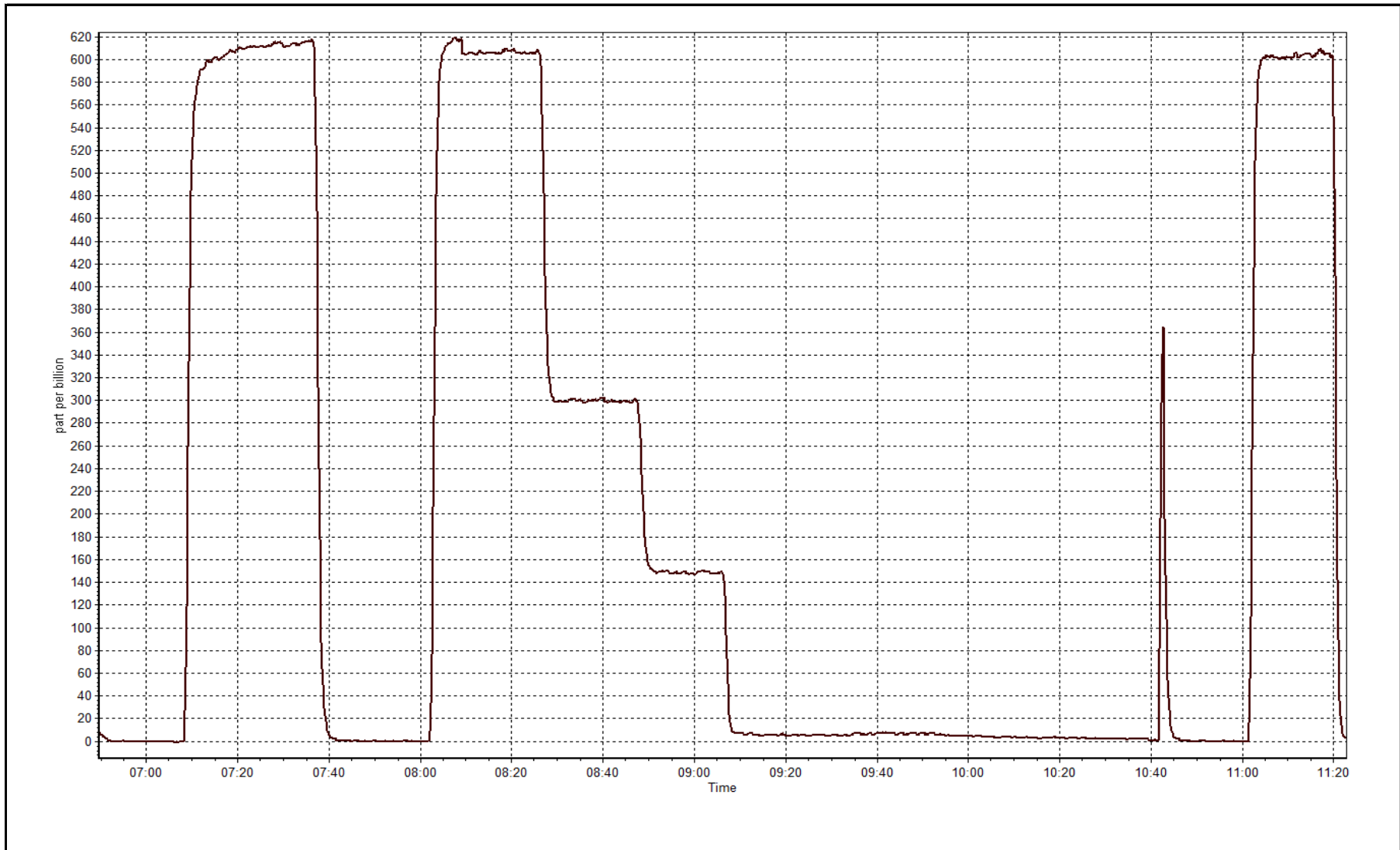
Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999929 |
| 607.0 | 606.4 | 1.0010 | | |
| 304.0 | 299.7 | 1.0143 | Slope | 1.000049 |
| 152.0 | 148.5 | 1.0236 | | |
| | | | Intercept | 2.037014 |



SO2 Calibration Plot

Date: July 5, 2016





Wood Buffalo Environmental Association

SO2 Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------|
| Calibration Date | July 27, 2016 | Last Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 9:00 | End Time (MST) | 3:15 |
| Gas Cert Reference | S970259A | Station temp. | 22 Deg C |
| Cal Gas Concentration | 50 ppm | Cal Gas Exp Date | 9/26/2017 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| ZAG Make/Model | API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|---------------|----------|--------------|--------|-------|
| Analyzer Range | 0 - 1000 ppb | | PMT voltage | -619 | -618 |
| Analyzer IP address | 192.168.1.103 | | Lamp voltage | 802 | 803 |
| Calculated slope | 1.000049 | 0.994697 | Chamber temp | 44.4 | 44.0 |
| Calculated intercept | 2.037014 | 1.396770 | Pressure | 689.9 | 693.1 |
| Analyzer Background | 18.1 | 18.9 | Flow | 0.477 | 0.467 |
| Analyzer Coefficient | 1.045 | 1.100 | Intensity | 43489 | 43551 |

Analyzer make Thermo 45C Analyzer serial # 630718530

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| as found span | 5000 | 60.7 | 607.0 | 569.5 | 1.066 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 5000 | 60.7 | 607.0 | 610.0 | 0.995 |
| second point | 5000 | 30.4 | 304.0 | 302.3 | 1.006 |
| third point | 5000 | 15.2 | 152.0 | 150.6 | 1.009 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 5000 | 60.7 | 607.0 | 607.8 | 0.999 |
| Average Correction Factor | | | | | 1.003 |

Corrected As found 569.6 Previous response 604.9 % change 6.2%

Notes:

Replaced pump for preventative maintenace. Adjusted span

Calibration Performed By: Asad Hidayat



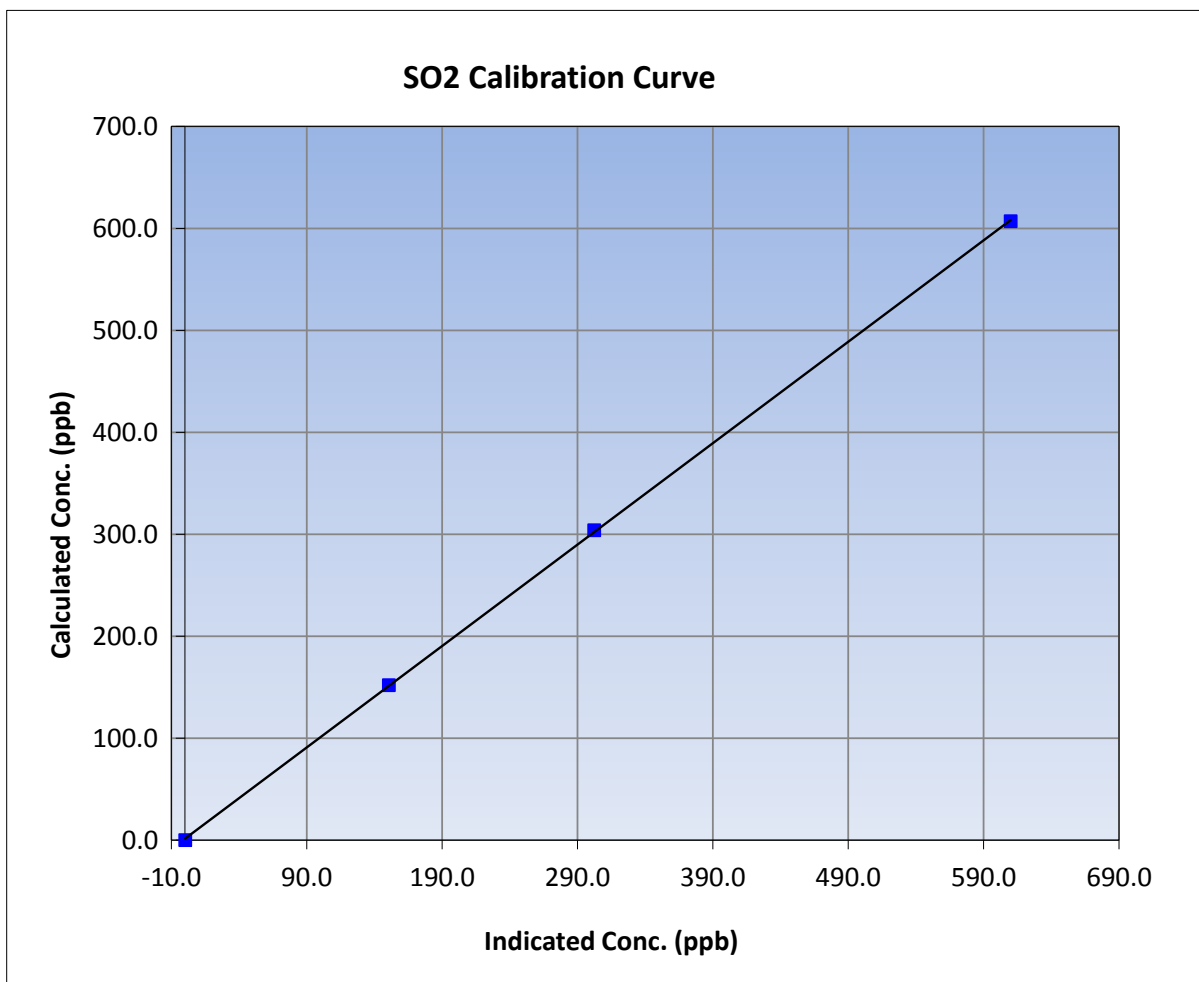
Wood Buffalo Environmental Association SO2 Calibration Report

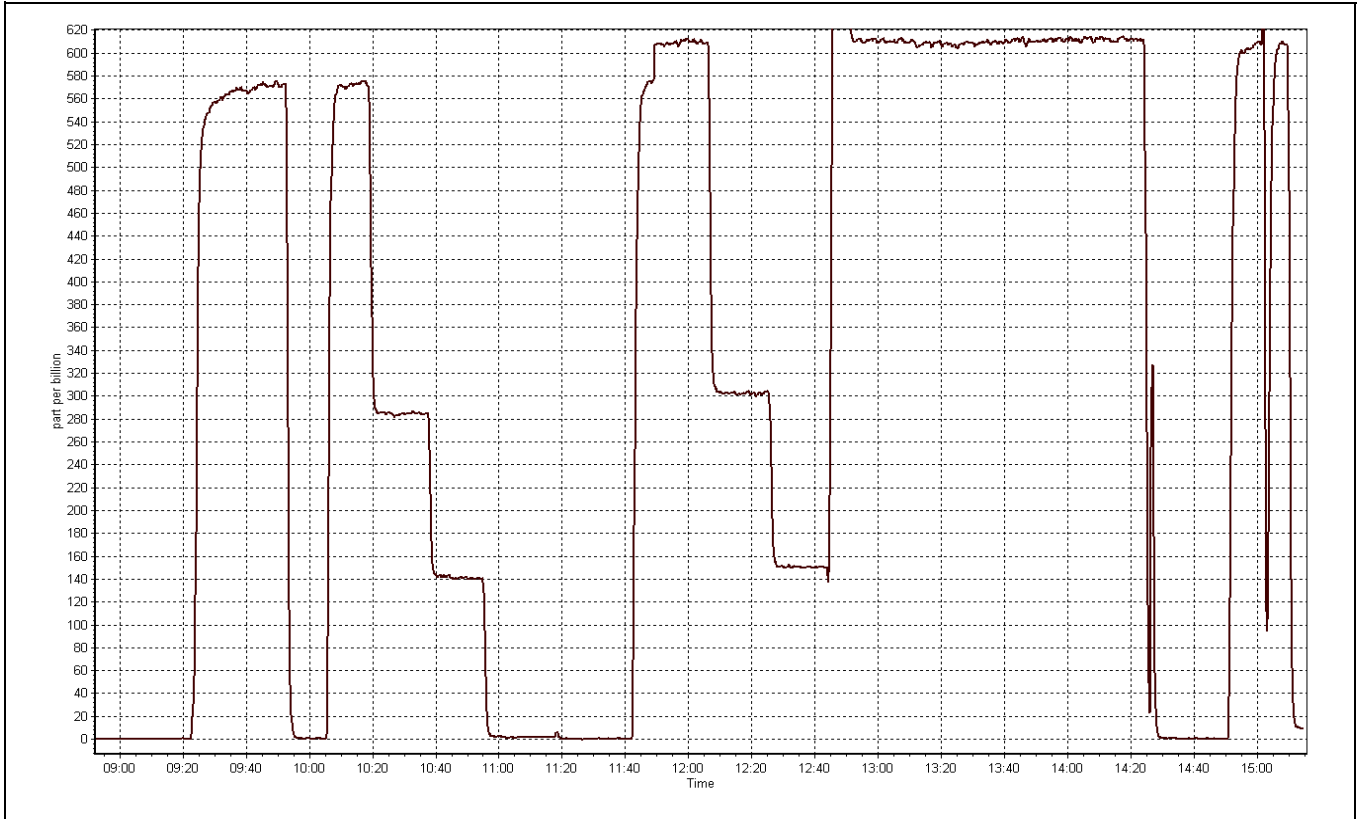
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 27, 2016 | Previous Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:00 | End Time (MST) | 3:15 |
| Analyzer make | Thermo 45C | Analyzer serial # | 630718530 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999960 |
| 607.0 | 610.0 | 0.9951 | | |
| 304.0 | 302.3 | 1.0056 | Slope | 0.994697 |
| 152.0 | 150.6 | 1.0094 | | |
| | | | Intercept | 1.396770 |







Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | July 7, 2016 | Last Calibration | June 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 7:07 | End Time (MST) | 9:49 |
| Gas Cert Reference | ALM052589 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.02 ppm | Cal Gas Exp Date | 09/09/2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11021107 |
| Dil air Make/Model | API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 5564 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S970259A 26/Sep/17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -699 | -699 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1100 | 1102 |
| Calculated slope | 0.987902 | 0.993770 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.140503 | 0.042843 | Pressure | 721.0 | 700.7 |
| Analyzer Background | 2.39 | 2.39 | Flow | 0.434 | 0.434 |
| Analyzer Coefficient | 1.067 | 1.067 | Intensity | 72 | 72 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-LTE | | Analyzer serial # | 1507864683 | |
| Converter make/model | CDN-101 | | Converter serial # | 503 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 6000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 6000 | 89.6 | 75.0 | 75.2 | 0.997 |
| SO2 scrubber check | 5000 | 15.2 | 152.0 | 0.5 | ---- |
| calibrator zero | 6000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 6000 | 89.6 | 75.0 | 75.6 | 0.992 |
| second point | 6000 | 50.2 | 42.0 | 42.0 | 1.001 |
| third point | 6000 | 29.9 | 25.0 | 24.9 | 1.004 |
| as left zero | 6000 | 0.0 | 0.0 | 0.3 | ---- |
| as left span | 6000 | 89.6 | 75.0 | 74.6 | 1.004 |
| Average Correction Factor | | | | | 0.999 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 75.0 | Previous response | 76.0 | % change | 1.4% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Inlet filter chagned out. No adjustments or maintenance done.

Calibration Performed By:

Melissa Lemay



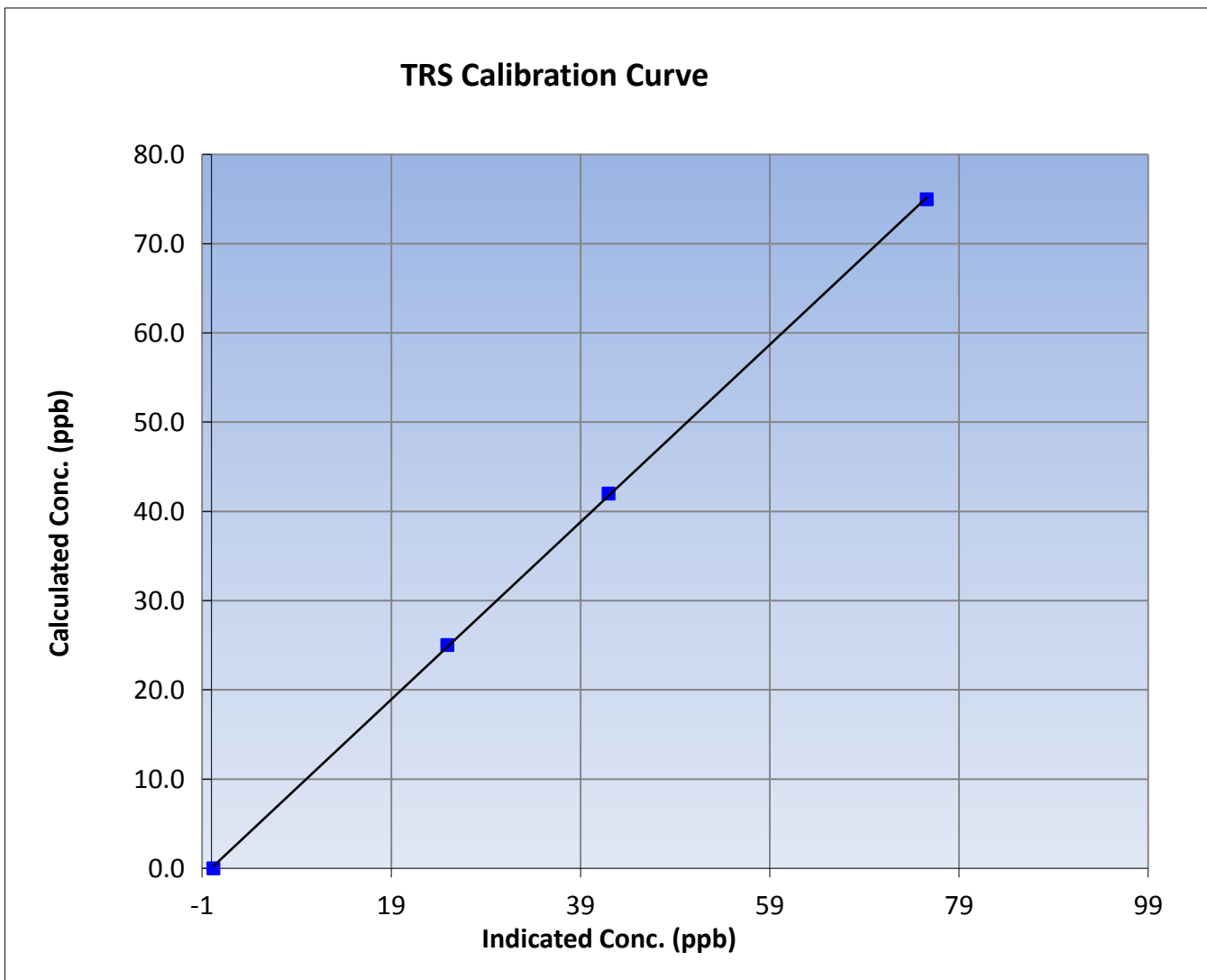
Wood Buffalo Environmental Association TRS Calibration Report

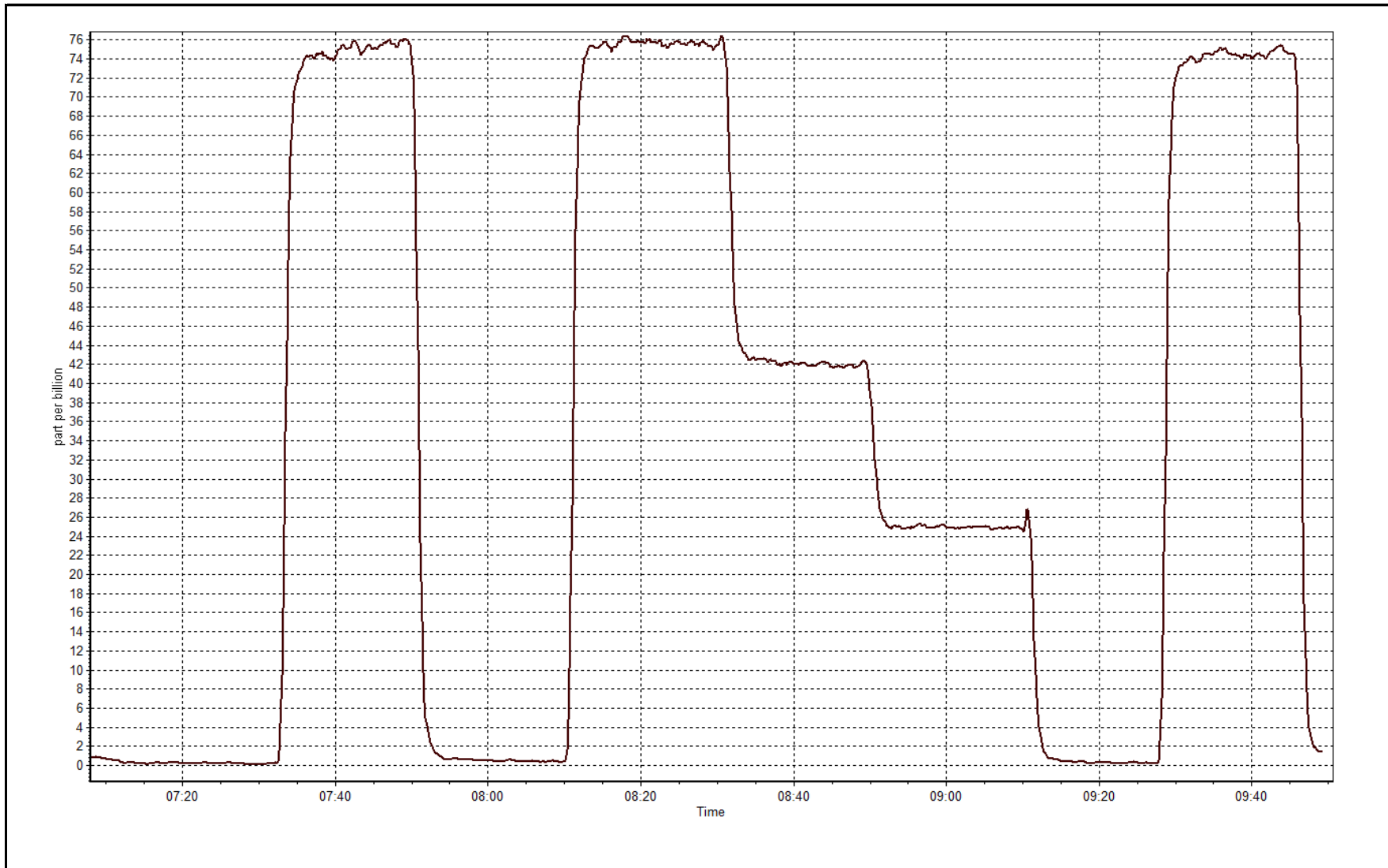
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 7, 2016 | Previous Calibration | June 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:07 | End Time (MST) | 9:49 |
| Analyzer make | Thermo 43i-LTE | Analyzer serial # | 1507864683 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999929 |
| 75.0 | 75.6 | 0.9916 | | |
| 42.0 | 42.0 | 1.0007 | Slope | 0.993770 |
| 25.0 | 24.9 | 1.0039 | | |
| | | | Intercept | 0.042843 |







Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | July 21, 2016 | Last Calibration | July 7, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 9:25 | End Time (MST) | 11:46 |
| Gas Cert Reference | ALM052589 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.02 ppm | Cal Gas Exp Date | 9/9/2017 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11021107 |
| Dil air Make/Model | API 701-H | Serial Number | 198 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S970259A 26/Sep/17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -699 | -699 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1094 | 1102 |
| Calculated slope | 0.993770 | 1.060310 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.042843 | -0.414477 | Pressure | 705.3 | 700.7 |
| Analyzer Background | 2.39 | 2.39 | Flow | 0.436 | 0.434 |
| Analyzer Coefficient | 1.067 | 1.067 | Intensity | 71 | 72 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-LTE | | Analyzer serial # | 1507864683 | |
| Converter make/model | CDN-101 | | Converter serial # | 503 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 6000 | 0.0 | 0.0 | 0.2 | ---- |
| as found span | 6000 | 89.6 | 75.0 | 71.0 | 1.056 |
| SO2 scrubber check | 4900 | 9.1 | 92.9 | 0.6 | ---- |
| calibrator zero | 6000 | 0.0 | 0.0 | 0.2 | ---- |
| high point | 6000 | 89.6 | 75.0 | 71.0 | 1.056 |
| second point | 6000 | 50.2 | 42.0 | 40.0 | 1.050 |
| third point | 6000 | 29.9 | 25.0 | 24.3 | 1.031 |
| as left zero | | | | | |
| as left span | | | | | |
| Average Correction Factor | | | | | 1.046 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 70.8 | Previous response | 75.4 | % change | 6.6% |
|--------------------|------|-------------------|------|----------|------|

Notes:

TRS daily spans were low, came to verify the analyzers performance. As left zero spans were not completed.

Calibration Performed By:

Jayme Rycroft and
Gary Cross



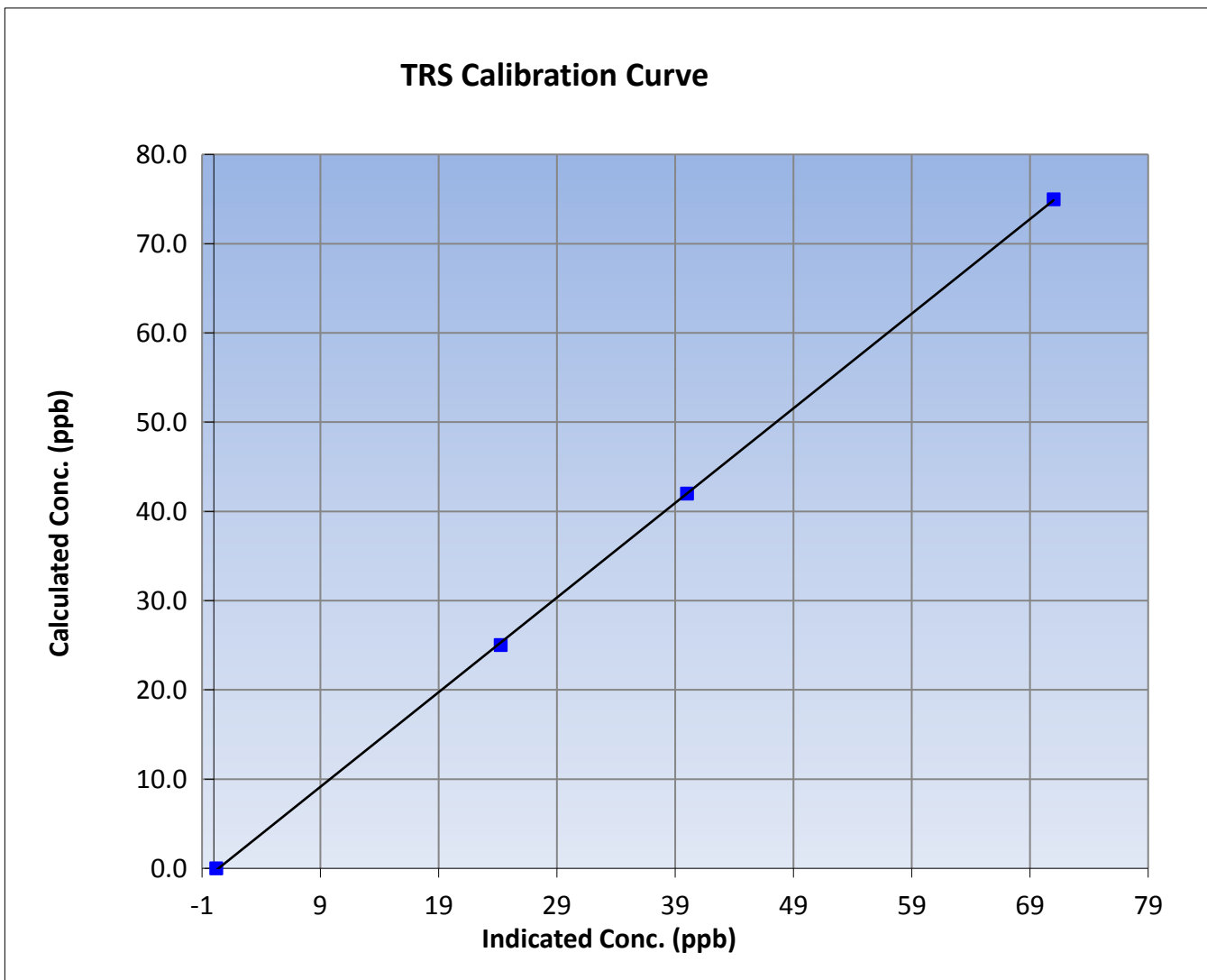
Wood Buffalo Environmental Association TRS Calibration Report

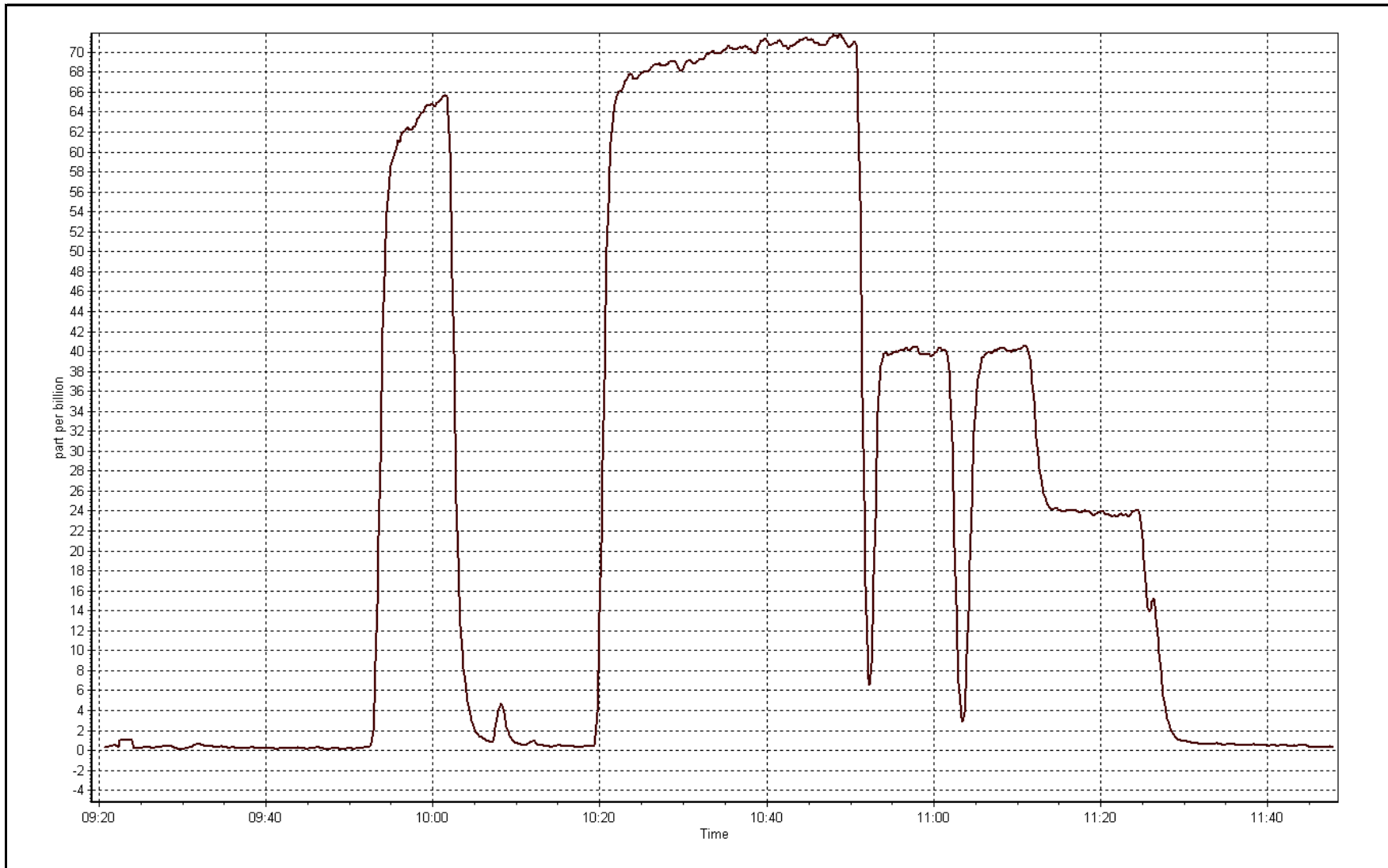
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 21, 2016 | Previous Calibration | July 7, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:25 | End Time (MST) | 11:46 |
| Analyzer make | Thermo 43i-LTE | Analyzer serial # | 1507864683 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.2 | ---- | Correlation Coefficient | 0.999956 |
| 75.0 | 71.0 | 1.0558 | | |
| 42.0 | 40.0 | 1.0500 | Slope | 1.060310 |
| 25.0 | 24.3 | 1.0312 | | |
| | | | Intercept | -0.414477 |







Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

| | | | |
|-----------------------|--------------------------------------------|------------------|--------------------|
| Calibration Date | July 26, 2016 | Last Calibration | July 21, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Other: <input type="text" value="Repair"/> | | |
| Start Time (MST) | 14:42 | End Time (MST) | 17:00 |
| Gas Cert Reference | ALM052589 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.02 ppm | Cal Gas Exp Date | 09/09/2017 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| Dil air Make/Model | API 701-H | Serial Number | 198 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S970259A 26/Sep/17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -699 | -699 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1094 | 1102 |
| Calculated slope | 1.060310 | 1.004882 | Chamber temp | 45 | 45 |
| Calculated intercept | -0.414477 | 0.076835 | Pressure | 796.0 | 701.0 |
| Analyzer Background | 2.39 | 2.91 | Flow | 0.000 | 0.431 |
| Analyzer Coefficient | 1.067 | 1.160 | Intensity | 71 | 72 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-LTE | | Analyzer serial # | 1507864683 | |
| Converter make/model | CDN-101 | | Converter serial # | 503 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| SO2 scrubber check | 5000 | 10.0 | 100.0 | 0.0 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | -0.1 | ---- |
| high point | 5000 | 74.7 | 75.0 | 74.5 | 1.007 |
| second point | 5000 | 41.8 | 42.0 | 41.9 | 1.003 |
| third point | 5000 | 24.9 | 25.0 | 24.7 | 1.012 |
| as left zero | 5000 | 0.0 | 0.0 | 0.2 | ---- |
| as left span | 5000 | 75.0 | 75.3 | 74.6 | 1.009 |
| Average Correction Factor | | | | | 1.007 |

Corrected As found NA Previous response NA % change NA

Notes:

Pump failed, instrument exhibiting zero flow. New pump installed and instrument re-calibrated.

Calibration Performed By: _____ Zach Eastman



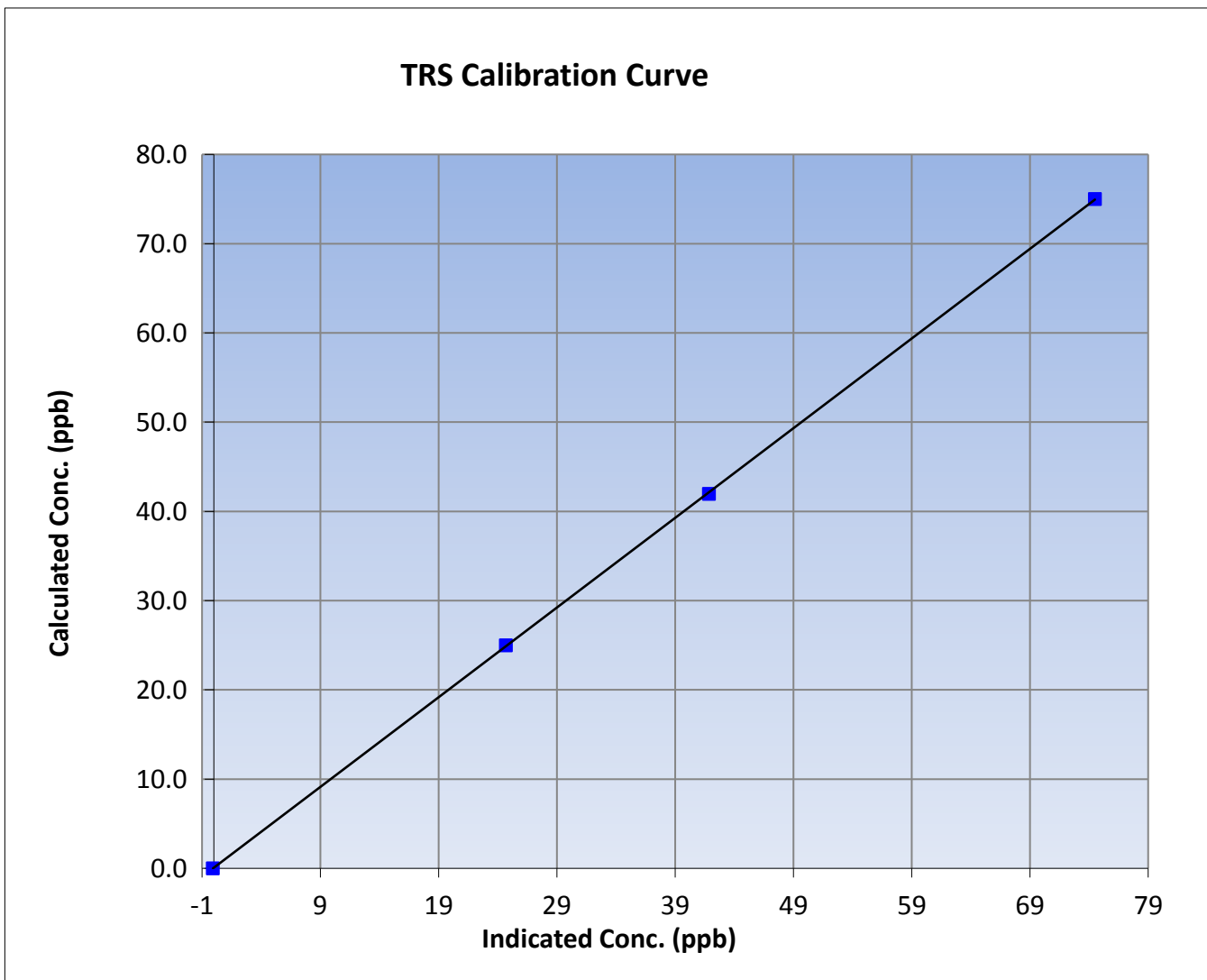
Wood Buffalo Environmental Association TRS Calibration Report

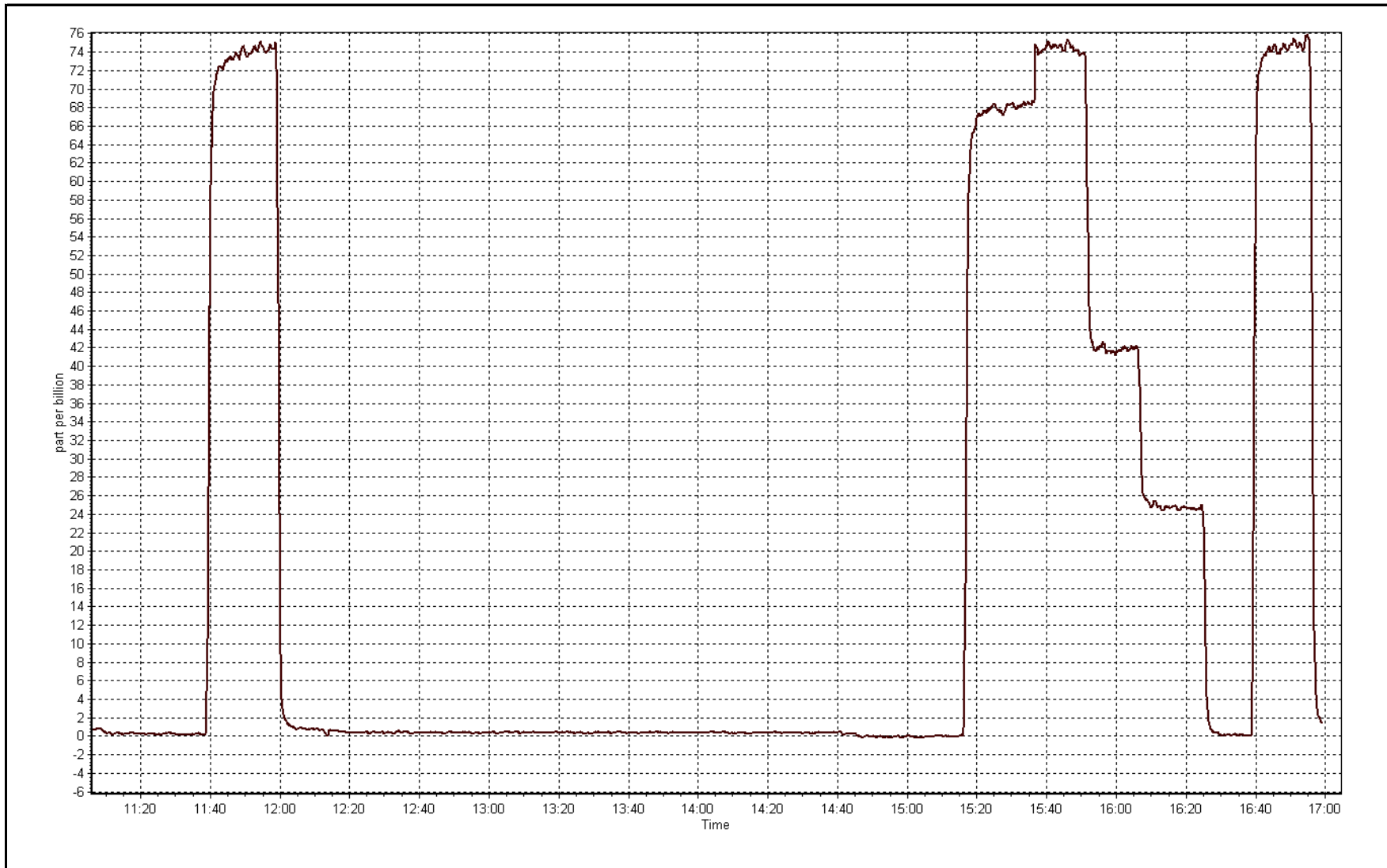
Station Information

| | | | |
|------------------|------------------|----------------------|---------------|
| Calibration Date | July 26, 2016 | Previous Calibration | July 21, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 14:42 | End Time (MST) | 17:00 |
| Analyzer make | Thermo 43i-LTE | Analyzer serial # | 1507864683 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | ---- | Correlation Coefficient | 0.999986 |
| 75.0 | 74.5 | 1.0067 | | |
| 42.0 | 41.9 | 1.0028 | Slope | 1.004882 |
| 25.0 | 24.7 | 1.0121 | | |
| | | | Intercept | 0.076835 |







Wood Buffalo Environmental Association

TRS Calibration Report

Station Information

| | | | |
|-----------------------|--------------------------------------------------|------------------|--------------------|
| Calibration Date | July 29, 2016 | Last Calibration | July 26, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Other: <input type="checkbox"/> Repair / removal | | |
| Start Time (MST) | 7:45 | End Time (MST) | 12:10 |
| Gas Cert Reference | ALM052589 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.02 ppm | Cal Gas Exp Date | 09/09/2017 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| Dil air Make/Model | API 701-H | Serial Number | 198 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S970259A 26/Sep/17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|----------------|-----------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | -699 | -699 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | 1095 | 1102 |
| Calculated slope | 1.004882 | 1.000071 | Chamber temp | 45 | 45 |
| Calculated intercept | 0.076835 | -0.142717 | Pressure | 703.1 | 701.0 |
| Analyzer Background | 2.91 | 2.65 | Flow | 0.440 | 0.431 |
| Analyzer Coefficient | 1.16 | 1.053 | Intensity | 71 | 72 |
| | | | Converter temp. | 800 | 800 |
| Analyzer make/model | Thermo 43i-LTE | | Analyzer serial # | 1507864683 | |
| Converter make/model | CDN-101 | | Converter serial # | 503/460 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as found span | 5000 | 74.7 | 75.0 | 69.7 | 1.076 |
| SO2 scrubber check | 5000 | 20.3 | 203.0 | 0.5 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.4 | ---- |
| high point | 5000 | 74.7 | 75.0 | 75.3 | 0.996 |
| second point | 5000 | 40.0 | 40.2 | 40.1 | 1.001 |
| third point | 5000 | 20.0 | 20.1 | 20.0 | 1.004 |
| as left zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| as left span | 5000 | 75.0 | 75.3 | 77.5 | 0.972 |
| Average Correction Factor | | | | | 1.000 |

| | | | | | |
|--------------------|------|-------------------|------|----------|------|
| Corrected As found | 69.6 | Previous response | 74.6 | % change | 7.1% |
|--------------------|------|-------------------|------|----------|------|

Notes:

Slow response to span, converter changed out, optic test done and passed, no delay in ticking of lamp, Scrubber test done before calibrator zero, during third point calibrator would switch to zero

Calibration Performed By:

Melissa Lemay



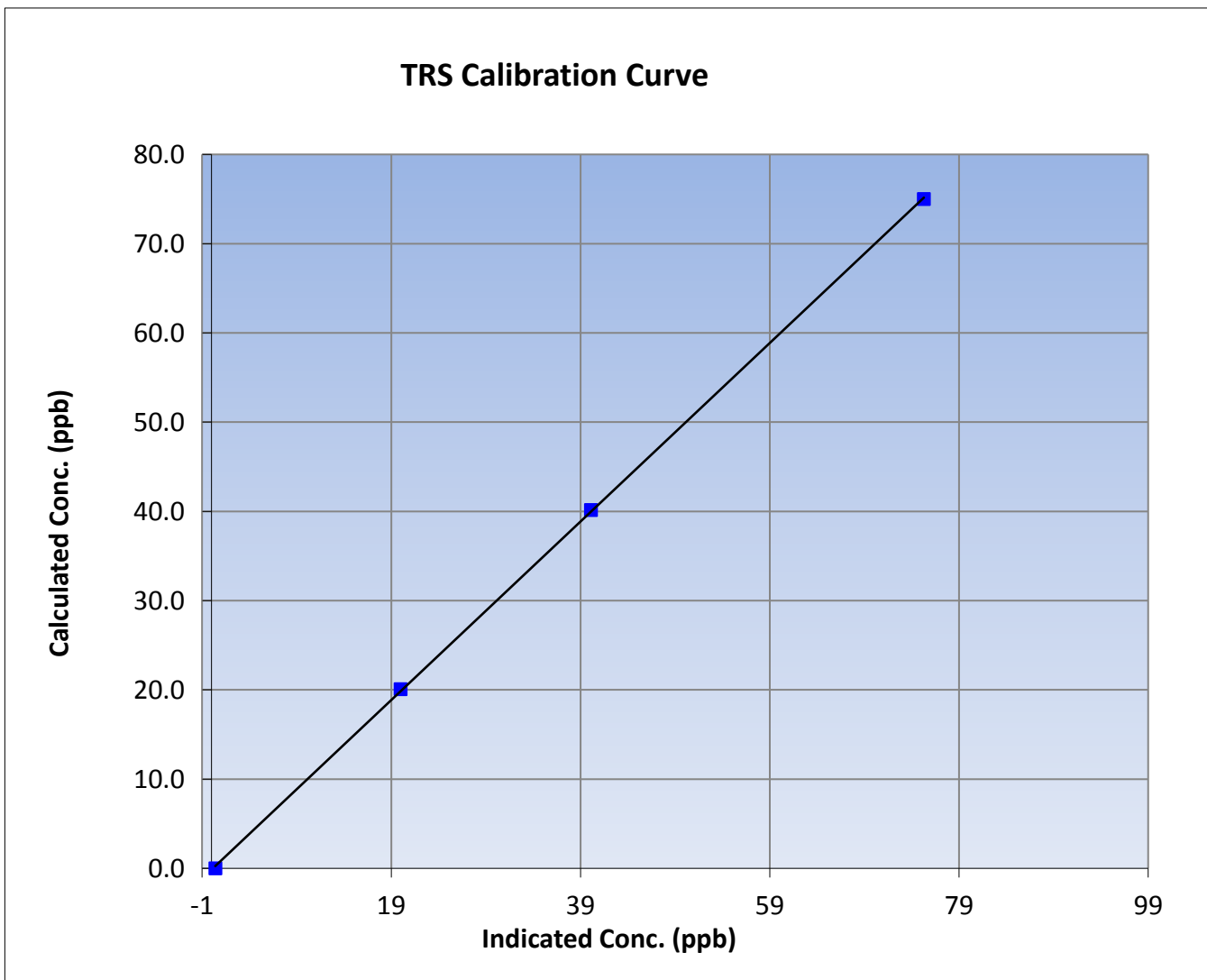
Wood Buffalo Environmental Association TRS Calibration Report

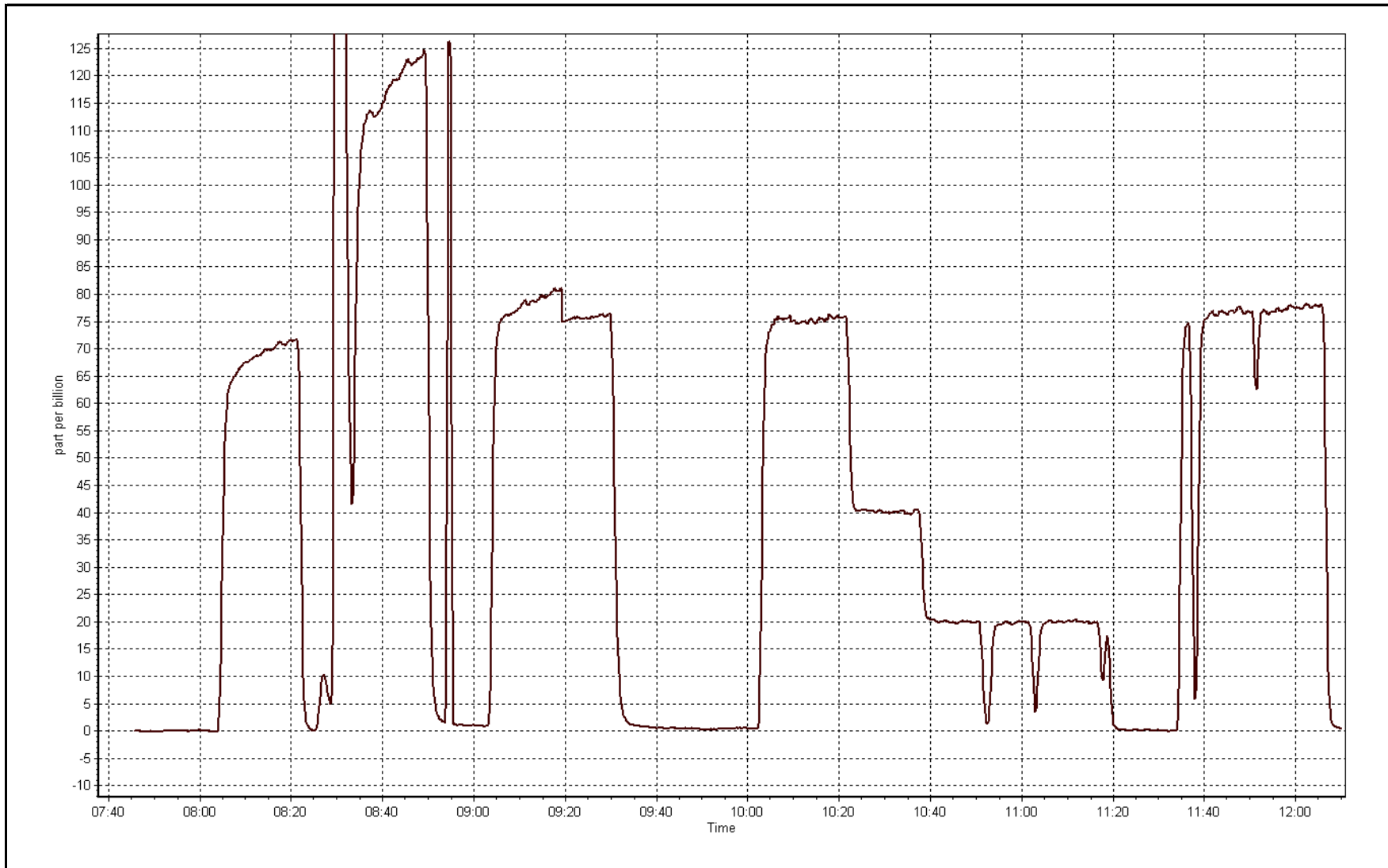
Station Information

| | | | |
|------------------|------------------|----------------------|---------------|
| Calibration Date | July 29, 2016 | Previous Calibration | July 26, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 7:45 | End Time (MST) | 12:10 |
| Analyzer make | Thermo 43i-LTE | Analyzer serial # | 1507864683 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.4 | ---- | Correlation Coefficient | 0.999941 |
| 75.0 | 75.3 | 0.9960 | | |
| 40.2 | 40.1 | 1.0015 | Slope | 1.000071 |
| 20.1 | 20.0 | 1.0040 | | |
| | | | Intercept | -0.142717 |







Wood Buffalo Environmental Association TRS Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------------|
| Calibration Date | July 30, 2016 | Last Calibration | |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Install | | |
| Start Time (MST) | 11:50 | End Time (MST) | 13:58 |
| Gas Cert Reference | ALM052589 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 5.02 ppm | Cal Gas Exp Date | 09/09/2017 |
| Calibrator Make/Model | API T700 | Serial Number | 2445 |
| Dil air Make/Model | API 701-H | Serial Number | 198 |
| DACS make/model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
| SO2 gas concentration | 50 ppm | SO2 gas cert/exp | S970259A 26/Sep/17 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|-------|--------------------|------------|-------|
| Analyzer Range (ppb) | 0 - 100 ppb | | PMT voltage | | -609 |
| Analyzer IP address | 192.168.1.44 | | Lamp voltage | | 797 |
| Calculated slope | 0.998719 | | Chamber temp | | 45 |
| Calculated intercept | 0.177834 | | Pressure | | 710.0 |
| Analyzer Background | 22.4 | | Flow | | 0.453 |
| Analyzer Coefficient | 1.282 | | Intensity | | 91 |
| | | | Converter temp. | | 800 |
| Analyzer make/model | Thermo 43i | | Analyzer serial # | 1160290014 | |
| Converter make/model | CDN-101 | | Converter serial # | 460 | |

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | | | | | |
| as found span | | | | | |
| SO2 scrubber check | 5000 | 20.0 | 200.0 | 0.1 | ---- |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.1 | ---- |
| high point | 5000 | 74.7 | 75.0 | 75.1 | 0.999 |
| second point | 5000 | 40.0 | 40.2 | 39.8 | 1.009 |
| third point | 5000 | 20.0 | 20.1 | 19.7 | 1.019 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 5000 | 74.7 | 75.0 | 76.5 | 0.980 |
| Average Correction Factor | | | | | 1.009 |

Corrected As found NA Previous response NA % change NA

Notes:

Installed to replace unstable 43i-LTE, filter replaced, scrubber test done before calibrator zero

Calibration Performed By: Melissa Lemay



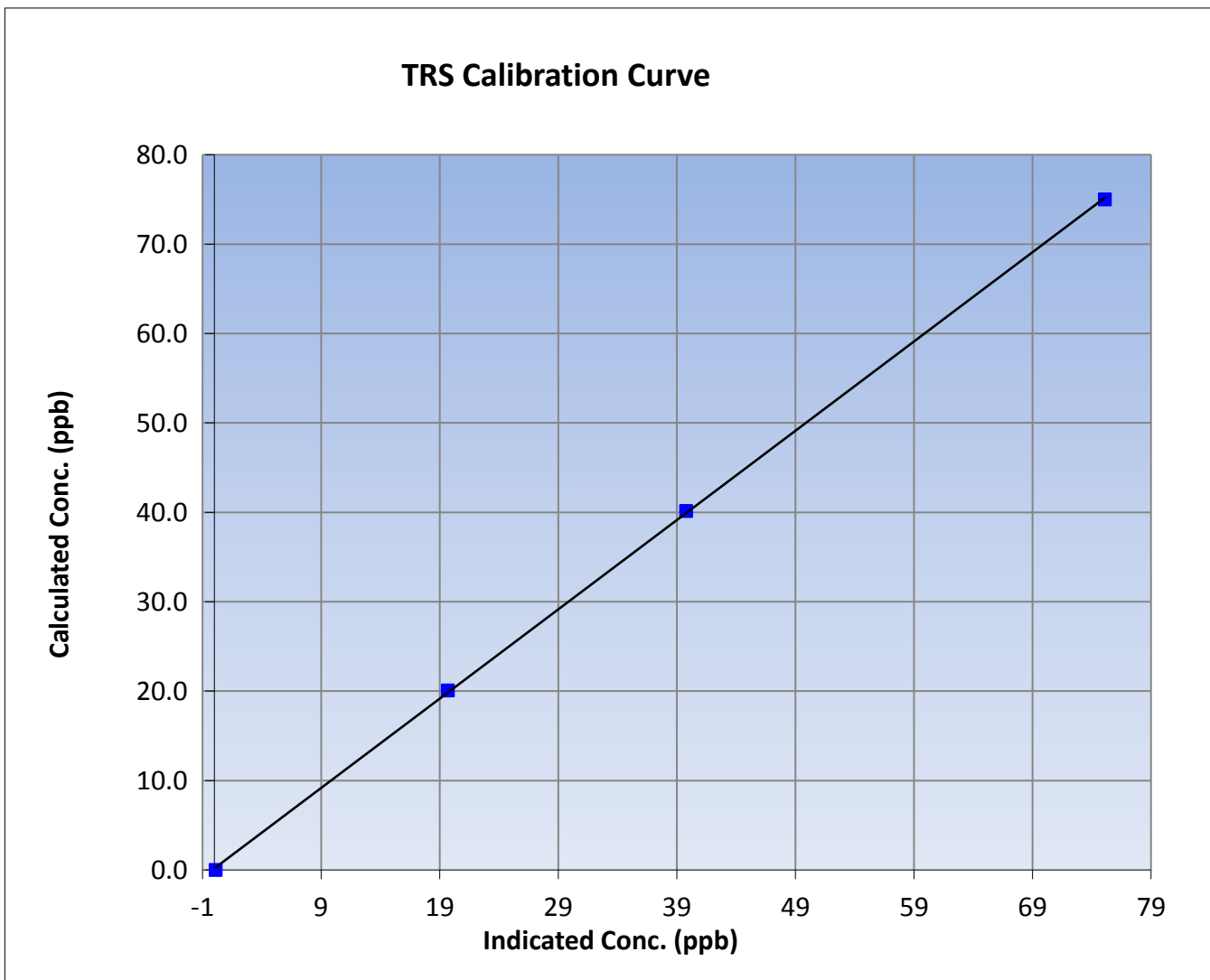
Wood Buffalo Environmental Association TRS Calibration Report

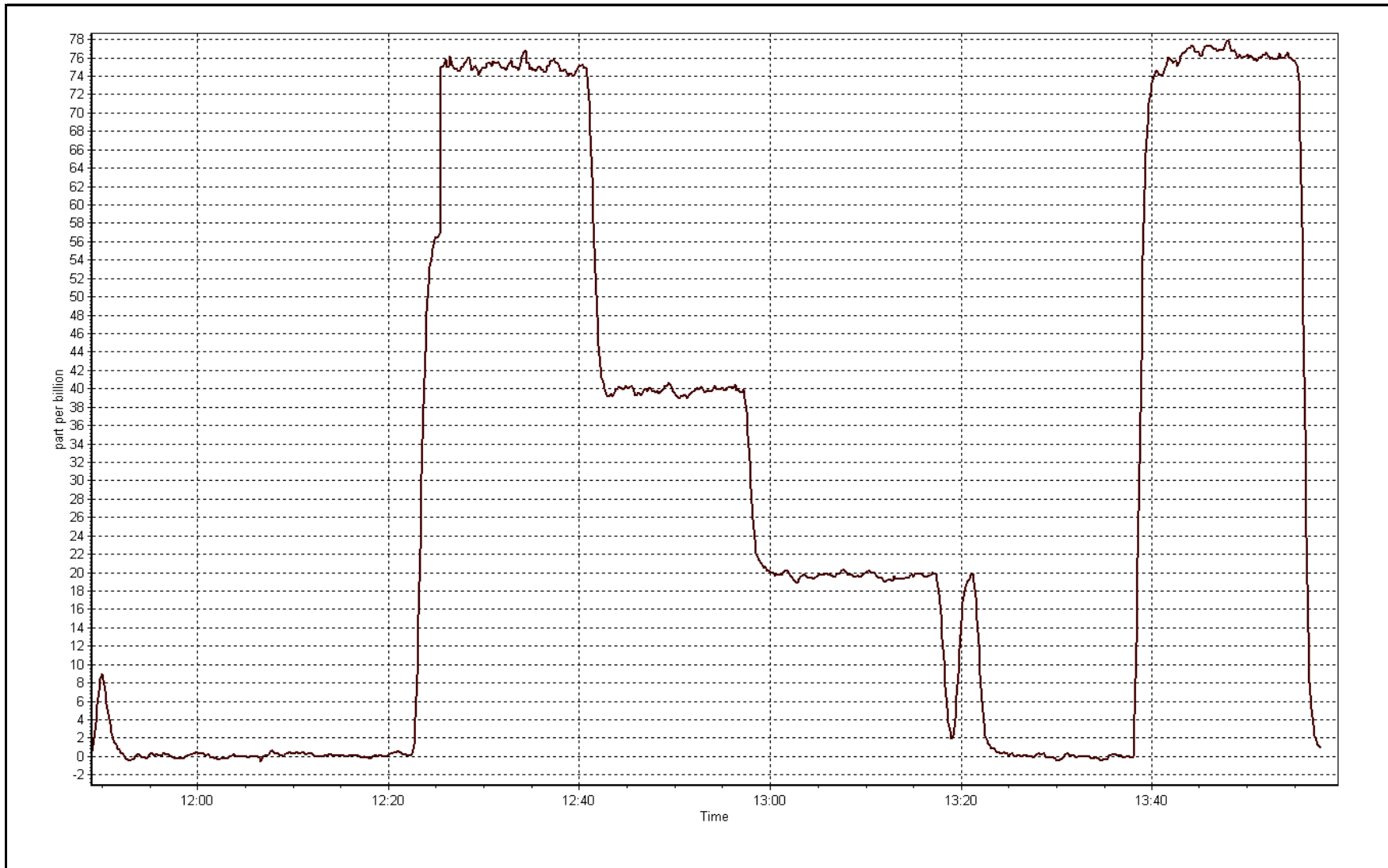
Station Information

| | | | |
|------------------|------------------|----------------------|------------|
| Calibration Date | July 30, 2016 | Previous Calibration | |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 11:50 | End Time (MST) | 13:58 |
| Analyzer make | Thermo 43i | Analyzer serial # | 1160290014 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999929 |
| 75.0 | 75.1 | 0.9987 | | |
| 40.2 | 39.8 | 1.0090 | Slope | 0.998719 |
| 20.1 | 19.7 | 1.0193 | | |
| | | | Intercept | 0.177834 |







Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|----------------------------|---------------------|------------|
| Calibration Date | July-05-16 | Last Calibration | June-01-16 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 6:48 | End Time (MST) | 11:22 |
| Gas Cert Reference | S970259A | Cal Gas Expiry Date | 9/26/2017 |
| CH4 Cal Gas Conc. | 490.0 ppm | CH4 Equiv Conc. | 1040.0 ppm |
| C3H8 Cal Gas Conc. | 200.0 ppm | Station temp. | 22 Deg C |
| Calibrator Model | Sabio 4010 | Serial Number | 11021107 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 5564 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 384.7 | 387.8 |
| THC Calc slope | 1.002419 | 1.000936 | Carrier Pressure | 36.8 | 36.8 |
| THC Calc intercept | 0.024322 | 0.032460 | Fuel Pressure | 42.1 | 42.1 |
| NMHC Calc slope | 1.002930 | 1.001379 | Air Pressure | 32.2 | 32.2 |
| NMHC Calc intercept | 0.002218 | 0.004231 | | | |

Analyzer make Thermo 55i Analyzer serial # 1426262594

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 12.63 | 12.63 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 60.7 | 12.63 | 12.61 | 1.001 |
| second point | 5000 | 30.4 | 6.32 | 6.23 | 1.015 |
| third point | 5000 | 15.2 | 3.16 | 3.12 | 1.013 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 60.7 | 12.63 | 12.57 | 1.004 |
| Average Correction Factor | | | | | 1.010 |

Corrected As found 12.63 Previous response 12.57 % change -0.5%

Notes:

no adjustments done, filter changed out, hydrogen changed

]

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 6.68 | 6.68 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 60.7 | 6.68 | 6.67 | 1.001 |
| second point | 5000 | 30.4 | 3.34 | 3.32 | 1.007 |
| third point | 5000 | 15.2 | 1.67 | 1.67 | 1.001 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 60.7 | 6.68 | 6.66 | 1.003 |
| Average Correction Factor | | | | | 1.003 |

Corrected As found 6.68 Previous response 6.66 % change -0.4%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 5.95 | 5.95 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 60.7 | 5.95 | 5.94 | 1.001 |
| second point | 5000 | 30.4 | 2.98 | 2.91 | 1.024 |
| third point | 5000 | 15.2 | 1.49 | 1.46 | 1.020 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 60.7 | 5.95 | 5.91 | 1.007 |
| Average Correction Factor | | | | | 1.015 |

Corrected As found 5.95 Previous response 5.92 % change -0.6%



Wood Buffalo Environmental Association

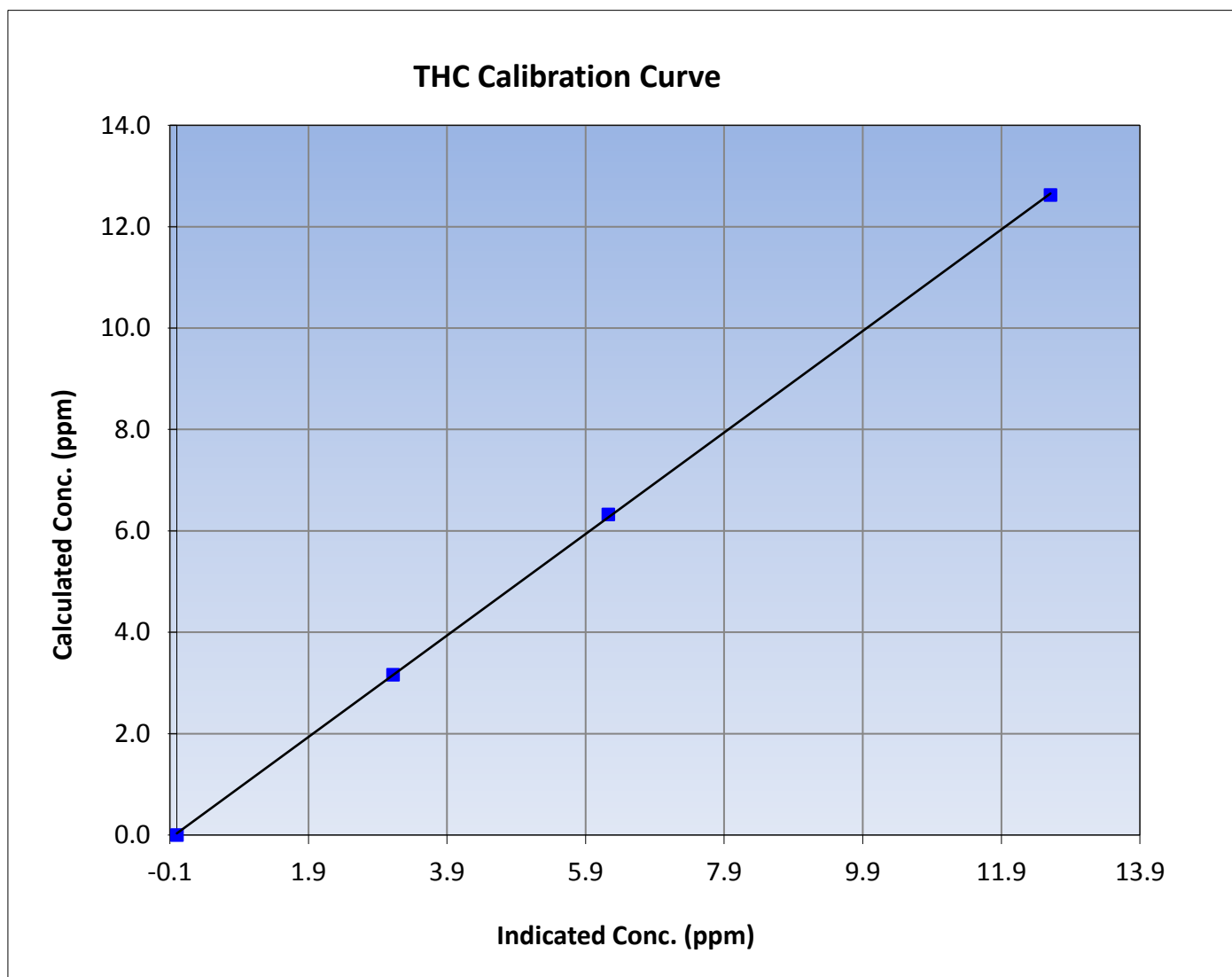
THC Calibration Summary

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 6:48 | End Time (MST) | 11:22 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999943 |
| 12.63 | 12.61 | 1.0012 | | |
| 6.32 | 6.23 | 1.0150 | Slope | 1.000936 |
| 3.16 | 3.12 | 1.0133 | | |
| | | | Intercept | 0.032460 |





Wood Buffalo Environmental Association

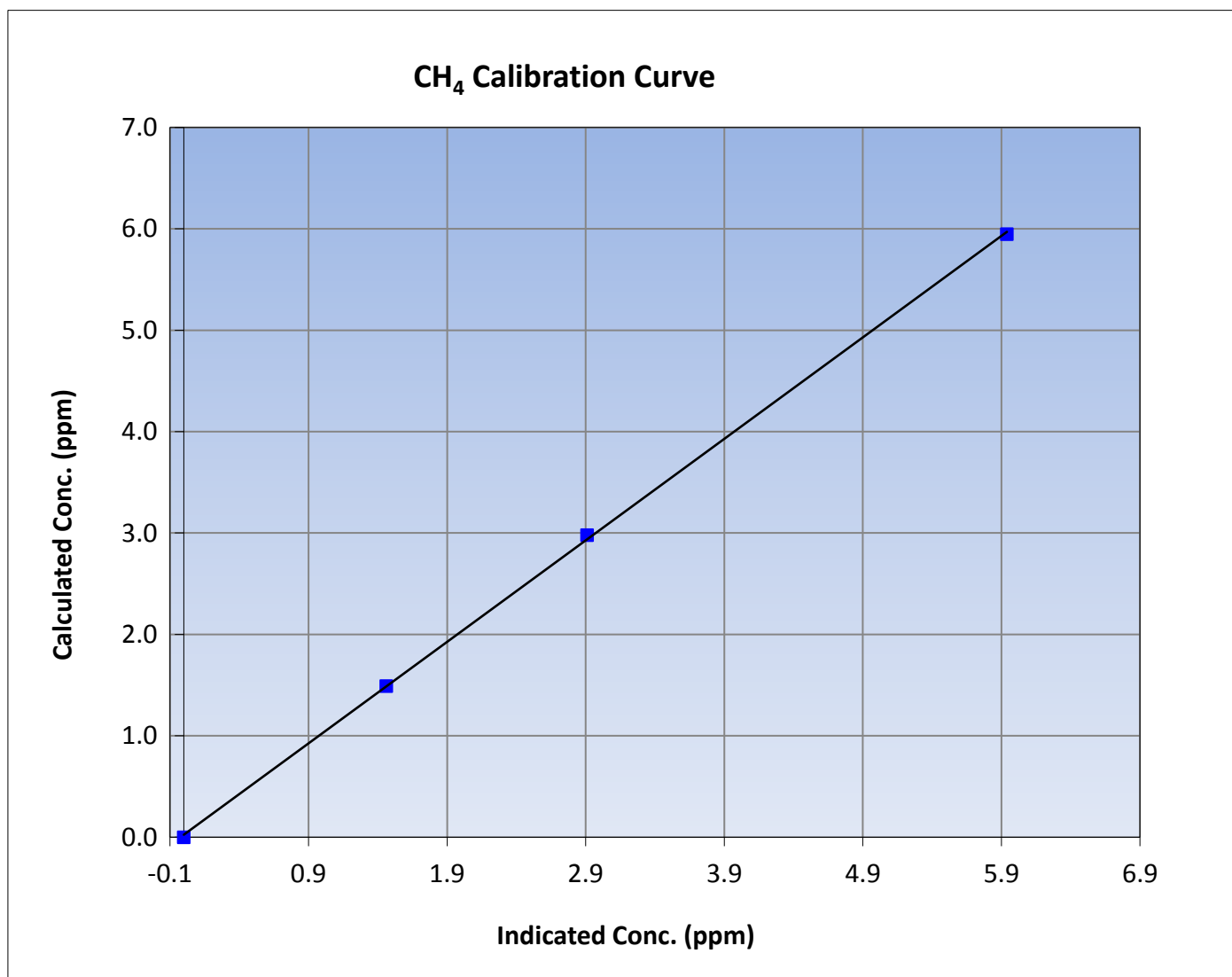
CH₄ Calibration Summary

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 6:48 | End Time (MST) | 11:22 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999853 |
| 5.95 | 5.94 | 1.0014 | | |
| 2.98 | 2.91 | 1.0238 | Slope | 1.000976 |
| 1.49 | 1.46 | 1.0203 | | |
| | | | Intercept | 0.024334 |





Wood Buffalo Environmental Association

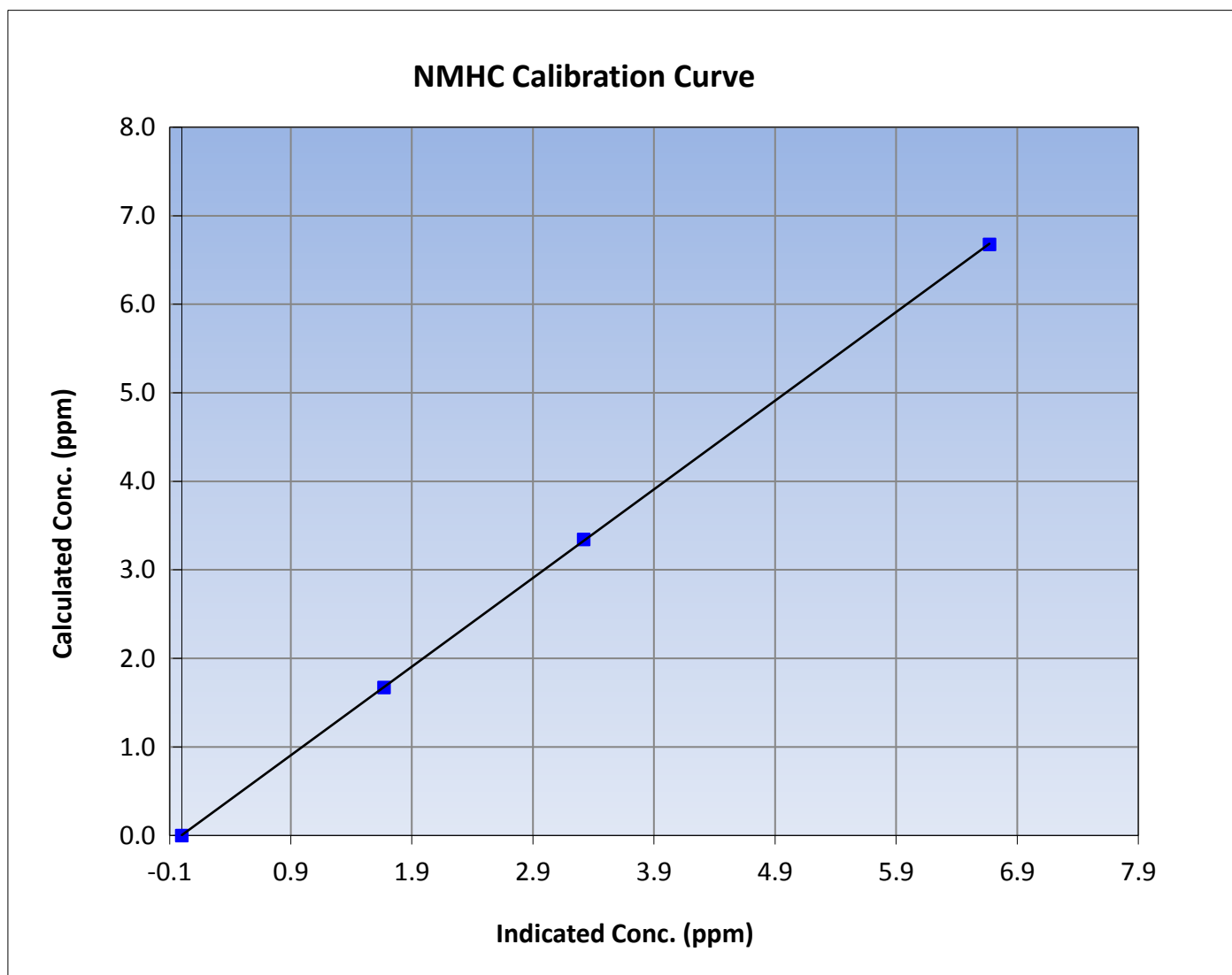
NMHC Calibration Summary

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 6:48 | End Time (MST) | 11:22 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

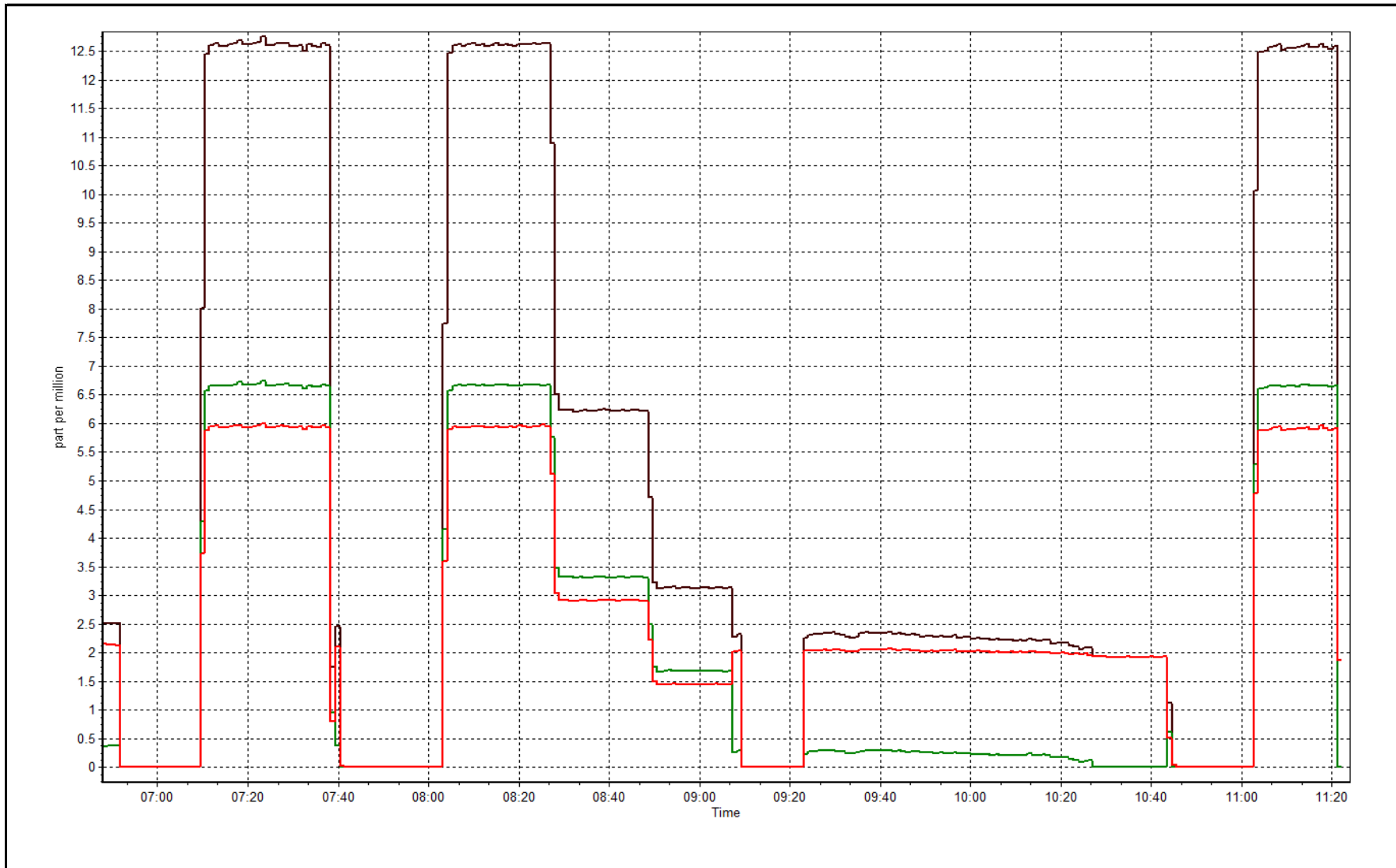
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999987 |
| 6.68 | 6.67 | 1.0010 | | |
| 3.34 | 3.32 | 1.0072 | Slope | 1.001379 |
| 1.67 | 1.67 | 1.0012 | | |
| | | | Intercept | 0.004231 |



THC Calibration Plot

Date: July 5, 2016





Wood Buffalo Environmental Association THC / NMHC Calibration Report

Station Information

| | | | |
|--------------------|---------------------------------------------------------------------------------|---------------------|------------|
| Calibration Date | July-11-16 | Last Calibration | July-05-16 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | <input type="checkbox"/> Other: <input checked="" type="checkbox"/> Maintenance | | |
| Start Time (MST) | 8:04 | End Time (MST) | 13:09 |
| Gas Cert Reference | S970259A | Cal Gas Expiry Date | 9/26/2017 |
| CH4 Cal Gas Conc. | 490.0 ppm | CH4 Equiv Conc. | 1040.0 ppm |
| C3H8 Cal Gas Conc. | 200.0 ppm | Station temp. | 22 Deg C |
| Calibrator Model | Sabio 4010 | Serial Number | 11021107 |
| ZAG make/model | Teledyne API 701 | Serial Number | 1864 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 5564 |

Analyzer Information

| | Before | After | | Before | After |
|---------------------|--------------|----------|------------------|--------|-------|
| THC Range (ppm) | 0 - 50 ppm | | Column Temp | 75.0 | 75.1 |
| NMHC Range (ppm) | 0 - 25 ppm | | Detector Temp | 175.0 | 175.0 |
| Analyzer IP address | 192.168.1.55 | | Flame Temp | 379.0 | 399.4 |
| THC Calc slope | 1.000936 | 1.000308 | Carrier Pressure | 36.8 | 36.8 |
| THC Calc intercept | 0.032460 | 0.028406 | Fuel Pressure | 42.1 | 46.0 |
| NMHC Calc slope | 1.001379 | 1.001536 | Air Pressure | 32.2 | 32.2 |
| NMHC Calc intercept | 0.004231 | 0.006276 | | | |

Analyzer make Thermo 55i Analyzer serial # 1426262594

THC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration THC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|-----------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 12.63 | 12.62 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 60.7 | 12.63 | 12.62 | 1.000 |
| second point | 5000 | 30.4 | 6.32 | 6.24 | 1.013 |
| third point | 5000 | 15.2 | 3.16 | 3.13 | 1.010 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 60.7 | 12.63 | 12.62 | 1.000 |
| Average Correction Factor | | | | | 1.008 |

Corrected As found 12.62 Previous response 12.58 % change -0.3%

Notes:

Optimized the gas pressure, span adjusted

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Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association

THC / NMHC Calibration Report

NMHC Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 6.68 | 6.68 | 1.000 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 60.7 | 6.68 | 6.67 | 1.001 |
| second point | 5000 | 30.4 | 3.34 | 3.31 | 1.010 |
| third point | 5000 | 15.2 | 1.67 | 1.67 | 1.001 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 60.7 | 6.68 | 6.66 | 1.003 |
| Average Correction Factor | | | | | 1.004 |

Corrected As found 6.68 Previous response 6.66 % change -0.2%

CH4 Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration NMHC (ppm) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|-------------------------------|------------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0 | 0.00 | 0.00 | ---- |
| as found span | 5000 | 60.7 | 5.95 | 5.94 | 1.001 |
| calibrator zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| high point | 5000 | 60.7 | 5.95 | 5.95 | 1.000 |
| second point | 5000 | 30.4 | 2.98 | 2.93 | 1.017 |
| third point | 5000 | 15.2 | 1.49 | 1.46 | 1.020 |
| as left zero | 5000 | 0.0 | 0.00 | 0.00 | ---- |
| as left span | 5000 | 60.7 | 5.95 | 5.96 | 0.998 |
| Average Correction Factor | | | | | 1.012 |

Corrected As found 5.94 Previous response 5.92 % change -0.4%



Wood Buffalo Environmental Association

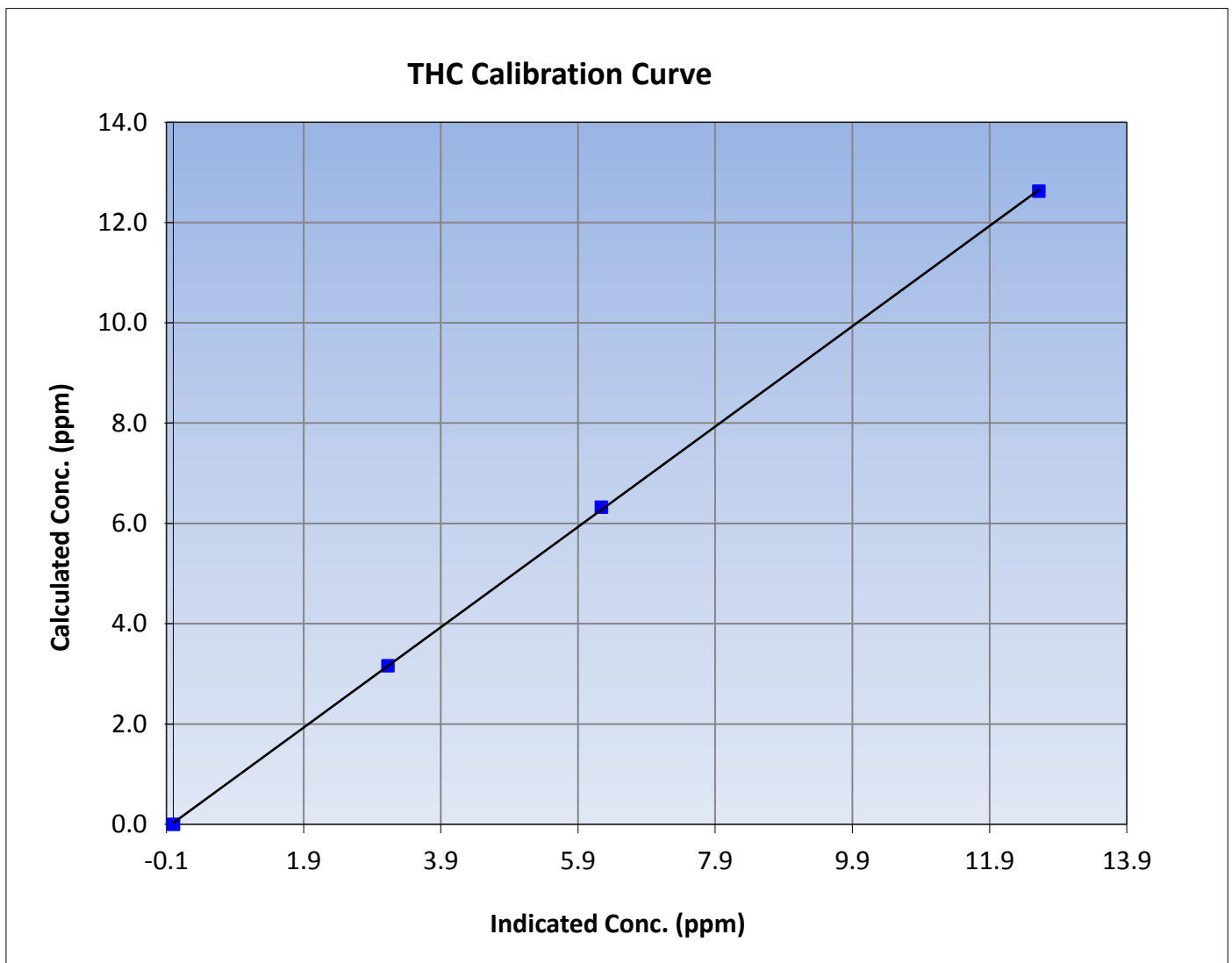
THC Calibration Summary

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 11, 2016 | Previous Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 8:04 | End Time (MST) | 13:09 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999950 |
| 12.63 | 12.62 | 1.0004 | | |
| 6.32 | 6.24 | 1.0133 | Slope | 1.000308 |
| 3.16 | 3.13 | 1.0101 | | |
| | | | Intercept | 0.028406 |





Wood Buffalo Environmental Association

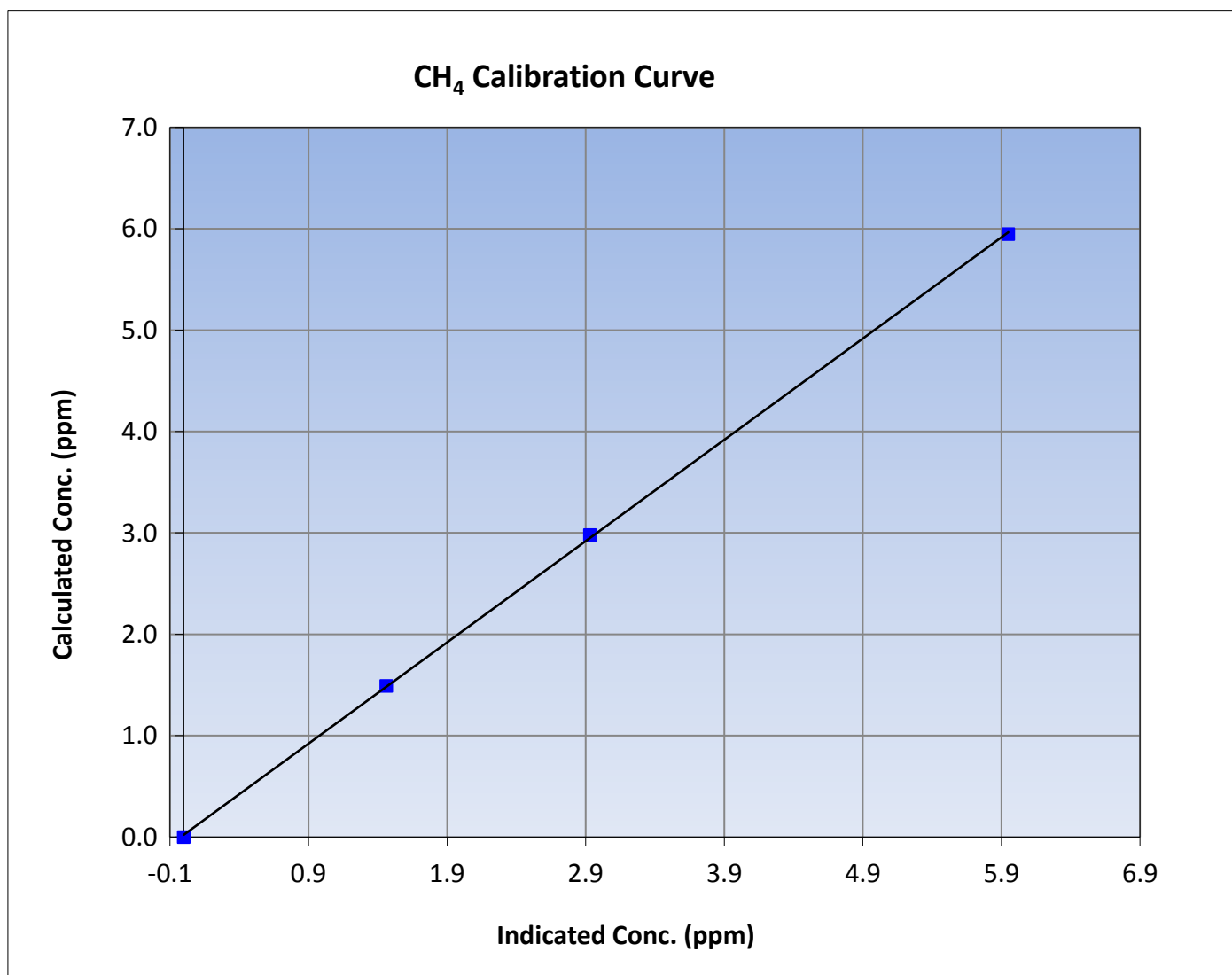
CH₄ Calibration Summary

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 11, 2016 | Previous Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 8:04 | End Time (MST) | 13:09 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999908 |
| 5.95 | 5.95 | 0.9998 | | |
| 2.98 | 2.93 | 1.0168 | Slope | 0.998915 |
| 1.49 | 1.46 | 1.0203 | | |
| | | | Intercept | 0.022155 |





Wood Buffalo Environmental Association

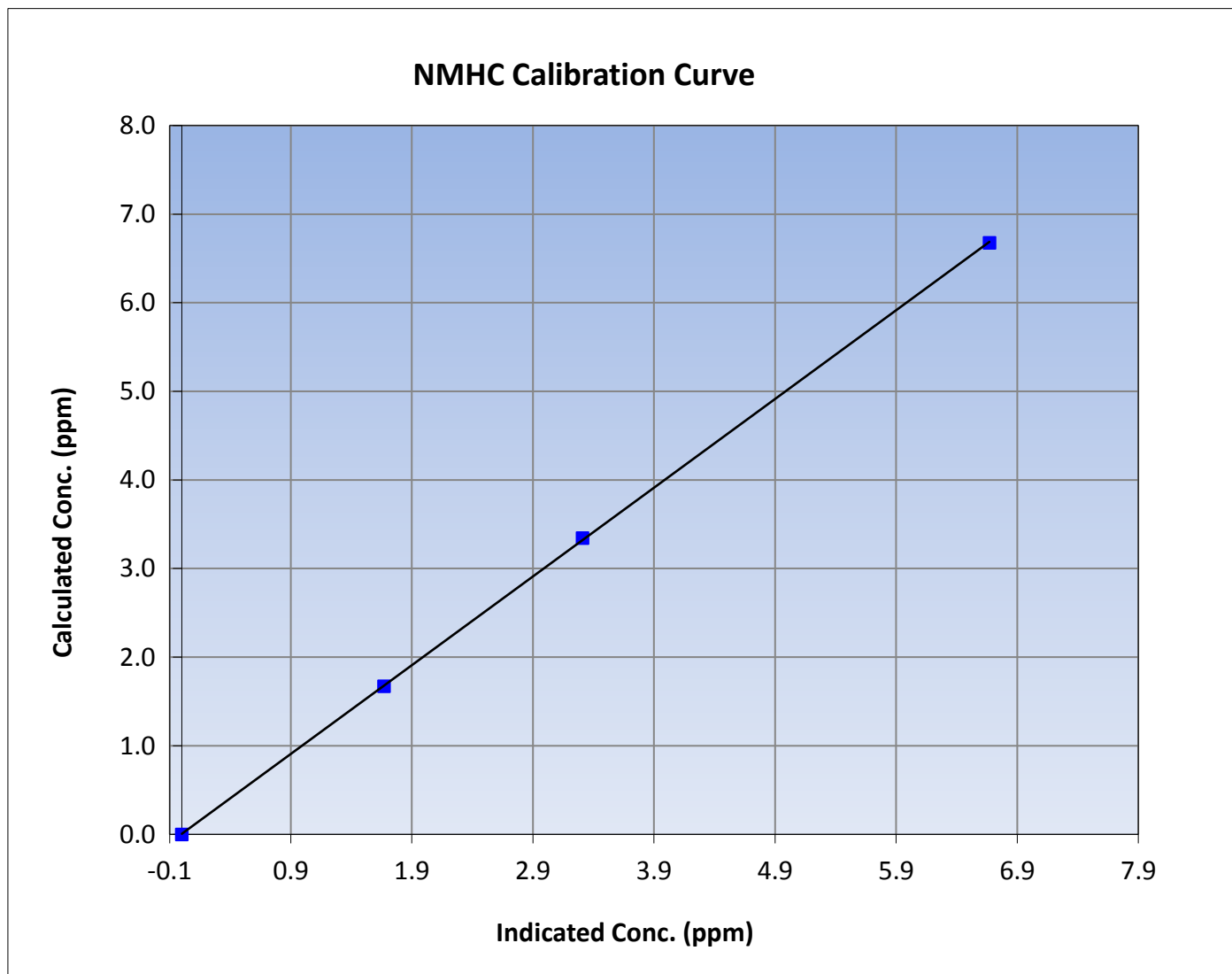
NMHC Calibration Summary

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 11, 2016 | Previous Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 8:04 | End Time (MST) | 13:09 |
| Analyzer make | Thermo 55i | Analyzer serial # | 1426262594 |

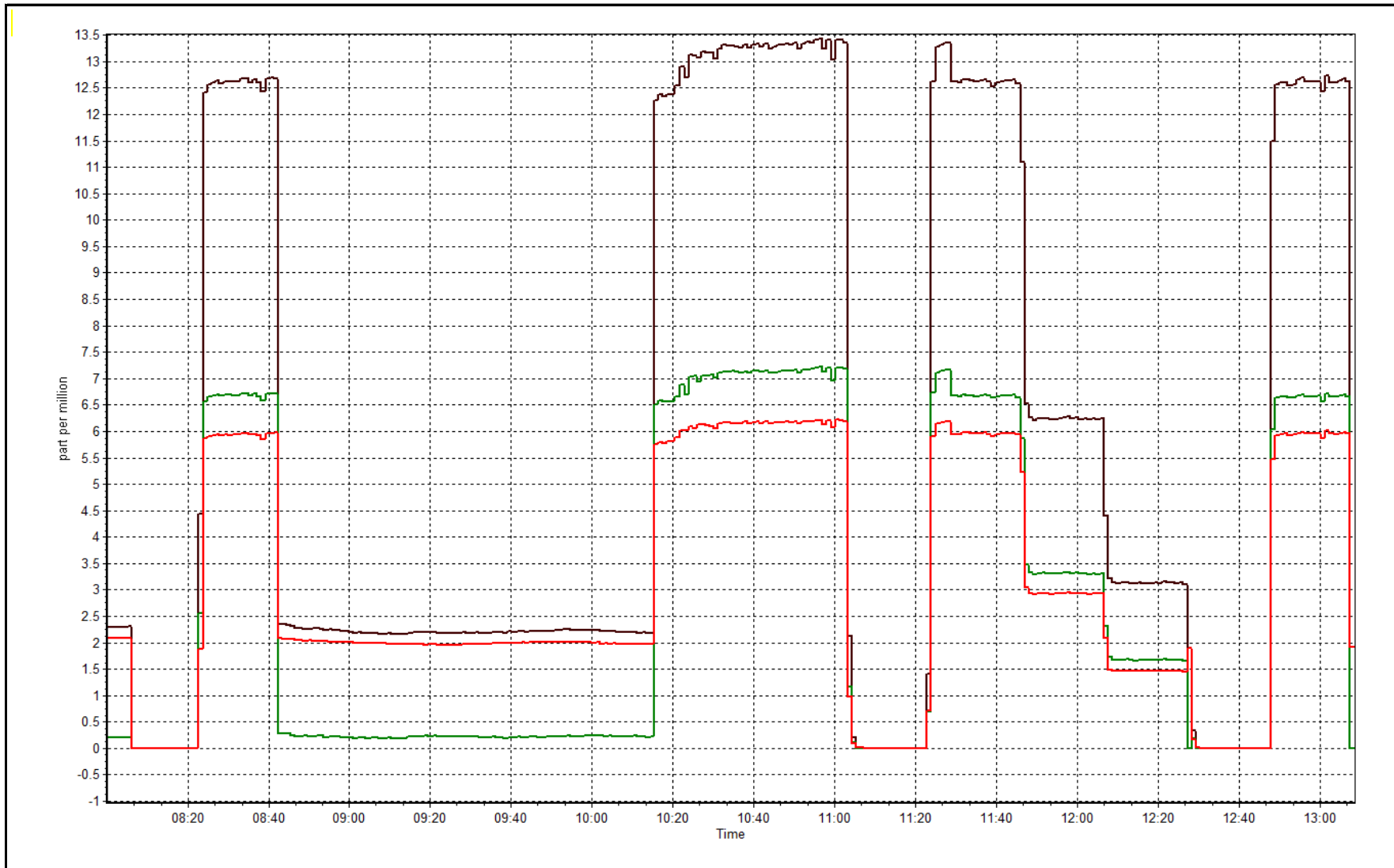
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.00 | 0.00 | ---- | Correlation Coefficient | 0.999972 |
| 6.68 | 6.67 | 1.0010 | | |
| 3.34 | 3.31 | 1.0103 | Slope | 1.001536 |
| 1.67 | 1.67 | 1.0012 | | |
| | | | Intercept | 0.006276 |



THC Calibration Plot

Date: July 11, 2016





Wood Buffalo Environmental Association

O₃ Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|----------------------|--------------|
| Calibration Date | July 6, 2016 | Previous Calibration | June 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 9:35 | End Time (MST) | 12:02 |
| NO2 GPT Ref date | July-05-16 | Transfer Standard | NOX GPT |
| Calibrator Make/Model | Sabio 4010 | Station temp. | 22 Deg C |
| ZAG make/model | Teledyne API 701 | Serial Number | 11021107 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 1864 |
| | | Serial Number | 5564 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|------------------|--------|-------|
| Analyzer Range | 0 - 500 ppb | | Bench temp. | 27.0 | 29.0 |
| Analyzer IP address | 192.168.1.48 | | Lamp temp. | 67.8 | 67.9 |
| Calculated slope | 1.005163 | 0.999712 | Pressure | 708.3 | 717.7 |
| Calculated intercept | 1.354446 | 1.061321 | Flow cell A | 0.754 | 0.761 |
| Analyzer Background | -0.3 | -0.3 | Flow cell B | 0.773 | 0.780 |
| Analyzer Coefficient | 0.943 | 0.915 | Cell A Intensity | 68773 | 68928 |
| | | | Cell B Intensity | 59885 | 60000 |

| | | | |
|---------------|---------|-------------------|------------|
| Analyzer make | TEI 49i | Analyzer serial # | 1507964700 |
|---------------|---------|-------------------|------------|

Calibration Data

| Set Point | Dilution air flow rate (cc/min) | Calibrator Lamp Intensity | Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|---------------------------------|---------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.00 | 0.0 | 0.3 | ---- |
| as found span | 5000 | 1.22 | 343.2 | 359.5 | 0.955 |
| calibrator zero | 5000 | 0.00 | 0.0 | 0.3 | ---- |
| high point | 5000 | 1.22 | 343.2 | 343.8 | 0.998 |
| second point | 5000 | 0.70 | 179.4 | 175.1 | 1.024 |
| third point | 5000 | 0.43 | 89.5 | 88.8 | 1.008 |
| as left zero | 5000 | 0.00 | 0.0 | 0.3 | ---- |
| as left span | 5000 | 1.22 | 343.2 | 338.5 | 1.014 |
| Average Correction Factor | | | | | 1.010 |

| | | | | | |
|--------------------|-------|-------------------|-------|----------|-------|
| Corrected As found | 359.2 | Previous response | 340.1 | % change | -5.3% |
|--------------------|-------|-------------------|-------|----------|-------|

Notes:

Filter changed out, span was adjusted and no maintenance done.

Calibration Performed By: Melissa Lemay



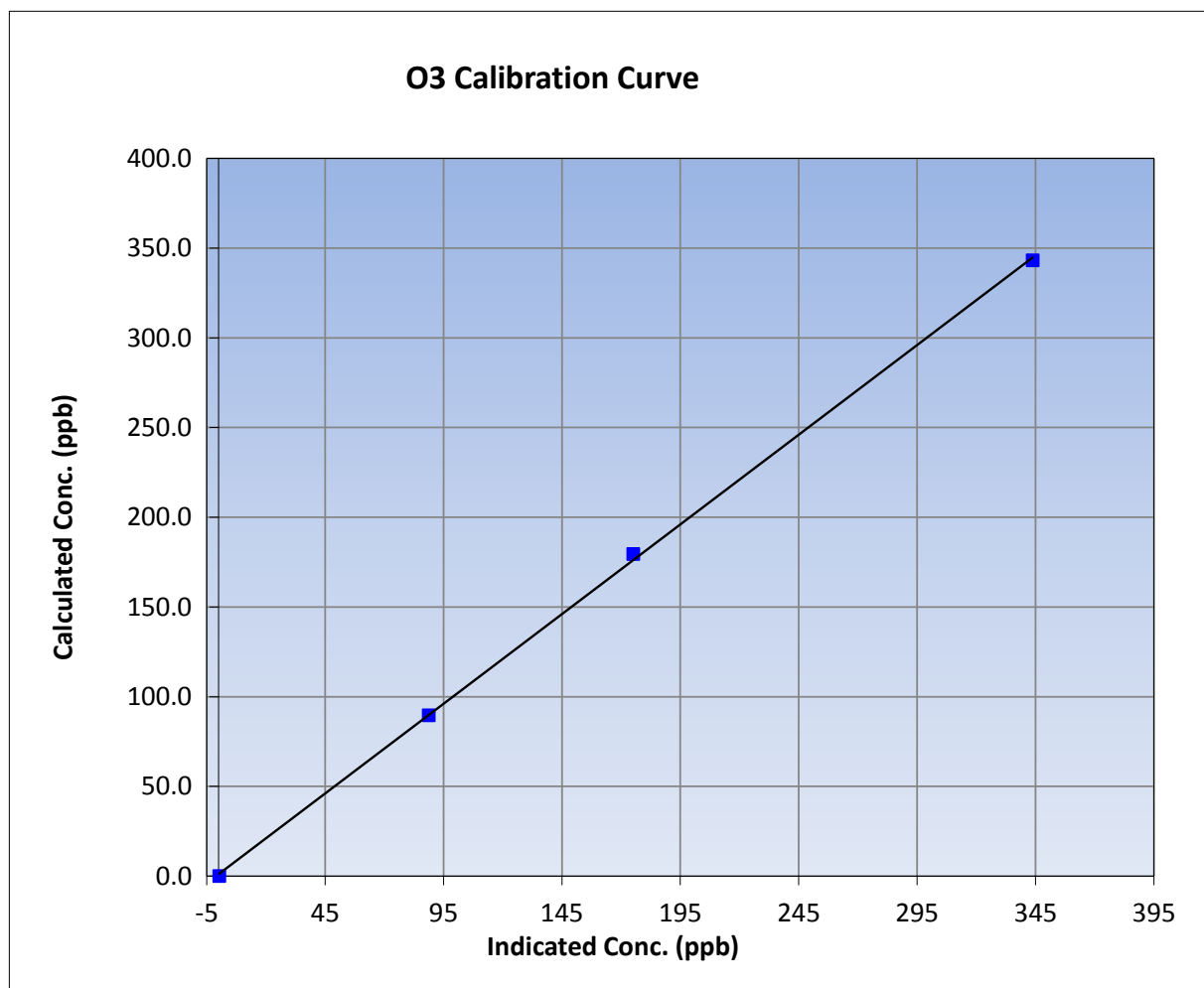
Wood Buffalo Environmental Association O3 Calibration Report

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July-06-16 | Previous Calibration | June 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:35 | End Time (MST) | 12:02 |
| Analyzer make | TEI 49i | Analyzer serial # | 1507964700 |

Calibration Data

| Calculated concentration (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.3 | ---- | Correlation Coefficient | 0.999763 |
| 343.2 | 343.8 | 0.9982 | | |
| 179.4 | 175.1 | 1.0245 | Slope | 0.999712 |
| 89.5 | 88.8 | 1.0079 | | |
| | | | Intercept | 1.061321 |



O3 Calibration Plot

Date: July 6, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|--------------------------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | <input type="text" value="Routine"/> | | |
| Start Time (MST) | 6:48 | End Time (MST) | 13:43 |
| NO Cal Gas Conc | 49.4 ppm | Gas Cert Reference | S970259A |
| NOx Cal Gas Conc | 49.4 ppm | Cal Gas Expiry Date | 9/26/2017 |
| Calibrator | Sabio 4010 | Serial Number | 11021107 |
| Zero air Generator | Teledyne PAI T701 | Serial Number | 1864 |

DACs Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 5564 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.997927 | 0.997669 | 0.999175 |
| | Data Offset | 2.406507 | 2.481264 | -0.341652 |
| Current Calibration | Data Slope | 0.994411 | 0.994899 | 1.008089 |
| | Data Offset | 2.895350 | 3.116093 | -0.557326 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|-----------|
| Analyzer make/model | Thermo 42C | Analyzer serial # | 601114773 |
|---------------------|------------|-------------------|-----------|

| Test Point | before | | after | |
|---------------------|---------------|-------|---------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.103 | | 192.168.1.103 | |
| NO coefficient | 1.244 | | 1.244 | |
| NOx coefficient | 0.999 | | 0.999 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgrnd | 4.1 | | 5.8 | |
| NOx bkgrnd | 4.8 | | 5.9 | |
| Chamber Temp | 49.8 | Deg C | 49.8 | Deg C |
| Moly Temp | 323 | Deg C | 323 | Deg C |
| PMT voltage | -784 | V | -784 | V |
| PMT Temp | -3 | Deg C | -3.6 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 142 | mmHg | 141.1 | mmHg |
| R Cell Press Nox | 142.1 | mmHg | 141.1 | mmHg |
| NO sample flow | 0.882 | lpm | 0.882 | lpm |
| Nox sample Flow | 0.882 | lpm | 0.882 | lpm |

Notes:

Zero adjusted, GPT second high point used, re did GPT due to 1st GPT being unstable, noticed the PMt drifted approx 3 degrees during the calibration, likely the cause of unstable GPT. PMT temp stable at -3.6 for second GPT. filter changed out



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

July 5, 2016

Station Number:

AMS 7

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 0.6 | 1.2 | ---- | ---- |
| as found span | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 609.8 | 608.8 | 1.2 | 0.9835 | 0.9851 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | 0.3 | ---- | ---- |
| high point | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 602.2 | 601.7 | 0.6 | 0.9959 | 0.9967 |
| second point | 5000 | 30.4 | 300.4 | 300.4 | 0.0 | 295.9 | 295.5 | 0.5 | 1.0150 | 1.0164 |
| third point | 5000 | 15.2 | 150.2 | 150.2 | 0.0 | 146.3 | 146.0 | 0.5 | 1.0265 | 1.0286 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.6 | -1.0 | 0.3 | ---- | ---- |
| as left span | 5000 | 60.7 | 599.7 | 263.3 | 336.4 | 604.0 | 262.2 | 341.8 | 0.9929 | 1.0042 |
| Average Correction Factor | | | | | | | | | 1.0125 | 1.0139 |

Corrected As found
Previous Response

NO_x= 608.6
NO_x= 598.6

NO= 608.2
NO= 598.6

Percent Change

NO_x= -1.6%

NO= -1.6%

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.70 ccm NOx ref calc conc = 599.7 ppb NO ref calc conc = 599.7 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 606.5 | 606.5 | 0.3 | 0.9888 | 0.9888 | ---- | ---- |
| 1st NO2 (300) | 263.3 | 343.2 | 603.8 | 263.3 | 340.7 | 0.9932 | ---- | 1.0073 | 99.3% |
| 2nd NO2 (200) | 427.1 | 179.4 | 606.0 | 427.1 | 179.1 | 0.9896 | ---- | 1.0017 | 99.8% |
| 3rd NO2 (100) | 517.0 | 89.5 | 606.5 | 517.0 | 89.3 | 0.9889 | ---- | 1.0022 | 99.8% |
| 2nd NO ref point | | 0.0 | 603.3 | 602.9 | 0.6 | 0.9941 | 0.9947 | ---- | ---- |
| Average Correction Factor | | | | | | 0.9915 | | 1.0038 | 99.6% |

Calibration Performed By: Melissa Lemay and Jayme Rycroft



Wood Buffalo Environmental Association

NO_x Calibration Summary

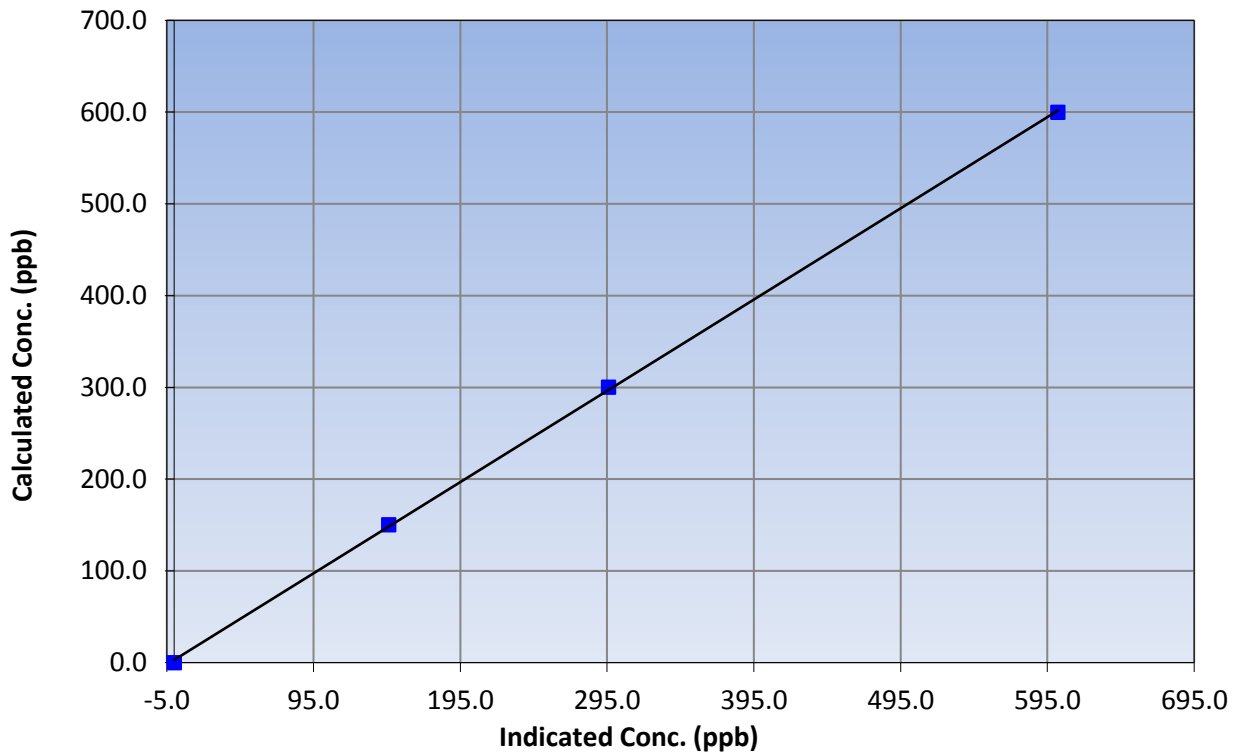
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 6:48 | End Time (MST) | 13:43 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999865 |
| 599.7 | 602.2 | 0.9959 | | |
| 300.4 | 295.9 | 1.0150 | Slope | 0.994411 |
| 150.2 | 146.3 | 1.0265 | | |
| | | | Intercept | 2.895350 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

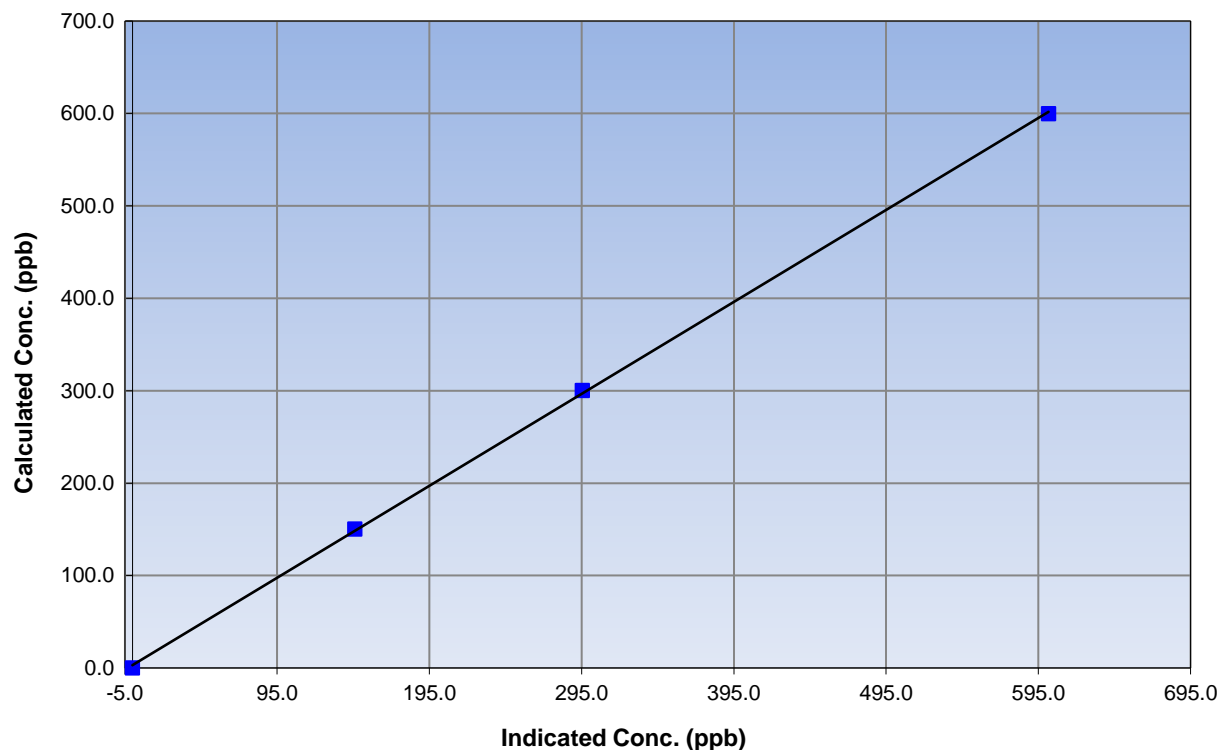
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 6:48 | End Time (MST) | 13:43 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999863 |
| 599.7 | 601.7 | 0.9967 | | |
| 300.4 | 295.5 | 1.0164 | Slope | 0.994899 |
| 150.2 | 146.0 | 1.0286 | | |
| | | | Intercept | 3.116093 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

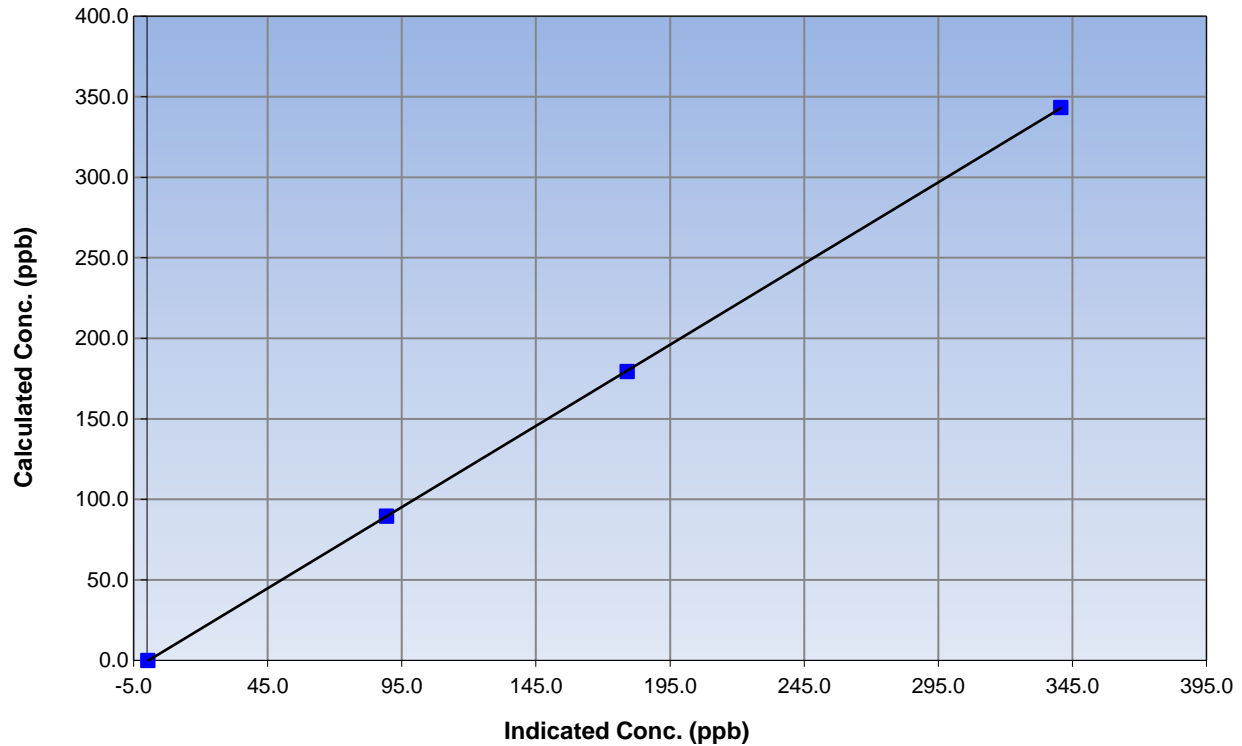
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 5, 2016 | Previous Calibration | June 1, 2016 |
| Station Number | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 6:48 | End Time (MST) | 13:43 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

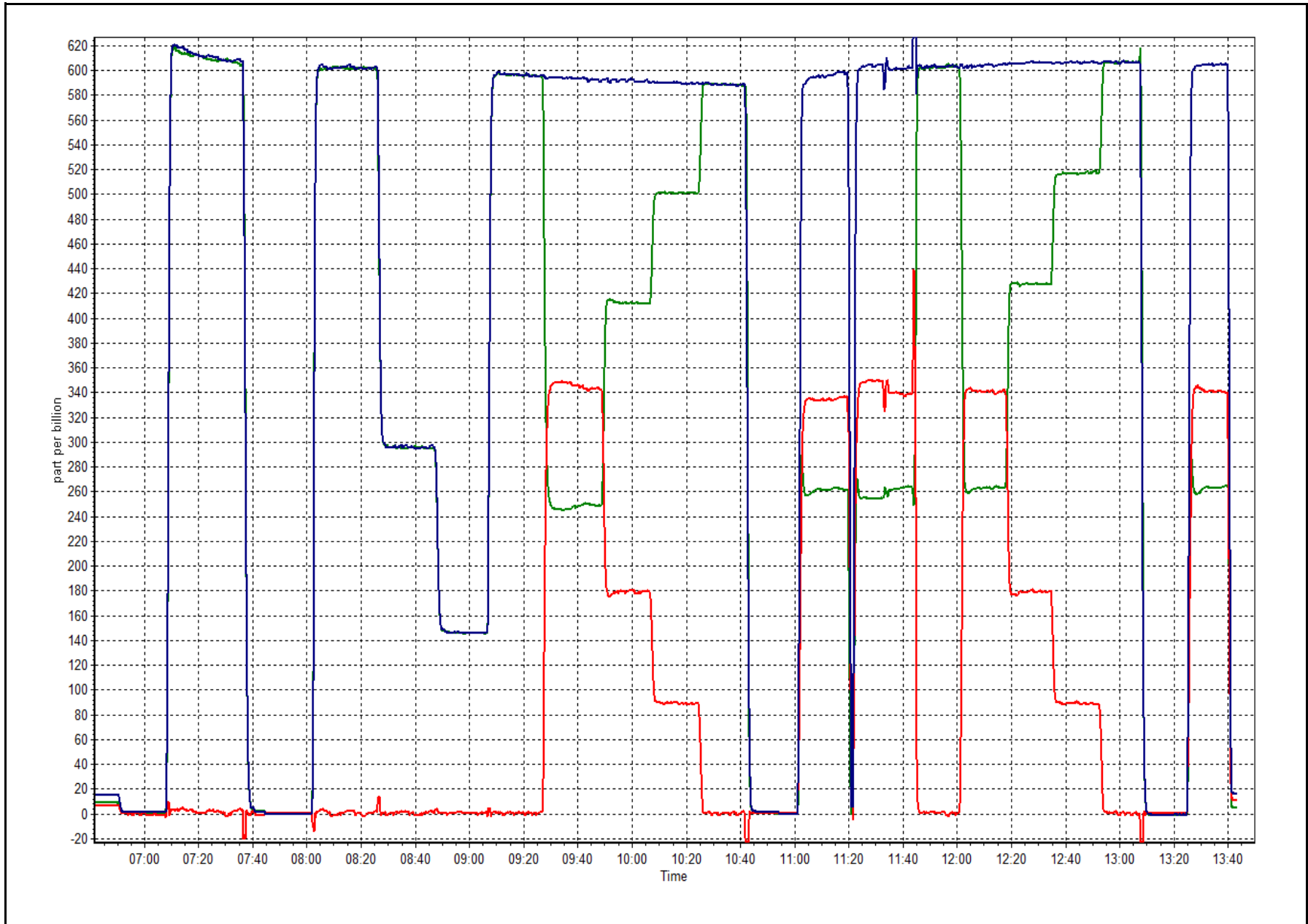
| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.3 | N/A | Correlation Coefficient | 0.999992 |
| 343.2 | 340.7 | 1.0073 | | |
| 179.4 | 179.1 | 1.0017 | Slope | 1.008089 |
| 89.5 | 89.3 | 1.0022 | | |
| | | | Intercept | -0.557326 |

NO₂ Calibration Curve



NOX Calibration Plot

Date: July 5, 2016





Wood Buffalo Environmental Association NOX-NO-NO2 Calibration Report

Station Information

| | | | |
|--------------------|-------------------|----------------------|--------------|
| Calibration Date | July 27, 2016 | Previous Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 9:00 | End Time (MST) | 3:15 |
| NO Cal Gas Conc | 49.4 ppm | Gas Cert Reference | S970259A |
| NOX Cal Gas Conc | 49.4 ppm | Cal Gas Expiry Date | 9/26/2017 |
| Calibrator | API T700 | Serial Number | 2445 |
| Zero air Generator | Teledyne PAI T701 | Serial Number | 1864 |

DACS Information

| | | | |
|-------------------|----------------------------|-----------------|------|
| DACS make & model | Campbell Scientific CR3000 | DACS serial No. | 8205 |
|-------------------|----------------------------|-----------------|------|

Calibration Statistics

| Parameter | | NOx | NO | NO2 |
|-------------------------------------|-------------|----------|----------|-----------|
| As Found (last calibration results) | Data Slope | 0.994411 | 0.994899 | 1.008089 |
| | Data Offset | 2.895350 | 3.116093 | -0.557326 |
| Current Calibration | Data Slope | 1.001062 | 1.000073 | 0.999770 |
| | Data Offset | 1.789347 | 1.894408 | -0.002904 |

Analyzer Information

| | | | |
|---------------------|------------|-------------------|-----------|
| Analyzer make/model | Thermo 42C | Analyzer serial # | 601114773 |
|---------------------|------------|-------------------|-----------|

| Test Point | before | | after | |
|---------------------|---------------|-------|---------------|-------|
| | | ppb | | ppb |
| Concentration range | 0-1000 | | 0-1000 | |
| Analyzer IP | 192.168.1.103 | | 192.168.1.103 | |
| NO coefficient | 1.244 | | 1.119 | |
| NOX coefficient | 0.999 | | 1.000 | |
| NO2 coefficient | 1.000 | | 1.000 | |
| NO bkgnd | 5.8 | | 4.1 | |
| NOX bkgnd | 5.9 | | 4.4 | |
| Chamber Temp | 49.8 | Deg C | 49.8 | Deg C |
| Moly Temp | 323 | Deg C | 323 | Deg C |
| PMT voltage | -784 | V | -784 | V |
| PMT Temp | -3.6 | Deg C | -3.6 | Deg C |
| O3 flow | ok | ccm | ok | ccm |
| R Cell press NO | 141.1 | mmHg | 136 | mmHg |
| R Cell Press Nox | 141.1 | mmHg | 136 | mmHg |
| NO sample flow | 0.882 | lpm | 0.903 | lpm |
| Nox sample Flow | 0.882 | lpm | 0.903 | lpm |

Notes:

Replaced pump for preventative maintenance. Sample filter replaced after as found. Adjusted zero and span.



Wood Buffalo Environmental Association

NOX-NO-NO2 Calibration Report

Station Information

Calibration Date:

July 27, 2016

Station Number:

AMS 7

Calibration Data

| Set Point | Total flow rate (ccm) | Source gas flow rate (ccm) | Calculated NOx conc (ppb) | Calculated NO conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor |
|---------------------------|-----------------------|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | -0.9 | -1.0 | 0.3 | ---- | ---- |
| as found span | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 643.7 | 643.3 | 0.6 | 0.9316 | 0.9322 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.1 | 0.3 | ---- | ---- |
| high point | 5000 | 60.7 | 599.7 | 599.7 | 0.0 | 598.5 | 598.9 | -0.1 | 1.0020 | 1.0013 |
| second point | 5000 | 30.4 | 300.4 | 300.4 | 0.0 | 296.3 | 296.8 | -0.2 | 1.0136 | 1.0119 |
| third point | 5000 | 15.2 | 150.2 | 150.2 | 0.0 | 147.0 | 146.9 | 0.3 | 1.0215 | 1.0223 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | -0.5 | 0.3 | ---- | ---- |
| as left span | 5000 | 60.7 | 599.7 | 208.9 | 390.8 | 589.1 | 207.9 | 380.2 | 1.0180 | 1.0048 |
| Average Correction Factor | | | | | | | | | 1.0124 | 1.0118 |

Corrected As found
Previous Response

NO_x= 644.6
NO_x= 600.2

NO= 644.3
NO= 599.7

Percent Change

NO_x= -6.9%

NO= -6.9%

GPT Calibration Data

Dilution Flow (total) 5000 ccm Source Gas Flow 60.70 ccm NOx ref calc conc = 599.7 ppb NO ref calc conc = 599.7 ppb

| O3 Setpoint (ppb) | Indicated NO drop conc (ppb) | Calculated NO2 conc (ppb) | Indicated NOx conc (ppb) | Indicated NO conc (ppb) | Indicated NO2 conc (ppb) | NOx Correction factor | NO Correction factor | NO2 Correction factor | Converter Efficiency |
|---------------------------|------------------------------|---------------------------|--------------------------|-------------------------|--------------------------|-----------------------|----------------------|-----------------------|----------------------|
| 1st NO ref point | | 0.0 | 595.9 | 595.0 | 0.3 | 1.0064 | 1.0080 | ---- | ---- |
| 1st NO2 (300) | 208.9 | 386.1 | 595.2 | 208.9 | 386.3 | 1.0076 | ---- | 0.9995 | 100.0% |
| 2nd NO2 (200) | 393.9 | 201.1 | 595.0 | 393.9 | 201.2 | 1.0080 | ---- | 0.9996 | 100.0% |
| 3rd NO2 (100) | 493.0 | 101.9 | 594.5 | 493.0 | 101.5 | 1.0088 | ---- | 1.0042 | 99.6% |
| 2nd NO ref point | | 0.0 | 593.1 | 593.0 | 0.3 | 1.0112 | 1.0113 | ---- | ---- |
| Average Correction Factor | | | | | | 1.0089 | | 1.0011 | 99.9% |

Calibration Performed By: Asad Hidayat



Wood Buffalo Environmental Association

NO_x Calibration Summary

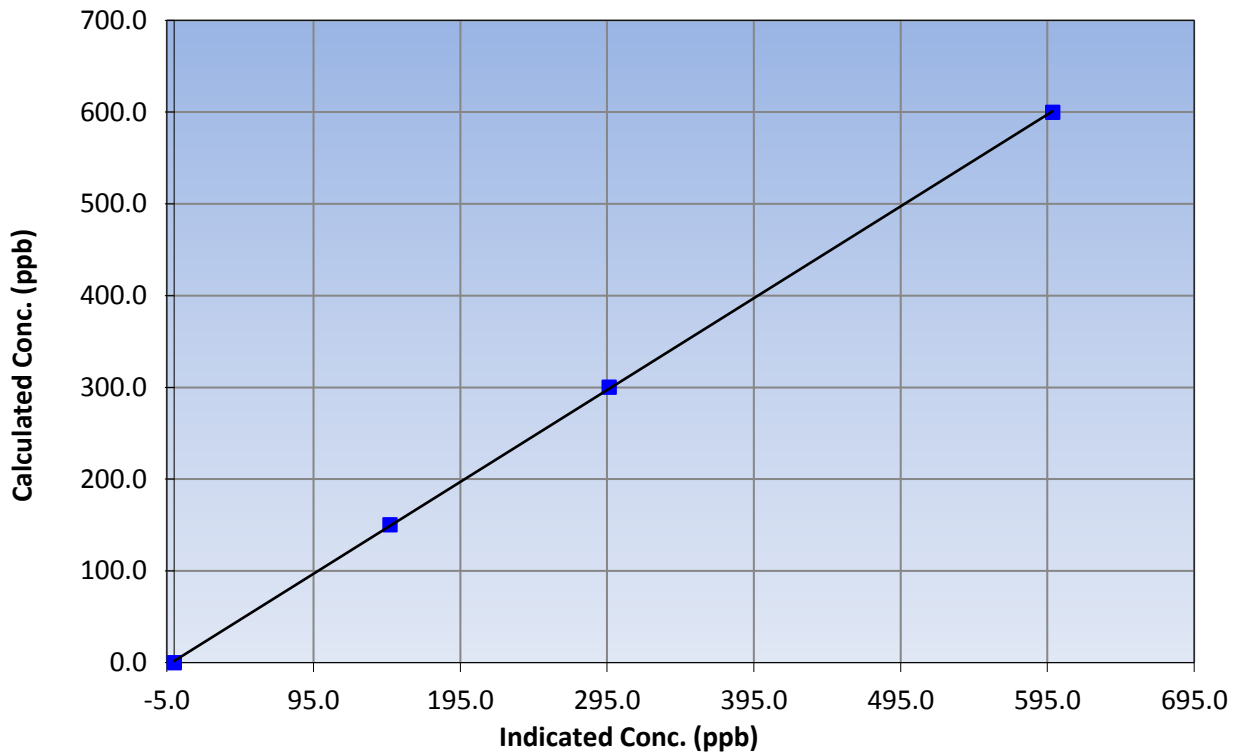
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 27, 2016 | Previous Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:00 | End Time (MST) | 3:15 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.1 | ---- | Correlation Coefficient | 0.999948 |
| 599.7 | 598.5 | 1.0020 | | |
| 300.4 | 296.3 | 1.0136 | Slope | 1.001062 |
| 150.2 | 147.0 | 1.0215 | | |
| | | | Intercept | 1.789347 |

NO_x Calibration Curve





Wood Buffalo Environmental Association

NO Calibration Summary

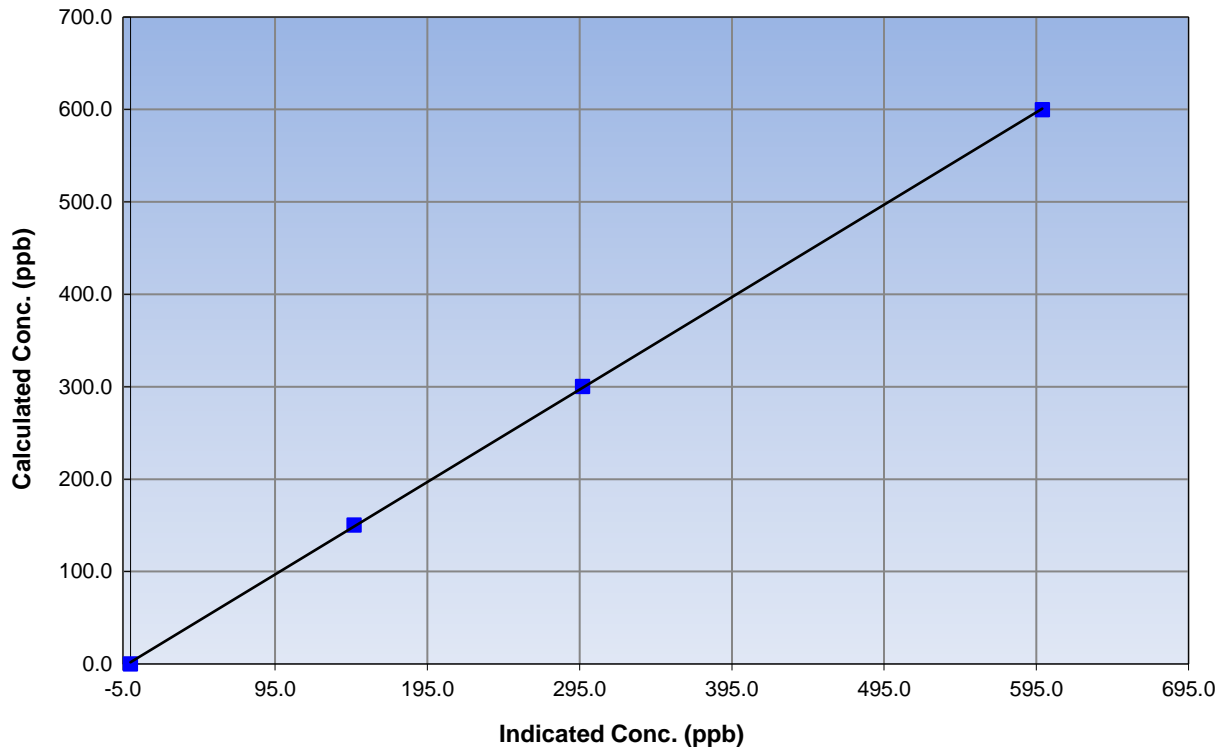
Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 27, 2016 | Previous Calibration | July 5, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:00 | End Time (MST) | 3:15 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | -0.1 | N/A | Correlation Coefficient | 0.999954 |
| 599.7 | 598.9 | 1.0013 | | |
| 300.4 | 296.8 | 1.0119 | Slope | 1.000073 |
| 150.2 | 146.9 | 1.0223 | | |
| | | | Intercept | 1.894408 |

NO Calibration Curve





Wood Buffalo Environmental Association

NO₂ Calibration Summary

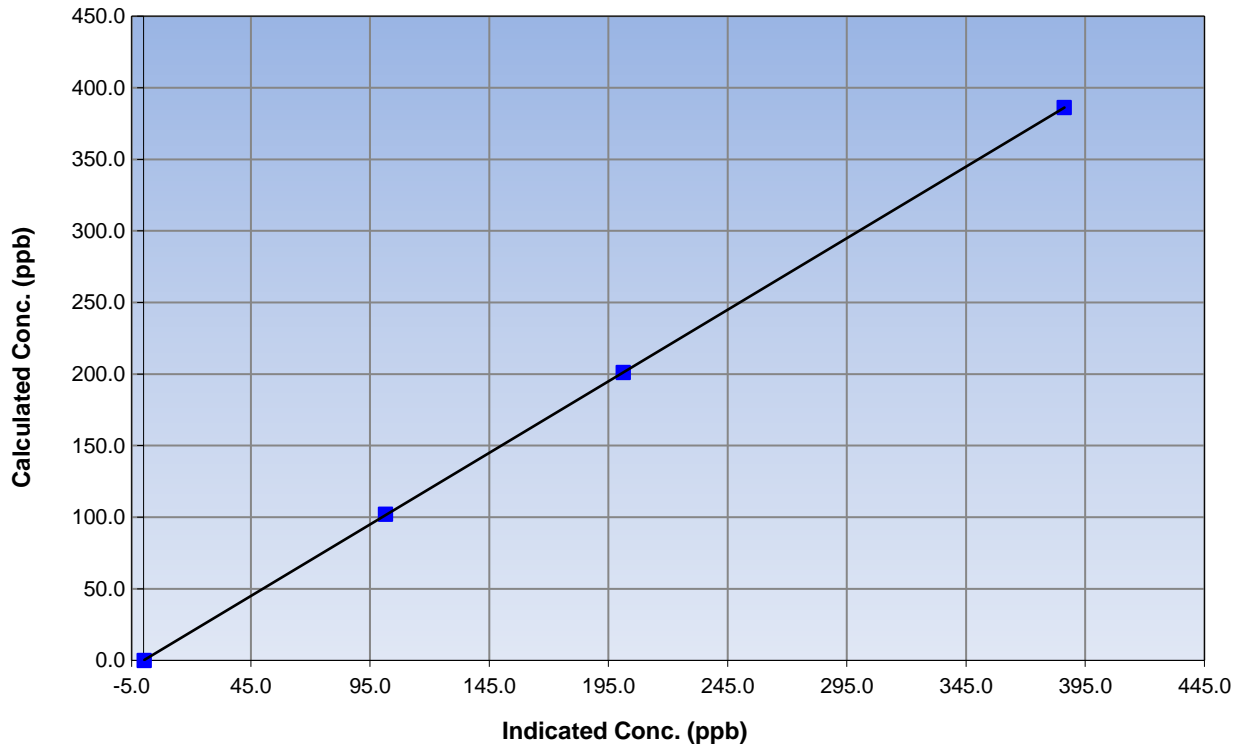
Station Information

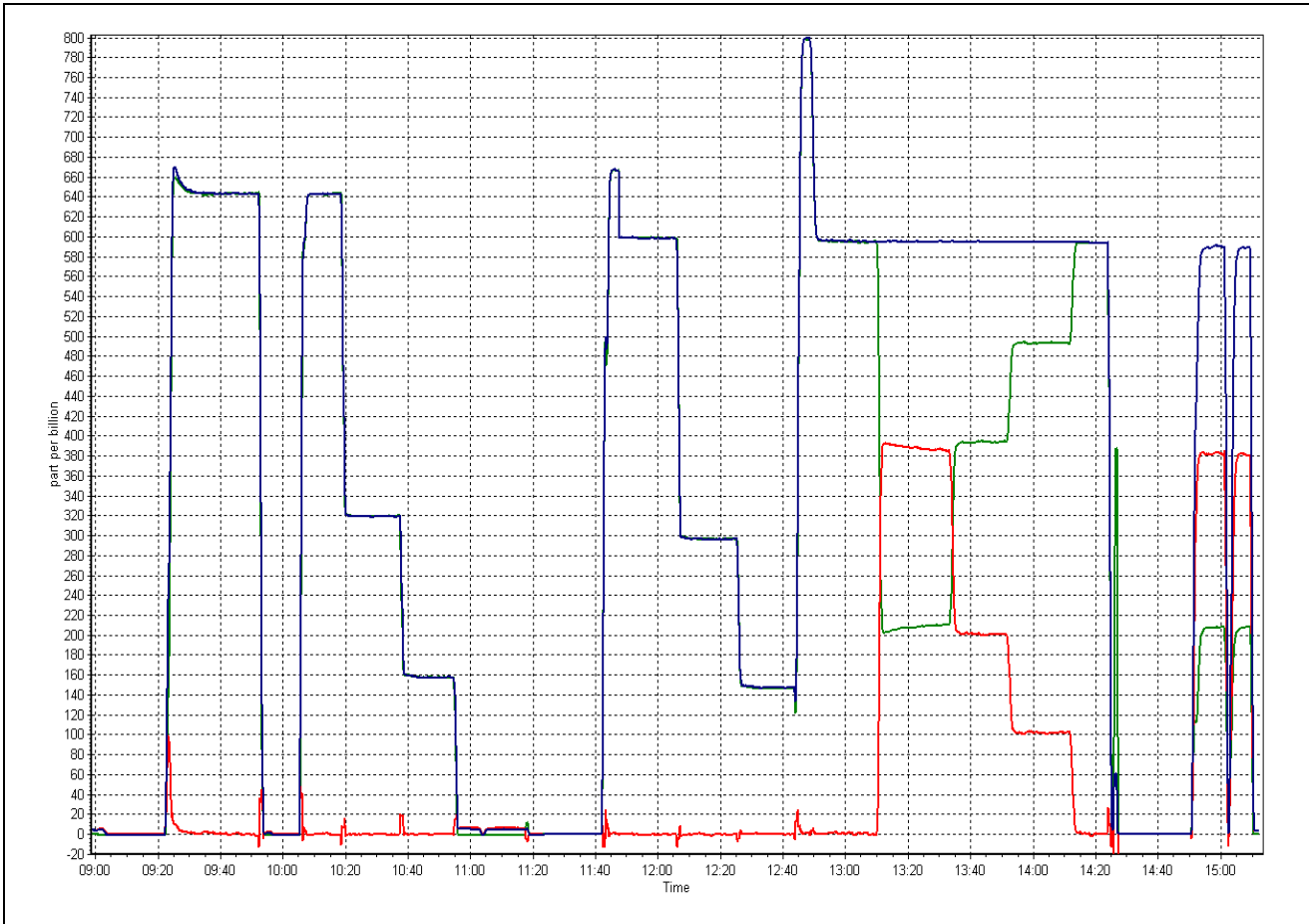
| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 27, 2016 | Previous Calibration | July 5, 2016 |
| Station Number | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:00 | End Time (MST) | 3:15 |
| Analyzer make | Thermo 42C | Analyzer serial # | 601114773 |

Calibration Information

| Calculated conc (ppb) (Cc) | Indicated concentration (ppb) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------|---------------------------------------|---------------------------|-------------------------|-----------|
| 0.0 | 0.3 | N/A | Correlation Coefficient | 0.999996 |
| 386.1 | 386.3 | 0.9995 | | |
| 201.1 | 201.2 | 0.9996 | Slope | 0.999770 |
| 101.9 | 101.5 | 1.0042 | | |
| | | | Intercept | -0.002904 |

NO₂ Calibration Curve







Wood Buffalo Environmental Association

SHARP CALIBRATION

| STATION INFORMATION | | | |
|------------------------|------------------|---------------------------|----------|
| Calibration Date: | July 7, 2016 | Previous Calibration: | 02/06/16 |
| Station Name: | Athabasca Valley | Station Number: | AMS 7 |
| Start Time (MST): | 7:36 | End Time (MST): | 8:35 |
| Calibrator Make/Model: | Delta Cal | Calibrator Serial Number: | 1097 |

| SHARP INFORMATION | | | |
|--------------------------------|-----------------------------------------|----------------------------------------|-----------------------------------------------|
| Particulate Fraction: | PM2.5 | | |
| Make/Model: | Thermo / SHARP 5030 | | |
| Serial Number | E515 | | |
| C ₁₄ Source SN: | 3256 | | |
| Confirmation of Time settings: | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Parameters Checked: | T1 <input checked="" type="checkbox"/> | T2 <input type="checkbox"/> | T3 <input type="checkbox"/> |
| | T4 <input type="checkbox"/> | P3 <input checked="" type="checkbox"/> | Main Flow <input checked="" type="checkbox"/> |
| | | Beta <input type="checkbox"/> | Neph <input checked="" type="checkbox"/> |

| CALIBRATION DATA | | | | |
|------------------|-----------|----------|------------------------------|-----------------|
| Temperature (°C) | | | | |
| Sensor | Indicated | Measured | Difference (Limit +/- 2.0°C) | Final Indicated |
| T1 | 11.0 | 13.0 | 2.0 | 13.0 |
| T2 | 24.0 | na | #VALUE! | 24.0 |
| T3 | 25.0 | na | #VALUE! | 25.0 |
| T4 | 29.0 | na | #VALUE! | 29.0 |
| RH (%) | 37.0 | na | #VALUE! | 37.0 |

| Pressure (Hpa) | | | | |
|----------------|-----------|----------|----------------------------------|-----------------|
| Sensor | Indicated | Measured | Difference (Limit +/- 13.33 hPa) | Final Indicated |
| P3 | 981 | 977.0 | -4.0 | 981 |

| Main Flow (Lph) | | | | |
|-----------------|----------|-----------------------------------------|----------------|-----------------|
| Indicated | Measured | Difference LPH (Limit +/- 7% or 70 Lph) | Final Measured | Final Indicated |
| 1000 | 1020 | 20 | 1000 | 1000 |

| Nephelometer Calibration | | | |
|---------------------------------|----------|-----------------------------|---------|
| Parameter | As Found | Zeroed (Limit +/- 2.0ug/m3) | As Left |
| Analog | 238 | | 242 |
| Neph | 10.7 | | -0.7 |
| C14 | -4.2 | | 0.6 |
| Indicated Concentration (ug/m3) | 3.2 | yes | -0.2 |
| Offset 1 | 243 | | 242.3 |
| Offset 2 | 35 | | 35.1 |

| Leak Check (Quarterly) | | | |
|--------------------------------------------------------------------------|-----------------|---------------------------|--------------------------------------------|
| Leak Check Date: | June 2, 2016 | Previous Leak Check Date: | April 22, 2016 |
| | Measured | | Difference LPM (Limit +/- 0.42 LPM) |
| Flow without adaptor (LPM): | 16.67 | | 0.02 |
| *Flow with adaptor (LPM): | 16.65 | | |
| <i>*Note - do not attach adaptor without shutting off the pump first</i> | | | |

| Mass Foil Calibration (Annually) | | | |
|----------------------------------|--------------|----------------------------|----------------|
| Foil Calibration Date: | June 2, 2016 | Previous Foil Calibration: | April 22, 2016 |
| Zeroed?: | No | | |
| Foil Mass: | 1337 | | |
| Previous Correction Factor: | 6853 | Mass foil set S/N: | 5872 |
| New Correction Factor: | 6895 | | |

| INSPECTION DATA | | |
|-------------------|----------------|----------------------------|
| Item | Condition | Date of install or rebuild |
| Cyclone | Good / cleaned | 07/07/2016 |
| Pump | Good | NA |
| Filter Tape | Good | NA |
| Mass Foil Cal Set | na | NA |
| HEPA filter | Good | 15/04/2015 |

NOTES:

Cyclone head was cleaned, T1, flow and nephelometer adjusted

| | |
|----------------------------------|----------------------|
| Calibration Performed By: | Melissa Lemay |
|----------------------------------|----------------------|



Wood Buffalo Environmental Association

SHARP CALIBRATION

| STATION INFORMATION | | | |
|------------------------|------------------|---------------------------|--------------|
| Calibration Date: | July 22, 2016 | Previous Calibration: | July 7, 2016 |
| Station Name: | Athabasca Valley | Station Number: | AMS 7 |
| Start Time (MST): | 9:30 | End Time (MST): | 11:05 |
| Calibrator Make/Model: | Delta Cal | Calibrator Serial Number: | 141229 |

| SHARP INFORMATION | | | |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--|
| Particulate Fraction: | | PM2.5 | |
| Make/Model: | | Thermo / SHARP 5030 | |
| Serial Number | | E515 | |
| C ₁₄ Source SN: | | 3256 | |
| Confirmation of Time settings: | | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> | |
| Parameters Checked: | T1 <input checked="" type="checkbox"/> T2 <input type="checkbox"/> T3 <input type="checkbox"/> T4 <input type="checkbox"/> P3 <input checked="" type="checkbox"/> Main Flow <input checked="" type="checkbox"/> Beta <input checked="" type="checkbox"/> Neph <input checked="" type="checkbox"/> | | |

CALIBRATION DATA

| Temperature (°C) | | | | |
|------------------|-----------|----------|------------------------------|-----------------|
| Sensor | Indicated | Measured | Difference (Limit +/- 2.0°C) | Final Indicated |
| T1 | 19.0 | 19.1 | 0.1 | 19.0 |
| T2 | 22.0 | na | #VALUE! | 22.0 |
| T3 | 24.0 | na | #VALUE! | 24.0 |
| T4 | 34.0 | na | #VALUE! | 34.0 |
| RH (%) | 42.0 | na | #VALUE! | 42.0 |

| Pressure (Hpa) | | | | |
|----------------|-----------|----------|----------------------------------|-----------------|
| Sensor | Indicated | Measured | Difference (Limit +/- 13.33 hPa) | Final Indicated |
| P3 | 982 | 981.0 | -1.0 | 981 |

| Main Flow (Lph) | | | | |
|-----------------|----------|-----------------------------------------|----------------|-----------------|
| Indicated | Measured | Difference LPH (Limit +/- 7% or 70 Lph) | Final Measured | Final Indicated |
| 1000 | 975 | -25 | 1000 | 1001 |

| Nephelometer Calibration | | | |
|---------------------------------|----------|-----------------------------|---------|
| Parameter | As Found | Zeroed (Limit +/- 2.0ug/m3) | As Left |
| Analog | 245 | | 245 |
| Neph | 4.2 | | -0.8 |
| C14 | 361 | | 223.3 |
| Indicated Concentration (ug/m3) | 1.2 | YES | -0.2 |
| Offset 1 | 239 | | 246.4 |
| Offset 2 | 35 | | 36.6 |

Leak Check (Quarterly)

| | | | |
|-----------------------------|---------------|---------------------------|-------------------------------------|
| Leak Check Date: | July 22, 2016 | Previous Leak Check Date: | June 2, 2016 |
| | Measured | | Difference LPM (Limit +/- 0.42 LPM) |
| Flow without adaptor (LPM): | 16.67 | | 0.31 |
| *Flow with adaptor (LPM): | 16.36 | | |

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

| Mass Foil Calibration (Annually) | | | |
|----------------------------------|---------------|----------------------------|-------------------------|
| Foil Calibration Date: | July 22, 2016 | Previous Foil Calibration: | June 2, 2016 |
| Zeroed?: | No | | |
| Foil Mass: | 1337 | | Mass foil set S/N: 2518 |
| Previous Correction Factor: | 6895 | | |
| New Correction Factor: | 6885 | | |

INSPECTION DATA

| Item | Condition | Date of install or rebuild |
|-------------------|----------------|----------------------------|
| Cyclone | Good / cleaned | 07/07/2016 |
| Pump | Good | NA |
| Filter Tape | Good | NA |
| Mass Foil Cal Set | na | NA |
| HEPA filter | Good | 15/04/2015 |

NOTES:

Debris cleared from sample inlet system as well as NEPH and BETA chambers. Flow calibrated slightly, leak check passed. Beta and Neph calibrated, all cal criteria met, instrument passed calibration.

Calibration Performed By: Zach Eastman



Wood Buffalo Environmental Association

SHARP CALIBRATION

| STATION INFORMATION | | | |
|------------------------|------------------|---------------------------|------------|
| Calibration Date: | July 28, 2016 | Previous Calibration: | 07/22/2016 |
| Station Name: | Athabasca Valley | Station Number: | AMS 7 |
| Start Time (MST): | 7:45 | End Time (MST): | 8:55 |
| Calibrator Make/Model: | Delta Cal | Calibrator Serial Number: | 141229 |

| SHARP INFORMATION | | | |
|--------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------------|
| Particulate Fraction: | PM2.5 | | |
| Make/Model: | Thermo / SHARP 5030 | | |
| Serial Number | E515 | | |
| C ₁₄ Source SN: | 3256 | | |
| Confirmation of Time settings: | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | |
| Parameters Checked: | T1 <input checked="" type="checkbox"/> | T2 <input type="checkbox"/> | T3 <input type="checkbox"/> |
| | T4 <input type="checkbox"/> | P3 <input checked="" type="checkbox"/> | Main Flow <input checked="" type="checkbox"/> |
| | | Beta <input checked="" type="checkbox"/> | Neph <input checked="" type="checkbox"/> |

CALIBRATION DATA

| Temperature (°C) | | | | |
|------------------|-----------|----------|------------------------------|-----------------|
| Sensor | Indicated | Measured | Difference (Limit +/- 2.0°C) | Final Indicated |
| T1 | 18.0 | 18.2 | 0.2 | 18.0 |
| T2 | 39.0 | na | #VALUE! | 39.0 |
| T3 | 29.0 | na | #VALUE! | 29.0 |
| T4 | 46.0 | na | #VALUE! | 46.0 |
| RH (%) | 39.0 | na | #VALUE! | 39.0 |

| Pressure (Hpa) | | | | |
|----------------|-----------|----------|----------------------------------|-----------------|
| Sensor | Indicated | Measured | Difference (Limit +/- 13.33 hPa) | Final Indicated |
| P3 | 990 | 989.0 | -1.0 | 990 |

| Main Flow (Lph) | | | | |
|-----------------|----------|-----------------------------------------|----------------|-----------------|
| Indicated | Measured | Difference LPH (Limit +/- 7% or 70 Lph) | Final Measured | Final Indicated |
| 1000 | 1000 | 0 | 1000 | 1001 |

| Nephelometer Calibration | | | |
|---------------------------------|----------|-----------------------------|---------|
| Parameter | As Found | Zeroed (Limit +/- 2.0ug/m3) | As Left |
| Analog | 238 | | 238 |
| Neph | -0.3 | | 0.1 |
| C14 | -10.4 | | -16.9 |
| Indicated Concentration (ug/m3) | -1 | YES | 0.2 |
| Offset 1 | 240 | | 240.2 |
| Offset 2 | 34.5 | | 34.9 |

Leak Check (Quarterly)

| | | | |
|-----------------------------|-----------------|---------------------------|--------------------------------------------|
| Leak Check Date: | July 22, 2016 | Previous Leak Check Date: | June 2, 2016 |
| | Measured | | Difference LPM (Limit +/- 0.42 LPM) |
| Flow without adaptor (LPM): | 16.67 | | 0.31 |
| *Flow with adaptor (LPM): | 16.36 | | |

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

| Mass Foil Calibration (Annually) | | | |
|----------------------------------|---------------|----------------------------|--------------------------------|
| Foil Calibration Date: | July 22, 2016 | Previous Foil Calibration: | June 2, 2016 |
| Zeroed?: | No | | |
| Foil Mass: | 1337 | | Mass foil set S/N: 2518 |
| Previous Correction Factor: | 6895 | | |
| New Correction Factor: | 6885 | | |

INSPECTION DATA

| Item | Condition | Date of install or rebuild |
|-------------------|----------------|----------------------------|
| Cyclone | Good / cleaned | 07/07/2016 |
| Pump | Good | NA |
| Filter Tape | Good | NA |
| Mass Foil Cal Set | na | NA |
| HEPA filter | Good | 15/04/2015 |

NOTES:

Nephelometer checked due to negative PM readings, T1, P3 and flow also checked. Nephelometer was adjusted. No other adjustments done

Calibration Performed By: Melissa Lemay



Wood Buffalo Environmental Association CO Calibration Report

Station Information

| | | | |
|-----------------------|----------------------------|------------------|--------------|
| Calibration Date | July 7, 2016 | Last Calibration | June 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Reason: | Routine | | |
| Start Time (MST) | 9:45 | End Time (MST) | 12:23 |
| Gas Cert Reference | CC101396 | Station temp. | 22 Deg C |
| Cal Gas Concentration | 2970 ppm | Cal Gas Exp Date | 02/02/2023 |
| Calibrator Make/Model | Sabio 4010 | Serial Number | 11021107 |
| ZAG Make/Model | API 701 | Serial Number | 5564 |
| DACS make/model | Campbell Scientific CR3000 | Serial Number | 1864 |

Analyzer Information

| | Before | After | | Before | After |
|----------------------|--------------|----------|---------------|----------|----------|
| Analyzer Range | 0 - 1000 ppb | | Chamber temp. | 48.1 | 48.3 |
| Analyzer IP address | 192.168.1.48 | | Pressure | 728.9 | 73406.0 |
| Calculated slope | 1.003299 | 1.000861 | Flow | 0.492 | 0.496 |
| Calculated intercept | 0.031307 | 0.062058 | Intensity | 199470 | 199495 |
| Analyzer Background | 5.483 | 5.716 | S/R ratio | 1.171971 | 1.171337 |
| Analyzer Coefficient | 1.065 | 1.065 | | | |

Analyzer make Thermo 48i-TLE Analyzer serial # 1408761381

Calibration Data

| Set Point | Total flow rate (cc/min) | Source gas flow rate (cc/min) | Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) |
|---------------------------|--------------------------|-------------------------------|-------------------------------------|------------------------------------|---------------------------|
| as found zero | 5000 | 0.0 | 0.0 | 0.3 | ---- |
| as found span | 5000 | 69.7 | 41.4 | 42.2 | 0.982 |
| calibrator zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| high point | 5000 | 69.7 | 41.4 | 41.3 | 1.001 |
| second point | 5000 | 35.2 | 20.9 | 20.8 | 1.007 |
| third point | 5000 | 15.2 | 9.0 | 8.9 | 1.011 |
| as left zero | 5000 | 0.0 | 0.0 | 0.0 | ---- |
| as left span | 5000 | 69.7 | 41.4 | 41.2 | 1.006 |
| Average Correction Factor | | | | | 1.006 |

Corrected As found 41.9 Previous response 41.2 % change -1.5%

Notes:

Filter changed out. Zero adjusted. Zero air switched after as founds.

Calibration Performed By:

Melissa Lemay



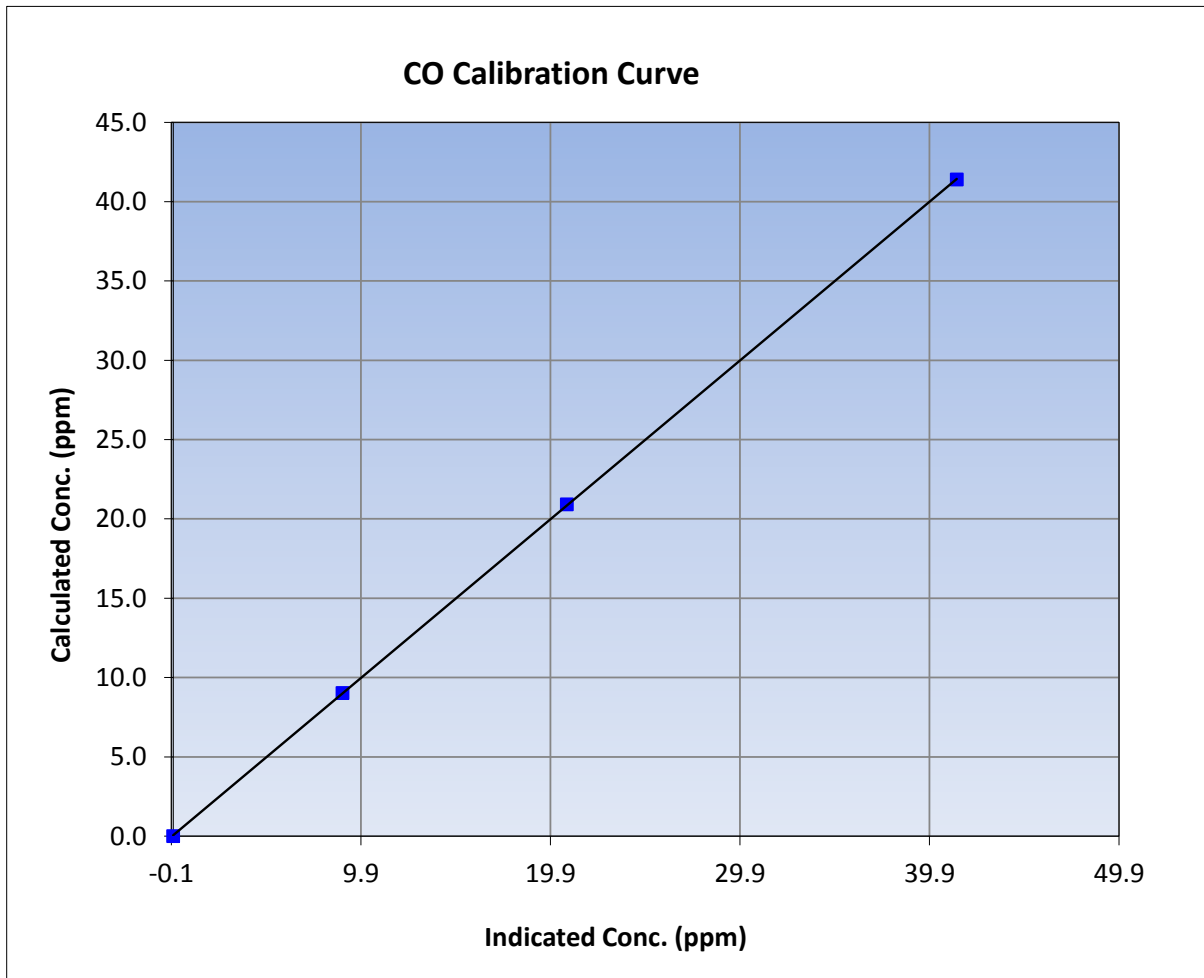
Wood Buffalo Environmental Association CO Calibration Report

Station Information

| | | | |
|------------------|------------------|----------------------|--------------|
| Calibration Date | July 7, 2016 | Previous Calibration | June 2, 2016 |
| Station Name | Athabasca Valley | Station Number | AMS 7 |
| Start Time (MST) | 9:45 | End Time (MST) | 12:23 |
| Analyzer make | Thermo 48i-TLE | Analyzer serial # | 1408761381 |

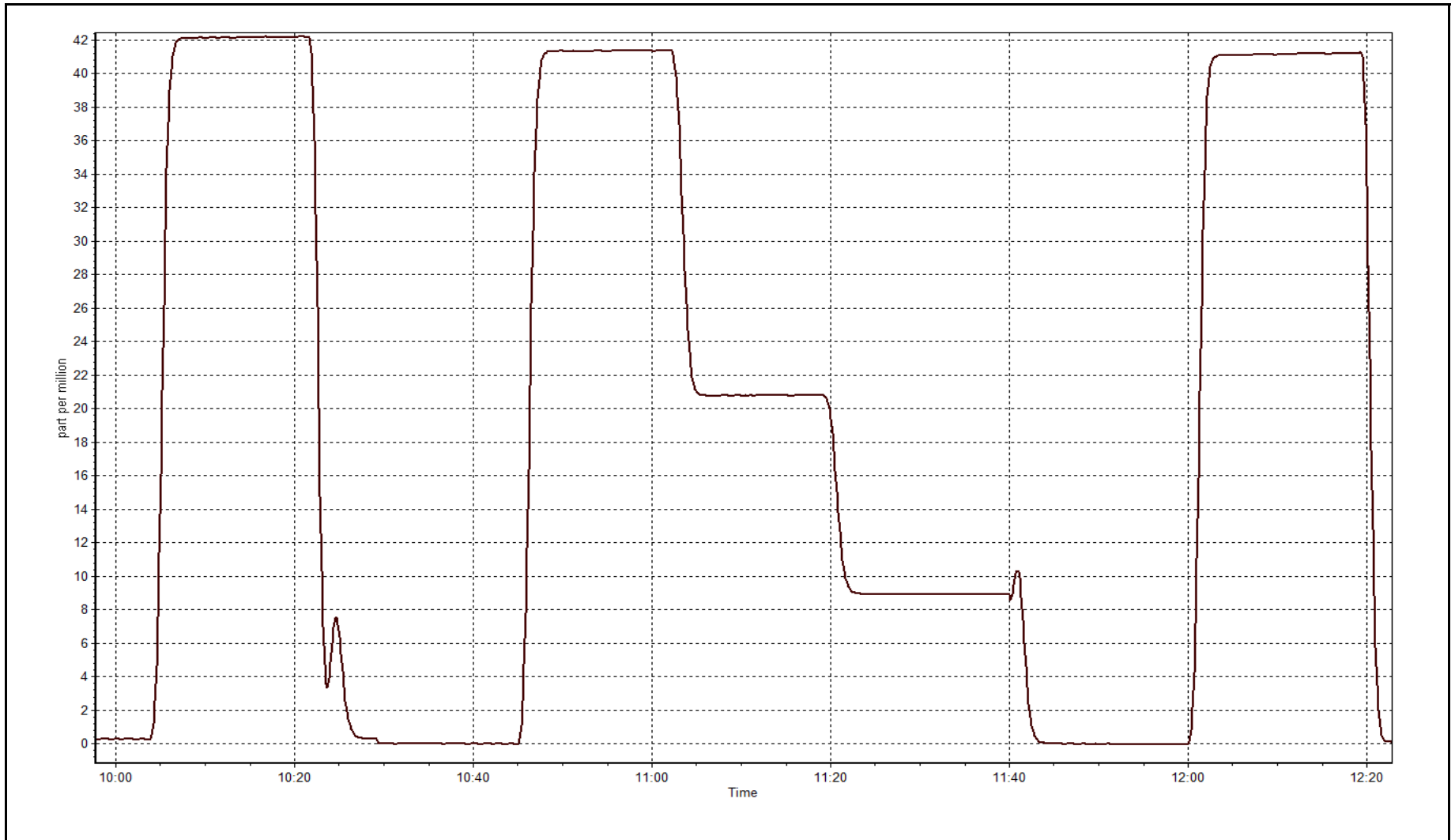
Calibration Data

| Calculated concentration (ppm) (Cc) | Indicated concentration (ppm) (Ic) | Correction factor (Cc/Ic) | Statistical Evaluation | |
|-------------------------------------|------------------------------------|---------------------------|-------------------------|----------|
| 0.0 | 0.0 | ---- | Correlation Coefficient | 0.999991 |
| 41.4 | 41.3 | 1.0015 | | |
| 20.9 | 20.8 | 1.0067 | Slope | 1.000861 |
| 9.0 | 8.9 | 1.0111 | | |
| | | | Intercept | 0.062058 |



CO Calibration Plot

Date: July 7, 2016





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